CHAPTER TWO

A Transit-Oriented Vision for the Turcot Interchange: Making Highway Reconstruction Compatible with Sustainability

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The Turcot Interchange was built to sustain car-oriented urban development. In urgent need of reconstruction, the Turcot Interchange should be redesigned in light of sustainable transit-oriented goals, such as those enunciated in the Montreal Transport Plan 2008. Implementation of major transit projects and adoption of car reduction policies would make possible a reduction in the interchange's traffic capacity and physical size, and diminish its impact on adjacent neighbourhoods. Land use planning, transit planning and parking or tolling policies must be integrated to the infrastructure plan in order to help reduce car dependency and improve health and quality of life for Montrealers. The proposal presented here combines transit improvements and disincentives for car users in order to reduce the number of drivers commuting from the West Island to the center of Montreal. By reducing this number it is possible to redesign the interchange to sustain this new transportation approach. Most importantly, we propose to reduce the capacity of the Ville Marie Expressway in three phases, converting the Turcot Interchange into a three-way junction.

Introduction

Rather than simply rebuilding a structure designed to meet a 1950's vision of the city, the Turcot project could be the first step in a lasting transformation of how people commute and travel in Montreal. It could also be the beginning of a new form of urban development, a catalyst for the creation of green transit-oriented neighbourhoods.

The urgent need for reconstruction of the Turcot Interchange and the project undertaken by the Quebec Ministry of Transport (MTQ) represent a unique opportunity for the citizens and leaders of Montreal. Many stakeholders have diverse interests in the future of this infrastructure megaproject; the challenge for the governments of Montreal and the province of Quebec will be to choose a course of action which benefits the city and the province in a long term, sustainable way.

The Turcot Interchange plays a vital role in the Greater Montreal transportation system, but also supports a high level of automobile dependency. It must continue to provide efficient, safe, and reliable forms for transporting people and goods. It must also conform to the long term, sustainability-oriented vision adopted by the City of Montreal both in its Master Plan and Transport Plan, and to the environmental vision the MTQ has set out in its policy.

Planning for Sustainability

Municipalities and government agencies are focusing more and more on sustainable development and on the integration of economic, environmental and social equity goals into the planning process (Carmona & Sieh, 2008; Handy, 2006b). In Quebec, both the provincial and the Montreal municipal governments have adopted policies aiming towards sustainable development (see chapter 8 by Ghamoushi et al.).

Economic growth over the last two decades has produced a growing need for the efficient transportation of people and goods. Automobile use has steadily increased and suburbanization has followed. Between 1987 and 1998 the number of auto trips increased by 30% in the Montreal region, while transit's modal share dropped from 37% in 1982 to 21% in 2003 (AMT, 2003a) (see chapter 4 by Kenworthy and Townsend).

This trend has very negative consequences on health and the environment. Global warming from car emissions is among the most serious of these. In 1991, 27% of all energy consumed in Quebec was transport-related; of this, 83% was consumed by automobiles (MTQ, 1994). Transport contributes to 47% of Montreal's greenhouse gas emissions, 85% of NOx emissions, and 30% of all airborne particulates (Drouin, 2008; Drouin, et al., 2006; DSP, 2006).

In addition, air pollution from automobile use is a serious health issue: air pollution caused 1500 premature deaths in Montreal in 2002 (Drouin, 2008; DSP, 2006). Cardio-respiratory disease, road injuries, obesity, diabetes, and exclusion of persons with reduced mobility are all identified as direct results of the changes in air quality, climate, road safety and accessibility which follow increased automobile use (Drouin, 2008; Drouin, et al., 2006; DSP, 2006; see also chapter 7 by Ferguson et al.).

Transportation policies adopted by both the MTQ and the City of Montreal assert the importance of reducing car dependency and place transit at the heart of sustainable development strategies. These policies also highlight the interaction between the land use and transportation systems

as well as the importance of integrating land use planning with transportation infrastructure projects.

Transit and Sustainability

The MTQ adopted its environmental policy in September 1992. It makes sustainable development its guiding principle and places environmental concerns at the heart of decision-making alongside economic issues.

Within its environmental policy document, the MTQ recognizes the fundamental link between land use planning and transportation. The document states that urban sprawl and less dense suburban areas favour car usage; this leads to increased noise and air pollution in central city areas. A transportation plan which integrates land-use planning could reduce pollution through the harmonious growth of urban development and transit. The MTQ also asserts that diminishing the negative effects of car use can only effectively be achieved by replacing cars with transit (MTQ, 1994).

The MTQ's environmental policy represents a financial and strategic commitment to the implementation and improvement of public transit. Developing public transit is a priority in order to meet today's needs without compromising those of future generations (MTQ, 2006).

Although transit ridership has slowly been declining since the 1950's, that trend is now reversing (AMT, 2003b),and transit use in Montreal has stabilized since 1998 (City of Montreal, 2003). While transit ridership declined by about 1% a year between 1986 and 1995, it increased 1.7% annually between 1996 and 2002 (AMT, 2003b). In fact, the annual growth in car trips (+0.9 %) was lower than the annual growth in transit trips (+1.6 %) for the year 2003 (see chapter 4 by Kenworthy and Townsend).

Economic and demographic growth on the island of Montreal as well as changes in service levels of transit to better meet needs may explain these results (City of Montreal, 2003). In order to meet Kyoto objectives, transit ridership should increase by 5% yearly (AMT, 2003a). Aggressive initiatives are needed to prioritise public transit so it can adequately meet transportation goals and be competitive with automobile use.

The Transit Metropolis

Following the merger of the municipalities on the island of Montreal in 2002, Mayor Gérald Tremblay held the Montreal Summit to determine development priorities. The Montreal Master Plan and the Montreal Transport Plan 2008 were the result. Both these plans are based on sustainable

development principles and have the goal of improving Montrealers' quality of life. They are future-oriented and environmentally focused; in fact, one of the stated aims of the Master Plan is "to guarantee that future development in Montreal will rest firmly on the principles of sustainable development". Explicitly-stated goals are to "maintain the quality of established living environments" and to "ensure the positive contribution of large transportation infrastructure to the urban landscape" (City of Montreal, 2004). The Master Plan addresses issues such as enhancing transportation efficiency and effectiveness, protecting natural areas, and improving environmental conditions.

