TECHNICAL BRIEFING

Gardiner/Lake Shore Corridor

Gardiner/Lake Shore Corridor Study Team
for the Toronto Waterfront Revitalization Corporation

July 15, 2004

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Toronto Waterfront Revitalization Corporation
Attn: Mr. Marc Hewitt, Vice President, Planning

Dear Mr. Hewitt:

We are pleased to forward to you the results of our comprehensive review of the Gardiner/Lake Shore Corridor. Since its completion in 1966, the impact of the elevated Gardiner Expressway on the quality of the city has been a matter of concern. As Toronto, like all waterfront cities, finds its future well-being strongly dependent on realizing the potential of its greatest natural asset, addressing this corridor takes on increasing significance. Certainly, a resolution to the challenges posed by the current design of the corridor is fundamental to waterfront revitalization.

Action is a matter of some urgency. Every year, significant new impediments to economic solutions to the redesign of the corridor, in the form of new development projects, are planned or constructed. These new projects increasingly foreclose solutions and implementation strategies to the corridor itself.

New York, Boston and San Francisco are only a few of several premier world cities which have addressed the problem of elevated expressway systems. In each case, removing such systems has proven an economic catalyst for revitalization. The presentation of such cities is now clearly understood to be an essential aspect of economic development. Toronto as Canada's Principal World City, cannot afford inaction.

The Gardiner/Lake Shore Corridor Study Group assembled to explore this matter was comprised of some of Canada's most renowned urban designers, transportation consultants, experts in modeling and simulation, and cost and implementation consultants; as well as world experts experienced in comparable projects. The most progressive analytical techniques and tools have been utilized in the work contained in this document. The findings embodied in this report represent a consensus of those involved.

The preferred approach recommended in this report is a feasible and workable proposal to the Gardiner/Lake Shore Corridor and would provide a fundamental transformation of the image and quality of Toronto's waterfront. Through the process of public consultation, other solutions may be advocated by various constituencies. Clearly, it is time to enter the environmental assessment which will provide the foundation for action on the Gardiner/Lake Shore Corridor and Toronto's waterfront revitalization.

Respectfully Submitted,

Gardiner/Lake Shore Corridor Study Team

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Appendices

The following consultants, groups and organizations have participated in the preparation of this Technical Briefing. Work by IntelliCAN was prepared in the Intelligent Transportation Systems Centre at the Department of Civil Engineering, University of Toronto. Acknowledgements are due to the City of Toronto, for their participation in the team meetings and workshops.

Architects Alliance
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EXECUTIVE SUMMARY

In Toronto, the first years of this century have been marked by a concerted effort to reposition the making of this city so that it meets the challenges posed by its growth to the efficiency of its infrastructure and to the quality of its environment; and in the process to create a vital waterfront united with the city. The new Official Plan, the Central Waterfront Secondary Plan, and the creation of the Toronto Waterfront Revitalization Corporation are all moves to address this challenge.

Key to these intentions is the question of movement to, from and within the central city and its waterfront, and in particular how meeting the needs of movement and environment can both be achieved harmoniously, rather than working at cross purposes. It is widely recognized and emphasized in the Official Plan that if the city is to be healthy, the movement infrastructure is to be sustainable, and the enormous opportunities of the waterfront are to be fully realized, then two important trends need to be nurtured and accelerated: the move away from automobile dependence and toward increased transit, walking and bicycle use, and the emphasis on place-making* in the public realm.

*** "The term *place* is shorthand for an area that is habitable, memorable, comfortable and pleasant. It is economically viable, and in a city is most closely associated with urban streets and blocks, squares, parks, promenades and vistas."**

Royal Commission on the Future of the Toronto Waterfront, 1989

It is in this context that the study team has examined how to reduce and/or eliminate the impediment to place-making posed by the Gardiner Expressway structure, and how to provide a movement system, in its place, that provides adequate automobile access to the city's centre but which also acts as a framework for sustainable city building and waterfront revitalization.

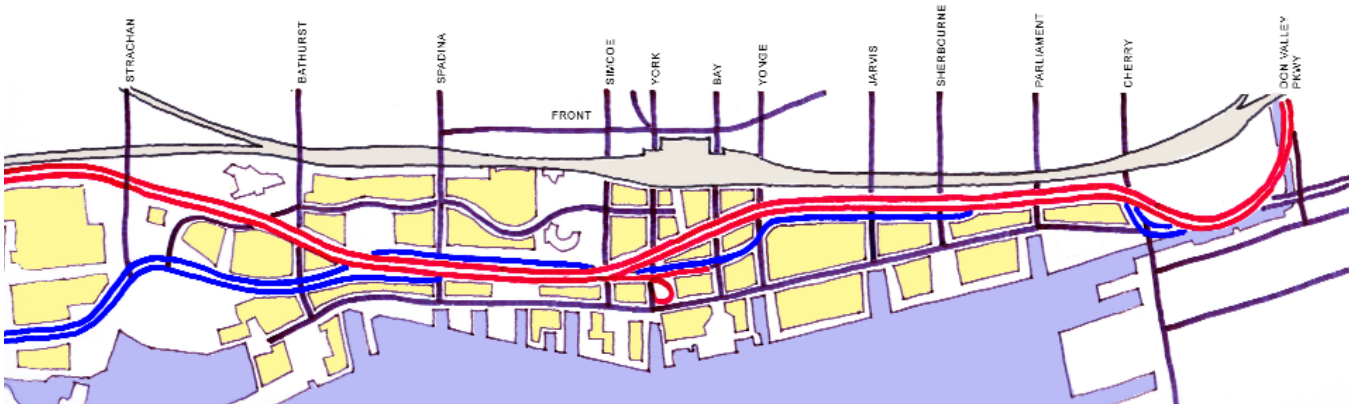
This work has included extensive investigation into the performance, operation and implications of automobile and truck traffic. Our mandate did not include similar detailed examinations of transit, although it was an underlying context and basis for the work in two ways. First, the central city has relied on transit, and the GO system in particular, for increased regional access over the last few decades and must continue to do so. There should not be an increase in access by automobile for commuting trips into the centre city. The automobile should remain important, but not as important as it has been. Second, the schemes examined have the potential for a transit improvement overlay in concept if not yet technically developed.

The work of the last year builds upon several decades of effort grappling with the question of reducing or removing the negative aspects of the Gardiner/Lake Shore structure, while providing a movement network that is a positive structure for revitalization. The team began this latest study with an examination of two different ideas: the replacement of the expressway with a combination of underground and surface roads, and the retention of the expressway while

reworking the ramp system and realigning Lake Shore Boulevard. Later, a more extensive surface street option evolved. These three have been thoroughly examined from a traffic perspective and measured against the existing condition. The results proved sufficiently encouraging to allow the team to explore even better place-making alternatives, albeit without the same level of traffic analysis.

The Do Nothing Approach

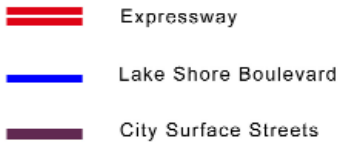
This is the base case, the status quo or "business as usual" scenario. It is the existing condition against which other options are measured in terms of improvement in place-making, and performance of vehicular transportation. If the existing system stays in place, there will be no improvement in place-making, the expressway will be "sealed in place" by development, and the street environment around it will be harsh and inhospitable. Transportation performance will remain stable given that it has already reached capacity. Costs will be in the order of $10-$12 million a year to repair, replace and maintain the aging structure.



Do Nothing Approach: (top) Digital Model View at York Street looking west; (bottom) Diagram

The Replacement Approach

The idea behind this scheme is to replace the existing structure with roads on the surface, underground, and on the railway embankment, and to do so in a way that retains and if possible enhances traffic performance. East of the Front Street interchange, a four-lane express road runs underground to the north of Fort York from Strachan to Spadina. Similarly, to the east of the central area, a four-lane express road runs on the railway embankment between Jarvis and Cherry, with Lake Shore (at grade) beside it. In the central area between Spadina and Jarvis, there are two five-lane one-way streets: eastbound on the surface and westbound partly on the surface and partly below grade.



This option improves place-making in many respects. It completely eliminates any structure around Fort York and through the railway lands to Spadina; it frees up land over the underground sections between Spadina and York and has normal surface roads for the most part between York and Jarvis. The road system between Jarvis and Cherry is more benign than at present. However, it does not have the kind of consistent character that would make it a memorable "address" street: the pieces are discontinuous and interspersed with ramp portals that in themselves are visual and physical obstructions.

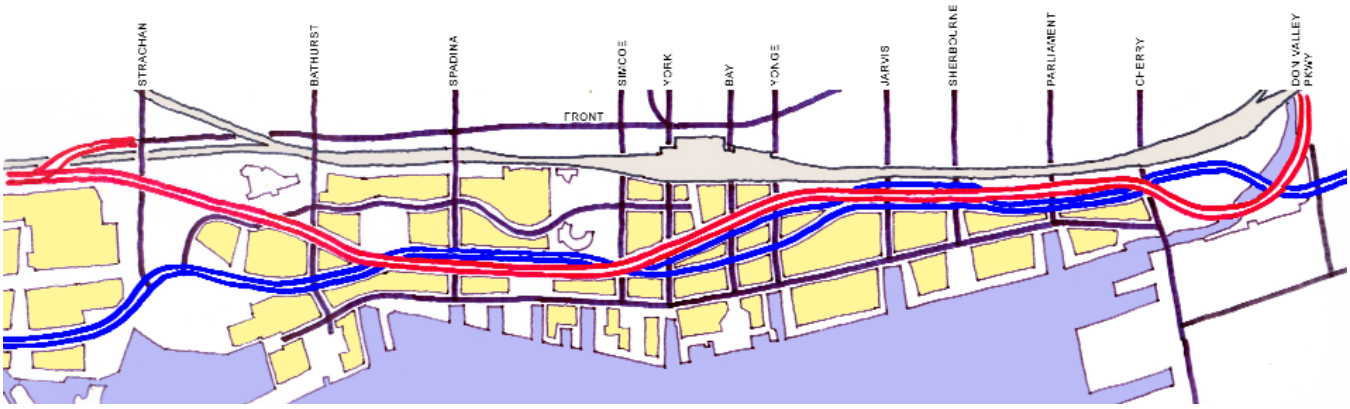
Transportation performance is about the same as at present – it will take a few minutes more to get into the city centre from the west, and a few minutes less to get out. The costs are in the order of $1,400 million to $1,475 million, depending on whether the tunnel north of Fort York is built cut and cover or bored.*

* Costs are for basic road works, including minimal sidewalks and standard street lighting. They do not include the Front Street Extension. Additional streetscape costs would be incurred as part of development charges.

The Mixed Replacement Approach: (top) Diagram; (bottom) Digital Model View at York looking West

The Transformation Approach

The idea behind this scheme is to reduce the barrier affect of the expressway without removing the upper structure, which after all does not physically restrict pedestrian movement at grade, but to remove some of the ramps, which do. Secondly, to attend to the current anti-pedestrian environment below and adjacent to the structure by relocating Lake Shore Boulevard and building beneath the structure, thereby providing frontage to adjacent streets and treating the Gardiner as a series of buildings and spaces with a roof carrying traffic. For most of its length, Lake Shore is beside rather than under the Gardiner, and has regular building frontage on one side and building frontage under the Gardiner on the other. Finally, the aesthetic problems are addressed by various architectural enhancements and cladding of the structure.



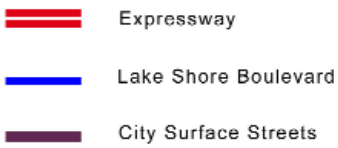
This approach has definite place-making advantages but requires public investment to achieve them beyond the engineering costs of the road works.

Traffic performance is somewhat reduced from the existing condition but satisfactory; a little less than the existing condition and the Replacement alternative, and about equivalent to the partial Great Street alternative (see below). The engineering costs for this alternative are in the order of $465 million for basic road works and perhaps $25 -$50 million for the architectural enhancements of the structure.

The Transformation Approach: (top) Diagram; (bottom) Digital Model looking West at York: Gardiner Transformed.

The Great Street Approach

The desire to further improve the quality of place, and reduce the cost, led to explorations based on a "place-making first" philosophy and the desire to make a "Great Street" which would act as an orientation spine in a streets-and-blocks framework for a Precinct Plan for the Central Waterfront, rather than simply a more normal set of roads. A continuous Lake Shore Drive from Humber Bay to Ashbridges Bay helps to create a scheme based on simplicity, ease of comprehension, and economy.



First Variation

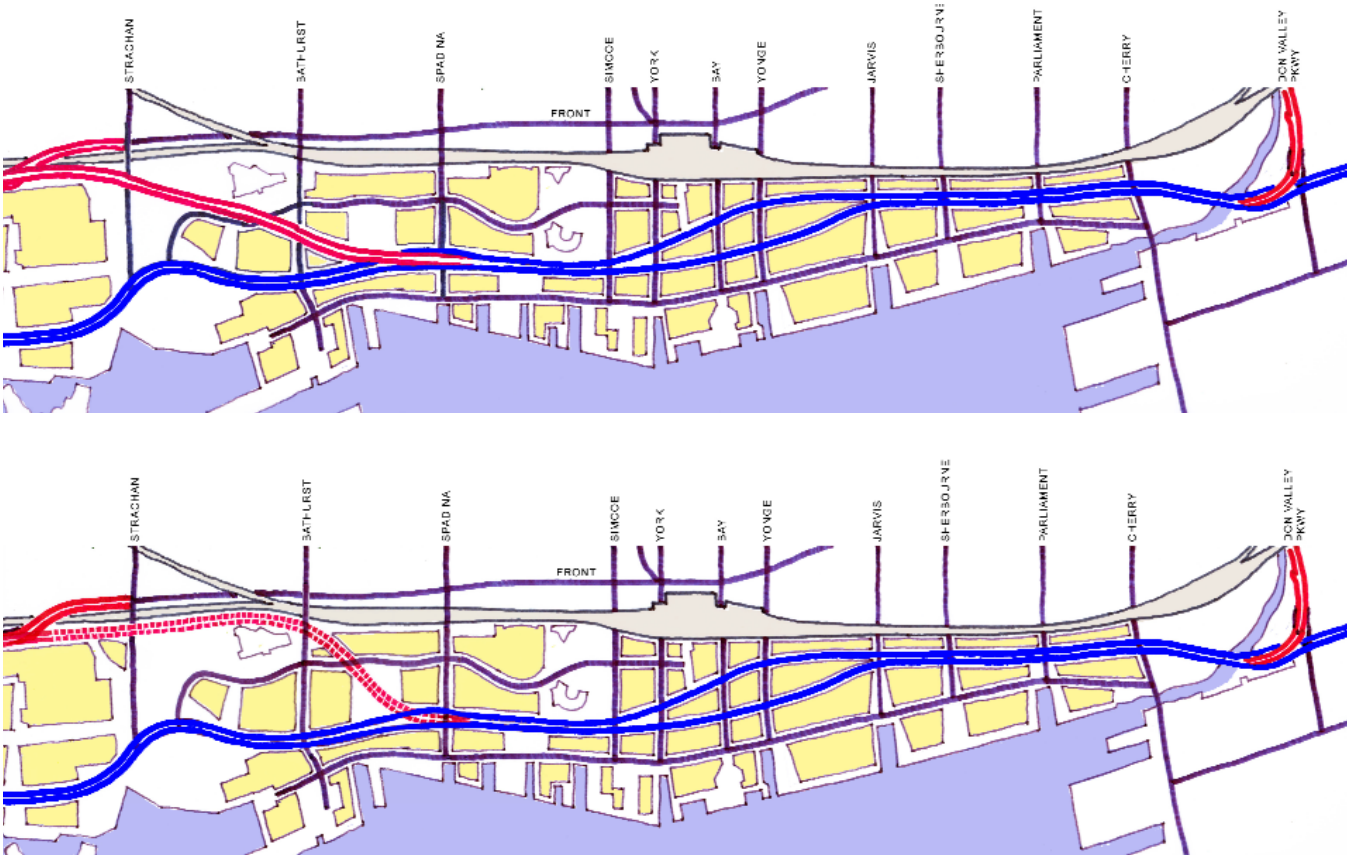
In the first of these schemes studied, the heavier traffic load west of Spadina is accommodated through retention of the existing Gardiner. The rest is accommodated on a ten-lane surface street with wide sidewalks and generous median between Spadina and Cherry, diverging into two five-lane, one-way streets in the central section between Simcoe and Jarvis. East of Spadina, the place-making attributes of this scheme exceed that of the others, although the

ten-lane two-way segments will take long enough to cross to require two green light cycles for slower pedestrians.

The traffic performance is less than the others, with slower average speeds; to be expected and in many ways desired in an urban condition. Capacity is nevertheless maintained, and the system operates satisfactorily. Basic costs are in the order of $490 million.

Second Variation

A variation is to construct an underground route west of Spadina rather than retaining the existing expressway in that portion. This particularly benefits Fort York, its adjacent neighbourhood, the railway lands, the railway lands community park and west Harbourfront. It brings a full surface street solution for the whole

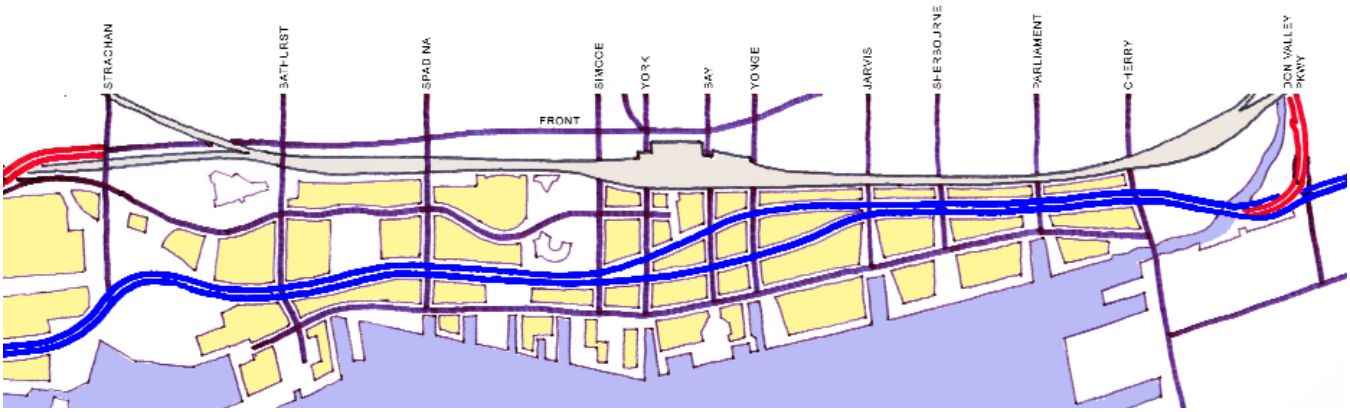


The Great Streets Approach: (top) Digital Model at York looking West; (middle) Diagram of First Variation, with elevated section west of Spadina; (bottom) Diagram of Second Variation, with underground west of Spadina

extent of the waterfront, except for ramp portal structures just east of Spadina. Traffic performance, while not tested, should be identical to the first variation. Costs are in the order of $1,070 million to $1,150 million (cut and cover or bored).

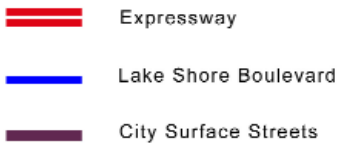
Third Variation

A third variation consists of a continuous eight-lane Lake Shore Drive across the full extent of the central waterfront between Jameson and the Don River. Its width is similar to University Avenue. Street crossings by pedestrians would be shorter than with other variations.



The Great Streets Approach: Third Variation, Full Great Street Diagram

This variation has not been tested with the traffic simulation model in the same way as the others. Rules of thumb indicate that it might carry about two thirds of existing capacity in the west end. This would require the development of strategies to reduce congestion and an increase in the use of transit to make up the shortfall. Road network costs (excluding transit system improvements) are in the order of $460 million.



Conclusions

The study team has concluded that the removal of the eastern and central portions of the elevated Gardiner Expressway is essential if the Corporation is to fulfill its mandate to revitalize the central section of Toronto's waterfront. More specifically, the Great Street Approach should be selected as the basis for an Environmental Assessment. The street should have a sufficiently consistent character across the whole central precinct so that it might accurately be called – and be readily perceived as – Lake Shore Drive; a new organizing feature of the waterfront.

The first variation is recommended as a starting point to the Environmental Assessment. The performance of this variation has been tested and the results are set out in the report. This variation provides satisfactory traffic performance.

The Great Streets Approach: Third Variation, Demonstration Model Plan View

Given the fact that the tested system works west of Yonge with a greater traffic load than east of Jarvis, it may not be unreasonable to expect that an eight-lane section might operate tolerably in the East Bayfront precinct. While this scheme maintains capacity (with slightly longer travel times) it will not increase it- a function propitiously being served by the current extensive upgrading of the GO transit system.

The team also found that continuing development was closing out alignment options and construction staging flexibility, and placemaking opportunities were being compromised even as the studies progressed. Alignments once possible in the Fort York neighbourhood were closed, as was one between Bay and Yonge Streets. The area of greatest opportunity is east of Simcoe, but plans will soon be finalized for almost all that area, including the corporation's own plan for East Bayfront. At present, there are reasonable economic phasing strategies possible, but these will soon be lost when development starts on the west section of the railway lands, the East Bayfront, and sites in the central area.

Urgent action is needed. An Environmental Assessment should be launched. The right-of-way for the Great Street alignment and the areas needed for phasing construction should be immediately protected while the assessment is undertaken.

PART 1

BACKGROUND

This part sets the stage for the examination of options. It sets out the fundamental objectives, provides a historical perspective, describes the physical characteristics of the corridor as well as its performance in providing access to the downtown, outlines the intentions of the city's Official Plan, and presents precedents of similar experience elsewhere.

1.1 Study Mandate and Objectives

> *"A successful city is one with a competitive advantage over others locally, nationally and internationally. It has a quality of life that will attract and retain people who have capital, skills, knowledge, ingenuity and creativity."*
>
> *City of Toronto Official Plan, November 2002*

This study is about quality of place in the waterfront, and by extension in the city as a whole. After decades of examining various ways of replacing or modifying the Gardiner/Lake Shore Corridor (GLC) so that it was compatible with waterfront revitalization, and after the new Official Plan and the Central Waterfront Secondary Plan ("Making Waves") were complete, City Council in February 2004, adopted recommendations to link transformation strategies of the corridor to "transit first" principles, and requested that staff report on all studies related to the removal or modification of the expressway.

This resolution supported the Toronto Waterfront Revitalization Corporation's strategy of February 2003, that stated the intention "to complete studies of the Gardiner to a consistent level so that TWRC can recommend to the governments on the future of the corridor."

This report is a summation of that work. It provides a history and synopsis of previous studies, but focuses on the alternatives most recently developed, which draw upon, and benefit from, the experience of the past work.

The GLC presents a severe impediment to revitalization of the central waterfront – particularly in light of the extraordinary importance of the enterprise. It constitutes a broad, high-speed traffic corridor across the whole area that is neither supportive nor consistent with what should be a richly textured central city district. Yet its renewal represents an extraordinary opportunity for intelligent transformation, and to generate land value and tax revenue in the process.

There are three broad objectives that should guide both the design of remedial alternatives and their comparative evaluation. The Corridor should be transformed to:

Create a public realm of streets, parks and open space, which acts as a viable framework for long-term development.

Essentially, what this means is converting the corridor so that it has the essential structure of any urban place of quality – a structure of streets, blocks and parcels, open to the sun and air, with their universal elements of sidewalks, trees, lighting, street furniture – that provides location and address for the buildings that line them, and provides a sense of place to the district. Thus, a single purpose traffic corridor will be replaced by a set of streets that, while performing necessary functions of access and transport, integrate the waterfront with the city. The result should be a showcase of Canada's skill, foresight and managerial excellence.

Play its part in delivering people and goods to the region's central area.

The GLC now provides mainly for central area destined traffic, as opposed to being a through route.

The newly reconstructed corridor must continue to deliver traffic in a way that sustains the functioning of the central city. There is no science to establishing the amount. In common with other cities, it is set by what is provided. Both city policy and practicality dictate that it does not expand. Within reason, reduction of automobile capacity in favour of transit and place-making is in line with policy.

Balance costs in keeping with the benefits.

There is no simple answer to this call, either. It is a matter of judgement. The study can set out the facts as clearly as possible so that an informed call can be made. However, it is clear that a call now will be far less costly than a call later, once the corridor is further built up, the missed opportunities greater, and the benefit less.

The study was conducted by nine consulting firms combining the disciplines of urban design, transportation, engineering construction and computerized analysis. It was monitored with regular input by the City of Toronto's Waterfront Secretariat. We have seen our role as demonstrating that it is possible to resolve the balance between access and place so that decisions can be made about the street component of a precinct Plan that will permit action toward a credible revitalization of the waterfront, and with it the city.

The Gardiner/Lake Shore Corridor presents a severe impediment to revitalization of the central waterfront – particularly in light of the extraordinary importance of the enterprise.

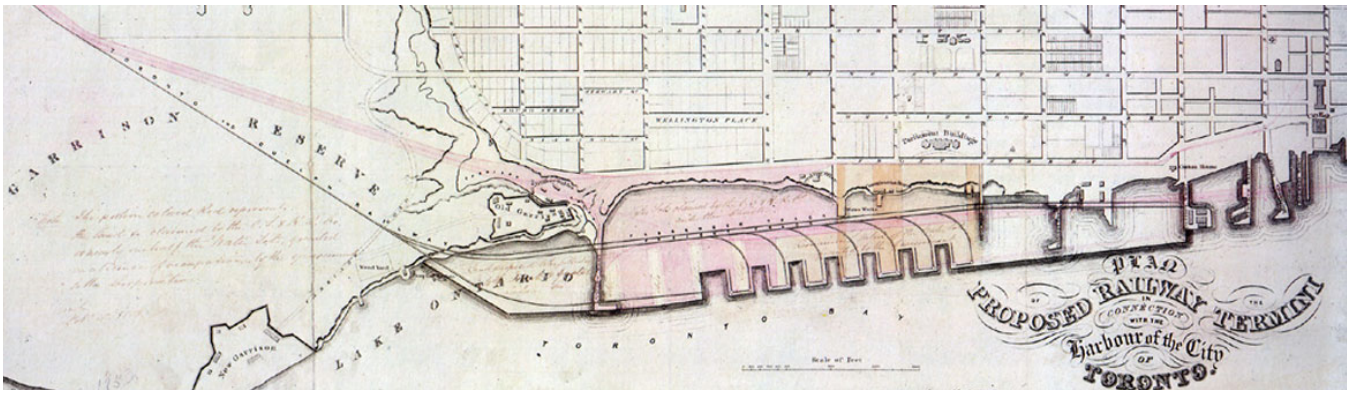


Figure (top): Howard's Waterfront Plan, 1852: a public space idea

Figure (bottom): Proposed Railway Plan, 1853; an industrial infrastructure idea

1.2 Historical Perspective

The 19th century history of the central waterfront shows a push and pull between a desire for public walks and gardens along the water's edge and the generally superceding imperative of industrial development, associated first with shipping and later rail access.

The 20th century history saw two major acts of severance between the main part of the city and its waterfront: the introduction of the railway viaduct east of Union Station and the addition of the Gardiner Expressway, followed by attempts to overcome these barriers and reclaim the waterfront.

Built in the 1920's, the Union Station railway corridor has been, and still is, a major barrier, but it is lower than the Gardiner, and does not cause overshadowing. West of Union Station, it is below grade, and has been reasonably successfully bridged in several places, somewhat reducing its barrier effect. The teamways and interior routes through the station have already started the linking process, and promise further animated connections between the two sides. East of Yonge Street the viaduct is quite narrow, and roads across it could, and should, be treated as more inviting thresholds.

Built between 1956 and 1966, Toronto's Gardiner Expressway was originally conceived as one of the links in an extensive expressway network designed to serve the new metropolitan municipality of Toronto.

The Spadina Expressway was under construction when its southward progress was stopped by the Province of Ontario after public protest. The un-built expressway links in the 1964 plan have since been eliminated from the Official Plan. These included the Scarborough Expressway from the Don River to Highway 401 near Port Union, the Richview Expressway and the Crosstown Expressway. The two which were constructed function as vehicular access to downtown rather than components of a network.

At the time of the Gardiner Expressway's construction, Toronto's central waterfront was an industrial area comprised of a variety of port, transportation, and railway functions. Because of the multitude of railroad corridors, road crossings and development the central portion of the expressway was planned as a continuous elevated facility and designed solely from a utilitarian point of view.

The end of World War II saw Canada as the world's fourth largest manufacturing country, and Toronto's waterfront as one of the major areas of the country's industrial capacity. But soon city expansion, increasing land values and congestion created the conditions for migration of heavy industry to cheaper and less constrained suburban land. This was associated with the construction of a regional expressway system (Highways 400, 401, etc.) north of the city, and later the move northward of primary freight rail facilities. This in turn led to the freeing up of the freight function of radial rail lines converging on Union Station.

