1-1-2011

Transitional Architecture: A Temporary Architectural System for De-Industrializing Waterfronts

Stephen Mauro
Ryerson University

TRANSITIONAL ARCHITECTURE:

A Temporary Architectural System for De-Industrializing Waterfronts

by

Stephen Mauro,

B. Arch Sci., Ryerson University, 2009

A design Thesis Project

presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Master of Architecture

Toronto, Ontario, Canada, 2011

Author's Declaration

I hereby declare that I am the sole author of this thesis project.
I authorize Ryerson University to lend this Thesis Project to other institutions or individuals for the purpose of scholarly research.

Stephen Mauro

I further authorize Ryerson University to reproduce this thesis project by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

Stephen Mauro

Transitional Architecture:

A Temporary Architectural System for De-Industrializing Waterfronts

M.Arch 2011

Stephen Mauro

Faculty of Engineering, Architecture and Science

Ryerson University

Abstract

The following thesis began as an investigation into port cities that lie in the limbo between industrial and post-industrial. It questions the role of architecture during this stage of transition. The research brought forth a vision of infrastructural re-use and reversible architecture, aimed to address the indeterminate and environmental condition of de-industrialized contexts. Essentially this thesis envisions the reactivation of wasted rail and manufacturing infrastructure present among industrial-port cities. They are to become a supply chain network, producing temporary architecture. Areas of high rail density such as rail yards and industrial piers thus act as incubators of the future era; served by a reversible architecture. These communities become the focus of the city's redevelopment efforts while resisting the pressure of permanent, large scale redevelopments. As the transition from industrial to post-industrial nears stabilization, more permanent solutions will begin to emerge while the architecture may move on to serve another context.

Acknowledgments

I would like to begin by thanking my family Adrian, Denise, Christopher and Linnea Mauro for their support throughout this thesis. I would also like to thank my colleagues, Jeff Cogliati and Karl Van Es, along with the staff at Chamberlain Architects for their thoughtful suggestions throughout this process. Foremost, I would like to extend my sincere gratitude to my thesis supervisor, George Kapelos for his insightfulness and continuous support. His guidance has helped me throughout the research, design, and writing of this thesis. Finally, I would like to thank Colin Ripley and John Cirka. Throughout this process, their thoughtful critiques have inspired the direction of this thesis.

.

Dedication

For my parents, Adrian and Denise.

Contents

List of Figures

Fig. 5-4 Duisburg Nord: Infrastructural Re-Use

http://en.wikipedia.org/wiki/Landschaftspark_Duisburg-Nord

Fig. 5-5 Duisburg Nord

Syntax of Landscape (2008) Weilacher, Udo pg.102

Fig. 5-6 Future Housing Fields

http://aru.londonmet.ac.uk/works/witznitz/

Fig. 5-7 Plan & Perspective of Future Housing Fields

http://aru.londonmet.ac.uk/works/witznitz/

Fig. 5-8 Plan of Activity Fields

http://aru.londonmet.ac.uk/works/witznitz/

Fig. 5-9 Potteries Think Belt: Mobile Prefabricated Units

http://designmuseum.org/design/cedric-price

Fig. 5-10 Potteries Think Belt Network

http://www.audacity.org/

Fig. 5-11 Strijp Phillips Masterplan: Andrea Branzi

http://places.designobserver.com/feature/notes-toward-a-history-of-agrarian-urbanism/15518/

Fig. 5-12 Demountable Structure

http://places.designobserver.com/feature/notes-toward-a-history-of-agrarian-urbanism/15518/

Fig. 5-13 Site Perspective

http://architettura.it/architetture/20020219/index.htm

Fig. 5-14 Loblolly House: South Facade

http://kierantimberlake.com/featured_projects/loblolly_1.html

Fig. 5-15 Loblolly House: Structural Aluminum Frame & Blocks

http://emthesis.wordpress.com/thesis/

Fig. 5-16 Loblolly House: Elements of Architecture

http://www.treehugger.com/files/2006/03/what_makes_a_bu_4.php

Fig. 5-17 Cellophane House

http://www.greeninmedusa.com/

Fig. 5-18 Chunk Assembly Diagram

http://kierantimberlake.com/featured_projects/cellophane_house_9.html

Fig. 5-19 Fabrication

http://kierantimberlake.com/featured_projects/cellophane_house_8.html

Fig. 5-20 North House

http://www.team-north.com/

Fig. 5-21 Responsiveness

An architectural system rooted in principals of transience, re-use and flexibility may lessen the costs of waterfront re-development failure. As cities transition to a new economic era, designers must resist the temptation to re-define the city through formal means. This thesis proposes to confront the uncertain realities of the de-industrializing condition with an architectural methodology that affords experimentation, reversibility and reusability. It is once conditions begin to stabilize that a more permanent architecture may begin to emerge.

1.0 Introduction

Figure 1-1 Hamilton, Ontario: A Deteriorating Waterfront

The industrial waterfront was once a symbol of wealth, prosperity and power. As a child of the industrial revolution, its progress was afforded by the evolution of trade and manufacturing methods at the turn of the 20th century. The shores of numerous cities throughout the western world were transformed into economic reservoirs of manufacturing and trade infrastructure. Regions fortunate to be alongside trade routes entered an era of prosperity; one which attracted immigration, investment and progress. However, as history has shown, the longevity of prosperity is indefinite. Such dependence also comes with great vulnerability. The costs of this dependence are illustrated in the de-industrialization of port cities throughout the western world. Fluctuations in global markets have destabilized the very foundation of these cities. What once proved to allow for economic and social progress in these cities, have ultimately led to their downfall. These cities now struggle with social, environmental and economic conditions as they desperately attempt to diversify towards a post-industrial base. They suffer in a state of limbo; neither industrial nor post-industrial.

In response to de-industrialization, the common strategy among many port cities is an attempt to strip away the association of industrialism in all forms (Short, 1993). Given the stage-like nature of the waterfront, it is often the first line of action. It becomes a platform to redefine or rebrand a city to meet a post-industrial aesthetic; attracting investment and tourism. Architecture has thus been devalued to the level of marketing, to what Richard Marshall describes as "architectural capital (Marshall, 2001, p. 6)." The result of such top-down design in both urban planning and architecture raises a number of concerns which will be discussed further in the following subsection. In essence, the notion of rebranding fails to address the reality of the de-industrializing condition, for the transition from industrial to post-industrial is uncertain in nature. It not only involves the experimentation of alternate economic endeavors; but also the restructuring of society, remediation of landscapes and the facilitation of new infrastructure. It is this relationship between landscape redevelopment and the transitioning waterfront that this thesis is concerned with.

As designers and planners, we must begin by confronting these contexts as unique instances in urban morphology, thus requiring a unique set of planning principals. It cannot be addressed with conventional, top-down design philosophy. In large part, the economic base is the city's lifeblood, suggesting that de-industrialization represents the death of a city. Yet, as the industrial city dies, the seeds for the post-industrial city are being planted. The transition is not solely characterized by a change in economy, but this extends into the deepest levels of society. In Daniel Bells seminal publication *The Coming of a Post-Industrial Society,* he illustrates differences between industrial and post-industrial society. He states:

> An industrial society is 'a game against fabricated nature' that centres on human-machine relationships and applies energy to the transformation of the natural into a technical environment. Economic activity focuses on the manufacturing and processing of tangible goods. The central occupations are the secondary sector ones of semi-skilled factory worker and engineer (Bell, 1999, p. 116)

> A post-industrial society is 'a "game between persons" in which an "intellectual technology," based on information, rises alongside of machine technology'. The post-industrial society involves industries from three sectors: the tertiary industries of transportation and utilities; the quaternary industries of trade, finance and capital exchange; and the quinary industries of health, education, research, public administration and leisure. Among these, the last is definitive because the key occupations are the professional and technical ones, with scientists at the core. (Bell, 1999, p. 116)

While the difference between industrial and post-industrial society may seem unrelated to an architectural discussion, it represents an infrastructural and architectural requirement as a

means to accommodate economic redevelopment. Moreover, in *The Nature of Economies* Jane Jacobs suggests that economic development is not a linear process, but indeterminate and acts as "a web of interdependent and co-dependents (Jacobs, 2001, p. 19)." In addition, Barbara Fennesy's research concerning transitioning economies affirms this as she recalls economist, Joseph Schumpeter's view of economic development in *The Theory of Economic Development* (Schumpeter, 2005). She states Schumpeter "characterizes economic development as a discontinuous process. Developments do not occur in an even, linear progression. Obstacles and setbacks, some of which may beyond local control, can render even relatively new developments obsolete. (Fennessy, 2009, p. 24)." Taking the ecological nature of economics into account, we can begin to imagine the level of uncertainty particularly facing the birth of a new economy; namely de-industrializing waterfronts. This transition and the complexities associated with it are illustrated in figure 1.2.

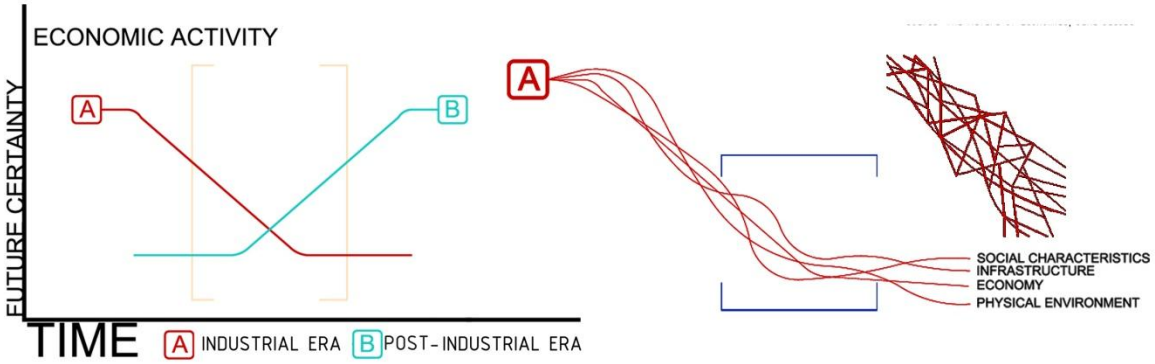


Figure 1-2 The Uncertain Transition from Industrial to Post-Industrial

Formally driven redevelopment strategies will do little, but reward temporary benefit through permanent solutions. However, how can designers plan and provide an urban and architectural response to such uncertain conditions? Referring to the comparison of ecological process and economic development, we may respond by reversing our thought process from a top-down to a bottom-up philosophy at both the urban and architectural level. As a result of the research, this thesis aims to confront indeterminacy by means of an architectural system rooted in principals of transience, prefabrication, and re-fabrication. A system which may be responsive to development pressures and environmental instability of the waterfront. It aims to develop a strategy which performs in harmony with discourse stemming from contemporary urbanists and architects such as Alex Wall, and Andrea Branzi respectively.

In order to gain an understanding of the line of thinking, the following paragraphs will outline main sections of this thesis. The opening section entitled, *The Formation*, provides a historical analysis of the industrial port city. It illustrates the historical underpinnings of its formation, and the factors that have lead to the de-industrializing condition. While the historical analysis may seem less relevant, it provided the basis for the thesis develop. Following this, the second section, entitled *Understanding Uncertainty* begins to look at the theoretical design discourse concerning indeterminacy. The section is divided into three subsections; opening with a discussion of reasons for the shift in thinking. Contemporary urbanist's, such as Alex Wall and Graham Shane provide background to this territory and begin to suggest potential responses to uncertainty. It is at this point the research turns toward the theoretical discourse of Landscape Urbanism in the subsection *Prepared Landscapes*. In many ways the principals of Landscape Urbanism could be considered a critique of traditional waterfront redevelopment. Furthermore, the association that landscape urbanism shares with de-industrializing contexts, indeterminate planning, and landscape remediation is of particular importance to this thesis. The attempt to accommodate uncertainty through bottom-up and ecological design strategies are embraced. Discussion stemming from the disciplines prominent figures such as Stan Allan, Charles Waldheim and James Corner are reviewed. However, the dialogue leading into the third subsection begins to shifts toward a critical tone. The discussion is fundamentally critical of the idealism and ambiguity of landscape urbanist principals. It argues that for an urban process to emerge, a greater degree of specificity is needed during the initial stages of the phasing framework. This is primarily attributed to the lack of an architectural agenda in much of the discussion. In response to this, the critique extends to the discourse of Andrea Branzi concerning ecological urbanism and the role of architecture in an indeterminate context. In particular, four of his *Seven Suggestions for a New Athens Charter* are embraced for the discussion regarding flexible and temporary architecture. However, the research remains critical of two aspects; the first being the consistent lack of detail given to the architecture object, and the second concerns the longevity of a temporary system. While Branzi and those alike suggests that transience and indeterminate planning is a response to the dynamic nature of the contemporary city, I argue that uncertainty in de-industrializing contexts is primarily a product of the transitional phase discussed earlier. In this regard, architectural strategies ought to utilize transient and flexible principals when addressing a de-industrializing context, though as a region nears re-stability, the need for such transience correspondingly decreases.

The conclusion of the second section represents a transition in the research. While the research and critique lead to a theoretical agenda of transience, the specificities of the

architectural system remain largely unanswered. This introduces the third section, entitled *Towards a Transient Object.* In this section, the research looks toward the body of work produced by architects concerned with mobility and flexibility. In light of this, prefabrication underlies much of the tone of the discussion. Robert Kronenburg has written extensively on the subject of temporary architecture. His research outlines the importance of assembly and prefabrication in the realm of flexibility. Further research into prefabrication raises a critique concerning the limitations of traditional modular systems. In response, the literature of Kieran Timberlake marks a divergence from traditional thinking. Their principals regarding the resistance of stylistic determinacy in favour of bottom-up design practices syncs well with the more theoretically intensive research in the second section. Furthermore, their discussion of a new assembly process which may facilitate a demountable architecture for future reuse solidifies the importance of their work to this thesis.

The vision for the de-industrializing waterfront owes itself to a diverse set of precedents. The following section, *Case Study* is a collection of precedents that range from the urban to architectural scale. Since much of the initial research concerned landscape urbanism, the first subsection includes large scale visions which dealt with de-industrializing or post-industrialized contexts. Conversely, the second subsection studies temporary architecture. The two groups of precedents combined, unify both the large and small scale strategies into single vision. Finally, the design research section completes the thesis by conveying the research and case studies into a vision for de-industrializing waterfronts. Prior to the design, a subsection entitled *Experimental Test Bed: Hamilton Ontario* will introduce a context which will facilitate the experimentation of design strategies which stem from the discourse and precedents studied. In this case, Hamilton, Ontario is used as the platform to illustrate the theoretical principals at both the urban and architectural scale.

The vision concerns the reuse of the existing rail network as a platform to distribute the elements of a transient architectural system. Furthermore, it proposes the re-activation of decaying industrial facilities as means of developing a supply-chain network for the architectural elements. Thus, areas of high rail density such as rail yards and abandoned industrial piers may become the field that withstands development experimentation. In doing so, this may alleviate pressure for rigid development on the waterfront landscape, allowing it to ecologically stabilize. As the transition from industrial to post-industrial nears stabilization, more permanent solutions will begin to emerge, while the architecture may move on to serve another context. The architecture produced from this system is demonstrated through the design of a temporary live-

work facility, emerging from a supply chain of compatible elements; each tier being capable of adapting to multiple contexts.

1.1 Background Information

This subsection outlines the area that this thesis sits within design discourse. It will point out the key designers and writers that have added to the research. As it has been stated, the thesis crosses the territories of both the urban and architectural scale. With regard to the theoretical and urban scale, the figures that will be studied in this thesis include, but are not limited to Andrea Branzi, Charles Waldheim, Stan Allen, Jim Corner and Alex Wall. The research will also study the work of architects concerned with temporary architecture and the technical aspects that facilitate flexibility. This includes the likes of Robert Kronenburg, Kieran Timberlake architects and Filiz Klassen. While the two territories differ in nature, the technical research acts as the avenue to fulfill theoretical and urban objective.

Much of Andrea Branzi's work has acted as critique of the contemporary city. He likens the city as a system of transformations and movements rather than a series of static objects (Branzi, The Weak Metropolis, 2010). The product of this analogy is the proposal of weak form of urbanism, rather than one of rigid solutions. The weak solutions are objects that act in similar nature to agriculture. They easily respond to change and limit the consequences of failure. Perhaps his statements regarding the Strijp Phillips Masterplan illustrate these ideas of a temporary architecture.

> The industrial agricultural civilization makes a horizontal landscape, without cathedrals, crossable and reversible: the turn-over of crops manages the agricultural landscape according to a temporary logic, fitting to the production of balance of the earth, to the flow of seasons and of the market. For all these reasons, contemporary architecture should start to look at modern agriculture as a reality with which to set new strategic relations. An architecture that renovates completely its reference patterns facing the challenge of weak and diffused modernity. Setting new relations with culture that is not constructive in traditional terms, but productive in territorial systems, following bio-compatible logics and using very advanced support technologies."
> (Branzi, 2003)

Figure 1-3 Strijp Phillips Masterplan: Andrea Branzi

The work of Andrea Branzi has influenced the prominent figures of Landscape Urbanism. As Charles Waldheim notes, “A generation of contemporary urbanists — ranging from Stan Allen and James Corner to Alex Wall to Alejandro Zaera-Polo — has thus drawn from Branzi’s intellectual commitments (Waldheim, Notes Toward a History of Agrarian Urbanism, 2010).” With regard to Landscape Urbanism much of the dialogue envisions the urban surface as a prepared field which may accommodate future uncertainty and change. Rem Koolhaas’ competition entry for Parc de la Villette express this idea through the design of indeterminate bands of organization intended to accommodate future program (Shane, 2006). Seminal essay such as ‘From Object to Field’ and ‘Reprogramming the Urban Surface’ by Stan Allen and Alex Wall respectively, represent a shift in emphasis from the qualities of the architectural object and toward the manipulation of the urban surface. In a sense the building or program which results from the surface is an afterthought or result of the field conditions. Consequently, Landscape Urbanistic proposals often fulfill an urban objective, while specificities concerning the objects acting upon it remain vague representations. Likewise, the work of Andrea Branzi often fulfills a theoretical position while remaining distant from the realities of the object. The resulting research will argue that whilst the manipulation of the surface is vital; the intent of developing a prepared surface can only suffice if the objects acting upon it are properly tuned to meet its requirements. As a response, the research shifts toward technical discourse that may complete the path of the thesis. The work and literature of architects concerned with aspects of mobility, prefabrication and adaptability within architecture will thus be studied.

The past two decades have produced vast advancements with regard to fabrication, communication technology and building modeling software. The work of Kieren Timberlake illustrates novel methods of pre-fabrication through the design of integrated components. Unlike modern prefabrication, an integrated componentized approach allows for flexibility, precision

and customization. The use of components is essentially a method of continuously subdividing architecture into parts with the ability to connect to various configurations. Along similar lines to the thinking of Landscape Urbanism, the act of designing concerns the process rather than stylistic determinacy. Design does not end upon construction, but is designed such that it may be easily assembled, disassembled and re-assembled through the use of integrated components. In this regard, the strategies of Kieran Timberlake and architects alike represent an avenue toward a transient solution.

2.0 The Formation

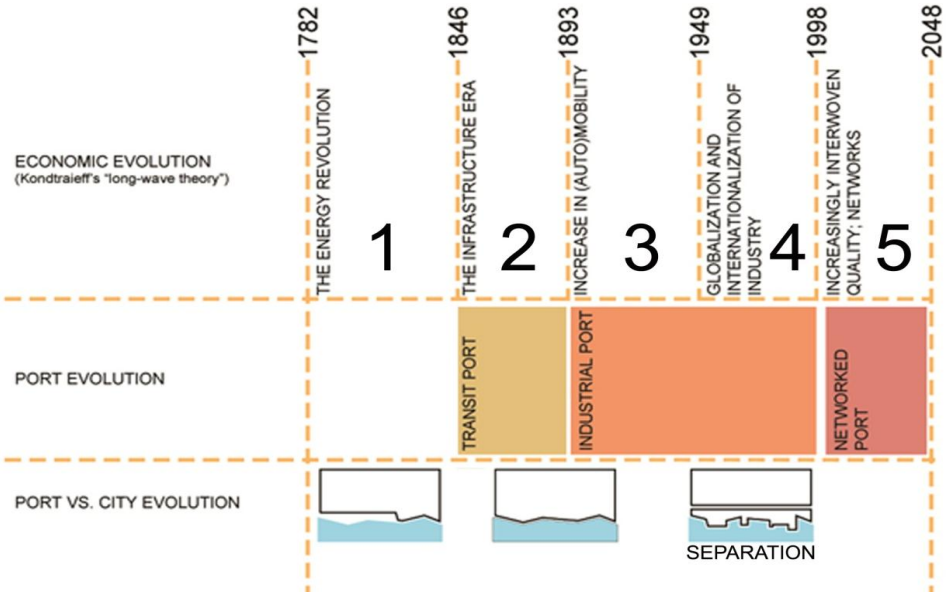


Figure 2-1 Kondratieff Cycles

The following section is intended to provide a background regarding the formation and condition of the industrial waterfront. The historical analysis may begin to illustrate the factors that have lead to the current condition along with the potentials that lie within these landscapes.

The industrial waterfront was a child of the industrial revolution. It provided innovative methods of manufacturing and transportation, ultimately shifting the characteristics that shape society. It brought forth the evolution of social structures, governments, and economic models. The evolution of modern economy is described as following five phases of development known as the Kondratieff Long Wave Theory (see figure 1). It was during the infrastructural era (1846-1893) that the industrial port began to form. This era gave birth to a global economy based on trade (Meyer, 1999). Given that water and rail networks were the primary trade platform, regions with extensive access to water networks thrived. The land-water edges of cities were occupied and transformed into trading communities, thus initiating a gradual separation of city and shore.

With the end of the infrastructural era around 1890, came the third phase of the Kondratieff Cycle. This phase is characterized as an increase in (auto) mobility and the development of mass production. Cities and economic models followed suit and thus, entered the next stage of evolution which initiated the reshaping of the urban fabric into what is now the modern city. With the development of manufacturing technologies, a city could no longer sustain itself on trade alone. As Meyer states, “for many port cities, the disappearance of their function as a depot for the port and the dominance of the transit function meant that the port provided the city with little added value (Meyer, 1999, p. 21).” However, all was not lost for the trade city. The combination of manufacturing advancement and the existing transportation infrastructure provided a greater opportunity for a city to yield economic benefits. Trade cities altered their shores once again to accommodate the migration of manufacturing industries. Economically, the potential of these landscapes could not have been better for it allowed for the import of raw materials, manufacturing, and export of products to occur within a single system. The shores of these cities quickly became consumed with industrial infrastructure. Growth occurred in along the shoreline and outward, beyond the natural edge through extensive infilling. In essence the shores became economic reservoirs devoid of social significance (Short, 1993, p. 213).

What once stood as an intersection between two natural realms was now a symbol of technology, wealth and consumption. The economic potential of this model resulted in clusters of industrial cities along the world’s trade networks. For instance, the areas along the north-eastern region of North America transformed into a steel and automotive manufacturing network due to the availability of resources and trade routes. The areas which hugged the Great Lakes subsequently became known as the Rust Belt. (High, 2003).

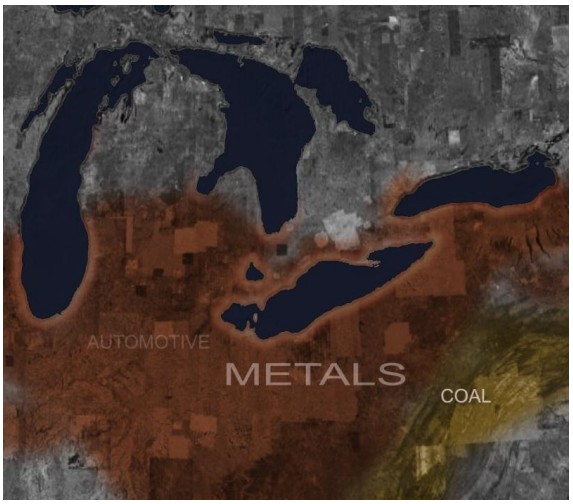


Figure 2-2 The North American Rust Belt

The formation of the industrial port illustrates the intentions in regard to the planning agenda of these cities. The desire for economic progress simply outweighed any opposition concerning use of these landscapes. Such conditions could be considered to be the result of what Lewis Mumford describes as metropolitan planning (Mumford, Regional Planning , 2007). Throughout the past century, planners have sought to define urban boundaries purely on the basis of capital potential. Regard for the ecological or social characteristic of a landscape was completely ignored if the scent of wealth was present. Conversely, agrarian or ancient civilizations have been characterized by their ecological distinctiveness. Human settlement was thus based upon the ecological potential of a given landscape. The cyclical nature of a given ecosystem provided for continuous growth and redevelopment. It is in this regard that metropolitan planning, and specifically, the planning of the industrial waterfront falls short. The tendency to develop such rigid infrastructure was destined to encounter volatility. Unlike the agrarian civilization which is based upon transient relationships and re-growth, the industrial waterfront relies on a linear system of input and output. What will the result be once the technology and economic potential that these landscapes were once founded upon are superseded? Such rigid and short sighted planning is destined to end in ruin. Lewis Mumford illustrates the instability of this ideology in his essay, Regional Planning:

> When the pioneer had skinned the soil, he moved on; when the miner had exhausted his mine, he moved on; when the timber cutter had gutted out the forests of the Appalachians, he moved on. All these social types left rack and ruin behind them. The regional planner points out that no civilization can exist on this unstable and nomadic basis. (Mumford, Regional Planning , 2007, p. 241)

The difference is that when it is time to move on, the capitalist structures may do so while the city is left to deal with the costs of what so many thought to be progress. While Lewis Mumford argues that no civilization can exist on instability, if planning were conceived along similar lines to an agrarian process, the potential costs of instability may be lessened.

2.1 Costs of Vulnerability

This subsection will now analyze the conditions ensuing from the industrial port in relation to the evolution of the surrounding social and economic context. In the decades following the Second World War, many industrial ports throughout the western world experienced peaks in productivity. It was around this time that western culture began to shift. The cultural movement during the 1960's marked the beginning of an evolution of lifestyle and cultural values. With this

came a growing awareness for environmental consequences of industrialism and modern technology. Growing concerns for personal well being along with that of our families and our planet began to develop an unhealthy image of industry. With respect to the industrial port, the environmental consequences were three fold, harming the land, air, and water. Reports such as the 1972 Water Quality Agreement between Canada and the United States demonstrated the direct correlation between the industrial port and water pollution. It was evident that the consequences of the industrial port were not bound to its landscape, but rather reached out to the surrounding regions (Melnick, 2007). Entire bodies of water became prohibited while air pollution spread across the lands. The industrial port was no longer solely a void in the urban fabric, but an area to avoid.

The increasing awareness of the correlation between the industrial port and unhealthiness became instilled in society. The portrayal of industry by the local residents has led to a number of issues affecting the city on both social and physical levels such as the suburbanization and deterioration of downtown cores. Existent levels of contamination along with the image of industry began to deter the local and foreign population from occupying the central areas of the city. Graham Shane describes James Corners view of the inner-city problems of Detroit as, “a result of Ford’s (and Chrysler and General Motor’s) organizational and territorial evolution. (Shane, 2006, p. 59)” As suburbanization occurred, social polarization followed as the most valuable land of the city shifted toward the periphery.

The awareness of the environmental consequences of industry was only a fraction of the long term costs of progress. The global shifts in economic structures have resulted in the destabilization of many port cities, inciting a slow decay of the city. Cities throughout North America have been experiencing significant rates of de-industrialization in the wake of international competition. As a result many industrial cities have been required to diversify their economic base in order to survive**.**

2.2 The Problem of the Postcard Waterfront

The following subsection will focus on the common response to port de-industrialization. Specifically it will criticize the emphasis placed upon iconography and stylistic determinacy. In many ways, this is an attempt to re-define the image of the city. In the paper *Reconstructing the Image of an Industrial City,* Short (1993) discusses the distinctions between the perception of industrial and post-industrial city. He suggests,

> To call a city 'industrial' in the present period is to associate it with a set of negative images: a declining economic base, pollution, a city on the downward slide. Industrial cities are associated with the past and the old, work, pollution and the world of production. Cities with a more positive imagery are associated with the post-industrial era, the future, the new, the clean, the high-tech, the economically up beat. The post-industrial city is associated with the new, the future, the unpolluted, consumption and exchange, the worlds of leisure as opposed to work. (Short, 1993, p. 208)

In light of these associations, this section will critique the traditional response to port de-industrialization; specifically in regard to urban revitalization. Regarding the statements made by Short (1993), many de-industrializing cities have come to view the waterfront as an instrument to redefine the image of a city, in search for the perfect post-card view. Given the focal location of the waterfront, strategies often stress the use of iconography or infrastructure catering to the interests of the tourist market. This is essentially as response to the increasing competitive nature between cities. Daniel Marshall (2001) explains this methodology in the text, *Waterfronts in Post-Industrial Cities*. He suggests,

> There is a tendency in much of the literature, to view the waterfront as a kind of urban panacea, a cure-all for ailing cities in search of new self images or ways of dealing with issues of competition for capital developments or tourist dollars. The waterfront redevelopment project has become synonymous with visions of exuberance. Images of Baltimore's Inner Harbor, or of Sydney's Darling Harbour (or any number of others), filled with joyous masses, inspired city officials and urban planners around the world and led to a rash of "festival marketplaces." However, the focus on the end-product of waterfront development ignores the problems, and possibilities, faced by cities as they work to create them. The idea of project-as-product combined with the spread of "architectural capital" has led to situations where international design clichés characterize the waterfronts of Boston, Tokyo and Dublin (Malone, 1996: 263). The result is a kind of rubber-stamping of the "successful" waterfront magic, often with limited results. (Marshall, 2001, p. 6)

The introduction discussed the transitional stage which lies between the industrial and post-industrial era and the uncertainty associated with it. Furthermore, the de-industrialization of the waterfront illustrates the burden which results from such rigid infrastructure. While there is an evident need for a level of rigidity in the urban fabric, the transitional stage represents unique stage in urban morphology. The high degree of uncertainty increases the likelihood of new development to fail when economic objectives fail to be met. With regard to waterfront redevelopment, what will the future of these formally driven developments be when their cycle of prosperity runs its course? The reality is that even slightest notion toward flexibility or anticipation is often absent from the planning agenda. The result will be a one not far from the current condition; landscapes of architectural and infrastructural ruin.

