Infra-LINK: Accommodating the Rising Seas at the Littoral Urban Edge

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INTRODUCTION

We have an intrinsic connection with the water and the natural world. The littoral or coastal region is a landscape we all love. We enjoy seeing the sun shimmer on the water's rippled surface as it sets over the horizon's edge. We enjoy hearing the sound of the water crash onto the sandy shore. We enjoy the salty aroma that infuses the seaside air. All over the world, our communities and cities dance along the waters edge. The blurred region between land and water is a place we visit, stay, and make our home. However, as we modify and transform this landscape with each building, road, and parking lot to accommodate our habitation, we are in turn placing ourselves at risk of potential devastation.

We are a growing species, expanding from our current 7+ billion people. Recent evaluations by the United Nations show that people all over the world are migrating to urban conditions. "The world's urban population has more than quadrupled since 1950, more than half of us live in urban environments for the first time, and the trend is accelerating. Like it or not, the globe has an urban future."[1] Many of these urban environments are located at or near the littoral edge. We built our cities next to the water for various reasons including: transportation, access to resources, and the sheer scenic beauty. Little did we know that these environments would be the primary contributors of our future challenges.

It is no secret that humanity has had a less than stellar impact on this planet. Geologists suggest that the Earth has entered the anthropocentric era; which is a new phase of geological time where human activity has primary influence over the Earth's ecosystem. Our output of greenhouse gases, namely carbon dioxide, into the atmosphere is causing a global increase in temperatures, thus creating a rapidly changing climate. This rise in temperature is causing our oceans to rise around the globe. As the glacier ice sheets melt and our ocean waters expand, the world's coastal cities face the challenge of how to address the urban fabric at the water's edge. A recent consideration by climatologist, James Hansen, states, "Recent estimates of sea level rise by 2100 have been of the order of 1 m, which is higher than earlier assessments, but these estimates still in part assume linear relations between warming and sea level rise. It has been argued that continued business-as-usual CO2 emissions are likely to spur a nonlinear response with multi-meter sea level rise this century."[2] In the next century, this phenomenon has a high potential to increase the rate of shoreline erosion and cause intensified flooding and storm damage. If we delay action, this water will threaten the future our cities coastal infrastructure, communities, and ecological networks.

Recent strategies that address the rising seas are primarily embedded in singular defensive principles that aim to protect and guard our existing urban real estate and infrastructure. These approaches often leave us with a physical disconnect from the waters edge, thus, contradicting our own motives for living so close to the shore. When contemplating this question, perhaps we need to reevaluate the relationship between the urban environment and the water. Perhaps this relationship should be one of collaboration? Perhaps, the urban edge can become iterative, adaptable, dynamic, and responsive. For us to live harmoniously near this condition, might we need to shift our approach to that of dynamism and multiplicity, rather than that of singular and static insertions?

It is the responsibility of architects and designers to think creatively about how we

move forward. Typically we are problem-solution oriented but in this case we must understand that we have nothing to solve. Sea level rise is a regional or local phenomenon that has not yet reached its pinnacle. In the next century, the condition has a high potential to intensify. Thus, this not an issue that demands typical "solutions" thinking. It is an issue that requires continual learning and the ability to remain flexible. While this paper will present recent strategies of water-based infrastructures, it will not offer any distinct solutions. However, it will offer a way of thinking that addresses the issue via innovation, regional awareness, and planning.

METHODOLOGY

Cities all over the world are taking action to address this unacquainted challenge. Many are taking a step back to see how others have responded to the pressures of inundation in the past. The following paper will look into current strategies used or proposed in response to imposing water levels to gain a general understanding of potential tools. Since this condition is relatively new and of the future, built coastal projects that address the rising seas are uncommon. Other infrastructural projects that address water management and flooding will be utilized to serve as example and discussion in this paper.

This information will be offered in the form of theoretical evaluation, historical analysis, and architectural case studies. In particular, we will observe and evaluate three case studies that will begin to shape our understanding of a layered infrastructural approach. The first case study will critically analyze the Parramatta Waterfront Proposal by Lateral Studio to study an infrastructural idea that blurs the lines between flood security and the added value of public space. The second case study will concentrate on the Folding Water concept by Kuth Ranieri Architects to better comprehend how a defensive strategy might become much more than a one-dimensional infrastructural component.

Architect activist Malcolm Wells in *Gentle Architecture* states, "Architecture has a moral side which must be faced. If we ever find a way to build with proper respect for this planet our reward can be more than just environmental. It can be aesthetic, too, perhaps beyond our wildest dreams. But first we've got to commit ourselves, for *life,* to the idea of land-respect. Without such commitment our efforts will be useless."[3] As we approach strategies for sea level rise, we must remember the moral responsibility we have to the land on which we live. It is crucial that we evaluate the environmental impact of our actions. Whether it is a tree we cut down or earth in which we move, morality must not be conquered by economy or other sources of influence.

THE 4 R'S OF RESPONDING

Fundamentally, we can begin to look at this condition by understanding the range of hypothetical methods employed in response to flooding and water management. These methods can be categorized into four sets, namely, Resist, Resiliency, Receive, and Retreat. These categories cover the theoretical spectrum and everything from measures of extreme defense to the ultimate accommodation. An important concept to remember is that the range of this spectrum can be directly linked to the amount of control humans impose upon the natural environment.

The act of resisting forms a relationship where we express our power over our ecosystem. Resistance methods are rooted in a defensive framework with a primary goal of protecting our land and controlling the water. Merriam Webster defines the term defensive as "defending or protecting someone or something from attack: helping to keep a person or thing safe".[4] In terms of sea level rise, current resistance mechanisms include dikes, dams, levees, floodwalls, bulkheads, and other large-scale barriers. Resistance strategies tend to be the largest in scale and most harmful to a local ecosystem. Their footprints have a high potential to transform landscapes, alter water quality, and destroy habitats. Even though this is the case, these strategies have been proven to provide protection. So why not think this way?

When we strive for resiliency, we fight to remain a dominant force and often build environments that can easily bounce back from impact. Strategies of resiliency try to become adaptable and responsive. Many cities around the world are developing climate change plans revolving around the idea of resiliency. These strategies

tend to be made up of larger scale natural elements that can help protect from flooding and storm surge. These natural elements include but are not limited to, natural topography, dunes, artificial reefs, barrier islands, beaches, and coastal restoration. In a recent proposal for the Rebuild by Design competition, SCAPE studio developed a strategy to create constructed living breakwaters that would protect Staten Island, NY from future storm events. This resilient design relies upon the natural strength and stamina that natural systems already provide. While the idea still resists in many ways, it comes without the negative environmental effects that hard infrastructure can engage.

One of the more thoughtful ways of thinking about how we deal with rising waters is to receive it. When we receive, we accept the forces of nature and build in a way that balances man and nature. The method of receiving can also be viewed as a simple compromise. When we begin to view our relationship with the water in a receptive manner, planning practices will no longer be primarily developmental but they will need to become somewhat deconstructive. Our existing infrastructure will need to be evaluated to determine where we are able to receive the water. A method of receiving will develop or replace infrastructure with more accommodating elements. These notions embrace elements like estuaries, wetlands, surge pools, spillways, waterfront parks, canals, and tidal inlets, just to name a few. We can see that receiving methods are made up of both passive and active strategies to act upon. This allows use to shape our approach to a specific condition.

The last stop on the spectrum is the idea of retreat. When we retreat, we give up the waters edge and look to seek higher ground. Retreating is the ultimate form of accommodation. This notion suggests that we pick up our communities and relocate to a safer environment. In theory, retreating would ultimately protect us from rising sea levels. However, there are many reasons that this is not a viable option in the urban environment. Our existing coastal buildings and infrastructure are far too valuable to just abandon. Not only is this the case, but the cost of rebuilding on higher ground would be inconceivable. However, it is crucial that we are willing to give and take within the coastal context. Regions that are at a higher risk of potential disaster will require a larger scale retreat effort.

Potential strategies will need to consider and utilize these concepts at the local level. Local analysis and research will begin to highlight a principle that is more appropriate than the others. However, it will always take a combination of the 4 R's to find balance within the dynamic world of our natural environment.

LEARNING FROM THE DUTCH

The Dutch are known to be the leading experts with issues of flooding and water management. This is due to the fact that their history is formed around a long and sometimes devastating relationship with the surrounding water. This relationship stems back to the 11th and 12th centuries when the Dutch were met with the All Saints' flood that dramatically changed the landscape of the Netherlands. The North Sea flooded and connected itself to a previously inland lake Almere, thus creating what we know today as Zuiderzee or the shallow bay in the northwest region of the Netherlands. In response, flood control became a topic of National importance to the people of the Netherlands.

In 1255, the Dutch responded by creating the first local government entities that would be responsible for dealing with issues relating to water. These entities became known as Water Boards. At the time, this was one of the first governing bodies ever to be initiated in the region. Water Boards were comprised of farmers, land owners, building owners, and community members that were closely positioned near the water. These groups of people became responsible for the planning of barriers, monitoring water levels, maintaining waterways, and controlling water quality. These Water Boards were very successful due to the fact that they could create infrastructure that was tailored to their local condition and engage the community in the process. They built dikes, dams, and levees to create many layers of defense. In the 16th century, they even began to construct windmills that were used to pump invasive water away from the community.

As time passed, Water Boards remained a crucial entity at the local level until the late 18th century when the state created a centralized water authority, namely, the Rijkswaterstaat. This state authority became the leading power behind Dutch water management. At this time, there was a shift from a localized mindset to a large-scale national approach. This

led to the creation of much larger infrastructural insertions in the Dutch landscape. The goal was to protect as much land as possible with few infrastructural elements.

Figure 1- Delta Works Map- Illustration by Author

In 1953, the North Sea reared its head again and reaped havoc on its bounding landmass. Among those affected, the people of the Netherlands were hit very hard by floodwaters that infiltrated their communities. The 1953 flood was responsible for over 8,000 deaths in this region. The event also destroyed a sizable portion of the Netherlands' prime agricultural land. Faced with this adversity, the state authority responded by planning one of the largest feats of engineering ever realized to this day. The Delta Works Project was devised to integrate a series of 13 dams along the Southwestern border of the Netherlands territory. The dams would be accompanied by levees, locks, and other barriers to provide a primary means of defense from future water rise. The project took over 50 years to complete, with it being finished in 1997.[5]

The Delta Works is representative of a heavy infrastructure with a singular use. It is a static element responding to the very dynamic system of the North Sea. While the Delta Works provides security for much of the Western Netherlands from tidal surge and flooding, the construction of this project has dramatically changed the regional ecosystem. Throughout this region is a series of estuaries that once fed off of the saltwater from the North Sea. Prior to the dams, these estuaries were the home of a rich natural landscape that contained many species of saltwater fish and a variety of plant life. The building of the dams ended the shifts and flows of salt water, thus damaging the ecological landscape. These estuaries are now predominately freshwater systems or dried up mudflats.

THAMES BARRIER

The Thames Barrier, located in London, UK, was constructed in response to the same1953 flood of the North Sea that spurred action with the Delta Works in the Netherlands. The people of London realized that they needed to prepare for future flooding events so they began to plan ways to defend their city. In 1966, Sir Herman Bondi developed a solution that called for raising the banks of the Thames in conjunction with a movable barrier system. [6] The barrier lies nearly 40 miles away from the North Sea on the Thames River, as shown in map below.

Figure 3- Aerial View- Thames Barrier- http://www.pla.co.uk/About-Us/Thames-Barrier-Navigation-Centre

The structure is made up of ten semi-circular steel barriers that have the ability to open and close. Thus, when high tides threaten the city, these barriers will be closed to create a damming effect. The barrier spans approximately 1,700 feet from shore to shore. When closed, each floodgate is nearly the height of a five-story building.[7] This intervention is massive is scale because it was designed to defend against sea level rise predictions up to the year 2030. In recent years Londoners have began to question if the barrier needs to be reevaluated for conditions beyond 2030. A 2010 proposal by Foster and Partners rethinks the Thames Barrier for the future of London. One complaint about the original Thames Barrier is the fact that 95% of the time the barrier is open and relatively useless. Londoners asked why

they invested so much into a piece of infrastructure that was only put to use once every few years. Foster and Partners proposal takes this feedback and creates added value to the project. Foster's proposal not only increases the capacity of the dam for future predictions but it suggests integrating other functions that can give back to the surrounding region. The new barrier would bring together transportation, energy, flood protection, and regional development into a widespread network that would service the future needs of the ever-expanding city of London.

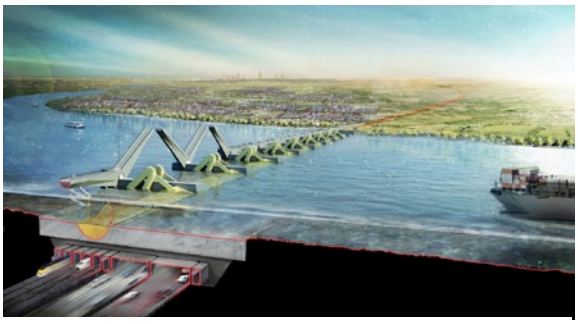

Figure 4- Thames Proposal- Foster and Partners http://www.fosterandpartners.com/projects/thames-hub

We can learn from the existing and proposed infrastructural ideas that the Thames presents. First of all, there has been a paradigm shift in the way we are thinking about large-scale water management projects. We are beginning to travel down the road of the proposed Foster and Partners proposal in that we now want this infrastructure to add value to our lives. It suggests a return to the Dutch way of thinking and making this a social and contextual analysis. Secondly, we can see that a large barrier must be accompanied by surrounding levees to prevent the displacement of water onto nearby development. This notion follows the saying that when you fix one problem upstream it creates another downstream. Ultimately expressing the importance of a layered system. It is a reminder to not lose sight of the overall scenario. Each intervention we make will in turn have a negative effect on the surrounding landscape; this is a fact that will never change. The next step is to begin to think about how we can reduce the "side effects" in the landscape as a result of our architecture.

A MEANS TO RECEIVE

During the summer of 2007, a group of architects, engineers, professors, students, and other design professionals came together to discuss the possibilities of how the New York-New Jersey Upper Bay would respond to the changing climate and rising waters. This collaboration resulted in a new way of thinking about how cities respond to rising sea levels, which lead contributors Guy Nordenson, Catherine Seavitt, Adam Yarinsky, and the rest of the team proposed the integration of "Soft Infrastructure". The principles behind soft infrastructure explain how we typically segregate our infrastructural approaches to static systems and dynamic systems. Where static system requires a strong and rigid solution, while a dynamic system requires a solution that is not only strong, but it has to be able to transfer or dampen energies. Based upon the nature of a condition, whether static or dynamic, we can respond accordingly. Their approach suggests integrating natural ecologies along urban coastlines to create resiliency layers between the built environment and the water.[8]

The publication by Nordenson, Seavitt, and Yarinsky, *On the Water* states,

> *"The ability to recover from accidents and catastrophes over time is a direct consequence and distinct characteristic of complex ecologies. As a result, successful design for mitigating natural hazards is based on the sophisticated understanding and mimicry of such natural systems."*[9]

The proposal for the Upper Bay involves regenerating urban estuaries to establish habitats for plants, fish, birds, oysters, and other natural species that can embrace and respond to excess oceanic waters. Their research shows that these natural systems have the ability of mitigate the effects of storm surge and rising water levels.

A takeaway from this idea is that new infrastructure should become more than just a strategy for mitigation. It proclaims that we should generate habitat, energy, and place as we accommodate the water. This notion of providing multiple functions and layers is a very optimistic and opportunistic approach to sea

level rise over the next century. If all approaches begin to embrace this principle, we would no longer have to sever our connection to the beauty that we all love.

ACCEPTING THE WATER

The following section will look at two recent proposals that begin to layer functions into sea level rise infrastructure. We will first analyze the Parramatta Public Riverfront proposal by Lateral Office and then examine the Folding Water concept by Kuth Ranieri. Following this analysis will be a discussion of how these concepts could possibly be linked to one another to create a new method of infrastructural design.

The Parramatta Public Riverfront proposal was created in 2011 by the Toronto based firm, Lateral Office. The proposal was in response to the City of Parramatta's' vision to build and develop new vibrant places to gather along the rivers edge. The only issue with this vision was the fact that the region experiences unpredictable flooding throughout the year. Faced with this challenge, Lateral Office chose to embrace the water and provide a place for it. They designed a waterfront that would be animated by multiple surge pools and green spaces. The surge pools would be made up of a tiered landscape that could be utilized as public space when the water is low, but as the water rises, the pools provide a place of integration and accommodation. This concept begins to do what the Thames Barrier does not. It celebrates the rising water through accommodation and also provides added value to the surrounding inhabitants.

Figure 5- Parramatta Riverfront Proposal- Lateral Office
http://lateraloffice.com/filter/Work/SURGE-2011

Another aspect of the Parramatta proposal we can learn from is the social component layered into the functionality of the surge pools. Lateral Office took an opportunistic approach and provided connection between the people of Parramatta and the waters edge. The tiered surge pools act as seating and social spaces during times of stability. By engaging the community, they are in turn also educating the community by means of active engagement. The pools foster an experiential understanding of the vulnerability of this location.

In 2009, Kuth Ranieri Architects submitted their Folding Water proposal to the Rising Tides Competition. The Rising Tides Competition was hosted by the San Francisco Bay Conservation and Development Commission (BCDC) and focused on generating ideas in regards to sea level rise in the San Francisco Bay area. Folding Water suggests creating large ventilated levees that would accept the ocean

Figure 7- Folding Water Proposal- Kuth Ranieri Architects
http://kuthranieri.com/folding-water

water in an accommodating fashion. The subgrade structure would house railway transportation, geothermal energy plants, turbines to harvest tidal energy, facilities to desalinate the water, and a means to dispose of wastewater. While this idea brings up questions regarding cost and constructability, the proposal expresses the possibilities of thinking about infrastructure in an opportunistic fashion.

If we begin to synchronize the ideas from the Parramatta Waterfront and the Folding Water proposal, we begin to see a much more rich and vibrant way of directing coastal infrastructure.

Conclusion

As we continue learning and discovering the impacts sea level rise will have on our coasts, it is important for us to remain positive. It is the responsibility of architects, engineers, urban designers, planners, and other design professionals to act as soon as possible and with great optimism. There will never be a single solution when it comes to addressing this issue, though, if we do not act soon there will be many problems.

The previous discussed projects displayed a range of principles and processes that are shaping our current understanding of infrastructural development in the coastal region. As we have witnessed, proposals addressing the water have evolved in recent times. It is evident that we should no longer conceive of singular and static solutions to defend the shore. Instead our littoral infrastructure must be reimagined and implemented in a layered approach like the Dutch once practiced. It must evolve and adapt to the forces that nature throws our way. It must give back to its surroundings by generating energy, restoring productive ecosystems, and creating places for its inhabitants. If we begin to practice in this manner, perhaps we can remain connected with the water and better balance our relationship in the natural world. Ultimately, providing future generations with a new sense of environmental morality and responsible building principles at the littoral edge.

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[7] Environment Agency, "The Thames Barrier." Accessed March 16, 2014. http://www.environment-agency.gov.uk/homeandleisure/floods/38353.aspx.

[8] Nordenson, Guy, Catherine Seavitt, and Adam Yarinsky. *On the Water: Palisade Bay*. Pg. 12

[9] Ibid., 16.

Addendum

ADAM CLARK

The written portion of this thesis attempted to unpack the related strategies of how we can begin to think about water management in our coastal cities. However, what it lacked was any sort of conjecture on the future of the coastal city itself. Thus, I would like to provide some commentary to supplement the design portion of the thesis from a standpoint of urban speculation. The following text was written as a portion of the ARC551 course and was developed simultaneously with the design for this thesis.

INTRODUCTION

The city is a physical manifestation of an accumulation of energy. This physical realm is in a constant state of oscillation, as its inputs and outputs fluctuate by the nanosecond. Social, political, economical, and environmental non-physical actions create this platform in which complexity and chaos control. While these non-physical actions rage on, the physical city of today remains a relatively static and thus an unsustainable backdrop to everyday life. In order to sustain a city in every sense of the word (environmentally, socially, politically, and economically), we must view the city as we view ourselves, as a living and breathing system. The city must become self-sufficient, pliable, and participatory to project itself as viable prospect for habitation in the future.

SELF-SUFFICIENCY (LOCALIZATION)

Popular perception of the term "sustainable" in the architectural world is often viewed through the lens of reducing an environmental footprint to further our respect the planet in which we live. A sustainable architecture tends to consider energy sources, materials, food, water and waste via systems thinking to create a more "efficient" and "enduring" architecture. While this method of approach is very important to our future cities, we must span beyond the mere environmental concern and integrate the human condition into a cohesive meshwork of ultimate self-sufficiency and localization.

In her 1961 work, *The Death and Life of Great American Cities*, Jane Jacobs states, "To understand cities, we have to deal outright with combinations or mixtures of uses, not separate uses, as the essential phenomena."[1] The everyday life of the city dweller should become a driving force to creating socially justifiable environments. Key concepts to this force are the notions of "variety", "multiplicity", and "overlap". Cities must contain a plethora of programmatic functions that layer upon the social and cultural platform of a locale. While this may seem like a rather fundamental urban hypothesis, the diversity with cities today remains moderately segregated with static social boundaries (due to modernist planning principles). The modernist "plan" and zoning regulations restricted the permeation of program and use, which resulted in bound enclaves within the city. A true urbanism of "variety" must allow programmatic overlay like we have never encountered before.

With this social layer comes the undeniable importance of the interrelated resources and material flows that are both initiators and by-products of a dense social fabric. This set of concerns relates to the food, water, energy, and waste that accompany urban life. As we are finding out, the result of allowing these forces to span the globe, although economically sensible, has created an environmental burden. In order to create a viable future for urban environments, resources must become a local phenomenon in which the people act upon their own subsistence.

The design portion of this thesis attempted to engage this idea via the suggestion of a series of autonomous floating islands that would accommodate "variety" in terms of program and their ability to facilitate localized energy production and flows.

PLIABILITY

The discipline of architecture is generally thought of through ideas about permanence or standing the test of time. Whether it is in relation to community value, function, aesthetics, or materiality, the architect is generally trained to conceive of an architecture

[1] *Jacobs, Jane. The Death and Life of Great American Cities. Modern Library ed. New York: Modern Library, 1993.*

in terms of durability. Meanwhile, the nonphysical components of an urban environment are anything but enduring. On the day-to-day, people and energy traverse the hard and static structures of the city. Their presence breathes dynamism into the architecture. Faced with this constant nonphysical evolution of place, we often see our buildings become dated due to those same issues that made it a reality: community value, function, aesthetics, or materiality. This urban challenge suggests a more temporal approach to the way we envision architecture for the city. The physical components of a city can no longer remain onlookers to dynamism around them.

The idea of pliability in the city refers to the implementation of "soft" systems into the physical environment. "Soft" architecture can be viewed in a variety of ways, most commonly via a material property or a systems ability to transform.[2] While these two often go hand-in-hand, for the sake of definition, pliability is the ability for a system or process to adapt, evolve, and transform over time. In regards to the future city, adaptation is essential for sustaining a society in flux.

Pliability extends beyond the macro system viewpoint into each and every architectural work. There is a need for malleable building types that offer creative solutions to their eventual obsolescence. As we are experiencing in recent times, technology is changing the way that we live our lives and the careers in which we choose to purse. Farmers are few and far between, where software architects are in high demand. It seems that the strict programmatic guidelines that were once crucial to our functioning economy are beginning to dissolve into multi-lateral spaces that accommodate change.