Thus, soon after the Gardiner and Don Valley Expressways were built, the industrial function and freight rail use of the central waterfront began its decline, freight track became available for use by commuter rail, and the land started to become available for recreational use and popular occupation of the waterfront.

Today, many of the negative aspects of the seven kilometre section of elevated Gardiner pertain to its impact at street level. Coupled with Lake Shore Boulevard, which is placed beneath the elevated structure for 65% of its length, and in combination with 13 ramp locations, the resulting serpentine road network is unattractive, it disregards pedestrians, it is devoid of landscaping and civic design and is land-consumptive. The lack of consistent maintenance of the elevated structure has compounded the unsightliness of the structure.

Figure (top): Historic photograph of the construction of the Gardiner Expressway below Fort York

Figure (bottom): Proposed Expressway system, 1964

The newly reconstructed corridor must continue to deliver traffic in a way that sustains the functioning of the central city.

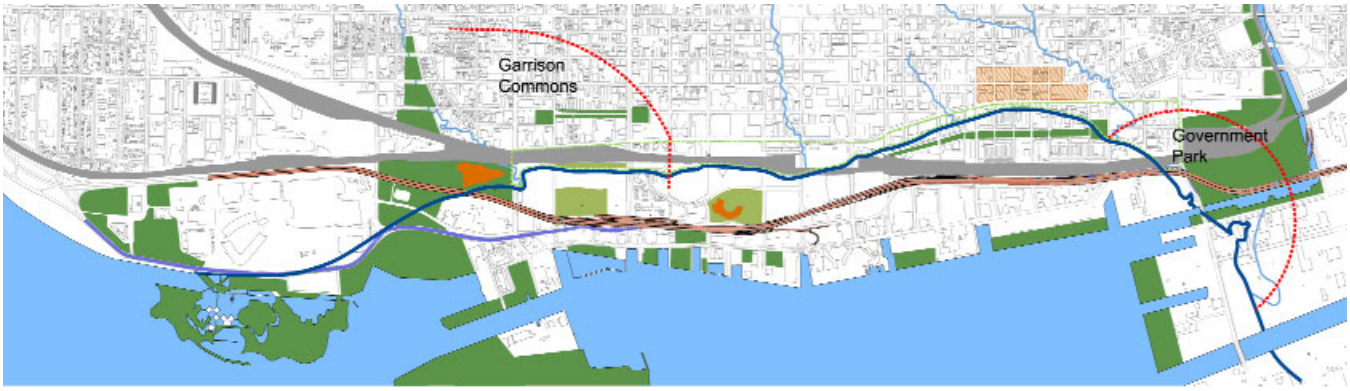


Figure (top): Waterfront Plan, Revitalization Task Force, 2000

Figure (bottom): Central Waterfront Plan, 2002: A public space and mixed-use precinct idea

And so began the initiatives, first of the City's Planning Department, then Harbourfront, followed by the Royal Commission on the Future of the Toronto Waterfront, The Waterfront Regeneration Trust, the Waterfront Revitalization Task Force, the Toronto Waterfront Revitalization Corporation, and the City's Central Waterfront Plan.

Along with plans to reclaim the waterfront, to occupy it with recreation, housing, cultural and commercial use, there has been a string of attempts to reinvent the

Figure: (left) Gardiner Expressway east leg before demolition; (right) same location after replacement with surface street

expressway. A notable success has been the replacement of the leg between the Don River and Cherry Street with a single surface road. First proposed in 1988, an Environmental Assessment was initiated in 1995 after it was realized that it would be cheaper to take it down than leave it up. There was great resistance from users of the route on the mistaken belief that a surface road would provide worse service. In fact, traffic now flows more freely than it did. The environment has improved beyond recognition.

The district's history has left a patchwork of jurisdictions, partly implemented plans, and sometimes competing governmental and agency objectives. This, together with the considerable political and technical challenges in marrying the two functions of access and place, has led to the inaction to date. An important function of this study is to provide the basis for action.

1.3 The Corridor's Physical Characteristics

An Integrated System

The Gardiner/Lake Shore Corridor is an integrated system of roadways and ramps between the Humber River in the west and the Don River in the east.

The expressway is a six-lane controlled access expressway with three lanes in each direction. It has no shoulder areas in either direction. It provides vehicular access to Toronto's central area and links the Queen Elizabeth Way and Highway 427 in the west with the Don Valley Parkway in the east. The expressway is elevated on structures between Dufferin Street and the Don River.

Figure: The Gardiner/Lake Shore controlled access system

Lake Shore Boulevard is a six-lane arterial road. It is aligned under or parallel to the expressway between Spadina and Cherry. For the most part, direct access from adjoining land use to Lake Shore Boulevard is not permitted and intersections of public streets are controlled by traffic signals. In some cases, the sight lines for left turn movements from Lake Shore Boulevard are impaired by piers in the centre median. Accordingly some of the traffic signal phasing plans within the corridor facilitate left turn movements on exclusive protected phases.

The two roadways are operated as a system to expedite the flow of traffic passing through and/or entering into or exiting from the central area. There are 13 ramp connections between them.

The Gardiner/Lake Shore Corridor is monitored by the city using camera and real time data collection systems, and fitted with traffic signal controls and variable messages signage. This system allows for the early detection and response to incidents on the expressway.

Design Limitations

The expressway was designed around a number of significant constraints and spatial limitations, particularly around its ramps. There has been much rehabilitation work and some operational improvements over the years. However, most of the limitations inherent in the original design of the expressway remain in place today. Several ramps are too short and merging distances too limited. Some of the weaving distances between on and off ramps are also much too short to accommodate the intensity of the weave that occurs on a regular basis. Without shoulders, breakdowns and collisions have more severe and prolonged impacts on traffic operations than they otherwise would.

In the last 17 years the city has spent some $121 million, or an average of $7.1 million annually, on rehabilitation of the elevated section of the Gardiner Expressway

Ongoing Maintenance

Like all infrastructure, the Gardiner Expressway requires continuous maintenance. However, unlike surface roads, this need is pronounced because it is an exposed, elevated structure, and is subject to continuous and unrelenting wear-and-tear. The application of ice melting chemicals adds to corrosion.

The city has responded to this ongoing maintenance requirement and budgets annually for a regular rehabilitation program. Over the next 12 years the city plans to spend a further $153 million or an annual average of $12.75 million on

rehabilitation of the elevated section. This forecast includes a number of years of increased spending to deal with main roadway deck rehabilitation.

The city believes that by committing these funds to a regular rehabilitation program, the useful life of the elevated Gardiner Expressway can be extended indefinitely. However, every year, and particularly in the last few years, the city has faced enormous pressure to reduce spending on all fronts. If the city does not maintain its resolve in this regard and allows deferral of this essential long-term program of continuous rehabilitation, the cost will escalate and the Gardiner Expressway will not be sustainable.

1.4 Downtown Access

There has been essentially no new major road access capacity developed into the central area since the completion of the Gardiner Expressway. Nevertheless, the ensuing forty years has witnessed enormous growth in the population and employment within Toronto's central area. How has this growth been supported in the absence of any increase in roadway capacity across the central area cordon (generally Bathurst Street on the west, CP Rail North Toronto line in the north, and the Don River in the east)?

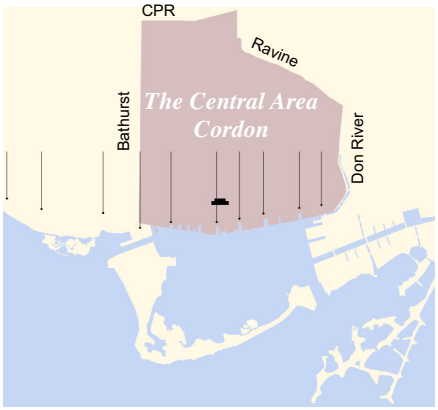


Figure: The Central Area Cordon

Spread of the Peak Period: At first, traffic increased until it reached the capacity of the roads during rush hour. Then, the rush hour lengthened so that it became a three or four hour peak period both morning and afternoon.

In a parallel trend, the emergence of a large employment base outside of the central area, together with residential development downtown, have balanced the traditional daily flow of traffic. The volumes flowing out of town in the morning and into town in the afternoon have grown to almost match the "normal" daily flows. Traffic volumes on the Gardiner Expressway are now sustained at peak levels in both directions for more than twelve hours each weekday.

Commuter Rail: Another way access has increased is through the growth of GO Transit, which serves a large and ever growing number of commuters on both rail and bus. Many of them transfer to the TTC subway at Union Station, but the majority walk from there, using either the outside sidewalks or the below grade corridors of the PATH system.

In recent years, the commuter rail system has not been able to expand due to lack of capital funding for the required infrastructure upgrades and equipment

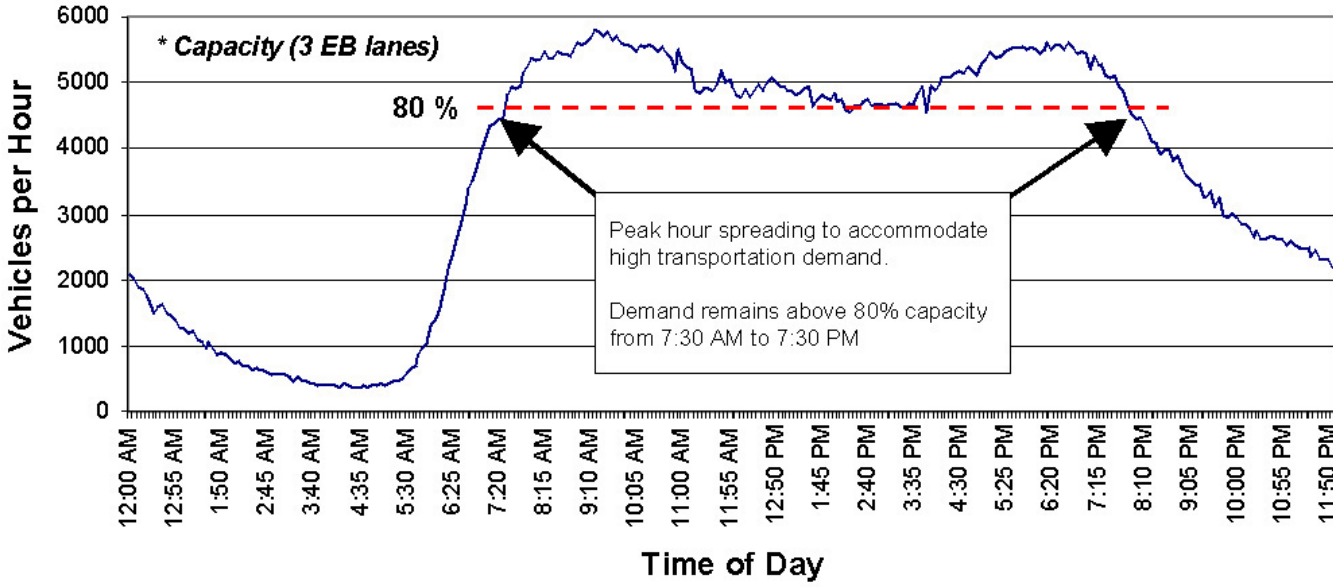


Figure: Hourly Traffic Volumes, Eastbound at Dufferin, May 22, 2002 (86,380 daily vehicles)

acquisition. Consequently, there is a large unfulfilled demand for GO Transit service, increasing yearly. New funding is now promised, and there are plans to expand track and station capacity, acquire additional rolling stock and add operational capacity and more service. As the system resumes expansion and enhancement of its core commuter rail services, its ridership will grow rapidly. GO Transit will continue to fulfill the primary role of supporting employment growth in Toronto's central area.

The strategy of investing in public transit systems rather than new roadways has been a consistent policy of the Province of Ontario and the City of Toronto.

The strategy of investing in public transit systems rather than new urban roadways has been a consistent policy of the Province of Ontario and the City of Toronto. It has provided the transport support for the economic growth of the central area for many years.

Local Transit: Over the last two decades, the TTC has established east-west LRT service along Queens Quay West between Bay and Bathurst streets and north-south LRT service along Spadina Avenue from the Bloor subway to the waterfront. Passenger loading of the University subway line and the Bathurst, Queen and King streetcars has increased. Improvements are planned to the Union subway station including a second platform and improved connections. Expansion of the LRT system along Queens Quay East and Cherry Street are planned to support waterfront communities in East Bayfront and West Donlands.

Local Population: Growth in the residential population of the central area has also allowed employment growth to occur while limiting the strain on the transportation system. People who live and work downtown have very short work trips, tend not to use automobiles as much, and walk to and from work in surprisingly large numbers. A comprehensive travel survey conducted in the spring of 2001 by the City of Toronto found that 66% of the work trips originating within the waterfront have destinations within the central area, and that 45% are made on foot. One of the significant benefits of establishing successful central area waterfront communities is that the residents of such communities are able and willing to walk, cycle and travel by public transit, in stark contrast to their suburban counterparts.

The most current data shows that in the three-hour morning peak period some 300,000 travellers cross into the central area cordon.

Transportation Statistics

The most current data shows that in the three-hour morning peak period some 300,000 (all numbers approximate and rounded) travellers cross into the central area cordon. Of these, approximately 120,000 (or 40%) enter in 100,000 automobiles. The TTC carries 135,000 (or 45%) of the inbound travellers and GO Transit 45,000 (or 15%). There are 28 roads entering the central area. The Gardiner Expressway carries almost 25% of the 120,000 automobile trips; 19,000 (16% of auto travellers or 7% of total travellers) enter on the Gardiner Expressway from the west and about 9,000 (7% of auto travellers or 3% of total travellers) enter on the Gardiner Expressway from the east. Eighty percent are motorists travelling alone in single occupant automobiles.

GLC eastbound auto travellers	19,000	6%
GLC westbound auto travellers	9,000	3%
Other auto travellers	92,000	31%
TTC passengers	135,000	45%
GO passengers	45,000	15%
Total Person Trips	300,000	100%

The pie charts above show the breakdown of morning peak period inbound person trips crossing the central area cordon by major mode of travel.

A majority of the Gardiner Expressway users either originate or are destined within the central area. On a daily basis, over two thirds are central area trips. During the morning peak period, fully 80% exit on the Spadina, York, Bay,

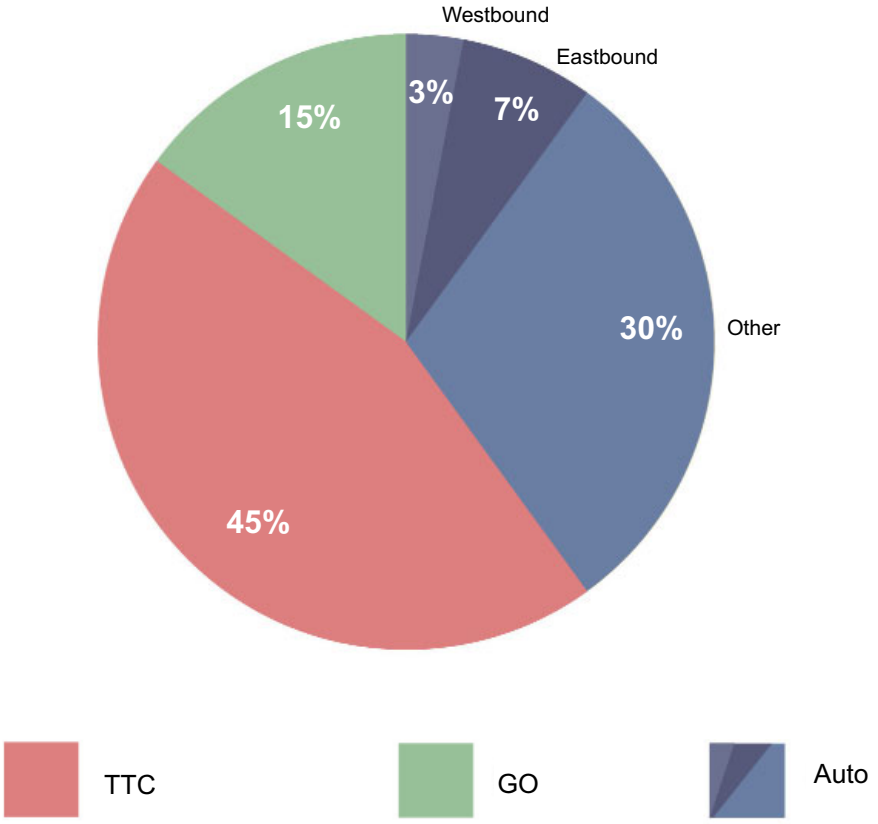


Figure: Central Area Person Trips by Mode

Yonge or Jarvis ramps, and are then accommodated on surface roads within the central area. The proportion of through trips is quite small: 12% eastbound in the AM peak; 13% westbound in the PM peak.

In peak periods the proportion of heavy trucks is relatively small at 2 to 4%. Around mid-day the range is from 5 to 7%, reflecting the higher volume of trucks and slightly lower volume of cars. The majority of trucks exit the Gardiner Expressway within the central area.

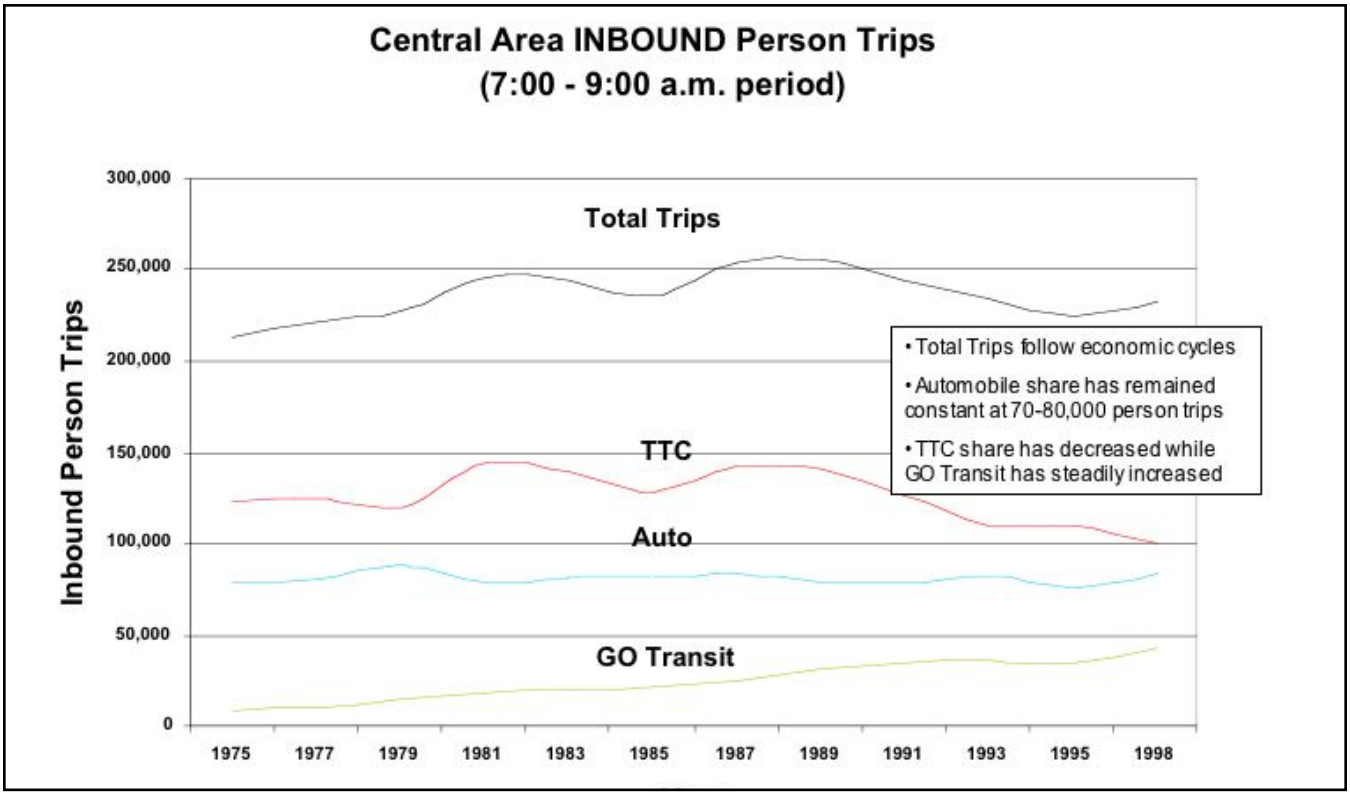


Figure: Central Area Inbound Person Trips

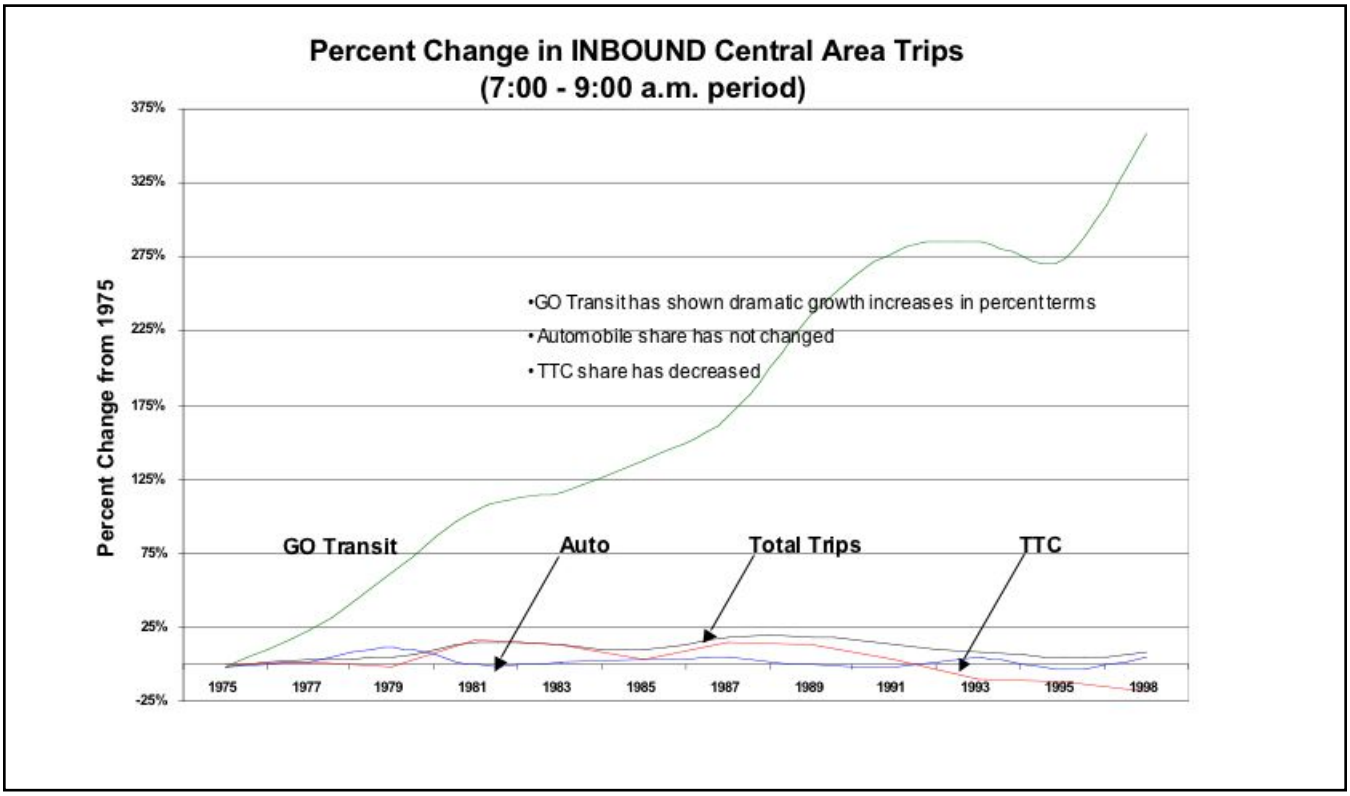


Figure: Percent change in inbound Central Area Trips (7:00 - 9:00 a.m. period)

1.5 Official Plan Transportation Objectives

"Policies favouring the expansion of transit over increases in road capacity and encouraging more mixed use development in the Downtown are key components of this Plan."

City of Toronto Official Plan, pg. 18, November 2002

"Priority will be given to improving transit (TTC and GO) access to the Downtown while the expansion of automobile commuting and all-day parking will be discouraged."

City of Toronto Official Plan, pg. 19, November 2002

If there is one significant message that typifies transportation policies of The City of Toronto Official Plan, then it is clearly the endorsement of alternatives to the use of private automobiles for travelling to work in the central area.

Reworking the Gardiner/Lake Shore Corridor is one aspect of an essential, city-wide transportation goal to establish an efficient and economic civic transportation network comfortably carrying a well informed public using the most efficient modes of travel.

If there is one significant message that typifies transportation policies of The City of Toronto Official Plan, then it is clearly the endorsement of alternatives to the use of private automobiles for travelling to work in the central area. The Official Plan highlights problems related to excessive vehicular use, including large areas of land for parking, traffic congestion and noxious pollution.

The emphasis on transit is consistent with much of what has already happened. The Official Plan notes that road capacity in and out of the downtown has not increased significantly over the last three decades. It recognizes that transportation needs resulting from growth of the city in that same time period have been met, for the most part, by dramatic improvements to transit services and enlightened planning policies that have encouraged location of housing near places of employment.

Finally, the Official Plan calls for a traffic demand management program to comprehensively coordinate transportation, to reduce car dependency and rush-hour congestion and to increase the proportion of trips made by transit. At the same time, the Official Plan recognizes that reduction in the demand for vehicular travel will only occur if accompanied by complimentary public transit improvements.

The Official Plan promotes reduction in automobile capacity and increase in the capacity of other modes. It especially calls for guarding the necessary space to achieve pedestrian and cycling related means of transportation:

> *"In a mature city like Toronto, the emphasis has to be on using the available road space more efficiently to move people instead of vehicles and on looking at how the demand for vehicle travel can be reduced in the first place."*
>
> *City of Toronto Official Plan, pg. 33, November 2002*

The most significant aspect of the Official Plan's transportation policies requiring the focus of efforts and funding is a "next generation transit" program. It would emphasize sustainability of practices, efficiency of the overall system, and affordability for users.

1.6 Some Precedents

Projects for transportation revitalization in other world cities, involving initial lack of environmental quality, public debate, mobilization of capital, and decisive action, offer valuable lessons for dealing with the same issues faced by Toronto today. This section, supplemented by detailed discussions in the Appendix, provides a brief overview of eight projects.

These precedents illustrate what cities around the world have done about elevated transportation structures (including highways, railways and transit lines). They range from retention to demolition. They have strategies and design solutions that redefine environments negatively impacted by transport infrastructure. They all include the design of open space, parks, public realm and buildings. By virtue of their success, they have become catalysts for physical and economic revitalization in downtown and waterfront areas.

The West Side Highway, a 7.2 km elevated structure along the west side of Manhattan extending from West 72nd Street south to the Brooklyn-Battery Tunnel, was completed in 1945. By 1957, it was handling 140,000 vehicles per day. In 1973 a section of the upper deck collapsed, and the entire highway was closed. In August 2001, the replacement for the elevated highway was completed, an at-grade urban boulevard featuring a green waterfront esplanade. The area has been transformed from the scene of "West Side Story" gangs to a desirable urban neighbourhood with significant increases in land value.

Figure: Westside Highway, New York

Figure: Embarcadero Freeway before its removal in 1990, San Francisco

The Embarcadero Freeway, part of State Route 480, was constructed in 1957 as a 3.2km long double-decker along San Francisco's waterfront. It was essentially a long ramp that connected city streets from Broadway to the approach to the Bay Bridge. It was an incomplete "stub" of a planned through expressway. Before it had sustained minor damage in an earthquake in 1989, the freeway carried 70,000 vehicles per day. In place of the freeway, a six-lane boulevard was built, and new transit capacity was added. Gridlock did not materialize as feared. Automobile traffic that formerly used the freeway now exited sooner and dispersed, using the gridded network of local streets. Property values for lands near the site of the freeway shot up by more than 30-40 percent. Port revenue skyrocketed over five times what it had been three years earlier.

Figure: Ronda del Litoral, Barcelona

Ronda del Litoral took the place of Passeig Colom, a 14-lane boulevard/highway, separating Barcelona from the wharf below. In preparation for the 1992 Olympics, the new road was designed to get rid of the barrier to the sea and revitalize the waterfront. It is multi-layered to provide easy pedestrian access across it, including a raised pedestrian terrace framed by mosaic archways, hiding a partially sunken parking area and two express travel lanes below. This initiative has resulted in the transformation of the waterfront to a popular promenade and assisted in no small measure to the renaissance of Barcelona.

