Relational Urbanism

A Framework for Variability

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

In a context of rapid urbanization and increasingly standardized built environments, urbanism must find new methods of creating appropriate conditions for the variability of contemporary urban life. The city, understood as a system of interconnected processes in constant change, offers a relational way of thinking about urban design. This thesis explores the concept of Relational Urbanism through a strategic design approach that engages the complexity of the site to create variability in the built environment by relating built form to landscape elements. This relational approach has particular potential in post-industrial sites, where challenging existing conditions and processes of remediation resist conventional methods of redevelopment. The thesis focuses on the Toronto Port Lands as a testing ground for this design approach, drawing on the site's built heritage to develop a landscape framework and a set of relational rules that will guide the emergence of a diverse urban environment able to change over time. A series of design strategies—remediation parks, urban delta, adapted industry, and differentiated fabric—rethink the challenges of the site as opportunities for public benefit, creating a variegated landscape for built form to respond to. In contrast to a singular static master plan, this method favours multiple flexible strategies that can be deployed incrementally, breaking down the scale of development and allowing it to be realized by a wide variety of stakeholders. Through this approach the thesis seeks to enable the city to intentionally but subtly guide its urban landscape toward diversity and allow its citizens to participate in its continued adaptation.

ACKNOWLEDGEMENTS

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My family has been extremely supportive and I would not have been able to finish this without their motivation. Thank you mom and dad for the interesting discussions and constant encouragement.

DEDICATION

To my family

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LIST OF ILLUSTRATIONS

Images by author unless otherwise noted

GLOSSARY

Relational

adjective

1. concerning the way in which two or more people or things are connected

Variable

adjective

1. not consistent or having a fixed pattern; liable to change

2. able to be changed or adapted

noun

3. an element, feature, or factor that is liable to vary or change

Diverse

adjective

1.showing a great deal of variety; very different:

Adaptable

adjective

1.able to adjust to new conditions relational

fig. O-1 Toronto's Waterfront Development

INTRODUCTION

"The city is becoming less the result of design and more the expression of economic and social forces. The size of contemporary urban agglomerations means that no single authority controls the form of the city. A mixture of bureaucracy and market forces defines the form of the city."

- Richard Marshall, Waterfronts in Post-Industrial Cities

The contemporary city is characterized by increasing complexity and accelerating pace of change, yet its built environment is becoming ever more standardized as a result of rapid urbanization, globalization, and the dominance of development economics in city building. In this context, contemporary urbanism must provide new ways of conceptualizing the city and intervening in its processes of transformation in order to create suitable conditions for our time. The dynamic interrelated forces that shape the city offer a relational way of thinking about contemporary city building, informing alternative urban design methods to traditional master planning. This thesis explores Relational Urbanism as a design approach that engages the site's specific conditions for generating diverse and adaptable urban landscapes. The thesis looks at post-industrial landscapes as sites of heightened complexity and uncertainty that resist conventional practices of urbanization and provide opportunities for this kind of approach, through their industrial heritage and processes of reclamation. Taking the Toronto Port Lands as a case study, the design proposal illustrates the implementation of this relational approach as a multilayered strategic design methodology that relates built form to systems of landscape infrastructures and built heritage, to create urban built environments that are more in tune with the heterogeneity and variability of contemporary life.

Cities are growing at an unprecedented rate as a result of the largest urban migration in human history.[1] The world population has is expected to grow from seven billion to nine billion people by 2050. Seventy percent of them are expected to live in cities.[2] Doug Saunders argues that this massive urban migration will have serious implications for the contemporary city, creating increasingly complex social and political conditions that will be dangerous for current planning policies to ignore.[3] The rapid pace of this global wave of urbanization is dramatically

fig. O-2 Urbanization in Beijing

fig. O-3 Urbanization in North Las Vegas

altering the urban landscape, producing increasingly homogeneous built environments. Several authors have written about the ubiquitous sameness of contemporary urbanization, attempting to reveal the processes and underlying forces that produce it. In his essay "Towards a Critical Regionalism: Six Points for an Architecture of Resistance", Kenneth Frampton describes the global phenomenon of architectural standardization as a result of the efficiencies of mass production and globalization of modern culture.[4] In a similar vein, Pier-Vittorio Aureli writes about the pervasive uniformity of contemporary urbanization that colonizes the landscape, arguing that processes of urbanization have become so interlaced with capital accumulation that the resultant built environment is merely a physical manifestation of the economic forces that drive its propagation and the bureaucracies that support it.[5] Both authors argue for an architecture of resistance to the dominant forces of ever-expanding urbanization, making the case for formal autonomy and site specificity. James Corner and Christophe Girot try to situate their landscape design practices in a seemingly automated context of contemporary urbanism, driven by economic and political forces producing urban environments that are not the outcomes of any intentional design. James Corner argues that "vast developer-engineering corporations are constructing today's world with such pace, efficiency, and profit that all of the traditional design disciplines are marginalized as mere decorative practices, literally disenfranchised from the work of spatial formation."[6] Christophe Girot echoes this line of thinking, writing that "the contemporary city is no longer the product of a single thought or plan, the vision of some prince, but rather the diffuse result of successive layers of decisions rarely having anything to do with each other…The aesthetic of the city at present, if one can still speak in such terms," Girot adds, "results at best from an *ad hoc* process, where older landscape identities collide relentlessly with

fig. O-4 Diverse urban environment, Christianshavn, Copenhagen

the harsh imperatives of land value, development, productivity, and mobility."[7] Although the physical form of the city has become increasingly homogeneous, the forces and processes that shape it have become more complex. Therefore in order to intentionally intervene in its future, the contemporary city must be understood as a system of interrelated forces underlying its production and regulatory structures that support them.

Many theories have interpreted the contemporary city as complex system, analyzing the relationships between the underlying ecological, social, economic, and political forces involved in its production, in order to better understand how to intervene on it. Through many of these interpretations it becomes evident that the richness and urbanity of the city are not direct products of design but rather characteristics of the diversity produced by the dynamic interaction of many forces and agents interacting over time. Diversity is the underlying condition of the city's social, political, and architectural qualities and the key for its sustainability. Patsy Healey argues that multiplicity and diversity are essential drivers of distributive justice, environmental well-being and economic vitality, giving cities their 'livable' quality.[8] Michael Hough furthers this view arguing that "diversity is (both) ecologically and socially necessary to the health and quality of urban life"[9]. The greater the variety of ecological and social conditions in cities, the higher the chances of adaptation and long-term sustainability. In a recent lecture on "The City as a stage", Richard Sennett argued that urban diversity—the condition of frequently encountering unfamiliar environments and people different from ourselves—is essential to the development of human cognition and its ability to interpret a changing environment.[10] Diversity is therefore a vital prerequisite for urban dwellers' ability to adapt to change, and as a result, it is key to the city's long-term sustainability. The accelerating pace of environmental, economic, and

social change of the contemporary world demands a higher degree of flexibility and adaptability of cities in order to endure an unpredictable future. These challenges render traditional master planning methods obsolete, and demand new approaches that are more variable and open to change. Variability provides both spatial diversity and temporal adaptation, and is therefore a useful concept for contemporary urbanism to aim for. The standardization of the urban built environment is incompatible with the contemporary city's increasing complexity, rapid change, and heightened need for adaptability, making it unsustainable for the city's uncertain future. Our urban theories must be mobilized to inform new methods of urban design in order to produce more variable built environments that are appropriate to the demands of our time.

The *relational* is a concept that has emerged to express the growing interconnectedness of the processes that shape our world, and has been adopted from art to architecture to planning and parametric urbanism to devise practices that engage the relationships between people, processes, and urban variables in the production of work that is more relevant to the contemporary context. Learning from this relational understanding to the city, this thesis reinterprets the concept of Relational Urbanism through a strategic design approach that rethinks a site's complexity as an opportunity for urban variability. The thesis argues that the richness and diversity of the city cannot be designed directly but can only be guided by establishing differentiated site conditions and simple rules and allowing it to emerge through participation by as many different stakeholders as possible. Drawing a relationship between site conditions and built form, the design strategy composes a landscape framework based on existing site elements, and creates a system of relational rules that generate diverse architecture in response to various site conditions. Rather than feeding these rules through a computer to

fig. O-5 Manufactured Landscapes: Bao Steel in Shanghai, China, Edward Burtynsky

fig. O-6 Packard Plant, Detroit

generate development scenarios like parametric urbanism methods that have claimed the name of Relational Urbanism as their own, this approach relies on the creativity of the many stakeholders involved in large urban projects to interpret the rules and further differentiate and enrich the resulting built environment. The site strategies leverage existing conditions and problems such as soil toxicity and flood protection as opportunities to create public space, while the built form strategy limits large scale standardized private development, encouraging a more fine-grained, diverse and dynamic urban environment that is particular to its site. In contrast to a master plan, the strategies are flexible and implementable incrementally over time, breaking down the scale of development and investment to engage a variety of actors in the process of the site's transformation, thereby encouraging emergent variation and change. This approach ultimately aims to empower the city and its users to have a more active role in the production of their urban environment, prioritizing quality of life, social equality and sustainability rather than development efficiency and profit.

Although Relational Urbanism is a method meant for all urban landscapes, it is perhaps most clearly applicable to post industrial landscapes. These are sites of heightened complexity in more urgent need of this kind of approach. They not only provide valuable territories for city building, but also inherently resist conventional forms of urbanization, as a result of their vast scale and challenging existing conditions, which slow the pace and complicate the process. These sites are loaded with difficult problems: contaminated soils, hydrological problems, and obsolete industrial ruins to be negotiated and reinterpreted. They are fissures in the urban fabric, central yet alienated from the rest of the city. Antoine Picon writes that "these waste landscapes embody the inherent anxiety of our technological age, in which humans are profoundly transforming the environment

fig. O-7 Toronto Port Lands Site in its strategic location on the harbour

at an unprecedented rate and heading toward an uncertain future.[11] Tim Edensor argues for the aesthetic value of industrial ruins as expressions of otherness from the ordered city, palimpsests of memory, and tactile embodiments of time.[12] These ruins preserve the collective memory of the city's industrial past, and have cultural value despite their marginal status.[13] The reclamation of such sites poses significant challenges for contemporary urban design in their physical remediation and appropriation for new uses and in the necessary reinterpretation of their identities.

As a result these sites have predominantly been treated as places of little value, and their differences have been viewed as problems to be fixed, wiping the slate clean so that conventional ideas of urbanism can be implemented. Ignazi de Sola-Morales saw potential in the inherent differences of these sites, which he called *terrain vague*. He argued that rather than 'solving' a place's problems through design, architects should fight to keep the differences of terrain vague as architectural opportunities, designing to resist planned continuity.[14] Alan Berger calls these sites *drosscapes,* and sees them as dynamic entities in a constant state of change, suggesting that they offer unique opportunities for "new landscape design practices that concurrently clean up contamination during redevelopment, or more notably where reclamation becomes integral to the final design process and form."[15] In order to take advantage of their opportunities, these sites demand a relational way of thinking that productively uses the complexity of their problematic conditions and interrelated processes of transformation for generating diverse urban fabric. By reconceptualising their differences as opportunities, these sites have the potential to act as catalysts for advancing contemporary landscape and urban design practice toward variability. Post-industrial sites have the capacity to simultaneously embody collective memories

of the past, reflections of the present and aspirations of the future. Tracing their multilayered identities to guide the dynamic processes of their transformation over time creates the possibility for truly resilient and meaningful contemporary urbanism.

This thesis focuses on the Toronto Port Lands, a vast post-industrial landscape on the city's harbourfront that is planned for redevelopment, as an ideal testing ground for the strategies of Relational Urbanism. Toronto's current rapid urban intensification, loosely regulated through negotiable zoning practises, is encroaching onto the waterfront, producing a standardized environment of condo towers that is the result of development economics more than that of an purposeful vision by the city or its citizens. Waterfront Toronto's attempts to plan the waterfront intentionally through award-winning master planning are difficult to implement due to the financial limitations of the city, and become dependent on negotiation with large scale development in order to fund the public realm and infrastructures prioritized by the design. As a result, the diversity of the built environment is compromised for idealized visions of public space, ending up with the same homogenous built form as the rest of the city centre. The Toronto Port Lands - a post-industrial hybrid landscape of abandoned infrastructures, remaining industries, city services, and recreational uses on the lakefront - provides an opportunity for a different model of urban development that is resonant with the site's character and history and creates the conditions for future variability. The scale and complexity of the site resist a totalizing fixed plan, demanding a more flexible, dynamic, and strategic long-term approach.

This thesis proposes a series of design strategies - remediation parks, urban delta, adapted industry, and differentiated fabric - to rethink the challenges of the Port Lands site as opportunities for public benefit, reusing its existing built heritage and infrastructures to create a diversified landscape for built fabric to respond to. By relating built form to landscape elements through a series of rules, and allowing a variety of agents to participate in the process, the proposal establishes the prerequisites for diverse and dynamic urbanism to emerge and change over time. The design offers an alternate vision of the Port Lands as a dynamic urban landscape in a constant state of change, in which persisting industry, remediation, new infrastructure and urban development simultaneously coexist, responding to each other and adapting to changing circumstances. Through the transformation of the Port Lands, this thesis demonstrates an approach to city building consistent with the variability of our contemporary context.

fig. O-8 Bike Tour of Self-Build floating houses on Ijburg, Amsterdam

Structure & Methodology

The thesis is comprised of three chapters providing the theoretical background, site context and strategic design proposal to support an exploration of Relational Urbanism and illustrate its speculative implementation on the Toronto Port Lands site.

The first chapter considers several urban design theories and precedents that have informed and influenced the ideas of the proposed approach. The second chapter investigates the Toronto's current development context and the Port Lands site: its history, existing conditions and issues, the on-going planning process for its future, and the potential for an alternate vision. The third chapter illustrates the relational approach by proposing a series of design strategies that re-conceptualize the site's key issues as opportunities for diversity. It establishes a landscape framework based on existing built heritage and infrastructures, and a system of rules that relate built form to landscape elements, creating the conditions for variable emergent urbanism on the Port Lands.

The research for the thesis has been informed by a combination of academic readings and design research, as well as engagement with the real world, through work experience, travel, and discussions with professionals involved in urban development. My internship at planning Alliance in 2011-12 provided valuable insights to help me better understand Toronto's development context, through involvement in several urban projects and discussions with colleagues from various disciplines. I also travelled to the Netherlands, Germany, Denmark, Sweden, and England to visit several post-industrial sites in the process of redevelopment, as precedents to inform my thesis. Speaking with professionals involved in the projects, I learned more about their processes of design and

implementation, and observed their diverse outcomes. All these sources have contributed to a more grounded understanding of contemporary urbanism practice, in comparison to theory.

The research for the first theoretical chapter has been based on critical readings, lectures, precedent research and travel, and discussions with professors. The research for the site chapter was based on readings of the site's history and planning process, multiple site visits, photography and mapping, attendance of public meetings, and discussions with developers and professionals involved in its management and redevelopment. The research for the design has been drawn from readings, precedent research and travel, all used as resources to inform the strategies.

Together, the research and design make the case for a different approach to urbanism that productively makes use of the relationships of the processes and agents involved in contemporary city building to generate diverse urban landscapes. These diverse environments in turn support the complex social relations of urban life and enable adaptation to future change.

Endnotes

[1] *Doug Saunders, Arrival City : The Final Migration and our Next World* (Toronto: A. A. Knopf Canada, 2010).,1.

[2] "Urban Population Growth." *WHO*. accessed 13 Nov. 2012, http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/index.html

[3] Saunders, *Arrival City: The Final Migration and our Next World*, 2.

[4] Kenneth Frampton, "Toward a Critical Regionalism: Six points for an architecture of resistance," *Postmodernism: a reader* (1993): 268.

[5] V. Pier Aureli, "Toward the Archipelago," *IN LOG* 11 (2008), 91-120.

[6] James Corner, "Terra Fluxus," in *The Landscape Urbanism reader*, ed. Charles Waldheim (New York: Princeton Architectural Press, 2006), 21-33.p.27.

[7] Christophe Girot, "Vision in Motion: Representing Landscape in Time," in *The Landscape Urbanism reader*, ed. Charles Waldheim (New York: Princeton Architectural Press, 2006), 87-103.p.89-91.

[8] Patsy Healey, *Urban complexity and spatial strategies: towards a relational planning for our times*. Vol. 14. (New York: Routledge, 2007), 268.

[9] Michael Hough, *Cities and Natural Process : A Basis for Sustainability* (London: Routledge, 2004).,6.

[10] Richard Sennett, "City as Stage," Lecture and discussion, Luminato Evening Illuminations, Bell Lightbox Toronto, June 14, 2013.

[11] Antoine Picon and Karen Bates, "Anxious Landscapes: From the Ruin to Rust," *Grey Room* (2000), 64-83.,79.

[12] Tim Edensor, *Industrial Ruins : Spaces, Aesthetics and Materiality* (Oxford: Berg, 2005).,72.

[13] Marc, Treib, "Remembering Ruins, Ruins Remembering,"Spatial Recall: *Memory in Architecture and Landscape*. (New York: Routledge, 2009).

[14] Alan Berger, *Drosscape : Wasting Land in Urban America* (New York: Princeton Architectural Press, 2006b).,34.

[15] Alan Berger, "Drosscape," in *The Landscape Urbanism Reader*, ed. Charles Waldheim (New York: Princeton Architectural Press, 2006a).p.209.

"Cities are not static objects, but active arenas marked by continuous energy flows and transformations of which landscapes and buildings and other hard parts are not permanent structures but transitional manifestations."

- Alan Berger, Drosscape

CHAPTER 1 : THEORY

Relational Urbanism

"Whether it's population, ocean temperature, energy consumption, or atmospheric gases, the speed of the material relations of human life find themselves ultimately approaching an asymptote."

-Seth Denizen

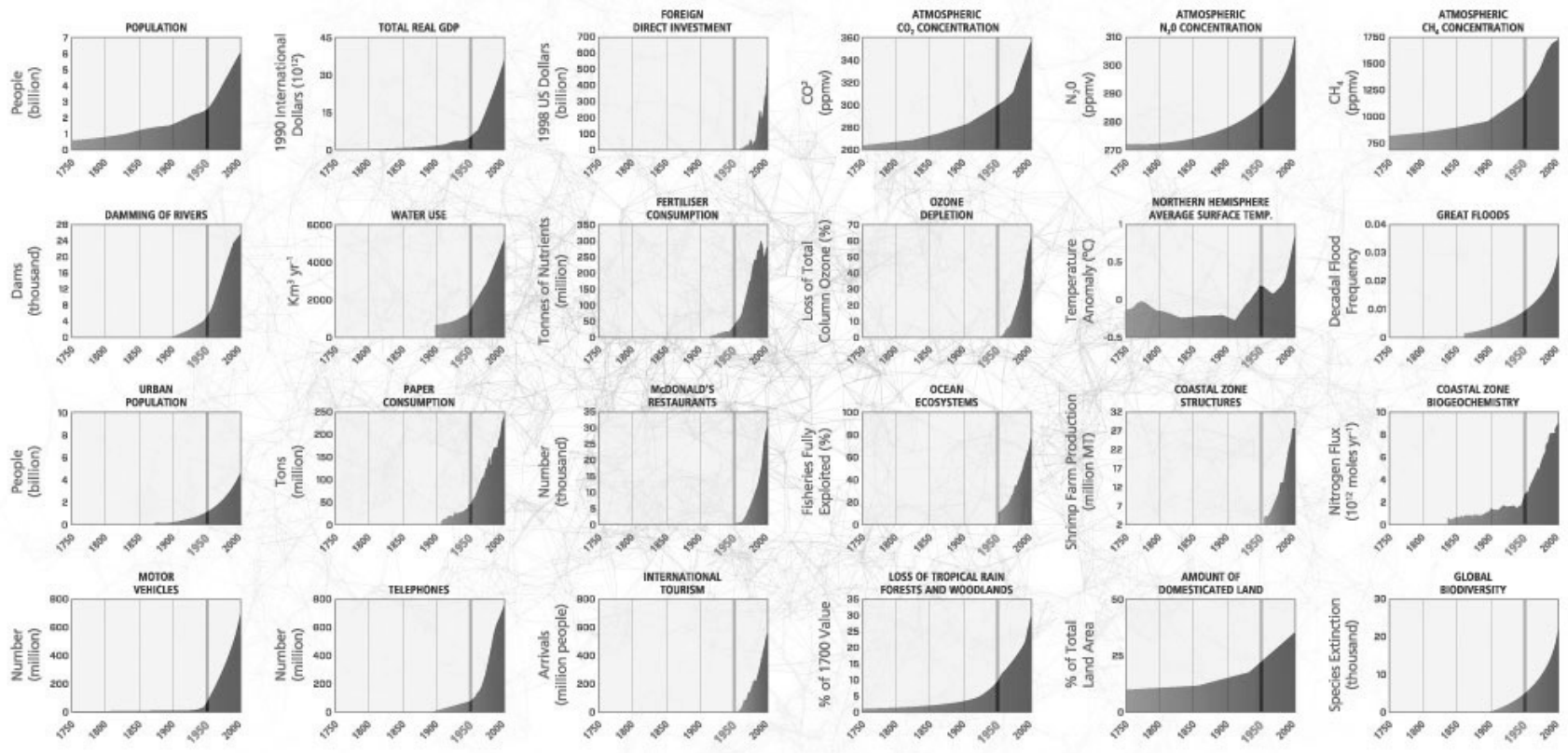


fig. 1-1 Exponential change in the Anthropocene

1.1 Contemporary Context

As a result of rapid urbanization and growing ecological, social and economic instability, our contemporary context has become increasingly complex and variable. Globalization, migration, and rapid advances in communications technology have created a highly interconnected and interdependent world. Global issues like climate change have challenged our scientific models, forcing us to revaluate our rational understanding of the world. According to sociologist Zygmut Bauman, in the last 50 years we have moved from 'solid' modernity to a 'liquid' phase.[1] 'Solid' modernity was based on the belief in the possibility of making a fully rational 'perfect world' where change was temporary and could be fixed by removing uncertainties through science, control over nature, and hierarchical bureaucracies of rules and regulations.[2] We have now moved to a phase of 'liquid' modernity in which change is constant and we no longer believe we can completely understand or control the world.[3] Complexity, interconnectedness, and constant change have become intrinsic conditions of contemporary life.

Our understanding of cities has also changed. Contemporary cities are now seen as the results of dynamic interactions within an intricate network of interrelated forces that shape and continuously alter their urban landscape. They are in a constant state of flux, evolving and adapting to changing circumstances over time. As Alan Berger writes, "Cities are not static objects, but active arenas marked by continuous energy flows and transformations of which landscapes and buildings and other hard parts are not permanent structures but transitional manifestations."[4] This understanding of cities informs and radically changes contemporary urban design practice. This growing complexity and rapid pace of change in cities create conditions of uncertainty that makes it increasingly difficult

to plan their future based on traditional models of the past. Steven Holl expresses this state in *Urbanisms*: "Today, working with doubt is unavoidable; the absolute is suspended by the relative and the interactive. Instead of stable systems we must work with dynamic systems. Instead of simple and clear programs we engage contingent and diverse programs. Instead of precision and perfection we work with intermittent, crossbred systems, and combined methods."[5] As a result, traditional master planning methods of urban design are no longer adequate in addressing the uncertainty of the contemporary city. City building has become dependent on unpredictable market forces and convoluted bureaucracies, making master planning approaches difficult to implement.[6] Moreover, sites of contemporary city building are no longer neutral blank slates but rather problematic repurposed landscapes with difficult conditions and uncertain futures. This context demands new methods of urban design to produce diverse and resilient urban environments for contemporary life.

A range of urban theories and practices have emerged to understand the city as a complex system and to intervene within it. Ecosystems Thinking, Landscape Urbanism, Urban Political Ecology, Participatory Urbanism, Rule-based, and Parametric Urbanism all conceptualize the city as a network of interrelated forces in constant change. Each of them, however, tends to prioritize one concern over the others—be it ecological, social or architectural—and few offer clear methodologies for practice. The thesis learns from these theories and synthesizes their ecological, social, and architectural preoccupations, offering an interpretation of Relational Urbanism as an integrated design approach that productively mobilizes complex relationships to transition sites into diverse, adaptable and resilient urban environments, providing a more flexible alternative to master planning.

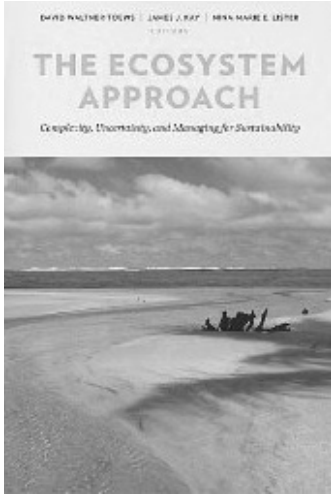


fig. 1-2 Book Cover

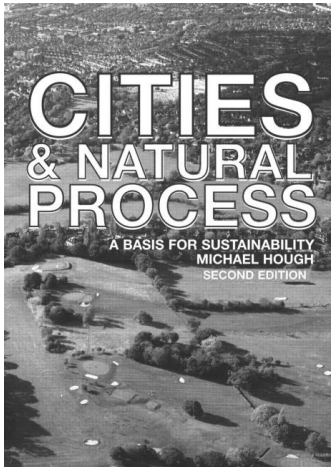


fig. 1-3 Book Cover

1.2 Ecosystems Thinking

As proposed by David Waltner-Toews, James Kay and Nina-Marie Lister in *The Ecosystem Approach: Complexity, Uncertainty and Managing for Sustainability,* Ecosystems Thinking has had a major influence on the establishment of the idea of the city as complex system and has laid the foundation for several other theories. Drawn from complexity and systems theory, it is based on the idea that the universe we live in is an exceptionally unpredictable place in which everything is interrelated.[7] We try to reduce its complication through science in order to be able to act confidently within it, however this reduction does not really represent reality and does not always work in predicting the correct outcomes of our actions, especially at times of instability. Systems thinking provides a model that better approximates the complexity of the real world focusing on the "patterns of relationships and how these translate into emergent behaviors"[8] rather than fixed categories and deterministic results. The complexity of the perceived world is the result of the self-organization of systems in response to environmental conditions. Disturbances in these conditions can cause drastic unpredictable changes through feedback loops that can shift the system quickly from one stable state to another.[9] James Kay, one of the key proponents of the theory writes, "systems thinking provides us with a window on the world that informs our understanding of nature and our relationship to it."[10] This understanding provides the basis for sustainable management in the context of complexity and uncertainty, and in the midst of the political, economic and ecological turmoil of the contemporary world.[11]

Although most directly useful in describing natural systems, Ecosystems Thinking also applies to cities. The authors argue that "an urban landscape is as much

"You don't design ecosystems. You design your relationships to them."

- James Kay

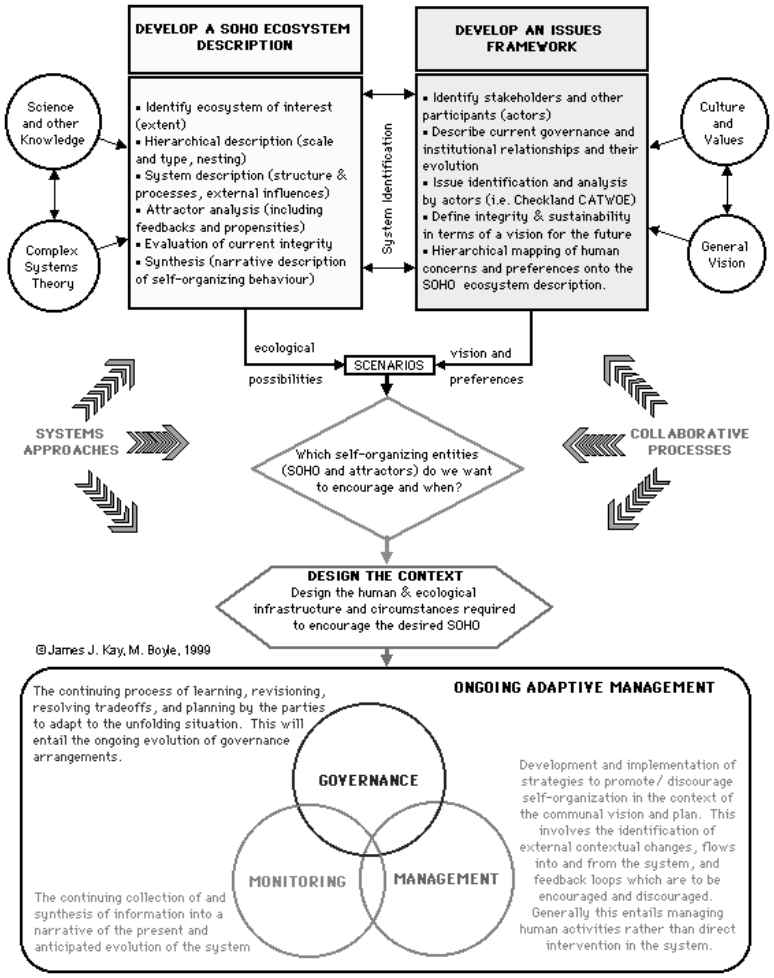


fig. 1-4 Ecosystems Approach - Decision-Making Process, James Kay

an ecosystem as any rural landscape or wilderness. Just as the restructuring of landscapes by cattle, elephants or coral do not change our scientific abilities to describe those landscapes in ecosystemic terms, just so urban restructuring by people does not change the essential ecological nature of a city."[12] Based on this idea of city as ecosystem Michael Hough's *Cities and Natural Process: A Basis for Sustainability* studies the underlying "ecological processes that have shaped the city's physical form and which in turn have been altered by it", in order to provide alternative sustainable approaches to planning cities.[13] Hough argues that the perceptual distinction between cities and their larger landscapes has been a cause of social and environmental conflicts, and calls for an integrated view of cities and the natural processes that underlie them in urban design practice. Essentially he makes the case for seeing cities as ecosystems in order to design and manage them sustainably.

The Ecosystem approach has been very influential in environmental management and planning, providing a good method for framing difficult problems through systems thinking and offering a participatory structure for decision making that involves multiple interdisciplinary perspectives.[14] This model is useful in addressing the many facets of contemporary environmental and urban issues in an integrated decision-making process. However, while Ecosystems Thinking provides an excellent framework for analyzing the complexity of existing natural and urban landscapes, it does not offer a clear method for designing new ones beyond the participatory process. Its analysis however has paved the way for other theories to bring it into urban design practice.

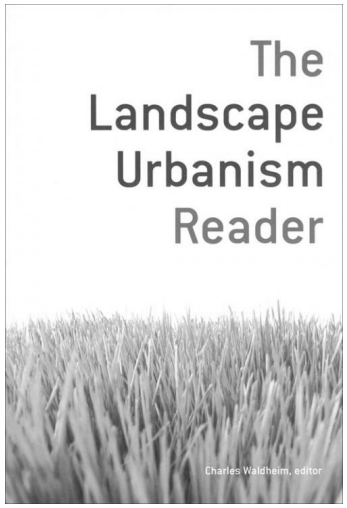


fig. 1-5 Book Cover

1.3 Landscape Urbanism

The more recent theory of Landscape Urbanism takes Ecosystems Thinking further toward practice conceptualizing landscape as a model for contemporary urbanism, and therefore positioning it as the driver of urban design instead of architecture.[15] This theory interprets the urban landscape as a network of interrelated dynamic processes in a constant state of change over time, much like an ecological system.[16] Landscape Urbanism orchestrates urban landscapes through evolutionary frameworks operating over time, designing the process of their transformation rather than attempting to predict their final form. James Corner describes such frameworks as "highly organized plans (spatial, programmatic, or logistical) that are at the same time flexible and structurally capable of significant adaptation in response to changing circumstances".[17] The infrastructural systems of these landscape frameworks act as armatures for the gradual urbanization of these sites, remaining as protected corridors of ecological and infrastructural function within the uncertainty of urban development.[18] Influenced by the principles of Ecosystems Thinking and the context of China's extreme urbanization, Kongjian Yu uses a similar approach he calls Negative Planning, arguing for the importance of first establishing the negative space of ecological infrastructure that will support the urban fabric to come.[19] The common thread to Landscape Urbanism practices is the idea that the design of the landscape should come first and guide the variable forces of urbanization through its ability to act as a dynamic organizational system. Corner describes the potential of Landscape Urbanism as "the ability to shift scales, to locate urban fabrics in their regional and biotic contexts, and to design relationships between dynamic environmental processes and urban form."[20] This kind of approach is particularly useful for the reclamation of post-industrial sites, their preparation

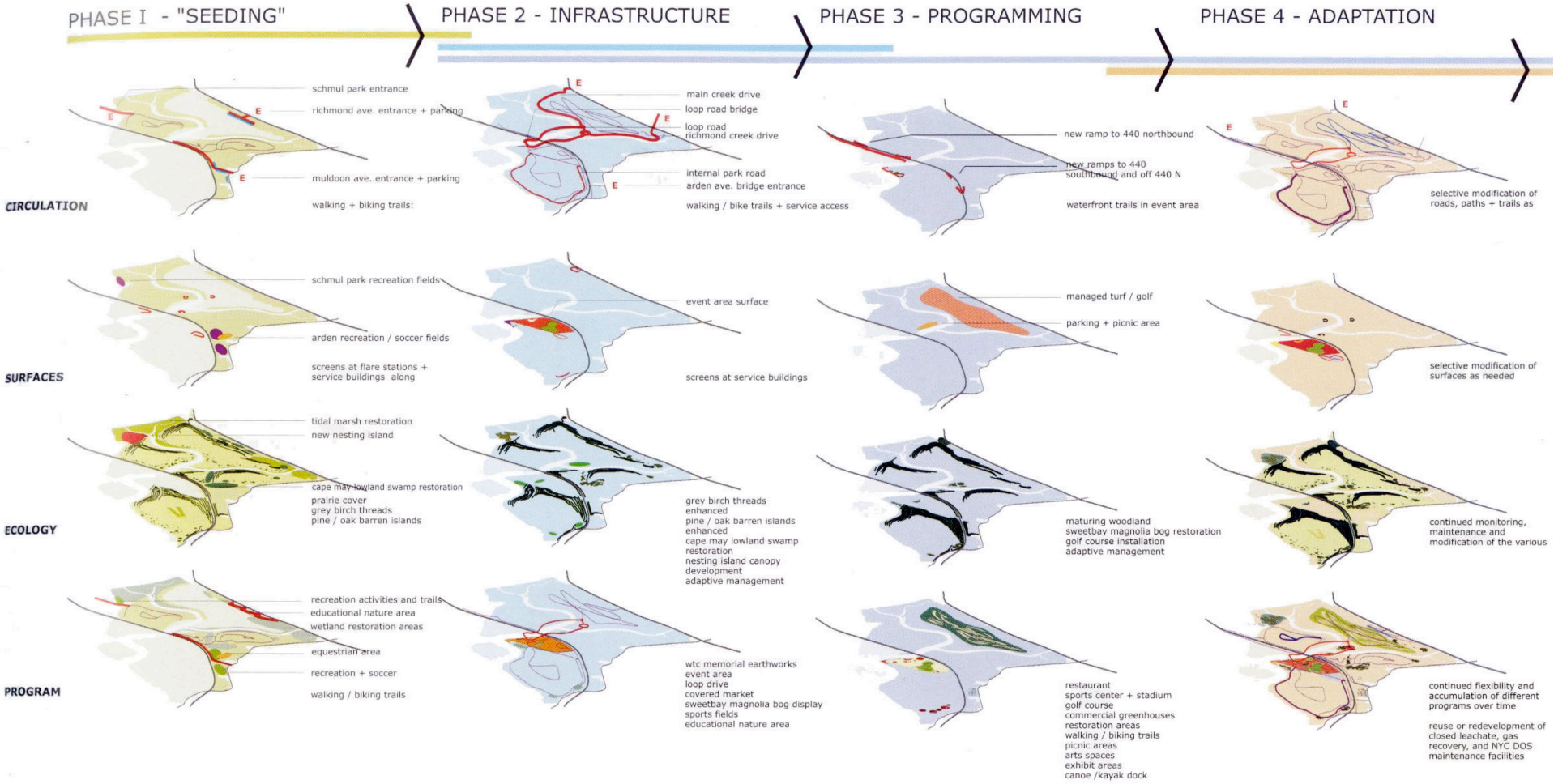


fig. 1-6 Fresh Kills Lifescape Matrix, Field Operations

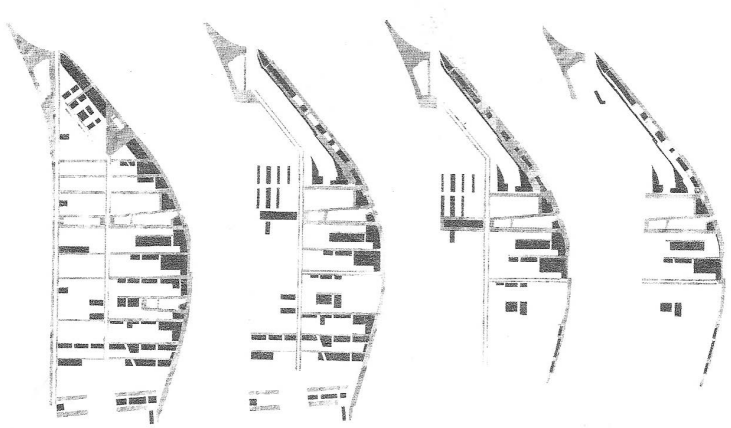


fig. 1-7 Lyon Confluence Framework, Michel Desvigne

for other uses, and their eventual long-term urbanization.

Landscape Urbanism has taken up the challenge of reclaiming post-industrial sites, using ecological processes to both theorize and remediate them, and to prepare the ground for other uses. A range of projects demonstrate the spectrum of the theory's applications from renaturalization to setting the stage for urbanization. Field Operation's Lifescape project for the transition of the Fresh Kills closed landfill into a massive park demonstrates how a waste landscape can be gradually renaturalized and re-appropriated for public use, as a reinterpretation of the idea of a park.[21] The artifacts and industrial processes managing the mounds of garbage below are made visible as a reminder of the site's past, while new pioneer ecologies gradually clean up the toxic soil through phytoremediation, allowing increasing diversity of species to become established over time.[22] While the ambition of the project for landscape reclamation is impressive, its premise of covering over decades of waste with a thin layer of 'nature' is problematic, reflecting a broader societal desire to repress the drastic anthropogenic alterations of the landscape through renaturalization.[23] Michel Desvigne is also interested in the transitional state of landscapes in the process of transformation - what he calls "intermediate nature".[24] His plan for the Lyon Confluence, an abandoned industrial site at the confluence of two rivers, is structured by a "dispersed and mobile" system of parks, allowing flexible occupation as parcels become available for new programs.[25] He uses the agricultural practices of crop rotation as a model for the transitional landscape, forming a tapestry that will become urbanized over time, thus responding to the indeterminacy of the site's future. Rather than envisioning a hypothetical definitive end state, he proposes a succession of states at different stages of the transformation.[26] A third representative example of this approach is OMA's plan for Melun Senart, a new town on a 5000ha predominantly

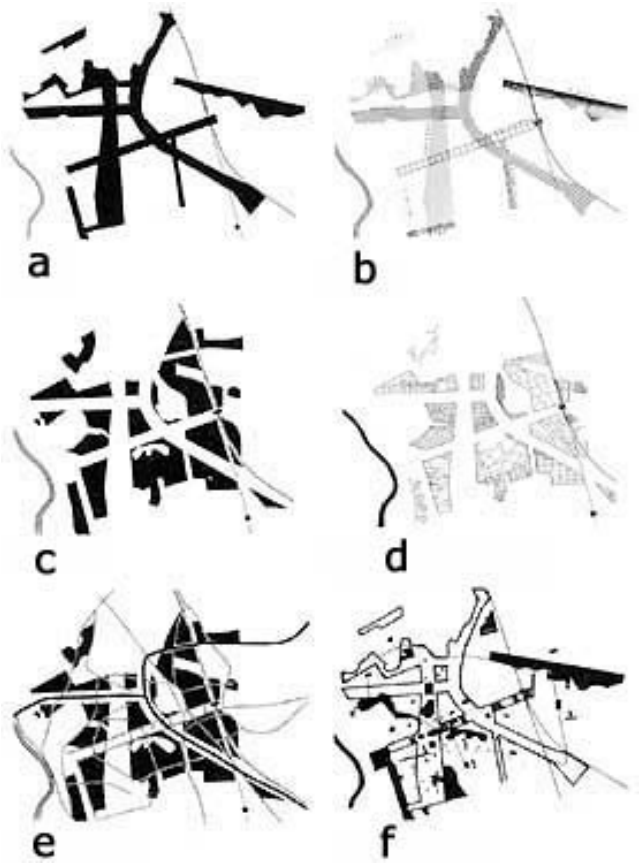
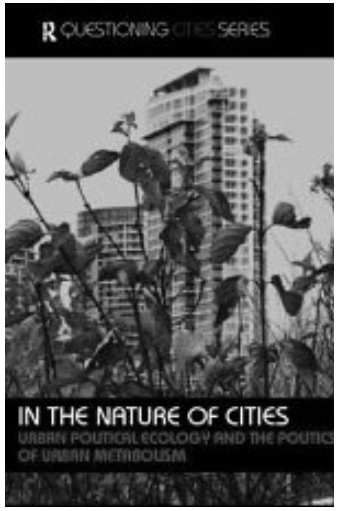


fig. 1-8 Melun Senart, OMA

rural site outside of Paris, which also addresses a landscape in anticipation of urbanization. It is based on the idea of getting around the instability of political, cultural, and financial pressures on the built environment by a "resilient structure of voids" comprised of a collection of "existing conditions, habitats, historical fragments, existing infrastructure corridors and new programs".[27] OMA's iconic "chinese hieroglyph" diagrams represent the concept of reversing the traditional roles of figure and ground, of building and open space, using the open space to structure built form. The voids are to be protected from "contamination by the city" while the leftover islands are "surrendered to the chaos of development".[28]

Although these projects successfully remediate and re-appropriate obsolete industrial landscapes for public uses and prepare them for eventual urbanization through long-term evolutionary processes, they do not move beyond the scope of landscape into urbanism, falling short of extending their ideas to the built environment to come, and leaving their urbanization up to the forces of development. In fact for projects like Melun Senart, this is explicitly stated as a design concept, setting up a framework of protected landscape voids, and leaving the remaining land to the market.[29] Graham Shane also points to this limitation, writing that "Landscape Urbanism does not yet begin to address the issue of urban morphologies or the emergence of settlement patterns over time."[30] The real challenge will be not just in remediating post-industrial landscapes and preparing them for other uses, but in planning how dense urban forms emerge from the transitional landscape to support future sustainable patterns of living. Thus, in prioritizing landscape systems as the primary elements of urban design, Landscape Urbanism tends to value ecological sustainability over social sustainability, neglecting the importance of architecture and not sufficiently addressing the relationship between the two.



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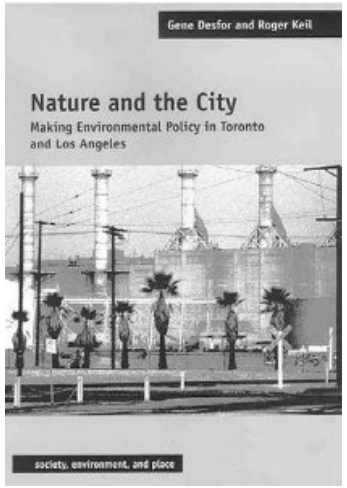


fig. 1-10 Book Cover

1.4 Urban Political Ecology

Focusing on the interrelationship of urban nature and society, Urban Political Ecology (UPE) proposes that the "urban condition is fundamentally a socio-environmental process".[31] Recognizing that environmental issues have their primary cause in the city, and their impacts are most acutely felt in urban environments, Urban Political Ecology focuses on the city as the locus of study for ecologically and socially sustainable environmental policy.[32] Challenging the binary nature/culture logic, David Harvey's assertion that "there is nothing unnatural about New York City" argued that "it is, in practice, hard to see where "society" begins and "nature" ends", and that human activity cannot be viewed as external to ecosystem function.[33] Following from this line of thinking, Urban Political Ecology views the city as a network of ecological and social processes, and urbanization as a form of socio-ecological change. Nik Heynen, Maria Kaika, and Erik Swyngedouw argue in their opening essay of their book *In the Nature of Cities: Urban Political Ecology and the politics of Urban Metabolism* that "cities are dense networks of interwoven socio-spatial processes that are simultaneously local and global, human and physical, cultural and organic."[34] More succinctly, "cities are built out of natural resources through socially mediated natural processes."[35] In "Cities, Nature, and the Political Imaginary", Kaika and Swyngedouw identify *urban metabolism* as "the process through which labour and capital transform socio-natural landscapes" and argue that it actively makes nature into urban commodities.[36] "Whether we consider a glass of water, an orange, or the steel and concrete embedded in buildings," they write, "they are all constituted through the social mobilization of metabolic processes under capitalist and market-driven social relations."[37] The theory therefore seeks to assemble an integrated theoretical framework for understanding and thinking critically about

the interrelated socio-ecological processes that make up the formation of cities.

The complex relationships between social, economic, and physical processes have political implications as a result of the "deeply uneven power relations" under which contemporary cities are produced.[38] Urban Political Ecology argues that "the material conditions that comprise urban environments are controlled, manipulated and serve the interests of the elite at the expense of marginalized populations."[39] It therefore studies the processes of socio-ecological change to understand who benefits and who suffers from their outcomes.[40] The object of the theory is to re-politicize the production of urban environments to produce more equitable urban socio-natural configurations.[41] Heynen et al. reaffirm this: "The central message that emerges from Urban Political Ecology is a decidedly political one...Urban Political Ecology is about formulating political projects that are radically democratic in terms of the organization of the processes through which the environments that we inhabit become produced."[42] The only way to ensure a balance of social and ecological sustainability is through "democratically controlled and organized process of socio-environmental (re)construction."[43]

While Urban Political Ecology provides important analysis of the complex interrelated processes and social implications of how urban nature is consumed, altered and produced, it does not offer a clear methodology for how it can be used in urban design practice. The theory has powerful social implications for design and strong potential for contributions to contemporary urbanism, yet its contributions are directed toward environmental policy and urban politics rather than aiming to inspire design. Perhaps the authors mistrust urban design as a tool of the powerful elite, opting instead to inspire subversive citizen-led initiatives in search of more equitable urban environments: "Ecology provides much of the basis for urban conflict. It is a matter through which urban regimes reorganize themselves, with which elites embroider their projects of state and market control. Yet it is also the basis - forever rejuvenated in new waves of subversive urbanism - for a new Urban Political Ecology strongly articulated with projects of emancipation, democracy, and justice."[44] Thus Urban Political Ecology looks to participatory practices in hope of mobilizing citizens to engage in the production and reconfiguration of their urban environment toward more sustainable ends.

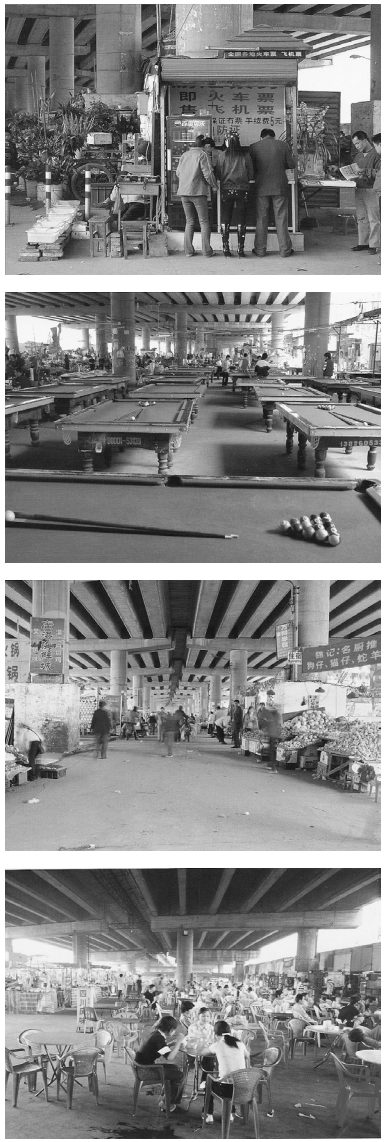


fig. 1-11 Shenzen-Guangzhou Highway Appropriated for public uses

1.5 Participatory Urbanism

While not necessarily an established theory, Participatory Urbanism is a collection of ideas and practices based on the premise that the urbanity, richness and diversity of cities are not the result of design, but of the collection of the individual actions of their users over time. Rooted in the tradition of Jane Jacobs' *Death and Life of Great American Cities*, this approach looks to the existing city in all its complexity to understand the bottom-up social forces that have shaped and adapted it over time, in contrast to top-down modern planning practices that have tried to fix its form or create it instantly. There is a renewed interest in studying the generative processes that have shaped historic cities over time, and that are spontaneously shaping rapidly growing informal cities in the developing world.[45] The appropriation the space underneath a highway connecting Shenzen and Guangzhou for informal economic activities is a manifestation of such unplanned bottom-up urbanism.[46] "Rather than viewing the city as a fixed entity, architects are now seeking direct inspiration from the existing urban environment and learning from its ever changing state that resists predetermination."[47] Drawing from the underlying dynamics of the contemporary city, architects and urban designers engage the "generative capacities of the city", using its potential and seeking opportunities in the existing conditions.[48] As Matt Hearn pointedly expresses this in *Common Ground in a Liquid City*, the object of this approach is "to create an organic unfolding city - what Christopher Alexander calls a living city; one that isn't run by bureaucratic planning or rampaging developers but is allowed to unfold, driven by a million decisions made by people on the ground."[49] Thus there is a newfound realization that user participation in the production of the built environment is central to the creation of diverse, resilient cities and should have a larger role in contemporary urban design practice.

fig. 1-12 Book Cover

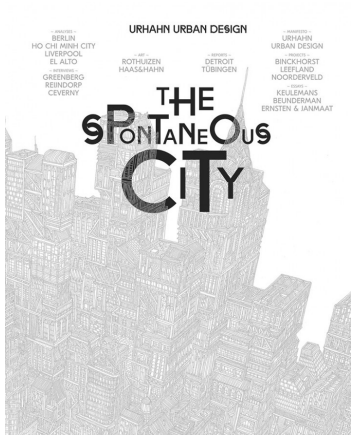


fig. 1-13 Book Cover

In *Architecture and Participation* Peter Blundell Jones, Doina Petrescu, and Jeremy Till make the case for participation by pointing out that "modernization has meant the removal of people from decisions, as layers of bureaucracy and specialist procedures compel experts to intervene between the user and the building." [50] The removal of the general public from the processes of architectural production has led to a sense of alienation of the users from their environment, and thus a gap has opened up between "the world as built and the world as needed and desired."[51] This is best exemplified by the mass housing projects of the mid-twentieth century which imposed standardized ideas of living and community rather than allowing them to grow spontaneously according to people's wishes. In this context participation offers "a means of making architectural practice more relevant to and more engaged with the everyday world".[52] Participation also engages with the political, "accepting...the contested conditions...conflictual possibilities and unpredictable nature" of real cities. As Jane Jacobs writes, "Cities have the capability of providing something for everybody, only because and only when, they are created by everybody."[53] Although a certain extent of participation has become institutionalized in recent years as part of the decision-making for public works and urban renewal projects, it must not be accepted uncritically. Too often it is just a placatory token involvement, if not an organized and potentially manipulated process, giving people a voice to ennoble the design, but not truly engaging them in decision-making.[54] More direct forms of user engagement must be devised in order for urban design to truly benefit from participation.

In response to this context, there has been a resurgence of grassroots citizen-led initiatives and DIY culture successfully engaging in local urban revitalization, and a shift in urban design thinking toward accepting and tapping into the energy and creativity of these processes as part of a new more flexible approach to

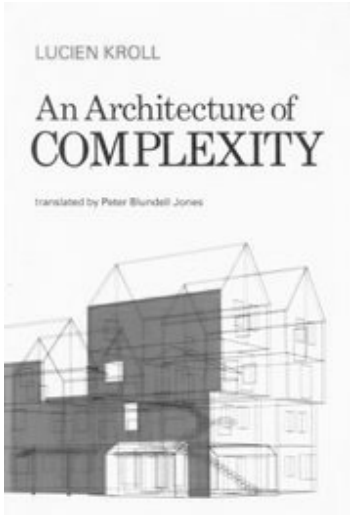


fig. 1-14 Book Cover

fig. 1-15 Book Cover

urbanism.[55] The desire to engage the users of cities in the production of the urban landscape is central to Gert Urhahn's *Spontaneous City*, a manifesto for a "flexible approach to planning that makes use of the power of private initiative" to produce cities "shaped by their occupants in a never-ending process of transformation, growth and adaptation".[56] Focusing on the city user as the generator of urban production, the manifesto proposes four principles for a new approach to planning: reducing scale, supervising open developments, creating collective values, and making user participation central to the process. The design approach is a reaction to the highly developed spatial planning practices of the Netherlands which produce well designed but rigid ready-to-use products, that are not open to chance or surprise.[57] Instead author argues for a symbiotic collaborative relationship between formal planning and informal user participation, making planners managers and negotiators of bottom-up private initiatives to " forge a path between individual choice and common interest."[58]

This kind of user participation in the production of the built environment produces "alternative aesthetics and spatialities" challenging mainstream architectural culture.[59] It is easy to dismiss these aesthetics as crude or messy, when compared to the standard architectural ideals of refinement and purity, yet the messiness of participatory architecture when viewed as a collective is what gives cities their richness and character. In An *Architecture of Complexity* Lucien Kroll makes a case for architectural diversity in a context of industrialization and computerization. He emphasizes that " it is inhabitants who really create the city and not planners."[60] In his book he seeks a way to combine the advantages of organization and spontaneity, through real or simulated participation by inhabitants, and through the exploitation of varieties of time and place. He argues that "diversity has a value even if artificially induced, as it denies the

fig. 1-16 Borneo-Sporenburg, Amsterdam

fig. 1-17 Self-build housing on Ijburg, Amsterdam

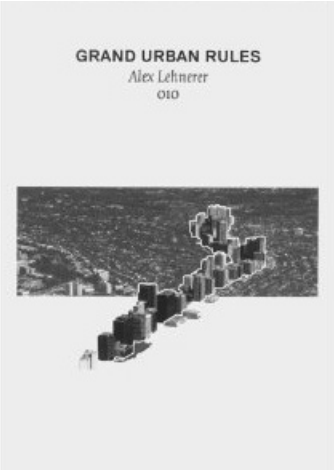
possibility of a finite aesthetic and encourages extension through the activities of the inhabitants".[61] In "Architecture's Public" Giancarlo De Carlo argues that architecture must reconceptualise its standards of quality to accept "those phenomena of creative participation currently dismissed as 'disorder'" in order to allow for the possibility of "growth and flexibility in the architectural organism".[62] In *Architecture Depends* Jeremy Till echoes these ideas, introducing contingency as a key condition that impacts contemporary life. He argues that architecture must learn how to cope with contingency in order to be relevant and engaged with the mess of the city, proposing that they are not threats but an opportunities for an architecture engaged with real life.[63]

The desire for this urban diversity has given rise to urban design methods that aim to generate the effect of bottom up emergent urbanism through an organized process involving multiple actors. Its object is to generate variation similar to historic cities but within a designed structured plan. This approach is best exemplified through the well known example of Borneo Sporenburg in Amsterdam, where West 8 designed the master plan and a set of rules and parameters to guide the built form, and invited over a hundred different architects to design different individual buildings, a subset of which were directly commissioned by owners. While this approach generates visual differentiation through architectural expression, it does not truly engage users in the process, maintaining control of the production of the built environment firmly in the hands of planners and architects. A better example of truly participatory urbanism is the experimentation with owner-built housing in the new city of Almere and on the polder island of Ijburg in Amsterdam. Certain areas in these larger urban plans have been subdivided into free-build parcels and sold to individual owners to build what they wish, within the bounds of a set of rules and allowable

fig. 1-18 Social Housing, Quinta Monroy, Chile

fig. 1-19 Play Oosterwold, MVRDV

parameters. Prospective owners can also group together to build multiunit co-op housing, providing an economically viable alternative to ready-made housing. The approach permits a high degree of freedom of expression and generates a truly diverse fabric. However, while owner-built housing allows the most direct engagement of the user, its applicability is limited since it produces lower densities at a generally higher cost , and cannot compete with the efficiencies of larger scale construction. Elemental's social housing projects in Quinta Monroy and Lo Barnachea combine the efficiency of designed mass constructed housing with owner participation by providing the frame and basic infrastructure of the housing and leaving it to the users to add rooms to it as their families grow and their needs and means change.[64] This allows families to escape poverty by buying half of a middle-class house in a good location and complete it themselves rather than owning a small ready-made unit in a social housing block that does not allow change. In this context of scarcity the designers mobilize the private initiative of users to create value. Another emerging participatory strategy for engaging multiple stakeholders in urban design decision making is to simulate scenarios is through gaming, as demonstrated by MVRDV's Play the City Studio. As an alternative to traditional top-down planning, MVRDV designs a platform to involve the collective intelligence of diverse stakeholders and professionals in the planning process for a variety of cities and urban growth areas. In this case the designers do not shape the final outcome, but rather the process of collective design. While this approach is valuable for generating multiple scenarios that are inclusive of the different desires of multiple stakeholders, it is not clear how final decisions would be made on which option to implement, and whether the public involvement at the design stage would translate to the final outcome. Stakeholder involvement at both the design and implementation stage would have greater potential in producing truly participatory urbanism.