It is easy to think about the benefits of a flexible system through a theoretical lens, however it is much more difficult to realize. One common thread to the realization of a pliable urbanism lies in our ability to embed technology into the physical environment. Not big brother technology, but technology that has the ability to sense the shifts in nonphysical phenomenon to institute sincere change within the city. The fields of real-time data, computation, and automation have a lot to offer our future cities if executed in a humanist fashion.

PARTICIPATORY

We can no longer think of the city as a backdrop for the unfolding of society. Our daily experiences are far too engrained in the objects and structures that surround us for them to be written off as a mere "setting". Our future environments must participate in everyday life. The act of participation suggests a radical shift the current role of architecture. It suggests a more intimate architecture that is not only engaged, but learns from those engagements. Participation can happen is a variety ways and at many scales, whether that be a sensory living space or mobile infrastructure.

In his *Constructing Adaptive Ecologies: Notes on a Computational Urbanism,* Theodore Spyropoulos states that, "Architecture today can serve as an emergent framework that displays a new nature, combining the biological, social and computational in a adaptive and evolving organism…"[3] Primary to Spyropoulos' belief, architecture and the city is not a mere physical entity but an active and performative illustration of the evolutionary forces that surround it. Under this notion, a participatory architecture breaches the physical and nonphysical, the object and its energy flows, the body and its emotions, to reveal an physical environment that learns from its counterpart. Similar to a pliable urbanism, participatory urbanism seeks to engage society with an opportunistic and optimistic attitude.

Gordon Pask speculates in his writings on the relationship between cybernetics and architecture that our environments will no longer become "machines for living" but they will become places where "the inhabitant cooperates and in which he can externalize his mental processes, ie, mutualism will be emphasized as compared to mere functionalism".[4] He proclaims that these environments will not just relieve user

[2] Bhatia, Neeraj. "Crazy-Radical Soft Architecture, From The 1950s To Today." Architizer. August 7, 2013. Accessed February 28, 2015. http://architizer.com/blog/soft-architcture/.

[3] Spyropoulos, Theodore. *Adaptive Ecologies: Correlated Systems of Living*. London: Architectural Association, 2013.

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requirements but that they will begin to evoke a more communicative dialog with people.

CONCLUSIONS

During a time of rapid urbanization around the globe, we must reconsider the constructive processes of our cities. As architects and designers, we have an obligation to consider the future social, cultural, environmental, economical, and political forces that will impact our region. While we will continue to become more connected via digital media on the global scale, our cities and communities hold the responsibility to foster self-sufficiency in their respective regions. It is time that our cities become more human. It is time that cities become ecologies within themselves. This viewpoint, if taken seriously, has an ability to take us beyond the modernist city and into the realm of an invested society that creates a better place for themselves to call home.

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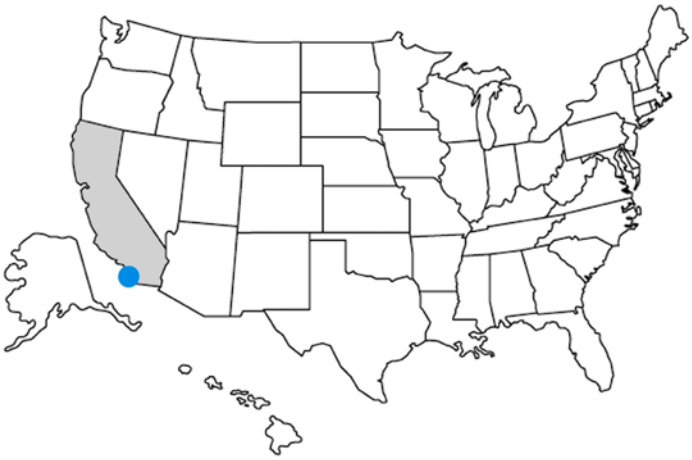
LOCATION



CALIFORNIA

SAN DIEGO COUNTY

SAN DIEGO BAY

DOWNTOWN SAN DIEGO

MACRO SITE ANALYSIS

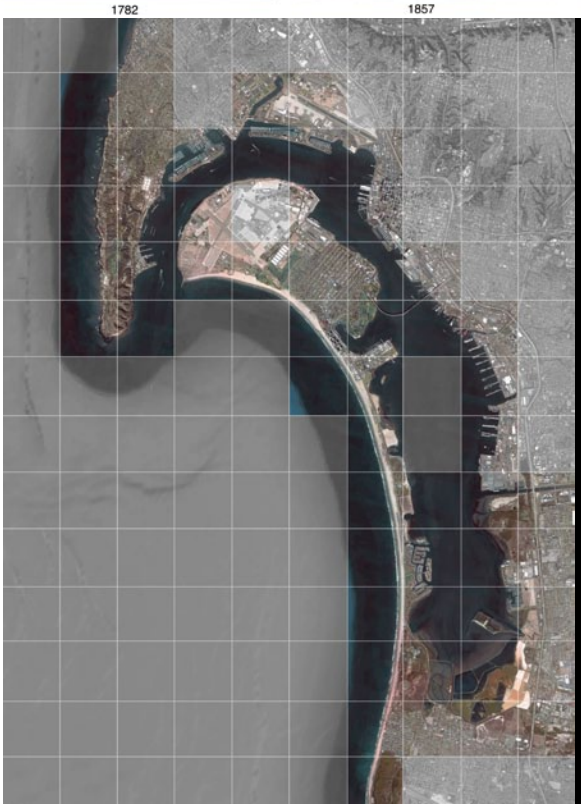
1782

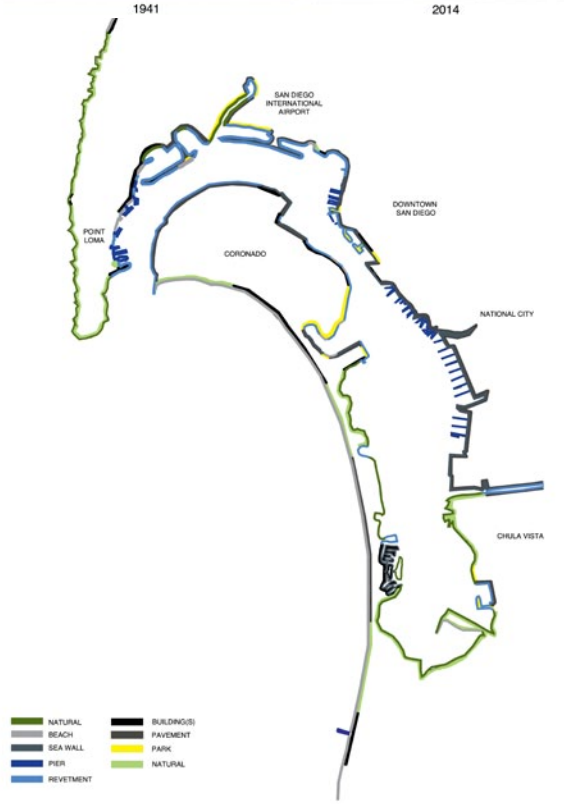
1857

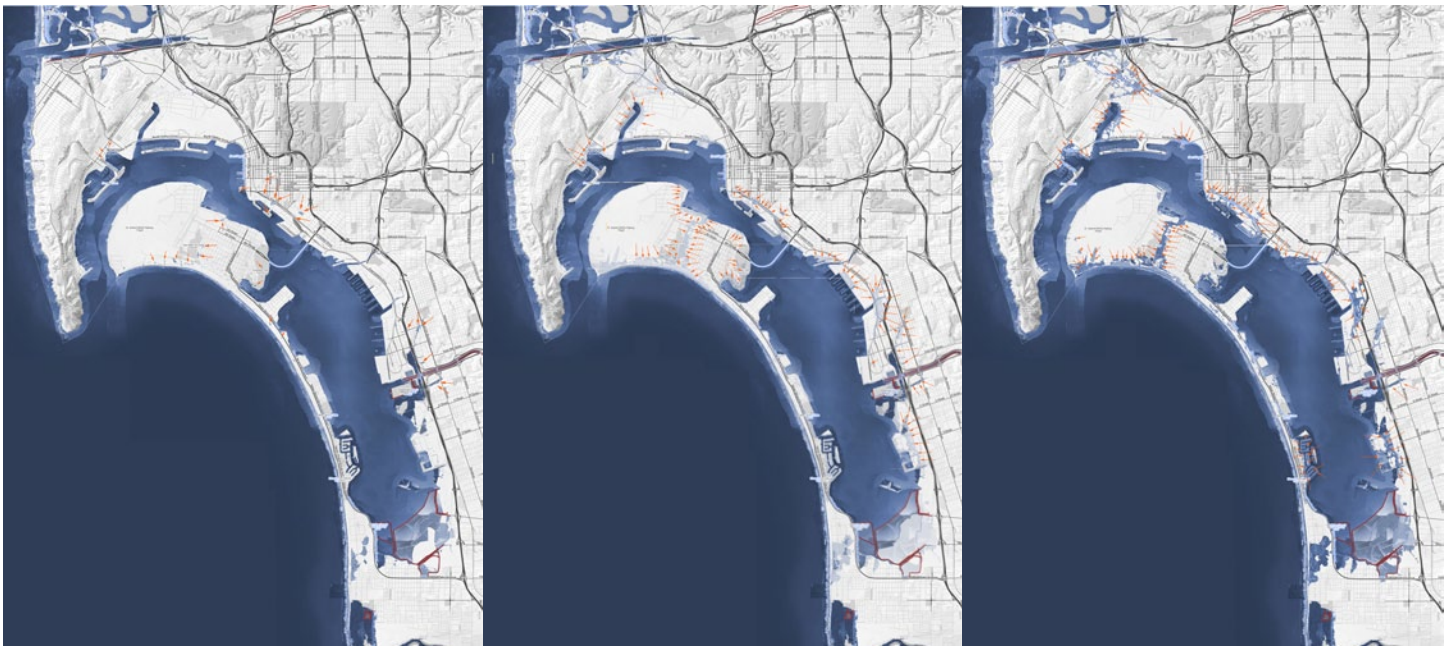
1919

1941

2014

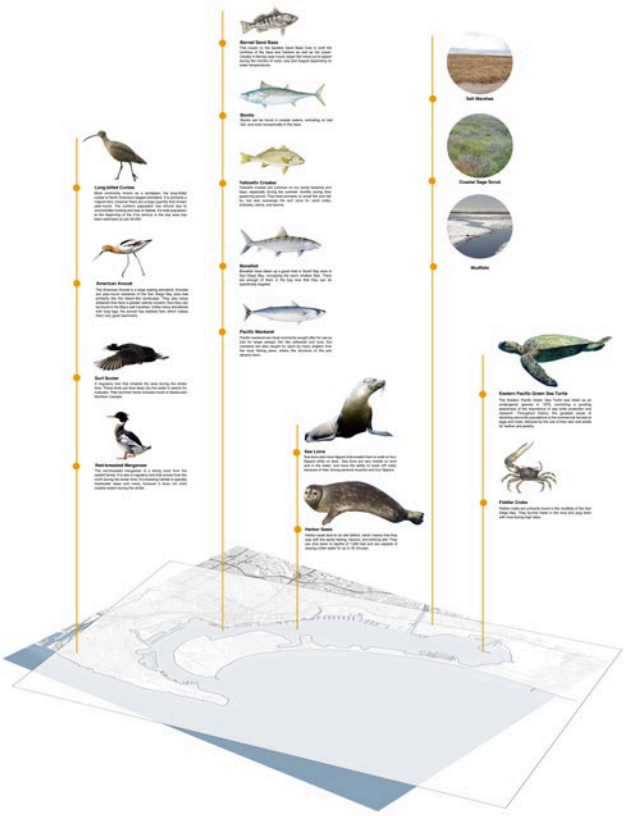






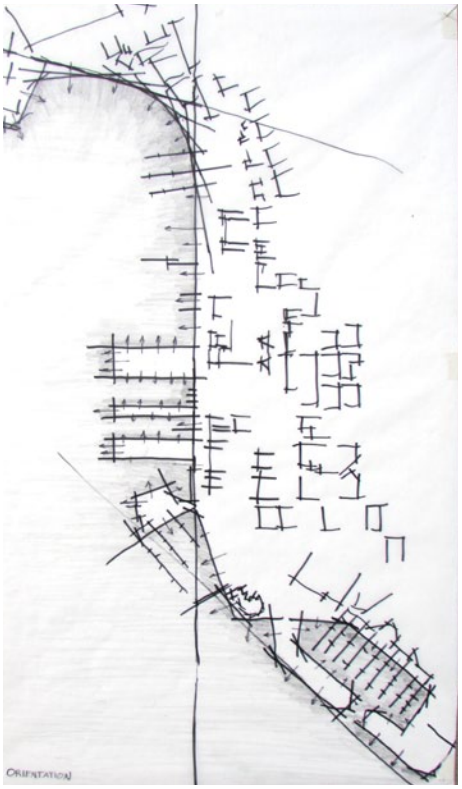
SEA LEVEL RISE- 1', 3', 6'

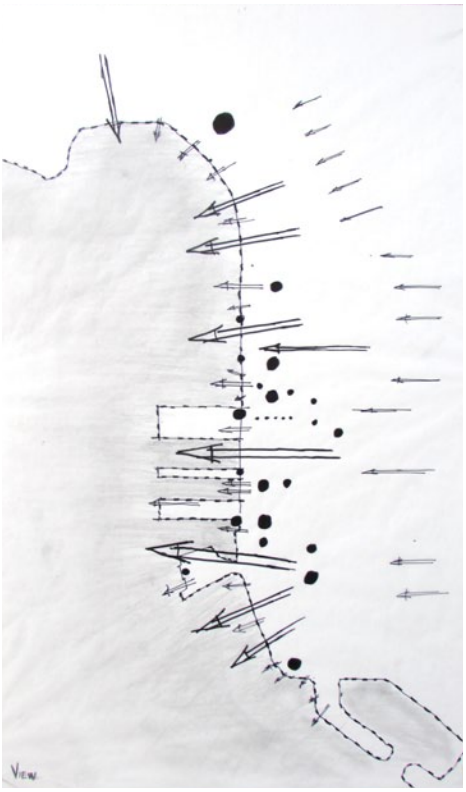
MACRO SITE ANALYSIS

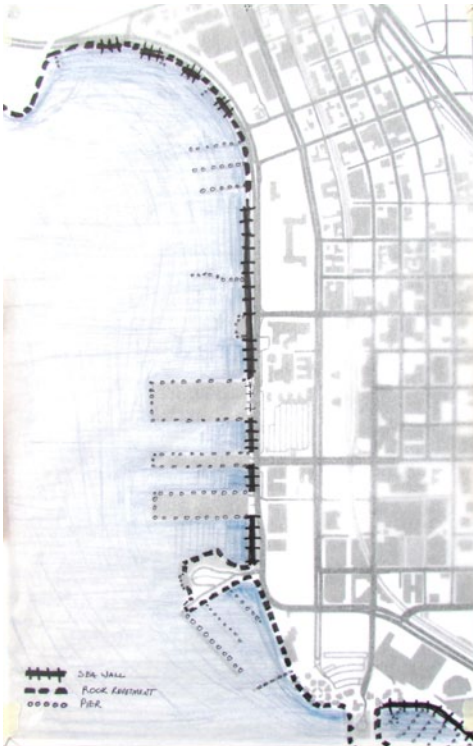


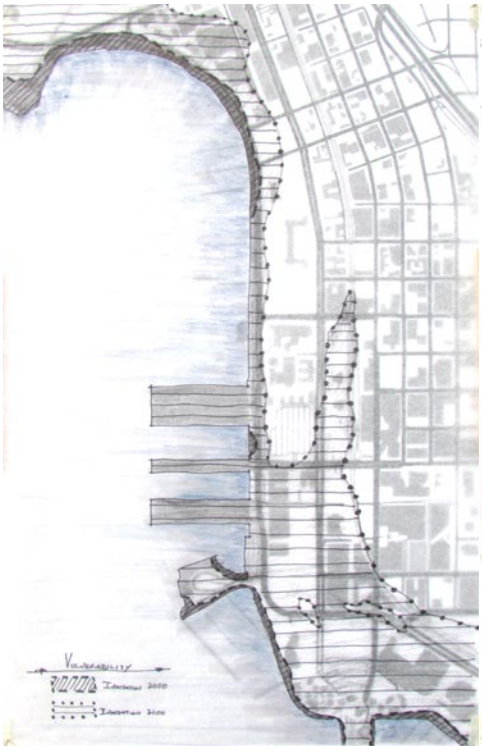
MICRO SITE ANALYSIS

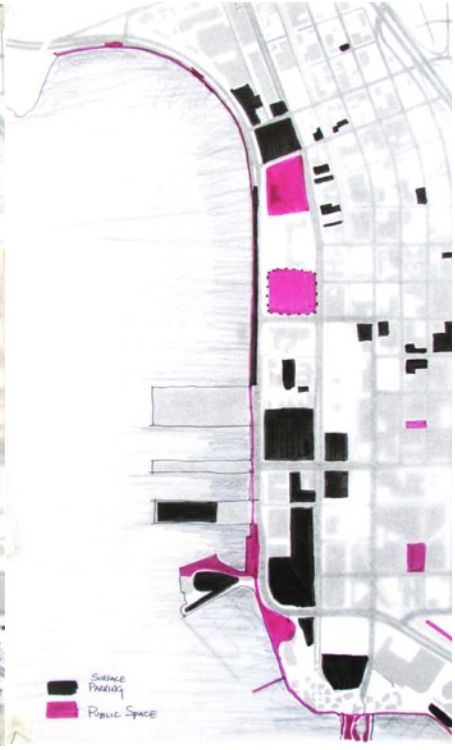
MICRO SITE ANALYSIS











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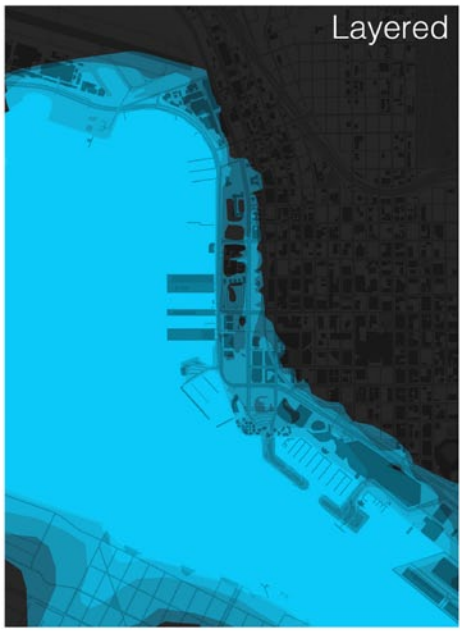
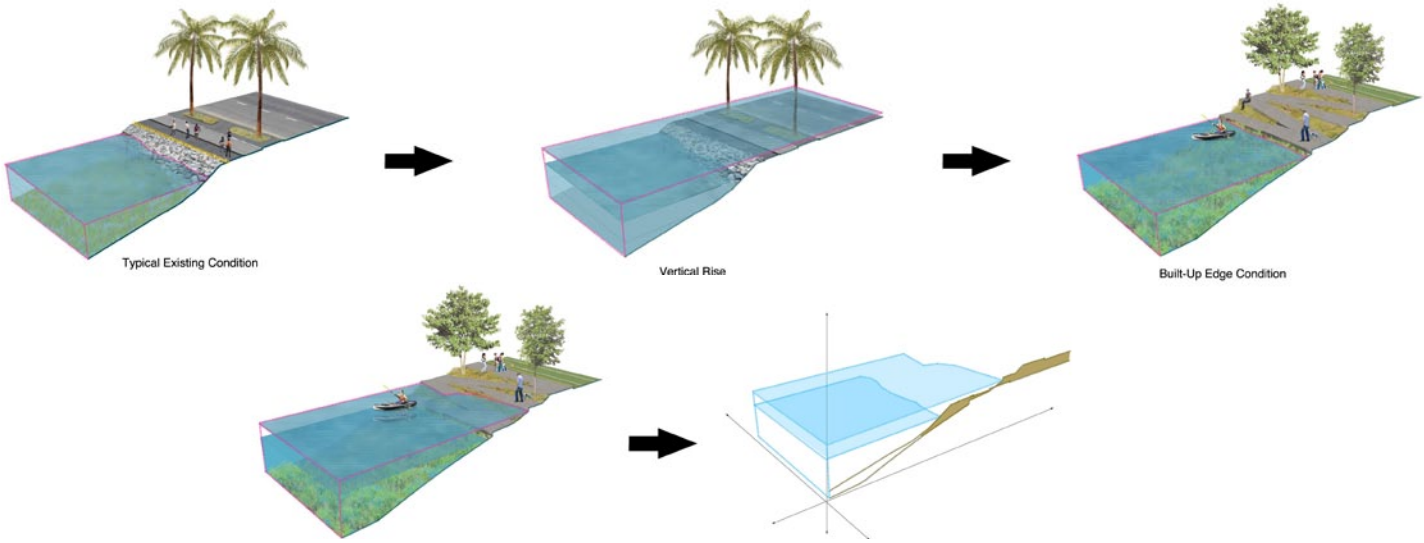
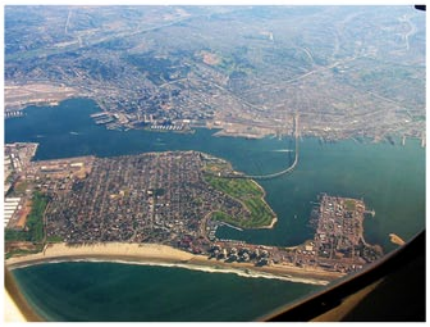
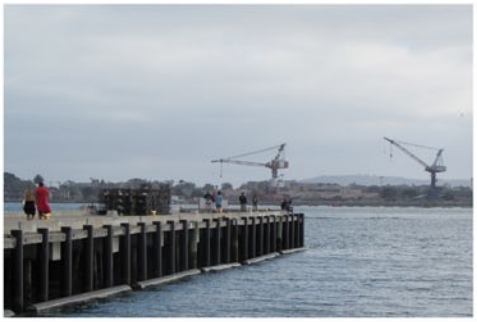




SITE PHOTOGRAPHS















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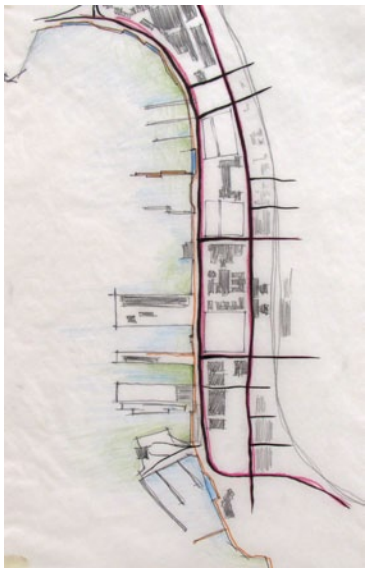
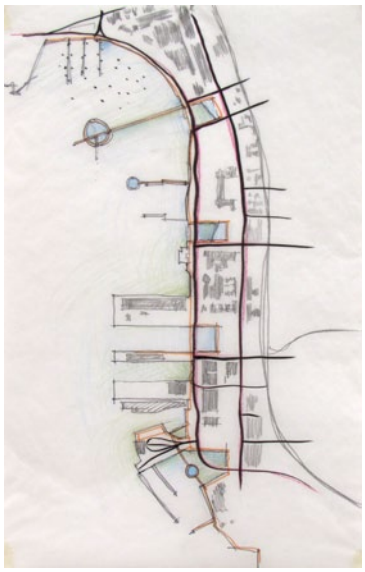
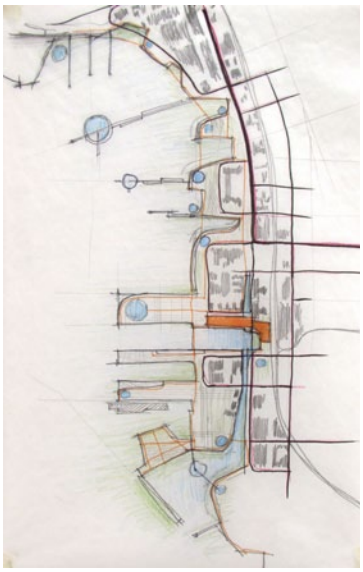

