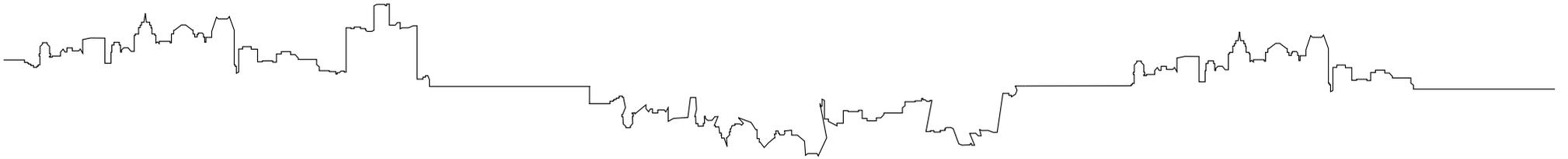


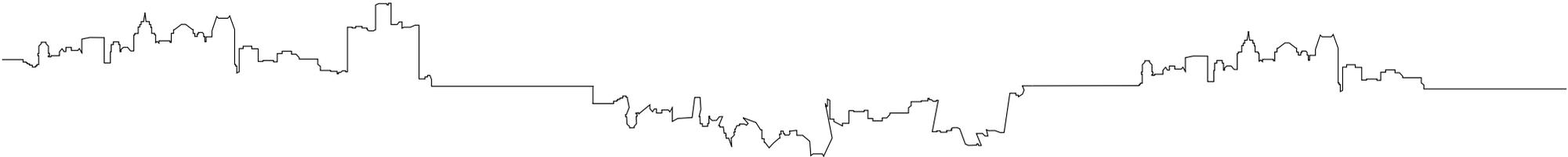
Adaptable Spaces for Changing Places

Design for Demographic Shifts



Adaptable Spaces for Changing Places

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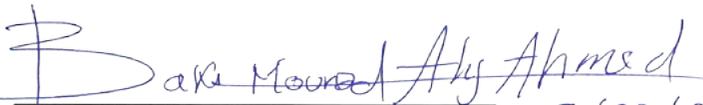


A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

By

Laura Lutterman

In Partial Fulfillment of the Requirements
for the Degree of
Master of Architecture



Primary Thesis Advisor

5/23/2011



Thesis Committee Chair

5/24/2011

May 2011
Fargo, ND

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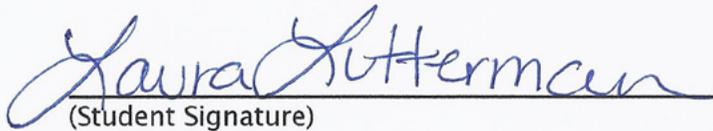
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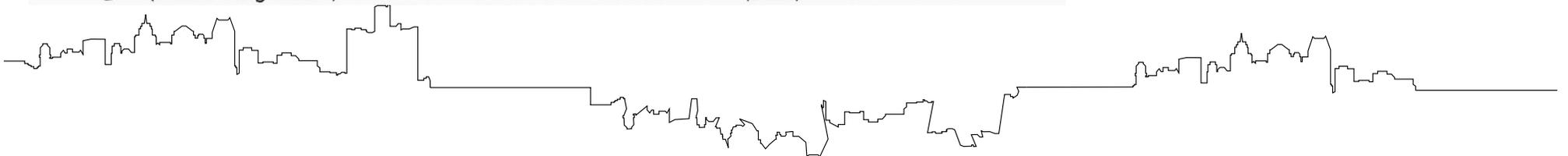
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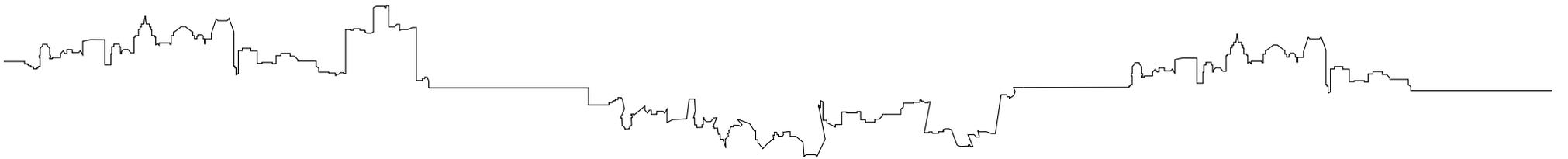

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Thesis Abstract

Laura A. Lutterman

Title

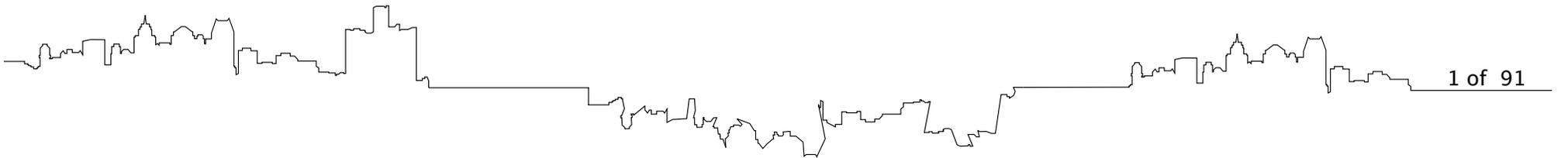
ADAPTABLE SPACES FOR CHANGING PACES: DESIGN FOR DEMOGRAPHIC SHIFTS

Summary

The built environment is currently designed with (only) the present demographic profile in mind. Designing in this manner fails to prepare for changes in demographic profiles and creates an obstacle for users when the program changes. The built environment needs to be designed in a manner that continually adapts to changes in the demographic profiles to facilitate a productive society.

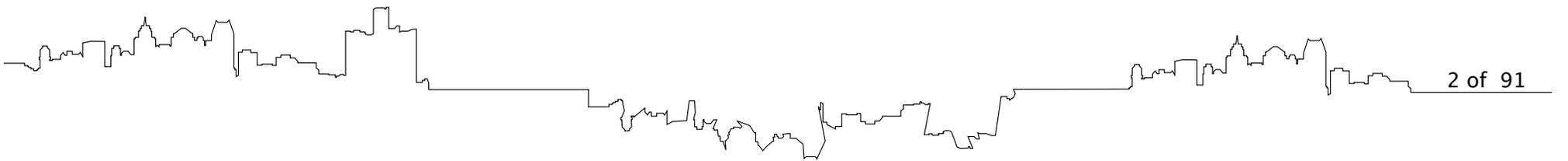
Keywords

Urban Renewal, Adaptable Design, Design for Assembly and Disassembly, Loq-Kit Building Component System



Problem Statement

How can a built environment, created with a modular construction system, prepare for dramatic shifts in a city's demographics?



Statement of Intent

Typology

A renovated and new multipurpose complex created in a adaptable and sustaianble manner.

The Theoretical Premise/Unifying Idea

Claim

The built environment must now be designed to prepare for changes in a city's demographic profile.

Supporting Premises

The users of the built environment comprise the city's demographic profile and are therefore the reason to design and build. With an ever fluctuating demographic profile there is a continuous need for changes in the program of a building and/or its built environment.

When the city's demographic profile changes significantly and buildings are no longer adequate, they are often replaced before their lifespan is over or left derelict. These desolate properties become socially dangerous to the built environment as they have visual, psychological and physical effects on the users. As poverty and crime radiates occupants are drawn to safer environments, creating a domino effect as more building's are left derelict.

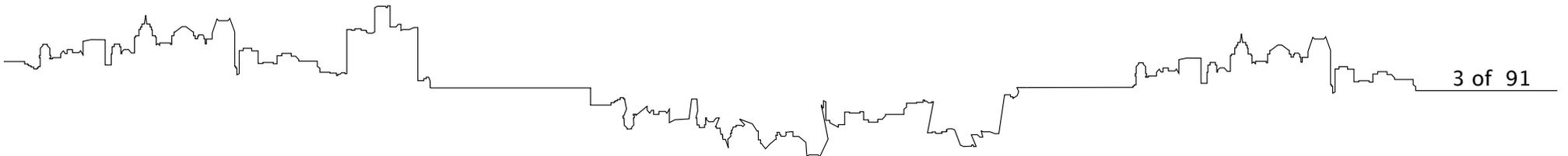
A cohesive built environment is essential for a city to maintain a successful infrastructure. Failure to maintain infrastructure results in poor health, the overconsumption and waste of resources, improper disposal of waste, and does not facilitate a productive society.

Conclusion

The built environment needs to continually adapt for shifts in a city's demographic profile to maintain its infrastructure; this can be done with a sustainable modular construction system.

The Project Justification

The built environment is thrown out of equilibrium with an ever-fluctuating demographic profile. This imbalance is resulting in an overabundance of commercial and/or housing properties. By taking advantage of improvements in sustainable modular construction systems, one can adapt the built environment to the needs of the city.

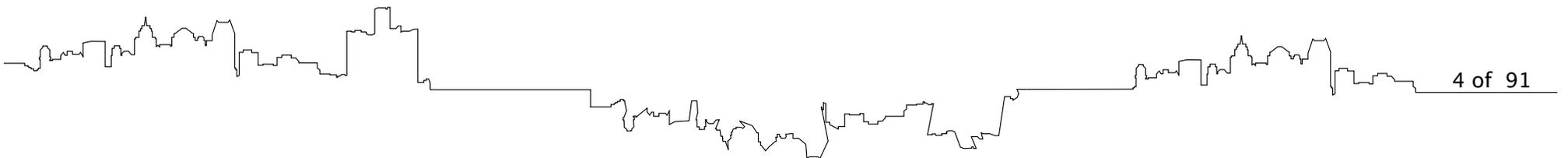


The Narrative

If our local or regional demographic profile changed, what impact would this have on our city? Our neighborhoods? Our schools? Would they be overcrowded? Or virtually empty?

In cities like Detroit, where the economy is more heavily affected by economic booms and depressions than most areas of the country and with a local population decline of 60% since 1950, thousands of buildings are foreclosed and derelict ("Detroit works project," 2010). A derelict building within a city is like the first tile in the domino effect: once a force is put on the tile it falls over, affecting all the tiles around it. Within a city, the force is crime: once crime becomes apparent, the occupants of the built environment migrate to safer environments (the suburbs), leaving more derelict buildings and attracting more crime.

Why is this happening to American cities? The built environment is currently designed and built for the present demographic profile with traditional building methods that ignore the possibility of change in user and program. Failing to prepare for future adaptation exhausts a once cohesive built environment and weakens the city's infrastructure.



User/Client Description

The Client

Is a private developer who will lease floor area to business owners, government programs/institutions and residents.

The Users

It is assumed that an undetermined number of users will have physical restrictions, medical, and/or mental health issues. With this in mind all spaces will be ADA compliant, and any additional accommodations will be established as needed.

National Grocery Chain

The grocery store will be one of the only full service grocery stores in the city. This space should have multiple entries and be on the ground floor.

The peak hours of usage will be from 7:00 a.m. to 9:00 a.m., 11:00 a.m. to 1:00 p.m. and 4:00 p.m. to 9:00 p.m.

The Coffee Clock

Detroit was the first city to have brewed coffee from an automatic coffee maker, "the Coffee Clock." This coffee shop will be unique as it will brew coffee from replicas of the original "coffee clock."

This coffee shop will have 12 employees rotating between 3 shifts. The peak usage will be from 7:00 a.m. until 10:00 a.m. and 11:00 a.m. until 1:00 p.m.

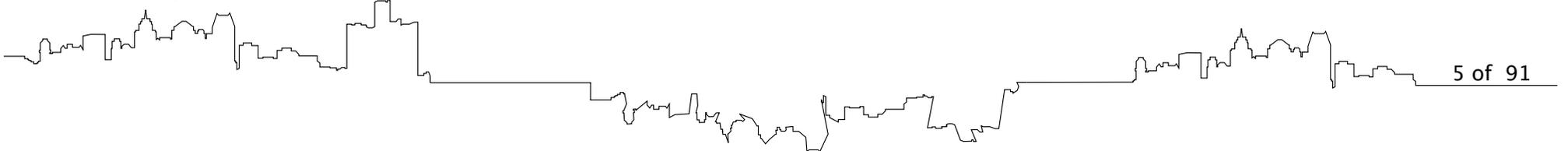
Retail

The retail spaces provided on the ground level will provide retail spaces that can easily transform from one tenant's needs to another.

The peak hours of usage will be from 11:00 a.m. to 1:00 p.m. and 4:00 p.m. to 8:00 p.m.

Adapt Business Units

Business units will be occupied from the hours of 7:00 a.m. until 7:00 p.m. The number of users and parking requirements have not yet been determined.



User/Client Description (Continued)

Adapt Condominiums + Apartments

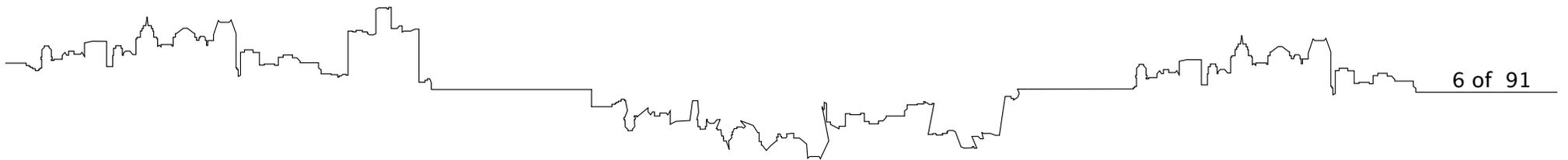
This complex will provide a diverse range of condominiums and apartments for Detroiters. Currently 86% of residents are single-family homes ("Detroit works project," 2010).

To ensure the safety of Detroiters there will need to be a private and controlled entryway. Each unit will need a minimum of 1 parking spot. The units will primarily be occupied during the evenings and early mornings (non-business hours).

Nursing Home

Each room will be designed for 1-occupant and will share a bathroom with the neighboring occupant of the same sex. The nursing home will require wide doorways and hallways. Each nursing home floor will have a nurses station, kitchen, dining room and activity room.

The nursing home will be occupied 24-hours a day by residents and staff, with peak visiting hours from 7:00 a.m. to 9:00 a.m., 11:00 a.m. to 1:00 p.m. and 4:00p.m to 7:00 p.m.



Major Project Elements

The program currently contains a wide variety users, while all users may not be present in the final project. My intention is to show that one structure could be used and adapted for multiple purposes. I am hoping to illustrate that one structure can be used for retail, apartments, business offices and a nursing home and that the use of the spaces can change depending on the demand.

National Grocery Chain

- Offices
- Restrooms
- Kitchen
- Cold and dry storage
- Employee break room
- Employee Restrooms

The Coffee Clock

- Commerical Kitchen – adequate for bakery items and simple sandwiches.
- Private Restroom – for employees.
- Public Restrooms – for customers.
- Management Office – should be in a private and secure location.
- Public Seating Area – should offer a relaxing and safe environment for customers. Computer work stations should be included in this space.

Retail

- Retail Floor Area
- Restroom
- Office
- Stock Room

Adapt Business Units

- Lobby
- Offices
- Conference Room(s)
- Computer Overhead Room
- File Storage
- Copy Room
- Break Room
- Public Restrooms

Adapt Condominiums and Apartments

- Kitchen
- Living Room
- Bathroom
- Bedrooms
- Storage
- Laundry

Nursing Home

- Laundry
- Office
- General Storage
- Medical Storage
- Equipment Storage
- Pantry
- Service Kitchen
- Public Restroom
- Classroom
- Bed Pan Room
- Break Room
- Nurses Station
- Dictation Room
- Activity Room
- Dinning Room

Site Information

Macro: Region

Michigan, being bordered by four of the five great lakes, has a climate that is unusually moist for the midwest. The region's land, which was once heavily wooded, is slowly being restored. The fertile soils of Michigan's southern peninsula are primarily used for agriculture.

Macro-Micro: City

Over the decades, Detroit has been a city that is too dependent on one industry, making it sensitive to the national economy. In addition to Detroit's 60% decrease in population, the city is also challenged with the highest unemployment rate in the country, 55,000+ foreclosed properties, 77% of jobs located 10 miles from Detroit's city center and limited mass transit-- because of the cities dependency on the automobile industry, in the past, the citizens rejected plans for a masstransit system.

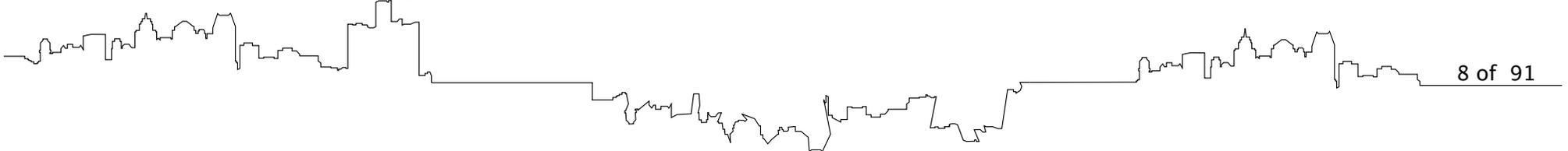
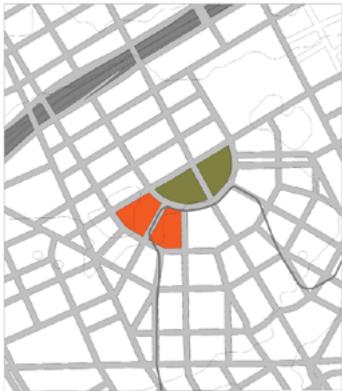
Detroit is one of few cities in the United States that has suffered from a dramatic shift in demographics, making it and ideal city to research the causes and preventions of urban decay. In August of 2010, Mayor Bing established the Detroit Works Project. The project held several open forum discussions in September to hear the concerns and ideas of Detroits Citizens. A project team and advisory task force have been created to help develop a plan for Detroit's future.

Micro: Site

The site is located southwest of Grand Circus Park and was home to the Tuller Hotel (demolished), the United Artists Building and Theater, the Statler Hotel (demolished), and the AAA Building (which was damaged during the demolition of the Statler Hotel).

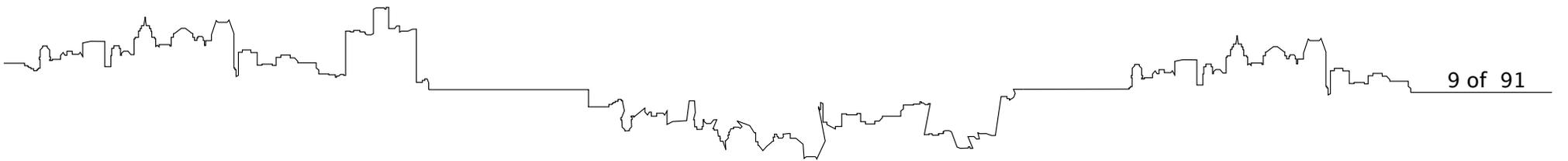
The Tuller Hotel was demolished in 1992 after is was deemed unrepairable. The Statler Hotel was demolished in 2005 because it was more feasible to demolish the building than to renovate.

The city has currently proposed a Woodward Lightrail Project to transport Detroiters in and out of the city.



Project Emphasis

This thesis project will explore: modular construction systems and its use in new construction; and the cause and solutions of urban decay.



Plan for Proceeding

Definition of a Research Direction

To make certain that the research for this thesis is thorough, guiding it to an appropriate and valuable solution, the following areas will be explored: the theoretical premise/unifying idea, project typology, historical context, site analysis and programmatic requirements.

Design Methodology

A Mixed Method Quantitative/Qualitative Approach with a Concurrent Transformative Strategy will be used, producing both quantitative and qualitative data to conform the research for this thesis. Premises developed in the Theoretical Premise/Unifying Idea will guide the direction of the strategy, generating different types and quantities of data.

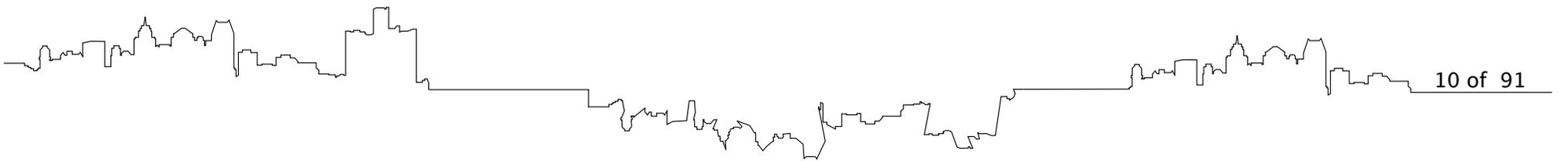
The quantitative data will include, but is not limited to, Statistical Data gathered and analyzed locally or obtained through an archival search and scientific data measured and obtained through instrumentation and/or experiment.

The qualitative data will include information gathered from direct observation, local survey, archival searches and direct interviews.

Documentation and Design Process

Throughout the research and design process, information will be analyzed and recorded both digitally and physically--by means of a research notebook. Digital materials (renderings, floor plans, graphs, etc.) will be organized in folders and preserved with multiple electronic copies (created weekly) and backed up daily. Sketches, models and other physical materials will be stored for future reference after being recorded (photographed or scanned) and preserved with other digital materials.

At the conclusion of the research and design process, the proposed solution will be presented with a physical model in addition to plans, sections and perspectives. The research, which guided the design, and documentation of the proposed design solution will be compiled as an eBook and made available to future scholars through the NDSU Digital Commons.



Previous Studio Experience

2nd Year

2007 Fall – Mike Christenson, Assistant Professor of Architecture

Tea House – Fargo ND
Boat House
Commercial Mixed Use – Fargo, ND

2009 Spring – Stephen Wischer , Assistant Professor

Winery – Fargo, ND
Music House – Fargo, ND

3rd Year

2008 Fall – Cindy Urness, Assistant Professor

Hide-a-Bed
North Dakota Center for Excellence for Future Students – Fargo, ND
5 Week Project
Lake Aggasiz Regional Library-- Morehead, MN

2009 Spring – David Crutchfield, Assistant Professor

Hotel Galactica
Theater--Austin Texas

4th Year

2009 Fall – Don Faulkner, Professor

High Rise – San Francisco, CA
KKE Competition

2010 Spring – Darryl Booker, Paul Gleye, Frank Kratky

Santo Domingo – Santo Domingo, Dominican Republic
Marvin Windows Project – Tanzania
Santo Domingo Housing Project (Dominican Republic)

5th Year

2010 Fall – Mark Barnhouse, Assistant Professor

Water Analysis Project
3Part Analysis
Missouri River Water Research Station

Theoretical Premise and Unifying Idea Research

This research explores the need for adaptable architecture by investigating demographic trends and transformations and their effects on the built environment and infrastructure. Primarily, it focuses on concepts and theories of flexible architecture “that are not only responding to today’s problems but are also predicting the architecture of tomorrow” (Kronenburg, 2007).

For the purpose of this thesis, the following definitions apply:

‘Demographics’ refers to the characteristics of a population such as gender, age, race, income, disabilities, educational attainment, employment status and homeownership.

‘Population Trends’ indicates changes in a population over time.

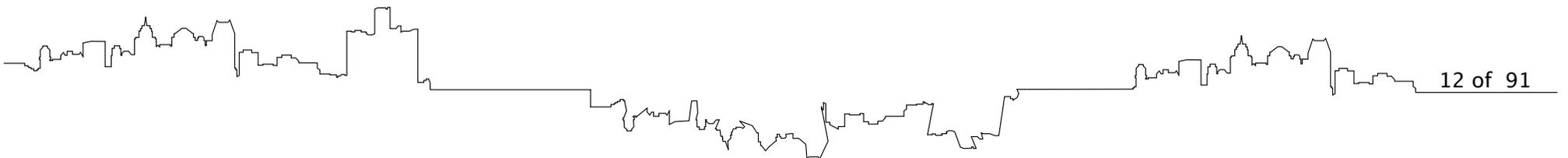
‘Demographic Transformations’ denotes a sudden change in demographics.

An Investigation of Demographic Trends and Transformations

The cities that we live in are constantly evolving as a result of social, political, natural and economic circumstances. These circumstances result in population trends and demographic transformations that reflect the “trends in fertility and mortality and in internal and international migration. These components underlie the changes in the size of our population, its geographic distribution, its age and sex composition, and its racial and ethnic composition. They also influence changes in the country’s housing and household composition” (Hobbs & Stoops, 2002).

