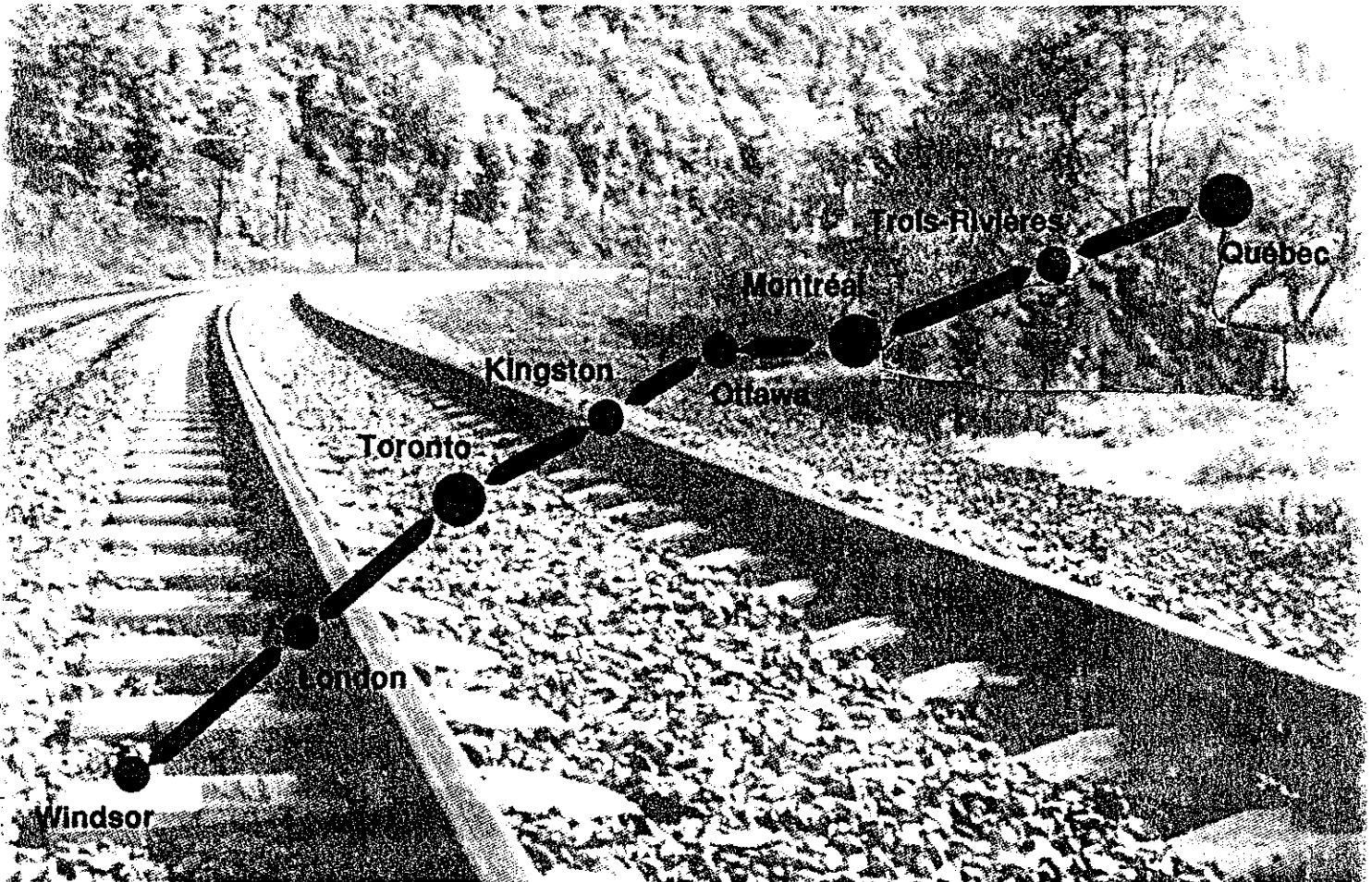


Quebec-Ontario High Speed Rail Project

Preliminary Routing Assessment and Costing Study

Interim Report No. 4 Development of Composite Representative Routes

February, 1994



SNC-LAVALIN and DELCAN

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1. INTRODUCTION

This **Interim Report**, prepared at the request of the Steering Committee in September 1993, documents the findings of an additional phase of the Routing Assessment and Costing Study leading to the development of Composite Representative Routes. The purpose of the additional phase was to investigate opportunities to lower the cost of representative routes for the 200-250 kph and the 300+ kph technologies by the adoption of lower alignment standards at specific locations and the acceptance of small increases in travel time due to the resulting speed restrictions.

The tasks carried out during this phase involved the following process:

- locate areas of costly capital works along original representative routes;
- identify infrastructure change from acceptance of speed restriction;
- develop alternative lower cost solution;
- calculate capital cost saving;
- carry out trade-off analysis for lower cost solution;
- conduct environmental overview of trade-offs; and
- derive composite representative routes.

In addition, this Interim Report also documents the identification and order-of-magnitude costing of possible links to Pearson and Dorval Airports, the cash flow requirements for the Composite Representative Routes and alternative technology/right-of-way combinations for the route segment between Ottawa and Montréal.

2. CAPITAL COST REDUCTION OPPORTUNITIES

2.1 TRADE-OFF OBJECTIVE

This chapter describes a trade-off analysis carried out with the objective of reducing the overall cost of route infrastructure. Cost reductions would be achieved by accepting a lower design operating speed on specific sections of the representative routes, thus permitting alignment geometry which avoids high infrastructure costs. The specific sections were to be selected to minimize the overall increase in travel time between city pairs as a result of the speed restrictions.

2.2 METHODOLOGY

In order to achieve the above objective, the following methodology was used:

- the detailed breakdown of the original cost estimates for each segment of the representative routes was scanned to identify locations along the routes requiring infrastructure with major costs;
- alternative lower cost methods of providing HSR infrastructure at these locations were developed, assuming reductions in the design operating speed;
- quantities of the major cost elements required for the alternative solutions were calculated, and quantities were also calculated for those elements removed from the original infrastructure definition;
- from these quantities and the unit costs adopted for the original cost estimates, the net reduction in infrastructure capital cost was determined for each location; and
- the alternative alignment definition for each location was provided to CIGGT to permit a re-calculation of travel time for each city pair affected.

2.3 LOCATIONS WITH POTENTIAL FOR COST REDUCTION

A brief description of each location identified and the alternative infrastructure solution proposed follows in this section with a summary in Table 2.1.

- a) Tunnelled section between Kitchener and Cambridge
(+ 300 kph New ROW and in combination with 200 and 300 kph Ex. ROW)

In the original alignment definition, this location required a 2.4 km long tunnel under Highway 401 to achieve geometry suitable for an operating speed up to 350 kph. This was due to the narrow width of the corridor between fully developed areas of Kitchener and Cambridge.

The cost of this section can be reduced by accepting a surface route with curves of 2000 m radius imposing a speed restriction of 210 kph for a distance of 7 km.

While a surface route would save the cost of the tunnel, some additional cost would be required for grade separation of roads in the section as well as property acquisition.

- b) Pearson Airport to Union Station
(+ 300 kph New ROW and in combination with 200 and 300 kph Ex. ROW)

This section of the original + 300 kph new ROW alignment carried significant land acquisition costs to achieve a cross-section and curvature suitable for speeds over 200 kph. Some of these costs can be reduced by accepting a 4.5 m track spacing and curves not exceeding 1750 m radius. This lower alignment standard would restrict speeds to 200 kph for a distance of 6.2 km between Weston Road and St. Clair Avenue. Although the governing curve radius would permit speeds of 235 kph with the tilt technology, the track spacing is considered acceptable only up to 200 kph.

**TABLE 2.1
CAPITAL COST REDUCTION OPPORTUNITIES**

LOCATIONS CONSIDERED	TRADE-OFF
a) HSR tunnel under Hwy 401 at Kitchener/Cambridge	<ul style="list-style-type: none"> • Surface alternatives requires sharper curves (6000-2000) • Commercial/industrial property required
b) Ex. ROW: Pearson Airport to Toronto Union Station	<ul style="list-style-type: none"> • 4.5 m track spacing and some track sharing to save ROW widening • Speed restricted to 200 kph
c) Toronto Union Station to East Oshawa	<ul style="list-style-type: none"> • As item (b) above
d) HSR tunnel near Trenton	<ul style="list-style-type: none"> • Surface alternative (viaduct and cuts) has greater visual/environmental impact • No speed restriction
e) HSR tunnel in Cartierville	<ul style="list-style-type: none"> • Surface alternative in ex. ROW restricts speed and requires underpass of CP
f) HSR tunnel in Laval	<ul style="list-style-type: none"> • Surface alternative in ex. ROW restricts speed and requires underpass of CP
g) HSR tunnel under Autoroute du Valon (Québec)	<ul style="list-style-type: none"> • Surface alternative in ex. CP/CN ROW restricts speed

- c) Union Station to East Oshawa
(+ 300 kph Ex. ROW and 200-250 kph Ex. ROW)

The acceptance of a track spacing of 4.5 m in this section provides the opportunity to reduce the high ROW acquisition costs included in the original cost estimate. Implicit in this track spacing assumption is a speed restriction of 200 kph for this 54.7 km section. Within this section there are also two zones where curve radii would have to be limited to the 1160-1400 m range to avoid expensive land costs. Speed through these zones would be further restricted to 160-175 kph for the non-tilting technology and 185-200 kph for tilting technology.

In addition to land cost savings, acceptance of the sharper curvature in East Oshawa removes the need for a 2 km viaduct section straddling Highway 401 by keeping the alignment south of the highway. A small portion of the viaduct cost saving would be offset by the need for a grade separation and local road relocation.

- d) Tunnelled section near Trenton
(+ 300 kph New ROW)

In the original alignment definition, a 1.8 km tunnel was included as a conservative approach to mitigate potential environmental impact in this hilly section adjacent to the Trent canal. Further review of the topography indicates that a combination of viaduct and cut section could be adopted with moderate environmental impact and without imposing a speed restriction.

- e) Tunnelled section south of Rivières des Prairie
(On representative route for all scenarios)

A 2.6 km tunnel was included in the original alignment definition to link the HSR right-of-way in the CN Mont Royal subdivision to the CP Lachute subdivision. This tunnel would bypass the sharp curvature of the wye tracks at the Jacques Cartier and de L'Est junctions. Most of the high cost of the tunnel can be avoided if the existing rail right-of-way between the junctions is used for HSR service and the resulting 100 kph speed restriction over a 3 km length of route is accepted. The alternative routing would still require a rail-over-rail grade separation to access the

CP right-of-way without conflict with freight traffic. Use of the existing right-of-way adds approx. 0.8 km to the route length in this segment.

- f) Tunnel in Laval
(On representative route for all scenarios)

The original alignment assumed a 2 km tunnel in the Laval urban area to bypass the 400 m radius curve at the St. Martin Junction. This tunnel provided the link between the CP Lachute and Trois Rivières Subdivisions. An alternative to the tunnelled section would have HSR tracks on the surface in the CP rights-of-way and passing through the St. Martin junction. The surface alternative is approximately 0.5 km longer.

- g) Underpass at Allenby Junction in Quebec
(On representative route for all scenarios)

The junction of the CP Trois Rivières and CN Bridge subdivisions at Allenby, west of Quebec, requires a 400 m radius curve to pass from one subdivision to the other. A 0.26 km tunnelled section was included in the original realignment of right-of-way to avoid the speed restriction imposed by the sharp curvature. If HSR speed is restricted to 110 kph through the junction the existing surface rights-of-way can be used for HSR tracks. It is likely that these tracks could be accommodated through the existing viaduct carrying the Autoroute Du Vallon over the junction.

2.4 REDUCTION IN INFRASTRUCTURE CAPITAL COST

The analysis of the locations described above focused on determining how much infrastructure capital cost could be traded off against operating speed reductions. For each location, an alternative less costly alignment definition was developed and the consequential restriction in operating speed determined.

The speed restrictions necessary at each location as well as the length over which they apply are listed in Table 2.2 for each of the technology/route combinations. This data was provided to the Technology Consultant for use in simulations to determine the travel time increases resulting from the speed restrictions. The results

Table 2.2
LOCATION WITH ALTERNATIVE ALIGNMENT/INFRASTRUCTURE DEFINITION
OPERATIONAL SPEED RESTRICTIONS

LOCATION	GOVERNING CURVE RADIUS m	SPEED RESTRICTION kph	LIMITS OF RESTRICTED SPEED (Local Chainages)	REPRESENTATIVE ROUTE
Kitchener/Cambridge	2000 2000	210 (180 cant, 0.05g.) 210 (180 cant, 0.05g.)	274-281 274-281	+ 300 New ROW + 300 New ROW used as 200 kph route
Pearson - Union Station	1750 1750	235 (300 comb, 0.05g.)* 200 (180 cant, 0.05g.)	12.9 - 19.1 12.9 - 19.1	200 - 250 using + 300 New ROW + 300 New ROW (S. Connector)
East Toronto	1160 1160	185 (300 comb, 0.05g.) 160 (180 cant, 0.05g.)	2362.7 - 2370.9 1367.3 - 1375.5	200-250 Ex. ROW + 300 Ex. ROW
Scarborough	1750 1750	235 (300 comb, 0.05g.)* 200 (180 cant, 0.05g.)	2370.9 - 2387.8 1375.5 - 1392.4	200-250 Ex. ROW + 300 Ex. ROW
Pickering	1400 1400	210 (300 comb, 0.05g.)* 175 (180 cant, 0.05g.)	2387.8 - 2391.6 1392.4 - 1396.2	200-250 Ex. ROW + 300 Ex. ROW
Whitby	3000 3000	No restriction ** 260 (180 cant, 0.05g.)	2391.6 - 2407.4 1396.2 - 1412.0	200 - 250 Ex. ROW + 300 Ex. ROW
East Oshawa	1750 1750	235 (300 comb, 0.05g.) 200 (180 cant, 0.05g.)	2407-2417; 2000-2001 1412-1422; 1000-1001	200-250 + 300 Ex. ROW
South of Rivières des Priarie (Ex. ROW through de L'Est and Jacques Cartier junctions)	300 300 300	100 (180 cant, 0.05g.) 100 (180 cant, 0.05g.) 100 (300 comb, 0.05g.)	14-17 1014-1017 2014-2017	+ 300 New ROW + 300 Ex. ROW 200-250 Ex. ROW
Laval (St. Martin Junction)	400 400 400	110 (180 cant, 0.05g.) 110 (180 cant, 0.05g.) 115 (300 comb, 0.05g.)	23.5-24.5 1023.5-1024.5 2023.5-2024.5	+ 300 New ROW + 300 Ex. ROW 200-250 Ex. ROW
Allenby Junction (Quebec)	400 400 400	110 (180 cant, 0.05g.) 110 (180 cant, 0.05g.) 115 (300 comb, 0.05g.)	271.2-271.7 1269.1-1269.6 2270.2-2270.7	+ 300 New ROW + 300 Ex. ROW 200-250 Ex. ROW

* Speed restricted to 200 Kph by 4.5 metre track centres.

** Speed restricted to 200 Kph by 4.5 metre track centres for west half of zone.

of these simulations have been submitted to the Project Manager as input to the trade-off analysis.

In addition to speed restrictions, the trade-offs will impact the environment as follows:

- surface routes replacing tunnels may require noise barriers;
- fewer residential and commercial properties will be affected except at Kitchener/Cambridge; and
- mitigation of visual and topographic impacts may be necessary in some locations.

The second part of the analysis comprised an assessment of the cost differences between the alternative and original alignment infrastructure requirements at each location. This assessment focused on the primary sub-system elements where significant cost differences were evident. Table 2.3 summarizes the net cost reductions achievable with the lower speed infrastructure, and Table 2.4 presents the associated travel time increases. These reductions are tabulated to reflect the derivation of the overall potential capital cost saving along the three primary representative route scenarios.

**Table 2.3
SUMMARY OF INFRASTRUCTURE COST REDUCTIONS**

Location	Segment	Cost Reduction on Representative Routes (\$ 000)		
		+ 300 New ROW	+ 300 Ex. ROW	200-250 Ex. ROW
a) Tunnelled section Kitchener/Cambridge	WTO-B0 WT1-New WT2-New	68,000 (\$113,000 civil minus \$45,000 land)	68,000	68,000
b) Pearson Airport to Union Station	WTO-C1 WT1-New WT2-New	8,300 (All land)	8,300	8,300
c) Union Station to East Oshawa	TMO-A1 TM1-A0 TM2-A0	12,000 (All land)	130,120 (\$58,720 civil plus \$71,400 land)	130,120
d) Tunnelled section near Trenton	TMO-B1	70,327	-	-
e) Tunnelled section south of Rivières-des- Prairie	TMO-H0 TM1-J0 MQ2-A0	80,711	80,711	80,711
f) Tunnel in Laval	MQ0-B0 MQ1-B0 MQ2-A0	66,320	66,320	66,320
g) Underpass at Allenby Junction in Quebec	MQ0-C0 MQ1-C0 MQ2-B0	8,200	8,200	8,200
Total of all Locations on Representative Routes		313,858	361,651	361,651

- Note:**
1. Percentage allowances for contingency and professional services/project management are not included in the above totals.
 2. Breakdown of infrastructure cost reductions is presented in Appendix A.

**TABLE 2.4
COST REDUCTION TRADE-OFF RESULTS**

LOCATION	NET COST SAVING (\$ MILLION)	TRAVEL TIME INCREASE (MINS.)	
		200 kph	300 kph
a) 401/Kitchener	\$68	under 0.5 in 60 mins. (Toronto-London)	under 0.5 in 42 mins (Toronto-London)
b) Pearson-Union Sta.	\$8		
c) Union Sta.-E. Oshawa	\$130		
d) Trenton tunnel	\$70	1.75 mins. in 205 mins. (Toronto-Montréal)	7.5 mins. in 153 mins. (Toronto-Montréal)
e) Cartierville tunnel	\$81		
f) Laval tunnel	\$66	2.5 mins. in 94 mins. (Montréal-Québec)	3 mins. in 72 mins. (Montréal-Québec)
g) Québec tunnel	\$8		

*All travel times are for non-stop trains.

3 ENVIRONMENTAL IMPACT

This section describes the potential environmental effects of introducing the alternative infrastructure solutions, described in Section 2.3 in terms of net environmental benefits and disadvantages.

- a) Tunnelled Section Between Kitchener and Cambridge
(+ 300 kph New ROW and in combination with 200 and 300 kph Ex. ROW)

The major environmental components affected are Provincially Significant Features; Ecological Reserves/Wildlife Areas; and Rural Communities. Impacts for all other components considered appear to be similar for the two route segments components. In summary, the alternative solution exhibits net disadvantages relative to the environmental factors considered.

Major impacts are related to the proximity of the alternative route to Puslinch Lake and environs, situated south of Highway 401 just east of the Cambridge urban area. The impacts of the more costly (tunnel) route would be limited to crossing of the Class 6 Irish Creek wetland complex north of Highway 401. The alternative route will traverse 2.0 km of Class 1 wetland associated with and north of the Puslinch Lake complex.

The alternative route will also be in very close proximity (within 100 m) of the Puslinch Lake area which exhibits the following natural sensitivities:

- Class 1 wetland complex;
- major waterfowl staging/breeding area; and
- Crown Game Preserve.

In terms of potential social impacts, the alternative alignment introduces new concerns for two (2) clusters of permanent/seasonal residences immediately to the north of Puslinch Lake - Barber's Beach (approximately 35 residences) and Little Lake (approximately 15 residences) - which are situated within 250 m of the route. Seasonal recreational areas within this area include two (2) extensive campground operations.

Immediately to the east of the Puslinch Lake area, the alternative introduces the additional impact of severing 3.0 km² (lineal impact over 3 km) of MNR lands on the south side of Highway 401 which are considered by the Ministry to have significant recreational potential.

There appears to be little difference in the two route segment options with respect to nuisance effects (e.g. noise and vibration) in the immediate vicinity of the tunnel area since adjacent land uses are primarily industrial-commercial in nature.

- b) Pearson Airport to Union Station
(+ 300 kph New ROW in combination with 200 and 300 kph Ex. ROW)

The significant differences in this route segment are related primarily to land acquisition costs. There are no apparent major implications with respect to the environmental components considered. The 200 kph speed restriction imposed by geometric constraints over an extended (6.2 km) section may result in a net reduction in noise impacts to sensitive uses adjacent to the rail line, although industrial lands are predominant in the corridor.

- c) Union Station to East Oshawa
(+ 300 kph Ex. ROW and 200-250 kph Ex. ROW)

The major environmental considerations on this Lakeshore corridor route segment are related to natural elements at the Rouge River crossing in the City of Scarborough and impacts to Darlington Provincial Park immediately east of the City of Oshawa.

Between the Rouge River and Petticoat Creek the alternative solution reverts to the existing rail corridor from the original (maximum) 90 m offset which included relocation of the existing CN Rail line. Although the lineal dimensions are similar for the two route segments - 1.0 km through the Rouge Lakeshore Swale ESA and Rouge Marsh Class 1 wetland; 3.0 km through the Rouge Park limits; and 0.2 km through the Petticoat Creek ESA - greater use of the existing rail corridor and reduced offsets for the new corridor will reduce earthworks and structural requirements and their associated impacts (e.g. filling/compaction of wetland area,

construction impacts to warm water fisheries/migratory runs, restrictions on valley wildlife/recreation corridors).

At the East Oshawa location, any cost savings should be weighed against the potential for encroachment over the full length (2.2 km) on Darlington Provincial Park, since the high speed corridor will be located on the south side of the existing rail line. Impacts to the other major sensitivity in the area - the Class 1 Second Marsh wetland complex - are similar for the two options.

- d) Tunnelled section near Trenton
(+ 300 kph New ROW)

East of the Trent Canal, the alignment enters an agricultural zone area. Moderate impact is therefore anticipated with the adoption of a surface route in lieu of the tunnelled section.

- e) Tunnelled section south of Rivières des Prairie
(On representative route for all scenarios)

In Montréal, a tunnel was originally proposed to avoid two sharp curves on the route linking the CN Deux-Montagnes line and the CP line in Laval. These two curves will severely limit the speed of the HSR from the St. Martin Junction to Central Station.

The local environmental impacts, will be noise impacts and visual impacts in relation to adjacent land uses. It should be noted that residential uses are more sensitive to noise and visual disruption than industrial uses.

In general, the use of existing right-of-way by HSR provides the opportunity to implement noise mitigation measures, which could reduce the overall noise associated with rail traffic and not just the noise associated with HSR. It therefore follows that the construction of tunnels cannot be associated necessarily with noise level reduction in the case of the use of tunnels compared to the sharing of existing ROW.

Another impact of the sharing of existing ROW is the modification of the visual environment resulting from the installation of noise barriers, intrusion control fences

and electrical power lines. From that perspective, a tunnel does not provide these disruption but it should be considered that existing ROW already represents visual barriers (and physical barriers) in the urban environment. Mitigation measures such as earth berms and planting provide the opportunity when space is available to improve the visual and physical integration of the existing ROW that would be shared with the HSR.

On the Montréal Island, the proposed route crosses medium density residential areas over half of its course. It also crosses industrial areas over the remainder. About one hundred residential buildings are situated in close proximity to the proposed right-of-way and a much larger number could also be affected by the noise resulting from HSR operation. Some high density residential buildings, including more than two hundred individual apartments, are also located near the right-of-way.

f) Tunnel in Laval
(On representative route for all scenarios)

From the east, the HSR route enters Laval (Ile Jesus) by the CP right-of-way, just south of Terrebonne. It first crosses a protected agricultural zone and then vacant residential land (south and north of right-of-way) and vacant industrial land (north of right-of-way), before reaching the important established neighbourhood of Saint-Vincent-de-Paul. From the Saint-Vincent-de-Paul neighbourhood to St. Martin Junction, the right-of-way mostly travels through vacant industrial land and industrial land. From St. Martin Junction to Concorde Boulevard, it travels along an existing industrial zone on one side and a residential neighbourhood on the other side. Due to the fact that this neighbourhood is recent, the houses are generally located at a reasonable distance from the CP right-of-way. South of the Concorde Boulevard, about fifty houses are located in close proximity to the CP right-of-way. A large number of small industrial buildings are located in the same segment, on the other side of the right-of-way.

A tunnel was originally proposed at St. Martin Junction in order to improve the curve radius and allow higher speed through this section. Removal of the tunnelled section will not cause severe impacts since at this location, houses are located at a reasonable distance from the right-of-way and sufficient space is available for the installation of noise barriers and landscaping. The land north of the curve is vacant.

- g) Underpass at Allenby junction in Québec
(On representative route for all scenarios)

From the west, the HSR route enters Québec using the CP right-of-way south of the Québec International Airport. It then has to reach the CN right-of-way to access the Gare du Palais. The junction between the existing CP and CN tracks is located under the Autoroute du Vallon. A new alignment leading to a tunnel was originally proposed at this location to improve the curve radius and avoid a rail-to-rail crossing.

From the Airport surroundings to the junction, the route travels through industrial and vacant industrial land for the most part. About fifty single-family dwellings (Laurentien and Les Saules neighbourhoods) are in close proximity to the right-of-way. As a result of the new alignment originally proposed, half of the residences were no longer in proximity to the HSR right-of-way.

The originally proposed new alignment had the disadvantage of leaving an unusable parcel of land between the existing right-of-way and the new one. Another disadvantage of the originally proposed new alignment is that the benefits of mitigation measures and intrusion barriers would only relate to the HSR right-of-way and would not apply to the existing right-of-way. The new alignment and the tunnel can nevertheless be associated with speed and safety improvements, compared to the right-of-way sharing proposal.

4 DEVELOPMENT OF COMPOSITE REPRESENTATIVE ROUTES

Following the analysis of capital cost reduction opportunities identified in Section 2, the development of composite representative routes commenced with the tabulation of a series of combination scenarios derived from individual costs of the segments making up the original representative routes. These scenarios presented a range of combination options incorporating the lowest cost infrastructure required to serve alternative travel markets. In combinations where cost vs. speed trade-offs are included, the totals reflect the cost reductions for the specific locations.

Where 300 kph segments have been included in the 200-250 kph scenarios to complete a route or reach a particular location (e.g. Pearson Airport), the cost of the fully grade-separated segment has been retained. This approach is recommended since in most cases these 300 kph segments are "new ROW" and guidelines issued by Transport Canada indicated that new at-grade crossings on new ROW would not be acceptable.

In all scenarios, the original estimated cost of acquisition of existing railway ROW has been included.

The scenarios prepared can be summarized as follows:

Table 4.1	A route for each technology made up of a combination of the segments required to reach Pearson and Mirabel airports and the lowest cost segments elsewhere in the corridor. Cost savings from cost/speed trade-offs are not included.
Table 4.2	The scenario as described for Table 4.1 but with cost/speed trade-offs included.
Table 4.3	A route for each technology made up of a combination of the segments serving Hamilton and Mirabel for 300 kph, Pearson and Dorval for 200-250 kph, and the lowest cost segments elsewhere including all cost/speed trade offs.

Table 4.4 The scenario as described for Table 4.2 i.e serving Pearson and Mirabel airports and including cost/speed trade-offs, but with the recently completed revised Hull-Mirabel segment (partial Lachute ROW).

The capital costs for each of the scenarios are tabulated below:

Scenario	300 kph (\$ billion)	200-250 kph (\$ billion)
Combination serving Pearson and Mirabel (excl. cost/speed trade-offs) - Table 4.1.	8.16	7.12
Combination serving Pearson and Mirabel (incl. cost/speed trade-offs) - Table 4.2.	7.59	6.64
Combination serving Hamilton/Mirabel for 300 kph, and Pearson/Dorval for 200-250 kph (incl. cost/speed trade-offs) - Table 4.3.	7.09	6.81
Combination through Hull serving Pearson and Mirabel (incl. cost/speed trade-offs) - Table 4.4.	7.72	6.79

Clearly, any of the above combinations can be assembled without the cost/speed trade-offs. Also, the Hamilton scenario can be combined with the Hull routing or either Montréal Airport option.

The above combinations were submitted to the Technical Advisory Committee as the range of options from which Composite Representative Routes would be selected.

QUEBEC-WINDSOR HSR PROJECT					TABLE 4.1
Preliminary Routing Assessment and Costing					
Optimization of Routes					
Combination Routes Serving Pearson and Mirabel Airports (excl. cost/speed trade-offs)					
Over 300 kph Technology			200-250 kph Technology		
Segment	Type of ROW	Capital Cost	Segment	Type of ROW	Capital Cost
Windsor Sta.	NA	\$16,135,838	Windsor Sta.	NA	\$16,135,838
Windsor-London	300 Ex.	\$1,003,294,584	Windsor-London	200 Ex.	\$714,379,544
London Sta.	NA	\$20,706,614	London Sta.	NA	\$11,045,047
London-Pearson	300 New	\$1,163,674,373	London-Pearson	300 New	\$1,163,674,373
Kitchener Sta.	NA	\$15,190,095	Kitchener Sta.	NA	\$15,190,095
C/S T-o:Hwy 401	300 New		C/S T-o:Hwy 401	300 New	
Pearson Sta.	NA	\$244,977,252	Pearson Sta.	NA	\$244,977,252
Pearson-Union	300 New	\$287,176,656	Pearson-Union	300 New	\$287,176,656
C/S T-o:Pearson-Union	300 New		C/S T-o:Pearson-Union	300 New	
Union Sta.	NA	\$34,651,547	Union Sta.	NA	\$34,651,547
Union-Oshawa	300 Ex.	\$523,802,011	Union-Oshawa	200 Ex.	\$505,756,142
E. Toronto Sta.	NA	\$12,515,813	E. Toronto Sta.	NA	\$12,515,813
C/S T-o:Union-Oshawa	300 Ex.		C/S T-o:Union-Oshawa	200 Ex.	
Oshawa-Kingston	300Ex-New	\$1,356,585,609	Oshawa-Kingston	200 Ex.	\$849,270,351
C/S T-o:Trenton	300 New		Kingston Sta.	NA	\$15,438,462
Kingston Sta.	NA	\$15,438,462	Kingston-Smiths Falls	300 Ex.(new)	\$549,504,663
Kingston-Smiths Falls	300 Ex.(new)	\$549,504,663	Sm. Falls-Richmond	200 Ex.	\$87,408,268
Sm. Falls-Richmond	300 New(ex.)	\$88,673,382	Richmond-Ottawa	200 Ex.	\$249,302,681
Richmond-Ottawa	300 Ex.	\$262,187,935	Ottawa Sta.(VIA)	NA	\$26,939,577
Ottawa Sta.(VIA)	NA	\$26,939,577	Ottawa-Mirabel Airport	300 Ex.	\$683,006,757
Ottawa-Mirabel Airport	300 Ex.	\$683,006,757	Mirabel Airport Sta.	NA	\$18,961,954
Mirabel Airport Sta.	NA	\$18,961,954	Mir. Apt.-St. Mtn Jct	300 Ex.	\$162,420,364
Mir. Apt.-St. Mtn Jct	300 Ex.	\$162,420,364	St. Mtn Jct-Montreal	300 Ex.	\$212,551,924
St. Mtn Jct-Montreal	300 Ex.	\$212,551,924	Laval Sta.	NA	\$18,659,014
Laval Sta.	NA	\$18,659,014	C/S T-o:Tunnel R des P	200 Ex.	
C/S T-o:Tunnel R des P	300 Ex.		Montreal Sta.(Central)	NA	\$36,636,302
Montreal Sta.(Central)	NA	\$36,636,302	Montreal-St. Mtn Jct	200 Ex.	included above
Montreal-St. Mtn Jct	300 Ex.	included above	C/S T-o: Tunnel Laval	200 Ex.	
C/S T-o: Tunnel Laval	300 Ex.		St. Mtn Jct-Tr. Rivs	200 Ex.	\$588,668,214
St. Mtn Jct-Tr. Rivs	300 Ex.	\$667,086,507	Trois Rivieres Sta.	NA	\$14,270,328
Trois Rivieres Sta.	NA	\$14,270,328	Tr. Rivieres. - Quebec	200 Ex.	\$564,209,313
Tr. Rivieres. - Quebec	300 Ex.	\$687,391,289	C/S T-o:Allenby Tunnel	200 Ex.	
C/S T-o:Allenby Tunnel	300 Ex.		Anc.-Lor. Sta.	NA	\$13,979,869
Anc.-Lor. Sta.	NA	\$13,979,869	Quebec Sta.(G du P)	NA	\$20,952,005
Quebec Sta.(G du P)	NA	\$20,952,005			
		\$8,157,370,724			\$7,117,682,353

NA : Not Applicable

300 Ex.(New) : A segment of new ROW forming part or the 300 Ex. representative route.

300 New(ex.) : A segment of existing ROW used as part of the 300 New representative route

C/S T-o : A saving in capital cost due to a Cost/Speed trade-off

Note : Breakdown of savings in capital cost is presented in Appendix B.