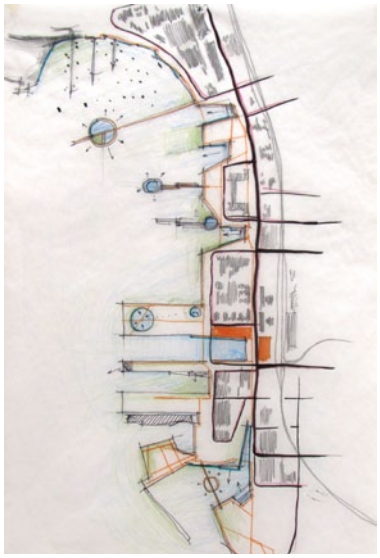
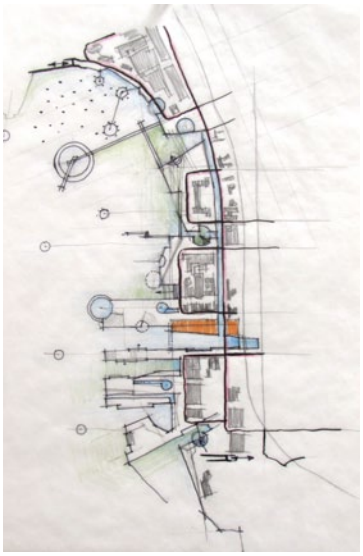
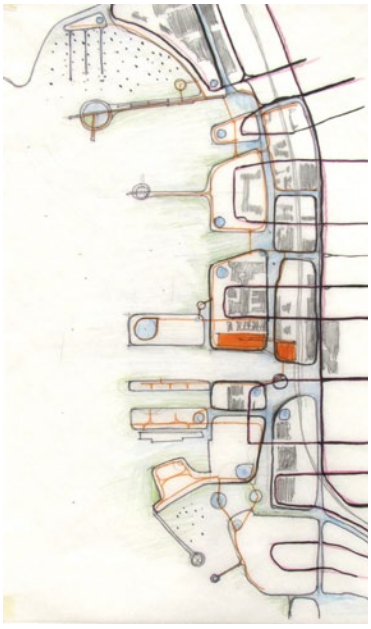
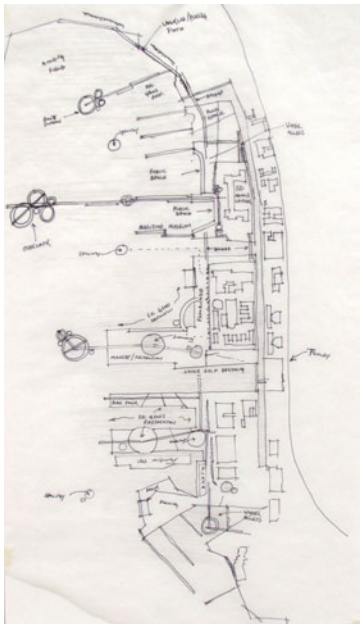
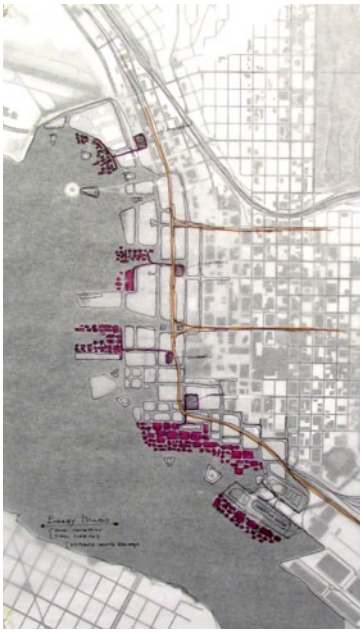

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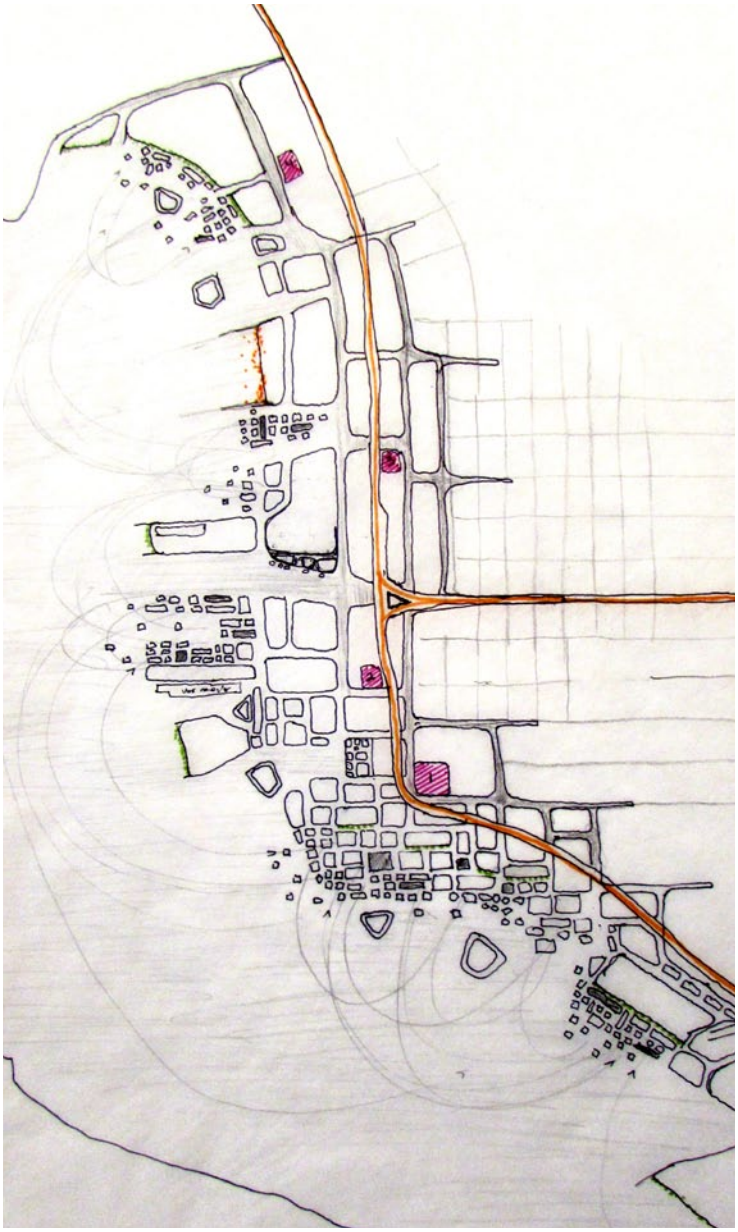

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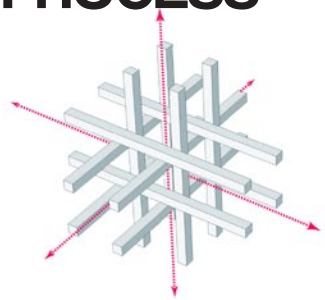
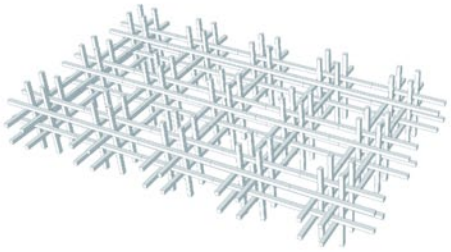
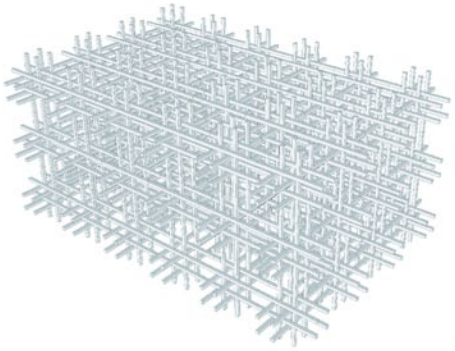
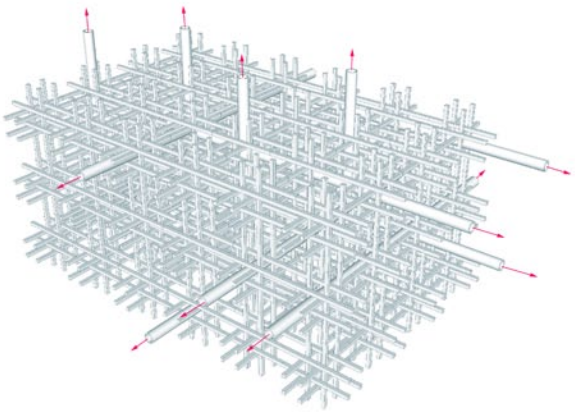
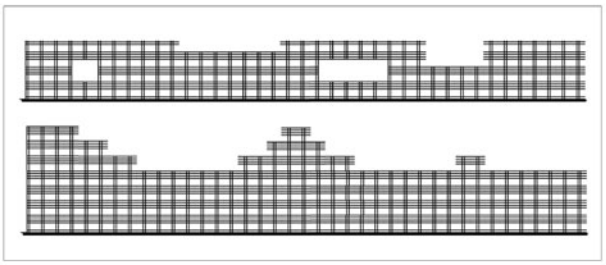
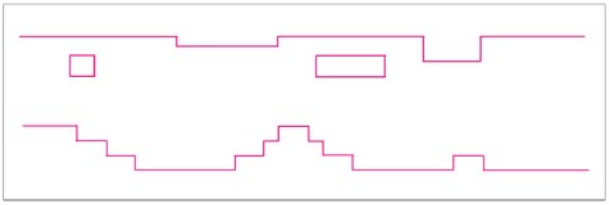


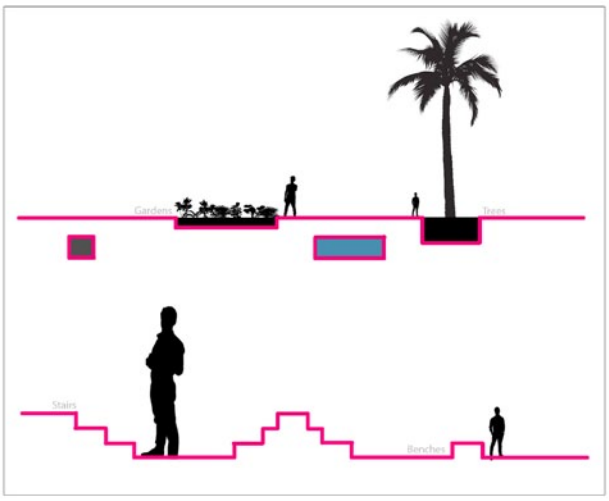




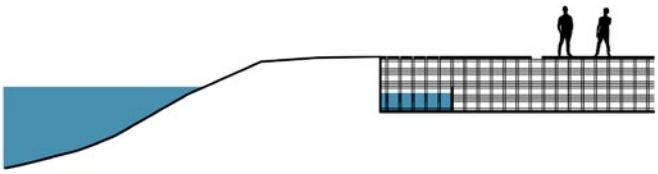




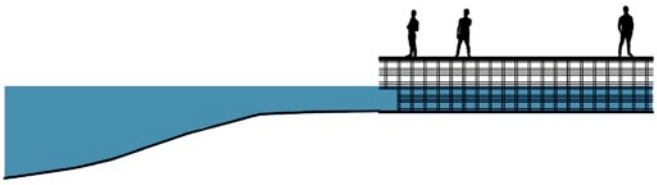




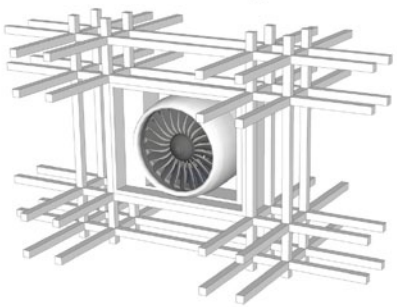
Semi-Permeable Landscape



Permeable Landscape



Harvest Tidal Energy



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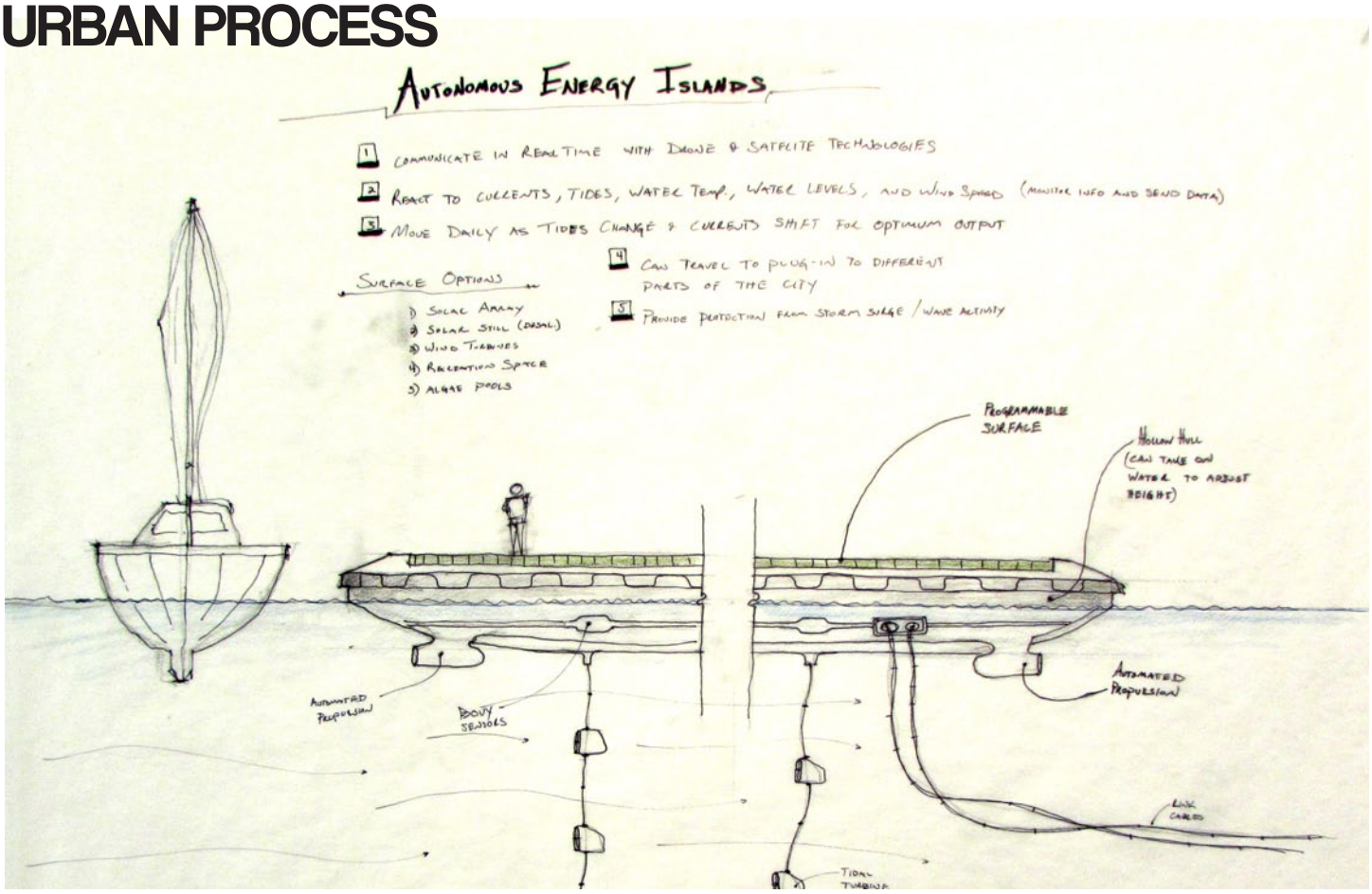
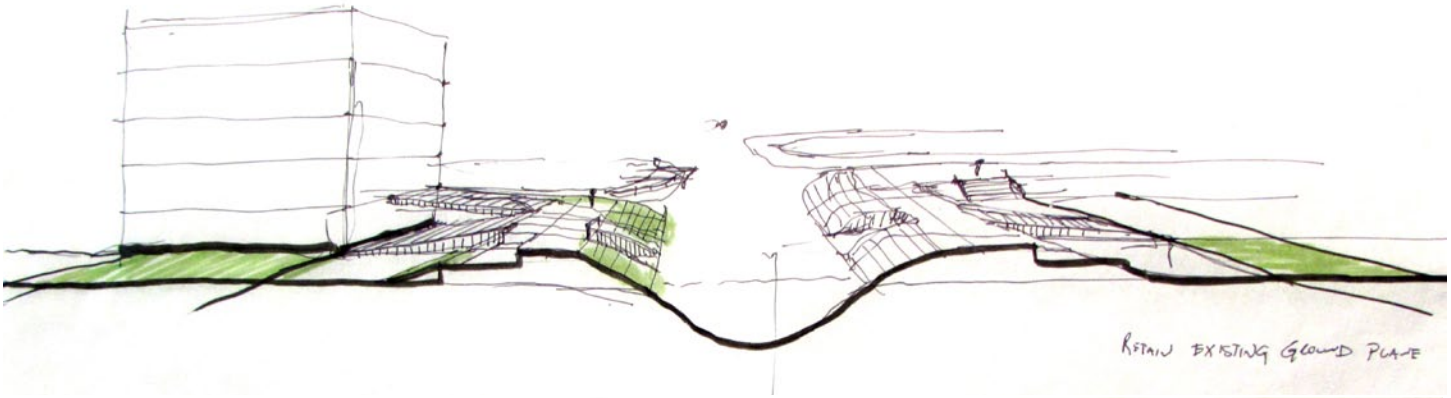
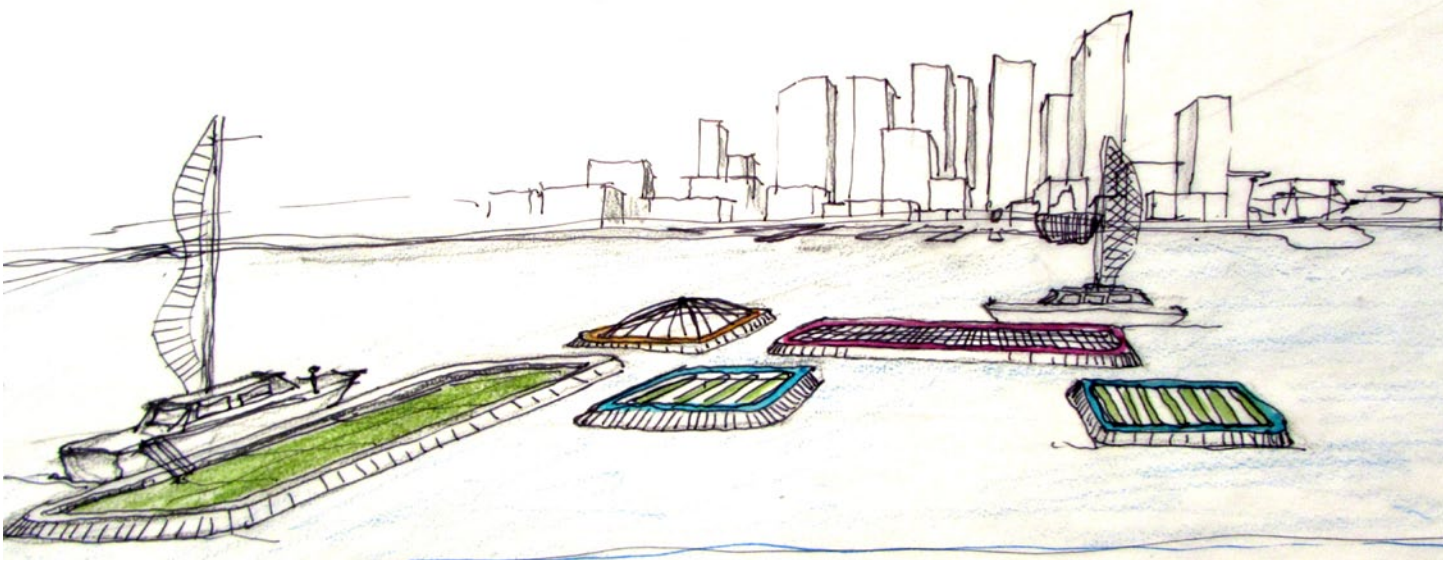
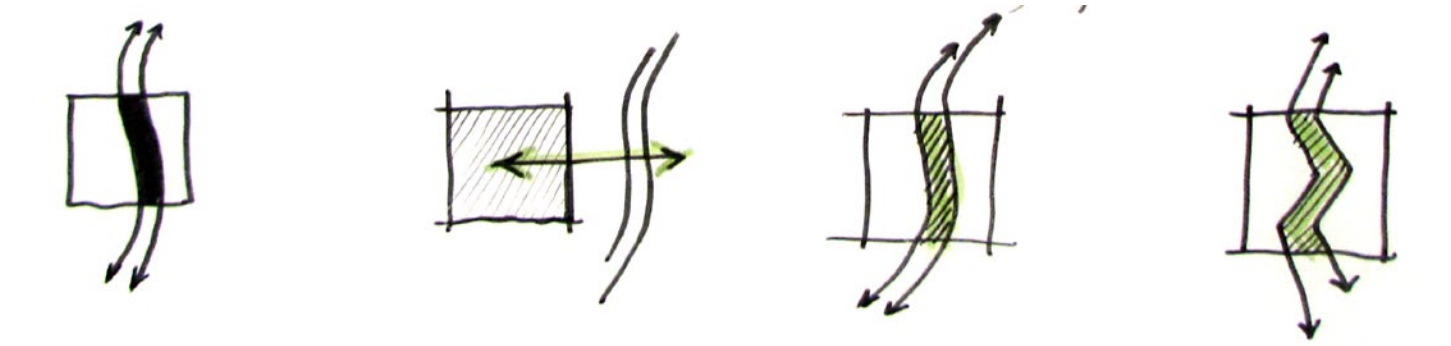
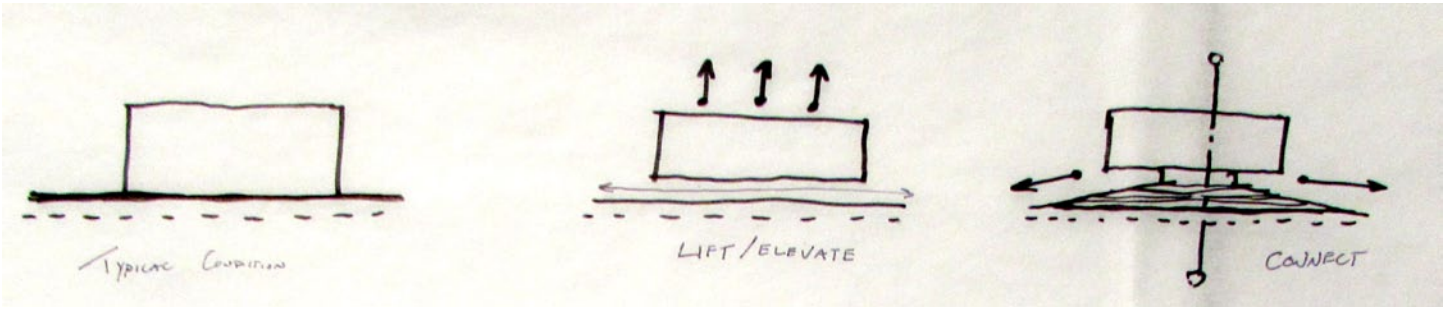