The suggestion that traditional waterfront redevelopment may act as a catalyst for urban renewal fails to address the realities of the de-industrializing port. Redevelopments such as the Sydney Darlington Harbour ignore the ecological and social condition of the city. Originally, the edges along Sydney's waterfront served as the industrial areas of the city. Due to the poor conditions of these industrial landscapes, the city relocated the existing industry in place of cultural and tourist driven programs (Marshall, 2001). Albeit the revitalization of Sydney is often considered to be a successful solution, the grounds for its success are primarily attributed to the formal alteration of the waterfront as a catalyst for a tourist economy. In reality the waterfront is simply a healthy exception to the poor conditions which surround it. Figure 1-3 illustrates the metaphorical agenda regarding this form of redevelopment. Apart from the social condition, the previous section illustrated the ecological ruin that has resulted from industrial presence, and yet, this condition is often ignored. How do these tourist driven mega-projects provide any ecological relief to these derelict landscapes? The reality is that these projects often place greater burden on the natural environment. While plans for East Darling Harbor attempt to reincorporate nature into the urban fabric, the result is purely superficial. As Jim Corner states, "do they really believe that putting people in touch with this fictional image called ·"nature" will predispose everybody to a more reverent relationship with the earth and with one another (Corner J. , 2006, p. 27)."

Figure 2-3 The Reality of the Post-Card Waterfront

In many regards, the aforementioned approach to waterfront revitalization is merely a band-aid solution to a much more complex and inevitable condition. Its short-sightedness will only yield short lived benefits. In response to the critique, the initial step toward redevelopment must be to recognize the realities of the transitional phase; in particular, those of future uncertainty and ecological instability. As it has been stated, the transitional stage represents unique stage in urban morphology which in turn, requires a response unique unto itself.

3.0 Understanding Uncertainty

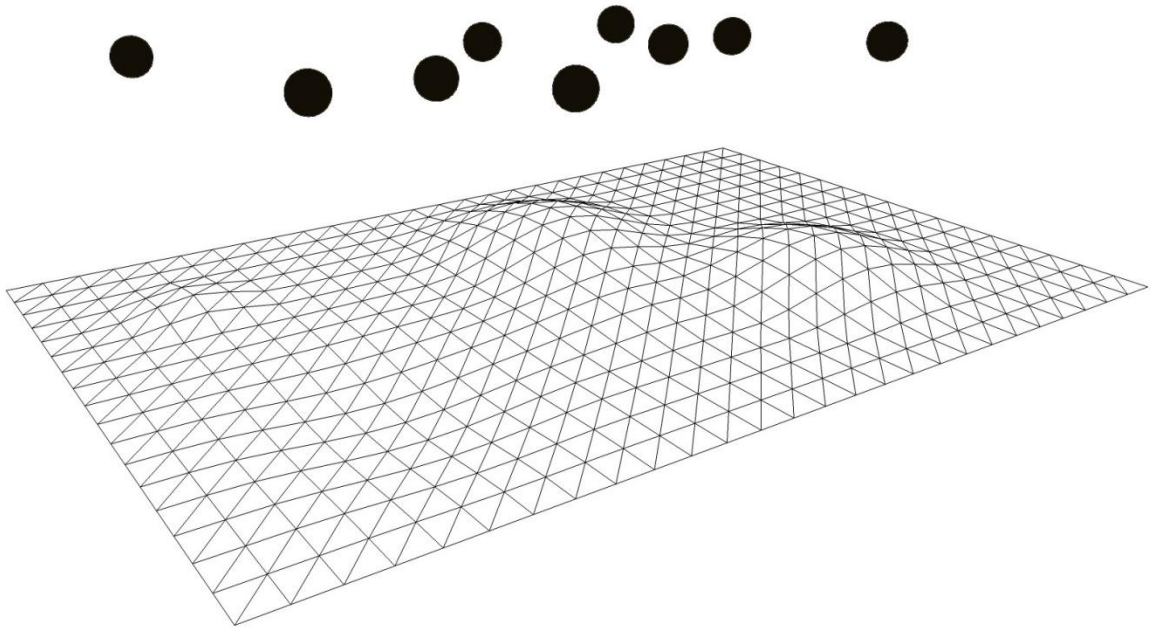


Figure 3-1 Programming the Urban Surface

The de-industrializing condition begins to outline a potential philosophy for an initial stage of redevelopment. To this point, the indeterminate and ecological condition of the de-industrializing waterfront has been stressed. Thus, redevelopment must respond to this condition both at the level of architecture and urban planning. With respect to uncertainty, there has been growing discussion within design discourse concerning the need for greater flexibility and indeterminacy in design. In large part, this discussion also encompasses a dialogue concerning environmental remediation. Thus, this territory of research is essential to this thesis. In the following section, the research focuses and critiques the disciplines of Landscape Urbanism and Ecological Urbanism. Furthermore, it will address the underpinning theory which inspired the emergence of these disciplines; specifically those concerning indeterminacy. The research will ultimately result in a theoretical frame work pertaining to the redevelopment of the de-industrializing waterfront; addressing both the urban and architectural realms.

The discussion of uncertainty is essentially a response to the nature of the contemporary city. The avant-garde provocations from the likes of Cedric Price and Andrea Branzi during the 1960's began as a critique regarding the changing nature of society and urban form (Waldheim, Notes Toward a History of Agrarian Urbanism, 2010). Being a key figure in this discussion, Price's analogy of The City as an Egg, illustrates the evolution of urban form through three stages. This progression is illustrated as a shift from a traditional centralized urban form [boiled] to the more dispersed industrial city [fried], which then led to a "more open, decentralized, self-organizing, and postmodern matrix (Shane, 2006, p. 58)," [scrambled]. The scrambled form was ultimately a result of the de-industrialization of the urban landscape. The evolution toward the networked city brought forth an urbanism which is dynamic and indeterminate. Technological advancements have afforded the dispersal of power structures, such as those concerning economics and production. Alex Wall has discussed the grounds for the dynamic nature of the post-modern city in Programming the Urban Surface. He suggests:

> The traditional notion of the city as a historical and institutional core surrounded by postwar suburbs and then open countryside has been largely replaced by a more polycentric and web-like sprawl the regional metropolis. Here, multiple centers are served by overlapping networks of transportation, electronic communication, production, and consumption. Operationally, if not experientially, the infrastructures and flows of material have become more significant than static political and spatial boundaries. The influx of people, vehicles, goods, and information constitute what urban geographers call the "daily urban system," painting a picture of urbanism that is dynamic and temporal. (Wall, 1999, p. 234)

This begins to imply that the uncertainty concerning the industrial waterfront must be met by a design philosophy which emphasizes flexibility in favor of aesthetics and rigidity. Additionally, there is a clear shift in focus from the architectural object to the manipulation of the urban surface as a means to anticipate these forces (see figure 3-1). Wall (1999) explains that it is the urban surface an integral element in anticipating programmatic flux. In regard to this study, the initial step toward waterfront redevelopment should begin by preparing the landscape for a flux of program. Along these lines of thinking, the emergence of Landscape Urbanism in the past fifteen years has built upon this theoretical territory through both literature and built work. Thus, the following subsection will discuss the principals of Landscape Urbanism which may benefit this thesis.

Figure 3-2 The City as an Egg

3.1 Prepared Landscapes

The emergence of Landscape Urbanism is rooted in principals concerning bottom-up planning practices as a means to anticipate flux and provide ecological remediation. More specific to this thesis, the discipline has a close association with post-industrial and deteriorated landscapes in need of redevelopment. Essentially, landscape is viewed as the means to address both the uncertainty and ecological instability plaguing these sites (Corner J. , 2006). In many ways, the first and second place entries for the Parc de La Villette competition in 1983 marked the foundation of this thinking. In both entries, the stylistic qualities of the design were resisted in favour of a process which aimed to accommodate growth across both space and time. The entries understood design as a continuous process rather than the development of an end-product (Shane, 2006). While the strategies will be further elaborated upon in the case study section of the thesis, it is worthy to note the importance that these projects have had on the discipline. Since the Parc de La Villette competition, the principals of landscape urbanism have been solidified. It could be argued that there are essentially four aspects which characterize the discipline. These include

- *Natural + Artificial*
- *Surface + Pattern*
- *Structured Indeterminacy (Program)*
- *Process + Change*

(Allen, From Object to Field (and back), 2010)

Natural + Artificial

The principal of natural + artificial concerns the differentiation of the natural and synthetic environment. Among landscape urbanists, there is a clear intent to address contexts that have faced deterioration (Czerniac, 2006). However, the notion of using landscape as a medium is not to say that one simply allows for the natural cycle to take over; nor does it concern a romantic imagery of nature. Rather, the line between natural and artificial is to be dissolved. There is an understanding that the existing conditions will require a strategy that utilizes artificial aspects as a means to create an ecological process. What in many cases may appear to be nature is often operated by a high level of infrastructure (Allen, Before And After Landscape Urbanism, 2009). In respect to this thesis, the de-industrializing waterfront is clearly a territory which concerns landscape urbanism. The redevelopment of these landscapes may begin by re-constructing the natural ecologies with an understanding of the value of combining both natural and synthetic systems.

Surface + Pattern

Given the territory of Landscape Urbanism, there is a high degree of focus on the horizontal surface. Any given landscape could be thought to contain an existing set of properties which may potentially inspire a pattern or design strategy. These may be the existing ecologies, topographic characteristics, or existing infrastructure which may allow for growth to take place. This notion of existing patterns not only concerns the specific landscape itself, but one must realize that any site is essentially connected to a greater network (Allen, From Object to Field (and back), 2010). It is essential to look beyond the borders of a specific landscape to understand the possibilities of the surrounding region (Wall, 1999). The highly diverse conditions of many landscapes throughout industrial waterfronts may hold greater potential for redevelopment.

Structured Indeterminacy

Landscape Urbanist discourse in large part, emphasizes a philosophy that is loosely defined in its program and resists architectural permanence. Through the manipulation of the surface condition, landscape or infrastructure can allow for a range of program to take place. In many ways, this is a response to the views shared by contemporary urbanists such as Alex Wall or Stan Allen. Wall (1999) describes the urban surface as, “dynamic and responsive; like a catalytic emulsion, the surface literally unfolds events in time (p. 233).” If the surface is to allow for an unfolding of events across space and time, the program itself will be an eventual

response to the pressures of the surrounding contexts. It light of this, many Landscape Urbanist proposals tend to result in open, connected surfaces that may support a range of events or program to unfold.

Process + Change

The principal of program indeterminacy is closely tied to the aspect of change and process. By designing an initial set of conditions in a bottom-up manner, the landscape will emerge and self-organize over time. There is often an analogy of seeding the landscape with potential which will develop over time (Corner J. , 2006). By designing a loose framework which allows for successive phases to occur, the landscape may emerge in an ecological manner.

3.2 Critique

The theoretical principals of Landscape Urbanism are undoubtedly a step toward a vision for the transitioning waterfront. They consider both the indeterminate and environmental condition of these landscapes. However, it could be argued that a level of idealism and ambiguity exists within the discourse. This will be addressed in the discussion that follows, along with possible strategies which may alleviate these concerns.

Process + Change and Program Indeterminacy

The principal of an indeterminate program tends to avoid a level of specificity in design. While this is often the intent of many Landscape Urbanist proposals, a contradiction arises when related to the premise of process and change. During the lecture Before and After Landscape, Stan Allen expands upon this argument by stating,

> Any ecologist will tell you that you don't get emergence unless you have highly specific individual conditions . . . This notion of emergence has been a bit of an alibi to avoid design and simply say that somehow if you get the right data, the solution will sort of bubble up out of nowhere through some sort of process of self emergence. Well that only happens if you make a commitment to highly specific and highly designed initial conditions. Then of course you can steer the emergence . . . it doesn't have to be one hundred percent predictable, but it doesn't happen without design. (Allen, Before And After Landscape Urbanism, 2009).

In this sense, the notion of process + change primarily addresses the evolution of the natural environment, while the notion of events unfolding in time falls short due to its initial indeterminacy. The lack of programmatic and design specificity often results in open landscapes primarily catering recreational program. If these landscapes are to in fact have the ability to

initiate an bottom-up process, the initial stage of development must rely on a specific architectural system that may on one hand; accommodate a specific initial program, while having the ability to disassemble or adapt to accommodate a programmatic changes.

It was previously mentioned that Landscape Urbanism is often associated with a recreation or public program. This is evident by simply observing the programmatic resemblance among the disciplines prominent models; such as Parc de La Villette, Fresh Kills Landscape or Downsview Parc. It has also been stated that landscape urbanism is primarily associated with post-industrial or deteriorated sites. Given this condition, it should be understood that a post-industrial site, such as those in the industrial waterfront often sit within a greater context experiencing an ongoing deterioration; what had been described as the transitional phase in the opening section. In Alan Berger's essay Drosscape, he illustrates the problems of defining a site as post-industrial,

> A common term, "post-industrial," has been used by landscape architects, architects, and planners to describe everything from polluted industrial landscapes to former factory buildings usually found in declining sections of cities. The term itself creates more problems than solutions because it narrowly isolates and objectifies the landscape as the byproduct of very specific processes no longer operating upon a given site (residual pollution aside). This outlook reifies the site as essentially static and defines it in terms of the past rather than as part of ongoing industrial processes that form other parts of the city (such as new manufacturing agglomerations on the periphery). (Berger A. , 2005, p. 200)

It has been stated that de-industrialization places significant economic burden on a region. Many of the contexts associated with landscape urbanism sit within a context that is deteriorating both environmentally and economically. Unfortunately, the realization of many landscape urbanist projects solely satisfy the environmental condition. Rather than primarily catering toward a recreational program, contexts may benefit if designs had the potential to accommodate greater programmatic diversity, such as those relating to economic restructuring.

The collapse of the industry is often met with a common response with respect to economic ambitions. The shift from a tangible to an intangible product; the tangible being industrial product; while the intangible is one of knowledge, information and intellectual property (Bell, 1999). Developing a service, research and knowledge based economy requires a city provide incubator space, attract, experiment, and develop close relationships with the education sectors. Thus, these struggling contexts require a vision that will be both determinate in their initial program and architecture, but flexible in their ability anticipate both success and failure. With respect to the port city, the economic restructuring of cities such as Pittsburgh or Bilbao

affirm this statement. While Landscape Urbanism may promise the ability to respond to the pressures of the surrounding context, this objective often fails to be realized.

Possibly the tendency to emphasise public program is a result of the disciplines association with Kenneth Frampton's writing on critical regionalism and the possibility that landscape may resist the placelessness that results from modernist planning (Shannon, 2006). He has written extensively on the need for a regional architecture and urbanism that may resist the forces of the capitalist culture of consumption, technology, global identity and the placelessness that ensues (Frampton, Towards a Critical Regionalism: Six Points for an Architecture of Resistance, 1983). However, is this to say that the economic outcries and pressures of a region be resisted, simply leaving a recreational landscape bereft of architecture? Lewis Mumford once described regionalism in The South of Architecture by stating,

> Regionalism is not a matter of using the most available local material, or of copying some simple form of construction that our ancestors used, for want of anything better, a century or two ago. Regional forms are those which closely meet the actual conditions of life and which most fully succeed in making a people feel at home in their environment: they do not merely utilize the soil but they reflect the current conditions of culture in the region. (Mumford, The South in Architecture, 1941, p. 30).

In regard to program, "the conditions of life," in the context of de-industrialization require a greater level of architectural strategies in tune with Landscape Urbanist principals; an architecture which may accommodate a diversity of programs other than that of recreation and public events, while allowing the natural environment to remediate.

The Role of Architecture & Indeterminacy

There has been a level of attention given to architecture to some degree within discourse of Landscape Urbanism. However, this primarily results from the discourse that influenced its emergence. While architects such as Stan Allen, see the role of architecture in this context as one which functions at the scale of infrastructure (infrastructural urbanism), Andrea Branzi has expressed urban and architectural principals guided by the small scale, the demountable, and the mobile. His research is aligned with many principals of Landscape Urbanism and divergent discipline of Ecological Urbanism. Beginning with his early provocation as a member of Archizoom, No Stop City (see figure 3-3) alluded to an architectural philosophy of flexibility,

transience and mobility as a means to anticipate dynamic forces which shape the contemporary city. In the essay Weak Work, Charles Waldheim suggests:

> Branzi's work reanimates a long tradition of using urban projects as social and cultural critique. This form of urban projection deploys a project not simply as an illustration or "vision but rather as a demystified distillation and description of our present urban predicaments. In this sense, one might read Branzi's urban projects as less a utopian future possible world than a critically engaged and politically literate delineation of the power structures, forces, and flows shaping the contemporary urban condition.
> (Waldheim, Weak Work: Andrea Branzi's "Weak Metropolis" and the Projective Potential of an "Ecological Urbanism", 2010, p. 116)

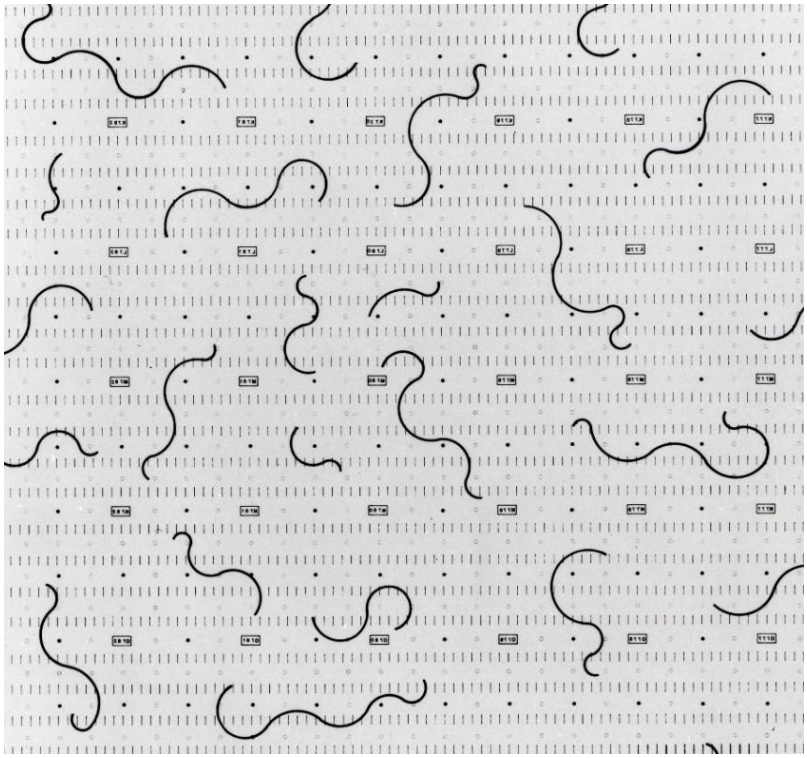


Figure 3-3 No-Stop City, Archizoom

While Branzi's work may be read as a critique, there exists a clear design intent even among his most radical provocations. Perhaps a greater injection of flexibility and reversability may fill the architectural void in Landscape Urbanist thinking. In the critique of traditional waterfront redevelopment, the problems of rigid planning were illustrated. Thus an architectural strategy which adopts flexibility and transience may be a step toward an architectural philosophy for redevelopment. The landscape revitalization strategy may be one of permanence while the respective architecture is transient as a means to anticipate the volatility of the transition. Since Branzi's years with Archizoom, he has continued to develop theory concerning architecture,

change and uncertainty. In the text Ecological Urbanism, he developed a list of suggestions for a New Athens Charter. In it, he suggests:

1. **Urban Re-Functionalization**
   Foster the Re-Use of existing states to fit the present city to the new need of diffuse work, of mass enterprise, of creative economy, and of cultural production and consumption
2. Great transformations Through Micro-Structures
   The quality of the city is made by the quality of its domestic objects, tools, facilities, products shown in the shop windows, people, flowers in their vases; just like the micro-credits of Mohammed Yunus, we have to enter in the home economies and the interstices of life
3. **The City as a High-Tech Favela**
   Avoid rigid and definitive solutions and foster reversible facilities that can be dismantled and transformed, allowing the interior space to accommodate new activities that are unforeseen and not programmed. Thus, a city that considers as a value the integral liberalization of the urban system.
4. **The City as a Personal Computer Every 20 Square Meters**
   Avoid specialized typologies, rigid facilities, and identification between form and function; create interior spaces similar to functionoids, that can host any kind of activity in any place, changing their function in real time.
5. Cosmic Hospitality
   Realize (as in the Indian metropolis) the conditions for a cohabitation between man and the animal kingdom, technologies and divinity, alive and dead people. a metropolis less anthropocentric and more open to biodiversities, to the sacred and to human beauty.
6. **Weak Urbanization Models: Create threshold areas between city and countryside through hybrid territories half urban and half agriculture; productive territories, horizontal, hospitable (but without cathedrals) following seasons and weather allowing conditions of flexible and discontinuous housing.**
7. Shade borders and fundaments
   Realize architectural facilities with crossable perimeters, to create an urban texture where the difference between interior and exterior, public and private, is intended to disappear, creating an integrated territory without specialization.

(Branzi, For a Post-Environmentalism: Seven Suggestions for a New Athens Charter, 2010, p. 110)

Despite the provocative and critical nature of these suggestions, they begin to outline a potential architectural form for the de-industrializing context. Beginning with the notion of Urban Re-Functionalization, if taken literally it clearly suggests a need to re-ignite existing Landscapes to fit the present condition. In this there is also an opportunity to re-awaken and re-use existing infrastructure and landscapes as a means to serve a new economy. In the case of the industrial waterfront, the potential that lies within the existing manufacturing and transportation infrastructure must not be overlooked. Cedric Prices provocation for the Potteries Thinkbelt or contemporary examples, such as New York Highline illustrates the potential that may exist

within the existing infrastructure. The potential to both re-awaken these infrastructures into new life, while simultaneously seeding the surrounding contexts with new economic potential.

The third suggestion, The City as a High Tech Favela begins to address further possibilities which concern the role of architecture and anticipating uncertainty. The architecture must be multi-faceted in its function and operation. It must inherit the possibility of becoming mobile in regard to location and flexible in regard to spatial arrangement, while having the ability to effectively operate and facilitate program. The architecture for the waterfront must have the ability to inhabit and transform in response to the flows which pressure the landscape. Moving ahead to the fourth suggestions, the discussion moves toward a concern for style and building typology. If the architecture is to have the ability be truly adaptable, the building typology must be non-figurative in form and style. The architecture for the de-industrializing waterfront must be specific in its technical intent, while being open ended formally and spatially.

Phasing Architectural Flexibility: Transience to Permanence

To this point, the discussion of uncertainty has related to the nature of the contemporary city. Much of the discussion concerning this topic stands upon the argument that urbanism has become more dynamic and volatile. While this is true to a large degree, I argue that the need for flexible architecture in de-industrializing contexts is not as much a response to the nature of the contemporary metropolis, but to the uncertainty surrounding contexts in transition. Considering Landscape Urbanism's association with de-industrializing contexts, it could be argued the condition of uncertainty will lessen as these contexts transition to a post-industrial economy. At the beginning of this section, Cedric Price's City as an Egg analogy was used to illustrate the evolution of urban form. Perhaps de-industrializing context represents the time between stages of evolution. The de-industrializing port is an instance of a city which is both fried and scrambled due to the remnants of the industrial city which remain along its edges. It may be better to begin to recognize the correlation between the economic condition of a given context and the degree of indeterminacy. Contexts which are attempting to transition between eras naturally experience the greatest level of indeterminacy, which will subside with time.

Figure 3-4 The Transitioning City

Given the argument of the relationship between de-industrialization and uncertainty, perhaps this should be manifested in the phasing framework often applied to landscape urbanist projects. The Fresh Kills Landscape design by Field Operations proposed a frame work for a process to take place (Waldheim, Landscape as Urbanism, 2006). This was illustrated as a progression of phases over a 30 year period. While the Fresh Kills Masterplan primarily concerned the process of remediation, if this notion of phasing had included a greater level of architecture, perhaps it would be served by flexible and temporary structures at the early stages. These structures may incubate program and experimentation of development as the region restructures toward a determinate direction. Once the respective contexts restructure, a permanent architecture may begin to replace the transient structures which once incubated the program. However, it should be noted that once the transitory stage is fulfilled, the architecture may move on to serve another transitioning context.

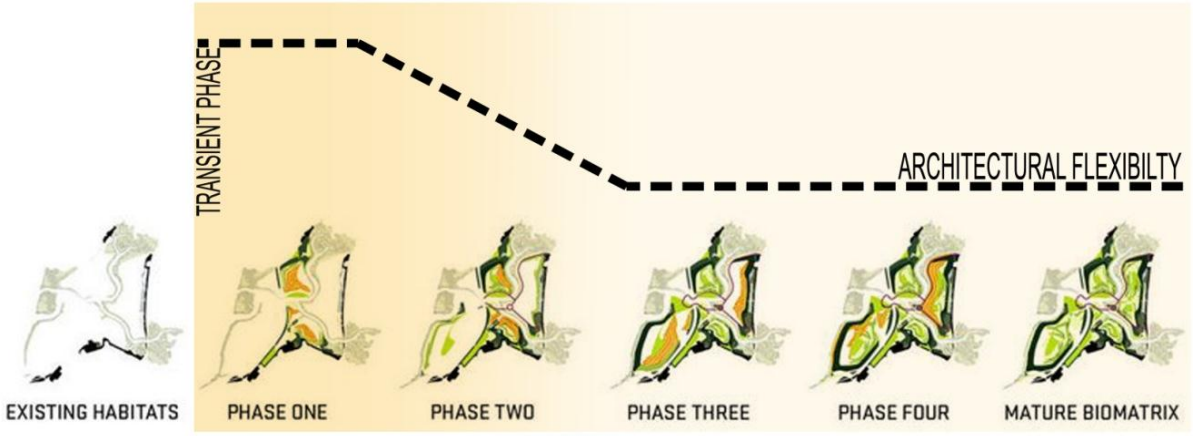


Figure 3-5 Phasing Architectural Permanence

The key to planning for contexts in transition will thus be in the adaptability of the infrastructure and architecture during the early stages. With this in mind, the redevelopment of these landscapes during this transitional phase may benefit if it were planned for both success and failure, mobility and permanence, assembly and disassembly. It may better to concern architectural redevelopment with the design of a system which may allow for the interchange of program and architectural objects. Can the architectural objects be designed with the intention of replacement? A flexible architecture which may both serve the economic endeavors of the city, while allowing the health landscape to be restored. For it is once the objectives of a city are tested and the natural ecology is stabilized that that a more permanent strategy may follow if needed. The architectural revitalization of these landscapes must ignite a process of change.

4.0 Towards a Transient Object

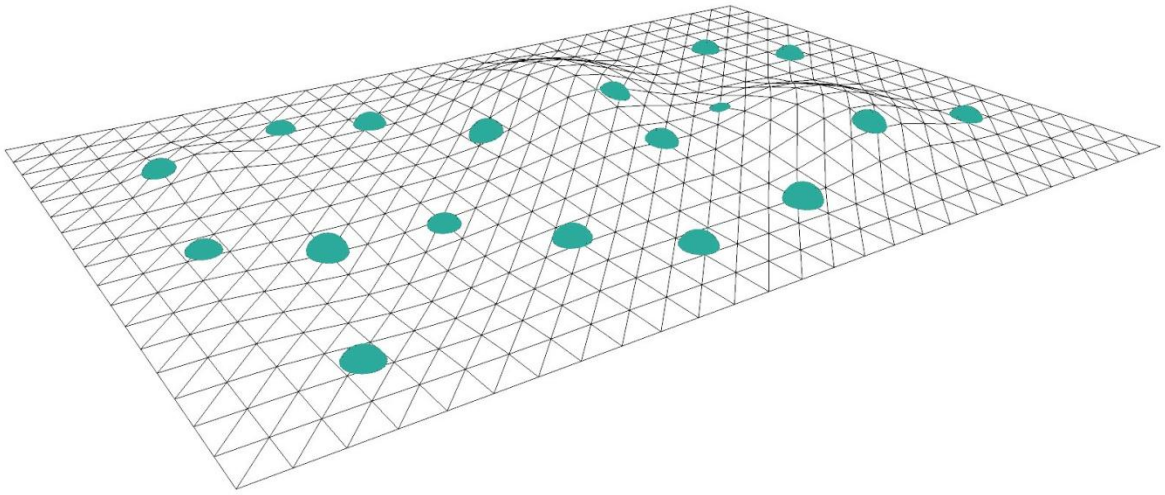


Figure 4-1 Architecture Emerging with the Field

To this point, the discussion has primarily concerned theoretical and large scale principals regarding the redevelopment of de-industrializing contexts. While architects such as Andrea Branzi have discussed the role of architecture, the dialogue often remains at a conceptual level. Projects such as the Strijp Phillips Masterplan provide a distant image of architecture with little indication of the technical qualities of the systems itself. The images often fail to sync with the theory in the sense that the architectural objects rarely seem capable of housing a truly diverse program. Thus, I argue that an urban vision which proclaims emergence of a system or process may only be realized if it is in tune with the specificities of the architecture serving it. The technical aspects of the objects such as assembly and operative characteristics must be clearly defined. The architecture must not be an afterthought.

The architectural objects themselves must have to ability to facilitate a flux of program while resisting the need to be fixed to the landscape. The flexibility of the architecture will be dependent on the level of effort required to respond to change. Thus, the design must be concerned with the system that will enable flexibility. It must be a driving force of the concept, ingrained within the design process; not to become an afterthought as it so often does in architectural practice. The system itself must not only be concerned with assembly, but disassembly and re-assembly are just as, if not more important in the success of the architecture.