QUEBEC-WINDSOR HSR PROJECT

TABLE 4.2

Preliminary Routing Assessment and Costing
Optimization of Routes

Combination Routes Serving Pearson and Mirabel Airports including cost/speed trade-offs

Over 300 kph Technology			200-250 kph Technology		
Segment	Type of ROW	Capital Cost	Segment	Type of ROW	Capital Cost
Windsor Sta.	NA	\$16,135,838	Windsor Sta.	NA	\$16,135,838
Windsor-London	300 Ex.	\$1,003,294,584	Windsor-London	200 Ex.	\$714,379,544
London Sta.	NA	\$20,706,614	London Sta.	NA	\$11,045,047
London-Pearson	300 New	\$1,163,674,373	London-Pearson	300 New	\$1,163,674,373
Kitchener Sta.	NA	\$15,190,095	Kitchener Sta.	NA	\$15,190,095
C/S T-o:Hwy 401	300 New	(\$90,997,417)	C/S T-o:Hwy 401	300 New	(\$90,997,417)
Pearson Sta.	NA	\$244,977,252	Pearson Sta.	NA	\$244,977,252
Pearson-Union	300 New	\$287,176,656	Pearson-Union	300 New	\$287,176,656
C/S T-o:Pearson-Union	300 New	(\$10,050,737)	C/S T-o:Pearson-Union	300 New	(\$10,050,737)
Union Sta.	NA	\$34,651,547	Union Sta.	NA	\$34,651,547
Union-Oshawa	300 Ex.	\$523,802,011	Union-Oshawa	200 Ex.	\$505,756,142
E. Toronto Sta.	NA	\$12,515,813	E. Toronto Sta.	NA	\$12,515,813
C/S T-o:Union-Oshawa	300 Ex.	(\$172,296,909)	C/S T-o:Union-Oshawa	200 Ex.	(\$172,296,909)
Oshawa-Kingston	300Ex-New	\$1,356,585,609	Oshawa-Kingston	200 Ex.	\$849,270,351
C/S T-o:Trenton	300 New	(\$97,255,797)	Kingston Sta.	NA	\$15,438,462
Kingston Sta.	NA	\$15,438,462	Kingston-Smiths Falls	300 Ex.(new)	\$549,504,663
Kingston-Smiths Falls	300 Ex.(new)	\$549,504,663	Sm. Falls-Richmond	200 Ex.	\$87,408,268
Sm. Falls-Richmond	300 New(ex.)	\$88,673,382	Richmond-Ottawa	200 Ex.	\$249,302,681
Richmond-Ottawa	300 Ex.	\$262,187,935	Ottawa Sta.(VIA)	NA	\$26,939,577
Ottawa Sta.(VIA)	NA	\$26,939,577	Ottawa-Mirabel Airport	300 Ex.	\$683,006,757
Ottawa-Mirabel Airport	300 Ex.	\$683,006,757	Mirabel Airport Sta.	NA	\$18,961,954
Mirabel Airport Sta.	NA	\$18,961,954	Mir. Apt.-St. Mtn Jct	300 Ex.	\$162,420,364
Mir. Apt.-St. Mtn Jct	300 Ex.	\$162,420,364	St. Mtn Jct-Montreal	300 Ex.	\$212,551,924
St. Mtn Jct-Montreal	300 Ex.	\$212,551,924	Laval Sta.	NA	\$16,659,014
Laval Sta.	NA	\$18,659,014	C/S T-o:Tunnel R des P	200 Ex.	(\$104,493,925)
C/S T-o:Tunnel R des P	300 Ex.	(\$104,493,925)	Montreal Sta.(Central)	NA	\$36,636,302
Montreal Sta.(Central)	NA	\$36,636,302	Montreal-St. Mtn Jct	200 Ex.	included above
Montreal-St. Mtn Jct	300 Ex.	included above	C/S T-o: Tunnel Laval	200 Ex.	(\$86,224,697)
C/S T-o: Tunnel Laval	300 Ex.	(\$86,224,697)	St. Mtn Jct-Tr. Rivs	200 Ex.	\$588,668,214
St. Mtn Jct-Tr. Rivs	300 Ex.	\$667,086,507	Trois Rivieres Sta.	NA	\$14,270,328
Trois Rivieres Sta.	NA	\$14,270,328	Tr. Rivieres. - Quebec	200 Ex.	\$564,209,313
Tr. Rivieres. - Quebec	300 Ex.	\$687,391,289	C/S T-o:Allenby Tunnel	200 Ex.	(\$10,566,429)
C/S T-o:Allenby Tunnel	300 Ex.	(\$10,566,429)	Anc.-Lor. Sta.	NA	\$13,979,869
Anc.-Lor. Sta.	NA	\$13,979,869	Quebec Sta.(G du P)	NA	\$20,952,005
Quebec Sta.(G du P)	NA	\$20,952,005			
		\$7,585,484,813			\$6,641,052,239

NA : Not Applicable

300 Ex.(New) : A segment of new ROW forming part of the 300 Ex. representative route

300 New(ex.) : A segment of existing ROW used as part of the 300 New representative route

C/S T-o : A saving in capital cost due to a Cost/Speed trade-off

Note : Breakdown of savings in capital cost is presented in Appendix B.

QUEBEC-WINDSOR HSR PROJECT					TABLE 4.3
Preliminary Routing Assessment and Costing					
Optimization of Routes					
Combination Routes Serving Hamilton/Mirabel (300kph), Pearson/Dorval (200kph)					
Over 300 kph Technology			200-250 kph Technology		
Segment	Type of ROW	Capital Cost	Segment	Type of ROW	Capital Cost
Windsor Sta.	NA	\$16,135,838	Windsor Sta.	NA	\$16,135,838
Windsor-London	300 Ex.	\$1,003,294,584	Windsor-London	200 Ex.	\$714,379,544
London Sta.	NA	\$20,706,614	London Sta.	NA	\$11,045,047
London-Hamilton	300 Ex.	\$841,232,227	London-Pearson	300 New	\$1,163,674,373
Hamilton/Burl. Sta.	NA	\$13,125,569	Kitchener Sta.	NA	\$15,190,095
C/S T-o:Hamilton tunnel	300 Ex.	(\$204,280,300)	C/S T-o:Hwy 401	300 New	(\$90,997,417)
Hamilton-Union	300 Ex.	\$529,766,572	Pearson Sta.	NA	\$244,977,252
C/S T-o:Hamilton-Union	300 Ex.	(\$68,666,750)	Pearson-Union	300 New	\$287,176,656
Union Sta.	NA	\$34,651,547	C/S T-o:Pearson-Union	300 New	(\$10,050,737)
Union-Oshawa	300 Ex.	\$523,802,011	Union Sta.	NA	\$34,651,547
E. Toronto Sta.	NA	\$12,515,813	Union-Oshawa	200 Ex.	\$505,756,142
C/S T-o:Union-Oshawa	300 Ex.	(\$172,296,909)	E. Toronto Sta.	NA	\$12,515,813
Oshawa-Kingston	300Ex-New	\$1,356,585,609	C/S T-o:Union-Oshawa	200 Ex.	(\$172,296,909)
C/S T-o:Trenton	300 New	(\$97,255,797)	Oshawa-Kingston	200 Ex.	\$849,270,351
Kingston Sta.	NA	\$15,438,462	Kingston Sta.	NA	\$15,438,462
Kingston-Smiths Falls	300 Ex.(new)	\$549,504,663	Kingston-Smiths Falls	300 Ex.(new)	\$549,504,663
Sm. Falls-Richmond	300 New(ex.)	\$88,673,382	Sm. Falls-Richmond	200 Ex.	\$87,408,268
Richmond-Ottawa	300 Ex.	\$262,187,935	Richmond-Ottawa	200 Ex.	\$249,302,681
Ottawa Sta.(VIA)	NA	\$26,939,577	Ottawa Sta.(VIA)	NA	\$26,939,577
Ottawa-Mirabel Airport	300 Ex.	\$683,006,757	Ottawa-Dorion	200 Ex.	\$728,160,853
Mirabel Airport Sta.	NA	\$18,961,954	Dorval Airport Sta.	NA	\$114,795,639
Mir. Apt.-St. Mtn Jct	300 Ex.	\$162,420,364	Dorion - Montreal	200 Ex.	\$194,990,039
St. Mtn Jct-Montreal	300 Ex.	\$212,551,924	Montreal Sta.(Central)	NA	\$36,636,302
Laval Sta.	NA	\$18,659,014	Montreal-Trois-Rivieres	200 Ex.	\$799,443,552
C/S T-o:Tunnel R des P	300 Ex.	(\$104,493,925)	Laval Sta.	NA	\$18,659,014
Montreal Sta.(Central)	NA	\$36,636,302	C/S T-o:Tunnel R des P	200 Ex.	(\$104,493,925)
Montreal-St. Mtn Jct	300 Ex.	included above	C/S T-o: Tunnel Laval	200 Ex.	(\$86,224,697)
C/S T-o: Tunnel Laval	300 Ex.	(\$86,224,697)	Trois Rivieres Sta.	NA	\$14,270,328
St. Mtn Jct-Tr. Rivs	300 Ex.	\$667,086,507	Tr. Rivieres. - Quebec	200 Ex.	\$564,209,313
Trois Rivieres Sta.	NA	\$14,270,328	C/S T-o:Allenby Tunnel	200 Ex.	(\$10,566,429)
Tr. Rivieres. - Quebec	300 Ex.	\$687,391,289	Anc.-Lor. Sta.	NA	\$13,979,869
C/S T-o:Allenby Tunnel	300 Ex.	(\$10,566,429)	Quebec Sta.(G du P)	NA	\$20,952,005
Anc.-Lor. Sta.	NA	\$13,979,869			
Quebec Sta.(G du P)	NA	\$20,952,005			
		\$7,086,691,909			\$6,814,833,109

NA : Not Applicable

300 Ex.(New) : A segment of new ROW forming part of the 300 Ex. representative route

300 New (ex.) : A segment of existing ROW used as part of the 300 New representative route

C/S T-o : A saving in capital cost due to a Cost/Speed trade-off

Note : Breakdown of savings in capital cost is presented in Appendix B.

QUEBEC-WINDSOR HSR PROJECT					TABLE 4.4
Preliminary Routing Assessment and Costing					
Optimization of Routes					
Combination Routes Through Hull and Serving Pearson and Mirabel Airports					
Over 300 kph Technology			200-250 kph Technology		
Segment	Type of ROW	Capital Cost	Segment	Type of ROW	Capital Cost
Windsor Sta.	NA	\$16,135,838	Windsor Sta.	NA	\$16,135,838
Windsor-London	300 Ex.	\$1,003,294,584	Windsor-London	200 Ex.	\$714,379,544
London Sta.	NA	\$20,706,614	London Sta.	NA	\$11,045,047
London-Pearson	300 New	\$1,163,674,373	London-Pearson	300 New	\$1,163,674,373
Kitchener Sta.	NA	\$15,190,095	Kitchener Sta.	NA	\$15,190,095
C/S T-o:Hwy 401	300 New	(\$90,997,417)	C/S T-o:Hwy 401	300 New	(\$90,997,417)
Pearson Sta.	NA	\$244,977,252	Pearson Sta.	NA	\$244,977,252
Pearson-Union	300 New	\$287,176,656	Pearson-Union	300 New	\$287,176,656
C/S T-o:Pearson-Union	300 New	(\$10,050,737)	C/S T-o:Pearson-Union	300 New	(\$10,050,737)
Union Sta.	NA	\$34,651,547	Union Sta.	NA	\$34,651,547
Union-Oshawa	300 Ex.	\$523,802,011	Union-Oshawa	200 Ex.	\$505,756,142
E. Toronto Sta.	NA	\$12,515,813	E. Toronto Sta.	NA	\$12,515,813
C/S T-o:Union-Oshawa	300 Ex.	(\$172,296,909)	C/S T-o:Union-Oshawa	200 Ex.	(\$172,296,909)
Oshawa-Kingston	300Ex-New	\$1,356,585,609	Oshawa-Kingston	200 Ex.	\$849,270,351
C/S T-o:Trenton	300 New	(\$97,255,797)	Kingston Sta.	NA	\$15,438,462
Kingston Sta.	NA	\$15,438,462	Kingston-Smiths Falls	300 Ex.(new)	\$549,504,663
Kingston-Smiths Falls	300 Ex.(new)	\$549,504,663	Sm. Falls-Richmond	200 Ex.	\$87,408,268
Sm. Falls-Richmond	300 New(ex.)	\$88,673,382	Richmond-Hull	300 Ex.	\$332,626,555
Richmond-Hull	300 Ex.	\$332,626,555	Hull Sta.	NA	\$32,061,531
Hull Sta.	NA	\$32,061,531	Hull-Mirabel Airport	300 Ex.	\$738,591,081
Hull-Mirabel Airport	300 Ex.	\$738,591,081	Mirabel Airport Sta.	NA	\$18,961,954
Mirabel Airport Sta.	NA	\$18,961,954	Mir. Apt.-St. Mtn Jct	300 Ex.	\$162,420,364
Mir. Apt.-St. Mtn Jct	300 Ex.	\$162,420,364	St. Mtn Jct-Montreal	300 Ex.	\$212,551,924
St. Mtn Jct-Montreal	300 Ex.	\$212,551,924	Laval Sta.	NA	\$18,659,014
Laval Sta.	NA	\$18,659,014	C/S T-o:Tunnel R des P	200 Ex.	(\$104,493,925)
C/S T-o:Tunnel R des P	300 Ex.	(\$104,493,925)	Montreal Sta.(Central)	NA	\$36,636,302
Montreal Sta.(Central)	NA	\$36,636,302	Montreal-St. Mtn Jct	200 Ex.	included above
Montreal-St. Mtn Jct	300 Ex.	included above	C/S T-o: Tunnel Laval	200 Ex.	(\$86,224,697)
C/S T-o: Tunnel Laval	300 Ex.	(\$86,224,697)	St. Mtn Jct-Tr. Rivs	200 Ex.	\$588,668,214
St. Mtn Jct-Tr. Rivs	300 Ex.	\$667,086,507	Trois Rivieres Sta.	NA	\$14,270,328
Trois Rivieres Sta.	NA	\$14,270,328	Tr. Rivieres. - Quebec	200 Ex.	\$564,209,313
Tr. Rivieres. - Quebec	300 Ex.	\$687,391,289	C/S T-o:Allenby Tunnel	200 Ex.	(\$10,566,429)
C/S T-o:Allenby Tunnel	300 Ex.	(\$10,566,429)	Anc.-Lor. Sta.	NA	\$13,979,869
Anc.-Lor. Sta.	NA	\$13,979,869	Quebec Sta.(G du P)	NA	\$20,952,005
Quebec Sta.(G du P)	NA	\$20,952,005			
		\$7,716,629,711			\$6,787,082,391

NA : Not Applicable

300 Ex.(New) : A segment of new ROW forming part of the 300 Ex. representative route

300 New(ex.) : A segment of existing ROW used as part of the 300 New representative route

C/S T-o : A saving in capital cost due to a Cost/Speed trade-off

Note : Breakdown of savings in capital cost is presented in Appendix B.

5 THE COMPOSITE REPRESENTATIVE ROUTES

Composite representative routes for the 200-250 kph and the 300+ kph technologies were selected from combinations of segments of the original representative routes presented in Section 4 and use of lower cost infrastructure at cost reduction locations. The alternative route between Ottawa/Hull and Montréal using the CP Lachute ROW has been used where possible.

The rationale for, and choice of, the composite representative routes are shown in Figures 5.1 & 5.2 with a summary of the capital costs in Table 5.1.

These two routes were selected as representative of the lowest cost infrastructure required to serve the specific travel markets identified by the Technical Advisory Committee based on ridership forecasting results, e.g. the Kitchener-Waterloo/Cambridge area and Pearson, Mirabel and Dorval airport links.

SEGMENT	200-250 KPH	300 KPH
Windsor - London	\$742	\$1,040
London - Toronto	\$1,645	\$1,645
Toronto - Ottawa/Hull	\$2,124	\$2,566
Ottawa/Hull - Montréal	\$1,074	\$1,159 (NS) \$1,028 (SS)
Montréal - Québec	\$1,230	\$1,307
Total	\$6,815	\$7,717 \$7,586

COMPOSITE REPRESENTATIVE ROUTE: 200-250 KPH TECHNOLOGY

LONDON - TORONTO

- Cost: \$1,645 million
- ROW: New 300 kph
- Stations:
 - Kitchener (sub.)
 - Pearson Airport
 - Toronto Union
- New ROW routing has higher ridership potential.

WINDSOR - LONDON

- Cost: \$742 million
- ROW: Existing
- Stations:
 - Windsor (suburban)
 - London (downtown)
- Use of ex. ROW assumes consolidation of CP freight onto Caso.

TORONTO - OTTAWA/HULL

- Cost: \$2,124 million
- ROW:
 - Ex: (Tor-Kingston)
 - New: (Kingston-S. Falls)
 - Ex: (S. Falls-Ottawa)
- Station:
 - East Toronto
 - Kingston (suburban)
 - Ottawa (VIA)
- New 300 kph ROW between Kingston and S. Falls offers time saving for similar cost.

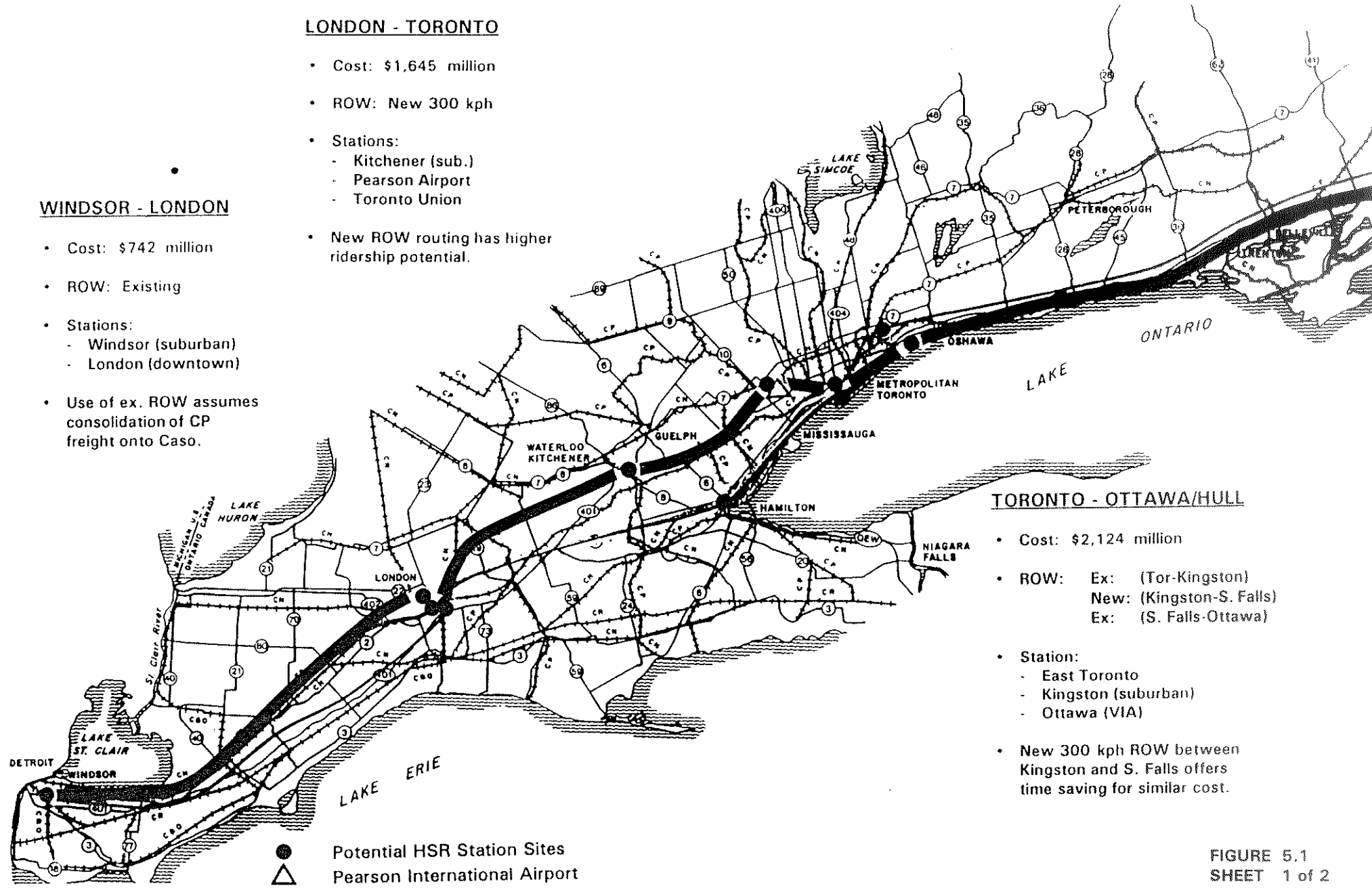
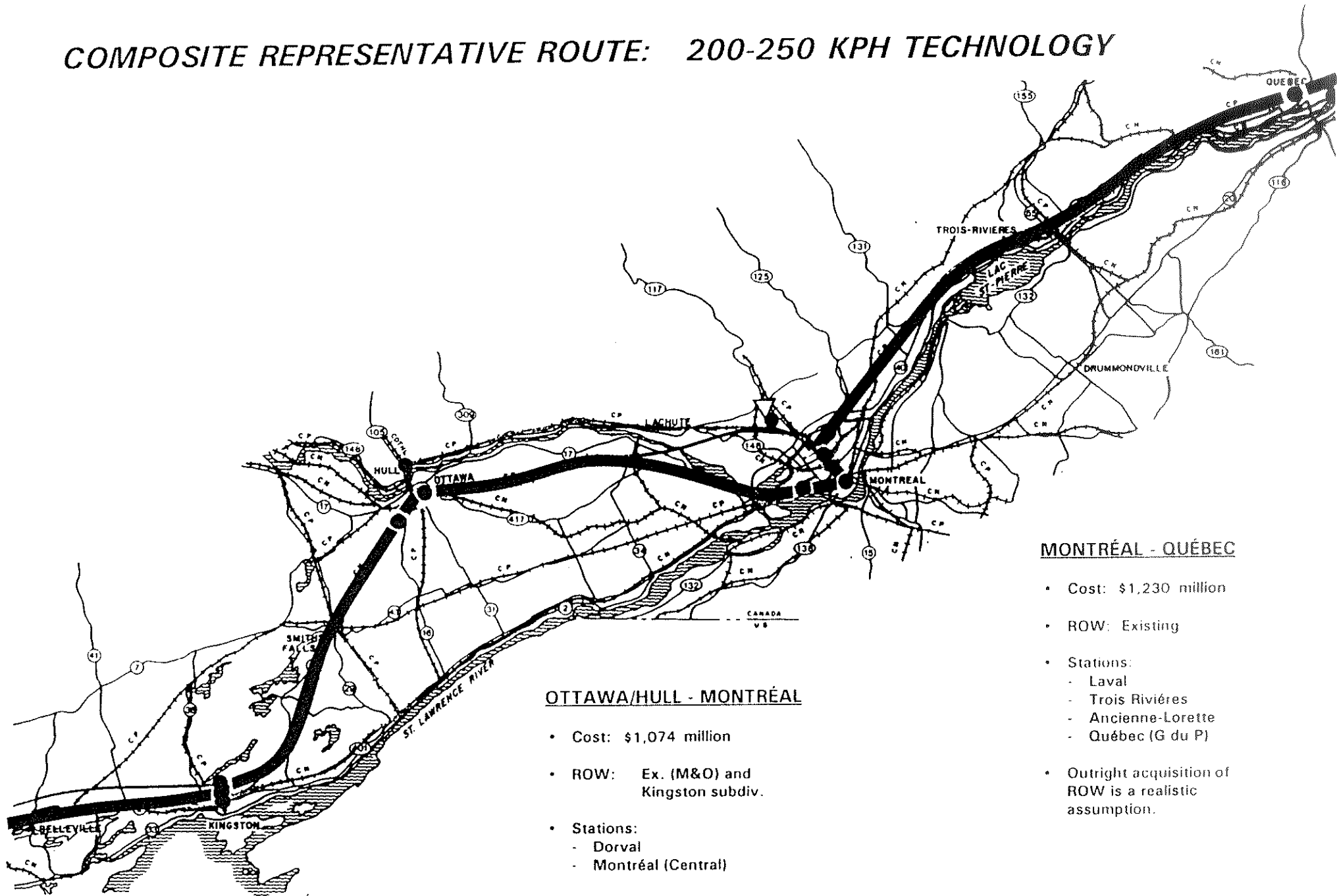


FIGURE 5.1
SHEET 1 of 2

COMPOSITE REPRESENTATIVE ROUTE: 200-250 KPH TECHNOLOGY



OTTAWA/HULL - MONTRÉAL

- Cost: \$1,074 million
- ROW: Ex. (M&O) and Kingston subdiv.
- Stations:
 - Dorval
 - Montréal (Central)
- Route offers link to Dorval Airport.
- Ex. M&O ROW is available.

MONTRÉAL - QUÉBEC

- Cost: \$1,230 million
- ROW: Existing
- Stations:
 - Laval
 - Trois Rivières
 - Ancienne-Lorette
 - Québec (G du P)
- Outright acquisition of ROW is a realistic assumption.

● Potential HSR Station Sites
 ▼ Mirabel Airport

FIGURE 5.1
 SHEET 2 of 2

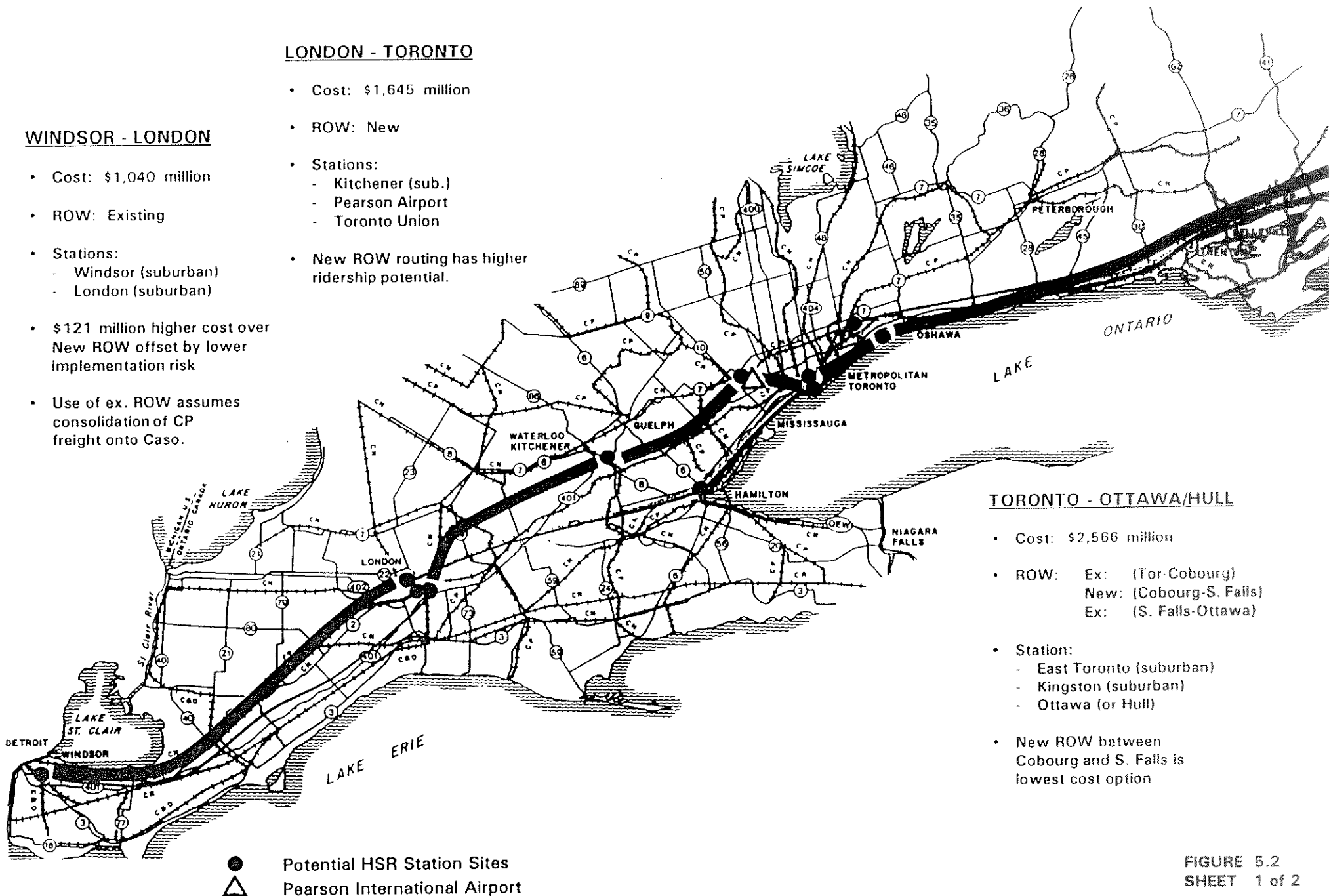
COMPOSITE REPRESENTATIVE ROUTE: + 300 KPH TECHNOLOGY

LONDON - TORONTO

- Cost: \$1,645 million
- ROW: New
- Stations:
 - Kitchener (sub.)
 - Pearson Airport
 - Toronto Union
- New ROW routing has higher ridership potential.

WINDSOR - LONDON

- Cost: \$1,040 million
- ROW: Existing
- Stations:
 - Windsor (suburban)
 - London (suburban)
- \$121 million higher cost over New ROW offset by lower implementation risk
- Use of ex. ROW assumes consolidation of CP freight onto Caso.



TORONTO - OTTAWA/HULL

- Cost: \$2,566 million
- ROW:
 - Ex: (Tor-Cobourg)
 - New: (Cobourg-S. Falls)
 - Ex: (S. Falls-Ottawa)
- Station:
 - East Toronto (suburban)
 - Kingston (suburban)
 - Ottawa (or Hull)
- New ROW between Cobourg and S. Falls is lowest cost option

● Potential HSR Station Sites
 ▲ Pearson International Airport

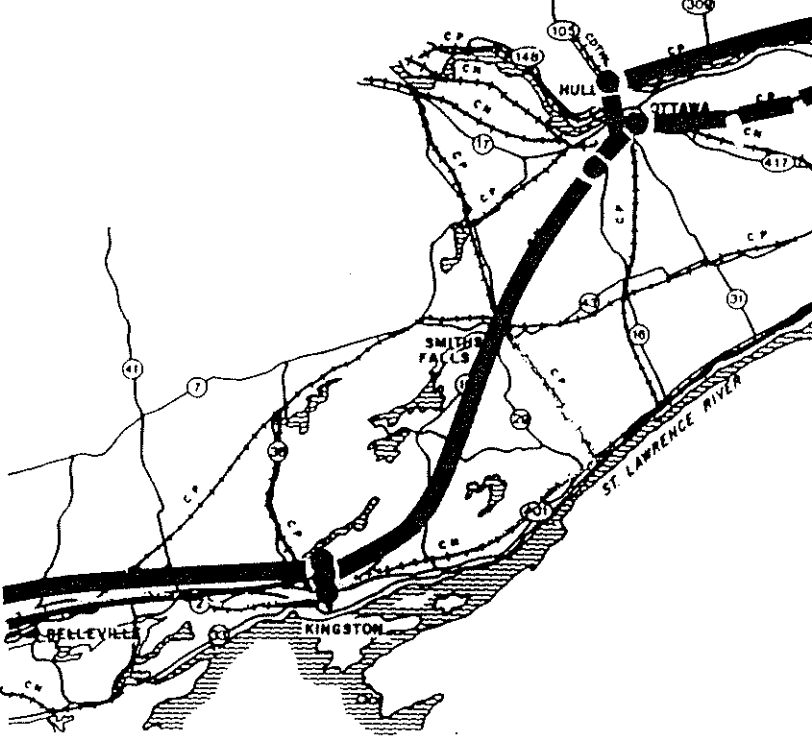
FIGURE 5.2
 SHEET 1 of 2

COMPOSITE REPRESENTATIVE ROUTE: + 300 KPH TECHNOLOGY

OTTAWA/HULL - MONTRÉAL

North Shore Option

- Cost: \$1,159 million
- ROW: Existing with New sections
- Stations:
 - Mirabel Airport
 - Laval
 - Montréal (Central)
- Composite ROW option cost is in some range as S. Shore (12% higher)

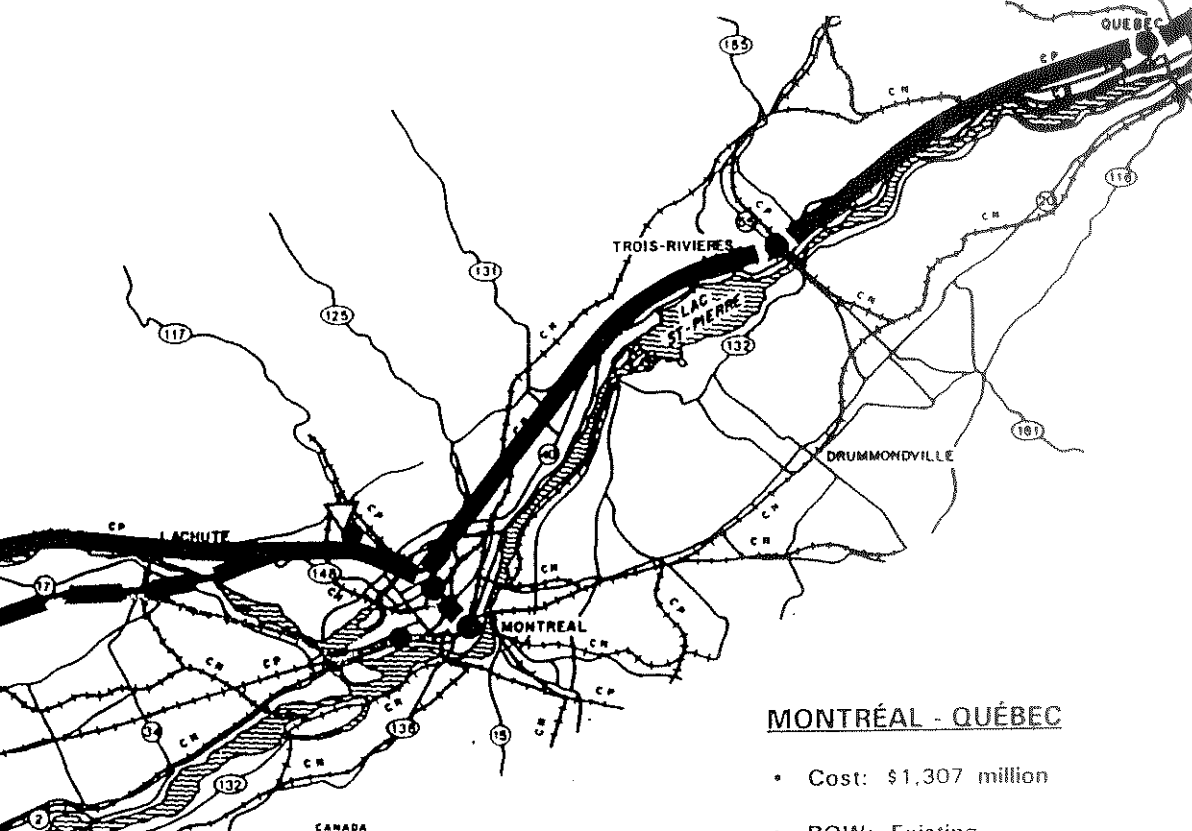


OTTAWA/HULL - MONTRÉAL

South Shore Option

- Cost: \$1,028 million
- ROW: Ex: (Ott-Vk Hill)
New: (Vk Hill-Mir)
Ex: (Mir-Mtl)
- Stations:
 - Mirabel Airport
 - Laval
 - Montréal (Central)
- Composite ROW is lowest cost option. Outright acquisition of a ROW is a realistic assumption.

- Potential HSR Station Sites
- ▽ Mirabel Airport



MONTRÉAL - QUÉBEC

- Cost: \$1,307 million
- ROW: Existing
- Stations:
 - Laval
 - Trois Rivières (suburban)
 - Ancienne-Lorette
 - Québec (G du P)
- Existing ROW is lowest cost option.
- Outright acquisition of ROW is a realistic assumption.

6 ACCESS TO PEARSON AND DORVAL AIRPORTS

In order to determine the infrastructure requirements to achieve direct HSR service connections with Pearson International and Dorval Airports, three possible links options have been considered.

a) Direct Through Route

This would provide the most direct connection between HSR service and the airport complex but would require a longer route through the airport property. As both airport sites and the adjacent rail corridors are located in built-up areas, the through routes would take the form of a tunnel section with underground stops as near as possible to the terminal building.

To minimize the cost implication and take advantage of the speed reductions required at station stops, tight curvature has been used to optimize the route length. This alignment however, would impose unnecessary speed restrictions on any through services. It is therefore suggested that the direct through route could be constructed as a duplicate track to serve the airport access trains only. The main line would serve as the bypass route for trains not stopping at the airports.

