


EMERGENT DESIGN IN LANDSCAPE ARCHITECTURE



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*THE APPLICATION OF THE THEORY OF EMERGENCE
TO THE CRAFT OF CREATING PUBLIC URBAN SPACES*

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*This book is dedicated to my Father,
Lewis Biesecker.*

I believe it would have made him proud.

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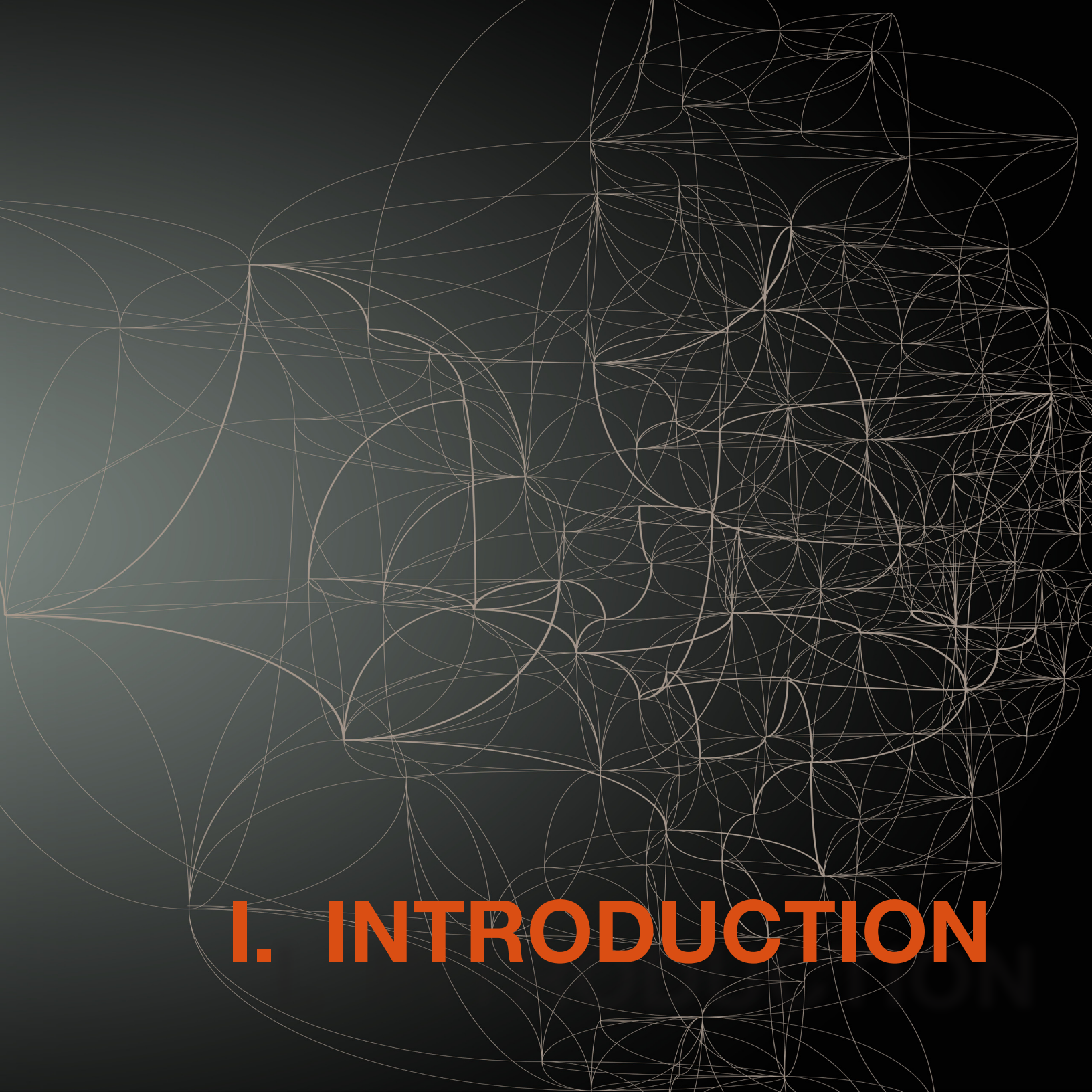
Due to the complicated nature of the material covered in this study and the audience's diverse range of expertise, I feel it is best to divide the book into three major chapters. These chapters include the following: a brief introduction to the thesis, an account of a design test of my proposed design methodology, and a conclusion consisting of my findings from the design test. These three chapters will be followed by extensive appendices, which further explain components of the study. This information was not included in the body of the text because it would have been distracting from the main points of the thesis.

ABSTRACT

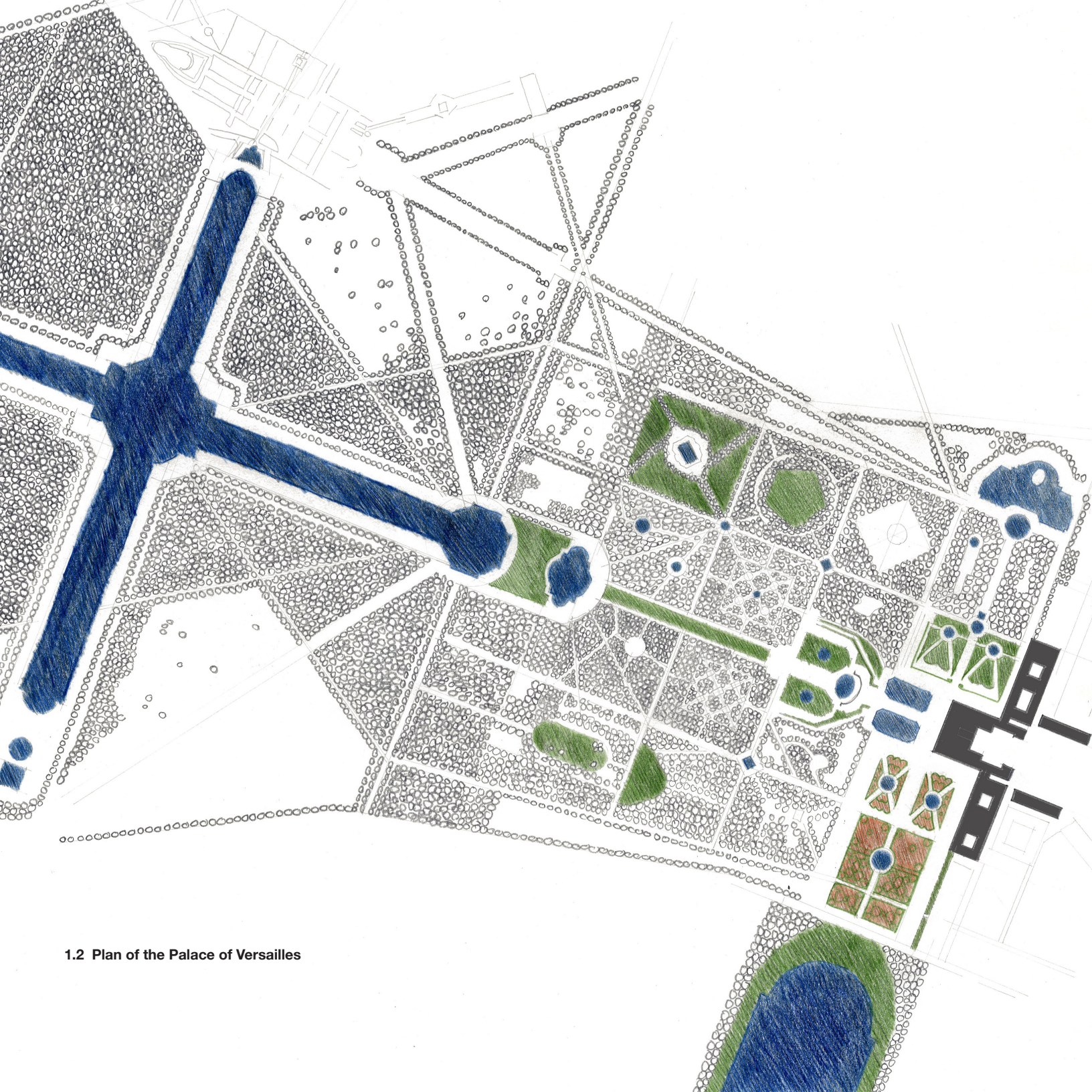
As scientific philosophies and theories have evolved, so has their application to the craft of landscape architecture. The theory of emergence, which was developed in the 1970s, is currently finding applications in the design disciplines. Because the built environment is now largely considered an emergent phenomenon, emergence might be used to obtain design goals using behaviors found in the urban realm. This thesis examines how the theory of emergence can be applied to a design methodology used to create a public urban space. The ultimate goal of creating an emergent design methodology would be to create an urban network that functions at a higher organized complexity than it did prior. It is hypothesized that if a higher organized complexity is generated, an even higher level of organized complexity will emerge because of the original increase in organized complexity. The strategy for researching this thesis is divided into two major sections: (1) determining the definition and sub-theory of emergence that is most appropriate for the application to the design methodology for creating public urban spaces, and (2) constructing a repeatable design methodology for creating a public urban space based on the application of the selected definition and sub-theory to a design test. The success of this examination is based on its ability to generate conceptual design methodologies and prompt further examination in the application of the theory of emergence to other sub-fields in landscape architecture. If an emergent design methodology can be created the inhabitant's desires can be reflected in the design of public urban spaces in a more direct manner than most current spaces.

KEYWORDS

Emergence, organized complexity, public urban spaces, design methodology



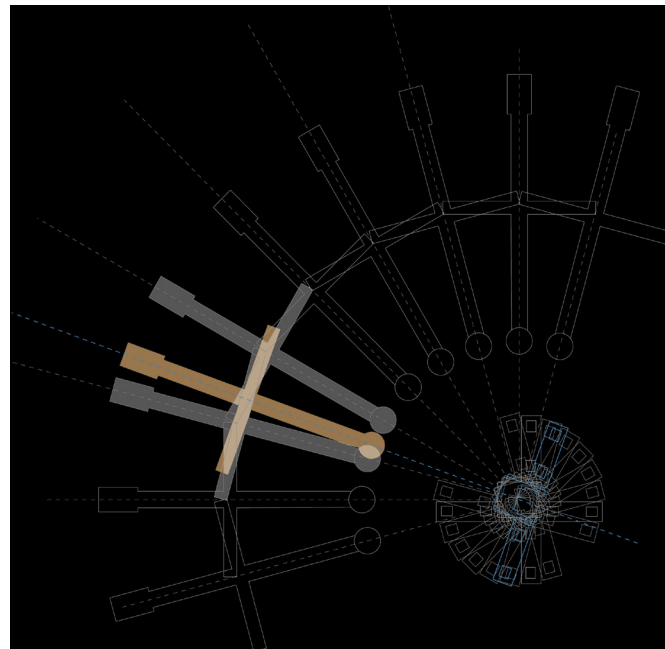
I. INTRODUCTION



1.2 Plan of the Palace of Versailles

1.3 Centric Diagram of the Sun King

This revolving diagram shows the centric nature of the the Palace of Versailles and the Sun King, Louis XIV.



INTRODUCTION

This thesis examines how the theory of emergence can be applied to the design methodology used in creating a public urban space. It has one primary goal: to create a design methodology (or a design process) based on the application of the theory of emergence that is suitable for guiding the transformation of a site from a private urban space to a public urban space. The study also has secondary goals which attempt to define the current state of research in the application of the theory of emergence to the craft of landscape architecture, extending that conversation, and postulating the future direction of research in this area.

This investigation began, as so many others do, by a smaller study guided by personal interest. My interest in the history of the urban form, the application of science and philosophy to landscape architecture, and contemporary issues and theories in landscape architecture naturally led me to examine the contemporary interpretation of the Baroque French formal garden.

This early study found that the Cartesian method, the paradox of science, philosophy, and religion found in the 17th Century influenced the master designers of the time to create amazing landscapes that demonstrated not only the artistic expression of these scientific theories, but as a functional implementation as well. In other words, the deeply layered designs found in the gardens at Vaux-le-Vicomte and Versailles were interpretations of how the universe was perceived at that time (Weiss, 1996). As this idea was translated into modern times, I found that landscape architects have translated scientific trends to obtain their design goals for as long as humankind has existed. Thus, in order for me to translate the Baroque French Formal Garden into contemporary landscapes, the contemporary scientific equivalent of Descartes' Scientific Revolution must be determined. Thus, I answered the original question and brought me to my personal discovery of the theory of emergence.

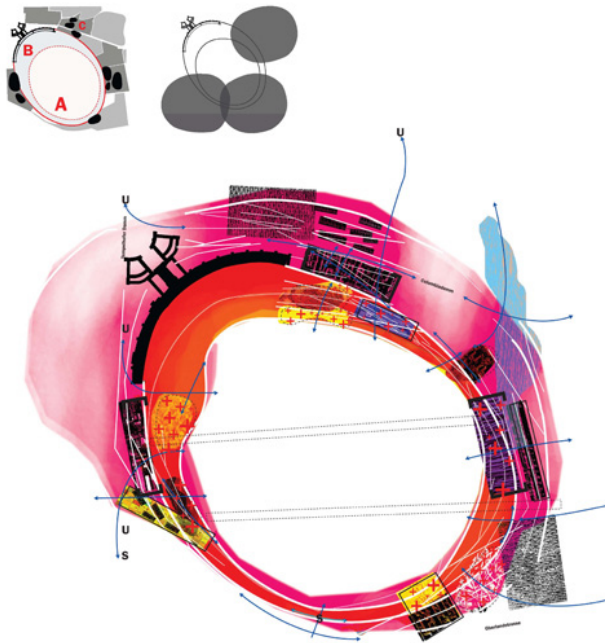
Several connections were found between the theory of emergence and many of the issues that have plagued landscape architecture over the last decade. The most fundamental and binding question of the array of questions that could possibly be addressed was how could a product of landscape architecture adapt to its fluctuating context. The possibility to answer this question is based on the research and practical application of the theory of emergence over the last half century. If the fields of computer science, mathematics, and economics can use emergence as a means to reach goals or answers, then why not landscape architecture?

The theory of emergence was developed approximately in the 1970s. It answered many questions about how the behavior of certain populations create the forms they do. From this initial series of discoveries, three distinct phases have occurred in the application of the theory. In the first phase, early discoveries in emergent behavior were rooted in biology and ecology. Examples of this movement include the history of how flocks of migrating birds or large schools of fish can maintain their form despite not having a leader. As the decades passed, the second phase brought a more defined understanding of emergence and what systems

are emergent. During this phase, the current understanding and principles of emergence were discovered, which views emergence as the movement from lower level simplicity to higher level complexity. The third and most current phase is using the theory to attain predetermined goals. Only a small group of fields, mostly located in computer science, have successfully created objects or processes that use emergent behavior to gain a goal or complexity previously unattainable (Johnson, 2001).

Over the last half century, urban theorists have applied the theory of emergence to better understand the spontaneous behavior of cities (Wiscombe, 2006). Their findings were similar to that of biologist or ecologist when they applied emergence to their fields (Johnson, 2001). The earliest and most influential researcher in this application was the writer and urban theorist Jane Jacobs. Her research, which was based on the spontaneous urban life found on the streets of New York City, created her perspective that the city is a problem of organized complexity (Jacobs, 1989). Organized complexity is the outcome of an emergent process (Johnson, 2001). This idea of city form originating from the bottom-up was starkly different from the top-down un-

derstanding that dominated the first half of the twentieth century. In the 1990s, Jacobs' research, along with the contributions of Christopher Alexander and Kevin Lynch, led mathematician Nikos Salingaros to develop his theory of the urban web. Salingaros hypothesized that the ability of a city to be emergent was based on its amount and diversity of pedestrian nodes and connections. Essentially, Salingaros, who has a fondness for ancient urban forms, stated that the greater amount of pedestrian based transport a space has, the greater opportunity it has to be spontaneous (Salingaros, 1998). Based on the studies in the urban realm, landscape architects and landscape architecture theorists began to question why the products of landscape architecture were not emergent if the context was (Wiscombe, 2006).



1.4, 1.5, 1.6, 1.7 Tempelhof Urban Ideas Competition

CHORA is a scenario-based urban design firm. (Below right) An Action Plan “contains strategies for the development of the conditions in which specific prototypes can be initiated, they also describe the potential interrelationships between different prototypes (Chora.org).

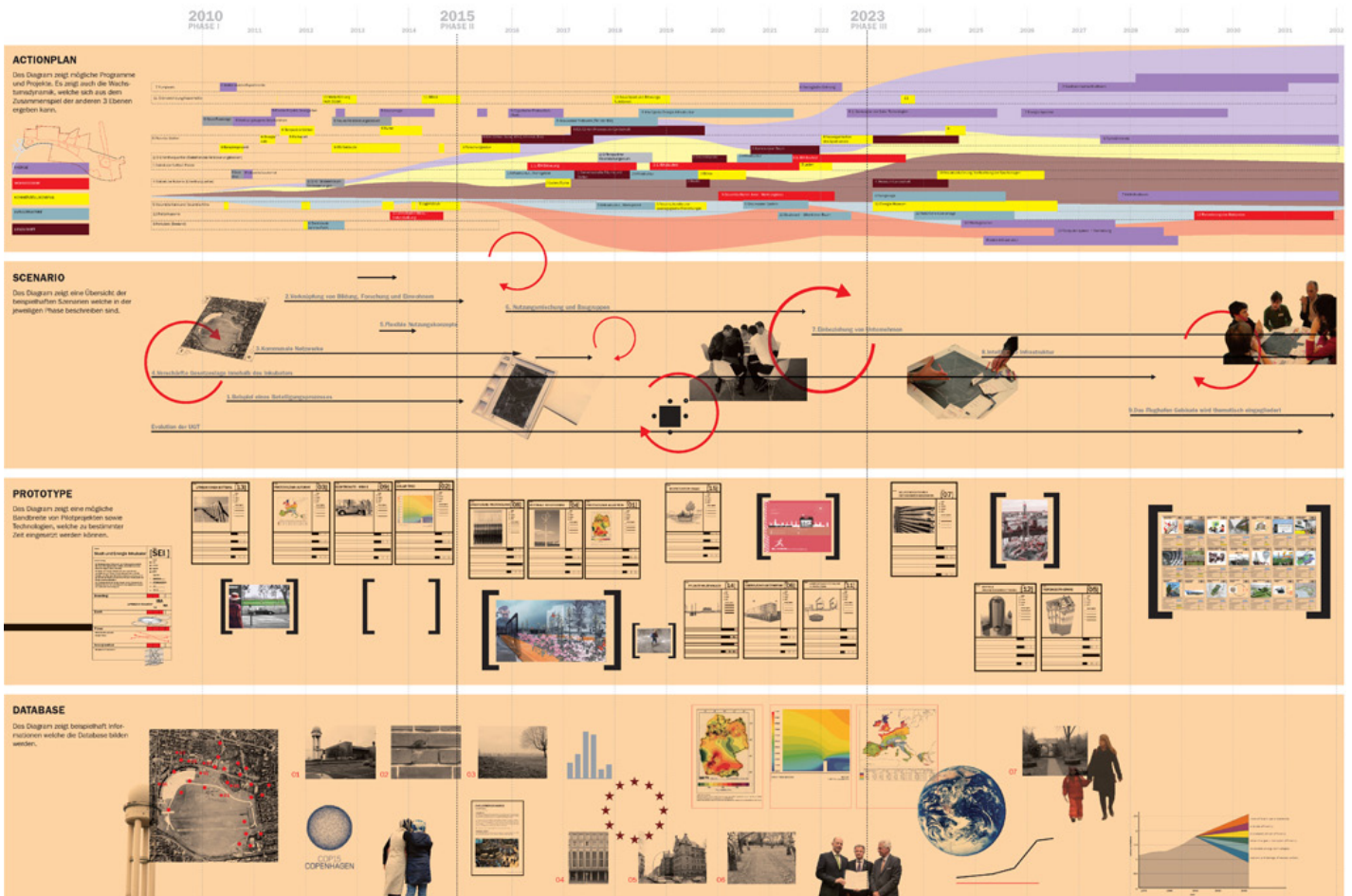
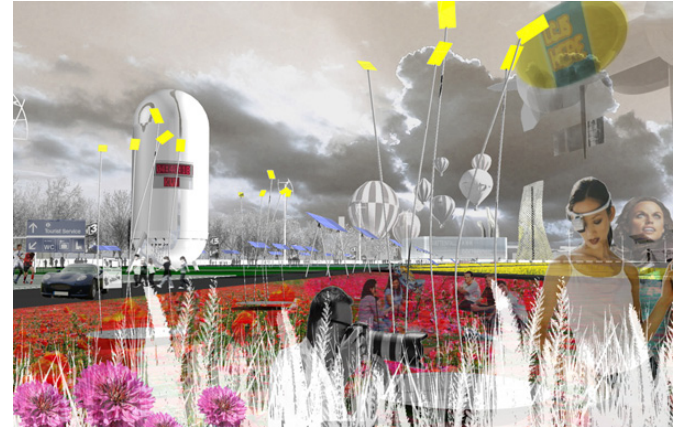
(Images courtesy of CHORA)

Based on the research that deemed the urban realm emergent, landscape architecture and landscape architecture theorist began to ponder whether the elements that create the urban realm be emergent as well (Waldheim, 2001). The elements which create the urban realm are, for the most part, landscape architectural nature. These elements include roads, streets, parks, plazas, squares, and infrastructure of all types. Although this question has been examined for a decade, little attention has been given to the role of the theory of emergence in understanding the question better or answering it. Despite the lack of application, there are some landscape architectural practices that use the theory of emergence to answer this question. Two of the examples of this is the work of CHORA and Rem Koolhaas and Bruce Mau’s project “Tree City”.

The Dutch planning, urban design, and architecture firm CHORA specializes in difficult urban problems that contain many stakeholders. CHORA’s principal, Raoul Bunschoten, and his students from the Berlage Institute in Rotterdam, the Netherlands developed a scenario-based design methodology that uses mostly qualitative information based on the firm’s fieldwork. CHORA and Bunschoten use a management system

called the Urban Gallery to guide the evolution of a planning project. The Urban Gallery is a dynamic tool that engages stakeholders to act collaboratively throughout the duration of the project. The dynamic nature of the Urban Gallery is created by its diagrammatical master plans, which generate project knowledge through its monitoring of a fluctuating and liquid design (Chora.org).