The focus of the Montreal Transport Plan 2008 is to make transit and active transportation the preferred transportation modes in order to reduce automobile dependency. The Transport Plan is composed of 21 strategic projects; nine of these are transit-oriented. The plan proposes several investments in active transportation and transit: extending metro and commuter rail lines, building several Light Rail Transit (LRT) lines in the center and a rail shuttle between downtown and the Montreal-Trudeau airport, implementing several Bus Rapid Transit (BRT) lines and new priority measures for buses, promoting car sharing, taxis and ridesharing and several measures to promote walking and cycling, including doubling the number of cycling paths in the next 7 years. It also has an important target: increase transit ridership by 8% by 2012, and 26% by 2021. The plan's overall strategy is a massive, systematic, and highly structured shift away from cars towards transit and active transportation modes.

Both the MTQ and the City of Montreal have adopted goals to reduce automobile dependency. Increasing transit is the favoured manner of attaining this goal. Although these goals have been adopted, they have not necessarily filtered through the planning process to the projects and plans being implemented. This is true not only of Quebec but generally of transportation plans in North America. Although transportation planning in general has moved towards new environmental and social goals, projects and policies still emphasize congestion relief (Handy, 2006a). The rebuilding of the Turcot Interchange is a prime example of a project that is still based on the idea of increasing mobility and reducing congestion.

Modal Shift Strategy

Reducing automobile dependency through transit is based on the concept of modal shift. Rather than aiming to reduce the number of trips that are

made, the goal of this strategy is to replace a percentage of solo automobile trips with transit, walking or cycling trips.

For this shift to happen, transit must be more attractive than driving. In a study evaluating the elements drivers wanted improved in order for them to shift to transit for their daily work commute, respondents named frequency, reliability, convenient drop off sites, better connections and discount tickets as important factors. Security, more comfortable vehicles and better information were also mentioned but were less important (Kingham, Dickinson, & Copsey, 2001). The Agence métropolitaine de transport (AMT) for Montreal has placed modal transfer at the heart of its strategy to attain Kyoto objectives: reduce car trips by 25%, double the number of walking and cycling trips and double transit ridership over 15 years (AMT, 2003a).

The success of new transit projects relies on the application of incentives for development and disincentives for car users (Cervero, 1984). One example is to combine reserved bus lanes and high occupancy vehicle lanes with an aggressive parking policy (City of Montreal, 2008). In the proposal outlined below, transit improvements are combined with disincentives for car users in order to reduce the number of drivers commuting from the West Island to the center of Montreal. By reducing this number, it would be possible to redesign the Turcot Interchange to sustain this new transportation approach.

An interesting example of a city with a clear strategy to reduce car trips by replacing them with sustainable transport options is Beijing, China. In 2003, the City of Beijing decided to launch an ambitious plan to rectify the city's transit problems in time for the 2008 Olympics. The objectives were to improve the efficiency and attractiveness of urban transport. The target was that 60% of people's daily trips would be met by transit, 20 % by cycling, and the remainder by private automobiles (Beijing Transport Bureau, 2003).

Beijing has given public transit a strategic position in the city's sustainable development planning. According to the Beijing Public Transport Group, the city's transit system served 4.6 billion persons in 2007, a 13% increase from the previous year (Beijing 2008 Olympic Games). These transit improvements were combined with a restriction on driving which allowed cars with license plates ending in even numbers permission to drive one day and those with license plates ending in odd numbers the next. This resulted in a reduction of 1.82 million vehicles during the 20 days of the Olympic event, and a corresponding emissions reduction of 20% (Beijing 2008). Interestingly, after this restriction was lifted, 54% of car users in Beijing favoured its continuation, citing the perceived benefit

of having clearer air and less congestion in a city which is consistently ranked among the world's worst in these categories (Beijing Airblog).

The Turcot Today

The Turcot Interchange was built hastily in 1966-67, to be ready for Montreal's hosting of the 1967 World Exposition. It facilitated transport fluidity in Montreal by linking suburban areas to the downtown core. The interchange is a major highway junction between east-west traffic on the Highway A-20/Ville Marie axis and the north-south traffic on Highway A-15; it also allows direct highway access to downtown Montreal. Highway A-15 is the only North-South link between the industrial sectors Northwest of Montreal and the economic cradle of South-eastern Québec and the Northern New England States. From an economic perspective, therefore, its stability and reliability are crucial. (See **Figure 2.1a** in the colour section.)

The interchange, which accommodates over 300,000 vehicles per day, is situated in an urban residential area. The ramps and spans pass over residential parts of St.-Henri and Cote-St.-Paul, and connect neighbourhoods in Westmount and Notre-Dame-de-Grace (NDG).

The interchange is south of the St-Jacques Escarpment (a five-kilometre-long linear park), and north of the Lachine Canal. Directly to the west of the interchange are the Turcot Yards, once owned by the Canadian National Railway (CN) and now owned, since 2003, by the Provincial Government. Below the interchange are Notre-Dame and Pullman Streets, as well as a CN rail line, which passes in a tunnel underneath the interchange ramps. The interchange itself is made up of four elevated spans, the criss-crossing A-15 and A-20, and eight elevated ramps that connect the spans to one another. The structures are 20 to 30 metres high; originally they were raised to clear the CN rail line and boat traffic on the Lachine Canal, as well as to connect Highway A-15 at the St-Jacques Escarpment.

The need to rebuild the Turcot Interchange provides an ideal opportunity to begin constructing the sustainable city described in the Montreal Master Plan and Transport Plan. It is also an opportunity to reflect on the impact of a massive highway system in the middle of a sensitive and densely populated urban area and to encourage new strategies to meet Montrealers' mobility needs in a sustainable manner. The project should refurbish the junction in a way that reduces car and truck traffic, encourages public transit, and also enhances the quality of life of local residents.

The MTQ Project

The scenario adopted by the MTQ is currently under review by the Bureau d'audiences publiques sur l'environnement (BAPE), a government commission mandated to conduct public hearings on the environmental impact of the project. (See **Figure 2.1b** in the colour section.) Construction is slated to begin in November 2009. The MTQ based the design of the new interchange on certain requirements:

- Maintain current traffic capacity
- Improve road and highway access
- Maintain interchange functionality
- Improve safety and reduce congestion
- Decrease the number of elevated structures by 65%, to reduce maintenance cost and effort
- Integrate the highway with its surrounding environment
- Maintain traffic flow during construction

An important element in the project is the establishment of a "transportation corridor" along the base of the St-Jacques escarpment. This corridor would include all the CN rail lines, and Highway A-20, both running in East and West directions. It would permit a complete opening of the Turcot Yards for development, either of an urban, industrial, or recreational nature. Since the Turcot Interchange is only 6km from downtown Montreal this land could have significant development potential.

