Quebec-Ontario High Speed Rail Project

Preliminary Routing Assessment and Costing Study

Interim Report No. 3 Infrastructure Costs

February, 1994



SNC-LAVALIN and DELCAN

in association with:

- CANARAIL
- SOFRERAIL
- SWEDERAIL

Quebec-Ontario High Speed Rail Project

Preliminary Routing Assessment and Costing Study

Interim Report No. 3

Infrastructure Costs

February, 1994

SNC LAVALIN and DELCAN

In association with:

CANARAIL

SOFRERAIL

SWEDERAIL

TABLE OF CONTENTS

	PAGE	
1.	1.1. 200+ km/hr - EXISTING RIGHTS-OF-WAY	3 3 4 6
2.		4 6 7
3.	KEY ASSUMPTIONS	0
4.	200+ km/hr - EXISTING RIGHTS-OF-WAY 2 4.1. WINDSOR - TORONTO 3 4.2. TORONTO - MONTRÉAL 3 4.3. MONTRÉAL - QUÉBEC 3 4.4. PROVINCIAL TOTALS 3	2 4 6
5.	300+ km/hr - EXISTING RIGHTS-OF-WAY 4 5.1. WINDSOR - TORONTO 4 5.2. TORONTO - MONTRÉAL 4 5.3. MONTRÉAL - QUÉBEC 4 5.4. PROVINCIAL TOTALS 5	4 6 8
6.	300+ km/hr - NEW RIGHTS-OF-WAY 5 6.1. WINDSOR - TORONTO 5 6.2. TORONTO - MONTRÉAL 5 6.3. MONTRÉAL - QUÉBEC 6 6.4. PROVINCIAL TOTALS 6	6 8 8 80

7.	ESTIN	MATE ACCURACY 68
	7.1.	GENERAL 65
	7.2.	SUB-SYSTEM ACCURACY 66
	7.3.	OVERALL ACCURACY 73
8.	SING	LE VS. DOUBLE TRACK 77
	8.1.	FEASIBILITY 77
	8.2.	COST IMPLICATIONS

APPENDICES

APPENDIX A COST ITEM DEFINITIONS

APPENDIX B PRESENTATION OF UNIT COSTS

- B1. UNIT COST LISTING
- B2. DEVELOPMENT OF INDIVIDUAL UNIT COSTS

APPENDIX C DETAILED ESTIMATES / WINDSOR - TORONTO

- C1. 200+ km/hr EXISTING RIGHTS-OF-WAY
- C2. 300+ km/hr EXISTING RIGHTS-OF-WAY
- C3. 300+ km/hr NEW RIGHTS-OF-WAY
- C4. TOTAL COST FOR SUB-SEGMENTS

APPENDIX D DETAILED ESTIMATES / TORONTO - MONTRÉAL

- D1. 200+ km/hr EXISTING RIGHTS-OF-WAY
- D2. 300+ km/hr EXISTING RIGHTS-OF-WAY
- D3. 300+ km/hr NEW RIGHTS-OF-WAY
- D4. TOTAL COST FOR SUB-SEGMENTS

APPENDIX E DETAILED ESTIMATES / MONTRÉAL - QUÉBEC

- E1. 200+ km/hr EXISTING RIGHTS-OF-WAY
- E2. 300+ km/hr EXISTING RIGHTS-OF-WAY
- E3. 300+ km/hr NEW RIGHTS-OF-WAY
- E4. TOTAL COST FOR SUB-SEGMENTS

INTRODUCTION

This comprises the third Interim Report submitted by SNC-Lavalin/DELCAN in association with CANARAIL and Swederail under their mandate for Alignment Selection and Costing which forms part of the Québec-Ontario High Speed Rail Study. This report presents the Cost Estimates for the components of the infrastructure included in this study. These are Land Acquisition, Earthworks, Bridges and Viaducts, Grade Separations, other Accommodation Works, Track, Electrification, and Stations.

The report is divided into 8 sections. The first provides a brief description of each of the speed/routing options evaluated. Further detailed definition and quantification of each of these options is included in Interim Report #2 and will not be repeated here.

The second section provides a description of the structure of the cost estimate. It defines the contents and scope of each of the components and explains the breakdown into geographical segments, the development of unit costs and quantities, and the approach to contingencies.

The next section addresses the key assumptions upon which the estimate is based. This includes basic conditions such as base year for costs, taxes, escalation, etc. and identification of the areas where there is potential for variation in the scope of the project.

Sections 4, 5, and 6 present the basic cost estimates for each of the representative speed/routing options. This includes breakdowns by each of the major geographical segments of the project and by province. Cost estimates for the two composite routes retained for the financial and economic analyses are presented in Interim Report No. 4.

Section 7 presents the analysis and estimate of the accuracy of the cost estimates produced under this study. The final section is an evaluation of the impact on costs that could be achieved by building certain segments of the line as a single-track railway with long passing sidings.

In addition, the report includes 6 appendices. Appendix A provides a definition of each of the cost items and an explanation of how the unit costs and quantities were

developed for that item. Appendix B lists the unit costs used in the estimate and includes a worksheet showing the development of each unit cost.

Appendices C, D, and E provide the cost estimates for each geographical segment. These include Summary Cost Tables, detailed Cost Reports, and cash flows for the total cost and the material, plant, and skilled/un-skilled labour breakdowns for each of the speed/routing options. It also includes the detailed estimate for each subsegment of the lines.

1. DEFINITION OF ALTERNATIVES

1.1. 200+ km/hr - EXISTING RIGHTS-OF-WAY

In accordance with the Terms of Reference, the objective of this technology/ROW scenario is to maximize the use of existing railway ROW. The representative route developed between downtown Windsor and Québec has a total length of 1249 km made up of 546 km of CN ROW, 377 km of CP ROW, 105 km of abandoned rail ROW now owned by VIA Rail and 215 km of new ROW.

1.1.1. Windsor to Toronto

The route starts at the south end of the Windsor - Detroit Tunnel in downtown Windsor and, with the exception of new bypasses of Tilbury and Chatham, follows the CP ROW to London. From London, it continues east to Hamilton, bypassing Woodstock and Paris. The route skirts the northern limits of Hamilton and after passing through Burlington, Oakville and Mississauga along the CN ROW, enters Metropolitan Toronto.

The CN ROW along the lakeshore through Etobicoke is used to reach Union Station. Continuing eastward, the CN ROW is again used to leave the urban area through Scarborough, Pickering, Ajax, Whitby and Oshawa.

1.1.2. Toronto to Montréal

From Oshawa, the route continues eastward in the CN ROW, passing through Port Hope, Cobourg and Trenton en route to Kingston and Brockville. The National Capital Region is reached from the Brockville area by bypassing the town to the west and following the CP ROW up to Smiths Falls. The route also bypasses Smiths Falls to the west and then joins the CN ROW which is used to continue north-east up to the National Capital Region.

After bypassing Richmond, the route enters Ottawa along the CN ROW through Federal junction and on to the existing VIA Station. From the station the route leaves

the Ottawa urban area using the CN ROW leading to the abandoned CP ROW which continues eastward through Bourget, Vankleek Hill and St-Eugene to Rigaud. A bypass of Rigaud and Hudson rejoins the CP ROW at Vandreuil and Dorion from where the route enters the Montréal urban area along the combined CN and CP ROW. This ROW is followed through Baie D'Urfé, Beaconsfield, Kirkland, Pointe Claire and Dorval to Lachine where the CN ROW is adopted to reach Central Station.

1.1.3. Montréal to Québec

Since the selected representative route for the Montréal-Québec segment follows the north shore of the Saint-Laurent River, the route leaves Central Station northward through the Mont Royal Tunnel. It passes through Laval along the CP ROW, which is then followed to Trois-Rivières passing south of L'Épiphanie, north of Berthierville and including bypasses of Maskinongé, Louiseville and Yamachiche.

Geometric constraints in Trois-Rivières are avoided by adopting a new route north of the City. The new route rejoins the CP ROW east of Cap-de-la-Madeleine, bypasses Portneuf and Pont-Rouge and follows the existing ROW eastward to Ancienne-Lorette. From Ancienne-Lorette, the route continues into the Québec urban area along the CP ROW as far as Allenby Junction where it joins the CN ROW. The CN ROW is used to reach Gare du Palais through Vanier and the Limoilou Yards

1.2. 300+ km/hr - EXISTING RIGHTS-OF-WAY

As with the 200-250 kph tilting technology scenario, the objective in defining this route is again, to maximize the use of existing railway ROW. The detailed analysis for this scenario has highlighted the need to include more sections of new ROW to avoid existing geometry constraints which preclude operation at speeds in the 300 kph range. This requirement, the adoption of a shorter route on new ROW between Kingston and Smiths Falls, and a preferent route between Vankleek Hill and downtown Montréal are the major differences between this route and that described for the tilting technology scenario in Section 1.1. Of the total length of 1211 km, between Windsor and Québec, 310 km is in CP ROW, 336 km uses CN ROW, 504 km is new ROW and the remaining 73 km is the abandoned CP ROW between Ottawa and Rigaud now owned by VIA Rail.

1.2.1. Windsor to Toronto

Starting at the south end of the Windsor-Detroit Tunnel in downtown Windsor, the route generally follows the CP ROW to London, except for new bypasses around Tilbury and Chatham. Geometric constraints in London are avoided with a new ROW bypassing the city to the south. From London, the route continues east to Hamilton using both CP and CN ROW along with new bypasses of Woodstock, Paris and Brantford.

The route skirts the northern limits of Hamilton and rejoins the CN ROW to pass through Burlington, Oakville and Mississauga before entering Metropolitan Toronto.

In Toronto, the CN ROW through Etobicoke is used to reach Union Station in downtown. Continuing eastward from the station, the CN ROW is again used to exit the urban area through Scarborough, Pickering, Ajax, Whitby and Oshawa.

1.2.2. Toronto to Montréal

From Oshawa, the route generally follows the CN ROW to Kingston, however, bypasses to avoid alignment geometry constraints are required at Port Hope and Cobourg. Sharp curvature again precludes use of the CN ROW through Napanee and Kingston, hence a new route across the north of the urban areas was developed, leading to a new corridor linking Kingston and Smiths Falls. After bypassing Smiths Falls to the west, this new corridor rejoins the CN ROW between Smiths Falls and Ottawa.

The route follows the CN ROW to Richmond, which it bypasses, entering Ottawa at Federal Junction from where it continues to the existing VIA Station. From the station, the route leaves the National Capital Region using the CN ROW to reach the abandoned CP ROW which is followed eastward to Vankleek Hill. East of Vankleek Hill the route leaves the CP ROW, turning north to cross the Ottawa River near Pointe Fortune. It then continues in a north-easterly direction in a new ROW up to the existing CP north-shore ROW which it joins south-west of Mirabel Airport. From this point the route could either follow the CP ROW eastward to Laval or be diverted through the airport rejoining the CP ROW in Sainte-Therese before continuing south into Laval. The direct route along the CP ROW is included in the cost estimate.

The CP ROW is used to cross the Rivière des Prairies from where a new tunnelled ROW links the route to the CN ROW entering the existing Mont Royal Tunnel. The existing tunnel is used to access Central Station in downtown Montréal.

1.2.3. Montréal to Québec

Since the selected representative route for the Montréal-Québec segment follows the north shore of the Saint-Laurent River, the route leaves Central Station northward through the Mont Royal Tunnel. It passes through Laval along the CP ROW which is then followed to Trois-Rivières passing, south of L'Épiphanie, north of Berthierville and including bypasses of Maskinongé, Louiseville and Yamachiche.

Geometric constraints in Trois-Rivières are avoided by adopting a new route north of the City. The new route rejoins the CP ROW east of Cap-De-la-Madeleine, bypasses Portneuf and Pont-Rouge and follows the existing ROW eastward to Ancienne-Lorette.

This section includes some re-alignment to improve curve radii and permit speeds over 300 kph. From Ancienne-Lorette, the route continues into the Québec urban area along the CP ROW as far as Allenby Junction where it joins the CN ROW. The CN ROW is then used to access the existing Gare du Palais through Vanier and the Limoilou rail yard.

1.3. 300+ km/hr - NEW RIGHTS-OF-WAY

For this scenario, the principal objective was to determine the infrastructure required to provide HSR service at over 300 kph mostly in new ROW between Windsor and Québec. The detailed analysis of alignment options revealed that the only feasible route through the major urban areas was the sharing of existing rail ROWs. The route developed for this scenario has a total length of 1245 km, of which 215 km is shared ROW in urban areas.

1.3.1. Windsor to Toronto

As with the other scenarios described previously, this route begins at the south end of the Windsor-Detroit Tunnel, however it remains within the CN Caso ROW up to the limits of the Windsor urban area. From here the route turns east into a new ROW between the CP ROW and the Highway 401 corridor. After bypassing Tilbury and Chatham, the route swings to the north-east and continues towards the southern limits of London generally following the Highway 401 corridor and paralleling the farm property grid.

From the outskirts of London, the route swings north to reach a new more northern ROW which continues eastward between Kitchener-Waterloo and Cambridge to the Niagara Escarpment. After crossing the escarpment in the Highway 401 corridor, the route follows this corridor through Milton where it joins the proposed Highway 407 corridor which provides the opportunity to pass the northern edge of Pearson Airport. At this location, the route swings south into the existing CN ROW which passes through the City of York to access Union Station in downtown Toronto from the west.

1.3.2. Toronto to Montréal

The route for this scenario exits the Metropolitan Toronto urban area by sharing the CP ROW through Leaside, Don Mills and Agincourt Yards in north Scarborough. Continuing north along the CP ROW the route reaches the proposed Highway 407 corridor near Locust Hill. The Highway corridor is used to bypass Pickering and Oshawa.

East of Oshawa the route continues gradually southward to the Highway 401 corridor near Port Hope and Cobourg.

The route leaves the highway corridor at Colborne and continues east in a new more northerly ROW through Frankford to Kingston. From the outskirts of Kingston, the route swings to the north-east and continues, generally parallel to Highway 15, up to Smiths Falls. After bypassing Smiths Falls to the west, the route joins the CN ROW to enter Ottawa through Federal Junction.

Since the representative route between the National Capital Region and Montréal was selected to be along the north shore of the Ottawa River, the route leaves the CN

ROW in Ottawa and follows the CP ROW across the river to enter downtown Hull. Between Hull and Montréal, the new ROW passes through Gatineau, south of Buckingham, north of Montebello and along the north shore to Lachute. After bypassing Lachute to the south, the route swings north to join the CP ROW at the south-west corner of Mirabel Airport. As described in Section 1.2.2 the route could either pass through the airport terminal and then south to Laval, or bypass the property to the south and continue to Laval. The route costed includes the station at Mirabel.

From Laval the CP ROW is used to cross the Rivière des Prairies from where a new tunnelled ROW links the route to the CN ROW entering the existing Mont Royal Tunnel. The existing tunnel is used to access Central Station in downtown Montréal.

1.3.3. Montréal to Québec

For this scenario, the route from Central Station to the eastern limit of the Montréal urban area is identical to that described in Section 1.2.3 for the "Existing ROW" scenario i.e. north through the Mont Royal Tunnel, up to Laval and then north-east along the CP ROW to Mascouche.

From Mascouche, the new ROW parallels the CP ROW as far as Saint-Barthélémy where it joins the Hydro Québec corridor which it follows to north of Louiseville. The route continues across country to join the bypass of Trois-Rivières developed for the other scenarios. Between Trois-Rivières and La Pérade the route generally follows the Autoroute 40 corridor. At La Pérade, a Hydro Québec corridor north of the Autoroute is again joined and followed eastward to a point 15 km west of Ancienne-Lorette. From this point, the route swings across to rejoin the CP ROW south of Québec airport.

The route through the urban area uses the CP ROW, with curve improvements in the Les Saules area, to reach the CN ROW at Allenby Junction. From the junction the CN ROW is shared through Vanier and Limoilou to gain access to Gare du Palais.

2. COST ESTIMATE STRUCTURE AND METHODOLOGY

This section of the report sets out the structure used for presenting the cost estimate by defining its various elements and then describes the approach taken in developing the figures presented.

2.1. DEFINITION OF COST ITEMS

The most basic components of this cost estimate have been designated items or subitems. These are the elements for which quantities, unit prices, and extensions are presented in the detailed cost estimates. They vary greatly in scale. For example, one item covers a scope as large as a grade separation whereas another is a railway tie. The scale for the items were selected on the basis of the difficulty of and the time available for estimating the quantities and costs under each discipline.

The items have been developed by the particular specialists involved in doing quantity take-offs and estimating unit costs for each of the sub-systems. This has ensured that, overall, the items include all the elements of the work required when the project goes ahead, yet at the same time, incorporates simplification where several elements can be grouped into a single larger cost item.

Appendix A to this report identifies the various cost items and provides a definition for each of these items, indicating what portion of the scope of work for the total project has been included within each cost item. It also provides information regarding the methods used to estimate quantities and to develop the unit costs.

2.2. DEFINITION OF SUB-SYSTEMS

The term "sub-system" is used here to refer to a clearly-defined physical element of the overall project that has common characteristics throughout its length. Contracts for the design and construction of the work would generally be awarded on a subsystem basis. This cost estimate includes the following sub-systems:

- Right-of-Way Acquisition
- Earthworks and Drainage
- Bridges, Viaducts, and Tunnels
- Grade Separations
- Other Accommodation Works
- Track
- Flectrification
- Stations

The criteria used in this study for assigning cost items to different sub-systems are presented in the sub-sections which follow.

Examples of other sub-systems required as part of this project but which fall outside the scope of work of this study are:

- Rolling Stock
- Signalling and Telecommunications
- Maintenance Facilities
- Administrative Facilities

2.2.1. Right-of-Way Acquisition

This sub-system is intended to include all costs associated with acquiring the land required to construct the project. This comprises land for new right-of-way, for widening or outright purchase of existing rights-of-way, for constructing grade separations, and for stations. The acquisition costs include the cost of compensation that will have to be paid for loss of property value and loss of business revenue resulting from the acquisition. It also encompasses land which may have to be purchased or other expenses necessary to acquire or extinguish crossing rights. It does not include any cost for sharing of existing rights-of-way. Legal and professional fees associated with the acquisition process are also included.

This sub-system excludes all track and roadbed items.

2.2.2. Earthworks and Drainage

This sub-system comprises all work required to construct the roadbed to the bottom of the ballast layer for the high speed rail lines, except for bridge structures, tunnels, and/or grade separations as covered in other sub-systems.

It includes the cost of clearing land, excavating cuts, hauling fill and spoil materials, compaction, providing culverts, ditches, and fencing, and treating interferences caused by pipe and wire crossings. It also encompasses the cost of capping the earthwork with a layer of superior quality material to serve as a sub-ballast.

In terms of civil structures, this sub-system will include retaining walls for earthwork and noise attenuation barriers. On existing rights-of-way, it will include the costs associated with improving the quality of embankments where required. This might involve the removal of fouled or incompetent materials and the use of special earth reinforcement or other treatments.

Costs associated with technical feasibility studies and the environmental evaluation of the project are also included here, as well as the cost of implementing measures to mitigate most environmental impacts.

Earth moving and drainage works for stations are included in the Stations sub-system.

2.2.3. Bridges, Viaducts, and Tunnels

These structures are naturally included with earthworks to produce a "Roadway" subsystem as both these elements are often awarded for construction under a common contract. However, they are treated separately here in order to conform to past practice associated with this project and allow easy comparisons. The fact that they encompass a significant portion of the total project cost also justifies a separate subsystem.

Therefore, this includes all costs associated with providing all new and reconstructed bridges over streams and waterways, building viaducts across valleys, and constructing tunnels if required.

This sub-system does not include bridge structures, either over- or underpasses, required for grade separating the railway from roadways.

2.2.4. Grade Separations

This sub-system includes all costs associated with maintaining the high speed right-of-way free of potential vehicular or animal obstruction. In addition to grade separations, this will include grade separated farm crossings where required and the costs for closing and/or diverting roads to avoid grade separation.

Where existing grade separations must be modified to allow for additional tracks, the cost of such work will be included here. Again, in terms of contracting for construction, all of these items would typically be included with earthworks and bridges.

Where level crossings with automatic crossing protection have been considered for the project, the costs for crossing protection has been included in this sub-system. These costs are traditionally included with signalling costs. However, they have been included here so that the full costs for treating the crossing issue (separation or protection) can be easily compared irrespective of the solution adopted.

2.2.5. Other Accommodation Works

In developing the cost items the consultant identified some which did not readily fall within the categories already defined. Although it may have been possible to make some of the items to fit under trackwork, earthwork, or grade separations, there were reasons for not including them there. In addition, it was thought easier to evaluate the overall impact of these items as a single unit than to provide for them under two or three sub-systems.

Therefore, the removal of rail lines, the construction of new tracks to maintain existing rail traffic during construction and allow continued service to the clients of the freight railways, and the provision of rail/rail grade separations are all addressed here.

2.2.6. Track

All costs associated with providing the new high speed track structure from the bottom of the ballast to the top of rail fall under this sub-system. This encompasses provision of new main track and passing and maintenance sidings. The cost of providing access and yard tracks at maintenance shops are included with the shop costs developed under another study. Where the rehabilitation of existing track is considered or required to support the new passenger service, these costs are included here.

In terms of track materials, this sub-system includes rails, ties, ballast, fastenings, other track materials, special track materials for turnouts, switch machines, switch heaters, and bumping posts.

2.2.7. Electrification

This sub-system comprises all costs associated with the electrification of the proposed high speed services. These facilities include the catenary and support structures, electrical sub-stations, and feeder lines from the electrical utilities. Other costs to be included here are any modifications to overhead structures to obtain necessary electrical clearances for the catenary and protection of adjacent signalling and telecommunications systems against electrical interferences.

2.2.8. Stations

This sub-system includes all costs associated with the construction or modification of stations for the high speed rail system. This includes the station building itself as well as providing track-side platforms and their access ways, services and utilities, associated roadways, parking areas, and landscaping. The cost of land, station tracks, and catenary are included in other sub-systems.

The costs presented do not include the provision of equipment or furniture required for railways operations.

2.3. DEFINITION OF SECTORS

The term "sector" is used to designate a category of expenditure within the context of the project. These categories are generally common to all sub-systems. However, some sectors are not applicable to some sub-systems or the level of detail of the estimate has not allowed the particular costs for a sector to be identified separately. This cost estimate has identified the following 5 work sectors¹:

- Professional Services/Project Management
- Equipment/Material
- Transportation/Distribution
- Construction/Installation
- Start-up

Each of the cost items in each sub-system will be allocated to one of the above sectors.

2.3.1. Professional Services/Project Management

This sector covers costs for preliminary engineering, design, construction supervision, and procurement services applicable to each of the sub-systems. In addition, it will cover other specialized services such as legal and professional services for land acquisition and the environmental approval process.

The costs for overall project management are also included in this sector.

2.3.2. Equipment/Material

This would cover the cost of any equipment or materials that could be procured for the project under individual contracts. An example of this is track materials - rail, ties, ballast, etc. - which would likely be purchased directly from the manufacturer. Other examples are materials required for electrification, furnishings for station buildings,

It should be noted that these sectors must not only suit the sub-systems which fall under the terms of reference for this study, but also those of other studies in order that the individual capital cost estimates can be combined into a single comprehensive project estimate.

and/or standard bridge girders that the project might decide to procure from a single fabricator for installation by other contractors.

The level of detail for and approach to this cost estimate developed in a manner that Equipment/Material costs were identified separately for the Right-of-Way Acquisition and Track Sub-systems only.

2.3.3. Transportation/Distribution

The transportation costs for separately purchased equipment and materials should be addressed here and can involve significant amounts of money. An example would be ballast which is purchased in large quantities and can involve transport over long distances.

The development of the cost estimate has resulted in all transportation and distribution costs being included in the cost of the material or its installation.

2.3.4. Construction/Installation

This sector covers the cost of construction contracts using materials purchased as part of the contract (e.g. stations, earthworks) or materials purchased under other contracts (e.g. trackwork).

2.3.5. Start-up

This sector covers additional costs that must be incurred in order to convert the physical assets that have been constructed and put in place into an viable operating transportation system. For example, this might include training of personnel, marketing of the service, and provision of working capital.

These costs do not fall within the scope of the current study.

2.4. GEOGRAPHICAL SEGMENTS

The terms of reference require that the cost estimates present the cost of each of the main city pairs Québec-Montréal, Montréal-Toronto, and Toronto-Windsor and the value of the project constructed in each province. Further instruction from the Project Manager has indicated that the two end segments of the project be evaluated in such a manner that it be possible to treat them as incremental to a core Montréal-Toronto project.

The cost estimates have been further broken down into smaller sub-segments in order to facilitate the development of quantities by each project office involved in the study and to permit flexibility in the analysis of the project by allowing for recombination of sub-segments to evaluate various routing options. The following conditions and/or features along the length of the route have been used as endpoints for geographical sub-segments in developing the quantities for the cost estimates:

- · terminal stations,
- · the point defining facilities east of Montréal,
- · the point defining facilities west of Toronto,
- the Ontario/Québec boundary,
- junctions between new and existing alignments,
- · junctions between alternate route options, and
- the points separating the territory covered by each of the project (study) offices.

Each of the station locations has also been treated as a separate geographical subsegment in order to allow for each station site to be easily included or excluded in the calculation of a total project cost.

Therefore, at the level of greatest detail, the cost estimates comprise the quantities and the associated extensions for all cost items broken down by sub-segment. However, all presentation of costs has been done at the level of the 3 major corridor segments.

2.5. UNIT COSTS AND QUANTITIES

2.5.1. Unit Costs

The unit costs for each of the cost items defined in Appendix A have been developed by the specialists amongst the consultant's team most familiar with that particular element of the overall cost estimate. Appendix B presents, in its first sub-section, a listing of all the unit costs for each of the speed/routing combinations. The second part of Appendix B presents the development of each of the unit costs used in the estimate. This information is in a standardized format, using 1 or 2 pages per unit cost. The pages are ordered according to sub-system, sector, and item number.

The unit costs are based on recent work that has gone to construction or has been designed and estimated by the consultant. In the case of track structure, where there are certain elements that are not typically common to North America (tolerances for rail straightness, use of high speed turnouts, high productivity track construction on account of the great distances, etc.), the consultant has undertaken discussions with potential suppliers to the project.

Although provision was made for varying unit costs amongst the 3 speed/routing combinations, this was only required for tunnels where the cross-sectional area is dependent on train operating speed. All other unit costs are identical between options. Therefore, differences in project costs between these options are almost entirely the result of the different quantities required to provide a functional right-of-way for the speed option being considered.

Unit costs for each cost item are generally identical, regardless of geographical segment, although prudence has been used in applying this generalization. Subballast unit costs for several sub-segments have been modified to be lower than the standard to reflect the availability of surplus rock from cuts which would be used for sub-ballast. Also costs were reduced for some tunnels on the 300 kph alignments where it would be impractical to consider operating trains at their maximum speed.

2.5.2. Quantities

The quantities associated with each of the route and speed options have been developed in the manner described in great detail in the consultant's Interim Report

No. 2. The total quantities calculated for each cost item for each of the project segments are presented in the Detailed Estimates included in Appendices C, D, and E. Detailed estimates by sub-segment are on file with the Consultant as they are too voluminous to include in this report.

Differences in project costs amongst the speed/routing options are, to a large extent, due to gross differences in project lengths, quantities of new/re-used subgrade, etc. However, these differences are also a result of different technical requirements of the two speed options and, consequently, in the way that the quantities were calculated for some of the cost items, such as:

- · Acceptance of level crossings,
- · Tie and ballast quantities for trackwork, and
- The lengths of noise barriers required.

2.6. CONTINGENCY

The issues of contingency and accuracy are closely related in the development of a cost estimate and in the analysis of potential variations to the cost. How they are treated is often a source of confusion when trying to understand a cost estimate. To avoid this situation, the Consultant presents the following explanation of the approach used by the team in applying contingency to the cost estimates.

Contingency can be defined as a provision in the cost estimate for those variations which are <u>likely to occur</u> but which <u>cannot be specifically identified</u> at the time the estimate is prepared. This is true for a fully detailed budget approval estimate. In the case of a "preliminary" estimate for a project, as has been prepared here, the contingency amount must also cover items which can be identified, but whose small relative cost does not warrant their being addressed on an individual basis.

In terms of a mathematical definition, contingency is the amount of money that should be added to the cost estimate in order to provide the Project Manager with a 50/50 probability of having the final project cost being above or below the cost estimate.

To apply the above approach "de rigueur", however, requires a large statistical data base of previous estimates with comparisons to actual constructed costs. As the study does not support such an analysis, we have relied on the judgement of the consultants to estimate appropriate contingencies. However, to facilitate the task, we have provided for contingency estimates within each of the sub-systems. We feel that this approach has allowed specialists to estimate a contingency relative to a specific area of work with which they are familiar and, therefore, has produced an overall contingency which is far more pertinent than a single figure estimated for the project as a whole.

The percentages used for contingency for each sub-system are shown in the detailed estimates. These percentages are the best estimates of the amounts needed to allow for <u>probable variations</u> to the costs estimated by those consultants involved in the development of the unit costs and quantities.

As a last point regarding contingencies, one should note the term <u>probable variations</u> and the definition provided above. These amounts for contingencies are not included to address the question of estimate accuracy. They are provided to give the estimate an equal chance of being overrun as underrun. As such, they represent real costs - though undefined. They must not be excluded in performing the financial or economic analysis.

Although contingencies applied to various sub-systems range from 5 to 30%, a review of the contingency reserve included in the total project costs provided indicates that they represent less than 10%.

KEY ASSUMPTIONS

3.1. BASIC CONDITIONS

Any cost estimate is only valid for the particular conditions under which it was developed. Where the conditions which will apply at the time of implementation are not or can not be known, it is necessary to make assumptions. The basic assumptions relating to this cost estimate are stated clearly in the following paragraphs.

- i) The estimate is based on prices valid in the 1st quarter of 1993 in Canadian dollars. Where prices have been obtained in foreign currencies the rates of exchange used to convert these to Canadian dollars have been indicated in the development of unit costs.
- ii) No allowance has been made for escalation in prices over the period of project implementation. The time required for implementation of the various line segments is discussed in Interim Report N° 4.
- iii) The unit prices developed do not include any federal or provincial taxes, nor import duties.
- iv) The estimate includes identified contingency amounts for physical contingencies, both known and un-known. These contingencies have been estimated for each sub-system/sector combination and are identified as line items in the estimate. As noted in Section 2.6, they represent real costs and must not be excluded in performing the financial or economic analysis.
- v) The estimate assumes that all work project management, design, construction will be contracted to outside parties.
- vi) No allowances have been included for owner-related costs, other than those related to personnel assigned to project management of construction. Costs not addressed might typically include those

- associated with maintaining an organization, training, financing charges, insurance during construction, legal fees, etc.
- vii) Where unit prices include costs for specialized track construction equipment, it is assumed that this equipment will be written off over a complete project from Windsor to Québec.
- viii) Although the estimate includes costs for commissioning the track and electrification sub-systems, no costs are included for hiring and training the operating staff required to run the system.

3.2. POTENTIAL AREAS OF RISK

The basic assumptions above establish certain limits around the cost estimate provided in this report. Although some of the basic assumptions carry large cost implications, they most often establish an understanding as to where a cost will be captured, not whether it need be addressed by the study or not.

However, there are a further set of assumptions that have been made in progressing this study which establish criteria about the type and scope of costs to be included in this estimate. These have such a large potential impact on costs that an incorrect assumption would be equivalent to implementing a major change in the scope of the project and the estimate could no longer be considered valid.

These assumptions which have the potential for leading to major scope variations in the project are described in the paragraphs which follow.

3.2.1. Existing Rights-of-Way

The estimate assumes that the project will be able to use existing railway rights-of-way for the purpose of constructing some segments of the line. This includes situations where the high speed project would completely take over an existing right-of-way and/or where the project would share an existing right-of-way with the current owner.

These assumptions have been based on preliminary discussions with the two national railways. For some segments of lines, the railways' intentions for abandonment have been made evident. However, outright acquisition of other line segments would

require that a settlement be negotiated that is acceptable to the railway and that the railway be able to negotiate a track sharing agreement for its traffic to move over the lines of the other national carrier. Although there has recently been some movement towards track sharing by the railways and a publically announced desire to merge their operations in Eastern Canada, there is still some risk involved in assuming that these rights-of-way will be available. This estimate does not include any allowance for cost variations that may result from these rights-of-way not being available.

It should also be noted that this estimate includes no payment to the railways for occupying portions of their land at locations assuming shared ROW. These payments for land rental will be an operating expense.

3.2.2. Level Crossings

The assumptions regarding level crossings in the estimate are that they will be permitted at speeds up to 200 kph, provided that the automated crossing protection used at crossings above 160 kph incorporate safety measures additional to those currently in use in Canada.² This assumption is based on discussions that have taken place between the Technology Consultant and Transport Canada.

However, there are two areas of risk here. The first is in being able to find a technological solution that fully meets the desired safety objectives of the new regulations that will be developed. The second is that this can be achieved at a reasonable cost. Potential consequences range from higher costs than estimated for crossing protection to the project being faced with the cost of grade separating the planned level crossings.

Comparison of cost figures on sections of the 200+ and 300+ existing rights-of-way options indicate that the additional cost for grade separations could be in the order of \$800 million over the length of the project. Although there is a relatively low risk that a level crossing solution will not be found, the fact that there is a potentially high cost penalty requires that this item be identified as a potential scope variation to the project as estimated.

These security requirements are discussed in the Technology Assessment Report.

It should also be noted that the estimate includes costs for the grade separations to be constructed under the initial project implementation. And, although there is an acceptance of level crossings at speeds up to 200 km/h in some national jurisdictions, these situations often include plans for the future grade separation and elimination of some or all of these level crossings. In addition, the growth of urban areas can lead to conditions which will require grade separation at locations which are initially accepted as level crossings.

Therefore, it is highly probable that some of the level crossings which remain after the initial construction will be grade separated during the life of the projet addressed by the financial evaluation. The cost of this future work has not been included in these estimates. To address this issue, it may be desirable for the financial evaluation to include an amount of \$52 million in the first year of operation for the 200 km/h option as representing the net present value of additional grade separations to be built over the life of the project. This amount would allow for separation of 10% of remaining level crossings over 20 years.

3.2.3. Grade Separations

In assessing the roadways crossing the alignments of the new high speed rail routes, the Consultant has costed all provincial highways as being grade separated. In the case of all other roadways, attempts have been made to identify individual opportunities where lessor roadways might be closed in order to reduce the cost.

However, it has been proposed that it may be possible to close more crossings than identified in this study by applying criteria for closing roads similar to those used in the construction of new highways. The potential for applying such a policy is not clear. Where the new line is constructed along an existing ROW and the public is accustomed to its existing right to pass from one side of the line to the other, it may be difficult to obtain road closures. Also, the benefits accruing to individuals in rural areas are not as readily identifiable for a railway project as for a highway. However, should it be possible to implement this more aggressive strategy for closing roads, the cost savings to the project would be significant.

In addition, funds are included in the estimate to provide grade separated farm crossings for the project. Potential for reducing costs also exists here if it is possible to purchase farmers' rights to crossings for less than the cost of grade separations.

3.2.4. Urban Zones

Quantities and costs within the urban zones along the length of the project have been developed on the basis of trying to obtain the shortest possible travel time for each of the technologies. As such, <u>feasible</u> technical solutions have been applied at all locations to obtain the best running times possible.

However, there are several other factors associated with the question of speed in urban areas which could have an impact on what can be achieved. These are discussed in the following paragraphs.

i) Noise

Assumptions have been made regarding current noise levels and the perception of the noise created by any new service.³ The result is that there are no noise-imposed speed restrictions on the system in the operations analysis. The costing has included some noise attenuation barriers in particularly sensitive locations, however, it has not been possible to evaluate the requirement for additional barriers within the context of this study.

This issue of noise and speed in urban areas, and the public perception of both, requires further study, including identification of local conditions. Although there may be some resistance to trains travelling at high speed in urban areas, it should be noted that the SNCF now penetrate to within 10 km of the center of Paris at maximum TGV speeds. Therefore, the consultant is confident in the potential to achieve the speed conditions projected, although there is a degree of uncertainty with respect to the level of expenditure required for noise mitigation.

ii) Track Sharing

A basic assumption of the study is that safety requirements will allow the high speed trains to use existing tracks with existing traffic up to speeds of 160 kph without restrictions and up to 200 kph with probable application of special conditions concerning track construction, maintenance, and train control.