Studies I have conducted found emergent behavior in certain phases of Urban Gallery including the stakeholder feedback generated by the prototypes. But as a methodology, it denies emergent behavior to affect the design’s outcome. This is due to the design process’s attempt to forecast an outcome for the unpredictable future of the site. CHORA limits the endless possibilities of a place to an “action plan” which is essentially a time-scaled master plan. It is suggested that the CHORA design methodology could benefit by not attempting to predict the future, but instead be susceptible to the unknown changes that will occur.





“Tree City”, the winning entry for the Downsview Park Competition, is one of the best examples of the application of the theory of emergence to the design process of a public urban space. Dutch architect Rem Koolhaas and graphic designer Bruce Mau who entered the most unpretentious presentation in terms of physical interventions produced the winning design. They developed a strategy that allowed the park’s design to adapt to the ever-changing contextual situation. Instead of proposing a design at the time of the competition, in the typical master designer fashion, they laid out a framework for a design process that was designed by the emerging patterns created by the individual elements that created the city. This strategy became the project’s design. Koolhaas and Mau reduced the design process into what is essentially a formula. This formula is based on the principles that urban parks are a lucrative investment and at the time of the competition it is impossible to understand enough about the site to successfully produce a design (Waldrop, 2001).

The studies of this thesis found if a truly emergent formula were to be created, the programmed elements would adapt with the desires of the individuals. For this reason, the emergent ability of Tree City is regu-

lated. This formula could function in a more emergent manner if it extended the feedback loop created in the placement of elements into the selection of elements.

If these two precedent studies were merged with the relative new landscape intervention strategy termed by Nan Ellin as “vulnerable urbanism,” a unique form of design could be developed that strengthens the emergent behavior found in the process of design. Ellin’s approach asks landscape architects to design for an unknown future using small interventions (Ellin, 2006). These small interventions could be low in cost and use small amounts materials. This idea is in opposition to the master-planning strategy. Open-ended vulnerability could remove the restrictions created by CHORA’s and Koolhaas and Mau’s “Tree City’s” methodologies. This addition would allow the methodology’s vulnerability to create an emergent behavior instead of regulating it. Based on these ideas and the studies of this thesis, a design methodology can be created that exhibits emergent behavior at several levels instead of just one or two. If this can be accomplished, the understanding of how a product of landscape architecture adapt to its fluctuating context may become more clear.



1.8, 1.9, 1.10, 1.11 Tree City
Images from the Downsview Park Competition in Toronto, Canada.
(Images courtesy of Office for Metropolitan Architecture (OMA))

Based on the research of three interconnected subjects: (1) emergence as it is applied to other fields, (2) emergence as it exists in the built environment, and (3) the current-state of the application of the theory of emergence to the field of landscape architecture; a design methodology has been created that exhibits emergent behavior during the process of design. The design should be followed as a procedure and should be applied in a cyclical manner. Also, based on the research, a set of principles has materialized that help guide the design process. Project goals come in two forms: (1) holistic goals (goals that control the entire project), and (2) individualistic goals (goals that are determined in an individual phase of the design process).

The design methodology's cyclical procedure was determined as follows:

{B.1} conception of the idea: this phase of the design methodology is the creation of a dream. An idea for what a site could become can come from anywhere or anyone and originate at any scale. Like most projects that arise in the public urban realm, this idea is generated by the citizens, the municipality, a private enterprise, or all three together. This phase begins when change is proposed and someone makes a decision to alter the landscape.

{B.2} investigation of the situation: at this point, the landscape architect should not criticize or condemn the idea or ideas brought to them in phase B.1, but devote him or herself to investigation of the true reason for the creation of the idea. The request for a design is sometimes based on a mis-aligned perception, which it is the landscape architect's duty to interpret. The investigation should consist of studies in the site's history and context, current functionality and use, and its projected situation.

{B.3} design the prognosis: after a thorough analysis has been accomplished and the site's situation is understood, the landscape architect should propose a design that is reflective of the investigation in B.2. The design should not be comprehensive, rather incremental. Early designs should be time and resource efficient in case the feedback after implementation does not propel the design forward. As the project continues into its later stages, more permanent elements can be designed.

{B.4} calibrate the components: this phase is the actual installation of the design.

{B.5} record the response: after the design is actualized on the site, rigorous efforts should be taken to document the actions that occur on the site. The data chosen to be recorded should be uniform throughout the duration of the project. The durations of time between this phase and the next can greatly differ, but the duration and routes of the recordings need to be similar.

{B.6} analyze the particulars: once significant and constant data is collected, the architect must interpret the recordings. This should be an objective and subjective process because the feedback is considered to be hierarchical. The direction of the project should be fundamentally determined by the data, but the architect's personal ideas can influence the conclusion of the analysis.

{B.7} commencement of the procedure: as the name of this phase indicates that this is not the end of the project, but yet merely a step. At this point the architect is instructed to return to step B.3. This should create a feedback and design loop that, as a whole, creates emergent properties within the defined site. This loop should be continued until the calibrations reach the peak of investment.

1.12 Design Methodology Procedure

This procedure should be followed in a cyclical manner, were phases B.3-B.6 repeat.



{B.1} conception of the idea

conception - the originating of something in the mind

idea - a thought or suggestion as to a possible course of action



{B.2} investigation of the situation

investigation - to carry out a systematic or formal inquiry to discover and examine the facts of to establish the truth

situation - a set of circumstances in which one finds oneself; a state of affairs



{B.3} design the prognosis

design - decide upon the look and function of

prognosis - a forecast of the likely outcome of a situation



{B.4} calibrate the components

calibrate - to adjust precisely for a particular function

components - a part or element of a larger whole



{B.5} record the response

record - to give evidence of

response - a reaction caused by a change or event



{B.6} analyze the particulars

analyze - examine methodically and in detail the constitution or structure of something, typically for purposes of explanation and interpretation

particulars - an individual fact, point, circumstance, or detail



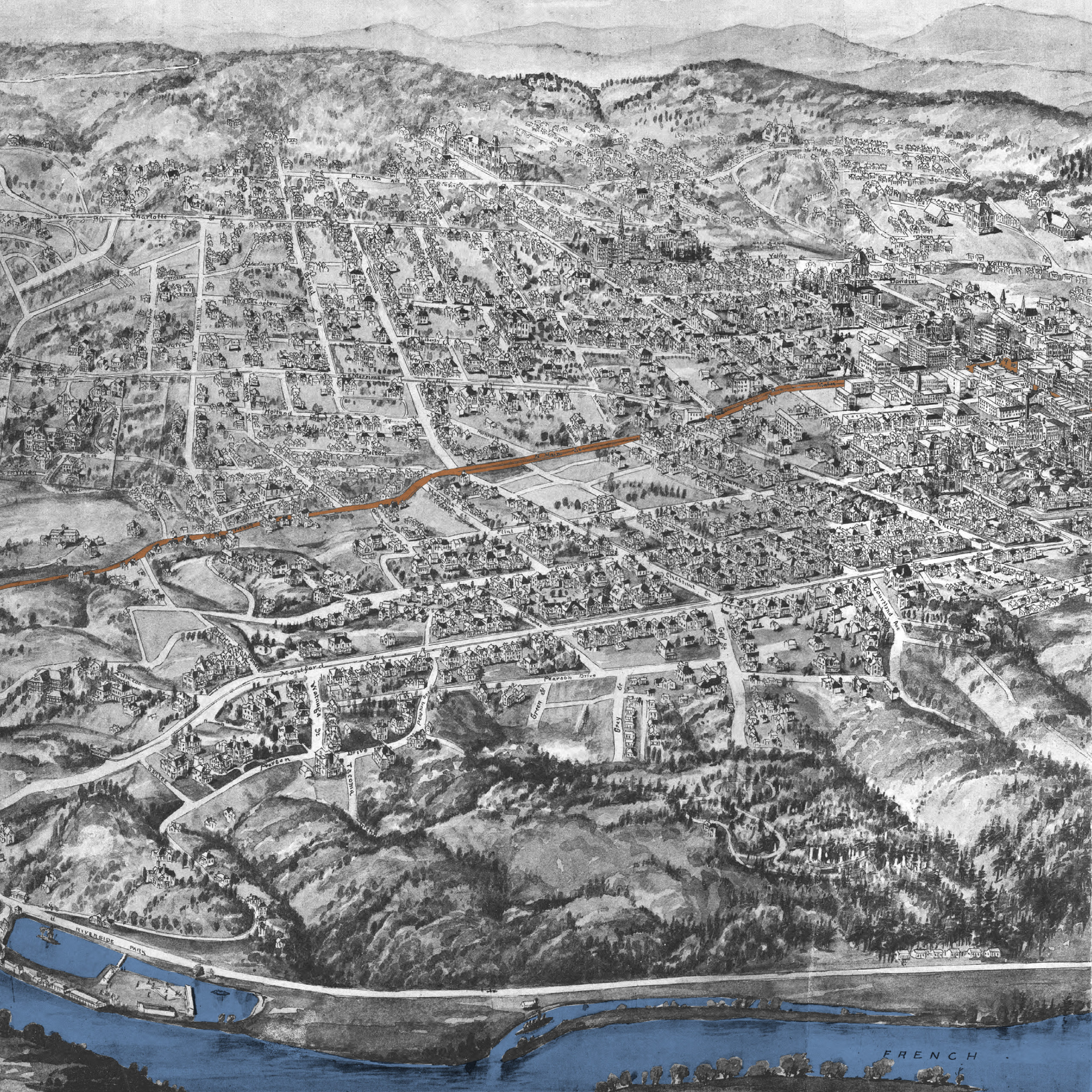
{B.7} commencement of the procedure

commencement - to have or make a beginning

procedure - an established official way of doing something

In conjunction with the process of the design methodology, several principles were found in the research and testing of this design procedure. These principles are based on the nature of emergence theory and the nature of Salingaros' "urban web." The first principle is the acceptance that nothing an architect can design is perfect. Designs, which are located in an emergent environment are always incorrect because emergent systems are unpredictable and above the understanding of the human mind. Therefore, design calibrations should be small in physical form, inexpensive, consume little time, and be easily amended. The second principle states that the feedback loops or the design's cycles should be small in duration and intimate in nature. The smaller the feedback loop, the more direct and intimate the design's response to feedback can be. Finally, the architect must view him or herself as part of the emergent system. Due to the static nature of landscape elements and materials, landscape architectural designs cannot be manipulated in the same way a computer program can. Therefore, someone is needed to design and install the elements. But the designer is not above the system, merely an individual participating in it.

After research had been conducted and a design methodology had been created, the next step was to examine the design methodology in a design test. Because the design test was not actually conducted, it was necessary to create a simulation that generated response to the calibration. The simulation of feedback responses was accomplished by presenting and inquiring two people familiar and understanding of the site's conditions and urban web. These people being Alex Bonda and myself, Matthew Biesecker, both Auburn University Master of Landscape Architecture students. Although the presentation of the design test may seem as if it is based on actual events, everything is simulated with the exception of for the data collected in the initial phase of analysis.



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RIVERSIDE PARK

FRENCH

II. THE DESIGN TEST

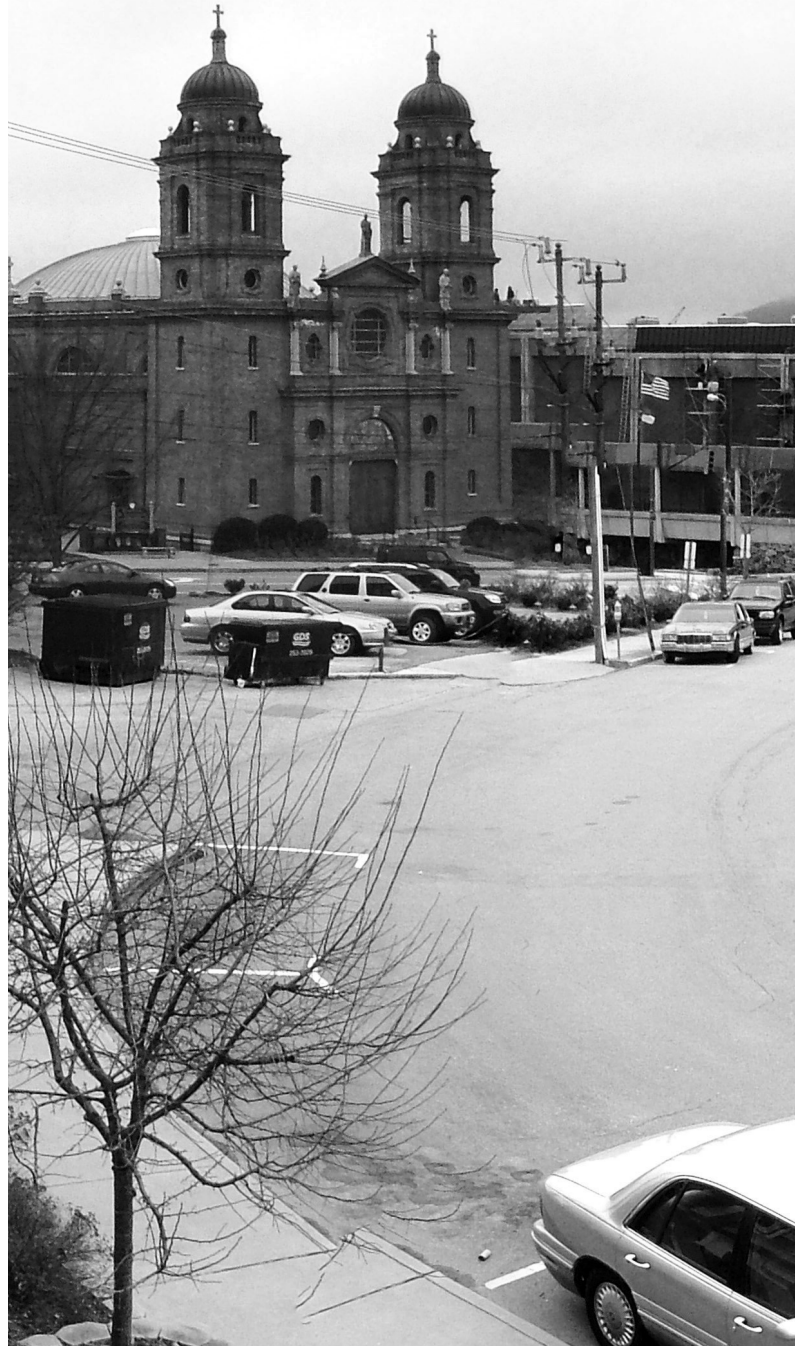


2.2 The Test Site

The site chosen for the design test is an inefficient automobile parking lot in the city of Asheville, North Carolina.

{1.1} THE CONCEPTION OF THE IDEA

This project began when a simulated Asheville city official approached a small simulated landscape architecture firm in Charlotte, North Carolina about creating an alternate use for an economically insufficient automobile parking lot located near Asheville's St. Lawrence Basilica. The site already had several other proposed private uses including a highrise apartment building and a multi-level automobile parking garage, but the city preferred to buy the property and transform it into a public amenity. The landscape architecture firm was given the guidelines that the alternate uses they propose must (1) be public in its nature, (2) generate revenue for local businesses, and (3) create value in the properties adjacent to the site. Being a non-native to Asheville, the project's assigned head landscape architect decided to follow an untested design methodology, which was taught as a way to create a public space based on an everchanging context. Because the landscape architect chose to follow that certain design methodology, the next step in the project was to study the site's historical and current situation.





Basilica of
St. Lawrence
←

Pack Library
→

2.3 Geological History of the Appalachian Mountains

Continental plate movement caused several mountains and oceans to form on the same location as the present-day Appalachian Mountain chain. The extent of the last Ice Age is indicated in pink.

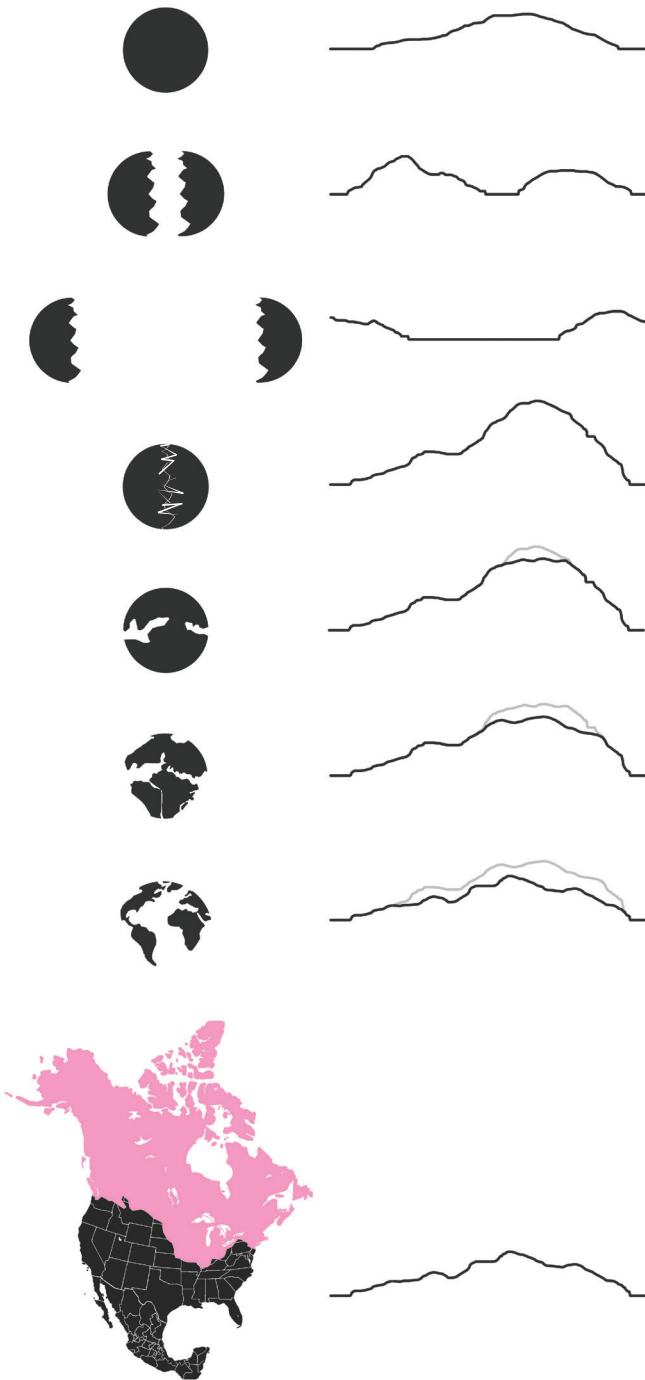
(Opposite) 2.4 The Appalachian Mountains

Photographed is the current landscape in the Pisgah National Forest.

{1.2} THE SITE SITUATION: ASHEVILLE'S HISTORICAL AND CURRENT CONTEXT

The rock at the core of the Appalachian Mountains and at the core of the site was formed over one billion years ago. 750 million years ago the supercontinent began to break apart, and 540 million years ago the continental crust split. As the continental crust split, the Ocoee Basin was formed and filled with seawater, while nearby rivers brought clay, silt, sand, and gravel, which settled in layers. The rocks that formed were resistant to weathering and erosion. As the new oceans became larger, the continental crust changed direction and collided, resulting in the formation of mountains. 240 million years ago a new basin formed because of another change in direction of the crustal plates. This is the present-day Atlantic Ocean. At the time of their formation, the Appalachian Mountains were much taller and steeper than the present-day Rocky Mountains. For the last 100 million years, erosion has carved away at the mountains. Vegetation, wind, ice, and water still continue to erode the mountains and deposit the sediment into the Atlantic Ocean and Gulf of Mexico (usgs.gov).

Four times in the last 2 million years, glaciers extended southward into the United States. The glaciers did not reach Asheville, but the climate brought animal and plant species common to cooler, northern climates. These species established themselves and continue to live in the higher elevations of Asheville. Among these migrating species were the earliest known human inhabitants, the ancestors of the Cherokee Indians (usgs.gov).







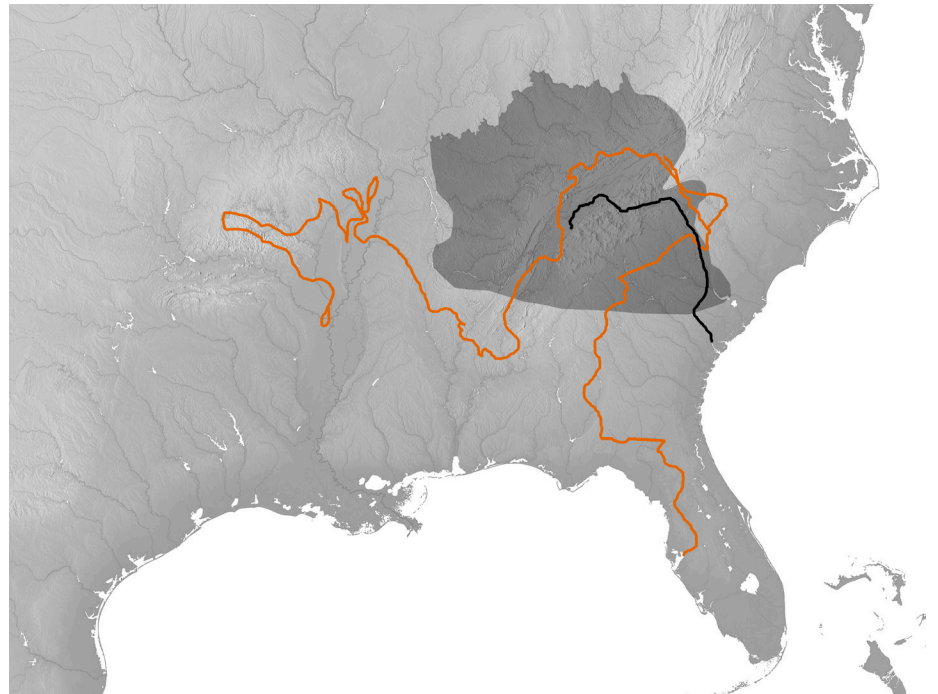
2.5 Exodus of the Cherokee Nation

This series of maps shows the exodus of the Cherokee Nation at 1700, 1783, and 1838. By the mid-1800's, nearly all of the Cherokee peoples would be removed from the Asheville area.



