REMEDIATION AS REVIVAL

TRANSFORMING THE ENVIRONMENTAL SCARS OF THE RUST BELT INTO SUSTAINABLE, THRIVING SPACES

A Thesis

Submitted to the

Faculty of Miami University

In partial fulfillment of

The requirements for the degree of

Master of Architecture

Department of Architecture and Interior Design

By

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Oxford, OH

2025

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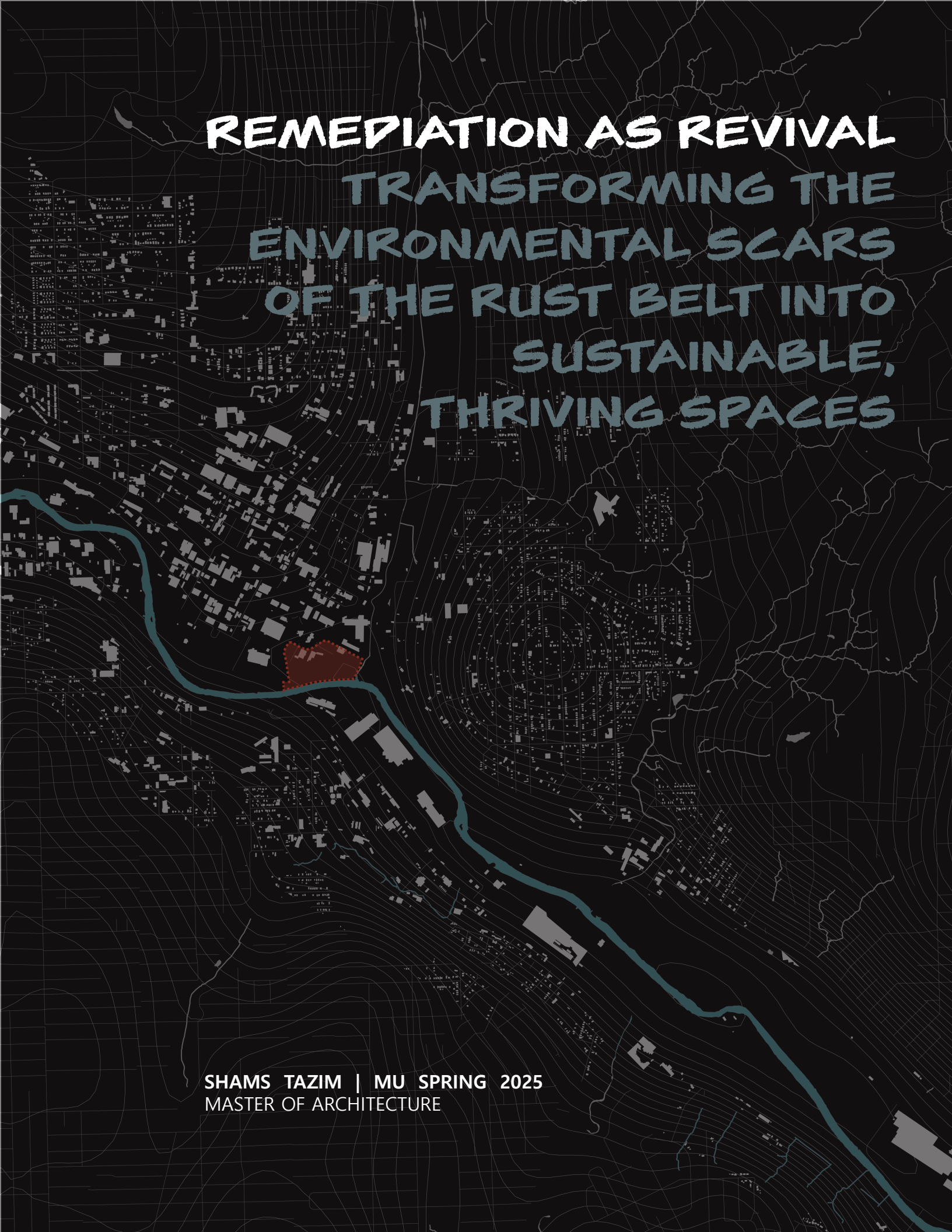
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SHAMS TAZIM | MU SPRING 2025
MASTER OF ARCHITECTURE

"THE SUN NEVER KNEW HOW GREAT IT WAS UNTIL IT HIT THE SIDE OF A BUILDING."

-Louis I Khan

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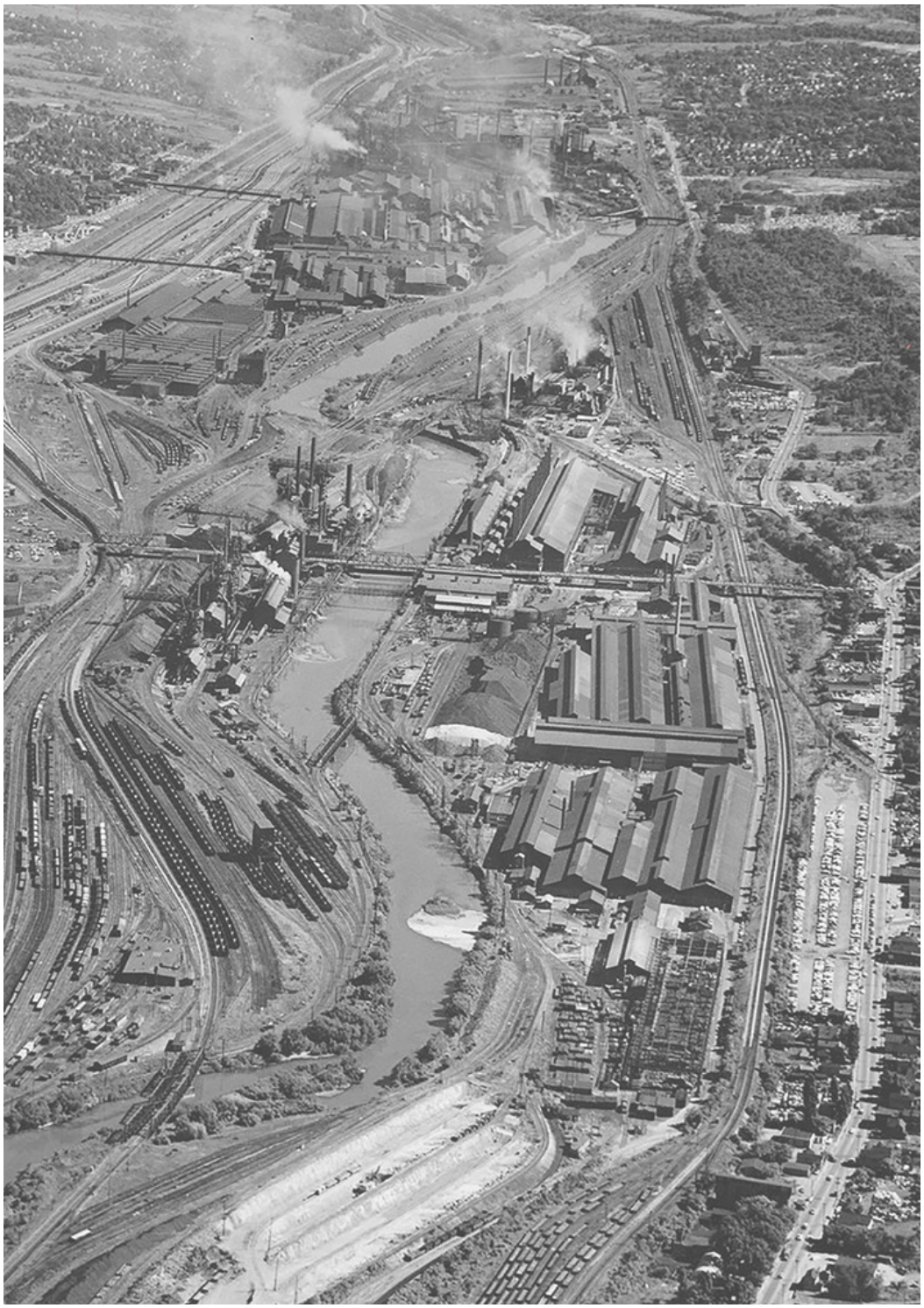


Image 1: *Republic Steel plant along the Mahoning River in Youngstown, Ohio. Courtesy of Youngstown, Ohio, Steel Valley Artifacts*

Abstract

Urban decay in American cities, particularly within the Rust Belt region, represents a significant challenge, characterized by abandoned buildings, deteriorating infrastructure, and widespread depopulation. Decaying industrial buildings, often ecologically contaminated and massive in scale, present unique difficulties for traditional renovation efforts. These issues have profound implications for society and the field of architecture as they directly impact public health, environmental sustainability, and economic stability. Without strategic and effective intervention, such conditions perpetuate cycles of disinvestment, increase crime rates, and exacerbate social inequality. This ultimately diminishes quality of life and hinders the potential for community development.

This design intervention focuses on the Mahoning River in Youngstown, Ohio, a city emblematic of industrial decline. Over decades, abandoned industrial sites have severely polluted the river, relegating it to a neglected state and severing its connection to the community. However, Youngstown has recently turned its attention toward restoring the river, seeking to bring back its lost flora and fauna and redefine it as the city's focal point, a "front yard" that unites people rather than a "backyard" they overlook.

The intervention approaches the grandeur of abandoned industrial spaces and the Mahoning River not as insurmountable challenges but as unique opportunities for architectural innovation and sustainable reuse. By retrofitting industrial structures with contemporary vernacular elements, the design aims to recondition both the past and future of these spaces while preserving the region's rich cultural heritage. The proposal aligns with broader objectives of sustainability, economic resilience, and social equity, ensuring that development benefits the community holistically.

Central to the proposal is the preservation and adaptive reuse of existing infrastructure. This reduces carbon emissions and transforms decaying industrial buildings into spaces for housing, healthcare services, public transportation, coworking hubs, and community-oriented facilities. These interventions address the housing crisis, generate employment opportunities, and stimulate the local economy, breathing new life into previously neglected areas.

The vision for Youngstown integrates sustainable design strategies along the Mahoning River, creating a walkable city enhanced by multi-modal transportation hubs, recreational opportunities, and innovative spaces for education and healthcare. This comprehensive, multi-faceted approach transforms the river into a symbol of the city's resilience and cultural identity, positioning it as a catalyst for economic growth and community revitalization.

Ultimately, this design intervention presents a forward-thinking model for cities in the Rust Belt and beyond, demonstrating how architecture can be a powerful tool in addressing urban decay and building a sustainable, equitable future.

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ACKNOWLEDGEMENTS

The reason for choosing Miami University for my graduate studies was because of its vibrant community and the opportunity to grow alongside incredible mentors and peers. Over these past years, I have been fortunate to receive unwavering support, guidance, and encouragement from so many.

First and foremost, I extend my deepest gratitude to my parents and my elder brother, Tahsin. Your unwavering love, sacrifices, and belief in me have been the foundation of my strength. I am endlessly thankful to Saida, without her tireless care and presence, this would not have been possible. To my dear friends and extended family, your support, kind words, and companionship through both hardship and joy have added meaning to this journey. You made it not only possible but beautiful.

To my professors and mentors at Miami University, I owe a debt of gratitude.

Mary Ben Bonham, my thesis chair, for your exceptional guidance, patience, and unwavering belief in my work. Your insights have been instrumental in shaping my research and design. Jeff Kruth, for your invaluable advice and mentorship, helping me refine my ideas and vision. Craig Hinrichs, for your encouragement and guidance in professional practice and beyond. To all the faculty in the Department of Architecture, who have inspired me to think critically, creatively, and ambitiously.

To my incredible cohort, my academic family: Andrew, Jose, Chloe, Razvan, Saif, Tasnia, and Joynal, thank you for the camaraderie, late-night brainstorming sessions, and shared experiences that made this journey unforgettable.

Lastly, to everyone who supported me in ways big and small, your kindness and encouragement have left an indelible mark on my life. This accomplishment is as much yours as it is mine.

FOREWORD

Our cities tell stories, not just of their successes, but also of their struggles and transformations. The Rust Belt is a powerful example of this. Once the backbone of America's industrial growth, this region now faces challenges like urban decay, abandoned buildings, polluted rivers, and shrinking populations. Yet, I believe these challenges also present opportunities for transformation. With the right interventions, these environmental and urban scars can be reimagined as sustainable and thriving spaces that benefit both the community and the environment.

This thesis, "Transforming the Environmental Scars of the Rust Belt into Sustainable, Thriving Spaces," focuses on Youngstown, Ohio, and the Mahoning River. Youngstown serves as a microcosm of the broader issues facing post-industrial cities, offering unique insights into the complex interplay of history, environment, and community needs. The Mahoning River, once an integral part of the city's industrial identity, became a symbol of decline as pollution and neglect turned it into a forgotten and inaccessible space. Today, however, there is hope, Youngstown is working to restore the river and its surroundings, transforming it into a centerpiece of urban revitalization.

In this thesis, I explore how architectural design can play a central role in addressing the challenges of post-industrial decline. By preserving existing structures, we can minimize carbon emissions while breathing new life into abandoned spaces. These structures, when retrofitted for contemporary needs like housing, healthcare, public transportation, and recreational spaces, can become vital assets for the community. My approach integrates sustainability, economic resilience, and social equity, demonstrating how architecture can bridge the past and future to create spaces that are inclusive, functional, and meaningful.

Growing up in Bangladesh, I witnessed firsthand the impacts of industrialization and urban challenges. These experiences instilled in me a deep interest in the relationship between the built environment and the well-being of people and communities. Moving to the United States and studying in the Rust Belt further shaped my understanding of how urban spaces can evolve to meet changing needs. Through this thesis, I sought to combine my personal experiences with academic research and creative exploration to propose a design that not only addresses current challenges but also creates a hopeful vision for the future.

I believe this work is more than just a design proposal—it is a call to action. It challenges us to view forgotten spaces not as liabilities but as opportunities. It invites us to consider how architecture, when thoughtfully applied, can heal the scars of the past and pave the way for a more sustainable and equitable future.

I hope this thesis inspires others to see the potential in overlooked places and to recognize the power of architecture to make meaningful change. Cities like Youngstown can become models of resilience and renewal, showing us how to honor history while creating spaces that benefit future generations.





Image 2: *Republic Steel plant along the Mahoning River in Youngstown, Ohio. Photo credit goes to Amelia Williams.*

CHAPTER ONE
THE RUST BELT

The Rust Belt, once the industrial backbone of the United States, now symbolizes the complex legacy of industrial decline and urban decay. Once-vibrant cities like Youngstown, Ohio, thrived on industries such as steel and manufacturing, shaping their cultural and economic identities. However, the deindustrialization of the mid-20th century led to widespread job losses, population decline, and the abandonment of industrial infrastructure. Today, these cities face challenges including environmental contamination, deteriorating infrastructure, and socio-economic instability. These issues are deeply

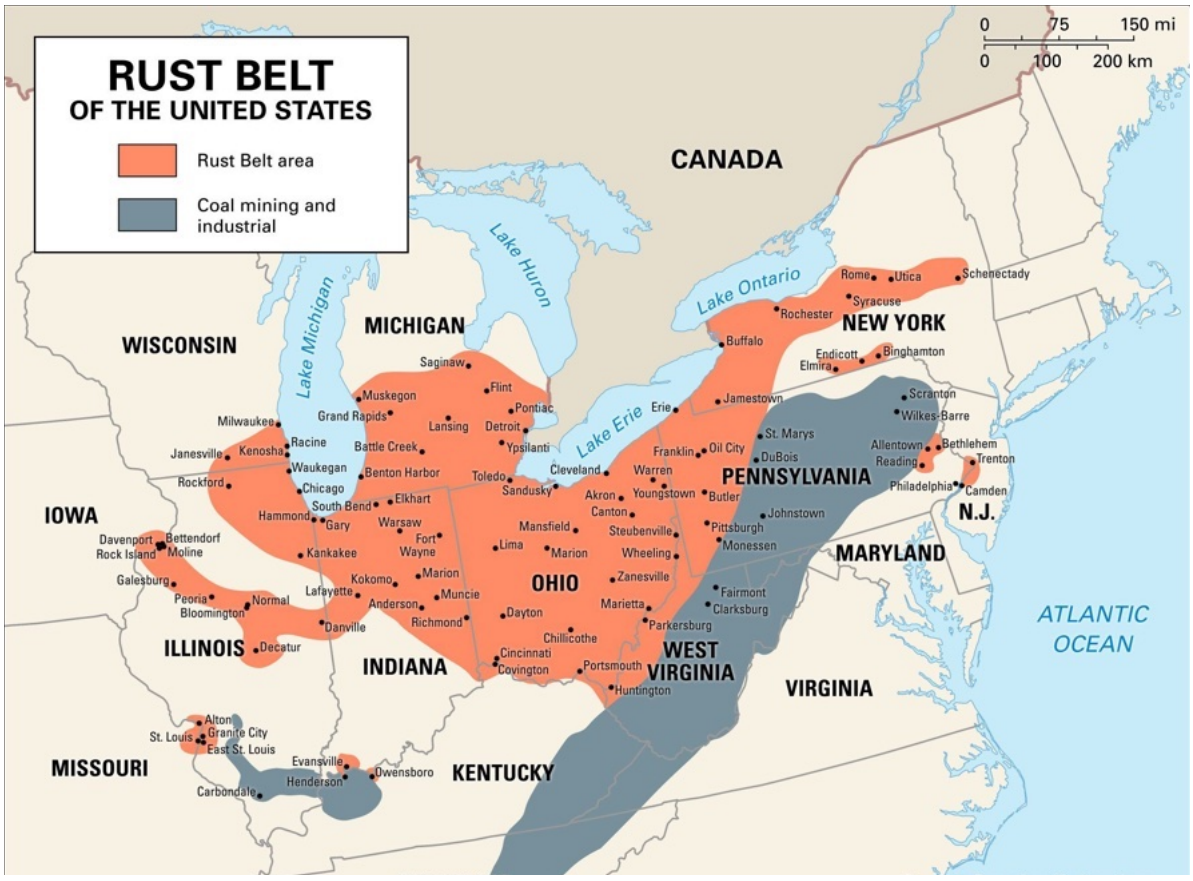


Image 3: *Map of Rust Belt cities accross the U.S. Courtesy of Brendan H. Jennings, Historian (2010)*

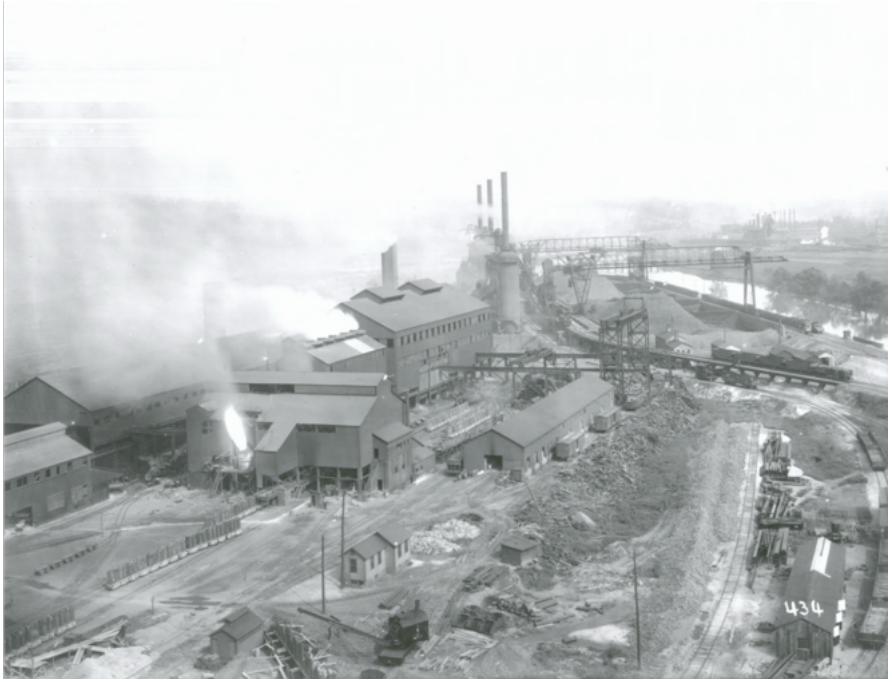


Image 4:
Youngstown Sheet and Tube Company, 1937. Courtesy of Youngstown, Ohio, Steel Valley Artifacts

intertwined, affecting public health, environmental sustainability, and economic growth.

Youngstown, often cited as a case study in post-industrial decline, highlights the pressing need for innovative approaches to urban revitalization. Its once-thriving Mahoning River corridor, a critical lifeline for the city's steel industry, now stands as a symbol of decay. Polluted by decades of industrial waste, the river remains underutilized, disconnected from the community, and burdened by its environmental scars. Yet, it also offers a unique opportunity for transformation.

This thesis explores the potential for architecture and urban design to address the lasting impacts of industrial decline while fostering environmental restoration, economic resilience, and social equity. By focusing on Youngstown and the Mahoning River, the research investigates how abandoned industrial spaces and polluted riverfronts can be reimagined as sustainable, thriving community assets.

The design proposal draws from interdisciplinary perspectives, combining theories of adaptive reuse, ecological remediation, and incremental urbanism. The aim is to create a replicable model for other Rust Belt cities by leveraging the unique characteristics of these post-industrial landscapes. By addressing the challenges of pollution, disinvestment, and social inequality, this thesis seeks to demonstrate how thoughtful design can serve as a catalyst for renewal, fostering a brighter future for Youngstown and similar communities.

This document outlines the research, analysis, and design strategies developed throughout this process, presenting a vision for how Youngstown can honor its industrial legacy while embracing a sustainable, inclusive future.



Image 5: *Locals remember September 19, 1977 'Black Monday' as the start of Youngstown's decline. Courtesy of Youngstown, Ohio, Steel Valley Artifacts*

WHAT HAPPENED IN 1977

Youngstown, Ohio, is a quintessential Rust Belt city that has experienced dramatic transformations over the past century. At its peak in the mid-20th century, the city was a bustling hub of steel production, contributing significantly to the industrial growth of the United States. The Mahoning River, which runs through the heart of Youngstown, played a vital role in this development, serving as a key resource for the steel mills and factories that lined its banks.

However, the decline of the steel industry, marked by the closure of major plants like the Campbell Works in 1977, brought devastating consequences to the city and its people.

The effects of deindustrialization were immediate and severe. The population of Youngstown plummeted by nearly 60% as jobs vanished, businesses closed, and families left in search of better opportunities. The city's infrastructure and housing stock, once vibrant and full of life, fell into disrepair. Many neighborhoods

became plagued by vacant lots, abandoned buildings, and urban blight. The Mahoning River, a symbol of the city's industrial might, was left polluted with toxic waste from decades of steel production, rendering it hazardous to both the environment and public health.