The project would put most of the elevated lanes onto embankments. Highway construction would take place beside or beneath existing structures. The Ville Marie Expressway would be expanded in width to 21 metres to create four 3.75-metre lanes in each direction, with 3 metre shoulders on each side.

Health and Environmental Implications

The MTQ project for the Turcot Interchange clearly does not meet the goals set out in its environmental policy. While it does not significantly increase the capacity of the interchange, it does not reduce it either and it includes no measures that favour transit. The City of Montreal has requested that the MTQ create reserved bus lanes on the east-west axis of the interchange; however, many believe this will be done by simply adding another lane, which would amount to increasing capacity (Bisson, 2008).

Figure 2.1a The Turcot today

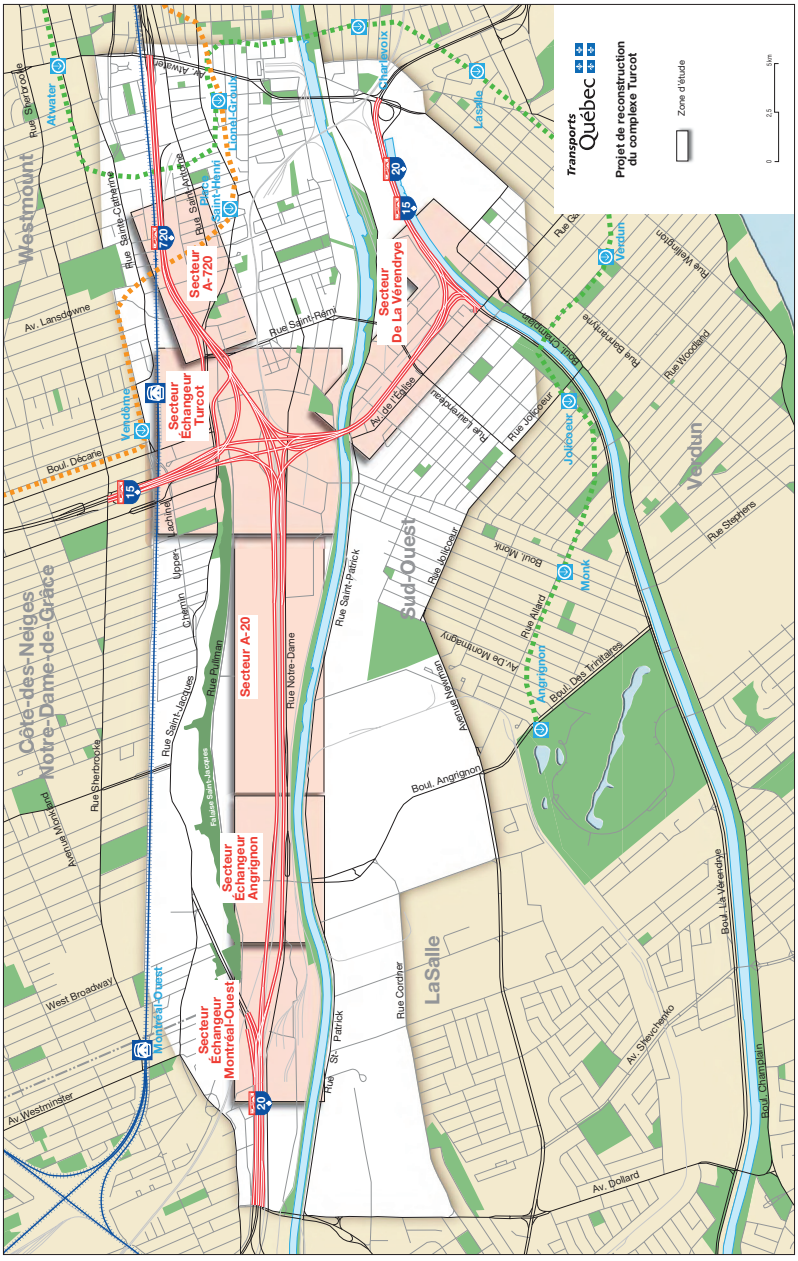

Figure 2.1b The MTQ Project