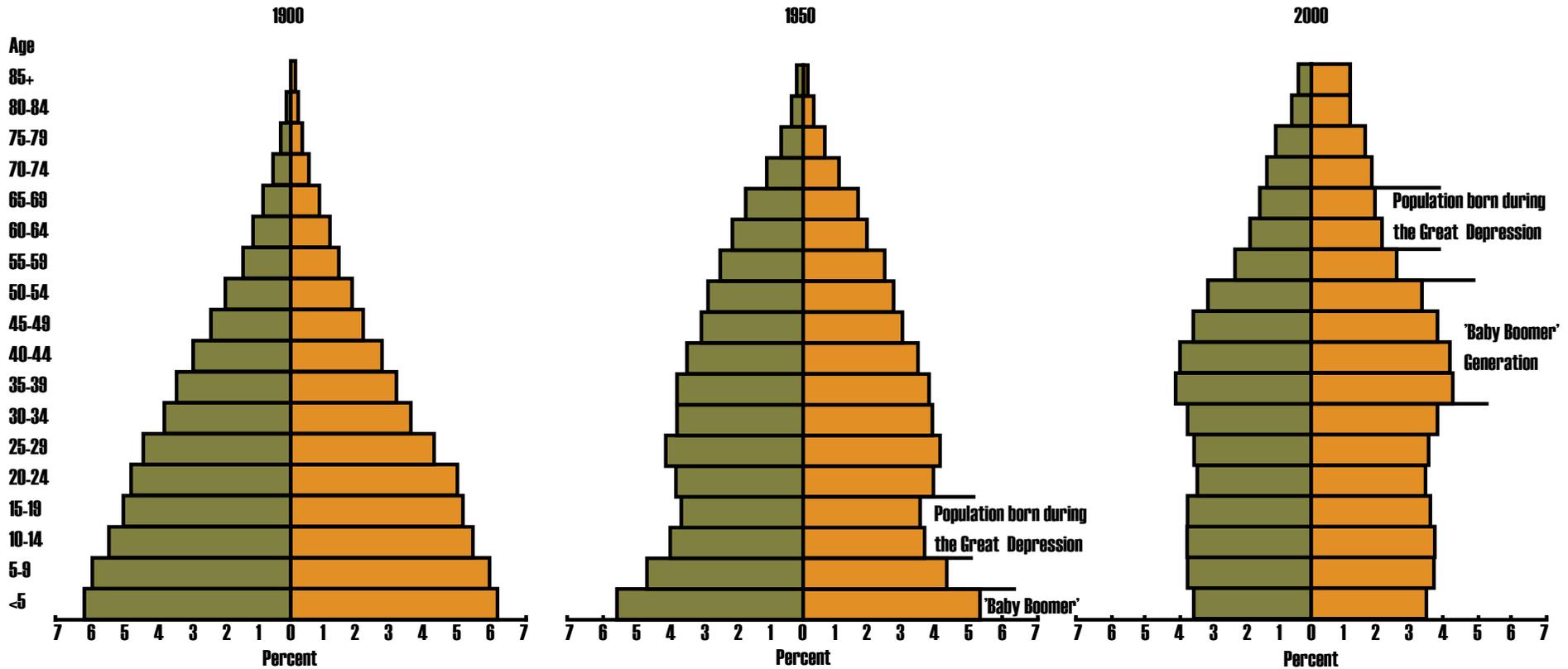
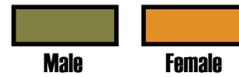
Population Trends

The population pyramids on the following page show the population trends in the United States over 100 years and convey the relationship between fertility and social, political, natural and economic circumstances. With steadily declining proportions, the population pyramid for the United States in 1900 characterizes a young and fertile population. The “pinch” in the 1950 pyramid shows a decrease in fertility and represents the proportion of the population born during a time of unfavorable economic circumstance, the Great Depression. The generational cohort that we know as the “baby boomers” is represented at the base of the 1950 pyramid and by the bulge in the 2000 pyramid.

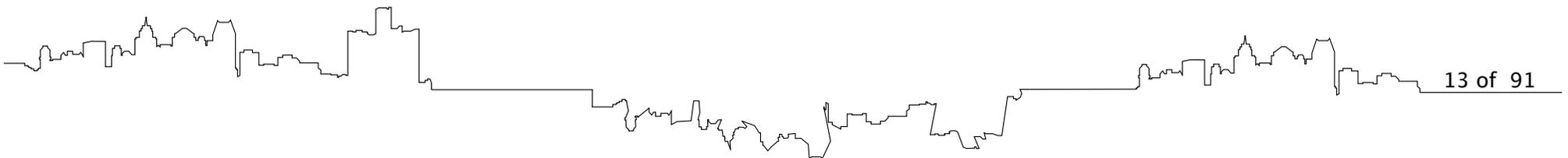


Theoretical Premise and Unifying Idea Research (Continued)

Age and Sex Distribution of the Total United States Population: 1900, 1950, and 2000



The comparison of these three population pyramids shows us that as our social, political, natural and economic circumstances change, we are becoming an ageing society as a result of our "simultaneously falling birthrate and the rising average age of population" (Ohno, 2010).



Theoretical Premise and Unifying Idea Research (Continued)

Demographic Transformations

Generally, demographic transformations are a result of natural disasters or social unrest in foreign countries. However, in recent history these demographic transformations have been a catastrophic result of social, political and/or economic disasters.

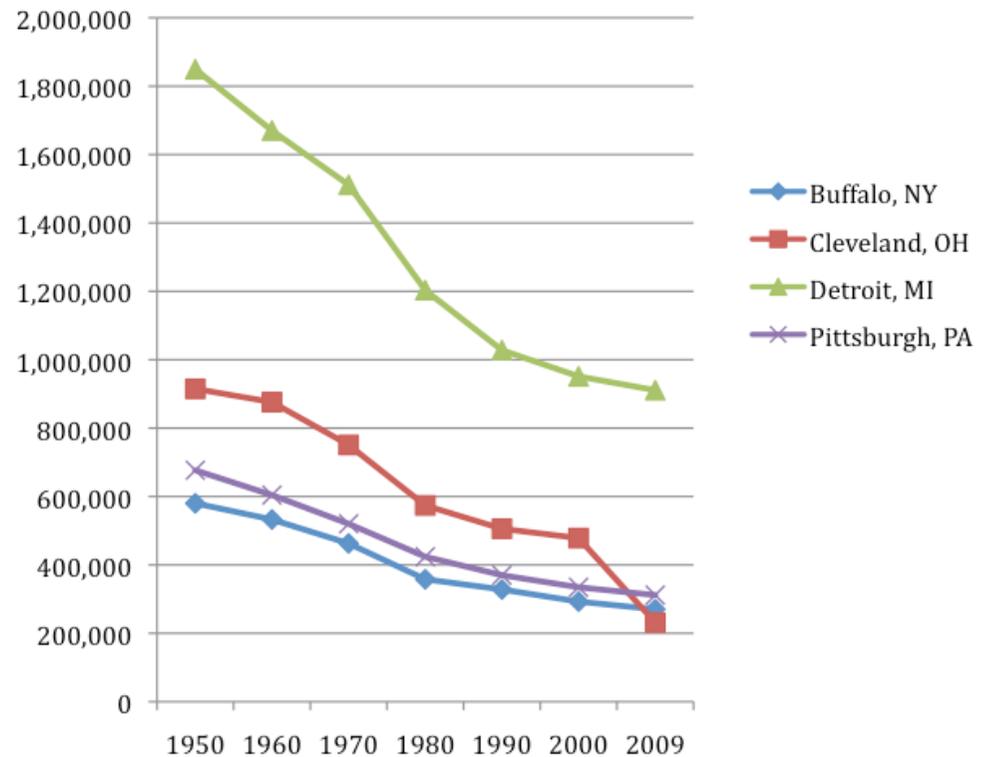
The Great Migration (1916–1970) was the first internal demographic transformation in the United States with nearly six million black southerners relocating to industrial centers in the North and West (Great Migration, 2011). This brought catastrophic social circumstances to Detroit, Michigan and Cleveland, Ohio.

During the 1960's and 1970's the mining and automobile industries could no longer compete with local and foreign markets and quickly closed or reduced in size. Detroit's automobile industry declined, Pittsburgh's steel mills closed, Buffalo's heavy industry relocated and was no longer a transportation hub, and Cleveland saw closure to its steel and automobile production centers.

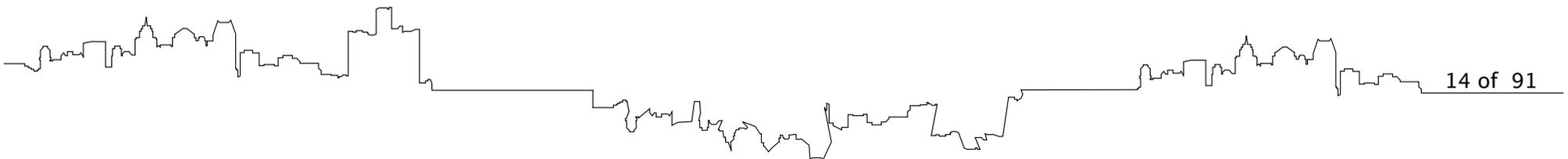
Between 1950 and 2009, the population of Buffalo decreased by 309,892; Cleveland by 683,439; Detroit by 938,647; and Pittsburgh by 365,159.

The 'Historical Context' of this thesis further explores the causes of demographic transformations and its effects on Detroit, Michigan.

Population Decline in Four U.S. Cities from 1950 - 2009



Source: U.S. Census Bureau, 2009 Population Estimates, decennial census of population 1900 to 2000.



Theoretical Premise and Unifying Idea Research (Continued)

The Effects on Infrastructure

While the causes of population trends and demographic transformations are diverse, the effects on the infrastructure of a city are similar. When demographic transformations take place, individuals generally relocate because they can; those who are left behind generally lack mobility and, like the elderly, rely heavily on public transportation. Because of this, the remaining populations generally live near public transportation routes or in the city center. The houses and facilities that are not accessible by public transportation will at some point become irrelevant surplus and is either left derelict or discarded.

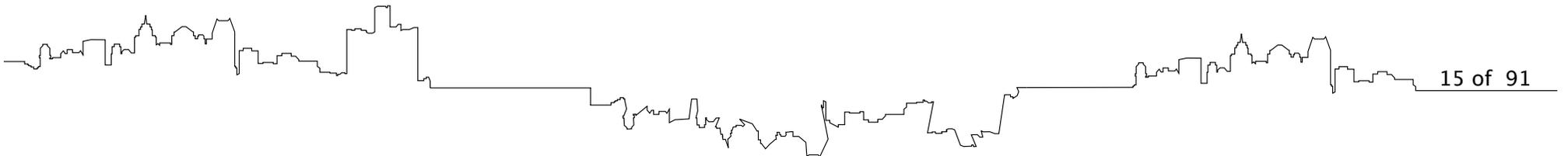
This creates two problems.

First, the buildings that are left derelict become socially and physically dangerous until the city acquires the funds to demolish the vacant structures. Generally, several void lots separate the occupied houses, taking away the sense of neighborhood, and preventing public departments—such as fire, police and sanitation—from operating efficiently. It can be predicted that taxes will increase and more businesses will close.

Second, our conventional buildings are assembled from an array of materials that are most often unrelated and physically altered as they are fastened together, resulting in an inability to recycle or adapt the existing structures. In most cases, it is more economical to obtain new materials than it is to retrieve those same materials from a derelict building; consequently creating significant energy outputs and 136 million tons of waste, while simultaneously losing 136 million tons of valuable resources in landfill across the United States annually (Durmisevic).

Youngstown, Ohio, is one example of a shrinking American city. After the mills shut down in the 70's and 80's, the population began to decrease from more than 170,000 to 80,000 as it struggled to attract new industry (Lanks, 2006). The excessive infrastructure led them to the willingness to downsize in hopes that the vacancy would turn from a liability to an asset. According to the Cleveland Urban Design Collaborative senior planner, Terry Schwarz, “In Youngstown there’s zero demand for new residential development and very little demands for retail uses . . . So the things we usually do—mixed-use housing with green spaces and such—didn’t have any relevance here because it simply would never happen” (Lanks, 2006).

The fact that entire blocks are torn into waste because of demographic circumstances within some cities while others are building new subdivisions reaffirms the idea that our current construction practices are not economical or environmentally friendly.



Theoretical Premise and Unifying Idea Research (Continued)

Syracuse is another American city that suffers from depopulation due to the loss of industry that has been symptomatic since the 1970's. Unlike the previously mentioned cities, Syracuse is not discussing what to do with the buildings; they are taking smaller steps to attain what they feel would be put the built environment and the social and economic conditions. Syracuse University dean of architecture, Mark Robbins, is leading the revitalization initiative. The professors at the university have and are working with local architecture firms on various projects, such as the recently completed Syracuse Center of Excellence, which flows with the two elevated highways that cross through the center of the city and is an icon for renewal. The purpose of the project is to test human responses to indoor air quality and includes test bays for experimental building envelope systems, research wing, laboratories and offices. The building also uses “technologies such as Carrier’s geothermal pumps and heat exchangers, photovoltaic panels, under floor displacement ventilation, rainwater recycling, and automatic shading and lighting systems are integrated with more traditional features” (Zacks, 2010).

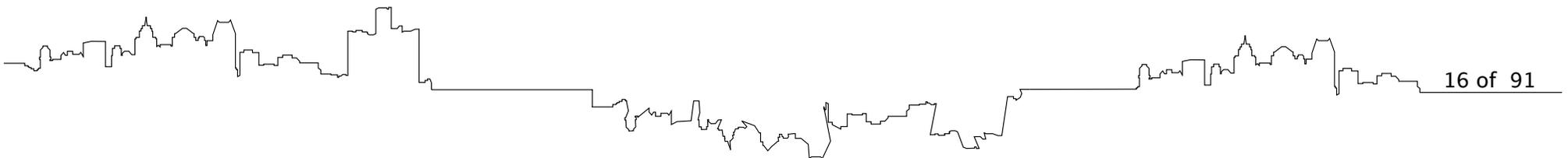
The university’s purchase and renovation of a warehouse downtown for the College of Visual and Performing Arts and the School of Architecture was a result of Robbins' ability to influence the new investments of the university. The revitalization initiative also organized a green-home design competition with Home Headquarters. Another project in this series of urban interventions is a Connective Corridor project that seeks out discussion with the public to gather ideas and focuses on streetscape and urban design.

Another urban design initiative converts one-way streets to two-way streets, incorporates bike paths, signage, and lights and redesigns parks. The project also improves the infrastructure of the county by incorporating storm water catchments to assist in reducing sewage overflow, avoiding pollution and preventing the need for a new water treatment plant.

Solution: Theories and Concepts of Flexible Architecture

For architecture to improve circumstances during or lessen the effects after a demographic transformation or trend we need to establish a successful industrialized building “strategy (the prototype) that is not the creation of a single building” but the conception of a system for fabricating buildings with limitless configurations (Freet, 2007).

A successful industrialized building system should be one that not only creates limitless configurations, but also be affordable and durable structures that can be assembled and disassembled without altering the physical makeup of building components. This type of system would give used building materials and components value.



Theoretical Premise and Unifying Idea Research (Continued)

Design for Disassembly and Adaptability is one of the most recognized theories of flexible architecture. This theory does not consider the building as one mass but as an object that can be easily assembled and/or adapted, then disassembled and recycled at the end of its lifecycle.

According to Vince Catalli, analysis of the design process should be carried out regarding:

'Systems' analysis at this level is generally applied to adaptable buildings that can change over time to suit changing requirements. In some cases, largely in Europe at present, entire modular buildings can undergo wholesale disassembly, relocation movement, and reuse.

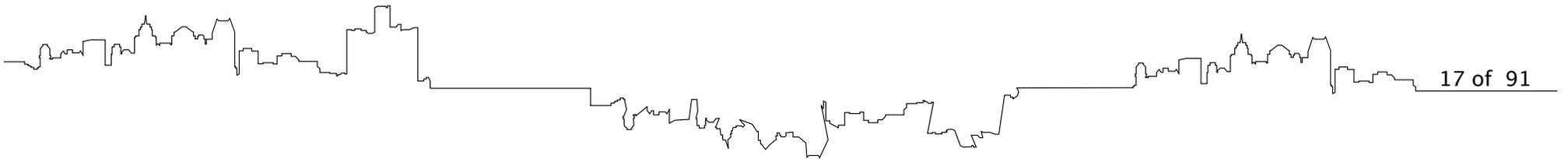
'Elements' analysis at this level focuses on a major building part, such as a roof, foundation, wall, or raised flooring system as well as designs for modular and panelized elements that can be readily fitted into common dimensional standards.

'Component or Assembly' at this level, analysis is focused on combinations of several subcomponents that are non-structural: layers of the building. These layers or systems should be designed to allow upgrading, repair and replacement. The replaced products can then enter the recycling loop or be used again in some form. An example of a component or assembly is a carpet system consisting of carpet, backing, and adhesive.

'Subcomponents' analysis of subcomponents breaks down a component into its smaller pieces, e.g., the duct [work system] of a heating or cooling system, or the glazing used for curtain wall.

'Materials' when a product has been stripped back to its most basic materials these can be reused or, at a minimum, serve as a feedstock in the recycling process to produce other materials.

The principles of design for disassembly and adaptability fall into two respective categories: the principles for adaptability deal with the practical use of space and the long-term usefulness of the building, while the principles of disassembly expand on the notion of 'reduce, reuse and recycle' and "applies to the assemblies and systems within a building that can be disassembled at the end of the building's life cycle or renovated with the potential for components and the assembly to be used for other environmental purposes" (Vince Catalli, 2010, pp. 2).



Theoretical Premise and Unifying Idea Research (Continued)

Design for Adaptability Principles:

'Versatility' allows a percentage of floor area to be used for multiple functions while avoiding changes to the main characteristics of the space on a daily, weekly, or monthly basis.

'Convertibility' allows a space to convert from one use to another use when the occupant requirements change. Planning for convertibility requires the designer to be thorough in the initial design of the structure and to anticipate minor reconfigurations of non-structural components to adapt a space for a new function.

'Expansibility' allows for a building to expand horizontally (by adding floors and floor area) or vertically (by adding floor area).

Design for Disassembly Principles:

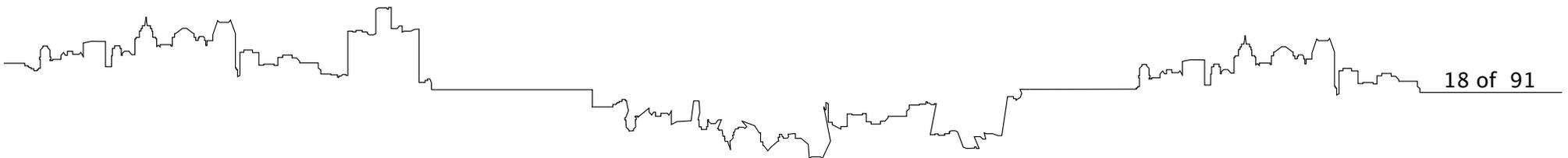
'Accessibility' of components should be considered to economically facilitate efficient maintenance and replacements of all components.

'Documentation of disassembly information' should include clear instructions on the disassembly of specific components, and the reusability and recyclability of materials in the specifications and construction documents to extract the maximum benefits of designing for disassembly.

'Durability' refers to the capacity in which a material can maintain its physical structure.

'Inherent Finishes, Recyclables, Refurbish ability and Reusability' are the characteristics that describe the materials, which should be specified. The materials should have integral or non-toxic finishes and should be clearly labeled to assist future users in obtaining additional information to refurbish, recycle or reuse the building materials or components.

'Exposed and/or Reversible Connections' are critical to facilitate disassembly of building components. Connection components should be corrosion resistant and reversible whenever possible.



Theoretical Premise and Unifying Idea Research (Continued)

'Independence' from other components will minimize damage during removal, repair and disassembly.

'Simplicity' of design reduces the complexity, and simplifies the process of disassembly.

Design for Disassembly requires a significant amount of control over the design and construction process and has many benefits which include: adaptable buildings; more affordable repairs/upgrades; allowing worn materials to be removed and replaced before failure without destroying other materials in the process, thus extending their lifecycle; minimizing waste generation; reducing energy outputs; and improving the utilization and recovery of resources (Catalli, 2009).

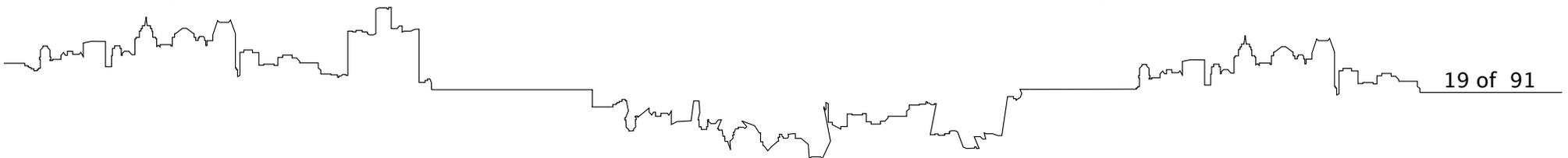
"We need to rethink our buildings and infrastructure design to be more durable, flexible, and adaptable. At a more detailed level, the design and construction industry must work with the material supply chain to produce environmentally, socially and economically sustainable solutions; and to work on connection details, especially between different materials. The potential benefits are considerable, and include not only more efficient utilization of resources and reduced environmental impacts; but also a greater degree of control over the construction process with a consequent increase in building quality." (Catalli, 2009)

In 2003, Minneapolis based architecture firm PAF Architecture, LLC developed a viable strategy of Design for Disassembly, Loq-Kit—a patent pending system that uses an assembly-based approach, "where the individual parts are engineered, mass-produced, and assembled without modification" (PAF Architecture, LLC, 2009). Loq-Kit's use of an assembly-based methodology minimizes the sameness that is seen in prefabricated and modular housing solutions by using a system of interchangeable parts that facilitate homeowners in modifying or their homes (PAF Architecture, LLC, 2009).

Loq-kit is the name of the company that will manufacture and distribute the components and is the brand name of the components and the houses that are assembled from them (PAF Architecture, LLC, 2009).

With the commercialization of Loq-kit the manufacturers service network would provide a "lifecycle service", a means of reuse and recycle, "so that the building materials are never abandoned in a landfill but are continuously redeployed in an economically suitable system of reuse" (PAF Architecture, LLC, 2009). The components, although used, remain valuable as a building material.

"A Loq-kit house is assembled by erecting a sequence-defined metal frame into which a variety of sequence-defined in-fill panels are placed—and over which all exposed structure and connections are concealed with various sequence-defined plastic coverings"



Theoretical Premise and Unifying Idea Research (Continued)

(Freet, 2007).

Building components are three varieties: sequence defined metal frame, sequence-defined in-fill panels and sequence defined snap-cladding components.

The sequence that coordinates the Loq-kit components is distinct from the regulatory grids of the past in that it “utilizes an alternating sequence of two modules—a module A and a smaller module B” (Freet, 2007). This A, B, A, B grid sequence defines the connection width, module B, and the space between each possible connection, module A.

The size of Loq-Kit’s modular components are not fixed to the A, B, A, B grid sequence, but are regulated by a series of regular connection locations along the length, width and height of the building. This allows the systems sub-assemblies to “maintain their own unique size and shapes based on utility, materiality, and structural needs, yet are able to conform readily to overall system dimension...Because the grid establishes a standard connection size and spacing, modular system dimensions result as a function of connection width and spacing” (Freet, 2007).

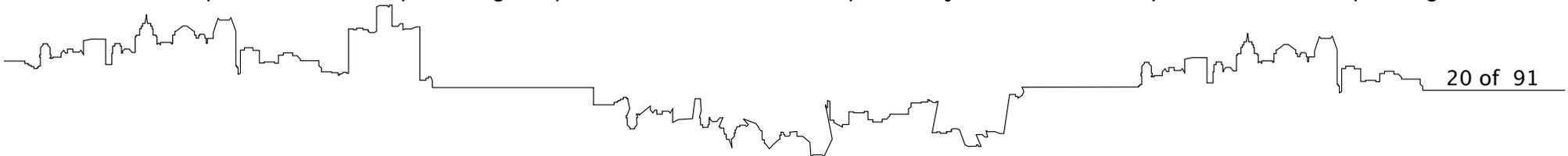
The loq-kit post and beam structure is a metal frame system defined by the A, B, A, B grid (Freet, 2007). The steel frame is the only loq-kit assembly that is assembled bolted connections.

Sequence-defined infill components are non-load bearing panels that are placed between the structural framework and create the building enclosure and provide protection from natural elements. Like the structure of a loq-kit home, the infill panels are regulated dimensionally by the alternating grid sequence—this allows panels to be placed in an endless variety of possibilities.

A 6-way connector was developed for exterior wall and window assemblies, allowing panels “to be locked together with pressure applied from one of six directions: above pushing downward, below pushing upward, left pushing right, right pushing left, inside pushing outside, and outside pushing in” (PAF Architecture, LLC, 2009).

All infill components are snapped into place with the 6-way connector and only after removing a screw from the connector can the infill components be released, allowing for components to be removed, interchanged or reused elsewhere. Structural and infill components can only be removed from the interior of the structure to keep the occupants safe.

The sequence-defined snap cladding components conceal and weatherproof the joints between infill panels. The weatherproofing



Theoretical Premise and Unifying Idea Research (Continued)

joints are generally a plastic extrusion that snaps over metal structural components.

Although the components design is highly technical it is simple to join the components so that persons of modest skill can assemble the building.

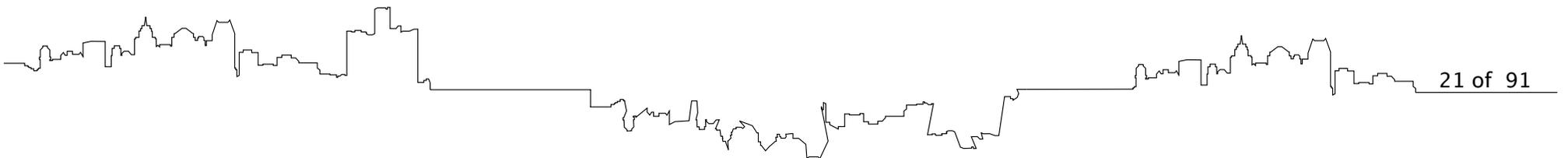
The benefits of a Loq-Kit home are: low building material costs, low building assembly costs, low building service costs, and compact reuse. Each component's connection method is incorporated into its design, making Loq-kit homes easy to assemble and accommodate a variety of change.

With a few modifications and/or variations of the Loq-Kit building components, the system could be used for an array of project types.