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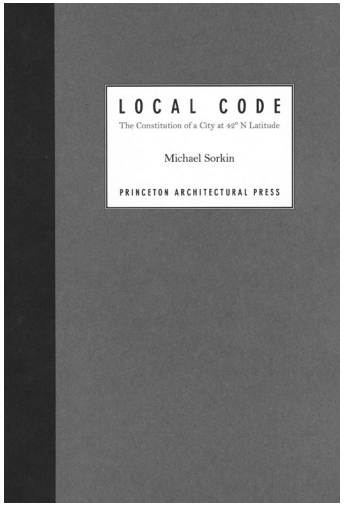

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1.6 Rule-based Urbanism

Taking the idea of designing the process a step further, Rule-based Urbanism replaces the design of an end condition with that of a set of rules and parameters that determine the range of possible outcomes. Based on the idea that "the city does not let itself be designed but merely steered in a limited way", rules are seen as a more effective tool for influencing its outcomes than direct design.[65] Kees Christiaanse sums up the production of the urban environment as the result of natural processes of settlement, man-made regulations and grand projects.[66] The natural processes follow principles such as free market demand and supply, attractive location, available land, land-price or quality of access. The man-made rules are generally negative limits to control the natural processes of settlement and protect the environment from excessive development, creating a sort of "freedom in bondage". The interaction between these two elements produces the complexity of the city. "The apparent "chaos" of the urbanized landscape, as it is perceived by many people," he writes, "in fact is an extremely ordered condition - a 'hyper-order'".[67] Grand projects are intentional designs by a limited group of people for a site, yet their implementation is still contingent on many factors - political interests, objections, geological conditions, financial deficits, ecological motives - which alter the designs' eventual form. Therefore, understanding that fixed idealized master plans are logistically impossible, an alternative method of a loose overall vision implemented through rules provides a more precise way of achieving design intent while allowing freedom within it.

Michael Sorkin's *Local Code: The Constitution of a City at 42 N Latitude* takes on the challenge of this approach by presenting a description of a utopic city as a verbal building code. Aided by no illustrations, the written rules establish

precise intentions while allowing the maximum freedom of interpretation. Sorkin writes that "codes - if they are both broad enough and precise enough - can be the channels of urban invention."[68] In presenting a vision for utopia through a building code, Sorkin's book is a critique of conventional master plans, making the case for the creative potential of rules to design a city "not simply through the deductions of a dominating generality, but also via induction from numberless individual points of departure."[69] The aim of the Code is therefore "to strike a balance between individuation and agreement."[70] The underlying objective of Rule-based Urbanism is to allow maximum individual freedom while protecting collective rights. Kees Christiaanse confirms this writing that, "urban design is about creating conditions for freedom."[71] This is the premise behind zoning codes and rule-based planning, despite their negative reputation as negative limits. The example of Manhattan demonstrates how a grid and a set of rules modulated by local conditions and differentiated development pressures create an extreme variety of built form and a variety of neighborhoods of different character. The risk of Rule-based Urbanism, however, is that in trying to control intent, it can become too comprehensive and specific in what it regulates, resulting in a prescriptive description of a predetermined design and allowing no freedom or emergent diversity. Conversely, in trying to allow maximum freedom, it can become so flexible that it can be taken advantage of by development economics, making it difficult to realize any design intent. The line between regulation and freedom in rule-based urban design is a delicate balance. Thus, as Urhahn argues in the *Spontaneous City*, "The greatest challenge for urban design in the 21st century is finding a balance between matters of common importance and creating freedom."[72]

Alex Lehnerer's *Grand Urban Rules* traces the history of the use of urban rules

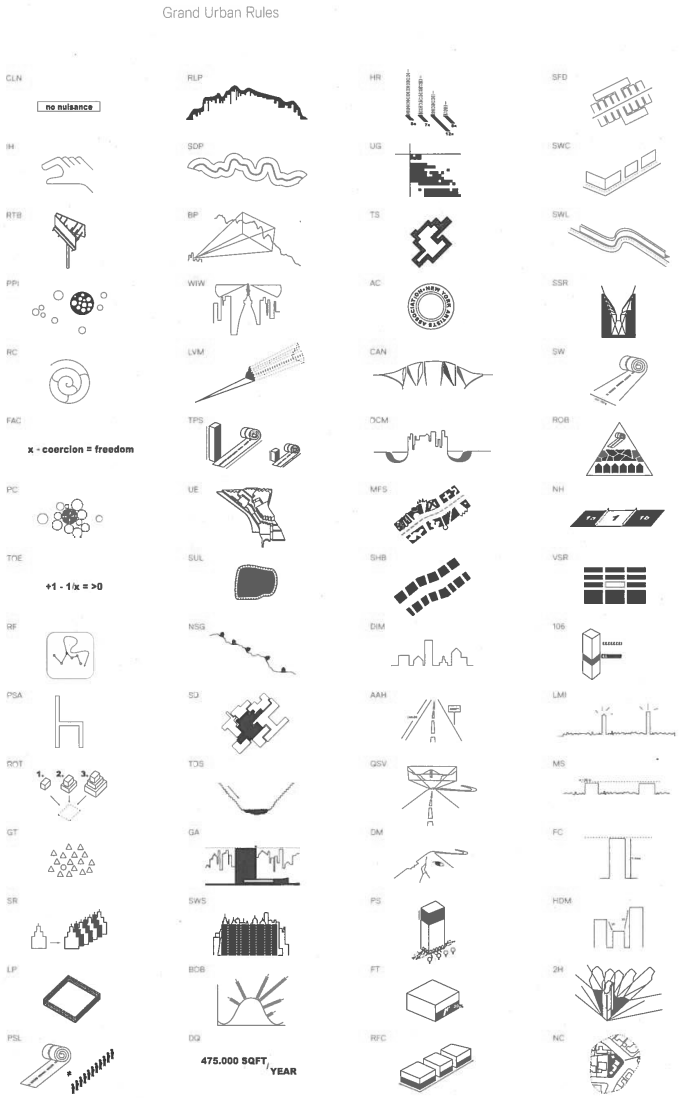


fig. 1-22 Grand Urban Rules

in the United States and other countries, drawing the best ones from 19 cities around the world to compile a code of 115 illustrated rules for the fictional city of Averuni. The book is essentially about the creative deployment of rules as design tools, making the case for the creative design of rules rather than that of master plans, as a more effective method of steering the contemporary city.[73] He argues that "rules posses special qualities", "enabling the precise formulation of degrees of freedom that are decisive for the generation of ephemeral qualities such as urban diversity, difference and vitality", as well as "endowing planning with a certain sustainability and permanence in confronting an unpredictable future."[74] Rules also structure the work of design by establishing criteria for producing and evaluating a design. Thus rules can be used as creative tools to generate and test multiple possible realities. Alex Lehnerer's research project *Kaisersrot* at the ETH , tests such urban rules by modeling them through parametric software to generate computer simulations for specific study areas in order to explore the associations between for example, desired city image, building typology, orientation, view-lines, daylight and sunlight exposure.[75] Such parametric processes help guide the reciprocal relationship between rules and design, so that they can inform each other toward better urbanism.

fig. 1-23 Post-Shanghai Expo master plan, Parametric Urbanism 2, DRL

1.7 Parametric Urbanism

The proliferation of parametric digital modeling software has led to the further development of these rule-based ideas into a computational Parametric Urbanism that does not begin with an intended vision but rather tries to abstract the relations between systems as algorithms to arrive at unpredictable emergent forms. Taking on a "relational view" of contemporary urbanism as a network of interrelated forces, the parametric approach "uses associative design systems to control local dynamic information to effect and adjust urban life processes by embedding intelligence into the formation, organization, and performance of urban spaces".[76] In contrast to static master plans based on stable typologies and final states, the Parametric Urbanism claims to allow built form to be dynamic and adaptable to environmental and social variables, enabling the city to respond to future contingencies. It is not clear how this is achieved, however, beyond the generation of iterations. The real advantage of its digital methods is the rapid production of multiple possible scenarios based on variable inputs, allowing the live visualization of rules and parameters.

The Design Research Laboratory at the Architectural Association uses this parametric approach to urbanism to model urban development scenarios using algorithms simulating growth in natural forms based on, for example, the observed behaviour in the flow of viscous fluids spreading across a surface as a model for the self-organization of urban growth. The results are highly abstracted organic forms based on repetition and systematic differentiation. While they create compelling images, they produce models that are very difficult to translate into real implementable urban design and often remain in the realm of fantasy. The risk of this kind of Parametric Urbanism is that in the attempt to arrive at unpredictable self-organizing forms through abstracted rules and parameters

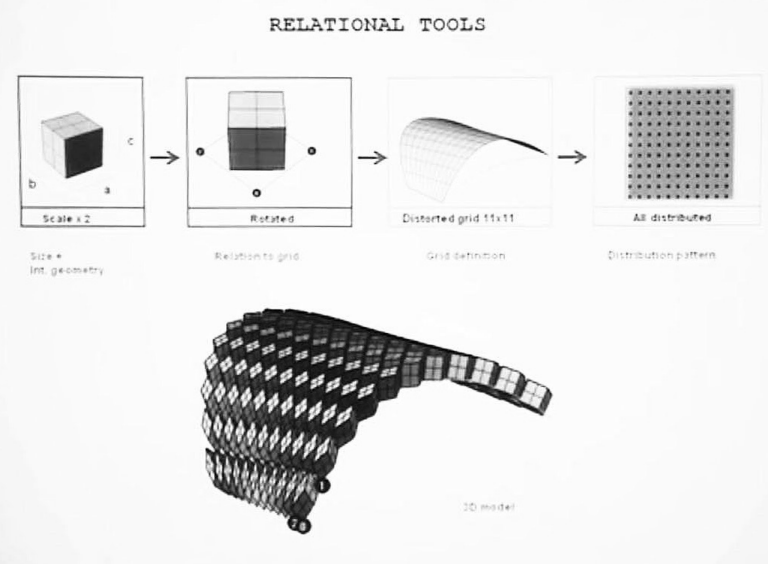


fig. 1-24 Relational Model Interface

that hope to better approximate reality, the connection with that reality is often lost through the multiple layers of abstraction and simplification, resulting in forms that are difficult to understand or evaluate. Because the outcomes are not designed directly, they are often accepted uncritically as products of an abstract process, offering no clear criteria to evaluate them with. The software takes on too central a role in the design and becomes the virtual author of the outcome. In order to make use of the power of this method careful attention must be paid to the intentional design of the rules and parameters to be tested and the relevance of the models used to simulate reality. The relevance and quality of the outcomes are only as good as that of the inputs, therefore conscious design of the process is crucial to the viability of the parametric approach.

A firm that has taken on the name of 'Relational Urbanism', directed by Enriqueta Llabres Valls and Eduardo Rico who teach at the AA, Harvard's GSD and the Berlage, uses parametric modelling in a more pragmatic way, as a means of rapidly visualizing quantifiable urban variables such as traffic volume, amount of development, cost, population density etc, and using them to influence decision-making on large urban design projects.[77] Drawing their relational understanding from complexity theories, cybernetics, urban and political ecology, and engineering, they seek to build a critical understanding of the links between socioeconomic factors, political decision-making processes and the spatial definition of the city.[78] "Departing from a radically materialist point of view," they understand "structural, social and environmental considerations as part of a palette of constraints and materials for the generation of emergent forms of spatial specificity."[79] To do this, they rely on 3D computing technologies to relate a database of variable quantities such as GFA, cost etc. to a model of resultant spatial patterns, in order to build up systematic tools to manage multiple large

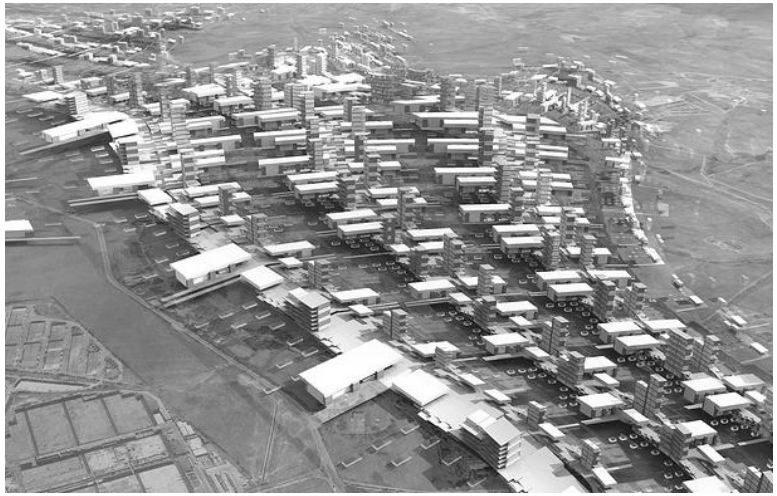


fig. 1-25 Relational Urban Model Outcome

scale development scenarios.[80] In collaboration with ARUP, they have developed a software interface they call 'relational urban modelling', that abstracts the site into a grid of equal blocks, and allows choices of building typologies, orientations and arrangements and various parameters such as height, set up as sliders that can be manipulated and instantly change the 3d model of the outcome.

Although the firm claims to be interested in engaging the complexity of the city and systematically using it to inform design, their method is reductive, as it must focus on few critical parameters at a time in order to allow the computer to generate the outcome. The intricacy of the real situation is therefore significantly reduced in order to allow it to be computed. Despite the firm's stated social and ecological interests, the method seems to have little to do with the existing conditions of a site or the participation of users, engaging only the large forces of development, and producing large-scale urban designs on seemingly blank sites. Rather than offering an alternative to master planning, this method provides a powerful tool for rapid visual number-crunching, at the service of generating iterative development scenarios for master plans. While this computational approach is useful as an analytical tool for visually understanding the implications of relationships between parameters such as height, GFA and population density on built form, it offers limited potential for producing the rich, diverse and adaptable urbanism that results from the real engagement with the complexity of a site, and the participation of many stakeholders involved in large urban projects. Despite its intentions for emergence and surprise its outcomes are the precise products of the parameters subjectively chosen by the designers and are thus are not representative of the truly emergent diversity of real cities. Therefore while the approach begins to engage in the relationships of city building processes, it does not fully make use of the opportunities offered by the relational.

fig. 1-26 Spectrum of Theories

1.8 Relational Urbanism: A synthesis

Although presented as discrete theories for the sake of clarity, the preceding ideas and practices are highly interconnected and overlapping. All of them are essentially based on the concept of the city as a complex system of related forces changing over time, which cannot be designed but merely guided. Each of the theories prioritizes one of these guiding forces over the others, together representing a spectrum of urban preoccupations from the ecological, to the political and social, and to the formal. While Ecosystems Thinking and Landscape Urbanism prioritize the ecological, Urban Political Ecology and Participatory Urbanism are more preoccupied with the political and social dimensions, and rule-based and parametric urbanism with the formal. Ecosystems Thinking and Urban Political Ecology provide analytical frameworks for better understanding the production of the city and inform ecological and political practices, whereas Landscape Urbanism, Participatory Urbanism, Rule-based, and Parametric Urbanism offer methodologies for translating the analysis into new multifaceted forms of urban design practice. Taken together these ideas represent an integrated view of the highly complex interdependent dynamics of city building and inform a new method of urban design rooted in this relational approach. The interpretation of Relational Urbanism proposed by this thesis draws certain elements from these current theories and practices aiming to balance their concerns and mobilize them toward an integrated design methodology for urban design practice.

The basic premise of Ecosystems Thinking, interpreting the world as a system of interrelated processes that self-organizes in response to environmental conditions and disturbances, is the foundation for the relational paradigm that

the proposed design approach is based on. Although Ecosystems Thinking in theory applies to all landscapes, including urban ones, it is better at describing natural systems and has mostly been used for environmental management. Its descriptions of cities are analogical, providing an interesting parallel between urban and natural systems but lacking the clarity and specificity to be productive. Ecosystems Thinking provides a valuable methodology for framing complex urban problems and identifying the multiple stakeholders that need to be involved in the decision-making process, making it a useful tool for participatory planning. However, it does not offer a clear application for urban design beyond framing the problem. Relational Urbanism attempts to mobilize the analysis of Ecosystems Thinking toward the formulation of an operative design methodology for practice, using the analysis of the site's interrelated issues as a basis for a set of integrated design strategies that establish the conditions for emergent diverse and adaptable urbanism.

Landscape Urbanism is based on the same relational premise of Ecosystems Thinking, but takes it a step further into practice by using dynamic landscape process not only as an analogy of existing urbanism but as a model for contemporary urban design practice. The theory is still in its infancy and has not been widely implemented, but most of its successful applications so far have been on purely landscape projects, leaving its urban design hypothesis largely untested. In many projects the design approach argues for leading urbanism with a landscape framework of ecological infrastructures as protected voids, leaving the rest to the unpredictable forces of development. Consequently, in making a case for the importance of landscape instead of architecture as a driver of urbanism, the theory undervalues and chooses to neglect working on built form, leaving it to the mercy of the market. Relational Urbanism adopts the idea of

leading urban design with a landscape framework but is not satisfied with simply leaving architecture to the market. It argues for a more integrated approach that relates built form to landscape through a set of responsive rules in order to produce a differentiated built fabric specific to the local conditions of the site. The landscape framework therefore becomes a productive source of diversity for the built environment, balancing the priorities of ecological and social sustainability.

Urban Political Ecology bridges the ecological concern of Landscape Urbanism with the political, revealing the uneven production and manipulation of urban nature through the interaction of social, political, and economic forces with the physical environment, and arguing for more democratic and equitable configurations of the urban landscape. This analysis is crucial to the understanding of the underlying forces of contemporary city building, and provides a solid foundation for Relational Urbanism. Like Ecosystems Thinking it provides a valuable methodology for framing the complexity of the problem, but it focuses specifically on the urban condition, and the social, political and economic forces that impact it, thus being much more relevant and applicable to urban design practice. However, beyond analysis and potential implications for policy, it does not offer a methodology for design. Relational Urbanism, conversely, uses the interrelationships and social implications revealed by UPE to devise a more balanced approach of ecological, social and architectural strategies to create an urban landscape that equally distributes amenities and liabilities, and produces heterogeneous conditions that are inclusive of a varied mix of social groups with various interests. While UPE mistrusts the agenda of urban design and looks to subversive participatory practices to reach its goals, Relational Urbanism attempts to create a productive relationship between urban design and user participation to create diverse and equitable conditions for urban life.

Participatory Urbanism echoes Ecosystems Thinking and UPE in emphasizing the importance of participation of a variety of stakeholders in the creation of diverse, inclusive, and resilient urban landscapes. It also provides an important lesson for Relational Urbanism in the necessity and interdependence of both top-down design and bottom-up emergence by the multiplicity of users participating in the production and adaptation of the built environment. Since it is not a single formulated theory but a collection of ideas and practices with different interpretations of participation, it is difficult to evaluate the extent of its efficacy as a whole in urban design practice. Its most successful applications have been limited in scale and applicability. Participatory Urbanism is at its best an emergent, self-organized and unpredictable phenomenon, so it is difficult to integrate it meaningfully into design practice, especially since designers tend to want to retain as much control as possible, and manipulate the participatory process to reach their desired ends. Relational Urbanism values the potential diversity generated by tapping into the relationships between the different stakeholders and their varying interests in the physical site. Through distributed infrastructures, and variable sizes of land subdivision, it breaks down the scale of its strategies and implements them incrementally over time to engage a variety of people in the process, and to encourage a more fine-grained, diverse and dynamic urban environment. The design approach is deliberately flexible and open-ended, encouraging variability by user participation through owner-built housing, additions and changes of use, regulated by simple rules designed to protect collective spaces.

Rule-Based Urbanism offers a way of translating the relational analysis of Ecosystems Thinking and Urban Political Ecology into productive tools for implementing desired relationships. It makes use of the creative potential of rules

as an alternative method of design to intentionally steer the city toward desirable directions while allowing the maximum individual freedom and variety within their parameters. It thus provides a clear methodology for effectively combining top-down design with bottom-up participation, protecting collective rights while maximizing individual freedom. Typically operating at the level of property development, this approach does not generally provide rules to manage bottom-up participation in the initial development or the subsequent change of the built fabric. Relational Urbanism taps into this creative potential of rules by using them to relate built form to specific landscape elements in order to encourage diversity in the resulting built environment. It also uses rules to manage the adaptation of the built form over time through user participation. Its parameters are intended to be recalibrated in response to future change in order to lend adaptability to the design while ensuring the maintenance of its key intentions. The relational rules differ from the ones typically used by addressing not only built form parameters but also the social conditions associated with them, such as ownership types and scale of subdivision, as well as the processes of their development and change over time.

Parametric Urbanism provides powerful tools for testing rules, understanding relationships between parameters, and visualizing their implications on built form. It offers rapid generation of multiple iterative scenarios for large urban models that would otherwise be difficult to understand, and thus has potential for helping guide decision-making on urban development. However its computational methods necessitate a reduction of variables and a significant simplification of the complexity of real situations, which reduces the possibility for emergent diversity. The quasi-scientific methods that are used create a sense of false confidence in the process and often lead to the uncritical acceptance of

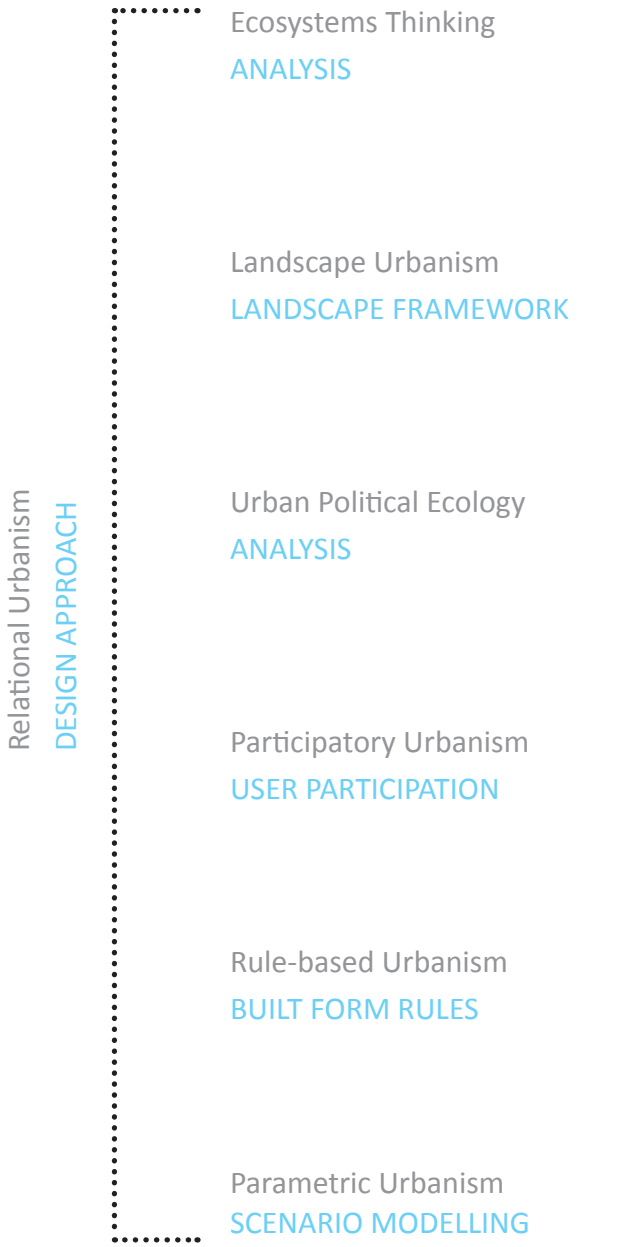


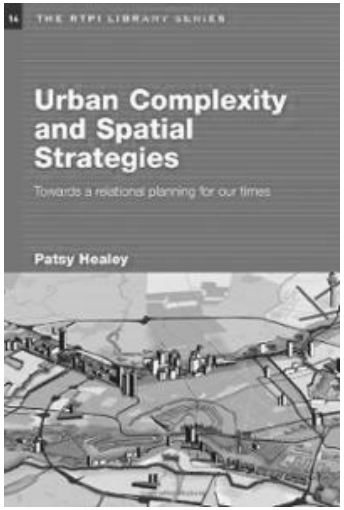
fig. 1-27 Design Approach Components

its subjective abstracted products as objective solutions. Despite deriving its logic from Rule-Based Urbanism It radically differs from it in its methodology. While Rule-based Urbanism carefully crafts rules to be interpreted and implemented by the multitude of stakeholders whose interaction produces the richness of the urban fabric, Parametric Urbanism feeds rules and variable parameters into the computer to generate scenarios. The creativity of the multitude of stakeholders and the variations they produce cannot be replaced by the computer, which simply follows the rules without variance. Thus although Parametric Urbanism claims the term "relational" to describe its methods of relating built form parameters to urban variables, it does not make use of the full potential of relationships between site constraints, stakeholders, and processes of development to generate truly diverse, adaptable and resilient urban landscapes. The Relational Urbanism approach offered by this thesis engages the specificity and variability of the site for creating diverse urbanism, using rules to implement it through the engagement of multiple stakeholders in different ownership associations and at different scales of development. Rather than reducing variables to generate computer simulations, this approach tries to engage multiple variables and use their relationships productively to establish the conditions for an emergent urbanism differentiated over time through user participation, and ultimately moving beyond the designer's full control.

The proposed interpretation of Relational Urbanism is part of a common line of thinking and combines ideas and practices from each of these theories. From Ecosystems Thinking and Urban Political ecology it draws its analysis; from Landscape Urbanism it adopts the landscape framework; from Participatory Urbanism it uses stakeholder engagement, and from Rule-based and Parametric Urbanism it borrows associative rules and modelling. However the proposed

fig. 1-28 Book Cover

approach also follows its own logic. It is based on a relational paradigm of the contemporary context, which views the world as a network of interconnected ecological, social, political and economic forces, and focuses on the relationships between them as a means of understanding and intervening responsibly within it, seeing the engagement of complexity as an opportunity. This paradigm has emerged from the heightened awareness of the interrelation and pluralism of the current context, and has influenced all aspects of contemporary culture, including art, architecture and urbanism. Deleuze and Guattari's concept of the *rhizome* is a fitting subtext for the relational cultural practices of our time, as a model for the complexity, interrelatedness and non-linearity of contemporary culture.[81] Based on Guattari's conception of subjectivity, Nicolas Bourriaud's *Relational Aesthetics* describes the shift of contemporary from an autonomous object to be enjoyed privately in an abstract art space, to a practice engaged in the real world, to be experienced collectively, and to create relationships between its participants.[82] Relational art works try to engage viewers to turn them from spectators into participants, proposing that "the art object is less important than the relationships it can create between people".[83] These works are not connected by any style or iconography but all operate within the "sphere of inter-human relations" involving methods of social exchange, interactivity with the viewer, and various forms of communication to link individuals and human groups together.[84] In "*Antagonism and Relational Aesthetics*" Claire Bishop takes this observation further arguing that the agenda of contemporary art practice is to not only create and reveal interrelationships but also to "provide polemical grounds for rethinking our relationship to the world and one another".[85] Thus by revealing the interrelationships intrinsic to our contemporary context, we make it possible to critically revaluate them.



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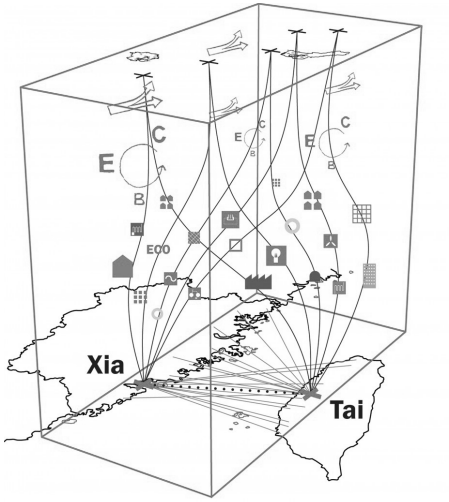

fig. 1-30 Taiwan Straits Climate Change Incubator, Chora

Architecture and urbanism create such associations between people and places even more directly. They can impose coercive relationships, or allow multiple open possibilities for interaction, depending on their ideology and design approach. Giancarlo de Carlo draws a clear distinction between two approaches: "The fundamental difference between an authoritarian architecture and a participatory architecture is that the former begins with the premise that to solve a problem it is necessary to reduce its variables to a minimum to make it constant and therefore controllable, while the latter calls into play as many variables as possible so that the result is multiple, open to change, and rich in meanings that are accessible to everyone."[86] This is an important principle for Relational Urbanism. Patsy Healy also argues for a relational approach to planning in *Urban Complexity and Spatial Strategies: Towards a relational planning for our times*, tracing the highly interconnected dynamic processes of urban governance that shape cities. She proposes a method of strategic spatial planning that focuses on the interconnections between stakeholders and the specificity of places to produce cities of higher quality of life, social justice, environmental well-being and economic vitality.[87] The idea of engaging multiple variables and stakeholder relations is echoed by Raoul Bunschoten's work with his research office Chora, who studies and maps the associations between the people, places, and organizations involved in complex urban projects. These observations are developed into scenario board games, played by stakeholders with diverse interests to simulate the intricacy of real world situations. Rather than designing objects and buildings, Chora designs "processes, interactions and organizational structures." The office acts as an "urban curator" to engage a wide variety of people and mobilize their relationships and various interests toward the creation of "urban strategies that can address the dynamic nature of cities."[88]

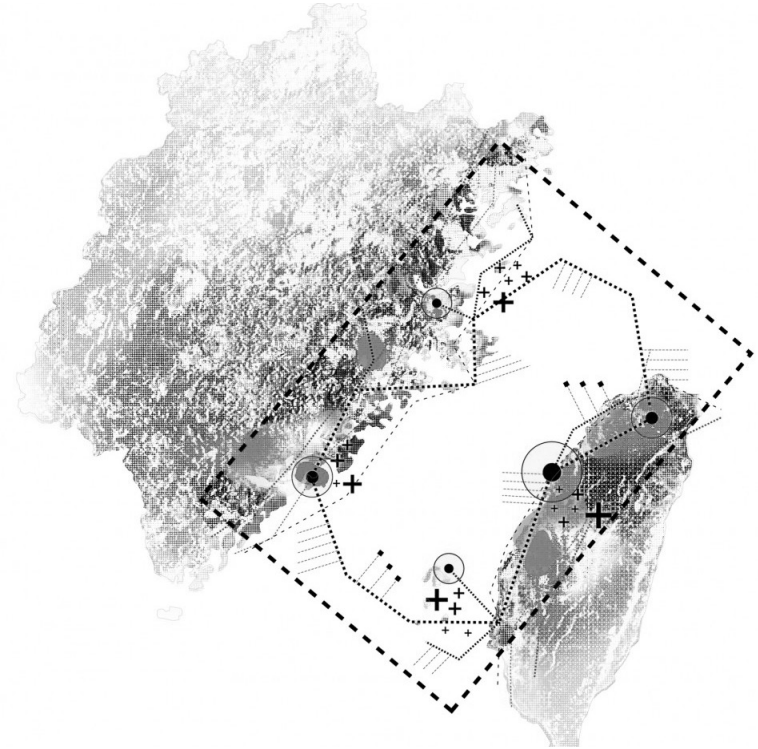

fig. 1-31 Taiwan Straits Climate Change Incubator, Chora

In "The Agency of Mapping", James Corner makes the case for this kind of relational approach offering mapping as a productive tool that "allows designers and planners to see certain possibilities in the complexity and contradiction of what already exists", and allowing them "greater efficacy in intervening in spatial and social processes."[89] He refers to Bunschoten's work as urban design "practiced less as a spatial composition and more as orchestrating the conditions around which processes in the city may be brought into relationship"- what he calls 'stirring'.[90] This kind of practice is based on the idea that a rich form of urbanism cannot be produced from a single directive authority, but rather through the engagement of multiple processes of urbanization which must be "artfully, yet indeterminately, choreographed in relation to evolving and open-ended spatial formation."[91] This is also an important idea for the proposed approach. Corner also refers to Deleuze and Guattari's *rhizome* as one of the key themes of mapping in contemporary design practice, describing both the interconnectedness of contemporary processes of urbanization and the potential of mapping for structuring new and open-ended series of relationships between them.[92] He concludes that mapping is "a practice of relational reasoning that intelligently unfolds new realities out of existing constraints, quantities, facts and conditions" thus creating agency for urban design practice.[93]

Following this line of thinking, the proposed interpretation of Relational Urbanism seeks to make visible the relationships between complex site conditions and processes of redevelopment, using them to guide the orchestration of a dynamic urban environment over time. It argues that urban design must not be conceptualized as a static end result, but rather must establish the conditions for more dynamic urban landscapes by benefitting from the variability of site constraints and stakeholder interrelationships. Rather than reducing variables

to have more control over the outcome or to compute scenarios, the approach engages the full complexity of a site in order to produce truly diverse, inclusive and adaptable urbanism. The relational approach rethinks existing site issues and stakeholder relationships as opportunities for variability, using their associations to create diversity in a context of increasing urban standardization.

The design approach first seeks to understand a site through analysis and mapping as a network of interrelated forces and processes extending beyond its boundaries and changing in time. It then offers a hybrid design methodology of a landscape framework drawn from existing site elements, and a set of rules that relate built form to various landscape elements, together setting the stage for emergent diverse urban form. The landscape framework strategically reuses existing site infrastructures to make use of their inherent value, and rethinks site issues such as flood protection and soil remediation as opportunities for public space. Its strategies are broken down into phases to be implemented incrementally over time, breaking down the scale of investment to make them easier to implement, while allowing a variety of actors to be involved in the process. It simultaneously addresses multiple scales: from macro-scale infrastructural networks to micro-scale differentiated elements across the site. By creating networks of variable infrastructures and public spaces, it distributes amenities evenly and creates varied conditions through the site. The rules guide private development toward heterogeneous built form and associated social relations by responding to the various elements of the landscape framework. Rules are used creatively to protect collective infrastructure and public space while encouraging freedom and variety, by allowing for user alteration over time. Together the site strategies and built form rules leverage the complexity of the site's character and variability of its processes of transformation for creating a more diverse and

adaptable urban environment.

Relational Urbanism therefore combines site research, flexible strategic design, and participation guided by rules, aiming to bridge ecological, social, and architectural priorities in an integrated methodology, to produce urbanism that is resilient and promotes quality of life and social equality. The approach balances collective and private interests by establishing the larger networks of infrastructure and public space, and uses rules to protect them from overdevelopment while taking advantage of their variety to produce different building sites for different forms of architecture. Through the creative use of rules the approach provides not only a design methodology, but, more importantly, an implementation strategy for its design intentions, making use of the public realm to guide private development toward mutually beneficial ends. This approach empowers the city to intentionally shape its future despite the pressures of market-dominated urban development. It offers a framework for a negotiated city that will be shaped by the interaction of the designed site conditions and rules and the participation of multiple stakeholders, and will continuously adapt to societal change. Relational Urbanism thus provides an urban design strategy and rule-based implementation framework as an alternative to traditional master-planning, that holds promise as a more relevant and viable method of city building for a contemporary urban condition characterized by variability.

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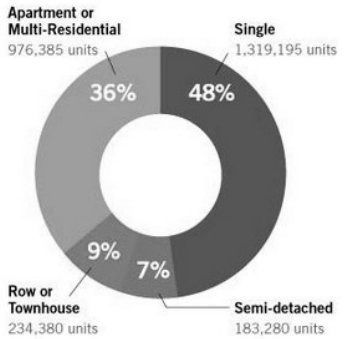
"There is a wonderful opportunity in the Port Industrial District, but it is not to start again as though nothing had happened there over the last hundred years."

-Jeffery Stinson

CHAPTER 2 : SITE

Toronto Port Lands

fig. 2-1 Places to Grow, Growth Plan for the Greater Golden Horseshoe



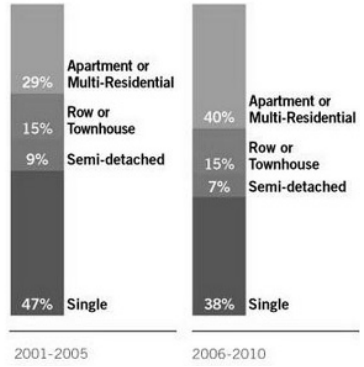


fig. 2-2 Total housing stock in GGH 2006 and shift in housing types

2.1 Context

The Greater Toronto Area is one of the fastest growing metropolitan regions in North America. Toronto's Official Plan forecasts that the GTA will to grow by 2.7 million residents and 1.8 million jobs by the year 2031."[1] Historically the growth of the GTA has been accommodated by outward sprawl bound by an increasingly pressured Green Belt. According to "The Changing Face of Urban Development in the GTA", "as a result of declining affordability of single family homes, limited land supply, changing lifestyle choices favouring urban living and significant changes in provincial government policy regarding urban development, growth patterns have undergone a fundamental shift from primarily single family suburban dwellings to more intensified urban dwelling types."[2] The 2006 Growth Plan for the Greater Golden Horseshoe has pushed for urban intensification in the downtowns and near transit nodes to curb urban sprawl as it approaches the green belt. As a result of this policy change, and fuelled by a building boom based on land speculation, "eighty percent the city's urban growth is now happening in the form of high-rise condominium development infilling the downtown core" and colonizing the last remaining tracts of vacant land along the post-industrial waterfront.[3] Despite efforts to intensify the avenues, eighty percent of the city's growth is going into its core. Toronto already has the second most high-rise buildings over twelve storeys in North America. Thirty percent of Toronto's housing stock is apartments in high rises. With 183 high-rise buildings currently under construction, Toronto's high-rise development has almost doubled that of other North American cities.[4] The current condo boom in Toronto is a manifestation of economic forces taking advantage of a good housing market to maximize profit, building more of one housing type than can be absorbed, despite a shortage of other typologies. A large portion of condominium units are paid for by foreign investors and are

fig. 2-3 Highrise development in Toronto

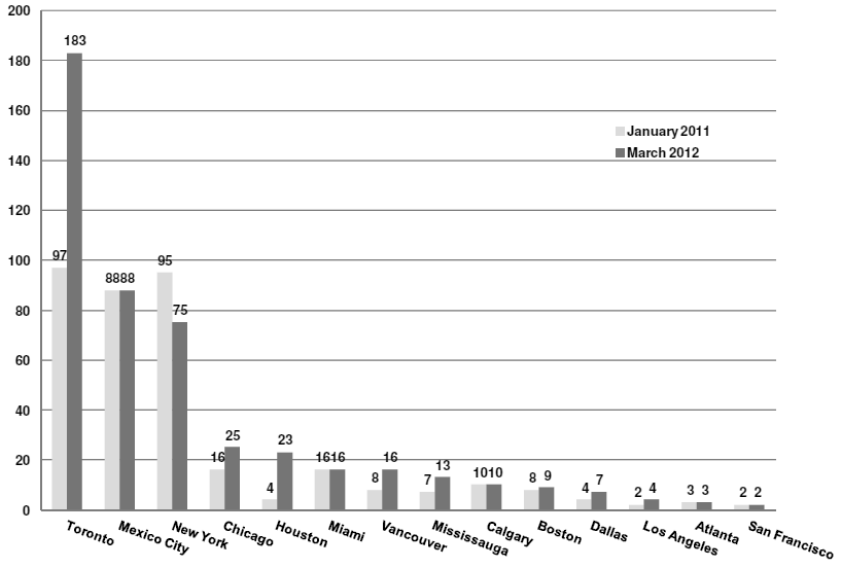


fig. 2-4 Highrise construction in North American Cities

either rented out at extremely high rates or remain unoccupied.[5] Mean while housing ownership and affordability continues to drop for Toronto's own citizens.

The structure facilitating this form of large scale urbanization in Toronto is a complex political process of negotiation between developers, the city, and the Ontario Municipal Board which constantly revise the limits established by the Official Plan and Zoning Bylaw. Despite its highly organized and detailed regulatory framework, Toronto's urban development is largely a developer-led process, merely managed by the city. Gene Desfor's observation in a 1989 paper on Toronto stating that "planning...has been forced to play catch-up, reacting to politically influential developers' initiatives and using them as the basis of policy formation,"[6] holds true today more than ever. The regulatory framework that guides the city's development consists of the Planning Act, Provincial Policy Statements, the Official Plan which sets out a general vision and policies for the city, and Zoning By-laws which put the Official Plan into action on a site-specific basis regulating land use, density, heights and setbacks, lot coverage, parking and open space requirements. As provided by the Planning Act, both Toronto City Council and the Committee of Adjustment provide landowners the opportunity to seek variances of differing degrees to the zoning bylaw, or amendments to the official plan, in order to allow development applications that do not conform 'as-of-right' to the city's planning permissions. Additionally, the Ontario Municipal Board provides a quasi-judicial tribunal for hearing appeals by landowners and affected stakeholders dissatisfied with Council's or the Committee of Adjustment's decision on a given development application. Failing a resolution to the satisfaction of all parties at the level of the Ontario Municipal Board, the Ontario Court of Appeals provides a final option for adjudication on land use and development matters.

fig. 2-5 Proposed developments in Toronto's downtown core


fig. 2-6 Ed Mirvish and Frank Gehry's proposed 80 storey towers on King West

Part of the problem with Toronto's current urban development process is that the Zoning Bylaw is out of sync with the Provincial Growth Plan, stipulating lower densities than what is encouraged by the province. Therefore in lieu of an updated Zoning Bylaw, there is a general understanding that the city will consider applications for increased density beyond what is allowable by zoning, in exchange for contributions to infrastructure and public space or cash through development charges through section 37 of the Planning Act. Once one property is granted extra density however, the landowners of the neighbouring properties feel entitled to the same, and if they don't get it from the city, they can appeal through the Ontario Municipal Board which often overrules the city's decision. Another channel is through negotiation with city council which can also overrule planning approvals decisions, thus making it a very complex political process. Since the value of land is a factor of the allowable zoning, and since zoning is negotiable based on precedents, this process is resulting in considerable land speculation, dramatically raising the value of downtown land and making the tower the only viable typology for its development. Low rise housing is practically no longer built in the downtown, and mid-rise development is limited. The Ontario Municipal Board has played an important role in the city's unrestrained high-rise development and is often criticized as making it too easy to bypass the city's approvals process. If a developer has the will and the financial means to get a non-conforming development application approved, the OMB provides an option that bypasses much of the transparency and stakeholder accountability required of Toronto City Council and city staff. This process of negotiation and litigation has added a high degree of uncertainty to Toronto's development, for planners and developers alike. While it more often than not works in favour of developers, it is a risky enterprise that many of them would rather do without. On the other hand

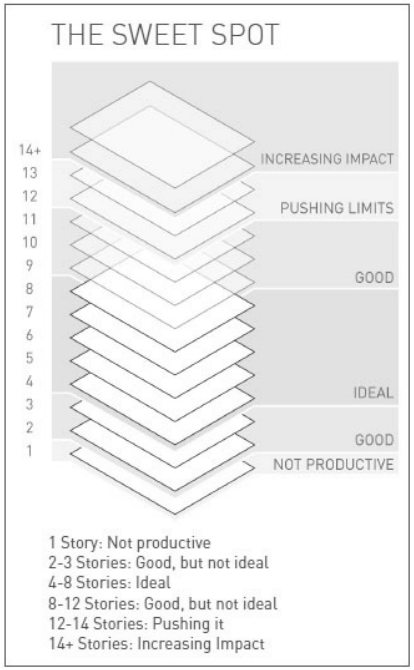


fig. 2-7 Density & Sustainability

the OMB renders the city's planning and approvals framework powerless, thus making it difficult for it to plan and implement any intentional vision for its future.

The high density development being produced by this process is putting pressure on the city's already congested transit and infrastructure, straining the city's resources and making it increasingly dependent on private development to fund public infrastructure through the negotiation and land speculation described, leading to a feedback loop of higher and higher density with no real limits in sight. Jason McLennan in an article titled "Density and Sustainability: a Radical Perspective" makes a convincing case against excessive density in contemporary cities, arguing that there is a natural limit to the sustainability of density.[7] He argues that while the shift toward urban intensification is a vital improvement over urban sprawl, density and height cannot be uncritically accepted as panacea for urban sustainability. He proposes that the optimal range of density and height are around 4-8 storeys in height and 30-100 dwellings/acre, beyond which their sustainability benefits begin to diminish and eventually reverse. To support his claim he provides seven arguments against excessive density: energy and water independence, transportation effectiveness, passive survivability, wayfinding, cultural legacy, biophilia, and an evolutionary human relationship with the ground.[8] He concludes that "cities of the future must be more than ecologically benign; they must also be socially just and culturally rich".[9] In order to balance all these priorities density and height must be maintained within its optimal range.

The future social implications of Toronto's unrestrained density and large scale forms of development are problematic. Already there is an oversupply of high-rise condominium units, and a shortage of single family or townhomes in the city.[10] The proliferation of condominiums offering small units for high prices caters only to a certain small portion of the population - single young professionals or childless

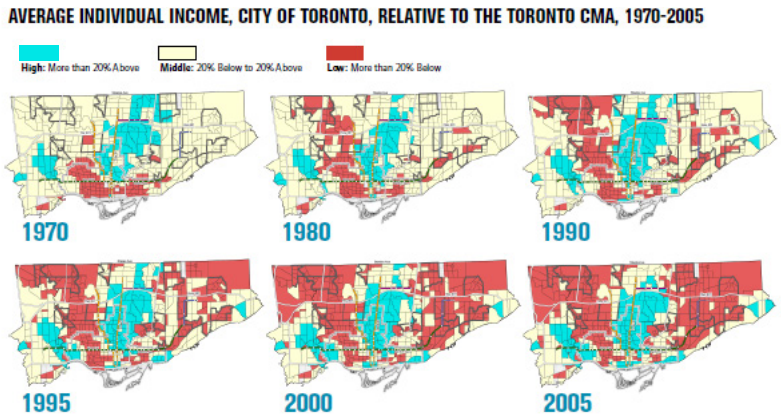
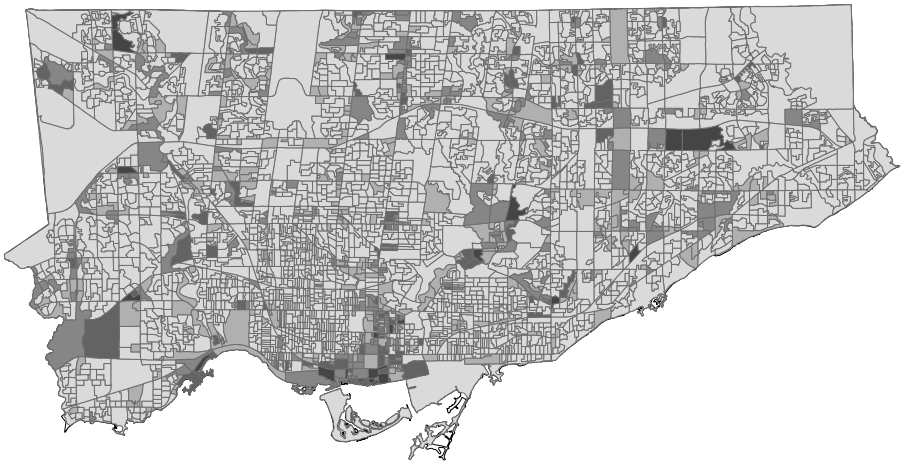


fig. 2-8 The Three Cities Within Toronto, David Hultchansky

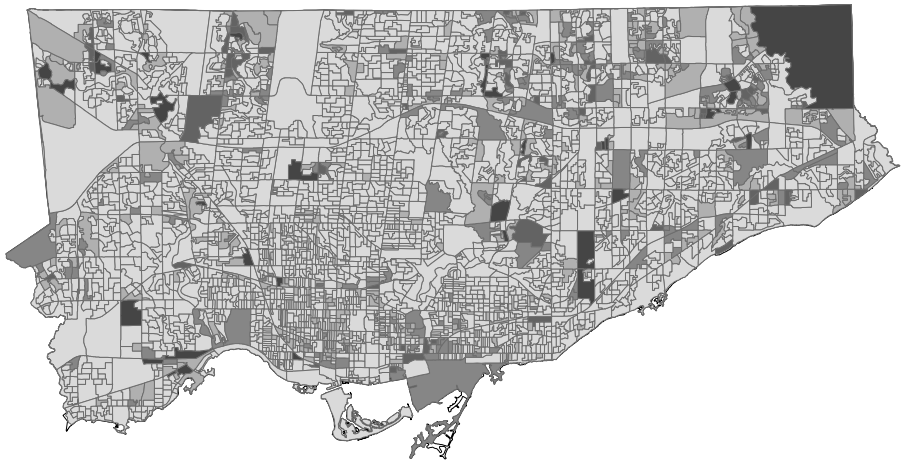
couples who can afford them and can live in such small spaces – leaving out families and lower income people.[11] Low income families are being increasingly pushed out to the periphery away from much needed transit and services, as more affluent people move into the city core.[12] The reduction of housing types is eliminating the social diversity that is key to the city's culture and vitality. Jane Jacobs writes, "No one way is a good way to house a city neighbourhood; no mere two or three ways are good. The more variations there can be, the better. As soon as the range and number of variations in buildings decline, the diversity of population and enterprises is too apt to stay static or decline, instead of increasing."[13] The shift toward housing people in depersonalized environments and depriving them of the ability to change or customize them according to their changing needs creates a sense of alienation and precludes the creation of community. The separation of housing types and associated demographic groups into different zones of the city is increasingly polarizing the interests of citizens from different neighbourhoods, and creating conflicts and power imbalances in the city's priorities, as exemplified by Toronto's transit planning struggles.

Toronto's large scale development is not only socially problematic, but also environmentally unsustainable. Ted Kesik, a University of Toronto building science professor, has written extensively on the poor energy performance of Toronto's condominium towers as they are currently built.[14] Clad in full glazing and pervasive thermal bridging balconies, these image driven buildings are completely inappropriate for Toronto's northern climate. Despite their higher construction costs, their energy performance does not even come close to typical wood frame housing minimum building code requirements.[15] The money is being spent on finishes and the exterior image, rather than on high performance envelopes and building systems. These buildings are products to be marketed and sold, and are

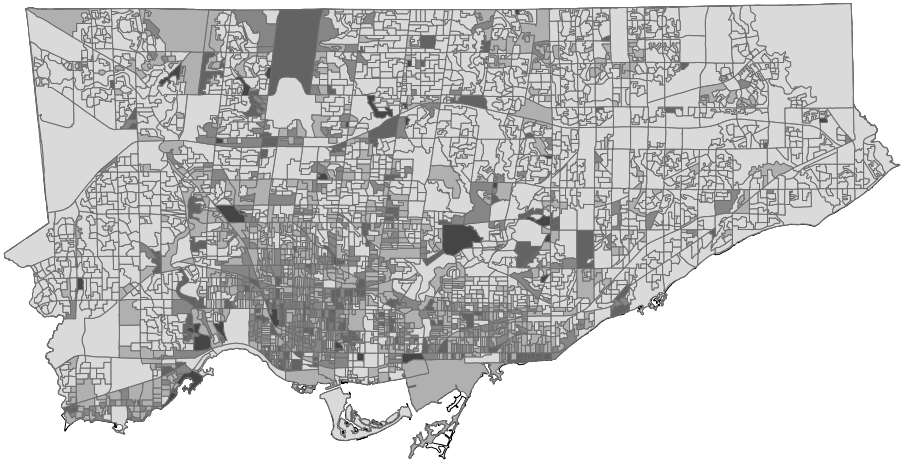
Apartments over 5 storeys



Rowhouse Dwellings



Apartments under 5 storeys



Semidetached Dwellings

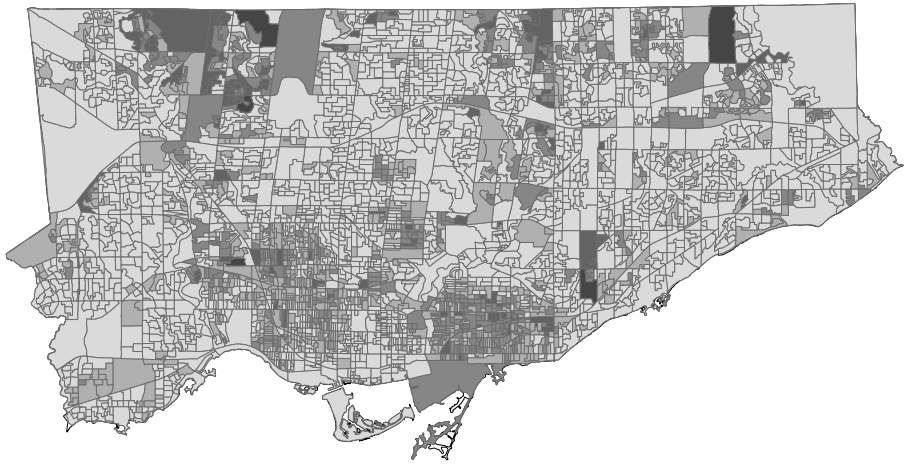
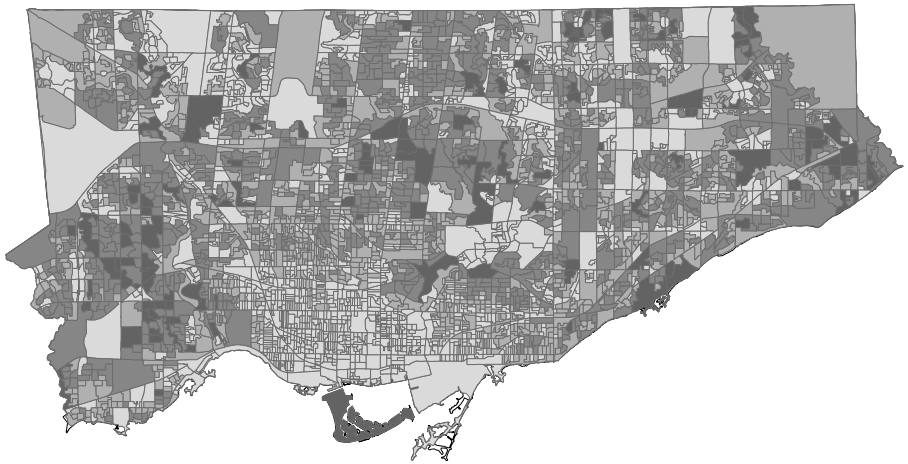


fig. 2-9 Distribution of Housing Types in Toronto, 2011 Census

Single Family Detached Dwellings



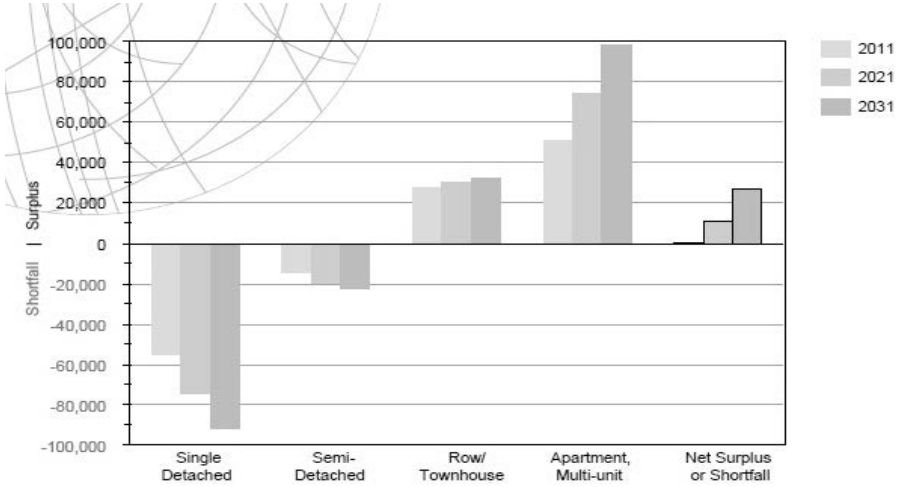


fig. 2-10 Housing Surplus or Shortfall by Dwelling Type

fig. 2-11 The Pinnacle on Adelaide

not designed for long-term maintenance and sustainability. Once they begin to age they will come across serious problems. Kesik predicts an average lifespan for today's glass towers of only 15-20 years.[16] Furthermore their typology and ownership structure does not lend itself to incremental change and adaptation by owners, and thus will become very difficult and expensive to maintain and retrofit all at once when it fails. With such a large existing stock of problematic aging high rise buildings in Toronto already addressed by the Tower Renewal Initiative, it makes very little sense to build more of them on such a massive scale.

