CATALYZING THE IN-BETWEEN:

Mediating Architecture, Landscape and Infrastructure

by

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Bachelor of Architectural Science, Ryerson University 2012

A thesis project presented
to Ryerson University
in partial fulfillment of requirements
for the degree of
Master of Architecture
Toronto, Ontario, Canada, 2015

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Hannah Hyder

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ABSTRACT

Dominated by motion, time, and event, the contemporary American metropolis has evolved into a loose agglomerated field, where residual space rules over built form (Lerup, 2000). Theorized as *Dross* by Lars Lerup, these interstitial residual territories disrupt connectivity and urban cohesion (Lerup, 2000). They emerge as the byproduct of infrastructure where processes accommodating flows are more valued than physical place-generating public domain. Architecture has become increasingly marginalized and is no longer the building block as traditionally understood in Aldo Rossi's terms (Rossi, 1984). By redesigning a specific site within the degraded downtown core of Houston Texas, this thesis contends that Architecture can seek new opportunities for urban cohesion when intersected with Landscape Urbanism and urban infrastructure. This synthesis has the potential to generate a public realm through strategies that can catalyze novel relationships and connections between territories that are separated by infrastructural systems. By mediating between architecture, landscape and infrastructure, the subsequent site will be restored and become a catalyst for further socioeconomic developments.

ACKNOWLEDGEMENTS

I would like to thank my family, my husband, my friend Dadin, my supervisor Cheryl Atkinson, my second readers John Cirka, and Ian MacBurnie for their support, critique and guidance on this thesis project. I would like to thank the City of Houston, Texas for providing me with site documentation and feedback on things. I would like to say special thanks to Stan Allen for his project documentation.

TABLE OF CONTENTS

CHAPTER 4: ARCHITECTURE AS INFRASTRUCTURE

CHAPTER 5 : DESIGN PROJECT

LIST OF FIGURES

Figure 10 (a): Palazzo Della Ragione
Source: http://www.francescocorni.com/show_design.php?id=831

Figure 10 (b): Palazzo Della Ragione
Source: http://immaginitalia.it/it/foto/veneto/padova-palazzo-della-ragione/

Figure 11: Nolli map of Rome
Source: http://www.palgrave-journals.com/udi/journal/v17/n2/images/udi20126f1.jpg

Figure 12 (a): The Vision For High Density Living
Source: https://findinghomeproject.files.wordpress.com/2012/02/highrise-city-hochhausstadt-perspective-view-east-west-street-1924.jpg

Figure 12 (b): The Communal Block
Source: http://41.media.tumblr.com/95162c324e9f2f061411f5753cebc184/tumblr_mrel86S4Rr1qmwcxto1_1280.jpg

Figure 13: The Contemporary City
Source: https://agingmodernism.files.wordpress.com/2010/06/radiant-city.jpg

Figure 14 (a): No Stop City, Archizoom
http://www.ecole.co/classics/branzi/no-stop-city-with-archizoom-associati/image-818/

Figure 14 (b): No Stop City, Archizoom
http://architetturaradicale.blogspot.ca/2012/05/teoriano-stop-city-1970-71.html

Figure 14 (c): No Stop City, Archizoom
Source: http://architizer.com/blog/archizoom-retrospective/

Figure 15: The Las Vegas Strip
Source: https://c1.staticflickr.com/9/8417/8784203661_5e82161450_b.jpg

Figure 16: Signage Before Form
Source: http://www.designersandbooks.com/blog/still-learning-from-denise-scott-brown

Figure 17: Building As a Duck
Source: http://media.tumblr.com/tumblr_l3bdkuigZJ1qbdj3v.jpg

Figure 18 (a): Big Sign Little Building
Source: http://media.tumblr.com/tumblr_l3bdkuigZJ1qbdj3v.jpg

Figure 87: Planting Along the Critical Path
Source: http://scenariojournal.com/article/the-performative-ground/

Figure 88: High Line Circulation Patterns
Source: http://www.scribd.com/doc/262191985/Highline-pdf#scribd

Figure 89: High Line Special Moments
Source: http://s3.amazonaws.com/trd_three/images/40603/highline6_midsize.jpg

Figure 90: Diverse Landscape Zones
Source: http://ecowebtown.eu/n_2/it/data/images24/b05_diagram_agritecture_hard_to_soft_ratios_150.jpg

Figure 91: Hong Kong at Night
http://upload.wikimedia.org/wikipedia/commons/1/18/Hong_Kong_Night_Skyline.jpg
Figure 92: Le Corbusier Plan Obus
Source: http://farm3.static.flickr.com/2253/3540804708_596e26862f_o.jpg

Figure 93: Learning from Las Vegas
Source: https://flavorwire.files.wordpress.com/2010/02/279561_las_vegas_pics_20.jpg

Figure 94: Pruitt-Igoe housing Demolition
Source: https://designerlythinking.files.wordpress.com/2011/04/pruitt-igoe.jpg

Figure 95: Yokohama Port Terminal
Source: http://ad009cdnb.archdaily.net/wp-content/uploads/2014/10/5420792ec07a800de500000e_ad-classics-yokohama-international-passenger-terminal-foreign-office-architects-foa-_yipt-0802-satoru_mishima-05-530x416.jpg

Figure 96 (a): Olympic Sculpture Park
Source: http://www.azuremagazine.com/wp-content/uploads/2013/10/Azure-QandA-Marion-Weiss-04.jpg

Figure 96 (b): Olympic Sculpture Park
Source: http://www.azuremagazine.com/wp-content/uploads/2013/10/Azure-QandA-Marion-Weiss-04.jpg

LIST OF APPENDICES

CHAPTER 1 : FORMLESS CITY: ARCHITECTURE'S NEMESIS

1.1 Introduction

In the past few decades, the concept of the city has changed fundamentally. Whereas it was once a defined hierarchy within an urban area, it is now a conglomeration of discrete areas and urban voids (Mayne & Allen, 2011). Driven by rapid urbanization, the city is now a polycentric metropolis, megalopolis or conurbation (*city of many cities*) that yet needs a morphological definition.

This spatial restructuring has been largely influenced by forces of capitalism and globalization under both private and governmental influence. The flux of human and financial capital has altered the spatial form of cities, and their relationship with architecture (Mayne & Allen, 2011). The meaning of Architecture has been reduced to a mere commodity, a reflection of economic and *status quo* forces.

The effects of urbanization on a city's infrastructure, spatial form and interconnectivity is a key concern. This issue is reinforced by future global migratory trends which suggest that by 2050, 70% of the world's population will be living in cities (UN DESA, 2014). It is crucial to understand how rapid urbanization will shape the built environment. What will the implications of this urbanization be on resources, environment, infrastructure, urbanism, and overall spatial form? What is the role of architecture in the changing dynamics of cities?

Given this broad global perspective, while some metropolitan cities have managed to consolidate rapid urbanization through vertical growth, others have experienced further horizontal expansion. American cities in particular have a history of horizontal sprawl, and treating urban land as a commodity. The problems of a suburban metropolis are extreme as urbanization of its physical landscape has created issues of an infrastructural scale (Berger, 2006). Dominated by speed, free enterprise and residential privacy, the suburban metropolis is a formless city.

Discontinuity, fragmentation, large tracts of waste lands, environmental degradation, and irregular and chaotic structures - have rendered the suburban metropolis formless (Berger, 2006). This lack of spatial definition has altered the traditional relationship of architecture to the city. Concrete architectural concepts such as *Form, Boundary and*

Symbolism have diminished in importance in the face of networks and flows that favour convenience and speed (Seewang, 2013). Buildings are largely conditioned by the context of their infrastructure, by movements and flows. The post-WWII abandonment of the traditional urban grid led to the development of a spine-like system of freeways and cul-de-sacs; this has generated a highly private urbanism (Pope, 2011).

In the late 20th century, the trend toward horizontal sprawl was caused by the industrial city. At present, horizontal sprawl is occurring as a result of debilitated city centers caused by intersecting infrastructural systems and market driven practices. While the global trend in the 21st century has been toward dense central cores, many American cities find themselves trapped in 20th-century development patterns of sprawl.

Certain trends have encapsulated the need to rehabilitate American central cores, which are now plagued with systematic infrastructural problems caused by the destruction of inner cities in the 20th century. Changing demographics such as the aging populations of baby boomers, young professionals, and immigrant populations demand a new urbanism.

The failure of ecological systems that at times results in problems such as flooding, has been caused by urbanization of watersheds. We must search for alternatives. Throughout the world, the rehabilitation of central city cores has often been followed by urban regeneration initiatives such as waterfront revitalizations. However, the infrastructural conditions of the American central urban core does not allow for straightforward revitalization.

How can Architecture create a sense of place in the American suburban metropolis given the complex spatial conditions created by infrastructural systems in the central core?

One point of departure is to use void spaces usually dismissed as urban waste, as catalysts for achieving interconnectivity through a holistic design approach. Theorized as *Dross* by Lars Lerup, these large tracts of waste lands and urban voids have emerged from the process of de-industrialization and through leapfrog real estate development practices (Lerup, 2000). However, reclaiming these landscapes is complicated due to the large scale and infrastructural problems associated with these sites (Berger, 2006).

In the field of design, the concept of *infrastructure* has become increasingly relevant by which the spatial form of contemporary cities can be better understood (Seewang, 2013). By definition infrastructure can be understood as systems, works and networks upon which the human inhabitation is reliant on (Carleson, 2013). As a means to address the issues of interconnectivity between built form and open space, the notion of *infrastructure* has expanded over the years to include the natural ecological systems along with gray infrastructures.

The need to address the issue of urban waste by recognizing the impact of infrastructure on the built environment - is becoming a territory for design. As the lifeblood of cities, *infrastructure* is not only the primary area for investment by governing bodies but its potential as an instrument for social, ecological, and economical transformations is being recognized and tested.

This line of thinking has found greater prominence in the discipline of Landscape Architecture which has evolved into an interdiscipline of *Landscape Urbanism*. By working with ecological infrastructural systems, Landscape Urbanism methods are able to articulate systematic ground plane conditions that can address post industrial and residual (*Dross*) sites (Shane, 2004).

What is an architectural approach to infrastructure?

Architectural form alone cannot catalyze *Dross* sites that have emerged from ecological infrastructural issues. However, it has the instrumental ability to synthesize qualitative information and generate spatial relationships that can transform reality (Allen, 1999). This fundamental strength of architectural methodology, allows it to be well situated within the problem of creating interconnectivity and organizing infrastructural-laden sites that have become residual spaces within the American central core.

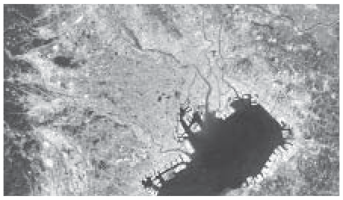
This thesis proposes to create a specific unified place within the formless suburban metropolis of Houston Texas, where market driven growth in the absence of zoning and planning governance, have resulted in countless *Dross* space and complex spatial conditions. By identifying a potential site as a catalyst in the degraded historic downtown core, this thesis aims to create a collective sense of place by using cultural, institutional and natural assets for revitalizing *Dross*, using an existing university as a key asset. The project repurposes a redundant bridge infrastructure to create a cultural and institutional park infrastructure. By curating new programmatic relationships to attract flows embedded within the linear park and superimposed on re-naturalized landscape, the project creates new inter-connectivity for the site that is both horizontal and vertical in its spatial experience.

The new identity for the site is created by integrating its natural and cultural history while spatially redefining the boundaries with buildings in a composition that relates to key assets in the context. It creates a conditioned exterior public space while reinforcing the bridge as an existing historic artifact.

By mediating between Architecture, Landscape and infrastructure, the project introduces a new development model that brings cultural and economic value to the site, making it a catalyst for surrounding residual territories while protecting local ecologies from disruption.

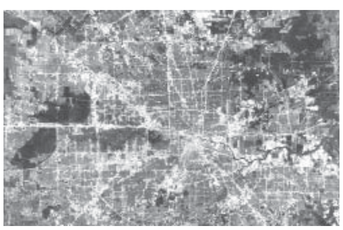
Fig 1. Figure ground, downtown Houston, Texas

1.1 Formlessness - A Compositional Problem



Tokyo - Japan
Asia

Sao paulo - brazil
Latin America



Houston - Texas
American city

Randstad - Holland
Europe

Fig 2. Global Mega regions

Cities around the world are becoming increasingly shapeless as rapid urbanization continuously redefines borders (*Fig 2*). The unbounded and endless expansion of cities has morphed the concept of the *traditional city* into various types (Mayne & Allen, 2011). Polycentric metropoli, megalopoli, edge cities, generic cities and global cities: these terms have been proposed to express regional scales and qualities of spontaneity and discontinuity.

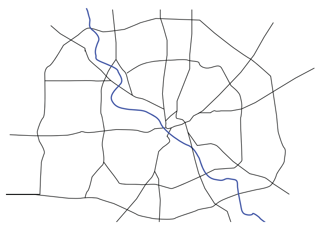
The effects of urbanization on the physical structure of cities continue to be destructive and deform what was once spatially uniform. Shopping malls, urban voids, post industrial tracts, parking lots, mixed with patches of natural landscape, have created a loose agglomerated field (Berger, 2006). Extreme urbanization has affected ecological systems such as watersheds, and has led to problems such as flooding. Ground-plane surface conditions have become increasingly complex as the result of horizontal expansion (Berger, 2006). The fragmented and chaotic spatial order of the contemporary city has given it an amorphous character, therefore being *formless* (Eisenschmidt, 2012).

However, urbanization has not just spatially restructured cities but "it has itself become a spatial effect of distributed networks of communication, resources, finance, and migration that characterize contemporary life" (Allen & Agrest, 2000, p.159). The transition to the information age has shifted the contemporary perception and value regarding physical space, from object-centered to non-object space. Cities are shaped by technology and interconnected by information flows, which has created an urbanism that values "process and program over form and place" (Allen & Agrest, 2000, p.159).

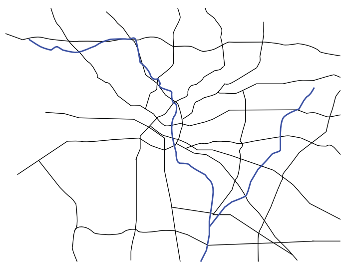
While in a traditional city, the dense center was significant as a place for concentrating socio-economic activities, providing cultural experiences with monuments and public spaces, the concept of *place* has eroded in the contemporary city (*Fig 3*). The distributed networks and uses of the contemporary metropolis have replaced the value of physical place with processes and flows accommodated by infrastructure, as opposed to the former emphasis on a central place (Allen & Agrest, 2000).

Fig 3. Debilitated American downtown cores

1.2 American City



Dallas



Los Angeles

Fig 4. American cities grew around infrastructure

This is especially relevant when we look at cities today that have been ordered and defined by infrastructure. In particular, South Western American cities are marked by the omnipresence of infrastructure. Cities in the American West developed around freeway systems, given their history of becoming urbanized later than Northern and Eastern American cities. Many cities in the West experienced explosive growth after WWII that was enabled by the interstate freeway system, allowing the region to take advantage of the vast untouched landscape that appeared to be empty (Nash, 1985). Therefore, many cities in the American West are defined by the car at their infancy.

Suburban metropolises such as Houston, Dallas, Los Angeles, Phoenix, and Denver developed around infrastructure like freeway beltlines (*Fig 4*). Paramount importance has been placed on the movement of goods and people, and on the speed with which this is accomplished. Speed has become a more essential urban element than plazas, neighborhoods, and the pedestrian realm. This undermines the concept of *City as Architecture* in Aldo Rossi's term, where it has been understood

Fig 5. Freeways define spatial form

as the basic building block of the city (Rossi, 1984). Increased reliance on processes and flows has led to infrastructure that defines a city's form and spatial boundaries, instead of individual buildings (*Fig 5 & Fig 6*). Buildings no longer need to line up consistently along the street and open spaces as boundaries to enhance the pedestrian experience. Instead, buildings have become increasingly homogenized, meaningless in their communication, banal, and scattered around freeways.

Therefore, Architecture no longer *constructs the city over time*, nor does it defines its spatial order as this has been traditionally understood (Rossi, 1984). Architecture has become increasingly marginalized by being treated as a commodity. It has been reduced to a role which simply accommodates the demands of the market and a social culture that is largely influenced by the automobile and consumerism.

Fig 6 (a).

Fig 6 (b).

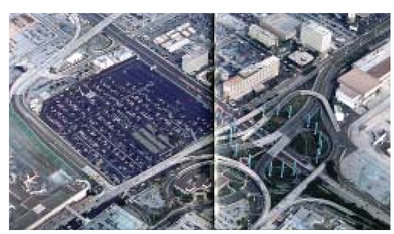


Fig 6 (c).

Fig 6 (a),(b),(c). Urban land has been treated as a commodity

1.3 Architecture in Extreme Urbanization

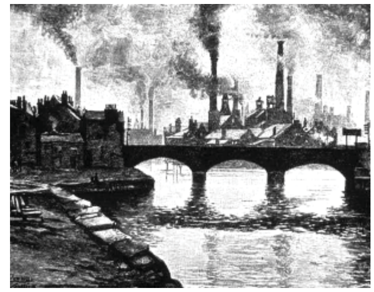


Fig 7. 19th Century metropolis, London. Exponential growth, congestion and inhabitable living conditions were few problems of the industrial city.

Since the birth of modern metropolis in the 19th century, architects have taken several positions to rethink and enhance the discipline’s engagement with the formless city.

In *City Catalyst: Architecture in the Age of Extreme Urbanisation,* Alexander Eisenschmidt states that architects have either resisted or radically embraced the contemporary city as a product of urbanization. The changing form of the city towards formlessness has given rise to autonomous and to absolute architecture. Instead of escaping or allowing itself to become marginalized by mimicking urban forms which leads to homogeneity, Architecture has yet to face the real flows shaping the contemporary city, without diminishing its role (Eisenschmidt, 2012).

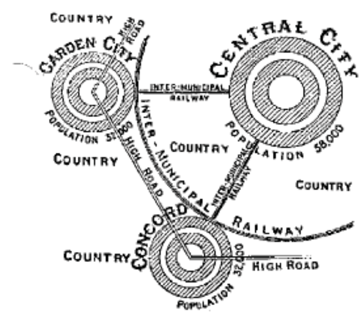


Fig 8 (a). The Garden City movement, Ebenezer Howard, London, 1898.

These attitudes of radically embracing or resisting the contemporary city have developed in the last two centuries with the exponential growth of cities. Beginning with the industrial cities of the 19th centuries, urban space and culture have been radically transformed. The industrial city driven by urbanization,

Fig 8 (b). 19th century renovation of Paris, Georges-Eugène Haussmann, Paris, 1853-1870 technological advancements, communication networks and new modes of production gave birth to the modern metropolis (*Fig 7*). New ways of thinking were needed to understand the city as previous forms of design could not respond to the new urban culture and problems of the industrial city (Eisenschmidt, 2012). Among others, Ebenezer Howard’s *Garden City movement* (*Fig 8. a*) and Georges-Eugène Haussmann’s renovation for Paris (*Fig 8. b*) were a few design concepts that emerged as *radical* for embracing the problems of the congested industrial city.

Towards the 20th century post-war years, the effects of urbanization driven by forces of modernization altered the shape of cities towards formlessness (*Fig 9*). Technological advancements such as the automobile and freeway systems led to increased fragmentation, residential privacy and unprecedented horizontal expansion.

Architects became increasingly critical of the contemporary city as formlessness challenged its significance and its privileged status as an urban form-maker in the city. This led to two extreme positions, “either resisting the current change or radicalising it” (Eisenschmidt, 2012, p.19). Both these stances aimed to use architecture to bring order to the increasingly disordered environment of the formless city.

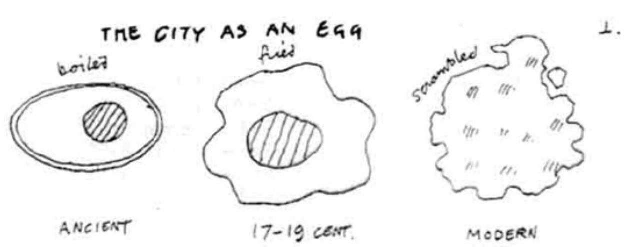


Fig. 9. Cedric Price - depicted formless and unbounded quality of the contemporary city

Some Architects resisted change by returning to history as a model for ordering cities. Among others, the work of Aldo Rossi was influential in presenting the city as an *Urban Artifact,* and as a critique of Modernism which emphasized function over various qualities of space (Eisenschmidt, 2012).

Aldo Rossi - City as an Urban Artifact

In *Architecture of the City*, Aldo Rossi argues that the value of the city relates to its construction over time. A city cannot be defined by its present use without considering it’s relationship to the past, which reveals the evolution of its urban structure. Architecture is not limited to the image of the city nor is it the sum of several parts, but understood as the *construction of the city over time* that links past with present (Rossi, 1984).

According to Rossi, the concept of *Urban Artifacts* relates to city elements that are considered in the context of it’s relationship with the past. *Urban Artifacts* bring meaning through a consideration of history, it’s influence on structures, and the historical inter-relatedness of structures themselves. Cities expand their axes of development according to the location of their older artifacts (*Fig 11*). *Urban Artifacts* may also be fixed points (*monuments*) that commemorate natural and man-made changes in the urban fabric. *Urban Artifacts* symbolize collective memory and thereby create a quality of *permanence* in the city (Rossi, 1984).

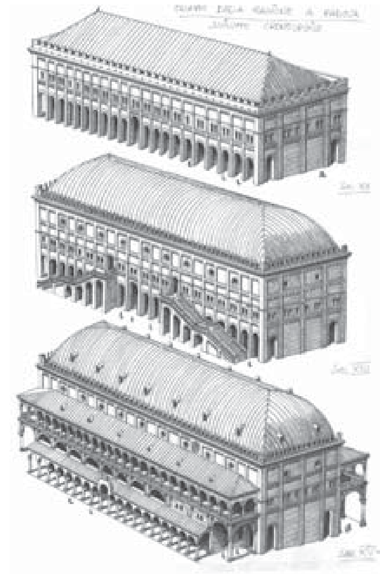


Fig 10 (a). The building changed its functions various times throughout history.

Fig 10 (b). The city structued around the Urban Artifact overtime.

Fig 10 (a,b). Palazzo della Ragione, Padua, Italy.

Rossi uses *Palazzo della Ragione* as an example of an *Urban Artifact* built in medieval times. He argues that if this building were constructed today, it would not have the same value and impact on the urban fabric as it had at the time. Its value arises from its multiple uses over the years. It has acquired *permanence* and became a focal point around which the city was structured over the centuries (*Fig 10 a,b*).

This architectural form generated a sense of space, and over time came to define the character of the city itself. For this reason, the city is a place, *a locus of collective memory,* and a cultural artifact (Rossi, 1984).

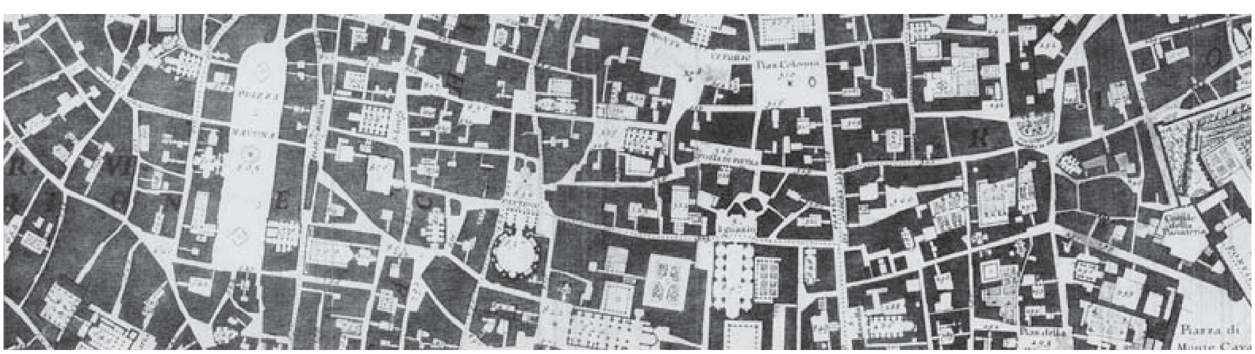


Fig 11. Nolli map of Rome, 1784 - The city has evolved over the centuries and extended its axes in reference to its older Urban Artifacts.

Ludwig Hilberseimer - The High-Rise City

Fig 12 (a). The vision for high density living

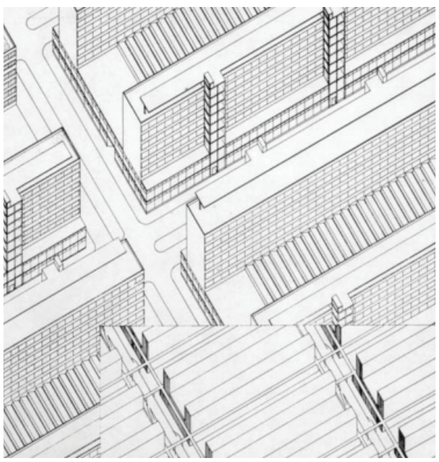


Fig 12 (b). The communal block

Fig 12 (a,b). The High rise city, Ludwig Hilberseimer, 1924.

On the other side of the spectrum, architects radically embraced the contemporary city driven by post WWII conditions. These included new technologies, production methods and the mass culture of consumption (Eisenschmidt, 2012).

The *High rise City* was conceived with the technologies of its time, and within that time's social and economic context. It strongly contrasted with cities of the past that Hilberseimer claimed were founded on religious and cultural arguments. It included ideas from other fields such as industrial processes to achieve the ambition of high rise living. This vision aimed to generate a vertical organizational model for the city which considered relations between parts, rather than a collage of images (Velazquez & Barajas, 2014).

This generic project was influenced by socialist ideals of collectivity where the communal block replaced the notion of aggregated individual buildings (*Fig 12 a,b).*

This model was conceived with the city being the central power, self-contained and efficient. It utilized Fordist ideals of mass production as it aimed for vertical urbanism. The *High rise City* was influenced by earlier radical visions such as Le Corbusier’s *Contemporary City for three million people*, that proposed high density living for Paris in an attempt to organize growth and resolve spatial problems in the city (Velazquez & Barajas, 2014).

Fig 13. The Contemporary City, Le Corbusier, 1922.

Archizoom - No Stop City

During the late 1960s, increased suburbanization and decentralization of cities provoked radical visions like *No Stop City* by Archizoom. This work illustrates an urbanism highly dependable on mobility: an endless city, one that is unbounded, and saturated with symbols of mass consumption (Varnelis, 2003).

It related to horizontal conditions of the city that was created by forces and flows rather than to discrete architectural objects. This vision accepted the reality of the traditional city coming to an end, where late capitalism and globalization created a homogenous city preoccupied by consumption (Artemel, 2013).

The result would be a place without qualities, useless Architecture that is “artificially lit and air conditioned” and where local diversity fades (Maffei, 2013, p.65). The role of design becomes instrumental, offering territorial organization through a repetitive grid which would be filled with generic programs over time (*Fig 14 a,b,c*). The vision stated that most cities will follow towards formlessness (Varnelis, 2003).

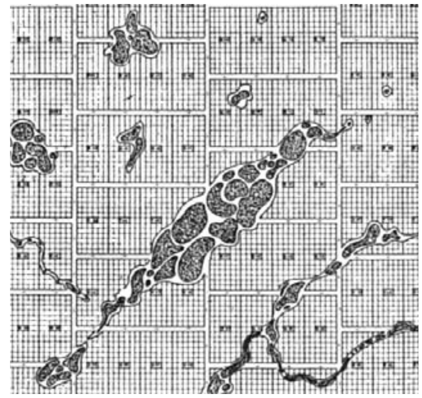


Fig 14. (a)

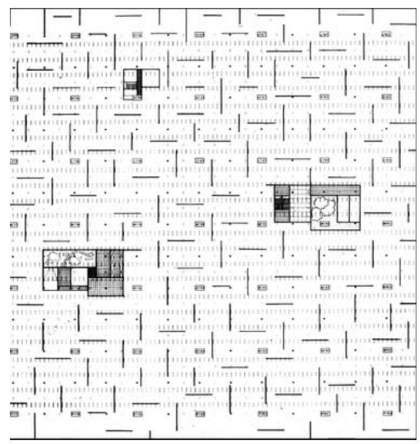


Fig 14. (b)

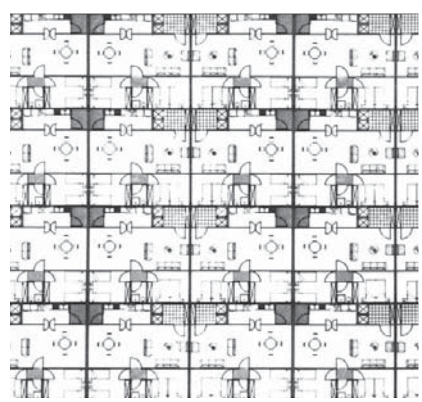


Fig 14. (c)

Fig 14. (a,b,c). No Stop City, Archizoom, 1970 - A city without qualities

Learning From Las Vegas

In their 1972 publication, *Learning from Las Vegas* , Robert Venturi and Denise Scott Brown advocated for approaching the American post WWII city on its own terms. By engaging with the existing conditions, architects can overcome their fear of chaos instilled by Modernism’s revolutionary, puristic and utopian predilection for changing existing environments. It is more revolutionary for architects to engage with an existing city. This contrasts with the intolerant positions taken by modern architects, such as Le Corbusier’s suggestion in the 1920’s to tear down Paris and begin again. (Venturi & Brown, 1977).

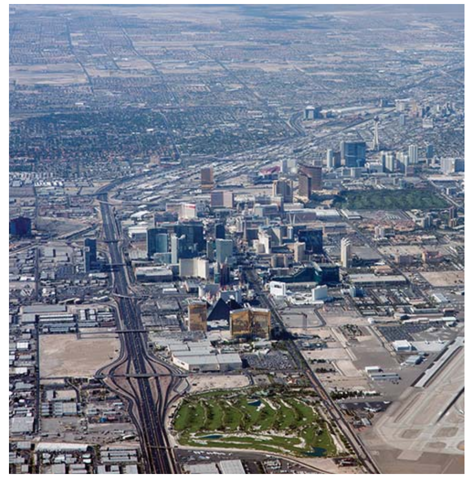


Fig 15. The Las Vegas strip, is a defined space within the suburban metropolis.

In the auto-centric city of Las Vegas, the traditional constructs of urban space as an environment defined by boundaries and urban form was revised. The contemporary landscape of sprawl, driven by post-WWII urbanization, had produced a special quality of place. Exemplified through the Las Vegas Strip (*Fig 15*), the chaotic and openness of the strip is significant to Las Vegas, just as an

Fig 16. Signage before form. Spatial relationships are defined by signage and symbols, instead of architectural form

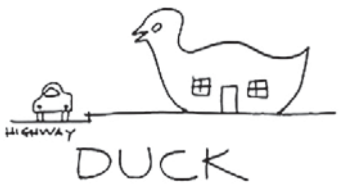


Fig 17. Building as a Duck, buildings are symbols themselves

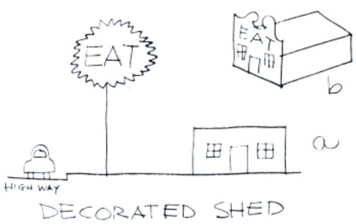


Fig 18 (a). Big sign, little building.

Fig 18 (b). Decorated Shed. Most buildings are a Decorated Shed

Fig 18 (a,b). A Decorated Shed building requires a sign to communicate as they are in-identifiable and generic.

enclosed urban space like a piazza is to Rome (Venturi & Brown, 1977). The Las Vegas strip is defined by symbols in space such as signage, ornaments, and by the monumentality of its casinos, rather than by form (*Fig 16*). The signage and symbols clearly communicate their buildings' functions. Unlike Modern buildings which did not communicate anything, Las Vegas was a place well defined by "intensified communication along the highway, where "If you take the sign away there is no place." (Venturi & Brown, 1977, p.18).

Architecture has a limited role in defining the city as "spatial relationships are defined by symbols", rather than architectural form (Venturi & Brown, 1977, p.13). Buildings can be classified as either a *Duck* or a *Decorated Shed (Fig a,b)* in terms of how they communicate with their context (Venturi & Brown, 1977). Most post-war American cities like Las Vegas consist of buildings of the *Decorated Shed* type.

Historically, the formal expression of architecture expressed information to the public through symbolism- for instance, Greek and Roman temples or Egyptian hieroglyph and mosaics. Buildings throughout history have expressed communication by being signs as well. Therefore, symbolism has always been an essential element of architecture throughout history until the 20th century (Becker, 2005). By doing so, buildings can engage with their context by using iconography to communicate meaning. Symbolism should return as one of the functions of Architecture (Venturi & Brown, 1977).

1.5 Summary

By returning to symbolism as an essential component of architectural form, the spatial relationship between built form and open space can be improved through meaningful communication. This is especially relevant in the context of the formless city where buildings play a smaller role in defining spatial relationships.

A symbolic architectural language can play a signifying role for creating value and a place of character through meaningful expression. By doing so, Architecture can potentially renew its engagement with the city by creating spatial definition that has been deconstructed by infrastructural systems.

CHAPTER 2 : THE WILD WINS THE WEST

2.1 Formless Houston

In his publication *After the City*, architect and urban theorist Lars Lerup attempts to redefine the diminishing role of Architecture in the auto-centric metropolis of Houston, Texas where "The metropolis has replaced the city, and as a consequence architecture as a static enterprise has been displaced by architecture as a form of software" (Lerup, 2000, p.22). This typical Texas city where *bigger is better* is understood as a means of achieving a better quality of life, is sprawling out of control. It has erased the boundary between the city, country and hinterland (*Fig.19-21*), appearing *oceanic* in its experience, with no geographic boundaries to control its horizontal growth (Lerup, 2000).

Fig 19. American cities are sprawling with no defined boundary controlling their growth.

Fig 20. Oceanic skyline, Dallas - Most Postwar American cities are identified with an Oceanic skyline

The concept of *a city* as a unified place with a downtown core that creates permanence and a collective sense, is almost non-existent in Houston. The values of permanence and stability as referred by Aldo Rossi - created by architectural density over time, has been replaced by impermanence, and transformation. Traditional structural components such

Fig 21. Houston Ship Channel - Houston's "bigger is better" lifestyle is fueled by its thriving petroleum based economy.

as order, density and formal continuity do not apply. The city's long tradition and history in rejecting any form of planning governance has yielded to free market self regulation which has consistently resulted in treating urban land as a commodity (Lerup, 2000).

Market driven practices favour suburban sprawl developments rather than consolidating density. The justification for running the city as a machine in the absence of zoning and planning governance, has created the belief that unregulated free-market development results in *freedom* (Lerup, 2000). This has created problematic spatial conditions and one million acres of undifferentiated self regulated spatial form that lacks identity (*Fig.22*)

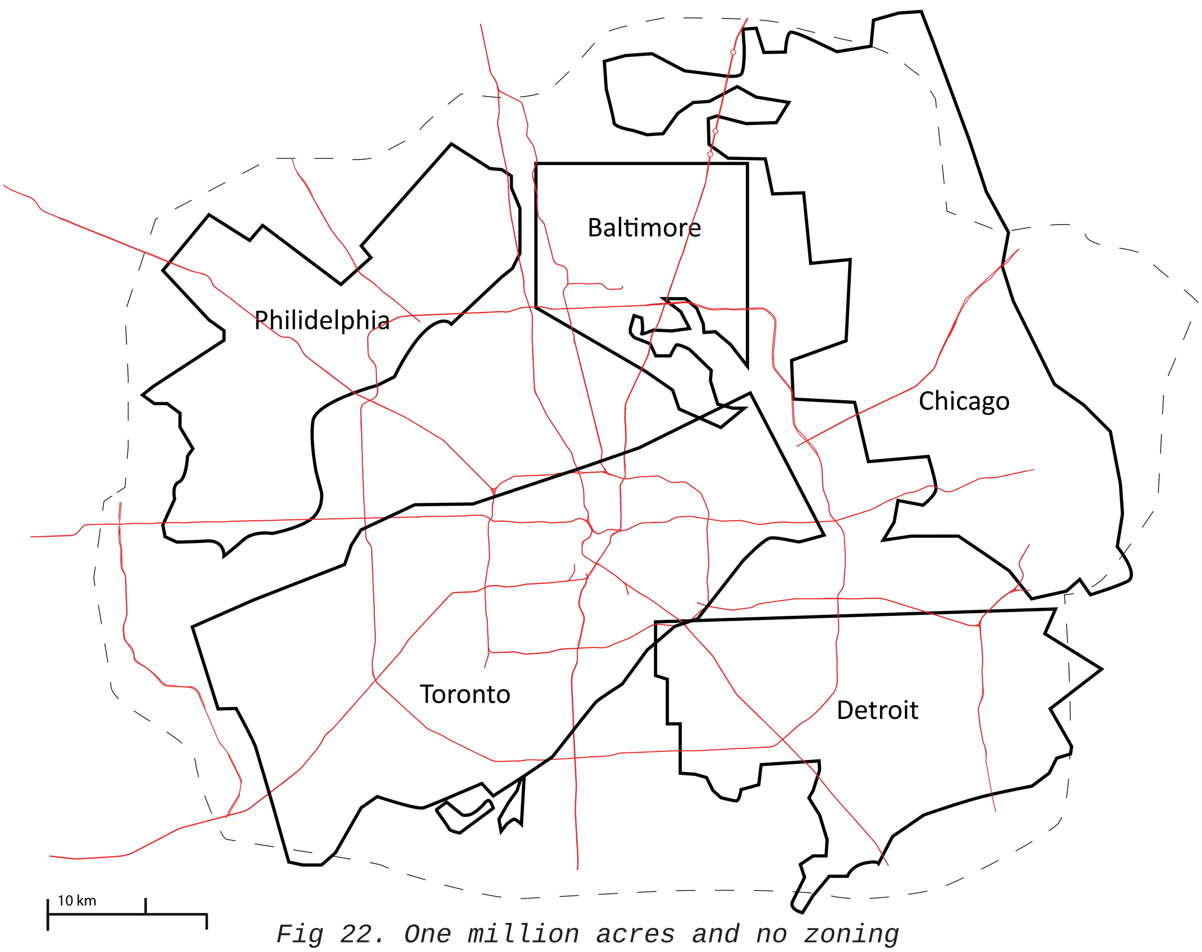
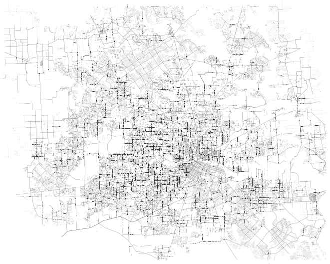
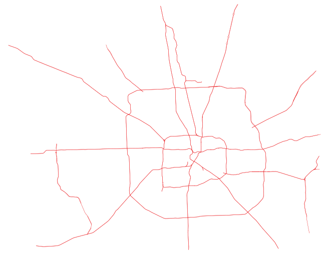


Fig 22. One million acres and no zoning



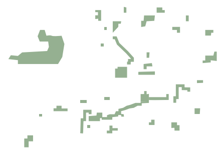
Urbanized Area and Roads



Freeway networks

Bayou networks

Rail networks



park networks

LRT line

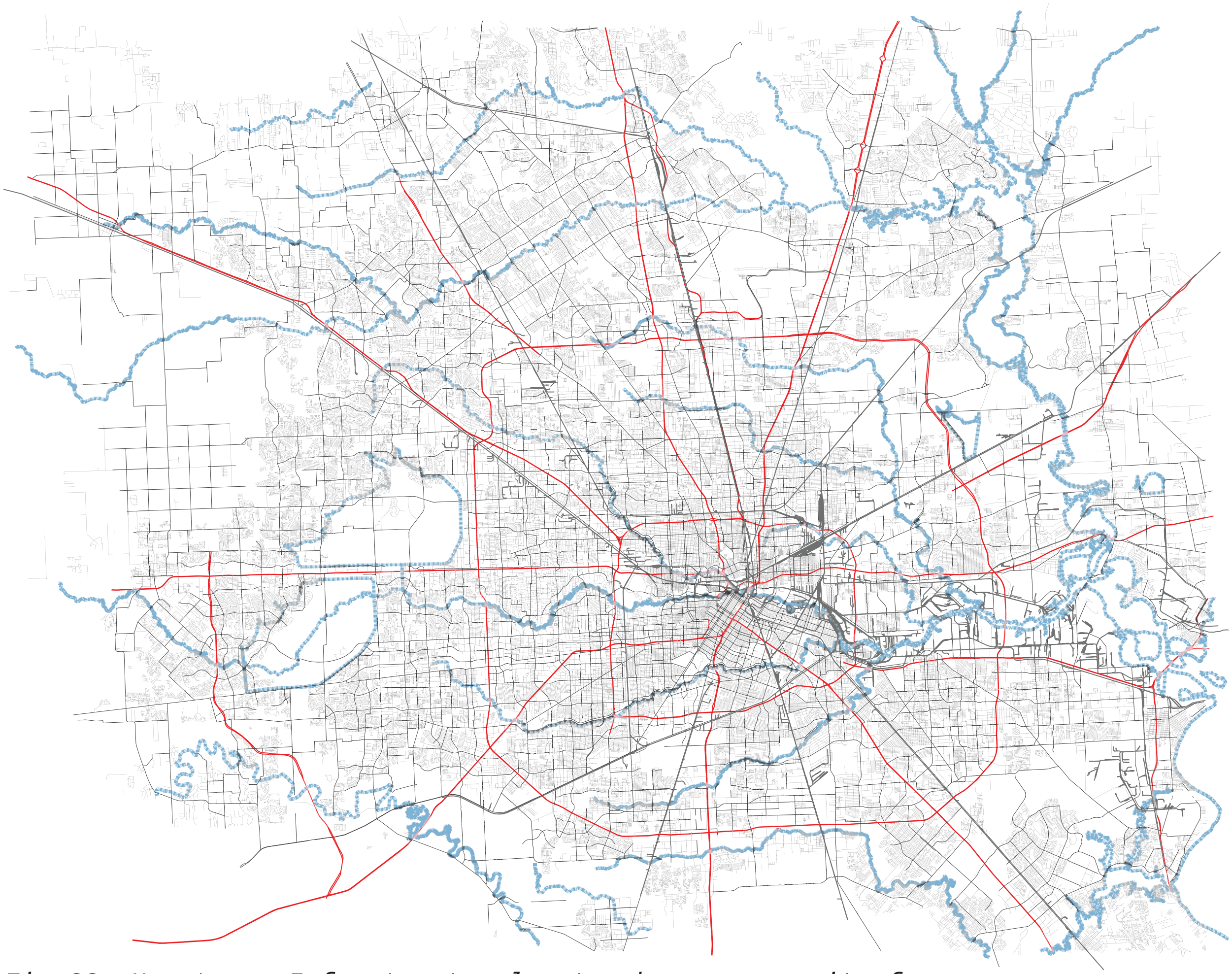


Fig 23. Houston - Infrastructural networks compose city form

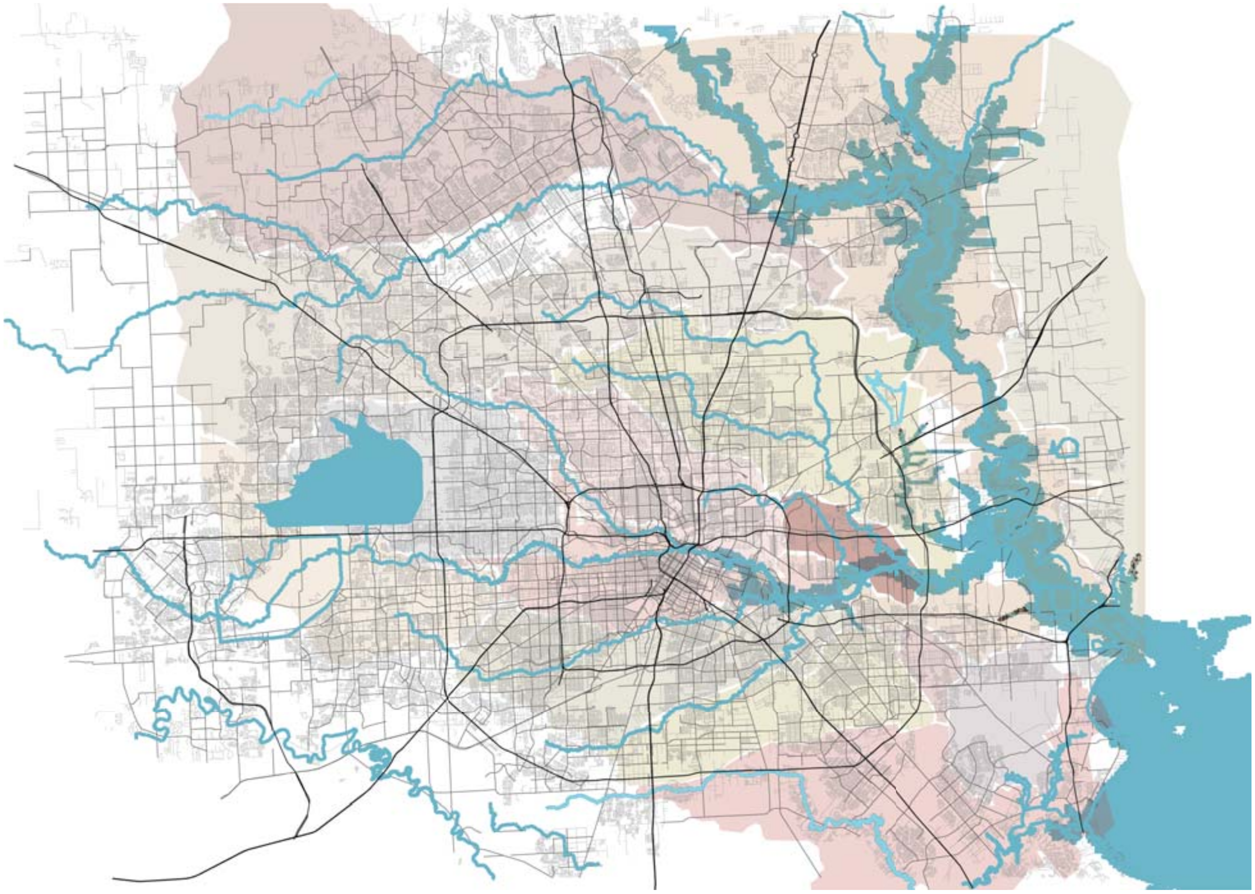


Fig 24. Urbanization of bayou watersheds

(a) Concrete ditches

(b) downtown Houston flooding

(c)

Fig 25. Natural drainage systems (bayous) turned into concrete ditches to accomodate speed. Flooding is a major setback as the primary drainage route (Buffalo Bayou) passes through downtown core towards Gulf of Mexico.

Fig 26. Houston - a polycentric metropolis

This makes Houston a prime example of the formless city, where the "wild has won over the west" (Lerup, 2000, p.169). Architecture as an urban form-maker "is facing its toughest test", where it has been displaced by infrastructure as the basic building block (Lerup, 2000, p. 86).

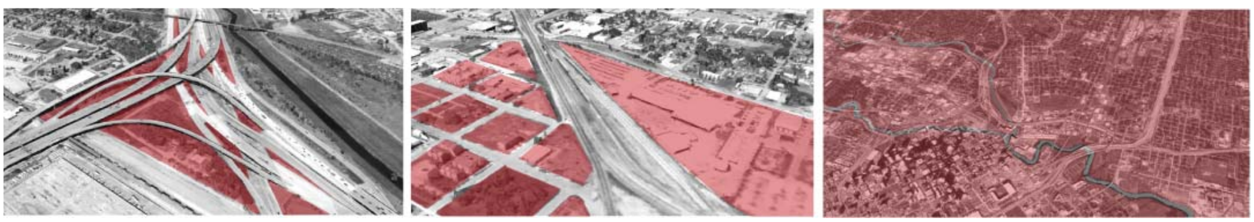
The concept of "place" in the traditional sense has gradually been eroded by distributed networks and by the uses of the contemporary metropolis. Processes and flows accommodated by infrastructure that favour convenience and speed take precedence over physical place.

This has contributed to the formless spatial order and the destruction of the public realm where "Space as value, as locus of events, as *genius loci*, is reduced to interior space, a return to the cave" (Lerup, 2000, p.58). As a city sustained by intensive networks of infrastructural systems, "it is dominated by motion, time and event" (Lerup, 2000, p.58).

(a) bloated houses *(b) bloated cars* *(c) shopping malls* *(d) larger distance*

Fig 27. Houston's Dross Urbanism, where bigger is better qualifies for better life

Spatial disorder created by infrastructural systems has fragmented the built environment, giving rise to territories that do not contribute in creating a sense of place. Infrastructural systems such as freeways, bayous, rail lines create boundaries and connections within the metropolis, but also produce physical discontinuity by disrupting the urban fabric in various ways (*Fig 28*).



(a) *(b)* *(c)*

Fig 28. Infrastructural systems such as freeways (a), railways (b) and bayous (c) intersect the ground plane and create residual territories.

The result is in-between wasted residual spaces that do not contribute to the public realm. These in-between marginalized territories are theorized as *Dross*, the “ignored, undervalued, unfortunate residues of the metropolitan machine” (Lerup, 2000, p.58). Lerup explains the deformation of space into residues as being “constantly carved out in the front and abandoned behind” (Lerup, 2000, p.48). How can Architecture renew its engagement with a city that is *dominated by motion, time and event*? How can it create a sense of place within the suburban metropolis of Houston that will generate public domain?.

2.2 Stim and Dross

Fig 29. Las Meninas, Diego Velázquez, 1659

In *The Order of Things - An Archaeology of the Human Sciences*, French philosopher Michel Foucault suggests that one must invent and evolve a *grey anonymous language* to transpose the visible into words, because “However hard one may try to say what one sees, what one sees never fully inhabits what one says” (Pedri & Petit, 2013, p.13). Foucault argues that the relationship between the language and the visible is an infinite one. By stating the obvious of what one sees by using identifiable names or (*proper names*), it suppresses other relative hidden elements from being discovered, that compose the visible image. Instead, one must “*pretend not to know”*, abstain from using “*proper names”* and depend on “*the visible facts”* (Foucault, 2012).

Foucault exemplifies the importance of anonymous and ambiguous language by using the *Las Meninas* painting as the material object. While concealing the facts about the painting, Foucault ambiguously discusses the sequential elements, the hidden subject, representation, and the complexity of perspective lines that questions the relationship between subject and object. Upon identifying the characters with their *proper names*, the material object transforms from a discursive space to a representation of known facts. The message that Foucault gives us through *Las Meninas* in regards to the use of *grey anonymous language*, is to challenge our perception of how we think about space. The use of an ambiguous and anonymous language allows one to engage in the complexities of space and to transgress the boundaries imposed by proper names.

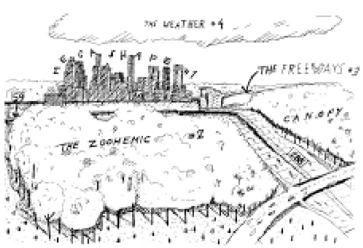


Fig 30. Lerup's sketch on ecologies of Houston.

Applying the notion of *grey language* to a highly exaggerated formless city, Lars Lerup invents a new vocabulary of metaphors to describe the ecologies governing the suburban metropolis of Houston. For Lerup who studied this metropolis for twenty years, this strategy allows for understanding relationships that are interrelated, hidden and complex.

By articulating the invisible complexities, Lerup summarizes the city's formless spatial conditions as being self organized. The city has its own order to it that provides reasoning for its built environment and urbanism, as opposed to being perceived as total chaos.

Among the list of vocabulary that Lerup generated, *Stim and Dross* is seminal for the discourse on built form and open space relationships, that attempts to define the formless composition of the city.

In his essay *Stim and Dross*, Lerup applies metaphors to space in an attempt to identify urbanism through a compositional strategy of *Stim and Dross*. *Stim* (Stimulations) denotes areas of activity and value. *Dross* is the worthless, inactive and under utilized (Lerup, 2000, p.58). Together their composition creates the ground plane surface conditions and the subsequent spatial form - the *Holey plane*, holes being the urban voids (Lerup, 2000, p.50). Lerup claims that the urbanized surface of any city consists of *Stim and Dross.*

Perceiving *Stims* as objects and *Dross* as subject, one can understand that the relationship of built form to space is interrelated (Lerup, 2000). Cities are dynamic entities that should be understood more than the binary thinking of subject/object. It is more important to understand the city as a series of correlating relationships than separate entities, that would inform design decisions for meaningful architectural responses.

Lerup tests his hypothesis of *Stim and Dross* in rationalizing the fragmented plane of Houston, where the residual *Dross* space dominates over form. Understanding the city through an *activity surface* in the downtown core and *holey plane* in the suburban developments, he concludes that *Dross* is the byproduct of *Stims* (Lerup, 2000). The production of *Dross* creates the spatial organization of Houston, where its relentless growth constantly deforms space.

Downtown Activity Surface

The *activity surface* captures the invisible relationship of space to points of high and low intensity in time (*Fig 32*).It also captures the dynamic nature of the non-static plane (Lerup, 2011). *Dross* is understood in terms of occupying patterns of the landscape and raises questions regarding efficiency of use of space. Most residents commute daily from the suburbs to downtown for work. Based on this activity during the day, the agglomeration of office towers are considered to be *Stims*, surrounded by the vast underutilized landscape of *Dross* (Lerup, 2011).

The agglomeration of office towers (which creates a *Megashape* in Lerup's metaphorical terms), projects an image of a typical downtown core. However, when observed from close-up they resemble prisons for being hermetic and concealed (Lerup, 2011). Parking garages connect to sky bridges leading to office towers that contain underground tunnels (*Fig 33)*. The extensive underground tunnel network consists mainly of commercial and retail activities that compete with the street.

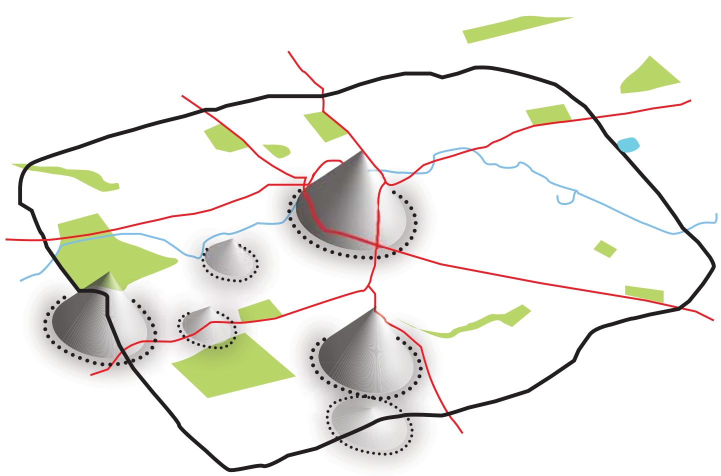


Fig 32. Houston activity surface within Loop 610 - showing downtown and other urban centers: Stim & Dross

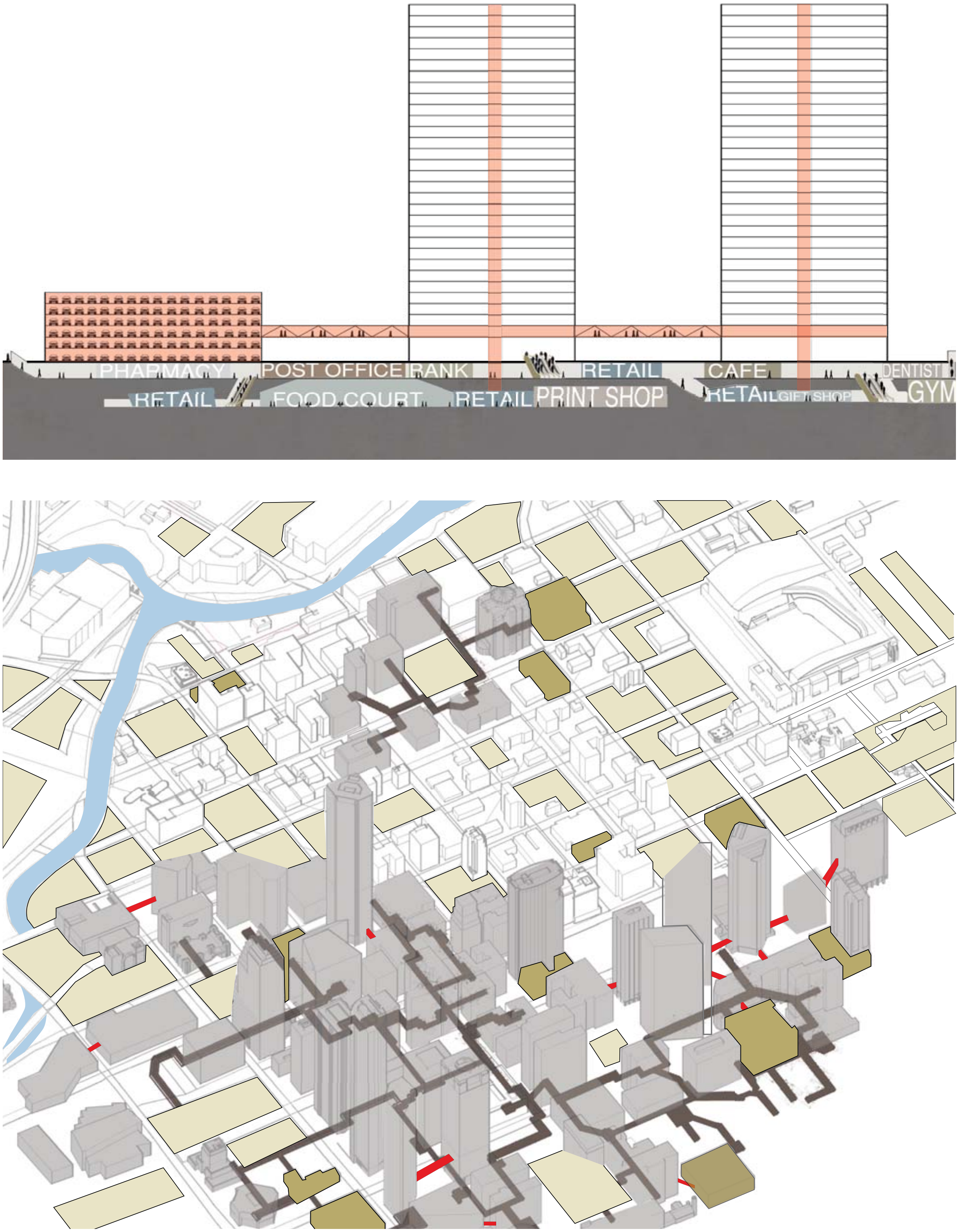


Fig 33. Downtown Houston Stim & Dross, (top) Typical building is connected to expanding underground tunnel system, creating an internalized urbanism. (above) Stims and Dross.

Fig 34. Empty streets

As a result, the hermetic character of the towers (*Stims*) contribute to dead streets (*Dross*); empty and only to be driven by, as activities on grade are rare. The downtown core becomes *Dross*, vacant and under-utilized once the work day comes to an end. It lacks both residential density, mixed-use or 24/7 spaces that would keep it active. This raises questions regarding efficient use of the extensive networks of infrastructure, the abundant available space, and of amenities that exist in the downtown core.

The landscape of Houston shifts daily between these two extreme dualities of activities driven by *motion, time and event* (Lerup, 2012).

Holey Plane

The concept of *holey plane* as urban voids scattered throughout the surface of the city is best understood through the real estate phenomenon of "Leapfrog development" (Lerup, 2000, p.78). Developers leapfrog – that is, "skip over properties to obtain land at a lower price further out despite the existence of utilities and other infrastructure that could serve the bypassed parcels" (Heim, 2003, p.245).

Over time, leapfrog developments create a scattered and discontinuous pattern of growth rather than a steady process of outward expansion (Heim, 2003).

This continues the trend of sprawl and also results in the construction of new infrastructures such as freeways. Thus, these voids are created systematically as noted by Lerup, and defined as “the ignored, undervalued, unfortunate economic residues of the metropolitan machine” (Lerup, 2000, p.58). In the absence of planning governance, these market-driven practices encourage wasteful thinking by treating urban land as a commodity, thereby accommodating speed and convenience instead of urban cohesion.

Fig 35. Leapfrog development: Leap frogging creates urban voids (holey plane)

As a result, the entire composition of the city appears as *mottled* - a fragmented plane combining urban voids, awkward programmatic juxtapositions, freeways and bits of untouched natural elements. It resembles a surface “dominated by a peculiar sense of ongoing struggle: struggle of economies against nature” (Lerup, 2000, p.50).

Both the *activity surface* and *holey plane* conclude wasteful thinking on a metropolitan scale. *Dross* is therefore epitomized in Houston, constantly emerging as the byproduct of horizontal urbanization, free enterprise and deregulation.

Fig 36. Mottled plane

Territory for Architecture

Lerup states that Architecture’s role of creating *stability* and *permanence*, has been taken for granted in the formless city of Houston (Lerup, 2000). *Dross* space provides a promising territory for Architecture as it has the unique ability to give form to the invisible and the visible spatial relationships.

By approaching the notion of urban waste as *Dross* in the metaphoric sense, it forces one to think about a site’s history, its relevance and flows, the processes that have created the residual space, and the governing inter-connected ecologies. This can inform design decisions for catalytic potential. It shifts the architectural perspective from considering the object in isolation to the relationships that create the object. By approaching *Dross* space through the composition of subject/object, a conceptual understanding of the parts to whole relationship can be achieved where the relationship between built form and open space can become holistically integrated (Lerup, 2000).

From this perspective, *Dross* spaces takes on an important transformative role and could potentially open up a renewed dialogue between architecture and the city. *Dross* space can be an architectural catalyst that connects the past with the present and the future, creating a sense of *permanence*, *stability* and socio-economic value over time.

Considering residual territories as catalysts can lead to the achievement of a more cohesive urban order, as Lerup writes “only in the hybrid field of stimdross may we begin to rethink and recover from this holey plane some of the many potential futures” (Lerup, 2000, p.62).

2.3 Alternative to the American Dream

In his 1996 publication *Ladders*, American Architect and theorist Albert Pope writes that a city's urban grid, the spatial form it produces and the urban identity it generates are interrelated (Pope, 1996).

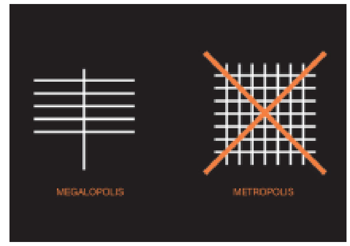


Fig 37. Houston constructs spine based urbanism (Ladders), instead of grid block urbanism (right)

Most post war American cities have constructed a *spine based urbanism*, a single access closed geometry of (*centripetal*) grid that is finite and indivisible, as opposed to the 19th century prewar open street (*centrifugal*) grid system. Few examples of a *centripetal system* are cul-de-sac suburban developments, office parks, and shopping malls that create an enclosed and discontinuous built environment. This system limits "the potential for integration into an extensive urban field" (Pope, 1996, p. 63). Additionally, this closed system of urban organization creates an *internal logic* of operations, an internalized public domain.

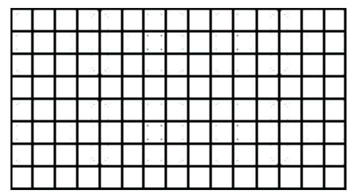


Fig 38. Centripetal grid, Metropolitan scale, a contained and bounded figure

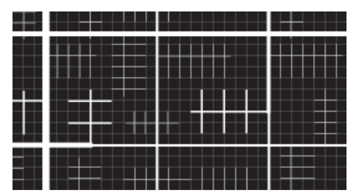


Fig 39. Centripetal grid at the local scale.

Pope applies structural notation to define this closed organizational system that produces the fragmented spatial form of the metropolis, as *Ladders* (Pope, 1996). A city of *Ladders* is not identified or characterized by the built form as

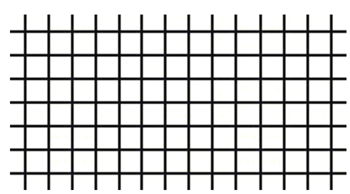


Fig 40. Centrifugal grid, an unbounded form, providing infinite extentions.

Fig 41 (a) Guggenheim Bilbao, Frank Gehry, Bilbao

spaces between objects are larger, decreasing the impact of the vertical plane associated with buildings on the horizontal plane of the streets. Rather, it is characterized “by residual spaces, urban decay, vast parking lots, undeveloped or vacant land parcels, urban expressways” and etc (Pope, 1996, p.6). These spaces lacking in identity and accessibility impact the contemporary city more than built form, and suppress the architectural significance to which Pope refers as *Primacy of space* over *Primacy of form* (Pope, 1996).

Fig 41 (b). Centre Pompidou, Renzo Piano & Richard Rogers -

The form’s success depends on grid block urbanism which generates dense urban fabric, that frames buildings

Pope explains that these spaces have been ignored by architects and planners that prefer designing discrete areas, while ignoring the real situation of the contemporary city where space is emphasized over form. He suggests that for design to confront the vast scale of space with any meaningful architectural intervention it must reassert the notion that “form can yet effect space as space continues to effect form” (Pope, 1996, p.7).

Architectural form may not hold the privileged status in defining *a city dominated by space*, but it can spatially reposition itself to recreate a dialogue between built form and open space. Pope suggests that the “key is to a revised urban strategy.. that aims indirectly at the primary target of space through a secondary intervention of form” (Pope, 1996, p. 8). The idea is not to develop residual space through a conventional architectural intervention by filling up void spaces, but to enhance its spatial qualities by re-establishing a strong link between built form and open space.

Both Albert Pope and Lars Lerup convey that this conventional urban relationship is a vital link even in the urban development of a city that is dominated by space; as *Stims* cannot exist without *Dross* and that only in the hybrid field of *Stimdross*, the city can potentially recover from the *holey plane* (Lerup, 2000). In addition to revising the built form relationship, we must consider for alternatives to the *closed centripetal system* of urban organization (or *Ladders*) as it internalizes the public domain, and contributes to the *disappearance of the city* (Pope, 1996).

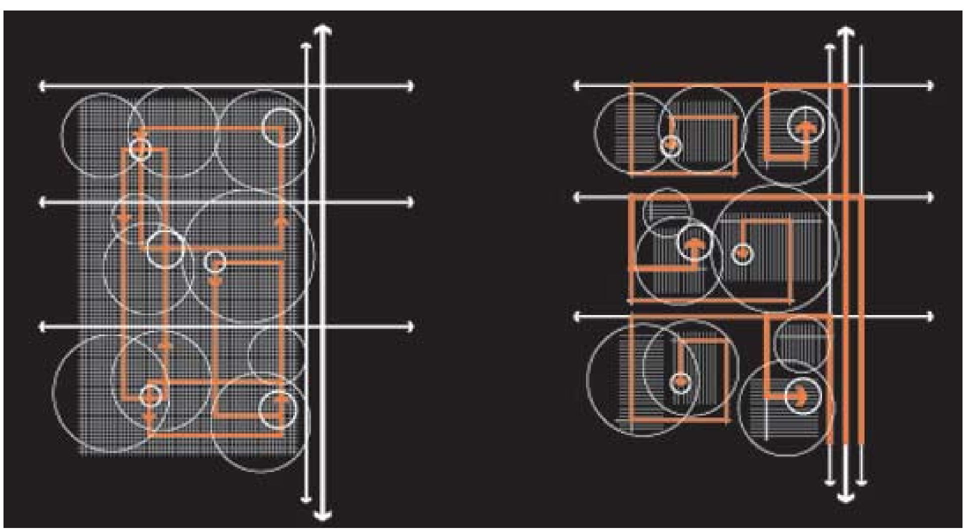


Fig 42. Grids (left) create higher connectivity by accomodating more paths and destinations than spines (right).