³ see Interim Report #2 and Technology Assessment Report

However, for the reasons set out in Interim Report #2, the study has provided for building dedicated tracks to the cores of the large urban centers. This has required procurement of land in the urban areas and realignment of existing tracks. These costs are reflected in the estimates.

iii) Cost/Revenue

The cost of the approach used in the urban areas can be a significant portion of the cost of constructing the overall project. To reduce these costs implies an impact on train speed, on overall travel time, and, consequently, ridership and revenue.

Therefore, in summary, this cost estimate represents <u>one</u> of a multiple of possible solutions in the urban areas that offer combinations of noise mitigation measures, track sharing, cost, and revenue. There are very strong probabilities that the optimum solution could be other than that presented here. However, maximizing revenues was a strong priority in this study and the consultant feels that the solutions provided meet this goal. The key point of this discussion, however, is that there is potential for variations in the scope of the work to be done in urban areas. The Consultant has performed an initial evaluation of the potential cost reductions that can be achieved by accepting speed restrictions at certain locations. The results of this evaluation will be included in the Consultant's Interim Report No. 4.

3.2.5. Double Track

The terms of reference require that the main thrust of the study be toward analyzing the construction of a double track high speed railway from one end of the Québec - Windsor corridor to the other. This has been the basis of the estimates presented.

However, a combination of high implementation costs with insufficient ridership and revenue projections may lead to a project which is not financially interesting for one or more of the speed/routing options. Under such conditions, and provided that the operations analysis points to a feasible solution, it may be desirable to construct a single track railway over one or more of the corridor segments.

Such a solution would constitute a major change in scope from the three projects that have been estimated in this report. Section 8 of this report addresses the technical and cost implications of constructing a single track line.

3.2.6. Contaminated Soils and Disposal of Materials

Railway lands have the potential to contain soils contaminated as a result of conditions associated with their historical use. Pollutants may take the form of fuels or toxic chemicals that have entered the soil through leakage in regular use or accidental spills. Although the contamination is usually associated with yard sites, it might have also occurred along the rail lines as well.

In view of this condition, the cost estimate has included an item for performing an audit of railway lands that are assumed to be included in the projet. However, no specific costs have been included to perform a clean-up at contaminated sites. This approach has been used for the following reasons:

- a clear consensus on the probability of finding a contaminated site is not available,
- the potential cost for cleaning up a site is highly variable, depending on contaminants and quantities and therefore very difficult to estimate, and
- the potential liability associated with owning such a site may frustrate negotiations for the transfer of land ownership and require an alternate location be used.

For these reasons, the occurrence of contaminated soils must be considered as a change of scope to the project which could impose costs in the millions of dollars if they must be treated. It should be noted that the potential for encountering such conditions is of course greater on the alignments maximizing use of existing rights-of-way.

In addition to contaminated soils, there has been some indication, particularly by the Province of Ontario, that the off-site removal of certain excess excavated materials may require disposal at "managed sites". Such a condition, which has not been considered in this estimate, could have a significant impact on project costs, particularly in view of disposal costs which were suggested to be as high as \$60/ton for "managed materials". Therefore, the current estimate includes the implicit assumption that, through careful design, it will be possible to dispose of these materials near to their point of excavation or within the confines of the project.

3.2.7. Economics Conditions

The unit prices for general civil construction work have been developed using an overview of the progression of prices over the last five years in order to produce prices which reflect normal economics conditions. To provide an insight into the type of impact that these conditions can have, the Ontario Ministry of Transport indicated that it has experienced a drop of 25% in prices quoted between the time of the construction boom in Ontario and the current recession.

As the prices provided in this report attempt to reflect "typical" conditions, it is evident that there could be a considerable saving in construction costs if the project were constructed under current economic conditions. On the other hand there could be a premium to pay if the awaited economic recovery has brought the construction industry to near-capacity levels of work.

3.2.8. Contracting Strategy

On a project of this magnitude, a key element in limiting the cost of the project will be the application of sound contract management principles. These include:

- ensuring that the design effort is thorough to identify all potential problem areas, ensure that feasible solutions are found during the design stage, and limit costly design changes and delays during construction,
- packaging of contracts to accommodate the capacities of contractors, minimize the amount of coordination required at interfaces, and obtain the maximum amount of standardization of common elements (bridge girders, catenary poles, etc.) throughout the length of the project, and
- close supervision of the work to ensure that it is proceeding in accordance with the schedule, budget, and specifications at all times and that modifications required to put the project back "on plan" are implemented in a timely manner.

Failure to follow these principles closely can easily lead to an escalating condition of project delays and cost overruns. This estimate does not include any allowance for this risk.

4. 200+ km/hr - EXISTING RIGHTS-OF-WAY

The total cost for a 200+ kph high speed railway project covering 1,249 km from Windsor to Québec City and using existing rights-of-way to the greatest extent possible is estimated to be \$6.864 billion. This results in an average cost of \$5.50 million per kilometre. A breakdown of this cost by sub-system and sector is provided in Table 4.1.

The percentage of the total cost allocated to each sub-system is presented in the pie chart in Figure 4.i.

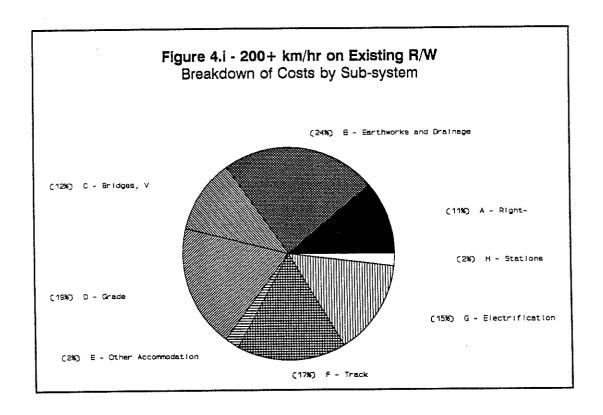


Table 4.1

QUEBEC - WINDSOR CORRIDOR TOTAL technology:

SUMMARY OF TOTAL COSTS

200+, TILTING

Sector Subsystem	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start — up	TOTAL	Contingency reserve included in TOTAL
A - Right-of-way Aquisition	\$51,884,925	\$540,467,973	N/A	N/A	see note c	\$592,352,899	\$57,780,940
B – Earthworks and Drainage	\$289,969,071	N/A	N/A	\$1,309,430,624	see note c	\$1,599,399,694	\$170,795,299
C – Bridges, Viaducts, and Tunnels	\$157,972,204	N/A	N/A	\$959,325,950	see note c	\$1,117,298,154	\$87,211,450
D - Grade Separations	\$158,495,204	N/A	N/A	\$962,502,000	see note c	\$1,120,997,204	\$160,417,000
E - Other Accom- modation works	\$15,545,361	see note a	see note a	\$94,403,116	see note c	\$109,948,477	\$21,785,334
F - Track	\$139,180,782	\$771,736,908	see note b	\$185,955,402	see note c	\$1,096,873,092	\$47,275,154
G - Electrification	\$137,783,131	see note a	see note a	\$836,722,721	see note c	\$974,505,852	\$109,137,746
H - Stations	\$35,810,785	see note a	see note a	\$217,470,000	see note c	\$253,280,785	\$19,770,000
Totals	\$986,641,463	\$1,312,204,881	\$0	\$4,565,809,813	\$0	\$6,864,656,157	\$674,172,923

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 4.2

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	592,353	9
Roadway	route-km	1,248.6	2,264,000	2,826,646	41
Road Crossings	each	736	1,523,000	1,120,997	16
Track & Power Supply	route-km	1,248.6	1,659,000	2,071,379	30
Stations ⁴	each	14	18,091,000	253,281	4

The above component costs include \$98,6 million for environmental impact mitigation measures and studies⁵.

⁴ includes the cost of people mover to access Dorval Airport (\$ 100 million)

Measures include environmental storm water controls, noise-attenuations structures, wildlifepassages, and EMI Mitigation Measures. Environmental Impact Assessment Studies and contaminated soils audits also included.

4.1. WINDSOR - TORONTO

The total cost for a 200+ kph high speed railway project using existing rights-of-way to the greatest extent possible is estimated to be \$2.030 billion. A breakdown of this cost by sub-system and sector is provided in Table 4.4.

The total length of the alignment studied and costed between Windsor and Toronto is 360 km. This comprises 29% of the length of the line between Québec and Windsor. The cost of this segment is also 29% of the project cost. The average costs for the major infrastructure components are as follows:

Table 4.3

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	279,635	14
Roadway	route-km	360	2,260,000	813,470	40
Road Crossings	each	264	1,270,000	335,211	17
Track & Power Supply	route-km	360	1,601,000	576,402	28
Stations	each	3	8,412,800	25,238	1

Table 4.4

SUBSYSTEM/SECTOR O	COST SUMMARY						
WINDSOR - TO	RONTO CORRI	IDOR	200+, TILTIN	G			denderweinderze
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A - Right-of-way Aquisition	\$24,493,603	\$255,141,700	N/A	N/A	see note c	\$279,635,303	\$27,276,967
B – Earthworks and Drainage	\$72,494,731	N/A	N/A	\$306,325,270	see note c	\$378,820,001	\$39,955,470
C – Bridges, Viaducts, and Tunnels	\$50,461,961	N/A	N/A	\$306,442,950	see note c	\$356,904,911	\$27,858,450
D - Grade Separations	\$47,394,727	N/A	N/A	\$287,816,400	see note c	\$335,211,127	\$47,969,400
E - Other Accom- modation works	\$10,992,170	see note a	see note a	\$66,752,719	see note c	\$77,744,890	\$15,404,474
F - Track	\$39,292,144	\$217,507,098	see note b	\$52,742,498	see note c	\$309,541,741	\$13,342,905
G - Electrification	\$37,730,822	see note a	see note a	\$229,129,910	see note c	\$266,860,732	\$29,886,510
H – Stations	\$3,568,399	see note a	see note a	\$21,670,000	see note c	\$25,238,399	\$1,970,000
Totals	\$286,428,558	\$472,6 <u>48,</u> 798	\$0	\$1,270,879,748	see note c	\$2,029,957,104	\$203,664,176

NOTES: a) included in Construction / Installation

b) included in Equipment / Material

c) included in Other Studies

08-Feb-94

02:15:31 PM

4.2. TORONTO - MONTRÉAL

The total cost for a 200+ kph high speed railway project, using existing rights-of-way to the greatest extent possible, is estimated to be \$3.403 billion. A breakdown of this cost by sub-system and sector is provided in Table 4.6.

The total length of the alignment studied and costed between Toronto and Montréal is 616.1 km. This comprises 48% of the length of the line between Québec and Windsor, whereas the cost of this segment is 50% of the project cost. The average costs for the major infrastructure components are as follows:

Table 4.5

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	239,210	7
Roadway	route-km	616.1	2,094,000	1,331,829	39
Road Crossings	each	352	1,740,000	612,430	18
Track & Power Supply	route-km	616.1	1,618,000	1,029,468	30
Stations ⁶	each	7	27,178,000	190,249	6

⁶ total cost includes \$100 million people mover to serve Dorval Airport

Table 4.6

TORONTO - MONTRÉAL ALIGNMENT 200+, TILTING TORONTO - MONTRÉAL							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition	\$20,952,695	\$218,257,243	N/A	N/A	see note c	\$239,209,938	\$23,333,683
B – Earthworks and Drainage	\$154,422,587	N/A	N/A	\$714,165,134	see note c	\$868,587,721	\$93,151,974
C – Bridges, Viaducts, and Tunnels	\$62,417,093	N/A	N/A	\$379,043,500	see note c	\$441,460,593	\$34,458,500
D - Grade Separations	\$86,590,073	N/A	N/A	\$525,840,000	see note c	\$612,430,073	\$87,640,000
E - Other Accom- modation works	\$3,079,464	see note a	see note a	\$18,700,819	see note c	\$21,780,283	\$4,315,574
F - Track	\$69,407,733	\$385,103,211	see note b	\$92,565,850	see note c	\$547,076,794	\$23,577,825
G – Electrification	\$68,204,110	see note a	see note a	\$414,186,616	see note c	\$482,390,726	\$54,024,341
H – Stations	\$26,898,845	see note a	see note a	\$163,350,000	see note c	\$190,248,845	\$14,850,000
Totals	\$491,972,599	\$603,360,453	\$0	\$2,307,851,920	see note c	\$3,403,184,972	\$3 35,351,897

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

4.3. MONTRÉAL - QUÉBEC

The total cost for a 200+ kph high speed railway project using existing rights-of-way to the greatest extent possible is estimated to be \$1.432 billion. A breakdown of this cost by sub-system and sector is provided in Table 4.8.

The total length of the alignment studied and costed between Montréal and Québec is 272.5 km. This comprises 22% of the length of the line between Québec and Windsor, whereas the cost of this segment is 21% of the project cost. The average costs for the major infrastructure components are as follows:

Table 4.7

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of
					Total
Land	lump sum	N/A	N/A	73,508	5
Roadway	route-km	272.5	2,500,000	681,348	48
Road Crossings	each	120	1,445,000	173,356	12
Track & Power Supply	route-km	272.5	1,708,000	465,509	33
Stations	each	4	9,448,000	37,794	2

Table 4.8

SUBSYSTEM/SECTOR (COST SUMMARY						AND THE PROPERTY OF THE PROPER
MONTREAL - Q	UÉBEC CORRI	DOR	200+, TILTIN	G			outropourist-tressummonto
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in 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	\$63,051,753	N/A	N/A	\$288,940,220	see note c	\$ 35 1 ,991,972	\$37,687,855
C - Bridges, Viaducts, and Tunnels	\$45,093,150	N/A	N/A	\$273,839,500	see note c	\$318,932,650	\$24,894, 500
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	\$1,473,727	see note a	see note a	\$8,949,577	see note c	\$10,423,304	\$2,065,287
F - Track	\$30,480,904	\$169,126,599	see note b	\$40,647,053	see note c	\$240,254,557	\$10,354,424
G - Electrification	\$31,848,198	see note a	see note a	\$193,406,195	see note c	\$225,254,393	\$25,226,895
H - Stations	\$5,343,542	see note a	see note a	\$32,450,000	see note c	\$37,793,542	\$2,950,000
Totals	\$208,240,306	\$236,195,630	\$0	\$987,078,146	see note c	\$1,431,514,081	\$135,156,850

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

4.4. PROVINCIAL TOTALS

Tables 4.9 and 4.10 present summary cost estimates for the work to be carried out in Ontario and Québec respectively.

They show that \$2.166 billion or 32% of the total cost of \$6.865 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 \$4.698 billion required for the infrastructure in the Province of Ontario represents 68% of the total cost.

<u>Table 4.9</u>

QUEBEC - WINDSOR (CORRIDOR TOT	AL		-	SUMMARY OF TOTAL COSTS			
technology:				ı	PROVINCE OF	OUÉREC		
200+, TILTING Sector Subsystem	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	\$89,724,641	N/A	N/A	\$402,873,146	see note c	\$492,597,787	\$52,548,671	
C Bridges, Viaducts, and Tunnels	\$80,501,811	N/A	N/A	\$488,867,500	see note c	\$569,369,311	\$44,442,500	
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	\$1,654,468	see note a	see note a	\$10,047,172	see note c	\$11,701,639	\$2,318,578	
F - Track	\$40,069,183	\$222,788,090	see note b	\$53,121,543	see note c	\$315,978,817	\$13,615,836	
G - Electrification	\$40,689,130	see note a	see note a	\$247,094,980	see note c	\$287,784,110	\$32,229,780	
H - Stations	\$23,819,516	see note a	see note a	\$144,650,000	see note c	\$168,469,516	\$13,150,000	
Totals	\$317,692,878	\$292,197,563	\$0	\$1,556,594,341	\$0	\$2,166,484,783	\$200,715,869	

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

Table 4.10

QUEBEC - WINDSOR C	ORRIDOR TOT	AL		\$	SUMMARY O	F TOTAL COS	TS	
technology:								
200+, TILTING					PROVINCE OF ONTARIO			
Sector Subsystem	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start - up	TOTAL	Contingency reserve included in TOTAL	
A – Rìght-of-way Aquisition	\$45,221,616	\$471,058,500	N/A	N/A	see note c	\$516,280,116	\$50,360,436	
B – Earthworks and Drainage	\$200,244,430	N/A	N/A	\$906,557,478	see note c	\$1,106,801,907	\$118,246,628	
C – Bridges, Viaducts, and Tunnels	\$77,470,393	N/A	N/A	\$470,458,450	see note c	\$547,928,843	\$42,768,950	
D - Grade Separations	\$123,924,385	N/A	N/A	\$752,562,000	see note c	\$876,486,385	\$125,427,000	
E – Other Accom– modation works	\$13,890,893	see note a	see note a	\$84,355,944	see note c	\$98,246,838	\$19,466,756	
F – Track	\$99,111,598	\$548,948,818	see note b	\$132,833,859	see note c	\$780,894,275	\$33,659,31 8	
G - Electrification	\$97,094,000	see note a	see note a	\$589,627,741	see note c	\$686,721,741	\$76,907,966	
H - Stations	\$11,991,269	see note a	see note a	\$72,820,000	see note c	\$84,811,269	\$6,620,000	
Totals	\$668,948,584	\$1,020,007,318	\$0	\$3,009,215,472	\$0	\$4,698,171,374	\$473,457,054	

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

5. 300+ km/hr - EXISTING RIGHTS-OF-WAY

The total cost for a 300+ kph high speed railway project covering 1,211 km from Windsor to Québec City and using existing rights-of-way to the greatest extent possible is estimated to be \$7.824 billion. This results in an average cost of \$ 6.46 million per kilometre. A breakdown of this cost by sub-system and sector is provided in Table 5.1.

The percentage of the total cost allocated to each sub-system is presented in the pie chart in Figure 5.i.

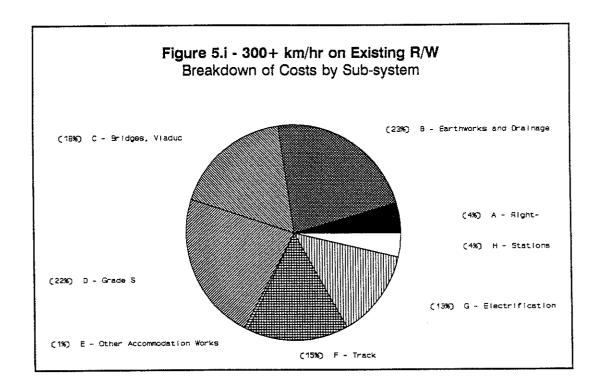


Table 5.1

QUEBEC - WINDSOR CORRIDOR TOTAL

SUMMARY OF TOTAL COSTS

technology:

300+, EXISTING ROW

<u>Se</u> Subsystem	etor Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start up	TOTAL	Contingency reserve included in TOTAL
A — Right-of-way Aquisition	\$57,672,772	\$600,758,046	N/A	N/A	see note c	\$658,430,818	\$6 4,226,497
B — Earthworks and Drainage	\$315,680,170	N/A	N/A	\$1,402,737,030	see note c	\$1,718,417,200	\$182,965,700
C – Bridges, Viaducts, and Tunnels	\$175,077,152	N/A	N/A	\$1,063,200,050	see note c	\$1,238,277,202	\$96,654,550
D - Grade Separations	\$271,506,735	N/A	N/A	\$1,648,792,950	see note c	\$1,920,299,685	\$215,059,950
E – Other Accom– modation works	\$16,861,718	see note a	see note a	\$102,397,023	see note c	\$119,258,741	\$23,630,082
F - Track	\$137,384,985	\$767,721,877	see note b	\$179,528,196	see note c	\$1,084,635,058	\$46,720,158
G - Electrification	\$130,884,794	see note a	see note a	\$794,830,838	see note c	\$925,715,632	\$103,673,588
H - Stations	\$22,406,647	see note a	see note a	\$136,070,000	see note c	\$158,476,647	\$12,370,000
Totals	\$1,127,474,974	\$1,368,479,923	\$0	\$5,327,556,085	\$0	\$7 ,823,510,982	\$745 ,300,524

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

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

Table 5.2

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of
					Total
Land	lump sum	N/A	N/A	658,430	8
Roadway	route-km	1,211	2,540,000	3,075,953	39
Road Crossings	each	668	2,875,000	1,920,300	25
Track & Power Supply	route-km	1,211	1,660,000	2,010,351	26
Stations	each	14	11,320,000	158,477	2

The above component costs include \$130 million for environmental impact mitigation measures and studies.

5.1. WINDSOR - TORONTO

The total cost for a 300+ kph high speed railway project using existing rights-of-way to the greatest extent possible is estimated to be \$2.424 billion. A breakdown of this cost by sub-system and sector is provided in Table 5.4.

The total length of the alignment studied and costed between Windsor and Toronto is 365 km. This comprises 30% of the length of the line between Québec and Windsor, whereas the cost of this segment is 31% of the project cost. The average costs for the major infrastructure components are as follows:

Table 5.3

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	322,670	13
Roadway	route-km	365	2,590,000	945,220	39
Road Crossings	each	189	2,892,000	546,539	23
Track & Power Supply	route-km	365	1,602,000	584,593	24
Stations	each	3	8,413,000	25,238	1

Table 5.4

SUBSYSTEM/SECTOR C		IDOR :	300+, EXISTI	NG ROW			
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A — Right—of—way Aquisition	\$28,263,101	\$294,407,300	N/A	N/A	see note c	\$322,670,401	\$31,474,817
B – Earthworks and Drainage	\$84,428,418	N/A	N/A	\$352,880,950	see note c	\$437,309,368	\$46,027,950
C - Bridges, Viaducts, and Tunnels	\$60,727,628	N/A	N/A	\$368,783,800	see note c	\$429,511,428	\$33,525,800
D - Grade Separations	\$77,273,958	N/A	N/A	\$469,265,550	see note c	\$546,539,508	\$61,208,550
E - Other Accom- modation works	\$11,084,670	see note a	see note a	\$67,314,447	see note c	\$78,399,118	\$15,534,103
F - Track	\$40,285,248	\$224,663,613	see note b	\$52,951,011	see note c	\$317,899,872	\$13,695,494
G - Electrification	\$37,707,151	see note a	see note a	\$228,986,160	see note c	\$266,693,311	\$29,867,760
H - Stations	\$3,568,399	see note a	see note a	\$21,670,000	see note c	\$25,238,399	\$1,970,000
Totals	\$343,338,573	\$519,070,913	\$0	\$1,561,851,919	see note c	\$2,424,261,404	\$233,304,474

NOTES: a) included in Construction / Installation

b) included in Equipment / Material

5.2. TORONTO - MONTRÉAL

The total cost for a 300+ kph high speed railway project using existing rights-of-way, is estimated to be \$3.996 billion. A breakdown of this cost by sub-system and sector is provided in Table 5.6.

The total length of the alignment studied and costed between Toronto and Montréal is 591.1 km. This comprises 49% of the length of the line between Québec and Windsor, whereas the cost of this segment is 51% of the project cost. The average costs for the major infrastructure components are as follows:

Table 5.5

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	271,224	7
Roadway	route-km	591.1	2,692,000	1,591,217	40
Road Crossings	each	366	2,775,000	1,015,678	25
Track & Power Supply	route-km	591.1	1,715,000	1,013,678	25
Stations	each	8	2,972,000	103,772	3

Table 5.6

SUBSYSTEM/SECTOR (_						
TORONTO - MC	Professional Serv./ Proj. Management	Equipment/	Transportation/	Construction/	TORONTO — MC 	TOTAL	Contingency reserve included ir TOTAL
A - Right-of-way Aquisition	\$23,756,855	\$247,467,243	N/A	N/A	see note c	\$271,224,098	\$26,456,498
B – Earthworks and Drainage	\$170,418,455	N/A	N/A	\$772,515,818	see note c	\$942,934,273	\$100,762,93 3
C – Bridges, Viaducts, and Tunnels	\$87,284,033	N/A	N/A	\$530,054,250	see note c	\$617,338,283	\$48,186 ₁ 750
D - Grade Separations	\$143,604,384	N/A	N/A	\$872,073,750	see note c	\$1,015,678,134	\$113,748,750
E - Other Accom- modation works	\$4,375,171	see note a	see note a	\$26,569,324	see note c	\$30,944,495	\$6,131,382
F - Track	\$69,089,825	\$387,099,143	see note b	\$89,593,375	see note c	\$545,782,342	\$23,504,616
G - Electrification	\$66,154,714	see note a	see note a	\$401,741,144	see note c	\$467,895,858	\$52,401,019
H - Stations	\$14,672,097	see note a	see note a	\$89,100,000	see note c	\$103,772,097	\$8,100,000
Totals	\$579,355,534	\$634,566,386	\$0	\$2,781,647,660	see note c	\$3,995,569,581	\$379,291,94

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

5.3. MONTRÉAL - QUÉBEC

The total cost for a 300+ kph high speed railway project using existing rights-of-way to the greatest extent possible is estimated to be \$1.404 billion. A breakdown of this cost by sub-system and sector is provided in Table 5.8.

The total length of the alignment studied and costed between Montréal and Québec is 255.1 km. This comprises 21% 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 5.7

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	49,729	5
Roadway	route-km	255.1	2,115,000	539,516	38
Road Crossings	each	113	3,169,000	358,082	26
Track & Power Supply	route-km	255.1	1,615,000	412,079	29
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 \$212 million. It includes a 2.6 km long tunnel costing \$91 million.

Table 5.8

SUBSYSTEM/SECTOR (COST SUMMARY						
MONTREAL - Q	<u>UÉBEC CORRI</u>	DOR	300+, EXISTI	NG ROW			Anna Maria Anna Anna Anna Anna Anna Anna Anna An
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start - up	TOTAL	Contingency reserve included in TOTAL
A - Right-of-way Aquisition	\$5,652,816	\$58,883,503	N/A	N/A	see note c	\$64,536,319	\$6,295,183
B – Earthworks and Drainage	\$60,833,297	N/A	N/A	\$277,340,262	see note c	\$338,173,559	\$36,174,817
C - Bridges, Viaducts, and Tunnels	\$27,065,491	N/A	N/A	\$164,362,000	see note c	\$191,427,491	\$14,942,000
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	\$28,009,913	\$155,959,121	see note b	\$36,983,810	see note c	\$220,952,843	\$9,520,048
G - Electrification	\$27,022,929	see note a	see note a	\$164,103,534	see note c	\$191,126,463	\$21,404,809
H – Stations	\$4,166,151	see note a	see note a	\$25,300,000	see note c	\$29,466,151	\$2,300,000
Totals	\$204,780,866	\$214,842,624	\$0	\$984,056,506	see note c	\$1,403,679,996	\$132,704,102

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

5.4. PROVINCIAL TOTALS

Tables 5.9 and 5.10 present summary cost estimates for the work to be carried out in Ontario and Québec respectively.

They show that \$2.061 billion or 26% of the total cost of \$7.824 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 \$5.763 billion required for the infrastructure in the Province of Ontario represents 74% of the total cost.

<u>Table 5.9</u>

QUEBEC - WINDSOR	CORRIDOR TOT	AL		9	SUMMARY OF	TOTAL COS	TS
technology:					PROVINCE OF Q	NÉBEC	
300+, EXISTING ROW Secto Subsystem	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A — Right—of—way Aquisition	\$7,701,137	\$80,220,177	N/A	N/A	see note c	\$87,921,314	\$8,576,266
B — Earthworks and Drainage	\$85,704,378	N/A	N/A	\$385,310,300	see note c	\$471,014,678	\$50,257,865
C — Bridges, Viaducts, and Tunnels	\$52,101,341	N/A	N/A	\$316,398,500	see note c	\$368,499,841	\$28,763,500
D - Grade Separations	\$65,485,834	N/A	N/A	\$397,679,200	see note c	\$463,165,034	\$51,871,200
E - Other Accom- modation works	\$1,510,955	see note a	see note a	\$9,175,654	see note c	\$10,686,609	\$2,117,459
F - Track	\$39,312,642	\$220,221,061	see note b	\$51,007,335	see note c	\$310,541,038	\$13,373,925
G - Electrification	\$38,916,570	see note a	see note a	\$236,330,664	see note c	\$275,247,234	\$30,825,739
H - Stations	\$10,415,378	see note a	see note a	\$63,250,000	see note c	\$73,665,378	\$5,750,000
Totals	\$301,148,235	\$300,441,238	\$0	\$1,459,151,653	\$0	\$2,060,741,126	\$191,535,954

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

Table 5.10

QUEBEC - WINDSOR C	ORRIDOR TOT	AL		<u> </u>	SUMMARY OF	F TOTAL COS	TS
technology:	-			_			
300+, EXISTING ROW					PROVINCE OF	ONTARIO	
Sector Subsystem	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A - Right-of-way Aquisition	\$49,971,635	\$520,537,868	N/A	N/A	see note c	\$570,509,504	\$55 ,650,230
B – Earthworks and Drainage	\$229,975,792	N/A	N/A	\$1,017,426,729	see note c	\$1,247,402,521	\$132,707,834
C – Bridges, Viaducts, and Tunnels	\$122,975,811	N/A	N/A	\$746,801,550	see note c	\$869,777,361	\$67,891,050
D - Grade Separations	\$206,020,901	N/A	N/A	\$1,251,113,750	see note c	\$1,457,134,651	\$163,188,75 0
E - Other Accom- modation works	\$15,350,763	see note a	see note a	\$93,221,369	see note c	\$108,572,131	\$21,512,624
F - Track	\$98,072,343	\$547,500,816	see note b	\$128,520,860	see note c	\$774,094,019	\$33,346,233
G - Electrification	\$91,968,224	see note a	see note a	\$558,500,174	see note c	\$650,468,397	\$72,847,849
H - Stations	\$11,991,269	see note a	see note a	\$72,820,000	see note c	\$84,811,269	\$6,620,000
Totals	\$826,326,739	\$1,068,038,684	\$0	\$3,868,404,432	\$0	\$5,762,769,8 55	\$553,764,570

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

6. 300+ km/hr - NEW RIGHTS-OF-WAY

The total cost for a 300+ kph high speed railway project covering 1,245 km from Windsor to Québec City and using new rights-of-way to the greatest extent possible is estimated to be \$9.506 billion. This results in an average cost of \$7.63 million per kilometre. A breakdown of this cost by sub-system and sector is provided in Table 6.1.

The percentage of the total cost allocated to each sub-system is presented in the pie chart in Figure 6.i.

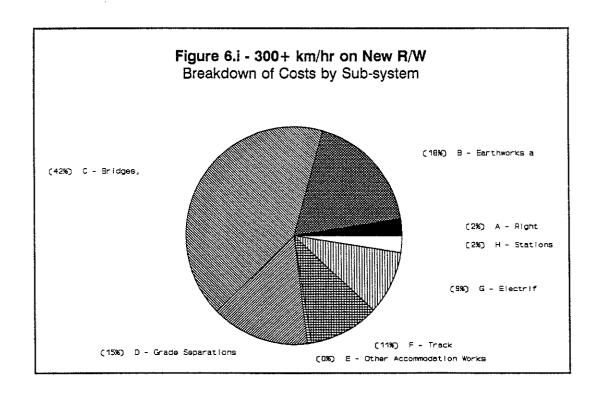


Table 6.1

SUMMARY OF TOTAL COSTS QUEBEC - WINDSOR CORRIDOR TOTAL technology: 300+. NEW ROW Contingency Prof. Services / Transportation / Construction / reserve included Sector Equipment / Proj. Management Material distribution Installation Start - up TOTAL in TOTAL Subsystem A - Right-of-way \$46,317,145 Aquisition \$41.590.906 \$433,238,603 N/A N/A see note c \$474.829.509 B - Earthworks and N/A N/A \$1,583,393,594 see note c \$1,946,778,667 \$206,529,599 Drainage \$363,385,073 C – Bridges, Viaducts. N/A see note c \$2,531,315,324 \$197,583,500 and Tunnels \$357,896,824 N/A \$2,173,418,500 N/A \$1.936.887.789 \$216,917,700 D - Grade Separations \$273,852,089 N/A \$1,663,035,700 see note c F - Other Accom-\$154,762,577 \$30,664,859 modation works \$21,881,523 see note a see note a \$132,881,054 see note c \$1,118,081,433 \$48,158,781 F - Track \$141,603,249 \$791,740,254 see note b \$184,737,929 see note c \$812,606,215 see note c \$946,418,080 \$105,992,115 \$133,811,865 see note a see note a G - Electrification \$396,768,129 \$30,970,000 \$56,098,129 see note a \$340,670,000 see note c H - Stations see note a \$883,133,699 \$1,224,978,858 \$0 \$6,890,742,992 \$9,505,841,509 \$1,390,119,659 Totals

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

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

Table 6.2

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	474,830	4
Roadway	route-km	1,245.4	3,720,000	4,632,857	51
Road Crossings	each	645	3,003,000	1,936,888	21
Track & Power Supply	route-km	1,245.4	1,658,000	2,064,500	22
Stations ⁷	each	15	26,451,000	396,768	2

The above component costs include \$111.8 million for environmental impact mitigation measures and studies.

⁷ includes \$230 million for a people mover at Pearson Airport

6.1. WINDSOR - TORONTO

The total cost for a 300+ kph high speed railway project using new rights-of-way to the greatest extent possible is estimated to be \$2.634 billion. A breakdown of this cost by sub-system and sector is provided in Table 6.4.

The total length of the alignment studied and costed between Windsor and Toronto is 375 km. This comprises 30% of the length of the line between Québec and Windsor, whereas the cost of this segment is 28% of the project cost. The average costs for the major infrastructure components are as follows:

Table 6.3

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	207,958	8
Roadway	route-km	375	2,405,000	901,970	34
Road Crossings	each	208	3,172,000	659,724	25
Track & Power Supply	route-km	375	1,603,000	601,310	23
Stations ⁸	each	4	65,882,000	263,530	10

⁸ includes \$230 million for a people mover at Pearson Airport

08-Feb-94

SUBSYSTEM/SECTOR COST SUMMARY	SOST SUMMARY						
WINDSOR - TORONTO CORRIDOR	RONTO CORR		300+, NEW ROW	MO			
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start - up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition	\$18,215,261	\$189,742,300	N/A	N/A	see note c	\$207,957,561	\$20,285,177
B – Earthworks and Drainage	\$96,299,595	N/A	N/A	\$411,708,165	see note c	\$508,007,760	\$53,701,065
C - Bridges, Viaducts, and Tunnels	\$42,626,517	N/A	N/A	\$258,860,250	see note c	\$301,486,767	\$23,532,750
D - Grade Separations	\$93,276,902	N/A	N/A	\$566,447,450	see note c	\$659,724,352	\$73,884,450
E - Other Accom- modation works	\$13,074,833	see note a	see note a	\$79,400,211	see note c	\$92,475,043	\$18,323,126
F – Track	\$42,061,242	\$234,967,397	see note b	\$55,014,672	see note c	\$332,043,312	\$14,302,962
G – Electrification	\$38,071,007	see note a	see note a	\$231,195,770	see note c	\$269,266,777	\$30,155,970
H - Stations	\$37,259,881	see note a	see note a	\$226,270,000	see note c	\$263,529,881	\$20,570,000
Totals	\$380,885,238	\$424,709,697	\$0	\$1,828,896,518	see note c	\$2,634,491,453	\$254,755,499

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

6.2. TORONTO - MONTRÉAL

The total cost for a 300+ kph high speed railway project using new rights-of-way to the greatest extent possible is estimated to be \$5.431 billion. A breakdown of this cost by sub-system and sector is provided in Table 6.6.

The total length of the alignment studied and costed between Toronto and Montréal is 613.0 km. This comprises 49% of the length of the line between Québec and Windsor, whereas the cost of this segment is 57% of the project cost. The average costs for the major infrastructure components are as follows:

Table 6.5

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	213,084	4
Roadway	route-km	613.0	5,100,000	3,126,595	58
Road Crossings	each	334	2,821,000	942,117	17
Track & Power Supply	route-km	613.0	1,705,000	1,045,124	19
Stations	each	8	12,972,000	103,772	2

Table 6.6

SUBSYSTEM/SECTOR (COST SUMMARY	110 110 110 110 110 110 110 110 110 110					
TORONTO - MC	NTRÉAL ALIGI	<u>NMENT</u>	300+, NEW F	ROW	TORONTO - MO	ONTRÉAL	WE OF THE PROPERTY OF THE PROP
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition	\$18,664,318	\$194,419,975	N/A	N/A	see note c	\$213,084,292	\$20,785,26
B – Earthworks and Drainage	\$203,304,073	N/A	N/A	\$878,814,814	see note c	\$1,082,118,887	\$114,628,019
C – Bridges, Viaducts, and Tunnels	\$281,538,975	N/A	N/A	\$1,709,716,250	see note c	\$1,991,255,225	\$155,428,750
D - Grade Separations	\$133,203,778	N/A	N/A	\$808,913,450	see note c	\$942,117,228	\$105,510,450
E - Other Accom- modation works	\$7,524,806	see note a	see note a	\$45,696,280	see note c	\$53,221,086	\$10,545,295
F - Track	\$71,120,904	\$398,311,251	see note b	\$92,340,882	see note c	\$561,773,037	\$24,194,045
G - Electrification	\$68,339,927	see note a	see note a	\$415,011,396	see note c	\$483,351,323	\$54,131,92°
H – Stations	\$14,672,097	see note a	see note a	\$89,100,000	see note c	\$103,772,097	\$8,100,000
Totals	\$798,368,877	\$592,731,226	\$0	\$4,039,593,072	see note c	\$5,430,693,175	\$493,323,743

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

6.3. MONTRÉAL - QUÉBEC

The total cost for a 300+ kph high speed railway project using new rights-of-way to the greatest extent possible is estimated to be \$1.441 billion. A breakdown of this cost by sub-system and sector is provided in Table 6.8.