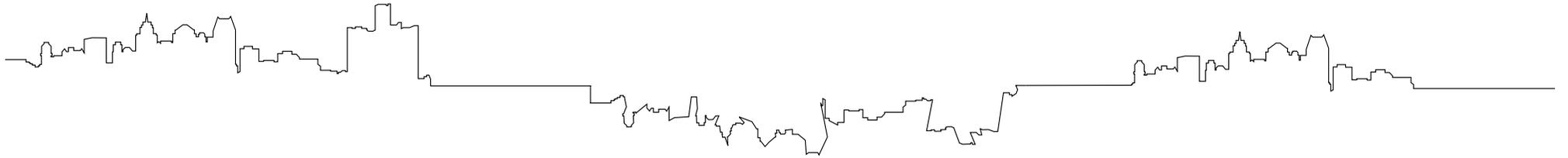
Theoretical Premise and Unifying Idea Research - Summary

This research has shown why a population goes through trends or dramatic transformation and how these demographic shifts effect the infrastructure/built environment. By better understanding demographic trends and transformations we can learn from the mistakes of the past.

Flexible architecture, and more specifically Loq-Kit, was the focus of this research. The Loq-Kit building components could be, and should be adapted for the use of more building typologies.



Typological Research



Case Study 1 - Liverpool ONE

Case Study 2 - Omotesando Hills

Case Study 3 - Matchbox

Case Study 1 - Liverpool ONE

Project Type: Mixed-Use Development

Location: Liverpool, UK

Size: 1.6m Sq. ft. on 42 acres of land

Liverpool ONE's most distinguishing characteristics are its size, architectural variety and focus on retail regeneration.

Program Elements

- 160 Retail Spaces
- 20 Bars and Restaurants
- Bus Station
- BBC Studio
- 5 acre remodeled park
- 600 Apartment Units
- Multi-screen Cinema
- 3000 Parking Spaces
(located under the park)



Image Source: Pelli Clarke Pelli Architects, 2010

Case Study 1 - Liverpool ONE (continued)

Research Findings

Liverpool ONE relates to the case study series in that it is a mixed use development. It differs from the other case studies in the series in that the size of the project is much larger, was designed by more than one architecture firms (22 to be exact) and was not constructed with prefabricated systems.

Liverpool ONE responds to the site by closely following the street grid that has existed in Liverpool for decades.

The project responds to the site socially by connecting different wards within the city.

Liverpool ONE is located on the site of the oldest commercial dock in the world; the design of the project commemorates the beginnings of the city as a world renowned port by allowing passerbys to look through the floor at the original wall of the Liverpool dock.

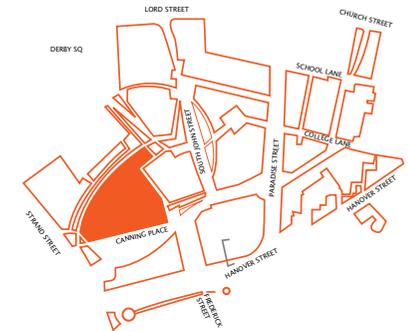
The project also responds to the culture of the site by refurbishing some of the oldest buildings in the city center, like The Bluecoat.

The proeject also responds to the site politically by incorporating a restored American eagle statue, which once represented the location of a pub by the same name. The American eagle is a symbol of the lasting relationship between Liverpool and the United States.

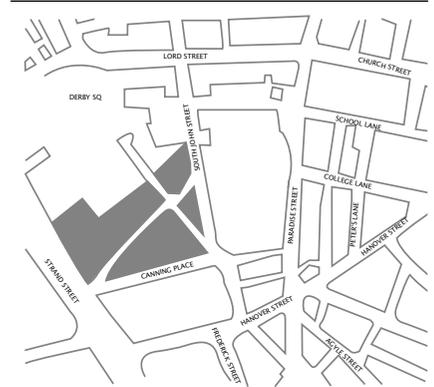
This mixed-use development seems to have been an attempt at improving the stability of the city's economy and population by re-establishing Liverpool's city center.

Conclusion

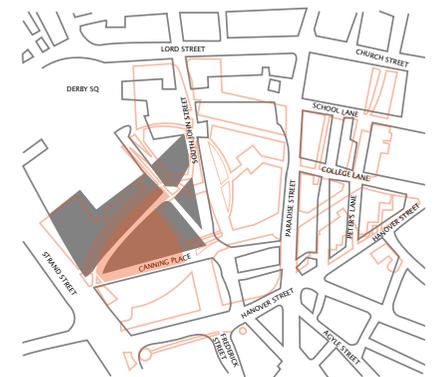
Like Detroit, Liverpool saw a dramatic decrease in population and a lack of inward investments resulting in the city's decline. The location of Liverpool ONE helps create a more cohesive built environment by replacing and refurbishing derelict buildings and connecting the docks and the



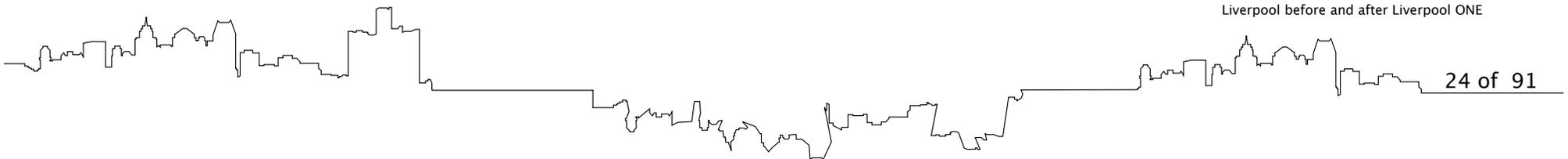
Liverpool ONE
The filled area is Chavasse Park



Liverpool prior to Liverpool ONE
The filled area is Chavasse Park



Liverpool before and after Liverpool ONE



Case Study 1 - Liverpool ONE (continued)

business district. The project improved the economy and brought tourists and shoppers back to the city, yet the population is still decreasing.

It will take more than an extreme regeneration scheme to improve Detroit's current position.

The regeneration scheme focused to much on retail and not enough on civic/ public spaces. While the project offers many great spaces The atmosphere is not as cohesive as it could be. While the client wanted alot of variety, you can still have variety with cohesive elements.

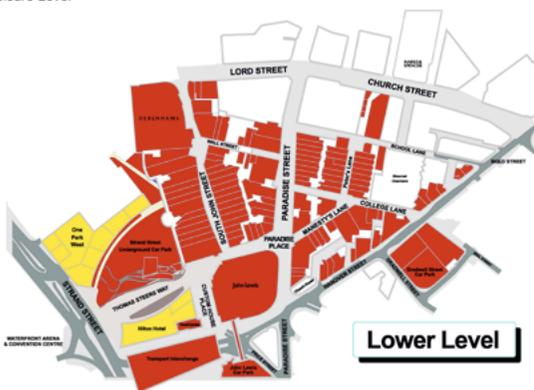


Image Source: Liverpool ONE

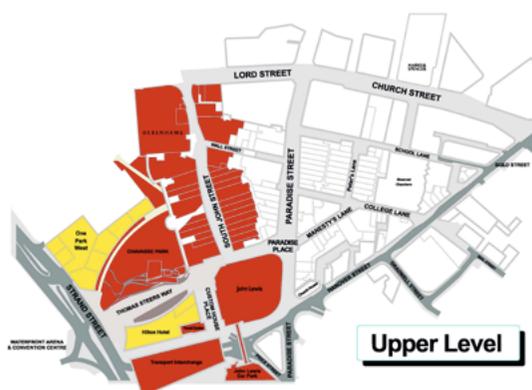


Image Source: Liverpool ONE

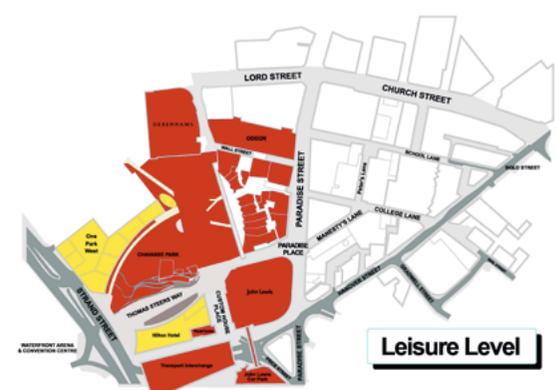
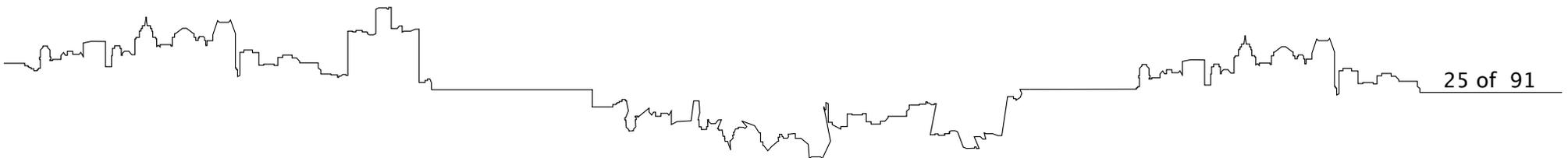


Image Source: Liverpool ONE



Case Study 2 - Omotesando Hills

Project Type: Cultural/Commercial Complex

Location: Tokyo, Japan

Size: 34,061m² on 6,041.36m²

Distinguishing Characteristics

At the core of the main building is the most distinctive characteristic of Omotesando Hills: the six level atrium space encompassed by a spiral ramp that is continuously lined with shops and restaurants.

Program Elements

100 Shops and restaurants
(24,666.46m²)

38 Residential Units (3,262.14m²)

196 Parking Units for Retailers

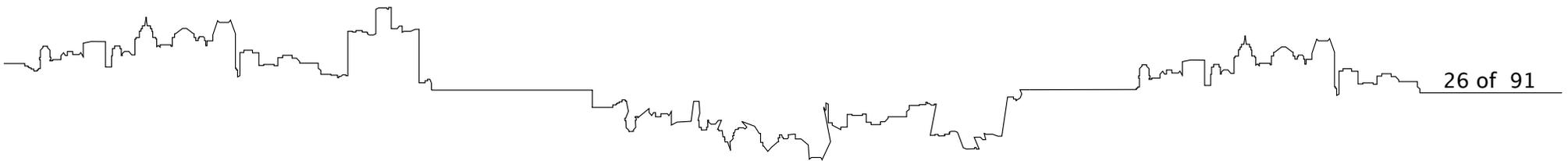
20 Parking Units for Residents

6 Level Atrium

Public Toilets

71 bicycle parking spots (retail)

38 bicycle parking spots
(residential)



Case Study 2 - Omotesando Hills (continued)

Research Findings

This case study is similar to the others in that the program consists of commercial and residential spaces. This case differs in that it includes bicycle parking spaces in the program and is based on the idea of "Media Ship." Omotesando Hills differs from Liverpool ONE in that it is used as a venue for cultural and artistic events, not just shopping.

The design of Omotesando Hills harmonizes with the environment by maximizing the use of underground space to keep the structure at the same height as the zelkova trees, which line Omotesando Boulevard.

The slope of Omotesando Boulevard is contiguous with the 700m ramp which encompasses the atrium. The project also incorporates rainwater collection.

Omotesando Hills strengthens the local community through community events and by creating a link from the Omotesando Subway Station to the Meiji Jingu Shrine.

Analysis

Structure: steel frame reinforced concrete, reinforced concrete (partial), steel frame (partial)

Height 23.3m

Depth 31.4m

Conclusion

This case study contributes to the theoretical premise and unifying idea in reaffirming the necessity of human links and connections to the environment. Buildings need to be created with the community in mind, not with the idea to create as much variety as possible to draw attention (like Liverpool ONE).

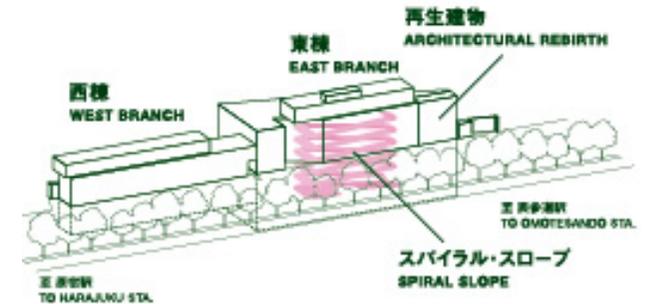


Image Source: Omotseando Hills

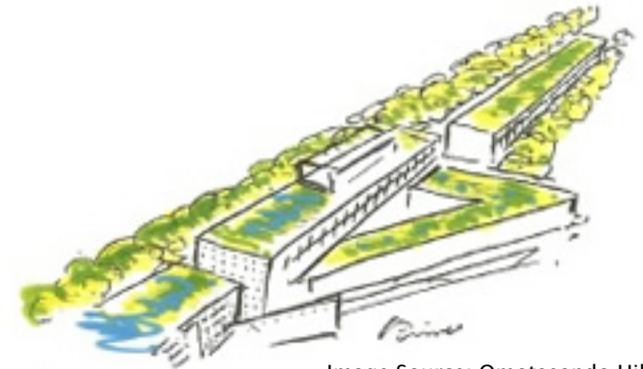


Image Source: Omotseando Hills

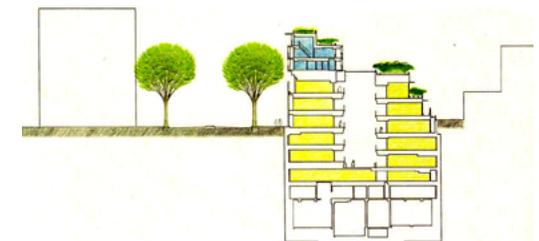
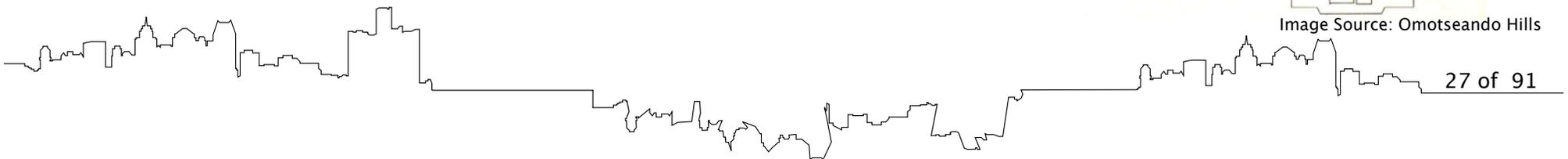


Image Source: Omotseando Hills



Case Study 3 - Matchbox

Project Type: Mixed-Use
Development

Location: Amsterdam, Netherlands

Size: 6,400m²

Distinguishing Characteristics

The most distinguishing characteristic of this project is the large black framed windows resembling film negatives.

Program Elements

22 Work Spaces (80–250m² per unit)

Rooftop Restaurant (250m²)

Parking Garage – 40 Spaces
(1,150m²)



Case Study 3 - Matchbox (continued)

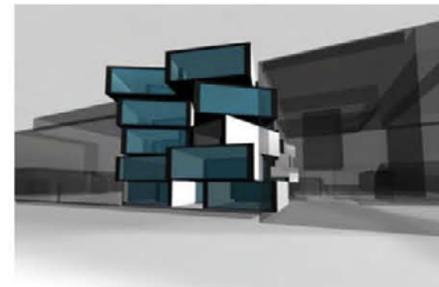
Research Findings

This project is similar to the other case studies in that it is a multi-use development, although it differs in that residential units are not included in the program.

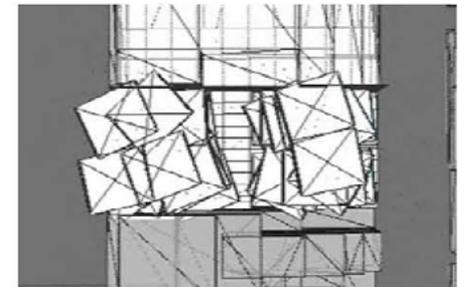
The design responds to the culture of the site by designing specifically to accommodate business in the creative industry--the project is located in the "artistic hub of Amsterdam" (Allard Architecture).



076 SI 0805 03



076 CI 0808 01



076 CI 0805 01

Image Source: allard architecture

The central atrium garden is designed to help ventilate the building and provide natural light.

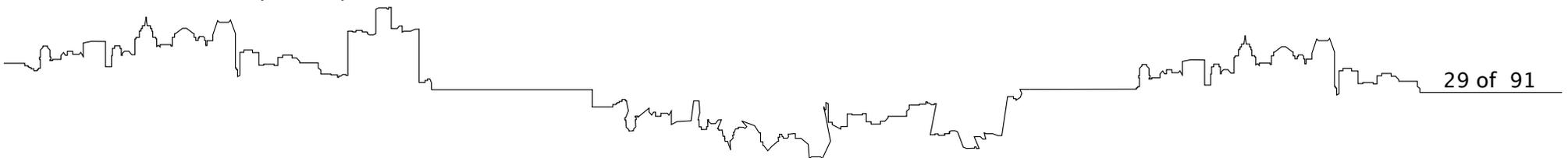
The ideas communicated by the architect and the ideas shown in the design are somewhat conflicting. Each box is supposed to give the company occupying the space its own identity, but the building as a whole has its own identity. It is a space that gives the occupants an opportunity to create their own identity in the building and that its not done for them. Identity can be created for the occupants in the way they dress the windows.

Analysis

Bridges connect the spaces to encourage horizontal and vertical networking between companies within the building. Cantilevered boxes are constructed of prefabricated concrete walls which hang on the shear walls. Interior walls (non-structural) are finished with galvanized steel allowing occupants to post their work with magnets.

Conclusion

This case study contributes to the theoretical premise and unifying idea in demonstrating how prefabricated structures do not all have the same characteristics. It is abounding that buildings that are prefabricated step away from being adaptable, ignoring the need for adaptable spaces.



Case Study 3 - Matchbox (continued)



Image Source: allard architecture

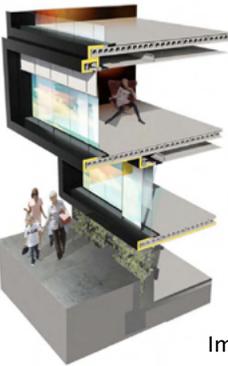


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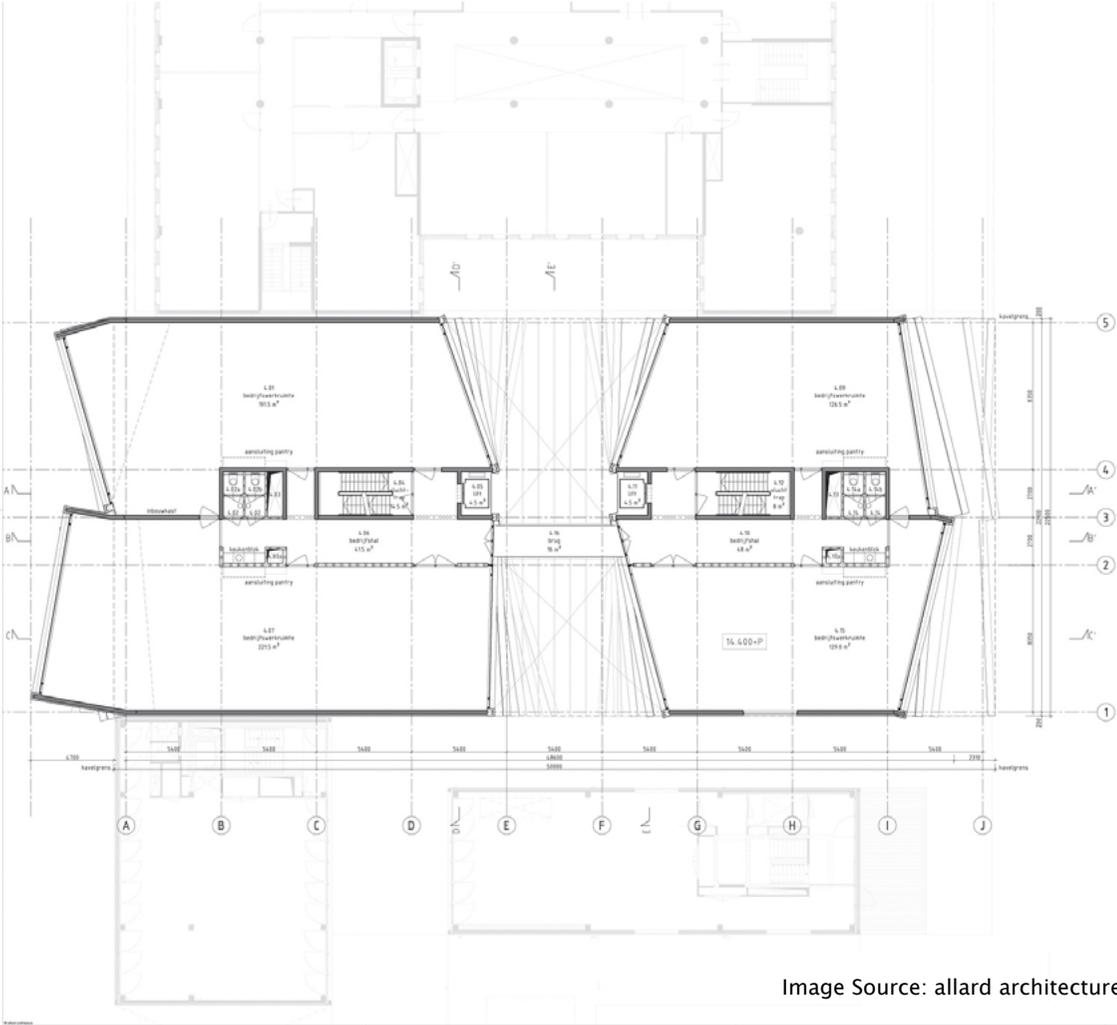
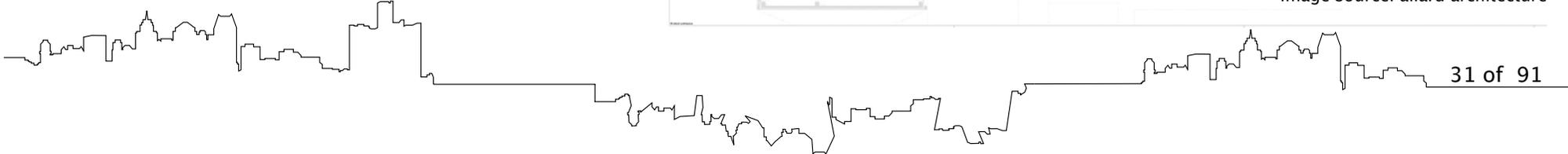
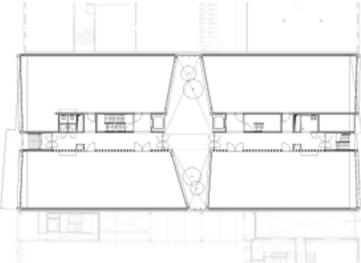


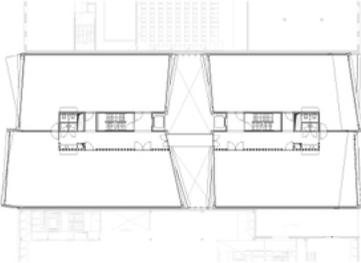
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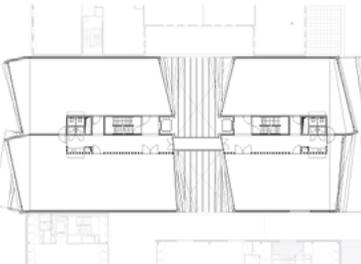
Case Study 3 - Matchbox (continued)



ground level



first floor



third floor



Image Source: allard architecture

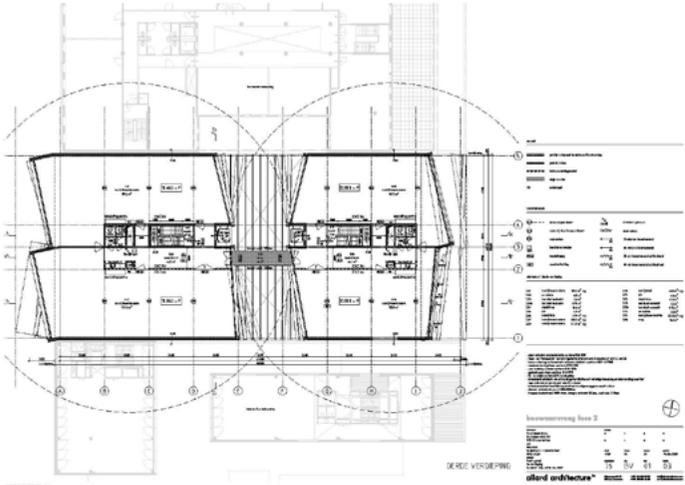


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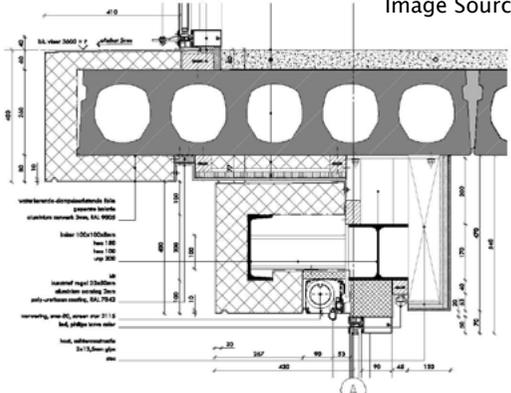
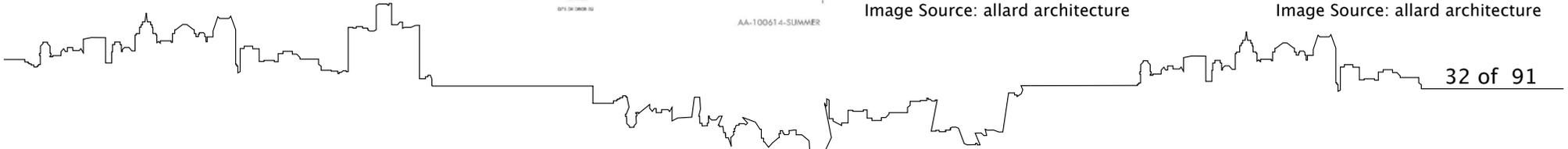


Image Source: allard architecture



Typographical Research - Summary

This new facility in Detroit's Central Business District would be described as a multi-use residential and commercial building. Because of the revitalization efforts of this community it was important to investigate a variety of mixed-use complexes that were built within historically significant districts. The three case studies for this series vary in size, style, construction and context. It was important to examine at least one city center regeneration project, one new construction with an emphasis on community, and one project with an emphasis on the historical context of the site. Although each case study in this series is very different from one another, I have found three important similarities that will contribute to this thesis.