2.6 Map of Early European Exploration

(Orange) 1540 Hernando de Soto Expedition
(Black) 1567 Juan Pardo expedition





2.7 The Trail of Tears

(Image authored of Robert Lindneux)

Origins of the title “Cherokee” are unknown, but may translate to “those who live in the mountains.” What little is known of Cherokee culture before the 18th century was recorded by the Spanish in their expeditions of the south. The first known contact between Europeans and the Cherokee tribes was in 1540 during the Hernando de Soto expedition and in 1567 during the Juan Pardo expedition. Some of these interactions were mutually beneficial, involving the trading of animals and agriculture techniques. Some of the interventions were harmful to both parties; ending in battle and the exchanging of previously unknown diseases (Conley, 2007).

In the late 1600s, European’s began traveling the region more consistently because of the game located in the seeming endless wilderness. In the decades following, the Europeans and Cherokee would establish trading links consisting mostly of guns for animal pelts. In the mid-1700s, colonist from the Carolina coastal region began to push the Cherokee out of their territory. This forced migration would continue for the next one hundred years and would be exacerbated by the federal land-payments given to the Revolutionary War Veterans. By the mid-1800s nearly all the Cherokee tribes would be removed from the region of Asheville. Currently, the Cherokee have reclaimed land in the region that is protected by the Federal Government (Conley, 2007).



2.8 Asheville Grist Mill

(Image courtesy of The University of North Carolina at Asheville)

2.9 Evolution of the Built Environment

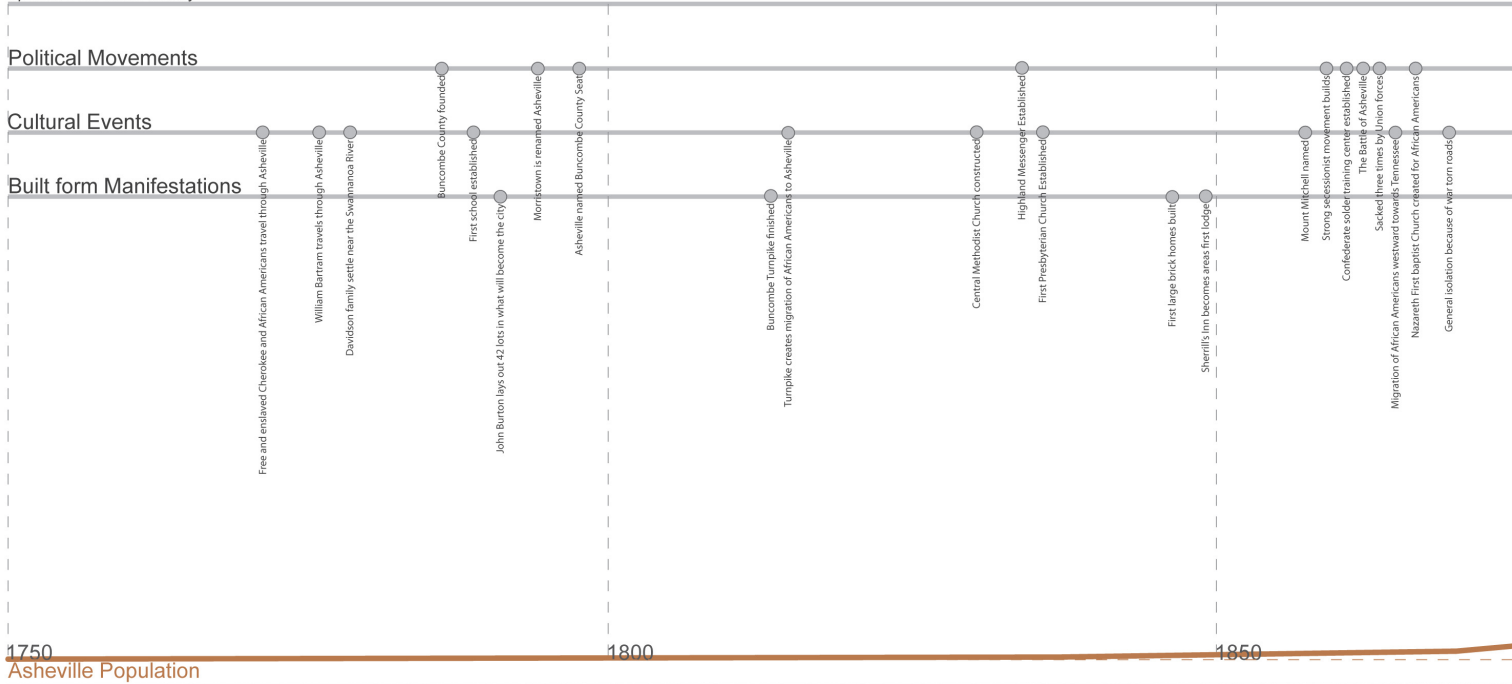
Periods shown: 1888, 1917, 2000



The region's topography made travel so difficult that the western reaches of the Carolina's were left virtually ungoverned. Morristown a small, remote town with an elementary log courthouse was established in 1793 as the county seat of Buncombe County. In 1795, Samuel Ashe was elected governor of North Carolina and with his nomination, the city renamed itself Asheville. At the intersection of two ancient trading routes, several large land grants were subdivided into more urban lots. In the census of 1800 the population of Asheville was recorded as "twentyfive free persons and thirteen slaves" and the built environment consisted of a general store, two grist mills, a tailor, a forge, a school, and several homes. The city would quickly grow due to the increased production of the region's raw natural resources (Chase, 2007).

Timeline of Events that Created Asheville's Built Environment

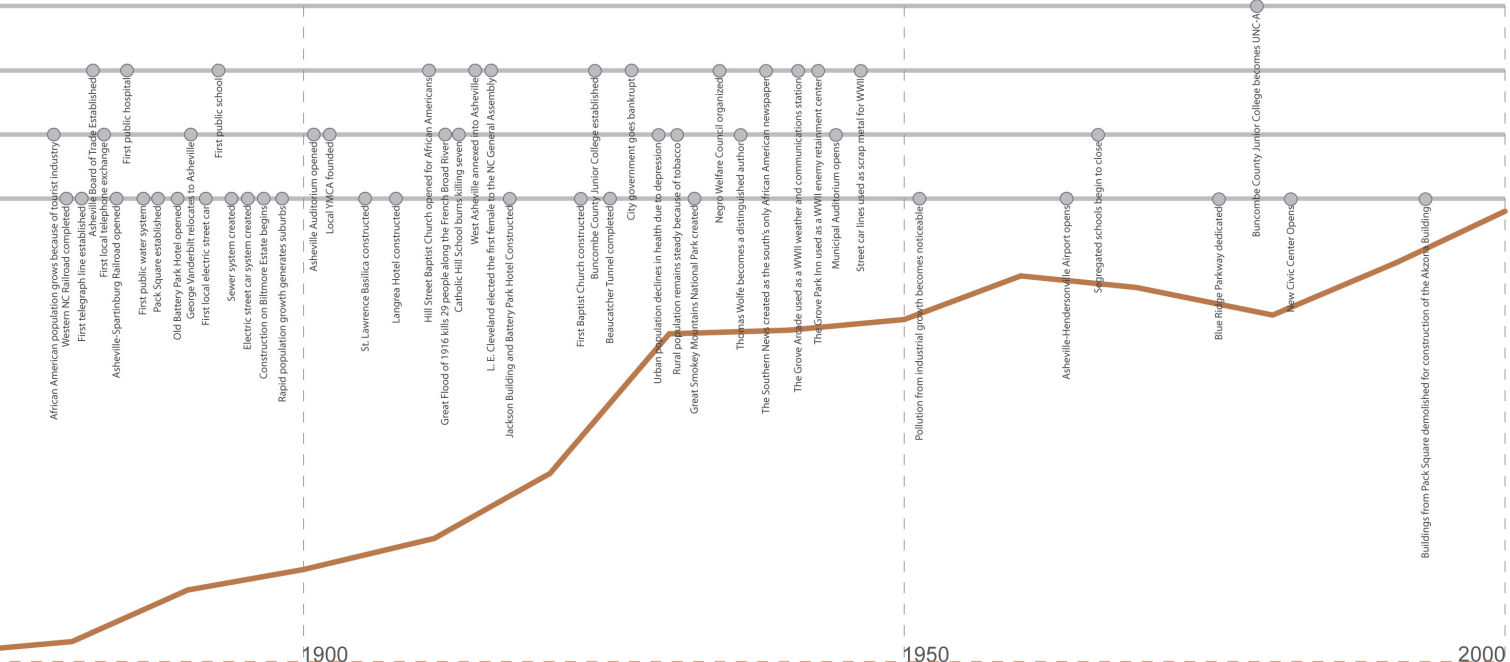
Timeline information referenced from the UNC-Asheville Special Collections Library



1750 Asheville Population

1800

1850





2.11 1890s Test Site Section

If compared to the 2010 Test Site Section, the over seventy feet of soil that was removed of the last two hundred years is noticeable. The knob's elevation was even higher when it functioned as a Battery.

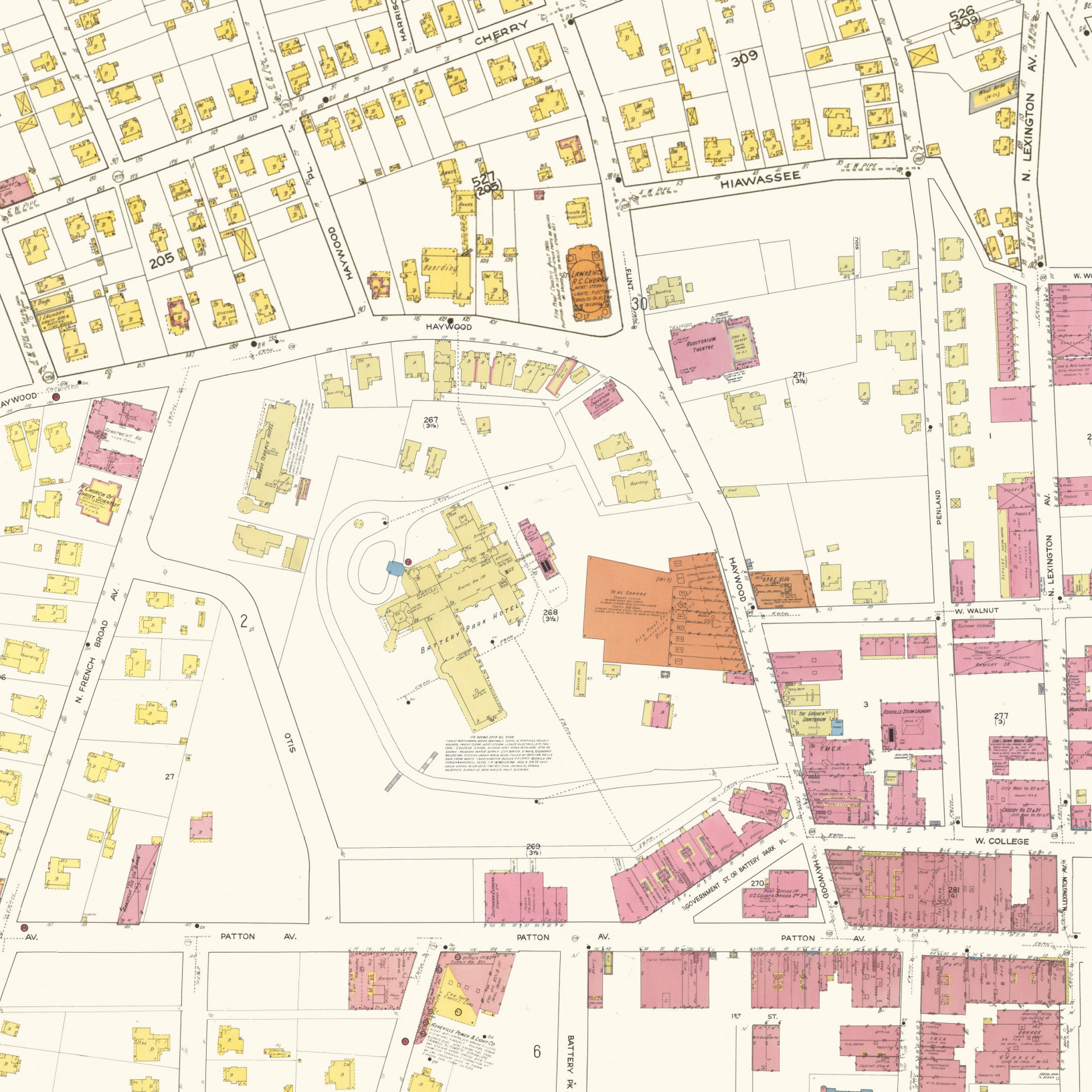
In 1814, the Eagle Hotel was established as the region's first luxury hotel to accommodate travelers wanting to escape from the Deep South's harsh summer humidity and heat. Other hotels would be established over the next two hundred years; some of which would be so massively scaled they would define and dominate the perspective of Asheville as a town. The hotels were created, as an escape from malaria outbreaks in coastal cities like Charleston and Savannah. They would also act as a place of natural relaxation for people of great wealth whom would have been accustomed to the smoky, industrial cities of the Northeast. This established the areas two perpetual attractors: health and travel, which are still the city's two largest revenue generators today (Chase, 2007).

The terrain of Stony Hill has been altered several times throughout the last couple hundred years. The first European American use of the site was as a Civil War Battery, which was influenced by the site's high elevation. This elevated situation gave influence to the site's next use as the one of the era's great southern travel destinations, the Battery Park Hotel.

(Opposite) 2.12 1890's Test Site Figure-ground

Pictured is the Battery Park Hotel atop Stony Hill.
(Photograph courtesy of The University of North Carolina at Asheville)





CHERRY

HIAWASSEE

HAYWOOD

BATTERY PARK HOTEL

GOONWAY

N. LEXINGTON AV.

N. FRENCH BROAD AV.

OLIS

PENLAND

W. WALNUT

W. COLLEGE

PATTON AV.

PATTON AV.

PATTON AV.

BATTERY DK

ST.

205

309

527
205

267
(3/4)

268
(3/4)

269
(3/4)

271
(3/4)

27

277
(3/4)

270

526
309

0

2

3

0

(Opposite) 2.13 1917 Test Site Sanborn Map

Notice the street and structure consistency to the north of the Basilica St. Lawrence.

(Map courtesy of the University of North Carolina at Chapel Hill)

After the Civil War, Asheville was devastated and left with little functional infrastructure. The city became remote, much like it was prior to early 1800s. When the railroad was replaced in 1880, the form of the built environment became much as it is in today's landscape. As the transportation networks from cities like Augusta, Georgia and Charlotte, North Carolina to Asheville were improved, outside investors and tourists brought their city's artistic sophistication and architectural styles to Asheville. This created an urban style unlike anything else in the southeast. This style was a unique blend of secluded rural life and the sophistication of a large Southern metropolis. This distinctive fashion became known as the "Asheville Style" and still exists today (Chase, 2007).



2.14 Stony Hill Soil Removal

(Image courtesy of the University of North Carolina at Asheville)

From the mid-1880s until the Great Depression, Asheville's landscape was profoundly altered by the dreams of four wealthy titans: George Pack, Franklin Coxe, George Vanderbilt, and E. W. Grove. These dreams were interpreted by the world-class architectural talents such as Richard Sharp Smith, Rafael Guastavino, Richard Morris Hunt, and Fredrick Law Olmstead. These architectural achievements exist today due to the interesting financial situation the city of

Asheville was in between the Great Depression Era and the mid-1970s. In the 1920s, the development of the Grove Arcade and the present-day Battery Park Hotel reduced the height of Stony Hill by 70 feet (over 100 feet has been taken in the site's history). Much of the site is now devoted to automobile parking, which was the most profitable use for the land in the 1970s (Chase, 2007).



2.15 Construction of The Grove Arcade
(Image courtesy of the University of North Carolina at Asheville)



2.16 2010 Test Site Section

Unlike many other Southern cities, Asheville did not default on its debt from the Great Depression. The debt payments, along with the national post World War II migration to the then newly created suburbs, caused Asheville's center city to deteriorate. Drove of important stores and businesses relocated to the suburbs to take advantage of the cheap land. This movement grew exponentially; when one store left, several others followed. Historical buildings in the city's center were either persevered because no new building use was needed or the buildings were completely demolished to accommodate the most profitable use for derelict lots, the parking lot.

(Opposite) 2.17 2010 Test Site Figure-ground

Pictured is the Battery Park Apartment (foreground) and the Grove Arcade (background).
(Photograph courtesy of The University of North Carolina at Asheville)



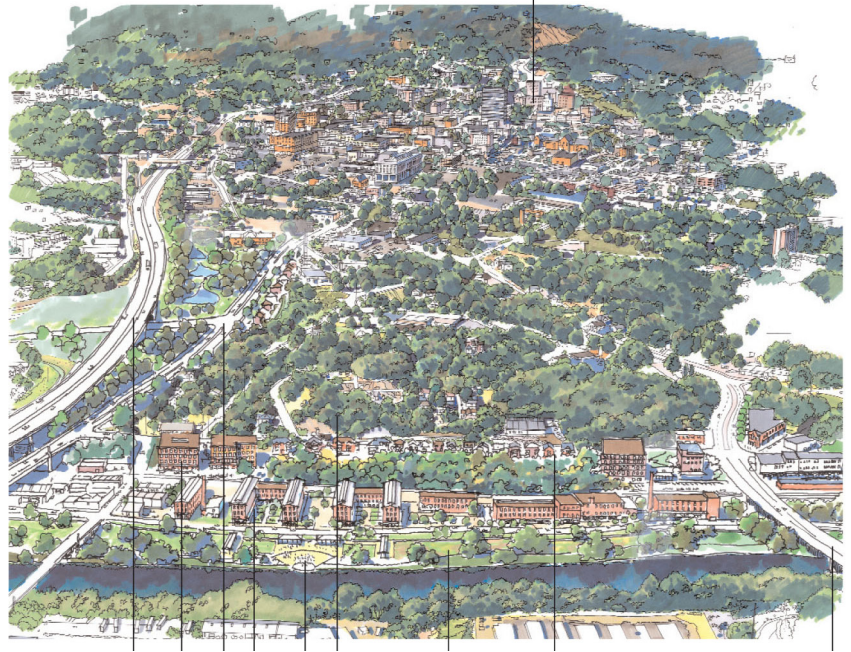
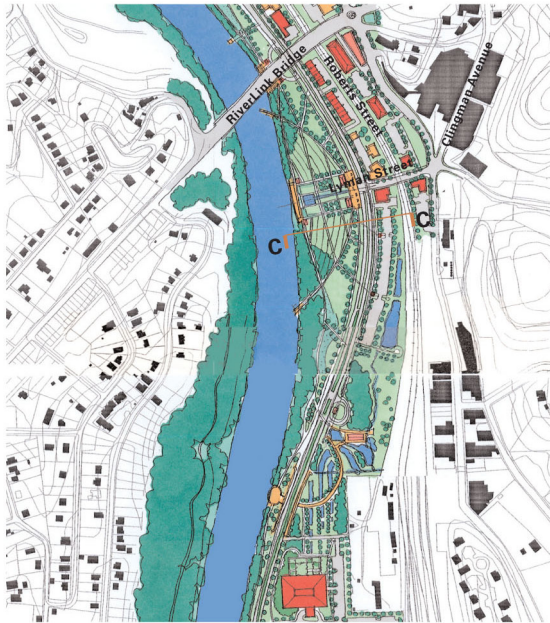
The debt from the Great Depression was not paid until 1976. This was a monumental event for the city and signaled a slow reinvestment into the center city of Asheville. Several projects of this period created strong civic compassion for historic reservation and established the hip, eccentric atmosphere, for which Asheville is known. This project's included landscape architect John L. Lantzius's renovation of 17 vacant buildings on Lexington Avenue, which were modeled after the eclectic neighborhoods of the Pacific Northwest. The Bele Chere Festival, which means "beautiful thing" in French, was the city's 1980's response to the lack of activity. Today, the festival generates \$12.4 million for the local economy over the span of only three days. The construction of I. M. Pei's 1977 Akzona, Inc. building created a civic appreciation for historical preservation through its demolition of several historic buildings and its dominate location in the public Pack Square. Pack Plaza and Pack Place were urban renewal and development responses to the Akzona, Inc. building. Pack Plaza restored many cherished buildings and Pack Place established new museums and civic amenities. The renewal of Haywood Avenue and Wall Street was the first successful redevelopment project that used Federal funding.



