

**STREETSCAPES IN MOTION:
URBAN REMEDIATION OF PUBLIC SPACE AND
ROAD INFRASTRUCTURE**

by

Selen Levi

Submitted in partial fulfilment of the requirements
for the degree of Master of Architecture

at

Dalhousie University
Halifax, Nova Scotia
July 2012

© Copyright by Selen Levi, 2012

DALHOUSIE UNIVERSITY
SCHOOL OF ARCHITECTURE

The undersigned hereby certify that they have read and recommend to the Faculty of Graduate Studies for acceptance a thesis entitled "Streetscapes in Motion: Urban Remediation of Public Space and Road Infrastructure" by Selen Levi in partial fulfilment of the requirements for the degree of Master of Architecture.

Dated: July 11, 2012

Supervisor: _____

Reader: _____

Reader: _____

DALHOUSIE UNIVERSITY

Date: July 11, 2012

AUTHOR: Selen Levi

TITLE: Streetscapes in Motion: Urban Remediation of Public Spaces and Road Infrastructure

DEPARTMENT OR SCHOOL: School of Architecture

DEGREE: MArch

CONVOCATION: October

YEAR: 2012

Permission is herewith granted to Dalhousie University to circulate and to have copied for non-commercial purposes, at its discretion, the above title upon the request of individuals or institutions. I understand that my thesis will be electronically available to the public.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

The author attests that permission has been obtained for the use of any copyrighted material appearing in the thesis (other than brief excerpts requiring only proper acknowledgement in scholarly writing), and that all such use is clearly acknowledged.

Signature of Author

*For my parents,
for all the wonderful conversations we've had, stuck in traffic on the Décarie.*

Merci pour avoir été une source de confiance et de courage.

CONTENTS

Abstract	vii
Acknowledgements	viii
Chapter 1: Introduction	1
Topic: How can Architecture Help with Today's Road Infrastructure Crisis?.....	1
The Evolution of Road Infrastructure in North American Urbanism.....	2
The Modernist Avant-Garde: Utopian Landscapes of Mobility.....	5
Critique of the Modernist City: Loss of Place.....	8
Critiques of the Modernist City: A Shift Towards Post-Modernist Urbanism	12
Chapter 2: Montreal's Precedent of Urban Remediation.....	14
Quartier International.....	14
Palais des congrès	16
Centre CDP Capital (Caisse de dépôt et placement du Québec).....	16
Chapter 3: Site.....	18
Area Of Study	18
Décarie Boulevard and Urban Growth.....	20
Land Uses and Connections at Various Scales.....	22
Local Amenities affecting the Décarie Axis Neighborhoods.....	22
Local Amenities with Metropolitan and Regional Effect	23
Neighborhood Classifications and Characteristics	25
Chapter 4: Site and Design Strategy	28
Neighborhood Characteristics	28
Décarie Type 1: Northern Sector, Employment and Commercial Corridor	28
Décarie Type 2: Mixed-Use and Commercial Corridor	29
Décarie Type 3: Heritage and Residential Corridor	30
Design Strategy: Objectives	30
Design Parameters for Program.....	31
Chapter 5: Design.....	34
Design - Step 1: Current Disconnection and the Potential Connection on Site.....	35
Design - Step 2: Response to Site - Pedestrian Plinth as a Connector.....	36
Program Summary	38

Multi-Level Connection	39
Plinth Breakdown.....	46
Chapter 6: Conclusion	55
Appendix A: Other Precedents	56
Design Precedent: Olympic Sculpture Park	56
Precedent in New Forms of Infrastructure: cityLAB.....	57
Appendix B: Décarie Blvd Site Information and Data	59
Population Study	59
Physical Characteristics and Conditions	60
Circulation.....	60
Noise Pollution.....	63
References	64

ABSTRACT

When undertaking the renovation of large-scale road infrastructure, there is a unique design opportunity to reconsider the role of road networks and their effect on our contemporary urban landscape. This study analyses Montreal's trenched Décarie Expressway to explore the potential space created by road infrastructure and its role as a key element in urban renewal.

The urban design takes shape according to the specific characteristics of the neighborhoods adjacent to the Décarie axis. Remediation of these neighborhoods occurs here by introducing public spaces and inserting real-estate development over the expressway. The design concentrates on connecting pedestrian paths along a new public plinth.

Since we have inherited the road infrastructure developed by modern car culture, we must begin to envision transportation infrastructure as an opportunity for public spaces with real three-dimensional connectivity that would marry civic needs with cultural amenities and ultimately symbolize the physical rehabilitation of the Décarie axis.

ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere gratitude to my supervisor Christine Macy for the continuous motivation, enthusiasm and immense knowledge. Her guidance along with her hard-hitting questions throughout these months prepared me not only for my examination but for the hurdles to come in my professional career. To my thesis advisor, Maria Elisa Navarro, thank you for your steadfast encouragement and support. I could not imagine a better supervisor and advisor team to mentor me through my thesis study.

I would like to thank Sarah Bonnemaïson for her help with the initial preparation of this thesis study. I thank my fellow classmates, for the great discussions and fun we had in and out of studio. This thesis work would not have been possible without the guidance and the help of several individuals who in one way or another contributed and extended their valuable assistance in the preparation and completion of this work.

Lastly, I would like to thank my parents and my sister for their amazing support and for being the best on-call cheerleaders.

CHAPTER 1: INTRODUCTION

Topic: How can Architecture Help with Today's Road Infrastructure Crisis?

Streetscapes, Mobility, Transportation

We mostly experience the city in motion - walking, cycling, or driving. Without motion, there is no city. We've all heard of roads being compared to arteries. Without them, the city has no pulse and yet just like a blood clot, traffic can kill the city. Yet, the modernist notion that great speed is the indicator of a great city has long been dismissed. While Le Corbusier believed the future of the city would rely on the car, the pedestrian remained a key factor in all his schemes. The design goal would be to create a space that would help find a more balanced relationship between the car and the pedestrian.

Our experience and perception of space varies by which speed we move through that space. The perception of the city or the image of the city also changes when we move through it by car. Our perception is born through our movement in the city, and through how we experience the in-between spaces in the city. However, if we only define movement as going from point A to point B, we lose the essence of movement as an experience.

Urban Remediation through Public Spaces

Urban expressways have also had an effect on the neighborhoods they pass through, as they cut them in half, creating barriers to movement at the neighborhood scale. For this reason, existing infrastructure should be maximized and developed to its full potential.

Every urban intervention should create a great public space. Disjointed urban fabric will only be unified by a framework of good public spaces. Neighborhoods could be improved by a combination of program and public space adjacent to urban expressways.

The Evolution of Road Infrastructure in North American Urbanism

Montreal has been shaped by its transportation infrastructure and like many port cities, its urban fabric grew around its transportation infrastructure: first the canal, then the railroad, and most recently, the highway. Ease of mobility and accessible transportation is a key factor in early twentieth century urban planning ideologies. The way we move through the city tells us how we live in a city.

To understand the evolution of road infrastructure, one must first recognize the evolution of urban mobility. By acknowledging the physical change the roadways have gone through, we can understand them as expressions of “competing aesthetic practices” (Nye 2011, 99). Some roadways emphasize the collective while others are more individualistic. Some prioritize speed while others privilege flexibility. In all cases, transportation and mobility - no matter how utilitarian they may seem - are part of an “idealized landscape” (Nye 2011, 99). During the industrial revolution in the middle of the 19th century, cities were shaped by roads, canals and railways. Each of these forms of transportation has been used to define and frame a landscape, and to embody a certain view.

In the 18th and early 19th century, travel by canal was more pleasant than travel on unpaved roads. Boats pulled by mules and horses moved at an unhurried pace and offered



James Duncan, *Lachine Canal, Lachine, QC*, painting, c.1850 (McCord Museum Collection 2011)

a sense of open space. Passengers often sat outside, with no obstructions to their view, and they were immersed in the landscape they passed through, which they could hear and smell as well as see (Nye 2011, 101).

While the canal boat ride allowed for a direct encounter with the passing scenery, railway travel literally changed the way that people saw the landscape. As passengers stepped up into train cars, their elevated perspective on the surrounding countryside, combined with the speed of the train, made it difficult to see at anything nearby. In *Metropolitan Corridor*, John Stilgoe writes “increase in speed forces the observer to look ever further from the car, and particularly east of the Mississippi River, such long views are rare” (Stilgoe 1983, 250). The railway journey erased the foreground, whose details disappeared from the traveller’s experience. Only the larger more distant panorama remained (Nye 2011, 101). Walt Whitman describes the industrialization of this landscape of “Specimen Days”:

I see, hear, the locomotives and cars, rumbling, roaring, flaming, smoking. Constantly, away off there, night and day – less than a mile distant, and in full view by day. I like both sight and sound. Express trains thunder and lighten along; of freight trains, most of them very long, there cannot be less than a hundred a day. (Whitman 1883, 132)

Yet like the canal boat, the railroad car was a social form of transportation, in which the traveller encountered strangers and often fell into conversation. The immensity of the system, the grand central stations, the bridges spanning over rivers, the tracks cutting through the mountains, and the speed in the movement all triumphed over the natural landscape. Yet at the same time passengers were deeply appreciative of the landscape (Nye 2011, 102).



Rail line tunnel under the Mount Royal and McGill College Ave., 1951. (Les Archives du Photographe 2012)

By the late 19th century, North Americans began to long for travel that did not follow a single track or timetable like the railroad. The frustration first emerged in the form of a bicycle craze, when people took to the open road at a new pace that was three times as fast as walking. The bicycle also gave to the traveller a flexibility to go at any time. With its invention, the automobile quickly became a favoured mode of transport. People preferred cars because they associated them with everything the railroad was not. Personal and never on a timetable, the car was understood as a free expression of individuality (Nye 2011, 103). Yet to understand the early car culture as it emerged as a prevailing mode of transportation, one needs to understand the modernist frame of mind that went along with the automobile.

The Modernist Avant-Garde: Utopian Landscapes of Mobility

Modernism is rooted in the 19th century industrial revolution, at the height of technological optimism. H.G. Wells, Albert Robida, and Jules Verne were some of many artists who described fantastic machines that would help man achieve extraordinary things.



Albert Robida, *Leaving the Opera*, Lithograph, 1883 (Nye 2011)

Robida represented everyday activities that were altered by unprecedented technologies. For example, in his 1883 lithograph *Leaving the Opera*, Robida takes a typical bourgeois activity and dresses it with vehicles that fly above the activity, creating multilayered routes of transportation and movement at all levels of the city (Wergeland 2011, 153). Robida's utopia foresees Paris as almost completely preserved. The new dimension of the future lies within new technologies of

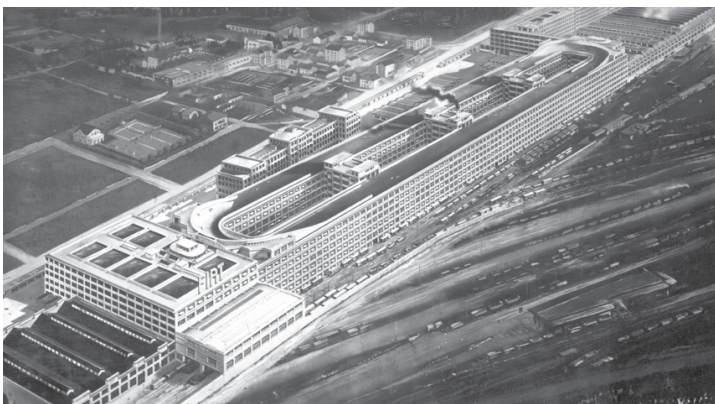


Le Corbusier's Plan Voisin for Paris, model, 1925 (Professor Hanser's Lectures 2012)

movement. He also establishes a hierarchy of speed, where rapid movement occurs above the city while the slower pace happens at ground level, just as Le Corbusier envisioned.

Like many of his contemporaries, Le Corbusier was infatuated with the aesthetic of speed and designed cities where mobility reigned at every level. Le Corbusier assumed that cars would become dominant but at the same time, he sought to reconcile the metropolis and the village, arguing for the separation of car and pedestrian traffic (Bell 2001, 71). In his 1925 *Guiding Principles of Town Planning*, Le Corbusier wrote that the car was a revolutionary tool to city organization. It would bring unprecedented freedom, providing the motorist a city of speed, therefore a “city of success” (Bell 2001, 72). With urban designs like *Plan Voisin*, Le Corbusier intended the automobile to save the city, and he made use of the skyscraper as a vertical reflection of the horizontal shape of urban roads, introducing the idea of “streets in the air” (Wergeland 2011, 152).

This stratified mobility is the beginning of the modernist notion of looking at the city in section, where movement does not only occur on a traditional “street”. One example is Giacomo Mette-Trucco’s Fiat Factory in Lingotto Turin. This 400,000 sq-m concrete structure was built in 1914-1926. The five-



Fiat Factory in Lingotto, Turin, 1914-1926. (Bell 2001)

storey building has two helicoid ramps leading to a banked test track for cars on the roof. The factory design was used by Le Corbusier as a demonstration of his principles in *Vers une Architecture* (1923) (Bell 2001, 7).

Early-modernist scenarios place the city in an objective reality, where common public good could be rationally defined in pure forms, and where experts are those who know how a city works and what is best for its citizens (Hirt 2005, 29). Modernism embraced machine-like efficiency, where Le Corbusier defined a house as a “machine for living in” and praised aesthetics in which “repetition dominates everything”, and where Frank Lloyd Wright welcomed a new planning measurement scale: not the walking man but the man driving a car (Hirt 2005, 29). These ideas would predominate the mid-twentieth century, in an urban design paradigm that sought technological modernity and efficiency. Efficient cities were understood as successful cities.



Bronx River Parkway, 1922. (Westchester Magazine 2009)

Until the 1930s, car mobility was an extension of the search for the natural landscape. The Bronx River Parkway, built in 1925, was the first limited-access road, comprised of twenty-five miles of curved roadway and forested vistas, evoking Olmsted's picturesque panoramas of the previous century.

The parkway created a new functional environment devoted exclusively to high-speed car travel. It treated motorists to an aesthetic experience, a pleasure road where cars moved efficiently and undisturbed by disagreeable sights (Schwarzer 2004, 100).

Critique of the Modernist City: Loss of Place

Yet in retrospect, the Bronx River Parkway is one of only a handful of road infrastructures that are still considered successful works of landscape design. By the 1930s, parkways gave way to more utilitarian turnpikes and highways that were wider and straighter. The most important pressure to upgrade intercity roads came from automobile manufacturers and these new highways were explicitly built for high speed. Freeway driving became an intense, self-absorbed activity that left no time for contemplation of the landscape. Unlike canal and railroad transportation, the driver had little opportunity to experience the surrounding setting, be it countryside or city. Reyner Banham notes that the L.A. motorist had to make an “almost total surrender of personal freedom for most of the journey” during which they are immersed in “an incredibly demanding man/machine system” (Banham 1971, 214).

The highway landscape has become more and more demanding of speed and immediacy, a maximum of experience in a minimum of time. The experience of travel has shifted from an awareness of the landscape, to a concentration on the activity of driving. By mid-20th century, highways generally ignored the irregularities of local topography, and were equipped with uniform signage placed at regular intervals and at standard heights. This automobile was designed as a high-speed experience in which the landscape was reduced to generic background space (Nye 2011, 108).

Le Corbusier did not anticipate the development of the commercial strip. However, motorists were also consumers who were catered to by a number of small businesses along the strip. New typologies such as car dealers, garages, tire stores, gas stations, and drive-by burger joints were all part of this new environment. To attract drivers, these new businesses erected enormous signs that could be seen a mile away. They created a “vernacular landscape of consumption”, where bright lights and eye-catching buildings vied with one another to catch the motorist’s attention (Nye 2011, 104).



The Original Orange Julep, Décarie Blvd, 1950s. Photograph by M. Connelly. (Spacing Montreal 2010)

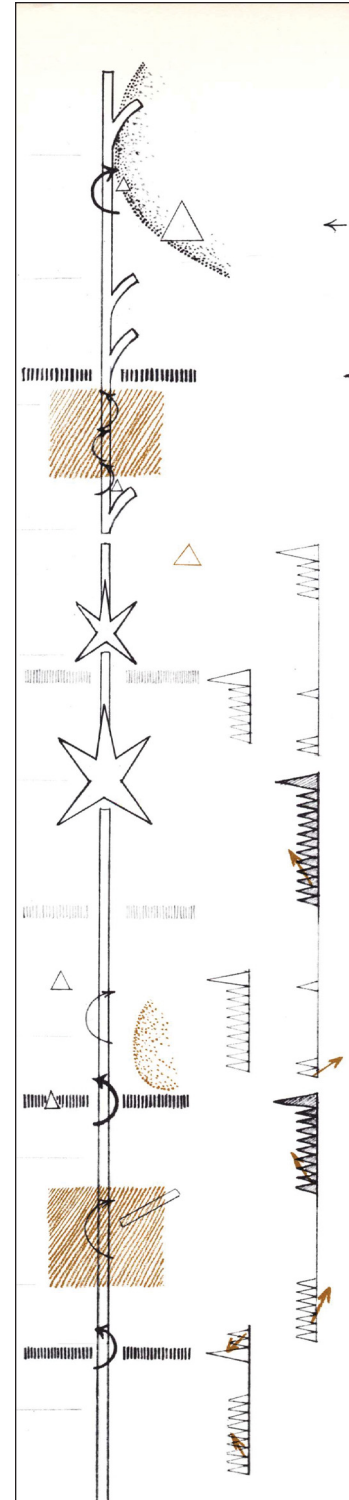


Orange Julep, Décarie Blvd, present. Photograph by Sue Clerc (Large Canadian Roadside Attractions 2006)

In an urban context, transportation infrastructure can rearrange social interaction. While railroads and expressways are similar in their disengagement from their surrounding landscape, railroads have the train station, which create strong central activity nodes in the city. The massive infrastructure of an expressway often does the opposite by cutting adjacent neighbourhoods apart. Yet expressways have a way of connecting the cities at a larger scale, as much as they tear them apart at a smaller scale. These zones of fast-speed transportation have become their own landscape, with exit ramps that provide individual destinations (Schwarzer 2004, 100).