Architecturally the rapid urban intensification of Toronto's downtown in the ubiquitous tower-podium type is producing a homogeneous built environment that is more the product of development economics and efficiencies than the purposeful work of the city's designers. The work of the building's spatial formation and unit design is largely guided by marketing departments in order to produce the most efficient and profitable standardized products, leaving architects with the diminished scope of merely dressing the exterior in some iconic fashion to address the city. Thus architects are alienated from actual spatial design, and confined to producing marketable images for development. Lisa Rochon, an architecture critic of the Globe and Mail, has also written on the standardization of Toronto's built environment, both in the suburbs and the downtown. She argues that contemporary architecture must resist the "commodification of the urban landscape" by the development industry, and champions an architecture of "small statements attempting to stem the tide of sameness" toward a renewed sense of place. [17]

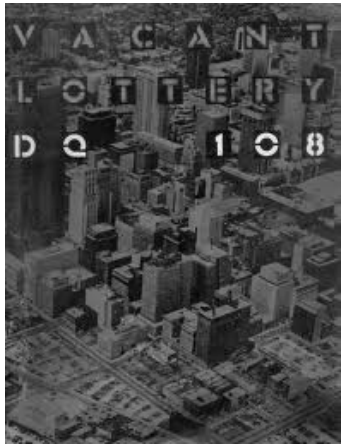


fig. 2-12 Vacant Lottery

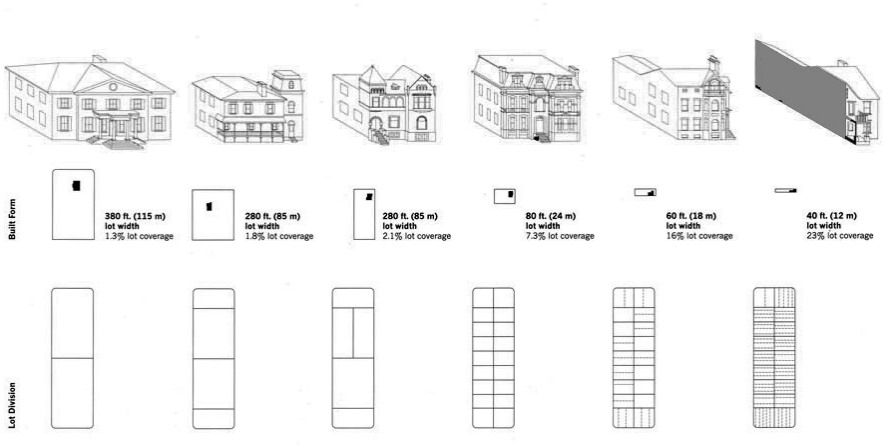


fig. 2-13 The evolution of the Toronto house

Toronto has a rich tradition of urbanism that opposes large scale development in favour of a finer grained, diverse and dynamic fabric, largely shaped and adapted by its own citizens. Jane Jacobs's legacy of fine-grained incremental emergent urbanism as promoted in *The Death and Life of Great American Cities* has been foundational to Toronto's school of thought in urbanism.[18] In this book she differentiates between two modes of development - gradual money and cataclysmic money - arguing that the former feeds a healthy form of urbanism whereas the latter leads to drastic change and poses great danger for a city's long-term vitality.[19] She makes the case for allowing "city building to unfold as an imperfect, often messy enterprise."[20] Barton Myers' criticism of the pervasive shift toward a high density high rise city centre surrounded by low density sprawl in most North American cities in the 1970s was also an influential foundation for the Toronto school of urbanism. In *Vacant Lottery* he argued for "urban consolidation" as a practice of preserving and infilling existing city fabric for a more even distribution of urban density.[21] George Baird has also been a key contributor in shaping Toronto's approach to urbanism through his writings, teaching and practice. In *Vacant Lottery* he tracks the morphology of the North Jarvis neighbourhood drawing a relation to the shifting pattern of land subdivision and examining the building typologies that have emerged over time in response to it. He concludes with new hybrid typologies of infill buildings, designed by his students, that provide the amenities of contemporary buildings while more consistently fitting into the fabric. The research initiatives of Baird's firm, *On Building Downtown: Design Guidelines for the Core Area* and *Built Form Analysis,* as well as its involvement in the *St. Lawrence Block Study* were important contributions to an emerging urban design consciousness of a more fine grained, varied, and adaptable fabric in Toronto. In his recent lecture "Thoughts on 'Agency' and

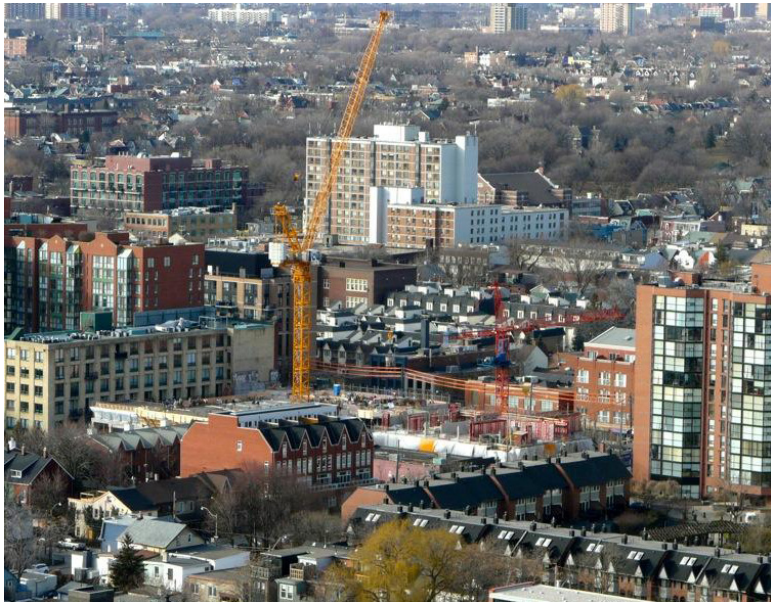


fig. 2-14 Diverse urban fabric in King West Neighbourhood

'Utopia' in Architectural and Urban Theory", he once again brought attention to the relationship between urban fabric and ownership patters, arguing that "differentiated land ownership" is a key generator of urban development types that produce "political agency", as observed from informal settlements in the developing world to the centre of mature cities like Tokyo.[22]

Much of Toronto's urban fabric initially emerged informally through owner built housing. In his book *Unplanned Suburbs: Toronto's American Tragedy,* Richard Harris outlines the history of the creation of Toronto's fabric as informal settlements built by owners on the fringes of the city at the time, before more formalized development and planning processes were established.[23] In a recent lecture, John van Nostrand argued that these areas of the city are now some of the most desirable neighbourhoods of the city. As a result of the incremental diversification and adaptation they have gone through over the years, they have become rich urban environments in contrast to formally developed suburbs that resist change.[24] The Beach neighbourhood on the city's east side is a perfect example of how a largely owner-built cottage community has become one of the most sought-after neighbourhoods in the city. Van Nostrand is also interested in owner-built housing, having proposed the Pro-home - a housing type designed to grow over time with the owner's needs. The design was proposed for the Port Lands, as a way of housing Toronto's homeless population.[25] With his work he continues to promote an urban fabric that is dynamic and can grow and change over time, learning from the complexity of real life. In contrast to this kind of urbanism, Toronto's current mass development represents a case of "cataclysmic money" and risks transforming the city into a standardized and static built environment dominated by the market and impossible to change by its occupants. This kind of city is contradictory with Toronto's tradition of emergent

fig. 2-15 New waterfront development on the Railway Lands

urbanism and incompatible with its diverse population and culture.

Understanding this context is crucial to making sense of Toronto's rapidly changing urban landscape, and purposefully intervening in its future. The built form of the city must be more than a physical manifestation of economic forces trying to maximize short term profits. It must be planned intentionally for the quality of life of its citizens, and its long-term sustainability in the context of rapid change and instability. More progressive and precise planning and design frameworks are needed to ensure the quality of the built environment, and to give agency to the city, to designers and users to intentionally plan for its future.

fig. 2-16 Port Lands Site in its strategic location

2.2 Potential

As sites in the downtown core are becoming more and more scarce, attention has shifted toward the post-industrial waterfront as a significant future territory for urban growth, and as a place where more progressive planning processes can be implemented. In the context of global competition, the redevelopment of post-industrial waterfronts has become a way for cities to reinvent their image and position themselves on the world stage.[26] With this mindset, Waterfront Toronto - an agency funded by the three levels of government to manage the redevelopment of the city's post-industrial land - has been planning Toronto's waterfront more deliberately through high-profile international design competitions and master planning for grand visions that prioritize spectacular parks and public spaces. Following the 2006 Central Waterfront Secondary Plan which established the overall intentions by the city, several competitions have been held for the overall waterfront vision, master plans of large areas, and more detailed precinct plans of smaller neighbourhoods. These precinct plans eventually lead to zoning bylaws which regulate their implementation. This process is intended to establish the frameworks of public space and infrastructure first to ensure the area will be developed sustainably before private development is allowed to start colonizing it. This approach however tends to be inconsistent with the financial means of the city since it requires high upfront investment, and therefore becomes dependent on large scale private development in order to fund the master planned public realm and infrastructures. The same process of negotiation for development charges in exchange for additional density and height is leveraged to make it possible to implement, resulting in the same unrestrained built form as the rest of the city. Therefore, despite its design aspirations and good intentions, this planning approach tends to compromise the diversity of the built environment

fig. 2-17 Port Lands Scale - 400 ha

in order to actualize the idealized visions of public space designed in the master plans.

The Port Lands represent a substantial part of the waterfront yet to be redeveloped, offering great potential for the exploration of more effective design methodologies aiming toward a different model of waterfront development. A vast post-industrial site on the east side of Toronto's harbour, it has become a hybrid landscape of municipal services, storage, remaining industries, industrial ruins, and a few recreational uses. Fronting onto the lake and the inner harbour and located only 5 km from downtown Toronto, at the confluence of major transportation systems, the Port Lands site holds a strategic location and offers immense potential for sustainable urban growth. In the context of the city's rapid urban intensification and growing scarcity of downtown land the site offers 400 ha for redevelopment - an area equivalent in size to the downtown core from Bathurst to Sherbourne and from Dundas to the lake - representing substantial territory for the city's future urban growth for the next 50-100 years. In light of the growing standardization of Toronto's built environment, this valuable site offers an opportunity for an alternative model of development, drawing from the complexity of its existing conditions to produce diverse and adaptable urbanism that is consistent with Toronto's culture and appropriate for the contemporary context.

The site is in the midst of planning to be redeveloped as a new mixed-use sustainable city district, also through a master planning process. The current vision prioritizes a grand plan of generous public space and a re-naturalized river mouth, but like much of the waterfront it relies on large-scale development to implement it. The scale and complexity of the site resist a totalizing fixed plan, demanding a dynamic vision of its evolution over time in which persisting industry, remediation, new infrastructure and urban development coexist and respond to changing circumstances. The process of its redevelopment will likely span generations and needs to be planned not only for today but for an unpredictable future. By interpreting the site as a dynamic urban landscape in constant transformation, rather than a blank slate to be designed, its urbanism has the potential to be socially and environmentally sustainable, and able to adapt to future uncertainty.

Site Identities over Time

Ashbridges Bay Marsh

At the time of founding of Toronto in 1793, Ashbridges Bay was one the largest and most biodiverse freshwater wetlands in North America.

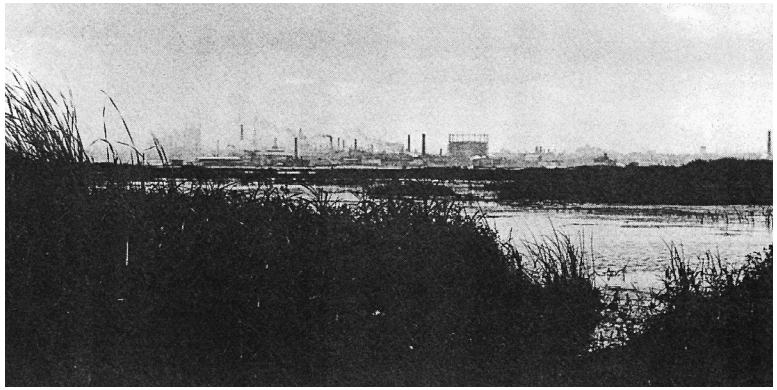


fig. 2-18 Ashbridges Bay Marsh

Port Industrial District

The Industrial Harbour District was created in the early 20th century by filling the Ashbridges bay marsh to accommodate the city's growing economy based on industry and shipping. As a result of the shifting economy and transportation trends, the site never became the busy port it was meant to be and has been actually used as a storage landscape for coal and oil, with limited manufacturing uses. It persists today as an underused post-industrial service landscape for the city.

fig. 2-19 Port Industrial District

Port Lands Waterfront Neighbourhood

The district is currently being re-imagined as a new mixed use waterfront neighbourhood including a re-naturalized Don River mouth, and mid to high-rise development.

fig. 2-20 Future Waterfront Neighbourhood

2.3 Historical Narrative

The abbreviated history that follows is based on Jeffery Stinson's report "The Heritage of the Port Industrial District", Gene Desfor and Jennefer Laidley's edited volume Reshaping Toronto's Waterfront, and J. M. S. Careless' Toronto to 1918: An Illustrated History. Careless' book emphasizes the connection between the city's lakefront site and its identity, tracking the city's transformation through various eras of change from first nations route, to military post, to port city, industrial railway city, to economic centre. Gene Desfor and Jennefer Laidley and the various authors that have contributed to Reshaping Toronto's Waterfront provide a historical context for the transformation of the Port Lands and its waterfront context, studied through the lens of urban political ecology, and therefore focusing on the interrelated socio-ecological processes that have continuously altered the site through its various states. Jeffery Stinson's report is perhaps the most comprehensive illustrated account of the Port Lands site's physical transformation, from its natural state to the manufactured post-industrial condition that persists today, and provides the primary basis for the narrative that follows.

The narrative of the Port Lands site can be described as series of long-term transformations that have shifted the site's identity along with Toronto's changing economy and values. With each era in the city's development the site has been reinvented to reflect its changing aspirations. The physical form of the landscape has been in a constant state of flux as a result of the dynamic interaction of natural processes and socio-economic forces that have continuously altered it for their purposes. Each of the physical manifestations and associated identities of the site - from wetland, to industrial port, to post-industrial service site and future

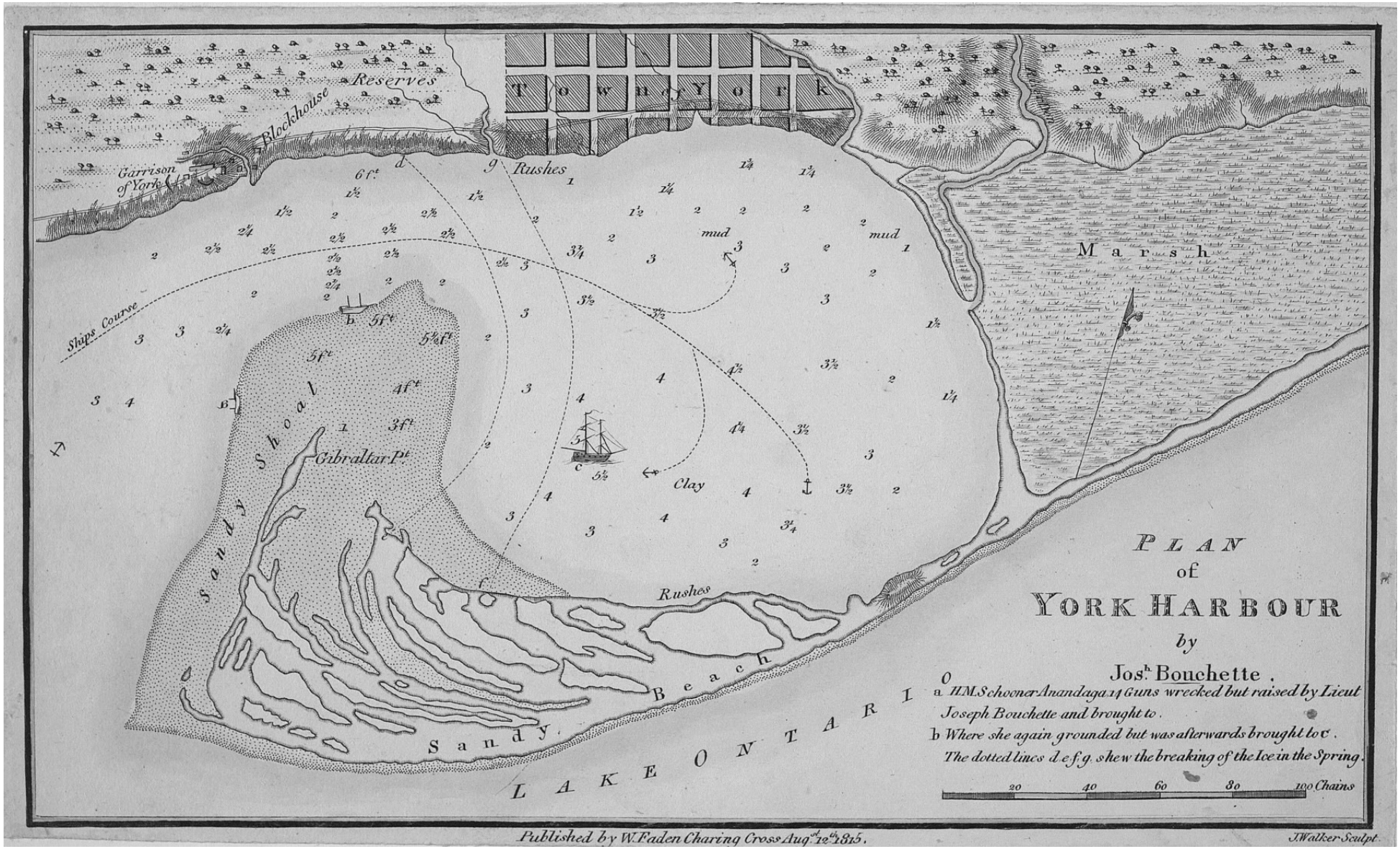


fig. 2-21 Plan of York Harbour, 1793

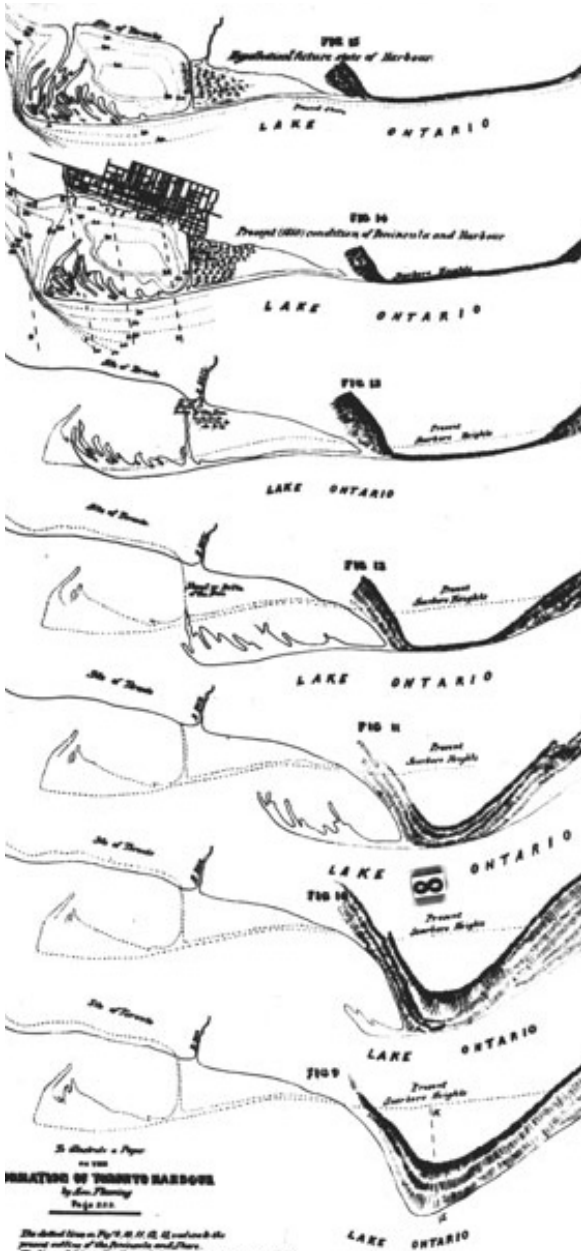


fig. 2-22 Formation of the Toronto Harbour through erosion

waterfront neighbourhood - reflect the complex processes and relationships of city-building at the time, guided by the changing identity and aspirations of the city.

The history of the site is bound with the identity of Toronto since its founding as a new port city on Lake Ontario. The town of York, later to become Toronto, was established in 1793 on the edge of Lake Ontario near the mouth of the Don River. The site was chosen by the city's founders for its naturally protected harbour, created by a sand spit formed by the dynamic interaction of the currents of Lake Ontario eroding the eastern bluffs and the Don River depositing its silt into a large marsh called Ashbridges bay.[27] The marsh had long been a rich ecologically diverse ecosystem where hunting and fishing had sustained first nations peoples and provided a place of peaceful recreation. Early accounts and paintings of the site describe it as an idyllic natural landscape, rich in flora and fauna and a place of recreation and fishing for the city's early settlers.

Despite its fixed appearance, however the land-water relationship of Toronto's harbour had been in a state of flux for centuries, and would continue to change In the early 1800s it became evident that constant erosion and siltation from the river were filling the harbour, making it difficult for larger ships to navigate.[28] Shipping was crucial to the city back then as the primary means of transport and practically as the only connection to the outside world.[29] The growing shipping industry had established itself along the waterfront and was actively building it out onto the lake through the accretion of piers and docks to create facilities for larger port activities. As a result, the Harbour Trust, a new city department, was created with the sole responsibility of maintaining the navigability of the harbour, and was undertaking constant dredging as early as 1833. A series of remedial projects were undertaken through the second half of the 19th century to formalize the

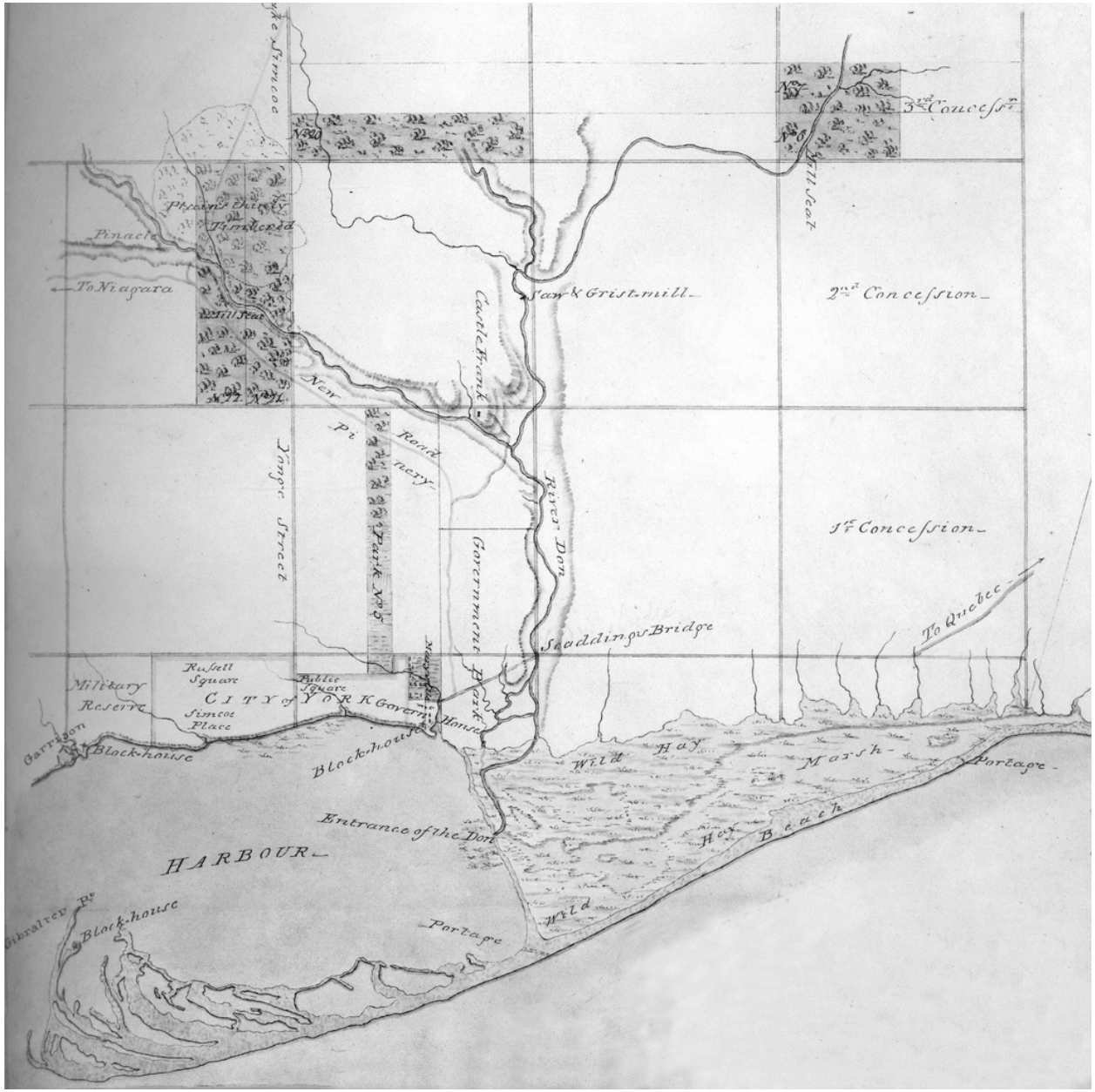


fig. 2-23 Don River and Ashbridges Bay Marsh

fig. 2-24 Ashbridges Bay Marsh

fig. 2-25 Cholera as miasmic fog

water's edge and Don River mouth in order to create more favourable conditions for shipping. To prevent the silt and effluents of the marsh from invading the harbour from Ashbridges Bay, the Harbour Trust built a breakwater along the western edge of the marsh in the 1880s, closing the harbour outlet of the Don River and stopping all water communication between the marsh and harbour.[30]

As the city's population had grown significantly in the 19th century the Don valley became urbanized and the river became more and more polluted, dumping raw sewage and garbage into the stagnant waters of the marsh. The nearby industries occupying the water's edge also dumped their waste into the marsh, adding toxins to the already contaminated murky waters. The conditions were only exacerbated by the breakwater, making the water in the marsh even more stagnant by blocking any circulation between it and the harbour. To make matters worse, as a result of the obsessive fear of cholera in the 19th century, the marsh became stigmatized as a source of disease and by the end of the century was perceived as a liability to be contained and urgently eliminated.[31] Five international cholera pandemics affected North America during the 19th century, frequently infecting Toronto. The medical science and bacteriology of the time was perplexed by the disease and susceptible to myths of its self-generation. According to miasma theory, the deadly disease seemed to spontaneously arise as a contagious fog from certain kinds of landscapes: damp low lying areas along rivers streams and canals of local waterfront ecologies.[32] Later the disease came to be seen as an element or particle that became integrated into marshes, houses, bodies, forming a 'morbid environment'. At the time doctors, engineers and moral reformers were becoming integrally involved in the planning and sanitation of cities as the discipline of public health became institutionalized in city governments.[33] The provision of a healthy city seemed to necessitate the containment and elimination of all ecologies that fostered disease.

fig. 2-26 Don Improvement Project

Under the civilizing Victorian paradigm of 'improving nature' for productive human use, several projects were undertaken to formalize the river mouth to eliminate the unsanitary conditions and expand shipping facilities.[34] In 1892 Edward Henry Keating, the city engineer of the Harbour Trust, proposed a 300m wide channel that would breach the breakwater to recreate water flow between the marsh and the harbour, gradually improving conditions by dispersing the contaminants more rapidly. The city, under intense pressure to resolve the issue , began work immediately the following year to excavate the channel and fill the adjacent land, and steadily continued its work over the next twenty years. Concurrently a public works program called the Don Improvement Project was initiated to straighten and channelize the lower part of the Don River south of the Winchester Street Bridge to alleviate floods on the lower Don that periodically washed out bridges, and to make the river navigable creating additional wharf space for the Toronto harbour. The project met little resistance and its implementation coincided with the dredging of the Keating Channel. In 1906 the channelized river was extended to the Keating channel connecting at a hard 90 degree angle, and its natural river mouth to the north was filled in, making the channel the river's only outlet into the harbour.[35]

The beginning of the 20th century was a period of affluence, stability and economic growth for Toronto resulting in a renewed confidence in the city's grand industrial and shipping future.[36] As a result several proposals emerged to fill the marsh and create a modern revenue-generating industrial port district. Mounting pressure from the city's industrialists, and growing concern for the unsanitary conditions of the marsh, resulted in the formation of the Harbour Commission in 1912, a powerful agency with limited accountability to the city, tasked with resolving the 'problem' of the marsh and turning it into a profitable asset for the city's growing

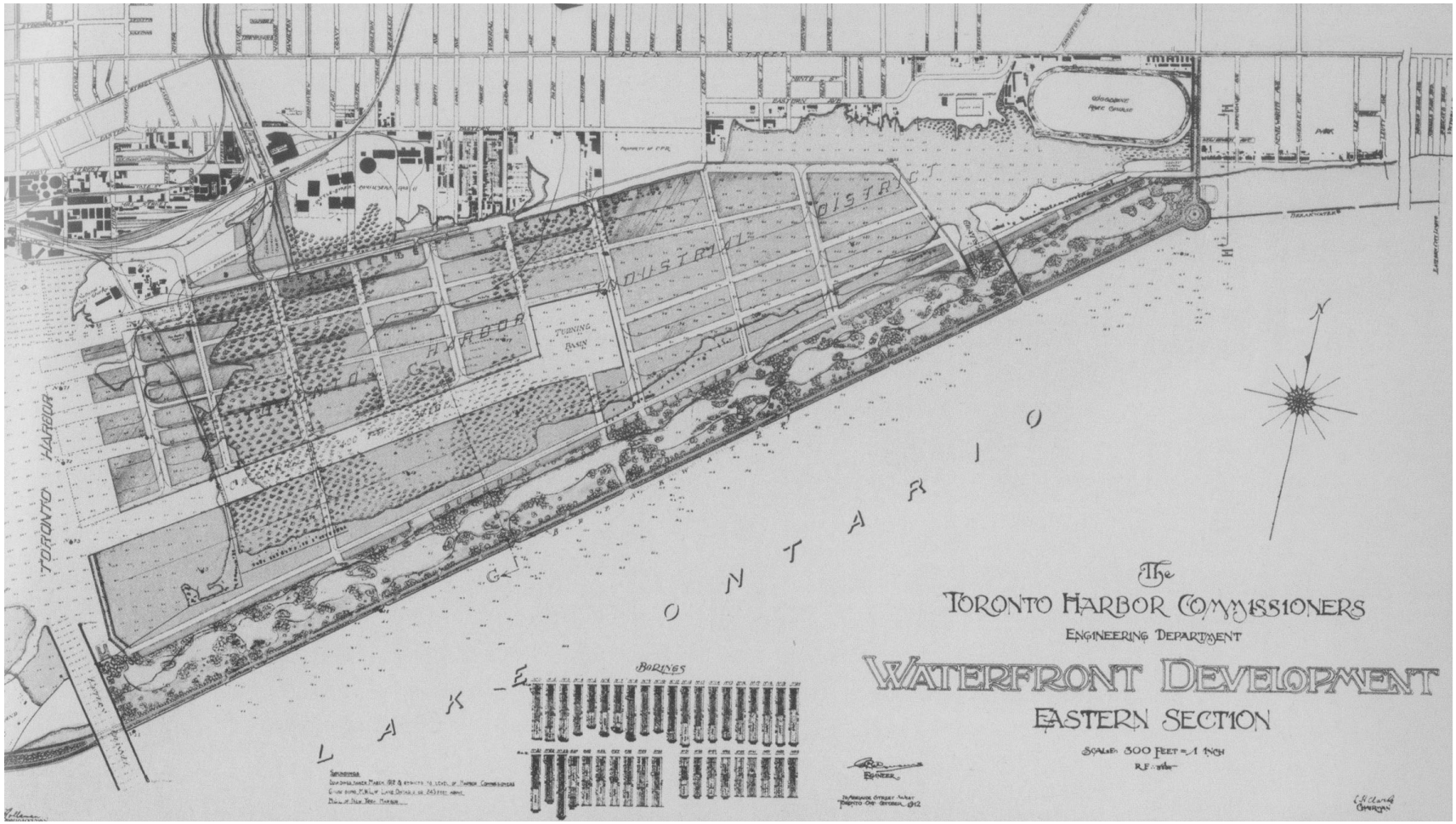


fig. 2-27 1912 Harbour Commissioners Plan

fig. 2-28 1917 Panorama from edge of Shipping Channel looking Northwest

November 1917, a panorama taken from the edge of the Ship Channel looking northwest to northeast. The development of filling and dock walls along the Marginal Way is evident on the left hand side. The filled section in the foreground is being used as a staging area to assemble wood piles. The trestle is the north end of the coal pier, a temporary structure erected to allow direct shipments of coal to the site from lake transports. The Melting House of British Forgings is in the centre background. The right hand side shows the Ship Channel under construction including the dam (located on the line of the 1880s Government Breakwater) which was used to lower water levels for dock wall construction in the channel. Some cottages and St. Nicholas church remain in place on the peninsula.

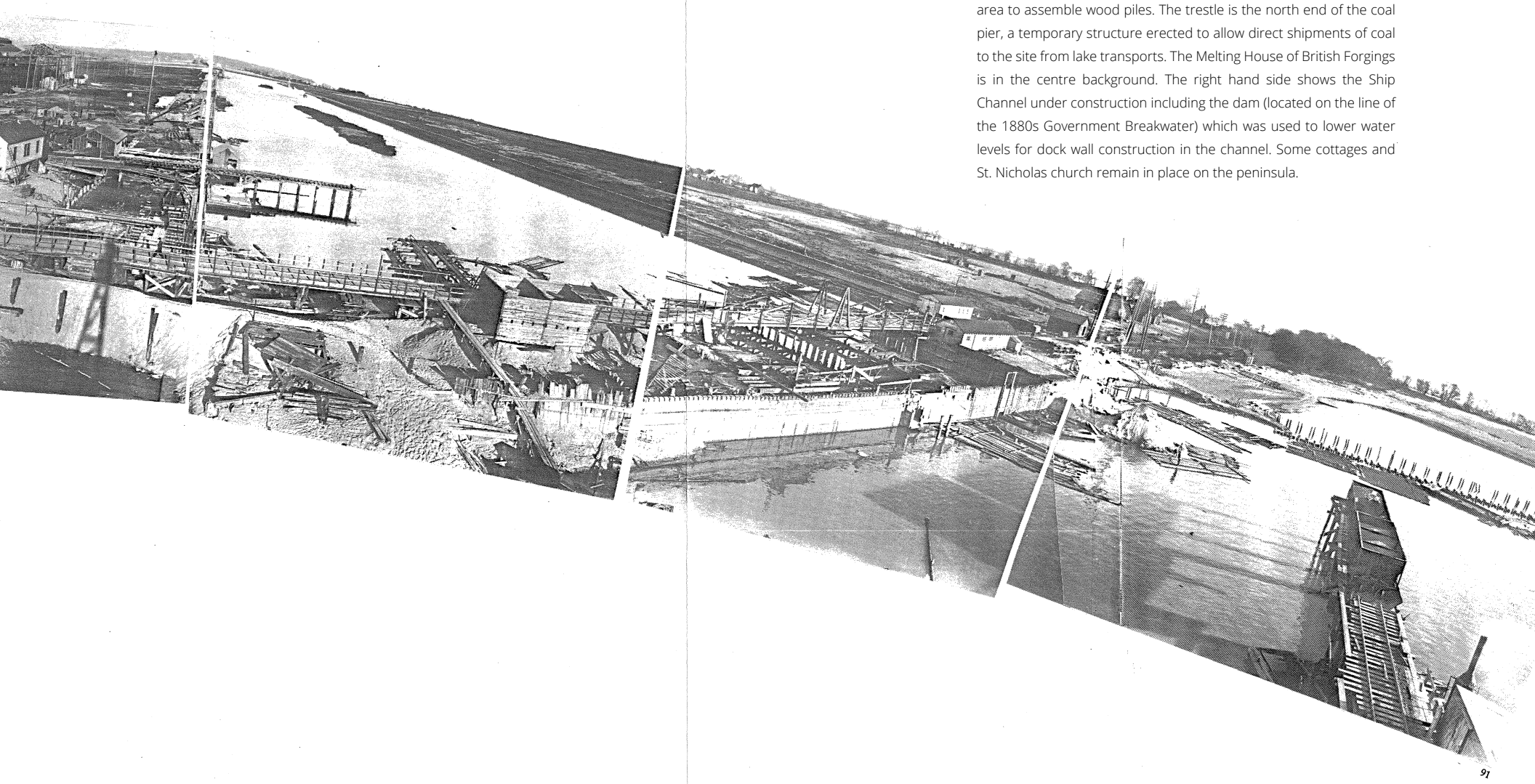


fig. 2-29 Dredging of the Marsh for the Port Industrial District

economy.[37] The fear of disease generated by marshy ecologies was used to frame the situation as an urgent problem to be solved, and to thus gather support for the Commission.[38] Thus far, efforts to control the changing nature of the harbour had been fragmentary and remedial in nature. The Harbour Commissioners Waterfront plan of 1912 combined ideas from many previous proposals, to offer a comprehensive vision of the waterfront and a substantial new Port District on the site of the Ashbridges Bay Marsh, providing industrial lands and shipping facilities, as well as a generous public park along its southern lakefront edge, and space for private cottages.[39] The project was well received and broadly accepted, thus sealing the fate of the Ashbridges Bay marsh to be remade as a modern Industrial Port District.

As a result of the vast scale of this massive infrastructural project, and its timing coinciding with an era of war and depression, its implementation proceeded slowly over several decades. A slow and steady process of excavation and fill, began to reclaim the marshy waters into useful land. Cofferdams were put in place to artificially lower the level of the water and piles were sunk to support formwork and steel reinforcing for concrete dockwalls, poured from mobile mixers moving along tracks to create navigable channels. The dredged material from the bottom of the channels was used to fill in behind the dockwalls creating level ground that could be used for industrial purposes and shipping facilities. The dredgers became a permanent fixture of the landscape, continuing this process over and over again to eventually create 400 ha of industrial land, serviced by a 2.8 km long shipping channel and turning basin, and a series of quays facing the harbour.

The First World War concentrated resources on the Industrial District proving an impetus toward completing serviced lands that could be used toward the war effort. The first major industrial tenant was the British Forgings munitions factory

fig. 2-30 The Hearn power generation plant

engaged in turning scrap metal into shells. A variety of smaller manufacturing enterprises began to take root in the northwester part around the Keating channel, as well as two new shipbuilding yards (one on the south side of the shipping channel) together producing 24 freighters for the war. Though the war effort accelerated lake filling and gave a temporary boost to the industrial activity of the port, the depression brought economic hardship, slowing down the completion of the ambitious 1912 plan, which had been conceived of in a very different economic climate.[40]

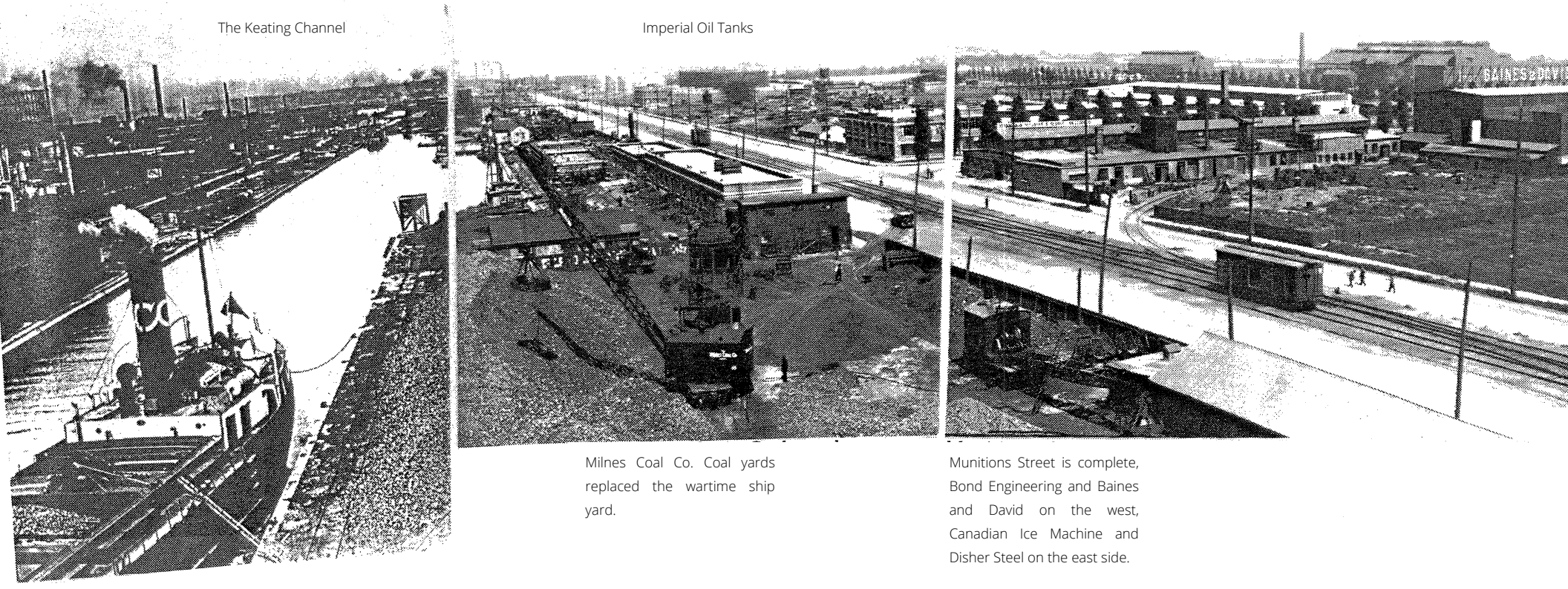
By the time the port industrial district was completed and ready for use in the 1950s, the prominence of shipping as a driver of the economy had been overshadowed by truck transport. Manufacturing was distributed to the outskirts of the city, making the strategic central location of the Port Lands irrelevant. The active industrial tenants the district was intended for never came. Thus in contrast to the vision of a bustling industrial port, the district became a sparse landscape of storage uses, primarily serving the purpose of storing the city's coal and oil supply. Two other major tenants, the Hearn Power Generation plant and the new Sewage Treatment plant established themselves on the plentiful land of the Port Lands, establishing the new identity of the district as it remains today as an underused service landscape for the city. The dream of a thriving modern port did not materialize, leaving the inherent value and potential of its reclaimed land and infrastructures to be realized by future uses.

This history of the Port Lands reveals the multi-layered identities of the site and the underlying forces and processes of transformation that have continuously altered its physical form over time, in order to help us put into perspective its current processes of change and to establish a framework for critically evaluating them. The narrative conceptualizes the site as a landscape in constant transformation,

The Keating Channel

Imperial Oil Tanks

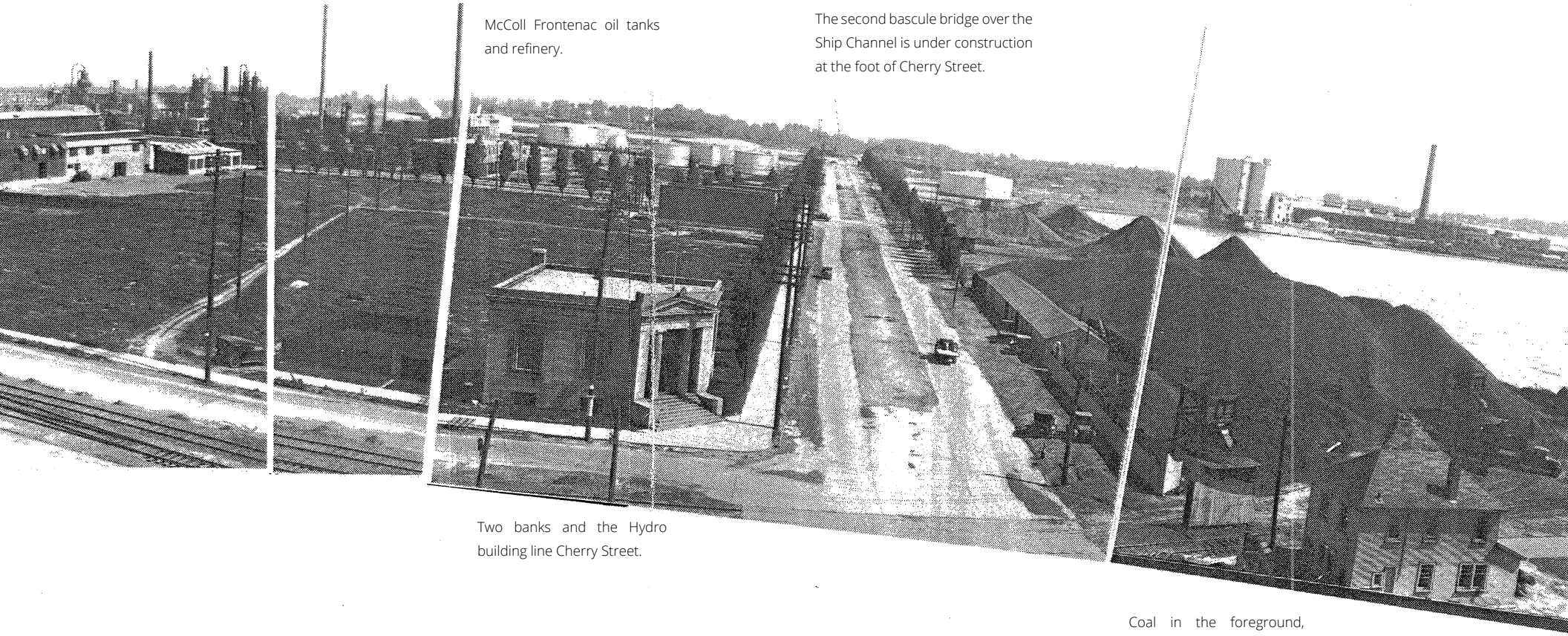
The plate shop of Baldwins Ltd still remains in the background, owned now by Montreal financiers, Nesbit Thompson.



Milnes Coal Co. Coal yards replaced the wartime ship yard.

Munitions Street is complete, Bond Engineering and Baines and David on the west, Canadian Ice Machine and Disher Steel on the east side.

fig. 2-31 1930s Panorama from Villiers and Cherry St.



McColl Frontenac oil tanks and refinery.

The second bascule bridge over the Ship Channel is under construction at the foot of Cherry Street.

Two banks and the Hydro building line Cherry Street.

Coal in the foreground, Canada Cement and Dominion Boxboard behind.

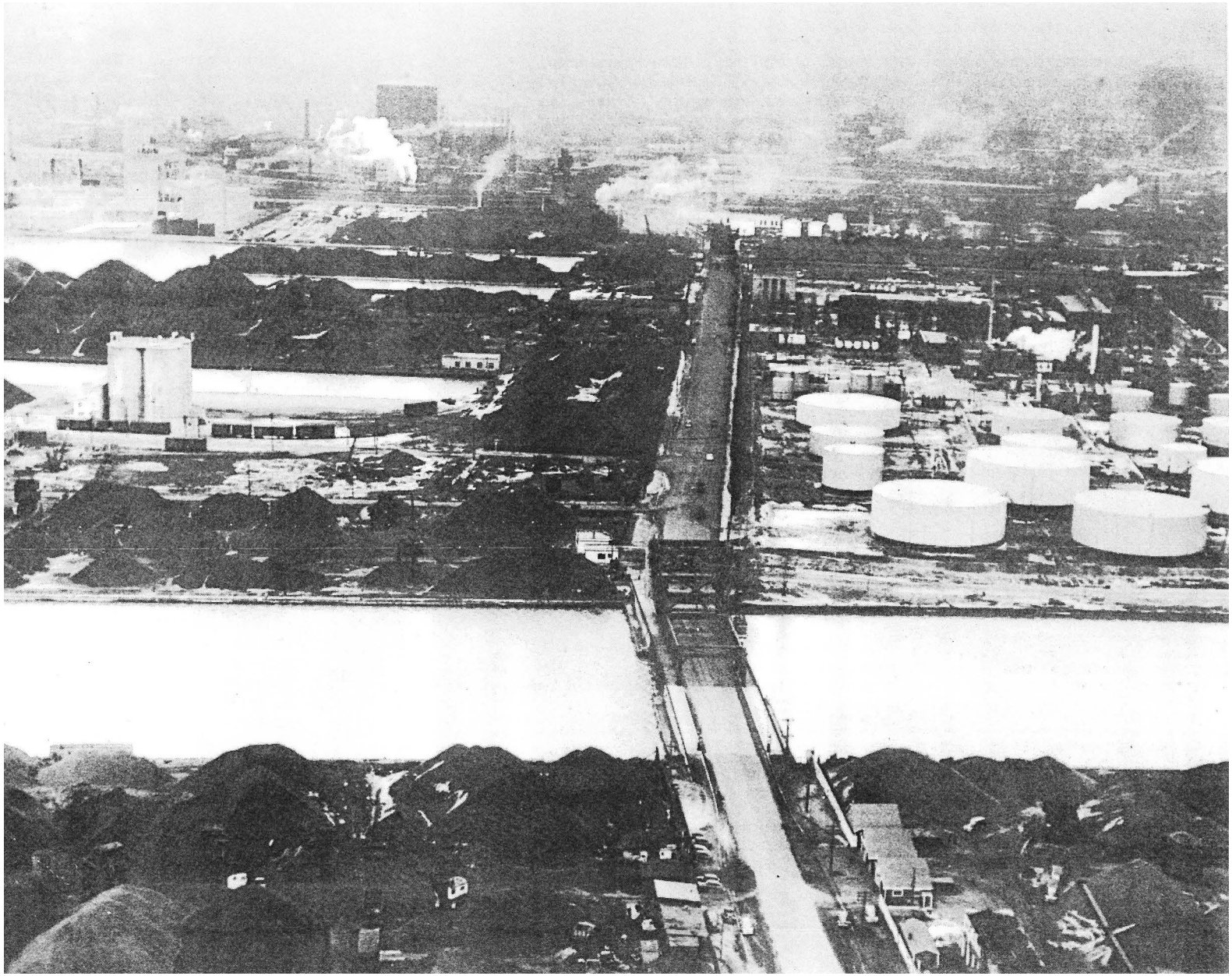
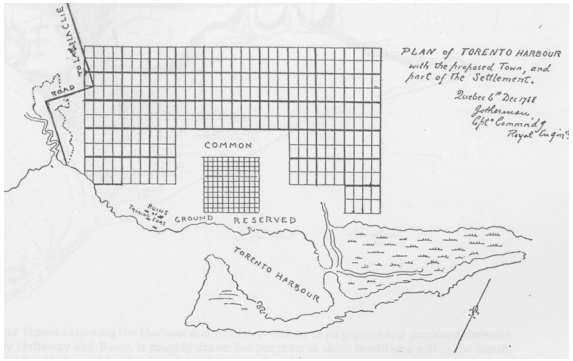


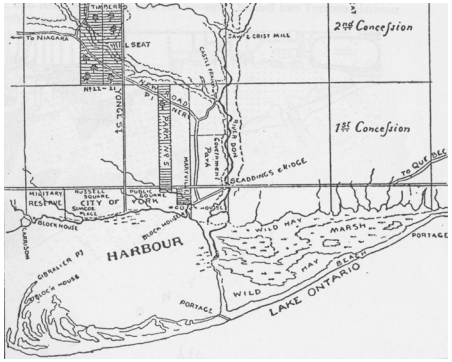
fig. 2-32 Coal and Oil Storage Landscape, 1949

fig. 2-33 Port Lands Aerial as storage landscape

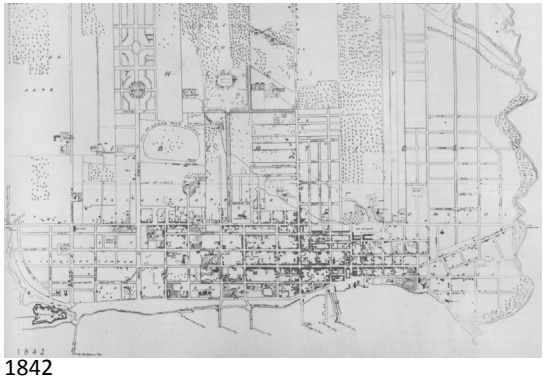
leading to a more dynamic vision of its future, as a continuously changing urban environment which communicates its processes of transformation and as a palimpsest that retains the layers of its changing identities. The long history of the incremental creation of the massive infrastructural project that was the Port Industrial District, as recorded by Stinson, as well as the story of its failed ambition, impart value to its remaining marginalized condition and helps us better understand its embodied energy and unrealized potential. The motive of Stinson's report - making the case for the heritage value of the industrial remains of the Port Lands - inspires this design approach to prioritize the preservation and adaptation of the site's industrial heritage as an embodiment of the collective memory of the city's industrial past. Its artifacts can provide an urban armature of "propelling permanences"[41]that could structure a more diverse and meaningful type of future development on the site unique to its place. The history of the site therefore helps us better understand its existing conditions and look deeper into their layers of meaning and potential.



1788

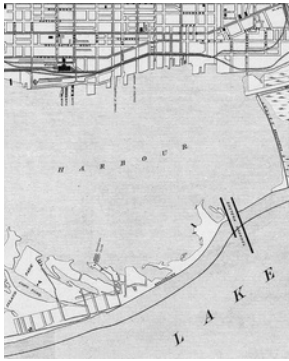


1794



1842

1880



1906

JURISDICTIONAL & SOCIO-ECONOMIC CONTEXT

PORT LANDS PHYSICAL EVOLUTION

1700

pre-1793
Carrying Place, Naturally shifting shorelines

1793
Town of York founded near Don Mouth on the Harbour

1800

1813
Second Don Outlet opened for defense

1830s
Three harbour commissioners appointed to maintain the harbour depth by dredging material collected due to erosion and sedimentation

1850
Harbour Trust formed

Railway established along waterfront

1870
Improvements to 2nd Don River Outlet, river mouth dredged to make navigable + Rolling Mills Wharf (Don Breakwater) constructed

1880
Government Breakwater

1880s
Lower Don River straightened and channelized to make navigable

1893
Keating Channel begun

1793

1834

1886

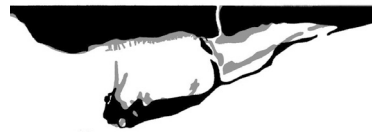
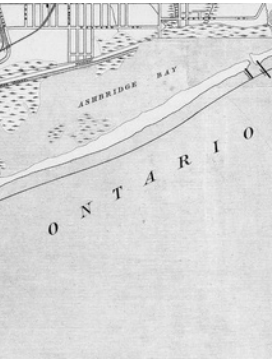
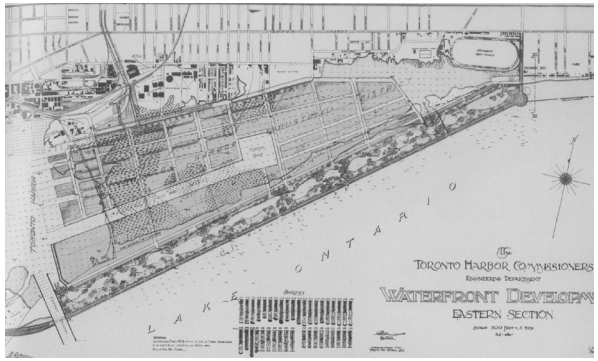
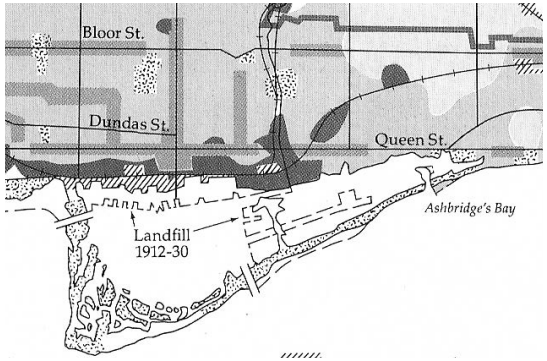


fig. 2-34 Timeline of Port Lands transformation

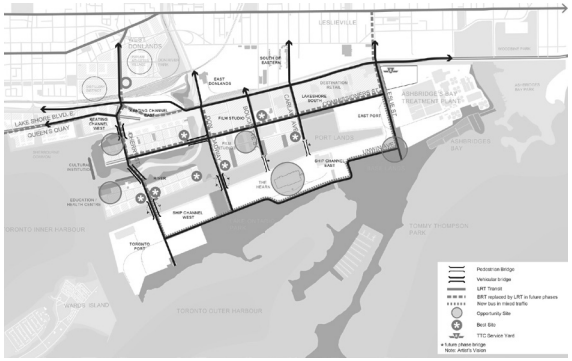




1912



1914-30



2012

1912
Harbour Commission formed
1914-18
Industrial + shipbuilding boom to support the War effort

1950s
Industry becomes decentralized, making Port Lands a storage landscape

1963
Gardiner Expressway built

1999
Toronto Port Authority formed
2000
Waterfront Toronto formed

1900

1906
Plan to connect channelized Don river to Keating Channel

1912
Harbour Commissioners' Industrial Harbour District Plan

1912-30 Incremental lakefill of Port Industrial District

1930
East Bayfront Docks filled

1960
Cousins Quay rebuilt
1960s
Leslie Spit began to form outer harbour
1962
Extension of Shipping Channel to Leslie

2000

2006
Central Waterfront Secondary Plan
2006
Lake Ontario Park Master Plan
2008
Olympic Bid Port Lands Athletes Village

2010
Lower Don Lands Framework

Keating Channel Precinct Plan

2011
Rob Ford's Port Lands Plan
2012
Port Lands Acceleration Initiative

1912

1959

2010

fig. 2-35 Obsolete industrial rail infrastructure on Villiers St.