Pope states that the centripetal structure was allowed to be developed in the absence of stable and centralized urban centers by 20th century urban reformers. The 20th century planners and designers viewed the 19th century grid as “the instrument of a reductive and banal form of social organization” where it was perceived as “a threat to heterogeneity and to choice” (Pope, 1996, p. 19). The gridded city that was initially perceived as an *icon of order* - a form of control was abandoned for the decentralized and space oriented enclosed system of *Ladders* (Pope, 1996).

In many American cities and in Houston particularly, the erosion of the downtown grid has led to an overall erosion of the city itself. This *centripetal closed system* of spatial organization and internalized public domain, has expanded over time to create a *polynuclear conurbation*. This has further contributed to the demise of the city. The result is a highly privatized city with many centers, and increased fragmentation with countless *Dross* spaces, constantly emerging as the byproduct of horizontal expansion. This system of development creates exclusion and disorganization (Pope, 1996).

Post WWII Abandonment of the Downtown core

Driven by post WWII wealth, many American cities recreated a new order for habitation by abandoning their downtown core for a suburban mode of living in pursuit of the American dream *(Fig 43)* Post-war modes of economic production and technological advancements contributed to the dramatic decentralization of many American cities. Technological innovations such as air conditioning, computers, new modes of automobile production and the development of the interstate highway system in the 1950s that linked the entire country - all facilitated sprawl ((Auch, Taylor & Acevedo, 2004).

Fig 43. Post war suburbia Ads.

The new freedom found in overcoming distances resulted in exhilaration as Americans developed a passion for speed and identified with the car culture by placing added value on mobility (*Fig 44*). The automobile provided liberation from the 19th century downtown core by separating the live-work environments with the intensive highway infrastructure.

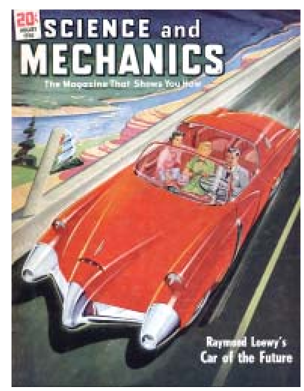


Fig 44. 1950's advertisement of the American car culture

This also caused the material destruction of the downtown core as the freeway infrastructure obliterated the unity of the urban grid that kept intact neighborhoods and other established real estate. Urban artifacts including buildings were torn down for parking lots, contributing to an overall re-shaping of the city to fit the horizontal organizational order of suburban living. (Melosi, 2010).

(a) *(b)*

Fig 55. Freeways divide unified neighborhoods in downtown Houston and extend into the periphery for suburban growth, razing the prairie lands, 1960

As a result of these changes, Houston's urban environment became highly introspective after WWII, from a 19th century gridded city to Albert Pope's *Laddered* city; favouring the trend of sprawl until the present. Both Lars Lerup and Albert Pope suggest that the goal of any city should be the "formation of the metropolitan consciousness" (Lerup, 2000, p.28). How can Architecture create a collective metropolitan sense in this formless city that continues to favour the trend of sprawl?.

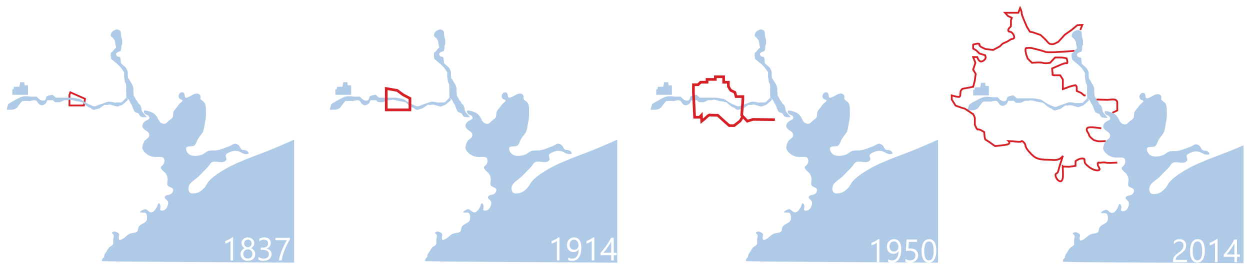


Fig 56 (a). Houston's zoneless growth - In the 19th century Houston's growth was tied to water trade, connected by the Buffalo Bayou waterway. Post WWII Houston sprawled dramatically following technological and economic shifts, continuing the trend of horizontal growth till today.

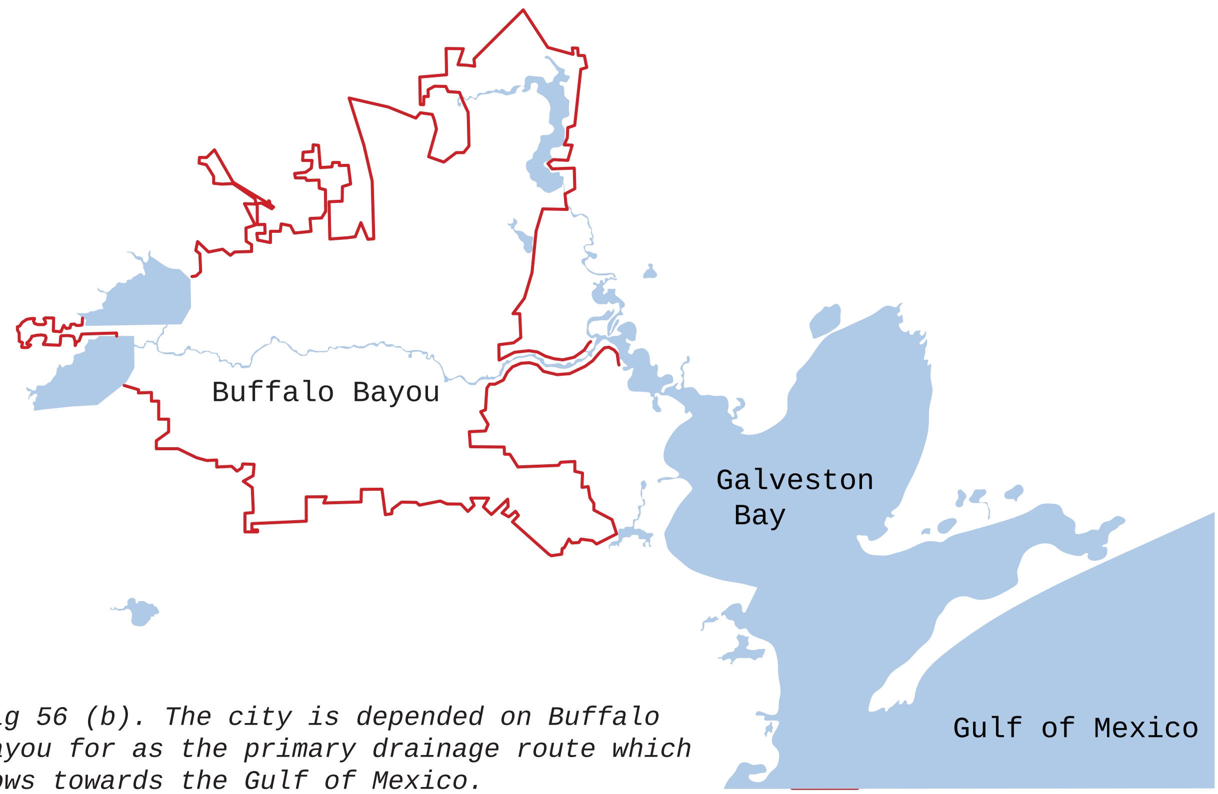


Fig 56 (b). The city is depended on Buffalo Bayou for as the primary drainage route which flows towards the Gulf of Mexico.

the goal of any city should be the “formation of the metropolitan consciousness”

- Lars Lerup, 2000, p 28

Fig 57. Downtown, Houston.

2.4 The Emerging Frontier: The Downtown Core

One strategy is to approach the downtown core as the territory for creating a collective sense of place, where the sprawling suburban metropolis can identify itself. In the 21st century, cities around the world have re-invented themselves by revitalizing their downtown cores through initiatives such as waterfront developments.

However, many American cities including Houston find themselves left behind. The 20th-century destruction of the gridded urban centers, the inefficient use of urban planning, and market driven practices have created a state of disorder that is not conducive to re-invention.

Fig 59. Downtown Houston Metropolitan scale - Re-inventing the downtown core can potentially create a collective sense of the "metropolitan concious-ness", given its central location, historic past and connectivity with infra-structure.

Infrastructural systems designed for speed and movement such as freeways, roads, bayous and rail networks, create conflicting relationships. In particular to the downtown core, the boundaries that these systems create, don’t relate to one other. These systems divide the ground plane in various ways, creating in-between residual territories of *Dross* (*Fig 60*).

Fig 60. Downtown Houston Figure ground - Segregated domains created by infra-structures - These systems create residual in between spaces.

The office towers in the downtown core, the extensive underground tunnel system and the in-between residual spaces don’t create a public domain (*Fig 61*). The city lacks an alternative model of development as there are only two development patterns: either low density residential sprawl or mid to high rise hermetic office towers. An alternative model for development is needed which would aim at creating urban cohesion while accommodating the various infrastructural flows and generate a public domain.

Rethinking the urbanism of this Texas metropolis is a challenging task where the motto *the bigger the better* prevails as the status quo. Lerup states that change will not come from social consciousness but from economic or natural calamity (Williams, 2009). Therefore, the potential for any catalytic architectural intervention in the downtown depends on socio-economic and natural forces that push for alternative thinking.

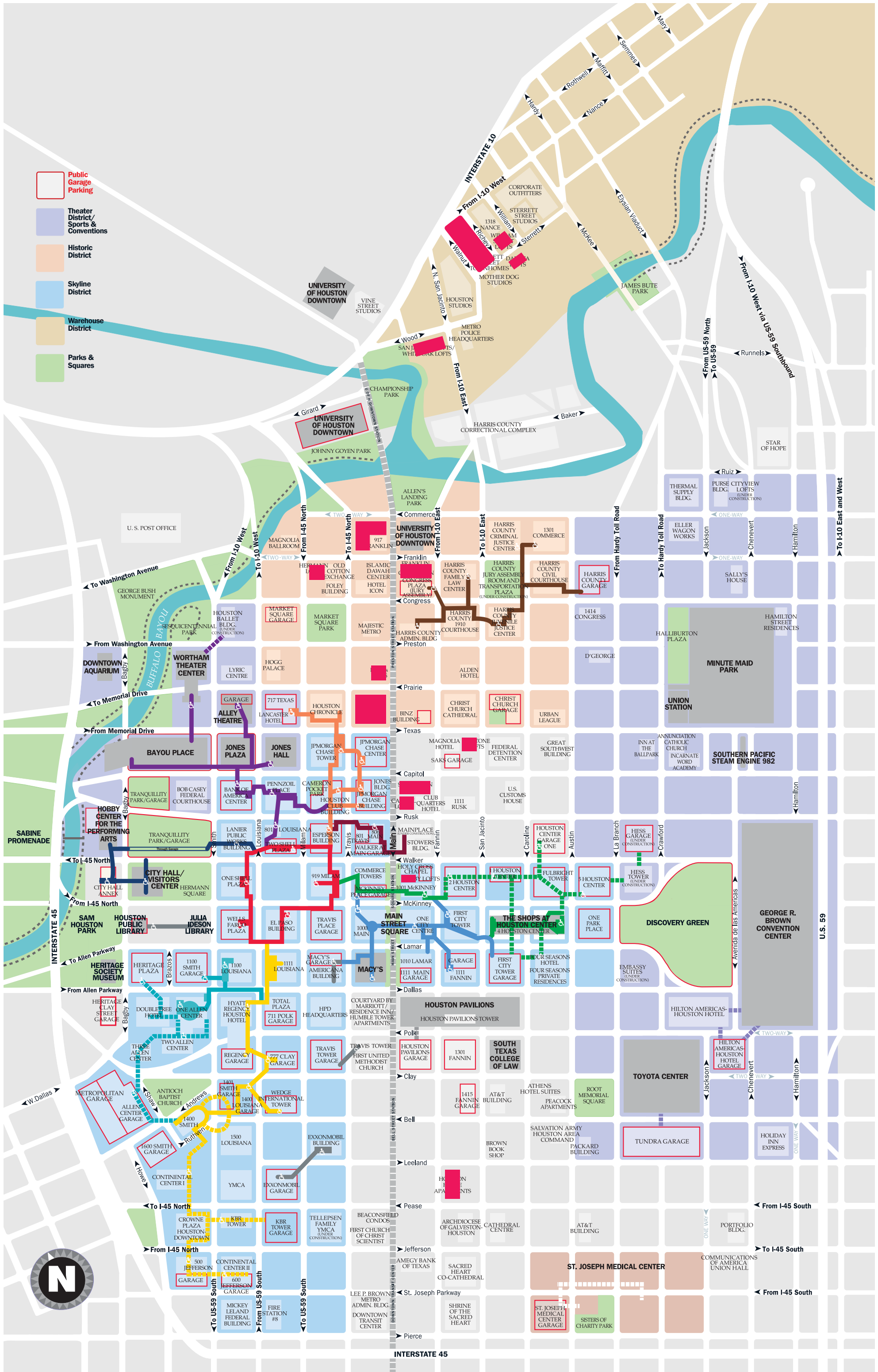


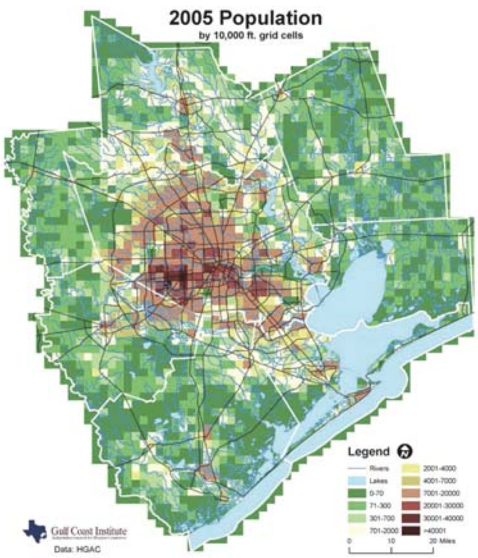
Fig 61. Downtown Houston is extensively connected by an underground tunnel system

Over the past few decades, Houston’s outward low-density development patterns (3,400 people per square mile) have continued to consume vast amounts of land resources. It is projected that by 2040, 81.4% of the land within the city will be developed (*Fig 62*). Houston’s current population of 6 million people is expected to grow by 3.7 million by 2040 (HGAC, 2013, P.17). This presents a problem as huge investment in infrastructures will be needed to sustain the sprawling growth.

Additionally, the city’s relentless growth and horizontal expansion has failed its natural ecological systems. They could have benefited the city if speed, convenience and private benefits were not the primary driving motives of development. The city’s natural drainage runoff systems (*bayous*) and its associated watersheds, have been neglected and destroyed as a result of ongoing horizontal expansion.

Consequently, flooding of the downtown core has become a major barrier for its revitalization as the city’s main drainage route (Buffalo Bayou) passes through it (*Fig 63*).

(a)



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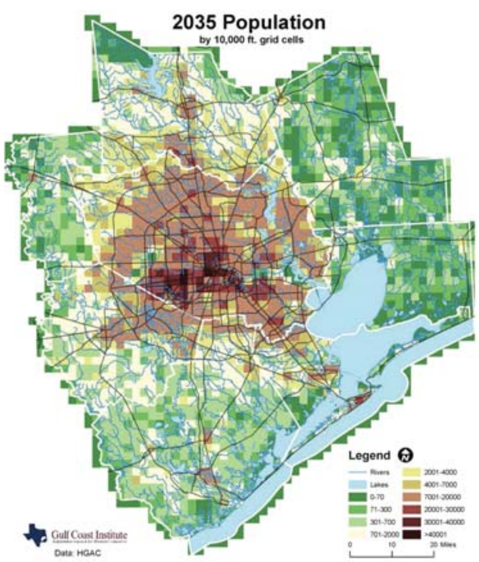


(c)

Fig 62 (a,b,c) New infrastructural developments facilitate sprawl, threatening leftover resourceful land.

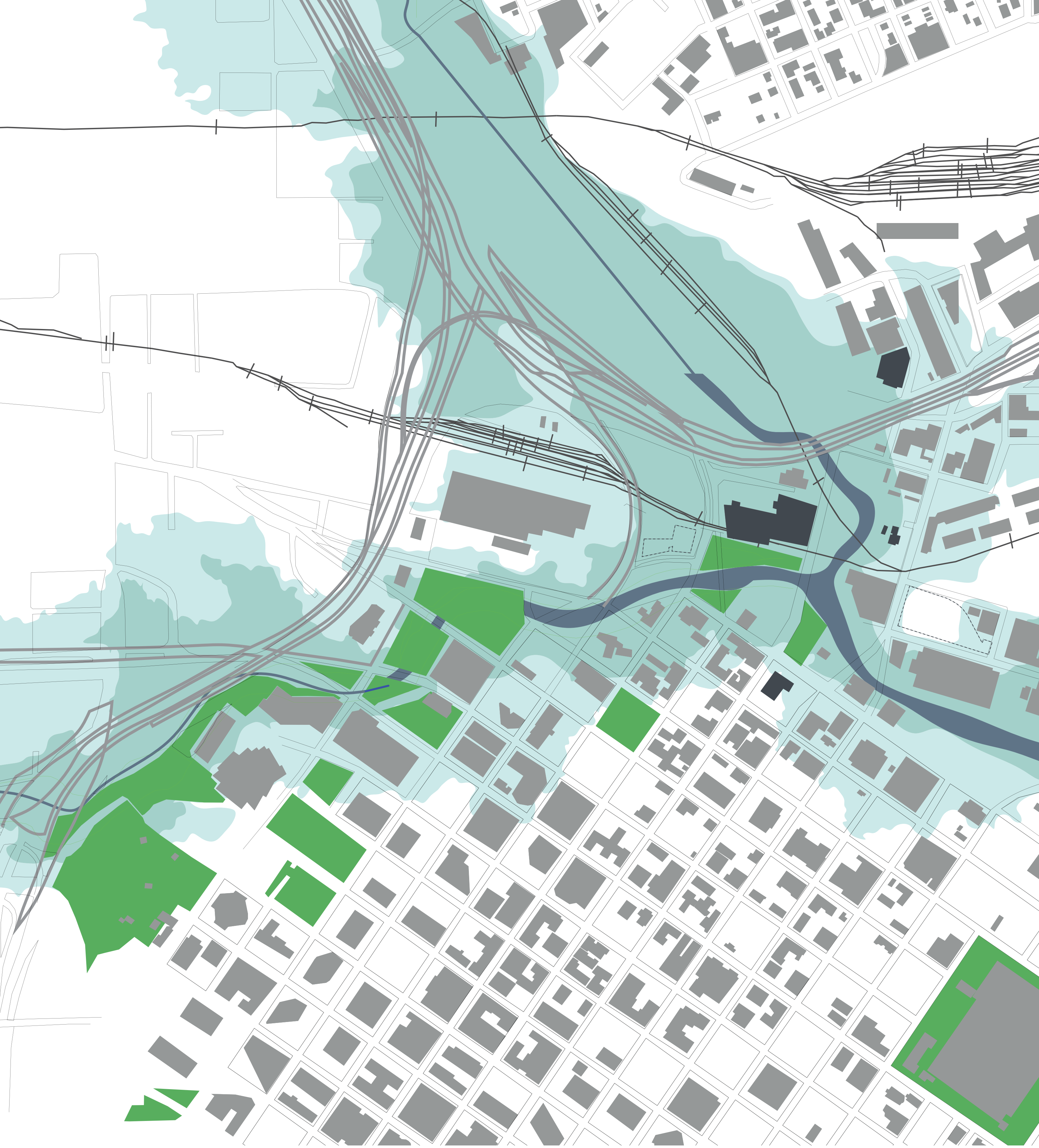


Fig 63. Downtown Houston Flooding - Flooding is a contributing factor in creating Dross space and segregated domains.

Over the past several years, shifting demographic trends have reflected the need to inhabit the downtown core. Changing demographics such as baby boomers, young professionals, and immigrant populations have created a demand for an alternative urbanism (HGAC, 2013).

Given the global trend of downtown rehabilitation, Houston does not want to see itself as a large Texas city but “as a world-renowned metropolis defined by its downtown and central city” (Downtown Management District, 2006, p.3). The city has started to recognize the importance of strategizing density or it may “risk losing in-migrating residents and businesses to other parts of the region” (HGAC, 2013, P.42).

According to the *Houston Urban Framework plan*, density can be strategized within urban centers of the city where infrastructure, services and transit will support the growth. Existing infrastructure should be utilized efficiently by increasing its usage instead of constructing new infrastructure to facilitate sprawl. Additionally, “densities should be focused near areas that have higher amenity density, so as to build upon existing infrastructure” (HGAC, 2013, P.44).

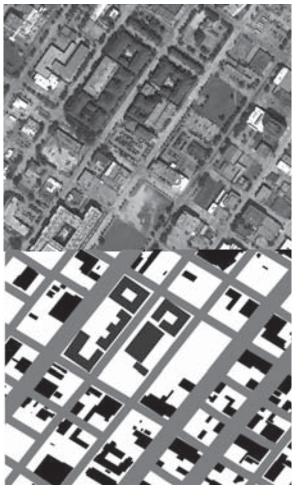


Fig 64. Larger block sizes - lower connectivity

An urban center has the potential to become a viable pedestrian live-work-play community if services and amenities are accessible within a quarter-mile walking distance. In addition to Light Rail Transit and access to amenities, the 19th century downtown grid has the potential to generate pedestrian oriented urbanism as it is composed by “smaller block sizes when compared to other centers” (HGAC, 2013, p.77). (Refer to *Fig 64,65*). Typical block sizes in the downtown core are 80x80 meters.

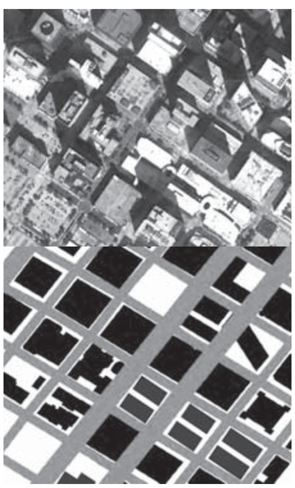


Fig 65. Downtown core - Smaller block sizes - higher connectivity

As the central business district of the city, it is significant for being the economic hub, containing corporate headquarters of prominent companies. Houston’s downtown core also includes left-over historical fabric and other cultural, commercial and institutional assets (HGAC, 2013). It’s close proximity to the water’s edge has potential for creating a waterfront character that could drive revitalization. Waterfronts are an important asset as they can enhance the overall spatial character of a city and its collective image.

As potential catalysts for growth, these assets can attract elements of economic and demographic growth. Existing amenities, cultural and natural assets, access to various types of infrastructures, and the compact grid structure; make the core a strategic location for strategizing density and becoming a collective cultural place.

However, revitalizing the downtown core through a conventional architectural intervention by filling up residual *Dross* space is not sufficient where conflicting infrastructural systems have created complex ground plane conditions. A holistic approach to place-making is needed which will enhance the existing spatial qualities relative to existing assets while accommodating the infrastructural flows that shape the built environment.

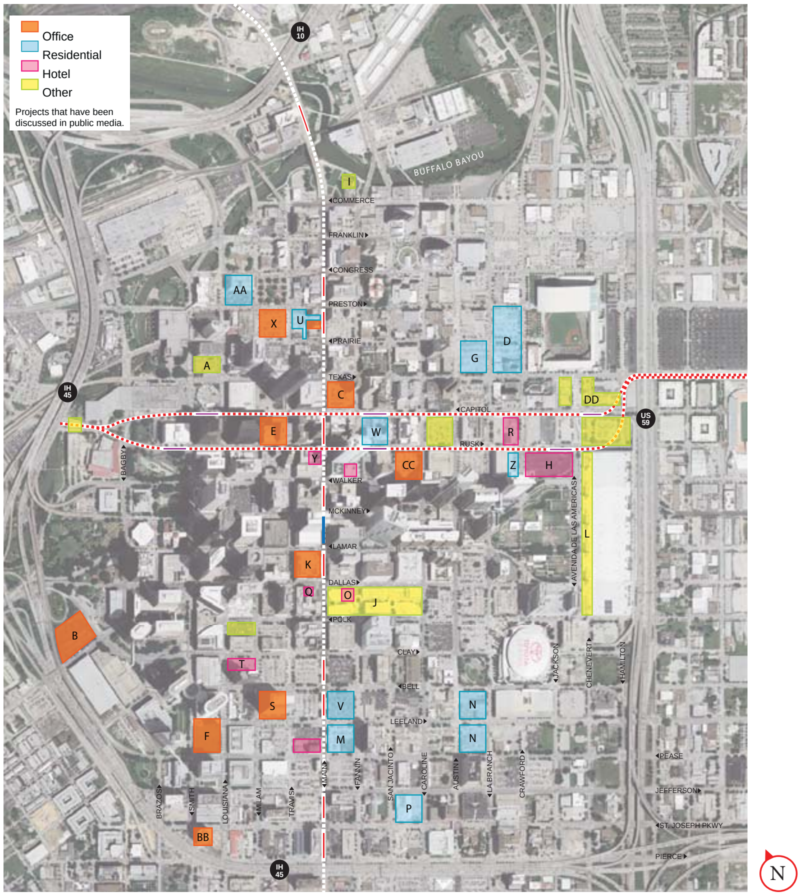


Fig 66. New Developments Downtown Houston.
The downtown core has attracted new developments over the past years, predominantly in the office tower, residential and hotel construction. However they are connected to the expanding underground tunnel system, rather than a comprehensive at grade network (Downtown Management District, 2006)

2.5 Infrastructure as Framework

Over the past few decades, the concept of *infrastructure* has become central in various disciplinary discourses concerning the future of cities and urbanism. Given the increasing formlessness resulting from urbanization trends, a holistic and systematic approach to design has become relevant. The consideration of *infrastructure* in the design agency has extended to include the *design and operations of systems*, rather than being limited to designing discrete parts of the city. This has led to re-conceptualizing the role of *infrastructure* as a framework based on its potential for direct impact, structuring and operating capabilities on the scale of the city (Carlisle & Pevzner, 2013). The definition of infrastructure and urbanism in its basic terms are widely understood follows:

infrastructure

-the basic, underlying framework or features of a system or organization

urbanism

- the way of life of people who live in a large city

Since the 20th century, the traditional concept of *infrastructure* has been associated with gray infrastructure such as roads, bridges, utilities, sewage systems and communication systems; to meet the modern city's need for technical efficiency. The term exclusively belonged in the realm of engineers who relied solely on technical criteria for evaluating urban environments, "disregarding social, aesthetic and ecological functions of space" (Waldheim, 2006, p. 171).

At present, the mono-functional realm of infrastructure is experiencing a paradigm shift to realize its full benefits by holistically integrating urban and natural systems in the urban environment. Increased environmental degradation caused by urbanization, commodification of the public realm, and accumulation of *Dross* sites, has led to a need to reconceptualise the role of infrastructure in addressing these issues coherently (Waldheim, 2006). Defining contemporary infrastructure in the realm of design varies in relation to its application in the different design fields.

This new understanding of *infrastructure* has resulted from thinking about the city as an interconnected ecology, one that should be perceived as a dynamic organism that is constantly changing. This biologically influenced trend does not look towards “individual species but to the collective behavior of ecological systems as a model for cities, buildings and landscape” (Allen, 2011, p.20).

Since rapid urbanization, globalization and capitalism are modern realities, cities are in constant flux, where tensions exist between *impermanence* versus *permanence*, *instability* versus *stability*, and *uncertainty* versus *certainty* (Lerup, 2000). These tensions contribute to formlessness in a city’s spatial order, as the rate of change affecting the urban environment is rapid and unpredictable.

Given the indeterminate and complex nature of cities, the traditional concept of a regulated *urban plan* or a *master plan*, as a means of controlling and organizing the future growth comes into question. How can a master plan organize future developments based on future predictions that cannot be accurately substantiated?

Comparatively, Architecture’s inherent role - considered as buildings set in a fixed matrix of a master plan, “becomes obsolete in the indeterminate changing environment” (Mayne & Allen, 2001, p.9).

The projective approach of a master plan which still dominates modern planning, has become criticised for oversimplifying the complex urban field of the city into a limited time-frame and distinct categories. This goes against the dynamic nature of the contemporary city and urbanism. A framework approach is necessary to designing cities as it allows for a structure that can stay flexible to future changes, while responding to the present needs of the city. Through *phasing* as an example, framework plans can still achieve a level of control and better integration between built form, open space and infrastructural systems (Waldheim, 2006).

2.6 Summary

As human habitation is reliant on infrastructures, approaching it as a framework for designing cities, territories can achieve urban cohesion in a meaningful way. By working with systems and operations instead of parts of the city, a holistic integration between built form and open space can be achieved. Addressing interconnectivity through *infrastructure as framework* allows for trans-disciplinary design initiatives, and for the collaborative development of techniques.

Part of architecture's limitation in engaging a formless city like Houston, is its isolation from Urban Planning. The seperation between *Dross* and articulated objects of *Stims* is an example of this. Therefore, a framework approach is necessary in activating residual space for a more unified compositional order.

How can *infrastructure* be used as a framework to holistically integrate the relationship between built form and open space?

CHAPTER 3 : LANDSCAPE AS INFRASTRUCTURE

3.1 Background

(a) Los Angeles at night

(b) Irrigated field

Fig 69. Natural/Man-made systems comparison. Both horizontal organization of the contemporary American city and an irrigated landscape field, are organized by infrastructural systems that creates the performance of the field.

In the field of design, the concept of *infrastructure* as an instrument for social, ecological, and economical mediation has found prominence in the discipline of Landscape Architecture. Landscape Architecture has hybridized the techniques of Urban Design and Landscape Ecology. This hybrid, often designated as Landscape Urbanism, presents an alternative strategy for place-making, one that incorporates the reconstruction of nature in the city (Waldheim, 2006). By comparing natural systems with urban systems found in the city, Landscape Urbanism argues that both conditions have a lot in common (Allen, 2009).

Landscape Urbanism believes that the horizontal organization of the contemporary American city and the horizontality of a green irrigated open field, have certain similar characteristics (*Fig 69 a,b*). Both decentralized conditions of the urban and natural landscapes have a horizontal organizational structure that are linked by infrastructural systems (Allen, 2011). These infrastructural systems, whether they are man-made (i.e. *freeways*) or natural (i.e. *irrigation system for plants*), organize the performance character of both landscapes. In his 2009 lecture, *Before And After Landscape Urbanism* and publication *Landform building: architecture's new terrain*; American architect and urban theorist Stan Allen, provides a background on the history of Landscape Urbanism, its strengths and deficiencies.

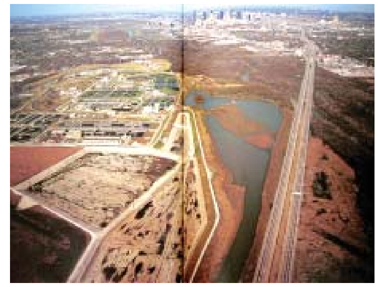


Fig 70. Contemporary American Dross condition

Over the past several years, Landscape Architecture has evolved into an inter-discipline of Landscape Urbanism. It evolved as a response to dilemmas that arose from the reduced role of landscape architects, and from problems associated with decentralized American cities (such as those involving large tracts of deindustrialized land or *Dross*) (Allen, 2011). (*Refer to Fig 70*).

Building upon the notion of Landscape Ecology, Landscape Urbanism synthesized practices such as Urban Design, Infrastructure, Ecology and Hydrology to produce new working concepts that were able to articulate a variety of ground plane conditions (Stan Allen, 2009). The surface of the city is understood as *Landscape* with the primary objective of returning performative and ecological functions to the ground plane (Waldheim, 2006, p.31).

3.2 Definition

By redefining the term *Landscape*, Landscape Urbanism re-conceptualizes the ground plane as an *urban infrastructure* (Waldheim, 2006 ,p.30). Landscape is conceived as a horizontal ecological surface condition that comprises both man-made systems and natural systems in the built environment. Landscape is understood as a *multidimensional surface,* rather than in a picturesque and aesthetic sense. It relates to the horizontal organizational configuration of the ground plane, where attention is given to infrastructure systems that create an impact on the surface (Waldheim, 2006).

This redefinition allows landscape architects to play a larger role in the city by engaging with large-scale projects, while staying in the realms of their traditional expertise of working on the ground plane. Since the 19th century, the role of Landscape Architecture in the built environment was greater for responding to the social, environmental and aesthetic issues of the industrial city (Allen, 2009).

Fig 71. Prospect Park, Frederick Law Olmsted, 1880, New York City -"Tree moving machines" were invented for re-constructing nature in most urban parks in the 19th century.

The work of landscape architects such as Frederick Law Olmsted, made significant contributions to creating quality of life. Olmsted's work influenced urban development and responded to the environmental, social and economic issues of the city. By considering it's past traditions in engaging with the urban environment and looking at current problems of the contemporary American city, Landscape Urbanism contends that by reconstructing the role of nature, cities can achieve better spatial organization (Allen, 2009). (Refer to *Fig 71-73*).

Fig 72. Central Park, Frederick Law Olmsted, 1857, New York City. Previously a void, Central Park was heavily engineered for its transformation into a park.

Fig 73. Landscape as catalyst - presented as "natural", it attracted urban development around it over time. Equally significant, the "grid block urbanism" of Manhattan played a larger role in conditioning Central Park as a restored urban space.

The core argument of Landscape Urbanism is that "Landscape rather than Architecture provides the basic building block of the city" (Waldheim, 2006, p.37). The best way to organize cities is through the design of *Landscape* and Landscape Ecology. Urban forms should be determined by the natural ecology and developments should be shaped by landscape rather than the other way around (Waldheim, 2006).

3.3 Working Concepts

According to Stan Allen, the working concepts of Landscape Urbanism can be articulated in four variables (Allen, 2009). These variables summarize the provisional themes of Landscape Urbanism as initially mentioned by landscape architect and theorist, James Corner, in the *Landscape Urbanism Reader*.

Allen summarizes the working methods and techniques of Landscape Urbanism in order to determine how these concepts can be physically implemented in projects. These methods signify an ecological infrastructural approach that can potentially re-contextualize *Dross* sites.

1. Infrastructural scale

Since landscape is conceived as urban infrastructure with the objective to return ecological functions to the ground plane, the ambition of Landscape Urbanism is to work on an infrastructural scale (Allen, 2009). The intent is to work on the infrastructure systems that impact the ground plane conditions of the city. By working with infrastructural components such as *services,* *supply and flow*, it allows landscape architects to work on a much larger scale in the city (Allen, 2009). This approach also starts to influence the traditional domain of Urban Planning, as working on an infrastructural scale means it has to be understood in its larger regional and ecological networks. An example for this concept is the 1999 *Downsview Park Competition* entry by Field Operations. One of the strategies in transforming the site into an urban park was to conceive the site in relation to its larger regional system (*Fig 74*).

Fig 74. Infrastructural scale, Downsview Park, Toronto: Situated at the high point between two watersheds, Downsview Park location has a distinct opportunity for managing storm-water runoff. By conceiving the site within its larger regional system, it can potentially inform design decisions and integrate the site better within its context.

2. Surface and Pattern

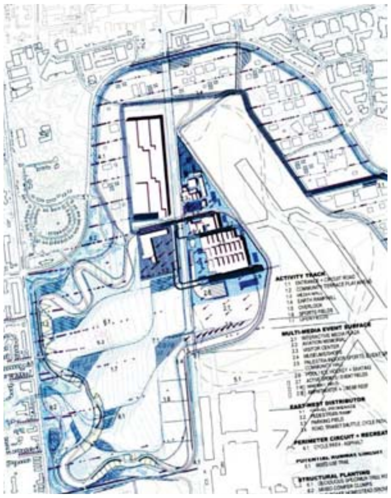


Fig 75. Downsview Park Competition entry, Field Operations, 1999 -integrated within its context as a performative landscape.

Ground plane surfaces achieve a level of organization and identity based on patterns thematic to the site (Allen, 2009). Deriving these patterns from natural elements such as vegetation, water flows, drainage, contours, slope, and topography allows for better integration of performance. Patterns can provide a framework for the surface to create a certain shape that may improve both site identity, character and performance (*Fig 75-76*).

The surface of the ground plane can be manipulated through topographic techniques such as *folding, bending, warping, and etc*., to create unique spatial qualities for improving site performance and Urban Design (Allen, 2011).

Fig 76. Downsview Park study model, Field Operations, 1999 - By reshaping and constructing new topography, it creates a new identity for the site and manages stormwater runoff through a water retention system.

3. Process and Change

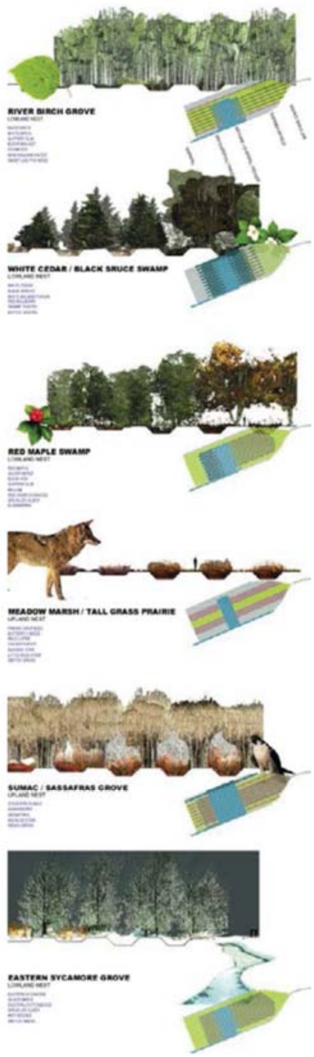


Fig 77. Downsview Park Competition, Field Operations, 1999. Surfaces are “staged” with planting regimens to create unique environments.

By creating an ecological logic for the site, over time its structure will evolve as it plays itself out (Allen, 2009). In Landscape Architecture, this concept is referred to as designing a method for landscape succession by “staging surfaces” with planting regimens (Waldheim, 2006, p.28).

By *staging surfaces* with planting regimens, a range of diverse environments can emerge over time (*Fig 77-78)*. The framework organization created by patterns leads to the transformation of the site over time (Allen, 2009). This concept suggests designing the site for present circumstances to some extent, while staying flexible with future uses.

Landscape architects believe that this concept is the most appropriate one for designing contemporary cities that are indeterminate and dynamic by nature. Instead of working towards a predetermined master plan without a guaranteed outcome, we should consider framework approaches that will guide the evolution of urban fabric over time (Waldheim, 2006).

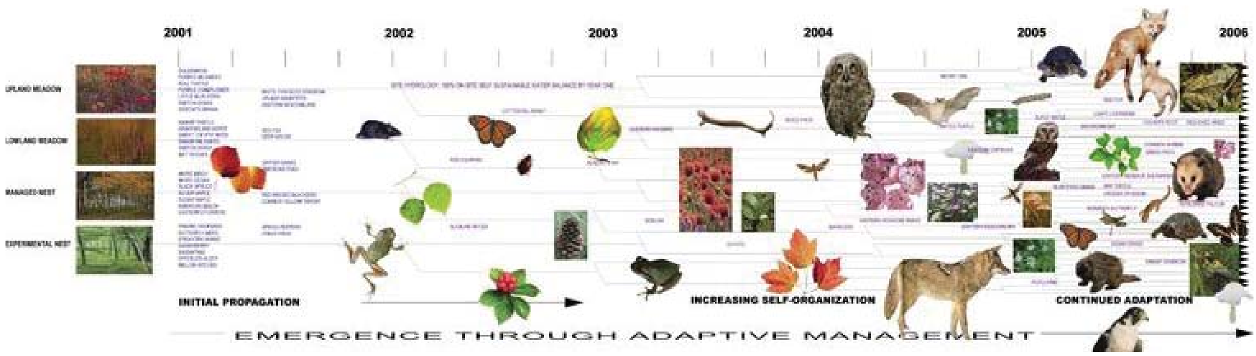


Fig 78. Concept of diversity emerging over time. Downsview Park Competition, Field Operations, 1999

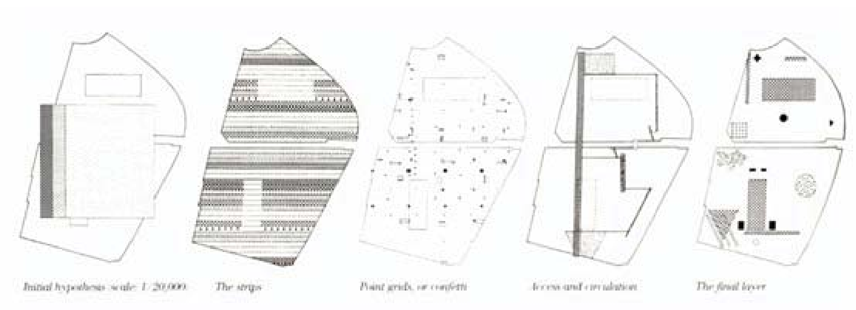
4. Program and Event

The concept of *programmatic indeterminacy* is often cited in the discourse surrounding Landscape Urbanism projects, where along with the spatial qualities created by *surface and pattern*, public events must be accommodated in numerous ways. The site must remain flexible and open to indeterminate events and future uses (Waldheim, 2006). Through *staging* different landscape surfaces with various planting regimens, programmatic use is unspecified and therefore remains open to various current and future uses (Allen, 2009).

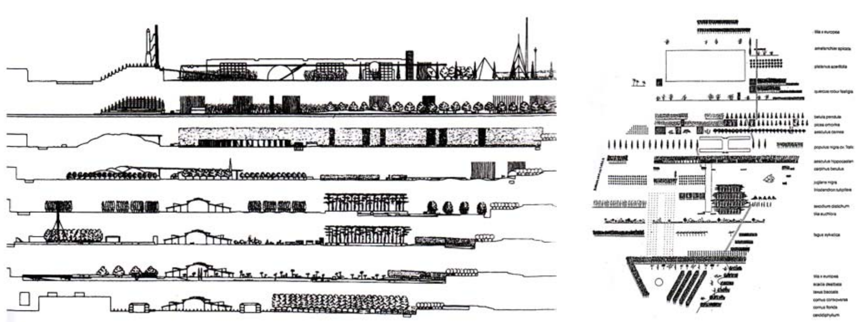
An example of this working concept is OMA'S Scheme for the 1982 Competition for *Parc de la Villette*. It is the most referenced example of *programmatic indeterminacy* in Landscape Urbanism for using landscape as a means to program space.

This unbuilt scheme explores the concept of creating a “social condenser on an empty lot” (ÖZKAN, 2008, p.64); by combining “architectural design specificity with programmatic indeterminacy” to establish a socially condensed environment on a metropolitan *Dross* site in Paris (ÖZKAN, 2008, p.5). Through the architectural design of the park’s infrastructure, and the superimposition of several layers, programmatic elements can be juxtaposed to generate heterogeneous and unplanned relationships between various park programs (ÖZKAN, 2008). Instead of deriving patterns from ecology for surface organization, it uses a projective strategy of grids and parallel strips on the landscape (*Fig 79*).

This concept allows for a particular way of thinking about programs and events that emphasizes the qualities of the landscape as a continuous *horizontal field on which program unfolds*. (Allen, 2009)



(a)



(b)

Fig 79. (Above a,b) Parc de la Villette Competition, OMA, 1982. A projective and layered approach is used for ordering and programming the landscape using plants.

3.4 Landscape Precedents

Lifescape Fresh Kills Competition, Field Operations, Staten Island, New York City 2001

Background summary:

This project led by a landscape architect James Corner and architect Stan Allen, re-contextualizes a previous landfill site into a public park. Historically, the site consisted of tidal creeks and coastal marshes (*Fig 80*). It was converted into a waste-dumping ground as the environmental significance of wetlands was not understood at the time (NYC, Department of City Planning, 2001).

Problem:

Forty five per cent of the site’s 2,200 acres is composed of four landfill mounds which create the large-scale topographic character (*Fig 81*). The site sits on low-lying, poorly drained soil where ponding of storm water, run-off, and water seepage into the waste

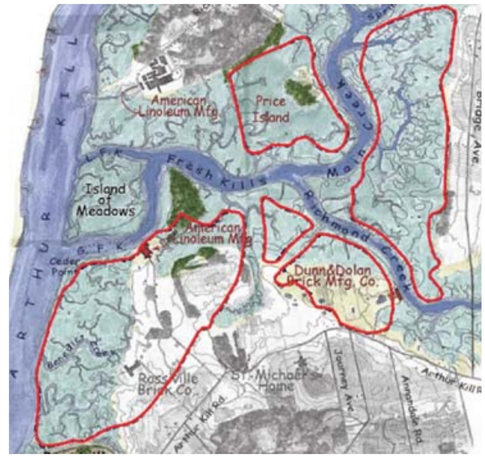


Fig 80. Map of Fresh Kills, 1912, Staten Island, New York

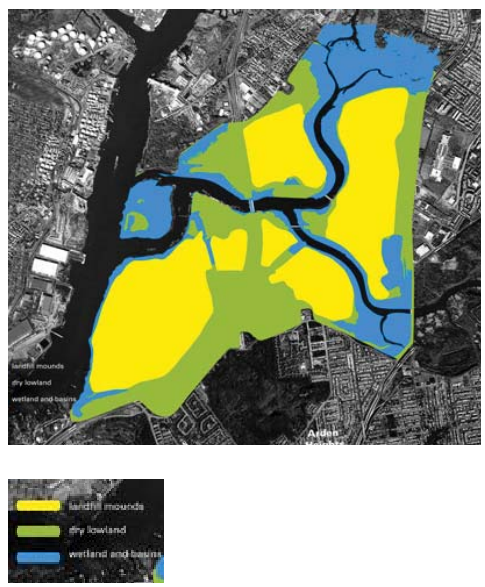


Fig 81. Previous to the revitalization, the site was composed of wetlands, lowlands, water basins and landfill mounds.

mounds are the primary concerns. If not controlled, water seepage in contact with waste can pollute the groundwater systems as the landfill sits on the Fresh Kills watershed (NYC, Department of City Planning, 2001).

In the competition brief, New York State asked for respondents to consider the hydrological issues of the site which would stabilize existing sterile soil conditions to create opportunities for plant growth (NYC, Department of City Planning, 2001). Field Operations was selected for designing a *layered process* which would help densify soil matter and create a diversity of plant species over time (*Fig 82*). It would also create special qualities of place, where a variety of passive program uses could occur (Allen, 2009).

By *staging* the site with one planting regimen on the west side and another on the north side, it would, over time create a site with a strong differentiated character. The organization of *patterns* and *surfaces* are thematic according to site conditions (*Fig 82-83*).

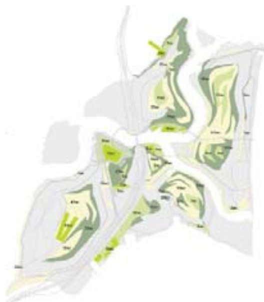
a. specific plant species follow contours on the north side

b. a clustered planting pattern will grow on the west slope

c. The entire site is planted with new top soil cover which will grow vegetation on the capped mounds

d.composite

Fig 82. Lifescape, Field Operations, Fresh Kills Competition, 2001. Concepts of the layered design process.



4. vegetation suggests program use

3. dense forest edge attracts wildlife while enhancing drainage

2. planting patterns follow contours

1. recovering ecological patterns

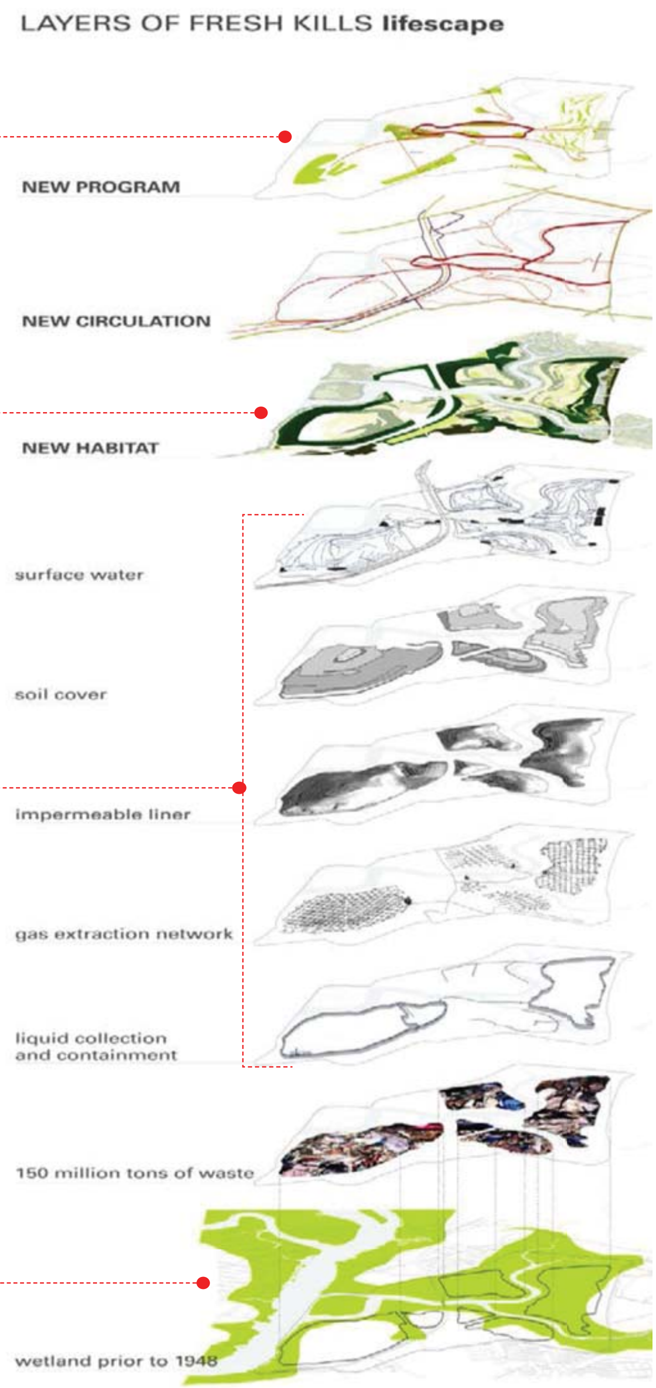


Fig 83. Landscape recovered in layers

The project uses an ecological infra-structural approach in reconstructing nature. A system of swales and water retention basins is used to divert water away from the mounds and to mitigate potential erosion of the mounds. A hydrological solution was critical to the site as the capped surface of the mounds needed to be protected from releasing the toxins into the regional water systems. Additionally, a planting strategy follows the swale lines to increase water absorption, attract wild life and create the park.

Fig 84. (a) The South Mound is used as a case study to exemplify the concepts in the Fresh Kills project.

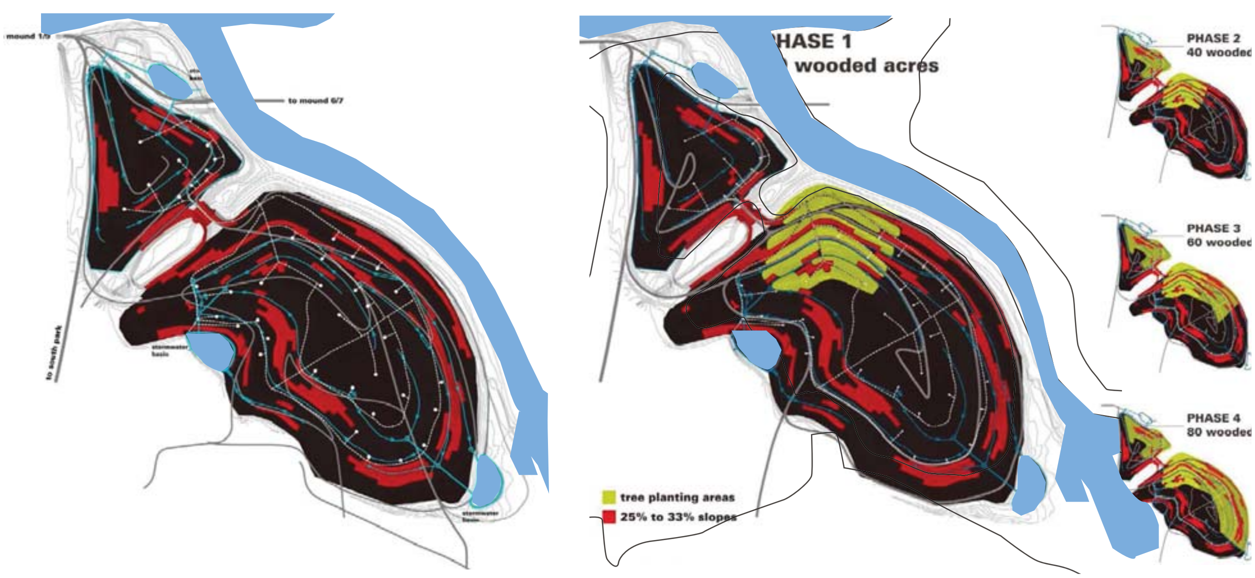


Fig 84. (b) Planting strategy and Swales. Swales follow the contours of the mounds to divert water away from it. The planting along the swale lines improve drainage, stabilize soil and create the park like character.

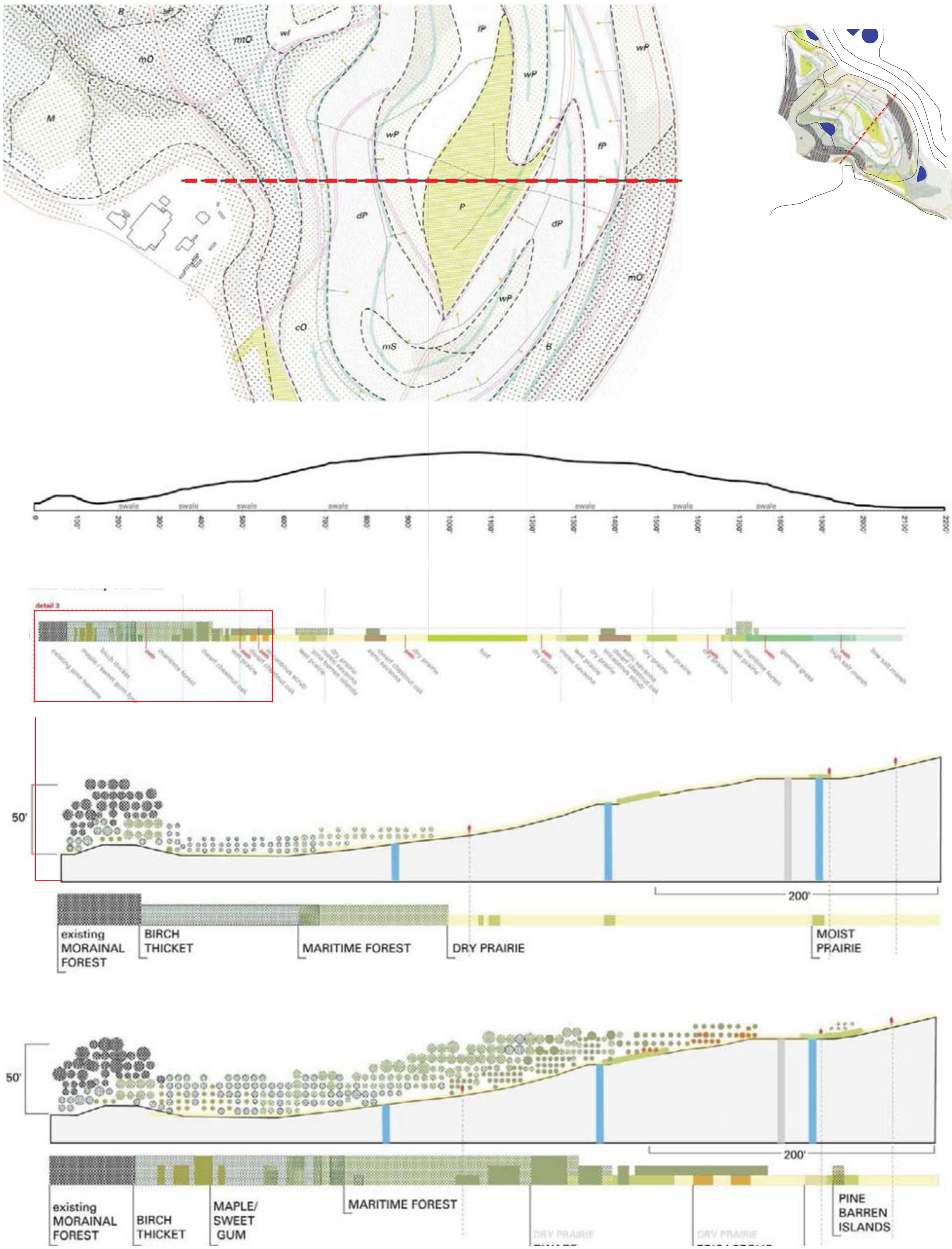


Fig 85. Diversity over time. The vegetation will grow over time, following the logic of the patterns and create a new character for the site.

Conceptual diagrams:

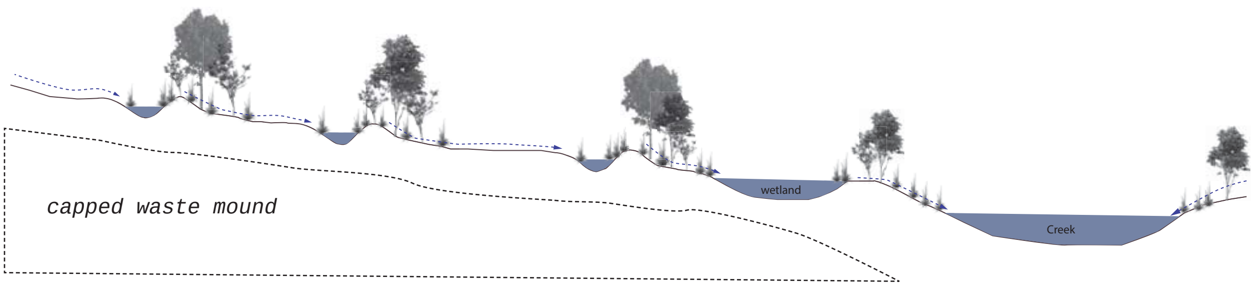


Fig 86 (a). The most effective way to deal with erosion and improve storm water drainage is through water diversion measures. To prevent water seepage into the waste mounds, the movement was designed for lateral drainage through swales (Morgan, 1995).

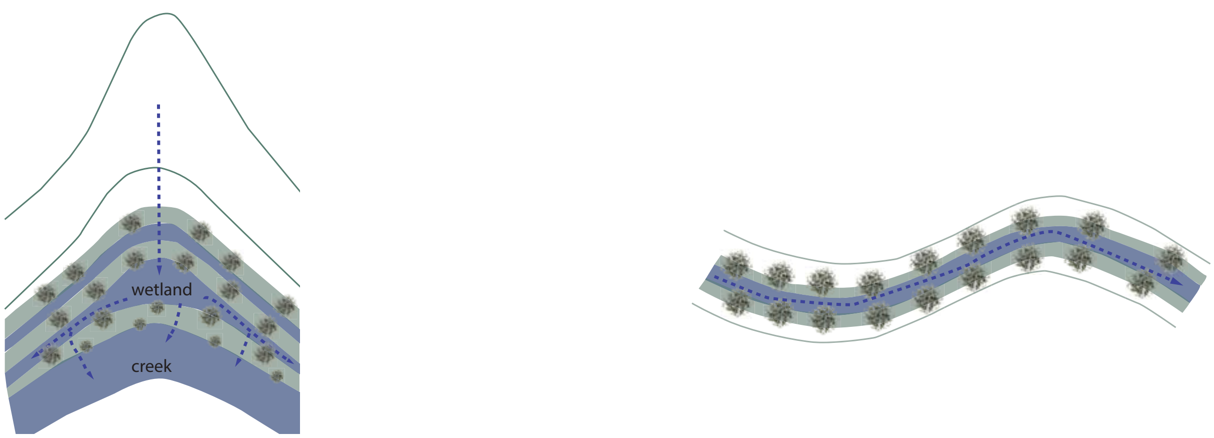


Fig 86 (b). During high rainfall season, excessive water gets stored in the swales which gradually releases it towards the main body of water. Additional water gets absorbed by wooded vegetation in between. The delaying of the water speed through a meandering effect, increased water storage through swales and heavy wooded vegetation in between, mitigates flooding and erosion.

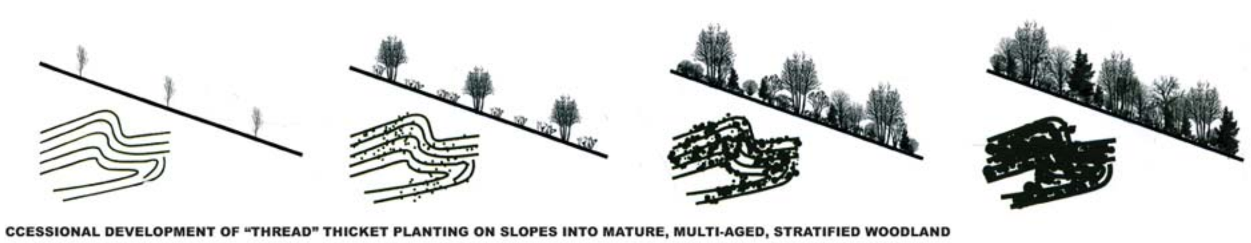


Fig 87. Fresh Kills Park, Field Operations, 2001. The logic for planting patterns follows along the critical path of the swales where it will grow over time.

The Highline, Field Operations & Diller Scofidio + Renfro, New York City, 2005-2007

Background summary:
Led by a design team of landscape architect James Corner and architects Diller Scofidio + Renfro, the objective was to convert a derelict rail infrastructure into a linear park. The project was conceived as a catalyst for a former industrial area in the lower west side of Manhattan by using landscape as the medium (Milbourne, 2014).

This project implements the concept of *architectural specificity* to strategically determine an order for the landscape, circulation and seating areas, in order to transform this bridge into a slow speed zone.

By projecting proposed circulation flow patterns on to the bridge,

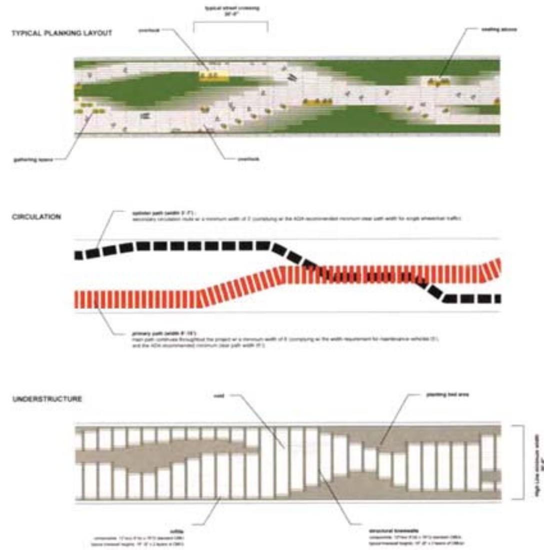


Fig 88. Circulation patterns are projected on the bridge surface to derive an order for landscape and flows.

Fig 89. The Highline creates a slow speed zone by introducing special moments along the path that attracts users and accomodates pedestrian activities. By repurposing the bridge structure and programming it with the landscape, it provides various opportunities for users to engage with the city.

a meandering path was derived which would demarcate zones for vegetation (*Fig 88*). The designers preserved the rail-road character of the bridge by maintaining a linear language (Margolis & Robinson, 2007). This is reflected in the paving patterns, materiality, and seating arrangements. A few special moments along the path of the bridge break away from the linearity to frame views into the city (*Fig 89*). Landscape plays a critical role in *staging the surface* with various plant species that attract wild life, nature based tourism and create unique opportunities for Urban Design. By using a concrete linear paving system with tapered joints, the project integrated plant life on the bridge with walking and seating surfaces.

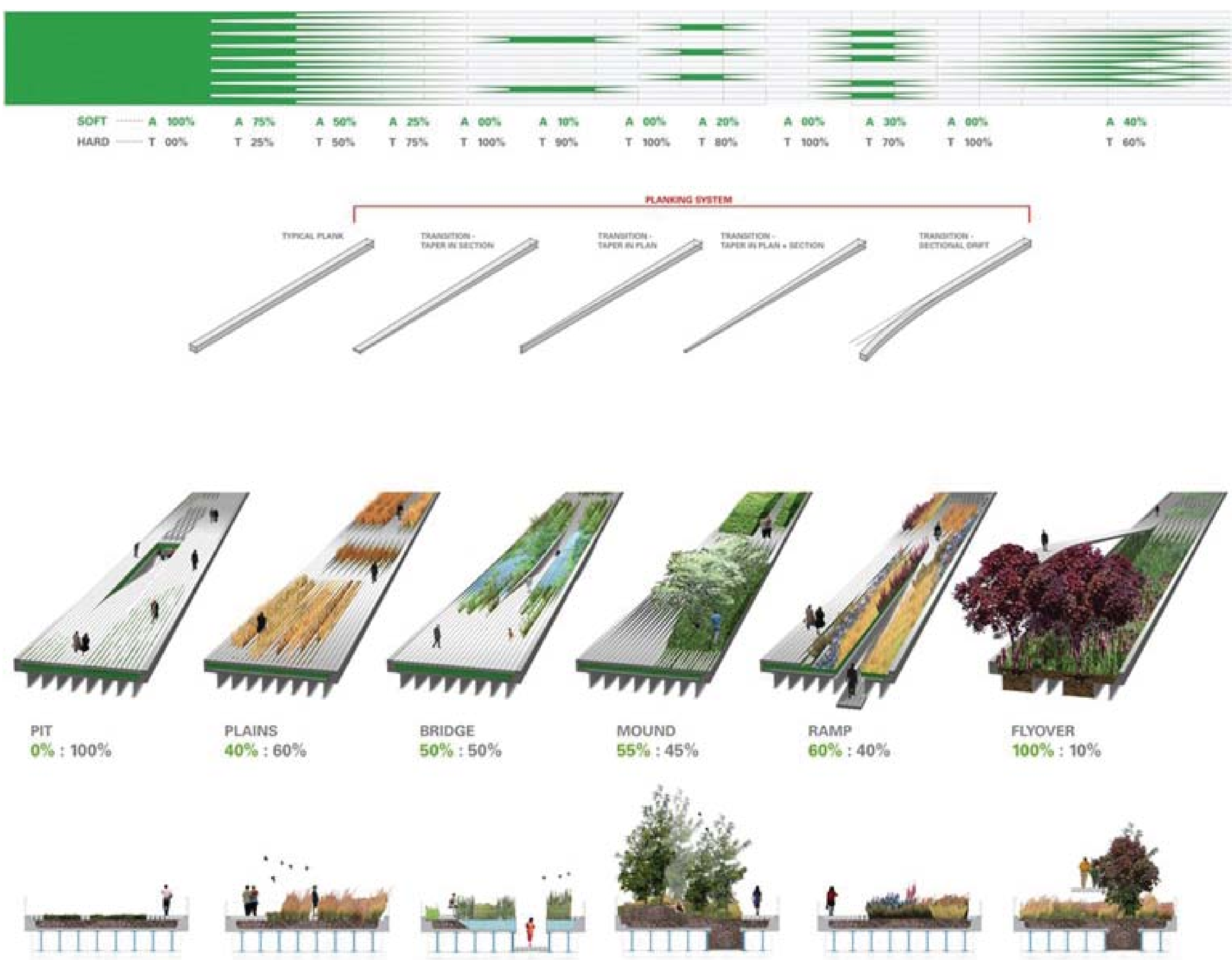


Fig 90. Diverse landscape zones create unique qualities for Urban Design.

