INFRASCAPE URBANISM

BEYOND THE LANDSCAPE OF LINEAR CITY

by

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Bachelor of Architectural Science, Ryerson University, 2011

A thesis
presented to Ryerson University
in partial fulfillment of the
requirement for the degree of
Master of Architecture

Toronto, Ontario, Canada 2013

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Master of Architecture 2013
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ABSTRACT

Across a breadth of disciplines, the criticism of automobile dependence and the re-conceptualization of mass transit infrastructure have become critical matters of concern. This thesis recognizes these concerns as architectural issues, and argues that design methodology can integrate solutions which respond to the challenges of our decentralized and fragmented urban landscape.

The following thesis is an investigation of the relationship between infrastructure and architecture, which explores and identifies opportunities within the unique challenges posed by transportation within the context of the rapid densification of the Greater Golden Horseshoe Area. Rather than subscribing to the utilitarian foundation of infrastructure, this thesis recognizes the significant design potential within this operative system and morphology. In doing so, the thesis project proposes a disciplinary hybrid, which calibrates and synthesizes landscape, infrastructure and architecture.

ACKNOWLEDGEMENTS

I would like to express a profound gratitude to Cheryl Atkinson for her continuing guidance, support and patience throughout the entire process of this thesis. I would also like to thank John Cirka, Ian MacBurnie and Baruch Zone for generously sharing their insight and enthusiasm.

To my family and friends, thank you for your unconditional support and encouragement. I am forever indebted to you.

For my parents,
Eun-Joo and Ki-Duk Kim

LIST OF ILLUSTRATIONS

INFRASCAPE URBANISM | BEYOND THE LANDSCAPE OF LINEAR CITY

M.Arch Thesis 2013
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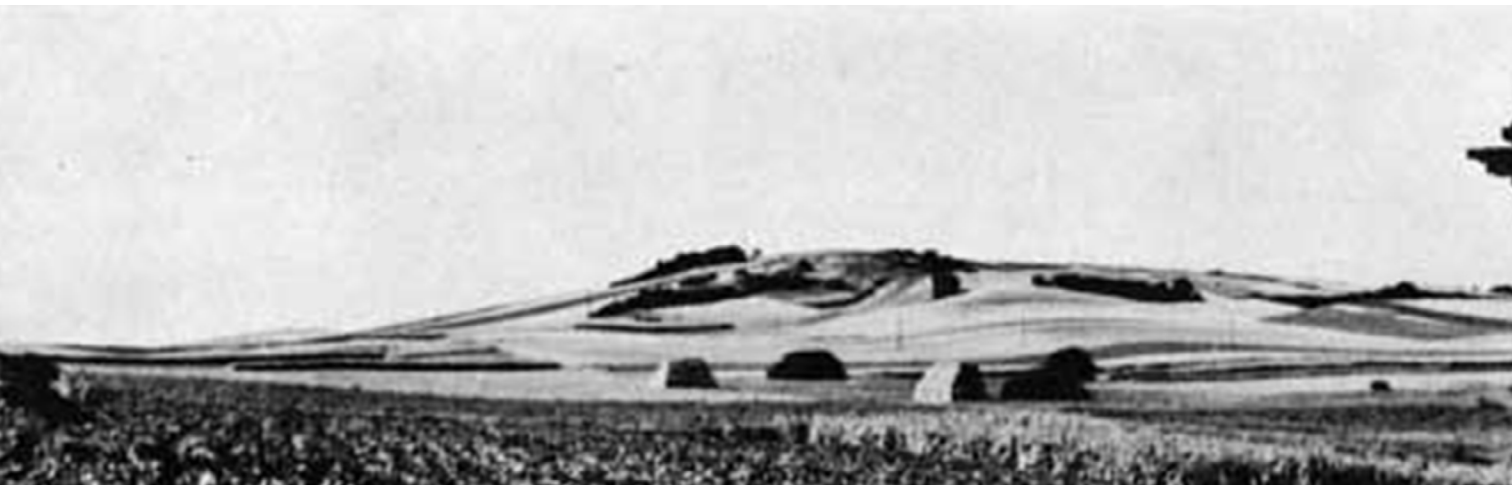


FIG. 0-0
Hans Hollein, Aircraft Carrier City in Landscape, 1964

"Much of the reason for revising practices of landscape and urbanism today derives from the changing nature of cities. The traditional notion of the city as a historical and institutional core surrounded by postwar suburbs and then open countryside has been largely replaced by a more polycentric and weblike sprawl: the regional metropolis. Here, multiple centers are served by overlapping networks of transportation, electronic communication, production, and consumption. Operationally, if not experientially, the infrastructures and flows of material have become more significant than static political and spatial boundaries. The influx of people, vehicles, goods, and information constitute what urban geographers call the "daily urban system," painting a picture of urbanism that is dynamic and temporal. The emphasis shifts here from forms of urban space to process of urbanization, processes that network across vast regional –if not global- surfaces."

(Wall, 1999, p.234)

INTRODUCTION

Rapid urbanization is one of the most frequently discussed issues in this current period of globalization. The massive migration of populations, both locally and transnationally, to existing urban centres is very quickly transforming traditionally low density and sprawling communities.

More specifically, this spatial transformation involves the post-World War II North American urban/suburban condition, characterized by single family houses, segregated living and working areas, and total dependence on automobiles. The 70 percent of the world's population which is expected to live in urbanized areas by the year 2050 (United Nations, 2011) requires cities to be extremely intensified, expanded or built anew. This rapid urbanization will drastically consume and damage the planet's limited resources, fragile ecosystem and economic balance in our society. This antithetical state between ecological concerns and rapid urbanization exists today as a perpetual challenge for the future of urban design and planning.

The Greater Golden Horseshoe Area (GGHA) is at a critical point in its spatial transformation, regional expansion and economic agglomeration. In 2005, the regional planning authority of Metropolitan Toronto recognized its potential as a regional metropolis, providing a provisional strategic plan for the GGHA. The Places to Grow Act created a framework of proposals consisting of medium to long-term actions, supported by holistic projects addressed to inter-sectorial development objectives; with key concerns regarding population growth, limited resources, economic losses and environmental impacts. The growth plan clearly identified that there is an urgent need for innovative approaches to large-scale regional planning.

As a part of the regional growth plan, this thesis is a response to two main conditions identified in these reports: the regional expansion of the transport network; and localized urban intensification through the concentration of population, commerce and governance. These reports propose a massive transformation of existing transportation nodes, in order to make a networked region with multiple centres of density, commercial activities and multi-modal transportations. In these terms, this thesis situates itself within the traditional categories of infrastructure

and urbanism. The discourses of landscape ecology, building typology and infrastructural morphology are key facilitators of this thesis. This research intends to provide a conceptual framework in a physical environment that calls for a new type of development method and a disciplinary hybrid, which calibrates and synthesizes ecology, landscape, infrastructure and architecture.

METHODOLOGY + STRUCTURE

This research uses a diverse and interdisciplinary methodology: which includes the use of statistics, a review of documents provided by governmental agencies, and the extraction of theories from a body of literature related to contemporary urbanism. By critically tracing the connections and interrelationships within the research, the aim for this thesis is to create a framework for the future development of one of the potential growth areas designated by the Growth Plan in the Greater Golden Horseshoe Area. Midtown Oakville, a transportation node 40km away from downtown Toronto, is the site chosen for this proposed new prototype.

This thesis follows a hierarchical structure in four parts, going from the general to the specific. The first chapter, Analytical Framework, provides an overview of issues of mobility, planning and ecology. These observations articulate a need for a series of distributed city centres within the metropolitan region, and the re-conceptualization of this mass transportation network.

The second chapter, Context, identifies the current and changing conditions of the GTA. Documents from governmental agencies, including Places to Grow: the Growth Plan for GGHA (2005), The Big Move (2008) and Livable Oakville Plan (2009) are reviewed in order

to provide a local and regional framework of developments throughout the region of the Greater Golden Horseshoe. The research sets up the conditions for the selection of the site for the design project, in the context of contemporary theory of Landscape Urbanism

The third chapter, Synthesis, investigates contemporary theories of urbanism, landscape and infrastructure. This chapter is a substantial focus of the thesis, provided by literature reviews and case studies. A body of written and designed works by Charles Waldheim, James Corner, Stan Allen and others are examined and analyzed, establishing many of the core principles and theoretical foundation applied in the thesis project on the selected site.

The final chapter, Examination, is a projection of conducted research. The site, Midtown Oakville, is a testing ground for theories and principles extracted from the research phase. Applying synthesized infrastructure, landscape and urbanism theory, the thesis project maps the potential development of a new city center. Learning from the previous research conducted, a prototype for a hybrid live/work environment and elevated urban park is proposed on the existing railway infrastructure. The proposed infrascape megastructure provides a model for a synthetic solution that feeds and influences the current and future landscape of the site.

PART 01 I ANALYTICAL FRAMEWORK

Urbanism as Model
Mobility Matters
Decentralization and Intensification
Position

FIG. 1-1
Cedric Price, the City as an Egg diagram

MODELS for URBANISM

Cedric Price's classic analogy of "the city as an egg" suggests an interesting interpretation of a modern city. An educator in urban theory and architectural design, Graham Shane explains the famous diagram: "Traditional, dense, 'hard-boiled egg' city fixed in concentric rings of development… the 'fried egg' city, where railways stretched the city's perimeter in accelerated linear space-time corridors out into the landscape… and the postmodern 'scramble egg city,' where everything is distributed evenly in small granules or pavilions across the landscape in a continuous network." (Shane, 1999)

In the late period of industrialization in Europe, emerging concerns of urban living conditions required an alternative model of the city. One of the most celebrated models in pre-modern planning theory is the Garden City Movement by Ebenezer Howard. Howard envisioned the decentralization of obsolete urban cores that places self-sustaining satellite cities connected by rail transit outside the core. Consequently, planning models of the industrial era relied on rail-based transportation as their primary transportation method. With automobiles being a relatively

new invention, railways were the major means for the movement of manufactured goods and labourers. Alternative models of development also drew upon logistical means of rail network; thus, urban planning in the late 1800s inherently embraced the qualities of transit-oriented developments.

It was during the modern era that automobiles started to be considered as the primary method of transportation. In 1920, Henry Ford's Model T enabled mass production of automobiles. This led to much easier ownership of automobiles, a rapid production rate and affordable prices: cars have become a predominant method of transportation, rapidly replacing the limited rail-based network system. Many urban planners and architects were fascinated by the advent of automobile in the early twentieth century which enabled seamless circulation and high-speed mobility. Visionaries including Le Corbusier, Frank Lloyd and Norman Bel Geddes, immediately reacted and incorporated the advanced technology into their visions in advocacy of urban renewal and Tabula Rasa. (Tatum, 1999) One of the most well-known examples,

FIG. 1-2
Ford Model T, production line

Le Corbusier's 1929 work "Contemporary City", envisioned a city with massive highways supporting the flow of automobiles. Pedestrian circulation was separated from vehicular circulation in order to maximize safety and efficiency. This attitude of championing car-centric urbanism and automobile infrastructure still continues today, encouraging the horizontal sprawl of peri-urban and suburban communities.

The post-modern architecture and planning theory continued the search for sign and semiotics found in pre-modern architecture. Some architects and planners insisted on the need for change under the thematic title of "New Urbanism". The idea of bringing back pre-modern European towns was unwelcomed by academics and architects; however, the New Urbanism played a significant role in promoting Transit Oriented Development (TOD). Peter Calthorpe's pedestrian pocket model challenges and responds to the traffic congestions in interurban conditions. Calthorpe envisions a 50 to 100 acre zone, much smaller than a typical new town development, which comprises of housing, offices, retail, day care, recreation centres and parks. (Calthorpe, 1989) The designated zone is a walkable community adjacent to rapid transit station, providing all necessary services within walking distance.

Modernism opposed pre-modern aesthetics by radically removing decorative elements, prioritizing functional and technological measures. Similarly, post-modernism disengaged itself from the scientific rationale, championing artistic expression of signs and semiotics. Stan Allen, an American architect, theorist and educator, identifies a shift from modernism to post-modernism as "a shift from technologies of production to technologies of reproduction and display." (Allen, 1999, p.49) In his view, the difference between production and reproduction was analogous to that between "factory floor" and "museum". Throughout history, the ideal model for urbanism continued to change under different times and circumstances. Urban planning and planning ideals started to have

significant influences on cities since the late 1800s, and were constantly changing in accordance with social, economic and environmental factors. Arguably, the guiding principles of urban planning strategically depend on transportation infrastructure; however, the prevailing mode of transportation drastically shifted from locomotive to automotive in the past 100 years.

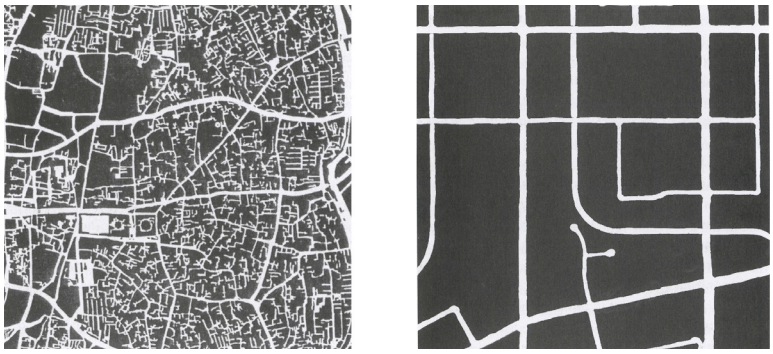


FIG. 1-3
Ahmedabad, an Indian city founded in the fifteenth century (right), Irvine, California, established in mid-twentieth century (left), drawn at the same scale.

Image by Allen Jacobs, Great Streets, 1995

MOBILITY MATTERS

Physical mobility helps shape our built environment. It shifts and steers the modes of development to be enacted, and has a significant impact on city building. A city's ambition to expand and progress is usually expressed in the adaptation of the most up-to-date transportation technology. Joel Garreau, the author of Edge City, states:

"Cities are always created around whatever the state-of-the-art transportation device is at the time. If the state of the art is sandal leather and donkeys, you get Jerusalem. Even when wheeled vehicles replaced pack animals as the freight technology of choice fifteen centuries after Jesus, Jerusalem remained shaped by its transportation origins." (Garreau, 1992, p.32)

As mentioned above, the larger, faster and more efficient movement of people, goods and information defined and governed the most elementary principles of geological locations and structures of cities from the earliest model of urbanization. Thus, the site and planning of cities were limited yet prevented from organizational chaos. Over time, infrastructures were opportunistically laid on the ground to help with the flow of physical mobility. Here, transport infrastructure has two basic, yet contradictory, identities. It is an instrument to connect and increases the efficiency of moving people, goods and information. Well-defined and logistically accurate infrastructures complement the growth of cities and their economic competitiveness. The other identity is a dividing tool, segregating land to become privately or publicly owned property. The geological definition of arterial infrastructure constitutes the shaping of land usages and territories; likewise, the prevailing mode of transportation method significantly affects the physicality and organization of both natural and artificial environment.

Today, the rise of car-centric infrastructure has eventually led to mutated forms of urbanism, characterized by low density and total dependence on cars: ex-urbia. (Gandelsonas, 1999) The emergence of mass production, coupled with the elevated economic plane in North America, has enabled affordability and easier ownership of automobiles. This has resulted in a disturbance of the fragile balance between modal shares and choices. Consequently, interregional rail-based transit system has become downgraded as an alternative second to automobiles.

This imbalance between two major methods of transportation further resulted in a severe stress on roads and highways. One of the most urgent signs of reduced physical mobility is best expressed in visible congestion. Since the private ownership of automobiles is deeply rooted in North American culture, simple removal of automobiles would not be possible. Evidently, more than 50% of Canadian population owns a car,

FIG. 1-4

Red dots are locations of Flickr pictures. Blue dots are locations of Twitter tweets. White dots are locations that have been posted to both. This map depicts the concentration of information gathered in centural area of the city.

See Something or Say Something by Eric Fischer, 2011

and the percentage is increasing along with the population growth of the country (Statistics Canada, 2006). On the other hand, annual ridership in both municipal and regional transit is also steadily increasing each year (Statistics Canada, 2006), in parallel with the rise of gasoline prices. This incremental demand on urban and interurban transit system indicates that there is a strong need for attractive and more efficient mass transit infrastructure. Consequently, the network of rail-based transit will face higher demands of interregional connections between decentralized urban centres.

DECENTRALIZATION + INTENSIFICATION

Due to the emergence of megaregions and agglomeration of global economy, inter-regional mobility has become one of the most critical issues in contemporary urbanism. Stan Allen recognizes the very nature of cities as the result of technological integration, stating, "Cities are the most intensive producers and consumers of new technologies. These technologies shape the city, but are also shaped by the needs and desire of the city itself." (Allen, 2011, p.39) In this respect, the distribution of centrality and intensification may hold the key to successful regional integration. Saskia Sassen also provides the answer to the necessity of central places, stating:

"One of the advantages of central urban density is that it has historically helped solve the risk of insufficient variety. It brings with it diverse labor markets, diverse networks of firms and colleagues, massive concentrations of diverse types of information on the latest developments, diverse marketplaces… Even as much economic activity has dispersed, the centers of a growing number of cities have expanded physically, at times simply spreading and at times in a multi nodal fashion. The geographic terrain for these new centralities is not always simply that

of the downtown; it can be metropolitan and even regional." (Sassen, 2007, p.70)

In place of intensified urban formation, active developments of multiple suburban centres have redefined the image of suburbs into the regional metropolis. (Gillham, 2002, p.301) In these terms, the noticeable characteristics of modal share in the Greater Toronto Area (GTA) distinctly differ in core urban and ex-urban conditions. In Central Toronto, with its established subway system, the modal share between automobiles and public transit is balanced and well-adjusted to its inherent urban condition. On the other hand, peri-urban traffic patterns show an extreme dependence on automobiles and private transportation, while GO transit is the only alternative mass transit system to travel to the inner city. Nevertheless, the geographic changes within networked regions have not yet engaged with problems in mobility today. Most of the North American cities still adhere to car-centric development, causing incremental congestions and consequential damages on the planet's fragile ecosystem. This blatant weakness of car-centric urbanism and infrastructures is shown through its mono-functionality. Alex Wall identifies this issue, stating:

"Transportation infrastructure is less a self-sufficient service element than an extremely visible and effective instrument in creating new network and relationships. Whereas the railroad station and the airport offer a centralized infrastructural condition –a density that almost resembles the city, in terms of services and programs- the more amorphous connective web or roads has rarely been recognized as a collective space unto itself." (Wall, 1999, p.238)

Wall's argument leads to the renewed interest in rail-based transits and railroad stations. Whilst automotive infrastructure, including undesired road congestions and environmental impacts, suffers a consequential

decline, railways provide a profound resolution in terms of efficiency and energy consumption. Also, in terms of contemporary mode of development, railway stations are newfound focus of redevelopment plans. There are two reasons: one, the typical consensus is that the railway station is a node, providing a point of access for multiple transportation networks, including trains, buses, and automobiles; two, the railway station is a site for diversified collection of interventions and public open spaces. (Bertonlini, 1998) In these terms, a railway station area consisting of buildings, open spaces and infrastructure has vast potential to become a desirable central place of the city with a concentration of inhabitants and economic activities.

POSITION

GO transit, an inter-regional public transit system in the Greater Golden Horseshoe Area (GGHA), began its first regular passenger service on May 23rd, 1967 (Metrolinx, 2012). As a strategic project to resolve unprecedented congestion caused by heavy flow of post-war immigrants and industrial shipments, GO transit demonstrated the potential of rail-based inter-regional connectivity. The implementation of a new transit system was executed under three distinct circumstances: first, the initial plan of the GO transit system was to replace the existing Toronto-Hamilton commuters' train by purchasing existing Canada National Railway line. This provided a huge relief in transporting workers from suburban areas to the downtown core of Toronto. Second, there was a technological breakthrough in replacing the steam locomotive with the diesel locomotive in the mid-fifties. The process of dieselization was geared towards moving larger, heavier freight and passenger trains faster than the old steam engines. Third, the historic Oakville-Pickering rail service was in fact a trial to test the possibility of incapacitating the new construction plan for the Gardiner Expressway. (Sergent, 2004)

Half a century ago, there was already a question of limitations in the construction of automobile-based infrastructure. Despite the success of laying the groundwork for commuter rail connection, circumstances surrounding mobility in the context of polycentric urban sprawl remain unchanged. We are continuously witnessing imminent challenges: obsolete train station areas, marginalized transit ridership and frequency of services, dominance of car-centric developments, and more. Immediate actions are needed; however, the existing methods of urban planning approaches are prone to disturbing the fragile balance of economic, social and environmental concerns.

How can a mass transit infrastructure morphologically transform, and perform as an agent for urbanization responding to the unique challenges of the ongoing rapid densification of the GGHA?

PART 02 | REGIONAL CONTEXT

Urgency
Places to Grow
The Big Move
Status Quo

FIG. 2-1
Polycentric development in central Toronto

URGENCY

Historically, cities have been metaphorically compared to living organisms; they grow, organize, regulate and sustain. (Littlefeld, p.8, 2012) However, the staggering transformation of lifestyle through globalization and rapid urbanization, a radical shift from rural to urban regimes, implies that the age of "organically growing" cities no longer exists. Inevitably, cities are strategically planned, invested and implemented in accordance with social, economic and political factors.