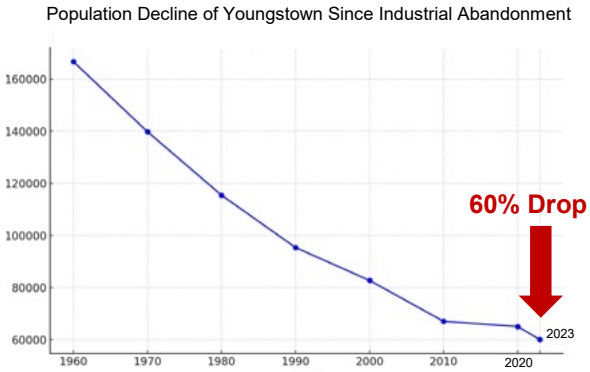


Image 6: *Chart showing the population decline of Youngstown, Ohio. Source: CYN Youngstown.*

Today, Youngstown faces a combination of social, economic, and environmental challenges that are deeply interconnected. The city struggles to attract and retain young talent due to a lack of modern amenities, affordable housing, and economic opportunities. The remnants of its industrial past, while significant as cultural and historical landmarks, also pose environmental risks and limit land use. The Mahoning River, in particular, stands as both a physical and symbolic barrier to the city's redevelopment.

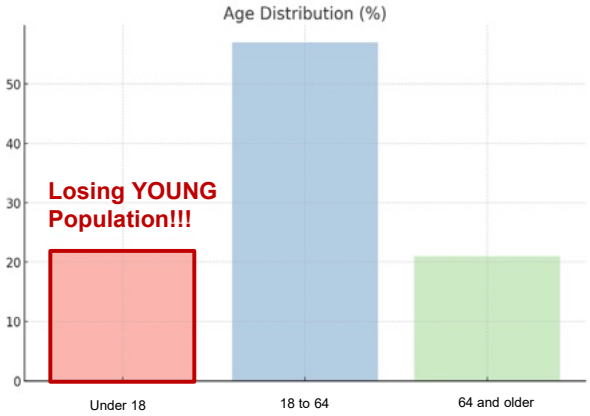


Image 7: *Graphs show Age distribution currently residing at Youngstown. Source: CYN Youngstown.*

Despite these challenges, Youngstown possesses unique opportunities for revitalization. The city's central location within the Rust Belt, its rich industrial heritage, and its commitment to addressing environmental issues make it a promising candidate for innovative urban interventions. Efforts to restore the Mahoning River have already begun, with initiatives like dam removal and dredging aimed at improving water quality and ecological health. Additionally, Youngstown's designation of industrial zones with sustainable practices points to a growing recognition of the need for environmentally conscious redevelopment.

This context sets the stage for a bold reimagining of Youngstown's future. By transforming its environmental scars into assets, the city can turn challenges into opportunities. This thesis explores how architecture and urban design can play a transformative role in this process, creating spaces that balance the preservation of history with the demands of modern sustainability and community well-being. The Mahoning River, once a lifeline for industry, has the potential to become a catalyst for renewal, reconnecting the city's people, heritage, and environment.

YOUNGSTOWN TODAY

The Mahoning River and its surroundings were integral to Youngstown's industrial prosperity, with steel mills and manufacturing plants lining its banks. These industries shaped the city's identity and provided thousands of jobs, making Youngstown a crucial hub in the American Rust Belt. However, the collapse of the steel industry in the mid-20th century marked the beginning of a sharp economic decline. As industries shut down, the sites they once occupied were abandoned, leaving behind extensive environmental contamination and structural decay. The Mahoning River, which had supported industrial operations, became polluted with toxic waste, including heavy metals like lead, zinc, and cadmium, turning it from an asset into a liability.

In recent decades, efforts to restore the Mahoning River have gained momentum, with a key focus on removing obsolete dams and addressing pollution. Many of the dams along the river were constructed during the industrial era to support manufacturing processes. While these dams once played a vital role in industrial operations, they are now largely redundant. Instead, they pose significant environmental challenges, including trapping toxic sediments, disrupting natural water flow, and hindering the river's ecological recovery. These stagnant water bodies create conditions that degrade water quality, harm aquatic ecosystems, and prevent the river from supporting recreational and community uses.

Removing these dams is a critical step in revitalizing the Mahoning River. Dam removal

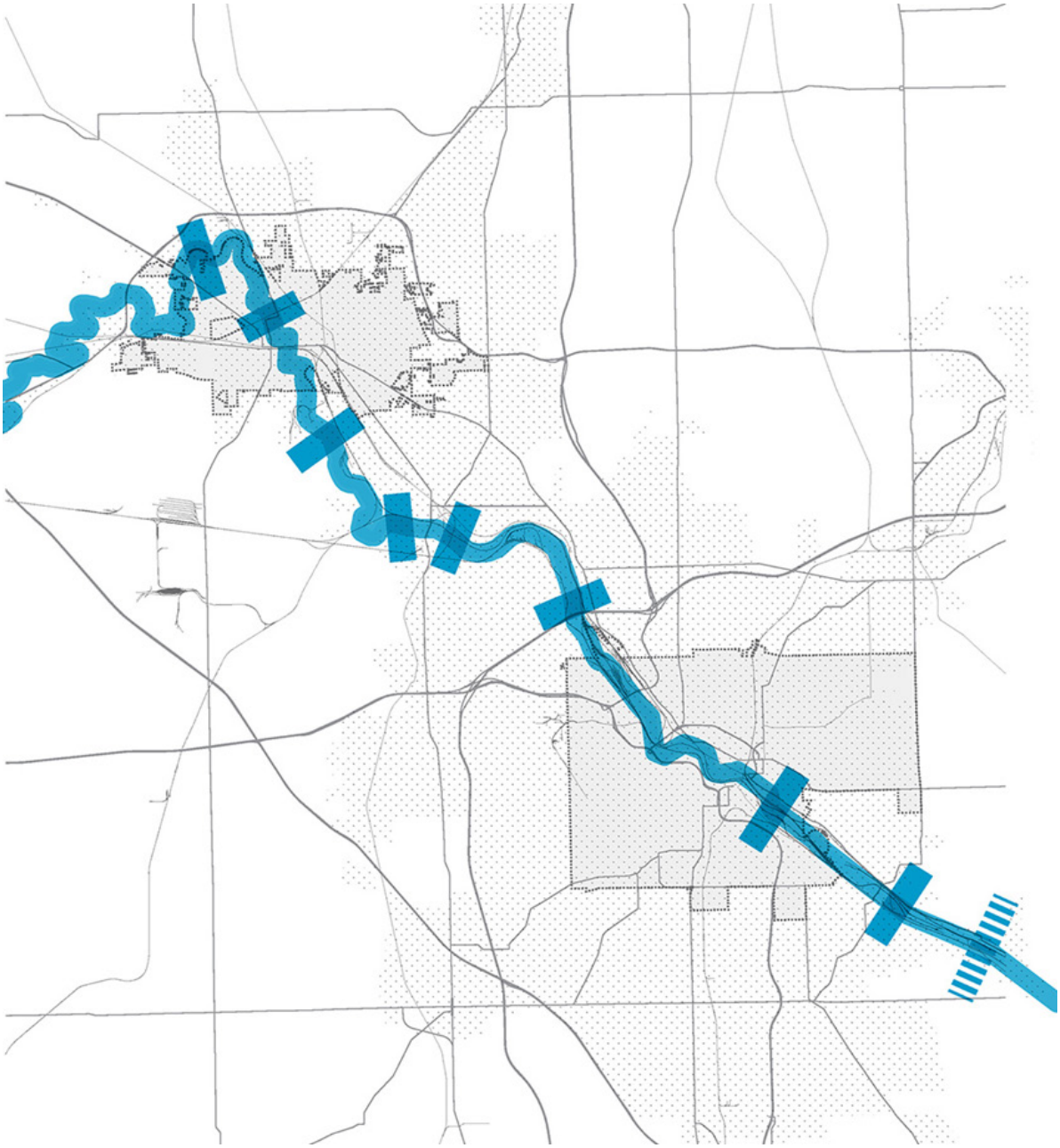


Image 8: *Location of dams along the Mahoning River. (Warren to the north, Youngstown to the south; Lowellville indicated by the dashed mark in the far southeast). Credit: In the Mahoning Valley editorial team.*

improves water flow, which helps to flush out accumulated pollutants, oxygenate the water, and restore aquatic habitats. It also reduces the risk of flooding by allowing the river to flow more naturally during heavy rainfall. For communities like Youngstown, this process transforms the river from a contaminated obstacle into a revitalized resource that can support recreation, tourism, and ecological diversity.

Youngstown is gradually addressing these challenges with forward-thinking strategies. The removal of low-use or high-hazard dams is part of a broader effort to restore the river's ecological health and reconnect it with the community. Environmental groups, local governments, and stakeholders are collaborating to dredge polluted sediments, plant native vegetation, and create accessible riverfront spaces.



Image 9: *The Mahoning River as Urban Reinvention. Source: YNNews*

These initiatives not only improve the environmental conditions of the river but also open up opportunities for urban development, including parks, walking trails, and recreational facilities.

The city has also begun to align its zoning and development plans with sustainable practices. For example, areas along the river are being designated as "Industrial Green Zones," focusing on renewable energy, green building, and pollution reduction. This reflects a shift in Youngstown's approach, balancing its industrial heritage with modern environmental goals.

As Youngstown grapples with the legacies of industrial decline, the restoration of the Mahoning River represents a transformative opportunity. By removing dams and addressing environmental damage, the city can turn the river into a focal point for community engagement, economic growth, and environmental sustainability. This effort not only restores the river's ecological functions but also redefines it as a vital asset for Youngstown's future.

CHAPTER TWO
LEARNING FROM WHAT WORKS

Youngstown's relationship with the Mahoning River presents a compelling opportunity to reframe the river as a catalyst for urban revitalization. Historically central to the city's industrial prosperity, the Mahoning River has since become a symbol of neglect and environmental degradation. However, its potential to serve as a transformative community asset is undeniable. Cities like Indianapolis and San Antonio have demonstrated how waterways can become vibrant public spaces that anchor communities, foster economic development, and enhance quality of life. The Indianapolis Cultural Trail, for example, seamlessly integrates green infrastructure with pedestrian and cycling pathways, promoting connectivity and recreation. Similarly, the San Antonio River Walk revitalized the city's downtown core, turning the river into a hub of tourism, culture, and local pride.



Image 10: *Indianapolis, Cultural Trail. Source: ArcDaily*



Image 11: *San Antonio, River Walk. Source: ArchDaily*

Oxford, though half the size of Youngstown, boasts nearly three times the student population, fostering a vibrant, dynamic community enriched with amenities tailored to meet the needs of its residents. Its infrastructure supports a thriving local economy, with accessible public spaces, affordable housing options, and recreational facilities that attract and retain young talent. This vibrancy contrasts sharply with the challenges faced by Youngstown, which struggles to attract and retain young people due to its lack of essential infrastructure, modern amenities, and inviting public spaces.

Youngstown's limited affordable housing, insufficient recreational opportunities, and inadequate public transportation make it difficult for the city to compete with more progressive urban centers. The absence of these amenities creates a barrier for young professionals and students seeking educational opportunities and a high quality of life. As a result, the city continues to lose its younger population, weakening its workforce and hindering efforts to revitalize its economy and community. Addressing these gaps is essential to reversing this trend, enabling Youngstown to become a more attractive, livable city that appeals to the next generation of residents and fosters long-term sustainability.

Image 12: *Map of Youngstown, Ohio overlayed on the city of Oxfod's boundary. Source: Google Earth*

	Youngstown	Oxford
Surface area	34.60 square miles	17.6 square miles

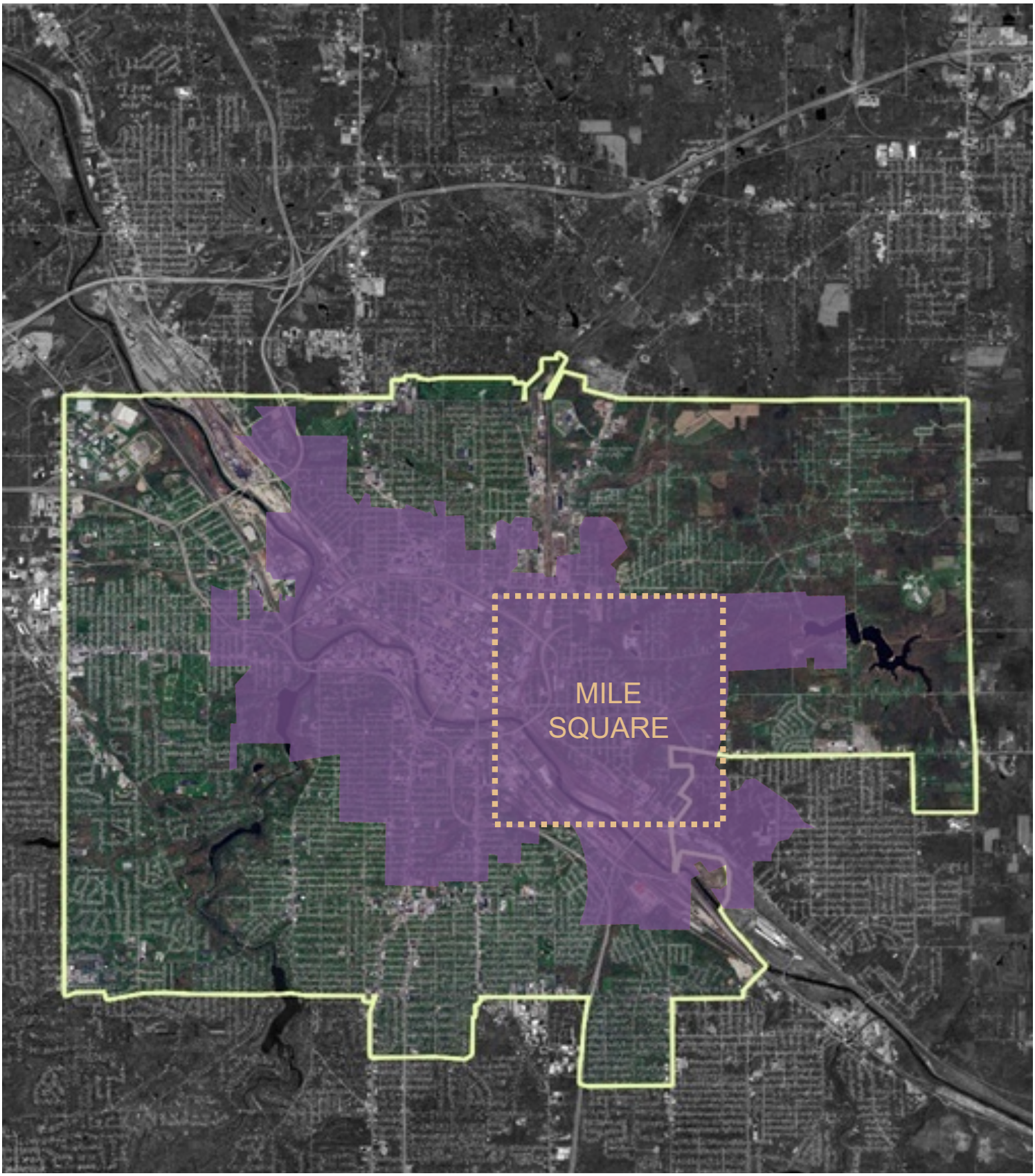




Image 13: *'Rubbish May be Shot Here,' (1937) by Julian Trevelyan. Credit: Tete*



Image 14: *SESC Pompéia Factory in São Paulo. Photo Credit: Mario Beniz*

The aim of my design is not simply to restore the Mahoning River but to reimagine it as the central artery of a revitalized Youngstown. Inspired by Helene Frichot's Dirty Theory, the design embraces the site's "messiness" and history rather than erasing it. This theory values the imperfections and remnants of industrial decay, treating them as elements that enrich a site's narrative. By incorporating features like pollution, waste, and structural relics, the project preserves the site's connection to the community's past while creating spaces relevant to its present. This approach challenges traditional redevelopment norms, fostering a more sustainable and honest relationship with the site's industrial legacy.



Image 15: *SESC Pompéia Factory in São Paulo. Photo Credit: Lisandro Martinez*

Lina Bo Bardi's redesign of the SESC Pompéia Factory in São Paulo exemplifies Dirty Theory by preserving the raw industrial character of the site while integrating contemporary elements. Her approach amplifies imperfections, creating spaces rich in texture and meaning. Inspired by her work, my project prioritizes preserving key site features, using local materials, and designing flexible spaces for community use. This approach transforms the Mahoning River into a sustainable, vibrant centerpiece for Youngstown's renewal while honoring its industrial heritage and supporting future growth.

KEY GOALS

My intervention aims to transform the Mahoning River and its surroundings into a sustainable, thriving, and inclusive community hub that honors Youngstown's industrial past while embracing its future. This transformation seeks to redefine the Mahoning River as a focal point for ecological restoration, economic growth, and community resilience, creating spaces that reconnect people to their environment and heritage. Thus my thesis question states:

"How can ecologically-driven redevelopment strategies transform post-industrial, polluted riverfront sites into sustainable, revenue-generating spaces that address both environmental restoration and economic revitalization, while serving as a replicable model for other Rust Belt cities?"

Balancing preservation with innovation, the intervention aspires to set a replicable precedent for other post-industrial cities, demonstrating how thoughtful design can turn environmental scars into opportunities for renewal and progress.

By conserving much of the existing industrial infrastructure, my design minimizes carbon emissions associated with demolition and new construction. Repurposing these structures for affordable housing, coworking spaces, and healthcare services creates direct community benefits and preserves the area's unique character.

The Mahoning River will serve as Youngstown's new focal point Adding recreational spaces, walkways, and green corridors can transform it from a polluted obstacle into a community hub, encouraging recreation and urban development.

To improve accessibility, my design includes multi-modal transportation options that enhance walkability, bike paths, and efficient public transit. This shift will reduce car reliance, lower the city's carbon footprint, and connect residents with jobs and essential services.

Learning centers, healthcare facilities, and public spaces within the industrial landscape provide essential resources, fostering social cohesion and offering opportunities for education and skill development.



Image 16: *Images representing key goals of my design intervention. Source: ArchDaily*

DISCOURSE:
THEORITICAL PRACTITIONERS

Dennis Rodwell

All historic conservation or intervention focuses on safeguarding buildings that are identified as monuments, symbols of culture and can transmit value and knowledge across generations. Modern conservation principles are the concept of authenticity, emphasizing the preservation of genuine characteristics in all interventions. Dennis Rodwell (2007) in his book 'Conservation and Sustainability in Historic Cities' mentions a few strategic interventions that can be applied to rust belt cities to preserve their rich history.

3 Es' - Economy, Environment, and Equity

In the sustainability dialogue, key environmental concepts for historic cities include prioritizing environmental considerations over motorized vehicles (environmental area), determining traffic volume compatible with environmental conditions (environmental apacity), and preserving natural resources and assets (environmental capital). Concepts like environmental impact and performance assess actions' effects, while environmental responsibility emphasizes preservation obligations. Environmental stakeholders encompass individuals, communities, and societies taking responsibility for environmental well-being.

3rs'- Reduce, Reuse, and Recycle

The three "Rs" to reduce waste in the construction industry are: Reduce: This involves minimizing the consumption of materials and resources during the construction process. It entails using materials more efficiently and opting for designs and practices that require fewer resources overall.

Reuse: Instead of disposing of materials after use, the construction industry can prioritize reuse by salvaging materials from demolished buildings or repurposing materials from previous projects. Reuse helps extend the lifespan of materials and reduces the need for new resources.

Recycle: Recycling involves processing materials that cannot be reused into new products or materials. By implementing recycling programs and utilizing recycled materials in construction projects, the industry can reduce the demand for raw materials and mitigate the environmental impact of waste generation.

Amalgamation of Top-Down and Bottom-Up Approach:

Top-down urban planning often imposes abstract ideas on real-life situations, while inclusive top-down mechanisms can support bottom-up solutions. Bottom-up approaches focus on understanding a historic city's identity and involve working with existing elements to safeguard local distinctiveness.

The synergy between top-down and bottom-up approaches in sustainability involves mutual understanding and skill sharing, empowering citizens and communities to act as environmental stakeholders. This principle seeks to restore the pre-industrial harmony between humanity and its natural environment.

Gensler: Adaptive Reuse- Climate Action Through Design

According to the Article by Bretaña, Anne (2021) adaptive reuse strategies are crucial for achieving climate-friendly development and reducing carbon emissions associated with new construction. By renovating existing buildings and repurposing materials, it can significantly decrease embodied carbon and waste production. Adaptive reuse is not only cost-effective but also attracts incentives and speeds up approval processes.

At different scales, adaptive reuse strategies can be applied to achieve net zero embodied carbon goals:
1. Products: Engage with vendors to re-purpose materials and prioritize locally sourced products.
2. Interiors: Design spaces for disassembly, select low-carbon materials, and prioritize items that are easy to reuse.
3. Buildings: Reposition and retrofit buildings for flexibility and multi-use, assess the building's core and shell for repurposing, and consider upgrades to the building envelope.
4. Cities: Explore new uses that meet community needs, collaborate with municipalities for sustainable urban planning, and consider historical and cultural significance when reusing buildings.

Through adaptive reuse strategies, buildings can be transformed to meet contemporary needs while reducing environmental impact and promoting sustainability.



Image 17:
Field Operations' Philadelphia's Pier 11. Photograph by Daniel Campo, 2011.

Brent D. Ryan: How to Rebuild Shrinking City

Ryan, Brent D. (2012) Suggests for urban design in shrinking cities include moving beyond demolition-based strategies to address the needs of remaining residents and considering alternative approaches. Key strategies for urban renewal in shrinking cities include:
1. Asset-based planning: Leveraging unique characteristics and assets of shrinking cities for innovative policy solutions.
2. Nonreformist reform: Implementing change within existing political and economic constraints while working towards meaningful progress.
3. Comprehensive vision: Moving beyond incremental changes by developing a comprehensive vision for urban revitalization that addresses underlying issues of poverty and isolation.
4. Everyday urbanism: Recognizing and supporting small-scale changes made by individuals within distressed neighborhoods while providing solutions beyond accepting the status quo.
5. Landscape urbanism: Transforming large areas of shrinking cities into mixed landscapes combining natural elements with new developments, promoting economic and social improvement.
6. Localization of expertise: Fostering local expertise and experimentation in post-renewal redevelopment efforts, focusing on modest, vernacular design culture.
7. New Urbanism: Embracing traditional city neighborhood designs with mixed-use spaces but adapting to the extreme conditions of shrinking cities.
8. Projective design: Balancing forward-looking design with social sensitivity to create meaningful architecture that revitalizes disinvested neighborhoods without stigmatization.
9. Patchwork urbanism: Embracing the dynamic and evolving nature of urban fabric in declining cities, influenced by market activity, public policy, and redevelopment efforts.