The feasibility of the single track versus double track configuration for the direct through route will be dependent on the frequency of the airport service and whether the airport stop is to serve as a terminal station.

b) Stub-ended Wye Connection

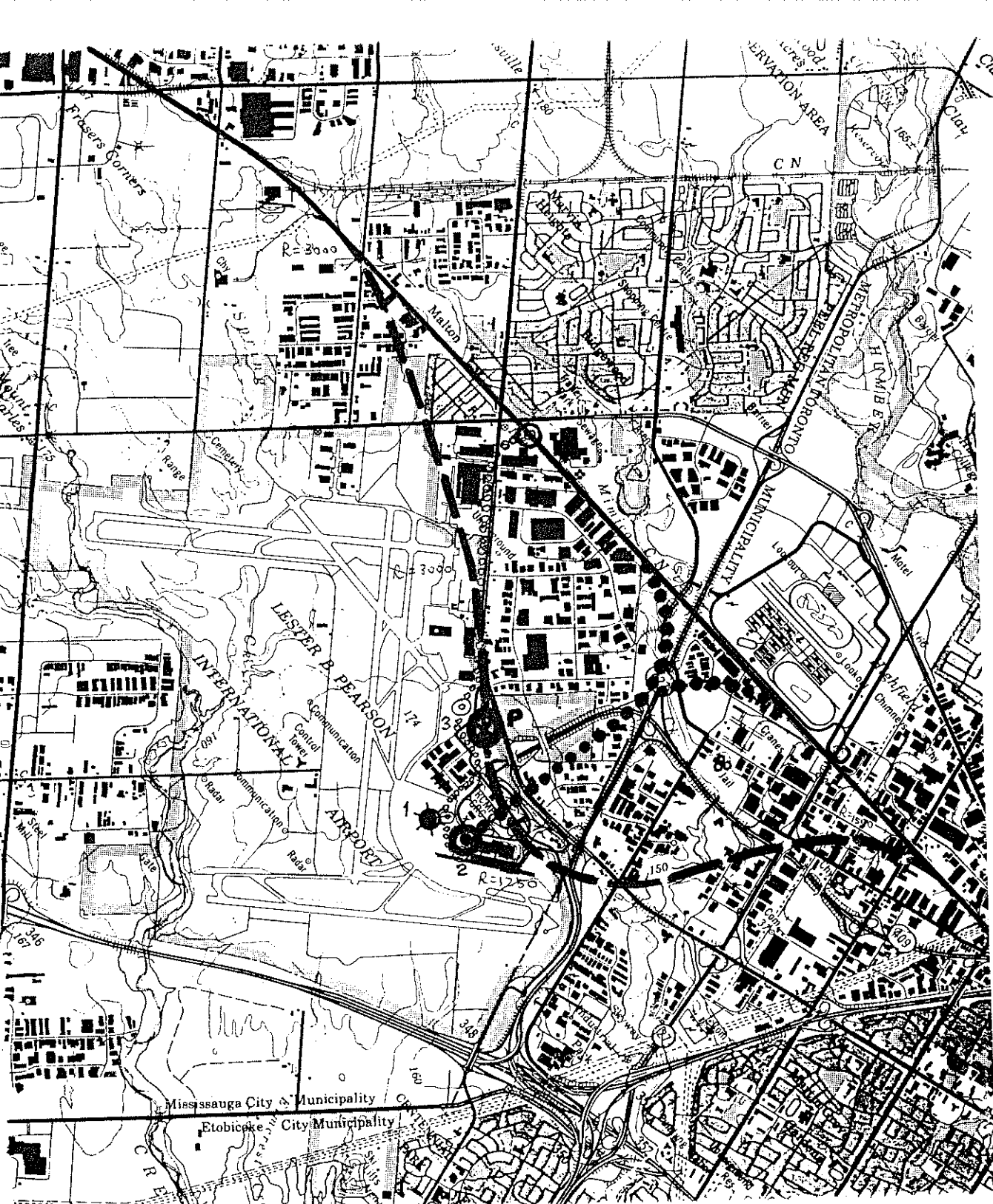
Given the anticipated frequency of the airport service, the option of a wye connection to a stub-ended track would offer a compromise lower cost solution and provide the opportunity for some trains to bypass the airport. This option however is not possible with Dorval Airport due to the short distance between the terminal building and the existing rail corridor.

Similarly, the use of a single track versus double track configuration will be dependent on whether the airport is to serve as a terminal station.

c) Automated People Mover System

The people mover system, in the form of vehicles travelling on two tracks on an elevated guideway structure between the HSR main line station and the terminal buildings, would provide a less convenient service to the airport-bound HSR passengers but is a significantly lower cost solution. In the case of Pearson Airport, it will also have the advantage of offering stops at each of the three terminal buildings not possible with the other two options.

The configuration and implications of the three possible link options to Pearson Airport and Dorval Airport are illustrated in Figures 6.1 and 6.2 respectively.



Possible Link Options:

- — — — —

 - Direct through route with one HSR stop U/G near Terminal 3 building
 - 10 km of tunnel section
 - Additional capital cost in the range of \$550-650 million for single track and \$700-800 million for double track configuration
 - HSR stop could potentially serve West Toronto ridership if parking facilities can be developed east of Airport Road

- - Wye connection to stub-ended track with one HSR stop U/G near Terminal 2 building
 - 5 km of tunnel section
 - Additional capital cost in the range of \$300-350 million for single track and \$375-425 million for double track configuration
 - HSR could potentially serve West Toronto ridership by utilizing the Airport shuttle bus system if parking facilities can be developed east of Airport Road in the vicinity of the Terminal 3 area

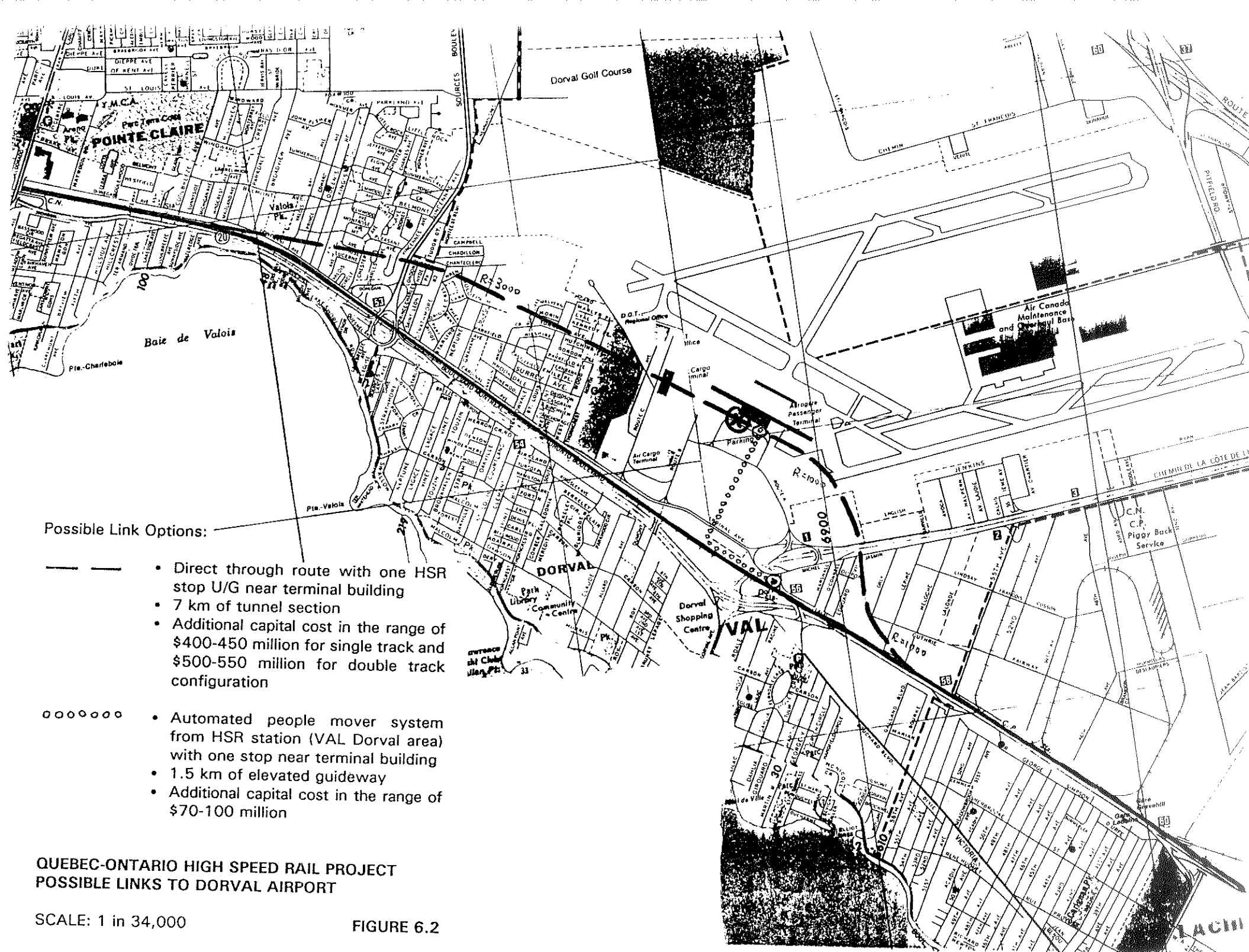
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 - Automated people mover system from HSR station (GO Malton area) with stops at each of the three terminal buildings
 - 4.25 km of elevated guideway
 - Additional capital cost in the range of \$180-230 million
 - HSR station serves both the people mover system and West Toronto ridership

**QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT
POSSIBLE LINKS TO PEARSON AIRPORT**

SCALE: 1 in 50,000

FIGURE 6.1



Possible Link Options:

- Direct through route with one HSR stop U/G near terminal building
 - 7 km of tunnel section
 - Additional capital cost in the range of \$400-450 million for single track and \$500-550 million for double track configuration

- Automated people mover system from HSR station (VAL Dorval area) with one stop near terminal building
 - 1.5 km of elevated guideway
 - Additional capital cost in the range of \$70-100 million

QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT
 POSSIBLE LINKS TO DORVAL AIRPORT

SCALE: 1 in 34,000

FIGURE 6.2

7 TECHNOLOGY AND RIGHT-OF-WAY COMBINATIONS FOR ROUTE SEGMENT BETWEEN OTTAWA AND MONTRÉAL

This section describes the cost implication of utilizing the two representative routes between Ottawa and Montréal for either the 200-250 kph or the 300 + kph technologies.

- a) Identification of additional infrastructures and cost increases to the Representative Route for the 200-250 kph technology on existing ROW, in order to accommodate the 300 + kph technology.

From a review of the route alignment, the section between Ottawa and Vankleek Hill could follow the Representative Route for 300 + kph on existing ROW technology up to approximately Chainage 1088 + 230. From Vankleek Hill, through Rigaud to Dorion, other than grade separations, adjustments to the horizontal alignment are being incorporated wherever possible to improve on the curves. As a result of these curve improvements, additional embankment construction from borrow material is required to raise alignment at approximately Chainage 2131 + 000 near Vaudreuil in order to clear Highway 40 and the existing CP track prior to joining with the existing track south of Dorion.

The cost comparison between the original and the adjusted alignment is tabulated below:

Sub-system	Cost of Original Alignment (\$ million)	Cost of Adjusted Alignment (\$ million)	Additional Cost (\$ million)
Right-of-way Acquisition	5	5	0
Earthworks and Drainage	183	187	4
Bridges, Viaducts, and Tunnels	231	231	0
Grade Separations	97	219	122
Other Accommodation Works	0	4	4
Track	112	112	0
Electrification	100	100	0
Stations	0	0	0
Totals	728	858	130

- b) Identification of potential cost savings to the Representative Route for the 300+ kph technology on existing ROW, i.e. the Lachute Alignment, in the event of 200-250 kph technology being adopted for use.

From a review of the route alignment, the section between Montebello and Pointe-Au-Chene from approximately Chainage 68+000 to 85+000 could be adjusted to follow the existing CP ROW. However, the revised alignment would result in an increased requirement for borrow material overall between Ottawa and Montreal and additional structures. It is therefore not to be recommended.

As a result, the only cost savings that could be identified to the Lachute Alignment for 200-250 kph technology is the replacement of some of the grade separations in the rural areas with at grade crossings, only principal and secondary highways are to be grade separated.

The cost comparison between the original and the adjusted alignment is tabulated below:

Sub-system	Cost of Original Alignment (\$ million)	Cost of Adjusted Alignment (\$ million)	Cost Saving (\$ million)
Right-of-way Acquisition	10	10	0
Earthworks and Drainage	271	270	1
Bridges, Viaducts, and Tunnels	53	53	0
Grade Separations	173	106	67
Other Accommodation Works	6	6	0
Track	121	121	0
Electrification	104	104	0
Stations	0	0	0
Totals	738	670	68

The cost summaries of the original and adjusted alignments for the above scenarios are presented in Appendix C.

8 200 + KM/HR - COMPOSITE RIGHTS-OF-WAY

The total cost for a 200+ kph high speed railway project using 1,248 km of composite alignment from Windsor to Québec City is estimated to be \$6.815 billion. This results in an average cost of \$5.46 million per kilometre. A breakdown of this cost by sub-system and sector is provided in Table 8.1.

The percentage of the total cost allocated to each sub-system is presented in the pie chart in Figure 8.i.

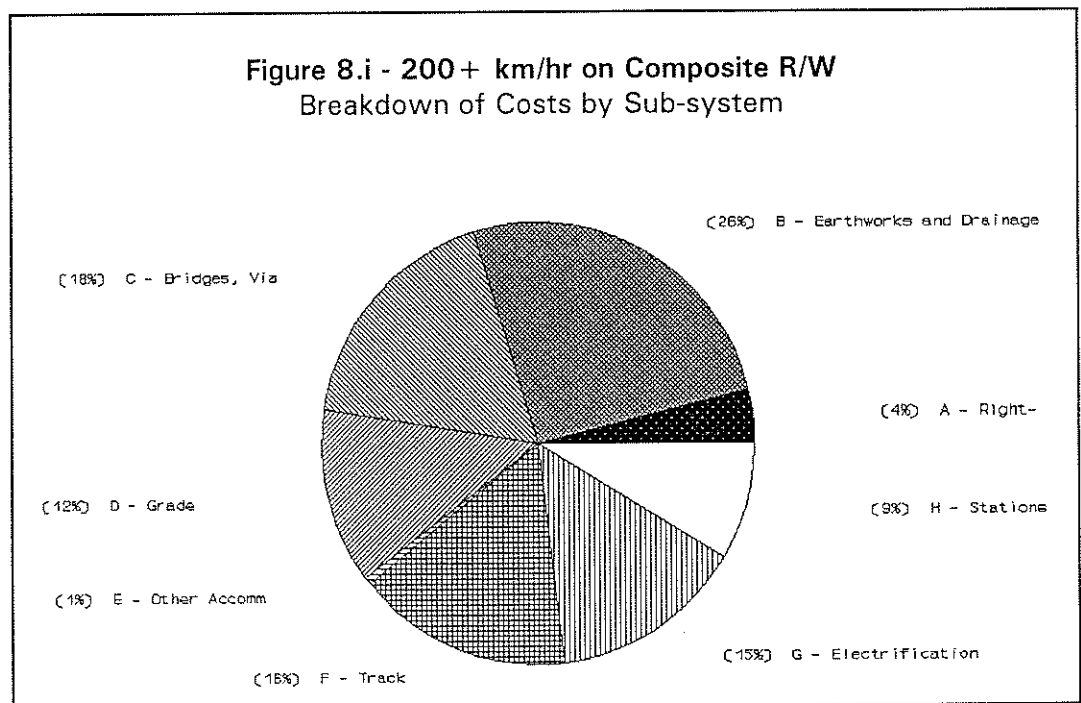


TABLE 8.1

QUEBEC – WINDSOR CORRIDOR TOTAL				SUMMARY OF TOTAL COSTS				
technology: 200+, COMPOSITE								
Subsystem	Sector	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start -- up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition		\$40,915,240	\$426,200,413	N/A	N/A	see note c	\$467,115,653	\$45,564,699
B – Earthworks and Drainage		\$302,400,897	N/A	N/A	\$1,388,701,009	see note c	\$1,691,101,906	\$181,134,914
C – Bridges, Viaducts, and Tunnels		\$96,238,450	N/A	N/A	\$584,432,200	see note c	\$680,670,650	\$53,130,200
D – Grade Separations		\$186,997,432	N/A	N/A	\$1,135,588,950	see note c	\$1,322,586,382	\$173,871,950
E – Other Accom- modation works		\$20,980,845	see note a	see note a	\$127,411,461	see note c	\$148,392,307	\$29,402,645
F – Track		\$137,177,150	\$762,007,811	see note b	\$182,342,505	see note c	\$1,081,527,465	\$46,607,360
G – Electrification		\$134,109,229	see note a	see note a	\$814,412,031	see note c	\$948,521,260	\$106,227,656
H – Stations		\$67,147,486	see note a	see note a	\$407,770,000	see note c	\$474,917,486	\$37,070,000
Totals		\$985,966,730	\$1,188,208,225	\$0	\$4,640,658,156	\$0	\$6,814,833,111	\$673,009,424

NOTES: a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

The average costs for the major infrastructure components are as follows:

Table 8.2

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land ¹	---	---	---	467,115	7
Roadway ²	route-km	1,248	2,005,000	2,502,165	37
Road Crossings	each	727	1,819,000	1,322,586	19
Track & Power Supply	route-km	1,248	1,627,000	2,030,049	21
Stations	each	13	36,532,000	474,917	7

When reviewing the costs for the Windsor-Toronto and Toronto-Montréal segments of this composite route, it should be noted that a direct comparison with the representative routes is not possible. This is on account of the reassignment of the Union Station to Pearson Airport sub-segment from the Windsor-Toronto segment to the Toronto-Montréal segment. This produces a corresponding transfer of \$522 millions in cost from one segment to the other.

8.1 WINDSOR - TORONTO

The cost for a 200+ kph high speed railway project from Windsor to Toronto using the composite alignment developed during the study is estimated to be \$1.829 billion. A breakdown of this cost by sub-system and sector is provided in Table 8.4.

The total length of the alignment studied and costed between Windsor and Toronto is 340 km. This comprises 27% of the length of the line between Québec and

¹ costs developed to be representative of the requirements for a high speed rail system. They do not include any costs for land within shared right-of-ways.

² includes Earthworks and Drainage, Bridges, Viaducts, and Tunnels, and Other Accommodation Works sub-systems

Windsor. The cost of this segment is also 27% of the total project cost. The average costs for the major infrastructure components are as follows:

Table 8.3

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	---	---	---	206,209	11
Roadway	route-km	340	1,666,000	566,583	31
Road Crossings	each	235	2,109,000	495,619	27
Track & Power Supply	route-km	340	1,595,000	542,183	30
Stations	each	3	6,278,000	18,833	1

8.2 TORONTO - MONTREAL

The cost for a 200+ kph high speed railway project from Toronto to Montréal, using the composite alignment developed during the study is estimated to be \$3.755 billion. A breakdown of this cost by sub-system and sector is provided in Table 8.6.

The total length of the alignment studied and costed between Toronto and Montréal is 634 km. This comprises 51% of the length of the line between Québec and Windsor, whereas the cost of this segment is 55% of the project cost. The average costs for the major infrastructure components are as follows:

Table 8.5

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	---	---	---	187,399	5
Roadway	route-km	634	2,326,000	1,475,275	40
Road Crossings	each	372	1,757,000	653,611	17
Track & Power Supply	route-km	634	1,609,000	1,020,600	27
Stations	each	6	69,715,000	418,291	11

TABLE 8.4

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
WINDSOR – TORONTO CORRIDOR 200+, OPTIMIZED							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$18,062,141	\$188,147,300	N/A	N/A	see note c	\$206,209,441	\$20,114,657
B – Earthworks and Drainage	\$73,516,695	N/A	N/A	\$325,929,665	see note c	\$399,446,360	\$42,512,565
C – Bridges, Viaducts, and Tunnels	\$17,459,252	N/A	N/A	\$106,025,700	see note c	\$123,484,952	\$9,638,700
D – Grade Separations	\$70,074,438	N/A	N/A	\$425,544,650	see note c	\$495,619,088	\$60,086,650
E – Other Accom- modation works	\$6,171,787	see note a	see note a	\$37,479,729	see note c	\$43,651,516	\$8,649,168
F – Track	\$37,207,561	\$206,674,989	see note b	\$49,464,841	see note c	\$293,347,390	\$12,641,563
G – Electrification	\$35,182,350	see note a	see note a	\$213,653,670	see note c	\$248,836,020	\$27,867,870
H – Stations	\$2,662,714	see note a	see note a	\$16,170,000	see note c	\$18,832,714	\$1,470,000
Totals	\$260,336,937	\$394,822,289	\$0	\$1,174,268,255	see note c	\$1,829,427,481	\$182,981,173

NOTES: a) included in Construction / Installation
b) included in Equipment / Material
c) included in Other Studies

TABLE 8.6

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
TORONTO – MONTRÉAL ALIGNMENT			200+, COMPOSITE		TOR–MONTR. 200 COMPOSITE		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$16,414,472	\$170,984,083	N/A	N/A	see note c	\$187,398,554	\$18,279,753
B – Earthworks and Drainage	\$166,071,742	N/A	N/A	\$762,153,565	see note c	\$928,225,307	\$99,411,335
C – Bridges, Viaducts, and Tunnels	\$64,224,840	N/A	N/A	\$390,021,500	see note c	\$454,246,340	\$35,456,500
D – Grade Separations	\$92,412,590	N/A	N/A	\$561,198,700	see note c	\$653,611,290	\$88,977,700
E – Other Accom- modation works	\$13,121,260	see note a	see note a	\$79,682,155	see note c	\$92,803,415	\$18,388,190
F – Track	\$69,342,271	\$385,444,319	see note b	\$92,001,145	see note c	\$546,787,735	\$23,562,103
G – Electrification	\$66,991,287	see note a	see note a	\$406,821,441	see note c	\$473,812,728	\$53,063,666
H – Stations	\$59,141,231	see note a	see note a	\$359,150,000	see note c	\$418,291,231	\$32,650,000
Totals	\$547,719,694	\$556,428,401	\$0	\$2,651,028,505	see note c	\$3,755,176,600	\$369,789,246

NOTES: a) included in Construction / Installation
b) included in Equipment / Material
c) included in Other Studies

8.3 MONTREAL - QUEBEC

The cost for a 200+ kph high speed railway project from Montréal to Québec using the composite alignment developed during the study is estimated to be \$1.230 billion. A breakdown of this cost by sub-system and sector is provided in Table 8.8.

The total length of the alignment studied and costed between Montréal and Québec is 274 km. This comprises 22% of the length of the line between Québec and Windsor, whereas the cost of this segment is 18% of the project cost. The average costs for the major infrastructure components are as follows:

Table 8.7

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	---	---	---	73,508	6
Roadway	route-km	274	1,747,000	478,307	39
Road Crossings	each	120	1,445,000	173,356	14
Track & Power Supply	route-km	274	1,707,000	467,265	38
Stations	each	4	9,448,000	37,794	3

8.4 PROVINCIAL TOTALS

Tables 8.9 and 8.10 present summary cost estimates for the work to be carried out in Ontario and Québec respectively.

They show that \$1.965 billion or 29% of the total cost of \$6.815 billion for the 200+ km/hr high speed rail project, using existing rights-of-way to the greatest extent possible, covers the cost of infrastructure constructed in the Province of Québec. The balance of \$4.850 billion required for the infrastructure in the Province of Ontario represents 71% of the total cost.

TABLE 8.8

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
MONTREAL – QUÉBEC CORRIDOR 200+, OPTIMIZED							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$6,438,627	\$67,069,031	N/A	N/A	see note c	\$73,507,658	\$7,170,289
B – Earthworks and Drainage	\$62,812,460	N/A	N/A	\$300,617,780	see note c	\$363,430,239	\$39,211,015
C – Bridges, Viaducts, and Tunnels	\$14,554,358	N/A	N/A	\$88,385,000	see note c	\$102,939,358	\$8,035,000
D – Grade Separations	\$24,510,405	N/A	N/A	\$148,845,600	see note c	\$173,356,005	\$24,807,600
E – Other Accom- modation works	\$1,687,798	see note a	see note a	\$10,249,577	see note c	\$11,937,375	\$2,365,287
F – Track	\$30,627,317	\$169,888,504	see note b	\$40,876,519	see note c	\$241,392,340	\$10,403,694
G – Electrification	\$31,935,593	see note a	see note a	\$193,936,920	see note c	\$225,872,513	\$25,296,120
H – Stations	\$5,343,542	see note a	see note a	\$32,450,000	see note c	\$37,793,542	\$2,950,000
Totals	\$177,910,099	\$236,957,534	\$0	\$815,361,396	see note c	\$1,230,229,029	\$120,239,005

NOTES : a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

TABLE 8.9

QUEBEC – WINDSOR CORRIDOR TOTAL				SUMMARY OF TOTAL COSTS				
technology: 200+, COMPOSITE				PROVINCE OF ONTARIO				
Subsystem	Sector	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start -- up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition		\$34,251,930	\$356,790,940	N/A	N/A	see note c	\$391,042,870	\$38,144,195
B – Earthworks and Drainage		\$212,915,549	N/A	N/A	\$974,150,303	see note c	\$1,187,065,852	\$127,063,083
C – Bridges, Viaducts, and Tunnels		\$46,275,432	N/A	N/A	\$281,019,200	see note c	\$327,294,632	\$25,547,200
D – Grade Separations		\$152,426,613	N/A	N/A	\$925,648,950	see note c	\$1,078,075,563	\$138,881,950
E – Other Accom- modation works		\$19,112,307	see note a	see note a	\$116,064,290	see note c	\$135,176,596	\$26,784,067
F – Track		\$96,961,553	\$538,457,816	see note b	\$128,991,496	see note c	\$764,410,865	\$32,942,254
G – Electrification		\$93,332,704	see note a	see note a	\$566,786,326	see note c	\$660,119,031	\$73,928,651
H – Stations		\$43,327,970	see note a	see note a	\$263,120,000	see note c	\$306,447,970	\$23,920,000
Totals		\$698,604,058	\$895,248,756	\$0	\$3,255,780,565	\$0	\$4,849,633,379	\$487,211,400

NOTES: a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

TABLE 8.10

QUEBEC – WINDSOR CORRIDOR TOTAL				SUMMARY OF TOTAL COSTS				
technology: 200+, COMPOSITE				PROVINCE OF QUÉBEC				
Subsystem	Sector	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition		\$6,663,309	\$69,409,473	N/A	N/A	see note c	\$76,072,783	\$7,420,504
B – Earthworks and Drainage		\$89,485,348	N/A	N/A	\$414,550,706	see note c	\$504,036,054	\$54,071,831
C – Bridges, Viaducts, and Tunnels		\$49,963,019	N/A	N/A	\$303,413,000	see note c	\$353,376,019	\$27,583,000
D – Grade Separations		\$34,570,820	N/A	N/A	\$209,940,000	see note c	\$244,510,820	\$34,990,000
E – Other Accom- modation works		\$1,868,539	see note a	see note a	\$11,347,172	see note c	\$13,215,710	\$2,618,578
F – Track		\$40,215,596	\$223,549,995	see note b	\$53,351,009	see note c	\$317,116,600	\$13,665,106
G – Electrification		\$40,776,525	see note a	see note a	\$247,625,705	see note c	\$288,402,230	\$32,299,005
H – Stations		\$23,819,516	see note a	see note a	\$144,650,000	see note c	\$168,469,516	\$13,150,000
Totals		\$287,362,671	\$292,959,468	\$0	\$1,384,877,592	\$0	\$1,965,199,731	\$185,798,024

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

c) Included in Other Studies

9 300 + KM/HR - COMPOSITE RIGHTS-OF-WAY

The total cost for a 300+ kph high speed railway project using 1,240 km of composite alignment from Windsor to Québec City is estimated to be \$7.717 billion. This results in an average cost of \$ 6.22 million per kilometre. A breakdown of this cost by sub-system and sector is provided in Table 9.1.

The percentage of the total cost allocated to each sub-system is presented in the pie chart in Figure 9.i.

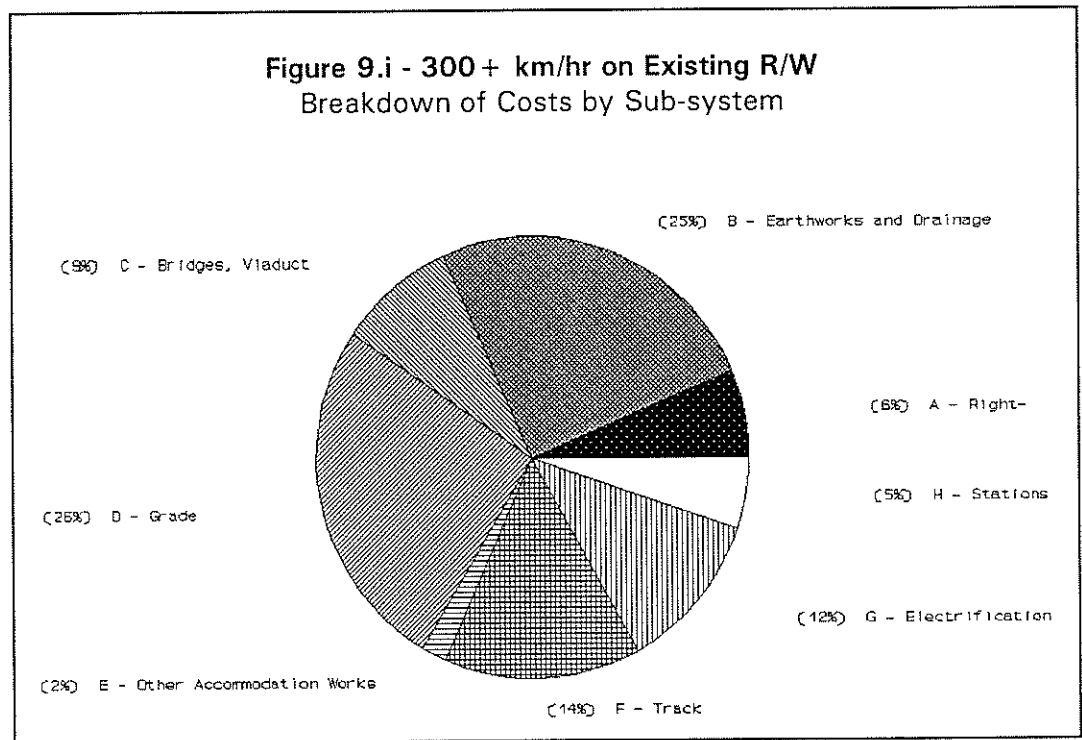


TABLE 9.1

QUEBEC – WINDSOR CORRIDOR TOTAL				SUMMARY OF TOTAL COSTS				
technology: 300+, COMPOSITE								
Subsystem	Sector	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition		\$42,801,634	\$445,850,354	N/A	N/A	see note c	\$488,651,988	\$47,665,456
B – Earthworks and Drainage		\$345,497,987	N/A	N/A	\$1,591,452,875	see note c	\$1,936,950,862	\$207,580,810
C – Bridges, Viaducts, and Tunnels		\$101,640,137	N/A	N/A	\$617,235,300	see note c	\$718,875,437	\$56,112,300
D – Grade Separations		\$280,602,390	N/A	N/A	\$1,704,028,600	see note c	\$1,984,630,990	\$222,264,600
E – Other Accom- modation works		\$22,687,988	see note a	see note a	\$137,778,517	see note c	\$160,466,505	\$31,795,042
F – Track		\$140,375,219	\$784,680,270	see note b	\$183,267,149	see note c	\$1,108,322,637	\$47,739,339
G – Electrification		\$131,531,632	see note a	see note a	\$798,758,921	see note c	\$930,290,553	\$104,185,946
H – Stations		\$54,920,738	see note a	see note a	\$333,520,000	see note c	\$388,440,738	\$30,320,000
Totals		\$1,120,057,725	\$1,230,530,625	\$0	\$5,366,041,362	\$0	\$7,716,629,711	\$747,663,494

NOTES: a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

The average costs for the major infrastructure components are as follows:

Table 9.2

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	---	---	---	488,652	6
Roadway	route-km	1,240	2,271,000	2,816,293	36
Road Crossings	each	674	2,295,000	1,984,631	26
Track & Power Supply	route-km	1,240	1,644,000	2,038,613	27
Stations	each	13	29,880,000	388,441	5

When reviewing the costs for the Windsor-Toronto and Toronto-Montréal segments of this composite route, it should be noted that a direct comparison with the representative routes is not possible. This is on account of the reassignment of the Union Station to Pearson Airport sub-segment from the Windsor-Toronto segment to the Toronto-Montréal segment. This produces a corresponding transfer of \$ 522 millions in cost from one segment to the other.

9.1 WINDSOR - TORONTO

The cost for a 300+ kph high speed railway project from Windsor to Toronto using the composite alignment developed during the study is estimated to be \$2.128 billion. A breakdown of this cost by sub-system and sector is provided in Table 9.4.

The total length of the alignment studied and costed between Windsor and Toronto is 350 km. This comprises 28% of the length of the line between Québec and Windsor. The cost of this segment is also 28% of the project cost. The average costs for the major infrastructure components are as follows:

Table 9.3

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	---	---	---	239,320	11
Roadway	route-km	350	1,808,000	632,786	30
Road Crossings	each	192	4,486,000	669,380	32
Track & Power Supply	route-km	350	1,598,000	559,359	26
Stations	each	3	9,053,000	27,160	1

9.2 TORONTO - MONTREAL

The cost for a 300+ kph high speed railway project from Toronto to Montréal using the composite alignment developed during the study is estimated to be \$4.282 billion. A breakdown of this cost by sub-system and sector is provided in Table 9.6.