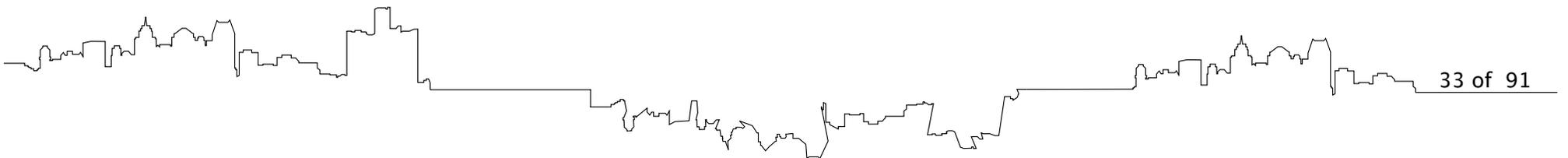
The first similarity between each of these projects is the variety that they bring to their environment. Liverpool ONE creates variety by revitalizing a once deserted area of Liverpool with a mix of remodeled buildings and new construction, which has varying styles and materials. Omotesando Hills is different from any other mixed-use facility in that it has a six-story atrium that is encompassed by a ramp to connect all of the retail spaces.

Another similarity between all three of these projects is the emphasis on the historical context of the site. Liverpool ONE shows the historical significance of the site by commemorating some of the artifacts left on the site. Omotesando Hills emphasizes its historical context of the site by replicating the height and footprint of the building that previously existed on the site. The Matchbox relates to its artistic context with a facade that resembles film negatives.

Each of these case studies are similar in that they all place circulation as an important aspect of the design. Liverpool ONE communicates the importance of pathways and circulation by closely following the original street grid. Omotesando Hills does this with its 700m ramp that rises with the exterior landscape, while the Matchbox does this with its central atrium and connecting skywalks.

In addition to these similarities, I feel that it is important to take notice of some of the differences between these case studies.

The scale of Liverpool ONE is much larger than the other case studies and covers several blocks. It shows one city's regeneration plan that gives tourists something—that I feel is—more interesting than the Mall of America. It is an eclectic combination of architectural styles trying to recreate that downtown pedestrian shopping experience.

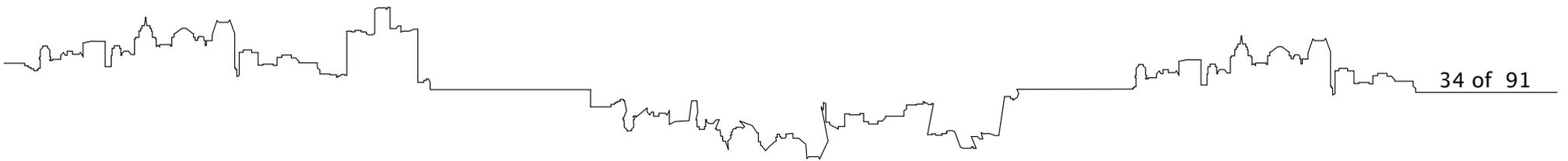


Typographical Research - Summary (continued)

Omotesando Hills uses one architectural style but focuses more on the community design of the public spaces rather than of the façade of the building.

The Matchbox is important to this series in that it focuses on the artistic history of the district and creating circulation that promotes interaction among the buildings occupants.

The similarities and the differences noted in this summary are issues that I find relevant to this thesis project. The ideas that these projects illustrate offer a variety of architectural solutions to explore during the study of this thesis.



Historical Context

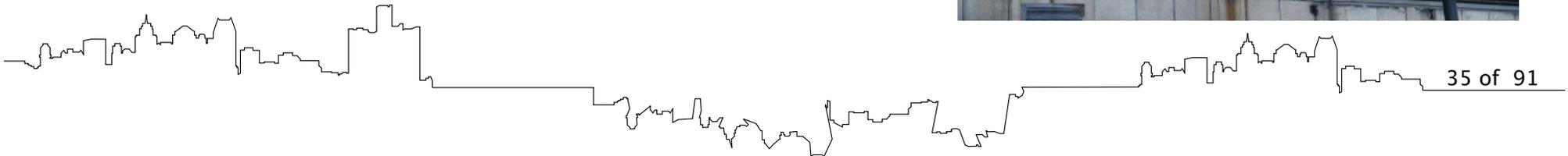
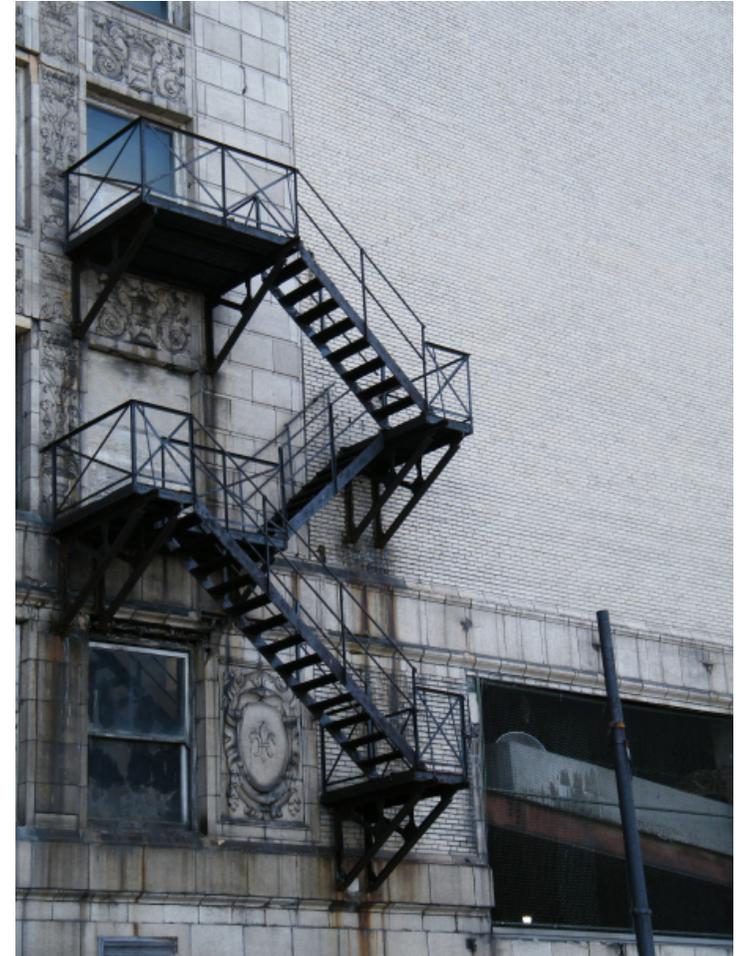
This project is set within the physical context of Detroit, Michigan. The social context of this project pertains to the issue of urban population decline and the resulting characteristics. This portion of my research will investigate and examine the causes of Detroit's ever-fluctuating demographics profile, which results in erratic demands for different building typologies and will examine the strategies that have been used by cities of similar circumstance.

Architects must understand the causes of demographic transformations and their effects on infrastructure in order to design a building that "retains its relevance and usefulness as time passes and circumstances change" (Kronenburg, p.116).

Generally, demographic transformations are a result of natural disasters or individuals' relocating/changing jobs. However, in recent history these demographic transformations have been a catastrophic result of social, political and/or economic circumstances.

In many of the industrial cities of the northern United States, such as Detroit, the evidence of such catastrophic circumstances is still apparent. The population of Detroit increased dramatically during the Great Migration (1910-1930) helping the city thrive until a chain reaction of catastrophic social, economic and then political circumstances changed its likely future.

To 'white Detroit' life in the automobile capital of the world seemed about as good as it could get and the problems of segregation were overlooked until the lines of segregation were drawn. Daniel Okrent, a Detroit native, wrote: "...not far from where I grew up, a home builder had in the 1940s erected a six-foot-high concrete wall, nearly half a mile long to separate his development from an adjacent black neighborhood" (Okrent, 2009).



Historical Context - Continued

In June of 1943 a fistfight between a white man and a black man turned into a three-day race riot that required Federal troops to intervene. The riot resulted in 34 deaths, 433 wounded, \$2million in property damage and the beginning of “white flight” from Detroit.

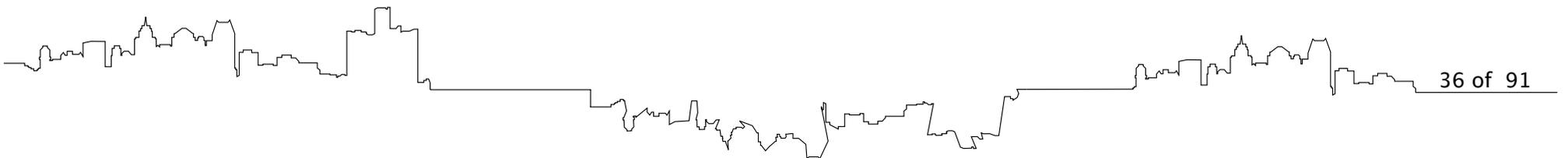
At this point, Detroit still had a mono-industry revolving around the automobile and every politician was elected with the support of GM, Ford, Chrysler and the United Auto Workers. The beginning of catastrophic economic circumstances was marked in 1956 when congressman John D. Dingwell resisted “tougher safety regulations, more stringent mileage standards, relaxed trade restrictions and virtually any other measure that might have forced the American Automobile industry to make cars that could not stand up to foreign competition” (Okrent, 2009).

The economic circumstances in Detroit were also affected by the high wages and luxurious benefits given to autoworkers and even more so by the United Auto Workers union insisting that “workers with comparable skill and comparable seniority be paid comparable wages, irrespective of who employed them” (Okrent, 2009).

Although Detroit was a majority-black city, racism continued to be a problem even after the Civil Rights Act of 1964. In July of 1967, five days of unrestrained rioting produced swathes of destroyed property—by looting and/or fire—and left 43 dead and 1,2000 injured. It took the police, National Guard and US Army troops to restore order to Detroit again. The rioting was a product of unspoken racism—the police brutality and segregation that kept blacks in non-progressive neighborhoods and deprived schools.

The election of Detroit’s first black mayor, Coleman Young, in 1973 drew the starting line for catastrophic political circumstances. Mayor Coleman Young was “at first effective when he wasn’t insulting suburban political leaders and alienating most of the city’s remaining white residents” (Okrent, 2009). However, over the twenty-years that Coleman Young was in office, the City of Detroit saw the school system decay, businesses close and the unemployment and crime rates soar. During 1984, Detroit became chiefly associated with Devils Night when 800 houses were burned to the ground within 72 hours. Even after Young left office in 1993, the residents of the city and the suburb could not collaborate.

This chain reaction of social, economic and political circumstances resulted in the dramatic depopulation of Detroit; from 1950 to 2000, Detroit lost 898,298 residents. Detroit is the only city in the United States to have reached over and then fallen below a population of 1 million.



Historical Context - Continued

Timeline of Detroit's History

1800's

The key industries were lumbering, mining and fur-trading.

1805

The capital of Michigan Territory was destroyed in a fire.

The War of 1812

Detroit came under British rule.

1813

Detroit was recaptured by Americans.

1818

Flour milling center of the county.

1861–1865 Civil War

following the war Detroit transformed into an industrial magnet.

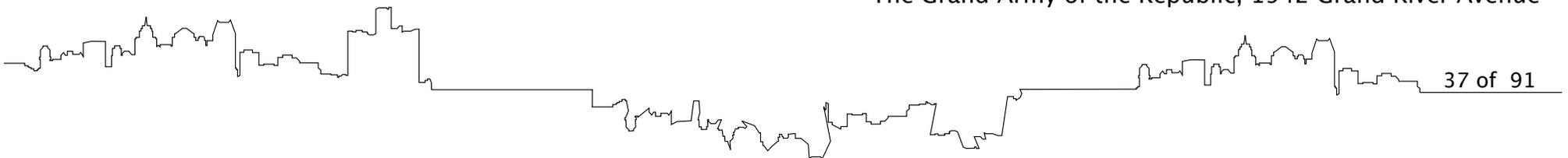
1914

Recognized as the automobile capital of the world. The Detroit automobile industry had produced over half of the world cars in the beginning of the 20th century.

Because of Detroit's mono-economy, it is sensitive to and has felt economic depressions and booms more heavily than in most areas of the country.



The Grand Army of the Republic, 1942 Grand River Avenue



Historical Context - Continued

1914–1918

(World War I) Industrial development accelerated as Detroit became a major producer of military armaments.

1916–1970

The Great Migration (Great Migration, 2010)

Detroit's reputation as a union dominated labor pool and General Motors nickname, "Generous Motors," attracted over 1,000,000 African Americans. The Great Migration added to the socioeconomic diversity and cultural variety of the city.

1943

After decades of racial tension, fighting broke out between the white and black communities.

1950

Population 1,850,000

Mid 1950's

The continued racial tension resulted in what became apparent as white flight and the start of Detroit's steady decline in population.

1960

The Cobo Convention Hall and Arena opened. Developers hoped that the center would attract conventions and their quick-spending buyers.

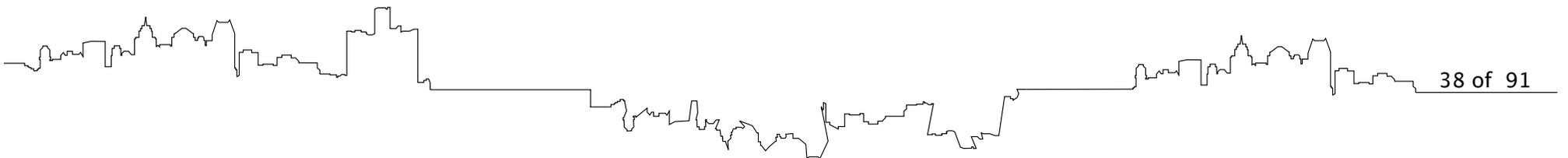
1961

"Detroit admittedly has its problems—intelligent citizen interest and action can solve them. As I see it, the vital need now is for the people themselves to become interested in the community and government and to take an active part in their affairs."

--Henry Ford II (Time, 1961)

1967

Beginning on July 23rd, five days of unrestrained rioting produced swathes of destroyed property—by looting and/or fire—and left 43 dead and 1,200 injured. It took the police, National Guard and US Army troops to restore order to Detroit.



Historical Context - Continued



1970's

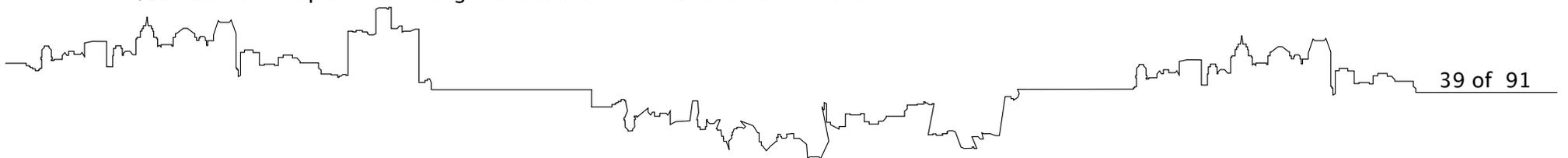
The oil embargo, increase of imported cars and the national economic recession caused an economic crisis in Michigan.

1977

\$500 million was spent on the General Motors Renaissance Center, a city-defining landmark. The project was intended to revitalize downtown Detroit.

1981

\$27 Million was spent renovating the General Motors Renaissance Center



Historical Context - Continued

1979–1982

The states unemployment rate became the highest in the country.

1990's

The last steel and copper mines closed as a result of higher productivity elsewhere.

Early 2000's

Auto industry nearly recovered.

2004

\$500 Million was spent on renovating the General Motors Renaissance Center for the third time.

2009

In Indian Village, Detroit's historic residential neighborhood, the median sale price of homes went from \$597,000 to \$8,000.

2010

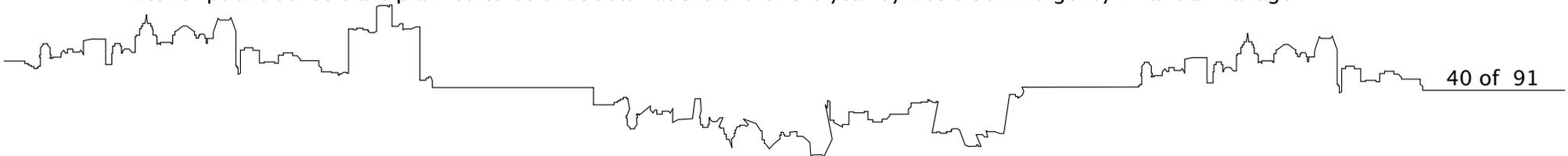
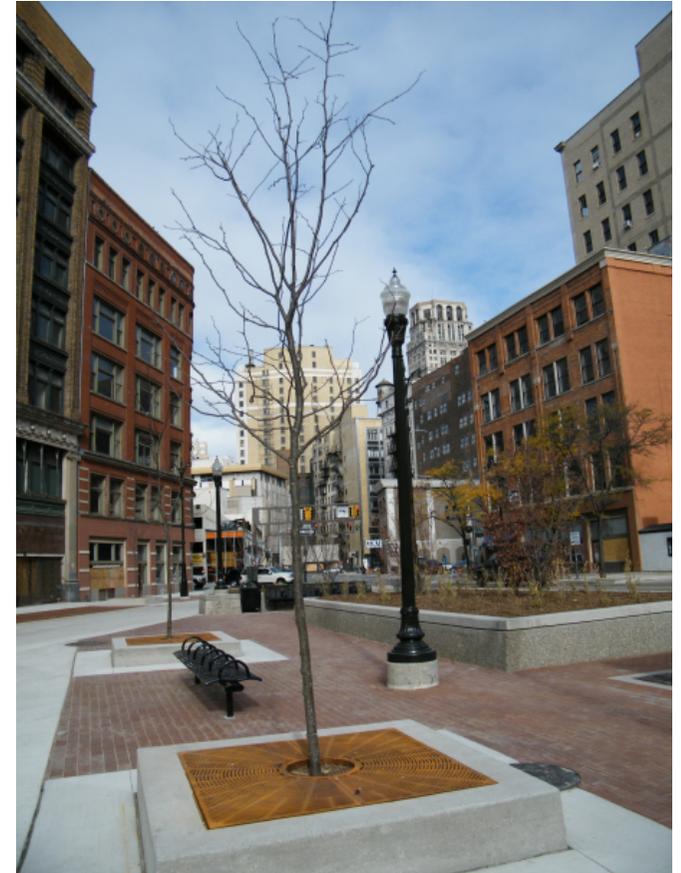
Population estimate 800,000 (60% decline from 1950).

1,867 Residential structures destroyed in the 2010 demolition process (Hackney, 2010).

Downtown's footfall increased by 6,000 with the relocation of Blue Cross Blue Shield, Quicken Loans, Strategic Staffing Solutions and GalaxESolutions in the central business district.

44% of adults are short of fundamental skills, such as reading, to be eligible for higher paying jobs (Gray, 2010).

25% of public schools are planned to be shut down at the end of the year by Detroit's Emergency Financial Manager.



Historical Context - Continued

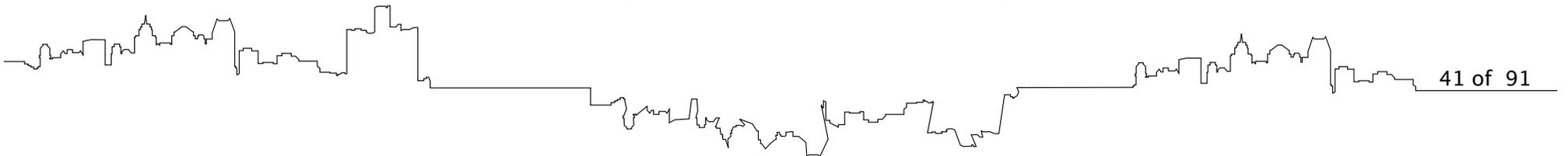
Statistics from the Detroit Works Project:

- 33% of the population lives below poverty level
- 80% of housing is single-family homes
- 86% of these homes are still in good condition
- 55,000+ properties are in foreclosure
- \$29,000 is the median income
- 30% Unemployment rate
- 77% of Jobs are 10 miles from central Detroit
- Over the last Decade 762,000 manufacturing jobs were lost in Michigan.
- 52% of Detroit Workers commute outside the city for jobs.
- 30% of households do not own cars
- Buses are unreliable in the Detroit Metro Area
- Public school enrollment is expected to decline by 11% by 2015
- The average grocery store is half the size of the average national grocery store.
- City's budget deficit is \$85 million
- It cost \$250 million to demolish the city's most dangerous abandoned properties.
- 600+ sites within the city are currently growing, producing and providing access to healthy food for residents.

Similar Projects in History

The General Motors Renaissance Center is one building from Detroit's past which is similar to the proposed program of this thesis. Both mixed-use programs are/were intended to assist in the revitalization of Detroit's downtown which will/would include commercial space, residential and/or hotel accommodations. The center was to be a symbol of the rebirth of the city and intended to help revitalize downtown but instead, the center drained vitality out of the already struggling downtown and has been called "the greatest urban tragedy of the country" by critic Roberta Brandes Gratz (Palm, 2000).

After 33 years and two different owners each initiating renovations, the complex is still criticized for having poor scale and symmetry. After the second renovation a stronger connection between the Renaissance Center and the city was created. The Winter Garden, which was also added on later improved the relationship of the building to the water—the Winter Garden is the



Historical Context - Continued

only enjoyable space within this building. The forms, surfaces and the juxtaposition of light and dark create intriguing spaces, although the structure is still overwhelmingly heavy. For visitors, way finding within this structure is not a straightforward experience.

In regard to the renovations, Jack Portman of John Portman and Associates (and the son of the architect) stated:

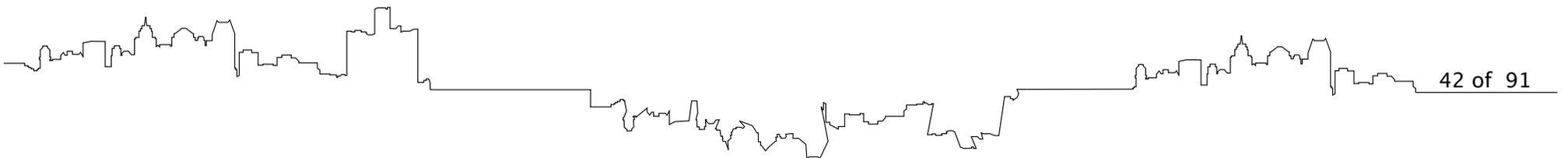
The need for an overhaul is to be expected... 'Real estate is something that needs to be rejuvenated quite regularly... Times change, fashions change, uses change. As cities evolve and grow, how buildings grow evolves within the context of the city' (Palm 2000).

In regard to Portman's statement only after omitting the idea that an overhaul is to be expected, It should not be expected that a building requires hundreds of millions of dollars in renovations within 5 years, or 10 years, or even 20—although times are changing faster, they're not changing that fast.

The Renaissance Center is 5,552,000 ft² spread throughout 7 towers located on 14 acres along Detroit's waterfront. The tallest standing standing is a 73-story tall cylinder that acts as a core at the center of the complex. Four 39-story octagonal towers surround the core tower and are offset by the two 21-story towers.

The Renaissance Center Program:

- 4 movie theaters
- YMCA fitness center
- 1,565 hotel rooms
- Food court (with a capacity to seat 1,100)
- Financial Center—with 5 banks and 10 ATMS
- 20,000 ft² conference center
- 44,000 ft² General Motors Show Room
- 106,500 ft² Ball Room
- 2 People Mover Stations
- Post Office
- The Winter Garden (a 14,000 ft² Atrium)

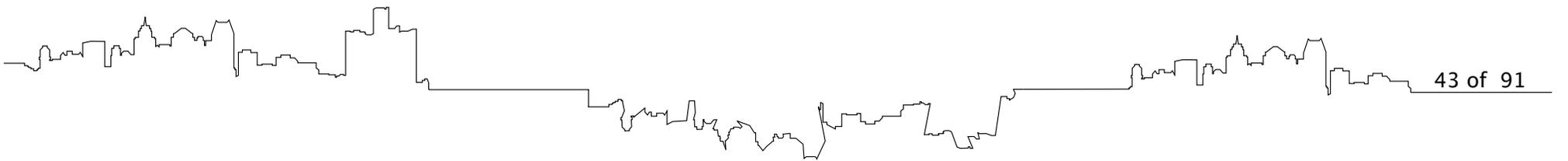


Historical Context - Continued

- 31,000 ft² Learning Center has
 - 13 adaptable training rooms
 - 5 breakout rooms
 - 2 lounge areas
- Underground Parking
- 165,000 ft² of Retail Space

When I visited the Renaissance Center in early November, the food court was virtually empty and most of the retail spaces were closed.

Detroit is not the only city in the world that has a shrinking population and swaths of derelict buildings. The IBA has 19 demonstration projects on how to respond reposition a city for current local conditions (Zacks, 2008). The cities of Bitterfeld and Wolfen took the approach of restructuring their administration into one entity—this collaboration increased tourism. The city of Dessau, the home of Germany's Bauhaus School of Design took a more drastic approach and demolished 2,642 units of dismal prefabricated apartments that replaced the rubble left behind in 1945 (Zacks, 2008).