The total length of the alignment studied and costed between Montréal and Québec is 257.4 km. This comprises 21% of the length of the line between Québec and Windsor, whereas the cost of this segment is 15% of the project cost. The average costs for the major infrastructure components are as follows:

Table 6.7

Component	Units	#	Average Cost	Total Cost (\$ 000)	% of Total
Land	lump sum	N/A	N/A	53,788	4
Roadway	route-km	257.4	2,348,000	604,292	42
Road Crossings	each	103	3,253,000	335,046	23
Track & Power Supply	route-km	257.4	1,624,000	418,065	29
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 \$212 million. It includes a 2.6 km long tunnel costing \$91 million.

Table 6.8

SUBSYSTEM/SECTOR O	COST SUMMARY					The second secon	
MONTREAL – QUÉBEC CORRIDOR 300+, NEW ROW							
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start - up	TOTAL	Contingency reserve included ir TOTAL
A – Right-of-way Aquisition	\$4,711,328	\$49,076,328	N/A	N/A	see note c	\$53,787,656	\$5,246,706
B – Earthworks and Drainage	\$63,781,405	N/A	N/A	\$292,870,615	see note c	\$356,652,020	\$38,200,515
C - Bridges, Viaducts, and Tunnels	\$33,731,332	N/A	N/A	\$204,842,000	see note c	\$238,573,332	\$18,622,000
D - Grade Separations	\$47,371,409	N/A	N/A	\$287,674,800	see note c	\$335,046,209	\$37,522,800
E - Other Accom- modation works	\$1,281,884	see note a	see note a	\$7,784,564	see note c	\$9,066,448	\$1,796,438
F – Track	\$28,421,103	\$158,461,606	see note b	\$37,382,375	see note c	\$224,265,084	\$9,661,774
G Electrification	\$27,400,931	see note a	see note a	\$166,399,049	see note c	\$193,799,980	\$21,704,224
H - Stations	\$4,166,151	see note a	see note a	\$25,300,000	see note c	\$29,466,151	\$2,300,000
Totals	\$210,865,544	\$207,537,934	\$0	\$1,022,253,403	see note c	\$1,440,656,880	\$135,054,456

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

6.4. PROVINCIAL TOTALS

Tables 6.9 and 6.10 present summary cost estimates for the work to be carried out in Ontario and Québec respectively.

They show that \$3.786 billion or 40% of the total cost of \$9.506 billion for the 300+ km/hr high speed rail project, using new rights-of-way to the greatest extent possible, covers the cost of infrastructure constructed in the Province of Québec. The balance of \$5.720 billion required for the infrastructure in the Province of Ontario represents 60% of the total cost.

Table 6.9

QUEBEC - WINDSOR CORRIDOR TOTAL **SUMMARY OF TOTAL COSTS** technology: PROVINCE OF QUÉBEC 300+, NEW ROW Contingency Transportation / Construction / reserve included Prof. Services / Equipment / Sector Material distribution Installation Start - up TOTAL in TOTAL Proi. Management Subsystem A - Right-of-way \$79,731,007 \$87.385.184 \$8,523,970 **Aguisition** \$7,654,177 N/A N/A see note c B - Earthworks and \$133,008,142 N/A N/A \$559.890.719 \$692,898,861 \$73,029,224 Drainage see note c C – Bridges, Viaducts. and Tunnels \$222,710,659 N/A N/A \$1,352,466,500 see note c \$1,575,177,159 \$122,951,500 \$555,041,832 \$62,160,750 D - Grade Separations \$78,476,082 N/A N/A \$476,565,750 see note c E - Other Accom-\$2,909,300 \$14.682.956 modation works \$2,075,989 see note a see note a \$12,606,967 see note c \$68,386,054 \$416,531,382 \$17,938,368 \$295,416,645 see note b see note c F - Track \$52,728,683 \$40,090,118 \$307.357.568 see note c \$357,970,138 G - Electrification \$50,612,571 see note a see note a \$74,250,000 see note c \$86,476,748 \$6,750,000 H - Stations \$12,226,748 see note a see note a \$3,786,164,259 \$334,353,229 Totals \$559,493,050 \$375,147,652 \$2,851,523,557

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

Table 6.10

QUEBEC - WINDSOR	SUMMARY OF TOTAL COSTS						
technology:							
300+, NEW ROW			PROVINCE OF ONTARIO				
<u>Sector</u> Subsystem	Prof. Services / Proj. Management	Equipment / Material	Transportation / distribution	Construction / Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right–of–way Aquisition	\$33,936,729	\$353,507,596	N/A	N/A	see note c	\$387,444,325	\$37,793,176
B – Earthworks and Drainage	\$230,376,931	N/A	N/A	\$1,023,502,875	see note c	\$1,253,879,806	\$133,500,375
C - Bridges, Viaducts, and Tunnels	\$135,186,166	N/A	N/A	\$820,952,000	see note c	\$956,138,166	\$74,632,000
D - Grade Separations	\$195,376,007	N/A	N/A	\$1,186,469,950	see note c	\$1,381,845,957	\$154,756,95 0
E - Other Accom- modation works	\$19,805,534	see note a	see note a	\$120,274,087	see note c	\$140,079,621	\$27,755,559
F - Track	\$88,874,566	\$496,323,610	see note b	\$11 6,351,875	see note c	\$701,550,051	\$30,220,413
G - Electrification	\$83,199,295	see note a	see note a	\$505,248,648	see note c	\$588,447,942	\$65,901,998
H - Stations	\$43,871,381	see note a	see note a	\$266,420,000	see note c	\$310,291,381	\$24,220,000
Totals	\$830,626,609	\$849,831,205	\$0	\$4,039,219,435	\$0	\$5,719,677,249	\$548,780,470

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material

7. ESTIMATE ACCURACY

7.1. GENERAL

This evaluation of the overall accuracy of this cost estimate is built up from assessments of the accuracy of the costs in each sub-system which are based on the experience and judgement of our individual consultants in each of their specializations.

When properly stated, an evaluation of the accuracy of a cost estimate should define a probability that the actual cost of the project will fall within a certain confidence limit of the estimated cost. (eg. there is a 90% probability that the final cost will be within $\pm 30\%$ of the estimate). However, it is more common to think of estimate accuracy in a manner which only addresses the confidence limit (possible range of the final cost) without specifying a probability (i.e. - a cost is accurate to \pm X%).

The assessments of accuracy for each sub-system were formulated along the second approach. In order to take these individual assessments by sub-system and combine them into an assessment of the accuracy of the overall cost estimate (including a statement regarding the probability of achieving the confidence limits), we have elected to use a "Monte Carlo" type analysis.

In a Monte Carlo analysis a probability density function is used to randomly generate component costs for the estimate. The component costs are then combined to produce a "possible" total project cost. Through repetition of this process, the analysis generates a "population" of possible total project costs. This population can then be analyzed to obtain a mean value and the characteristics of its distribution. These characteristics then allow us to state the accuracy of the total cost as a probability that the actual cost will fall within a specified confidence limit.

Performing this Monte Carlo analysis has required that the Consultant make the following 3 assumptions:

• that the cost estimates produced for the individual sub-systems are independent of each other,

- that the probability density function for the actual costs with respect to the estimated cost for any sub-system and/or the overall project cost would follow a "normal" distribution about the base estimate, and
- that the probability of sub-system costs falling within the ranges estimated by the consultants is approximately 2 times in 38.

7.2. SUB-SYSTEM ACCURACY

The assessment of the overall accuracy of this cost estimate has been built upon the anticipated accuracy for the costs developed within each of the sub-systems. The following table presents the level of accuracy as estimated by the specialists developing the unit costs and quantities.

Table 7.1

Sub-system	Estimated Accuracy			
A - Right-of-Way Acquisition	25 %			
B - Earthworks and Drainage	35 %			
C - Bridges, Viaducts, and Tunnels	15 %			
D - Grade Separations	15 %			
E - Other Accommodation Works	50 %			
F - Track	10 %			
G - Electrification	15 %			
H - Stations	20 %			

The accuracy of a cost estimate can be a function of several different factors. These may include the volatility of prices in the marketplace, the level of detail used in establishing quantities and unit costs, and whether the type of work being considered is common or rare.

To a certain extent, many of the potential sources for variation in this cost estimate have been limited through assumptions (Section 3) governing the costing process or in the approach to the study. Examples of this follow:

This assumption establishes a probability density function for the confidence limits proposed by the consultants for each sub-system. It is considered to be fairly conservative as it accepts the possibility of the estimate falling outside the range estimated by the consultant as often as 1 time in 3. These conditions are equivalent to a "normalized" standard deviation of 1.

- The consultant has been directed to use 1993 costs with no allowance for escalation over the duration of the project. As a result, our assessment of estimate accuracy need not account for inaccuracies in the evaluation of future levels of inflation. Presumably, this will be addressed through sensitivity analyses in the financial and economic evaluations.
- The screening process used in the first phase of our work has helped to limit the potential for variation in the length of each of the alignments. There is a variation of 22.6 km between the three speed/routing options. This is equivalent to a variation of less than 2%. In view of this, the potential for variation within any of the three options must be less. This potential for variations in length has a direct and proportional impact on cost for many sub-systems R/W Acquisition, Earthworks, Track, Electrification.

In addition to the factors which have an impact on the accuracy of all sub-systems, there are differences in how the costs and quantities have been developed within each. These differences have produced the different accuracies in the above table. The subsequent paragraphs provide a short description of these additional factors affecting accuracy.

7.2.1. Right-of-Way Acquisition

Land quantities have been determined from ROW widths projected from the design hypotheses used. These have been defined in Interim Report No. 2. There is potential for variation in these quantities on account of the necessity to make assumptions about ROW widths over long lengths of the line.

The wide variation in land costs according to location and additional allowances for buildings and disruption damages along the proposed routes precluded the use of a single set of unit costs for the various land types in this sub-system. Multiplication factors were applied to land costs to account for the costs of buildings which might exist on the land as well as for damages to be paid for disruption to existing land owners. In view of the above, Right-of-Way sub-system accuracy is judged to be in the order of ±25%.

7.2.2. Earthworks and Drainage

The two primary elements influencing the cost of sub-items falling under this subsystem are the quantities of each sub-item and the unit cost adopted for the cost calculation. The factors affecting the accuracy of the former, quantities, will be discussed first.

One of the major sub-items in the earthworks category is roadbed preparation, required prior to construction of embankments or sub-ballast layers in cuts. The various types of roadbed preparation assumed, have been based on practices adopted for high speed lines in Europe. Hence, they are considered to be a reasonably accurate representation of the extent of removal, replacement, and compaction required. Since the need for each type of preparation is a function of the existing ground condition over which the alignment passes, the accuracy of the quantities depends on an assessment of these ground conditions. For this feasibility study three categories of ground condition quality were defined and, using geological mapping, the extent of each condition along the route alignment was assessed. This mapping interpretation is the first area with potential for inaccuracy and given that the routes could only be plotted at large scale, the assessment can only be considered a reasonable approximation.

The second major earthworks sub-item is the construction of embankments and cuts themselves. Quantities of each are derived from the track profile developed for each route and a representation of the existing ground elevation along it. The latter could only be approximated from available contour mapping, most of which was based on a 10 metre contour interval requiring significant interpolation. Consequently some inaccuracy must be expected. The other area necessitating interpretation, is the breakdown of the total volume of earth excavated for cuts, into rock and soft material classifications. This breakdown also relied on the large scale geological mapping for depth to rock estimations. Thus, it was only possible to approximate the distribution of material type.

Drainage sub-items make up a smaller part of the total sub-system cost. To reflect a reasonable cost for general right-of-way drainage, a typical design was developed and costed for a 1 km length of route. Quantities of major drainage structures were estimated from interpretation of the large scale topographical mapping. While this approach to estimation of drainage requirements, can only be an approximation, it is believed to be accurate to within 25-30%.

The quantities for the selected sub-ballast layers can be determined with accuracy as they are based on a constant cross-section applied over a route length which can be measured reasonably accurately. Similarly, security fencing quantities are also derived from known route lengths.

As noted earlier, the other major element affecting the accuracy of the earthworks and drainage cost is the unit price assumed for each sub-item. The prices used are considered to be representative of the likely tender prices for contracts in a high speed rail project as they were obtained from actual contracts for large scale highway earthworks currently in progress. Further confirmation of the appropriateness of the unit prices was provided by a generally favourable review by the contract department of the Ontario Ministry of Transportation. One factor which could influence the accuracy of the unit prices is the very competitive pricing prevalent in the civil construction industry at the moment. A different pricing environment when high speed rail is implemented could increase prices.

Given the potential for significant variability in quantities and to some extent prices, the overall accuracy of the earthworks and drainage sub-system is assessed as plus or minus 35%.

7.2.3. Bridges, Viaducts, and Tunnels

As with the earthworks and drainage sub-system, the overall accuracy of the estimate for this structural subsystem is a function of the method for determining quantities and the use of realistic, current unit prices representative of the bridge and tunnel work for a megaproject such as the high speed rail system.

The mapping used to develop alignment has permitted a reasonably accurate assessment of the number of river bridges or viaducts required since most creeks and rivers of varying size are shown on the mapping used. It is in the estimation of the length and to a lesser extent, the height of the structures that uncertainty could occur in the quantity calculations. Although a track profile of each representative route was prepared, the lack of mapping with a small contour interval to define river valley topography necessitated some approximation in estimating bridge or viaduct lengths.

In the case of tunnels, the greatest uncertainty lies in the types of ground through which the tunnels are constructed. Detailed information is essential to estimate

tunnelling cost with precision, as unit costs vary considerably with different types of ground conditions. For the tunnelling locations identified, rock conditions were assumed, consequently costs may be under-estimated if soft or variable ground conditions actually occur at the proposed tunnel sites.

Unit prices for bridges and viaducts were estimated from prices obtained in contracts for bridges of a similar size and type to those required for high speed rail tracks. Since these prices do not fully reflect the benefits of large volume, standardized bridge building, as would be possible in a high speed rail project, they could be considered conservative. However, current structure costs are also very competitive due to the present recessionary environment. Taking into account the above quantity and cost variables and the estimating methodology used, the construction costs derived for the bridges, viaducts and tunnels sub-system are considered to have an accuracy of plus or minus 15%.

7.2.4. Grade Separations

It has been possible to determine the number of locations of potential grade separations reasonably, since most existing road and rail crossings of the representative routes are evident from the mapping used. The only uncertainty in estimating the number of grade separations lies in the assessment of the need for a grade separation versus closure or diversion of the intersecting road or rail facility.

In order to determine a representative cost for grade separating the high speed rail routes, categories of grade separation were established and the crossings shown on the mapping were allocated to the appropriate category reflecting either a rural or urban location and the size of road to be crossed. The total construction cost of each category of grade separation was derived from the quantities of the main components required for a typical grade separation contract and unit prices being tendered for current contracts. These total costs were assessed as being reasonably accurate, based on the assumptions, by the MTO Contract office during their review. As with bridges, some cost saving could arise from the large quantity and repetition associated with the grade separation sub-system. Recognizing all of the above factors, the accuracy of the overall costs is considered to be in the 15% range.

7.2.5. Other Accommodation Works

This sub-system includes works related to existing rail installations: the removal of existing tracks, the construction of new access tracks, and the grade separation of locations where the HSR line would cross existing tracks.

It was possible to establish quantities for both the removal of tracks and the number of rail/rail grade separations with a reasonable degree of accuracy. However, the length of new access tracks and other relocated trackwork was more difficult to establish without a more detailed investigation of current and future conditions, such as the continuing need for sidings in industrial locations.

The costs associated with the items involving trackwork (track removal and construction) are judged to be relatively accurate for the reasons outlined in the section on Track below, however, there is some potential for variation in the quantities of materials required per kilometer. The cost developed for rail/rail grade separations are less accurate as only two typical costs (rural and urban) were developed to address all situations.

Since the two items which involve uncertainty in either cost or quantity account for a significant portion of the total sub-system cost, the accuracy of the Other Accommodations Works sub-systems is estimated to be plus or minus 50%.

7.2.6. Track

Track has the lowest potential for variability of the 8 sub-systems evaluated. This is a result of several conditions.

One is that new budget prices have been obtained from suppliers of all major materials. This was done to ensure that prices addressed any impact that might result from higher standards than commonly used in North America. In addition, most of the unit costs for installation were developed particular to the project due to the very high and fairly uncommon production rates required for installation of trackwork. Again, these carry a lower potential for variation.

In terms of quantities of materials and installation effort required for trackwork, these are easily and accurately estimated for a given length of line and design standard.

Other than the variation in project length discussed above, the greatest potential for changes in track length are in the sidings. However, even a 50% variation here would have very little impact percentage-wise on the total length of track to be installed.

As a result of the above, the consultant estimates that the costs presented for the Track Sub-system reflect the final construction cost in 1993 dollars to within $\pm 10\%$.

7.2.7. Electrification

In terms of approach to developing electrification costs, a preliminary design reflecting local particularities was made for the entire length of the three alignments under study rather that develop an all-inclusive per kilometre cost for power supply and distribution.

As with most track items, those related to catenary are for the most part driven by sub-segment length. Once a design standard is settled upon, the generation of quantities is straightforward. As catenary accounts for over 50% of electrification costs, this helps to reduce the estimate variability.

A high degree of detail was also used in establishing items for the power supply work. For example, preliminary designs for main supply stations were prepared and costed for each of the three supply voltages (120kV, 230kV, and 315 kV) encountered along the HSR alignments.

Furthermore, the costs were developed by the team responsible for the design of the Deux-Montagnes (Montréal) electrified suburban rail line modernisation project. The experience acquired in producing a design incorporating current technology for the equipment necessary to interface with utilities (sub-stations, supply lines), evaluating quantities required, and sourcing potential suppliers should also help to reduce variability.

Some uncertainty is associated with Electromagnetic Induction (EMI) Mitigation Measures. Costs can vary greatly depending on the presence of vulnerable infrastructure (particularly telecommunications) along the right-of-way, as well as, to a lesser extent, on the types of soil and sub-soil present. The unit cost retained reflects the predominantly rural nature of the alignments. However, this item forms only a small portion of the total electrification cost.

The accuracy of the Electrification sub-system is evaluated at plus or minus 15%.

7.2.8. Stations

The total capital cost for the stations sub-system is comprised of an estimate for the new, largely suburban, stations combined with the estimated cost for modifications to existing stations in the major cities such as Québec, Montréal, Ottawa and Toronto. The accuracy of the estimate is a function of firstly, the extent and type of facilities at each station and secondly, the unit costs adopted for each station element.

For the new stations, a typical station arrangement and size was assumed based on facilities provided for new high speed lines in France as well as those used for commuter rail passenger service in Toronto and Montréal. The extent of the infrastructure and the corresponding estimated costs are considered to be reasonably accurate.

Quantifying and estimating the work required to make the larger, existing stations suitable for high speed rail is more difficult at the feasibility level of this study. Based on the track requirements provided by the Technology Consultant, the platform and related access needs have been assessed in general terms for each location. Without a detailed study of the methods of modifying the existing buildings and ancillary facilities, the estimate for this work can only be considered an order-of-magnitude. In costing the conversion of the major stations to high speed rail, it has been assumed that the primary concourse structure can be retained. If this proved not to be the case in detailed planning the conversion cost could be considerably higher.

The combination of the relatively reliable cost of the new stations and the less accurate estimate for modifications is considered to have a 20% accuracy

7.3. OVERALL ACCURACY

The estimates of accuracy for each sub-system described in the previous sub-section have been incorporated into an assessment of the overall accuracy of the cost estimate. This assessment as described here applies to the cost estimate for the 300 kph Existing Right-of-Way alignment between Windsor and Québec City. As the

percentage of total costs appearing under each of the sub-systems is relatively constant, regardless of alignment or route segment, the projected overall accuracy of the estimate would be similar for all of the options costed.

Table 7.2 comprises the results of our analysis. The first four columns present the implications of the discussion in the previous sub-section in terms of the potential dollar variation in costs for each sub-system. The Total for the column presenting **Accuracy -** ±\$ represents the potential cost over-run (or under-run) if the budget for all sub-systems are all overspent (or all underspent) by the amount of the projected accuracy.

The Total figure in the **Accuracy** - \pm % column is the result of dividing the total figure discussed above by the Total Estimated Cost. As such, it represents a weighting of the individual accuracy estimates to 20.2% of the total estimated cost of \$7.833 billion or \$1.578 billion.

However, it is evident that not all sub-systems will be overspent, or underspent, by amounts equal to the expected accuracy. Consequently, the consultant performed the Monte Carlo analysis as mentioned in 7.1 to evaluate the impact of differing cost variations in each sub-system. This consisted of statistically generating possible costs for each sub-system using the estimated costs, the anticipated accuracies, and the assumed probability density function. The cost population generated consisted of 1000 for each sub-system which were then added to produce 1000 total costs.

The last two columns of Table 7.2 present the results of the statistical analysis. The column **Statistical Cost Projection** is the mean cost of the 1000 sample costs generated for each sub-system. The **Standard Deviation** column presents the standard deviations of the same sets of numbers. The proximity of these costs and standard deviations to the original estimates and anticipated accuracies in dollars confirm the reliability of the cost generating function.

Again, the Total line of the **Statistical Cost Projection** column is the mean value of all the project total costs developed in the population and corresponds well with the total estimated project cost. The Total line for the **Standard Deviation** column presents the standard deviation for the population of Total Costs. This figure accounts for the expected statistical variation of costs above and below the estimated amounts and is consequently considerably lower than the figure presented as the total of the **Accuracy** - ±\$ column. Having developed this number as being one standard

Table 7.2

Cost Estimate Accuracy Evaluation

(dollars in thousands)

	Estimated	Accuracy	Accuracy	Statistical	Standard		
Sub-system	Cost	(%)	(±\$)	Cost Projection	Deviation		
Land							
Acquisition	\$658,430	25%	\$164,608	\$660,431	\$162,429		
Earthworks							
and Drainage	\$1,718,417	35%	\$601,446	\$1,724,075	\$604,716		
Bridges							
and Viaducts	\$1,238,277	15%	\$185,742	\$1,233,624	\$185,583		
Grade							
Separations	\$1,920,300	15%	\$288,045	\$1,921,121	\$295,220		
Other Accom.							
Works	\$119,259	50%	\$59,630	\$120,263	\$60,743		
Track	\$1,084,635	10%	\$108,464	\$1,085,822	\$108,053		
Electrification	\$925,715	15%	\$138,857	\$928,540	\$138,424		
Stations	\$158,477	20%	\$31,695	\$159,116	\$31,015		
			a		b		
Total \$7,823,510 20.2% \$1,578,486 \$7,832,992 \$750,377							
Standard devia	Standard deviation as % of total cost (probability = 2 times in 3)						
Two standard o	leviations as 🤋	6 of total co	st (prob. =	19 times in 20)	19.2%		

- a as the sum of the possible errors in each sub-system, this represents the maximum possible error that could result if the inaccuracy of every sub-system was of the maximum amount and same sign (+ or –)
- b This is the standard deviation of the generated "population" of "Total Costs". It indicates that
 the expected cost of the project should fall withn ± this value of the base cost 68% of the
 time (or on approximately 7 occasions out of 10). The expected cost of the project should fall
 within ± twice this value 95% of the time (or approx. 19 times out of 20).

deviation above and below the estimated cost, we can now express the accuracy of this cost estimate as a probability that the cost will fall within a certain confidence limit. As the confidence limit increases, the probability that the final cost will fall within the range also increases. The results based on the assumptions made in this Section are presented in Table 7.3. The probability of 95.4% shown in the second line of the table corresponds to 2 standard deviations which is equivalent to the "19 times out of 20" commonly heard in the reporting of opinion poll results.

Table 7.3

Confidence Interval	Dollar Range (000's)	Probability	
± 9.6%	\$750,377	68.4%	
± 19.2%	\$1,500,754	95.4%	

8. SINGLE VS. DOUBLE TRACK

Under the Terms of Reference for the current study, the Consultant has been requested to evaluate the feasibility of constructing the line as a single track, the resulting impacts on costs, and the problems of subsequently building a second track. These questions of feasibility and problems associated with subsequent construction are addressed together in the following sub-section. The impact on costs are discussed in the second half of this Section of the report.

8.1. FEASIBILITY

8.1.1. General

The interest in these discussions about single track is to provide for delay of investment in certain capital expenditures until the facilities are required for capacity or operating reasons. However, the initial single track configuration must also be such that it does not impose extensive time delays on scheduled train times on account of waiting or slowing for meets. It appears that the consensus on this issue in Canada for the Québec-Windsor corridor is that a single track layout with long sidings that total one third of the overall track length would be necessary to meet the desired operating characteristics. Consequently, this analysis addresses a track layout 10 with 7.5 km long sidings using 160 km/hr turnouts and spaced at 21 km intervals.

In terms of staging the construction of such a track layout, there are a few different approaches that could be considered, such as:

- building the embankment for only one track and completing the balance when required,
- building a double embankment but constructing bridge foundations and spans for only one track, or
- building a double embankment and constructing bridge foundations for two tracks but only installing spans for one track where possible.

as recommended by the Technology and Operating Strategy Consultant

Regardless of the option chosen, the trackwork and electrification would only built for the configuration described above. The following paragraphs discuss some of the considerations involved in staging the various elements of the project.

8.1.2. Staging of the Work

The decision as to whether to use a staged construction approach should depend, to a great extent, on the length of time anticipated before the second track is required and the type of work being considered for staging. Deciding factors include the immediate savings and the increased total cost associated with the staging as well as the impact of future construction work on the rail service offered and how delays will be perceived by the travelling public.

8.1.2.1. Earthworks

The safety considerations associated with widening an embankment to accept a second track immediately adjacent to an existing line will require speed restrictions on train operations. These may arise from:

- a need to perform earthwork during the day and have equipment working adjacent to the track while trains pass, and/or
- a need to cut into the slope of the existing embankment (potentially reducing stability) to achieve homogeneity in the overall fill.

Both these conditions require on-going speed restrictions that could extend over a fair length of line. Speed restrictions on account of equipment working adjacent to the track could be as low as 50 km/hr. Those imposed for reasons of slope stability would more likely be in the range of 80-100 km/hr. Such delays within a few years of commencing service may be perceived as being inherent to the technology and discourage ridership. If these interruptions are delayed sufficiently, they will be accurately perceived by riders as delays associated with the major improvement to service that they are.

Construction of the earthwork in two phases also has a significant cost impact. Not only must mobilization and supervision costs be absorbed a second time, but the unit costs also increase substantially. Building embankment for a single track reduces the

efficiency of the earth-moving operations due to the restricted width available at the top of the embankment (8m compared to 13+m for a 2-lane highway and 14+m for a double track line). Other complications adding to cost are the need to construct the second phase over only half the embankment width (6m), the obstacles to earthmoving and compaction created by culverts built during the first phase, and the need to remove and re-install security fencing.

It should be noted that some of these issues are similar to those which led to the expectation that it may be more economical to completely reconstruct embankments where existing ROWs were assumed to be used and converted for use as double track, high speed alignments.

8.1.2.2. Bridges

Much of the bridge construction work to accommodate a second track could be done without imposing speed restrictions on train operations. Work that would require restrictions is the placement of the bridge spans, however, such a restriction is localized and for a very short period of time. As such, the staging of bridge work allows for 2 approaches:

- construction of single track bridges, including abutments and piers during the original construction with the construction of independent structures at the time of adding the second track, or
- construction of double track abutments and piers which carry only a single span with the addition of second¹¹ spans in conjunction with the second track.

Using the first approach can produce some difficulties at the time that the second track is added on account of the displacements that might be produced in the original foundations by the driving of new pile foundations for the second structure. Avoiding this might require locating the new structure away from the second which could produce undesirable track geometry.

It should be noted that, for some major bridge structures, the most economical span construction may be a box girder supporting two tracks and, consequently, a single track span may not be an option.

With the second approach, the final 2-track abutments and piers are constructed at a marginal cost to what would be required for a single track only. Afterwards, the span for the second track can be added with very little disruption to train traffic and this for only a short period of time.

8.1.2.3. Trackwork and Electrification.

In the case of track work and electrification, the effects on service on account of construction of the second track becomes less of an issue. This is because this work can be done either at night, with special safety precautions, and/or a few localised speed restrictions. As such, there is a minimal impact on travel time and, consequently, service.

There are two principle areas where staging would imply additional costs for track work and electrification. These are for the construction bases which would have to be re-established for construction of the second track and for facilities which are constructed for the single track operation which would no longer be required (at their original location, anyway) for double track.

On a per kilometre of track constructed basis, the cost of the construction bases would probably increase in the order of 25% for the initial construction. In addition, these bases would have to be re-established for construction of the second track. It is estimated that the unit cost per track kilometre would again be 25% higher than that for double track construction.

Installations from the single track alignment which would no longer be required for double track consist primarily of turnouts and their associated catenary and signalling. It should be noted that there could be potential for using some of the single track turnouts at their original location. If we consider that single track would use sidings spaced \approx every 20 km and that double track would have double crossovers every 20 km, there is potential for using the turnout at one end of each siding, without relocating it, in the double track configuration.

As a result of these conditions, the total cost (total of both stages including necessary removals) of the trackwork and electrification sub-systems would increase in a staged project by an amount that would be in the order of 5% of their respective costs for an initial double track project.

8.1.3. Selected Approach

As mentioned previously, the approach to be used in staging the work of a high speed line should depend on the impact that staging will have on train operations and the cost of the project and on the anticipated length of time that the work can be deferred.

It is evident that there are benefits in phasing track work and electrification as the work can be performed later with very little impact on operations or cost penalty. Bridges could also be extended for a second track without much disruption of operations. However, there is a larger cost penalty and potential structural problems involved in phasing which make it less desirable.

Phasing of earthworks does not produce cost savings proportional to the quantity of work postponed due to increases in unit costs. It also causes a considerable impact on train operations during the subsequent widening of the embankment. Discussions with representatives of the French National Railways indicate that they consider this type of phasing to be unrecommended unless the capacity requirements for the second track are more than 10-15 years away. This opinion was supported by VIA's comments during stakeholders' meetings. In addition to the financial considerations, this delay allows riders to become familiar with and adapted to the HSR service before experiencing the deterioration in service that would be associated with work to widen the subgrade.

In view of these impacts and our understanding that double track will be a necessity for almost all of the corridor within 15 years of the start of operations, the construction phasing that has been costed for single track operation is as follows:

- Construct all stations for double track operation;
- Construct all bridge foundations for double track but the superstructure for single track only;
- Construct all embankment for double track but the track structure for single track and sidings;

 Construct all electrification for single track and sidings but all substations for the ultimate facility;

In addition, all environmental mitigation measures would have to be in place for single track operation as would all of the common administrative and maintenance facilities.

8.2. COST IMPLICATIONS

As mentioned above, an implementation plan using a single track layout in the Québec - Windsor corridor should allow for construction of a second track within 15 years throughout most of its length. Therefore, in accordance with the construction phasing proposed in 8.1, the costs for the Land, Earthworks and Drainage, Grade Separation, Other Accommodation Works, and Station sub-systems will be identical to those required to construct a double track line. Cost savings for constructing a single track line would be obtained in the Track and Electrification sub-systems, obviously, and in the Bridges and Viaducts sub-system where installation of the bridge spans for the second track could be delayed at single track locations.

In order to estimate the dollar value of the cost reduction to be achieved through the above approach, the consultant has developed a cost for a single track installation on one of the line sub-segments analyzed during the study. The sub-segment used is from Oshawa to Kingston on the 300 kph New ROW alignment as it was considered to present characteristics that are most typical of the overall corridor.

Table 8.1 presents the estimated costs for this sub-segment under the double and single track options. The result of this analysis is a projected cost saving of \$70.9 million over the 198.56 km length of this sub-segment. This equates to a saving of \$357,071 per kilometre and can be attributed to the following sub-systems percentage-wise: 64% for Track, 20% for Electrification, and 16% for Bridges.

Based on this analysis, we have developed costs for alignments incorporating single track for each of the route segments evaluated during this study. They reflect a reduction in the original cost of each major line segment by \$357,000 per kilometer of line which could be built in the single track with passing tracks configuration. These portions of the lines are considered to be those located outside the heavily urbanized areas. Table 8.2, Table 8.3, and Table 8.4 indicate the estimated rural route lengths where the single track configuration could be used and present the resulting cost for

Table 8.1
Comparison of Double vs. Single Track Costs
Oshawa - Kingston 300 kph New ROW
(\$ millions)

<u>Sub-system</u>	Double <u>Track</u>	Single <u>Track</u>
 A - Right-of-Way Acquisition B - Earthworks and Drainage C - Bridges, Viaducts, and Tunnels D - Grade Separations E - Other Accommodation Works F - Track G - Electrification H - Stations 	23.5 271.2 239.3 359.7 4.9 165.7 147.1	23.5 270.4 228.6 359.7 4.9 120.6 132.8 0.0
TOTAL	1,211.4	1,140.5

each speed/routing combination.

Table 8.2
Cost Estimate incorporating Single Track
200 kph Existing ROW
(\$ millions)

Line Segment	Double Track Cost	Rural Route <u>Length</u>	Cost Saving	Single Track Cost
Windsor - Toronto	2,030	313	112	\$ 1,918
Toronto - Montréal	3,403	501	179	\$ 3,224
Montréal - Québec	1,432	233	83	\$ 1,349
TOTALS	\$ 6,865	1,047	\$ 374	\$ 6,491

Table 8.3
Cost Estimate incorporating Single Track
300 kph Existing ROW
(\$ millions)

Line Segment	Double Track Cost	Rural Route <u>Length</u>	Cost <u>Saving</u>	Single Track Cost
Windsor - Toronto	2,424	313	112	2,312
Toronto - Montréal	3,996	501	179	3,817
Montréal - Québec	1,404	233	83	1,321
TOTALS	\$ 7,824	1,047	\$ 374	\$ 7,450

Table 8.4
Cost Estimate incorporating Single Track
300 kph New ROW
(\$ millions)

Line Segment	Double Track Cost	Rural Route <u>Length</u>	Cost Saving	Single Track Cost
Windsor - Toronto	2,634	313	112	2,522
Toronto - Montréal	5,431	501	179	5,252
Montréal - Québec	1,441	233	83	1,358
TOTALS	\$ 9,506	1,047	\$ 374	\$ 9,132

The estimated cost for converting the single track configuration to a full double track railway is estimated to be \$441,000 per kilometer. This includes the \$357,000 of work per kilometer not performed during the initial single track phase plus allowances for lower efficiency in performing bridge and track work and the extra cost for dismantling track and catenary at the turnouts installed for the long sidings.

APPENDIX - A COST ITEM DEFINITIONS

SUB-SYSTEM A: RIGHT-OF-WAY ACQUISITION

Item No.	Description	Units	Elements Included	Measurement and Costing Methods
1.1	Surveying.	%	All professional services related to land surveying.	The cost will be developed as a percentage of the acquisition cost for the land based on the Consultant's experience from similar
1.2	Appraisal.	%	All professional services related to land appraisal.	projects undertaken recently on highways corridors. The costs he not been differentiated between the different specializations and covered by only 1 percentage figure.
1.3	Legal expertise.	%	All professional services related to purchase and legal transfer of properties.	
2	Project Management	%	This amount is intended to cover a portion of the cost of providing project management services for the Client. This includes the costs for contract management, cost, quality, and schedule control, establishing project procedures, and coordinating.	This amount will be estimated as a percentage of the total cost of the project by the consultant based on experience with previous projects and the level of effort anticipated for the particular subsystem.