The total length of the alignment studied and costed between Toronto and Montréal is 634 km. This comprises 51% of the length of the line between Québec and Windsor, whereas the cost of this segment is 55% of the project cost. The average costs for the major infrastructure components are as follows:

TABLE 9.4

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
WINDSOR – TORONTO CORRIDOR 300+, OPTIMIZED							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$20,962,339	\$218,357,700	N/A	N/A	see note c	\$239,320,039	\$23,344,423
B – Earthworks and Drainage	\$83,865,517	N/A	N/A	\$369,143,905	see note c	\$453,009,422	\$48,149,205
C – Bridges, Viaducts, and Tunnels	\$19,017,664	N/A	N/A	\$115,489,550	see note c	\$134,507,214	\$10,499,050
D – Grade Separations	\$94,642,074	N/A	N/A	\$574,737,800	see note c	\$669,379,874	\$74,965,800
E – Other Accom- modation works	\$6,400,465	see note a	see note a	\$38,868,431	see note c	\$45,268,895	\$8,969,638
F – Track	\$38,791,209	\$216,428,960	see note b	\$50,921,270	see note c	\$306,141,439	\$13,188,477
G – Electrification	\$35,801,781	see note a	see note a	\$217,415,320	see note c	\$253,217,101	\$28,358,520
H – Stations	\$3,840,104	see note a	see note a	\$23,320,000	see note c	\$27,160,104	\$2,120,000
Totals	\$303,321,152	\$434,786,660	\$0	\$1,389,896,276	see note c	\$2,128,004,089	\$209,595,113

NOTES: a) included in Construction / Installation
b) included in Equipment / Material
c) included in Other Studies

TABLE 9.6

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
TORONTO – MONTRÉAL ALIGNMENT			300+, COMPOSITE		300 COMPOSITE north shore		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$16,186,479	\$168,609,152	N/A	N/A	see note c	\$184,795,630	\$18,025,851
B – Earthworks and Drainage	\$201,463,984	N/A	N/A	\$942,691,708	see note c	\$1,144,155,692	\$122,959,788
C – Bridges, Viaducts, and Tunnels	\$69,567,929	N/A	N/A	\$422,468,750	see note c	\$492,036,679	\$38,406,250
D – Grade Separations	\$135,331,923	N/A	N/A	\$821,837,150	see note c	\$957,169,073	\$107,196,150
E – Other Accom- modation works	\$14,885,647	see note a	see note a	\$90,396,835	see note c	\$105,282,482	\$20,860,808
F – Track	\$73,515,323	\$411,992,049	see note b	\$95,266,090	see note c	\$580,773,462	\$25,011,089
G – Electrification	\$68,673,309	see note a	see note a	\$417,035,943	see note c	\$485,709,251	\$54,395,993
H – Stations	\$46,914,483	see note a	see note a	\$284,900,000	see note c	\$331,814,483	\$25,900,000
Totals	\$626,539,076	\$580,601,201	\$0	\$3,074,596,475	see note c	\$4,281,736,752	\$412,755,929

NOTES: a) included in Construction / Installation

b) included in Equipment / Material

c) included in Other Studies

Table 9.5

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	---	---	---	184,796	4
Roadway	route-km	634	2,748,000	1,741,475	41
Road Crossings	each	369	2,594,000	957,169	22
Track & Power Supply	route-km	634	1,683,000	1,066,483	25
Stations	each	7	47,402,000	331,814	8

9.3 MONTREAL - QUEBEC

The cost for a 300+ kph high speed railway project from Montréal to Québec using the composite alignment developed during the study is estimated to be \$1.307 billion. A breakdown of this cost by sub-system and sector is provided in Table 9.8.

The total length of the alignment studied and costed between Montréal and Québec is 256 km. This comprises 21% of the length of the line between Québec and Windsor, whereas the cost of this segment is 17% of the project cost. The average costs for the major infrastructure components are as follows:

Table 9.7

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	---	---	---	64,536	5
Roadway	route-km	256	1,724,000	442,032	34
Road Crossings	each	113	3,169,000	358,082	27
Track & Power Supply	route-km	256	1,610,000	412,772	32
Stations	each	3	9,822,000	29,466	2

As the Toronto-Montréal and Montréal-Québec segments of this option use the identical alignment between Central Station and St. Martin Jct., the costs presented here only cover the territory between St. Martin Jct. and Québec City. The line between Central Station and St. Martin Jct. is assumed to have been constructed as part of the Toronto-Montréal segment. This shared portion of line is 16.2 km long and costs \$108 million.

9.4 PROVINCIAL TOTALS

Tables 9.9 and 9.10 present summary cost estimates for the work to be carried out in Ontario and Québec respectively.

They show that \$2.422 billion or 31% of the total cost of \$7.717 billion for the 300+ km/hr high speed rail project, using existing rights-of-way, covers the cost of infrastructure constructed in the Province of Québec. The balance of \$5.294 billion required for the infrastructure in the Province of Ontario represents 69% of the total cost.

TABLE 9.8

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
MONTREAL – QUÉBEC CORRIDOR 300+, OPTIMIZED							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Acquisition	\$5,652,816	\$58,883,503	N/A	N/A	see note c	\$64,536,319	\$6,295,182
B – Earthworks and Drainage	\$60,168,487	N/A	N/A	\$279,617,262	see note c	\$339,785,749	\$36,471,817
C – Bridges, Viaducts, and Tunnels	\$13,054,544	N/A	N/A	\$79,277,000	see note c	\$92,331,544	\$7,207,000
D – Grade Separations	\$50,628,393	N/A	N/A	\$307,453,650	see note c	\$358,082,043	\$40,102,650
E – Other Accom- modation works	\$1,401,877	see note a	see note a	\$8,513,251	see note c	\$9,915,128	\$1,964,596
F – Track	\$28,068,686	\$156,259,261	see note b	\$37,079,789	see note c	\$221,407,736	\$9,539,773
G – Electrification	\$27,056,542	see note a	see note a	\$164,307,659	see note c	\$191,364,201	\$21,431,434
H – Stations	\$4,166,151	see note a	see note a	\$25,300,000	see note c	\$29,466,151	\$2,300,000
Totals	\$190,197,496	\$215,142,763	\$0	\$901,548,611	see note c	\$1,306,888,870	\$125,312,452

NOTES: a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

TABLE 9.9

QUEBEC – WINDSOR CORRIDOR TOTAL				SUMMARY OF TOTAL COSTS				
technology: 300+, COMPOSITE				PROVINCE OF ONTARIO				
Subsystem	Sector	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition		\$33,862,543	\$352,734,828	N/A	N/A	see note c	\$386,597,371	\$37,710,560
B – Earthworks and Drainage		\$223,714,886	N/A	N/A	\$1,010,805,035	see note c	\$1,234,519,921	\$131,844,135
C – Bridges, Viaducts, and Tunnels		\$79,871,998	N/A	N/A	\$485,042,800	see note c	\$564,914,798	\$44,094,800
D – Grade Separations		\$197,183,548	N/A	N/A	\$1,197,446,700	see note c	\$1,394,630,248	\$156,188,700
E – Other Accom- modation works		\$20,106,678	see note a	see note a	\$122,102,863	see note c	\$142,209,541	\$28,177,584
F – Track		\$88,004,695	\$491,520,275	see note b	\$115,176,128	see note c	\$694,701,097	\$29,925,131
G – Electrification		\$81,271,853	see note a	see note a	\$493,543,775	see note c	\$574,815,628	\$64,375,275
H – Stations		\$42,693,991	see note a	see note a	\$259,270,000	see note c	\$301,963,991	\$23,570,000
Totals		\$766,710,193	\$844,255,102	\$0	\$3,683,387,301	\$0	\$5,294,352,596	\$515,886,184

NOTES: a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

TABLE 9.10

QUEBEC – WINDSOR CORRIDOR TOTAL				SUMMARY OF TOTAL COSTS				
technology: 300+, COMPOSITE				PROVINCE OF QUÉBEC				
Subsystem	Sector	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition		\$8,939,091	\$93,115,527	N/A	N/A	see note c	\$102,054,617	\$9,954,896
B – Earthworks and Drainage		\$121,783,101	N/A	N/A	\$580,647,840	see note c	\$702,430,941	\$75,736,675
C – Bridges, Viaducts, and Tunnels		\$21,768,139	N/A	N/A	\$132,192,500	see note c	\$153,960,639	\$12,017,500
D – Grade Separations		\$83,418,841	N/A	N/A	\$506,581,900	see note c	\$590,000,741	\$66,075,900
E – Other Accom- modation works		\$2,581,310	see note a	see note a	\$15,675,654	see note c	\$18,256,964	\$3,617,459
F – Track		\$52,370,524	\$293,159,996	see note b	\$68,091,021	see note c	\$413,621,540	\$17,814,209
G – Electrification		\$50,259,778	see note a	see note a	\$305,215,146	see note c	\$355,474,924	\$39,810,671
H – Stations		\$12,226,748	see note a	see note a	\$74,250,000	see note c	\$86,476,748	\$6,750,000
Totals		\$353,347,532	\$386,275,522	\$0	\$1,682,654,061	\$0	\$2,422,277,115	\$231,777,309

NOTES: a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

10. CONSTRUCTION SCHEDULES AND CASH FLOWS

The Terms of Reference for this Study require that cash flows be developed for each of the alignment options for use in the financial and economic analyses of the project. The main task in developing these cash flows is to relate each of the expenditures to a specific time period in the implementation of the project. This relationship has been established through the development of construction schedules for each of the major route segments: Toronto - Montréal, Windsor - Toronto, and Montréal - Québec.

10.1 CONSTRUCTION SCHEDULES

These construction schedules are a result of discussions amongst members of the consultant's team familiar with the construction of large transportation projects in Canada and with construction of two of the TGV projects in France (including the TGV-Nord inaugurated in May, 1993). The activities that are presented in the schedule relate to the major phases of project implementation - design, construction, commissioning - and present the durations of the critical components within each. The activities addressed are identified below:

- Preliminary Design
- Environmental Assessment
- Preliminary Design
- Detailed Design
- ROW Acquisition
- Tenders for Civil Works
- General Construction
- Fixed Railway Plant & Testing
- Stations

There are other activities which must certainly be included in a project implementation schedule. However, these have not been considered here, as they are not part of the route selection mandate. They include signalling, rolling stock, shops and buildings, regulatory aspects, training and commissioning, start-up, and

financing. In general, it should be possible to integrate the timing of these items into the schedules presented.

10.1.1 TORONTO - MONTREAL

Figure 10.i presents the projected implementation schedule for the Toronto - Montréal segment of the project. Although the Toronto - Montréal segment has been treated as a whole throughout the current study, the consultant has followed the lead of a previous project in developing this implementation plan. This has been to presume, for two reasons, that the Montréal - Ottawa portion of the line would be constructed first. The first reason is that, being approximately 185 km apart, these two cities are the closest together of the major ridership generating centres. Therefore, completion of the line between them would provide the quickest means to start generating revenue. The second is that this segment could also provide a demonstration for the technology and assist in the decision to continue to complete the entire project. The distance from Ottawa to Toronto is approximately 400 km.

The following paragraphs describe the assumptions and links between activities that were used to develop this implementation schedule.

10.1.1.1 Preliminary Design/Environmental Assessment

The preliminary design phase of the project has been divided into two parts. This was done in order to reflect the work that would be needed to prepare for and support the environmental assessment and, afterwards, to complete the preliminary design work based on the resulting environmental recommendations.

It was felt that the environmental review process could start 6 months after beginning preliminary design. This review is expected to take 18 months on the Montréal - Ottawa portion of the line and 24 months between Ottawa and Toronto. The time required for environmental review could vary if a common process can be established amongst the three governments involved.

Completion of preliminary design would take 6 months after the last environmental recommendations are received. However, completion of the preliminary design on

Figure 10.i. Proposed HSR Implementation Schedule : Montréal - Ottawa (M-O), and Ottawa - Toronto (O-T)

ID	Name	Duration	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8				Year 9				Ye	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2				
1	Prelim. Design - Ph.1/M-O	78w	██████████																																					
2	Environmental Assess. /M-O	78w		██████████																																				
3	Prelim. Design - Ph.2/M-O	78w			██████████																																			
4	Detailed Design /M-O	104w				██████████																																		
5	ROW Acquisition/ M-O	156w					██████████																																	
6	Tenders- Civil Engi. /M-O	65w						██████████																																
7	Construction - Major Works	156w							██████████																															
8	General Construction /M-O	143w							██████████																															
9	Fixed Railway Plant /M-O	78w																																						
10	Testing / M-O	52w																																						
11	Stations /M-O	104w																																						
12	Service Start-up / M-O	0.2w																																				◆		
13																																								
14	Preliminary Design - Ph.1 /O-	78w	██████████																																					
15	Environmental Assess. /O-T	104w		██████████																																				
16	Preliminary Design - Ph.2 /O-	78w			██████████																																			
17	Detailed Design / O-T	130w				██████████																																		
18	ROW Acquisition /O-T	156w					██████████																																	
19	Tenders for Civil Engineering	91w						██████████																																
20	General Construction /O-T	156w							██████████																															
21	Fixed Railway Plant /O-T	104w																																						
22	Testing /O-T	52w																																						
23	Stations /O-T	104w																																						
24	Passenger Service Start-up	0.2w																																				◆		

Project: HSR Alignment Selection
Date: 94/2/9

Critical ██████████
Noncritical ██████████

Progress ██████████
Milestone ◆

Summary ██████████
Rolled Up ◆

some portions of the line could be completed earlier, allowing detailed design and ROW acquisition to start.

10.1.1.2 Detailed Design

There are two possible approaches to detailed design. One is to have the design performed by one or several engineering firms which would complete detailed plans, specifications, and bidding documents for tendering by contractors. This is the more common approach in North America. The second is to produce a functional design document and call for bids by contractor/engineering firm joint ventures and require these joint ventures to complete the detailed design. This is the approach that has been used for the TGV lines in France. An evaluation of the merits of each is not within the scope of this study. The implementation plan presented has tended to assume the first case and detailed design appears as a separate activity which precedes tendering.

It is projected that the detailed design would take two years for Montréal - Ottawa and 2½ for Ottawa - Toronto.

Although this detailed design might start 3 months before completion of all the preliminary design work, we have projected a 6 month overlap for the Montréal - Ottawa segment. This is in acknowledgement of the extra effort required to achieve the start of operations on this portion of the line in year 8 of the project.

10.1.1.3 Right-of-way acquisition

This task has been shown as taking three years for both portions of the Toronto - Montréal segment. The full process could take even longer. However, it appears that the Railway and Expropriation Acts would allow the project to take possession of the land for design and construction purposes before all claims have been settled. Failing this, it may be possible to suspend the application of portions of the expropriation acts, exclusively for this project, in favour of more expeditious procedures, as was done for Autoroute 30 in Québec where the Expropriation Act of Québec was made non-applicable to the project by the adoption of special law. In considering the above, the schedule anticipates beginning construction on some portions of the line

within two years of the start of land acquisition. It is possible that proceedings to acquire some of that land will not have been completed when construction begins.

10.1.1.4 Tenders for Civil Works

The schedule assumes a period of 3 months for tendering and award of contract for the general construction contracts. The assumption has been made that the first tender documents would be ready to issue 12 months after detailed design work starts. Subsequent tender documents for work packages not on the critical path would be issued as required.

10.1.1.5 General Construction

Construction of the earthworks has generally been assumed to require two full construction seasons per contract. Therefore, it would not be until the end of the second season before any roadbed would be ready for the installation of the fixed railway plant (track structure and signalling). Once track construction has begun, it sets the pace for the completion of the other roadbed contracts. They must be finished in time so as to not delay the track construction.

Montréal - Ottawa

There are potentially two major construction items on this portion of the line - the connection between CP and CN in the north of Montréal and a major bridge crossing of the Ottawa River. The schedule has allowed 3 years for the construction of these items. Construction of the remainder of the roadbed is spaced out over 2½ years.

Ottawa - Toronto

Although no single large civil construction items are identified on this portion of the line, a 3 year duration has been used for civil construction. There are two reasons for this. The first is that the conditions for installing fixed railway plant will accept such a schedule. In addition, 3 years may possibly be required to construct roadbed in the urban areas of Toronto, especially if significant amounts of relocation and accommodation of existing facilities are involved.

10.1.1.6 Fixed Railway Plant/Testing

Installation of the railway plant is one of the key items in the development of an implementation schedule for any railway project. This is due to the specialized nature of the construction equipment and the sensitivity of the work to the supply of materials. Track construction itself can proceed at a rate of 1,000 to 2,000 m/day depending on the construction methods used and the supply of materials.

After installation of the track structures, the rest of the railway plant follows: cables, catenary, and signalling. These are most easily installed by using rail-mounted equipment and consequently cannot proceed until substantial portions of the track are completed. This work requires 5-6 months beyond the completion of the trackwork to finish.

The implementation schedule allows 18 months for installing railway plant between Montréal and Ottawa and 24 months from Ottawa to Toronto. Assuming that equipment used to construct one line segment will move on to the next, the two periods mentioned above should not overlap.

Once all of the railway plant has been installed, the system still requires a period for testing of the whole and commissioning before it enters into revenue service. Although much of this testing involves verification of the interaction of the train and signalling system which falls outside this mandate, it has been included in the schedule presented in order to identify the start of operations.

10.1.1.7 Stations

It is expected that construction of new or modification of existing stations would take in the order of 2 years. Due to the much longer lead times required for construction of the roadbed and railway plant, stations do not fall on the critical path. They have therefore been presented as being completed before the start of commercial operations.

10.1.2 Windsor - Toronto

The Windsor - Toronto segment of the line is about 365 km long. This distance is slightly shorter than the approximately 400 km that are required to build the line between Toronto and Ottawa. Therefore, the consultant has re-used the Toronto - Ottawa construction schedule to develop a cash flow for Windsor - Toronto.

Based on the above, Figure 10.ii presents 9-year implementation schedule for the Windsor -Toronto segment of the line.

10.1.3 Montreal - Quebec

The Montréal - Québec segment of the line is 270 km long, although, under the 300+ kph scenarios, 16 km of this distance is common with the Toronto - Montréal segment. This distance falls between the 185 km that are required to build the line between Montréal and Ottawa and the 400 km between Ottawa and Toronto. As a result, the consultant has developed a construction schedule for this segment which reflects an average of the two. This produces a project duration of 8 years. It assumes a slightly higher productivity for this segment of the project which, again, is reasonable in consideration of the experience that will have been gained in constructing the central segment of the project.

Based on the above, Figure 10.iii presents the implementation schedule for the Montréal - Québec segment of the line.

10.1.4 Initiation of Operations

The preceding schedules have been developed as being representative of the time required to implement a high speed rail project over each of the respective segments. Depending on the implementation strategy used for the project, these schedules might be compressed slightly or delayed. However, in terms of initiation of operations (and revenue generation) for the purposes of financial and economic analysis of the project, it is recommended that the following be used for the year of initial operations:

Figure 10.ii. Proposed HSR Implementation Schedule : Windsor - Toronto

ID	Name	Duration	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8				Year 9				Ye	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2				
1	Preliminary Design - Ph.1	78w	██████████																																					
2	Environmental Assess.	104w					██████████																																	
3	Preliminary Design - Ph.2	78w									██████████																													
4	Detailed Design	130w													██████████																									
5	ROW Acquisition	156w													██████████																									
6	Tenders for Civil Engineering	91w													██████████																									
7	General Construction	156w													██████████																									
8	Fixed Railway Plant	104w																	██████████																					
9	Testing	52w																					██████████																	
10	Stations	104w																	██████████																					
11	Passenger Service Start-up	0.2w																													◆									

Project: HSR Alignment Selection
Date: 9/4/2/9

Critical ██████████
Noncritical ██████████

Progress ██████████
Milestone ◆

Summary ██████████
Rolled Up ◆

Figure 10.iii. Proposed HSR Implementation Schedule : Montréal - Québec

ID	Name	Duration	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8				Year 9				Ye	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2				
1	Prelim. Design - Ph.1	78w	██████████																																					
2	Environmental Assessment	91w		██████████																																				
3	Prelim. Design - Ph.2	78w			██████████																																			
4	Detailed Design	117w				██████████																																		
5	ROW Acquisition	156w					██████████																																	
6	Tenders- Civil Engineering	78w						██████████																																
7	General Construction	156w							██████████																															
8	Fixed Railway Plant	91w																			██████████																			
9	Testing	52w																																						
10	Stations	104w																				██████████																		
11	Passenger Service Start-up	0.2w																																	◆					

Project: HSR Alignment Selection Date: 9/2/9	Critical	██████████	Progress	██████████	Summary	██████████
	Noncritical	██████████	Milestone	◆	Rolled Up	◆

Project Segment	Start of Operations ³
Ottawa - Montréal	Year 8
Toronto - Ottawa	Year 10
Montréal - Québec	Year 9
Windsor - Toronto	Year 10

It will be noted when reviewing cash flows that they include small expenditures on construction during these years. However, these represent final payments to contractors for work completed previously.

10.2 CASH FLOW

As mentioned previously, the cash flows for the project were produced in light of the proposed implementation schedules. However, when developing the cash flows, the Consultant elected to use the Sub-system and Sector breakdowns of the total cost, as provided in the Summary estimates, as the principle cost inputs. The two main reasons for this decision were:

- first, a cost figure for each of these particular elements was already available and,
- second, these elements allow us to readily identify the cost with a physical component of the project which can easily be perceived as being carried out over a specific period of time.

As a result, it was necessary to relate each of the Sub-system/Sector costs to a schedule activity. The following table provides a cross-reference showing the correlation used between the two.

³ Where Year 1 is taken as the start of preliminary design.

Schedule Activity	Sub-system/Sector
Preliminary Design - Phase 1	partial B/1
Environmental Assessment	partial B/1
Preliminary Design - Phase 2	partial B/1
Detailed Design	partial B, C, D, & E/1
ROW Acquisition	A/1&2
Tenders for Civil Works	partial B, C, D, & E/1
General Construction	B, C, D, & E/4
Fixed Railway Plant & Testing	F & G/1, 2, & 4
Stations	H/1 & 4

Using the above, it was then possible to distribute the Sub-system/Sector costs amongst particular project years on a percentage basis. A separate distribution was made for each geographical segment based on the corresponding implementation schedule. The resulting distributions of these costs for each routing/segment combination are included in Appendix D to this report.

10.2.1 Summary Results

Although details for the cash flows are included in the appendices, the following three tables present the total cash flow for each of the speed/segment combinations being assessed. They are grouped under each of the main geographical segments: Windsor - Toronto, Toronto - Montréal, and Montréal - Québec. The results are presented in millions of dollars and as percentages of the full project cost.

Table 10.1
Windsor - Toronto Cash Flows
(\$ 000,000)

Year		1	2	3	4	5	6	7	8	9	10	Total
200+	\$	7.4	7.4	7.5	75.2	213.9	464.2	486.7	357.0	194.9	15.3	1,829.4
	%	0.3%	0.3%	0.4%	4%	12%	25%	27%	19%	11%	1.0%	100%
300+	\$	9.0	9.0	9.1	87.7	251.3	563.7	578.0	398.9	205.5	15.7	2,128.0
	%	0.4%	0.4%	0.4%	4%	12%	26%	27%	19%	10%	0.8%	100%

Table 10.2
Toronto - Montréal Cash Flows
(\$ 000,000)

Year		1	2	3	4	5	6	7	8	9	10	Total
200+	\$	19.5	21.1	44.8	248.4	532.9	994.6	864.9	585.0	421.8	22.1	3,755.2
	%	.5%	.5%	1%	7%	14%	26%	23%	16%	11%	1%	100%
300+ North Shore	\$	22.3	24.2	59.8	278.5	586.8	1,189.8	1,039.2	652.1	407.9	21.2	4,281.7
	%	.5%	1%	1%	7%	14%	27%	24%	15%	10%	.5%	100%
300+ South Shore	\$	21.5	23.2	53.9	257.2	561.3	1,140.8	998.5	651.5	421.0	21.7	4,150.6
	%	.5%	.5%	1.5%	6%	14%	27%	24%	16%	10%	.5%	100%

Table 10.3
Montréal - Québec Cash Flows
(\$ 000,000)

Year		1	2	3	4	5	6	7	8	9	10	Total
200 +	\$	6.9	5.8	35.0	59.9	182.9	312.4	408.0	198.0	21.4	0.0	1,230.2
	%	0.5%	0.5%	3%	5%	15%	25%	33%	16%	2%	0%	100%
300 +	\$	8.0	6.8	36.9	59.8	208.1	357.0	439.4	172.6	18.3	0	1,306.9
	%	0.5%	0.5%	3%	5%	16%	27%	34%	13%	1%	0%	100%

10.2.2 Combination of Cash Flows

The implementation schedules and the corresponding cash flows discussed in the preceding paragraphs relate to the major geographical segments of the project only. They have been developed in this manner to allow the financial and economic analysts the flexibility of combining them to fit an overall corridor implementation plan that schedules the construction of infrastructure for when it is justified by sufficient ridership. This flexibility has been provided to address the fact that the financial and economic evaluations will be undertaken after completion of the current study.

However, using this approach requires that some direction be provided for combining the individual implementation schedules and cash flows. To undertake the entire corridor at one time would prove to be an enormous task. On the other hand, waiting for one segment to be completed before doing any work on the next would drag the project out over a period of 25 + years.

A reasonable duration for construction of the complete project between Québec and Windsor falls between these two extremes. In evaluating the possibilities for combining the schedules, the governing consideration is the time required for construction of the fixed railway plant. These activities use specialized construction equipment and materials that are not as common as those in general heavy

construction. As an example, the quantity of rail required for the project is more than half of that purchased annually by the railway industry in North America.

Therefore, the general rule for combining the implementation schedules for the 3 major line segments is that the construction periods for Fixed Railway Plant Construction for each geographical segment should not overlap. These periods occur at the following times within their particular construction schedules:

Segment	From	To
Montréal - Toronto	Year 6, Q2	Year 9, Q3
Québec - Montréal	Year 7, Q1	Year 8, Q3
Toronto - Windsor	Year 7, Q4	Year 9, Q3

As an example, if one wished to construct the Montréal - Québec segment as soon as possible after completing Montréal - Toronto, the cash flow for Montréal - Québec should be delayed according to the following analysis:

- Fixed Railway Plant construction for Montréal - Québec must be delayed until this work has been completed for the Montréal - Toronto segment.
- Consequently, the entire implementation schedule for Montréal - Québec should be delayed in time by 33 months (equal to the delay from Year 7, Q1⁴ to Year 9, Q4⁵ or 11 quarters).

10.2.3 Breakdown by Labour/Market/Plant

Each of the cost estimates and cash flows developed as part of the cost estimate has been broken down into its labour, (skilled and unskilled), material, and plant⁶ components. This was accomplished by estimating the percentage that each

⁴ Beginning of Fixed Railway Plant in Montréal - Quebec schedule.

⁵ End of Fixed Railway Plant/O-T in Toronto - Montréal schedule.

⁶ Plant costs include construction and other equipment that are required to build the high speed rail line, but which are not incorporated into the completed infrastructure.

component comprised within the costs for each sub-system/sector combination appearing in the cash flows.

It should be noted that this breakdown only addresses first order costs to the authority responsible for infrastructure construction, and not allocations for components indirectly included in outside purchases. For example, the unit cost for ballast includes, in addition to the cost of the raw material, the acquisition of ballast cars and locomotives for the transportation of ballast from the quarry to the construction sites. This expenditure for plant is reflected in the component percentages developed for the Track - Materials subsystem. However, fixed plant and equipment at the quarry are not reflected in the component percentages developed for the Track -Materials Sector. The entire cost for the purchase of the crushed rock has been considered to be material and is reflected in the corresponding component percentage.

Working with this disaggregated approach has allowed us to use the same percentages for all speed/routing combinations. These percentages are presented in Table 10.4. The cash flows by component are included in Appendix D.

10.2.4 Breakdown by Geographic Origin of Cost Components

In response to special requirements for the economic analysis, an evaluation of the probable geographic origin(s) of the four components (skilled and unskilled labour, materials, and plant) identified in the preceding section was undertaken. This resulted in a further split of the infrastructure expenditures into a maximum of four geographic sources for each component. Allocation was made on the basis of the following geographic divisions:

- Québec,
- Ontario,
- the Rest of Canada, and
- Outside of Canada (Foreign).

In a similar fashion to the breakdown into components described above, a split between the four geographic locations was made for each component at the sub-system/sector level. In addition, in order to allow for the large amount of local

Table 10.4 LABOUR/MATERIAL/PLANT SUB-SYSTEM – SECTOR BREAKDOWNS

SUBSYSTEM/SECTOR COST VECTOR				
TOTAL COST				
<u>Subsystem/Sector</u>	<u>% SKILLED LABOUR FOR SUBS./SECTOR</u>	<u>% UNSKILLED LABOUR FOR SUBS./SECTOR</u>	<u>% MATERIALS FOR SUBS./SECTOR</u>	<u>% PLANT FOR SUBS./SECTOR</u>
<u>A – Right-of-way Acquisition</u>				
Sector 1	72%	3%	5%	20%
Sector 2	0%	0%	100%	0%
<u>B – Earthworks and Drainage</u>				
Sector 1	72%	3%	5%	20%
Sector 4	35%	15%	12%	38%
<u>C – Bridges, Viaducts, and Tunnels</u>				
Sector 1	72%	3%	5%	20%
Sector 4	30%	10%	40%	20%
<u>D – Grade Separations</u>				
Sector 1	72%	3%	5%	20%
Sector 4	35%	15%	30%	20%
<u>E – Other Accommodation Works</u>				
Sector 1	72%	3%	5%	20%
Sector 4	30%	20%	15%	35%
<u>F – Track</u>				
Sector 1	72%	3%	5%	20%
Sector 2	1%	1%	88%	10%
Sector 4	30%	20%	17%	33%
<u>G – Electrification</u>				
Sector 1	72%	3%	5%	20%
Sector 4	18%	5%	65%	12%
<u>H – Stations</u>				
Sector 1	72%	3%	5%	20%
Sector 4	30%	10%	40%	20%

expenditures that would occur in the actual province of work, particularly with respect to manpower, one set of geographic origin percentages was developed for each of the two corridor provinces. The resulting 8 tables showing these percentage allocations are also included in Appendix D. Since the assignment of geographic origin was made on a sub-system/sector basis, once the appropriate set for the province of work is chosen, the same percentages can apply to all technological options.

The resulting breakdown of total expenditure for each of the segments and the total corridor into their component/geographic origin costs is presented in Table 10.5. for the two speed options assessed. Cash flows for each speed/route segment included in Table 10.5 are presented in their respective sections of Appendix D.

Table 10.5

TOTAL EXPENDITURES BY ORIGIN AND TYPE (THOUSANDS)

Type of Expenditure	Origin of Expenditure	200 KPH COMPOSITE ROUTE				300 KPH COMPOSITE ROUTE			
		W-T	T-M	M-Q	TOTAL	W-T	T-M	M-Q	TOTAL
SKILLED LABOUR	Québec	\$26,804	\$284,376	\$343,239	\$654,419	\$29,269	\$377,869	\$389,443	\$796,581
	Ontario	\$515,433	\$903,239	\$21,255	\$1,439,927	\$616,816	\$1,012,452	\$20,414	\$1,649,682
	Rest of Canada	\$1,339	\$2,496	\$1,103	\$4,938	\$1,396	\$2,647	\$1,010	\$5,053
	Foreign	\$10,148	\$20,759	\$8,007	\$38,914	\$11,147	\$22,822	\$7,739	\$41,708
UNSKILLED LABOUR	Québec	\$0	\$68,196	\$106,461	\$174,657	\$0	\$106,154	\$123,121	\$229,275
	Ontario	\$162,889	\$280,186	\$0	\$443,075	\$195,556	\$310,163	\$0	\$505,719
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MATERIALS	Québec	\$101,736	\$364,878	\$301,854	\$768,468	\$104,910	\$385,865	\$321,227	\$812,002
	Ontario	\$553,892	\$844,749	\$107,309	\$1,505,950	\$646,975	\$929,262	\$93,962	\$1,670,199
	Rest of Canada	\$66,748	\$124,483	\$54,867	\$246,098	\$69,898	\$133,057	\$50,465	\$253,420
	Foreign	\$29,221	\$54,964	\$25,044	\$109,229	\$30,247	\$57,755	\$22,248	\$110,250
PLANT	Québec	\$14,929	\$51,969	\$38,833	\$105,731	\$17,863	\$67,155	\$41,916	\$126,934
	Ontario	\$98,174	\$189,062	\$43,398	\$330,634	\$111,830	\$208,676	\$43,201	\$363,707
	Rest of Canada	\$7,854	\$14,647	\$6,456	\$28,957	\$8,224	\$15,656	\$5,938	\$29,818
	Foreign	\$240,259	\$551,171	\$172,404	\$963,834	\$283,872	\$652,206	\$186,205	\$1,122,283
TOTAL ALL TYPES	Québec	\$143,469	\$769,419	\$790,387	\$1,703,275	\$152,042	\$937,043	\$875,707	\$1,964,792
	Ontario	\$1,330,388	\$2,217,236	\$171,962	\$3,719,586	\$1,571,177	\$2,460,553	\$157,577	\$4,189,307
	Rest of Canada	\$75,941	\$141,626	\$62,426	\$279,993	\$79,518	\$151,360	\$57,413	\$288,291
	Foreign	\$279,628	\$626,894	\$205,455	\$1,111,977	\$325,266	\$732,783	\$216,192	\$1,274,241
	total	\$1,829,426	\$3,755,175	\$1,230,230	\$6,814,831	\$2,128,003	\$4,281,739	\$1,306,889	\$7,716,631

APPENDIX A

BREAKDOWN OF INFRASTRUCTURE COST REDUCTIONS

CIVIL COSTS		Reduction	Addition
a)	Eliminate Kitchener/Cambridge Tunnel (\$000's)		
a.1	Rock Tunnel - 2400m	\$120,000	
a.2	Embankment - 2400 x 2 x 17/1000		\$244.8
a.3	Grade Separations - 3		\$6,600
a.4	Fencing - 2.4 km		\$134.4
a.5	Normal ROW Drainage - 2.4. km		\$60
		\$120,000	\$7,039.2
Net Reduction		\$112,960,000	

CIVIL COSTS		Reduction	Addition
c)	Elimination of Viaducts in East Oshawa (\$000's)		
c.1	Viaduct - 2,000m	\$54,000	
c.2	E-O for difficult fdns - 1,800m	\$7,200	
c.3	Grade separation - 2 lane		\$2,200
c.4	Relocation of 2 lane road - 1 km		\$280
		\$61,200	\$2,480
Net Reduction		\$58,720,000	

CIVIL COSTS		Reduction	Addition
d)	Replacement of Trent tunnel by viaduct and Cut (\$000's)		
d.1	Rock Tunnel - 1800m	\$90,000	
d.2	Embankment - 1750 x 14 x 35/1000 60% rock		\$1,029 \$7,718
d.3	Viaduct - 300m E-O for height - 300m		\$8,100 \$2,400
d.4	Fencing - 1500m		\$84
d.5	Normal ROW Drainage - 1.5km		\$37.5
d.6	Sub-ballast layers - 1.5km		\$305
		\$90,000	\$19,673.5
Net Reduction		\$70,327,000	

CIVIL COSTS		Reduction	Addition
e)	Elimination of tunnel south of Rivières des Prairie (\$000's)		
e.1	Rock Tunnelling - 2,607m	\$91,245	
e.2	Roadbed upgrade on Ex. ROW: 3.4km		\$2,040
e.3	Rail/Rail Grade Separation - 1		\$1,000
e.4	Track structure and Power Supply: 0.8km		\$1,360
e.5	Earthworks: 800 x 14 x 0.5 x 8		\$134.4
e.6	Ret Walls over 3m: 0.4 x 2		\$4,000
e.7	Ret Walls under 3m: 0.4 x 2		\$2,000
		\$91,245	\$10,534.4
Net Reduction		\$80,711,000	

CIVIL COSTS		Reduction	Addition
f)	Elimination of tunnel in Laval by using ex ROW with 300m curve (\$000's)		
f.1	Rock Tunnelling - 1950m	\$68,250	
f.2	Roadbed upgrade on ex. ROW 1.8 km		\$1,080
f.3	Track structure & Power supply 0.5 km		\$850
		\$68,250,000	\$1,930
Net Reduction		\$66,320,000	

CIVIL COSTS		Reduction	Addition
g)	Elimination of tunnel near Autoroute Du Vallon by using a 500m curve (\$000's)		
g.1	Rock Tunnelling - 260m	\$9,100	
g.2	Roadbed upgrade in ex. ROW: 1.5km		\$900
		\$9,100	\$900
Net Reduction		\$8,200,000	

LAND COSTS		Original	Revised
a)	Eliminate Kitchener/Cambridge Tunnel (\$000's)		
a.1	London to Toronto Pearson Airport	\$77,950	\$123,000
Net Reduction		(\$45,050,000)	

LAND COSTS		Original	Revised
b)	Lower alignment standard from Pearson Airport to Union Station (\$000's)		
b.1	Pearson Airport to Union Station	\$41,300	\$33,000
Net Reduction		\$8,300,000	

LAND COSTS (+ 300 New ROW)		Original	Revised
c)	Lower alignment standard from Union Station to East Oshawa (\$000's)		
c.1	Union Station to North Pickering Net Reduction	\$35,000	\$23,000
Net Reduction		\$12,000,000	

LAND COSTS (+ 300 Ex. ROW & 200-250 Ex. ROW)		Original	Revised
c)	Lower alignment standard from Union Station to East Oshawa (\$000's)		
c.1	Union Station to Oshawa	\$126,400	\$55,000
Net Reduction		\$71,400,000	

Note: Net land cost reduction available at various locations due to speed trade-off.