2.4 Current Conditions

The Port Lands site is currently a vast post-industrial service district for the city while awaiting redevelopment. It is managed by the Toronto Port Lands Company, which leases out available land to interim uses or provides sites for redevelopment. Largely underused for its key location, it has become a sparse collection of storage and city services - storing road salt for winter, treating the city's waste, and making concrete for the downtown building boom, among other things. However, despite its apparent dereliction the site is not nearly totally empty - it is a dynamic hybrid landscape of active industrial and commercial uses, an emerging film district and creative businesses, industrial heritage artifacts, park land and trails, and recreational uses. Increasingly it is used by bikers, photographers, and all sorts of people curious about its layered history, current character and future potential.

The site is burdened by several environmental problems and barriers to development including obsolete industrial infrastructures and persisting industrial uses, soil contamination and risk of flooding under severe storm conditions. Most of the site's industrial infrastructures and built artifacts are vacant, in disrepair and awaiting demolition. Persisting industries and city services have long-term leases of a hundred years or more, presenting additional barriers for redevelopment. Limited but continuing port uses occupy valuable harbour-front sites and make use of the channels. As a result of many years of industrial uses and coal and oil storage on the site, the soil and groundwater are highly contaminated with hydrocarbons and trace heavy metals. The extent of contamination is unknown due to the scale of the site, the hybrid makeup of the fill used to reclaim the land, and the variable nature of groundwater contamination. Many areas that

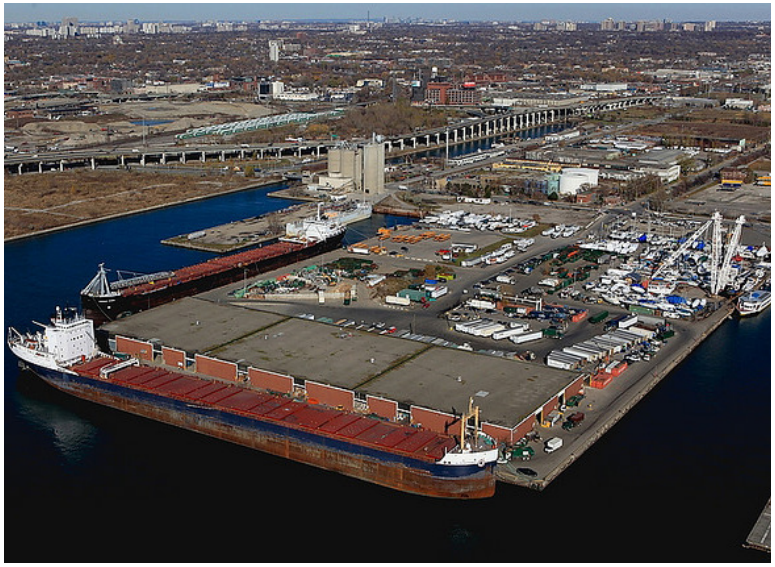


fig. 2-36 Diversity of activities on Port Lands Site

have been tested however, surpass residential and sometimes even industrial standards. Therefore the site will need significant remediation efforts to allow for rezoning and prepare it for redevelopment. As a result of the channelizing of the lower Don River and its river mouth as the Keating Channel, much of the Port Lands site and surrounding area to the north are at risk of flooding under heavy storms. This risk limits the type of uses and scale of buildings allowed to be constructed on the site by the current zoning, and is therefore a significant barrier to redevelopment. In order for the site to be rezoned, a flood-protection strategy must be implemented prior to any development on the site.

The complex issues of the site however also provide opportunities for its future diversity. The heritage landscape and built artifacts that remain embody the ambition and aspirations of the city's past, and have the potential enrich the identity of the site's future as catalytic urban artifacts. The industrial uses that persist employ hundreds of people and take advantage of the site's location for shipping and proximity to construction projects downtown. The site's vast but underused natural landscape and bike trails along its lakeshore, could be a huge resource for the city if connected to its larger parks and trails network west to the island, north to the Don Valley, and east to the Beach. The site's relationship to water, with its frontage on the lake, the inner harbour and its grand channels, offer opportunities for creating a stronger connection between the city and the lake, with spectacular sites for architecture, and significant public amenities. The site's hybrid character of various uses and site elements provides a rich tapestry of conditions for a diverse urbanism to emerge grow, and adapt over time.

Hybrid Landscape

Aerial photography reveals the great variety of uses currently occupying the Port Lands. It also reveals largely underused areas, with great potential for phytoremediation and temporary uses.

fig. 2-37 Cousin`s Quay

fig. 2-38 Lower Don Lands along Cherry St.

fig. 2-39 Shipping Channel at Don Roadway

fig. 2-40 Turning Basin + the Hearn

fig. 2-41 Tommy Thompson Park + Sewage Treatment Plant

Service Landscape

The primary current uses of the site are city services such as power generation, waste treatment , and salt storage, as well as some remaining industrial uses that support the city's construction industry such as aggregate and cement storage and production of concrete.

fig. 2-42 Sewage Treatment Plant

fig. 2-43 Ontario Power Generation Plant

fig. 2-44 City Works Yard

fig. 2-45 Salt storage

fig. 2-46 Truck Parking

fig. 2-47 Shipping Dock

Recreational Landscape

The site is also used recreationally both formally and informally. The beaches, wild lake front, and bike trails are well used throughout the year. The vast post-industrial landscape provides a place for exploration for many curious bikers and photographers. The rowing club and several yacht clubs draw watersport enthusiasts to make use of the site's close relationship with water. Several recreational facilities such as the Docks Entertainment Complex, the drive- in theatre, the temporary Cirque du Soleil tent, and a few restaurant patios also attract the public to the site promoting public use of the Port Lands.

fig. 2-48 Canal-side Pub Patio

fig. 2-49 Harbourfront Views

fig. 2-50 Cirque du Soleil

fig. 2-51 Cherry Beach

fig. 2-52 Rowing Club

fig. 2-53 The Docks Entertainment Complex

Heritage Landscape

In contrast to older industrial sites, 20th century industry did not leave dense historic architectural fabric or mega-infrastructures on the Port Lands that are generally associated with industrial heritage. The primarily storage-based functions it accommodated left it largely unbuilt, with few small scattered sheds and silos dispersed through a vast flat landscape. With the exception of the Hearn power generation plant, the smokestacks, and the Bascule bridge, the most significant heritage element that remains is perhaps the land itself, contained by its profiles.

fig. 2-54 Essroc Silos

fig. 2-55 Villiers St. Railway

fig. 2-56 Keating Channel

fig. 2-57 Shipping Channel + the Hearn Generating Plant

fig. 2-58 Bascule Bridge

fig. 2-59 Turning Basin

Natural Landscape

The southern edge of the site remains as wild parkland and beaches, connected by the waterfront trail. The park land is actively used in the summer, but becomes a quiet contemplative landscape in winter.

fig. 2-60 Cherry Beach

fig. 2-61 Lakeside park

fig. 2-62 Tommy Thompson Park Bay

fig. 2-63 South of Unwin St.

fig. 2-64 Waterfront Trail

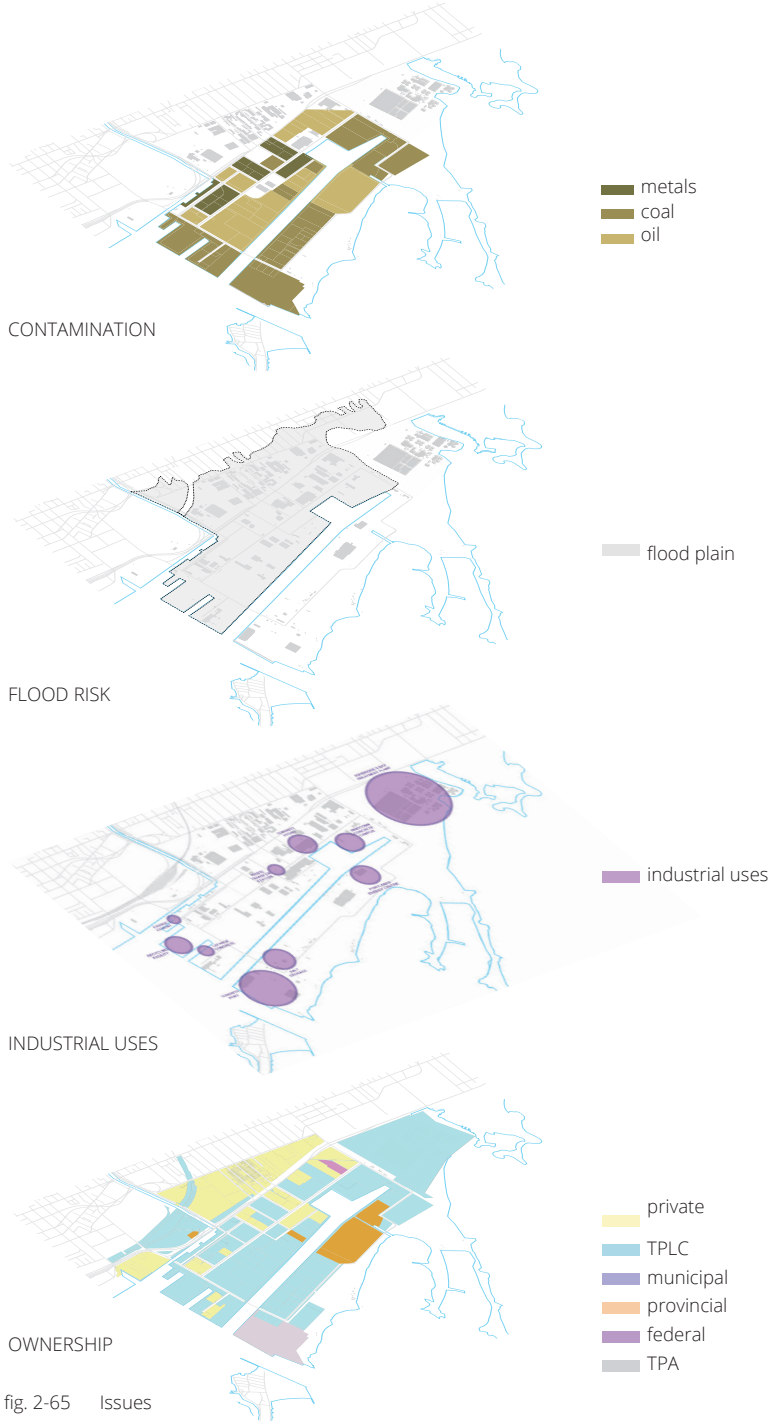
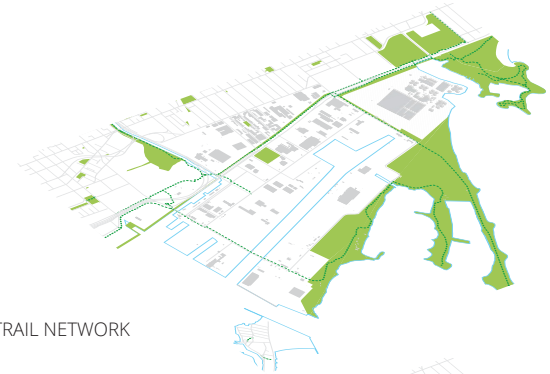


fig. 2-65 Issues

Issues

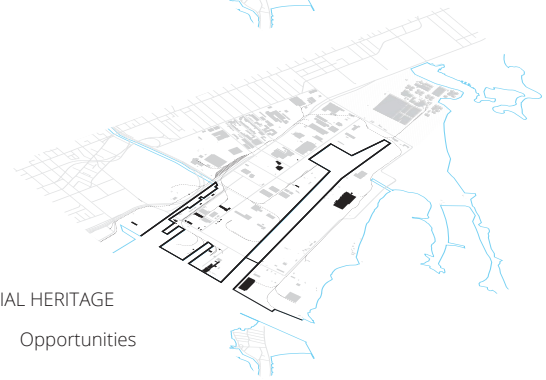
A series of issues impact the redevelopment of the site, the most important being soil contamination, flood protection, persistent industrial uses, and fragmented ownership.



PARK + TRAIL NETWORK

WATER ACCESS

MIXED USES



INDUSTRIAL HERITAGE

fig. 2-66 Opportunities

Opportunities

The site also presents a series of opportunities such as its industrial heritage, a wide variety of uses that have begun to approporiate the site, the network of parks and trails, and the proximity and extensive access to the water through docks and canals that make up its extensive water's edge.

Contamination

fig. 2-67 Port Lands Soil Recycling Pilot Facility

Most of the Port Lands 400 ha of post industrial land, are contaminated as a result of past industrial uses and storage of coal, oil, and gas. High concentrations of hydrocarbons and trace metals are unevenly distributed in the soil and groundwater of the site. Significant remediation efforts are required before the site can be rezoned for residential and other non-industrial uses.

Current Initiatives

Waterfront Toronto established the Port Lands Soil Recycling Facility in July 2010 to determine the viability of treating and reusing impacted soil as an alternative to the traditional "dig-and-dump" disposal of brownfield soil.

Operated by Green Soils, 8.2 ha site, is being used to test a number of cutting-edge technologies, to treat contaminated soil to an environmental condition that allows it to be reused in future residential and commercial areas.

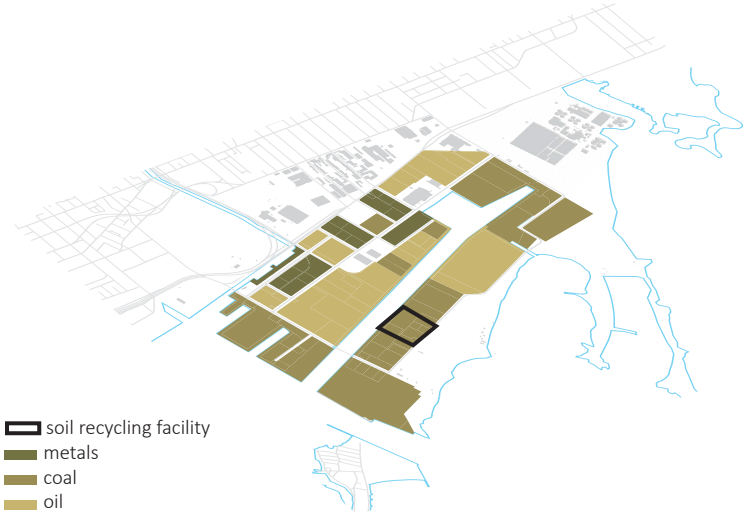


fig. 2-68 Speculative Soil Contamination

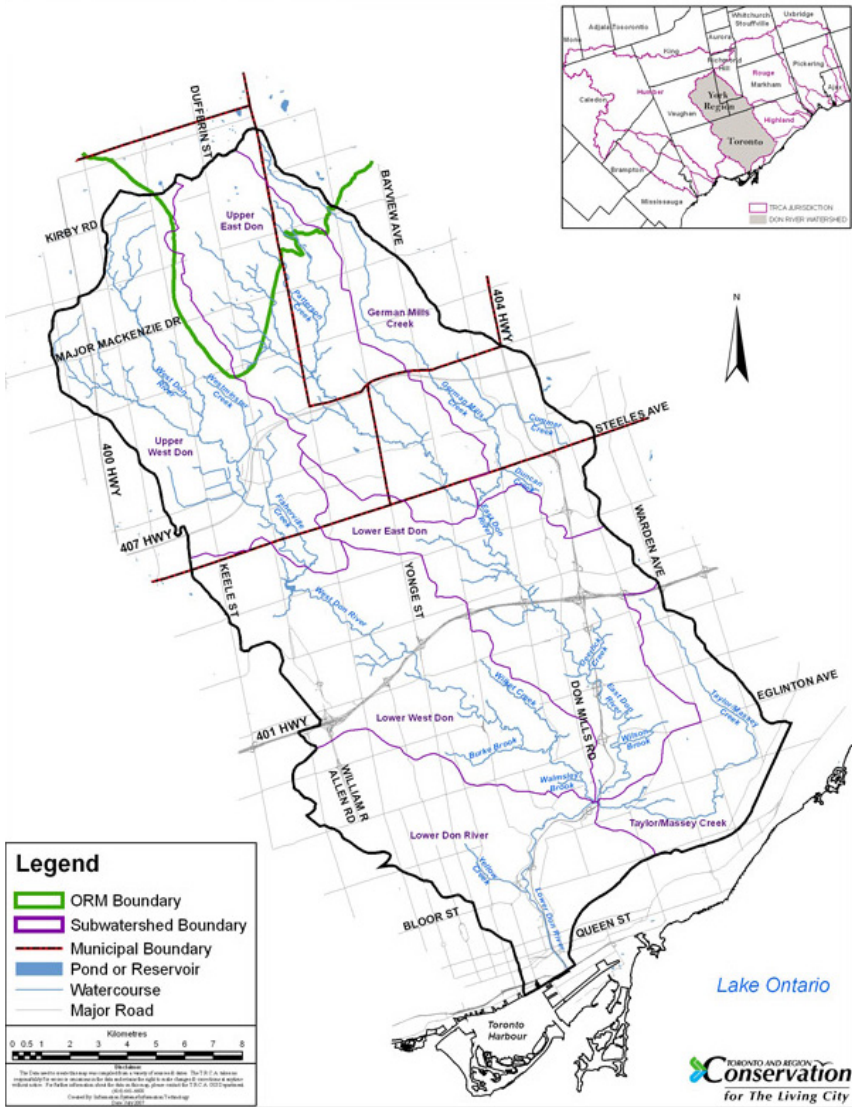


fig. 2-69 Don Ricer Watershed

Flood Risk

The Port Lands is at the outlet of the Don River's 36000 ha watershed, and as a result is susceptible to flooding and siltation during rainstorms. As a result of seasonal storms, much of the lowlying area of the Port Lands and adjacent land to the north is susceptible to flooding. This flood risk directly affects the zoning of the area, and limits development and land use.A flood protection strategy and infrastructure is required to be put in place before the area can be made available for redevelopment.

Current Initiatives

The Don River Mouth Naturalization Environmental Assessment has studied several alternative Flood Protection strategies involving a naturalized river mouth, spillway and raised landforms. It is in the process of finalizing a scheme based on a naturalized river mouth through the Lower Don lands and out onto the harbour.

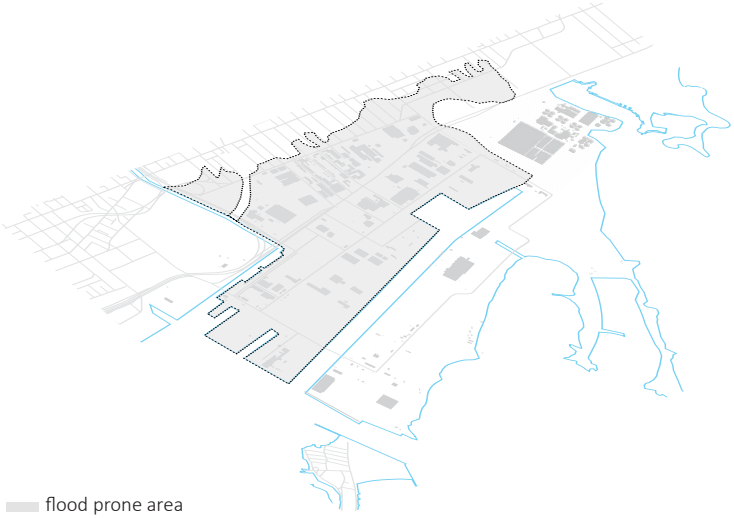


fig. 2-70 Flood Risk

fig. 2-71 Lower Don Lands Competition, MVVA

fig. 2-72 2010 Current Lower Don Lands Vision, MVVA

2.5 Planning Process

Designated as part of the downtown and central waterfront growth area in the Toronto Official Plan and Central Waterfront Secondary Plan, the Port Lands site is currently being planned for redevelopment as a mixed use residential and employment area. The process is being managed by Waterfront Toronto, collaborating with the city and the Toronto and Region Conservation Authority on this project, as a result of the site's complex ecological and hydrological issues, and the Don River mouth re-naturalization initiative which has been a major part of the site's redevelopment plans.

Starting with Toronto's Olympic Bid which planned to locate the Olympic village on the Port Lands, the site has been the subject of several studies and master plans, including most notably, an international competition for the Lower Don Lands, the portion of the site nearest to the city and river. The winning entry by MVVA Landscape Architects has had widespread public support and continues to provide the basis for the current planning direction. Its proposal of an urban estuary, prioritizes the re-naturalization of the Don River mouth as flood-protection infrastructure and generous parkland for the neighbourhood and the city. The competition concept was further elaborated by MVVA in 2010 for the Lower Don Lands Framework Plan and the Keating channel Precinct Plan and Zoning Bylaw. However, despite its popularity, the vision had not thought about implementation and ran into major challenges as a result of the extremely high cost of flood protection infrastructure, the reduced development area, and the difficulty of its phasing.

In the fall of 2011, Mayor Rob Ford and the city run Toronto Port Lands Company attempted to take control of the 400 ha Port Lands site from Waterfront Toronto,

fig. 2-73 2011 Rob Ford + Toronto Port Lands Company Vision, Erik Kuhne Associates

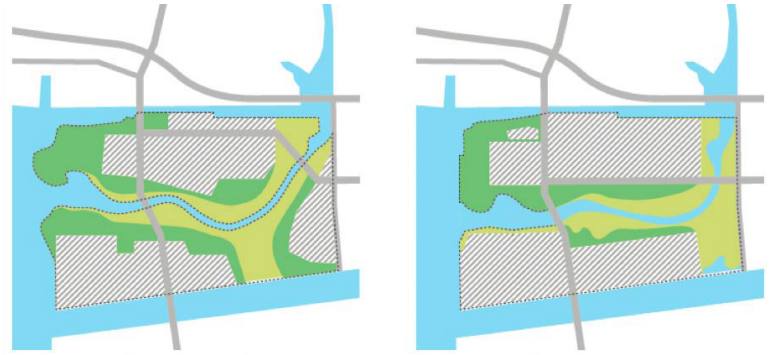


fig. 2-74 Planning Alliance + Public Work + Michael Van Valkenburgh Associates

proposing an alternative vision designed by Erik Huhne that featured a megamall, Ferris wheel, monorail and marina and huge roundabout, proposing to accelerate development of the whole site to just ten years in order to take advantage of its development potential to generate revenue for the city. After much public outcry and resistance from the Toronto's design community, city council voted against it, agreeing to keep the previously accepted MVVA vision, but initiating an acceleration initiative to assess how it could be implemented.

The Port Lands Acceleration Initiative was also a joint effort between Waterfront Toronto the City of Toronto and the TRCA, in collaboration with several consultants, as well as periodic stakeholder and public participation. The goals were to review Flood Protection options, analyze development costs, and review the Lower Don Lands Framework Plan to make it phaseable and implementable. The result was a modified river mouth design and slightly larger development parcels that allow the plan to be implemented over several phases and therefore make it able to generate the resources needed for its infrastructure over time. The business plan for the project's implementation was also researched in depth, concluding that private investment will be crucial to the project's implementation. The initiative engaged in public consultation throughout the process but still met a lot of resistance from the public who were reluctant to compromise the initial design. MVVA was brought it to revise their own design in order to appease the public, and convince them that the changes were minor and necessary. Regardless there is still resistance to the plan as it is seen as a compromise of the initial vision. The results of the initiative were summarized in a report with directives to city council on how to proceed with the area, and were adopted in the fall of 2012.

Following the report, the Don River Mouth Naturalization Project Environmental Assessment is to be finalized to accept and proceed with the preferred river mouth alignment. Once that is in place, a planning framework needs to be developed

fig. 2-75 Lower Don Lands Urban Estuary, Michael Van Valkenburgh Associates

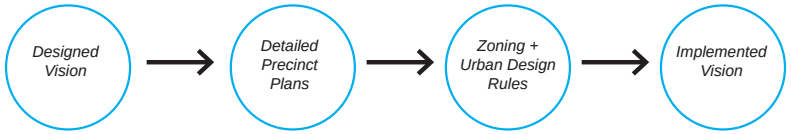


fig. 2-76 Master Plan Process

for the whole Port Lands site, before leading to detailed precinct plans, zoning and urban design guidelines for individual neighbourhoods. The environmental assessment, the overall framework plan and a couple of initial precinct plans are currently underway, based on the revised MVVA design.

The current vision is highly sophisticated and progressive in terms of the public realm and parkland that it proposes. However by prioritizing re-naturalization, it undervalues and erases much of the industrial heritage of the site in favour of its earlier wetland identity. The plan also sacrifices the quality and diversity of the built environment, by forcing high density in small developable areas resulting in the same high-rise typology as the rest of the downtown core. By focusing only on the Lower Don lands, it concentrates all the parkland and public spaces around the river mouth, creating a zone of intense amenity but leaving the rest of the Port Lands at a disadvantage. The naturalization of the river mouth is more symbolic than functional, since the rest of the lower Don River remains channelized. In a context of scarce city resources, the high cost of the naturalized river mouth makes its implementability largely dependent on funding from private development, thus risking the standardization of the built form of the Port Lands through the same processes of negotiation as the rest of the city. Based on a single grand vision to be implemented as designed, the master plan leaves little room for emergence of a diverse urbanism that can develop and change over time through user participation. Instead it demands large scale development to realize it sacrificing the variety of the urban fabric for the public realm. In providing a singular fixed vision for the site based on one of its past identities, the approach misses the opportunities of offered by the site's physical complexity and multi-layered character. An alternate vision of the Port Lands is possible, which engages the intricate conditions and relationships of the site to produce a variable, and dynamic urban landscape particular to its place and history.

fig. 2-77 Alternative Vision of simultaneous strategies

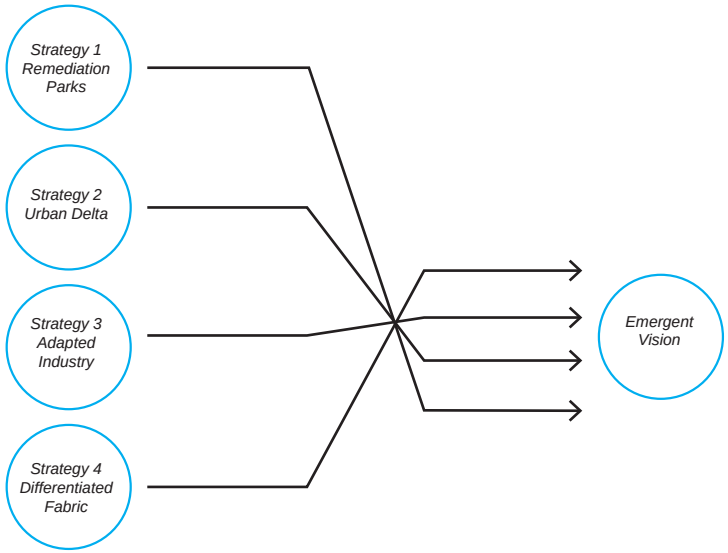


fig. 2-78 Relational Process

2.6 Alternate Vision

The site has been in a constant state of flux since its formation, from natural processes of coastal erosion and sedimentation that formed the original wetland, to socio-economic processes of dredging and lake fill that aimed to create a modern Port Industrial District, to the shifting uses and activities of the service landscape that persists today. By interpreting the site as a dynamic landscape in continuous transformation rather than as a blank slate to be designed as a fixed end product, this vision has a greater chance of creating a socially and environmentally sustainable city district able to adapt to unpredictable future challenges.

The site's vast scale, complexity, and history of constant change, resist a fixed singular master plan, demanding a more dynamic, multiple and variable vision of its evolution over time. This vision imagines a district in which industry, remediation, infrastructure, and development co-habit and simultaneously progress. Compatible persistent industry, city servicing infrastructures and port uses remain, while new light industrial uses are integrated into new urban fabric. The inherent value of port infrastructures is preserved and reused for public amenity and potential future utility. Heritage industrial buildings are preserved and adapted for mixed cultural, small business, and community uses. The processes of remediation of the soil and groundwater are not externalized, but make use of phytoremediation planting to become part of the site's changing landscape and remaining park network. The site's parks are not mere passive spaces of recreation but productive landscapes that continue to improve the quality of the ground and communicate this process to the public. Flood protection infrastructure taps into the site's existing canals to create a dispersed

and differentiated network of waterways that collect and treat storm water, while providing various kinds of public spaces with a stronger relationship to water. The collection of existing conditions and new landscape networks create an intricate matrix of conditions for diverse forms of development to respond to. A variable urban landscape emerges gradually, and continues to diversify over time through the work of its users. A city gradually emerges and begins to mature on the Port Lands site.

The Port Lands offer a valuable opportunity for developing and testing a new approach to city building that draws from the complexity of the site and the relationships between its processes of transformation to create a model of more diverse and adaptable urban development for Toronto's culture of diversity. The relationship between built form and landscape could be used productively and orchestrated more precisely to generate architectural variety, rather than sacrifice it for the public realm. Instead of resorting to the same large scale high-rise forms of development, the planning of the Port Lands could learn from Toronto's tradition of finer grained incremental emergent urbanism to produce a more vibrant urban fabric along the water's edge.

Endnotes

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"Urban design is practiced less as spatial composition and more as orchestrating the conditions around which processes in the city may be brought into relationship and 'put into effect'".

- James Corner, The Agency of Mapping

CHAPTER 3 : Design Proposal

Strategies for Variability

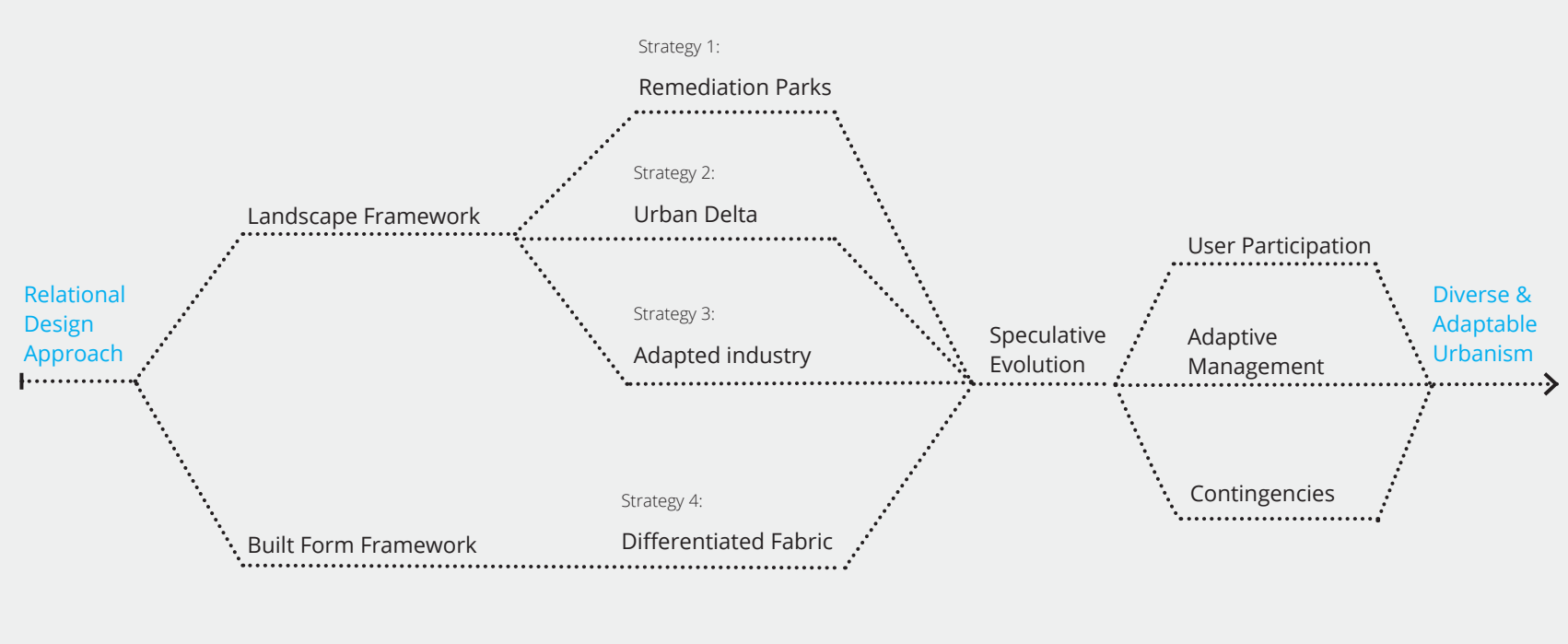


fig. 3-1 Relational Design Approach

3.1 Relational Design Approach

The design proposal consists of a landscape framework that creates differentiated site conditions and a set of rules that relate built form parameters to the various site elements to generate diversity. The landscape framework is composed of three site strategies - remediation parks, urban delta, and adapted industry. Each addresses one of the existing problems of the site - soil toxicity, flood risk, and remaining industry - rethinking them as opportunities for different forms of public space that can in turn influence the variety of the built environment to come. Each strategy is developed through research of the existing conditions and design of a potential alternative. Each maps the problem it focuses on, and links it with an opportunity for public benefit, researching the ways the problem is currently being addressed and providing precedents that illustrate alternative potentials. The design of each landscape strategy provides a plan of the full system at the scale of the site, and a series of typologies of its different conditions, followed by an illustration of their deployment over time on a particular site within the Port Lands. The built form strategy is different as it responds to the site through a framework of relational rules. It consists of three sets of rules providing overall intentions for the district scale, minimum-maximum ranges of parameters for the block scale, and different parameters for adjacencies to existing and proposed landscape infrastructures. Each set of rules is illustrated with maps and models of their potential results and differentiation over time. A speculative resultant overall built form outcome of the site conditions and rules is illustrated through drawings and model as a glimpse of the potential diversity that would result. The potential sequencing and interaction of the landscape strategies are also mapped and illustrated in time to demonstrate a possible scenario of the site's dynamic process of transformation following this relational approach.

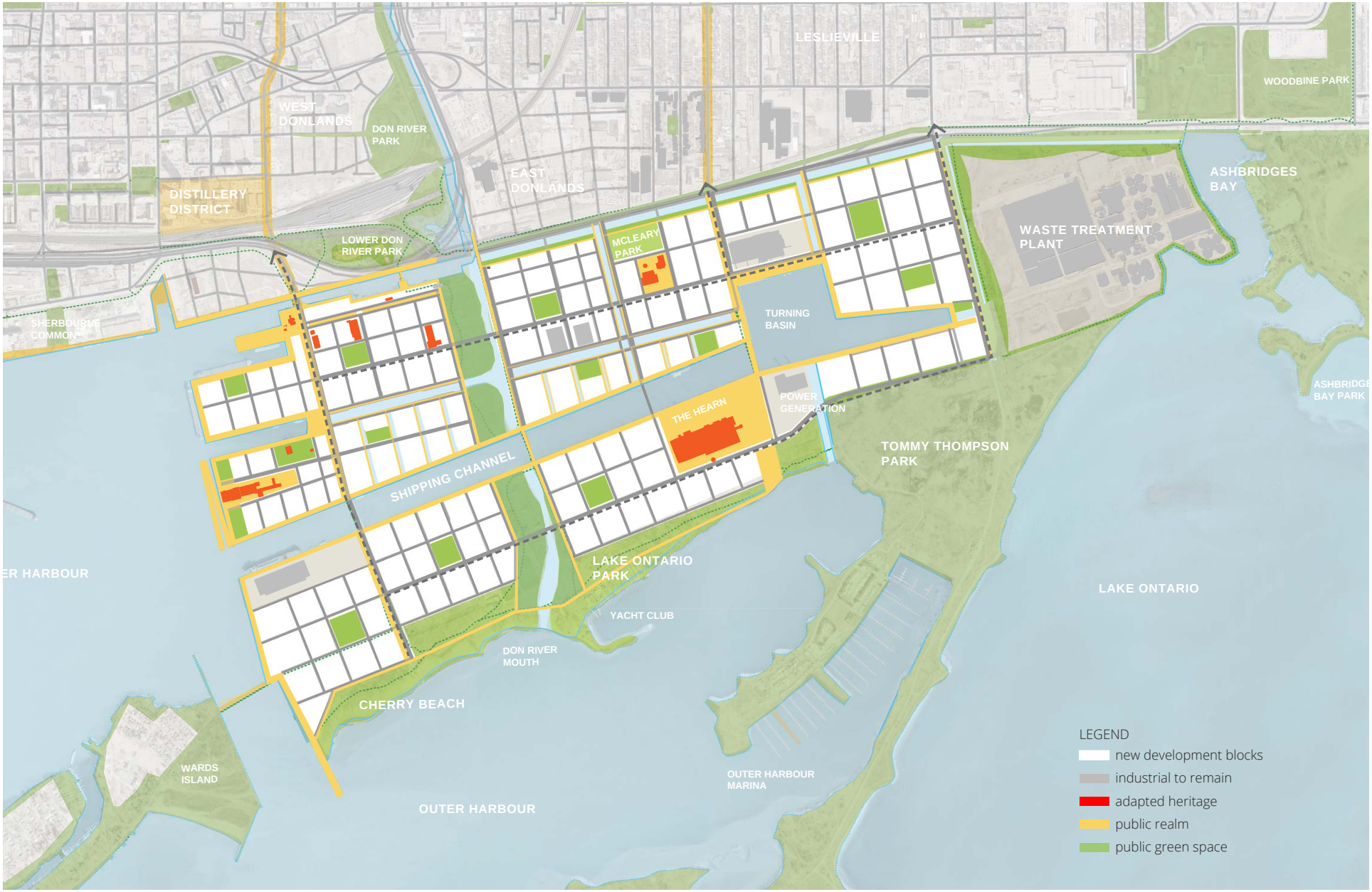


fig. 3-2 Landscape Framework

fig. 3-3 Framework Layers: Remediation Parks, Urban Delta, and Adapted industry.

3.2 Landscape Framework

Three site strategies - remediation parks, urban delta, and adapted industry, - opportunistically rethink the issues of the site, strategically reusing the existing infrastructure and built heritage to create a dynamic landscape framework that will guide the emergence of diverse and adaptable urbanism over time. The landscape framework establishes an intricate matrix of site conditions for built form to respond to, through a set of relational rules. Each of the layers of the landscape framework are based on existing site elements that are connected into larger networks of variable character across the site. Each strategy is designed to be broken down into phases that will be deployed incrementally over time, making the transformation of the site a dynamic long-term process of simultaneous adaptation of built heritage, remediation, infrastructure, and urban development.

fig. 3-4 View of remediation field on site awaiting redevelopment

3.2.1 Remediation Parks

This strategy re-imagines parks as productive landscapes that remediate the ground while providing amenity, challenging conventional ideas of park space as simply recreational. This new definition of park includes large scale temporary remediation fields planted through agricultural methods to clean up land awaiting development, medium scale long-term parks that will make up the regional green network of the site and continue to remediate the land for many years, and small scale neighbourhood parks that will continue remediation through the participation of community gardening organizations. The sequencing of remediation will follow the overall phasing plan but will be modulated by the inevitable contingencies of phytoremediation as a result of variable remediation times for different contaminants and species. The collection of these park types, their different temporal permanence and various planting types will create a dynamic and highly differentiated landscape that will remediate the site over time while increasingly providing ecological functions and public amenities to the emerging urban landscape.

Issue:

Soil Contamination

Most of the soil on the Port Lands site is contaminated as a result of the poor quality mixed fill used to reclaim the land and due to past industrial uses and storage of coal, oil, and gas. High concentrations of hydrocarbons and trace metals are unevenly distributed in the soil and groundwater of the site. Because the water table is high, the contaminated groundwater spreads and mixes the contaminants in the soil. Significant remediation efforts are required before the site can be rezoned for residential and other non-industrial uses.

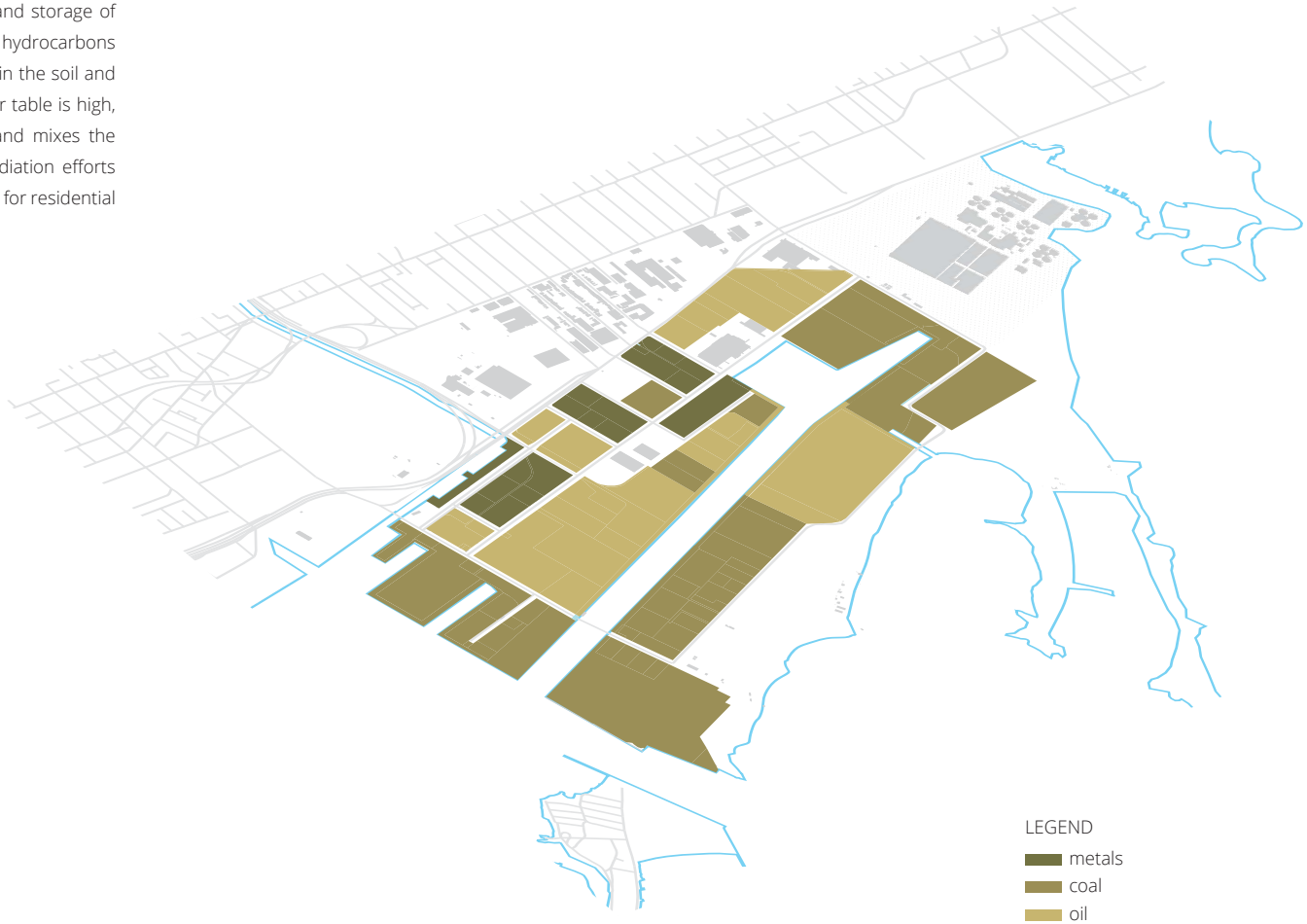


fig. 3-5 Soil Contamination

Opportunity

Parks & Trails

The Port Lands holds a strategic location in Toronto's broader parks network, with access to the Don Valley park system to the north, the Beaches to the east, Tommy Thompson Park to the south, and the Toronto islands and waterfront trail to the west. If thoughtfully planned the Port Lands parks could both act as a link to integrate these disparate park systems into a regional parks network, and as a destination offering a vast wild parkland by the lake.

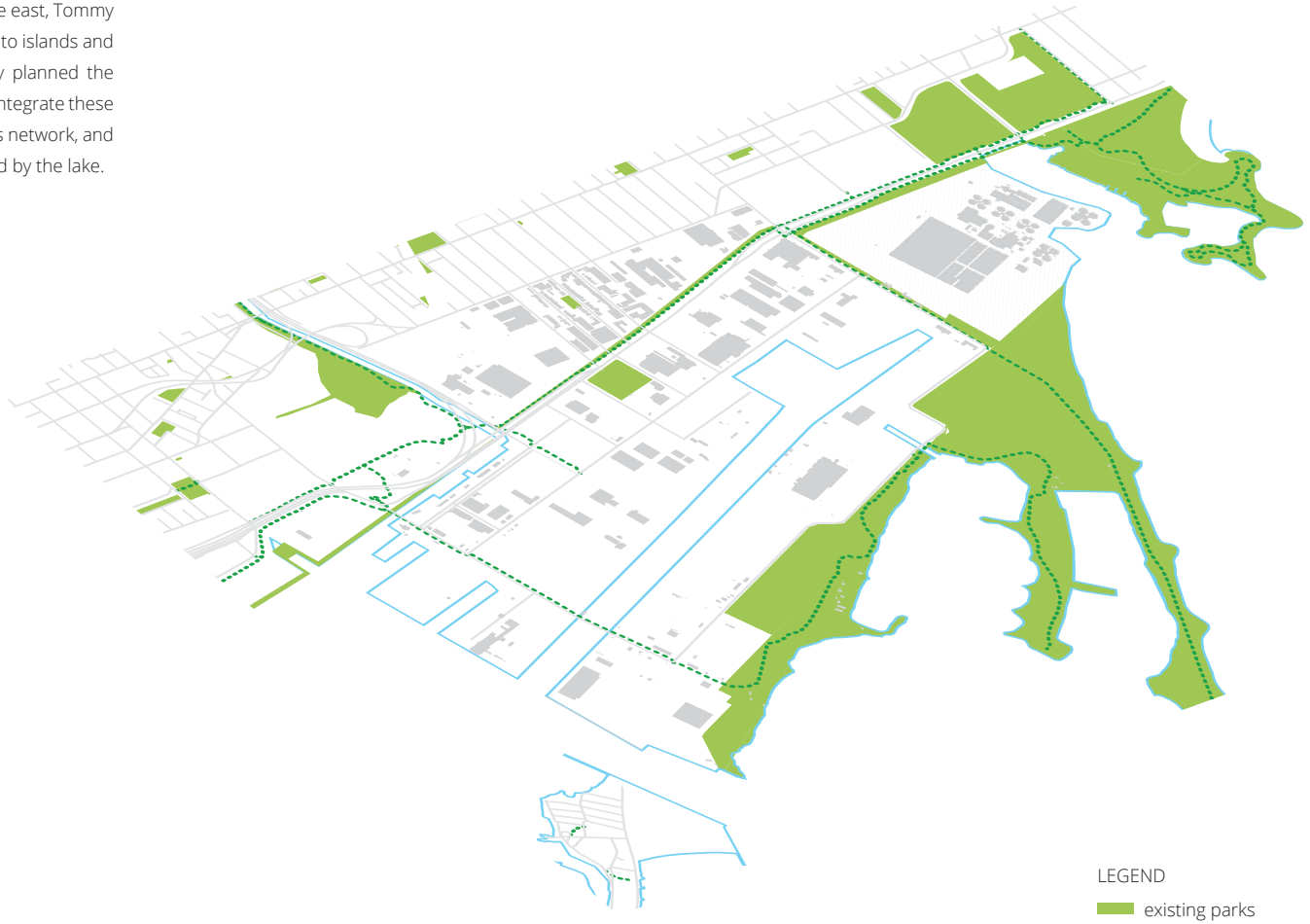


fig. 3-6 Parks & Trails

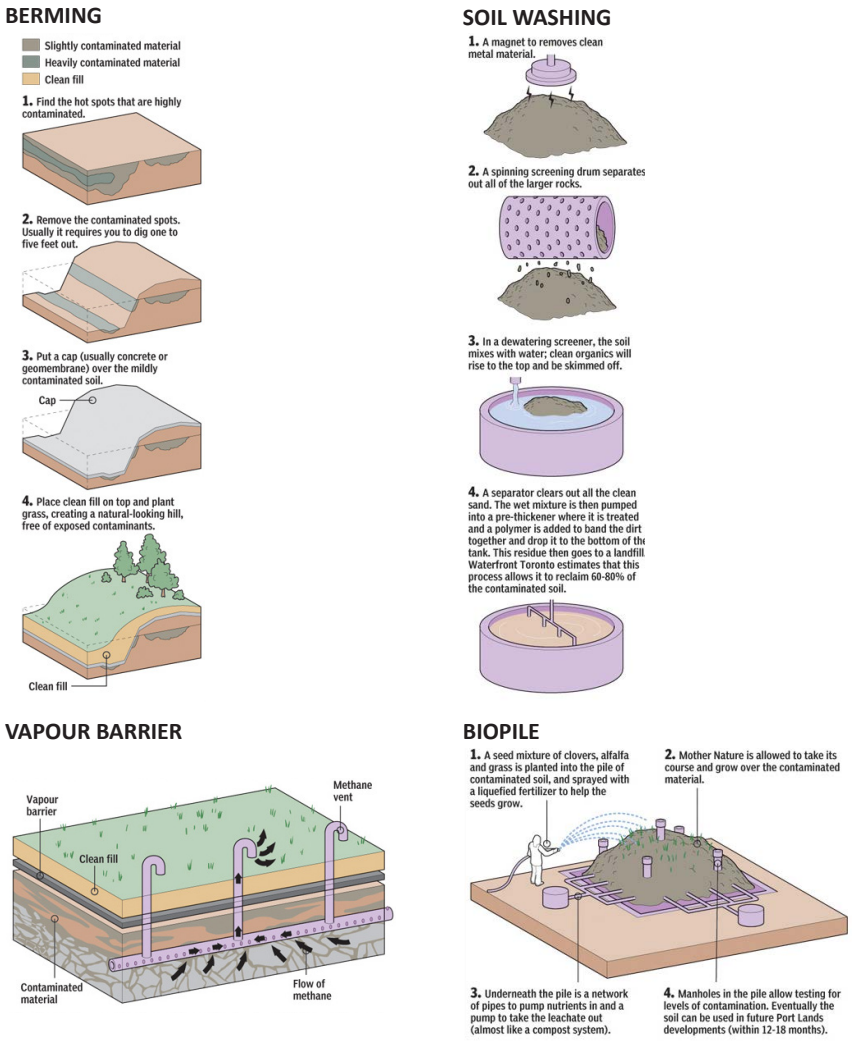


fig. 3-7 Soil Remediation Techniques being considered

Current Situation

The current approach to remediation in the Port Lands is based on a process of site-by-site characterization, risk assessment and offsite treatment. Beyond historical information there is little data about the actual extent and distribution of contaminants on the site since the process of assessing them is expensive and site intrusive, and it is not done unless there is a redevelopment proposal for the site. A risk assessment process is used to determine site specific standards that are protective of human and ecological health according to the use of the redevelopment and particular contaminants on the site. Depending on the contaminants and type of future use there may be requirements for clean soil caps or hard surface caps to prevent direct contact with remaining soils or to ensure vegetation roots do not enter the impacted soil zone. There may also be a requirement to install vapour proof barriers on building foundations, etc. Depending on levels of contaminants on site there may be "hot spots" that require remediation even after the risk assessment has been completed. Typically this soil is excavated and trucked offsite to be recycled or simply disposed of and new soil brought in as clean fill. TPLC and Waterfront Toronto are testing several methods of recycling soil on a part of the Port Lands site so that it doesn's have to be trucked elsewhere. Soil washing and bioremediation are being tested on the pilot site run by Green Soils. Capping methods such as the vapor barrier and berming options are also being considered, and have been used on a few redeveloped sites already. So far no testing of in-situ phytoremediation has been considered or tested, missing a big opportunity for a cost-effective long term strategy for the clean-up of the Port Lands, making good use of time.

fig. 3-8 Unimetal Iron Plant Landscape Plan

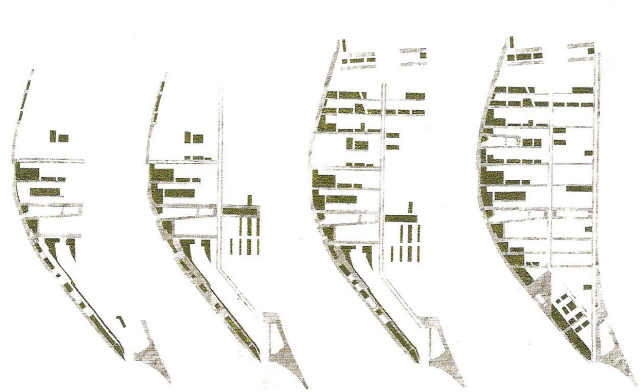


fig. 3-9 Lyon Confluence Phased Landscape Plan

fig. 3-10 Phytoremediation site in Ogden, Utah

Precedents + Opportunities

Pre-Landscape

Unimetal Iron Plant, Caen, France

1994-7

A100x100m grid of alternately planted fields creates a texture that marks the territory, recovers the river banks and links the city, river, and peripheral agricultural fields, and establishes an infrastructural backdrop for future development. This pre-landscape prepares the site for development, creating a landscape structure for it to be redeveloped over time.

Migrating Parks

Lyon Confluence, Lyon, France

2000-2005

Michel Desvigne's landscape plan for the Lyon Confluence imagines a changing landscape of sometimes temporary, sometimes permanent parks establishing a landscape structure that anticipates development. In the 30 year transformation process all exterior land will at one time or other be parkland, either provisionally or long term-shifting according to the rhythm of liberation of land for building.

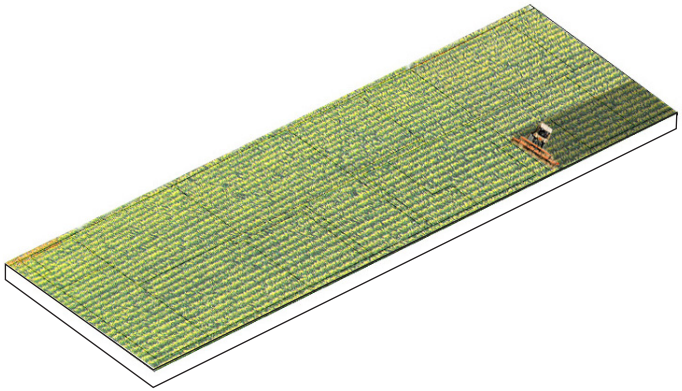
Phytoremediation

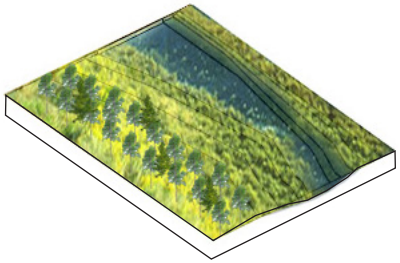
Ogden, Utah

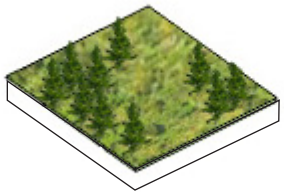
This phytoremediation project uses poplar trees to remediate a previous fuel terminal operated by Chevron from 1950-1989 with heavily contaminated soil and groundwater. Removing or incinerating or landfilling the soil would have cost an estimated $850,000, therefore phytoremediation was used as a cost effective solution, supported by the public and the state regulators. Led by PHYTOkinetics, the project uses poplar trees to suck up much of the hydrocarbon impacted groundwater through a process called Phytovolatization. The poplar trees act as hydraulic barriers to the contaminated groundwater spreading into the surroundings. The project also uses Phytoextraction with Alfalfa, Juniper and Fescue.

fig. 3-11 Remediation parks network

The three types of remediation parks - temporary remediation fields, green corridors, and neighbourhood parks - create a dynamic network of diverse green spaces providing different kinds of amenity while actively cleaning the soil and groundwater.







Typologies

A - Remediation Fields

Remediation fields are planted for Phytoremediation and farmed for a few years to extract the majority of contaminants from the soil. The temporary nature of the Remediation Fields makes the parks network a dynamic constantly changing landscape, communicating the processes of remediation to the public and making present the site's past industrial identity. Every site in the Port Lands will at one time or another be a remediation field, prior to redevelopment, its timing depending on the phasing sequence and the severity of contamination.

B - Greenways

Sites designated as Green Corridors will remain as long term ecological infrastructure for the site, and will therefore be planted with larger long-term species like poplar and willow trees which stabilize and continue to clean the soil and groundwater while providing habitat and amenity.

C - Neighbourhood Parks

Neighbourhood parks also remain for the long term following remediation fields. Once the majority of contaminants has been extracted through remediation fields, neighbourhood parks continue to stabilize the soil through decorative garden planting tended to by community gardening organizations. Their role is to engage new residents in the process of the site's remediation, creating more local places of amenity and a sense of community for each neighbourhood.

fig. 3-12 Remediation Park Typologies

Remediation Strategy

Phytoremediation is used as an opportunistic strategy that takes advantage of the site's scale and subsequent length of time it will take to be redeveloped , to utilize a lower intensity, less expensive technology to gradually remediate the soil in situ. The technology is much less expensive than other more intensive techniques being considered and does not require any excavation and transportation which are both intrusive and expensive. The planted fields provide a much more pleasant environment for the public, allowing remediation to carry on while the site becomes occupied. Longer-term phytoremediation techniques will continue to stabilize and clean the soil and groundwater on sites designated as greenways and neighbourhood parks.