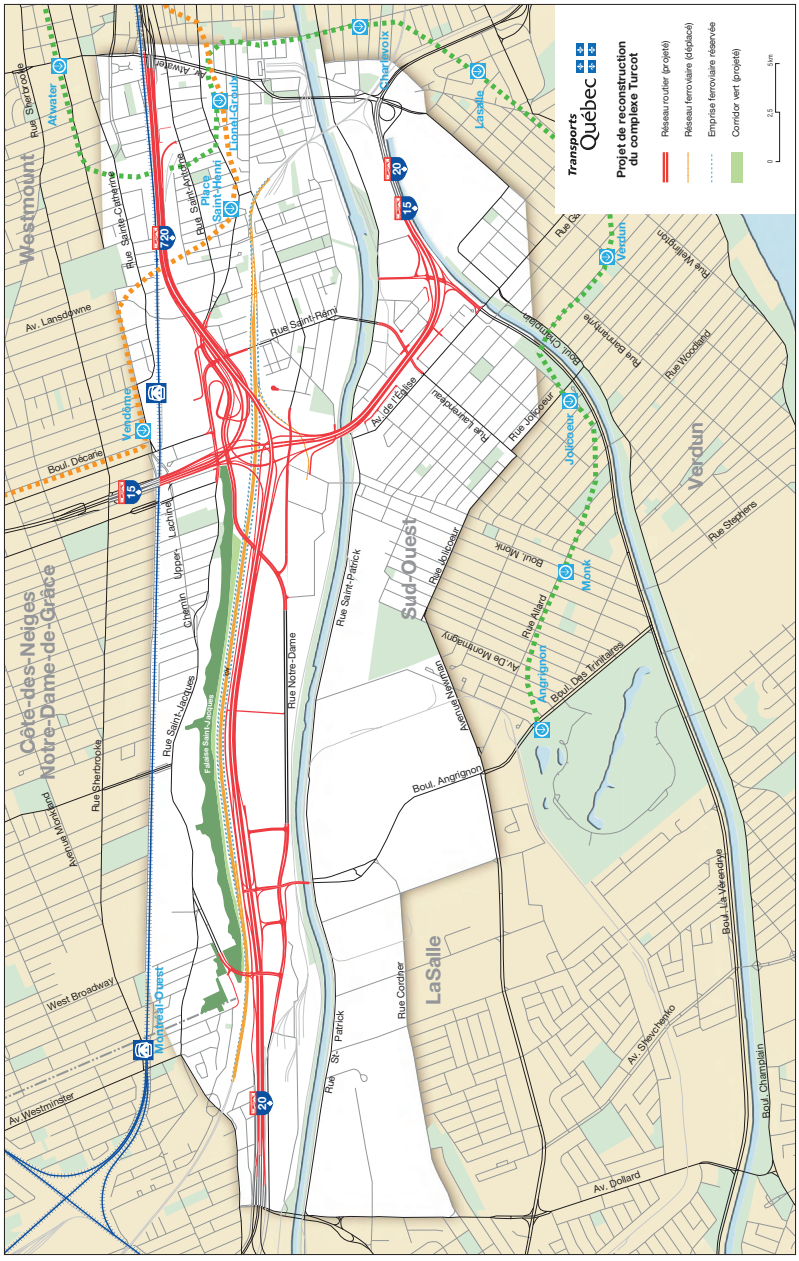

Figure 2.3 Improve transit between West Island and Downtown Montreal

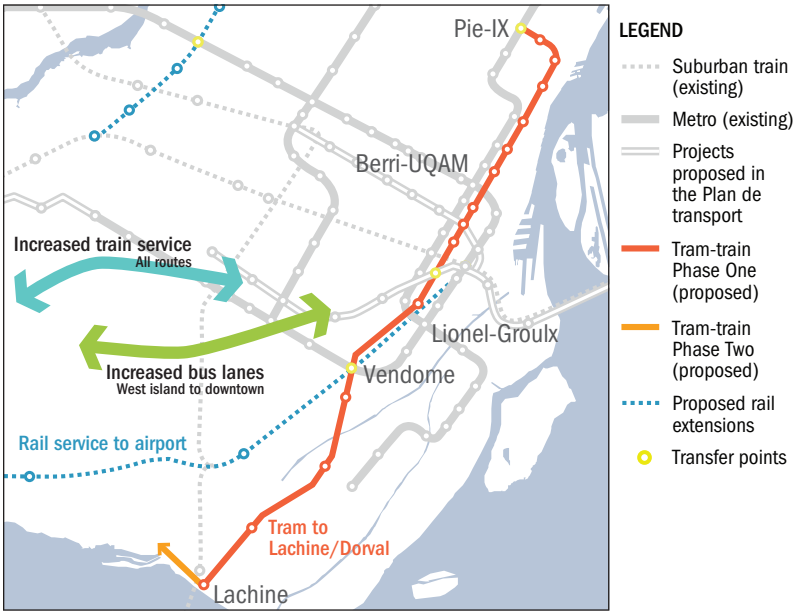

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Figure 2.4 MetroExpress

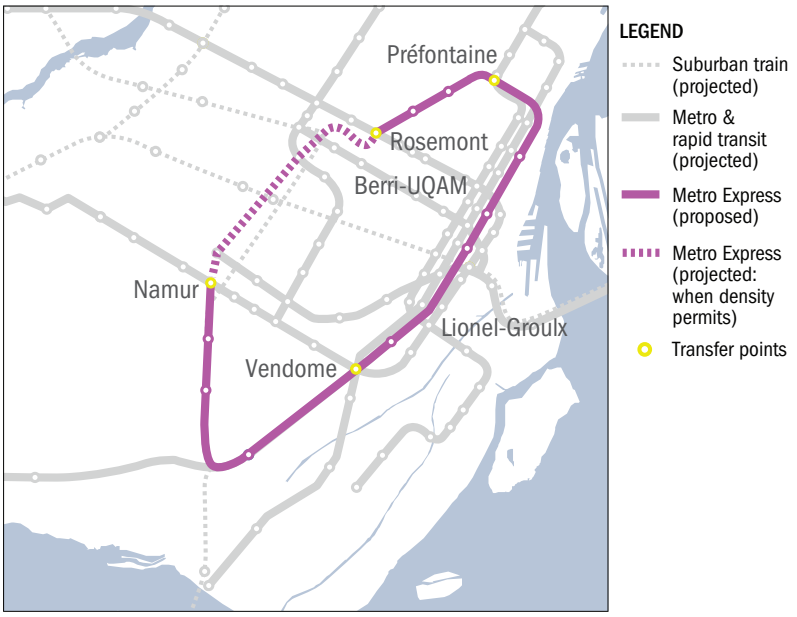

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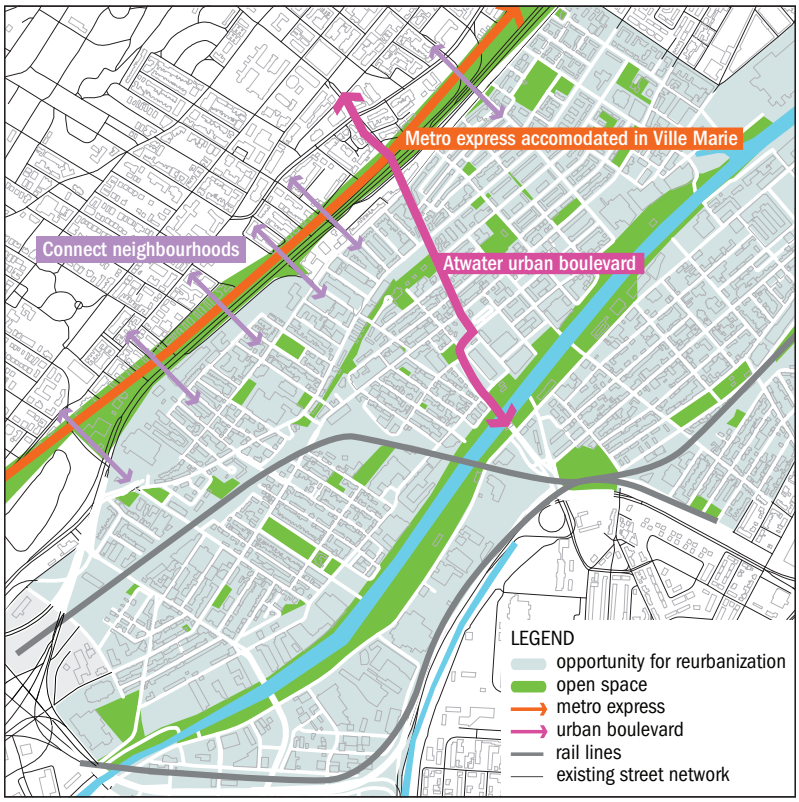
Figure 2.5 Reconnect Westmount to Saint-Henri



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Furthermore, this project would have several serious health and environmental impacts. Transportation infrastructure is a significant factor in environmental degradation. Construction, rebuilding, maintenance, use, and even presence of infrastructure, particularly roads and railway lines, can have serious environmental consequences (Forman et al., 2003). Transport-related impacts are often cumulative: they combine with the effects of agriculture and industry to produce a magnified overall impact (Noble, 2006).