LONDON-HAMILTON SEGMENT

CIVIL COSTS	Reduction	Addition
Elimination of Tunnel through escarpment by assuming track sharing with CN on Dundas subdivision		
Rock Tunnel - 3250m	\$162,500,000	
Allowance assumed for misc. additional items required on ex. ROW		\$7,500,000
Net Reduction	\$155,000,000	
Adjusted Net Reduction (with allowance for professional service and project management)	\$204,280,300	

HAMILTON-UNION SEGMENT

LAND COSTS	Reduction	Addition
Land	\$56,300,000	
Net Reduction	\$56,300,000	
Adjusted Net Reduction (with allowance for professional service and project management)	\$68,666,750	

APPENDIX B

BREAKDOWN OF SAVINGS IN CAPITAL COST

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
WINDSOR – TORONTO CORRIDOR			300+, NEW ROW		segment: WTR-01		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$4,752,000	\$49,500,000	\$0	\$0	\$0	\$54,252,000	\$5,292,000
B – Earthworks and Drainage	(\$857,902)	\$0	\$0	\$505,080	\$0	(\$352,822)	\$65,880
C – Bridges, Viaducts, and Tunnels	(\$21,736,440)	\$0	\$0	(\$132,000,000)	\$0	(\$153,736,440)	(\$12,000,000)
D – Grade Separation	\$1,249,845	\$0	\$0	\$7,590,000	\$0	\$8,839,845	\$990,000
E – Other Accom- modation works	\$0	\$0	\$0	\$0	\$0	\$0	\$0
F – Track	\$0	\$0	\$0	\$0	\$0	\$0	\$0
G – Electrification	\$0	\$0	\$0	\$0	\$0	\$0	\$0
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	(\$16,592,497)	\$49,500,000	\$0	(\$123,904,920)	\$0	(\$90,997,417)	(\$5,652,120)

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
WINDSOR – TORONTO CORRIDOR		300+, NEW ROW			segment: WTR-02		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	(\$870,313)	(\$9,065,760)	\$0	\$0	\$0	(\$9,936,073)	(\$969,212)
B – Earthworks and Drainage	(\$114,664)	\$0	\$0	\$0	\$0	(\$114,664)	\$0
C – Bridges, Viaducts, and Tunnels	\$0	\$0	\$0	\$0	\$0	\$0	\$0
D – Grade Separation	\$0	\$0	\$0	\$0	\$0	\$0	\$0
E – Other Accom- modation works	\$0	\$0	\$0	\$0	\$0	\$0	\$0
F – Track	\$0	\$0	\$0	\$0	\$0	\$0	\$0
G – Electrification	\$0	\$0	\$0	\$0	\$0	\$0	\$0
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	(\$984,977)	(\$9,065,760)	\$0	\$0	\$0	(\$10,050,737)	(\$969,212)

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
TORONTO – ONTARIO/QUEBEC BORDER		300+, NEW ROW		segment: TMR-01			
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	(\$1,267,200)	(\$13,200,000)	\$0	\$0	\$0	(\$14,467,200)	(\$1,411,200)
B – Earthworks and Drainage	(\$166,954)	\$0	\$0	\$0	\$0	(\$166,954)	\$0
C – Bridges, Viaducts, and Tunnels	\$0	\$0	\$0	\$0	\$0	\$0	\$0
D – Grade Separation	\$0	\$0	\$0	\$0	\$0	\$0	\$0
E – Other Accom- modation works	\$0	\$0	\$0	\$0	\$0	\$0	\$0
F – Track	\$0	\$0	\$0	\$0	\$0	\$0	\$0
G – Electrification	\$0	\$0	\$0	\$0	\$0	\$0	\$0
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	(\$1,434,154)	(\$13,200,000)	\$0	\$0	\$0	(\$14,634,154)	(\$1,411,200)

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
TORONTO - ONTARIO/QUEBEC BORDER		300+, EXISTING ROW			segment: TMR-02		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start - up	TOTAL	
A - Right-of-way Aquisition	(\$7,539,840)	(\$78,540,000)	\$0	\$0	\$0	(\$86,079,840)	(\$8,396,640)
B - Earthworks and Drainage	(\$1,908,937)	\$0	\$0	\$0	\$0	(\$1,908,937)	\$0
C - Bridges, Viaducts, and Tunnels	(\$12,389,771)	\$0	\$0	(\$75,240,000)	\$0	(\$87,629,771)	(\$6,840,000)
D - Grade Separation	\$469,639	\$0	\$0	\$2,852,000	\$0	\$3,321,639	\$372,000
E - Other Accom- modation works	\$0	\$0	\$0	\$0	\$0	\$0	\$0
F - Track	\$0	\$0	\$0	\$0	\$0	\$0	\$0
G - Electrification	\$0	\$0	\$0	\$0	\$0	\$0	\$0
H - Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	(\$21,368,909)	(\$78,540,000)	\$0	(\$72,388,000)	\$0	(\$172,296,909)	(\$14,864,640)

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
TORONTO – ONTARIO/QUEBEC BORDER			300+, NEW ROW		segment: TMR-03		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage	(\$247,481)	\$0	\$0	\$4,842,075	\$0	\$4,594,594	\$631,575
C – Bridges, Viaducts, and Tunnels	(\$14,400,392)	\$0	\$0	(\$87,450,000)	\$0	(\$101,850,392)	(\$7,950,000)
D – Grade Separation	\$0	\$0	\$0	\$0	\$0	\$0	\$0
E – Other Accom- modation works	\$0	\$0	\$0	\$0	\$0	\$0	\$0
F – Track	\$0	\$0	\$0	\$0	\$0	\$0	\$0
G – Electrification	\$0	\$0	\$0	\$0	\$0	\$0	\$0
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	(\$14,647,872)	\$0	\$0	(\$82,607,925)	\$0	(\$97,255,797)	(\$7,318,425)

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
ONTARIO/QUEBEC BORDER – MONTREAL			300+, NEW ROW		segment: TMR-04		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage	\$425,517	\$0	\$0	\$9,400,560	\$0	\$9,826,077	\$1,226,160
C – Bridges, Viaducts, and Tunnels	(\$16,527,846)	\$0	\$0	(\$100,369,500)	\$0	(\$116,897,346)	(\$9,124,500)
D – Grade Separation	\$0	\$0	\$0	\$0	\$0	\$0	\$0
E – Other Accom- modation works	\$214,071	\$0	\$0	\$1,300,000	\$0	\$1,514,071	\$300,000
F – Track	\$87,640	\$461,765	\$0	\$133,486	\$0	\$682,891	\$29,545
G – Electrification	\$53,781	\$0	\$0	\$326,600	\$0	\$380,381	\$42,600
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	(\$15,746,836)	\$461,765	\$0	(\$89,208,854)	\$0	(\$104,493,925)	(\$7,526,195)

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
MONTREAL – QUÉBEC CORRIDOR		300+, NEW ROW			segment: MQR-01		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage	(\$721,728)	\$0	\$0	\$1,242,000	\$0	\$520,272	\$162,000
C – Bridges, Viaducts, and Tunnels	(\$12,362,600)	\$0	\$0	(\$75,075,000)	\$0	(\$87,437,600)	(\$6,825,000)
D – Grade Separation	\$0	\$0	\$0	\$0	\$0	\$0	\$0
E – Other Accom- modation works	\$0	\$0	\$0	\$0	\$0	\$0	\$0
F – Track	\$58,773	\$300,140	\$0	\$95,979	\$0	\$454,893	\$19,725
G – Electrification	\$33,613	\$0	\$0	\$204,125	\$0	\$237,738	\$26,625
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	(\$12,991,941)	\$300,140	\$0	(\$73,532,896)	\$0	(\$86,224,697)	(\$6,616,650)

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
MONTREAL – QUÉBEC CORRIDOR			300+, NEW ROW		segment: MQR-02		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage	\$56,918	\$0	\$0	\$1,035,000	\$0	\$1,091,918	\$135,000
C – Bridges, Viaducts, and Tunnels	(\$1,648,347)	\$0	\$0	(\$10,010,000)	\$0	(\$11,658,347)	(\$910,000)
D – Grade Separation	\$0	\$0	\$0	\$0	\$0	\$0	\$0
E – Other Accom- modation works	\$0	\$0	\$0	\$0	\$0	\$0	\$0
F – Track	\$0	\$0	\$0	\$0	\$0	\$0	\$0
G – Electrification	\$0	\$0	\$0	\$0	\$0	\$0	\$0
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	(\$1,591,429)	\$0	\$0	(\$8,975,000)	\$0	(\$10,566,429)	(\$775,000)

APPENDIX C

COST SUMMARIES OF ORIGINAL AND ADJUSTED AGLINMENT FOR ROUTE SEGMENT BETWEEN OTTAWA AND MONTRÉAL

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
ONTARIO/QUÉBEC BORDER – DORION ¹			200+, EXISTING ROW		segment: TM2-FG		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$453,874	\$4,727,855	N/A	N/A	see note c	\$5,181,729	\$505,451
B – Earthworks and Drainage	\$32,658,122	N/A	N/A	\$150,676,220	see note c	\$183,334,342	\$19,653,420
C – Bridges, Viaducts, and Tunnels	\$32,722,399	N/A	N/A	\$198,715,000	see note c	\$231,437,399	\$18,065,000
D – Grade Separation	\$13,662,341	N/A	N/A	\$82,968,000	see note c	\$96,630,341	\$13,828,000
E – Other Accom- modation works	\$0	see note a	see note a	\$0	see note c	\$0	\$0
F – Track	\$14,217,530	\$78,442,338	see note b	\$19,261,179	see note c	\$111,921,047	\$4,825,605
G – Electrification	\$14,090,131	see note a	see note a	\$85,565,865	see note c	\$99,655,996	\$11,160,765
H – Stations	\$0	see note a	see note a	\$0	see note c	\$0	\$0
Totals	\$107,804,396	\$83,170,193	\$0	\$537,186,264	\$0	\$728,160,853	\$68,038,241

Notes:

- a) Included in Construction/Installation
- b) Included in Equipment/Material
- c) Included in Other Studies

(1) Includes Cost for TM2-F0 and TM2-G0 sub-segments only

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
ONTARIO/QUÉBEC BORDER – DORION			300+, EXISTING ROW		segment: TM2-FG 1		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$453,874	\$4,727,855	\$0	\$0	\$0	\$5,181,729	\$505,451
B – Earthworks and Drainage	\$34,477,529	\$0	\$0	\$153,223,642	\$0	\$187,701,172	\$19,985,692
C – Bridges, Viaducts, and Tunnels	\$32,660,812	\$0	\$0	\$198,341,000	\$0	\$231,001,812	\$18,031,000
D – Grade Separation	\$30,961,698	\$0	\$0	\$188,022,700	\$0	\$218,984,398	\$24,524,700
E – Other Accom- modation works	\$568,979	\$0	\$0	\$3,455,270	\$0	\$4,024,249	\$797,370
F – Track	\$14,217,530	\$78,442,338	\$0	\$19,261,179	\$0	\$111,921,047	\$4,825,605
G – Electrification	\$14,090,131	\$0	\$0	\$85,565,865	\$0	\$99,655,996	\$11,160,765
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$127,430,554	\$83,170,193	\$0	\$647,869,657	\$0	\$858,470,403	\$79,830,583

Notes:

(1) Combined TM2-F0 and TM2-G0, with changes to allow costing of sub-segment for use with 300+ technology.

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
ONTARIO/QUÉBEC BORDER – MIRABEL			300+, NEW ROW		segment: TM0-F2		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$873,699	\$9,101,029	\$0	\$0	\$0	\$9,974,728	\$972,983
B – Earthworks and Drainage	\$45,164,103	\$0	\$0	\$225,909,818	\$0	\$271,073,921	\$29,466,498
C – Bridges, Viaducts, and Tunnels	\$7,512,657	\$0	\$0	\$45,622,500	\$0	\$53,135,157	\$4,147,500
D – Grade Separation	\$24,466,290	\$0	\$0	\$148,577,700	\$0	\$173,043,990	\$19,379,700
E – Other Accom- modation works	\$856,284	\$0	\$0	\$5,200,000	\$0	\$6,056,284	\$1,200,000
F – Track	\$15,327,345	\$85,296,579	\$0	\$20,269,168	\$0	\$120,893,092	\$5,209,053
G – Electrification	\$14,762,841	\$0	\$0	\$89,651,068	\$0	\$104,413,909	\$11,693,618
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$108,963,219	\$94,397,608	\$0	\$535,230,254	\$0	\$738,591,081	\$72,069,352

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
ONTARIO/QUÉBEC BORDER – MIRABEL			200+, NEW ROW		segment: TM0–F2 ¹		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$873,699	\$9,101,029	\$0	\$0	\$0	\$9,974,728	\$972,983
B – Earthworks and Drainage	\$44,434,225	\$0	\$0	\$225,909,818	\$0	\$270,344,043	\$29,466,498
C – Bridges, Viaducts, and Tunnels	\$7,512,657	\$0	\$0	\$45,622,500	\$0	\$53,135,157	\$4,147,500
D – Grade Separation	\$14,963,678	\$0	\$0	\$90,870,700	\$0	\$105,834,378	\$11,852,700
E – Other Accom- modation works	\$856,284	\$0	\$0	\$5,200,000	\$0	\$6,056,284	\$1,200,000
F – Track	\$15,327,345	\$85,296,579	\$0	\$20,269,168	\$0	\$120,893,092	\$5,209,053
G – Electrification	\$14,762,841	\$0	\$0	\$89,651,068	\$0	\$104,413,909	\$11,693,618
H – Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$98,730,729	\$94,397,608	\$0	\$477,523,254	\$0	\$670,651,591	\$64,542,352

Notes:

(1) With Changes to Number of Grade Separations: 26 transferred to Automatic Crossing Protection to allow costing of sub-segment for use with 200+ technology

APPENDIX D

SUPPLEMENTARY COST INFORMATION

SUPPLEMENTARY COST INFORMATION

D1. WINDSOR - TORONTO

200+ km/hr Composite Route

Segment Summary Cost Table

Sub-Segment Table

Segment Cash Flows by Sub-system/Sector

- Total Cost
- Skilled Labour
- Unskilled Labour
- Material
- Plant

Yearly Expenditure by Origin and Type

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
WINDSOR – TORONTO CORRIDOR 200+, OPTIMIZED							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$18,062,141	\$188,147,300	N/A	N/A	see note c	\$206,209,441	\$20,114,657
B – Earthworks and Drainage	\$73,516,695	N/A	N/A	\$325,929,665	see note c	\$399,446,360	\$42,512,565
C – Bridges, Viaducts, and Tunnels	\$17,459,252	N/A	N/A	\$106,025,700	see note c	\$123,484,952	\$9,638,700
D – Grade Separations	\$70,074,438	N/A	N/A	\$425,544,650	see note c	\$495,619,088	\$60,086,650
E – Other Accom- modation works	\$6,171,787	see note a	see note a	\$37,479,729	see note c	\$43,651,516	\$8,649,168
F – Track	\$37,207,561	\$206,674,989	see note b	\$49,464,841	see note c	\$293,347,390	\$12,641,563
G – Electrification	\$35,182,350	see note a	see note a	\$213,653,670	see note c	\$248,836,020	\$27,867,870
H – Stations	\$2,662,714	see note a	see note a	\$16,170,000	see note c	\$18,832,714	\$1,470,000
Totals	\$260,336,937	\$394,822,289	\$0	\$1,174,268,255	see note c	\$1,829,427,481	\$182,981,173

NOTES: a) included in Construction / Installation
b) included in Equipment / Material
c) included in Other Studies

08-Feb-94 current costs on file	
Windsor Toronto Corridor	
segment	total cost
WT2-A0	\$714,379,544
WT2-B0	\$0
WT2-C0	\$0
WT1-A0	\$0
WT1-B0	\$0
WT1-C0	\$0
WT0-A0	\$0
WT0-B0	\$1,163,674,373
WT0-C0	\$0
WT0-C1	\$0
WTS-1	\$16,135,838
WTS-2a	\$11,045,047
WTS-2b	\$0
WTS-3	\$0
WTS-4	\$15,190,095
WTS-5	\$0
WTR-01	(\$90,997,417)
WTR-02	\$0

TOTAL \$1,829,427,481

WINDSOR – TORONTO CORRIDOR

technology:
200+, OPTIMIZED

TOTAL COSTS CASH FLOW (THOUSANDS)

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$542	\$542	\$722	\$7,225	\$6,322	\$1,806	\$903	\$0	\$0	\$0	\$18,062
Sector 2	\$0	\$0	\$0	\$37,629	\$84,666	\$56,444	\$9,407	\$0	\$0	\$0	\$188,147
B – Earthworks and Drainage											
Sector 1	\$2,941	\$2,941	\$2,941	\$10,292	\$19,850	\$20,585	\$9,557	\$4,411	\$0	\$0	\$73,517
Sector 4	\$0	\$0	\$0	\$0	\$32,593	\$114,075	\$130,372	\$48,889	\$0	\$0	\$325,930
C – Bridges, Viad., and Tunnels											
Sector 1	\$698	\$698	\$698	\$2,444	\$4,714	\$4,889	\$2,270	\$1,048	\$0	\$0	\$17,459
Sector 4	\$0	\$0	\$0	\$0	\$5,301	\$42,410	\$42,410	\$15,904	\$0	\$0	\$106,026
D – Grade Separations											
Sector 1	\$2,803	\$2,803	\$2,803	\$9,810	\$18,920	\$19,621	\$9,110	\$4,204	\$0	\$0	\$70,074
Sector 4	\$0	\$0	\$0	\$0	\$21,277	\$170,218	\$170,218	\$63,832	\$0	\$0	\$425,545
E – Other Accom. Works											
Sector 1	\$247	\$247	\$247	\$1,234	\$2,222	\$1,605	\$370	\$0	\$0	\$0	\$6,172
Sector 4	\$0	\$0	\$0	\$0	\$9,370	\$20,614	\$7,496	\$0	\$0	\$0	\$37,480
F – Track											
Sector 1	\$0	\$0	\$0	\$3,349	\$4,465	\$5,953	\$7,814	\$10,046	\$4,465	\$1,116	\$37,208
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$51,669	\$82,670	\$72,336	\$0	\$206,675
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$4,946	\$24,732	\$17,313	\$2,473	\$49,465
G – Electrification											
Sector 1	\$0	\$0	\$0	\$3,166	\$4,222	\$5,629	\$7,388	\$9,499	\$4,222	\$1,055	\$35,182
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$32,048	\$85,461	\$85,461	\$10,683	\$213,654
H – Stations											
Sector 1	\$160	\$160	\$80	\$0	\$0	\$346	\$692	\$612	\$612	\$0	\$2,663
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,660	\$10,511	\$0	\$16,170
TOTAL	\$7,391	\$7,391	\$7,491	\$75,151	\$213,922	\$464,195	\$486,671	\$356,969	\$194,920	\$15,328	\$1,829,427
% of total cost expended in year	0%	0%	0%	4%	12%	25%	27%	20%	11%	1%	100%

WINDSOR – TORONTO CORRIDOR

SKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
200+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$390	\$390	\$520	\$5,202	\$4,552	\$1,300	\$650	\$0	\$0	\$0	\$13,005
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$2,117	\$2,117	\$2,117	\$7,410	\$14,292	\$14,821	\$6,881	\$3,176	\$0	\$0	\$52,932
Sector 4	\$0	\$0	\$0	\$0	\$11,408	\$39,926	\$45,630	\$17,111	\$0	\$0	\$114,075
C – Bridges, Viad., and Tunnels											
Sector 1	\$503	\$503	\$503	\$1,760	\$3,394	\$3,520	\$1,634	\$754	\$0	\$0	\$12,571
Sector 4	\$0	\$0	\$0	\$0	\$1,590	\$12,723	\$12,723	\$4,771	\$0	\$0	\$31,808
D – Grade Separations											
Sector 1	\$2,018	\$2,018	\$2,018	\$7,064	\$13,622	\$14,127	\$6,559	\$3,027	\$0	\$0	\$50,454
Sector 4	\$0	\$0	\$0	\$0	\$7,447	\$59,576	\$59,576	\$22,341	\$0	\$0	\$148,941
E – Other Accom. Works											
Sector 1	\$178	\$178	\$178	\$889	\$1,600	\$1,155	\$267	\$0	\$0	\$0	\$4,444
Sector 4	\$0	\$0	\$0	\$0	\$2,811	\$6,184	\$2,249	\$0	\$0	\$0	\$11,244
F – Track											
Sector 1	\$0	\$0	\$0	\$2,411	\$3,215	\$4,286	\$5,626	\$7,233	\$3,215	\$804	\$26,789
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$517	\$827	\$723	\$0	\$2,067
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,484	\$7,420	\$5,194	\$742	\$14,839
G – Electrification											
Sector 1	\$0	\$0	\$0	\$2,280	\$3,040	\$4,053	\$5,320	\$6,839	\$3,040	\$760	\$25,331
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$5,769	\$15,383	\$15,383	\$1,923	\$38,458
H – Stations											
Sector 1	\$115	\$115	\$58	\$0	\$0	\$249	\$498	\$441	\$441	\$0	\$1,917
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,698	\$3,153	\$0	\$4,851
total	\$5,321	\$5,321	\$5,394	\$27,015	\$66,970	\$161,922	\$155,383	\$91,022	\$31,149	\$4,228	\$553,725

WINDSOR – TORONTO CORRIDOR

UNSKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
200+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$16	\$16	\$22	\$217	\$190	\$54	\$27	\$0	\$0	\$0	\$542
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$88	\$88	\$88	\$309	\$595	\$618	\$287	\$132	\$0	\$0	\$2,206
Sector 4	\$0	\$0	\$0	\$0	\$4,889	\$17,111	\$19,556	\$7,333	\$0	\$0	\$48,889
C – Bridges, Viad., and Tunnels											
Sector 1	\$21	\$21	\$21	\$73	\$141	\$147	\$68	\$31	\$0	\$0	\$524
Sector 4	\$0	\$0	\$0	\$0	\$530	\$4,241	\$4,241	\$1,590	\$0	\$0	\$10,603
D – Grade Separations											
Sector 1	\$84	\$84	\$84	\$294	\$568	\$589	\$273	\$126	\$0	\$0	\$2,102
Sector 4	\$0	\$0	\$0	\$0	\$3,192	\$25,533	\$25,533	\$9,575	\$0	\$0	\$63,832
E – Other Accom. Works											
Sector 1	\$7	\$7	\$7	\$37	\$67	\$48	\$11	\$0	\$0	\$0	\$185
Sector 4	\$0	\$0	\$0	\$0	\$1,874	\$4,123	\$1,499	\$0	\$0	\$0	\$7,496
F – Track											
Sector 1	\$0	\$0	\$0	\$100	\$134	\$179	\$234	\$301	\$134	\$33	\$1,116
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$517	\$827	\$723	\$0	\$2,067
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$989	\$4,946	\$3,463	\$495	\$9,893
G – Electrification											
Sector 1	\$0	\$0	\$0	\$95	\$127	\$169	\$222	\$285	\$127	\$32	\$1,055
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,602	\$4,273	\$4,273	\$534	\$10,683
H – Stations											
Sector 1	\$5	\$5	\$2	\$0	\$0	\$10	\$21	\$18	\$18	\$0	\$80
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$566	\$1,051	\$0	\$1,617
total	\$222	\$222	\$225	\$1,126	\$12,306	\$52,821	\$55,080	\$30,005	\$9,789	\$1,094	\$162,889

WINDSOR – TORONTO CORRIDOR

MATERIALS COSTS CASH FLOW (THOUSANDS)

technology:
200+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$27	\$27	\$36	\$361	\$316	\$90	\$45	\$0	\$0	\$0	\$903
Sector 2	\$0	\$0	\$0	\$37,629	\$84,666	\$56,444	\$9,407	\$0	\$0	\$0	\$188,147
B – Earthworks and Drainage											
Sector 1	\$147	\$147	\$147	\$515	\$992	\$1,029	\$478	\$221	\$0	\$0	\$3,676
Sector 4	\$0	\$0	\$0	\$0	\$3,911	\$13,689	\$15,645	\$5,867	\$0	\$0	\$39,112
C – Bridges, Viad., and Tunnels											
Sector 1	\$35	\$35	\$35	\$122	\$236	\$244	\$113	\$52	\$0	\$0	\$873
Sector 4	\$0	\$0	\$0	\$0	\$2,121	\$16,964	\$16,964	\$6,362	\$0	\$0	\$42,410
D – Grade Separations											
Sector 1	\$140	\$140	\$140	\$491	\$946	\$981	\$455	\$210	\$0	\$0	\$3,504
Sector 4	\$0	\$0	\$0	\$0	\$6,383	\$51,065	\$51,065	\$19,150	\$0	\$0	\$127,663
E – Other Accom. Works											
Sector 1	\$12	\$12	\$12	\$62	\$111	\$80	\$19	\$0	\$0	\$0	\$309
Sector 4	\$0	\$0	\$0	\$0	\$1,405	\$3,092	\$1,124	\$0	\$0	\$0	\$5,622
F – Track											
Sector 1	\$0	\$0	\$0	\$167	\$223	\$298	\$391	\$502	\$223	\$56	\$1,860
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$45,468	\$72,750	\$63,656	\$0	\$181,874
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$841	\$4,205	\$2,943	\$420	\$8,409
G – Electrification											
Sector 1	\$0	\$0	\$0	\$158	\$211	\$281	\$369	\$475	\$211	\$53	\$1,759
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$20,831	\$55,550	\$55,550	\$6,944	\$138,875
H – Stations											
Sector 1	\$8	\$8	\$4	\$0	\$0	\$17	\$35	\$31	\$31	\$0	\$133
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,264	\$4,204	\$0	\$6,468
total	\$370	\$370	\$375	\$39,506	\$101,522	\$144,276	\$163,252	\$167,637	\$126,818	\$7,473	\$751,597

WINDSOR – TORONTO CORRIDOR

technology:
200+, OPTIMIZED

PLANT COSTS CASH FLOW (THOUSANDS)

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$108	\$108	\$144	\$1,445	\$1,264	\$361	\$181	\$0	\$0	\$0	\$3,612
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$588	\$588	\$588	\$2,058	\$3,970	\$4,117	\$1,911	\$882	\$0	\$0	\$14,703
Sector 4	\$0	\$0	\$0	\$0	\$12,385	\$43,349	\$49,541	\$18,578	\$0	\$0	\$123,853
C – Bridges, Viad., and Tunnels											
Sector 1	\$140	\$140	\$140	\$489	\$943	\$978	\$454	\$210	\$0	\$0	\$3,492
Sector 4	\$0	\$0	\$0	\$0	\$1,060	\$8,482	\$8,482	\$3,181	\$0	\$0	\$21,205
D – Grade Separations											
Sector 1	\$561	\$561	\$561	\$1,962	\$3,784	\$3,924	\$1,822	\$841	\$0	\$0	\$14,015
Sector 4	\$0	\$0	\$0	\$0	\$4,255	\$34,044	\$34,044	\$12,766	\$0	\$0	\$85,109
E – Other Accom. Works											
Sector 1	\$49	\$49	\$49	\$247	\$444	\$321	\$74	\$0	\$0	\$0	\$1,234
Sector 4	\$0	\$0	\$0	\$0	\$3,279	\$7,215	\$2,624	\$0	\$0	\$0	\$13,118
F – Track											
Sector 1	\$0	\$0	\$0	\$670	\$893	\$1,191	\$1,563	\$2,009	\$893	\$223	\$7,442
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$5,167	\$8,267	\$7,234	\$0	\$20,667
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,632	\$8,162	\$5,713	\$816	\$16,323
G – Electrification											
Sector 1	\$0	\$0	\$0	\$633	\$844	\$1,126	\$1,478	\$1,900	\$844	\$211	\$7,036
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$3,846	\$10,255	\$10,255	\$1,282	\$25,638
H – Stations											
Sector 1	\$32	\$32	\$16	\$0	\$0	\$69	\$138	\$122	\$122	\$0	\$533
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,132	\$2,102	\$0	\$3,234
total	\$1,478	\$1,478	\$1,498	\$7,504	\$33,123	\$105,176	\$112,956	\$68,305	\$27,164	\$2,532	\$361,216

WINDSOR – TORONTO CORRIDOR

YEARLY EXPENDITURES BY ORIGIN AND TYPE (THOUSANDS)

technology:
200+, OPTIMIZED

GEOGRAPHIC ORIGIN :
ALL

Type of Expenditure	Origin of Expenditure	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
SKILLED LABOUR	Québec	\$345	\$345	\$341	\$2,840	\$4,493	\$5,290	\$4,940	\$5,443	\$2,220	\$547	\$26,804
	Ontario	\$4,828	\$4,828	\$4,906	\$22,958	\$60,552	\$154,365	\$148,326	\$83,246	\$27,977	\$3,447	\$515,433
	Rest of Canada	\$0	\$0	\$0	\$121	\$161	\$214	\$281	\$362	\$161	\$40	\$1,339
	Foreign	\$148	\$148	\$146	\$1,097	\$1,765	\$2,053	\$1,836	\$1,971	\$791	\$194	\$10,148
UNSKILLED LABOUR	Québec	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Ontario	\$222	\$222	\$225	\$1,126	\$12,306	\$52,821	\$55,080	\$30,005	\$9,789	\$1,094	\$162,889
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MATERIALS	Québec	\$0	\$0	\$0	\$0	\$0	\$0	\$19,935	\$40,694	\$38,357	\$2,750	\$101,736
	Ontario	\$370	\$370	\$375	\$39,506	\$101,522	\$144,276	\$120,519	\$88,555	\$54,275	\$4,126	\$553,892
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$16,687	\$26,699	\$23,362	\$0	\$66,748
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$6,111	\$11,689	\$10,825	\$597	\$29,221
PLANT	Québec	\$74	\$74	\$75	\$375	\$1,656	\$5,259	\$5,116	\$2,081	\$198	\$22	\$14,929
	Ontario	\$1,330	\$1,330	\$1,348	\$6,754	\$13,027	\$20,187	\$21,339	\$20,137	\$11,639	\$1,083	\$98,174
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$1,963	\$3,141	\$2,749	\$0	\$7,854
	Foreign	\$74	\$74	\$75	\$375	\$18,441	\$79,730	\$84,538	\$42,946	\$12,579	\$1,427	\$240,259
TOTAL ALL TYPES	Québec	\$419	\$419	\$416	\$3,216	\$6,149	\$10,549	\$29,990	\$48,219	\$40,775	\$3,319	\$143,470
	Ontario	\$6,750	\$6,750	\$6,854	\$70,343	\$187,407	\$371,649	\$345,264	\$221,942	\$103,680	\$9,750	\$1,330,388
	Rest of Canada	\$0	\$0	\$0	\$121	\$161	\$214	\$18,932	\$30,202	\$26,271	\$40	\$75,941
	Foreign	\$222	\$222	\$221	\$1,472	\$20,205	\$81,783	\$92,485	\$56,606	\$24,194	\$2,219	\$279,629
	total	\$7,391	\$7,391	\$7,491	\$75,151	\$213,922	\$464,195	\$486,671	\$356,969	\$194,920	\$15,328	\$1,829,427

SUPPLEMENTARY COST INFORMATION

D2. WINDSOR - TORONTO

300+ km/hr Composite Route

Segment Summary Cost Table

Sub-Segment Table

Segment Cash Flows by Sub-system/Sector

- Total Cost
- Skilled Labour
- Unskilled Labour
- Material
- Plant

Yearly Expenditure by Origin and Type

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
WINDSOR – TORONTO CORRIDOR 300+, OPTIMIZED							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Acquisition	\$20,962,339	\$218,357,700	N/A	N/A	see note c	\$239,320,039	\$23,344,423
B – Earthworks and Drainage	\$83,865,517	N/A	N/A	\$369,143,905	see note c	\$453,009,422	\$48,149,205
C – Bridges, Viaducts, and Tunnels	\$19,017,664	N/A	N/A	\$115,489,550	see note c	\$134,507,214	\$10,499,050
D – Grade Separations	\$94,642,074	N/A	N/A	\$574,737,800	see note c	\$669,379,874	\$74,965,800
E – Other Accom- modation works	\$6,400,465	see note a	see note a	\$38,868,431	see note c	\$45,268,895	\$8,969,638
F – Track	\$38,791,209	\$216,428,960	see note b	\$50,921,270	see note c	\$306,141,439	\$13,188,477
G – Electrification	\$35,801,781	see note a	see note a	\$217,415,320	see note c	\$253,217,101	\$28,358,520
H – Stations	\$3,840,104	see note a	see note a	\$23,320,000	see note c	\$27,160,104	\$2,120,000
Totals	\$303,321,152	\$434,786,660	\$0	\$1,389,896,276	see note c	\$2,128,004,089	\$209,595,113

NOTES: a) included in Construction / Installation
b) included in Equipment / Material
c) included in Other Studies

08-Feb-94 current costs on file	
Windsor Toronto Corridor	
300 OPTIMIZED	
segment	total cost
WT2-A0	\$0
WT2-B0	\$0
WT2-C0	\$0
WT1-A0	\$1,003,294,584
WT1-B0	\$0
WT1-C0	\$0
WT0-A0	\$0
WT0-B0	\$1,163,674,373
WT0-C0	\$0
WT0-C1	\$0
WTS-1	\$16,135,838
WTS-2a	\$0
WTS-2b	\$20,706,614
WTS-3	\$0
WTS-4	\$15,190,095
WTS-5	\$0
WTR-01	(\$90,997,417)
WTR-02	\$0