SUB-SYSTEM A: RIGHT-OF-WAY ACQUISITION Sector 2 - Equipment/Materials

	Sector 2 - Equipment/Materials					
Item No.	Description	Units	Elements Included	Measurement and Costing Methods		
1.1	Land Acquisition in Residential Areas.	Lump sum	All costs associated with purchasing non- railway land (for completely new rights-of- way and additional land required adjacent to existing railway land for shared rights-of way) and making it available in a useable condition for the project. This includes severances, other injurious allocations, and demolition of structures and facilities.	Quantities and costs developed to be representative of the requirements for a high speed rail system. Final costs upon project implementation will be the result of individual negotiations for each parcel of land to be acquired.		
1.2	Land Acquisition in Commercial Areas.	Lump sum	As per Item 1.1.	As per Item 1.1.		
1.3	Land Acquisition in Industrial Areas.	Lump sum	As per Item 1.1.	As per Item 1.1.		
2.1	Land Acquisition in Agricultural Areas.	Lump sum	As per Item 1.1.	As per Item 1.1.		
2.2	Land Acquisition in Natural Areas (non-farming rural areas, forests).	Lump sum	As per Item 1.1.	As per Item 1.1.		
3	Disruption, Capital Improvement Removal, and Land Costs for Existing Rail Right-of-Ways	Lump sum	Costs for purchasing existing or abandoned RoW for exclusive use by the HSR system. Costs presented include disruption, capital improvement removal, and land costs. Does not include purchase of railway lands for shared rights-of-way. Does not include the cost for removing or relocating tracks.	Quantities and costs developed to be representative of the requirements for a high speed rail system. Final costs upon project implementation will be the result of individual negotiations for each parcel of land to be acquired.		

SUB-SYSTEM: ALL (except Land Acquisition)

Item No.	Description	Units	Elements included	Measurement and Costing Methods
1	Engineering	%	This covers costs for further studies and final design of each of the infrastructure sub-systems. This final design includes obtaining all information on site conditions and preparing the plans, specifications, and bidding documents for the execution of the work.	This amount will be estimated as a percentage of the cost of construction work by the consultant based on experience with previous projects and the level of effort anticipated for the particular sub-system.
2	Construction Supervision	%	This covers costs for overseeing the execution of the work in the field. It includes the monitoring and supervision of contractors, recommending payment of invoices, and acceptance of the completed work and as-built drawings.	This amount will be estimated as a percentage of the cost of construction work by the consultant based on experience with previous projects and the level of effort anticipated for the particular sub-system.
3	Materials Procurement	%	This covers costs for overseeing the procurement of materials to be used on the project. It includes the quality assessment of suppliers and manufacturers, inspection of delivered materials, and recommending payment of invoices.	This amount will be estimated as a percentage of the cost of construction work by the consultant based on experience with previous projects and the level of effort anticipated for the particular sub-system. (Only applied to track sub-system).
4	Project Management	%	This amount is intended to cover a portion of the cost of providing project management services for the Client. This includes the costs for contract management, cost, quality, and schedule control, establishing project procedures, and coordinating.	This amount will be estimated as a percentage of the total cost of the project by the consultant based on experience with previous projects and the level of effort anticipated for the particular subsystem.

item No.	Description	Units	Elements Included	Measurement and Costing Methods
3	Environmental Assessment	%	This amount is intended to cover the cost of the environmental assessment, review, and approval process, including public hearings, required for implementation of the project.	This amount has been estimated by the consultant as a percentag of the total construction cost (excluding professional fees) of the project based on experience with previous projects.
4	Feasibility Studies (Technical)	%	This amount is intended to cover the cost of the technical feasibility study whose objective will be to finalize the desired routing for the project, identify feasible solutions to all constraints on the construction and operation of the line, and refine the cost estimate.	This amount has been estimated by the consultant as a percentag of the total construction cost (excluding professional fees) of the project based on experience with previous projects.

Sector 4 - Construction/Installation

			Sector 4 - Construction/Installation	
Item No.	Description	Units	Elements included	Measurement and Costing Methods
1.1	Clearing and roadbed preparation in Type 1 soils.	Route-km.	Clearing of ROW vegetation, removal of existing buildings facilities, preparation and/or replacement of existing roadbed including geo-textiles etc. across rock or other solid material and restoration.	Geological mapping of routes. Unit price has been developed for all work for 1 km of route based on cross-sections recommended by Sofrerail from TGV experience.
1.2	Clearing and roadbed preparation in Type 2 soils.	Route-km.	As above for roadbed across till, sands, and clays.	Geological mapping of routes. Unit price has been developed for all work for 1 km of route based on cross-sections recommended by Sofrerail from TGV experience.
1.3	Clearing and roadbed preparation in Type 3 soils.	Route-km.	As above for roadbed across wetlands, marshy areas, and water-sensitive clays.	Geological mapping of routes. Unit price has been developed for all work for 1 km of route based on cross-sections recommended by Sofrerail from TGV experience.
2.1	Embankment constructed from ROW cut in soft material.	Thousand cubic-metres.	Excavation of general or rippable fill material from cuts in the ROW using scrapers and placing in embankment, including compaction (excludes selected sub-ballast layers).	Quantities determined from geological mapping and cut and fill calculations using profiles at 1:50000 scale and 10 metre contours. (Accuracy verified by typical sections with larger scale).
2.2	Embankment constructed from ROW cut material in rock.	Thousand cubic-material.	Excavation of rock using explosives from cuts in ROW and selection and placing of suitable material in embankment, including compaction. (excludes selected sub-ballast layers).	Quantities determined from geological mapping and cut and fill calculations using profiles at 1:50000 scale and 10 metre contours. (Accuracy verified by typical sections with larger scale).
2.3	Embankment constructed from borrow material.	Thousand cubic-metres.	Excavation of general fill material in borrow pit and placing in embankment including compaction (excludes selected sub-ballast layers).	Borrow material determined from cut and fill calculations using profiles at 1:50000 scale and 10 metre contours. (Accuracy verified by typical sections with larger scale).
2.4	Disposal of unsuitable material.	Thousand cubic metres.	Loading, hauling and dumping of excavated material found to be unsuitable for embankment construction.	Geological mapping of routes has been used to assess percentage of excavation likely to be unsuitable.
3	Haulage of fill material (from borrow or excavation).	Thousand Cubic metre- km.	Loading, hauling and tipping of material suitable for general embankment fill or selected sub-ballast layers. Hauled either from borrow pits or along ROW from cuts.	The cost implications for haul of excavated fill or borrow have been included in the unit costs developed for item 2, Embankment Construction.
4.1	Sub-ballast layers; new ROW.	Route-km.	Placing and compaction of selected material in two layers above general roadbed fill.	Quantities from typical cross-sections provided by Technology Consultant from European experience. Unit prices from current contracts for similar work items.

Sector 4 - Construction/Installation

Item No.	Description	Units	Elements included	Measurement and Costing Methods
4.2	Sub-ballast layers; exist ROW.	Route-km.	Placing and compaction of selected material in two layers above general roadbed fill.	Quantities from typical cross-sections provided by Technology Consultant from European experience. Unit prices from current contracts for similar work items.
5.1	Normal ROW drainage system.	Route-km.	Minor culverts, parallel ditches, (including lining if required) sub-drainage systems.	Quantities from a typical 1 km section of ROW. Unit prices from current highway contracts for similar work items.
5.2	Major watercourse culverts.	Each.	Culvert across ROW complete, including headwalls, outlet works, grading and structure.	Unit cost developed from current contract prices for a representative major culvert approximately 6-10 metres across.
5.3	Environmental stormwater controls.	Route-km.	Provision of facilities such as settling ponds to mitigate transport of silts and debris into sensitive water courses.	Quantities to be identified by environmental specialists. Representative price to be developed for a typical facility.
6	Upgrade of existing roadbed on existing ROW.	Route-km.	Removal of unsuitable material, placing of selected sub-ballast layers, drainage improvement, minor widening if required.	Roadbed standards from Technical Consultant and European experience. Quantities based on data from railways on condition of existing roadbeds.
7.1	Retaining structures up to 3 metres height.	Km.	Retaining walls, including foundations, to support embankments or sides of cuts.	Urban area mapping, aerial photographs for quantities. Unit prices from current contracts for similar structures.
7.2	Retaining structures over 3 metres height.	Km.	Retaining Walls, including foundations, to support embankments or sides of cuts.	Urban area mapping, aerial photographs for quantities. Unit prices from current contracts for similar structures.
8	Intrusion Barriers	Km.	Concrete barrier or berm designed to prevent derailed trains on shared right-of-ways from interfering with the high speed tracks.	Final assumptions for track configuration and operating regulation eliminated requirement for solid barriers. Consequently, costs and quantities not assessed.
9.1	Noise attenuation structures - barriers.	Km.	Complete noise attenuation structure including foundations, manufacture and installation.	Configuration and materials to be developed from European experience and local applications. Unit price from potential local suppliers and similar highway/rail applications. Measured per side of ROW.
9.2	Noise attenuation structures - Berms.	Km.	Complete noise attenuation berm including placement of material, compaction and drainage.	Configuration to be developed from European experience and local applications. Unit price from similar highway/rail applications.
10	ROW security fencing (2 sided).	Route-km.	Complete security fencing of the ROW.	Configuration and materials from European experience. Unit prices from potential suppliers and European contracts applied to local conditions.

	Sector 4 - Construction/Installation				
ltem No.	Description	Units	Elements Included	Measurement and Costing Methods	
11	Snow control measures.	Km.	Manufacture and installation of snow control barriers.	This is a minor cost with difficult to estimate quantities. Cost implications have been covered by contingencies.	
12.1	Utilities - Major Hydro relocation.	Each.	Representative allowance for relocation of Hydro lines and towers.	Cost implications included in contingencies.	
12.2	Utilities - Major Oil/gas line relocation.	Each.	Representative allowance for relocation or crossing of oil/gas lines.	Cost implications included in contingencies.	
12.3	Minor pipe or wire crossings.	Route-km.	Representative allowance for minor pipe and wire crossings including all works required.	Cost implications included in contingencies.	
13	Other items.	Lump sum.	These items are intended to address any particular cases which have not been covered by the standard cost items elsewhere. They have been defined specifically for each case and may differ from one geographical segment to the next.	These items have been identified on a individual basis as situations which must be addressed during construction, but which do not fall into any other category. A lump sum has been developed representing the cost of all work required to accomodate the particular situation.	
13.1	Audit for Contaminated Soil	Route-km.	This item is to cover the cost of site and lab investigations required to assess the presence of contaminated soils on railway lands.	Quantities based on length of railway right-of-way to be acquired. Unit costs are typical costs encoutered by MTO for similar investigations.	
13.2	Audit for Contaminated Rail Yards	€а.	This item is to cover the cost of site and lab investigations required to assess the presence of contaminated soils on railway lands.	Quantities based on number of railway yard sites associated with railway lands to be acquired. Unit costs are typical costs encoutered by MTO for similar investigations.	

SUB-SYSTEM C: BRIDGES, VIADUCTS AND TUNNELS

item No.	Description	Units	Elements included	Measurement and Costing Methods
1.1	Small river crossings (up to 30 metres in length).	Each.	Complete bridge including associated earthworks, river protection works, but excluding track structure.	Rivers, creeks identified on 1:50,000 and 1:10,000 or 1:20,000 plans. Unit cost for a typical bridge of an assumed length from local contracts for similar multi-structure projects.
1.2	Extra over 1.1 for height over 10 metres.	Each.	Effect of sub-structure height on cost of all bridge components.	Additional cost per linear metre of bridge to be applied to small but high river bridges. Cost to be based on past local experience.
1.3	Intermediate river crossings (30 - 100 metres in length).	Linear metre.	Complete bridge including associated earthworks, river protection works, but excluding track structure.	Rivers identified on 1:10,000 and 1:20,000 plans. Bridge lengths estimated from plans and profiles. Unit cost per metre length of bridge from local contracts for similar multi-structure projects.
1.4	Extra over 1.2 for height over 10 metres.	Linear metre.	Effect of sub-structure height on cost of all bridge components.	Additional cost per linear metre of bridge to be applied to intermediate but high river bridges. Cost to be based on past local experience.
1.5	Large river crossings (100-250 metres in length).	Linear metre.	Complete bridge including associated earthworks, river protection works, but excluding track structure.	Rivers identified on 1:10,000 and 1:20,000 plans. Bridge lengths estimated from plans and profiles. Unit cost per metre length of bridge from local contracts for similar multi-structure projects.
1.6	Extra over 1.3 for height over 10 metres.	Linear metre.	Effect of sub-structure height on cost of all bridge components.	Additional cost per linear metre of bridge to be applied to large but high river bridges. Cost to be based on past local experience.
1.7	Major river crossings (over 250 metres).	Linear metre.	Complete bridge including associated earthworks, river protection works, but excluding track structure.	Rivers identified on 1:10,000 and 1:20,000 plans. Bridge lengths estimated from plans and profiles. Unit cost per metre length of bridge from local contracts for similar large bridge projects.
1.8	Extra-over items 1.1, 1.3, 1.5 and 1.7 for difficult foundation conditions.	Linear metre.	Effect of poor soil conditions or complex foundation requirements on the cost of bridges of each size.	Additional cost per linear metre of bridge to be applied to each size of bridge if location is known to involve poor soil conditions. Geological mapping, past experience to be used to identify complexity of foundations.
1.9	Modifications to existing bridges (new deck).	Linear metre.	Replacement or modification of existing bridge deck to accommodate HSR track structure. As most existing corridor bridges are single track, this includes the cost for constructing an additional single track span adjacent to the existing bridge.	Railway databases, 1:10,000 or larger scale plans of existing bridges. Unit cost developed from local experience applied to deck configuration specified by Technology Consultant.

SUB-SYSTEM C: BRIDGES, VIADUCTS AND TUNNELS

Item No.	Description	Units	Elements Included	Measurement and Costing Methods
2.1	Viaducts exceeding 250 metres in length.	Linear metre.	Complete viaduct (elevated ROW) including temporary works, slope protection at abutments, any channelization or protection works if waterways under viaduct.	Locations identified on 1:50,000 or 1:10,000 plans. Lengths from track profiles. Unit costs per metre of viaduct from European experience applied to local construction industry.
2.2	Extra over 2.0 for height over 10 metres.	Linear metre.	Effect of sub-structure height on cost of all viaduct components.	Additional cost per linear metre of bridge to be applied to small but high viaducts. Cost to be based on past local experience.
2.3	Extra-over items 2.1 for difficult foundation conditions.	Linear metre.	Effect of poor soil conditions or complex foundation requirements on the cost of a viaduct.	Additional cost per linear metre of viaduct to be applied if location is known to involve poor soil conditions. Geological mapping, past experience to be used to identify complexity of foundations.
3.1	Double track tunnelling in soft ground.	Metre.	Complete tunnel in soft ground including all equipment, materials and labour for excavation, dewatering, lining and portal works.	Size and configuration from European experience. Lengths from track profiles. Ground conditions from geological mapping. Unit cost from European experience and local tunnelling contract records.
3.2	Double track tunnelling in rock.	Metre.	Complete tunnel in rock including all equipment materials and labour for excavation, dewatering, lining and portal works.	Size and configuration from European experience. Lengths from track profiles. Ground conditions from geological mapping. Unit cost from European experience and local tunnelling contract records.
3.3	Modifications to existing tunnels.	Lump sum.	Any modifications works to accommodate HSR trains in existing tunnels.	Prior studies or plans of existing tunnels (e.g. Mont Royal, Montreal; Dows Lake, Ottawa) Cost from local experience for similar works.
3.4	Noise Mitigation Measures.	Lump sum.	Special tunnel entrance hoods or ballast mats to mitigate noise and vibration.	Prior studies or plans of existing tunnels (e.g. Mont Royal, Montreal; Dows Lake, Ottawa) Cost from local and European experience for similar works.

SUB-SYSTEM D: GRADE SEPARATIONS

Item No.	Description	Units	Elements Included	Measurement and Costing Methods
1.1	2 lane rural highway crossing.	ea.	All works to grade separate HSR from highway including bridge, approach earthworks, drainage, paving, signing, land, detours, traffic accommodation.	Quantities from 1:50,000, 1:20,000 or 1:10,000 plans. Unit costs of complete works from typical similar local contracts (MTO, MTQ).
1.2	2 lane rural highway crossing, dual ROW	еа.	All works to grade separate HSR plus an adjacent railway line from highway including bridge, approach earthworks, drainage, paving, signing, land, detours, traffic accommodation.	Quantities from 1:50,000, 1:20,000 or 1:10,000 plans. Unit costs of complete works from typical similar local contracts (MTO, MTQ).
1.3	4 lane rural highway crossing.	ea .	All works to grade separate HSR from highway including bridge, approach earthworks, drainage, paving, signing, land, detours, traffic accommodation.	Quantities from 1:50,000, 1:20,000 or 1:10,000 plans. Unit costs of complete works from typical similar local contracts (MTO, MTQ).
1.4	4 lane rural highway crossing, dual ROW.	ea.	All works to grade separate HSR plus an adjacent railway line from highway including bridge, approach earthworks, drainage, paving, signing, land, detours, traffic accommodation.	Quantities from 1:50,000, 1:20,000 or 1:10,000 plans. Unit costs of complete works from typical similar local contracts (MTO, MTQ).
1.5	Major rural highway crossing.	•а.	All works to grade separate HSR from freeways (401, 40 etc.) including bridge, approach earthworks, drainage, paving, signing, land, detours, traffic accommodation.	Quantities from 1:50,000, 1:20,000 or 1:10,000 plans. Unit costs of complete works from typical similar local contracts (MTO, MTQ).
1.6	Extra-over items 1.1 to 1.3 for difficult foundation conditions.	ea.	Effect of poor soil conditions or complex foundation requirements on the cost of bridges of each size.	Additional cost per linear metre of bridge to be applied to each size of bridge if location is known to involve poor soil conditions. Geological mapping, past experience to be used to identify complexity of foundations.
2.1	Secondary urban highway (2-4 lanes) crossing.	ea.	All works to grade separate HSR from urban highway including bridges, retaining walls earthworks, drainage, paving, signing, land, detours, traffic accommodation.	Quantities from 1:50,000, 1:20,000 or 1:10,000 plans. Unit costs of complete works from typical similar local municipal contracts.
2.2	Secondary urban highway (2-4 lanes) crossing, dual ROW.	еа.	All works to grade separate HSR plus an adjacent railway line from urban highway including bridges, retaining walls earthworks, drainage, paving, signing, land, detours, traffic accommodation.	Quantities from 1:50,000, 1:20,000 or 1:10,000 plans. Unit costs of complete works from typical similar local municipal contracts.

SUB-SYSTEM D: GRADE SEPARATIONS

Costor 4 Construction/Installation

Item No.	Description	Units	Elements Included	Measurement and Costing Methods
2.3	Major urban highway (over 4 lanes).	ea.	All works to grade separate HSR from urban highway including bridges, retaining walls earthworks, drainage, paving, signing, land, detours, traffic accommodation.	Quantities from 1:50,000, 1:20,000 or 1:10,000 plans. Unit costs of complete works from typical similar local municipal contracts.
2.4	Extra-over items 2.1 to 2.3 for difficult foundation conditions.	ea.	Effect of poor soil conditions or complex foundation requirements on the cost of bridges of each size.	Additional cost per linear metre of bridge to be applied to each size of bridge if location is known to involve poor soil conditions. Geological mapping, past experience to be used to identify complexity of foundations.
3.1	Modification of existing urban grade separations.	өа.	Works to increase horizontal or vertical clearances through existing grade separations including earthworks and structural modifications.	A lump sum will be developed representing the cost of all works for a typical modification.
3.2	Modification of existing rural grade separations.	өа.	Works to increase horizontal or vertical clearances through existing grade separations including earthworks and structural modifications.	A lump sum will be developed representing the cost of all works for a typical modification.
4	Automatic Crossing Protection	ea.	Fixed barriers, gates, fencing, highway surfacing, railway drainage, electronic detection equipment, and signalling modifications.	A lump sum will be developed representing the cost of all works for a typical crossing. Quantities from 1:50,000 and 1:20,000 mapping and criteria established in conjunction with the technology consultant. Signalling portion of the work included here to allow comparison of the total cost for treating road crossings.
5	Closure and Diversion of roads.	km of road.	Roadworks to link roads cut off by HSR ROW to other grade separated roads.	1:50,000 and 1:20,000 mapping. Unit costs from typical provincial road contract records.
6	Private farm crossing.	ea.	All works to provide a grade separated crossing structure for private property owners adjacent to ROW. (approx 5 metre square opening).	Quantities from assessment of land use adjacent to ROWs. Frequency based on precedents from other limited access corridors. Unit costs from similar local contract works.
7	Wildlife passages.	еа.	All works to provide a grade separated crossing structure for wildlife moving from one side of the ROW to the other.	Quantities from assessment of land use to adjacent to ROWs and from environmental assessment. Frequencies based on precedents from other limited access corridors. Unit costs from similar local contract works.

SUB-SYSTEM E: OTHER ACCOMMODATION WORKS

Sector 4 - Construction/Installation

Item No.	Description	Units	Elements included	Measurement and Costing Methods
1	Removal of Rail Lines.	Km.	The removal of rail, ties, OTM, and other railway plant to make an existing line available for construction works or due relocation of rail services to another subdivision.	Quantities will be identified from topographic and railway maps and requirements to either perform work on existing subgrade or to remove existing infrastructure due to relocation of railway services to another subdivision. Costs will be estimated from the work effort associated with removal of typical railway track.
2	Construction of New Rail Lines.	Km.	The provision a subgrade and construction of railway track and associated facilities.	This item will be used where existing rail lines must be relocated to accomodate the larger radius curves of adjacent high speed lines or where new tracks are required to provide access to railway customers. Quantities will be identified from topographic and railway maps. A unit cost will be developed to represent the cost of all works required for a typical rail line.
3	Rail/Rail Grade Separation.	ea.	All works required to grade separate HSR from other railways lines that it may cross. These include structures to pass over or beneath intersecting lines and/or tracks providing paralleling lines with access to the other side of the right-of-way.	Quantities from locations of existing railway lines and railway operating and service requirements. A lump sum will be developed representing the cost of all works for a typical rail/rail grade separation.
4	Other Particular Items.	Lum sum.	These items are intended to address any particular cases which have not been covered by the standard cost items elsewhere. They will be defined specifically for each case and may differ from one geographical segment to the next.	These items will be identified on a individual basis as situations which must be addressed during construction, but which do not fall into any other category. A lump sum will be developed representing the cost of all work required to accomodate the particular situation.

SUB-SYSTEM F: TRACK

		<u> </u>	Sector 2 - Equipment/Materials	
Item No.	Description	Units	Elements Included	Measurement and Costing Methods
1	Rail (main line and siding)	tonnes	Procurement, welding into CWR strings, and delivery of rail for main line and siding tracks	Quantities from trackage required according to operations consultant. Prices from suppliers.
2	Ties	e a.	Procurement and delivery of concrete track ties. Shoulders to be provided by project.	Quantities from trackage required and design tie spacing. Prices from manufacturer or supplier.
3	Ballast	m.3	Procurement, crushing, and delivery of ballast.	Quantities from trackage required and design ballast section. Potential sources and costs to be identified through discussion with railways.
4	Turnouts	ea.	Supply and delivery of switch points, stock rails, frogs, other track materials, switch ties, and switch machines.	Quantities of main line and siding/yard turnouts from operations consultant. Costs from European experience and discussion with local suppliers.
5.1	Rail Fastening Assemblies	sets	Supply and delivery of tie inserts, elastic fasteners, and rail pads for concrete ties.	Quantities as a function of the number of ties. Prices from suppliers.
5.2	Bonded Insulated Joints	ea.	Supply and delivery of bonded insulated rail joints.	Included in signalling costs.
5.3	Bumping Posts	e a.	Supply, delivery, and installation of bumping posts required for stub end tracks.	Quantities developed from preliminary track layouts, Costs from suppliers.
6	Switch Heaters/Snow Blowers	ea.	Supply, delivery, and installation of equipment to prevent build-up of snow between switch points and stock rails and at moveable point frogs.	Quantities developed in accordance with the requirements of the operations consultant. Prices from European experience and discussion with local suppliers.
7	Ballast Mats for Noise Attenuation	m ²	Supply, delivery, and installation of rubber mats to be installed beneath the track ballast to reduce train-induced vibrations.	Quantities developed in accordance with vibration/noise levels and limits specified by technology consultant and environmental specialists on team. Costs from European experience.

SUB-SYSTEM F: TRACK

Sector 4 - Construction/Installation

item No.	Description	Units	Elements Included	Measurement and Costing Methods
1.1	Main Line Track Construction	km.	Labour and equipment required for high production construction of the basic track structure (rail, ties, and fastenings).	Length will include total main line identified within a segment, including lengths through turnouts. Costs based on estimated production rates and construction industry wages.
1.2	Siding Track Construction	km.	Labour and equipment required for construction of the basic track structure (rail, ties, and fastenings) using traditional methods.	Length will include total siding and auxilliary trackage identified within a segment, including lengths through turnouts. Costs based on estimated production rates and construction industry wages.
2	Field Welding Joints	ea.	All field welding required to join CWR strings into continuous rail and to weld turnouts.	Quantities have been based on total track length, the length of rail strings, and the number of turnouts. Costs based on estimated production rates and construction industry wages.
3.1	Main Line Turnout Construction	еа.	Work required to assemble and install a main line turnout.	Quantities as per Sector 2 - Item 4.1 plus 4.2. Costs based on estimated production rates and construction industry wages.
3.2	Yard Turnout Construction	ea.	Work required to assemble and install a yard turnout.	Quantities as per Sector 2 - Item 4.3. Costs based on estimated production rates and construction industry wages.
4	Ballasting and Surfacing	m. ³	Work required to distribute ballast on the track structure and lift, line, and surface the track to its final position.	Quantities correspond to ballast purchased. Costs based on estimated production rates and construction industry wages.
5	Rail Grinding	track-km.	Pre-operation rail grinding program to remove rail surface irregularities for ride comfort, noise, and track maintenance reasons.	Costs based on European experience. Quantities corresponding to Item 1.1.
6	Construction Bases	route-km.	Land, trackage, and facilities required to provide a base for track, catenary, and signalling construction activities.	A lump sum cost for a typical base has been developed and apportioned over the length of line which would be built from such a base.

SUB-SYSTEM G: ELECTRIFICATION

ltem No.	Description	Units	Elements Included	Measurement and Costing Methods
1.1	Single track - Independent structures.	Km.	Supply, delivery and installation of catenary conductors, grounding conductors, grounding rods, tensioning equipment clamps, fittings, catenary posts including arms and insulators, shield wire, foundations.	Length based on track layout, with typical span for catenary structure. Cost will be based on Deux-Montagnes experience and suppliers' data. Structures and foundations will be estimated from steel weight.
1.2	Double track - Independent structures.	Km.	Supply, delivery and installation of catenary conductors, grounding conductors, grounding rods, tensioning equipment clamps, fittings, catenary posts including arms and insulators, shield wire, foundations.	Length based on track layout, with typical span for catenary structure. Cost will be based on Deux-Montagnes experience and suppliers' data. Structures and foundations will be estimated from steel weight.
1.3	Double track - Portal structures.	Кт.	Supply, delivery and installation of conductors, clamps, fittings, catenary posts, foundation, catenary supports, tensioning equipment, grounding rods, or counterweight.	Length based on track layout, with typical span for catenary structure. Cost will be based on Deux-Montagnes experience and suppliers' data. Structures and foundations will be estimated from steel weight.
1.4	Triple track - Portal structures.	Km.	Supply, delivery and installation of conductors, clamps, fittings, catenary posts, foundation, catenary supports, tensioning equipment, grounding rods, or counterweight.	Length based on track layout, with typical span for catenary structure. Cost will be based on Deux-Montagnes experience and suppliers' data. Structures and foundations will be estimated from steel weight.
1.5	Yard catenary.	100 m.	Supply, delivery and installation of catenary conductors, grounding conductors, grounding rods, tensioning equipment clamps, fittings, catenary posts including arms and insulators, shield wire, foundations.	Length based on track layout, with typical span for catenary structure. Cost will be based on Deux-Montagnes experience and suppliers' data. Structures and foundations will be estimated from steel weight.
1.6	Siding catenary.	100 m.	Supply, delivery and installation of catenary conductors, grounding conductors, grounding rods, tensioning equipment clamps, fittings, catenary posts including arms and insulators, shield wire, foundations.	Length based on track layout, with typical span for catenary structure. Cost will be based on Deux-Montagnes experience and suppliers' data. Structures and foundations will be estimated from steel weight.
1.7	Garage area catenary.	100 m.	Supply, delivery and installation of catenary conductors, grounding conductors, grounding rods, tensioning equipment clamps, fittings, catenary posts including arms and insulators, shield wire, foundations.	Length based on track layout, with typical span for catenary structure. Cost will be based on Deux-Montagnes experience and suppliers' data. Structures and foundations will be estimated from steel weight.

SUB-SYSTEM G: ELECTRIFICATION Sector 4 - Construction/Installation Measurement and Costing Methods Units Flements Included Description Item No. Supply, delivery and installation of catenary Length based on track layout, with typical span for catenary 100 m. 1.8 In-station catenary. structure. Cost has been based on Deux-Montagnes experience conductors, grounding conductors, and suppliers' data. Structures and foundations have been grounding rods, tensioning equipment clamps, fittings, catenary posts including estimated from steel weight. arms and insulators, shield wire, foundations. Quantities estimated from track layout (number of crossovers). Supply, delivery and installation of section Unit 21 Crossover single (with section breaks, insulators, tensioning equipment. breaks). section insulators, conductors, potential transformers. Quantities estimated from track layout (number of crossovers). Crossover double (with section Unit. Supply, delivery and installation of section 2.2 breaks, insulators, tensioning equipment, breaks). section insulators, conductors, potential transformers. Calculated from the number of traction stations. Prices based Supply, delivery and installation of section 2.3 Phase break. Unit. breaks, insulators, tensioning equipment, on manufacturer's catalog. section insulators, conductors, potential transformers. Quantities taken from civil group (number of underbridges). Supply of special supports, delivery and 100 m. 3.1 Underbridge. installation. Quantities taken from civil group (number of overbridges). Supply of special supports, delivery and 100 m. 3.2 Overbridge. installation. Quantities determined from single line diagram. Civil works, delivery, transport and Main supply station - 230 kV. ea. 4.1 installation of the equipment as defined in the single line diagrams. Civil works, delivery, transport and Quantities determined from single line diagram. Main supply station - 120 kV. ea. 4.2 installation of the equipment as defined in the single line diagrams. Quantities determined from single line diagram. Civil works, delivery, transport and Paralleling and autotransformer 4.3 ea. installation of the equipment as defined in station. the single line diagrams. Quantities determined from single line diagram. Civil works, delivery, transport and Interface station: 2x25kV - 1x25kV 4.4 ea. installation of the equipment as defined in w/ autotransformer. the single line diagrams. 4.5 not used

SUB-SYSTEM G: ELECTRIFICATION

	Sector 4 - Construction/Installation					
Item No.	Description	Units	Elements included	Measurement and Costing Methods		
4.6	Main supply station - 315 kV.	ea.	Civil works, delivery, transport and installation of the equipment as defined in the single line diagrams.	Quantities determined from single line diagram.		
4.7	315 kV supply line from O.H. or H.Q.	Km.	Supply, delivery, and installation of a 315 kV line including structures, conductors, insulators, clamps, etc.	Lengths estimated based on desired location of the feeder stations for traction purposes and adjacent power lines.		
4.8	230 kV supply line from O.H. or H.Q.	Km.	Supply, delivery, and installation of a 230 kV line including structures, conductors, insulators, clamps, etc.	Lengths estimated based on desired location of the feeder stations for traction purposes and adjacent power lines.		
4.9	120 kV supply line from O.H. or H.Q.	Km.	Supply, delivery, and installation of a 120 kV line including structures, conductors, insulators, clamps, etc.	Lengths estimated based on desired location of the feeder stations for traction purposes and adjacent power lines.		
4.10	Control center.	Unit.	Includes supervisory controls, telecommunications, multiplex, RTU's etc.	Lump sum to include all SCADA equipment.		
5	EMI mitigation measures.	route-km.	Includes installations and special measures required to reduce interference of the 25 kV catenary on adjacent communications systems.	A typical cost has been developed based on European experience.		

SUB-SYSTEM H: STATIONS

item No.	Description	Units	Elements Included	Measurement and Costing Methods
1	Modifications to Gare du Palais, Quebec.	Lump sum.	Platforms, Concourse, Parking, Service Facilities.	Prior studies, European experience.
2	New station at Trois Rivières.	Lump sum.	Platforms, Buildings, Parking, Auto and Access Bus.	European HSR and local commuter rail station experience. Contract costs for similar work items.
3	Modifications to Central Station, Montreal.	Lump sum.	Platforms, Concourse, Parking, Services Facilities.	Prior studies, European experience.
4	Modifications to Ottawa Station.	Lump sum.	Platforms, Concourse, Parking, Services Facilities.	Prior studies, European experience.
5	New station at Kingston.	Lump sum.	Platforms, Buildings, Parking, Auto and Bus Access.	European HSR and local commuter rail station experience. Contract costs for similar work items.
6	Modifications to Union Station.	Lump sum.	Platforms, Concourse, Parking, Services Facilities and Intermodal connections.	Prior studies, European experience.
7	New Station at Yonge St/CP.	Lump sum.	Platforms, Concourse, Parking, Service Facilities, Intermodal Connections.	European HSR and local commuter rail station experience. Contract costs for similar work items.
8	New station at Hamilton/Burlington.	Lump sum.	Platforms, Buildings, Parking, Auto and Bus Access.	European HSR and local commuter rail station experience. Contract costs for similar work items.
9	New station at Kitchener/Cambridge.	Lump sum.	Platforms, Buildings, Parking, Auto and Bus Access.	European HSR and local commuter rail station experience. Contract costs for similar work items.
10	New station at Suburban London.	Lump sum.	Platforms, Buildings, Parking, Auto and Bus Access.	European HSR and local commuter rail station experience. Contract costs for similar work items.
11	New station at Downtown London.	Lump sum.	Platforms, Buildings, Parking, Auto and Bus Access.	European HSR and local commuter rail station experience. Contract costs for similar work items.
12	New station at Windsor.	Lump sum.	Platforms, Buildings, Parking, Auto and Bus Access.	European HSR and local commuter rail station experience. Contract costs for similar work items.
13	New Mirabel Airport station.	Lump sum.	Platforms, intermodal connections.	Provision in airport plan, European HSR experience, typical local unit costs.
14	New Pearson Airport station.	Lump sum.	Platforms, intermodal connections, parking, auto and bus access.	Prior studies, European HSR experience, typical local unit costs for similar work e.g. suburban commuter rail stations.