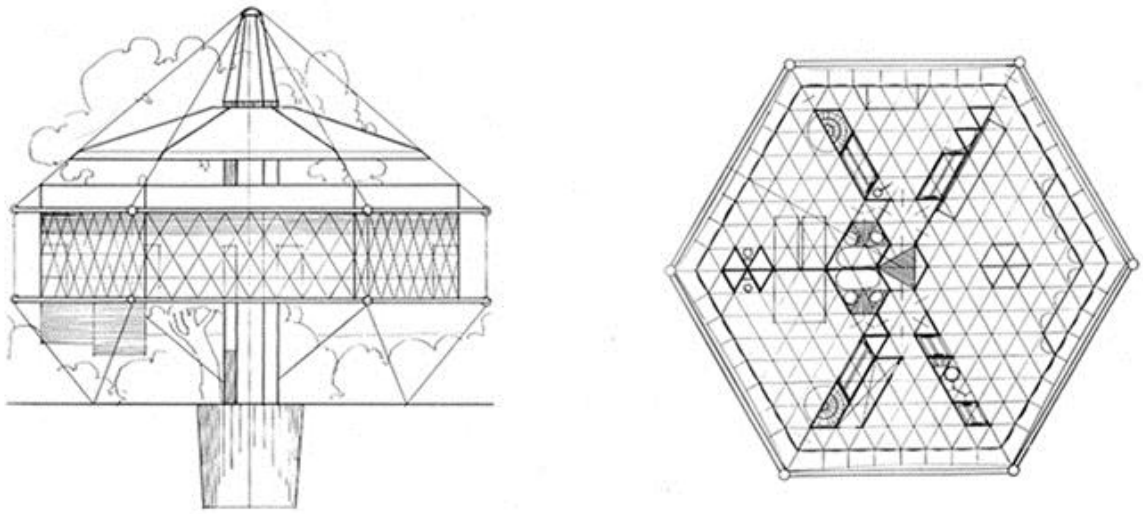


Figure 4-2 Dymaxion House, Buckminster Fuller

Unfortunately, architecture is often associated with permanence and rigidity. This could be attributed to the predominant manufacturing techniques, materials and operational systems utilized in building construction, or simply the rooted appearance of architecture. In this sense, architects often have a tendency to be exclusively concerned with the means to construction. Once the design is realized, the architect moves on with little regard to the future outcome of these permanent artefacts. However, there have been examples of architects throughout

history who have attempted to resist the association of permanence by developing innovative manufacturing strategies. The use of pre-fabrication has often been an avenue to provide flexibility and responsiveness. Ryan Smith suggests that its mobile nature and the limitation of on-site construction grant the ability to quickly respond to changing conditions (Smith, 2010, p. 229). Works by the likes of Le Corbusier or Buckminster Fuller were inspired by innovative manufacturing techniques that existed outside of architecture. Fuller's Dymaxion House represents the intent to employ pre-fabrication techniques as a means provide responsiveness to economic forces (see figure 4-2). Along these lines, Archigram's Plug-In city sought after flexibility through a system of infrastructure and modularity (Leslie, 2001). Given the relationship that the territory of pre-fabrication shares with transience and flexibility, it may be the initial step toward defining the architectural system for the waterfront in transition. Prior to delving into pre-fabrication methodologies, it may be better to identify the conceptual tactics which may best afford flexibility. In the publication, *Flexible Housing*, Schneider and Tills discuss the differentiation between hard and soft tactics of flexibility. They suggest:

> 'Soft' refers to tactics which allow a certain indeterminacy, where as 'Hard' refers to elements that more specifically determine the way the design may be used. In terms of use it may appear a contradiction that flexibility can be achieved through being either very indeterminate in plan form or else very determinate. . . Soft use allows the user to adopt the plan according to their needs, the design effectively working in the background. With hard use, the designer works in the foreground, determining how spaces can be used over time. (Shneider & Till, 2007)

One could liken soft flexible strategies to open floor plans, essentially based on initial indeterminacy, while hard strategies incorporate highly determinate initial conditions to allow a process to emerge. In many ways, the discussion of hard and soft flexibility relates to Stan Allan's statement in regard to the large open surfaces often sought after within landscape urbanism. Specifically in the suggestion that the emergence of a process "only happens if you make a commitment to highly specific and highly designed initial conditions (Allen, Before And After Landscape Urbanism, 2009)." Accordingly, the critique of landscape urbanism in the previous section suggests that the respective architecture must also operate on a highly determinate, hard flexible system.

4.1 In Search for Hard Flexibility: Systems of Prefabrication

Within the realm of architecture, there are generally three systems of pre-fabrication utilised. Each system corresponds to the elements produced. According to *PREFAB Architecture,* Smith (2010) classifies these systems as panelized, componentized and modular systems.

> ***Panelized System:*** This system encompasses pre-fabrication of the "planar elements used to build walls, floors, and roofs, load-bearing or non-load bearing enclosures, and interior partitions (Smith, 2010, p. 140).
>
> ***Componentized:*** "Componentized prefabrication allows for the greatest degree of customization and flexibility with the design and execution phases. Component however become numerous on a construction site and are difficult to account for, there in a prefabrication method, the responsibility becomes one of the design and production team to ensure that the system is well defined from the beginning. . . Componentized systems include wood kits, metal building systems, and precast concrete construction. (2010, p. 128)
>
> **Modular**: Modular architecture is often associated with utopian ideals of the 1960s in which architects developed proposals that were temporary, mobile, and used new materials and techniques of erection and disassembly . . . A modular is a standardized unit of construction that is design for ease of assembly, tends to be finished more than other methods of prefabrication, but is not restricted in scale . . . but restrict the flexibility of the overall building when compared to smaller modules. (2010, p. 159)

Smith further illustrates the elements of pre-fabrication into categories corresponding to the level of pre-fabrication (see figure 4-3).

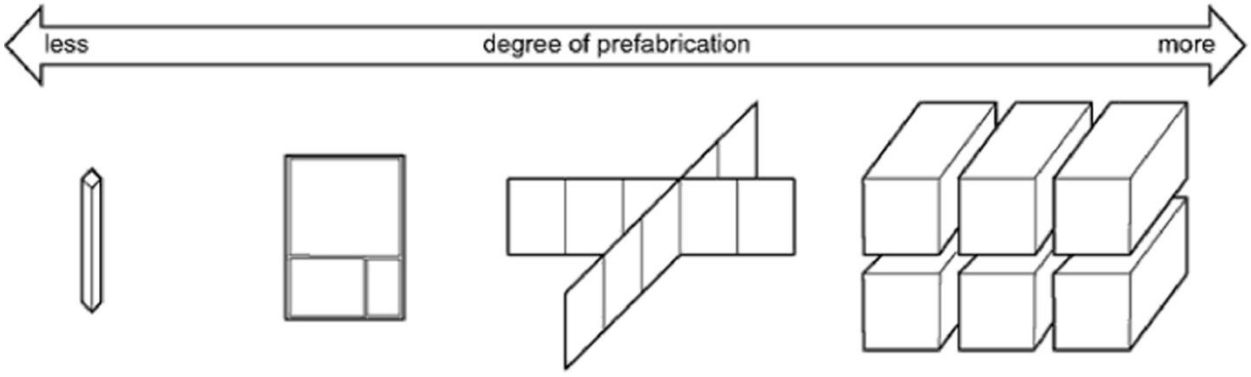


Figure 4-3. Elements of Prefabrication

It should be noted, that prefabrication can and often should be a hybrid of each system. Michael Stacey affirms this by suggesting that, “prefabrication has the greatest possibility of success when used in a hybrid manner (Stacey, 2008, p. 12). Developing a system of prefabrication based upon the subdivision of modules to panels to components may provide the benefits of each system. However, the final result of this system will ultimately be restricted to the module. While Smith suggests that modular units are not restricted to scale, there is reason to argue otherwise. In *Loblolly House: Elements of a New Architecture,* Stephen Kieran and James Timberlake define modularity as:

> In architectural terms, module implies a strategy of expansion. Modular architecture results from the organization of repetitive modules. Each module must have an integrated internal structure that, in combination with other modules, forms the superstructure of a building. Modular strategies often depend on shipping the largest elements possible within certain limitations, such as highway clearance or other transport requirements. (Kieran & Timberlake, 2008, p. 103)

While, the superstructure of the building is not restricted to scale, the size of the individual modules are constrained to the method of transportation. While a hybrid modular system may satisfy needs of customization and mobility, hard flexibility is only afforded at the large scale. Meaning that, although it may be possible to deploy and relocate these modules, flexibility at the small scale is limiting. The architectural agenda for the de-industrializing waterfront stated the need for disassembly and reassembly. This suggests that the architecture must have the ability to be easily disassembled to the component level, be catalogued, and re-used for a future architectural system. Moreover, the emphasis on limiting on-site assembly time raises another concern regarding to the use of a prefabrication system for this thesis. While quick assembly is needed, it must not sacrifice other aspects of the architecture. A modular approach may take a matter of days to assemble, but disassembly beyond the scope of the module requires a large degree of effort. On the other hand, a system of integrated components that stresses disassembly may take longer to assemble, yet the decreased effort needed to perform complete disassembly outweighs the benefit of faster on-site assembly.

4.2 Prefabrication for Refabrication

Looking outside the realm of conventional prefabrication, the recent work and research of Stephen Kieran and James Timberlake demonstrates a prefabrication methodology which diverges from conventional thinking. Their publications *Refabricating Architecture, and Loblolly House: Elements of a New Architecture* display a conscious effort toward alternate prefabrication methods and designing for complete disassembly. Similar to the modernist examples of Le Corbusier and Buckminster Fuller, they have looked to inspiration outside the discipline of architecture. In *Loblolly House,* Kieran and Timberlake suggest, "We should conceive our architecture in the same way that manufacturers conceive cars, as a collection of used parts that remain ripe for reconditioning and reuse (Kieran & Timberlake, 2008, p. 141)." Moreover, the underlying theory of Kieran Timberlake's discourse evokes similar lines of thinking to Landscape Urbanism. Either territory is rooted in ideas concerning the resistance of stylistic determinism in favour the bottom-up design processes. Traces of this thinking are evident throughout *Refabricating Architecture* and *Loblolly House:*

> Before the fundamental processes of architecture can change, we must focus ourselves anew. We must return to the process of thinking, drawing, and making. We must begin by not beginning. We must resist the irresistible: the instinct to seek form (Kieran & Timberlake, 2008, p. 43).
>
> New processes offer elevation of the art of architecture: more control, higher quality, and improved features. To do so, we must look deeper into what lies beyond mere appearances to see how we do things, not merely what they look like (Kieren & Timberlake, 2004, p. 23).
>
> The charts that govern the levels of responsibility for making decisions about design in the production of most complex artefacts have in the past been largely hierarchical and top-down, a centralized network . . . Designing need not be controlled entirely from the top down and making need not proceed sequentially from the bottom up. Problems can be separated into small pieces and solved both individually and together. (Kieren & Timberlake, 2004, p. 15)

Given the awareness of re-use and the theoretical similarities that connect the sections, Kieran Timberlake's system of prefabrication may better satisfy the architectural requirements for the transitioning waterfront. Furthermore, their research fills the technical gap left by Andrea Branzi and those alike (see figure 4-4). Thus, the research will look deeper into the methodology which underlies their work, and its potential application.

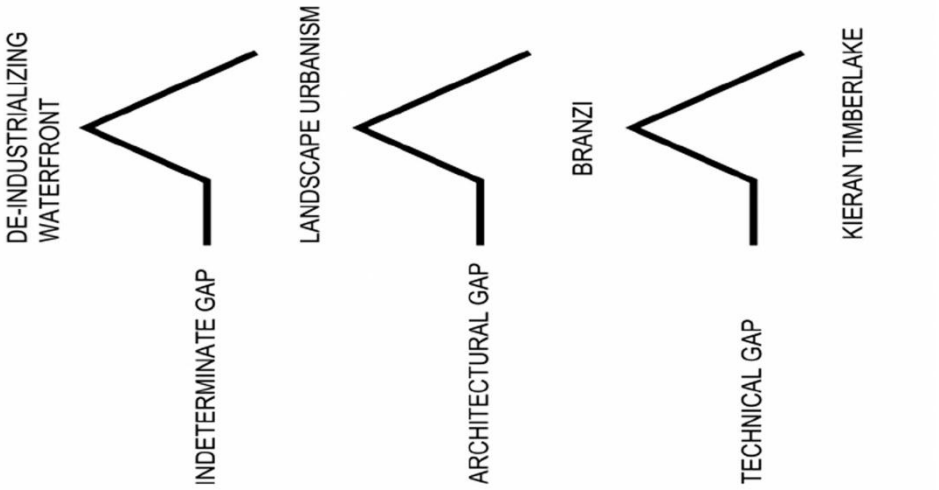


Figure 4-4 Research Process

From Integrated Components to an Integrated Process

To this point, the influence of the automotive industry has been touched upon. However, its influence runs far deeper than a simply the notion of assembly and disassembly. In many ways, the inspiration marks the divergence from traditional prefabrication systems. The recent restructuring automotive production has resulted in a shift from the top-down assembly line system to a bottom-up structure in which the final product is the result of various sub-assemblies or integrated components simultaneously growing along a supply chain (see figure 4-5). As each sub-assembly grows, the required connection between successive assembly's decreases. Thus, as a design nears completion, the effort required for final assembly reach a minimum. The final form is only realized at the final stages of assembly (Kieren & Timberlake, 2004, p. 17). In regard to architecture, this approach will not only afford precision and increased assembly time, but also a hard flexibility at both the large and small scale. Whether it is an interchange of components that is needed or complete disassembly, either may be completed with little effort. A building may undergo various degrees of change throughout its lifetime.

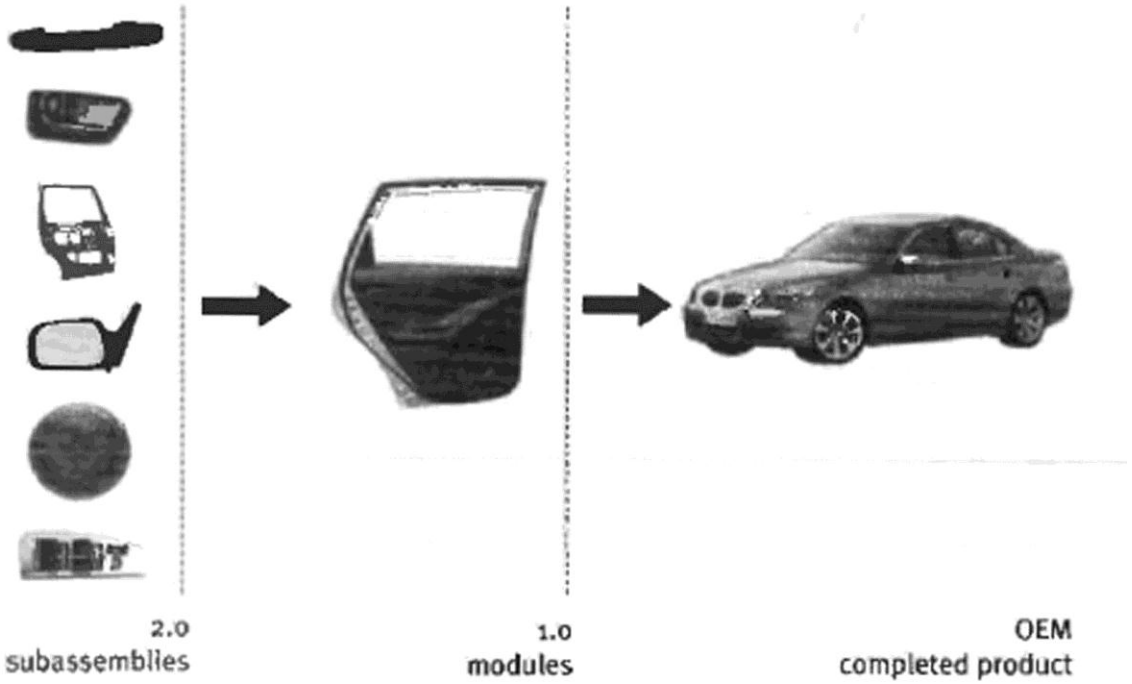


Figure 4-5. Integrated Components

Reverting back to the discussion of the automotive industry, the logistics concerning the assembly of these components is of specific interest to this thesis. Essentially every component is an assembly of parts supplied by an original equipment manufacturer (OEM). The various models of automobiles built by companies such as Chrysler (and the divisions which fall under it: i.e. Dodge, Jeep, Ram, Mopar) are built from the same kit of parts (Kieren & Timberlake, 2004, p. 17). While the various models may seem different, they could be thought to be of the same DNA (see figure 4-4). Looking further into the automotive industry, companies such as Nissan have developed a catalogue of automotive platforms where numerous models may emerge from. While certain model lines may seem unique, they have emerged from a common set of design principles (see figure 4-4). Thus, the architecture for the de-industrializing waterfront may function on similar lines of thinking. A series of platforms which correspond to structural bay dimension, or material may allow for multiple building and spatial permutations to emerge from a single system. The key element to the success of this system will thus be in the permutations granted by every level of assembly; beginning from the individual parts themselves. In this sense, the design of the connection between components significantly influences structures adaptability. Regardless of the type of component (i.e. structural, wall member, fixture), all must have the ability to be easily disassembled and reconfigured. Universality and compatibility among the connections is the means to provide flexibility.

With respect to this thesis, the value of this system is multi-faceted. Naturally the potential for increased flexibility and customization is critical. However, on a level of logistics, the ability to grant such variety and production from a single system of parts provides great benefit to the de-industrializing waterfront; or even for all de-industrializing contexts for that matter given the need for new infrastructure. One could imagine the re-use of the existing manufacturing infrastructure as a means to supply the OEM parts for the architecture itself. The abandoned industrial facilities that occupy much of the waterfront landscape may be reawakened to become elements in an architectural supply chain.

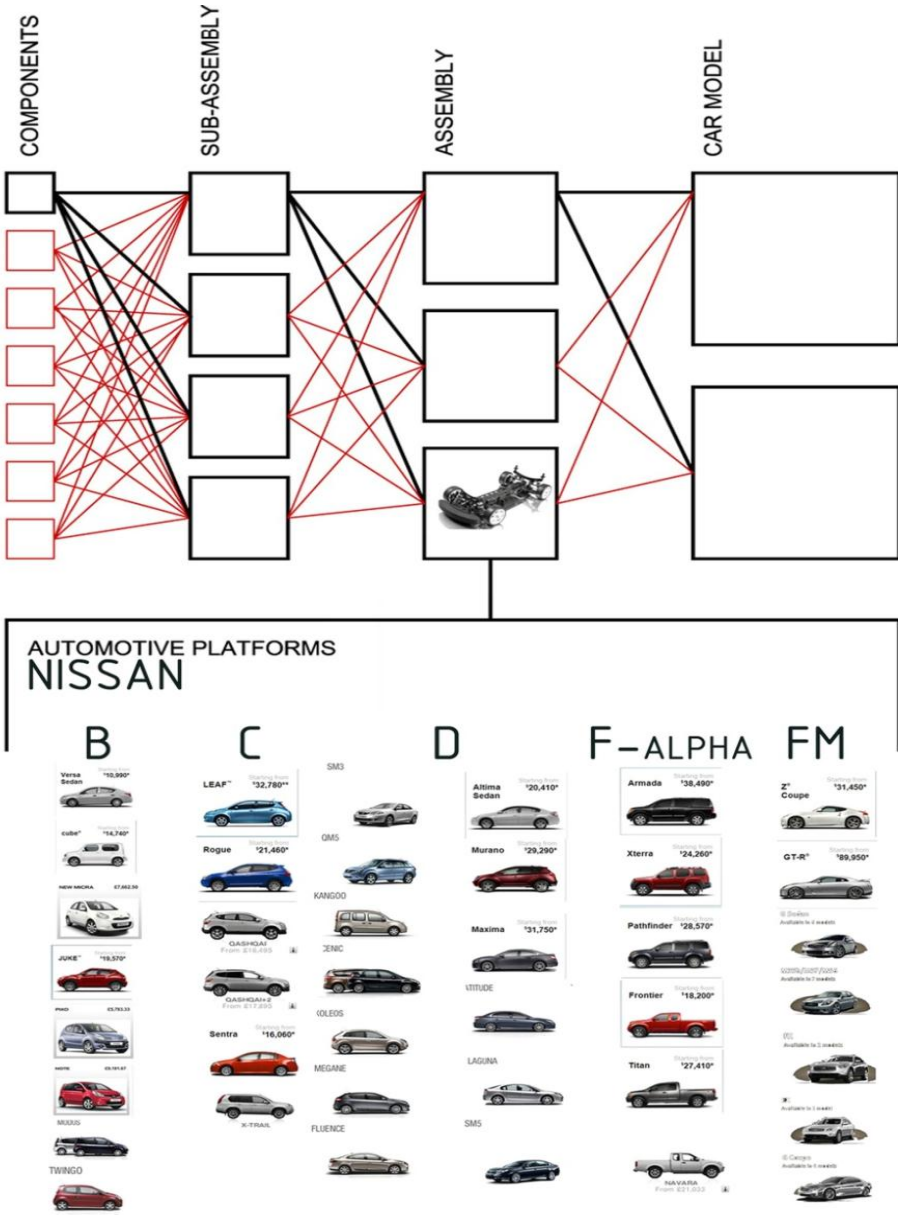


Figure 4-6 Automotive Platforms and Compatibility among Assemblies

The Means to a System

The possibility of guiding such an assembly process is reliant on the design tools available within architecture. In *Loblolly House,* Kieran and Timberlake use an analogy to illustrate the difference between traditional practice and bottom-up assembly by likening the two systems to weaving and quilting respectively. Present within this analogy is the importance of parametric modeling. They state:

> In current practice, a building is woven together as a series of systems. We measure as we go, ensuring the fit of each successive element. In contrast, the parametric model embeds geometric and dimensional certainty within it, as opposed to unearthing these details during construction. Through the agency of this digital tool, we can become confident quilters, rather than tentative weavers. We can fabricate multiple elements simultaneously and assemble them on-site. We no longer have to wait for a prior element to arrive to proceed with the fabrication of interdependent systems (Kieran & Timberlake, 2008, p. 101).

In many ways, this methodology is afforded by recent advancements in architectural representation and design software. While the advent of CAD provided architects with easier means to representation and reproduction, the introduction of parametric modeling has opened the doors to a wealth of possibilities. In particular Building Information Modeling (BIM) software could be considered to be a tool for simulation rather than representation. In *Loblolly House,*

Kieran and Timberlake discuss the differences between representative and parametric tools. They state:

> Despite the integration of computers within the field of architecture more than twenty-five years ago, the drawing types we use to describe our buildings have changed little since the Renaissance. . . Each represents architecture at a particular time and place and from a particular point of view, be it a plan, section, elevation, or detail . . . in short, our buildings have been static and incomplete. They represent architecture but do not simulate it. In contrast, parametric drawing tools allow for the formation of a solid model grounded in the physical elements that make up architecture. . . The parametric model is built like the building, from virtual elements that correspond to the physical building. In essence, we are building our architecture before we do so physically. (Kieran & Timberlake, 2008, p. 41)

The fact that these are simulations suggests a number potential uses. The imbedded information that lies within parametric modeling benefits all aspects of construction from a logistical standpoint. In particular to this thesis, the information embedded within parametric models would not only be beneficial during the design and fabrication stages, but more so during the life of these transitory building. It would provide the control and organizational structure needed to account for the components being used throughout the landscape. One

could begin to imagine a system that accounts for every building element existent throughout the landscape. Just as parametric models provide simulations of architecture prior to being constructed, this system could allow for simulation prior to being re-built.

Apart from the aspects of ease of organization, the use of BIM differentiates itself from traditional prefabrication in its ability to be responsive. The prefabricated or mobile structure is often criticized for its inability to adapt to site specific conditions. However, the advent of Building Information Modeling (BIM) software has enabled the mass-customization of buildings allowing structures to be designed to suit specific environmental conditions

Materials

While the assembly and disassembly process is crucial to flexibility, the choice of materials will ultimately provide the means for flexibility. While material choices are often specific to each building, there are guidelines which may enable greater mobility. The architecture intended for the transitional stage must take advantage of the wealth of innovative materials available today. Unfortunately, within the field of architecture there exists the same inability to advance materials as there is with the construction process. Kieran and Timberlake illustrate this argument by stating,

> Here, at the turn of the twenty-first century, there has been an exponential explosion in the creation of new materials, unlike any in history. Relatively few of these materials have yet made their way into architecture, but many are now used in other industries, where they have allowed important gains in quality and features. We must over, come an industry wide aversion to research and experimentation in order to speed the integration of these new materials into architecture. (Kieren & Timberlake, 2004, p. 23)

The success of mobility and adaptability will naturally rely on weight of the materials. The design must resist the need to use materials which compile much of the built environment. However, this is not to say that one simply chooses the most lightweight product, but rather bases a decision on performance relative to a material composition (Klassen, 2006, p. 124). The structure must provide the most performance with the least material needed. Systems such as an extruded aluminum frame possesses lightweight characteristics along with the ability to be simply assembled and disassembled. While aluminum is not often used as a structural material in building construction, its presence in automotive and the aircraft industries has proven its abilities with regard to structure and ease of (dis)assembly. Kieran Timberlake has displayed the advantages of aluminum in projects such as the Cellophane House or the Loblolly House,

where they developed a Bosch extruded aluminum frame as the structural system (Smith, 2010, p. 113). Essentially, the material selection must follow a lean design philosophy. Meaning that, the materials selected must provide optimal performance while minimizing wasteful weight gain. The research in this section sums up a number of strategies which may afford a transient architectural system for the waterfront. Thus, they will be illustrated in the final design-research section.

5.0 Case Study

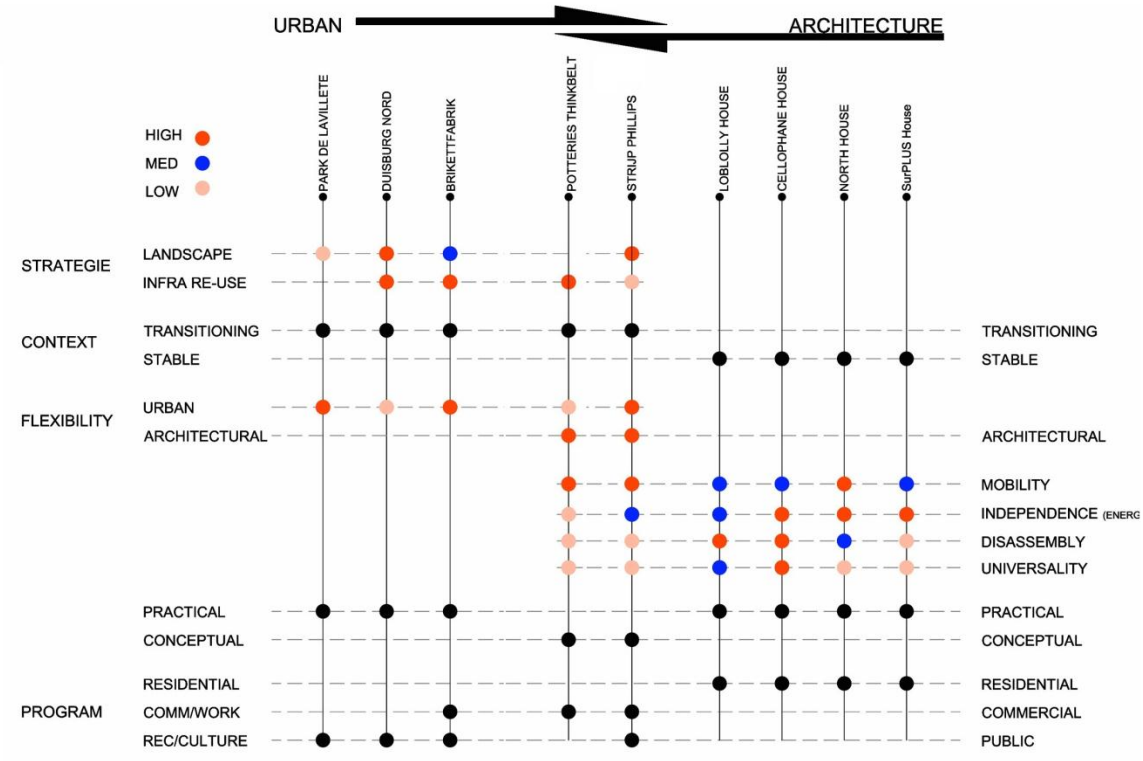


Figure 5-1 Case Study Taxonomy

The vision for the de-industrializing waterfront owes itself to a diverse set of precedents. The following section is a collection of precedents that range from the urban to architectural scale (see figure 6-1). Since much of the initial research concerned landscape urbanism, the first subsection includes large scale visions which dealt with de-industrializing or post-industrialized contexts. The success of this vision must consider the urban element to be equally important to its architectural counterpart. It is both the field and network for which architectural objects may pass through. Thus, the set of urban precedents range from those proposed to built, practical to theoretical, each illustrating the principals of landscape urbanism. Conversely, the second subsection studies temporary architecture which may act in harmony with the urban vision. The two groups of precedents combined, unify both the large and small scale strategies into single vision.

5.1 Parc De La Villette

OMA
Paris, France
1982
Competition Entry

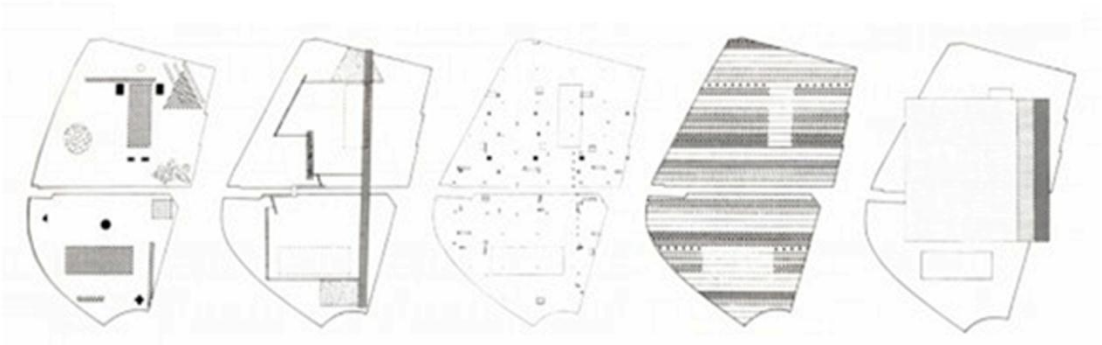


Figure 5-2 Layers of Landscape

In many ways the first and second place competition entries for the Parc de La Villete revolutionized design practices. The 125-acre existing landscape was once home to Paris' largest slaughterhouse; however de-industrialization left the site in need of redevelopment (Office for Metropolitan Architecture). With regard to the competition, OMA's second place entry strayed far from tradition in its implementation of design and program. It began by recognizing indeterminacy as an integral element within urbanism. One must understand that programmatic requirements are not fixed but endure fluctuations with time.