TOTAL \$2,128,004,089

WINDSOR – TORONTO CORRIDOR

TOTAL COSTS CASH FLOW (THOUSANDS)

technology:
300+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$629	\$629	\$838	\$8,385	\$7,337	\$2,096	\$1,048	\$0	\$0	\$0	\$20,962
Sector 2	\$0	\$0	\$0	\$43,672	\$98,261	\$65,507	\$10,918	\$0	\$0	\$0	\$218,358
B – Earthworks and Drainage											
Sector 1	\$3,355	\$3,355	\$3,355	\$11,741	\$22,644	\$23,482	\$10,903	\$5,032	\$0	\$0	\$83,866
Sector 4	\$0	\$0	\$0	\$0	\$36,914	\$129,200	\$147,658	\$55,372	\$0	\$0	\$369,144
C – Bridges, Viad., and Tunnels											
Sector 1	\$761	\$761	\$761	\$2,662	\$5,135	\$5,325	\$2,472	\$1,141	\$0	\$0	\$19,018
Sector 4	\$0	\$0	\$0	\$0	\$5,774	\$46,196	\$46,196	\$17,323	\$0	\$0	\$115,490
D – Grade Separations											
Sector 1	\$3,786	\$3,786	\$3,786	\$13,250	\$25,553	\$26,500	\$12,303	\$5,679	\$0	\$0	\$94,642
Sector 4	\$0	\$0	\$0	\$0	\$28,737	\$229,895	\$229,895	\$86,211	\$0	\$0	\$574,738
E – Other Accom. Works											
Sector 1	\$256	\$256	\$256	\$1,280	\$2,304	\$1,664	\$384	\$0	\$0	\$0	\$6,400
Sector 4	\$0	\$0	\$0	\$0	\$9,717	\$21,378	\$7,774	\$0	\$0	\$0	\$38,868
F – Track											
Sector 1	\$0	\$0	\$0	\$3,491	\$4,655	\$6,207	\$8,146	\$10,474	\$4,655	\$1,164	\$38,791
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$54,107	\$86,572	\$75,750	\$0	\$216,429
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$5,092	\$25,461	\$17,822	\$2,546	\$50,921
G – Electrification											
Sector 1	\$0	\$0	\$0	\$3,222	\$4,296	\$5,728	\$7,518	\$9,666	\$4,296	\$1,074	\$35,802
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$32,612	\$86,966	\$86,966	\$10,871	\$217,415
H – Stations											
Sector 1	\$230	\$230	\$115	\$0	\$0	\$499	\$998	\$883	\$883	\$0	\$3,840
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,162	\$15,158	\$0	\$23,320
TOTAL	\$9,016	\$9,016	\$9,111	\$87,703	\$251,328	\$563,678	\$578,025	\$398,941	\$205,531	\$15,655	\$2,128,004
% of total cost expended in year	0%	0%	0%	4%	12%	26%	27%	19%	10%	1%	100%

WINDSOR – TORONTO CORRIDOR

SKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
300+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$453	\$453	\$604	\$6,037	\$5,283	\$1,509	\$755	\$0	\$0	\$0	\$15,093
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$2,415	\$2,415	\$2,415	\$8,454	\$16,303	\$16,907	\$7,850	\$3,623	\$0	\$0	\$60,383
Sector 4	\$0	\$0	\$0	\$0	\$12,920	\$45,220	\$51,680	\$19,380	\$0	\$0	\$129,200
C – Bridges, Viad., and Tunnels											
Sector 1	\$548	\$548	\$548	\$1,917	\$3,697	\$3,834	\$1,780	\$822	\$0	\$0	\$13,693
Sector 4	\$0	\$0	\$0	\$0	\$1,732	\$13,859	\$13,859	\$5,197	\$0	\$0	\$34,647
D – Grade Separations											
Sector 1	\$2,726	\$2,726	\$2,726	\$9,540	\$18,398	\$19,080	\$8,858	\$4,089	\$0	\$0	\$68,142
Sector 4	\$0	\$0	\$0	\$0	\$10,058	\$80,463	\$80,463	\$30,174	\$0	\$0	\$201,158
E – Other Accom. Works											
Sector 1	\$184	\$184	\$184	\$922	\$1,659	\$1,198	\$277	\$0	\$0	\$0	\$4,608
Sector 4	\$0	\$0	\$0	\$0	\$2,915	\$6,413	\$2,332	\$0	\$0	\$0	\$11,661
F – Track											
Sector 1	\$0	\$0	\$0	\$2,514	\$3,352	\$4,469	\$5,865	\$7,541	\$3,352	\$838	\$27,930
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$541	\$866	\$758	\$0	\$2,164
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,528	\$7,638	\$5,347	\$764	\$15,276
G – Electrification											
Sector 1	\$0	\$0	\$0	\$2,320	\$3,093	\$4,124	\$5,413	\$6,960	\$3,093	\$773	\$25,777
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$5,870	\$15,654	\$15,654	\$1,957	\$39,135
H – Stations											
Sector 1	\$166	\$166	\$83	\$0	\$0	\$359	\$719	\$636	\$636	\$0	\$2,765
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,449	\$4,547	\$0	\$6,996
total	\$6,492	\$6,492	\$6,560	\$31,703	\$79,411	\$197,437	\$187,790	\$105,027	\$33,386	\$4,332	\$658,629

WINDSOR – TORONTO CORRIDOR

UNSKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
300+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$19	\$19	\$25	\$252	\$220	\$63	\$31	\$0	\$0	\$0	\$629
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$101	\$101	\$101	\$352	\$679	\$704	\$327	\$151	\$0	\$0	\$2,516
Sector 4	\$0	\$0	\$0	\$0	\$5,537	\$19,380	\$22,149	\$8,306	\$0	\$0	\$55,372
C – Bridges, Viad., and Tunnels											
Sector 1	\$23	\$23	\$23	\$80	\$154	\$160	\$74	\$34	\$0	\$0	\$571
Sector 4	\$0	\$0	\$0	\$0	\$577	\$4,620	\$4,620	\$1,732	\$0	\$0	\$11,549
D – Grade Separations											
Sector 1	\$114	\$114	\$114	\$397	\$767	\$795	\$369	\$170	\$0	\$0	\$2,839
Sector 4	\$0	\$0	\$0	\$0	\$4,311	\$34,484	\$34,484	\$12,932	\$0	\$0	\$86,211
E – Other Accom. Works											
Sector 1	\$8	\$8	\$8	\$38	\$69	\$50	\$12	\$0	\$0	\$0	\$192
Sector 4	\$0	\$0	\$0	\$0	\$1,943	\$4,276	\$1,555	\$0	\$0	\$0	\$7,774
F – Track											
Sector 1	\$0	\$0	\$0	\$105	\$140	\$186	\$244	\$314	\$140	\$35	\$1,164
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$541	\$866	\$758	\$0	\$2,164
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,018	\$5,092	\$3,564	\$509	\$10,184
G – Electrification											
Sector 1	\$0	\$0	\$0	\$97	\$129	\$172	\$226	\$290	\$129	\$32	\$1,074
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,631	\$4,348	\$4,348	\$544	\$10,871
H – Stations											
Sector 1	\$7	\$7	\$3	\$0	\$0	\$15	\$30	\$26	\$26	\$0	\$115
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$816	\$1,516	\$0	\$2,332
total	\$270	\$270	\$273	\$1,321	\$14,526	\$64,904	\$67,311	\$35,078	\$10,481	\$1,120	\$195,556

WINDSOR – TORONTO CORRIDOR

MATERIALS COSTS CASH FLOW (THOUSANDS)

technology:
300+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$31	\$31	\$42	\$419	\$367	\$105	\$52	\$0	\$0	\$0	\$1,048
Sector 2	\$0	\$0	\$0	\$43,672	\$98,261	\$65,507	\$10,918	\$0	\$0	\$0	\$218,358
B – Earthworks and Drainage											
Sector 1	\$168	\$168	\$168	\$587	\$1,132	\$1,174	\$545	\$252	\$0	\$0	\$4,193
Sector 4	\$0	\$0	\$0	\$0	\$4,430	\$15,504	\$17,719	\$6,645	\$0	\$0	\$44,297
C – Bridges, Viad., and Tunnels											
Sector 1	\$38	\$38	\$38	\$133	\$257	\$266	\$124	\$57	\$0	\$0	\$951
Sector 4	\$0	\$0	\$0	\$0	\$2,310	\$18,478	\$18,478	\$6,929	\$0	\$0	\$46,196
D – Grade Separations											
Sector 1	\$189	\$189	\$189	\$662	\$1,278	\$1,325	\$615	\$284	\$0	\$0	\$4,732
Sector 4	\$0	\$0	\$0	\$0	\$8,621	\$68,969	\$68,969	\$25,863	\$0	\$0	\$172,421
E – Other Accom. Works											
Sector 1	\$13	\$13	\$13	\$64	\$115	\$83	\$19	\$0	\$0	\$0	\$320
Sector 4	\$0	\$0	\$0	\$0	\$1,458	\$3,207	\$1,166	\$0	\$0	\$0	\$5,830
F – Track											
Sector 1	\$0	\$0	\$0	\$175	\$233	\$310	\$407	\$524	\$233	\$58	\$1,940
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$47,614	\$76,183	\$66,660	\$0	\$190,457
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$866	\$4,328	\$3,030	\$433	\$8,657
G – Electrification											
Sector 1	\$0	\$0	\$0	\$161	\$215	\$286	\$376	\$483	\$215	\$54	\$1,790
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$21,198	\$56,528	\$56,528	\$7,066	\$141,320
H – Stations											
Sector 1	\$12	\$12	\$6	\$0	\$0	\$25	\$50	\$44	\$44	\$0	\$192
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,265	\$6,063	\$0	\$9,328
total	\$451	\$451	\$456	\$45,873	\$118,675	\$175,240	\$189,116	\$181,385	\$132,773	\$7,611	\$852,031

WINDSOR – TORONTO CORRIDOR

technology:
300+, OPTIMIZED

PLANT COSTS CASH FLOW (THOUSANDS)

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$126	\$126	\$168	\$1,677	\$1,467	\$419	\$210	\$0	\$0	\$0	\$4,192
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$671	\$671	\$671	\$2,348	\$4,529	\$4,696	\$2,181	\$1,006	\$0	\$0	\$16,773
Sector 4	\$0	\$0	\$0	\$0	\$14,027	\$49,096	\$56,110	\$21,041	\$0	\$0	\$140,275
C – Bridges, Viad., and Tunnels											
Sector 1	\$152	\$152	\$152	\$532	\$1,027	\$1,065	\$494	\$228	\$0	\$0	\$3,804
Sector 4	\$0	\$0	\$0	\$0	\$1,155	\$9,239	\$9,239	\$3,465	\$0	\$0	\$23,098
D – Grade Separations											
Sector 1	\$757	\$757	\$757	\$2,650	\$5,111	\$5,300	\$2,461	\$1,136	\$0	\$0	\$18,928
Sector 4	\$0	\$0	\$0	\$0	\$5,747	\$45,979	\$45,979	\$17,242	\$0	\$0	\$114,948
E – Other Accom. Works											
Sector 1	\$51	\$51	\$51	\$256	\$461	\$333	\$77	\$0	\$0	\$0	\$1,280
Sector 4	\$0	\$0	\$0	\$0	\$3,401	\$7,482	\$2,721	\$0	\$0	\$0	\$13,604
F – Track											
Sector 1	\$0	\$0	\$0	\$698	\$931	\$1,241	\$1,629	\$2,095	\$931	\$233	\$7,758
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$5,411	\$8,657	\$7,575	\$0	\$21,643
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,680	\$8,402	\$5,881	\$840	\$16,804
G – Electrification											
Sector 1	\$0	\$0	\$0	\$644	\$859	\$1,146	\$1,504	\$1,933	\$859	\$215	\$7,160
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$3,913	\$10,436	\$10,436	\$1,304	\$26,090
H – Stations											
Sector 1	\$46	\$46	\$23	\$0	\$0	\$100	\$200	\$177	\$177	\$0	\$768
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,632	\$3,032	\$0	\$4,664
total	\$1,803	\$1,803	\$1,822	\$8,806	\$38,716	\$126,097	\$133,808	\$77,450	\$28,891	\$2,592	\$421,789

WINDSOR – TORONTO CORRIDOR

YEARLY EXPENDITURES BY ORIGIN AND TYPE (THOUSANDS)

technology:
300+, OPTIMIZED

GEOGRAPHIC ORIGIN :
ALL

Expenditure Component	Origin of Component	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
SKILLED LABOUR	Québec	\$423	\$423	\$417	\$3,150	\$5,060	\$5,904	\$5,311	\$5,717	\$2,300	\$564	\$29,269
	Ontario	\$5,888	\$5,888	\$5,964	\$27,203	\$72,182	\$189,002	\$180,202	\$96,860	\$30,100	\$3,526	\$616,816
	Rest of Canada	\$0	\$0	\$0	\$126	\$168	\$223	\$293	\$377	\$168	\$42	\$1,396
	Foreign	\$181	\$181	\$179	\$1,224	\$2,001	\$2,307	\$1,983	\$2,073	\$818	\$200	\$11,147
UNSKILLED LABOUR	Québec	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Ontario	\$270	\$270	\$273	\$1,321	\$14,526	\$64,904	\$67,311	\$35,078	\$10,481	\$1,120	\$195,556
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MATERIALS	Québec	\$0	\$0	\$0	\$0	\$0	\$0	\$20,631	\$41,964	\$39,517	\$2,798	\$104,910
	Ontario	\$451	\$451	\$456	\$45,873	\$118,675	\$175,240	\$144,664	\$99,363	\$57,598	\$4,205	\$646,975
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$17,474	\$27,959	\$24,464	\$0	\$69,898
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$6,346	\$12,099	\$11,194	\$608	\$30,247
PLANT	Québec	\$90	\$90	\$91	\$440	\$1,936	\$6,305	\$6,140	\$2,498	\$250	\$22	\$17,863
	Ontario	\$1,623	\$1,623	\$1,640	\$7,926	\$15,379	\$24,050	\$24,485	\$21,839	\$12,155	\$1,111	\$111,830
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$2,056	\$3,290	\$2,879	\$0	\$8,224
	Foreign	\$90	\$90	\$91	\$440	\$21,400	\$95,742	\$101,127	\$49,824	\$13,608	\$1,459	\$283,872
TOTAL ALL TYPES	Québec	\$513	\$513	\$508	\$3,590	\$6,996	\$12,209	\$32,083	\$50,179	\$42,067	\$3,384	\$152,042
	Ontario	\$8,232	\$8,232	\$8,333	\$82,323	\$220,763	\$453,196	\$416,662	\$253,140	\$110,334	\$9,962	\$1,571,177
	Rest of Canada	\$0	\$0	\$0	\$126	\$168	\$223	\$19,824	\$31,626	\$27,510	\$42	\$79,519
	Foreign	\$271	\$271	\$270	\$1,665	\$23,401	\$98,049	\$109,457	\$63,995	\$25,620	\$2,267	\$325,266
	total	\$9,016	\$9,016	\$9,111	\$87,703	\$251,328	\$563,678	\$578,025	\$398,941	\$205,531	\$15,655	\$2,128,004



SUPPLEMENTARY COST INFORMATION

D3. TORONTO - MONTRÉAL

200+ km/hr Composite Route


Segment Summary Cost Table

Sub-Segment Table

Segment Cash Flows by Sub-system/Sector

- Total Cost
- Skilled Labour
- Unskilled Labour
- Material
- Plant

Yearly Expenditure by Origin and Type



SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
TORONTO – MONTRÉAL ALIGNMENT			200+, COMPOSITE		TOR-MONTR. 200 COMPOSITE		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$16,414,472	\$170,984,083	N/A	N/A	see note c	\$187,398,554	\$18,279,753
B – Earthworks and Drainage	\$166,071,742	N/A	N/A	\$762,153,565	see note c	\$928,225,307	\$99,411,335
C – Bridges, Viaducts, and Tunnels	\$64,224,840	N/A	N/A	\$390,021,500	see note c	\$454,246,340	\$35,456,500
D – Grade Separations	\$92,412,590	N/A	N/A	\$561,198,700	see note c	\$653,611,290	\$88,977,700
E – Other Accom- modation works	\$13,121,260	see note a	see note a	\$79,682,155	see note c	\$92,803,415	\$18,388,190
F – Track	\$69,342,271	\$385,444,319	see note b	\$92,001,145	see note c	\$546,787,735	\$23,562,103
G – Electrification	\$66,991,287	see note a	see note a	\$406,821,441	see note c	\$473,812,728	\$53,063,666
H – Stations	\$59,141,231	see note a	see note a	\$359,150,000	see note c	\$418,291,231	\$32,650,000
Totals	\$547,719,694	\$556,428,401	\$0	\$2,651,028,505	see note c	\$3,755,176,600	\$369,789,246

NOTES: a) included in Construction / Installation
b) included in Equipment / Material
c) included in Other Studies

09-Feb-94 current costs in file

Toronto – Montréal Corridor

segment	total cost	segment	total cost
TM2-A0	\$505,756,142	TMS-3a	\$0
TM2-B0	\$849,270,351	TMS-3b	\$26,939,577
TM2-C0	\$0	TMS-DIV	
TM2-D0	\$87,408,268	TM2-G0	\$388,548,721
TM2-E0	\$249,302,681	TM2-H0	\$194,990,039
TM2-F0	\$339,612,132	TM1-H0	\$0
TM1-A0	\$0	TM1-H1	\$0
TM1-B0	\$0	TM1-I0	\$0
TM1-C0	\$549,504,663	TM1-I1	\$0
TM1-D0	\$0	TM1-J0	\$0
TM1-E0	\$0	TM0-F0	\$0
TM1-F0	\$0	TM0-F1	\$0
TM1-G0	\$0	TM0-F2	\$0
TM0-A0	\$0		
TM0-A1	\$0	TM0-G0	\$0
TM0-A2	\$0	TM0-G1	\$0
TM0-B0	\$0	TM0-H0	\$0
TM0-B1	\$0	TMS-3c	\$0
TM0-C0	\$0	TMS-4	\$0
TM0-D0	\$0	TMS-5a	\$0
TM0-E0	\$0	TMS-5b	\$36,636,302
TMS-1a	\$34,651,547	TMS-5c	\$114,795,639
TMS-1b	\$0	TMR-01	\$0
TMS-1c	\$12,515,813	TMR-02	(\$172,296,909)
TMS-2	\$15,438,462	TMR-03	\$0
		TMR-04	\$0
		WTR-02	(\$10,050,737)
		WT0-C1	\$287,176,656
		WTS-5	\$244,977,252

TOTAL \$3,755,176,600

MONTREAL – TORONTO CORRIDOR

technology:
200+ OPTIMIZED

TOTAL COSTS CASH FLOW (THOUSANDS)

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$502	\$502	\$865	\$6,520	\$5,632	\$1,596	\$798	\$0	\$0	\$0	\$16,414
Sector 2	\$0	\$0	\$1,418	\$35,615	\$75,761	\$49,877	\$8,313	\$0	\$0	\$0	\$170,984
B – Earthworks and Drainage											
Sector 1	\$7,604	\$7,604	\$17,213	\$32,859	\$38,594	\$39,774	\$15,344	\$7,082	\$0	\$0	\$166,072
Sector 4	\$0	\$0	\$0	\$55,365	\$142,654	\$266,754	\$216,277	\$81,104	\$0	\$0	\$762,154
C – Bridges, Viad., and Tunnels											
Sector 1	\$3,287	\$3,287	\$10,467	\$16,172	\$12,674	\$12,957	\$3,682	\$1,699	\$0	\$0	\$64,225
Sector 4	\$0	\$0	\$0	\$43,604	\$95,808	\$156,009	\$68,801	\$25,800	\$0	\$0	\$390,022
D – Grade Separations											
Sector 1	\$4,037	\$4,037	\$7,446	\$16,347	\$22,736	\$23,489	\$9,798	\$4,522	\$0	\$0	\$92,413
Sector 4	\$0	\$0	\$0	\$20,700	\$64,286	\$224,479	\$183,079	\$68,654	\$0	\$0	\$561,199
E – Other Accom. Works											
Sector 1	\$528	\$528	\$565	\$2,660	\$4,698	\$3,365	\$776	\$0	\$0	\$0	\$13,121
Sector 4	\$0	\$0	\$0	\$659	\$20,085	\$43,222	\$15,717	\$0	\$0	\$0	\$79,682
F – Track											
Sector 1	\$0	\$802	\$2,605	\$7,644	\$8,121	\$12,698	\$15,363	\$14,715	\$5,916	\$1,479	\$69,342
Sector 2	\$0	\$0	\$0	\$0	\$16,689	\$44,504	\$118,613	\$109,674	\$95,964	\$0	\$385,444
Sector 4	\$0	\$0	\$0	\$0	\$1,334	\$10,669	\$18,536	\$35,331	\$22,865	\$3,266	\$92,001
G – Electrification											
Sector 1	\$0	\$766	\$2,491	\$7,849	\$7,369	\$9,860	\$11,965	\$12,821	\$11,002	\$2,870	\$66,991
Sector 4	\$0	\$0	\$0	\$0	\$11,634	\$46,537	\$90,109	\$127,826	\$116,191	\$14,524	\$406,821
H – Stations											
Sector 1	\$3,548	\$3,548	\$1,774	\$2,402	\$4,804	\$9,536	\$14,822	\$9,353	\$9,353	\$0	\$59,141
Sector 4	\$0	\$0	\$0	\$0	\$0	\$39,270	\$72,930	\$86,433	\$160,518	\$0	\$359,150
TOTAL	\$19,507	\$21,074	\$44,844	\$248,396	\$532,877	\$994,595	\$864,922	\$585,013	\$421,809	\$22,139	\$3,755,177
% of total cost expended in year	1%	1%	1%	7%	14%	26%	23%	16%	11%	1%	100%

MONTREAL – TORONTO CORRIDOR

SKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:

200+ OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$361	\$361	\$623	\$4,695	\$4,055	\$1,149	\$575	\$0	\$0	\$0	\$11,818
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$5,475	\$5,475	\$12,393	\$23,658	\$27,787	\$28,637	\$11,047	\$5,099	\$0	\$0	\$119,572
Sector 4	\$0	\$0	\$0	\$19,378	\$49,929	\$93,364	\$75,697	\$28,386	\$0	\$0	\$266,754
C – Bridges, Viad., and Tunnels											
Sector 1	\$2,367	\$2,367	\$7,536	\$11,644	\$9,125	\$9,329	\$2,651	\$1,224	\$0	\$0	\$46,242
Sector 4	\$0	\$0	\$0	\$13,081	\$28,742	\$46,803	\$20,640	\$7,740	\$0	\$0	\$117,006
D – Grade Separations											
Sector 1	\$2,907	\$2,907	\$5,361	\$11,769	\$16,370	\$16,912	\$7,055	\$3,256	\$0	\$0	\$66,537
Sector 4	\$0	\$0	\$0	\$7,245	\$22,500	\$78,568	\$64,077	\$24,029	\$0	\$0	\$196,420
E – Other Accom. Works											
Sector 1	\$380	\$380	\$407	\$1,915	\$3,383	\$2,422	\$559	\$0	\$0	\$0	\$9,447
Sector 4	\$0	\$0	\$0	\$198	\$6,026	\$12,966	\$4,715	\$0	\$0	\$0	\$23,905
F – Track											
Sector 1	\$0	\$577	\$1,876	\$5,503	\$5,847	\$9,142	\$11,062	\$10,595	\$4,260	\$1,065	\$49,926
Sector 2	\$0	\$0	\$0	\$0	\$167	\$445	\$1,186	\$1,097	\$960	\$0	\$3,854
Sector 4	\$0	\$0	\$0	\$0	\$400	\$3,201	\$5,561	\$10,599	\$6,859	\$980	\$27,600
G – Electrification											
Sector 1	\$0	\$552	\$1,793	\$5,651	\$5,306	\$7,099	\$8,614	\$9,231	\$7,921	\$2,066	\$48,234
Sector 4	\$0	\$0	\$0	\$0	\$2,094	\$8,377	\$16,220	\$23,009	\$20,914	\$2,614	\$73,228
H – Stations											
Sector 1	\$2,555	\$2,555	\$1,277	\$1,729	\$3,459	\$6,866	\$10,672	\$6,734	\$6,734	\$0	\$42,582
Sector 4	\$0	\$0	\$0	\$0	\$0	\$11,781	\$21,879	\$25,930	\$48,155	\$0	\$107,745
total	\$14,045	\$15,174	\$31,267	\$106,467	\$185,189	\$337,061	\$262,210	\$156,928	\$95,804	\$6,726	\$1,210,870

MONTREAL – TORONTO CORRIDOR

UNSKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:

200+ OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$15	\$15	\$26	\$196	\$169	\$48	\$24	\$0	\$0	\$0	\$492
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$228	\$228	\$516	\$986	\$1,158	\$1,193	\$460	\$212	\$0	\$0	\$4,982
Sector 4	\$0	\$0	\$0	\$8,305	\$21,398	\$40,013	\$32,442	\$12,166	\$0	\$0	\$114,323
C – Bridges, Viad., and Tunnels											
Sector 1	\$99	\$99	\$314	\$485	\$380	\$389	\$110	\$51	\$0	\$0	\$1,927
Sector 4	\$0	\$0	\$0	\$4,360	\$9,581	\$15,601	\$6,880	\$2,580	\$0	\$0	\$39,002
D – Grade Separations											
Sector 1	\$121	\$121	\$223	\$490	\$682	\$705	\$294	\$136	\$0	\$0	\$2,772
Sector 4	\$0	\$0	\$0	\$3,105	\$9,643	\$33,672	\$27,462	\$10,298	\$0	\$0	\$84,180
E – Other Accom. Works											
Sector 1	\$16	\$16	\$17	\$80	\$141	\$101	\$23	\$0	\$0	\$0	\$394
Sector 4	\$0	\$0	\$0	\$132	\$4,017	\$8,644	\$3,143	\$0	\$0	\$0	\$15,936
F – Track											
Sector 1	\$0	\$24	\$78	\$229	\$244	\$381	\$461	\$441	\$177	\$44	\$2,080
Sector 2	\$0	\$0	\$0	\$0	\$167	\$445	\$1,186	\$1,097	\$960	\$0	\$3,854
Sector 4	\$0	\$0	\$0	\$0	\$267	\$2,134	\$3,707	\$7,066	\$4,573	\$653	\$18,400
G – Electrification											
Sector 1	\$0	\$23	\$75	\$235	\$221	\$296	\$359	\$385	\$330	\$86	\$2,010
Sector 4	\$0	\$0	\$0	\$0	\$582	\$2,327	\$4,505	\$6,391	\$5,810	\$726	\$20,341
H – Stations											
Sector 1	\$106	\$106	\$53	\$72	\$144	\$286	\$445	\$281	\$281	\$0	\$1,774
Sector 4	\$0	\$0	\$0	\$0	\$0	\$3,927	\$7,293	\$8,643	\$16,052	\$0	\$35,915
total	\$585	\$632	\$1,303	\$18,676	\$48,793	\$110,161	\$88,795	\$49,747	\$28,182	\$1,510	\$348,384

MONTREAL – TORONTO CORRIDOR

MATERIALS COSTS CASH FLOW (THOUSANDS)

technology:
200+ OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$25	\$25	\$43	\$326	\$282	\$80	\$40	\$0	\$0	\$0	\$821
Sector 2	\$0	\$0	\$1,418	\$35,615	\$75,761	\$49,877	\$8,313	\$0	\$0	\$0	\$170,984
B – Earthworks and Drainage											
Sector 1	\$380	\$380	\$861	\$1,643	\$1,930	\$1,989	\$767	\$354	\$0	\$0	\$8,304
Sector 4	\$0	\$0	\$0	\$6,644	\$17,118	\$32,010	\$25,953	\$9,732	\$0	\$0	\$91,458
C – Bridges, Viad., and Tunnels											
Sector 1	\$164	\$164	\$523	\$809	\$634	\$648	\$184	\$85	\$0	\$0	\$3,211
Sector 4	\$0	\$0	\$0	\$17,442	\$38,323	\$62,403	\$27,520	\$10,320	\$0	\$0	\$156,009
D – Grade Separations											
Sector 1	\$202	\$202	\$372	\$817	\$1,137	\$1,174	\$490	\$226	\$0	\$0	\$4,621
Sector 4	\$0	\$0	\$0	\$6,210	\$19,286	\$67,344	\$54,924	\$20,596	\$0	\$0	\$168,360
E – Other Accom. Works											
Sector 1	\$26	\$26	\$28	\$133	\$235	\$168	\$39	\$0	\$0	\$0	\$656
Sector 4	\$0	\$0	\$0	\$99	\$3,013	\$6,483	\$2,358	\$0	\$0	\$0	\$11,952
F – Track											
Sector 1	\$0	\$40	\$130	\$382	\$406	\$635	\$768	\$736	\$296	\$74	\$3,467
Sector 2	\$0	\$0	\$0	\$0	\$14,686	\$39,164	\$104,380	\$96,513	\$84,449	\$0	\$339,191
Sector 4	\$0	\$0	\$0	\$0	\$227	\$1,814	\$3,151	\$6,006	\$3,887	\$555	\$15,640
G – Electrification											
Sector 1	\$0	\$38	\$125	\$392	\$368	\$493	\$598	\$641	\$550	\$143	\$3,350
Sector 4	\$0	\$0	\$0	\$0	\$7,562	\$30,249	\$58,571	\$83,087	\$75,524	\$9,441	\$264,434
H – Stations											
Sector 1	\$177	\$177	\$89	\$120	\$240	\$477	\$741	\$468	\$468	\$0	\$2,957
Sector 4	\$0	\$0	\$0	\$0	\$0	\$15,708	\$29,172	\$34,573	\$64,207	\$0	\$143,660
total	\$975	\$1,054	\$3,590	\$70,632	\$181,208	\$310,716	\$317,968	\$263,337	\$229,381	\$10,213	\$1,389,074

MONTREAL – TORONTO CORRIDOR

PLANT COSTS CASH FLOW (THOUSANDS)

technology:
200+ OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$100	\$100	\$173	\$1,304	\$1,126	\$319	\$160	\$0	\$0	\$0	\$3,283
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$1,521	\$1,521	\$3,443	\$6,572	\$7,719	\$7,955	\$3,069	\$1,416	\$0	\$0	\$33,214
Sector 4	\$0	\$0	\$0	\$21,039	\$54,208	\$101,366	\$82,185	\$30,819	\$0	\$0	\$289,618
C – Bridges, Viad., and Tunnels											
Sector 1	\$657	\$657	\$2,093	\$3,234	\$2,535	\$2,591	\$736	\$340	\$0	\$0	\$12,845
Sector 4	\$0	\$0	\$0	\$8,721	\$19,162	\$31,202	\$13,760	\$5,160	\$0	\$0	\$78,004
D – Grade Separations											
Sector 1	\$807	\$807	\$1,489	\$3,269	\$4,547	\$4,698	\$1,960	\$904	\$0	\$0	\$18,483
Sector 4	\$0	\$0	\$0	\$4,140	\$12,857	\$44,896	\$36,616	\$13,731	\$0	\$0	\$112,240
E – Other Accom. Works											
Sector 1	\$106	\$106	\$113	\$532	\$940	\$673	\$155	\$0	\$0	\$0	\$2,624
Sector 4	\$0	\$0	\$0	\$230	\$7,030	\$15,128	\$5,501	\$0	\$0	\$0	\$27,889
F – Track											
Sector 1	\$0	\$160	\$521	\$1,529	\$1,624	\$2,540	\$3,073	\$2,943	\$1,183	\$296	\$13,868
Sector 2	\$0	\$0	\$0	\$0	\$1,669	\$4,450	\$11,861	\$10,967	\$9,596	\$0	\$38,544
Sector 4	\$0	\$0	\$0	\$0	\$440	\$3,521	\$6,117	\$11,659	\$7,545	\$1,078	\$30,360
G – Electrification											
Sector 1	\$0	\$153	\$498	\$1,570	\$1,474	\$1,972	\$2,393	\$2,564	\$2,200	\$574	\$13,398
Sector 4	\$0	\$0	\$0	\$0	\$1,396	\$5,584	\$10,813	\$15,339	\$13,943	\$1,743	\$48,819
H – Stations											
Sector 1	\$710	\$710	\$355	\$480	\$961	\$1,907	\$2,964	\$1,871	\$1,871	\$0	\$11,828
Sector 4	\$0	\$0	\$0	\$0	\$0	\$7,854	\$14,586	\$17,287	\$32,103	\$0	\$71,830
total	\$3,901	\$4,215	\$8,685	\$52,621	\$117,687	\$236,656	\$195,949	\$115,001	\$68,443	\$3,691	\$806,848

MONTREAL – TORONTO CORRIDOR

YEARLY EXPENDITURES BY ORIGIN AND TYPE

technology:
200+ OPTIMIZED

GEOGRAPHIC ORIGIN :
ALL

Type of Expenditure	Origin of Expenditure	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
SKILLED LABOUR	Québec	\$4,222	\$4,696	\$15,080	\$51,303	\$68,950	\$84,901	\$39,833	\$9,561	\$4,735	\$1,096	\$284,376
	Ontario	\$9,413	\$9,897	\$14,827	\$51,970	\$112,762	\$247,800	\$218,466	\$143,904	\$89,040	\$5,160	\$903,239
	Rest of Canada	\$0	\$29	\$94	\$275	\$292	\$457	\$553	\$530	\$213	\$53	\$2,496
	Foreign	\$411	\$551	\$1,266	\$2,919	\$3,184	\$3,904	\$3,358	\$2,933	\$1,816	\$416	\$20,759
UNSKILLED LABOUR	Québec	\$164	\$186	\$656	\$11,438	\$20,174	\$25,025	\$9,997	\$557	\$0	\$0	\$68,196
	Ontario	\$421	\$446	\$647	\$7,237	\$28,619	\$85,136	\$78,798	\$49,190	\$28,182	\$1,510	
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MATERIALS	Québec	\$273	\$310	\$1,795	\$27,056	\$55,463	\$86,060	\$80,589	\$57,983	\$51,611	\$3,738	\$364,878
	Ontario	\$702	\$744	\$1,794	\$43,576	\$118,309	\$203,962	\$184,119	\$153,620	\$132,259	\$5,663	\$844,749
	Rest of Canada	\$0	\$0	\$0	\$0	\$5,390	\$14,373	\$38,307	\$35,420	\$30,993	\$0	\$124,483
	Foreign	\$0	\$0	\$0	\$0	\$2,046	\$6,322	\$14,953	\$16,314	\$14,518	\$812	\$54,964
PLANT	Québec	\$1,069	\$1,202	\$3,933	\$7,434	\$8,428	\$14,159	\$9,775	\$4,058	\$1,868	\$43	\$51,969
	Ontario	\$2,638	\$2,802	\$4,318	\$15,251	\$27,080	\$43,194	\$39,847	\$31,237	\$20,980	\$1,714	\$189,062
	Rest of Canada	\$0	\$0	\$0	\$0	\$634	\$1,691	\$4,507	\$4,168	\$3,647	\$0	\$14,647
	Foreign	\$195	\$211	\$434	\$29,935	\$81,545	\$177,612	\$141,819	\$75,538	\$41,948	\$1,933	\$551,171
TOTAL ALL TYPES	Québec	\$5,727	\$6,394	\$21,465	\$97,231	\$153,016	\$210,144	\$140,193	\$72,158	\$58,214	\$4,878	\$769,419
	Ontario	\$13,174	\$13,890	\$21,586	\$118,035	\$286,770	\$580,092	\$521,231	\$377,952	\$270,461	\$14,046	\$2,217,237
	Rest of Canada	\$0	\$29	\$94	\$275	\$6,316	\$16,521	\$43,368	\$40,117	\$34,852	\$53	\$141,626
	Foreign	\$606	\$762	\$1,700	\$32,855	\$86,775	\$187,838	\$160,130	\$94,786	\$58,282	\$3,162	\$626,895
	total	\$19,507	\$21,074	\$44,844	\$248,396	\$532,877	\$994,595	\$864,922	\$585,013	\$421,809	\$22,139	\$3,755,177