Highways in urban settings negatively impact their environment and pose serious health risks (see chapter 7 by Ferguson et al.). Both the construction and operational phases of a highway's existence affect the immediate environment, the regional environment, and local and regional residents' quality of life. Noise, air quality, socio-economic conditions, groundwater, soil and geology, and cultural and landscape assets are all potentially affected by the presence of a highway system such as the Turcot Interchange. Living in proximity to highways has measurable health-risks: in households within 100m of a highway cardio-respiratory illnesses can increase by 53%; within 200m of a highway, there is a 17% greater occurrence of babies born underweight (Drouin, 2008). These considerations are not addressed by the MTQ's proposal.

Furthermore, the scenario adopted by the MTQ will necessitate the partial expropriation of industries and residents. Presently the *Village des Tanneries*, a community of 450 residences, faces partial expropriation because of its proximity to the Eastbound Ville Marie Expressway.

The health hazards involved in putting highway lanes onto embankments in the middle of residential neighbourhoods are significant (Drouin, 2008; Thérien, 2008). Moreover, studies show that measures such as vegetation and noise barriers are not infallible mitigation methods. The results of a pollutant concentration study in Raleigh, North Carolina, for example, show that particulate matter engendered by highway vehicles may in fact occur in higher concentrations around noise barriers (Baldauf et al., 2008).

The shift of the railway lines to the north of their current position would also negatively impact the construction and operation of the new McGill University Health Centre (MUHC) hospital: noise levels, air quality, and accessibility to the hospital by emergency vehicles would all be affected. No mitigation measures are currently proposed to attenuate these impacts.

A New Vision for Turcot

These health and environmental issues show that much more than connecting highways is at stake. The goals stated in the City of Montreal's Master Plan and Transport Plan correspond to a collective long term vision for an urban development that shifts away from automobile dependency towards sustainable transportation modes and improves the quality of life of residents. These goals must not only find their way into the projects built on the island of Montreal, they must be their main focus.

Rather than maintaining traffic capacity, a project based on the sustainability goals enunciated in the MTQ and the City of Montreal's policy statements would aim to reduce it by favouring transit and by penalizing or increasing the cost of driving. Rather than expropriate residents and further the dismantling of a residential neighbourhood in the heart of the city, a sustainable transport project would aim to connect residents more efficiently with their destinations and promote active transportation.

The adoption of the Montreal Transport Plan 2008 presents a favourable opportunity to reorient the Turcot project towards a transit-oriented design. In fact, the plan contains several transit projects that connect the West Island to downtown. These projects have in turn stimulated promoters to propose new transit initiatives specifically for commuters between these areas.

The implementation of four major transit initiatives, combined with a reconfiguration of the highway to reduce its impact on adjoining neighbourhoods, could significantly contribute to reducing the daily vehicle traffic on the highway and start Montreal on the process of lessening its dependence on the automobile.

The Transit-Oriented Proposal

The transit-oriented initiative aims to reduce automobile dependence in Montreal. This proposal is composed of four parts that include: the implementation of new transit projects, the elimination of ramps, the adoption of policies that discourage drive-alone trips, and the redesign of the interchange to reduce highway capacity and enhance the quality of life of local residents.

GOALS

The primary goal of a sustainable, transit-oriented design for the Turcot Interchange is to reduce traffic volumes on the highway by getting people

out of their cars and onto the transit system or the active transportation network. This concept directly informs the design of the project.

The second goal is to ensure that the quality of life of local residents is preserved and enhanced. This includes avoiding both expropriation of neighbourhoods and creation of physical barriers which would further disconnect and isolate neighbourhoods from one another or from other parts of the city. The physical design of the interchange must have these considerations at heart.

OBJECTIVE

The immediate objective of the transit-oriented proposal is to reduce the vehicle traffic on the Ville Marie Expressway by 41% by 2016. This is equal to 68,000 vehicles per day (v.p.d.); going from the current volume of 163,000 v.p.d. to a volume of 95,000 v.p.d. This contrasts with the MTQ proposal, which would permit the highway's capacity to grow to nearly 200,000 v.p.d. by 2016 (Consortium SNC-Lavalin-CIMA 2008).

This objective is achieved by implementing four complementary initiatives: (1) improve transit to the West Island to remove 28,000 vehicles per day; (2) remove ramps and introduce new mass transit links from inner city neighbourhoods to the city centre thereby discouraging "short trips" using highway infrastructure to eliminate 40,000 vehicles per day; (3) introduce drive-alone disincentives such as parking controls and congestion pricing to consolidate these gains; and (4) redesign the Turcot Interchange.

1: INCREASE TRANSIT TO THE WEST ISLAND

At the forefront of this proposal is an expansion of public transit in the Highway A-20 corridor between downtown and the West Island. Four projects are currently under study for that corridor (see **Figure 2.3** in the colour section of the book): a rail shuttle connecting downtown and the Montreal-Trudeau Airport; an express tramway from Lachine and Dorval towards downtown Montreal; increased capacity on the Delson and Dorion commuter rail lines, and an additional service to Chateauguay; and the creation of reserved bus lanes on highway A-20.

All of these projects have the capacity of alleviating traffic; they must be part of a concerted strategy to reduce the number of vehicles that use Highway A-20 and the Turcot Interchange daily. Financing and building these transit projects should be an integral part of the Turcot project. Further details on each project follow below.