With this in mind, the proposal sought to provide a response which would express this condition through the landscape. The surface was conceived as a framework which would allow for the interchange of program and events. As Charles Waldheim notes, "landscape was itself conceived as a complex medium capable of articulating relation between urban infrastructure, public events, and indeterminate urban futures for large post-industrial sites, rather than simply as healthful exceptions to the unhealthy city that surrounded them (Waldheim, Landscape as Urbanism, 2006, p. 40)". With regard to this thesis, the proposals most valuable aspect was the bands of organization which cut through the site from east to west. These bands were conceived in similar nature to the floors of the modern skyscraper, only to be distinguished their respective position; one extends upward, while the other does so horizontally (Allen, Before And After Landscape Urbanism, 2009). The reasoning was that this framework could allow for fluctuation and dynamic programmatic relationships much like those that occur between the floors of the modern skyscraper.

The Parc de La Villette demonstrated an idea that attempted to provide a timeless framework which would anticipate change. However, this thesis poses the notion that the degree of indeterminacy is fluctuates relative the economic era of the city. If this same framework were conceived to serve the industrial-post industrial transition it may lessen the burden of both building and replacing permanent infrastructure. In this sense, that frame work itself may be replaced once the transition is complete.

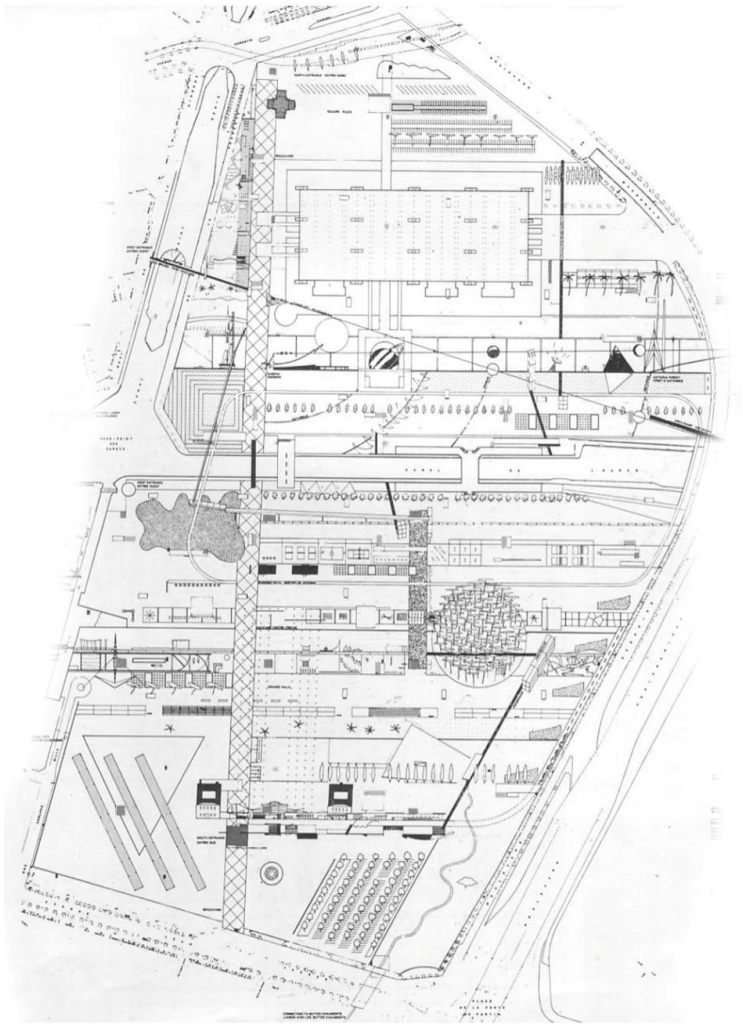


Figure 5-3 Parc de la Villette, Site Plan

5.2 Duisburg Nord

Latz + Partner
Duisburg, Germany
1991
Complete

Figure 5-4 Duisburg Nord: Infrastructural Re-Use

> I am concerned with precisely the opposite: deliberately placing gardens in the most horrible places that I can't use at the moment, that I have to visit in protective clothing and so on, and one day making them into places where I can once more say: I want to stay here, this is where I want to be. (Weilacher, 2008, p. 86)

During the 1980's the Ruhr region of Germany was heavily affected by deindustrialization. Thus, the region experienced numerous steel plant shutdowns along with staggering employment losses. Landscapes of industrial infrastructure (primarily steel plants) were abandoned and scattered throughout the Ruhr. One example of this was the shutdown of the Duisburg Nord Steel Mill in 1985, which resulted in the unemployment of thousands of workers and a blow to the city's economic base. After years of economic reconstruction, the city had evolved into a knowledge based economy which also increased the living conditions for the residents (Weilacher, 2008).

The city held a competition to revitalize and reprogram the site to suit the character of new city. The winning entry, designed by Peter Latz and Partners displayed an innovative approach to the problem. Rather than removing the industrial infrastructure, the design strategy was to apply the minimal amount of intervention. What was once perceived as waste, was utilized as an asset. Since the days of the steel industry, the surrounding neighborhood had become much more affluent, therefore the intention was to create a recreational space for public use. In a sense, this strategy juxtaposed the original function of the site.

With regard to the design, the plan was to create a park space by using the existing landscape. This would not only serve the community, but also serve as a method of removing contamination from the site. The contrast between industrial infrastructure and natural vegetation helped to redefine the image of the existing facility. With respect to this thesis, the

value of the project is not a result of the formal or programmatic strategies, but rather the concept of salvaging existing infrastructure. The economic burden facing cities in transition is exacerbated with traditional methods of waterfront revitalization. Rather than considering redevelopment as a fresh start, cities may lessen the burden of de-industrialization by salvaging all that may be of potential benefit. Industry the infrastructure that houses it was designed on the basis of productivity, therefore there exists great potential for the artifacts to serve an alternate use.

Figure 5-5 Duisburg Nord

5.3 Brikettfabrik Witznitz

Florian Beigel Architects
Borna, Germany
1996
Competition winner

Figure 5-6 Future Housing Fields

The competition entry for Brikettfabric Witznitz in Leipzig Germany begins to demonstrate a shift in the understanding of post-industrial sites. With regard to this thesis, the projects value was its awareness of the interstitial stage which characterizes post-industrial contexts. Essentially, the entry proposes the reuse of an abandoned mining facility. The proposal strength was the vision of developing initial, interim, and long term programs which would facilitate growth and re-generation. In a sense, the landscape was conceived as an activity field carpet which can evolve over time depending on the pressures of the city (Shannon, 2006, p. 149) (see figure5-8). Thus if development is not needed, they will be left with a garden however if so, the carpet can adapt to a range of programs ranging from housing, commercial, etc. (see figure 5-7). The notion of providing a transient strategy for post-industrial sites was an key inspiration for this thesis. However, the difference is in what occupies the interstitial stage. Florian Biegel's proposal primarily concerns an ecological program for the interstitial stage, while this thesis recognizes both the ecological and economic instability, thus requiring a transient architecture to incubate economic objectives.

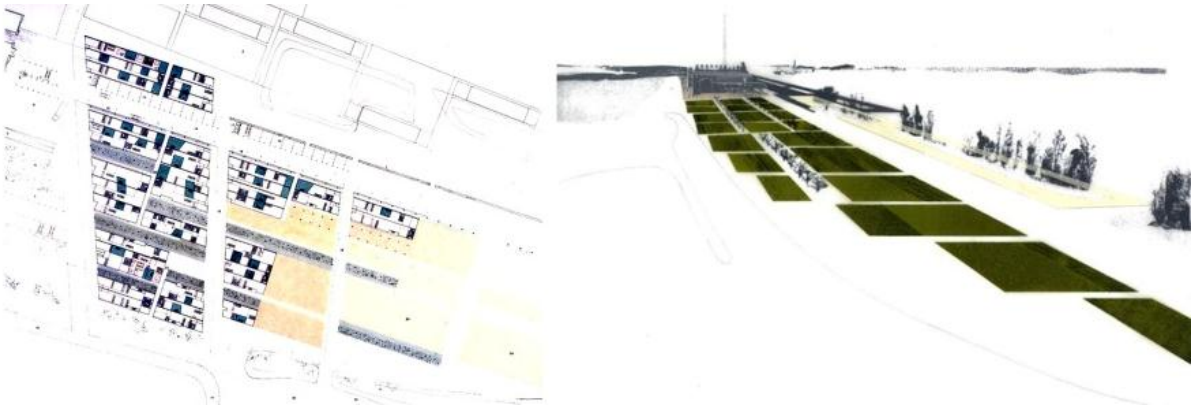


Figure 5-7 Plan & Perspective of Future Housing Fields

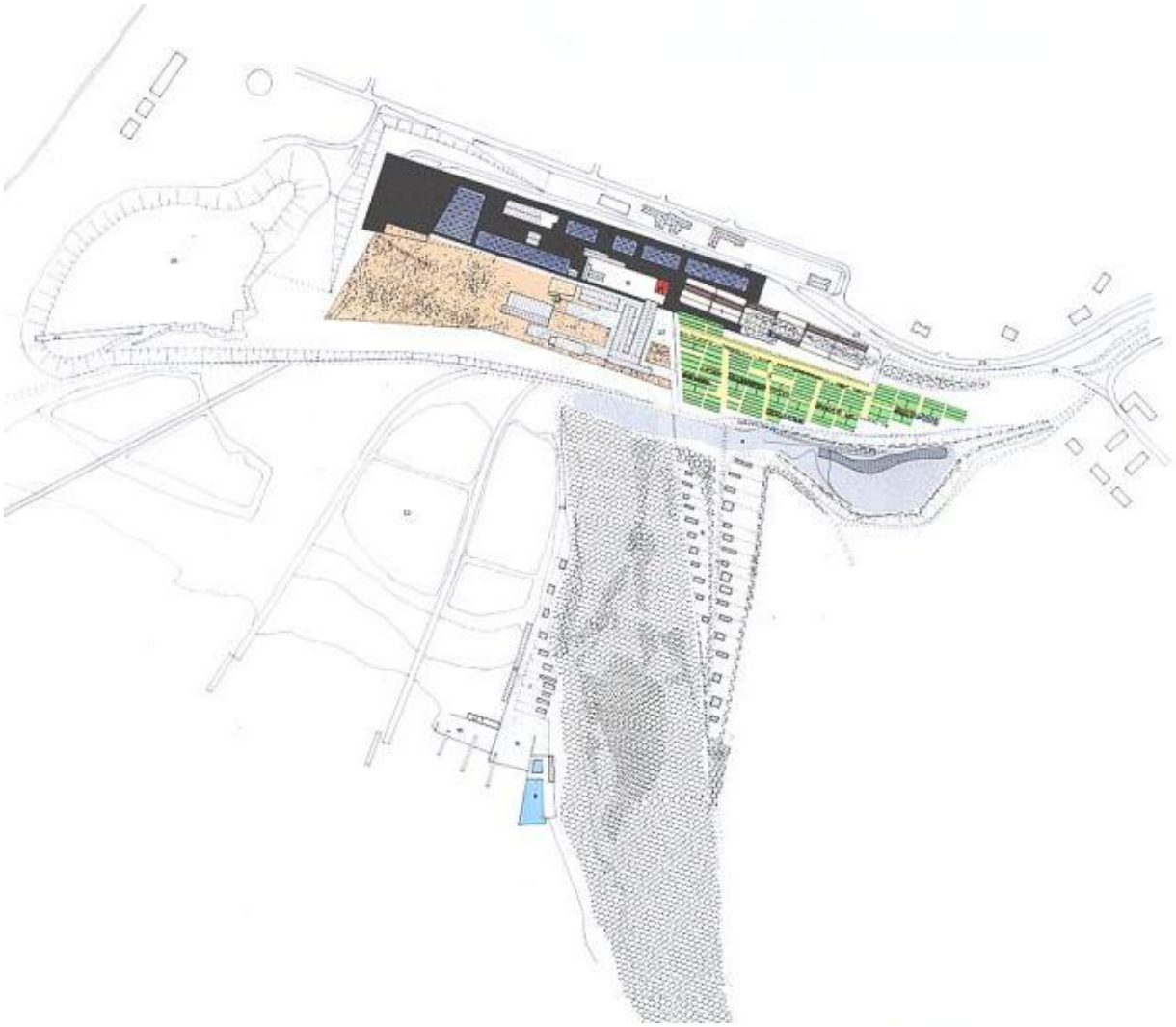


Figure 5-8 Plan of Activity Fields

5.4 Potteries Think Belt

Designer: Cedric Price
Location: Staffordshire, England
Year: 1964
Status: Proposal - Unbuilt

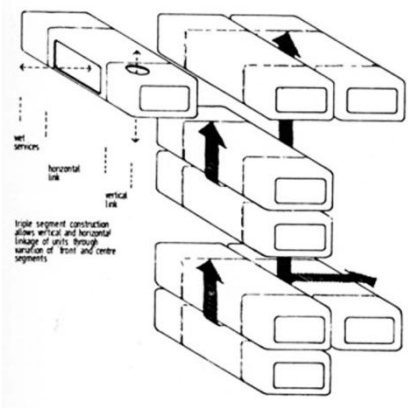


Figure 5-9 Potteries Think Belt: Mobile Prefabricated Units

When it comes to flexible and mobile architecture, there are few in history that can match the visionary studies of Cedric Price. In many ways, his thoughts provided a basis for much of the theory corresponding to landscape urbanism. Among these studies, the Potteries Think Belt was one of particular value to this thesis. Essentially, the project is a critical response to the changing nature of cities and society during the second half of the 20th century. Industrial cities throughout England suffered significant losses in manufacturing sectors, thus leading social and economic instability. Specifically, Price used the Potteries urban area as a test bed for a concept which would utilize the existing rail infrastructure to become a network of knowledge and education. The rail network would become a mobile university, educating the future population to serve a post-industrial society.

The railcars were designed with the intention of expanding, contracting and to be dynamic elements moving throughout the nodes of the network. While such an intervention may have been technologically impractical for its time, the advancements within manufacturing, energy generation and communications provide the ingredients necessary for such an idea to succeed. With regard to the transitioning waterfront, the existing industrial rail network houses and excess of industrial rail yards which sit dormant as the manufacturing base shrinks. There exists the possibility of providing a vision of similar nature to the Potteries think belt. To take on a more critical perspective, the concept behind the Thinkbelt projects tends to consider the existing infrastructure as something irreplaceable. His provocation ofteno employ flexibility and transience through permanent infrastructural networks the project may have been more provocative if it were to consider the network as something temporary in itself. A network that is not timeless and can respond to the changing context as much as the mobile objects themselves.

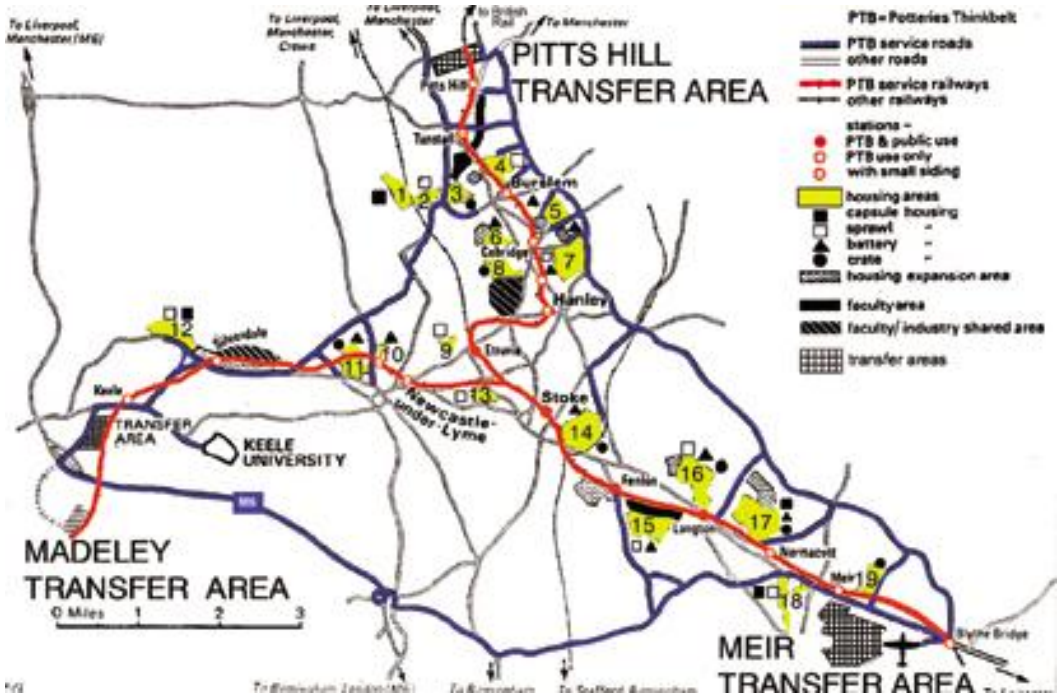


Figure 5-10 Potteries Thinkbelt Network

5.5 Strijp Phillips Masterplan

Andrea Branzi
Eindhoven, Holland
1999
proposal/incomplete

Figure 5-11 Strijp Phillips Masterplan: Andrea Branzi

The work of Andrea Branzi has been a significant source of knowledge for this thesis. Beginning with his provocations with Archizoom, he has maintained an affinity for indeterminate design. His avant guard ideals regarding architecture and urbanism have demonstrated concepts concerning flexibility, mobility, and the new economy. In many ways, the Strijp Phillips Masterplan is a realization of his theoretical views. Branzi himself has described the projects as "a territory for the new economy (Branzi, Master Plan Strijp Philips, Eindhoven, 2000)." The project concerns the relationship between urbanism and agriculture in the sense that they both must respond to changing needs seasons. The Masterplan was essentially a redevelopment strategy for an abandoned industrial site. The site was to become an "agricultural park" characterized by movable, impermanent infrastructure that could shift based on changing needs. Furthermore, spaces could be spatially reorganized providing a number of configurations. Along with Branzi's discussion concerning ecological urbanism, the concept of effortless demountable and mobile structures is of particular importance. However, from a critical standpoint, the projects fail to delve beyond the conceptual and provocative level.

Figure 5-12 Demountable Structure

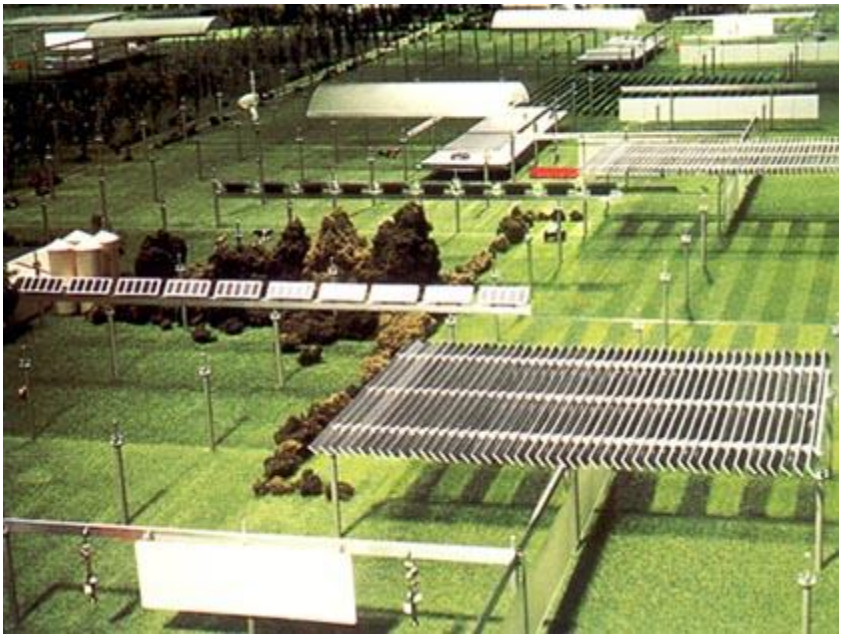


Figure 5-13 Site Perspective

5.6 Loblolly House

Designer: KieranTimberlake
Location: Taylors island, Maryland
Year: 2006
Status: Built

Figure 5-14 Loblolly House: South Facade

The Loblolly house is in many ways a tangible result of the ideas within Refabricating Architecture. Given that the site location posed issues of accessibility, the architects sought to design a house which required the least amount of on-site fabrication and provided utmost precision and flexibility in fabrication. Unlike traditional prefabrication, Kieren Timberlake integrated various levels of assembly units based on individual parts, components and modules to allow for maximum flexibility and customization (Kieran & Timberlake, 2008). For instance, the main structure for the house is an extruded aluminum frame, complete with bolt on connections. Within this frame, sits the floor, ceiling and wall panels. The panels themselves are either smart or dumb; meaning that include integrated mechanical and electrical services or are simply and insulating unit. More importantly, every piece that made the Loblolly house contains an identification code which corresponds to a BIM platform (Fortmeyer, 2006).

Within this process, not only does assembly become efficient and mobile, but so too does disassembly. With regard to this thesis, mobility does not simply signify the movement of a single prefabricated unit, but its ability to be recycled to suit multiple spatial arrangements. Unlike the historic precedent work of Buckminster Fuller and Cedric Price, the intent would be to provide a design where the elements of the structure would correspond to various levels of permanence adaptability.

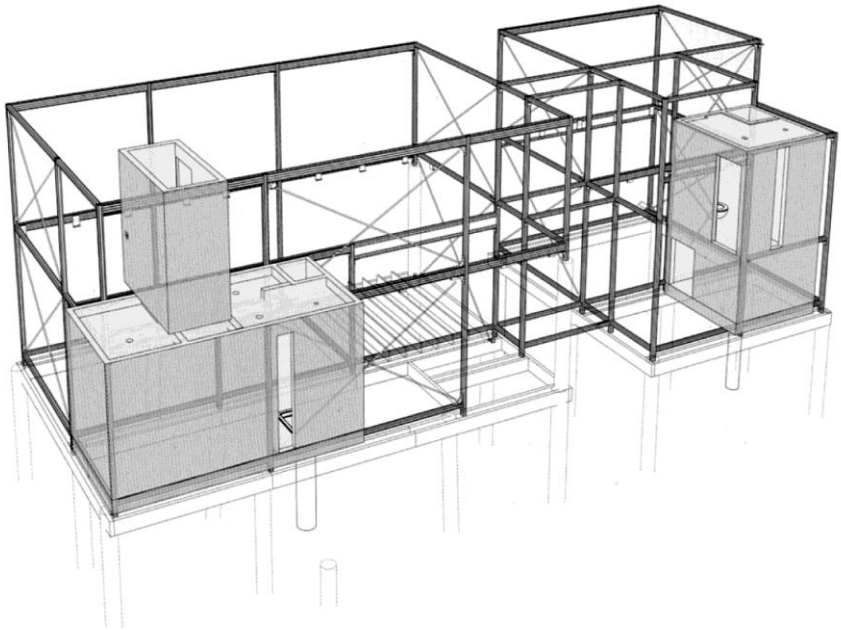


Figure 5-15 Loblolly House: Structural Aluminum Frame & Blocks

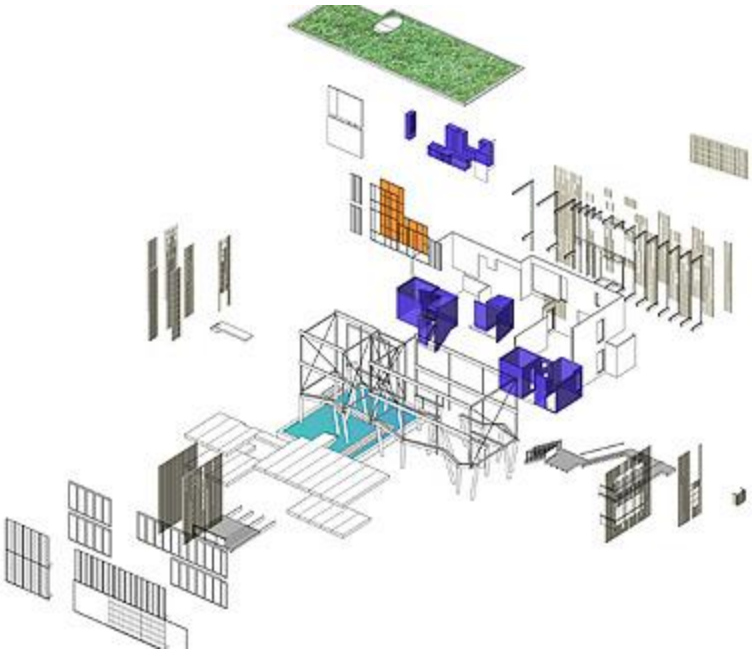


Figure 5-16 Loblolly House: Elements of Architecture

5.7 Cellophane House

Designer: KieranTimberlake
Location:
Year: 2008
Status: Built

Figure 5-17 Cellophane House

The cellophane house is essentially a development of the ideas expressed in the Loblolly House. The assembly process operates on a similar system of integrated components consisting of blocks, cartridges, and scaffold. In many ways, the house represents strategies that tie closely with this thesis. The idea of transience is expressed to a greater degree in comparison to the loblolly house. One strategy to mention is that the house opted to use blocks for living space rather than solely for mechanical and equipment purposes. In the case of Loblolly, the sizes of blocks were intended to be minimized, relying on a larger number of components (Kieran & Timberlake, 2008). Moreover, the project also demonstrates further investigation into the importance of materials in relation to temporary architecture. The house integrates a polymer film, Smartwrap as the outside layer skin. Feliz Klassen suggests that the material,

> "expirements with the most common plastic material (polyethylene terephthalate used in water bottles) to provide an overall cladding that eliminates the need to define permanently fixed transparent and opaque surfaces. . . This innovative cladding material is an ideal solar collector, moderates temperatures through phase change material, and is able to provide lighting and information displays. (Klassen, 2006, p. 124)"

The relevance of this project is primarily in the advancements built from the Loblolly House. The house illustrates the importance of material selection for both ease of assembly and the possibility of lessening the dependence of service infrastructure. Thus, energy generating materials may provide a greater degree of flexibility with regard to location. The house also illustrates the structural potentials of an aluminum frame. While there is a tendency for many temporary architectural designs to be fixed to one or two storeys, the cellophane house demonstrates a significant advancement in this territory.

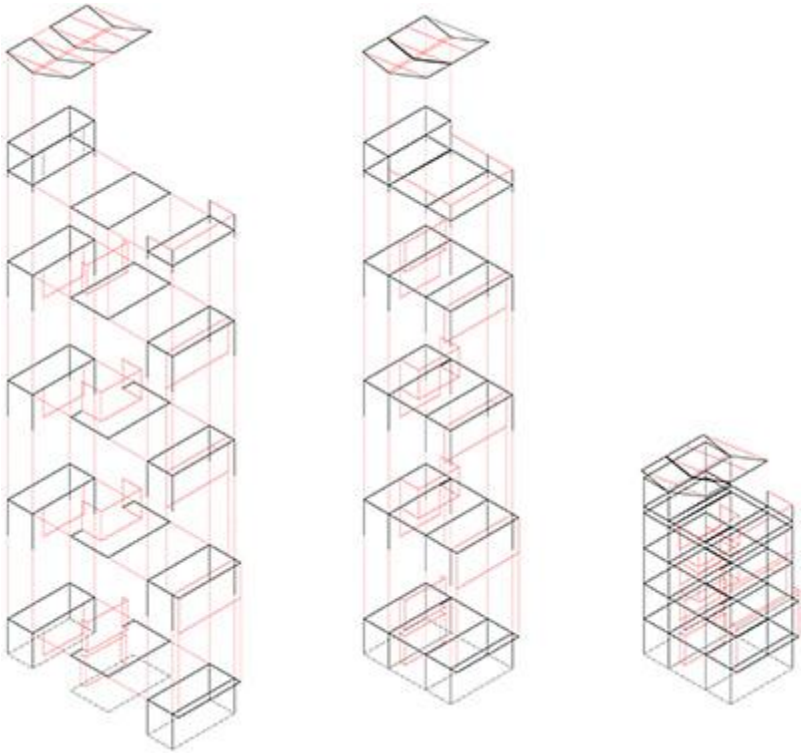


Figure 5-18 Chunk Assembly Diagram

Figure 5-19 Fabrication

5.8 The North House

Team North
2009
Built

Figure 5-20 North House

The North House demonstrates the potential that lies within solar energy in both energy generation and environmental conditions. The house was designed to adapt to a range of northern climatic conditions. Thus, the design also uses modularity and prefabrication as a means to ease of both assembly and disassembly. With regard to the use of solar energy, a system of photovoltaic panels is integrated onto the roof, east and west facade. Depending on the orientation, the photovoltaic panels may utilize the various angles of the sun through the day and year. The value of this design not only sits within its energy producing potential, but also its potential to limit the need for energy use. The reliance on mechanical systems to control the interior environment constitutes for the majority of energy usage in buildings situated in northern climates. Thus, the north house uses strategies to limit the need for heating, cooling and natural lighting through both innovative building materials and the spatial organization. For instance, the south wall consists of insulated glass panels which allow for solar heat gain during the winter months, while exterior shades provide cooling during the summer months. Due to this, the living space occupies the south side, while the service oriented program occupy the north side. Communication technologies allow the user to most effectively control the interior environment while conserving the most energy possible. The combination of these strategies resulted in a design which generated more energy than it consumed (North House). It has been suggested that the effectiveness of mobility is a result from a range of aspects. The North House most effectively illustrates the ability for an architectural object to operate independent from the electrical grid. If the transitioning waterfront is to be served by a vision of mobility, the architecture must have the ability to operate in any given location, regardless of the availability of on-site services.