Figure: A40 Westway, London

The A40 Westway is an elevated expressway developed in the late 1960's to speed traffic from central London towards Oxford. A Community Trust was established in 1971 to manage and develop 23 acres of derelict land under and adjacent to the Westway. Redevelopment began with the construction of a community center, nursery, stables, an administration building, offices and space for stallholders and small businesses. Today, the quality of the place is vastly improved. There are a total of 120 commercial leases, including studios, workshops, offices, shops, restaurants, market space, light industrial premises and yards. In addition, 3.5 acres of public green space has been created.

Figure: Viaduc des Arts, Paris

Viaduc des Arts is a decommissioned railroad viaduct located in the 12e Arrondissement of Paris. By the 1990s it was an abandoned and decaying eyesore in a neighbourhood with declining socio-economic conditions. In 1990, the Paris city council decided to restore the Viaduc. The arches of the viaduct itself were renovated and enclosed by windows to create workshops for over 50 artists, craftsmen and boutiques. New workspaces were developed over a 10-year period and officially opened to the public in mid-2000. In association with the viaduct development, the elevated rail line / right of way of the viaduct was landscaped and redesigned as a pedestrian promenade, firstly atop the viaduct and then at ground level. The project was the catalyst for an active arts district.

City	Project	Action	Results	Costs/Value Created
London	A40 Westway	Build under expressway	Revitalized community oriented facilities	Costs: NA 120 leases held
Paris	Viaduc des Arts a Promenade Plantee	Infill existing viaduct	Catalyzes active arts district	
London	Spacia Wooten St. Arches	Build under railroad overpasses	New design district	
Barcelona	Ronda del Litoral Moll de la Fusta	Remove 14-lane roadway; build at-grade boulevard with pedestrian crossings	Popular waterfront promenade created	Costs: NA Land value uplift 80-100%
New York	West Side Highway	Remove elevated highway; build new at-grade boulevard and riverside park	Waterfront park Significant increase in land value	Costs: NA Land value uplift 120%
Boston*	Central Artery	Remove elevated highway; build new tunnel	New proposed parks	Costs: $14 billion USD
San Francisco	Embarcadero	Remove elevated highway	Revitalized district	Land value uplift 30-40%
Seattle**	Alaskan Way Viaduct	Debates about removing elevated highway	N/A	N/A

* Project to be completed, September 2004
** Referendum to be held, mid 2004

Spacia, established to lease and develop properties for British rail infrastructure provider Network Rail, has refurbished a series of railway arches at Wooten Street, London into A-grade quality designer offices. Proximity of a network of rail arches to the central city area makes this a desirable location for revitalization for business, and a fashionable destination due to its 'raw' urban feel. The project produced a new design district, with loft-style commercial space, mainly studio offices aimed at small creative businesses, plus a wine bar and restaurant units.

Figure: Spacia, London

Figure: The Central Artery, Boston

The Central Artery through downtown Boston, a 12.6km elevated section of Interstate 93, opened in 1959. It then carried 75,000 vehicles per day. In 1982, a US $2.6 billion plan, dubbed The Big Dig, was approved to replace the elevated highway with an eight-to-ten-lane underground expressway, including over 5.6 km of tunnels. When completed in late 2004 at a final cost of approximately US $14.6 billion, the downtown Central Artery/Tunnel will carry 245,000 vehicles per day. As a result of the Big Dig, the city will be better connected to its waterfront, and there will be 30 acres of landscaped open space over the highway, 40 acres of downtown parkland, and a 100-acre park over capped landfill. Congestion savings are estimated at $500 million every year.

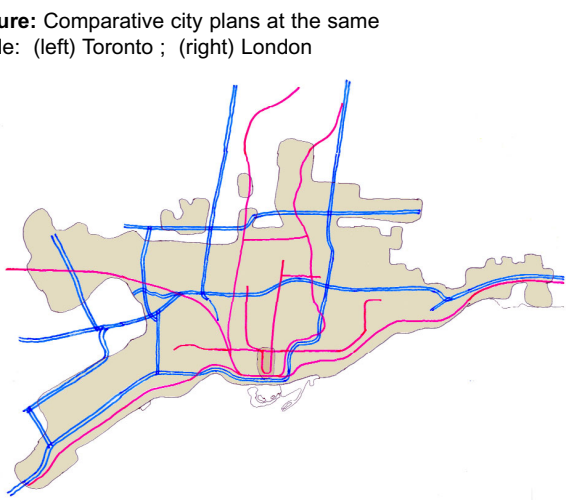
Figure: The Alaskan Way, Seattle

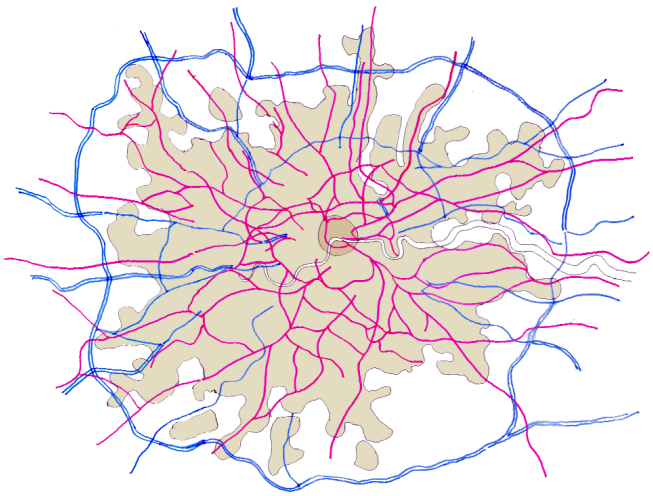
The Alaskan Way Viaduct is a 3.4 km double-decked, elevated, reinforced concrete viaduct carrying State Route 99 along the shoreline of Elliott Bay past downtown Seattle. Originally built to carry 65,000 vehicles per day, it currently carries approximately 100,000, and has a $5 million annual maintenance budget. A complete takedown plan is expected by the end of 2004, followed by steps to secure the estimated $2.4 billion to $4.7 billion needed to demolish the structure. A surface street replacement is the affordable alternative, and favoured in spite of an estimated capacity of 40,000 vehicles less than the other options considered.

Freeways, Road and Rail

Because Toronto is at a point in its evolution where further expressway capacity is not part of the solution, it is instructive to compare cities that have reached this point earlier, or that were sufficiently mature before the advent of expressways, that their central areas remained free of them. The diagrams below show two cities to the same scale: Toronto and London. The elements isolated are

Figure: Comparative city plans at the same scale: (left) Toronto ; (right) London





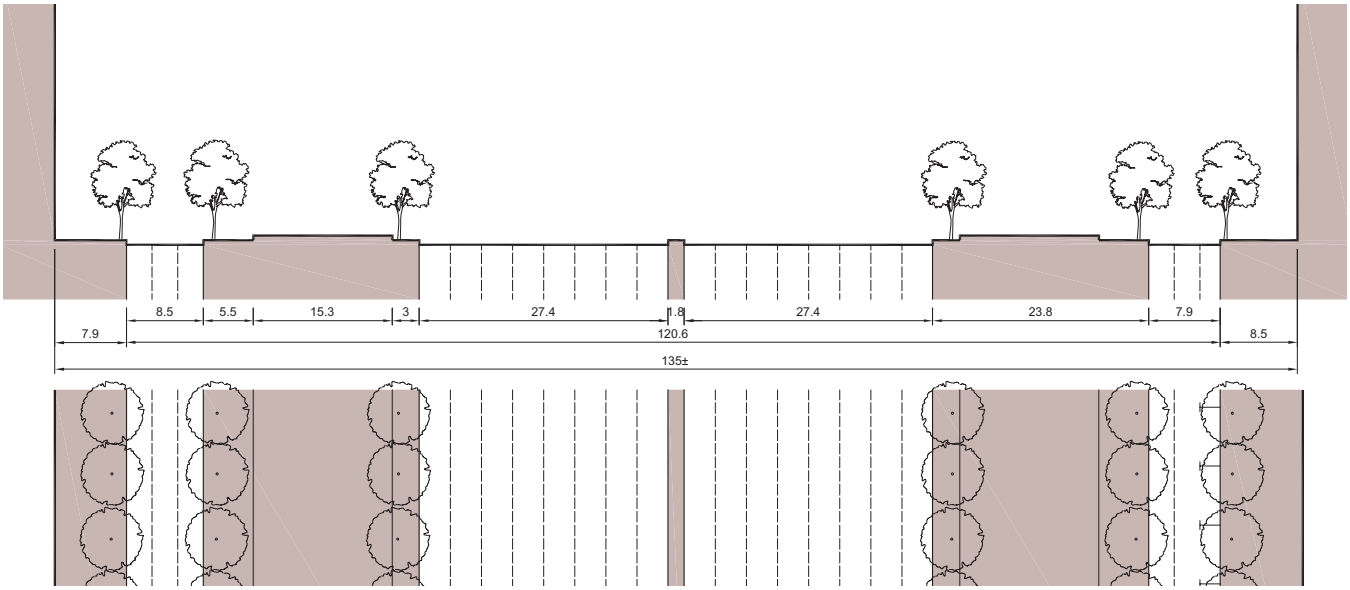


Figure: Paseo de Castellana, Madrid (above) section and plan

expressways, shown in double blue line, restricted access arterial roads in single blue line, tracks in red, and urbanized area. The central city area is also indicated.

Figure: View of a crossing of Fifth Avenue, New York

It is striking to note that in London there is a significant emphasis on rail infrastructure, enabling the city to effectively service the movement needs of a much greater population over an area not significantly larger than the Toronto centred region. As the population of the Toronto region keeps growing, it will similarly have to rely on rail or equivalent transit.

It is also noteworthy that in London the expressway systems encircle the city in countryside, with little penetration to the urbanized area and none to the centre. This is a fundamental difference between European and North American cities, a difference that many North American cities are now trying to eliminate with their expressway replacement plans.

Surface Roads

There are many examples of surface roads carrying heavy traffic but nevertheless acting as organizing spines and popular pedestrian destinations as well.

The ***Paseo de Castellana*** is the central artery of Madrid, extending into an expressway. The street section varies, but typically has six to eight lanes plus dedicated bus lanes, flanked by roadways each of which have two lanes plus parking, to a total of 12 lanes.

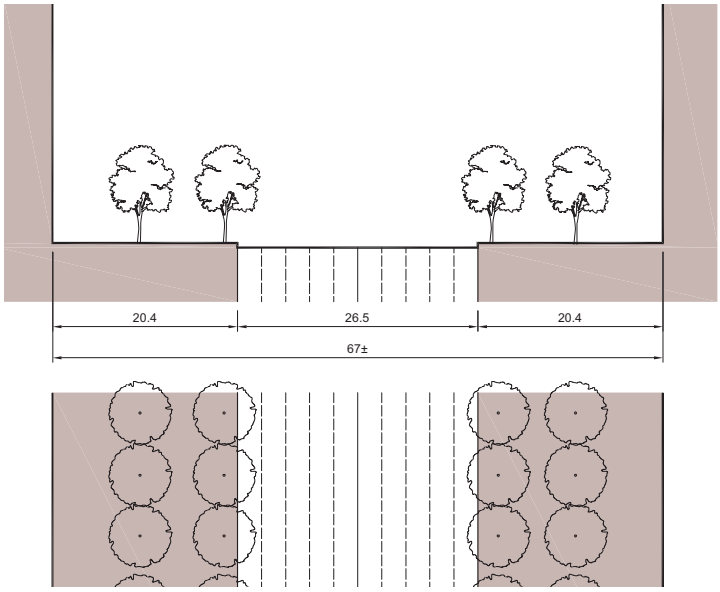


Figure: Avenue des Champs-Elysées, Paris (above) section and plan

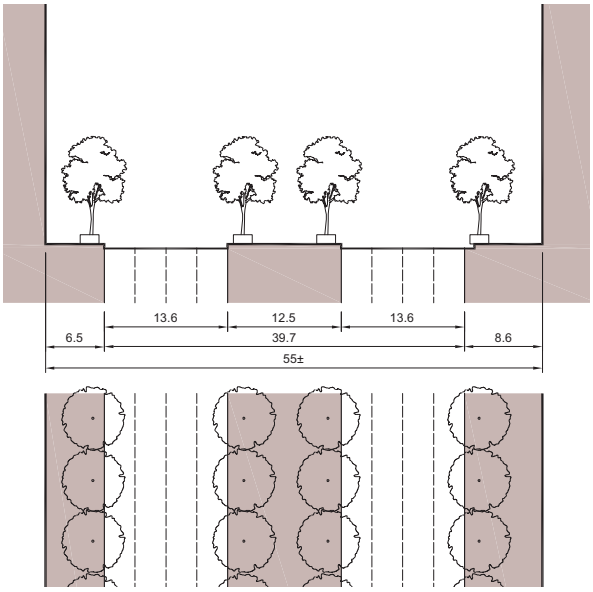


Figure: University Avenue, Toronto, (above) section and plan

Figure: (left) View of Avenue des Champs-Elysées, Paris; (right) View looking across University Avenue, Toronto

The ***Avenue des Champs-Elysées*** in Paris is one of the world's most famous and memorable streets. It is a ten-lane two-way road and a tourist destination lined with restaurants, offices, cultural facilities and pedestrian promenades.

Manhattan has numerous five-lane, one-way streets that are comfortable for pedestrians.

We have our own eight (and sometimes nine) lane ***University Avenue***, the nearest thing to a monumental and ceremonial avenue in Toronto.

The primary requirement for a big street, if it is to be a place of quality, is that it have generous pedestrian areas, flanked by attractive buildings, employment or residential use, and containing animating uses at streetlevel, such as retail, food, and entertainment.

PART 2

FOUR APPROACHES

This part begins with common features of the options examined, followed by the comparing of the transportation and city-building performance of each. It then describes the options and their performance.

2.1 Alternatives Considered

The alternatives were selected to determine if a cost effective, place-making, and traffic-functional approach was sufficiently feasible to consider embarking upon an environmental assessment to replace the Gardiner/Lake Shore combination. These were:

- ***The Do Nothing Approach,*** which assumes that the elevated expressway and Lake Shore Boulevard will remain in place indefinitely as they are.

- ***The Replacement Approach,*** which contains a mix of surface streets and express segments.

- ***The Transformation Approach,*** which retains the expressway upper deck, but reworks the ramps and realigns Lake Shore Boulevard.

- ***The Great Street Approach,*** which maximizes the use of surface streets so that the Gardiner Expressway and DVP both end as they enter the central area.

Common Aspects of the Alternatives

Transit: Significant expansion of the highway system is neither feasible nor desired, whereas expansion of the transit system is. Indeed, quite large increases or reductions in Gardiner traffic represent quite small changes in total access. For example, a 15% chnage in the number of people entering on the Gardiner from the west would represent less than 1% of the total entering the central area during the 3-hour morning peak.* Clearly, transit improvement is necessary regardless and independent of corridor restructuring.

All alternatives rely on the expansion of GO Transit to accommodate increases in access to the city centre as its employment grows. Transit will also compensate for any reduction in automobile service. This is in keeping with current trends and policy. It is certainly the most efficient means of providing access. One additional GO train per hour would carry almost as many people (1,700 compared to 2,300) as one additional lane on the expressway, or about 25% of the Gardiner's existing capacity.*

The alternatives are all based on the understanding that while reconfiguring the Gardiner will benefit the city's physical environment, benefit to both local and regional access will come through transit.

* 19,000 trips from west in 3 hours
15% of 19,000 = 2,850
2,850 = 0.95% of 300,000 total trips

3 GO trains = 5,100 - 5,400 passengers

Identifying new local transit alignments were not part of the study, but the alternatives can take an overlay of transit. Two alignments are known: the Union Station rail corridor and Queens Quay. Others could be integrated with a continuous Lake Shore Boulevard – the common objective of each plan.

Cyclists: In view of the essential vehicular role of the proposed east-west arterials, bicycle lanes are not provided on them. Instead, a continuous east-west bicycle lane will be a feature of the adjacent Queens Quay throughout the central waterfront. This could be supplemented with a route integrated into the railway embankment east of Yonge Street.

Pedestrians: All alternative plans have generously wide sidewalks on the main roads, intended to be fitted with street trees, quality lighting, surface treatments, street furniture and other amenities. Buildings are configured so that substantial pedestrian areas are available at intersections where pedestrians may need to wait for a green phase before crossing the major road. New buildings flanking the street should feature arcades and/or interior publicly accessible space to provide refuge from inclement weather.

The Gardiner/Lake Shore Corridor looks like a continuous through route, but only a small part of the traffic on it functions in that way. This system is best understood as two expressways feeding most of their traffic onto the surface streets downtown.

A landscaped centre median is provided as a safe and comfortable refuge where pedestrians unable to cross the entire roadway in one green phase of the traffic signal cycle can wait to complete the crossing on the next. Improved pedestrian linkages across the rail corridor are part of all alternatives, including direct connections to the PATH system north of the rail corridor. These include a south central entrance to Union Station, the station teamways on both sides of Bay and York Streets, and publicly accessible walkways through the Convention Centre.

Pedestrian routes through the rail underpasses at Yonge, Jarvis, Sherbourne, Parliament and Cherry need to be improved. Initial actions should include upgraded lighting, bright paint and pedestrian separation from adjacent traffic.

Vehicular Movement: The Gardiner/Lake Shore Corridor looks like a continuous through route, but only a small part of the traffic on it functions in that way. This system is best understood as two expressways feeding most of their traffic onto the surface streets downtown. The alternatives studied rely on the fact that the ends of these two expressways, rather than touching and connecting to each other, can be separated and their traffic can enter the surface road system further east and west.

This can be done in progressive stages. The DVP already releases much of its traffic to the Richmond/Adelaide/Front interchange, which provides a much

more direct access to the downtown core than travelling all the way down to the waterfront and back under the rail viaduct. All alternatives envision doubling this ramp access so as to further reduce the amount of traffic through the waterfront, and thereby allow earlier transition from express to surface roads.

In the west, the Front Street Extension will perform a similar function. In fact, most drivers destined downtown would choose that route if the surface road system could accommodate it there. The result will be less traffic taking the waterfront route, and again, earlier transition from express to surface roads south of the track.

These two moves to reduce waterfront traffic volumes are common to all the alternatives, permitting the reliance on surface roads proposed in two of the options, or the fewer ramp connections proposed in the other.

One important demand placed on the design of a high-volume two-way road is accommodating left hand turns. The greatest left turn volumes are from the eastbound direction, turning north on York, Bay, and Yonge. In a two-way configuration, left turns on a regular green light are obstructed by traffic flowing in the opposite direction. One-way streets have no such impediment. Accordingly, all schemes rely on a split of the two-way Lake Shore into a one-way pair at these streets to improve service.

2.2 Measures of City-Building Performance

The essence of successful urban design or city-building "performance" of a given scheme lies in its organization of streets, blocks and open space.

Making a city that has a viable public realm, a sense of place, is as much an art as it is a science. The essence of successful urban design or city-building "performance" of a given scheme lies in its organization of streets, blocks and open space; how well it will act as a suitable vessel for private and communal life; how much a pedestrian can comfortably move about and will feel at home in it; how productive it is in real estate terms; how well it accommodates diverse use. Arithmetic measures for these qualities are hard to come by, and those available give an incomplete picture.

What is done here is a combination of commentary and some comparative calculations of frontage quality, impacted or unobstructed land area, and pedestrian linkage. The calculations cover the area between Spadina and Cherry, north to Bremner or the tracks, and south to Queens Quay.

Pedestrian Linkage: Numbers of north-south street crossings under or beside expressways, ramps or portals are counted.

Frontage Quality: Street frontage is an important measure of real estate value, which in private property is generally a measure of its environmental quality. The *status* of the street as an "address" comes into play as well as the *amount* of frontage. Length-of-frontage measurements have been made along the roads and from Bremner Boulevard and Queens Quay between Strachan and Cherry Streets (see Appendix 5). "Good" frontage is along the east-west surface roads unimpacted by the expressway structure. "Poor" frontage faces directly to the deck and/or ramps or portals. "Medium" frontage faces the expressway in the Transform option.

Figure: Building backs to the Gardiner: an example of poor frontage

Land Area: Measurements are made of land area unencumbered by expressways or ramps.

2.3 Measures of Transportation Performance

The PARAMICS Traffic Simulation Program

The team spent considerable effort in predicting the traffic operation consequences of implementing the various alternatives. It had access to one of the world's most advanced traffic analytical capabilities in the University of Toronto's Intelligent Transportation System Centre and a team of researchers using state-of-the-art simulation software. Using the PARAMICS software, a virtual reality or simulation model was built of the road network bounded by Dundas Street, the Humber River, Lake Ontario, and Woodbine Avenue.

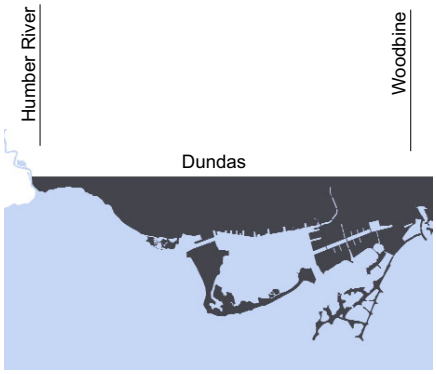


Figure: Area of the PARAMICS model

The city's Transportation Tomorrow Survey 1996 database provided the origins and destinations for auto trips both inside and outside this area. The PARAMICS software calculates the route and speed of each trip by car and truck, individually simulating representative driver behaviour such as car-following distance, lane changing, and route choice. The program then runs a simulation of all these vehicles making their way from origin to destination, and interacting with others, as would happen in real life. In order to make sure that the simulation performs as traffic does in reality, the program was first calibrated so that simulated runs of the existing road network provided the same results as found on the real system The various alternatives were then tested in the same way.

The program records all kinds of information such as the route and time each journey took, and speeds obtained. Each run can also be viewed three-dimensionally, so that congestion areas can be readily seen and the road layout

adjusted to improve operational performance. Many runs are made and averages established, which can then be used as measures to determine the relative performance of each alternative.

Measures Used

The following key measures were used to compare the performance of the approaches. A table with statistics for all of the approaches can be found at the end of this section.

Average speed of travel is a calculation of the length driven and time spent for all the trips made throughout the study area, and the resulting combined average speed.

Downtown trip travel time measures the time taken on a typical trip from the boundaries of the model area to King and Bay Street, as an example of how much longer or shorter a commuting trip would take.

Through trip travel time measures the average time for through trips within the Gardiner/Lake Shore Corridor from one end of the model to the other.

2.4 The Do Nothing Approach

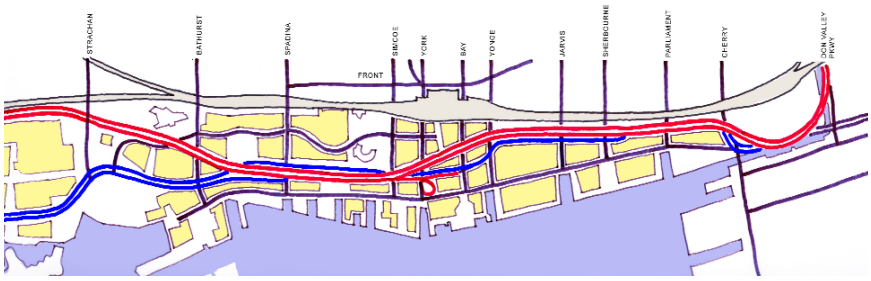


Figure: Do Nothing Approach, (right) Diagram; (bottom right) Plan View of Digital Model; (bottom left) Model view

The "Do Nothing" Approach is effectively maintaining "business as usual" in terms of both the Gardiner/Lake Shore structure and the forms of development that can be expected adjacent to it.

Place-Making

Keeping the current elevated deck of the Gardiner Expressway, along with its access/exit ramps and interrelated Lake Shore Boulevard, would favour the continued design of buildings that react to the noxious aspects of adjacency to a high-volume transportation corridor, such as noise, fumes, shadow, dirt, and traffic speed, by trying to seal them off. Rather than attempting to contribute to a healthy pedestrian environment, the built form will act to seal in a poor one. Anyone walking along Lake Shore Boulevard between Portland and Simcoe streets today can attest to the fact that it is a miserable environment. Thus we can expect a doubly disadvantageous future – a sealed-in no-man's land and a lost opportunity to create a main street to the central waterfront.

Recent developments adjacent to the corridor are case studies demonstrating the opportunities and constraints of their respective sites. The Riviera and Waterclub, both scheduled for completion in mid 2004, have common design strategies: tower formations on podiums which in other places would be called street-related but on the north side facing the Gardiner Corridor, the podiums are blank and residential units only begin at the fifth floor.

This reflexive "turning away" from the Corridor is also evident west of Bathurst Street, where submitted plans have similar residential tower/podium arrangements. For almost 15 years, King's Landing, an upscale residential condominium completed in 1983 at Queens Quay and Spadina Avenue, had unleased spaces facing the Gardiner/Lake Shore Corridor.

Figure: Back of King's Landing facing the Gardiner/Lake Shore Corridor

The Gardiner's array of circular and long parallel access/exit ramps, are land-consumptive, even more so when combined with Lake Shore's adjacent alignment. They also exert unfortunate geometric influence, evidenced by the presence of irregularly shaped blocks and residual parcels of land.

The Do Nothing Approach means that new development on adjacent sites would repeat and extend these conditions, with unfortunate consequences for the "quality-of-place" of the entire area.

Pedestrian linkage across the Corridor is the poorest of the options. They exhibit longer walks through the most inhospitable of the alternatives.

Frontage is compromised across the whole central waterfront: 1,300 metres of "good" frontage; 4,750 metres of "poor" frontage (facing ramps and/or elevated expressway).

Land Area: There are 127 acres of developable and park land outside a 50 metre impact zone of the Gardiner, and 70 acres within it.

Comparisons of all approaches are found in Part 2.9.

Traffic Performance

Average speed of all the trips in the system during the AM peak hour is 43.4 km/h and 36.5 km/h during the PM peak hour.

Downtown trip travel time from the Humber River to King and Bay averages 14.5 minutes in the AM peak hour and 14.9 minutes in the PM peak hour. The trip back from downtown to the Humber River is 13.2 minutes in the AM hour and 18.4 minutes in the PM hour.

Through trip travel time from the Humber River through to the DVP at Queen averages 17.3 minutes in the AM peak and 19.6 minutes in the PM peak. In the opposite westbound direction it is 15.5 minutes in the AM peak and 18.1 minutes in the PM peak.

Cost and Staging

If the Gardiner stays in place, it requires continuous rehabilitation and maintenance. Most of the deck needs replacing, which will close traffic for short periods at various times over the years. Over the next 12 years, the City expects to spend $153 million on this approach.

2.5 The Replacement Approach

This approach includes the replacement of the elevated Gardiner from west of Strachan Avenue to east of the Don River. Traffic to and from the west is dispersed on Front Street, east of which the expressway is reduced to four lanes. It is underground on a new alignment from Strachan Avenue to Spadina Avenue. From Spadina to Jarvis Street eastbound traffic is at grade on a five-lane one-way street. Westbound traffic remains below grade between Spadina and Bay Street in order to reduce conflicts for heavy volumes of left-hand turns into town in the

Figure: Replacement Approach, (top left) Diagram; (left) Plan View of Digital Model; (right) Model View

morning. Westbound traffic is at grade on a five-lane one-way street between Bay and Jarvis. East of Jarvis, a four-lane two-way express route on an extension of the rail embankment connects directly to the DVP, while a six-lane Lake Shore Boulevard is at grade.

Figure: Existing view of Gardiner at Fort York

Figure: Existing view of Gardiner at Parliament Street

Place-Making

In the west part of the central waterfront, the proposal sets conditions for the creation of attractive neighbourhoods, associated with a continuous flow of parkland between Fort York and the lake. The historic fort would finally emerge from behind the dominant expressway structure. The proposed development around it and the railway lands would be free of the structure, with a generous linear park in its place. The proposed railway lands community park would be expanded by about four acres (adding 50% to its size) and have an unimpeded public face to a newly attractive Lake Shore Drive. Seven acres of open-air parkland will replace the Gardiner in the Fort York neighbourhood.

At Spadina, Rees and Simcoe, pedestrians crossing the road would have a much shorter walk; four lanes at Spadina, and five or six lanes at the other two. However, the ramps to underground portals do form obstructions and are therefore an urban design disadvantage. They also break the continuity of the street – naming it would be difficult in this area.

South of the financial district, between Simcoe and Jarvis, pedestrians will be able to cross surface roads at traffic-controlled intersections. Union Station and

the Air Canada Centre will be seen as directly associated with the waterfront. The whole area gains through being organized in a pattern of surface streets and blocks.

East of Jarvis, removal of the expressway frees new urban land, and permits the East Bayfront precinct to be served by a framework of regular city blocks with frontages on all four streets of each block. It will also permit a regenerated Don River mouth to seem part of the city, and the proposed new Commissioner's Park will have a face to the city.

Pedestrian Linkage is excellent west of Spadina, very good at traffic lights between Spadina and Yonge, and better than the Do Nothing Alternative east of Jarvis. There are six crossings either impacted by associated ramps or under the expanded rail viaduct.

Frontage is excellent west of Spadina and improved for the rest of the corridor. There are 5,300 metres of "good" and 1,100 metres of "poor" frontage.

