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*QUÉBEC/ONTARIO HIGH SPEED RAIL PROJECT*

*TRENDS IN INTERCITY PASSENGER TRANSPORTATION*

*AND GOVERNMENT SUPPORT*

# Reference Scenario

**Prepared for**

Steering Committee
Québec-Ontario High Speed Rail Project

**Submitted by**

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Montreal
March 15, 1993 (revised April 5, 1993)
2030/THL/92/tl

# Contents

The Reference Scenario described in this document has been developed to provide input in the form of general descriptions of future passenger transportation infrastructure and services, and certain network parameters needed in the areas of passenger and revenue forecasting, financial analysis, cost/benefit analysis, economic impact analysis, and environmental impact analysis for the Québec/Ontario High Speed Rail Project. As its name implies, the Reference Scenario constitutes the baseline from which to measure the incremental effects of introducing an eventual High Speed Rail (HSR) service in the Corridor for these several areas of study. It presents our view of the "most probable" characteristics of the passenger transportation network in the Québec-Windsor Corridor for the period 2005-2025 in the absence of HSR service.

## A. Methodology

The Reference Scenario is the product of a comprehensive evaluation process leading to a sounding of expert opinion as well as independent analysis. This process included:

- a comprehensive survey of the literature (detailed in Appendix A);
- detailed discussions with representatives of government, the carriers and other stakeholders (as listed in Appendix B);
- identification of major issues as documented in our "Issues Paper";
- a one-day workshop discussion of transportation experts (see Appendix C for list of participants);
- analysis of carrier operating costs and projection of future fare levels;
- modification of the draft version of the Reference Scenario following review by the HSR Steering Committee and the Project Management Committee.

It should be noted in particular that the Reference Scenario is a *supply* scenario that will assist the forecasting consultants conduct their travel *demand* analyses. In this respect, the Reference Scenario does not provide a direct indication of projected traffic for all modes. However, we have taken account of Transport Canada's socio-economic forecasts prepared for the HSR project and other indicators of potential future traffic in the development of the scenario. We assume that some adjustment may be required to certain elements of the Reference Scenario after the forecasting consultants have prepared their initial runs for travel by mode without HSR.

## B. General Trends Affecting Transportation in the Corridor

This section provides a summary of the results of our research into those areas that provide a context for the potential future transportation network in the Corridor.

## 1. Socio-economic environment

The socio-economic environment will continue to be characterized by:

### a. Slower economic and demographic growth than in the past

In this respect we subscribe to the "Base Case" Scenario developed by the Economic Analysis Directorate of Transport Canada in their *Québec/Ontario High Speed Rail Project: Socio-economic Variables, Forecasts for 2005 and 2025—Three Scenarios* of December 1992 and as updated.

This will have the general effect of slower growth in passenger transportation in the Corridor. The demographic profile of the population will change also. For example, it may be expected that an aging population will make fewer intercity trips by automobile; but there may also be shifts to the public modes. In forecasting future travel patterns, particular attention must be paid to changes that will occur by trip purpose.

### b. Increasing integration of the North American economies

The North American Free Trade Agreement and the more general evolution of the North American economy will reenforce north-south economic linkages. This will likely have a negative effect on the volume of business travel that occurs in the Corridor, particularly between Toronto and Montréal.

### c. Indebtedness of all levels of government

The indebtedness of governments will affect both levels of taxation and the ability to provide current levels of service and support (including subsidies to transportation, R & D funds, etc.). This will continue until the early years of the next century (at least until 2005).

## 2. Policy Environment

### a. National Transportation Policy

We may expect a continuation of the present National Transportation Policy for which "competition and market forces are, whenever possible, the prime agents in providing viable and effective transportation services." This will have the effect of movement toward the increased provision of transportation services by private sector carriers.

### b. Government Role in Transportation

We expect increased devolution and decentralization of powers and responsibilities of governments. This will be motivated by the need to reduce government expenditures and reduce deficits.

Within government's continuing role, we can expect to see increasing emphasis on integrated self-supporting multi-modal solutions designed, in part, to transfer demand from single-occupant automobiles to multi-occupant public modes of transportation.

### c. Environmental Policy

There will be increased environmental sensitivities leading to public pressures on governments to "plan green" in transportation, and to tighten existing environmental standards. This is currently reflected in the new regulations associated with the coming into force of the Environmental Assessment Act (Bill C-13), and the recent decision to legislate the phase-out by 2001 of Stage II aircraft at Canadian airports in line with ICAO Resolution A28-3. Public pressure will also permit governments to increase existing taxes or to introduce new measures designed to reduce fuel consumption, congestion, noise and atmospheric pollution. These moves will, in part, also be motivated by the need to control government deficits.

Although, according to recent research, the cost of pollution is a relatively minor component of the total cost of transportation, these pressures will continue to spur technological improvements in greater fuel efficiency and noise reduction. By the year 2001, it is expected that Stage III (with perhaps some "Stage IV") aircraft will have effectively replaced those of Stage I and Stage II at major Corridor airports. On the other hand, unless there is a major degradation in the air quality of larger cities, it is unlikely that new fuels or engine types will have a material effect on the performance of intercity road or rail travel.

## 3. Other Trends

The following general portrait emerged from the literature review and from the results of stakeholder and workshop discussions.

### a. Vehicle Technology

Vehicle technology that will be in use in the Corridor during the majority of the period 2005-2025 is either already built and in operation (e.g., Stage III aircraft; high quality single-unit or articulated highway coaches) or is in design ("Stage IV" aircraft). In this respect, there are few if any "unknowns" about the vehicles that will provide transportation during the planning horizon of this study. Intelligent Vehicle Highway Systems (IVHS) and Driver Information Systems (DIS) will most likely not have significant application for intercity travel until at least 2015—midway into the planning horizon.

**b. Fuel Prices (including taxes)**

- Hydrocarbon fuel prices will rise in line with inflation until 2005. This reflects a continuation of the trend of the 1980s which we do not believe will change dramatically over the coming ten years. After 2005, we expect the price of fuel, including taxes, to accelerate to twice the rate of inflation. This will be due principally to increasing costs of developing new oil deposits and the application of increased taxes as governments respond to environmental concerns and seek out additional sources of revenue.