2.18 Significant Events in Asheville's Built Environment 1976-2010

(From top-left to bottom-right)

- 1.) Restoration by John L. Lantzius
- 2.) Restoration by John L. Lantzius
- 3.) Restoration by John L. Lantzius
- 4.) The Bele Chere Festival
- 5.) Pack Square and the Akzona Building
- 6.) Pack Place and Pack Plaza
- 7.) The Wall Street Restoration
- 8.) The Restoration of the Grove Arcade

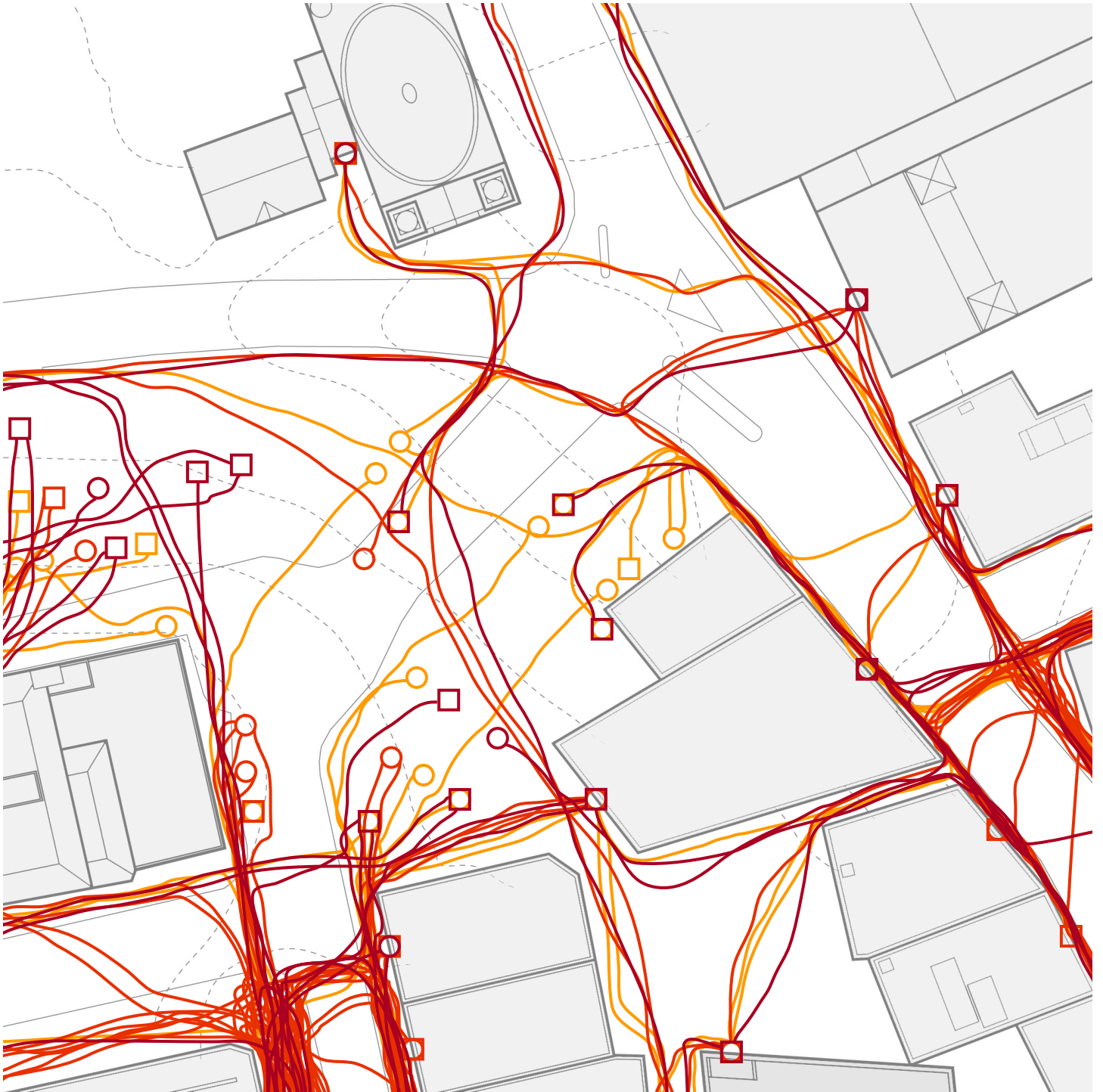


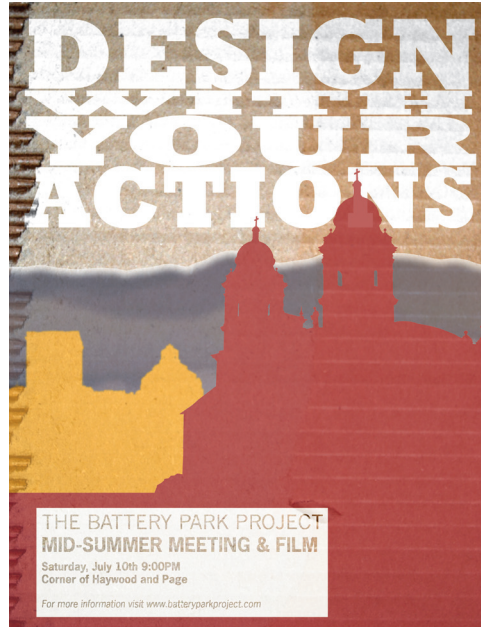
2.19, 2.20, 2.21 Proposed Development Along the French Broad River
(Images courtesy of Urban Design Associates)



2.22 1.2 Pedestrian Indirect Feedback

This feedback study indicates a morning study in yellow, a midday study in orange, and an evening study in red. The circles indicate pedestrian origins, the squares indicate pedestrian conclusions, and the lines indicate the location of pedestrian movement. Opposite is a compilation of the studies.





2.23 Publicity Poster Design

These posters, along with other media, were created to generate excitement and feedback for the project.

{1.3-1.6} PUBLICITY AND PEDESTRIAN CONNECTIVITY

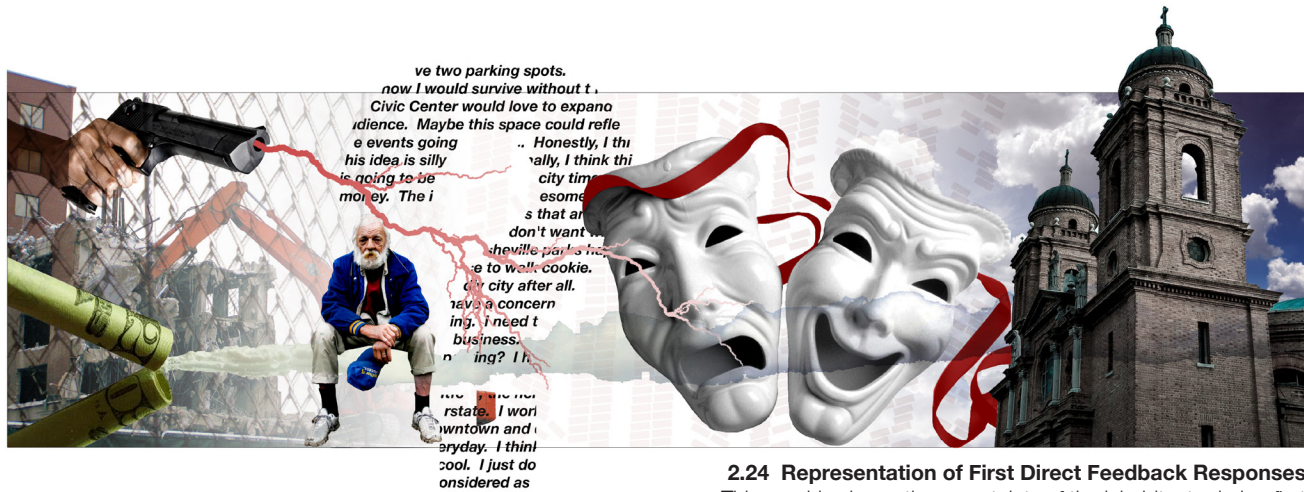
February 2010-April 2012

After the initial study of the site's historical and current context was completed, holistic design goals were created for the entire project. These goals included generating revenue for the local businesses, building interest in properties adjacent to the site, and creating a space that is public in nature. It was simulated that when these goals were presented to the Asheville city officials, they were deemed appropriate and related to the desires they had for the space. Although skepticism surrounded the decision to use the selected design methodology, the city officials allowed it to be used.

Based on the information gathered from the historical and contextual study and the presentation to the city, the design goals for the first design cycle were established. These goals are as follows: 1.) to create a publicity among the inhabitants of the site in order to generate interest, support, and ideas about the future

of the site, and 2.) to create an environment conducive to restoring the urban web around the site to its pre-1970s function in order to bring pedestrian locomotion to the site. These goals essentially strive to give people knowledge of the project and move pedestrians to and thorough the site.

Publicity was obtained in a variety of communicative methods: the Internet, word-of-mouth, visual communication, etc., all of which relayed the message of what, why, and how this project's intended to construct. Most of these publicity generators also recorded feedback from the site's inhabitants. For example, the Internet proved to be a strong tool because it not only communicated information about the project, but retrieved information as well. The accessible nature of the blog, the websites, and the e-mail address created for the project, allows someone the opportunity to reflect on how they directly respond. Although meetings and postings were used, they did not seem to produce the well thought-out and comfortable responses of the one generated on the Internet. Meetings were held with local investors, local organizations, local businesses, and local homeowners. There were also several meetings that were held on the site to help generate interest in the



2.24 Representation of First Direct Feedback Responses

This graphic shows the uncertainty of the inhabitants during first phase of the project. It also shows how the feedback was typically segregated in to what was deemed desired and not desired.

project.

Publicity was generated for several reasons. First, it allowed the public to be aware of the changes that were about to happen on the site. Second, it allowed a greater amount of direct feedback to be collected because people understood what was being asked of them. Lastly, the reason publicity was needed was because it allowed a more realistic prediction of how the site would function in the future. If the holistic project goals were to be obtained, a much more diverse crowd would be present on the site than was in the existing conditions.

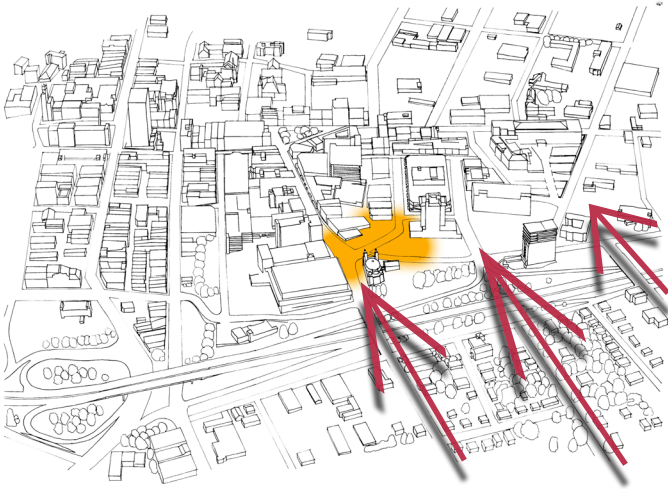
These reasons for why publicity is important is also the basis for how the success of the calibration was assessed. If the calibration is judged on whether or not it created publicity that generated interest, support, and ideas for the future of the site, the calibration will be viewed as a successful. However, the calibration did not create a depth of rich interest, support, or ideas. This could be due to the relatively short time-span between the beginning and the end of this design phase. Because the publicity did complete its goal, although more could come from it, the tactics used in creating publicity should continue.



2.25 Summer Night Movie and Meeting

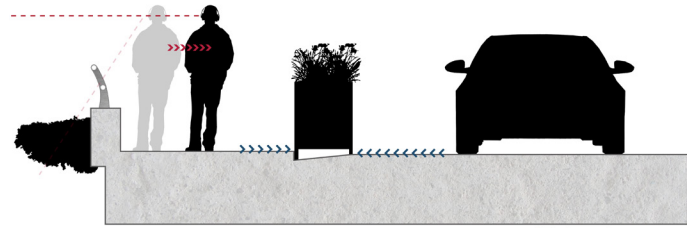
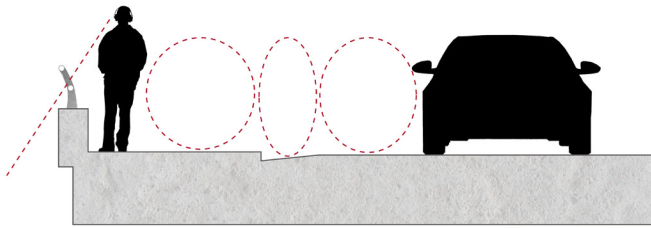
Events that showed alternative ideas for the site became a breeding-ground for creative thinking among the inhabitants.





2.26 Montford Context Map

Red arrows indicate the pedestrian movement from the Montford neighborhood. This is needed if the urban network is to function at its most efficient. The test site is indicated in yellow.



2.27 Existing and Proposed Flint Street Bridge Sections

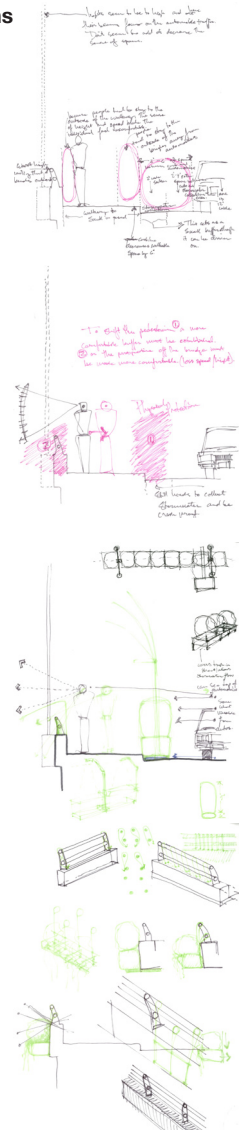
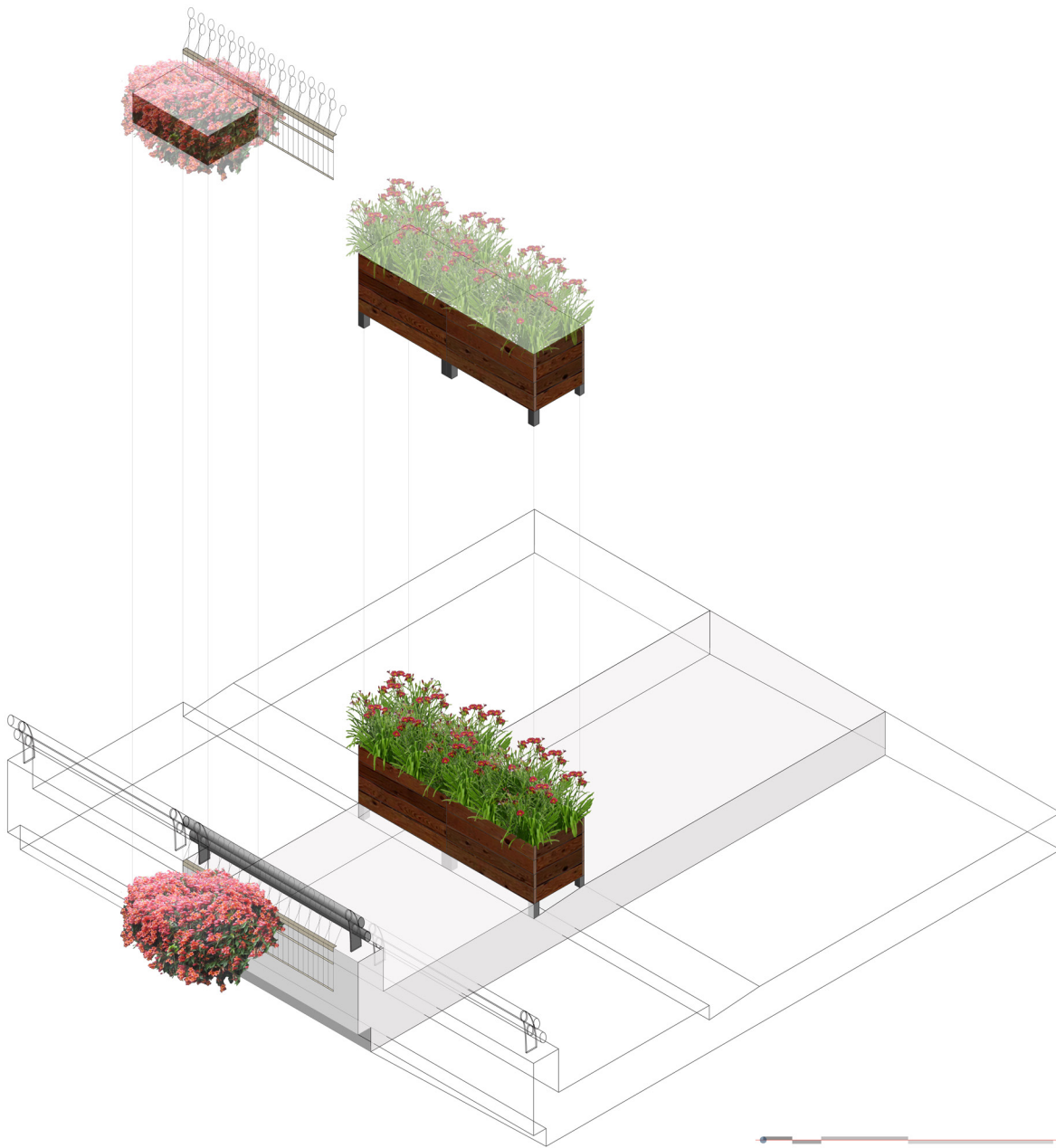
The section to the left describes how the automobile traffic on the bridge shifts the pedestrian to the outside of the bridge. The section to the right shows how placing an object in the bridge's gutter can shift the pedestrian to the center of the path.

Two calibrations were installed in the site's surroundings to help improve the pedestrian conditions to and through the site. These calibrations were installed on the Flint Street Bridge, which spans Interstate 240, and at the intersection between the site and the Asheville Civic Center.

The Flint Street calibration's goal was to create safer and healthier pedestrian condition for daily commuters from the Montford neighborhood. To accomplish this, focus was put on the existing conditions of the bridge. It was observed that people walking the bridge tended to stay to the outside of bridge because of automobile traffic in the bridge's center. This causes the pedestrian to then look downward towards the in-

terstate below. A series of planter boxes were placed in the gutter of the bridge to create a physically and physiologically safer experience for the pedestrian. This caused the pedestrian to shift towards the center of the designated pedestrian path. The planter boxes did not interfere with traffic patterns of automobiles. Hanging planters were placed on the outside of the bridge to deter pedestrians from looking downward. This encouraged their perspective outward to the distant mountain view. Planter boxes proved to be a cost effective answer because they were created from recycled material from the abandoned industries located along the French Broad River.

2.29 Process Drawings of Flint Street Bridge Calibrations



2.28 Flint Street Bridge Calibration



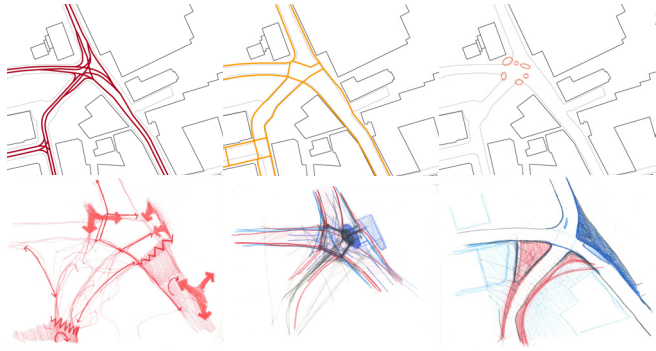
2.30 Flint Street Bridge Calibration

Notice how the publicity and feedback mechanism is integrated into the Flint Street Bridge calibration. Also, note how the planter boxes allow the gutters to collect storm-water and road debris.

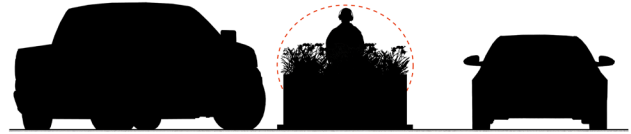
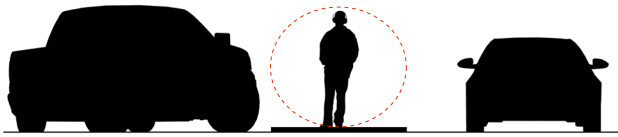


2.31 Flint Street Bridge Calibration

These overhanging planters attempt to create a reflection of the vegetative overhangs, which are common in the higher elevations of the Appalachian Mountains.



2.32 Process Drawings of Haywood Street Calibrations



2.33 Existing and Proposed Haywood Street Sections

The section to the left leaves the pedestrian exposed to patterns of automobile traffic. The section to the right attempts to protect the pedestrian from patterns of automobile traffic.

The Haywood Intersection calibration essentially attempted the same technique used on the Flint Street Bridge. A high volume of intricate traffic patterns created uncomfortable pedestrian patterns for people crossing the Haywood, Flint, and Page streets. In this case, no objects could be placed in the gutter, only on the raised automobile traffic dividers. It was hypothesized that if an object could be placed between the pedestrian and the intersection's automobile traffic, pedestrian conditions would improve by making the pedestrian feel and be safer. Because the calibrations used recycled materials, cheap plantings, and were placed in a delicate manner, the city used very little resources compared the cost of most the top-down landscape architecture projects they fund.

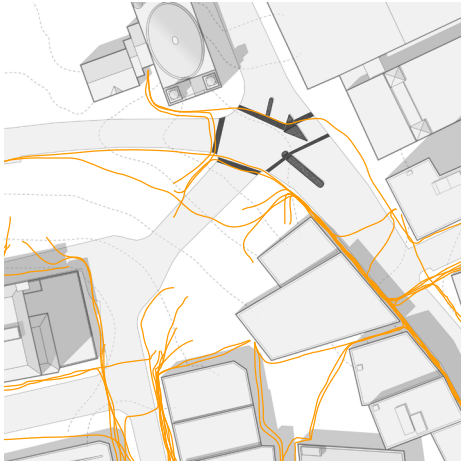
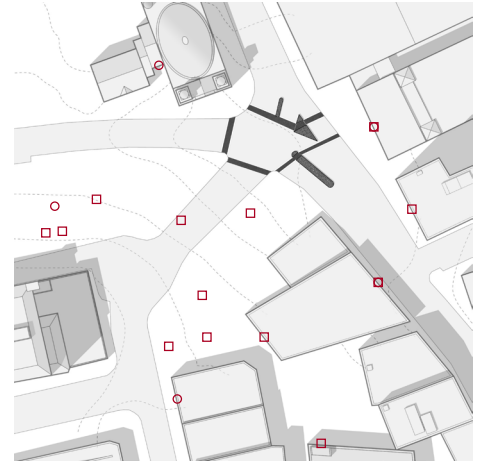
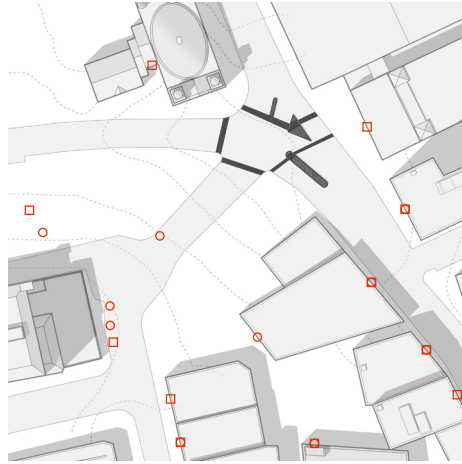
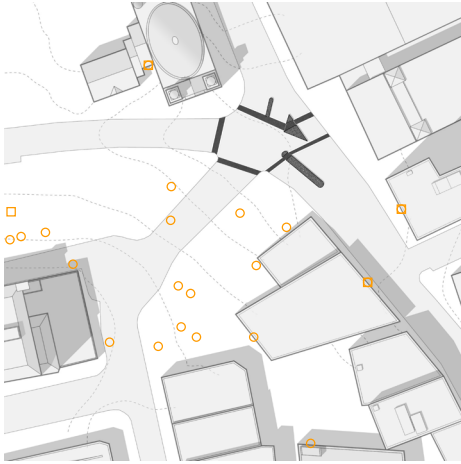
The assessment of this calibration is based not only on its ability to return the site's pedestrian network

back to a pre-1970s function, but its ability to increase the amount of pedestrian traffic moving to and through the site. An increase in pedestrian traffic amounts, if correctly adjusted to external factors, could be seen as a success. If the amounts of pedestrian traffic were to decrease, the direction of the next design would change. The Flint Street Bridge calibrations generated a higher rate of pedestrian traffic and caused no other major issues. The Haywood Intersection calibrations increased the amount of pedestrian traffic slightly, but also created conflict with automobiles. This major design flaw caused the calibration to be removed.