By the 1960s, many written pieces such as *Man-Made America* and *The View from the Road* envisioned the expressway as a potential artifact, like an outdoor museum of mobile expressionist sculpture (Schwarzer 2004, 104). Although designed by engineers and not architects, the expressway was not merely functional. It was to be seen as a work of art experienced simultaneously with technological and artistic perception. In *The View from the Road*, Donald Appleyard and his colleagues take a look at the aesthetics of highways as an experience of the driver and passenger, and what this implies for their design. He underlines their “potential beauty...as contrasted with their current ugliness” (Appleyard, Lynch and Myer 1964, 1). The view from the road has the potential to be a great urban experience, where the driver could experience the play of space and motion and of light and texture. According to Appleyard, the highway is the “great neglected opportunity in city design” (2). As the old city is created for the pedestrian, the modern city is best experienced from its highways. Only then, can the motorist understand the form and meaning of the place. But the highway view also supplies a new type of machine-experience knowledge. Expanding on their analysis of the now-demolished Central Artery in Boston, the authors describe a variety of views and panoramas that exhibit the interplay of major and minor architectural experience and of landmarks and rushing cityscapes (Appleyard, Lynch and Myer 1964, 29).

Would it be possible to use the highway as a means of education, a way of making the driver aware of the function, history, and human values of his world? The highway could be a linear exposition, running by the vital centers, exposing the working parts, picking out the symbols and historical landmarks. Signs might be used for something more than giving directions or pressing a sale. They could point out the meaning of the scene. (Appleyard, Lynch and Myer 1964, 17)



Sequence diagram showing the visual experience of a highway. In this case, the approach to Central Boston via the Mystic River Bridge (Appleyard, Lynch and Myer 1964)

This moving “exposition” would work for the car passenger but the driver’s view would be framed by what is comprised in the front of the car’s windshield (Schwarzer 2004, 106). Motorists navigate through a space framed by speeding cars, rushing by guardrails, retaining walls, and signage.

Appleyard further describes how details and textures radiate from the center point straight ahead and how a building can appear to hover over the road. “Landmarks may move against a background or a foreground, be caught in a moving frame, be masked and revealed, or rotate first one way and then another. Two important landmarks may come into conjunction, to give a powerful sense of being on line” (Appleyard, Lynch and Myer 1964, 11). The landmark becomes larger as the car approaches it. Yet one never reaches it from the expressway, having to exit first in an anti-climactic conclusion to the commanding views of the expressway (Schwarzer 2004, 109).

Our experience and perception of space varies by the speed at which we move through that space. One perception or the “image” of the city also changes when we move through it by car. However, if we define movement as going from point A to point B, we lose its essence as an experience. Mitchell Schwarzer’s *Zoomscape* is a study of our altered perception of the built environment due to transportation and camera technologies. We experience buildings, neighbourhoods, cities and landscapes as we ride in trains, cars, and planes. We perceive places at high speeds, across large distances and always in a state of distraction. William H. Whyte notes in *The Last Landscape*, “our appreciation of a picturesque landscape seen from an automobile depends on the brevity and remoteness of the view” (Whyte 2002, 324).

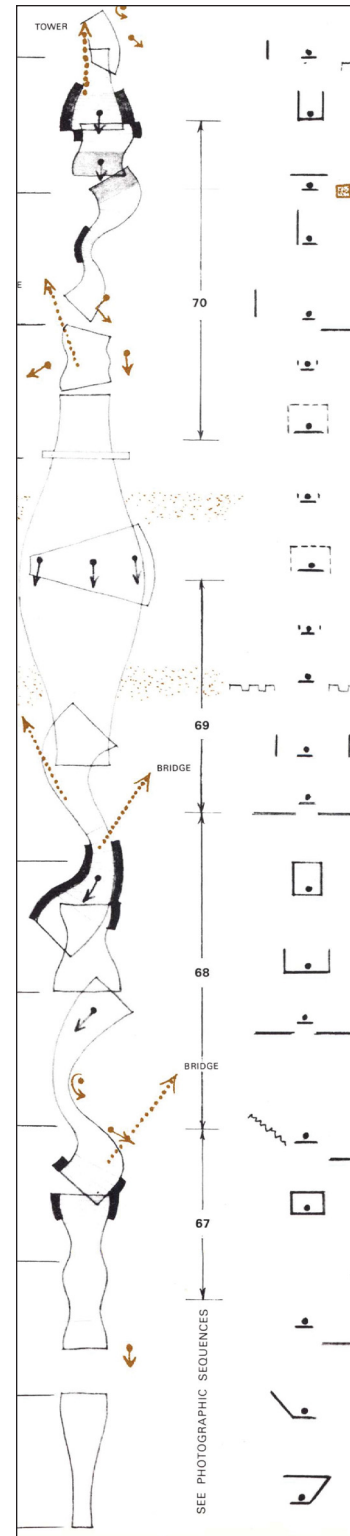


Diagram on how to design visual sequences for the observer in motion in Central Boston. (Appleyard, Lynch and Myer 1964)

Critiques of the Modernist City: A Shift Towards Post-Modernist Urbanism

Robert Beauregard argues that master planning schemes arose to rationally arrange the chaotic land use of newly industrializing cities in the late nineteenth century. The master plan is and has always been an attempt to control the processes that make a city in terms of the spatial organizations of functional and economic factors (Beauregard 2003). Modernist planning also had a lot to do with categorizing and then dividing according to land use and function. Modernist architecture was intended to overcome the city's resistance, by rigorous design (some might call over-design). Discussions on city image and its legibility show a shift away from the Rational-Functionalism-Machine metaphor and toward pluralist and urban identity priorities (Hirt 2005, 30). In most modernist urban planning, cities were to be at once colonizing and eternal, and strengthened by limited-access highways that would push the driver in and out of the city with enjoyable speed (Cuff and Sherman 2011). However, we have now come to the point where we live in an auto dystopia of our own making. In *Carchitecture*, Jonathan Bell explains our complex relationship with cars. On the one hand, they are the epitome of the perfect private environment that shelters us from the



Décarie Expressway, Montréal, Québec. 2012.

exterior elements. On the other hand, we use our cars on the primary social spaces within the city: roads. Spaces created in the automobile's wake are the landscapes of the car: a landscape with little interaction, but conflict between the pedestrian and the vehicle.

Sonia Hirt addresses the urgent need to upgrade modernist urbanism as cities realize that the traditional thinking of urbanism is not working for the current urban citizen. She lists four related aspects of a postmodern shift in urbanism:

- A growing interest in participatory planning (in lieu of the former dominance of rational planning performed by value-free experts)
- A search for urbanity, urban identity and cultural uniqueness (in lieu of the former focus on functionalism, efficiency and rational organization of urban forms)
- A mixing of land use and flexible zoning (rather than strict land-use segregation)
- The pursuit of human-scale, pedestrian-friendly, higher density, urban, and compact forms (in contrast to spread-out, low density, and auto-oriented forms). (Hirt 2005, 28)

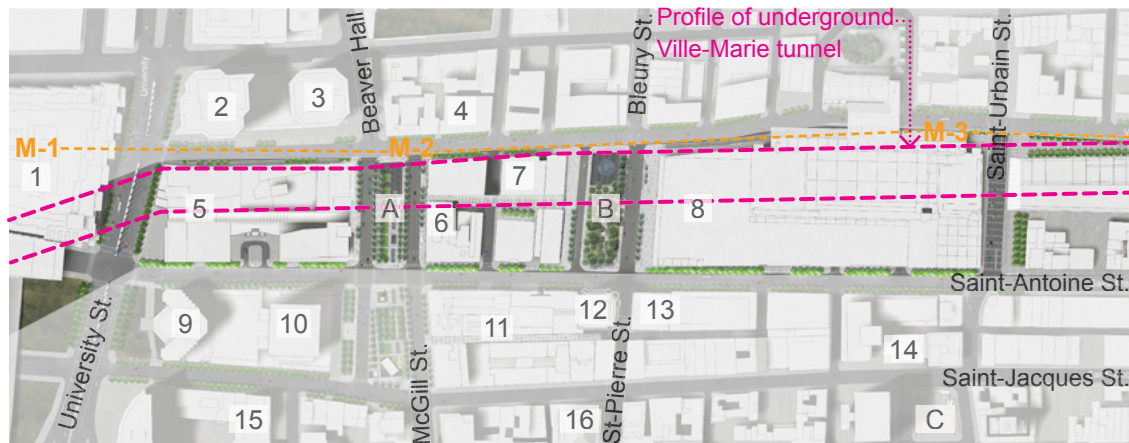
Rem Koolhaas describes his frustration with the modernist city in *Junkspace*, where the city has abandoned architecture and planning. "Junkspace is the sum total of our current achievement...It was a mistake to invent modern architecture for the twentieth century. Architecture disappeared in the twentieth century." Mega-structures like highways and expressways are part of this Junkspace, "a vast utopia clogged by its users." And as bridges and overpasses collapse, aging in Junkspace is catastrophic (Koolhaas 2002, 175). The theory of "everyday urbanism" suggests that the city does not demand design dictated by professionals from the outside such as architects. Instead, the vitality of the city is shaped by the everyday actors, immune to professional theories.

CHAPTER 2: MONTREAL'S PRECEDENT OF URBAN REMEDIATION

Quartier International

Inserting Program over Road Infrastructure with Public-Private Partnerships

Established in 1999, the *Quartier International de Montréal* (QIM) is a non-profit organization with the goal of revitalizing the old financial district bordering old Montreal. The organization is under the control of the city of Montreal and under the leadership of the Caisse de dépôt et placement du Québec. The project and agency are supported by local businesses as well as neighboring land owners (Quartier International de Montréal 2012).



Quartier International de Montréal

- | | |
|--|---------------------------------|
| 1. Place Bonaventure | 13. Le Westin Montreal |
| 2. Bell Tower | 14. BMO Bank of Montreal |
| 3. National Bank Tower | 15. Place University St-Jacques |
| 4. Unity and Unity2 Residence | 16. RBC Royal Bank |
| 5. International Civil Aviation Organization | |
| 6. The W Montreal | A. Square Victoria |
| 7. CDP Capital Centre | B. Place Jean-Paul-Riopelle |
| 8. Palais des congrès de Montréal | C. Place d'Armes |
| 9. Downtown Delta Hotel | |
| 10. Stock Exchange Tower Place Victoria | M-1. Metro Bonaventure |
| 11. Montreal World Trade Centre | M-2. Metro Square Victoria |
| 12. Montreal Intercontinental Hotel | M-3. Metro Place d'Armes |

(Base Image from Palais des congrès 2010)

The success of the QIM originates from the unique partnership between the Government of Canada, the Government of Québec, the City of Montréal, the Caisse de dépôt et placement du Québec, and the Landlords Association of the Quartier international de Montréal (ARQIM). While this Public-Private Partnership was vital to this project, certain building projects were crucial to ensuring the urban design success. Main interventions included: covering the Ville-Marie Expressway, in collaboration of the Palais des congrès de Montréal and the CDP Capital Centre; the creation of a new public square, Place Jean-Paul-Riopelle, featuring public art (see image below); the redevelopment of Square Victoria; and the design of an official gateway to Montréal with the construction of a colonade of pillars on University Street (Quartier International de Montréal 2012).



Square Victoria, Montréal, Québec. Photo by Jean Gagnon. (Wikipedia 2008)

Palais des congrès

The expansion served to mend the urban fabric severed by the Ville-Marie expressway by providing strategic development and becoming a hub linking together the neighboring districts of Chinatown, Old Montreal and the city's downtown. Each side of the convention centre has its own personality, integrating with the different district it faces. While the collection of facades may seem a little convoluted, the goal was for the facade to respond and respect the site's existing program and heritage (Quartier International de Montréal 2012).



The Palais des congrès, facing the public square Place Jean-Paul-Riopelle, the space features a fountain sculpture designed by Riopelle. Both rest above the Ville-Marie Expressway. Photograph by Stéphan Poulin (Palais des congrès 2008)

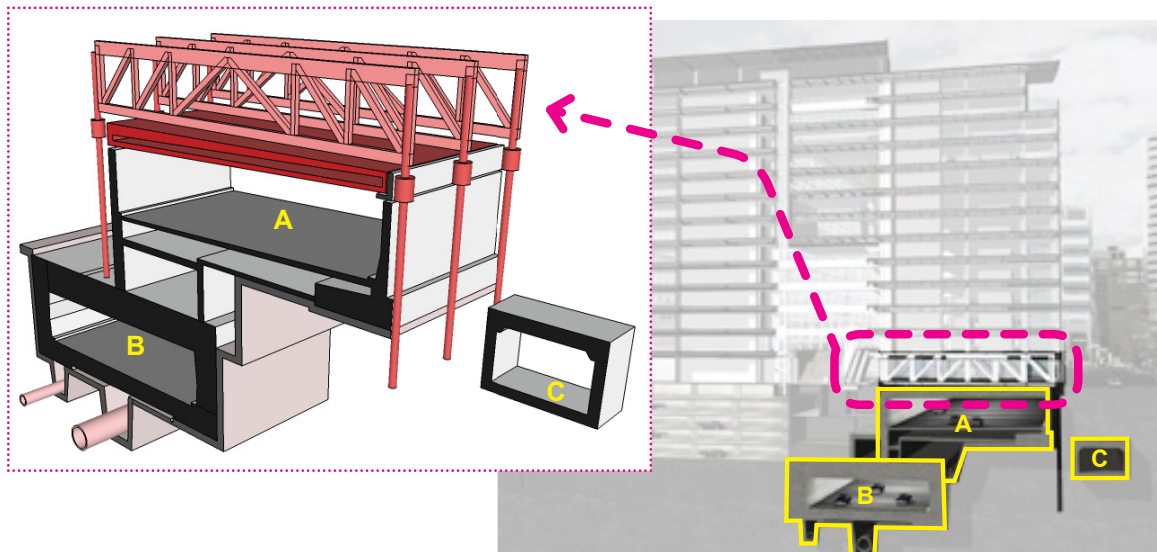
Centre CDP Capital (Caisse de dépôt et placement du Québec)

Built directly over the Ville-Marie Expressway (A-720), the Centre is considered to be one of the most challenging Montreal construction projects in the last thirty years. The structural design is framed as a bridge-like building that stretches over the expressway. In order to achieve the span, steel beams 30m wide and 5m high were used in the section

built directly above the expressway. Two braced towers were also constructed to provide seismic resistance in the event of an earthquake. The braced towers are also functional in other ways, such as emergency stairs, service elevators, storage, and administrative facilities (Le Centre Capitale 2011).



Front facade of CDP Capital (Le Centre Capitale 2011)



The CDP building structure and the expressway

A. Ville Marie Expressway - Westbound

B. Ville Marie Expressway - Eastbound

C. Metro Tunnel

(Base Image Le Centre Capitale 2011)

CHAPTER 3: SITE

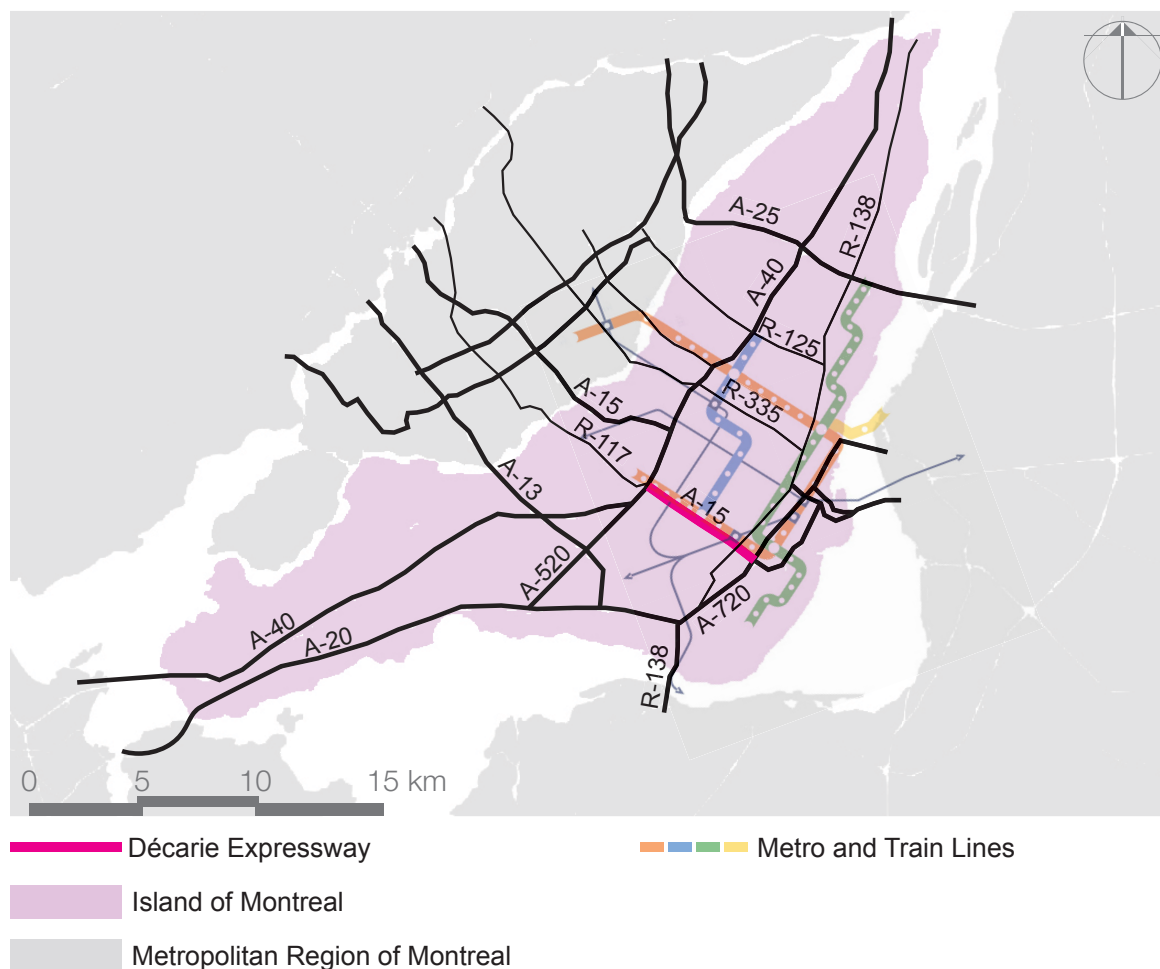
The Canadian federal government has expanded on many infrastructure renovation plans (CBC News 2011). Many highways, bridges and roadways built in the 1960s and 1970s have now reached their lifespan and are at risk of structural collapse. Montreal in particular has been in the news as the most extreme example of what the Federation of Canadian Municipalities calls a \$123-billion shortfall in municipal infrastructure spending across the country (Blatchford 2011). Infrastructure projects have ballooned over the past years with no end in sight. Governments at different levels keep funding infrastructure projects because cities cannot function without water, sewers and transportation. Yet with so much capital being invested in these projects, one may wonder whether road infrastructures are as economically sustainable as we once thought they were fifty years ago? As federal, provincial, and local governments consider large-scale investments in the renovation and replacement of urban infrastructures, there is a unique opportunity to reconsider the role of these systemic networks and their effect on our contemporary urban landscapes (cityLAB 2009).