In its previous history of urban development, the city of Toronto did not fully adhere to low-density, car-oriented, post-World War II urban planning; instead, it meticulously measured the balance between cars, public transit and transit-centric developments in the mid-twentieth century. Toronto adapted the development of rapid public transit system by building a subway line, then up-zoning the surrounding areas of the subway stations by aiming for high-density developments in the different nodes: polycentric city was the vision of Toronto as a competent metropolitan region. The mode of high-density decentralization,

FIG. 2-2
Average Travel Delay in the GTA 2000
(Source: Neptis Foundation)

Avg. Delay minutes/trip/km
- 2.86-2.87
- 0.38-2.86
- 0.27-0.38
- 0.19-0.27
- 0.12-0.19
- 0.06-0.12
- 0.03-0.06
- 0.00-0.03

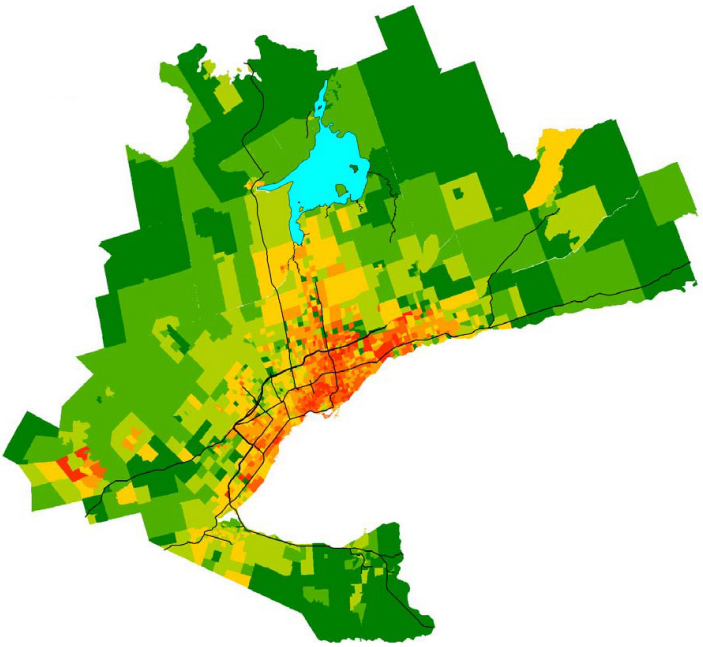
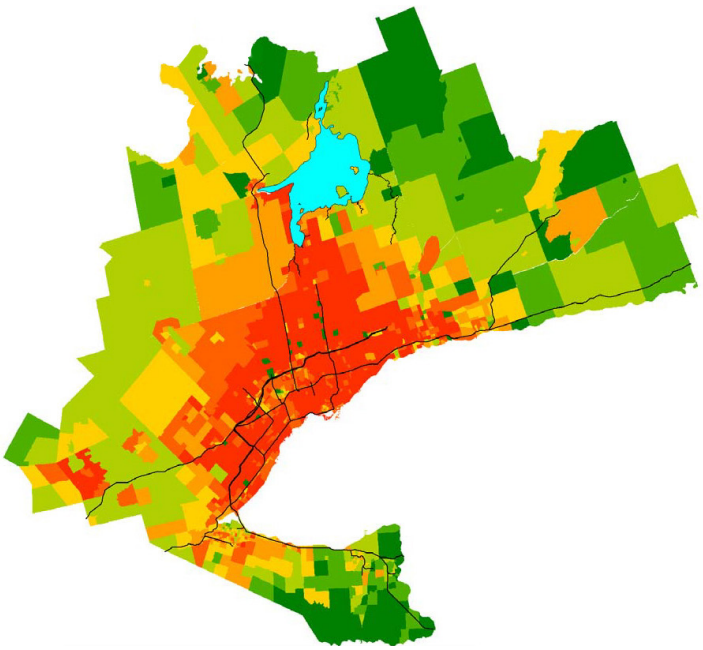


FIG. 2-3
Average Travel Delay in the GTA 2030
(Source: Neptis Foundation)

Avg. Delay minutes/trip/km
- 2.86-2.87
- 0.38-2.86
- 0.27-0.38
- 0.19-0.27
- 0.12-0.19
- 0.06-0.12
- 0.03-0.06
- 0.00-0.03



however, was eventually scattered throughout the seventies to eighties, when Toronto amalgamated several municipalities in the creation of Metropolitan Toronto. The opposition was from the suburban municipalities that wanted to keep their low-density suburban image, and Toronto departed from its previous vision (Searle, 2011).

Since the beginning of the twenty-first century, the developments in the downtown core, as well as the suburban cores, started shifting into a different direction. Downtown Toronto is increasingly investing in high-density residential projects: the population of the downtown core has grown by 65 per cent in the last thirty years and 10 per cent in the last five years (Spears, 2007). Suburban municipalities in the GTA, including Mississauga, Markham, Vaughan and Pickering, have already developed or are developing their own downtown core. Altogether, the Greater Toronto Area is projected to be the fastest growing region of the province, with its population increased by 2.8 million, or 44.6 per cent, to reach almost 9.2 million by 2036 (Ministry of Finances Canada, 2011). The Greater Toronto Area, clearly a metropolitan region, is again reviving its vision of a polycentric city, at a much larger scale.

In the context of decentralized urban cores, the role of the downtown is significant, especially in a networked region. Employment in downtown Toronto is less of an issue, since the developments of suburban cores are rapidly producing chances of local employment. Other factors, including shopping, leisure, cultural events and education, significantly increase the value of travelling inbound to downtown Toronto. The centralization is not only occurring in the area of commerce and governance, but also in the areas of culture, education and recreation at large. The city of Toronto houses three major universities in Canada, five colleges of applied art and technology, numerous museums and hosts many international events, all of which make downtown Toronto a lively and attractive place to visit. Despite the regional decentralization of commerce and business centres,

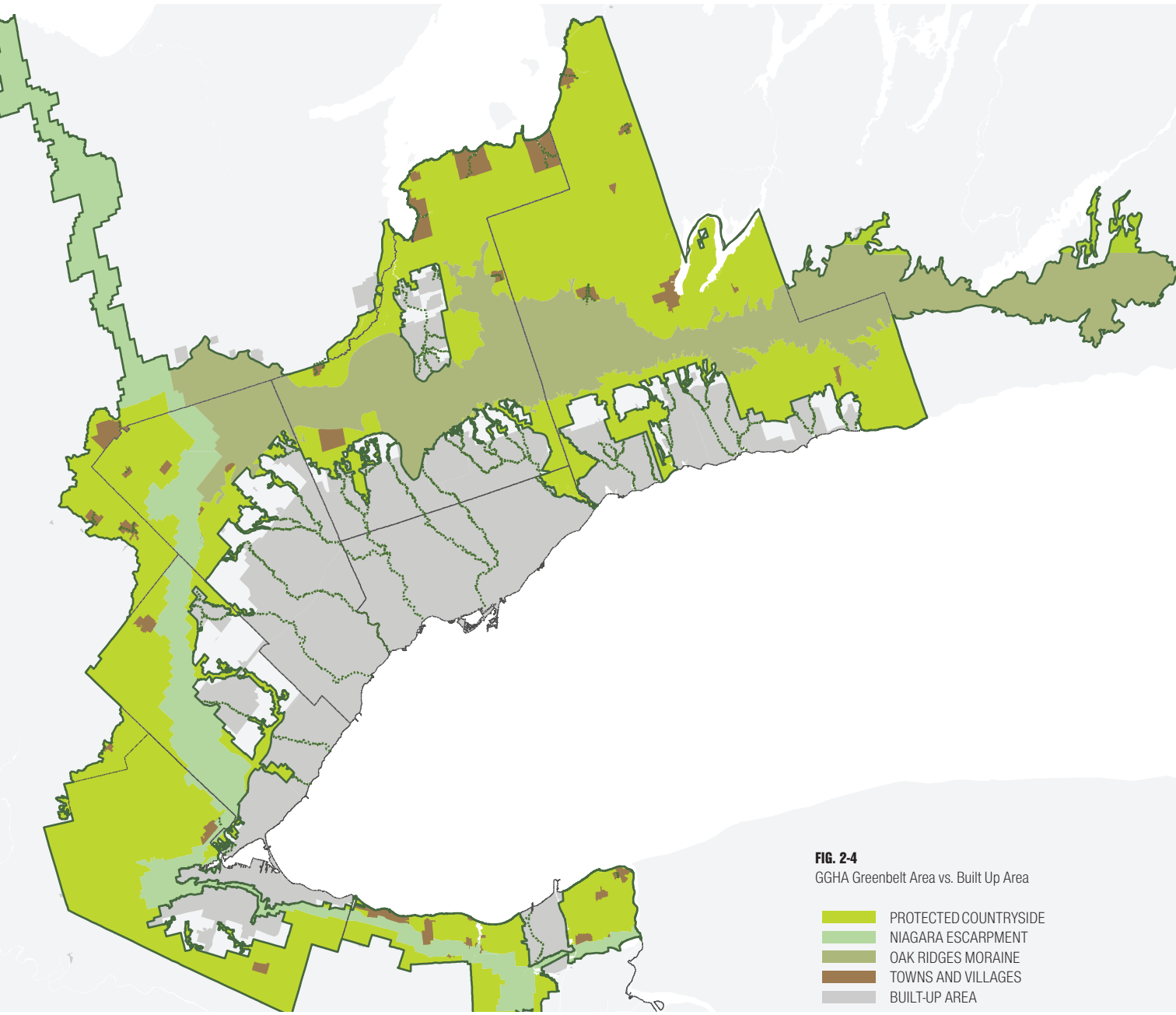


FIG. 2-4
GGHA Greenbelt Area vs. Built Up Area

traffic congestion in and out of central Toronto is still an unsolved problem. Evidently, the number of inbound vehicular traffic increased from 179,300 vehicles to 313,900 vehicles (+75%) from 1985 to 2006, and was projected to increase even more (City of Toronto, 2006). In order to avoid vehicular congestion in the downtown core area, the rate of public transit ridership is increasing in a steady manner.

The lack of accessibility in the urban core area has been an issue for the city of Toronto, which subsequently will cause the lagging in our socioeconomic mobility. This unilateral dependence on cars is resulted hand in hand by the way we built our transit infrastructures: including highways, expressways, railways and subway system. Rail-based transit system in Toronto is unique, where all rail lines in Toronto, including subway lines and inter-regional railways, are radiating from one hub: Union Station. Other cities, most evidently in Europe and Asia, are forming a network of rail lines, hinged by multiple transit hubs. Highways in the Greater Toronto Area, in contrast to the railways, retain much greater mobility by both pointing towards and completely bypassing the urban core area. Despite the enhanced accessibility and mobility, vehicular congestion in downtown Toronto is increasing each year, which leads to other problems, including insufficient parking spaces, inefficient use of existing roads, sociocultural disconnection and environmental impact (Metrolinx, 2008).

Under such circumstances, designing in the Greater Toronto Area is a challenge; yet, it is also an opportunity to establish a new model for polycentric regional development. The regional planning authority of metropolitan Toronto recognizes the growth potential in the regional development; however, the existing automobile-centric urban planning is no longer an effective method to provide efficient linkages between the cities. The metropolitan region of the Greater Golden Horseshoe Area (GGHA) is at a critical moment of its lifespan in its confrontation with

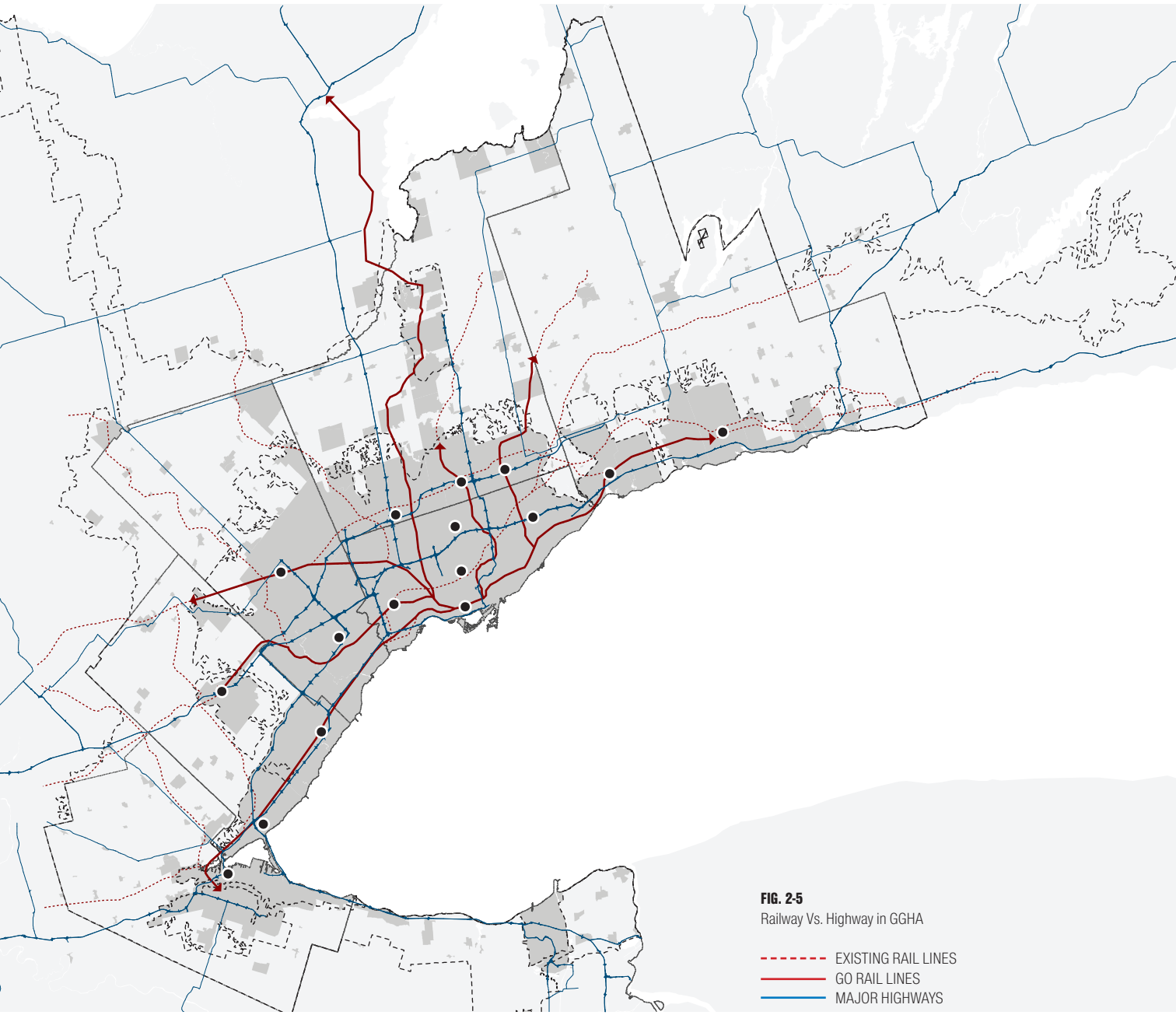


FIG. 2-5
Railway Vs. Highway in GGHA

regional expansion, and anticipation for strategic planning of the city. Strategic plan of a city differentiates its objective from the predominant form of master plan. It is a framework of proposals for medium- to long-term actions, a holistic project that addressed inter-sectorial development objectives; also it may be referred to as a collection of short-term micro scale projects that are strategic by nature (Carmona, 2009). This thesis reviews two governmental documents that are highly associated with the strategic plan of the city: Places to Grow (2005), and The Big Move (2008).

Places to Grow 2005

In 2005, the government of Ontario announced the Places to Grow Act. The plan was released in June 16, 2006, providing a framework of a 25-year growth plan for the Greater Golden Horseshoe Area. The new growth plan for the GGHA metropolitan region anticipates a future city that shares the common value of our society: a city that is supported by strong economy, sustainable environment and social

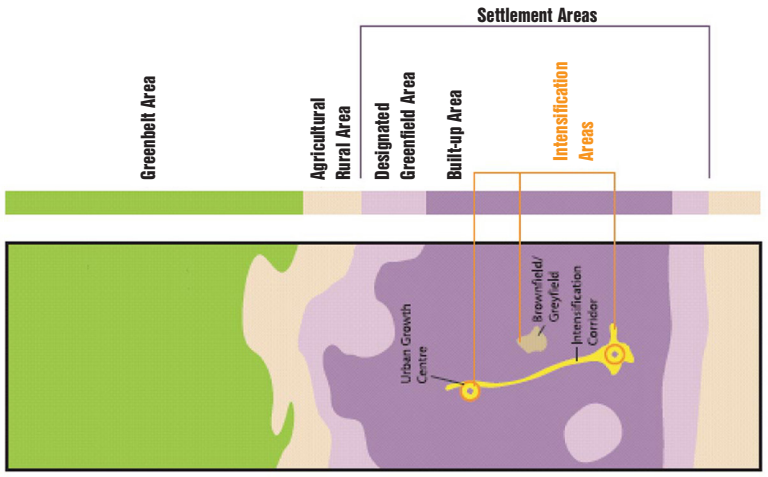


FIG. 2-6
Illustration Diagram: Growth Plan Land-use Terminology

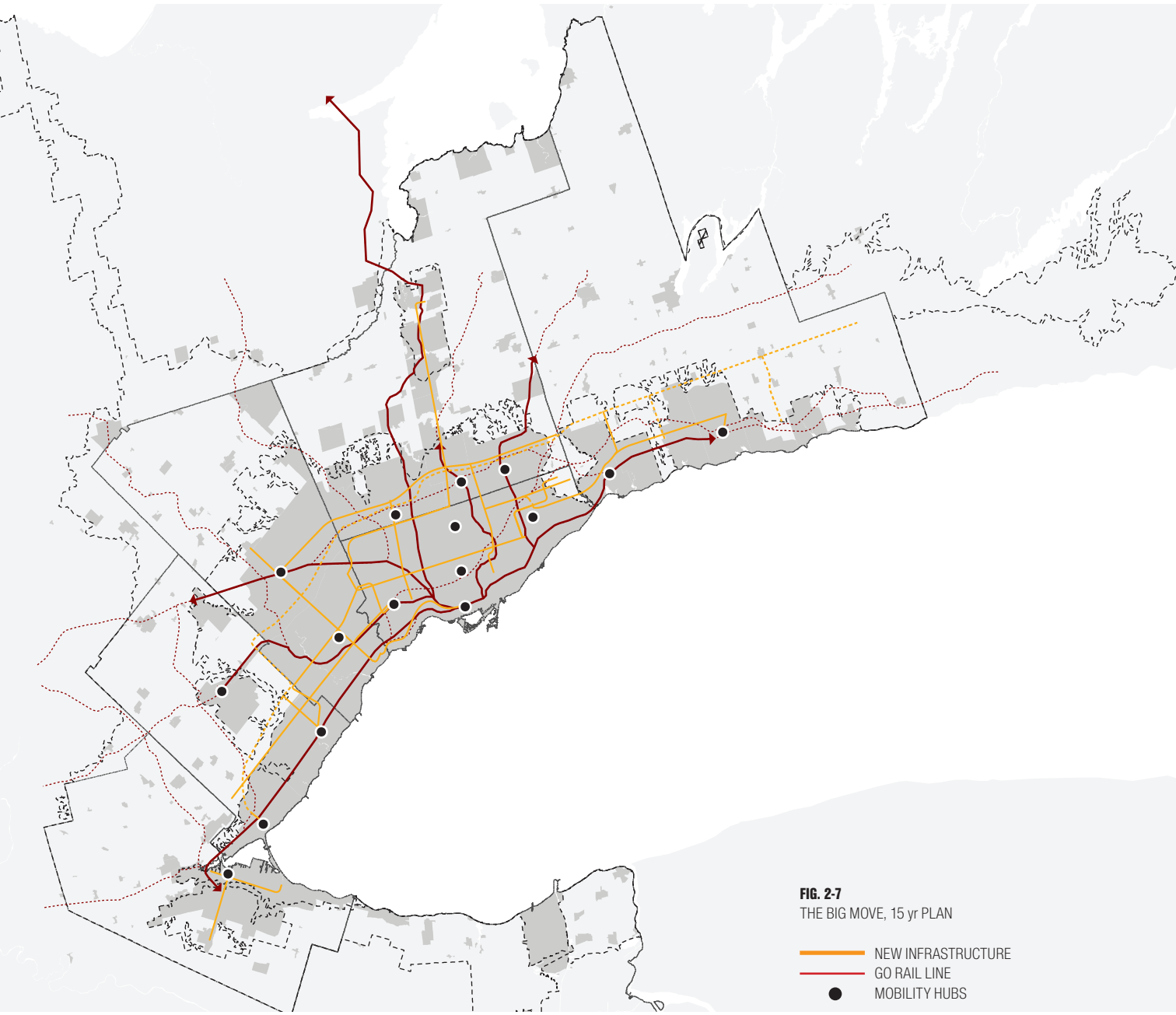


FIG. 2-7
THE BIG MOVE, 15 yr PLAN

equity. In an equivalent way, it is obvious that the planning authority of the government of Ontario recognizes the limits and disadvantages of urban sprawl. The growth plan reveals several challenges of the GGHA to become a competent global metropolitan region: economic cost of traffic congestion; low-density preference in sprawling communities; ineffective and short-sighted use of land, especially in employment lands; underutilized existing transit related infrastructures; and environmental challenges of sprawling communities.