2.34 Haywood Street Calibration
Highlighting the designated pedestrian paths and placing lighted planter boxes attempted to create better conditions for pedestrians crossing the intersection.





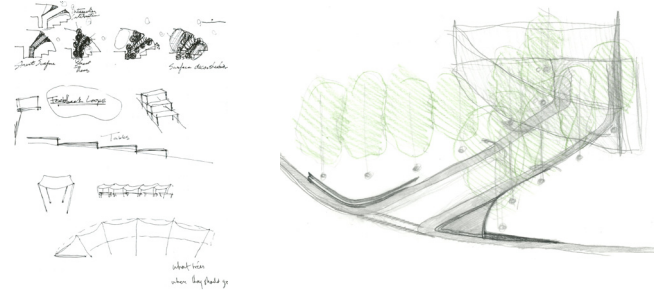
2.36 1.6 Pedestrian Indirect Feedback

This feedback study indicates a morning study in yellow, a midday study in orange, and an evening study in red. The circles indicate pedestrian origins, the squares indicate pedestrian conclusions, and the lines indicate the location of pedestrian movement.

2.35 1.6 Direct Feedback Distribution



2.37 Process Drawings of Market and Ledge Calibrations



{2.3-2.6} THE MARKET AND THE LEDGES

April 2012-November 2012

Based on the information found in the first feedback loop, a new design goal can be created. Although the amount of pedestrian traffic increased, most of the traffic in the site was based on larger patterns of pedestrian traffic that traversed the entire city. In other words, the site was full of pedestrian connections, but contained few nodes. Although the site could be used as infrastructure for pedestrian traffic, it was predicted that the site could act as both a node and a connection. This is evident in the ideas generated by the site's inhabitation in the first design phase. Therefore, the goal of this design phase was to create an attraction on the site that addressed the patterns found in the inhabitation desires, while not completely altering the existing function on the site. It is important to not vastly change the site because: 1.) the site's inhabitants are concerned about the decrease of automobile parking and 2.) it is not possible to collect and reflect upon data if the design is completed in one phase; multiple phases allow a subtle growth of uses.

To create an attraction, patterns of direct feed-

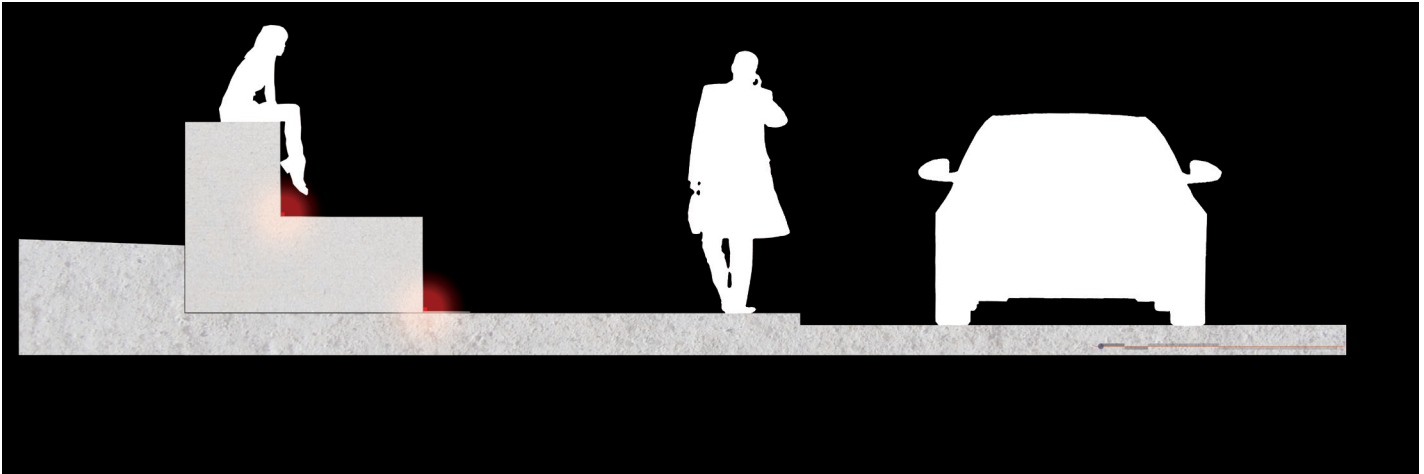
back were examined. These patterns of direct feedback included: 1.) the desire to have an alternative to the high priced food and produce sold in the local area, 2.) concern of the space being loitered by the areas large homeless population, 3.) a space to relax, read, and reflect, and 4.) a place to hold events of varying sizes.

With these ideas in mind, a series of strategically placed steps, terraces, and ledges were installed. This created areas to rest and relax, while also creating a space to hold events. The main attracting element was a market which was held daily between the hours of 6am-6pm. The businesses that participated in the market consisted of several small local enterprises that had struggled during the economic recession. Rules were created that established a daily rotation of businesses on the site. This created an ever-changing shift of businesses, which allowed the local inhabitants to experience new foods and products on a daily basis. This became very popular with the local inhabitants based on the direct and indirect feedback received. It also created higher sales for the struggling businesses because they reached a previously unattained client-base. Sales also increased due to the low cost of space retail, because it decreased the price of products being sold. This satisfied the local inhabitants who wanted lower priced goods in the area.



2.38 Market Calibration Section

A series of steps creates an elevated terrace that is used for a daily market.



2.39 Ledge Calibration Section

Ledges create spaces to sit, read, relax, watch other people, etc.



2.40 Market and Ledges Calibration

Notice the diversity of uses from the calibrations that were installed.

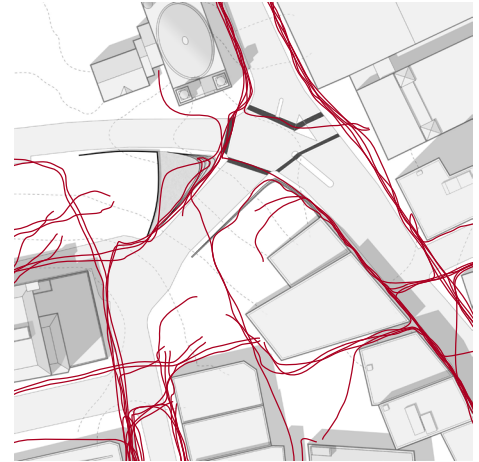
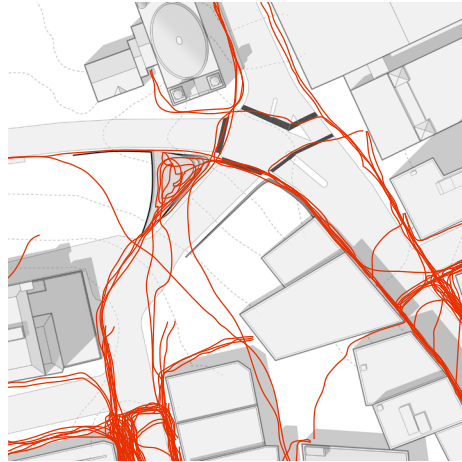
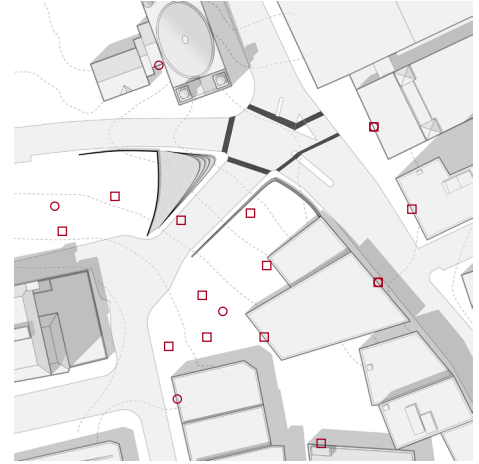
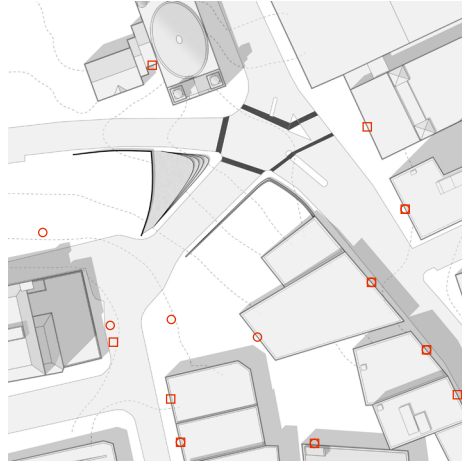
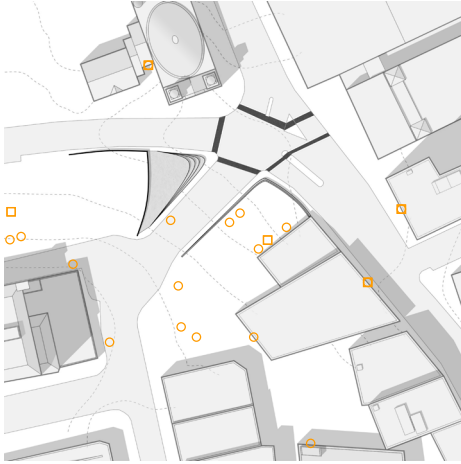


(Following Spread) 2.41 Market Calibrations
The terrace allows for several functions, such as a market and product showcase, which acts as an attraction for tourists and locals.





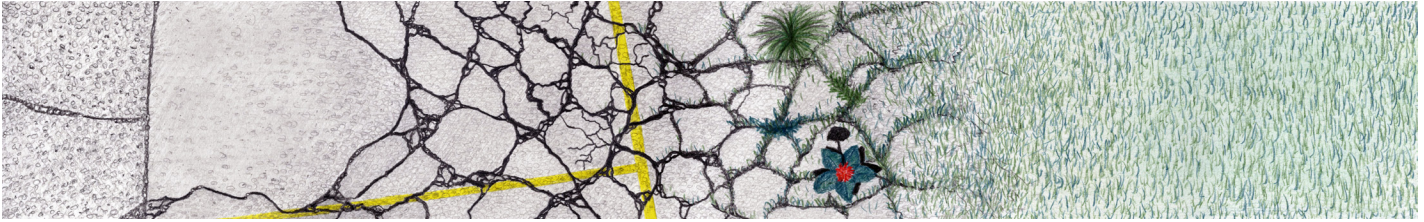




2.43 2.6 Pedestrian Indirect Feedback

This feedback study indicates a morning study in yellow, a midday study in orange, and an evening study in red. The circles indicate pedestrian origins, the squares indicate pedestrian conclusions, and the lines indicate the location of pedestrian movement.

2.42 2.6 Direct Feedback Distribution



2.44 Ground-plane Transformation

The transformation from broken concrete to a flat lawn is symbolic of the approach taken in this project's design methodology. The gradual transformation for the existing to the desired.

{3.3-3.6} TOPOGRAPHIC TRANSFORMATION

November 2012-July 2013

Like the previous design phase, the goal of this phase is to reflect the desires of the site's inhabitants. In this phase, a paradox arose when the feedback indicated conflicting desires. This conflict originated from the underlying desire to have the space still function as an automobile parking lot. Animosity cannot arise from the inhabitant's decision to still want the site to function as an automobile parking lot. This is because it is built on the collection of decades of urban patterns adapting to the space functioning as an automobile parking lot. The goal becomes figuring out how to give the inhabitants the opportunity to use the space as they want, while the space is still used as an automobile parking lot?

For whatever reason, the site's designated space for automobile parking has been slowly decaying. Cracks split the concrete, dividing the yellow lines that indicate parking spaces into beautifully broken shapes. Some of the cracks are large enough to be considered a walking hazard and others are small and intricately spreading. If this fractured surface is viewed as a design opportunity, an interesting ground-plane can emerge.

Previous feedback showed a strong desire for a public open space that could be used for events, sports,

relaxation, and summer night movie screenings. Due to the sloping surface on the site, a flatter ground-plane is needed if many of these actions are to be performed on this site. Therefore, infill was brought to the site and distributed above the parking surface. Soil was placed until it reached the height of the ledges that were installed in the previous design phase. Afterward grass was seeded and was allowed to grow into the cracks of the concrete. This created a softer, flatter surface than previously existed.

The reaction to the design by the site's inhabitation was astonishing. Although it was never stated that automobiles could not park on the calibrated surface, the amount of automobiles parking in that area decreased. The intention of the design was to allow parking because it only occurred during the daytime. This would have allowed events space in the nighttime when no automobiles were present. The recorded reaction after the calibration of the simulation was that only a few cars would park on the surface leaving it open to other uses 24 hours a day. The reaction to a 24 hour unprogrammed open space was also astonishing. Instead of the space functioning as the previous feedback loop indicated, the space became much more under-utilized than predicted. The uses people stated desire for in this space was not emerging even though it had been created. Of course some people did use the space, but not in the manner or amounts previous envisioned.



2.45 Existing Ground-plane



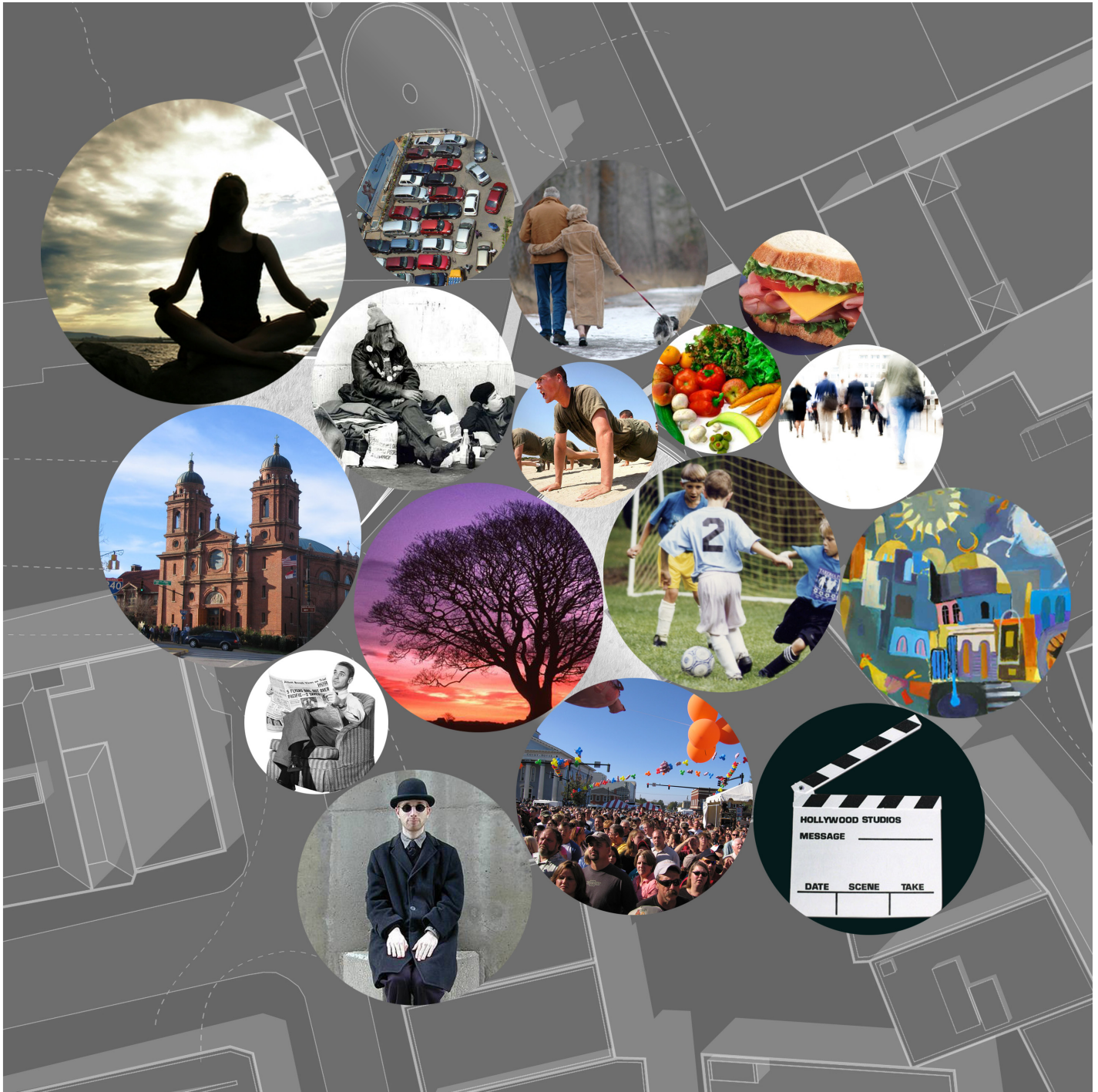
2.46 Ground-plane Calibrations

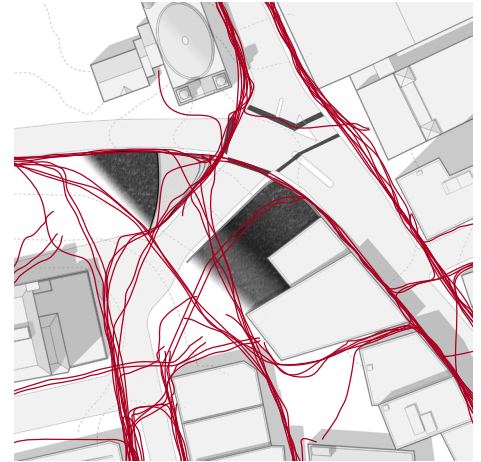
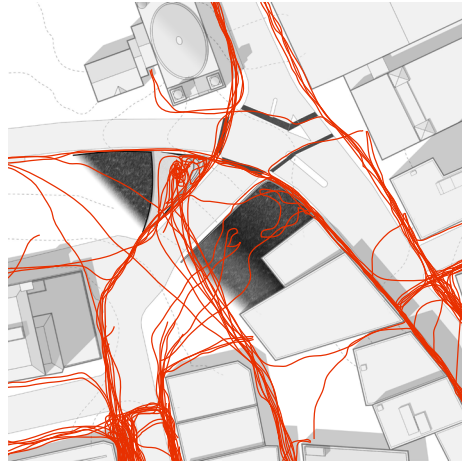
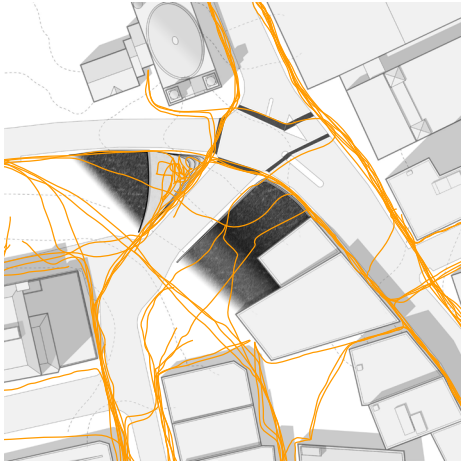
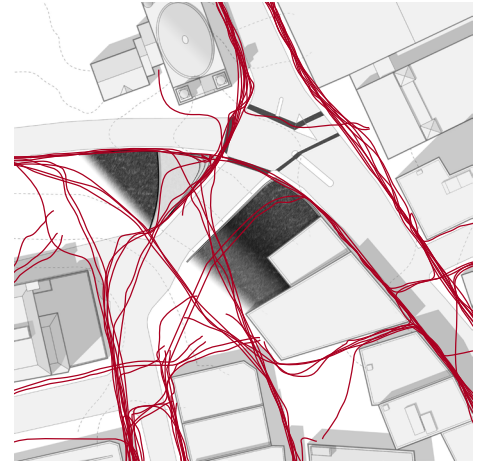
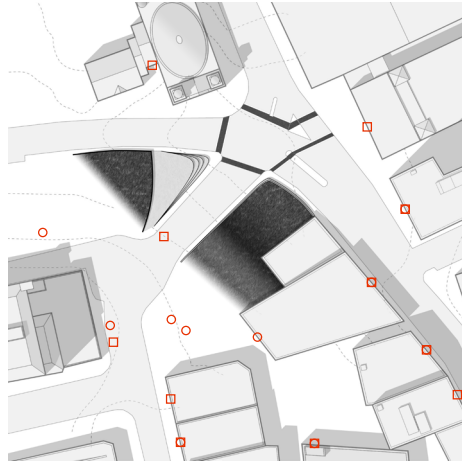
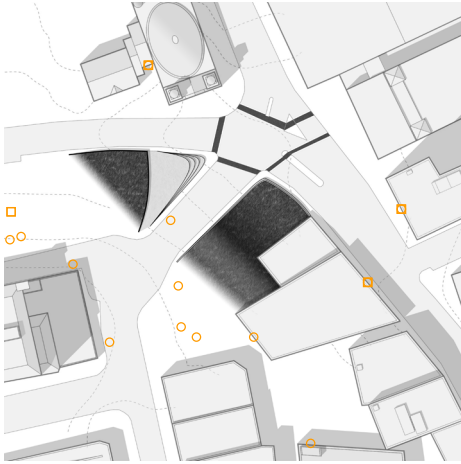


2.47 Topography Calibrations

The calibration was much less popular with the site's inhabitants than originally projected. The building to the extreme right of the perspective had to be covered with a creeping vegetation in order to keep people from climbing onto its roof. The canopy of the Flowering Dogwoods divide the space both vertically and horizontally.