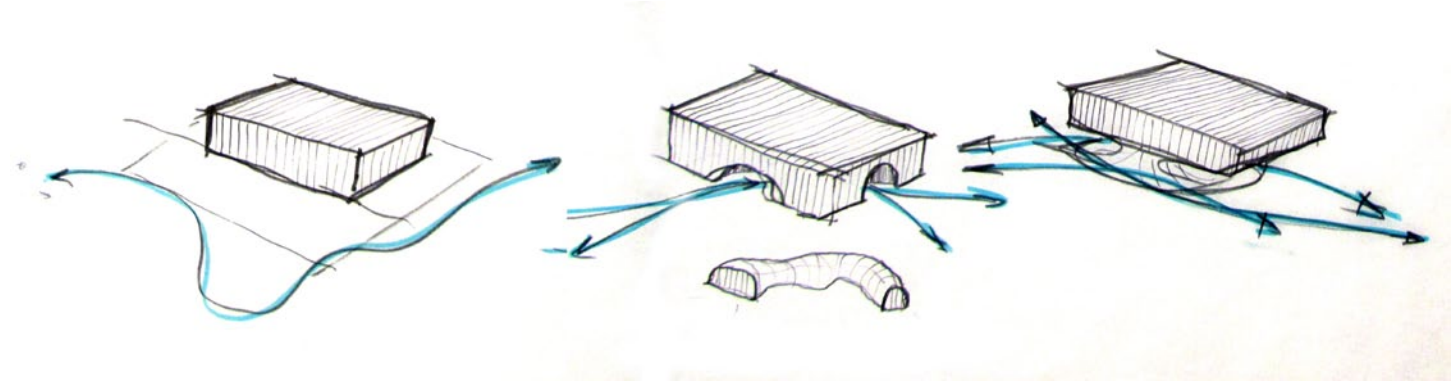


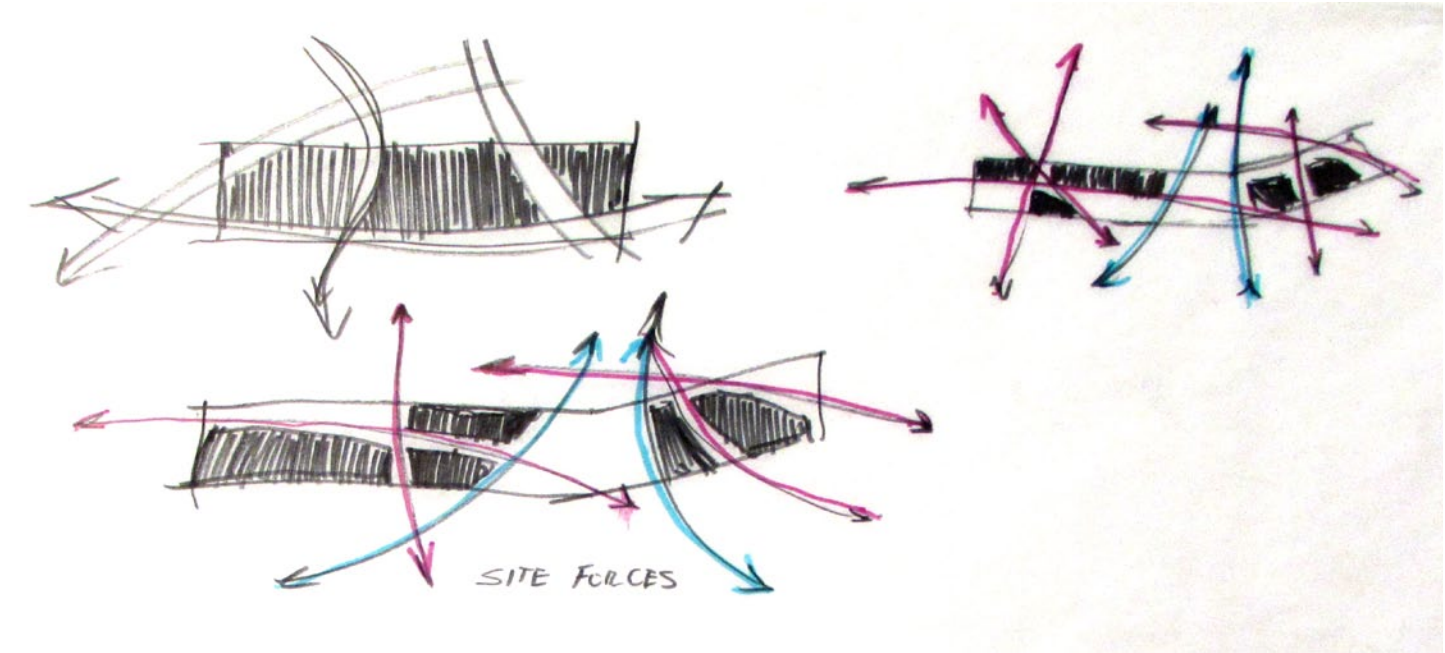


PROCESS









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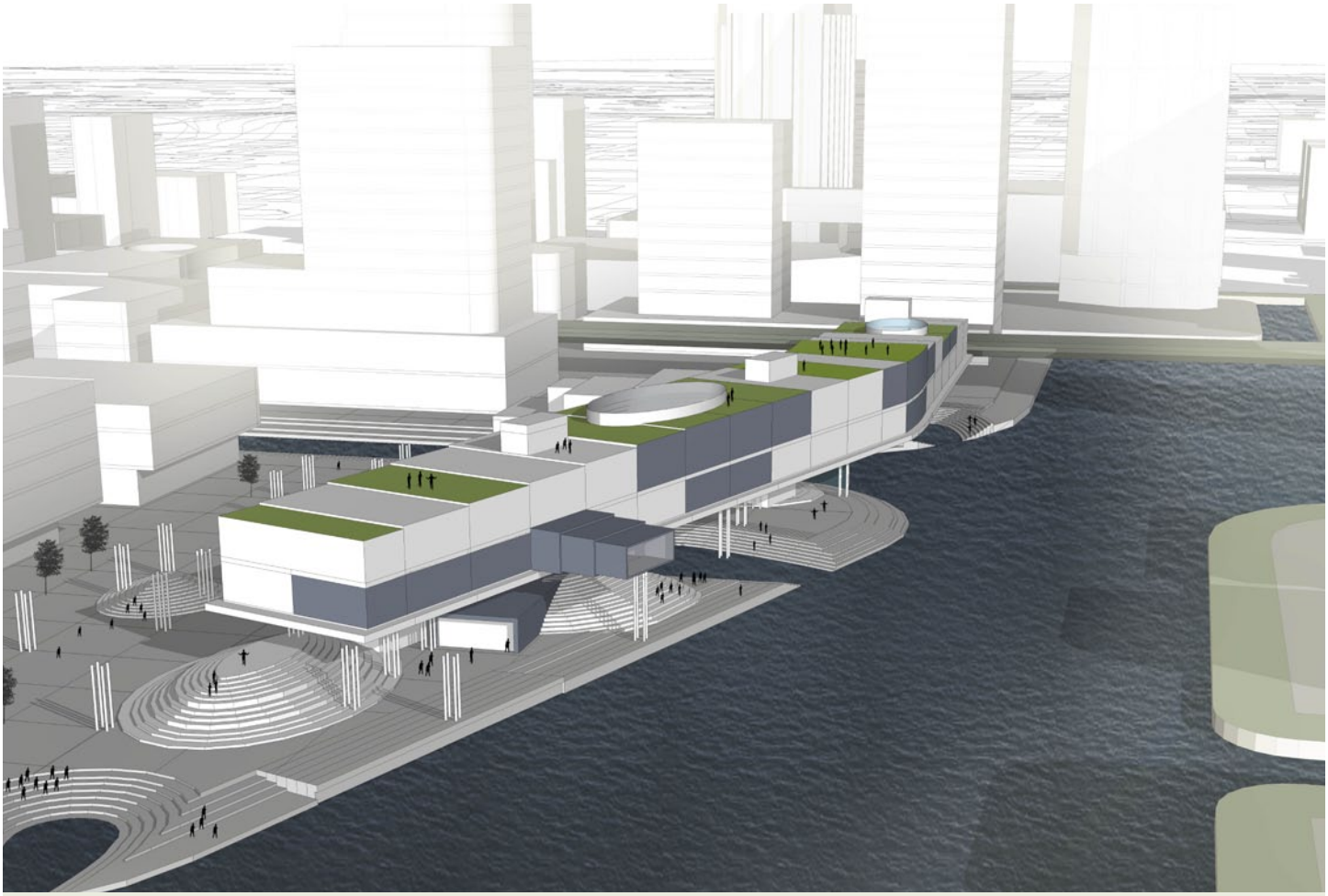
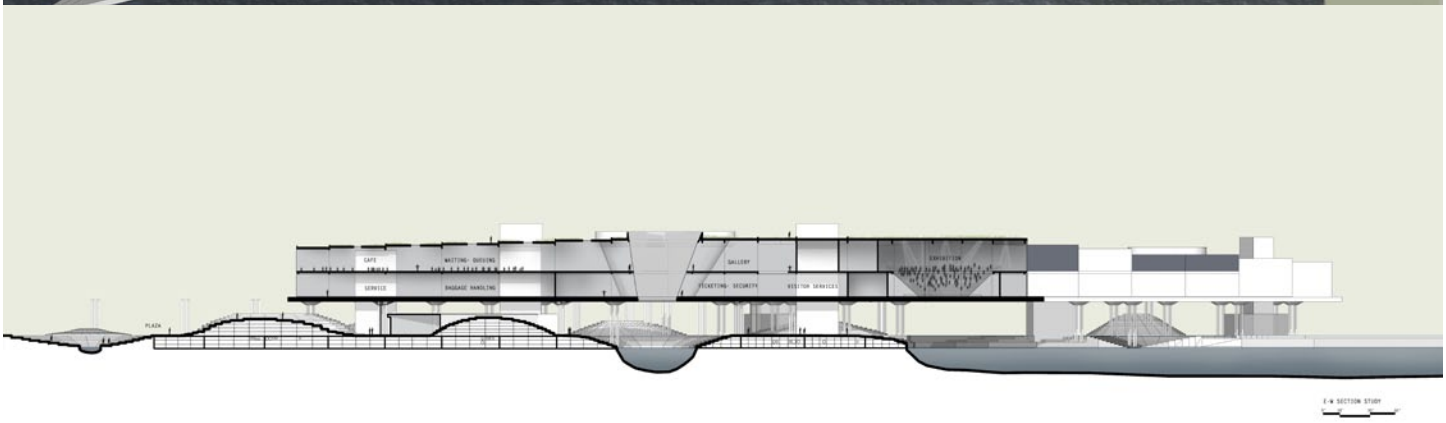
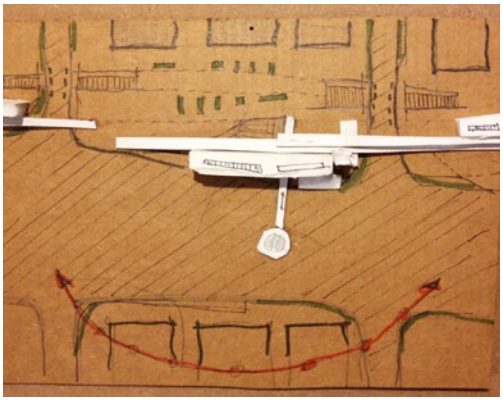
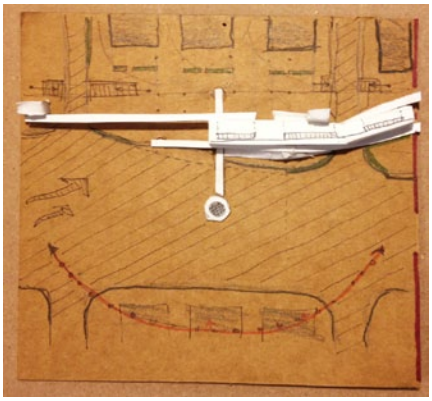
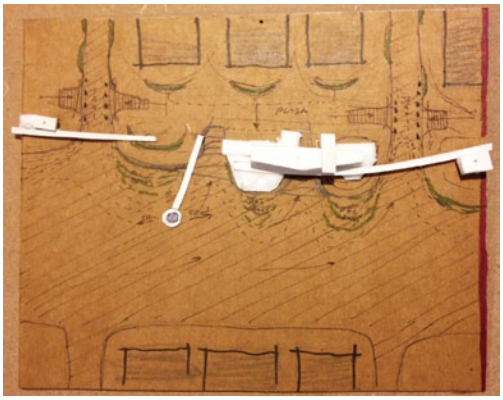
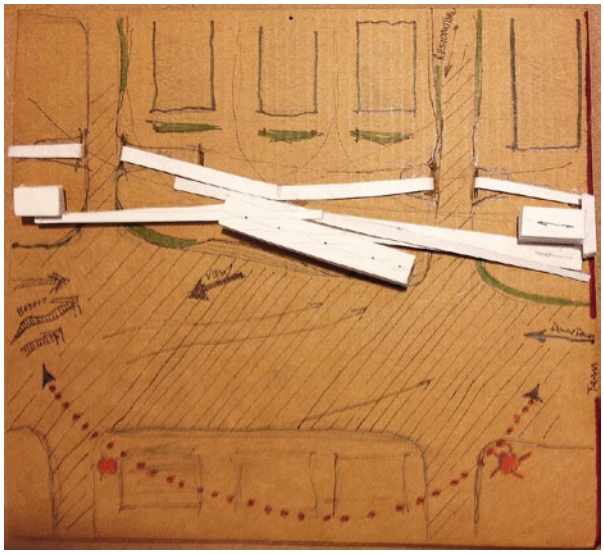
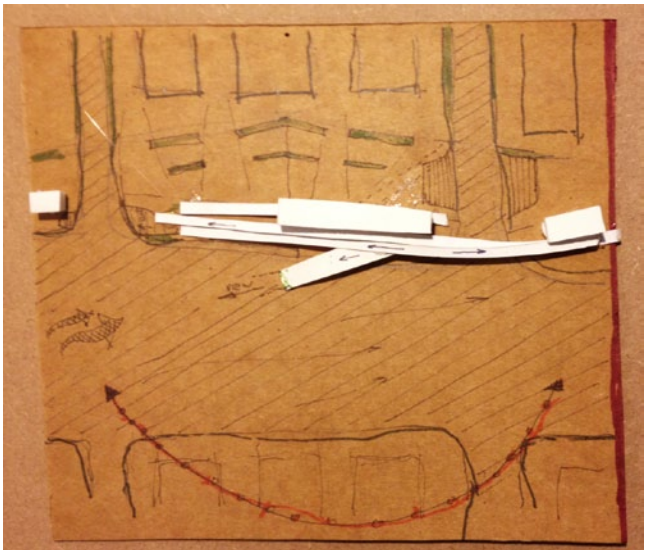
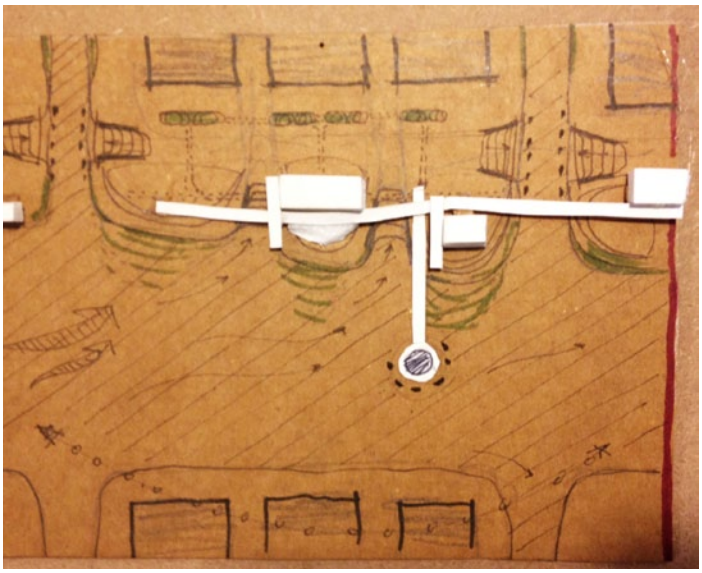
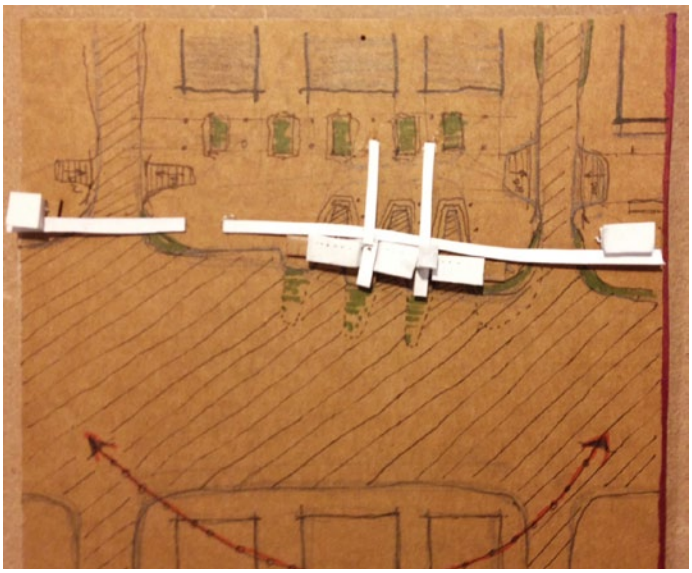




E-W SECTION STUDY

SOUTH ELEVATION STUDY

PROCESS

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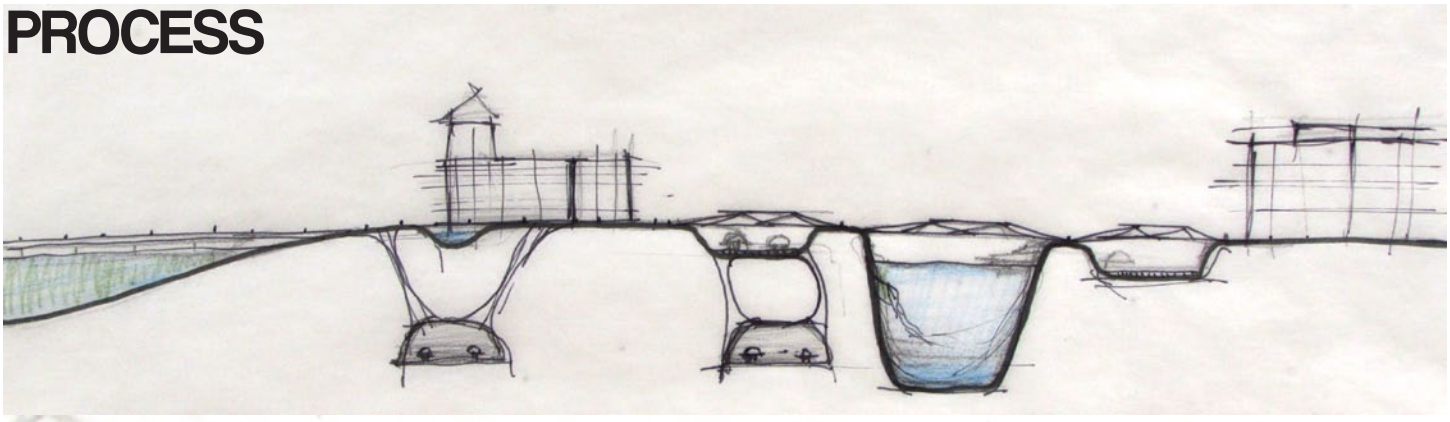

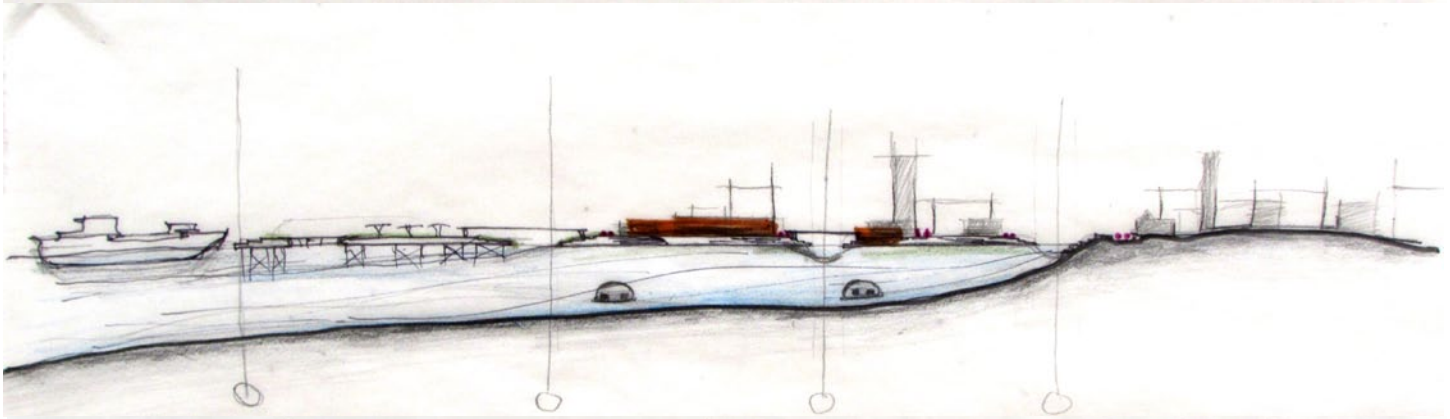

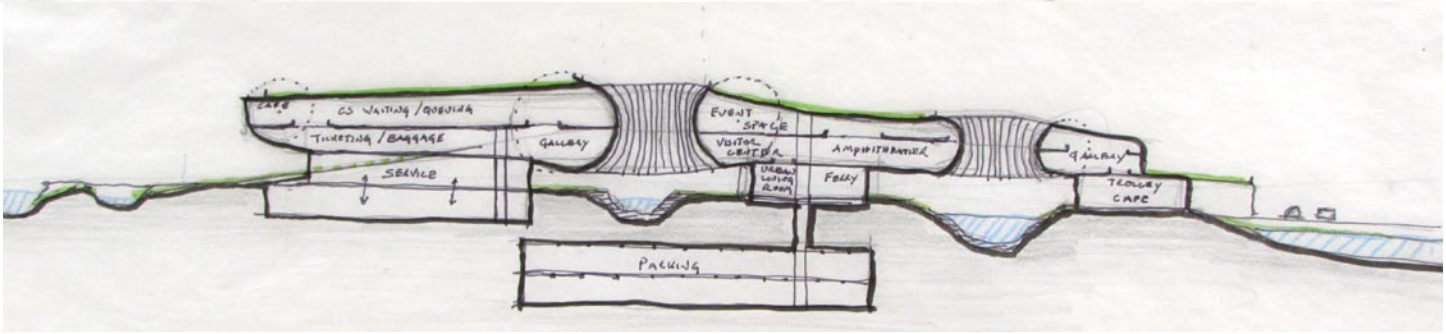
CS WAITING / BOARDING
TICKETING / BAGGAGE
SERVICE
GALLERY
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VISITOR CENTER
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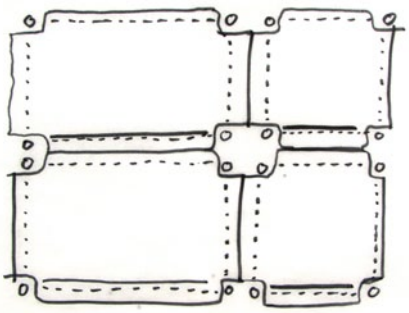