APPENDIX - B PRESENTATION OF UNIT COSTS

PRESENTATION OF UNIT COSTS

B1 - UNIT COST LISTING

ALL CORRIDORS MASTER UNIT COST FILE technology: ALL TECHNOLOGIES 10-Feb-94

ITEM	ITEM	UNITS	300 NEW	300 EXIST	200 TILT.	SOURCE /
NUMBER			LOT / UNIT	LOT / UNIT	LOT / UNIT	REMARKS
	D. S.		PRICE	PRICE	PRICE	

ALL CORRIDORS	MASTER UNIT COST FILE
technology:	
ALL TECHNOLOGIES	10-Feb-94
Valuation and a state of the st	

ITEM ITEM NUMBER	UNITS	300 NEW LOT / UNIT PRICE	300 EXIST LOT / UNIT PRICE	200 TILT. LOT / UNIT PRICE	SOURCE / REMARKS
------------------	-------	--------------------------------	----------------------------------	----------------------------------	---------------------

	SUBSYSTEM	A - RIGHT-	-OF-WAY A	CQUISITION		
65650D 4	DOCETOOLOUM CEDIMOEO / DDC /	FOT MANAGEMENT				 !
SECTOR 1	PROFESSIONAL SERVICES / PROJE Professional Services	ECT MANAGEMENT				
item i	1.1 — Surveying	%	8%	8%	8%	As a % of total cost of Sector 2
	1.2 – Solveying 1.2 – Appraisal	%	0%	0%	0%	included in item 1.1
	1.3 - Legal Expertise	%	0%	0%	0%	included in Item 1.1
item 2	Project Management	%	0%	0%	0%	As % of Sector 2 total + item 1.
Item X	Contingencies	%	20%	20%	20%	, 5 , 6 6, 6 6, 6 6, 6 6, 6 6, 6 6, 6 6
item A	Contrigencies	70	2078	2070	2070	
SECTOR 1	TOTAL: PROFESSIONAL SERVICES	/ PROJECT MANAGE	EMENT			
SECTOR 2	EQUIPMENT / MATERIALS					
item 1	Urban Land					
	1.1 - Residential	hectare				
!	1.2 - Commercial	hectare				
	1.3 – Industrial	hectare				
item 2	Rural Land					
	2.1 - Agricultural	hectare				
!	2.2 — Natural	hectare				
! item 3	Purchase of Existing Rail ROW					
:	3.1 - CN	hectare				
:	3.2 - CP	hectare				
	3.3 - VIA	hectare			4 800	
ltem X	Contingencies	%	10%	10%	10%	
SECTOR 2	TOTAL: EQUIPMENT / MATERIALS					
SECTOR 3	TRANSPORTATION / DISTRIBUTION	N				
3	Not Applicable		\$0	\$0	\$0	
SECTOR 3	TOTAL: TRANSPORTATION / DISTR	BIRLITION				
SECTOR	TOTAL: HIMAGI SHITKHON, STOR	115011011				
SECTOR 4	CONSTRUCTION / INSTALLATION					
,	Not Applicable		\$0	\$0	\$0	
•	• •					
SECTOR 4	TOTAL: CONSTRUCTION / INSTAL	LATION				
SECTOR 5	START-UP					
5	Included in Other Studies		\$0	\$0	\$0	
5	13 I date that the shade \$1.0 commerces and commerce page payor.		**	+-	**	
SECTOR 5	TOTAL: STARTUP					
	(GIAL GIANT OF					

MASTER UNIT COST FILE

technology:

ALL TECHNOLOGIES

ITEM NUMBER	ITEM	UNITS	LOT / UNIT PRICE	300 EXIST LOT / UNIT PRICE	LOT / UNIT PRICE	SOURCE / REMARKS		
					Marine Commission Comm			
SUBSYSTEM B - FARTHWORKS AND DRAINAGE								

			SUBSYSTEM	B – EARTH	WORKS AN	ID DRAINAGE		
								A construction
1	SECTOR 1		PROFESSIONAL SERVICES / PROJECT I	MANAGEMENT %	5.5%	E ED/	E 20/	As a % of total cost of Sector 2
1	Item 2		Engineering Construction Supervision	%	5.0%	5.5% 5.0%	5.5% 5.0%	As a % of total cost of Sector 2
1	Item 3		Environmental Assessment	%	0.2%	0.2%	0.2%	Items 3 and 4 are %'s of entire
1	Item 4		Feasibility Studies (Technical)	%	1%	1%	1%	project's cost less profes, fees
i	item 5		Project Management	%	5.4%	5.4%	5.4%	% of sector 2 total plus items 1 – 4
1	Item X		Contingencies	%	0%	0%	0%	70 Of Booton & form plan from 1
1			-			4,0	• 7.0	
	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PR	OJECT MANAG	EMENT			
2 2 2	SECTOR 2		EQUIPMENT / MATERIALS Not Applicable		\$0	\$0	\$0	
2	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS					
3 3 3	SECTOR 3		TRANSPORTATION / DISTRIBUTION Not Applicable		\$0	\$0	\$0	
	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUT	ION				
	SECTOR 4		CONSTRUCTION / INSTALLATION					
4	item 1		Clearing and Roadbed Preparation					
4		1.1	- Type 1 Soils	route-km	\$142,000	\$142,000	\$142,000	\$104,000 used in TM0 -B1
4		1.2	– Type 2 Soils – Type 3 Soils	route-km	\$627,000	\$627,000	\$627,000	\$437,000 used in TM0~B1
4	item 2		= Type 3 Solls Embankment Construction	route-km	\$1,035,000	\$1,035,000	\$1,035,000	\$695,000 used in TM0-B1
4	(10111 2	2.1	- Soft Excavated Material	1000 m ^3	\$3,000	\$3,000	\$3,000	
4		2.2	- Hard Excavated Material (Rock)	1000 m ^ 3	\$18,000	\$18,000	\$18,000	
4		2.3	- Borrow Material	1000 m ^ 3	\$8,000	\$8,000	\$8,000	
4		2.4	 Disposal of Unsuitable Material 	1000 m ^ 3	\$5,500	\$5,500	\$5,500	
4	ltem 3		Haulage of Fill Material					
4			(from Borrow or Excavation)	1000 m ^3-	\$0	\$0	\$0	Cost included in items B4-2.X
4	Item 4		Sub - Ballast Layers		****	0000000	****	For TM2 – B0, TM2 – D0, TM1 – B0,
4		4.1 4.2	- New ROW - Existing ROW	route-km route-km	\$228,000 \$228,000	\$228,000	\$228,000	TM1-D0,TM0-B0,TM0-B1,
4	Item 5		Drainage Systems	route-km	\$226,000	\$228,000	\$228,000	TM0-C0,and TM0-D0, \$152,000 used for cost of sub-ballast(it. 4)
4	10111 0	5.1	- Normal ROW	route-km	\$25,000	\$25,000	\$25,000	dsed for cost of sub-banast(it, +)
4		5.2	- Major Watercourse Culverts	ea.	\$35,000	\$35,000	\$35,000	
4		5.3	- Environment, Stormwater Controls		\$7,000	\$7,000	\$7,000	
4	ltem 6		Roadbed Upgrade on Existing ROW	route-km	\$600,000	\$600,000	\$600,000	
4	Item 7		Retaining Structures					
4		7.1	 Up to 3 metres in Height 	km.	\$2,500,000	\$2,500,000	\$2,500,000	
4		7.2	 Over 3 metres in Height 	km.	\$5,000,000	\$5,000,000	\$5,000,000	
4	Item 8		Intrusion Barriers	km.	\$0	\$0	\$0	Intrusion Barriers not required
4	Item 9		Noise Attenuation Structures					
4		9.1	- Barriers	km.	\$660,000	\$660,000	\$660,000	
4	Item 10	9.2	Berms ROW Security Fencing (on both sides)	km. route-km	\$165,000 \$56,000	\$165,000 \$56,000	\$165,000 \$56,000	
4	Item 11		Snow Control Measures	km.	\$50,000	\$56,000 \$0	\$56,000 \$0	Accounted for in Contingencies
4	item 12		Utility Interferences	NIII.	ΨΦ	ΨΟ	Ψ0	Accounted for in Contingencies
4		12.1	- Major Hydro Relocation	ea.	\$0	\$0	\$0	Accounted for in Contingencies
4		12.2	- Major Oil/Gas Relocation	ea.	\$0	\$0	\$0	Accounted for in Contingencies
4		12.3	•	route-km	\$0	\$0	\$0	Accounted for in Contingencies
4	item 13		Other items		_			
4		13.1	- Audit for Contaminated Soil	route-km	\$2,000	\$2,000	\$2,000	
4		13.2			\$500,000	\$500,000	\$500,000	
4	V	13.3	_ , , , , , , , , , , , , , , , , , , ,		\$100,000	\$100,000	\$100,000	
4	Item X		Contingencies	%	15%	15%	15%	
4	SECTOR 4		TOTAL; CONSTRUCTION / INSTALLATIO	NC				
5	SECTOR 5		START-UP					
5			Included in Other Studies		\$0	\$0	\$0	
5 5	SECTOR 5		TOTAL: START-UP					

MASTER UNIT COST FILE

technology: ALL TECHNOLOGIES

8	ITEM NUMBER	ITEM	UNITS	300 NEW LOT / UNIT PRICE	300 EXIST LOT / UNIT PRICE	200 TILT. LOT / UNIT PRICE	SOURCE / REMARKS
		SUBSYSTEM	C - BRID	DGES, VIADU	JCTS, AND	TUNNELS	
		——————————————————————————————————————			,		
					Katharan mada kabun Marin Marin Marin M		
	SECTOR 1	PROFESSIONAL SERVICES / PROJECT					
1	item 1	Engineering	%	5.5%		5.5%	As a % of total cost of Sector 2
1	Item 2	Construction Supervision	% %	5.0%		5.0%	As a % of total cost of Sector 2
1	Item 3	Project Management	%	5.4%		5.4%	% of sector 2 total plus items 1 - 2
1	Item X	Contingencies	%	0%	0%	0%	
	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PR	OJECT MAN	NAGEMENT			
2	SECTOR 2	EQUIPMENT / MATERIALS					
2		Not Applicable		\$0	\$0	\$0	
2							
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS					
	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3	SECTORS	Not Applicable		\$0	so so	\$0	
3		Not Applicable		30	30	4 0	
-	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUT	ION				
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	Bridges					
4		1.1 - Small Rivers (< 30 metres)	ea.	\$340,000	\$340,000	\$340,000	
4		1.2 - Extra at 1.1 for Height Over 10 m.	ea.	\$85,000	\$85,000	\$85,000	
4		1.3 - Interm. Rivers (30 - 100 metres)	lin. m.	\$23,500	\$23,500	\$23,500	
4		1.4 - Extra at 1.3 for Height Over 10 m.	lin. m.	\$6,000	\$6,000	\$6,000	
4		1.5 - Large Rivers (100 - 250 metres)	lin. m.	\$42,000	\$42,000	\$42,000	
4		1.6 - Extra at 1.5 for Height Over 10 m.	lin. m.	\$10,500	\$10,500	\$10,500	
4		1.7 - Major Rivers (over 250 m.)	lin. m.	\$50,000	\$50,000	\$50,000	
4		1.8 - Extra for Difficult Foundation Cond	. lin. m.	\$5,000	\$5,000	\$5,000	
4		1.9 - Modif. to Exist. Bridges (new deck) lin. m.	\$13,000	\$13,000	\$13,000	
4	Item 2	Viaducts					
4		2.1 - Viaducts over 250 metres in Lengt	h lin.m.	\$27,000		\$27,000	
4		2.2 - Extra for Height Over XX metres	lin. m.	\$8,000	\$8,000	\$8,000	
4		2.3 - Extra for Difficult Foundation Cond	. lin. m.	\$4,000	\$4,000	\$4,000	
4	item 3	Tunnels (Double Track)					
4		3.1 — In Soft Ground	lin. m.	\$70,000		\$70,000	5. ,
4		3.2 - In Rock	lin. m.	\$50,000		\$35,000	
4		3.3 - Modifications to Existing Tunnels	lump sum			\$0	
4		3.4 - Noise Mitigation Measures	lump sum			\$0	
4	ltem X	Contingencies	%	10%	6 10%	10%	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATION	N				
_	ACATAR 5	CTART IID					
5 5	SECTOR 5	START-UP Included in Other Studies		6.4	,	**	
5 5		included in Other Studies		\$0	\$0	\$0	
	SECTOR 5	TOTAL: START-UP					

ALL CORRIDORS
technology:
ALL TECHNOLOGIES

MASTER UNIT COST FILE

10-Feb-94

ITEM ITEM UNITS 300 NEW 300 EXIST 200 TILT. SOURCE /
NUMBER LOT / UNIT LOT / UNIT LOT / UNIT REMARKS
PRICE PRICE PRICE

			PRICE	PRICE	PRICE	
H						
	SUBSYSTEM D	<u> – GRAD</u>	DE SEPARAT	<u>IONS</u>		
	4 4					
			Maria Commission and American State of the Commission of the Commi	·	The second secon	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT MA	ANAGEMEN	JT			
1 item 1	Engineering	%	5.5%	5.5%	5.5%	As a % of total cost of Sector 2
1 Item 2	Construction Supervision	%	5.0%	5.0%	5.0%	As a % of total cost of Sector 2
1 item 3	Project Management	%	5.4%	5.4%	5.4%	% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	0%	0%	0%	
1						
1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PRO	JECT MAN	AGEMENT			
2 SECTOR 2	EQUIPMENT / MATERIALS					
2 36010112	Not Applicable		\$0	\$0	\$0	
2	(tot Hphioadio		40	40	75	
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS					
	,					
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3	Not Applicable		\$0	\$0	\$0	
3						
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUTION	N				
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 SECTOR 4	New Grade Separations, Rural					
4	1.1 - 2 Lane Highways	ea.	\$2,200,000	\$2,200,000	\$2,200,000	
4	1.2 - 2 Lane Highways, Dual ROW	ea.	\$2,800,000		\$2,800,000	
4	1.3 - 4 Lane Highways	ea.	\$3,100,000		\$3,100,000	
4	1.4 - 4 Lane Highways, Dual ROW	ea.	\$3,565,000	\$3,565,000	\$3,565,000	
4	1.5 - Major Highways (401, 20, etc)	ea.	\$4,450,000		\$4,450,000	
4	1.6 - Extra for Difficult Foundation Cond.	ea.	\$180,000	\$180,000	\$180,000	
4 !tem 2	New Grade Separations, Urban				44.000.000	
4	2.1 - Secondary Highways (2-4 lanes) 2.2 - Second. Hwys (2-4 l.) Dual ROW	ea. ea.	\$4,068,000 \$4,456,000	\$4,068,000 \$4,456,000	\$4,068,000 \$4,456,000	
4	2.3 - Major Highways (over 4 lanes)	ea.	\$5,300,000	\$5,300,000	\$5,300,000	
4	2.4 — Extra for Difficult Foundation Cond.	ea.	\$200,000	\$200,000	\$200,000	
4 Item 3	Modification of Exist. Grade Separations		4	+===,===	V	
4	3.1 - Urban	ea.	\$830,000	\$830,000	\$830,000	
4	3.2 - Rural	ea.	\$627,000	\$627,000	\$627,000	
4 Item 4	Automatic Crossing Protection	ea.	\$270,000	\$270,000	\$270,000	
4 Item 5		m, of road	\$280,000	\$280,000	\$280,000	
4 Item 6	Private Farm Crossings	ea.	\$300,000	\$300,000	\$300,000	
4 tem 7	Major Wildlife Passages	ea. %	\$500,000 15%	\$500,000	\$500,000 20%	
4 item X	Contingencies	76	15%	15%	20%	
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATION	4				
5 SECTOR 5	START-UP					
5	Included in Other Studies		\$0	\$0	\$0	
5	TOTAL: START-UP					
5 SECTOR 5	TOTAL START OF					

MASTER UNIT COST FILE

technology:

ALL TECHNOLOGIES

A CONTRACTOR OF THE PROPERTY O			General Section of the Control of th	ANGERS OF THE PROPERTY OF THE		
ITEM NUMBER	ITEM	UNITS	ì	300 EXIST LOT / UNIT PRICE	LOT / UNIT PRICE	SOURCE / REMARKS

		SUBSYSTEM	E – OTHER	RACCOMO	DATION WO	RKS	
			····	20-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-00-18-0			
1	SECTOR 1	PROFESSIONAL SERVICES / PROJEC	T MANAGEMENT				
1	Item 1	Engineering	%	5.5%	5.5%	5.5%	As a % of total cost of Sector 2
1	item 2	Construction Supervision	%	5.0%	5.0%	5.0%	As a % of total cost of Sector 2
1	Item 3	Project Management	%	5.4%	5.4%	5.4%	% of sector 2 total plus items 1-2
1	Item X	Contingencies	%	0%	0%	0%	
	SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MANA	GEMENT			
2	SECTOR 2	EQUIPMENT / MATERIALS					
2		Included in Construction / Installat	on	\$0	\$0	\$0	
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS					
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3		included in Construction / Installat	ion	\$0	\$0	\$0	
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION				
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	Removal of Rail Lines	km.	\$21,134	\$21,134	\$21,134	
4	Item 2	Construction of New Access Tracks	km.	\$644,750	\$644,750	\$644,750	
4	item 3	Rail/Rail Grade Separation 3.1 - Rural	ea. ea.	\$800,000	\$800,000	\$800,000	
4		3.1 – Rural 3.2 – Urban	ea. ea.	\$1,000,000	\$1,000,000	\$1,000,000	
4	Item 4	Other Particular Items:	оц.	\$1,000,000	\$1,000,000	4 ,,400,000	
4	ileni 4	4.1 - Sub-Item	lump sum				
4		4.2 - Sub-Item	lump sum				
4		4.3 - Sub-Item	lump sum				
4		4.4 - Sub-Item	lump sum				
4	item X	Contingencies	%	30%	30%	30%	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	TION				
5	SECTOR 5	START-UP					
5		Included in Other Studies		\$0	\$0	\$0	
5		TOTAL: START-UP					

ALL CORRIDORS technology:
ALL TECHNOLOGIES

MASTER UNIT COST FILE

	TEW IUMBER	ITEM	UNITS	300 NEW LOT / UNIT PRICE	300 EXIST LOT / UNIT PRICE	200 TILT. LOT / UNIT PRICE	SOURCE / REMARKS
		рительный менен на принципальный референципальный принципальный принцип	***********************	Control of the Contro	Managaria de la companya de la comp		летинает Десонинает
		SUBSYSTEM	F - TRA	<u>CK</u>			
		anna anna anna anna anna anna anna ann				POPULATION CONTRACTOR OF THE POPULATION OF THE P	NAME OF THE PARTY
	OF OTO 5	DEOCESCIONAL CERVICES / DEO JECT	14 A N I A C T 14 T	NIT			
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT Engineering	WANAGEWE	3.5%	3.5%	3.5%	As % of total for Sectors 2 and 4
1	Item 2	Construction Supervision	%	10%		10%	As % of total for Sector 4
1	Item 3	Materials Procurement	%	4%		4%	As % of total for Sector 2
1	Item 4	Project Management	%	5.4%	5.4%	5.4%	As % of Sectors 2,4 totals plus
1	item X	Contingencies	%	0%	0%	0%	items 1-3
1							
1 :	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PR	ROJECT MAN	NAGEMENT			
2 :	SECTOR 2	EQUIPMENT / MATERIALS					
2	item 1	Rail					
2		1.1 - Main Line	t.	\$773	\$ \$773	\$773	
2		1.2 - Siding	t.	\$773		\$773	
2	item 2	Ties	ea.	\$45	\$45	\$45	
2	Item 3	Ballast	m ^ 3	\$21	\$21	\$21	
2	item 4	Turnouts				2002.000	
2		4.1 - High Speed	ea.	\$280,000		\$280,000	
2		4.2 Medium Speed 4.3 Yard	ea. ea.	\$135,000 \$46,000		\$135,000 \$46,000	
2	Item 5	Other Track Material	ea.	\$40,000	340,000	νου, υνφ	
2	1.011.0	5.1 - Rail Fastening Assemblies	set	\$27	7 \$27	\$27	
2		5.2 - Bonded Insulated Joints	ea.	\$0		\$0	Included in Signalling costs
2		5.3 - Bumping Posts	ea.	\$3,120	\$3,120	\$3,120	
2	item 6	Switch Heaters/ Snow Blowers	ea.				
2		6.1 - Main Line	ea.	\$105,000		\$105,000	
2	(b 77	6.2 - Siding	ea.	\$11,800	-	\$11,800	
2	Item 7 Item X	Ballast Mats for Noise Attenuation Contingencies	m ^ 2 %	\$60 5%		\$63 5%	
2	Hom A	Contangencies	76	37	3 78	370	
	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS					
	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3		(included in Equipment / Materials)		\$0	50	\$0	H
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	TION				
•	02010110						
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	Track Construction					
4		1.1 - Main Line	km.	\$18,21			
4	làm ma O	1.2 - Yard	km.	\$44,17		\$44,175	
4	Item 2	Field Welded Joints Turnout Construction	ea.	\$2,02	8 \$2,028	\$2,028	
4	Hein 3	3.1 - High and Med. Speed (Main Line)	ea.	\$20,45	5 \$20,455	\$20,455	ì
4		3.2 - Yard	ea.	\$4,68			
4	item 4	Ballasting and Surfacing	m ^ 3	\$8.4			
4	ltem 5	Rail Grinding	track - km				
4	Item 6	Construction Bases	route-km				
4	Item X	Contingencies	%	69	% 6%	6%	i
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATI	ON				
-	JEG, 011 4	. J. m. John Committy mornes					
5	SECTOR 5	START-UP					
5		Included in Other Studies					
5	0E0T05 -	TOTAL OTABLE LIP					
5	SECTOR 5	TOTAL: START-UP					

MASTER UNIT COST FILE

technology:

ALL TECHNOLOGIES

ITEM NUMBER		ITEM	UNITS		300 EXIST LOT / UNIT PRICE	200 TILT. LOT / UNIT PRICE	SOURCE / REMARKS
	Samon			77.57729mmm37m30m3017m131m12HASA			and the same of th
		SUBSYSTEM	G - ELE	CTRIFICATIO	<u>N</u>		1000
1 SECTOR 1	PR	OFESSIONAL SERVICES / PROJECT M	1ANAGEME	NT			
1 (tem 1		gineering	%	5.5%	5.5%	5.5%	As % of total for Sector 4
1 Item 2 1 Item 3		nstruction Supervision	%	5.0%	5.0%	5.0% 5.4%	As % of total for Sector 4 % of sector 4 total plus items 1 – 2
1 Item 3 1 Item X		oject Management Intingencies	% %	5.4% 0%	5.4% 0%	5.4% 0%	% or sector 4 total plus items 1-2
1	00	itti igericies	/0	V 76	078	V/0	
1 SECTOR 1	то	TAL: PROFESSIONAL SERVICES / PRO	DJECT MAN	NAGEMENT			
2 SECTOR 2	EC	QUIPMENT / MATERIALS					
2		(included in Construction / Installation)	\$0	\$0	\$0	
2	то	TAL - FOUNDAMENT / MATERIAL O					
2 SECTOR 2	10	TAL: EQUIPMENT / MATERIALS					
3 SECTOR 3	TR	ANSPORTATION / DISTRIBUTION					
3		(included in Construction / Installation)	\$0	\$0	\$0	
3		•	,				
3 SECTOR 3	TO	TAL: TRANSPORTATION / DISTRIBUTI	ON				
4 SECTOR 4	cc	INSTRUCTION / INSTALLATION					
4 tem 1		pical Catenary					
4	1.1	- Single Track - Independent Struct.	km.	\$175,000	\$175,000	\$175,000	
4	1.2	- Double Track - Independ, Struct.	km.	\$350,000	\$350,000	\$350,000	
4	1.3	- Double Track - Portal Structures	km.	\$400,000	\$400,000	\$400,000	
4	1.4	 Triple Track — Portal Structures 	km.	\$460,000	\$460,000	\$460,000	
4	1.5	 Yard Catenary 	100 m.	\$13,500	\$13,500	\$13,500	
4	1.6	 Sidings Catenary 	100 m.	\$13,500	\$13,500	\$13,500	
4	1.7	 Garage Area Catenary 	100 m.	\$13,500	\$13,500	\$13,500	
4	1.8	- In-Station Catenary	100 m.	\$17,500	\$17,500	\$17,500	
4 Item 2		urticular Catenary Installations		#A0A AAA	6200.000	\$290.000	
4	2.1 2.2	 Xover Single (with section breaks) Xover Double (with section breaks) 	ea. ea.	\$280,000 \$369,000	,	\$280,000 \$369,000	
4	2.3	- Phase Break	ea.	\$1,052,000	•	\$1,052,000	
4 Item 3		pecial Catenary Structures		4.10-01-0	+1,100-1000	V.,002,000	
4	3.1	- Underbridge	100 m.	\$10,000	\$10,000	\$10,000	
4	3.2	- Overbridge	100 m.	\$15,000	\$15,000	\$15,000	
4 tem 4		ower Supply					
4	4.1	- Main Supply Station, 230 kV	ea.	\$5,355,000		\$5,355,000	
4	4.2	- Main Supply Station, 138 - 120 kV		\$4,075,000		\$4,075,000	
4	4.3	- Paralleling and Auto-transf. Stn	ea.	\$730,000		\$730,000	
4	4.4	- 2x25 - 1x25 Interface Station	ea.	\$925,000		\$925,000	
4	4.5	not used	98.	\$0		\$0	
4	4.6	- Main Supply Station, 315 kV	88.	\$6,380,000		\$6,380,000	
4	4.7	- 315 kV Supply Line	ea.	\$252,500		\$252,500	
-	4.8	 230 kV Supply Line 120 kV Supply Line 	km.	\$170,300		\$170,300	
4	4.9 4.10	- 120 KV Supply Line - Control Center	km. ea.	\$132,200 \$200,000		\$132,200 \$200,000	
4 Item 5		VI Mitigation Measures	route-km			\$5,000	
4 Item X		ontingencies	%	15%		15%	
4							
4 SECTOR 4	TO	OTAL: CONSTRUCTION / INSTALLATIO	N				
5 SECTOR 5	S	TART-UP					
5		Included in Other Studies					
5 5 SECTOR 5	τ	OTAL: START-UP					

ALL CORRIDORS	MASTER UNIT COST FILE
technology:	
ALL TECHNOLOGIES	10-Feb-94

ITEM NUMBER	ITEM	UNITS	300 NEW LOT / UNIT PRICE	300 EXIST LOT / UNIT PRICE	200 TILT. LOT / UNIT PRICE	SOURCE / REMARKS
	SUBSYSTEM	H - STA	TIONS			0.000
		THE PROPERTY OF THE PROPERTY O				Determinent
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEME	ENT			
1	Engineering	%	5.5%	5.5%	5.5%	As a % of total for Sector 2
1 Item 2	Construction Supervision	%	5.0%	5.0%	5.0%	As a % of total for Sector 2
1 Item 3	Project Management	%	5.4%		5.4%	% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	0%	0%	0%	
1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAN	NAGEMENT			
2 SECTOR 2 2 2	EQUIPMENT / MATERIALS (included in Construction / Installati	on)	\$0	\$0	\$0	
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS					
3 SECTOR 3 3 3	TRANSPORTATION / DISTRIBUTION (included in Construction / Installati	on)	so	\$0	\$0	
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	NOITU				
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 Item 1	Individual Station (location, name)	lump sum	\$0		\$0	
4 Item 2	Individual Station (location, name)	lump sum	\$0		\$0	
4 Item 3	Individual Station (location, name)	lump sum	\$0	**	\$0	
4 tem 4	Individual Station (location, name)	lump sum	\$0		\$0	
4 Item X	Contingencies	%	10%	10%	10%	
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION				
5 SECTOR 5	START-UP					
5	Included in Other Studies		\$0	\$0	\$0	
5 SECTOR 5	TOTAL: START-UP					

c:\canarail\92-204\workpk2\mstrcost.wk3

PRESENTATION OF UNIT COSTS

B2 - DEVELOPMENT OF INDIVIDUAL UNIT COSTS

Date:			Page: <u></u> of <u></u>					
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING								
Technology: 결	350 kph - new ROW 350 kph - exist. ROW 250 kph - exist. ROW	Sub-system: Sector: Item:	- BCDEGH I - PROK SERVICES					
Geographical Variation ? 🗹 no 🔲 yes If yes, indicate segments applicable:								
Percentages for professional services have been developed by the Consultant using information about similar costs for large transit projects throughout North America, costs from TGV experience in France, and additional consideration in view of the scope of the project and potential for economies of scale. The percentages retained for use are:								
		appliedapplied						
·		applied to construction						
These equate to an amount of 16.5% on top of the construction cost of the project to cover professional services. They compare to figures of 20% and higher for North American transit projects, 19% for the "Let's Move" TTC expansion in Toronto, and 15% for the TGV, although it should be noted that much of the detailed engineering in Europe is performed by the Contractor. In the case of Project Management shown above, the 5.4% applied to construction and engineering costs is equivalent to 6.0% applied to construction costs only (the more								
traditional approach).								
In reviewing costs on other projects, it is noted that these percentages for "administration costs" generally include a minimum of 2% of agency or owner cost. A similar amount can be assumed to be included here.								
Prepared by:			continued					

Date:			and a second sec	Page: <u>1</u> of <u>5</u>				
C	QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING							
Technology:	30	IO+ kph - new R/W IO+ kph - exist. R/W IO+ kph - exist. R/W		B - EARTHWORKS 4 - CONSTRUCTION 1 - CLEARING				
Geographical Varia	Geographical Variation ? In no In yes If yes, indicate segments applicable:							
1.1 - Type 1 Soi	1.1 - Type 1 Soils							
Assume	Assume a 50 m wide corridor - (per/km)							
1,000 m	x 50 m	$n = 50,000 \text{ m}^2 = 5 \text{ ha}$	***************************************					
		23 m average	e					
				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
		<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>	0.30 m					
			Ţ					
			Della	decimals the control of the terror Heavill Mile Metales (Management and America)				
	,		opsoil and replace					
		WITH Selec	eted material					
/1\	looring	(soranor work):						
(1)		- (scraper work): 5 ha @ \$5,000/ha = \$2	5 000/km	entelektrick mit deutscheiter (WV WINTSMAN) et de let entelemmen megengeppipp				
) Ha @ \$5,000/Ha = \$2	5,000/KIII					
(2) E	xcavati	on of unsuitable material	and backfill:					
12-7		23 x 0.3 x 1,000 m/km						
		The second secon						
(Case 1 -	· 2a) Assuming 5 km hau	lage					
(2.a1)	Exc → 6,900 m³/km @ \$:	$2.5/m^3 = $17,250/km$					
((2.a2) Disposal → assuming 5 km haulage @ \$0.60 per m³/km							
		\$3.0/m³ x 6,900	$m^3/km = $20,700/km$					
Prepared by:				continued 🗹				

Date:				Page: <u>2</u> of <u>5</u>			
mulli-delicitic cast in George (Constitution of Proceedings of the Indiana)	QU	EBEC-ONTARIO HIGH UNIT COSTS FOR PRI		OJECT			
Technology:		300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	B - EARTHWORKS 4 - CONSTRUCTION I - CLEARING			
Geographical V	/ariatio	n? Ino yes If yes, inc	licate segments applica	ble:			
	Case	e 2 - 2b) If all backfill is borro	w material, assuming 1	0 km avg. haulage			
	(2.b1) \$17,250/km (same as in 2.a1)						
	(2.b	2) \$20,700/km (same as in	2.a2)				
	(2.b3) Excavation, placement and compaction of selected material: 6,900 m³ @ \$3/m³ = \$20,700/km						
	(2.b4) Haulage @ \$0.50 per m³/km \$5.0/m³ x 6,900 m³/km = \$34,500/km						
(3)	(3) Demolition of buildings and other structures Lump sum \$10,000/km (assuming an average of 2 houses/km)						
Total	Item 1	1.1					
	Cas	e 1 - Total = [(1) + (2a) + (3)]	+ 10% allowance for	misc. items			
	(No borrow. Free haulage) = \$80,000/km						
	Case 2 - Total = $[(1)+(2b)+(3)]+10\%$ allowance for misc. items						
	(All	borrow. 10 km haulage) = 5	\$142,000/km				
and the second of the second o	Cas	e 3 - Average of Case 1 & C	ase 2 = \$111,000/km				
Prepared by:	.**			continued 🗹			

Date:		Per de Libertonia de la companya de			- Line	Page: <u>3</u> of <u>5</u>		
op en mer y mysjogisty rejs disseliele de jo nder de fyr pen ei de fyr en de fer en disseliele de st	QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT							
	UNIT COSTS FOR PRELIMINARY ROUTING							
Technology:		300+ k	ph - new l ph - exist. ph - exist.	R/W		B - EARTHWORKS 4 - CONSTRUCTION 1 - CLEARING		
Geographical V	ariatio	n ? 🔲 no	□ yes	If yes, in	dicate segments applica	ole:		
	1.2 - Type 2 Soils; 1.3 - Type 3 Soils							
Assume a 50 m wide corridor - (per km)								
1,000	x 50	m = 50,0	000 m ² =	5 ha	PHPID - MANAGEMENT			
***************************************		***************************************						
		_		w	-			
		i						
				Geotexti	ile ile			
					/////// d			
		. •			T			
ltem '	1.2 : d	= 1.5 m	; w = 23	m	maga masamu sama sama dasan masaha sama masa 1 daha 1 1991 - mpasa masamu sa	anno carllada i Sarinis, emprejarente en		
ltem '	1.3 : d	= 2.0 m	; w = 31	m				
(1)	Clea	ring (scra	per) = \$2	5,000/kr	m (same as in 1.1)			
(2)	Exca	avation ar	nd backfill:					
	for l	tem 1.2:	23 x 1.5	x 1,000	= 34,500 m ³ /km			
1144.6., 384.1.114.5.	for I	tem 1.3 :	31 x 2 x	1,000 =	62,000 m ³ /km			
	Cas	e 1 - (2a)	If backfill	material	is hauled from excavation	on item, free haulage		
	Item	າ 1.2:	(2.a1)	Exc → 34	,500 m³/km @ \$2.5/m³	= \$86,250/km		
			(2.a2)	Disposal	→ assuming 5 km haula	ge @ \$0.60 per m³/km		
			_	0.60 x 5	$\times 34,500 = $103,500$	/km		
					\$40 A 100 T	F-#		
Prepared by:						continued 🔽		

Date:						Page: <u>4</u> of <u>5</u>
understütelige gegen mit der der der gegen der der der gegen der	QUE				I SPEED RAIL PR	OJECT
Technology:		300 + k 300 + k	ph - new ph - exis ph - exis	R/W t. R/W	Sub-system: Sector:	B - EARTHWORKS 4 - CONSTRUCTION 1 - CLEARING
Geographical V	/ariatior	n ? 🔲 no	☐ yes	If yes, inc	dicate segments applica	ble:
	ltem	1.3:	(2.a1)	Exc → 62,	000 m ³ /km @ \$2.5/m ³	= \$155,000/km
			(2.a2)		→ assuming 5 km haulag x 62,000 = \$186,000	, pro
	Case	2 - (2b)	If all bac	kfill is borr	row material, assuming	10 km avg. haulage
	Item	1.3:	(2.b1)	\$155,000	D/km (same as in 2.a1)	
			(2.b2)	\$186,000	O/km (same as in 2.a2)	
-			(2.b3)	Excavation	on, placement and comp	paction of selected
				material:		
	***************************************			62,000 x	(3 = \$186,000/km	
			(2.b4)		@ \$0.50 per m ³ /km 0 x 62,000 = \$310,00)O/km
	ltem	1.2:	(2.b1)	\$86,250	/km (same as in 2.a1)	
			(2.b2)	\$103,50	O/km (same as in 2.a2)	
			(2.b3)	\$34,500	x 3 = \$103,500/km	
			(2.b4)	\$10 x 0.	.50 x 34,500 = \$172,5	500 km
		,,,,				
Prepared by:						continued

Date:			Page: <u>5</u> of <u>6</u>				
Ql	QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING						
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sub-system: Sector: Item:	B - EARTHWORKS 4 - CONSTRUCTION 1 - CLEARING				
Geographical Variati	ion ? \square no \square yes If yes, inc	dicate segments applical	ole:				
(3) De	molition of structures = lump	sum = \$10,000/km					
(4) Ge	otextile @ \$3/m²						
	23 x 1000 x 3 = \$69,00	00/km					
Total Item	1.2						
Ca	se 1 : [(1) + (2a) + (3) + (4)] +	10% allowance for misc	c. items				
(Ne	o borrow. Free haulage) =	\$323,000/km					
Са	se 2: [(1)+(2b)+(3)+(4)]+	10% allowance for misc	c. items				
(A)	ll borrow. 10 km haulage) = \$	627,000/km	-				
Ca	Case 3 : Average of Case 1 & Case 2 = \$475,000/km						
Total Item	Total Item 1.3						
Ca	use 1 : [(1) + (2a) + (3) + (4)] +	10% allowance for misc	c. items				
(N	o borrow. Free haulage) =	\$490,000/km					
Са	ase 2: [(1)+(2b)+(3)+(4)] +	10% allowance for mis	c. items				
(A	ll borrow. 10 km haulage) = \$	\$1,035,000/km					
Ca	ase 3 : Average of Case 1 & C	ase 2 = \$763,000/km					
Prepared by:	August Au		continued \Box				

Date:				Page: <u>/</u> of <u>2</u>
rider and a fill of the state o	QUI	EBEC-ONTARIO HIGH UNIT COSTS FOR PRE		OJECT
Technology	/:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W		B - EARTHWORKS 4 - CONSTRUCTION 2 - EMBANKMENT
Geographic	al Variation	n ? \square no \square yes If yes, ind	licate segments applica	ble:
		ENT CONSTRUCTION		
	n (free hau t and comp	lage of 500 m in either direc	tion of embankment, al	ong R.O.W.);
2.1 - S	oft excavat	ed material (scraper; small d	ozer work) = \$3/m ³	
2.2.a - 9	Soft rock (la	arge dozer work) = \$15/m ³)	. 11.2 11.2 (
	,) Use \$18	J/m³
2.2.b - H	ard rock (b	lasting required) = \$25/m ³)	
		and talking shiftly in the contract of an interest of the contract of the cont		
2.3 - B	orrow mate	erial		
<u>(</u>	soil excavat	tion) = \$3/m ³		
		L	3/1	3
А	ssuming 5	km avg. hauling @ $$0.60/m$ = $$6/m^3$	*/km = \$3/m* + \$3/m	annan manusan manusahan manusah adak apin pengunungan daka tahun 1999 P
		— 40/111		
Α	ssumina 1	0 km avg. hauling @ \$0.50/r	$m^3/km = \$5/m^3 + \$3/i$	m ³
		$= \$8/m^3$		
Sec. 17. WEIGH 171 properties and the second second	al hira hillion a san an a	hallakkikkikiteliffikkikitellifalmatta madalmaha madala at samukaniman manun manun manun manun manun manun man		astronominalista dibinalista ataba (6,4 km² tristep permananta masa dibin pepermanan
S	oft rock ex	cavation = \$15/m³		
Δ	ssuming 1	0 km avg. hauling @ \$0.50/i	m³/km	ре егр 1.6-, делиниеты слигинини илт деприментического сет 111 т. 11-т.
		$= $5/m^3 + $15/$	m³	
		= \$20/m ³		
or attacks	,			
			Andrew Statement	· · · · · · · · · · · · · · · · · · ·
Prepared b	oy:			continued 🗹