Area Of Study

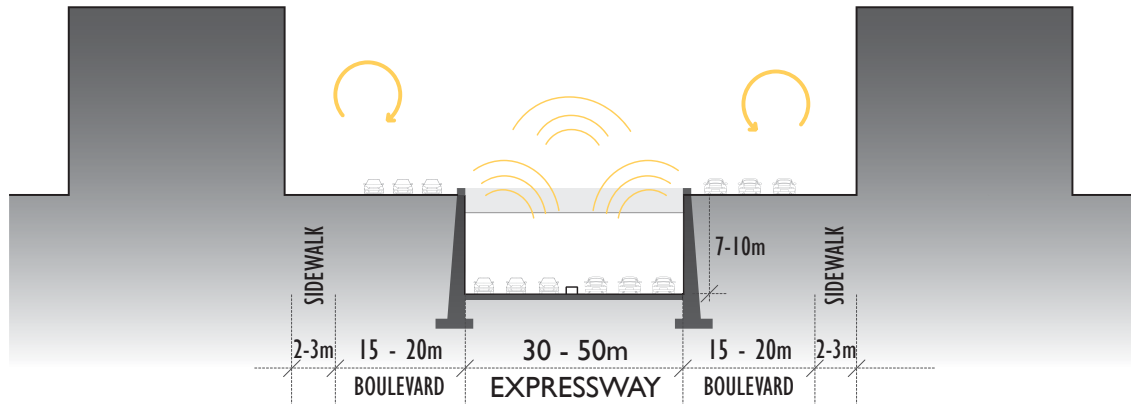
Montreal's Décarie Expressway will be the area of study to see how road infrastructure has the potential to become the key to support a more multivalent approach to urban renewal, particularly with respect to adjacent neighbourhoods.

The Décarie Expressway crosses north to south from the Borough of Mount Royal (Décarie Interchange) to Saint-Jacques Street (Turcot Interchange). An important transportation infrastructure in the metropolitan area, the

highway and its service roads are in a state of chronic congestion several times a day, creating noise and air pollution for the surrounding neighbourhoods. Converted into a trench expressway in the 1960s, the Décarie Expressway was built through existing neighbourhoods, rupturing the continuity of communities. As a result, some adjacent areas have experienced a deterioration of uses and housing. The Décarie corridor is bordered on its east side by a metro line (seven stations). The presence of many metro stations and a multitude of commercial establishments generate large flows of pedestrian activity at several intersections that, like the entire Décarie axis, are characterized by high levels of vehicular traffic.



Island of Montreal and its roads. (Base map from Google Maps 2011). (Metro and train maps from STM 2009).

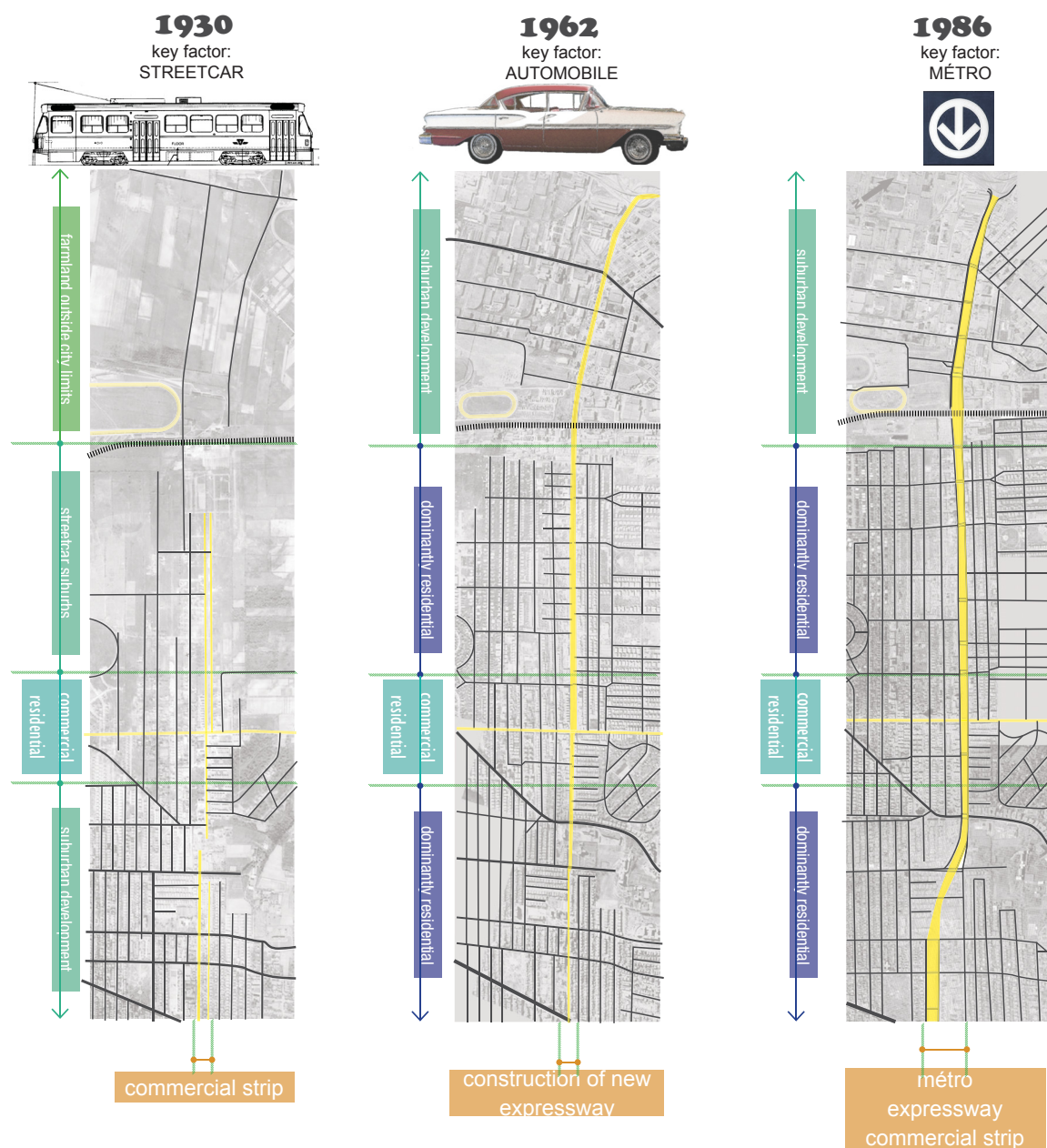


Basic conditions of existing trench of the Décarie Expressway. (Data from Ville de Montréal 2009)

Décarie Boulevard and Urban Growth

When the Décarie Autoroute was completed, Montreal was at the height of its urban growth. This expressway was opened to traffic a few days before the opening of Expo 67, an event that not only declared Montreal as a world metropolis, but also shaped the city's physical fabric that endures today. The 1950s and 60s were a time of extensive highway and roadway development, and the Décarie was the first trenched expressway in Montreal. While many cities chose the less expensive process of elevated highways to facilitate traveling through the adjacent urban areas, it was decided that a trenched highway would be the best option for Décarie Blvd, as less disruptive to the passing neighbourhoods by minimizing noise and visual impact. This expressway called Autoroute 15 (A-15) is the main north-south expressway linking the island of Montreal to the north and the South Shore. The area of study lies between the two major east-west Montreal expressways and is one of the busiest on the island. I will concentrate on the sunken portion, a 4-km stretch in the Borough of Cote-des-Neiges/Notre-Dames-des-Graces (CDN/NDG). According to Transport Québec, the Décarie Expressway was designed for a traffic capacity of 90,000 cars a day, but it currently carries

as many as 280,000 vehicles a day. No major changes have occurred on the expressway until a recent \$100-million project that promises to make the Autoroute 40-15 interchange safer (Riga 2010).



Décarie axis growth timeline (Aerial photographs from Richer 2010)

Land Uses and Connections at Various Scales

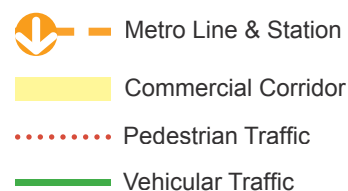
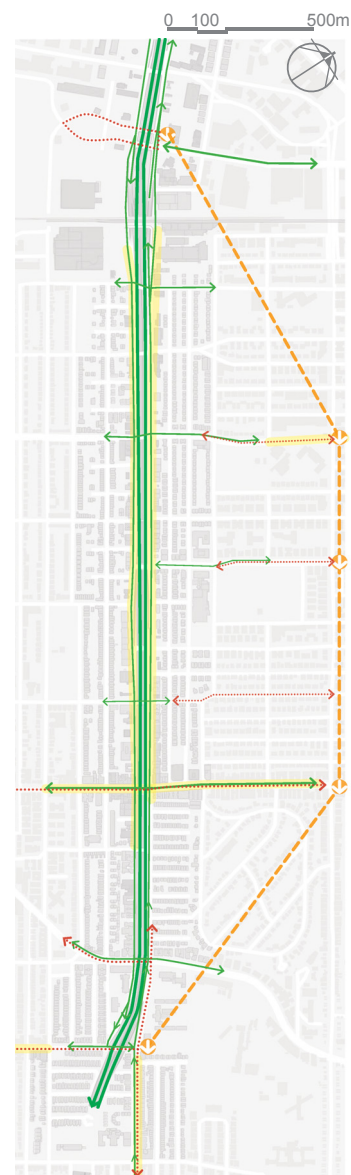
Décarie, like all urban sites, is conditioned by, and contributes to, its surroundings. The various types of forces and boundaries offer an alternate perception of the limits of the Décarie, and the scale of its effects on the city. To capture the actual urban complexity of the Décarie Axis, one has to understand this urban site as a constant crossing of networks each with its own degree of extension and reach through the city. The Décarie Axis operates at many different scales. It is comprised of residential neighborhoods, commercial corridors with pedestrian activity nodes, as well as intersections of transportation infrastructure.

The identity of the Décarie axis is comprised by the following interactions:

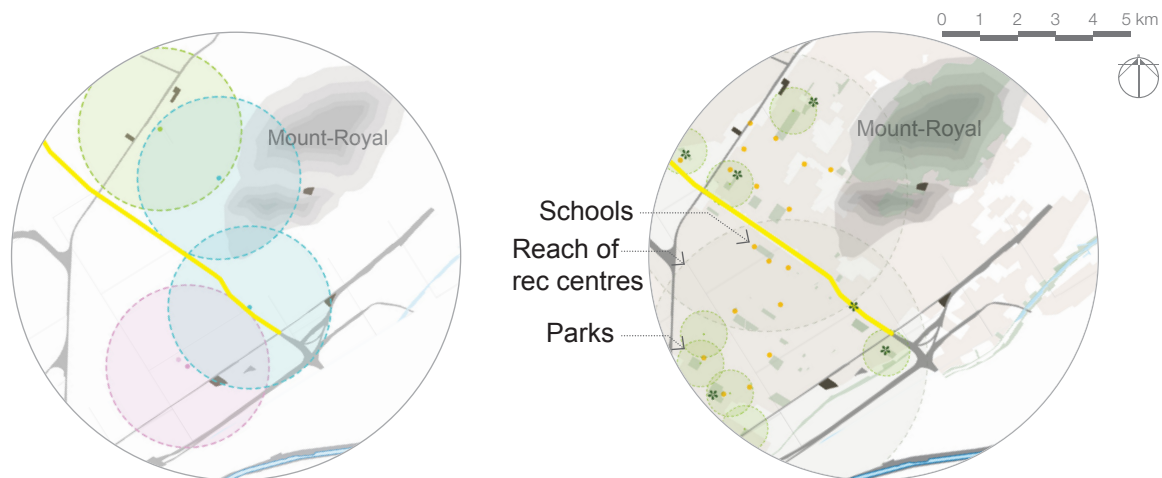
- A global sector of corporations (eg. Erikson Headquarters)
- Metropolitan crossroads of commercial development (Jean-Talon Street, Queen-Mary Rd, Monkland Ave, Sherbrooke Street)
- Local sector of direct amenities (parks, schools, libraries, recreational centres)

Local Amenities affecting the Décarie Axis Neighborhoods

Dense residential neighborhoods are mostly between the northern railway and the southern edge of the A-720 highway. However, the northern sector is undergoing intense residential development. Local amenities, such as libraries, cultural centres, schools, parks and recreational centres currently exist adjacent to the expressway. In order to establish and sustain highly successful neighborhoods, real estate development should occur directly above the expressway to maintain cohesive links along the axis.



Current Décarie Blvd, a transport-oriented axis.
(Base map Richer 2010)



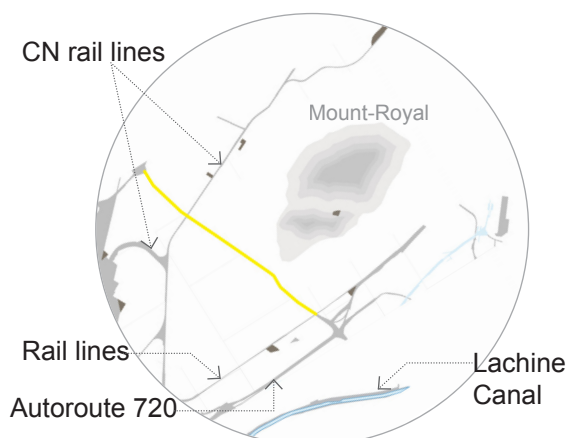
Libraries and cultural nodes.
(Base map from Ville de Montreal - Côte-des-Neiges Notre-Dame-de-Grâce, 2010)

Schools, parks and recreation nodes.
(Base map from Ville de Montreal - Côte-des-Neiges Notre-Dame-de-Grâce, 2010)

Local Amenities with Metropolitan and Regional Effect

Transportation Infrastructure

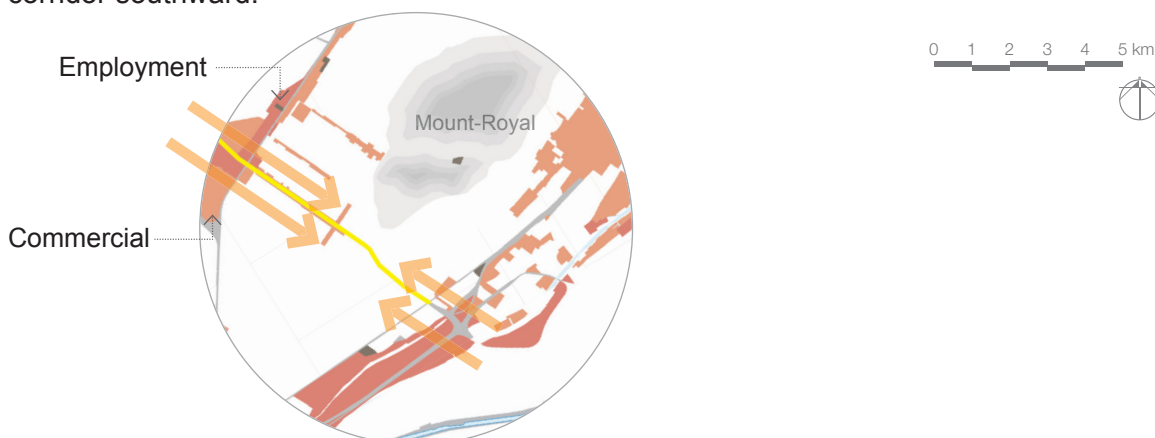
Road infrastructures around the Décarie corridor create various physical boundaries at the local scale. However the various highways, expressways, railway, metro and bus network allow a strong link and connection at the metropolitan and regional scale. Resulting influence: an intervention directly above the expressway would allow for better local link to neighborhood while the prime location of the Décarie axis would allow public ease of access.



Transportation Infrastructure around the Décarie Axis. (Base map from Ville de Montreal - Côte-des-Neiges Notre-Dame-de-Grâce, 2010)

Commercial and Employment Areas

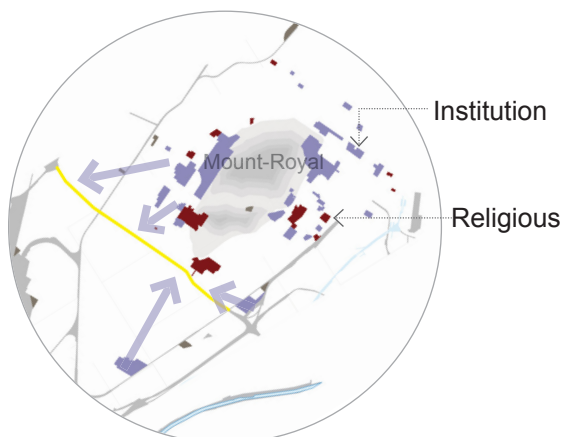
Commercial and employment areas are at the northern and southern points of the Décarie Axis, with several commercial corridors running along or crossing over the Décarie. Resulting influence: the existence of vibrant commercial areas allows for public-private partnership or leverage of public funds to encourage development by expanding the commercial corridor southward.