3.5 Limitations of Landscape Theory in Urbanization

As mentioned in Chapter 2, that in order to fully realize the benefits of *infrastructure as a framework* in revitalizing debilitated downtown cores, territories of built form, open space and infrastructural systems must be integrated holistically. Landscape Urbanism becomes controversial when contrasted with Urbanism. It emerged as a hybrid discipline between Landscape Architecture and Urban Design but it negates the role of Architecture within the realms of urbanism and as an urban form-maker.

Stan Allen has criticized Landscape Urbanism for being specific to the problems of the American city and being limited as a theory that can be applied to other cities such as in Asia or the Middle East, that are rapidly growing (*Fig 91*). He states that although it offers a productive model for a design process, its tools for implementation “have been limited to park-like interventions that leave the city more or less untouched” (Allen, Ramos, Boeri, & Turan, 2009, p.17).

The design processes that incorporate landscape concepts for adaptation, transformation, growth and succession are analogous to contemporary processes of urbanization (Van der Velde, 2012).

The working concepts such as *indeterminate programming*, *transformation over time*, and achieving horizontal continuity with *surface and pattern*, are appropriate for contemporary urbanization trends. For this reason, Landscape Urbanism offers a productive model for a design process. Through these design concepts, Landscape Urbanism aims to achieve interconnectivity in the formless American city by recovering post-industrial and Dross sites (Waldheim, 2006).

However, cities are man-made artifacts as well, where permanence and stability generated by architectural form over time contributes to collective memory and to identity of a place (Rossi, 1984). Through architectural form, cities reflect an indicator of healthy growth and embody the social relations that allow for urban life. Therefore, the core argument of Landscape Urbanism theory that “Landscape rather than Architecture provides the basic building block of the city” (Waldheim, 2006, p.37), is problematic in most dense and rapidly urbanizing cities where Architecture as an urban form maker has spatially defined its boundaries and urbanism.

Fig 91. Hong Kong

3.6 False Promises

Continuing on with the discussion on the limitations of landscape theory, Stan Allen states that despite the lessons learned from Landscape Urbanism with its ecological approach in transforming *Dross* environments and conceiving the city as an ecological model, there are contributions that are specific to Architecture (Allen, 2009).

Unlike Landscape Architecture which operates in the horizontal alignment of the ground plane and emphasizes horizontal continuities, Architecture is associated with the vertical plane where “marking out of territory and the separation of a protected interior space from nature are founding acts of architecture” (Allen, 2011, p. 24). Establishments of boundaries and limits by separating interior space from exterior is fundamental to human habitation and spatial use. This fundamental difference between landscape and architecture, contributes to the *iconic power of the architectural object*, in terms of its relationship with the landscape as a vertical figure in the horizontal plane (Allen, 2011).

There are other elements where Architecture contributes to constructing the built environment as an urban form-maker as opposed to the promises made by Landscape

Urbanism through its working concepts in achieving better spatial organization in formless cities.

False promise of programmatic indeterminacy

Unlike the concept of *programmatic indeterminacy* where a variety of programmatic functions and unplanned events *unfold in the horizontal landscape*, Architects need to be specific because in programmatically unspecified places where anything can happen, nothing happens (Allen, 2009). Architecture is obligated to specify programmatic functions of space that determine the use and organizational relationship of the site.

False promise of self-organization

The concept of *Process and Change* whereby specifying an ecological logic in the site, it will allow it to *self organize itself* over time, still requires specifying rules (Allen, 2009). This concept was used as part of the argument of Landscape Urbanism theory which argues that landscape rather than architecture is more flexible, adaptive and transforming in accommodating various functions of space (Waldheim, 2006). This argument was made relative to conceiving the contemporary city as an ecological model, one that is unpredictable and constantly evolving. Putting this into practice, Allen states that this concept is a contradiction even from an ecological perspective, as *self-organization* and *emergence* cannot occur on their own without the design of rules. Landscape architects still have to design a set of rules for the emergence over time of various planting patterns of the site. The concept of designing a space based on some level of prediction and precision, is still relevant.

He suggests that for architects to apply the notion of *self-organization* within Architecture, they need to understand with a high level of precision what can be designed in the given moment and what cannot be designed over time (Allen, 2009). It is important to note that self-organization and the transformation of the urban fabric over time are not new concepts and deeply belong to the history of Architecture (Allen, 2011).

As referenced in Chapter 1, Aldo Rossi’s *Palazzo Della Ragione* as an *Urban Artifact* transformed the urban fabric incrementally over time, by being flexible and adaptive to multiple uses. Allen suggests that within the context of fluid transformations of the contemporary city, we should consider the definition of Architecture as understood by Rossi, as “a geological matter, hard and persistent, yet capable of accommodating change over time”. (Allen, 2011, p. 36)

3.7 Summary

In debilitated downtown cores, an infrastructural approach to landscape can be an important catalyst for revitalization. However, Landscape Urbanism on its own cannot activate *Dross* with park interventions and in downtown cores that are *dominated by motion, time and event* as, by principle, density creates walk-ability (Duany, 2013). Similarly, architectural density cannot occur in downtown cores that have become debilitated due to conflicting infrastructural and ecological systems. A new synthesis between architecture, infrastructure and landscape is needed to create a sense of place that would mediate the relationship between built form and open space.

CHAPTER 4 : ARCHITECTURE AS INFRASTRUCTURE

4.1 Definition

Although written in 1999, Stan Allen's essay *Infrastructural Urbanism* published in *Points+Lines: Diagrams and projects for the city*, has a greater relevance today for defining infrastructure's role within Architecture. He proposes *infrastructure* as a model in which Architecture is understood as a *material practice*, differentiating it from other art-related discursive mediums. *Infrastructural Architecture* "works in and among the world of things, not exclusively with meaning and image" (Allen, 1999, p.52). It emphasizes Architecture's instrumental ability in not only critiquing, but in its capability to transform reality (Allen, 1999).

This fundamental strength of Architectural methodology is unique for its ability to synthesize a contrasting array of qualitative information, using abstract techniques such as "notation, simulation or calculation" to determine possible solutions for producing physical forms (Allen, 1999, p.51). This differentiates Architecture from the immaterial abstract field of Art, and from strictly technical disciplines such as Engineering, that lack integrative and holistic approaches to the transformation of cities (Allen, 1999).

4.2 Background

Fig 92. Plan Obus projected for Algiers, Le Corbusier, 1930. Kenneth Frampton referred this project as a megaform, where buildings perform at the scale of infrastructure. This project is an earlier example of a hybrid between landscape, architecture and infrastructure.

The relationship between Architecture and infrastructure can be traced through its trajectory over the last decade. During Modernism, architects used emerging infrastructure technologies as foundations for creating a new spatial order for the contemporary city (Allen, 1999). As Le Corbusier states in *Towards a New Architecture*, “The Engineer governed by mathematical calculation, puts us in accord with natural law. He achieves harmony”. On that foundation “the Architect, by his arrangement of forms, realizes an order which is a pure creation of his spirit,... he gives us the measure of an order which is in accordance with that of our world” (Corbusier, 2013, p.11). This philosophy allowed Modernists to conceive a role of master planner and to work on large-scale interventions (*Fig 92*).

During pre-Post-Modern critiques in the late sixties, shifting trends towards the information age and the increasing formlessness of cities triggered by the reproduction of modern technologies, provoked a semiotic response within Architecture (Allen, 2009). Post-Modernism in Architecture became associated with rediscovering its historical past, to address the crises of its meaning within the context of formless cities. It communicated by *representing* its meaning rather than focusing on Architecture’s instrumentality and functionality. As Allen cites Robin Evans, “a building was once an opportunity to improve the human condition, now it is conceived as an opportunity to express the human condition” (Allen, 1999, p.50).

Fig 93. Learning from Las Vegas, Venturi & Scott Brown, 1972

Much of the work in Architecture within this period, was based on a *representational model* that focused on critique (*Fig 93*). It focused on representing the contemporary issues of the city, rather than on constructing alternative realities (Allen, 1999).

Fig 94. Pruitt-Igoe housing project 1955-1965, Missouri, the large scale housing project was a serious problem. Its demolition signalled “the death of Modernism,” according to Charles Jencks.

While Modernism sought to design cities following the logic of the new model of industrial mass production, large-scale interventions and standardization led to problems such as homogenous landscapes and social problems (*Fig 94*). For this reason, Post-Modernism rejected the *totality* of comprehensive planning (Goodchild, 1990). Ultimately, Urban Planning and Architecture became divided, which affected Architecture’s ability to practice extensively (Pope, 2012). According to Allen, Architecture should both return to functionality and the instrumentality that once influenced the *construction of the city over time*, in addition to representing its meaning. (Allen, 1999).

One of the ways Architecture can reposition itself as an urban form-maker in the context of formless cities, is to consider the systematic design approaches used in other fields. Architecture can learn from Landscape Urbanism which utilizes an infrastructural approach in working on larger systems and connections that affect the ground plane (Allen, 2010). By understanding how larger systems affect the urban environment, it can inform meaningful design decisions and allow architects to practice more extensively.

4.3 Landscape Techniques in Architecture

Re-interpreting landscape infrastructural effects of *surface connectivity, programmatic indeterminacy* and *change over time* into Architecture, creates potential for renewed dialogue between built form and open space, as “the techniques of one discipline are re-contextualized within another” (Allen, 2011, p.28). In the publication, *Infrastructure as Architecture: Designing Composite Networks*, Stan Allen explains how landscape concepts have been implemented within Architecture, that use an infrastructural approach in creating a dialogue between built form and open space.

Surface Connectivity:

Formal structures including buildings, can be understood as *infrastructures* that perform similarly (*Fig 95*). Infrastructure systems offer connectivity through established pathways and nodes that accommodate various types of movements such as people, information, goods and natural systems. Even within the fluid transformations of the contemporary city, “infrastructures themselves are *static* but they serve movement” (Allen, 2010, p.39).

Fig 95. Yokohama Port Terminal, FOA, 2002. Architects have used landscape techniques of surface manipulation since the 90’s, to construct new sites for achieving connectivity. This project functions at the level of infrastructure by shaping and channeling flows.

(a)

(b)

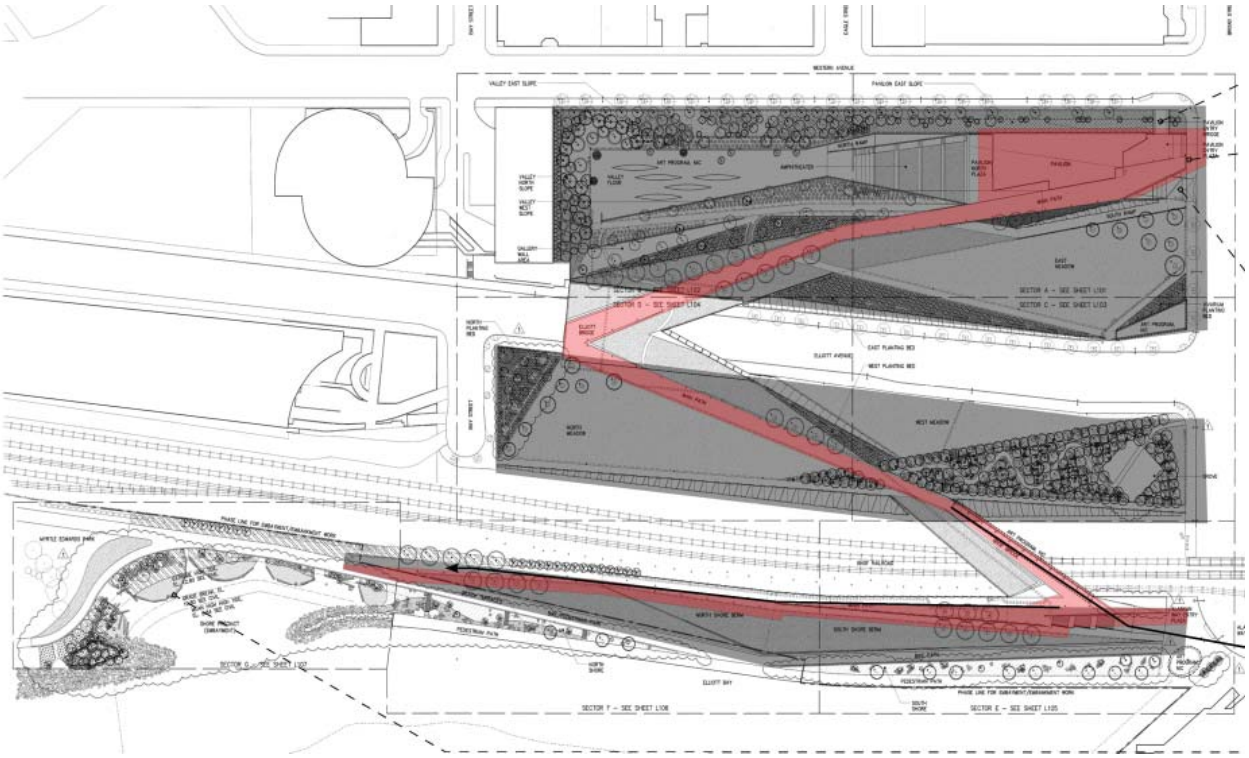
Fig 96. (Above a,b), Weiss & Manfredi Architects, Seattle, 2007.

Before/After Olympic Sculpture Park. Logistical issues of the site such as existing infrastructural systems and contaminated soil conditions, did not allow for conventional architectural intervention.

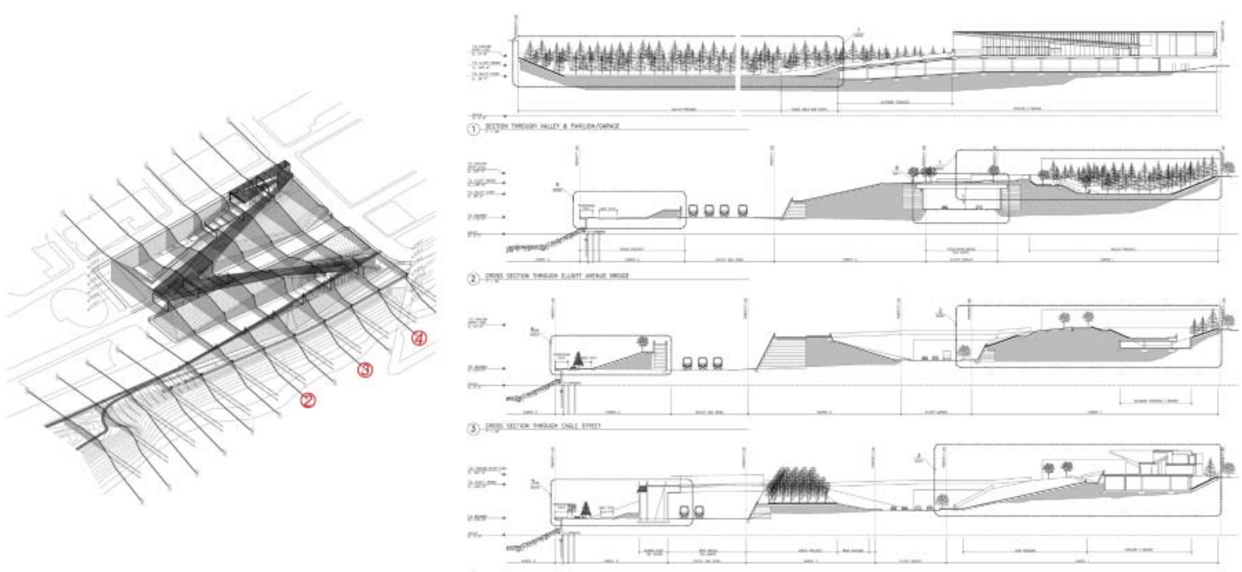
Similar to infrastructures, buildings themselves are static but create *surface connectivity* through established programmatic functions, that trigger movement into the site (Allen, 2010). Formally, buildings have created *surface connectivity* by implementing landscape techniques of creating topography to connect disparate sites. For this reason, buildings should be considered as infrastructures as well, and be part of the equation in designing cities.

An example of this concept is the *Olympic Sculpture Park* by Weiss Manfredi Architects (*Fig 96 a,b*). By using landscape techniques of constructing topography, the project creates *surface connectivity* over existing infrastructure systems which disconnected the city of Seattle from its waterfront (Allen, 2011).

Sculptural pieces are placed along the paths surrounded by landscape. The site is anchored by a pavilion on one end that is used for art exhibits and other events. Circulation paths connect the pavilion to the water, to trigger movements across the site. The site sections convey different spatial conditions that are created by new topography and landscape (*Fig 97*).



(a)



(b)

Fig 97 . (Above a,b) Olympic Sculpture Park, Weiss & Manfredi Architects, Seattle, 2007. New surfaces allow for opportunities for bridging over infrastructure and programming the site to create new identity.

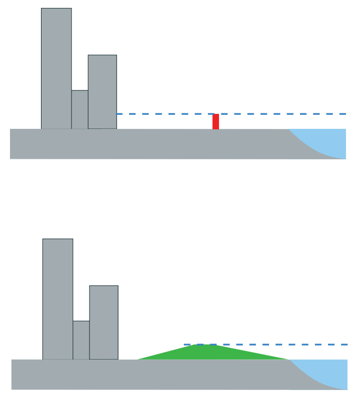
Yan Ping waterfront - Stan Allen Architect, *(under construction)* - Taipei, Taiwan

This project is another example of an architectural infrastructural approach that creates surface connectivity by constructing topography.

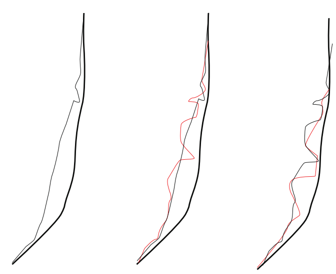
The goal was to connect the city of Taipei to its waterfront by designing an urban park that it can identify with. The design challenge was to connect the city while maintaining the existing 8.3 m high flood wall levee system, which physically disconnected the site (*Fig 98*). An urban park could not be simply created without re-considering the levee system. By rethinking the architecture of the flood wall levee system, the architect created strategic access points to allow pedestrian movements into the site (Gerfen, 2009).

Instead of a straight wall that would have to be maintained to protect the city from river flooding, the design approach reshaped the wall system to resolve the issue of access, views and program (*Fig 98*). The serpentine form of flood wall opens up the site (*Fig 99*). It creates new spaces for program while maintaining the requisite height for flood protection (Gerfen, 2009).

(a)



(b)



(c)

Fig 98 . By reshaping the form of the levee system into a serpentine shape, it re-connected the waterfront with the city.

(a)

(b)

(c)

Fig 99 (a,b,c) The architectural infrastructural approach was able to mediate between infrastructure, landscape and program, to transform the site into an urban park, as opposed to a conventional landscape approach in creating park space.

Architectural Specificity/Programmatic Indeterminacy

The concept of *unprecedented programmatic events* accommodated by the openness of landscape offers Architecture a model for considering the relationship between program and site (Allen, 2010). However, the spatial use of any site depends on specifying to some extent how various programmatic events can occur.

Events cannot *unfold in the landscape* without "concentrations of density that in turn trigger concentrations of activity" (Allen, 2010, p.41). Prominent landscape precedents such as Fresh Kills Urban Park, the Highline, and the Olympic Sculpture Park have all had partial success due to their dense context.

Therefore, Architecture can perform as *infrastructure* that offers connectivity by strategically specifying movement through attractors and programmatic relationships on site (Allen, 2010).

Quai Branly Museum - Jean Nouvel, 1999 Paris

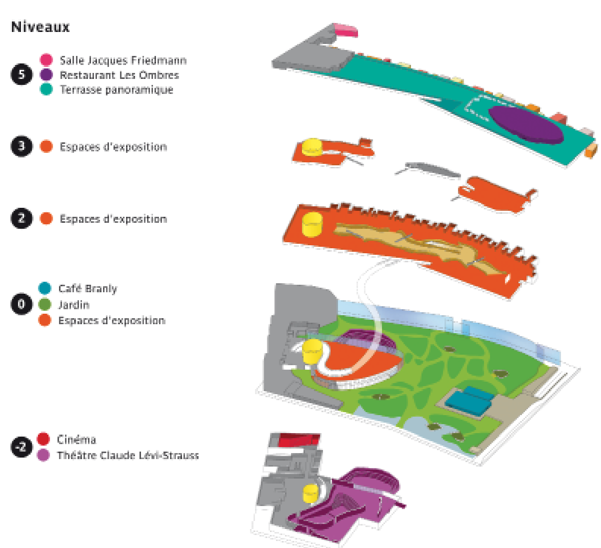
(a)

(b)

Fig 100. (Above a,b) The building hovers above the landscape by being situated on a bridge armature structure. Passive program such as the amphitheater, activates the ground while more active program concentrates on the bridge (c) Program layers super imposed on the landscape to trigger flows.

Located on the banks of river Seine and in close proximity to the Eiffel Tower, Quai Branly Museum houses artwork in an exotic landscape setting. The dominant metaphor of this museum is an exotic mysterious building situated in the garden forest. This project is significant for its treatment of the landscape while conditioning it strategically by program (Edelmann,2006).

The programmatic volumes rest on a constructed bridge form in order to keep continuous the landscape of “garden exhibits” and an amphitheater. The theater, restaurant and cafe below and above grade become “attractors” to trigger motion across the landscape.



(c)

(a)

(b)

Fig 101. (Above a,b) Landscape is used to frame the building in ways that triggers movement and public interest.

Visitors can meander through the forest which contains a diversity of plant life with trees that grow over 15 meters tall that partially conceal and frame the building (*Fig 101 a,b*). The landscape is programmed for passive use, while the active program rests on the bridge.

A monumental biodiversity wall covers one side of the building; it offers wild life habitats, shade and public interest (Edelmann, 2006). Although the building is separated from its ground plane, the connection between the two is established by landscape, program and movement.

Fig 102. Quai Branly Museum, elevation. The museum gains its significance for its integration with the landscape.

Architecture and Change Over Time

As mentioned in Chapter 3, one of the concepts of landscape is for a site's potential to evolve over time and to create distinct qualities of space that will influence the surrounding context. Landscape achieves this change by constructing new site ecologies as *urban infrastructure*, and by preparing the ground surfaces through an ecological logic, rather than through a single-surface construction approach (Allen, 2010).

By shaping and *staging surfaces* with different planting regimens, landscape creates environments for indefinite programmatic events and therefore maintains flexibility for future change (Allen, 2010). As Stan Allen emphasizes, what this means for Architecture is to consider what can be designed in the present moment and what needs to be left open to future changes. By designing strategic aspects of the urban fabric that can be controlled, it leaves future possibilities for the context to adapt around it over time.

Taichung Gateway Park, Stan Allen Architect, 2008 - 2010,

One of the project examples for designing for change over time, is the Taichung Gateway Park. This was a framework plan for repurposing a former airport site which left 240 hectares of void space in the urban fabric after relocating in the 1990’s (Allen, 2008).

Over time, the large-scale site became encircled by built fabric of various uses and scales, that created demands for the urban void to be activated. Considering the large scale of the site, this design was mainly invested in what the city could control such as the roadways and park (Allen, 2008)

The architectural strategy was to create a framework infrastructure for the park that provided spatial order for various elements such as circulation, landscape ecologies, new cultural institutions, and public anchors (*Fig 104*).

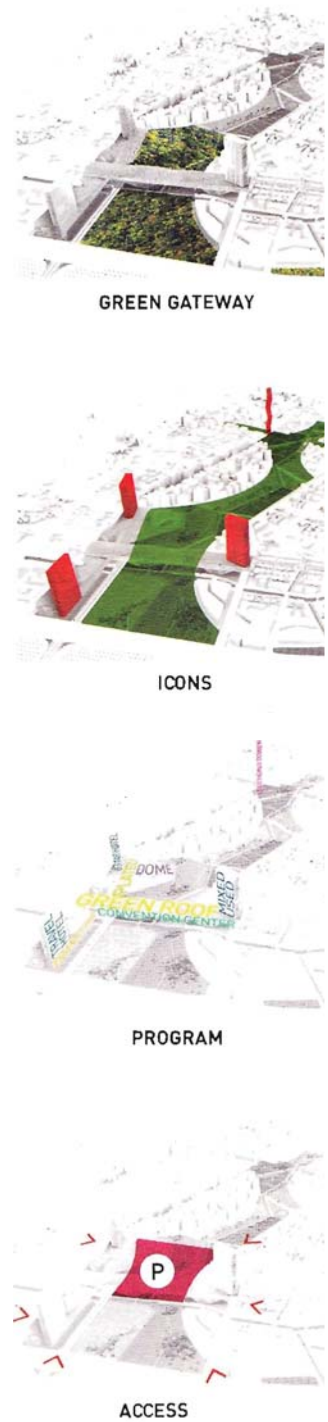


Fig 103. Program anchors, access, and landscape

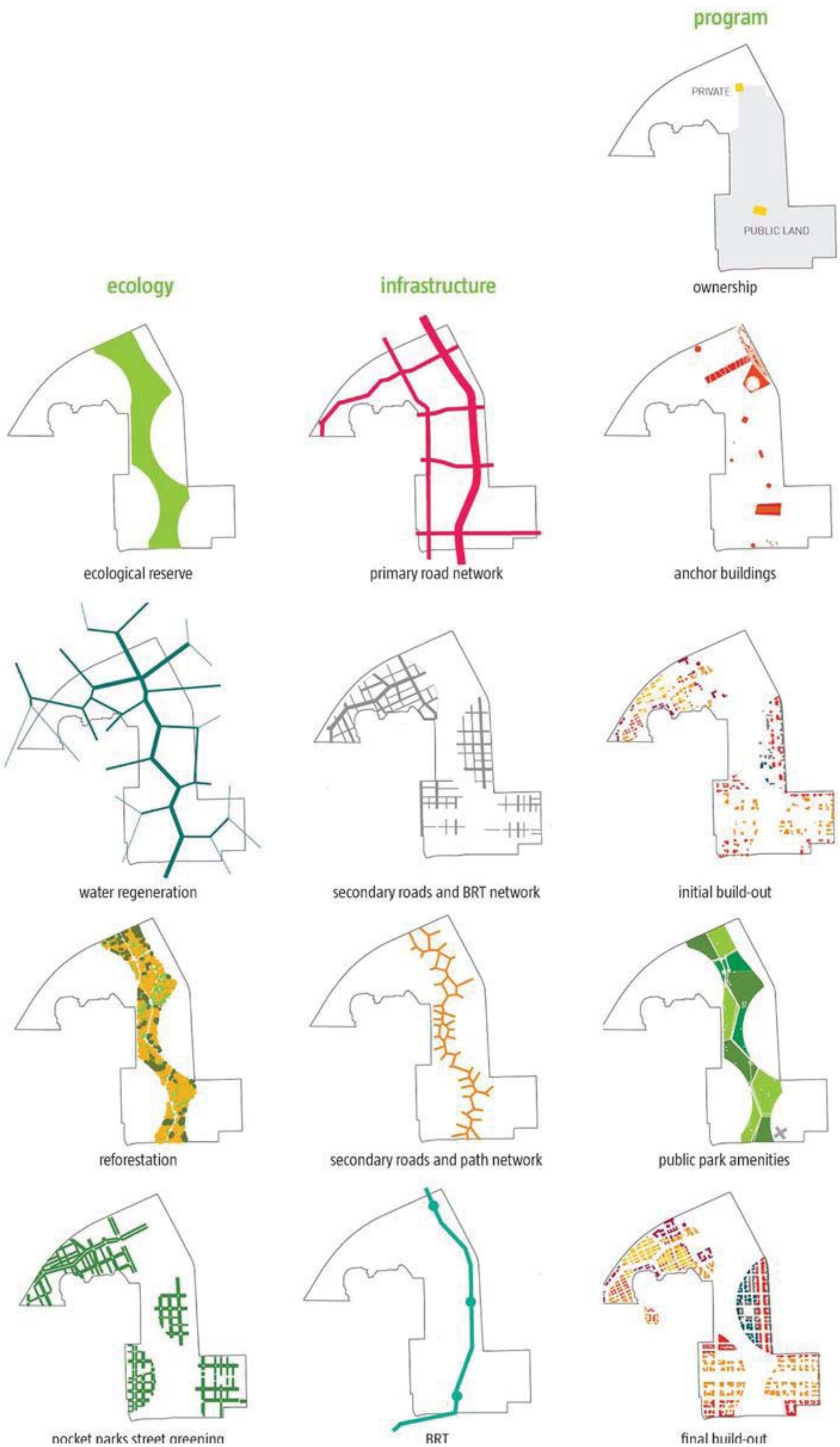


Fig 104. Infrastructural layers compose the framework, which will restore the site and guide urban development over time.

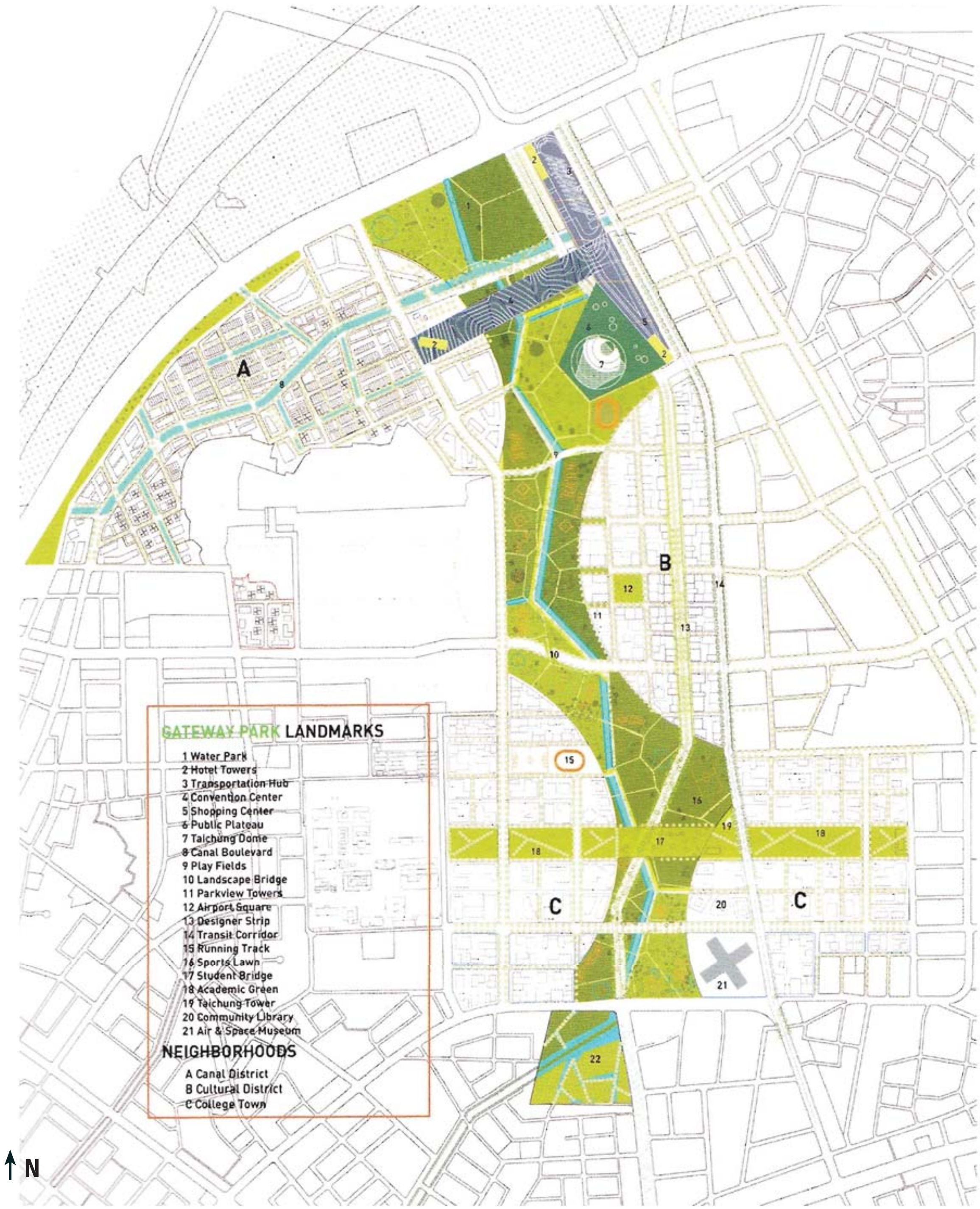


Fig 105. The strategy was to design key features of the site to restore the urban void into a place. The design focused on creating the figurative landscape and an iconic architectural form which would create new identity for the site and guide new developments around it over time.

The project strategically defined zones for the figurative landscape, while opening up edges to future developments over time (Allen, 2008).

One of the key infrastructural architecture design elements was the *gateway structure* that bridged the park and urban fabric at the north end of the site (*Fig 106*). The architect created an iconic presence with these buildings that projects over the figurative landscape, as landmarks. These buildings rest on a bridge structure that maintains the horizontal continuity of the figurative landscape (Allen, 2008).

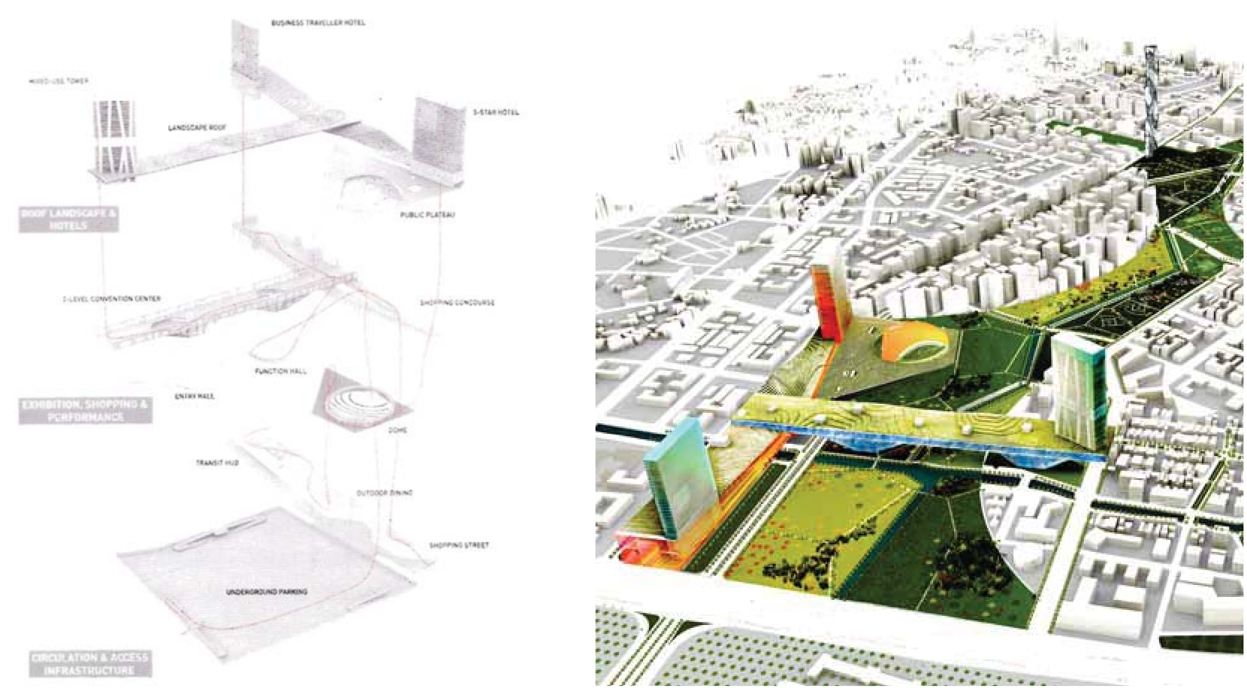


Fig 106. (Above) The gateway bridge structure creates a new identity for the site through an architectural iconic presence that integrates both landscape and density.

4.4 Summary

Architecture can have a more meaningful role in engaging with the formless city if it repositions itself as infrastructure. By engaging with larger infrastructural systems that affect territories and impact the spatial order of the city, Architecture can potentially extend its specific design expertise to encompass designing larger urban systems and structures. Landscape Urbanism teaches us that design can operate at the level of infrastructure where form and function work together, neither one following the other. It teaches us that a systematic design approach can integrate *Dross* territories holistically and ecologically.

How can architecture, infrastructure and landscape together integrate residual space, and invent spatial qualities for creating a place?

CHAPTER 5 : DESIGN PROJECT

If Architecture creates boundaries and connections between interior and exterior space, how can it create a bounded sense of place which will generate public domain in an infrastructural dominated and marginalized site?

5.1 Project Description

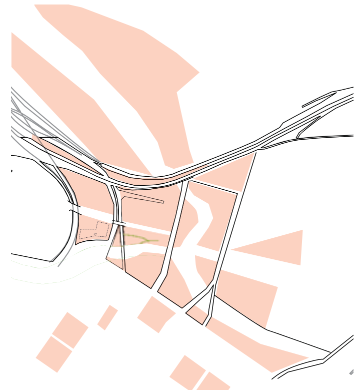
By identifying an actual subject - a site for experimentation, Architecture’s instrumental capacity for integrating disjoined surfaces and creating public domain can be explored. This thesis is an effort to investigate how design can implement urban cohesion between the segregated domains created by infrastructural systems and generate public realm, creating socio-economic value in residual space.

An ideal site would be where infrastructural systems intersect the ground plane to create residual in-between territory and where restoring such a site can generate public realm by creating a unique spatial experience through design.

A criteria for identifying the potential site was used -

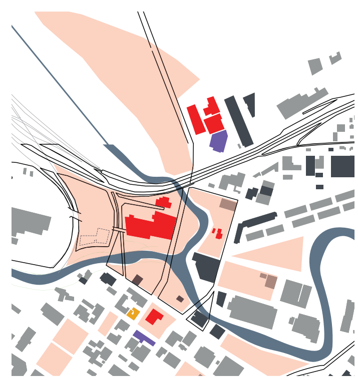
Criteria for identifying potential site:

1. Infrastructure has cut off the ground plane creating a residual site



2. Site as potential catalyst for activating dross space

3. Infrastructure intersects with key assets & open space



4. Potential to generate pedestrian activities

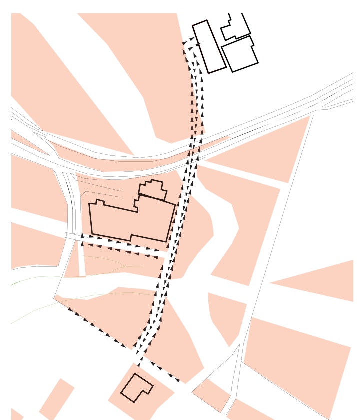


Fig 109.

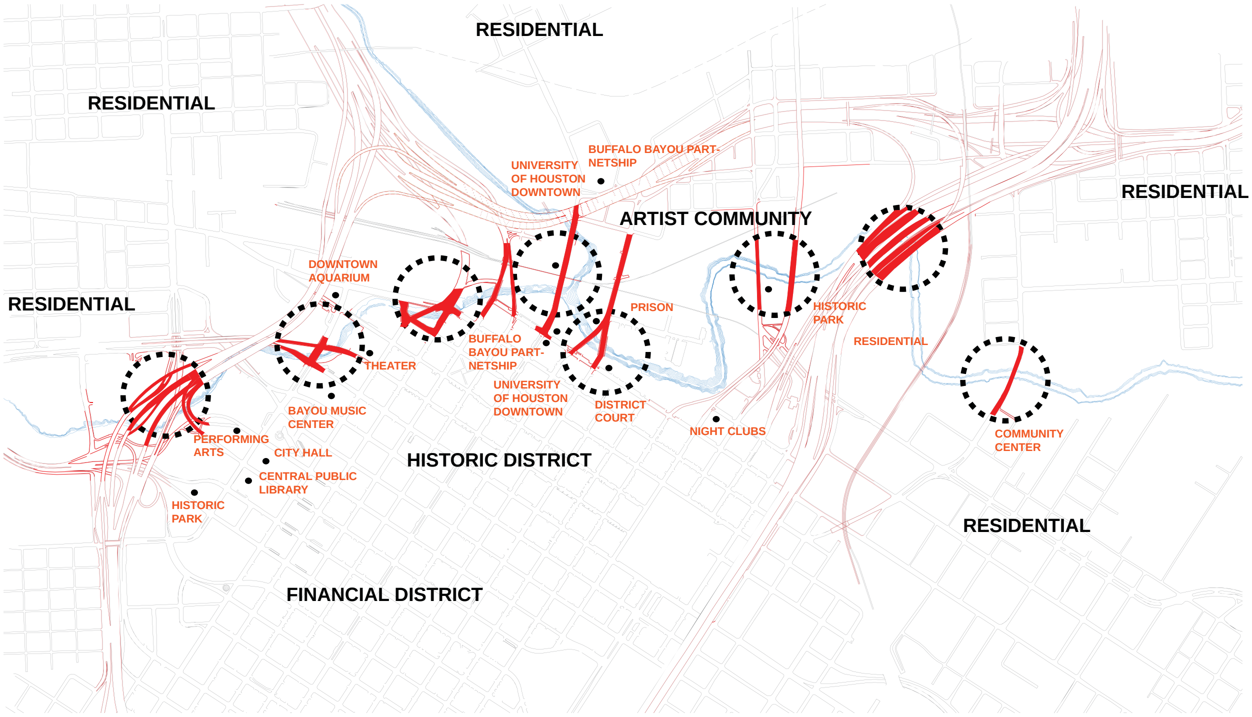


Fig 110. Potential sites where infrastructure intersects with key assets and open space

Fig 111. Intersecting infrastructural systems have created residual space, predominantly along the waterfront.

Fig 112. UHD institutional asset

The site consisting the University of Houston Downtown was chosen as it met the specified criteria. It intersects with infrastructural systems that have created residual sites. It is already somewhat activated by student activities and can be accessed directly by the light rail transit. The entire campus is situated within the 5 min walking radius, therefore restoring this site as a pedestrian campus and its location on the waterfront can potentially allow the site to become a catalyst for other residual spaces.

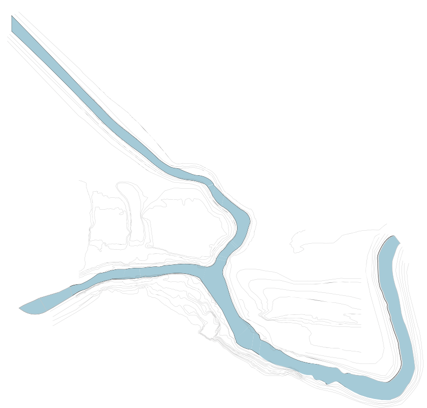
5.2 Site Analysis

The site intersects with both types of infrastructures, the Buffalo Bayou waterway and the Main street bridge.

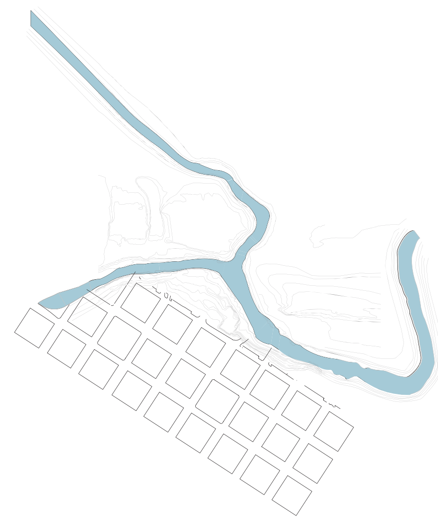
The site is a threshold between the downtown core to the south,a residential neighborhood to the north and and in-between post industrial grid which contains an artist community, offices, and criminal justice institutional program.

These programmatic juxtapositions and conflicting infrastructural systems are a result of the absence of zoning and planning governance.

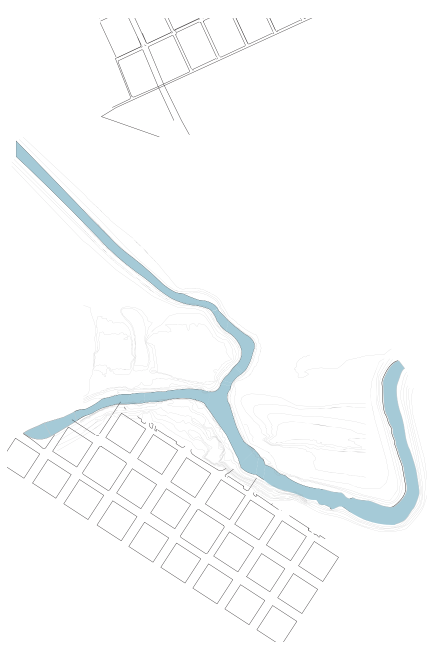
Fig 113. UHD Campus



1. The area is a threshold between three land parcels carved naturally by Buffalo bayou.



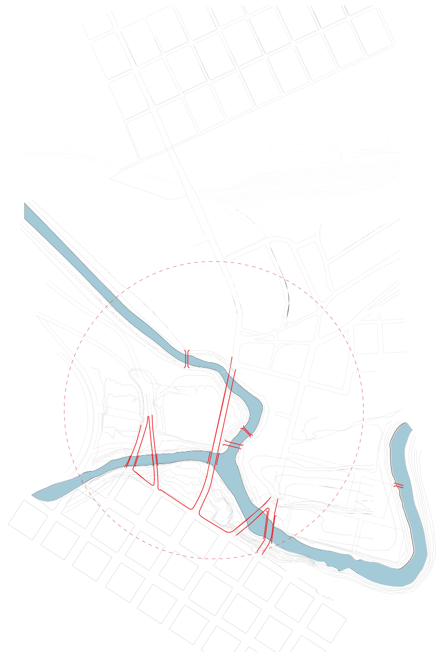
2. The south side is bounded by the 19th century downtown grid.



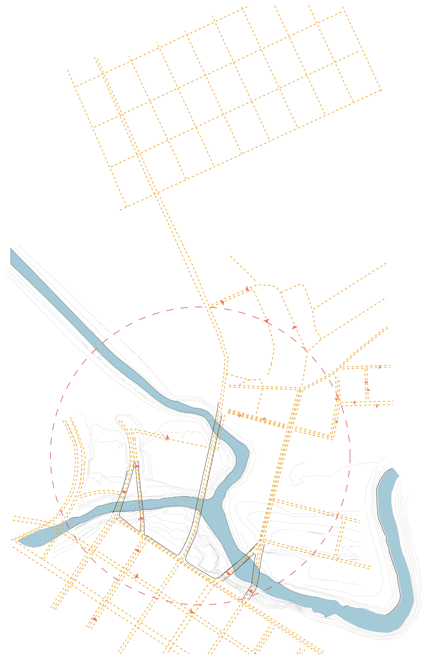
3. The north side consists of a residential neighborhood

4. The in-between consists of a post industrial grid with historic warehouse remnants, home to artist community

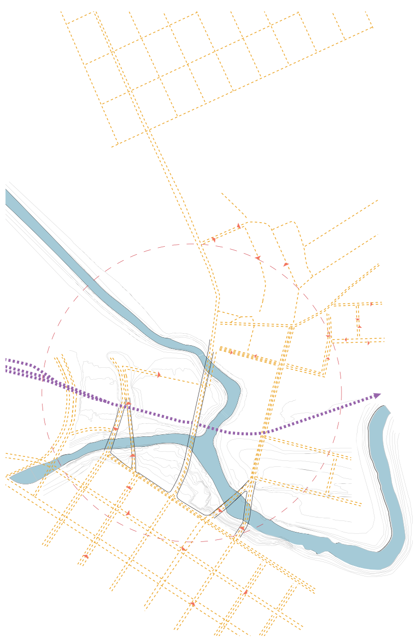
Fig 114. Existing Site Analysis



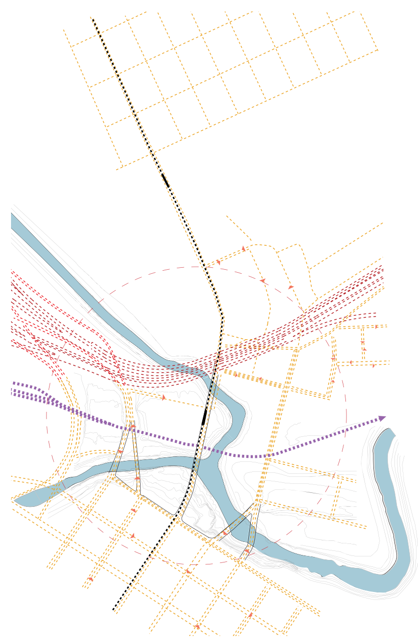
5. The area within the quarter miles radius is primarily connected with bridges



6. The character of the bridges and the area is car dominated



7. A freight line physically disconnects the ground plane



8. Freeway and tramline systems intersect to create segregated domains

(a)

(b)

Fig 115 (a,b). The site is a threshold in between downtown, post industrial and residential grid with the University in between that is connected by the Main St Bridge.

Fig 116. UHD as potential catalyst

The University spans in-between these three land parcels, and is segregated as a campus without a central core to connect the buildings and provide a collective sense of place.

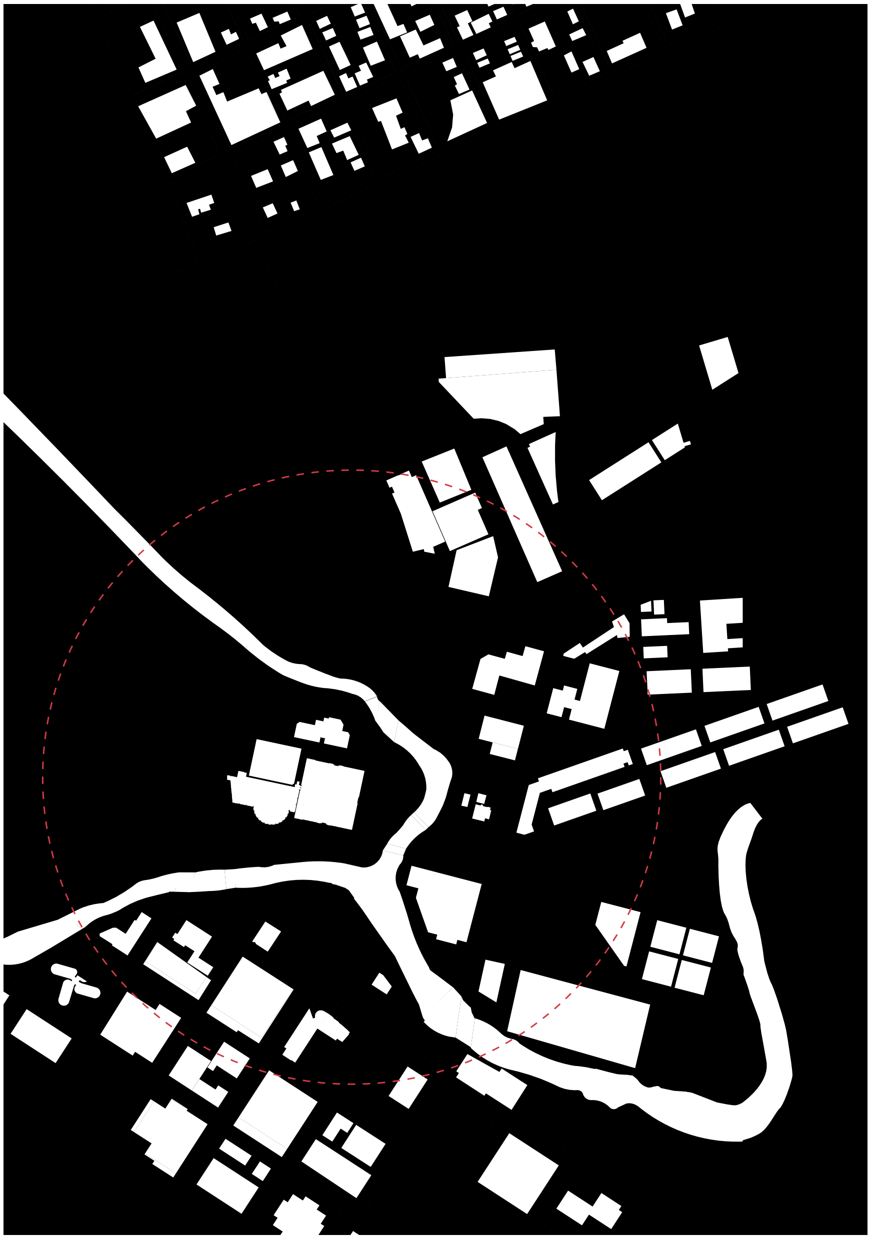


Fig 117. The site is surrounded by in-between residual spac-es.

Residual space is more dominant than built form. The concept is that the University will be used as a catalyst to attract further socio-economic developments and overtime, organize the residual spaces.

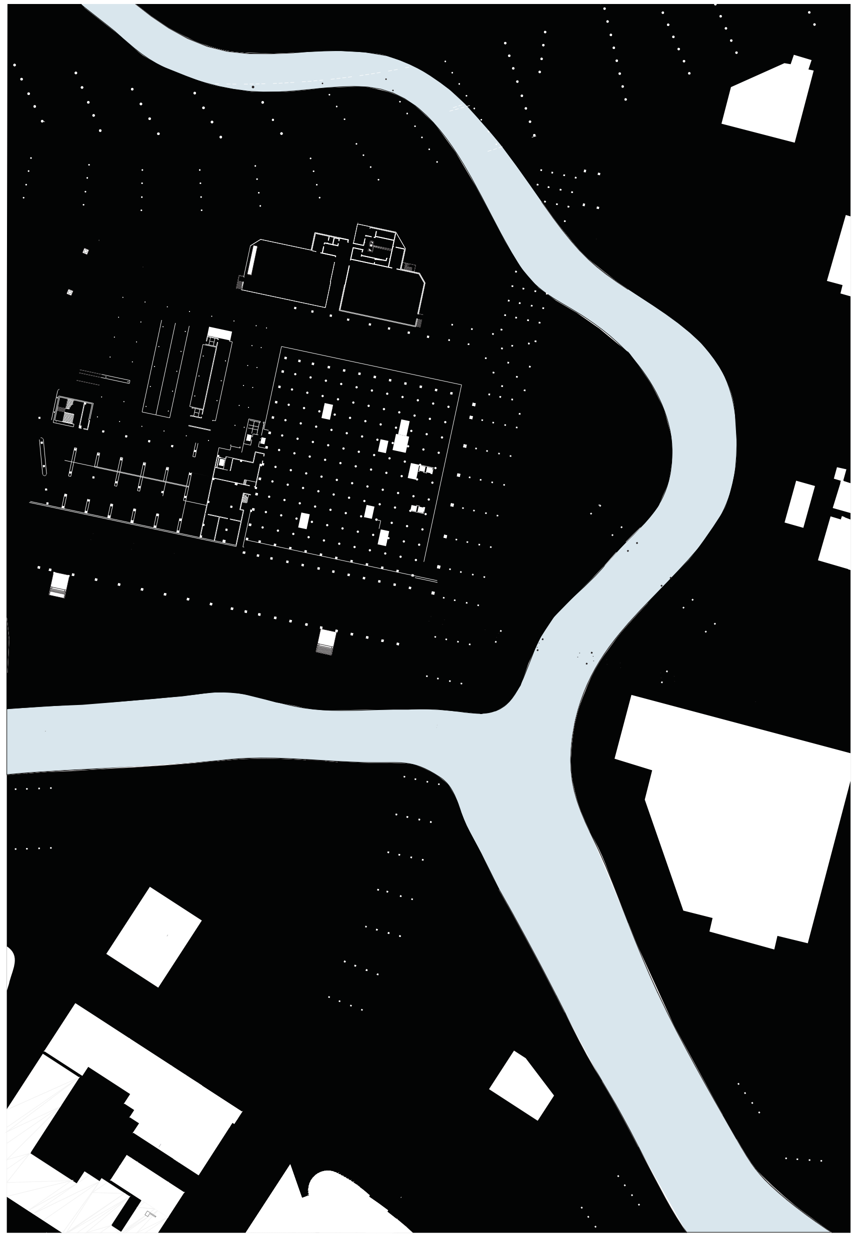


Fig 118. Figure Ground - Site area

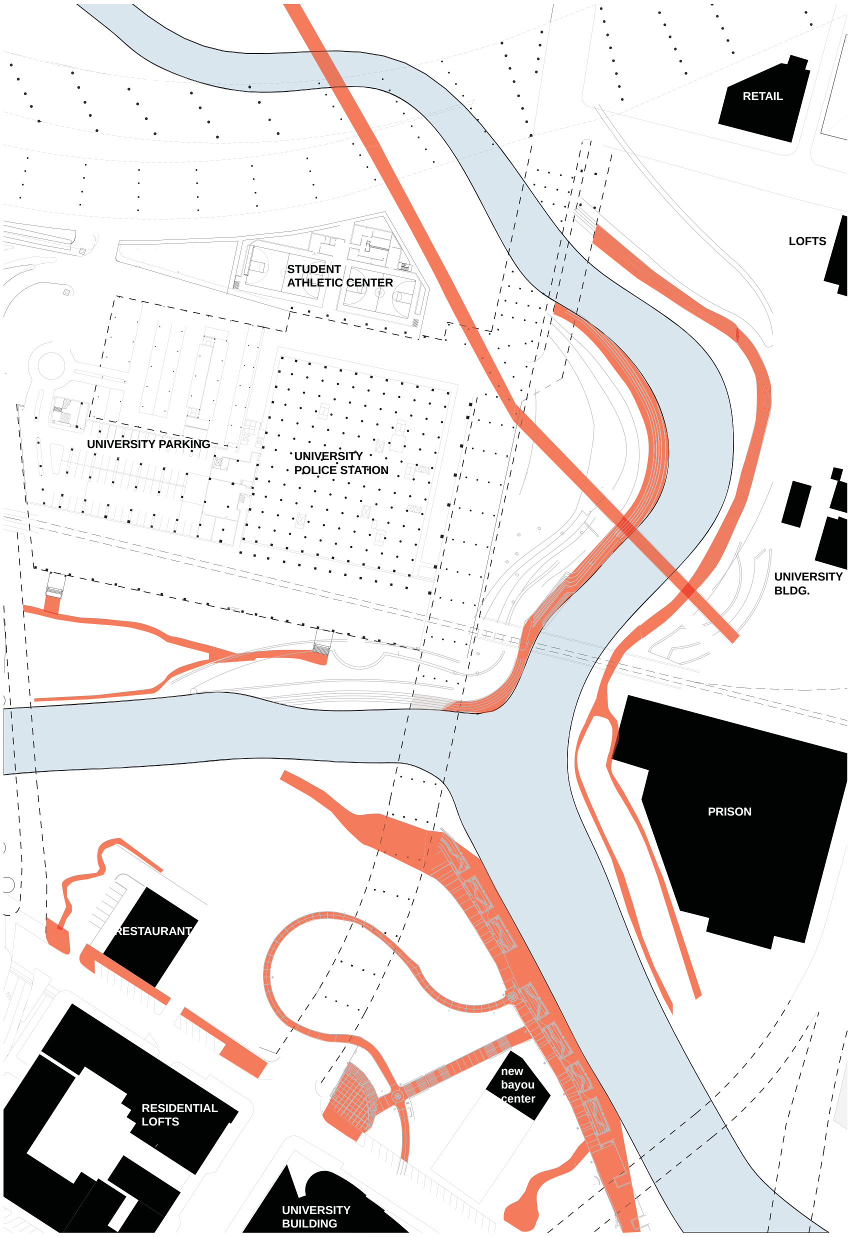


Fig 119. Existing program and paths

Existing paths are disconnected and don't relate to meaningful program which would generate pedestrian activities.

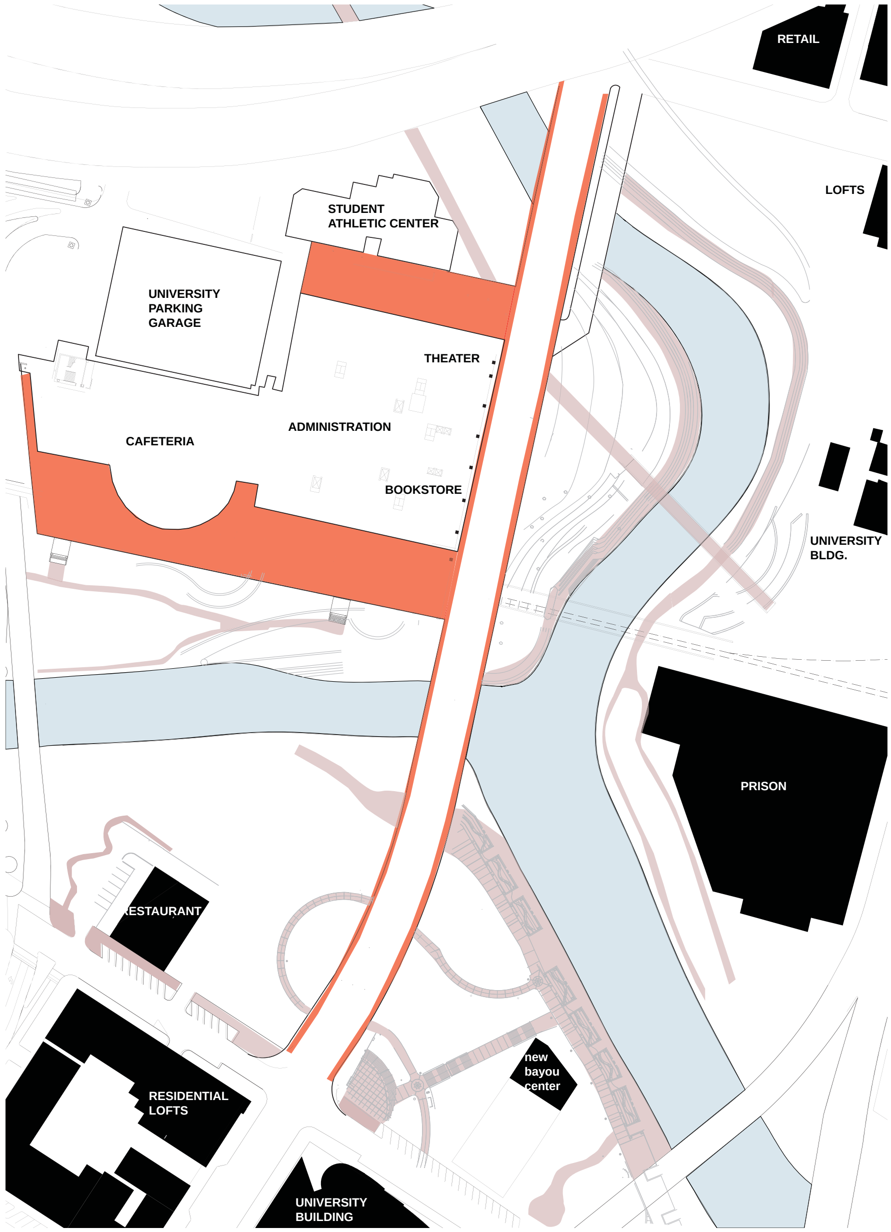
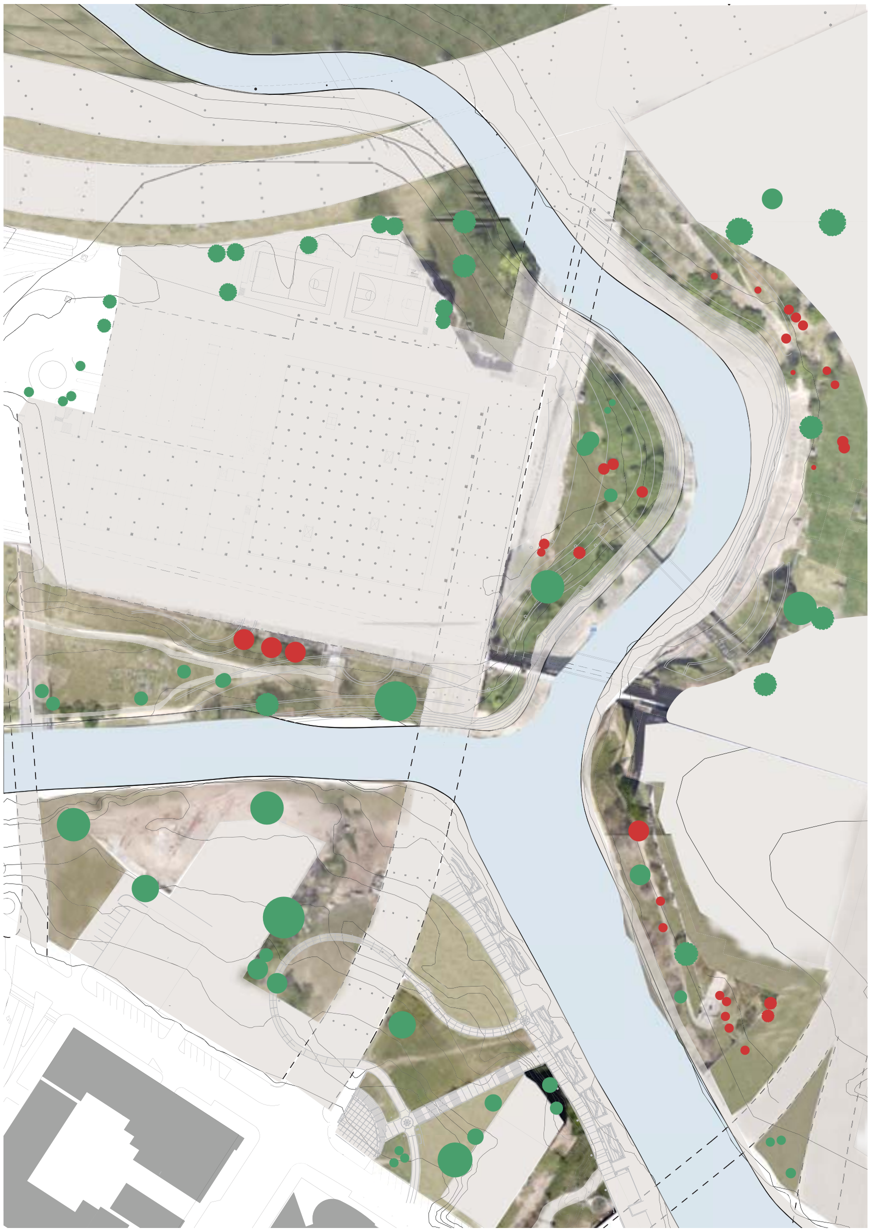


Fig 120. Existing program and paths (bridge level)

Pedestrian zones on the bridge are underutlized, limited to crossing between campus buildings. Pedestrian decks are left empty as the majority of the activities take place indoors.