Figure: Proposal: Gardiner removed, 4-lane expressway below grade, parkland over

Land Area: There are 200 acres of development and park land unencumbered by elevated, ramp, or portal structures, and 12 acres which are. However, this option as shown requires seven acres of railway property adjacent to the tracks.

Traffic Performance

Figure: Proposal: Gardiner removed, view along East Bayfront precinct

Average speed of all vehicles on all trips during the peak hour is 37.9 km/h in the morning and 36.0 km/h in the afternoon. Somewhat slower than the existing, these averages are acceptable for an urban condition.

Downtown trip travel time from the Humber River to King and Bay averages 16.8 minutes in the AM peak hour; about 2 minutes longer than now. The return trip averages 17.4 minutes in the PM peak hour; one minute less than now.

Through trip travel time eastbound takes 19 minutes in the AM peak hour; about two minutes longer than now. The westbound through trip takes 16.2 minutes in the PM peak hour, two minutes less than now.

Cost and Staging

The base engineering cost including staging, demolition, construction, soft cost and contingency is $1,400 million assuming the underground section is constructed using cut and cover technique. If the tunnel is bored, in order to completely avoid disturbing the Fort York cemetery and abutments, the cost

would be $1,475 million. Costs for a southern alignment under Fleet Street have not been calculated but would probably fall in the same range.

The staging of this approach is the most complex of the ones considered because of the great number of underground sections and portals.

2.6 The Transformation Approach

This approach maintains the elevated structure but transforms its physical and functional conditions to reduce the barrier effect and create a framework of frontage streets. The diversion of traffic volumes to the Front Street Extension

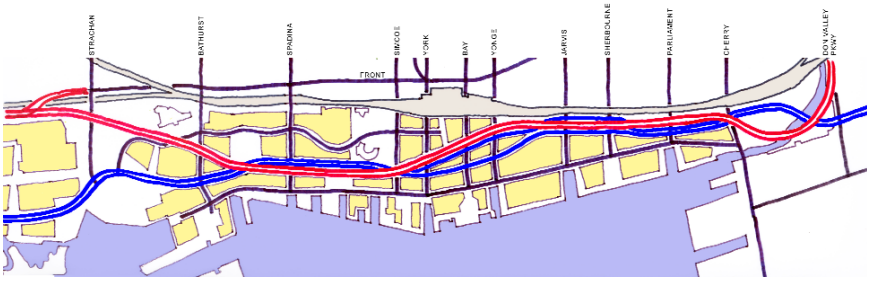


Figure: Transformation Approach, (top) Diagram; (above) Plan View of Digital Model; (right) Model view

and the DVP/Richmond/Front interchange permit the reduction and reconfiguration of ramps and the realignment of Lake Shore Boulevard.

Place-Making

The Transformation Approach establishes a linear district of urban spaces, buildings and gateways that enliven the streets that cross the Gardiner/Lake Shore Corridor both functionally and visually and thereby link the waterfront to the city. The proposed Lake Shore Boulevard realignment provides the opportunity to infill below and beside the structure with a combination of

buildings, public plazas and landscape. This provides building frontage and a sense of occupation to the generally adjacent Lake Shore Boulevard. It also means that pedestrians crossing the corridor do not have to contend with the double barrier, noise and grime of the Lake Shore stacked beneath the Gardiner.

Architectural enhancement through recladding and making feature "gateways" at cross roads transforms the gaunt structure to an aesthetically pleasing event in the city.

New development under the Gardiner Expressway establishes conditions for introducing a finer grain of diverse urban land use and investment with new opportunities for public art and interpretation. However, this development is in a different category than "normal" development through private enterprise controlled by public regulation envisioned in the other alternatives. If it is to materialize, it will likely require public, non-profit management.

Pedestrian Linkage: The 14 crossings are considerably improved because many of the parallel ramps are removed, the stacking of Lake Shore is mostly eliminated, and the Gardiner deck is architecturally enhanced.

Frontage is improved because the underside of the expressway has buildings facing the adjacent realigned Lake Shore. There are 2,180 metres of "good" and 7,180 metres of "medium" frontage. The scheme requires some building construction under the Gardiner facing Lake Shore. This construction is crucial to the strategy.

Land Area: There are 73 acres of land within 50m of road structures, which cannot however be equally compared to the equivalent statistic in the Do Nothing alternative because of the improved environment. There are 136 acres of unencumbered land.

Traffic Performance

Average speed is 36.6 km/h in the AM peak hour, and 36.4 km/h in the PM peak hour, little slower than at present.

Downtown trip travel time from the Humber River to King and Bay takes 18.4 minutes in the AM peak hour; about 4 minutes longer than now, and 18 minutes to return in the PM peak hour; about half a minute less than now.

Through trip travel time eastbound takes 19.4 minutes in the AM peak hour; about 2 minutes more than now, while the westbound through trip takes 18.8 minutes in the PM peak hour; about half a minute longer than now.

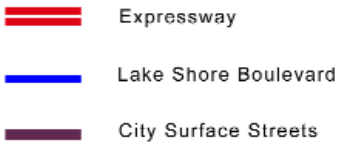
Cost and Staging

The engineering cost including temporary staging measures, demolition, construction, soft costs and contingency is $465 million. This approach requires additional expenditures for aesthetic treatment of the existing structure, not carried by others. They have not been costed, but will likely add from $20 million to $50 million. In addition, this option proposes buildings be constructed under the Gardiner facing onto Lake Shore Boulevard. Such uses may not be economical a could constitute a substantial additional cost.

The phasing will be simpler than the other two options, mainly dealing with the removal and replacement of ramps, and the phasing of a complete realignment of Lake Shore Boulevard. See Appendix 8 for further commentary.

2.7 The Great Street Approach

This approach achieves city-building or place-making objectives more than the others. There are three variations. All variations produce a continuous waterfront Lake Shore Drive from the Humber River to Ashbridges Bay. The First Variation, a Great Street/Elevated Expressway combination, retains the existing expressway west of Spadina, with a surface street between Spadina and the Don River. This would be a 10-lane surface street for the section east of Spadina to Simcoe. In the central section between Simcoe and Jarvis, it would split to a pair of five-lane, one-way streets. East of Jarvis to Cherry they would combine again to a 10-lane surface street. Further testing would confirm whether or not this eastern section, which takes lower traffic volumes, could be reduced to eight lanes.



The term *"Great Street"* was given particular meaning by Allan Jacobs in his book of the same name. His criteria include: first and foremost a great street should help make community. A great street is physically comfortable and safe. The best streets encourage participation. The best streets are those that can be remembered.

Figure: The Great Street Approach, (below) Plan View of Digital Model

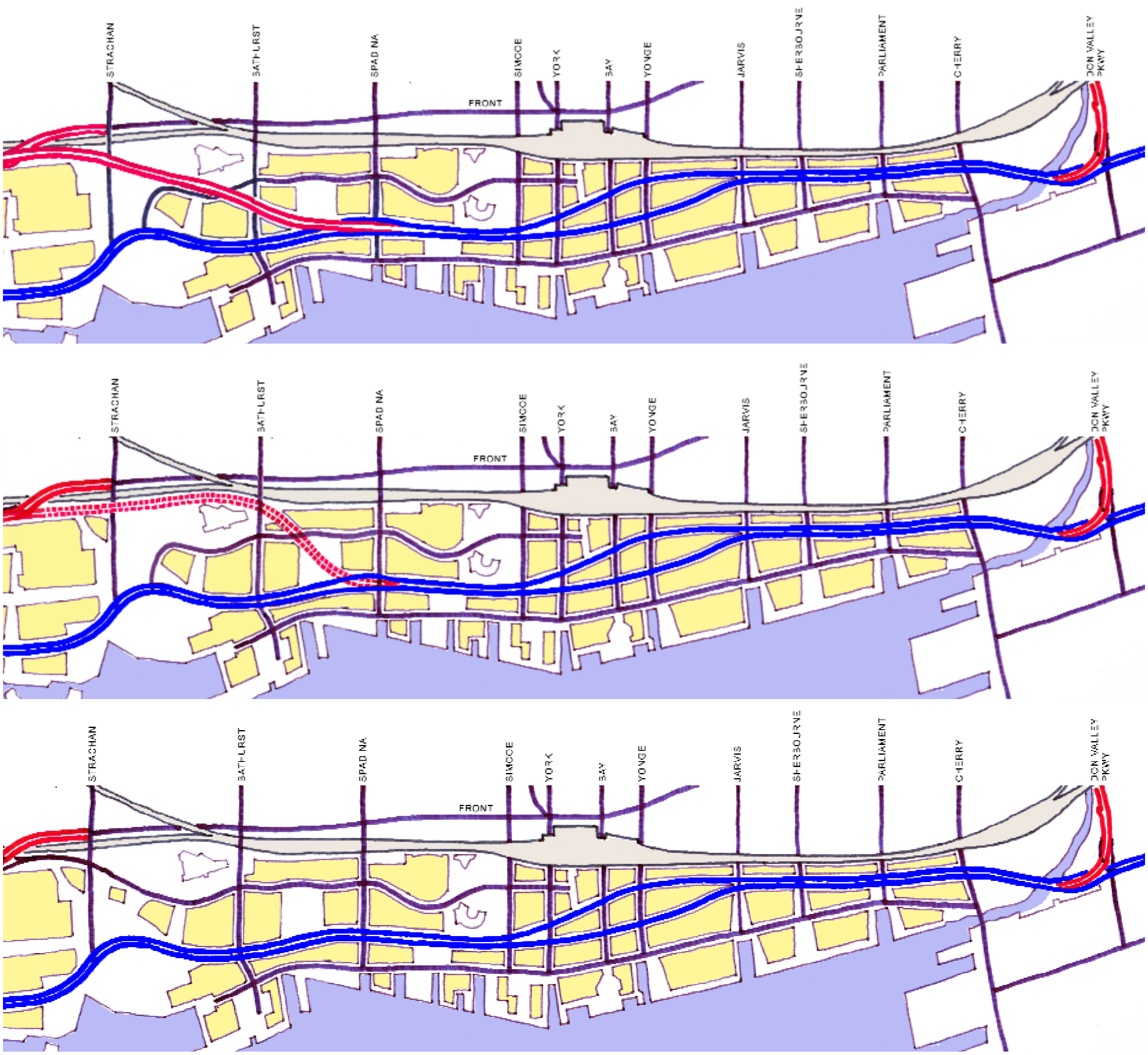


Figure: The Great Street Approach, (top) Diagram of First Variation, Great Street with elevated section west of Spadina; (middle) Diagram of Second Variation, Great Street with underground west of Spadina; (bottom) Diagram of Third Variation, Full Great Street

Figure: The Great Street Approach, (left) Model view

The Second Variation, a Great Street/Underground Expressway combination, is underground west of Spadina with the same surface streets east of Spadina as in the First Variation. The Third Variation, a Full Great Street, is an eight-lane continuous drive across the full waterfront.

The first two variations recognize that corridor traffic volumes are higher in the west section and therefore maintain a four-lane express connection to the Gardiner west of Spadina.

In the Third Variation, corridor traffic capacity would be reduced in the west. Traffic would be diverted to other city streets and the resulting capacity shortfall would have to be accommodated by additional transit improvements. The expressway would end at the Front Street Extension with a surface road along its current alignment connecting to Fort York/Bremner Boulevard.

Place-Making

The Great Street is designed to act as the basis of a precinct plan for the central waterfront, a city building organizing structure, not simply as a less benign Gardiner/Lake Shore Corridor. Many great cities and precincts in the world have such streets. They are busy, even congested, because they are popular, and they work very well.

In this approach, greater emphasis is placed on making a street with continuous and memorable characteristics along its length than the other alternatives. It can be easily named and understood as an urban element. University Avenue fits this definition. So does Spadina Avenue, and Bay Street. It is different, grander, than the surrounding streets. It is a *place*, one in which a pedestrian feels at home. If it is these things, it can act as the centrepiece, an organizing spine, of the central waterfront.

Pedestrian Linkage is superior to the others, given no overhead, ramp, or portal structures in the full version, and narrower than existing ramp or portal for the other. However, where ten lanes converge into a two-way street, pedestrian crossing times may require two green light phases. The eight lane variation is superior.

Frontage: Both the quality and amount of uncompromised frontage exceeds that of other options. There are 7,050 metres of "good" frontage and 500 metres of "poor" frontage in the second variation; more poor frontage in the first, and none in the third.

	AM Peak Hour				PM Peak Hour			
	Existing	Replace	Transform	Grt. Street*	Existing	Replace	Transform	Grt. Street*
Average Speed *(kilometres per hour)*	43.4	37.9	36.6	33.2	36.5	36.0	36.4	31.7
Travel Time Inbound (minutes)								
Humber River to King @ Bay	14.5	16.8	18.4	18.1	14.9	17.2	17.3	19.8
Travel Time Outbound *(minutes)*								
King @ Bay to Humber River	13.2	13.0	15.1	14.9	18.4	17.4	18.0	18.2
Key Route Travel Time Through *(minutes)*								
Eastbound								
Humber River to DVP at Dundas	17.3	19.0	19.4	24.3	19.6	20.1	24.5	28.8
Westbound								
DVP at Dundas to Humber River	15.5	15.3	17.0	19.8	18.1	16.2	18.8	21.7

* Speeds and Travel Times are applicable to the First and Second Variations of the Great Streets Approach

Figure: Traffic Statistics

Land Area: There are 205 acres of uncompromised land similar to the "Replace" option, and 60% greater than the other two. Five acres are associated with expressway ramps.

Traffic Performance

Average speed for the first variation within the central area for this approach is 33.2 km/h in the AM peak hour and 31.7 km/h in the PM peak hour.

Downtown trip travel time from the Humber River to King and Bay would take 18.1 minutes in the AM peak hour with a return of 18.2 minutes in the PM peak hour. This will add 3.5 minutes to a morning commute, and marginally reduce travel time in the evening.

Through trip travel time eastbound from the Humber River to the DVP at Queen would take 24.3 minutes in the AM peak hour, and 21.7 minutes westbound in the PM peak hour. This adds 7 and 3.5 minutes respectively to the trip.

These are the slowest speeds and longest times of the options considered, which is to be expected with its greater length of urban streets. It is an acceptable condition in the urban centre, and part of the solution toward a pedestrian friendly street system.

	Do Nothing	Replace	Transform	Great Street
Unencumbered Land Area (acres)	127	200	128 *	205
Structure-Impacted Land Area	70	12	73	5
Total Development and Park Area (acres)	197	212	201	210
Area of Road R.O.W. (acres)	164	150	161 **	150
Length of 'good' Frontage (m)	1,300	5,300	2,180	7,050
Length of 'poor' Frontage (m)	4,750	1,100	7,180	500
Number of Crossings	14	6	14	1

* Includes buildings/public space under Gardiner
** Excludes Gardiner deck over buildings/public space.

Figure: Development Value Statistics

Costs and Staging

The costs of staging, demolition, construction, soft costs and contingency is $440 million for the first variation which retains the existing expressway west of Spadina. The cost for the full Great Street from Jameson to the DVP is $460 million. The Great Street/Underground Expressway option is $1,150 million.

Staging complexity and partial traffic closure time for this approach is expected to fit somewhere between the Replacement and the Transformation approaches.

2.8 Revenue Generation

Appendix 8 provides rough calculations of potential approaches to revenue generation. By no means definitive, they demonstrate that investment in reconfiguring the movement system and revitalizing the central waterfront can be funded in one or more of a number of ways. For instance:

1. If tax revenue is used, based on the fact that an increase in real estate value will establish a more productive tax base, this might generate three to four billion dollars over 100 years, or $30 - $40 million annually.

Existing	Replace 1	Replace 2	Transform	Grt. Street 1	Grt. Street 2	Grt. Street 3
$13 m per Annum	$1,400 m	$1,475 m	$440 m*	$440 m	$1,150 m	$460 m

Costs shown in $millions for basic engineering excluding Front St. Extension or special landscape treatment
* Includes $25 million allowance for architectural enhancements of structure, cladding, gateway elements etc. Does not include cost of building construction under the structure

Replace 1: Cut and cover tunnel west of Spadina
Replace 2: Bored tunnel around Fort York and Cemetary

Grt. Street Variation 1: Retain existing expressway west of Spadina
Grt. Street Variation 2: Underground expressway west of Spadina
Grt. Street Variation 3: Eight lane boulevard from Jameson to Don River

Figure: Estimated Costs of the Approaches

2. A toll equivalent to a subway fare could generate even more: about $130 million annually. This could fund $1.5 billion in capital cost. Depending on the option selected, this is two or possibly three times the amount needed, allowing the surplus to fund concomitant transit improvements.

These and the other options described are complex and some require policy shifts. Direct public expenditure may be needed, but not exclusively. User pay systems and leveraged financing from enhanced value both warrant consideration.

2.9 Arithmetic Comparisons

The charts below highlight key numbers and provide an array against which all the approaches can be compared. Appendices 5 and 6 provide more detailed descriptions of the traffic and place-making measures and comparisons between the alternative approaches.

PART 3

CONCLUSIONS

This part summarizes the study team's seven Conclusions. The team recommends the appropriate next steps to be:

- ***A series of focus groups to discuss the findings of this work, establish potential reaction to it, and solicit input.***

- ***Public consultation and debate.***

- ***After amendments responding to the above input, forwarding these recommendations to City Council for a decision this fall to initiate an independent EA for the reconfiguration of the Gardiner/Lake Shore Corridor as a component of waterfront revitalization, including the full range of physical, social and economic considerations.***

- ***Protection of the proposed Great Street right-of-way as soon as possible.***

The study team concluded that:

1) A profound reconfiguration of the Gardiner/Lake Shore Corridor is necessary and fundamental to realizing significant revitalization of the Toronto Waterfront. To do so represents a unprecedented opportunity to improve the physical environment of the City.

2) Reconfiguration of the corridor is feasible, can be built at an acceptable cost, can be phased without undue disruption, and need not produce traffic failure. It represents a sound investment in light of it's significant environmental and economic benefits to Toronto, Ontario and Canada.

3) Reconfiguration is consistent with the city's Official Plan, entails sustainable transportation principles, and is complementary to an acceleration of public investment in both GO Transit and the TTC. Funding for road reconfiguration and transit should not been seen as competitive; initiatives to improve both should be made in concert with each other.

4) The greatest benefits to the waterfront will be achieved by removal of the entire elevated expressway and by the complementary creation of a great new civic waterfront street – Lake Shore Drive – extending from Humber Bay to Ashbridge's Bay.

5) The "Great Street Approach" in this report should be the preferred basis for an Environmental Assessment. Its focus should be on establishing an accepted balance between the competing needs of traffic capacity and place-making. Transit serving the waterfront should be a component of the environmental analysis.

6) Successful reconfiguration of the corridor is dependent upon effective ramp connections- in the east between the Don Valley Parkway and both the Richmond /Adelaide interchange and the new Great Street, and in the west between the Gardiner Expressway and both Front Street and the new Great Street. The design configuration of these ramp connections should be addressed within the Environmental Assessment of the corridor as a whole in order to realize all opportunities for optimizing design and performance, and minimizing costs and disruption.

7) Time is of the essence. Right-of-way protection should be established immediately. An EA work program should take account of the substantial work already undertaken on the subject, and be completed in as short a timetable as possible so that regeneration of the waterfront can proceed in a timely manner.

APPENDICES

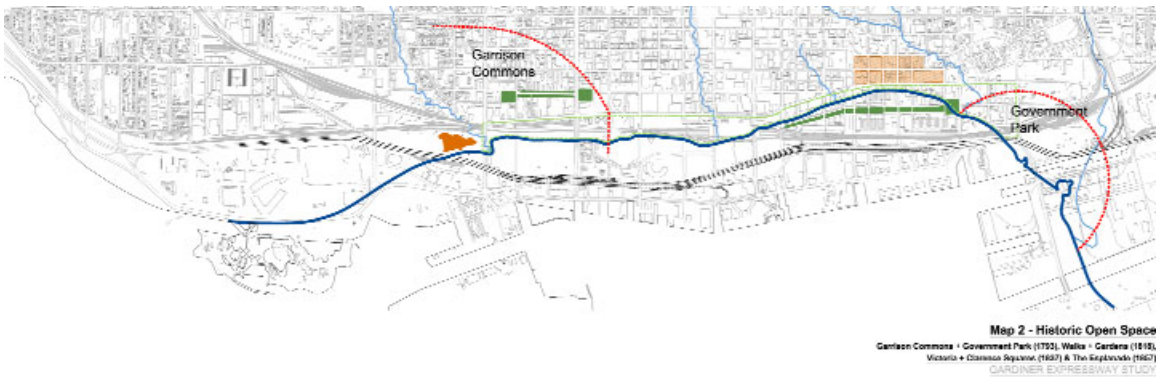
The Appendices are a record of research undertaken as part of this study and a detailed review of selected topics .

Appendix 1
Historical Notes

The following presents a summary of the chronology of the development of Toronto's Waterfront, in map form, as it relates to current conditions.

Map 1 illustrates the approximate location of the original shoreline of Lake Ontario, as it existed when Governor John Graves Simcoe arrived in 1793. This map also shows the approximate locations of primary rivers and creeks flowing into the Lake along the waterfront, including Garrison Creek (just west of Fort York), Taddle Creek and the Don River in the east. Finally, it shows the location of the original ten blocks (bounded by King, Jarvis, Richmond and Berkeley Streets) that formed the first phase of the new Town of York, and the original Fort York located at the mouth of Garrison Creek.

1	Original Waterfront (1793)	2	Original Creeks (1793)
3	Fort York	4	Town of York (1793)



Map 2 shows the approximate location of the two principal green spaces established under Simcoe: the 1200-acre Garrison Reserve west of the Town and the smaller Government Park on the east, between Berkeley Street and the Don River. An informal Public Walk or Mall was established linking these "bookends" with a 30-acre strip south of Front Street between Berkeley and Peter Streets. Known as the Walks and Gardens, the Strip was formally designated in 1818. In 1856, the Grand Trunk Railway pressured the city into letting it run a line within the eastern Walks and Gardens in exchange for creating The Esplanade north of the new rail corridor, where it was permanently severed from the lake.

1	Garrison Commons (1793)	2	Government Park (1793)
3	Walks + Gardens (1818)	4	Victoria Square (1837)
5	Clarence Square (1837)	6	The Esplanade (1857)

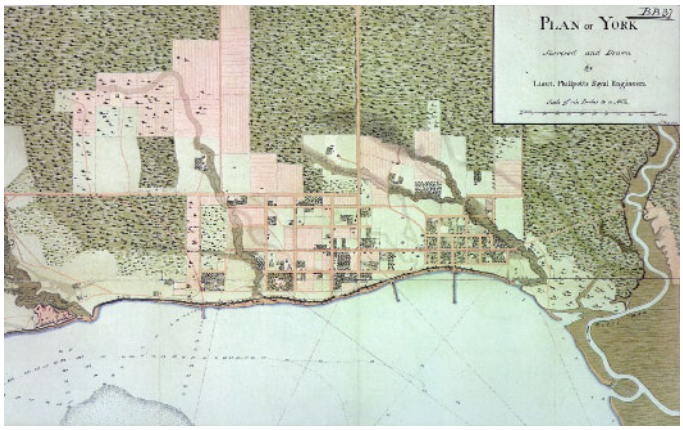


Figure 2 - Plan of York, Phillpott [1818] illustrates the location and dimension of the Walks and Gardens as they existed in 1818.

Figure 3 - A View of Part of York [1804] painted by Hale, shows the Walks and Gardens extending along the waterfront.

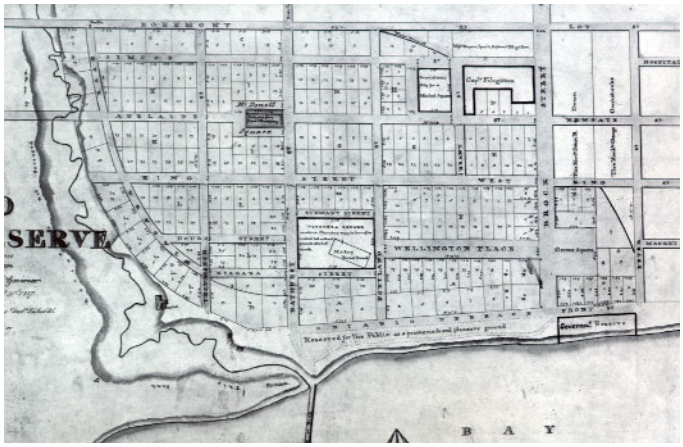


Figure 4 - Plan of Bonnycastle [1837] shows lands along the western waterfront "reserved for the public as a promenade and pleasure ground" reinforcing Front Street as a "terrace" overlooking the lake. It also shows the proposed locations of Victoria and Clarence Squares, linked by a "broader, tree-lined avenue" which now forms an extension of Wellington Street.

Figure 5 - Plan For Waterfront, Howard [1852] shows John Howard's "Sketch of a Design for Laying Out the North Shore of the Toronto Harbour in Pleasure Drives Walks and Shrubbery for the Recreation of the Citizens". The plan illustrates the notion of placing certain key institutions within the linear park, as has been suggested in The City's Part II Plan. This plan also shows the railways from the west terminating at Bathurst Street.

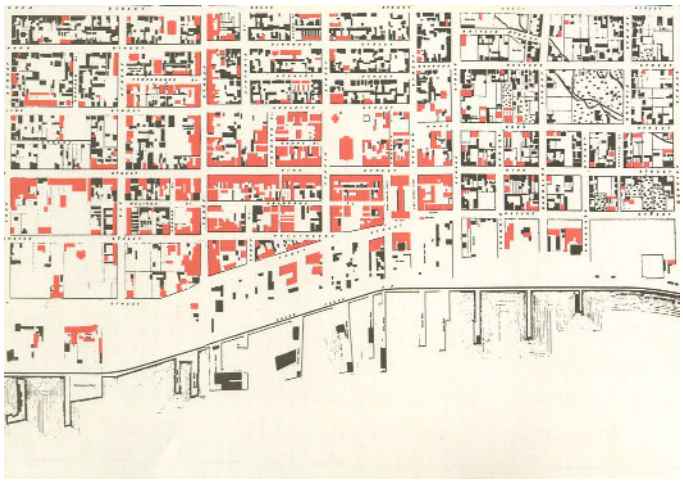
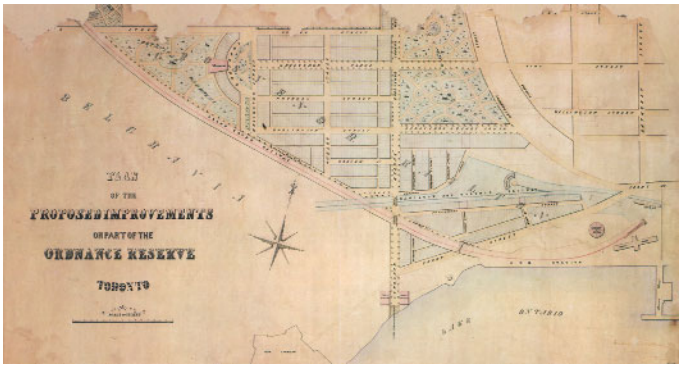


Figure 6 - Partial Map of The City Of Toronto [1858] shows the initial stages of the demise of the Parks and Gardens as merchants began to establish wharves south of the linear park jutting out into Lake Ontario, placing pressure on the intervening open space to be occupied for commercial and industrial uses, as it ultimately was. In turn, the wharves established a framework for landfilling which began in the 1860s to create more land for industrial development.

Figure 7 - Plan of Proposed Improvements On Part of The Ordnance Reserve [1856] shows how the railways initially proposed to link beautification and civic improvement with the construction of new termini on the waterfront.