SUPPLEMENTARY COST INFORMATION

D4. TORONTO - MONTRÉAL

300+ km/hr Composite Route

Segment Summary Cost Table

Sub-Segment Table

Segment Cash Flows by Sub-system/Sector

- Total Cost
- Skilled Labour
- Unskilled Labour
- Material
- Plant

Yearly Expenditure by Origin and Type

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve Included in TOTAL
TORONTO – MONTRÉAL ALIGNMENT			300 +, COMPOSITE		300 COMPOSITE north shore		
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$16,186,479	\$168,609,152	N/A	N/A	see note c	\$184,795,630	\$18,025,851
B – Earthworks and Drainage	\$201,463,984	N/A	N/A	\$942,691,708	see note c	\$1,144,155,692	\$122,959,788
C – Bridges, Viaducts, and Tunnels	\$69,567,929	N/A	N/A	\$422,468,750	see note c	\$492,036,679	\$38,406,250
D – Grade Separations	\$135,331,923	N/A	N/A	\$821,837,150	see note c	\$957,169,073	\$107,196,150
E – Other Accom- modation works	\$14,885,647	see note a	see note a	\$90,396,835	see note c	\$105,282,482	\$20,860,808
F – Track	\$73,515,323	\$411,992,049	see note b	\$95,266,090	see note c	\$580,773,462	\$25,011,089
G – Electrification	\$68,673,309	see note a	see note a	\$417,035,943	see note c	\$485,709,251	\$54,395,993
H – Stations	\$46,914,483	see note a	see note a	\$284,900,000	see note c	\$331,814,483	\$25,900,000
Totals	\$626,539,076	\$580,601,201	\$0	\$3,074,596,475	see note c	\$4,281,736,752	\$412,755,929

NOTES: a) included in Construction / Installation
b) included in Equipment / Material
c) included in Other Studies

09-Feb-94 current costs in file

Toronto – Montréal Corridor

segment	total cost	segment	total cost
TM2-A0	\$0	TMS-3a	\$0
TM2-B0	\$0	TMS-3b	\$0
TM2-C0	\$0	TMS-DIV	
TM2-D0	\$0	TM2-G0	\$0
TM2-E0	\$0	TM2-H0	\$0
TM2-F0	\$0	TM1-H0	\$0
TM1-A0	\$523,802,011	TM1-H1	\$0
TM1-B0	\$0	TM1-I0	\$162,420,364
TM1-C0	\$549,504,663	TM1-I1	\$0
TM1-D0	\$0	TM1-J0	\$212,551,924
TM1-E0	\$0	TM0-F0	\$0
TM1-F0	\$0	TM0-F1	\$0
TM1-G0	\$0	TM0-F2	\$738,591,081
TM0-A0	\$0		
TM0-A1	\$0	TM0-G0	\$0
TM0-A2	\$0	TM0-G1	\$0
TM0-B0	\$1,356,585,609	TM0-H0	\$0
TM0-B1	\$0	TMS-3c	\$32,061,531
TM0-C0	\$0	TMS-4	\$18,961,954
TM0-D0	\$88,673,382	TMS-5a	\$18,659,014
TM0-E0	\$332,626,555	TMS-5b	\$36,636,302
TMS-1a	\$34,651,547	TMS-5c	\$0
TMS-1b	\$0	TMR-01	\$0
TMS-1c	\$12,515,813	TMR-02	(\$172,296,909)
TMS-2	\$15,438,462	TMR-03	(\$97,255,797)
		TMR-04	(\$104,493,925)
		WTR-02	(\$10,050,737)
		WT0-C1	\$287,176,656
		WTS-5	\$244,977,252

TOTAL \$4,281,736,752

MONTREAL – TORONTO CORRIDOR

TOTAL COSTS CASH FLOW (THOUSANDS)

technology:
300+ OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$551	\$551	\$2,159	\$6,146	\$4,844	\$1,290	\$645	\$0	\$0	\$0	\$16,186
Sector 2	\$0	\$0	\$10,270	\$43,991	\$67,316	\$40,313	\$6,719	\$0	\$0	\$0	\$168,609
B – Earthworks and Drainage											
Sector 1	\$9,291	\$9,291	\$21,614	\$40,528	\$46,385	\$47,784	\$18,180	\$8,391	\$0	\$0	\$201,464
Sector 4	\$0	\$0	\$0	\$75,258	\$184,578	\$329,942	\$256,664	\$96,249	\$0	\$0	\$942,692
C – Bridges, Viad., and Tunnels											
Sector 1	\$2,957	\$2,957	\$4,700	\$11,482	\$17,651	\$18,259	\$7,911	\$3,651	\$0	\$0	\$69,568
Sector 4	\$0	\$0	\$0	\$10,583	\$39,644	\$168,988	\$147,821	\$55,433	\$0	\$0	\$422,469
D – Grade Separations											
Sector 1	\$6,069	\$6,069	\$12,627	\$25,505	\$32,277	\$33,302	\$13,330	\$6,152	\$0	\$0	\$135,332
Sector 4	\$0	\$0	\$0	\$39,826	\$110,787	\$328,735	\$249,084	\$93,406	\$0	\$0	\$821,837
E – Other Accom. Works											
Sector 1	\$619	\$619	\$855	\$3,213	\$5,194	\$3,564	\$822	\$0	\$0	\$0	\$14,886
Sector 4	\$0	\$0	\$0	\$4,297	\$23,674	\$45,779	\$16,647	\$0	\$0	\$0	\$90,397
F – Track											
Sector 1	\$0	\$972	\$3,159	\$8,318	\$8,579	\$13,707	\$16,410	\$14,989	\$5,906	\$1,476	\$73,515
Sector 2	\$0	\$0	\$0	\$0	\$20,535	\$54,760	\$130,378	\$110,037	\$96,282	\$0	\$411,992
Sector 4	\$0	\$0	\$0	\$0	\$1,551	\$12,404	\$20,381	\$35,229	\$22,489	\$3,213	\$95,266
G – Electrification											
Sector 1	\$0	\$928	\$3,016	\$8,260	\$7,554	\$10,570	\$12,621	\$12,537	\$10,458	\$2,728	\$68,673
Sector 4	\$0	\$0	\$0	\$0	\$14,091	\$56,363	\$97,782	\$124,542	\$110,451	\$13,806	\$417,036
H – Stations											
Sector 1	\$2,815	\$2,815	\$1,407	\$1,048	\$2,096	\$6,905	\$11,956	\$8,936	\$8,936	\$0	\$46,914
Sector 4	\$0	\$0	\$0	\$0	\$0	\$17,133	\$31,817	\$82,583	\$153,368	\$0	\$284,900
TOTAL	\$22,302	\$24,202	\$59,807	\$278,454	\$586,754	\$1,189,798	\$1,039,170	\$652,135	\$407,890	\$21,224	\$4,281,737
% of total cost expended in year	1%	1%	1%	7%	14%	28%	24%	15%	10%	0%	100%

MONTREAL – TORONTO CORRIDOR

SKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
300+ OPTIMIZED

GEOGRAPHIC ORIGIN :
ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$397	\$397	\$1,555	\$4,425	\$3,487	\$929	\$464	\$0	\$0	\$0	\$11,654
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$6,689	\$6,689	\$15,562	\$29,180	\$33,397	\$34,404	\$13,090	\$6,041	\$0	\$0	\$145,054
Sector 4	\$0	\$0	\$0	\$26,340	\$64,602	\$115,480	\$89,833	\$33,687	\$0	\$0	\$329,942
C – Bridges, Viad., and Tunnels											
Sector 1	\$2,129	\$2,129	\$3,384	\$8,267	\$12,708	\$13,147	\$5,696	\$2,629	\$0	\$0	\$50,089
Sector 4	\$0	\$0	\$0	\$3,175	\$11,893	\$50,696	\$44,346	\$16,630	\$0	\$0	\$126,741
D – Grade Separations											
Sector 1	\$4,370	\$4,370	\$9,092	\$18,363	\$23,239	\$23,978	\$9,598	\$4,430	\$0	\$0	\$97,439
Sector 4	\$0	\$0	\$0	\$13,939	\$38,775	\$115,057	\$87,179	\$32,692	\$0	\$0	\$287,643
E – Other Accom. Works											
Sector 1	\$446	\$446	\$616	\$2,313	\$3,739	\$2,566	\$592	\$0	\$0	\$0	\$10,718
Sector 4	\$0	\$0	\$0	\$1,289	\$7,102	\$13,734	\$4,994	\$0	\$0	\$0	\$27,119
F – Track											
Sector 1	\$0	\$700	\$2,275	\$5,989	\$6,177	\$9,869	\$11,815	\$10,792	\$4,252	\$1,063	\$52,931
Sector 2	\$0	\$0	\$0	\$0	\$205	\$548	\$1,304	\$1,100	\$963	\$0	\$4,120
Sector 4	\$0	\$0	\$0	\$0	\$465	\$3,721	\$6,114	\$10,569	\$6,747	\$964	\$28,580
G – Electrification											
Sector 1	\$0	\$668	\$2,172	\$5,947	\$5,439	\$7,611	\$9,087	\$9,027	\$7,530	\$1,964	\$49,445
Sector 4	\$0	\$0	\$0	\$0	\$2,536	\$10,145	\$17,601	\$22,418	\$19,881	\$2,485	\$75,066
H – Stations											
Sector 1	\$2,027	\$2,027	\$1,013	\$754	\$1,509	\$4,972	\$8,608	\$6,434	\$6,434	\$0	\$33,778
Sector 4	\$0	\$0	\$0	\$0	\$0	\$5,140	\$9,545	\$24,775	\$46,010	\$0	\$85,470
total	\$16,058	\$17,426	\$35,667	\$119,982	\$215,277	\$411,995	\$319,868	\$181,224	\$91,817	\$6,476	\$1,415,789

MONTREAL – TORONTO CORRIDOR

UNSKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
300+ OPTIMIZED

GEOGRAPHIC ORIGIN :
ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$17	\$17	\$65	\$184	\$145	\$39	\$19	\$0	\$0	\$0	\$486
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$279	\$279	\$648	\$1,216	\$1,392	\$1,434	\$545	\$252	\$0	\$0	\$6,044
Sector 4	\$0	\$0	\$0	\$11,289	\$27,687	\$49,491	\$38,500	\$14,437	\$0	\$0	\$141,404
C – Bridges, Viad., and Tunnels											
Sector 1	\$89	\$89	\$141	\$344	\$530	\$548	\$237	\$110	\$0	\$0	\$2,087
Sector 4	\$0	\$0	\$0	\$1,058	\$3,964	\$16,899	\$14,782	\$5,543	\$0	\$0	\$42,247
D – Grade Separations											
Sector 1	\$182	\$182	\$379	\$765	\$968	\$999	\$400	\$185	\$0	\$0	\$4,060
Sector 4	\$0	\$0	\$0	\$5,974	\$16,618	\$49,310	\$37,363	\$14,011	\$0	\$0	\$123,276
E – Other Accom. Works											
Sector 1	\$19	\$19	\$26	\$96	\$156	\$107	\$25	\$0	\$0	\$0	\$447
Sector 4	\$0	\$0	\$0	\$859	\$4,735	\$9,156	\$3,329	\$0	\$0	\$0	\$18,079
F – Track											
Sector 1	\$0	\$29	\$95	\$250	\$257	\$411	\$492	\$450	\$177	\$44	\$2,205
Sector 2	\$0	\$0	\$0	\$0	\$205	\$548	\$1,304	\$1,100	\$963	\$0	\$4,120
Sector 4	\$0	\$0	\$0	\$0	\$310	\$2,481	\$4,076	\$7,046	\$4,498	\$643	\$19,053
G – Electrification											
Sector 1	\$0	\$28	\$90	\$248	\$227	\$317	\$379	\$376	\$314	\$82	\$2,060
Sector 4	\$0	\$0	\$0	\$0	\$705	\$2,818	\$4,889	\$6,227	\$5,523	\$690	\$20,852
H – Stations											
Sector 1	\$84	\$84	\$42	\$31	\$63	\$207	\$359	\$268	\$268	\$0	\$1,407
Sector 4	\$0	\$0	\$0	\$0	\$0	\$1,713	\$3,182	\$8,258	\$15,337	\$0	\$28,490
total	\$669	\$726	\$1,486	\$22,315	\$57,961	\$136,477	\$109,881	\$58,263	\$27,079	\$1,459	\$416,317

MONTREAL – TORONTO CORRIDOR

MATERIALS COSTS CASH FLOW (THOUSANDS)

technology:
300+ OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$28	\$28	\$108	\$307	\$242	\$65	\$32	\$0	\$0	\$0	\$809
Sector 2	\$0	\$0	\$10,270	\$43,991	\$67,316	\$40,313	\$6,719	\$0	\$0	\$0	\$168,609
B – Earthworks and Drainage											
Sector 1	\$465	\$465	\$1,081	\$2,026	\$2,319	\$2,389	\$909	\$420	\$0	\$0	\$10,073
Sector 4	\$0	\$0	\$0	\$9,031	\$22,149	\$39,593	\$30,800	\$11,550	\$0	\$0	\$113,123
C – Bridges, Viad., and Tunnels											
Sector 1	\$148	\$148	\$235	\$574	\$883	\$913	\$396	\$183	\$0	\$0	\$3,478
Sector 4	\$0	\$0	\$0	\$4,233	\$15,858	\$67,595	\$59,129	\$22,173	\$0	\$0	\$168,988
D – Grade Separations											
Sector 1	\$303	\$303	\$631	\$1,275	\$1,614	\$1,665	\$667	\$308	\$0	\$0	\$6,767
Sector 4	\$0	\$0	\$0	\$11,948	\$33,236	\$98,620	\$74,725	\$28,022	\$0	\$0	\$246,551
E – Other Accom. Works											
Sector 1	\$31	\$31	\$43	\$161	\$260	\$178	\$41	\$0	\$0	\$0	\$744
Sector 4	\$0	\$0	\$0	\$645	\$3,551	\$6,867	\$2,497	\$0	\$0	\$0	\$13,560
F – Track											
Sector 1	\$0	\$49	\$158	\$416	\$429	\$685	\$821	\$749	\$295	\$74	\$3,676
Sector 2	\$0	\$0	\$0	\$0	\$18,071	\$48,189	\$114,733	\$96,832	\$84,728	\$0	\$362,553
Sector 4	\$0	\$0	\$0	\$0	\$264	\$2,109	\$3,465	\$5,989	\$3,823	\$546	\$16,195
G – Electrification											
Sector 1	\$0	\$46	\$151	\$413	\$378	\$529	\$631	\$627	\$523	\$136	\$3,434
Sector 4	\$0	\$0	\$0	\$0	\$9,159	\$36,636	\$63,558	\$80,952	\$71,793	\$8,974	\$271,073
H – Stations											
Sector 1	\$141	\$141	\$70	\$52	\$105	\$345	\$598	\$447	\$447	\$0	\$2,346
Sector 4	\$0	\$0	\$0	\$0	\$0	\$6,853	\$12,727	\$33,033	\$61,347	\$0	\$113,960
total	\$1,115	\$1,210	\$12,746	\$75,073	\$175,833	\$353,544	\$372,446	\$281,284	\$222,957	\$9,731	\$1,505,939

MONTREAL – TORONTO CORRIDOR

technology:
300+ OPTIMIZED

PLANT COSTS CASH FLOW (THOUSANDS)

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$110	\$110	\$432	\$1,229	\$969	\$258	\$129	\$0	\$0	\$0	\$3,237
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$1,858	\$1,858	\$4,323	\$8,106	\$9,277	\$9,557	\$3,636	\$1,678	\$0	\$0	\$40,293
Sector 4	\$0	\$0	\$0	\$28,598	\$70,140	\$125,378	\$97,532	\$36,575	\$0	\$0	\$358,223
C – Bridges, Viad., and Tunnels											
Sector 1	\$591	\$591	\$940	\$2,296	\$3,530	\$3,652	\$1,582	\$730	\$0	\$0	\$13,914
Sector 4	\$0	\$0	\$0	\$2,117	\$7,929	\$33,798	\$29,564	\$11,087	\$0	\$0	\$84,494
D – Grade Separations											
Sector 1	\$1,214	\$1,214	\$2,525	\$5,101	\$6,455	\$6,660	\$2,666	\$1,230	\$0	\$0	\$27,066
Sector 4	\$0	\$0	\$0	\$7,965	\$22,157	\$65,747	\$49,817	\$18,681	\$0	\$0	\$164,367
E – Other Accom. Works											
Sector 1	\$124	\$124	\$171	\$643	\$1,039	\$713	\$164	\$0	\$0	\$0	\$2,977
Sector 4	\$0	\$0	\$0	\$1,504	\$8,286	\$16,023	\$5,826	\$0	\$0	\$0	\$31,639
F – Track											
Sector 1	\$0	\$194	\$632	\$1,664	\$1,716	\$2,741	\$3,282	\$2,998	\$1,181	\$295	\$14,703
Sector 2	\$0	\$0	\$0	\$0	\$2,054	\$5,476	\$13,038	\$11,004	\$9,628	\$0	\$41,199
Sector 4	\$0	\$0	\$0	\$0	\$512	\$4,093	\$6,726	\$11,625	\$7,421	\$1,060	\$31,438
G – Electrification											
Sector 1	\$0	\$186	\$603	\$1,652	\$1,511	\$2,114	\$2,524	\$2,507	\$2,092	\$546	\$13,735
Sector 4	\$0	\$0	\$0	\$0	\$1,691	\$6,764	\$11,734	\$14,945	\$13,254	\$1,657	\$50,044
H – Stations											
Sector 1	\$563	\$563	\$281	\$210	\$419	\$1,381	\$2,391	\$1,787	\$1,787	\$0	\$9,383
Sector 4	\$0	\$0	\$0	\$0	\$0	\$3,426	\$6,363	\$16,517	\$30,673	\$0	\$56,980
total	\$4,460	\$4,840	\$9,908	\$61,083	\$137,683	\$287,781	\$236,976	\$131,365	\$66,037	\$3,558	\$943,692

MONTREAL – TORONTO CORRIDOR

YEARLY EXPENDITURES BY ORIGIN AND TYPE

technology:
300+ OPTIMIZED

GEOGRAPHIC ORIGIN :
ALL

Type of Expenditure	Origin of Expenditure	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
SKILLED LABOUR	Québec	\$5,243	\$5,927	\$21,833	\$76,433	\$100,561	\$113,277	\$36,831	\$12,130	\$4,574	\$1,060	\$377,869
	Ontario	\$10,344	\$10,823	\$12,277	\$39,992	\$110,735	\$293,724	\$278,774	\$165,535	\$85,283	\$4,963	\$1,012,452
	Rest of Canada	\$0	\$35	\$114	\$299	\$309	\$493	\$591	\$540	\$213	\$53	\$2,647
	Foreign	\$470	\$640	\$1,443	\$3,257	\$3,671	\$4,500	\$3,672	\$3,019	\$1,748	\$401	\$22,822
UNSKILLED LABOUR	Québec	\$207	\$264	\$1,055	\$20,535	\$34,590	\$38,259	\$9,819	\$1,425	\$0	\$0	\$106,154
	Ontario	\$462	\$462	\$431	\$1,780	\$23,372	\$98,218	\$100,062	\$56,838	\$27,079	\$1,459	\$0
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MATERIALS	Québec	\$345	\$440	\$12,029	\$45,231	\$63,740	\$82,244	\$70,441	\$57,636	\$50,205	\$3,554	\$385,865
	Ontario	\$770	\$770	\$718	\$29,842	\$102,957	\$245,886	\$243,532	\$171,949	\$127,433	\$5,405	\$929,262
	Rest of Canada	\$0	\$0	\$0	\$0	\$6,632	\$17,685	\$42,107	\$35,537	\$31,095	\$0	\$133,057
	Foreign	\$0	\$0	\$0	\$0	\$2,504	\$7,729	\$16,366	\$16,161	\$14,223	\$772	\$57,755
PLANT	Québec	\$1,328	\$1,651	\$6,124	\$10,281	\$10,247	\$18,003	\$12,471	\$5,222	\$1,787	\$42	\$67,155
	Ontario	\$2,909	\$2,947	\$3,288	\$15,601	\$31,700	\$51,353	\$45,626	\$33,183	\$20,414	\$1,653	\$208,676
	Rest of Canada	\$0	\$0	\$0	\$0	\$780	\$2,081	\$4,954	\$4,181	\$3,659	\$0	\$15,656
	Foreign	\$223	\$242	\$495	\$35,201	\$94,956	\$216,344	\$173,924	\$88,779	\$40,178	\$1,862	\$652,206
TOTAL ALL TYPES	Québec	\$7,124	\$8,283	\$41,041	\$152,480	\$209,137	\$251,783	\$129,562	\$76,412	\$56,566	\$4,655	\$937,043
	Ontario	\$14,486	\$15,002	\$16,714	\$87,216	\$268,764	\$689,182	\$667,994	\$427,505	\$260,208	\$13,480	\$2,460,552
	Rest of Canada	\$0	\$35	\$114	\$299	\$7,721	\$20,260	\$47,652	\$40,258	\$34,967	\$53	\$151,359
	Foreign	\$693	\$882	\$1,939	\$38,458	\$101,132	\$228,573	\$193,962	\$107,959	\$56,149	\$3,035	\$732,783
	total	\$22,302	\$24,202	\$59,807	\$278,454	\$586,754	\$1,189,798	\$1,039,170	\$652,135	\$407,890	\$21,224	\$4,281,737

SUPPLEMENTARY COST INFORMATION

D5. MONTRÉAL - QUÉBEC

200+ km/hr Composite Route

Segment Summary Cost Table

Sub-Segment Table

Segment Cash Flows by Sub-system/Sector

- Total Cost
- Skilled Labour
- Unskilled Labour
- Material
- Plant

Yearly Expenditure by Origin and Type

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
MONTREAL – QUÉBEC CORRIDOR			200+, OPTIMIZED				
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Acquisition	\$6,438,627	\$67,069,031	N/A	N/A	see note c	\$73,507,658	\$7,170,289
B – Earthworks and Drainage	\$62,812,460	N/A	N/A	\$300,617,780	see note c	\$363,430,239	\$39,211,015
C – Bridges, Viaducts, and Tunnels	\$14,554,358	N/A	N/A	\$88,385,000	see note c	\$102,939,358	\$8,035,000
D – Grade Separations	\$24,510,405	N/A	N/A	\$148,845,600	see note c	\$173,356,005	\$24,807,600
E – Other Accom- modation works	\$1,687,798	see note a	see note a	\$10,249,577	see note c	\$11,937,375	\$2,365,287
F – Track	\$30,627,317	\$169,888,504	see note b	\$40,876,519	see note c	\$241,392,340	\$10,403,694
G – Electrification	\$31,935,593	see note a	see note a	\$193,936,920	see note c	\$225,872,513	\$25,296,120
H – Stations	\$5,343,542	see note a	see note a	\$32,450,000	see note c	\$37,793,542	\$2,950,000
Totals	\$177,910,099	\$236,957,534	\$0	\$815,361,396	see note c	\$1,230,229,029	\$120,239,005

NOTES : a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

09-Feb-94 current costs on file	
Montréal – Québec Corridor	
200+, OPTIMIZED	
segment	total cost
MQ2-A0	\$799,443,552
MQ2-B0	\$564,209,313
MQ1-A0	\$0
MQ1-B0	\$0
MQ1-C0	\$0
MQ0-A0	\$0
MQ0-B0	\$0
MQ0-C0	\$0
MQS-1	\$18,659,014
MQS-2	\$14,270,328
MQS-3a	\$13,979,869
MQS-3b	\$20,952,005
MQR-01	(\$86,224,697)
MQR-02	(\$10,566,429)
TMR-04	(\$104,493,925)

\$1,230,229,029

MONTREAL – QUÉBEC CORRIDOR

TOTAL COSTS CASH FLOW (THOUSANDS)

technology:
200+, OPTIMIZED

GEOGRAPHIC ORIGIN :
ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$322	\$322	\$2,575	\$1,932	\$644	\$644	\$0	\$0	\$0	\$0	\$6,439
Sector 2	\$0	\$0	\$6,707	\$26,828	\$23,474	\$10,060	\$0	\$0	\$0	\$0	\$67,069
B – Earthworks and Drainage											
Sector 1	\$3,769	\$3,141	\$11,306	\$13,191	\$15,075	\$8,166	\$8,166	\$0	\$0	\$0	\$62,812
Sector 4	\$0	\$0	\$0	\$0	\$75,154	\$120,247	\$105,216	\$0	\$0	\$0	\$300,618
C – Bridges, Viad., and Tunnels											
Sector 1	\$873	\$728	\$2,620	\$3,056	\$3,493	\$1,892	\$1,892	\$0	\$0	\$0	\$14,554
Sector 4	\$0	\$0	\$0	\$0	\$17,677	\$35,354	\$35,354	\$0	\$0	\$0	\$88,385
D – Grade Separations											
Sector 1	\$1,471	\$1,226	\$4,412	\$5,147	\$5,882	\$3,186	\$3,186	\$0	\$0	\$0	\$24,510
Sector 4	\$0	\$0	\$0	\$0	\$29,769	\$59,538	\$59,538	\$0	\$0	\$0	\$148,846
E – Other Accom. Works											
Sector 1	\$101	\$84	\$304	\$354	\$506	\$338	\$0	\$0	\$0	\$0	\$1,688
Sector 4	\$0	\$0	\$0	\$0	\$6,150	\$4,100	\$0	\$0	\$0	\$0	\$10,250
F – Track											
Sector 1	\$0	\$0	\$3,369	\$4,594	\$2,144	\$4,900	\$8,882	\$6,738	\$0	\$0	\$30,627
Sector 2	\$0	\$0	\$0	\$0	\$0	\$33,978	\$67,955	\$67,955	\$0	\$0	\$169,889
Sector 4	\$0	\$0	\$0	\$0	\$0	\$4,088	\$18,394	\$16,351	\$2,044	\$0	\$40,877
G – Electrification											
Sector 1	\$0	\$0	\$3,513	\$4,790	\$2,235	\$5,110	\$9,261	\$7,026	\$0	\$0	\$31,936
Sector 4	\$0	\$0	\$0	\$0	\$0	\$19,394	\$77,575	\$77,575	\$19,394	\$0	\$193,937
H – Stations											
Sector 1	\$321	\$321	\$160	\$0	\$695	\$1,389	\$1,229	\$1,229	\$0	\$0	\$5,344
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$11,358	\$21,093	\$0	\$0	\$32,450
TOTAL	\$6,856	\$5,821	\$34,966	\$59,892	\$182,899	\$312,383	\$408,007	\$197,966	\$21,438	\$0	\$1,230,229
% of total cost expended in year	1%	0%	3%	5%	15%	25%	33%	16%	2%	0%	100%

MONTREAL – QUÉBEC CORRIDOR

SKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
200+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$232	\$232	\$1,854	\$1,391	\$464	\$464	\$0	\$0	\$0	\$0	\$4,636
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$2,713	\$2,261	\$8,140	\$9,497	\$10,854	\$5,879	\$5,879	\$0	\$0	\$0	\$45,225
Sector 4	\$0	\$0	\$0	\$0	\$26,304	\$42,086	\$36,826	\$0	\$0	\$0	\$105,216
C – Bridges, Viad., and Tunnels											
Sector 1	\$629	\$524	\$1,886	\$2,201	\$2,515	\$1,362	\$1,362	\$0	\$0	\$0	\$10,479
Sector 4	\$0	\$0	\$0	\$0	\$5,303	\$10,606	\$10,606	\$0	\$0	\$0	\$26,516
D – Grade Separations											
Sector 1	\$1,059	\$882	\$3,177	\$3,706	\$4,235	\$2,294	\$2,294	\$0	\$0	\$0	\$17,647
Sector 4	\$0	\$0	\$0	\$0	\$10,419	\$20,838	\$20,838	\$0	\$0	\$0	\$52,096
E – Other Accom. Works											
Sector 1	\$73	\$61	\$219	\$255	\$365	\$243	\$0	\$0	\$0	\$0	\$1,215
Sector 4	\$0	\$0	\$0	\$0	\$1,845	\$1,230	\$0	\$0	\$0	\$0	\$3,075
F – Track											
Sector 1	\$0	\$0	\$2,426	\$3,308	\$1,544	\$3,528	\$6,395	\$4,851	\$0	\$0	\$22,052
Sector 2	\$0	\$0	\$0	\$0	\$0	\$340	\$680	\$680	\$0	\$0	\$1,699
Sector 4	\$0	\$0	\$0	\$0	\$0	\$1,226	\$5,518	\$4,905	\$613	\$0	\$12,263
G – Electrification											
Sector 1	\$0	\$0	\$2,529	\$3,449	\$1,610	\$3,679	\$6,668	\$5,059	\$0	\$0	\$22,994
Sector 4	\$0	\$0	\$0	\$0	\$0	\$3,491	\$13,963	\$13,963	\$3,491	\$0	\$34,909
H – Stations											
Sector 1	\$231	\$231	\$115	\$0	\$500	\$1,000	\$885	\$885	\$0	\$0	\$3,847
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$3,407	\$6,328	\$0	\$0	\$9,735
total	\$4,937	\$4,191	\$20,347	\$23,807	\$65,957	\$98,268	\$115,323	\$36,671	\$4,104	\$0	\$373,603

MONTREAL – QUÉBEC CORRIDOR

UNSKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
200+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$10	\$10	\$77	\$58	\$19	\$19	\$0	\$0	\$0	\$0	\$193
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$113	\$94	\$339	\$396	\$452	\$245	\$245	\$0	\$0	\$0	\$1,884
Sector 4	\$0	\$0	\$0	\$0	\$11,273	\$18,037	\$15,782	\$0	\$0	\$0	\$45,093
C – Bridges, Viad., and Tunnels											
Sector 1	\$26	\$22	\$79	\$92	\$105	\$57	\$57	\$0	\$0	\$0	\$437
Sector 4	\$0	\$0	\$0	\$0	\$1,768	\$3,535	\$3,535	\$0	\$0	\$0	\$8,839
D – Grade Separations											
Sector 1	\$44	\$37	\$132	\$154	\$176	\$96	\$96	\$0	\$0	\$0	\$735
Sector 4	\$0	\$0	\$0	\$0	\$4,465	\$8,931	\$8,931	\$0	\$0	\$0	\$22,327
E – Other Accom. Works											
Sector 1	\$3	\$3	\$9	\$11	\$15	\$10	\$0	\$0	\$0	\$0	\$51
Sector 4	\$0	\$0	\$0	\$0	\$1,230	\$820	\$0	\$0	\$0	\$0	\$2,050
F – Track											
Sector 1	\$0	\$0	\$101	\$138	\$64	\$147	\$266	\$202	\$0	\$0	\$919
Sector 2	\$0	\$0	\$0	\$0	\$0	\$340	\$680	\$680	\$0	\$0	\$1,699
Sector 4	\$0	\$0	\$0	\$0	\$0	\$818	\$3,679	\$3,270	\$409	\$0	\$8,175
G – Electrification											
Sector 1	\$0	\$0	\$105	\$144	\$67	\$153	\$278	\$211	\$0	\$0	\$958
Sector 4	\$0	\$0	\$0	\$0	\$0	\$970	\$3,879	\$3,879	\$970	\$0	\$9,697
H – Stations											
Sector 1	\$10	\$10	\$5	\$0	\$21	\$42	\$37	\$37	\$0	\$0	\$160
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,136	\$2,109	\$0	\$0	\$3,245
total	\$206	\$175	\$848	\$992	\$19,656	\$34,219	\$38,600	\$10,387	\$1,378	\$0	\$106,461

MONTREAL – QUÉBEC CORRIDOR

MATERIALS COSTS CASH FLOW (THOUSANDS)

technology:

GEOGRAPHIC ORIGIN :

200+, OPTIMIZED

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$16	\$16	\$129	\$97	\$32	\$32	\$0	\$0	\$0	\$0	\$322
Sector 2	\$0	\$0	\$6,707	\$26,828	\$23,474	\$10,060	\$0	\$0	\$0	\$0	\$67,069
B – Earthworks and Drainage											
Sector 1	\$188	\$157	\$565	\$660	\$754	\$408	\$408	\$0	\$0	\$0	\$3,141
Sector 4	\$0	\$0	\$0	\$0	\$9,019	\$14,430	\$12,626	\$0	\$0	\$0	\$36,074
C – Bridges, Viad., and Tunnels											
Sector 1	\$44	\$36	\$131	\$153	\$175	\$95	\$95	\$0	\$0	\$0	\$728
Sector 4	\$0	\$0	\$0	\$0	\$7,071	\$14,142	\$14,142	\$0	\$0	\$0	\$35,354
D – Grade Separations											
Sector 1	\$74	\$61	\$221	\$257	\$294	\$159	\$159	\$0	\$0	\$0	\$1,226
Sector 4	\$0	\$0	\$0	\$0	\$8,931	\$17,861	\$17,861	\$0	\$0	\$0	\$44,654
E – Other Accom. Works											
Sector 1	\$5	\$4	\$15	\$18	\$25	\$17	\$0	\$0	\$0	\$0	\$84
Sector 4	\$0	\$0	\$0	\$0	\$922	\$615	\$0	\$0	\$0	\$0	\$1,537
F – Track											
Sector 1	\$0	\$0	\$168	\$230	\$107	\$245	\$444	\$337	\$0	\$0	\$1,531
Sector 2	\$0	\$0	\$0	\$0	\$0	\$29,900	\$59,801	\$59,801	\$0	\$0	\$149,502
Sector 4	\$0	\$0	\$0	\$0	\$0	\$695	\$3,127	\$2,780	\$347	\$0	\$6,949
G – Electrification											
Sector 1	\$0	\$0	\$176	\$240	\$112	\$255	\$463	\$351	\$0	\$0	\$1,597
Sector 4	\$0	\$0	\$0	\$0	\$0	\$12,606	\$50,424	\$50,424	\$12,606	\$0	\$126,059
H – Stations											
Sector 1	\$16	\$16	\$8	\$0	\$35	\$69	\$61	\$61	\$0	\$0	\$267
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$4,543	\$8,437	\$0	\$0	\$12,980
total	\$343	\$291	\$8,120	\$28,481	\$50,950	\$101,590	\$164,154	\$122,191	\$12,953	\$0	\$489,074