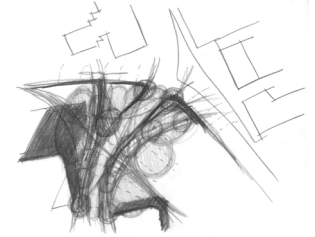
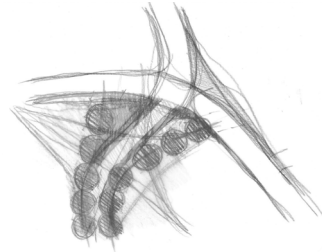
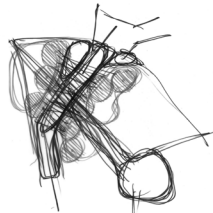




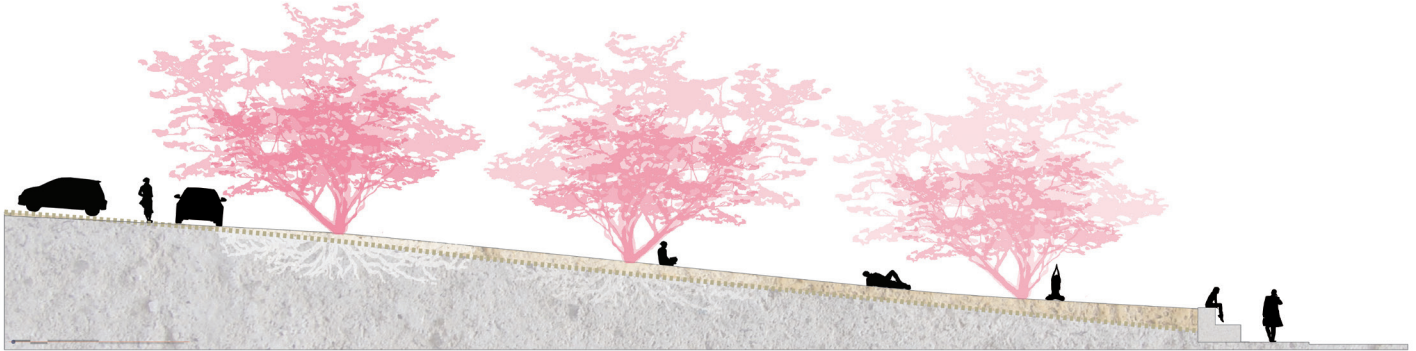
2.49 3.6 Pedestrian Indirect Feedback

This feedback study indicates a morning study in yellow, a midday study in orange, and an evening study in red. The circles indicate pedestrian origins, the squares indicate pedestrian conclusions, and the lines indicate the location of pedestrian movement.

2.48 3.6 Direct Feedback Distribution



2.50 Process Drawings of Vegetation Installation Calibrations



2.51 Vegetation Installation Calibration

Growth of trees indicated by different shades of pink.

{4.3-4.6} VEGETATION INSTALLATION

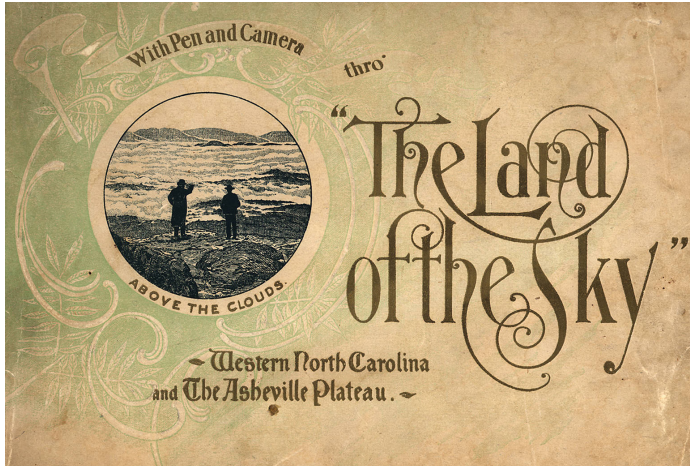
July 2013-August 2023

In the previous design phase, changes to the site's surface caused the site to have less automobile parking. The calibration also left a void in the reflection of feedback such as the desire to have an event space and a space to participate in sports. After a period of recording data on the direct and indirect feedback of the site's inhabitants, it was found that people neglected to use the space as determined in previous feedback because of the limited size of the space and other climatic issues. Therefore, the goal of this design phase was to determine its limitations of the site and then reevaluated its possibilities.

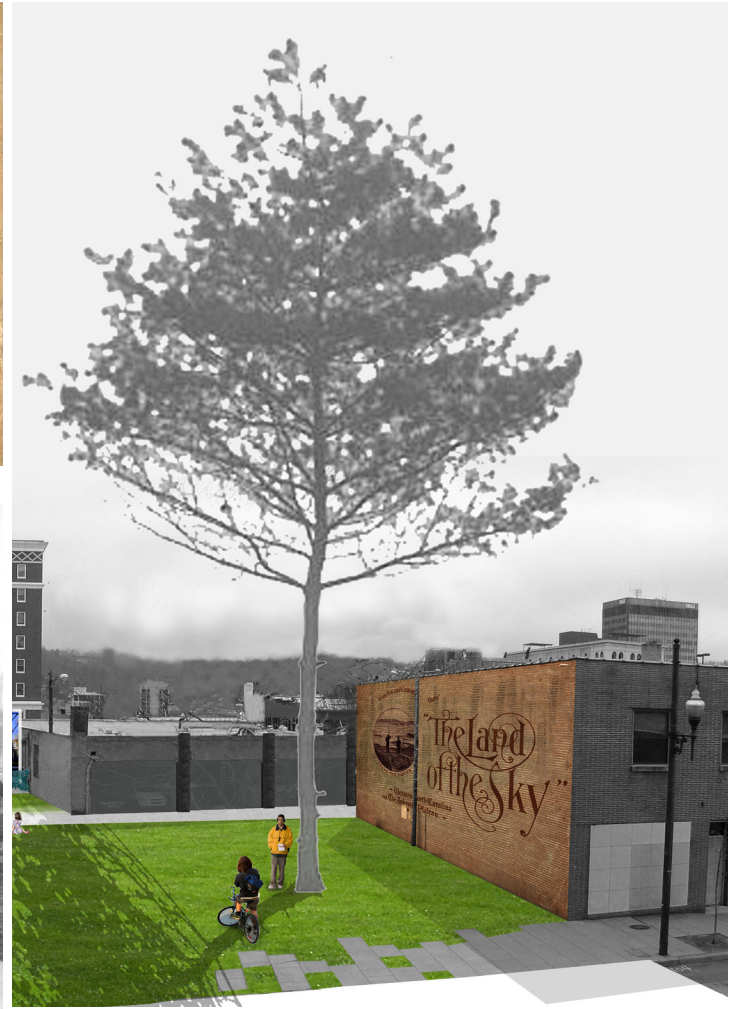
Even though there was a demand for the site to become a space conducive to sports, the size and slope of the site limited its possibilities of fulfilling that desire. Because of this, it was concluded that the design should focus on enhancing the other ideas generated by the site's inhabitants, such as the desire to

have a place to relax, reflect, read, view and be viewed by other people, and as a place to reinforce pedestrian locomotion.

This reassessment led to a design calibration that attempted to create microclimates based on the experiences people desired to have. This calibration was accomplished in two sections. First, a series of Flowering Dogwoods were planted to create a microclimate underneath and around its canopy. An intimate space was created underneath the canopy that allowed people a softly shaded space to read and relax. These trees also created barriers along the site which divided the site into smaller spaces. The second calibration was the planting of a native pine near the high-point of the site. The pine tree attempted to create shade for the western half of the site, while also acting as an attraction. The pine acted as a reflection of the past elevation changes. This is based on the image of the knobs excavation during the 1920s, which showed a quarry like landscape with one remaining pine atop a struggling mound of soil. The maximum height of the pine at maturity would reflect, almost exactly, the elevation of the knob prior to the revolutionary war.



(Top Left) 2.52 The Land of the Sky Booklet Cover
(Image courtesy of The University of North Carolina at Asheville)
(Bottom Left) 2.53 Stony Hill Soil Removal
(Image courtesy of The University of North Carolina at Asheville)



2.54 Pine Tree Calibration
The pine tree calibration is a symbol of past landscapes.

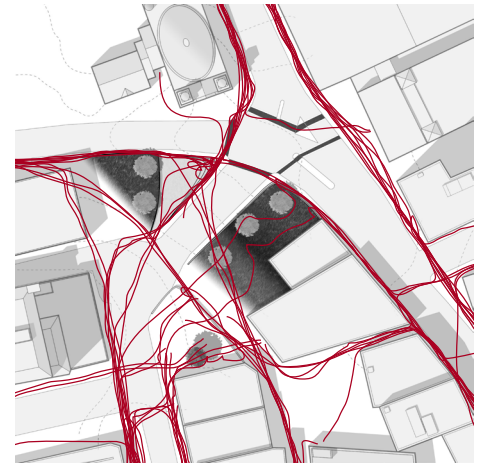
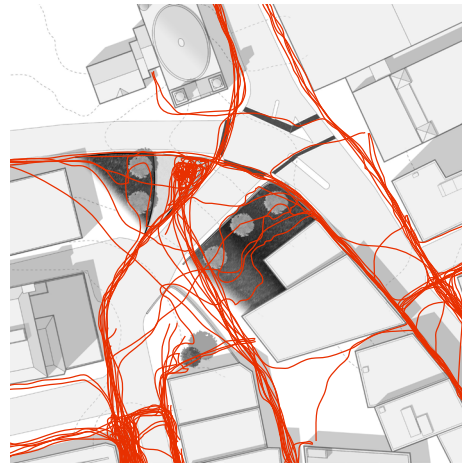
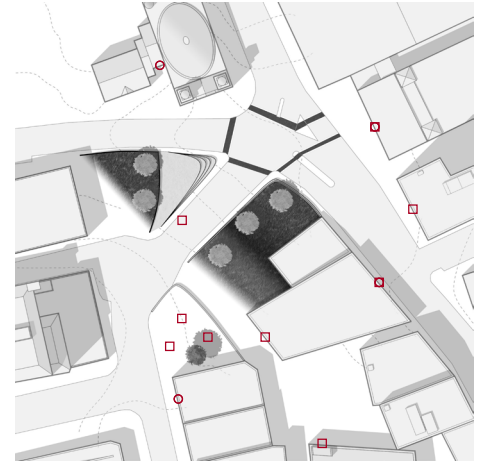
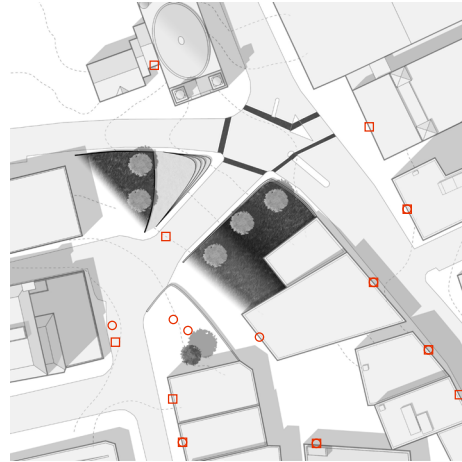
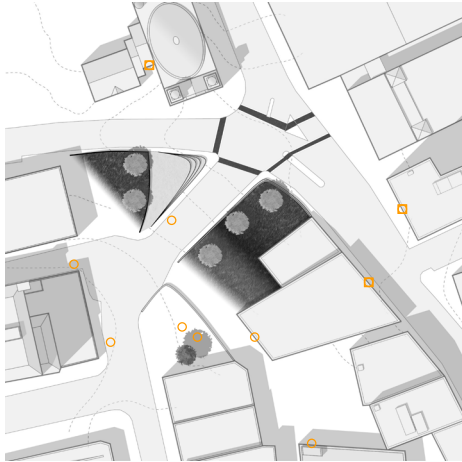


2.55 Vegetation Installation Calibration

The pine tree calibration is a symbol of past landscapes.



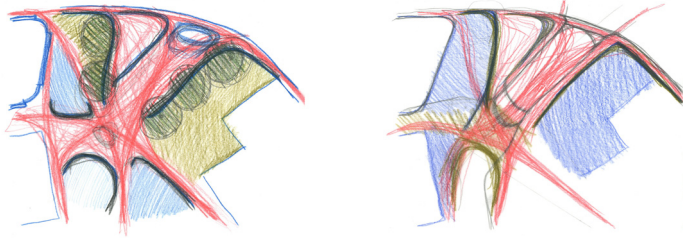




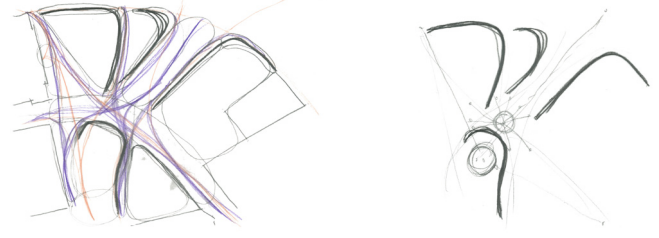
2.57 4.6 Pedestrian Indirect Feedback

This feedback study indicates a morning study in yellow, a midday study in orange, and an evening study in red. The circles indicate pedestrian origins, the squares indicate pedestrian conclusions, and the lines indicate the location of pedestrian movement.

2.56 4.6 Direct Feedback Distribution



2.58 Process Drawings of Geological Expression



(Opposite) 2.59 Layers of Uses Map

This map shows the pedestrian patterns that traverse the site (pink dots), the event spaces created by the calibrations (pink ovals), and the increased building front intensities (pink lines).

{5.3-5.6} GEOLOGICAL EXPRESSION

August 2023-

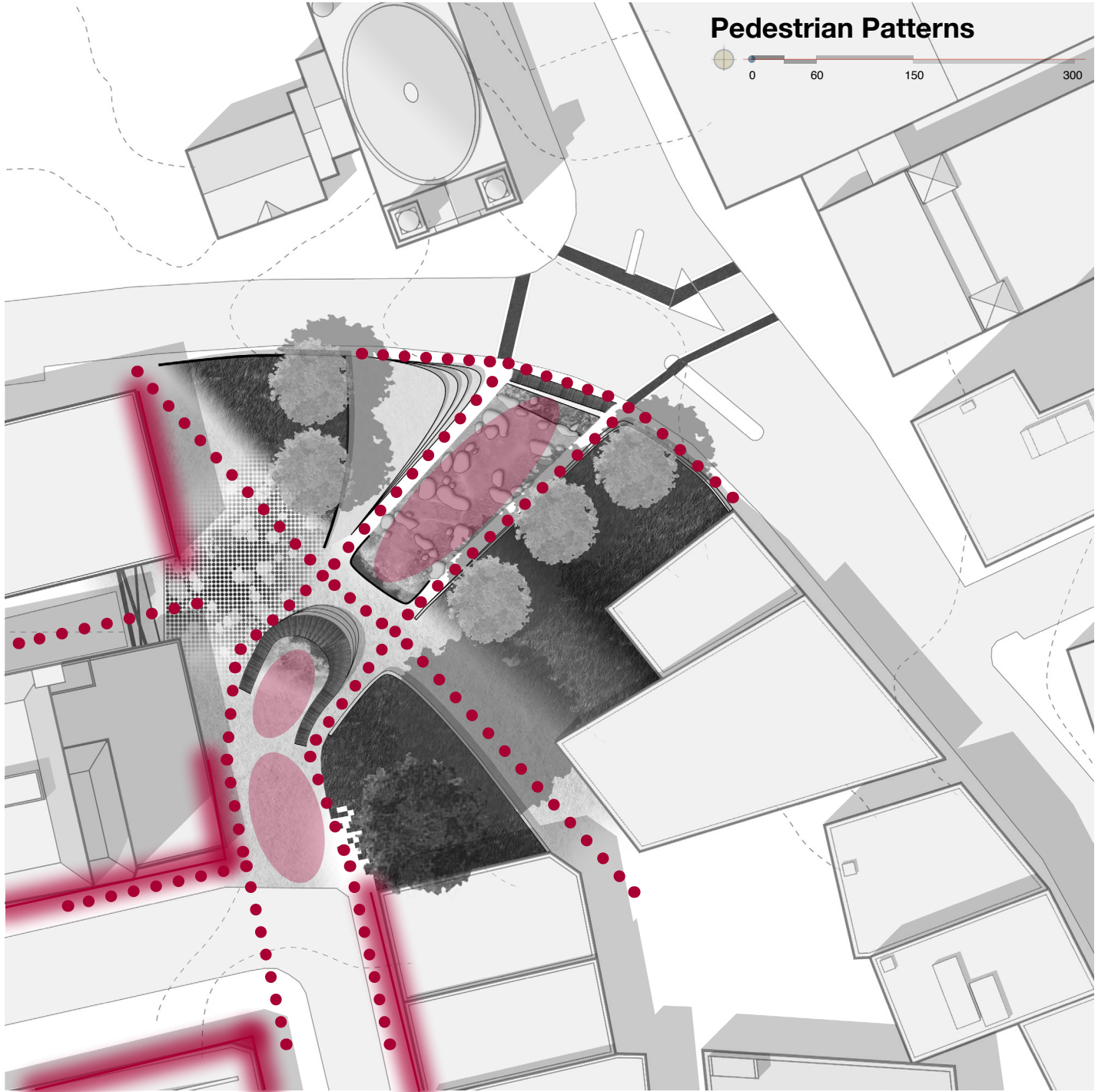
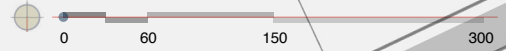
Over the period of almost a decade the site's inhabitants remained content with its form. Over this time, recession that hindered the city's resources to invest into public space ended, businesses established themselves in nearby vacant buildings, and private investors constructed several multi-use high rises adjacent to and in the vicinity of the site. The placement of new structures reduced the site's capacity to be used as parking for automobiles. Because the space and the inhabitants desires for automobile parking on the site decreased, Page Avenue was no longer required. Therefore, the city decided to remove the street and grant it to the public space. This along with slowly evolving changes the site's context lead to a new design phase.

One of the main goals of this design phase was to retain the pedestrian patterns that accumulated along Page Avenue for the duration of the project, while still reflecting the new changes in the site's context. This

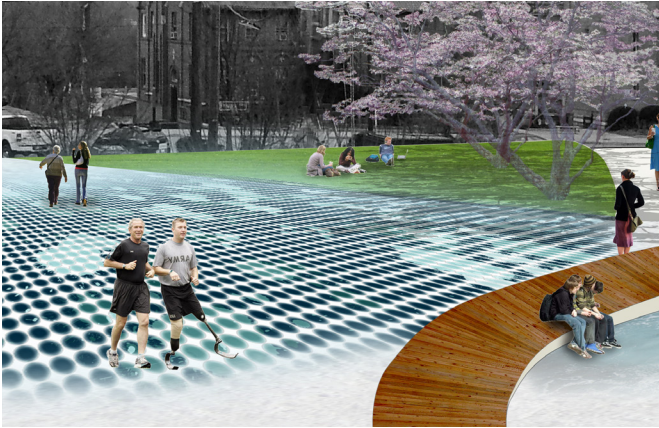
was accomplished by leaving the existing pathway which were heavily used by pedestrian traffic. This created a unified site that contained layers of pedestrian traffic patterns.

Over the duration of the project, movies have been screen on a regular basis, along with the occasional live theatrical show, courtesy of the Asheville Civic Center. The screen that was used for movie projections became worn and needed replacing due to the frequency it had been used. This situation created the opportunity to permanently replace the screen with one of better quality. It also created the opportunity to allow a the screen to be viewed 24 hours a day. At first, the screen showed different movies throughout the daytime and evening hours. Although this created an ever-changing show for the local inhabitants, it became overplayed and lost much of its attraction. Instead of leaving the screen unused for a majority of the day, it was connected to a two-way video feed to Asheville's sister cities. The video feed was timed for communication during appropriate daytime hours and became a popular attraction for tourist and locals. Through the digital realm, the screen extended the public space into another public space halfway around the world.

Pedestrian Patterns







(Top Opposite) 2.60 Screen Calibration

The screen functions as a two-way transmitter of public space and a part-time movie screen.

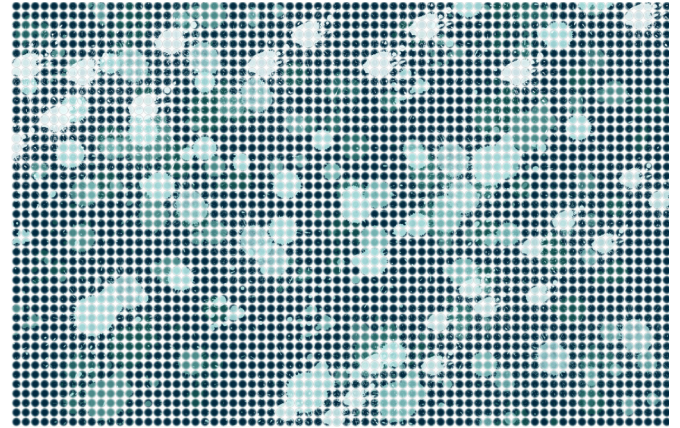
(Bottom Opposite) 2.61 Asheville's Sister Cities

Asheville established itself as a sister city to promote world peace.

The demand for a public art installation on the site grew over the duration of the project. To reflect this desire, a ground-plane was installed that recorded movement by signaling small lights placed within the surface. The ground-plane could be programmed to react to pressure in an infinite amount of ways, the first tested being a watercolor spat. This also became a popular attraction for both tourist and locals and also recorded indirect data for future feedback.

Three pools were created to reflect the desires of the site's inhabitants to include a dog wash and a hot springs. One pool was located near the highest elevation of the site, one at a middle elevation in the center of Page Avenue and the other was located near Haywood Avenue at one of the lowest elevations. The two most elevated pools were gently sloped to allow for ease of accessibility. The lower pool had been created to allow a slow movement of water to circulate. Between the lowest pools, a variety of boulders were placed to create a space for sitting within the pathways of heavy pedestrian traffic. These boulders were also a reflection of the past state of the site when it was termed "Stony Hill."