Commercial and employment areas around the Décarie Axis. (Base map from Ville de Montreal - Côte-des-Neiges Notre-Dame-de-Grâce, 2010)

Institutional and Religious Nodes

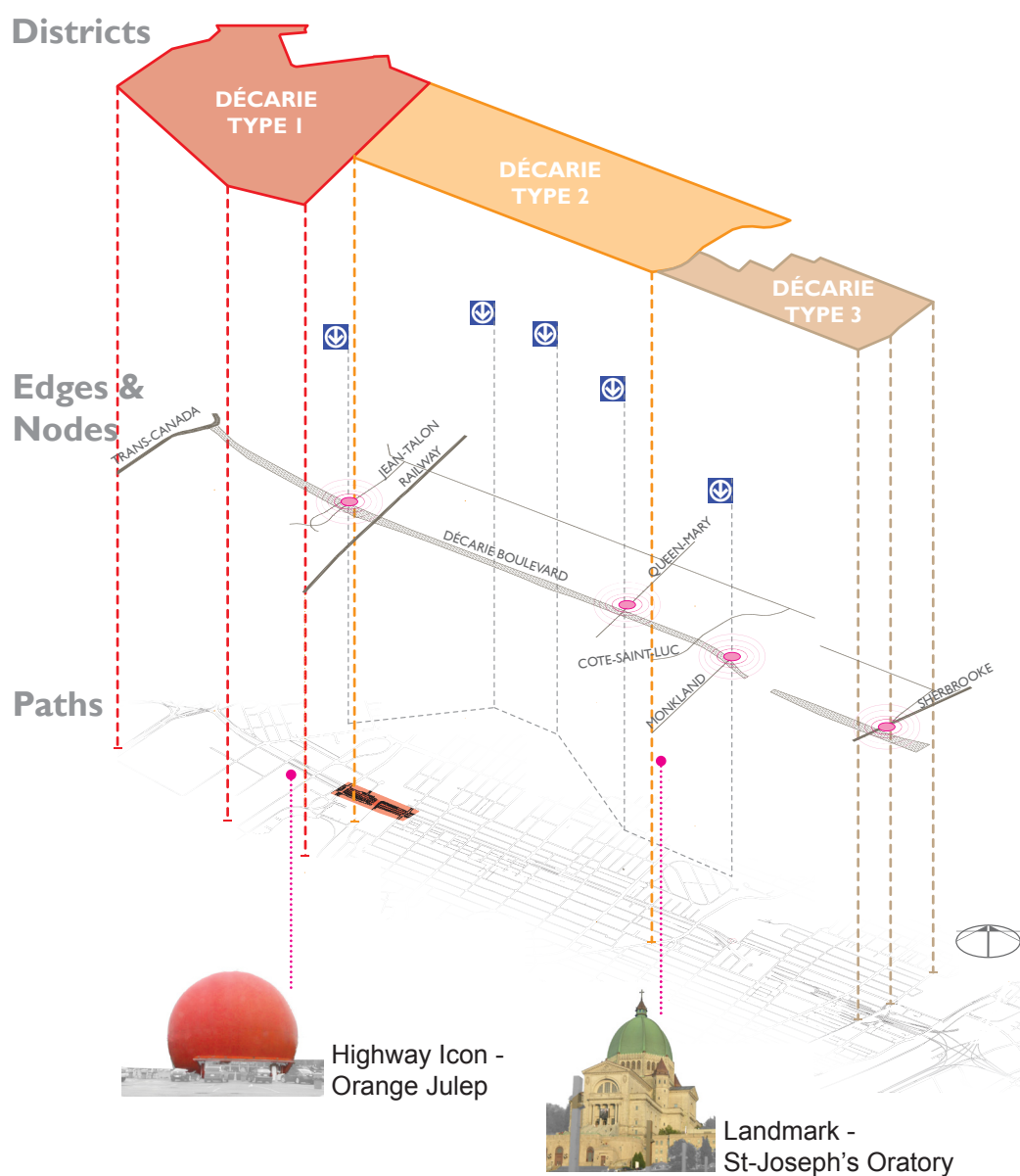
While the institutional and religious nodes do not overlap the Décarie, they are still important forces that demand an influx of traffic on the Décarie. Resulting influence: the proximity of institutions makes for additional support for increased tenancy.



Potential tenancy from institutions around the Décarie axis. (Base map from Ville de Montreal - Côte-des-Neiges Notre-Dame-de-Grâce, 2010)

Neighborhood Classifications and Characteristics

The initial analysis of the site was based on Kevin Lynch's studies in *The Image of the City* (1960). Lynch explored how people perceive and move through the urban landscape and how they understand their surroundings in consistent and predictable ways forming mental maps with five elements: Paths, Edges, Districts, Nodes, and Landmarks. To understand



Neighborhood classification. (Data from Ville de Montreal 2009)

the role of environmental images in our own urban lives, the initial study helped define the visual qualities of Montreal's Décarie Boulevard neighbourhoods.

Paths are the channels along which the observer customarily, occasionally, or potentially moves. (Evan Mather Hand Crafted Films, 2010)

The huge number of paths seen as a total network when repeating relationships are regular and predictable. The Montréal grid is a good example.

Edges are the linear elements not used or considered as paths but breaks in continuity. (Evan Mather Hand Crafted Films, 2010)

For example, the Snowdon neighbourhood is usually considered to be bordered by Queen Mary Rd, Côte-Saint-Luc Rd and Clanranald ave. However the Décarie expressway has added a secondary edge to this once unified neighbourhood.

Districts are the medium to large sections of the city which the observer mentally enters inside of and which are recognisable as having some common, identifying character. (Evan Mather Hand Crafted Films, 2010)

For example, the area of study for this thesis is in the Snowdon district, which is named for James Snowdon, who owned a farm where the neighbourhood now stands. The area evolved from farmland, to a transit-oriented neighbourhood of streetcars, and finally to an area divided by a six-lane sunken expressway.

Nodes are the conceptual anchor points in our cities. They are junctions, the convergence of paths and moments of shifts from one structure to another, and are related to the concept of the journey. (Evan Mather Hand Crafted Films, 2010)

The intersection at Queen-Mary Road is a good example of a node where building composition and road size shifts at the

intersection of Décarie Boulevard. While there is a noticeable physical and environmental change, Queen Mary in its entirety is a very vibrant street.

Landmarks are another type of point reference. But in this case, the observer does not enter within them – they are external. (Evan Mather Hand Crafted Films, 2010)

The Saint-Joseph Oratory and the Mount Royal Cross are examples of landmarks that are focal reference points for every background in the entire city Montreal.

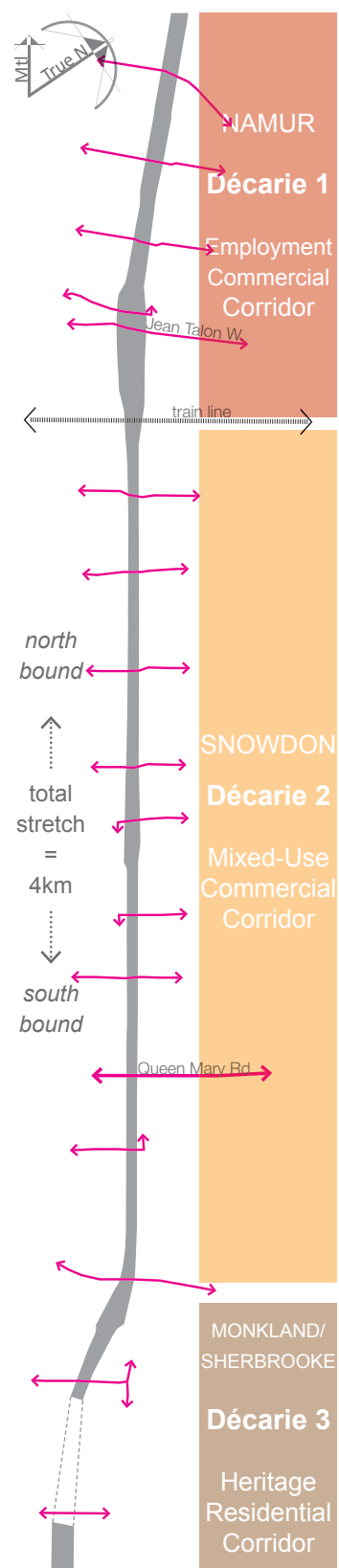
CHAPTER 4: SITE AND DESIGN STRATEGY

A thorough site analysis was undertaken to better understand the design goals for possible interventions on the site. First, the site was divided into three sites based on land uses, built form and density. Once each zone was studied to highlight their major problems and issues, objectives were set out to frame distinct design parameters. Then, possible actions and interventions were layered out based on the parameters.

Neighborhood Characteristics

Décarie Type 1: Northern Sector, Employment and Commercial Corridor

Comprising of both the Town of Mount Royal and the Borough of Côte-des-Neiges-Notre-Dame-de-Grâce, the northern sector has several office buildings and corporate headquarters that leverage high visibility to drivers offered by the expressway. The general deterioration of the built environment near the Namur metro station and the presence of many underused buildings have given this area a disintegrated image to the area. The city has acknowledged these empty lots and buildings as an opportunity to gradually recast the area into a residential neighborhood. With the presence of two metro stations in the area and the ease of access to the nearby highways, the city's agenda also includes encouraging other sectors - such as light industrial, storage activities, offices and educational institutions - to establish in this area.



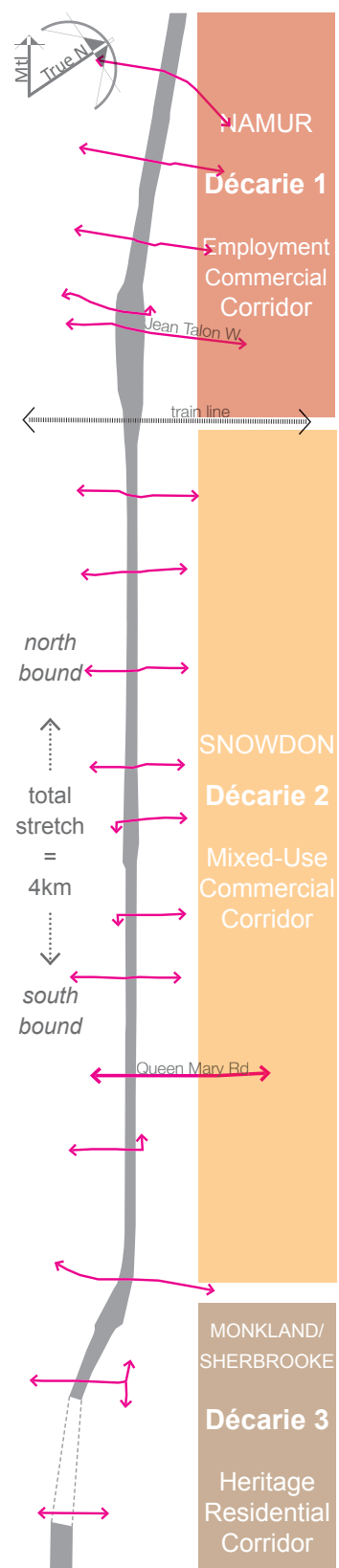
Site & Neighbourhood Diagram

Décarie Type 2: Mixed-Use and Commercial Corridor

The area includes commercial activities along the service roads of Décarie and Queen Mary Road. With the exception of intersections located at the Queen Mary Road and Rue Jean-Talon Ouest, commercial activity along the axis of the Décarie Expressway is scattered and in constant decline. The lack of public space and recreational space on the Décarie axis further weakens the cultural identity of the neighborhood. The current Borough Hall is placed in a generic rented office space on the Décarie service road with no adjacent public space and no proper seating or parking. This zone, especially at the Queen Mary intersection has the highest pedestrian activity as a result of nearby commercial activity and the Snowdon metro station. Yet pedestrians must deal with the large heat-island effect in the summer and strong wind tunnels in the winter. The lack of pedestrian permeability along the boulevard creates a strong dividing barrier and in turn generates an unfriendly and potentially dangerous environment for pedestrians.



Blue-Glazing Building; Location of existing CDN-NDG Borough Hall



Site & Neighbourhood Diagram

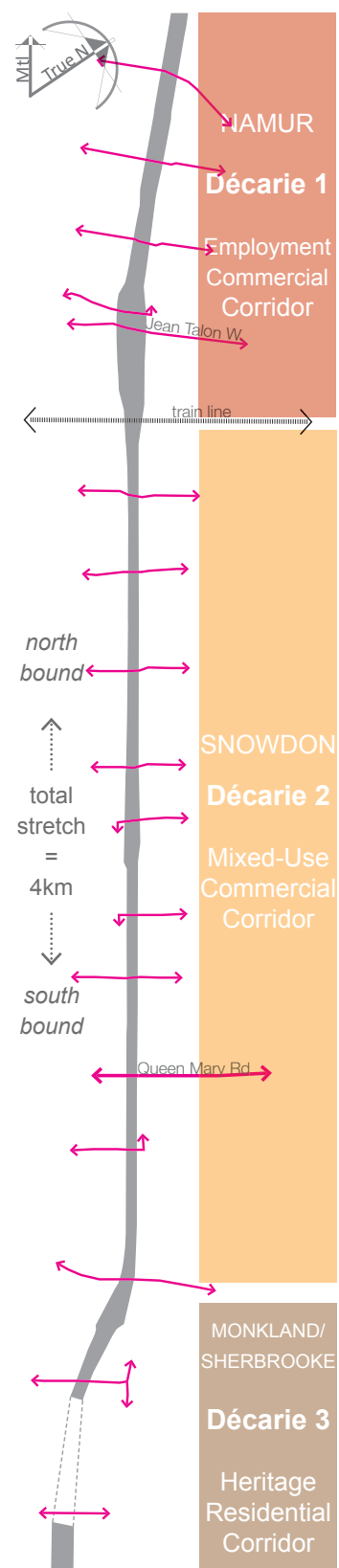
Décarie Type 3: Heritage and Residential Corridor

The southern sector of the Décarie axis is predominantly residential with two adjacent heritage campuses. The latter faces the only block on the Décarie axis that has covered the expressway with green space and a small community garden. However, these spaces are difficult to access by car or by foot. The lack of pedestrian permeability between the Villa Maria metro station intersection and at the Côte-Saint-Luc intersection create a constant barrier and make it inconvenient and unsafe for pedestrians to cross. This residential neighborhood has to constantly deal with air and noise pollution due to the highway.

Design Strategy: Objectives

Based on Montreal's *Plan d'Urbanisme* published in 2005, the principal objectives are as follows:

- Improve overall image of the area by establishing a visible character for the Décarie axis that would be identifiable in the greater metropolitan area.
- Increase business by promoting new development
- Reduce undesirable conditions, particularly noise and air pollution, by forming a stronger pedestrian connection with the surrounding neighborhoods.

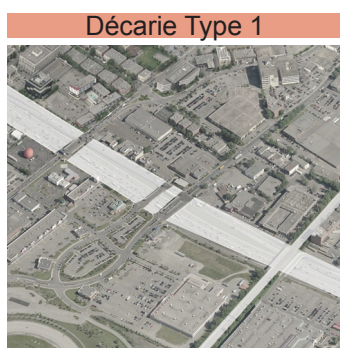


Site & Neighbourhood Diagram

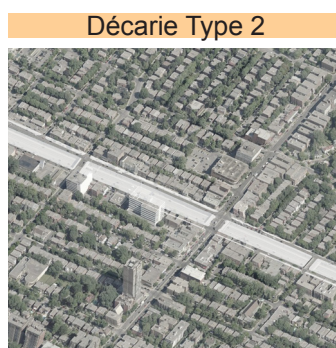
Design Parameters for Program

Based on Montreal's *Plan d'Urbanisme* published in 2005, the following parameters will guide the design of each intervention in the previously mentioned three zones:

- 1 Implement noise mitigation measures along the Décarie Expressway and study the possibility of covering some sections of the highway corridor.
- 2 Redevelop design strategy for safety and comfort of pedestrians, improve landscaping and increase of street lighting.
- 3 Improve the design of public spaces and the urban landscape of the Décarie axis to in turn improve the safety and comfort of pedestrians and to be able to increase tree planting and other plants that can mitigate air toxins.
- 4 Take advantage of the redevelopment planned for the Turcot Interchange, and in turn to increase the quality of urban landscaping in the vicinity of the interchange.
- 5 Strengthen the commercial vitality of Queen Mary Road.
- 6 Bring on employment opportunity with real estate development in the area bordering along the Namur metro station for commercial space, specifically for office space.
- 7 Where height allows viewing points, create view planes of the Mount Royal and Saint-Joseph's Oratory, as well as the St-Lawrence River.



Type 1 - A new neighborhood under construction



Type 2 - A mixed-use neighborhood in need of a connection



Type 3 - A residential neighborhood in need of a connection

Synopsis of site issues by categorized neighbourhood. (Aerials photos by Bing Maps 2011)

NAMUR
Décarie 1
 Employment
 Commercial
 Corridor

Characteristics:

- Underused lots
- Car-oriented traffic patterns
- Areas of defunct industrial land-use currently being turned into residential development

Design Parameters:

- 1 2 6 7

SNOWDON
Décarie 2
 Mixed-Use
 Commercial
 Corridor

Characteristics:

- Due to its transit-oriented nature, the Décarie axis is more a place to pass through than a destination. The design exercise for this zone will examine the first steps and interventions in creating a cohesive neighborhood, by creating a destination boulevard.
- Street vitality lacking, except for at the intersection of Queen Mary Road. Exercise will attempt to further consolidate this vitality to help spread pedestrian along the Décarie axis.