(a)


(b)


(c)


(d)


(e)

Fig 121. Existing landscape conditions and Urban Design

The landscape conditions of the site are comprised of impermeable surfaces created by an extensive use of concrete. Concrete street furniture, paths, spread footings, parking surfaces and concretized banks dominate the site. Erosion takes place along the edges of the bayou where it has not been stablized. Invasive species overcoming leftover native vegetation are changing the character of the bayou and don’t accomodate wildlife habitats. These conditions contribute to a neglected site.

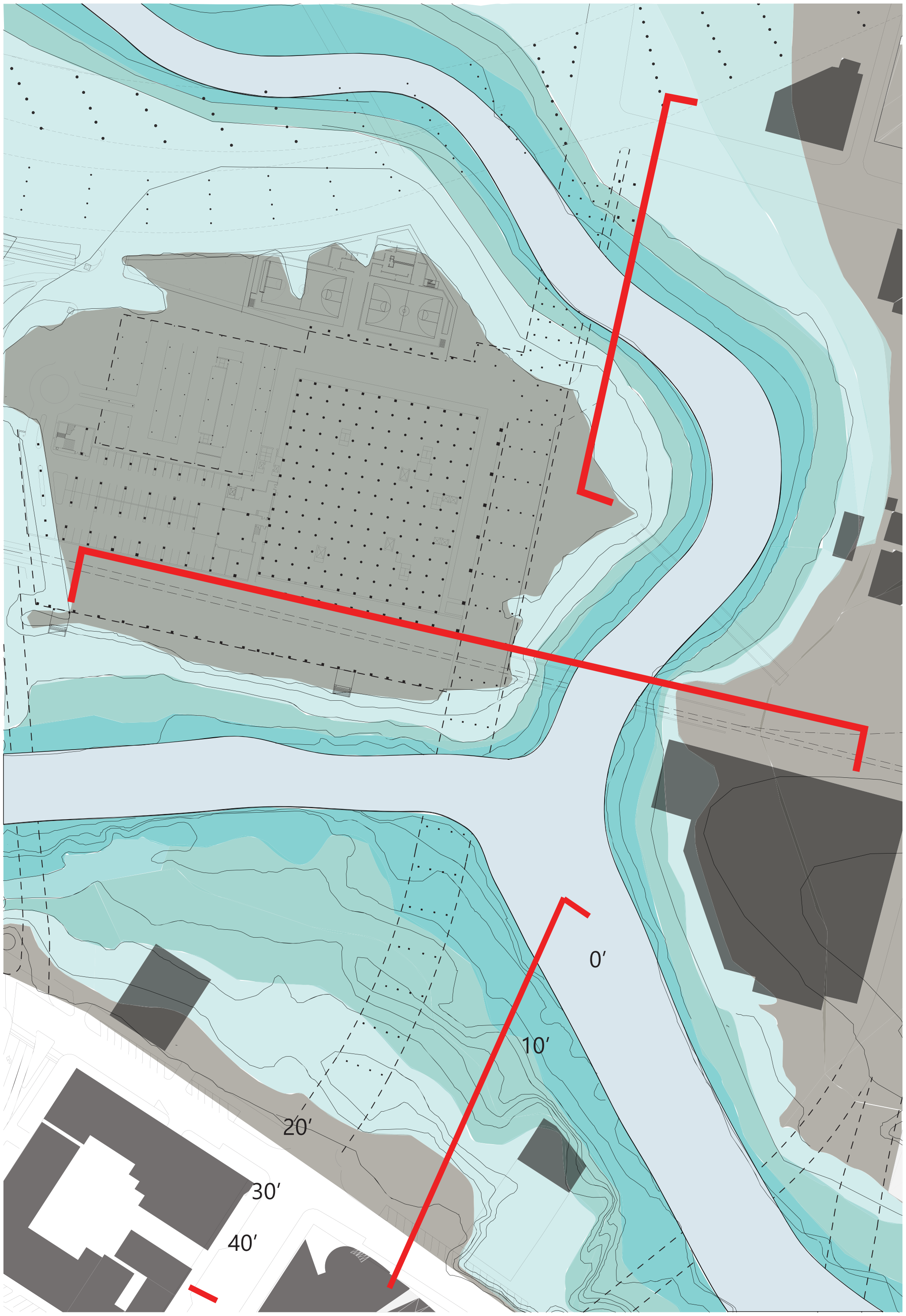


Fig 122. Existing flooding

The site is susceptible to flooding which limits conventional programmatic uses proposed to activate the waterfront. During the 500 yr flood event, the water can rise up to 40′ from the regular water level of the bayou.

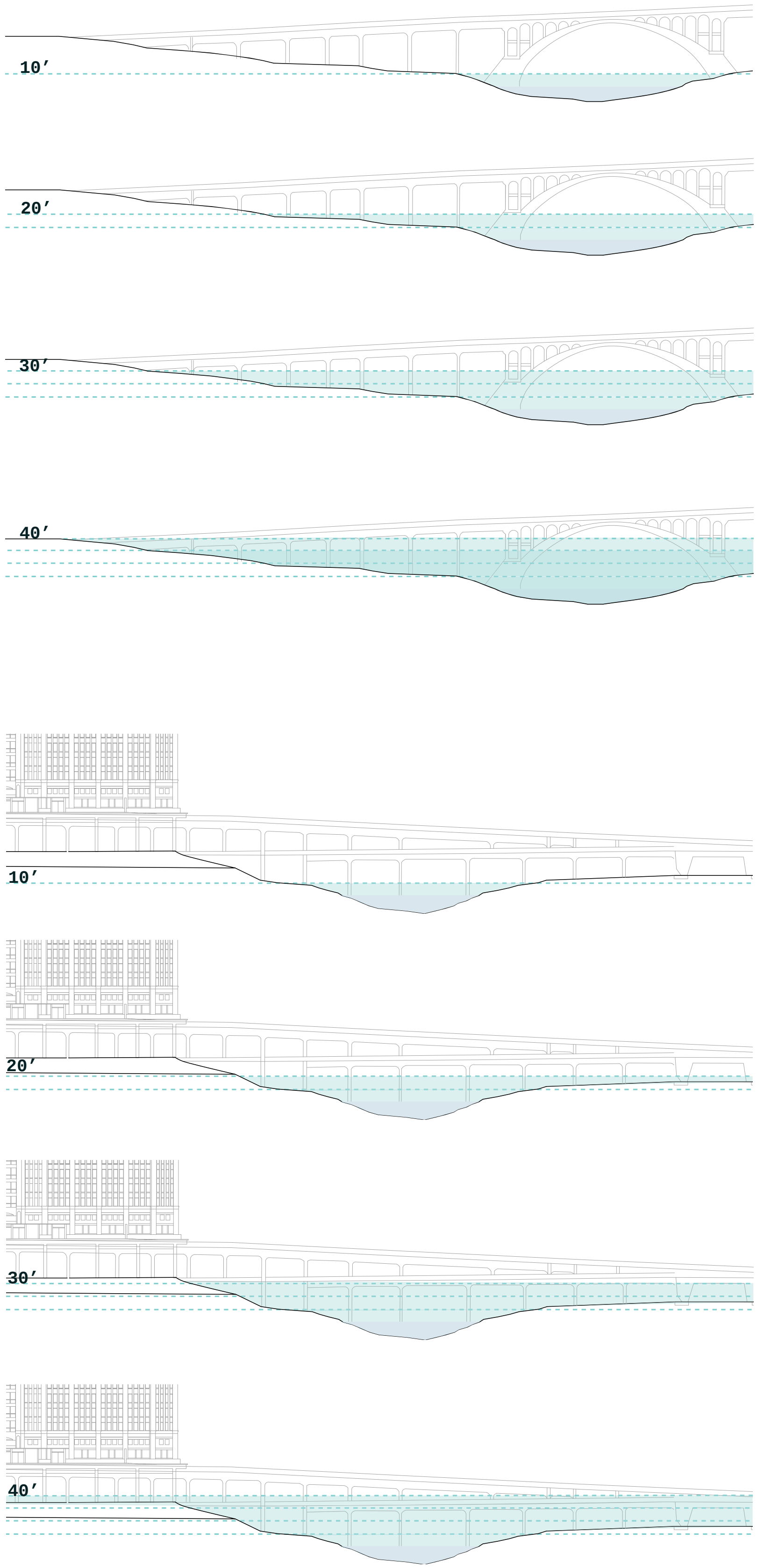
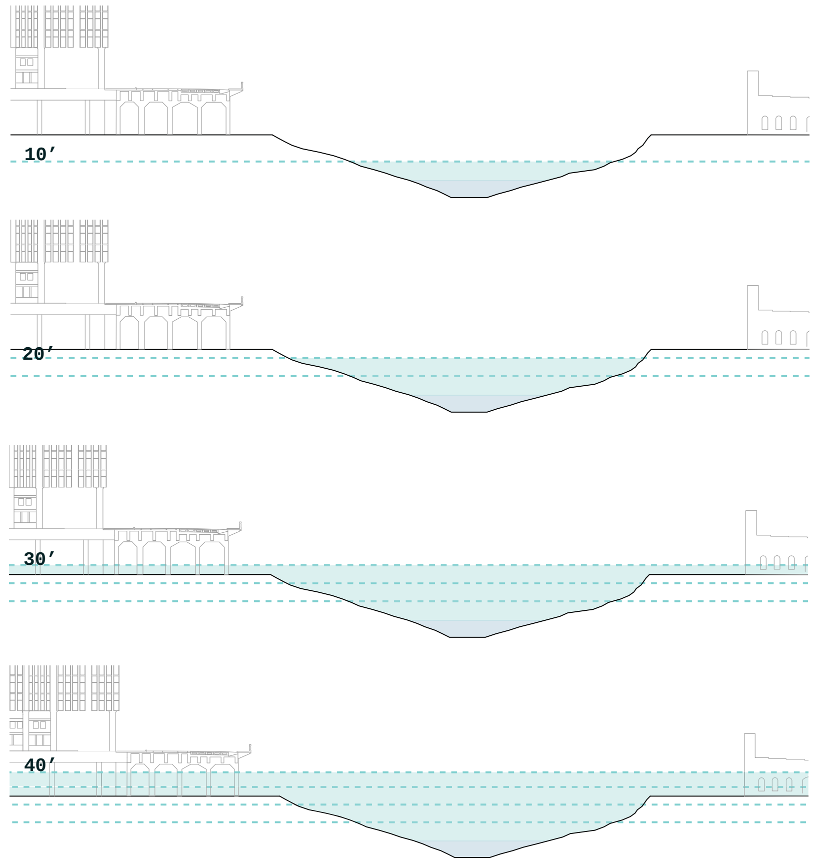
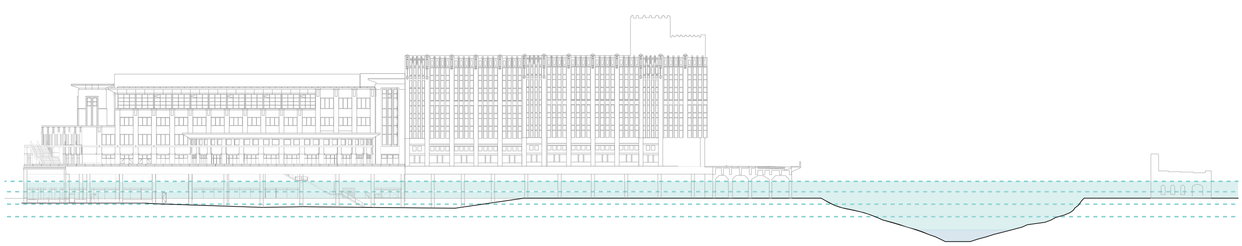
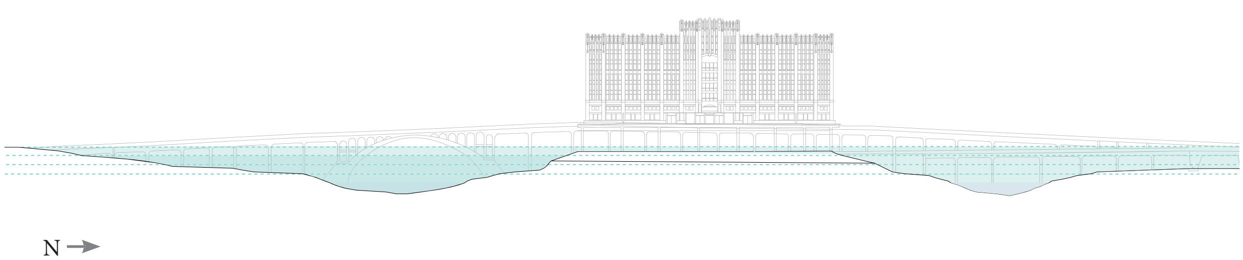


Fig 123. Flood elevations in relationship to the bridge







Majority of the bridge is above the flood line with the exception of the bridge ramp and the south end.

Site Research Panorama’s

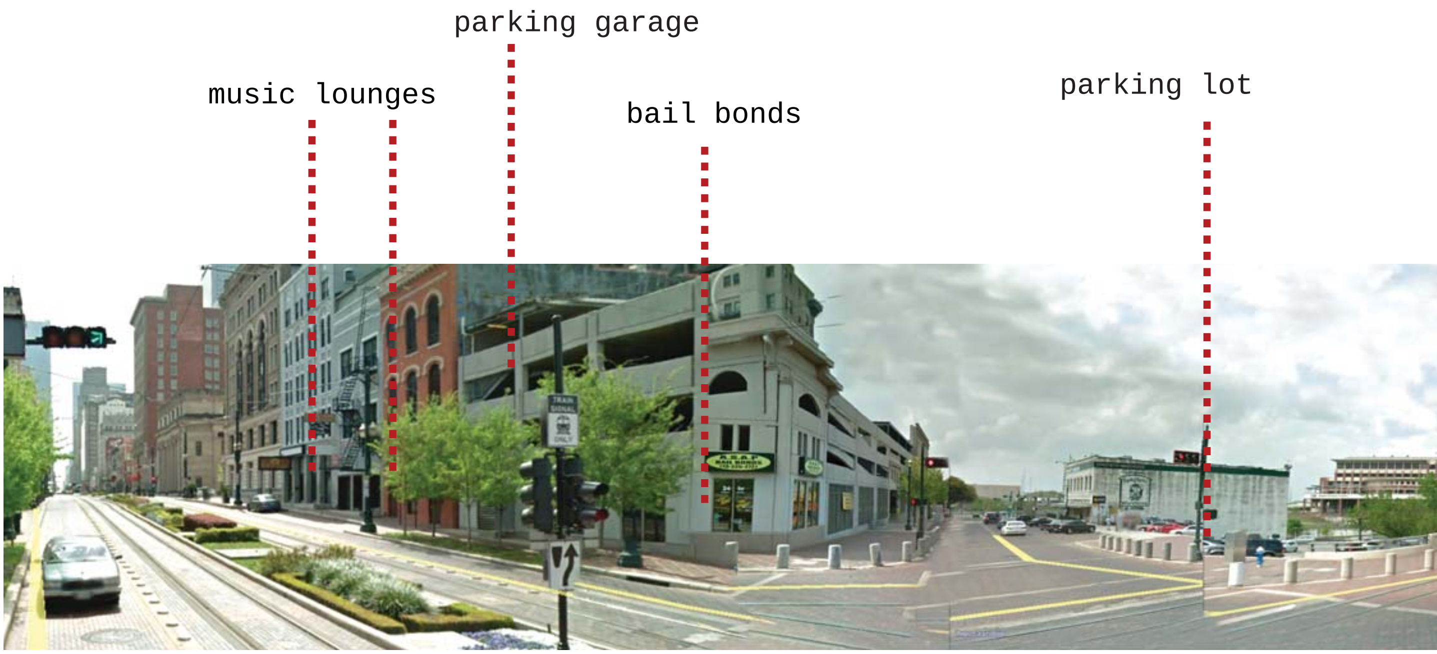
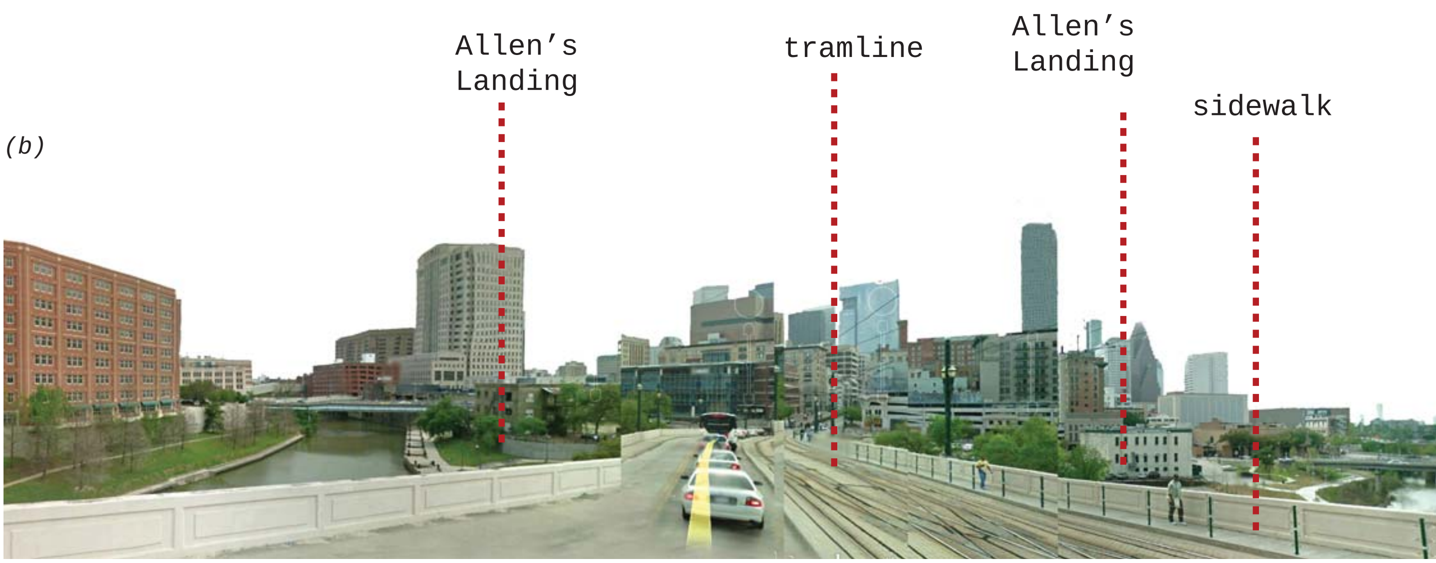
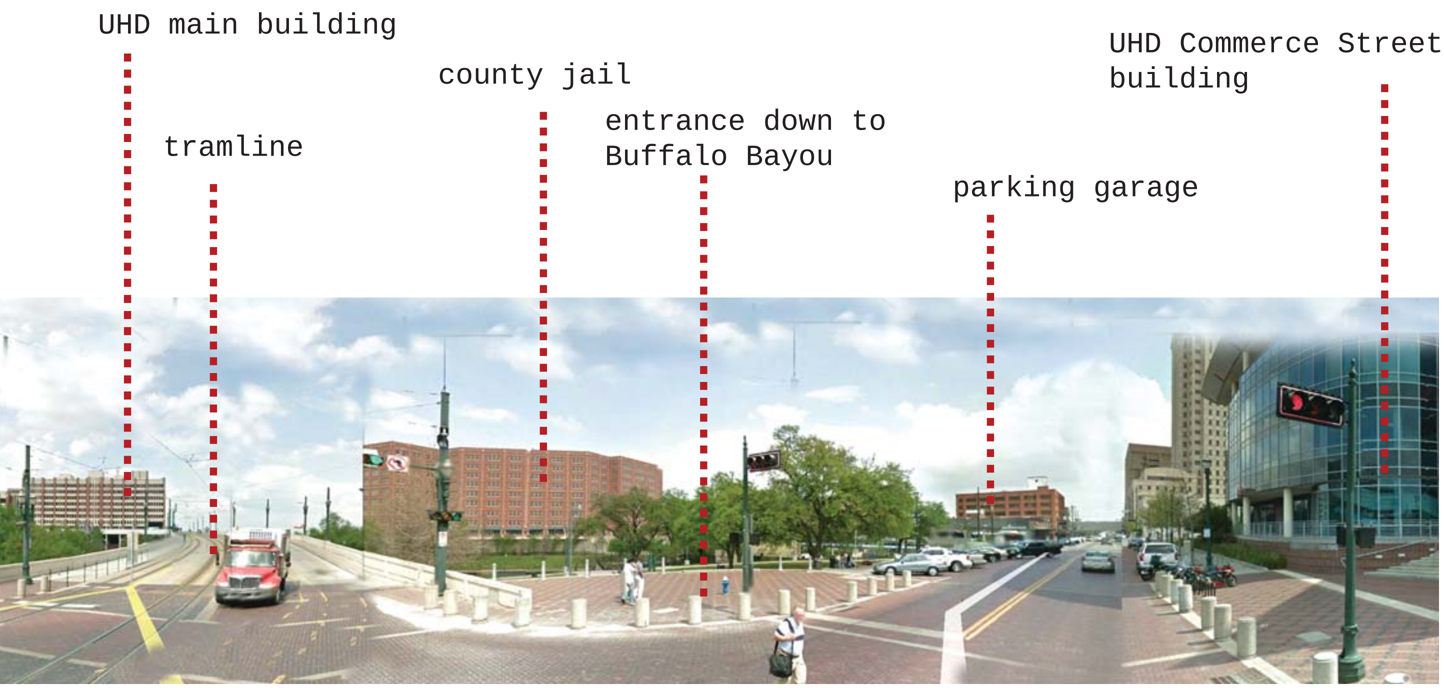
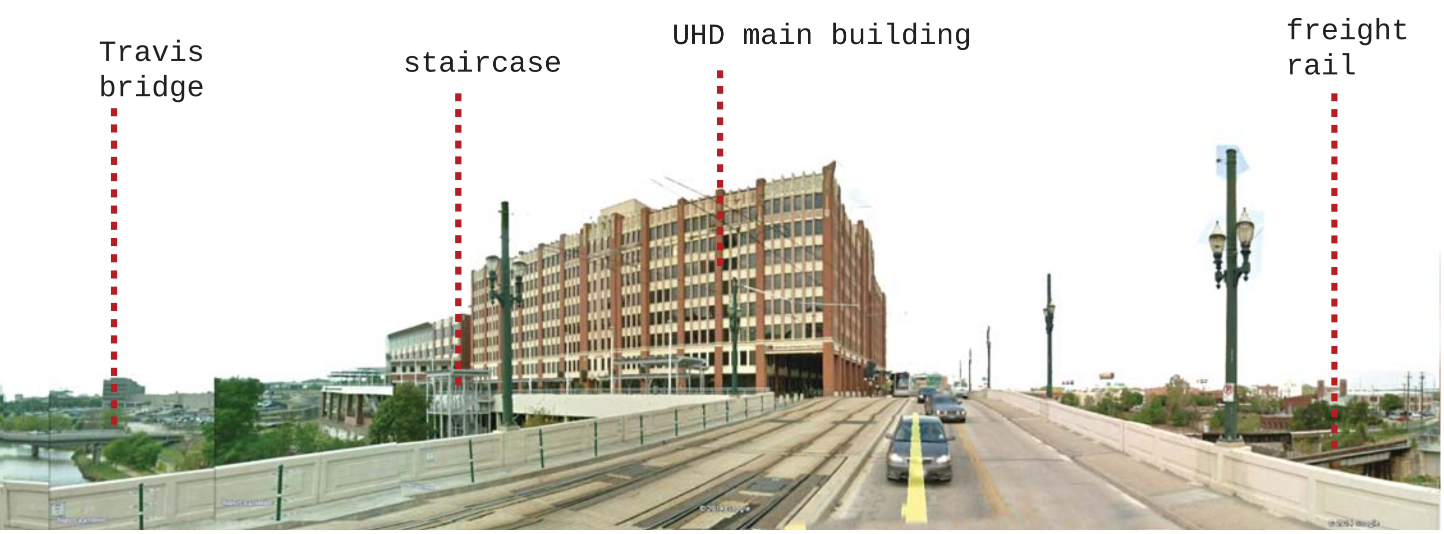


Fig 124. (a)

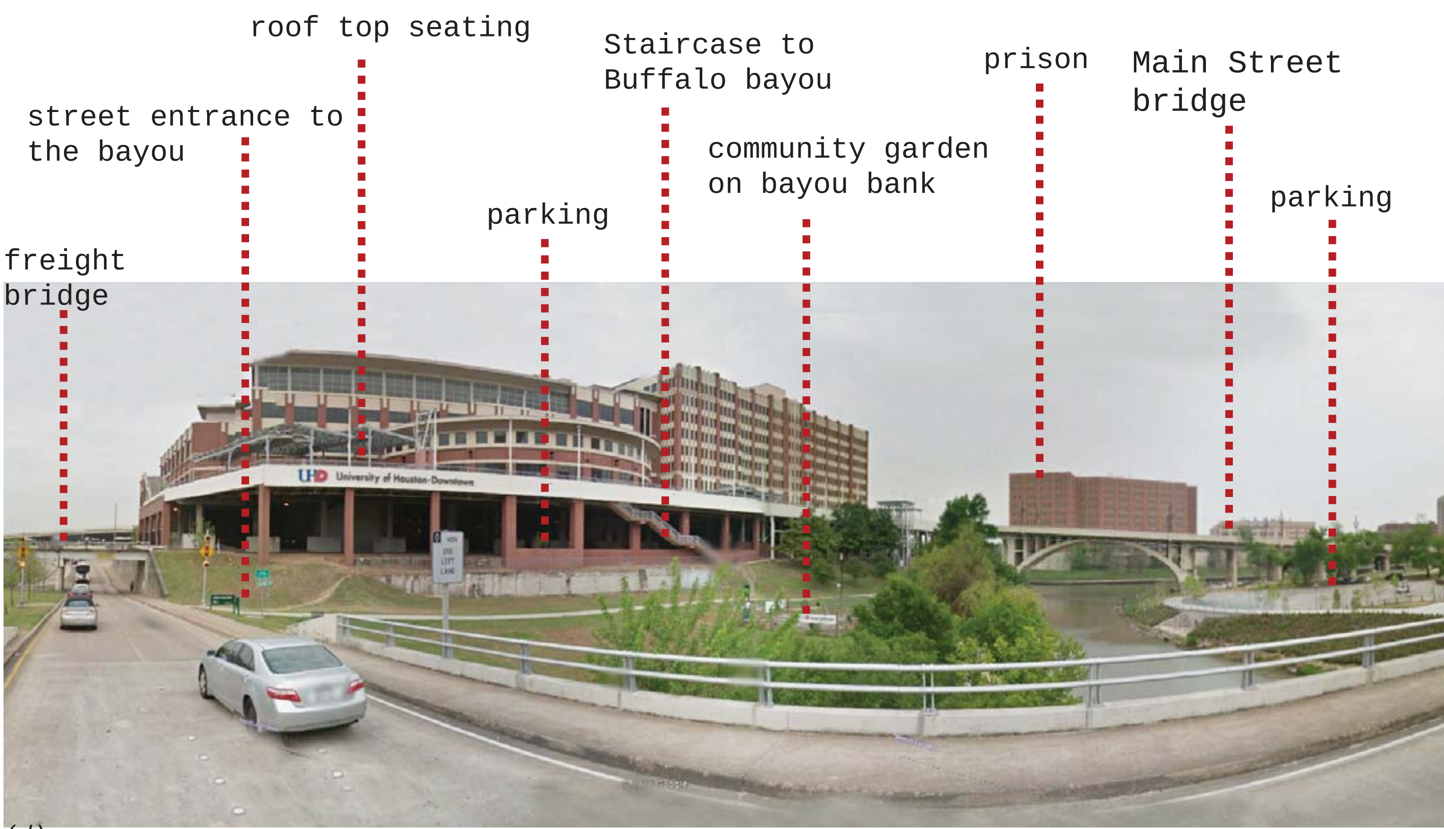
(b)




UHD main building
tramline
county jail
entrance down to Buffalo Bayou
parking garage
UHD Commerce Street building


Travis bridge
staircase
UHD main building
freight rail


freeway
(c)


roof top seating
Staircase to Buffalo bayou
prison
Main Street bridge
street entrance to the bayou
community garden on bayou bank
parking
parking
freight bridge
UHD University of Houston-Downtown
(d)

willow street
pumping station
(heritage)

parking

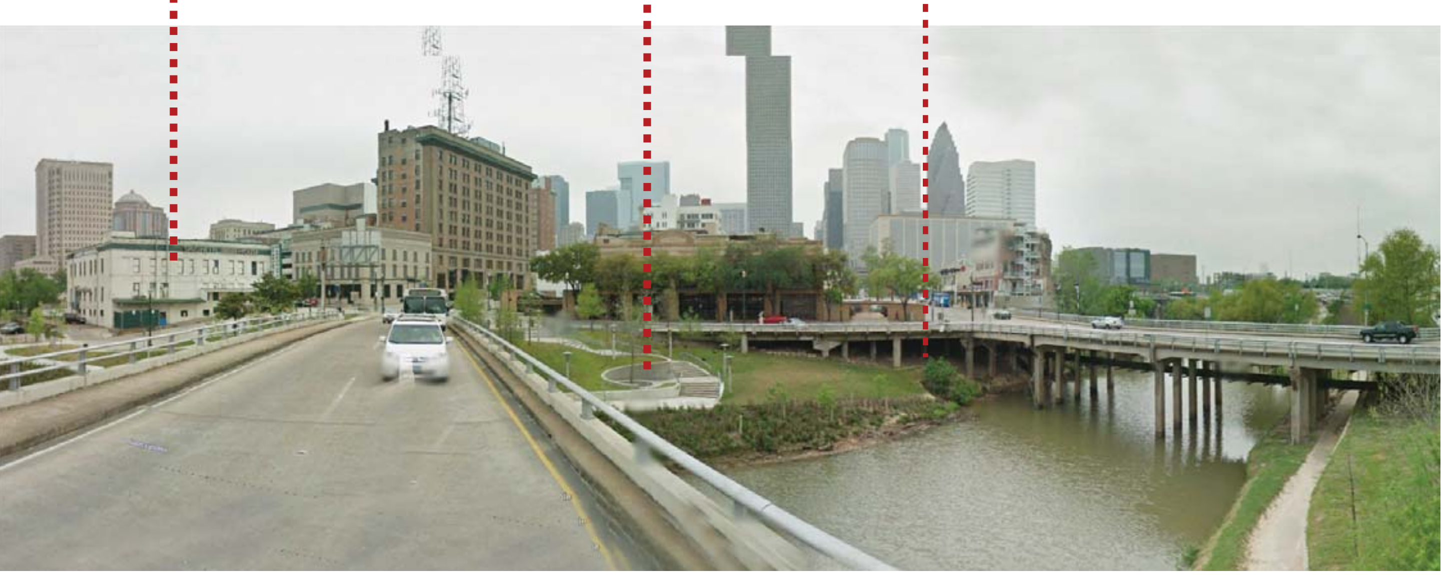
county jail

UHD - parking

restaurant

staircase to bayou
from Allen’s Landing

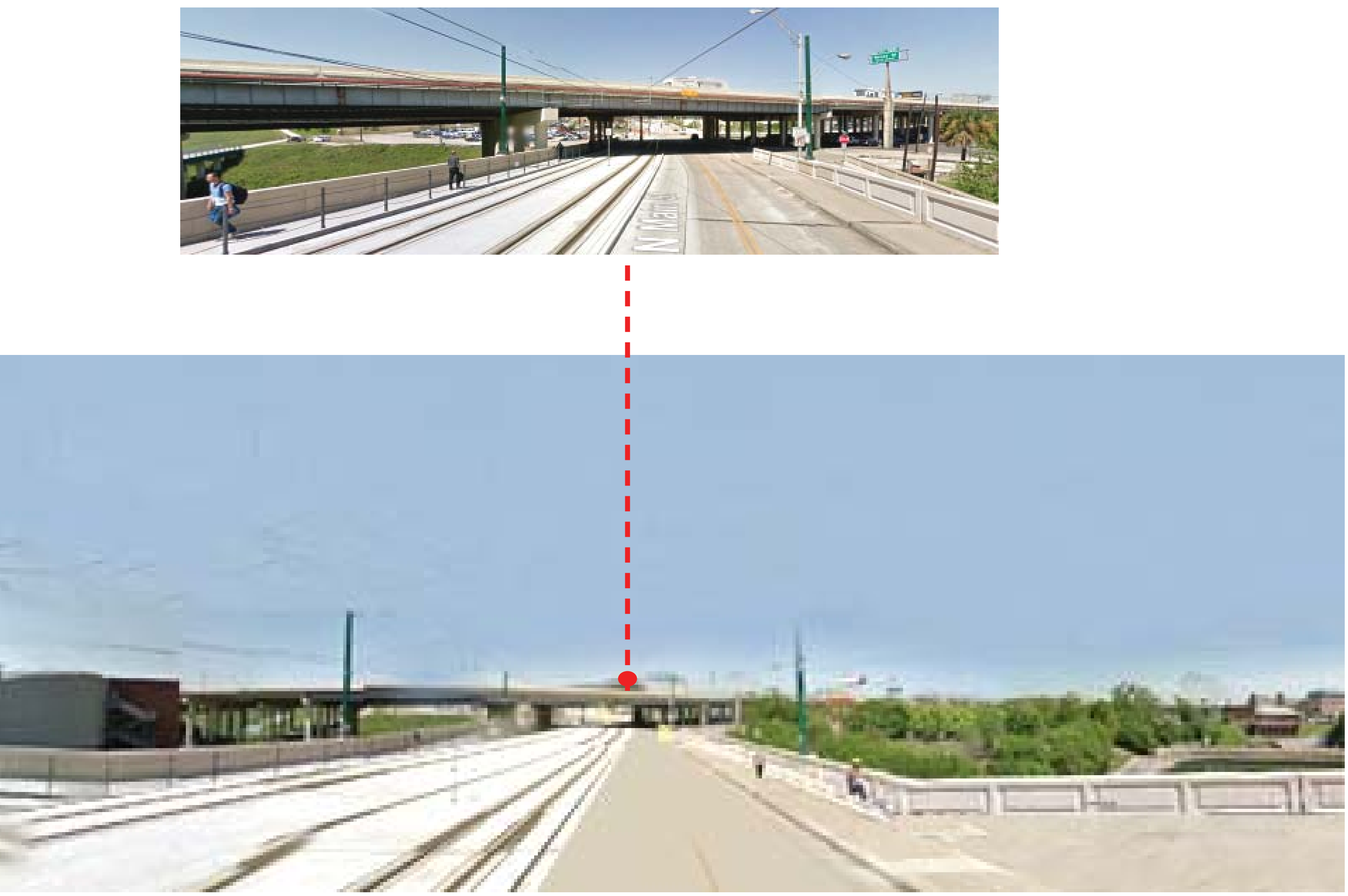
dead space created by
infrastructure



There are unique spatial conditions along the bridge that have the potential to create public interest. Spaces such as the bridge ramp which spans over the bayou, create a unique condition for being closer to the water, in ways that cannot be experienced anywhere else as the ramp spans directly over it (*Fig 124 (c)*). It can provide a unique opportunity to experience the bayou which is often ignored and driven by. The Main Street bridge offers unique views to the city and to the historic fabric around it that can potentially contribute to creating public interest as these *Urban Artifacts* have been forgotten.

(e)

There is no defined boundary for the site which indicates where the campus starts and ends. On the north side, the freeway spans over the bridge, creating an unaesthetic condition for pedestrians to walk by (*Fig 124 (e)*). The bridge is 22 meters wide, shared between the tramline, pedestrian corridors on each end, and two car lanes. Some areas of the bridge will have to be widened for transforming this bridge into a pedestrian zone. Areas along the tramline can be widened as the tramline cuts off the circulation.



5.3 Site History

The historic significance of the site relates to the fact that it was the first port of Houston which connected the city with the rest of the world, and therefore is considered as the "birth place of Houston". Locally known as the *Allen's Landing*, the site was strategic for laying the city grid as the confluence of the two bayou's served as a natural turning basin for port activities. The site - being 50 miles inland from the Gulf of Mexico, gave protection from storm surges (Fisher, 2014).

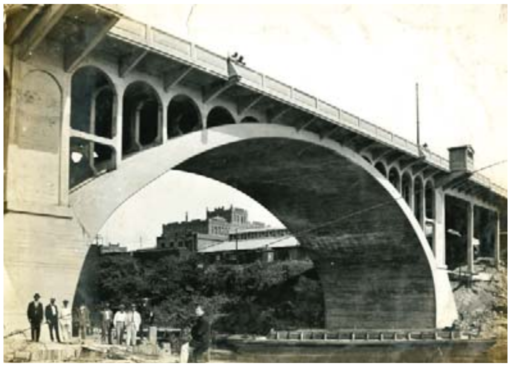
Houston as a 19th century industrial city, grew in land from the site with the downtown core being the central hub and Buffalo Bayou as the primary transportation infrastructure. As a result of port related activities the heavy wooded riparian forest was cleared off its banks to serve the shipping and rail industry (Fisher, 2014).

Fig 125. Allen's Landing - first port and Main street evolved the 19th century downtown grid.

Fig 126. Industry located along the banks connected to rail lines crossed over Buffalo Bayou - 1907.

Fig 127. Allen's landing - vegetation cleared off for port activities

The Main Street bridge was erected to connect commerce and people over the bayous- with a tramline - and extend the city towards Northside where key rail infrastructure was located. This reinforced concrete bridge with an arch that spans 150 feet in length made a monumental statement for Houston “as a major center for commerce and transportation”, while being the longest bridge span in the entire state of Texas (Gonzales, 2013).



(a)

(b)

Fig 128 (a,b). Main Street Bridge, 1913, Houston, Texas

Fig 129. Allen’s Landing site in relation to the downtown, Buffalo Bayou and Gulf of Mexico with industry along its banks, 1891.

5.4 Alterations to Buffalo Bayou

Since Allen's landing was designated as a port of delivery in the 19th century, significant alterations to Buffalo Bayou were made in the late 1800's. In order to improve navigation and allow for deep water vessels through the meandering bayou, *U.S Army Corps of Engineers* recommended dredging of the shallow bayou to allow for deep water ocean vessels. The bayou was dredged from 9ft to 12 ft.

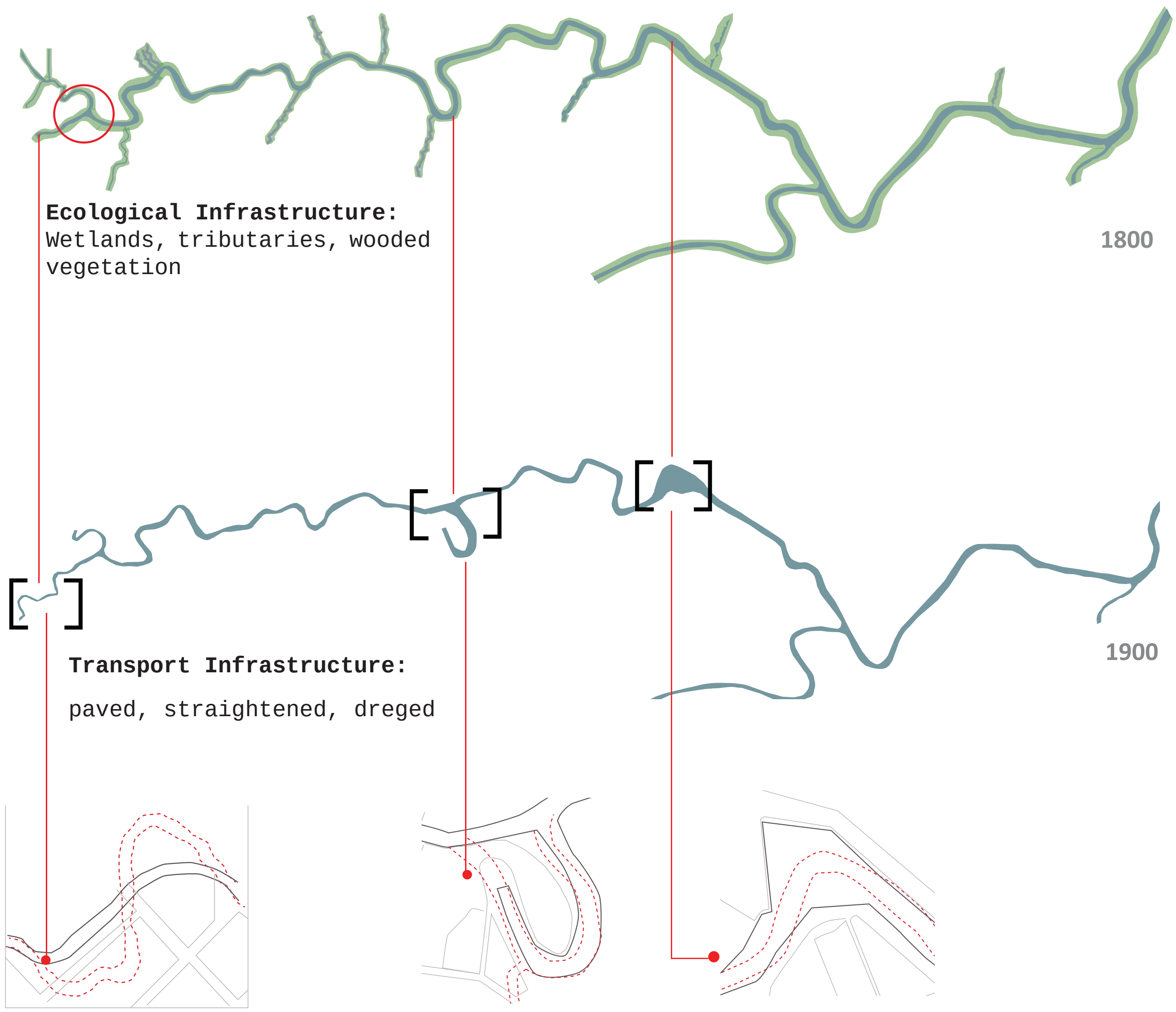
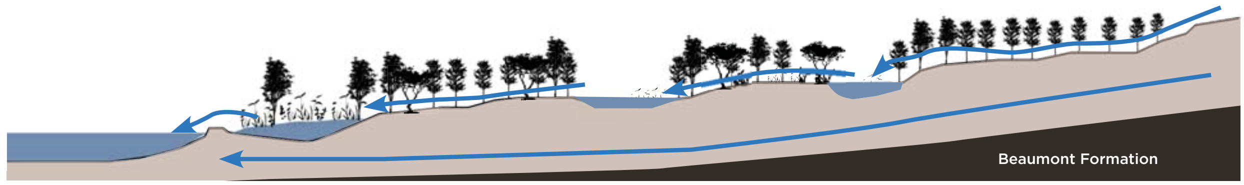


Fig 130. From an ecological infrastructure to transport infrastructure.



Aquatic ecosystem		Bottom land mixed hardwood riparian ecosystem			Grassland/Forest upland transition
Bayou	Wetland - Bald cypress swamp	Lower hardwood wetlands	Medium hardwood & wetlands	Higher hardwood & wetlands	Transition to upland
Permanent open water	continuously flooded	semi permanently flooded	seasonally flooded	Temporarily flooded	No flooding

Fig 131. (above) Buffalo Bayou site hydrology prior to alterations.

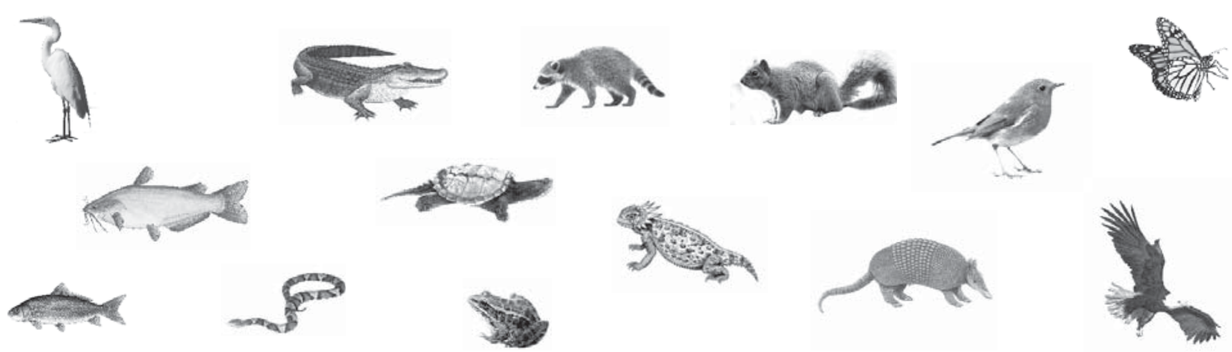


Fig 132. Buffalo Bayou functioned as an ecological infrastructure prior to its alterations as a transport infrastructure. Various plant and animal life flourished along its banks which held water for weeks, while gradually releasing it into slow moving meandering bayous.

Straightening the natural meandering shape of Buffalo Bayou has altered its capacity for draining storm water as bayous are naturally slow moving rivers. The clay based geological formation of the site known as the *Beaumont Formation,* allows for poorly drained soil composition that naturally causes the water to move laterally towards the bayous.

The removal of riparian forests along it’s banks and urbanization of the prairie landscape has created problems such as flooding that occurs during major rainfall events due to the speed of storm water runoff reaching the bayous.

Fig 133. Buffalo Bayou was framed by heavy wooded vegetation.

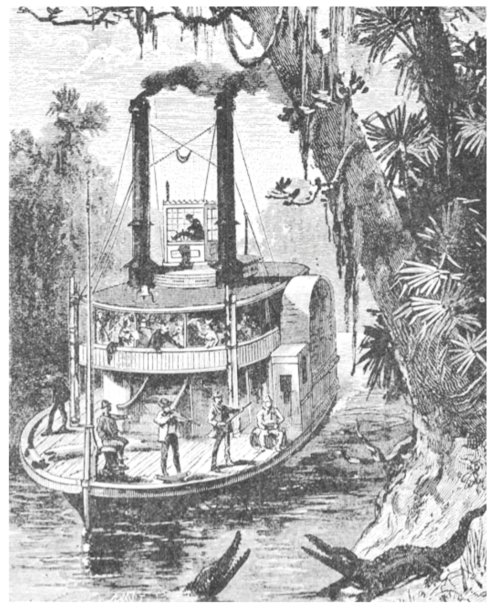


Fig 134. An illustration of Allen’s Landing when it was first discovered through Buffalo Bayou.

(a)

(b)

Fig 135. Few remnants of wooded vegetation along Buffalo Bayou, 1950’s.

How can infrastructure be used as a catalyst to restore a university campus and revitalize drosscape along Buffalo Bayou?

5.5 Design Principles

As mentioned in Chapter 3, the concept of *infrastructure* has emerged in the design field over the last decades, primarily in the inter-discipline of Landscape Urbanism. Three prominent examples of built projects that use landscape and infrastructural techniques to restore residual sites are the *Highline, the Olympic Sculpture park and the Fresh Kills Urban Park.* The *Olympic Sculpture Park* constructs new topography to bridge over existing infrastructural systems to create surface continuity for accessing the waterfront. The *Highline* reuses a redundant bridge infrastructure and landscape techniques to create a linear park experience which would serve as a catalyst for the adjacent neighborhood. The *Fresh Kills Urban Park* uses landscape ecological techniques to create infrastructural spatial qualities for restoring an ecologically bereft landfill into an urban park and catalyst. Learning from these precedents, the thesis proposes to create certain rules that guide the vision for the site to transform it into a catalyst.

6 STEPS FOR RESTORING THE UNIVERSITY CAMPUS AND ACTIVATING DROSSCAPE ALONG BUFFALO BAYOU

1. Adaptive reuse of existing infrastructure
2. Programming the bridge
3. Creating interconnectivity with proposed buildings
4. Bridging the Linear Park
5. Renaturalization of the bayou
6. Rules for campus expansion

The university campus is separated from the city by the river of the Buffalo Bayou. The Main Street Bridge and other bridges on the east and west side are the only connection points. The university campus is fragmented with 3 distinct campus buildings as anchors but nothing in between that establishes an urban connection.

Due to flooding, the ground plane in the Bayou only has built form that has been there from a long time ago or buildings that were constructed on top of a super- structure that would protect it from flooding. This reality has brought a lot of neglect to the site with no real plan or strategy as to how to address the flooding while maintaining space for nature and people. Currently the UHD building addresses the flooding in the site with a parking garage at the lowest two levels with a jail and police station (*Fig. 136 (a)*). To move forward in revitalizing this site, there needs to be an implementation of natural processes to accomodate the flood plain and potentially link the river front to create a park. Strategies need to be formed to create edge conditions along the empty infrastructure and residual space.

Fig 136(a). Underneath the Main St. Bridge. The University is built above the flood plain by resting on top of a parking garage that consists of a police station.

The existing infrastructure can play a key role in connecting urbanity to the University of Houston - Downtown campus. Looking at (*Fig. 136 (b)*) these buildings reside in a 5 minute walking distance and are connected by the Main St. bridge with an existing tram line – recently extended north. In Houston the heat is a major factor in driving people indoors unless considerable effort is taken in designing an urban space that can protect people

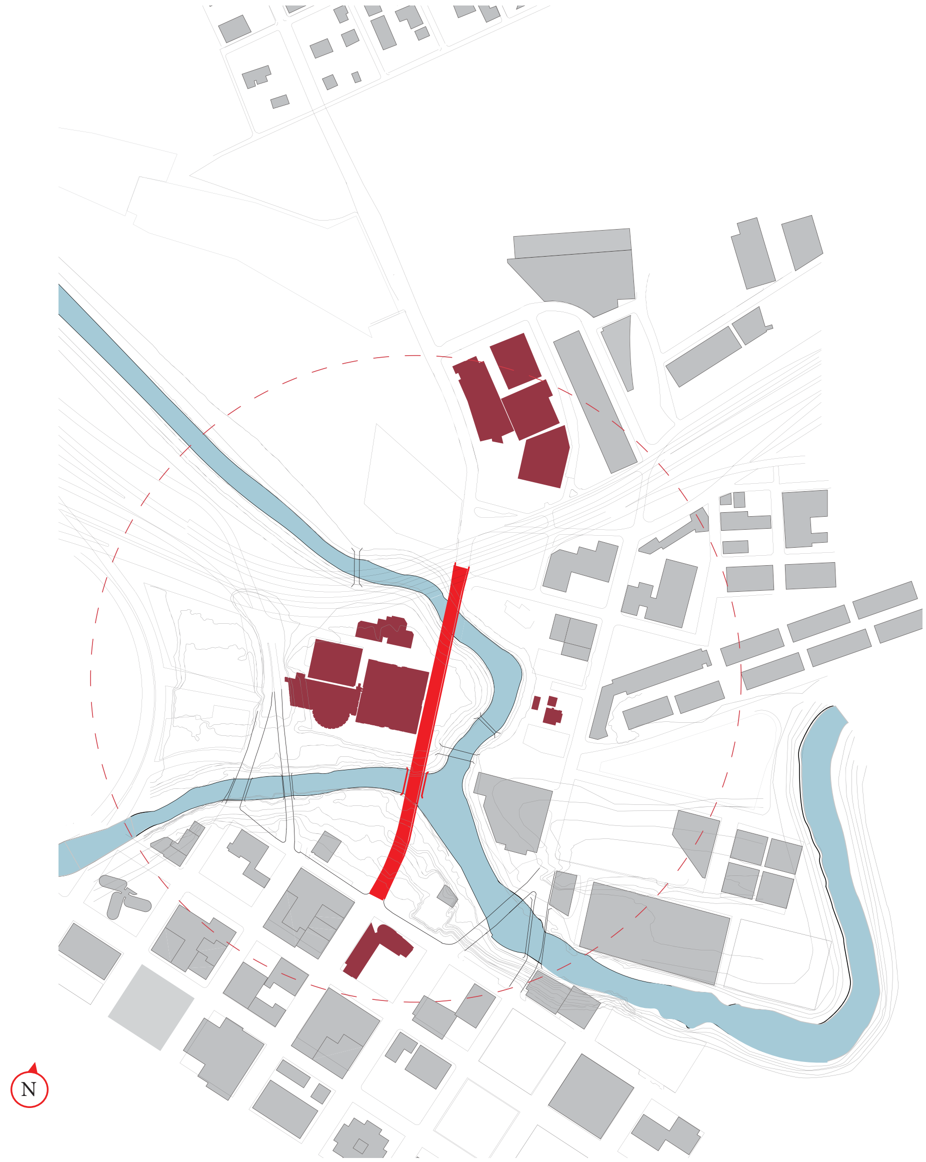


Fig 136(b). Adaptive reuse redundant infrastructure

from it. At the same time the overall built form of the bridge or relationship of the bridge to adjacent buildings needs to be addressed. A boundary of built form needs to be created to give scale to the users and intimacy with the surroundings. A number of existing underused bridges connecting south and north Houston can be activated to alleviate traffic

1. Adaptive reuse redundant bridge infrastructure

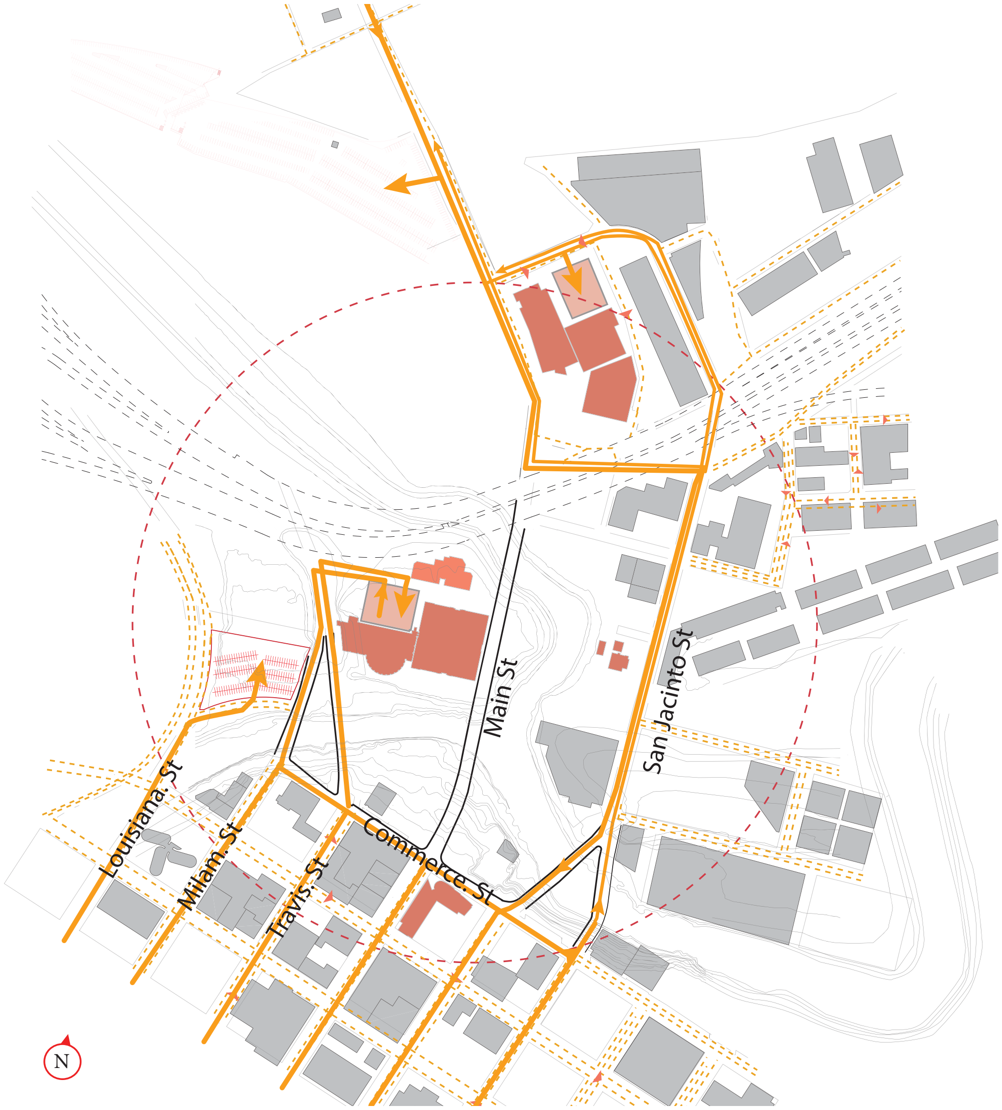


Fig 137. Main street bridge has ADT (Annual Daily traffic) 14,000 cars per day, while the travis, milam and San Jacinto St. bridges carry ADT 5,000-8,000 cars per day. This makes the Main Street bridge redundant.

on the Main Street Bridge in order to give more space for pedestrians and possibly new buildings that engage the landscape, bridge and city. The first step in the design intervention was to create a pedestrian spine of urban activity that would connect the three anchors (ecological center, rowing club and the arts building) with the UHD campus and back to the city. That was then used as a way to connect to other forms of existing infrastructure in order to establish three dimensional connectivity from the bridge and to the Bayou (*Fig 138*). Existing programmatic use

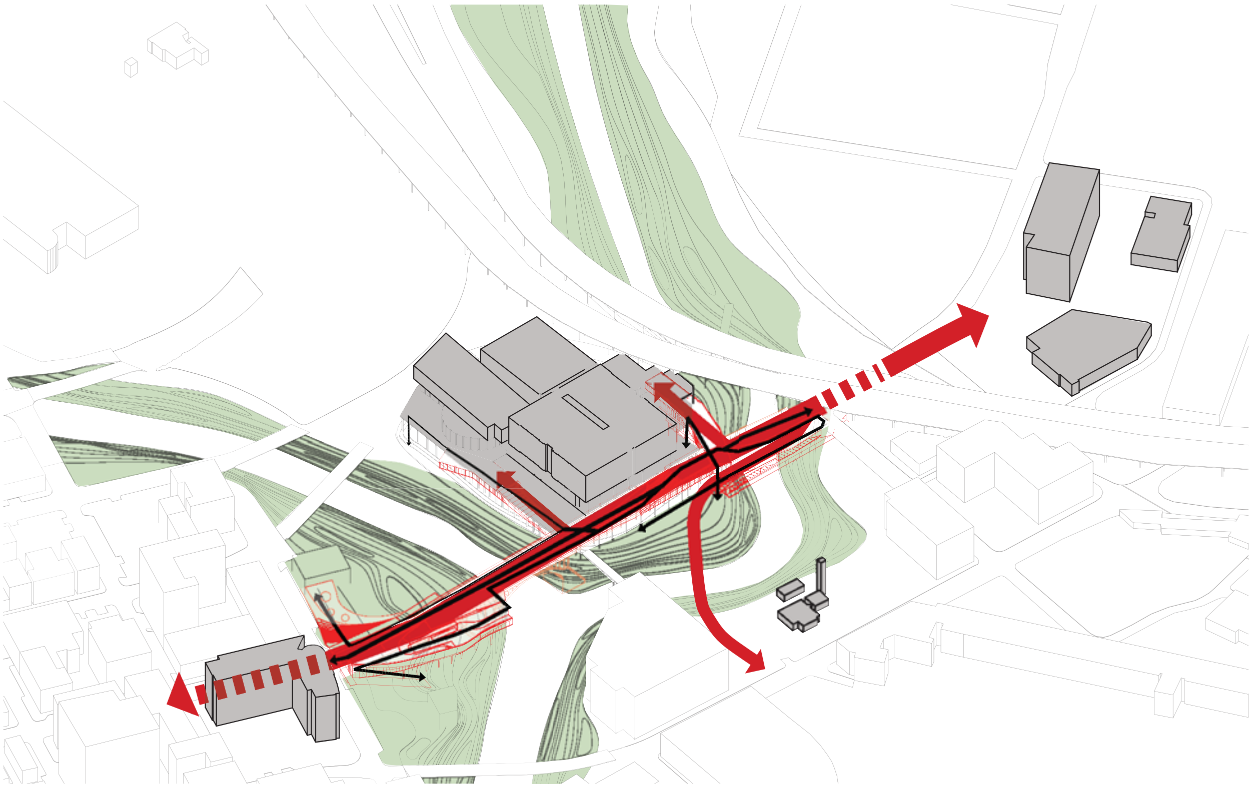


Fig 138. Pedestrian spine linking University, Landscape & City

within the context does not attract waterfront activities as it is predominantly occupied by correctional facilities and other institutional criminal justice programs along the water's edge (*Fig 139*). A program strategy is needed that will diversify the bridge with a new cultural, educational, and tourism related mix. The major proposed anchors are an ecological centre at the southern end and a market with a canopy opposite the ecological centre. A restaurant adjacent to the ground floor of the UHD building. An arts building connected to the student centre that intersects the bridge with the theatre portion hovering over

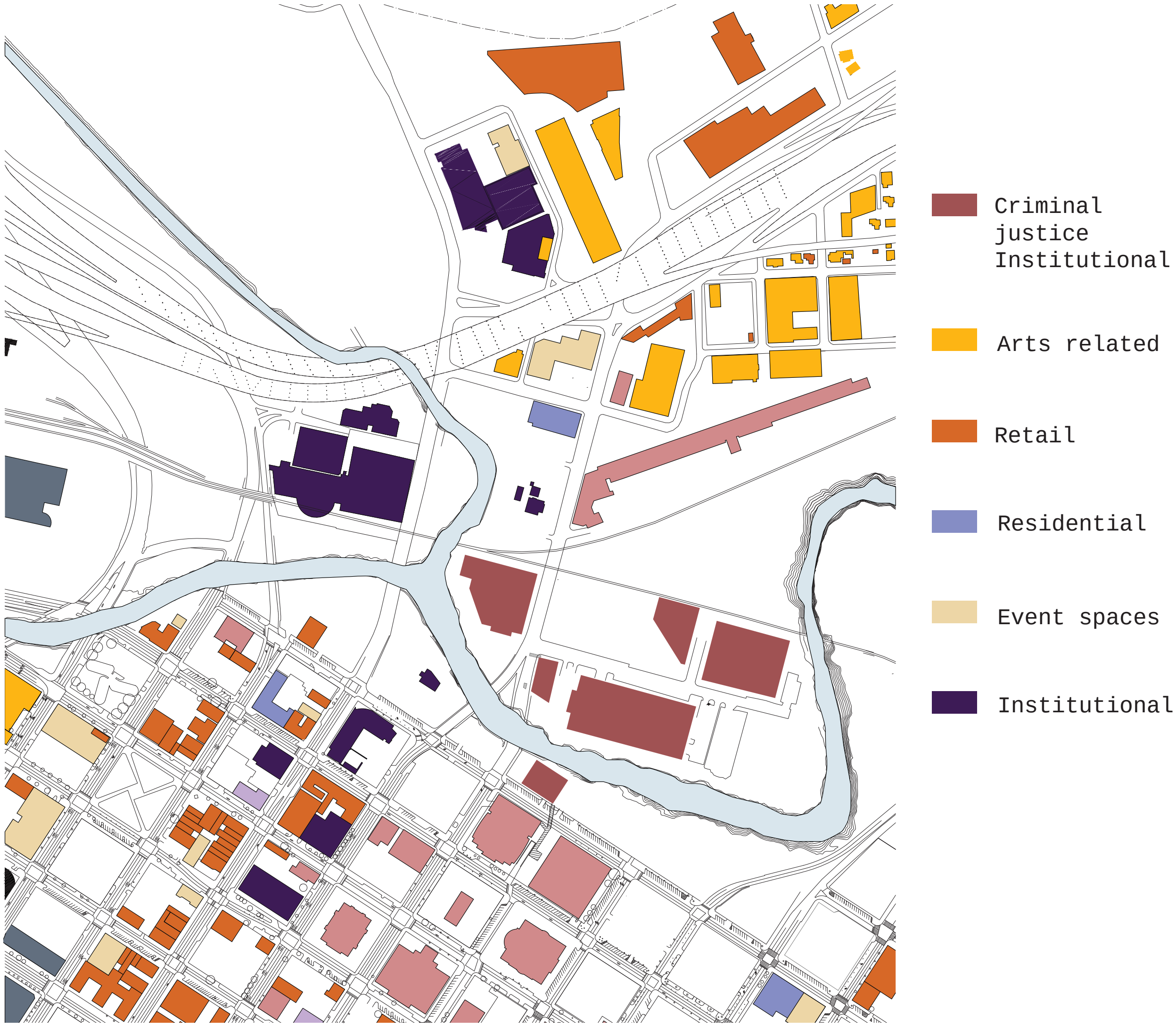


Fig 139. Existing programmatic uses around the site do not activate the waterfront. Majority of the site is occupied by criminal justice institutional uses that do not activate the site nor attract people to the site.

top. The rowing club is connected to the underpass bridge which forms a relationship to the landscape below. The program has been dispersed so that only recreational program is located near the flood plane and cultural, commercial, and institutional is located on the bridge which protects it from the 500 year flood plane.