In order to provide a sound solution for these challenges, the government would inevitably demand a research on the problems of urban sprawl. The GGHA is composed of diverse and complex cultures and economies, as well as both built and natural environment. The fundamental question comes down to where and how to grow.

The plan initially recognizes the population growth, forecasting an additional 3.7 million to the existing 11.5 million people in the GGHA, announcing that Greater Hamilton-Toronto Area will be a thriving metropolis in the year 2031. Growth of population in the context of metropolitan region means global competency and accumulation of intellectual resources. Intensification and optimization of the existing fabrics of the city is the key emphasis on this plan. Generally, intensification areas are located in built-up areas, strategically selected to enhance the economy, culture, recreation and social needs of the public. In this approach, the growth plan identifies possible urban growth centres, major transit station areas and intensification corridors that are focal areas of investment in city building. By the year 2031, when the growth plan comes into effect, the minimum target of 400 residents and jobs per hectare is expected in each of the urban growth centres.

In this growth plan, infrastructural investment is the key method of implementation. Transportation is one of the integral parts of this plan,

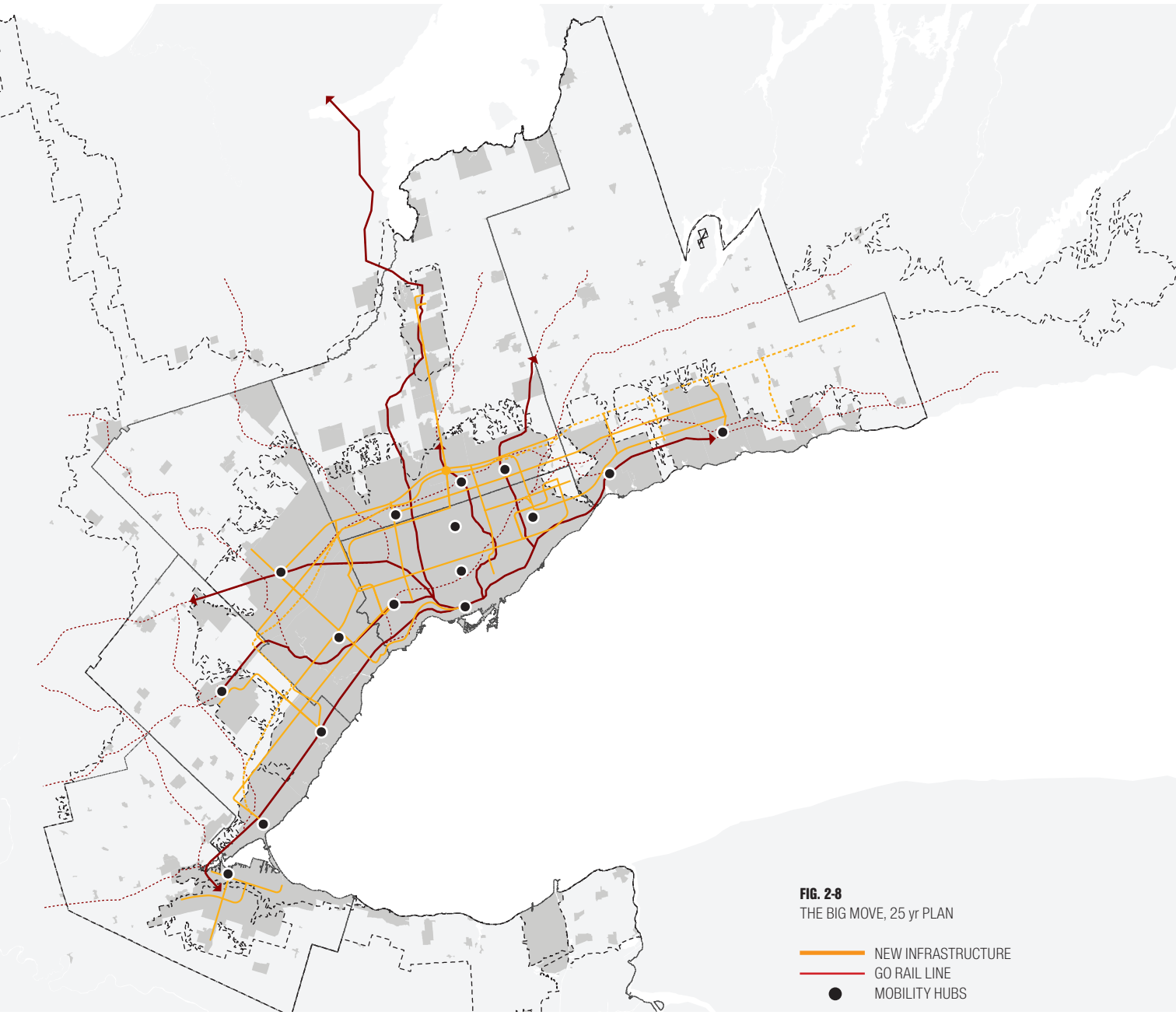
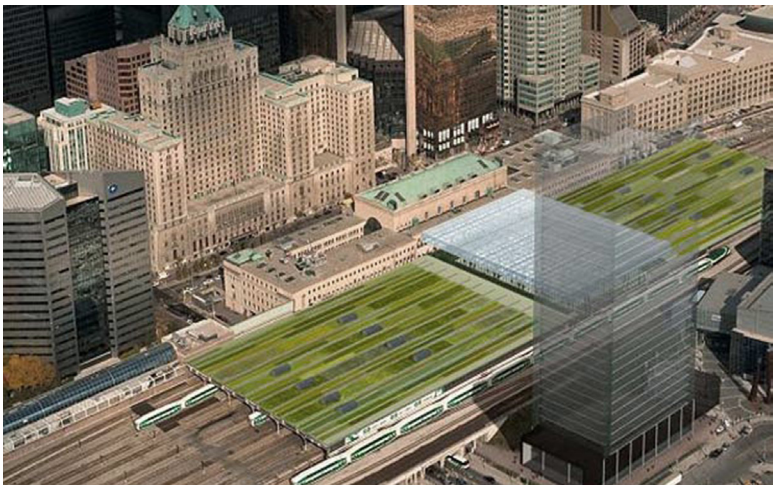


FIG. 2-8
THE BIG MOVE, 25 yr PLAN

FIG. 2-9
Union Station re-development, Toronto
Source: Zeidler Partnership Architects



stressing the need for multi-modal access to employment, educational, recreational, and residential areas. Disinvestment in auto-mobility and more engagement with alternative transportation, including public transit, bike and walking, are clearly stated in this document. Further actions of this plan will promote the eventual establishment of a Greater Toronto Transit Authority which will facilitate the coordination of several different municipal transit systems.

The Big Move 2008

In 2008, Metrolinx, the governmental agency of public transportation in the Greater Golden Horseshoe Area (GGHA), announced the new regional transit plan. The Big Move identifies GGHA as a grown metropolitan region, and goes together with the Places to Grow Act in 2005. The population growth and the forecasted number of dwelling units in GGHA initiated the need for a new transit plan to accommodate the inter-regional movement of people and goods. The Big Move provides a framework for a multi-faceted, multi-modal and highly integrated public

transit system.

The growth plan for the GGHA and The Big Move share the same problem statement. Both documents recognize auto-mobility as the primary source of challenge, questioning the consequential transformation of urban sprawl. In The Big Move, the listed challenges are more intensively associated with the transportation sector. The Big Move, a regional transit plan for the GGHA, accurately pinpoints the problems of the car-centric urban planning and the aging regional transportation system. Currently, the GGHA is facing significant problems with regards to the increasing reliance on automobiles as a primary mode of transportation. The rate of private automobile-based travelling is increasing at a faster rate than our population growth: the number of trips made by cars in the GGHA increased by 56 per cent, while the population grew by 45 per cent between 1986 and 2006. (Metrolinx, 2008) What it means is that the existing arterials supporting automobile movement will likely be incapable of accommodating the expected overload of automobiles.

The vision depicted in The Big Move is simple: an attractive and highly efficient public transit system that will replace the current mode of transportation that is dominated by car. They hope to drop the automobile reliance by one third by increasing the use of public transit, and making the road safe enough to walk and bike. Metrolinx rigorously reveals ambitious actions and policies that will endorse the transformation of transportation system in the GGHA. The “Nine Big Moves” are the priority actions, which will be effective as a long-term strategy of 25 years. Some of these priority actions illustrate the guiding principles of the strategic plan for the GGHA: Implementation of a regional rapid transit system; expanded infrastructural network of active transit, including walking and cycling; Initiation of a region-wide integrated transit fare system; and development of connection between mobility hubs.

FIG. 2-10
Industrial corridor along the existing Lakeshore West Line

The plan recognizes that economic growth will occur in built-up areas. These were previously mentioned in the Growth Plan for the GGHA: through intensification areas, major transit stations and transit corridors. Based upon the guidelines of The Big Move, it is speculated that Urban Growth Centres are reinterpreted as Mobility Hubs. The Big Move identifies Mobility Hubs as systemic integration of public transit system, and inter-connected urban centres of intensified area. These hubs are designed to connect with each other by both the existing GO train services and the newly introduced regional rapid transit system. Over the next 25 years, transit system in the GGHA will be faster, more efficient, attractive and inter-connected, forming a larger metropolitan region, with less dependence on privately owned automobiles.

FIG. 2-11
The existing master plan of the Midtown Oakville
Source: Urban Strategies Inc.

STATUS QUO

The Growth Plan (2005) and The Big Move (2008) are hand in hand strategies to define the strategic plan of the megaregion: The Growth Plan provides the framework of development; the Big Move suggests ways to connect these areas of interest. These governmental documents are absolutely crucial in understanding the future transformation of the city. It has been pointed out that all of these plans recognize the problems of sprawl communities, the culture of automobiles and its infrastructural flaws. The vision of the GGHA delineates the long-term agenda of integrated regional mobility, nourishment and preservation of existing natural fabric, development of interconnected urban centres and strategic distribution of economic sectors.

The plan to revitalize Midtown Oakville is subsequently followed by a package of development plans, which includes revised urban infrastructure, revised zoning regulations and a master plan of the site. However, several problems are identified as the research progresses,

which include: absence of ecological agenda; automobile oriented planning of infrastructure; conventionally divided land use; and no consideration for the long-term potential of the site.

The set of problems detected in the existing Master Plan leads to the discovery of vast opportunities for the site. Midtown Oakville is bound by several existing infrastructures: railway, highway, local roads and the Sixteen Mile Creek as an ecological infrastructure. These preexisting infrastructures must be embraced and reinforced. Another opportunity is logistics of the site. Oakville station is planned to become a transportation hub accommodating existing rail commuters, local transportation and the proposed inter-regional connections lines. This means that the physical intermodal hub must be addressed as a synthesis of architecture and infrastructure. It is clear that the development of the site intrinsically requires an unconventional, interdisciplinary approach: the synthesis of architecture, landscape, infrastructure, and urban ecology. An innovative design strategy will work as a tool to reconcile and re-connect the divided land into one entity.

PART 03 | SYNTHESIS

Infrastructure as Landscape
Infrastructure as Architecture
Infrastructure as Urbanism

"A seminal attribute of the megaform is its quintessential horizontality, which is integrated as much as possible with the site on which it sits. At times this topographic character may be so dominant as to become a virtual landscape in itself... the megaform has the capacity to provide public domain in what is otherwise a totally privatized, process-oriented, and largely placeless environment."

(Frampton, 2009, p.46)

In recent years, the problems and challenges raised in urban conditions have become blatantly visible due to the complexity of subject matter. Many authors and practitioners of post-industrial urbanism have identified the renewed interest in the synthesis of architecture, landscape and infrastructure. James Corner, one of the iconic figures in landscape architecture and urban design, recognizes an imminent need for a new approach in urbanism that intrinsically builds a symbiotic relationship among living and non-living entities. He states:

"Only through a synthetic and imaginative reordering of categories in the built environment might we escape our present predicament in the cul-de-sac of post-industrial modernity, and 'the bureaucratic and uninspired failings' of the planning profession." (Waldheim, 2006, p.38)

The theories generated under various adjectival modifiers, such as landscape, infrastructural and ecological, reveal the continuous effort in understanding urbanism, as well as the social, cultural, economic and

FIG. 3-1
Eastern Schelt Storm Barrier, West 8 Landscape Architects

environmental conditions of the contemporary city. (Waldheim, 2010) They offer the theoretical foundation and framework for anticipating potential of urban design. Thus, meticulous investigation and synthesis of theories are an essential part of the thesis. The following section frames a discussion which revolves around infrastructural morphology. There are three areas of focus: infrastructure as landscape; infrastructure as architecture; and infrastructure as urbanism.

INFRASTRUCTURE as LANDSCAPE

Landscape urbanism, among many other contemporary urban theories, champions the idea of the regeneration of ecology and balance between human needs and environmental values. Charles Waldheim, one of the forerunners of landscape urbanism, describes this movement as an exclusive model for contemporary urbanism that is "uniquely capable of describing the conditions for radically decentralized urbanization, especially in the context of complex natural environment." (Waldheim, 2006, p.37) Waldheim's statement subtly differentiates landscape urbanism from modernist approaches, seeing the realms of architecture, infrastructure, landscape and ecology not as separate entities, but as a pluralistic synthesis of all of the above. Through the evolutionary processes, landscape has been accepted not only as a model, but a medium for urbanism: in this view, ecology is a framework and a driving force of urbanism. Thus, the term "landscape" departs from the traditional notion of planted surface and vegetation.

James Corner emphasizes that the dichotomy of nature versus culture would be diminished, for everything is artificial and man-made in urban condition. Corner's main argument forms a conceptual amendment of the traditional difference between landscape and urbanism, stating,

FIG. 3-2
The High Line before its transformation
Photograph by Jonathan Flaum, February 2002

"Categorical separation between landscape and urbanism persists today not because of a perceived difference in material, technical, and imaginative/moralistic dimensions of these two media, but also because of a hyper-professionalized classification, a construction further complicated through competing power relations." (Corner, 1999, p.27)

The statement further advocates the interdisciplinary involvement within each of the design professions as a shared form of practice centred on the term landscape. The landscape, precisely in terms of urbanism, invokes the urban surface as dynamic processes that can be programmed, manipulated and prepared for future adaptations. Theories in landscape urbanism contextualize the combined field that accommodates buildings, roads, utilities, open spaces, neighborhoods, and natural habitats (Wall, 1999). This radical manifestation suggests that infrastructure should be considered as a medium for urban landscape rather than service-based artifacts. An American landscape architect, Elizabeth Mossop, expands on this view:

"Explorations in landscape urbanism have focused on infrastructure as the most important generative public landscape. In the course of twentieth century we have seen the increasing standardization of infrastructural systems as they meet higher standards of technical efficiency. These ubiquitous urban environments have been considered and evaluated solely on technical criteria and somehow exempted from having to function socially, aesthetically, or ecologically." (Mossop, 2006, p.171)

The work of James Corner, "Field Operations", exemplifies this understanding of landscape that can be found in immanent urban conditions. The High Line Park of New York establishes a benchmark for extremely dense urban condition, first by recognizing the potential of a 2.4 km elevated railway as a found object. Corner's particular interests in "artificial ecology" and "process over time" have contributed to the transformation of obsolete infrastructure into an inhabited horizontal landmark.

FIG. 3-3
Gwanggyo Pier Lakeside Park, Suwon, Korea
by STAN ALLEN ARCHITECTS, 2008

This re-conceptualization of infrastructure and infrastructural space enables the refinement of thinking that all types of space are inherently embedded with full potentials. This functional rethinking of landscape infrastructure involves remediation strategies, and massive programming of the urban surface. As a response to the disciplinary realignment, the term infrastructure poses itself as a condition: it represents natural systems that are artificially supplemented. (Sheppard & White, 2010)

INFRASTRUCTURE as ARCHITECTURE

The inception of modernism advocated a universal adaptation of rationalization and standardization of architecture and the building industry, anticipating emancipation of architecture's inherent limitation. Modernists believed that mass production and standardization of products could elevate the role of architecture such as in urban infrastructure. Nonetheless, the failure of short-lived modernism has abandoned its obligation to engage with the instrumentality of architecture. Today, infrastructural development typically exists within the realm of

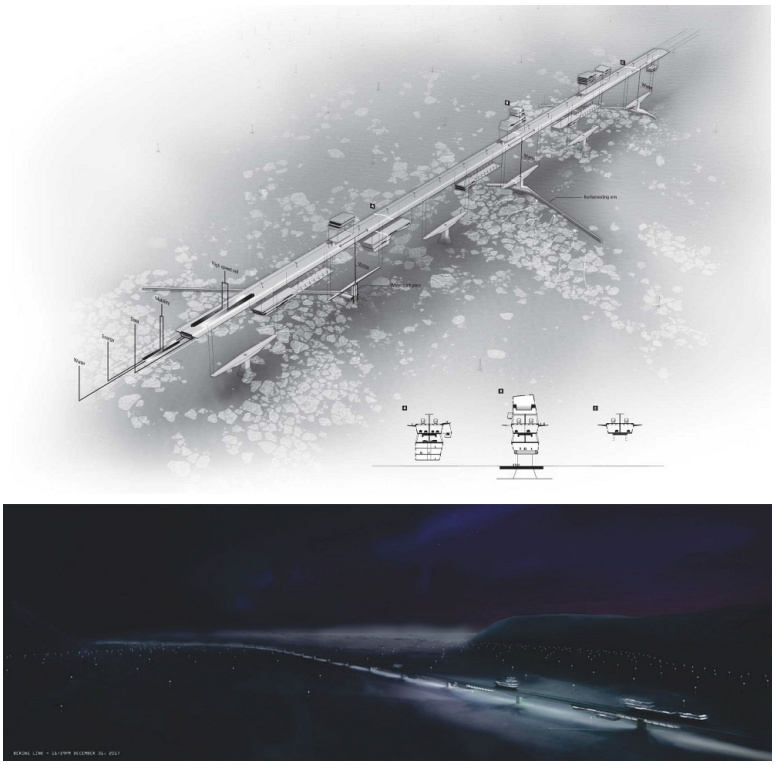


FIG. 3-4
International Bridge & Park, Bering Strait, USA, Russia
by LATERAL OFFICE, 2009

engineering. (Stoll & Lloyd, 2010) Waldheim suggests a categorical realignment for a new inter-disciplinary hybrid that challenges the status quo, which leads to the rethinking of infrastructural performance and morphology, stating:

"Landscape urbanism has come to stand for a profound critique of the perceived failures of urban design to effectively respond to the spatial decentralization, neoliberal economic shifts, and environmental toxicity in cities. Equally, it has come to promise an alternative to the reactionary cultural politics of traditional urban form, simultaneously offering a future for urbanism in which environmental health, social welfare, and cultural aspiration are no longer mutually exclusive." (Waldheim, 2008, p.7)

Infrastructural urbanism is a derivative of landscape urbanism in many aspects; however, it differentiates itself from landscape urbanism by insisting on the ultimate reappearance of architecture as a spinal cord in urbanism. Stan Allen explicitly reveals the limitation of landscape urbanism by stating that "the projects of Landscape Urbanism realized to date have stayed more or less within the boundaries of landscape architecture. Primarily the design of urban parks and waterfronts, they reinforce the conventional expertise of the landscape architect." (Allen, 2011, p.28) His seminal writing, Infrastructural Urbanism, suggests the regaining of architecture's inherent instrumentality. He states:

"Infrastructural urbanism understands architecture as a material practice–as an activity that works in and among the world of things, and not exclusively with meaning and image. It is an architecture dedicated to concrete proposals and realistic strategies of implementation and not distanced commentary or critique. It is a way of working at the large scale that escapes suspect notions of master planning and the heroic ego of the individual architect. Infrastructural urbanism marks a return to instrumentality and a move away from the representational imperative in architecture." (Allen, 1999, p.52)

Allen establishes an intimate connection between architecture and infrastructure, recognizing both as material practice. By accepting the very existence of instrumentality-as opposed to that of aesthetics-of architecture, architects would rediscover their direction towards urbanism. Here, Allen makes seven propositions to make clear the agenda for infrastructural urbanism: Infrastructure works prepare and create the conditions for future change; Infrastructures work through flexibility and anticipation; Infrastructural works allow multiple authorship; Infrastructures maintain regularity and continuity; Infrastructures organize and manage complex systems of flow; Infrastructures work as