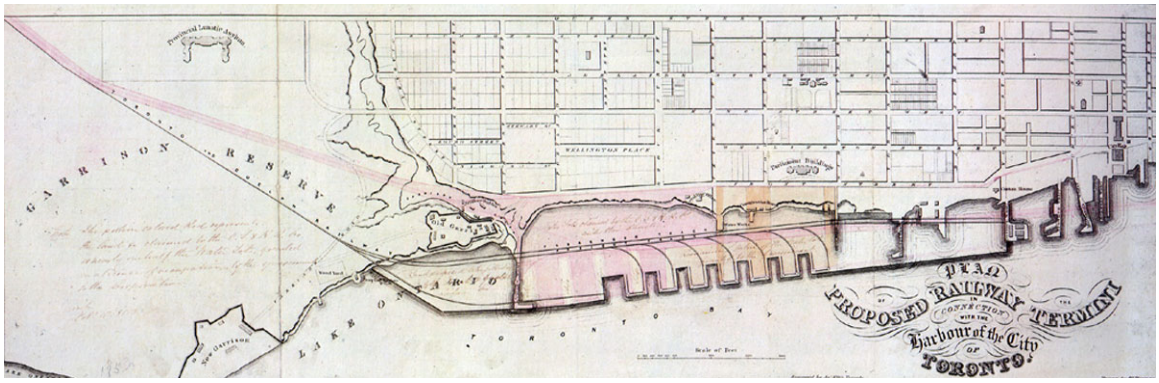
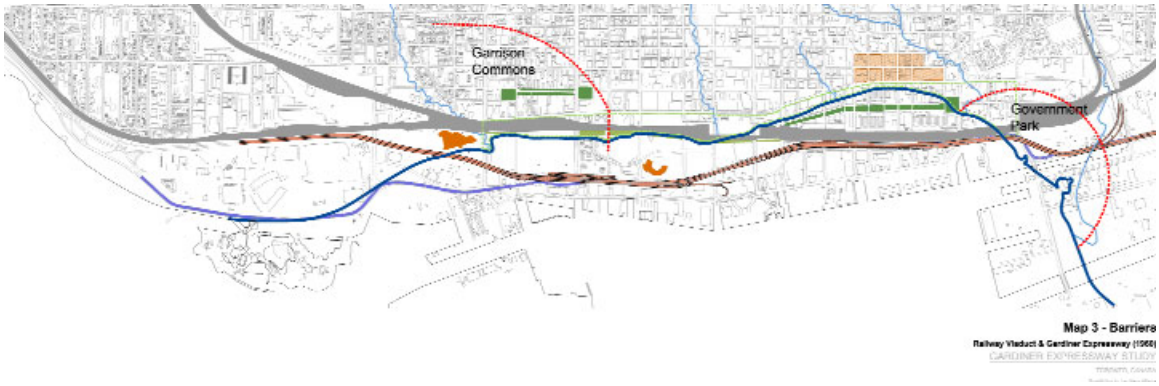


Figure 8 - Plan of Proposed Railway Termini [1853] is closer to what actually happened, when civic amenities were almost totally abandoned.



Map 3 shows the location of the railway viaduct that was built in the 1930s to consolidate the railway approach to Union Station from the East and carrying it over the city's major north-south streets including Parliament, Jarvis, Yonge and Bay Streets. It also shows the location of the Gardiner Expressway and realigned Lake Shore Boulevard as these were constructed between 1956 and 1966.

1 Railway Viaduct (1930s) 2 Gardiner / Lake Shore Corridor (1960)

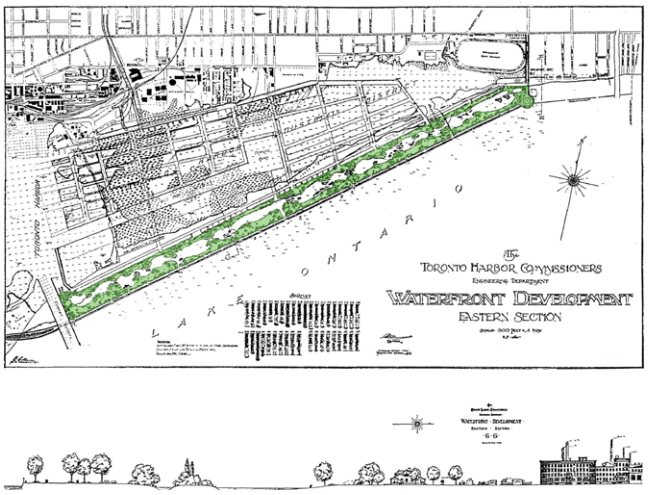


Figure 9 - Plan of Waterfront Development, Toronto Harbour Commissioners [1912] shows the last attempt made by the THC to develop a continuous waterfront green space - once again in front of the railways and along the new water's edge created by landfill. This Plan was based on Frederick Law Olmsted's 1912 Plan for the waterfront.

Map 4 - Existing Conditions

Map 4 depicts the existing situation along the waterfront showing the location of major new parks and green spaces as proposed in the railway lands Part II Plans (Western and Central) (1999) and the Central Waterfront Secondary Plan (2002).

1 Existing Waterfront (2002)
2 Designated Rail Lands Parks (1999)
3 Central Waterfront Plan Parks (2002)

Map 5 - Historic Context

Map 5 shows an overlay of the previous four maps, thus illustrating the historic context for the concept plan discussed on the following pages.

Appendix 2

Previous Studies

1980: Technical Working Group On South Parkdale

The Technical Working Group comprising two Commissioners from the City of Toronto, and two Commissioners from Metropolitan Toronto reported that the proposal to create approximately 17 hectares (42 acres) of new land on the south side of South Parkdale was feasible. This new land would be realized through the development of a deck over the railway corridor and the Gardiner Expressway. Changes to expressway interchange ramps were proposed including a diamond interchange at Dufferin, a remodeled Lake Shore Boulevard interchange south of Dowling Avenue, the removal of some existing ramps, and a connection between Dufferin Street and Lake Shore Boulevard over the Gardiner Expressway on the west side of Dufferin Street.

1983: Central Bayfront Access Investigation

A preliminary examination of alternative ramp and interchange configurations in the Gardiner/Lake Shore Corridor between Spadina Avenue and Jarvis Street was completed for the City of Toronto. The examination identified a series of alternative concept plans for the Spadina, York, Yonge, and Jarvis interchange areas. In 1984, a feasibility study of specific design alternatives for the Gardiner Expressway ramps and Lake Shore Boulevard in the Central Bayfront area was completed for the City of Toronto.

1983: Central Waterfront Transportation Study

In 1983, Metropolitan Toronto developed the Central Waterfront Transportation Plan which included a number of road extensions including the following:

- Extension of Front Street from Bathurst Street to Strachan Avenue;
- Construction of a new Gardiner Expressway interchange with the proposed Front Street extension;
- Widening of the Gardiner Expressway to four lanes in each direction from the proposed Front Street interchange to the Humber River;
- Extension of Dufferin Street through Exhibition Place to Lake Shore Boulevard;
- Elimination of the jog in Dufferin Street at Queen Street;
- Extension of Simcoe Street southerly from Front Street under the rail corridor to Queens Quay;
- Extension of Portland Street southerly from Front Street over the rail corridor to Queens Quay.

1986-1990: The Task Force On The Gardiner/Lake Shore Corridor

This Task Force, established by the City of Toronto in 1986, was a forum for addressing means of mitigating the impacts of the Gardiner Expressway and Lake Shore Boulevard. In October 1986, a companion set studies for the Task Force on the Gardiner/Lake Shore Corridor entitled Guiding the Gardiner and Urbanizing the Gardiner was prepared which identified the urban design problems of the elevated expressway within the central area of Toronto and suggested a variety of precedents for housing development forms and typologies which would not adversely affect the capacity of the expressway but would establish an urbanized pedestrian-oriented corridor with grade-related environment of shops, offices and housing. In 1988, the Task Force released a report entitled A Civic Design Study that identified a range of planning and design strategies to improve the corridor, including a recommendation to remove the elevated section east of the Don Valley Expressway connection.

In December 1990, the Task Force issued a report entitled Gardiner Expressway East of Don Valley Sweep Civic Design Study. The study team concluded that the elevated Gardiner Expressway could be removed east of the Don River providing that a series of corresponding transportation measures were introduced.

1988: City Drive: An Idea For The Gardiner/Lake Shore Corridor

The City of Toronto Planning and Development Department developed a concept for replacing the present Gardiner Expressway and Lake Shore Boulevard from Dufferin Street to the Don River with an urban tree-lined avenue referred to as City Drive. Four lanes would be provided in each direction and City Drive would underpass major north south streets. Diamond type on and off ramps would be provided at some north south streets.

1989: Toronto Waterfront Charrette

In September 1989, the Toronto Waterfront Charrette was held with the participation of 25 international

experts in waterfront planning. The Charrette was sponsored by the Ontario Professional Planners Institute, the Ontario Association of Architects and the Ontario Association of Landscape Architects.

The overview section of the report on the charrette states that:

> *"We take it as 'given' that between the harbour and the City Centre the Gardiner Expressway must disappear.*
>
> *Diagrammatically, we suggest that the present arrangement of the Gardiner and Lake Shore Drive be turned upside down, that the Gardiner be depressed below a broad at-grade, tree-lined avenue that is a ceremonial entrance to both the City centre and waterfront.*
>
> *Replacing the Gardiner will require a large public investment. This should be matched by the quality of the private investment around it. Both public and private investments should be guided by an urban design plan; this work aims to be a first approximation of such a plan. Planning the future of the Gardiner and the area around it should be tackled immediately. It is already late in the game."*

1989: The Four Guys Off the Wall

A group led by William Teron proposed to construct a expressway replacement for the elevated central section of the Gardiner which would be located under water just south of the dock wall in the harbour. The proposal was to finance the project utilizing the residential and commercial development rights associated with all of the lands which would become surplus as a consequence of the relocation.

1990: Gardiner Expressway Widening

The Environmental Study Report for the Humber crossing section of the Gardiner Expressway widening was completed by Metropolitan Toronto. The approved plan provided for the complete separation of the Gardiner Expressway and Lake Shore Boulevard traffic flows in the westbound direction and elimination of the bump at the Humber River. The work was undertaken in a phased program over several years and completed in 2001.

1990: The Future of the F.G. Gardiner Expressway

In January 1990, the Metropolitan Transportation Department issued a discussion paper on the future of the Gardiner Expressway. The paper considered four options as follows:

1. Dismantle the elevated portion of the expressway and do not replace it;
2. "Bury" the expressway in its existing corridor;
3. Relocate and bury the expressway in a location in the harbour;
4. Ameliorate the physical impact of the existing expressway.

The paper concluded that Options 3 and 4 are the only ones meriting further consideration. It notes that a relocated expressway would likely cost in the range of $1.5 - 3 billion and could take 12 to 15 years to construct. It notes that it is feasible to proceed with some of the proposals in Option 4, and that even if the relocation options was pursued, some of the proposals contained in Option 4 could be undertaken given the long time frame to relocate the existing elevated expressway.

1990: Royal Commission on the Future of the Toronto Waterfront- Waterfront Transportation in the Context of Regional Transportation

The Royal Commission on the Future of the Toronto Waterfront, chaired by David Crombie, released Report 9: Waterfront Transportation in the Context of Regional Transportation: Background and Issues, prepared by Neal Irwin and Shane Foreman. The report outlines many of the more generic proposals that had been made for improved or relocated transportation facilities and services in the waterfront area including proposals for arterial roads, parking facilities, the Gardiner Expressway, traffic management, commuter rail, transit, pedestrian ways and bicycle paths, goods movement, the port area, intercity transportation, and waterborne passenger transportation. In particular, the report suggested the removal of the elevated expressway and its replacement with a robust network of at-grade and below-grade arterial streets within the central area.

1991: Toronto Central Waterfront Transportation Corridor Study

In November 1991, the Royal Commission on the Future of the Toronto Waterfront released Report 15: Toronto Central Waterfront Transportation Corridor Study, co-directed by Neal Irwin and Edward Levy . The study set out a range of transportation options and identifies the environmental, land-use, urban design and economic opportunities and concepts that they would make possible. The report concluded that significant growth in auto travel within the central waterfront would not be possible and that public transit systems must be expanded to support growth in travel demand. The study noted that retaining the expressway with amelioration could reduce the barrier effect. It also noted that removal of a portion of the expressway would allow a better place to emerge, but that such action would at a minimum require prerequisite actions including greatly improved transit and the implementation of the Front Street Extension. The study set out a detailed plan of action. The study concluded by noting that major public policy issues are at stake and that decisions taken (or not taken) would greatly effect the quality of Toronto's central waterfront and that a new process was needed for planning and delivering the bold plan that is within the grasp of this generation.

1995: Removal of the Elevated Expressway East of the Don River

In 1995, Metropolitan Toronto initiated an Environmental Assessment of its proposal to remove the elevated portion of the Gardiner Expressway that existed east of the Don River to Leslie Street. Repair of the expressway had the prospect of being very costly, and the City had concluded that the life cycle costs of replacing the structure with a surface roadway would be much lower. Analysis had also shown that replacement of the elevated expressway and the arterial road below it with a six lane urban boulevard would provide an improved level of service for corridor traffic. The removal of the expressway also provided the opportunity to develop a much improved urban environment and facilitate development of lands near the roadway. Following a lengthy and contentious process, the successful conclusion of the EA provided the approval for the project. Detailed design and contracts were developed and demolition of the facility was initiated in 1999. All the new roadways were completed and put into operation by 2002 and construction was complete in 2003. While there was public resistance to the plans, all observers now agree that the decision to remove the expressway was correct and that the resulting conditions are in every respect an improvement.

1993: Waterfront Regeneration Trust

The successor to the Royal Commission took the work further and developed a plan at the West end to deflect some traffic to Front Street, bury the rest to Spadina, and thence utilize surface roads. The work was stopped before publication. This is essentially the approach (for that section) shown in the Replace alternative.

1999: Canadian Highways International Corporation

Shortly following the amalgamation of the new City of Toronto, Canadian Highways International Corporation, the original operators of the electronically tolled Highway 407 proposed to the City of Toronto to develop a replacement for the elevated central section of the Gardiner Expressway. The proposal involved constructing a below grade expressway using cut and cover techniques and creating an urban boulevard of Lake Shore Boulevard atop the expressway. The proposal had two scenarios: one burying only section west of Yonge Street and one burying the expressway all the way to the Don River. The proposal was to finance the project in whole or in part using the revenue which could be derived from tolling the facility.

2000: Work of the Toronto Waterfront Revitalization Task Force

The Toronto Waterfront Revitalization Task Force issued a report that called for the reconfiguration of the Gardiner Lake Shore corridor. The majority of motorists on the Gardiner Expressway are actually destined to the Toronto Central Area and exit the expressway using several central area ramps. The strategy in the concept was to provide better road connections between the expressway elements and central area street grid. West of the central area, the Front Street Extension would connect to the Gardiner Expressway. Northeast of the central area, the Richmond/Front interchange on the Don Valley Parkway would be improved. West of Spadina, the elevated expressway would be removed and replaced by an express route in a tunnel on a different alignment. The expressway through functions within the central area from east of Spadina Avenue to the Don River would be replaced with major surface streets, including a new pair of five-lane one-way streets utilizing the alignments of Lake Shore Boulevard, Harbour Street, and Queens Quay Boulevard, with an upper level westbound express road adjacent to the rail corridor.

2002: City of Toronto Due Diligence

The new City of Toronto's due diligence review of the Task Force business plan identified certain concerns with the Task Force transportation concept. The concerns included the lack of a through route, the incompatibility between high traffic volumes and pedestrians and the resulting loss of vehicular capacity. The City produced a waterfront transportation network plan which introduced a number of new transit service elements and a cycling network. The City's road network proposal was similar to that envisaged by the Task Force. However, it differed in a significant respect in that it provided for the creation of a replacement four-lane expressway through route below grade between Spadina Avenue and Jarvis Street and above grade on an embankment south of the rail corridor between Jarvis Street and the Don Valley Parkway. There ensued some debate concerning the severe and prolonged civic disruption that would be associated with construction of the concept.

2002: Work of the Toronto Waterfront Revitalization Corporation

The TWRC initiated a workshop to review the range of options for the future of the Gardiner/Lake Shore Corridor. The workshop led to a collaborative investigation of the full range of options drawn from work done, and design concepts developed by the Task Force and the City. These were tested using an advanced technology for the micro-simulation of roadway operations based upon the Paramics software and other technologies at the Civil Engineering Department at the University of Toronto. The strategy was to develop a robust roadway network that could essentially replicate the performance of the existing road network in accommodating existing demand volumes and origin-destination patterns. The simulation demonstrated that a replacement road system could offer essentially the same level of service as the existing network for trips into and out of the downtown area. The resulting road network formed the basis for the Replacement Approach considered in the current study.

2003: Gardiner/Lake Shore Corridor Transformation Proposal

The TWRC engaged separate consultants to undertake a parallel study exploring the possibility of changing much of the barrier aspects of the expressway without removing it, expecting significantly lower cost. The report concluded that much of the barrier could be overcome and a much better pedestrian environment provided if the ramps were reworked, the Lake Shore were “uncoupled” from the expressway and the space below occupied by buildings and public space. This strategy is referred to in this Technical Briefing as the Gardiner Transformation Approach.

2004: Front Street Extension Environmental Assessment

In 2002, as eligible recipient, the TWRC and the City of Toronto initiated an update to the Environmental Assessment of the Front Street extension. The extension had been recognized and widely accepted as an element common to all strategies for the removal of the elevated Gardiner Expressway and was widely accepted as a prerequisite to its removal. In response to community interests, the concept for the Front Street extension identified as preferred in the EA provides for a basic four-lane cross-section following an alignment that passes under the railways and under Strachan Avenue. At this writing, the EA process has not reached a conclusion.

Appendix 3

Case Studies

Case Study 1: The Westway Development Trust, London, England

The Westway Development Trust site comprises 23 acres of land that is 1.6km long and situated predominantly under an elevated motorway known as the A40 Westway. The A40 crosses over Portobello Road in the Notting Hill area of London, England. Use of space under the motorway has sites for commercial and community facilities has been a part of the revitalization of the area.

The A40 elevated motorway was developed during the late 1960's to relieve congestion in Holland Park and to speed traffic from central London towards Oxford and beyond. Its development had a profoundly destructive impact on the local urban environment. A total of 23 acres of redundant derelict land was created in areas around the A40, some situated beneath the canopy and other open spaces. **A Community Trust was established in 1971 to manage and develop land under the Westway for local and greater community benefit.** The land is sub-leased for 120 years from the local Borough who lease freehold from Greater London Authority. The Trust is an independent body and is financially self-sufficient (turnover is £4.5 million), it operates with in-house project and property managers to ensure effective management of Trust land and properties.

By 1976, redevelopment under the A40 Westway had commenced with the construction of a Community center, nursery, stables, an administration building, offices and space for stallholders and small businesses.

Today, development is split between community (80%) and commercial use (20%), providing for a range of business use, with the focus on flexible work-space, leased to small to medium-sized local businesses. There are a total of 120 commercial leases, including studios, workshops, offices, shops, restaurants, market space, light industrial premises and yards. A total of 3.5 acres of public green space has been created, proving attractive, vibrant, and sustainable planting for public enjoyment.

The A40 Westway crosses over Portobello Road, one of London's most vibrant and successful shopping-streets. This road cum street-market is lined with an array of new and long-established shops. The surrounding area comprises significant residential uses with several large Council housing estates and some attractive residential mews within an economically and culturally varied community.

Case Study 2: Viaduc des Arts and Promenade Plantee, Paris

Viaduc des Arts is a decommissioned railroad viaduct located in the 12e Arrondissement of Paris. Successful in-fill of habitable space under the structural arches demonstrates the potential for well-considered adaptive reuse of urban infrastructure. It is orientated east-west along Avenue Daumesnil, and runs between the Place de la Bastille and the City Hall of the 12e, in the southeast section of Paris, near the Gare de Lyon station.

Rehabilitation of Viaduc des Arts is part of programmed development of Paris's east side. **In 1990 the Paris city council decided to restore the Viaduc** that had been built in 1859 to support the railway line linking the Bastille to Vincennes. By the 1990s it was an abandoned and decaying eyesore in a neighborhood that had been declining due to declining socio-economic conditions.

Development was in keeping with the vision for the new 'status' of the viaduct as a Parisian 'temple' of Arts and Crafts. The arches of the viaduct itself were renovated and enclosed by windows to create workshops for over 50 artists, craftsmen and boutiques. New workspaces were developed over a 10-year period and officially opened to the public in mid-2000.

In association with the viaduct development, the elevated rail line / right of way of the viaduct was landscaped and redesigned as a pedestrian promenade, firstly atop the viaduct and then at ground level. The promenade is known as the Promenade Plantee runs the entire 4.5km length of the 12e Arrondissement and is almost entirely pedestrian, however the eastern segment includes a bike path.

The 12e Arrondissement is an area of mixed use, with hospitals, a major railway station, plazas and parks, housing and office buildings. Since redevelopment of the viaduct and pedestrian promenade, the adjoining

neighborhood has benefited from significant economic growth including the addition of 1,040 new dwellings, 75,000 square feet of new commercial space, and more than 200,000 square feet of new office space.

Case Study 3: Spacia & Wooten Street Arches, London, England



Spacia, formerly Railtrack Property, is a division of Network Rail which is the primary rail infrastructure network provider in the United Kingdom. The role of Spacia is to lease and develop property assets that are owned by Network Rail and provide business accommodation to generate income that is reinvested to improve railway infrastructure and passenger facilities. Spacia is a private sector organization and operates as a commercial business, but has no shareholders, and is owned by and accountable to its members, who take no income or profit.

Spacia manages in excess of 9,000 lettings nation-wide, and approximately fifty percent of these properties are located beneath elevated rail infrastructure. Currently, there are about 4,000 "working" arches in London.

Spacia has refurbished a series of railway arches at Wooten Street, London into A-grade quality designer offices. The area around Wooten Street has an extensive network of arches due the close proximity to major rail stations including London Bridge, Waterloo and Charing Cross. Proximity to the central city area means that it is an obvious location for revitalization for business, and a fashionable destination due to its 'raw' urban feel. Development has produced loft-style commercial space, mainly studio offices aimed at small creative businesses, plus a wine bar and restaurant units. Vinopolis, the "city of wine" is a showpiece refurbishment. Apart from being a wine museum, there's a complex of bars and restaurants plus space and facilities for corporate entertaining.

Typically, the raw fabric of arches is being kept, with internal spaces predominantly open plan, Design features, including glass frontage enhances the open-plan interiors, which have glass and steel mezzanines. Rent for this type of space is in the order of £25 a sq ft. and offices range in size from 1,000sq ft to 4,900sq ft. Opportunities for larger spaces such 2,055sq ft space can be developed for uses including a health club.

Case Study 4: Ronda del Litoral / Moll de la Fusta, Barcelona

Ronda del Litoral is the coastal section of Barcelona's ring road system and was constructed in the mid 1980's. It was one of the first of many urban transformation projects completed prior to the 1992 Olympics and was designed to connect the city to its region and relieve traffic congestion. The initial construction of the Ronda del Litoral began with a project associated with the conversion of the Porta Vella (the Old Port)


from an active port into public space - the redevelopment of the Moll de la Fusta (Timber Wharf). Prior to redevelopment, Passeig Colom, a 14-lane boulevard/highway complete with iron railing, separated the city from the wharf below. To avoid creating a barrier to the sea, a new road was designed to be multi-layered and provide easy pedestrian access across it. This composition includes the following components:

- a realigned and narrowed Passeig Colom that incorporated a separated transitway;
- a raised pedestrian terrace framed by mosaic archways, hiding a partially sunken parking area and two express travel lanes below;
- two express travel lanes and two local travel lanes at a lower level, with pedestrian bridges at three points connecting the upper terrace to the lower plaza.

Segments of the Ronda del Litoral built in the late 1980's near the Olympic Village were constructed with the central through-lanes located partially below grade, just above the water table, and the land surrounding it raised by 4-5m above the road. Streets leading to the seafront therefore gently slope up to Ronda. Parkland covers the buried portion and three at-grade lanes on either side of the park connect to local streets at every third urban block. The Ronda del Litoral was designed to carry 120,000 vehicles per day.

The Ronda del Litoral was funded publicly by various levels of government. It is considered a great success as a transportation route that accommodates both express and local traffic while sensitively addressing its urban context. The Moll de la Fusta is a vibrant urban waterfront space and its success helped spur further development of the Porta Vella.

Case Study 5: Miller Elevated Highway, NY (West Side Highway)

The 7.2 km-elevated highway from West 72nd Street extending south to the Brooklyn-Battery Tunnel was completed in 1945. **By 1957, the Miller Elevated Highway was handling 140,000 vehicles per day.** However, its deterioration and obsolescence were recognized, prompting the first of six studies on improving the road. In December 1973 a 60-foot section of the upper deck collapsed, and the entire highway from the Battery north to West 46th Street was closed.

In 1975, an assessment by Robert Moses outlined alternatives:

- **Maintenance**: approximately a "no-build" alternative; cost $86 million
- **Arterial:** an at-grade arterial from Battery Place to West 59th Street, and a depressed and covered transit way; cost $76 million
- **Reconstruction:** provide for the rehabilitation and partial reconstruction of the existing West Side Highway between the Battery and West 72nd Street); cost $239 million
- **Inboard:** create three new transportation facilities: a six-lane Interstate highway, a new transit way, and a reconstructed West Street - Twelfth); cost $950 million
- **Outboard:** remove existing structure and construct new Interstate highway similar to Inboard Alternative, except that the northerly half is in a tunnel built in fill deposited out in the Hudson River; cost $1.2 billion

Moses rejected the "maintenance" and "arterial" alternatives because they would provide no traffic solution, and rejected the "inboard" and "outboard" alternatives because of their cost. **Moses recommended replacing the elevated structure with a highway at grade with separated crossings where required.**

In September 1985, New York City leaders allocated $690 million of Federal funds, plus an additional state and city share of $121 million to the "West Side Highway Replacement Project." In September 1986, the highway design firm Vollmer Associates was commissioned to develop alternatives. In January 1987, the West Side Task Force unanimously recommended an at-grade boulevard between Battery and 59th Street, and a green waterfront esplanade between the proposed roadway and the Hudson River. In May 1993, a coalition of local, city and state officials approved a $380 million budget for an urban boulevard dubbed, "Lessway" by community board members because of its lower cost relative to earlier proposals for the West Side Highway. The urban boulevard was completed in August 2001.

Footnote:
In 2003, two fifteen storey condominium towers designed by architect Richard Meier opened on the west side of the former Miller Highway site. An 8,000sf triplex was purchased for $14 million; a 4,000sf space was purchased for $8 million; the raw spaces in the building sold for an average $1,480 per square foot. Recently, the 12,000sf site immediately south of the condominiums, currently occupied by Pathfinder Press, sold for $20 million (approximately $250 per square foot).

Case Study 6: Central Artery/Tunnel, Boston (The Big Dig)

When the 7.8 mile (12.6km) elevated section of Interstate 93 Central Artery through downtown Boston opened in 1959, it carried 75,000 vehicles per day; **by 2003 the now-crumbling and congested roadway carried 200,000 vehicles per day**. In the early 1970's, this congestion was forecast concurrent with the envisioning of a new urban design plan for the downtown; this resulted in the commencement of planning for a replacement transportation corridor. **In 1982, a $2.6 billion plan was approved to replace the elevated highway with an eight-to-ten-lane underground expressway, with over 3.5 miles of tunnels.** The EA for the plan took 8 years.

Construction of the Central Artery/Tunnel project began in 1991; 50% completion was achieved in 1999; 80% completion occurred at the end of 2001. **When the project is completed in late 2004 after 13 years of construction, the final cost will be approximately $14.6 billion, mostly financed by the Massachusetts Turnpike Authority.**

Remarkably, greater Boston's millions of residents and businesses have enjoyed continued access to the city during construction. Through it all, Boston's downtown financial and commercial district has stayed open for business. These major accomplishments have come at a significant cost. Mitigation measures fall into three broad categories: Traffic, community outreach, and environment.

When completed in late 2004, the downtown Central Artery/Tunnel will carry 245,000 vehicles per day. By cutting downtown traffic congestion, the project will benefit area residents and businesses to the tune of about $500 million a year (based on reduced accident rates, less wasted fuel from engines idling in stalled traffic, and reduced late-delivery charges). There will also be health benefits due to a 12 percent reduction in citywide carbon monoxide levels. Other major project benefits include creation of more than 260 acres of open land, including 30 acres where the existing former elevated highway stood, more than 100 acres at Spectacle Island in Boston Harbor (where project dirt is capping an abandoned dump), and 40 more acres of new parks in and around downtown Boston.

Case Study 7: Embarcadero Freeway, San Francisco

In 1957 the 2-mile (3.2km) long double-decked Embarcadero Freeway was constructed as part of state highway Route 480; it connected city streets from Broadway to the approach to the Bay Bridge. Originally it was planned to be extended as a continuous expressway to join the Bay Bridge to the Golden Gate Bridge as part of a grand scheme to build a complete network of freeways in San Francisco. By 1973 there was strong local sentiment against the freeway. In 1974 a Planning Department report concluded it was never needed in the first place, it could be taken down, and furthermore that staging could be undertaken to minimize impact during dismantling. In 1985 the San Francisco Board of Directors voted to dismantle the highway. However in 1986 a popular plebiscite favoured retaining it. **Before it had sustained minor damage in an earthquake in 1989, the freeway carried 70,000 vehicles per day.** The cost of repairs and improvements to the structure to withstand seismic loads sponsored another reappraisal, resulting in its demolition, which was completed in 1993.

The total amount of state and federal funds for the takedown was capped at $700 million. As a condition of the removal, the State required the City to create a Port Commission that has the authority to manage the San Francisco waterfront. In place of the freeway, a 6-lane boulevard was built, and new transit capacity was added. Third Street Light Railway, a project of the San Francisco Municipal Railway, was designed to run the length of the Embarcadero.