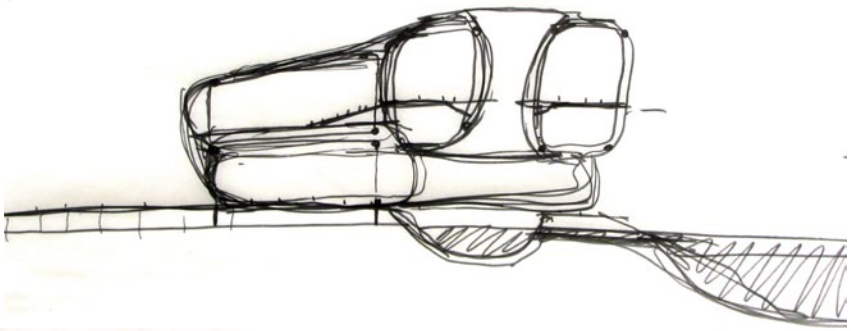

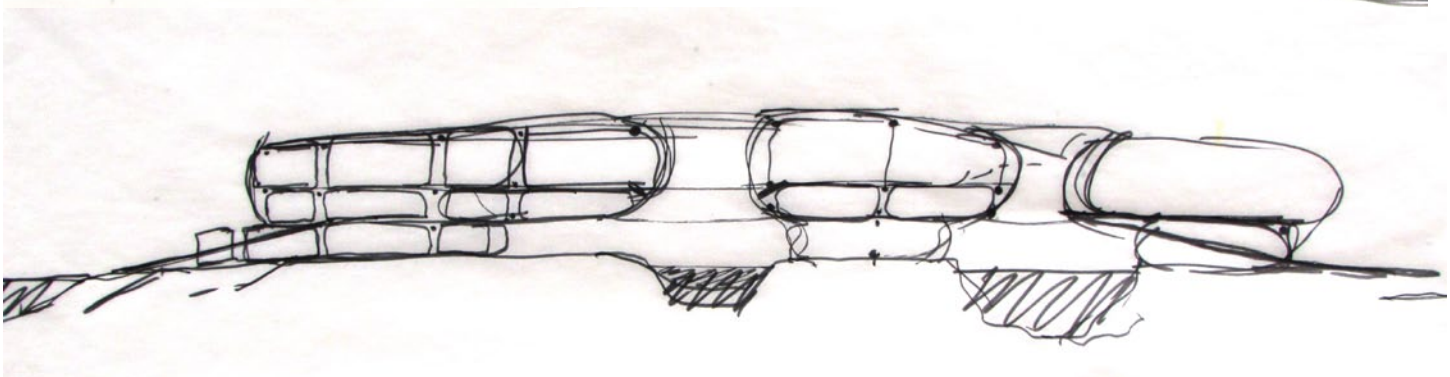

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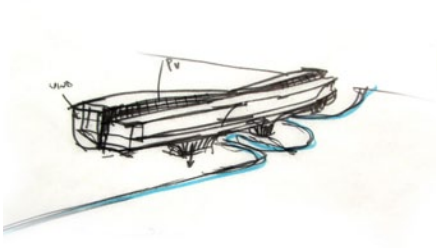
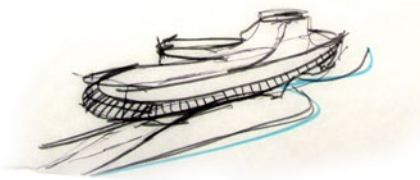
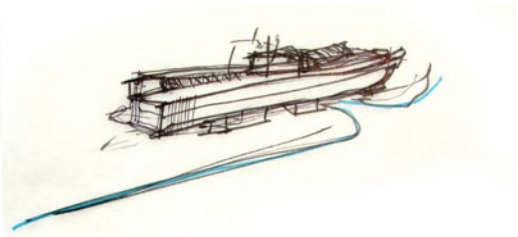
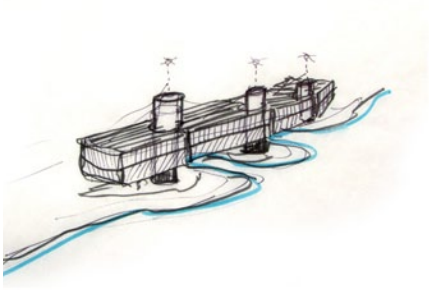
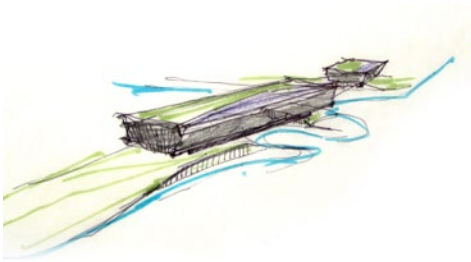
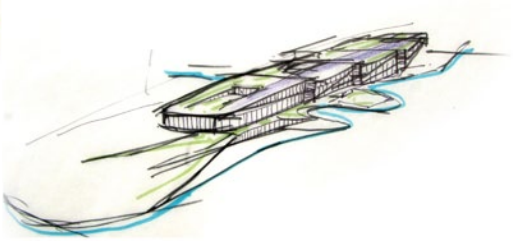
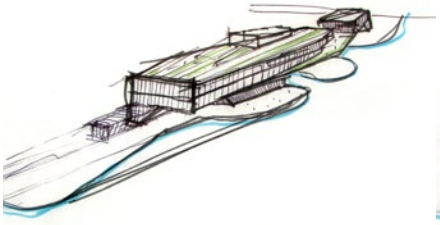
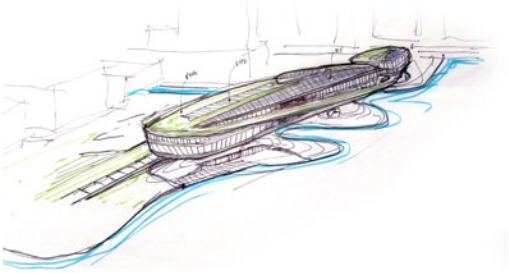
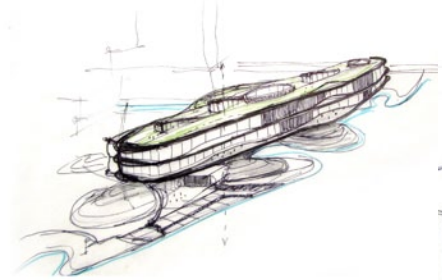
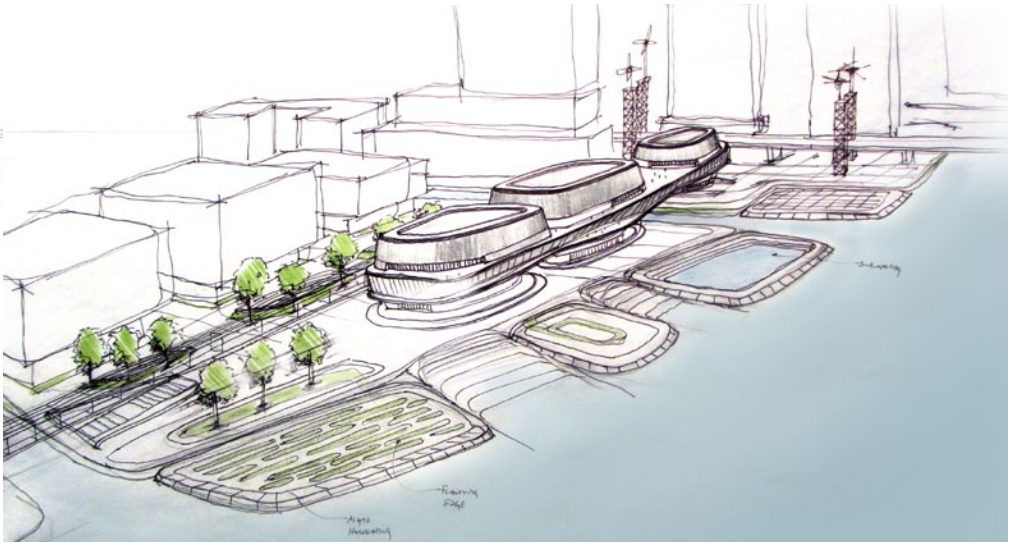
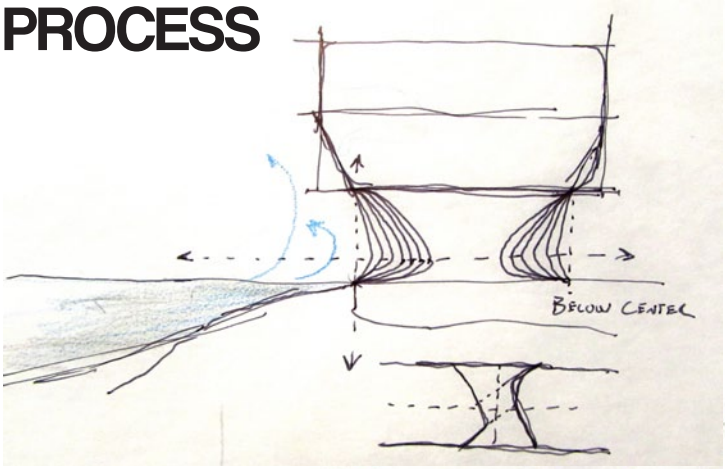
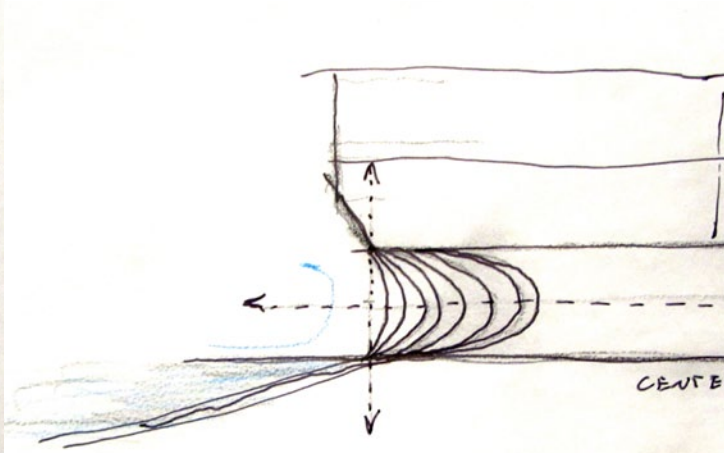
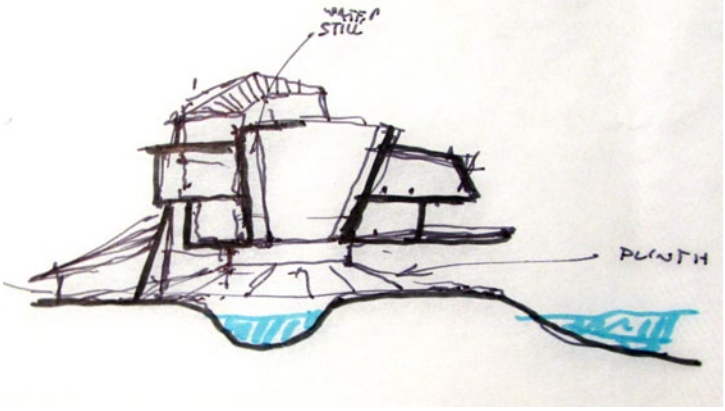