Design Parameters:

- 1 2 3 5 7

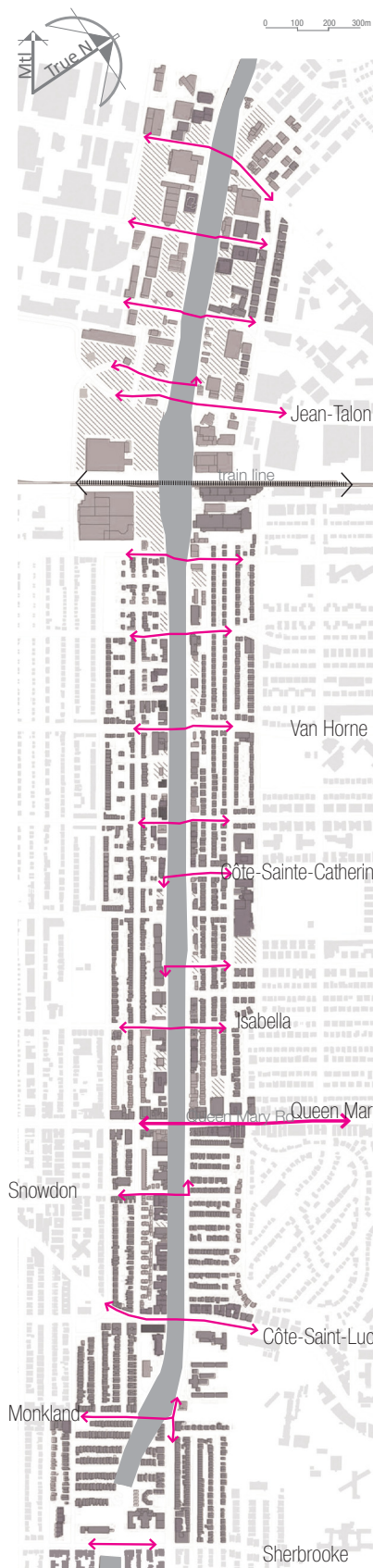
MONKLAND/
 SHERBROOKE
Décarie 3
 Heritage
 Residential
 Corridor

Characteristics:

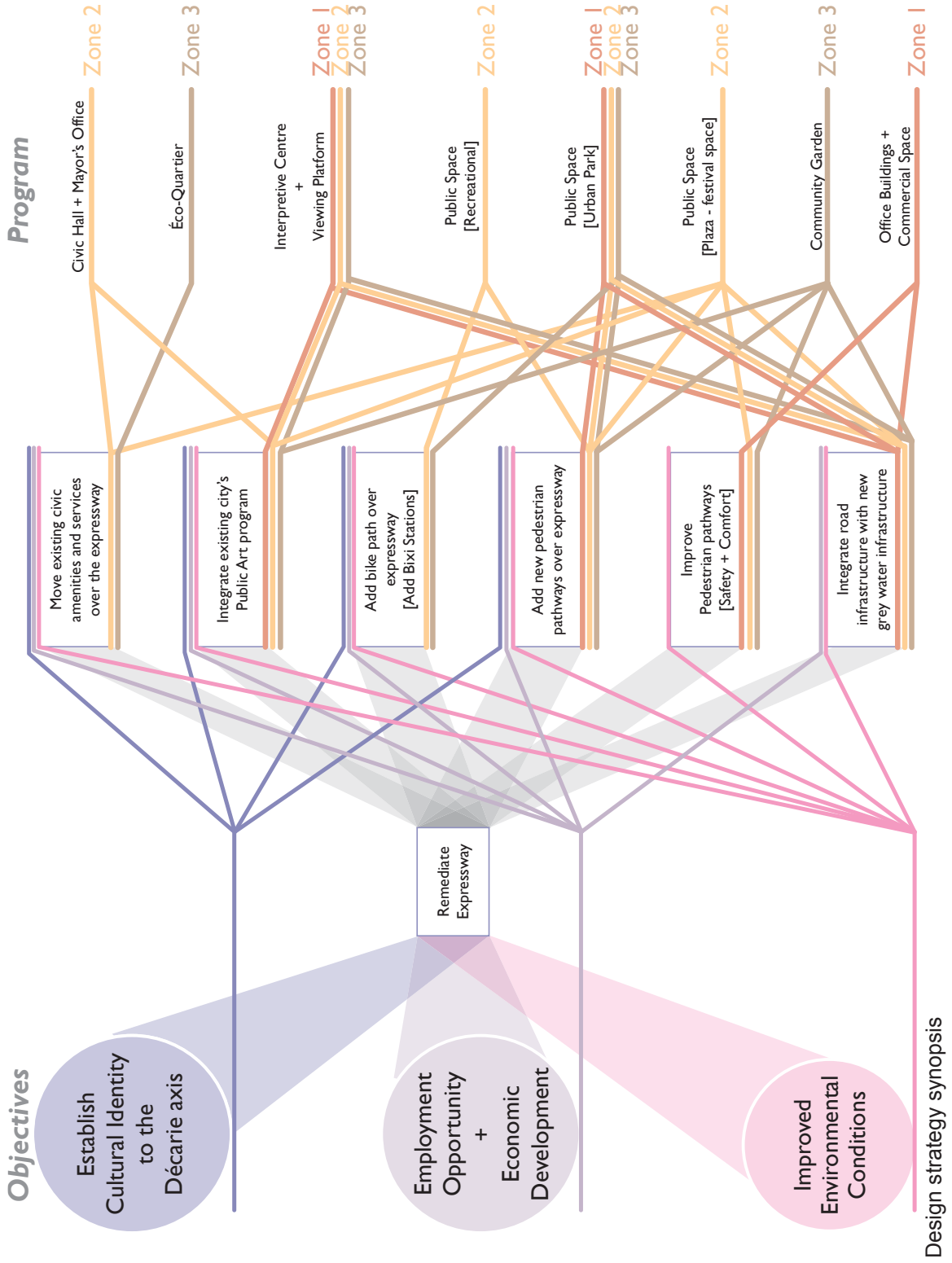
- Dominantly residential area with two adjacent heritage campuses.
- Even though a section of the highway is covered, there is no real pedestrian permeability across the boulevard.

Design Parameters:

- 1 2 3 4 7



Site issues and their solutions through design parameters. (Base map Richer 2010)



Design strategy synopsis

CHAPTER 5: DESIGN

Based on the preceding general site study, a detailed intervention is concentrated on the northern corridor, named below as 'Décarie 1'. The results and conclusions found here can then further be used to study and implement the same design principles for Zone 2 and 3.

The surrounding area is under intense redevelopment with The Triangle development which is implementing residential land-use to populate the once industrial brownfields. The nearby highway intersection of the Décarie and the Trans-Canada; the series of metro stations and the future commuter train station make this area a promising hub and an important node at both the local and regional scale.



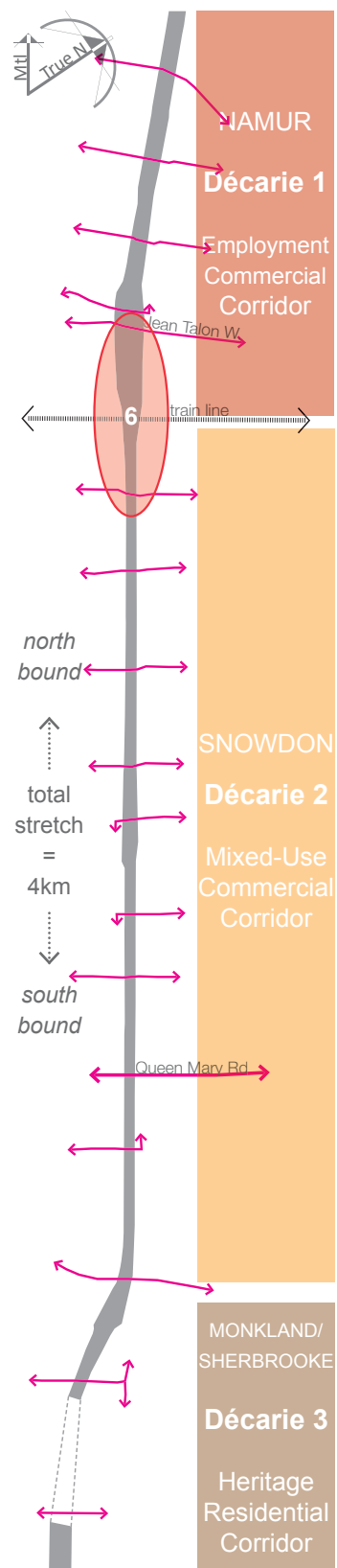
A. "Le Triangle"
Residential Development currently under construction

B. Hippodrome
city land sold for future residential development

C. Residential area
currently under revitalization

- 1. Orange Julep
- 2. Namur Metro Station
- 3. Railway
- 4. Wal-Mart
- 5. Décarie-Square Shopping Mall
- 6. Area of Intervention

The Namur neighbourhood. (Bing Maps 2011)



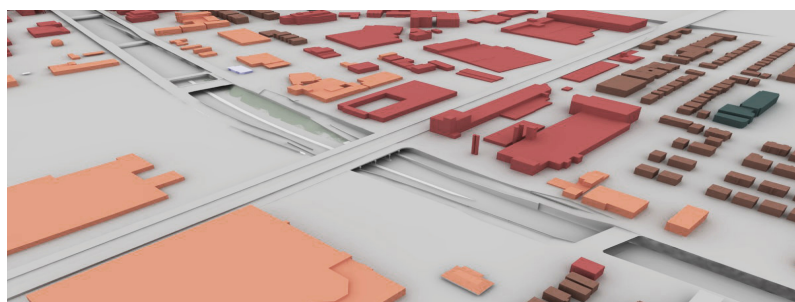
Site & Neighbourhood Diagram

The premise of the design is that in the next twenty years, this neighborhood will drastically increase urban density and will implement a new commuter train line. A new train station will be placed in this neighborhood. My position is to shift the station over the highway to help create an open public space. Other programs will include shops, restaurants to compliment the area's employment, and commercial land-use.

Design - Step 1: Current Disconnection and the Potential Connection on Site

As mentioned before, the Décarie's Zone 1 is all about building up a neighborhood. The first step is to identify the existing elements and land uses.

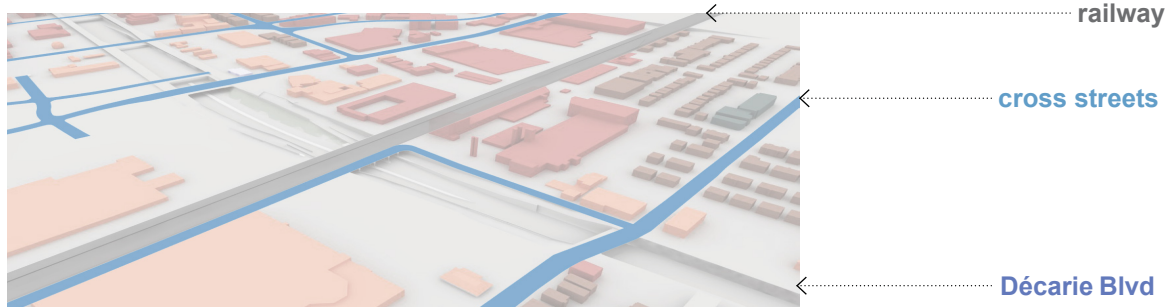
Built Form - Zone 1 is dominated by low density and high commercial use. The area is considered an employment sector with many office spaces and other similar professional spaces. Most commercial spaces are big box retail and franchise restaurants. Most importantly, Zone 1 was developed after the expressway was built.



Built forms on site intervention

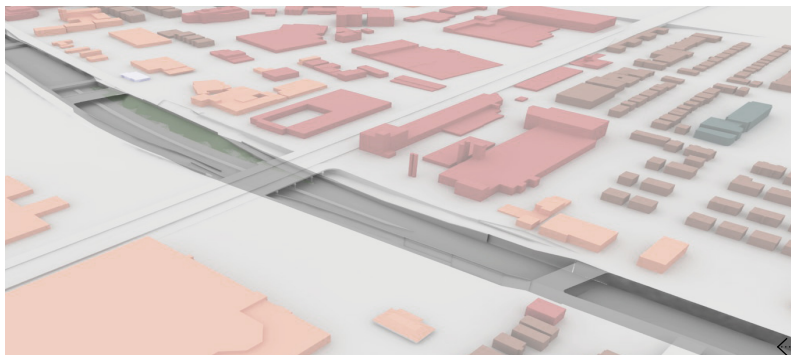
Roads - The site has a distinctive edge condition with an at-grade railway line that completely divides the axis by forcing the boulevard to ramp down to the same level as the trench expressway. The railway line causes the entire boulevard, including the service roads on either side (including sidewalks) to go below-grade. At this intersection, the railway forces a

north-south divide as well as the expressway's east-west physical obstruction.



Street-level cross streets and railway on site intervention

Expressway - The Décarie is at its widest at the point of intervention. The service roads on either side of the expressway are three lanes each with another 6 lanes for the expressway. Traffic in this area is very problematic especially during rush hours.

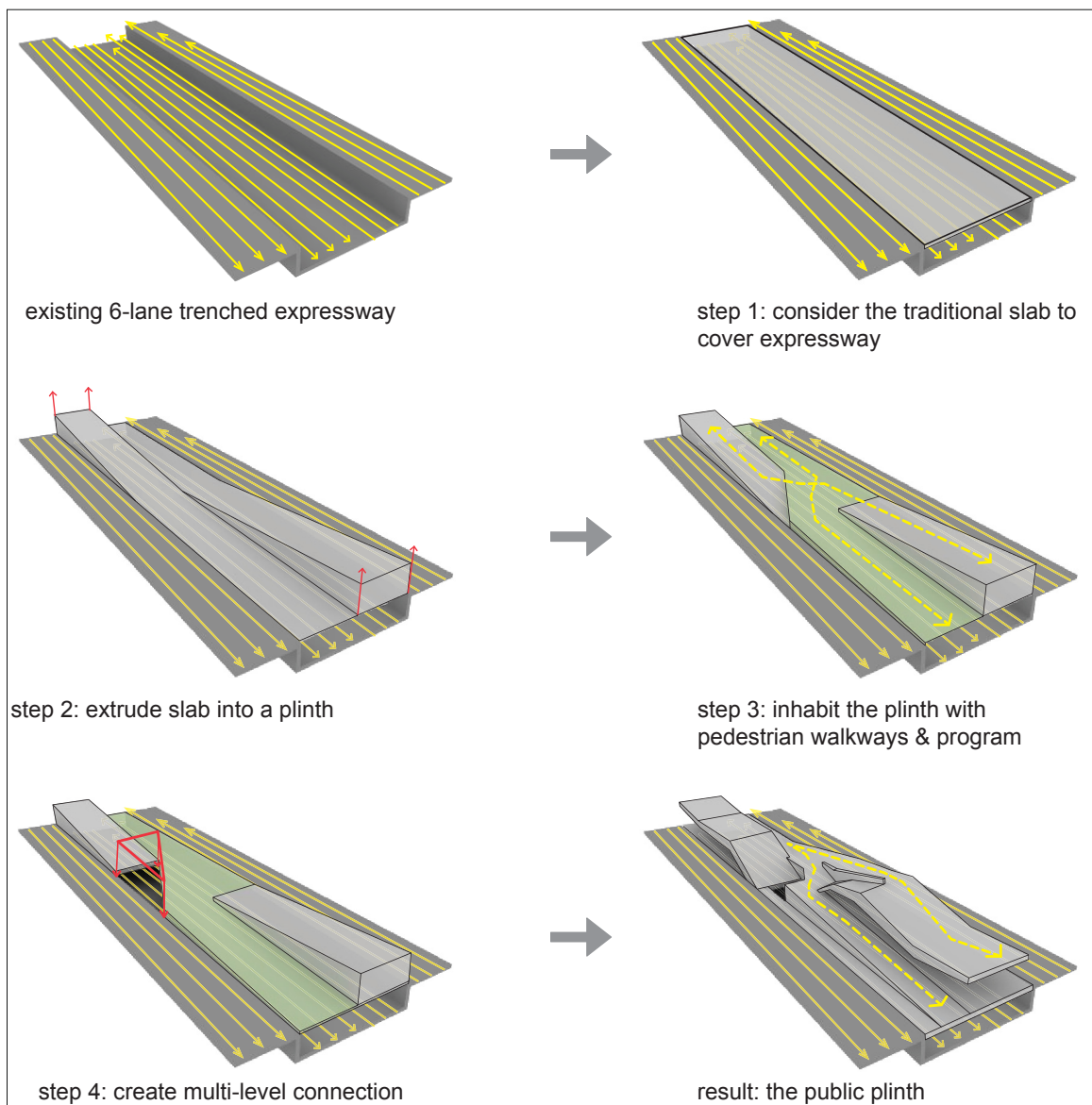


Expressway on site intervention

Design - Step 2: Response to Site - Pedestrian Plinth as a Connector

Many precedents on infrastructure interventions tend to be covered in one solid piece in order to create a continuous site (such as Chicago's Millennium Park or Boston's Big Dig). If this type of intervention was applied on the Décarie Expressway, you would lose an architectural opportunity of designing the highway as well. The major forces on the site - the highway, and the train lines - should remain participants in the urban dialogue of the site, united by the new public plinth.

The public plinth is designed by answering the following questions: How do we cross the highway? How do we cross the train tracks? How do we create a site that can cater to public art? By lining the expressway site with diverse programs, the project creates an urban node that not only connects previously disparate parts of the city but also becomes its own vital place.



The public plinth

Program Summary

The program development on the site began in response to the hard edge of the railway. When beginning with such a harsh boundary, the focus was to weaken the edge by introducing new program. The edge (railway) becomes a node (train station) - a hub that now connects the Décarie axis.

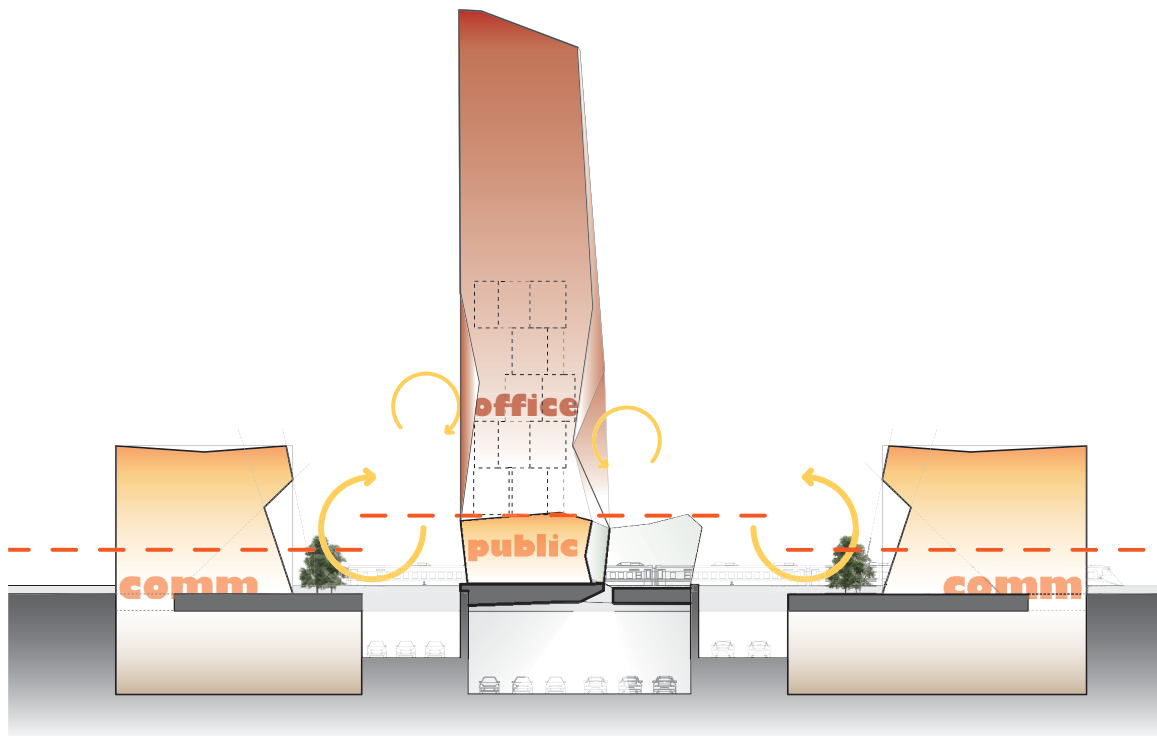
Both sides of the new train station will hold separate plinths. The northern plinth (image below as item 1) will have a professional zone, holding office spaces as well as some commercial tenants on the street level. The southern side (image below as item 3) will have a more public nature with an exterior pathway over the plinth with interior commercial tenants. This real estate development will help propagate further development on the Décarie Axis.