After the Embarcadero Freeway was removed, gridlock didn't materialize. Automobile traffic dispersed using the gridded network of local streets. Furthermore, property values for lands near the site of the freeway shot up by more than 30-40 percent. And buoyed by a stream of new leases, port revenue skyrocketed to $16 million in 1998, more than five times its 1995 value. The port's entire revenue is based on the leases of its land holdings on the waterfront.

Source:
Alan Jacobs, Director of the Planning Department (1974-), San Francisco

Case Study 8: Alaskan Way Viaduct, Seattle (State Route 99)

Originally built to carry 65,000 vehicles per day, the Alaskan Way Viaduct is a 3.4 km double-decked, reinforced elevated concrete viaduct channeling State Route 99 along the shoreline of Elliott Bay past downtown Seattle. **It currently carries approximately 100,000 vehicles per day and has a $5 million annual maintenance budget.**

Fears of seismic damage have prompted the state of Washington to study the following options:

- Rebuild: retrofit the current structure; cost range $3.2 - $3.5 billion US.
- Aerial: replace the viaduct with a wider double-decked, elevated highway structure; cost range $3.2 - $3.5 billion US.
- Tunnel: replace the existing Viaduct with a tunnel through downtown Seattle; cost $3.8 - $4.1billion US.
- Bypass Tunnel: replace the existing viaduct with a bypass tunnel that would include a four-lane

tunnel through downtown Seattle and a six-lane Alaskan Way; cost range $3.1 - $3.4 billion.
- Surface: remove existing viaduct and add a surface street in its place; cost range $2.5 billion to $2.8 billion.

Due to affordability, the Surface street option is supported by the chair of Seattle City Council's transportation committee. However, while the surface street is the least costly, its estimated capacity is 40,000 fewer vehicles per day than other alternatives.

In the beginning of 2003, the U.S. Senate passed a $390 billion spending package that included $2.5 million for preliminary engineering and design work on a replacement for the Alaskan Way Viaduct and Seattle seawall. Furthermore, $177 million was raised for the project when the Washington State Legislature passed a nickel-funding package. Other funding has come from the City of Seattle ($5 million), Puget Sound Regional Council ($1.2 million), the Corps of Engineers ($100,000), and the federal 2003 budget ($2 million).

The Alaskan Way Viaduct and Seawall Replacement Project is jointly lead by the Washington State Dept. of Transportation, Federal Highway Administration and the City of Seattle. A completed plan is expected by the end of 2004, followed by steps to secure the estimated $2.4 billion to $4.7 billion needed to replace the structure.

Appendix 4
The Gardiner/Lake Shore Corridor

Physical Characteristics

The Gardiner/Lake Shore Corridor is the system of roadways consisting of both the Gardiner Expressway and Lake Shore Boulevard and the ramps which interconnect them, in the section between the Humber River in the west and the recently constructed Lake Shore Boulevard exit ramps east of the Don River in the east.

The Gardiner Expressway is a controlled access expressway with a basic six lane cross-section (three lanes in each direction). It does not feature inside or outside shoulder areas in either the eastbound or westbound directions. The Gardiner Expressway provides vehicular access to the Toronto Central Area and links the Queen Elizabeth Way and Highway 427 in the west with the Don Valley Parkway. Between the Humber River and Dufferin Street, the expressway is situated on grade immediately south of the main CN Rail Lake Shore railway corridor. Between Dufferin and the Don River, the expressway is elevated on structures. The expressway passes over north/south streets like Bathurst, Spadina, Yonge, Jarvis and Parliament.

Lake Shore Boulevard is an arterial road with a basic six lane cross-section throughout most of the Gardiner/Lake Shore Corridor. Between Spadina and Cherry, Lake Shore Boulevard is aligned generally parallel to

the Gardiner Expressway and very close to it. In most locations in this section, all or part of Lake Shore Boulevard is located directly below the Gardiner Expressway elevated structure. For the most part, although there are a few exceptions, direct access to Lake Shore Boulevard is not permitted and intersections of public streets with left-turn movements are controlled by traffic signals. In some cases, the sight lines for left turn movements from Lake Shore Boulevard are impaired by the presence of structures in the centre median of the roadway. Accordingly some of the traffic signal phasing plans within the corridor facilitate left turn movements on exclusive protected phases.

Ramp connections between the elevated expressway and the surface street systems are situated along the Gardiner/Lake Shore Corridor in a number of locations.

Exit ramps from the eastbound Gardiner Expressway are located as follows:

- west of the Humber River to Lake Shore Boulevard (eastbound)
- to Jameson Avenue to Lake Shore Boulevard (eastbound)
- to Spadina Avenue (northbound)
- to York (northbound), Bay and Yonge Streets
- to Jarvis Street (northbound) and Lake Shore Boulevard (eastbound)
- west of the Don River to Don Valley Parkway (northbound)
- east of the Don River to Lake Shore Boulevard (eastbound)

Exit ramps from the westbound Gardiner Expressway are located as follows:

- to Sherbourne (northbound) and Lake Shore Boulevard (westbound)
- to Yonge (northbound) and Lake Shore Boulevard (westbound)
- to Spadina (northbound) and Lake Shore Boulevard (westbound)
- to Jameson and Lake Shore Boulevard (westbound)
- east of the Humber River to South Kingsway and the Queensway
- west of the Humber River to Lake Shore Boulevard (westbound)

Entrance ramps to the eastbound Gardiner Expressway are located as follows:

- west of the Humber River from Lake Shore Boulevard (eastbound)
- east of the Humber River from South Kingsway and the Queensway
- from Jameson and Lake Shore Boulevard (eastbound) at Jameson
- from Lake Shore Boulevard (westbound) at British Columbia
- from Lake Shore Boulevard (eastbound) at Rees
- from Bay (northbound)
- from Lake Shore Boulevard (eastbound) east of Jarvis

Entrance ramps to the westbound Gardiner Expressway are located as follows:

- east of the Don River from Lake Shore Boulevard (westbound)
- west of the Don River from Don Valley Parkway (southbound)
- from Jarvis and Lake Shore Boulevard (westbound)
- from York and Lake Shore Boulevard (westbound)
- from Spadina (southbound)
- from Jameson and Lake Shore Boulevard (westbound)

The City of Toronto Works and Emergency Services has arranged for the Gardiner/Lake Shore Corridor to monitored by camera and real time data collection systems, and fitted with by traffic signal controls and

variable messages signage. This system allows for the early detection and response to incidents which occur on the expressway, and allows the two roadways to be operated as a system to expedite the flow of traffic passing through and/or entering into or exiting from the Central Area.

The Gardiner Expressway was designed around a number of significant constraints and spatial limitations, particularly around its ramps. It was designed at a time when the traffic engineering science associated with expressway facilities was in its developmental stages. Many interchanges on the QEW and Highway 401 which were the design contemporaries of the Gardiner Expressway have been replaced or significantly reconfigured over the years to incorporate the significantly improved operational design standards. Although there has been much rehabilitation work and some operational improvements made to the Gardiner Expressway over the years, the basic framework of ramps has not been changed significantly and most of the limitations inherent in the original design of the expressway remain in place to this day. For example, for many years the on ramp from Lake Shore Boulevard (westbound) at Jameson has been closed during peak periods because the ramp is too short and the merging distance too limited. Also, the weaving distance between the westbound on-ramp from York and the westbound off ramp to Spadina is much too short to accommodate the intensity of the weave which occurs on a regular basis. The previously mentioned lack of shoulders means that breakdowns and collisions have more severe and prolonged impacts on traffic operations than they otherwise would.

Transportation Services Context

The Gardiner Expressway was planned, designed and constructed in the late 50's and early 60's. The facility with its connection through the Central Area to the Don Valley Parkway was completed by the mid 60's. It implemented, as described in the 1964 Metropolitan Transportation Plan proposal, as one element of a great network of expressways which were planned to distribute traffic throughout the Metro Toronto area.

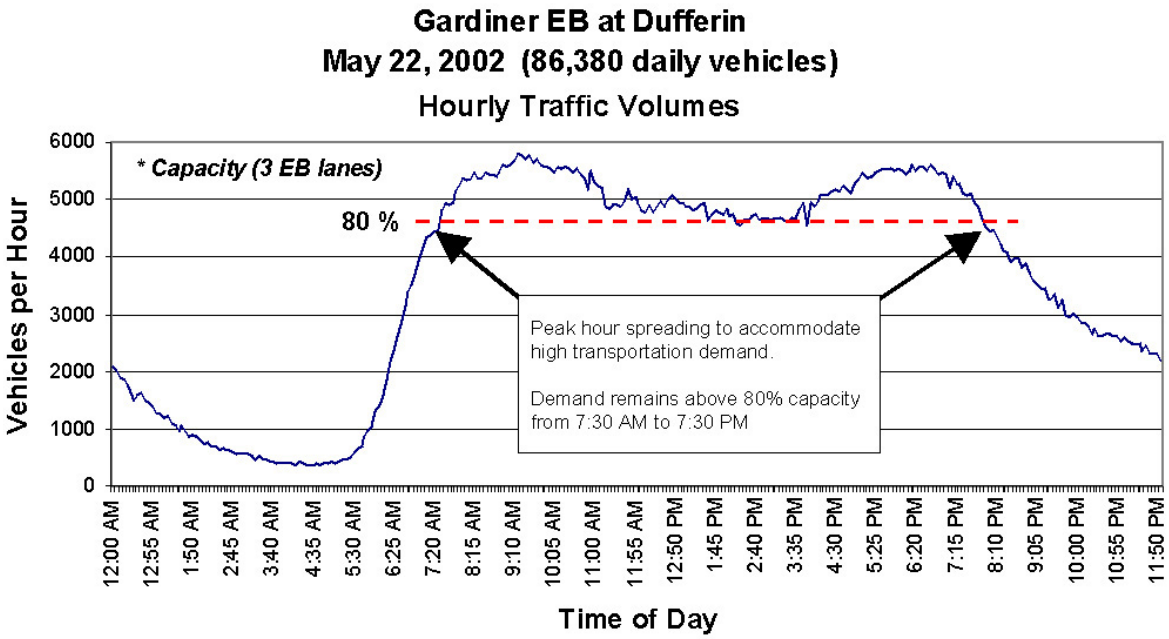
The Spadina Expressway was under construction when is southward progress was arrested at Lawrence (eventually Eglinton) by public protest and action by the Province of Ontario. In the ensuing years, the remainder of the Spadina Expressway and all of the other expressways which were included in the 1964 plan which were never built have long since been eliminated from the Official Plan. These included the Scarborough Expressway (an extension of the Gardiner Expressway from the Don River to Highway 401 near Port Union), the Highway 400 extension (from Jane along Black Creek, Weston and Parkside to the Gardiner Expressway), the Richview Expressway and the Crosstown Expressway. As it turns out, there has been essentially no new major roadway capacity developed into the Central Area since the completion of the Gardiner Expressway.

Nevertheless, the ensuing forty years has witnessed enormous growth in the population and employment within the Toronto Central Area. How has this growth been supported in the absence of any increase in roadway capacity across the Central Area cordon (generally Bathurst Street on the west, CP Rail North Toronto line in the north, and the Don River in the east)?

Major roadways serving to provide access to the Toronto Central Area once exhibited certain pronounced and typical characteristics. There was a morning rush hour during which the flow of traffic into the city was heavy. After the rush hour ended and throughout the mid-day, the traffic volumes were much smaller and it was easier to get around. Then in the afternoon there was another rush hour during which the flow of traffic out of the city was heavy. After the afternoon rush hour, traffic volumes dropped sharply and during the evening it was again much easier to get around.

One way in which the transportation system has adapted to the fixed quantity of capacity has been that major roads which provide access to the Central Area experience traffic volumes over a much longer period of time. The rush hour has become a three or four hour peak period.

As a result of the development of a large employment base outside of the Central Area in numerous employment districts throughout the GTA, and as a result of the successful development of a large downtown residential population, the volumes of traffic flowing out from the Central Area during the morning and into the Central Area in the afternoon has grown quite significantly and disproportionately over the period.



As a result, roadway volumes exhibit quite different patterns now than they did years ago. In the particular case of the Gardiner Expressway, the roadway now typically carries peak period level traffic volumes in both directions for more than twelve hours each weekday.

Another important factor has been the growth in ridership of **GO Transit**. Over the years the introduction of GO Transit commuter rail service in corridors throughout the GTA has led to an increase in the capacity of the transit system to serve the needs of longer distance commuters to the Central Area. GO Transit has become a viable and attractive option for a large and ever growing number of commuters who would otherwise have had no option but to drive into the city from suburban residential locations. Although a significant number of GO Transit commuters transfer to the TTC subway at Union Station, the majority have workplace destinations within walking distance of Union Station and use either the outside roadway sidewalks or the below grade corridors of the PATH system. The GO Transit rail system is supplemented by the GO Transit bus system which is served by the new coach terminal located immediately east of Union Station. GO Transit schedules some 300 bus trips per day at the coach terminal, the majority of which utilize the Gardiner Expressway or the Don Valley Parkway for some part of their route to/from the Central Area.

In recent years, there has been a pause in the expansion of the GO Transit commuter rail system due to limitations on the capital funding of the required infrastructure construction and acquisition. As a result there is a large latent demand for GO Transit service which cannot be addressed due to limited capacity in the GO Transit system. If the system had more capacity, more people would certainly use the system. This situation seems about to be addressed. As the GO Transit system resumes the expansion and enhancement of its core commuter rail services, its ridership levels will grow rapidly as GO Transit continues to fulfill the prime role of supporting employment growth in the Toronto Central Area.

Changes in land-use patterns, of places of work and place of residence have also allowed growth to occur while limiting the strain on the transportation system. In particular, growth in the residential population of the Central Area has had a very significant positive impact on the transportation system. People who live and work downtown, make very short work trips, do not tend to use automobiles as much, certainly do not use the expressways and in surprisingly large numbers actually walk to and from work. A travel survey conducted in the spring of 2001 by the City of Toronto collected comprehensive data regarding travel characteristics of the residents of the central waterfront. It was found that two thirds of the work trips originating within the waterfront have destinations within the Central Area. It further found that 45 percent of all work trips originated with the central waterfront are made on foot. One of the significant benefits of establishing successful Central Area waterfront communities is that the residents of such communities are able and willing to walk, cycle and travel by public transit for a much more than are their suburban dwelling counterparts.

The most current data shows that in the three hour morning peak period some 300,000 (all numbers approximate and rounded) travellers cross the Central Area cordon (generally Bathurst Street on the west, CP Rail North Toronto line on the north, and the Don River on the east). Of these, approximately 120,000 travellers (or 40 percent) enter by way of approximately 100,000 automobiles. The TTC carries 135,000 (or 45 percent) of the inbound travellers and GO Transit 45,000 (or 15 percent). Of the 120,000 travellers who enter the Central Area in the morning peak period in automobiles 19,000 (or 16 percent) enter on the Gardiner Expressway from the west and about 9000 (or 7 percent) enter on the Gardiner Expressway from the east. Eighty percent are motorists travelling alone in single occupant automobiles.

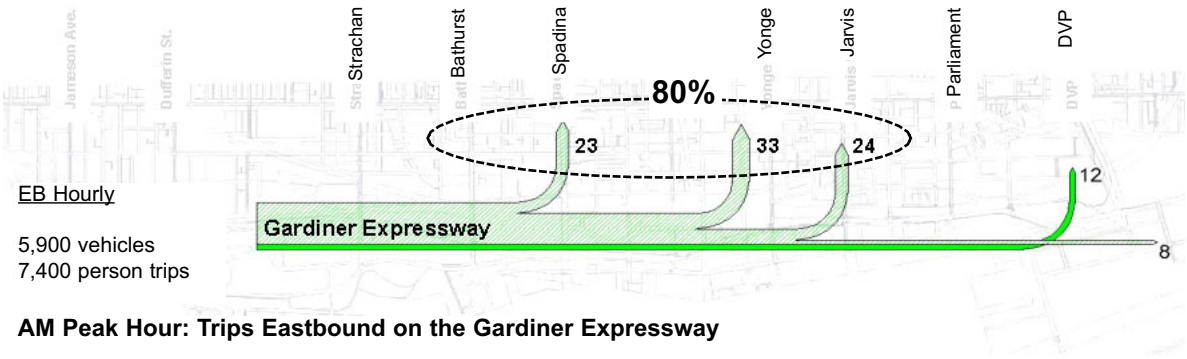
License plate trace surveys were conducted on behalf of the TWRC on Wednesday June 26, 2002 during three two-hour time periods: a.m. peak period (7:00 – 9:00 a.m.); p.m. peak period (4:00 – 6:00 p.m.); and the midday peak period (12:00 – 2:00 p.m.). These surveys were undertaken to determine the distribution of truck and automobile trips on the Gardiner Expressway.

To supplement and aid the interpretation of this data, the City of Toronto WES provided a large dataset of traffic volumes collected by the RESCU system of buried loop detectors located along the Gardiner Expressway. Specifically, the data which was most extensively used was the Wednesday data from the smoothed historical data for May 2002.

The survey findings confirm earlier studies by the City of Toronto that had clearly indicated that a majority of the Gardiner Expressway users either originate or are destined within the Central Area. On a daily basis, over two thirds of the trips on the Gardiner Expressway west of the Central Area originate or are destined within the downtown.

As illustrated in the following graphics, the majority of motorists using the expressway system in the central waterfront area either enter or exit the expressway system using the ramps within the central waterfront area. During the morning peak period, fully 80 percent of the trips entering the Central Area from the west of the Gardiner Expressway exit on the Spadina, York, Bay, Yonge or Jarvis ramps. These automobile trips are subsequently accommodated on surface roads within the Central Area. The proportion of motorists who remain on the Gardiner Expressway / Don Valley Parkway route and travel through without entering from, or exiting to, Central Area streets is quite small.

The licence plate trace survey also considered the heavy trucks using the Gardiner Expressway. This data allowed a determination of the number of heavy trucks which currently use the Gardiner Expressway within the central waterfront area and the proportion of those that remain on the expressway and travel through between the Gardiner Expressway and the Don Valley Parkway. The proportion of all vehicles on the Gardiner Expressway which are heavy trucks is relatively small during peak periods (the range is from 2 to 4 percent). During the mid-day period the volume of trucks is higher (the range is from 5 to 7 percent) reflecting the conduct of business in the central are and port area during the day. The survey indicated that



AM Peak Hour: Trips Eastbound on the Gardiner Expressway

a significant majority of trucks on the Gardiner Expressway do not travel through to the Don Valley Parkway but rather exit the Gardiner Expressway within the Central Area or the ramps to Don Valley Parkway east.

Some of the Gardiner/Lake Shore Corridor reconfiguration options described in this report involve some measure of a reduction in the vehicular capacity of the corridor. Since the vast majority of those that use the expressway exit within (and are destined within the Central Area), the capacity lost in the road system could be suitably offset by a further increase in the capacity of the public transit system, or by other forms of adaptation. For example, if the capacity of the Gardiner Expressway to deliver people into the Central Area from the west in the morning peak period was reduced by twenty percent, the equivalent of 3,800 travellers would be displaced from the road over a three hour period. This number is slightly greater than the number of people who could be accommodated on two additional fully loaded GO Transit commuter trains entering the downtown during the same three hour period. Alternatively, it would require the average auto occupancy within the Gardiner Lake Shore Corridor to increase to an average of somewhat more than 1.4 persons per automobile to move the same number of people with twenty percent less vehicular capacity.

In investigating options for the reconfiguration of the Gardiner/Lake Shore Corridor, the goal is not to maximize or minimize vehicular capacity. The objective has been to better understand the relationship between the important role of the corridor in accommodating the vehicular access needs of the Central Area and the physical and operational characteristics of the corridor required to accomplish this movement. In its current form, these characteristics have demonstrated a clear undesirable consequence for the quality of the character place in the central waterfront.

An adequate quantity of vehicular capacity for access to the Central Area, complemented by a suitable increase in the capacity of public transit services, could be provided in a form which would have far less noxious consequences. Such an improved relationship between movement and place would better support the emergence of a central waterfront of considerably higher civic quality than could ever be possible with the status quo arrangement of the elevated and surface roads within the Gardiner lake Shore Corridor.

Appendix 5

Measures of City-Building Performance

Making a city that has a viable public realm, a sense of place, is as much an art as it is a science. The essence of successful urban design or city-building “performance” of a given scheme lies in its organization of streets, blocks and open space; how well it will act as a suitable vessel for private and communal life; how much a pedestrian can comfortably move about and will feel at home in it; how productive it is in real estate terms; how well it accommodates diverse use. Arithmetic measures for these qualities are hard to come by, and those available give an incomplete picture.

There are some. What follows is a kind of Urban Design accounting: calculations of frontage quality, impacted or unobstructed land area, and pedestrian linkage. The calculations cover the area between Bremner Boulevard and Queens Quay, and between Strachan and Cherry Streets. Calculated blocks and frontage, and links counted, are shown in a series of diagrams of each of the four approaches covered in this report. They are also combined in a table.

Pedestrian Linkage: Measurements can be made of walking length, under expressways and ramps, with or without a "stacking" of Lake Shore Boulevard, through which pedestrians must pass to walk between downtown and the waterfront. Different values can be put to the experience: worse under a "stacked" structure, under a structure with architectural enhancements and/or with buildings tucked beneath it. For the sake of simplicity the charts and diagrams only show the number and places of these crossings, leaving the reader to place value on them.

Frontage Quality: Street frontage is an important measure of real estate value, which in private property is generally a measure of its environmental quality. The status of the street as an "address" comes into play as well as the amount. Measurements are made of length of both park and development frontage along the east/west streets. Frontage is considered "poor" if it faces expressways or ramps, "good" if it is clear of such elements. It should be noted that the Transformation approach represents a special case – neither "good" nor "poor" as defined above, because it sets up a special kind of frontage beneath the deck. It also results in a greater length of frontage than the other approaches.

Land Area: Measurements are made of land either free and clear of expressways, ramps or portals, or within 50 meters of them, chosen as a representative way of measuring the impact these structures have on the urban design value of the land.

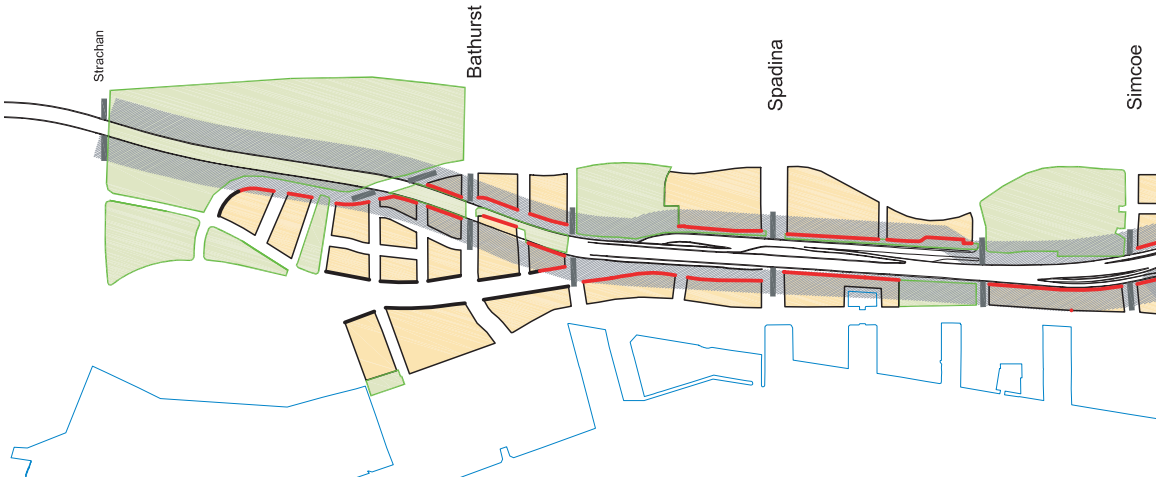


Figure: Comparative statistics of Area, Frontage and Linkage

	Do Nothing	Replace	Transform	Great Street
Unemcumbered Development Area	78	121	88	125
Unencumbered Park Area	49	79	40	80
Unencumbered Land Area (acres)	**127**	**200**	**128**	**205**
Structure-Impacted Development Area	42	7	45 *	3
Structure-Impacted Park Area	28	5	28 *	2
Structure-Impacted Land Area	**70**	**12**	**73**	**5**
Total Development + Park Area (acres)	**197**	**212**	**201**	**210**
Area of Road R.O.W. (acres)	**164**	**150**	**161 ****	**150**
Length of Clear or "Good" Frontage	1,310	5,270	2,180	7,045
Length of 50m impacted or "Poor" Frontage	4,750	1,090	7,180	500
Subtotal (m)	**6,060**	**6,360**	**9,360**	**7,545**
Number of Crossings	**14**	**6**	**14**	**1**

* Includes buildings/public space under Gardiner
** Excludes Gardiner deck over buildings/public space.

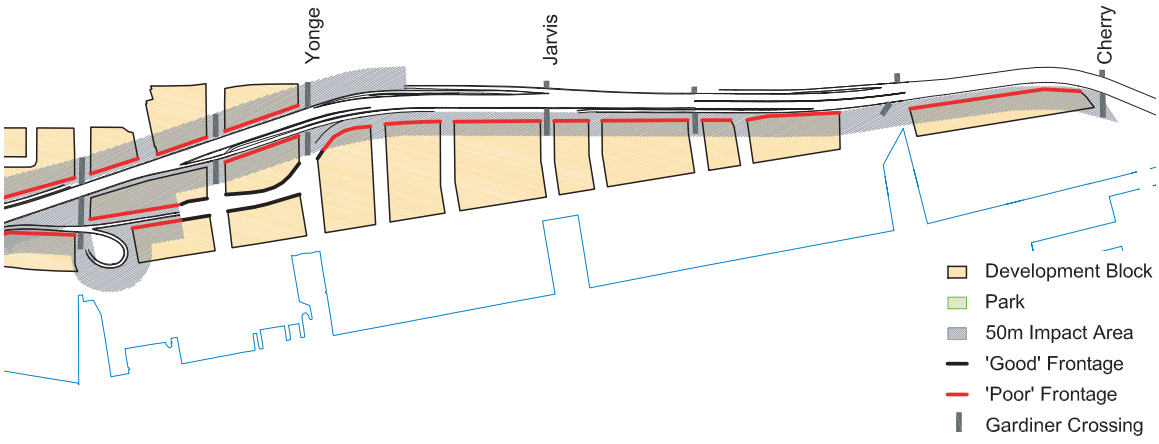
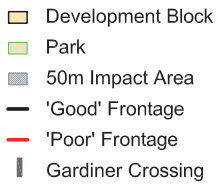


Figure: (top left) Parks, Development Blocks, Frontage and Linkage of the Do Nothing Approach

Figure: (above top) Parks, Development Blocks, Frontage and Linkage of the Replacement Approach
Figure: (above bottom) Parks, Development Blocks, Frontage and Linkage of the Great Street Approach



Appendix 6

Assessing Traffic Performance

The reconfiguration of the Gardiner/Lake Shore Corridor is one component of an over arching strategy to create an efficient attractive venue for economic development in waterfront communities for living, working and recreating in the central area of Toronto. This goal is consistent with the directions and policies of the new Official Plan relating to higher quality places, reduced auto dependence, enhanced public transit, pedestrian and bicycle supportive streets and sustainability.

Generic Options

The work undertaken in connection with this study has led to the development of a set of four generic options for the reconfiguration of the road network in the Gardiner/Lake Shore Corridor. These four options include:

- the existing or Status Quo road network, (the Do Nothing Approach)

- the Retain network (the Transform Approach) which maintains the elevated structure but alters the ramps and relocates Lake Shore Boulevard out from under the expressway so as to accommodate built form or open space below in a manner which would ameliorate some of the most noxious aspects of the environment around the expressway,

- the Replace network (the Replacement Approach) which would eliminate the elevated expressway while providing for as much express route as possible penetrating into the central area in the east on an extension of the railway berm and in the west in a system of below grade and at-grade roads and ramps,

- the Remove network (the Great Street Approach) which would eliminate portions of the elevated expressway and create a ten lane great street extending throughout the central area with a one way section between York Street and Jarvis Street and with short ramp connections to/from the Don Valley Parkway east of Cherry and the Gardiner Expressway west of Spadina.

Discrete Unit Micro-simulation Analysis

In order to provide insight with respect to transportation system performance implications of the four generic road plan options, the TWRC determined that it would be desirable to develop an objective method of comparing the alternative networks to each other and to the existing system. Accordingly, on the advice of its advisors, the TWRC retained the services of IntelliCAN, an independent team of researchers led by Dr. Baher Abdulhai, Assistant Professor and Director of the Intelligent Transportation System Centre located at the University of Toronto in the Department of Civil Engineering.

In consultation with other consultants working with the TWRC, IntelliCAN developed a comprehensive micro-simulation model of the existing central waterfront road network using the state-of-the-art PARAMICS software. The network extends from the Humber River in the west to Woodbine Avenue in the east, and from Dundas Street south to Lake Ontario. In the model, each section of roadway is specified as to its length, number of lanes, grade, operating speed and similar characteristics. Each intersection is described as to the traffic control measures, signal timing and phasing plans and other operational parameters supplied to the team by the City of Toronto Transportation Service Division of the Department of Works and Emergency Services.