The primary contaminants of the Port Lands are hydrocarbons (from coal and oil) in high concentrations, which take anywhere from 1 - 3 years or more to phytoremediate, as well as some trace metals, which take 5-50 years. Thus sites contaminated with hydrocarbons will be planted 5 years before each phase of planned redevelopment and sites contaminated with metals will be vacated and planted immediately, in order to allow more time for phytoremediation to work.

The phytoremediation strategy will be complemented by a soil recycling facility in the south east corner of the Port Lands, which will use more intensive technologies to remediate heavily contaminated soil that is beyond the means of phytoremediation. Small sites that need to be made available for redevelopment immediately to catalyze the transformation of the Port Lands can also use this facility for faster remediation. Since phytoremediation cleans the soil only to the depth of the roots, excavated soil from building projects will also be treated at the recycling facility and used for landscaping on site or sold as clean fill.

A - Remediation Fields

Sites awaiting developments are vacated and planted with alfalfa, indian mustard and sunflowers to be farmed on an agricultural scale and can extract most of the contaminants, in preparation for redevelopment or further remediation.

TIMING: temporary 1-5 years / 5-50 years for heavy metals contamination

METHODS:

Phytoextraction works through plants taking up or hyperaccumulating contaminants through their roots and storing them in the tissues of the stem or leaves. The contaminants are not necessarily degraded but are removed from the environment when the plants are harvested. This is particularly useful for removing metals from soil and, in some cases, the metals can be recovered for reuse, by incinerating the plants, in a process called phytomining.

SCALE: industrial farming

SITE: large vacant sites

SPECIES:

Sunflower *Helianthus Annuus*

The common sunflower is used to extract heavy metals and degrading Poly-aromatic Hydrocarbons.

Alfalfa *Medicago sativa*

Perrennial legume that is very deep rooted and drought resistent and can stabilize and degrade petroleum contaminants in soil and phytoaccumulate metals.

Indian Mustard *Brassica Juncea*

Various species have been used for removing heavy metals from soil or water through phytoaccumulation.

fig. 3-13 Phytoremediation Species

B - Greenways

Sites designated as green corridors or naturalized canals will be planted with grasses and Poplar and Willow trees to treat the water and soil of the site over time, and act as barriers to contaminated groundwater leaching into the river.

TIMING: permanent recreational and ecological park, years 1-5 interpretive remediationpark

METHODS:

Phytodegradation involves the uptake of contaminants; however, metabolic processes within the plant subsequently break down the contaminants. Phytodegradation also encompasses the breakdown of contaminants in the soil through the effects of enzymes and other compounds produced by plant tissues other than the roots

Phytohydraulics involves the use of deep-rooted plants (usually trees) to contain, sequester or degrade ground water contaminants that come into contact with their roots.

SCALE: municipal tree planting

SITE: major park corridors

SPECIES:

Willow *Salix spp.*

Deciduous trees or shrubs shown to uptake and degrade percholate in soils as well as phytoextract metals.

Poplar *Populus spp.*

Deciduous trees known for deep rooting and rapid growth, uptaking and degrading hydrocarbons from groundwater.

Switchgrass *Panicum virgatum*

Planted around streambanks and wetlands, switchgrass enhances degradation of PAHs in soils and groundwater, and prevents erosion.

fig. 3-14 Phytoremediation Species

C - Neighbourhood Parks

Blocks designated as neighbourhood parks will be planted with decorative but remediative species like red Fescue and Juniper. They will be tended to by community gardening neighbourhood organizations, and will continue to improve the quality of the soil while creating a sense of community.

TIMING: permanent recreational park, years 1-5 years interpretative remediation park

METHODS:

Phytostabilization is a mechanism that immobilizes contaminants within the root zone, limiting their migration. Immobilization of contaminants can result from adsorption of metals to plant roots, formation of metal complexes, or a change to a less toxic state.

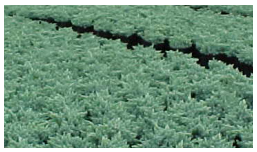
Rhizodegradation is the process by which contaminants are broken down by enzymes at the roots of plants in the rhizosphere. The process breaks down contaminants; thus, plant harvesting and disposal is not necessary.

SCALE: community gardening

SITE: small community parks

Red Fescue *Festuca rubra*

Perrennial grass often used in lawn mixes, used for removing hydrocarbons through rhizodegradation.



Juniper *Juniperus procumbens*

Shrub that uptakes and degrades pertoleum contaminants in soil and groundwater.

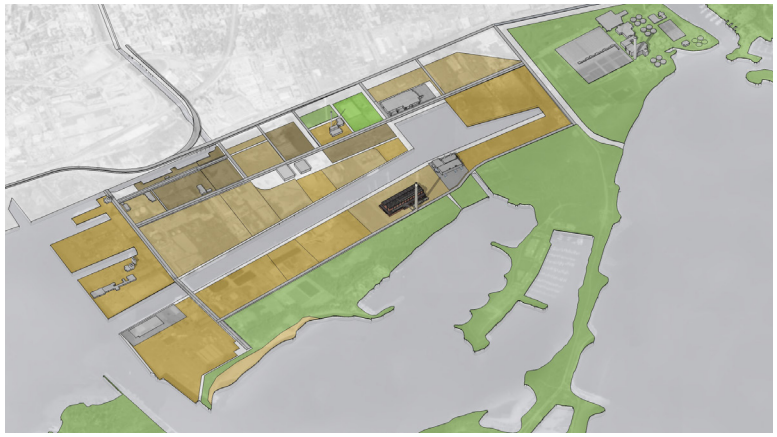
White Birch *Betula pendula*

Attractive European native tree that has been shown to degrade PAHs through phytodegradation.

fig. 3-15 Phytoremediation Species

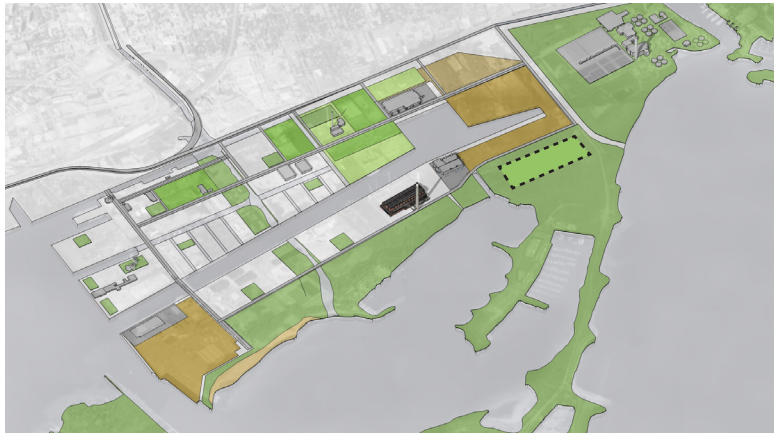
Phasing

The phasing of the remediation parks will follow the overall development phasing, but will be flexible to respond to contingencies. Areas of more severe contamination such as heavy metals will be planted earlier and remain as remediation fields while development continues around them. The soil recycling facility will be used for contaminated soil that is beyond the means of phytoremediation and will complement the overall strategy. Each phase will be led by phytoremediation fields which precede development and will end with parks which remain and continue to improve the quality of the soil while providing amenity to the surrounding neighbourhoods.



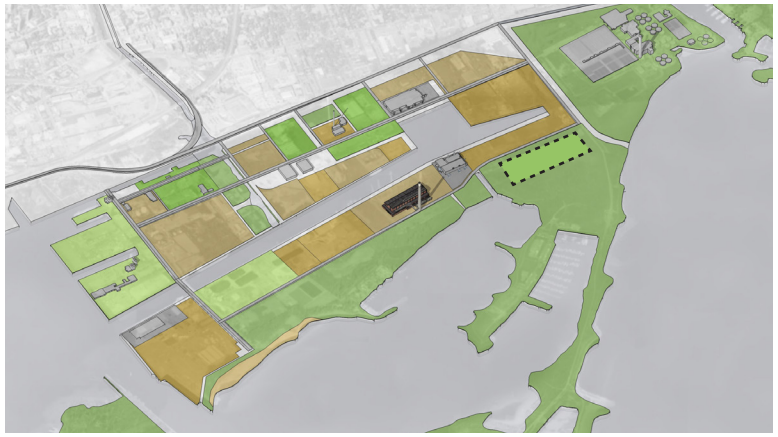
Existing - 2013

Entire site is contaminated with hydrocarbons and trace metals



Phase 4 - 2045

Fourth phase planted, Metals fields + neighbourhood parks + green corridors remain



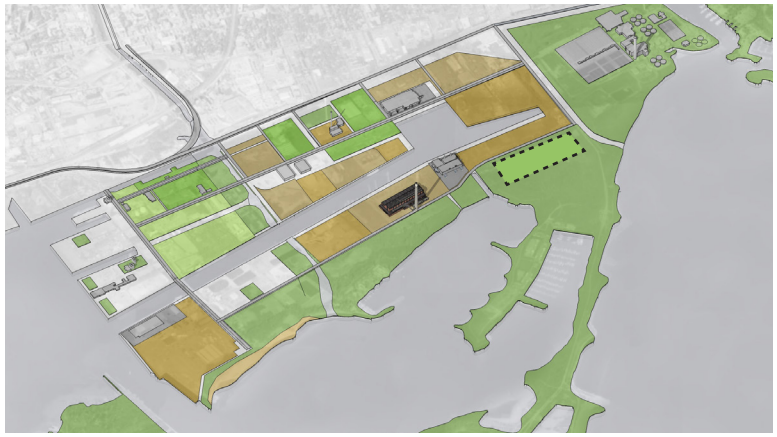
Phase 1 - 2015

First phase + Metals fields + Green corridor planted

Phase 5 - 2050

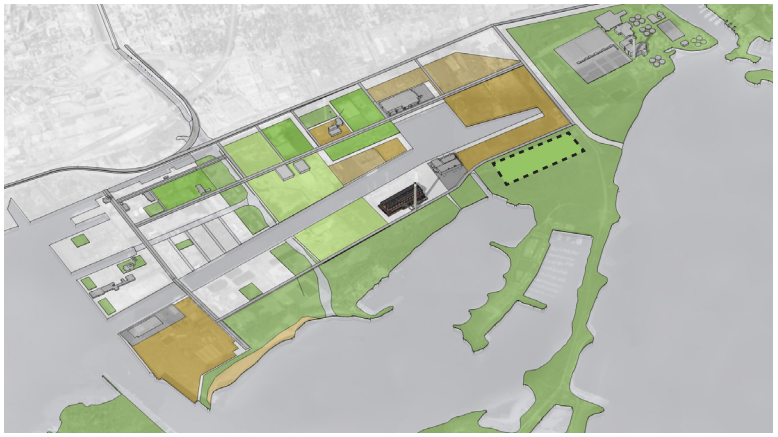
Fifth phase planted, Metals fields + neighbourhood parks + green corridors remain

fig. 3-16 Remediation Parks Phasing



Phase 2 - 2025

Second phase + green corridor planted, Metals fields + Neighbourhood parks remain



Phase 3 - 2035

Third phase planted, Metals fields + neighbourhood parks + green corridors remain

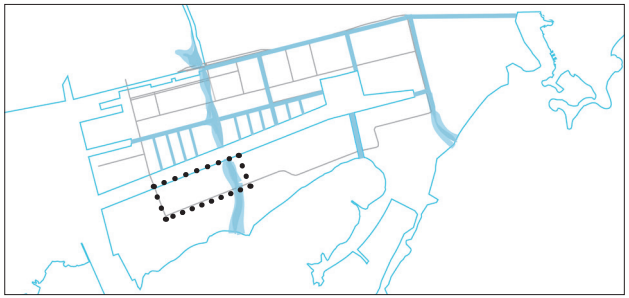
Phase 6 - 2055

Metals fields + neighbourhood parks + green corridors remain

Remaining Parks - 2070

All sites have been remediated, neighbourhood parks + green corridors remain

Diversification Over Time



Sample Site: South of Shipping Channel

Objective: Parks should be productive landscapes that improve the quality of the soil and groundwater while providing amenity to users, and linking a site to a larger regional park network.

Variables: Length of time, Scale of operation, Species

Rules:

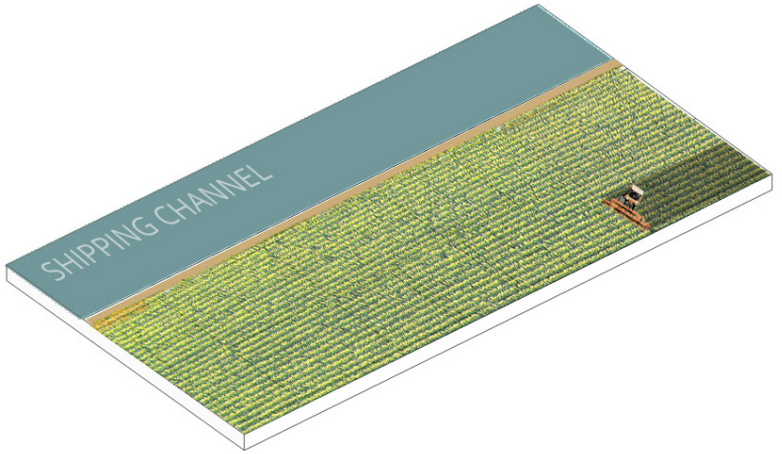
1.Plant all vacant land for phytoremediation.

2. Vacate leased land at least 5 years before the site's redevelopment and farm it for phytoremediation .

3. Protect green corridor ROWs from development. Long term phytoremediation species such as certaom trees are to be planted to improve the quality of the soil.

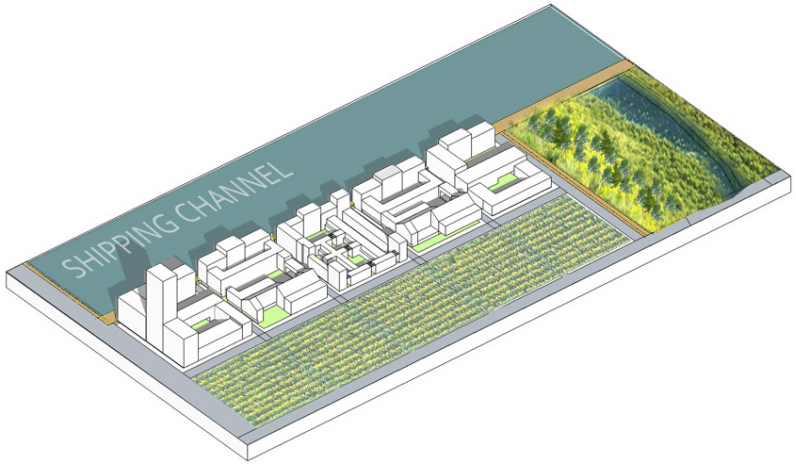
4. After phytoremediation sites to be redeveloped are assessed for contamination levels and further remediated through other more intensive methods if necessary.

5. 15% of developable land must remain open space as neighbourhood parks.Small scale phytoremediation may continue to further improve the quality of the soil if necessary through community gardening.

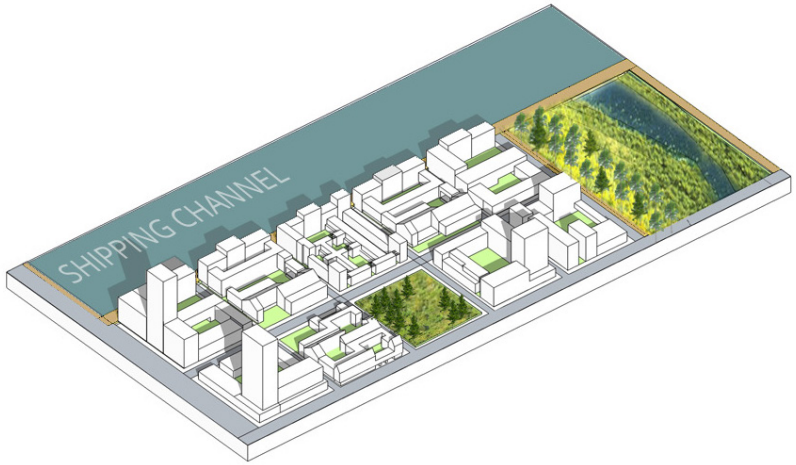


Phase 1 YEAR 1-5 - Vacant fields are planted for Phytoextraction through agricultural scale farming temporarily while awaiting development

fig. 3-17 Deployment of park types over time



Phase 2 YEAR 3+ - Areas designated to remain as long term green corridors are planted with Phytoremediation trees to clean the soil and water over time through Phytovolatization and act as barriers to the spread of contaminated groundwater through Phytohydraulics



Phase 3 YEAR 5+ **-** Remaining neighbourhood park blocks are planted with gardening species that allow for community gardening organizations to participate in the continued process of remediation through Phytostabilization

fig. 3-18 View of minor canal and owner built housing with direct water access

3.2.2 Urban Delta

This strategy uses the site's existing relationship to water as a starting point to create a distributed network of canals to provide reliable flood protection and storm water management, while distributing public amenity evenly across the site. The existing heritage channels of the site and the Don River are interconnected into a delta of various canal types - from minor urban canals that provide sites with direct access to the water, to major urban canals that provide generous public realm and retail frontage, to minor naturalized canals that filter storm water through wetland plants, and the larger naturalized Don Mouth canal that filters the river's sedimentation and allows it to flow out onto the lake. These various types of canals provide different building sites with varying relationships to water, thus creating not only a differentiated network of public spaces but also the conditions for diverse built form. The delta of canals is implementable incrementally in phases gradually flood-protecting portions of the site to unlock them for development, while expanding the site's public realm network.

Issue

Risk of flooding

The Port Lands is at the outlet of the Don River's 36000 ha watershed, and as a result is susceptible to flooding and siltation during rainstorms. As a result of seasonal storms, much of the low lying area of the Port Lands and adjacent land to the north is susceptible to flooding. This flood risk directly affects the zoning of the area, and limits development and land use. A flood-protection strategy and infrastructure is required to be put in place before the area can be made available for redevelopment.

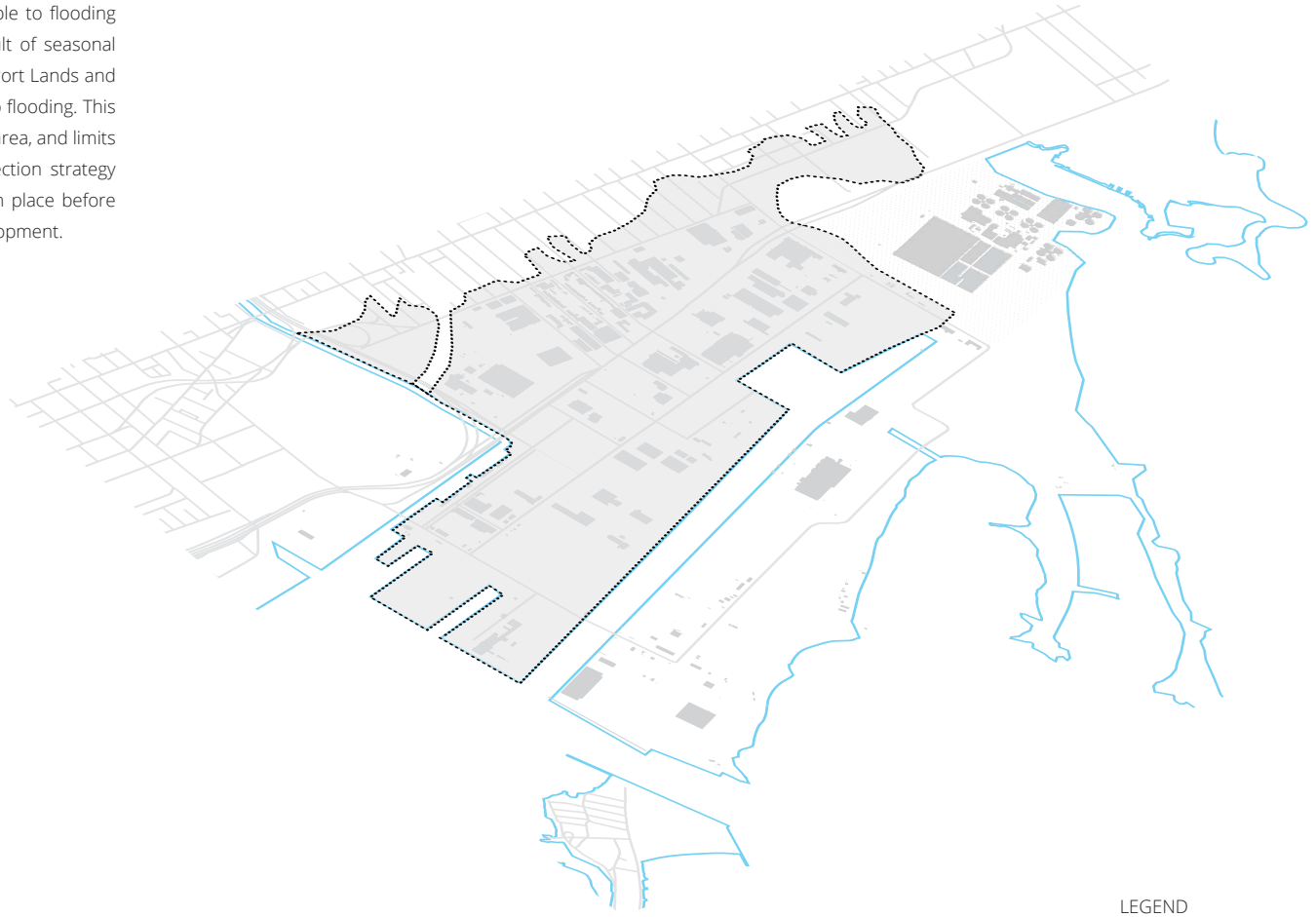


fig. 3-19 Flood Prone Area

Opportunity

Relationship to water

The Port Lands site has a strong relationship to water as a result of its strategic location on the lake and inner harbour as well as its canals and slips. The site was previously a wetland, thus water has always been part of its identity. The existing canals are valuable infrastructures and hold potential for a broader network of waterways to provide diverse public realm and differentiated sites for development.

fig. 3-20 Water Access

fig. 3-21 Current vision of river mouth

Current Situation

The current vision for the Port Lands is based on the idea of an urban estuary, prioritizing a renaturalized river mouth that acts as flood infrastructure and provides vast public parkland. Because all the parkland on the site is consolidated into the river mouth, it is all contained within the Lower Donlands, leaving the rest of the site at a disadvantage. Thus the amenity and ecological function of the river mouth are not evenly distributed throughout the site. There are no smaller local parks integrated with the community. By prioritizing ecology, the naturalization of the river mouth undermines much of the industrial heritage and compromises much higher density built form for park space.

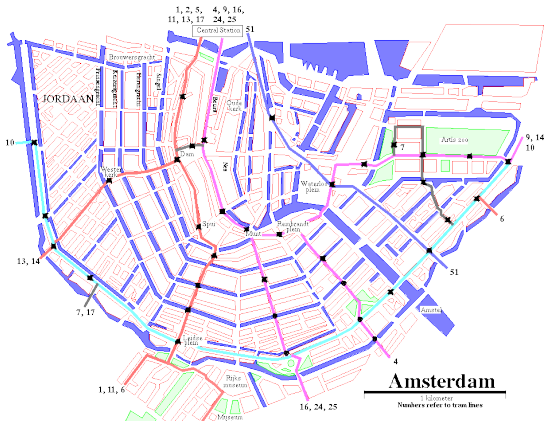


fig. 3-22 Amsterdam canals network

fig. 3-23 Sluseholmen canal district

fig. 3-24 East Bayfront Promenade

Precedents + Opportunities

Flood Control

Amsterdam Canals, Netherlands

17th century

An extensive network of canals were constructed to drain the land, provide flood protection and navigability, while also structuring the public realm. The network of canals and associated public realm give Amsterdam its water-city character.

Amenity

Sluseholmen, Copenhagen, Denmark

2005-2009

A network of major and minor canals establishes the urban structure for a canal district of island blocks and provides equally distributed water access to the whole neighbourhood. A major canals is lined with a street and public promenade acting as the spine of the whole development, while minor canals provide buildings with direct access to the water.

Stormwater Management

East Bayfront Promenade, Toronto, ON

2007-2010

Linear stormwater managemnet infrastructure is built into the boardwalk that lines the dockwalls. Stormwater tanks integrated into boardwalk structure collect and pre-treat the water by sediment settling before directing it to a constructed wetland underneath the Parliament wavedeck which further treats the water.

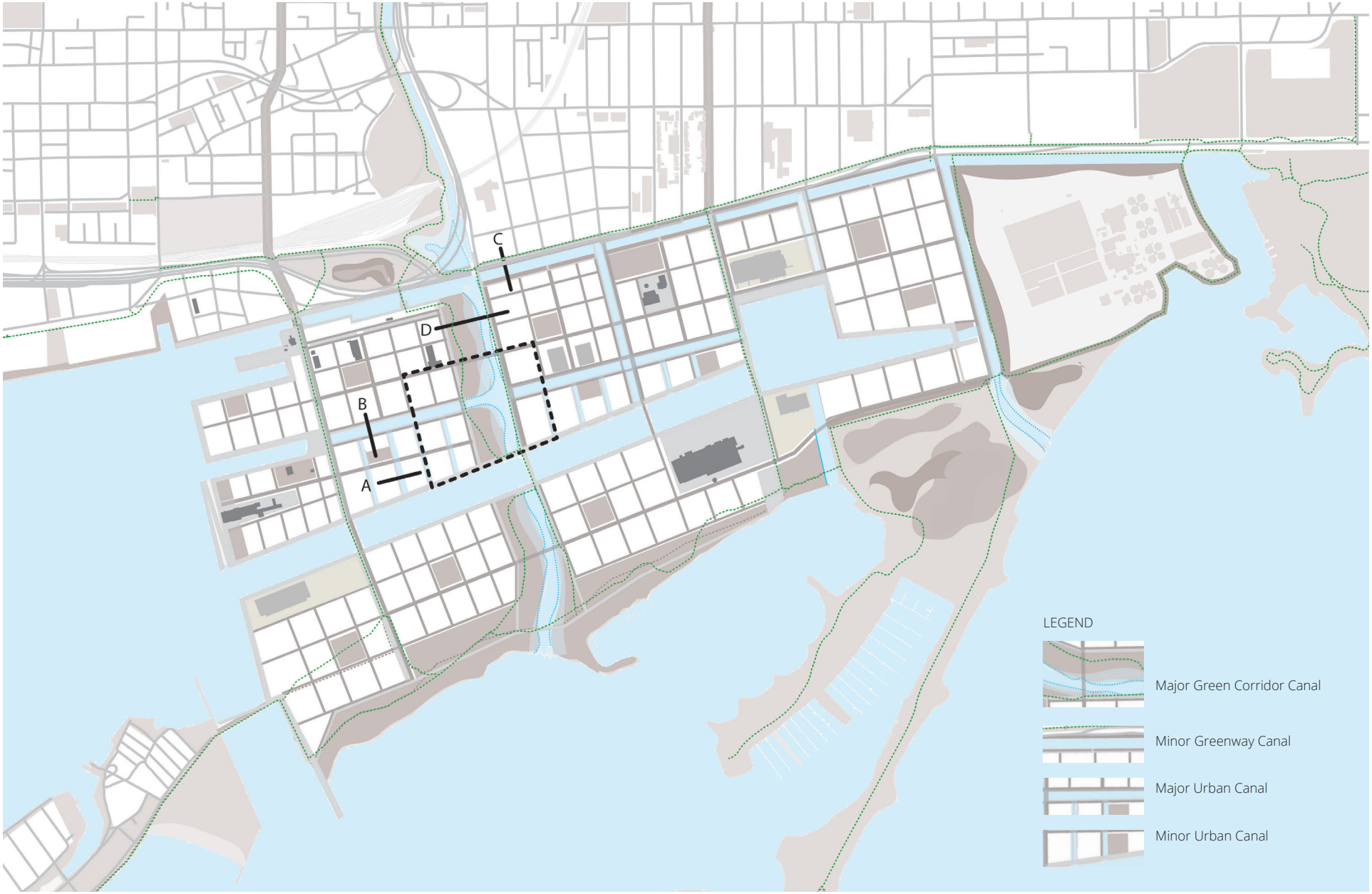
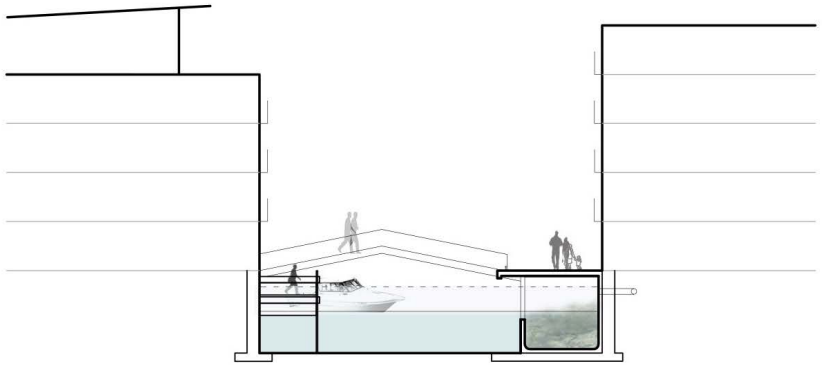
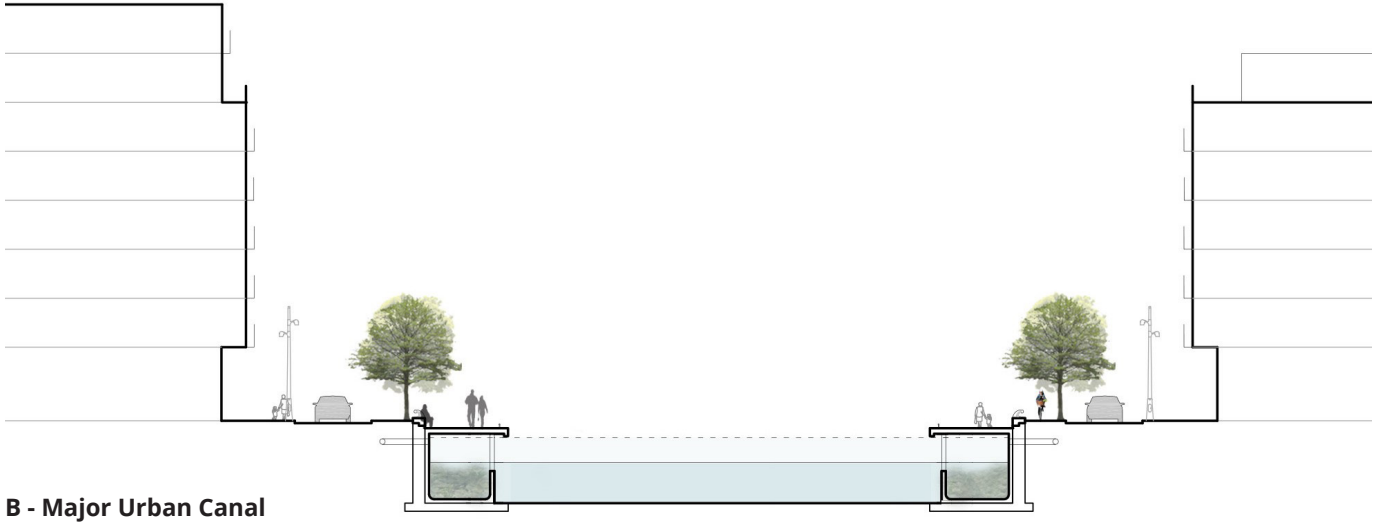


fig. 3-25 Urban Delta canals network

Based on the existing heritage channels, a distributed network of new canals form an urban delta that provides stormwater management and flood protection, distributes amenity evenly through the site, and refers back to the site's past condition of multiple river outlets through the marsh. A variety of canal types and scales - minor and major urban canals, minor greenway and major green corridor canals - create a diverse public realm and provide a wide range of building sites with different relationships to water.



A - Minor Urban Canal



B - Major Urban Canal

fig. 3-26 Urban canal types

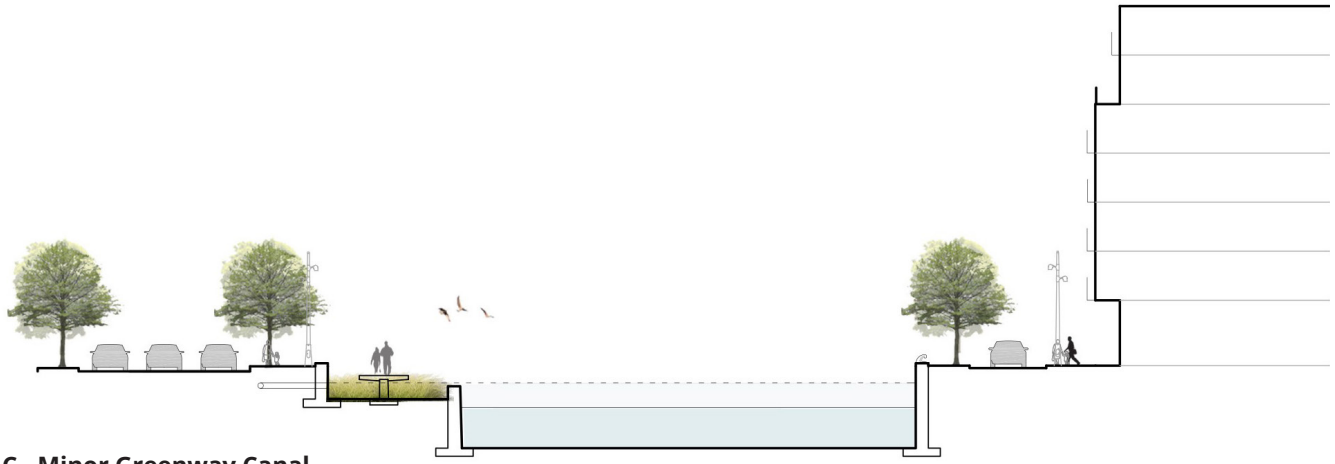
Typologies

A - Minor Urban Canal

Minor urban canals are smaller public spaces, with a pedestrian promenade on one side of the canal, and building sites with direct water access on the other. These sites are intended to be subdivided into fine grained narrow lots for owner-built housing with canal access for private boats to create a high level of diversity, amenity and connection with water. A linear storm water retention and treatment tank is integrated under the public promenade to collect and filter stormwater before it is released into the canals.

B - Major Urban Canal

Major urban canals are intended as main canal streets that provide prominent sites for office, retail and mid-rise residential. These are the major axes of the public realm network providing generous public promenades and adjacent public uses and amenities that activate the street. They are intended to be navigable by mid-size and small watercraft, and provide dockside access to restaurant boats and programmed barges to activate the public realm. Linear stormwater treatment tanks are again integrated under the public promenades to filter stormwater going into the canals.



C - Minor Greenway Canal

C - Minor Greenway Canal

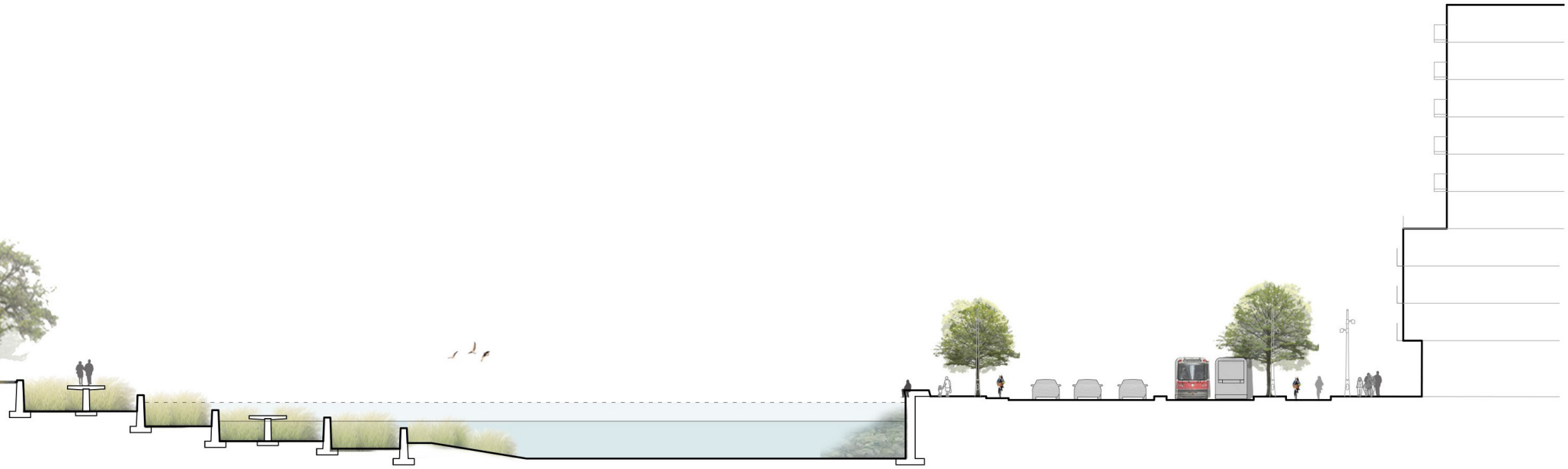
The greenway canals are also navigable but they provide a soft vegetated edge along one side to treat stormwater using wetland plants, to act as a link between larger natural habitat areas, and provide a different kind of amenity and relationship to water.

D - Major Green Corridor Canal

fig. 3-27 Natrualized canal types

D - Major Green Corridor Canal

The Don green corridor canal is a modified greenway canal, due to its adjacency to a green corridor park and its direct alignment with the Don River, resulting in a much wider and more substantially naturalized waterway. The canal is the primary route for the river's outflow and therefore will handle more volume of water under heavy storm conditions, acting as a sponge to slow the water and retain its sediments. The vegetated edge uses wetland plants to filter the stormwater and retain its sediments through a system of weirs before releasing the water into the shipping channel and out to the harbour and lake. Depending on the level of the water, more or less of the park is accessible thus making it a variable landscape that communicates stormwater levels. The wider naturalized water's edge and green corridor park provides habitat for wildlife and acst as the continuation of the Don Valley regional park system to the lakefront park that continues onto the islands to the west and beaches to the east. Thus the canal provides flood protection, stormwater treatment and sediment management, habitat and amenity to the site, while connecting it to the larger parks network of the city.



Diversification Over Time

Site: Lower Don Lands South

Objective: Flood protection infrastructure should be a distributed system that provides stormwater management, water access and habitat, distributing different kinds of public amenities evenly throughout the entire site.

Variables: Width, Water level, Vegetated edge vs. Dockwall

Rules:

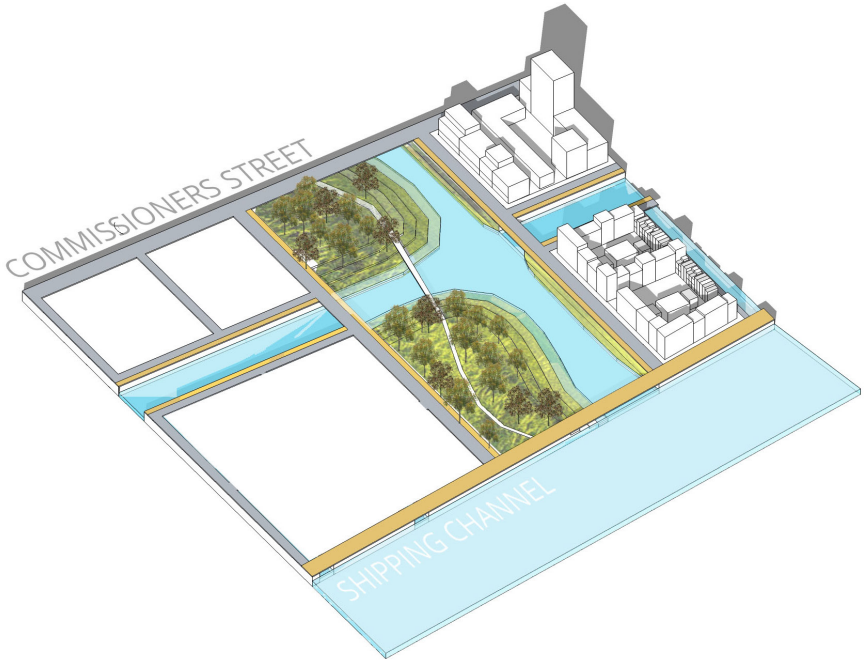
1. Protect the Don River ROW from future development.

2. Provide each neighbourhood with access to at least one canal.

3. Provide bridge connections across canals every 500m or less.

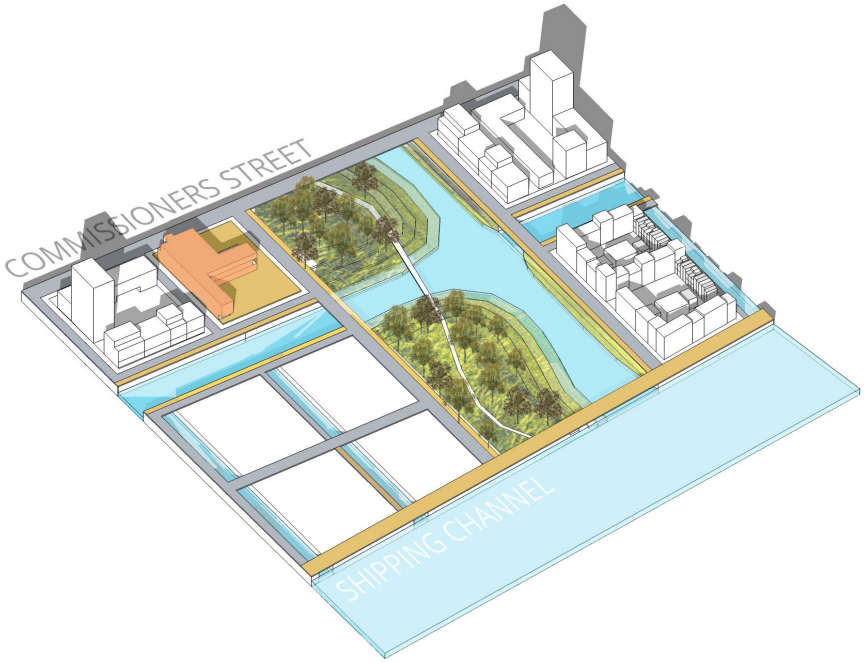
4. Allow enough clearance under bridges to ensure navigability of small watercraft.

5.Provide stormwater management and treatment through major canals.

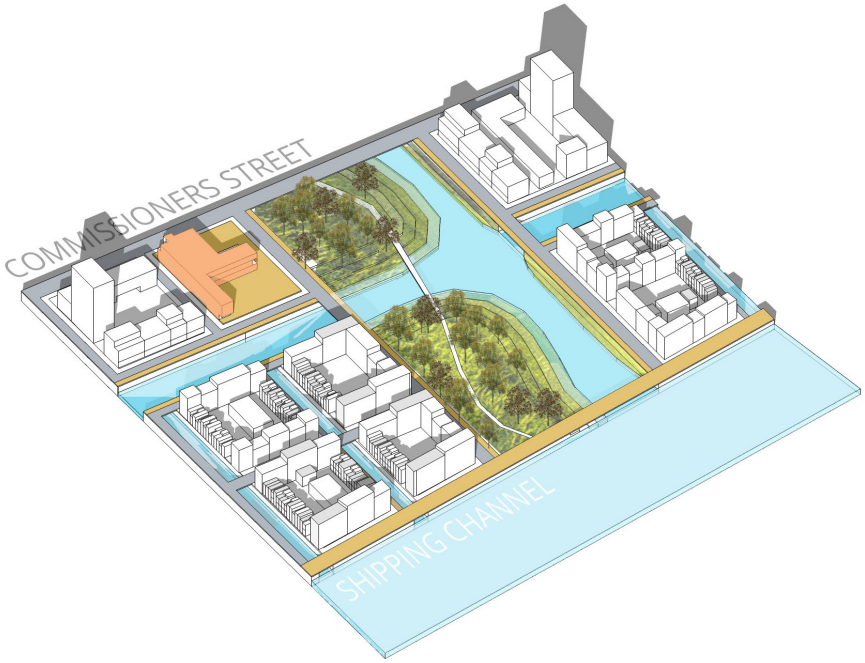


Phase 1 - Don River Naturalized Channel provides river front lots and park amenities

fig. 3-28 Development and differentiation of site over time



Phase 2 - Major Polson Canal provides commercial frontage lots and public promenades



Phase 3 - Minor Canals provide residential lots with direct water access

fig. 3-29 View of appropriated industrial heritage around the turning basin

3.2.3 Adapted industry

The object of this strategy is to retain and renew the site's industrial identity by maintaining compatible industrial uses, and adaptively reusing the site's obsolete infrastructures as a public realm network that embodies the site's history. By retaining and reusing industrial infrastructures as public space, reprogramming built heritage for cultural, creative businesses and light industrial uses, and introducing new compatible industrial uses integrated with new urban development, the site creates a differentiated heritage landscape appropriated for various uses, as well as integrating employment and light industry with urban development, to resist the trend of gentrification and standardization of such sites as solely recreational tourist attractions. The strategy encourages shifting uses over time, creating a diverse and dynamic industrial heritage landscape that adapts to changing circumstances while retaining the collective memory of the site.

Issue

Obsolete + persistent industry

The site contains a collection of obsolete industrial infrastructures and built heritage, that are currently in disrepair, vacant and, awaiting demolition or reuse. Several persistent industrial uses also remain on the site. These industrial remnants are important in preserving the district's past industrial identity, but pose challenges to redevelopment.

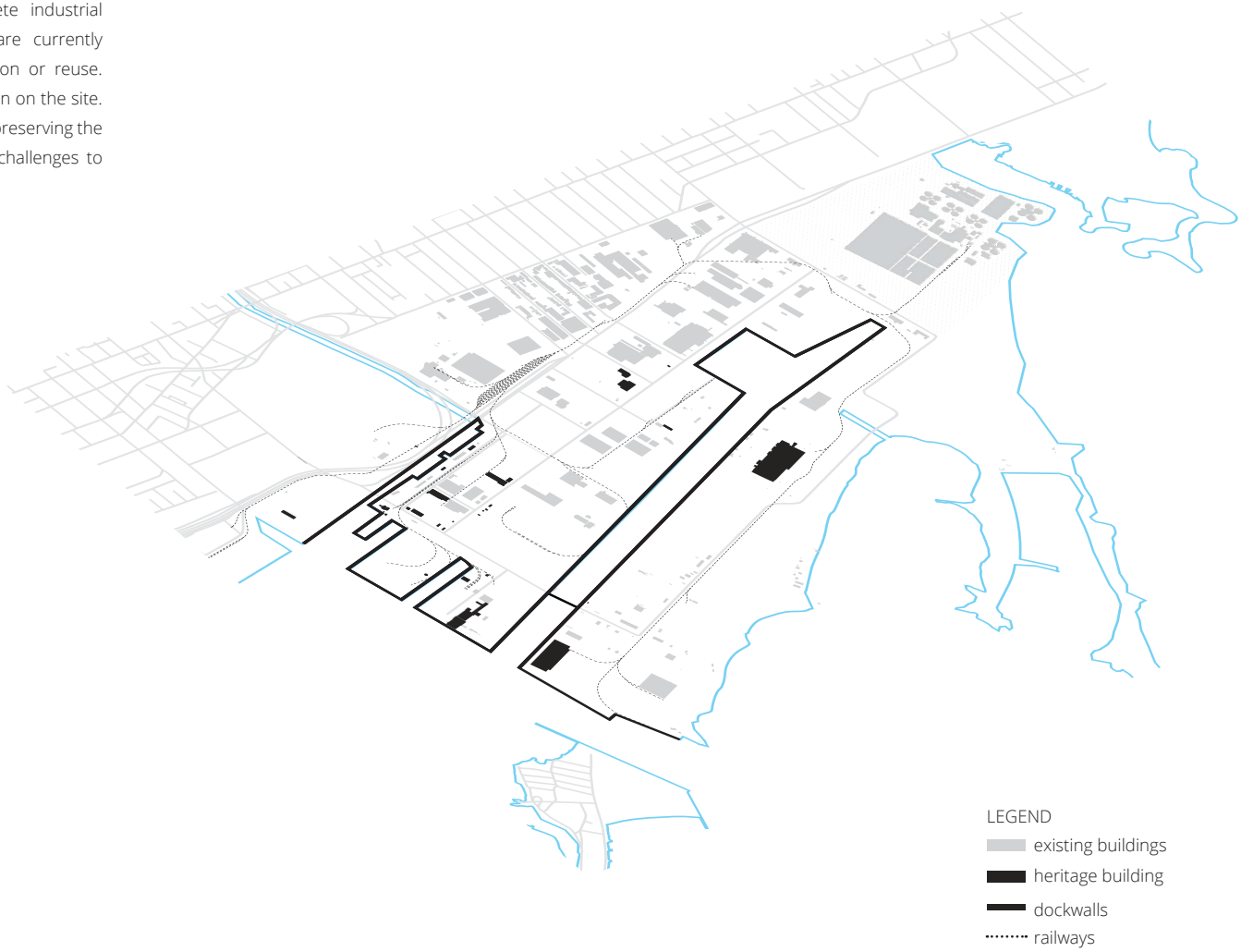


fig. 3-30 Industrial Heritage

Opportunity

Multiple mixed uses

The wide variety of mixed uses existing on the Port Lands offer an opportunity for appropriating the site's obsolete industrial heritage artifacts and reinventing them for other uses. The mix of existing uses and persistent industry also represent an opportunity to create a more vibrant waterfront community by maintaining industry and employment uses in the site's redevelopment plans.

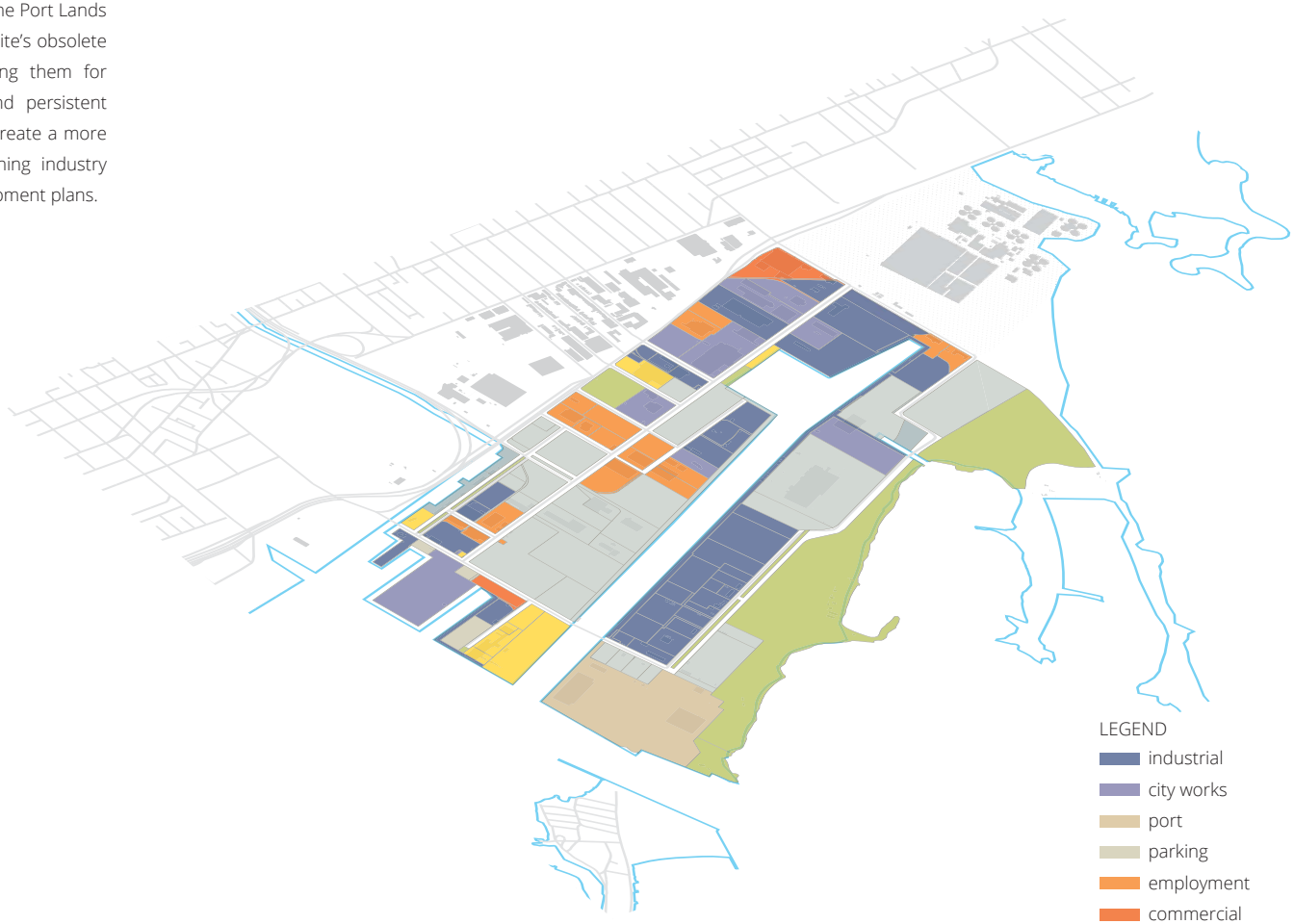


fig. 3-31 Land Uses

fig. 3-32 Hearn Power Generation Plant

fig. 3-33 Keating Channel

Current Situation

The industrial heritage of the Port Lands offers the valuable potential of embodying the industrial past and ambitions of the city. The land, shipping infrastructures and industrial artifacts hold unrealized inherent value and embodied energy and offer potential for adaptive reuse as a heritage landscape that could enrich the future redevelopment of the district. However its artifacts are not being protected, restored or reused and not recieving the care they deserve. Industrial artifacts are inaccessible, underused, vacant, and often demolished. Canals and dockwalls are undervalued, and planned for renaturalization. Persistent industrial uses are slowly being driven out or relocated to less prominent areas of the site, eventually planned to be eliminated in order to allow for 'clean' urban development to take over the site.

fig. 3-34 Landschaftpark Duisburg Nord

fig. 3-35 Hafencity Speicherstadt

fig. 3-36 ExRotaprint

Precedents + Opportunities

Sublime Industrial Landscape

Landschaftpark Duisbug Nord, Duisburg, Germany

1990-2002

The existing infrastructures of this massive obsolete steel plant - rail lines, steel catwalks, canal, monumental bunkers, gas tanks and engine houses - are reinterpreted as monumental sculptures that serve new programatic activities. Recreational programs such as children's playgrounds, rock climbing and diving clubs activate the reclaimed landscape. New ecologies remediate the toxic landscape while providing a contrasting backdrop for industrial artifacts .

Post-Industrial Port District

Hafencity Speicherstadt, Hamburg, Germany

1997-2025

This obsolete historic port warehouse district is being reinvented as a mixed use urban neighbourhood in the centre of Hamburg. Rows of industrial warehouse buildings are appropriated for museums, performance halls, markets, and offices. Docklands are repurposed for mixed use development with water access. The industrial port character of the site is preserved while new uses and contemporary architecture reappropriate the site.

Renewed Industry

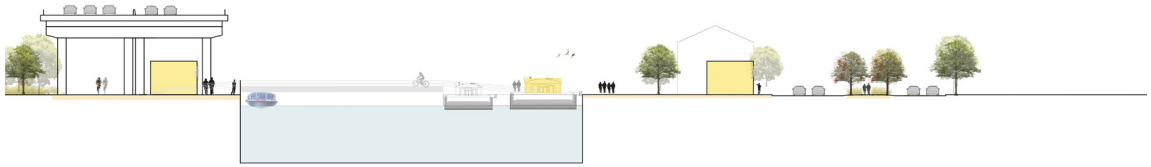
ExRotaprint, Berlin, Germany

2007

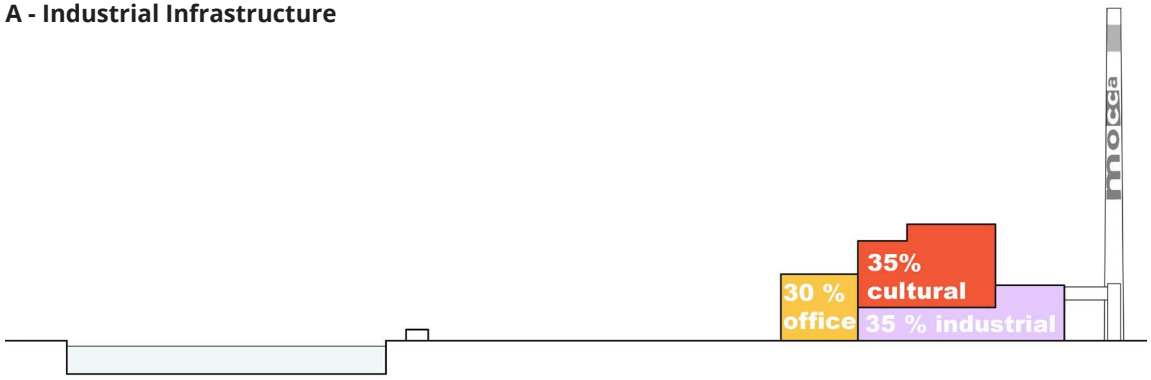
ExRotaprint is an industrial complex that has been taken over by the previous factory workers after the industry went bankrupt. It is run as a not-for-profit organization that manages the industrial heritage buildings as a mix of 30% small industrial uses, 30% community programs, and 30% art programming to address the needs of a socially marginalized local community and resist the gentrification of the area by the speculation of the real estate market.

fig. 3-37 Adapted industry Network

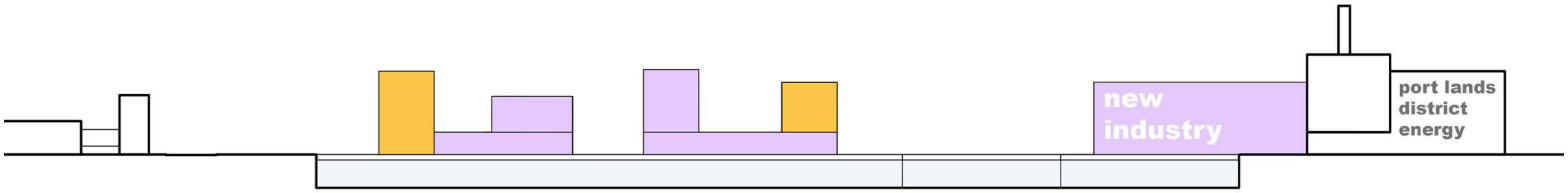
Three different types of industrial heritage - infrastructures, buildings and persistent uses - are reappropriated, renewed, and integrated with new urban fabric. They create a network of industrial heritage on the site creating a culturally rich and socially diverse backdrop for redevelopment. Three sites that represent each of the types of industrial heritage illustrate the strategy.