DISCOURSE: **CASE STUDIES**



Image 18: *The tree plaza demonstrates harmony of a 170-meter-long former power plant with an almost closed canopy of foliage.*

Duisburg Nord Landscape Park:

Peter Latz in his book Rust Red: Duisburg Nord Landscape Park describes that the Landscape Park is located on the former Thyssen plant site and combines industrial heritage with natural beauty.

Consent & Method: The approach to transforming industrial wasteland into the Landscape Park involved assessing existing spaces without focusing solely on aesthetics or current standards. The goal was to identify new uses for the existing structures while preserving their integrity. The strategy aimed to develop new images based on existing structures, mapping out trees, streets, and buildings to understand the site's evolution.

Railway Park: The Railway Park project focused on repurposing the ruins of the production plant into walkways above bunkers rather than demolishing them. The walkways provide views and spaces of art, garden and recreational activities featuring graffiti covered walls. Over 30 bridges were repurposed or built to unite fragmented sections of the park to facilitate connectivity.

Walls: The walls in the park, originally serving industrial functions, were repurposed, and integrated into the park's design to preserve the unique qualities of each space and prevent them from blending. They were strategically repositioned, reconstructed, and planted with vegetation to create openings and transitions, improving accessibility and coherence throughout the park. Quality, and considering environmental factors like pH levels and potential contamination to ensure the restoration efforts were environmentally sound.

Pathways: The promenades are vital for social interaction and neighborhood connectivity, but motorways limited pedestrian mobility. Existing underpasses were improved instead of building new bridges, benefiting pedestrians, cyclists, and drivers. Centralized entrances, gates, and parking areas were designed to reduce visual clutter. Shuttle systems manage public transportation access, while improved signage encourages longer walks, enhancing the visitor experience.

Water Park: Designing the park was complicated by the absence of clean water, as the Old Emscher had become a polluted sewer. To make the water clean in the Old Emscher, the procedure involved separating surface water and foul water, installing large pipes for wastewater, developing the New Old Emscher watercourse, regulating and treating water Vegetation and Soil

Dislocation of a Habitat:The "Emscher Breach" project involved excavating 100,000 cubic meters of slag benefiting from the high pH value to create a riverbed for the Emscher Stream. The fill material was used to build a viewing mound, preserving existing pioneer species. The Emscher Cooperative's proposal to divert water from the cemetery was impractical, so rainwater collected from rooftops was directed to the New Old Emscher to fill the Clear Water Canal.



Image 19: *Facade showing reuse of gothic elements from demolished Veronese buildings.*

Museo Di Castelvecchio: Restoration, Refurbish, reservation, Adaptive Reuse, Demolition

The Castelvecchio in Verona, constructed between 1354 and 1356, stands as a formidable fortress with its towering presence. Originally built by the Della Scala dynasty. Over time, the castle underwent significant changes, notably during the Napoleonic era when large barracks were erected. Its military significance waned in the early 20th century, leading to a restoration effort between 1924 and 1926 that aimed to recapture Verona's medieval charm (see Olsberg, Nicholas, George Ranalli, Jean Francois Bedard, Sergio Polano, Alba Di Lieto, and Mildred Friedman; 2021).19

Massive In Scale and Marked: Scarpa's use of layering techniques in the Castelvecchio Museum effectively communicates the building's gradual evolution and historical significance. By carefully preserving and integrating elements from different eras, Scarpa creates a narrative that celebrates the building's rich

history while adapting it for contemporary use.
Facade: Repurposed Elements
The facade of the new museum incorporated elements from demolished Veronese buildings, such as Gothic and Renaissance windows, while the interior of the barracks underwent extensive renovation, including the addition of frescoes, coffered ceilings, and decorative elements.

The Porta Del Morbio and The Reggia Wing: The reconstruction of the museum began in 1957 with underground excavations, revealing historical elements like the Porta del Morbio. He connected the Reggia to the Torre del Mastio by a hanging bridge and to the Napoleonic wing by underground passageway of Porta del Morbio. The first phase, from 1957 to 1964, focused on the Reggia wing, showcased by the 1958 exhibition "From Altichiero to Pisanello.

Image 20: *Gallery in Reggia wing (left), Strategic placement of Cangrande Della Scala (right).*





Sala Boggian, Sala Avena, Library, and Northeast Tower: Scarpa envisioned linking the upper floor of the museum and the Sala Avena with the northeast tower through a suspended, covered, and glassed-in passageway. Additionally, Scarpa explored ways to emphasize the historical distance between the fourteenth-century tower and the Napoleonic-era wall.

Scarpa renovated the art library adjacent to the tower. He created an incision between the Napoleonic wall and the tower to bring light into the library reading room. The restoration of the northeast tower, adapted to house offices and a restoration workshop.

Facades and Garden: Scarpa's renovation of the Castelvecchio museum's gallery wing involved preserving the architectural fragments on the courtyard facade while redesigning window divisions in a Mondrian-like style. The central hall features a geometric window as a filter between exterior and interior spaces. The Sacello, a cube adorned with Prun stone mosaic, holds precious objects illuminated by a skylight. The geometric garden, completed before the museum's opening, was personally landscaped by Scarpa (Magann, Eugenia Hope; 2001).

Contamination removed.
1 Round Clarifying Basins
2 Cyan Decontamination Plant
Contaminations encapsulated.
3 Chimney
4 Tar Lake
Contamination secured.
5 Settling Basins
6 Foundry
7 Gas Purifying Plant West
8 Gas Purifying Plant West
Isolated spots of contamination secured.
9 varnish residues Emtermannshof

Landscape Park Duisburg-Nord, which aimed to reflect natural succession processes while addressing soil contamination issues. The park's vegetation strategy incorporated different succession stages and diverse plant communities, creating a multifunctional and emotionally engaging space that balanced natural elements with industrial remnants.

Adaptive Reuse of Buildings: The buildings on the site, once part of the iron production process, now serve diverse purposes. Adaptive reuse strategies were employed to ensure the long-term viability of the buildings, aligning their functions with their structural constraints.

The strategies used for recycling the three buildings are:

1. Ingenhammshof Barn Conversion: Instead of demolishing obsolete outhouses, a new barn was built using a simple steel frame with a pitched roof. The new barn accommodates the required uses in a clearly understandable structure, emphasizing visual axes to the Blast Furnace site and surrounding landscape. The orientation and rhythm of the building were designed to integrate with the existing farm layout.

2. Electromechanical Workshop Transformation: The two-story steel framework structure of the workshop was filled in with brick to restore its original shape. Sensitive clearing was done to re-emerge its clear urban edge. Rainscreen cladding on the south facade restored the building's appearance. Space allocation was determined jointly with users, and areas were defined for training courses, break rooms, and washrooms. Structural restoration was done, including renewing the concrete vaulted ceiling above the ground floor.
rooms, and washrooms. Structural restoration was done, including renewing the concrete vaulted ceiling above the ground floor.

3. Conversion of Staff Buildings at the Sinter Plant: Two single-story brick buildings with flat roofs were repurposed into the Gardeners' Base. The larger building now accommodates training rooms and washrooms, while the smaller one contains management offices. Energy self-sufficiency was achieved through a wood chip boiler and solar panels on the roof. A drying hall was constructed for drying wood chips, a by-product of park maintenance.

This approach minimizes waste and maximizes resource utilization, aligning with principles of minimal intervention and eco-sufficiency.



Image 21: *During the competition phase, there were distinct areas of vegetation and soil that appeared isolated, resembling islands amidst the embankments.*



Image 22: *Section showing envelopment of the new building within the historic structure. Source: ArchDaily*

Domino Sugar Refinery:

The Domino Sugar Refinery, a historic industrial landmark in Brooklyn built in 1884, the Domino Sugar Refinery once stood as the world's largest sugar manufacturing producer.

Design Concept: PAU's design concept focused on seamlessly integrating a new glass building within the existing brick façade, paying homage to the Refinery's industrial heritage while meeting contemporary workspace demands. The design aimed to create a harmonious dialogue between history and modernity, fostering a unique sense of place for users.

Functional Spaces: The revitalized Refinery now boasts 15 stories of office space spanning

approximately 460,000 square feet, complemented by retail areas, communal workspaces, a private club, and event spaces.

This diverse mix of amenities caters to the needs of tenants and the larger community, enhancing the building's vibrancy and utility.

Biophilic Design: PAU incorporated biophilic elements into the project, including a vertical garden populated with native plants by landscape architecture firm Field Operations.

This greenery not only enhances the aesthetic appeal of the space but also promotes employee well-being and environmental sustainability.

Historical Integration: Integral to the project was the preservation and integration of historical artifacts from the original Refinery, such as the iconic chimney and sugar manufacturing machinery. These elements were repurposed as focal points within Domino Park, enriching the site's historical narrative and cultural significance.

Sustainability Initiatives: The project prioritized sustainability, implementing all-electric equipment and a private water reuse system to reduce the building's environmental footprint. By diverting polluted water from city outfalls, the system alleviated strain on municipal infrastructure while promoting responsible resource management.

Impact and Significance: The adaptive reuse of The Refinery at Domino Sugar represents a successful marriage of historic preservation and innovative design, revitalizing a cherished landmark for future generations. By creating a dynamic workspace that respects the site's heritage and fosters community engagement, the project has become a beacon of urban renewal and sustainable development in Brooklyn (see Florian, Maria Cristina; 2023).

CHAPTER THREE
SITE ANALYSIS

Over the past four decades, satellite imagery reveals that nature has slowly begun to reclaim portions of the site, with vegetation creeping back into areas once dominated by industrial infrastructure. Trees, shrubs, and grasses have taken root in some locations, softening the stark appearance of abandoned buildings and concrete wastelands. This natural regrowth offers a glimpse of the site's potential for ecological recovery and its ability to heal over time.

However, the extent of this recovery remains limited and uneven due to persistent soil contamination caused by decades of industrial activity. Heavy metals, oils, and other pollutants have leached into the ground, creating inhospitable conditions for many plant species and disrupting the natural regeneration process. In some areas, vegetation is sparse or completely absent, and the soil remains unstable and unsuitable for sustainable growth. This contamination not only hinders the site's ecological restoration but also poses ongoing risks to water quality, public health, and future land use.

Addressing these environmental challenges is essential to unlocking the full potential of the site, enabling it to transition from a symbol of decay into a thriving, biodiverse landscape that benefits both the community and the environment.

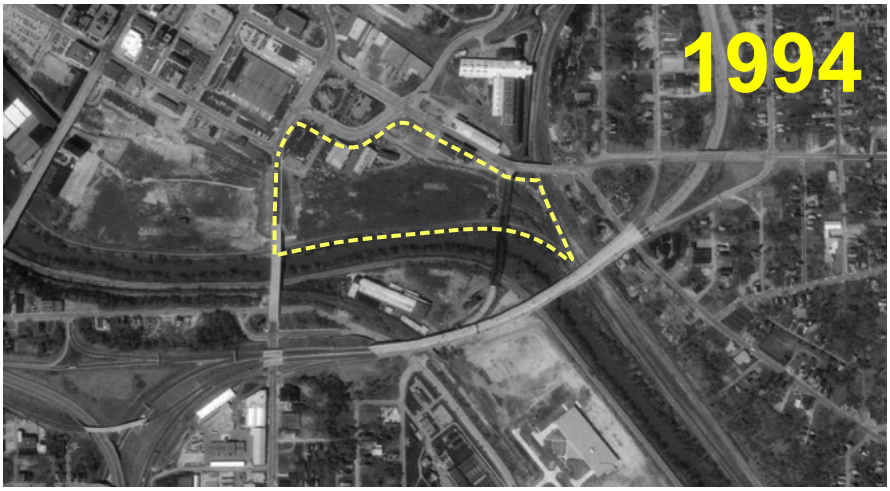








Image 23: *Satellite Images showing Site over last four decades. Source: Google Earth*

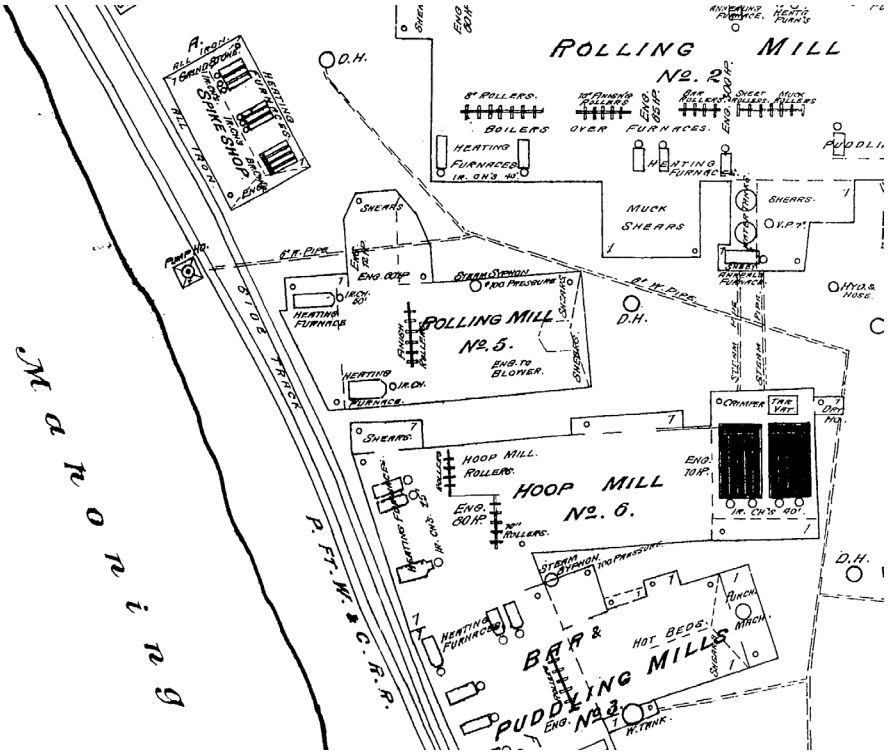


Image 24: *Hand drawn Map of Youngstown, Ohio (1884). Source: The Rust Jungle.*

The first industrial relic was just past where the William Tod Co. / Wean United stood, south of the Market Street bridge. (No traces of the Tod Co. remained.) The Covelli Centre replaced Republic Steel, but the water intake still exists. The same intake is pictured on this postcard and appears on this map dated 1884. Built to last in Youngstown.

Compare the postcard above to the modern photo below. The trees along the riverbank have really bounced back, not just here but all along the river; it was amazing walking through the tree canopy. This resurgence of natural growth highlights the potential for ecological recovery, even in areas with a history of industrial contamination, offering hope for further restoration and revitalization.

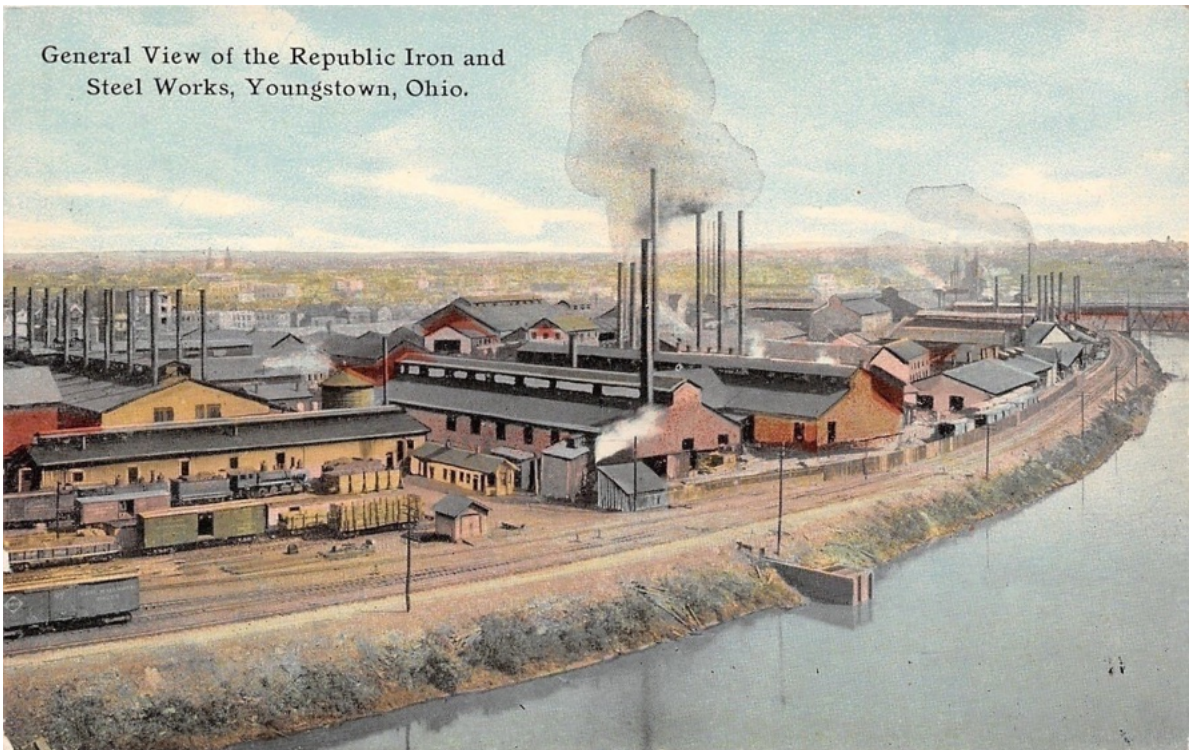


Image 25: *Republic Steel plant along the Mahoning River in Youngstown, Ohio. Photo credit goes to The Rust Jungle.*



Image 26: *Water intake on site along the Mahoning River in Youngstown, Ohio. Photo taken by Author.*

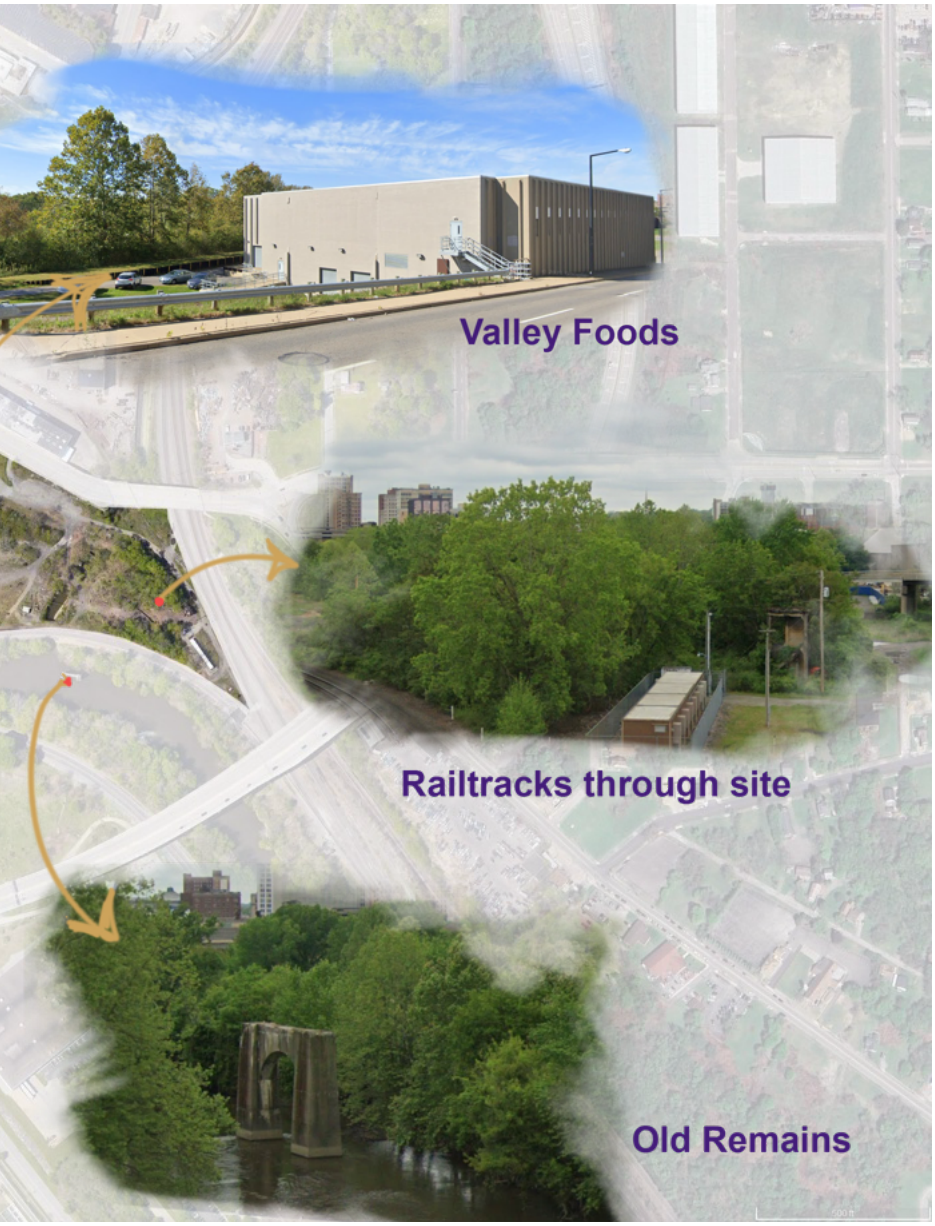


Image 27: *Current active businesses on site. Illustration by author.*






Image 28: *Photos showing activities on site. Collected from various facebook groups.*







The site today hosts multiple active businesses. First, Valley Foods, a family-owned business for 60 years, initially focused on food delivery to schools and senior meal services but now supplies the U.S. National Guard. Next, there's a U.S.P.S. parking lot across the road, supporting the operations of a nearby postal facility. Lastly, Northeast Fabricators, LLC, a heavy steel plate fabricator established in 1870 with 25,000 square feet of space, was sold at auction in 2016 to Derrick McDowell, a local community activist and entrepreneur.

He repurposed these structurally sound buildings into 'The Youngstown Flea Market,' which opens monthly. The next market is scheduled for December 6th through 8th. Due to increasing demand for the flea market and other community events, Derrick often finds it necessary to extend the market into the outdoor space. This adaptability highlights the potential of the site to host diverse activities that bring the community together. These ongoing uses demonstrate the value of preserving industrial structures, showing how they can be successfully reimagined to serve modern needs while fostering economic growth and social engagement.