Feedback on this collection of calibrations was neither propelling or direction altering. The feedback



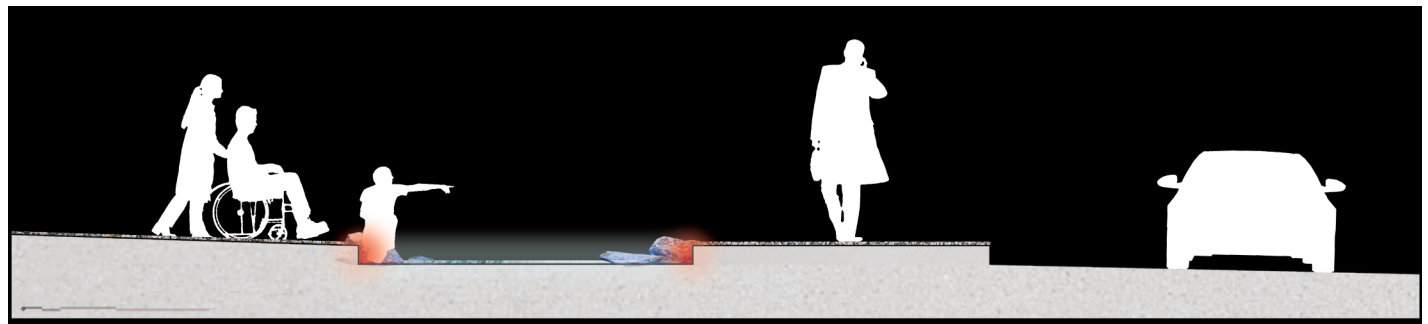
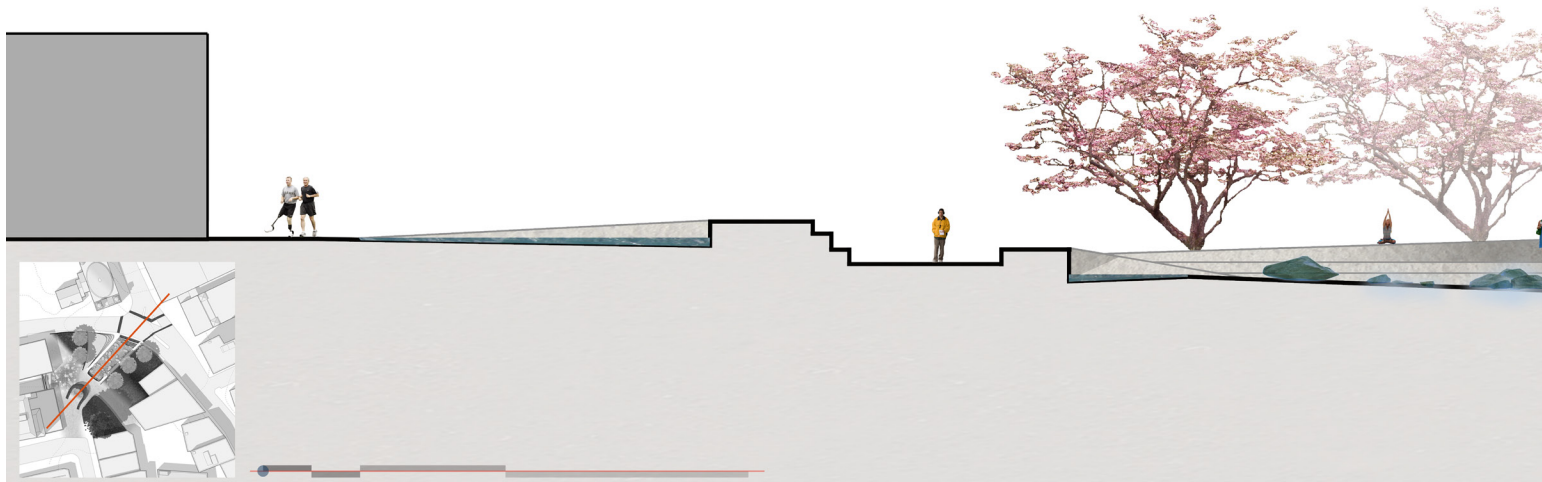
(Top Left) 2.62 Interactive Ground-plane Calibration

The interactive ground-plane acts as an attraction and a feedback mechanism.

(Top Right) 2.63 Interactive Ground-plane Detail

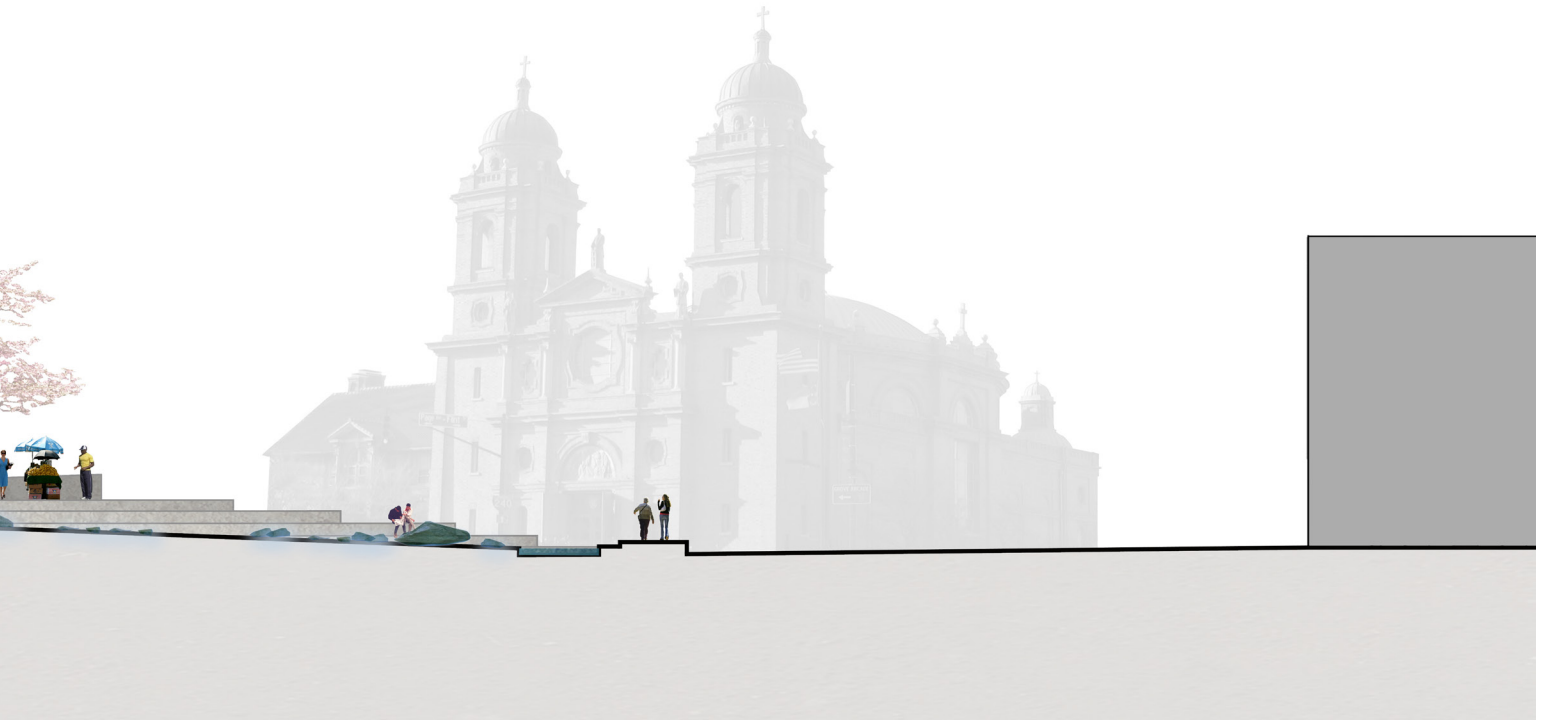
The interactive ground-plane consists of a pressure activated LED light-board.

recorded showed the inhabitants to be content with the calibrations, although still slowly generating unique ideas. These new ideas, as the ones before it, were based on the emergent phenomena found in the interaction of the site's inhabitants and their interaction with the calibration. Based on the feedback, it was decided that a larger design calibration would disrupt the patterns that have been and are being established on this site. From this point forward, it is predicted that the desires of the site's inhabitants will remain level, needing many small calibrations, but very few calibrations of comparable size to the five previous.



2.65 Lower Pool Section

The lower pool cycles water through itself to allow fresh water for dog washing. Inside the pool is a collection of rocks that are reflective of past landscapes.



2.64 Geological Calibrations Section

This section shows the all three pools, along with the boulders that were placed in what was Page Avenue. Also shown is the relationship between these newly created spaces and the existing market terrace.



2.66 Geological Calibration

Mist rises from the pools as a symbol of the Great Smokey Mountains and the site's past landscapes.

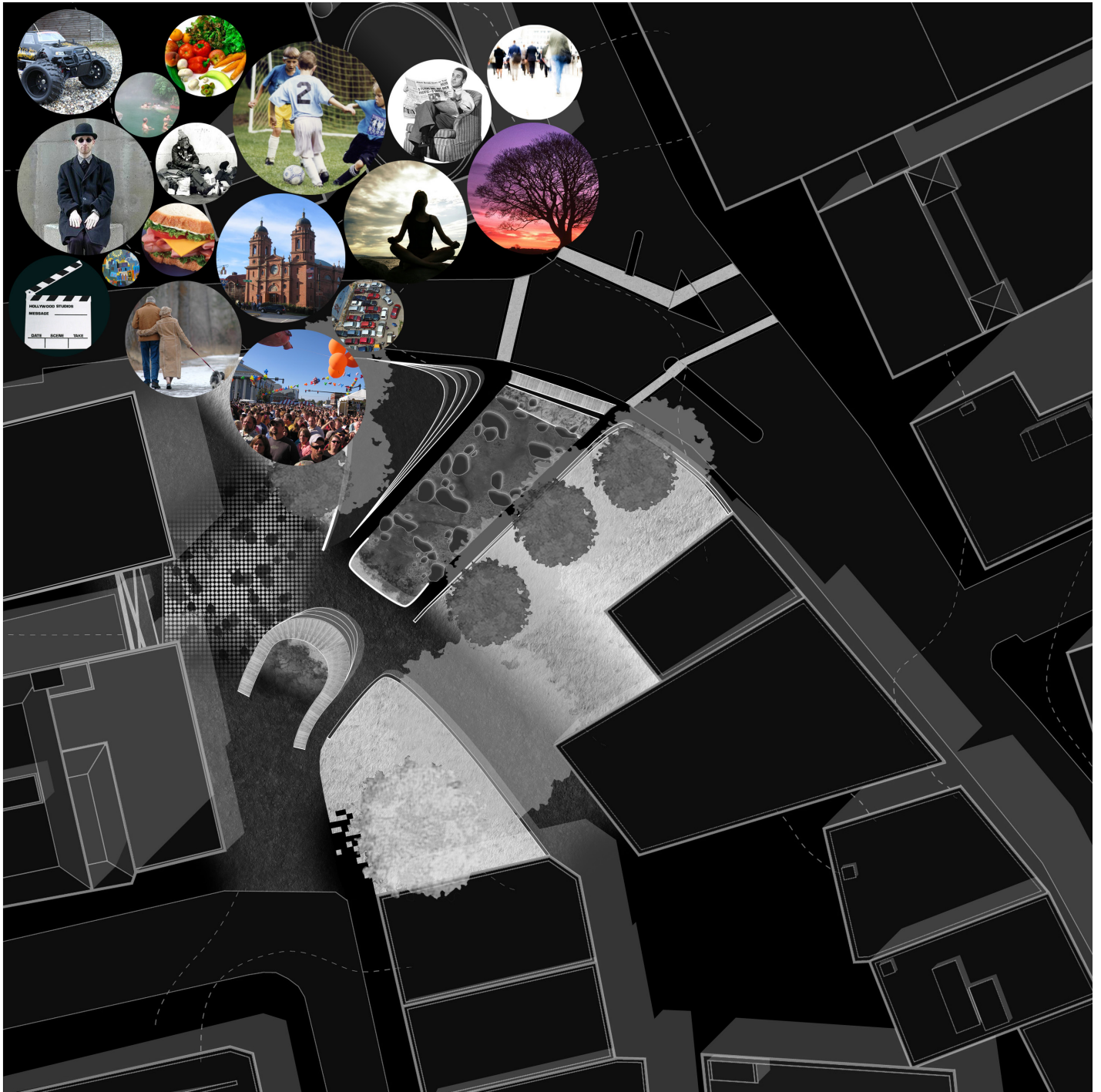


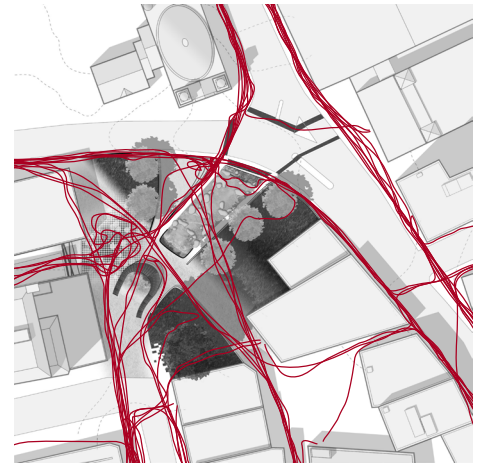
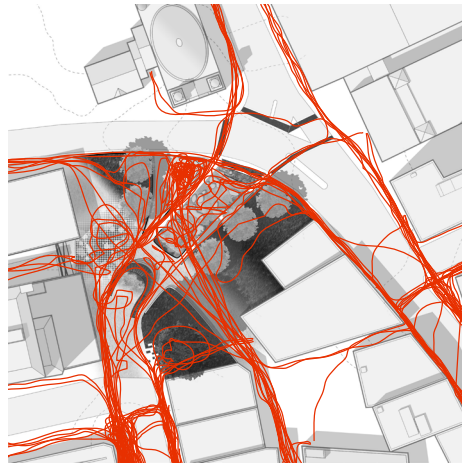
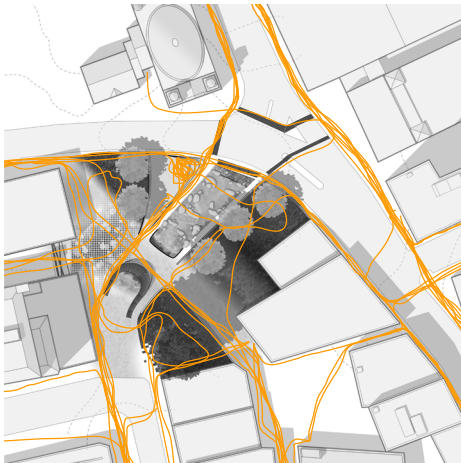
(Following Spread) 2.67 Geological Calibration

This is the perspective of the fifth calibration from the balcony of the Battery Park Apartment Building.









2.69 5.6 Pedestrian Indirect Feedback

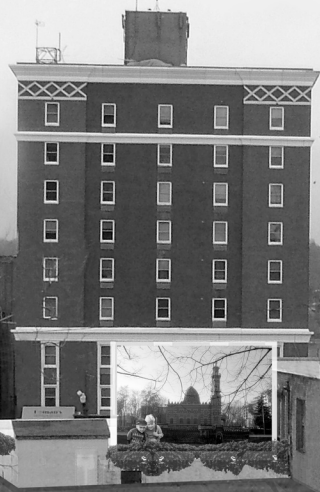
This feedback study indicates a morning study in yellow, a midday study in orange, and an evening study in red. The circles indicate pedestrian origins, the squares indicate pedestrian conclusions, and the lines indicate the location of pedestrian movement.

2.68 5.6 Direct Feedback Distribution

III. CONCLUSION

III. CONCLUSION





CONCLUSION

After the design test was completed, the thesis and design test were assessed by their predetermined goals. The thesis was also criticized by a panel of critics from the Auburn University School of Architecture, my colleagues in the Auburn University Master's of Landscape Architecture Program, and myself in order to find the strengths and weaknesses of the thesis. This conclusion will be based on seven post-design test questions that are a culmination of the questions used to assess and critique the thesis. The questions are as follows: (1) did this thesis establish a vocabulary suitable for the discussion of the application of the theory of emergence to landscape architecture? (2) was the design methodology emergent in the process of designing a public urban space? (3) did the design test create an emergent design methodology for creating public urban spaces? (4) did this thesis generate a foundation for further discussion on the subject? (5) what ideas were developed in this thesis that could be furthered? (6) how could this project be improved? (7) what might be the future developments in the application of emergence to the craft of landscape architecture?

This thesis established a vocabulary based on the research I conducted using several sources. The vocabulary created covered terms that would be used in this thesis: rules, interactions, complexity, complex systems, organized complexity, public urban spaces. Other terms will need to be explored and defined if this thesis continues into other sub-fields of landscape architecture. Also, new methods for detecting emergent behavior in the built environment will have to be created in order to relate this thesis to other sub-fields in landscape architecture.

Although the term *emergent* is still elusive, the design methodology created in this thesis was found to have emergent behavior. This should not be mistaken as a perfect emergent process. Due to the material nature of landscape architecture, I doubt a truly and holistically emergent process, as we would compare it to other disciplines, will ever evolve. This does not mean we should not seek to create a design methodology that has emergent behavior; only that perfection might not be attainable.

The design test echoed the success of my attempt to create an emergent design methodology. The design test, if viewed at the scale of single phase, is not emergent, except maybe for inhabitant's responses to the design calibration and the designer's response to the analysis. If the design test is viewed at the scale of the entire project, it is emergent. This is possible because it increases organized complexity throughout the life of the project, uses feedback loops that indicate the patterns of desires and reactions of the site's inhabitants, and the design's form is not predictable by examining one individual.

Further discussion on this thesis should arise because only one design test was used, which could be limited by its test location's place and time, my reactions as a designer, and the nature of simulating the test. If another person using the same test parameters and the same design methodology replicated this same test, I believe a completely different process and design would materialize. This, I believe, is the freedom in the project to still be a designer. This interpretation is the project's design.

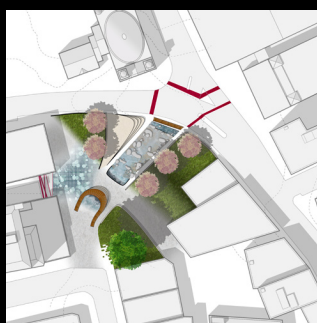
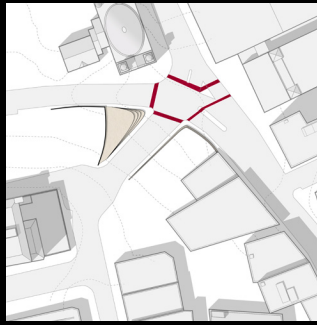
This project had several ideas that could be used in other studies. Most of the ideas that could be furthered are individually no different than the ideas of others in the field of landscape architecture. What is dif-

ferent about this project is how these ideas are related. This relationship of ideas is what should be developed further in other academic inquiries. The following are individual components of this project that could be furthered: (1) the feedback loops or mechanisms, (2) the cyclical nature of the design procedure, and (3) the application of emergence after the design has reached its calibrations/fulfillment pinnacle.

Several components of this project could be improved; three of which will be identified and alternatives for the improvements will be attempted. The first component that could be improved is the simulation of the design test. Because the project was a simulation of what might occur in real life, concern arises about the authenticity of the simulation. This could be improved in several ways: (1) test the design methodology in a real-world setting, (2) create a larger and more diverse base of people to simulate the unpredictable feedback, and (3) take more time to test the simulation against case-studies that are similar to each of the phases of design.

The second component that could use future improvement is the functionality of the feedback loops. During the multiple presentations of this project the same question arose, “on what basis are the feedback loops assessed?” This question was answered by stating that the analysis that brought on a design goal design also created the basis for assessment of the feedback. The design’s goal created a means for testing the successfulness of the design. I do not have an alternative basis for the feedback loops, but it is accepted that this is not completely acceptable answer. But the answer is not completely wrong as well. Each person who tests this design method could have their personal interpretation of what the basis should be. The third concern found for this project is the lack of control a designer would have in the design of the project.

It is the nature of the project to allow certain controllable reactions to take form in the design; therefore the designer cannot have complete control. If the design that emerges is not to the designer liking, then this design methodology may be discarded and another methodology be used. The design cannot be completely condemnable, even if it is aesthetically unpleasing, because the form of the project is based on the responses of the individuals who inhabit the site. This question is the essences of the top-down/bottom-up design paradox, thus cannot be answered completely by the current state of theoretical understanding in landscape architecture.

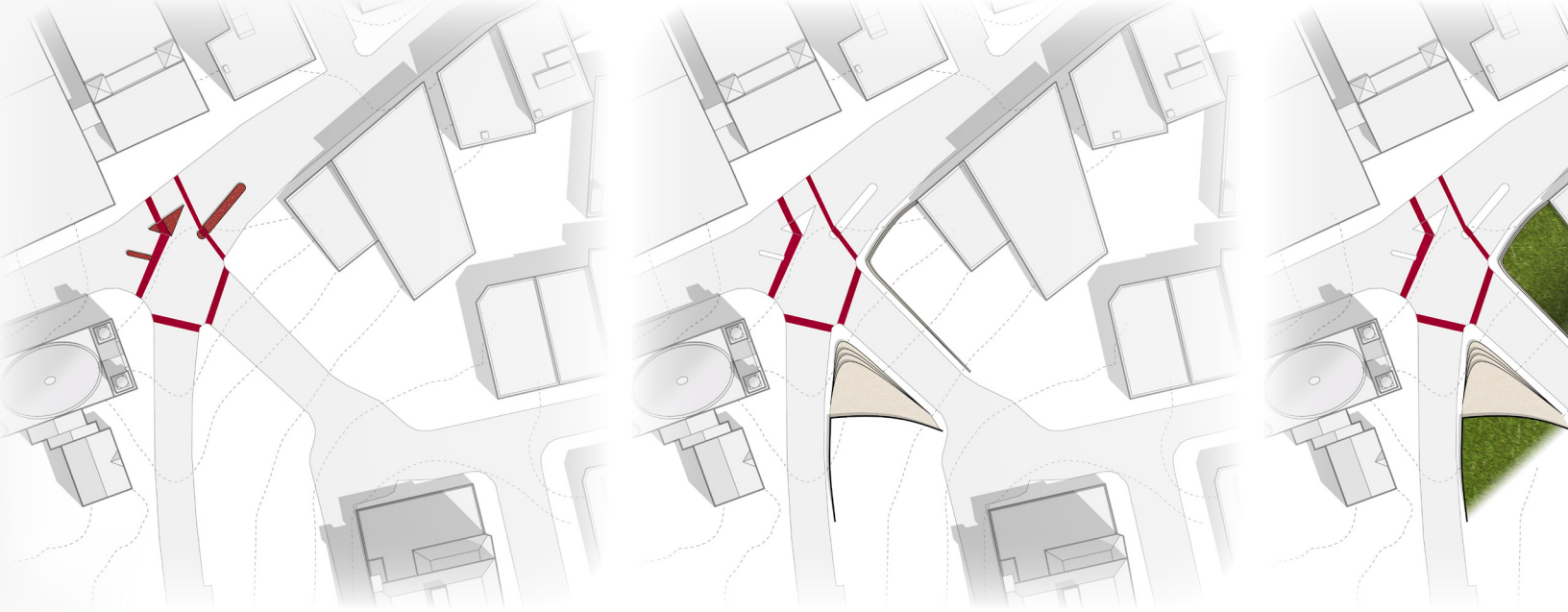


(Opposite) 3.2 Evolution of the Site

This graphic is an account of the simulated evolution of the design test. Notice the gradual accumulation of landscape architecture elements on the site over the duration of the project.