A - Industrial Infrastructure



B - Built Heritage



C - New + Updated Industry

A - Industrial Infrastructure

The Keating Channel is rethought as a public space with public promenades, and new temporary and permanent public programs adjacent and on floating barges.

B - Built Heritage

The Hearn Power Generation Plant is adaptively reused as a hybrid of cultural public uses, creative offices, and light industrial uses.

C - New + Updated Industry

The Turning Basin area is reimagined as an industrial hub of adapted industrial heritage, updated service infrastructures, and new light industrial uses integrated with commercial and residential fabric.

fig. 3-38 Adapted industry Typological Sections

Diversification Over Time

Sample Site: Turning Basin

Objective: Industry is the essence of the site's identity and its built heritage and existing uses should be maintained, upgraded, and adapted to coexist and integrate with new urban fabric.

Variables: % Mixed use

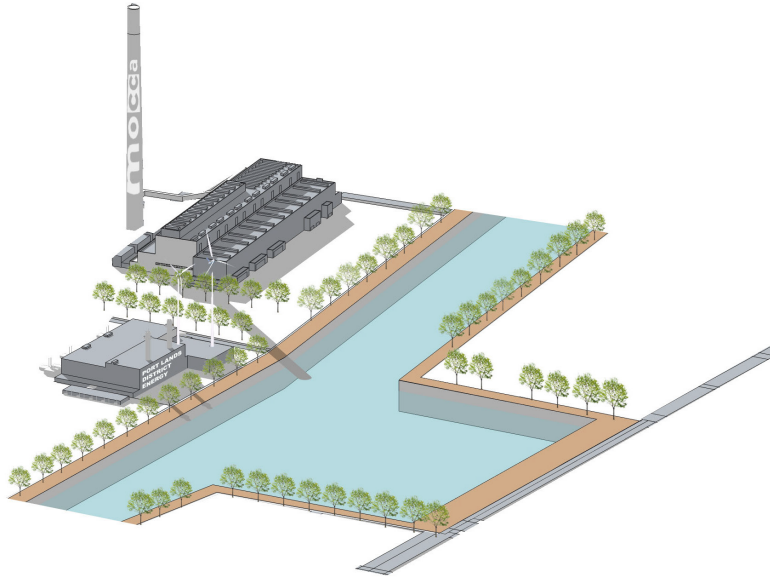
Rules:

1. Allow for 18m public promenade around all infrastructural heritage elements.

2. Reuse and adapt all major built heritage as 35% cultural, 35% light industrial, and 30% office uses.

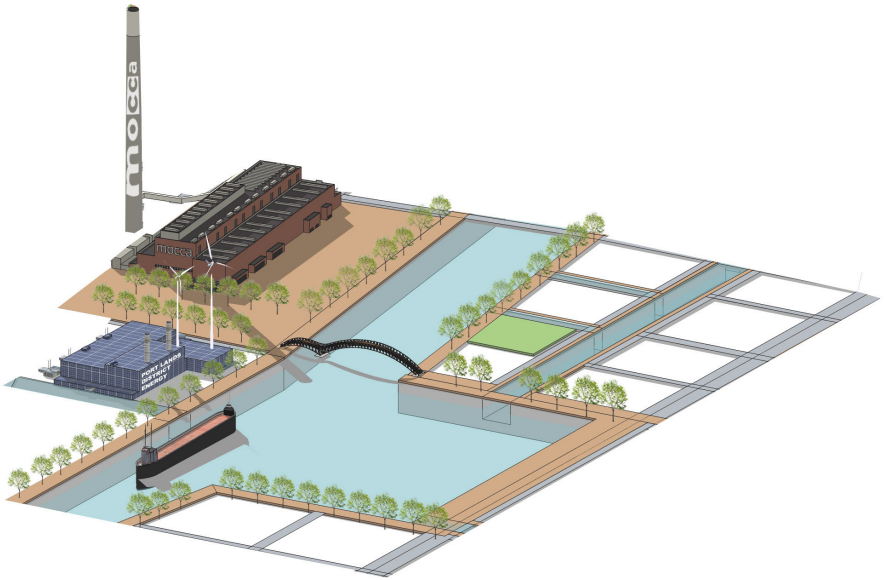
3. Maintain and upgrade service infrastructural uses such as power generation stations to new technologies.

4. Maintain compatible industry and bring in new manufacturing and light industrial uses in mixed use buildings.

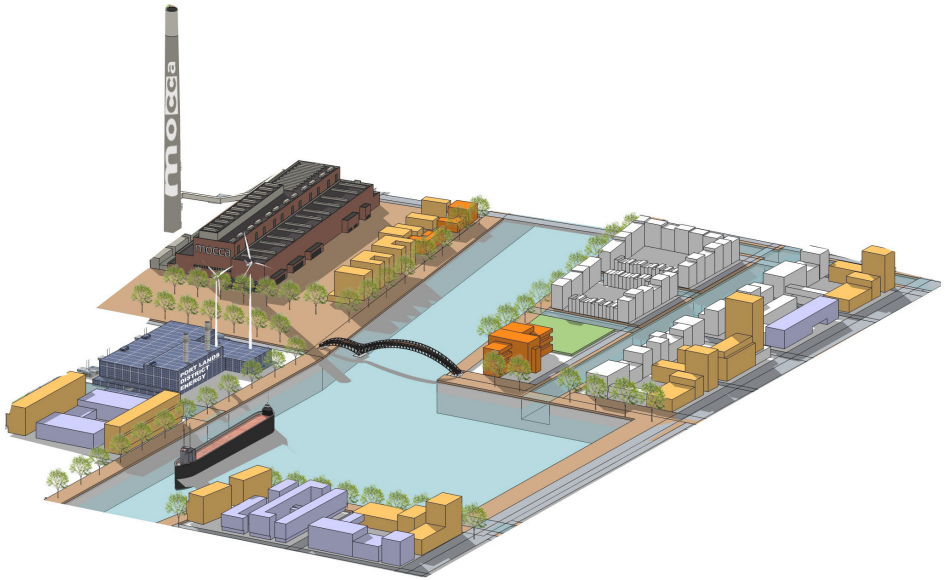


Phase 1 Year 1-3 Industrial infrastructure is appropriated as public realm

fig. 3-39 Adaptive reuse of industrial heritage of the Turning Basin over time



Phase 2 Year 3-5 Industrial built heritage is reused and service infrastructure upgraded



Phase 3 Year 5-15 New compatible light industrial uses are integrated with new commercial and residential fabric to maintain industry on the site

fig. 3-40 View of diverse built form along the Shipping Channel

3.3 Built Form Framework - Differentiated Fabric

This strategy aims to generate diverse fabric by relating built form to the varying conditions of the landscape framework through a set of relational rules. The landscape framework creates a wide range of building sites with different adjacencies to various kinds of heritage elements, parks, and canals, streets, and industrial uses. The rules encourage differentiated built form by making it respond to site constraints and allowing a level of interpretation by the many stakeholders involved. The strategy encourages a varied and dynamic built fabric by also differentiating land ownership and land use, and breaking down the scale of development to engage many different actors bound by simple rules that encourage additions and adaptation over time. Thus the publicly controlled landscape framework and rules are used strategically to guide privately developed built form toward a variable built environment.

Issue

Consolidated Land Ownership

The vast scale of the site and the mostly consolidated land ownership under the Toronto Port Lands Company (TPLC) on behalf of the city, lend themselves to large scale homogeneous master planned development led by the city. However the city does not have the resources to fund such a large undertaking and can only have limited control over built form. Privately owned sites pose challenges to the planning process because they represent different interests and resist the regulated forms and schedules imposed by the city. Also, federally and provincially owned land is not at the city's disposal to redevelop and will need coordination and negotiation to be made available as needed.

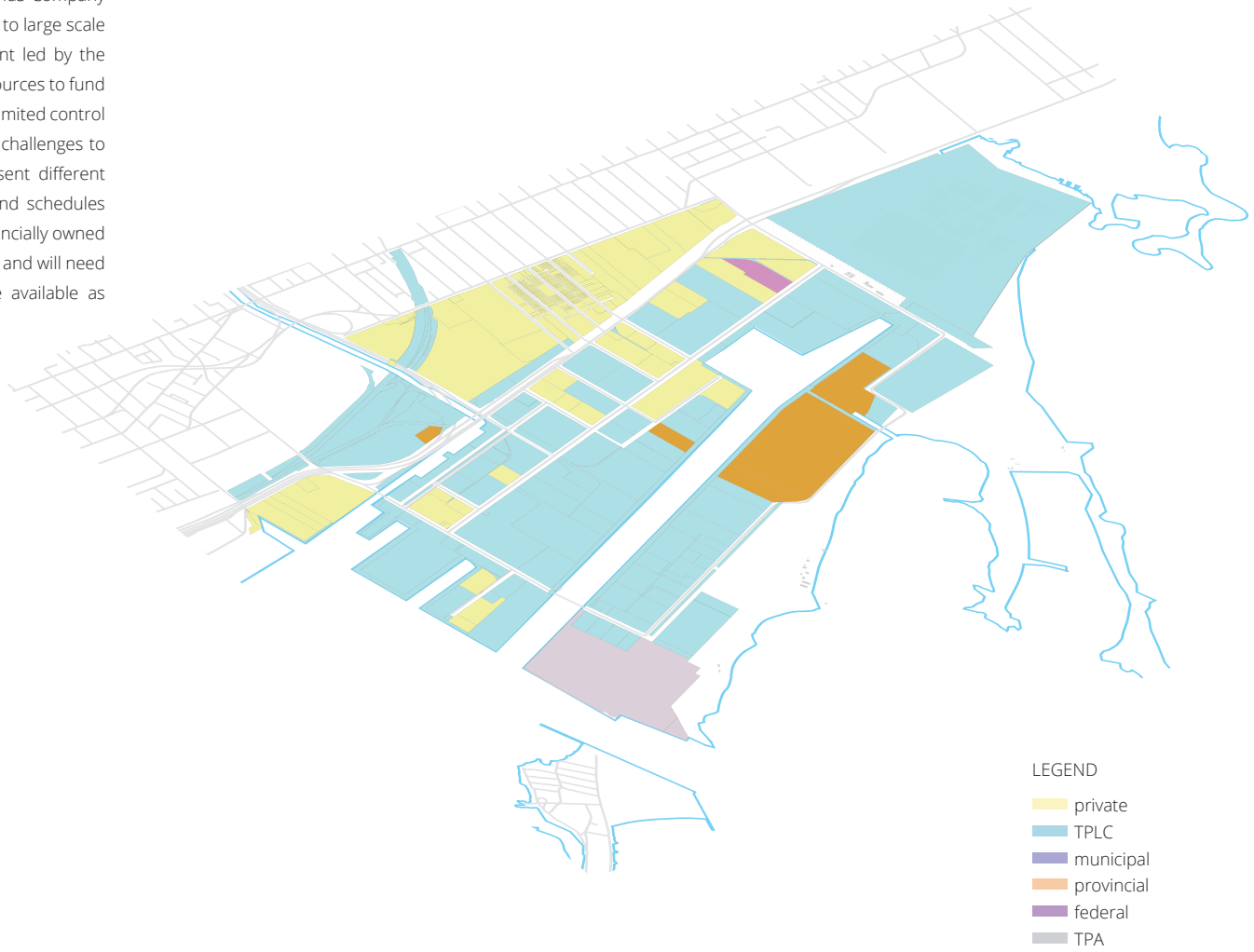


fig. 3-41 Land Ownership

Opportunity

Diverse Site Conditions

The diverse existing site conditions of the Port Lands provide different types of building sites encouraging diverse site specific built form adjacent to the various site elements. The Keating and Shipping Channels and Turning Basin provide canal-side sites with water access. The quays provide harbourfront sites with amazing views of the city. The interior sites provide direct connection to the existing city fabric to the north and access to major streets like Lakeshore and Commissioners.

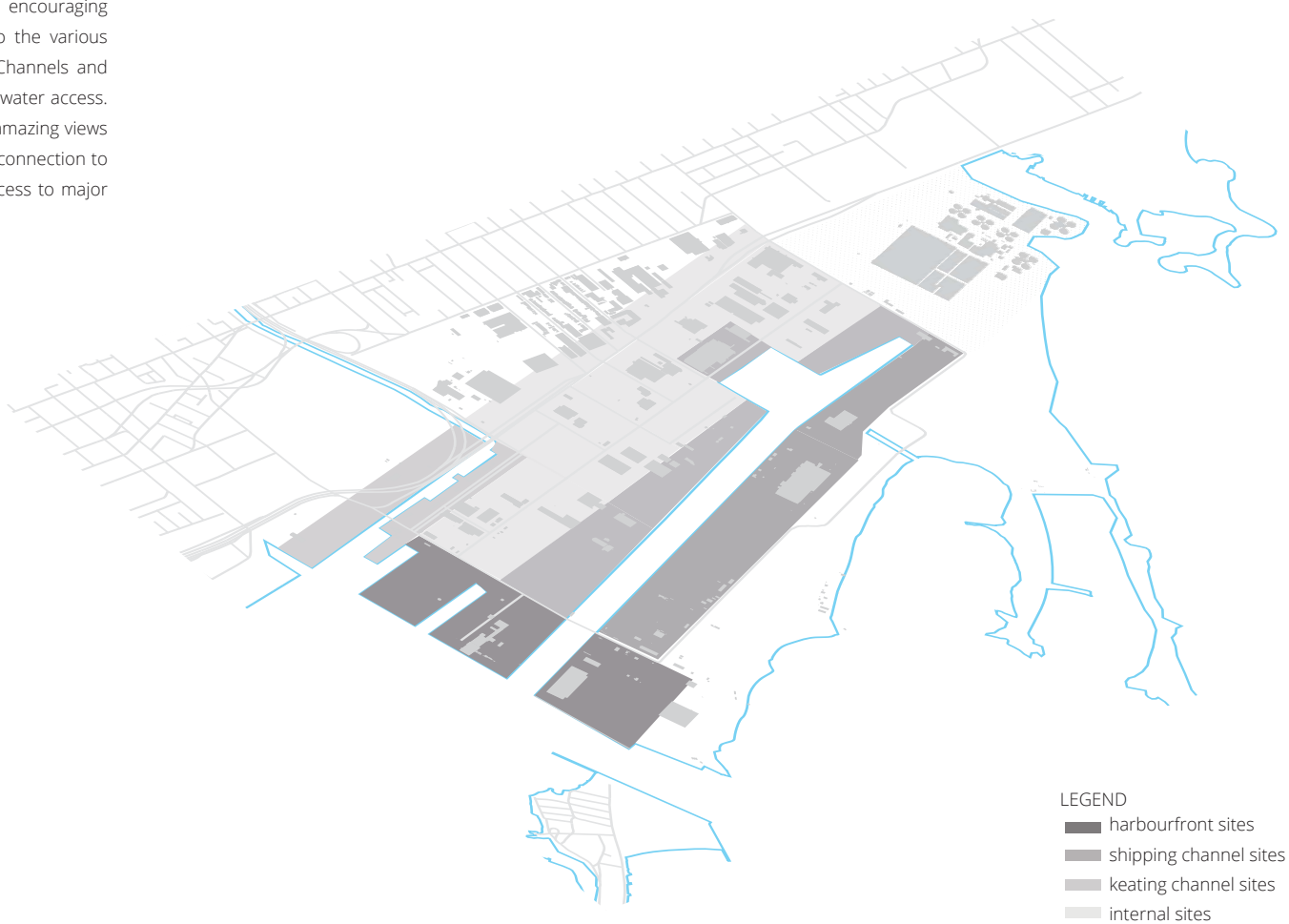


fig. 3-42 Site Diversity

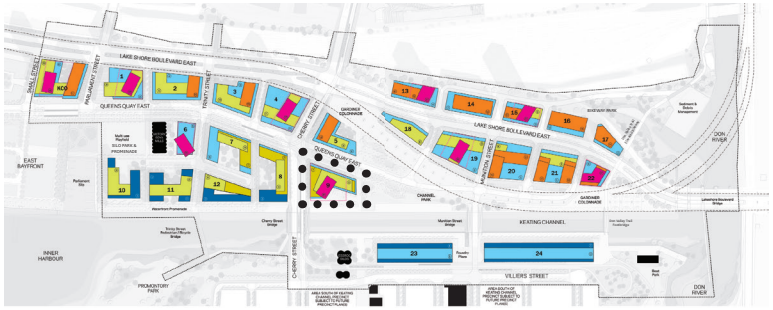


fig. 3-43 Keating Channel Precinct Plan heights plan

fig. 3-44 Keating Channel Precinct Plan built form massing

fig. 3-45 Proposal for privately owned site in Keating Precinct

Current Situation

Since the city is the primary land owner of the Port Lands, it is establishing the planning framework to set the infrastructures and zoning parameters for future development through a process of master planning and precinct planning, which lead to zoning bylaws. However, it does not have the resources to fund the infrastructure or the development relying on private developers to negotiate density for infrastructure, and thus does not have the leverage to regulate built form. The city's planning framework already proposes high densities, but even higher densities are proposed and negotiated for sites under private ownership.

For example the Keating Channel Precinct Plan specifies a density range of 4-20x FSI for its various blocks with an average block density of 7.5x FSI. The privately owned Home Depot site in the Keating Precinct recently released a proposal for much taller and higher density development that surpasses the densities and heights of the Precinct Plan and corresponding zoning bylaw. Looking at a sample tower block, an estimated 5x additional FSI is added beyond the already very high planned density of 10.4x FSI. Following the well established process of negotiation used in the city, the owners could negotiate the additional density with the city, or appeal to the OMB. The site's built form is therefore beyond the city's control, despite its sophisticated planning structure.

Keating Channel Precinct Plan

7.5x FSI Average Net Block Density

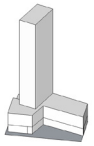
4-20x FSI Density Range for blocks within precinct

Sample Block

PLANNED

FAR: 10.4x

HEIGHT: 3-8-44 storeys



ESTIMATED INCREASE

FAR: 15.4x

HEIGHT: 3-80 storeys

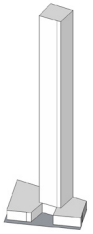


fig. 3-46 Keating Channel Sample Block

fig. 3-47 Ijburg, Amsterdam

fig. 3-48 Pro-home growth over time

fig. 3-49 'Play-the-city' participatory process

Precedents + Opportunities

Planned Diversity

Ijburg, Amsterdam, Netherlands

The Ijburg is a collection of newly formed polder islands to accomodate urban expansion near the centre of Amsterdam. The islands provide a diverse community of various dwelling types and public realm conditions to support a diverse social mix. Built form is low to mid-rise in height but building types vary widely from large apartment blocks to collections of small apartment buildings, rowhousing and finely subdivided owner-built detached houses with private access to the water, rowhouses, or floating boathouses. The district thus accommodates a wide range of incomes and demographics.

Owner-building + Adaptation

Pro-home, Toronto, Canada

John van Nostrand's Pro-home, originally proposed for the Port Lands site, offers a housing type that can begin as a modest small residence for one person and grow over time to accommodate a larger family and a second apartment that can be rented out to allow for upward mobility for low income people. It was originally proposed as an alternative strategy for housing Toronto's homeless and engaging them in the process of escaping poverty by gradually improving their homes.

Bottom-up Rule-based Urbanism

Oosterwold Polder, Almere, Netherlands

MVRDV's 'Play the City' studio is a new planning strategy that engages multiple stakeholders in the process of planning scenarios for urban growth areas. MVRDV does not design the product but rather guides the process through a gameboard and set of rules that allow the dynamic relationships of the stakeholders to generate the outcomes. The process has been used to generate scenarios for several places including the Oosterwold Polder in Almere.

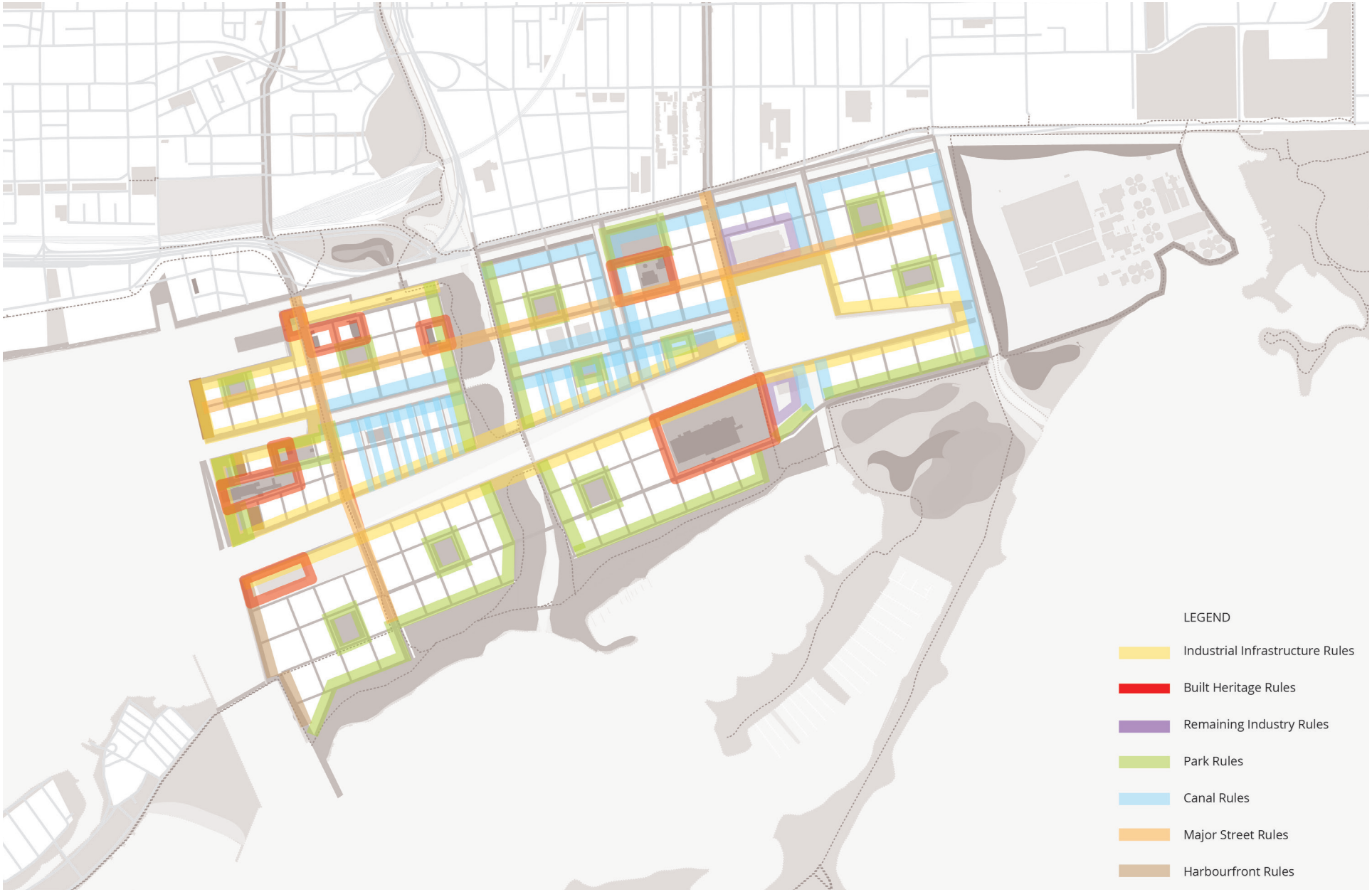


fig. 3-50 Rule Adjacency Matrix

Index

Rule Category
R1 District Rules
R2 Block Rules
R3 Site Specific Rules

Motivation
M1 Views
M2 Sunlight
M3 Heritage Preservation
M4 Diversity
M5 Adaptability
M6 Scale
M7 Mixed Use
M8 Access to Public Space & Transit
M9 Remediation
M10 Design Quality

Control
C1 Height
C2 Lot Scale
C3 Setback
C4 Land Use
C5 Form
C6 Density
C7 Open Space
C8 Parking
C9 Ownership
C10 Time
C11 Lot Coverage

Parameter
P1 Absolute - Fixed limit
P2 Relative - Ratio, percentage

Zone of Influence
Z1 Industrial Channel
Z2 Industrial Artifact
Z3 Industrial Use
Z4 Parks
Z5 Canals
Z6 Major Streets
Z7 Harbourfront

Rx. Mx. Cx. Px. Zx

fig. 3-51 Rule Index

Built Form Rules

The built form of the Port Lands cannot be determined through a Master Plan because the city lacks the power to implement it as designed. Therefore an alternative framework of rules that relate built form to specific elements of the landscape is used to guide development toward diversity. A series of rule types set design intentions and control zoning parameters to implement them from the district scale, to the block scale, and to the building scale based on adjacencies to various landscape infrastructures. Rules are used as creative design tools to set intentions but allow multiple interpretations and create conditions for freedom and diversity.

The district rules set the overall intentions for the district, and provide guiding principles for more detailed rules, and establish the vision for the distribution of height, density, land use, parks and amenities on the site. They also determine the processes by which the site will be remediated, reused, serviced, built out and adapted.

The typical block rules set the generic ranges of zoning parameters that will be made specific by the adjacency rules. These rules serve to allow the most flexibility and diversity, while precluding excessive development or underdevelopment.

The adjacency rules create a matrix of variegated site conditions to encourage diverse built form. Different types of adjacencies - industrial infrastructure, built heritage, remaining industry, parks, canals, major streets, and harbourfront - have different rules or parameters and are further differentiated by scale or type , i.e. minor urban canal to major green corridor canal. The combinations of adjacencies create a wide range of unique sites with different parameters which encourage a differentiated fabric.

District Rules

These general rules are the guiding principles for the more detailed rules to follow.They set the intentions for the future character of the site and the process of its transformation.

FORM RULES

R1.M357.C4

INDUSTRY: The district will retain its industrial identity through adaptively reused built heritage and new light industrial uses integrated with urban fabric.

R1.M9.C10.P2

REMEDIATION: Areas scheduled for redevelopment as per the phasing plan, must be vacated and planted as remediation parks the number of years required for decontamination according to the type and severity of contamination.

R1.M8.C7.P1

PARKS: At least 15% of developable area must remain as publicly accessible green corridors and neighbourhood parks after redevelopment.

R1.M8.C7

PARKS: All privately owned courtyards will be publicly accessible.

R1.M8.C7

AMENITY: Parks, public spaces and canals will be distributed evenly throughout the site to provide equal access to amenities.

R1.M4.C45

DIVERSITY: The district will be a collection of neighbourhoods of heterogeneous character, building types and mixed uses.

R1.M45.C9

OWNERSHIP: The district will provide a variety of land tenure types: 40% freehold, 30% condominium, and 30% coop.

R1.M4.C9

HOUSING: Housing will be 30% affordable housing units, 30% rental units and 40% market housing units.

R1.M1.C1

VIEWS: Height will be concentrated in the center of the site along the main Commissioners Street, stepping down toward the harbour and channels to allow the most views of the water.

R1.M2.C1

SUNLIGHT: New buildings may not block access to sunlight of existing buildings or of the public realm.

R1.M48.C6.P1

DENSITY: Density will be highest 5-7x along the main streets serviced by transit, medium 3-5x in the majority of the site close to water, and lower 2x near built heritage or minor canals. Height will follow site specific rules.

PROCESS RULES

R1.M5.C1.P2

GROWTH: All buildings must provide adequate structure to allow for at least 25% of allowable height for future additions.

R1.M5.C4

FLEXIBILITY: All buildings must be designed to allow future change of use through column grid structural systems, generous floor to floor heights and subdivision or consolidation of units.

R1.M4.C5

DESIGN REVIEW: All development applications must be reviewed for adherence to Built Form Framework rules and for design quality by a multidisciplinary Design Review Panel.

R1.M5.C10.P1

ADAPTIVE MANAGEMENT: All rules will be continuously under review and will be updated every 10 years to account for changing conditions.

The following maps are illustrations of some of these overall intentions and are not regulatory for each block. The actual density, lot scale, and land use for each block are specified by the site specific rules.

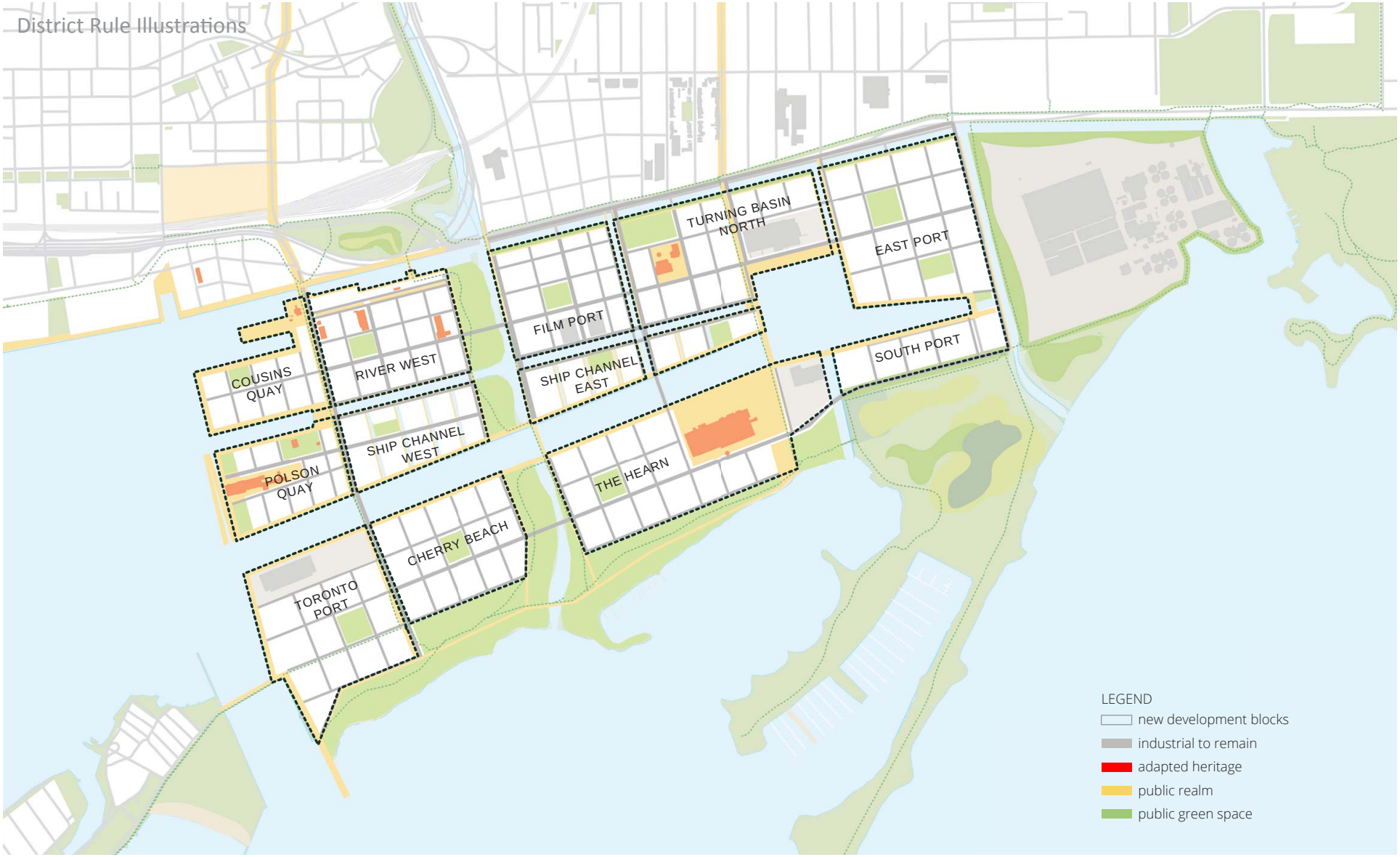


fig. 3-52 Neighbourhoods Map

The canals and major streets define a series of neighbourhoods of distinct character. All neighbourhoods are diverse in use, built form and amenities but they are all also different from one another bearing a different name based on their particular site and the artifacts and landscape infrastructures they contain.

fig. 3-53 Land Use Map

The land uses are mixed at all scales from the building, to the block, to the neighbourhood, and the whole district. However the neighbourhoods are not all evenly mixed; they have different proportions of residential, commercial, and industrial in order to create different characters while providing diversity within each one.

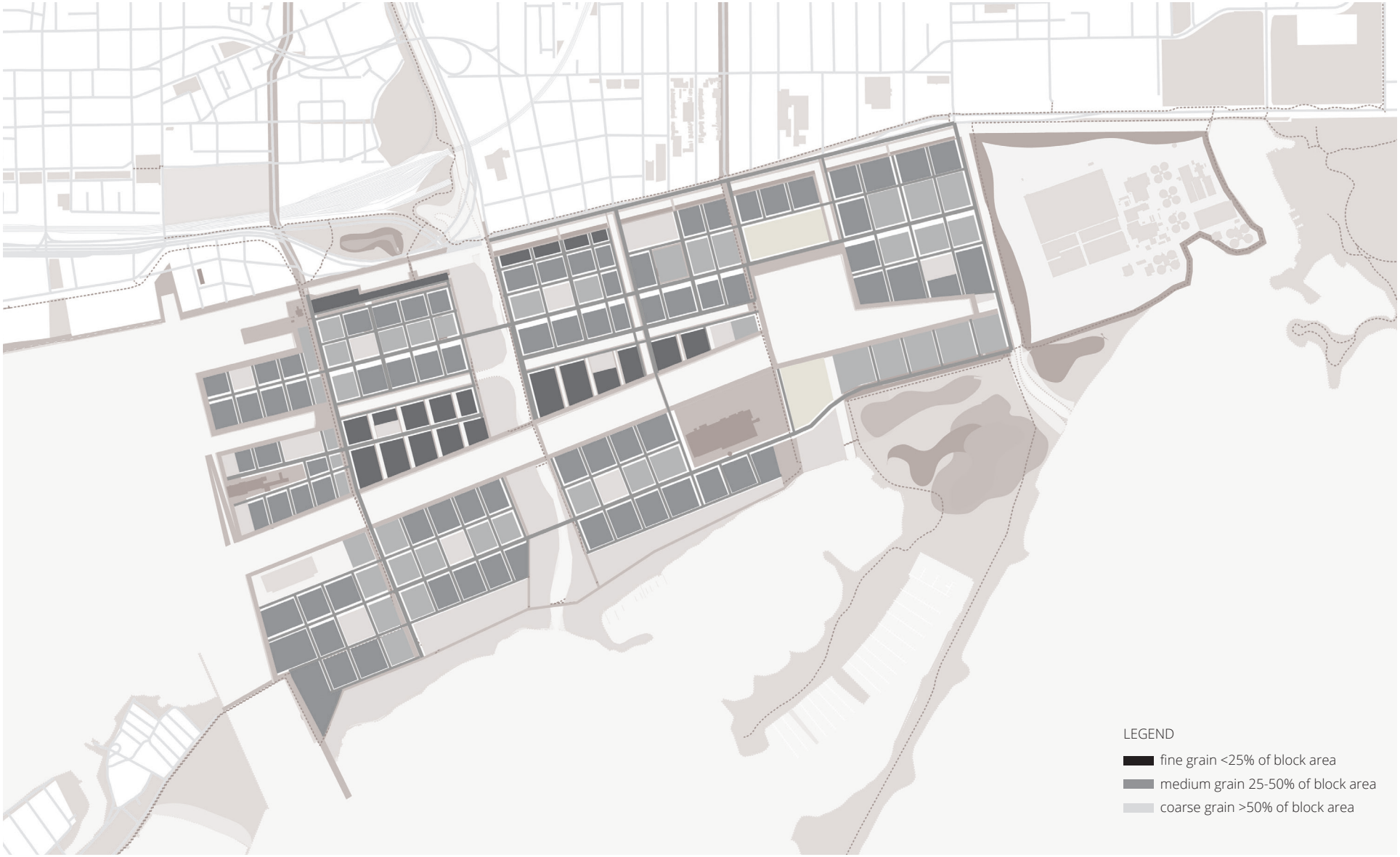


fig. 3-54 Parcelization Map

The parcelization of the land is unevenly distributed to create different conditions across the site, based on the landscape elements it responds to. Sites adjacent to the minor canals are subdivided to the finest grain, sites along the major streets are the largest to allow for higher densities and underground parking, while sites along major canals, harbourfront and parks are of a medium size to create variety while encouraging density.

fig. 3-55 Density Map

The highest density is concentrated along the major roads of the site, in order to take advantage of transit. The majority of the site is in the medium density range, with a few areas of lower density to allow for smaller dwelling typologies and institutional uses on prominent sites.

Typical Block Rules

These rules establish the general built form parameters applicable to all sites within the Port Lands, and are designed to allow maximum flexibility and diversity while precluding undesirable conditions such as underdevelopment or over-development. They represent the minimums and maximums allowable, and are made more specific by the adjacency rules which respond to site conditions.

R2.M8.C7.P1

LAND USE: Every block will be mixed use, with at least two different uses.

R2.M48.C6.P1

DENSITY: 2x - 5x as of right as specified by adjacency rules, 5-7x negotiable only along major streets in exchange for contribution to transit costs.

R2.M4.C1.P1

HEIGHT: 4-12 storeys as of right, 12 -20 storeys negotiable only along major streets, with provision of 30% of total as affordable units and publicly accessible open space within the block. 20-35 storeys negotiable only at intersections of major roads and along Cherry St with provision of 40% affordable units and community centre, library, or school at grade. Only one tower above 10 storeys with max 750sm floor plate is allowed per block.

R2.M2.C3.P1

SETBACK: 0m at to major streets, 3-5m for residential at grade on local streets. 45 degree angled plane above 80% of maximum height to preserve sunlight penetration to sidewalks.

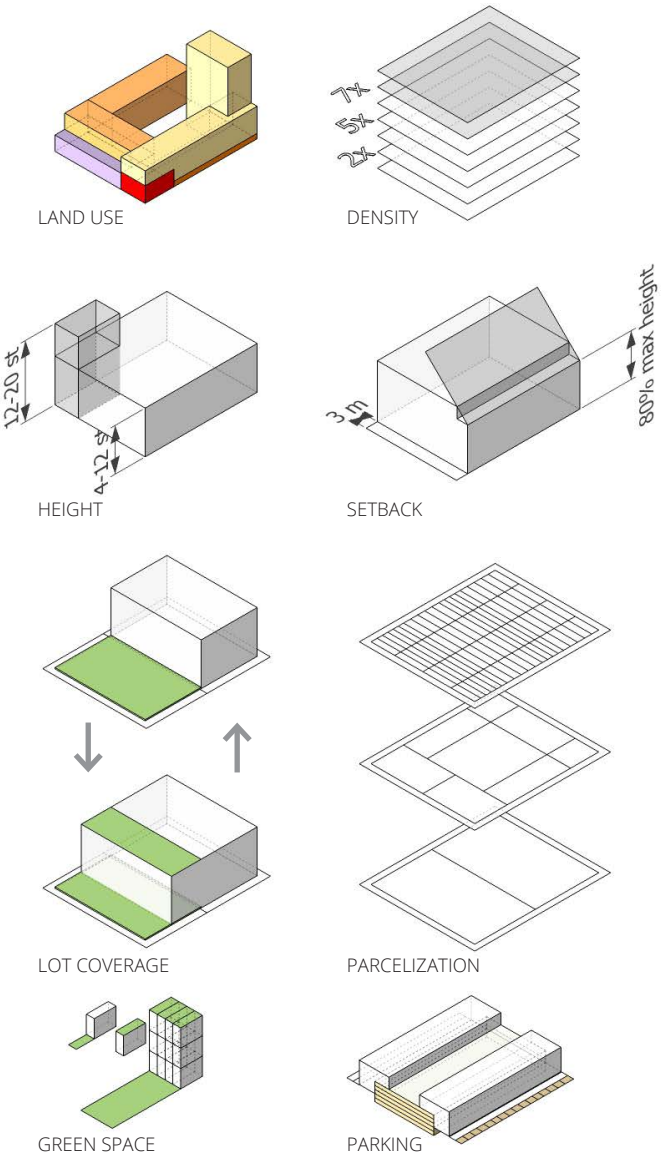


fig. 3-56 Block rule illustrations

R2.M8.C11.P1

LOT COVERAGE: 50% min - 80% max. At least 20% of lot must be publicly accessible open space at grade.

R2.M8.C7.P1

GREEN SPACE: Every suite must have access to at least 9 sm private or shared green space within the block at grade or on the roof.

R2.M4.C2.P12

LOT SCALE: Lot sizes will be 4.5x12m minimum to 80% of the block maximum. Every block must be parceled into at least two lots. No more than 80% of the block may be assembled to be developed as one project.

R2.M8.C8.P1

PARKING: 1 spot for every 2 residential units or 1-4 spots per 100sm of commercial /employment space, to be provided on street or in integrated parking garage below or above grade. Bike storage to be provided for every unit at convenient locations on the ground floor.

Density - Height Relationship & Mid-Rise

By allowing high or practically unlimited densities and heights, the path of least resistance for development is to resort to the easiest, cheapest and most familiar typologies. In the case of Toronto, this leads to the tower-podium type and the townhouse type. By limiting height to mid-rise around 4-12 storeys but still demanding relatively high densities, developers can be forced to explore different typologies to find new ways of achieving their profits. The mid-density range of 2x-5x and the mid-height range 4-15 allows a wide range of possibilities in built form, as shown by the precedent examples that follow.

The examples are chosen to illustrate the different combinations of density and height and resultant diverse built form possible within the mid-range. They contrast the typical development forms of Toronto, and demonstrate the potential of the mid-density mid-rise block type for diversity. The precedent blocks inform a selection of sample block types that are well suited for each of the different adjacency types and have been used as a basis for developing a speculative build-out scenario for the site.

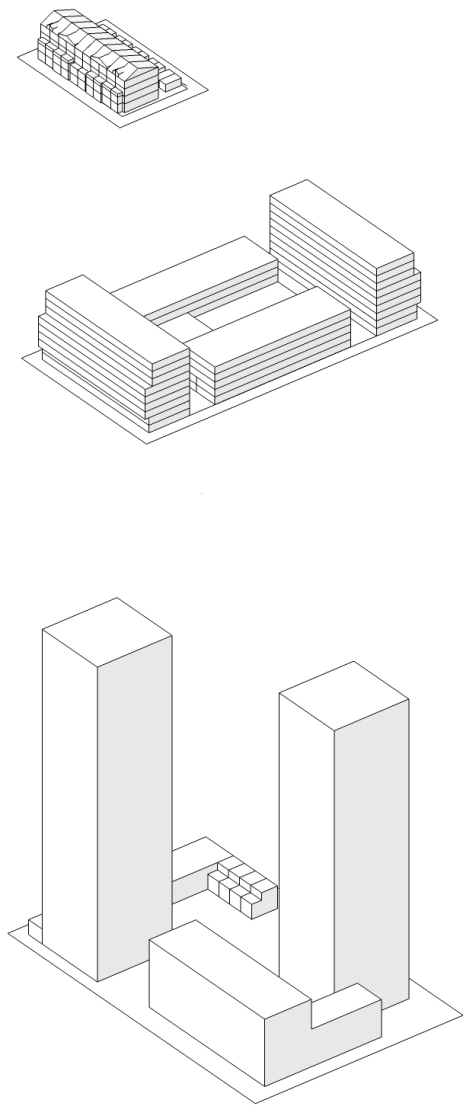


fig. 3-57 Toronto's typical development types

Toronto Development Block Types

Toronto's most prevalent new housing typologies are lowrise townhouses on the low density end and high rise towers on podiums on the high density end. Mid rise types are much less common and are typically the result of heavy handed planning. This is a missed opportunity as the mid-range provides the most efficient use of infrastructure and passive sustainability, and allows the most variability in built form configurations.

The Beach Townhouses

FAR: 2x

HEIGHT: 4 storeys

BLOCK SIZE: 1519 sm

COVERAGE: 50%

West Don Lands Mid-rise

FAR: 3.2x

HEIGHT: 4-9 storeys

BLOCK SIZE: 7751 sm

COVERAGE: 67%

Railway Lands Tower + Podium

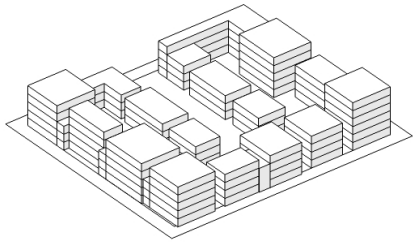
FAR: 7.6x

HEIGHT: 3-40 storeys

BLOCK SIZE: 12300 sm

COVERAGE: 40%

Mid-rise Precedent Blocks



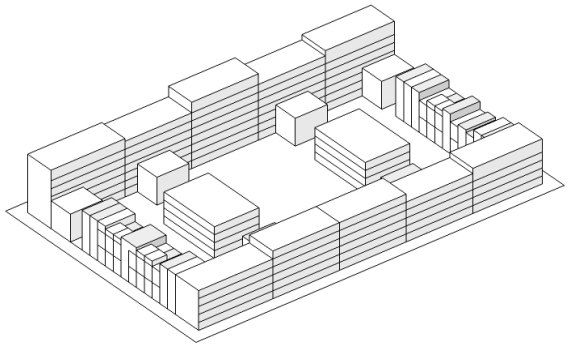
Ijburg, Amsterdam

FAR: 2.2x

HEIGHT: 3-5 storeys

BLOCK SIZE: 6576 sm

COVERAGE: 50%



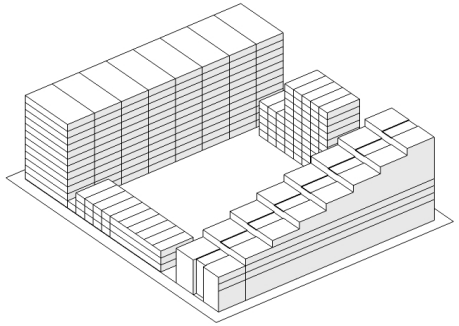
Java Eiland, Amsterdam

FAR: 2.4x

HEIGHT: 3-8 storeys

BLOCK SIZE: 12232 sm

COVERAGE: 41%



De Landtong, Rotterdam

FAR: 2.5x

HEIGHT: 3-11 storeys

BLOCK SIZE:4000 sm

COVERAGE: 98%

fig. 3-58 Mid-rise precedent Blocks

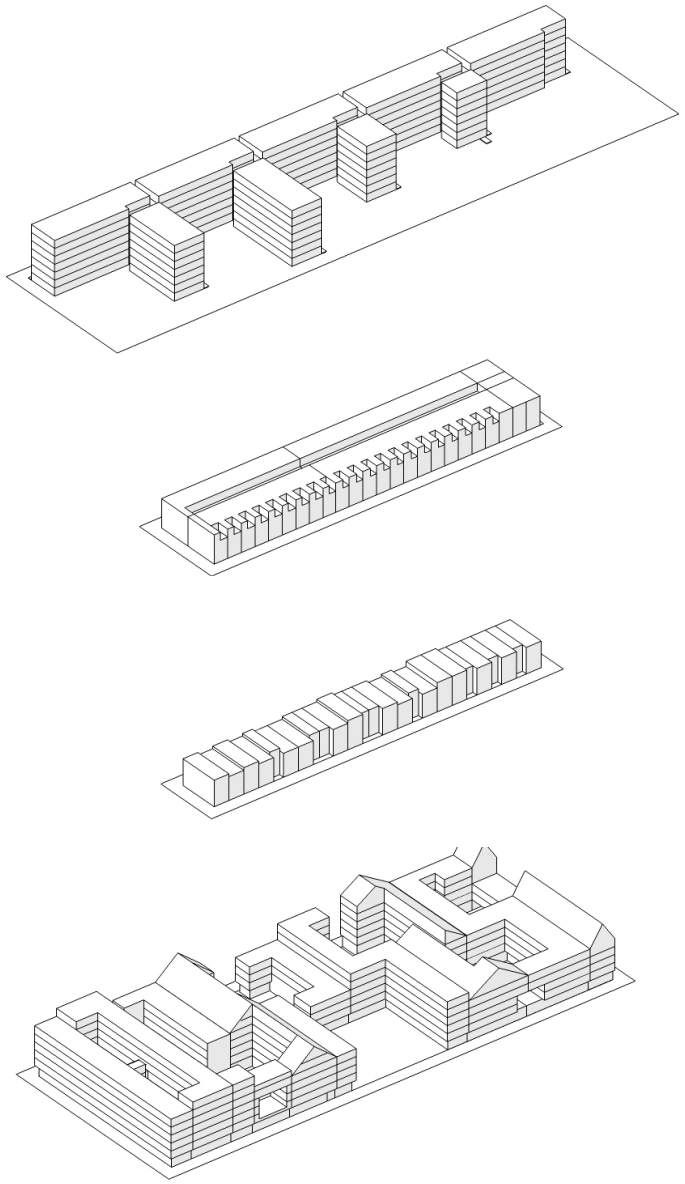


fig. 3-59 Mid-rise precedent Blocks

Mid-rise Precedent Blocks

Palmete, Seville

FAR: 2.7x

HEIGHT: 7 storeys

BLOCK SIZE: 8000 sm

COVERAGE: 40%

Borneo-Sporenburg, Amsterdam

FAR: 2.75x

HEIGHT: 3 storeys

BLOCK SIZE: 3591 sm

COVERAGE: 100%

Borneo-Sporenburg, Amsterdam

FAR: 2.8x

HEIGHT: 3-4 storeys

BLOCK SIZE: 2112 sm

COVERAGE: 96%

Ijburg, Amsterdam

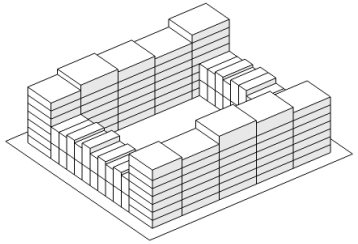
FAR: 2.8x

HEIGHT: 3-7 storeys

BLOCK SIZE: 12621 sm

COVERAGE: 55%

Mid-rise Precedent Blocks



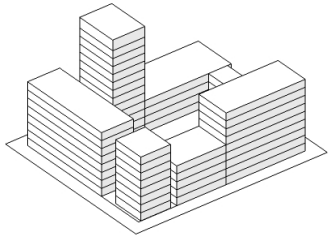
Sluseholmen, Copenhagen

FAR: 3.3x

HEIGHT: 4-7 storeys

BLOCK SIZE: 4608 sm

COVERAGE: 61%



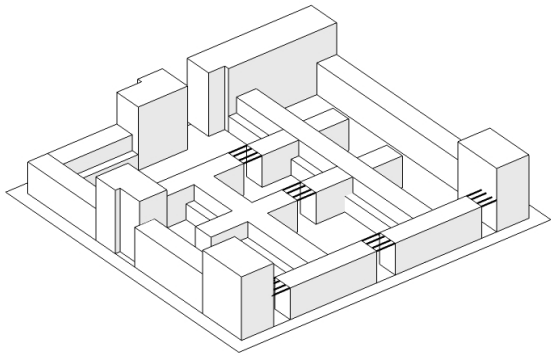
Ijburg, Amsterdam

FAR: 4.1x

HEIGHT: 4-13 storeys

BLOCK SIZE: 3934 sm

COVERAGE: 60%



Ijburg, Amsterdam

FAR: 3.4x

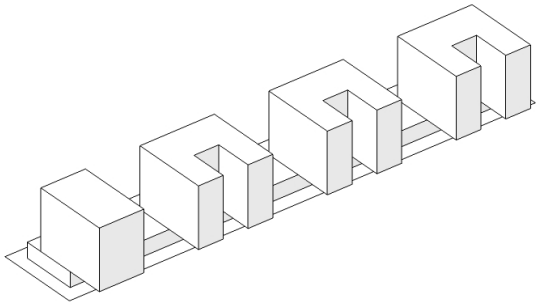
HEIGHT: 4-8 storeys

BLOCK SIZE: 9900 sm

COVERAGE: 67%

fig. 3-60 Mid-rise precedent Blocks

Mid-rise Precedent Blocks



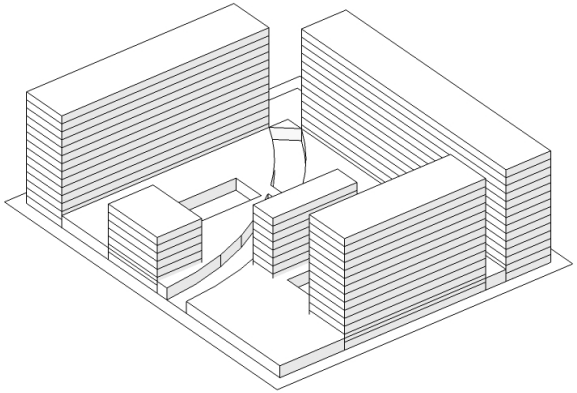
Hafencity, Hamburg

FAR: 4.5x

HEIGHT: 8 storeys

BLOCK SIZE: 6438 sm

COVERAGE: 60%



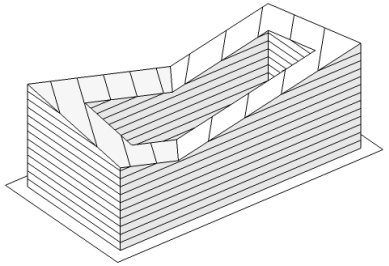
Codan Shinonome, Tokyo

FAR: 5.4x

HEIGHT: 9-14 storeys

BLOCK SIZE: 9200 sm

COVERAGE: 95%



Borneo-Sporenburg, Amsterdam

FAR: 7.2x

HEIGHT: 7-12 storeys

BLOCK SIZE: 5000 sm

COVERAGE: 98%

fig. 3-61 Mid-rise precedent Blocks

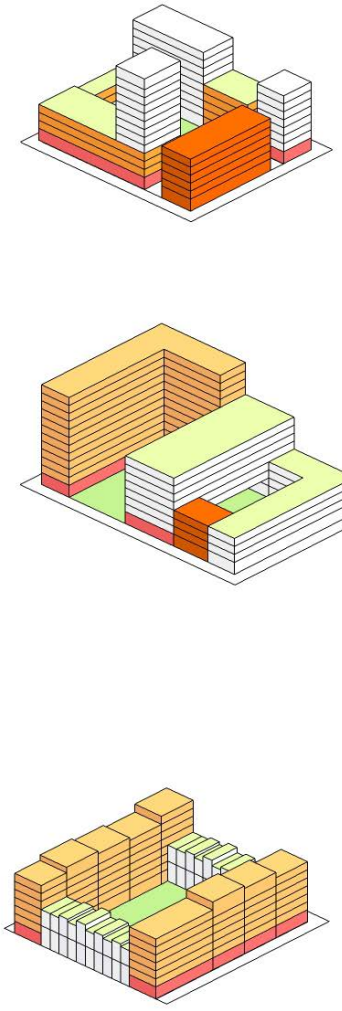


fig. 3-62 Sample Blocks

Block Rule Illustrations

These are possible basic block types within the parameters of the block rules, which could respond to different conditions on the site. They will become further hybridized by the combinations of adjacencies of their specific sites. They will also continue to diversify over time as a result of the various additions and alterations made by their owners and users.