Rail Shuttle. The rail shuttle between downtown and the Montreal-Trudeau Trudeau Airport is one of the major transit initiatives adopted by

the City of Montreal in the transport plan. It is currently under study by the AMT. Its objective is to accommodate 17% of airline travelers destined for downtown Montreal, a potential of 2 million travelers a year (City of Montreal, 2008).

Lachine Tramway. The Lachine tramway project is proposed jointly by Pabeco Inc. and the City of Lachine. The project proposes a commuter tramway linking the suburban area of Lachine with downtown. Lachine residents typically use the Highway A-20/Ville Marie Expressway as their commuter route (Bourque, Barrieau, & Lemire, 2007); implementing a tramway would specifically service this demographic. According to Pabeco, the Lachine Tramway would accommodate 30,000 passengers per day, representing 7.5 million users per year (Bourque, et al., 2007).

Increased Rail Service. The Dorion/Riguaud commuter rail line is currently operating over capacity. The AMT predicts that the population in the West Island and in the region directly west of the Island of Montreal will increase by 15-20% by 2026, as will the ridership of the trains for the home-work commute (AMT, 2006). Consequently, a new system and infrastructure is needed to meet the growing demand. It is vitally important that growing transport needs be met by an alternative to the automobile. As a response, the AMT and the provincial government have proposed increasing train frequency in this corridor by 35% (which corresponds to 230 more trains a week), and creating 10,000 new parking spaces in park and ride facilities around train stations. Increasing commuter rail ridership from the West into the downtown core will directly affect the number of cars using the east/west axis of the Turcot Interchange. It is expected 1.35 million additional passengers a year will use the trains (AMT, 2006).

Reserved Bus Lanes. The final element in increasing public transit to the West Island involves transforming one of the existing four lanes per direction on Highway A-20 to a reserved lane for transit and high occupancy vehicles. These reserved bus lanes would increase the efficiency of the numerous express bus lines that already use this circuit to bring commuters to the Lionel-Groulx metro station. Also, a transit service on reserved lanes would be faster since it would not be affected by traffic congestion. Reducing travel times will increase the appeal of transit and make it more competitive with the car. In fact, transit must offer comparable travel times with the automobile to conserve existing users and attract new ones (Vuchic, 2005).

Implementing each of these transit projects can potentially significantly reduce the number of vehicles using Highway A-20 and the Turcot Interchange to commute to and from the West Island. According to the 2003

Origin-Destination survey, 53,273 work trips to Montreal Center originate in the West Island during the morning peak alone (Enquête Origine-Destination 2003). Combined, these four transit projects have the potential of moving over 10 million people a year, or removing approximately 28,000 vehicles per day on the East-West axis of the interchange. The Lachine tramway and the improvements to the Dorion/Rigaud commuter rail line could move over 35,000 passengers a day, corresponding to 32% of the morning peak work trips between the West Island and Montreal Center. Reductions, whether at or exceeding these levels, or even at half these estimates, will alleviate the traffic on the interchange, which in turn will have a positive impact on pollution and health.

Transit projects can also have a significant impact on development around stations. They have consistently been shown to have a positive impact on land values, and when combined with appropriate planning and zoning can help to create denser neighbourhoods (Cervero & Duncan, 2001; Cervero & Landis, 1997; Chen, Rufolo, & Dueker, 1998; Knaap, Ding, & Hopkins, 2001).

2: REMOVE RAMPS AND INTRODUCE NEW TRANSIT LINKS

A second and more ambitious intervention is proposed for inner-city "short haul" traffic that uses the Turcot Interchange to access the Ville Marie Expressway. Through a series of strategic measures aimed at changing the behaviour of residents of Notre-Dame-de-Grace, Cote St. Luc, Hampstead and Verdun, we can further remove vehicles per day from the Expressway, theoretically as many as 40,000 vehicles each day.

The traffic reductions posited here are based on the traffic count volumes on the Turcot ramps provided by the MTQ in Atlas Quebec, http://transports.atlas.gouv.qc.ca/Infrastructures/InfrastructuresRoutier.asp (as of March 31, 2009). The reductions represent an indication, based on available data, of the scale of reductions that could be realised. More rigorous modeling, based on more accurate data, would likely lead to more robust estimates of traffic flows, driving behaviour and measures to reduce local use of the Turcot. In this sense, the numbers presented here represent goals which could theoretically be achieved by the replacement of solo automobile transport needs by public transit options similar to those described here.

A central element of this initiative would be the addition of express bus service lines that link the neighbourhoods of Notre-Dame-de-Grâce (NDG), Côte St. Luc, Hampstead and Verdun to the downtown core. Express bus lines would serve the neighbourhoods bordering the Decarie

Autoroute and would have exclusive access to the Ville Marie via the ramps connecting the highway to St-Jacques Street in Notre-Dame-de-Grace. Verdun express bus routes would access downtown via the new configuration of the Bonaventure highway.

The addition of these express bus service lines could result in a reduction in solo automobile use for back-and-forth traffic on the Ville Marie of 40,000 vehicles per day. This could be realized through, for example, the implementation of bus routes to specific ramps servicing the Ville Marie, as follows:

- The ramp linking the Decarie Autoroute to the Ville Marie, in the direction of downtown: this could potentially displace 11,000 v.p.d.
- The pair of ramps providing access to the Ville Marie from NDG would be reserved for emergency vehicles from the new MUHC hospital and public transit vehicles: this could potentially displace 21,000 v.p.d.
- Moreover, certain ramps could be closed entirely—such as those between the A-15 South and the Ville Marie—with 8,000 v.p.d. removed.

Figure 2.2 portrays the projected reduction in traffic volumes from the express bus service.