Goals For The Thesis

Academic

The goal of my thesis is to bring awareness to and effectively communicate the the causes and effects of depopulation and how doing nothing affects the matrix of our society at different political levels.

To inform others on the ideas of in-built flexibility and design for disassembly. To educate others on how systems such as these could work together to improve the circumstances for for depopulating cities.

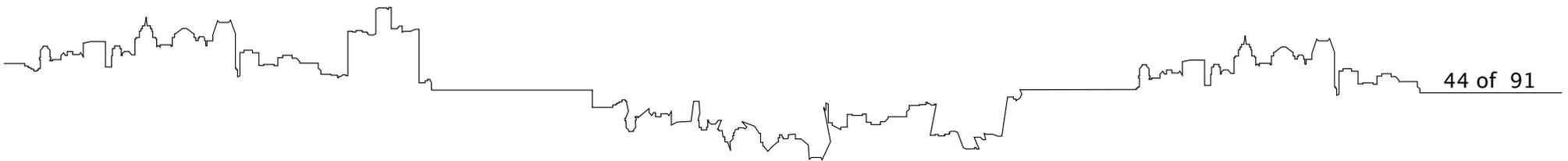
Professional

To demonstrate my ability to problem solve and successfully apply the knowledge that I have gained through extensive research on urban decay, urban design, eco-tourism and flexible architecture.

Pesonal

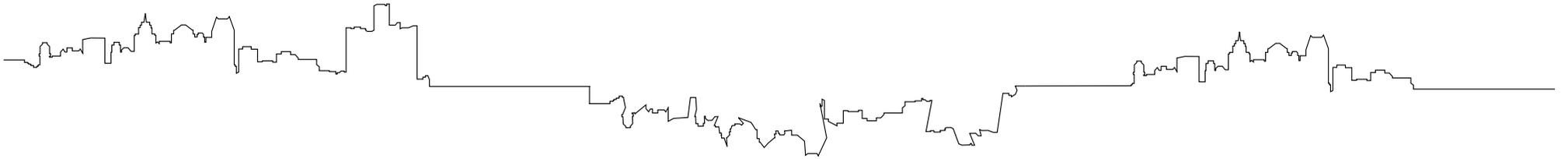
I have set four personal goals for the Thesis. The first is to use my time efficiently and to avoid procrastination. The second goal is to continually push the project forward while finding new and innovative sources to acquire knowledge from. The third is to be able to effectively communicate my ideas by pushing the limits on my knoweldge of 3D modeling. And my fourth goal is to be able to maintian a healthy, active and 8-hours hours of sleep per night lifestyle.

I hope to inspire others to break out of the box, push the norms and be flexible.



Site Analysis

Quantitative and Qualitative Aspects



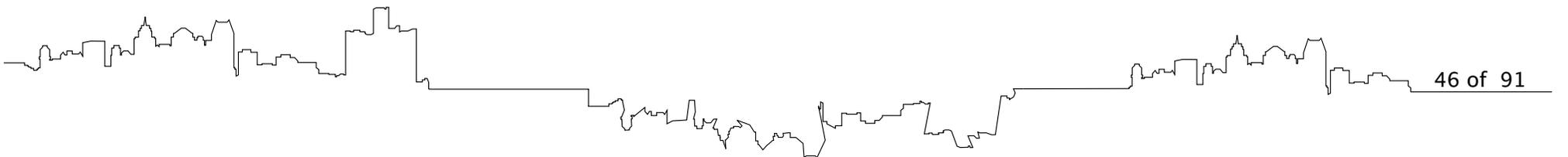
Qualitative Aspects



The design site for this thesis is not like anything I had experienced before. I was almost completely surrounded by tall buildings that varied from low to mid-rise. While I was at the site both blocks were fenced in, all I could do was observe and walk around the perimeter. Most of the foot traffic that I observed at the site was from people pulling up to Subway and going in for breakfast (and the same for lunch and dinner). As I began walking north west from the corner near Grand Circus Park I began to feel like the condition of the environment was getting worse and worse and that the little energy that was left in the city was not radiating very far, but then a sign that I looked past at first caught my eye..



The sign in the window made me hopeful, then I started to think that things really were starting to change for the city of Detroit.



Qualitative Aspects (continued)

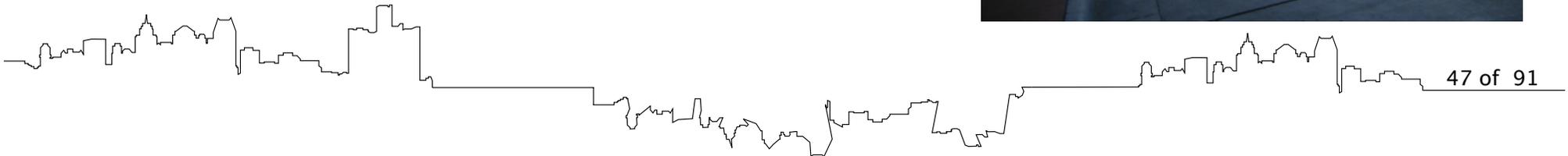
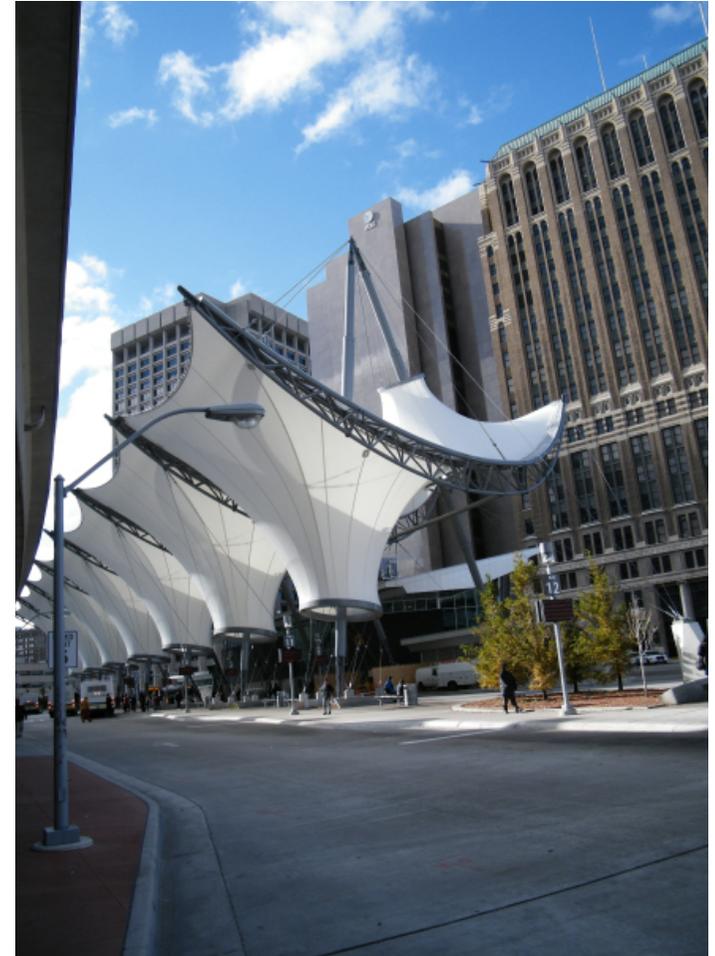
When I came back the next day, as the hours passed the footfall picked up. During the early evening small groups of young adults walked toward toward the Theatre District, which is located just north of the site. I had dinner at a restaurant next to the FOX Theatre and observed 8 different wedding parties pull up in limos and take pictures in front of the historic FOX Theater, which I visited after dinner. I was under the impression that buildings in Detroit were either cared for really well or simply not at all.

As I walked back to the hotel that night, passing by the site I caught a view of the Rosa Parks bus terminal as I looked down the street that devides the site, it was quite the view.

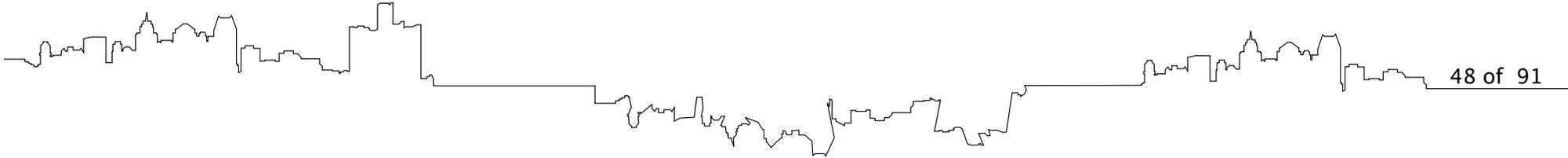
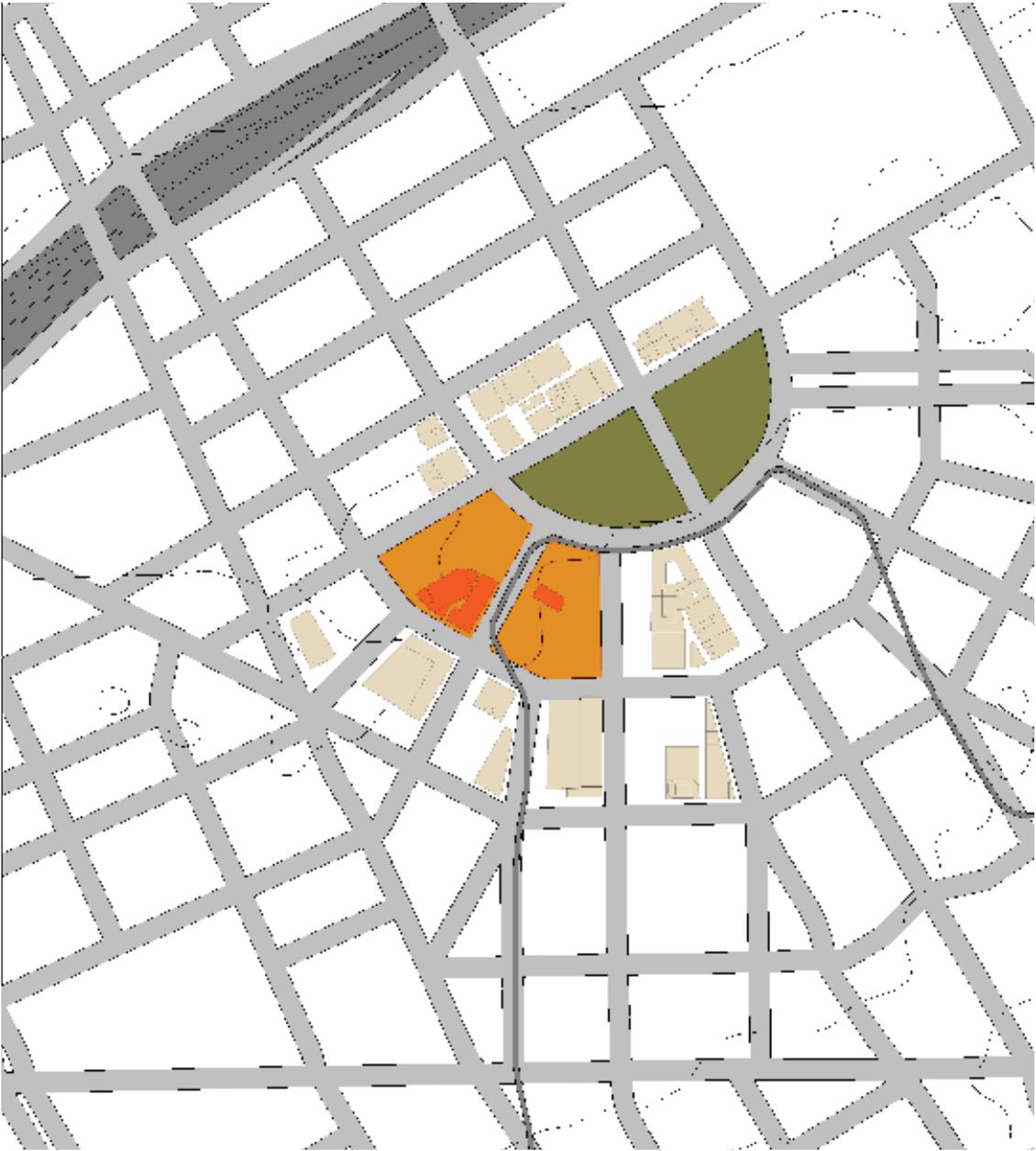
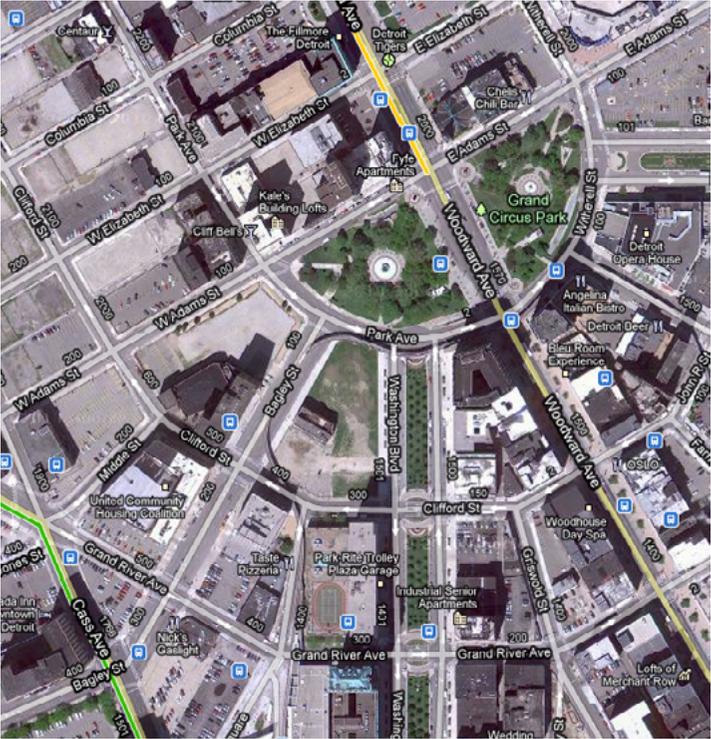
The buildings surrounding the site are all historic in nature, with the exception of the stadiums to the north east of the site and the Rosa Parks bus terminal to the south west. At some point over the years developers or planners walked away from the original master plan which inteded for Grand Circus Park to be a full circle.

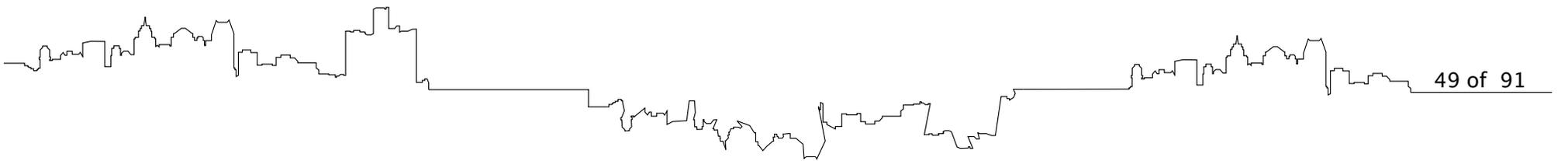
Early Saturday afternoon was when I saw the most footfall thourgh Grand Circus Park and around the site. People came to downtown for three reasons that day, to see Curious George at the FOX Theatre, to attend the marching band competition at the stadium, or to watch the Veteran's Day Parade. I slowly walked up Woodward Avenue, against the flow of the parade, and was astonished at the lack of attnedance. The only participants in the parade were the local high school ROTC, the Veterans, Policeman, the Guards, the Army and the Firemen.

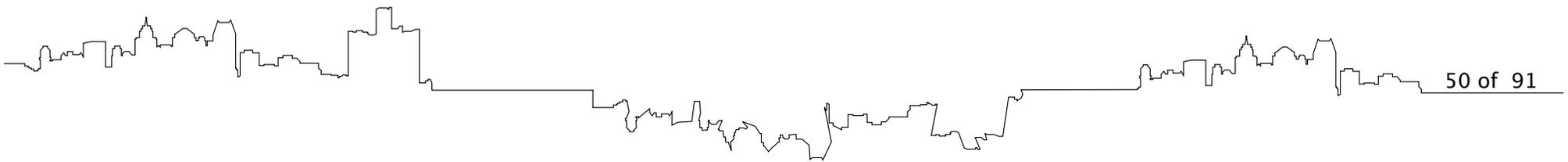
The only vegetation on the site are the weeds were are growing up linked fence. With the exception of Grand Circus Park and the vegetation seperating lanes on Washignton Boulevard (which goes north along the east side of the site), the closest green space is about 1200 ft. away.

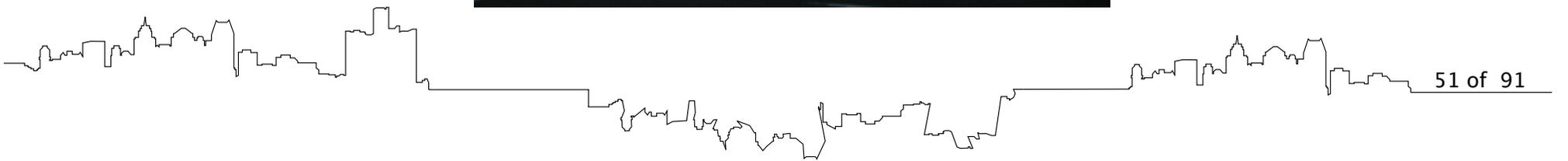


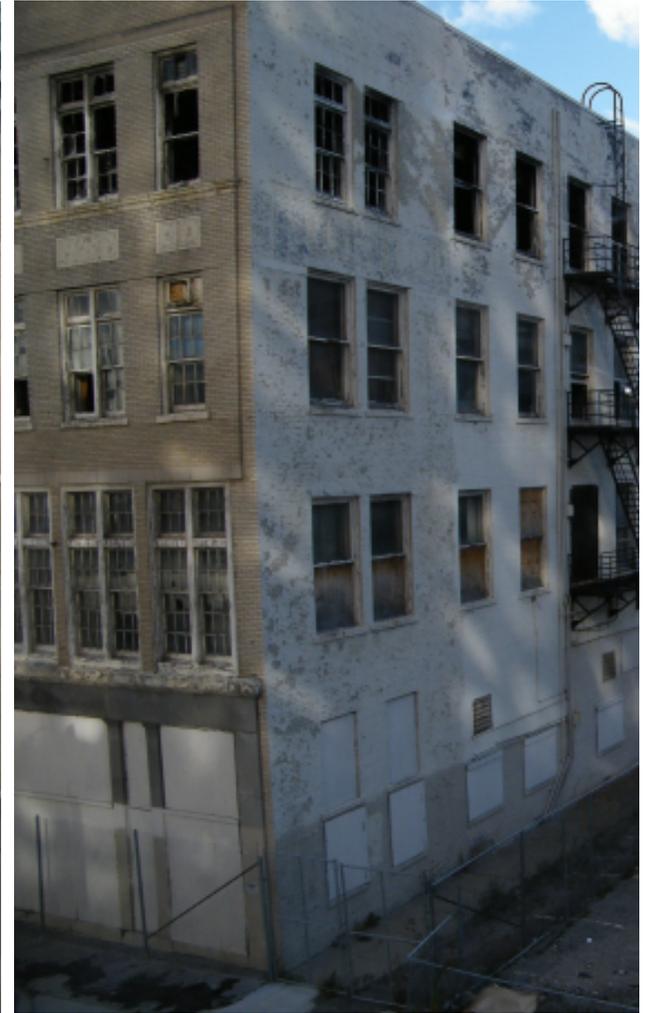
Qualitative Aspects (continued)

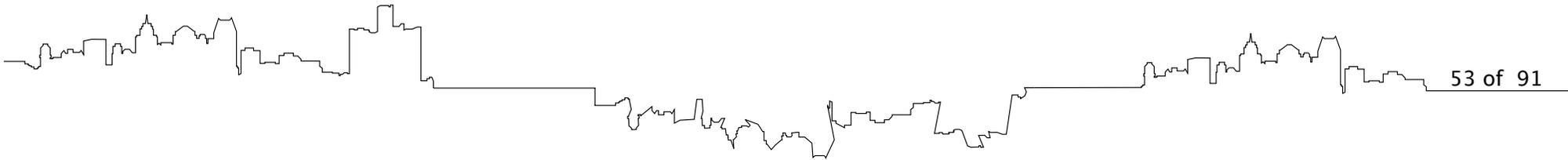


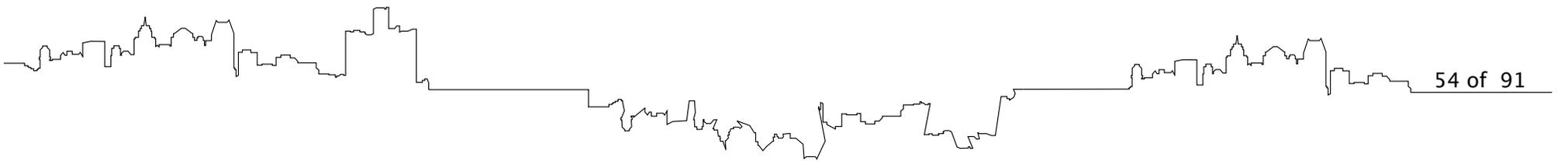


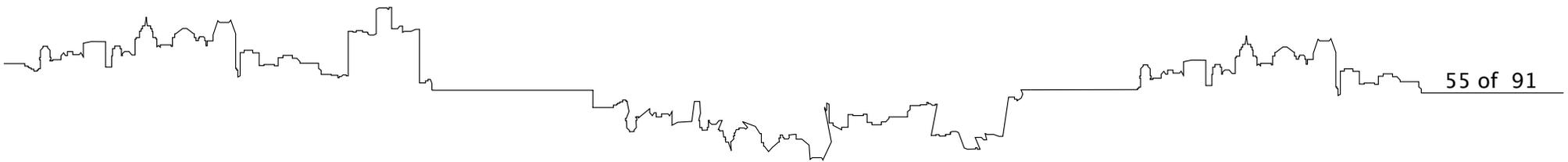


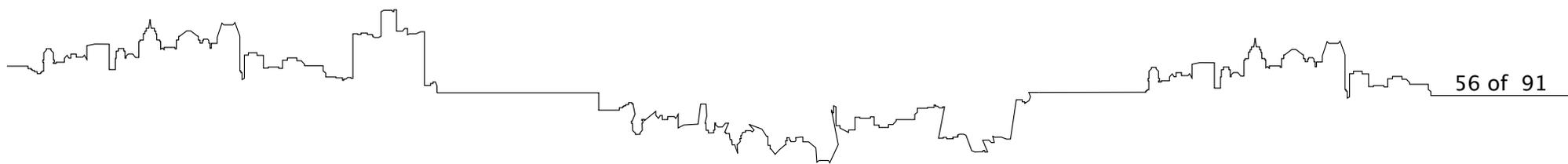


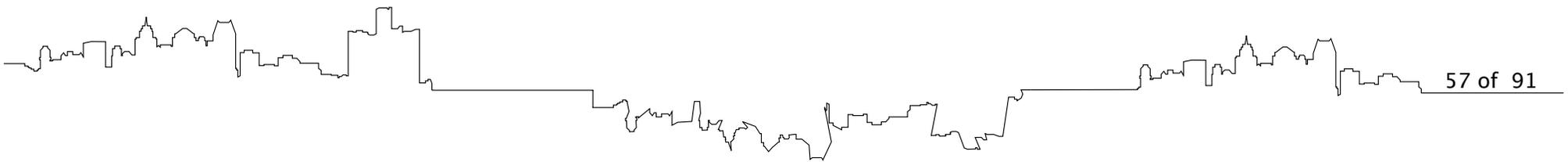
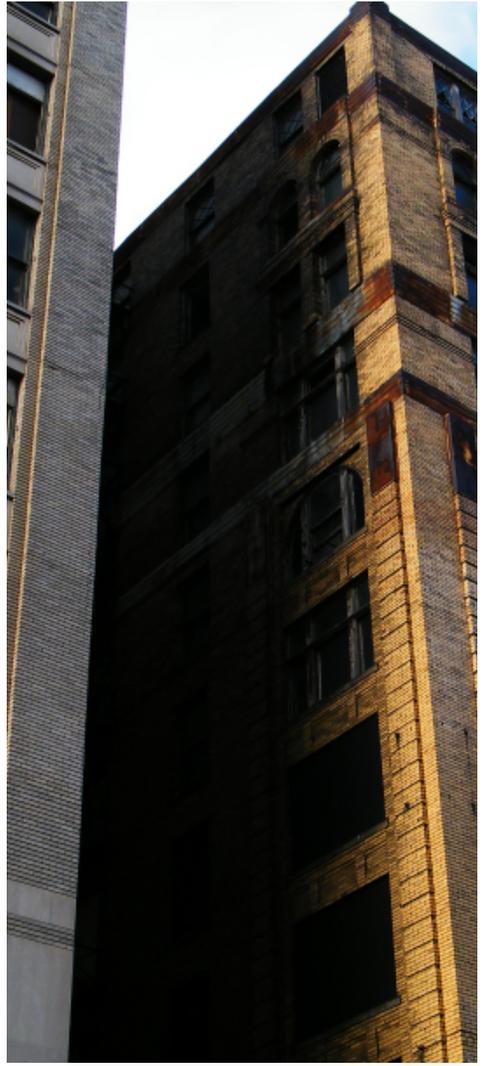