Date:			Page: 2 of 2					
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING								
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sector:	B - EARTHWORKS 4 - CONSTRUCTION 2 - EMBANKMENT					
Geographical Variation	n ? \square no \square yes If yes, inc	licate segments applica	ble:					
2.4 - Disposal of un								
Excavation	= \$2.5/m³							
	suming 5 km haulage @ \$0.0	60/m³/km)						
	= \$0.6 x 5							
	= \$3/m³							
Total cost	= \$5.5/m ³							
			and naturalist allasticises. Participate and experience and participate and observed the experience of					
			econyano economica (Admicalo) e e e e e e e e e e e e e e e e e e e					
·····								
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,								
	garganan mananan mananan mananan mananan mananan da barkatist bahat saltista di ista ta ta ta ta ta ta ta ta t							
Prepared by:			continued \Box					

Date:			Page: <u>/</u> of <u>/</u>				
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING							
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W		B - EARTHWORKS 4 - CONSTRUCTION 4 - SUB - BALLAST				
Geographical Variation	n ? \square no \square yes If yes, inc	licate segments applica	ble:				
ITEM 4 - SUB-BALL	AST LAYER:						
(i) @ \$15/m³ w	vith borrow material						
(1) @ \$15/111 4		and the state of t					
Assuming a	0.9 m layer						
	14 m						
<u></u>		16.64 - 1.46444000000000000000000000000000000000	A CALLEST CO.				
0.9 m		1.5					
_		3	TOTAL				
<u></u> [-	(14 + 16.7) 2 X 0.9 X 1000	+ 10% allowance x	\$15/m ³				
	= \$228,000/km						
(ii) With availab	ole material, rate to be adjust	ed to eliminate haulage	@ \$0.50/m³/km for				
	gth of 10 km, i.e., use a rate						
	= \$152,000/km						
Prepared by:	***************************************		continued \Box				

Date:				Page: _L of _L			
	QUI	EBEC-ONTARIO HIGH UNIT COSTS FOR PRI		KOJECT			
(Contrology, amail ,				B - EARTHWORKS 4 - GONSTRUCTION 5 - DRAINAGE			
Geograp	ohical Variation	n ? 🗆 no 🗖 yes If yes, ind	dicate segments applica	bie:			
5.1	Normal R.O.	W:					
(1)		no. 450 to 900 mm balancii /m x 25 m x 4 = \$7,500/km	alla (1) p. p. p. maran (1)				
(2)	(2) Assuming 50% of the route requires 200 mm subdrains on both sides \$10/m x 1,000 m = \$10,000/km						
(3)	Assuming \$	5,000/km for other drainage	items				
5.2	= \$	+ (3)] + 10% allowance for r 25,000/km rcourse Culverts	niscellaneous items				
		-0 m (4 m dia.) culvert includ 5/m x 40 m = \$35,000 eac					
5.3 Environmental Stormwater Controls							
Cost of settlement pond = \$70,000 including excavation for 50 x 30 x 2 m deep por one inlet, one outlet and restoration of site.							
Assume provision of one settlement pond for every 10 km, use rate of \$7,000 per route-km.							
Prepare	ed by:			continued			

Date:			Page: <u>/</u> of <u>/</u>
QUI	EBEC-ONTARIO H UNIT COSTS FOR	IGH SPEED RAIL I	· · · · · · · · · · · · · · · · · · ·
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W		n: <u>B - EARTHWORKS</u> r: <u>A - CONSTRUCTION</u> n: <u>G - ROADBED UPGRADE</u>
Geographical Variation	n? 🗆 no 🔲 yes If yes	, indicate segments appl	icable:
	UPGRADE ON EXISTING		
Exis	ting embankment	in	Assume 2 m
Benching of	existing slope = sq	$t 2^2 + 3^2$	
	= 3,0	31 m² @ \$40/m²	
	= \$1	45/m 	
Embankmen	t construction = 16	.7 x 2	
with borrow		.4 m³ @ \$8/m³ 68/m	
Add	50% for working in clos	e proximity of operation	
	= \$4	02/m	
Total cost		145 + \$402) + 10% al	lowance for misc. items
Prepared by:			continued \Box

Date:	((((((((((((((((((((((((((((((((((((((THE STATE OF THE S	POOCOCCOPPORTING INCOME PROPERTY OF THE PROPER	ooosoonooooonaa ka keesa maara maara maara ka	Page: /_ of /_			
	QU			H SPEED RAIL PF	OJECT			
NEEDELEN SECTION SECTI	galaga kana di kalaka kana di k	UNIT COST	S FOR PF	RELIMINARY ROUTING				
Technol	ogy: \square	300 + kph - new 300 + kph - exis 200 + kph - exis	t. R/W		B - EARTHWORKS 4 - CONSTRUCTION 7 - RET. WALLS			
Geograp	hical Variation	n?□no□yes	If yes, ir	dicate segments applica	ble:			
7.1	Up to 3 Met	res in Height						
	Concrete		= \$1,60	0/m				
	Excavation/b	packfill	= \$100/	m				
	Reinforceme	nt	= \$300/	m				
	Total		= \$2,00	0/m				
					N			
	Add 20% fo	r difficult foundat	ion and si	te constraints = \$2,500	o/m say			
7.2	Over 6 Metr	es in Height						
	Concrete	A THE STATE OF THE	= \$3,20	O/m				
	Excavation/b	packfill	= \$200/m = \$600/m = \$4,000/m					
	Reinforceme	ent						
	Total	MATERIAL OF THE STATE OF THE ST						
	Add 20% fo	or difficult foundat	ion and si	te constraints = \$5,000)/m say			
,								
				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				

			•••••					
	·····							
	on a second balance of the second balance of	erapetista, tava tartaera, viintee PhatMillian ee estimmeerine	lean la control and an analysis of the second se	(1) and (1) an	ad Palal Bakera papara and a salah da salah da salah 1117NN, esemana adalah 1520 menangan basar salah salah sa			
Prepare	d by:				continued \square			

Date:		Page: <u>I</u> of <u>I</u>
	QUEBEC-ONTARIO HIGH SPEED RA UNIT COSTS FOR PRELIMINARY ROL	-
Technology:		vstem: <u>B</u> - <u>EARTHWORKS</u> lector: <u>4</u> - <u>Construction</u> Item: <u>9</u> - <u>Noise BARRIERS</u>
Geographical Va	ariation ? \square no \square yes If yes, indicate segments	applicable:
ITEM 9	NOISE ATTENUATION STRUCTURES	
9.1	Barriers	
	Assuming 3 m in height:	
***************************************	from MTO Unit rates = \$600/m	
	Add 10% allowance for miscellaneous items = :	\$660,000/km
9.2	Berms	
	Assuming all borrow material, average hauling o	f 10 km @ \$11/m³
	15m ² x 1,000m x 11/m ³ = \$165,000/km	
11-1-11-11-11-11-11-11-11-11-11-11-11-1		
- 2		
Prepared by:		continued \Box

Date:				Page: <u>/</u> of <u>/</u>					
	QUI	BEC-ONTARIO HIGH UNIT COSTS FOR PRI		ROJECT					
Technology:		300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sector:	B - EARTHWORKS 4 - CONSTRUCTION 10 - FENCING					
Geographical Variation ? 🔲 no 🔲 yes If yes, indicate segments applicable:									
ITEM 10	ROW	SECURITY FENCING (BOTH	I SIDES)						
a construction process recovery 193-194 Milliand a function recovery	@ \$2	28/m = \$56,000/km							
17-17-18-18-18-18-18-18-18-18-18-18-18-18-18-									
	•								
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,									
a perspective and the second s									
, i i a i i i i i i i i i i i i i i i i									
	· 								
	La . P								
de la									
· · · · · · · · · · · · · · · · · · ·									
		- LANGE CO.		T					
Prepared by:				continued \Box					

Date:			Page: of _4_					
QUI	EBEC-ONTARIO HIGH UNIT COSTS FOR PRI		OJECT					
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sector:	C - BRIDGES 4 - CONSTRUCTION 1.1 - SMALL RIVERS					
Geographical Variation ? \square no \square yes If yes, indicate segments applicable:								
Small River Bridges	± 20m							
	esigned and estimated, cost of idge (2 tracks) = 13 m	of such a bridge is \$1,3	00/m²					
\$1,300 x 13	3 = \$16,900/m							
or, \$16,900	x 20 = \$340,000/each							

		4 17 17 17 17 17 17 17 17 17 17 17 17 17						
			10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
The state of the s								
Prepared by:			continued 🗖					

Date:			Page: <u>2</u> of <u>4</u>						
QUI	EBEC-ONTARIO HIGH UNIT COSTS FOR PRI		OJECT						
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sector:	C - BRIDGES 4 - CONSTRUCTION 1.3 - INTERM. RIVERS						
Geographical Variation Intermediate River B	Geographical Variation ? no yes If yes, indicate segments applicable: ntermediate River Bridges 300 - 100 m								
Based on bridges de	signed and estimated, cost o	f such a bridge is \$1;8	00/m²						
Assume width of bri	idge (2 tracks) = 13 m								
\$1,800 x 13	3 = \$23,400/m								
Prepared by:	dilikansa muo oo uu uu uu uu uu uu uu uu ka kii kii kii ka maa uu oo		continued						

Date:			Page: <u>3</u> of <u>4</u>
QU	IEBEC-ONTARIO HIGH UNIT COSTS FOR PRI		OJECT
Technology: \Box	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sector:	C - BRIDGES 4 - CONSTRUCTION 1.5 -1.7 LARGE RIVERS
Geographical Variation	on ? \square no \square yes If yes, inc	licate segments applica	ble:
Large River Bridges			
, and a second to the state of the second to	esigned and estimated, cost of	of such a bridge is \$3,2	00/m²
Assume width of b	ridge (2 tracks) = 13 m		
\$3,200/m²	x 13 = \$41,600/m		
Same cost applies	to the major river bridges.		
	in Carrier or any consequence of the consequence of	dadaman mada dan kani dikidi bahasa bahasa kani bahasa kani bahasa da kani bahasa da kani bahasa da kani bahasa	
		Habida Habid Habid Hallanda Kalanda Habida H	MANGEL AND THE RESIDENCE OF THE RESIDENCE OF THE STATE OF
		Harris de la casa de l	
,		.,,	
			A DAMAN DA PARA CONTRACTOR CONTRA
Prepared by:			continued \Box

Date:	VOLUMENT AND			Page: <u>4</u> of <u>4</u>
ensoeren kaldelekki 1994 (1896) (1896) (1896) (1896) (1896) (1896) (1896) (1896) (1896) (1896) (1896) (1896) (H SPEED RAIL PF	OJECT
annan parameter kan	UNIT C	OSTS FOR PR	ELIMINARY ROUTING	
Technology:	☐ 300 + kph -		1	C - BRIDGES
•	300 + kph -		Sector:	4 - CONSTRUCTION 1.9 - BRIDGE MODIF.
	200 + kph -	exist. n/vv	ILGIII.	DRIVOE FOUR
Geographical Va	ariation ? 🔲 no 🔲	yes If yes, in	dicate segments applica	ible:
New deck for	1 track existing brid	ige of width 4	m	
Canada	ma			
Concrete volu		6490 00/m	the distriction of the state of	and the state of the first trade of the state of the stat
4m x (0.3m x \$400/m ³ =	\$480.00/11	,,	
Reinforcing st	eel			
400 k	$g/m^3 \times $1.25/kg =$	\$500.00/m		tools (Physica communicates also the property to a prompt the state of the property to the state of the physical state of the physic
	also Livery Processing and Alexander Representation and Alexander Constitution	\$980.00/m		
***************************************	say	\$1,000/m		
Provision shal	l be made to streng		eam	
	say	<u>\$800/m</u>		
		\$1,800/m		
Provision for	maintenance access	\$600/m		
The state of the s		\$2,400/m		
For double tra				
Add new brid	lge of width 8 m @	\$1,300/m ²		oskoldo (Mari II 1818) i Nesspermeljeco med likela II richt (II 1814) processer je pr. 1818 i 1914 i ocean spekti (Maria Maria Herio)
\$1,30	00 x 8 = \$10,400/r	n		
Total cost	= \$10,400 + \$2	2,400		
	= \$12,800			
	= \$13,000/m sa	V	no saal lad a lad 14 1885/1990 oo oo oo oo oo oo la 14 1888 ee gaaraa ah oo	

.,			······	
The state of the s		A STATE OF THE STA		A A A A A A A A A A A A A A A A A A A
Prepared by:				continued L

RURAL GRADE SEPARATIONS

			ltem	1.1	Ite	m 1.2	lte	m 1.3	Ite	Item 1.4		Item 1.5	
			2 Lane Rura	Louar 2 Trica	A Long Durg	l over 4 Trks	A Lana Dura	l over 2 Trks	4 Lane Rura	Lover 4 Teles		iv. Freeway 2 Tracks	
	Unit	Price		Cost	Quantity		Quantity	Cost	Quantity	Cost	Quantity	Cost	
1. Excavation	3 M	5.0	1,760	8,800	1,760	8,800	2,140	10,700	2,140	10,700	3,590	17,950	
2. Borrow	m ³	5.0	145,730	728,650	145,730	728,650	182,560	912,800	182,560	912,800	3 15,350	1,576,750	
3. Hot Mix	t	60.0	2,265	135,900	2,365	141,900	4,680	280,800	4,850	291,000	6,670	400,200	
4. Gran 'A'	1	10.0	6,820	68,200	6,820	68,200	9,340	93,400	9,340	93,400	14,350	143,500	
5. Gran. 'B'	t	8.0	10,925	87,400	10,925	87,400	16,000	128,000	16,000	128,000	31,360	250,880	
6. Guide Rail	_m	<u>75.0</u>	1,540	<u>115,500</u>	1,540	115,500	1,540	115,500	1,540	115,500	840	63,000	
Sub Total				1,144,450		1,150,450		1,541,200		1,551,400		2,452,280	
7. Minor Items 10%				114,450		115,050		154,120		155,140		245,230	
TOTAL ROADWORK				<u>1,258,900</u>		1,265,500		1,695,320		<u>1,706,540</u>		2,697,510	
STRUCTURE												Name of the Association of the A	
8. Standard Conditions	m ²	1100	500	550,000	945	1,039,500	800	880,000	1,150	1,265,000	920	1,012,000	
9. Diff.Fnd.Conditions	m 2	1265	500	632,500	945	1,195,430	800	1,012,000	1,150	1,454,750	920	1,163,800	
TOTAL COST Standard Conditions				2, ^გ აუ _{ასაე} 1,808,900		≥,႘ંა૦,ၹo 2,305,000	i i	3,100 wa 2,575,320		3,565,000 2,971,540		3,709,510	
Difficult Fnd. Conditions				1,891,400		2,460,930		2,707,320		3,161,290		3,861,310	
	L			2,300,000	<u> </u>	3,000,000		3,350000		3.800,000		\$. (. · · · · · · · · · · · · · · · · ·	

Note: 20% added to total inte to componede for law borrows unit price

SAR SALAN

00\$550\spr\ruralgr.wk1

URBAN GRADE SEPARATIONS

				Item	2.1	Ite	m 2.2	lte	m 2.3a	lte	em 2.3b
				4 Lane Road	l over 2 Trks	4 Lane Road	l over 4 Trks	6 Lane Road	i over 2 Trks	6 Lane Road	d over 4 Tiks
· ·		Unit	Price		Cost	Quantity	Cost	Quantity	Cost	Quantity	Cos
1.	Borrow	m³	5.0	198,000	990,000	198,000	990,000	233,330	1,166,650	233,330	1,166,650
2.	Hot Mix	t	60.0	4,445	266,700	4,495	269,700	6,610	396,600	6,685	401,100
3.	Gran 'A'	t	10.0	5,640	56,400	5,640	56,400	8,670	86,700	8,670	86,700
١.	Gran. 'B'	t	8.0	14,100	112,800	14,100	112,800	25,000	200,000	25,000	200,000
S .	Guide Rail	m	75.0	1,540	115,500	1,540	115,500	1,540	115,500	1,540	115,500
S.	Curbs	m	32.0	1,880	60,160	1,880	60,160	3,760	120,320	3,760	120,320
· :	Sidewalks	_m²	35.0	2,820	98,700	2,820	98,700	2,820	98,700	2,820	98,700
	Sub Total				1,700,260		1,703,260		2,184,470	And a second sec	2,188,970
	Minor Items 30%				510,080		510,980		655,340		656,690
	TOTAL ROADWORK		The state of the s		2,210,340		<u>2,214,240</u>	, as well-stated a series and a	2,839,810		2,845,660
	STRUCTURE						Total Property of the Property	۴		A minimum or minimum of the state of the sta	
9.	Standard Conditions	m ²	1100	800	880,000	1,090	1,199,000	1,160	1,276,000	1,580	1,738,000
0.	Diff.Fnd.Conditions	m ²	1265	800	1,012,000	1,090	1,378,850	1,160	1,467,400	1,580	1,998,70
1.	Traffic Maintenance				100,000		100,000		100,000		100,00
2.	Detours				150,000		150,000		150,000		150,00
13.	Mitigations - Private Property				50,000		50,000		50,000		50,00
TOT. Stan	AL COST dard Conditions				4.ასგ.ააა 3,390,340	THE PARTY OF THE P	4.456;3\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- k :	ზ, პიაკაია 4,415,810		5.361.,33 4,883,66
Diffic	ult Fnd. Conditions				3,522,340 4:+26,000		3,893,090 4,עקרט, 4	والمراورة فقيلهم فيليانه فمستقمه	4,607,210 5,529,030	A committee of the comm	5,144,36 6.13.00
055501	spelurbange,wkl Pky e		to ia.	added to myeniate for which we will prove the contract of the	in laws					THE	

MODIFICATION OF EXISTING GRADE SEPARATION

					3.2a		m 3.2b		m 3.1a		n 3.1b
				2 Lane Ru	il	Ru	ľ		ban Road	Urban	
		,		over 4	:	Minor Mod			4 tracks	Minor Modification	
		Unit	Price	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
1.	Roadway	L.S.		L.S.	100,000	L.S.	30,000	L.S.	200,000	L.S.	60, 000
2.	Detour	1 km	280,000	0.7	196,000		Landon Antonio	N/A		- Aren weigh a security of security and security of se	
	Sub Total				296,000		30,000		200,000	Control of the Contro	60,000
	Minor Items 30%				29,600		3,000		20,000		6,000
	TOTAL ROADWORK				<u>325,600</u>		33,000		220,000	The state of the s	66,000
3.	Structure	m m	1,100	500	550,000			1,090 bridge	1,199,000	N/A	
4.	Existing Bridge Rehabilitation	n M	250	190	47,500	190	47,500	removal N/A	100,000	300	75,000
5.	Crossing Protect. Signals, etc.	EA			250,000			N/A r		N/A	
	TOTAL COST				1,173,100		80,500		1,519,000		141,000
								,		A CONTRACTOR OF THE CONTRACTOR	whether the delication and the second

Accord using average According average

COST ESTIMATE - QUANTITIES SUBSYSTEM D

2 Lane Rural Roadway Overpassing 2 Tracks

1.1.1 GRADING

Excavation - stripping only

l = 105 m w = 28.0 m

area $2 \times (105 \times 28) = 5880 \text{ m}^2$

depth 0.3 m

volume 1764 m²

1760.0 m³

<u>Fill</u>	- botto	m only				
		Ht.	End Area			
Sta	1 + 020	9.5	312			
				301 >	c 70	21,070
	1 + 0990	9.0	289			
				231 >	< 116	26,796
	1 + 206	6.5	173			
				144 >	< 134	19,296
	1 + 340	5.0	114			
				57 x	100	5,700
						72, 862 m
				x 2 =	= 145,724 m ²	3

1.1.2 PAVEMENT

Hot Mix

Roadway length - $470 \times 2 = 940 \text{ m}$

width 7.50

area = 750 m^2

assuming 120 mm of asphalt

 $7050 \times 12 \times 25.4 = 2148.84t$ 1000on the bridge deck 90 mm length = 40 m $width = 7.5 + 2 \times 2.50 = 12.5$ $area = 40 \times 12.5 = 500 \text{ m}^2$ $500 \times 9 \times 25.2 = 114.3t$ 1000 2,265t

GRANULAR 'A'

end area - $7.5 \times 0.15 + 2(3.5 \times 0.27)$ = $1.13 + 1.89 = 3.02\text{m}^2$ $940 \times 3.02 = 2839\text{m}^3 \times 2.4 =$ 6.813t

GRANULAR 'B'

d = 0.3 + 0.39 = 0.35 2 $W = 16.6 \text{ m end area} = 5.81 \text{m}_2$ $5.81 \times 940 = 5.461.4 \times 2.0$ 10,923 t

1.1.3 GUIDE RAIL I = 385 m x 4 = 1540 m

1.14 STRUCTURE

length = 40 m w = 12.5 marea = 500 m²

1.2 2 lane roadway over 4 tracks

1.2.1 & 1.2.3 as for two track (see 1.1)

1.2.4 - STRUCTURE

$$I = 40 + 35.5 = 75.5 \,\mathrm{m}$$

 $w = 12.5 \, \text{m}$

area $75.5 \times 12.5 = 943.75 \text{ m}^2 \text{ say } 945 \text{ m}^2$

1.2.2 PAVEMENT

Hot mix on the bridge

Area 945 m₂ 90 mm

Asphalt
$$945 \times 9 \times 25.4 = 216t$$

1000

Total Bridge

216

Roadway as for 2 track (see 1.1)

2150

2366t

4 Lane Rural Roadway over 2 tracks 1.3

EXCAVATION - Stripping only

$$l = 105 \text{ m}$$
 $w = 34.0 \text{ m}$

area =
$$2(105 \times 34) = 7140 \text{ m}^2$$

depth 0.3

$$7140 \times 0.3 =$$

2140 m³

bottom only Fill -

		_			
	·	Ht.	End Area		
Sta	1 + 020	9.5	383		
				369 x 70	25,830
	1 + 090	9.0	355		
				287 x 116	33,292
	1 + 206	6.5	218		

1.3.2 **PAVEMENT**

Hot Mix

Roadway length - 940 m

width = 15.0 M

area = 14100 m^2 (120 mm H.M)

tonnage $14100 \times 12 \times 25.4 = 4,298 \text{ t say}$

4,300 t

100

bridge deck d = 90 mm

l = 40 m $w = 15 + (2.5 \times 2) = 20 \text{ m}$ area $40 \times 20 = 800 \text{ m}^2$

tonnage $800 \times 9 \times 25.4 = 182.88$ say

185 t

100

shoulder I = 940 $w = 2 \times 0.5$

area $940 \times 1.0 \times 940 \text{ m}^2$ d = 80 mm

tonnage $940 \times 8 \times 25.4 = 191 \text{ t say}$

190 t

1000

4,675 t

GRANULAR 'A'

end area - $15 \times 0.15 + 2(3.5 \times 0.27)$

 $= 2.25 + 1.89 = 4.14 \text{ m}^2$

 $940 \times 4.14 = 3891.6 \text{m}^3 \times 2.4 =$

9,340 t

GRANULAR 'B'

$$d = 0.3 + 043 = 0.37$$

2

end area =
$$23 \times 0.37 = 8.51 \text{m}_2$$

8.51 x 940 = 7,999.4 x 2.0

16,000 t

$$1 = 385 \text{ m x 4} =$$

1540 m

1.3.4 STRUCTURE

length = 40 m

w = 20.0 m

area = 800 m^2

1.4 4 lane roadway over 4 tracks (31.0 m offset)

1.4.1 As for 2 tracks

1.4.2 Pavement

Hot mix over bridge

$$I = 75.5$$
 $W = 20.0$

area $75.5 \times 20 = 1510 \text{ m}^2$

tonnage <u>1510 x 9 x 25.4</u> =

345 t

1000

on the road

4,300 t

shoulders

190 4,835 t

1.4.3 As for 2 tracks

1.4.4 Structure - area = 1510 m^2

1.5.1 GRADING

Excavation - stripping only

l = 105 m w = 57.0 m

area $2 \times (105 \times 57) = 11970 \text{ m}^2$

depth 0.3 m

volume 3591 m² say 3590 m³

<u>Fill</u>	-			
		Ht.	End Area	
Sta	1 + 020	9.5	556	
				536 x 110 58,960
	1 + 130	9.0	515	
				422 x 155 65,410
	1 + 285	6.5	329	
				233 x 105 24,465
	1 + 390	3.5	136	
				68 x 130 8,840
	1 + 520	0	0	
				157,6752 m
				$x = 315,350 \text{ m}^3$

1.5.2 Pavement

Hot Mix

Roadway length - 1120 m (120 mm)

Pavement width $2 \times 7.50 = 15.0$

 $1120 \times 15 = 16800 \text{ m}^2$

 $16,800 \times 13 \times 25.4 = 5547.3 \text{ t say}$

1000

Shoulders (80 mm)

Outer $1120 \times 2 \times 0.5 = 1120 \text{ m}^2$

5550 t

Inner
$$1120 \times 2 \times 1.5 = 3360 \text{ m}^2$$

 4480 m^2

$$4480 \times 8 \times 25.4 = 910.33 \text{ t say}$$

910 t

1000

On the bridge deck (90 mm)

2 bridges -
$$1 = 40 \text{ m}$$
 w $(7.5 + 2.5 + 1.5) = 11.5$

area 2 (40 x 11.5) = 920 m^2

$$920 \times 9 \times 25.4 = 210.3 \text{ say}$$

100

6,670 t

Granular 'A'

End area 2 x (7.50 x 0.15 + 3.5 x 0.28 +

$$2.0 \times 0.28$$
) = 2 (1.13 + 0.98 = 0.56)

$$=$$
 5.34 m²

$$1120 \times 5.34 = 5980.8 \text{ m}^3 \times 2.4 = 14,350 \text{ t}$$

Granular 'B'

End area

Avg.
$$d = 0.45 + 0.54 = 0.50$$

2

end area 2 $(14 \times 0.5) = 14.0 \text{ m}^2$

$$1120 \times 14.0 = 15,680 \text{ m}^2 \times 2 =$$

31,360 t

1.5.3 Guide Rail

Assuming only on the outer edges

$$l = 420 \text{ m} \times 2 = 820 \text{ m}$$

$$1 = 40$$
 W - $(2.5 + 7.5 + 1.5) = 11.5$

area 2 x 40 x 11.5 = 920 m

Item 1.6 Extra for difficult foundation condition

- depends on bridge type
- depends on conditions

For uniformity used 15% additional to standard bridge cost - using $$1100/m^2$ for standard bridge cost - additional cost is <math>$165/m^2$

Item 2.1 4 Lane Urban Roadway Over 2 Tracks

2.1.1	Grac	ling				
	Exca	vation	- negligible			
<u>Fill</u>	-					
		Ht.	End Area			
Sta	1 + 020	9.5	412			
				396 ×	70	27,720
	1 + 090	9.0	380			
				309 ×	116	35,844
	1 + 206	6.5	238			
				202 ×	134	27,068
	1 + 340	5.0	165			
				83 x	100	8,300
	1 + 440	0	0			
						98,9322 m
				x 2 =	197,864 m	³ say 198,000

2.1.2 Pavement

Hot Mix

Road: I = 940 m w = 15 m

area = 14100 m^2

tonnage $14100 \times 12 \times 25.4 = 4298$ t say 4300 m 1000 On the bridge deck d = 90 mm Area: l = 40 m w = 15.6area $40 \times 15.6 = 624 \text{ m}^2$ <u>145 t</u> tonnage $624 \times 9 \times 25.4 = 142.6$ say 1000 4,445 t Granular 'A' w = 16.6End area $16.6 \times 0.15 = 2.49 \text{ m}^2 \text{ say } 2.5 \text{m}^2$ I = 940 $940 \times 2.5 = 2350 \text{ m}^3 \times 2.4$ 5640 t Granular 'B' d = 0.45 + 0.53 = 0.492 w = 16.6 m $16.6 \times 0.49 = 7.47 \text{ m}^2 \text{ say } 7.5 \text{ m}$ l = 940 m $940 \times 7.5 = 7050 \text{ m}^3 \times 2 =$ 14,000 t 2.1.3 Guide Rail $1 = 3.85 \times 4 =$ 1540 m 1880 m 2.1.4 Curb - $940 \times 2 =$ 2820 m 2.1.5 Sidewalk - 940 x 2 x 1.5 = 2.1.6 Structure $W = 15 + 2 \times 2.5 = 20 \text{ m}$ $l = 40 \, \text{m}$

area = 800 m^2

2.2 4 Lane Urban Roadway over 4 tracks tracks (offset 10.0 m)

2.2.1 Grading as for 2 track	2.2.1	Grading	as	for	2	tracks
------------------------------	-------	---------	----	-----	---	--------

2.2.2 Pavement

Hot Mix

Roadway as for 2 tracks 4,300

On bridge deck

$$1 = (20 + 7.25) \times 2 = 54.5 \text{ m}$$

 $w = 15.6 \, m$

area $54.5 \times 15.6 = 850.2 \text{ m}^2$

 $850.2 \times 9 \times 25.4 = 194.4 \text{ t say}$ 195

100

4,495

Granulars as for 2 tracks

2.2.3	Guide Rail	As for two tracks
2.2.4	Curb	As for two tracks
2.2.5	Sidewalk	As for two tracks
2.2.6	Structure	
	w = 20	54.5 area = 1090 m^3

Item 2.3a 6 Lane Urban Roadway over 2 Tracks

2.3a.1 GRADING

Excavation - negligible

Fill

Ht. End Area

Sta 1 + 020 9.5 480

463 x 70 32,380

1 + 190 9.0 445

				364	X	116	42,225
	1 + 206	6.5	283				
				240	X	134	32,160
	1 + 340	5.0	198				
				99	X	100	9,900
	1 + 440	0	0				
							116,6652 m
				x 2	=	233,330 m ³	\$
2.3a.2	2	Pavement					
	Hot Mix		*				
	Roadway le	ngth - 940 m					
	Pavement w						
	area 940 x 2	22 = 20,680 r	Π^2				. 2
	tonnage <u>20</u> ,	680 x 12 x 25	6.4 = 6,303.2	t say			6,300 m ²
		1000					
	On the bridg	ge deck (90 n	nm)				
	l = 40 m	w (11 +0.6)	$\times 2 = 23.2 \text{ n}$	n			
	area = (40	\times 23.2) = 92.3	8m²				
	tonnage 928	$3 \times 9 \times 25.4 =$	•				<u>212 t</u>
		1000					
	on the med	ian - 40 mm					
		w = 2 - 2x	0.5 = 1.0				
	area 940 m	2					
		<u>5.4</u> = 95.504	say				96.0 t
	1000						6,608.0 t
							0.070 4
							6,670 t
	Granular 'A'				. 2		
	w = 25.6	End area 25	$5.6 \times 0.15 = 3$	3.89 n	nf		

 $I = 940 \times 3.84 = 3609.6 \times 2.4 = 8.663 t$

8665 t

```
Granular 'B'
```

$$d = 0.45 + 0.58 = 0.52$$

2

$$w = 25.6$$
 end area = 25.6 x 0.52 = 13.3 m²

$$I = 940$$
 $940 \times 13.3 = 12502 \text{ m}^3 \times 2$

25,000 t

$$I = 385 \text{ m x 4} = 1540 \text{ m}$$

2.3a.6 Structure

$$W = 2 (11 + 1.0 + 2.5) = 29.0$$

1 = 40

area $40 \times 29 = 1160 \text{ m}^2$

2.3b 6 Lane Urban Roadway over 4 tracks (offset 10.0m)

2.3b.1 Grading - as for two tracks

2.3b.2 Pavement (hot mix)

Roadway as for 2 tracks 6,300 t

On the bridge deck (90 mm)

$$I = (20+7.25) \times 2 = 54.5 \text{ m}$$

 $w = 23.2 \, \text{m}$

 $area - 54.5 \times 23.2 = 1264.0$

tonnage <u>1264 x 9 x 25.4</u> = 288.95 t say 289 t

1000

in the median - as for 2 tracks 96.0 t

6685 t

Granulars as for 2 tracks

2.3b.4 Guide Rail As for 2 tracks

2.3b.4 Curbs As for 2 tracks

2.3b.5

Sidewalk

As for 2 tracks

2.3b.6

Structure

$$W - (11 + 1.0 + 2.5) \times 2 = 290$$

 $l = 54.5 \, \text{m}$

area = 1580.5 say

1580 m²

Item 2.4 Extra for difficult foundation condition as for rural grade separation added 15% to bridge structure - see item 1.6.

3. Modification of Existing Grade Separations

Existing rural grade separations cost of modification was estimated with following assumptions:

Rural

- existing roadway will be maintained
- proposed railway will be lower than existing ±1.3 m
- road will be closed during construction traffic will be on the temporary at grade crossing
- cost of railway is not included
- with offset 31.0 m existing bridge will be maintained for existing tracks new bridge
 will be built as separate structure
- for minor modification existing clearance ± 6.8 m may require lowering of tracks.