**c. Corridor Network Capacity**

- The capacity of transportation networks will be enhanced largely through operational improvements in the quality of transportation services. Highway infrastructure will be added only as a "solution of last resort", and will likely be limited to express bypasses of major urban areas. New runways are planned for Pearson (1995-2000) and Québec City (1998).

- Depending on the growth of traffic, there will be pressure on Pearson's terminal capacity after 2015. In the event, some traffic will be diverted to other regional airports and to rail.

- Public/private partnership funding will evolve in the road and air modes. However, tolls will be imposed only on certain underground or costly new urban expressway links. The private funding of runways might prompt restrictions on government support for modes that compete with air as a "quid pro quo" condition in private sector/government contracts.

- Urban congestion is unlikely to have significant effects on access times to public mode terminals. Improvements to the road network and public transit have grown in step with suburbanization and have maintained average urban trip times over the past two decades. Incremental improvements to transit and to access roads to airports will limit any material increase in access times.

**d. Modal Choice**

- In spite of attempts to shift demand to public transportation, the automobile will remain the dominant mode on intercity travel links throughout the Québec-Windsor Corridor. If road tolls are introduced, they will be applied to a very limited number of short links in the urban networks and will not significantly deter the use of the private automobile for intercity trips.

- We believe that bus will continue to be regulated and will perform the role it has at present, i.e., as rural feeder and lower cost intercity public mode. However, the quality of bus services on major routes will improve substantially, leading to a better image for this mode.

  There is the possibility that the industry will be deregulated, and we have taken account of this in the Reference Scenario.

- Rail services would likely benefit from terminal congestion at Pearson after 2015.

## C. Evolution of Corridor Network

In this section, we present our conclusions about the parameters of each mode in the Corridor during the period 2005-2025. The parameters are described in terms of the projected *changes* from the existing situation as presented in the 1992 profile prepared by Consumer Contact. The parameters are summarized in Exhibits 1, 2 and 3.

### 1. Bus Services

#### a. Assumptions

The bus mode provides a relatively extensive network and good frequency of service. We assume that:

- Bus will continue to provide line haul services between all major centres between Québec and Windsor and feeder service from outlying communities. In the event of deregulation, line haul services will remain as at present. The experience with deregulation in other countries supports this assumption: additional capacity, where it occurs, is soon tempered by new entrant failures and the scaling back of service to pre-deregulation levels.

- The industry will suffer no radical deregulation of fares, though entry rules may be relaxed somewhat.

- Service to downtown terminals through congested urban areas will be expedited by dedicated or priority bus lanes. This will have a marginal effect on trip times, depending on line haul distance.

- There will be no major frequency changes for major markets. Demand increases will be handled by extras, as required.

- New buses will be more comfortable, with wide bodies, bigger windows and more space between seats.

## Exhibit 1
## Selected public mode characteristics, 2005

| City Pair | Distance (km) | Bus | | Rail | | Air | |
|---|---|---|---|---|---|---|---|
| | | Freq/wk | Time | Freq/wk | Time | Freq/wk | Time |
| Quebec–Montreal | 255 | 254 | 2:50 | 54 | 2:55 | 418 | 0:45 |
| Montreal–Ottawa | 205 | 301 | 2:10 | 52 | 2:00 | 252 | 0:35 |
| Montreal–Toronto | 555 | 137 | 6:10 | 76 | 3:59 | 571 | 1:10 |
| Ottawa–Toronto | 435 | 149 | 4:15 | 50 | 3:40 | 490 | 1:00 |
| Toronto–London | 195 | 80 | 2:10 | 97 | 1:55 | 236 | 0:45 |
| Toronto–Windsor | 380 | 105 | 4:40 | 60 | 3:55 | 151 | 1:05 |

## Exhibit 2
## Selected public mode characteristics, 2025

| City Pair | Distance (km) | Bus | | Rail | | Air | |
|---|---|---|---|---|---|---|---|
| | | Freq/wk | Time | Freq/wk | Time | Freq/wk | Time |
| Quebec–Montreal | 255 | 254 | 2:50 | 54 | 2:55 | 418 | 0:45 |
| Montreal–Ottawa | 205 | 301 | 2:10 | 52 | 2:00 | 252 | 0:35 |
| Montreal–Toronto | 555 | 137 | 6:10 | 76 | 3:59 | 571 | 1:10 |
| Ottawa–Toronto | 435 | 149 | 4:15 | 50 | 3:40 | 490 | 1:00 |
| Toronto–London | 195 | 80 | 2:10 | 97 | 1:55 | 236 | 0:45 |
| Toronto–Windsor | 380 | 105 | 4:40 | 60 | 3:55 | 151 | 1:05 |

*Note: Distances shown are for travel by highway. Frequencies represent total weekly departures (both directions). Transit times are representative, although actual transit times vary with type of service, departure time and other factors. Air frequencies include services to/from Toronto Island and Buttonville airports, but exclude services to/from Mirabel.*

- The standard bus length will increase from 40 feet to 45 feet.

- Articulated or double deck buses may appear on some routes (e.g., Montréal-Québec; Montréal-Toronto), but they will remain the exception rather than the rule.

- There will be more onboard amenities (e.g., movies, vending machines, and telephones).

### b. Parameters

Under these conditions, changes to cost and service parameters will be as follows:

***Network changes***. No changes to the service network in the Corridor are anticipated.

***Frequency of service***. No change. Increased demand will be accommodated by larger capacity buses and "extras", as required.

***In-vehicle transit times***. Reduction of 5% with dedicated or priority lanes in urban areas.

***Fares***. The reduced rate of growth in passenger transportation, productivity improvements brought on in part by competition with conventional rail, and other developments will result in fare levels as follows: 95% of the 1992 fares in 2005; 100% of the 1992 fares in 2025. Bus will continue to be the cheapest mode of public intercity transportation. (See Appendix C for our analysis of carrier costs and projected fare levels for years 2005 and year 2025).