Image 29: *Photo taken from the Peace Officers Memorial Bridge, marking the western boundary of the site. Photo taken from Google Street View.*



Image 30: *View from U.S. Highway 62, capturing the pier. Photo taken from Google Street View.*



Image 31: *View of the two factory buildings of Northeast Fabricators from East Boardman Street. Photo taken from Google Street View.*



Image 32: *View of Basin Street looking at the back of the Factory Buildings on site. Photo taken from Google Street View.*

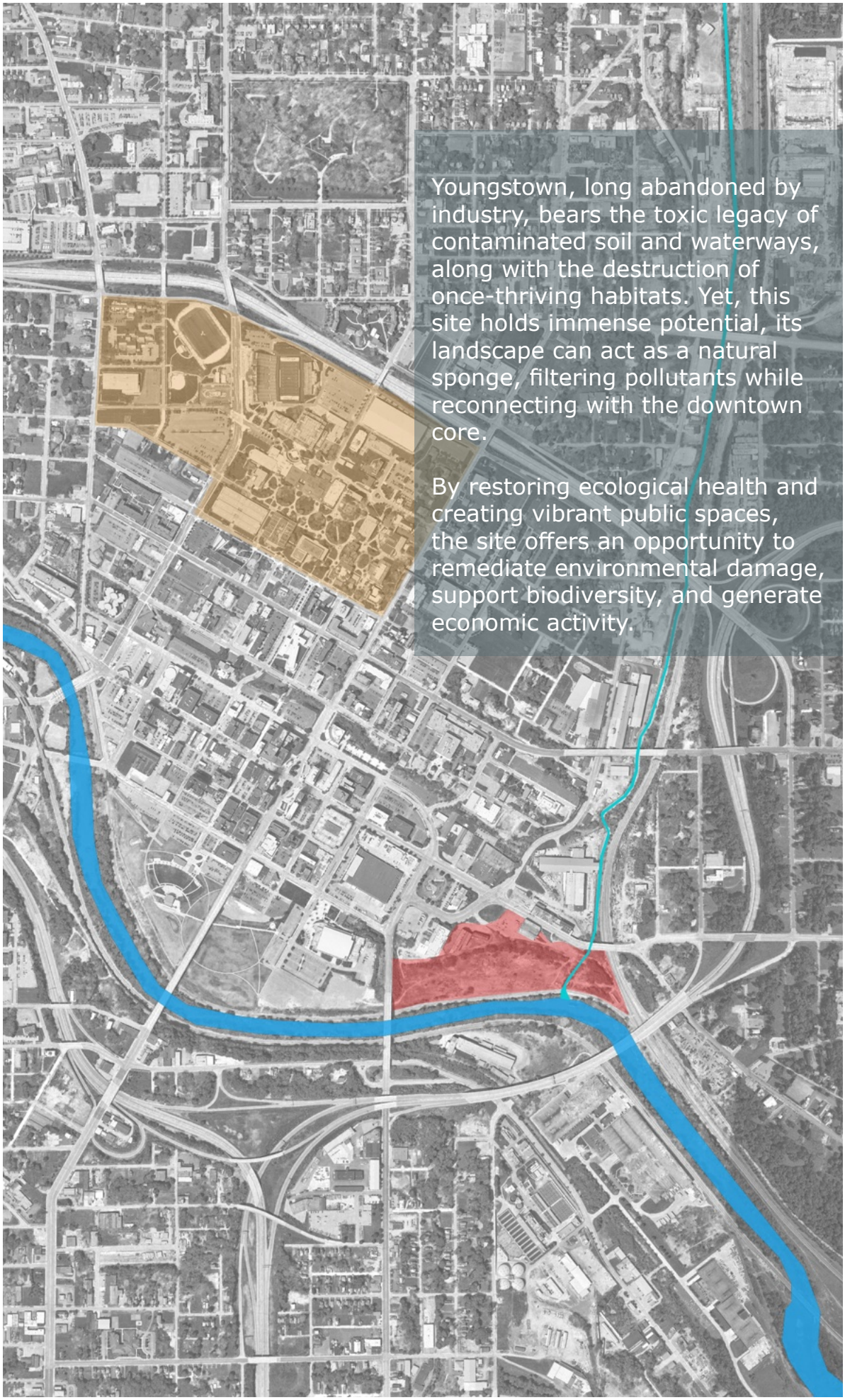


Image 33: *Image showing map of Downtown, Youngstown. Red marked as proposed site and orange as YSU campus.*

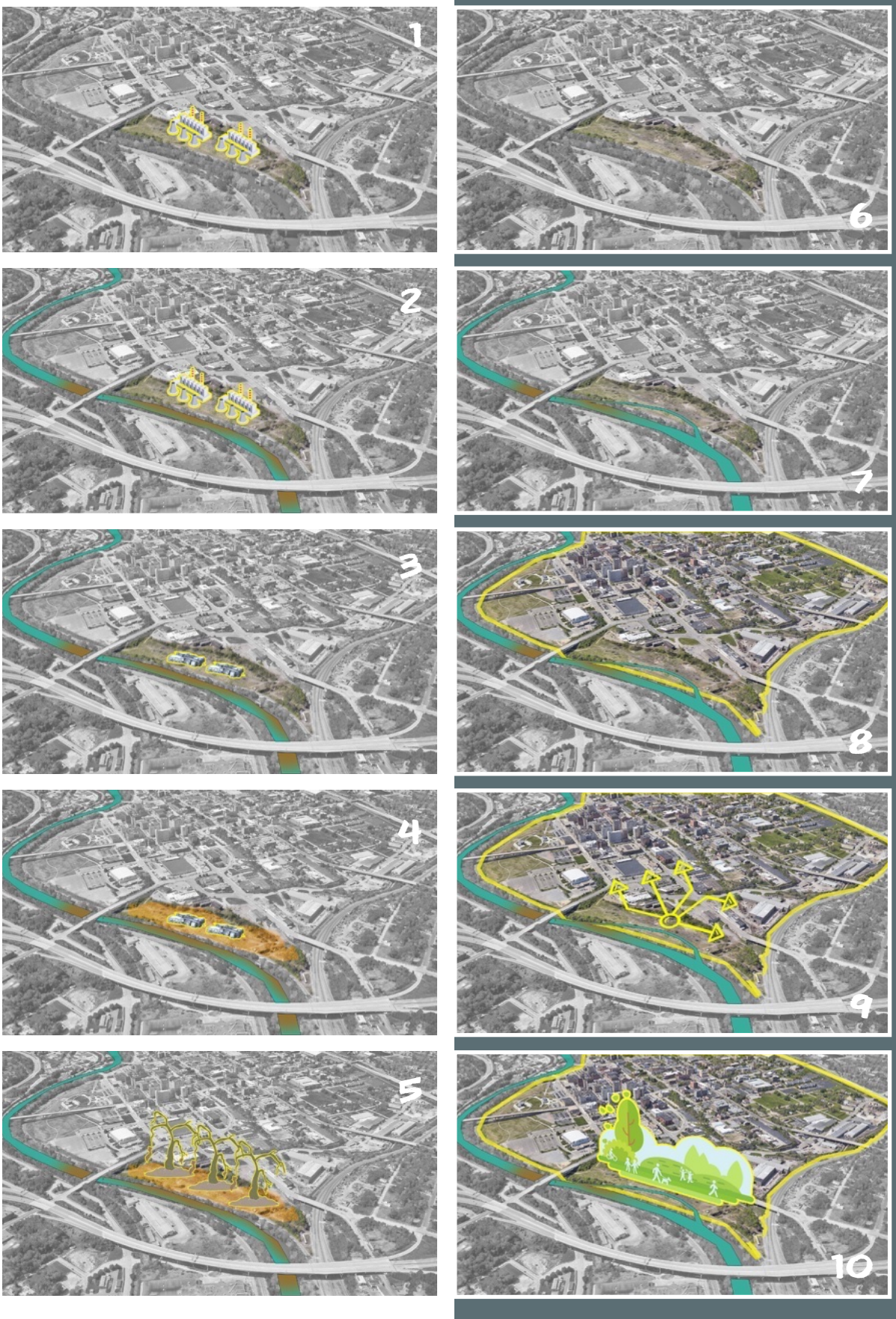


Image 34:
Diagrams 1-5 showing problems at site. Diagrams 6-10 showing possible outcomes of how the site can be rejuvinated. Illustrations by author.



Image 35: *Current access points to the site Illustration by author.*

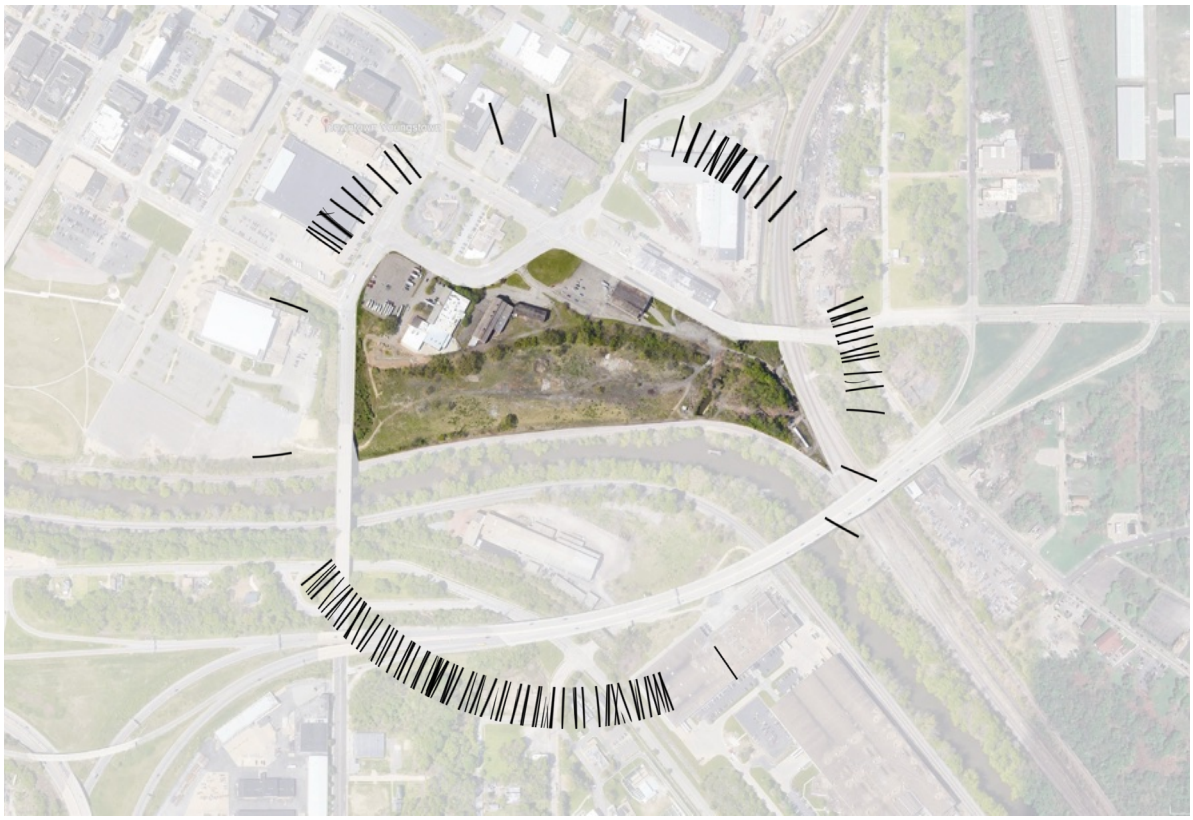


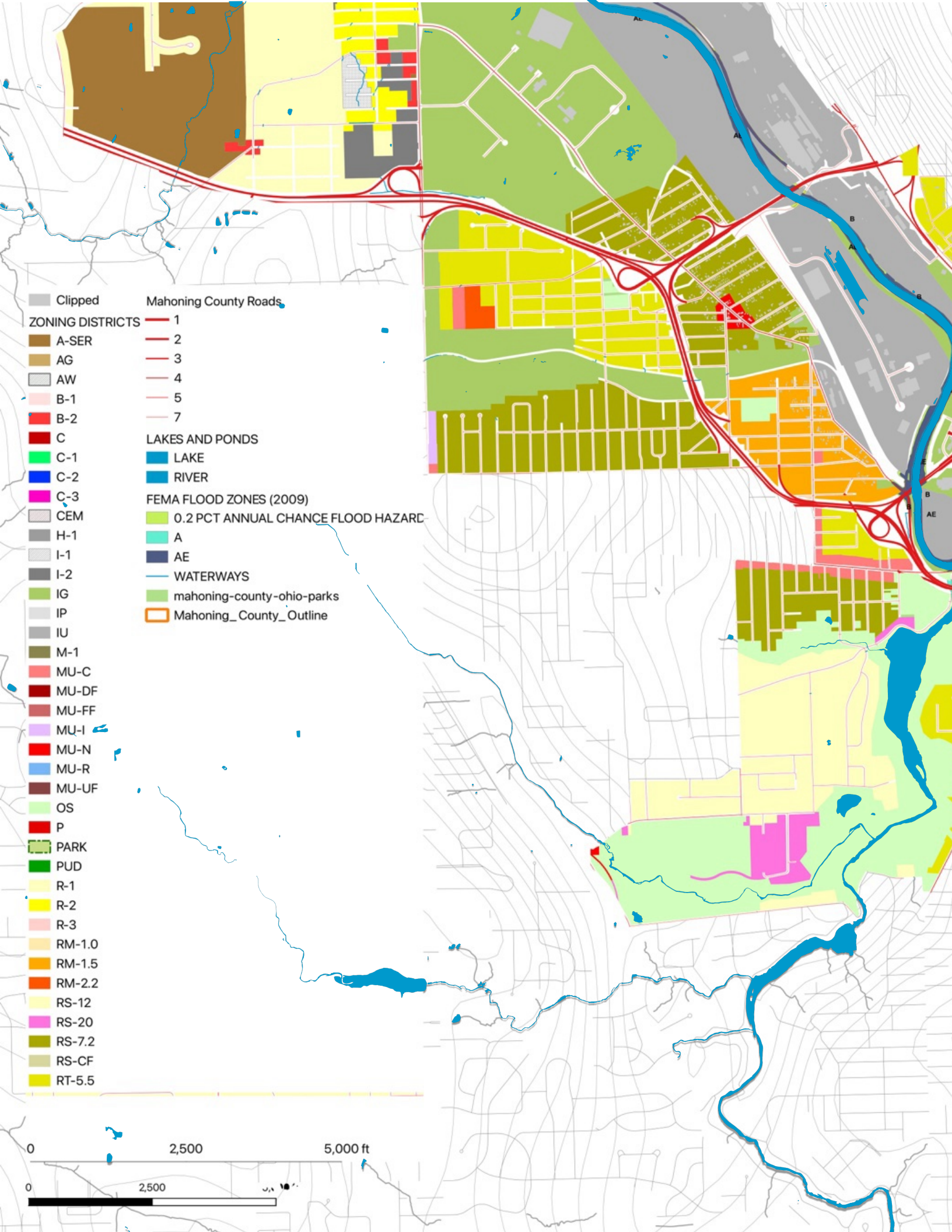
Image 36: *Sensory View diagram showing site is predominantly viewed from above rather than from within. Illustration by author.*

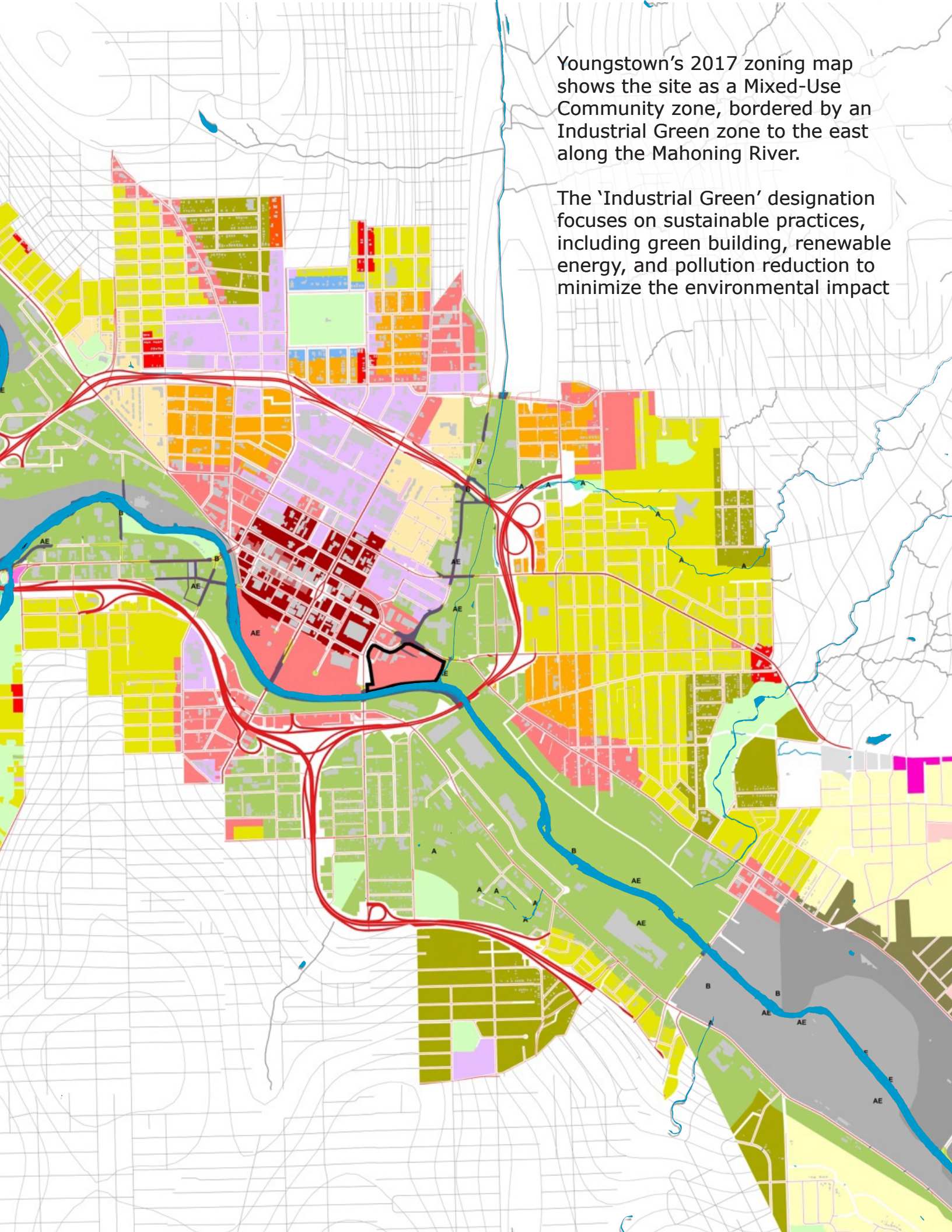


Image 37: *Map showing Human interaction on the site being densest in the northwest region. Illustration by author.*



Image 38: *Map showing noise being more prominent in both the western and northeastern areas. Illustration by author.*


Clipped
ZONING DISTRICTS
A-SER
AG
AW
B-1
B-2
C
C-1
C-2
C-3
CEM
H-1
I-1
I-2
IG
IP
IU
M-1
MU-C
MU-DF
MU-FF
MU-I
MU-N
MU-R
MU-UF
OS
P
PARK
PUD
R-1
R-2
R-3
RM-1.0
RM-1.5
RM-2.2
RS-12
RS-20
RS-7.2
RS-CF
RT-5.5
Mahoning County Roads
1
2
3
4
5
7
LAKES AND PONDS
LAKE
RIVER
FEMA FLOOD ZONES (2009)
0.2 PCT ANNUAL CHANCE FLOOD HAZARD
A
AE
WATERWAYS
mahoning-county-ohio-parks
Mahoning_County_Outline
0
2,500
5,000 ft
0
2,500



Youngstown's 2017 zoning map shows the site as a Mixed-Use Community zone, bordered by an Industrial Green zone to the east along the Mahoning River.

The 'Industrial Green' designation focuses on sustainable practices, including green building, renewable energy, and pollution reduction to minimize the environmental impact



Image 39: *Flooding of Republic Steel Mills along the Mahoning River, Photo from Mahoning Valley Historical Society Archive*

Looking at the 100-year floodplain, we can see that the site experiences some level of flooding where Crab Creek meets the Mahoning River. However, since the significant flood in 1920, five new reservoirs have been created to control flooding.

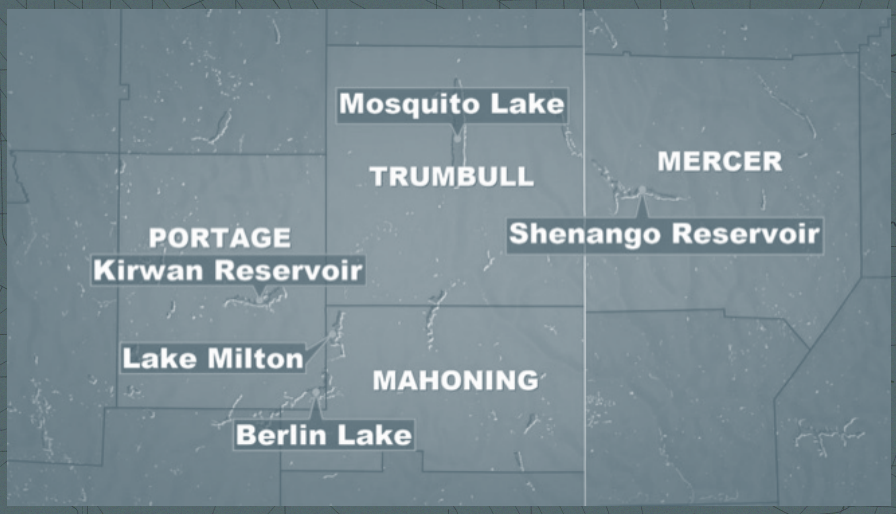
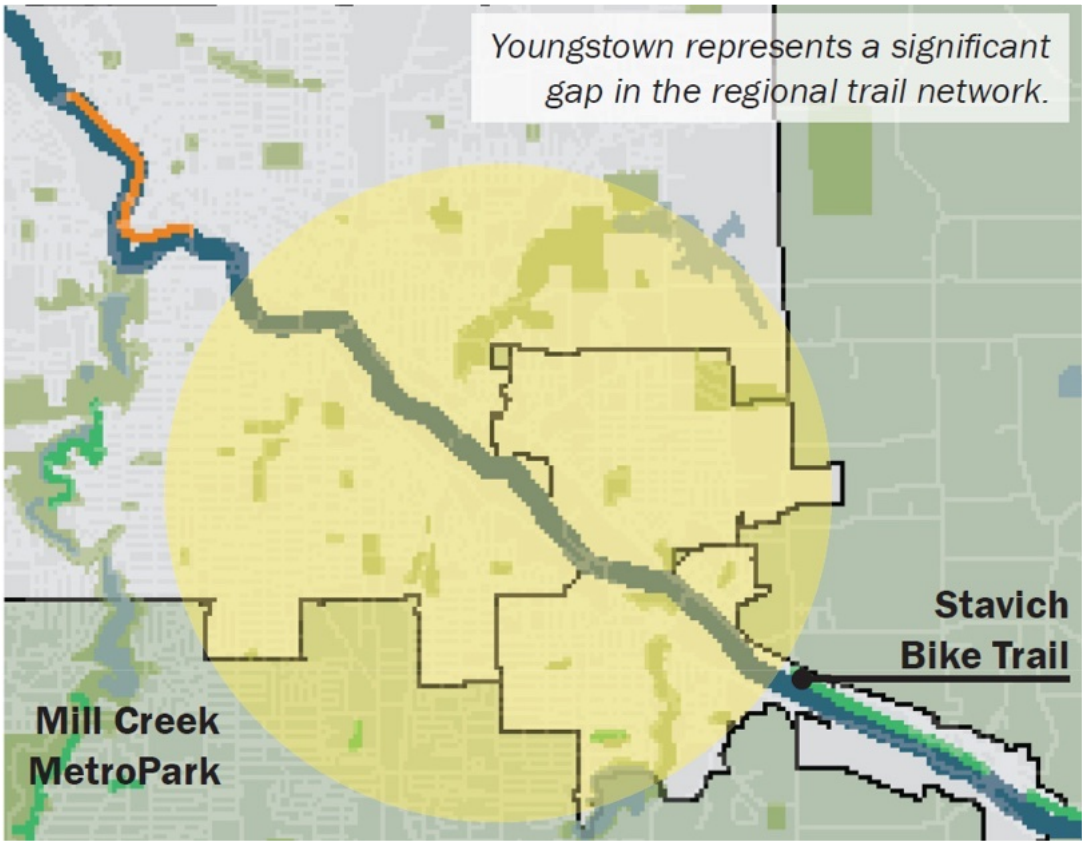


Image 40: *Map showing Reservoirs that help control the water level of the Mahoning River. Photo from Mahoning Valley Historical Society Archive*

In particular, the Milton and Berlin Reservoirs work together to reduce water levels on the Mahoning River by 3 to 5 feet. Today, the Mahoning River experiences little to no change in water levels, even during heavy rainfall. Eventually, when these dams are removed, flooding is unlikely to cause a major issue, having the Crab Creek running through the site.