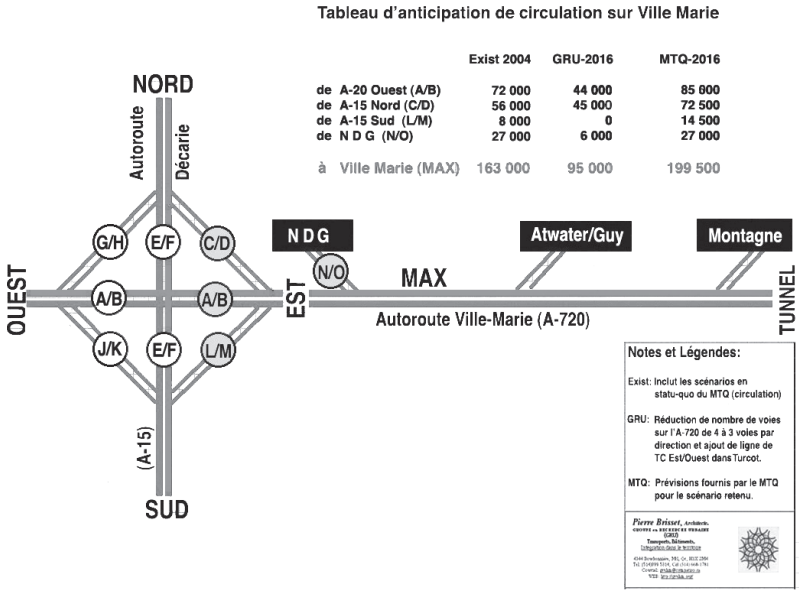
3: DRIVE-ALONE DISINCENTIVES

The third part of the transit-oriented design aims at lessening automobile dependency by creating disincentives for car use. Implementing these measures will help to consolidate the reductions described above. By increasing the cost to the driver, these strategies make driving less attractive and make transit more competitive with the car. Additionally, these measures can be used to finance transportation improvements and projects, including transit, which is another step towards sustainability.

Two such measures are proposed by the City of Montreal in their Transport Plan 2008 and can be implemented immediately as part of a concerted transit-oriented strategy.

Parking Control. The City of Montreal proposes to reduce parking spaces in the downtown core in order to discourage car use (City of Montreal, 2004). Parking availability plays an important role in the choice of driving versus transit; by reducing the number of available parking spaces, the city is actually favouring transit over the car (Weiss, 2004). Also, by ensuring drivers pay for parking, car use will be reduced and revenue will be raised for public transit initiatives through the user-pay principle (Gouvernement du Québec, 2007). This initiative could have a substantial

Figure 2.2 Traffic counts for the Ville Marie Expressway, actual and projected



Interpreting the table:

- The column "Exist 2004" shows the daily numbers of cars that currently use the four ramps (volumes provided by the MTQ in Atlas Quebec, see endnotes),
- The column "GRU-2016" shows the potential daily numbers of cars that could be found on these ramps after the reductions specified by initiatives 1 and 2 above (28,000 v.p.d. from West Island reductions, 40,000 v.p.d. from inner core neighbourhood reductions).
- The column "MTQ-2016" shows the MTQ projections of daily traffic counts for the MTQ's Turcot Interchange reconstruction alternative (data from Consortium SNC Lavalin-CIMA 2008).

Source: Traffic count data retrieved from Atlas Quebec and Consortium SNC Lavalin-CIMA 2008.

impact on traffic volumes. A study in San-Francisco found that a $3 'parking cashout' caused 45% of the reduction in drive-alone trips predicted by the transportation model; a cashout means offering employees who receive free parking the choice of using the space or receiving the equivalent value in cash (Lewis, 1998).

Furthermore, both minimum and maximum parking requirement policies would be implemented by the City to encourage the use of public transit. Adding maximum parking requirements for certain land uses is an

important measure since having only minimum parking requirements subsidizes driving and inflates parking demand (Manville & Shoup, 2005).

Congestion Pricing. The City of Montreal is considering placing tolls on the roads surrounding Montreal: the goal is to discourage car use, reduce negative impacts of automobiles, and increase city revenues. These tolls could be an efficient way to increase revenue as well as control the number of cars that access the city center. Tolls would be electronic and would not disrupt traffic flow. Payment would vary between times of the day; evenings and weekends would be free; and tariffs would depend on weather or air quality conditions, such as smog and snowstorms. Buses, taxis and emergency vehicles would be exempt. These tolls could raise between $425–$450 million per year, which would be dedicated to the implementation and operation of public transit (Lavallée, 2008). Other cities around the world have implemented similar congestion pricing systems to reduce traffic. London, Singapore and Stockholm, for example, report 15% to 45% reductions in traffic after implementing these systems (Environmental Defense Fund, 2007).

By combining increased transit options with disincentives for drive-alone trips and for car commutes to the city center, it could be possible to reduce the number of vehicles using the Turcot Interchange daily. This would not impact the number of trips between downtown and the West Island; it would simply move people out of cars and into sustainable transport modes. Simply by implementing the transit projects contained in the Montreal Transport Plan and those planned by the City of Lachine and the AMT, combined with parking policies and congestion pricing, it would be possible to reduce the number of cars going from the West Island to downtown by over 28,000 vehicles daily.

Finally, with additional improved transit links from adjacent neighbourhoods that also use the Ville Marie Expressway, such as Notre-Dame-de-Grace, Cote-St Luc, Hampstead and Verdun, we believe it is possible to remove an additional 40,000 vehicles per day, for a combined reduction of 68,000 v.p.d. (See **Figure 2.2** for projected traffic counts on ramps that feed into the Ville Marie Expressway).

In light of the above observations, it is possible to imagine a different design for the Turcot Interchange. This design would support the new transit projects and would impact the health and quality life of nearby residents in a positive manner. It could reconnect rather than disconnect neighbourhoods and free up valuable land for development to create sustainable, transit-oriented neighbourhoods. It would also discourage the use of the highway for short trips between neighbourhoods.

4: REDESIGNING THE INTERCHANGE

Rather than simply rebuilding the Turcot Interchange in the same manner and for the same purpose, there is an opportunity to redesign it in a fashion that would still fulfill its transportation function, while placing transit and people first.

The City of Montreal is currently building the first phase of a plan to replace the Bonaventure Highway with an urban arterial network, linking downtown to the Champlain Bridge through a series of urban streets and boulevards (Société du Havre, 2007). This approach should also be applied to the Turcot Interchange. Some ramps currently encourage expressway use for travel between adjacent neighbourhoods, something which is incommensurate with the goals of sustainability and quality of life. Replacing this access by an urban arterial boulevard on Atwater Street would solve this problem, and also eliminate the higher-emissions option of travelling the extra 5 km of highway to get from downtown to the Champlain Bridge.

Certain inner-city public transit initiatives could also serve to reduce traffic on the ramps of the interchange: for example, adding express bus lines from adjoining boroughs to downtown and designating ramps exclusively for their use could potentially reduce traffic by 40,000 vehicles per day, as we have seen above.