In the event of deregulation, and more significant cost reductions, the fare levels will be: 90% of the 1992 fares in 2005; 95% of the 1992 fares in 2025. These changes represent a 25% reduction to current labour costs.

***Access and egress times***. No change. Increased suburbanization will be compensated by improved transit connections.

***Terminal waiting and delay times***. No change from the present.

## 2. Rail Services

### a. Assumptions

The future of conventional rail services in the Corridor depend on the fortunes of the current operator, VIA Rail Canada, Inc. The following scenario was developed by Transport Canada and VIA Rail.

## Exhibit 3—Summary of Parameters, Corridor Transportation Network

| PARAMETERS | MODES | | | |
|---|---|---|---|---|
| | **Bus** | **Rail** | **Air** | **Automobile** |
| Frequency of service | See Ex. 1 & 2 | See Ex. 1 & 2 | See Ex. 1 & 2 | N/A (1) |
| In-vehicle transit time | See Ex. 1 & 2 | See Ex. 1 & 2 | See Ex. 1 & 2 | 2-5% decrease for Tor-Ottawa |
| Network changes | No change | No change | Limited change | *H'way 407 bypass of GTA<br>*New link from 401 to Ottawa<br>*H'way 30 South Shore by-pass of Greater Montreal |
| Fares/Cost (2) | | | | |
| ▶ 2005 | 0.95<br>0.90 (if dereg) | 1.00 | 1.00 | 1.00 |
| ▶ 2025 | 1.00<br>0.95 (if dereg) | 1.00 | 1.10 | 1.15 |
| Access/egress times | No change | No change | No change | N/A |
| Terminal waiting/delays | No change | No change | Delays at Pearson after 2015 | N/A |

(1) N/A: Not applicable
(2) Factor x 1992 Fare/Cost

- Conventional rail passenger service will continue to be provided by VIA Rail.

- Passengers will grow at the annual rate of 4.4% for the period 1993-1997, and thereafter at the rate of 1.4%* until 2005, at which time, seat occupancies of 69% will be achieved. No additional capacity will be added and, consequently, there will be no material growth thereafter.

- Operating subsidies will continue to be provided by the federal government, reducing at the rate of approximately 2% per year during the planning period.

- VIA will continue to provide the current network of services in the Corridor.

- VIA will replace locomotives and cars according to the follow schedule, which will improve the image of the fleet and will increase train speeds:

| | | |
|---|---|---|
| LRC locomotives | 1997-1999 | $ 34.8 million |
| GPA-418 | 2000-2004 | 43.5 million |
| Blue & Yellow | 2002-2004 | 91.5 million |
| HEP I cars | 2008-2012 | 579.2 million |
| HEP II cars | 2011-2015 | 101.2 million |
| F40 | 2013-2016 | 179.8 million |
| LRC cars | 2013-2017 | 242.0 million |

- Train speeds will also be improved by the selective removal of slow orders, as feasible, and some improvements to rail plant. On-going capital costs, excluding major equipment project costs, are assumed to be $13 million per year.

### b. Parameters

Under these conditions, changes to cost and service parameters will be as follows:

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* *This figure is used to achieve the passenger volumes projected by VIA for 2005, beginning with the 2.915 million rail passengers estimated by Consumer Contact for 1992.*

***Network changes.*** Current network (service from Windsor to Québec City, including Toronto-Sarnia and Toronto-Niagara Falls. No changes to routes.

***Frequency of service.*** No change to frequencies.

***In-vehicle transit times.*** Typical Montréal-Toronto service will improve to 3:59 by 2000 (10% reduction). The Montréal-Toronto express service (currently 15% of departures) will be improving towards 3:30 by 2005. Times for other services will be reduced by 10% by 2005. No changes thereafter.

***Fares.*** There will be no real increases in prices.

***Access and egress times.*** No change. Increased suburbanization will be compensated by improved transit connections.

***Terminal waiting and delay times.*** No change from the present.

## 3. Air Services and Infrastructure

### a. Assumptions

The current uncertainty with respect to the future of the existing air carriers makes projection of air services difficult. The following assumptions were used as a guide to future conditions in the Corridor:

- Open skies air policy will result in more direct flights between Canadian and U.S. business centres. This will tend to temper the growth of business travel in the Corridor.

- No increase in frequency. According to Transport Canada's official aviation forecasts, domestic air carrier aircraft movements in Canada will increase at an annual rate of about 1.7% between 1990 and 2010. Also, Toronto-Montréal should see annual increases in the range of 1% to 2%. At the stated rate of growth, the use of larger Stage III aircraft (e.g., DC9s replaced by A320s) will accommodate the increase in demand at manageable load factors until the latter years of the planning period (2005-2025).

- More direct service between smaller centres in the Corridor using turboprop aircraft. New generation of turboprop aircraft will have performance levels very close to those of jets. Larger jets will continue to be used between the major centres in the Corridor.

- Stage III aircraft will replace older aircraft by the year 2001. New aircraft are much quieter and more fuel efficient.

- During the period until 2005, fuel costs will decrease as a proportion of total airline operating costs. However, after 2005, as the price of fuel rises at our assumed rate of twice-inflation, fuel costs will represent an increasing proportion of airline operating costs (and fares). The increase will be tempered somewhat by the use of more fuel-efficient aircraft.

- ATC services will be funded and managed by the federal government on a cost recovery basis. Pressure for new runway capacity at all airports will ease after 2005 as a result of:

  —New ATC technologies permitting reduction in separation minima;

  —refinements in ATC procedures;

  —runway, terminal and access improvements.

- Toronto Island Airport will continue its current role as a convenient downtown airport accommodating turboprop aircraft (jets are banned). The airport may eventually allow jet aircraft that meet acceptable noise criteria; however, there is still major opposition to lifting the ban.

- Depending on the future of traffic currently served through Mirabel, St-Hubert airport may be required to serve a larger role since cost-effective expansion of Dorval is limited.