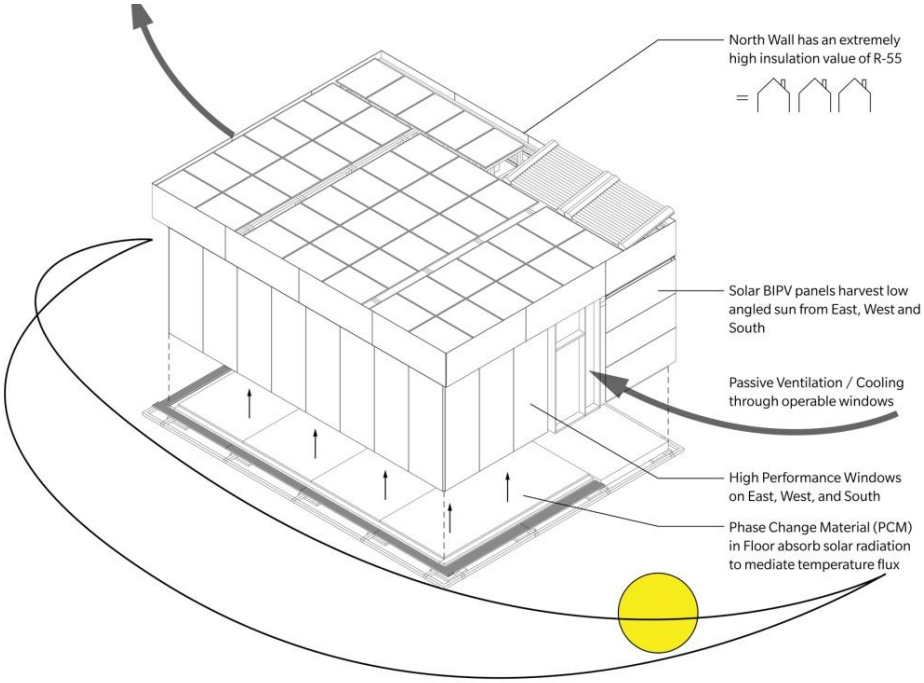


Figure 5-21 Responsiveness to Environment

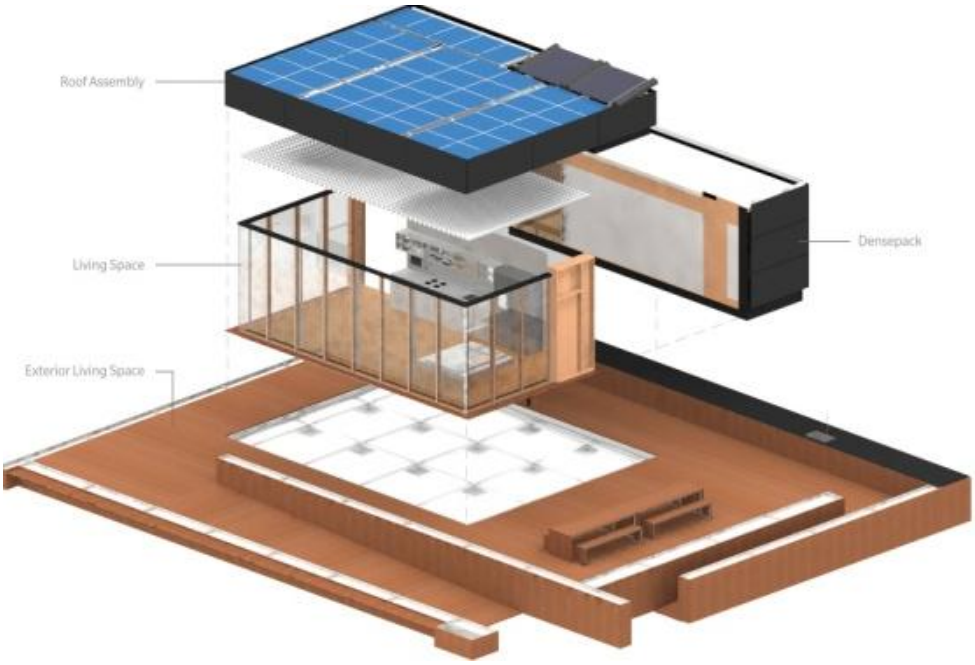


Figure 5-22 Assembly of Components

5.9 SurPLUShome

Technische Universität Darmstadt
2009
Built

Figure 5-23 surPLUShome

The first place entry for the 2009 solar decathlon is another example of the potential the lies within solar energy. Essentially the concept was to utilize the entire outer surface of the building as an energy generator. Thin film photovoltaic panels cover the vertical surfaces of the building, while the roof integrates 40 high efficiency photovoltaic panels. With regard to the vertical surface, the technology and angle of the individual panels maximize the energy generating potential of indirect solar radiation. The energy generated by this house is 200% of the energy that is consumed. The spatial arrangement is conceived as a single space as method of providing greater thermal mass, effective natural lighting and ventilation. As with the north house, the design was conceived as an assembly of modules. Thus, the house is composed of 4 modules in sizes of approximately 3 x10.5m (TU Darmstadt). While programmatically the later twi projects may not correspond to the vision of this thesis, the aspects concerning the on-site independence cannot be undermined.

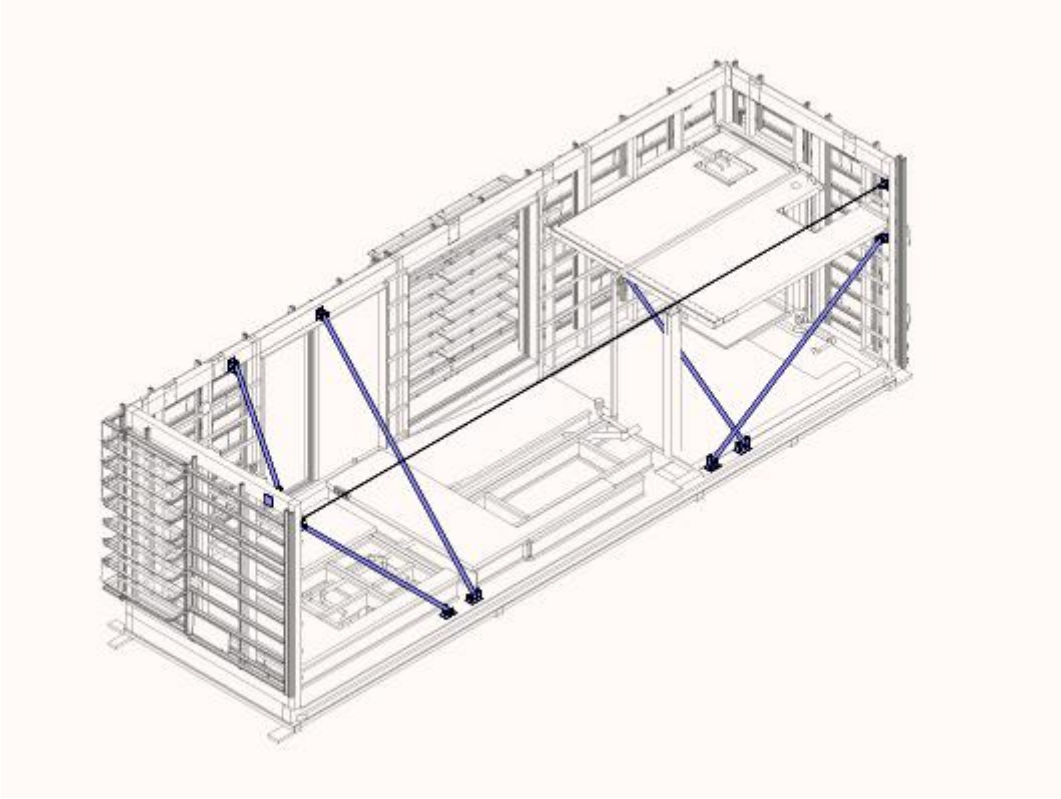


Figure 5-24 surPLUShome: Assembly Unit

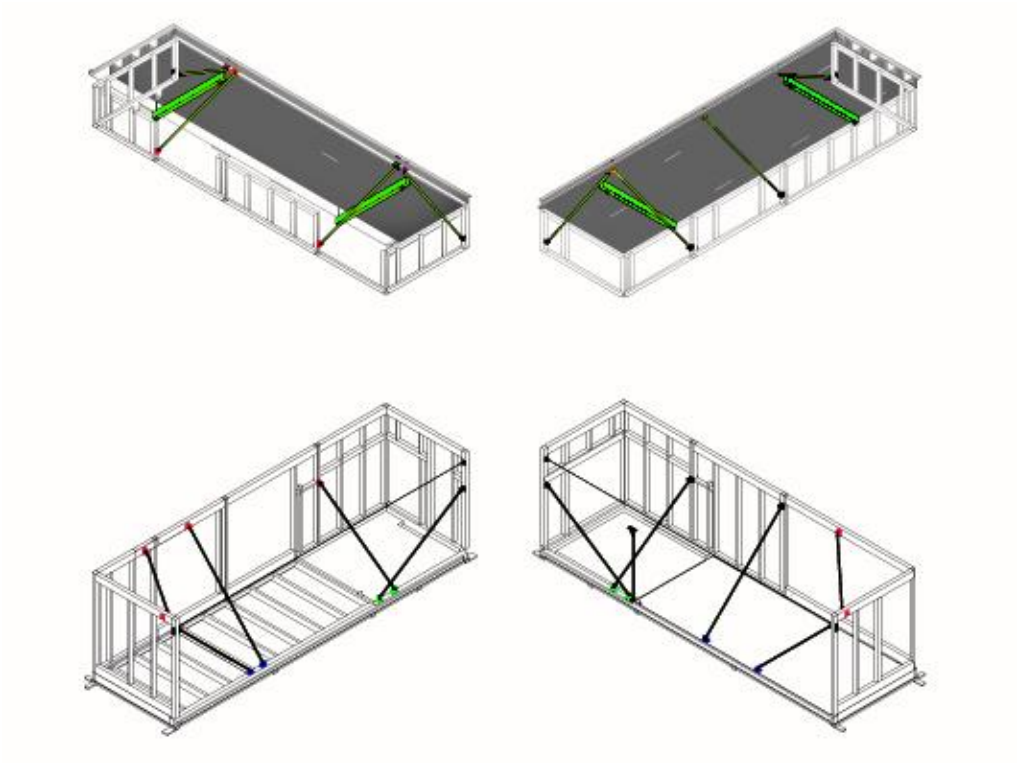


Figure 5-25 surPLUShome: Assembly Elements

6.0 Envisioning a Transient Waterfront

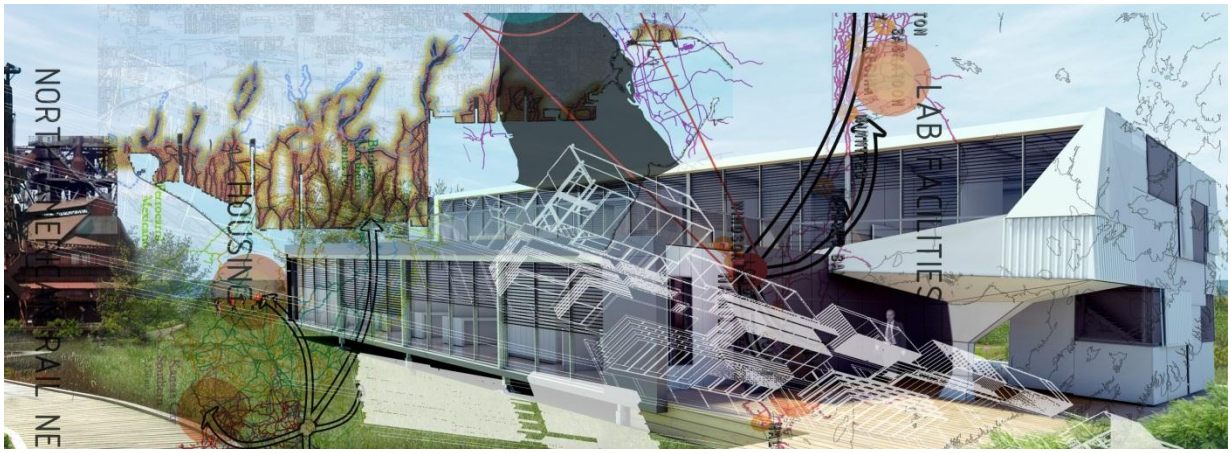


Figure 6-1 Design Research

The final section of this thesis conveys the research and case studies into a vision for de-industrializing waterfronts. In the design project which follows, Hamilton, Ontario acts as the platform to express the vision. The section is divided into three subsections; the first introduces the context selected to test the design; the second provides narrative of the design at the urban level through text, mapping and diagram. Finally, the third subsection focuses on the architectural system.

6.1 Experimental Test Bed: Hamilton

The following subsection will introduce the context which will serve as the platform to test potential design strategies resulting from the research and case studies. Hamilton, Ontario was selected as it serves as a quintessential example of a port city that struggles between industrial and post-industrial. As such, it sits at the early stages of the transition from an industrial to post-industrial economy. To put it briefly, it became prosperous as a result of the steel industry which has occupied its waterfront for much of the past century. However, shifts in global markets have left the city to face a slow process of deindustrialization, while it attempts to reposition itself into a knowledge based economy. The process of industrial exodus is resulting in heavily contaminated landscapes along the north shore, while the city centre continues to deteriorate.

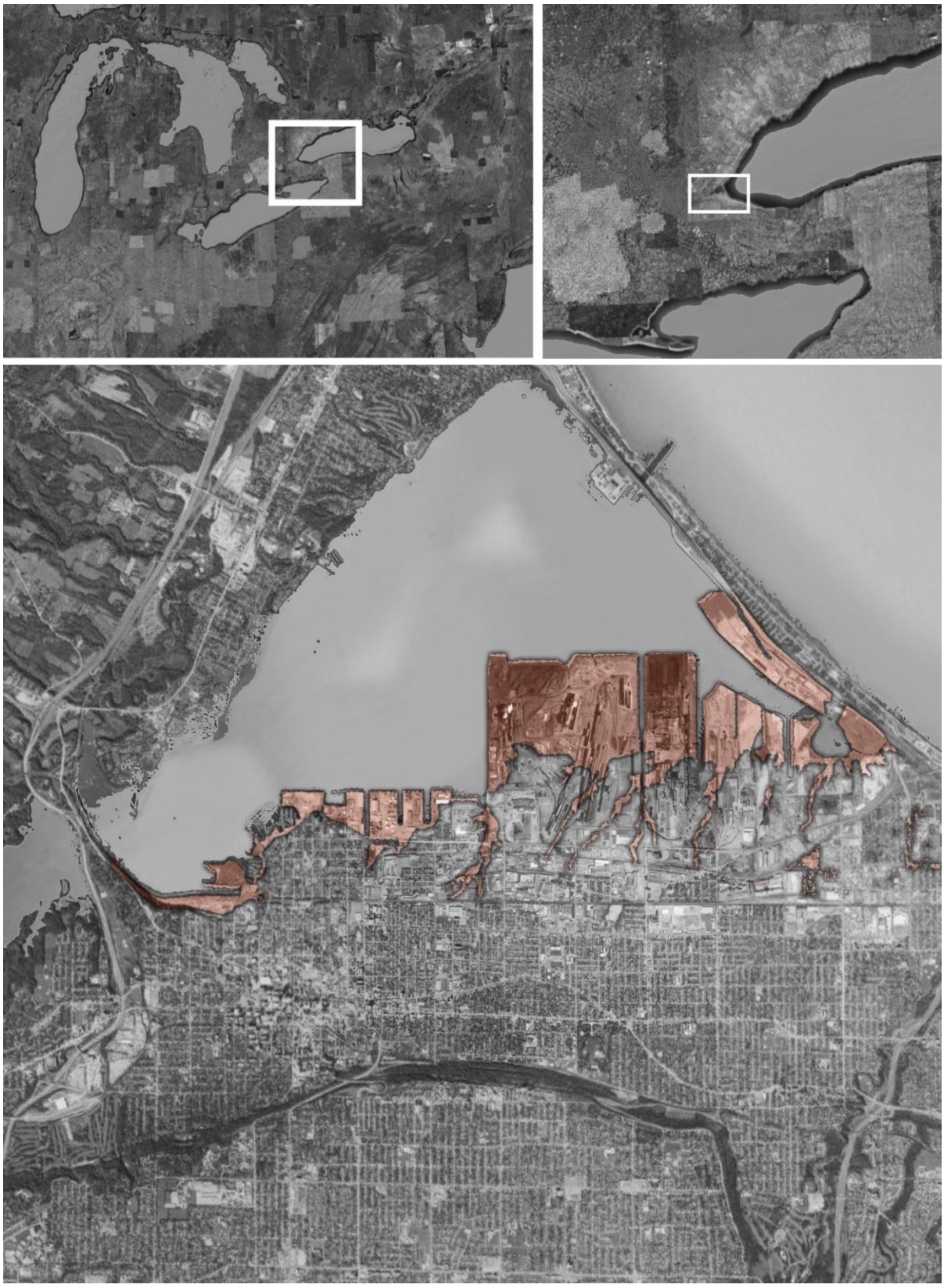


Figure 6-2 Hamilton, Ontario

Hamilton: Growth and Prosperity

Prior to the alteration of the natural shoreline, the region of Hamilton was characterized by marshy inlets which stretched toward the escarpment. The landscape was once home to a diverse wildlife population. Due to its advantageous location and potential to become a trading post, urbanization began in the early 19th century. As such, the formation of the city followed the path described in the first section concerning the historical research. The transformation of the natural landscape began with the opening of the bay to Lake Ontario during the 1820's. This allowed for the city to develop into commercial trade. Following this, the construction of the rail network began in 1854, creating a network between the American border, Hamilton and Toronto. The plethora of rail yards soon became a feature of the city's waterfront. While the city had become a commercial trade hub, the north shores remained a place for social gathering and recreation. However, this would soon change as the city began to look for alternative sources of income in response to the evolution of economic models (Melnick, 2007).

By the 1890's, Hamilton began its evolution into the steel manufacturing hub of Canada (Gordon). The proximity to coal mines in west Virginia and iron ore on lake superior provided an efficient platform for the production and export of steel (United Steel Workers, 2007). As such, heavy industry began to occupy the waterfront along the northern edge of the city. Extensive infilling resulted in a bay altered to a quarter of its original size. The inlets and ravines no longer extended into the city. Stelco and Dofasco soon became the leaders in Canada's steel production, providing economic prosperity for the city. The thriving market was the catalyst for significant amounts of immigration. As the manufacturing sector continued to see success, other manufacturing companies began to establish along the waterfront. The northern edge of the city consequently became a district isolated from the city itself.

Figure 6-3 Hamilton: The Evolution of Industry

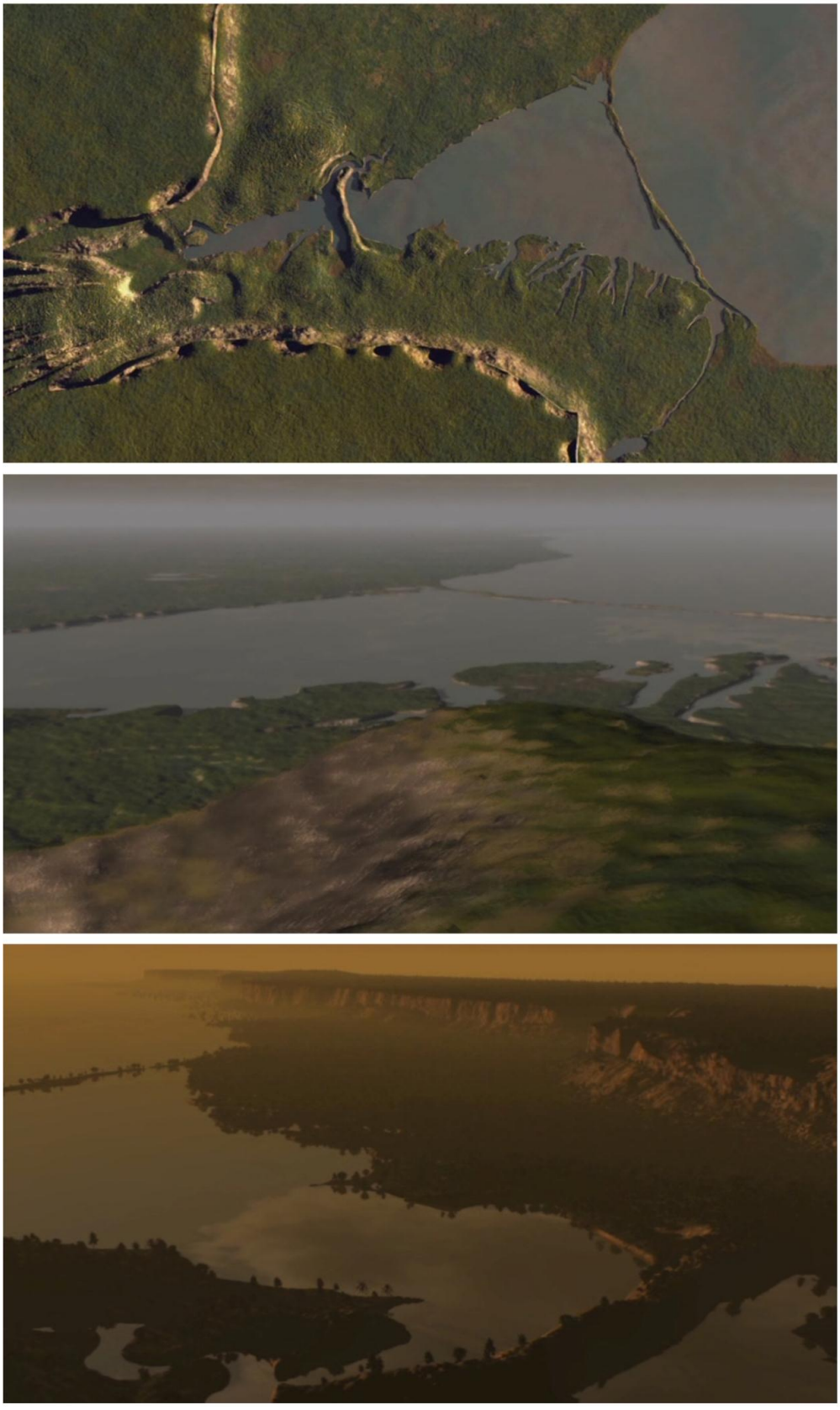


Figure 6-4 Hamilton: Natural History

Hamilton: Industrial Decline

The prosperity of the steel industry peaked during the early 1980's as foreign competition began to overshadow Hamilton's steel production. During the last three decades, the steel industry has suffered staggering losses in terms of production and employment. Between the two steel companies, Stelco has faced the greatest struggles. In 2007, Stelco filed for bankruptcy and sold the company to the Pittsburgh based steel giant, U.S. Steel (Cole, 2009). However, after three years the plant has been closed twice due to lack of profits with the most recent closure noted as being indefinite. As of November 7th, 2010, U.S. Steel locked out its workers leaving the facilities in an wasted state. To give an indication of the losses that the industry has endured, Stelco employed approximately 26,000 workers in 1981, while in 2009 the numbers have fallen to a staggering 1700. Between 1991 and 2001, employment in Hamilton's manufacturing industry declined by 20.5% relative to other sectors (Fennessy, 2009). Fennessy has described Hamilton as "a city that's caught in the early to mid stages of a (Fennessy, 2009, p. 356)"

The result of the industrial decline and the resulting environmental condition has lead to the demographic condition facing many industrial port cities. There is an evident demographic progression as proximity to the waterfront shifts. For instance, characteristics such as dwelling value and family income display a progression from lowest to highest as one moves further from the waterfront and toward the periphery. Conversely, attributes such as the average unemployment rate decrease from highest to lowest as one moves away from industry. Areas such as the "North End," have displayed the worst social conditions in the city. Interestingly, these communities lie adjacent to the industrial sectors. These observations illustrate the social polarization that is taking place as a result of the industrial presence.

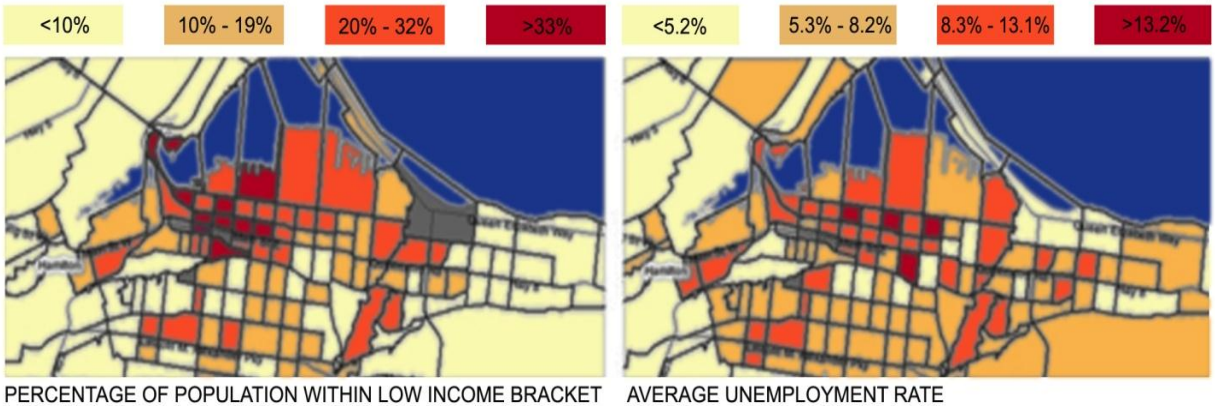


Figure 6-5 Hamilton 2005 Demographic Data

Economic Diversification

The economic constraints that Hamilton has experienced in the past few decades have required diversification and restructuring of the city's economic base. While the manufacturing sector has displayed declines, growth has begun to show in the sectors of health science, education, science and technology. Organizations such as McMaster University and Hamilton Health Sciences have displayed steady increases in profitability. The shift from an industrial to a knowledge based economy has been rather slow in Hamilton's case; however the last decade has displayed a greater effort toward diversification. Despite this, the economic condition remains unstable, as an interview with a local economist, conducted by Barbara Fennessy suggests:

> "They [Hamilton] see change happening; they see thousands of jobs being lost and major, major employers packing up and leaving; and maybe those large employers are being replaced by dozens of smaller ones, but they come and they go and there's no clear vision of exactly what we're morphing into." (Fennessy, 2009, p. 356)

Given this, the cities re-development plans would benefit by having the ability to accommodate the experimentation of economic development efforts.

6.2 A Shift in Production: A Regional Network

> Appropriation of infrastructure strategies and ecological Tactics for New Civic Programs While conceived as rational, absolute and utilitarian, infrastructure has the capacity to be appropriated and transformed toward social, cultural, ecological, and artistic ends. Architectural accretions. layerings of program and use, existing infrastructures made useful- herein lies the basis for a new civic realm. one created by appendage and insertion. Conversely, architecture and landscape can appropriate the utility and serviceability of infrastructure. One could imagine landscape/architectural/urbanistic projects conceived as functional infrastructures, ecological machines that process and perform, public spaces that literally "work." One might also imagine the creation of fertile testing grounds that structure or initiate an unfolding of hydrologic, ecological, social-cultural, and urbanistic processes and adaptations--earthen infrastructures available for appropriation and transformation and whose form is valued for its performative rather than its sculptural characteristics. (Reed, 2006)

In the third section, *Understanding Uncertainty,* a large part of landscape urbanist discourse concerned the potentials that lie within the existing conditions. The *Duisurg Nord* case study demonstrated the revitalization of existing manufacturing and rail infrastructure. In this case, the industrial infrastructure became the platform for a public program simply through the revitalization of the landscape. The research also resulted in a critique of landscape urbanism's overt affiliation with recreational programs. Can the existing conditions facilitate more than simply public program? Can they help support the transition of the city? Andrea Branzi's *Seven Suggestions for a New Athens* charter also suggested the revitalization of "existing states to fit the present city to suit the new need for diffuse work, of mass enterprise, of creative economy, and of cultural production and consumption. (Branzi, For a Post-Environmentalism: Seven Suggestions for a New Athens Charter, 2010, p. 110)." Given the extent of infrastructural network built for industrial port cities, there may be an opportunity to revive dying infrastructure to support the city on a logistical and regional level. As Stan Allen has also suggested,

> Logistics of context suggests the need to recognize the limits of architecture's ability to order the city, and at the same time, to learn from the complex self-regulating orders already present in the city. Attention is shifted to systems of service and supply, a logic of flow and vectors. This implies close attention to existing conditions, carefully defined rules for intensive linkages at the local scale, and a relatively indifferent attitude toward the overall configuration. Logistics of context is a loosely defined working framework. It suggests a network of relations capable of accommodating difference (Allen, From Object to Field, 1997, p. 28).

Landscapes of Mobility

Focusing on the existing conditions of the industrial waterfront, a number of potentials lie within the infrastructural network at the regional scale. The deterioration of the industrial waterfront leaves behind the remains of an era in economic history. The research section that outlined the formation of the waterfront described the extensive rail and manufacturing infrastructure constructed. As de-industrialization occurs, its respective infrastructure is no longer needed and thus, often removed. However, a range of re-use opportunities exists within these networks of infrastructure. In the case of Hamilton, nearly a quarter of the urban fabric is dedicated to a manufacturing network. The rail network serving the port was initially designed to efficiently transport industrial goods to and from the port. As elements of these landscapes fade to ruin, the rail may serve as an alternate system of transport.

Looking back at the section *Towards a Transient Object*, Dean Goodmans essay, *Mobile Architecture a Pre-manufacturing Buildings* in *Transportable Environments* suggests the need for mobility in a temporary architectural system. Referring to Tent City by Levitt Goodman Architects, he explains, “due to the short-term nature at Tent City and the self-contained aspects of services, we determined that the mobile home model was particularly appropriate for the method of design and construction of these building (Goodman, 2006, p. 110).” Considering that the research also led to a critique of the modular approach to prefabrication, mobility is needed for the transport of integrated components rather than completed units. Thus, the rail network may serve as the organizational structure which deploys components throughout the landscape (see figure 6-6).