The Turcot Rail Yards, abandoned for the last five years, could be reinstated for parking, maintenance, and repair of trains. The Yards are in a naturally occurring physical depression between the St-Jacques Escarpment and the escarpment on the South side of the Lachine Canal, and tend to accumulate smog and air pollution. As such, they are unfit for residential development but ideal for use pertaining to the maintenance of the public transit initiatives (Brisset, 2008). At a minimum, given its industrial history, these hectares would require decontamination at considerable cost.

The St.-Jacques Escarpment would be protected from disturbance and encroachment. It could be developed as a public park and a natural sound barrier which would enhance the neighbourhood (see chapter 4, by Asch).

Finally, when possible, whatever is rebuilt must remain within the existing right of way and a serious debate should be held as to the pertinence of replacing this urban expressway (see chapter 3 by Sijkpes for the renovation option).

Reducing Traffic Volume

There is a strong relationship between the reduction in the number of cars and the reduction in pollution. Studies have shown that higher traffic count data indicate higher environmental impacts, while reduced traffic volumes indicate a corresponding reduction in impacts. Traffic reduction has a positive effect on health and safety, air quality, noise environment quality, greenhouse gas emissions, soil quality, hydrological system health, and urban micro-climate integrity (Canter, 1996; Forman, et al., 2003; Morris & Therivel, 2001; Noble, 2006).

The proposed transit projects, parking policies and congestion pricing have the potential of reducing car traffic by over 68,000 vehicles per day. By reconnecting neighbourhoods and eliminating inter-neighbourhood traffic, the redesign of the interchange would create more sustainable neighbourhoods where walking and cycling are favoured by residents. It is entirely within reach to reduce car traffic and improve health and quality of life.

All the above mentioned projects are presently in the preliminary study phases. Concerted political will and leadership are now required to integrate them within a large scale transportation project.

Now we must turn our attention to more ambitious projects.

* * *

Planning For The Future

Reconstructing the Turcot Interchange is a short term project with long term impacts. The MTQ project maintains the status quo, projecting the current situation onto future generations. The transit-oriented proposal uses the Turcot project as an opportunity to begin building a large scale transit network which improves neighbourhoods. Turcot is only the first step in what can be a major transformation of Montrealers' commute and travel behaviour, and also of the city center's urban landscape.

Once the new transit projects that connect downtown with the West Island are implemented, it would be possible to begin other phases to increase transit access and decrease car use.

The Ville Marie Expressway brought with its construction the massive expropriation of neighbourhoods. It is still a major barrier in Montreal's center. Conversely, transit projects can be catalysts for development (Gospodini, 2005) and provide an opportunity to develop new neighbourhoods.

Transit projects attract people and businesses and have a positive impact on land values (Cervero, 1984; Cervero & Duncan, 2001; Chen, et al., 1998; Knaap, et al., 2001).

A long term vision for Montreal, therefore, would see the Ville Marie Expressway dismantled or buried in central neighbourhoods and new transit projects built to ensure Montrealers' transportation needs are met in a sustainable manner. The current proposal suggests several steps for the achievement of these goals, the first of which is the implementation of a new high-capacity transit line: the Metro-Express.

The Metro-Express

In order to reduce car use in the downtown area, the number of lanes on the Ville Marie Expressway should be reduced. Two lanes in each direction could be reserved for transit vehicles allowing installation of a new major transit project. Because several bus lines and metro lines are currently at capacity (City of Montreal, 2008), a third high-capacity transit line could be built to connect the east and west of central Montreal to downtown. A Light Rail Transit (LRT) line running from the Rosemont borough through downtown to Montreal West and NDG would reduce passenger congestion, supplement tramway services, and further discourage automobile use (see **Figure 2.4** in the colour section).

This LRT could be built using only existing infrastructure, such as CP rights-of-way, and the Ville Marie tunnel. It should be an express train, stopping less frequently than the metro. It should be designed to go underground and on the surface in order to permit future expansions on the network.

Reclaim Central Neighbourhoods

Another long term goal should be the removal of the Ville Marie Expressway between St-Remi, at the heart of the Turcot Interchange, and Atwater on the Eastern border of Westmount. Removal of this section would permit the restoration of an urban neighbourhood devastated by the demolitions engendered in the early 1970s, and would heal an urban wound which has isolated the area since.

In order to do this, the number of vehicles using the highway must be reduced and the ridership of transit increased: it must be feasible to dramatically reduce car access to the city center or to split the remaining volume up, slow it down and redirect it into the existing city street network. This

depends on planning strategically to attain this goal, rather than following existing trends.

The ultimate goal is to completely remove the Ville Marie Expressway between the Turcot Yards and Atwater Street, and subsequently convert the Turcot Interchange into a three-way junction. The highway would stop before the city center; cars would travel on the arterial network through the center; or preferably people would use transit, walk or cycle to get around the center. A 2-lane high-speed inner-city slipway, accessible from Atwater Street and terminating at Papineau, would still permit emergency vehicle traffic to travel towards the east and the west. The area that is freed up by the removal of the Ville Marie could then be re-greened or developed in a way which is no longer inhibited by the presence of an expressway. The resulting free land would have increased value due to its proximity to the downtown core (see **Figure 2.5** in the colour section).

Conclusion

The need to rebuild the Turcot Interchange presents a unique opportunity to redesign it according to sustainable long-term goals. Rather than maintain the status quo, the transit-oriented proposal uses the Turcot project as an opportunity to begin building a large-scale transit network and improve neighbourhoods.

Several major transit projects connecting the West Island to the city center are currently under study: the rail shuttle connecting downtown to the Montreal-Trudeau airport, a Tramway between Lachine and downtown, increased service on commuter rail lines and reserved bus lanes combined with new inner-city BRT lines. These transit projects have the potential of reducing car traffic by over 68,000 vehicles per day. By enforcing the parking policies and congestion pricing proposed by the City of Montreal, this approach would assure this decrease, instead of increasing the volume by 36,500 vehicles per day as proposed by the MTQ (Consortium SNC Lavalin-CIMA 2008). It would then be possible to redesign the interchange to reconnect neighbourhoods and eliminate inter-neighbourhood traffic, creating more sustainable neighbourhoods where walking and cycling are favoured by residents. By implementing these projects as part of a concerted transit-oriented strategy for the Turcot Interchange it is entirely within reach to reduce car traffic and improve health and quality of life of residents. The Turcot project is only the first step in what could be a major transformation in Montrealers' commuting and traveling patterns, and in the city center's urban landscape.

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