- Assumed timing and cost of planned expansion at major airports is as follows:

  —Pearson fourth (1994-1995), fifth (1997) and sixth (2000) runways at estimated total cost of $500 million;

  —Improvement to Pearson's existing terminal capacity (1993-1998) at cost of $750-800 million;

  —Pearson new terminal (1998-2006) at cost of $400-500 million;

  —Dorval terminal expansion (2003-2008). Cost $145 million;

  —Québec City terminal expansion (1994-1997). Cost $15 million;

  —Québec City new runway (1997-1998) and control tower (1995-1996). Cost (control tower only) $10 million.

- Depending on growth of traffic, there will be additional pressure on Pearson's terminals after 2015. This will require the accommodation of some traffic at alternative airports in the region and will likely result in some diversion to rail.

- Montréal-Toronto will continue to be served by jet aircraft without any change in frequency. No change from present mix of turboprops and jets for other city pairs.

### b. Parameters

Under these conditions, changes to cost and service parameters will be as follows:

***Network changes.*** Limited change. If Mirabel traffic is transferred to Dorval, use of St-Hubert may be required for additional capacity. Pressure on Pearson's terminals after 2015 will likely result in diversion of traffic to other regional airports and rail.

***Frequency of service.*** No change.

***In-vehicle transit times.*** No change.

***Fares.*** A combination of cost structure reductions, productivity improvements, and required increases to the airlines' return on equity will result in the maintenance of current fares (in real terms) in 2005 and 110% of 1992 fares in 2025.

***Access and egress times.*** No change. Increased suburbanization will be compensated by improved ground transport connections, including principally dedicated or priority bus/high-occupany vehicle (HOV) lanes.

***Terminal waiting and delay times.*** Delays will occur at Pearson after 2015. This will likely drive local carriers to alternative airports and some passengers to rail.

## 4. Automobile Travel

### a. Assumptions

Governments are already under pressure to reduce highway expenditures, improve transportation efficiencies, conserve energy and reduce petroleum-based fuel emissions. By the year 2005 this pressure will be translated into practical measures to move passengers from cars to public modes, at least for urban travel. A shift of even one or two percentage points in favour of public modes would have a dramatic impact. This possibility has been considered by MTO and MTQ in the context of their strategic planning, although no final decisions have been made. Establishment of a "Southern Ontario Transportation Authority" has recently been recommended.

*Highway Infrastructure*

The cost of highway infrastructure needed to accommodate the natural growth of vehicular traffic is seen to be impossible to sustain. We assume therefore that:

- For the remainder of this century, Québec will concentrate on the maintenance and refurbishing of the existing highway plant.

- Québec has prepared a strategic plan (up to 2005) for the extension of the following links; however, all links do not yet have program status:

  —Route 13 to Mirabel airport;

  —Route 440 to the TransCanada;

  —Route 50 from Mirabel to Ottawa.

  —Route 30 from Brossard to Coteau along the South Shore.

- The following are the major highway developments in Ontario under consideration for the period to 2005:

  —Highway 407 extension to bypass the GTA;

  —Highway 420 through the Niagara peninsula;

  —Extension of highway 403 to Brantford;

  —Extension of highway 400 to North Bay;

  —New link from the 401 to Ottawa (Route 16 alignment).

- Until 2005, tolls will be levied only to finance expensive urban expressway links (such as the proposal for putting the Gardiner expressway underground).

- After that time, there will be the possibility of electronic tagging of vehicles to enable automatic assessment of user charges for highway use. This will affect urban travel more than intercity travel.

*Vehicles*

The private automobile is the most flexible mode and is generally superior in terms of door-to-door time for distances up to 300 kms. However, while the cost advantage of this mode increases with the number of people travelling together, the rail and air modes become increasingly viable alternatives as the

distance expands beyond 300 kms (e.g., Montréal-Toronto). This fact is being seized upon by public authorities interested in relieving congestion on the highways, reducing the capital burden of infrastructure development and reducing emissions.

Automobiles will nevertheless continue to become cleaner and safer (though speed has reached its practical limit). Although fuel efficiency has improved constantly since the early 1970s, fuel use is currently rising again as a result of the popularity of larger engines and 4-wheel drive vehicles.

**b. Parameters**

Under these conditions cost and service parameters will change as follows:

***Travel time (including rest time):*** Reduction of 2-5% for the Toronto-Ottawa trip, using the new 401-Ottawa link. No change for others.

***Travel Cost (vehicle operating cost):*** Will increase in line with inflation weighted by the cost of fuel, including taxes. No change to 2005; 15% increase from 2005 to 2025, reflecting an 80% real increase in fuel cost and a 20% increase in insurance.

***Parking Fees:*** Will increase in line with inflation.

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# Appendix B—List of Stakeholders Consulted

## A. Carriers

### 1. Intercity Bus

| | | |
|---|---|---|
| Chatham Coach | ► | Reg Denure, President |
| Gray Coach | ► | William Verrier, Vice-Chairman |
| Greyhound | ► | Roger Pike, Vice-President |
| Orléans Express | ► | Sylvain Langis |
| Voyageur Colonial | ► | Don Haire, President |

### 2. Rail

| | | |
|---|---|---|
| Via Rail | ► | Steve Delbosco |
| | ► | Gerry Kolaitis, Director, Strategic & Financial Management |
| | ► | Gabor Matayas |
| | ► | John Udell |

### 3. Air

| | | |
|---|---|---|
| Air Canada | ► | (unavailable to date) |
| Canadian Airlines | ► | Robert Hamilton |
| | ► | Peter Wallace, Vice-President, Government and Regulatory Affairs |
| Nationair | ► | Daniel-Yves Durand, Vice-President, Public Affairs |
| Pem-Air | ► | D. A. O'Brian |
| Skycraft | ► | (unavailable to date) |

## B. Government

### 1. Federal Government

| | | |
|---|---|---|
| Transport Canada | ► | Clyde McElman, Director, Rail Policy & Programs Branch |
| | ► | Ian Henderson, Director General, Airports Corporate Management |
| Environmental Review Agency | ► | John Connelly |
| Transportation Development Centre | ► | Brian Marshall, Chief, Technology Applications |
| | ► | Barry Myers, Air R & D Coordinator |
| Royal Commission on National Passenger Transportation | ► | John Sargeant, Director of Research |