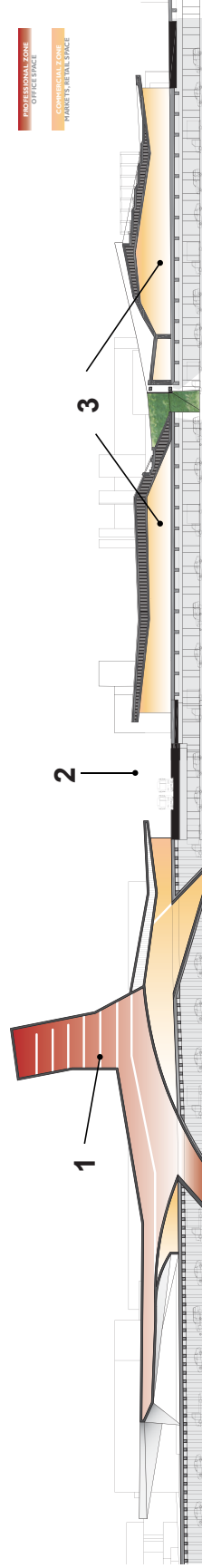
Applied program over the expressway

Multi-Level Connection

While applying real-estate over the expressway, spaces were designated as multi-level connectors where the expressway level, street level and building level can all co-exist. These three levels are parallel yet certain points allow them to overlap, which in turn makes the user aware of what is happening above and below the street. A skylight and a green wall establish a connection that remind the driver and the pedestrian of the cross-sectional complexity of the site.



Section A - demonstrating multi-level connection



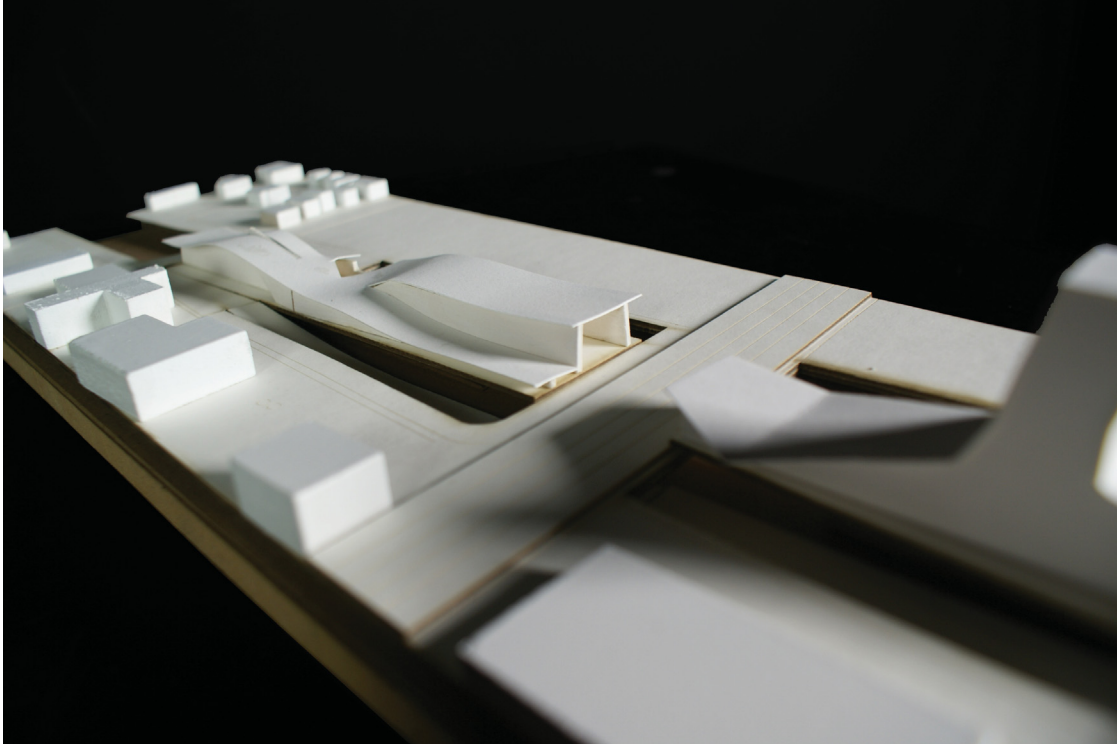
PROGRAM

- 1. Professional zone [office space]
- 2. New train station
- 3. Commercial zone [shops, market, restaurants]

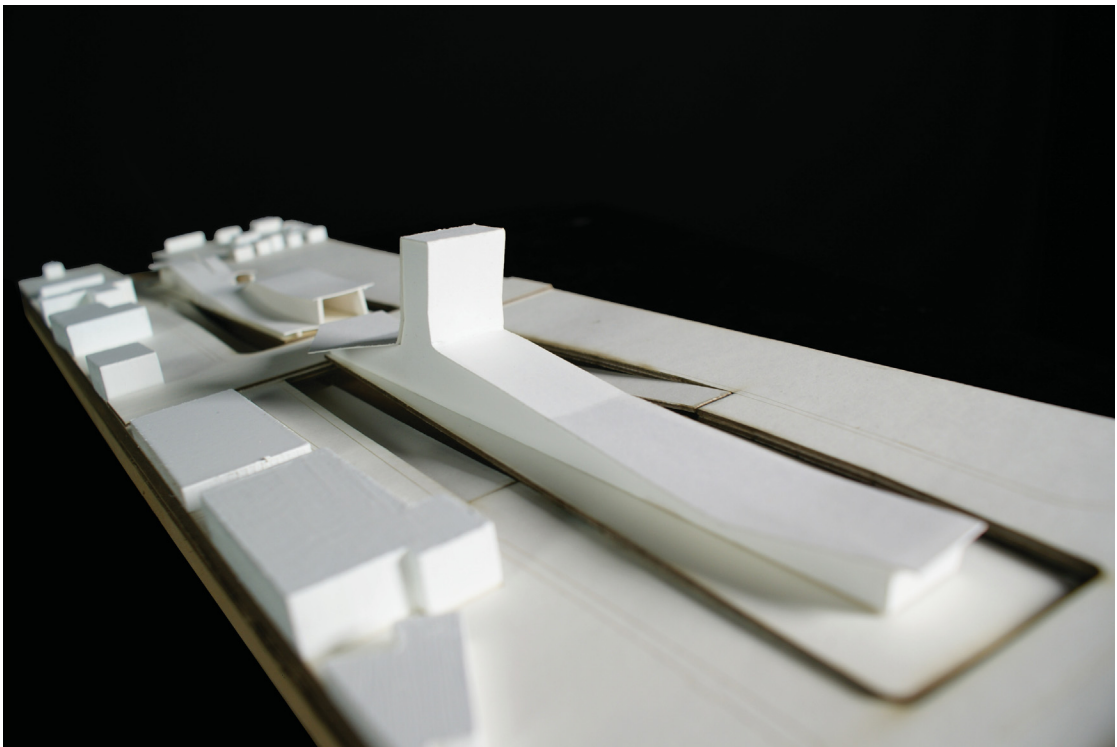
Section B - demonstrating multi-level connection



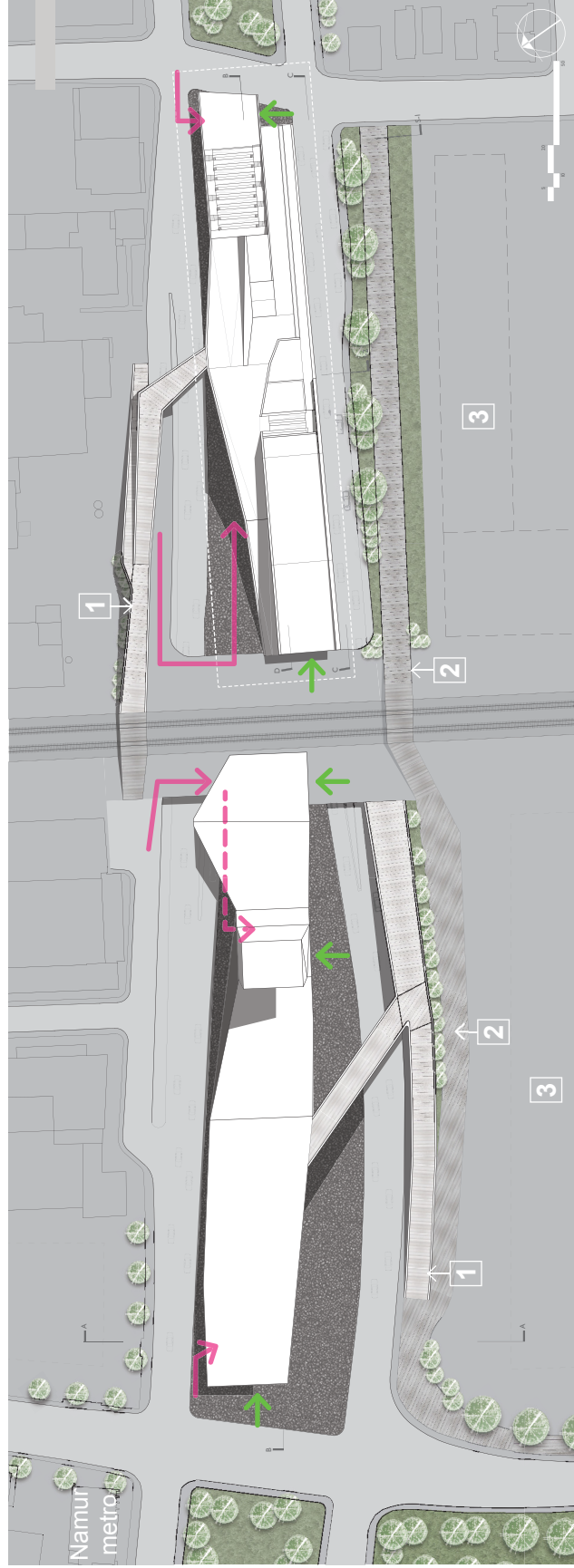
Concept for pedestrian pathway experience



Physical model - close-up of pedestrian plinth



Physical model - close-up of professional plinth



- 1. Plinth Walkway bridging both sides of expressway
- 2. Walkway connecting both sides of railway
- 3. Future development on current parking lots

→ Service access

→ Public user access

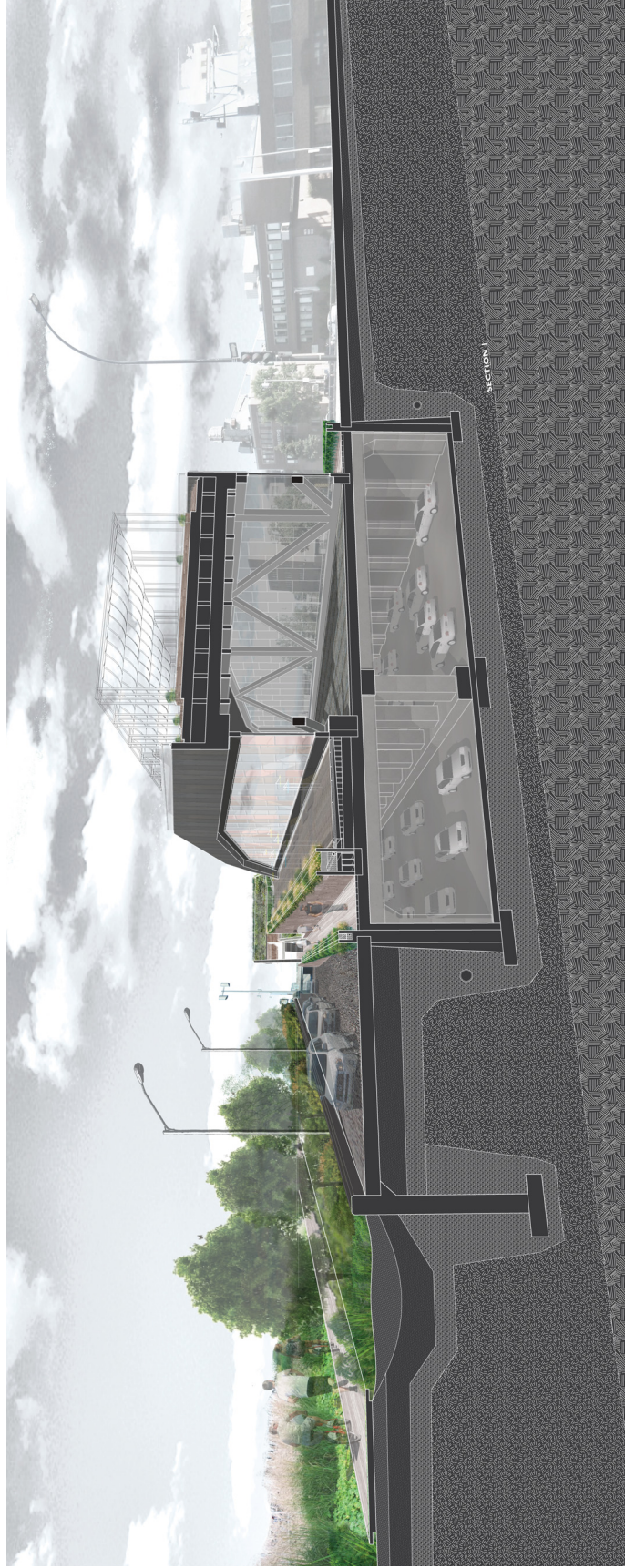
Drawing - Site Plan



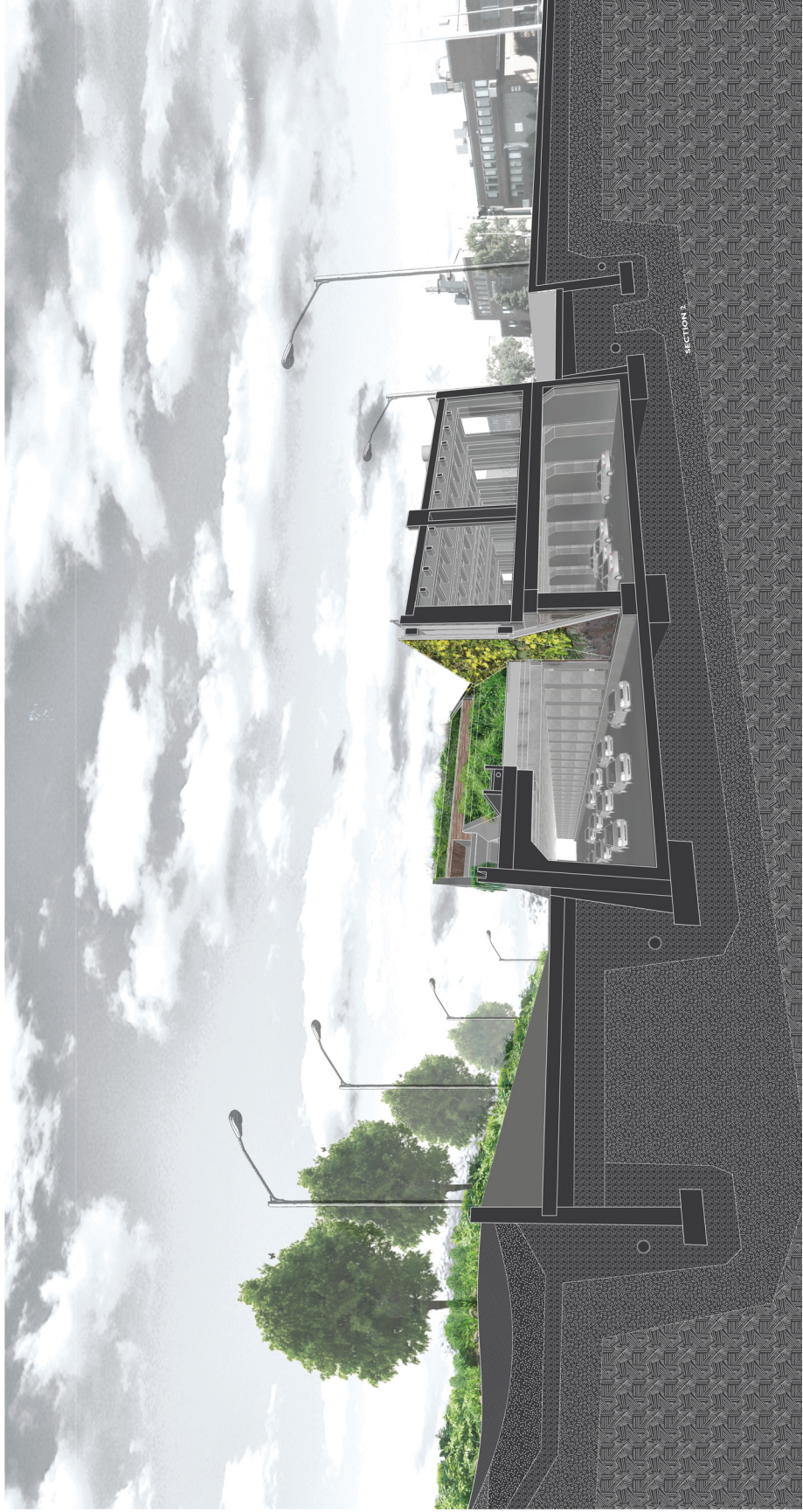
Elevation - cut at south west service road