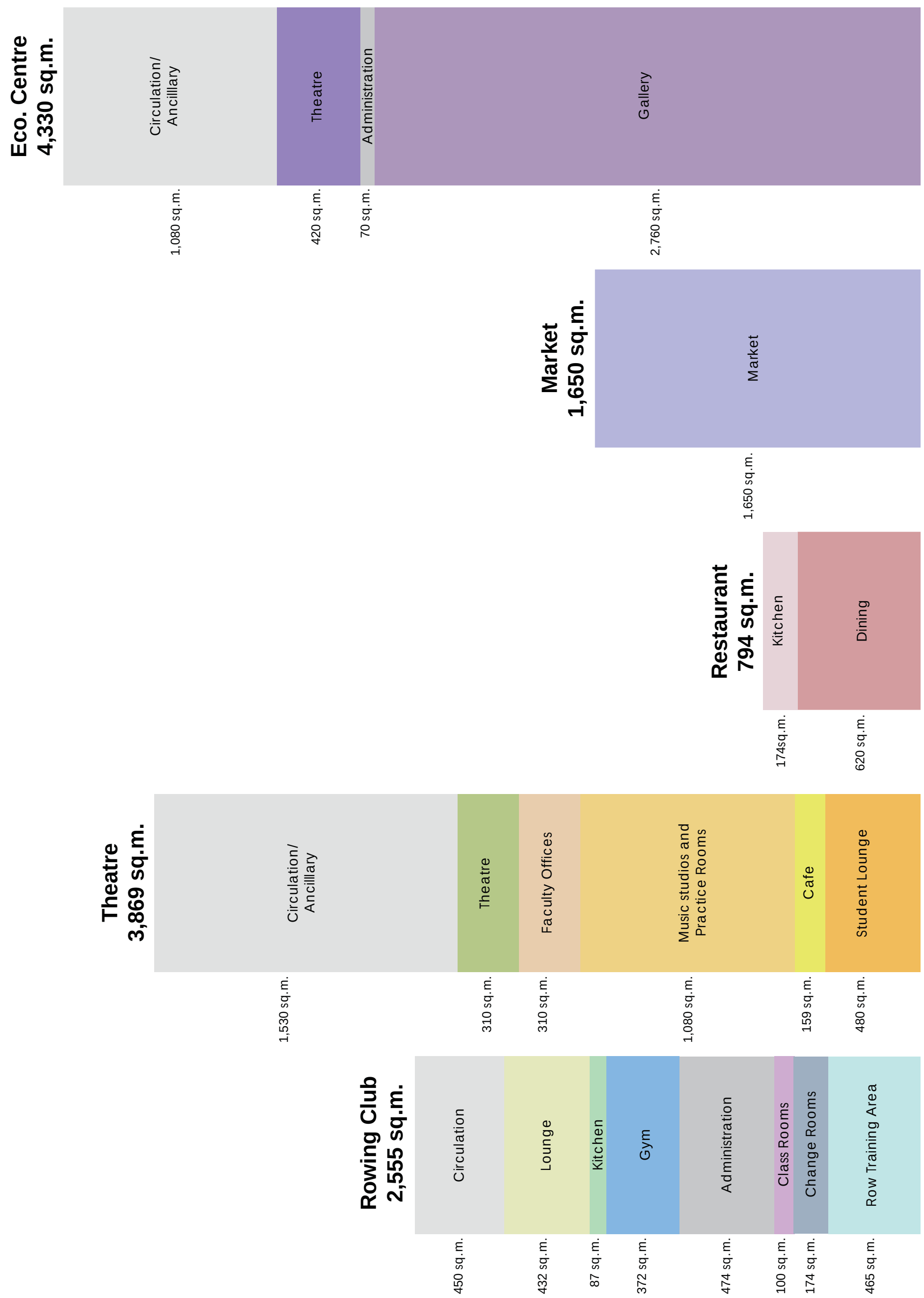


Fig 140. Curate new program uses

By proposing new anchors, the project creates the attractors by introducing new programmatic relationships to transform the bridge into a cultural and institutional infrastructure for attracting people into the site while generating waterfront activities.

2. Program the bridge and create the attractors

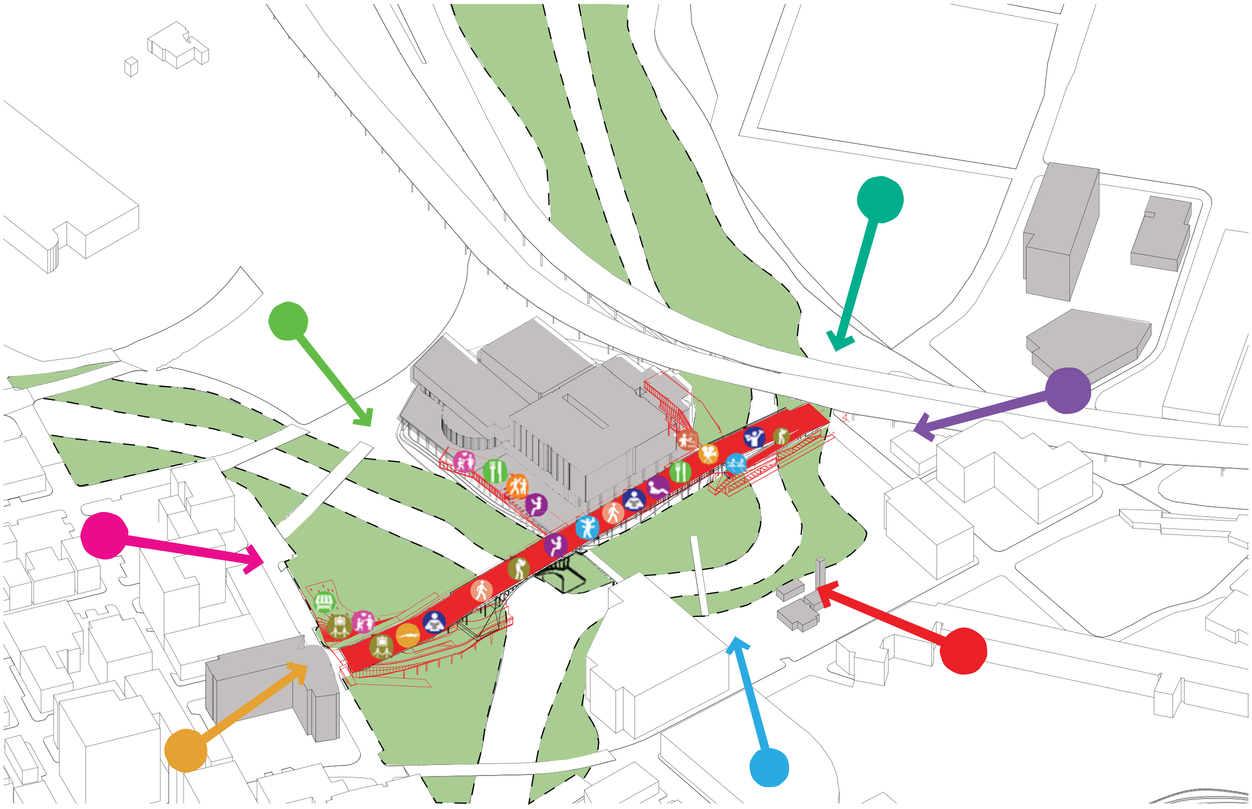


Fig 141. By placing the active programs on the bridge, the landscape below can be protected from disruption.

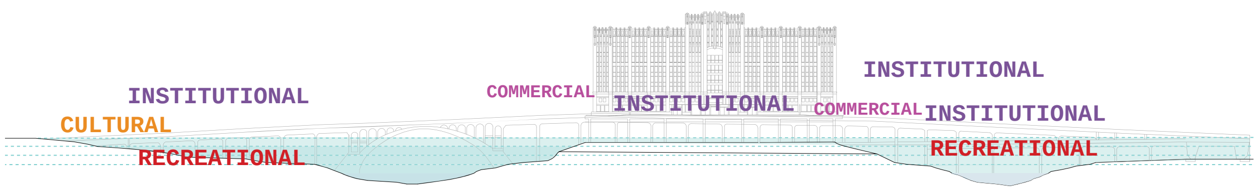


Fig 142. Strategy to connect the site end to end, above and below.

By utilizing the existing bridge, all the active program can be placed on the bridge while protecting the landscape below (*Fig 141*). It opens up the site to various uses while being resilient to flooding by placing institutional, commercial and cultural program above the flood line and recreational below (*Fig 142*). This activates and programmatically connects the site end to end and above/below. By curating new program combinations that can be flexible for various institutional and cultural uses, the proposed program is compatible for a university campus setting while encouraging waterfront recreational activities. At present, their is no bayou ecological center in Houston, nor any rowing facilities that directly access the bayou. As a liberal arts institution, University of Houston Downtown does not have much variety in the arts program despite the growing demand in the downtown entertainment sector.

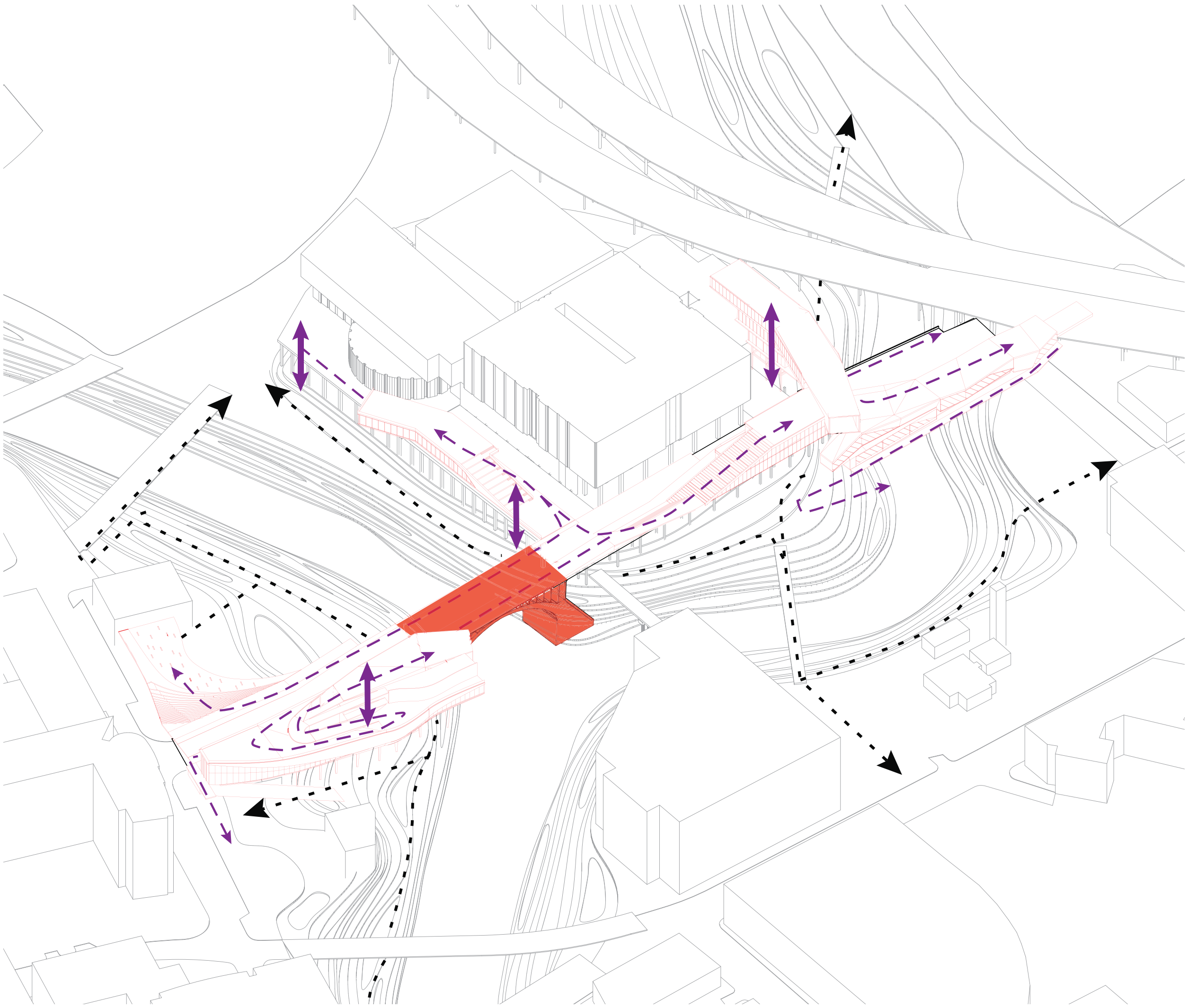


Fig 143. Place the attractors while keeping the span of the arch clear.

The programs are placed on the bridge to create anchor points, to trigger motion across the bridge and into the landscape, while keeping the span of the arch clear (*Fig 143*).

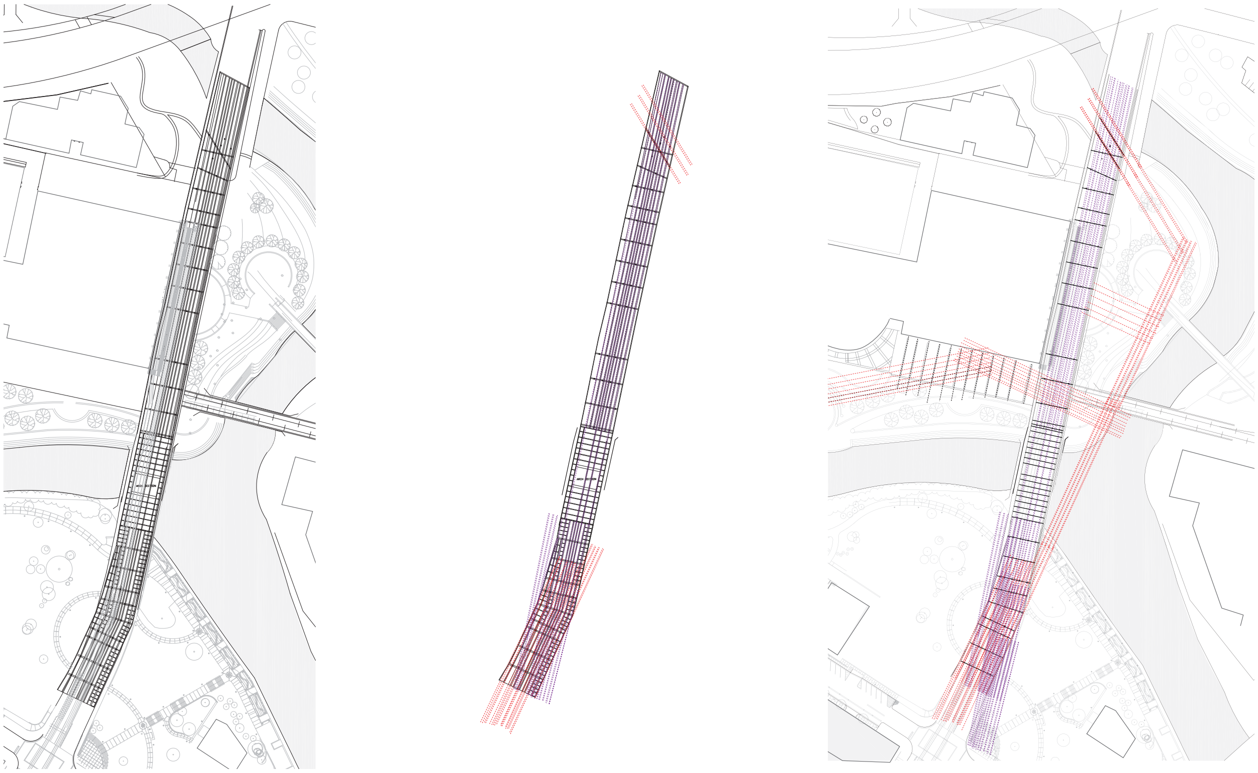
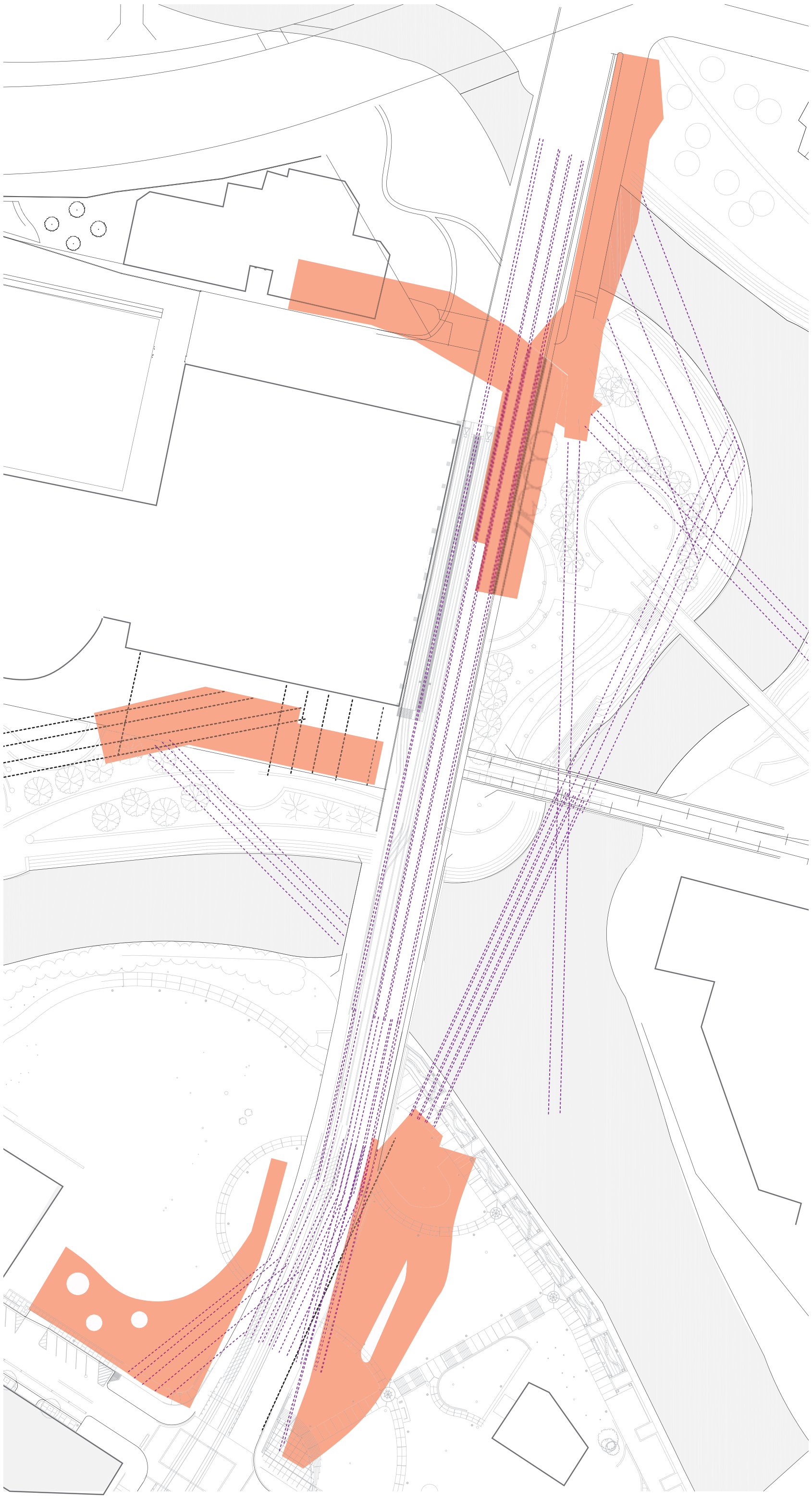


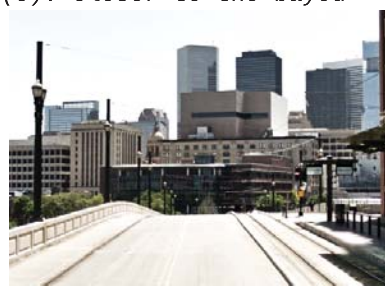
Fig 144 (a). The formal order was derived from the existing structural grid of the bridge. By projecting and intersecting lines into the landscape, an architectural language was derived for the buildings.

One strategy to derive an order to place program on this banal bridge is to extract patterns from its structural grid. This strategy aims to maintain the linear language of the bridge while creating new spatial relationships by projecting lines towards key views into the site (*Fig 144 (a,b*).

3. Creating interconnectivity with proposed buildings

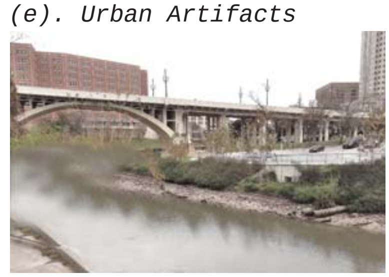


(c). closer to the bayou



(d). downtown houston

(e). Urban Artifacts



(f). Arch

(g). Arch

Fig 144 (b). Aligning to key views to create formal gestures.

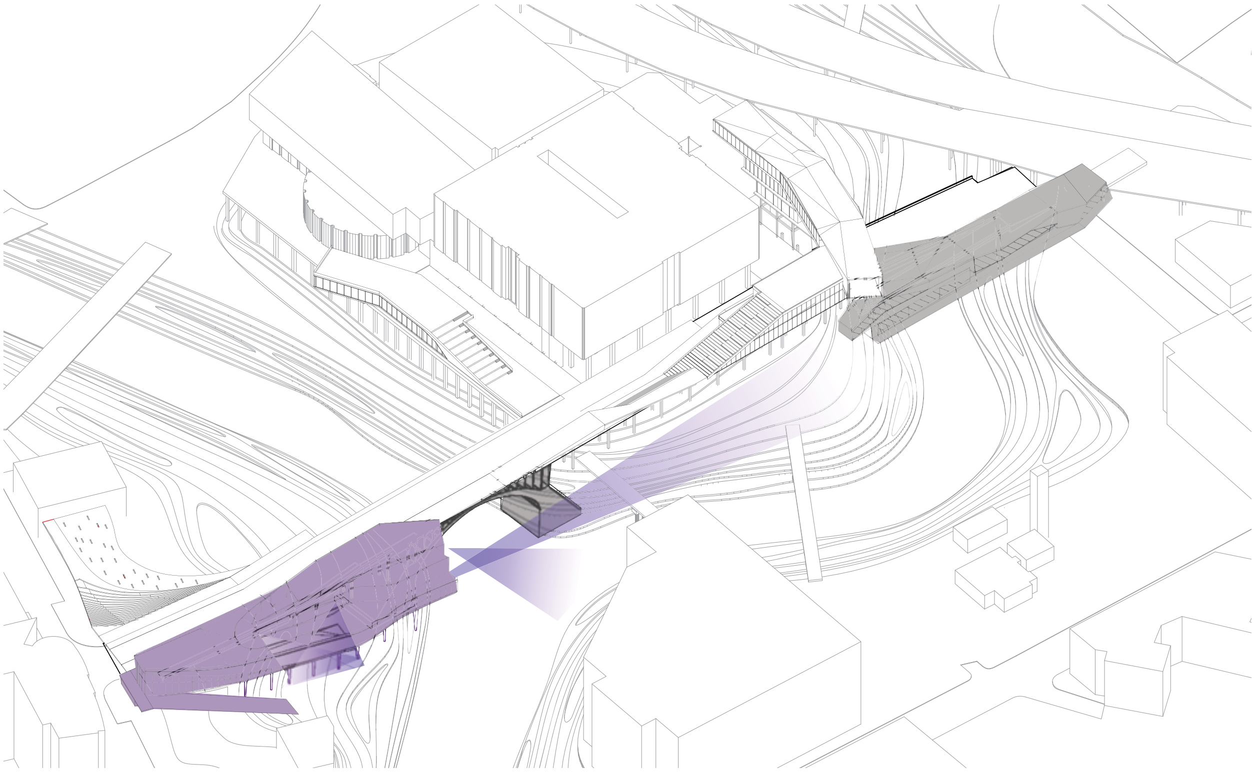


Fig 145. Ecological Centre View Diagram

On the end bounded by the downtown core, the new ecological center anchors the bridge, providing cultural and institutional program for displaying the history of the site. Galleries wrap around the existing lightwell which allows indirect lighting and views to the landscape below. Galleries gradually step above the flood line, opening up views to the landscape.

The concept of this building is to wrap the circulation horizontally and vertically, connecting the bridge with the landscape. The entrance bounds the street and bridge corner connecting people to the landscape. The building gradually steps and ramps up above the flood plain. The galleries interconnect with each other while framing views to the landscape. The two main galleries anchor the circulation which wraps

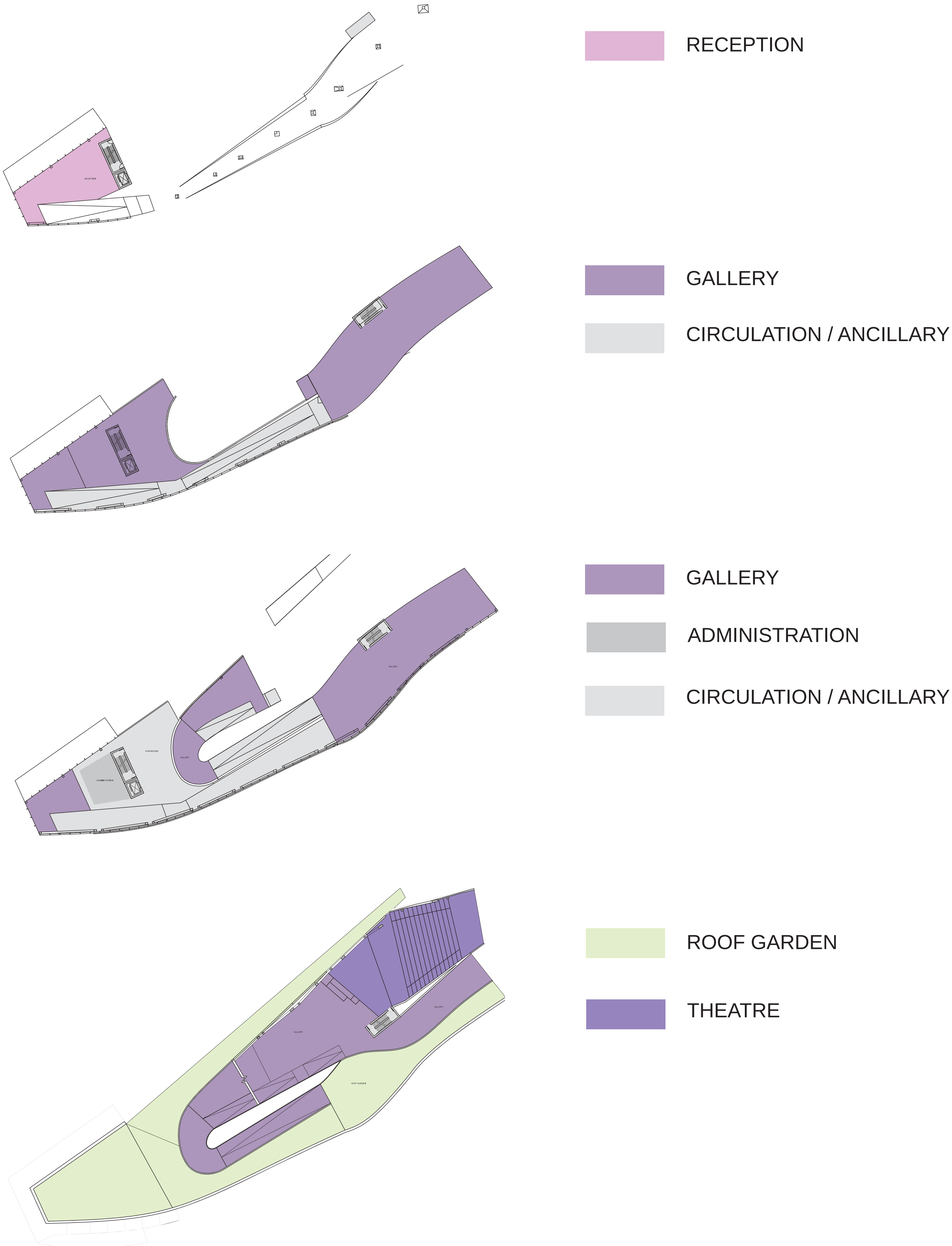


Fig 146. Ecological Centre Floor and Roof Plans

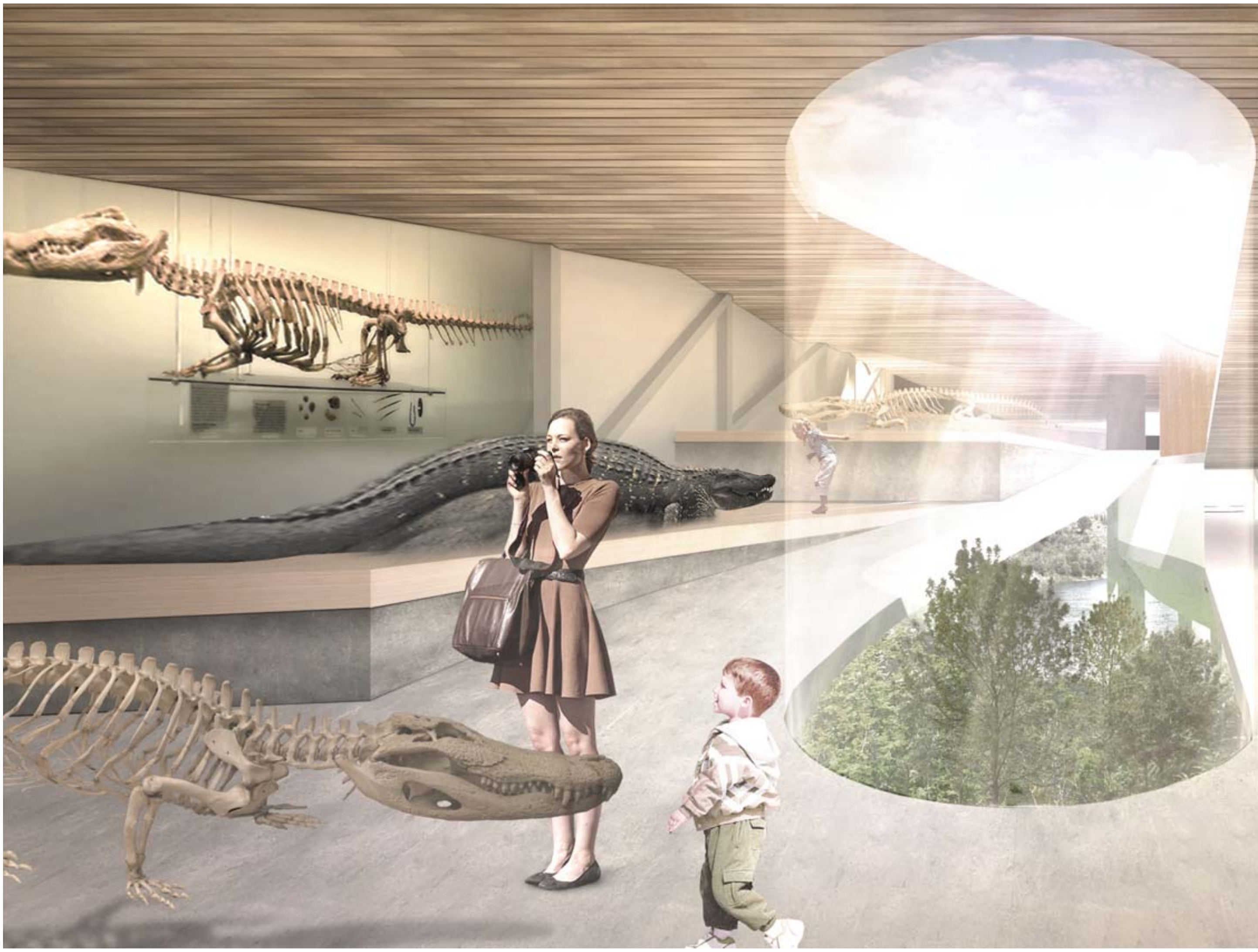


Fig 147. Interior circulation

back, then around a small opening introducing users with native plant species below. The building's circulation is constantly meandering to simulate the experience of walking in the natural landscape. The final point along this path is a space with raked seating forming a multi functional area either as a theatre or multi-use gallery with a view of the bridge. The façade has a hanging screen of vegetation to protect the interior from the southern sun while embracing, the local ecology of

the Buffalo Bayou and providing opportunities to attract local fauna. The weathering steel façade creates a monolithic tone contrasting with the monumentality of the bridge and is ideal in this moist environment. The soffit and underside of the building is reinforced concrete creating a contrasting relationship with the landscape and providing a micro-climate for plants to grow.

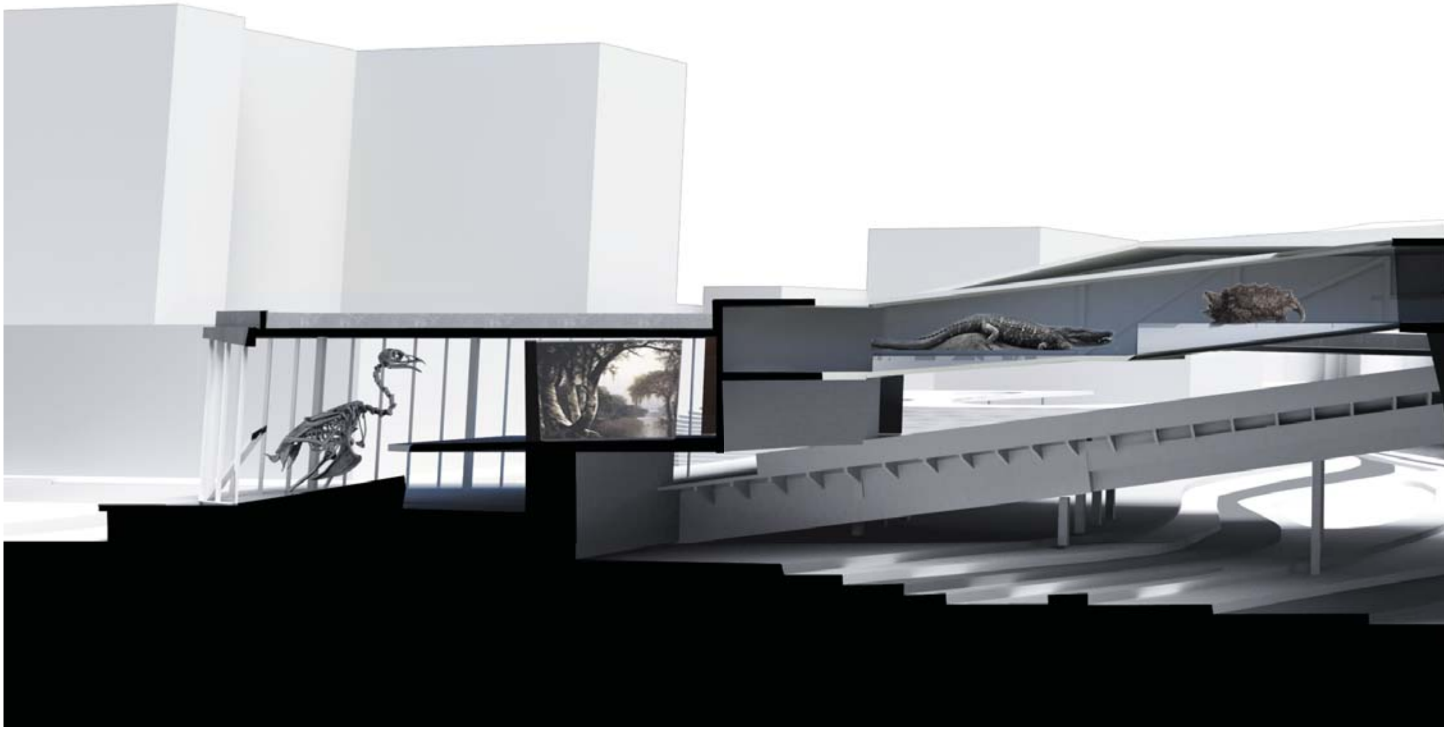


Fig 148. Ecological Centre Rendered Section

Fig 147. Ecological Centre Rendered Section

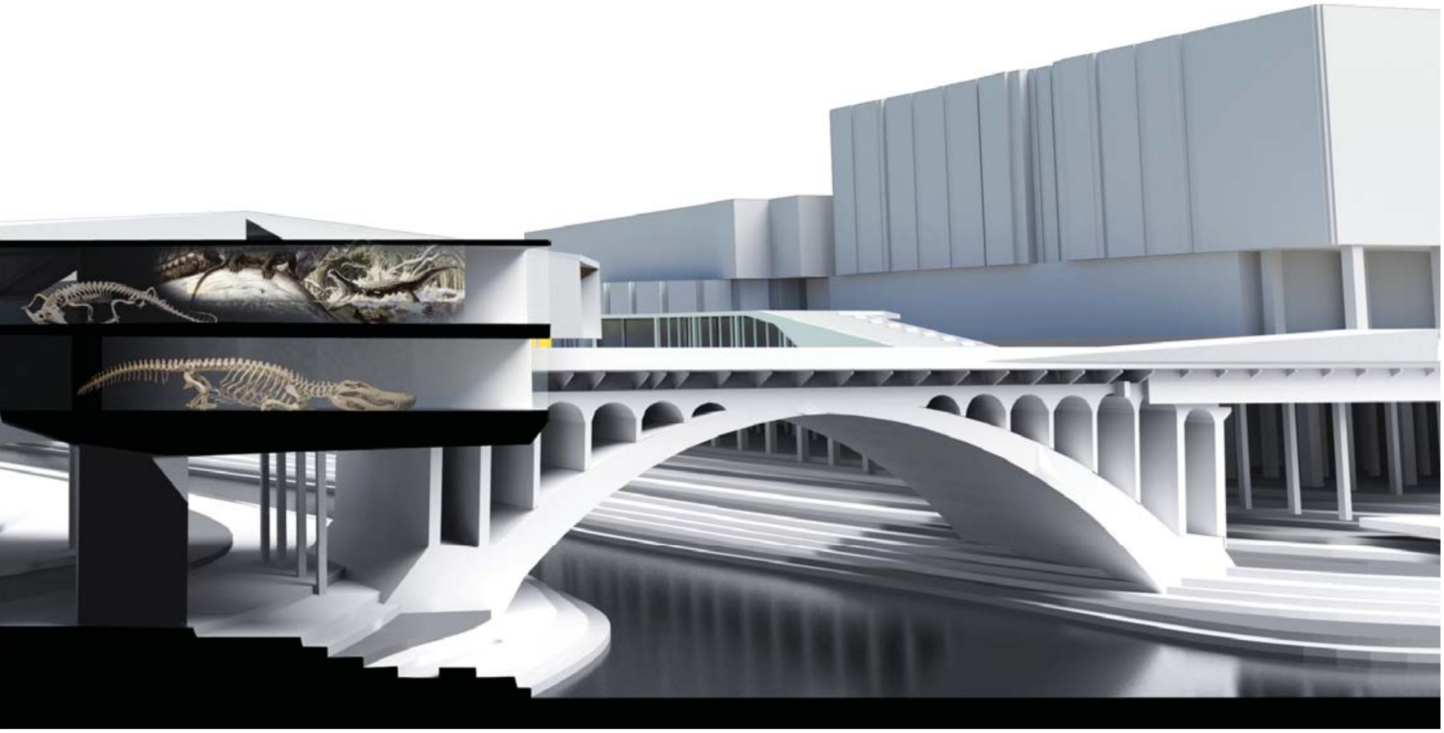


Fig 150. Gallery 1

Fig 151. Interior classroom/work shop space steps down towards the bayou

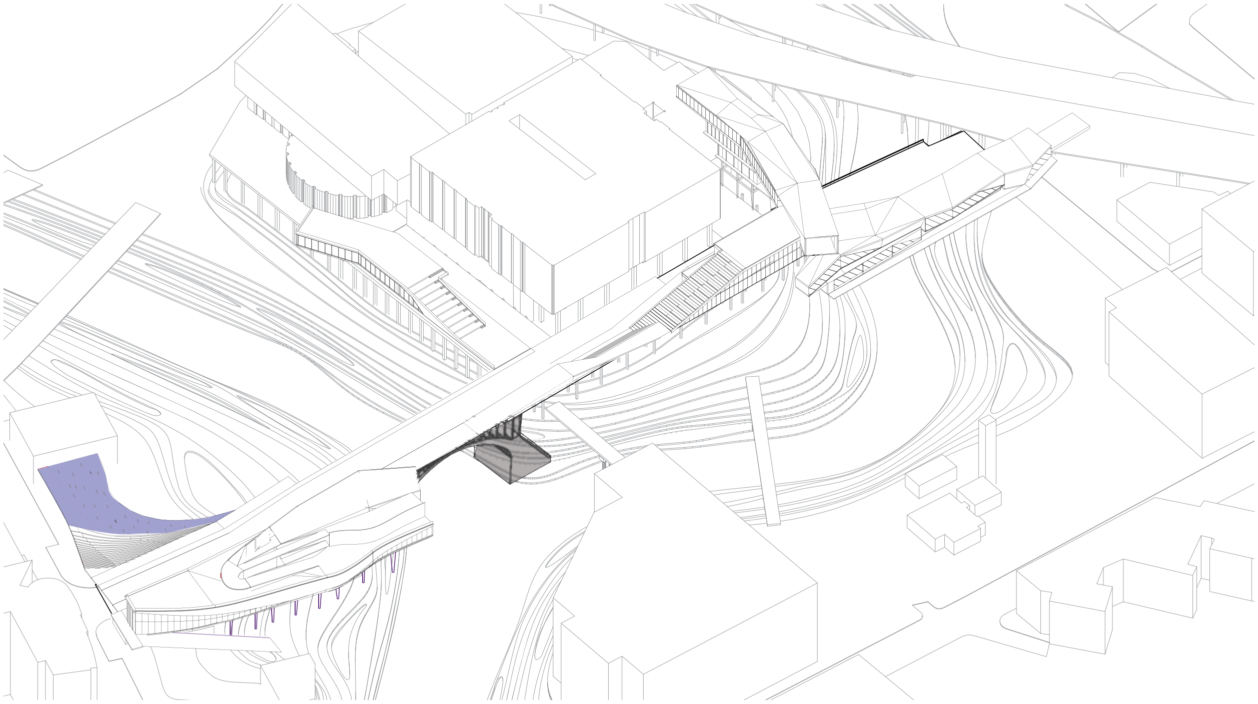


Fig 152. Market

On the opposite side of ecological center, a farmers market with a perforated canopy is situated.

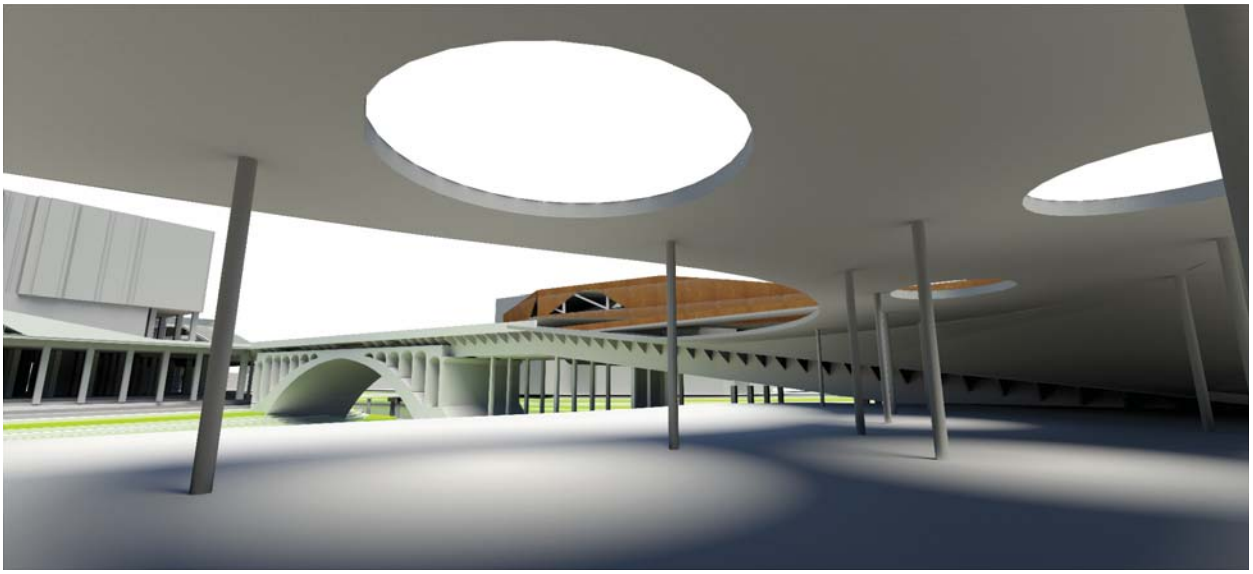


Fig 153. Market

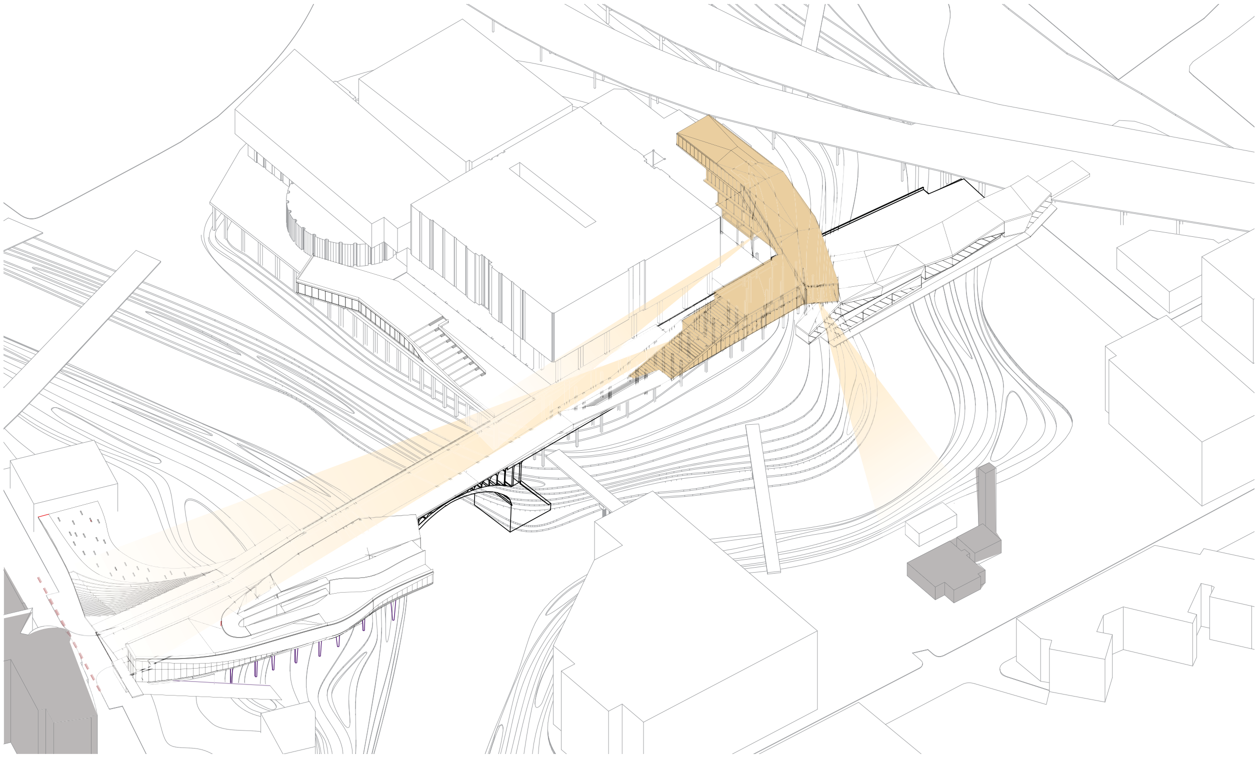


Fig 154 (a). Arts building

On the mid section of the bridge, a student lounge and the arts building anchors the space. The driving idea of this building was to create a lounge space at grade (on the bridge) that would engage the Buffalo Bayou with views and form a spatial boundary linearly adjacent to the existing main campus building.

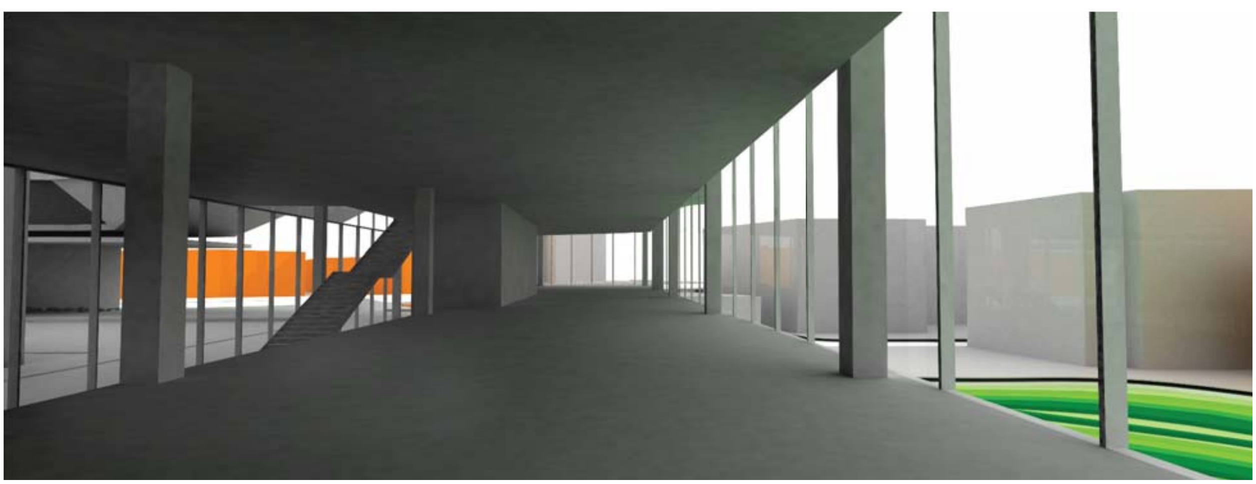


Fig 154 (b). A student lounge space (bridge level), connected with the atrium.

Fig 154 (c). A cafe opens up onto the bridge

Fig 154 (d). Looking towards the double height atrium space and the cafe. The atrium is connected with the student lounge and the arts building. It creates a visual connection with the bridge through circulation.

There is a café on the ground floor level on the bridge with a atrium that extends vertically, interconnecting the two floor plates while keeping the visual connection with the bridge. The theatre portion bridges above the Main street bridge creating a visual gateway while framing a view from the theatre to Bayou. The circulation is oriented along the exterior with interstitial common space – this creates large views to the city and other elements around the site (*Fig 154 b,c,d*).

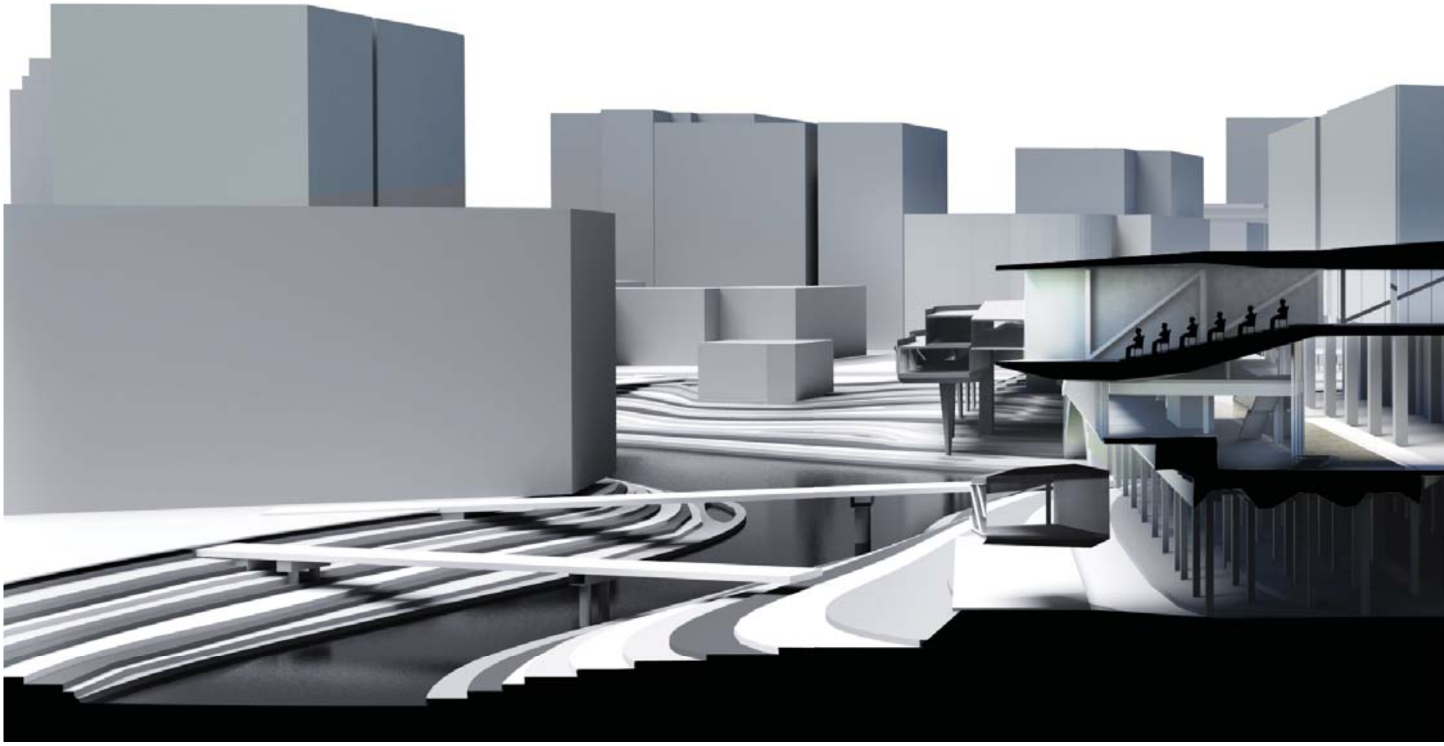


Fig 155. The arts building is oriented towards the bayou and the city. It hovers above to allow the tramline through, while creating a new gateway boundary for the north end of the bridge.

THEATRE

CAFE

STUDENT LOUNGE

MUSIC STUDIO

PRIVATE STUDIO CLASSROOM

PRACTICE ROOM

FACULTY OFFICES

THEATRE

CIRCULATION / ANCILLARY

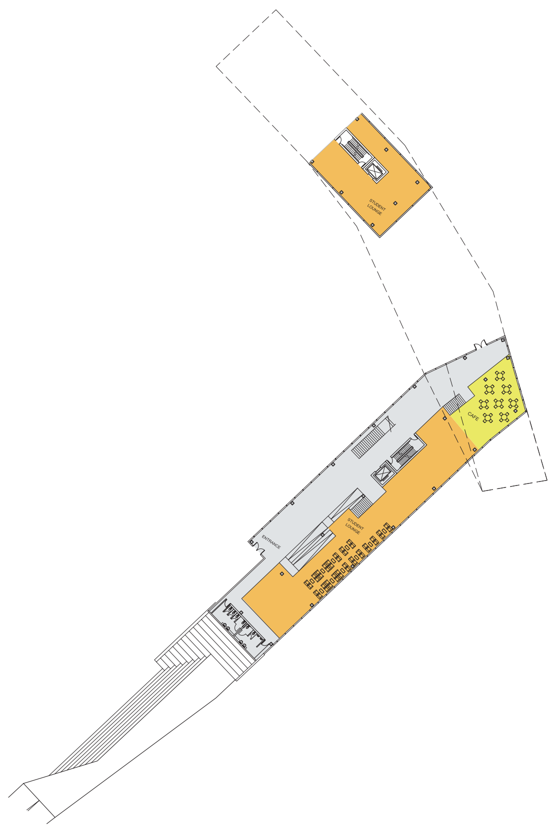


Fig 156. Ground FLoor Plan Student Centre

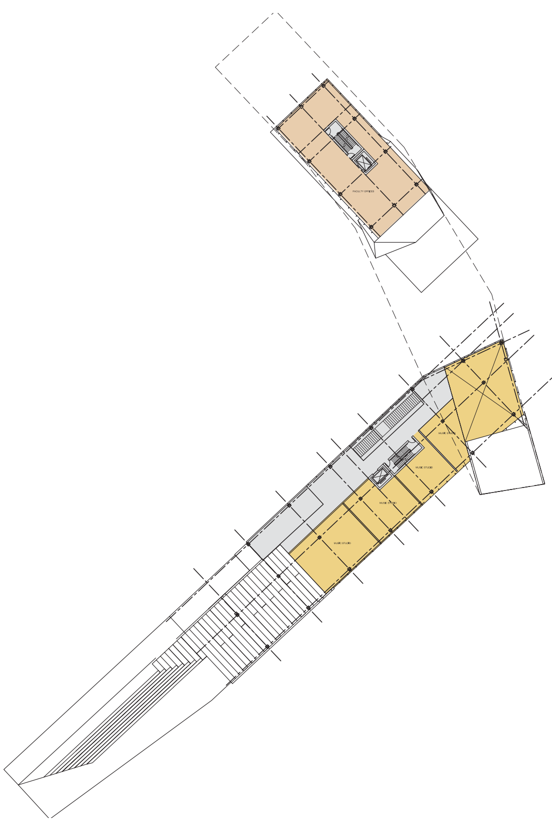


Fig 157. Second Floor Plan Student Centre

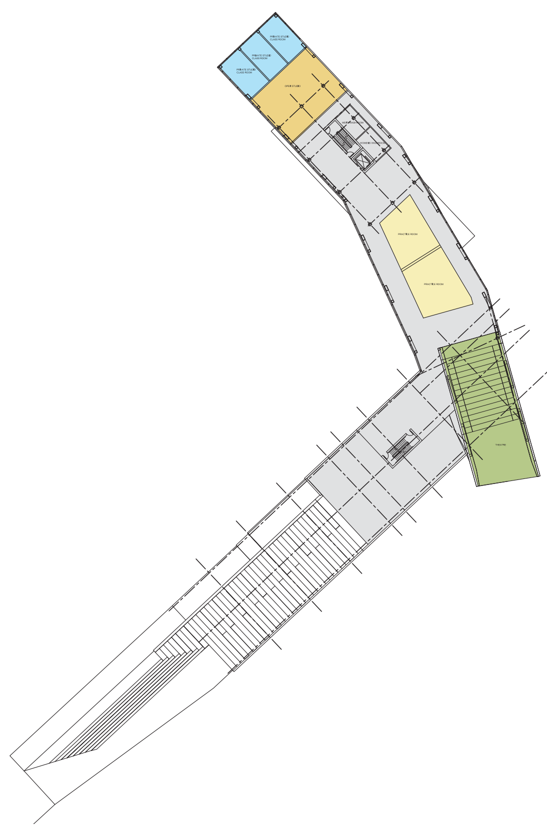


Fig 158. Main Theatre Plan

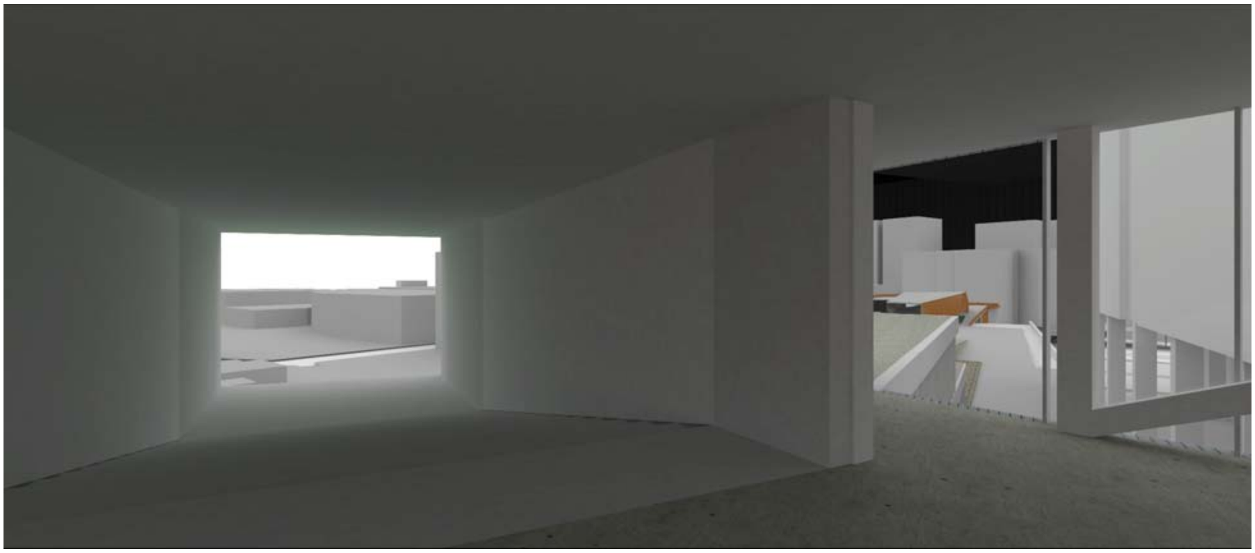


Fig 159. Interior spaces such as the classroom/theatre space, is framed towards the bayou, the city and the eco-logical center.

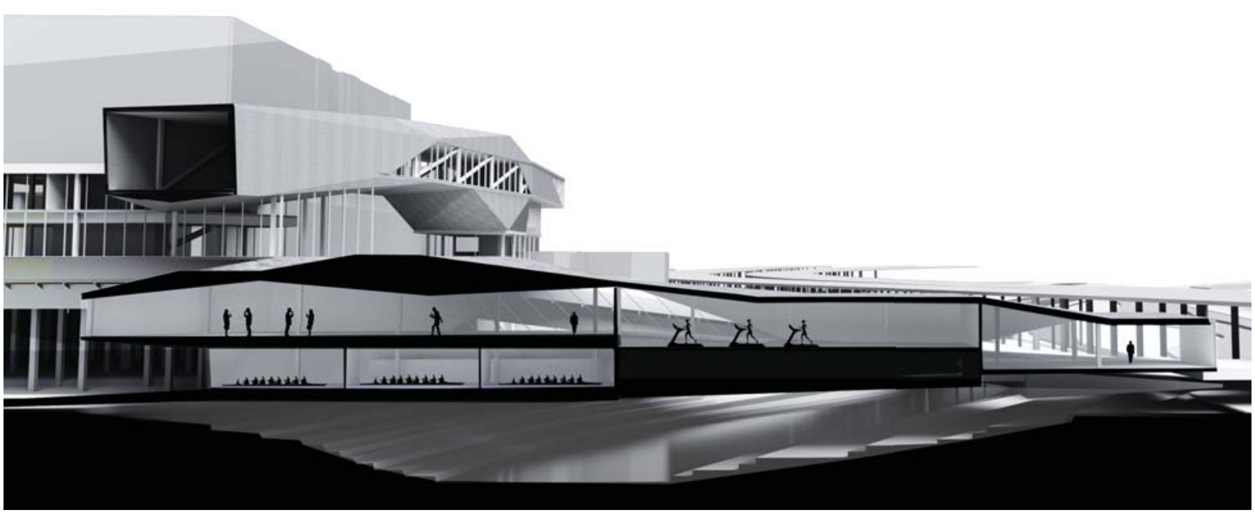


Fig 160. The rowing club-rendered Section

Fig 161. Rowing Club Practice Area - framed by the landscape and ecological center across.

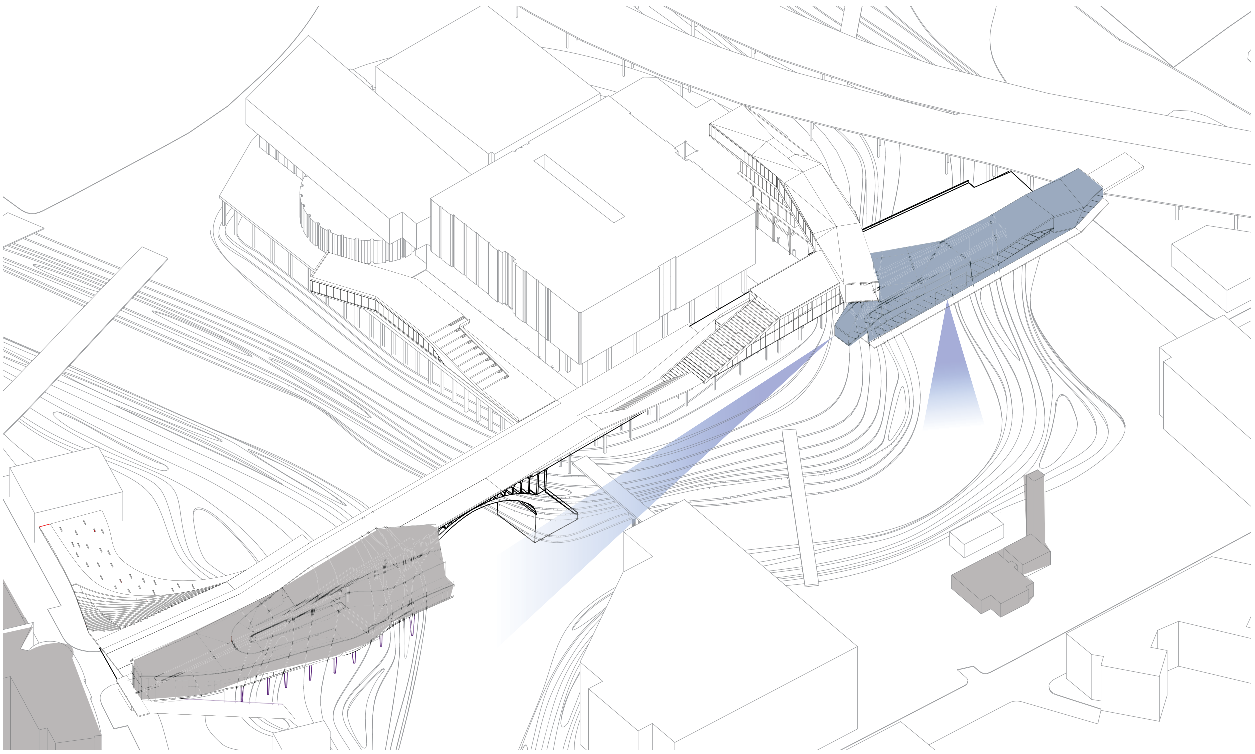


Fig 162. Rowing Club

The rowing club is situated on the existing bridge ramp which creates it’s linear configuration and frames views towards the bayou. It activates the bayou for institutional and recreational use while being compatible to flooding as the program below the flood line mainly consists of indoor rowing tanks, change rooms and washrooms.