### 2. Provincial Government

| | | |
|---|---|---|
| Ministry of Transportation of Ontario | ► | Ian Chadwick, Director, Passenger Transportation Policy |
| Ministère des Transports du Québec | ► | Liguori Hinse, Sous-ministre adjoint, Direction générale du transport terrestre |
| | ► | Michel Auclair, Service des politiques en transport des personnes |

## C. Other

| | | |
|---|---|---|
| Transportation Association of Canada | ► | Norm Brown, Executive Director |

# Appendix C—Workshop Participants

The participants in the workshop held at Peat Marwick Stevenson & Kellogg's offices in Montreal on March 5, 1993 included the following:

- Daniel Brod, Hickling Corporation
- John Gratwick, Hickling Corporation; Ocean Institute of Canada
- Dave Frank, Horizon Pacific Ventures, Ltd.
- Marc Gaudry, Centre de recherche sur les transports (Université de Montréal)
- Richard Soberman, University of Toronto

Daniel Brand, Charles River Associates, representing one of the Québec/Ontario High Speed Rail Project's forecasting consultants, also attended.

A brief biographical sketch of the five "external" participants in the workshop is provided below.



## Daniel Brod

Daniel Brod is a Principal with Hickling Corporation and has over fifteen years experience in economics, finance and management sciences with clients in the U.S., Canada and abroad. His areas of expertise include risk analysis, benefit-cost analysis, and applied economic and policy analysis. Mr. Brod has been very active in transportation economics and has conducted research in this area and is conducting on-going projects for the Transportation Research Board. He has co-authored a benefit-cost analysis manual for transportation investment appraisal to be used by Transport Canada.

He has been a key contributor to the development of new analytic frameworks for estimating the relationship between freight transport and industry productivity. For the Federal Transit Administration he has been assisting in the development of an Urban Transportation Monitoring System. He has conducted risk analysis for the evaluation of the construction and right-of-way costs of the MAG Freeway/Expressway Plan for the Arizona Department of Transportation.

In the area of finance of public projects, Mr. Brod led Hickling's evaluation of the financial structure of the $1.3 billion tax exempt revenue bond issue for the New Denver Airport—conducted for the U.S. General Accounting Office.

Mr. Brod holds degrees in economics and mathematics from Tel Aviv University and the Illinois Institute of Technology.

## John Gratwick

John Gratwick is a transportation consultant and writer; until retirement in 1988, he was Executive Director of the International Institute for Transportation and Ocean Policy Studies at Dalhousie University, and remains an Associate of its successor, the Oceans Institute of Canada. He is also a Partner in Hickling, the Ottawa consulting firm.

He was formerly a Vice-President of Canadian National, and was first President of CN Marine (now Marine Atlantic) on its formation in 1978.

He is Chairman of the Halifax-Dartmouth Port Development Commission, a Governor of Mount Saint Vincent University and Vice-Chairman of Halifax's Transit Advisory Committee. In January 1992 he was appointed to the Commission to review the National Transportation Act; its report will be presented to Parliament in March.

Mr. Gratwick is a Fellow of the Chartered Institute of Transport, a Fellow of the Royal Statistical Society and an Honorary Life Member of the Canadian Transportation Research Forum.

## Dave Frank

Dave Frank completed both his B.Sc. (Physics) and his MBA at the University of British Columbia and was asked to remain active with the Faculty of Commerce to create, manage and obtain funding for the Industry Productivity Study Group. He has coordinated research in all modes of transportation, economic development, forestry and tourism industries as well as in the productivity, forecasting, advanced human resources needs, information technology and marketing areas.

While at the university, Dave co-authored the book *Deregulation and Airline Employment*. Most recently, he has been the community observer for the Association of Canadian Airport Communities at the "Open Skies" negotiations between Canada and the United States. He has also been managing the development of a long-term strategic and marketing plan for Melbourne Airport (Australia).

He is a Founding Principal and Managing Director of Horizon Pacific Ventures Limited, an economic development consulting, marketing, facilitating and project implementation firm based in Vancouver. At Horizon Pacific, he has coordinated a diverse range of projects from Royal Commission submissions on developing competitive advantage through future-thinking transportation policy to creating demand for air passenger and cargo services, as well as others.

## Marc Gaudry

Marc Gaudry is a Full Professor of Economics and Senior Researcher of the *Centre de recherche sur les transports* (CRT) at the *Université de Montréal*. He has published

extensively, principally in applied econometrics and transportation, and has developed a number of documented statistical estimation programs and data banks in collaboration with others.

He is an associate editor of the Transportation Research Board for *Les Cahiers Scientifiques du Transport* and of *Recherche Transports Sécurité*. He was elected Alexander von Humboldt research fellow in 1985 and Fellow of the Royal Society of Canada in 1987. In 1990, he won the Quebec Transportation Research and Development Prize and an Alexander von Humboldt Research Award.

Associated with the CRT since its beginning in 1971, he has contributed as founding member, assistant director, and occasionally as director, to making the CRT one of the world's leading research centres in transportation planning.

During the period 1989-1992, he was a member of the Royal Commission on National Passenger Transportation that studied the future of passenger transportation in Canada.

Mr. Gaudry holds degrees from the *Université de Montréal*, Oxford University, the *Institut Catholique de Paris*, and Princeton University.

## Richard M. Soberman

A graduate of Dalhousie University and M.I.T., Richard Soberman is Chairman of the Department of Civil Engineering at the University of Toronto. He formerly served as Director of the Metropolitan Toronto Transportation Plan Review, an inter-governmental task force responsible for the development of comprehensive transportation and land use plans in the early 1970s.

He has held positions as Director of Research in the Canadian Transport Commission, Director of the Toronto Commuter Rail Study, Senior Vice President of the Urban Transportation Development Corporation, and Director of the University of Toronto-York University, Joint Program in Transportation.