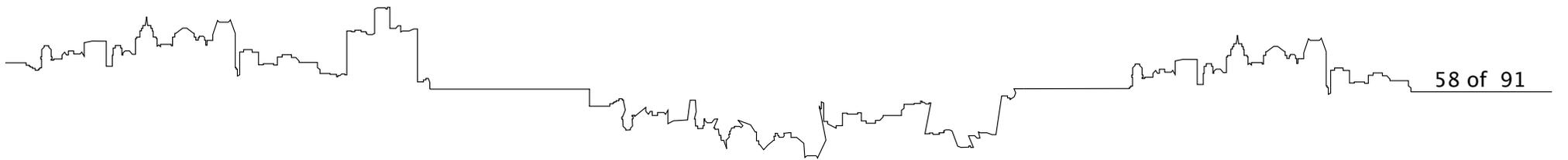
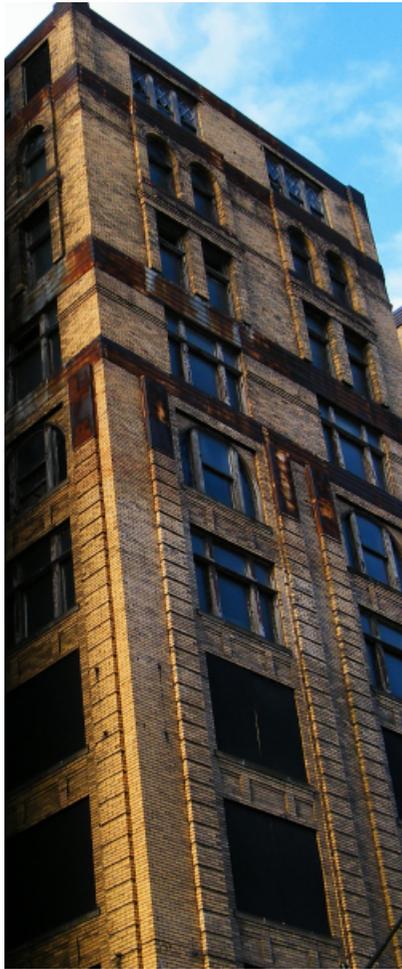


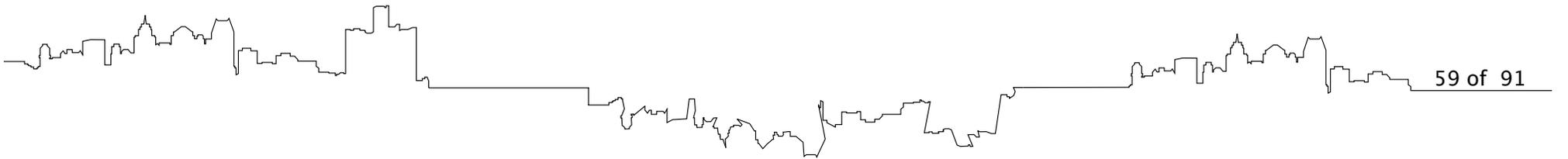


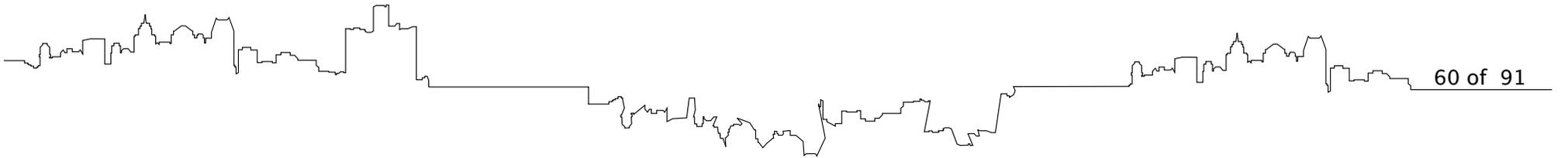


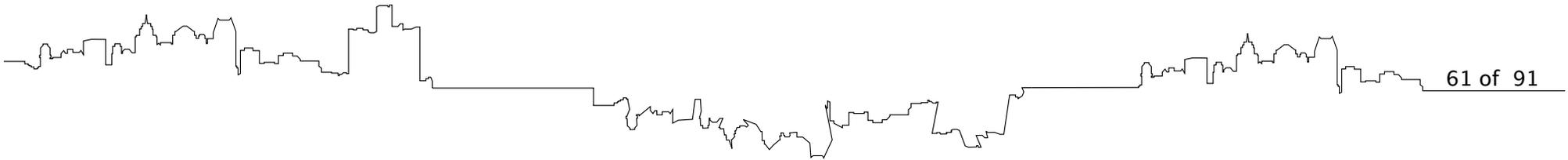


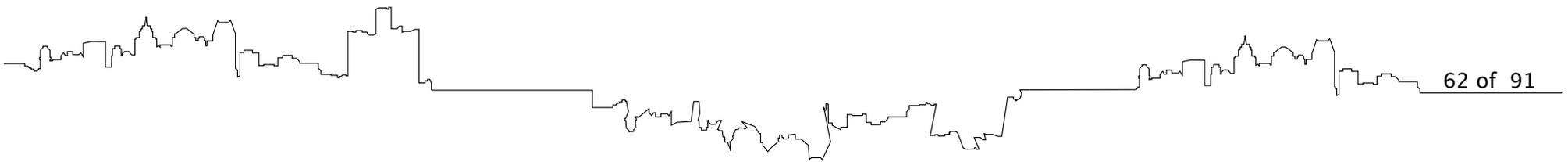


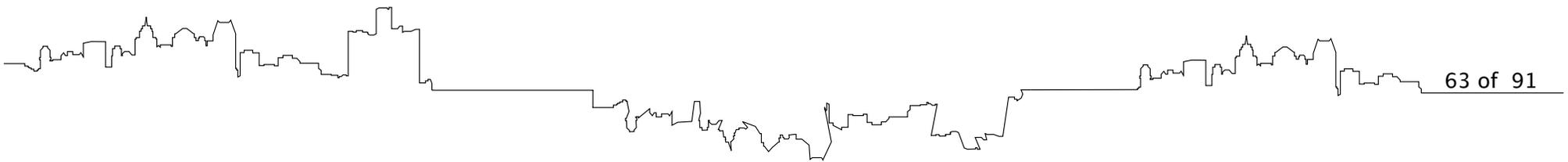


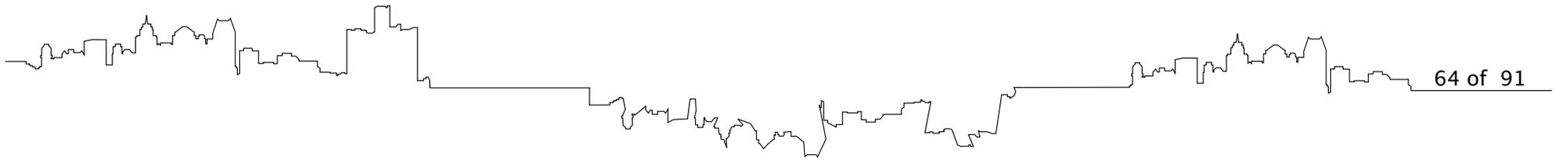




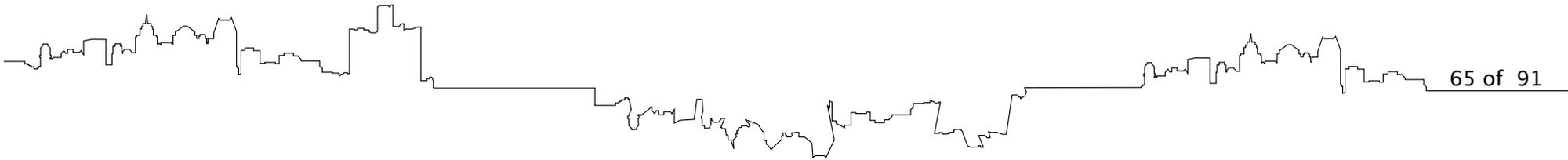
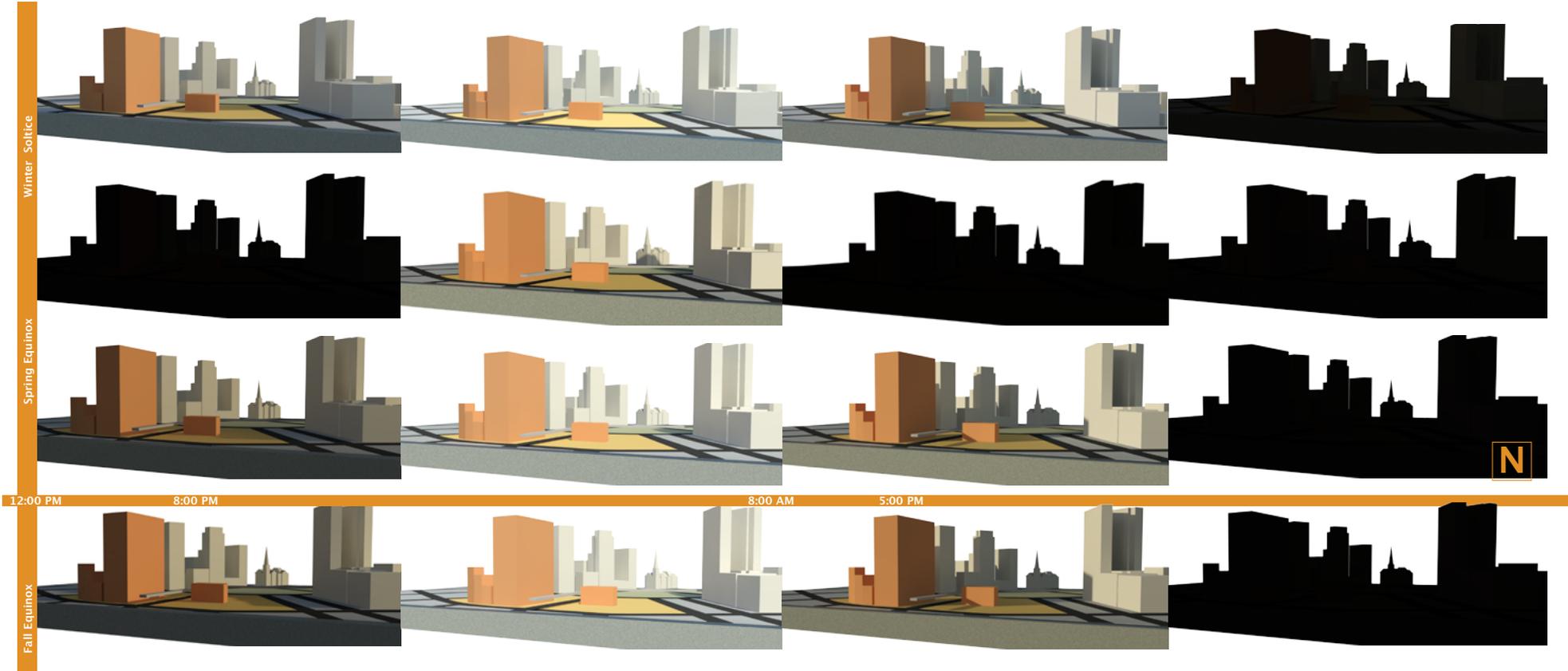




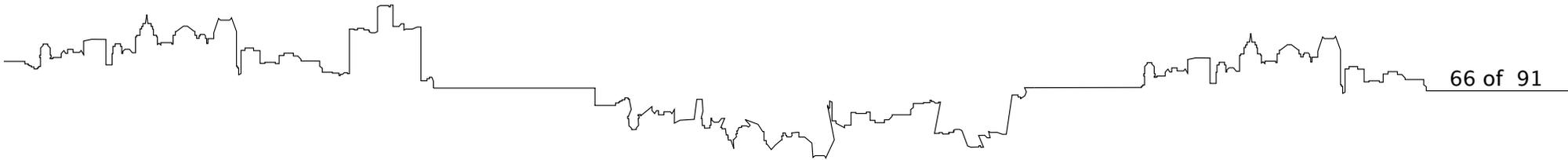
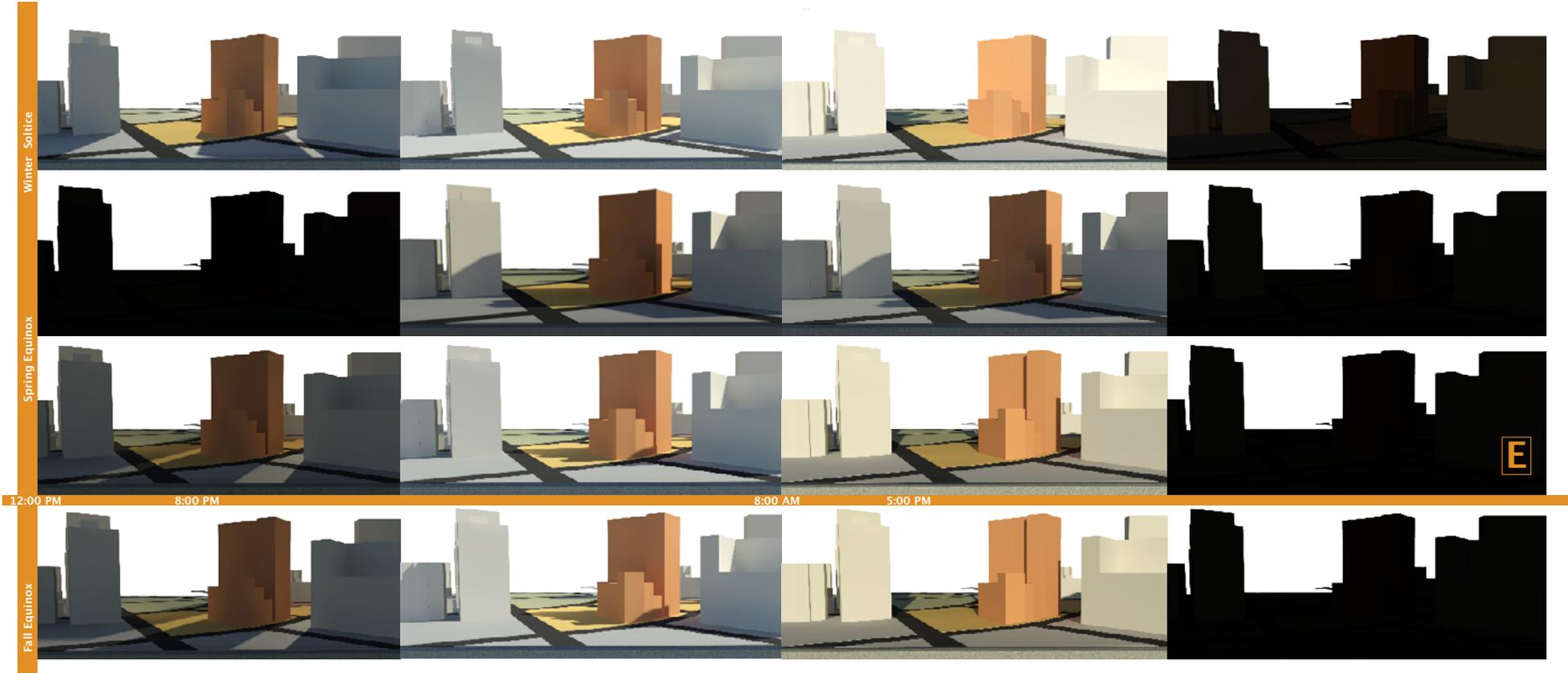




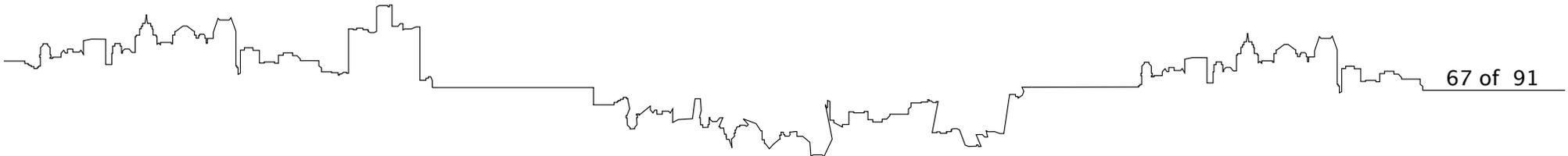
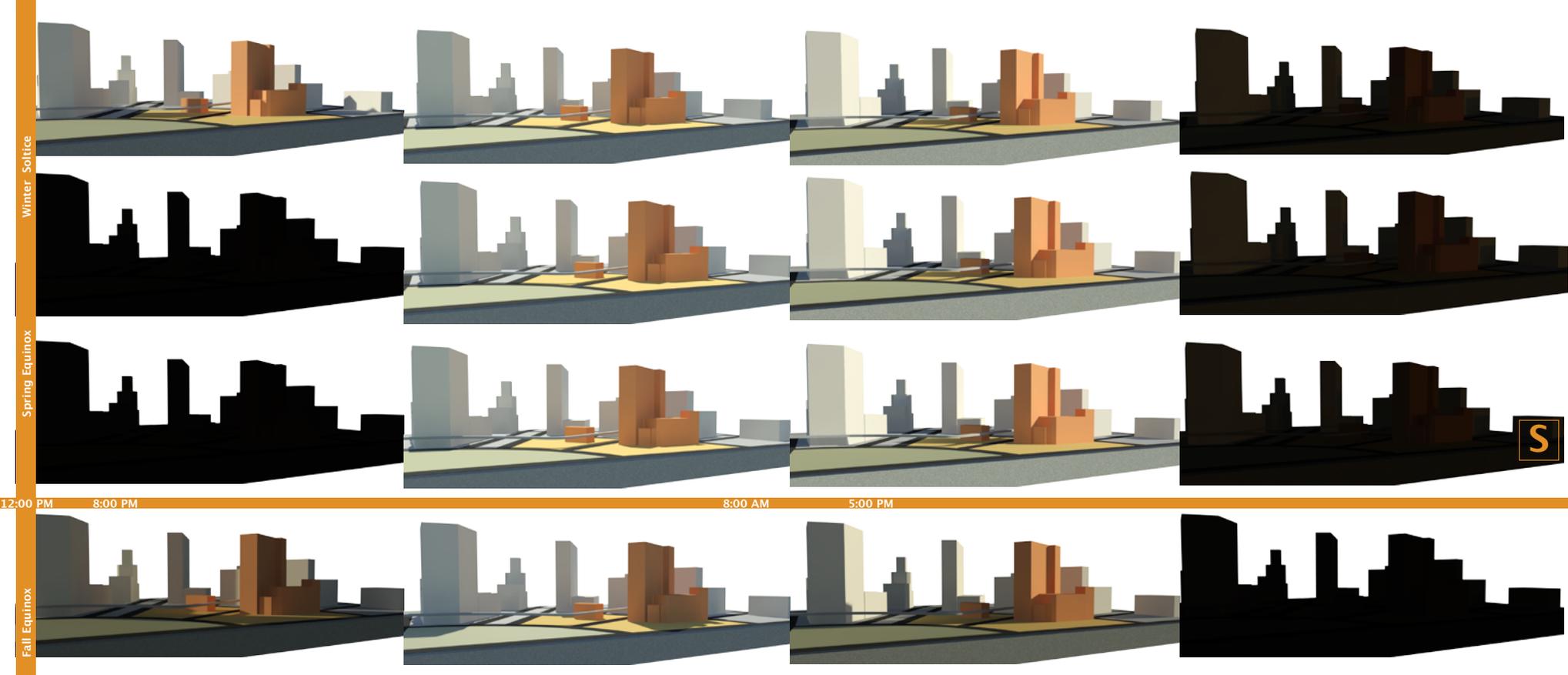
Qualitative Aspects (continued)



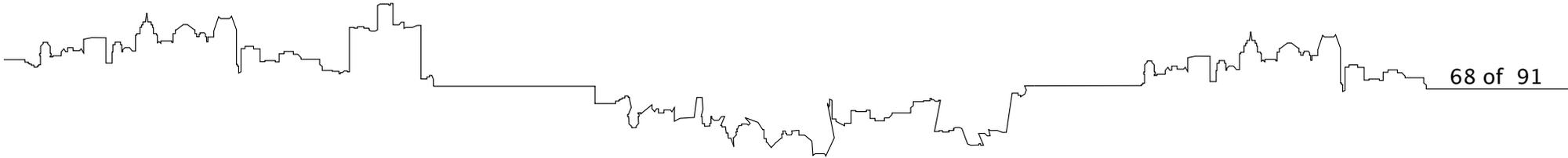
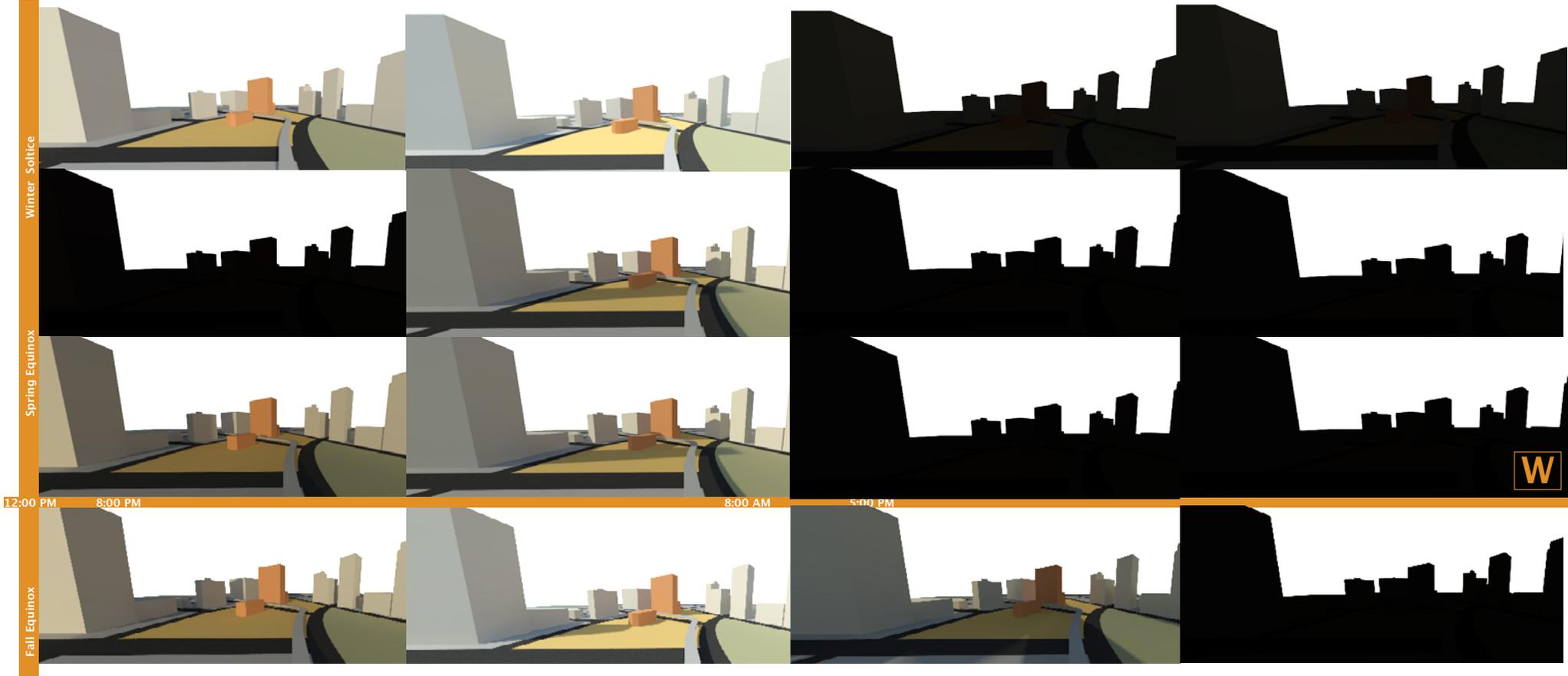
Qualitative Aspects (continued)



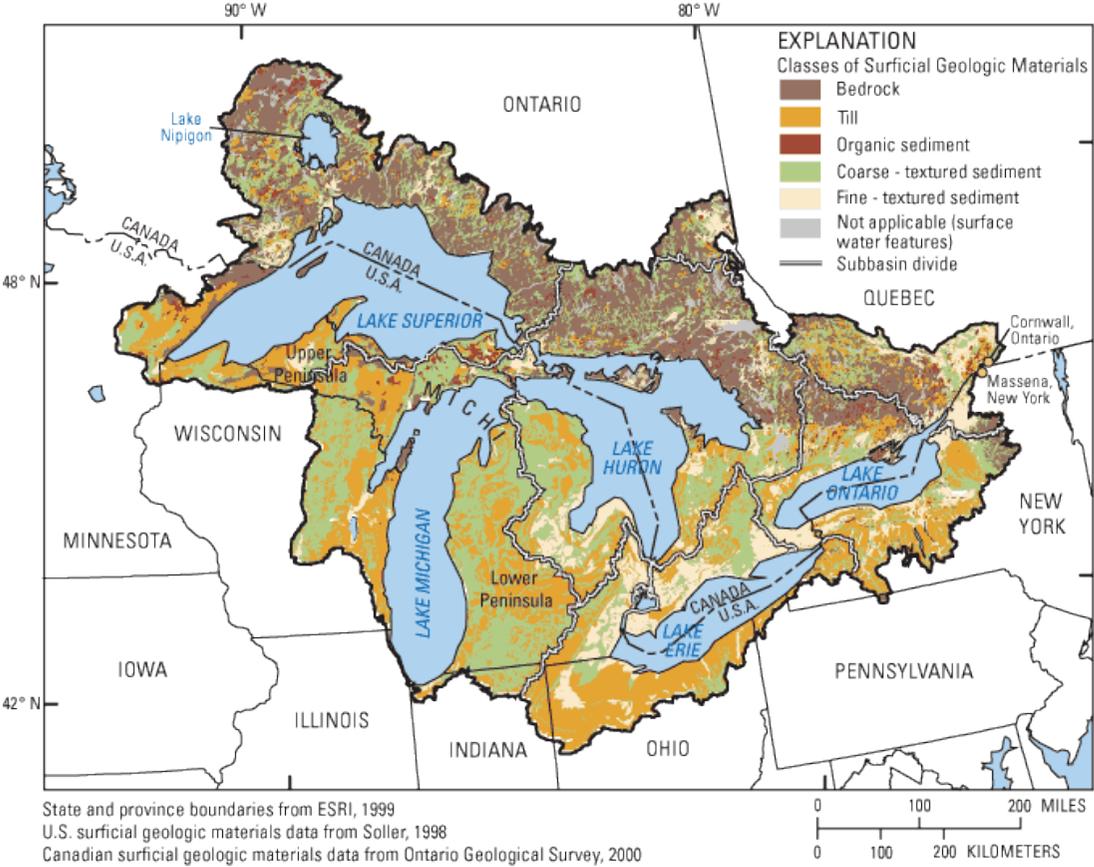
Qualitative Aspects (continued)