A - Heritage Block

Motivation: Heritage Scale + Active Uses

FAR: 4.1x

HEIGHT: 4-12 storeys

USE: commercial + residential + institutional

OWNERSHIP: rental + condominium

B - Park Block

Motivation: Views + Access to Park

FAR: 5.0x

HEIGHT: 4-12 storeys

USE: commercial + residential + institutional

OWNERSHIP: rental + condominium

C- Canal Block

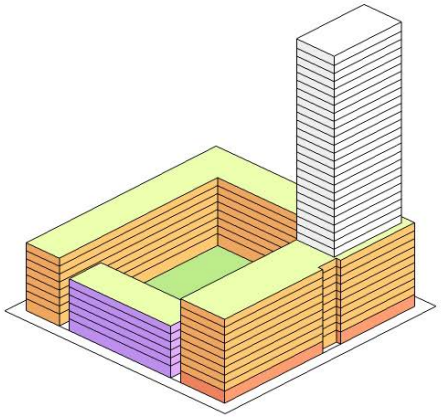
Motivation: Access to Water

FAR: 3.8x

HEIGHT: 4-8 storeys

USE: COMMERCIAL residential

OWNERSHIP: freehold + rental



D - Main Street Block

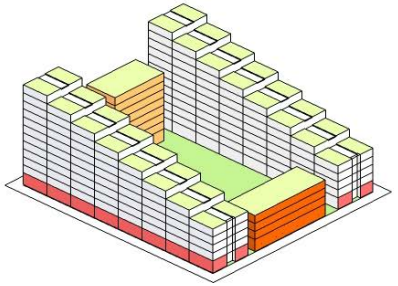
Motivation: Density near Transit

FAR: 6.1x

HEIGHT: 6-35 storeys

USE: Commercial + residential + industrial + retail

OWNERSHIP: rental + condominium



E - Harbour Block

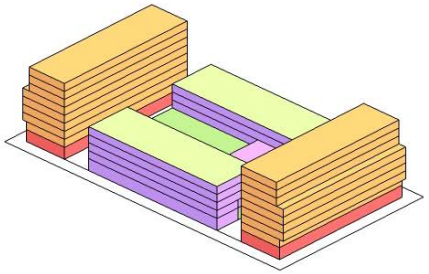
Motivation: Views of Harbour

FAR: 4.3x

HEIGHT: 4-12

USE: RESIDENTIAL institutional commercial retail

OWNERSHIP: condominium



F- Industry Block

Motivation: Integrated New Industry

FAR: 3.2x

HEIGHT: 4-9 storeys

USE: INDUSTRIAL commercial retail

OWNERSHIP: rental + condominium

LEGEND

- industrial
- commercial
- residential
- retail
- institutional
- adapted heritage
- private green space
- semi-private green space
- public green space

fig. 3-63 Sample Blocks

Site Specific Rules

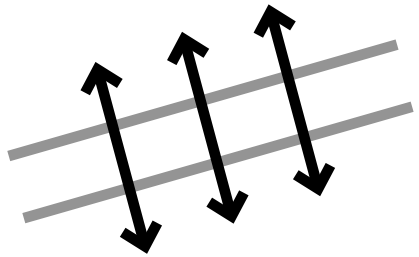
These rules establish the relationships of buildings to existing heritage elements and new landscape infrastructures to differentiate the generic zoning rules to respond to particular site conditions and to protect the quality and consistency of the public realm from over-development.

R3.M8.

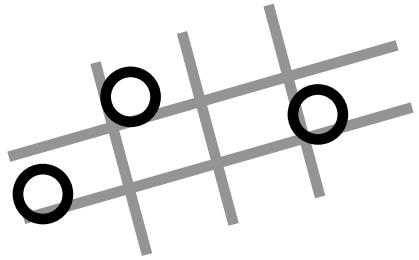
HIERARCHY: Where node-based rules (i.e. neighbourhood parks, industrial artifacts) intersect with linear rule axes, the node rules will take precedence to generate diversity along the long axes.

R3.M8.

HIERARCHY: Where rule adjacency axes intersect the North-South axis rules will take precedence to maintain continuity of connections with the city and generate diversity across the district.



3.0.1 HIERARCHY



3.0.2 HIERARCHY

fig. 3-64 Rule Illustrations

3.1 ADJACENCY TO EXISTING HERITAGE ELEMENTS

3.1.1 INDUSTRIAL CHANNELS

R3.M34.C1.P2.Z1

HEIGHT: The maximum height of buildings adjacent to channels will be equal to 1/4 of the width of the channel -10 st for the Shipping Channel and 5 st for the Keating Channel. The minimum height will be 6 storeys adjacent to the Shipping Channel and 4 storeys adjacent to the Keating Channel. Heights of adjacent buildings will vary along the length of the channel.

R3.M4.C2.P2.Z1

LOT SCALE: Medium scale lots, 25-50% of block area will be permitted. The maximum width of a lot along a heritage channel will be 1/4 of the width of the channel - 30m for the Shipping Channel and 15 m for the Keating Channel.

R3.M8.C3.P1.Z1

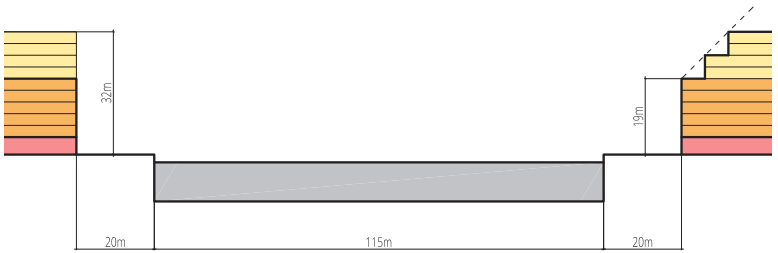
SETBACK: Building sites will be set back 20 m from Shipping Channel dockwall and 10 m from Keating Channel dockwall to allow for public promenade. Lots on south side of canals will set back to maintain an angled plane of 45 above the minimum height to allow sun penetration into canals.

R3.M7.C4.P1.Z1

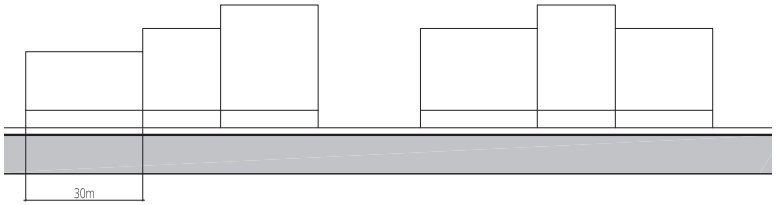
LAND USE: Retail and institutional space at grade will activate the promenades along industrial channels. Commercial and residential mixed uses will be prioritized above grade.

R3.M18.C6.P2.Z1

DENSITY: Medium densities 2-4x FAR will be permitted near industrial channels to maintain an appropriate scale.



INDUSTRIAL CHANNEL SECTION



INDUSTRIAL CHANNEL ELEVATION

LEGEND

- industrial
- commercial
- residential
- retail
- institutional

fig. 3-65 Rule Illustrations

3.1.2 INDUSTRIAL ARTIFACTS

R3.M3.C1.P1.Z2

HEIGHT: Heights of buildings in blocks adjacent to built heritage must be 2 storeys lower than tall artifacts (over 4 m) in order preserve their visibility as landmarks, or must continue the roofline of low artifacts (4m or lower) with a setback to respect their scale.

R3.M3.C2.P2.Z2

LOT SCALE: Lot sizes adjacent to industrial artifacts will be of a similar scale as the artifact.

R3.M3.C3.P2.Z2

SETBACK: New buildings will match setbacks of industrial artifacts along streets and canals.

R3.M7.C4.P1.Z2

LAND USE: Institutional, commercial and retail uses will be prioritized around Industrial Artifacts to animate the public spaces around them.

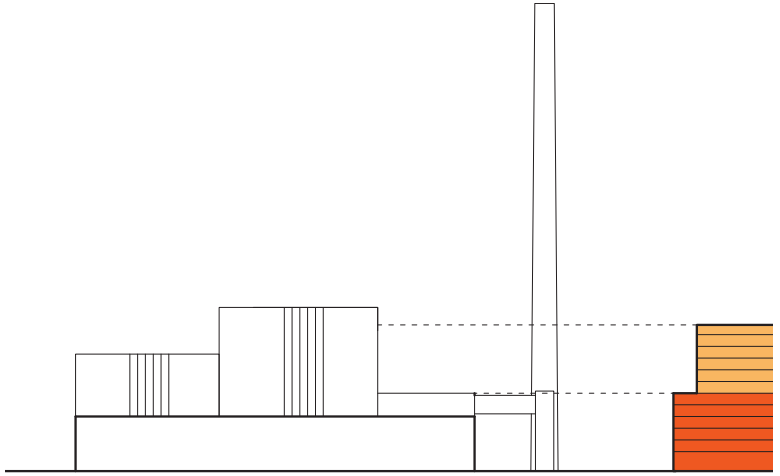
R3.M18.C6.P2.Z2

DENSITY: Low -medium densities 2-4x FAR will be permitted near industrial artifacts to maintain a similar scale.

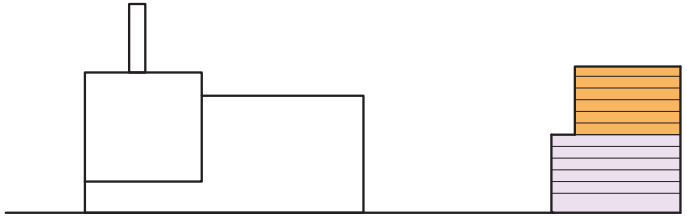
3.1.3 REMAINING INDUSTRIAL USES

R3.M7.C4.P.Z3

LAND USE: New light industrial and commercial uses, will be prioritized adjacent to existing industrial uses, in order to maintain industrial identity and integrate industry in new mixed-use urban fabric.



INDUSTRIAL ARTIFACT SECTION



REMAINING INDUSTRY SECTION

fig. 3-66 Rule Illustrations

3.2 ADJACENCY TO PARKS

R3.M1.C3.P1.Z4

SETBACK: Buildings fronting onto parks will set back 3m from property line to allow for porches, balconies, and gardens fronting onto parks.

R3.M8.C4.P1.Z4

LAND USE: Residential and institutional uses will be prioritized adjacent to parks.

R3.M8.C6.P2.Z4

DENSITY: Medium-high densities 3-5x FAR will be permitted along parks to take advantage of their amenities.

3.2.2 GREEN CORRIDORS

R3.M18.C1.P1.Z4

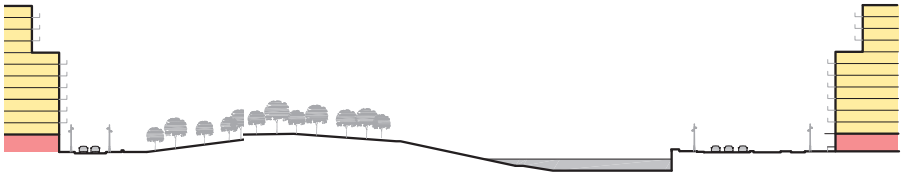
HEIGHT: Maximum heights adjacent to parks will be 12 storeys and minimum heights will be 8 storeys to allow density along park amenities while not blocking views of building sites beyond.

R3.M8.C2.P2.Z4

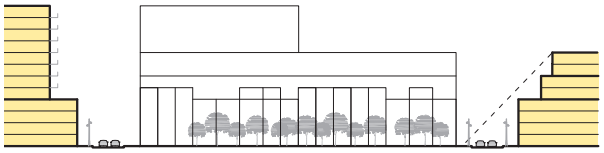
LOT SCALE: Lot sizes along green corridors will be mid-sized, 25-50% of block area, to provide park access to multi-unit residential buildings, while maintaining variety.

R3.M1.C5.P1.Z4

VIEWS: Balconies and generous glazing will be provided on building faces fronting onto green corridors to capitalize on the views.



GREEN CORRIDOR SECTION



NEIGHBOURHOOD PARK SECTION + ELEVATION

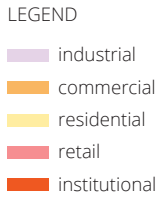


fig. 3-67 Rule Illustrations

3.2.3 NEIGHBOURHOOD PARKS

R3.M8.C2.P2.Z4

LOT SCALE: Smaller lot sizes, 10-25% of block area, and street related residential units will be prioritized fronting onto neighbourhood parks to activate and maintain them.

R3.M2.C1.P2.Z4

HEIGHT: Tall buildings will be sited so that they do not cast a shadow on neighbourhood parks between 10am and 4pm on September 21.

3.3 ADJACENCY TO CANALS

R3.M2.C1.P2.Z5

HEIGHT: Maximum height of buildings adjacent to canals will equal the width of the canal, and minimum height will be 75%

of width of the canal (minor canals 4-5 st, medium canals 6-8 st, large canals 8-12m).

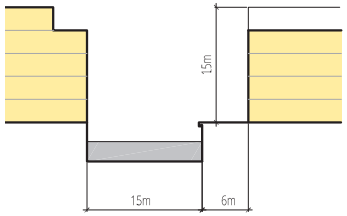
R3.M18.C6.P2.Z7

DENSITY: Low - medium densities 2-4x FAR will be permitted along canals according to the scale of canals to generate a finer grained and varied fabric.

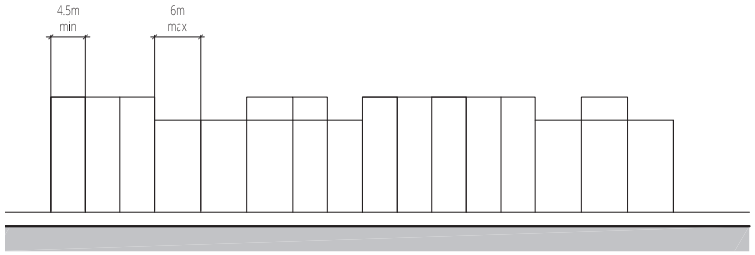
3.3.1 MINOR URBAN CANAL

R3.M4.C2.P1.Z5

LOT SCALE: Sites adjacent to minor urban canals will be subdivided to the minimum lot size 4.5x 12m and no more than 2 lots will be allowed to be assembled.



MINOR URBAN CANAL SECTION



MINOR URBAN CANAL ELEVATION

fig. 3-68 Rule Illustrations

R3.M8.C3.P1.Z5

SETBACK: Building sites will be set back 0m from the dockwall on one side of the canal to provide units with direct water access, and 5m on the other side to provide pedestrian access.

R3.M8.C4.P1.Z5

LAND USE: Residential units with direct water access or grade access will be prioritized along minor canals.

3.3.2 MAJOR URBAN CANAL

R3.M2.C2.P2.Z5

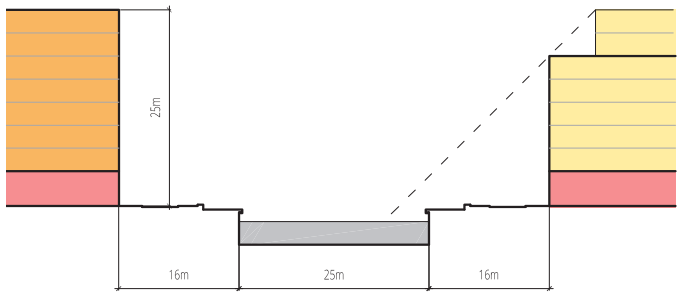
LOT SCALE: Small-medium lot sizes will be permitted, 10-25% of the block area, Maximum width of lots along major urban canal will be equal to the canal width.

R3.M2.C3.P1.Z5

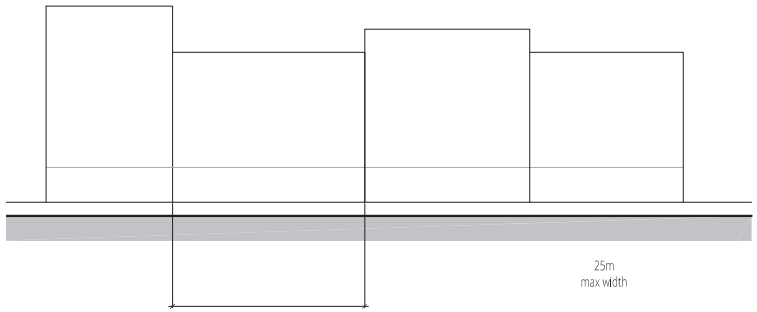
SETBACK: Lots on south side of canals will set back to maintain an angled plane of 45 above the minimum height to allow sun penetration into canals.

R3.M7.C4.P1.Z5

LAND USE: Ground floor uses along major canals will be retail, commercial or institutional to activate the street and promenade. Mixed commercial and residential uses will be prioritized along Major Urban Canals.



MAJOR URBAN CANAL SECTION



MAJOR URBAN CANAL - ELEVATION

LEGEND

- industrial
- commercial
- residential
- retail
- institutional

fig. 3-69 Rule Illustrations

3.4 ADJACENCY TO MAJOR URBAN STREETS

Commissioners St., Cherry St., Carlaw Ave, Leslie St., and Unwin Ave. are main streets serviced by public transit.

R3.M6.C1.P2.Z6

HEIGHT: Maximum heights will be allowed to give prominence to main streets. Minimum height will be 10 storeys to maintain street wall continuity and appropriate scale.

R3.M8.C2.P2.Z6

LOT SCALE: Lots fronting onto main streets will be large, 50% of block area or larger, to allow for higher densities to take advantage of public transit.

R3.M2.C3.P1.Z6

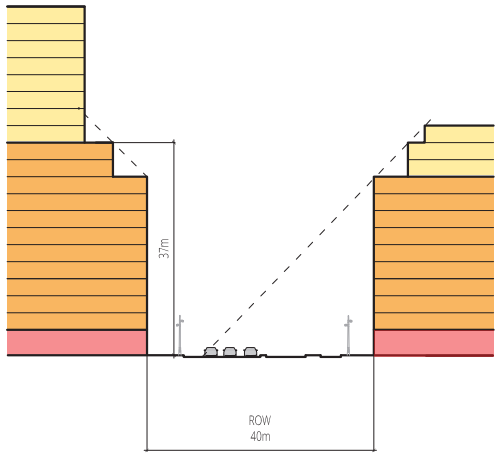
SETBACK: Buildings will have 0m setback at grade, and will set back within a 45 degree angled plane above 10 storeys to maintain continuity of the street wall and allow light penetration.

R3.M78.C4.P1.Z6

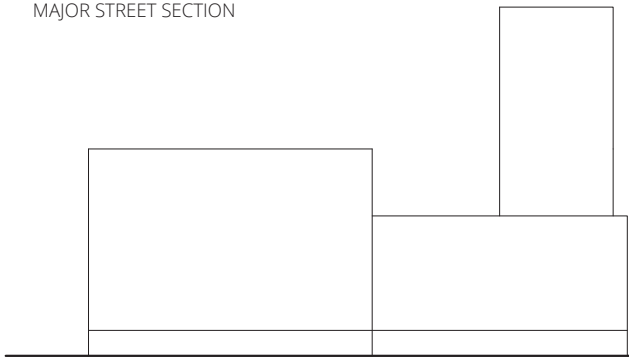
LAND USE: Commercial and employment uses will be prioritized along main streets.

R3.M8.C6.P2.Z6

DENSITY: Highest densities 5-7x FAR will be allowed along main streets to take advantage of public transit.



MAJOR STREET SECTION



MAJOR STREET ELEVATION

fig. 3-70 Rule Illustrations

3.5 ADJACENCY TO HARBOURFRONT

R3.M6.C1.P1.Z7

HEIGHT: Minimum height will be 6 storeys, and maximum height 12 storeys to maintain appropriate presence on the skyline while allowing views of the harbour for buildings beyond.

R3.M6.C2.P2.Z7

LOT SCALE: Scale of building lots will be mid-sized, 25-50% of the block area, in order to have presence on the harbourfront seen from the water or the city, while maintaining variety.

R3.M8.C3.P1.Z7

SETBACK: Building sites will be set back 20 m from harbourfront dockwall to allow for public promenade.

R3.M8.C4.P1.Z7

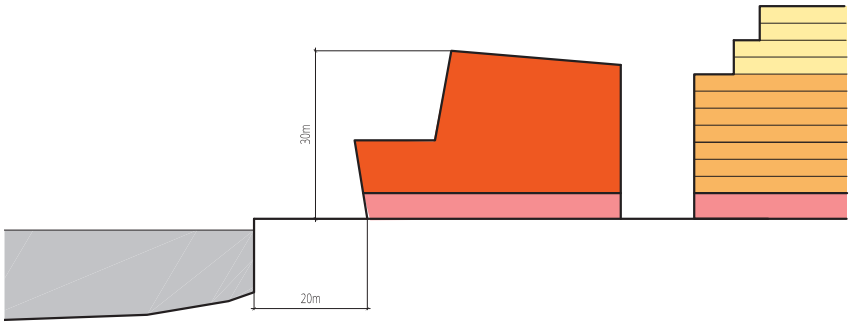
LAND USE: Public institutional uses will be prioritized on harbourfront sites.

R3.M18.C6.P2.Z7

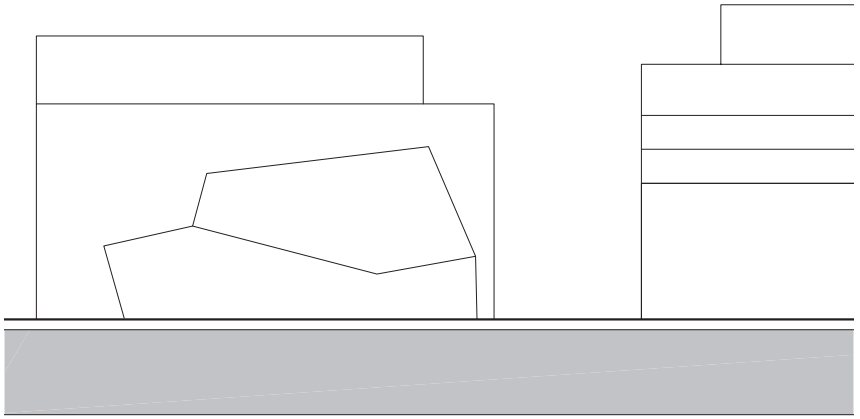
DENSITY: Medium densities 3-5x FAR will be permitted along the harbour to take advantage of views and amenities without blocking views of blocks behind them.

R3.M10.C5.Z7

DESIGN QUALITY: Proposed buildings will be reviewed and approved by review panel for design quality as they will make up the skyline of the Port Lands.



HARBOURFRONT SECTION



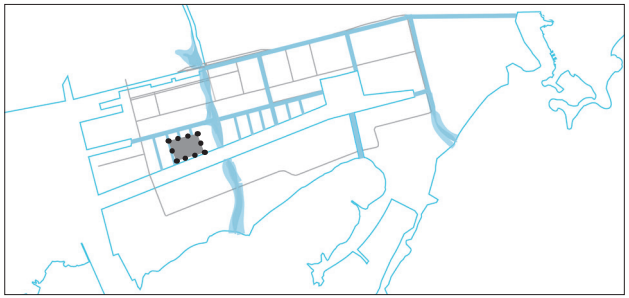
HARBOURFRONT ELEVATION

LEGEND

- industrial
- commercial
- residential
- retail
- institutional

fig. 3-71 Rule Illustrations

Diversification Over Time



Site: Canal block along Shipping Channel

Objective : Built form should be diverse and adaptable, responsive to differentiated site conditions and changing needs of various users.

Adjacencies: Shipping Channel, minor canals, local road

Parcelization: Fine grain, 10 medium lots and 20 small rowhouse lots

Density: 3x FAR

Land Use: Residential, Commercial, Retail

Ownership: Freehold, Coop, Rental

Rules:

Shipping Channel

1. Height: 8 storeys minimum - 10 storeys maximum

2. Parcelization: Max. 30 m long facade

3. Use: mixed, prioritize commercial / public uses

Minor Canals

1. Height: 4 storeys minimum - 5 storeys maximum

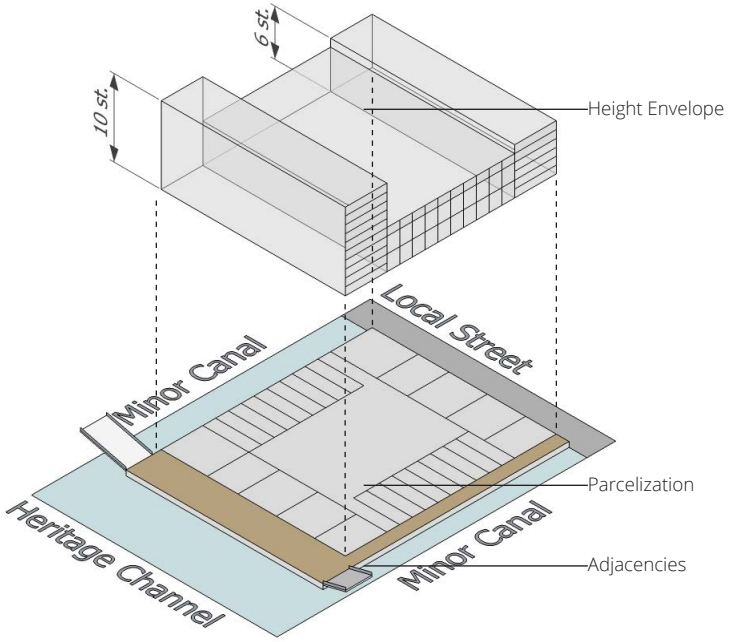
2. Parcelization: 4.5 m width

3. Use: residential

4. Setback: 0m on one side of canal, 5m on the other

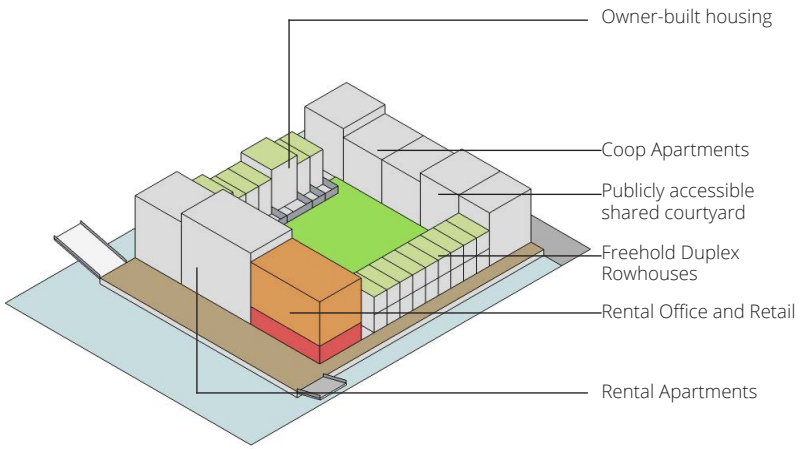
Local Street

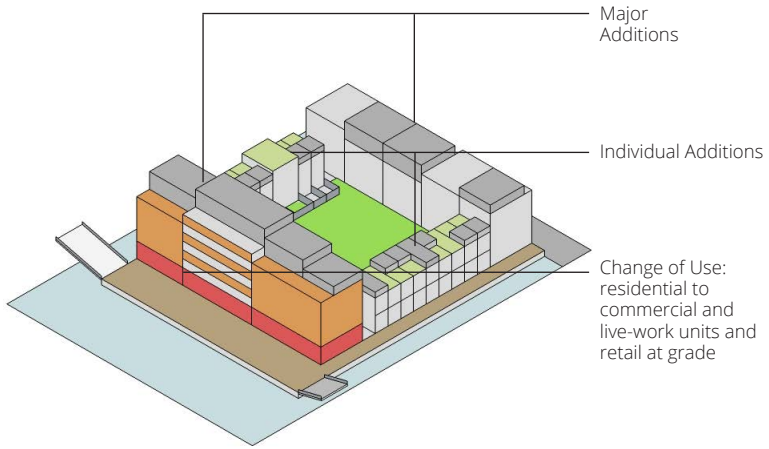
1. Height: 4 storeys minimum - 6 storeys maximum



Constraints: Island block surrounded by canals demands fine grain of subdivision and limited heights consistent with the scale of the canals and local street

fig. 3-72 Block diversification over time





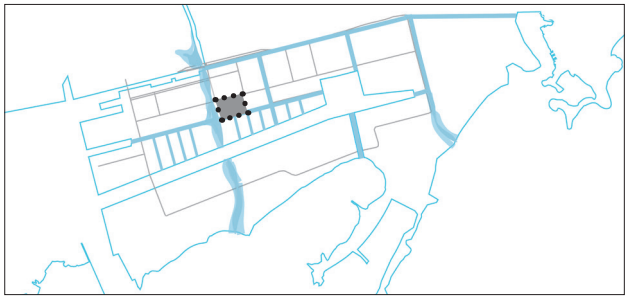
Diversity: A variety of building types and ownership types result from the fine grained subdivision and the adjacency rules interpreted by a variety of builders from small developers to individual homeowners

Adaptation - Changes of use and additions over time in response to increased density allow the block to further diversify and change according to user's needs

LEGEND

- industrial
- commercial
- residential
- retail
- institutional
- adapted heritage
- private green space
- semi-private green space
- public green space

Diversification Over Time



Site: Corner Block at Don Canal and Commissioners St.

Adjacencies: Major road, major park, major urban canal, industry

Parcelization: Medium grain, 2 large lots and 5 small lots

Density: 4x FAR

Land Use: Residential, Commercial, Retail, Light Industrial

Ownership: Freehold, Rental

Rules:

Major Street

1. Height: 8 storeys minimum - 12 storeys maximum

1 tower up to 20 storeys negotiable for 30% affordable housing and contribution to transit costs

2. Parcelization: Large lots

3. Use: mixed, prioritize commercial uses

Major Park

1. Height: 8 storeys minimum -12 storeys maximum

2. Use: residential

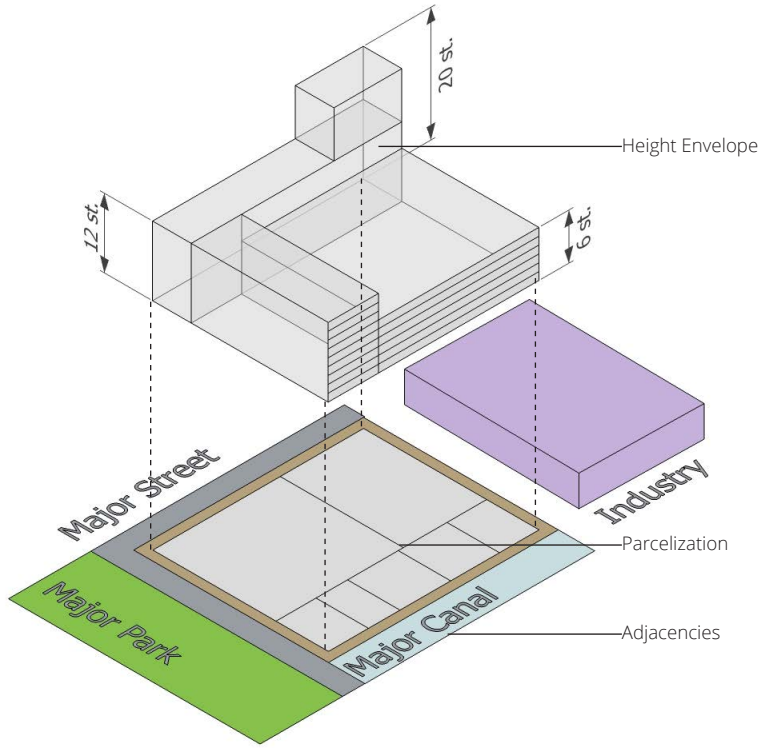
Major Urban Canal

1. Height: 6 storeys minimum - 8 storeys maximum

2. Use: prioritize commercial/public uses

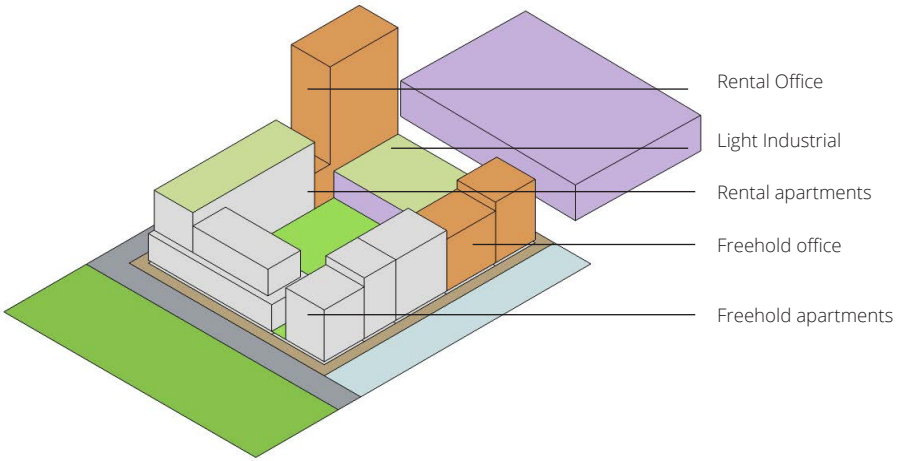
Industry

1. Use: prioritize light industrial uses

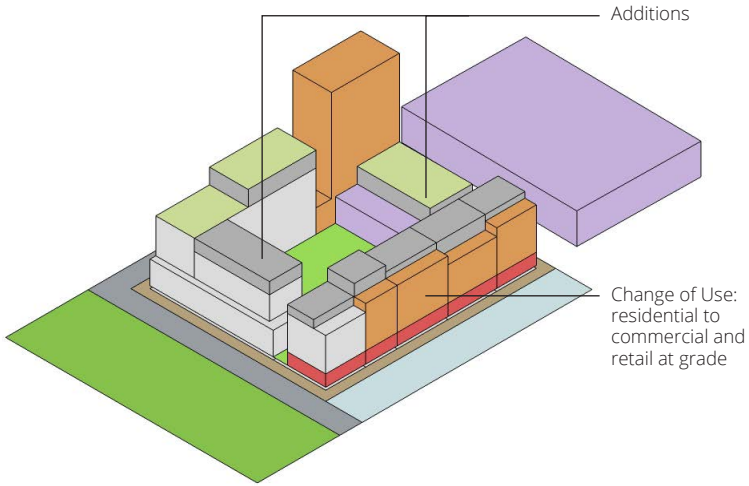


Constraints - Corner block with four different adjacencies on each side demands varying height, scale of parcelization and uses

fig. 3-73 Block diversification over time



Diversity - A variety of large and small building types, ownership types and uses result from various adjacencies and medium grained parcelization.



Adaptation - Changes of use and additions over time further diversify the built form of the block

LEGEND

- industrial
- commercial
- residential
- retail
- institutional
- adapted heritage
- private green space
- semi-private green space
- public green space

Diversification Over Time

Site: Corner Block at Cherry St. and Commissioners St.

Adjacencies: Two major roads, neighbourhood park, built heritage

Parcelization: Coarse grain, 2 large lots

Density: 6x FAR

Land Use: Residential, Commercial, Retail, Institutional

Ownership: Freehold, Condominium, Rental

Rules:

Major Street

1. Height: 8 storeys minimum -12 storeys maximum,

1 tower up to 35 storeys negotiable for 40% affordable housing and a public library

2. Parcelization: Large lots

3. Use: mixed, prioritize commercial uses

Neighbourhood Park

1. Height: 4 storeys minimum - 5 storeys maximum

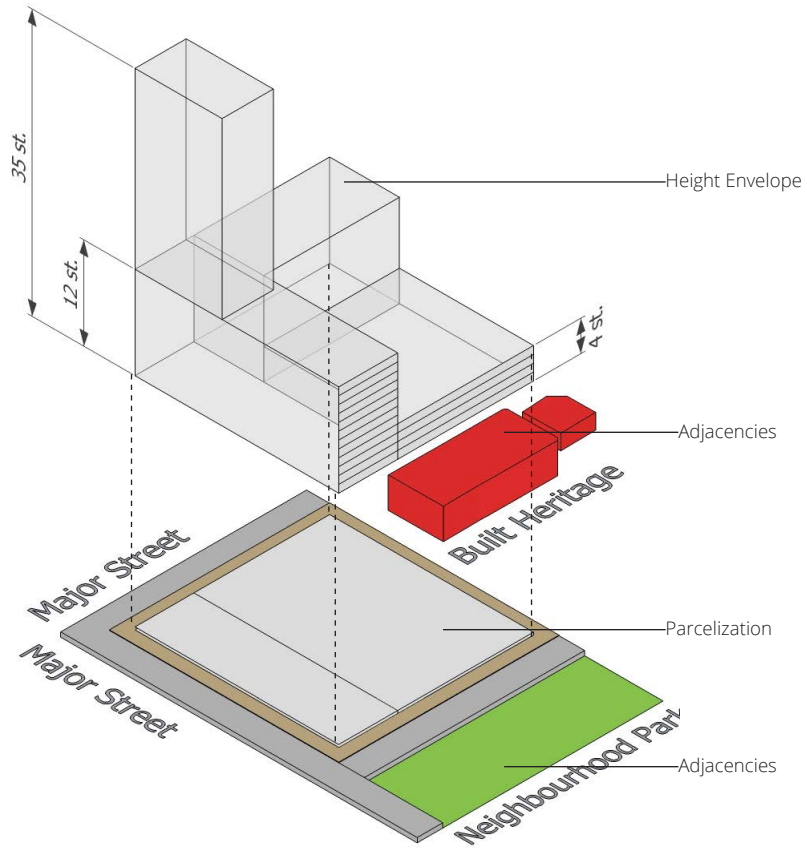
2. Parcelization: small rowhouse lots

3. Use: residential, ground related units

Built Heritage

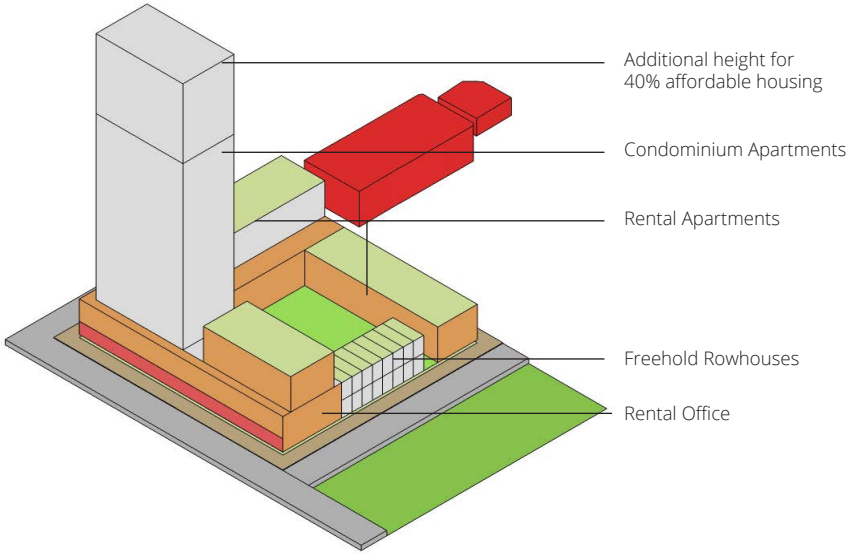
1. Height: continue roofline of built heritage and set back 3m above it

2. Use: prioritize institutional/public uses

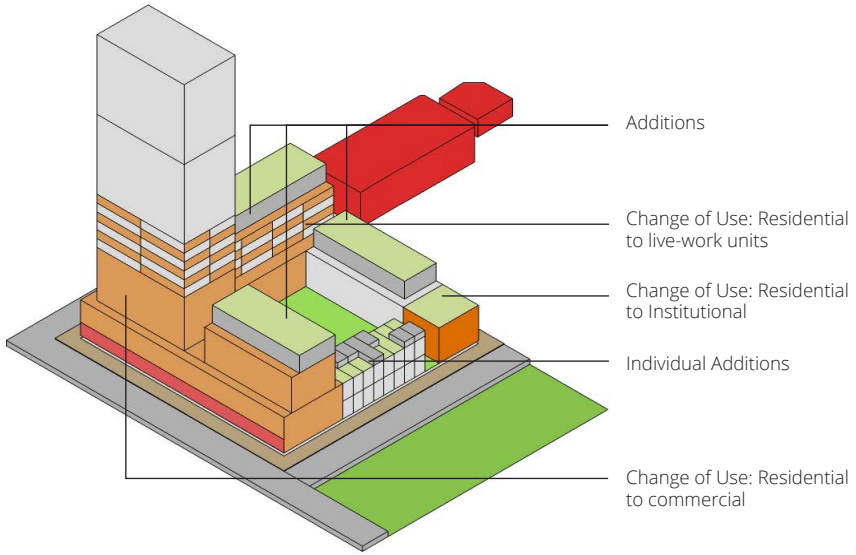


Constraints - Prominent site at intersection of two major roads, adjacent to a neighbourhood park and built heritage allows height and large lots, but requires finer grain and smaller scale development along park and heritage adjacencies

fig. 3-74 Block diversification over time



DIversity - Larger building types result from the site's prominent location and scale of subdivision, but a 4 storey street wall is maintained to reference the adjacent built heritage, and finer grained housing transitions to the neighbourhood park



Adaptation - Changes of use and additions further differentiate the block over time, adding density, office space and live-work units, as well as a public library

LEGEND

- industrial
- commercial
- residential
- retail
- institutional
- adapted heritage
- private green space
- semi-private green space
- public green space

Street Sections

Three basic street types are used, major streets, secondary streets, and local streets.

Major Streets are 40 m wide and comprised of one lane of street parking, 3 lanes of traffic, rapid transit in its own right of way, dedicated off road bike lanes, and generous sidewalks.

Secondary Streets are 24 m wide and have one lane of street parking, 3 lanes of traffic bus transit in mixed traffic, dedicated off road bike lanes, and pedestrian sidewalks.

Local streets are much narrower at 18m wide and consist of two lanes of mixed traffic and bike traffic, and pedestrian sidewalks.

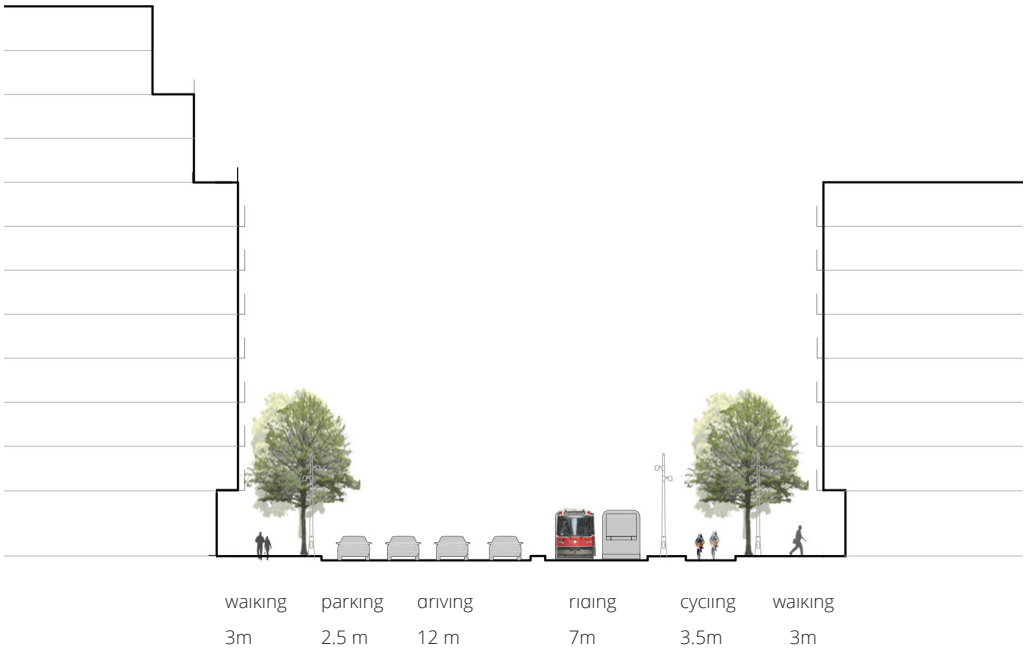


fig. 3-75 Major Street Section - 40 m ROW

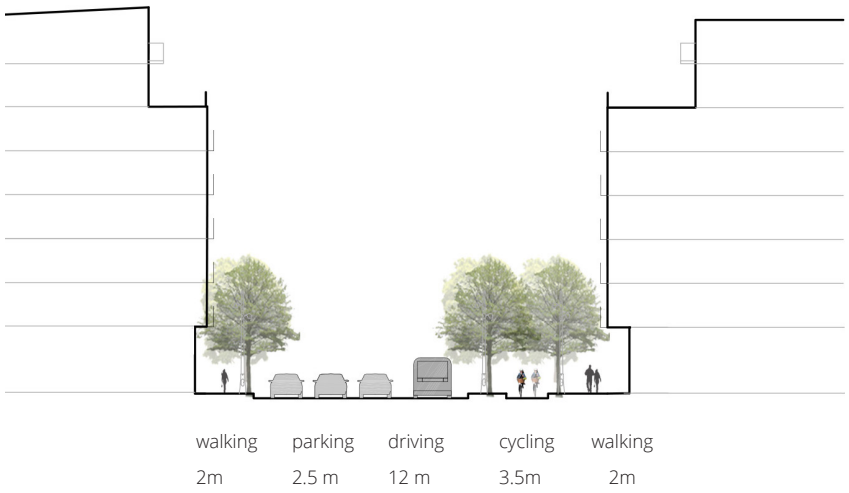


fig. 3-76 Secondary Street Section - 24 m ROW

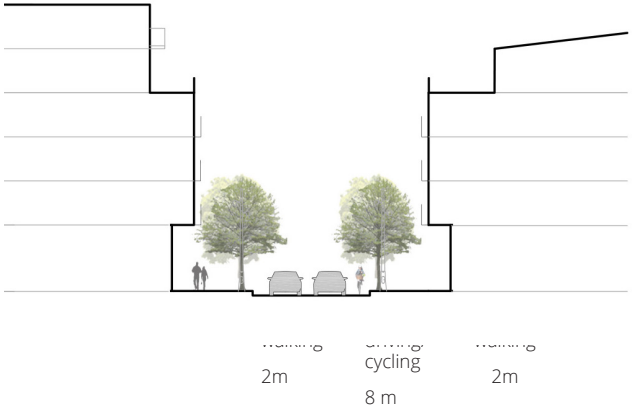
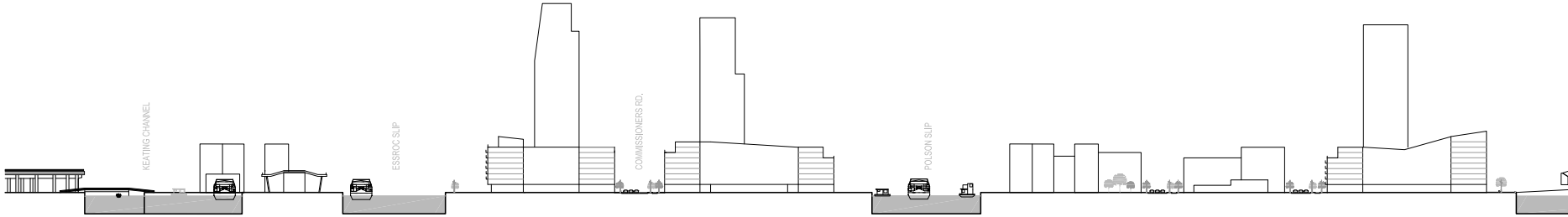


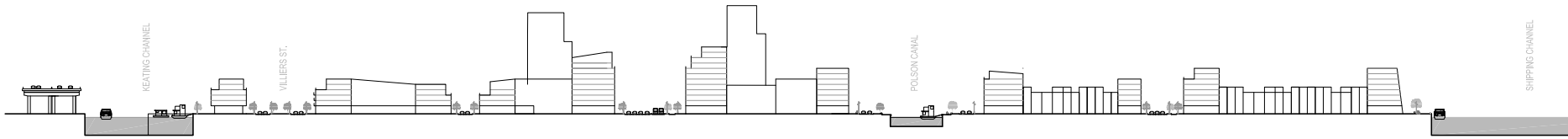
fig. 3-77 Local Street Section - 18m ROW

Site Sections

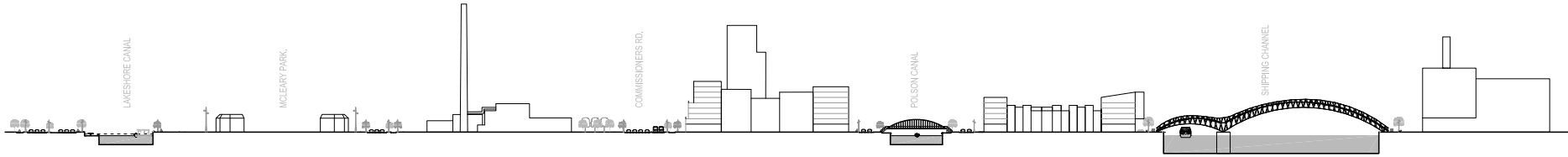
This series of site sections show more precisely the relationships of built form to various linear infrastructures , parks, and heritage elements as established by the rules, and the resultant diverse urban landscape they produce.



Section A

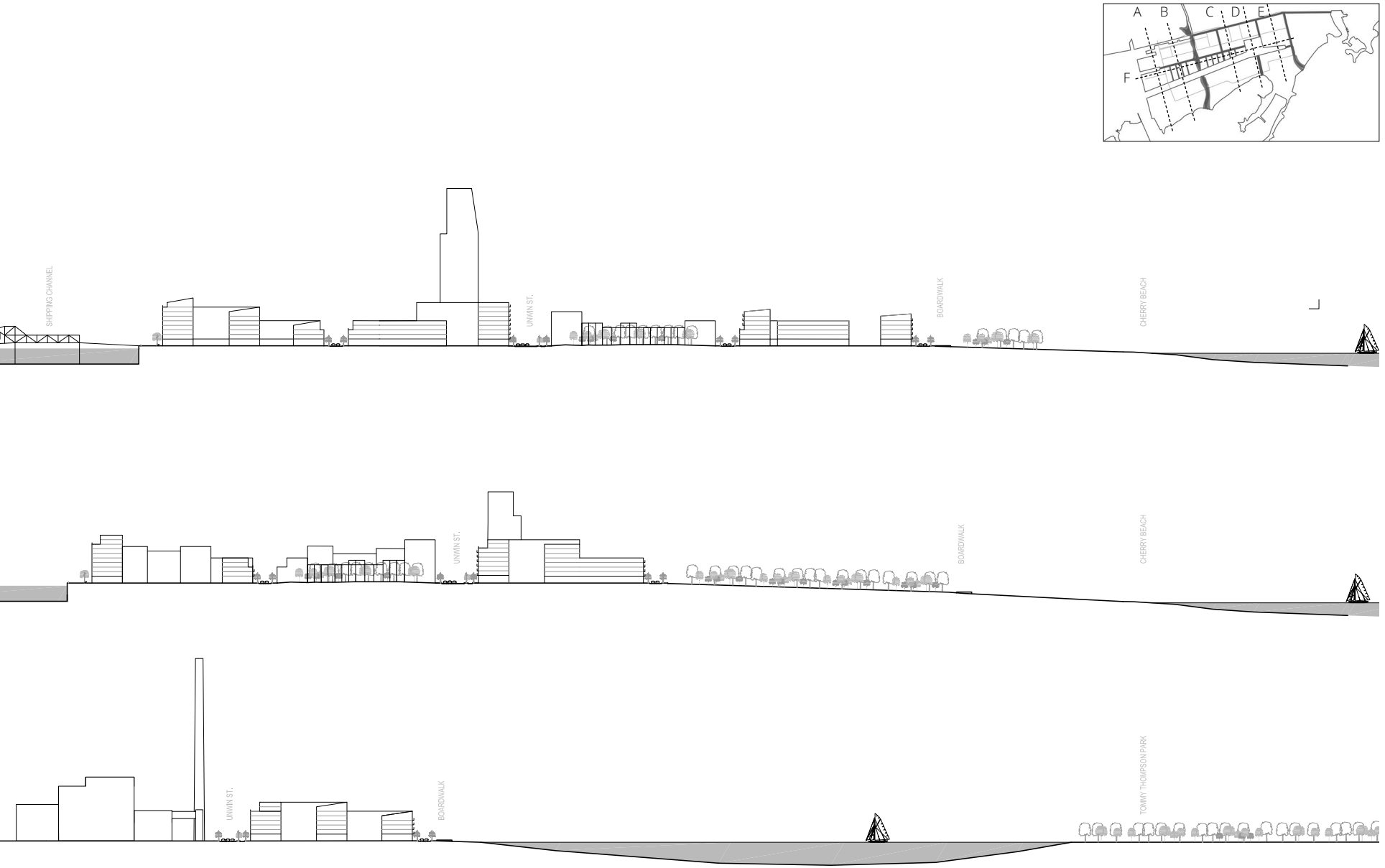


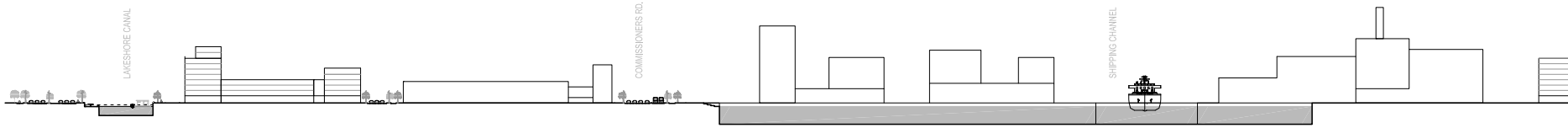
Section B



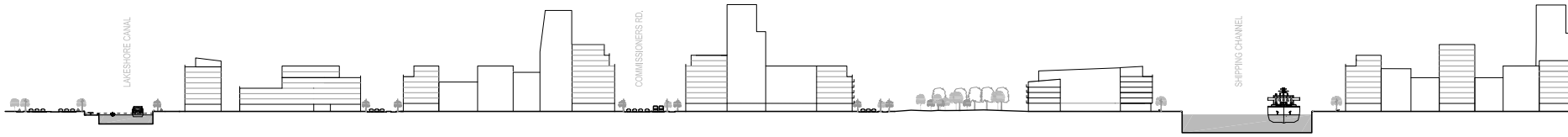
Section C

fig. 3-78 North-south cross sections from West to East showing diversity produced by rule adjacencies


A
B
C
D
E
F
SHIPPING CHANNEL
UNWIN ST.
BOARDWALK
CHERRY BEACH
UNWIN ST.
BOARDWALK
CHERRY BEACH
UNWIN ST.
BOARDWALK
TOMMY THOMPSON PARK

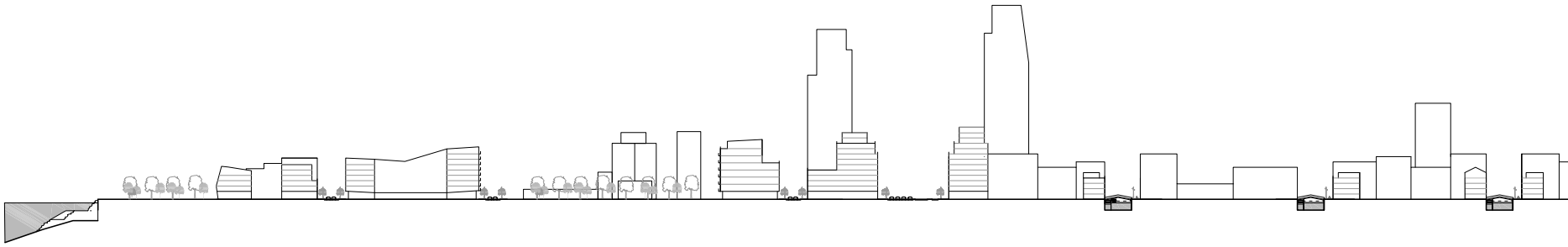


Section D



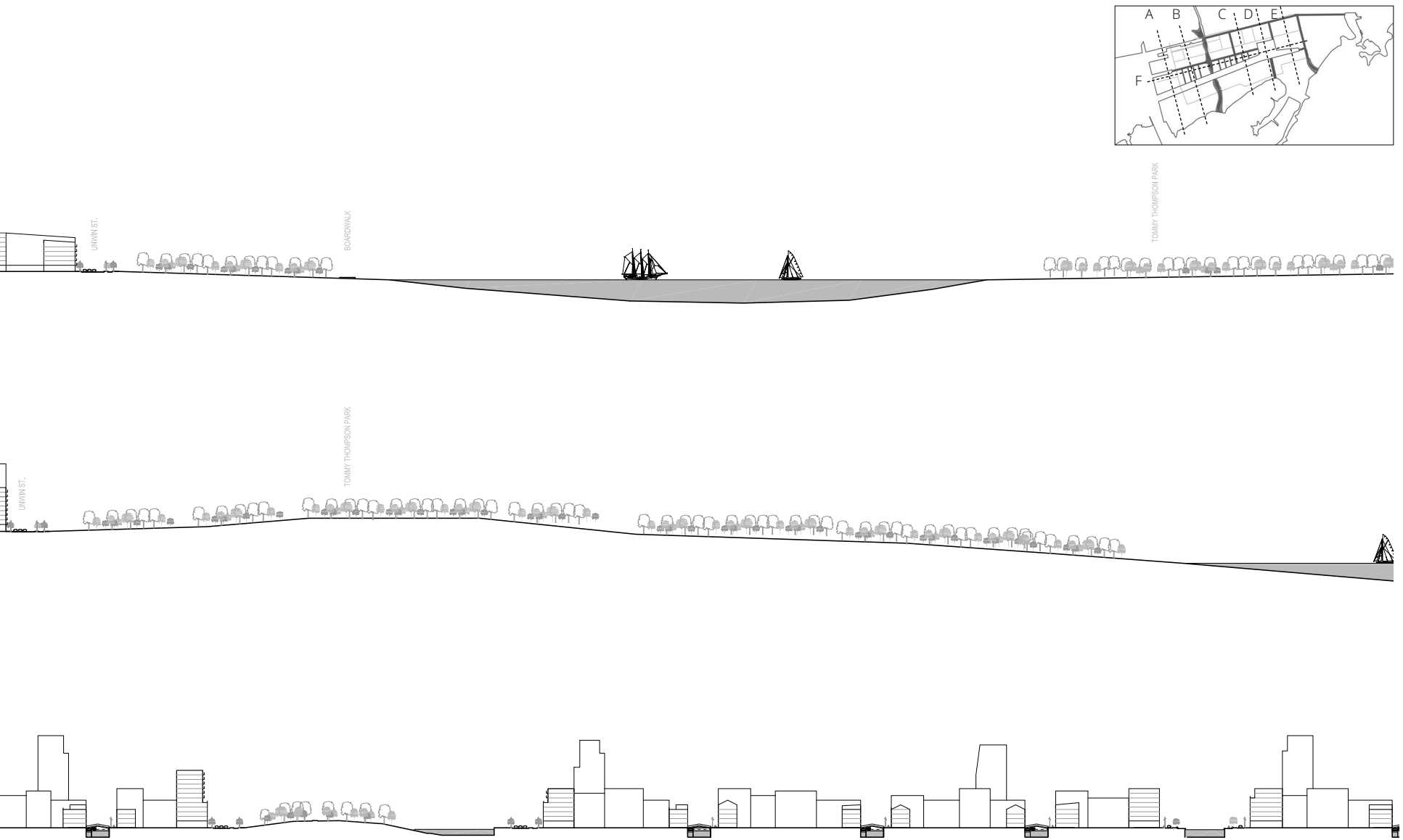
Section E

fig. 3-79 North-south cross sections from West to East showing diversity produced by rule adjacencies



Section F

fig. 3-80 East - West longitudinal Section along Commissioners St.