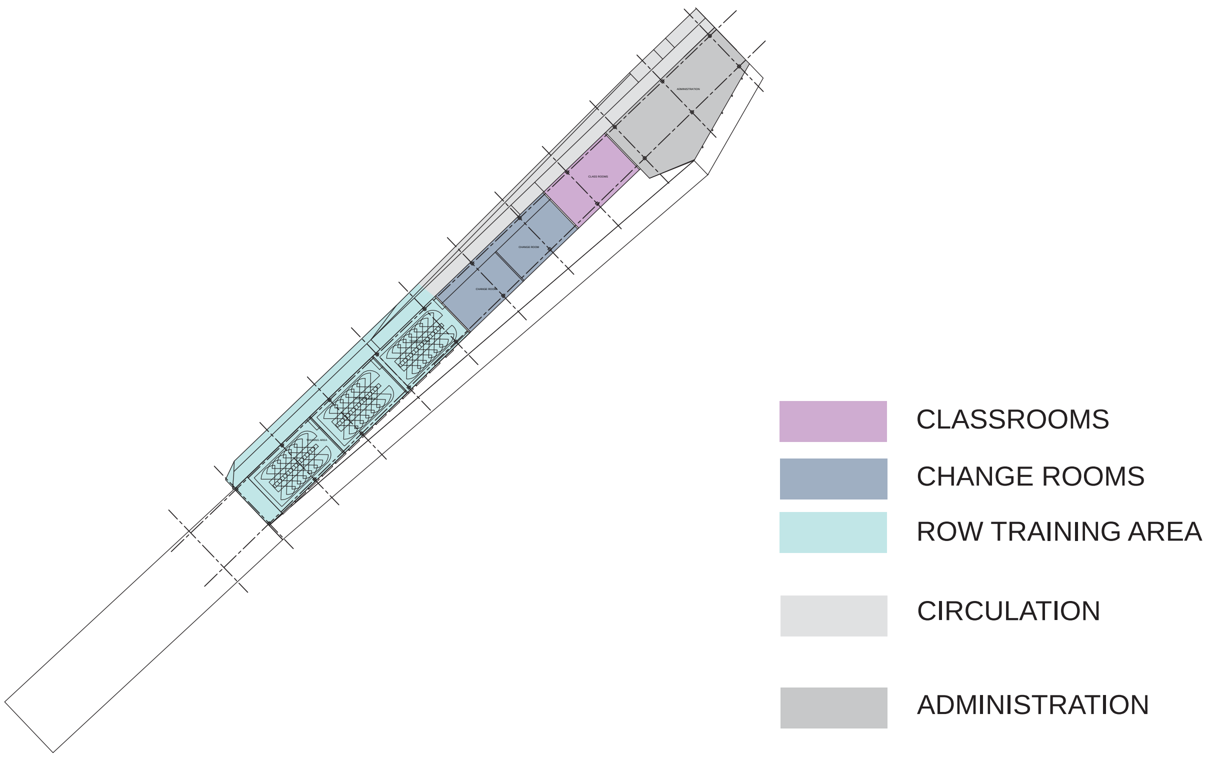


Fig 163. Lower Floor Plan

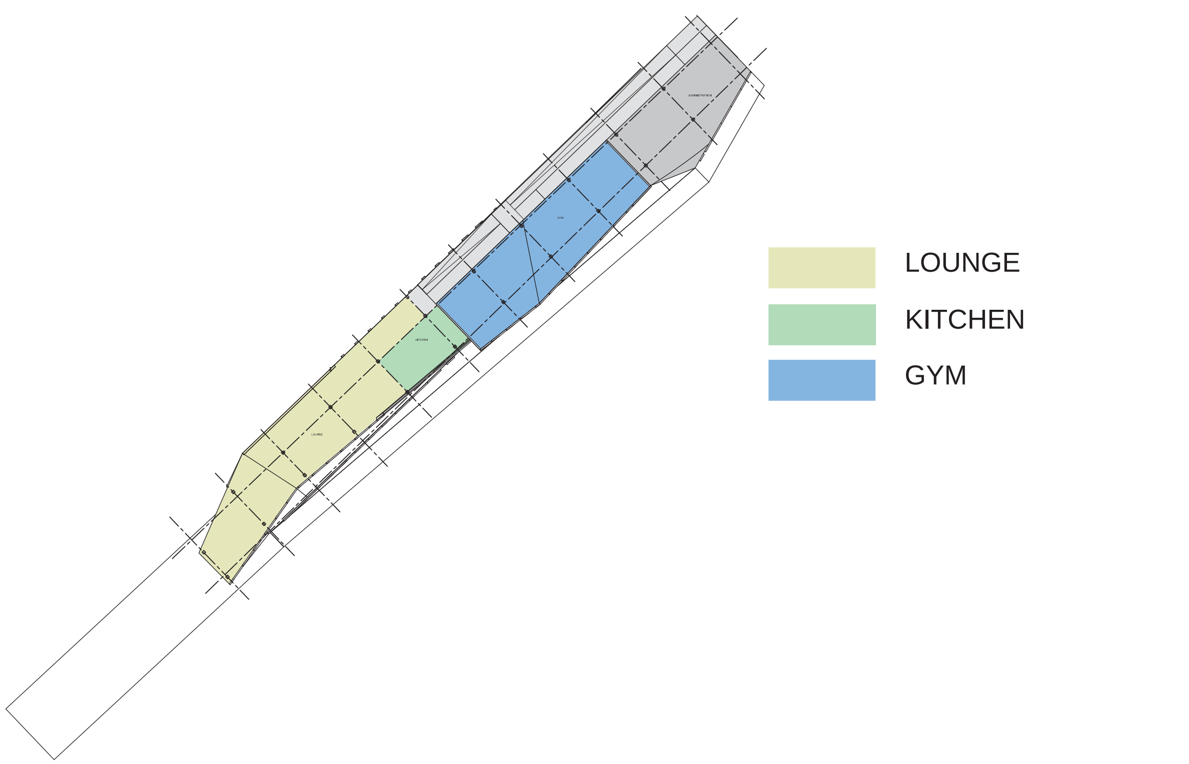


Fig 164. Main Floor Plan

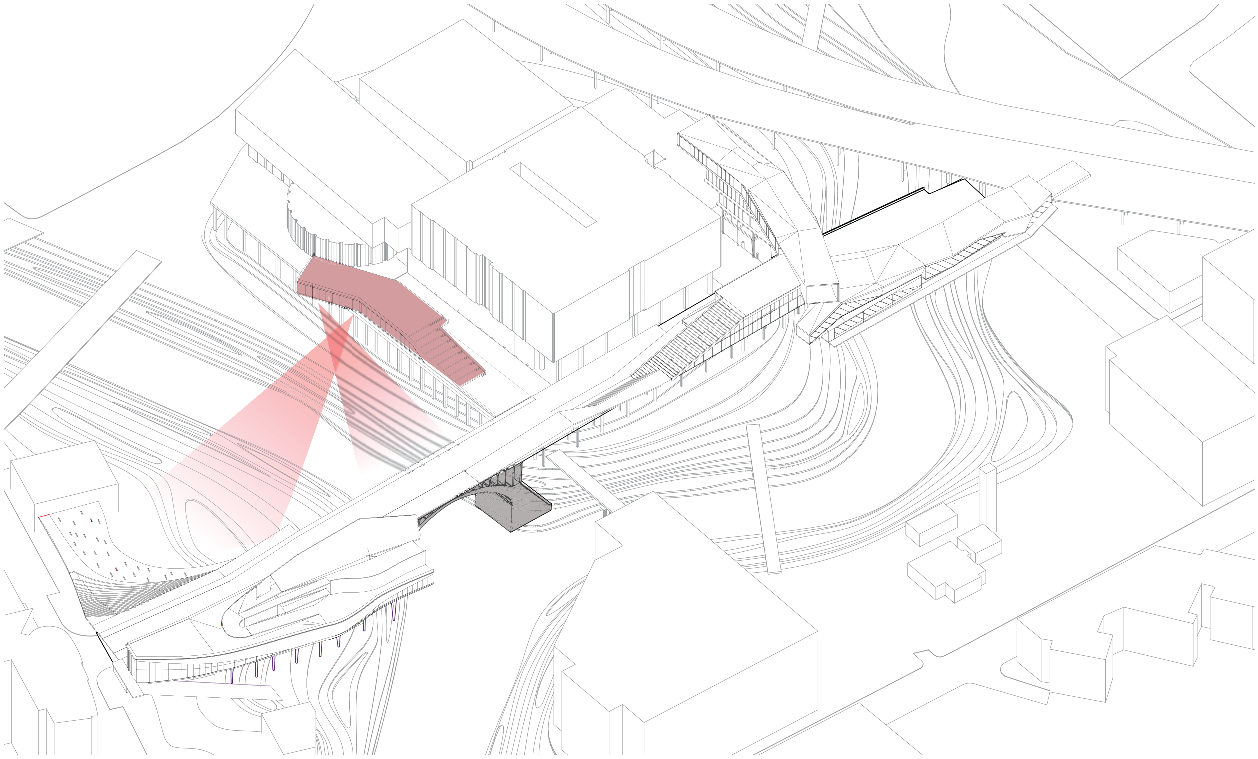


Fig 165. Restaurant Views

The restaurant angles out at the end, to frame the views towards the arch, landscape and the downtown. The restaurant can be used as an exhibition event space as well, as there is a demand for rentable events space in the downtown core.

Fig 166. Restaurant Interior

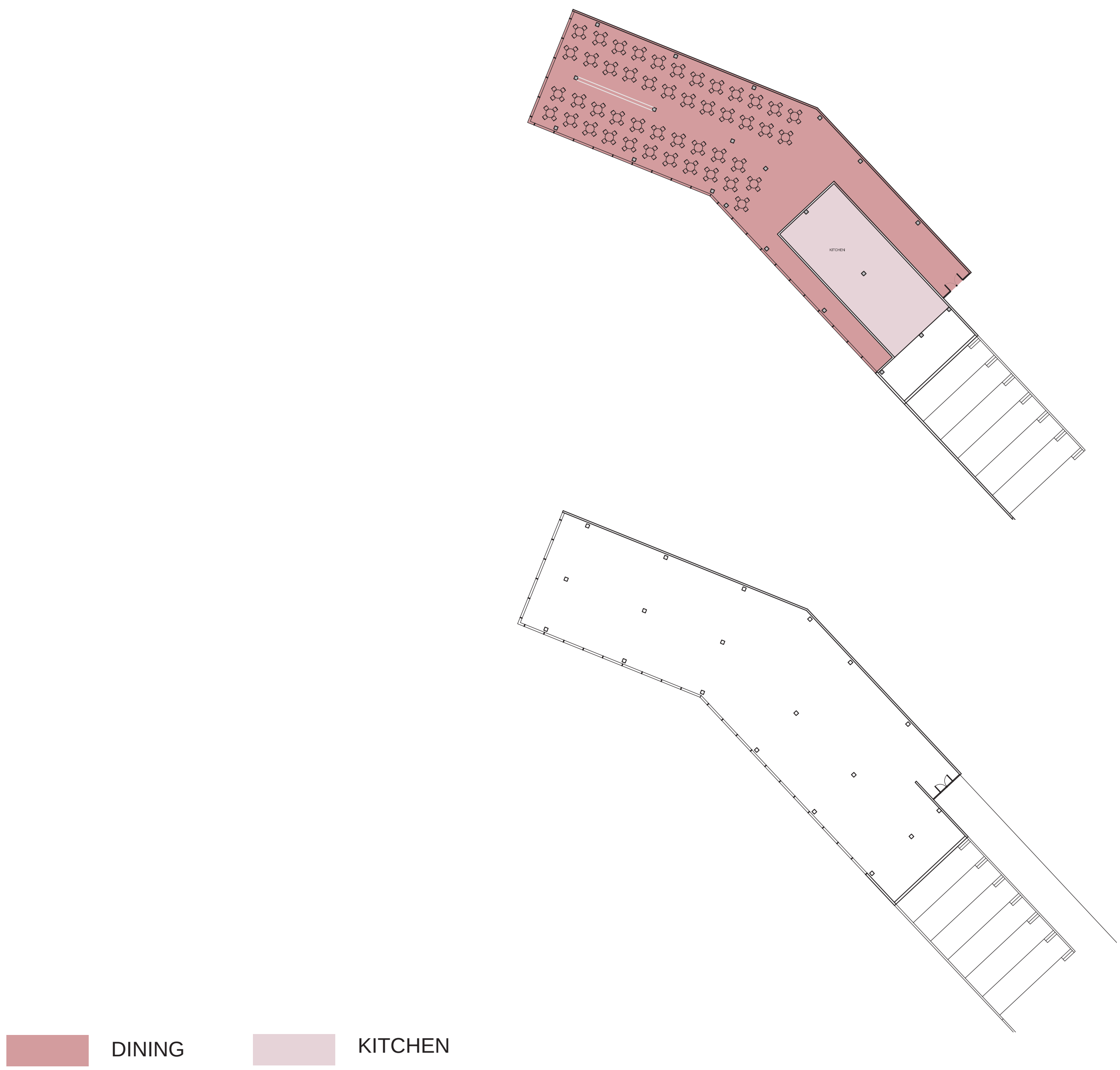


Fig 167. Restaurant Floor Plan and Roof Plan

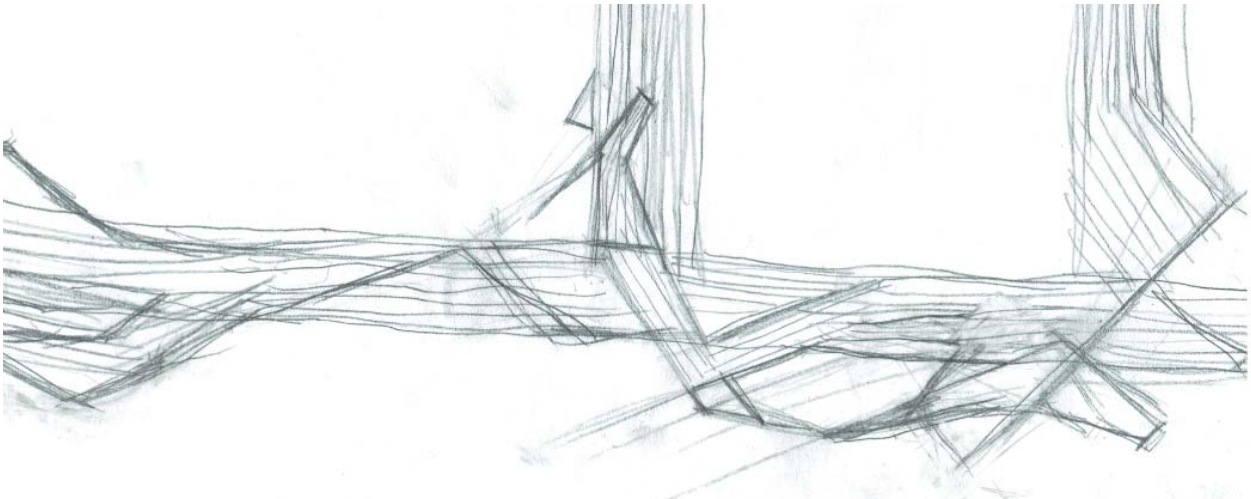


Fig 168. Abstract bridge surface sketch - by using the existing structural pattern of the bridge and intersecting lines between the anchor points, the organizational pattern of the surface deck was generated.

Deck surface pattern:

The surface patterning is a mix of soft and hard scape that has been oriented to emphasize the internal structure of the bridge as well as the key views off the site. The hard-scapes are composed of precast concrete pavers and Ipe decking. The soft-scape ranges depending on where you are on the bridge. Grasses are used on the north side to create vertical scale with the buildings around it. Smaller grasses are used on the south to reinforce the landscape edges where the Ecological Centre is located. Grasses are also used on the steps on both the restaurant and Student Centre.

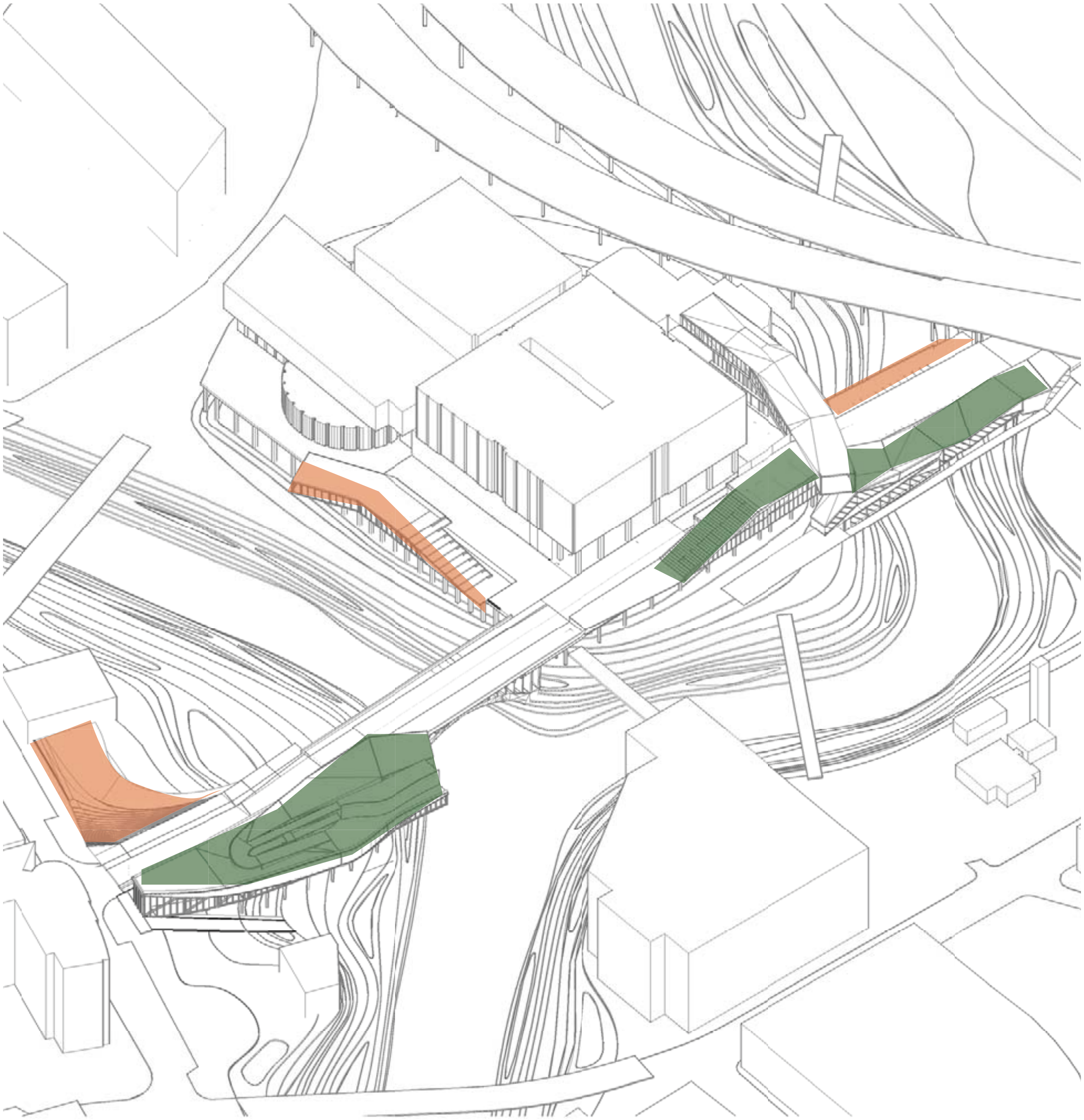


Fig 169. Bridge Linear Park - In order to transform this bridge into a pedestrian park space, it had to be extended at key locations. Areas along the tramline (indicated as red), are extended to increase the width along the tramline.

The bridge deck was extended along the tram line in key areas to allow the creation of pedestrian platforms. Additionally, rooftops of the buildings (*indicated as green*) provide new pedestrian space and opportunities for engaging with the landscape (*Fig 170*).

Fig 170.Spaces such as the roof of the ecological center provide additional pedestrian platforms and opportunities create spaces to connect with the landscape and the wild life.

Fig 171. Spaces such as the outdoor exhibit over farmers market is created by extending the bridge deck. Pine trees that can grow betweem 15-30 meters tall provide an opportunity as a shading element for the exhibit space.

Landform Bridge - Entrance: New deck extension along the west end of the bridge creates a canopy for the farmers market with outdoor exhibition space at the top. Landscape intersects the two vertically, providing a shaded area for the outdoor exhibit space above while staying uninterrupted at the bottom to allow for market activities (*Fig 171*).

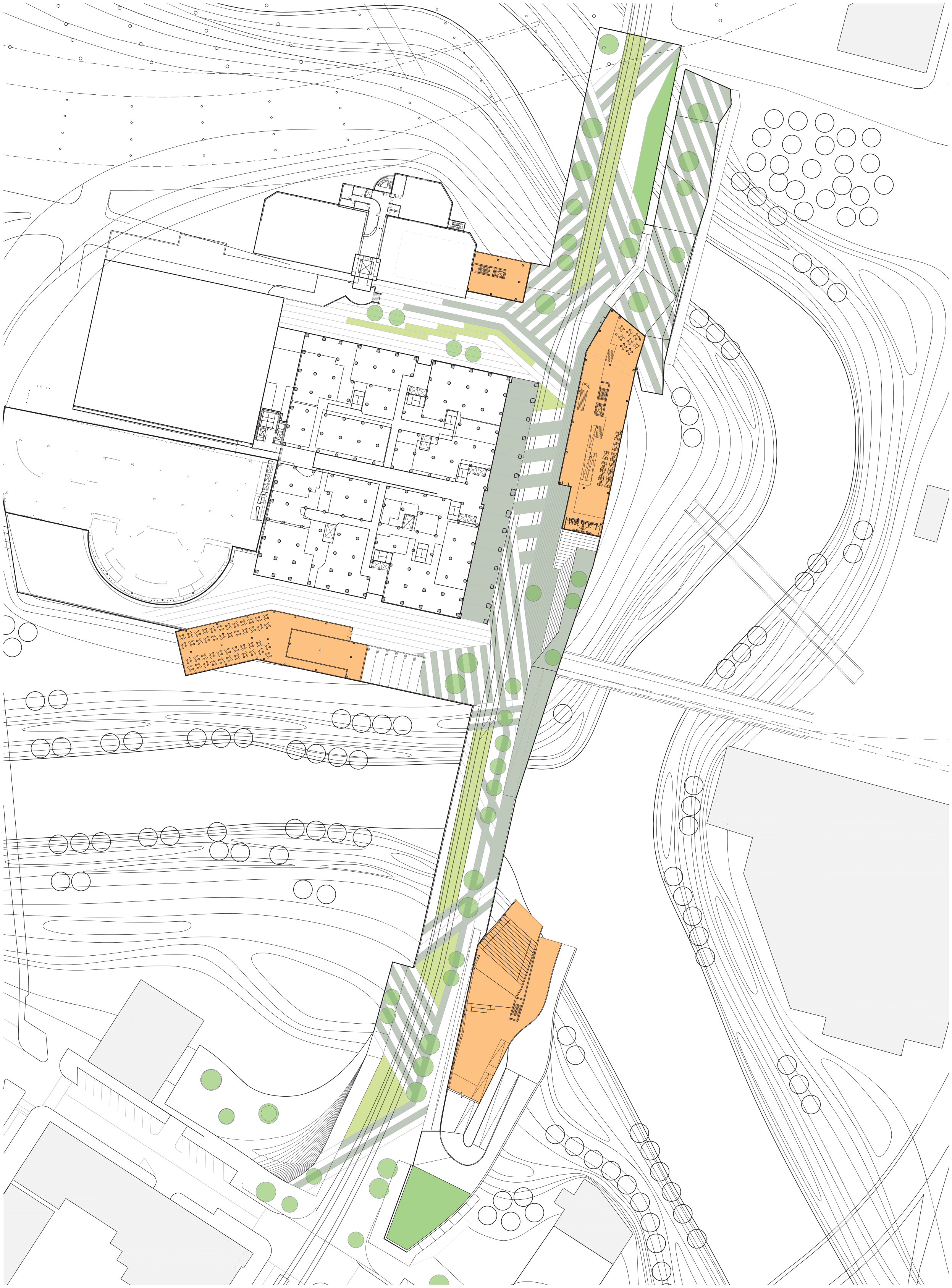


Fig 172. Bridge site plan

Fig 173. Outdoor public space, shaded with landscape

Fig 174. Top of steps at student centre looking south

Fig 175. North end of bridge looking towards the arts building

Fig 176. South bridge entrance

Fig 177. looking south towards the Ecological Center and the Downtown

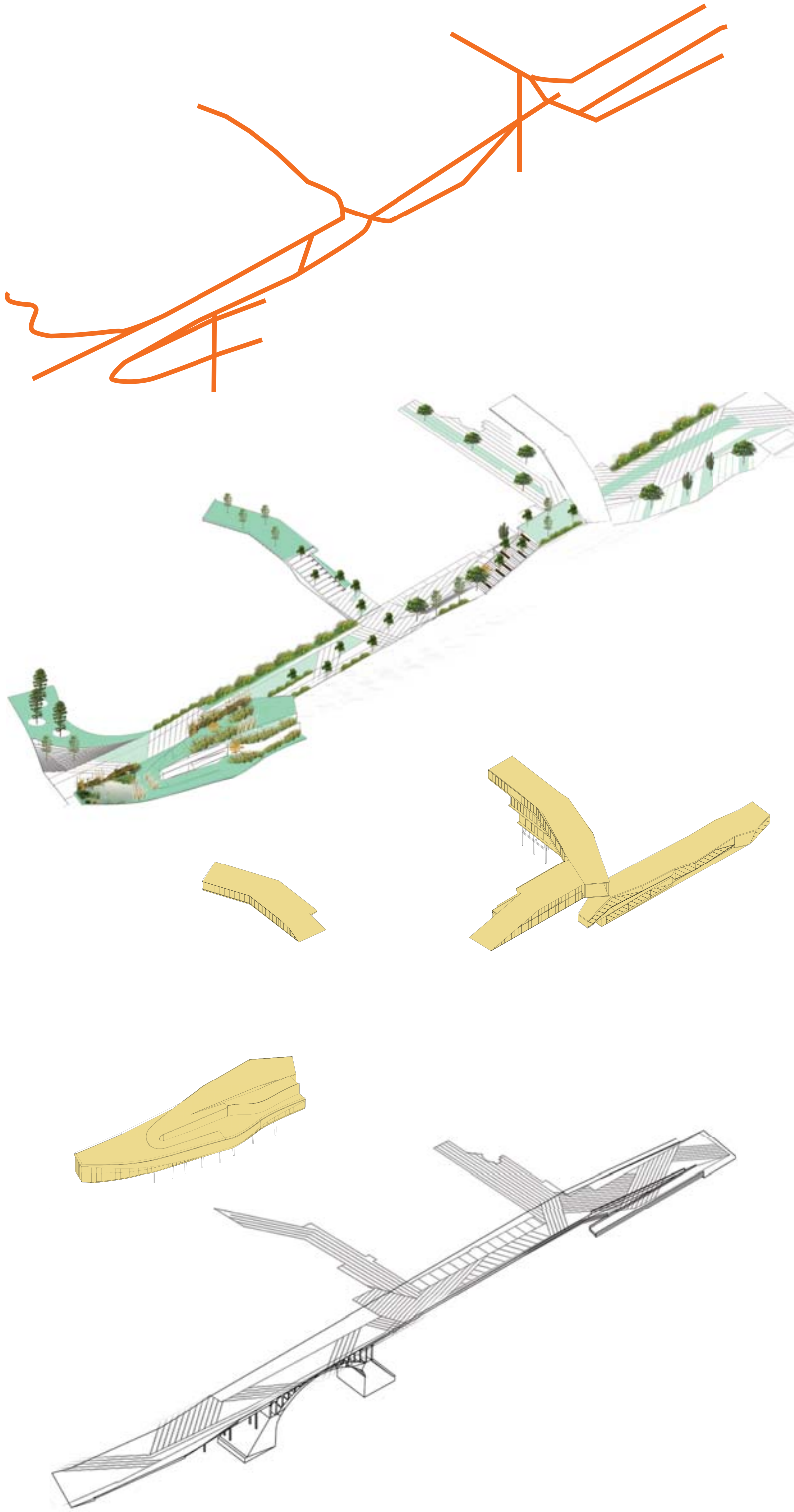


Fig 178. The bridge is synthesized as a Cultural & Institutional infrastructure - a composite system of movement, program & landscape surfaces

There was some research done for re-naturalizing the Buffalo Bayou according to it’s local site conditions and ecologies. One of the precedents for re-naturalizing it is *Buffalo Bayou Promenade* by SWA landscape architects. This project demonstates that landscape can coexist with freeways that obstruct the bayou in problematic ways.

5.6 Buffalo Bayou Promenade, SWA landscape architects, Houston, Texas

Initiated by the *Buffalo Bayou Partnership*, a neglected portion of the bayou was renaturalized along the downtown core where towering freeways crisscrossed the ground plane, creating an unpleasant pedestrian and built environment for developers. This project was part of the *Buffalo Bayou masterplan*, a vision to transform the bayou into a regional amenity, and was initiated with the intention to serve

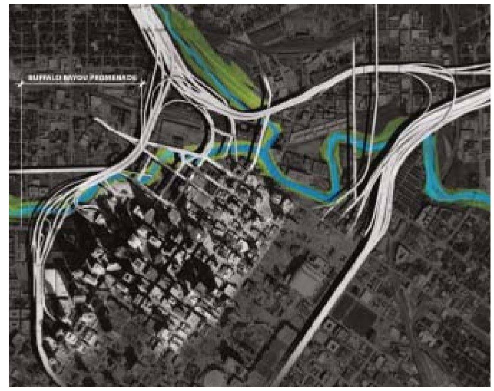


Fig 179.

Fig 180. prior to re-naturaliza-tion (Above)

Fig 181. After re-naturalization.

Fig 182.

Fig 184. Open gabion cage renaturalized edge with riparian vegetation.

Fig 185. vegetation creates stable edge

as a precedent for re-naturalizing other areas of the bayou (Hung, 2013). There were similar site specific landscape issues such as eroding banks, concrete edges, dying vegetation, obstructed access and views to the street. Seasonal storm water flows cause soil friction along the banks causing it to erode, as removal of heavy wooded riparian vegetation and impermeable surfaces contributed to a higher rate of water flow velocity reaching the bayou (Hung, 2013). The edges of the bayou were stabilized by open gabion cages that were filled by 12,700 metric tons of rock and recycled crushed concrete (*Fig 184*). The porosity of open gabion cages allowed for tree roots and riparian ground cover to form a natural edge (Hung, 2013). The root system of riparian vegetation grows *horizontally,* providing additional soil stabilization over time (*Fig 185*).

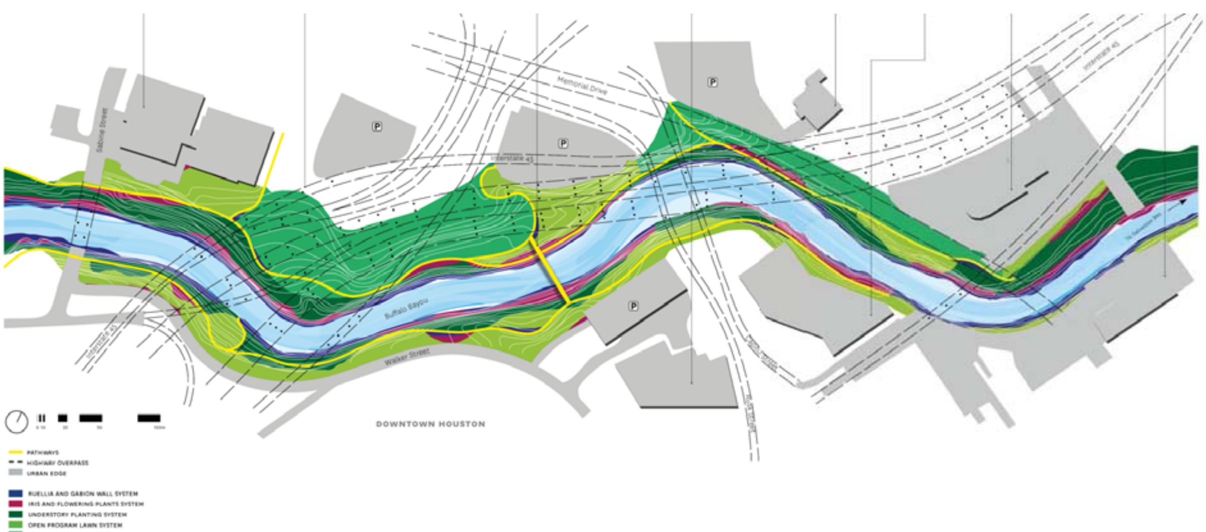


Fig 183. Buffalo Bayou promenade - renaturalized ecological zones

Fig 186. Re-naturalizing Buffalo Bayou

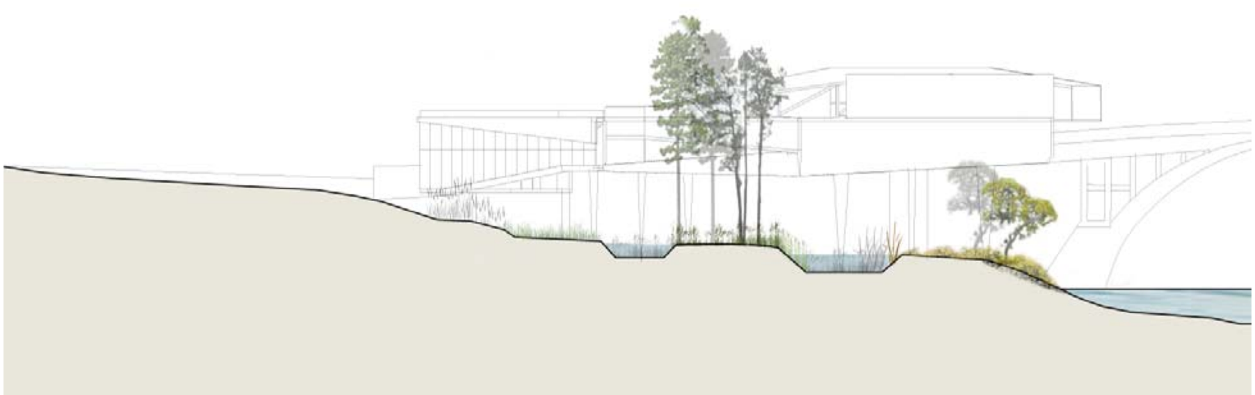


Fig 187. Conceptual Swale Section. Learning from precedents such as Fresh Kills and Buffalo Bayou Promenade, flooding of the site can be improved by constructing swales and creating dense vegetation. This re-animates the ecological character of the Bayou previous to its pavement by meandering flow patterns and increasing flood conveyance through a swale system.

5. Re-naturalizing the Buffalo Bayou

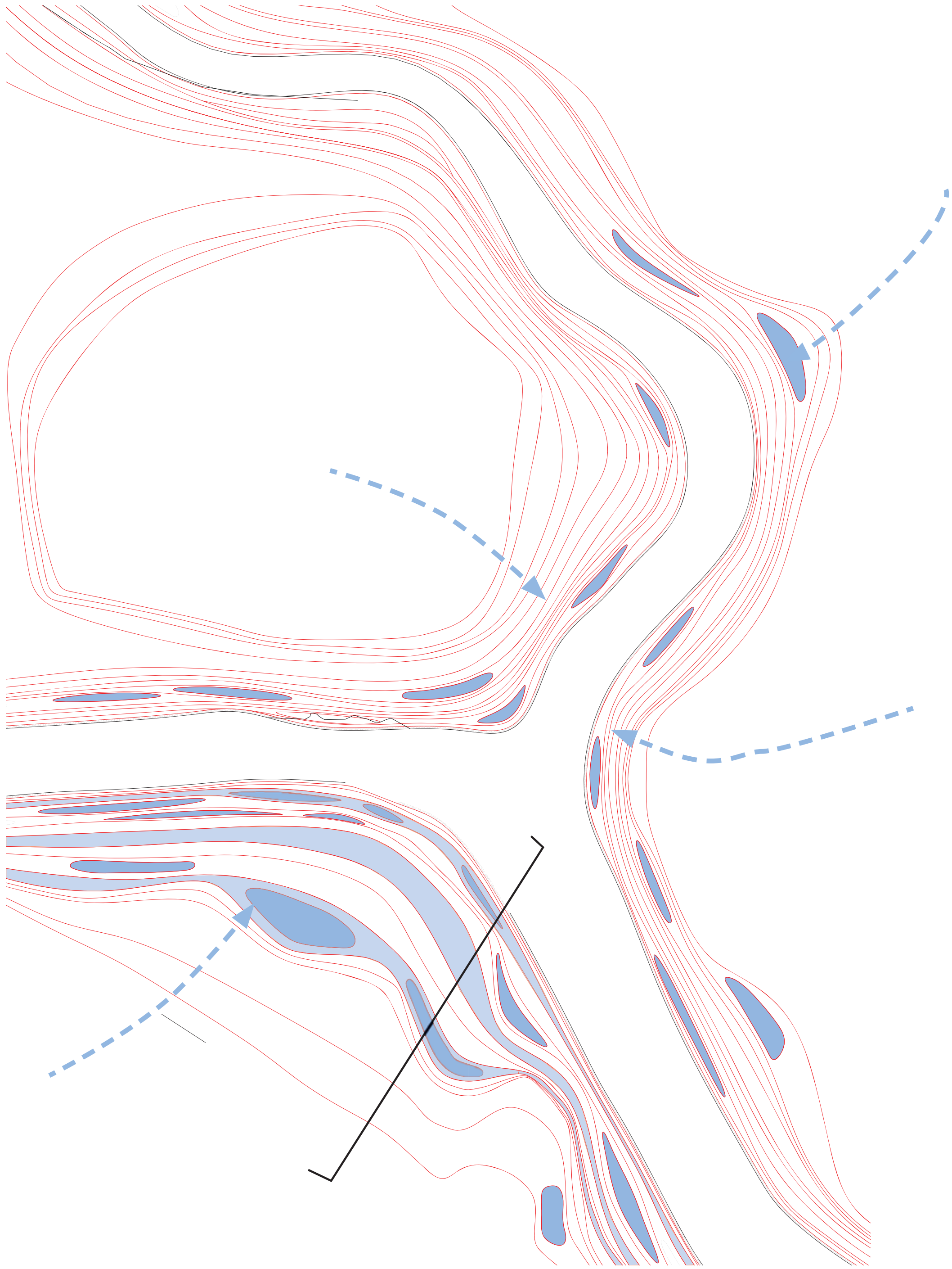
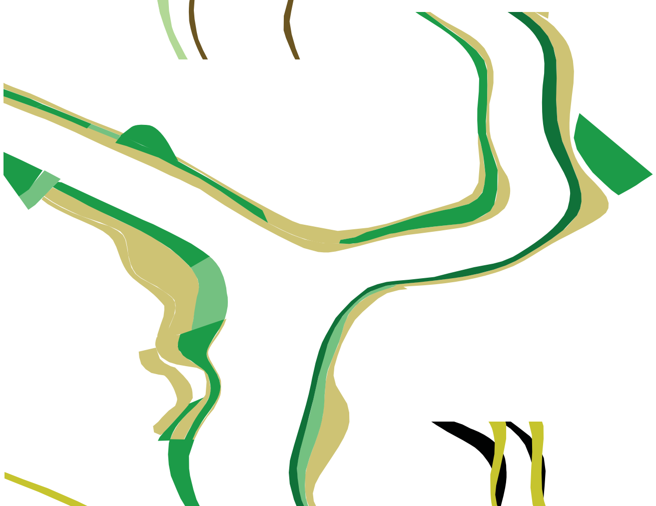
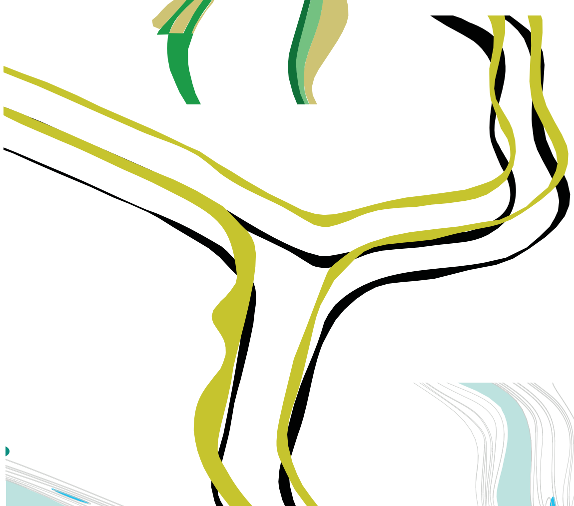


Fig 188. Regrading to create swales and seasonal retention ponds

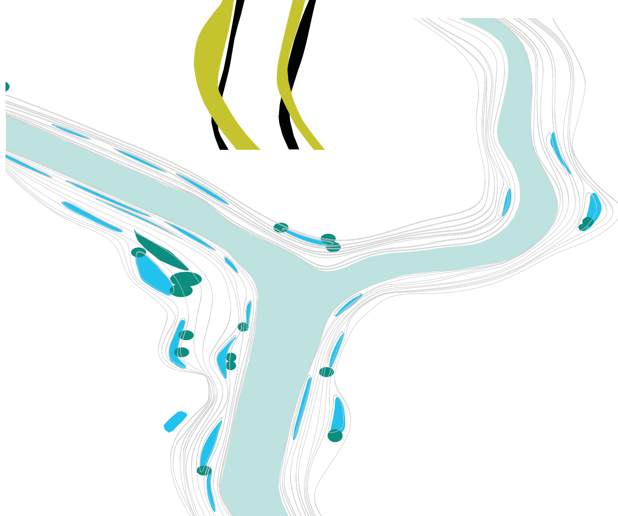
Pathways, programmed landscapes
garden fields and green lawn



Forest zones, understory
planting & prairies



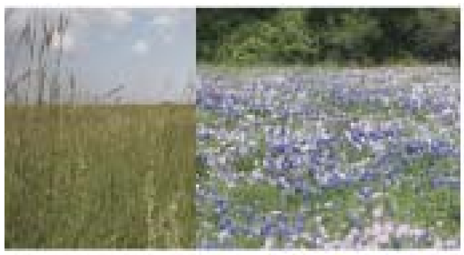
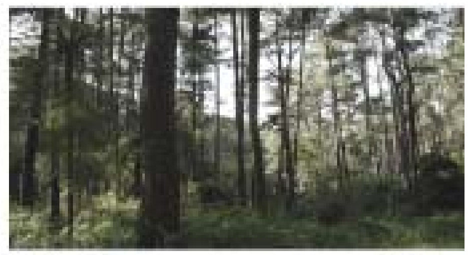
Gabion wall & riparian top
cover



Seasonal ponds & water plants

Fig 189. Re-naturalized layers of the site


Permeable pavers are used as walkways instead of impermeable concrete paths.

The landscape is programmed with specific forest zones, praries, and understory planting to attract wild life.


A gabion wall system provides stability along the edges of the bayou. Riparian plants cover the wall system.


Seasonal wetlands attract wild life habitat

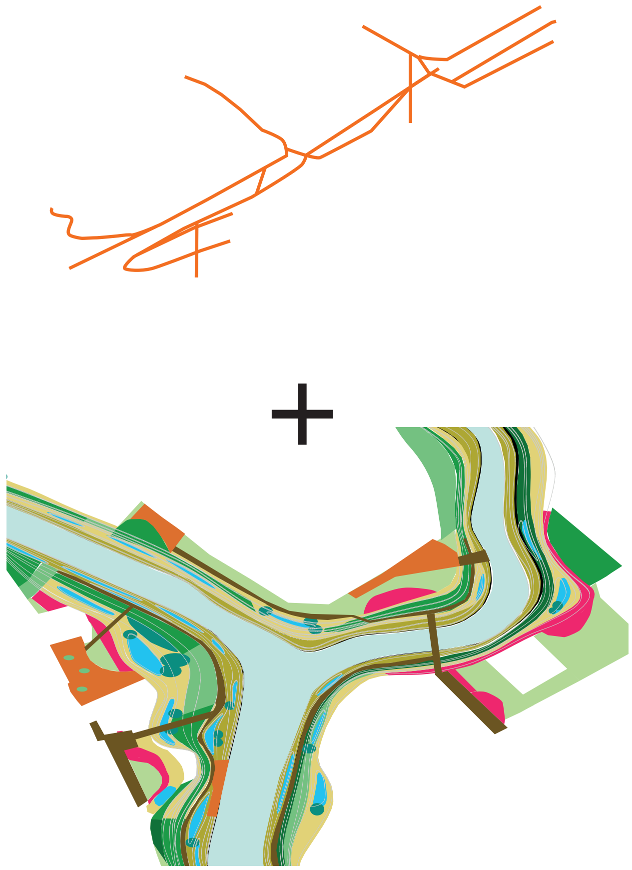


Fig 190. Cultural/institutional infrastructure + landscape infrastructure

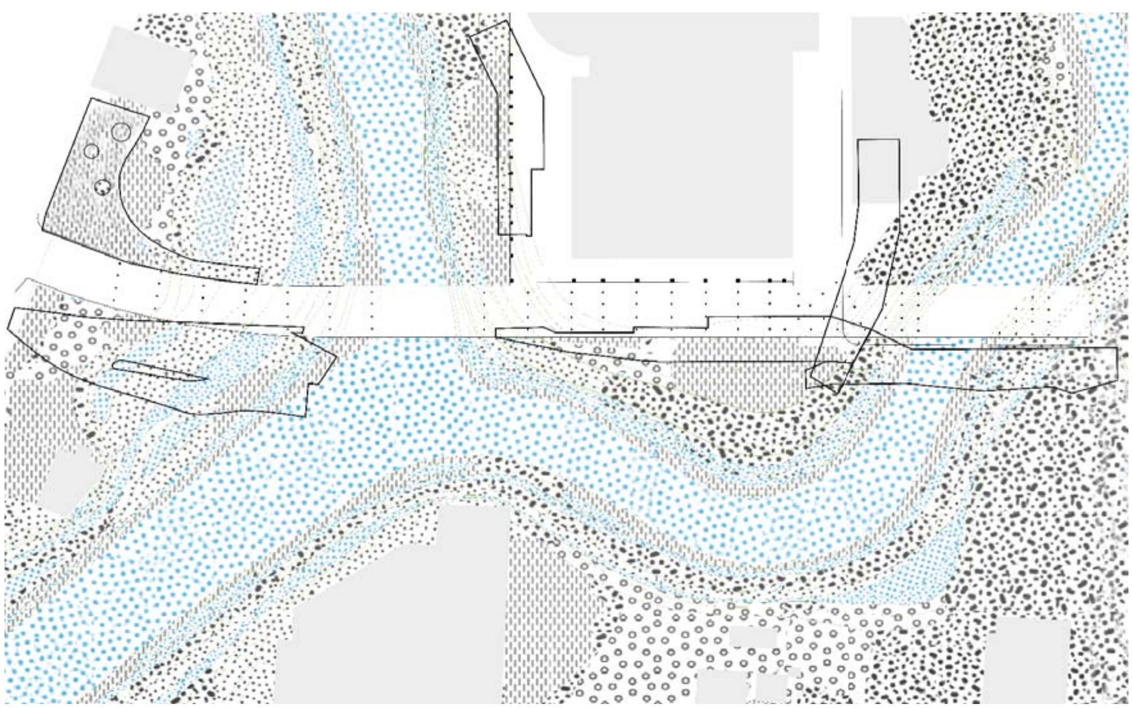


Fig 191. Figurative landscape

Landscape zones of Buffalo Bayou

Figurative Landscape

Based on the *Buffalo Bayou Masterplan*, distinct ecological zones were derived that are native to the Buffalo Bayou. These include:

5 zones

- Riparian forest
- Wild flower gardens
- Prairies
- Wetlands
- Forests

These zones create an additional buffer system along the swale lines and are flood compatible. By overlapping ecologies, a differentiated landscape character can be established, attracting wild life and creating new identity for the site. The landscape figure changes during the dry and wet seasons.

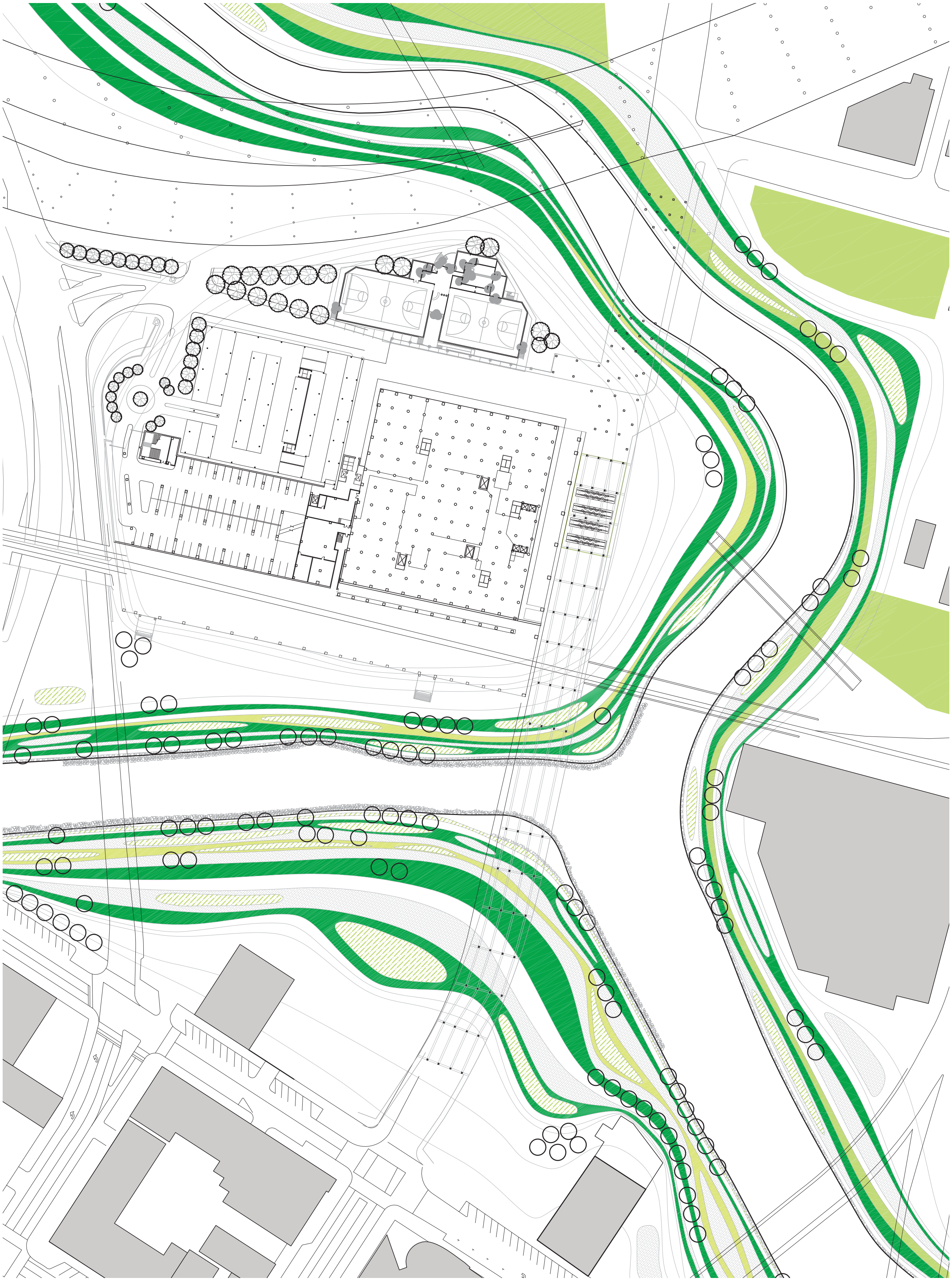


Fig 192. Dry Season - park like quality

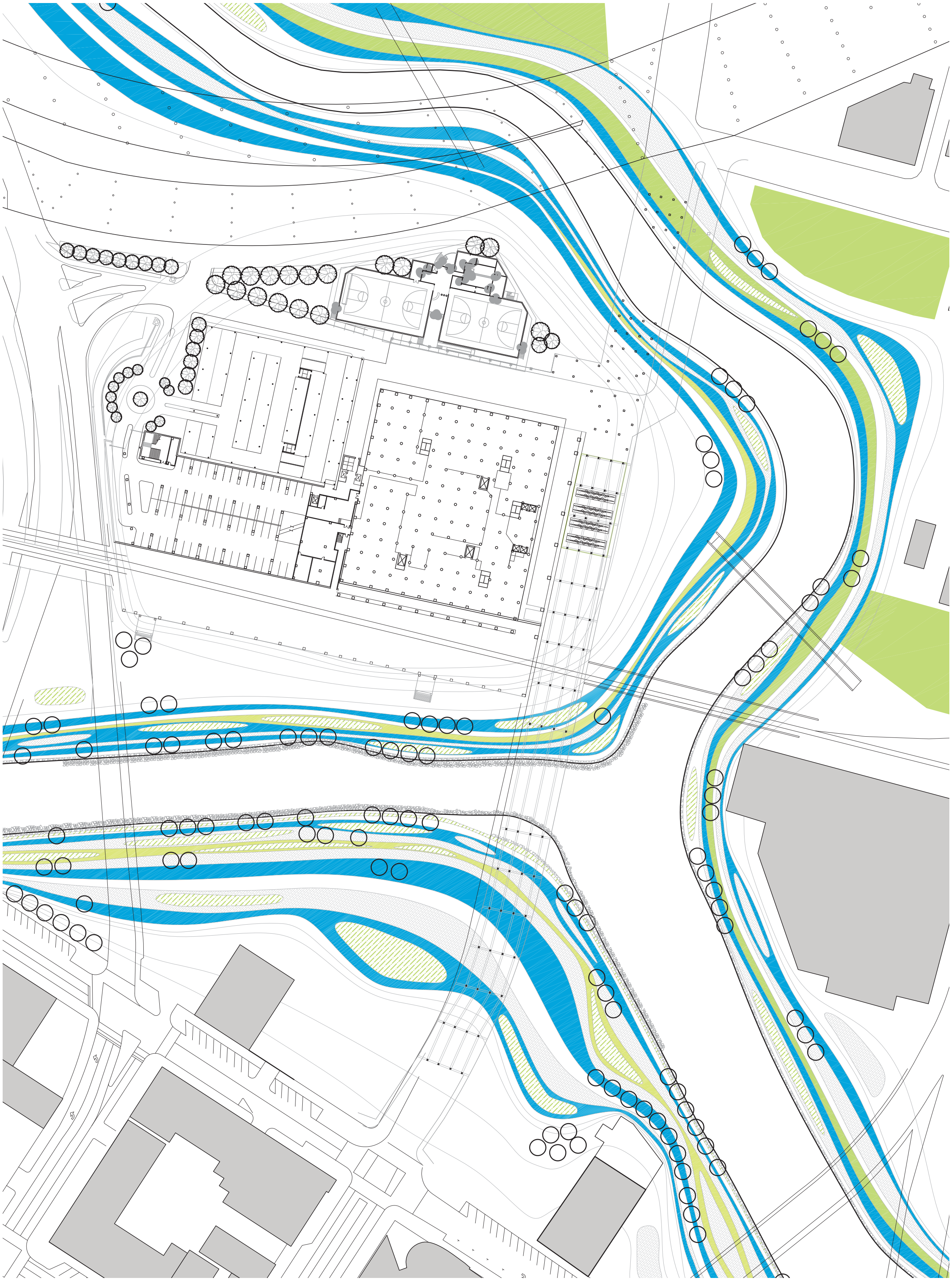
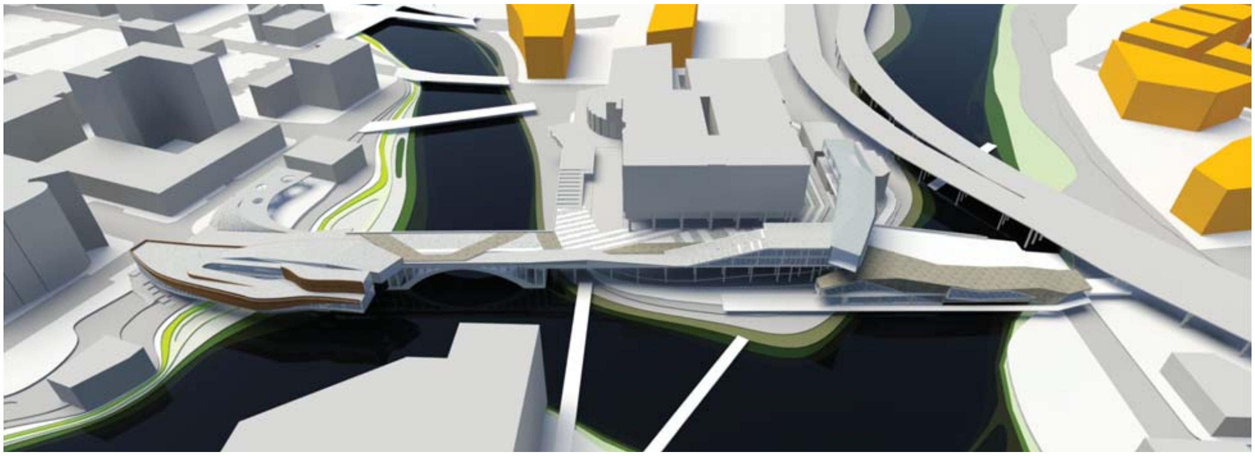
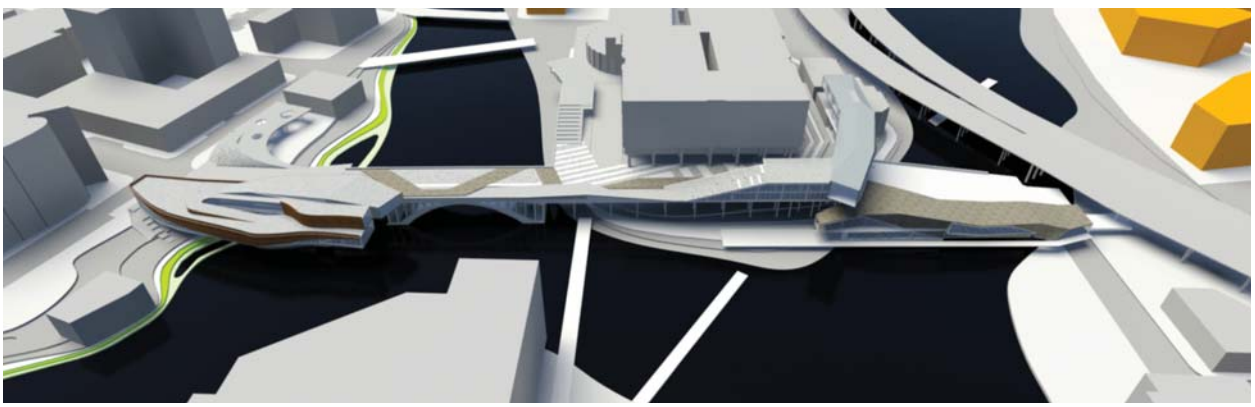


Fig 193. Wet Season - creates a swamp like quality, attracting wild life habitats.



20’, flood plain



30’, flood plain

The University of Houston Downtown campus was envisioned with the flooding problem of the site. The heights and orientations of the buildings on the bridge take into consideration the indeterminate nature of the bayou in regards to flooding.

Moments within the Landscape

Fig 194. Buildings are framed within the landscape in key areas

Fig 195. Buildings create a dialogue with the landscape through materiality

Fig 196. Towards the re-naturalized edge, buildings create an iconic presence

Fig 197. Future campus development - The bridge will be linked as a pedestrian spine with the proposed future developments, providing a collective sense of place.

Fig 198. Main Street bridge - a collective place of culture, history, nature and institution, becoming a catalyst for future growth and socioeconomic developments.

6. Future campus development

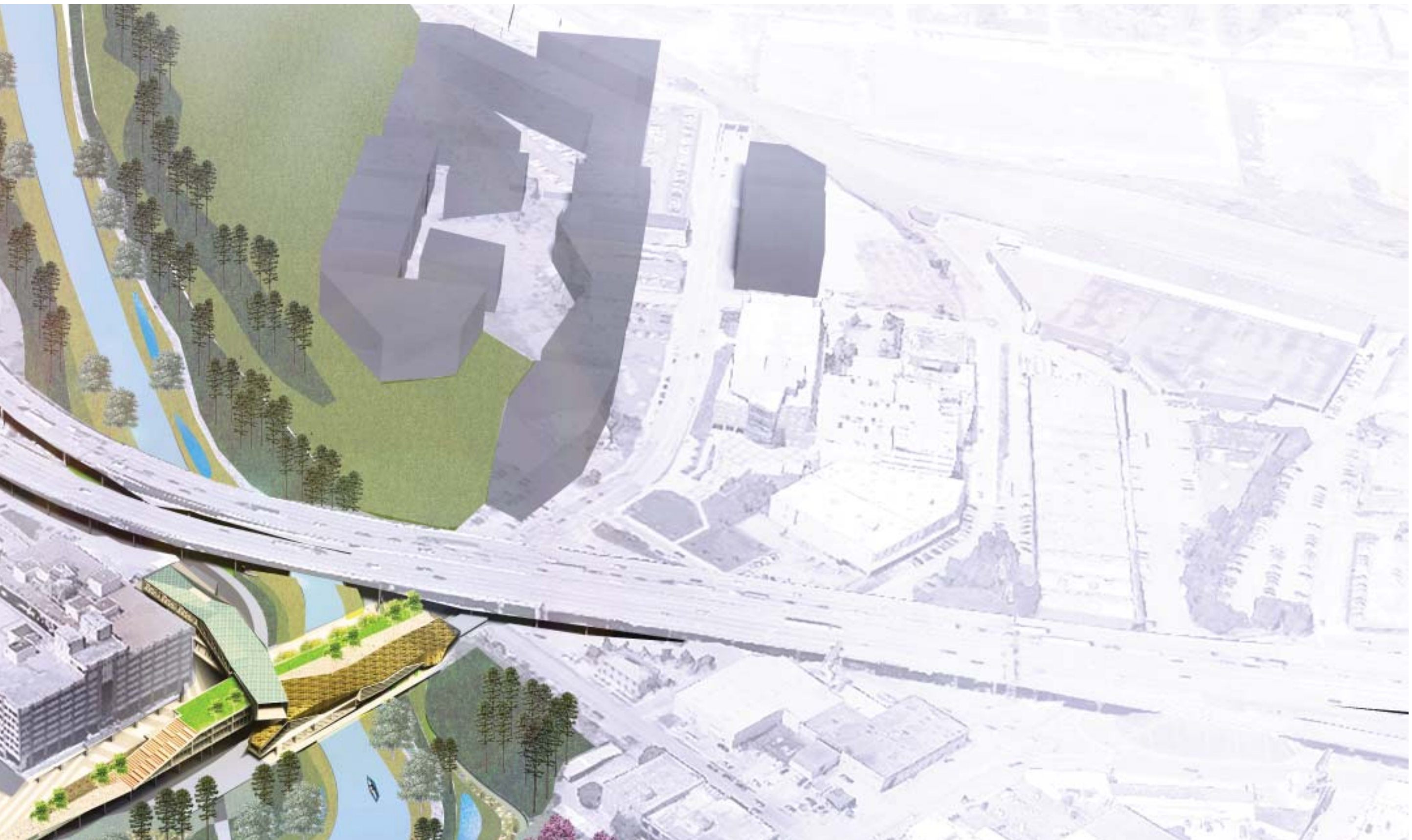
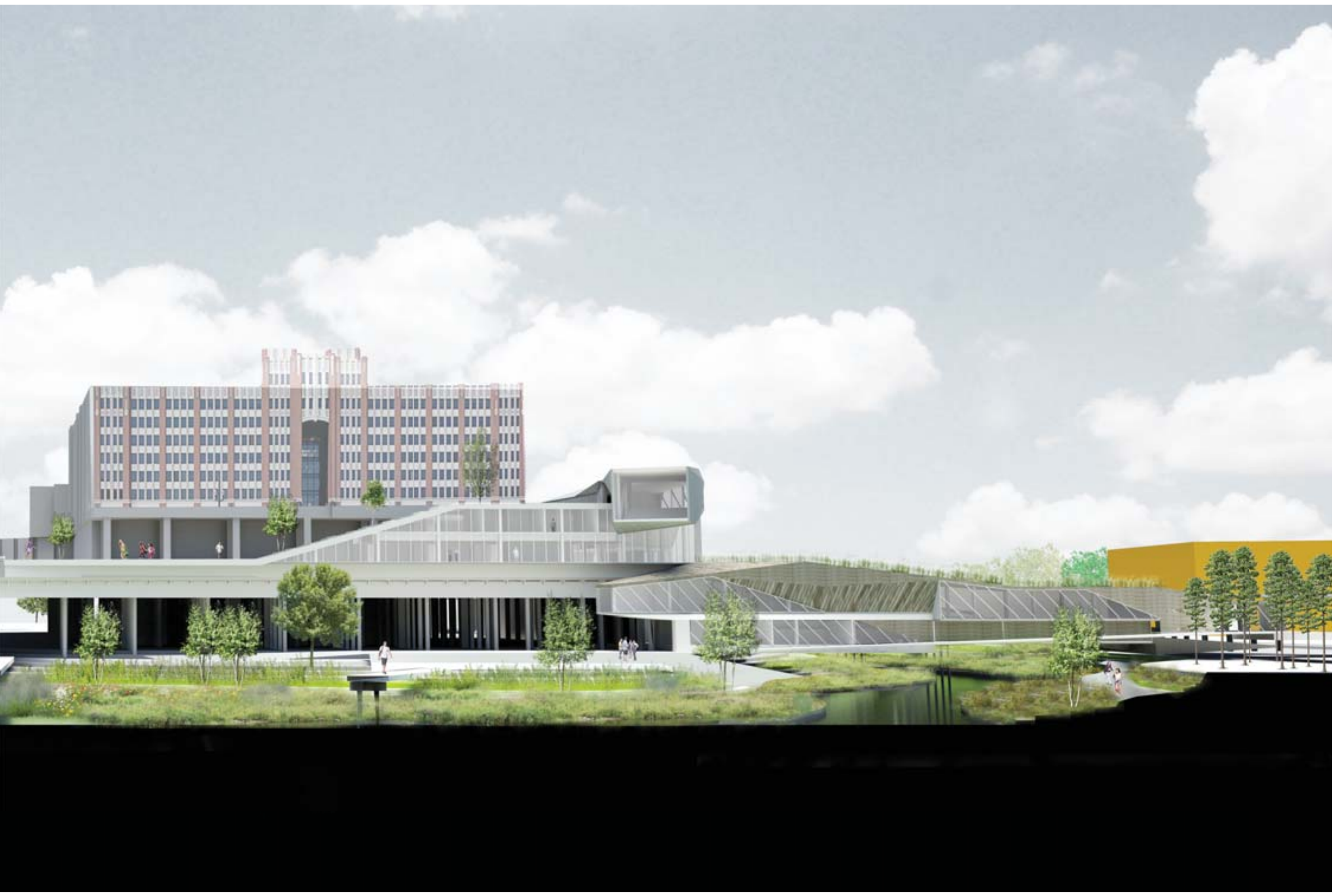

Google
29°45'56.79" N 95°21'31.51" W elev 78 ft

Fig 199. Overall Rendering

Fig 200. Elevation

The project creates a new identity for the site by integrating architecture, landscape and infrastructure while respecting the arch and the bridge as Urban Artifacts.



5.7 Conclusion

This design project demonstrates that Architecture, when combined with Landscape Urbanism practices informed by a deep understanding of the local manmade and natural infrastructure of *Drosscapes*, has the potential to rejuvenate post-war urban centres in car-dominated American cities. While Landscape Urbanism theory has recognized the criticality of a holistic approach to urban interventions, addressing ecology, geography and human infrastructure at ever-larger scales of consideration, it has devalued architecture's efficacy within this open terrain.

Architecture and program, in this case new university facilities, and cultural and recreational programs, both animate the site and catalyze its future growth and connectivity. Through an operation of editing the existing infrastructure and drawing upon its form and monumentality to generate a language for new built form; spatial coherence and destination are restored within this amorphous and degraded urban centre. The project creates a new identity for the site by integrating architecture, landscape and infrastructure while respecting the existing arch and bridge as Urban Artifacts to create form, place, meaning and connectivity

APPENDIX A.1 : REFERENCES

Allen, S., & Agrest, D. (2000). VII_Urbanisms in the Plural. In Practice: Architecture, technique, and representation (p. 159). Australia: G B Arts International

Allen, S. (2011). Landform building: Architecture's new terrain. Baden, Switzerland: Lars Müller ;

Allen, Stan. & SCI-Arc Media Archive. (March 04, 2009). *Stan Allen Before And After Landscape Urbanism*. Southern California Institute of Architecture.

Allen, S., Ramos, S., Boeri, S., & Turan, N. (n.d.). New Geographies, Volume 0 Graduate School of Design New Geographies New Geographies, 0(1934510130, 9781934510131)

Allen, S. (1999). Infrastructural Urbanism. In Points lines: Diagrams and projects for the city (pp. 48-57). New York: Princeton Architectural Press.

Allen, S. (2010). Landscape Infrastructures. In Infrastructure as architecture: Designing composite networks (pp. 36-45).