Qualitative Aspects (continued)



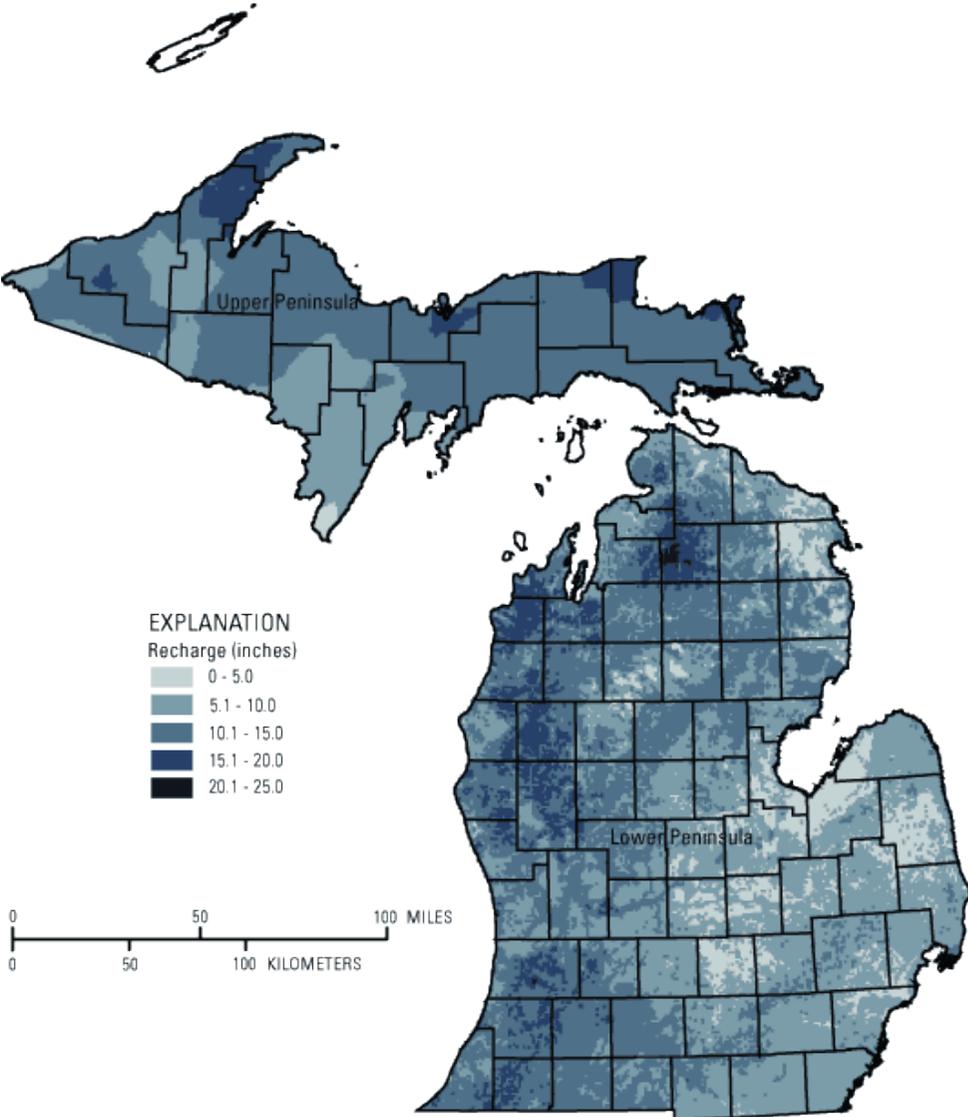
Quantitative Aspects



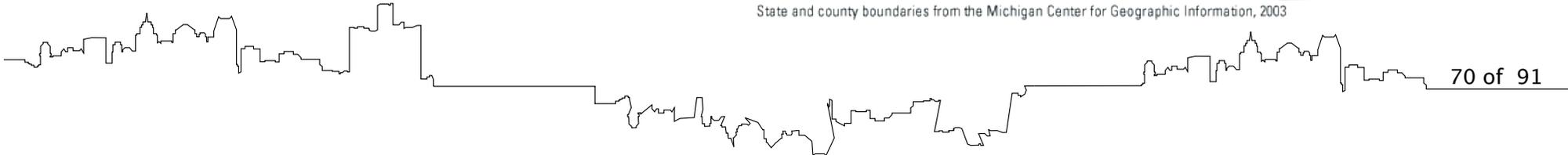
Soil

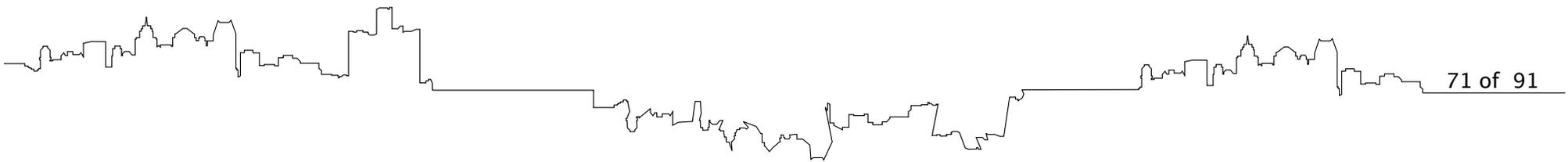
The southern lower peninsula of Michigan fosters extensive agriculture with its fertile clays and loams. The lower peninsula has peak and muck soils that are important, more recently, for turf grass and vegetable production (Michigan, 2010).

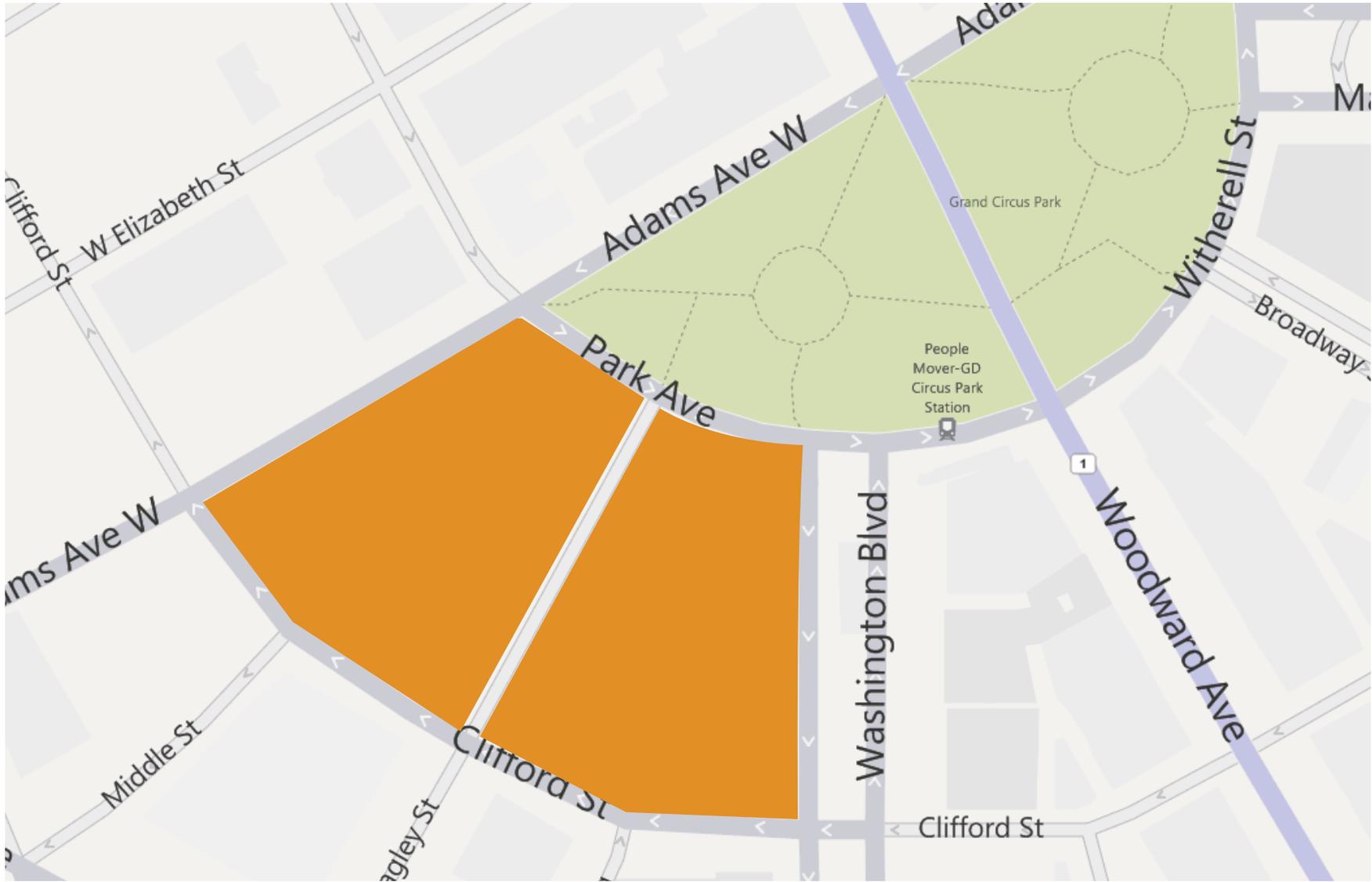
Quantitative Aspects (continued)



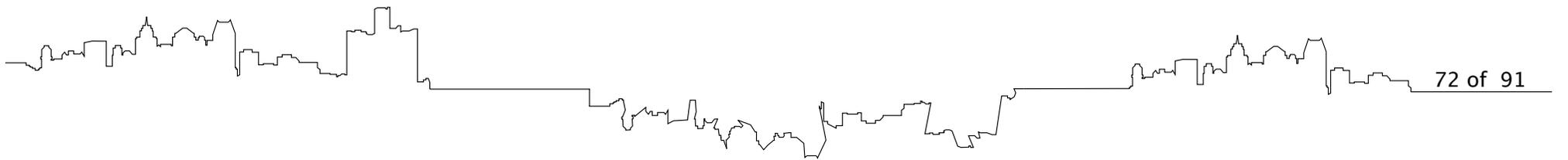
State and county boundaries from the Michigan Center for Geographic Information, 2003





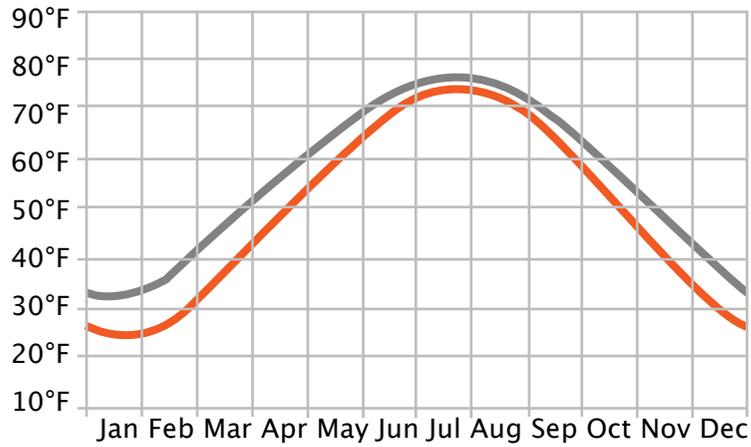


The slope of the site is less than 4%.
Each block has a 10'-00" sidewalk around its perimeter.

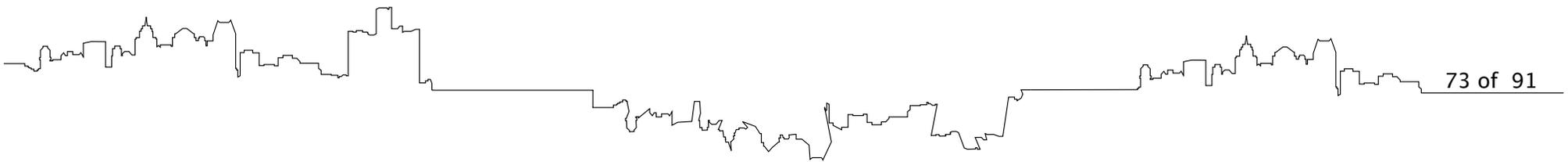
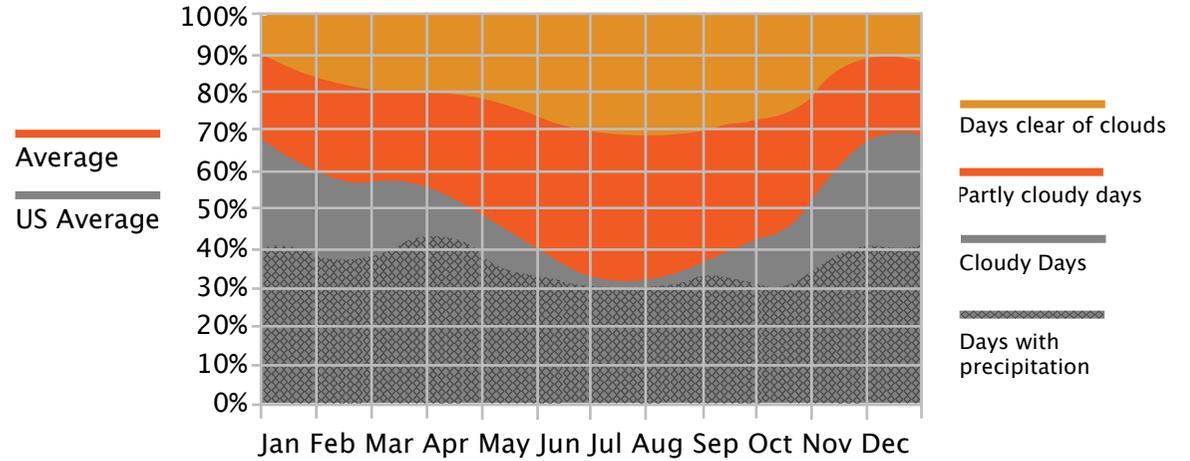


Climate Data

Average Temperatures

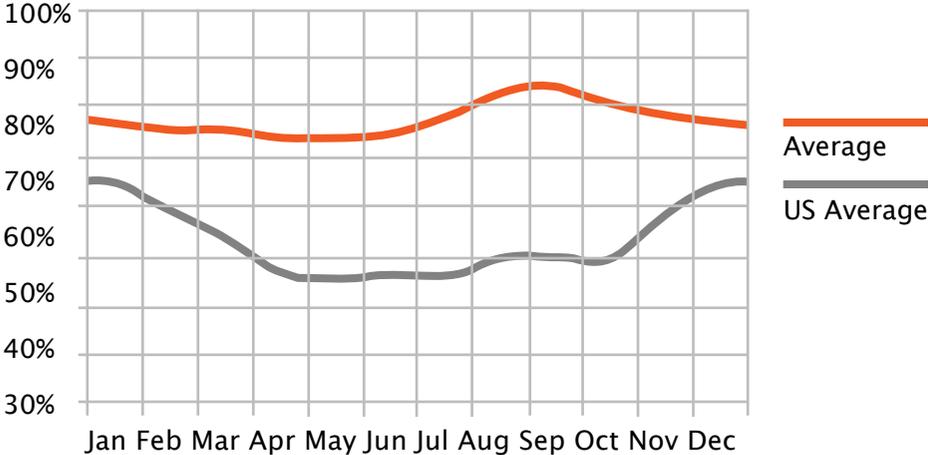


Average Cloudy Days

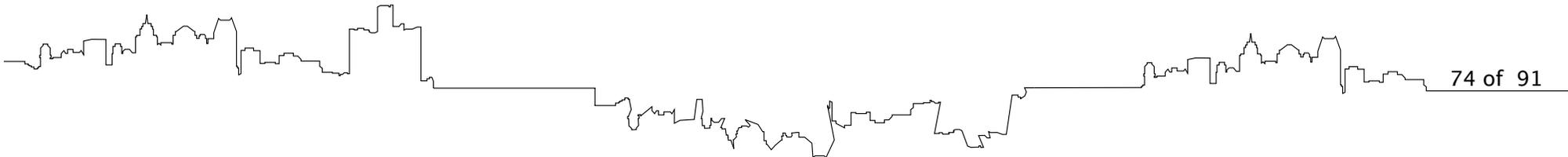
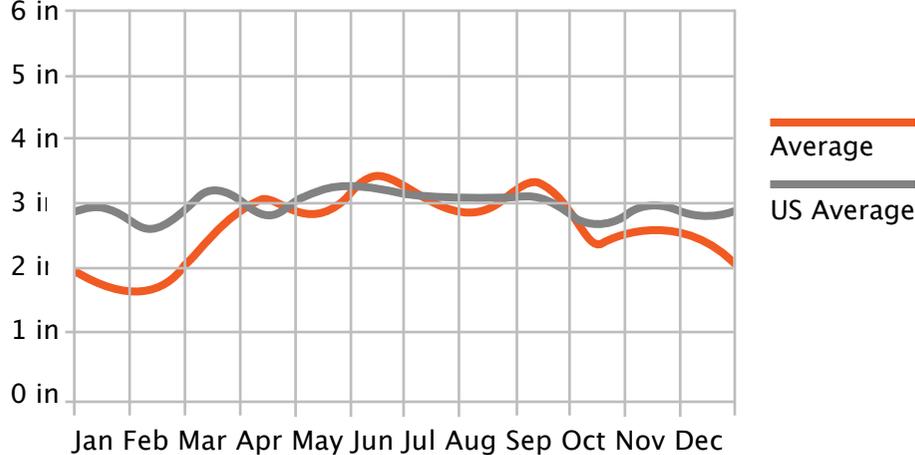


Climate Data

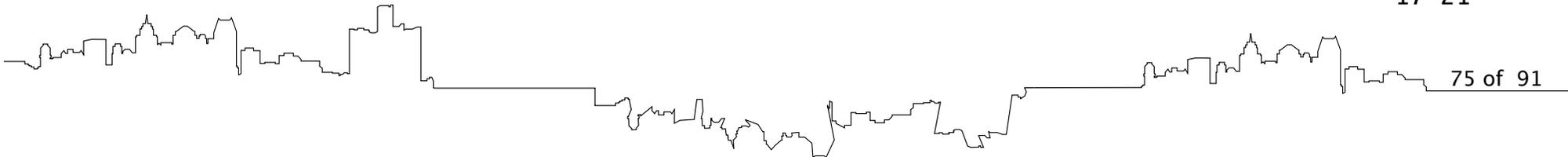
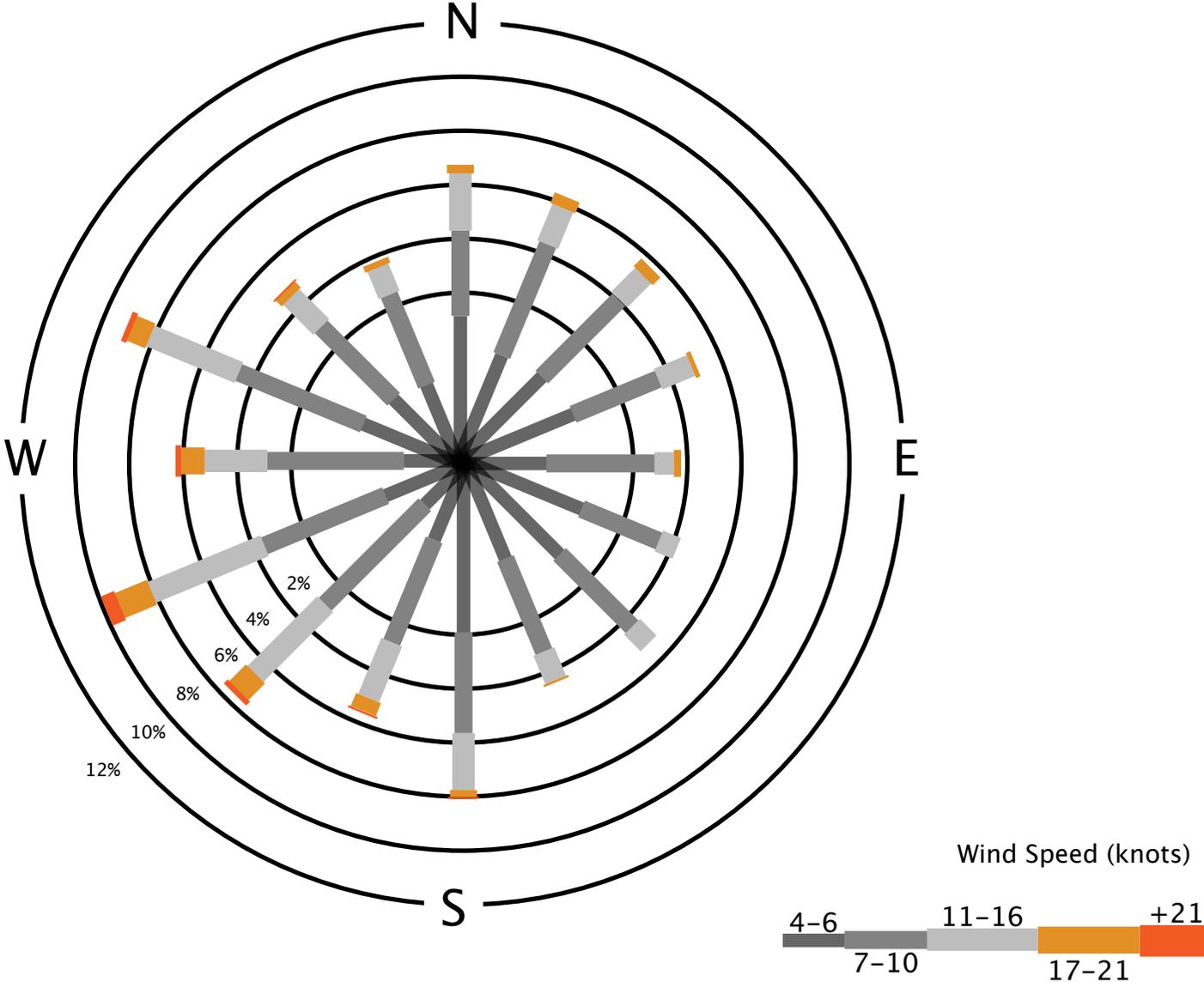
Average Humidity