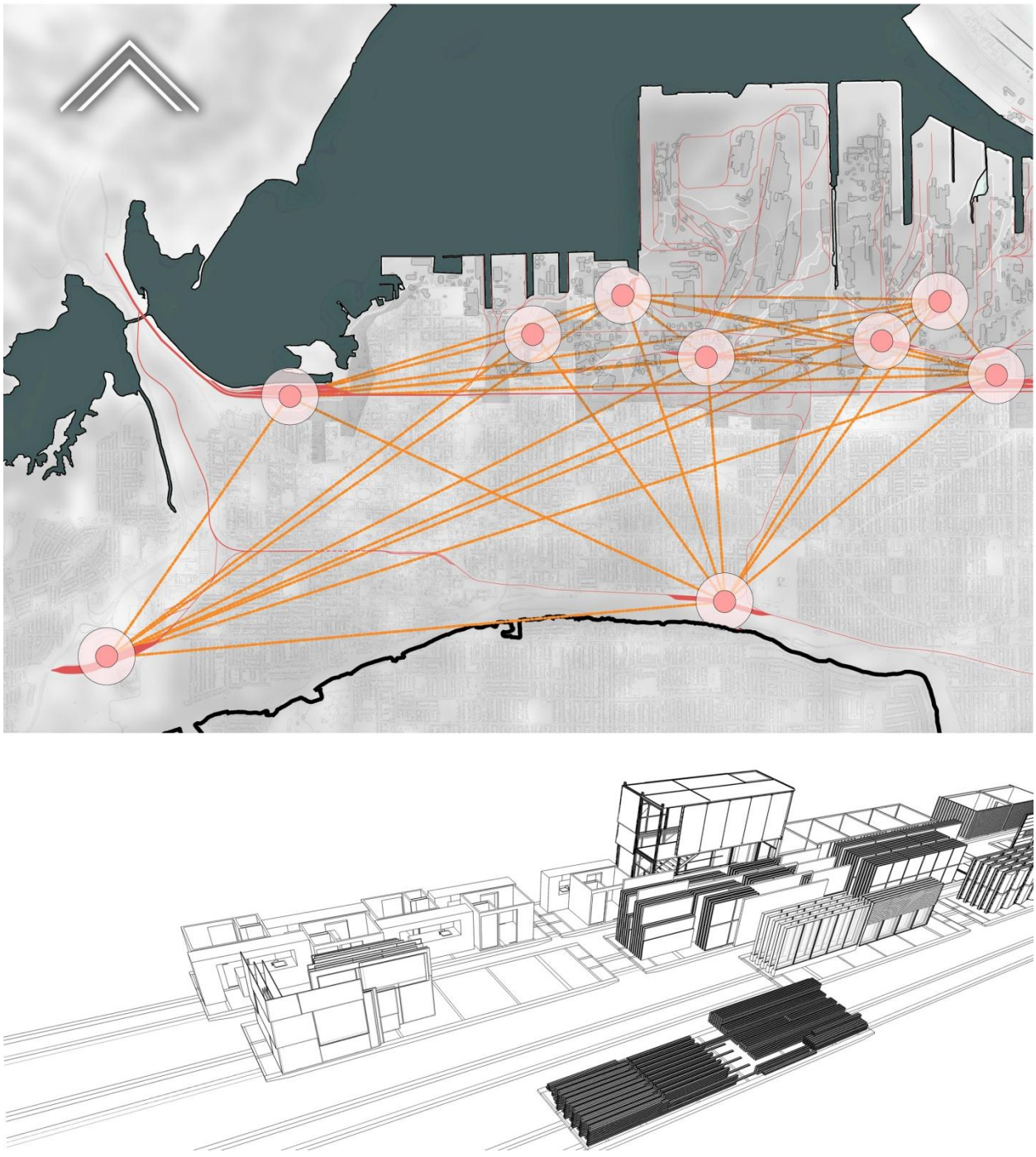


Figure 6-6 The Rail Network as the Supplier

Landscapes of Production

The potentials which lie within the existing infrastructure do not end at the rail network. The relationship between the manufacturing and transportation infrastructure is historically reciprocal with respect to the level of operation. De-industrialization of a manufacturing landscape naturally lessens the need for the transportation infrastructure serving it. In the subsection of the fourth section *Prefabricating for Re-fabrication*, the supply chain of the automotive industry was suggested for its potential application for architecture. In reference to the automotive industries supply chain methodology, Kieran and Timberlake state,

> Increasingly, OEMs are demanding that suppliers attach facilities to their assembly plants to maximize flexibility and to minimize both shipping time and the expense of handling materials. The resulting architectural type is one of feeders, above-grade roots that supply the factory with pre-digested parts. These suppliers are expressed in terms of tiers. For instance, a Tier 2 supplier is far downstream from the assembly plant and might produce only screws and fasteners; a Tier 1.5 supplier is responsible for the complete dashboard. (Kieren & Timberlake, 2004, p. 89).

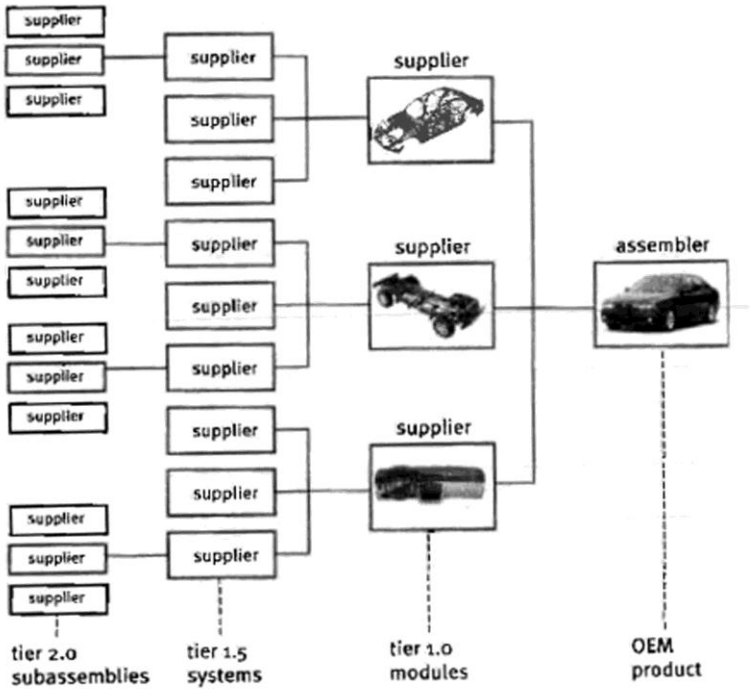


Figure 6-7. Automotive Supply Chain Structure

Relating this methodology to architecture, and specifically, the de-industrializing waterfront, one can begin to imagine the potentials that lie within the abandoned manufacturing network. If the abandoned manufacturing facilities were re-activated to become facets within an architectural supply-chain network, the existing connection to the rail network would allow for maximum fluidity. The final assembly would thus be the result of modules, (in the automotive sense of the term) arriving from various tier 1.0 suppliers throughout the network (see figure 6-8).

Figure 6-8 Reawakening Existing Industrial Infrastructure as a Supply Chain Network

Landscapes of Re-Production

This network would not only provide fabrication, but re-fabrication would be afforded with even less required effort. Recalling the discussion of parametric modelling and the ability to track and organize information, it does not seem unlikely to suggest that every part, sub-assembly, system and module of a building supplied by the network be recorded. The ultimate benefit of this system would be the relationship with the architectures ability to completely disassemble and be re-used. By tracking the location of the inventory of active parts throughout the landscape, the potential to plan re-fabrication prior to disassembly may streamline the re-assembly process, increasing the likelihood of a truly re-usable architecture (see figure 6-9). Just as parametric models provide simulations of architecture prior to being constructed, this system could allow for simulation prior to being re-built. For instance, a probable situation would be that as one building is being planned for disassembly, future assemblies may have a catalogue of parts soon to be available (see figure 6-10). Given that the rail network extends throughout North America, one could imagine this system potentially extending beyond the regional boundaries of Hamilton (see figure 6-11).

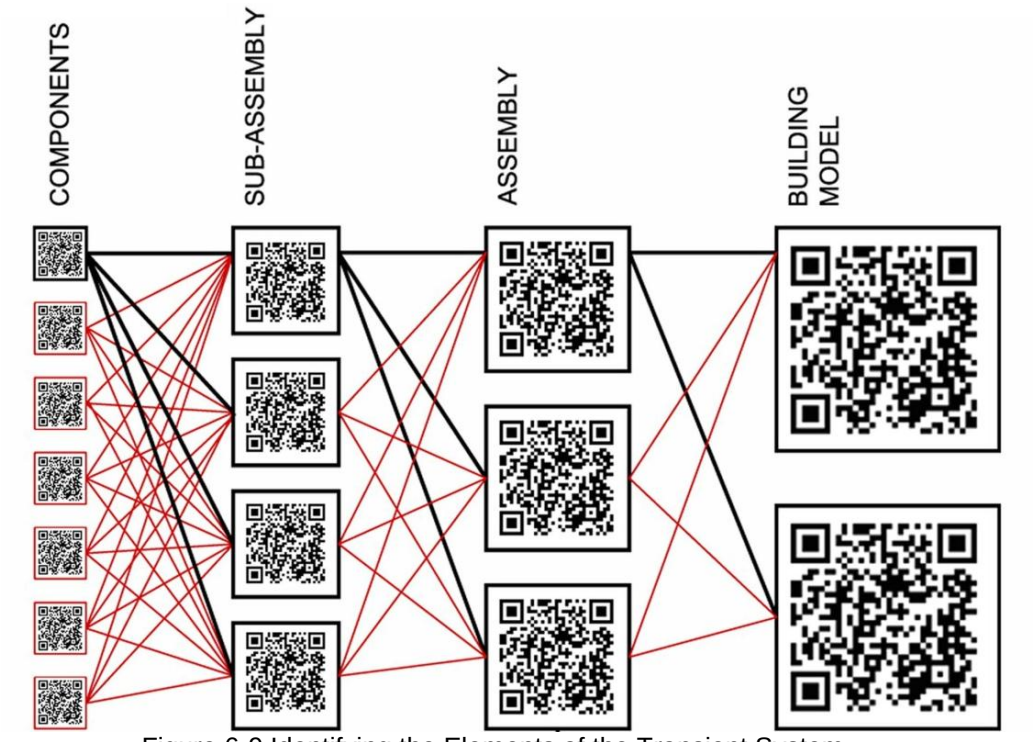


Figure 6-9 Identifying the Elements of the Transient System

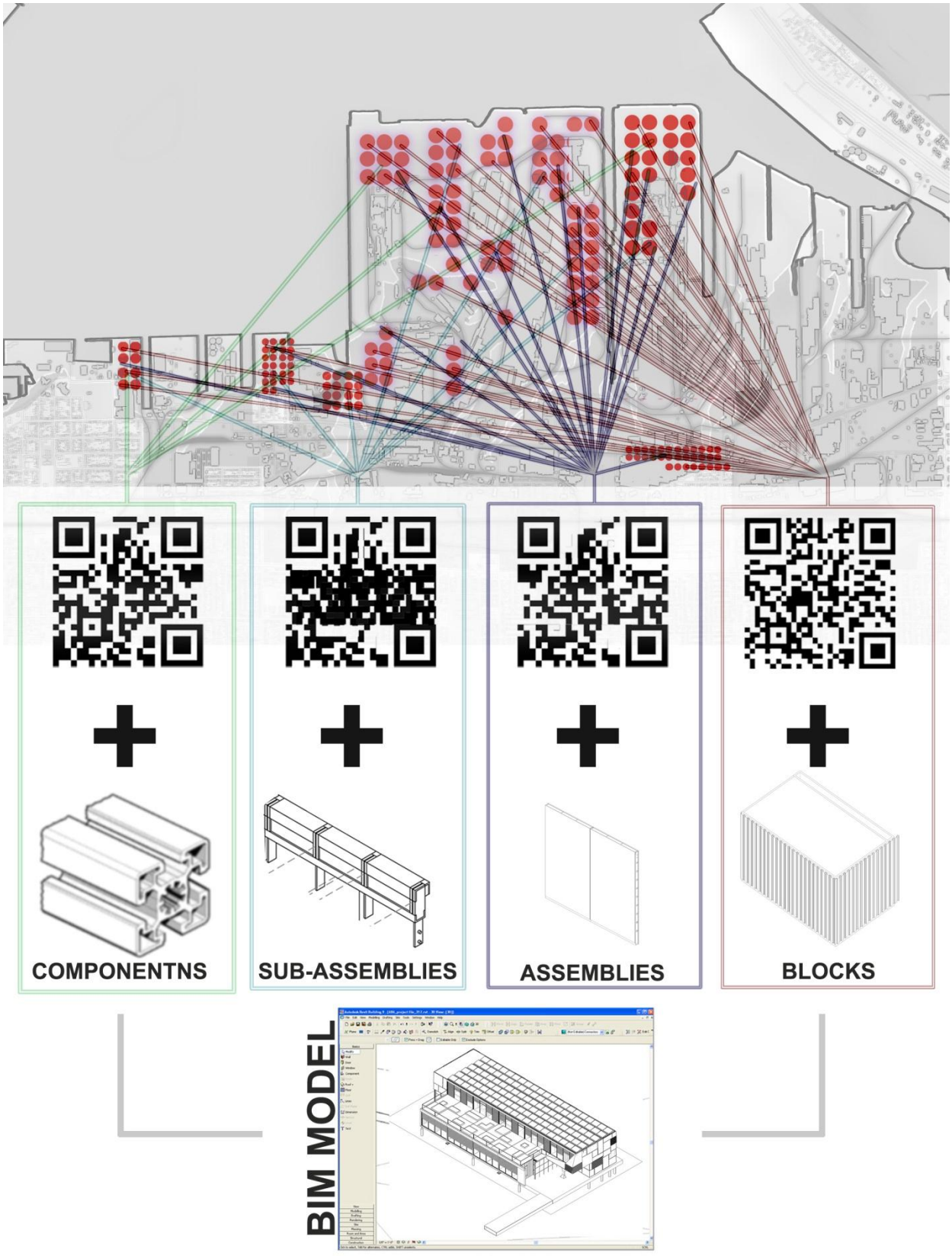
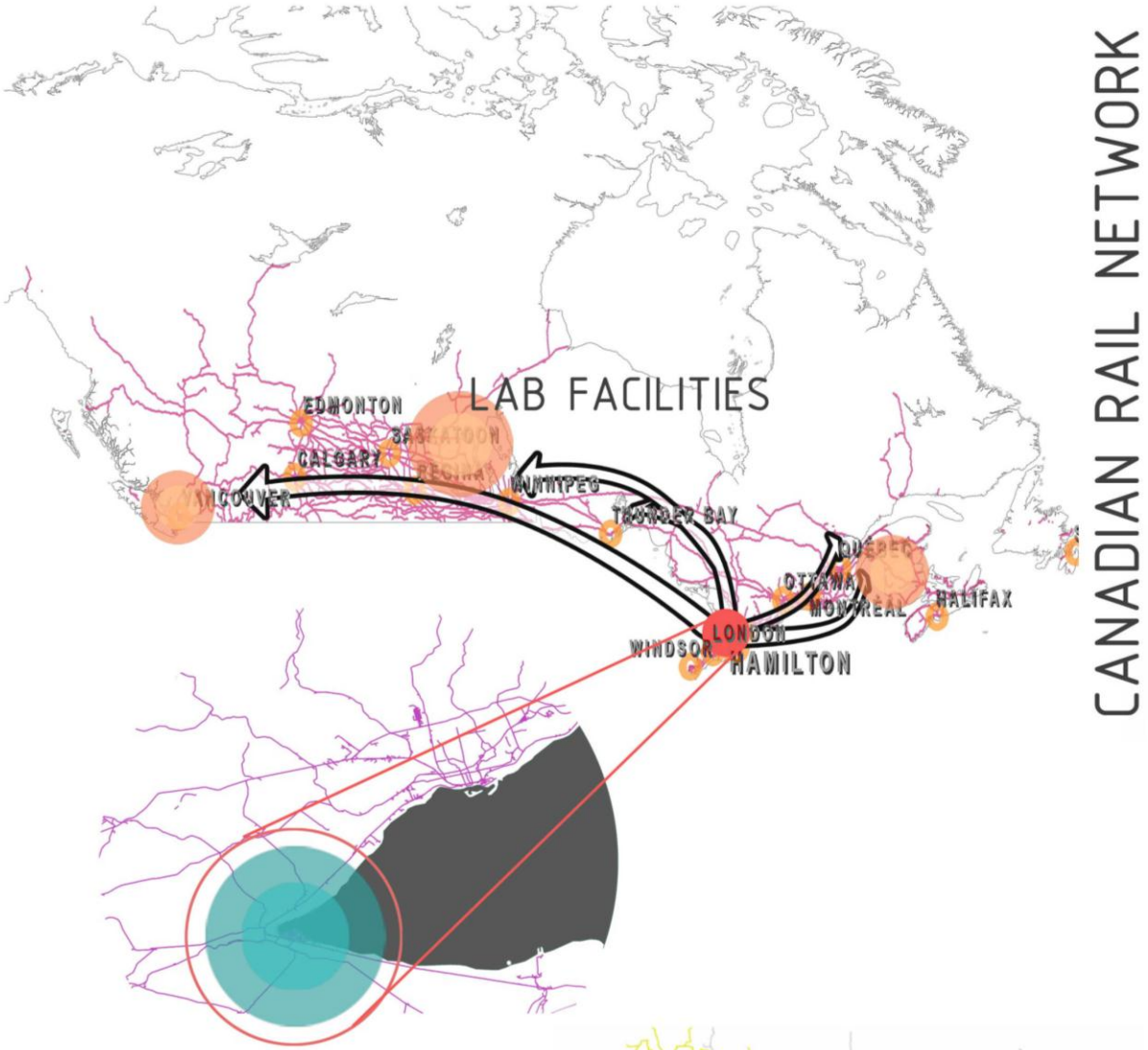
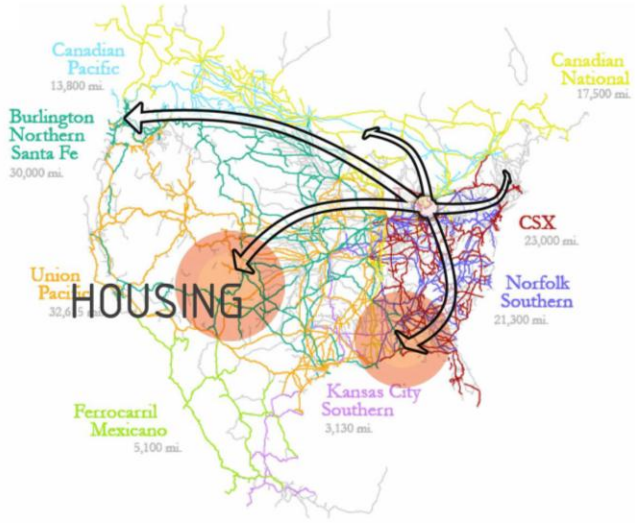


Figure 6-10 Tracking the Elements of Architecture for Disassembly and Re-Us





NORTH AMERICAN RAIL NETWORK

Relieving the Natural Ecology

This strategy is not only intended to respond to the economic context, but also the ecological condition. The use of temporary architecture acts as a method of alleviating the ecological stress placed upon the landscapes in need of remediation. Often, the initial phase of redevelopment begins at the shore line for its real-estate potential. These are the landscapes which have faced the greatest degree of contamination and yet their ability to fully restore to the natural ecology is restricted by large scale redevelopment projects. If development was to focus on temporary solutions as the city matures, the redevelopment of the shore and manufacturing sites may solely concern the landscape and the restoration of ecological stability. In this, there is also the possibility of both restoring and uncovering the ecological history of the waterfront in an attempt to re-establish its sense of place. The condition of many industrial waterfronts bears little resemblance of its ecological roots. Extensive infilling has altered the shorelines which allowed industrial expansion. In the case of Hamilton, it was mentioned in the previous subsection that the landscape was once characterized by a series of inlets which stretched toward the escarpment. If these historical traces were slowly uncovered as a means of land remediation, the greater prospect may be in the potential to restore public life and social balance along the shore (see figure 6-11).

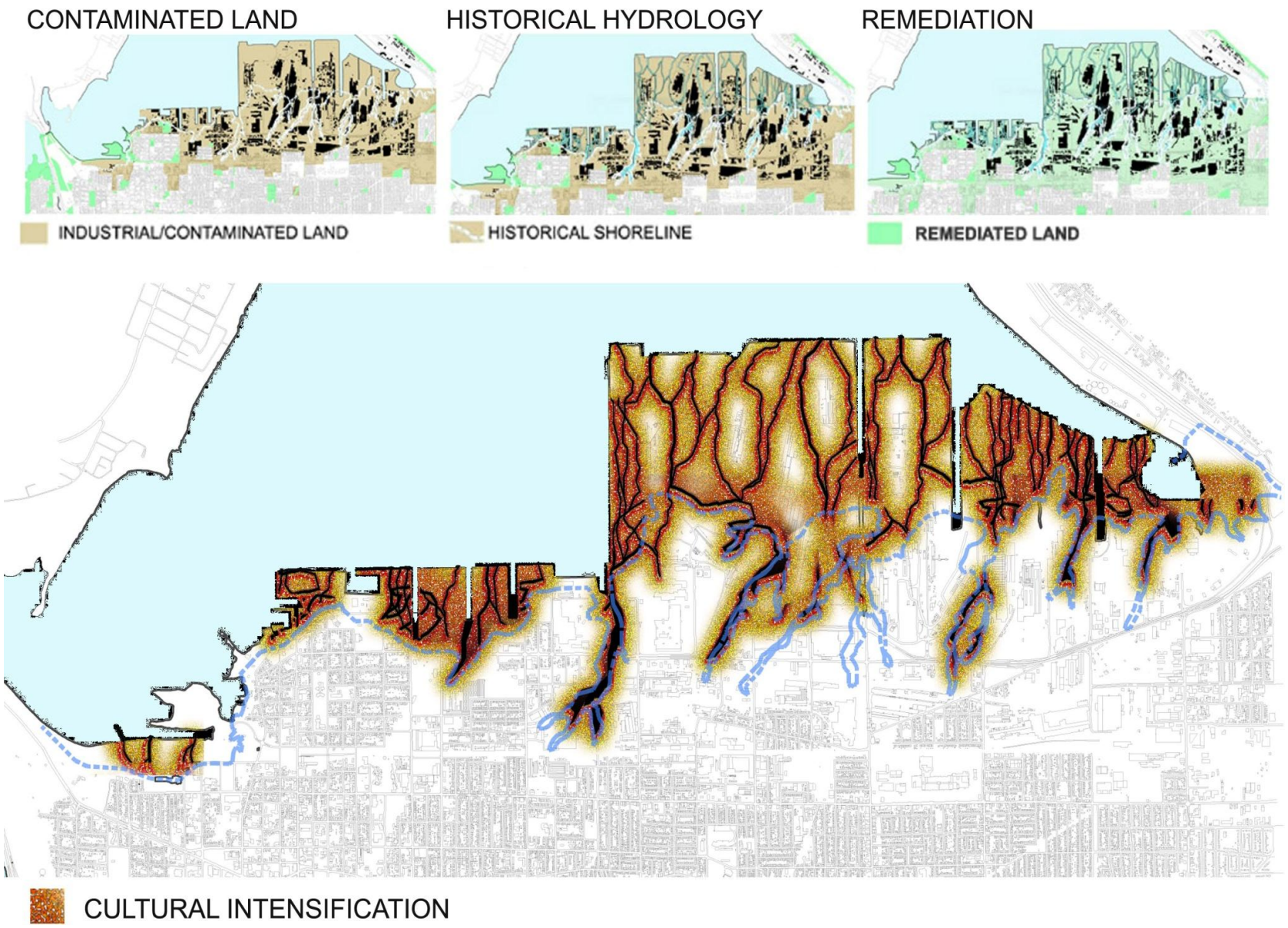


Figure 6-11 Remediation & Cultural Intensification Process

Paths of Emergence: Development along the Rails

The emergence of this system would likely follow a loose pattern of development. Temporary communities may begin to emerge along areas of high rail density as the landscape remediates. One could begin to imagine architecture occupying the manufacturing ports which stretch past the natural shoreline. As the city nears stabilization, more permanent developments may begin replacing the transient developments (see figures 6-12 to 6-15).

In the case of Hamilton, the potential closure of Stelco may provide a future territory for a transient community to develop (see figures 6-12). Apart from the manufacturing ports, the conglomeration of industrial rail yards throughout Hamilton, and all industrial port cities for that matter may too become a network of transient communities. During the peak of industrial productivity, high levels of rail traffic were controlled by rail yards which were placed periodically throughout the rail network. As Edwin Kraft states, “the railroad yard is a system of tracks where trains are born. Individual cars gather from shippers’ docks, assemble to become trains for travel to another yard, then are segregated for delivery to receivers’ docks (Kraft, 2002, p. 47).” In many ways, the industrial waterfront owed its productivity to the rail yard, for they maximized fluidity within the manufacturing network. A system such as the rail yard that was initially designed to manage such chaos must have the potential to serve a greater purpose for waterfronts in transition. Their innate ability to provide mobility and flexibility for the past era may carry on to serve the transitioning context.