Origin/destination matrices were developed by Intellican using the Transportation Tomorrow Survey 1996 database as a “seed” and modified by a sophisticated method in order that in the existing road network the modelled volumes closely approximate recently counted volumes and observed distributions of traffic. The model was calibrated to the existing distribution of traffic and observed network performance during both the a.m. and p.m. peak hours.

The simulated behaviour of motorists in the network was optimized by adjusting a wide range of parameters in the model in an extensive iterative process using a special purpose algorithm. Each motorist/vehicle in the model exhibits driving behaviour, road system knowledge, vehicle performance characteristics which adjust five times per second as moving through the network from its point of origin to its destination.

The result is a comprehensive model of the existing road network in the waterfront which quite accurately simulates the performance characteristics of the existing “real world” road system under the traffic volume demand load levels typically experienced during the morning and afternoon peak hours under routine weather and operating conditions.

The PARAMICS software has many powerful capabilities, the most compelling of which is its ability to visually display the operation of the system as each discrete vehicle moves through the network according to its own

unique origin/destination, driver behaviour characteristics, responses to the controls of the network and behaviour of other vehicles in the network. The visual display can be viewed at large scale or small scale, and in plan or perspective views. It is a very valuable tool for stimulating ideas, developing and testing solutions and communicating results and consequences.

The resulting origin/destination matrices and operational characteristics of the simulation were carried forward and applied to the simulation of the three generic alternative road networks in order to obtain a standard basis for comparison of network performance. Each of the new networks (retain, replace and remove) was detailed in the same fashion as was the existing network. This included identifying links, lanes, grades, operating speeds, intersection configurations and operational parameters. New traffic signal timing and phasing plans were specified using a traffic engineering tool known as Synchro to develop optimum phasing, cycle length and offsets for each of the options and for both the a.m. and the p.m. periods. These parameters were input into the micro-simulation model.

The preliminary networks were each fine tuned in an iterative fashion with input from the study team, in response to visualized traffic conditions, until the team felt that each network was performing at a level fairly representative of its potential.

Measures of Performance

The micro-simulation model facilitates the gathering of a variety of performance measures that can be used to compare the effectiveness of alternative networks. Once the network for each of the three generic road network option was fine tuned, IntelliCAN ran a large number of (in excess of 20) simulation runs on each network for each of the a.m. and p.m. peak hour time periods. Performance measures were collected during the simulation runs. The objective was to determine how the performance of each generic road network compares to each other and to the existing road network.

The following key benchmarks have been used in the assessment of the transportation service function performance of the options:

Average speed of travel is a measure of the average total length of all trips taken by the vehicles in the simulation divided by the total amount of time taken to complete the simulated trips. Generally speaking one would conclude that the slower the speed the less efficiently the road network is performing, since the same number of trips take longer to achieve, thus providing evidence of greater delay and congestion in the system.

Travel time along the Gardiner/Lake Shore Corridor is used as a measure of the speed of travel within the most express and highest capacity element of the corridor. Specifically, the speed of travel for eastbound and westbound through trips between the Gardiner Expressway at the Humber River in the west and the Don Valley Parkway or Lake Shore Boulevard in the east was measured. Again, generally speaking the shorter the trip takes, the better the network is performing.

Travel time to and from downtown destinations is used as a measure of the accessibility provided by the Gardiner/Lake Shore Corridor for motorists with trip origins or destinations within downtown Toronto. Six measures were taken for each time period and on each road network option. In all cases, the travel time of a trip to / from King and Bay and the key extremities of the network at the Humber River, Woodbine Avenue or the Don Valley Parkway north of Queen Street was measured. The accessibility provided by the Gardiner/Lake Shore Corridor into and out from the central area is of prime importance. Therefore, the shorter the time required to travel into or out from the central area the better the performance of the system.

The results of the analysis are presented in a summary form in the following table.

Paramics Micro-Simulation of Toronto Waterfront

Measure of Effectiveness	AM Peak Hour				PM Peak Hour			
	Status Quo	**Replace**	**Remove**	**Retain**	**Status Quo**	**Replace**	**Remove**	**Retain**
Average Speed *(kilometres per hour)*	*43.4*	*37.9*	*33.2*	*36.6*	*36.5*	*36.0*	*31.7*	*36.4*
Origin-Destination Travel Time *(minutes)*								
Inbound (to downtown)								
Humber River to King @ Bay	14.5	16.8	18.1	18.4	14.9	17.2	19.8	17.3
DVP @ Dundas to King @ Bay	6.3	6.8	9.2	7.1	5.1	5.4	6.2	5.7
Queen @ Woodbine to King @ Bay	10.9	12.6	12.0	12.6	9.7	10.6	11.1	10.7
Outbound (from downtown)								
King @ Bay to Humber River	13.2	13.0	14.9	15.1	18.4	17.4	18.2	18.0
King @ Bay to DVP @ Dundas	8.0	7.3	8.7	7.9	10.9	9.2	10.8	10.1
King @ Bay to Queen @ Woodbine	12.8	14.0	16.6	12.9	19.5	21.3	22.5	21.3
Key Route Travel Time *(minutes)*								
Eastbound								
Humber River to Dufferin via FGE	10.1	9.2	9.3	9.9	10.1	7.8	10.0	9.4
Dufferin to Yonge via FGE/Waterfront	3.3	5.7	8.1	5.3	3.7	8.1	12.0	6.9
Yonge to DVP @ Dundas via Waterfront	3.9	4.1	6.9	4.4	5.7	4.3	6.9	6.4
Yonge to Queen @ Woodbine via Waterfront	8.1	9.7	12.4	9.7	12.3	14.4	15.7	16.1
Westbound								
Dufferin to Humber River via FGE	8.5	6.1	7.5	7.5	9.7	6.9	8.2	8.3
Yonge to Dufferin via FGE/Waterfront	3.1	4.6	6.2	5.1	4.3	5.1	7.4	5.6
DVP @ Dundas to Yonge via Waterfront	3.9	4.6	6.1	4.4	4.1	4.2	6.2	4.9
Queen/Woodbine to Yonge via Waterfront	8.9	10.7	12.5	11.5	9.2	9.8	12.5	11.1

Performance Results

The Paramics micro-simulation analysis undertaken by IntelliCAN has demonstrated that each of the three optional networks can provide sufficient vehicular capacity to accommodate the existing a.m. and p.m. peak hour traffic volume demand loads. Each alternative has been optimized with respect to lane configurations, signal timing and phasing and turning movement restrictions (and the like).

The Paramics model has not yet been applied to the assessment of the additional traffic volumes that would be generated as a consequence of planned development within the central waterfront. Additional assessment of the performance of the options could be undertaken in the future to incorporate such additional travel demand. The current analysis has not specifically considered the interplay between the capacity required for vehicular turning movements and the green time required for future pedestrian volumes to clear intersections (except to ensure that at all intersections the signal timing and phasing plans have provided for minimum safe pedestrian crossing times.)

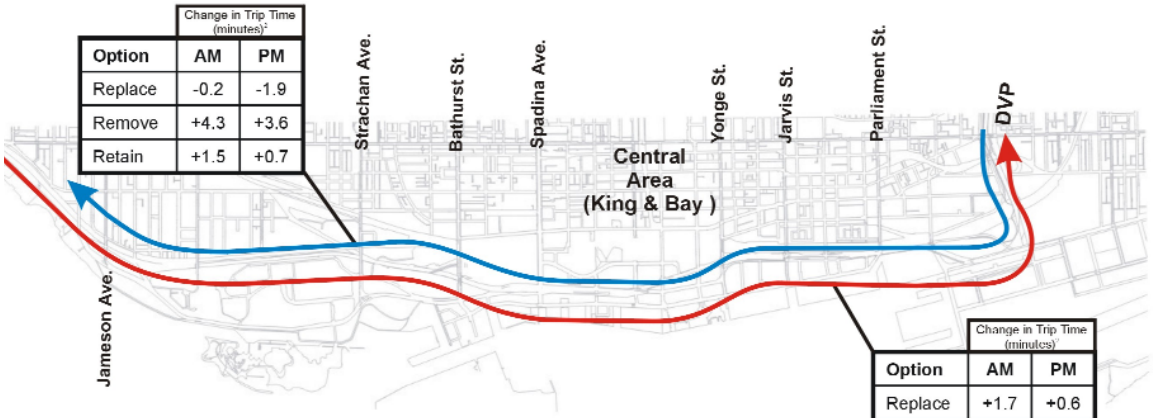
As the tables indicate, the Paramics micro-simulation has identified certain distinctions between the alternatives based upon the performance measures that were analyzed.

Average speed: during the a.m. peak hour the existing network provides the highest average travel speed, followed by the Replace and Retain network options (which are similar to each other). As expected the Remove option, which has the least amount of expressway facility, would exhibit the lowest overall travel speed. During the p.m. peak hour, the existing network and the Replace and Retain networks would all offer essentially equivalent travel speeds, while the Remove option would operate with slower speeds.

The other cells in the table report travel times rather than speeds. The travel times reported are specifically those portions of the total travel times that occur within the modelled area of the road network. For the majority of motorists using the Gardiner/ Lake Shore Corridor the only a relatively small portion of the total trip (i.e., from Oakville to downtown Toronto or from Don Mills through to Burlington, etc.) is made within the modelled area of the road network. The interpretation of the practical consequences of changes in trip time should consider the total length of the trip rather than just the portion within the modelled area.

The differences between the options are most readily discerned by considering the differences between the options and the existing network. These differences are illustrated in the following three graphics.

Through Travel: The micro-simulation results relating to the through travel time on the Gardiner/Lake Shore Corridor across the central area between the Gardiner Expressway and the Don Valley Parkway are given on the first graphic. During both the a.m. and p.m. peak hours the Replace option produces modestly shorter travel times in the westbound direction. All of the other options produce somewhat longer through trip times in either direction during both the a.m. and p.m. peak hours. It is worth noting that the increased trip time for the Retain and Replace options is generally less than three minutes and could be considered of minor significance. The increased through trip time resulting from the Remove option are longer because of the absence of an expressway



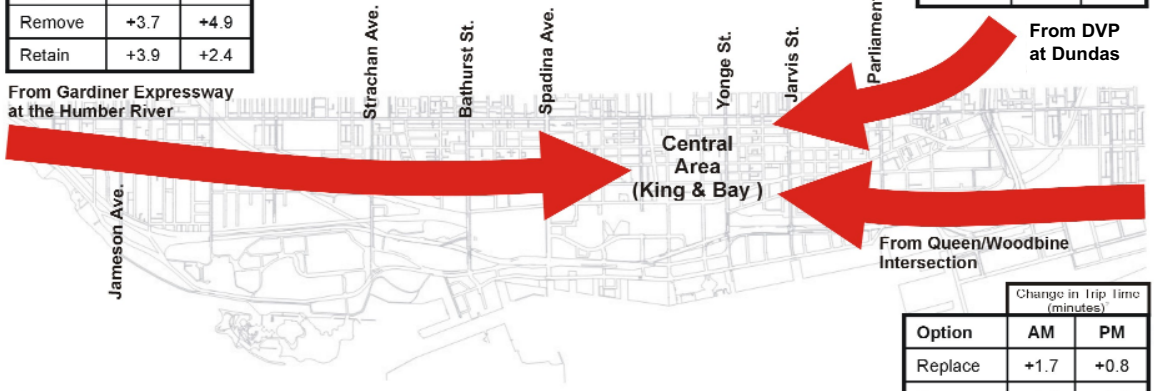
Notes:
1. Times represent trips using Gardiner-Lakeshore Corridor route only
2. Change in average trip time compared to existing network in minutes

route.

Downtown Trips: The micro-simulation results relating to trips destined to, or originating within, the downtown area are given in the next two graphics. The downtown is represented by a destination at King and Bay. It is recognized that there are many other destinations and that some will have shorter and some longer trip times. The selection of King and Bay was for simplification of the analysis and is arguably the most appropriate location to serve as a proxy measure for downtown destined trips. The trip times reported in the graphics relate to the average time for all trips taken on any of the potential routes which might be employed to travel between the entry points of the model

Trip Time - Into Central Area[1]

Option	Change in Trip Time (minutes)[2] AM	PM
Replace	+2.3	+2.3
Remove	+3.7	+4.9
Retain	+3.9	+2.4



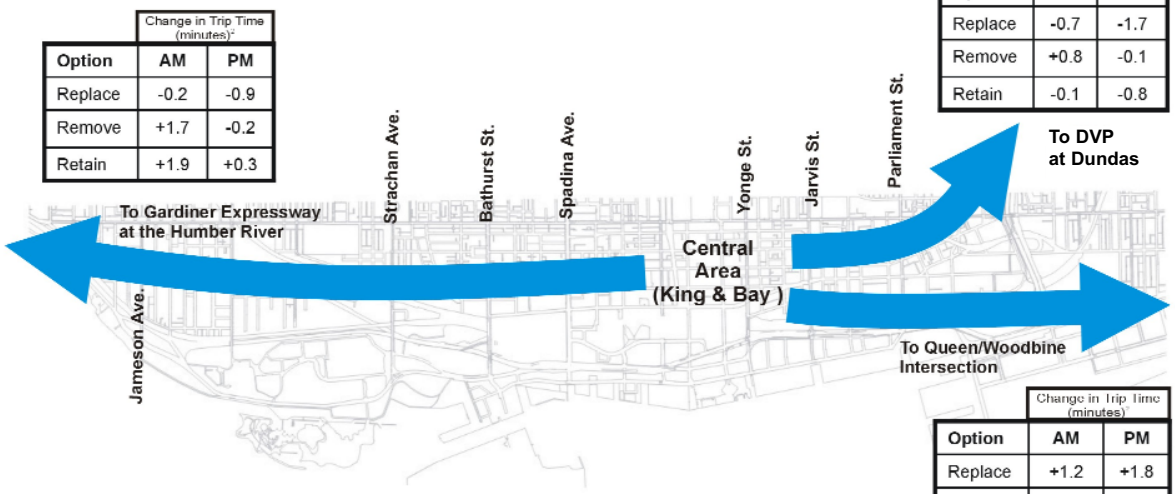
Option	Change in Trip Time (minutes)[2] AM	PM
Replace	+0.5	+0.2
Remove	+2.9	+1.0
Retain	+0.8	+0.5

Option	Change in Trip Time (minutes)[2] AM	PM
Replace	+1.7	+0.8
Remove	+1.2	+1.3
Retain	+1.8	+0.9

Notes:
1. Times represent trips using all routes
2. Change in average trip time compared to existing network in minutes

Trip Time - Out of Central Area[1]

Option	Change in Trip Time (minutes)[2] AM	PM
Replace	-0.2	-0.9
Remove	+1.7	-0.2
Retain	+1.9	+0.3



Option	Change in Trip Time (minutes)[2] AM	PM
Replace	-0.7	-1.7
Remove	+0.8	-0.1
Retain	-0.1	-0.8

Option	Change in Trip Time (minutes)[2] AM	PM
Replace	+1.2	+1.8
Remove	+3.7	+3.0
Retain	+0.1	+1.8

Notes:
1. Times represent trips using all routes
2. Change in average trip time compared to existing network in minutes

and the King and Bay destination.

All of the options produce some increase in travel time into the downtown from each point of entry during both the a.m. and p.m. peak hours. In many cases the increases are quite small and could be considered inconsequential. The Retain and Remove options show a.m. peak hour trip time increases greater than three minutes coming into the City from the west during the a.m. peak hour and the Remove option produces a trip time of nearly five minutes longer coming into the downtown from the west during the p.m. peak hour.

With respect to motorists leaving the downtown area, it is significant to note that several of the options produce a modest improvement relative to the existing network. In certain cases, the micro-simulation shows

a modest increase in trip times out of the downtown, but the magnitude of the increase is small and could be considered inconsequential. The Remove option shows trip times to the east Lake Shore Boulevard of somewhat in excess of three minutes during both time periods.

Conclusions

The micro-simulation model developed for TWRC by IntelliCAN has proven itself to be a valuable analytical tool that should be used for a variety of ongoing studies of the central waterfront road system. The analysis of the options undertaken by IntelliCAN has provided considerable new technical and objective insight into the issues and consequences associated with certain generic approaches that could be taken to the reconfiguration of the Gardiner/Lake Shore Corridor. There is reason to anticipate that further study and refinement of the alternatives would lead to enhanced Gardiner/Lake Shore Corridor solutions exhibiting even better relative performance.

The analysis has demonstrated that major physical and operational changes can be made to the corridor that would result in transportation system performance favourably comparable to the performance of the existing road system under the existing traffic demand volume loading. The various options each have strengths and weakness relative to each other and to the existing network, but none would perform so poorly as to be ruled out for further assessment on the basis of the research completed in this study. Indeed, it has become clear that there are options for the reconfiguration of the Gardiner/Lake Shore Corridor which would not only provide for a far better place within the central waterfront, but which also would provide adequate performance.

Additional study will identify a wide range of measures which could be taken to further enhance the pedestrian and bicycling environment and develop new local and regional public transit service and capacity which would more than offset the minor reduction in road network performance which might be associated with the reconfiguration of the Gardiner/Lake Shore Corridor.

Appendix 7

Costs, Constructability, Staging and Disruption

The GLC alternative concept plans have been comprehensively reviewed by specialist consultants, who have been engaged over many years on assignments related to design, demolition, rehabilitation and new construction for the Gardiner Expressway, including the recent dismantling and reconfiguration of the elevated section east of the Don River. They analyzed the constructability and possible staging of the plans, and prepared a comprehensive cost estimate

Costs

The cost study included a thorough analysis of the constructability of the concept design options and the

	Existing	Replace	Transform	Great Street 1	Great Street 2	Great Street 3
COST ESTIMATES	$13 m per Annum	$1,475 m	$440 m*	$440 m	$1,150 m	$460 m

Costs shown in $millions for basic engineering excluding Front St. Extension or special landscape treatment

* Includes $25 million allowance for architectural enhancements of structure, cladding, gateway elements etc. Does not include cost of building construction under the structure

Great Street 1: Retain existing expressway west of Spadina

Great Street 2: Eight lane boulevard from Jameson to Don River

Great Street 3: Underground expressway west of Spadina

staging and transitional components. Accordingly, there is a high degree of confidence that the preliminary cost estimates incorporate all requirements for the project. Furthermore, the costs reflect proven construction and demolition techniques that are commonly used, and have been applied to other major transportation and infrastructure projects in the Toronto waterfront area.

During the cost estimating process, the specific concept designs were evolving as discussed in Section 6.5. The cost estimates have been prepared for the following specific design concepts:

1a.	Replacement Approach (Cut and Cover Tunnel)	$1,395 Million
1b.	Replacement Approach (Bored Tunnels under Fort York, 1.2km)	$1,476 Million
2.	Retain Option Transformation Approach	$415 Million
3a.	Great Street Approach- Variation 1	$437 Million
3b.	Great Street Approach- Variation 2 (cut and cover tunnel)	$1,070 Million
3c.	Great Street Approach- Variation 3 (bored tunnel)	$1,150 Million

The cost estimates incorporate realistic allowances for contingencies (30%), design and other cost elements (32%) that reflect the preliminary conceptual nature of the plans. However, the following costs have been excluded:

(1) Extension of Front Street from Bathurst to Dufferin including ramp connections to the Gardiner west of Strachan (required to be in place for all the options)
(2) Property
(3) Hard and soft landscaping
(4) Life cycle, maintenance and operating costs
(5) Architectural enhancements to portals, bridges and retaining wall for the Replacement Approach
(6) Architectural enhancements to and under the elevated expressway for the Transformation Approach

Constructability

A variety of structural elements are involved in the concepts under review, including:

- underground sections constructed as cut and cover or as bored tunnels
- open below grade sections with retaining walls
- retaining walls for above grade sections
- bridges, including crossings of the existing and relocated Don River
- ramps and transitional sections
- road sections
- temporary construction of structural supports, ramps and road sections

The review indicates that the proposed designs are readily constructable. They involve the application of construction techniques, materials and equipment that are commonly used by contractors in the Toronto area. Numerous transportation and other infrastructure projects involving the elements needed for these options have been constructed in the Toronto waterfront area. Prevailing soil conditions are understood and can be addressed successfully in the construction of the proposed designs.

Staging

The staging of the undertaking is of critical importance to the waterfront and to the city at large. The methods used for construction and dismantling and the duration of construction will be significant concerns for nearby residents and workers as well as for motorists using the road network.

The extent to which the construction staging retains traffic capacity is a significant issue, particularly during the critical period after closure of the elevated expressway but before the replacement roadway is fully completed.

The current situation in the Toronto Waterfront is still favourable for changes to the road network. Considerable land remains in the control of public ownership or in an undeveloped state at this time. As a result, there is still some flexibility for choice of new corridor alignments and for construction activities, temporary roadways and detour routes. However, the flexibility is quickly diminishing as new development occurs.

Each option offers favourable opportunities for staging such as:

- Early completion of an extension of Front Street west from Bathurst Street with ramp connections to the Gardiner, and early completion of capacity improvements to the DVP/Front/Richmond ramps. These improvements are intended to encourage diversion of some corridor traffic to the city centre street network north of the GLC, thereby reducing the traffic volume that needs to be accommodated in the GLC during construction.
- Completion of Bremner Boulevard from Spadina to Bathurst as a parallel route providing some traffic relief to Lake Shore Boulevard.
- Pre-building sections of the new road network that are on alignments independent of the existing elevated expressway so that they will be in operation before demolition begins.
- Pre-building sections of temporary roads and detour routes.
- Staged removal of certain ramps in order to make room for construction of new road sections.
- Temporary works to provide interim transitional connections, or to provide temporary support structures for strategic sections of the elevated expressway while relocation of piers or construction of new road elements is undertaken.

The staging sequence for each option can be generally described as follows:

Staging for all Approaches:

- Pre-build the extension of Front Street and the DVP/Front/Richmond interchange improvements and complete Bremner Boulevard.
- Pre-build EB new lanes of Lake Shore Boulevard (LSB) from west of York to east of Jarvis (along Harbour Street alignment). This may involve early removal of ramps on the south side (EB) of the Gardiner.

Staging for the Transformation Approach:

- Remove ramps that are to be eliminated.
- Build new LSB lanes that are outside the Gardiner footprint. This includes WB lanes from west of Jarvis to York, EB/WB lanes from west of Spadina to west of York, and EB lanes from east of Jarvis to east of Cherry Street. The latter section could be used by WB traffic temporarily with EB traffic using the newly constructed extension of Queens Quay from near Sherbourne to Cherry.
- Build new piers to support sections of the elevated expressway and reconstruct LSB where it is realigned to cross under the elevated Gardiner at several locations (west of Spadina, near Simcoe, east and west of Jarvis, east of Cherry and west of Don Roadway).
- Modify or build relocated ramps.

Staging for the Replacement Approach:

- Build 4-lane express road on rail embankment from west of Jarvis to DVP.
- Build new EB LSB lanes from York to east of Jarvis, and temporary EB LSB lanes adjacent to Gardiner from east to Jarvis to east of Cherry.
- Build new LSB alignment from east of Cherry to Don Roadway.
- Stage construction of new ramps to link express road to DVP.
- Build tunnel sections from west of Strachan to west of Spadina.
- Remove WB on and off ramps at Spadina and build new EB and WB LSB lanes adjacent to north side of Gardiner
- Build WB tunnel from west of Spadina to west of York below LSB (with temporary decking to maintain traffic on LSB WB).
- Build partial ramp connection to allow traffic to be diverted into the tunnel from the elevated Gardiner that will remain west of Strachan.
- Build temporary tunnel ramp connection to surface LSB east of York.
- Install temporary median barrier in 4-lane WB tunnel between Spadina and York to allow temporary two way traffic operation in the tunnel.

At this stage, Gardiner traffic can be diverted off the elevated deck onto an interim surface road network. In the west, Gardiner traffic would be routed in both directions through the tunnel between Strachan Avenue and York Street. Between York and Jarvis, two-way traffic would use the permanent EB LSB lanes (Harbour Street alignment) and temporary WB lanes adjacent to but south of the elevated deck. East of Jarvis, EB traffic would use the surface LSB lanes to east of Cherry with connections to the DVP ramp and to LSB east. At the east end, WB traffic from LSB and from the DVP would be re-routed onto the express road adjacent to the rail corridor, which would temporarily operate as 4 WB lanes. Local WB traffic from LSB would be diverted at a connection to Queens Quay for local access to N-S streets such as Parliament, Sherbourne and Jarvis. Dismantling of the Gardiner west central section (Spadina to York) could then be undertaken and the final surface road network could be completed.

This sequence of construction allows much of the new system to be completed and other temporary surface lanes to be constructed to accommodate all corridor traffic on the surface before the elevated Gardiner is closed.

Staging for the Great Street Approach:

The concepts for staging would be similar to the Replacement Approach, with as many new sections as possible constructed in advance of closure of the elevated expressway. Advanced activities include construction of the Front Street Extension, improvements to the DVP/Richmond interchange, construction of the Queens Quay Extension and temporary ramp capacity improvements (Spadina and Jarvis) to accommodate traffic diversions during demolition.

For this option, most of the future road network is located within the “footprint” of the Gardiner structure. Therefore, most of the demolition will occur over live traffic. This is a common practice in road construction projects and when done properly, poses no significant safety risks to motorists.

Staged closure and removal would commence in the central section between Simcoe and Jarvis. Gardiner traffic would be forced to exit the elevated expressway at the remaining ramps, until the ramps themselves were closed and removed as dismantling proceeded.

For Variation 1, a new transition ramp would be constructed to connect the new surface street east of Spadina to the remaining elevated section west of Spadina. The transition ramp would be completed once the central section of the Gardiner has been removed.

Disruption

The disruption will include:

- Utility relocations
- Construction of temporary roads
- New construction of roads, ramps, bridges, retaining walls, open cut and tunnel segments
- Removal of existing roads
- Dismantling and removal of the elevated deck
- Removal of temporary roads
- Reinstatement and final streetscaping

The duration of the disruption would be minimized to the extent possible by careful scheduling and application of effective construction practices. However, the undertaking is enormous and complex. It will take many years (at least 7-9) to complete the entire project from Dufferin Street (or in one case from the Gardiner/ Jameson interchange) to east of the Don Roadway. Construction activity will be focused in different areas at different times so that no one section will be under construction continuously for the entire period. However the traffic disruption will be in effect for a considerable time over long segments of the corridor.

The capital costs of the options vary from approximately $500 Million to $1,500 Million. The cost differences provide an indication of the relative degree and duration of disruption for the alternatives:

The Transformation Approach will have less disruption over a shorter duration. It requires new construction of most of LSB from west of Spadina to east of the Don River. It also requires removal of some ramps and relocation of others. However, it does not require the extensive effort to dismantle and remove the elevated deck.

The Replacement Approach will involve the most disruption over the longest period.

It involves dismantling and removal of the entire elevated deck from west of Strachan to east of the Don River. It also requires extensive tunnel construction from west of Strachan to east of York, plus the upper level express road with overpasses of north-south streets from Jarvis to Cherry. It involves considerable temporary construction and sophisticated staging of traffic routing.

The Great Street variations fall in between the Transformation and Replacement options in terms of disruption and duration. The impact will differ according to the specific Great Street variation. All variations will have the same effect east from Spadina where staging of temporary construction, removal, and construction of the final network will be identical. Variation 1 will have virtually no effect where it leaves the existing elevated deck in operation west of Spadina, except for the construction of new transition ramps and removal of the deck from east of Spadina to Portland.

Variations 2 and 3 require removal of the entire length of the elevated deck from west of Strachan to east of the Don River. West of Spadina, new construction for Variation 2 comprises a new tunnel from Spadina to west of Strachan and related transition ramps as required for the Replacement Alternative. If the tunnel alignment north of Fort York is selected, construction activity will avoid most roads and development areas and will affect primarily Fort York. A southerly tunnel alignment would disrupt the Armoury area and the Fleet St/LSB corridor from Fort York Blvd to Spadina.

In comparison, the Variation 3 contemplates construction of only new surface roads in the Gardiner alignment from west of Strachan to Fort York Boulevard and widening of LSB to 8 lanes from Jameson Avenue to Spadina Avenue. However, it also requires a major realignment of LSB in the vicinity of Jameson and

reconstruction of a redesigned Gardiner/LSB/Jameson interchange. The latter will have an effect on the Parkdale area and disrupt access to the lake parkland during reconstruction. The widening of LSB will primarily affect Ontario Place and Exhibition Place as well as the developing area along LSB from Fort York Blvd to Spadina.

On balance the extent and duration of the construction disruption for the Great Street variations can be summarized as follows:

Less - Variation 1
- Variation 2 with north tunnel alignment
- Variation 3

More - Variation 2 with south tunnel alignment

Appendix 8

Funding the Project

It is acknowledged that, except for maintaining the status quo, all of the options described in this report for redesigning the Gardiner/Lake Shore Corridor require substantial investment over a number of years.