Allen, S. (2008). Taichung Gateway Park. Retrieved May 10, 2015, from http://isites.harvard.edu/fs/docs/icb.topic881993.files/Taichung Gateway - Stan Allen/Taichung Gateway.pdf

Artemel, A. (2013, August 9). Retrospective: Archizoom And No-Stop City. Retrieved April 27, 2015, from http://architizer.com/blog/archizoom-retrospective/

Auch, R., Taylor, J., & Acevedo, W. (2004). Urban Growth in American Cities : Glimpses of U.S Urbanization. Retrieved May 3, 2015, from http://pubs.usgs.gov/circ/2004/circ1252/

Auch, R., Taylor, J., & Acevedo, W. (2004). Urban Growth in American Cities : Glimpses of U.S Urbanization. Retrieved May 3, 2015, from http://pubs.usgs.gov/circ/2004/circ1252/

Becker, L. (2005). Repeat- Writings on Architecture: Designing Women - Bobbing for Mies - Robert Venturi at IIT. Retrieved May 7, 2015, from http://www.lynnbecker.com/repeat/venturi/venturi.htm

Berger, A. (2006). Drosscape: Wasting land in urban America (pp. 26-37). New York: Princeton Architectural Press.

Carlisle, S., & Pevzner, N. (2013, May 25). Introduction: Rethinking Infrastructure - Infrastructure as Urbanism. Retrieved May 4, 2015, from http://scenariojournal.com/article/introduction_rethinking_infrastructure/

Carleson, D. (2013, May 25). The Humanity of Infrastructure: Landscape as Operative Ground. Retrieved May 13, 2015, from http://scenariojournal.com/article/humanity-of-infrastructure/

Corbusier, L. (2013). THE ENGINEER’S AESTHETIC AND ARCHITECTURE. In Towards a New Architecture (pp. 1-11). Courier Corporation.

Downtown Management District, H. (2006). HOUSTON DOWNTOWN DEVELOPMENT FRAMEWORK - A VISION FOR 2025. Retrieved May 4, 2015, from http://www.downtowndistrict.org/Home/Development/HoustonDowntownDevelop/Frameworkpg1-18/Framework pg. 1-18. PDF

Duany, A. (2013). Landscape urbanism and its discontents: Dissimulating the sustainable city. Gabriola Island, BC: New Society.

Edelmann, F. (2006, August 28). Jean Nouvel. Musée du quai Branly. Retrieved May 10, 2015, from http://www.domusweb.it/en/architecture/2006/08/28/jean-nouvel-musee-du-quai-branly.html

Eisenschmidt, A. (2012). The City's Architectural Project: From Formless City to Forms of Architecture. In City Catalyst: Architecture in the age of extreme urbanisation (pp. 18-25). Chichester: Wiley.

Foucault, M. (2002). Las Meninas. In The Order Of Things: An Archaeology of the Human Sciences. London: Routledge.

Fisher, J. (2014, August 1). Deep Water Houston: From the Laura to the Deep Water Jubilee. Retrieved May 11, 2015, from https://houstonhistorymagazine.org/2014/10/deep-water-houston-from-the-laura-to-the-deep-water-jubilee/

GERFEN, K. (2009, January 17). Taipei Waterfront: Taipei, Taiwan / Stan Allen Architect. Architect Magazine, 70-71.

Goodchild, B. (1990). Planning and the Modern/Postmodern Debate. The Town Planning Review, Vol. 61, No. 2, 119-137. Retrieved May 9, 2015, from http://www.jstor.org/discover/10.2307/40112887?uid=3739448&uid=2134&uid=2&uid=70&uid=3737720&uid=4&sid=21106767617463

Gonzales, J. (2013, July 1). The new Main Street Viaduct. Retrieved May 11, 2015, from http://blog.chron.com/bayoucityhistory/2013/07/the-new-main-street-viaduct/

Heim, C. E. (2001), Leapfrogging, Urban Sprawl, and Growth Management: Phoenix, 1950–2000. American Journal of Economics and Sociology, 60: 245–283. doi: 10.1111/1536-7150.00063

HGAC - Houston Galveston Area Council, H. (2013, May 1). Urban Houston Framework - A CASE STUDY FOR THE H-GAC REGIONAL PLAN FOR SUSTAINABLE DEVELOPMENT. Retrieved May 4, 2015, from http://www.houstontx.gov/planning/DevelopRegs/urbanhoustonframework/PDFs/FullReport_UrbanHoustonFramework.pdf

Hung, Y. (2013). Landscape infrastructure case studies by SWA (2nd, rev. ed.). Basel: Birkhäuser.

“Infrastructure.” Def. 1. Dictionary.com. N.p., n.d. Web. <http://dictionary.reference.com/browse/infrastructure>.

Lerup, L. (2000). After the city. Cambridge: MIT Press.

Lerup, L. (2012, February 27). Lars Lerup, professor of architecture, Rice University, at Texas A&M’s Architecture Lecture Series. Retrieved April 28, 2015, from https://www.youtube.com/watch?v=XWV9ak8Pm1Q

Lerup, L. (2011). One million acres & no zoning. London: Architectural Association.

Mayne, T., & Allen, S. (2011). Combinatory urbanism: The complex behavior of collective form (pp. 9-31). Culver City, CA: Stray Dog Café.

Maffei, G. (2013). Design Groups, Collectives, and Networks. In Made in Italy: Rethinking a century of Italian design (p. 65).

Margolis, L., & Robinson, A. (2007). Multi - Operational Modular Surface - Field Operations. In Living systems innovative materials and technologies for landscape architecture. Basel: Birkhäuser.

Melosi, M. (2010). The Automobile Shapes The City - Modifying the City Core. Retrieved May 3, 2015, from http://www.autolife.umd.umich.edu/Environment/E_Casestudy/E_casestudy.htm

Morgan, R. (1995). Slope stabilization and erosion control, a bioengineering approach. London: E & FN Spon.

Milbourne, B. (2014, July 13). New York City: Crowd-funded public realm. Retrieved May 9, 2015, from http://architectureau.com/articles/new-york-crowd-funded-public-buildings/

Nash, G. (1985). The American West transformed: The impact of the Second World War. Bloomington: Indiana University Press.

NYC DEPARTMENT OF CITY PLANNING. (2001). FRESH KILLS: FROM LANDFILL TO LANDSCAPE: INTERNATIONAL DESIGN COMPETITION : 2001. Retrieved May 9, 2015, from http://www.nyc.gov/html/dcp/pdf/fkl/about_fkl.pdf

ÖZKAN, Ö. (2008, December 1). STRATEGIC WAY OF DESIGN IN REM KOOLHAAS’ PARC DE LA VILLETTE PROJECT : A THESIS SUBMITTED TO THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES OF MIDDLE EAST TECHNICAL UNIVERSITY. Retrieved May 8, 2015, from https://etd.lib.metu.edu.tr/upload/12610287/index.pdf

Pedri, N., & Petit, L. (2013). Chapter One : FROM INTERSEMIOTIC TO INTERMEDIAL TRANSPOSITION:”EX-CHANGING IMAGE INTO WORD/WORD INTO IMAGE” In Picturing the Language of Images (pp. 13-14). Newcastle upon Tyne: Cambridge Scholars Publishing.

Pope, A. (2012). The Unified Project. Architectural Design: City Catalyst: Architecture in the Age of Extreme Urbanisation, 81-87.

Pope, A. (2011, October 10). ‘The Form of the Present’ — presented by Albert Pope, the Gus Wortham professor of architecture at Rice University. Retrieved April 25, 2015, from https://vimeo.com/30858140

Pope, A. (1996). Ladders. Houston, Tex.: Rice School of Architecture

Rossi, A., (1984). The Architecture of the City (Pbk. ed., pp. 20-41). Cambridge, Mass.: MIT Press.

Seewang, L. (2013, May 24). Skeleton Forms: The Architecture of Infrastructure. Retrieved April 25, 2015, from http://scenariojournal.com/article/skeleton-forms-the-architecture-of-infrastructure/

Shane, G. (2004, December 1). The Emergence of “Landscape Urbanism” Reflections on Stalking Detroit. Harvard Design Magazine, 1-8.

United Nations Department of Economic and Social Affairs. (2014, July 10) “UN DESA ” Retrieved from http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html

“Urbanism.” Def. 2. Dictionary.com. N.p., n.d. Web. <http://dictionary.reference.com/browse/urbanism?s=t>.

Van der Velde, R. (2012). Oxymoron Introduction Urban Landscape. Retrieved May 9, 2015, from http://webcache.googleusercontent.com/search?q=cache:EPBwgkJzzjUJ:repository.tudelft.nl/assets/uuid:3a96a944-36b6-43c4-9a96-fc67ef6e6aaa/Van_der_Velde_Oxymoron_Atlantis_22.4_2012_small.pdf &cd=1&hl=en&ct=clnk&gl=ca

Varnelis, K. (2003, March 1). A brief history of horizontality - No Stop City. Retrieved April 27, 2015, from http://varnelis.net/articles/horizontality

Velazquez, M., & Barajas, D. (2014). Ludwig Hilberseimer: Radical Gray - The project of the High Rise City. Retrieved April 27, 2015, from http://www.a-u-r-a.eu/upload/research_radicalurbanism_100dpi_2.pdf?PHPSESSID=1994337267bf5d06e80f6fdcf94c5471

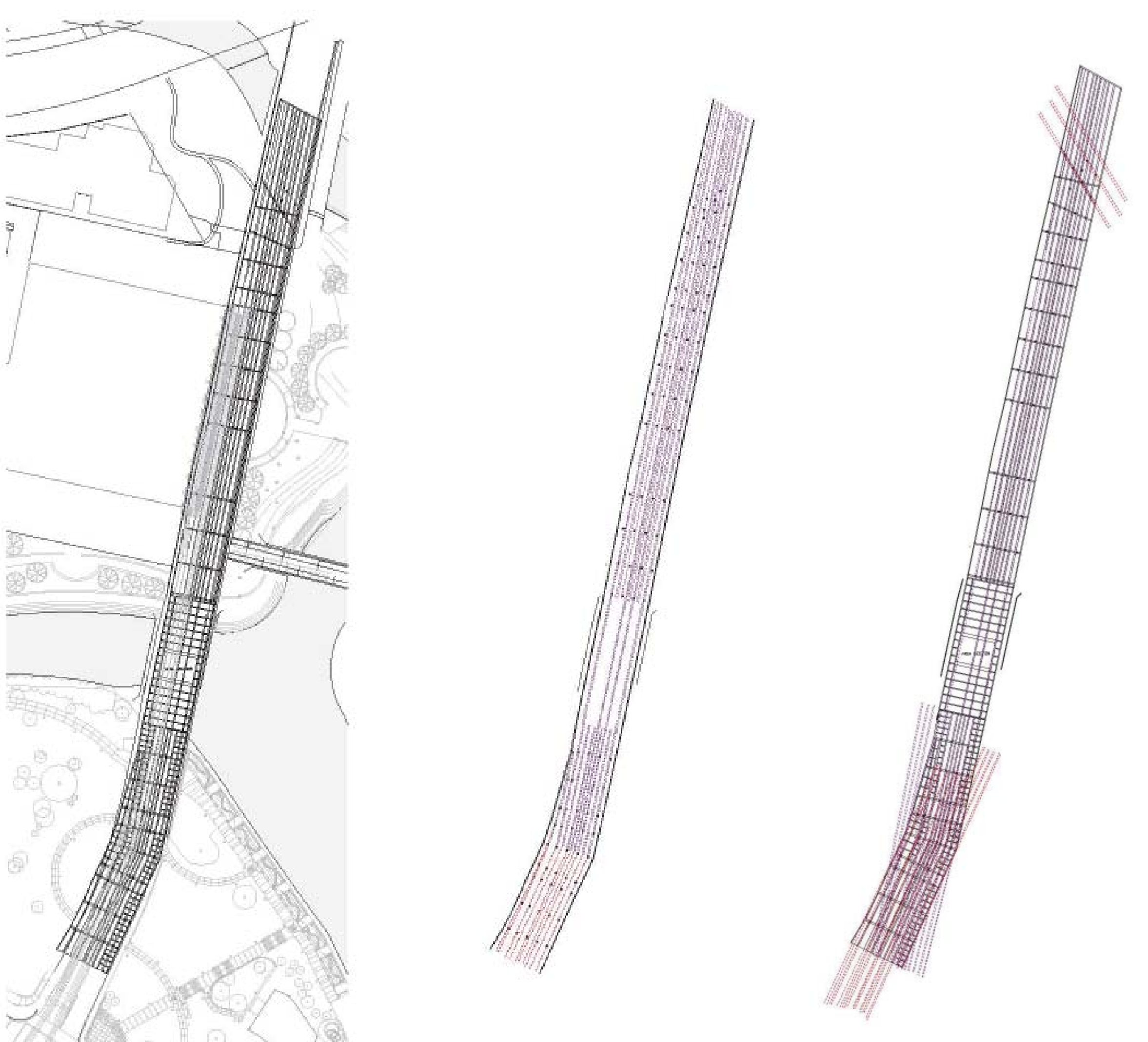
Venturi, R., & Scott Brown, D. (1977). Learning from Las Vegas: The forgotten symbolism of architectural form (Rev. ed., pp. 3-19). Cambridge, Mass.: MIT Press.

Waldheim, C. (2006). The Landscape Urbanism reader. New York: Princeton Architectural Press.

Williams, M. (2009, July 10). Departing architecture dean Lars Lerup takes a hard look at Houston’s future. Retrieved May 4, 2015, from http://news.rice.edu/2009/07/10/departing-architecture-dean-lars-lerup-takes-a-hard-look-at-houstons-future/

APPENDIX A.2 : DESIGN PROCESS

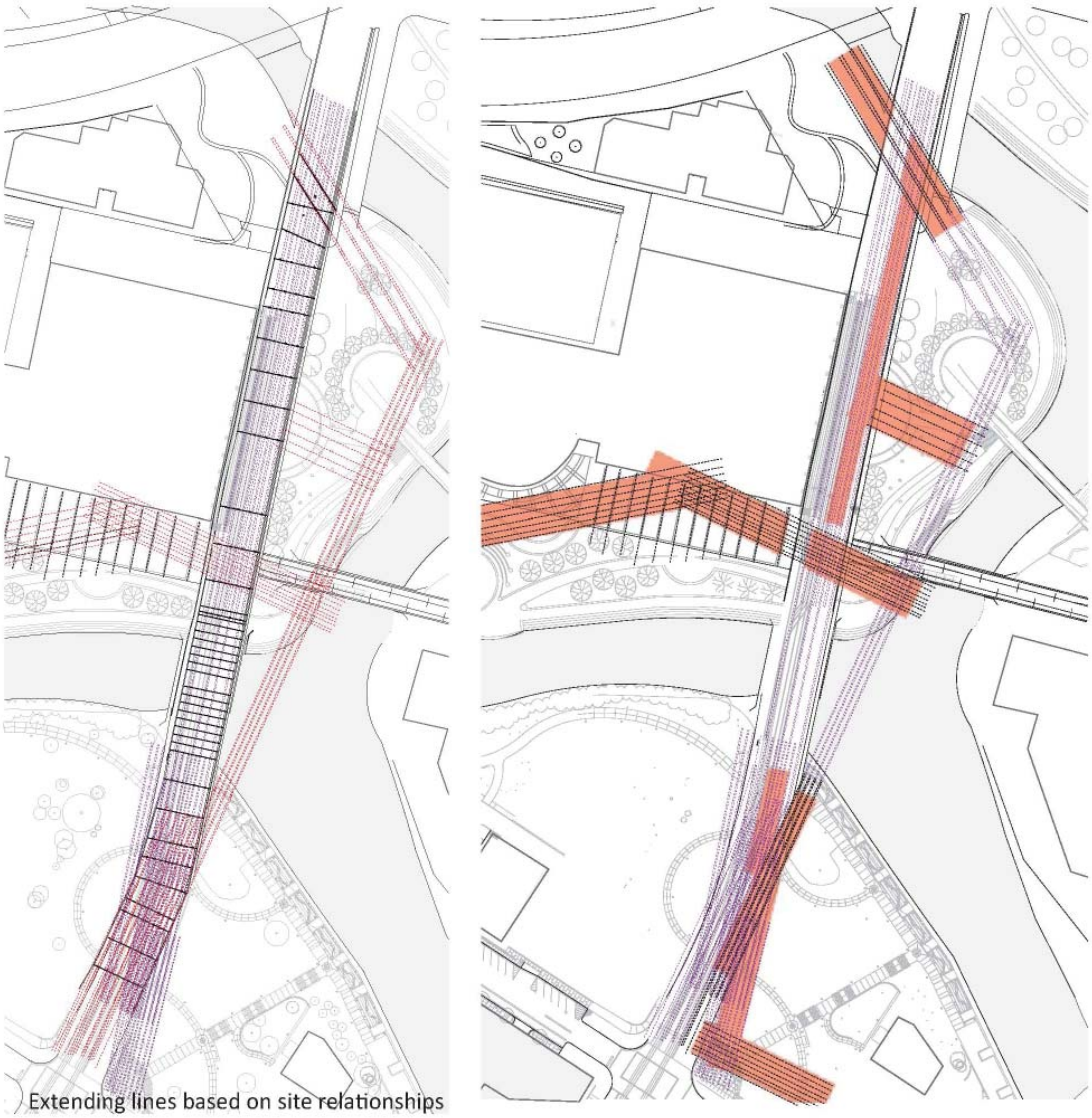
Design Process



Existing structure grid pattern   Extracting the pattern of axes   Intersecting grid pattern

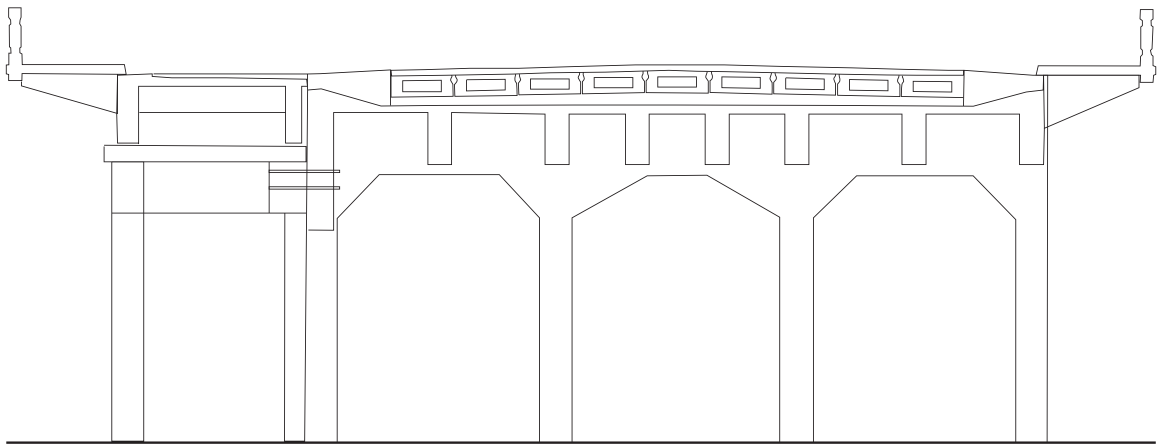
Bridge Grid

By extracting the the patterns of the bridge structural grid, it provided an order to place the proposed program onto the bridge.

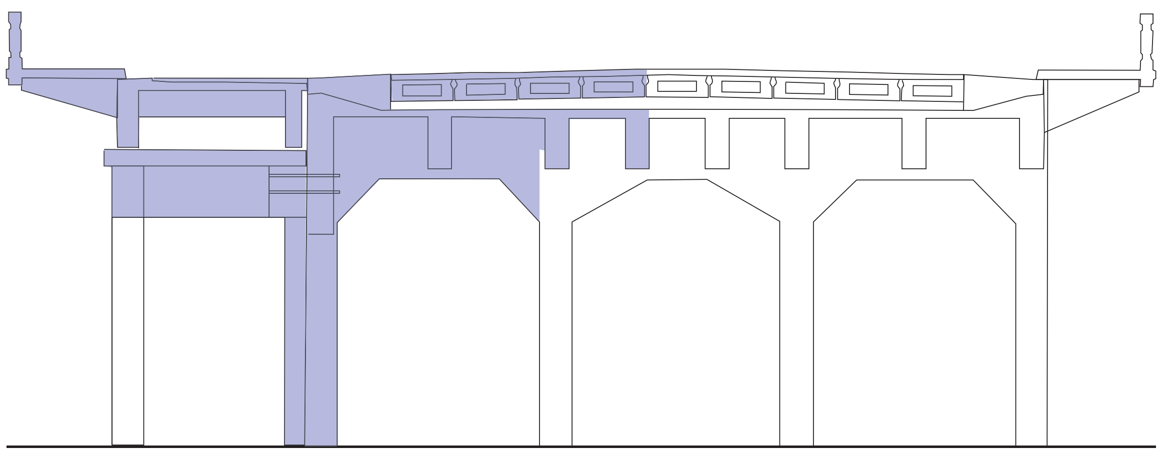


Extending lines based on site relationships

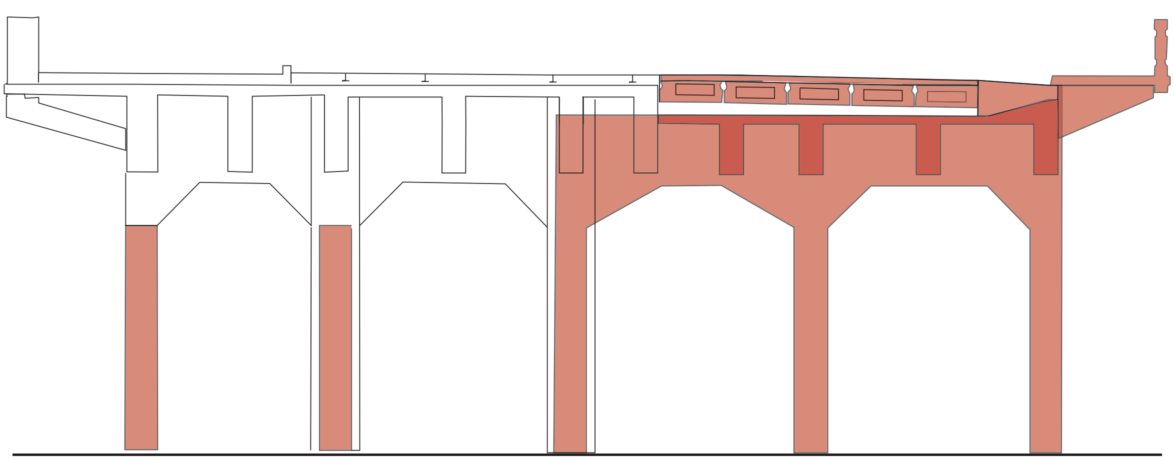
Majority of the programs are placed on the east end of the bridge as the tracks of the tramline occupy the west end of the bridge. The strategy was to build over or along the existing heritage railing as it cannot be removed. Similarly, the structure of the bridge has to be preserved as a heritage element, therefore the programs are placed directly on the bridge deck.



Main street bridge prior to tramline



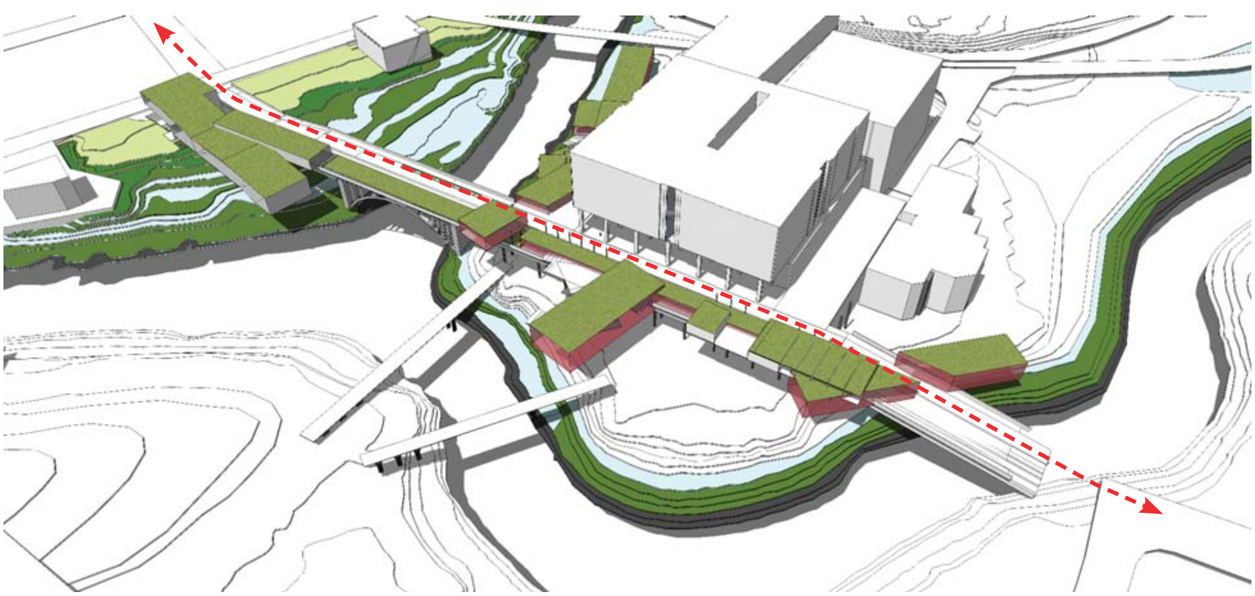
Main street bridge demolitian 2001



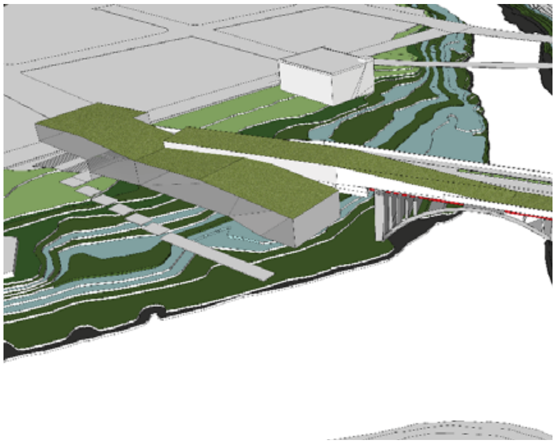
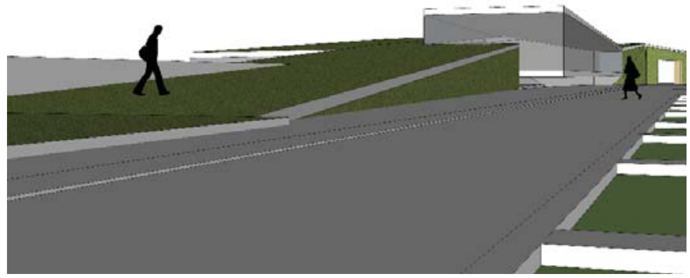
Main street bridge Heritage elements to remain - the columns, railing and the structure.

Landscape re-naturalization layers

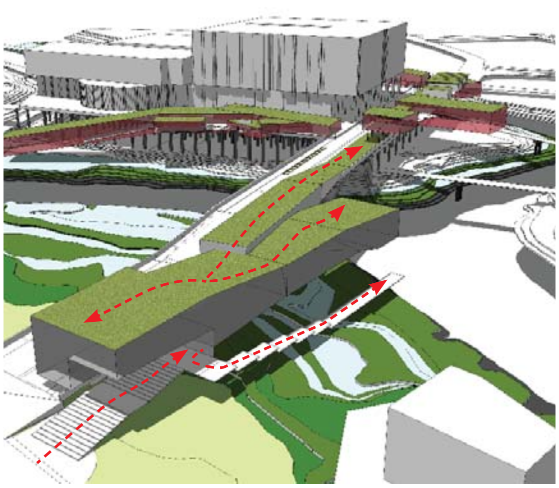
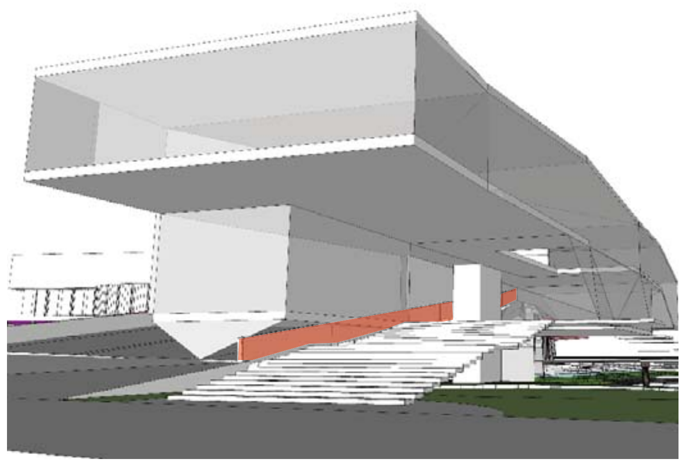
After deriving geometrical order for the program, the next step was to work out the placement of the buildings with existing pedestrian circulation, the tramline, interface between the landscape, historic railing and individual buildings. First iterations of the design were conceptual explorations on how landscape and program massing can fold to become a linear system to provide pedestrian experience. By placing the program on east side of the bridge, circulation of the tramline is not obstructed. The best views into the site are along this end, however due to the presence of the historic railing, program is cantilevered from the bridge. A green strip notating linear park folds over the volumes to provide potential access and pedestrian experience.



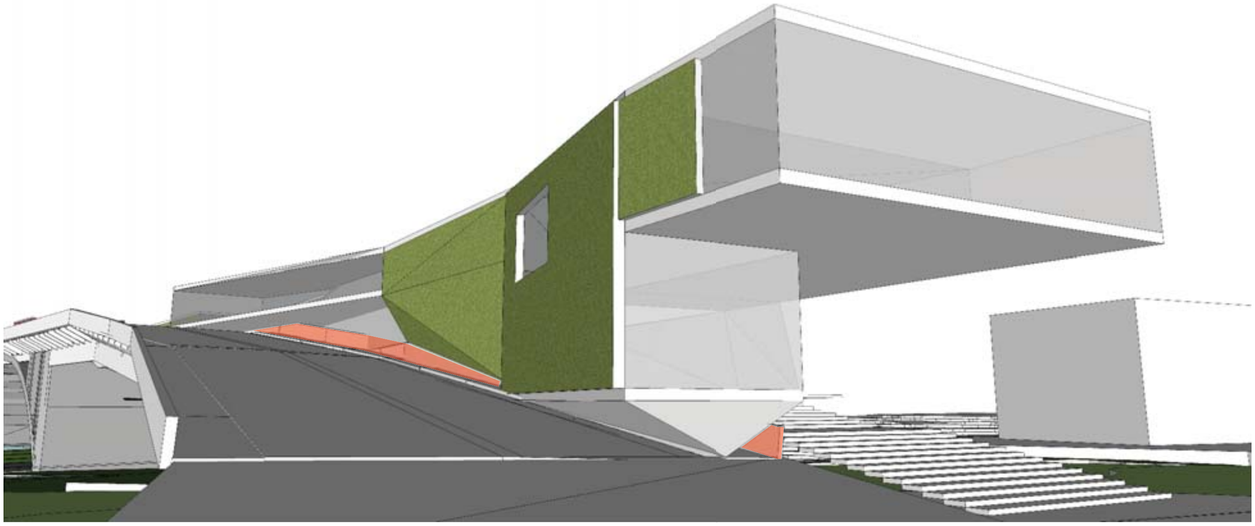
Ecological Center

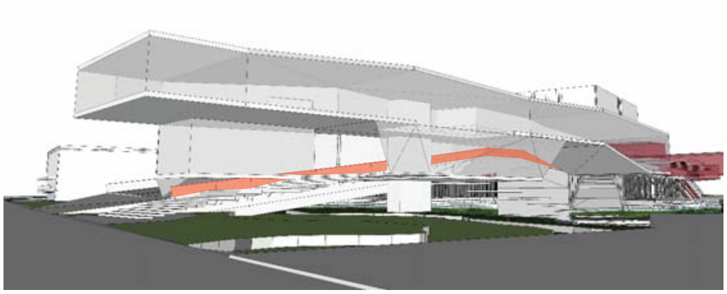
The ramp continues off the bridge and becomes the roof of the ecological center, creating new potential for ecological park space that will be accessed by pedestrians.

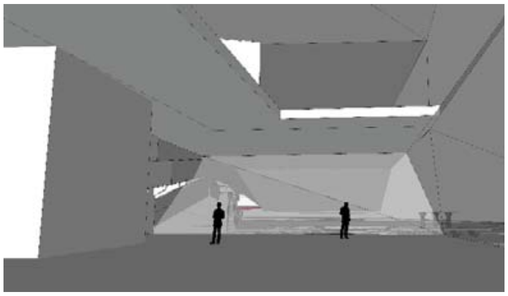
 

Circulation connecting the ground plane into the center can be through stairs from the street and ramps that provide access into the didactic landscape. The building is lifted above the existing historic railing.

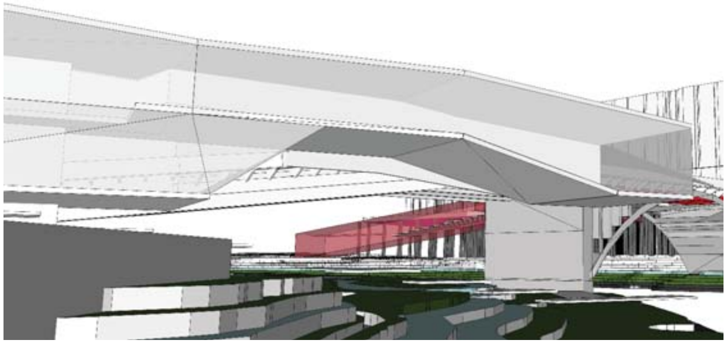


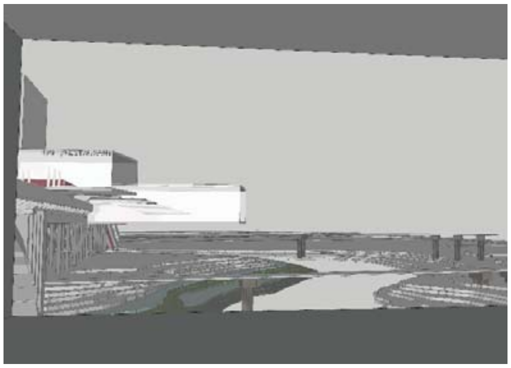
The building is placed along the edge of the historic railing and potentially is built around it.



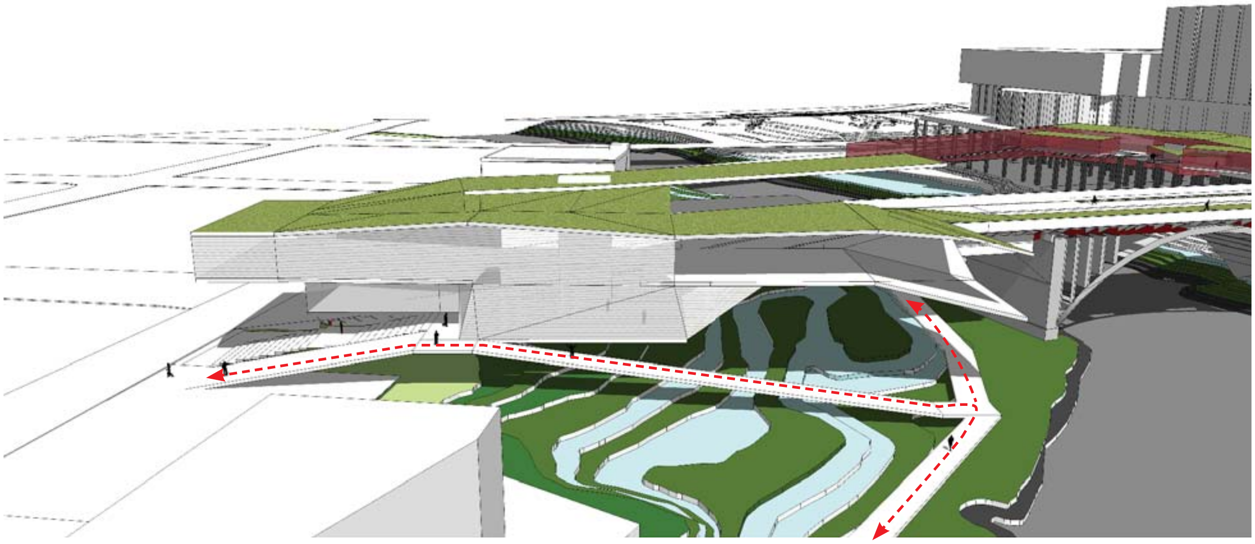


The initial concept was that all the gallery spaces would be at the top to protect artefacts from flood and the lobby space would be at the bottom, connected to the main stair case.

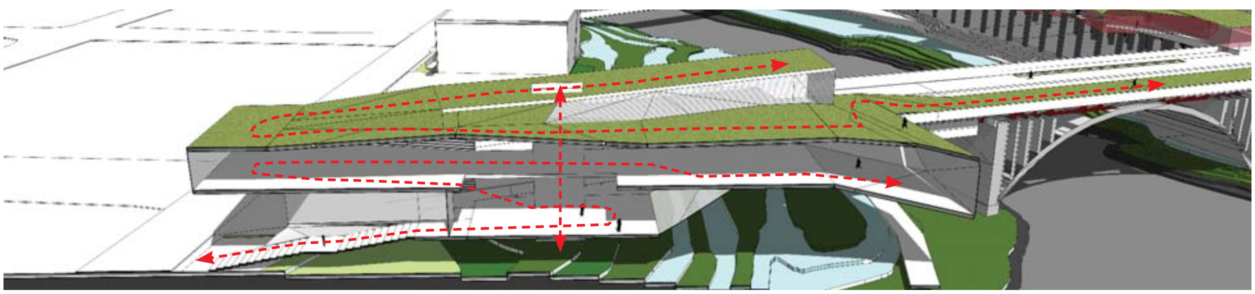




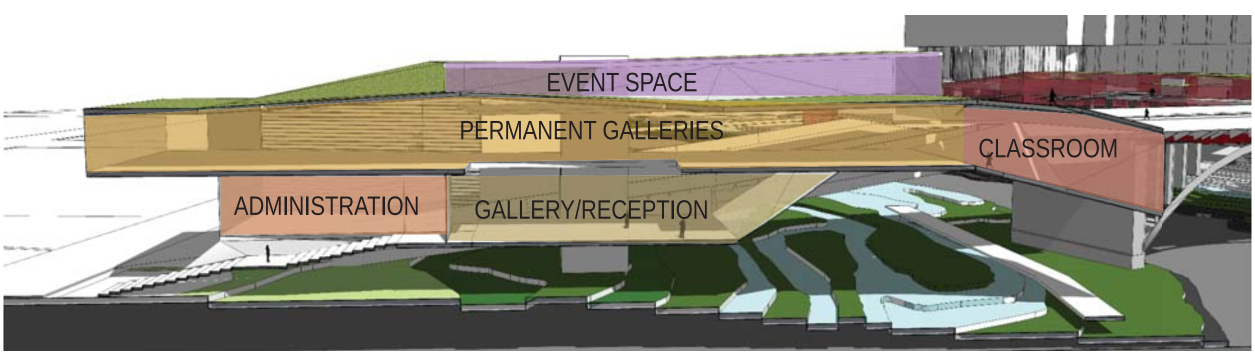
The multipurpose space (gallery and an occasional classroom, steps down towards the monumental arch to capture the view of the bayou.

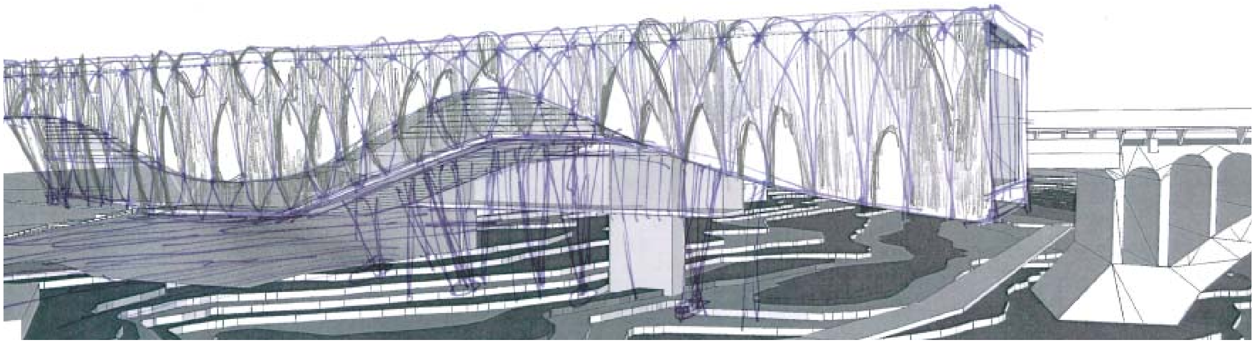


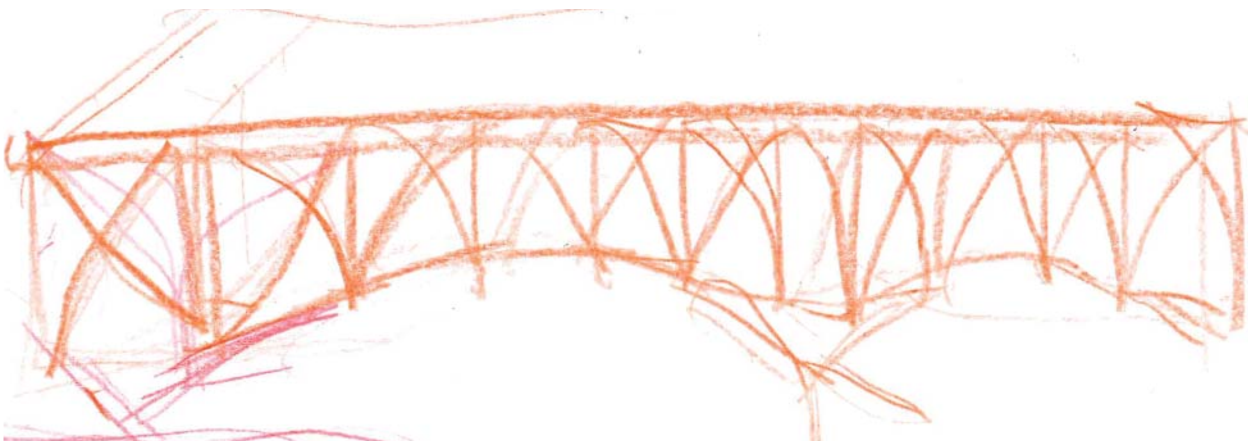
A ramp was added to the stairs for accessible entrance that connects to landscape paths. A wider atrium in the middle accomodates reception and temporary gallery space.



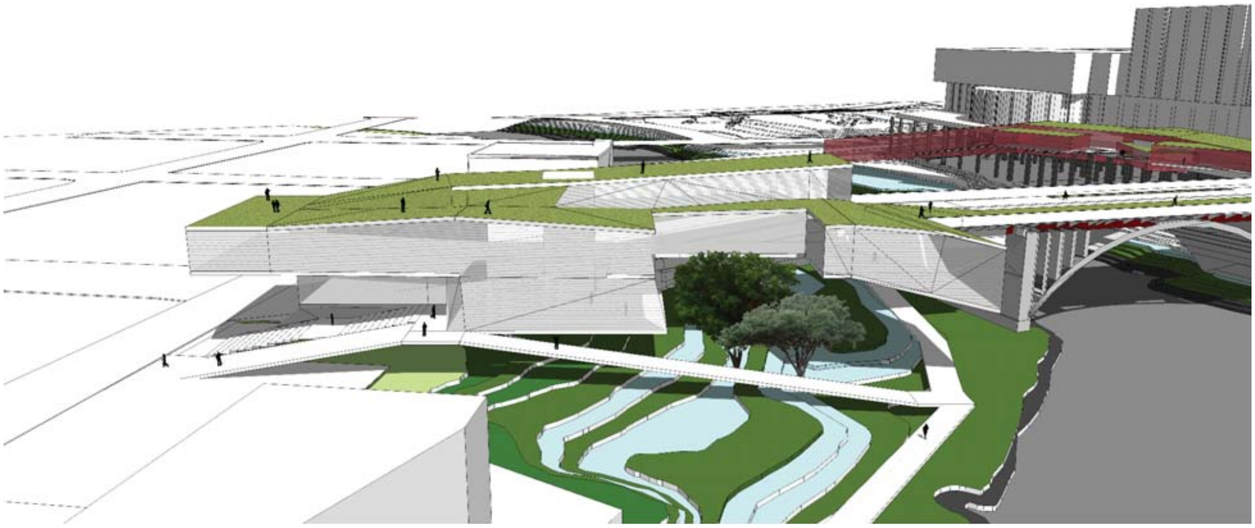
(Above) Conceptual section showing potential circulation from the bridge to the roof and from the street into the building. (Below) Conceptual section and programmatic relationships



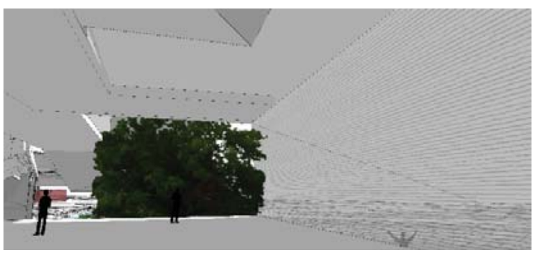


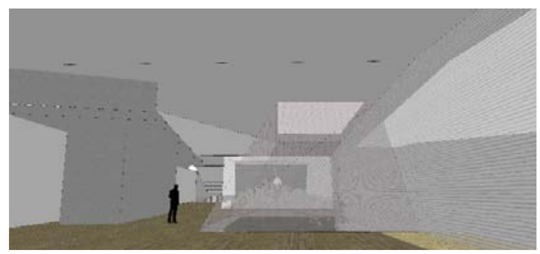


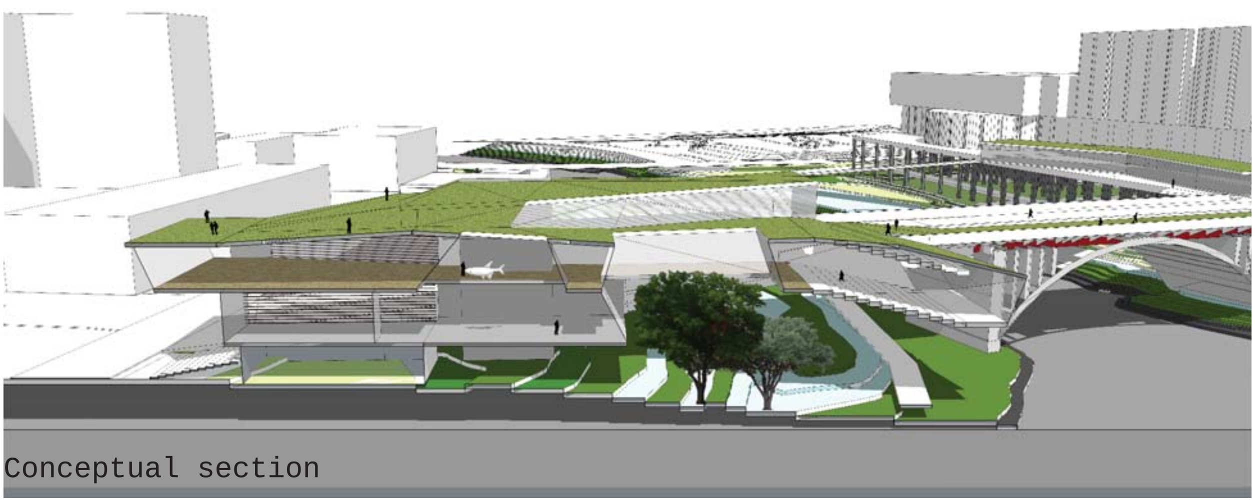
Early exoskeleton sketches for the Ecological center - inspired by the curvaceous language of the parabolic arch



A portion of the building was carved out to test potential courtyard space where landscape might enhance interior space. However it decreased the size of galleries.

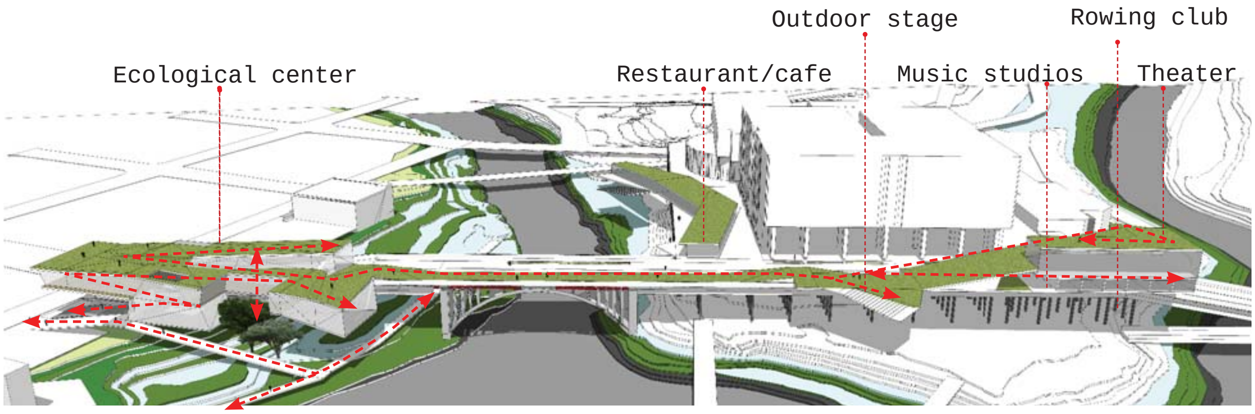




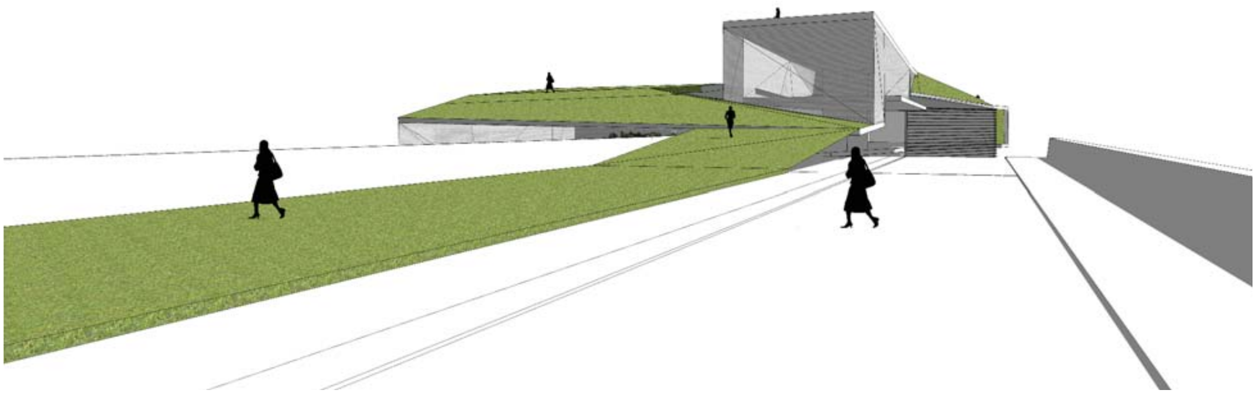


Conceptual section

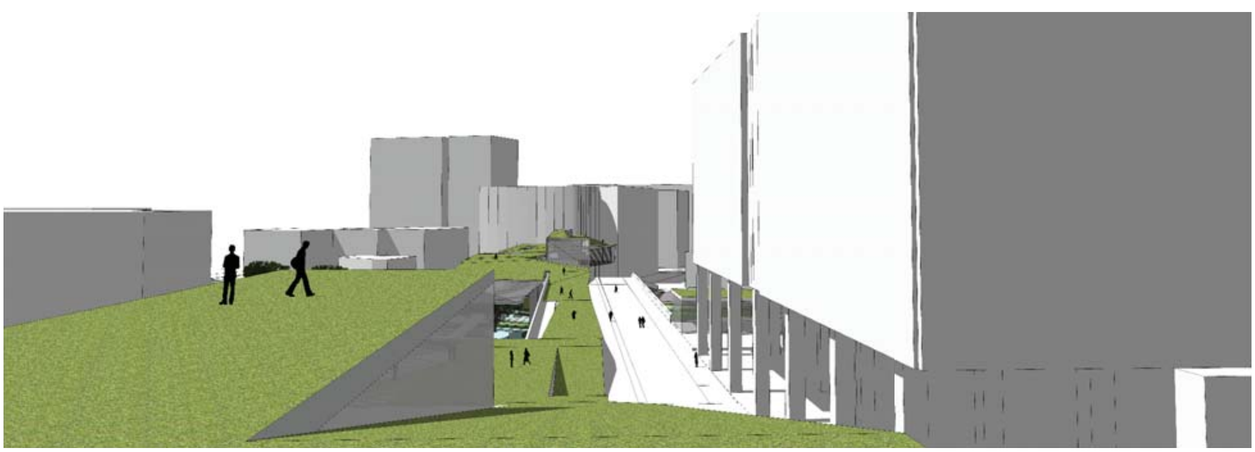
(above) View towards the theater from the event space. (below) circulation on the new ecological roof after courtyard and atrium openings.



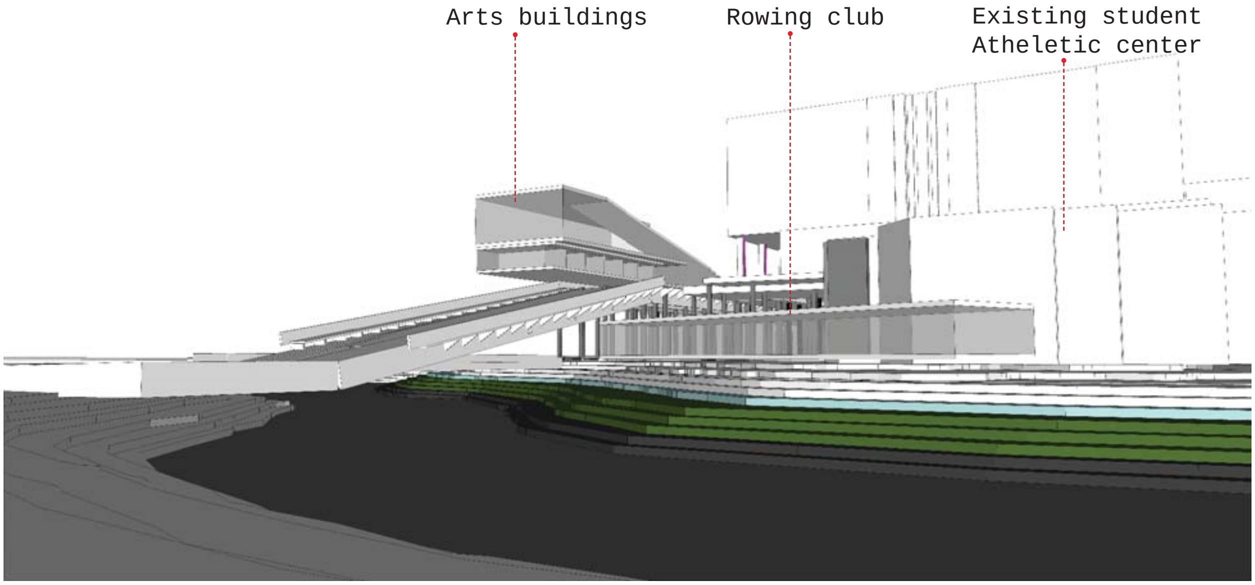
The linear park would fold over the massing on the entire bridge, with ecological center on the south end and Arts program on the north end serving as two attractor points.



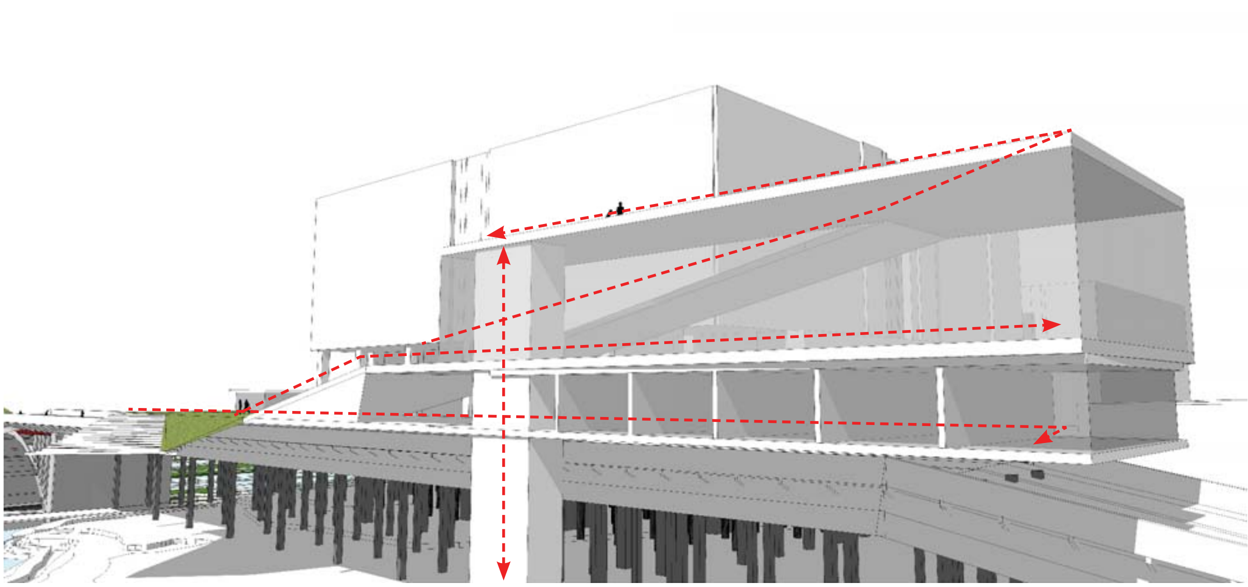
Entrance onto the roof of ecological center from the bridge. The overlap created by the historic railing can be connected through landscape folding surface that provides continuity.



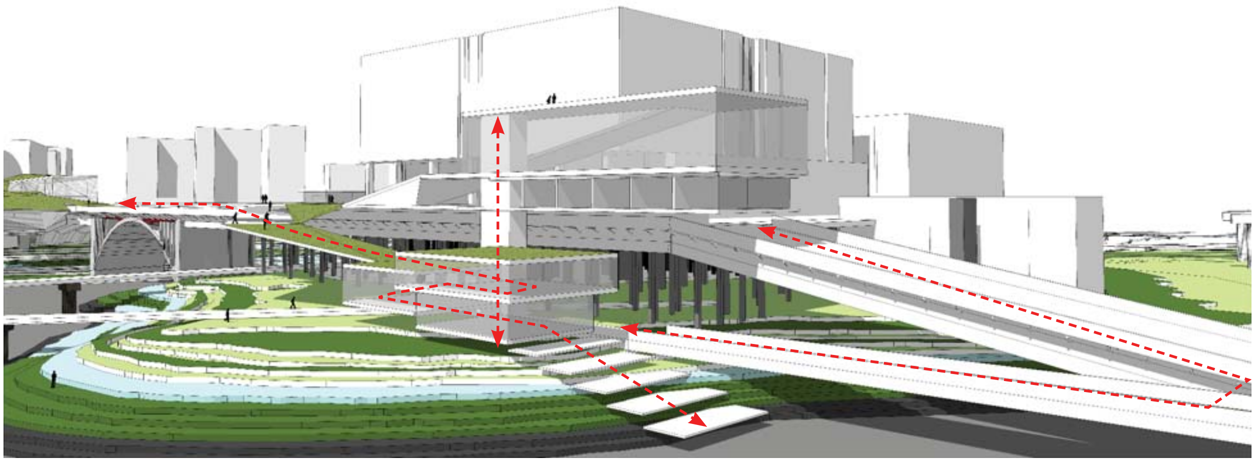
View towards downtown and ecological center from the rooftop of the theater



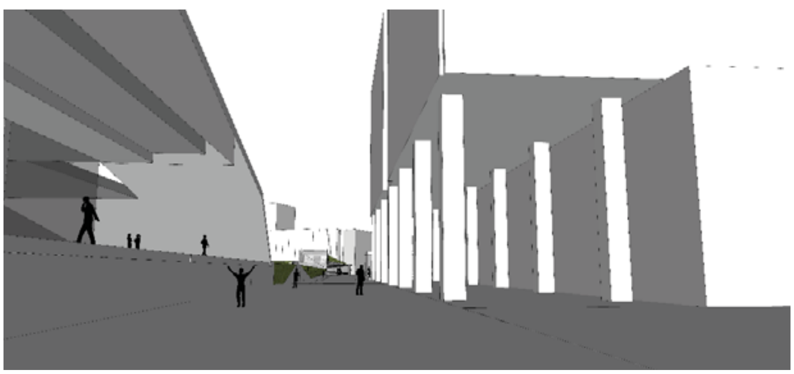
The North end of the bridge needed revision as the rowing club could not be placed under the bridge due to the columns occupying space. The Arts building consisting music studios and theater did not interface well with the sloping ramp of the bridge.

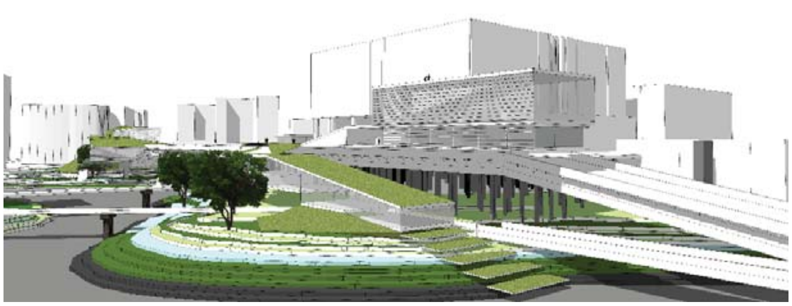


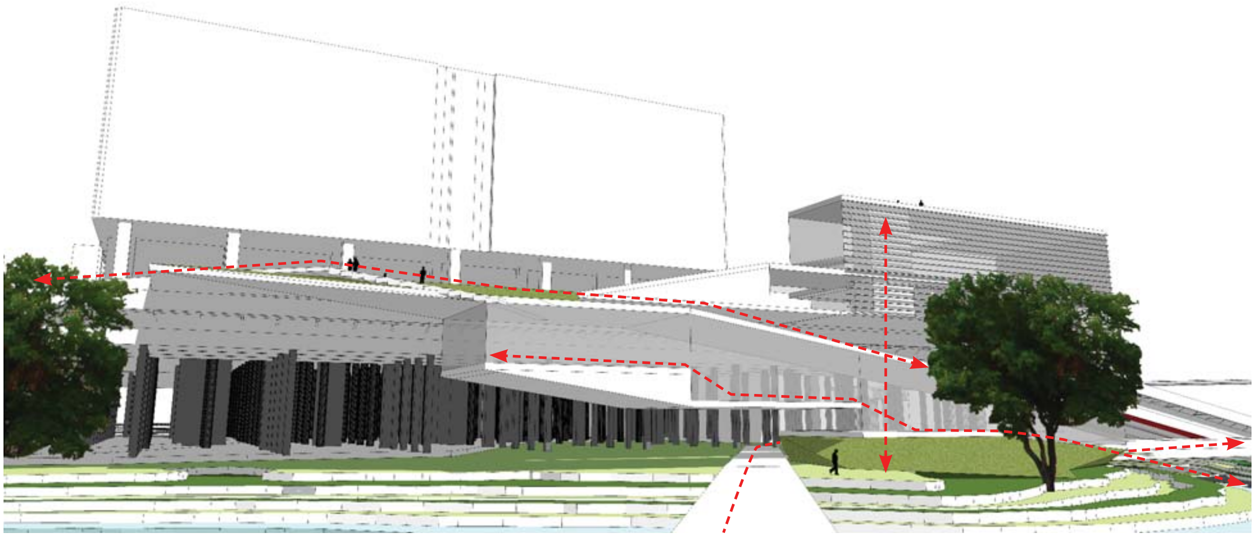
Circulation into the Arts building is connected to the bridge and to the ground plane with an elevator shaft for access to the rowing club.



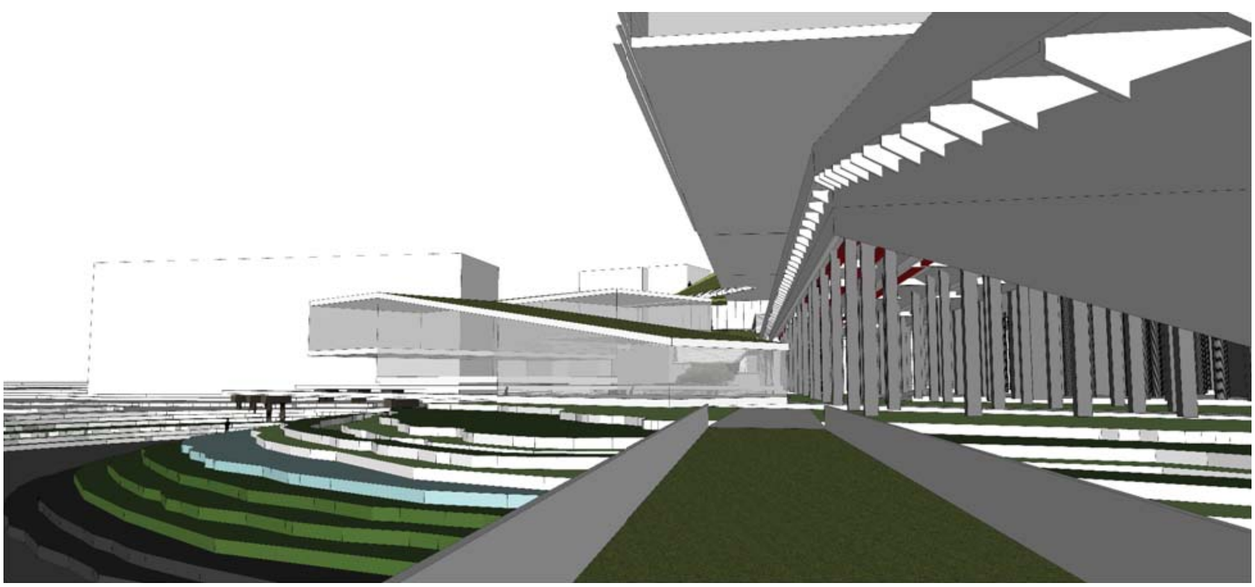
The Rowing club was moved to the east end of the bridge for functionable spaces, direct access and views towards the water. By doing so, it could share the elevator shaft connected to the bridge. Potentially, the cantilevered stage can connect to the roof, providing additional pedestrian space and circulation.