Figure 6-12 Hamilton: Current Condition

Figure 6-13 Hamilton: Progression from Phase 1-3

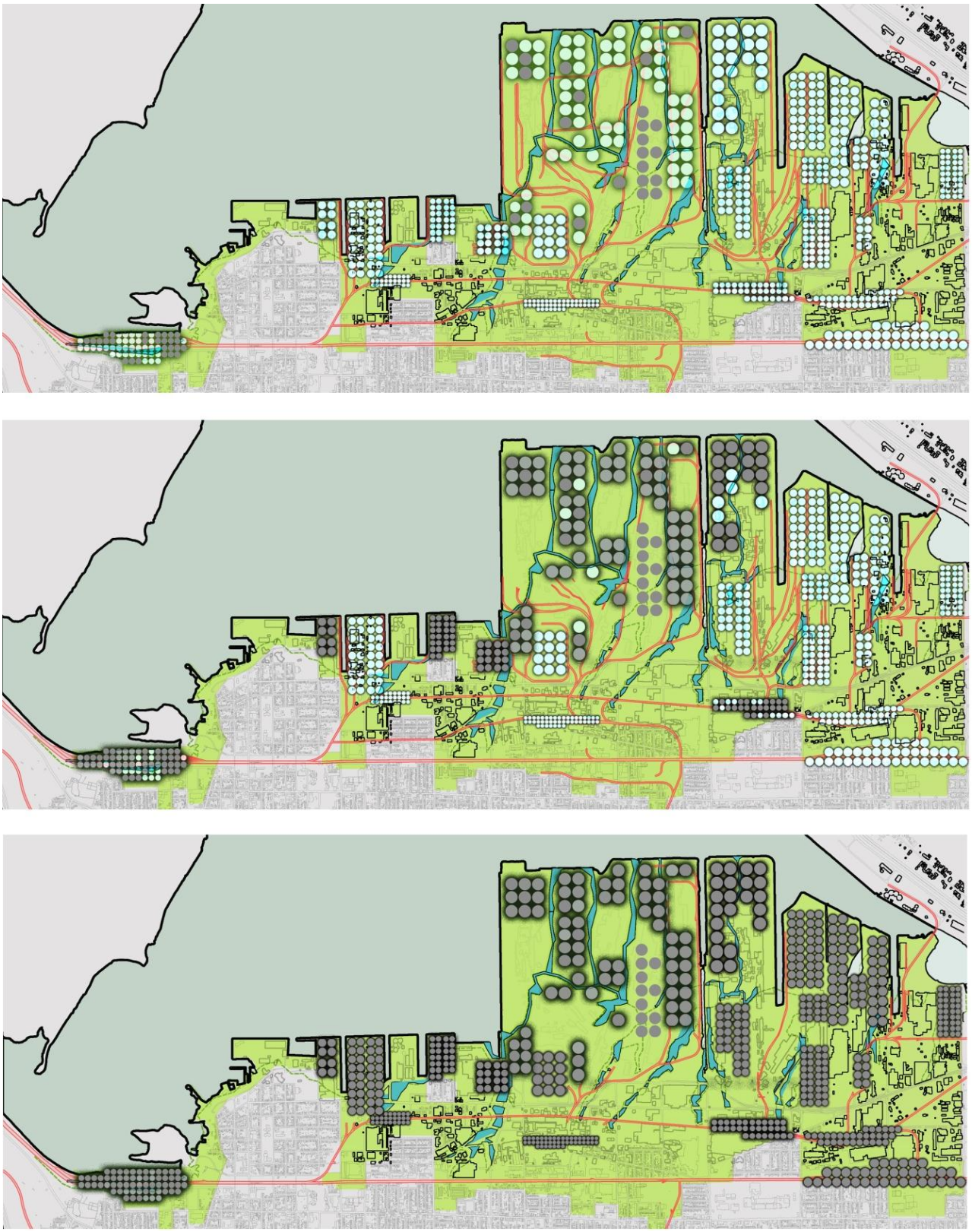


Figure 6-14 Hamilton: Progression from Phase 3-6

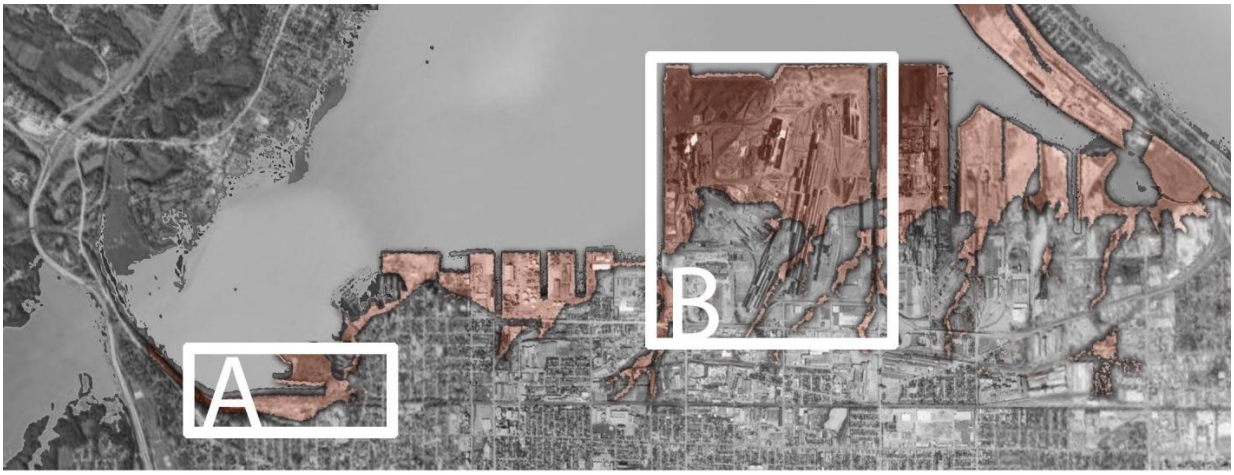


Figure 6-15 Site Examples

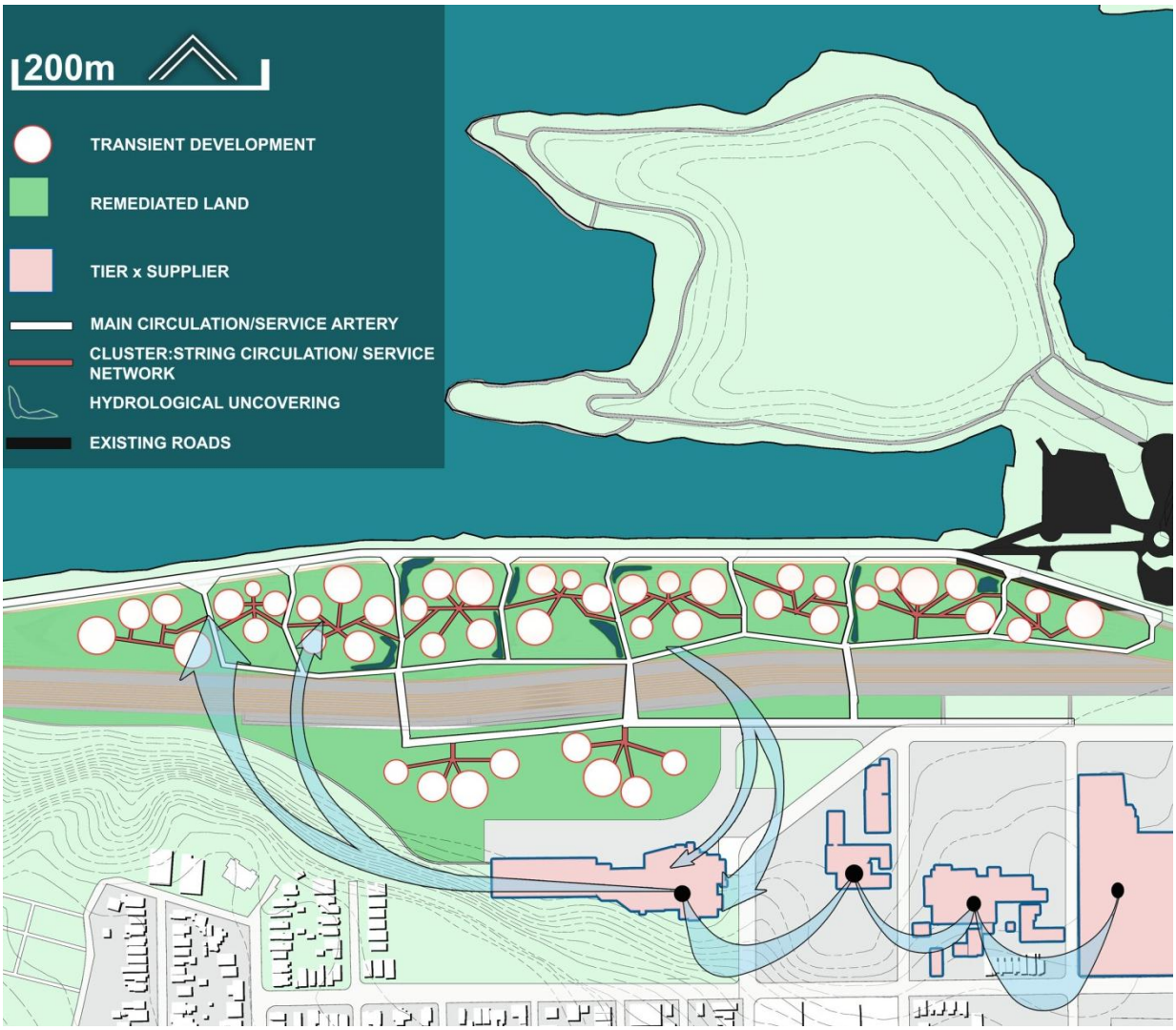


Figure 6-16 Site Example A: Bayfront Rail Yard

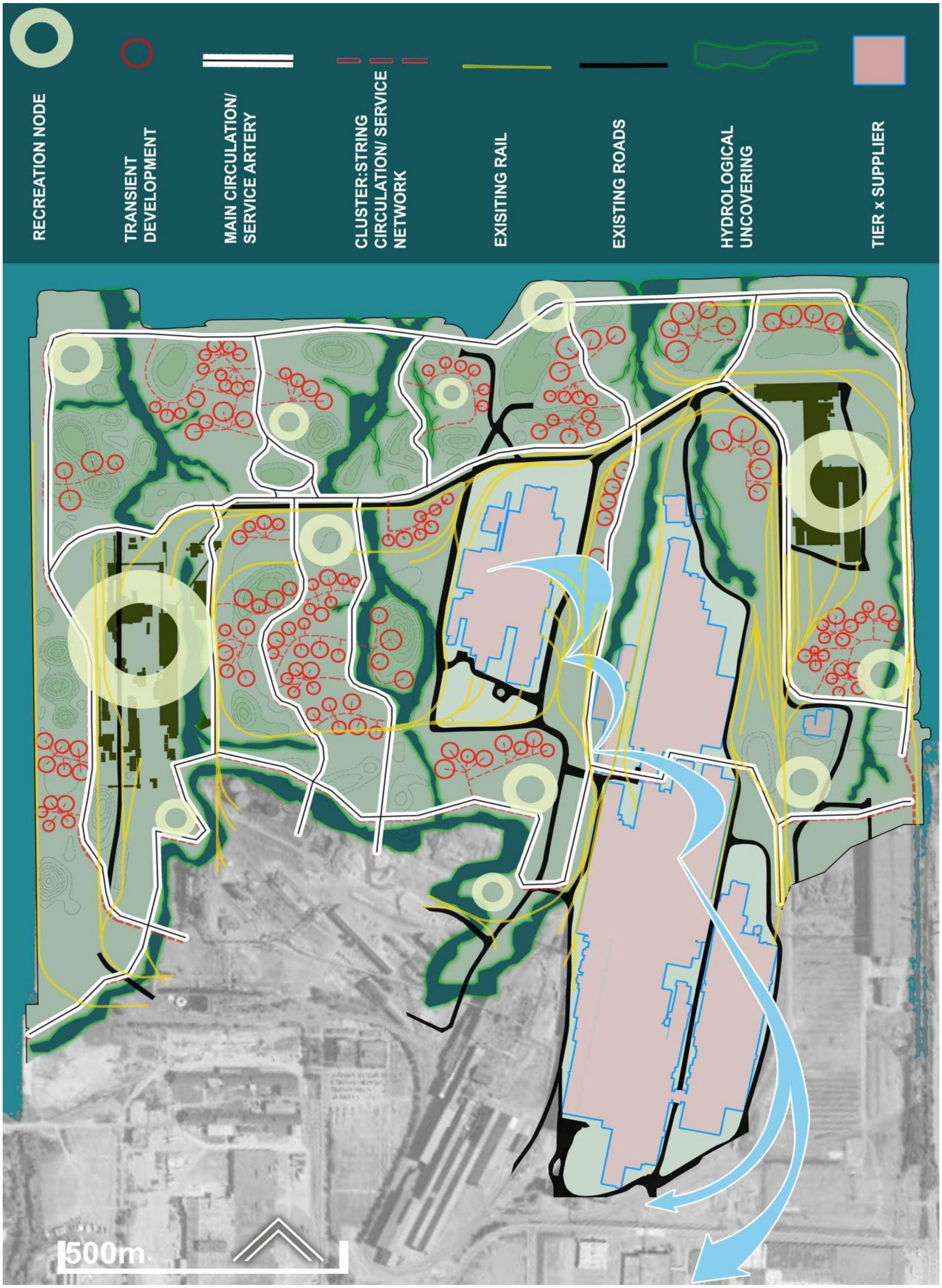

RECREATION NODE
TRANSIENT DEVELOPMENT
MAIN CIRCULATION/ SERVICE ARTERY
CLUSTER:STRING CIRCULATION/ SERVICE NETWORK
EXISITING RAIL
EXISTING ROADS
HYDROLOGICAL UNCOVERING
TIER x SUPPLIER
500m

Figure 6-17 Site Example B: Stelco Pier

Incubating a New Economy

In regard to the programmatic characteristics of these communities, the architectural system is intended to suit various programs. However, given the economic condition of these cities, the architecture would ideally facilitate the experimentation of economic endeavours. These may include the expansion of research and development initiatives tied to the educational sectors. The key item to be mentioned in regard to Hamilton, is the presence of Mcmaster University and Hamilton Health Science. Located on the west end of the city, the university is a highly recognized university in Canada especially in the fields of medical research and engineering. The University has begun to expand its research initiatives through the creation of new infrastructure. For instance, the McMaster Innovation Park has recently begun construction and will supply support space for researchers entering the city. Thus, these developments would likely cater to live-work communities that may be closely linked to the educational sector (see figure 6-18).

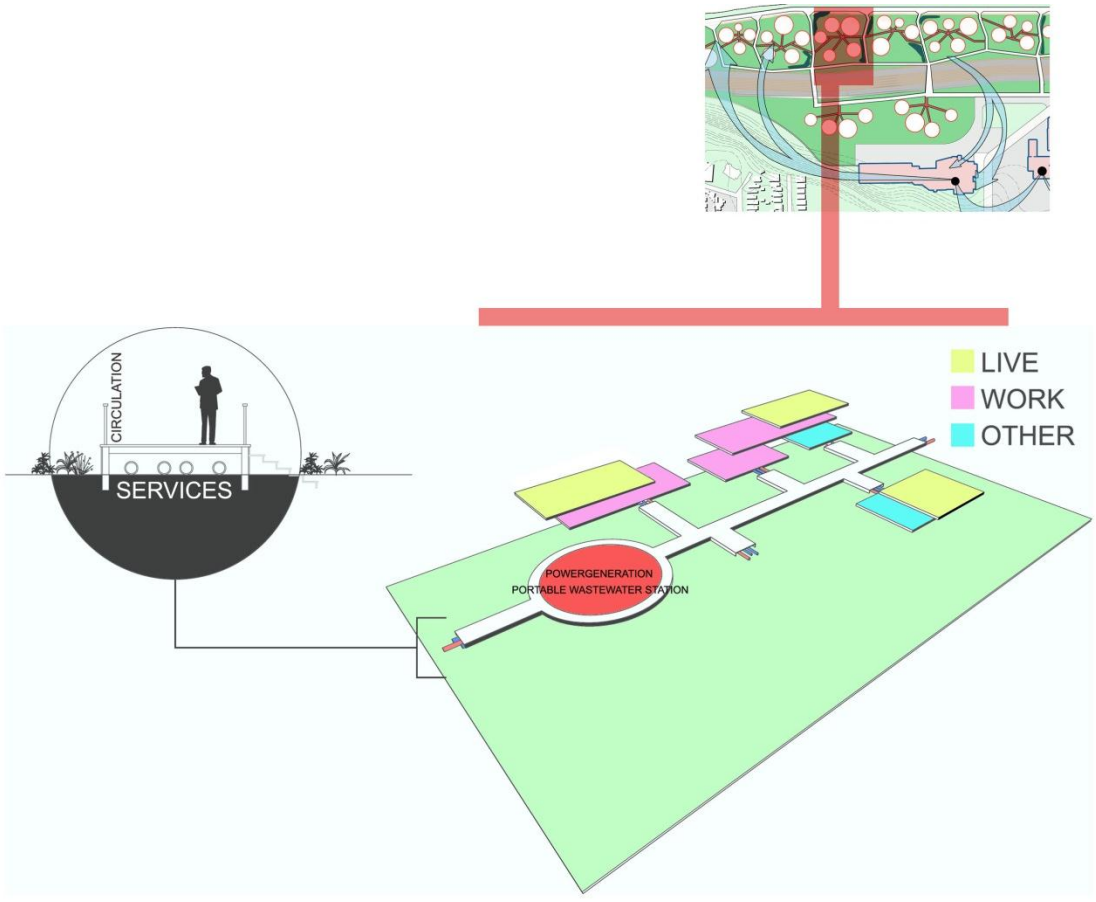


Figure 6-18 Transient Communities & Services

6.3 Transient Objects

The final subsection will now demonstrate a possible building that may emerge from this system and occupy a transient community. Given the programmatic characteristics of these communities, a live-work facility will be used to demonstrate the ideas at the architectural scale (see figures).

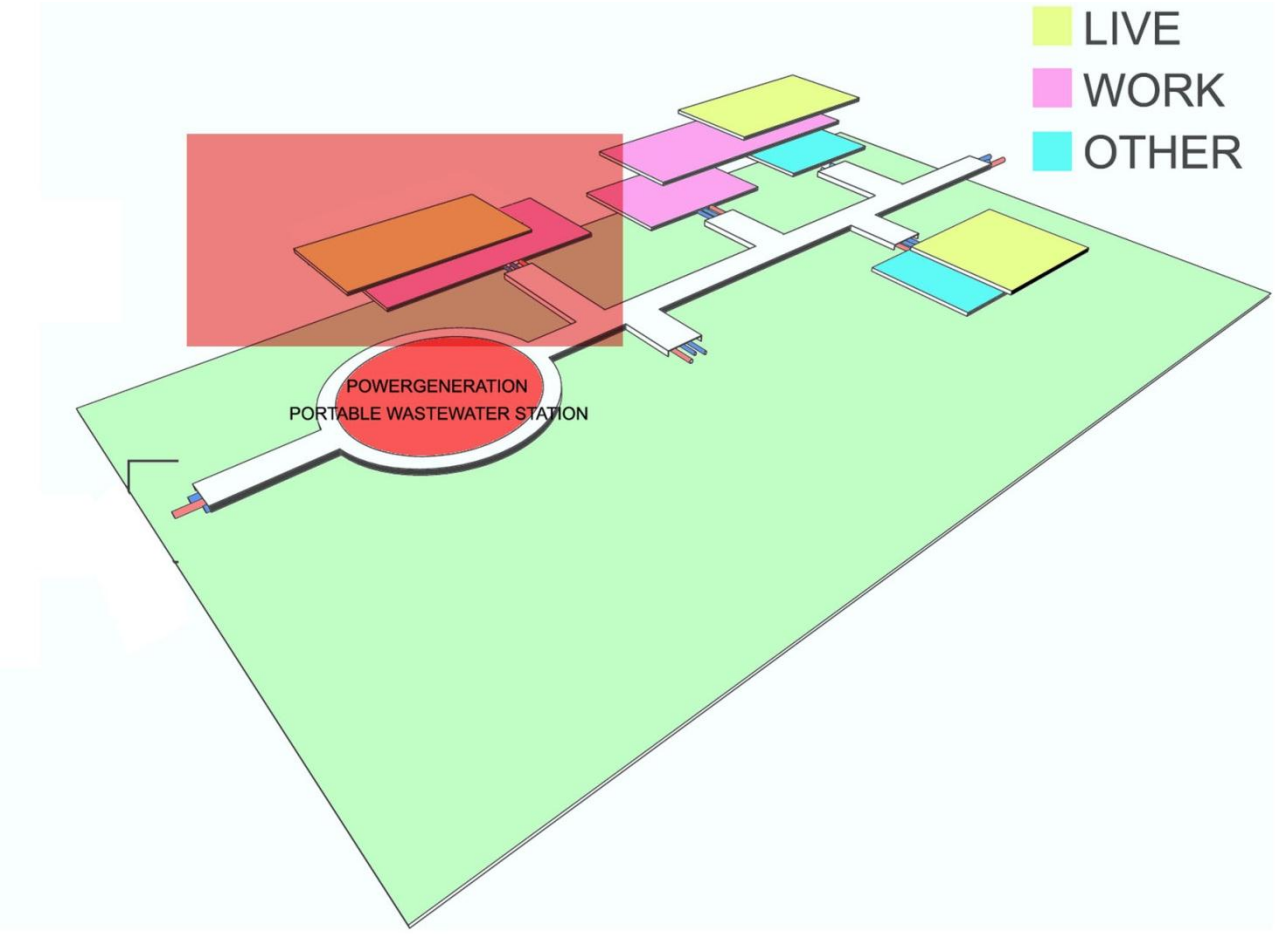


Figure 6-19 Selected Facility

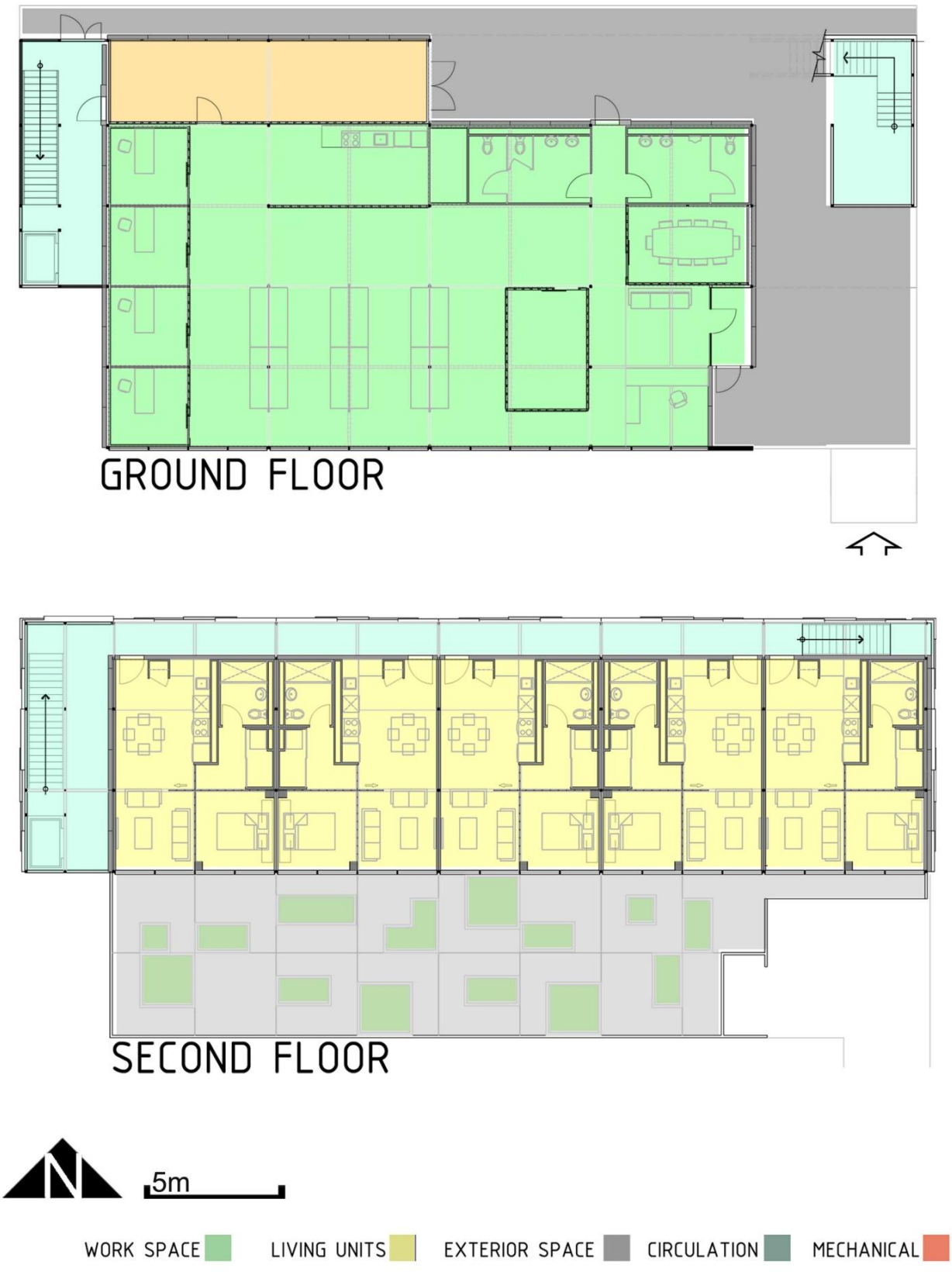
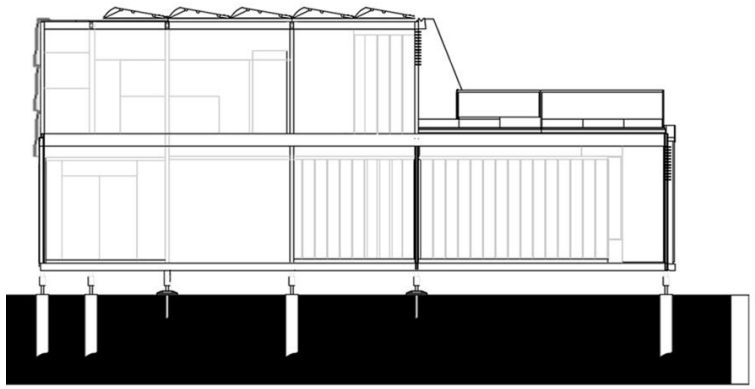
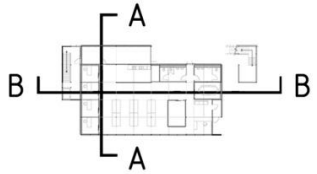


Figure 6-20 Floor Plans



SECTION A



SECTION B

Figure 6-21 Sections

Figure 6-22 Perspectives

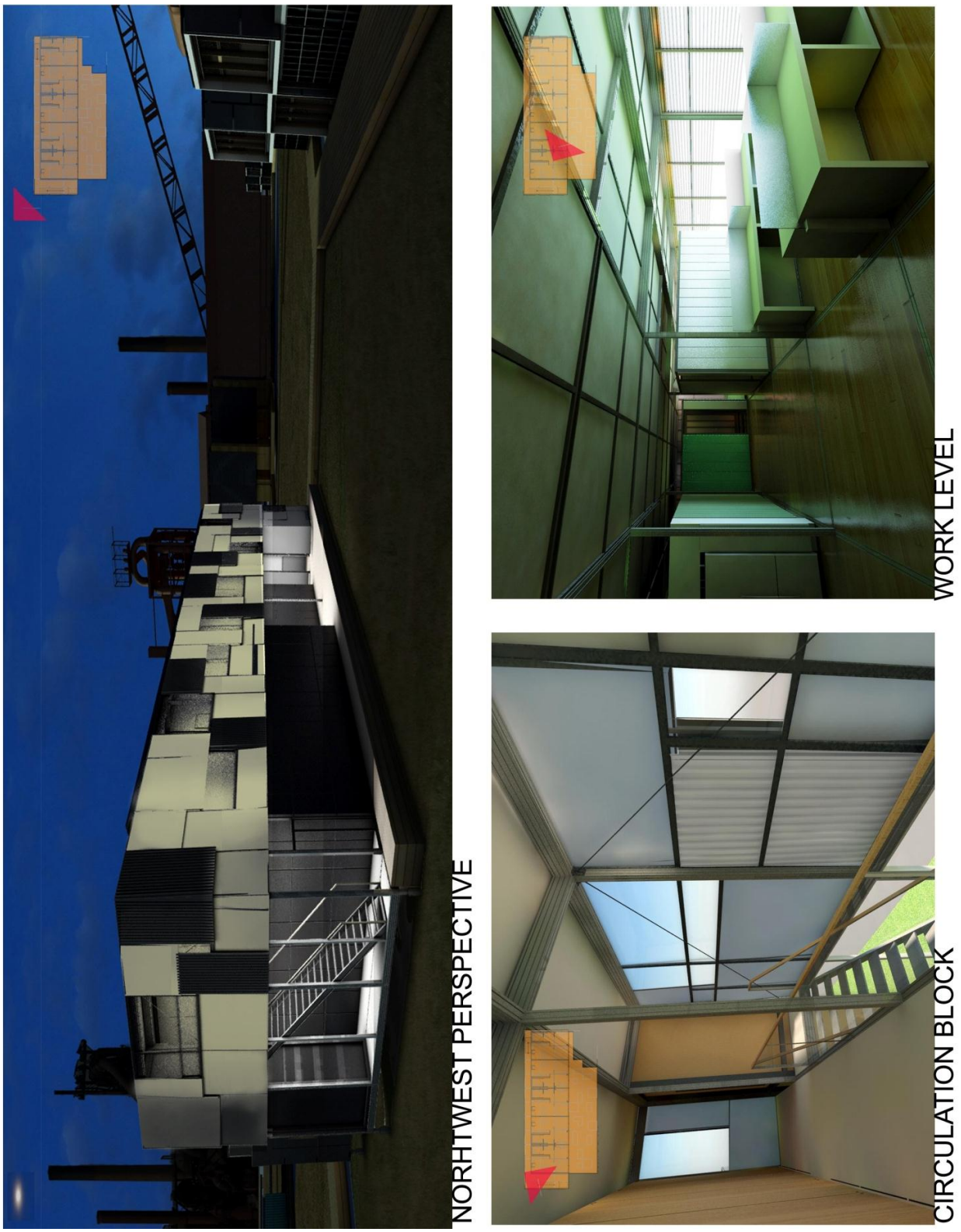


Figure 6-23 Perspectives

Architectural Platforms & Compatibility

Essentially, the building was conceived as a composition of aluminum framed platforms (see figure 6-24). The architectural platform corresponds to material and the dimensions of the structural frame. While this building focuses on platform model A-A-A (see figure 6-25), the development of a series of platforms may allow for buildings requiring other spatial characteristics, or hybrid facilities which operate on a diverse set of platforms. However the components at the lower tier levels may have be compatible with various configurations within the platform, as well as other platform types (see figure 6-26 to 6-28). The compatibility among the various elements of the architecture is heavily dependent on universal connections between the respective assemblies.