A specific or detailed proposal on funding this undertaking is not considered within the scope of this study and may in fact be dependent on the option selected. However, this appendix briefly discusses a range of funding options available.

We do not consider the cost of maintaining the existing 50-year old structure as an offset since the City of Toronto has determined that an annual maintenance budget of $10 - 12 million (2002 dollars) is adequate to ensure the continued utility of the expressway for the foreseeable future. This maintenance cost comes out of the City's annual budget.

The various options considered in this study will, like all infrastructure, also have an associated maintenance cost. However, it will relate to new facilities utilizing modern materials, and so should be lower; particularly so in the early years.

Essentially, the funding options fall into one of three categories: government grants or dedicated tax allocations; user pay systems such as tolls or parking surcharges; or private sector investment in exchange for development or other rights on created value (e.g. Development Charges or TIF's, etc.)

Grants and Taxes

Throughout this report, the case is made that reconfiguring the Gardiner/Lake Shore Corridor creates real value for the City, Province and Federal governments. On this premise, a strong argument can be made that this transforming project should be assumed by a combination of governments through grants in the same way they have created a joint initiative through the TWRC.

Using tax revenue to create growth and thus further tax revenue is consistent with Governments actions in this and other jurisdictions. In fact, projects of this magnitude and impact are normally undertaken with strong government support and full or partial financing.

On the other hand, recommitted government funding of transit is seen for cities across Canada as a higher priority than road works and an expanded transit system into and out of downtown Toronto is an essential component of redesigning the Gardiner.

Between Yonge Street and Parliament Street, approximately 47 net acres of land exists in a zone impacted by the Gardiner or adversely affected as a result of the Gardiner's effect of separating the city from its waterfront.

- The Gardiner from Yonge and Parliament is about 1.26 km whereas the Gardiner from Dufferin to the DVP is about 6.80 km. (approximately 18.5% of that length)

47 acres X 3 F.S.I. = 6,141,960 sq. ft. of floor area
6,141,960 sq. ft. of floor area / average 1,000 sq. ft. unit = 6,142 units

The total value of land within this area is
6,141,960 sq. ft. X $350/sq. ft. = $2.15 billion

For an aggregate developed $2.15 billion land value, the annual Present Real Estate Tax Yield is:
$2.15 billion X 1.15% = $24.7 million

If the experience in appreciation of land value in other cities is indicative (150%) , then the Projected Real Estate Tax Yield from the revitalized central waterfront sections would be:
$24.7 million X 150% = $37.1 million per annum

Which is a Projected Increase over Present Tax Revenue of:
$37.1 million - $24.7 million = $12.4 million per annum

or
for a 100 year period = $1.24 billion

Figure - Sample Calculations of Change in Tax Revenue (Present vs. Projected Increase)

Because infrastructure expansion and rehabilitation, including transit, will continue to place heavy competing demands on existing tax dollars, it is important to acknowledge other alternative sources of funding.

Dedicated Tax

If financing of the Gardiner reconfiguration cannot be supported from the existing tax base, it may be necessary to create a new, dedicated tax expressly for this purpose.

One obvious solution would be to add a gas tax surcharge or licensing fee to generate additional revenue. This basically is a tax on drivers as opposed to a more targeted "user pay" system since it may be necessary to have such a system apply over a large area of the Province, that could include much of the Golden Horseshoe.

User Pay Recovery Systems

The Task Force Report entitled "Our Toronto Waterfront - Gateway to the New Canada" published in March 2000 identified a number of sources of revenue associated with revitalization including tolling and parking levies as two feasible "user pay" options that could be applied to a Gardiner/Lake Shore reconfiguration. At that time it was estimated that $1.2 to $2.0 billion could be financed over a 30-year time frame from tolls and/or parking levies.

Tolling

Tolling as a means of financing new or improved road infrastructure is a well-established and practical way to place the burden of cost on the user of the facility. This is usually associated with the establishment of a higher level of service and, politically, more acceptable where a reasonable alternative to the tolled facility is available.

In the case of the Gardiner redesign option, some may argue that the improvements being paid for by the users are more to the benefit of others, in terms of an improved urban environment, and that the level of service is not necessarily improved, and in some options may be seen as reduced.

Furthermore, for those options involving replacing a limited access facility such as the elevated Gardiner with an at-grade street system having multiple and frequent points of access, the practicality of tolling creates a challenge.

Tolling limits would likely be required to extend to include portions of the QEW and 427 in the west and Don Valley Parkway in the east. As radical as this may initially seem, it may be commonplace in the future for all

Tollable Route	**Current Daily Tollable Trips**
Gardiner east of the Humber River in the West	175,000
Don Vally Parkway south of Blor Street in the North / East	75,000
Total Daily	**250,000 trips**

	Mon	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat**	**Sun**
Current Daily Trips	250,000	250,000	250,000	250,000	250,000	250,000	250,000
15% Diversion Rate	(37,500)	(37,500)	(37,500)	(37,500)	(37,500)	(37,500)	(37,500)
75% less on Saturday, Sunday and Holiday						(159,375)	(159,375)
Effective Tollable Trips	**212,50**	**212,500**	**212,500**	**212,500**	**212,500**	**53,125**	**53,125**
Assume $2.50 per Trip	$531,250	$531,250	$531,250	$531,250	$531,250	$132,813	$132,813

Average Weekly	$2,921,878 weekly
- **or** based on 50 weeks per year	*$146 million annually*
Deduct cost of Tolling at 10%	($15 million)
Total Annual	**$131M (net)**

$130 million annually could fund $1.5 billion in capital cost.

Figure - Tolling Illustration

expressways and 400 series highways to be tolled.

Calculations made to provide an order of magnitude of the potential revenue stream of such a tolling scenario have resulted in estimates of approximately $130 million annually, which could fund $1.5 billion in capital cost, over three time the amount needed for the Great Street alternative, the surplus could be used for transit improvements. Many cities such as London and New York have had long-standing user tolling programs. Other cities such as Melbourne and Sydney have recently implemented tolling in order to provide funding sources for expressway transformation projects.

Parking Surcharge

By placing a levy or parking surcharge on parking in the downtown core, revenue can be generated that could be used to finance the reconfiguration of the Gardiner. Such a system would be "user pay" but not limited to users of the Gardiner/Lake Shore Corridor.

The Task Force acknowledged that such a proposal would be "… more egalitarian than a toll, in that a levy would be paid by every person parking in the City for any purpose, not just by persons who work in downtown Toronto." Such a proposal would not impact taxis, couriers, or delivery trucks, as would be the case with a road toll.

Levering Added Value

The principle of raising money based on the creation of enhanced value through changing land uses is well established. Along the Gardiner/Lake Shore Corridor, each of the options described in the report has been analyzed to determine the length of enhanced frontage that is created – or development potential that is enhanced – because the Gardiner structure is removed, replaced or transformed. The differential in land values that will inevitably result creates the opportunity to fund all or a portion of the transformation.

Tax Incentive Financing (TIF's) is another method of raising private sector money today based on "mortgaging" tax revenue into the future.

All of these options are complex and require detailed analysis, debate, and in some cases policy shifts. This report does not intend to delve into any of these options but rather seeks an acknowledgement that there are reasonable and plausible methods available that include direct government grants, but not exclusively. User pay systems and leveraging private sector financing from enhanced value both warrant further study.

In fact, if the next immediate step in this process is to proceed to a detailed evaluation of options through the Provincial Environmental Assessment Process, funding alternatives will need to be fully investigated as part of the Terms of Reference for the EA Study.

Appendix 9

Elaboration of the Transformation Approach

The Gardiner Expressway Transformation Approach is a fundamental change to the functional and physical relationships between the Corridor and the surrounding city fabric, and therefore much more than an exercise in beautification.

Transformation of the Gardiner from a barrier to a highly active element in the urban fabric of the waterfront can be achieved through a number of strategic modifications to the transportation network. These include,

- construction of the Front Street extension in the west, and improvements to the DVP/Richmond/Adelaide/Front interchange in the east to offload traffic for the GLC Corridor; and
- "uncoupling" of Lake Shore Boulevard from the Gardiner.

The Retain option identifies three primary proposals for transforming the Gardiner/Lake Shore Corridor.

1) Remove/Modify Ramps Construction.

Removal of 5 of the total of 13 existing ramps that are currently impeding access to and development of key portions of the Central waterfront will be possible without compromising peak-hour traffic flows. Specific Ramp modifications include:

- Removing the eastbound York/Bay/Yonge and westbound Yonge off-ramps
- Removing the eastbound Bay and westbound York on-ramps
- Reconfiguring the eastbound Jarvis and westbound Spadina off-ramps
- Reconfiguring the eastbound Sherbourne on-ramp
- Relocate westbound Spadina on-ramp to Portland

2) Uncouple & Rebuild Lake Shore Boulevard as a Major Urban Street

Hostile environmental conditions can be significantly improved by relocating Lake Shore Boulevard out from beneath the Gardiner so that it can serve as a major new urban boulevard with a landscaped centre median, tree-lined sidewalks, transit, and bicycle use.

3) Infill Below and Beside the Gardiner

With Lake Shore Boulevard relocated, the areas beneath and beside the Gardiner become available for infill development, yielding sites suitable for studios, galleries, shops, offices, community facilities, health clubs, restaurants and cafés. For the pedestrian or street-level motorist, The Gardiner will be perceived as a two / three-story building integrated into the block pattern and fabric of the city.

At grade, the Gardiner will become a sequence of animated urban spaces, including buildings, public open spaces and gateways.

10 Key Strategies

1 Remove/Modify Ramps

Construction of the Front Street Extension (including the Front/Wellington "one-way pair") and improvement of the Richmond/Adelaide intersection with the DVP will reduce morning and evening peak-hour traffic on the Gardiner. As a result, the number of ramps serving the Gardiner may be reduced from 12 to eight (Table 1). Four of the eight ramps may be relocated/ modified to move exit/entry points away from north-south intersections and pedestrian crossings, and improve integration with new surrounding developments.

2 Rebuild Lake Shore Boulevard as a Great Urban Street

Lake Shore Boulevard is moved from beneath the Gardiner, and east- and westbound lanes are consolidated. Most lands for this new alignment are within existing City-owned right-of-ways or lands opened up by removing ramps.

3 Infill Below + Beside the Gardiner

Approximately 20.5 hectares are opened up for redevelopment; 14.5 hectares below the Gardiner and six hectares beside it. The Plan shows new revenue-generating development within the present City-owned Gardiner Corridor right-of-way: 130,000 m2 building infill below the structure, with the potential to generate $20-25 million in annual rents. Additional development flanking the structure could be conveyed to expand existing development parcels through long-term land-lease or sale.

4 Create Diverse + Dynamic Uses

Large-scale projects have dominated waterfront redevelopment to date, and are expected to continue to do so under Toronto's waterfront revitalisation plans. This form of development leads to high-end, market-rate rents, which favour traditional large-scale retail and restaurant chain tenants, and extend the uniform, even sterile, context of current waterfront development. The Gardiner Expressway Transformation Plan alone provides the opportunity for the City, as owner of the Gardiner lands, to establish on the waterfront a fine grain of flexible, affordable leased space for small businesses and the new and innovative creative enterprises that thrive on "non-traditional" spaces.

5 Establish Civic Design

Where the Gardiner is visible as a freestanding structure, its appearance can be radically improved to reflect a high standard of urban design in the following five areas:

Maintenance
The structure must be subject to a higher standard of maintenance. It is believed that the relocation of Lake Shore Boulevard will decrease deterioration caused by salt spray. This, in turn, will reduce repair and maintenance costs. Simple improvements such as resurfacing concrete columns and beams, repainting dark green steel beams a light gray or white, and instituting standard civic maintenance (graffiti eradication, trash removal and landscaping) will dramatically improve its appearance.

Landscaping
Areas that are now bare earth can be landscaped with ground cover, shrubs, trees and ivy extending up the columns. Lands beneath and adjacent to the Gardiner have sufficient daylight for normal plant growth, particularly on the south side.

Water
Millions of litres of storm water run off the Gardiner into catch buckets at the edge of the bridge deck, then into the storm water system. This water could be channeled into a network of storm-water ponds and wetlands to cleanse the water, beautify the Corridor, and provide irrigation.

Creative Lighting
At night the structure can be transformed into a "ribbon-of-light" with up-lighting, column-accent lighting and pedestrian-scaled light standards.

Soffit Panels
In key locations, such as north-south streets, panel systems can be suspended below the deck to reflect light, reduce noise and transform the structure into a sculptural element. These systems can be easily maintained with occasional spray-wash.

The Bridge Deck
Where the edge of the bridge deck is prominent, it can be transformed with a lightweight system of galvanized

or stainless steel mesh panels attached to the edge of the structure. These panels will mask the deck, catch buckets and expressway traffic. In the evening they can be lit to create a luminous, linear ribbon of light across the waterfront.

6 Create a Network of Public Spaces

A series of dynamic public spaces will alternate with areas of building infill, to house a range of formal and informal activities that take advantage of the "canopy" that the structure provides. Potential activities include open-air markets, skateboard parks, ice skating, community playgrounds, activity plazas adjacent to surrounding development, naturalized wetland areas, and other recreational uses.

Key public open spaces (from east to west) include the Mouth of the Don Wetlands, Gardiner Market, Yonge-Bay Galleria, the Air Canada Centre Event Plaza, Rees/Simcoe, Portland Street and Fort York. Each are described in more detail below.

7 Create Gateways to the waterfront

Where north-south streets and pedestrian areas cross beneath the Expressway both the structure and the pedestrian environment can be designed to invite public passage to and from the waterfront. At these important crossing points the structure can be designed as a series of bridges, providing a sequence of Gateways to the waterfront.

An inviting pedestrian environment will be created through building infill providing active edges underneath the Gardiner, special pavement, lighting and public art. These gateways can incorporate tall landmark elements - similar to the language of bridge design - that can be seen from both the ground and expressway level.

8 Improve the Railway Viaduct

The east-west railway corridor is another significant physical barrier to the waterfront. Improving the quality of viaduct passageways, bridge structures and the pedestrian environment will strengthen north-south linkages between the city and waterfront and mitigate the "barrier effect".

9 Strengthen North-South Connectors

Streetscape improvements are needed to improve the north-south corridors that link the city to the waterfront. Special paving materials and patterns, landscaping, banner posts, lighting, public art and civic features such as fountains will provide a high quality public realm that will in turn encourage private-sector investment and revitalization.

10 Plan for the Expressway as a Future Transit Corridor

One of the most compelling reasons to keep the Gardiner is derived from its basic role as a grade separated transportation corridor. As the GTA grows, a more extensive and efficient transit system must be developed to cope with demand. Within the city core, we will not have the option of expanding the road network to meet increased private automobile use.

In the future, a portion of the Gardiner roadway could be converted for use as a dedicated east west transit corridor. Two lanes of this corridor could be reserved for high-occupancy vehicle use, the other four lanes remaining for general public use. Station stops at major north-south streets would be integrated into the planning and design of new development adjacent to the Expressway.

In view of the enormous difficulty and expense of developing a new grade-separated transit corridor at some point in the future, the Gardiner in situ represents a remarkably valuable long-term asset for the city.

25 years out!

Twenty-five years of urban development around and under the streamlined version of the Gardiner Expressway has resulted in a new urban environment, responding to key transformation strategies, including infill development and shifting Lake Shore Boulevard, and now represents a continuous seam of urban spaces, buildings and streets. The Gardiner Expressway, again, symbolizes progress and modernization, and reflects sustainable development principles by serving as the key link in an extensive regional transportation and transit network, serving new outlying urban communities and economic growth areas. High speed, impediment free public transit serves new neighbourhoods along the new Lake Shore Boulevard and atop the Gardiner itself.

With Lake Shore Boulevard removed out from under the elevated expressway, a new street pattern and hierarchy enables free and easy movement between the city and the revitalized waterfront. The 'at-grade' environment is pedestrian in scale due to an intimate street network, and pedestrian movement between the city and waterfront is efficient and safe. A finer grain of land uses, both adjacent to and under the Gardiner structure, provides for a range of retail and commercial uses, contributing to local economic growth and further revitalisation.

North-south links run directly through infill development located beneath the Gardiner and provide opportunities for direct access to the commercial core or diversions to numerous retail opportunities. The entire corridor is the focus of activity and a place where people want to live, work and shop - but at a price due to rising land values.

Buildings developed adjacent to the Gardiner Expressway 'wrap-around' and 'capture' the elevated structure, providing seamless integration of previously incompatible environments. The ultimate aesthetic qualities of this urban environment are now comparable to any standard street and building interface but attract national and international recognition and attention due to the remarkable transformation and adaptive reuse efforts.

Public open spaces and parks are located at key locations along the length of the corridor, taking advantage of links to the new Waterfront public space system and existing sport and recreation facilities. Open green space attracts residents from across the municipal area, all travelling considerable distances (by transit) to the revitalized waterfront to take advantage of to the high quality open space and urban environment and to participate in a range of recreational activities.

Appendix 10

Optimistic Speculations

The Gardiner has lasted almost half a century, and the reconfiguration of the corridor must be seen as positioning the transportation system of the waterfront for the next half. The enterprise will help shape the movement structure of the city as a whole. So it must be seen as part of a much larger picture, with a perspective into the future. To help turn the team’s mind into this perspective, speculations were made as to what a functional movement system would look like 25 years from now.

S***peculation One: The Year 2030 as it Should Be***

There exists a Greater Toronto Transportation Authority (GTTA) which is well funded, well respected, professionally administered, and effecting positive change in the performance of the transportation system. Through smart planning and effectively directed funding, the provision of new transit service and the

development of new urban communities is coordinated, strategically focused, based upon sound economics and effective use of investment in public transport infrastructure.

The Transportation Management Associations (TMA) have grown in number and flourished in membership and extend to every major employment district within the city. They have evolved into strong effective advocates and providers of support services for the consumer of public transit service and other efficient urban transport options.

New transit oriented development has occurred extensively within nodes and corridors throughout Toronto. New urban development does not occur in auto-dependent precincts within Toronto. Attractive, diverse and dense urban form is sought after as offering the rich and economic life style preferred by the majority of residents in all demographic categories. Most trips under a kilometre in length are made by walking and cycling within urban environments which are increasingly designed to safely accommodate slower speed non-motorized transport. Average household vehicle kilometres of travel per day are decreasing.

Public transit systems are well funded and offer door to door travel times, safety, comfort and convenience competitive with the private motor car for a majority for routine trip purposes within Toronto. As a result mode splits to transit have sharply increased throughout the GTA and travel by transit is the predominant mode along well served corridors.

The TTC has expanded its subway system to include an extension of the Spadina line north to York University and into Vaughan, an extension of the Sheppard line west to Downsview and east to Victoria Park Avenue, and has developed a new rapid transit service along Eglinton Avenue from Weston Road to Don Mills Road. A new high order rapid transit service line has been created across the entire waterfront linking the central waterfront with communities from Long Branch to Port Union.

GO Transit operates all-day two-way frequent service with fully electrified or dual-mode locomotion on all of its GTA corridors with station spacing averaging about half the distance currently required. As a result GO Transit has effectively been transformed from a central area focussed commuter rail service to an integral component of a regional rapid transit system.

Motor cars are smaller and powered almost exclusively by hydrogen produced using renewable sources of electrical supply. Inefficient motor cars are removed from service. Auto ownership remains high but is not essential for a high quality of accessibility within the city. Small urban motor cars are widely available on a car-share basis within Toronto. Highway cars are available for rent at a higher cost. Intercity travel by train has been dramatically improved and considered a preferred option by a significant number of persons.

Public and personal information / communication systems are extremely powerful, integrated, omnipresent and responsive to individual or circumstantial need. There is almost no aspect of routine daily life where desired information is not immediately available… including urban transportation service. When is my bus coming? Will I be able to get a seat? How do I get from here to there? What will it cost to park? Is the roadway congested? Where will we meet? Is there a car-share vehicle within easy walking distance of where I am now? Is there anyone nearby willing to share the cost of this trip with me? All such questions can be instantly and accurately answered.

No new expressways or arterial roads have been constructed within the City of Toronto and all existing expressways have been fitted with high-tech traffic monitoring, control and revenue collection devices. Existing expressways and arterial roads are regularly reconfigured to be more efficient and to offer enhanced service for public transit vehicles and for non-motorized transport modes.

Smart transponder based licensing technology enables municipal and provincial roadway service providers

to derive revenue from roadway users consistent with full cost accounting principles and reflecting congestion pricing and other factors. All provincial highways and all municipal arterial roads are equipped to electronically identify users and collect tolls. Auto occupancy is generally increasing throughout the GTA and the frequency of single auto occupancy for travel to work in the Toronto central area has been sharply reduced.

Enforcement of the rules of the road is a responsible function of a municipal authority which is largely funded by the levied fines. The authority aggressively enforces the rules of the road including: on-street parking bylaws and moving violations using fully deployed systems such red light camera, photo radar, automated vehicle identification systems and the like. Drinking and driving has been effectively eliminated and the number of deaths and personal injuries sustained in motor vehicle accidents has been greatly reduced.

Speculation Two: 2030, A History of the Future

Looking back 30 years from now…. After Toronto added half of it's projected 1,000,000 people, and the region added even more, there were the gridlock wars and the revised Municipal Finances Act.

The gridlock wars and the inspired educational efforts of the Toronto Transportation Department helped voters conclude that there simply wasn't the space to continue commuter car-dependence, and demanded an aggressive transit future for longer distances and good pedestrian travel environments within an increasingly mixed use city.

The Municipal Finances Act brought about the road user-pay system that leveled the financial playing field between private and public transportation. People understood, and paid, the real costs of moving about in different modes.

Since car travel was no longer subsidized, the quality of the environment in which people lived and worked became sacred, because getting out was both more difficult and more expensive. Nevertheless, as the regional population neared doubling, the sheer traveling numbers of people and goods continued apace. Toronto was left with the dilemma of having more people moving about, but without the room to build new transportation corridors. Movement simply had to be more efficient in the space available, not possible using the old ways.

The policies of the Official Plan left the realm of lip service and were given real teeth, including a specific Movement Plan Schedule.

The GO rail system has been expanded. The whole Toronto track network, a legacy of the railway era, is now pressed into use for daily travel, much as cities like London and Paris had years before.

Using various technological innovations and some physical changes, expressways have been reworked within their rights of way, primarily to accommodate additional trucking and the vastly expanded GO/TTC bus system. The expressways now carry twice as many people, but two thirds the number of cars than in the heydays of the early 21st Century.

The subway and dedicated streetcar systems have been expanded. In the waterfront, an express streetcar line (or LRT) now links an extended Queensway/Lake Shore line and the Kingston Rd./Broadview lines with the downtown. The central waterfront has been organized around the great street of Lake Shore Drive, a central spine of urban activity. All the streets and squares are active and pedestrian-friendly. The immediate water frontage is a popular, city-wide recreational resource. The arcades under the rail track are lined with shops and active uses, helping to extend the pedestrian environment through the old downtown and the lake. Where the Gardiner once laid a shadow, the sun now shines.

Appendix 11
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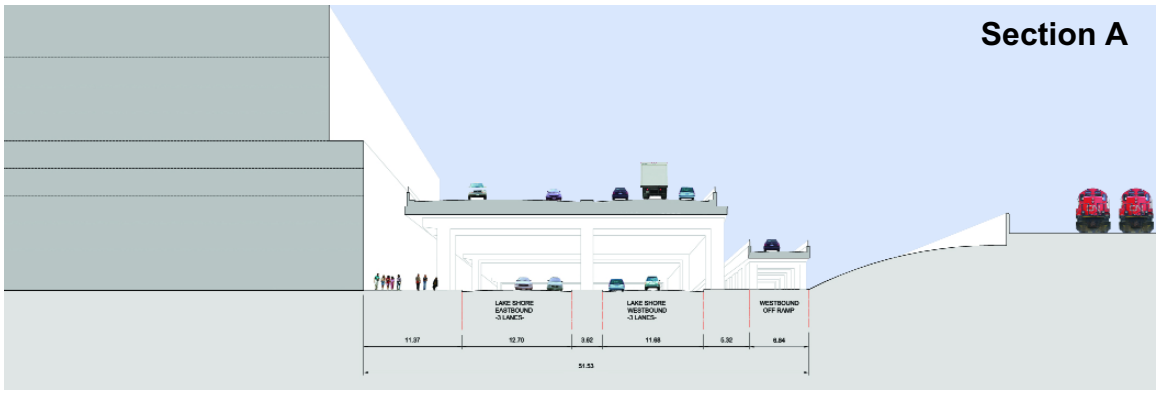
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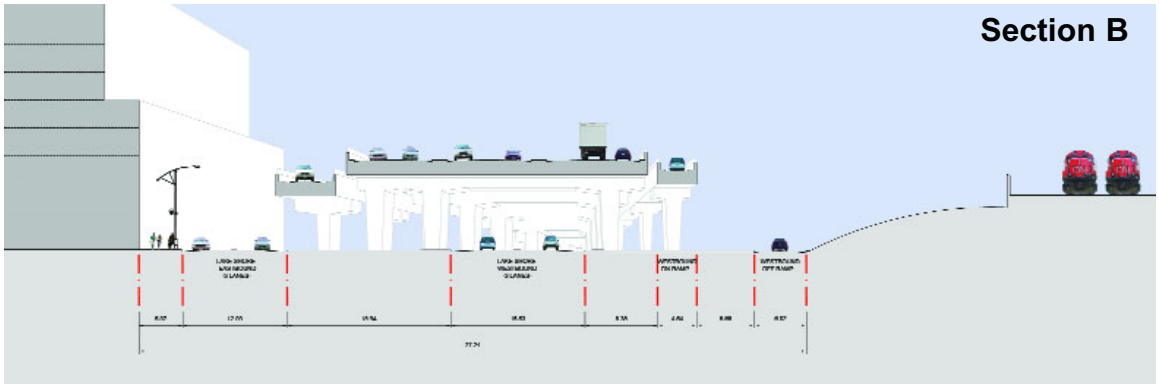
LAKE SHORE EASTBOUND
LAKE SHORE WESTBOUND
WESTBOUND OFF RAMP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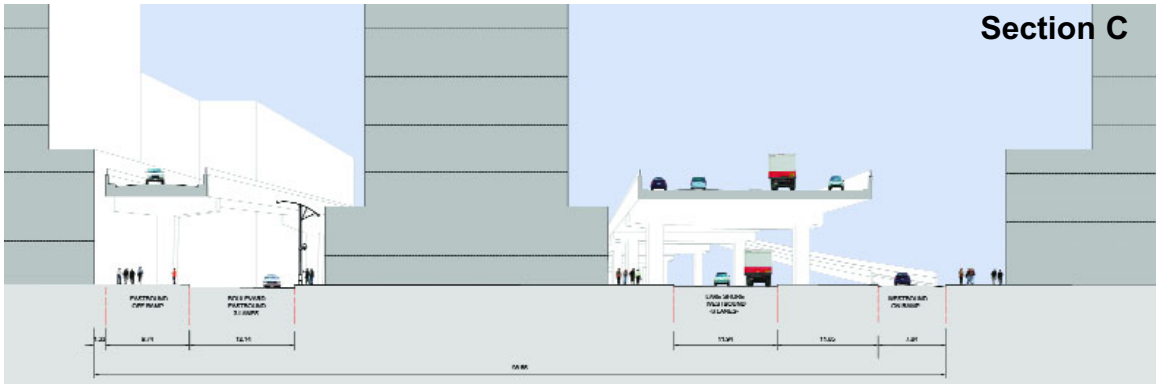
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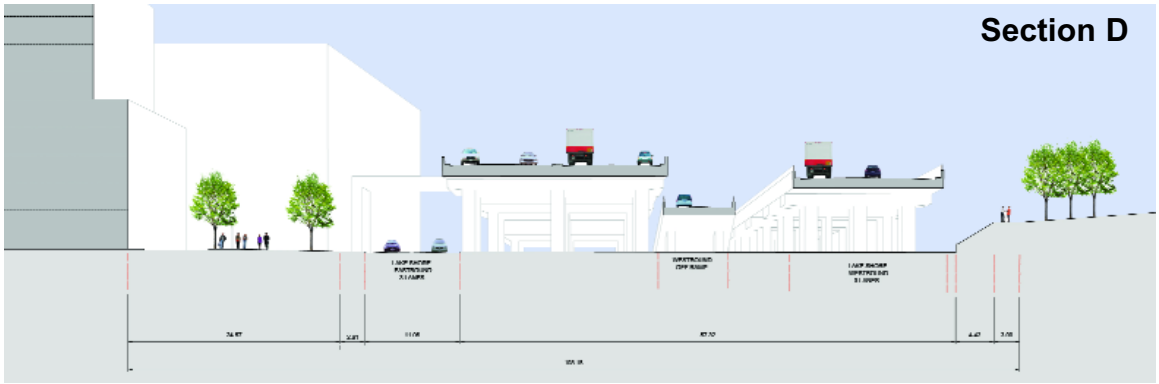
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