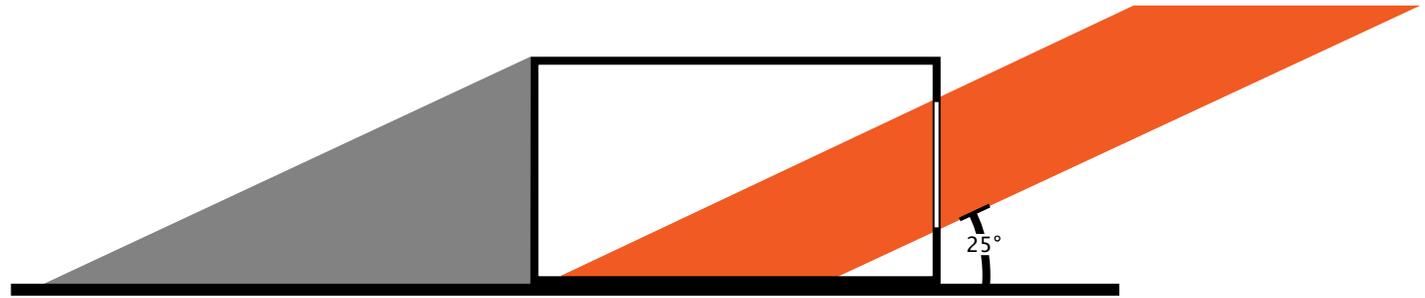
Average Precipitation



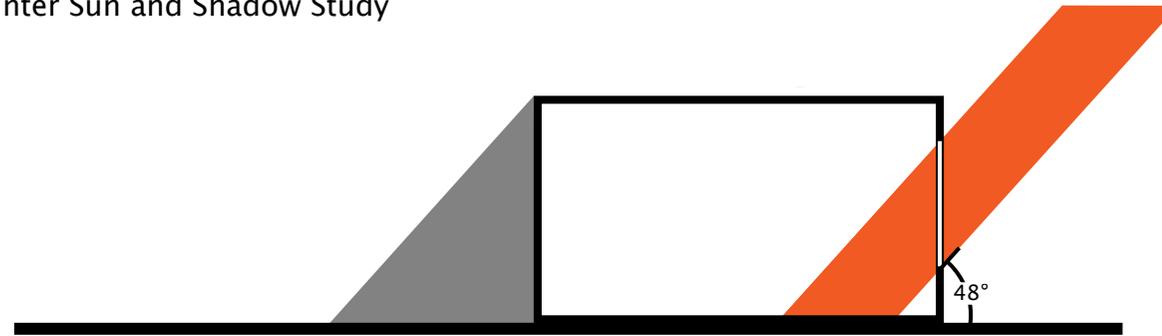
Wind Rose



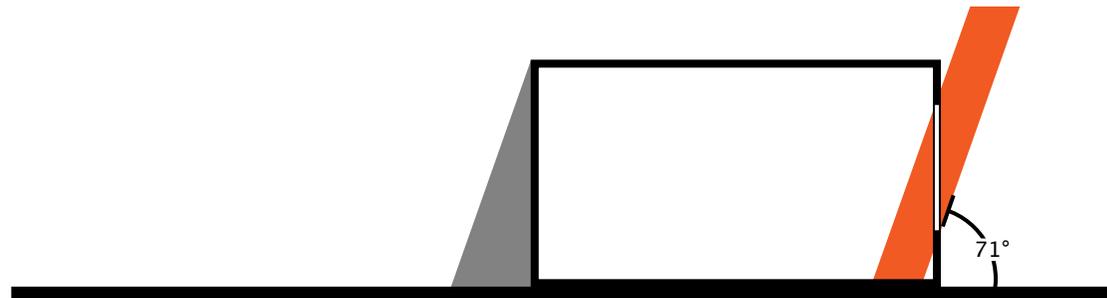
Sun Path



Winter Sun and Shadow Study

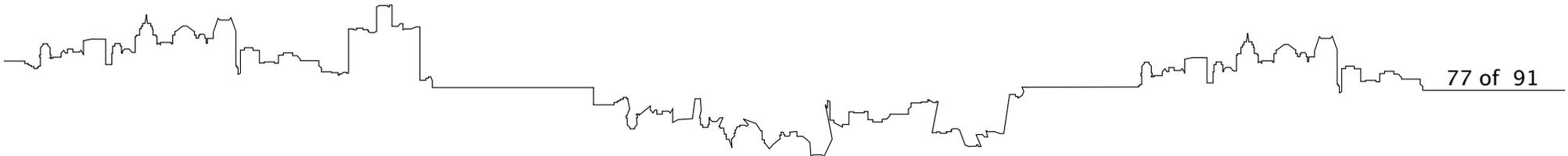
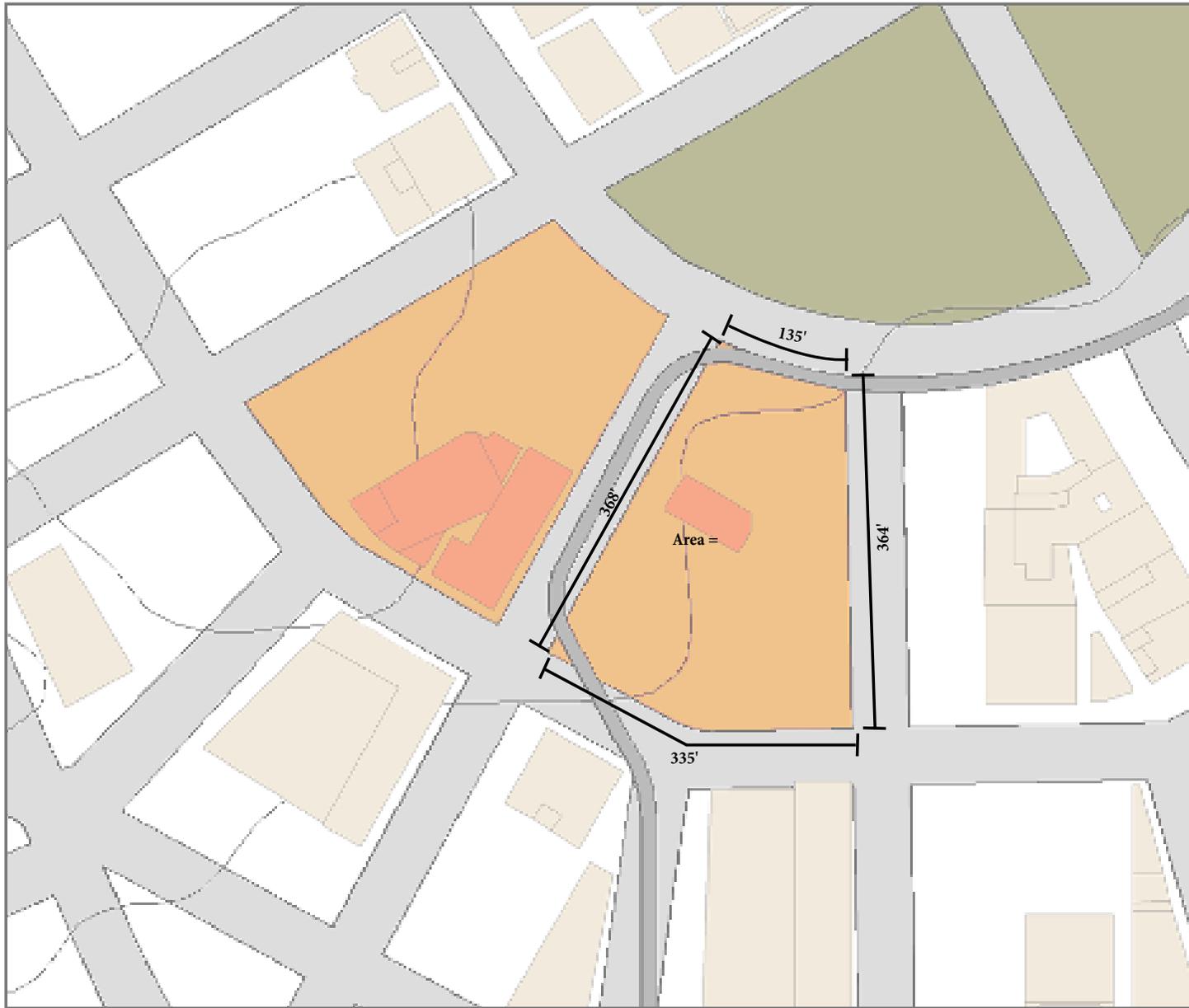


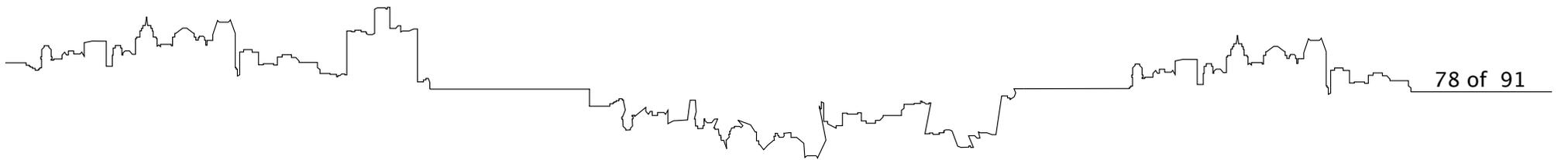
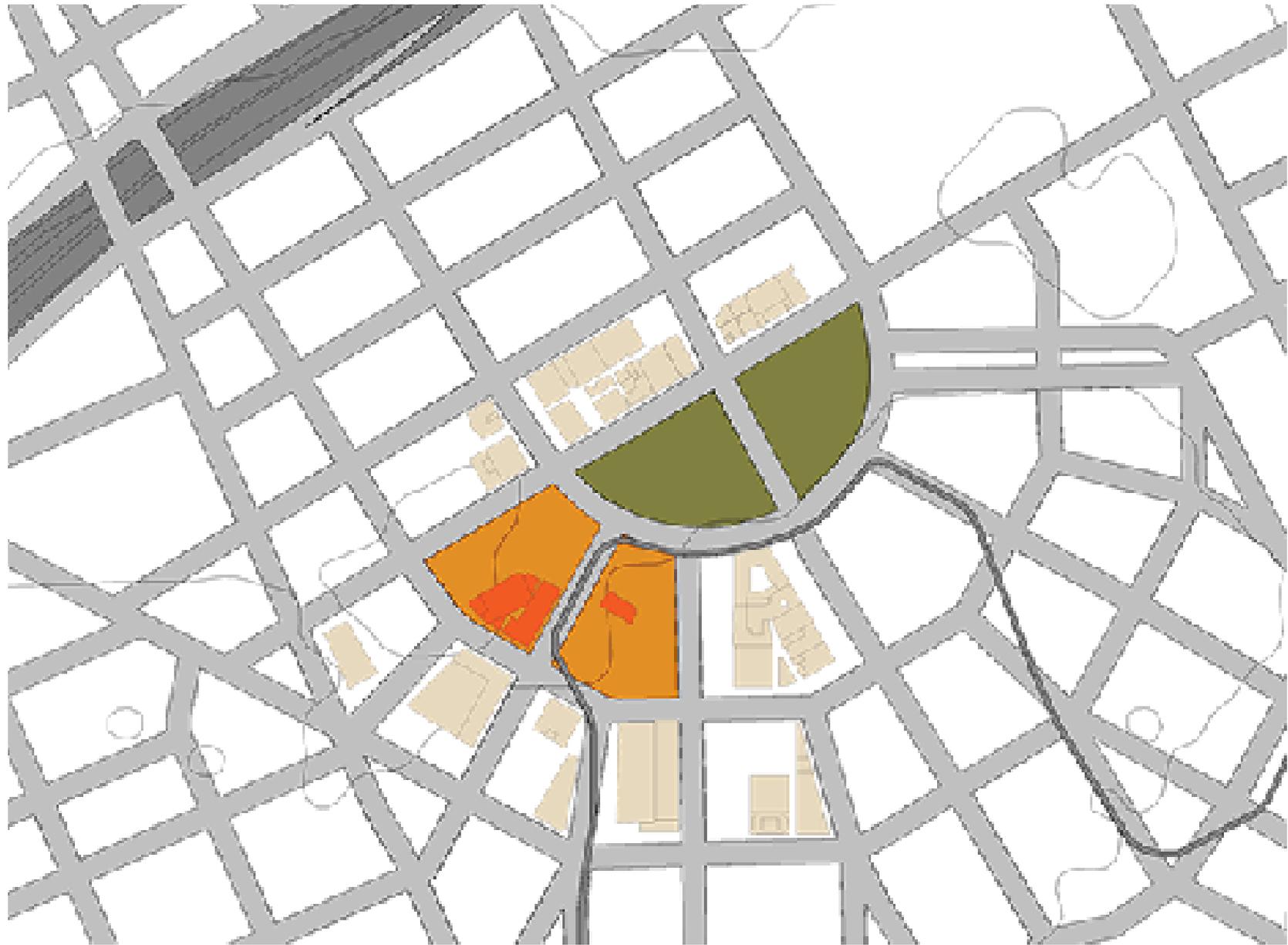
Spring/Fall Sun and Shadow Study



Summer Sun and Shadow Study







Zoning
Detroit Central Business District

- Institutional
- Mixed Residential/Commercial
- Major Commercial
- Open/Public Space
- Special Commercial



Programmatic Requirements

The Coffee Clock

Commerical Kitchen	300 SF
Preperation Area	300 SF
Private Toilet	200 SF
Public Toilet	200 SF
Public Toilet	200 SF
Management Office	250 SF
Public Seating Area	1000 SF
Dry Storage	300 SF
Cold Storage	<u>300 SF</u>
Total Area	3,250 SF

The Detroit Public Boarding School

Ground Floor Atrium	700 (5600)SF
Classrooms (8)	400 (38,400) SF
Dorm Rooms (96)	500 (1000) SF
Restrooms (2)	1000 (4000) SF
Bathrooms (4)	9600 SF
Gym/Auditorium	800 (1600) SF
Locker Rooms (2)	1000 (4000) SF
Kitchen/Caffeteria	800 SF
Faculty Suites (4)	400 SF
Administrative Office	300 SF
Storage	600 SF
Nurses Office	200 SF
Nurses Bathroom	300 SF
Teacher Breakroom	2000 SF
Circulation	400 SF
Mechanical	<u>2400 SF</u>
<u>Parking 15 Spaces</u>	69900 SF

Total Area

Adaptive Condominiums and Apartments

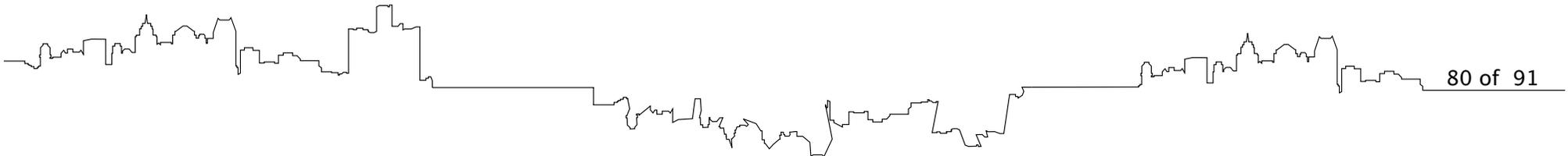
Usable Area (Adaptable)	42,2793 SF
Circulation	22252 SF
<u>Parking</u>	<u>2458 SF</u>
Total Area	447,503 SF

Adaptive Business Suites

Usable Area (Adaptable)	27110 SF
Circulation	515103 SF
<u>Parking</u>	<u>3000 SF</u>
Total Area	545213 SF

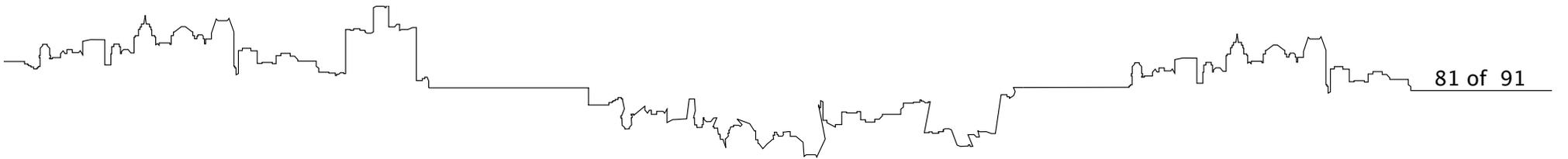
National Grocery Chain

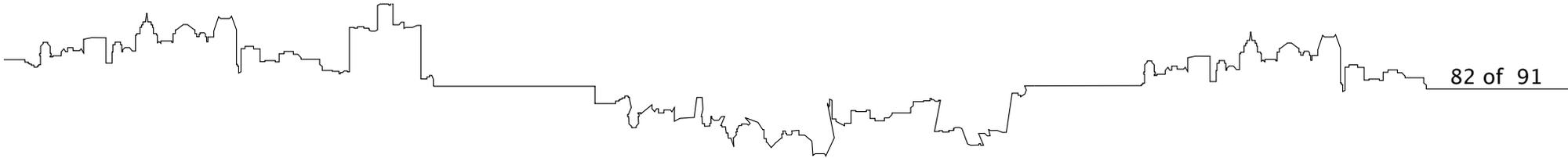
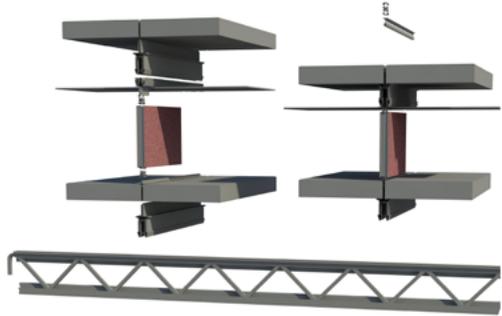
Offices 1	300 SF
Office 2	300 SF
Employee Toilet 1	300 SF
Employee Toilet 2	600 SF
Employee Break Room	1000 SF
Bakery	1100 SF
Butcher	600 SF
Colst Storage	600 SF
Dry Storage	500 SF
Loading Dock	500 SF
Mechanical Room	500 SF
Public Toilets 1	800 SF
Public Toilets 2	<u>52100 SF</u>
Private Circulation	60000 SF
<u>Retail Floor Area</u>	
Total Area	11185866

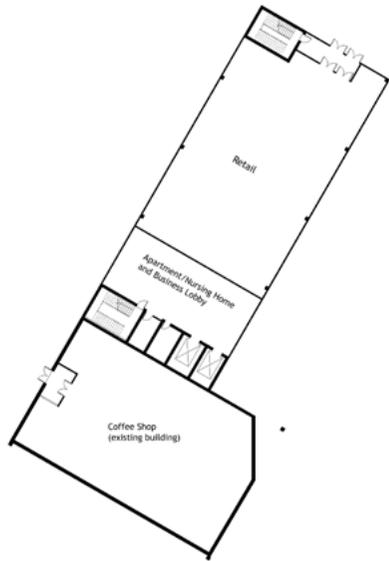


ADAPTABLE SPACES FOR CHANGING PACES

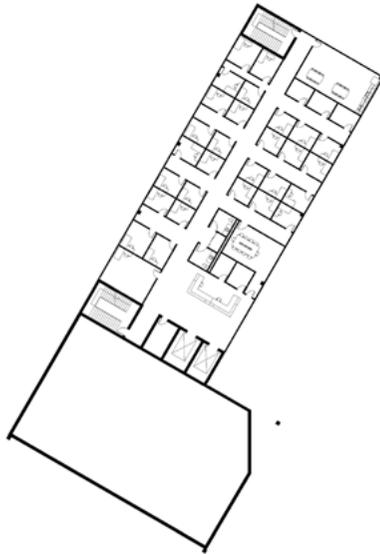
Laura Lutterman | Prof. Barr Mourad Aly Ahmed | Architecture 772 Design Thesis | Spring 2011
Department of Architecture and Landscape Architecture | North Dakota State University
Software: Revit Architecture 2011, AutoCAD Architecture 2011, Photoshop CS5, InDesign CS5



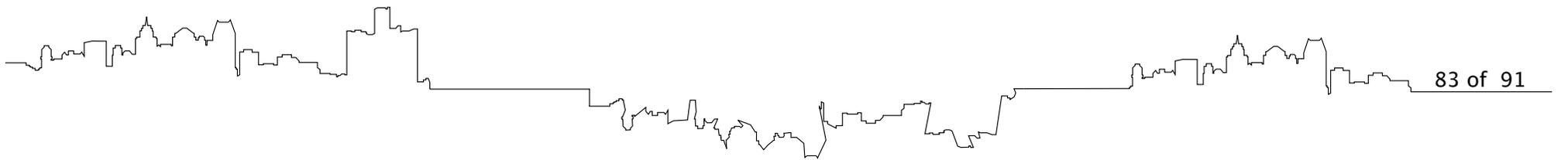


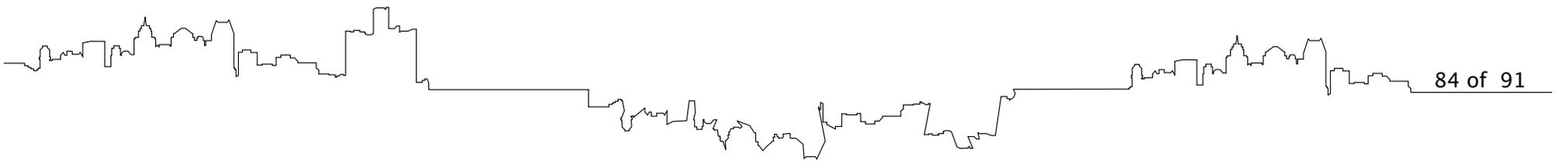


Ground Level



Level 2 - Business Offices



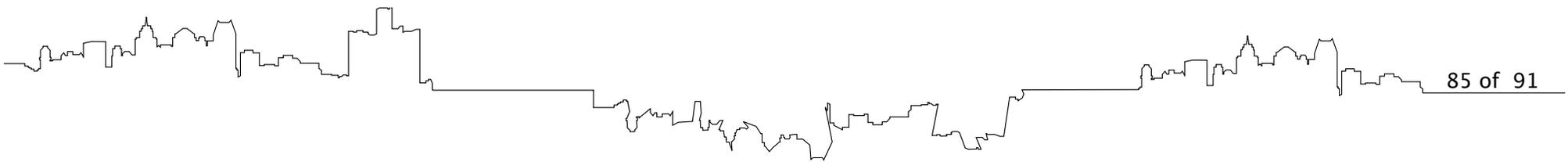


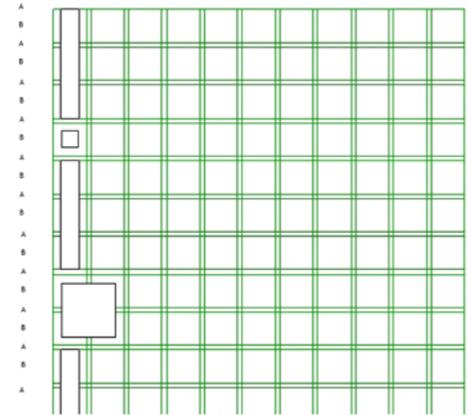
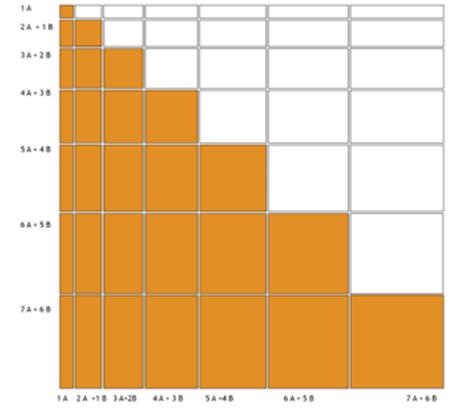


Level 5 - Nursing Home / Assisted Living



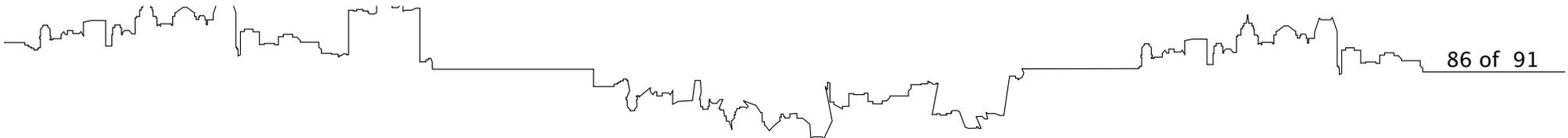
Level 10 - Apartment Units





Problem Statement:
How can a built environment, created with a modular construction system, prepare for dramatic shifts in a city's demographics?

Project Justification:
The built environment is thrown out of equilibrium with an ever-fluctuating demographic profile. This imbalance is resulting in an overabundance of commercial and/or housing properties. By taking advantage of improvements in sustainable modular construction systems, one can adapt the built environment to the needs of the city.



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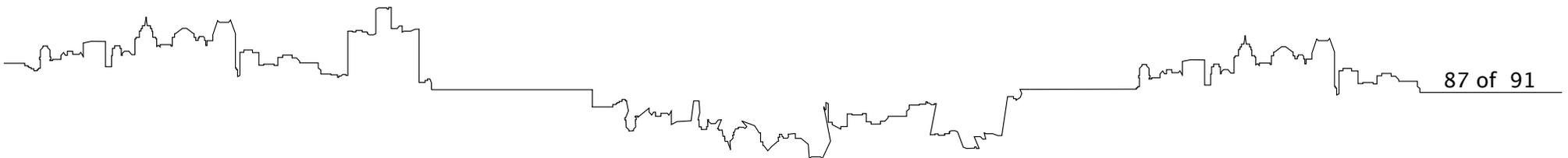
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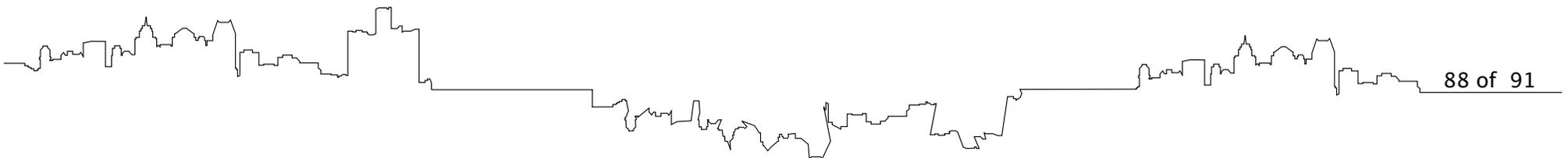
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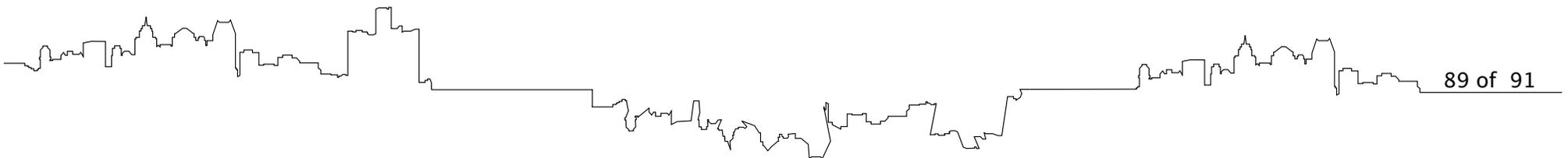
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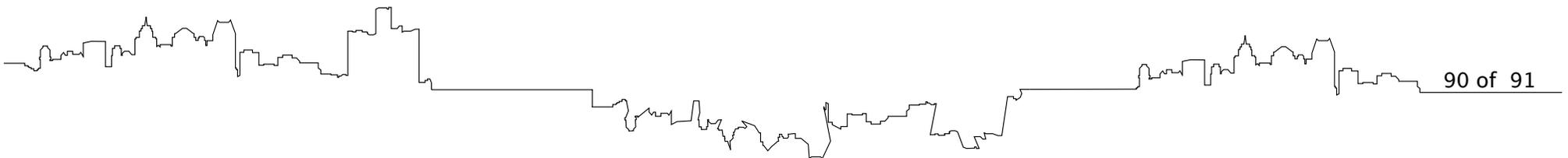
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"I think I can."