0 2,500


Crab Creek
Mahoning River



Legend

- Parks/Trails
- Site
- Main Roads
- Water Body
- Proposed Trail

0 2,500



Downtown Youngstown is currently disconnected from existing trail networks, limiting recreational access. My proposal seeks to transform the Mahoning River waterfront into a vital corridor, linking the Mill Creek Trail to the west with the Stavich Trail to the east. This continuous trail network would enhance mobility and open scenic pit stops, boat launches, and natural retreats along the route. By reframing the waterfront as an accessible, vibrant corridor, the project aims to attract both residents and visitors, fostering deeper connections to Youngstown's natural and cultural landscape.

CHAPTER FOUR
DESIGN PROPOSAL

Figuring out the missing links and connecting the trails would also create easier access to several key junctions. Starting with the Lantern Mill on the lower east end, it would link to some abandoned boat launches to the north, then to the Hopewell Theater, Youngstown's oldest banquet hall, additional fishing and boat launch areas, the old walking bridge just before the Mahoning Avenue Dam, and the abandoned brewery that still stands on three facades. It would then connect to the new amphitheater, the Covelli Center, and finally the Flea Market, before continuing downriver to reach the Stavich Trail. This missing link would help reconnect downtown with the rest of Youngstown's important hubs, enhancing mobility, fostering greater community interaction, and supporting sustainable urban development.



















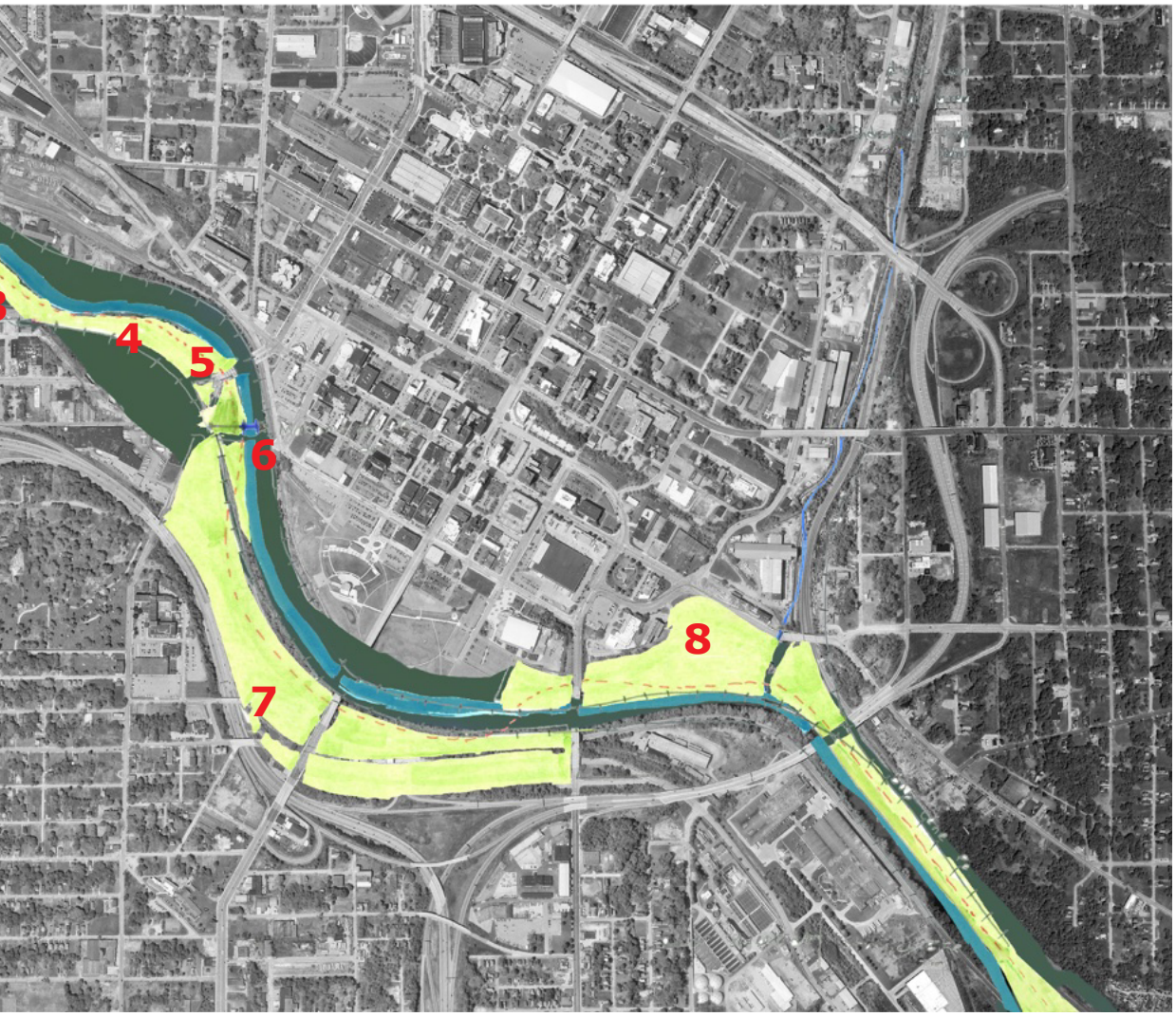


Image 41:
Proposed Masterplan of trails connecting across Downtown, Youngstown. Illustration by author.

Current access to the site is either from East Boardman Street or East Federal Street, with Basin Street Alley providing a key connection between these streets and the rear of the existing buildings on-site. This network of streets, though functional, highlights the need for improved access and integration with surrounding areas to enhance the site's usability. The newly implemented Smart2 shuttle transit, running close to the site, has been a positive addition, facilitating better connectivity between the northern and southern parts of downtown. This transit system has the potential to play a critical role in bridging gaps between key urban zones. However, despite these improvements, the rail tracks running along both sides of the Mahoning River create significant barriers, restricting direct interaction with the water and limiting the site's accessibility and potential for recreational activities. The Mahoning River flows southward, with Crab Creek joining it near the remaining pier by Cedar Steel, an area that could serve as a focal point for future development.

Landmarks close to the site underscore its strategic location within Youngstown's downtown core. Youngstown State University (YSU), a significant hub of education and activity, is a short distance away. Although most YSU buildings are located to the north of downtown, several key facilities are within a 15-minute walking distance from the site, making it an accessible location for students and faculty. Additional nearby landmarks include the Butler Institute of American Art, renowned for its extensive collection and cultural significance; the DoubleTree by Hilton, which stands out as the only hotel within a 5-mile radius and caters to business travelers and visitors alike; and Penguin Brewery, a popular local destination that attracts patrons with its unique offerings. Other notable landmarks include the Youngstown Foundation Amphitheater and the Covelli Center, both of which draw significant crowds for concerts, events, and community gatherings.

These nearby landmarks position the site as a prime candidate for integration into Youngstown's broader cultural and economic framework. Improved access and development could create strong linkages between the site and these key destinations, fostering a more connected and dynamic downtown environment. Additionally, the proximity to educational, cultural, and recreational assets provides a unique opportunity to develop the site into a vibrant, multifunctional space that complements and enhances its surroundings. By addressing current barriers and leveraging nearby resources, the site has the potential to become a vital node in Youngstown's urban revitalization efforts.

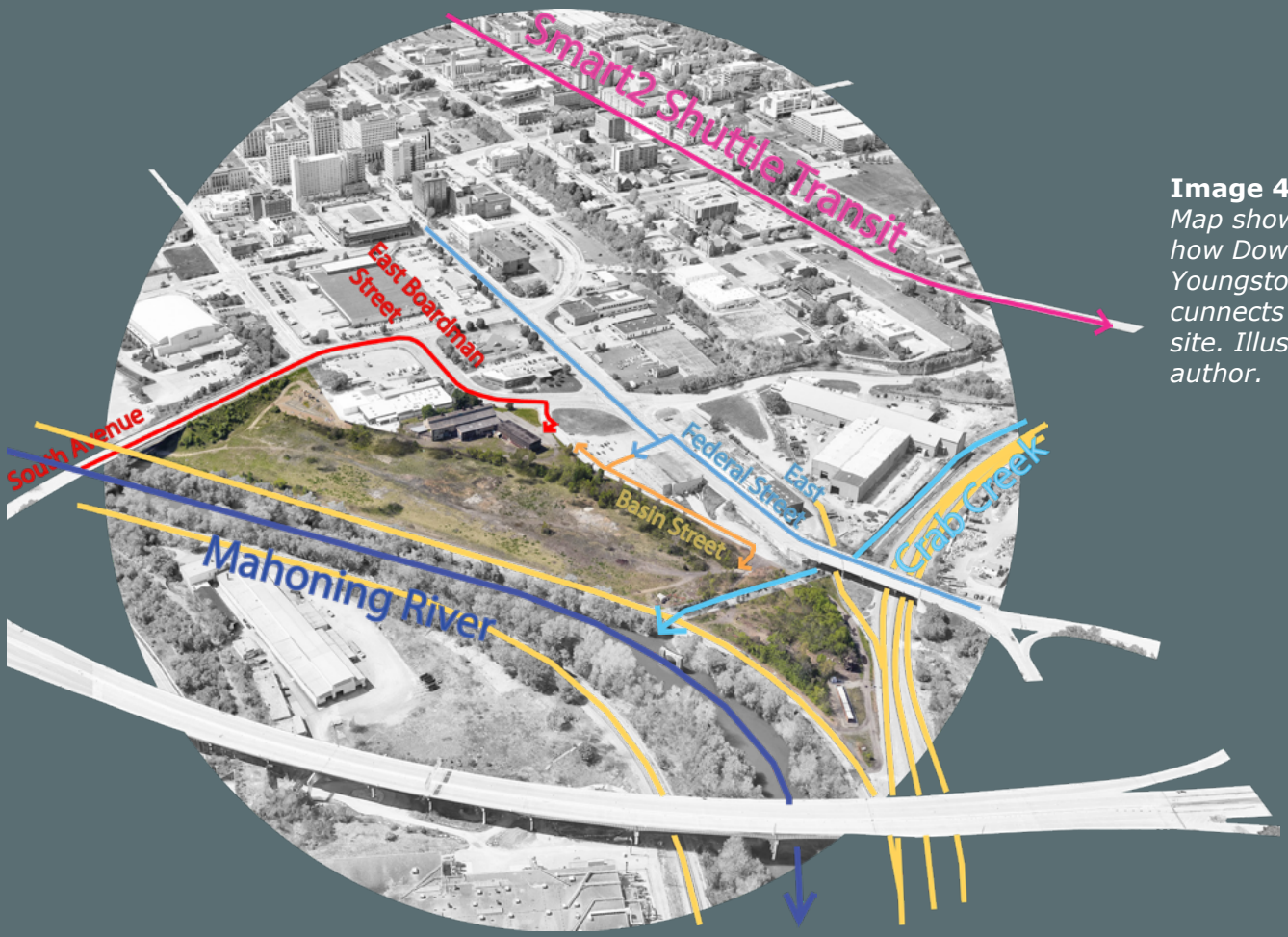
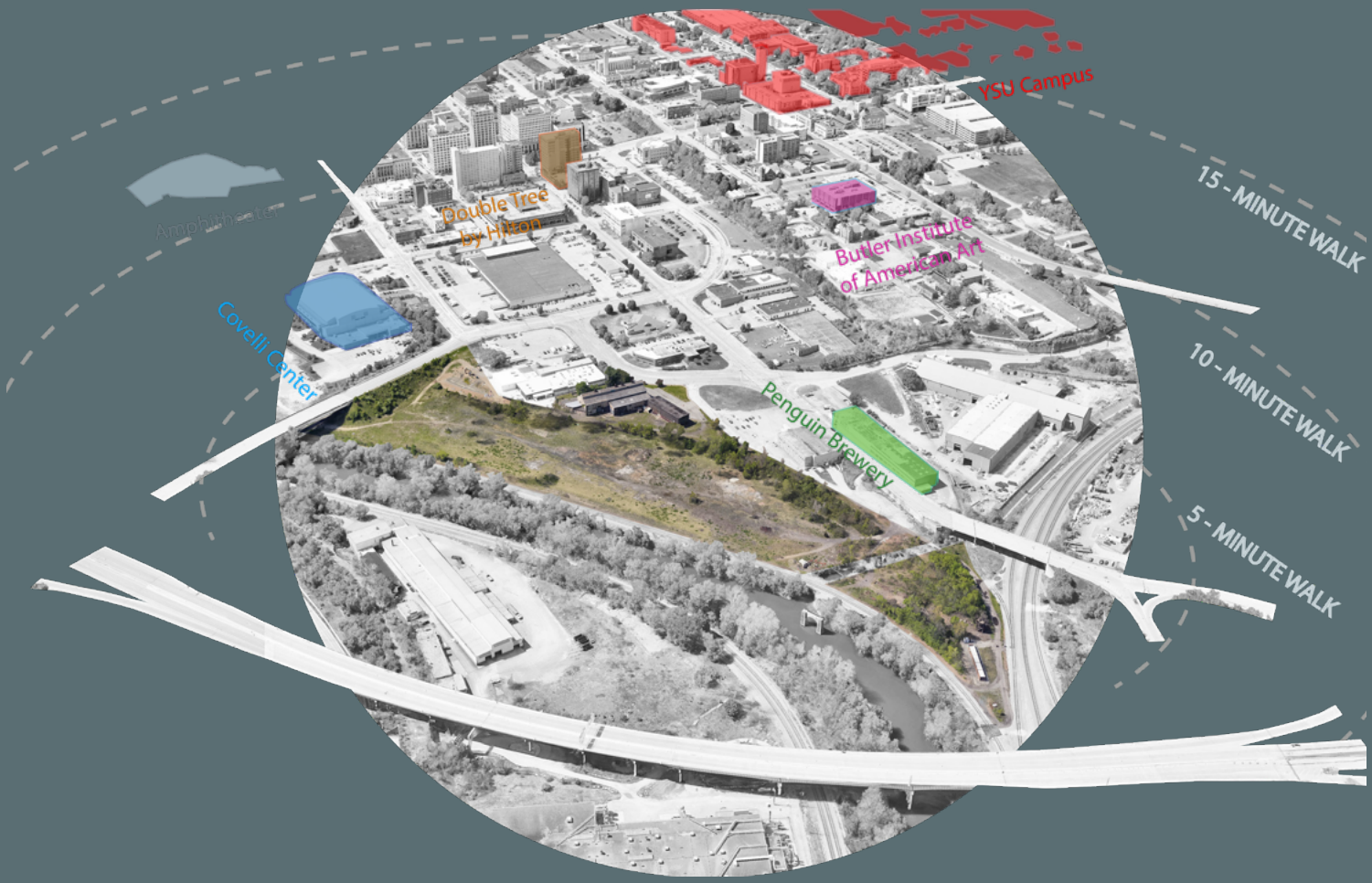


Image 42: *Road Map showing how Downtown, Youngstown cunnects to my site. Illustration by author.*



SUTAINABLE INTERVENTIONS



Image 43: *Diagrams showing how the medthods 'Resist, Delay, Store, Discharge' can help control flood. Illustration credit: OMA.*

To address potential flooding, I drew inspiration from OMA's Resist, Delay, Discharge, and Store strategy, a comprehensive urban flood control approach. This method fortifies flood-prone areas (Resist), slows water runoff with green infrastructure like bioswales and permeable surfaces (Delay), removes excess water efficiently through improved drainage systems (Discharge), and temporarily holds floodwaters in retention ponds or wetlands (Store).

In my project, I apply these principles by integrating retention basins, biofiltration systems, and terraced wetlands along the Mahoning River and Crab Creek. These measures not only mitigate flooding but also enhance ecological balance, improve water quality, and create spaces for recreation, ensuring a resilient and multifunctional design.

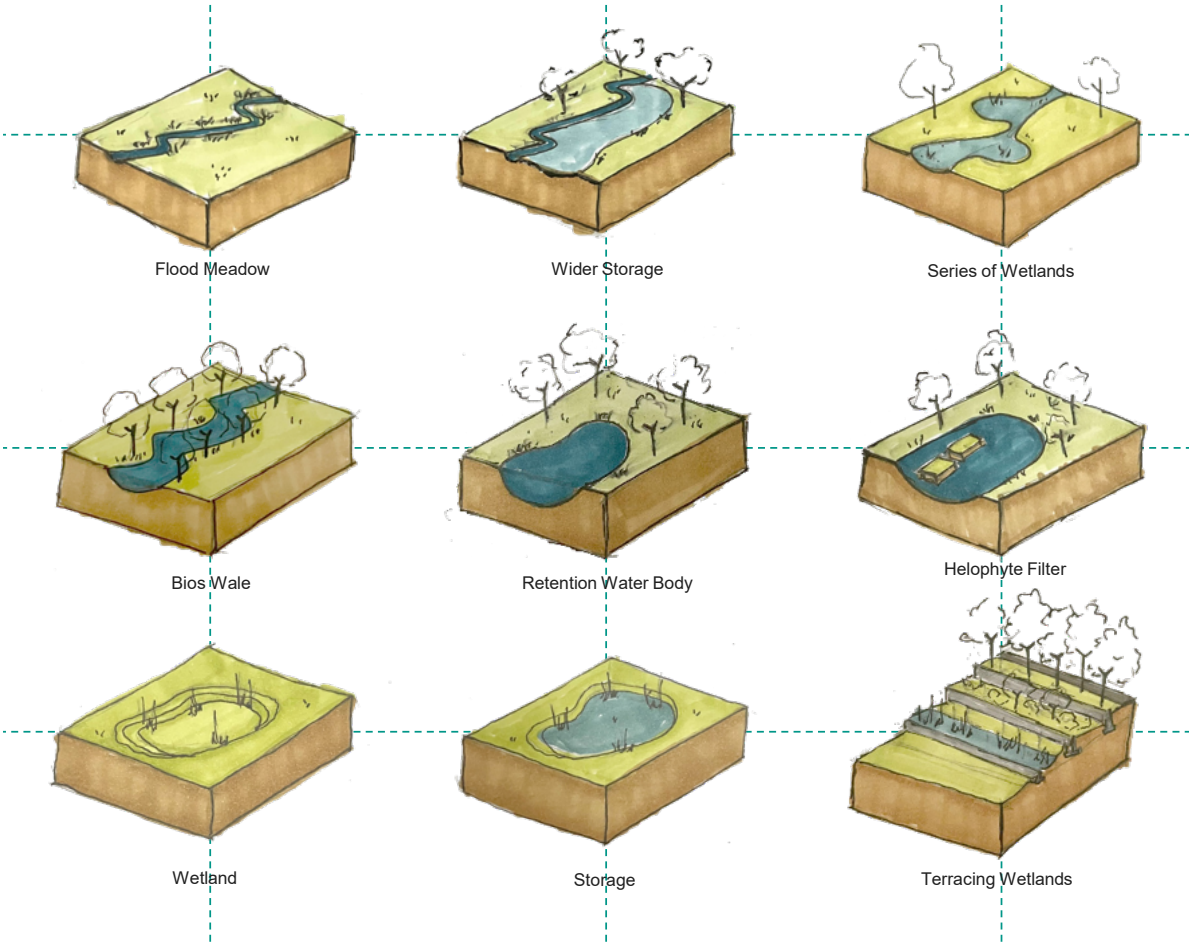


Image 44:
Diagrams of green infrastructures that can be installed in site to help migtigate soil contamination. Illustration by author.

The design incorporates green infrastructure such as permeable pavements, bioswales, retention ponds, and rain gardens to manage stormwater by reducing runoff, preventing river overflow, and promoting groundwater recharge. These measures protect the site from flooding while enhancing its ecological health and aesthetic appeal.

Resilient native plants, including trees, grasses, and shrubs, are introduced to detoxify the soil, stabilize erosion-prone areas, and restore local ecosystems. These plantings improve soil quality, support biodiversity, and create habitats for wildlife.

Together, these strategies combine functionality with environmental stewardship, transforming the site into a sustainable, resilient landscape that addresses urbanization impacts while fostering long-term ecological health and community engagement.

















Image 45: *Images of Plants (above) and Trees (below) that helps improve soil conditions. Photo credit: Simpletree*

Fast-growing species like poplars, willows, and certain grasses are particularly effective in addressing soil contamination through phytoremediation. These plants absorb heavy metals and toxins through their root systems, trapping harmful substances in their biomass and detoxifying the soil. This natural method of remediation is cost-effective and environmentally friendly, making it ideal for post-industrial sites.

In addition to their detoxifying properties, these plants play a crucial role in stabilizing soil and preventing erosion. Their extensive root systems bind the soil, reducing sediment runoff during heavy rains or flooding and improving its structure. As these plants grow, they also contribute organic matter to the soil, enriching its composition and enhancing water retention, which supports ecological recovery.

Over time, this enriched soil becomes conducive to the reintroduction of native species, enabling the gradual restoration of a healthy, biodiverse ecosystem. These plants create habitats for wildlife, fostering biodiversity and promoting long-term ecological stability. By addressing both soil contamination and erosion, fast-growing species like poplars and willows lay the foundation for transforming contaminated landscapes into vibrant, sustainable environments supporting nature and community use.

THESIS QUESTION!?

"HOW CAN ECOLOGICALLY-DRIVEN REDEVELOPMENT STRATEGIES TRANSFORM POST-INDUSTRIAL, POLLUTED RIVERFRONT SITES INTO SUSTAINABLE, REVENUE-GENERATING SPACES THAT ADDRESS BOTH ENVIRONMENTAL RESTORATION AND ECONOMIC REVITALIZATION, WHILE SERVING AS A REPLICABLE MODEL FOR OTHER RUST BELT CITIES?"