Elevation - cut at expressway



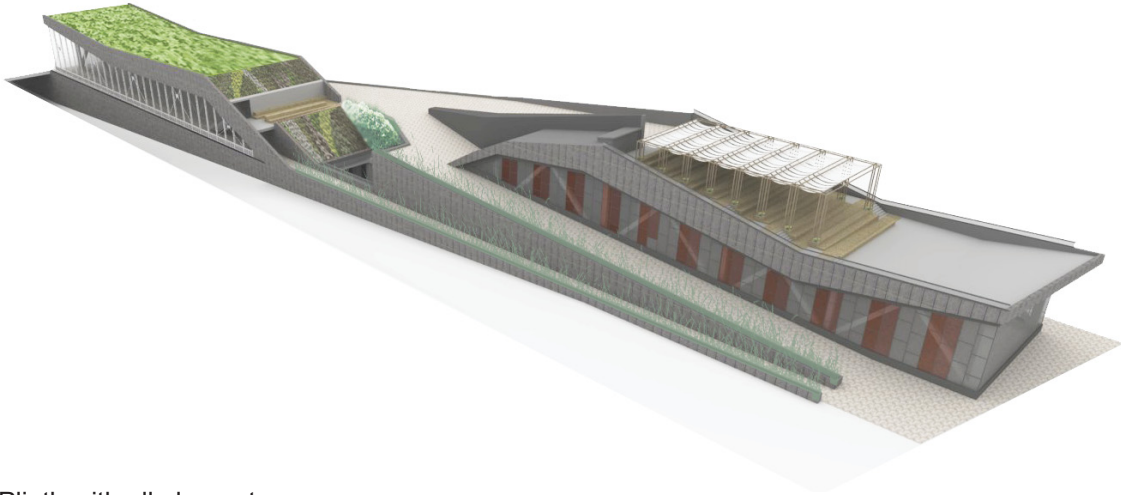
Detailed sectional perspective - 1



Detailed sectional perspective - 2

Plinth Breakdown

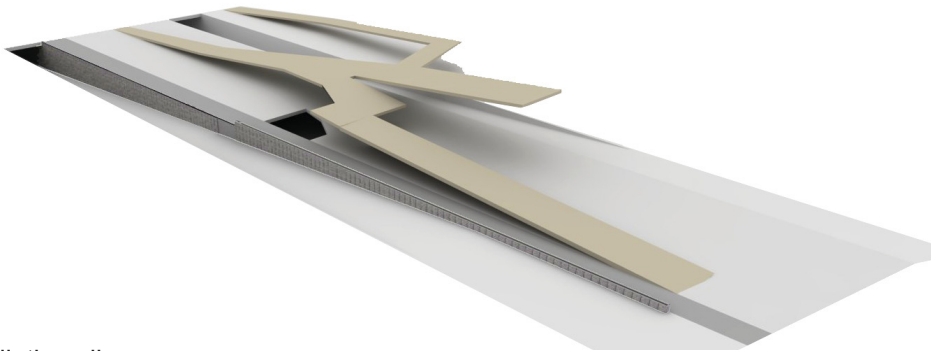
The following breakdown is a synopsis of design choices while cross referencing material choices with user activity.



Plinth with all elements

The Walkway

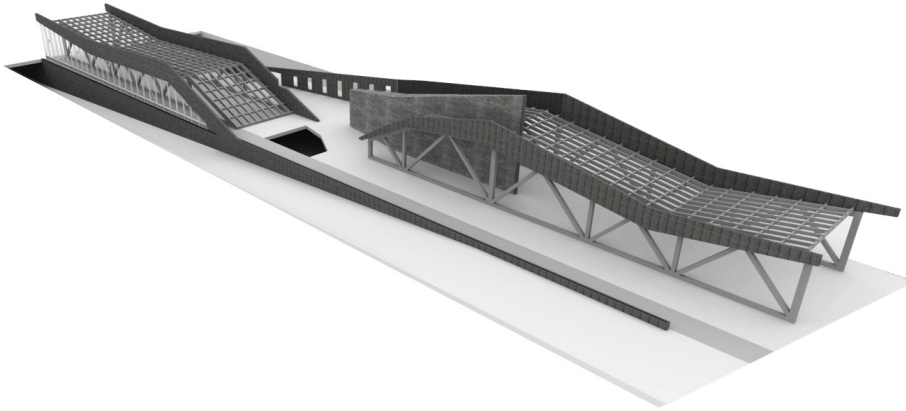
The shape of the plinth was heavily influenced by the pedestrian walkway. The path allows for a choreography of procession, streetscape views and glimpses to interior spaces, all while climbing up and down the plinth. The walkway is meant to connect the fractured block.



Plinth walkway

The Structure

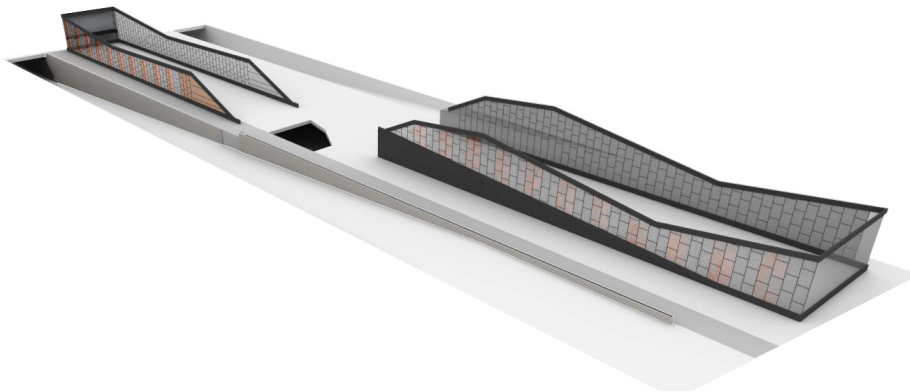
An expressive structure generates an iconic shape for the neighborhood. The hybrid of concrete and steel allows large spans for the commercial spaces.



Plinth structure

Glass Enclosure

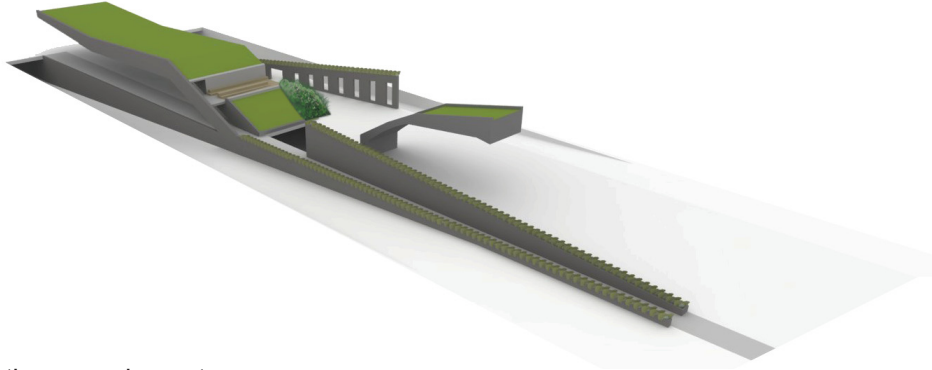
The glass facade emulates the chromatic legacy of the neighboring brick buildings. The mullions form vertical bars to allow self-metering for the user to help break down the massive scale of the plinth.



Plinth glass facade

Green Line, Green Roof, Green Wall

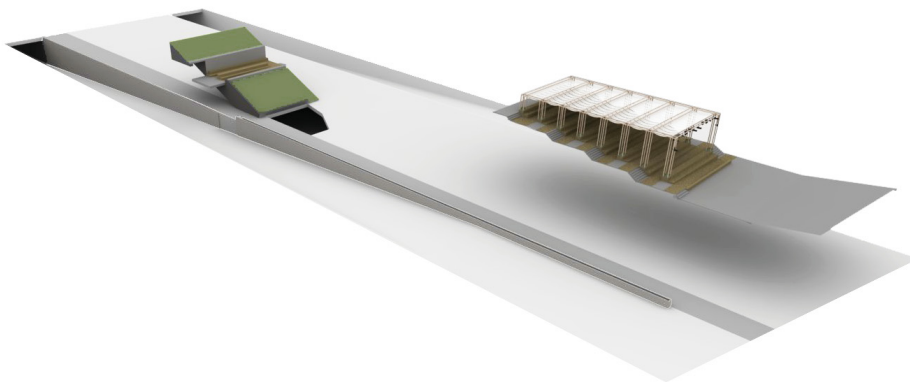
The walkway is framed by native plants to help buffer the traffic noise. The green roof and wall help connect the ground and expressway level.



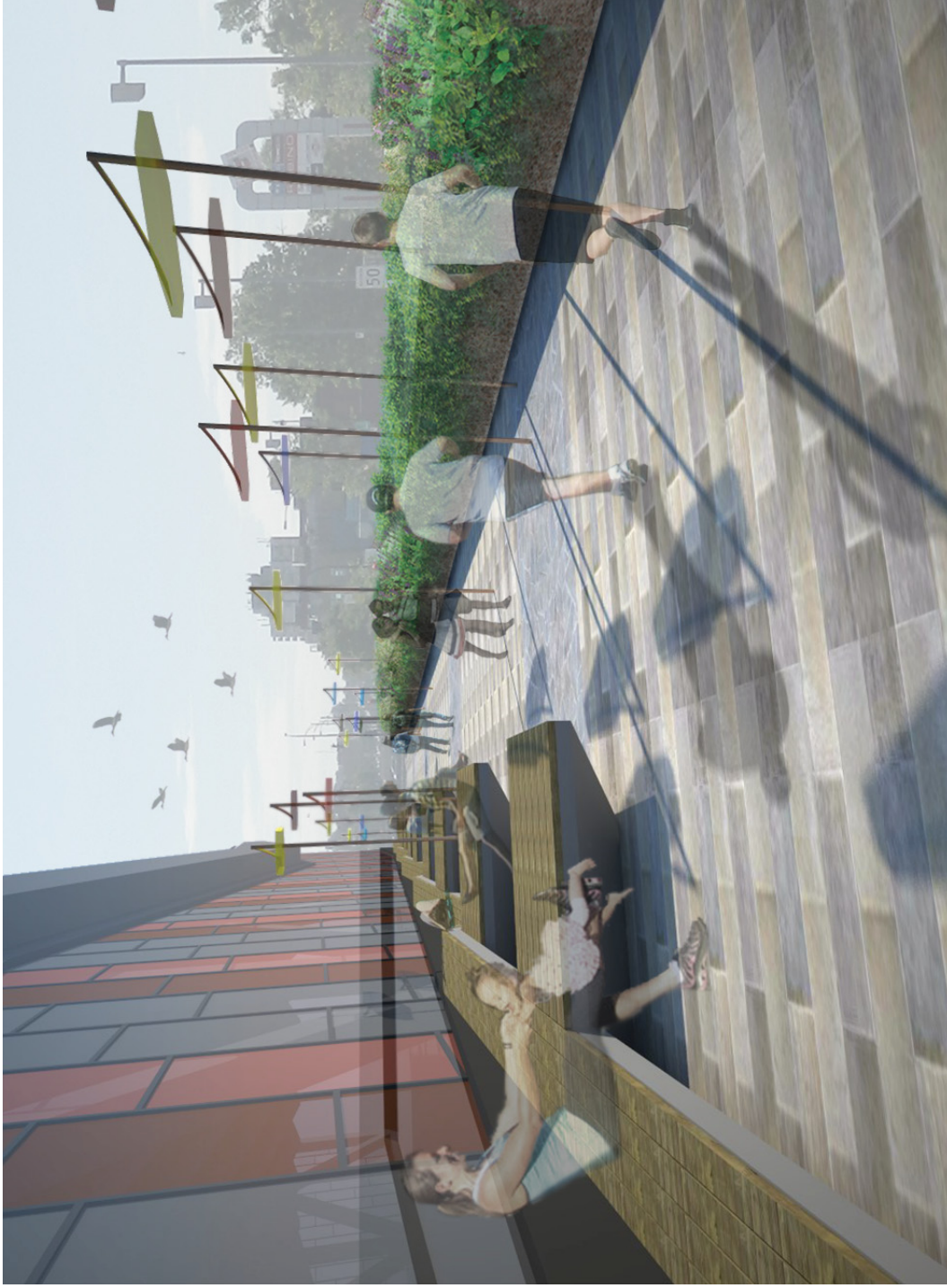
Plinth green elements

Seating and Canopy

Seating areas around the plinth are highlighted with wood to add warmth to the space. The amphitheatre is sheltered by a large canopy that also provides support for theatre lights and shading.



Plinth canopy seating



The Walkway
The shape of the plinth was heavily influenced by the pedestrian walkway. The path allows for a choreography of procession, streetscape views and glimpses to interior spaces, all while climbing up and down the plinth.



The Structure
An expressive structure generates an iconic shape for the neighborhood. The hybrid of concrete and steel allows large spans for the commercial spaces.

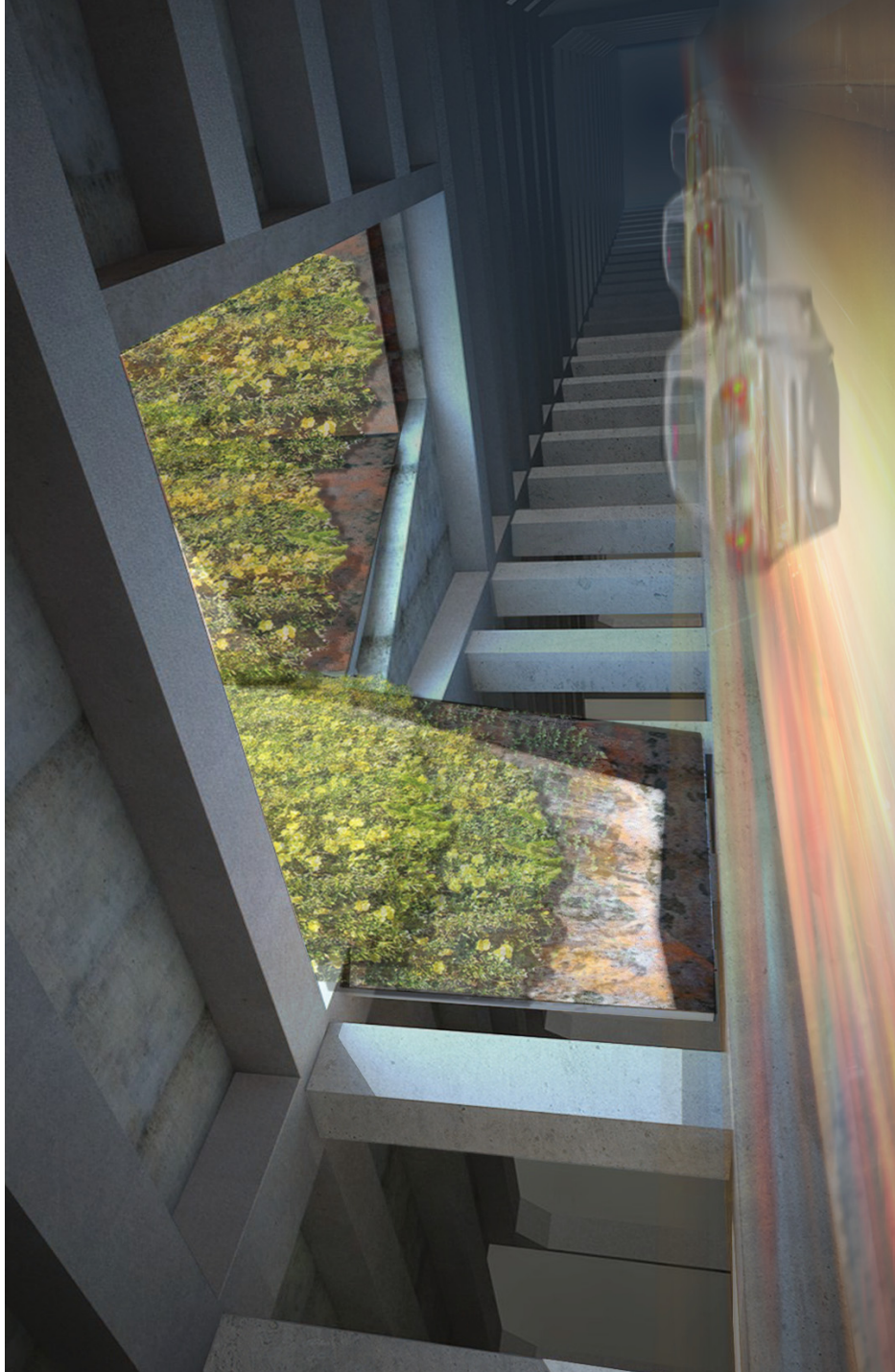


Glass Enclosure

The glass facade emulates the chromatic legacy of the neighboring brick buildings. The mullions form vertical bars to allow self-metering for the user to help break down the massive scale of the plinth.



Green Line, Green Roof
The walkway is framed by native plants to help buffer the traffic noise. The green roof and wall help connect the ground and expressway level.



Green Wall
The Green Wall acts as an emblem for the underground expressway as a way of offering a sense of place to the drivers. The location of the wall was strategically placed where traffic has a tendency to slow down at both the service road and expressway level.



Seating and Canopy
Seating areas around the plinth are highlighted with wood to add warmth to the space. The amphitheatre is sheltered by a large canopy that also provides support for theatre lights and shading.

CHAPTER 6: CONCLUSION

This thesis examines how real-estate development can begin to be generated over the Décarie Expressway while still respecting and complementing the adjacent neighborhoods. Throughout the design process, the leading question was what can the expressway do for the neighbourhood and what can the neighbourhood do for the expressway? The proposed public plinth would help to reconnect the fragmented neighborhood at the local scale and to a new train station, strengthening the links at a metropolitan scale. Further design work would concentrate on developing the interior walkway as well as adding grey water collector and treatment infrastructure within the plinth.

Road infrastructures are public spaces that are used by cars yet not inhabited by people. When the general public stops thinking of highways and expressways as merely a civil engineering problem, but includes all disciplines as part of the solution, the possibilities for this infrastructure are endless.

Heavy government spending on infrastructure should be reason enough to demand more from these superstructures. Montreal's current infrastructure crisis should be seen as an opportunity for integrating innovative public spaces while acknowledging the local identity of the site.