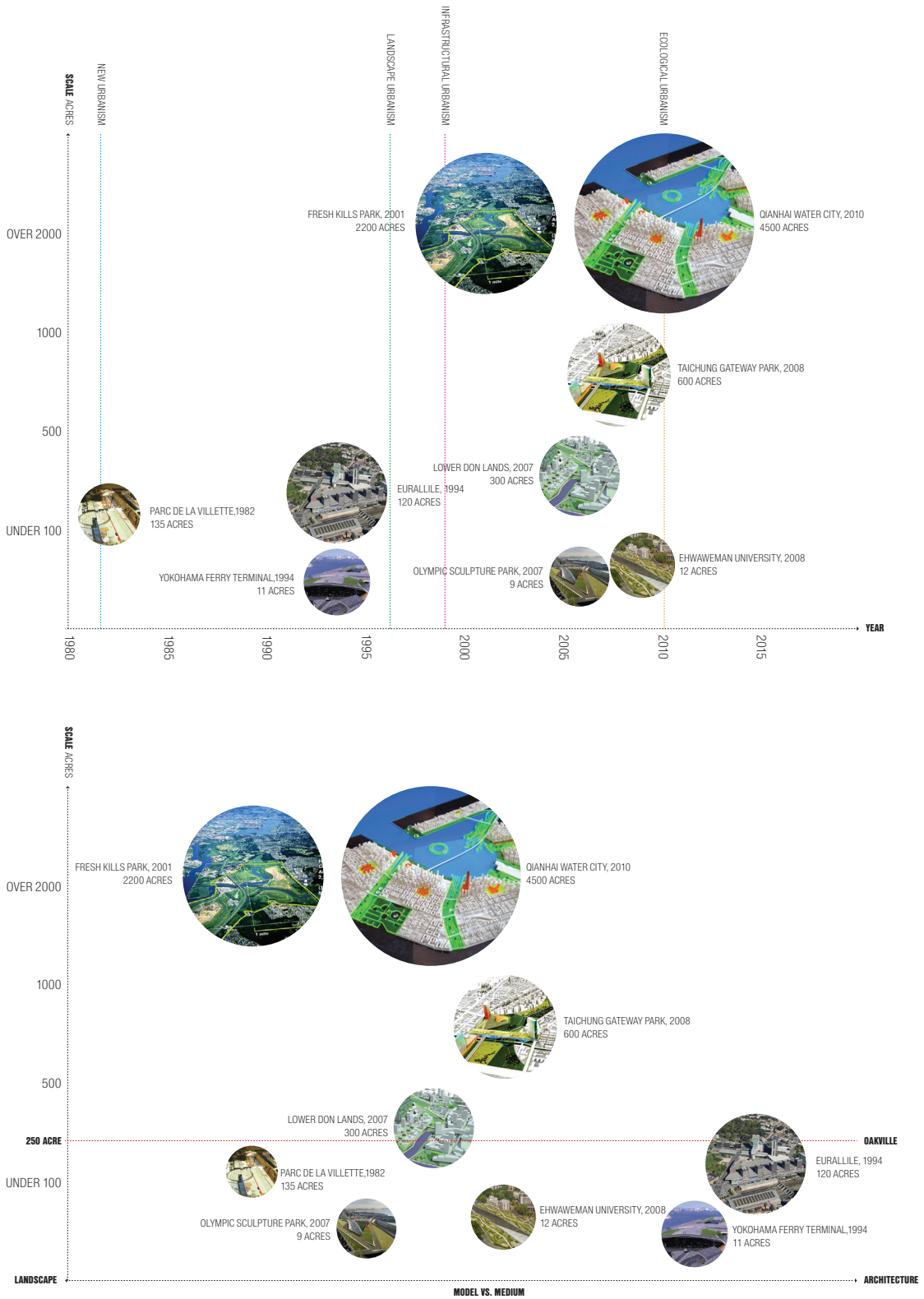


FIG. 3-5
Comparative Study: Projects related to landscape urbanism

an artificial ecology; Infrastructures are technical and instrumental before aesthetical. In this way, Allen shows the shift in recent practice toward infrastructure. Going beyond stylistic or formal issues, infrastructural urbanism offers a new model for architectural practice, and anticipates architecture to structure the future of the city.

INFRASTRUCTURE as URBANISM

How do we position architecture within the realm of infrastructure? The previous research gave an overview of contemporary urban/architectural theories, and geographically changing circumstances of the region, which leads to the significance of designing a new city centre on existing infrastructure.

The thesis is a response towards two main conditions generated by the strategic plans of governmental agencies: first, the regional expansion of the transport network; second, the local intensification through the concentration of population, commerce and governance. This means that there will be a massive spatial transformation in the areas of transportation nodes, in order to make networked region with decentralized density and commercial activities. Can infrastructure be a catalyst for an improved urban ecology? How can it transform the surrounding area, the lifestyle of the inhabitants, and the future of urbanism?

The underlying purpose of the thesis is to discover a meaningful potential of infrastructure as a part of the ecosystem. Based on design theories and principles derived from landscape urbanism and its fully fledged sub-disciplines, the thesis intends to offer a series of principles to begin with. Under the working title “Infrascape Urbanism,” the thesis proposes five key principles:

FIG. 3-6
An aerial image of Midtown Oakville, GO Train Station Area, 1980s

1. Built form as linkages: The current mode of development consumes and depletes what is known as the four pillars of sustainability: cultural, economic, environment and social. This thesis, on the other hand, recognizes the four pillars as subjects to be linked together. The built environment becomes linkages to interconnect these essential entities.

2. Site remediation: Remediation of contaminated lands must be addressed in order to create healthy and livable fabric of city. The existing on-grade parking lots, empty grounds and industrial waste lands are potential areas that would require ecological restoration to become an inhabitable area.

3. Reinforcing and embracing the existing network: The thesis works against meaningless tabula rasa. Existing networks and infrastructures are subjects to be repurposed and strengthened so as to provide enhanced functionality and usability.

4. Flexibility and contingency: The planning of new city centre adheres to the complex and changing nature of urbanism. Thus, the strategy must be flexible, while preparing for contingencies of the future. Design projects must reflect the quality that can be universally applied in other similar situations.

5. Mix and condense: Throughout macro to micro scale, design strategies advocate intelligent blurring of boundaries. The plan should reflect a mixed configuration of both coarse grain and fine grain city blocks, and intermingled characteristics of urban and rural.

PART 04 I EXAMINATION

Testing Ground
Infrascape Megastructure
North and South Connection
Leverage

Today's urbanism, represented by the term "megalopolis," created many problems: such as privatization, loss of public spaces, environmental degradations and social inequality. As a counter-reaction, new urban practices have emerged as an integration of culture, geography, politics, engineering, architecture and ecology: promising renewed ethics toward limitless sprawl and consumerism. The following section of the thesis intends to provide a physical example of this integration, combining design theories and geographic analyses covered in previous chapters. Applying principles extracted from landscape, ecological and infrastructural urbanism, the proposed intervention provides a new infrastructural morphology: a hybrid that comprises an urban park, public amenities, and diverse architectural typologies.

While the vision is proposed as an infrastructural catalyst situated in Midtown Oakville, it is also catered to the objectives outlined by The Growth Plan and the Big Move. The proposal is developed as a prototype based on principles and strategies that could be applied to other sites with similar conditions across the region.

TESTING GROUND

Both The Growth Plan (2005) and The Big Move (2008) recognize Midtown Oakville as both the Urban Growth Centre and the Mobility Hub. The Livable Oakville Plan was released in 2009 and replaced the town of Oakville's Official Plan, previously released in 1984. The plan establishes a framework of revised policies and land use, conforming to the Growth Plan released in 2006. The plan recognizes the consequences of growth in the GGHA as well, highlighting development of urban centres which caters to the high quality pedestrian-oriented and transit-supportive environment.

FIG. 4-1
Midtown Oakville, GO Train Station and Parking Structure

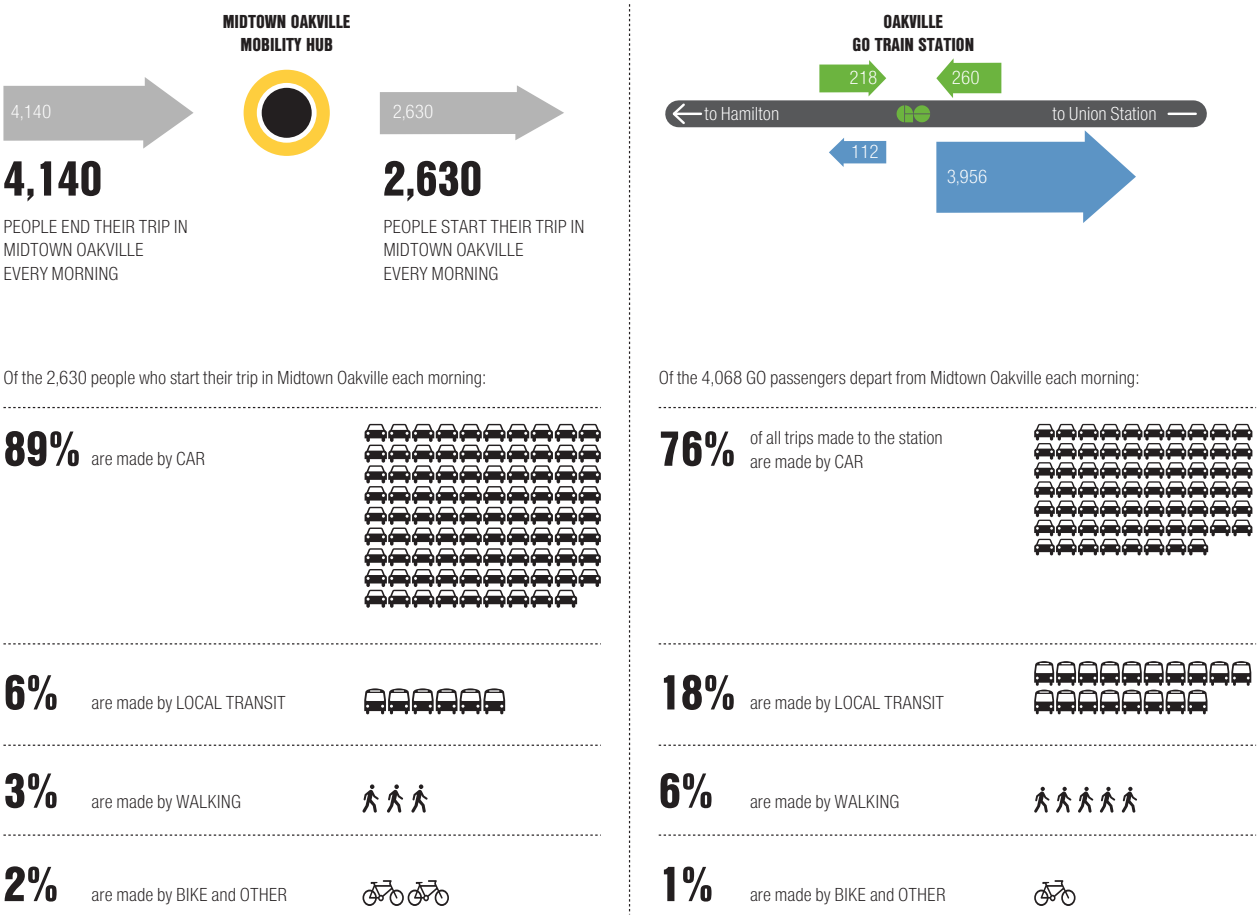


FIG. 4-2
Midtown Oakville Mobility Hub, Travel Behaviour
Source: Metrolinx, 2012

Part E: Growth Areas, Special Policy Areas and Exception specifically addresses Midtown Oakville, and the development of the Oakville station area as an urban growth centre. Situated on the busiest GO train route within GGHA, Lakeshore West line, Midtown Oakville attains a logistical advantage of 30 minute (20 minutes with express service) travel time from the Union station. That being said, the logistical definition of Midtown Oakville alone embraces several factors delineating vast opportunities for becoming a major hub of metropolitan region. The Livable Oakville plan clearly identifies the potential of the site:

"The interchange of Trafalgar Road and the QEW and the Oakville Go Station are major entry points to the Town and distinguish Midtown Oakville as a strategic location to accommodate both population and employment growth. The accessibility by major roads and local and inter-regional transit, combined with a large amount of vacant and underutilized land, provide the infrastructure and development opportunity to create a complete urban community comprised of a mix of high density residential and employment uses." (Town of Oakville, 2009)

The development in Midtown Oakville, if implemented, promotes high-density residential as well as employment opportunities. The land use policy in this area also recognizes the importance of cultural community: studio, office, exhibition, performance and retail spaces are also designated, creating a creative centre based in Oakville. According to the Growth Plan, Midtown Oakville, the urban growth centre, shall provide a combined density of 200 residents and jobs per hectare; the 100 hectare land of Midtown Oakville shall accommodate 20,000 residents and jobs. More specifically, a combination of roughly 5,900 residential units and 186,000 – 279,000 square metres of commercial and employment space will accommodate 12,000 residents and 8,000 jobs.

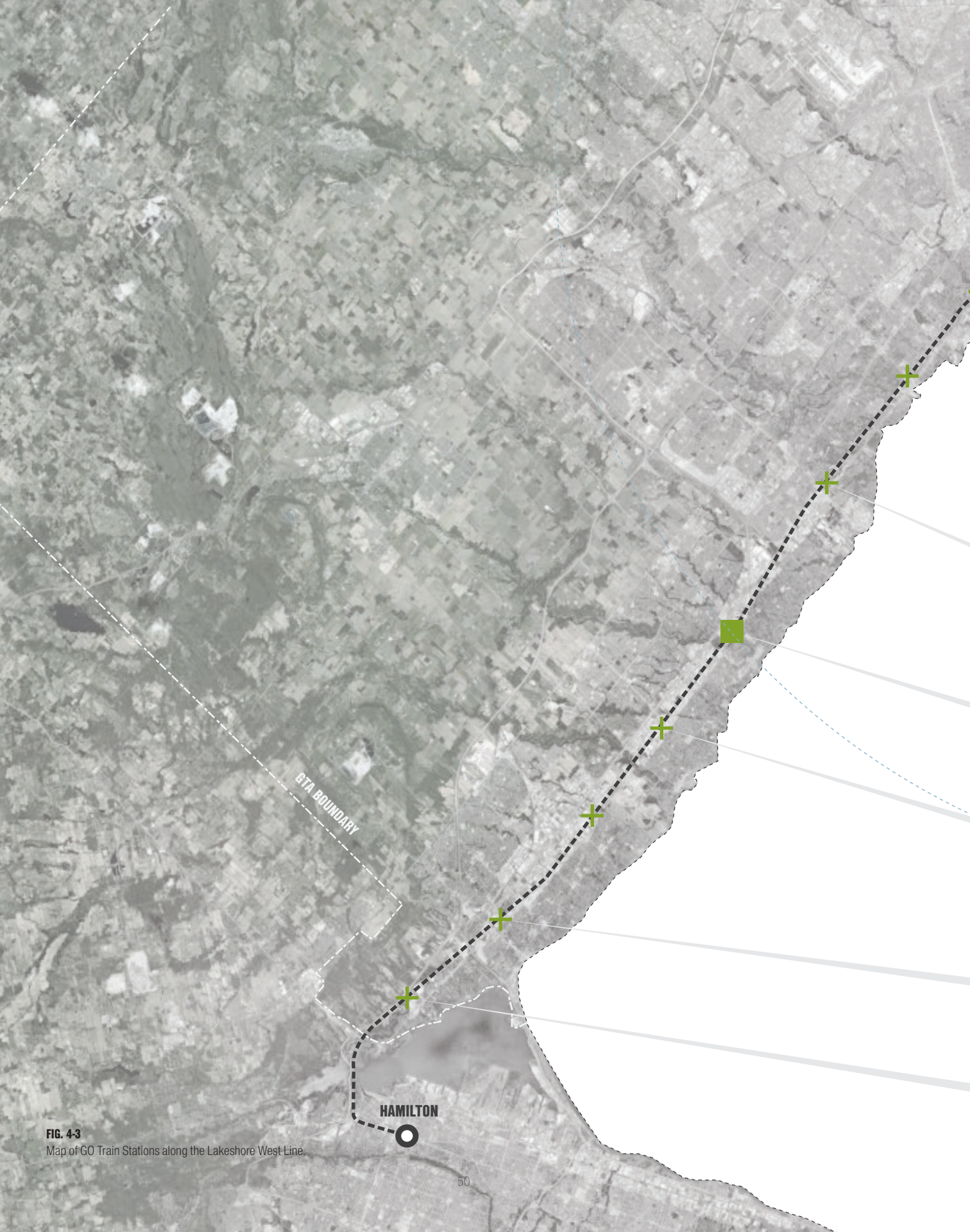


FIG. 4-3
Map of GO Train Stations along the Lakeshore West Line.

MIMICO_TYPE 01

LAKE ONTARIO

CLARKSON_TYPE 02

OAKVILLE_TYPE 03

BRONTE_TYPE 04

BURLINGTON_TYPE 05

ALDERSHOT_TYPE 06

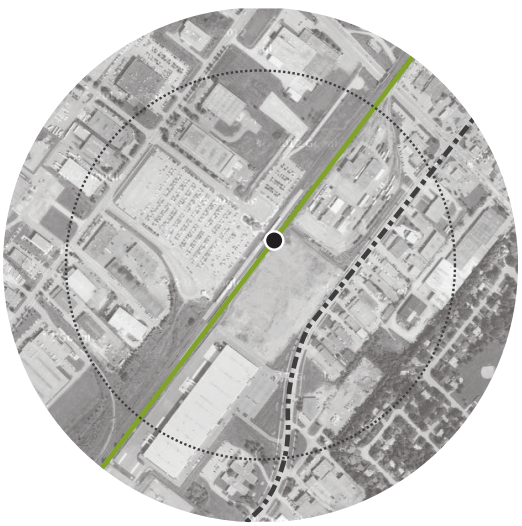
LAKESHORE WEST LINE
GO TRAIN STATION
TERMINAL STATION
MOBILITY HUB

RAILWAY
MAJOR ROADWAY
PARKING LOT

FIG. 4-4
A series of photographs illustrate the current conditions of station areas

While zooming into GO Train stations along the Lakeshore West rail corridor, each station area features similar conditions: it consist of railway, highway, parking lots and empty lots. This condition indicates the potential of the project as a prototype based on principles and strategies that could be applied to other sites with similar conditions across the region.

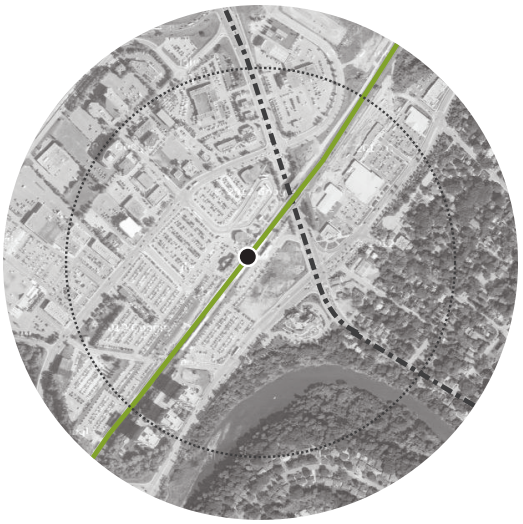
MIMICO
TYPE 01



BRONTE
TYPE 04

FIG. 4-5
GO Train station areas along the Lakeshore West Line

CLARKSON
TYPE 02



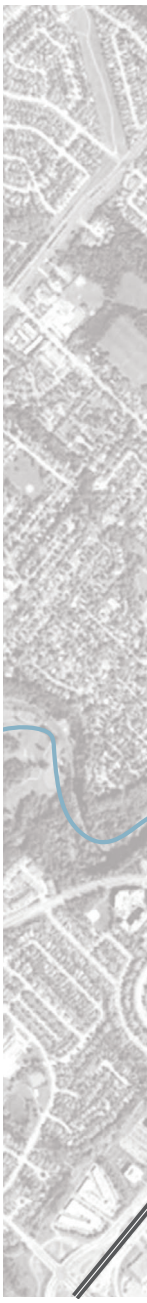
OAKVILLE
TYPE 03

BURLINGTON
TYPE 05

ALDERSHOT
TYPE 06

FIG. 4-6
Location, Context and Proximity of the site

1. Sheridan College Campus
2. Town hall of Oakville
3. Shopping Mall
4. Oakville-Trafalgar Memorial Hospital
5. Downtown Oakville



Connectivity into and within the site works at both macro and micro scales. With its existing GO train infrastructure, and adjacencies to the low-density residential communities and commercial facilities, the proposal provides a critical mass in the town of Oakville: an intensified live and work community anticipating re-urbanization of the Midtown Oakville. In consideration of people moving in and out of the city with reduced usage of automobiles, the walking distance and the proximity to the site play an important role in this proposal.