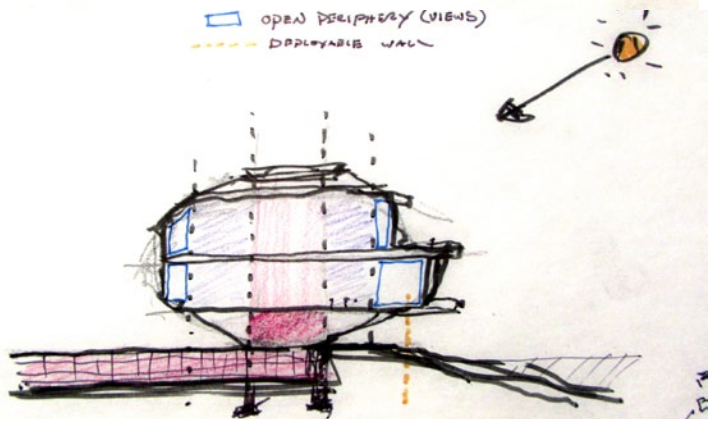




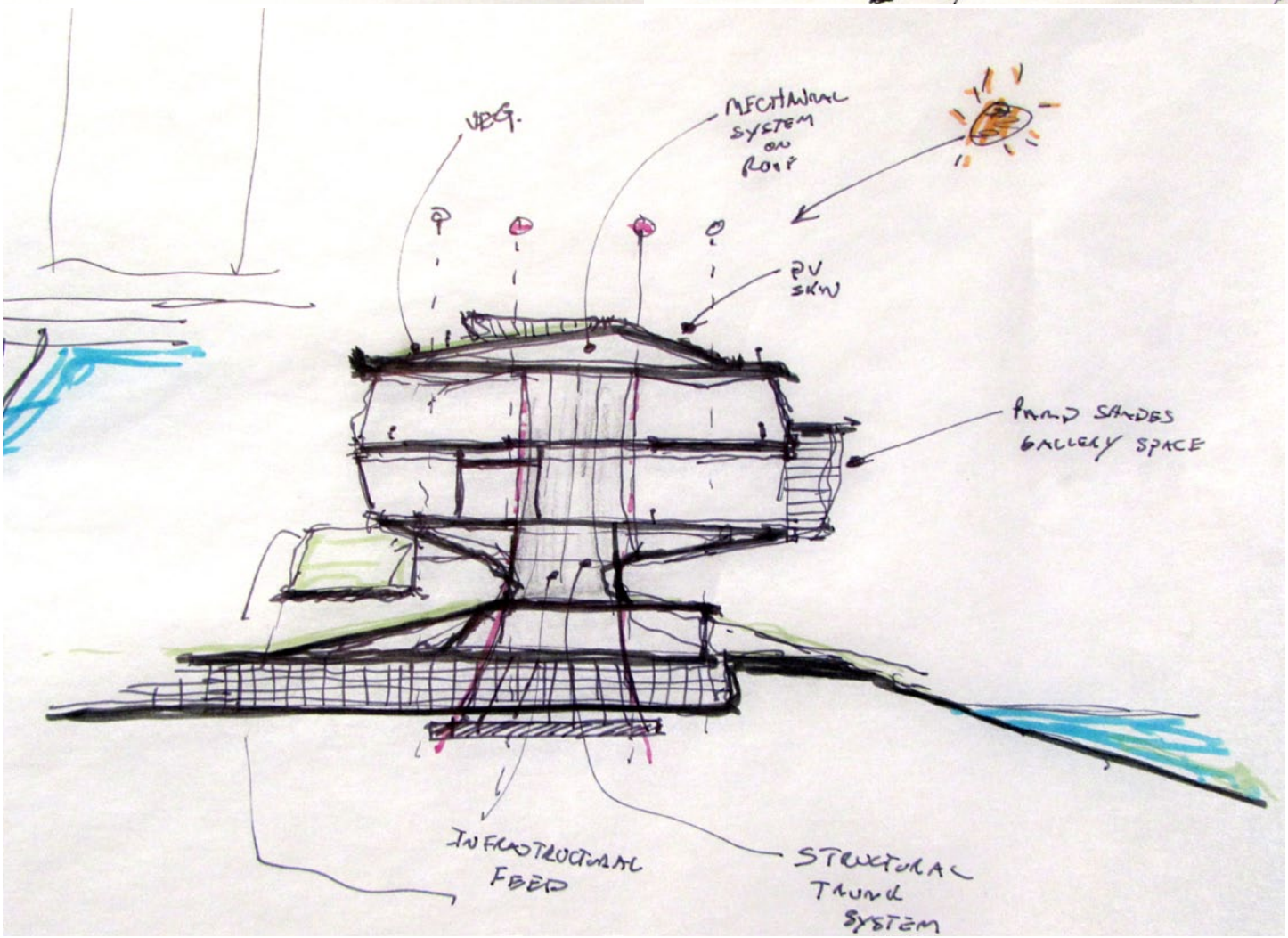
PROCESS


BELOW CENTER

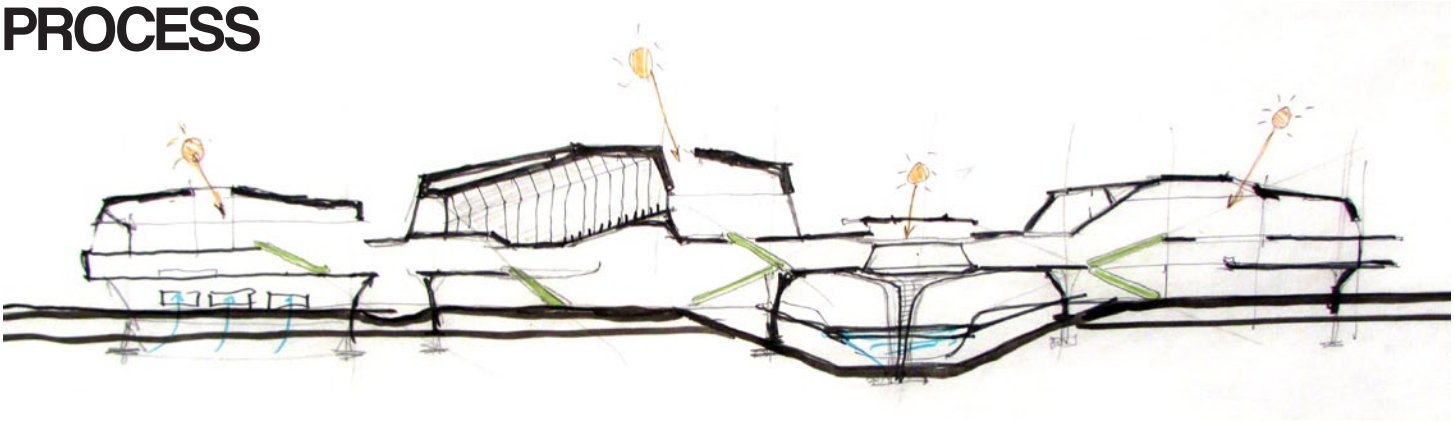


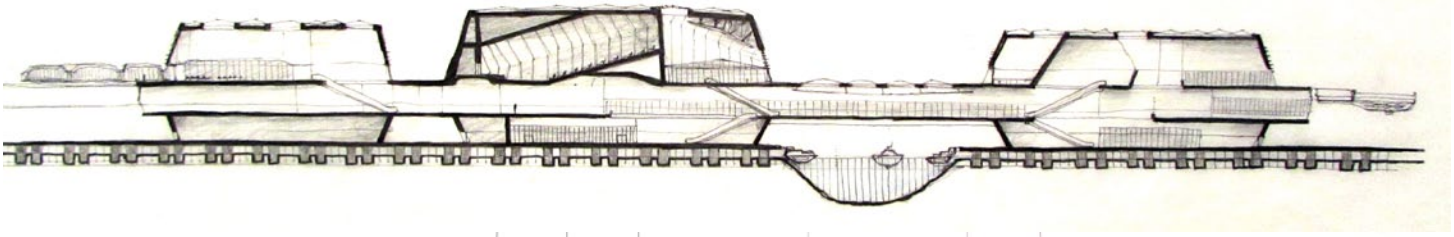

PLINTH

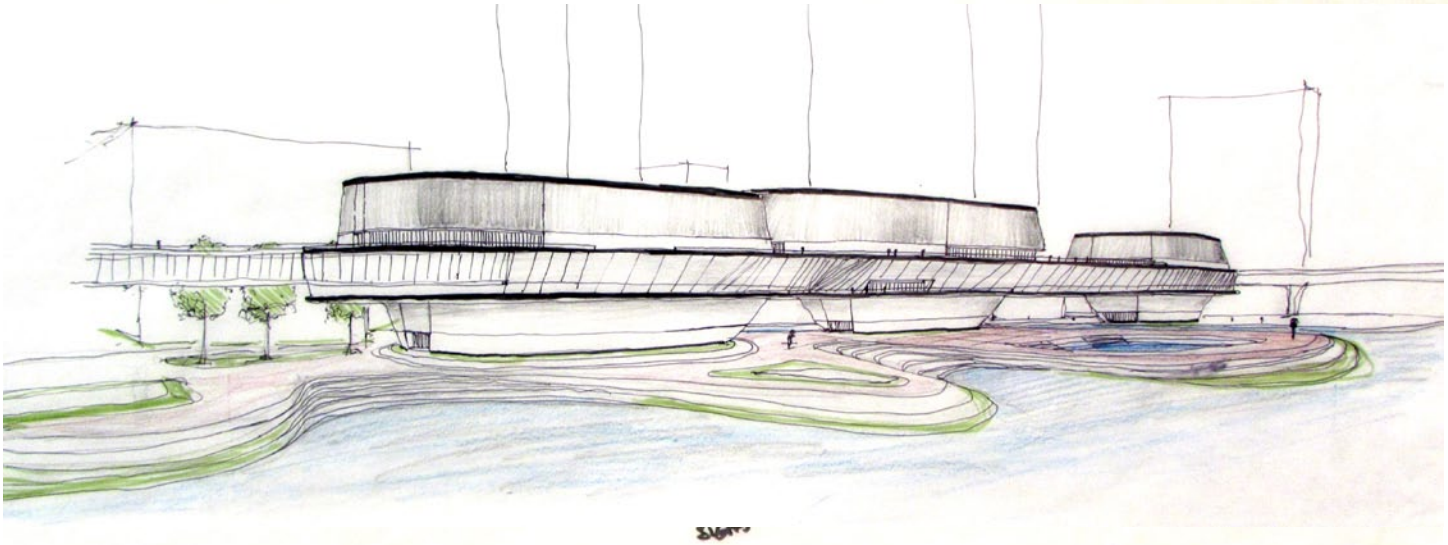

OPEN PERIPHERY (VIEWS)
DEPLOYABLE WALL

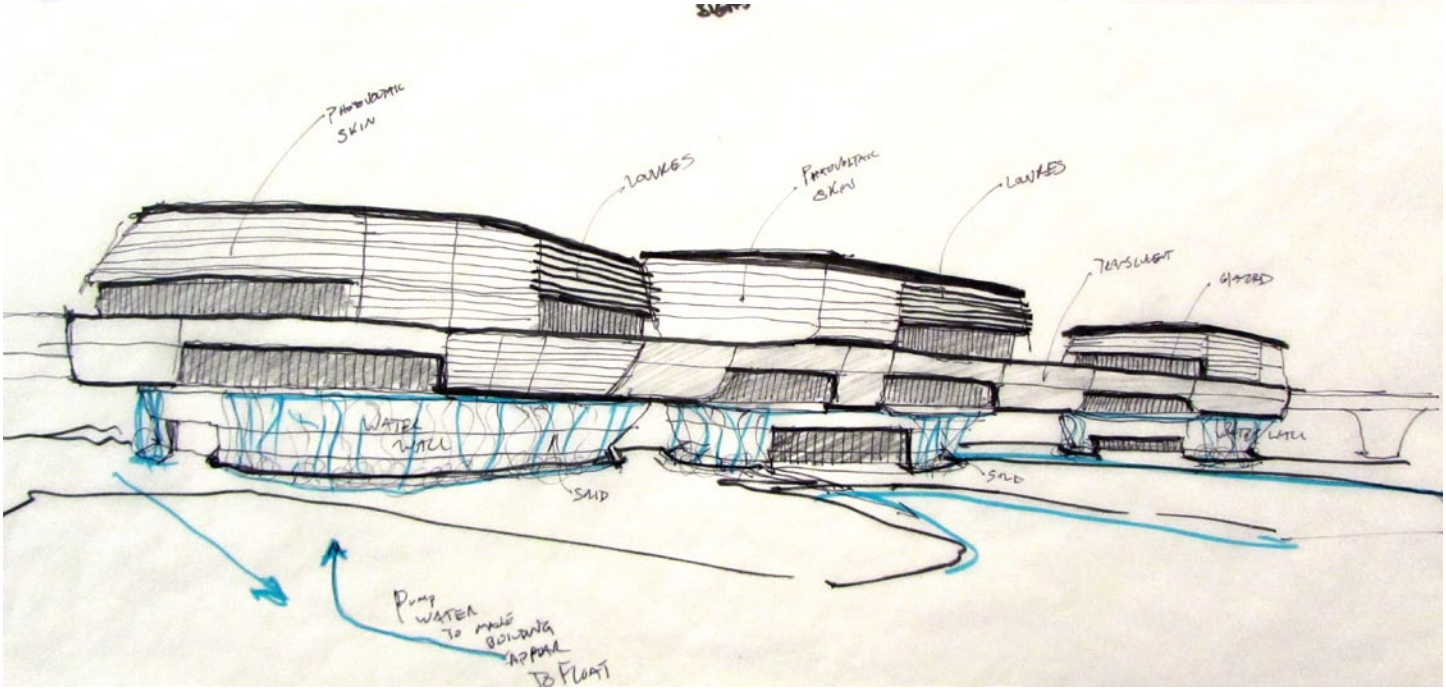

VEG.
MECHANICAL SYSTEM ON ROOF
PV SKIN
RAMP SPACES GALLERY SPACE
INFRASTRUCTURAL FEED
STRUCTURAL TRUNK SYSTEM

PROCESS

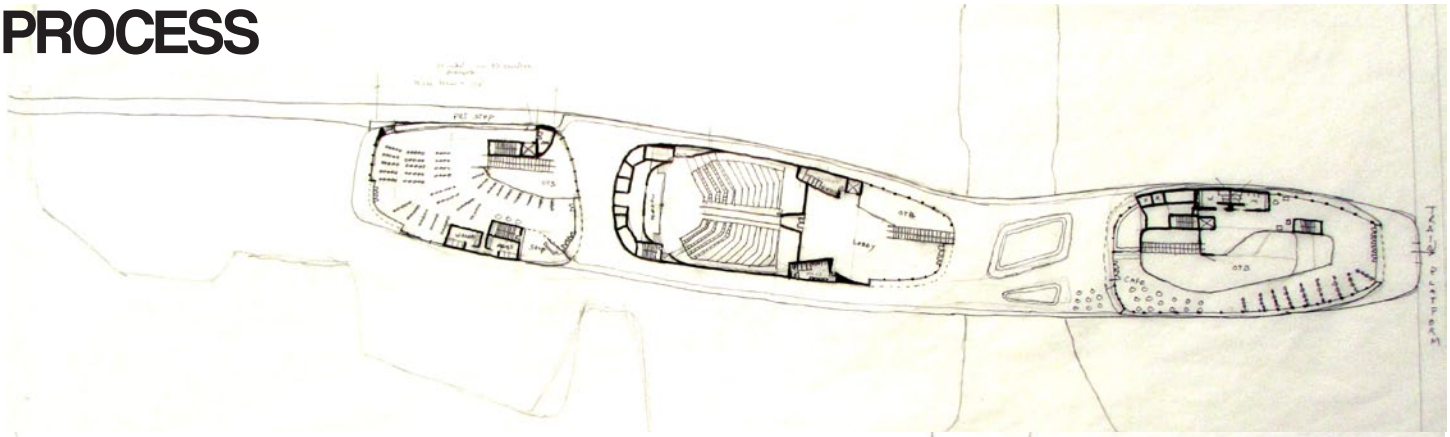


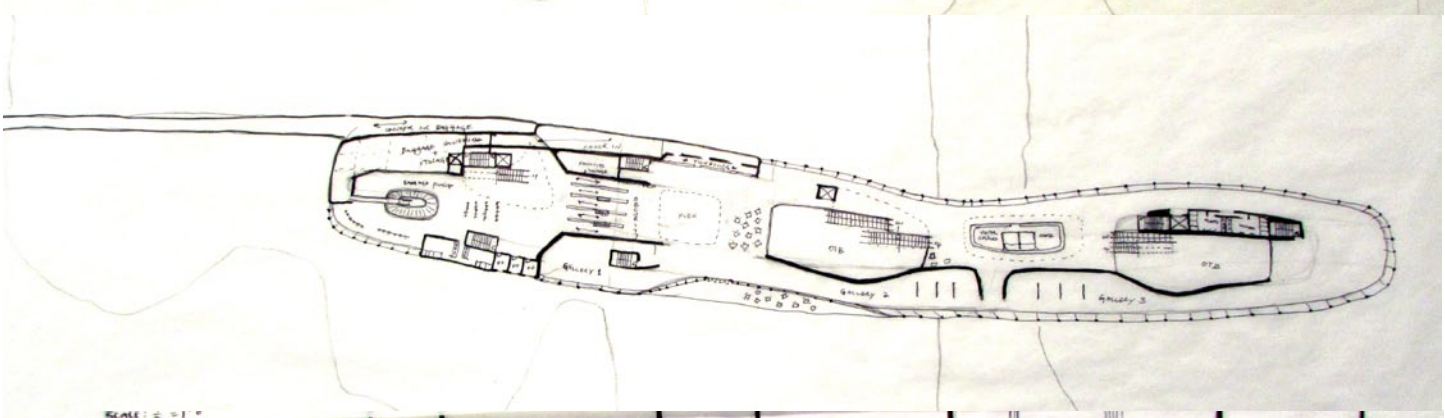


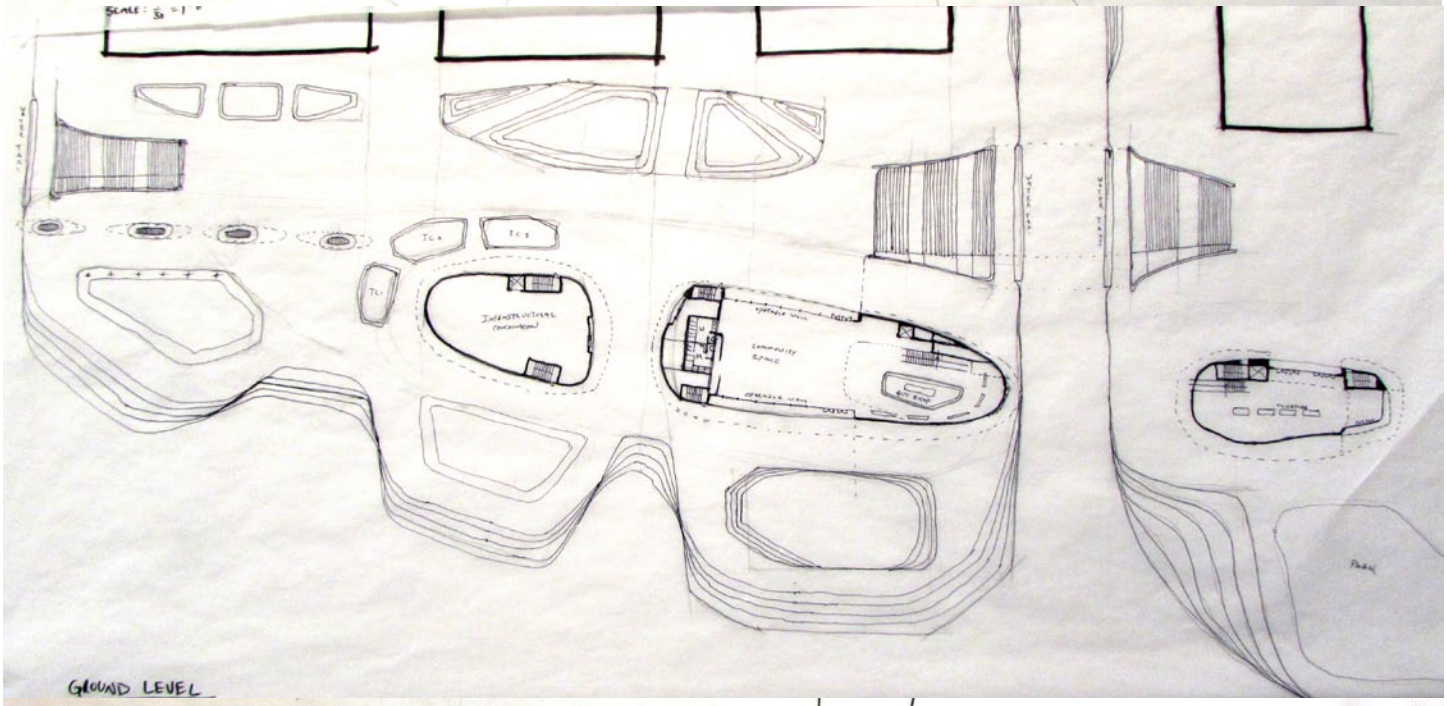


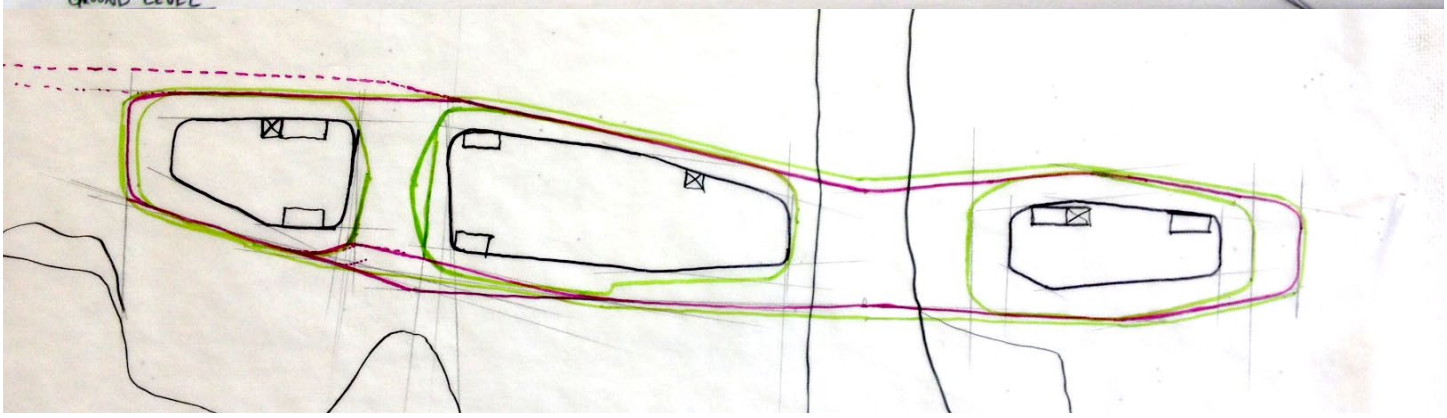

PHOTOVOLTAIC SKIN
LOUNGES
PHOTOVOLTAIC SKIN
LOUNGES
SAND
SAND
Pump WATER TO MAKE BUILDING APPEAR TO FLOAT

PROCESS









FINAL DESIGN

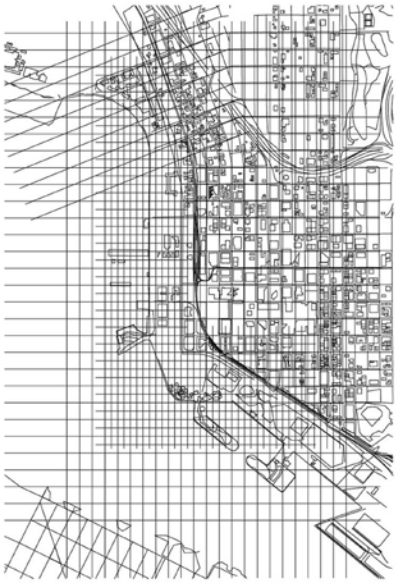
MASTER PLAN

MASTER PLAN

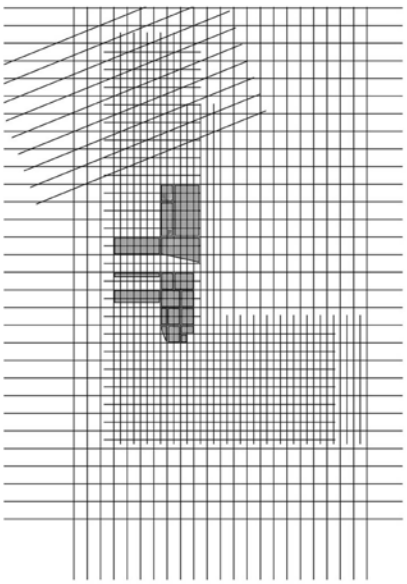
MASTER PLAN

Master Plan Concepts

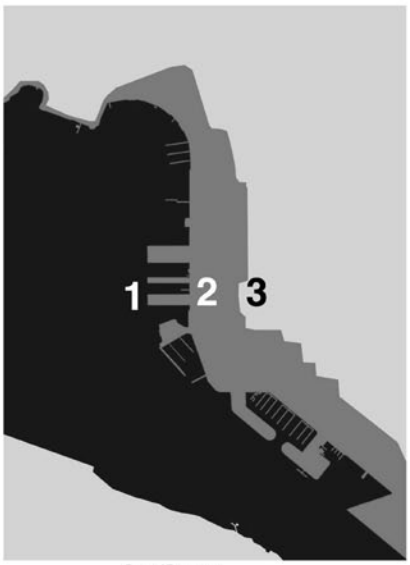
Existing City Plan



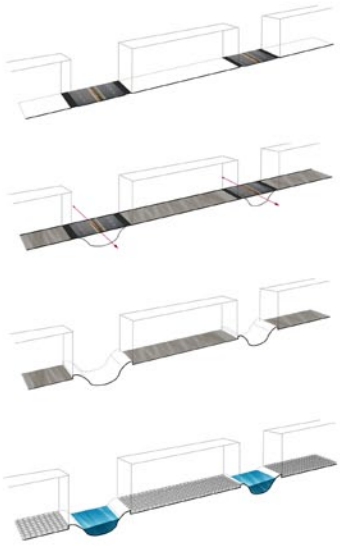
Grid Modulation



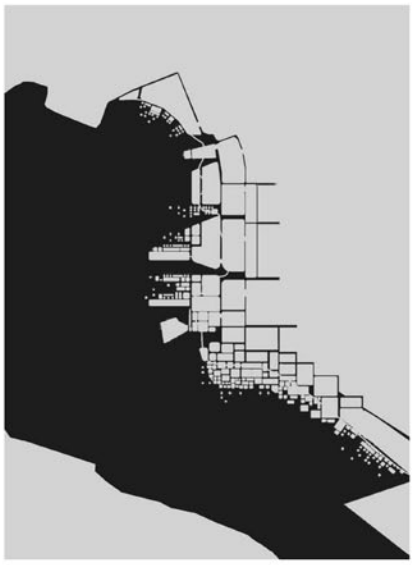
Landscape Articulation



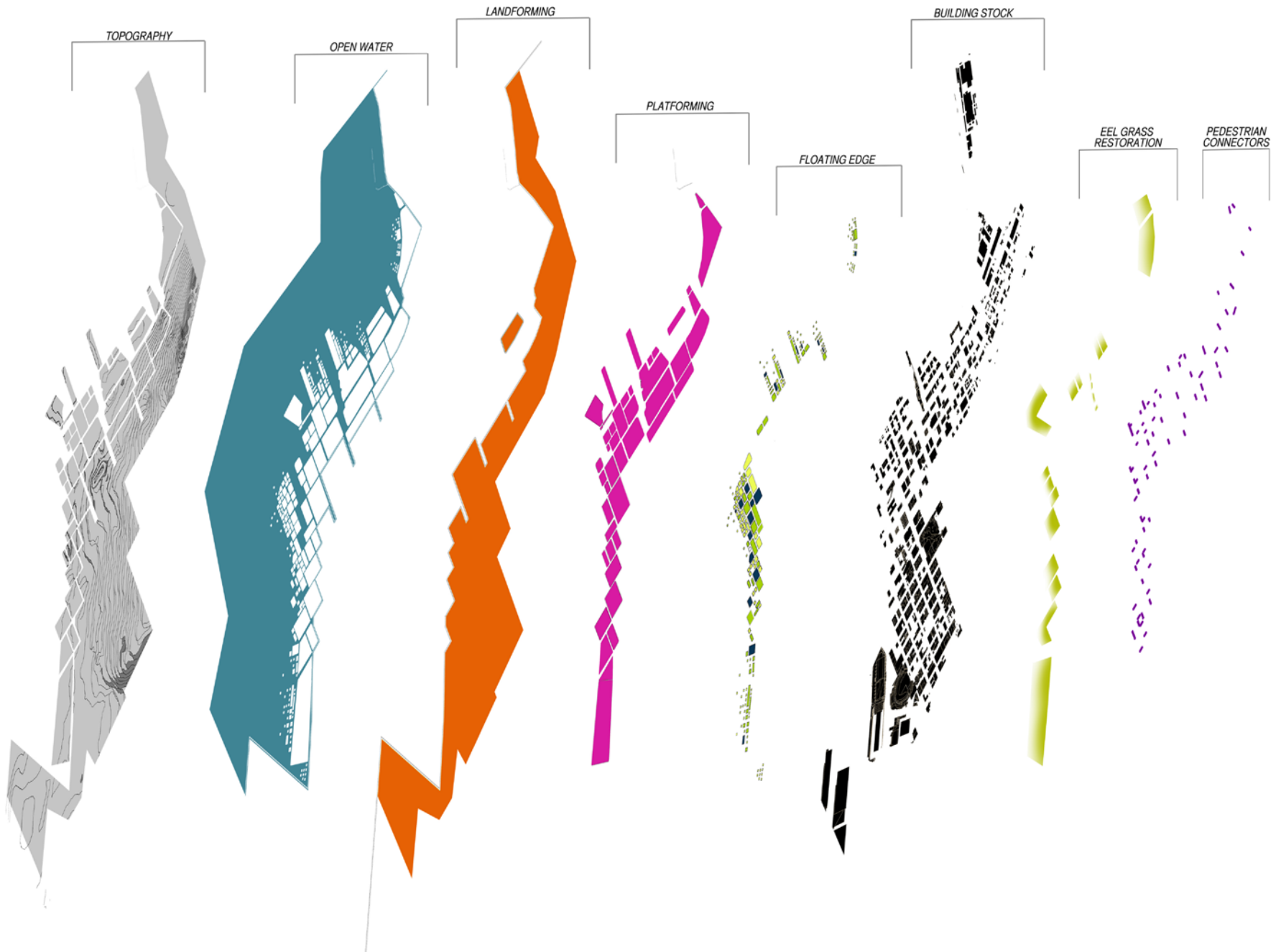
Zones of Engagement



Process of Dredging

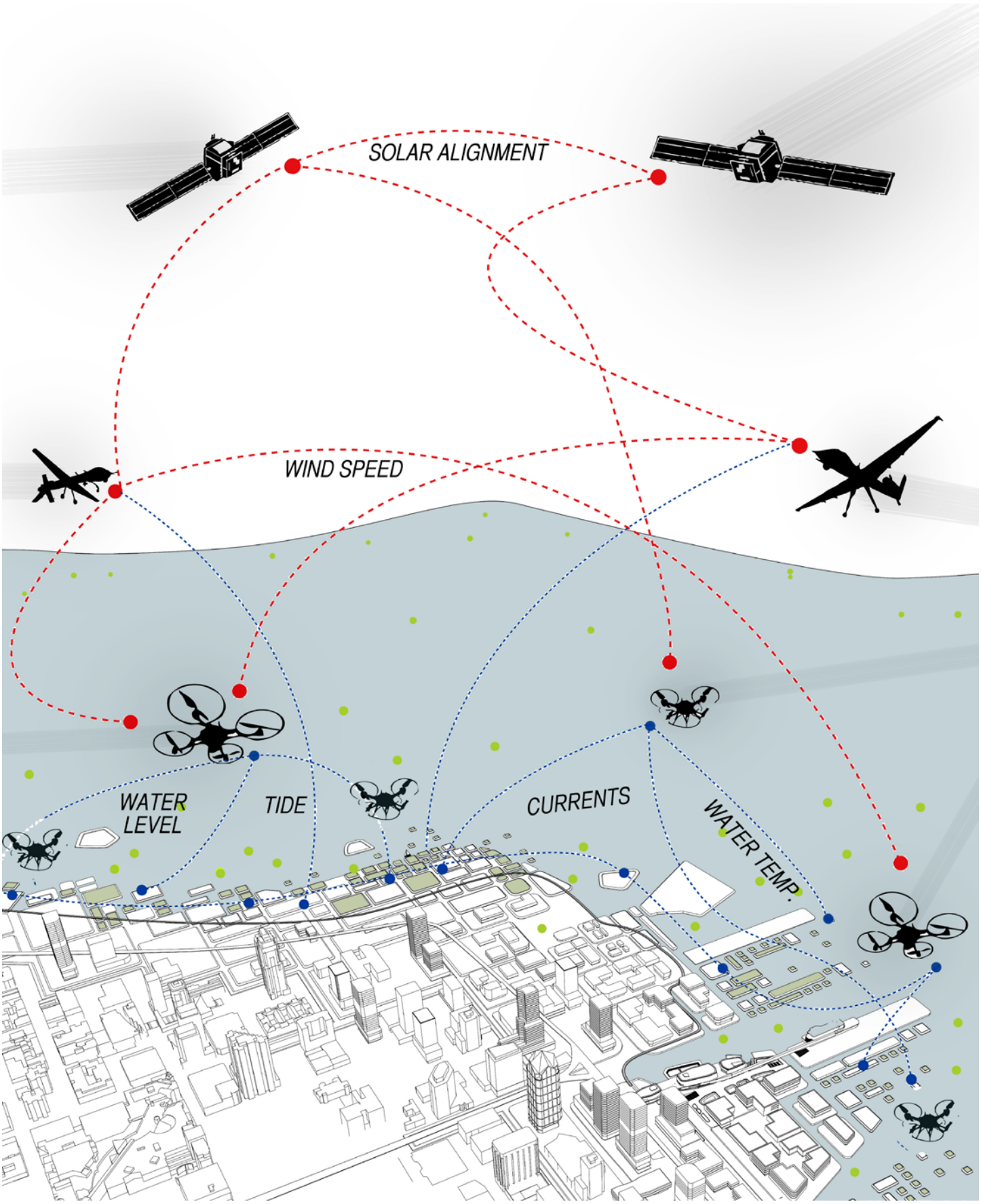


Subtractive Water Urbanism

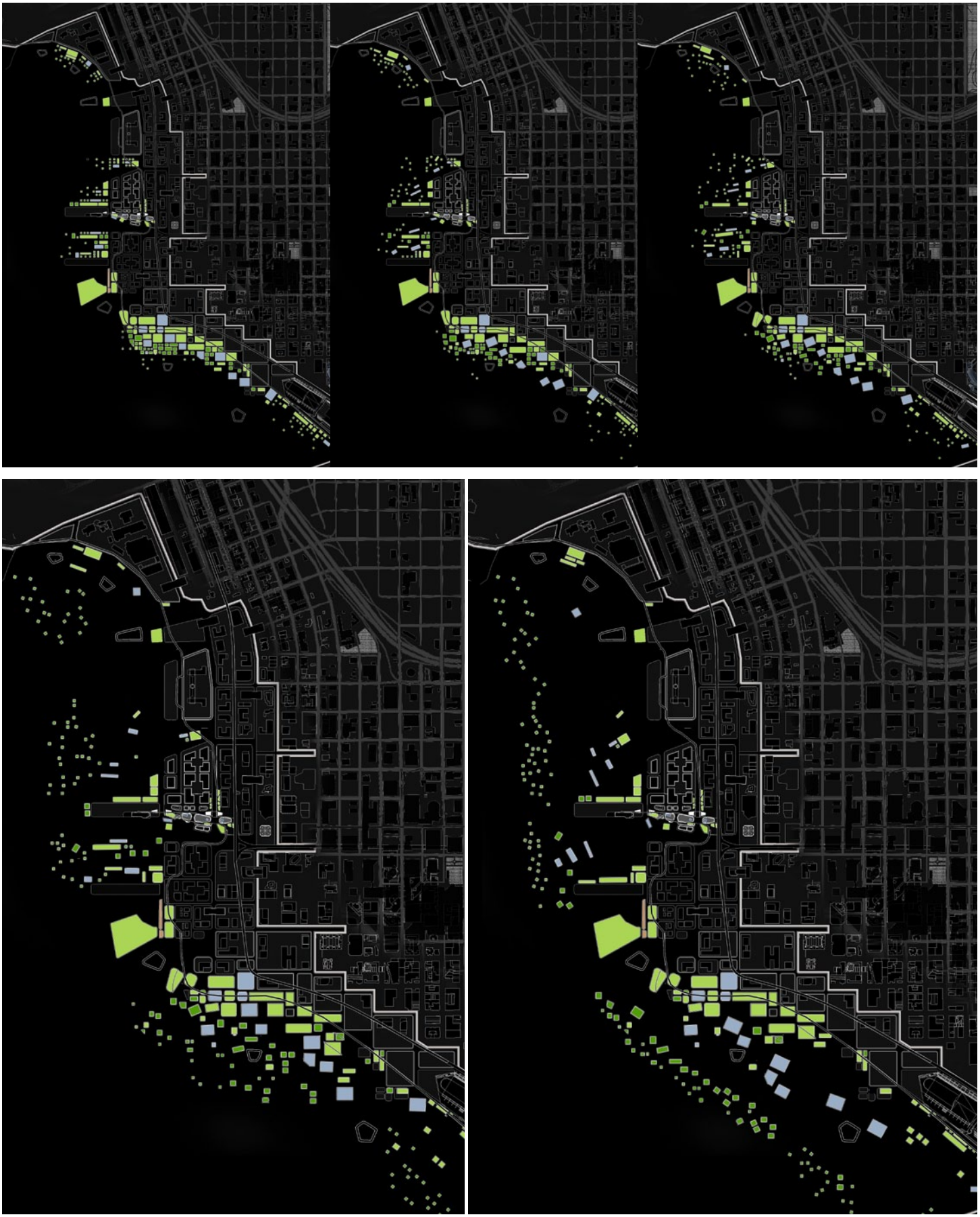

TOPOGRAPHY
OPEN WATER