A
B
C
D
E
F
UNWIN ST.
BOARDWALK
TOMMY THOMPSON PARK
UNWIN ST.
TOMMY THOMPSON PARK

Height Envelopes

The adjacency rules produce a differentiated height map across the site, encouraging a diverse mix of built forms appropriate to their sites.

LEGEND
- unconstrained
- major street adjacency
- park adjacency
- heritage infrastructure adjacency
- heritage building adjacency
- canal adjacency

fig. 3-81 Maxium Height Map

Speculative Build Out

The sample and precedent blocks are used to generate a speculative build-out of the site following the intentions of the rules.

LEGEND

- new development
- new institutional
- industrial to remain
- adapted heritage
- semi-private green space
- public green space
- public realm

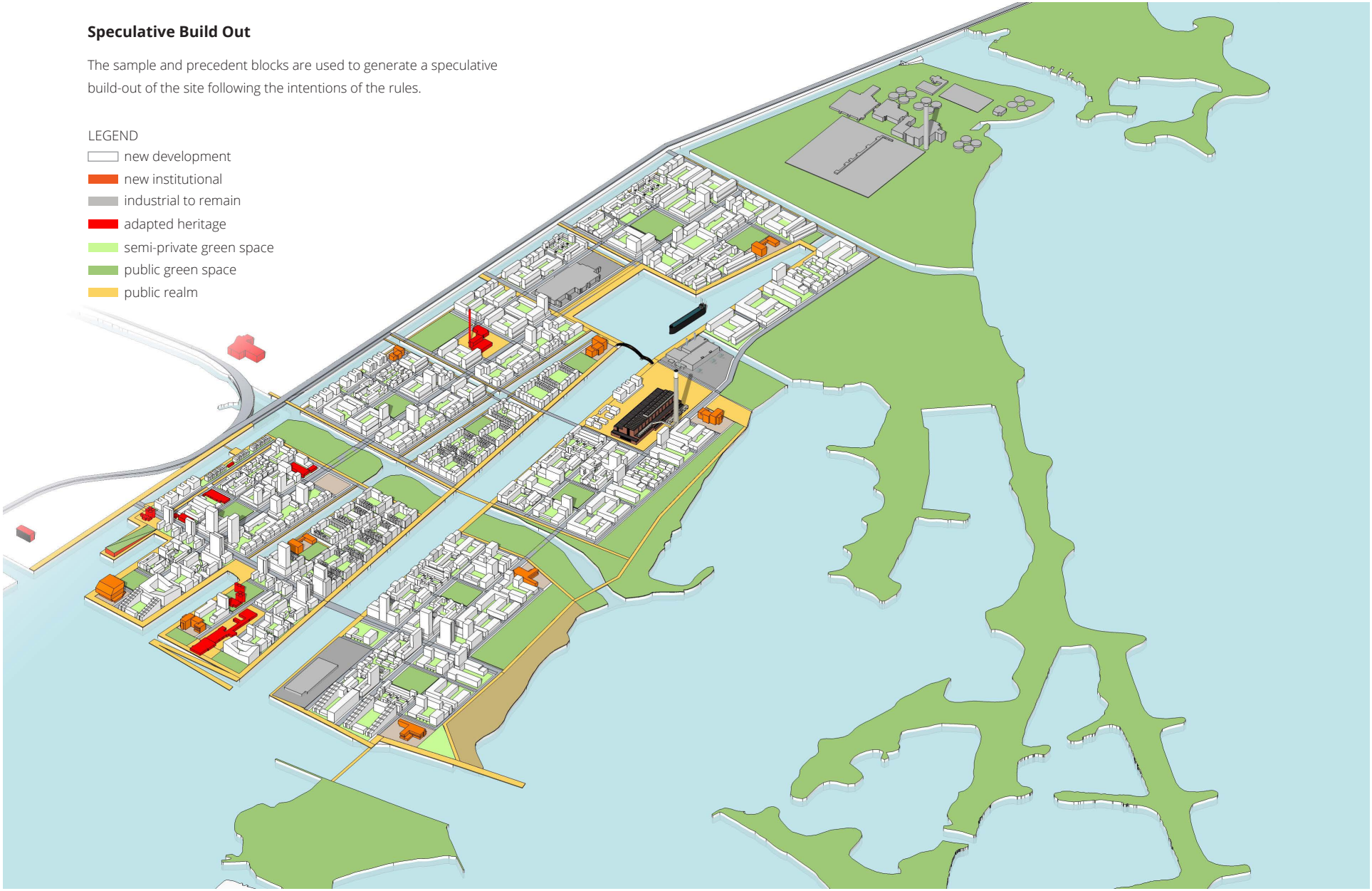


fig. 3-82 Speculative Built Out

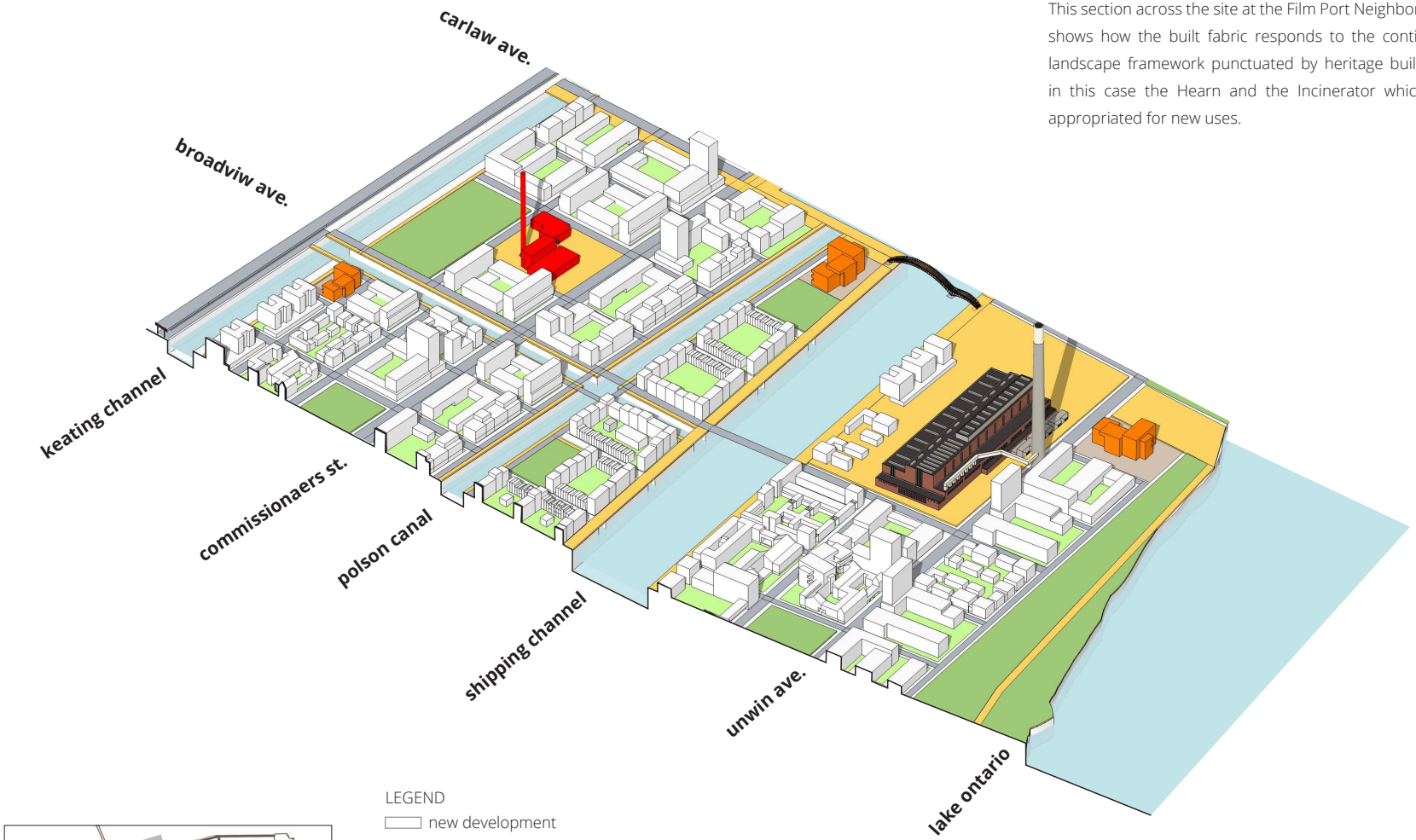
Perspectival Site Section A - River

This section across the site at the River Neighbourhood shows the high level of differentiation in the built fabric in response to a range of site conditions from the heritage Keating Channel, to the major Commissioner's Street, to the new Polson Channel, the historic Shipping Channel, Unwin Ave, and the lakefront. The fabric also responds to the park

fig. 3-83 Cross Section at River Neighbourhooood

Perspectival Site Section B - Film Port

This section across the site at the Film Port Neighborhood shows how the built fabric responds to the continuing landscape framework punctuated by heritage buildings, in this case the Hearn and the Incinerator which are appropriated for new uses.



LEGEND
- new development
- new institution
- industrial use to remain
- adapted heritage
- semi-private green space
- public green space
- public realm

fig. 3-84 Cross Section at Film Port Neighbourhood

Perspectival Site Section C - Commissioners St.

This section across the lenght of the site along the new Poson Canall illustrates the variation of fabric along the canal punctuated by moments of difference at intersections with major streets, canals and the Turning Basin.

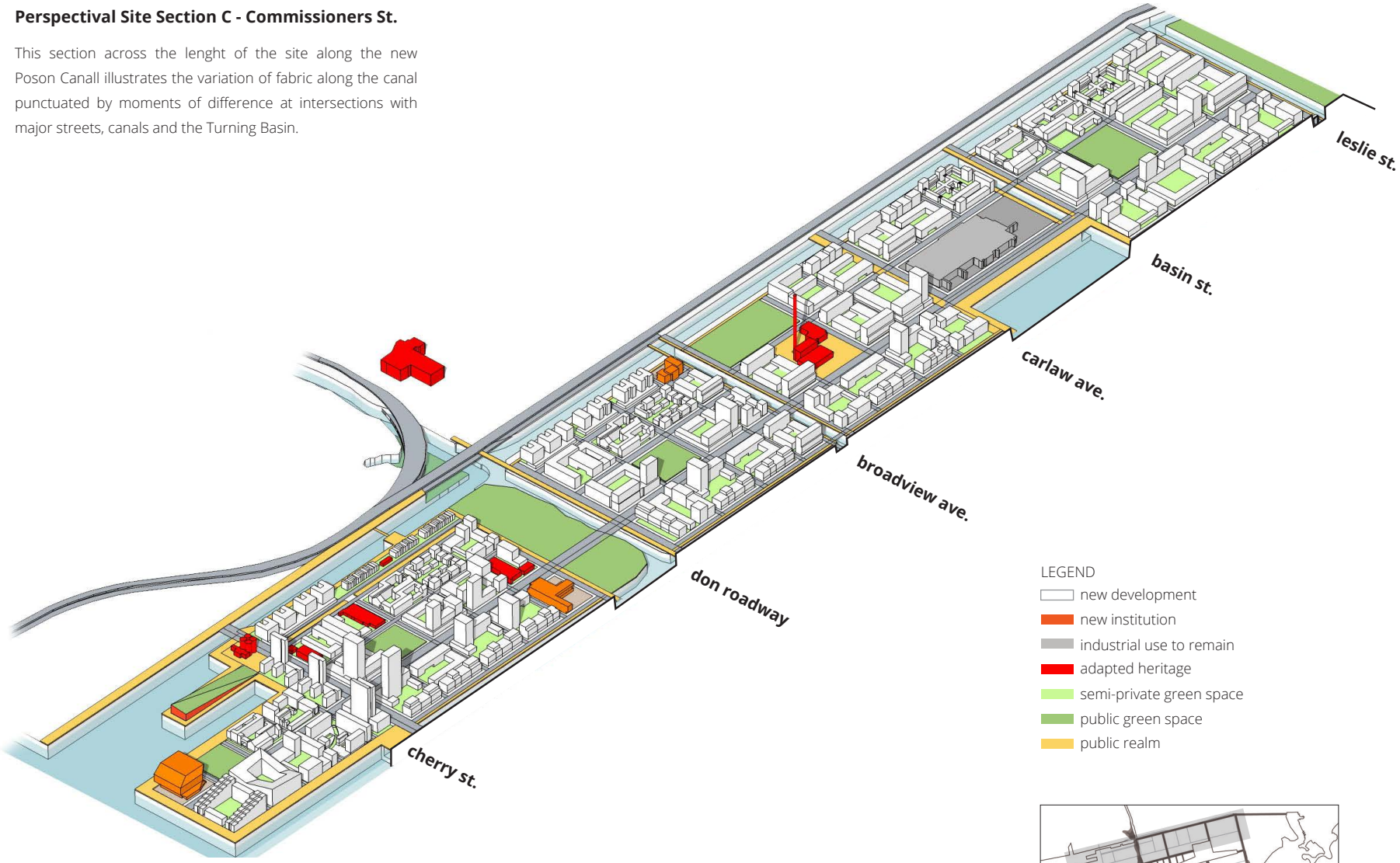


fig. 3-85 Longitudinal Section along Polson Canal

Perspectival Site Section D - Shipping Channel

This section across the length of the site along Unwin street shows the differences of the neighbourhoods across the site, from the concentrated height along Cherry St., to the lower rise finer grained canal neighbourhoods along the shipping channel and the more commercial and industrial uses around the turning basin.

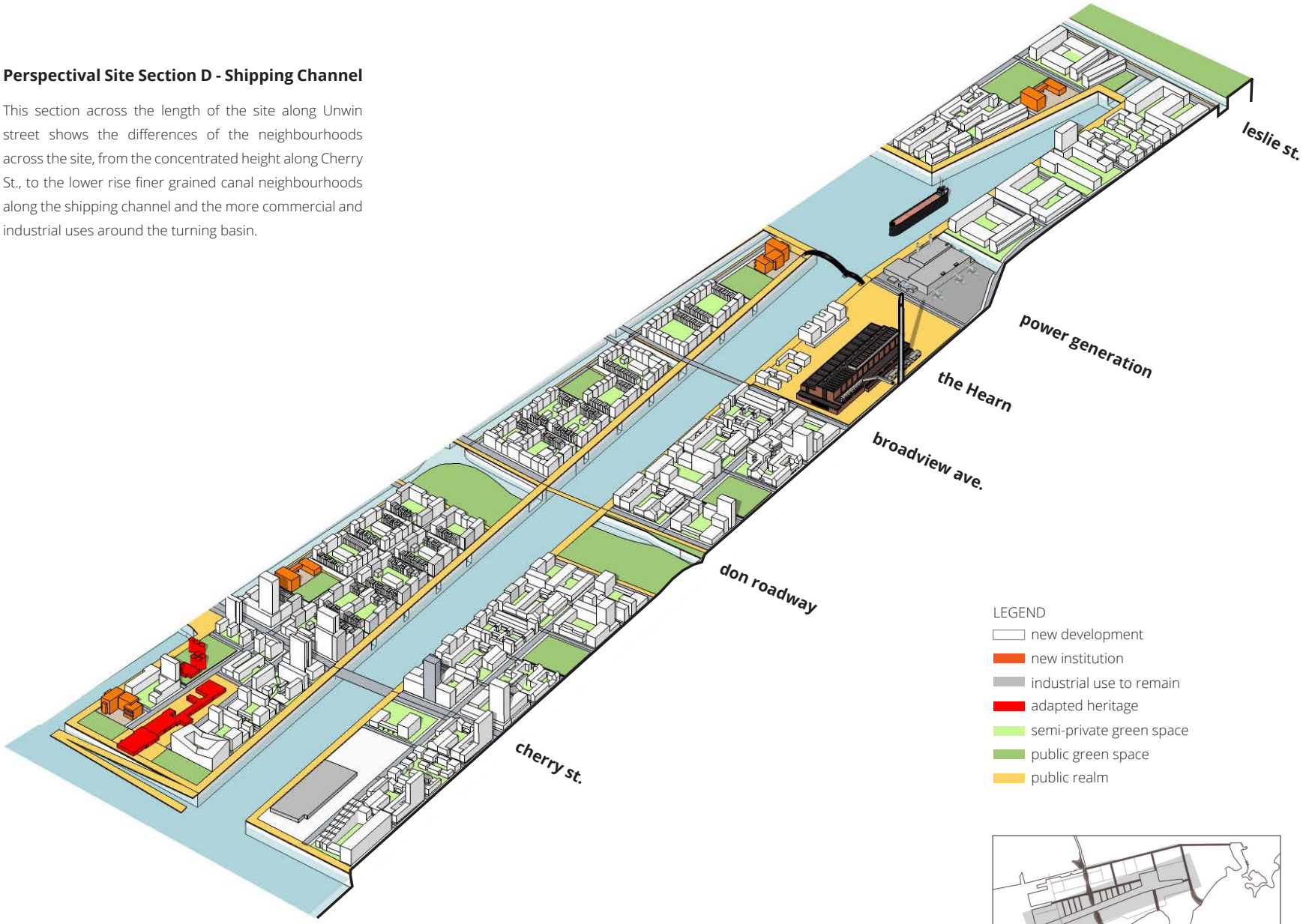


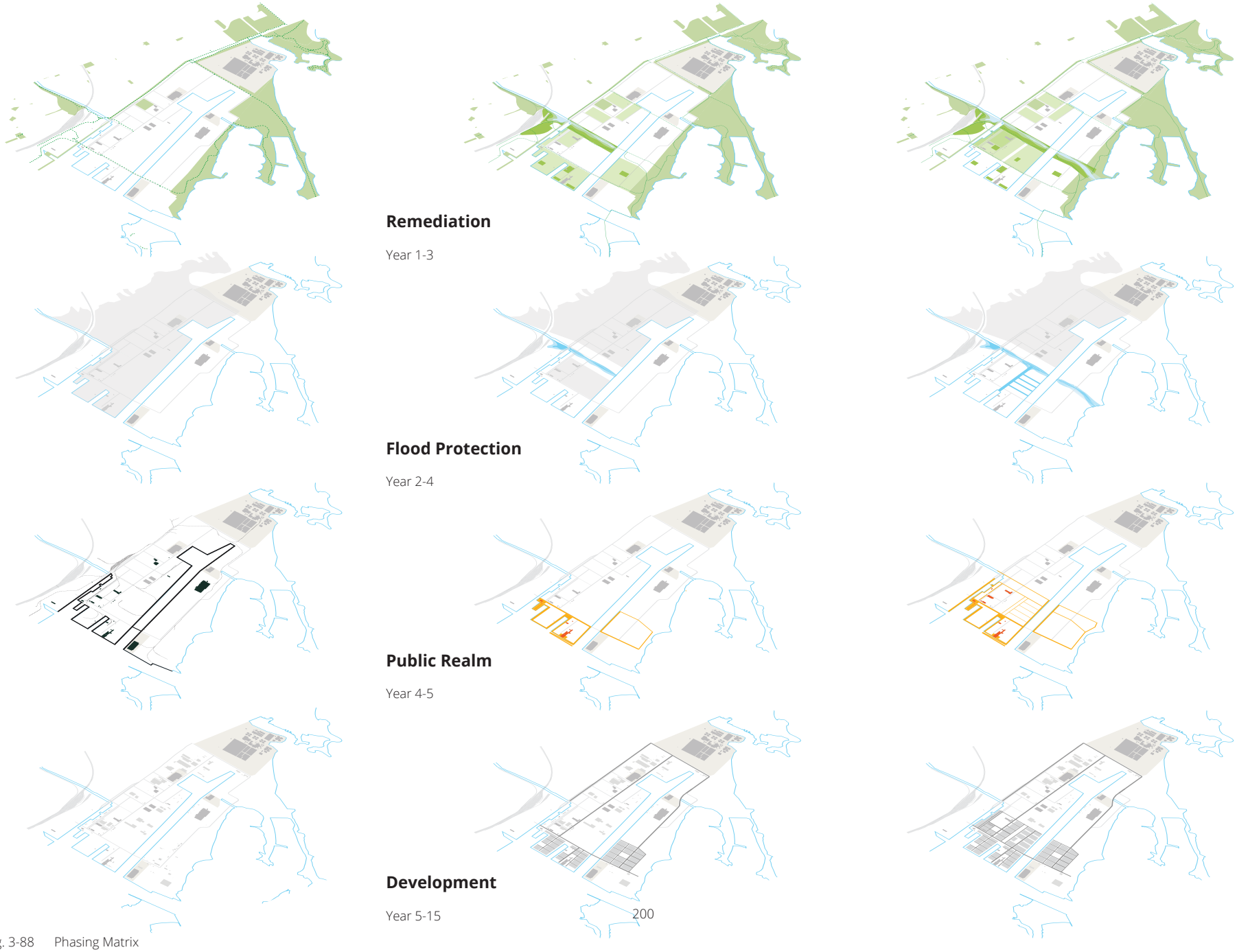
fig. 3-86 Longitudinal Section along Unwin St.

fig. 3-87 View of the site in the process of transformation

3.4 Speculative Evolution

The site strategies are implemented sequentially and incrementally in phases each about 15 years in length. Soil remediation leads the process a minimum of 5 years in advance of redevelopment, depending on the type of contamination, in order to clean the site while waiting for design and planning. The canals follow to flood protect the site and allow for rezoning and redevelopment. Once the area is flood protected, the edges of industrial canals are appropriated and upgraded as public promenades, and built heritage is adaptively reused for community, cultural and creative office or light industrial uses. Development follows, first occupying the sites along major roads and canals, and then filling in the interiors. The timing of the phases and strategies within each phase will overlap to create a process of simultaneous remediation, infrastructure, public space and development on the site that will produce a dynamic constantly changing urban landscape. The site will be constantly in a productive state of change, transitioning gradually from a post-industrial state to an urban condition, and increasingly diversifying over time to create a differentiated urban landscape. The strategies are flexible, and deployed incrementally, in order to allow adaptation to changing circumstances and unforeseen contingencies.

Existing 2013	Phase 1 2015-2030	Phase 2 2025-2040



Remediation

Year 1-3

Flood Protection

Year 2-4

Public Realm

Year 4-5

Development

Year 5-15

fig. 3-88 Phasing Matrix

Phase 3 2035-2050

Phase 4 2045-2055

Phase 5 2050-2070

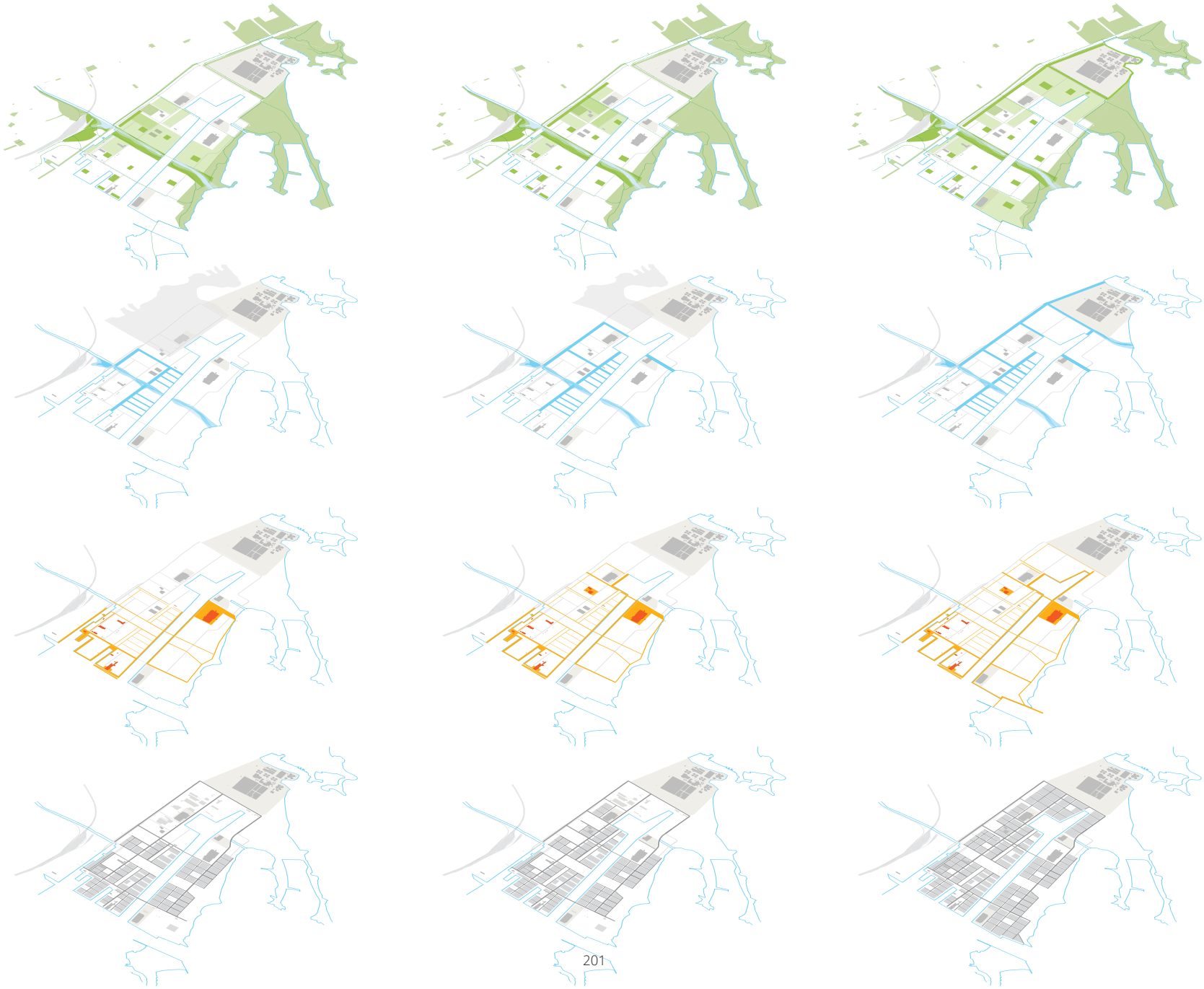


fig. 3-89 Existing Condition

Phase 1 - 2015

Sites planned for the first phase of redevelopment are vacated and planted for remediation. Sites known to have heavy metals contamination are also vacated and planted in oder to allow additional remediation time.

fig. 3-90 Phase 1 Infrastructure

Phase 1-2 2030

The Don naturalized canal is implemented as flood protection infrastructure to free the quays. The public realm along the harbourfront water's edge is improved and heritage buildings on the quays are adaptively reused for cultural, creative office, and community uses. The harbourfront sites are gradually built out starting with cultural and community projects along the water. The rest of the Lower Don Lands are planted for phytoremediation.

fig. 3-91 Phase 1 Development + Phase 2 Infrastructure

Phase 2-3 2040

The River Neighbourhood is developed. A central canal connects the Don canal to the Polson slip, and new minor canals provide sites for fine-grained owner built housing. The Keating Channel is appropriated and improved for public realm and the built heritage in the area is adapted for cultural and community uses. The sites are gradually built out, while the existing built fabric begins to adapt. The land for the next phase of development is planted for remediation.

fig. 3-92 Phase 2 Development + Phase 3 Infrastructure

Phase 3-4 2050

The Film Port South Shipping Channel Neighbourhoods are developed. A new major canal connects the Don canal with the Turning Basin and new minor canals connect it with the Shipping Channel. Public realm improvements along the shipping channel continue eastward and the Hearn is adaptively reused as a cultural and creative industry hub. The new sites are built out. The land for the next phase of development is planted for remediation.

fig. 3-93 Phase 3 Development + Phase 4 Infrastructure

Phase 4-5 2055

The Turning Basin Neighbourhood sites are serviced with canals, public realm improvements and adapted built heritage, and built out gradually. The remaining heavy industry in the east and west ports is displaced since the land has become too valuable and there is demand for more developable area, and the vacated land is planted for remediation.

fig. 3-94 Phase 4 Development + Phase 5 Infrastructure

Phase 5-6 2065

The East and West Port Neighbourhoods are developed. Additional canals connect the Lakeshore canal with Ashbridges Bay and with the outer harbour along Leslie. Remaining industrial infrastructures are reused and improved completing the public realm network. The port areas are built out and the existing fabric continues to diversify through additions and changes of use.

fig. 3-95 Phase 5 Development

Phase 6 - 2070

The remaining remediation fields are serviced and built out, as the rest of the Port Lands continues to mature as an established neighbourhood.

fig. 3-96 Phase 6 Development

fig. 3-97 View of remediation field

Speculative Site Evolution

Phase A:Remediation Fields and Temporary Uses

Vacant land is planted and farmed for phytoremediation, alongside temporary uses occupying adjacent sites. The remediation fields also serve as new types of temporary parks which make present the site`s toxic past and its processes of remediation for the public .

fig. 3-98 View of neighbourhood park, new canal and first phase of development

Phase B: Canals, Development and Neighbourhood Parks

The land continues to be remediated through the work of community gardening organizations in neighbourhood parks. New canals flood protect the land and allow for development to begin.

fig. 3-99 View of second phase of development, owner built hoses and public promenade

Phase C: Development and Public Realm

Development continues infilling sites along the canal. Owner-built plots with direct access to the canal get gradually built out. A new pedestrian promenade along the other side provides public access to the canal.

fig. 3-100 View of mature neighbourhood with differentiated uses and adapted built form

Phase D: Diversification

As the neighbourhood matures, changes of use and building additions continue to diversify and enrich the built fabric, further activating the public realm.

Management Hierarchy:

1. City of Toronto

Long Term Vision - Supporting Policy - Investment

2.Waterfront Toronto

Coordination + Public Realm + Built Form Rules

3.Toronto Port Lands Company

Management of remediation + flood-protection

4. Neighbourhood Associations

Adminstration of Adaptation Rules

5. Individual Homeowners, Building / Land Owners

Adaptation + diversification of built fabric

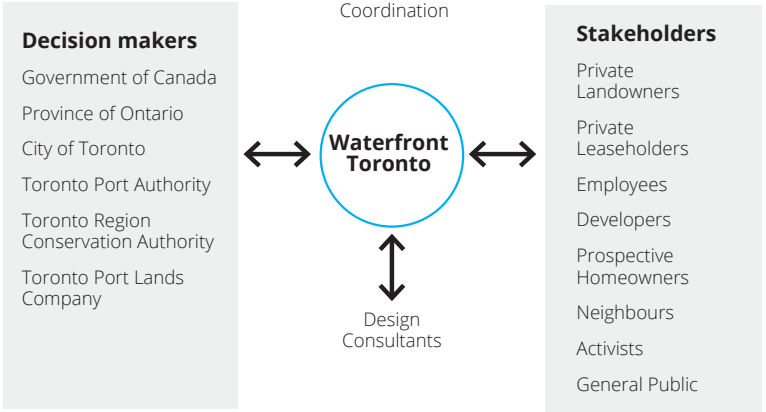


fig. 3-101 Management Structure

3.5 Implementation + Adaptive Management

The transformation of the Port Lands from its current post-industrial state into an urban district of the city will be a long-term process likely taking place over sixty years or more. The incremental decontamination, flood protection, servicing, development, occupation and adaptation will require significant coordination, monitoring and modification at various levels from the City, to Waterfront Toronto, to the Port Lands Company and to a set of new neighbourhood associations. The adaptive management of the site's processes of transformation through these various organizations will be crucial to its successful implementation and its ability to adapt to changes over time.

Significant policy changes will be necessary to allow and support this approach to redevelopment, as well as the continued adaptation of the fabric. The city will need to take a leading role in establishing the necessary policy framework to support this vision of a dynamic urban landscape, and enable public participation and individual private enterprise while preventing large scale development industry from taking advantage of its flexibility. The policies must be reviewed continuously and updated regularly with changing conditions over time to fine tune parameters and make sure they are relevant to current circumstances.

The city must also step up to invest in the site by funding its remediation and infrastructure, in order to have more leverage in demanding higher standards of quality and diversity of development. Hamburg's Hafencity development is a good precedent for this method, where the city invested in the preparation of the land and was able to sell it much more expensively than it otherwise would have, thus retaining greater control over the outcomes of its development.1 The incremental phasing of the site strategies and their lower intensity long-term nature, allows

the city to invest gradually, gaining returns from one phase of serviced land before investing in the next. The value of the land will become higher and higher as parts of the site are built out and occupied, gaining higher revenues for the city and allowing the project to be economically sustainable in the long-term without reliance on significant negotiation with private development.

The remediation and flood protection of the site would be managed by the Toronto Port Lands Company acting on behalf of the city and working in collaboration with TRCA. The coordination of the site strategies would be managed by Waterfront Toronto, which would also handle the adaptive reuse of industrial infrastructures and built heritage, and the development of the built fabric. Waterfront Toronto would commission the development of the built form rules which would then be adopted as a zoning bylaw on sites where specific zoning codes do not exist, or additional urban design guidelines where they do. Waterfront Toronto would then establish a structure of competitions to sell these precious sites to teams of developers, prospective building owners or co-op organizations paired with designers, who best fulfil the rules while demonstrating design innovation and quality. Certain areas would be parcelled at a finer grain and sold as free plots for owner-built housing, regulated by the site specific rules and design criteria. The processes used by Hafencity in Hamburg and Ijburg in Amsterdam are great examples of this approach with a system of competitions for the overall vision, neighbourhood plans, and individual block proposals with stringent performance criteria for design quality and innovation to generate diversity.2 Borneo-Sporenburg and Java Island in Amsterdam, Sluseholmen in Copenhagen, and the more loosely regulated practices in Almere provide good examples for the management of the finer grained owner-built scale of development.3 Once built out, the continued adaptation of the fabric would be overseen by neighbourhood associations made up of residents, to ensure the active participation of the community in the creation of distinct neighbourhood character particular to its local conditions and social make up. The neighbourhood associations would make decisions on variances to the general built form rules, balancing priorities of private landowners with collective community interests.

Endnotes

[1] Hafen City Hamburg – The Master Plan, New Edition, 2006.

[2] Ibid, and Mozas, Javier and Aurora Fernandez Per. Density: New Collective Housing. A+T editions, Vitoria-Gasteiz, 2006.

[3] Rodolfo, Machado, *Residential Waterfront, Borneo Sporenburg, Amsterdam, (* Cambridge, Mass.: Harvard University Graduate School of Design, 2005).

· Jaap Evert Abrahamse, *Eastern Harbour District Amsterdam : Urbanism and Architecture*, (Rotterdam: NAi, 2003).

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fig. 4-1 View of Urbanized Shipping Channel

CONCLUSION

In a world of rapid urbanization and growing instability, cities have become more complex yet their built environments are becoming increasingly standardized, posing great risk to their future sustainability. The sites of contemporary city building are progressively more challenging, often repurposed post-industrial landscapes with problematic existing conditions, multilayered histories and indeterminate futures that resist conventional redevelopment practices. Combined with the interrelated forces that shape cities and the context of instability and future uncertainty, the challenges of these sites render traditional master planning ineffective, demanding more flexible, dynamic, and multifaceted methods of urban design that learn from their complexity and variability to create more diverse and adaptable new urban landscapes.

This thesis argues that diversity is the key for the city's adaptability and long-term social, ecological and economic sustainability, as well as for the quality of urban life it can offer. It bases its design approach on the idea that this diversity cannot be directly designed but only guided through the orchestration of processes of agents acting on the city. Learning from an understanding of the city as a network of interrelated ecological, social, economic and political forces in constant transformation, the thesis explores Relational Urbanism as an alternative design approach that makes use of the complexity of sites and the processes of contemporary city building as generators of diversity and adaptation. This approach attempts to link and mobilize existing urban theories to compose an integrated design method that balances social, environmental, and architectural concerns, for the production of more variable and resilient urbanism. It draws from the relational paradigm of contemporary culture to understand the relationships between the forces, processes, and agents that act on the city in order to inform how to intervene on them. The thesis reinterprets established

meanings of Relational Urbanism to not only visualize possible scenarios, but to engage the full complexity of the site and its stakeholders to actualize more inclusive and meaningful urban environments for contemporary urban life.

The design proposal illustrates the relational approach on the Port Lands as a test site for its strategies. The site is interpreted as a system of natural and socio-economic processes in constant flux that have transformed the landscape from a natural wetland, to a constructed industrial port, to a hybrid semi-abandoned service district, according to the changing economy and aspirations of the city. Its problems and processes of remediation are rethought as opportunities for public benefit through urban design strategies that produce a diverse public realm and urban fabric. As an alternative vision to the current grand plan for its final state, the thesis re-imagines the site as a dynamic landscape of simultaneous processes of transformation continuously adapting to changing circumstances.

The proposed design is not intended as yet another master plan for the Port Lands, but as an exploration of an alternative strategic approach for appropriating, remediating and gradually urbanizing such complex sites. It is based on a series of interrelated landscape strategies and carefully designed rules relating diverse site conditions to built form. The strategies aim to prepare the site for development not as a blank slate to be homogeneously urbanized, but as an intricate urban armature of varied public spaces and infrastructures for architecture to respond to. The rules make sure that the variability of the landscape translates into differentiated built form and mixed uses, ownership types, and scales which create the conditions for the diverse social relations of a city. Together the landscape framework and relational rules set the stage for diverse urbanism to emerge and change over time, creating a variable urban environment better able adapt to a rapidly changing contemporary context.

While the design proposal attempts to illustrate and test the ambitious goals of the Relational Urbanism theory, its breadth and level of resolution are limited by the ambitious scope and complexity of issues it takes on, beyond the disciplinary boundaries of architecture and beyond the means of a master's thesis. The strategies explored through the design are a sample of many more possible, and are by no means exhaustive or prescriptive for all sites. They simply illustrate an integrated approach to analyzing site issues systemically, choosing the most pressing ones, and rethinking them as opportunities for generating diverse urbanism. The issues and strategies that would need to be addressed in the implementation of such a project are much more numerous, and would need to be developed through participatory processes involving many different professionals and stakeholders to truly engage the complexity of the site. The strategies deal with issues outside the disciplinary expertise of architecture, and are therefore limited in their technical development. The infrastructural designs are intended as illustrations of the strategies to support the overall vision but would need further development by the relevant disciplines in order to be implemented.

The proposed built form rules are a sample of possible controls and parameters, and would require further study, testing and development to ensure their language and parameters are precise enough to produce desired intentions yet flexible enough to allow for emergence and surprise. The number and choice of rules would also need to be tested, in order to ensure that the balance between regulation and freedom is not tipped too far on either side. The tension between control and freedom implied by the rules is an underlying theme in this thesis. While it argues for a participatory bottom-up process of urbanism in order to create real emergent diversity, it also finds it necessary to design landscape

systems to establish the conditions for site specific urban fabric, and impose rules to enforce site-responsive development, in order to preclude the undesirable standardized outcomes produced by the dominance of the market in a loosely regulated context. The degree of control established by the proposed landscape designs and associative rules may prove to be too prescriptive and would have to be tested and adjusted accordingly to allow for the intended emergent diversity.

Although the thesis aims for emergent and unpredictable results through the participation of many stakeholders and does not intend to design the end state of the site, it still attempts to illustrate the potential outcomes of the process. The speculative build-out views of the site are only best guesses of the differentiation that would really be created by the interaction of stakeholders with the established site conditions and rules. The production of these illustrations was challenged by the complexity of site constraints and rule adjacency combinations, which intentionally create a large number of unique sites to produce varied results, but make it difficult for one designer to respond to in a limited amount of time. To truly engage the intricacy of the landscape and relational rules, the build-out would need to be tested and implemented by a large number of designers, each responding to the combined site constraints of one block. Because the illustrations have been developed by one designer, they are inevitably subjective in their character, favouring a certain style of fine-grained, visually differentiated urbanism characteristic of many northern European water cities visited as part of the precedent research. While a conscious effort has been made to use different typologies based on precedents, the results may still appear biased. The actual outcomes of such a process would be much more varied as a result of the involvement and subjective interpretation of multiple designers in response to changing circumstances over time. The full diversity of the end condition is

impossible to predict, but the illustrations provide views of what they may be.

The coordination of all the various strategies by one designer is also not a true reflection of the proposed approach as it precludes the emergence and self-organization possible by the interaction of different agents. The proposed speculative evolution of the site is one of many possible scenarios, dependent on contingencies and future change. The design does not try to impose the proposed sequence, but attempts to illustrate a possible play-out of the site's transformation over time. The strategies are intended to be flexible enough to adapt to future change, however the design cannot predict all possible futures, and its implementation would need a robust structure of adaptive management and periodic updates to be truly responsive to future contingencies.

The thesis offers the transformation of the Port Lands as a case study for an alternative model of post-industrial redevelopment, and a different approach to city building based on a relational understanding of the forces and agents that shape cities. The site is one of many post-industrial landscapes awaiting adaptive in reuse in Toronto, and worldwide, offering a rich territory for further exploration for Relational Urbanism. While post-industrial sites demand such a method because of their complex physical conditions, they represent only a fraction of the many other types of challenging urban sites that would benefit from this design approach. Post-industrial sites provide a limited scope for urban transformation, but they offer opportunities to test new design methods and policies that would be more difficult to experiment with in the city. Once implemented on such sites and proven successful, Relational Urbanism can inform the future planning of our cities, making these post-industrial sites catalysts for larger urban transformation. Thus the transformation of the Port Lands could provide a model for a different approach to city building in Toronto, and inform a contemporary urban design

practice rooted in the specificity and variability of its context.

In trying to provide an integrated urban design method that balances ecological, social, and formal strategies Relational Urbanism demands interdisciplinary knowledge of landscape, planning and architecture as well as their related technical and social sciences. The thesis does not suggest to replace the involvement of the many specialized disciplines involved in city building; rather it argues for their collaboration and integration as part of an interdisciplinary design practice that synergistically uses the relationships between the specific disciplines to produce more balanced, diverse and resilient urban environments. The thesis also argues that architects need to become knowledgeable in larger landscape and planning issues to better understand the context that frames our work and the larger implications of what we design. By engaging in the design of the regulatory frameworks and processes that we are bound by in our traditional scope of work, we can create greater creative freedom and greater agency for our discipline to be able to make a larger impact on the city.

The thesis illustrates an alternative approach to the current state of city building to initiate a conversation about contemporary urban design methods and their implications for the quality and sustainability of the future city. In a context of increasing standardization of the urban landscape, Relational Urbanism prioritizes the diversity of the built environment as a key condition for the quality of life and urbanity of cities, for equitable access to its benefits, and for its social, economic and environmental sustainability. Encouraging adaptation as a vital ingredient for sustainability, it provides a design approach that is flexible enough to respond to contingencies and produce truly sustainable cities for a future of instability and rapid change. Its emphasis on site specificity engages the complexity of sites, to create more particular and meaningful urban landscapes that embody

the collective memory of their past identities and make present the processes of their transformation. By proposing more active participatory practices, this approach makes use of the energy and creativity of the collective to generate not just superficial stylistic differentiation of built from, but fundamental difference which makes possible the social diversity and agonism that are vital to the city's culture. Through this approach, the thesis challenges the dominant power of the market in current city building practices to give agency to the city, to designers, and to its users to have a more active role in purposefully guiding their city toward a more diverse, adaptable and resilient urban environment suitable for a variable contemporary world.

APPENDIX

Precedent Redevelopment Projects

The following projects are precedents that were visited as part of my preparatory research for the thesis. The projects were researched in advance, toured and photographed extensively on site, and discussed with professionals involved in their design and management. They have provided a rich collection of precedents for planning, design and implementation processes, landscape strategies, as well as built form typologies.

Hafencity, Hamburg

Ijburg, Amsterdam

Borneo Sporenburg, Amsterdam

Java Eisland, Amsterdam

Sluseholmen, Copenhagen

Orestad, Copenhagen

Bo01, Malmo

Canary Wharf, London

Hafencity

Hamburg, Germany

1997-2025

KCAP Architects & Planners

Size: 157 hectares

Density: 100 dwellings/hectare

Program: 2.23 million m2

6,000 residential units, 45,000 jobs, and leisure amenities

Hamburg's Hafencity is the largest city development project in Europe, expanding Hamburg's city area by 40%, on previously industrial port lands made obsolete. A dense lively city with a maritime character is taking shape in its place, bringing together workplace and residential uses, culture, education and leisure, tourism and retail facilities.

Mirroring the fabric of the rest of the city, most of the buildings are around 8 storeys tall, with a few exceptions of landmarks. To deal with flood risks due to tide fluctuations, the buildings are raised on 7-8m plinths of parking, connected by pedestrian walkways providing access in case of flood. Generous public spaces (40% of the total land area) provide public pedestrian access under normal conditions.

fig. 4-2 Hafencity Aerial

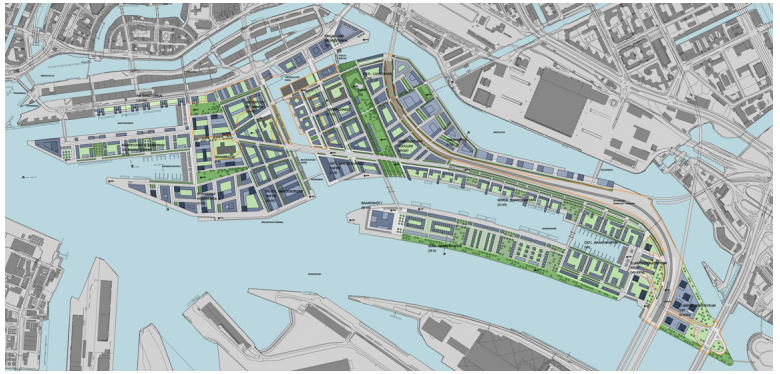


fig. 4-3 Hafencity Master Plan

fig. 4-4 View from the river

fig. 4-5 Public realm

fig. 4-6 Built form by canal

fig. 4-7 Public realm

Ijburg

Amsterdam, Netherlands

1998-ongoing

CLAUS, VAN DONGEN, SCHAAP

Size: 150.6 ha

Density: 47 dwellings/ha

Program: Mixed use, 7062 Dwellings, 2:1 Live-work ratio

Ijburg is an archipelago of six polder islands created to accomodate Amsterdam's urban growth on the Ij river: Steigereiland, Haveneiland, two Rietlanden, Strandeiland, and Buiteneiland. The master plan allows for a high degree of diversity of building types for a variety of lifestyles from luxury villas, to floating houses, to owner-built custom rowhouses, to dense apartment buildings, seniors housing, and to social housing. The islands are each different in character, while also providing a mix of uses and block typologies within them, A series of canals, some hard edged and some naturalized, provide different relationships to water to buildings and public space.

Each block is 175m by 70-90m with a density of 200 units/block, and contains a mix of housing and commercial space. The building height varies from 10-24m. Each block is given to a consortium and one coordinating architect to develop, responding to the demands of the housing market to create the great variety of the district. Scattered loosely among the larger blocks are a series of self-build ground and water plots sold to individual owners wanting to build their own custom house, regulated by a set of rules.

fig. 4-8 Ijburg Aerial

fig. 4-9 Ijburg Master Plan

fig. 4-10 Self-build housing

fig. 4-11 Self-built water housing

fig. 4-12 Ijburg beach & diverse built form

fig. 4-13 Mixed built form

Borneo-Sporenburg

Amsterdam, Netherlands

West 8

1993-96

Size: 23.4 hectares

Program: 2500 dwelling units

Density: 100 dwellings/ha

West 8 treated this project as an opportunity for an urban experiment to design a dense neighbourhood of low rise housing focused on the individual plot and property owner, by developing a new typology of 3 storey ground- and water-accessed houses with patios and roof gardens, as a variant of the typical Dutch canal house.

West 8 created a framework for high density living, while satisfying the desire for private property and individual expression through maximum architectural variation within a unified whole.

A set of design codes establish the criteria for a unified master plan, while a wide range of architects were commissioned to interpret the patio house typology and create the rich fabric of architectural diversity.

fig. 4-14 Borneo-Sporenburg Aerial

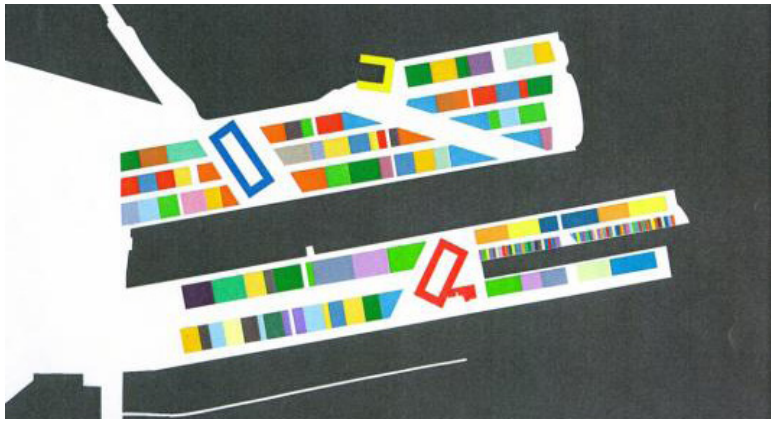
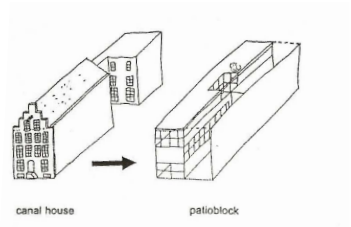


fig. 4-15 Borneo-Sporenburg Master Plan

fig. 4-16 Self-build housing and row-housing on canal



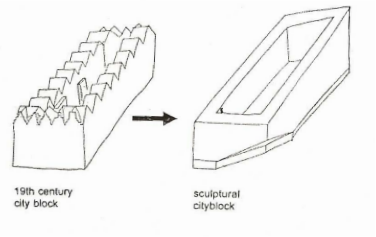


fig. 4-18 Housing Typology Concept

fig. 4-17 Housing Block

fig. 4-19 Canal-side self-build housing

Java Eiland

Amsterdam, Netherlands

Sjoerd Soeters

1990s

Size: 15 ha

Program: Residential

Density: 80 dwellings/ha

The master plan for the redevelopment of this post-industrial island on the eastern harbour of Amsterdam, was designed by Sjoerd Soeters, who based it on the principles of Amsterdam's canal district: unity and differentiation. Soeters was interested in the height differentiation and architectural diversity of Amsterdam's traditional fabric, and sought to create a modern reinterpretation of it. He designed the basic organization of the island by cutting 4 canals across it to create large island perimeter blocks linked by a variety of vehicular, pedestrian, and cyclist bridges, and a pedestrian path that links the whole island. He then invited a large number of architects to design the different apartment buildings, generating enormous variation, while still maintaining unified street facades. The housing typologies were designed to accommodate a variety of lifestyles providing conditions for a diverse demographic.

fig. 4-20 Java Eiland Aerial

fig. 4-21 Java Eiland Master Plan

fig. 4-22 Public realm by water

fig. 4-23 Courtyard view & pedestrian path

fig. 4-24 View of built form from the water

Sluseholmen

Copenhagen, Denmark

Arkitema and Sjoerd Soeters

2005-2009

Size: 6 hectares

Program: 85,000 m² residential, 50,000 m² commercial

Density: 150 dwellings/ha

Slusholmen was the first phase of development in the larger Sydhavn post-industrial area on Copenhagen's harbour. Developed as a canal district through collaboration between Sjoerd Soeters (dutch Architect responsible for Java Eiland Amsterdam), Arkitema, the Port of Copenhagen and the City of Copenhagen. A curved main canal and a series of secondary canals create 8 islands each a block composed of 4 storey rowhouses and attached mid rise 4-7 storey apartments around a communal landscaped courtyard with underground parking below.

The sense of overall unity and individual diversity was created through a master plan that set out the structure and rules (height, width, allowable materials etc.) and allowed 25 different architecture firms to design a wide variety of facades.

fig. 4-25 Sluseholmen Aerial

fig. 4-26 Sluseholmen Master Plan

fig. 4-27 Canal-side duplex housing

fig. 4-28 Courtyard view

fig. 4-29 Shared water access

fig. 4-30 Canal-side apartment housing

Orestad

Copenhagen, Denmark

ARKKI

1994-ongoing

Size: 310 ha

Program: more than 3000 flats, 71 400 m² for educational use, 65 000 m² of retail

Density: 180 dwellings/ha

Orestad is a large district of urban growth 5 km south of Copenhagen's city centre along a new rapid transit line, laid out on previously argricultural land. The development is expected to take 20 to 30 years at a cost of about €175 million. It is expected that 20,000 people will live in Ørestad, 20,000 will study, and 80,000 people will be employed in the area.

The district is composed of a series of neighbourhoods along the metro line, Orestad Nord, Orestad City, Orestad Syd, and Amager Faelled, each at different levels of development. The district contains a wide variety of building types, housing, office and institutional, all at relatively high densities. The built form is highly differentiated as a result of the participation of many different architects. Water is used as a linking element, through a series of ponds and a long canal that ties the neighbourhoods of the district together.

fig. 4-31 Orestad Aerial

fig. 4-32 Orestad Master Plan

fig. 4-33 Orestad Boulevard, metro, dedicated bike lanes and sidewalks

fig. 4-34 Canal-side 'Mountain' Dwellings

fig. 4-35 Commercial development

fig. 4-36 VM Housing

Bo01, Western Harbour

Malmo, Sweden

1996-ongoing

Klas Tham in collaboration with City of Malmo Planning Office

Size: 22 hectares

Program: mixed use

Density: 59 dwellings/ha, 120 persons/ha

The first development phase of the Western Harbour growth area of Malmo, the area was typical of the the redundant contaminated industrial urban land of most contemporary cities, while being by the sea, the beach and the city centre.

A fundamentally ecological approach to planning, building and construction is a key tool in the creation of the district. Man's interaction with the evironment is a fundamental principle guiding the design of the district to be ecologically and socially sustainable.

By integrating ecological principles with sustainable building systems, and information technology to facilitate sustainable lifestyles, Bo01 is one of the most synthetic examples of landscape urbanism.

fig. 4-37 Bo01 Aerial

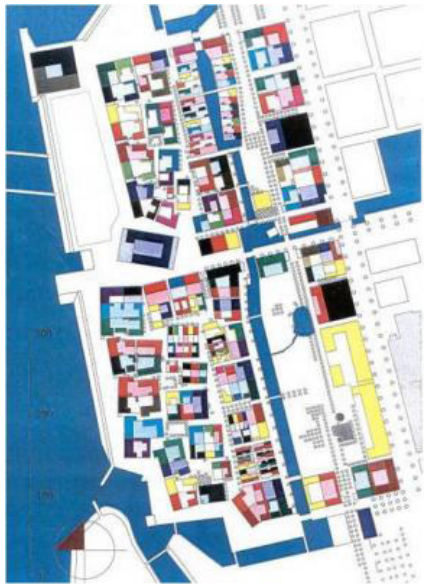


fig. 4-38 Bo01 Master Plan

fig. 4-39 Naturalized canal

fig. 4-40 Harbourside Housing

fig. 4-41 Storm-water management communicated as water feature

fig. 4-42 View from canal

Canary Wharf

London, UK

Skidmore Owings & Merrill

1980s

Size:35 ha

Program: 1.3 million sm of office and retail space

Density:

Canary Wharf is a well known post-industrial redevelopment project on the site of the West India Docks in London, once one of the busiest port areas in the world. Master-planned in the 80s by SOM and developed as a mixed use office and reatail district, the site has been become an employment hub for East London and a catalyst for broader regeneration.

The master plan established over 20 building sites and four districts modeled after traditional London squares, and established links to central London through public transit, via the Docklands Light Rail and the Jubilee underground line. Over 80% of the employees who currently work in the district commute by public transit.

fig. 4-43 Canary Wharf District Aerial

fig. 4-44 Canary Wharf Master Plan

fig. 4-45 Adapted industrial built heritage

fig. 4-46 Public green space

fig. 4-47 View from the river

fig. 4-48 Public plaza

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