Mr. Soberman has been involved in a wide variety of transportation studies and projects in both Canada and the United States, as well as in Latin America, Africa and the Middle East. He is a former member of the National Capital Commission, Transit Advisory Group to the Ontario Minister of Transportation, and Deputy Director (Transportation) of the 1985 federal government Ministerial Task Force on Program Review.

# Appendix D—Public Mode Cost Projections

The methodology used to estimate future operating costs for public modes and the automobile is briefly described below. Results can be combined with current passenger fares/operating costs to estimate real fare/operating cost levels in the years 2005 and 2025. They also provide insight on the relative competitiveness and viability of each mode.

Analysis of the rail mode is not included here since projected future fare levels were provided by VIA for use in the Reference Scenario.



## A. Methodology

A five step methodology was used to prepare cost projections for the air, bus, and automobile modes:

- **Step 1:** Identify major costs categories (e.g., fuel, equipment depreciation) and calculate their current proportions of total operating expenses. This step is based on financial statements published by Statistics Canada and statistics provided by the Canadian Automobile Association.

- **Step 2:** Make adjustments to reflect operations exclusively within the Québec–Windsor Corridor (e.g., landing and navigation fees account for a higher proportion of operating expenses with short haul flights). Adjustments are required because Statistics Canada data include both Corridor and non-Corridor operations.

- **Step 3:** Estimate price indices for each category (e.g., if real diesel fuel prices are expected to be 80% higher in 2005 the fuel price index would be 1.80).

- **Step 4:** Estimate consumption indices for each category to reflect changes in productivity (e.g., if aircraft operating in 2025 are 20% more fuel efficient, the fuel consumption index would be 0.80).

- **Step 5:** Sum the results of **Step 2 x Step 3 x Step 4** for all expense categories. The result is an index of overall operating costs for passenger transportation in the Québec–Windsor Corridor.

Cost indices can also be used to project fare levels assuming that contribution margins are constant in percentage terms. This assumption is not realistic for the air mode, because

current profitability levels are inadequate to sustain long term operations. Therefore, air indices were adjusted to include an allowance for a 15% return on shareholders' equity.

## B. Results

Results of the analysis are summarized in Exhibit D-1, below. Supporting information is presented in Exhibits D-2 to D–9.

Indices presented in Exhibit D–1 have been rounded to the nearest 5%, and air results are an average for Air Canada and Canadian Airlines International. By definition, indices for 1992 are 1.00. Results for 2005 and 2025 can be used to project future passenger fares in 1992 dollars.

**Exhibit D–1**
**Passenger fare indices**

| Mode | 1992 index | 2005 index | 2025 index |
|---|---|---|---|
| Air | 1.00 | 1.00 | 1.10 |
| Intercity Bus | 1.00 | 0.95* | 1.00* |
| Automobile | 1.00 | 1.00 | 1.15 |

* Assumes no deregulation.

**Exhibit D–2**
**Airline Cost Projections (Air Canada), 2005**

| Item | Dollars–1991 | Proportions System | Proportions Corridor | Indices: 1991 – 2005 Price | Indices: 1991 – 2005 Consumption | Results |
|---|---|---|---|---|---|---|
| Flight crew | 215,856 | 6.96% | 7.05% | 0.90 | 0.95 | 6.03% |
| Cabin crew | 123,929 | 4.00% | 3.68% | 0.95 | 0.95 | 3.32% |
| Passenger food and supplies | 168,712 | 5.44% | 5.01% | 1.00 | 0.80 | 4.01% |
| Fuel | 439,179 | 14.16% | 15.65% | 1.00 | 0.80 | 12.52% |
| Landing and navigation fees | 86,945 | 2.80% | 3.10% | 1.10 | 0.90 | 3.07% |
| Maintenance labour (aircraft) | 117,176 | 3.78% | 3.83% | 0.95 | 0.90 | 3.27% |
| Maintenance expenses (aircraft) | 211,832 | 6.83% | 6.92% | 1.00 | 0.90 | 6.23% |
| Maintenance (ground) | 33,205 | 1.07% | 0.99% | 0.95 | 1.00 | 0.94% |
| Aircraft rental | 110,640 | 3.57% | 2.96% | 1.25 | 1.00 | 3.70% |
| Aircraft depreciation | 107,301 | 3.46% | 2.87% | 1.25 | 1.00 | 3.58% |
| Other depreciation | 45,629 | 1.47% | 1.36% | 1.00 | 1.00 | 1.36% |
| General services, admin. & miscel. | 1,287,167 | 41.51% | 42.05% | 0.95 | 0.90 | 35.95% |
| Interest (net) | 98,591 | 3.18% | 2.93% | 1.25 | 1.00 | 3.66% |
| Miscellaneous non-operating expenses | 42,670 | 1.38% | 1.27% | 1.00 | 1.00 | 1.27% |
| Capital losses (gains) | 11,978 | 0.39% | 0.36% | 1.00 | 1.00 | 0.36% |
| TOTAL | 3,100,810 | 100.00% | 100.00% | | | 89.25% |
| REQUIRED IMPROVEMENT (15% ROE) | | | | | 12.15% | 100.09% |