TRAFALGAR RD.
QEW
RAILWAY
OAKVILLE GO STATION
1
2
3
4
5
400m I 5min walk from centre
1mile I 5min bicycle ride from centre

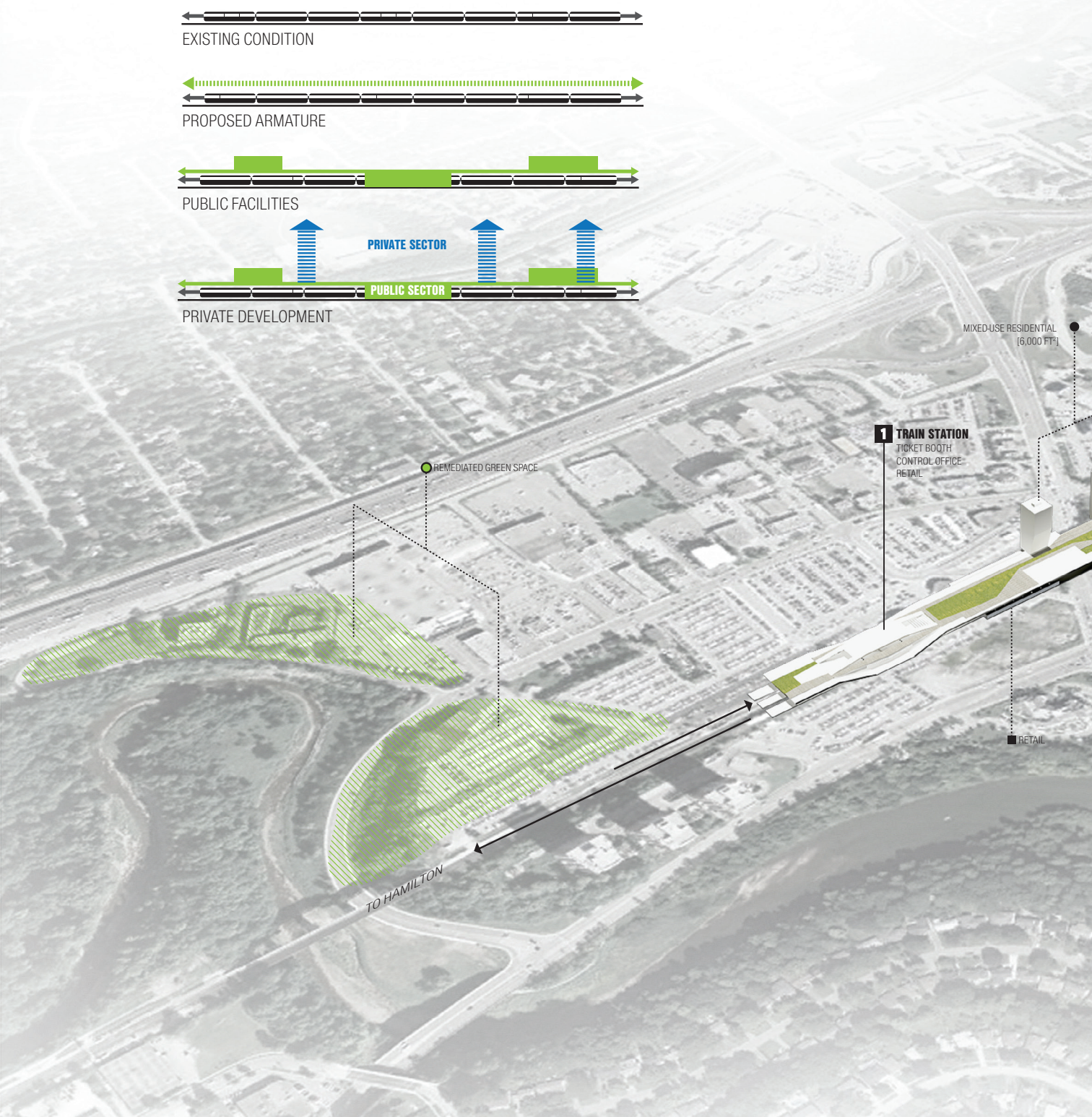
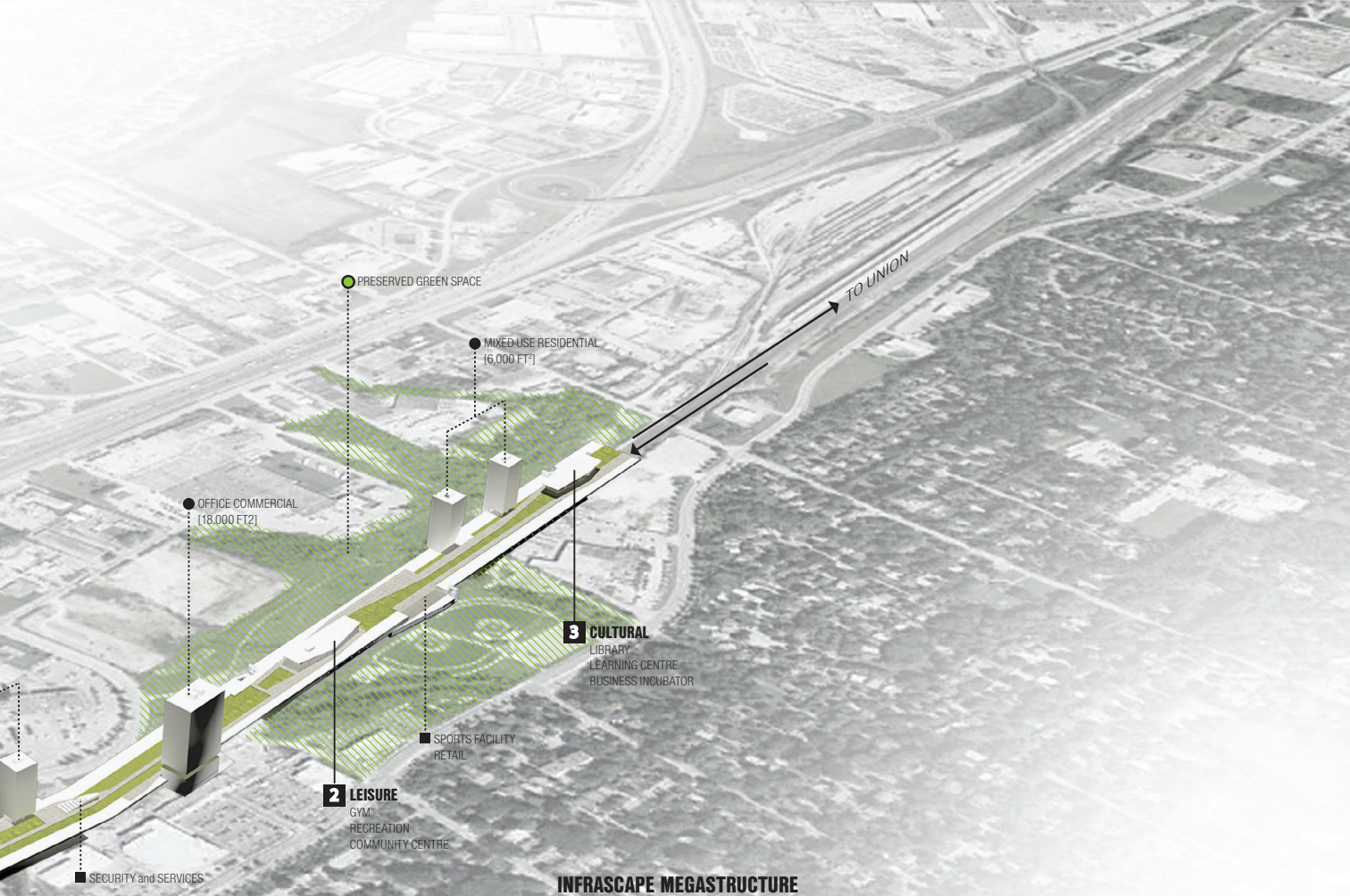


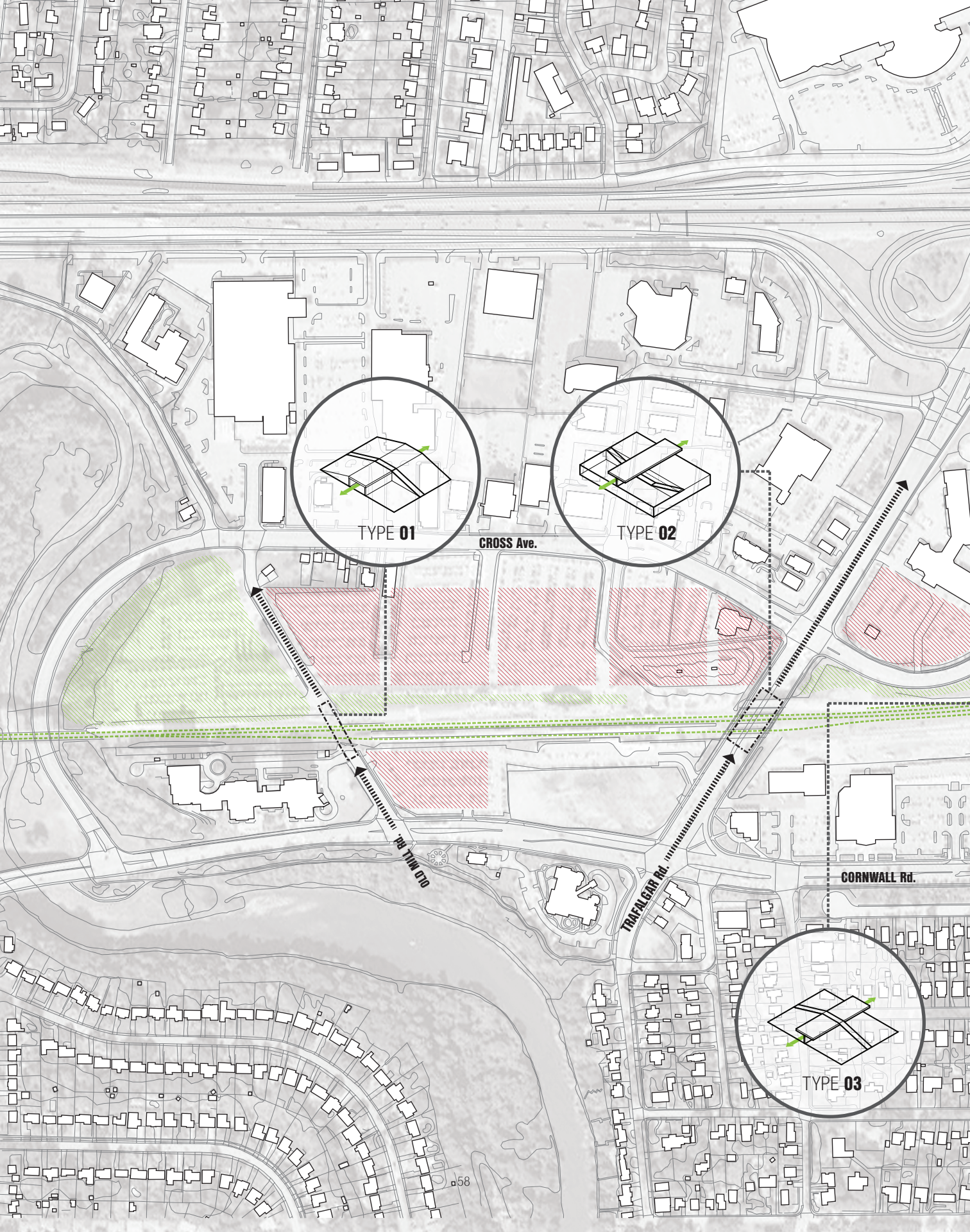
FIG. 4-7
Aerial image of the proposal: Infrascape Megastructure



INFRASCAPE MEGASTRUCTURE

As a response to the official plan, and development strategies provided by governmental agencies, the site of Midtown Oakville will be transformed into a new city centre housing 20,000 residents and jobs altogether. This ambitious plan, however, leads to the marginalization of public spaces and ecological reserve, as well as isolation of transit infrastructure. Given that the major portion of usable land is dedicated to private residential and commercial development, the linear transit corridor offers a rare opportunity for re-establishing the public realm.

The infrascape megastructure acts as a catalyst to evoke attention through its spectacles and place-making potentials. Here, the proposed intervention is offered as a synthesized new "device" that works within the system of urban ecology. The scope of proposal acts as an urban magnet, capable of drawing attention and investments for the entire site. As it continues to evolve with the growth of the city, the megastructure will contribute to the increase of density, land values and economic activities. This thesis aims to stimulate the process of urban transformation into a thriving city centre of the twenty first century.


TYPE 01
TYPE 02
TYPE 03
CROSS Ave.
OLD MILL Rd.
TRAFALGAR Rd.
CORNWALL Rd.

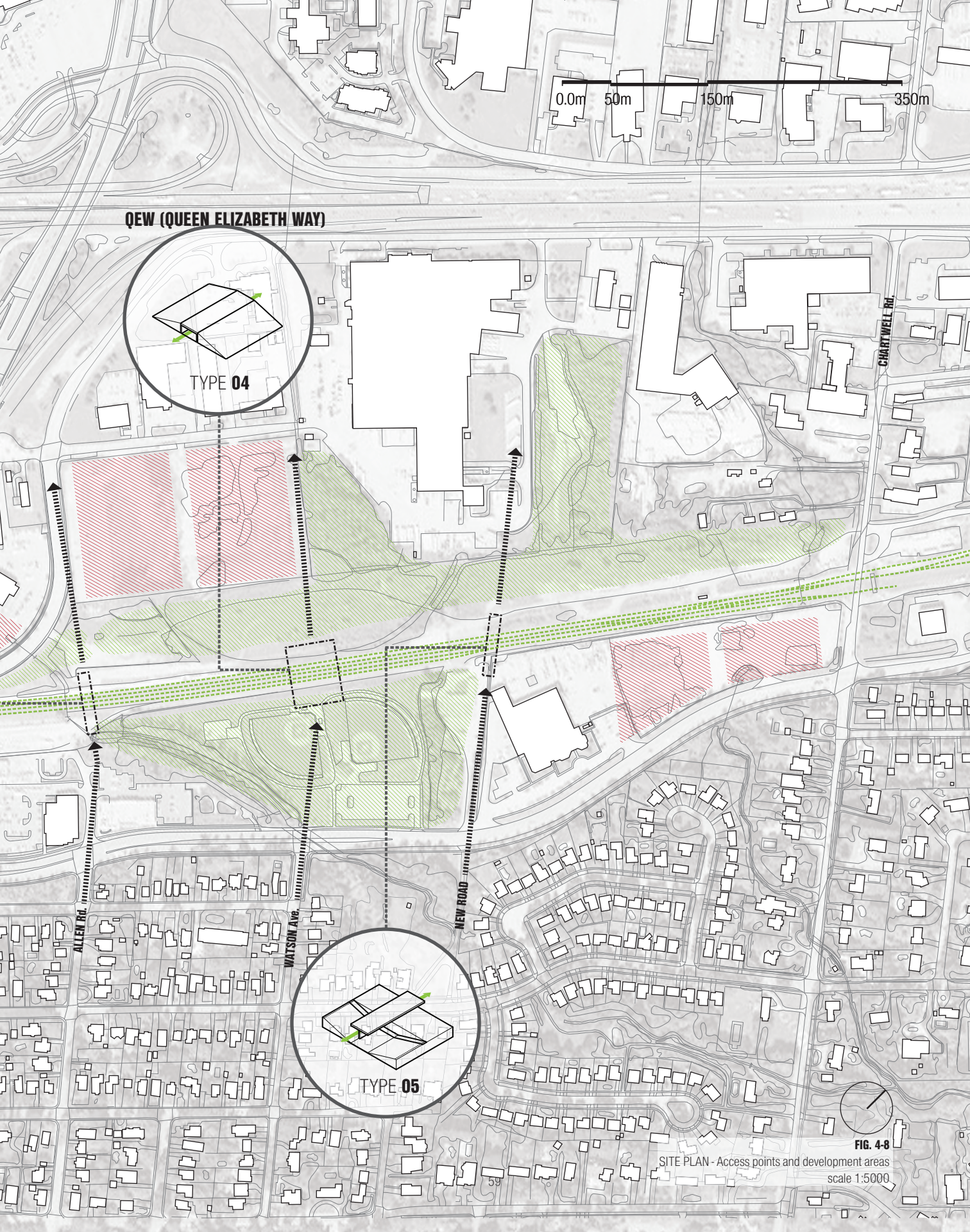


FIG. 4-8
SITE PLAN - Access points and development areas
scale 1:5000

NORTH and SOUTH Connection

The existing GO train railway acts as a major physical barrier, which divides the Midtown Oakville into two pieces. The proposal intends to provide multiple points of access, connecting both vehicular and pedestrian circulation from North to South. Various options and strategies can be employed as diagrammatically drawn below.

Type 1: Manipulated landscape combined with overpass provides a transition from natural features to new development area.

Type 2: Underpass provides an entrance to the underground parking facility directly connected to the proposed intermodal station.

Type 3: Overpass connection minimizes the foot print of newly constructed roads and walkways.

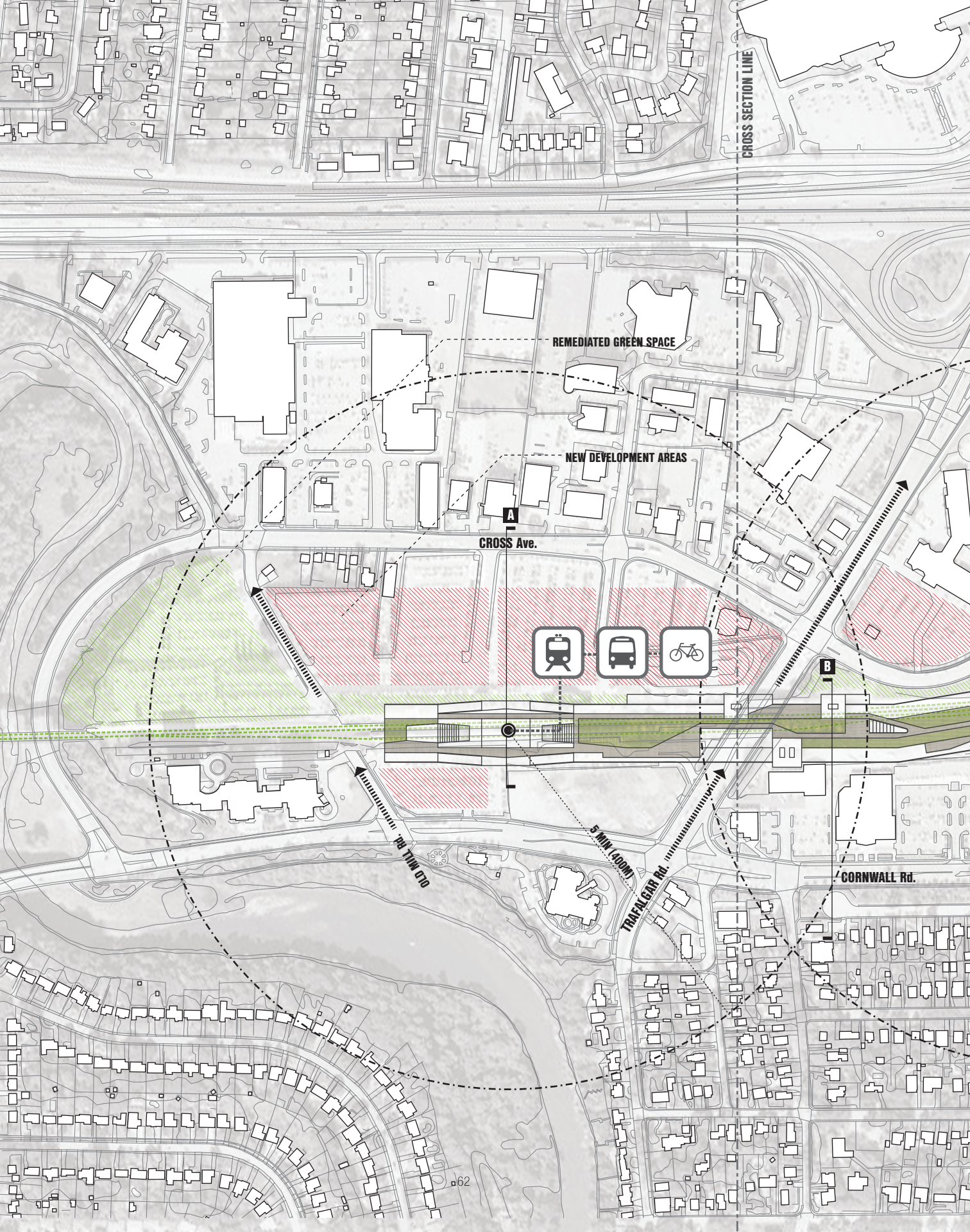
Type 4: Vegetaed overpass utilizes manipulated landscape to serve pedestrian circulation, also providing extended park space.

Type 5: Underpass condition serves vehicular circulation without touching the existing railway infrastructure.

FIG. 4-9
North and South connection diagram

FIG. 4-10
Examples of public spaces integrated with infrastructure
Underpass Park by PFS Studio (top)
Fort York Visitor Centre by Baird Sampson Neuert Architects (bottom)

In recognition of the existing railway as the physical barrier that creates linear void, the interface between car and pedestrian ramps under and over the railway offers opportunities to become unique public spaces. The examples provided in Figure 4-9 suggests innovative design strategies that have been dealt with Toronto's Gardiner Expressway. Underpass Park, designed by landscape architects at PFS Studio, demonstrates how the void space under the overpass can be revitalized through the landscape design. The other example, Fort York Visitor Centre by Baird Sampson Neuert Architects, demonstrates an integration of architecture, landscape and infrastructure, intertwined in order to create a meaningful public realm.