LANDFORMING
PLATFORMING
FLOATING EDGE
BUILDING STOCK
EEL GRASS RESTORATION
PEDESTRIAN CONNECTORS

Networked Landscape

LANDSCAPE COMMUNICATES IN REAL TIME WITH SATELITE, DRONE, AND SERSORED TECHNOLOGIES



AUTONOMOUS ARCHIPELIGO



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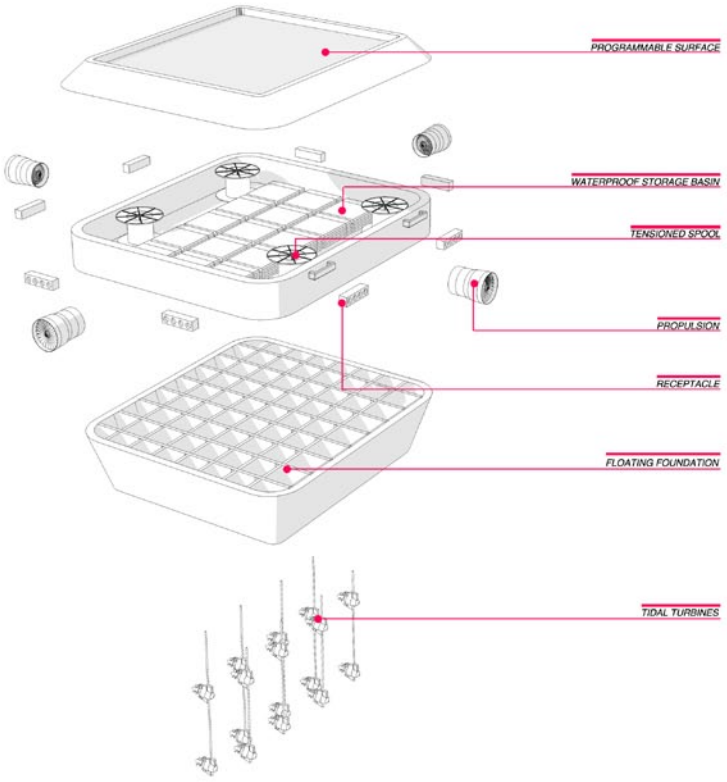
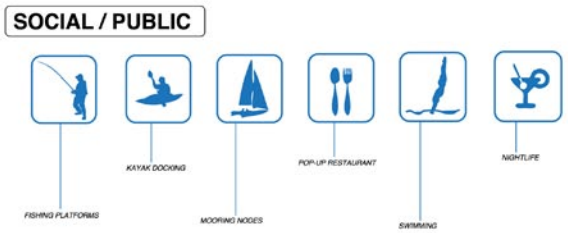
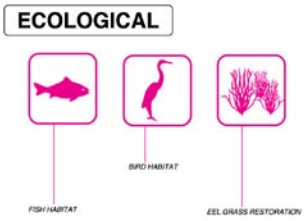
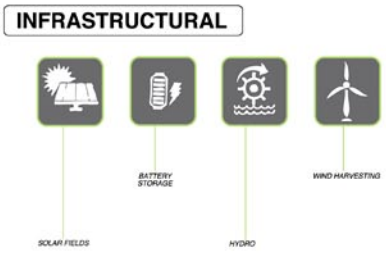
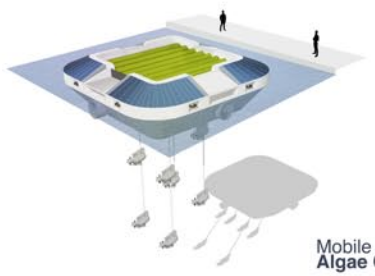


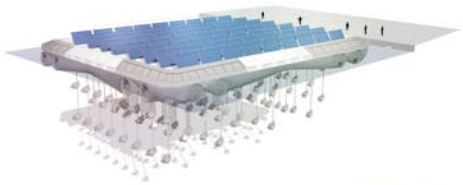




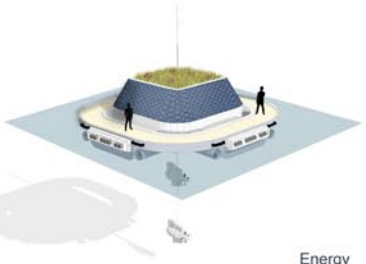




Mobile
Algae Cells



Solar Fields



Energy
Transport Cell

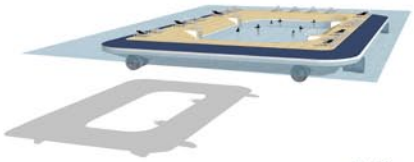
Self-Orienting
Wind Wheel

Ferry Park

Pocket Park

Pop-Up
Cafe

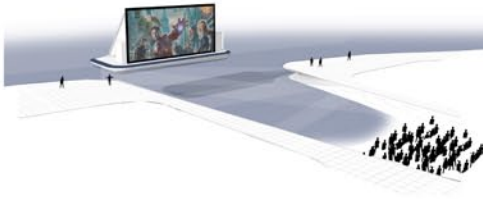
Mooring
Archipelago



Public
Water Access

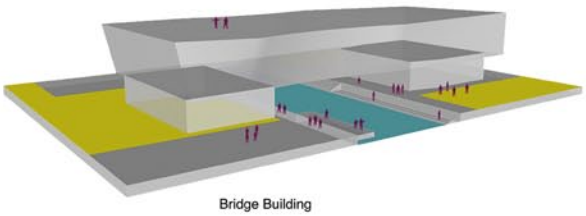
Underwater
Observation Basin

Fishing Platform

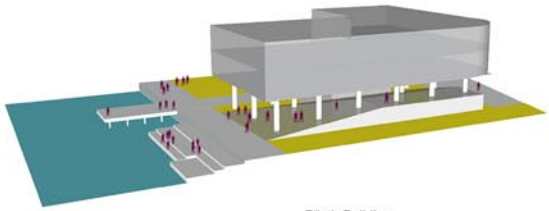


Floating Theater

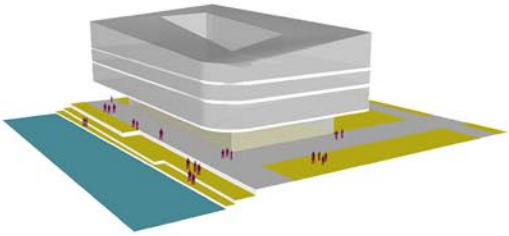
Water Responsive
Building Typologies



Bridge Building



Plinth Building

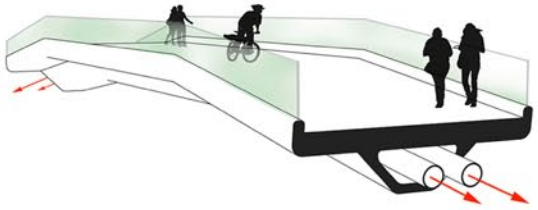


Housing Block

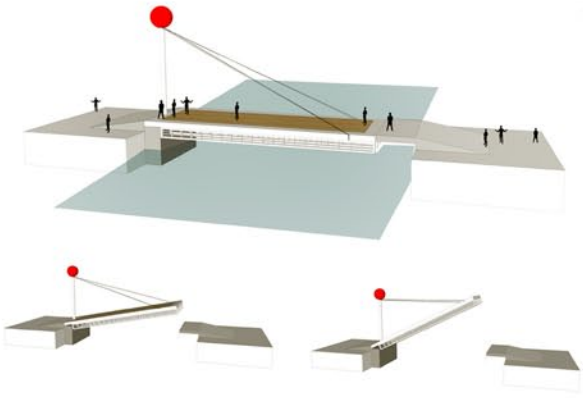
High Rise

Minimal Ground Level Footprints_Deployable Flood Walls_Porous Surfaces Around Building