**Exhibit D–3**
**Airline Cost Projections (Air Canada), 2025**

| Item | Dollars–1991 | Proportions System | Proportions Corridor | Indices: 1991 – 2025 Price | Indices: 1991 – 2025 Consumption | Results |
|---|---|---|---|---|---|---|
| Flight crew | 215,856 | 6.96% | 7.05% | 0.90 | 0.95 | 6.03% |
| Cabin crew | 123,929 | 4.00% | 3.68% | 0.95 | 0.95 | 3.32% |
| Passenger food and supplies | 168,712 | 5.44% | 5.01% | 1.00 | 0.80 | 4.01% |
| Fuel | 439,179 | 14.16% | 15.65% | 1.80 | 0.80 | 22.54% |
| Landing and navigation fees | 86,945 | 2.80% | 3.10% | 1.10 | 0.90 | 3.07% |
| Maintenance labour (aircraft) | 117,176 | 3.78% | 3.83% | 0.95 | 0.90 | 3.27% |
| Maintenance expenses (aircraft) | 211,832 | 6.83% | 6.92% | 1.00 | 0.90 | 6.23% |
| Maintenance (ground) | 33,205 | 1.07% | 0.99% | 0.95 | 1.00 | 0.94% |
| Aircraft rental | 110,640 | 3.57% | 2.96% | 1.25 | 1.00 | 3.70% |
| Aircraft depreciation | 107,301 | 3.46% | 2.87% | 1.25 | 1.00 | 3.58% |
| Other depreciation | 45,629 | 1.47% | 1.36% | 1.00 | 1.00 | 1.36% |
| General services, admin. & miscel. | 1,287,167 | 41.51% | 42.05% | 0.95 | 0.90 | 35.95% |
| Interest (net) | 98,591 | 3.18% | 2.93% | 1.25 | 1.00 | 3.66% |
| Miscellaneous non-operating expenses | 42,670 | 1.38% | 1.27% | 1.00 | 1.00 | 1.27% |
| Capital losses (gains) | 11,978 | 0.39% | 0.36% | 1.00 | 1.00 | 0.36% |
| TOTAL | 3,100,810 | 100.00% | 100.00% | | | 99.27% |
| REQUIRED IMPROVEMENT (15% ROE) | | | | | 12.15% | 111.33% |

**Exhibit D–4**
**Airline Cost Projections (Canadian), 2005**

| Item | Dollars–1991 | Proportions System | Proportions Corridor | Indices: 1991 – 2005 Price | Indices: 1991 – 2005 Consumption | Results |
|---|---|---|---|---|---|---|
| Flight crew | 199,123 | 7.45% | 7.59% | 0.90 | 0.95 | 6.49% |
| Cabin crew | 169,733 | 6.35% | 5.88% | 0.95 | 0.95 | 5.31% |
| Passenger food and supplies | 130,704 | 4.89% | 4.53% | 1.00 | 0.80 | 3.62% |
| Fuel | 387,472 | 14.50% | 16.12% | 1.00 | 0.80 | 12.89% |
| Landing and navigation fees | 45,356 | 1.70% | 1.89% | 1.10 | 0.90 | 1.87% |
| Maintenance labour (aircraft) | 87,068 | 3.26% | 3.32% | 0.95 | 0.90 | 2.84% |
| Maintenance expenses (aircraft) | 98,650 | 3.69% | 3.76% | 1.00 | 0.90 | 3.39% |
| Maintenance (ground) | 15,426 | 0.58% | 0.53% | 0.95 | 1.00 | 0.51% |
| Aircraft rental | 209,586 | 7.84% | 6.54% | 1.25 | 1.00 | 8.17% |
| Aircraft depreciation | 63,674 | 2.38% | 1.99% | 1.25 | 1.00 | 2.48% |
| Other depreciation | 41,126 | 1.54% | 1.43% | 1.00 | 1.00 | 1.43% |
| General services, admin. & miscel. | 1,146,228 | 42.89% | 43.70% | 0.95 | 0.90 | 37.37% |
| Interest (net) | 100,950 | 3.78% | 3.50% | 1.25 | 1.00 | 4.37% |
| Miscellaneous non-operating expenses | 827 | 0.03% | 0.03% | 1.00 | 1.00 | 0.03% |
| Capital losses (gains) | (23,249) | -0.87% | -0.81% | 1.00 | 1.00 | -0.81% |
| TOTAL | 2,672,674 | 100.00% | 100.00% | | | 89.96% |
| REQUIRED IMPROVEMENT (15% ROE) | | | | | 10.05% | 99.00% |

**Exhibit D–5**
**Airline Cost Projections (Canadian), 2025**

| Item | Dollars–1991 | Proportions System | Proportions Corridor | Indices: 1991 – 2025 Price | Indices: 1991 – 2025 Consumption | Results |
|---|---|---|---|---|---|---|
| Flight crew | 199,123 | 7.45% | 7.59% | 0.90 | 0.95 | 6.49% |
| Cabin crew | 169,733 | 6.35% | 5.88% | 0.95 | 0.95 | 5.31% |
| Passenger food and supplies | 130,704 | 4.89% | 4.53% | 1.00 | 0.80 | 3.62% |
| Fuel | 387,472 | 14.50% | 16.12% | 1.80 | 0.80 | 23.21% |
| Landing and navigation fees | 45,356 | 1.70% | 1.89% | 1.10 | 0.90 | 1.87% |
| Maintenance labour (aircraft) | 87,068 | 3.26% | 3.32% | 0.95 | 0.90 | 2.84% |
| Maintenance expenses (aircraft) | 98,650 | 3.69% | 3.76% | 1.00 | 0.90 | 3.39% |
| Maintenance (ground) | 15,426 | 0.58% | 0.53% | 0.95 | 1.00 | 0.51% |
| Aircraft rental | 209,586 | 7.84% | 6.54% | 1.25 | 1.00 | 8.17% |
| Aircraft depreciation | 63,674 | 2.38% | 1.99% | 1.25 | 1.00 | 2.48% |
| Other depreciation | 41,126 | 1.54% | 1.43% | 1.00 | 1.00 | 1.43% |
| General services, admin. & miscel. | 1,146,228 | 42.89% | 43.70% | 0.95 | 0.90 | 37.37% |
| Interest (net) | 100,950 | 3.78% | 3.50% | 1.25 | 1.00 | 4.37% |
| Miscellaneous non-operating expenses | 827 | 0.03% | 0.03% | 1.00 | 1.00 | 0.03% |
| Capital losses (gains) | (23,249) | -0.87% | -0.81% | 1.00 | 1.00 | -0.81% |
| TOTAL | 2,672,674 | 100.00% | 100.00% | | | 100.28% |
| REQUIRED IMPROVEMENT (15% ROE) | | | | | 10.05% | 110.35% |