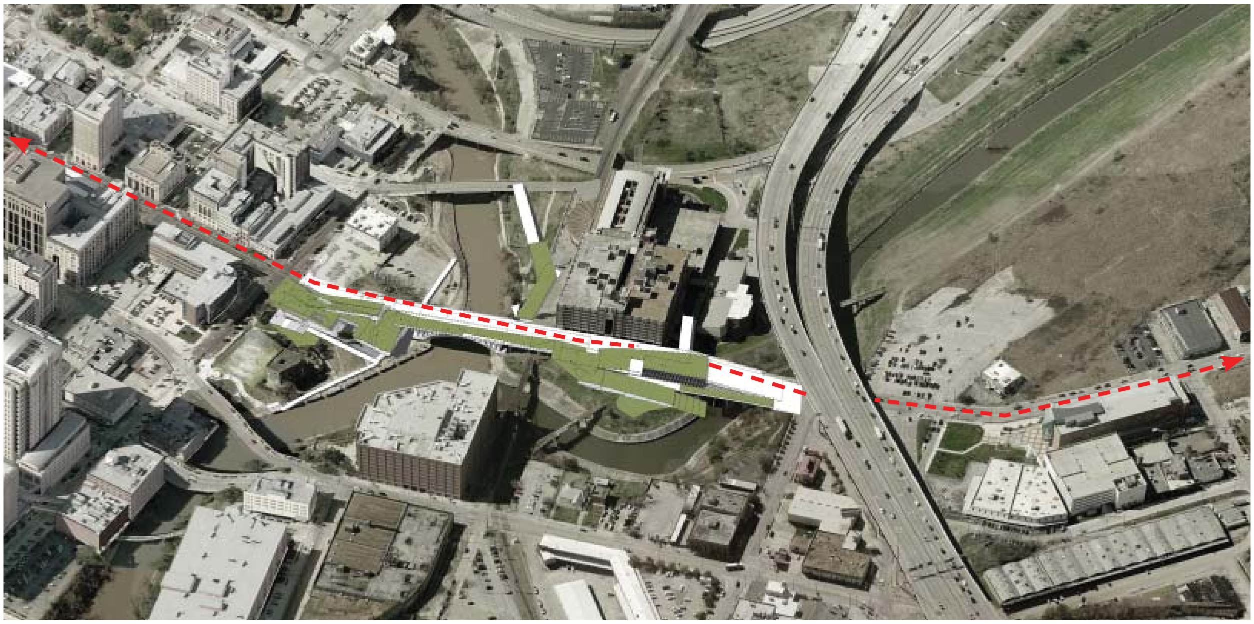




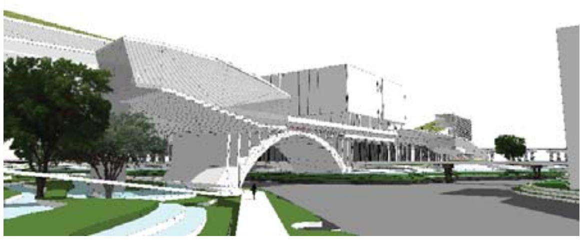


The building can step down gradually towards the bayou, activating the residual space with waterfront recreation. The building would rest on terraced - earth berm on one end and lifted above on the other. This maintains access and activates redundant bridge underneath for pedestrian circulation, while connecting to the bridge



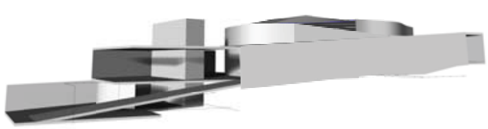


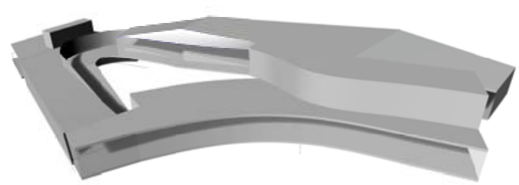
Jackson St
Oxheart
Wood St
N San Jacinto St
Baker St
Travis St

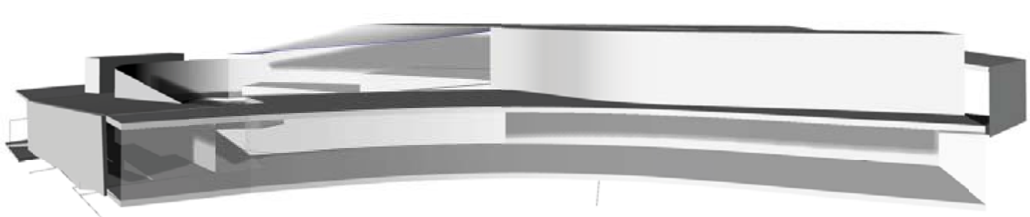


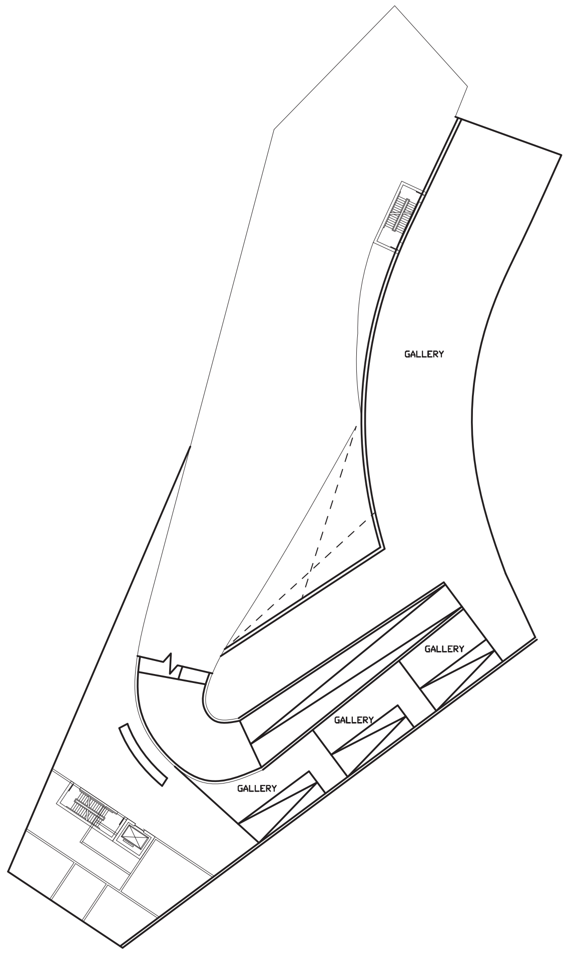
Formal explorations:

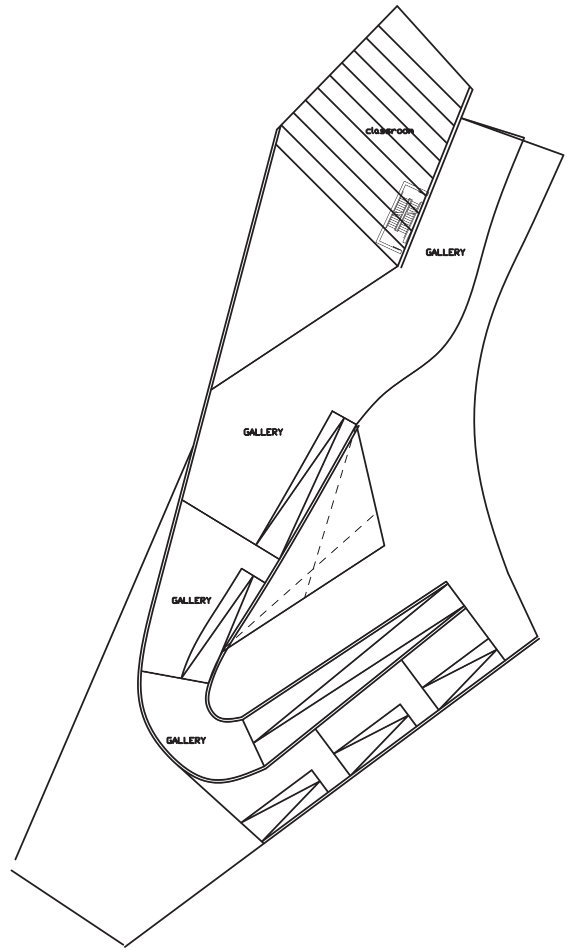
After acheiving some sense of order in terms of how program and circulation can interwine on the bridge, further formal explorations were done to achieve an architectural language that informs the bridge holistically and spatially define interior spaces better.



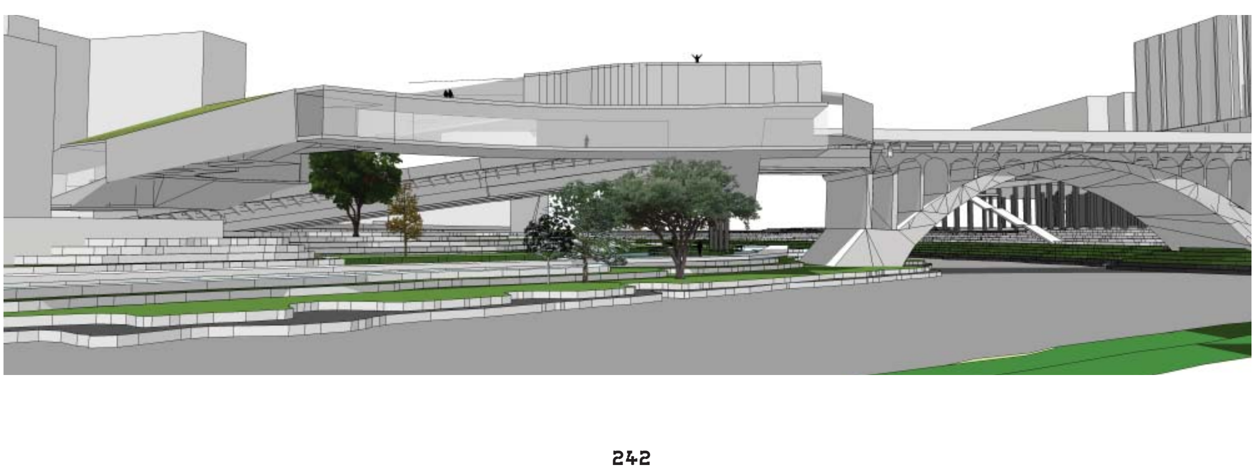


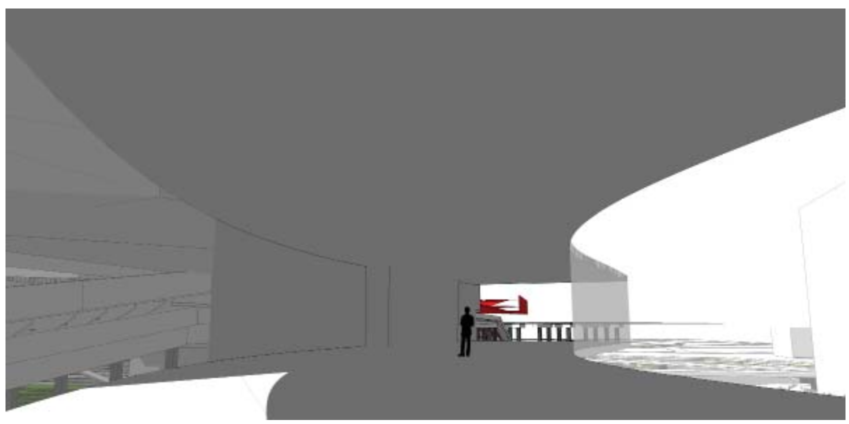


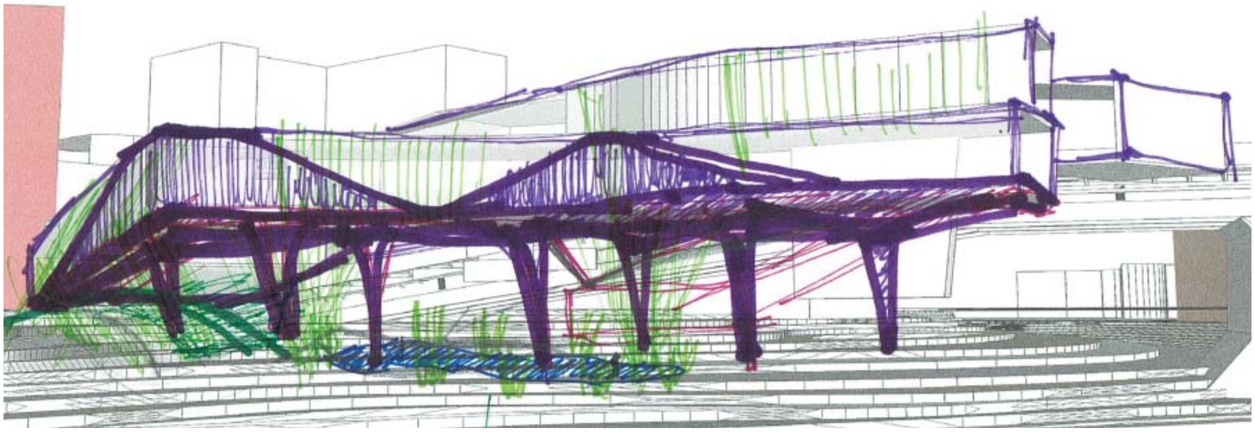


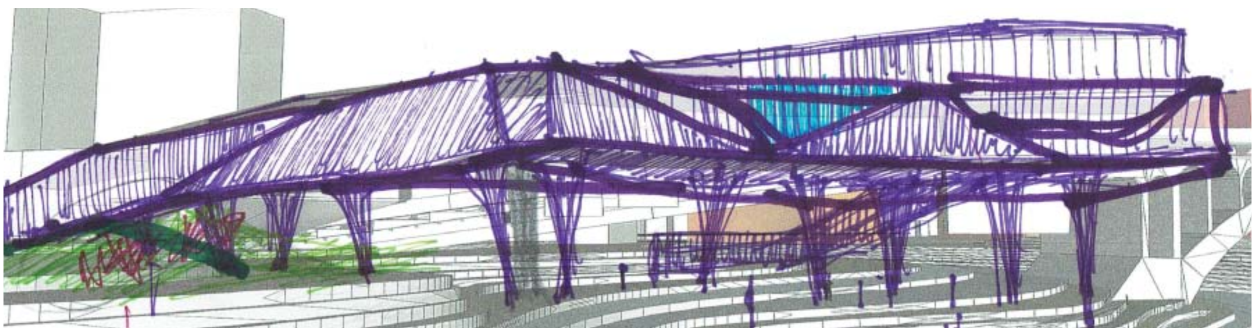


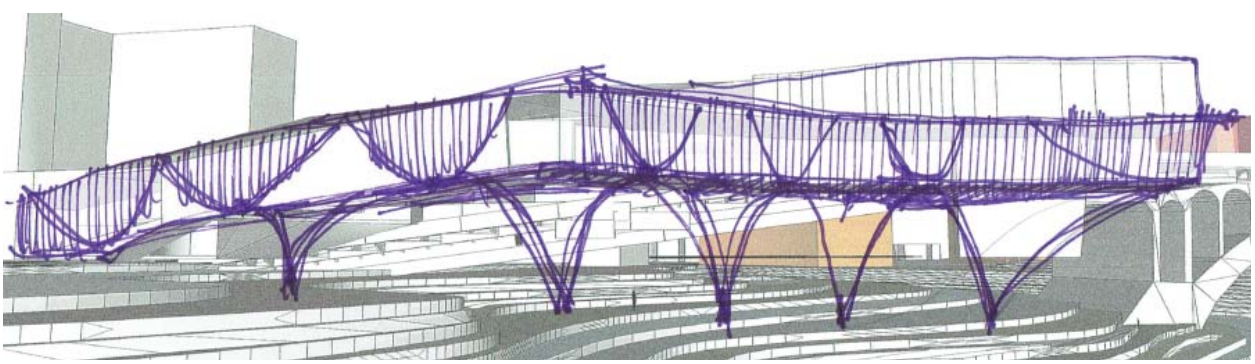
The ecological center was revised to find a fluid formal language where interior paths can create a meandering experience surrounded by galleries, framed by views and trees. The gallery sizes were expanded to optimize its functionality.

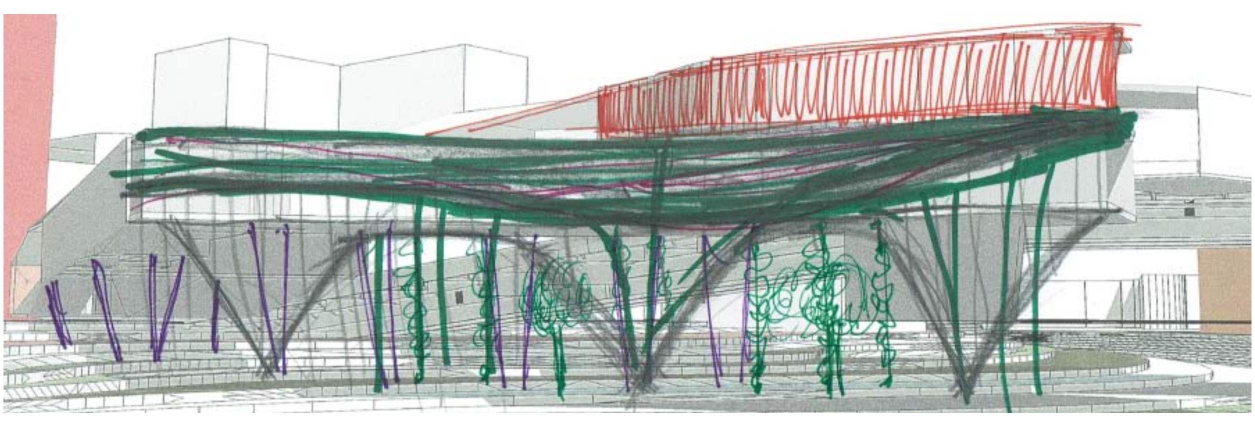


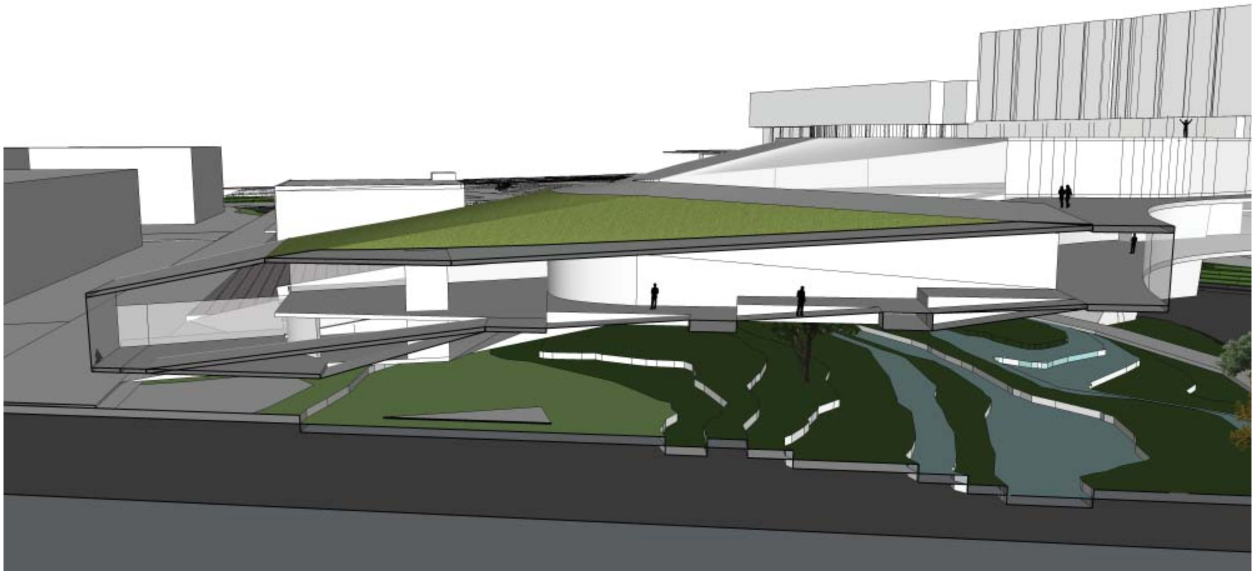




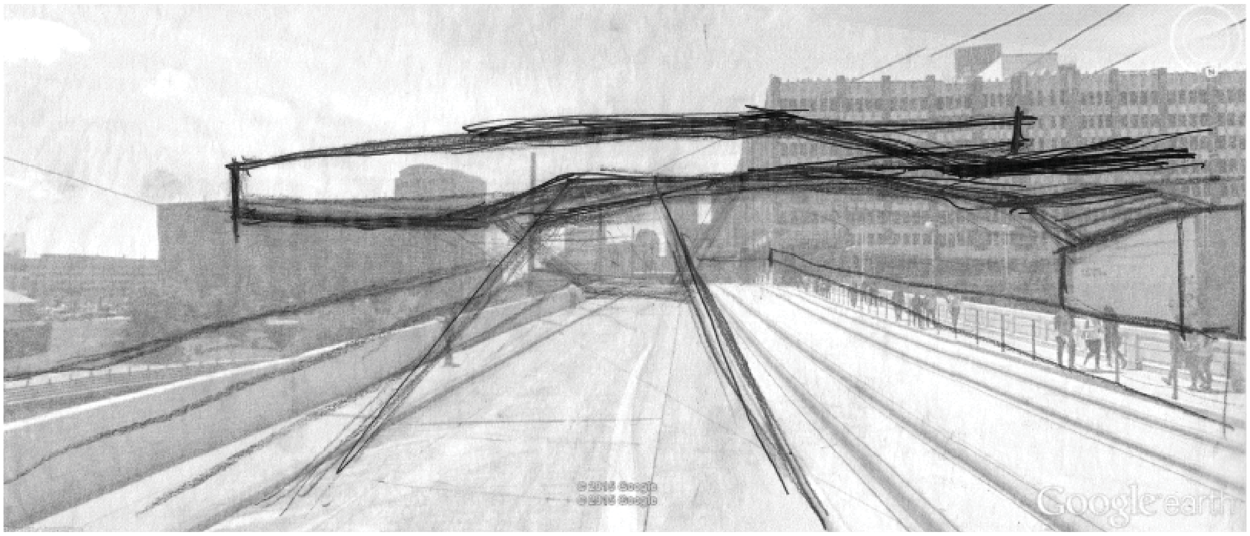




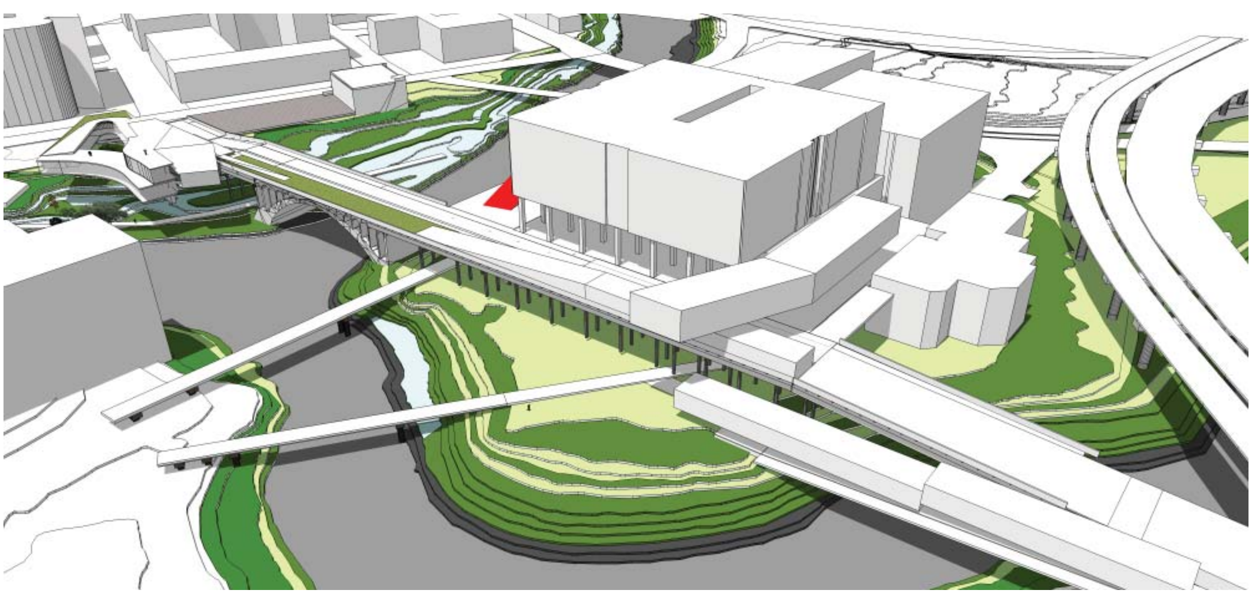


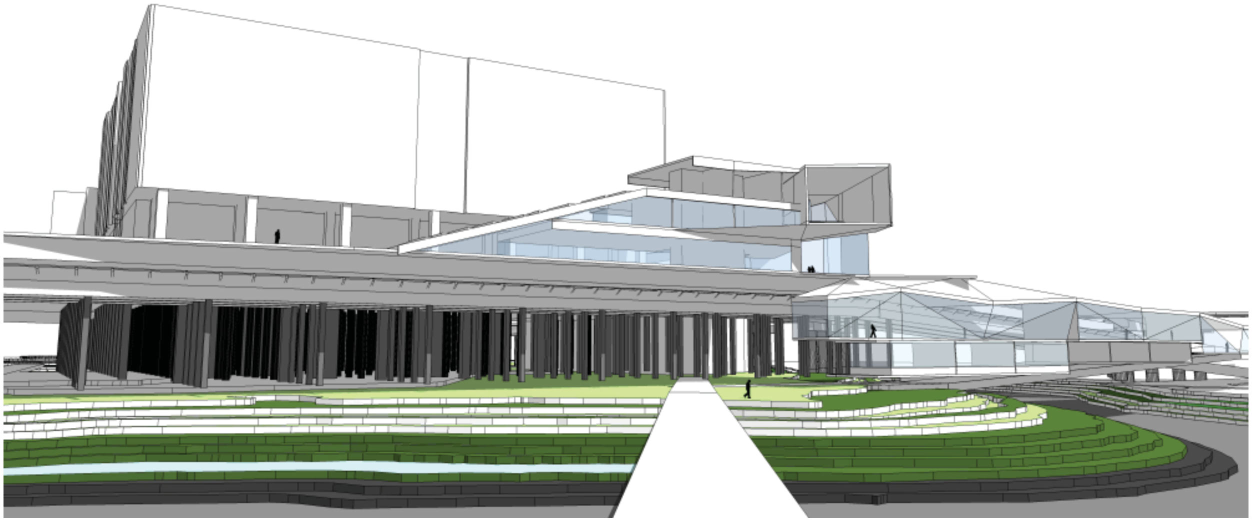


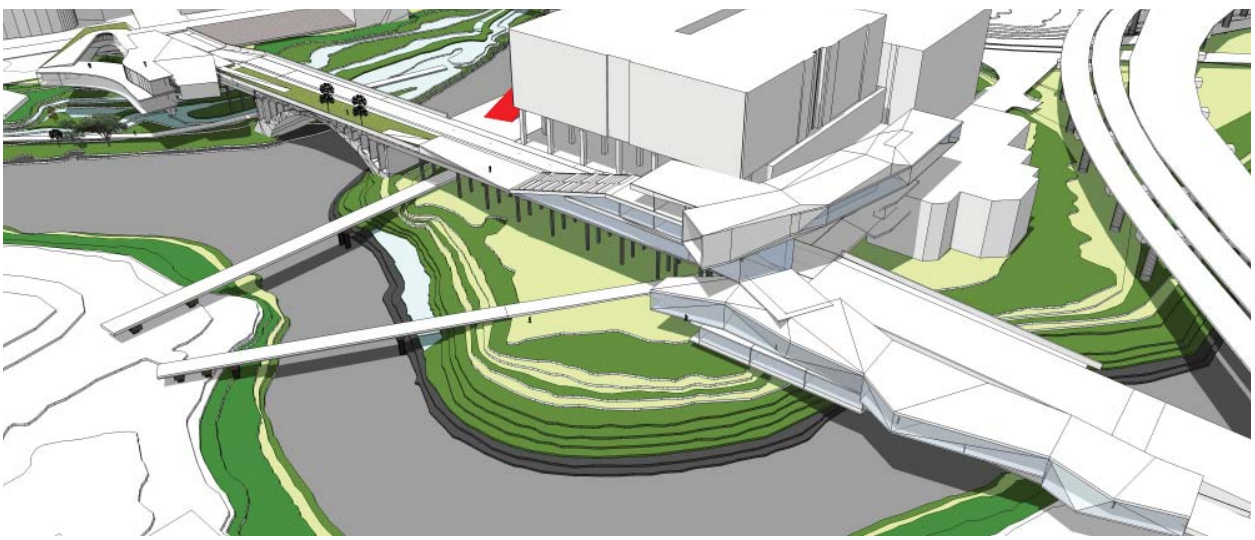
Although this scheme is more interesting then the previous one as it is spatially following a similar meandering language of the bayou, it projects too far into the landscape, which would compromise native vegetation and require increasing amounts of structural columns.

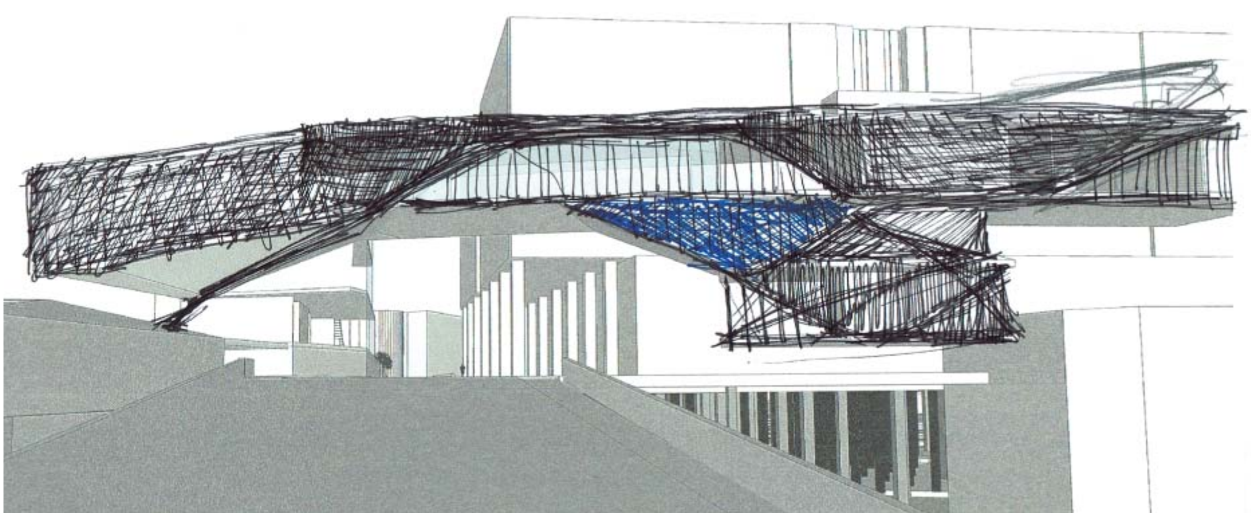


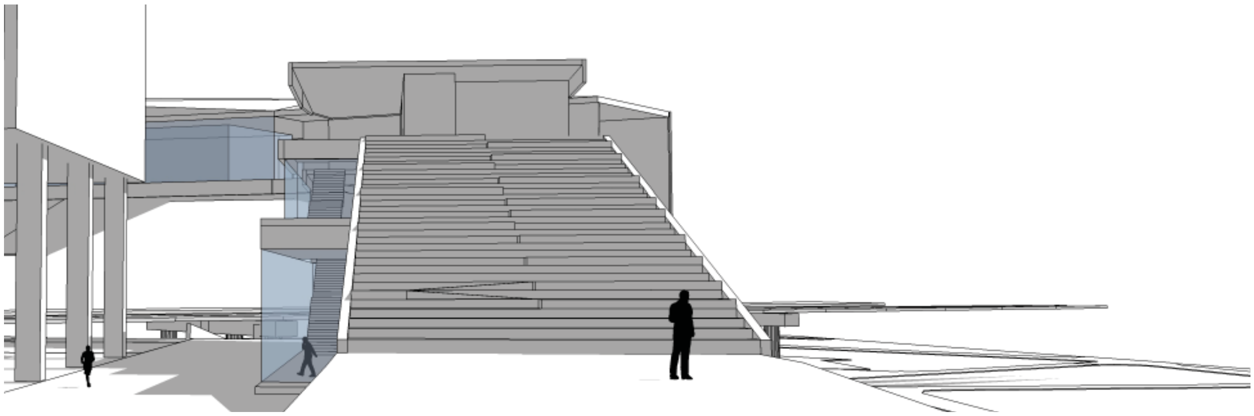
The student lounge space, Arts building and the rowing club was also revised to compositionally distribute the mass better so it does not interfere with the renaturalized landscape below, while optimizing existing infrastructure. The rowing club was moved on the existing bridge ramp and “on the bayou”, making the building appear more linear and extended towards key views on the water. The Arts building hovers above the existing bridge inorder to optimize existing infrastructure for placing support structure on and for meeting the spatial requirements of arts program.

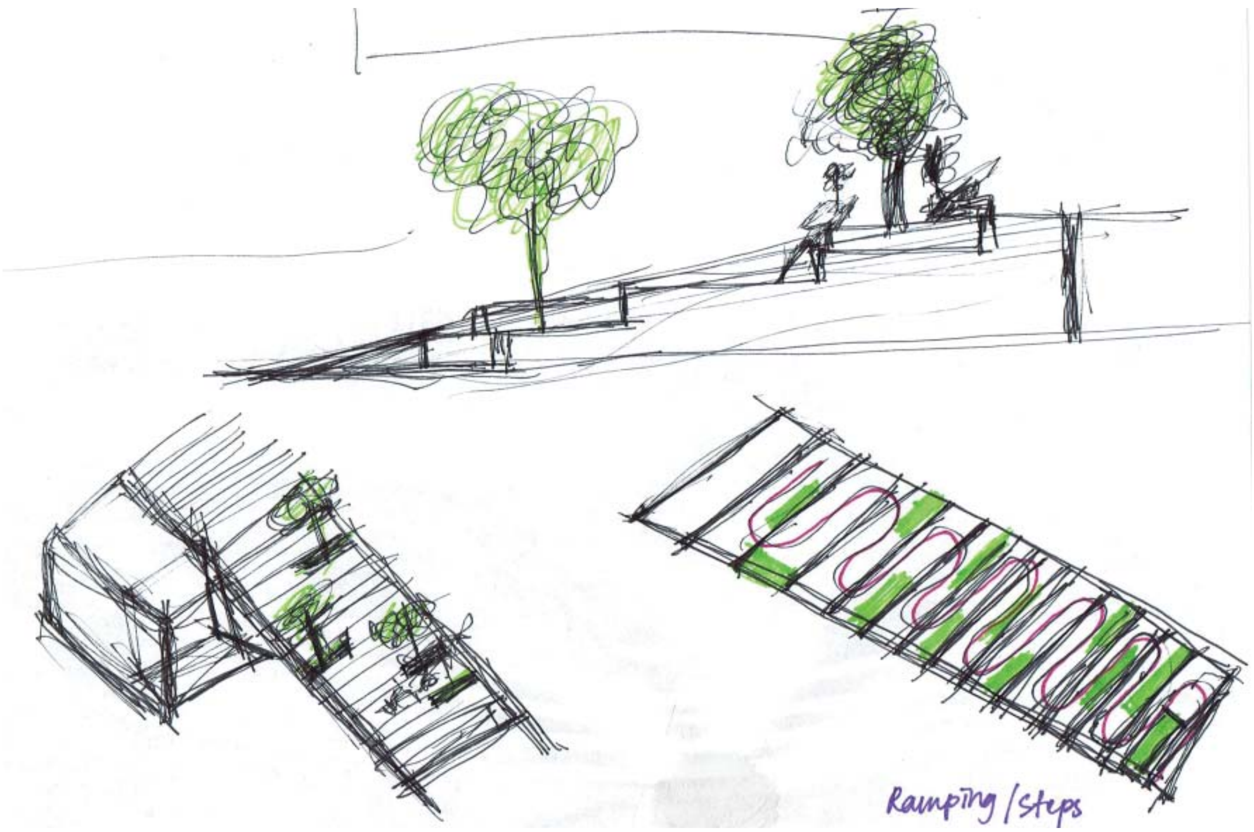




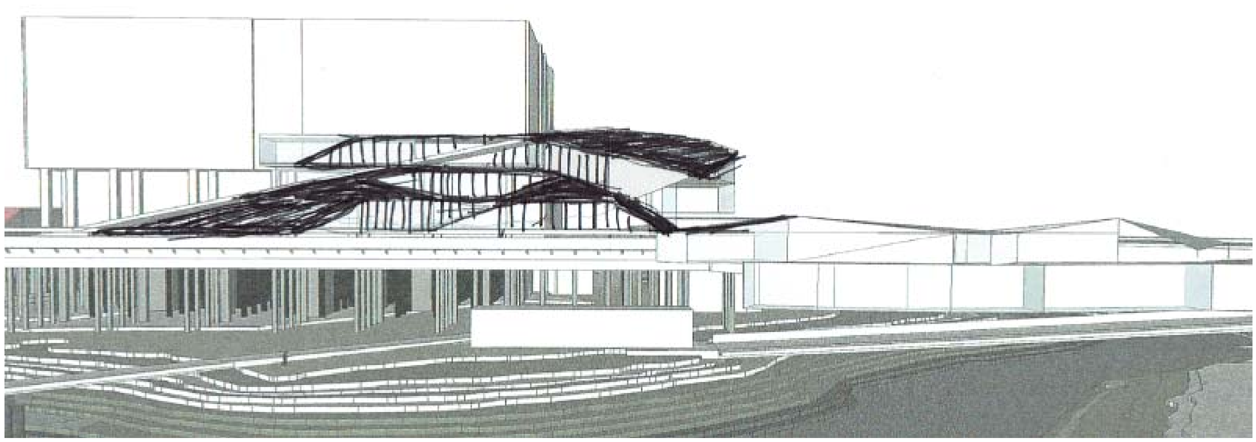


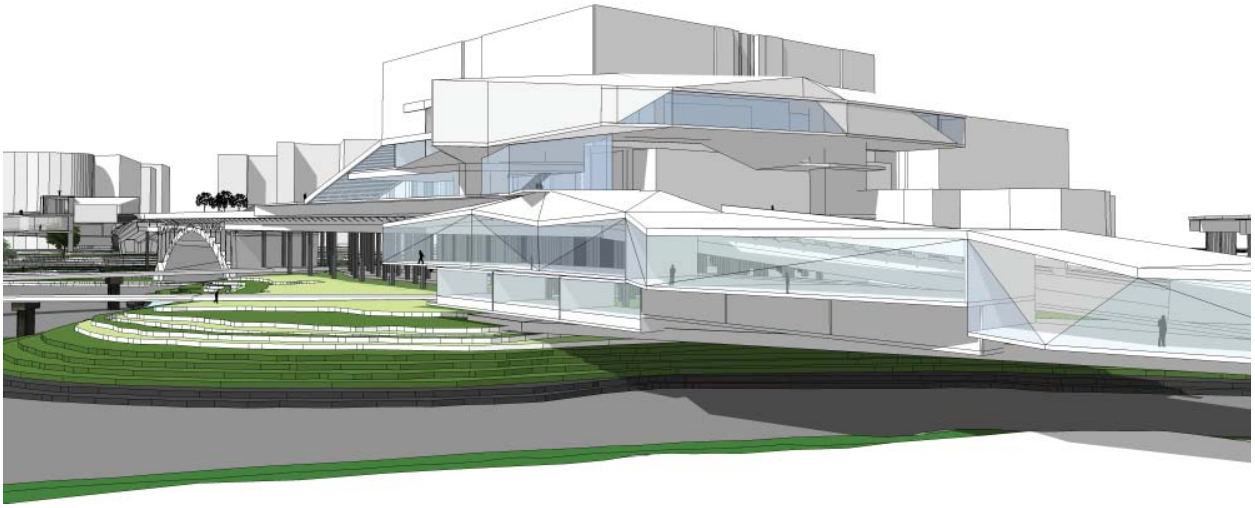




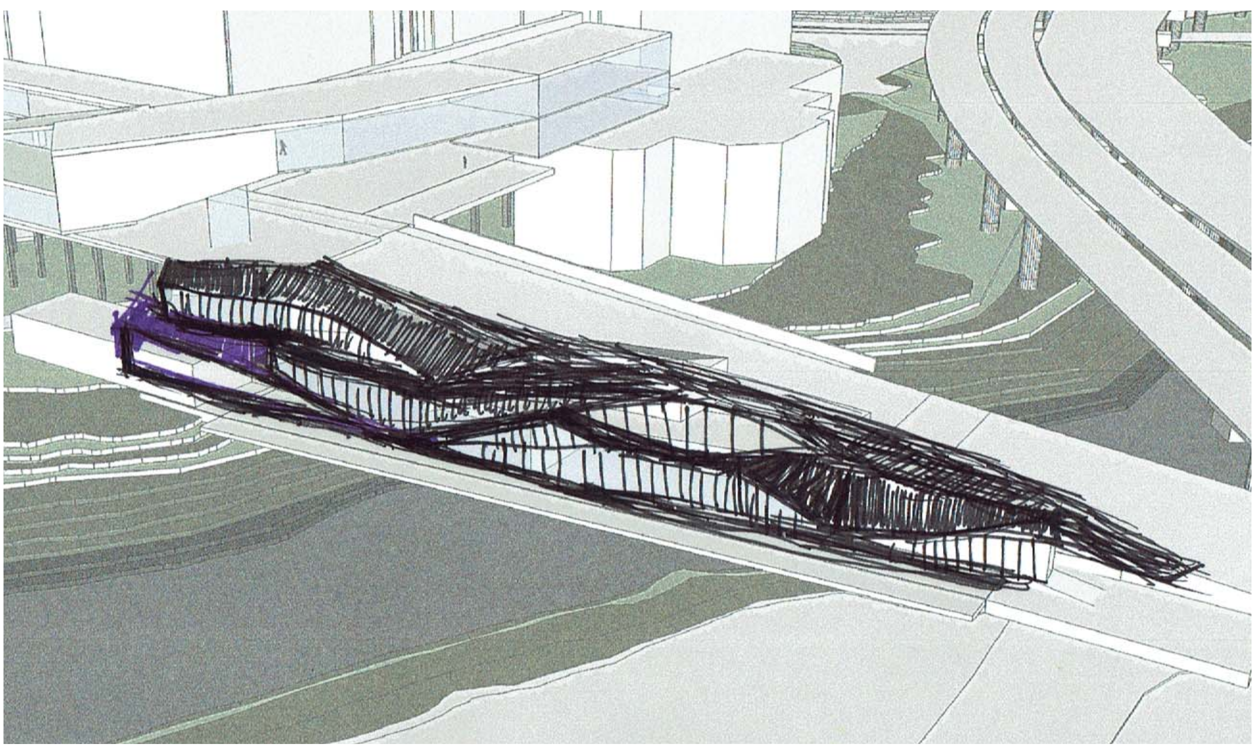


Ramping /steps

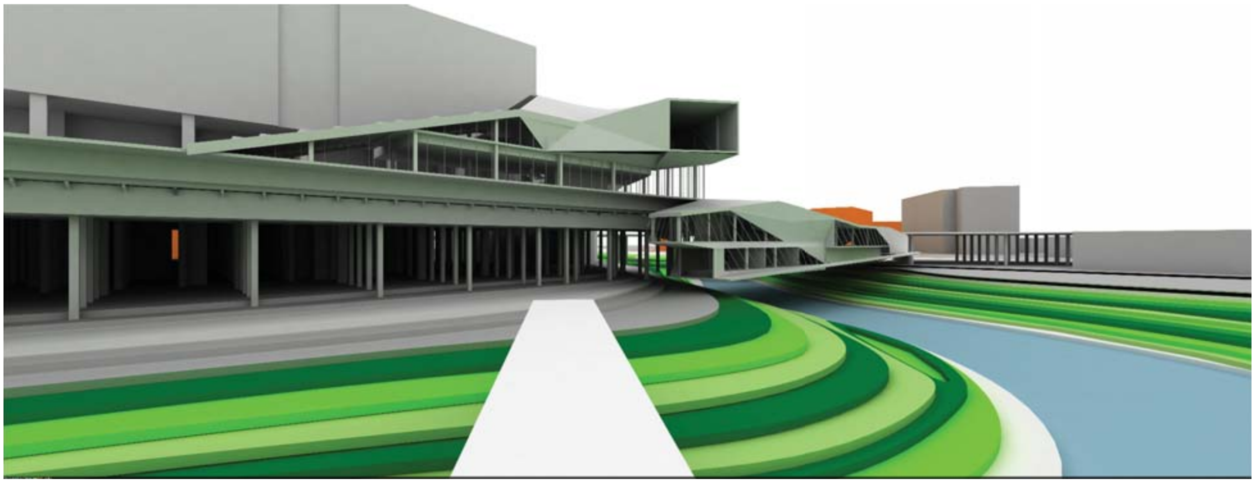


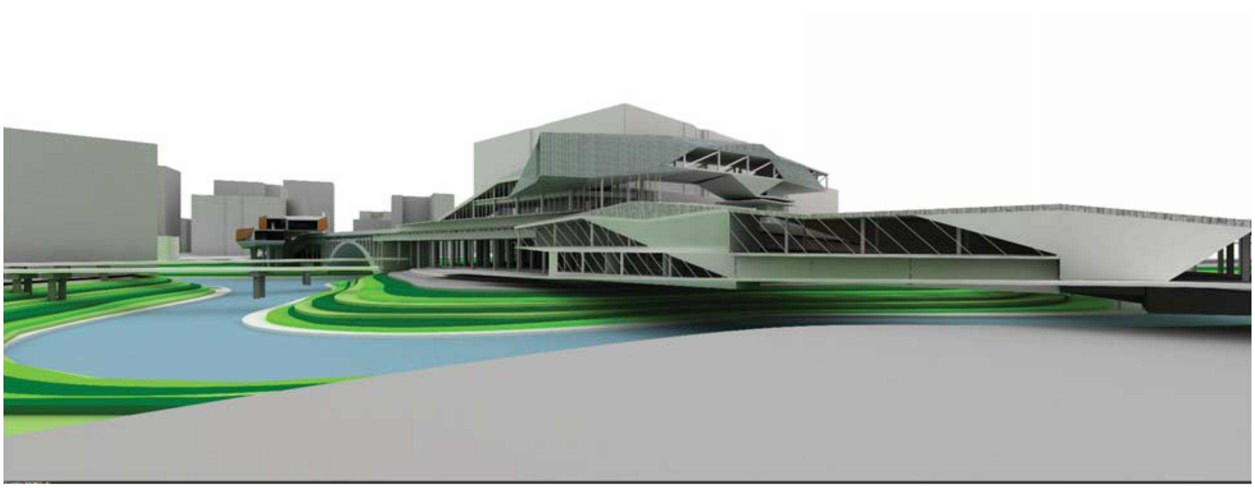


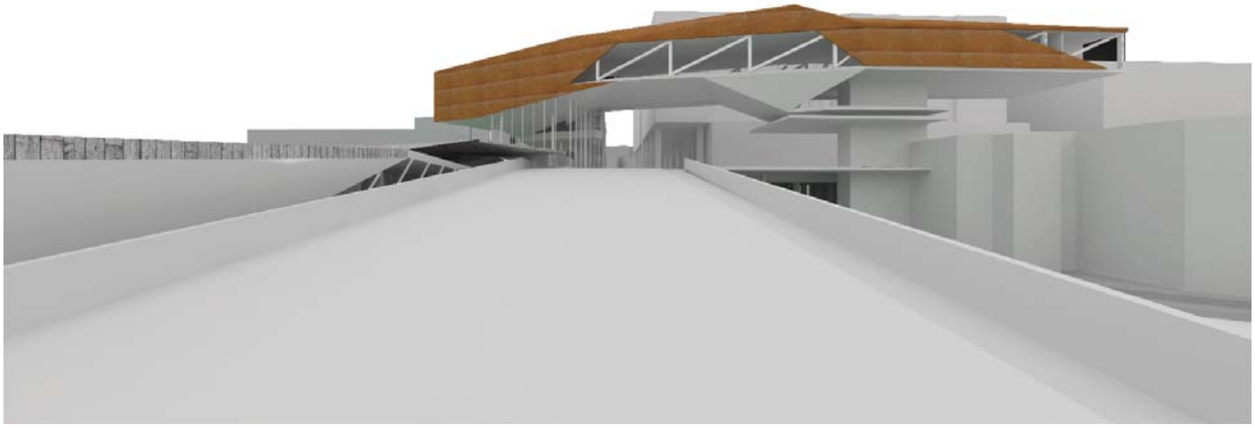
The Rowing club and the arts building hovering above - provides a new boundary along the north end of the bridge. The rowing club is situated on the existing bridge ramp, and directly on the bayou. It was initially envisioned as a curvateous form that would speak to the fluid language of the bayou.

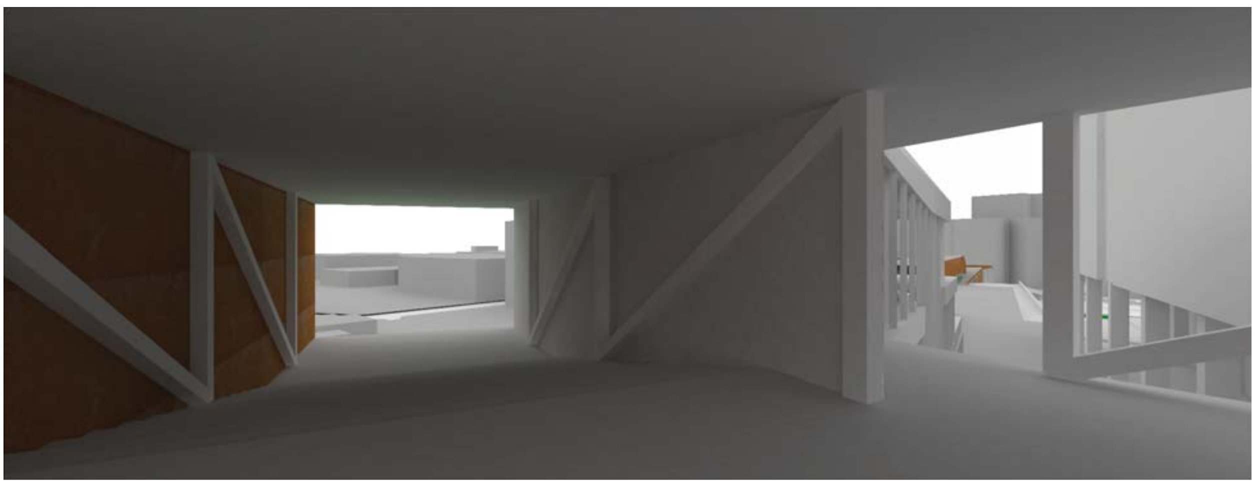


Compositionally, the programmed bridge appears more balanced with the landscape compared to before and formally starts to express the fluid, meandering language of the bayou. It structurally utilizes the existing bridge more efficiently by being placed on it directly with the exception of the ecological center.

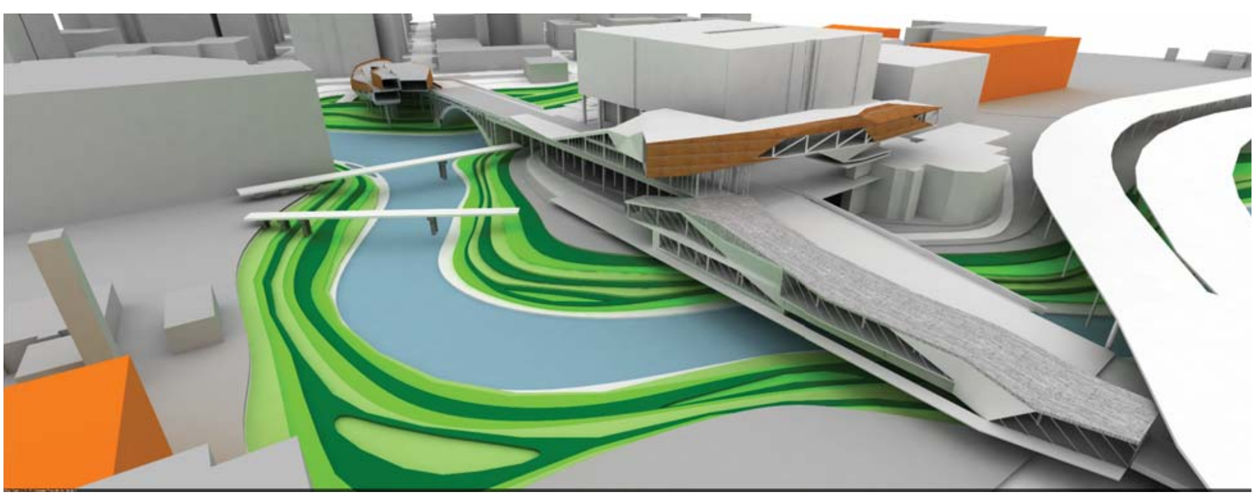


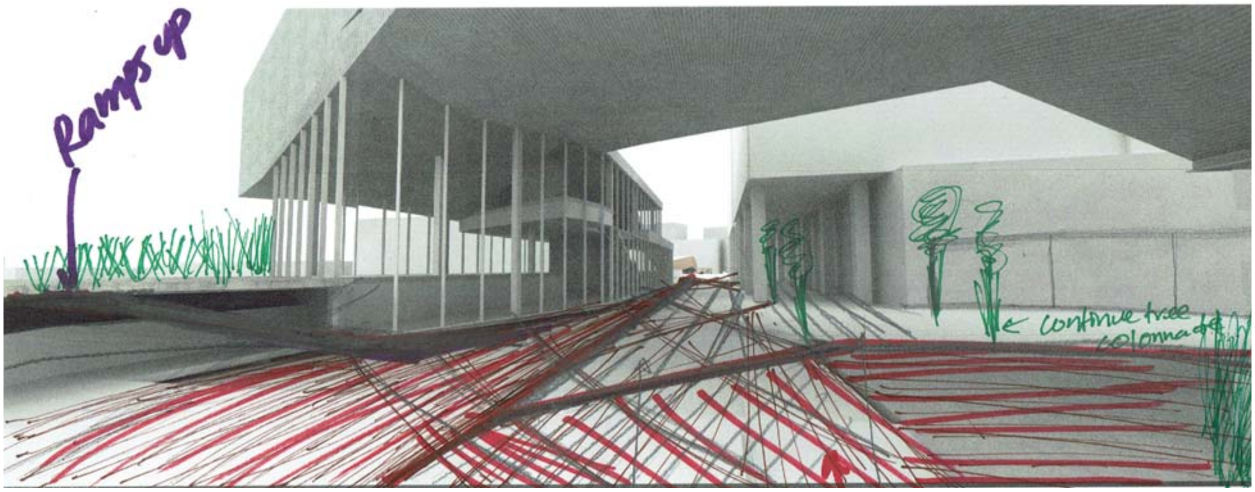


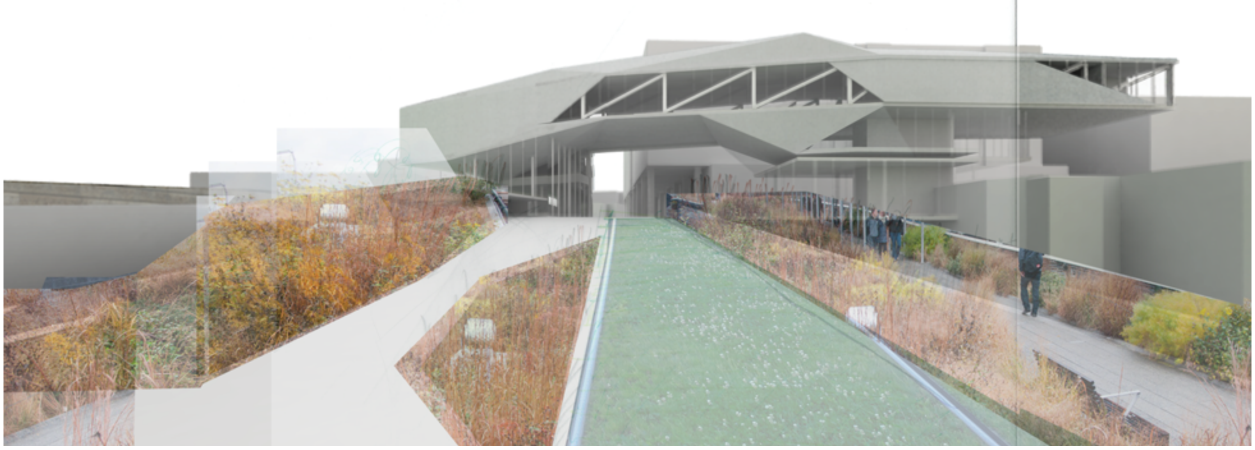


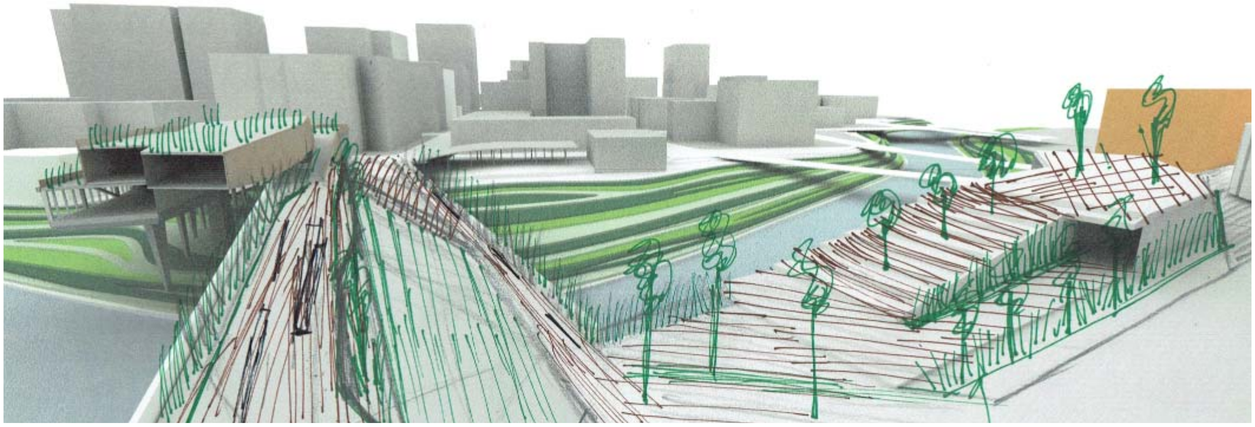


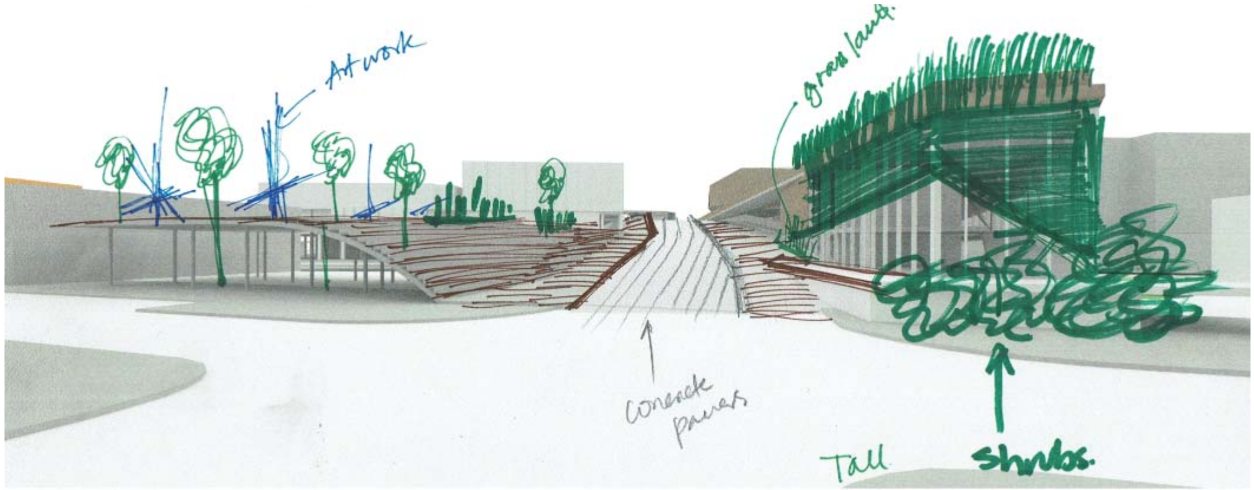
Interior theater - frames views to the city and the bayou

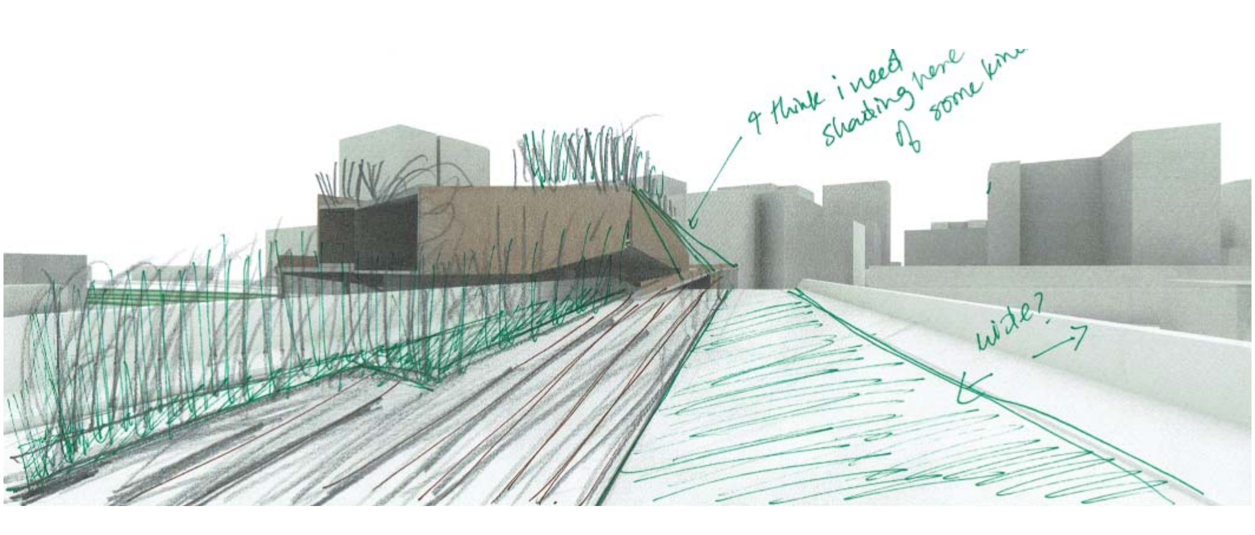


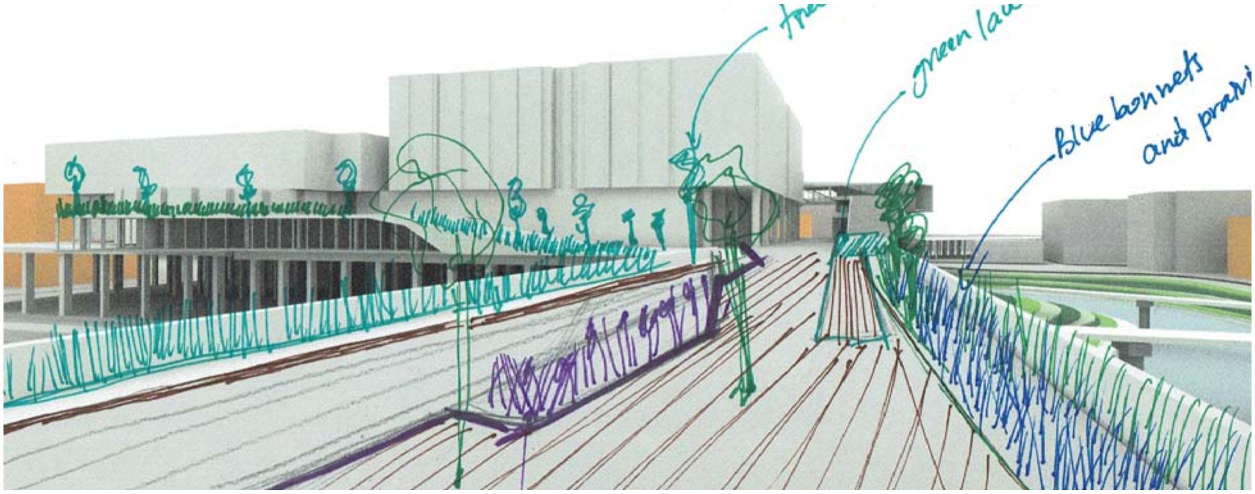

Ramps up
continue tree colonnade





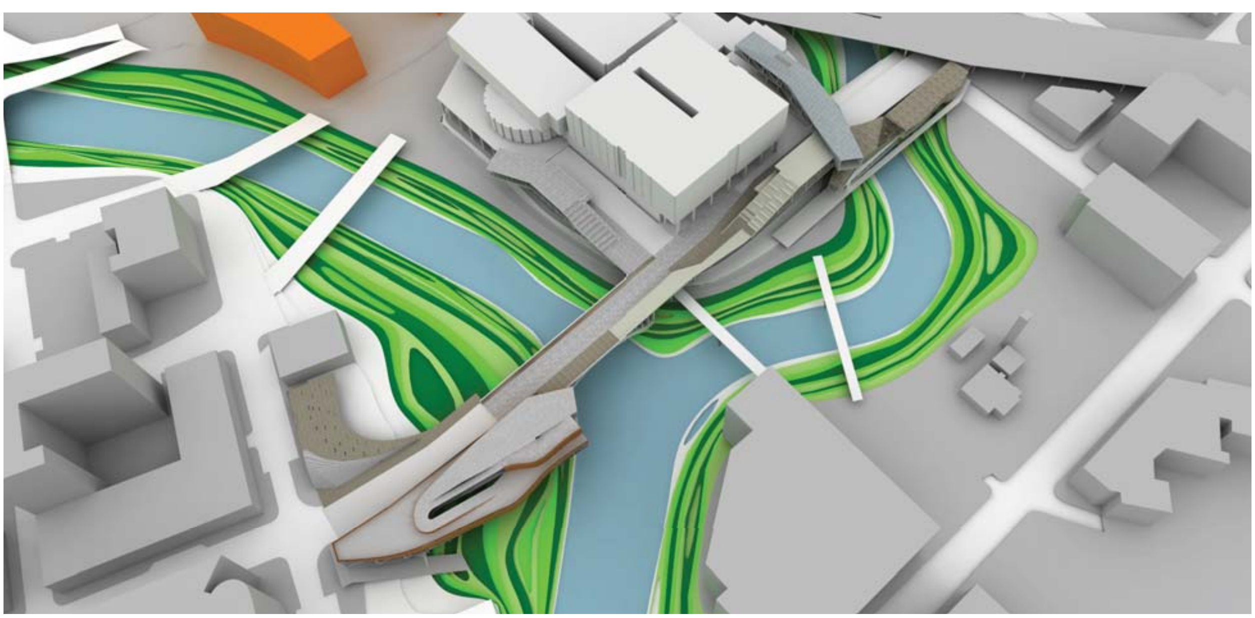

Art work
grass land.
concrete pavers
Tall
Shrubs.


I think i need shading here of some kin
wide?



Linear park pattern above the arch

Seating and landscape concepts infront of the UHD entrance



APPENDIX A.3 : PHYSICAL MODEL