Urban

- existing roadway will be maintained (see page 38)
- proposed railway will be lower than existing ±1.3m
- road will be closed during construction, local streets in the vicinity will be used to detour traffic
- cost of railway is not included
- with offset 10.0 m existing bridge will partially be demolished and lengthen to accommodate new tracks

- 3.1a Urban 4 lane roadway over 4 tracks
 - 3.1a.1 Roadway allowance for restoration, signals and traffic diversion -

Lump Sum

- 3.1a.2 Structure see new crossing area 1090 m²
- 3.1b Minor Modification

Rehabilitation of deck etc. assumed

w = 20.0 m i = 15.0 m

area = 300 m^2

- 3.2a 2 Lane Rural Roadway over 4 tracks 2 existing; 2 proposed
 - 3.2a.1 Roadway allowance for restoration L.S.
 - 3.2a.2 Structure: 1 40 m; w = 7.5 + 2x2.5 = 12.5

area = 500.0 m^2

3.2a.3 Existing bridge rehabilitation

area = $15 \times 12.5 = 187.5 \text{ m}^2 \text{ say}$

200 m²

- 3.1.4 Detour 700 m
- 3.2b Minor Modification

Rehabilitation of deck, etc. assumed deck area - 190 m²

w = 12.5 l = 15.0 m

- Item 4. Automatic Crossing Protection
- Item 5. Detours Diversion of Roads

Cost for 1.0 km

Excavation - assuming roadway at grade - excavation required to place base coat for ditching

Used 10m² end area

 $10 \times 1000 = 10,000 \times \$5.0/\text{m}^3 = \$50,000$

Hot mix $7500m^2$ d = 80 mm \$91,500 $7500 \times 8 \times 25.4 = 1524 \$60/t =$ 1000 Granular 'A' W = 12.5 d = 0.15 l = 1000 $12.5 \times 0.15 \times 1000 = 1875 \text{ m}^3 \times 2.4$ \$45,000 = 4500 t @ \$10/t =Granular 'B' w = 12.5 d = 0.35 l = 1000 $12.5 \times 0.35 \times 1000 = 4375 \text{ m}^3 \times 2 = 8750 \text{ t} @ \$8/\text{t} =$ 70,000 20,000 Removal of detour L.S. 276,500 Total Used 280,000

Date:			Page: <u>l</u> of <u>l</u>					
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PR		ROJECT					
Technology: 미	300+ kph - new R/W , 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: ltem:	D-GRADE SEPARATIONS 4-CONSTR/INSTAL. 4-					
Geographical Variati	on?☑no ☐yes Ifyes	, indicate segments ap	plicable:					
AUTOMATIC CRO	SSING PROTECTION							
automatic c	minary data furnished by Al crossing protection suitable subsequently reviewed and	for track speeds of 16	60 to 200 kph.					
The cost in	cludes:							
- OC	- occupancy detection circuits linked to train control,							
- ful	I-width barriers with vehicle	intrusion detection,						
- im	proved roadway signage.							
Total cost f	or 1 crossing: <u>\$270,000.</u>							
Prepared by:			continued					

Date: 93.04.01		Page: <u></u> of <u></u>
QUEBEC-ONTARIO H UNIT COSTS FO	HIGH SPEED RAIL P	
Technology: 300+ kph - new R/W 300+ kph - exist. R/V 200+ kph - exist. R/V	W Sector:	E - OTHER ALLOY, WORK 4 - CONSTRUCTION 1 - TRACE REMOVAL
Geographical Variation ? ☐ no ☐ yes i	f yes, indicate segments a	pplicable:
Price developed by CANARAIL		
Work consists of 3 steps - picking	*****	
picking up ties. Each has been estimated with 115 lb/yd rail and are presented below.		ption of lifting track built
Will Tro 10/ya ran ana ara proportion por	O11.	
Other Track Materials: (tie plates, spike	es, rail anchors, joint bars)	
40 tonnes/km @ \$143/tonne		\$ 5,720
Rail:		
115 tonnes/km @ \$43.40/tonne		\$ 4,991
Ties:		
2000 ties/km @ \$2.65/tie		\$ 5,300
Contractor's overhead and profit:	@ 32% of above cost	\$ 5,123
T	OTAL (/km)	\$ 21,134
Prepared by:		continued \Box

Date: 93.04.20			Page: <u>L</u> c)f
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PR			100000000000000000000000000000000000000
Technology: 및	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	E-OTHER AC 4-CONSTRU 2-NEWACC	1CT10N
Geographical Variation	on ? 🗹 no 🔲 yes If yes	, indicate segments a	pplicable:	
Price developed b	y SNC-Lavalin + DELCAN	+ CANARAIL		
Cubauada				·
Subgrade:			.,,,,,	-, -
Grading @	40,000 cu.m/km @ \$ 5.00		\$ 200,000	
	: @ 1,600 cu.m/km @ \$ 15		24,000	,,,,,,,,
Other costs			33,600	
Cirior occi.		Total		\$ 257,600
Track Materials:				
Rail @ 120	tonnes/km @ \$680/tonne		\$ 81,600	
Fastenings	@ 40 tonnes/km @ \$850/	/tonne	34,000	
Wood ties	@ 2,000/km @ \$32.00/tie		64,000	
Ballast @ 2	2080 m ³ /km @ \$21.37/m ³		44,400	
Turnouts -	assume 2/km @ \$46,000/t	turnout	92,000	, , , , , , , , , , , , , , , , , , ,
		Total		\$ 316,000
Track Construction	on: (overhead and profit al	ready included in unit	t prices)	
Build 1 km	of track @ \$44,171/km		\$ 44,170	
Install turn	outs - 2 @ \$4,680/turnout		9,360	Д
Ballast and	d surface 2080 m³/km @ \$	8.47/m ³	<u>17,620</u>	
		Total		\$ 71,150
	тотл	AL (/km)		\$ 644,750
Prepared by:			contin	ued 🔲

Date:	MANA PROSERVATA VARIAN VARIAN VARIAN PARA PARA PARA PARA PARA PARA PARA PA		Page: <u>l</u> of <u>l</u>					
QUI	EBEC-ONTARIO HIGI UNIT COSTS FOR PR	H SPEED RAIL PR ELIMINARY ROUTING	OJECT					
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	1	E - OTHER ACC. WORKS A - CONSTRUCTION 3 - RAIL/RAIL G/S					
Geographical Variation	n ? ☐ no ☐ yes If yes, in	dicate segments applica	ble:					
i) Rail/Rail (Grade Separation in Rural Ar	ea						
•								
	with existing rail tracks, the		4					
existing tracks with earthworks to be covered by linear measurement under Sub-system								
В.	В.							
Assume an a	Assume an average bridge length of 30m and a width of 13 m for 2 tracks,							
cost of bridg	ge structure = 13 x 3	30 @ \$1,800/m²						
	= \$702,	000						
Allow 15%	for rail diversions, miscellan	eous temporary works,	etc.					
	= \$800,	000 say						
ii) Rail/Rail (Grade Separation in Urban A	Area						
Assume an a	average bridge length of 36	m and a width of 13 m	for 2 tracks,					
cost of bridg	ge structure = 13 x 3	36 @ \$1,800/m²						
months and the second s	= \$842,	(Integrapes and the second of the second						
Allow 20%	for rail diversions, retaining	structures in constraine	ed areas, miscellaneous					
temporary v	temporary works, etc. = \$1,000,000 say							
Prepared by:		Market Control of the	continued \Box					

Date: 93.04.14	Page: <u>l</u> of <u>2</u>
	H SPEED RAIL PROJECT RELIMINARY ROUTING
Technology: 300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: F - TRACK Sector: 2 - MATERIALS Item: I.I - RAIL
Geographical Variation ? ☐ no ☐ yes If yes	s, indicate segments applicable:
Price guoted by supplier:	
Price for rail meeting HSR specs	600.00
Freight costs to Kingston	<u>51.50</u>
TOTAL	\$Can 651.50 /Ton
	9 1.1 Tons/tonne = \$Can/tonne 716.65
District 100 continue	
Price to weld into 400m strings:	
Quote by contractor (including handli	ng from gondolae to rail train)
Quote by Contractor (including narion	\$US 45.00 /weld
	<u>x 15.</u> welds/string
= Cost of welding/string	675.00
- Cost of Welding, suring	+ 24, tonnes/string
	2
TOTAL	\$US 28.125 /tonne
@ 1.2 \$Can/\$US = \$Can/tonr	ne 33.75
Prepared by:	continued 🗹

Date:			Page: <u>2</u> of <u>2</u>				
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PR						
Technology:	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	F - 2 - 1.1				
Geographical Variation	on ? 🗌 no 🔲 yes if yes	indicate segments ap	oplicable:				
Land and trackage	required @ welding plant:						
Land require	ed = 2 hectares @ \$2,500	/hectare \$	5,000				
Track requir	Track required = 1,500m @ \$286/m						
= Total add	litional costs for rail weldin	g 43	34,000				
		+ 30	00,000. tonnes				
	Total \$ 1.45 /tonne						
	and the same and t						
Cost to transport w	velded rail to rail head:						
Indudes ou	a 200 km main line roil he	ul and awarship of th	oroo 28 oor rail trains				
includes av	g. 300 km main line rail ha	ul allo ownership of the	nee 20-car rain trains				
		\$C	an 21.57 /tonne				
TOTAL COST							
		ail	716.65				
		/elding	33.75				
The state of the s		and + Trackage	1.45				
		ransport					
	TOTAL	(/tonne)	773.42				
Prepared by:			continued				

Date: 약3.ơ-	1.01	77/25 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		Page: 1 of 1					
ı	QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PR		ROJECT	макен е фон МДА, МОСКО ДЕКТИВ.				
Technology:		300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	F- TRACK 2- MATERIALS 2- TIES					
Geographical	Variati	on ? I no I yes if yes	, indicate segments ap	plicable:					
Price quoted									
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,									
Conc	rete tr	ack ties manufactured @ p	lant in Kingston		**************************************				
	- inserts to be supplied by the project								
- H-ampton American		Total		\$ 42.00 /tie					
Land and tra	ckage	required @ tie plant:	A L. B. W. W.	ALL AND ALL AN					
		ed = 16.2 hectares @ \$2,5	500/hectare \$ 40	0,500					
The second secon	······································	red = 1,830m @ \$286/m		3,380					
= To	tal add	ditional costs for tie manufa		3,880	.,				
<u> </u>		HE AND THE WORLD WITH A WAY AND THE WAY A STATE OF THE WAY AND THE WAY A STATE OF THE WAY AND THE WAY	+ 4,000	0,000. ties					
		Total		\$ 0.14 /tie	·····				
	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1								
0 11.1.1									
Cost to trans	sport to	o rail nead:							
lnol 1		g. 300 km main line rail ha	ul and ownership of 1	10 enocial tip care					
IIICIU	JES AV	g. 500 km main inte rai na		Can 4.12 /tie					
			Ψ	Jan 4.12 / 116	**************				
		-			***************************************				
TOTAL COS	T	<u></u>	***************************************		.,,				
		T	les		42.00				
**************************************			and + Trackage		0.14				
W404-000-00-00-00-00-00-00-00-00-00-00-00			ransport		2.65				
***************************************			1						
AND REPORTED THE PROPERTY OF T		T	OTAL (/tie)		44.79				
				•••••••••••••••••••••••••••••••••••••••					
	9								
Prepared by:				continued	Ц				

Date: 43.04.01		ласа и манеса и мане	Page: <u>l</u> of <u>l</u>		
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology:	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	F - TRACK 2 - MATERIAL 3 - BALLAST		
Geographical Variati	on ? 🗌 no 🔲 yes If yes	, indicate segments ap	plicable:		
Price quoted by su	ppliers:				
	ast from Ottawa region				
	g. price loaded in rail hopp	ers	\$ 4.90 /tonne		
- de	nsity of ballast in track		<u>x 1.72</u> tonnes/cu.m.		
	To	otal	\$ 8.43 /cu.m.		
Cost to transport to	o rail head:				
includes av	g. 300 km main line rail ha	ul @ 2¢/t-km and own	ership of 322 ballast		
hoppers					
		\$Ca	an 12.94 /cu.m.		
Hart Color of the					
TOTAL COST					
and the second that the second that the second the seco	В	allast	8.43		
4444	T	ransport	<u>12.94</u>		
	ТОТА	L (/m³)	21.37		
	NAME OF THE PROPERTY OF THE PR	TO THE			
Prepared by:	the thirt is a six of the constraint of the cons		continued \Box		

Date: 93.03.30			Page: <u>l</u> of <u>l</u>			
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING						
Technology: 면	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	E - TRACK 2 - MATERIALS 4 - TURNOUTS			
Geographical Variati	on ? 🗹 no 🔲 yes If yes	, indicate segments ar	oplicable:			
Price provided in	discussion with supplier (E	European/N.A. joint ve	nture):			
Prices inc	lude: - complete turr	nout,				
	- concrete swit	ch ties,				
	- rods and leve	ers for remote throw po	oints,			
	- locking devic	es on points, and				
	- delivery to pr	oject.				
	not include switch machin		***************************************			
	I \$30,000 (2 x \$15,000) for					
	the high speed turnouts a	***************************************	00 for switch machines			
on the int	termediate and low speed t	urnouts.				
The hasir	speeds and turnouts bein	a considered under e	ach classification are as			
	cluding a corresponding p		adj, djastiloanori aro as			
Classifica	<u>ition</u> <u>Frog No.</u>	<u>Speed (kph)</u>	<u>Cost</u>			
High Spe	ed 46	160	\$280,000			
Medium S	Speed 15.3	80	\$135,000			
Low Spee	ed 10	25	\$ 46,000			
ADMINISTRAÇÃO	The state of the s					
Prepared by:			continued			

Date: <u>ქვ.<i>ი</i>ვ.</u> ვ _ლ)		Page: I of L
QU	EBEC-ONTARIO HIGH		ROJECT
Technology: ビ	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item: S	E - TRACK 2 - MATERIALS 11 - FASTENINGS
Geographical Varia	ation ? I no I yes If yes	, indicate segments ap	plicable:
Price quoted by			
Complete	fastener sets per tie include	•	
	- 4 inserts into ti		
	- 2 rubber tie pa		
101 Marian 1 may 1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (- 4 nylon insulat		***
,	- 4 elastic faster	ing systems fixing to the	ne inserts.
	1 Add State of the Control of the Co		MACANITIS I I I I I I I I I I I I I I I I I I
Replies re	eceived from European and I	N.A. suppliers. Account	ing for exchange rates
and differ	ential shipping charges, both	n provided prices withir	a few percentage
points of	each other. Resulting price t	o be used:	
			,
	TOTAL	(/tie set)	\$ 26,50
	TOTAL	(1000)	———
		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	
MODELL CONTROL OF THE			
Prepared by:			continued

Date: 93.03	3.30		Page: <u>l</u> of <u>l</u>		
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology:	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	F - TRACK 2 - MATERIAL 5.3 - BUMPING POSTS		
Geographical	Variation ? ☐ no ☐ yes If yes, indi	cate segments ar	pplicable:		
	s developed through discussion with				
MANAGEMENT OF THE PARTY OF THE	Cost of bumping post from supplier		\$ 1920		
	Shipping and handling for above @	15%	288		
		Total	\$ 2210		
			WARRIED WARRING TO THE STATE OF		
Installation c	osts developed by consultant:				
***************************************	MANAGEMENT				
.,,,,	Labour		\$ 550		
NEW YORK THE THE TAXABLE PARTY OF TA	Equipment Control of the Control of		140		
	Overheads and profit @ 32% of inst		_220		
	 	Total	\$ 910		
		,			
.d.amanananananananananananananananananana					
.,					
	TOTAL (/bumpir	a post)	\$ 3120		
	101AL (Joseph	g poor,			
			30 00 00 00 00 00 00 00 00 00 00 00 00 0		
,,,,,,					
-con-representation of the latest tentral areas of the lat					
Prepared by:			continued \square		

Date: 93.03.23		Page: <u>L</u>	of <u>L</u>		
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology: 300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W		F - TRACK 2 - MATER 6.1 - Sworm H	IAL		
Geographical Variation ? ☐ no ☐ yes If	yes, indicate segments ar	oplicable:			
Price for equipment developed from discussions with supplier:					

Switch heater for switch po-	nts up to 100'	\$ 30,000			
Switch heater for moveable	point frog	12,500			
Possible drainage protectio	n for switch and frog	15,000	AND THE PROPERTY OF THE PROPER		
Transportation for above @	5%	<u>2,875</u>			
	Total	say	\$ 60,000		
Prices for installation costs developed from	n discussion with railway:				
Cost of typical power service	e to a turnout:				
Labou	ır	\$ 15,000	***************************************		
Mater	ials	14,000			
Total		\$ 29,000			
Reduce cost account most	turnouts being in pairs	<u>x 0.75</u>			
		\$ 21,750			
Fuel Tank [2x typical accou	nt extra energy consump	.] 20,000			
Miscellaneous Other Costs		3,000			
	Total	say	\$ 45,000		
	TOTAL		\$ 105,000		
Prepared by:		contin	ued \square		

Date: 43.03.23	Marie Ma		Page: _/_ c	of L		
QUE	QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology: 미	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	E - TRACK 2 - MATORIA 6.2- Switch Hi	IC CATER-YARD		
Geographical Variati	on ? 면 no 口 yes If yes	, indicate segments ap	plicable:			
Price for equipmen	Price for equipment developed from discussions with supplier:					
			nn			
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	zontal air curtain for switch	***************************************	\$ 5,000			
Tran	sportation for above @ 10			A = F00		
		Total		\$ 5,500		
Installation costs d	eveloped from discussion	with railway:				
Cos	t of typical power service to	o a turnout:		1.11		
	Labour		\$ 15,000	*****		
and the last of th	Materials	The state of the s	14,000			
	Total		\$ 29,000			
Red	<u>x 0.2</u>					
ngapi na mananaka kakaka kakaka kata da		TO AND AND A CONTROL OF THE CONTROL	\$ 5,800			
Misc	cellaneous Other Costs		<u>500</u>			
		Total		\$ 6,300		
				A 11 900		
	10	TAL		\$ 11,800		
			·			
				·		
		AAA	A TRANSPORTED TO THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE P			
Prepared by:			contin	ued \square		

•

Date: 43.03	.30		Page: of			
	QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology:	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	E - Track 2 - Materiaus 3 - Ballast Mats			
Geographical	Geographical Variation ? Ino I yes If yes, indicate segments applicable:					
	s developed in consultation with					
.,						
	Cost of ballast mat in France	185 FF/m ² + 4.4 FF/\$)	\$ 41.00			
	Shipping and handling for abo	ve @ 20%	8.20			
		Total	\$ 49.20			
<u>Installation c</u>	osts developed by consultant:					
	Lateran		\$ 7.50			
	Labour		2.70			
the Martin Andrews of the April 19 Martin Anne and the April 19 Martin Anne Anne and the April 19 Martin Anne and the April 19 Martin Anne Anne Anne Anne Anne Anne Anne An	Equipment Overheads and profit © 33%	of inetallation	3.25			
	Overheads and profit @ 32%	Total	<u></u> \$ 13.45			
Post Carrier Co.		. • • • • • • • • • • • • • • • • • • •				
- MARION - A	ТОТА	\L (/m²)	\$ 62.65			
and the little state of the sta	THANKS IN THE PROPERTY OF THE	**************************************				
(\$46,444,444,444,444,444,444,444,444,444,						
, a		· · · · · · · · · · · · · · · · · · ·	the state of the s			
and M had to the state of the s						
***************************************	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
		Man tolandrings view and tolandrings and tolan				
Prepared by:			continued			

Date: 93.0	74.01			Page: <u></u> of <u></u> 2		
aanum ka keen kiris ja ka	QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology		300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: ltem:	F - TRACK 4 - CONSTRUCTION 1.1 - MAINTEACES.		
Geographic	Geographical Variation ? 🗹 no 🔲 yes If yes, indicate segments applicable:					
Price deve	loped by	/ CANARAIL				
Ass	sumes u	sing track construction trail	n to lay ties and afix co	ontinuously welded rail		
,,	to th	nem				
Ga	ng size a	as below:				
		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	upervisor oremen			
			perators			
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			abourers			
11/4 (All All All All All All All All All Al			lagman			
			otal			
	wor	king 9 hour days for total c	laily labour cost of:	\$ 14,230		
Av	g. daily r	neal & accomodation costs	s @ \$ 20 per person:	\$ 1,040		
Da	ily equip	ment cost				
	-	based on use of a trac	k construction train plu	is		
		assorted work equipme	ent to fasten rail,			
		transport crews, and se	ervice men and			
		equipment		\$ 7,725		
Co	Contractor's overhead and profit @ 32% of above costs					
		Total D	aily Cost	\$ 30,345		
Prepared b	y:			continued 🗹		

Date:				Page: <u>2</u> of <u>2</u>		
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING						
Technology:		300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:			
Geographical Va	Geographical Variation ? no yes If yes, indicate segments applicable:					
Production						
-		assumes daily production	on of 2 km of track			
		laying and a weekly out	put of 10 km, but in a			
		6-day week to allow for	possible downtime du	le		
		to weather, machine rep				
		daily production = 10kr	n/6 days =	1-2/3 km/day		
		TOTAL (/	track-km.)	\$ 18,212		
shareholder and the same of th						
			······			
	that countries that the first		.,			
		77 - 76 Million (1974)				
44444						
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•••••					
			,			
Valados de la tradata di della con decensione de la constanta della consta			THE COMMENT OF THE OWNER OF THE COMMENT OF THE COME	P. THEOLUS ALMANDA CONTROL STATE STA		

Prepared by:				continued \square		

Date: 93. <i>0</i> 4.0乙	*			Page: L of L	
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology: 말	300+ kph - 300+ kph - 200+ kph -	exist. R/W	Sub-system: Sector: Item:	F-TERCY CONSTRUCTION 12-YARD TRACES	
Geographical Varia	tion ? 🗹 no	☐ yes If yes	s, indicate segments ap	plicable:	
Price developed b					
		ing with Burro	crane and loader to la	y ties and afix jointed	
rail	to them	· · · · · · · · · · · · · · · · · · ·			
Gang size	as follows:	1 S	upervisor		
Guilg 5120	45 1010115.		oremen		
	***************************************		perators		
			abourers		
		_2 F	lagman		
	THE STREET PROPERTY WEST AND ADDRESS OF THE STREET	40 T	otal		
WO	rking 9 hour d	lays for total o	daily labour cost of:	\$ 10,193	
Daily acco	modation cos	ts for crew @	\$ 20 per person:	800	
Daily equip	oment cost			2,393	
Contractor	's overhead a	nd profit @ 3	2% of above costs	4,284	
		Total Da	ily Cost	\$ 17,670	
Production					
- assumes production of 400m of track laying					
	TOTAL (/ track-km.) \$ 44,175				
Prepared by:	- Alexander - Constitution - Constit			continued	

Date: 역3.04.02			Page: L of Z			
QUE	QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology:	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	F - TRACK 4 - CONSTRUCTION 2 - RESTRESSIONS & WELDING.			
Geographical Variati	Geographical Variation ? 🗹 no 🔲 yes If yes, indicate segments applicable:					
Price developed by	Price developed by CANARAIL:					
Assumes us	sing a mobile flash butt rail	welder to weld strings	s together in the field.			
The	operation will also include	unclipping the rail, he	ating it to its desired			
layir	ng temperature, and reappl	ying the clips.				
Gang size a		upervisor				
error for distribution between the Control of the Control		oremen				
	7 0	perators				
THE RESERVE THE PROPERTY OF TH	12 L	bourers	# 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<u>2</u> FI	agman				
	26 To	otal				
worl	king 10 hour days for total	daily labour cost of:	\$ 8,062			
Avg. daily a	ccomodation costs for cre	w @ \$ 20 per person:	\$ 520			
Daily equip	ment cost					
-	- based on lease of a mobile rail welder					
	(including 2 operators)	and work equipment t	0			
	unfasten/fasten and res	tress the rail	\$ 9,856			
Contractor's overhead and profit @ 32% of above costs \$5,900						
	Total Daily Cost \$ 24,338					
Prepared by:			continued 🗹			

Date:				Page: 2 of 2	
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology:		300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: ltem:	F - 4 - 2 -	
Geographical V	ariati	on ? 🗆 no 🔲 yes If yes			
Produc	ction				
		assumes production of	2 wolds per hour and	6	
	- .,	hours of working time in		12 welds/day	
		TOTAL (/jc	int welded)	\$ 2,028	
SWIFE					
	•••••				
WHICE &	· · · · · · · · · · · · · · · · · · ·				
.,					
		deliberatum transport to the state of the st			

Topics age in minimal of all allowing MAMARAM EXPLICIT EASY 1 (1997) 17 (1977) 1977 W.F. SPERFER			WATER TO THE PARTY OF THE PARTY	AND THE CONTRACT OF THE CONTRA	
		north and Miller bairs habital Madinal and all the collections and the collection of the last of the l			
	· · · · · · · · · · · · · · · · · · ·				
Prepared by:				continued 📙	

Date: 93,04.06		and a second	Page: _l_ of _l_		
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology: 교	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	F - TRACK 4 - CONSTRUCTION 3.1 - MAINLING TURNOUTS		
Geographical Variat	ion ? 🗌 no 🔲 yes If y	es, indicate segments a	pplicable:		
Price developed b	y CANARAIL:				
			main line turneute et e		
	using 2 gangs to pre-assentral site and one gang to		4.4444444		
	chanization, especially wi				
	avy panels and concrete s				
ALESSA DE LA CONTRACTOR DE		200			
Gang size	as follows: 1	Supervisor			
,,	3	Foremen			
	5 34	Operator Labourers			
	2	Flagman			
	45	Total			
WOI	rking 8.5 hour days for to	tal daily labour cost of:	\$ 10,394		
Daily acco	modation costs for crew	@ \$ 20 per person:	900		
Daily equip	pment cost		4,202		
Contractor	r's overhead and profit @	32% of above costs	4,959		
	TOTAL (/ main	line turnout installed)	\$ 20,455		
Prepared by:			continued		

Date: 93.04.06		Page: <u></u> of <u></u>			
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology: 300+ kph - new 300+ kph - exist 200+ kph - exist	:. R/W Sector:	F - TRACK 4 - CONSTRUCTION 3.2 - YARD TURNOUTS			
Geographical Variation ? 🔲 no 🔲 y	es If yes, indicate segments a	pplicable:			
Price developed by CANARAIL:					
	with a speed swing and small				
	el) per day in yards with no int	erference from other			
traffic					
Gang size as follows: 1	Foremen	100-2010 00 48 0 48 10 490 00 00 00 00 00 00 00 00 00 00 00 00 0			
1	Operator				
10					
_2	. Flagman				
14	Total				
		0.0040			
working 8 hour days	for total daily labour cost of:	\$ 2,840			
Daily accomodation costs for	r crew @ \$ 20 per person:	280			
Daily equipment cost		425			
Contractor's overhead and p	rofit @ 32% of above costs	1,135			
ТОТА	L (/ yard turnout installed)	\$ 4,680			
	THE PROPERTY OF THE PROPERTY O				
Prepared by:		continued			

Date: 93.04.02	Action	Page: L of Z			
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology: 300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W		F - TRACK 4 - CONSTRUCTION 4 - BALLASTING + SURFACING			
Geographical Variation ? ☐ no ☐ yes If	yes, indicate segments ap	plicable:			
Price developed by CANARAIL:					
Assumes 1 high production surfact					
gang + 1 intermediate proc		he second track. Also			
includes costs for dumping	ballast.				
Gang size as below:					
1	Supervisor				
7	Foremen				
12	Operators				
18	Labourers				
_8	Flagman				
46	Total				
working 9 hour days for tot	at daily labour cost of:	\$ 11,808			
Avg. daily accomodation costs for	crew @ \$ 20 per person:	\$ 920			
Daily equipment cost					
- to cover cost of providing tampers, ballast regulators, ballast					
compactors, and a spreader for distributing ballast \$ 9,535					
Contractor's overhead and profit (② 32% of above costs	<u>\$ 7,124</u>			
	Total Daily Cost	\$ 29,387			
Prepared by:		continued 🗹			

Date:			- torone and a second	Page: <u>2</u> of <u>2</u>		
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING						
Technology:		300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	F		
Geographica	l Variati	on ? 🗌 no 🔲 yes If yes	, indicate segments ap	plicable:		
Proc	duction					
-paq	A	was E tools life from also	atan tanah ta final mani	Han		
***************************************		umes 5 track lifts from skel n/day of track laying requir				
		lifts installing = 20% of the				
		nverts to a daily productio				
. I THE STATE OF T	of 2	km x 2080 m ³ /km. Howeve	er, as for track constru	ction, we		
		assumed that it will take				
		of full production at the a				
	aver	age daily production is 5/6	of the above =	3,467 m ³ /day		
	·					
		ТОТА	L (/m³)	\$ 8.47		
		ТОТА	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		
		TOTA	L (/m³)	\$ 8.47		

Technology:	Date: 역3. 호	4.02		A CONTRACTOR OF THE CONTRACTOR	Page: <u></u> of <u></u>
Geographical Variation? ☐ no ☐ yes If yes, indicate segments applicable: Cost based on European experience: - SNCF contracts for grinding of newly installed rail on TGV lines to remove damage due to construction trains and provide the required rail surface. Cost for this service, including all ccahrges from the contractor, is approximately 20,000 FF/km + 4.4 FF/\$ ≈		QUE			ROJECT
- SNCF contracts for grinding of newly installed rail on TGV lines to remove damage due to construction trains and provide the required rail surface. Cost for this service, including all ccahrges from the contractor, is approximately 20,000 FF/km + 4.4 FF/\$ ≈	Technology:		300+ kph - exist. R/W	Sub-system: Sector: Item:5	F - TRACK 4 - CONSTRUCTION 5 - KAIL GRWDING
- SNCF contracts for grinding of newly installed rail on TGV lines to remove damage due to construction trains and provide the required rail surface. Cost for this service, including all ccahrges from the contractor, is approximately 20,000 FF/km + 4.4 FF/\$ ≈	Geographica	l Variati	on?□no□yes If yes	, indicate segments ap	plicable:
lines to remove damage due to construction trains and provide the required rail surface. Cost for this service, including all ccahrges from the contractor, is approximately 20,000 FF/km + 4.4 FF/\$ ≈				A CONTRACTOR OF THE CONTRACTOR	
lines to remove damage due to construction trains and provide the required rail surface. Cost for this service, including all ccahrges from the contractor, is approximately 20,000 FF/km + 4.4 FF/\$ ≈	***************************************		·		
provide the required rail surface. Cost for this service, including all ccahrges from the contractor, is approximately 20,000 FF/km + 4.4 FF/\$ ≈	-				
including all ccahrges from the contractor, is approximately 20,000 FF/km + 4.4 FF/\$ ≈					
20,000 FF/km + 4.4 FF/\$ ≈		-			
				contractor, is approxim	natery
TOTAL (/km.) \$ 4,545		20,0	UU FF/KIII + 4.4 FF/⊅ ≈		
TOTAL (/km.) \$ 4,545					
TOTAL (/km.) \$ 4,545				······	
			TOTAL	. (/km.)	\$ 4,545
			Manadalahusu da		

		,			
	The state of the s	v			The state of the s

		of a sales of the trade that the terminate and the	AND THE RESIDENCE OF THE PARTY		/
	***************************************	•••••			
					The second secon
	LES BALLES DE LE LA COMPANIA DE COMP	······································		11.00	
	***************************************				***************************************
Prepared by: continued					

Date: 43.04.20			Fage:		
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING					
Technology: 및	300+ kph - new R/W 300+ kph - exist, R/W 200+ kph - exist, R/W	Sub-system: Sector: Item:	F - TRACK 4 - CONSTRU 6 - CONSTRUC	Transmission !	
Geographical Variati	on ? 🗌 no 🔲 yes If yes	, indicate segments a	pplicable:		
Developed in consu	ultation with European cons	sultant:			
activ it is a for th	10 km/week, a typical bas ities for only 12-15 weeks also required for catenary a ne time to grade and const I probably be necessary to	+ 2-3 week lag for the and signalling constru ruct trackage and the	e second track, ction. Allowing n clear the site		
year	3.		w		
Land, trackage, and	d facilities required for cons	struction base:			
Grading = 0	66,500 cu.m @ \$ 5/cu.m. +	- 15%	\$ 382,370		
Land require	ed = 13.3 hectares @ \$2,5	600/hectare	33,250	oo oo oo oo oo oo bahaalahada waatti oo ee ee	
Track requir	ed = 12,500 m @ \$286/m	· · · · · · · · · · · · · · · · · · ·	3,575,000		
Turnouts re	quired = 41 @ \$ 34,680/tu	rnout	1,421,880		
Salvage of t	rack materials @ 75% (on	\$180/m and \$30,000/	switch)		
		***	-2,610,000		
Office space	ə:				
- 20	ATCO trailers @ \$ 400/mg	onth for 18 months	144,000		
Services - lu	ump sum		100,000		
Total cost t	o establish a construction	base	\$	3,046,500	
Length of average	segment served by base:			125 km	
	TOTAL ((route-km)		\$ 24,372	
Prepared by:			contin	ued 🔲	

Date:			Page: <u>l</u> of <u>2</u>
QUE	BEC-ONTARIO HIGH		ROJECT
Technology:	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W		G - ELECTRIFICATION 4 - CONSTR./INSTAL. 1 -
Geographical Variati	on ? 🗹 no 🗌 yes If yes	, indicate segments ap	oplicable:
TYPICAL CATENA			
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ed from european experien naterials and labour costs.	nce, with adjustments	to reflect north
<u>ltem 1.1</u> Si	ngle Track - Independent S	Structure:	
Cot	topon; \$127.400		
	tenary: \$137,400. eder: \$37,600.		
	<u> </u>		
Tota	al: <u>\$175,000.</u> per ki	lometre.	
<u>ltem 1.2</u> Do	ouble Track - Independent	Structure:	
-Cat	tenary: \$274,900.		
-Fee	eder: \$ 75,100.		
Tota	al: <u>\$350,000.</u> per ki	lometre.	
Acta de differente adjacta acco encommunica			
<u>ltem 1.3</u> D	ouble Track - Portal Structi	ure:	
-Cai	tenary: \$324,900.		
-Fee	eder: \$ 75,100.		
Tota	al: <u>\$400,000.</u> per k	ilometre.	
Prepared by:		And the state of t	continued 🗹

Date:					Page: <u>2</u> of <u>2</u>
Q	UE			SPEED RAIL PELIMINARY ROUTING	I I
Technology:		300+ k	ph - new R/W ph - exist. R/W ph - exist. R/W	Sub-system: Sector: Item:	G-ELECTRIFICATION 4-CONSTR./INSTAL. 1-
Geographical Va	ariatio	on ? 🗹	no 🗌 yes If yes	, indicate segments a	oplicable:
TYPICAL CATE	ENAF	RY (cont	inued)		
	L Trir	nle Track	c - Portal Structure	,	
<u> </u>	<u>r</u> 1111	Jie Tracr	(-) Ortal Olidotale	•	
- seconds of terms left 100 (149)	-Cate	nary:	\$384,900.		
•	-Feed	der:	\$ 75,100.		
	Total	•	<u>\$460,000.</u> per kil	ometre.	
ltems 1	<u>.5, 1.</u>	<u>6, 1.7</u> Ya	ard, Sidings, and (Garage Area Catenary	:
	Total	Cost:	<u>\$13,500.</u> per 100) metres.	
<u>ltem 1.8</u>	<u>8</u> Sta	tion Cate	enary:		
	Tota	l Cost:	<u>\$17,500.</u> per 100) metres.	
	••••				
, posperiose a manufacture at a catal 1867 PHE PAG			e e e e e e e e e e e e e e e e e e e		
ar gerpagellanssentissentissentissentissentissentissentissen			manuscription & access to Sales and the law	90. Tak sam s 180. Tak saman an aman masa masa sama s 180. Tak sa 180. Tak sa 180. Tak sa 180. Tak sa 180. Tak	

Prepared by:					continued \Box

Date: 93.05.07			Page: L of Z
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PREL	IMINARY ROUTING	
Technology: 년 년	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: 4 Sector: 5 Item: 2	- ELECTRIFICATION - CONSTRUCTION - SINGLE X-OVER
Geographical Variat	ion?巴no 口yes Ifyes, ir		
- Al Way And			
	· · · · · · · · · · · · · · · · · · ·		
		· · · · · · · · · · · · · · · · · · ·	
	······		
.,,			
Prepared by:			continued 🗹

CLIENT: CANARAIL CONSULTAI	NTS	TITLI	<u> </u>	TRACK	SECTIO	N STATION						SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S						DISCONN		ONTRO	L			ESTIMATION DATE: APRIL 1993			
LOCATION: ONTARIO - QUEBEC		MADE		R.G.		СПЕСК ВУ:						SHEET NO.:		I OF I	
Location of the Control of the Contr	i i			LABOR			EQUIPMENT					MATERIAL		TOTAL	
DESCRIPTION	QTY U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EII	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
J. Dockii II o.	*	MII	MII	RATE	COST		EII	EH	RATE	cost		COST		COST	
Section break:															
25kV manual disc. 2poles, 1200A outdoor	4 un	45	180	50.00	2 250.00	9 000.00	45	180	10.00	450.00	1 800.00	7 000.00	28 000.00	9 700.00	38 800.00
25kV mot. disc. 2poles, 1200A outdoor	2 un	50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	8 500.00	17 000.00	11 500.00	23 000.(K)
25kV potential transformer, 1ph., outdoor	3 un	25	75	50.00	1 250.00	3 750.00	25	75	10.00	250.00	750.00	4 000.00	12 000.00	\$ 500.00	16 500.00
Structures & insulators	6 un	40	240	50.00	2 000.00	12 000.00	40	240	10.00	400.00	2 400.00	1 500.00	9 000.00	3 900.00	23 400.00
Bus work 25kV	1 l.s.	75	75	50.00	3 750.00	3 750.00	75	75	10.00	750.00	750.00	3 500.00	3 500.00	8 000,00	8 000.00

Catenary section break (see ITEM #2)															outpeased.
															200
															-
															LL COMPANY
															A
											:				Source Control
	ĺ														
															LA CANADA
															n diversable

												[от
		Ì													Option Control
25kV/240-120V, 1ph., transformer 10kVA	1 un	50	50	50.00	2 500.00	2 500.00	50	50	10.00	500.00	500.00	12 000.00	12 000.00	15 000.00	15 000.00
Distribution panel 120/240V 1ph. 24cct	1 un	15	15	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00	2 400.00	2 400.00
Transformer 240V/240-120V 1ph. 5 kVA	l un	10	10	50.00	500.00	500.00	10	10	10.00	100.00	100.00	1 800.00	1 800.00	2.4(x).(x)	2 4(0).(0)
129V c.c.System (UPS) 12.5kVA	1 un	30	30	50.00	1 500.00	1 500.00	30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.00
Control and relays panels	1 l.s.	85	85	50.00	4 250.00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100,00	35 100.00
Sarray was central buneta	, ,,,,,,		, ,	- 770			"								:
Power and control cabling	1 l.s.	50	50	50.00	2 500.00	2 500	50	50	10.00	500.00	500.00	1 500.00	1.500,00	4 500.00	4.5(00,00)
Misc (electrical works) 10%	1 lot	91	91	50.00	4 550.00	4 550.00	91	91	10.00	910.00	910.00	13 130.00	13 130.00	18 590.00	18 590.00
Sous-Total			1001			50 050		1001			10 010		\$144 430		\$204 490
Total			1001			50 050		1001			10 010		\$144 430		\$204 490
	<u> </u>	1													