**Exhibit D–6**
**Intercity Bus Cost Projections, 2005**

| Item | Dollars–1991 | Proportions System | Proportions Corridor | Indices: 1990 – 2005 Price | Indices: 1990 – 2005 Consumption | Results |
|---|---|---|---|---|---|---|
| Driver labour | 84,236 | 21.85% | 21.85% | 0.95 | 1.00 | 20.75% |
| Fuel | 29,295 | 7.60% | 7.60% | 1.00 | 0.95 | 7.22% |
| Equipment depreciation | 13,624 | 3.53% | 3.53% | 1.10 | 0.95 | 3.69% |
| Leases, rentals and purchased transportation | 12,328 | 3.20% | 3.20% | 1.10 | 0.95 | 3.34% |
| Other operating expenses | 16,554 | 4.29% | 4.29% | 1.00 | 1.00 | 4.29% |
| Maintenance labour | 15,656 | 4.06% | 4.06% | 0.90 | 0.80 | 2.92% |
| Maintenance expenses | 40,355 | 10.47% | 10.47% | 1.00 | 1.00 | 10.47% |
| Terminal labour | 26,947 | 6.99% | 6.99% | 0.95 | 0.90 | 5.98% |
| Terminal expenses | 53,907 | 13.98% | 13.98% | 1.00 | 1.00 | 13.98% |
| Traffic and sales | 13,530 | 3.51% | 3.51% | 0.95 | 0.90 | 3.00% |
| Insurance and claims | 8,823 | 2.29% | 2.29% | 1.00 | 1.00 | 2.29% |
| Administrative labour | 17,859 | 4.63% | 4.63% | 0.95 | 0.90 | 3.96% |
| Employee benefits (all) | 29,633 | 7.69% | 7.69% | 1.00 | 0.90 | 6.92% |
| Administration and office expenses | 22,825 | 5.92% | 5.92% | 0.95 | 0.90 | 5.06% |
| TOTAL | 385,572 | 100.00% | 100.00% | | | 93.87% |

**Exhibit D–7**
**Intercity Bus Cost Projections, 2025**

| Item | Dollars–1991 | Proportions System | Proportions Corridor | Indices: 1990 – 2025 Price | Indices: 1990 – 2025 Consumption | Results |
|---|---|---|---|---|---|---|
| Driver labour | 84,236 | 21.85% | 21.85% | 0.95 | 1.00 | 20.75% |
| Fuel | 29,295 | 7.60% | 7.60% | 1.80 | 0.90 | 12.31% |
| Equipment depreciation | 13,624 | 3.53% | 3.53% | 1.10 | 0.95 | 3.69% |
| Leases, rentals and purchased transportation | 12,328 | 3.20% | 3.20% | 1.10 | 0.95 | 3.34% |
| Other operating expenses | 16,554 | 4.29% | 4.29% | 1.00 | 1.00 | 4.29% |
| Maintenance labour | 15,656 | 4.06% | 4.06% | 0.90 | 0.80 | 2.92% |
| Maintenance expenses | 40,355 | 10.47% | 10.47% | 1.00 | 1.00 | 10.47% |
| Terminal labour | 26,947 | 6.99% | 6.99% | 0.95 | 0.90 | 5.98% |
| Terminal expenses | 53,907 | 13.98% | 13.98% | 1.00 | 1.00 | 13.98% |
| Traffic and sales | 13,530 | 3.51% | 3.51% | 0.95 | 0.90 | 3.00% |
| Insurance and claims | 8,823 | 2.29% | 2.29% | 1.00 | 1.00 | 2.29% |
| Administrative labour | 17,859 | 4.63% | 4.63% | 0.95 | 0.90 | 3.96% |
| Employee benefits (all) | 29,633 | 7.69% | 7.69% | 1.00 | 0.90 | 6.92% |
| Administration and office expenses | 22,825 | 5.92% | 5.92% | 0.95 | 0.90 | 5.06% |
| TOTAL | 385,572 | 100.00% | 100.00% | | | 98.96% |

**Exhibit D–8**
**Private Automobile Cost Projections, 2005**

| Item | ¢/km –1991 | Proportions System | Proportions Corridor | Indices: 1990 – 2005 Price | Indices: 1990 – 2005 Consumption | Results |
|---|---|---|---|---|---|---|
| Fuel | 6.26 | 16.83% | 16.83% | 1.00 | 1.00 | 16.83% |
| Lubrification | 0.73 | 1.96% | 1.96% | 1.00 | 1.00 | 1.96% |
| Maintenance | 4.38 | 11.78% | 11.78% | 1.10 | 1.00 | 12.95% |
| Tires | 1.08 | 2.90% | 2.90% | 1.00 | 1.00 | 2.90% |
| Insurance | 3.04 | 8.17% | 8.17% | 1.10 | 1.00 | 8.99% |
| Registration | 0.93 | 2.50% | 2.50% | 1.10 | 1.00 | 2.75% |
| Depreciation | 17.44 | 46.89% | 46.89% | 1.00 | 0.95 | 44.54% |
| Financing | 3.34 | 8.97% | 8.97% | 1.00 | 1.00 | 8.97% |
| TOTAL | 37.20 | 100.00% | 100.00% | | | 99.90% |

**Exhibit D–9**
**Private Automobile Cost Projections, 2025**

| Item | ¢/km –1991 | Proportions System | Proportions Corridor | Indices: 1990 – 2025 Price | Indices: 1990 – 2025 Consumption | Results |
|---|---|---|---|---|---|---|
| Fuel | 6.26 | 16.83% | 16.83% | 1.80 | 1.00 | 30.29% |
| Lubrification | 0.73 | 1.96% | 1.96% | 1.00 | 1.00 | 1.96% |
| Maintenance | 4.38 | 11.78% | 11.78% | 1.10 | 1.00 | 12.95% |
| Tires | 1.08 | 2.90% | 2.90% | 1.00 | 1.00 | 2.90% |
| Insurance | 3.04 | 8.17% | 8.17% | 1.20 | 1.00 | 9.81% |
| Registration | 0.93 | 2.50% | 2.50% | 1.10 | 1.00 | 2.75% |
| Depreciation | 17.44 | 46.89% | 46.89% | 1.00 | 0.95 | 44.54% |
| Financing | 3.34 | 8.97% | 8.97% | 1.00 | 1.00 | 8.97% |
| TOTAL | 37.20 | 100.00% | 100.00% | | | 114.18% |