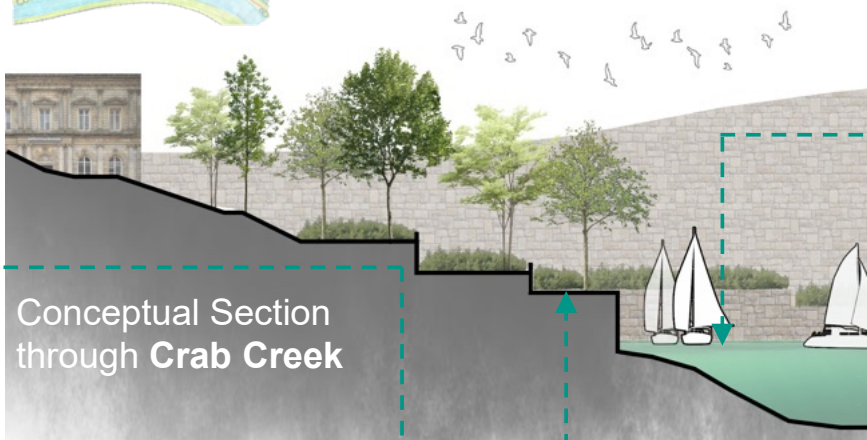
Biofiltration Systems



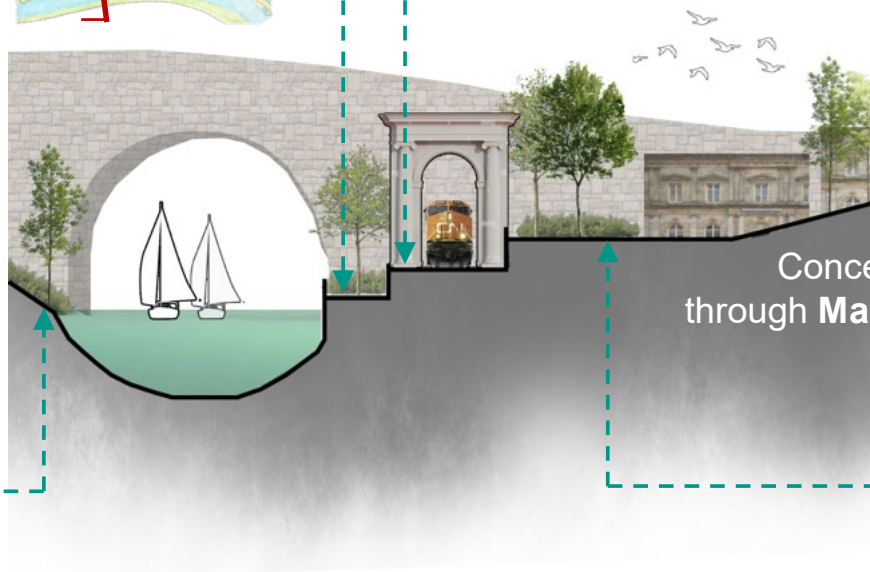












Riverside Activities









Additionally, biofiltration systems will be installed along the Mahoning River to cleanse the water by filtering out pollutants. These systems utilize natural elements like sand, gravel, and native wetland plants to capture contaminants from stormwater runoff. This approach not only restores the health of the river but also enhances its potential as a recreational resource. By improving water quality, the project can reintroduce activities like kayaking, fishing, and riverside walking trails, which have been missing from the community for decades.

Furthermore, these biofiltration systems contribute to the ecological recovery of the river by supporting aquatic habitats and fostering biodiversity. They also serve as an educational opportunity for the community, showcasing sustainable practices that balance environmental restoration with urban development.

CHAPTER FIVE
A VISION FOR THE FUTURE





Image 46: *Images representing type of space the new intervention would bring to the site. Image credit: ArchDaily*



Center for River Studies & Research Facility

My thesis portrays a bold and hopeful vision for the future, where cities like Youngstown can transform their environmental scars into vibrant, sustainable spaces that serve as catalysts for community renewal and growth. This vision embraces not only environmental restoration but also the creation of a dynamic urban ecosystem that attracts and retains young talent. By integrating recreational facilities along the waterfront, expansive green spaces, and contemporary learning centers, the design fosters an appealing lifestyle and offers opportunities for innovation, education, and economic advancement.

Central to this vision is the Mahoning River, reimagined as a river of opportunity, a vital resource that bridges Youngstown's industrial past with a sustainable and inclusive future. My thesis proposes turning the riverfront into a vibrant hub of activity, reconnecting the community to its natural and cultural heritage while supporting modern aspirations. By thoughtfully combining ecological restoration with practical amenities, such as exhibition spaces, Learning

centers, recreational spaces, and collaborative workspaces, the design addresses both immediate needs and long-term goals for resilience.

To maximize community involvement. there is the scope of facilitating a canoe learning center and a bike shop along the path of the newly proposed bike path that cuts through the site to enrich engagement with programs on site and continue further to coonect downtown Youngstown and its neighboring special features.

Visiting the site in person was a crucial step in grounding my design process. Walking the terrain allowed me to engage with the place beyond maps and data, to hear the river, feel the textures underfoot, and observe subtle elevation changes that revealed how water moved across the landscape. Areas of visible surface runoff helped me determine the most effective placement for bioswales and water features, ensuring they respond to both environmental conditions and the lived reality of the land.



Image 47:
Pictures showing ice formulation on site. Depicting water stagnation in certain areas. Photos taken by author.

ECOLOGICALLY-DRIVEN REDEVELOPMENT

1. Environmentally Friendly
Minimizing harm to ecosystems, reducing waste, and preserving biodiversity.

2. Sustainable
Using resources in a way that does not deplete them for future generations.

3. Energy-Efficient
Reducing energy consumption and carbon footprints.

4. Regenerative
Not just minimizing harm, but actively restoring and improving environmental conditions.

5. Biodegradable & Non-Toxic
Materials or products that break down naturally without harming ecosystems.

6. Circular Economy-Oriented
Supporting reuse, recycling, and minimal waste.

CURRENT.....





WORKING TOWARDS.....





Adaptive reuse of a former steel work factory in Minneapolis.

Image 48: *Pictures showing thoughtful transformation of existing structure. Photo credit ArchDaily.*

PROGRAMING AND FORM ANALYSIS

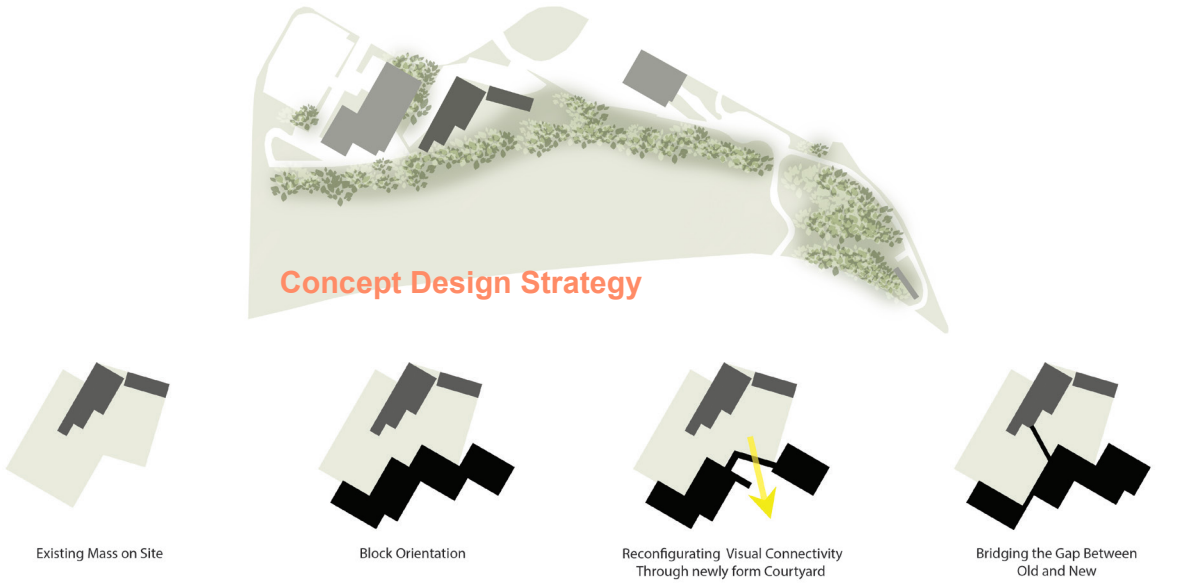


Image 49: *Diagram exploring massing strategies and visual connection with site. Illustration by author.*



Image 50: *Diagram showing programs and how they are connected to each other. Illustration by author.*

My concept design strategy involves several key elements: optimizing block orientation, reconfiguring visual connectivity through a newly formed courtyard, bridging the gap between the old and the new structures, retaining the existing tree line, creating pathways for accessing all areas, and, importantly, establishing a strong connection with green spaces. The plan also incorporates active recreational zones to promote community engagement and enhance the site's functionality.

The program flow creates a seamless journey from public engagement to focused research. Visitors enter through the main entrance into the public exhibition, with easy access to the café, library, and lecture hall. A secondary entrance connects to trails, the flea market, and bike shop.

As users move deeper into the site, they encounter the labs, research pavilion, and offices, organized around the bioswale, which acts as both a filtration system and central landscape feature. The path concludes at the fishery and canoe learning area, connecting research, recreation, and river restoration in one continuous experience.

PROGRAM FLOW DIAGRAM

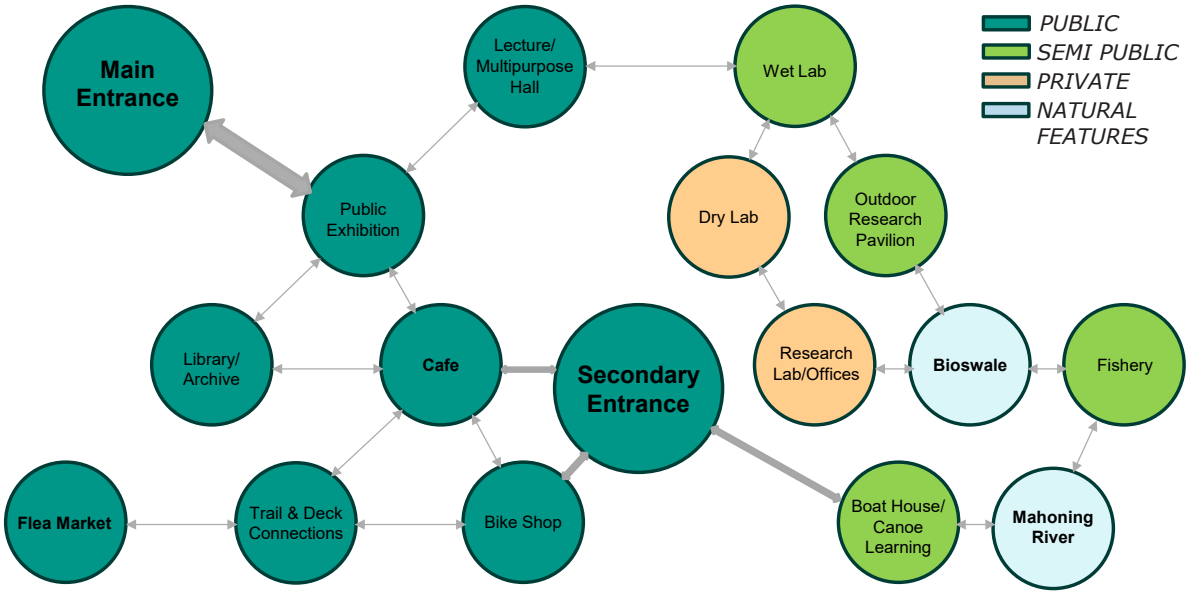


Image 51: *Diagram showing proposed program on site. Illustration by author.*

The central courtyard becomes a community hub, dispersing traffic flow to various amenities like research labs, workshops, and recreational spaces. The aim is to create a multifunctional space where people can gather, learn, and engage with the site in meaningful ways.

My design includes a carefully planned program flow that optimizes the use of space on the site. The courtyard acts as the central node, dispersing visitors to different areas such as research facilities, Center for River Studies, exhibition spaces, and recreational amenities like pickleball courts, biking trails, and kayaking access points. Additionally, the inclusion of a boathouse, cafes, and open green spaces enhances the site's attractiveness, making it a year-round destination for both residents and visitors.

Program Type	Suggested Area (sq ft)
Research + Labs	6,000–8,000
Exhibition / Education Wing	4,000–5,000
Public / Community Spaces (Lecture hall, classrooms, meeting rooms)	3,000–4,000
Café	1,500–2,000
Service / Mechanical / Circulation	2,000–3,000
Outdoor Decks, Boardwalks, Observation Platforms	Variable (~3,000–5,000)
Total	~16,000–22,000

Image 52: *Table showing programs and suggested square footage. Illustration by author.*

Space	Function
Wet Lab	Sample analysis, water testing, sediment studies (v
Dry Lab	Data analysis, GIS, research work, modeling
Outdoor Research Pavilion	Sampling deck, equipment station, outdoor teachin
Research Offices	Workspace for researchers and faculty (6-10 staff)
Lecture / Multipurpose Hall	Flexible for workshops, conferences, public events
Public Exhibition Space	Interactive & interpretive display area
Classroom / Studio	Teaching space for visiting students, small groups
Library / Archive	Research storage, digital and physical archive
Café	Small café with seating and kitchen/service
General Circulation	Hallways, lobbies, vertical circulation
Restrooms / Lockers / Changing	For both public and researchers
Mechanical / Storage	Support spaces, MEP
Outdoor Decks / Boardwalks	Platforms, trail links, seating zones

The program was shaped by the site's ecological needs and community potential. Research and lab spaces address environmental monitoring, while the exhibition and education wing supports awareness and learning about Youngstown's industrial legacy. Public spaces foster engagement, and a café offers a social hub. Outdoor decks reconnect visitors to the riverfront, promoting environmental appreciation. Each component was selected to balance restoration, education, and community use within a flexible and sustainable footprint.

	Estimated Sq ft
with prep space)	2,000 - 2,500
	1,200 - 1,500
g	Variable (~6000 - 10,000)
	1,200 - 1,500
(~100-120 seats)	2,000 - 2,500
	2,500 - 3,000
	1,000 - 1,200
	500 - 700
	1,500 - 2,000
	2,000 - 2,500
	800 - 1,000
	800 - 1,000
	Variable (~3,000 - 5,000)

Image 53: *Table showing Space Distrubution within Center for River Studies. Illustration by author.*

The spatial organization of the Center for River Studies was guided by the site's ecological complexity, educational mission, and the need for community integration. I began by prioritizing research functions, recognizing the importance of ongoing environmental analysis for river and soil remediation. This led to the inclusion of wet and dry labs, as well as outdoor pavilions that support hands-on sampling and fieldwork directly along the river's edge. Their sizes reflect not only technical requirements but also the desire to blur boundaries between lab and landscape.

Public-facing spaces were scaled to encourage civic engagement without overwhelming the intimacy of the site. Exhibition zones, lecture halls, and classrooms were designed to foster interactive learning and dialogue, welcoming both casual visitors and academic groups. These spaces are flexible in layout to accommodate seasonal programming, workshops, and partnerships with schools or advocacy organizations.

Support spaces like offices, archives, and mechanical rooms were kept efficient to maximize active areas. The café and outdoor boardwalks draw people in and encourage them to linger, offering both social and contemplative experiences. Each program component was shaped not just by spatial standards, but by its role in fostering environmental awareness and collective restoration in a city still healing from industrial decline.

MATERIALITY AND DESIGN ATMOSPHERE



Image 54: *Photo showing possible choice of materails for such site. Photo credit ArchDaily.*









Image 55: *Photos of WMS Boathouse at Clark Park, Chicago. Credit ArchDaily*

Program	Material	Atmosphere	Design Note
Pond & Bioswales	Natural stone, Corten steel edge retainers, timber boardwalks.	Soft, resilient, and seasonal. Wetland plants swaying, birds, frogs audible.	The bioswale acts as both filtration and visual introduction to the research center.
Wet Lab & Outdoor Research Pavilion	Exposed concrete (symbolizing permanence), glass curtain walls toward the pond, reclaimed wood structural elements.	Honest, industrial-modern with transparency to landscape. Inside, wet-lab tables with direct outdoor access for sampling.	Outdoor pavilion could use gabion walls, light metal mesh, and wood decking.
Trail	Crushed limestone or permeable asphalt, low Corten steel borders, timber bridges where needed.	Meandering, informal, blending into the bioswales and building edges.	Could elevate slightly to avoid interrupting stormwater flows.
Pond & Bioswales	Natural stone, Corten steel edge retainers, timber boardwalks.	Soft, resilient, and seasonal. Wetland plants swaying, birds, frogs audible.	The bioswale acts as both filtration and visual introduction to the research center.
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Trail	Crushed limestone or permeable asphalt, low Corten steel borders, timber bridges where needed.	Meandering, informal, blending into the bioswales and building edges.	Could elevate slightly to avoid interrupting stormwater flows.

The material palette for the site was chosen to reflect both ecological responsiveness and the layered industrial history of Youngstown. I leaned into natural, resilient materials, like Corten steel, reclaimed wood, and natural stone, for elements such as bioswales, trails, and observation decks to blend built interventions into the wetland landscape. These materials weather over time, echoing the seasonal character of the site.

For structures like the café and research pavilion, I introduced exposed concrete, recycled brick, and steel framing to evoke a sense of permanence while honoring the grit and honesty of the Rust Belt aesthetic.

In the reused industrial buildings, I preserved aged materials like patched brick and exposed trusses to celebrate imperfection and memory. Every material was chosen not just for performance, but to ground the architecture in its local context and create atmospheres that support reflection, interaction, and restoration.

Image 56: *Table Listing Materail and Atmosphere. Illustration by author.*



Wetland/ Rain Garden Habitat



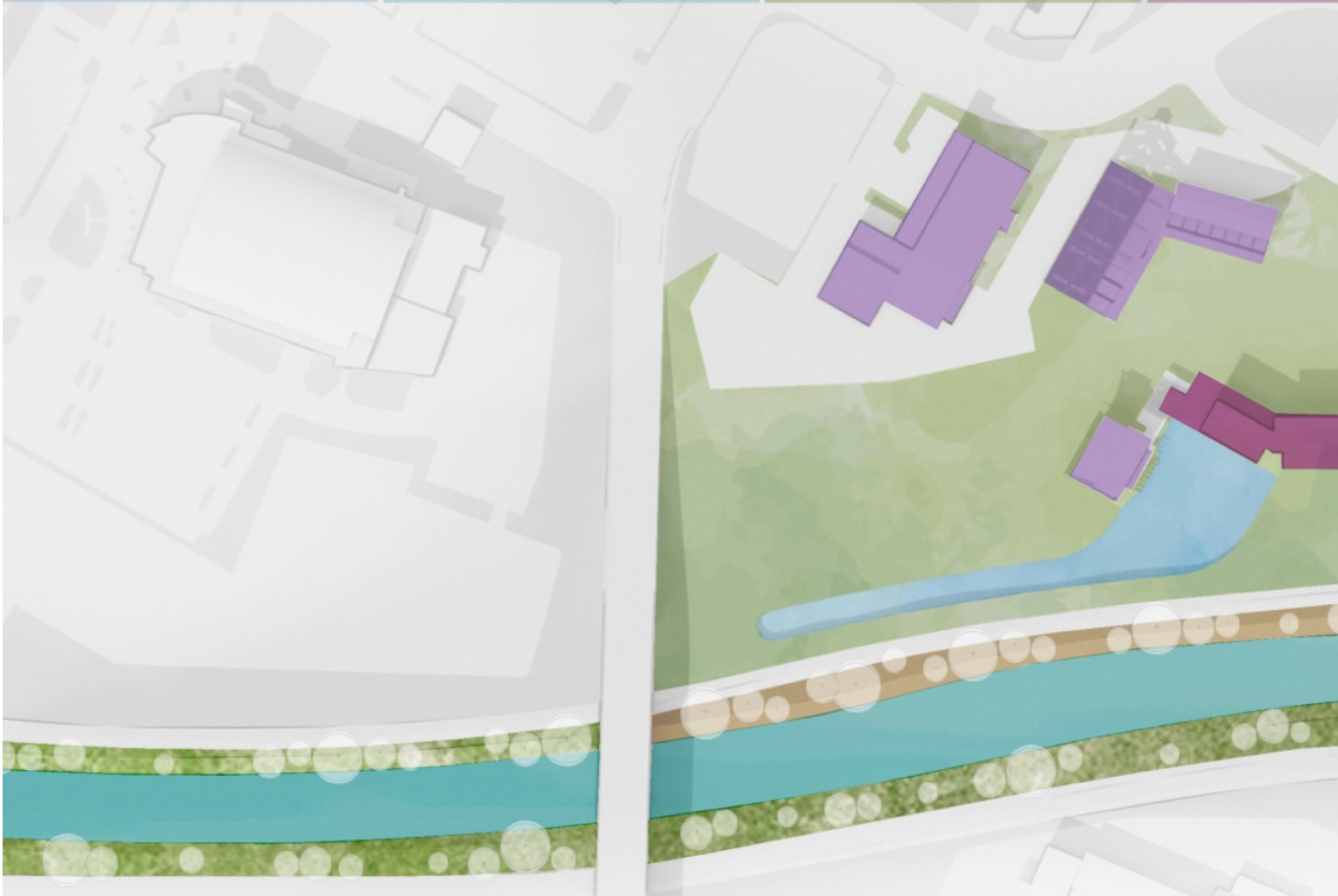
In- Stream Water



Native Riparian Habitat



Enviro Educ



RESTORING THE SITE'S CAPACITY TO SUPPORT LIFE

Provides natural filtration for stormwater while creating habitats for diverse plant and animal species.

Refers to the natural flow of water within a stream or river system.

Vegetation along riverbanks that stabilizes soil and provides shade and habitat.

Engages the especially st in learning a ecological sy sustainability



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Native Medow Habitat

Areas planted with native grasses and wildflowers.

Sustainable Urban Design

Integrates ecological practices into urban planning, green roofs, permeable pavements, and mixed-use spaces.

Water Quality Feature

Infrastructure or natural systems designed to monitor and improve water quality (sensors, filtration systems).

DESIGN DEVELOPMENT

The proposed site plan emphasizes a harmonious integration of new structures with the existing industrial landscape, bridging the past and the present in a thoughtful and sustainable way. By aligning new building masses with the spatial grammar of former factories, the design respects the site's industrial heritage and preserves its unique character. This approach celebrates the site's historical significance, ensuring that the architectural language of the new development complements, rather than overshadows, the remnants of its industrial past.