CROSS SECTION LINE
REMEDIATED GREEN SPACE
NEW DEVELOPMENT AREAS
A
CROSS Ave.
B
OLD MILL Rd.
5 MIN (400M)
TRAFALGAR Rd.
CORNWALL Rd.

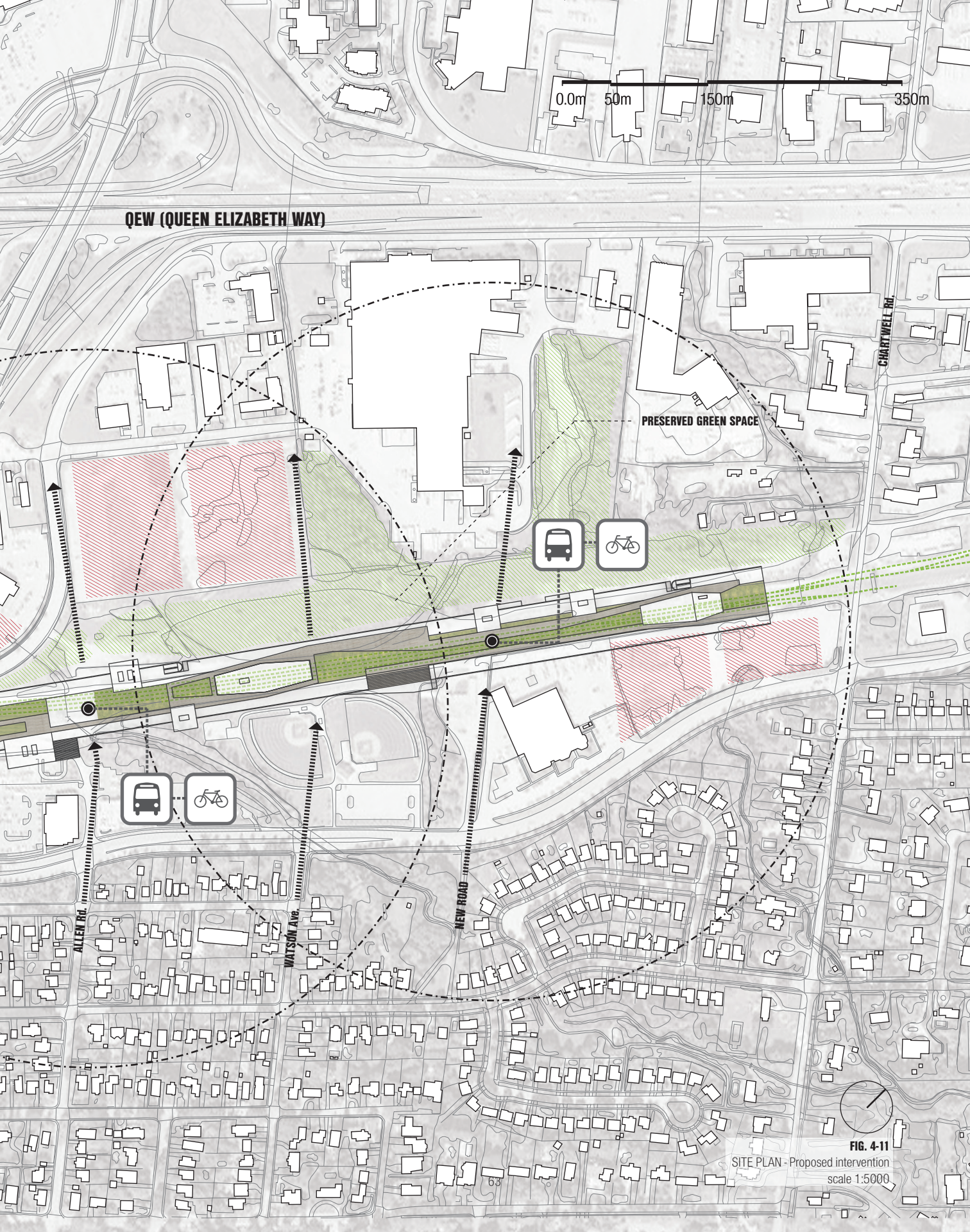
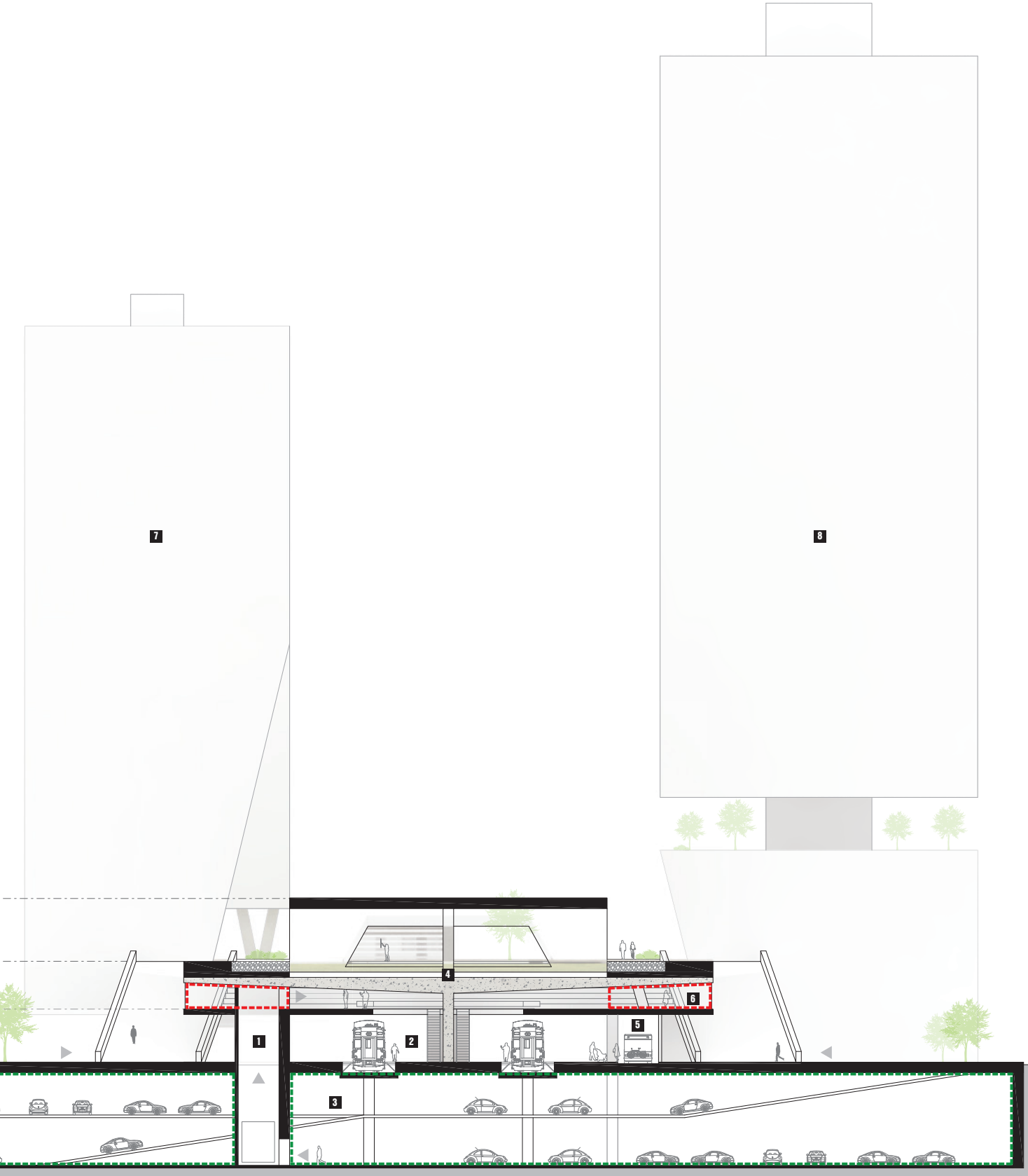


FIG. 4-11
SITE PLAN - Proposed intervention
scale 1:5000

FIG. 4-12
Section A, Intermodal Station Area
Scale 1:500


7
8
4
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1
2
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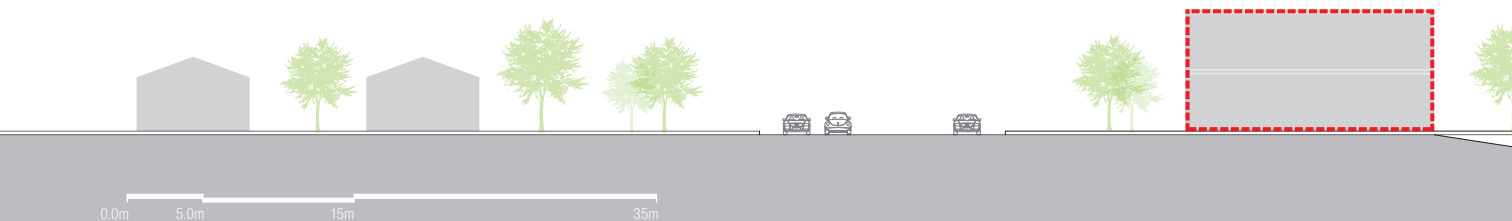
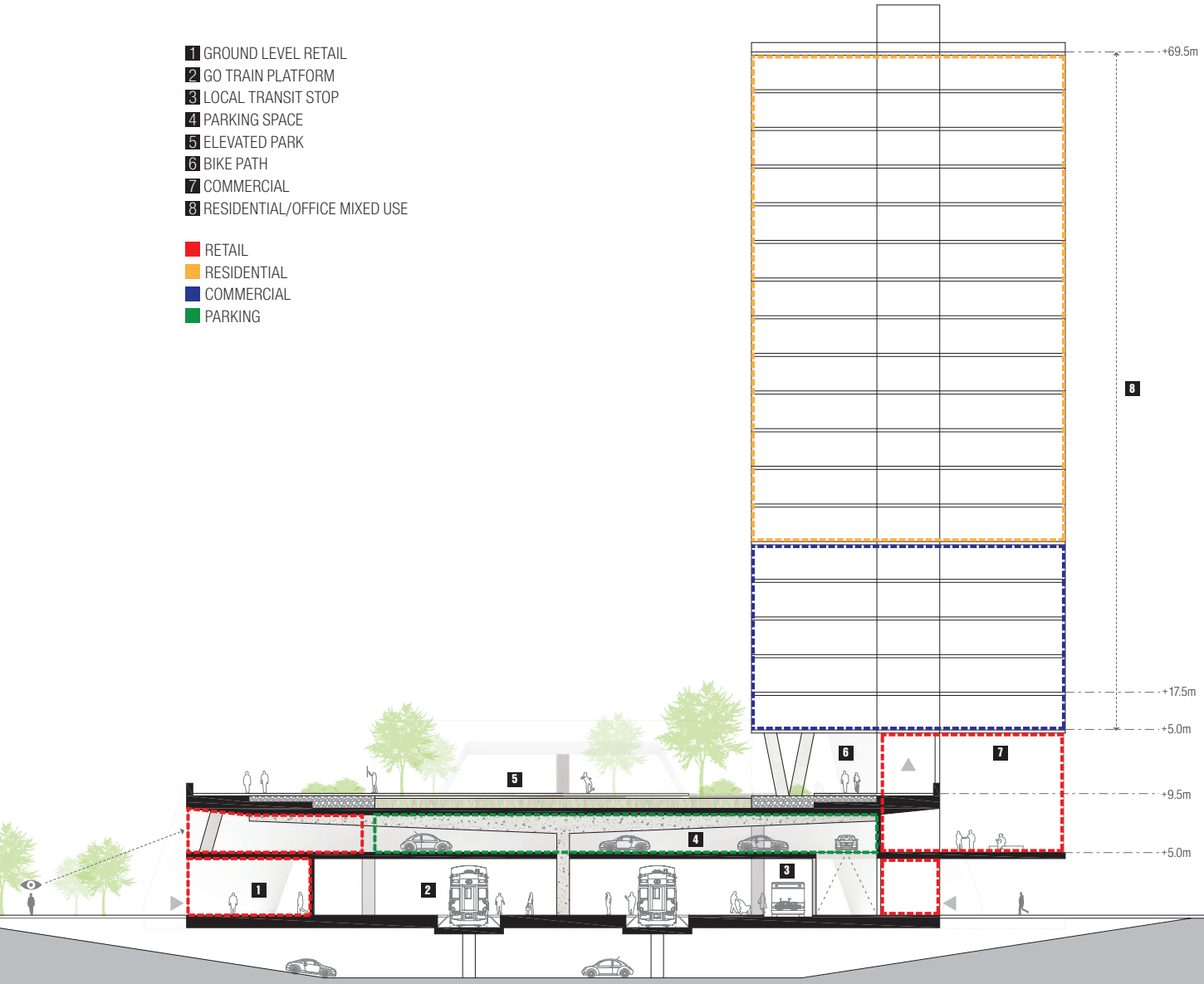


FIG. 4-13
Section B, Underpass Condition
Scale 1:500


1 GROUND LEVEL RETAIL
2 GO TRAIN PLATFORM
3 LOCAL TRANSIT STOP
4 PARKING SPACE
5 ELEVATED PARK
6 BIKE PATH
7 COMMERCIAL
8 RESIDENTIAL/OFFICE MIXED USE
RETAIL
RESIDENTIAL
COMMERCIAL
PARKING
+69.5m
+17.5m
+5.0m
+9.5m
+5.0m

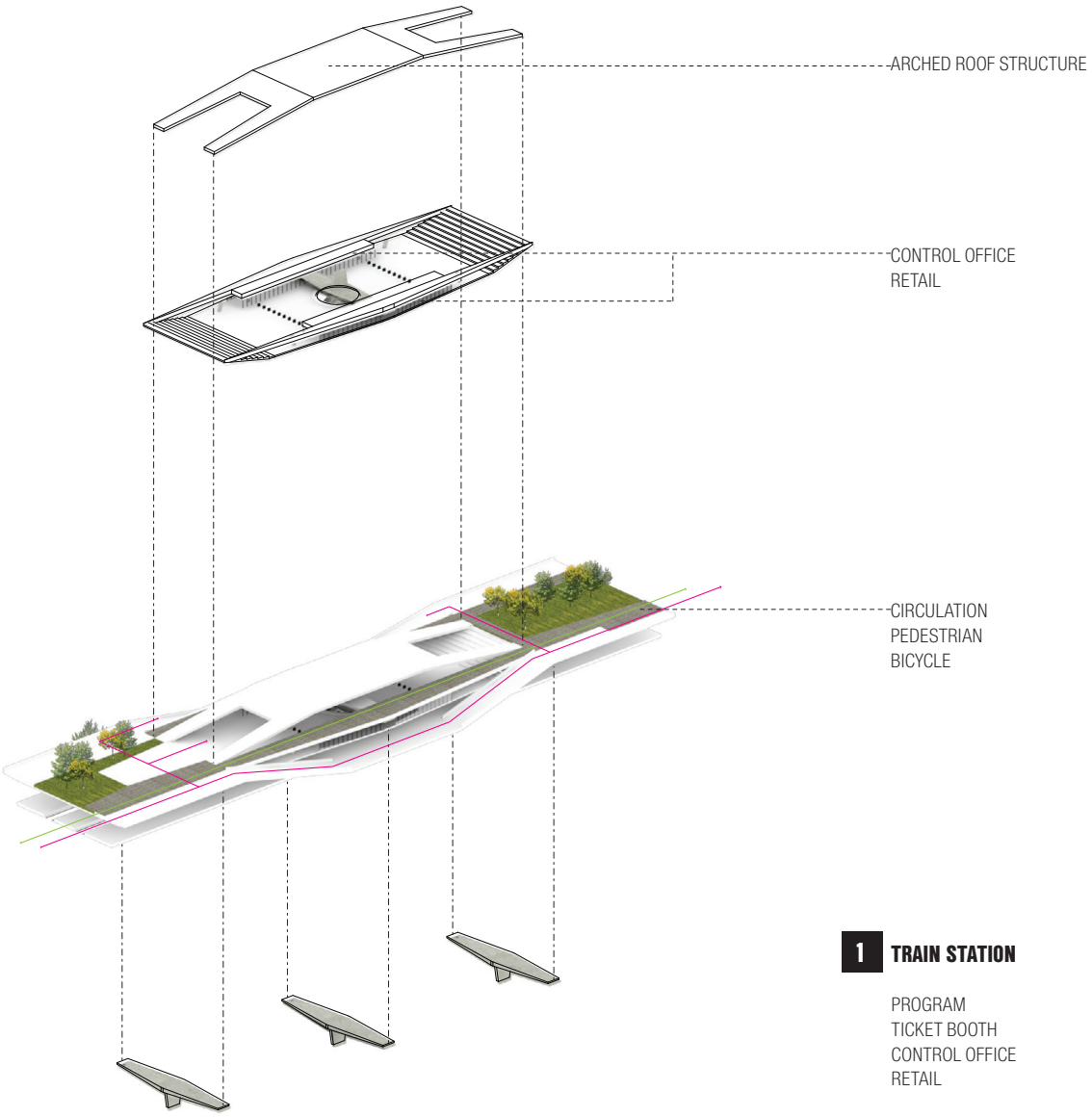
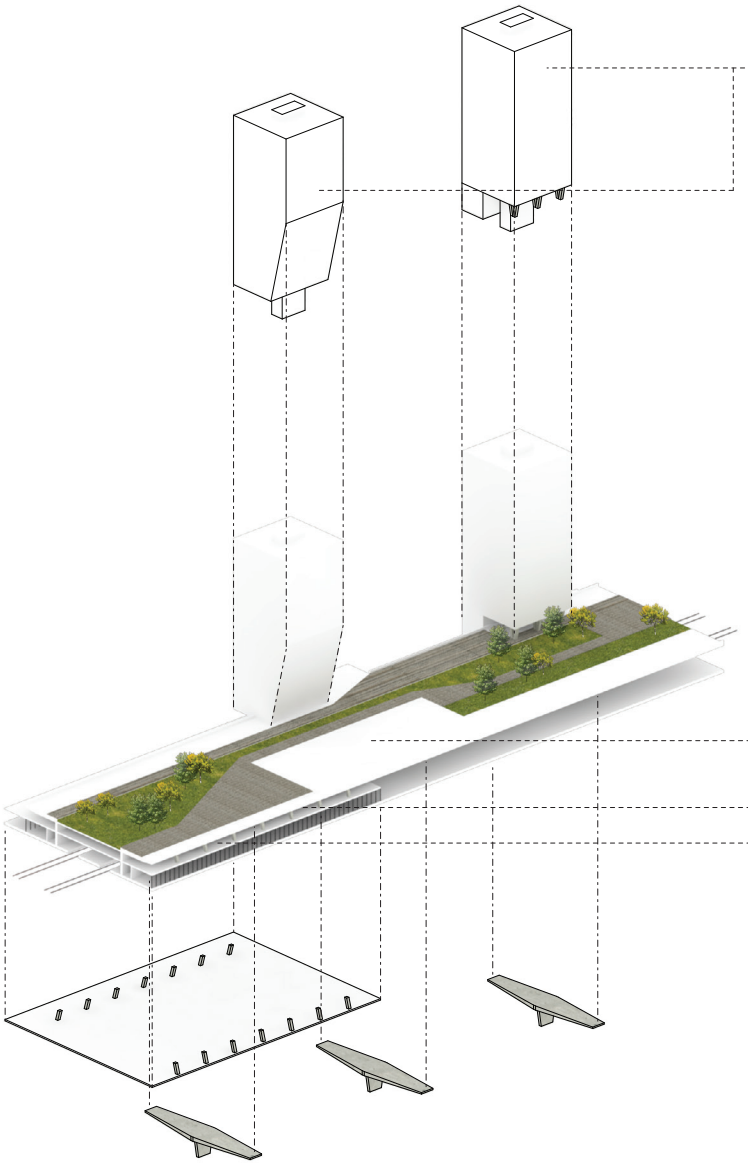