Plan view of model

APPENDIX A: OTHER PRECEDENTS

Design Precedent: Olympic Sculpture Park

Applying a Pedestrian Walkway as a Means of Reconnecting a Site Fractured by Infrastructure



Weiss and Manfredi's Olympic Sculpture Park. Photograph by Benjamin Benschneider (ArchDaily 2011)

The Olympic Sculpture Park Project's goal in Seattle was to reframe relationships of different forms of infrastructure. The large site had been repeatedly transformed heavily and was bordered by the heart of the city, the water edge, a contaminated site, a wide trucking route, train tracks and a failing sea wall.

They first looked at Millennium Park in Chicago, where the infrastructure of the highway and train lines would be covered in one solid piece in order to generate a continuous site. Weiss and Manfredi thought that if you did that, you lose all the things that make the site so unique. So the question became how could the forces of the site be kept – the highway, the train lines – as participants somehow of the site, and still unfold a slow unfolding landscape that might begin in the city and

wander to the water's edge. The Olympic Sculpture Park is an "inhabitable topography", where the project becomes both a path and inhabitation to hold a space that rests above an urban expressway and railway (The Harvard GSD 2011).

Precedent in New Forms of Infrastructure: cityLAB

Re-imagining Existing Infrastructure and Combining Public Spaces as a Tool to Revitalizing Cities



Winner of WAP 2.0. Carbon TAP || Tunnel Algae Park by Port:Architecture + Urbanism (cityLab 2009)

In 2009, UCLA's cityLAB organized an open design competition seeking innovative proposals that place infrastructure at the heart of rebuilding our cities during this next era of city recovery. As governments across North-America undertake consideration of large-scale investments in the renovation and replacement of urban infrastructures, academics are seeing a unique opportunity to reconsider the role of these systemic networks and their effect on our contemporary urban landscapes (cityLAB 2009). Proposals explored the value of infrastructure not only as an engineering endeavour but as a strong design opportunity to strengthen communities

and revitalize cities. The finalists all proposed transforming existing urban infrastructure with an emphasis on better public spaces, more conscientious energy and water use, and turning detriments into resources.

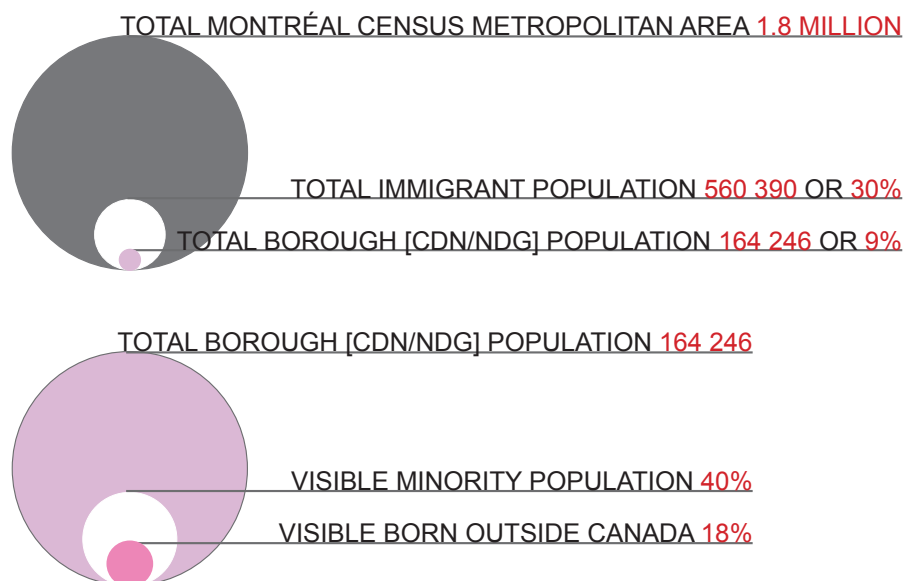
The winner of the competition was Carbon TAP // Tunnel Algae Park by Port: Architecture + Urbanism whose scenario outlined a new type of green infrastructure that is deployed at urban locations comprising concentrated sources of CO₂ production. This new infrastructure utilizes a proprietary system of industrial scale algal agriculture to sequester and consume greenhouse gas emissions (in particular CO₂) in order to limit their exhaust into the atmosphere, while simultaneously creating a new economic resource through the production of oxygen, biofuels, bioplastics, and/or agricultural feeds. The new infrastructure manifests itself as a series of pier-like armatures linked to the ventilation system for the Brooklyn-Battery tunnel.

What is unique about this proposition is not just the introduction of large-scale green infrastructure in the context of a city, but rather the use of this infrastructure to create an exceptional public amenity for the city. Rather than considering urban infrastructures as a necessary evil only to be hidden or mitigated, the proposal views the renovation and re-imagination of these systems as opportunities to create new forms of civic and social domain that have the capacity to positively transform the urban landscape.

APPENDIX B: DÉCARIE BLVD SITE INFORMATION AND DATA

Population Study

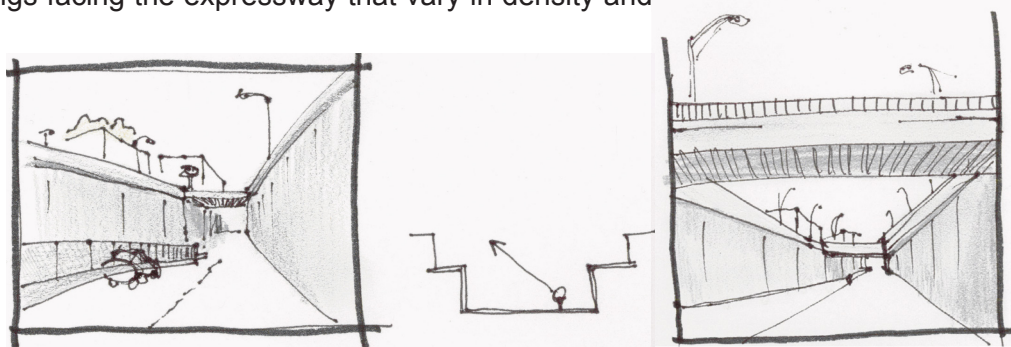
The population of the area is around 40,000 residents. The density is almost twice the median density of Montreal Census Metropolitan Area. The Côte-des-Neiges borough is an immigrant reception area with at least a quarter of the population being Canadian citizens for less than five years. Many recent immigrants settle in areas around Queen Mary and Victoria Street and as a result are food shops and clothing stores that reflect a global range of tastes (Statistics Canada 2006).



(Data from Statistics Canada 2006)

Physical Characteristics and Conditions

The Décarie Expressway is a trenched expressway with an average depth of seven to eight meters. The width of the trench varies between thirty to fifty meters along the boulevard. The two-way, six-lane highway is divided by a narrow concrete median with a chain-link fence. Along both sides of the autoroute are at-grade service roads with varying two to five lanes on each side. The service roads are lined with buildings facing the expressway that vary in density and height.



Basic conditions of existing trench

Circulation

Along the four-kilometre stretch of Décarie Blvd, there are six nearby metro stations as well as a variety of bus routes. There are pedestrian crosswalks at every intersection along the expressway, however it is important to mention that the sidewalks are very narrow and little space is given to pedestrians to feel safe. No real priority is given to the pedestrian, even though the Décarie passes through a predominantly residential fabric. The boroughs of Côte-des-Neiges and Notre-Dame-de-Grace are known for the low-rise, high-density housing. There are no significant public spaces in the neighbourhoods except for a few parks several blocks away from the boulevard. Pedestrian activity is higher near the metro stations, which are heavily used however there are few gathering spaces or proper seating.

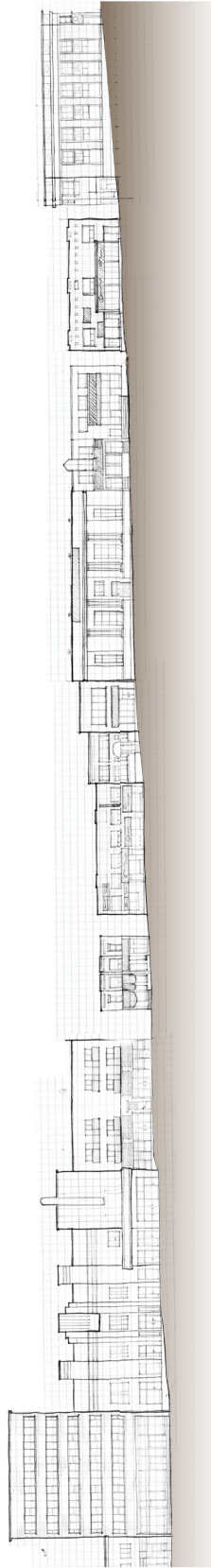


commercial strip

Bird's eye view of the Décarie Axis. (Base image from Bing Maps 2011)



View from the Expressway





Facade study - Decarie Boulevard



Facade study - Queen Mary Road

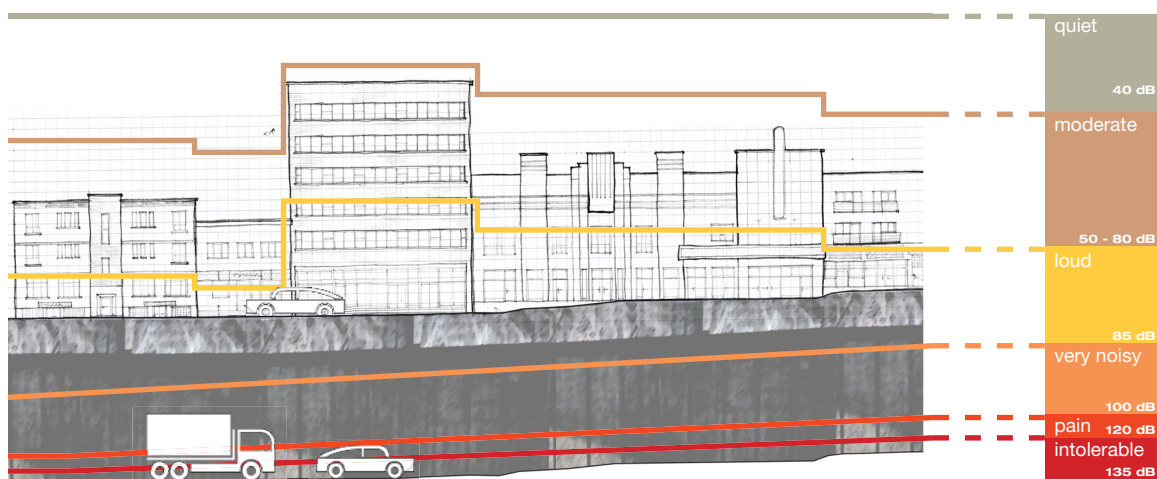
Noise Pollution

A noise pollution study completed by the CDN/NDG borough in March of 2006 explains the issues created by vehicles on the Decarie. Noise carries up to 150m on either side of the expressway. Up to half of adjacent block depths are affected by 65 to 70 dB of sound and full block lengths along streets perpendicular to the expressway are affected. The MTQ sets the threshold for noise pollution requiring sound barrier walls to 65 dB. The Decarie produces noise above these levels in most areas (Ville de Montréal 2005).

	Car @ 60km/hr	65 dB @ 20m away 75 dB @ 3m away
	Truck @ 50km/hr	85 dB @ 20m away



Noise levels in plan (Ville de Montréal 2005)



Noise levels in section (Ville de Montréal 2005)

REFERENCES

- Appleyard, Donald, Kevin Lynch, and John Randolph Myer. 1964. *The View from the Road*. Cambridge: M.I.T. Press.
- ArchDaily. 2011. Weiss and Mafredi's Olympic Sculpture Park. (photograph). <http://www.archdaily.com/101836/olympic-sculpture-park-weissmanfredi/>.
- Les Archives du Photographes. 2012. La Valeur d'une Image. (photograph). <http://www.lesarchivesduphotographe.com/wp-content/uploads/2012/01/CI-DIA-01091951-0642011-9.jpg>. (accessed July 14)
- Banham, Reyner. 1971. *Los Angeles: The Architecture of Four Ecologies*. New York: Harper & Row.
- Beauregard, Robert. 2003. Between Modernity and Postmodernity: The Ambitious Position of U.S. Planning. In *Readings in Planning Theory*, ed. Scott Campbell and Susan S. Fainstein, 108-124. Malden, MA: Blackwell Publishers.
- Bell, Jonathan. 2001. *Architecture: When the Car and the City Collide*. London: August.
- Bing Maps. 2011. <http://www.bing.com/maps/> (accessed October 10).
- Blatchford, Andy. 2011. Authorities Rip Down Another Concrete Beam in Montreal after one Collapsed. The Canadian Press. August 1. <http://www.winnipegfreepress.com/breakingnews/authorities-rip-down-another-concrete-beam-in-montreal-after-one-collapsed.html>.
- CBC News. 2011. Feds to replace Champlain Bridge. October 4. <http://www.cbc.ca/news/canada/montreal/story/2011/10/04/mtl-champlain-bridge-plan.html>.
- Le Centre Capitale. 2011. Discover the Centre CDP Capital / Centre CDP capital Description. <http://www.centrecdpcapital.com/en/discover/description.php> (accessed Feb. 14).
- cityLAB. 2009. *WPA 2.0: Whoever Rules the Sewers Rules the City*. <http://wpa2.aud.ucla.edu/info/index.php?/theprojects/winners/>.
- Cuff, Dana, and Roger Sherman. 2011. *Fast-Forward Urbanism*. New York: Princeton Architectural Press.
- Evan Mather Hand Crafted Films [youtube channel]. 2010. Image of the City. October 8. http://www.youtube.com/watch?v=iuWPCNlj_rA
- Google Maps. 2011. <https://maps.google.ca/> (accessed October 10).

- The Harvard GSD [youtube channel]. 2011. Evolutionary Infrastructures - Marion Weiss and Michael Manfredi. October 12. http://www.youtube.com/watch?v=mJH_bLPKOAU&feature=player_embedded#!.
- Hirt, Sonia. 2005. Toward Postmodern Urbanism?. *Journal of Planning Education and Research* 25, no.1: 27-42.
- Holl, Steven. 2009. *Urbanisms: Working with Doubt*. New York: Princeton Architectural Press.
- Koolhaas, Rem. 2002. Junkspace. *October* 1, no.100: 175-190.
- Large Canadian Roadside Attractions. 2006. Orange Julep. (photograph). <http://www.roadsideattractions.ca/orange.htm>.
- Lynch, Kevin. 1960. *The Image of the City*. Cambridge, Mass: MIT Press.
- McCord Museum Collection. 2011. *Lachine Canal*. (painting). <http://www.mccord-museum.qc.ca/scripts/large.php?accessnumber=M984.273&zoomify=true&Lang=1&imageID=149525> (accessed October 10).
- Nye, David E. 2011. Redefining the American Sublime, from Open Road to Interstate. In *Routes, Roads and Landscapes*, ed. Mari Hvattum, Brita Brenna, Beate Elvebakk and Janike Kampevold Larsen, 99-111. Farnham, Surrey: Ashgate Pub.
- Palais des congrès. 2010. The Palais des congrès. (photograph). <http://www.congresmtl.com/fr/nouvelles/communiqués-item.aspx?id=139>.
- Professor Hanser's Lectures. 2012. ARCH 6083. Le Corbusier's Plan Voisin. (Image). <http://hanser.ceat.okstate.edu/6083/Corbusier/Urban%20planning.htm> (accessed July 14).
- Quartier International de Montréal. 2012. http://www.congresmtl.com/link_out.asp?id=1064 (accessed July 14).
- Richer, Nadia. 2010. Rethinking Trench Expressways. (Maps and Aerials) Supervised Research Project in Urban Design for the degree of Master of Urban Planning, McGill University.
- Riga, Andy. 2010. Quebec is going to straighten out parts of the Décarie spaghetti junction. *montrealgazette.com*. November. <http://blogs.montrealgazette.com/2010/11/03/quebec-is-going-to-straighten-out-parts-of-the-decarie-spaghetti-junction/>.
- Schwarzer, Mitchell. 2004. *Zoomscape: Architecture in Motion and Media*. New York: Princeton Architectural Press.
- Spacing Montreal. 2010. Orange Julep an Oldie and a Goodie. (photograph). <http://spacingmontreal.ca/2010/01/28/orange-julep-an-oldie-and-a-goodie/>.

- Statistics Canada. 2006. Immigration in Canada: A Portrait of the Foreign-born Population, 2006 Census: Portraits of major metropolitan centres. <http://www12.statcan.ca/census-recensement/2006/as-sa/97-557/p22-eng.cfm>.
- Stilgoe, John R. 1983. *Metropolitan Corridor: Railroads and the American Scene*. New Haven: Yale University Press.
- STM (Société de Transport de Montréal). 2009. STM Plan Interactif. (Map). <http://www.stm.info/metro/mapmetro.htm>.
- Ville de Montreal. 2005. *Plan d'Urbanisme*. http://ville.montreal.qc.ca/portal/page?_pageid=2761,3098311&_dad=portal&_schema=PORTAL.
- Ville de Montreal. 2009. *Cartographie de base numérique de Montréal 1:1000*. (digital file). Montreal: McGill University.
- Ville de Montreal, Côte-des-Neiges Notre-Dame-de-Grace. 2010. *Plan Directeur - Culture, sports et loisirs en réflexion*. October 4. http://ville.montreal.qc.ca/portal/page?_pageid=7497,95019716&_dad=portal&_schema=PORTAL.
- Wergeland, Even Smith. 2011. Aerocabs and Skycar Cities: Utopian Landscapes of Mobility. In *Routes, Roads and Landscapes*, ed. Mari Hvattum, Brita Brenna, Beate Elvebakk and Janike Kampevold Larsen, 151-159. Farnham, Surrey: Ashgate Pub.
- Westchester Magazine. 2009. Westchester - A Pictorial History. <http://www.westchestermagazine.com/Westchester-Magazine/January-2010/Westchester-ndashA-Pictorial-History/index.php?mode=popup&cp=4&view=slideshow&play=0&pageid=47181>.
- Whitman, Walt. 1883. *Specimen Days*. Google Books. <http://books.google.ca/ebooks/reader?id=tC0LAAAAIAAJ&printsec=frontcover&output=reader&pg=GBS.PA132>.
- Whyte, William H. 2002. *The Last Landscape*. Philadelphia: University of Pennsylvania Press.
- Wikipedia. 2008. Square Victoria. (photograph) http://en.wikipedia.org/wiki/File:Square_Victoria.jpg.