Pedestrian Bridge Types

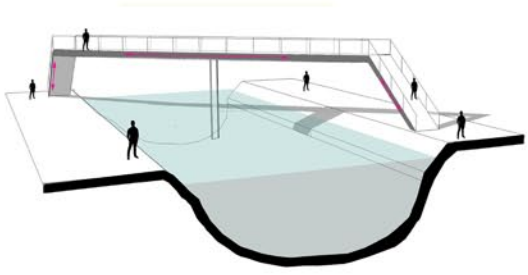


Infrastructural Conduit



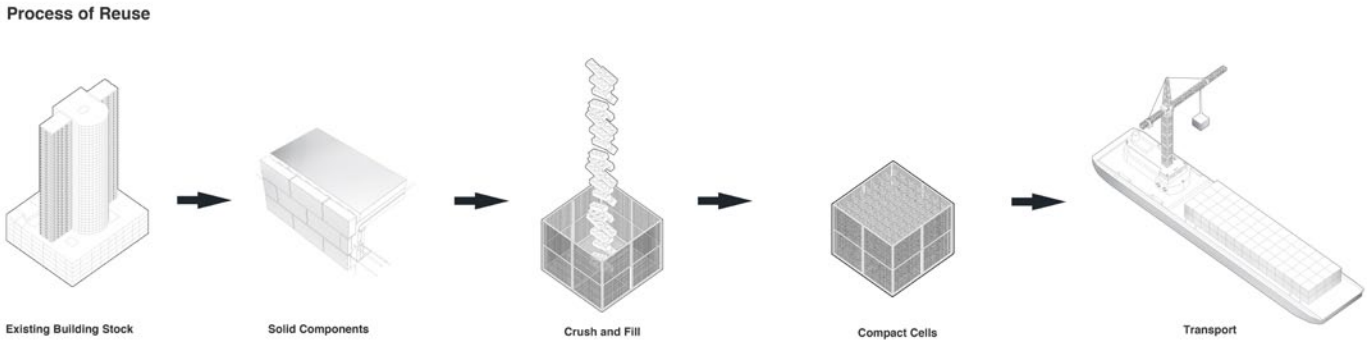
Wayfinding Drawbridge

Water Bridge

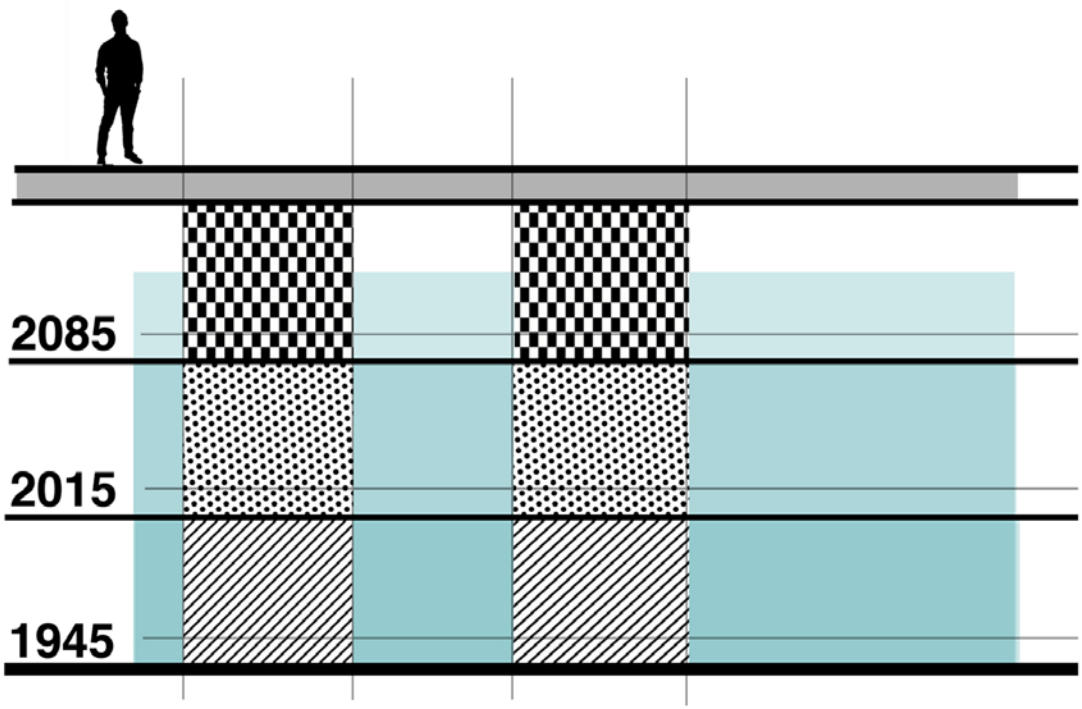


Elevated Bridge

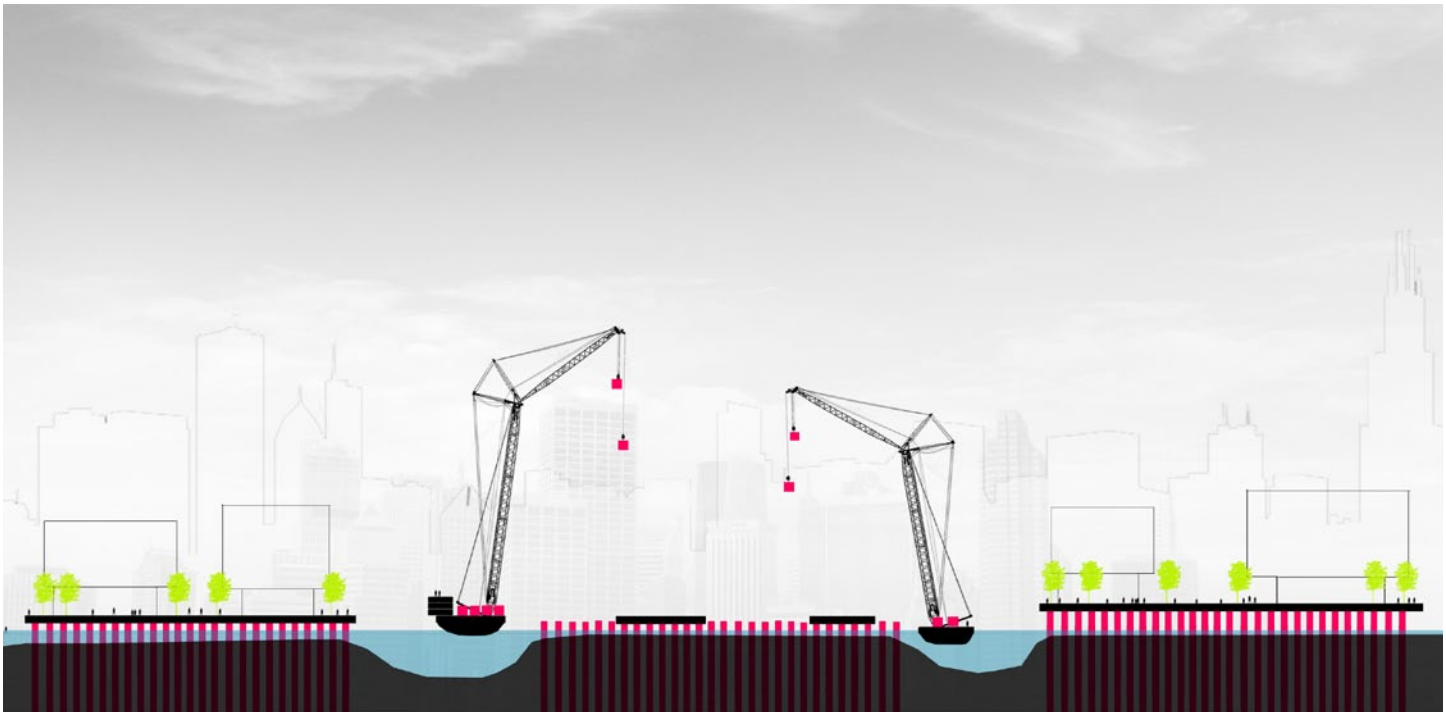
PLATFORMING_RECYCLED LANDSCAPES

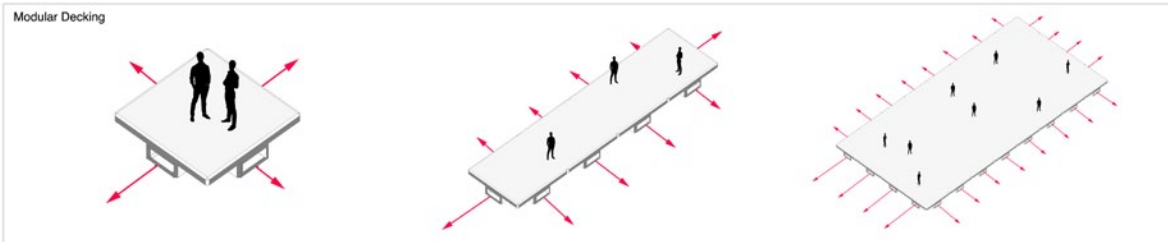


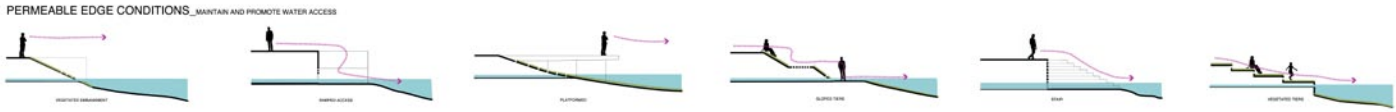
Time Layered Landscape

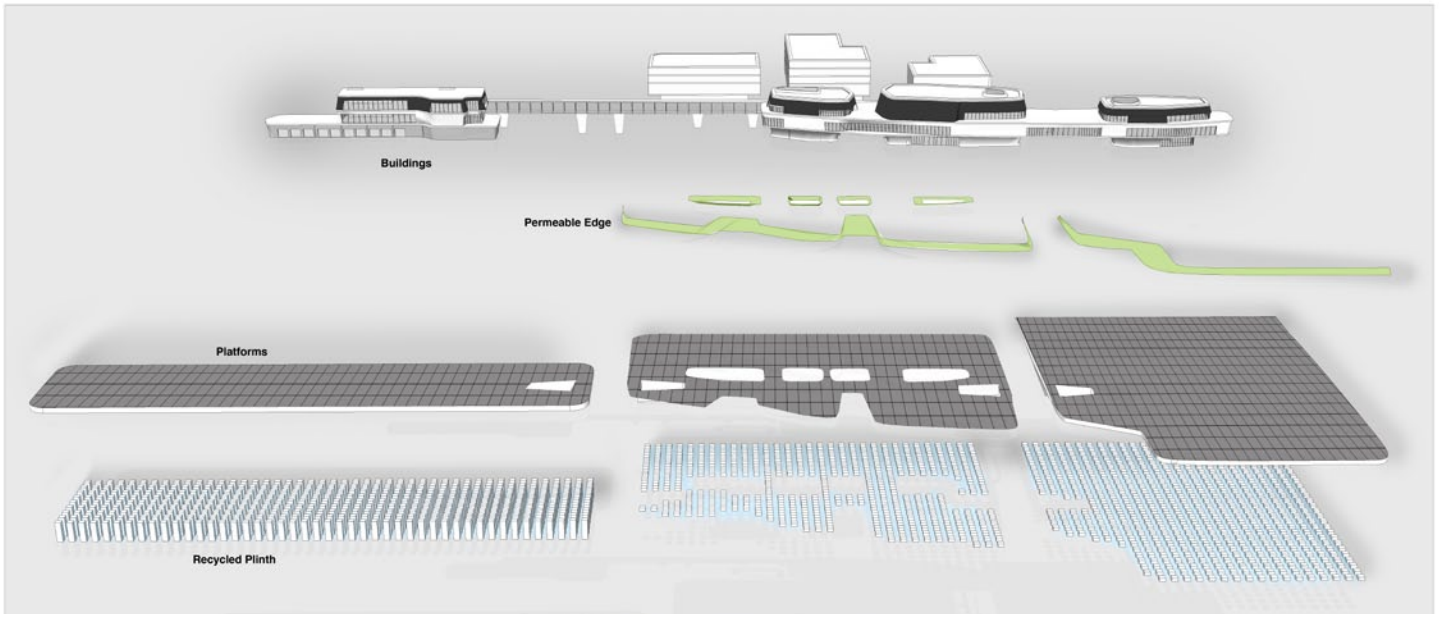


PLATFORMING_RECYCLED LANDSCAPES

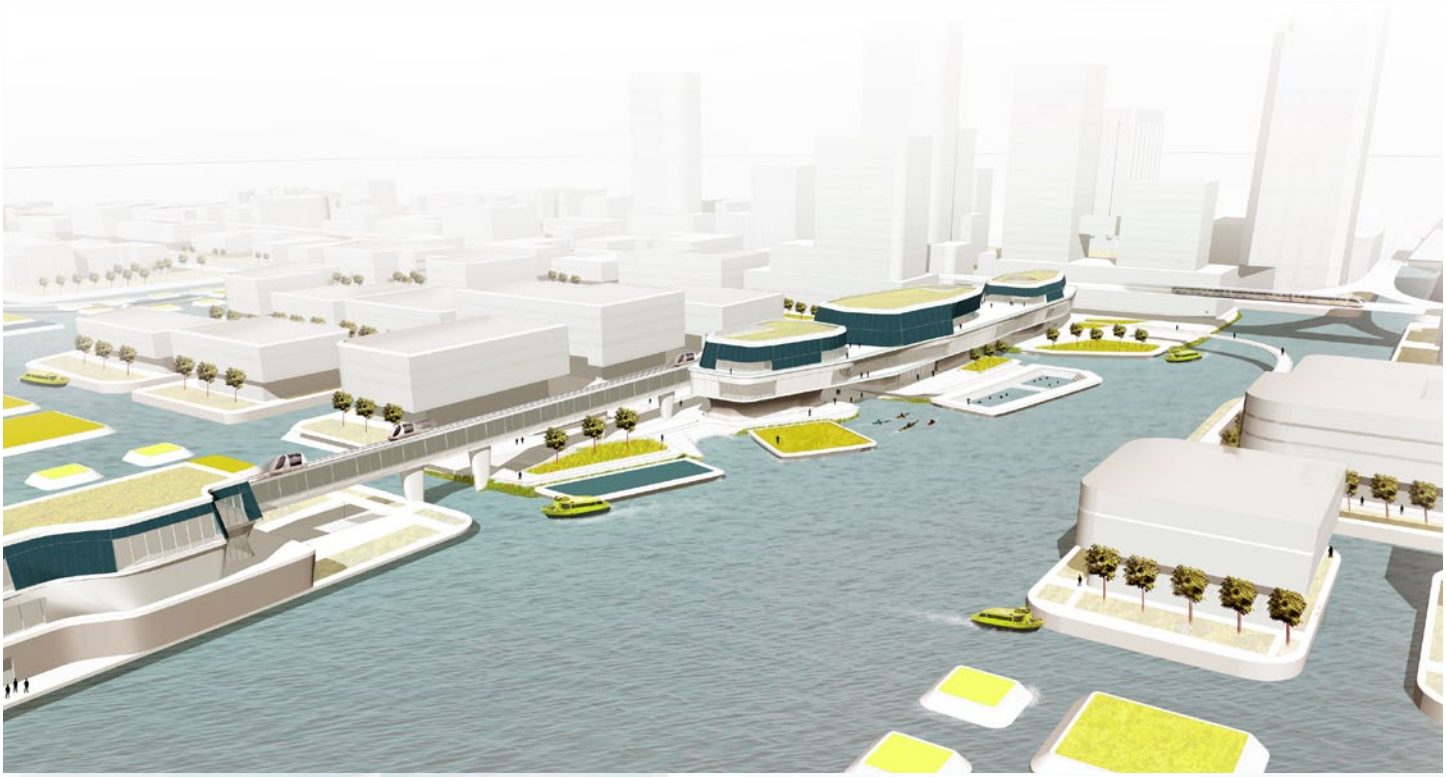


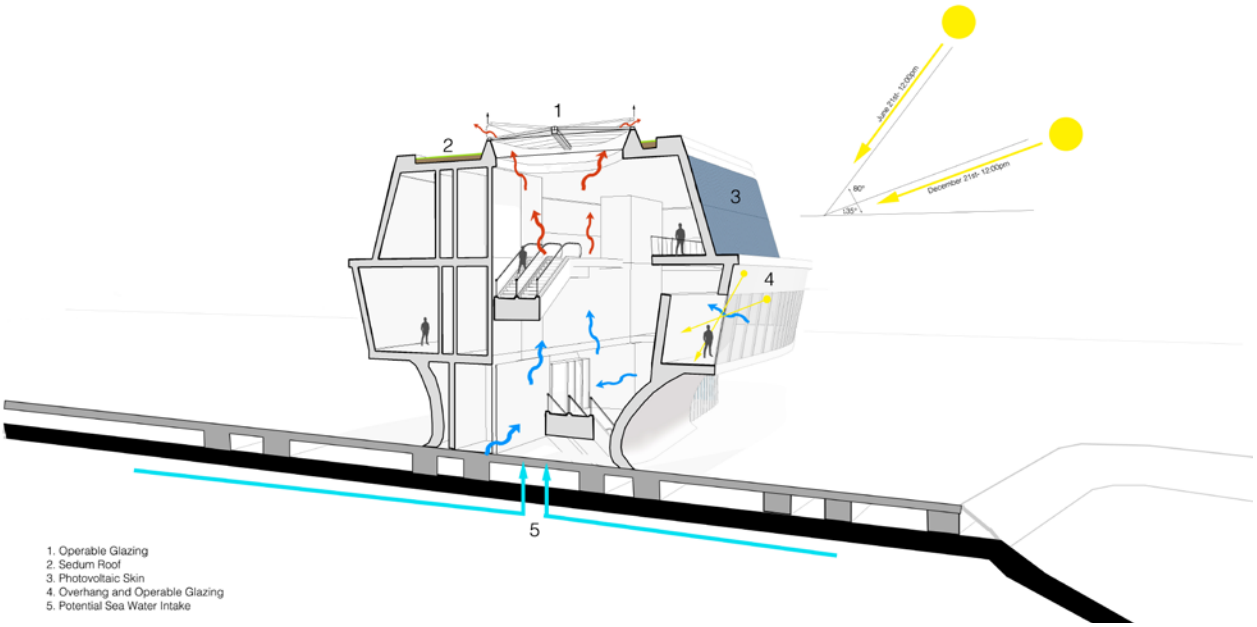






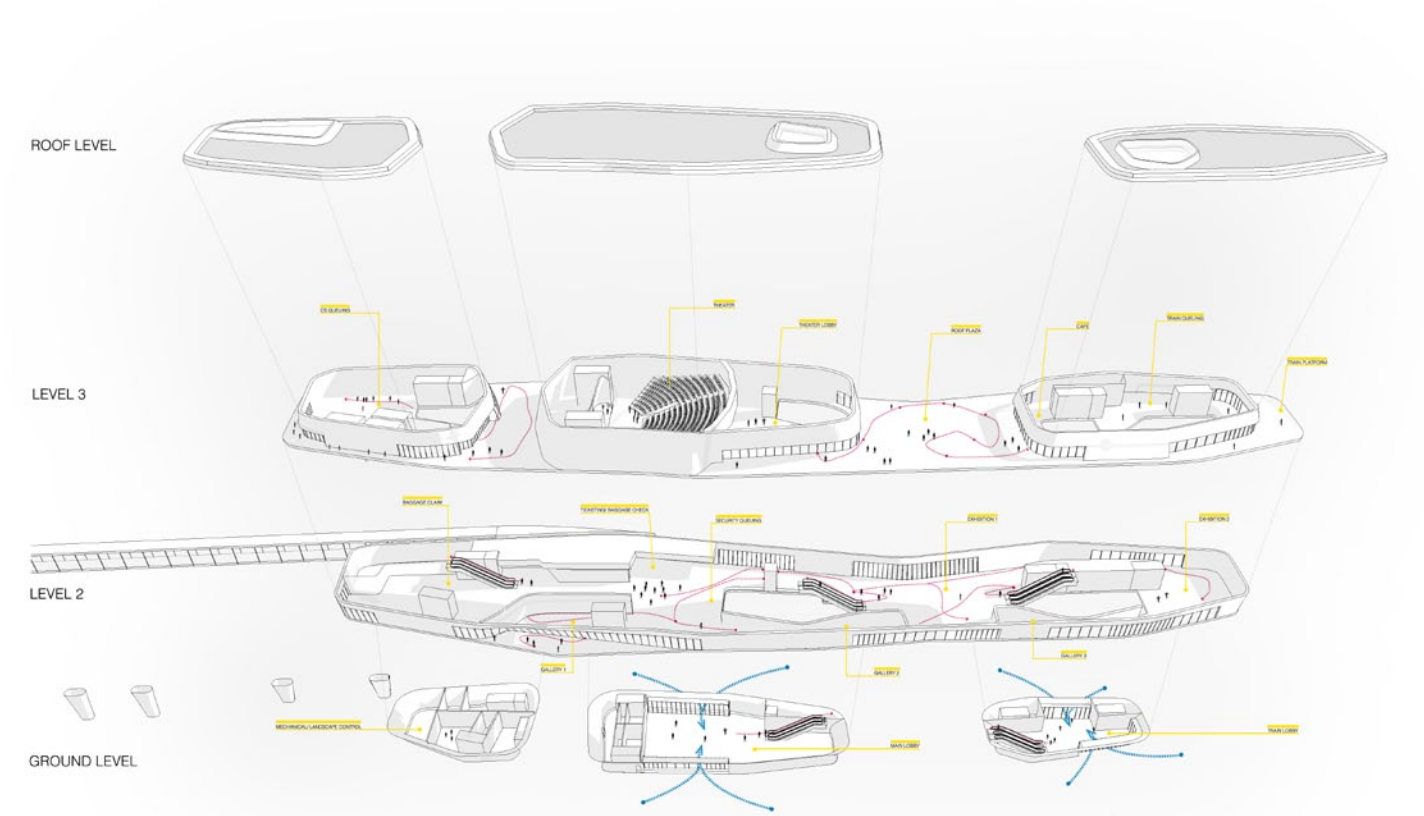
CULTURE HUB_TRANSIT TERMINAL

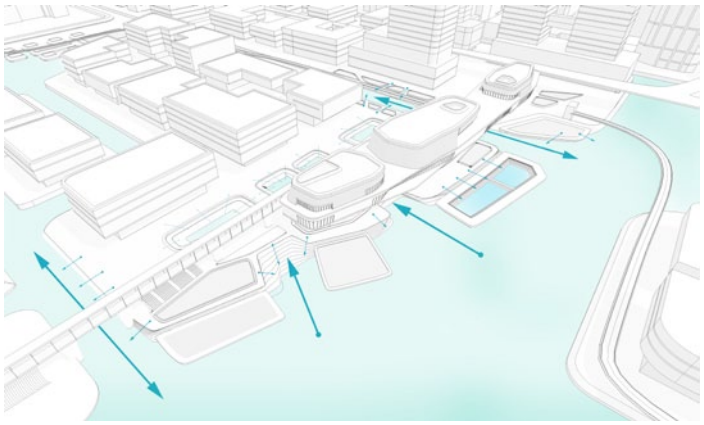


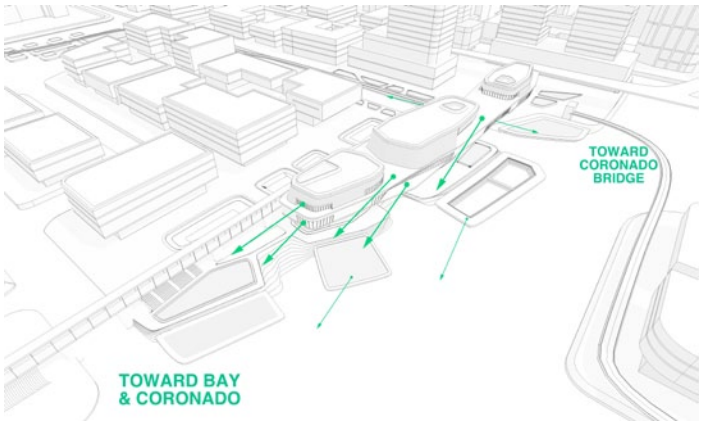


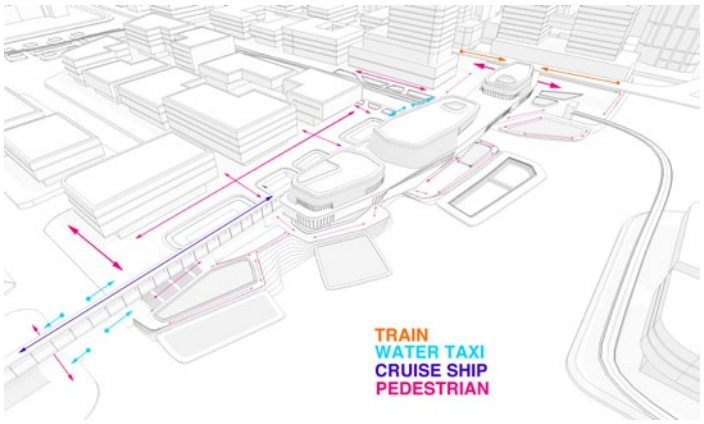
1. Operable Glazing
2. Sedum Roof
3. Photovoltaic Skin
4. Overhang and Operable Glazing
5. Potential Sea Water Intake

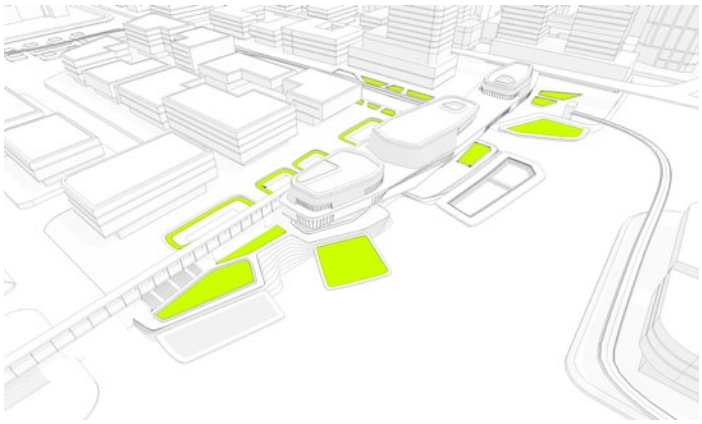
CULTURE HUB_TRANSIT TERMINAL



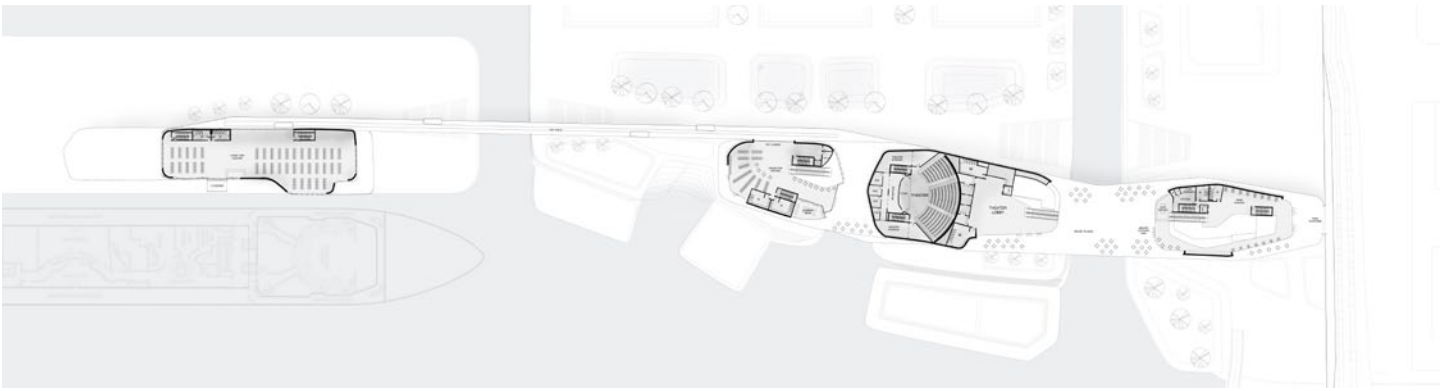


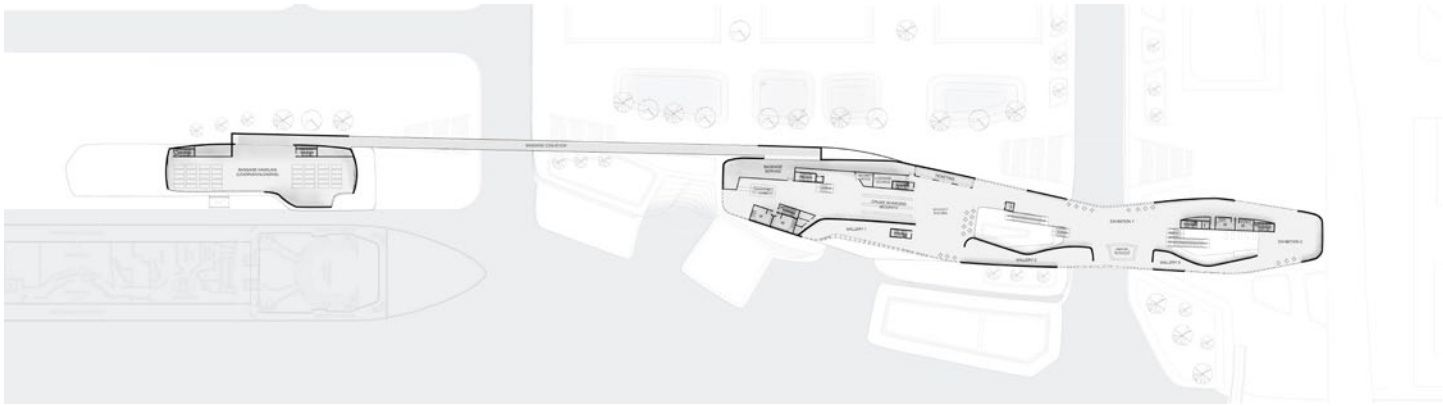


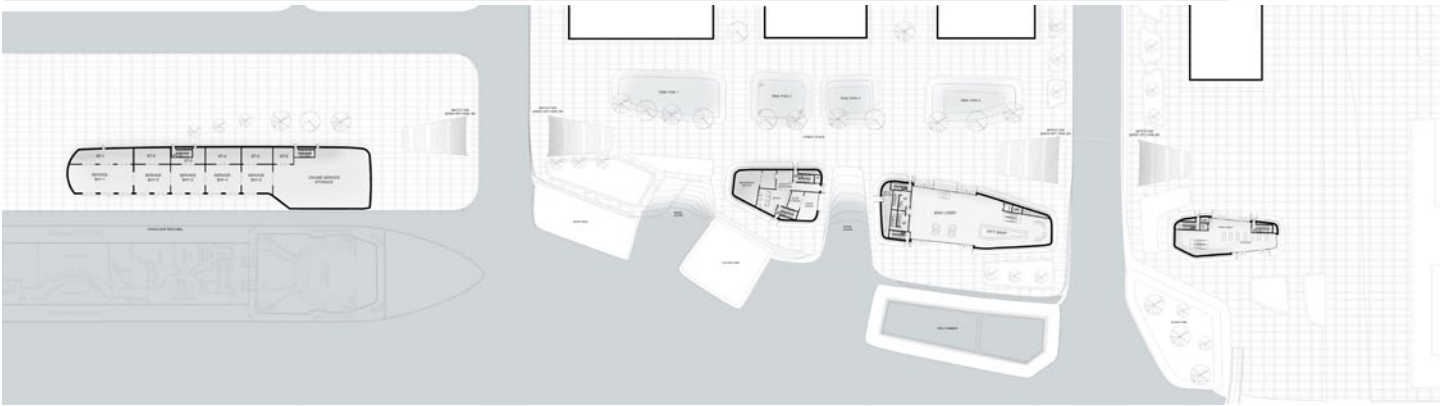




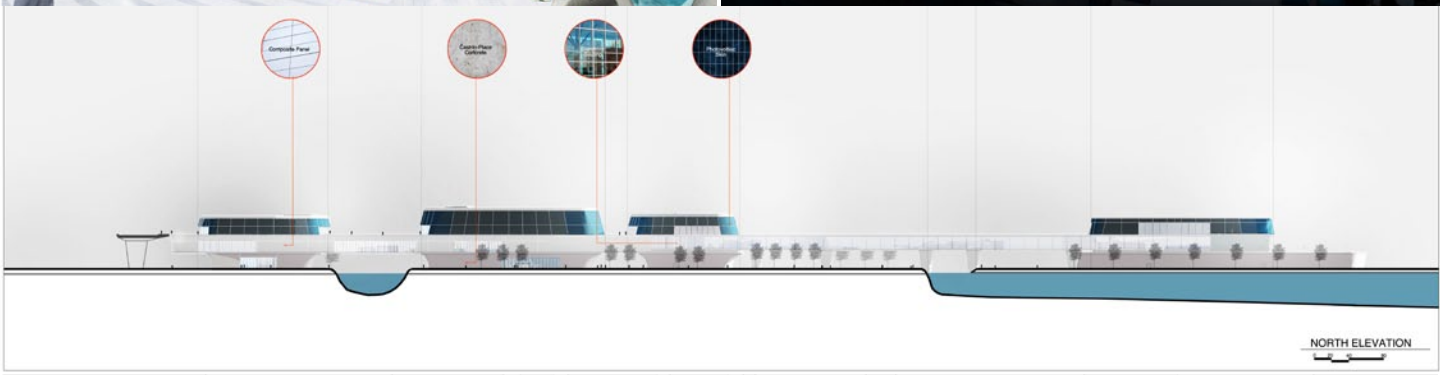
CULTURE HUB_TRANSIT TERMINAL

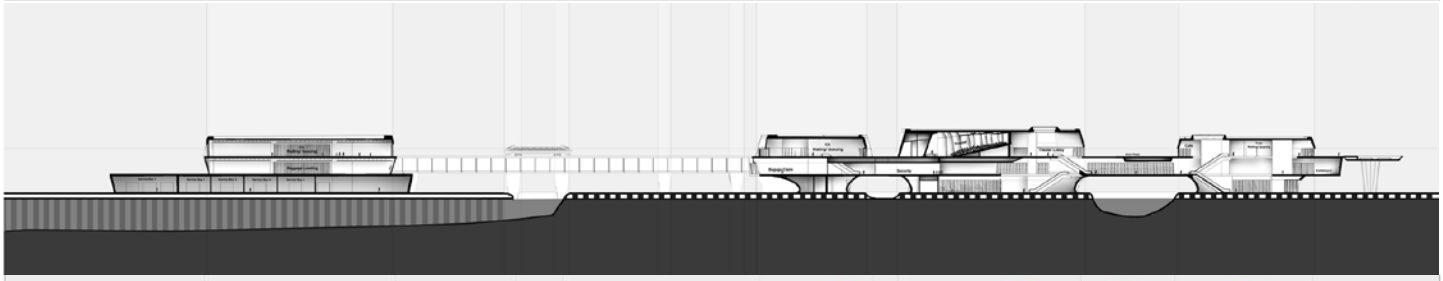


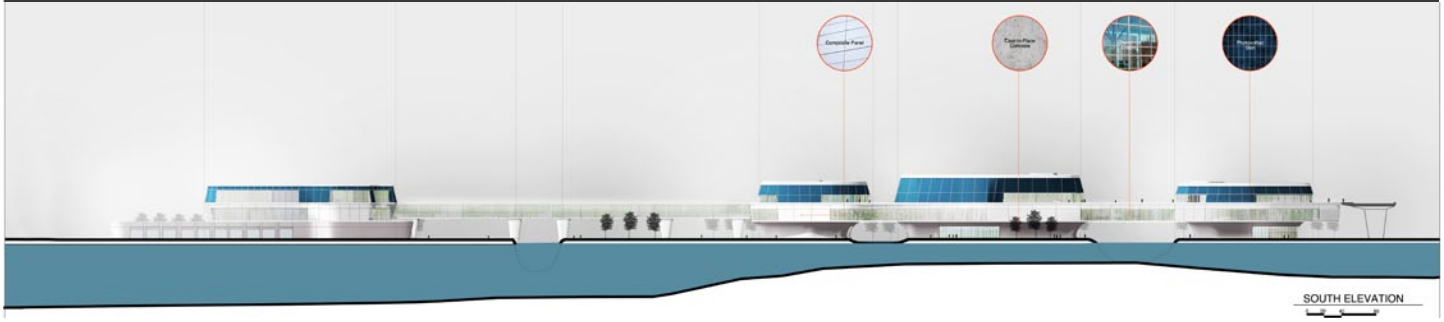




CULTURE HUB_TRANSIT TERMINAL







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