MONTREAL – QUÉBEC CORRIDOR

PLANT COSTS CASH FLOW (THOUSANDS)

technology:

GEOGRAPHIC ORIGIN :

200+, OPTIMIZED

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$64	\$64	\$515	\$386	\$129	\$129	\$0	\$0	\$0	\$0	\$1,288
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$754	\$628	\$2,261	\$2,638	\$3,015	\$1,633	\$1,633	\$0	\$0	\$0	\$12,562
Sector 4	\$0	\$0	\$0	\$0	\$28,559	\$45,694	\$39,982	\$0	\$0	\$0	\$114,235
C – Bridges, Viad., and Tunnels											
Sector 1	\$175	\$146	\$524	\$611	\$699	\$378	\$378	\$0	\$0	\$0	\$2,911
Sector 4	\$0	\$0	\$0	\$0	\$3,535	\$7,071	\$7,071	\$0	\$0	\$0	\$17,677
D – Grade Separations											
Sector 1	\$294	\$245	\$882	\$1,029	\$1,176	\$637	\$637	\$0	\$0	\$0	\$4,902
Sector 4	\$0	\$0	\$0	\$0	\$5,954	\$11,908	\$11,908	\$0	\$0	\$0	\$29,769
E – Other Accom. Works											
Sector 1	\$20	\$17	\$61	\$71	\$101	\$68	\$0	\$0	\$0	\$0	\$338
Sector 4	\$0	\$0	\$0	\$0	\$2,152	\$1,435	\$0	\$0	\$0	\$0	\$3,587
F – Track											
Sector 1	\$0	\$0	\$674	\$919	\$429	\$980	\$1,776	\$1,348	\$0	\$0	\$6,125
Sector 2	\$0	\$0	\$0	\$0	\$0	\$3,398	\$6,796	\$6,796	\$0	\$0	\$16,989
Sector 4	\$0	\$0	\$0	\$0	\$0	\$1,349	\$6,070	\$5,396	\$674	\$0	\$13,489
G – Electrification											
Sector 1	\$0	\$0	\$703	\$958	\$447	\$1,022	\$1,852	\$1,405	\$0	\$0	\$6,387
Sector 4	\$0	\$0	\$0	\$0	\$0	\$2,327	\$9,309	\$9,309	\$2,327	\$0	\$23,272
H – Stations											
Sector 1	\$64	\$64	\$32	\$0	\$139	\$278	\$246	\$246	\$0	\$0	\$1,069
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$2,272	\$4,219	\$0	\$0	\$6,490
total	\$1,371	\$1,164	\$5,652	\$6,613	\$46,335	\$78,306	\$89,930	\$28,717	\$3,002	\$0	\$261,091

MONTREAL – QUÉBEC CORRIDOR
YEARLY EXPENDITURES BY ORIGIN AND TYPE (THOUSANDS)

technology:

200+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

Type of Expenditure	Origin of Expenditure	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
SKILLED LABOUR	Québec	\$4,466	\$3,795	\$16,516	\$18,862	\$62,534	\$93,586	\$107,749	\$31,627	\$4,104	\$0	\$343,239
	Ontario	\$329	\$277	\$2,682	\$3,461	\$2,396	\$3,277	\$5,302	\$3,530	\$0	\$0	\$21,255
	Rest of Canada	\$0	\$0	\$121	\$165	\$77	\$176	\$320	\$243	\$0	\$0	\$1,103
	Foreign	\$141	\$119	\$1,028	\$1,318	\$950	\$1,228	\$1,952	\$1,270	\$0	\$0	\$8,007
UNSKILLED LABOUR	Québec	\$206	\$175	\$848	\$992	\$19,656	\$34,219	\$38,600	\$10,387	\$1,378	\$0	\$106,461
	Ontario	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MATERIALS	Québec	\$343	\$291	\$8,120	\$28,481	\$50,950	\$71,761	\$89,266	\$47,303	\$5,339	\$0	\$301,854
	Ontario	\$0	\$0	\$0	\$0	\$0	\$14,932	\$42,923	\$42,923	\$6,530	\$0	\$107,309
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$10,973	\$21,947	\$21,947	\$0	\$0	\$54,867
	Foreign	\$0	\$0	\$0	\$0	\$0	\$3,925	\$10,018	\$10,018	\$1,084	\$0	\$25,044
PLANT	Québec	\$1,166	\$990	\$4,804	\$5,621	\$7,225	\$7,662	\$8,606	\$2,760	\$0	\$0	\$38,833
	Ontario	\$137	\$116	\$565	\$661	\$4,634	\$10,443	\$16,064	\$9,787	\$991	\$0	\$43,398
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$1,291	\$2,582	\$2,582	\$0	\$0	\$6,456
	Foreign	\$69	\$58	\$283	\$331	\$34,477	\$58,910	\$62,677	\$13,588	\$2,011	\$0	\$172,404
TOTAL ALL TYPES	Québec	\$6,180	\$5,250	\$30,287	\$53,956	\$140,365	\$207,227	\$244,222	\$92,077	\$10,822	\$0	\$790,387
	Ontario	\$466	\$394	\$3,247	\$4,122	\$7,030	\$28,652	\$64,289	\$56,241	\$7,520	\$0	\$171,962
	Rest of Canada	\$0	\$0	\$121	\$165	\$77	\$12,441	\$24,849	\$24,772	\$0	\$0	\$62,426
	Foreign	\$210	\$177	\$1,311	\$1,649	\$35,427	\$64,063	\$74,647	\$24,876	\$3,095	\$0	\$205,454
	total	\$6,856	\$5,821	\$34,966	\$59,892	\$182,899	\$312,383	\$408,007	\$197,966	\$21,438	\$0	\$1,230,229

SUPPLEMENTARY COST INFORMATION

D6. MONTRÉAL - QUÉBEC

300+ km/hr Composite Route

Segment Summary Cost Table

Sub-Segment Table

Segment Cash Flows by Sub-system/Sector

- Total Cost
- Skilled Labour
- Unskilled Labour
- Material
- Plant

Yearly Expenditure by Origin and Type

SUBSYSTEM/SECTOR COST SUMMARY							Contingency reserve included in TOTAL
MONTREAL – QUÉBEC CORRIDOR 300+, OPTIMIZED							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	
A – Right-of-way Aquisition	\$5,652,816	\$58,883,503	N/A	N/A	see note c	\$64,536,319	\$6,295,182
B – Earthworks and Drainage	\$60,168,487	N/A	N/A	\$279,617,262	see note c	\$339,785,749	\$36,471,817
C – Bridges, Viaducts, and Tunnels	\$13,054,544	N/A	N/A	\$79,277,000	see note c	\$92,331,544	\$7,207,000
D – Grade Separations	\$50,628,393	N/A	N/A	\$307,453,650	see note c	\$358,082,043	\$40,102,650
E – Other Accom- modation works	\$1,401,877	see note a	see note a	\$8,513,251	see note c	\$9,915,128	\$1,964,596
F – Track	\$28,068,686	\$156,259,261	see note b	\$37,079,789	see note c	\$221,407,736	\$9,539,773
G – Electrification	\$27,056,542	see note a	see note a	\$164,307,659	see note c	\$191,364,201	\$21,431,434
H – Stations	\$4,166,151	see note a	see note a	\$25,300,000	see note c	\$29,466,151	\$2,300,000
Totals	\$190,197,496	\$215,142,763	\$0	\$901,548,611	see note c	\$1,306,888,870	\$125,312,452

NOTES : a) Included in Construction / Installation
b) Included in Equipment / Material
c) Included in Other Studies

09-Feb-94 current costs on file	
Montréal – Québec Corridor	
300+, OPTIMIZED	
segment	total cost
MQ2-A0	\$0
MQ2-B0	\$0
MQ1-A0	\$0
MQ1-B0	\$667,086,507
MQ1-C0	\$687,391,289
MQ0-A0	\$0
MQ0-B0	\$0
MQ0-C0	\$0
MQS-1	\$0
MQS-2	\$14,270,328
MQS-3a	\$13,979,869
MQS-3b	\$20,952,005
MQR-01	(\$86,224,697)
MQR-02	(\$10,566,429)
TMR-04	\$0

\$1,306,888,870

MONTREAL – QUÉBEC CORRIDOR

TOTAL COSTS CASH FLOW (THOUSANDS)

technology:

GEOGRAPHIC ORIGIN :

300+, OPTIMIZED

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$283	\$283	\$2,261	\$1,696	\$565	\$565	\$0	\$0	\$0	\$0	\$5,653
Sector 2	\$0	\$0	\$5,888	\$23,553	\$20,609	\$8,833	\$0	\$0	\$0	\$0	\$58,884
B – Earthworks and Drainage											
Sector 1	\$3,610	\$3,008	\$10,830	\$12,635	\$14,440	\$7,822	\$7,822	\$0	\$0	\$0	\$60,168
Sector 4	\$0	\$0	\$0	\$0	\$69,904	\$111,847	\$97,866	\$0	\$0	\$0	\$279,617
C – Bridges, Viad., and Tunnels											
Sector 1	\$783	\$653	\$2,350	\$2,741	\$3,133	\$1,697	\$1,697	\$0	\$0	\$0	\$13,055
Sector 4	\$0	\$0	\$0	\$0	\$15,855	\$31,711	\$31,711	\$0	\$0	\$0	\$79,277
D – Grade Separations											
Sector 1	\$3,038	\$2,531	\$9,113	\$10,632	\$12,151	\$6,582	\$6,582	\$0	\$0	\$0	\$50,628
Sector 4	\$0	\$0	\$0	\$0	\$61,491	\$122,981	\$122,981	\$0	\$0	\$0	\$307,454
E – Other Accom. Works											
Sector 1	\$84	\$70	\$252	\$294	\$421	\$280	\$0	\$0	\$0	\$0	\$1,402
Sector 4	\$0	\$0	\$0	\$0	\$5,108	\$3,405	\$0	\$0	\$0	\$0	\$8,513
F – Track											
Sector 1	\$0	\$0	\$3,088	\$4,210	\$1,965	\$4,491	\$8,140	\$6,175	\$0	\$0	\$28,069
Sector 2	\$0	\$0	\$0	\$0	\$0	\$31,252	\$62,504	\$62,504	\$0	\$0	\$156,259
Sector 4	\$0	\$0	\$0	\$0	\$0	\$3,708	\$16,686	\$14,832	\$1,854	\$0	\$37,080
G – Electrification											
Sector 1	\$0	\$0	\$2,976	\$4,058	\$1,894	\$4,329	\$7,846	\$5,952	\$0	\$0	\$27,057
Sector 4	\$0	\$0	\$0	\$0	\$0	\$16,431	\$65,723	\$65,723	\$16,431	\$0	\$164,308
H – Stations											
Sector 1	\$250	\$250	\$125	\$0	\$542	\$1,083	\$958	\$958	\$0	\$0	\$4,166
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$8,855	\$16,445	\$0	\$0	\$25,300
TOTAL	\$8,048	\$6,795	\$36,884	\$59,821	\$208,078	\$357,017	\$439,371	\$172,589	\$18,285	\$0	\$1,306,889
% of total cost expended in year	1%	1%	3%	5%	16%	27%	34%	13%	1%	0%	100%

MONTREAL – QUÉBEC CORRIDOR

SKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:

GEOGRAPHIC ORIGIN :

300+, OPTIMIZED

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$204	\$204	\$1,628	\$1,221	\$407	\$407	\$0	\$0	\$0	\$0	\$4,070
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$2,599	\$2,166	\$7,798	\$9,097	\$10,397	\$5,632	\$5,632	\$0	\$0	\$0	\$43,321
Sector 4	\$0	\$0	\$0	\$0	\$24,467	\$39,146	\$34,253	\$0	\$0	\$0	\$97,866
C – Bridges, Viad., and Tunnels											
Sector 1	\$564	\$470	\$1,692	\$1,974	\$2,256	\$1,222	\$1,222	\$0	\$0	\$0	\$9,399
Sector 4	\$0	\$0	\$0	\$0	\$4,757	\$9,513	\$9,513	\$0	\$0	\$0	\$23,783
D – Grade Separations											
Sector 1	\$2,187	\$1,823	\$6,561	\$7,655	\$8,749	\$4,739	\$4,739	\$0	\$0	\$0	\$36,452
Sector 4	\$0	\$0	\$0	\$0	\$21,522	\$43,044	\$43,044	\$0	\$0	\$0	\$107,609
E – Other Accom. Works											
Sector 1	\$61	\$50	\$182	\$212	\$303	\$202	\$0	\$0	\$0	\$0	\$1,009
Sector 4	\$0	\$0	\$0	\$0	\$1,532	\$1,022	\$0	\$0	\$0	\$0	\$2,554
F – Track											
Sector 1	\$0	\$0	\$2,223	\$3,031	\$1,415	\$3,234	\$5,861	\$4,446	\$0	\$0	\$20,209
Sector 2	\$0	\$0	\$0	\$0	\$0	\$313	\$625	\$625	\$0	\$0	\$1,563
Sector 4	\$0	\$0	\$0	\$0	\$0	\$1,112	\$5,006	\$4,450	\$556	\$0	\$11,124
G – Electrification											
Sector 1	\$0	\$0	\$2,143	\$2,922	\$1,364	\$3,117	\$5,649	\$4,286	\$0	\$0	\$19,481
Sector 4	\$0	\$0	\$0	\$0	\$0	\$2,958	\$11,830	\$11,830	\$2,958	\$0	\$29,575
H – Stations											
Sector 1	\$180	\$180	\$90	\$0	\$390	\$780	\$690	\$690	\$0	\$0	\$3,000
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$2,657	\$4,934	\$0	\$0	\$7,590
total	\$5,794	\$4,893	\$22,317	\$26,113	\$77,557	\$116,439	\$130,720	\$31,260	\$3,514	\$0	\$418,606

MONTREAL – QUÉBEC CORRIDOR

UNSKILLED LABOUR COSTS CASH FLOW (THOUSANDS)

technology:
300+, OPTIMIZED

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$8	\$8	\$68	\$51	\$17	\$17	\$0	\$0	\$0	\$0	\$170
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$108	\$90	\$325	\$379	\$433	\$235	\$235	\$0	\$0	\$0	\$1,805
Sector 4	\$0	\$0	\$0	\$0	\$10,486	\$16,777	\$14,680	\$0	\$0	\$0	\$41,943
C – Bridges, Viad., and Tunnels											
Sector 1	\$23	\$20	\$70	\$82	\$94	\$51	\$51	\$0	\$0	\$0	\$392
Sector 4	\$0	\$0	\$0	\$0	\$1,586	\$3,171	\$3,171	\$0	\$0	\$0	\$7,928
D – Grade Separations											
Sector 1	\$91	\$76	\$273	\$319	\$365	\$197	\$197	\$0	\$0	\$0	\$1,519
Sector 4	\$0	\$0	\$0	\$0	\$9,224	\$18,447	\$18,447	\$0	\$0	\$0	\$46,118
E – Other Accom. Works											
Sector 1	\$3	\$2	\$8	\$9	\$13	\$8	\$0	\$0	\$0	\$0	\$42
Sector 4	\$0	\$0	\$0	\$0	\$1,022	\$681	\$0	\$0	\$0	\$0	\$1,703
F – Track											
Sector 1	\$0	\$0	\$93	\$126	\$59	\$135	\$244	\$185	\$0	\$0	\$842
Sector 2	\$0	\$0	\$0	\$0	\$0	\$313	\$625	\$625	\$0	\$0	\$1,563
Sector 4	\$0	\$0	\$0	\$0	\$0	\$742	\$3,337	\$2,966	\$371	\$0	\$7,416
G – Electrification											
Sector 1	\$0	\$0	\$89	\$122	\$57	\$130	\$235	\$179	\$0	\$0	\$812
Sector 4	\$0	\$0	\$0	\$0	\$0	\$822	\$3,286	\$3,286	\$822	\$0	\$8,215
H – Stations											
Sector 1	\$7	\$7	\$4	\$0	\$16	\$32	\$29	\$29	\$0	\$0	\$125
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$885	\$1,644	\$0	\$0	\$2,530
total	\$241	\$204	\$930	\$1,088	\$23,370	\$41,758	\$45,423	\$8,915	\$1,192	\$0	\$123,121

MONTREAL – QUÉBEC CORRIDOR

MATERIALS COSTS CASH FLOW (THOUSANDS)

technology:

GEOGRAPHIC ORIGIN :

300+, OPTIMIZED

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

Subsystem	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$14	\$14	\$113	\$85	\$28	\$28	\$0	\$0	\$0	\$0	\$283
Sector 2	\$0	\$0	\$5,888	\$23,553	\$20,609	\$8,833	\$0	\$0	\$0	\$0	\$58,884
B – Earthworks and Drainage											
Sector 1	\$181	\$150	\$542	\$632	\$722	\$391	\$391	\$0	\$0	\$0	\$3,008
Sector 4	\$0	\$0	\$0	\$0	\$8,389	\$13,422	\$11,744	\$0	\$0	\$0	\$33,554
C – Bridges, Viad., and Tunnels											
Sector 1	\$39	\$33	\$117	\$137	\$157	\$85	\$85	\$0	\$0	\$0	\$653
Sector 4	\$0	\$0	\$0	\$0	\$6,342	\$12,684	\$12,684	\$0	\$0	\$0	\$31,711
D – Grade Separations											
Sector 1	\$152	\$127	\$456	\$532	\$608	\$329	\$329	\$0	\$0	\$0	\$2,531
Sector 4	\$0	\$0	\$0	\$0	\$18,447	\$36,894	\$36,894	\$0	\$0	\$0	\$92,236
E – Other Accom. Works											
Sector 1	\$4	\$4	\$13	\$15	\$21	\$14	\$0	\$0	\$0	\$0	\$70
Sector 4	\$0	\$0	\$0	\$0	\$766	\$511	\$0	\$0	\$0	\$0	\$1,277
F – Track											
Sector 1	\$0	\$0	\$154	\$211	\$98	\$225	\$407	\$309	\$0	\$0	\$1,403
Sector 2	\$0	\$0	\$0	\$0	\$0	\$27,502	\$55,003	\$55,003	\$0	\$0	\$137,508
Sector 4	\$0	\$0	\$0	\$0	\$0	\$630	\$2,837	\$2,521	\$315	\$0	\$6,304
G – Electrification											
Sector 1	\$0	\$0	\$149	\$203	\$95	\$216	\$392	\$298	\$0	\$0	\$1,353
Sector 4	\$0	\$0	\$0	\$0	\$0	\$10,680	\$42,720	\$42,720	\$10,680	\$0	\$106,800
H – Stations											
Sector 1	\$12	\$12	\$6	\$0	\$27	\$54	\$48	\$48	\$0	\$0	\$208
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$3,542	\$6,578	\$0	\$0	\$10,120
total	\$402	\$340	\$7,438	\$25,367	\$56,309	\$112,498	\$167,077	\$107,477	\$10,995	\$0	\$487,903

MONTREAL – QUÉBEC CORRIDOR

technology:
300+, OPTIMIZED

PLANT COSTS CASH FLOW (THOUSANDS)

GEOGRAPHIC ORIGIN :

ALL

CASH FLOW PREVISIONS : ESTIMATED ALLOCATION OF SUBSYSTEM COST, PER YEAR, IN A TEN YEAR PERIOD

<u>Subsystem</u>	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
A – Right-of-way Acquisition											
Sector 1	\$57	\$57	\$452	\$339	\$113	\$113	\$0	\$0	\$0	\$0	\$1,131
Sector 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B – Earthworks and Drainage											
Sector 1	\$722	\$602	\$2,166	\$2,527	\$2,888	\$1,564	\$1,564	\$0	\$0	\$0	\$12,034
Sector 4	\$0	\$0	\$0	\$0	\$26,564	\$42,502	\$37,189	\$0	\$0	\$0	\$106,255
C – Bridges, Viad., and Tunnels											
Sector 1	\$157	\$131	\$470	\$548	\$627	\$339	\$339	\$0	\$0	\$0	\$2,611
Sector 4	\$0	\$0	\$0	\$0	\$3,171	\$6,342	\$6,342	\$0	\$0	\$0	\$15,855
D – Grade Separations											
Sector 1	\$608	\$506	\$1,823	\$2,126	\$2,430	\$1,316	\$1,316	\$0	\$0	\$0	\$10,126
Sector 4	\$0	\$0	\$0	\$0	\$12,298	\$24,596	\$24,596	\$0	\$0	\$0	\$61,491
E – Other Accom. Works											
Sector 1	\$17	\$14	\$50	\$59	\$84	\$56	\$0	\$0	\$0	\$0	\$280
Sector 4	\$0	\$0	\$0	\$0	\$1,788	\$1,192	\$0	\$0	\$0	\$0	\$2,980
F – Track											
Sector 1	\$0	\$0	\$618	\$842	\$393	\$898	\$1,628	\$1,235	\$0	\$0	\$5,614
Sector 2	\$0	\$0	\$0	\$0	\$0	\$3,125	\$6,250	\$6,250	\$0	\$0	\$15,626
Sector 4	\$0	\$0	\$0	\$0	\$0	\$1,224	\$5,506	\$4,895	\$612	\$0	\$12,236
G – Electrification											
Sector 1	\$0	\$0	\$595	\$812	\$379	\$866	\$1,569	\$1,190	\$0	\$0	\$5,411
Sector 4	\$0	\$0	\$0	\$0	\$0	\$1,972	\$7,887	\$7,887	\$1,972	\$0	\$19,717
H – Stations											
Sector 1	\$50	\$50	\$25	\$0	\$108	\$217	\$192	\$192	\$0	\$0	\$833
Sector 4	\$0	\$0	\$0	\$0	\$0	\$0	\$1,771	\$3,289	\$0	\$0	\$5,060
total	\$1,610	\$1,359	\$6,199	\$7,254	\$50,843	\$86,323	\$96,151	\$24,938	\$2,584	\$0	\$277,259

MONTREAL – QUÉBEC CORRIDOR

YEARLY EXPENDITURES BY ORIGIN AND TYPE (THOUSANDS)

technology:
300+, OPTIMIZED

GEOGRAPHIC ORIGIN :
ALL

Type of Expenditure	Origin of Expenditure	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
SKILLED LABOUR	Québec	\$5,235	\$4,424	\$18,502	\$21,242	\$73,958	\$112,006	\$123,737	\$26,825	\$3,514	\$0	\$389,443
	Ontario	\$391	\$328	\$2,671	\$3,409	\$2,519	\$3,103	\$4,888	\$3,104	\$0	\$0	\$20,414
	Rest of Canada	\$0	\$0	\$111	\$152	\$71	\$162	\$293	\$222	\$0	\$0	\$1,010
	Foreign	\$168	\$141	\$1,033	\$1,310	\$1,009	\$1,168	\$1,802	\$1,108	\$0	\$0	\$7,739
UNSKILLED LABOUR	Québec	\$241	\$204	\$930	\$1,088	\$23,370	\$41,758	\$45,423	\$8,915	\$1,192	\$0	\$123,121
	Ontario	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Foreign	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MATERIALS	Québec	\$402	\$340	\$7,438	\$25,367	\$56,309	\$85,614	\$100,407	\$40,807	\$4,544	\$0	\$321,227
	Ontario	\$0	\$0	\$0	\$0	\$0	\$13,260	\$37,585	\$37,585	\$5,532	\$0	\$93,962
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$10,093	\$20,186	\$20,186	\$0	\$0	\$50,465
	Foreign	\$0	\$0	\$0	\$0	\$0	\$3,531	\$8,899	\$8,899	\$918	\$0	\$22,248
PLANT	Québec	\$1,368	\$1,155	\$5,269	\$6,166	\$8,160	\$8,296	\$9,113	\$2,389	\$0	\$0	\$41,916
	Ontario	\$161	\$136	\$620	\$725	\$5,084	\$10,992	\$15,946	\$8,684	\$853	\$0	\$43,201
	Rest of Canada	\$0	\$0	\$0	\$0	\$0	\$1,188	\$2,375	\$2,375	\$0	\$0	\$5,938
	Foreign	\$80	\$68	\$310	\$363	\$37,599	\$65,847	\$68,718	\$11,490	\$1,731	\$0	\$186,205
TOTAL ALL TYPES	Québec	\$7,247	\$6,123	\$32,139	\$53,863	\$161,797	\$247,674	\$278,679	\$78,935	\$9,251	\$0	\$875,706
	Ontario	\$552	\$464	\$3,291	\$4,135	\$7,603	\$27,355	\$58,419	\$49,373	\$6,385	\$0	\$157,577
	Rest of Canada	\$0	\$0	\$111	\$152	\$71	\$11,442	\$22,854	\$22,784	\$0	\$0	\$57,414
	Foreign	\$248	\$209	\$1,343	\$1,672	\$38,607	\$70,546	\$79,419	\$21,497	\$2,649	\$0	\$216,192
	total	\$8,048	\$6,795	\$36,884	\$59,821	\$208,078	\$357,017	\$439,371	\$172,589	\$18,285	\$0	\$1,306,889

SUPPLEMENTARY COST INFORMATION

D7. PERCENTAGE ALLOCATION TABLES FOR GEOGRAPHIC ORIGIN

SUBS./SECT. % INPUT BY ORIGIN		QUÉBEC	percent of total originating in QUÉBEC	percent of total originating in ONTARIO	percent of total originating in OTHER PROV.	percent of total originating in OTHER COUNTRIES
SKILLED LABOUR COSTS		Point of View				
Subsystem/Sector		% sum check				
<u>A – Right-of-way Acquisition</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 2	100%	100%	0%	0%	0%
<u>B – Earthworks and Drainage</u>						
	Sector 1	100%	90%	7%	0%	3%
	Sector 4	100%	100%	0%	0%	0%
<u>C – Bridges, Viaducts, and Tunnels</u>						
	Sector 1	100%	90%	7%	0%	3%
	Sector 4	100%	100%	0%	0%	0%
<u>D – Grade Separations</u>						
	Sector 1	100%	90%	7%	0%	3%
	Sector 4	100%	100%	0%	0%	0%
<u>E – Other Accommodation Works</u>						
	Sector 1	100%	90%	7%	0%	3%
	Sector 4	100%	100%	0%	0%	0%
<u>F – Track</u>						
	Sector 1	100%	50%	35%	5%	10%
	Sector 2	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>G – Electrification</u>						
	Sector 1	100%	50%	35%	0%	15%
	Sector 4	100%	100%	0%	0%	0%
<u>H – Stations</u>						
	Sector 1	100%	90%	7%	0%	3%
	Sector 4	100%	100%	0%	0%	0%
total						

SUBS./SECT. % INPUT BY ORIGIN		QUÉBEC	percent of total originating in QUÉBEC	percent of total originating in ONTARIO	percent of total originating in OTHER PROV.	percent of total originating in OTHER COUNTRIES
UNSKILLED LABOUR COSTS		Point of View				
Subsystem/Sector		% sum check				
<u>A – Right-of-way Acquisition</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 2	100%	100%	0%	0%	0%
<u>B – Earthworks and Drainage</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>C – Bridges, Viaducts, and Tunnels</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>D – Grade Separations</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>E – Other Accommodation Works</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>F – Track</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 2	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>G – Electrification</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>H – Stations</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
total						

SUBS./SECT. % INPUT BY ORIGIN		QUÉBEC	percent of total originating in QUÉBEC	percent of total originating in ONTARIO	percent of total originating in OTHER PROV.	percent of total originating in OTHER COUNTRIES
MATERIALS COSTS		Point of View				
Subsystem/Sector		% sum check				
<u>A – Right-of-way Acquisition</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 2	100%	100%	0%	0%	0%
<u>B – Earthworks and Drainage</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>C – Bridges, Viaducts, and Tunnels</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>D – Grade Separations</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>E – Other Accommodation Works</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
<u>F – Track</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 2	100%	26%	28%	37%	10%
	Sector 4	100%	100%	0%	0%	0%
<u>G – Electrification</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	40%	52%	0%	9%
<u>H – Stations</u>						
	Sector 1	100%	100%	0%	0%	0%
	Sector 4	100%	100%	0%	0%	0%
total						

SUBS./SECT. % INPUT BY ORIGIN		QUÉBEC	percent of total originating in QUÉBEC	percent of total originating in ONTARIO	percent of total originating in OTHER PROV.	percent of total originating in OTHER COUNTRIES
PLANT COSTS		Point of View				
Subsystem/Sector		% sum check				
<u>A – Right-of-way Acquisition</u>						
	Sector 1	100%	85%	10%	0%	5%
	Sector 2	100%	85%	10%	0%	5%
<u>B – Earthworks and Drainage</u>						
	Sector 1	100%	85%	10%	0%	5%
	Sector 4	100%	5%	10%	0%	85%
<u>C – Bridges, Viaducts, and Tunnels</u>						
	Sector 1	100%	85%	10%	0%	5%
	Sector 4	100%	5%	10%	0%	85%
<u>D – Grade Separations</u>						
	Sector 1	100%	85%	10%	0%	5%
	Sector 4	100%	5%	10%	0%	85%
<u>E – Other Accommodation Works</u>						
	Sector 1	100%	85%	10%	0%	5%
	Sector 4	100%	5%	10%	0%	85%
<u>F – Track</u>						
	Sector 1	100%	85%	10%	0%	5%
	Sector 2	100%	0%	62%	38%	0%
	Sector 4	100%	0%	33%	0%	67%
<u>G – Electrification</u>						
	Sector 1	100%	85%	10%	0%	5%
	Sector 4	100%	0%	33%	0%	67%
<u>H – Stations</u>						
	Sector 1	100%	85%	10%	0%	5%
	Sector 4	100%	5%	10%	0%	85%
total						

SUBS./SECT. % INPUT BY ORIGIN SKILLED LABOUR COSTS		ONTARIO Point of View	percent of total originating in QUÉBEC	percent of total originating in ONTARIO	percent of total originating in OTHER PROV.	percent of total originating in OTHER COUNTRIES
Subsystem/Sector		% sum check				
<u>A – Right-of-way Acquisition</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 2	100%	0%	100%	0%	0%
<u>B – Earthworks and Drainage</u>						
	Sector 1	100%	7%	90%	0%	3%
	Sector 4	100%	0%	100%	0%	0%
<u>C – Bridges, Viaducts, and Tunnels</u>						
	Sector 1	100%	7%	90%	0%	3%
	Sector 4	100%	0%	100%	0%	0%
<u>D – Grade Separations</u>						
	Sector 1	100%	7%	90%	0%	3%
	Sector 4	100%	0%	100%	0%	0%
<u>E – Other Accommodation Works</u>						
	Sector 1	100%	7%	90%	0%	3%
	Sector 4	100%	0%	100%	0%	0%
<u>F – Track</u>						
	Sector 1	100%	35%	50%	5%	10%
	Sector 2	100%	0%	100%	0%	0%
	Sector 4	100%	0%	100%	0%	0%
<u>G – Electrification</u>						
	Sector 1	100%	35%	50%	0%	15%
	Sector 4	100%	0%	100%	0%	0%
<u>H – Stations</u>						
	Sector 1	100%	7%	90%	0%	3%
	Sector 4	100%	0%	100%	0%	0%
total						

SUBS./SECT. % INPUT BY ORIGIN UNSKILLED LABOUR COSTS		ONTARIO Point of View	percent of total originating in QUÉBEC	percent of total originating in ONTARIO	percent of total originating in OTHER PROV.	percent of total originating in OTHER COUNTRIES
Subsystem/Sector		% sum check				
<u>A – Right-of-way Acquisition</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 2	100%	0%	100%	0%	0%
<u>B – Earthworks and Drainage</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 4	100%	0%	100%	0%	0%
<u>C – Bridges, Viaducts, and Tunnels</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 4	100%	0%	100%	0%	0%
<u>D – Grade Separations</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 4	100%	0%	100%	0%	0%
<u>E – Other Accommodation Works</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 4	100%	0%	100%	0%	0%
<u>F – Track</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 2	100%	0%	100%	0%	0%
	Sector 4	100%	0%	100%	0%	0%
<u>G – Electrification</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 4	100%	0%	100%	0%	0%
<u>H – Stations</u>						
	Sector 1	100%	0%	100%	0%	0%
	Sector 4	100%	0%	100%	0%	0%
total						

SUBS./SECT. % INPUT BY ORIGIN		ONTARIO				percent of total
MATERIALS COSTS		Point of View	percent of total	percent of total	percent of total	originating in
Subsystem/Sector	% sum check		originating in	originating in	originating in	OTHER
			QUÉBEC	ONTARIO	OTHER PROV.	COUNTRIES
A – Right-of-way Acquisition						
Sector 1	100%		0%	100%	0%	0%
Sector 2	100%		0%	100%	0%	0%
B – Earthworks and Drainage						
Sector 1	100%		0%	100%	0%	0%
Sector 4	100%		0%	100%	0%	0%
C – Bridges, Viaducts, and Tunnels						
Sector 1	100%		0%	100%	0%	0%
Sector 4	100%		0%	100%	0%	0%
D – Grade Separations						
Sector 1	100%		0%	100%	0%	0%
Sector 4	100%		0%	100%	0%	0%
E – Other Accommodation Works						
Sector 1	100%		0%	100%	0%	0%
Sector 4	100%		0%	100%	0%	0%
F – Track						
Sector 1	100%		0%	100%	0%	0%
Sector 2	100%		26%	28%	37%	10%
Sector 4	100%		0%	100%	0%	0%
G – Electrification						
Sector 1	100%		0%	100%	0%	0%
Sector 4	100%		40%	52%	0%	9%
H – Stations						
Sector 1	100%		0%	100%	0%	0%
Sector 4	100%		0%	100%	0%	0%
total						

SUBS./SECT. % INPUT BY ORIGIN		ONTARIO				percent of total
PLANT COSTS		Point of View	percent of total	percent of total	percent of total	originating in
Subsystem/Sector	% sum check		originating in	originating in	originating in	OTHER
			QUÉBEC	ONTARIO	OTHER PROV.	COUNTRIES
A – Right-of-way Acquisition						
Sector 1	100%		5%	90%	0%	5%
Sector 2	100%		5%	90%	0%	5%
B – Earthworks and Drainage						
Sector 1	100%		5%	90%	0%	5%
Sector 4	100%		5%	10%	0%	85%
C – Bridges, Viaducts, and Tunnels						
Sector 1	100%		5%	90%	0%	5%
Sector 4	100%		5%	10%	0%	85%
D – Grade Separations						
Sector 1	100%		5%	90%	0%	5%
Sector 4	100%		5%	10%	0%	85%
E – Other Accommodation Works						
Sector 1	100%		5%	90%	0%	5%
Sector 4	100%		5%	10%	0%	85%
F – Track						
Sector 1	100%		5%	90%	0%	5%
Sector 2	100%		0%	62%	38%	0%
Sector 4	100%		0%	33%	0%	67%
G – Electrification						
Sector 1	100%		5%	90%	0%	5%
Sector 4	100%		0%	33%	0%	67%
H – Stations						
Sector 1	100%		5%	90%	0%	5%
Sector 4	100%		5%	10%	0%	85%
total						