FIG. 4-14
Component 1: Intermodal Station



2 RESIDENTIAL/COMMERCIAL

PRIVIATE DEVELOPMENTS
STRIP COMMERCIAL
PARKING LOT

FIG. 4-15
Component 2: Park+Tower Integration

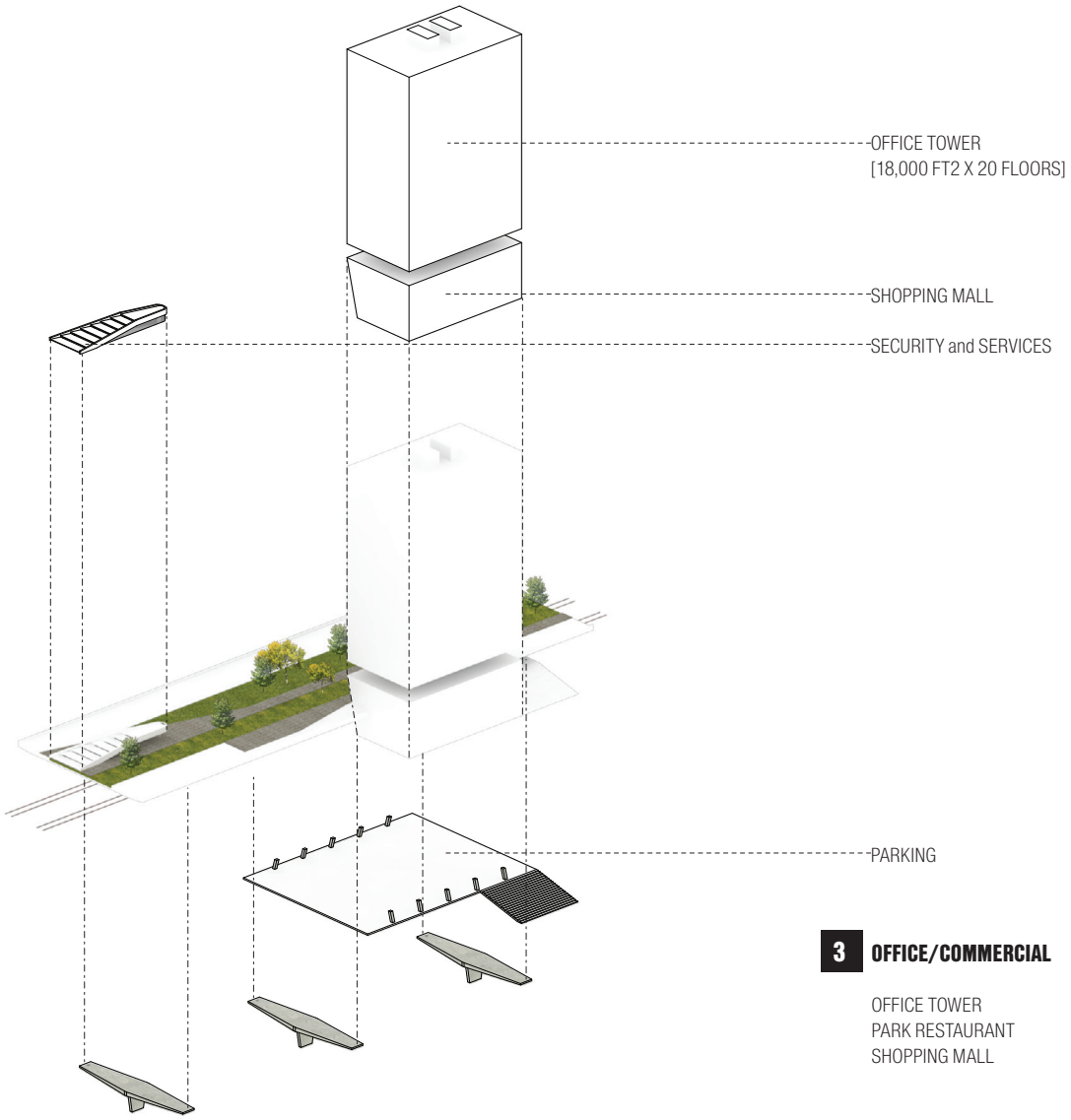


FIG. 4-16
Component 3: Park+Tower Integration

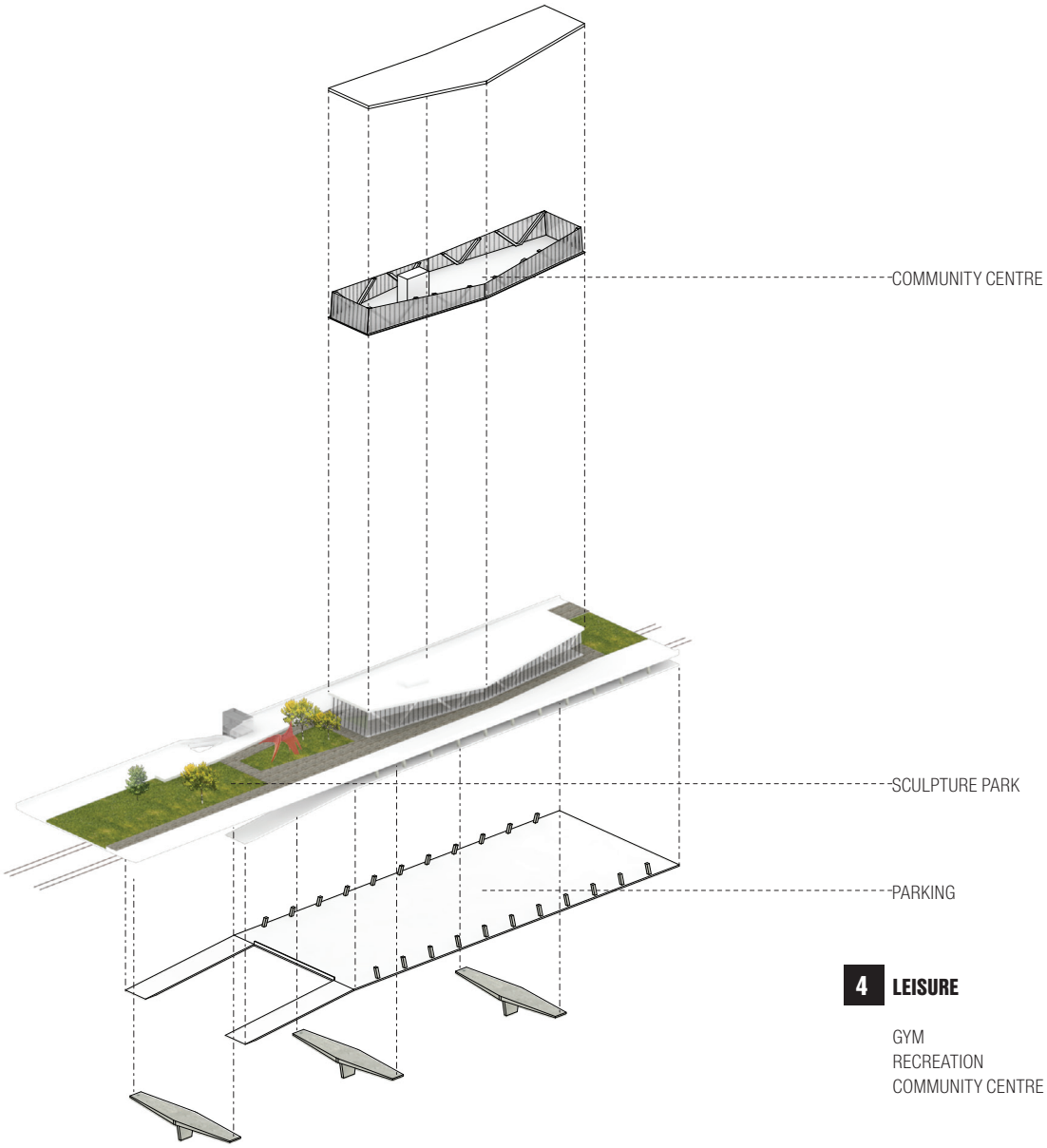


FIG. 4-17
Component 4: Public Facility

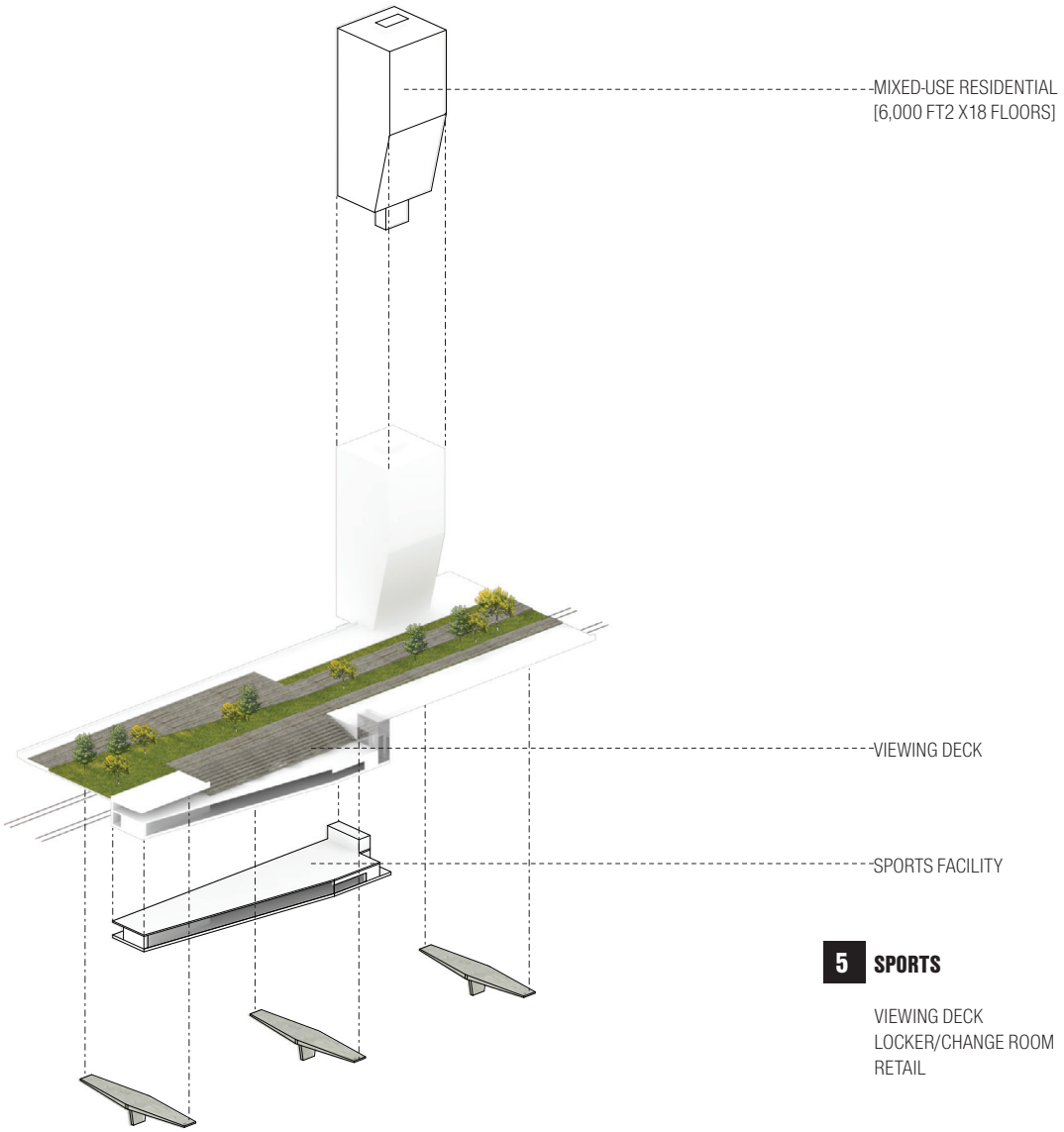
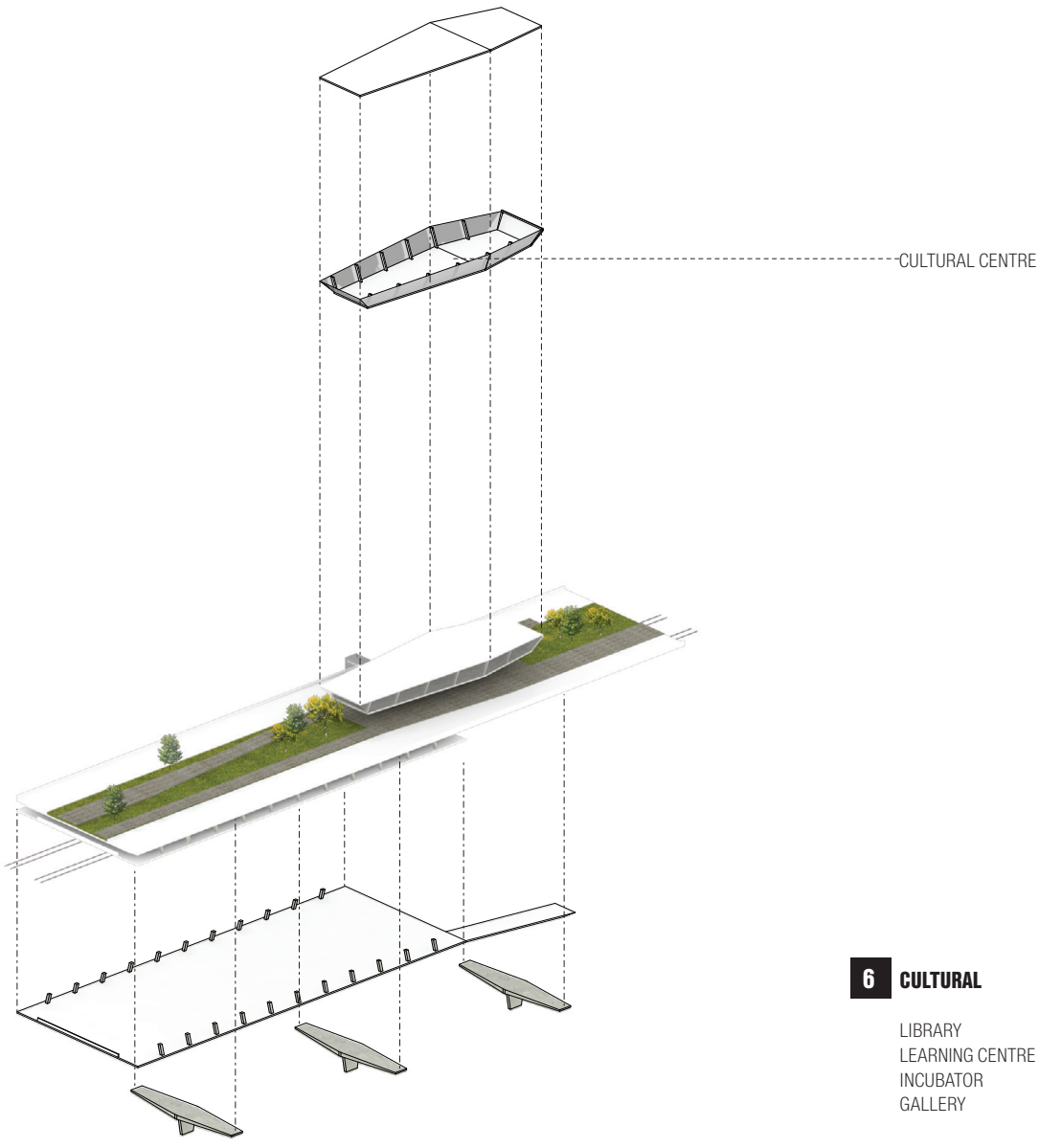


FIG. 4-18
Component 5: Sports Facility



6 CULTURAL

LIBRARY
LEARNING CENTRE
INCUBATOR
GALLERY

FIG. 4-19
Component 6: Cultural Facility

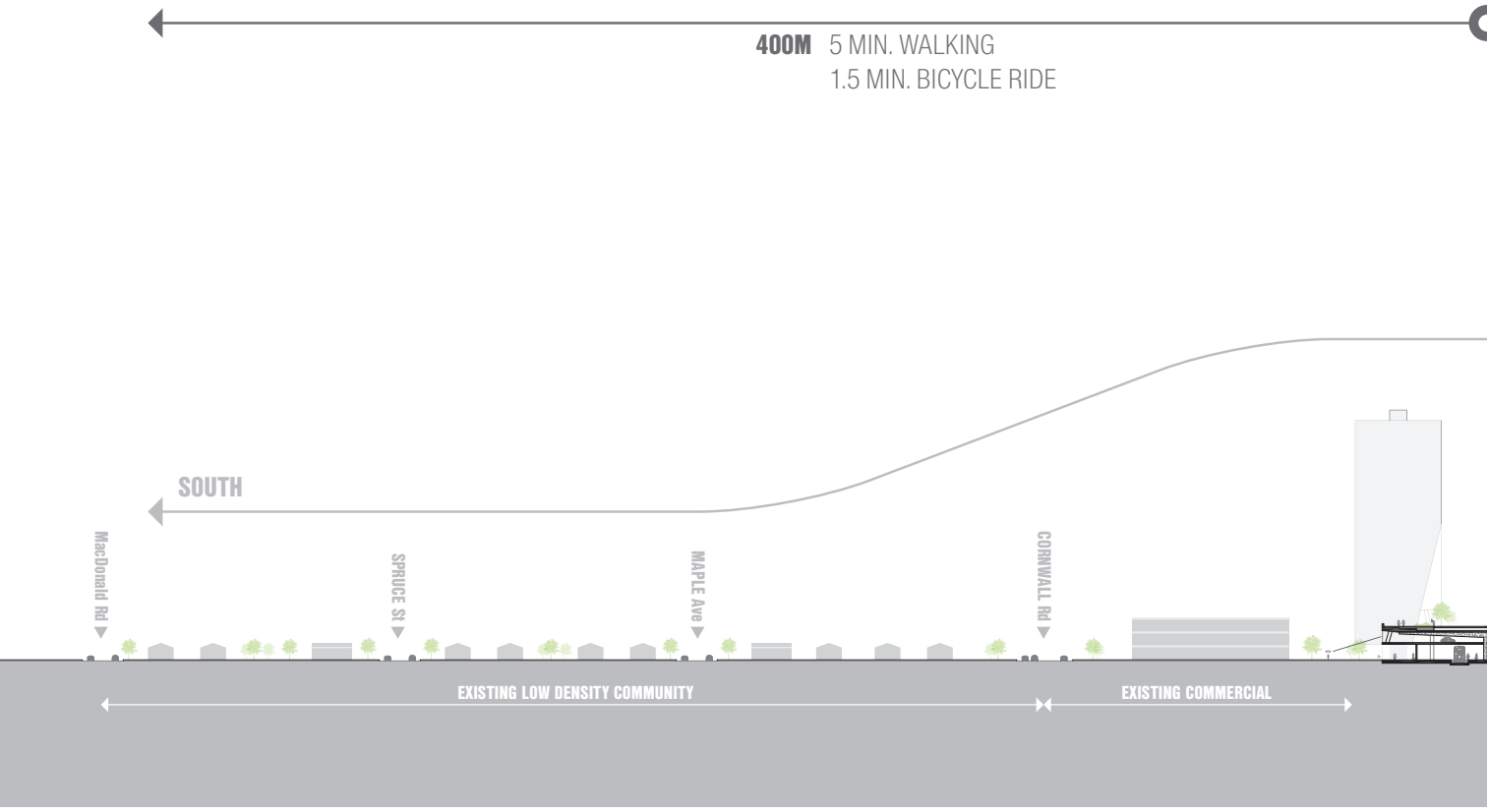


FIG. 4-20
North to South Cross Section, showing the proximity to the proposed intervention