Modern, sustainable features are carefully incorporated into the design, such as energy-efficient building materials, green roofs, and passive solar strategies, to enhance environmental performance while maintaining visual cohesion with the existing structures. These additions serve not only to modernize the site but also to address current community needs, such as creating spaces for housing, recreation, and education.

The site plan also integrates public spaces, like courtyards and green corridors, that connect the new and existing elements, fostering interaction and accessibility. These spaces create a seamless flow between functional areas, encouraging community engagement while supporting ecological restoration. Overall, the proposed plan transforms the site into a vibrant, multifunctional hub that honors its industrial legacy while paving the way for a sustainable and inclusive future.

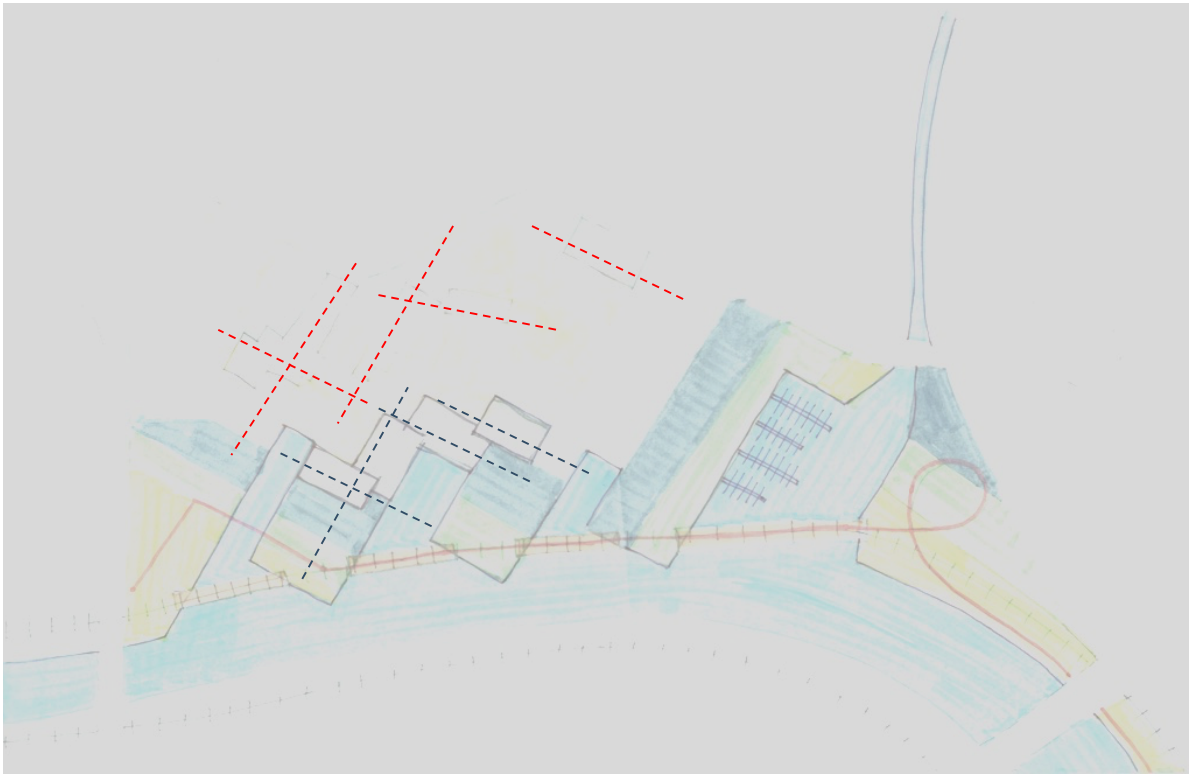


Image 57:
Proposed Phase 1 of site plan, showing block orientation and connection with water. Illustration by author.



Image 58:
Proposed Phase 2 of site plan, showing connection with old forms creating a courtyard in between. Illustration by author.



Image 48:
Proposed Phase 3 of site plan, showing block orientation, bike path and connection with water. Illustration by author.



Image 48:
Proposed Phase 4 of site plan, showing block orientation, bike path and connection with water. Illustration by author.



Image 48:
Proposed Phase 5 of site plan, showing block orientation, bike path and connection with water. Illustration by author.

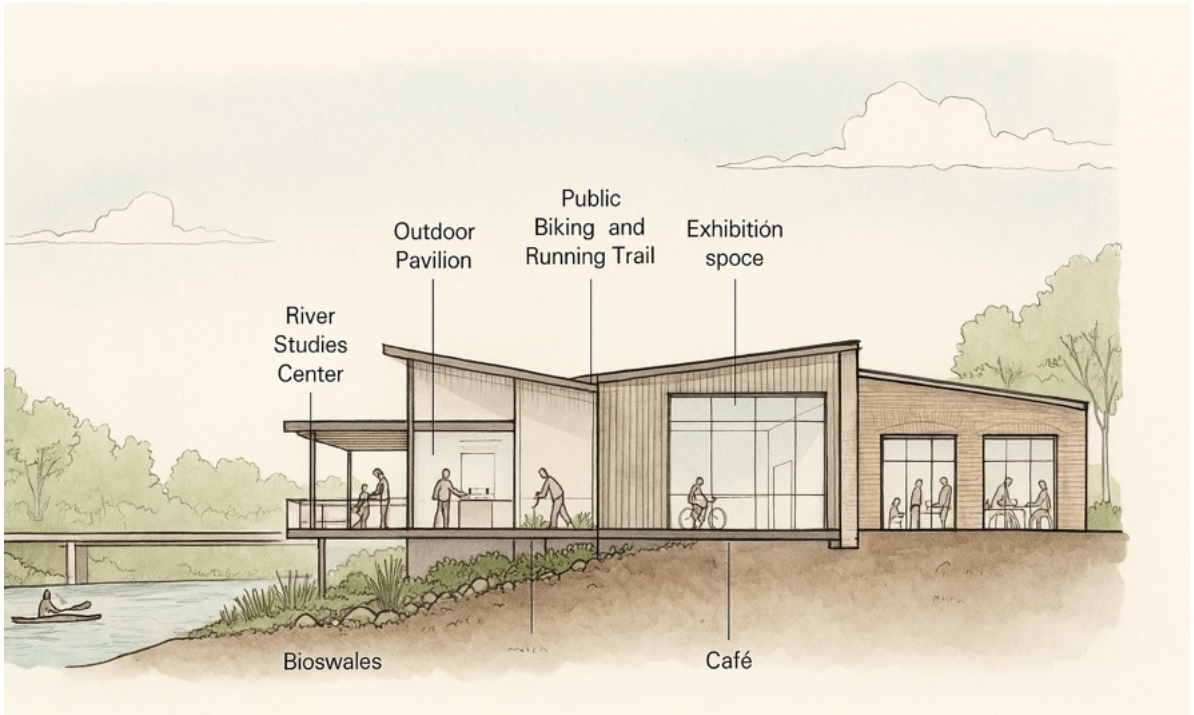
Arriving at the final site plan was a layered and iterative process, grounded in both ecological logic and spatial intent. I began by analyzing how water naturally approached and moved through the site, this flow became the foundation for how I positioned buildings, bioswales, and open spaces. Through a series of trace overlays, I explored different configurations, testing relationships between built forms and the landscape. Each round brought greater clarity, refining how the research center could anchor the site, how the labs would open toward the pond, and how public and private programs could interlock without friction.

Connections between spaces were carefully choreographed, leading to the introduction of a bike path that glides along the edge of the Center for River Studies, weaving through research, recreation, and restoration zones. The path not only links programs, but also reinforces a narrative of movement, discovery, and environmental awareness across the site.

Image 59:
Proposed Fianl Phase of site plan, showing block orientation, bike path, formation of water body and proposed programs. Illustration by author.



Image 60:
Conceptual Section showing form, roof slope and connection with ground. Illustration by author.



The LSU Center for River Studies was a valuable precedent in shaping my program. Its layout and integration of labs, public exhibits, and outdoor research spaces helped me define clearer spatial relationships and functional adjacencies.

Referencing its model allowed me to fine-tune program sizes, access points, and the balance between public engagement and scientific work, making my design for Youngstown more grounded and effective.



Image 61: *Image of LSU Center for River Studies. Photo credit Erica Sweeney Glory.*



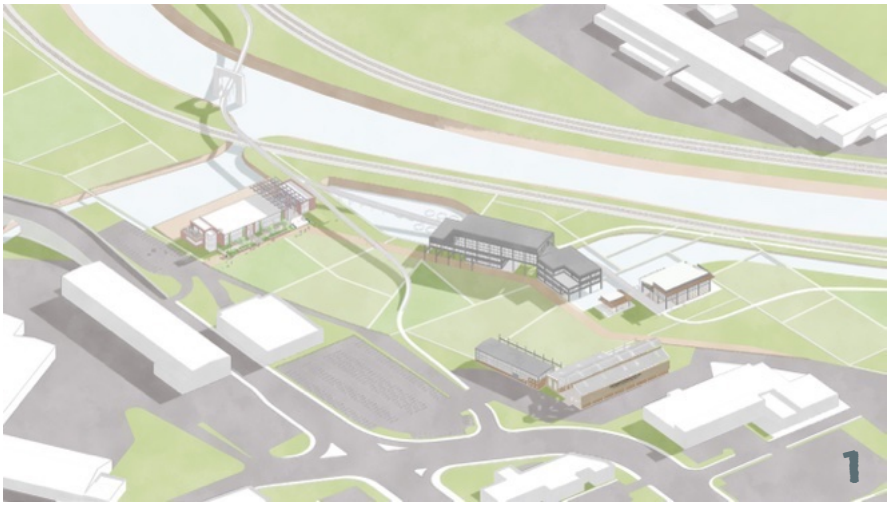


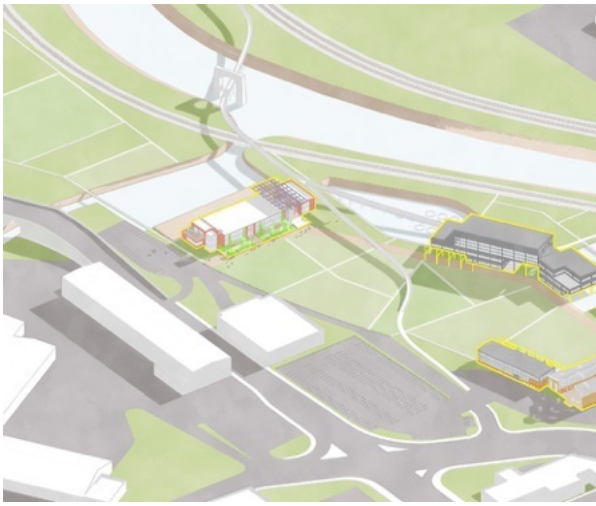


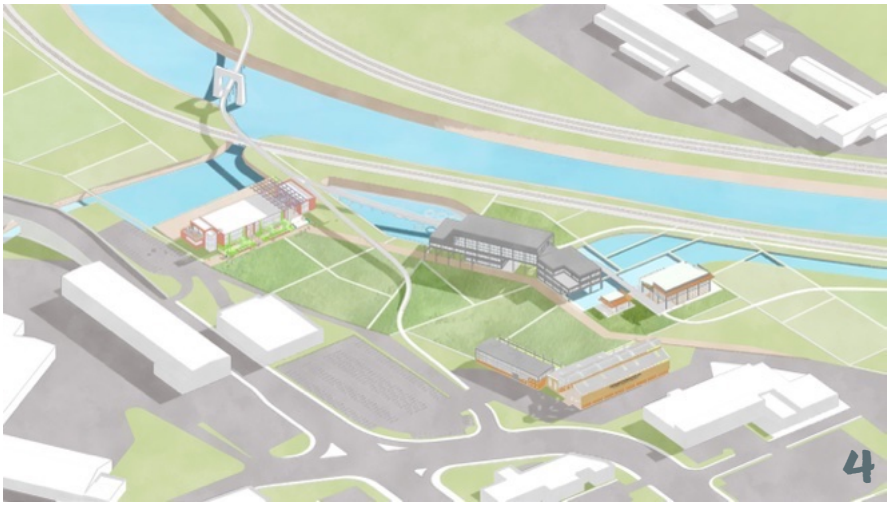


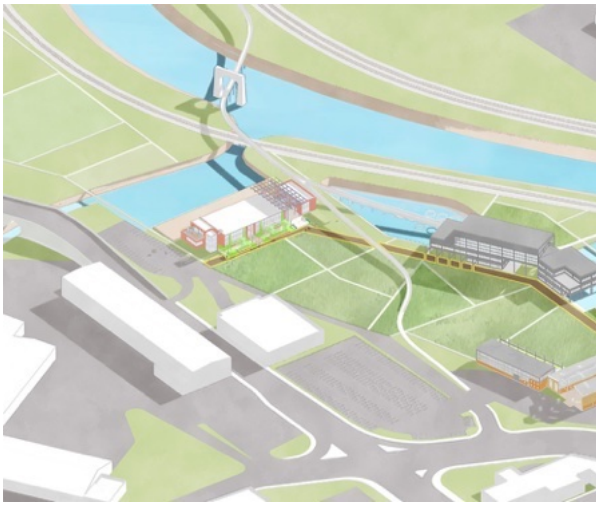
Image 62: *Images showing the roof of the abandonded Republic Rubber. Photo credit old Youngstown.*

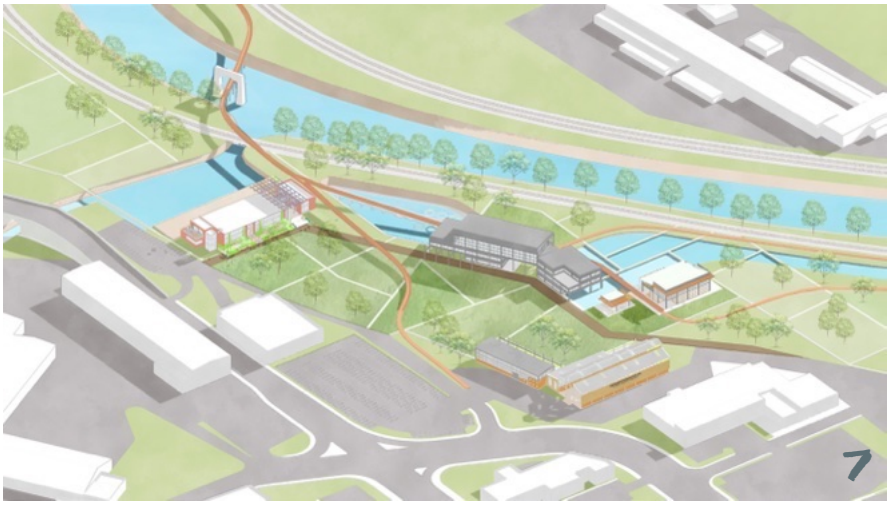
DESIGN PHASING









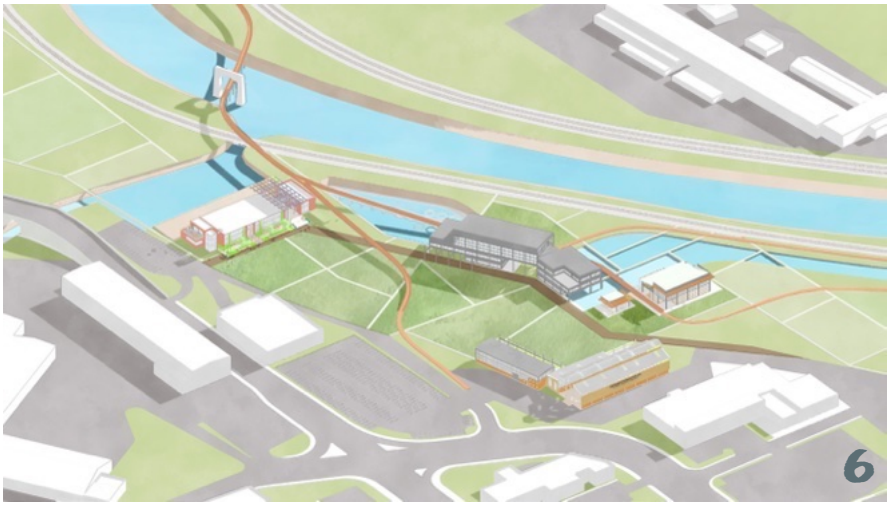














The development of the proposed master plan was a multi-layered process that evolved through continuous refinement of spatial relationships, site conditions, and programmatic intent. By breaking the design down into eight distinct diagrams, I was able to isolate and analyze key components, from the placement of the seven structures, including repurposed existing buildings, to the integration of circulation routes, vegetation, and water engagement.

Image 63:
Diagrams showing different pahses of development. Illustration by author.

This step-by-step approach allowed me to test how each element, such as the café, bike shop, restaurant, and the Center for River Studies. It could not only function individually but contribute to a cohesive whole. Mapping walkways, bike trails, and public access points helped establish a flow that feels intuitive and inclusive. At the same time, layering ecological systems like landscaping and water connections ensured the site remains responsive to its environmental context. Through this iterative diagramming process, I've shaped a master plan that supports both human experience and ecological healing.

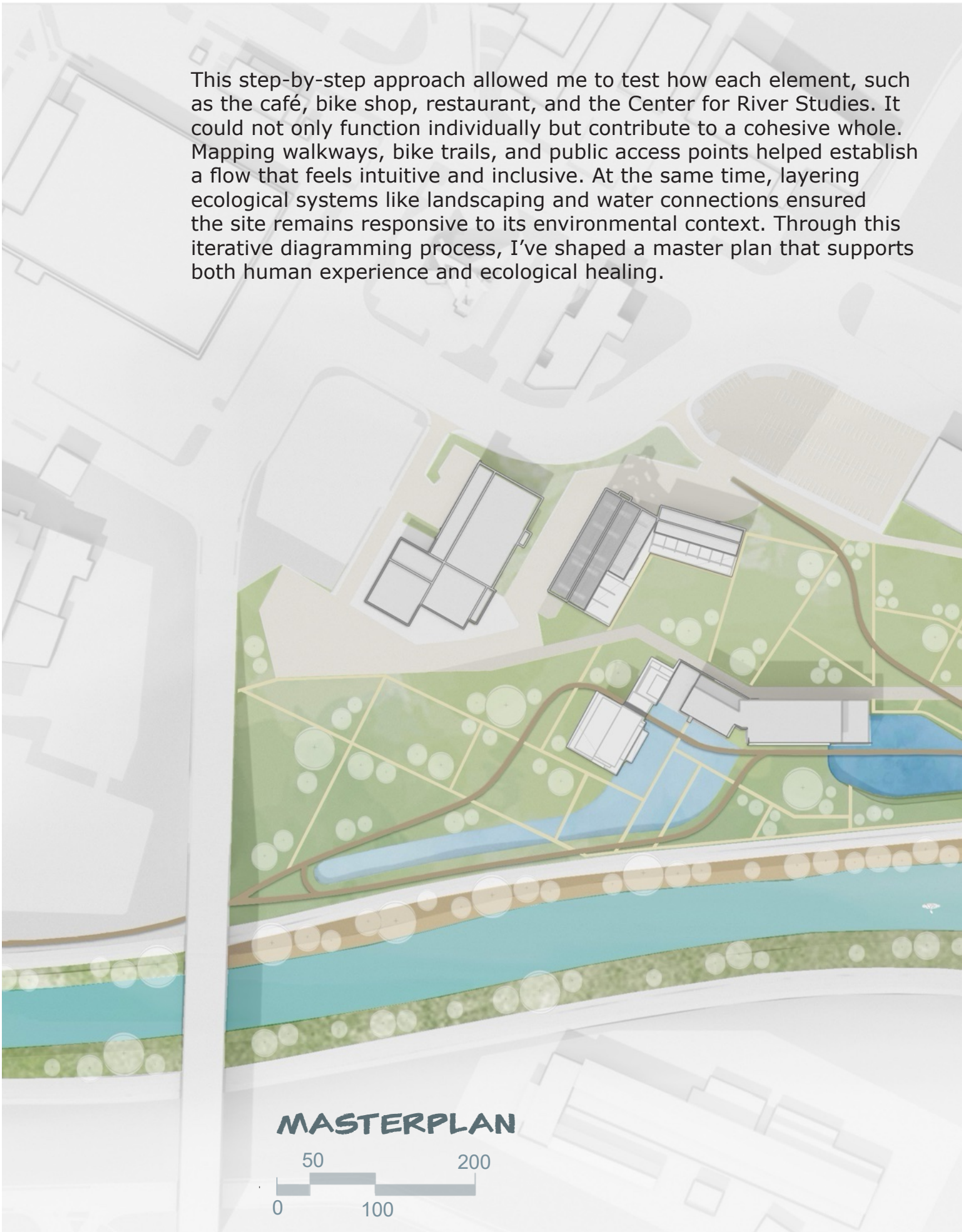




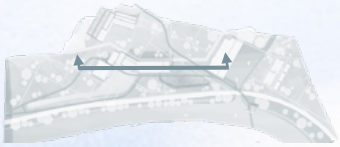
Image 64:
Sectional Perspective showing structure within the exsting buildings. Illustration by author.



SECTIONAL PERSPECTIVE

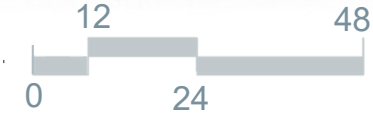
The two existing industrial structures on site have been reimagined as dynamic multipurpose halls, serving as flexible spaces that can host concerts, performance art, exhibitions, flea markets, and community events throughout the year. Rather than erasing their industrial past, I chose to celebrate and adapt it, preserving the architectural bones while redefining their purpose.

A key move in this transformation was opening up the north and south facades, creating large, transparent thresholds that invite movement through the buildings and visually connect the interior activity to the broader landscape. These openings establish a powerful sense of entry into the new urban intervention, framing views of the river and making the structures feel porous, accessible, and integral to the site's renewed public life.