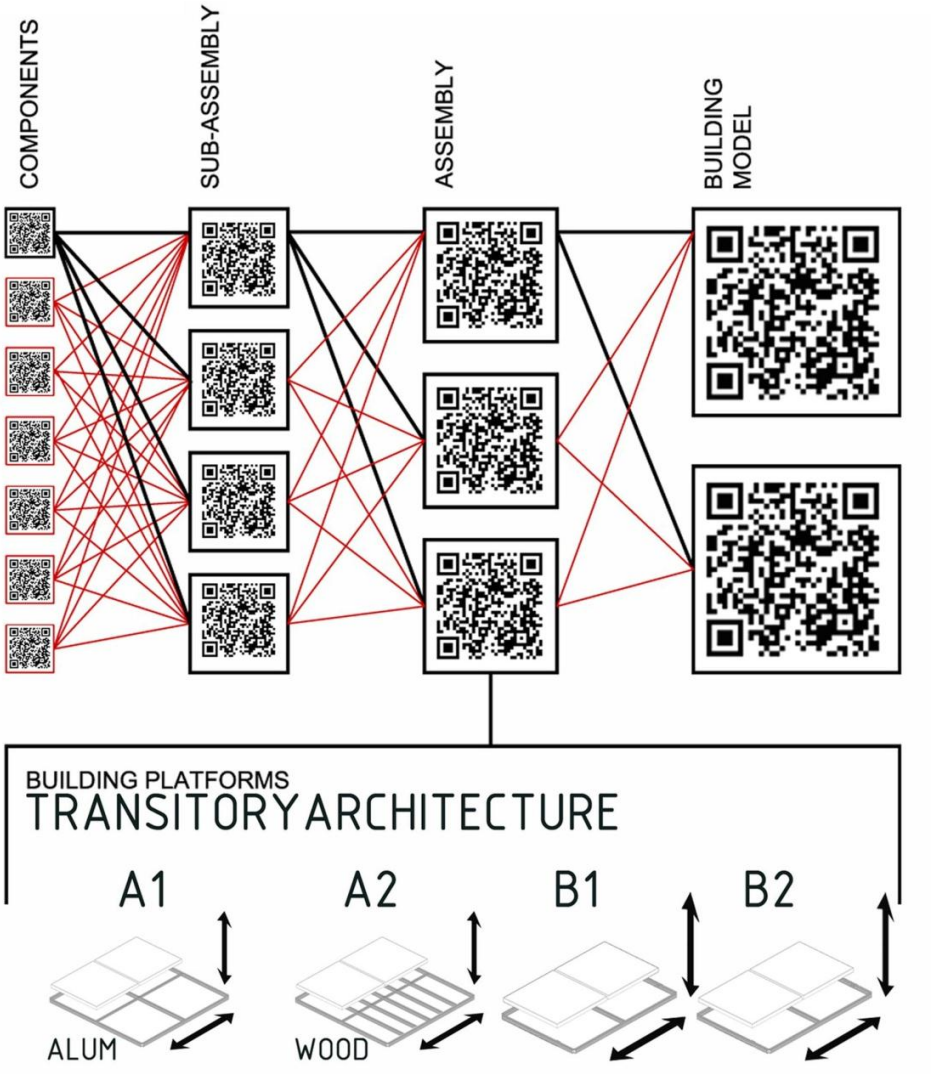


Figure 6-24 Architectural Platforms

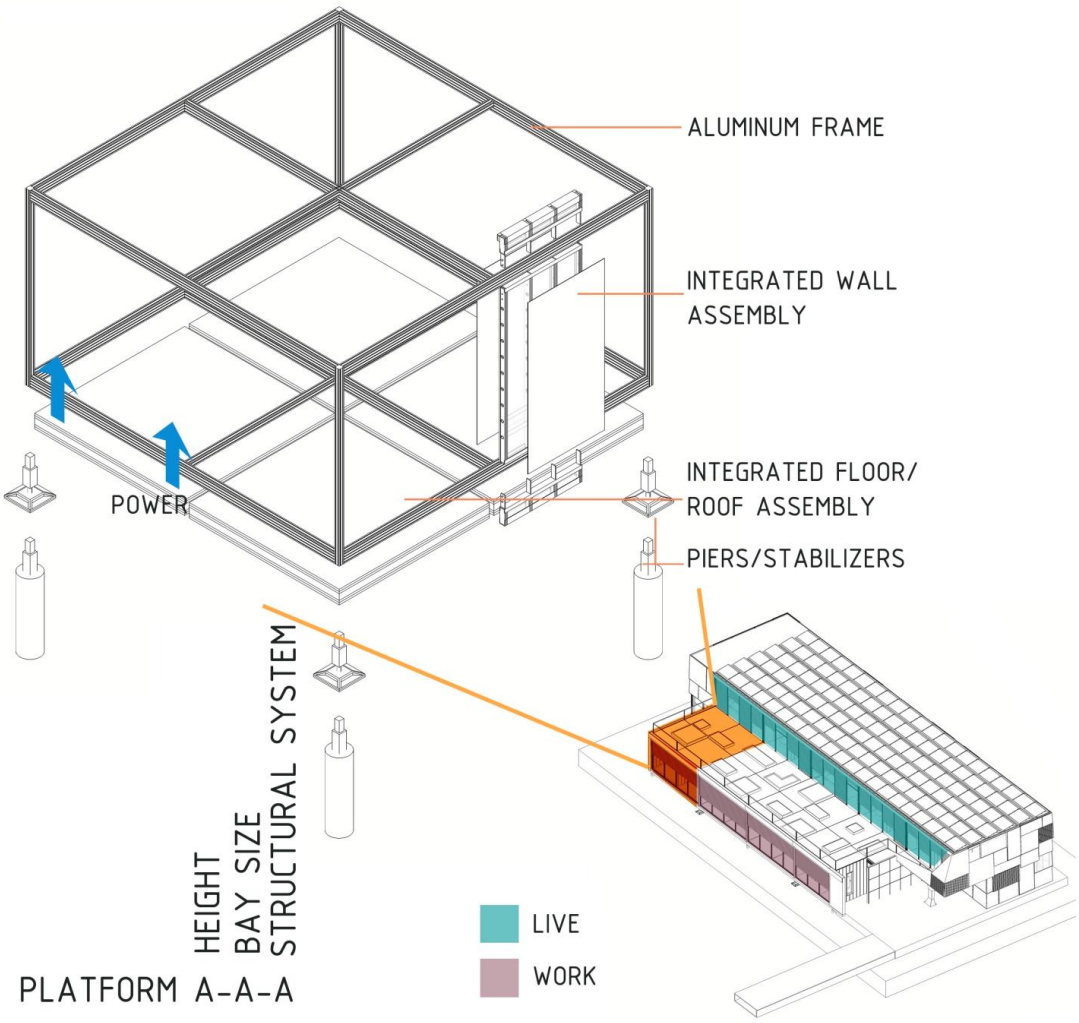


Figure 6-25 Architectural Platform A-A-A

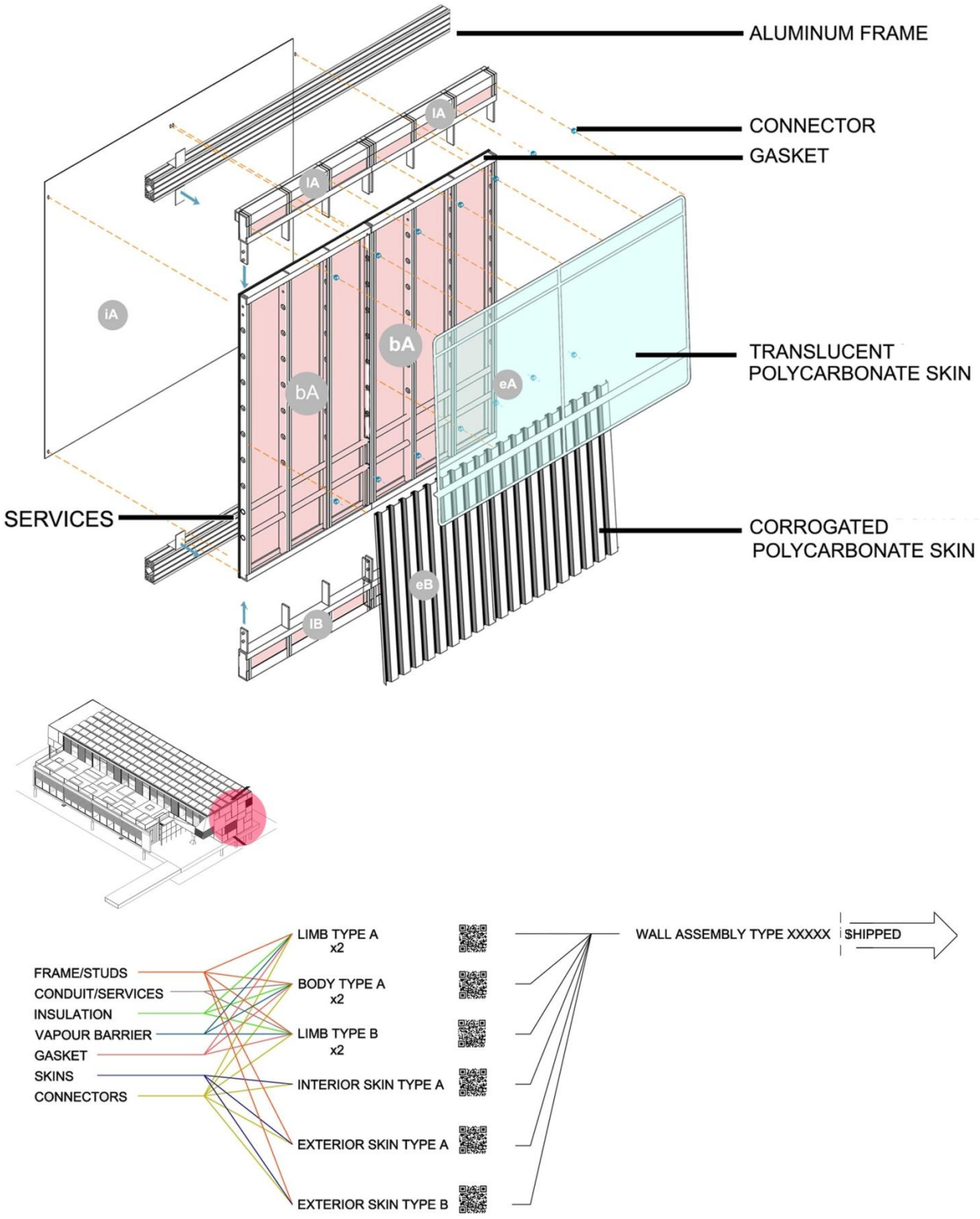


Figure 6-26 Wall Assembly Example & Tiers of Assembly

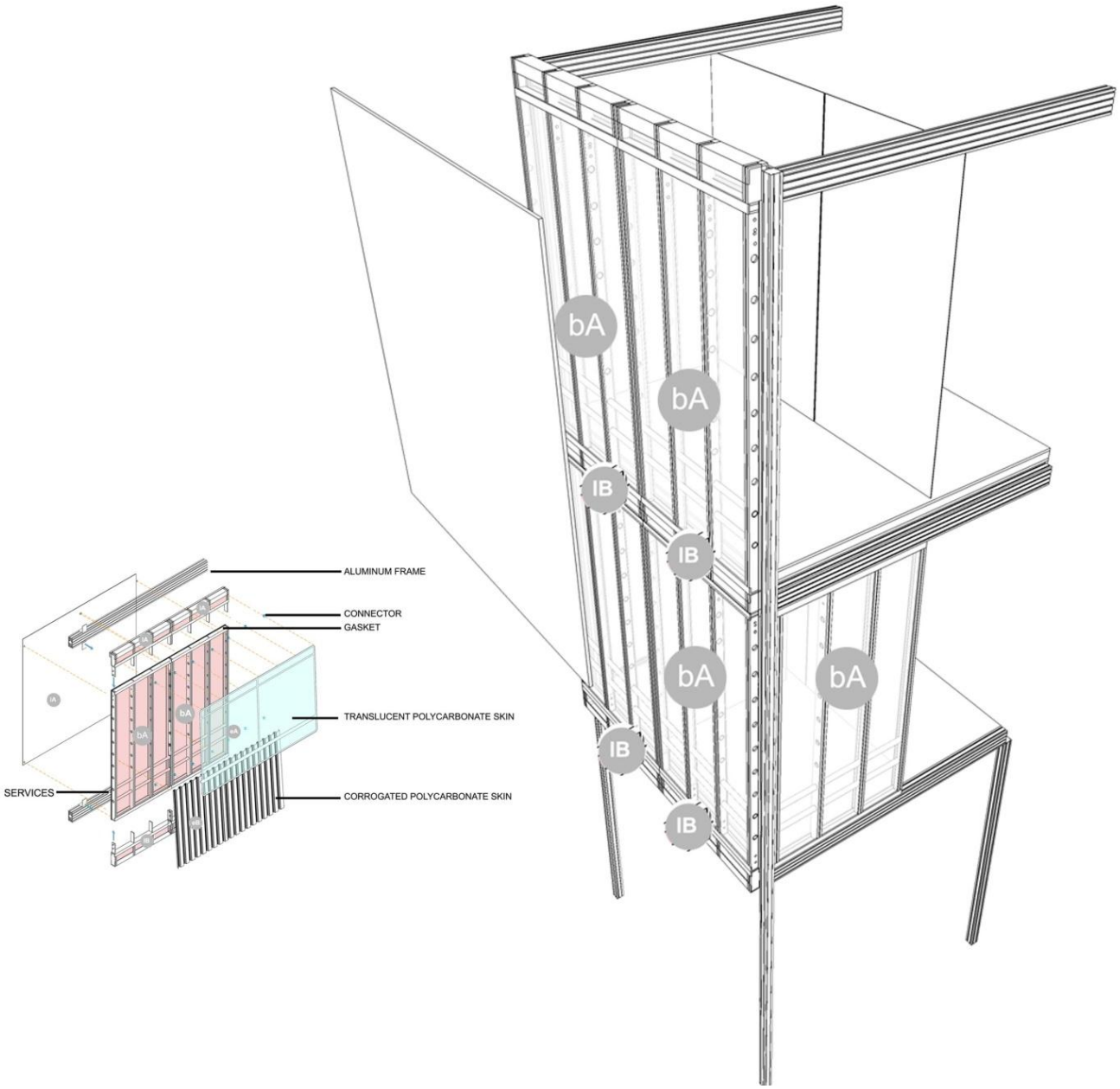


Figure 6-27 Wall Sub-Assembly: Inner-Platform Compatibility

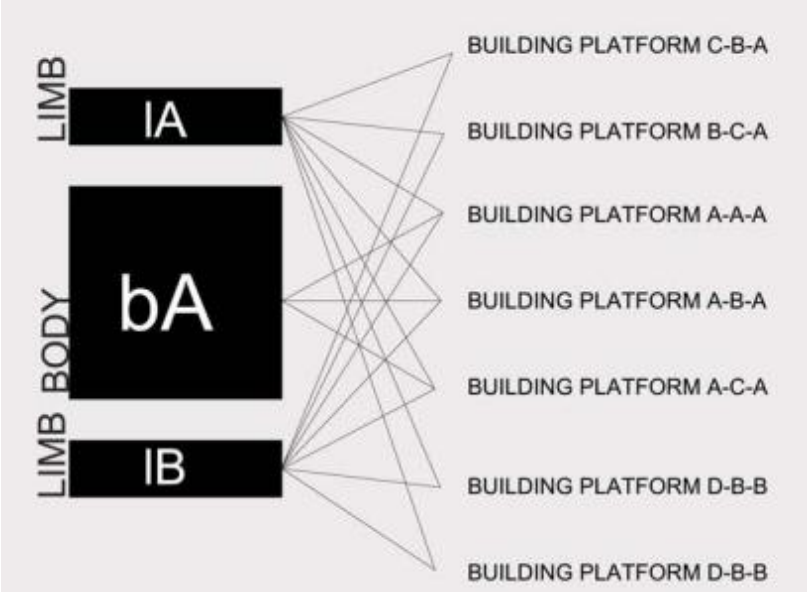


Figure 6-28 Wall Assembly: Cross-Platform Compatibility

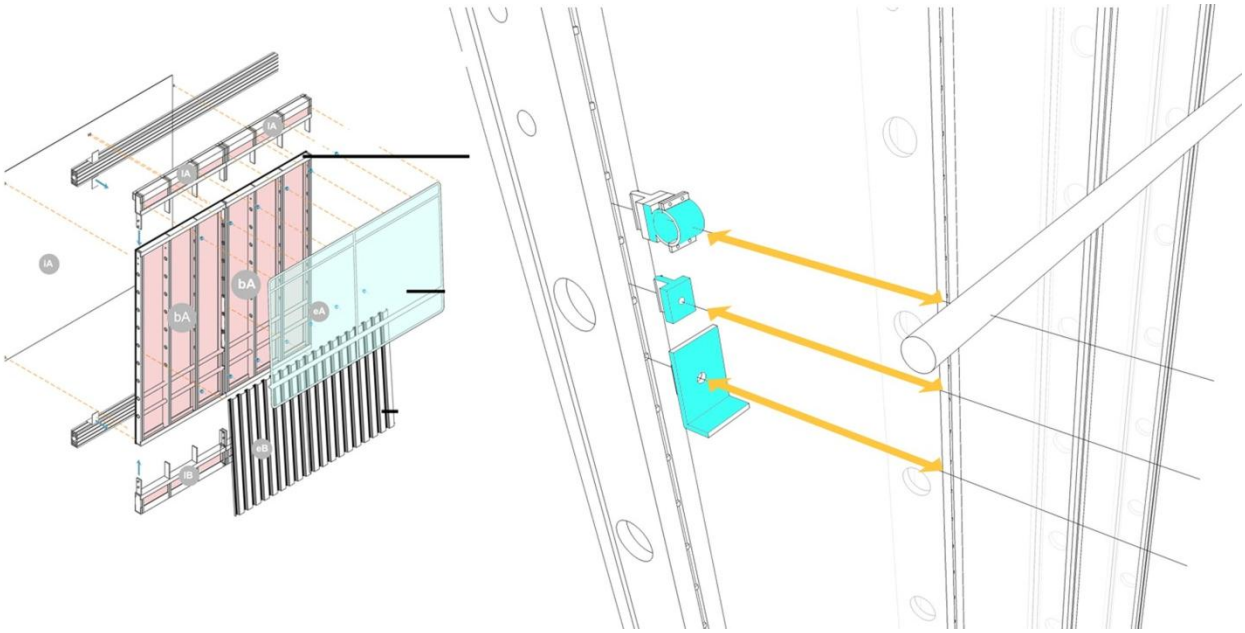


Figure 6-29 Universal Connections

The Elements of Architecture

The building is essentially the product of blocks, equipment, wall/floor/roof assemblies, skin and site. Each of these elements may be fabricated simultaneously along the supply chain system. (See figure 6-32)

Blocks:

Blocks may either be smart or dumb blocks. Smart blocks are those which contain mechanical equipment/assemblies such as mechanical rooms and bathrooms. Through the use of parametric design tools, the smart blocks include fully integrated services which simply connect to the main system. On the other hand, dumb blocks are those which purely function as spatial/program dividers. The advantage of dumb blocks is that they allow for the upmost flexibility in spatial configuration as they may be inserted, moved, or removed effortlessly.

Equipment:

Equipment is associated with assemblies such as façade systems, stairs, photovoltaic panels, temporary lifts etc. Thus elements such as the south facing assembly includes a quad glazed facade and exterior shading system.

Wall/Floor/Roof Assembly:

Like the smart blocks, the majority of the wall/floor/roof assemblies are prefabricated complete with integrated components and services. These may include conduits, insulation, vapour barriers, lightning etc. Furthermore the exterior wall assemblies integrate a gasket system similar to those use in the automotive industry as means to provide a weather seal while resisting the need for permanent connections (i.e. adhesives). The concept for the assemblies is that they may be standardized at the centre of larger assemblies, while customized assemblies occur toward the ends (i.e. corners of wall etc.) (see figure 6-29)

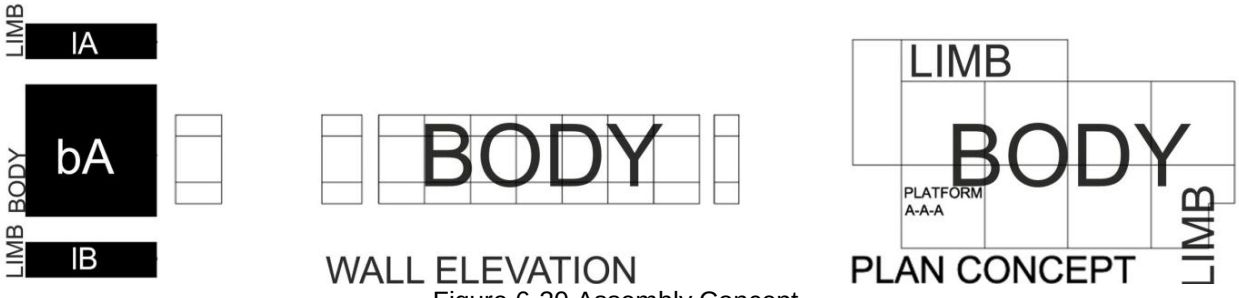


Figure 6-30 Assembly Concept

Skin:

The skin is the final layer to be added to the building. Skin elements often will be the most customized aspects of the architecture for the waterfront, ultimately providing each building with an individual identity. In the case of the prototype design, the skin system integrates a series of polymer fabric/polycarbonate scales which vary in transparency. The skin functions on three level; the first being its light weight nature and ability to be disassembled; the second function is that it acts as the weather barrier in spaces not requiring complete separation; and third is the skins ability to allow for natural lighting within the entry corridors. Furthermore, the use of parametric tools may allow for pre-fabricated architecture to be environmentally responsive. In the case of the prototype, the program, window openings, etc. were arranged to utilize the southern exposure.

Figure 6-31 Responsiveness

Site:

The final category includes those elements which require a greater need for on-site assembly. Elements such as the deck and foundation would fall into this category. In the case of the prototype, the foundation system relies on a combination of concrete piers and stabilizers to both provide structural stability while limiting the degree of permanence. Also, the deck and circulation system serves as a temporary conduit for site services which connects to a cluster-service centre (i.e. water, waste water, power).

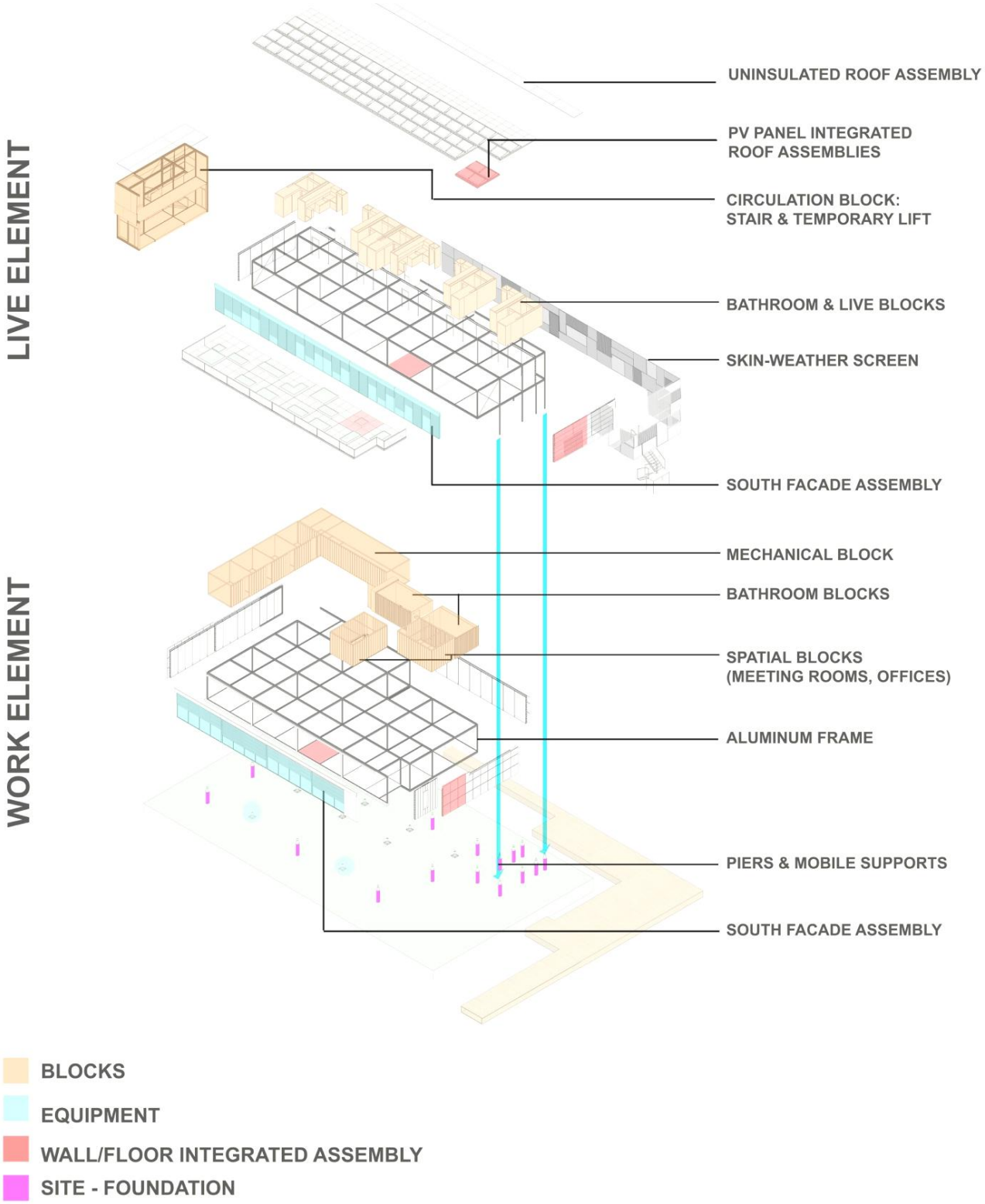


Figure 6-32 Exploded Axonometric: Elements of Architecture

Conclusions

Providing a vision for a deteriorating condition poses great difficulty. However, this project proposes that we must begin by confronting the harsh realities of the transitioning context. We must resist the temptation to conceal the realities that lie within, through forms that depict a city emanating with vigour. It will not be long before the instability of the city beneath breaks through the thin layer of aesthetic. Often, the obvious routes towards progress come with invisible costs. As Ronald Wright once suggested in *A Short History of Progress*, “progress has an internal logic that can lead beyond reason to catastrophe. A seductive trail of successes may end in a trap. (Wright, 2004, p. 4). In light of this, the designer must understand that the period of instability is an inevitable occurrence and its solution is reliant on processes beyond our grasp. We may incubate the transition, but to force its path may lead to greater turmoil. This project suggests that we may design for instability, by means of instability. The drawings and renderings attempt to convey an architectural system which operates on flexible principals as a method of lessening the burdens of failure. Contrary to flexibility, the project also suggests that the landscape revitalization be the only permanent intervention during this stage. The images depicting these architectural objects deployed throughout the waterfront begin to suggest a possible role for architecture during the initial phases of the landscape urbanist framework. The strategy of the system is based on a hybrid of knowledge stemming from the landscape urbanism and the territory concerning temporary architecture. It is built upon a reciprocal relationship between large and the small scale systems. On a final note, this project attempts re-establish the importance of the architecture object in the discourse of landscape urbanism. This is not to suggest a competitive relationship between the object and the field, but that they may emerge together so long as they both operate on the same philosophy.

7.0 References

(n.d.). Retrieved 02 02, 2011, from Stats Canada : www.statcan.gc.ca

Allen, S. (1997). From Object to Field. *Architecture After Geometry, Architectural Design, 67*(Jan-Feb), 23-31.

Allen, S. (Director). (2009). *Before And After Landscape Urbanism* [Motion Picture].

Allen, S. (2010, June 11). From Object to Field (and back). (B. I. Architecture, Interviewer)

Annette, L. (2003). *Steel and Beyond: New Strategies for Metals in Architecture.* Berlin: Birkauser.

Bell, D. (1999). *The Coming of Post-Industrial Society.* New York: Basic Books.

Berger, A. (2005). Drosscape. In C. Waldheim, *Landscape Urbanism Reader* (pp. 197-217). New York: Princeton Architectural Press.

Branzi, A. (2000). Master Plan Strijp Philips, Eindhoven. *Lotus, no. 107*, 110-123.

Branzi, A. (2003). Weak and Spread: Public Lecture at Berlage Institue. Rotterdam.

Branzi, A. (2010). For a Post-Environmentalism: Seven Suggestions for a New Athens Charter. In M. Mostafavi, *Ecological Urbanism* (pp. 110-113). Lars Müller Publishers .

Branzi, A. (2010, April). The Weak Metropolis. (H. G. Design, Interviewer)

Brikettfactory Witznitz. (n.d.). Retrieved 10 23, 2010, from Architecture Research Unit: http://aru.londonmet.ac.uk/works/witznitz

Corner, J. (2006). Terra Fluxus. In C. Waldheim, *The Landscape Urbanism Reader* (pp. 21-33). New York: Princeton Architectural Press.

Czerniac, J. (2006). Looking Back at Landscape Urbanism: Speculations on Site. In *The Landscape Urbanism Reader* (pp. 105-123). New York: Princeton Architectural Press.

Fennessy, B. (2009). *Communities and Leaders at Work in the New Economy: A Comparative Analysis of Agents of Transformation in Pittsburgh, Pennsylvania and Hamilton, Ontario.* Toronto: Doctor of Philosophy, University of Toronto.

Fortmeyer, R. (2006). Loblolly House: In Stock and Ready to Ship. *Architectural Record*, 185.

Frampton, K. (1983). Towards a Critical Regionalism: Six Points for an Architecture of Resistance. In H. Foster (Ed.), *The Anti-Aesthetic: Essays on Post-Modern Culture* (pp. 16-30). Seattle: Bay Press.

Frampton, K. (1996). Towards an Urban Landscape. *Columbia Documents no. 4*, 83-93.

Goodman, D. (2006). Mobile Architecture and Pre-manufactured Buildings: Two Case Studies. In *Transportable Environments 3* (pp. 107-113). Taylor & Francis: New York.

Gordon, J. (n.d.). *Iron and Steel Industry.*

High, S. (2003). *Industrial sunset: The making of North America's rust belt: 1969-1984.* Toronto, Canada: University of Toronto Press.

Jacobs, J. (2001). *The Nature of Economies.* Toronto: Vintage Canada.

Kieran, S., & Timberlake, J. (2008). *Loblolly House: Elements of a New Architecture.* New York: Princeton Architectural Press.

Kieren, S., & Timberlake, J. (2004). *Refabricating Architecture.* New York: McGraw Hill.

Klassen, F. (2006). Material Innovations: Transparent, Lightweight, and Malleable. In R. [. Kronenburg, *Transportable Environments 3* (pp. 122-135). New York, NY: Taylor & Francis Inc.

Kraft, E. (2002). The Yard: Railroading's Hidden Half Part I. *Trains*, 46-67.

Kronenberg, R. (2006). *Portable Architecture: Design and Technology.* Birkhauser.

Leslie, T. W. (2001). Energetic geometries: the Dymaxion Map and the skin/structure fusion of Buckminster Fuller's geodesics. *Architectural Research Quarterly Vol: 5 Issue: 2*, 161-170.

Marshall, R. (2001). *Waterfronts in Post-Industrial Cities.* New York: Spoon Press.

Melnick, Z. (Director). (2007). *The People and the Bay: The History of Hamilton Harbour* [Motion Picture].

Meyer, H. (1999). *City and port: Urban planning as a cultural venture in london, barcelona, new york, and rotterdam : Changing relations between public urban space and large-scale infrastructure.* Utrecht: International Books.

Mumford, L. (1941). *The South in Architecture.* New York: Harcourt, Brace and Company.

Mumford, L. (2007). Regional Planning . In V. B. Catizerio, *Architectural Regionalism: Collected Writings on Place, Identity, Modernity, and Tradition* (pp. 236-243). New York: Princeton Architectural Press.

North House. (n.d.). Retrieved March 21, 2011, from Team-North: www.team-north.com

Office for Metropolitan Architecture. (n.d.). *Parc de La Villette, France, Paris, 1982*. Retrieved 01 20, 2011, from OMA: http://www.oma.eu/index.php?option=com_projects&view=portal&Itemid=10&id=644

Operations, F. (2006). *Fresh Kills Park: Draft Masterplan.* New York: Field Operations.

Reed, C. (2006). Public Works Practice. In *The Landscape Urbanism Reader* (p. Princeton Architectural Press). New York: Princeton Architectural Press.

Schumpeter, J. A. (2005). *The theory of economic development: An inquiry into profits, capital,credit, interest, and the business cycle.* London: Transaction.

Shane, G. (2006). The Emergence of Landscape Urbanism. In C. Waldheim, *Landscape Urbanism Reader* (pp. 55-67). New York: Princeton Architectural Press.

Shannon, K. (2006). From Theory to Resistance: Landscape Urbanism in Europe. In C. Waldheim, *The Landscape Urbanism Reader* (pp. 141-162). New York: Princeton Architectural Press.

Shneider, T., & Till, J. (2007). *Flexible Housing.* Architectural Press.

Short, J. B. (1993). Reconstructing the Image of an Industrial City. *Annals of the Association of American Geographers, 83*(2), 207-224.

Smith, R. E. (2010). *PREFAB Architecture: A Guide to Modular Design and Construction.* New Jersey: John Wiley & Sons, Inc.

Stacey, M. (2008). Introduction. In S. Kieran, & J. Timberlake, *Loblolly House: Elements of a New Architecture* (pp. 10-14). New York: Princeton Architectural Press.

TU Darmstadt. (n.d.). *Solar Decatholon*. Retrieved 02 21, 2011, from Technische Universität Darmstadt: http://www.solardecathlon.tu-darmstadt.de/home/home.en.jsp

Waldheim, C. (2006). Landscape as Urbanism. In *The Landscape Urbanism Reader* (pp. 35-53). New York: Princton Architectural Press.

Waldheim, C. (2006). Landscape as Urbanism. In C. Waldheim, *The Landscape Urbanism Reader* (pp. 35-53). New York: Princton Architectural Press.

Waldheim, C. (2010). Notes Toward a History of Agrarian Urbanism. In M. Przybylski, & M. White (Eds.), *Bracket 1: On Farming.* New York: Actar.

Waldheim, C. (2010). Weak Work: Andrea Branzi's "Weak Metropolis" and the Projective Potential of an "Ecological Urbanism". In M. Mostafavi, *Ecological Urbanism* (pp. 114-121). Lars Müller Publishers .

Wall, A. (1999). Programming the Urban Surface. In J. (. Corner, *Recovering Landscape: Essays in Contemporary Landscape Architecture* (pp. 233-250). New York: Princeton Architectural Press.

Weilacher, U. (2008). *Syntax of Landscape: The Landscape Architecture of Peter Latz and Partners.* Berlin: Berkhauser.

Wright, R. (2004). *A Short History of Progress.* Toronto: House of Anansi Press Inc.