0.0M 50.0M 100.0M 200.0M

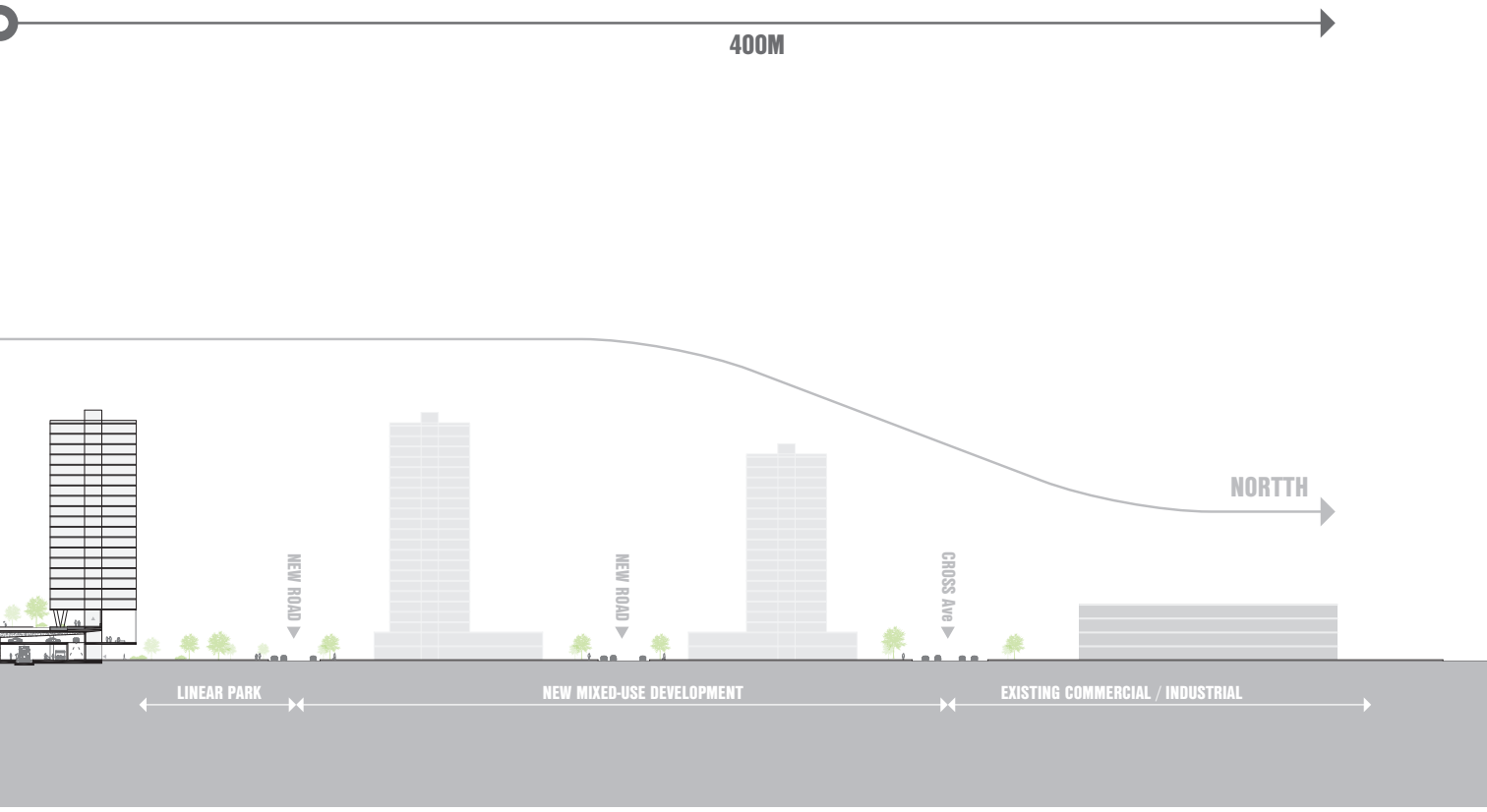
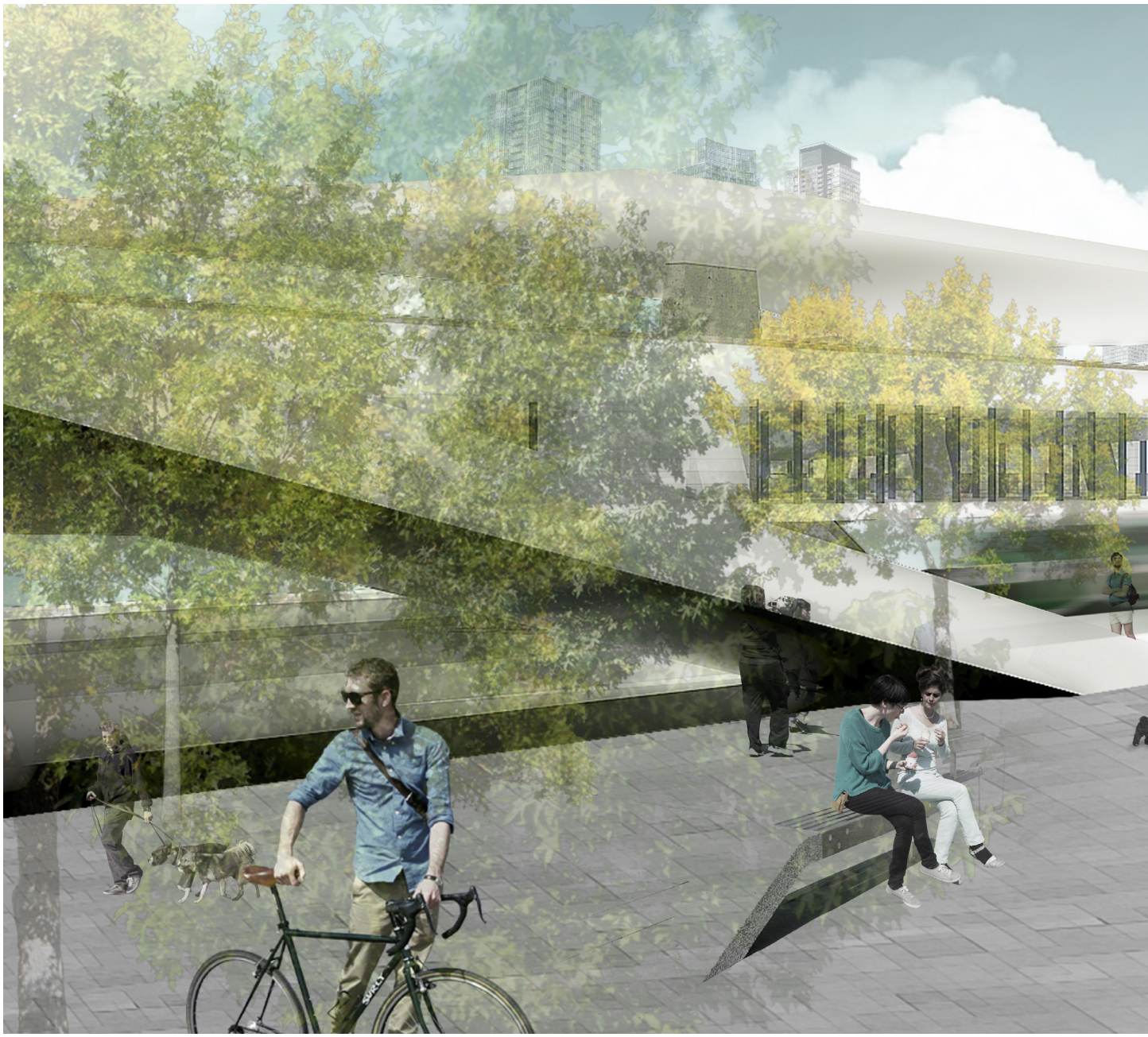

400M
NORTTH
NEW ROAD
NEW ROAD
CROSS Ave
LINEAR PARK
NEW MIXED-USE DEVELOPMENT
EXISTING COMMERCIAL / INDUSTRIAL

FIG. 4-21
Exterior Perspective: Illustration of public access to the park and station

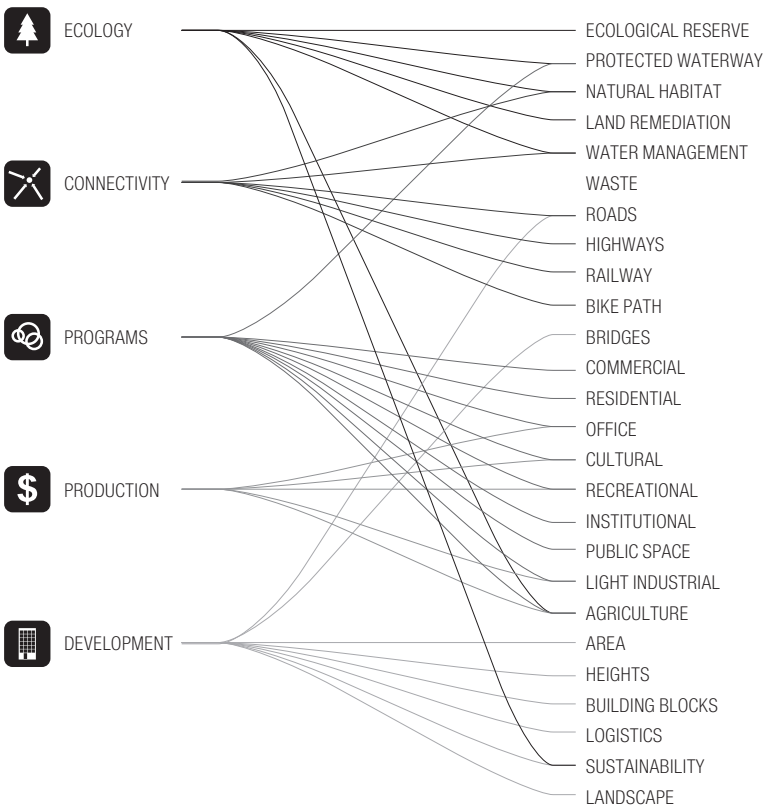



Circle&Band

FIG. 4-22
Interior Perspective: Newly designed Intermodal Station


TO UNION

FIG. 4-23
Matrix Chart : Programs and Typologies



LEVERAGE

The renewed perception towards large-scale infrastructural landscape represents multi-level leverages binding the environment, the public realms and private developments. The core idea behind the proposal owes much to Allen's "field theory" which describes the relationship between landscape infrastructure and the condition triggered by its operations:

"Landscape also offers architecture new models for thinking about the relationship between program and site. In the first instance, there is a

promise that on an open field, anything can happen: sports, festivals, demonstrations, fairs, festivals, concerts, or picnics, as well as any number of informal, unsubscribed events. This is an effect of scale--landscapes are bigger than buildings--but it also has to do with the intricacy of the landscape field… That is to say, architecture and infrastructure create concentrations of density that in turn trigger concentrations of activities." (Allen, 2011, p.225)

The resulting project expresses the role of infrastructure in various measures: ecology, connectivity, programs, economic production and developments. In doing so, the notion of contemporary infrastructure escapes its service-based standards to work within the realm of an architectural and urban phenomenon.

FIG. 4-24
Water Management System diagram

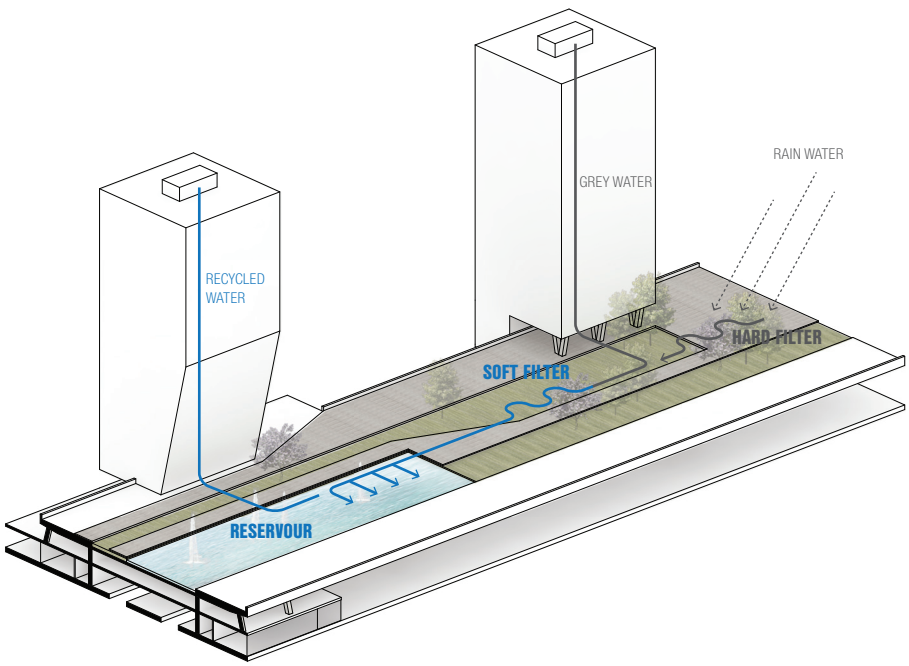
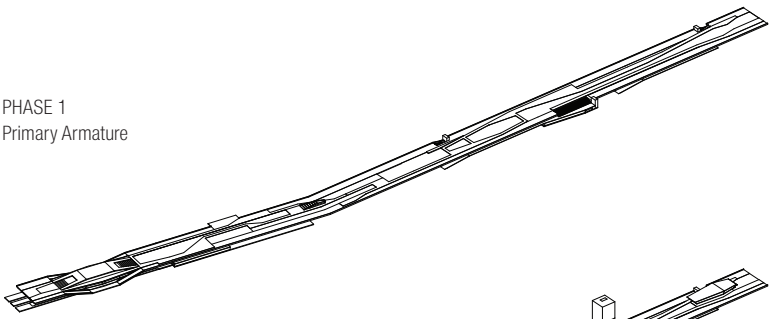
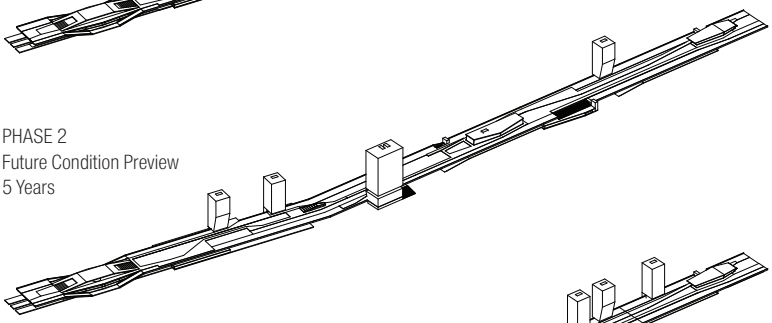


FIG. 4-25
Diagram of Phased Plan

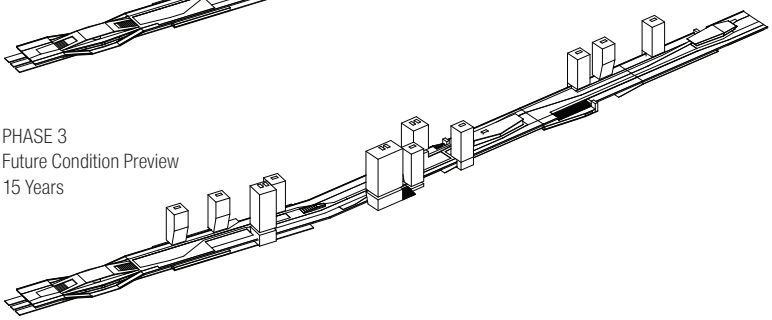
PHASE 1
Primary Armature



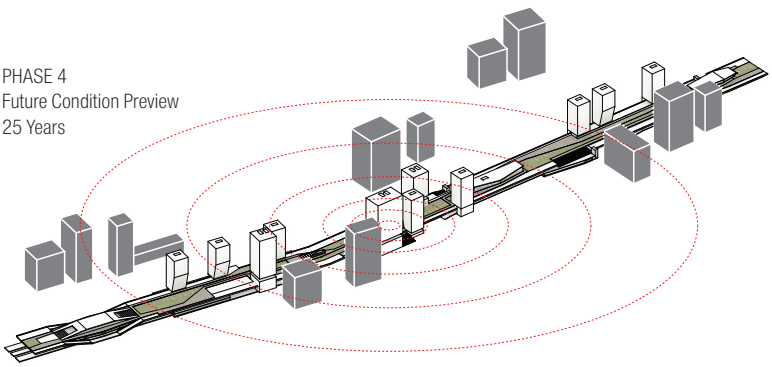
PHASE 2
Future Condition Preview
5 Years



PHASE 3
Future Condition Preview
15 Years



PHASE 4
Future Condition Preview
25 Years



URBAN MAGNET EFFECT
The proposed megastructure acts as a catalyst that enables the flow of investments and growth of the surrounding area.

FIG. 4-26
New developments along the High Line Park
SOLAR CARVE TOWER by STUDIO GANG (left)
HL23 by NEIL DENARI ARCHITECTS (right)

As a phased venture, the intervention will start with recognizing the potential design strategy. The primary armature superimposed on top of the existing rail corridor will initially provide infrastructural services: train station, bus terminal and bridge connection from North to South. The establishment of public facilities and spaces will subsequently follow, formulating an elevated urban park. The latter phases will further involve private developments on the surface of the megastructure, as well as the rest of site. This additive progression is geared towards intensification along the rail corridor, minimizing the ecological footprint of the site in preservation of the Sixteen Mile Creek as an ecological reserve.

FIG. 4-27
Exterior Perspective, Elevated park over the existing railway

CONCLUSION

In light of the significant regional growth in the Greater Golden Horseshoe Area, this thesis investigates mass transit infrastructure as a potential catalyst for re-urbanizing the low density sprawl that characterizes the areas in the vicinity of rapid transit infrastructure. This research demonstrates that infrastructure must not be limited to a mono-functional intervention; rather, it should be explicitly reconsidered as an opportunity to have an impact on society, culture and the environment. This thesis argues that intensification and re-use of existing transit infrastructure not only promotes economic and environmental benefits, but can also create a more vibrant, healthy and sustainable community.

We need a paradigm shift that rethinks the mono-dimensionality of existing transit infrastructure, not only as a service based artifact, but also as a multi-faceted intervention. Currently, transit station developments in the Greater Toronto Area are prone to marginalize valuable ecological reserves and public spaces. The strategic thickening of obsolete railway infrastructure programmatically reconfigures the existing condition, and generates usable spaces for the public realm and further development. This proposition expands the realm of infrastructure; morphologically synthesized with architecture, landscape and urbanism.

The profession of architecture works with concepts and projections, coordinating existing technologies to evaluate and envision the future built environment. This thesis posits that transit infrastructure presents a critical territory for the full and creative participation of architects and planners, and should no longer be relegated in isolation to the domain of transit engineers and planners. A holistic vision of this issue is required along with the expertise of a broader interdisciplinary team of specialists that would also include ecologists, industrial designers, sociologists, and

architects. This coordination between professionals is crucial, because infrastructure mutually exists together with cities and communities, not just mobility.

Throughout the process of this thesis, a myriad of issues emerged requiring an ever expanding depth of investigation. New transportation technologies, inter-regional integration, specific programming, planning and methods of implementation, still remain unanswered and would require an expanded study beyond the scope of this thesis. It is the end of the beginning.

BIBLIOGRAPHY

TEXT

Allen, S. (2008). Taichung Gateway Park. New geographies (pp. 16-31). Cambridge, MA: Harvard University Graduate School of Design.

Allen, S. (1997). From Object to Field. Architecture after geometry (pp. 24-31). London: Academy Editions.

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

Allen, S. (2010). Landscape Infrastructures. Infrastructure as architecture: designing composite networks (pp. 36-45). Berlin: Jovis.

Allen, S. (2011). Urbanisms in the Plural: The Information Thread. Fast-forward urbanism: rethinking architecture's engagement with the city (pp. 36-61). New York: Princeton Architectural Press.

Calthorpe, P. (1989). The Pedestrian Pocket. The Pedestrian pocket book: a new suburban design strategy (p. N/A). New York, NY: Princeton Architectural Press in association with the University of Washington.

Calthorpe, P. (1993). The next American metropolis: ecology, community, and the American dream. New York: Princeton Architectural Press.

Corner, J. (2006). Terra Fluxus. The landscape urbanism reader (pp. 21-33). New York: Princeton Architectural Press.

Corner, J. (2007). Not Unlike Life Itself: Landscape Strategy Now. The new architectural pragmatism (pp. 89-93). Minneapolis, Minn.: University of Minnesota Press ;.

Frampton, K. (1999). Megaform as urban landscape. Ann Arbor, Mich.: University of Michigan, A. Alfred Taubman College of Architecture + Urban Planning.

Gandelsonas, M. (1999). X-urbanism: architecture and the American city. New York: Princeton Architectural Press.

Garreau, J. (1991). Edge city: life on the new frontier. New York: Doubleday.

Gillham, O., & MacLean, A. S. (2002). The limitless city: a primer on the urban sprawl debate. Washington, DC: Island Press.

Kelbaugh, D. (2002). Repairing the American metropolis. Seattle: University of Washington Press.

Littlefield, D. (2012) London (re)generation. Chichester: Wiley.

Mossop, E. (2006). Landscapes of Infrastructure. The landscape urbanism reader (pp. 163-177). New York: Princeton Architectural Press.

Shane, G. (2006). Emergence of Landscape urbanism. The landscape urbanism reader (pp. 36-53). New York: Princeton Architectural Press.

Searle, Glen, and Pierre Filion. (2011). Planning context and urban intensifications outcomes: Sydney versus Toronto. Urban Studies 48: 1419-1438.

Sergeant, W. (2004). Building GO-Transit. Starkville, MS: HTA PRESS.

Sheppard, L., & White, M. (2010). New New deal. Infrastructure as architecture: designing composite networks (pp. 56-63). Berlin: Jovis.

Stoll, K. (2010). Infrastructure as architecture: designing composite networks. Berlin: Jovis.

Tatum, J. (2006). Urban Highways and the Reluctant Public Realm. The landscape urbanism reader (pp. 179-195). New York: Princeton Architectural Press.

Waldheim, C. (2006). Landscape as Urbanism. The landscape urbanism reader (pp. 35-53). New York: Princeton Architectural Press.

Wall, A. (1999). Programming the Urban Surface. Recovering landscape: essays in contemporary landscape architecture (pp. 232-249). New York: Princeton Architectural Press.

WEB RESOURCES

Ministry of Public Infrastructure Renewal. (2005). Planning growth: A guide to the proposed growth plan for the greater golden horseshoe Toronto: Ministry of Public Infrastructure Renewal, http://www.pir.gov.on.ca/userfiles/page_attachments/Library/4/PTGGUIDEENGPP.pdf?N_ID=4 (accessed July 27, 2013).

Metrolinx. (2008). The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area, http://www.metrolinx.com/thebigmove/Docs/big_move/TheBigMove_020109.pdf (accessed July 27, 2013).

Spears , J. (2007). "City's downtown population surges." The Star (Toronto), October 27, 2007. http://www.thestar.com/news/gta/article/270694--city-s-downtown-population-surges (accessed October 1, 2012).

Town of Oakville. (2012). Livable Oakville: Town of Oakville Official Plan 2006, http://www.oakville.ca/assets/2011%20planning/lo-Sep12-fullplan.pdf (accessed July 27, 2013).