LONG SECTION THROUGH SITE



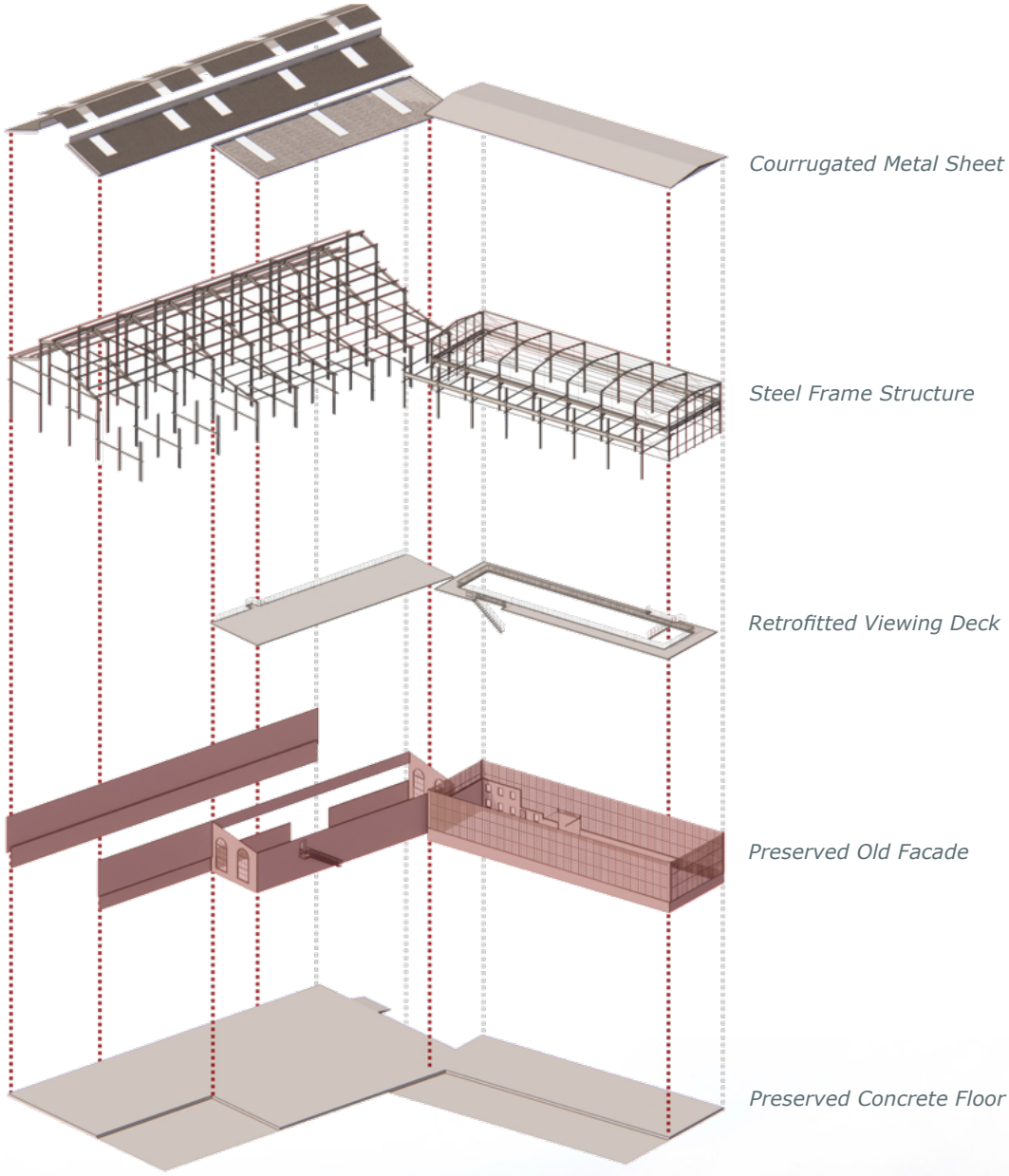


Image 65: *Exploded axonometric view showing the types of structures involved in the exisiing framework of the Flea Market. Illustration by author.*

EXPLODED AXONOMETRIC VIEW OF EXHIBITION/GALLERY/MULTI-PURPOSE SPACE

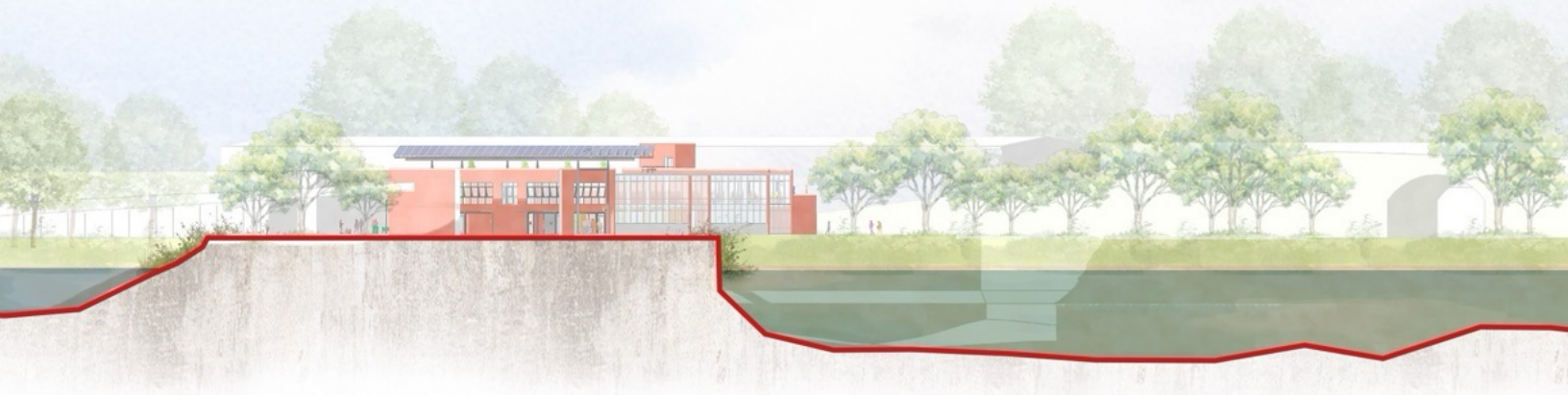
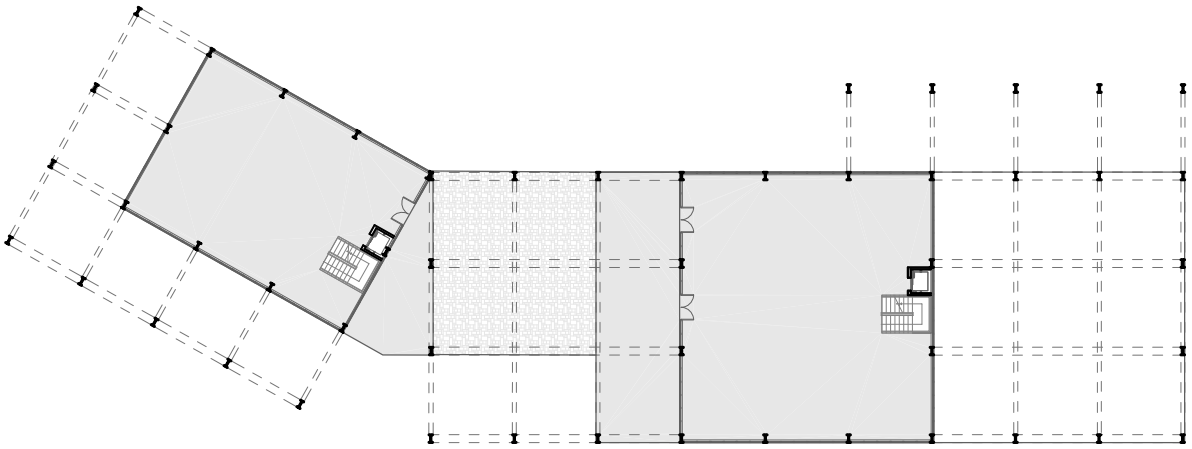
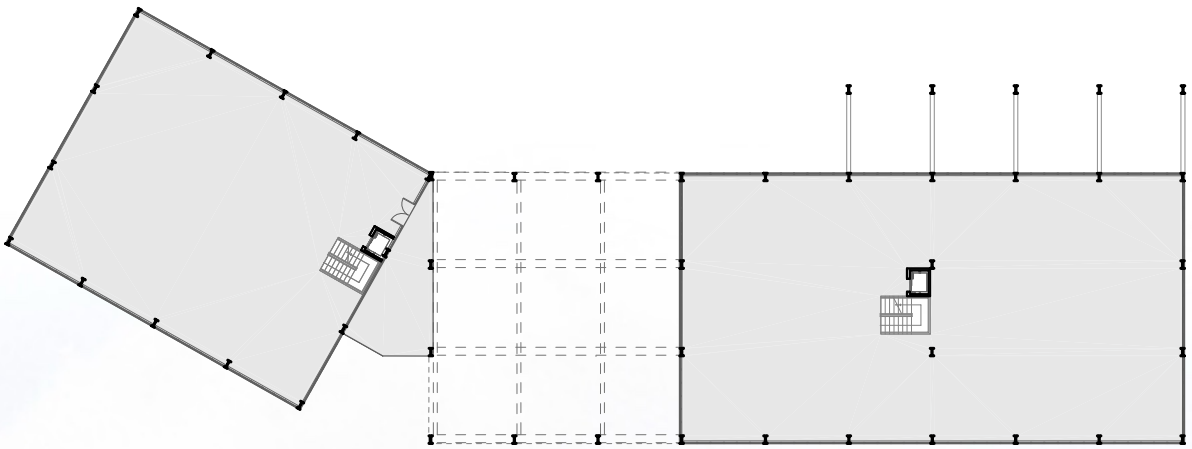


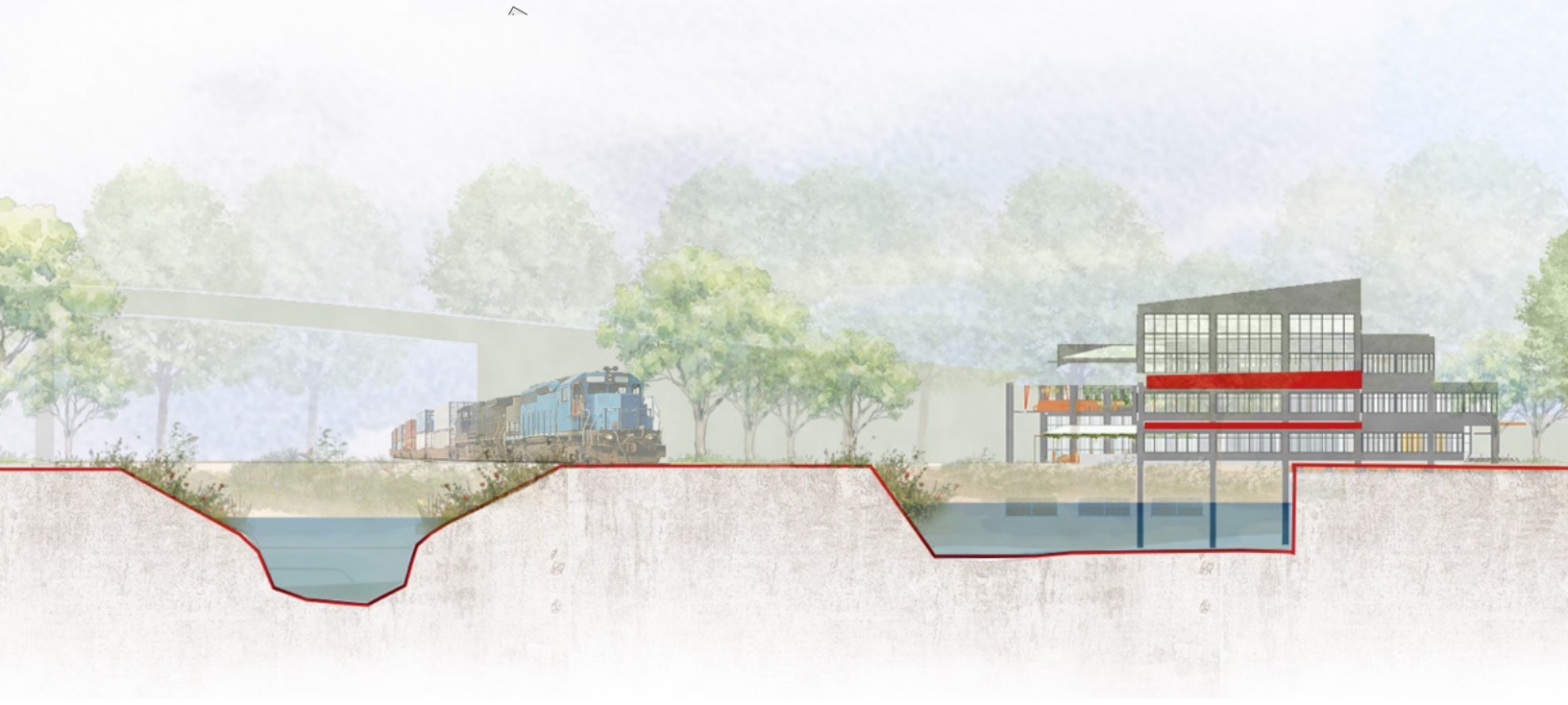
Image 66:
Proposed plan of Cernter for River studies. Drawings by author.

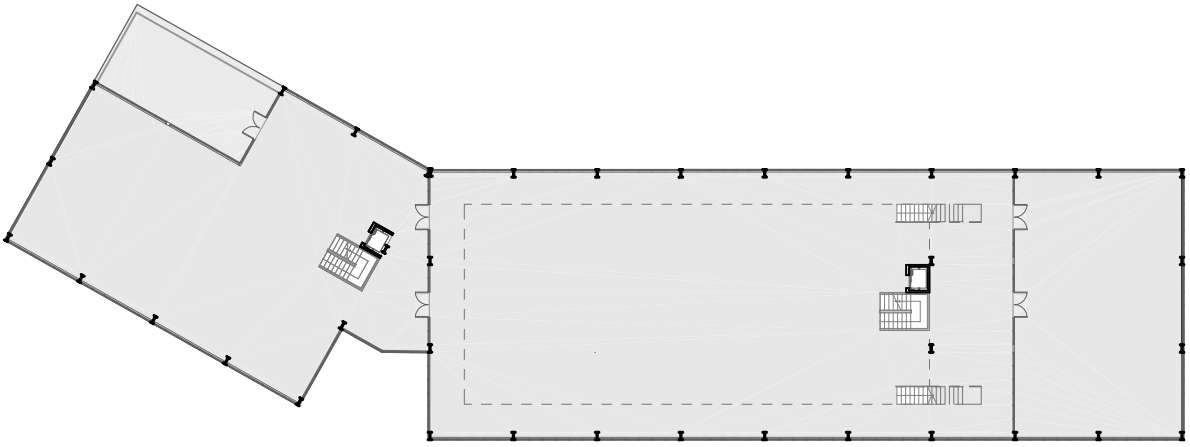


GROUND FLOOR PLAN

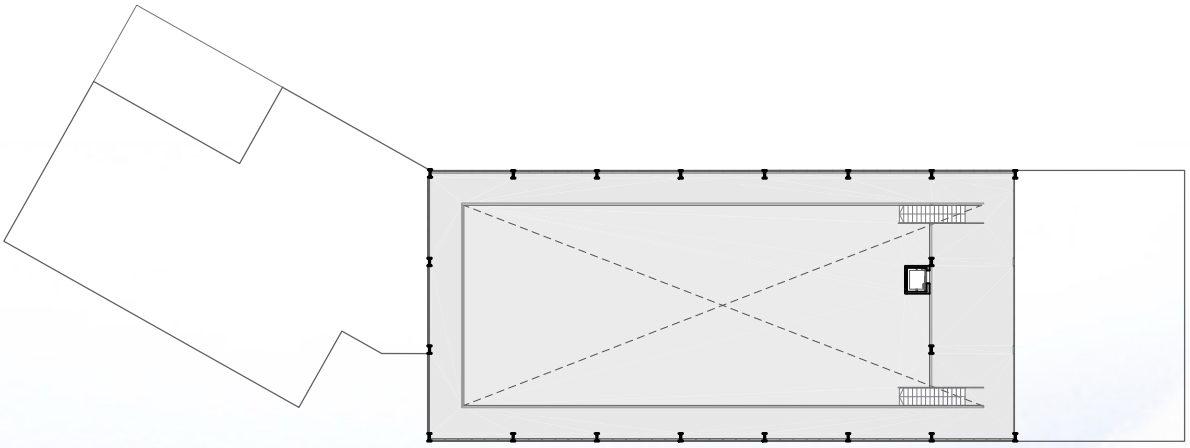


1ST FLOOR PLAN

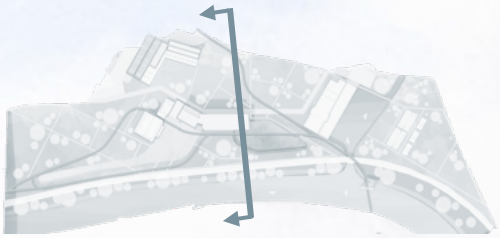




2ND FLOOR PLAN



3RD FLOOR PLAN





SHORT SECTION THROUGH SITE



Image 67: *Render of newly proposed Multi-purpose hall/flea market. Illustration by author.*



Image 68: *Render of newly proposed Canoe Learning Center and Bike shop. Illustration by author.*





Image 69: *Render of Center For River Studies. Illustration by author.*



Image 70: *View of water feature (fishery) below the Cernter for River Studies. Illustration by author.*



Image 71: *Render of newly proposed bike trail that runs through the abandoned pier currently standing on site. Illustration by author.*



Image 72: *View of newly proposed cafe and restuarant. Illustration by author.*

Ultimately, my thesis positions Youngstown as a forward-thinking model for sustainable innovation, where environmental stewardship, economic revitalization, and community empowerment intersect. The proposed master plan envisions a future where residents thrive through improved quality of life, career development in research and green industries, and renewed access to natural systems. This vision offers a replicable framework for post-industrial cities seeking to reclaim their identity, demonstrating how thoughtful design can turn environmental and economic challenges into opportunities for equity, resilience, and shared purpose.

This is how the site begins to come alive. The new architectural interventions draw from the industrial language of the past, using contemporary materials and solar-responsive forms while echoing the abstract geometry of factory structures that once shaped the landscape. The rooflines, in particular, pay homage to the iconic silhouette of the Republic Rubber Company, an abandoned factory just a mile north, preserving its memory as a local landmark while giving it new life through reinterpretation.

At the heart of the plan lies a vibrant open courtyard that anchors the site's activity. Framed by key programs like the Center for River Studies, the café, and the exhibition space, this courtyard acts as a shared platform for seasonal flea markets, outdoor lectures, concerts, or even spontaneous gatherings. The research center opens onto the courtyard through large operable doors, creating an expandable zone that can adapt to larger public programs or educational outreach. A pedestrian bridge connects the research facility with the multipurpose hall housed in the repurposed industrial structure, enabling fluid movement between experimentation and expression, science and storytelling.

This central space not only encourages engagement but also supports wellness and environmental performance. With native planting, shaded seating, and water-conscious landscaping, the courtyard improves microclimatic conditions through passive cooling and air circulation. It creates a welcoming, inclusive atmosphere that invites people of all ages to participate in the life of the site, fostering belonging, reflection, and collective care for a landscape in transformation.

Image 73:
Proposed design of old factory buildings being used for art exhibition. Image produced by author.





Image 74:
Proposed gateway of new Kayak launch from site. Image produced by author.

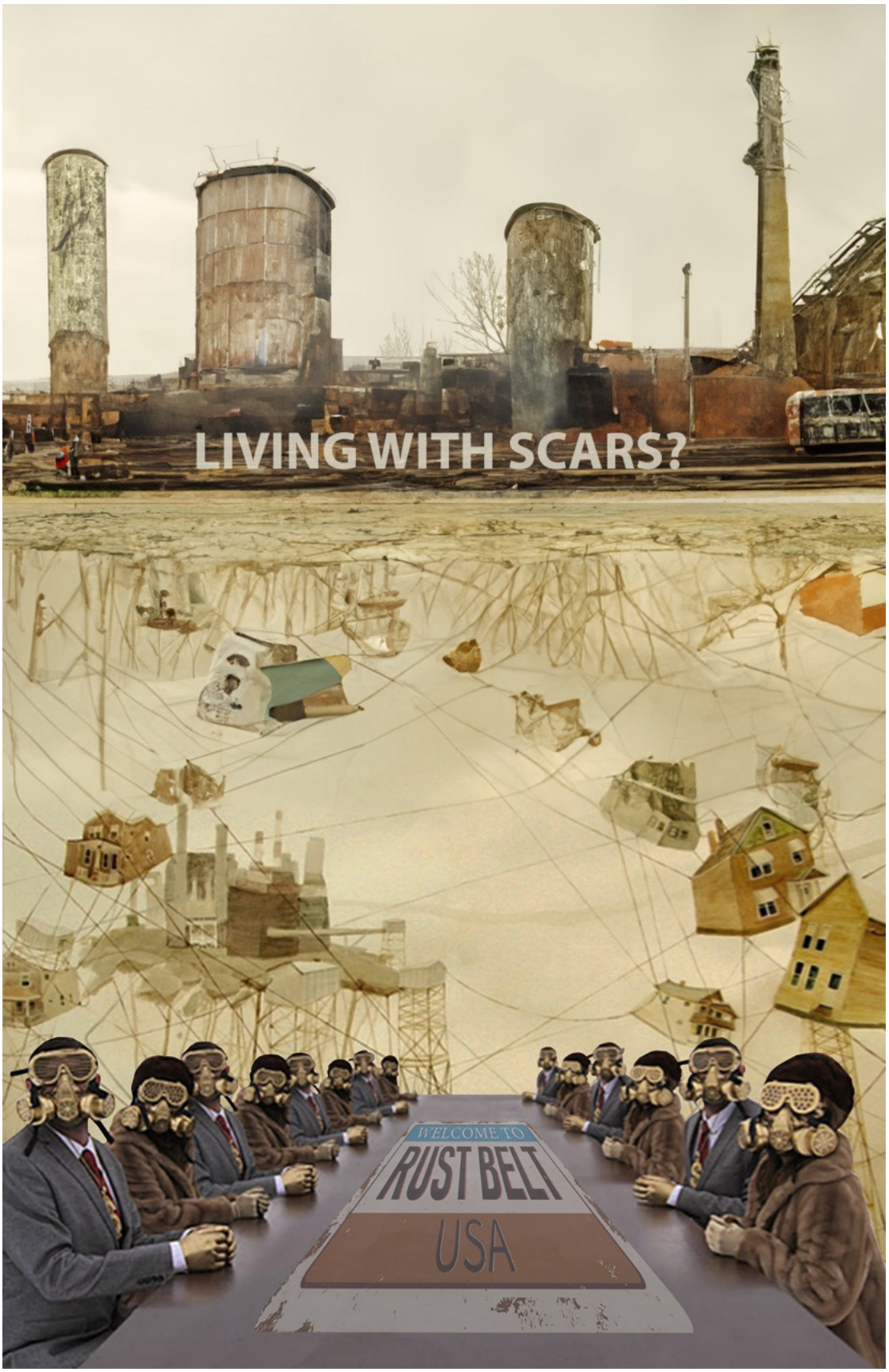


Image 75:
Collage showing how economic priorities often favor tolerating urban blight and pollution over investing in revitalization. Illustration produced by author.



Hi. I'm Shams, a Master of Architecture candidate at Miami University with a passion for designing socially and environmentally responsive spaces. With a foundation in architecture from Bangladesh and ongoing professional experience at Luckett & Farley, I bring a global perspective and a drive to create meaningful, community-centered design.

My thesis explores adaptive reuse and environmental regeneration in post-industrial cities, focusing on transforming urban decay into opportunity. I'm driven by the belief that architecture should heal, inspire, and empower and I'm eager to contribute to a team where I can grow, collaborate, and make a lasting impact.



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