The phases were as follows:

- {1.3-1.6} February 2010-April 2012
- {2.3-2.6} April 2012-November 2012
- {3.3-3.6} November 2012-July 2013
- {4.3-4.6} July 2013-August 2023
- {5.3-5.6} August -



APPENDIX I-V





APPENDIX I: DEFINING EMERGENCE

It is important to understand that similar to most words, which can be expressed in both the forms of a noun and a verb, the term emergence has several interpretations and understandings. For the purposes of this thesis it is important to define emergence as it relates to the design process of creating public urban spaces.

Essentially, emergence is the complexity created from the patterns of behavior on a lower scale. An emergent system is a bottom-up system, which is a complex adaptive system that displays emergent behavior. Its adaptive ability comes from a multitude of relatively simple lower-level elements and not a singular higher-level entity. Depending on the definition in use, several different components form its meaning. In some definitions the lower-level entity that generates higher-level complexity is *interaction*, while other definitions use *rules*. In this thesis, interactions and rules will be used separately and in conjunction in order to generate organized complexity.

Ants and the structures they create are commonly used as examples to explain the theory of emergence. The operations of an ant colony will also help to explain four commonly used terms: rules, interactions, complexity, and complex systems. Keep in mind, I do not think of humans as ants, but merely want to use them as an aid for understanding fundamentals of emergence.

Despite the title “queen ant” studies have shown that there is no ultimate leader, planner, or architect in the structural development of ant colonies or the structures known as anthills. The form of an anthill

is designed by the incomprehensible actions of the entire ant population. The theory of emergence has identified the designer as emergence itself. To describe how this design without a designer takes place, the narrative should begin at the lowest-scale of ant colonies and move towards the highest-scale.

Ants communicate by emitting chemical signals, which express approximately twelve functional emotions. Ants, not being able to understand the world outside of their local perspective, think and act on their local scale. This behavior is based on the rules of ant communication and understanding. When an ant's desires are regulated by these simple rules the controlled unpredictable behavior of an individual creates the patterns of higher-level complex systems. Therefore, rules, in the sense of emergence, are not used to regulate individuals from their desires, but to regulate a complex system from becoming chaotic. Rules are what sustain organization in organized complexity.

The rules allow ants to communicate and to interact with one another at their local scale. These interactions, when viewed at an individual level may seem and might be random. Communication signals may indicate the desire to exchange food particles, create alarm, or show attraction; however, if the signals are viewed at the next highest-level, patterns of the ants desires as a whole will emerge. This is how interactional emergence functions. Many seemingly random interaction over a duration of time generates the patterns found in complex systems. Interactions breed other interactions in the same way that when ideas are exchanged it usually promotes the creation of other ideas.

If the entire ant colony sequence is understood, the rules of ants create the interactions of ants, which create trails and ant infrastructure, which then create the entire ant colony; organized complex systems

arise from the individuals. Complexity, although often thought of as confusing or incomprehensible, is simply the composition between many interacting parts. Complex systems are systems composed of interconnected parts that exhibit behaviors, which are not obvious from the properties or behavior of the individual parts. In the ant colony example, complexity would be all of the ants interacting, and a complex systems would be the colony itself.

After these fundamentals are understood, questions arise about how this theory can be applied to create a desired goal. These are typically questions about organized complexity. Organized complexity is the ultimate goal of most scientific and computational applications. It allows a bottom-up complexity to emerge from lower level patterns, while still having some form of control and guidance. Organized complexity is the juxtaposition of complete control and chaos. It allows an unknown outcome to transform into something useful.

APPENDIX II: EMERGENCE AND LAND- SCAPE ARCHITECTURE

Since the term emergence was coined in 1875 by English philosopher and literary and theatrical critic G. H. Lewes (Lewes, 412), the theory has been tested by scholars in a variety of fields including ecology, economics, mathematics, and computer science. As the theory was examined, emergence was found to be present in nearly everything and seemed as though it had always existed. As the urban realm was taken under examination, the results were similar to the findings of other fields (Helie, 2009, 76). But the development of the theory of emergence did not end in its application as a means to understand an existing phenomenon. The next step in its development was dedicated to the application of emergence to obtain a predetermined goal. This second application of emergence to the urban realm is currently in an early state. Tom Wiscombe, an architectural designer and founder of the California-based architectural practice EMERGENT, finds that this transition to apply emergence as a means to obtain a goal in architecture is posed for investigation.

“The idea that innovation, whether scientific, technological, or architectural, is a by-product of artistic chance or a result of singular genius can no longer be sustained in the 21st century. Complexity theory reveals that innovation--the creation of the new-- is the direct result of bottom-up evolutionary processes. Science knows this; industry is learning. Architecture is just beginning to engage the concept.

In order to move into this space of innovation, architects will have to except the value of multiplicity and dynamic feedback over the retrograde nature of authority. They

will have to accept that architecture might not be about essences and theoretical positions, but rather about exchanges of techniques, expertise and materials in multiple industries. They will have to accept that the architecture is no longer a heroic center, but one micro-intelligence among many. They will have to let go and begin to love the swarm.

New models of practice therefore might be based on dynamic organizations in which entities can operate both independently and in collectives at the same time--that is, as parts and as wholes. Parts, which are more specialized than wholes, can rarely evolve or become innovative on their own, just as a single neuron in the human brain can never have thought. Evolution occurs in the system.

Perhaps the best way to frame this discussion is through the phenomenon of emergence (Wiscombe, 2006, 59-61).”

More studies are currently being conducted about the relationship of the theory of emergence to urban design and planning than the related fields of architecture and landscape architecture. It is important to understand that most of these studies being conducted use different definitions of emergence and have varying goals for its application. These discrepancies seem to be rooted in the conflicting material natures of the disciplines: urbanism more flexible, architecture more rigid. As a variety of understandings of emergence are applied to this array of interconnected fields, a diversity of ideas about how emergence should be used is generated.

Studies in urbanism typically apply the theory of emergence to cities much the same way an entomologist would study ants; viewing the city as an existing phenomena. Urban theorists typically perceive the city as an existing whole and view objects in the city, especially buildings, as the parts. Studies often state that building design has little to do with the emergent behavior of a city and often times it is more generative of emergent behavior if the buildings are universal and mundane (Helie, 2009).

Architects tend to use the theory of emergence as a means to accomplish a design goal by applying it to the design of an object. For the most part, architects view emergence as a trendy form of morphogenesis. This application of emergence perceives an evolutionary object that has a very loose correlation to its surroundings. Object-based perception this is what is termed artificial emergence. Artificial emergence occurs when a misunderstood version of emergence is attempted to be claimed as emergence. This misunderstanding may exist because the material nature of architecture does not allow evolutionary change to occur. It would probably be constructive if architects did not view emergence in an objects design, but as an evolutionary behavior that created objects and creates other objects (Wiscombe, 2006).

The studies conducted in landscape architecture have used the theory of emergence in both a contextual and an object-based manner. This might be due to the medial positioning of landscape architecture to its related disciplines and its material nature's variance between the fluctuating nature of urbanism and static nature of architecture. Another reason for landscape architecture's balanced perspective could be scaling and the current understanding of emergent patterns. These reasons could position landscape architecture to best apply the theory of emergence as a means to obtain a goal in the urban realm.

The balanced nature of landscape architecture creates two main fields of thought when it comes to the application of emergence to practice: emergence before a design and emergence after a design. In this instance design is defined as the pinnacle of landscape alteration and the return of "should this be of?" designated goals. With emergence before a design, emergence is viewed as a series of reactions that creates a situa-

tion. Emergence after a design, emergence is viewed as a reaction to a situation. Because the urban realm is an emergent phenomenon, either approach could be used as a means of creating emergence. But only emergence before a design allow emergence to guide a design. Therefore, emergence before a design should be examined further in attempting to create a public space. However, because of the paradoxical nature of these two types of applications, it might be impossible to rely entirely on either one. Instead of viewing the applications as separate, it could be more effective to use emergence before a design and emergence after a design in conjunction.

APPENDIX III: CHORA CRITICISM

The Dutch planning, urban design, and architecture firm CHORA specializes in difficult urban problems that contain many stakeholders. Currently CHORA has diverged its focus to merge energy planning and urban design. CHORA's principal, Raoul Bunschoten, is a Professor of Urban Systematics at the University of Applied Science in Dusseldorf, Germany and is the advisor on sustainable urbanism and urban energy efficiency to the German Ministry of Urbanism and Construction (chora.org). Bunschoten and students from the Berlage Institute in Rotterdam, the Netherlands developed a scenario-based design methodology that uses mostly qualitative information based on the firm's fieldwork (Ellin, 125).

CHORA and Bunschoten use a management system called the Urban Gallery to guide the evolution of a planning project. The Urban Gallery is a dynamic tool that engages stakeholders to act collaboratively throughout the duration of the project. The dynamic nature of the Urban Gallery is created by its diagrammatic master plans, which generate project knowledge through its monitoring of a fluctuating and liquid design. The Urban Gallery consists of four main phases; database, prototype, scenario game, and action plan (chora.org).

The first phase of the Urban Gallery collects information and creates a narrative for the dynamic processes in a certain place and time (Ellin, 125). CHORA officially defines the database phase as "a description of dynamic processes (chora.org). The narrative is written in a qualitative fashion focusing on four basic

processes; erasure (elements taken away), origination (the emergence of something new), transformation (elements that are changing), and migration (elements moving through) (Ellin, 126). These processes are described in mini-scenarios, which are called "operational fields" (Ellin, 126). These operational fields create small narratives for the area along with mapping of the area's dynamic processes (chora.org). These processes are divided into three categories: scale, impact, and involvement (Ellin, 126).

The second phase of the Urban Gallery creates prototypes based on the operational fields from the first phase. Bunschoten defines prototypes as;

"a programmatic condition: it is an organization of the programs in that case is not an object in itself, it is a device in the form of a specific architectural configuration, an organizational structure embedded in the architecture or urban space that links and intertwines programs in such a way as to give them dynamic properties. These lead to emergent spatial, social, political, and other developing qualities (Bunschoten, 2002, 5)."

A prototype creates new conditions by intertwining two or more operational fields based on four actions: branding (symbolizing to distinguish), earth (land, water atmosphere, etc.), flow (the fluctuation of ecologies, economies, hydrology, etc.), and incorporation (the calibration of political and social structures) (Ellin, 126).

The third phase, scenario games, is a simulation and a test of possible realities. "The dynamic processes registered in the database form the raw material of the scenario games and the fuel for the prototypes (chora.org). The scenario game phase leads to the fourth phase called action plan. Action plans are strategies that initiate the implementation of specific prototypes, while also "describing the potential interrelationships

between different prototypes” (chora.org).

Studies I have conducted found the methodological approach of CHORA’s Urban Gallery practices to be an attempt to create emergent behavior or extend existing emergent behavior into the design and post-construction functionality of public urban spaces. Emergent behavior can be seen in certain phases of Urban Gallery including the stakeholder feedback generated by the prototypes. But as a methodology, it denies emergent behavior to affect the design’s outcome. This is due to the design process’s attempt to forecast an outcome for the unpredictable future of the site. CHORA limits the endless possibilities of a place to an “action plan” which is essentially a time-scaled master plan.

It is suggested that the CHORA design methodology could benefit by not attempting to predict the future, but instead be susceptible to the unknown changes that will occur. Allowing the unpredictable to enter the design process and feed it would eliminate the need for an action plan. CHORA’s design methodology could also benefit from not viewing their predictions as the controlling element, but use the design process itself. The methodology itself could create rules to keep the project from becoming chaotic. This would also eliminate the need for the controlling efforts of the action plan. Tom Wiscombe states this susceptibility using the terms linear and non-linear.

“The products of emergent networks are non-linear and non-predictable, which is a risk, but one with exponential rewards. Linear processes will always create products, which are calculable and applicable in particular, industries, but they will never exceed their inputs. Non-linear, emergent processes create innovation and newness out of proportion to their inputs, and often applications which lie outside the original trajectory (Wiscombe, 2006, 60).”

Because CHORA typically works in the public urban realm, it is necessary to distinguish the firm’s definition or goal of a public urban space. Bunschoten describes public space as such;

“Public spaces must have a prototypical character; they are instruments of change for a society. They are singular, they create an identity, and they must be able to stimulate the evolution of all kinds of parts of society. The singularity of public space remains a key attractor for a variety of people, events, collective expressions, programs, but what comes out constantly changes, adapts to new trends, forces, desires, and it multiplies in its adaptations over time. The use of a public space proliferates increasingly in the ways that they are used and the ways they give form to a society and its dynamic mechanisms. (Bunschoten, 2002, 5).

Bunschoten description of a public space is consistent with my own views of how a public space should perform. Bunschoten concludes that public space is an element that is both inspired by and inspiring to the evolution of societies. The terms “prototypical” and “singularity” relate to the ability of a public space’s to be authentic and unique in its reflection of contextual changes. When a public space is influenced by its context’s desires, it must adapt in a manner that creates an idiosyncratic attraction that initiates more desires. In this cycle, public space can affect its distinctive uses. This process, if viewed holistically and not as individual phases or cycles, is an emergent behavior. The question becomes whether or not CHORA’s methodology is the most effective means of achieving this ambition of public space?

APPENDIX IV: “TREE CITY” CRITICISM

Tree City, the winning entry for the Downsview Park Competition, is one of the best examples of the application of the theory of emergence to the design process of a public urban space. The competition was held in two-stages: one in November 1999 and one in May 2000. Dutch architect Rem Koolhaas and graphic designer Bruce Mau who entered the most unpretentious presentation in terms of physical interventions produced the winning team. While other teams, like James Corner and Stan Allen, tried to convince the jury on their design using a great depth of detail for the future outcome of the site, Koolhaas and Mau developed a strategy that allowed the park’s design to adapt its the ever-changing contextual situation. Instead of proposing a design at the time of the competition, in the typical master designer fashion, they laid out a framework for a design process that was designed by the emerging patterns that were created by the individual elements that created the city. This strategy became the project’s design (Waldheim, 81).

Koolhaas and Mau reduced the design process into what is essentially a formula. This formula is based on the principles that urban parks are a lucrative investment and at the time of the competition it is impossible to understand enough about the site to successfully produce a design. From understanding those principles, Koolhaas and Mau created a formula emerged that creates a design over time. The formula is written as such: SACRIFICE AND SAVE + GROW THE PARK + MANUFACTURE NATURE + 1,000 PATHWAYS + CURATE CULTURE + DESTINATION AND DISPER-

SAL = LOW DENSITY METROPOLITAN LIFE (85).

When the process was applied to Downsview Park it created a timeline, which listed phased interactions. From 2001 to 2005 the site’s contaminated soils would be remediated with a succession of vegetation. From 2006 to 2010 programmed activities would be established along with a network of pathways. These human-based interactions would be based on the actions of the people who inhabited the site from 2001 to 2005. In the years between 2011 and 2015 large circular planting of trees would be established in order to distinguish the natural landscape elements from the human designed landscape elements (oma.eu).

Tree City has been written about extensively over the last decade. The negative criticism is generally focused on how the project reduces the craft of landscape architecture to a simple equation of pathways and ball fields. The negative criticism also heavily reflects on how the project places an emphasis on generic elements in a field that is physically engaged in diverse systems. The project’s positive criticism includes its strategic nature and its stance on public space as a revenue generator (Berger, 131).

This thesis’ criticism of Tree City is consistent with other criticisms, but I also feel that there is relationship between Tree City and the theory of emergence, which could bring a different perspective on the existing criticism. This new criticism can be broken into two questions; first is the formula used in Tree City emergent and if it is, then how could it be improved?

Reducing the design strategy in Tree City to its essentials, the formula can be read as “when it becomes this date, we will do this.” Because Koolhaas and Mau understood that the site’s situation in 1999 was much different than it would be in 2015, they allowed the unpredictable nature of the urban form to influence their

design. They set forth rules that stated certain landscape elements will be placed based on the unpredictable actions of the site's inhabitants. This institutes a bottom-up design strategy. This shows that they were aware of the emergent behavior and how it currently exists in low-density urban life. Therefore, I believe the placement of design elements exhibits emergent behavior, but the design formula lacks emergent behavior. If a truly emergent formula were to be created, the programmed elements would adapt with the desires of the individuals. For this reason, the emergent ability of Tree City is regulated. This formula could function in a more emergent manner if it extended the feedback loop created in the placement of elements into the selection of elements.

APPENDIX V: CONVERSATIONS AND CRITICISM: DISCUSSIONS FROM THE STUDENTS, FACULTY, AND ALUMNI OF AUBURN UNIVERSITY'S LANDSCAPE ARCHITECTURE DEPARTMENT

Feedback from several presentations and dozens of conversations occurred throughout this study. These talks helped guide the project's development and evolution. These discussions occurred in several different forms and sizes, but almost all of them involved the presence of the students, faculty, and alumni of Auburn University's Landscape Architecture Department. The accumulation of a year's worth of discussions created noticeable patterns of positive and negative criticism. These patterns were created by the same question being asked consistently. Although these patterns are different, they are interconnected by a similar and binding question. This fundamental question asked, "On what basis is a design made?" This is an account of what this question is asking, how it emerged, why it's important, and how it has answered.

What does it mean to question the basis of a design? Essentially, this is questioning what is the rationale or logic behind the decisions that lead to the creation of a design. What made the designed product and what it is? Of course, this could ask several different variations of the same question depending on the design under consideration. In order for this thesis's design test ask this question, a further definition of *what* this question is asking is needed.

If this question were inquiring the rationale behind design maneuvers of this thesis, it would be logical to apply the question to the part of the project that requires a rationale. This could be established as the transformation from recording feedback data to the creation of design goals that reflect that data. This is the analysis phase of the project, and it is the backbone of the feedback loop. In this section of the feedback loop, the landscape architect has to interpret the information found in the responses of the site's inhabitants. To reduce this problem to a formula, the basis would be the information or data recorded as a response from the site's inhabitants, and the "rationale" would be the landscape architect's interpretation of the data. At the surface, this formulaic expression seems to answer the question, but the answer had a much deeper understanding that needed to be further explored.

When this study was in its early developmental stages, several instances arose where the audience could not perceive the feedback loops during the presentation. This was due to poor oral and graphic representations of the information found by the feedback mechanisms. This poor representation led to a misunderstanding of not only the information found by the feedback mechanisms and what mechanisms were being used, but the function of the mechanisms themselves. As the project advanced, better visual and audible representations were constructed. This created a better understanding of the information found by the feedback mechanism, but the questions of why it is important and how it is used remained.

The main significance of the feedback loops is that it allows the possibility for the site's inhabitants to react to a situation and then have that reaction reflected in the design. This reflection of the site's inhabitants desires is what divides this design methodology from top-

down methodologies, which rarely offers the chance for the site's inhabitance desires to be reflected in an adaptive manner. The feedback is also what makes this design methodology different than CHORA's approach or the approach found in "Tree City." If the feedback were not taken into consideration, the adaptive quality of the design methodology would diminish, if not completely be removed.

Questioning how the feedback is used is very interesting because it cannot be answered universally. The type of response a landscape architect can give is based on the type of feedback data recorded. For instance, a design that yields feedback that is qualitative in nature will produce an evaluation that uses qualitative methods. If a design produces feedback that is quantitative in nature, the feedback data is measurable, therefore able to be reacted to in a quantitative manner.

With that stated, I believe the feedback produced in the design test of this thesis is interpreted by the person controlling the project's process. That is, of course, only if the landscape architect is willing to be humble and allow the feedback to dictate the outcome of the project. Although the landscape architect is supposed to reflect the desires of the site's inhabitants, an injection of professional responsibility has to underlie the landscape architect's reaction to feedback data in order to keep the design in check. In other words, someone has to regulate the ideas in order to respect the goals of good urban form.

This explanation may seem as though it gives responsibilities to the landscape architect that are broad and undefined, but I believe this is the section of the feedback loop where personal creativity and grassroots programming can converge. For example, if this design methodology was tested using the same site, but with different landscape architects, different designs would

emerge. This is because each landscape architect would interpret what their responsibilities are differently. This seems to be a unique position where the programming of a site is bottom-up and the design reaction is top-down.

This rationale also has many negative criticisms. The main critique is the looseness or openness of the landscape architect's ability to decide what feedback is important. Ironically, this is the same element of the feedback loop that hinges the entire project together, allowing a unique design based on the landscape architect's interpretation. This criticism is both functional and ethical in nature and should be answered with further research. But for now, it should be concluded that the programming in this project is bottom-up and the means to address the programming is top-down.

In conclusion, the basis or rationale behind the design is located within the feedback. The type of information that can be recorded as feedback determines the type of feedback data produced. This then dictates the type of assessment that can be given, which guides the goals of the design. Essentially, the type of information that can be extracted from the situation determines the type of design.

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As scientific philosophies and theories have evolved, so has their application to the craft of landscape architecture. The theory of emergence, which was developed in the 1970's, is currently finding applications in the design disciplines. Since the built environment is now largely considered an emergent phenomenon, emergence might be used to obtain design goals using behaviors found in the urban realm. This thesis examines how the theory of emergence can be applied to the design methodology of creating a public urban space. The ultimate goal of creating an emergent design methodology would be to create an urban network that functions at a higher organized complexity than it did prior. It is hypothesized that if a higher organized complexity is generated, an even higher level of organized complexity will emerge because of the original increase in organized complexity. The strategy for researching this thesis is divided into two major sections: (1) determining the definition and sub-theory of emergence that is most appropriate for the application to the design methodology for creating public urban spaces, and (2) constructing a repeatable design methodology for creating a public urban space based on the submission selected definition and sub-theory to a design test. The success of this examination is based on its ability to generate conceptual design methodologies and prompt further examination in the application of the theory of emergence to other sub-fields in landscape architecture. If an emergent design methodology can be created the inhabitant's desires can be reflected in the design of public urban spaces in a more direct manner than most current spaces.