Date: 13.05.07			Page: <u>/</u>	of Z	***************************************
QUEBEC-ONTARIC UNIT COSTS) HIGH SPE FOR PRELIMINA		ROJECT		
Technology: 델 300+ kph - new l	R/W	Sub-system: Sector: 4 Item: 7	6 - <u>Elec</u> 4 - <u>Con</u> 2 - Doubl	TRIFICATI ETRUCTION LA X-OUR	#U \ \ K
Geographical Variation ? In no ye	s If yes, indicat	e segments ap	plicable:		
					•••••
					,,
			······································		,
	·	.,,,,,,,	, .		
			<u></u>		
		.,,,,,,,,		,,,,,	
		,			
				v	
			-		
	4				
	MARILA DA 4444-1447 MILLER HARRING VICTOR	······································	<u> </u>		

Prepared by:			con	tinued	

CLIENT: CANARAIL CONSULTAN	VTS	TITLI	E:	TRACK	SECTIO	N STATION						SHAWINIGAN NO: 005556			
PROJECT: HIGH SPEED TRAIN ST	rudy	DESCR	IPTION:	DOUBL	E X-OVE	R DISCON	NECT (CONTRO	OL			ESTIMATION DATE: APRIL 1993			93
LOCATION: ONTARIO - QUEBEC		MADE	BY:	R.G.		СНЕСК ВУ:		H.S.	ACCOUN	T:		SHEET NO.:			1 OF 1
		LABOR							EQUIPM	ENT		MAT	ERIAL	TOTAL	
DESCRIPTION	QTY U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
		мп	MII	RATE	cost		EH	EH	RATE	COST		COST		COST	
Section break:															
25kV manual disc. 2poles, 1200A outdoor	бъn	45	270	50.00	2 250.00	13 500.00	45	270	10.00	450.00	2 700.00	7 000.00	42 000.00	9 700.00	58 200.00
25kV mot. disc. 2poles, 1200A outdoor	3 un	50	150	50.00	2 500.00	7 500.00	50	150	10.00	500.00	1 500.00	8 500.00	25 500.00	11 500.00	34 500.00
25kV potential transformer, 1ph., outdoor	3 un	25	75	50.00	1 250.00	3 750.00	25	75	10.00	250.00	750.00	4 000.00	12 000.00	5 500.00	16 500.00
Structures & insulators	9 un	40	360	50.00	2 000.00	18 000.00	40	360	10.00	400.00	3 600.00	1 500.00	13 500.00	3 900.00	35 100.00
Bus work 25kV	1 l.s.	100	100	50.00	5 000.00	5 000.00	100	100	10.00	1 000.00	1 000.00	4 500.00	4 500.00	10 500.00	10 500.00
Catenary section break (see ITEM #2)															
25kV/240-120V, 1ph., transformer 10kVA Distribution panel 120/240V 1ph. 24cct Fransformer 240V/240-120V 1ph. 5 kVA 129V c.c.System (UPS) 12.5kVA Control and relays panels Power and control cabling Mise (electrical works) 10%	1 un 1 un 1 un 1 un 1 l.s. 1 l.s.	50 15 10 30 85 50	50 15 10 30 85 50	50.00 50.00 50.00 50.00 50.00 50.00	2 500.00 750.00 500.00 1 500.00 4 250.00 2 500.00 6 000.00	2 500.00 750.00 500.00 1 500.00 4 250.00 2 500 6 000.00	50 15 10 30 85 50	50 15 10 30 85 50	10.00 10.00 10.00 10.00 10.00	500.00 150.00 100.00 300.00 850.00 500.00	\$00.00 150.00 100.00 300.00 850.00 500.00	12 000.00 1 500.00 1 800.00 15 000.00 30 000.00 1 500.00 15 930.00	12 000.00 1 500.00 1 800.00 15 000.00 30 000.00 1 500.00	15 000.00 2 400.00 2 400.00 16 800.00 35 100.00 4 500.00	15 000.00 2 400.00 2 400.00 16 800.00 35 100.00 4 500.00
Sous-Total			1315			65 750		1315			13 150		\$175 230		\$254 130
Total			1315			65 750		1315			13 150		\$175 230		\$254 130

Date: 93.05.07		Page: <u>I</u> of <u>Z</u>
QUE	BEC-ONTARIO HIGH SPEED RAIL F UNIT COSTS FOR PRELIMINARY ROUTING	ž.
Technology: 다	300+ kph - new R/W Sub-system: 300+ kph - exist. R/W Sector: 200+ kph - exist. R/W Item:	G - ELECTRIFICATION 4 - CONSTRUCTION 2.3 - YHASE BREAK
Geographical Variat	ion ? 🗹 no 🔲 yes If yes, indicate segments a	applicable:
Prepared by:		continued 🕒

CLIENT: CANARAIL CONSULTAI	NTS		TITLI	TITLE: PHASE BREAK STATION									SHAWINIGAN NO: 005556			
PROJECT: HIGH SPEED TRAIN S							ON - 2 x 2	5kV					ESTIMATI	STIMATION DATE: APRIL 1993		
LOCATION: ONTARIO - QUEBEC			MADE BY: R.G. CHECK BY:				II.S. ACCOUNT:					SHEET NO.: 1 OF			1 OF 1	
EGCATION: ONTARIO - QUEDEC			1		LABOR			<u> </u>		EQUIPM	ENT		MAT	ERIAL	TOTAL	
DESCRIPTION	QTY	E T	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
DESCRIPTION	\ \frac{1}{2} \cdot \cdo	U	MH	MH	RATE	COST	,1,1100,111	EII	EH	RATE	COST		COST		COST	
25kV metalclad switchgear including:	1	un	200	200	50.00	10 000.00	10 000.00	200	200	10.00	2 000.00	2 000.00	27 000.00	27 000.00	39 000.00	39 000.00
(rated 46kV)																
-load break mot. disc., 1pole, 1200A	N/A	un	incl.					incl.					20 000.00			
-load break mot. disc., 2poles, 1200A	5	un	incl.					incl.					25 000.00	125 000.00	25 000.00	125 (XX).(X
-motorised disconnect, Ipole, 1200A	N/A	un	incl.					incl.		İ			16 000.00			
-motorised disconnect, 2poles, 1200A	N/A	นก	incl.					incl.					20 000.00			
-manual disconnect, 1pole, 1200A	N/A	un	incl.					incl.		İ		ł	12 000.00			
-manual disconnect, 2poles, 1200A	8	un	incl.					incl.				i	15 000.00	120 000.00	15 000.00	120 000.00
-potential transformer, 1ph., 25kV:120V	4	บก	incl.					incl.]				4 500.00	18 000.00	4 500.00	18 000.00
-outdoor bushing. Ipole	8	un	incl.					incl.					3 500.00	28 000.00	3 500.00	28 000.00
-bus work, Ipole, 1200A (per cell)	N/A	uп	incl.					incl.			:		3 000.00			
-bus work, 2poles, 1200A (per cell)	13	un	incl.					incl.					5 000.00	65 000.00	5 000.00	65 000.00
-neutral bus and links, 1pole, 1200A	6	បធ	incl.					incl.		l			1 500.00	9 000.00	1 500.00	9 000.0
-25kV auto transformer 10MVA	2	បន	225	450	50.00	11 250.00	22 500.00	225	450				170 000	340 000.00	181 250.00	362 5(X).0K
															9244445	
Phase break:								l							SOUTH STATE OF THE	
25kV mot, disc. Ipole, 1200A outdoor	2	un	40	80	50.00	2 000.00	4 000.00	40	80	10.00	400.00	800.00	6 500.00	13 000.00	8 900.00	17 800.0X
25kV mot. disc. 2poles, 1200A outdoor	2	un	50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	8 500.00	17 000.00	11 500.00	23 000.00
Structures & insulators	5	un	40	200	50.00	2 000.00	10 000.00	40	200	10.00	400.00	2 000.00	1 500.00	7 500.00	3 900.00	19 500.00
Bus work 25kV	1	1.5.	60	60	50.00	3 000.00	3 000.00	60	60	10.00	600.00	600.00	2 500.00	2 500.00	6 100.00	6 100.00
Catenary section break (see ITEM #2)																
								1						******	45,000,00	20,000,0
25kV/240-120V, 1ph., transformer 10kVA	2	មព	50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	12 000.00	24 000.00	15 000.00	30 000.0 2 400.0
Distribution panel 120/240V 1ph. 24cct	1	un	15	15	50.00	750.00	750.00	15	15	10.00	\$50.00	150.00	1 500.00	1 500.00	2 400.00	2 400.0
Transformer 240V/240-120V 1ph. 5 kVA	1	បក	10	10	50.00	500.00	500.00	10	10	10.00	100.00	100.00	1 800.00	1 800.00	2 400.00	2
129V c.c.System (UPS) 12.5kVA	1	un	30	30	50.00	1 500.00	1 500.00	30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.0 35 100.0
Control and relays panels	1	1.s.	85	85	50.00	4 250.00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100.00	1 35 8180.07
								l					2,000,00	3 000,00	9 000.00	9.000.0
Power and control cabling	1	l.s.	100	100	50.00	5 000.00	5 000	100	100	10.00	1 000.00	1 000.00	3 000.00	3 000,000	9 (AR).(A)	9 (7(7,1)
	1							1		10.00		. 430.00	04 730 00	84 730.00	93 310.00	93 310.0
Mise (electrical works) 10%	1	lot	143	143	50.00	7 150.00	7 150.00	143	143	10.00	1 430.00	1 430.00	84 730.00		93.330.00	
Sous-Total				1573			78 650		1573			11 230		\$932 030		\$102191
Total				1573			78 650	<u> </u>	1573			11 230	<u> </u>	\$932 030	1	\$1 021 91

Date:			Page: of
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PR		ROJECT
Technology:	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	G-ELECTRIFICATION 4-CONSTR./INSTAL. 3-
Geographical Variati	ion ? 🗌 no 🔲 yes If yes	indicate segments ap	oplicable:
SPECIAL CATENA	RY STRUCTURES		
***************************************	ed from european experien aterials and labour costs.	ce, with adjustments t	o reflect north
<u>Item 3.1</u> Un	derbridge catenary:		
Tota	al Cost: <u>\$10,000.</u> per 100	metres.	
<u>Item 3.2</u> Ov	erbridge catenary:		
Tota	al Cost: <u>\$15,000.</u> per 100	metres.	
			······
Prepared by:			continued

Date: 行3. のち.のみ			Page: <u>I</u> of <u>7</u>
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PRE		ROJECT
Technology: 모	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item: 4	G - ELECTRIFICATION 4 - CONSTRUCTION 1.1 - 230 KU SUB-STATION
Geographical Variati	ion ? Ino I yes If yes,	indicate segments ap	plicable:
Prepared by:			continued 🗹

CLIENT: CANARAIL CONSULTA	Т	TITLE: 230kV SUBSTATION - 2 INCOMMING LINES										SHAWINIGAN NO: 005556				
PROJECT: HIGH SPEED TRAIN S		-					RICAL EQU					·	ESTIMATION DATE: APRIL 1993			
LOCATION: ONTARIO - QUEBEC			MADE		R.G.	,-,- <u>-</u>	СНЕСК ВУ:	II.S. ACCOUNT:					SHEET NO.:			1 ()1° 3
	1	_			LABOR			EQUIPMENT					MATERIAL		TOTAL	
DESCRIPTION	OTY	υľ	UNIT	TOTAL	MH	UNIT	AMOUNT	UNIT	TOTAL	EII	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
	`		MII	МП	RATE	COST		ЕП	EH	RATE	COST		COST		COST	
230k V Disconnect, 3ph., 1200A,c/w grnd.sw.	2	บก	170	340	50.00	8 500.00	17 000.00	170	340	10.00	1 700.00	3 400.00	46 200.00	92 400.00	56 400.00	112 800.00
		ı														
230kV current transf., 1ph., 2 windings	6	un	UTILI					UTILI					UTILITY			
230kV potential transf., 1ph., 120/120V	2	un 📗	บาน		•			UTILI					UTILITY			
230kV current transf., 1ph., 3 windings	6	un 🏻	45	270	50.00	2 250.00	13 500.00	45	270	10.00	450.00	2 700.00	23 500.00	141 000.00	26 200.00	157 200.00
230kV potential transf., 1ph., 120/120V	2	un	50	100	50.00	2 500,00	5 000.00	50	100	10.00	500.00	1 000.00	13 600.00	27 200.00	16 600.00	33-200,00
230kV circuit breaker, 3ph., 1200A SF6	3	นก	390	1170	50.00	19 500,00	58 500.00	390	1170	10.00	3 900.00	11 700,00	220 000	660 000.00	243 400,00	730-200,00
220147 Garage 2nt 1700 A margin	2	_ [140	280	50.00	7 000.00	14 000.00	140	280	10.00	1 400.00	2 800.00	40 000.00	80 000.00	48 400.00	96 800.00
230kV disconnect, 3ph., 1200A, manual	2		120	240	50.00	6 000.00	12 000.00	120	240	10.00	1 200.00	2 400.00	38 000.00	76 000.00	45 200.00	90.400,00
230kV disconnect, 2ph., 1200A, motorised		un	120	240	30.00	0 000.00	12 000.00	120	240	10,(6)	1 200.001	2 400.00	.10 000.00	70 000.00	45 200.00	200 11000000
230kV station post insulators, 1ph.	16	un	15	240	50.00	750.00	12 000.00	15	240	19.00	00.021	2 400.00	1 200.00	19 200.00	2 100.00	33 600,00
25kV disconnect, 2ph., 2000A motorised	2	un	80	160	50.00	4 000.00	8 000.00	80	160	10,00	800,00	1 600.00	14 300.00	28 600.00	19 100.00	38 200 00
Flexible bus work 1250kcm ACSR	300 1	m	0.8	240	50.00	40.00	12 000,00	0.8	240	00.01	8.00	2 400.00	10.00	3 000.00	58.00	17 400.00
Tubular rigid aluminum bus work 75mm dia.		nı.	1	360	50.00	50.00	18 000	1	360	10.00	10.00	3 600.00	95.00	34 200.00	155.00	55-800,(IO
230 / 25kV Transformer, 2ph., 30MVA 4-current transf. 230kV, bushing type	2 (un	1190	2380	50.00	59 500.00	119 000,00	1190	2380	25.00	29 750	59 500.00	750 000	1 500 000	839 250.00	1 678 500
4-current transf. 25kV, bushing type																
2-lightning arresters 230kV, 1 ph.,																
2-lightning arresters 25kV, 1 ph.,	ē.														and the second	
Line protection panel	2 1		75	150	50.00	3 750.00	7 500.00	75	150	10.00	750.00	1 500.00	80 000.00	160 000.00	84 500.00	169 000,00
Circuit breaker control panel		ın	60	180	50.00	3 000.00	9 000.00	60	180	10.00	600.00	1 800.00	40 000.00	120 000.00	43 600.00	130 800 (m
Fransformer control panel	2	un	30	60	50.00	1.500.00	3 000.00	30	60	10,00	300.00	600,00	15 000.00	30 000.00	16 800.00	33 600.00
Power and control cabling	1 1	.s.	250	250	50.00	12 500.00	12 500.00	250	250	10.00	2 500.00	2 500.00	12 000.00	12 000.00	27 000.00	27 (100.00
Misc. (brackets, supports, etc) 10%	1 1	.s.	642	642	50.00	32 100.00	32 100.00	642	642	10.00	6 420.00	6 420.00	298 360	298 360.00	336 880.00	336 880.00
Sub-Total				7062			353 100		7062		-	106 320		\$3 281 960		\$3 741 380
Total																

CLIENT: CANARAIL CONSULTAN		TTTL	TITLE: 230kV SUBSTATION - 2 INCOMMING LINES										SHAWINIGAN NO: 005556			
PROJECT: HIGH SPEED TRAIN S'												ESTIMATION DATE: APRIL 1993		93		
LOCATION: ONTARIO - QUEBEC	10171		MADE BY: R.G. CHECK BY:							ACCOUN'	T:		SHEET NO.:		2 OF 3	
EOCATION, ONTARIO - QUBINCE			144744745		LABOR	***		<u> </u>		EQUIPM	ENT		MATERIAL		TOTAL	
DESCRIPTION	OTY	₽ Ţ	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
/ DESCRIPTION	\ \ ·	Ĭ	мп	MH	RATE	COST		EH	EII	RATE	COST		cost		COST	
25kV metalclad switchgear including:	1	un	200	200	50.00	10 000.00	00.000 01	200	200	10.00	2 000.00	2 000.00	40 500.00	40 500.00	52 500.00	52 500.00
(rated 46kV)																
-circuit breaker, Ipoles, 1200A c/w CT's	N/A	un	incl.					incl.					36 000.00			
-circuit breaker, 2poles, 1200A c/w CT's	5	un	incl.					incl.				!	40 000.00	200 000.00	40 (0)0.00	200 000.00
-motorised disconnect, Ipole, 1200A	N/A	un	incl.					incl.					16 000.00	,		
-motorised disconnect, 2poles, 1200A	2	un	incl.					incl.					20 000.00	40 000,00	20 000.00	40 000.00
-manual disconnect, 1pole, 1200A	N/A	un	incl.					incl.					12 000.00			
-manual disconnect, 2poles, 1200A	12	un	incl.					incl.					15 000.00	180 000.00	15 000.00	180 (000.00
-potential transformer, 1ph., 25kV:120V	12	un	incl.					incl.					4 500,00	54 000.00	4 500.00	54 000.00 42 000.00
-outdoor bushing, Ipole	12	un	inel.					incl.					3 500.00	42 000.00	3 500.00	42 (101.00)
-bus work, 1pole, 1200A (per cell)	N/A	un	incl.					incl.					3 000.00 5 000.00	95 000.00	5 000.00	95 000.00
-bus work, 2poles, 1200A (per cell)	19	un	incl.					incl.					1 500.00	10 500.00	1 500.00	10 500.00
-neutral bus and links, Ipole, 1200A	7	пп	incl.					incl.					1 500.00	10 300.00	1 300.00	KEY _713(5,1511)
Section break:															ALL PROPERTY OF THE PERSON OF	
25kV mot. disc. 1pole, 1200A outdoor	2	un	40	80	50.00	2 000.00	4 000.00	40	80	10.00	400.00	800.00	6 500.00	13 000.00	8 900.00	17 800.00
25kV mot. disc. 2poles, 1200A outdoor	2	un	50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	8 500.00	17 000.00	11 500.00	23 000.00
Structures & insulators	5	นท	40	200	50.00	2 000.00	10 000.00	40	200	10.00	400.00	2 000.00	1.500.00	7 500.00	3 900.00	19 500.00
Bus work 25kV	1	1.5.	60	60	50.00	3 000.00	3 000.00	60	60	10.00	600.00	600.00	2 500.00	2 500.00	6 100.00	6 100.00
Catenary section break (see ITEM #2)															6	
	_		50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	20 000.00	40 000.00	23 000.00	46 000.00
25kV/240-120V, 1ph., transformer 50kVA		un un	30 15	150	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00	2 400.00	2.400.00
Distribution panel 120/240V 1ph. 24ccl		1111	10	10	50.00	500.00	500.00	10	10	10.00	100.00	100.00	1 800.00	1 800	2 400.00	2.40(1.00
Transformer 240V/240-120V Iph, 5 kVA		un	30	30	50.00	1 500.00	1.500.00	30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.00
129V c.c.System (UPS) 12.5kVA	1	Ls.	85	85	50.00	4 250.00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100.00	35 100.00
Control and relays panels	•	j	0.7		20.00	. 2000									Walland Co.	
Power and control cabling		Ls.	100	100	50.00	5 000.00	5 000	100	100	10.00	1 000.00	1 000.00	3 000.00	3 000.00	9 ()0(),0()	9 000.00
															95.940.00	0.5 3/11.1
Misc (electrical works) 10%	1	lot	98	98	50.00	4 900.00	4 900.00	98	98	10.00	980.00	980.00	79 330.00	79 330.00	85 210.00	85 210.00
Sous-Total				1078			53 900		1078			10 780		\$872 630		\$937.310
Total								<u> </u>							<u> </u>	

CLIENT: CANARAIL CONSULTAI	NTS	$\overline{}$	TITLI	<u>S:</u>	230kV	SUBSTAT	TION - 2 IN	COMN	IING LI	NES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S					CIVIL	WORKS A	ND EQUIP	MENT	FOUND	ATIONS			ESTIMATI	ION DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC			MADE	BY:	R.G.		CHECK BY:		II.S.	ACCOUN	r:		SHEET NO).:		3 OF 3
					LABO	R				EQUIPM	ENT		MΛT	ERIAL	T()	ľAL
DESCRIPTION	QTY	U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
			МН	MII	RATE	COST		EII	EH	RATE	COST		COST		COST	
230kV circuit breaker foundations	3	ψn	140	420	46.00	6 440.00	19 320.00	140	420	8.60	1 204.00	3 612.00	3 770.00	11 310,00	11 414.00	34 242,00
230kV motorised disconnect foundations	4	un	90	360	46.00	4 140.00	16.560.00	90	360	8.60	774.00	3 096.00	4 390.00	17 560.00	9 304.00	37 216.00
230kV manual disconnect foundations	4	un	90	360	46.00	4 140.00	16 560.00	90	360	8.60	774.00	3 096,00	4 390.00	17 560.00	9 304.00	37 216,00
230/25kV power transformer foundations	2	un	675	1350	46.00	31 050.00	62 100.00	675	1350	8.60	5 805.00	11 610.00	16 200.00	32 400.00	53 055.00	106 110.00
230kV potential transformer foundations	4	un	30	120	46.00	1 380.00	5 520.00	30	120	8.60	258.00	1 032.00	1 315.00	5 260.00	2 953.00	11 812.00
230kV current transformer foundations	18	un	.30	540	46.00	1 380.00	24 840.00	30	540	8.60	258.00	4 644.00	1 290.00	23 220,00	2 928.00	52 70 1.00
230kV station post insulator foundations	12	un	35	420	46.00	1 610.00	19 320.00	35	420	8.60	301.00	3 612.00	1 550.00	18 600.00	3 461.00	41 532.00
230kV incomming line structure foundations	2	บก	135	270	46.00	6 210.00	12 420.00	135	270	8.60	1 161.00	2 322.00	9 300.00	18 600.00	16 671.00	33 342.00
25kV switchgear foundation	1	un	300	300	46.00	00,008 £1	13 800.00	300	300	8.60	2 580.00	2 580.00	7 200.00	7 200.00	23 580.00	23 580.00
Oil recuperator and accessories	ı	นก	280	280	46.00	12 880.00	12 880.00	280	280	8.60	2 408.00	2 408.00	15 000.00	15 000.00	30 288.00	30 288.00
Site preparation and transport	5600	m3	10.0	56	46.00	0.46	2 576.00	0.01	56	130.00	1.30	7 280.00	N/A		1.76	9 856.00
Fences and gates	1	m	0.8	272	46.00	36.80	12 512.00	0.8	272	8.60	6.88	2 339.20	30.00	10 200.00	73.68	25 051.20
Control building 15' x 40'	1	un	600	600	46.00	27 600.00	27 600.00	600	600	8.60	5 160.00	5 160.00	25 000.00	25 000.00	57 760.00	57 760.00
Grounding loop and shieldwire	5600	m2	0.25	1400	50.00	12.50	70 000.00	0.25	1400	10,00	2.50	14 000,00	10.60	59 360.00	25.60	143-360.00
Substation gravel topping (500mm)	5600	m2	0.04	224	40.00	1.60	8 960.00	0.04	224	8.60	0.34	1 926.40	9.65	54 040	11.59	64 926,40
Cable trenching and manholes	140	m	1.5	210	46.00	69.00	9 660.00	1.5	210	8.60	12.90	1 806.00	250.00	35 000.00	331.90	46 466.00
Misc. (cívil works, etc) 10%	1	l.s.	718	718	50.00	35 900.00	35 900.00	718	718	10.00	7 180.00	7 180.00	35 031.00	35 031.00	78 111.00	78 111.00
Sub-Total				7900			\$370 528		7900			\$77 704		\$385 341		\$833 573
Total				14962			\$723 628		14962			\$194 804		\$4 539 931		\$5 512 263

CLIENT: CANARAIL CONSULTA	NTS	TITL	F:	230kV	SUBSTAT	IION - 2 IN	COMN	AING LI	NES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S						RICAL EQU				······································		ESTIMATI	ION DATE:	APRIL 19	193
LOCATION: ONTARIO - QUEBEC		MADE		R.G.		CHECK BY:		11.S.	ACCOUN	T:		SHEET NO).;		1 OF 3
				LABOI	ł	<u>. </u>		W	EQUIPM	ENT	×	MAT	ERIAL	TOT	`AL
DESCRIPTION	QTY U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
	`	мн	MII	RATE	COST		EII	EII	RATE	COST		COST		cost	
230kV Disconnect, 3ph., 1200A,c/w grnd.sw.	2 u	170	340	50.00	8 500.00	17 000.00	170	340	10.00	1 700.00	3 400.00	46 200.00	92 400.00	56 400.00	112 800.00
_															
230kV current transf., 1ph., 2 windings	6 u	ı UTILI					UTILI					UTILITY			
230kV potential transf., 1ph., 120/120V	2 u						UTILI					UTILITY			SACTION AND ADDRESS OF THE PROPERTY OF THE PRO
230kV current transf., 1ph., 3 windings	6 и		270	50.00	2 250.00	13 500.00	45	270	10.00	450.00	2 700.00	23 500.00	141 000.00	26 200.00	157 200.00
230kV potential transf., 1ph., 120/120V	2 u	n 50	100	50.00	2 500.00	5 ()(00.00	50	100	10.00	500.00	1 000.00	13 600.00	27 200.00	16 600.00	33 200.00
	_			5 0.00	40 70-100	*****	200	4450	*****	2.000.02	11 700 00	220,000	//0.000.00	212 400 00	730 340 00
230kV circuit breaker, 3ph., 1200A SF6	3 u	390	1170	50.00	19 500.00	58 500.00	390	1170	10.00	3 900.00	11 700.00	220 000	660 000.00	243 400.00	730 200.00
22001 C	2 u	140	280	50.00	7 000.00	14 000.00	140	280	10.00	1 400.00	2 800.00	40 000.00	80 000.00	48 400.00	96 800.00
230kV disconnect, 3ph., 1200A, manual	2 u		240	50.00	6 000.00	12 000.00	120	240	10.00	1 200.00	2 400.00	38 000.00	76 000.00	45 200.00	90 400.00
230kV disconnect, 2ph., 1200A, motorised	"	1 120	240	20.00	0 000.00	12000.00	120	240	10.00	1 200.00	2 400.00	.10 000,00	70 000,00	45 200.00	70 400.00
230k∨ station post insulators, 1ph.	16 u	1 15	240	50.00	750.00	12 000.00	15	240	10.00	150.00	2 400.00	1 200.00	19 200.00	2 100.00	33 600.00
2.00k v station post insulators, 17th.	'0 "	`		50.00	12-07-00	12 (100.00					2 720.00	1 200.00			
25kV disconnect, 2ph., 2000A motorised	2 u	1 80	160	50.00	4 000.00	8 000.00	80	160	10.00	800.00	1 600.00	14 300.00	28 600.00	19 100.00	38 200.00
,															
Flexible bus work 1250kcm ACSR	300 m	0.8	240	50.00	40.00	12 000.00	0.8	240	10.00	8.00	2 400.00	10.00	3 000.00	58.00	17 400.00
Fubular rigid aluminum bus work 75mm dia.	360 m	1	360	50.00	50.00	18 000	1	360	10.00	10.00	3 600.00	95.00	34 200.00	155.00	55 8(H).(H)
		ı													
230 / 25kV Transformer, 2ph., 30MVA	2 u	1 1190	2380	50.00	59 500.00	119 000.00	1190	2380	25.00	29 750	59 500.00	750 000	1 500 000	839 250.00	1 678 500
4-current transf. 230kV, bushing type		1													
4-current transf. 25kV, bushing type															
2-lightning arresters 230kV. 1 ph.,		1													
2-lightning arresters 25kV, 1 ph.,		1													
	_				A 8-0 05	9 600.00		150	10.00	760.00	1 600 00	90,000,00	140 (900 00	84 5()0.(X)	169 000,00
I ine protection panel	2 ui		150	50.00	3 750.00	7 500.00	75 60	150 180	10.00	750.00 600.00	1 500.00 1 800.00	80 000.00 40 000.00	160 000.00 120 000.00	43 600.00	130 800.00
Circuit breaker control panel	3 11	1	180	50.00	3 000.00	9 000.00 3 000.00	30	60	10.00	300.00	600.00	15 000.00	30 000.00	16 800.00	33 600.00
Transformer control panel	2 11	1	60	50.00 50.00	1 500.00 12 500.00	12 500.00	250	250	10.00	2 500.00	2 500.00	12 000.00	12 000.00	27 000.00	27 000.00
Power and control cabling	1 1.	1	250 642	50.00	32 100.00	32 100.00	642	642	10.00	6 420.00	6 420.00	298 360	298 360.00	336 880.00	336 880.00
Misc. (brackets, supports, etc) 10%	1 1.3	042		0.00	32 100.00				10.00	0 420.00		2,0,,00	\$3 281 960		\$3 741 380
Sub-Total			7062			353 100		7062			106 320		p3 281 960		\$2 (41 JU))
Total															

CLIENT: CANARAIL CONSULTAI	NTS	Titi	E:	230kV	SUBSTAT	ION - 2 IN	COMN	IING L	INES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S		_				STATION						ESTIMAT	ION DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC	1001	MADI		R.G.		CHECK BY:		II.S.	ACCOUN	 T:		SHEET NO			2 OF 3
	<u> </u>			LABOR	<u> </u>		<u> </u>		EQUIPM	ENT			ERIAL	TOT	ΛL
DESCRIPTION	QTY U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EII	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
		мн	MII	RATE	COST		EII	ЕН	RATE	COST		COST		COST	
25kV metalclad switchgear including:	1 u	-1	200	50.00	10 000.00	10 000.00	200	200	10.00	2 000.00	2 000.00	27 000,00	27 000.00	39 000.00	39 (80).00
(rated 46kV)			ļ												
-circuit breaker, Ipoles, 1200A c/w CT's	5 u	n incl.					incl.]			36 000.00	180 000.00	36 000.00	180 000,00
-circuit breaker, 2poles, 1200A c/w CT's	N/A u	n incl.					incl.					40 000.00			
-motorised disconnect, 1 pole, 1200A	2 u	n incl.					incl.					16 000.00	32 000.00	16 000.00	32 000.00
-motorised disconnect, 2poles, 1200A	N/A u	n incl.					incl.					20 000.00			
-manual disconnect, 1pole, 1200A	12 u	n incl.					incl.					12 000.00	144 000.00	12 000.00	144 000.00
-manual disconnect, 2poles, 1200A	N/A u	n incl.					incl.					15 000.00			
-potential transformer, 1ph., 25kV:120V	6 u	n incl.					inel.					4 500.00	27 000.00	4.500,00	27 000.00
-outdoor bushing, 1pole	6 u	n incl.					incl.					3 500.00	21 000.00	3 500.00	21 000.00
-bus work, Ipole, 1200A (per cell)	19 u	n incl.					incl.					3 000.00	57 000.00	3 000.00	57 000.00
-bus work, 2poles, 1200A (per cell)	N/A u	n incl.					incl.					5 000.00			
-neutral bus and links, Ipole, 1200A	7 u	n incl.					incl.					1 500.00	10 500.00	1 500.00	10.500,00
Section break:															
25kV mot. disc. Ipole, 1200A outdoor	N/A u	n 40		50.00			40		10.00			6 500.00			
25kV mot. disc. 2poles, 1200A outdoor	N/A u			50.00			50		10.00			8 500.00			
Structures & insulators	N/A u	••		50.00			40		10.00			1 500.00			
Bus work 25kV	N/A I			50.00			60		10.00			2 500.00			
Catenary section break (see ITEM #2)	14/74 1.	3.		50.00					201011						
Catenary Section Freuk (Sect 11231 72)															
25kV/240-120V, 1ph., transformer 50kVA	2 u	n 50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	20 000.00	40 000.00	23 000.00	46 ()((),()()
Distribution panel 120/240V 1ph. 24cct	l u		15	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00	2 400.00	2.4(10),(10)
Fransformer 240V/240-120V 1ph. 5 kVA	1 u	n 10	10	50.00	500.00	500.00	10	10	10.00	100.00	100.00	1 800.00	1 800	2 400.00	2 400.00
129V e.c.System (UPS) 12.5kVA	1 u	n 30	30	50.00	1 500.00	1 500.00	30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.00
Control and relays panels	1 1.	s. 85	85	50.00	4 250.00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100.00	35 100,00
														O. C.	
Power and control cabling	1 1.	s. 100	100	50.00	5 000.00	5 000	100	100	10.00	1 000.00	1 000.00	3 000.00	3 000.00	9 000.00	9 (90),(8)
_															
Misc (electrical works) 10%	1 10	ot 54	54	50.00	2 700.00	2 700.00	54	54	10.00	540.00	540.00	58 980.00	58 980.00	62 220.00	62 220.00
Sous-Total			594			29 700		594			5 940		\$648 780		\$684 420
Total															

CLIENT: CANARAIL CONSULTAI	VTS		TITLE	<u>:</u>	230kV	SUBSTAT	TON - 2 IN	COMN	IING LI	NES			SHAWINI	GAN NO:	005556	· · · · · · · · · · · · · · · · · · ·
PROJECT: HIGH SPEED TRAIN ST			DESCR	IPTION:	CIVIL	WORKS A	ND EQUIP	MENT	FOUND	ATIONS	1		ESTIMAT	ON DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC			MADE	BY:	R.G.		CHECK BY:		II.S.	ACCOUN	T:		SHEET NO).:		3 OF 3
					LABO	R				EQUIPM	ENT		MAT	ERIAL	'],'()	îλL
DESCRIPTION	QTY	U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	ЕН	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
			MII	MII	RATE	COST		EII	EH	RATE	COST	·	COST		COST	
230kV circuit breaker foundations	3	un	140	420	46.00	6 440.00	19 320.00	140	420	8.60	1 204.00	3 612.00	3 770.00	11 310.00	11 414.00	34 242.00
230kV motorised disconnect foundations	4	un	90	360	46.00	4 140.00	16 560.00	90	360	8.60	774.00	3 096.00	4 390.00	17 560.00	9 304.00	37 216.00
230kV manual disconnect foundations	4	uп	90	360	46.00	4 140.00	16 560.00	90	360	8.60	774.00	3 096.00	4 390.00	17 560.00	9 304.00	37 216.00
230/25kV power transformer foundations	2	บก	675	1350	46.00	31 050.00	62 100.00	675	1350	8.60	5 805.00	11 610.00	16 200.00	32 400.00	53 055.00	1()6 (10,(H)
230kV potential transformer foundations	4	un	30	120	46.00	1 380.00	5 520.00	30	120	8.60	258.00	1 032.00	1 315.00	5 260.00	2 953.00	11.812.00
230kV current transformer foundations	18	un	30	540	46.00	1 380.00	24 840,00	30	540	8.60	258.00	4 644.00	1 290.00	23 220.00	2 928.00	52 7(14.(10)
230kV station post insulator foundations	12	un	35	420	46.00	1 610.00	19 320.00	35	420	8.60	301.00	3 612.00	1 550.00	18 600.00	3 461.00	41 532.00
230kV incomming line structure foundations	2	un	135	270	46.00	6 210.00	12 420.00	135	270	8.60	1 161.00	2 322.00	9 300.00	18 600.00	16 671.(X)	33 342.00
25kV switchgear foundation	1	un	300	300	46.00	13 800.00	13 800.00	300	300	8.60	2 580.00	2 580.00	7 200.00	7 200.00	23 580.00	23 580.00
Oil recuperator and accessories	1	មក	280	280	46.00	12 880.00	12 880.00	280	280	8.60	2 408.00	2 408.00	15 000.00	15 000.00	30 288.00	30 288.00
Site preparation and transport	5600	m3	0.01	56	46.00	0.46	2 576.00	0.01	56	130.00	1.30	7 280.00	N/A		1.76	9 856.00
Fences and gates	340	m	0.8	272	46.00	36.80	12 512.00	0.8	272	8.60	6.88	2 339.20	30.00	10 200.00	73.68	25 051.20
Control building 15' x 40'	ı	un	600	600	46.00	27 600.00	27 600.00	600	600	8.60	5 160.00	5 160.00	25 000.00	25 000.00	57 760.00	57 760.00
Grounding loop and shieldwire	5600	m2	0.25	1400	50.00	12.50	70 000.00	0.25	1400	10.00	2.50	14 000.00	10.60	59 360.00	25.60	143-360.00
Substation gravel topping (500mm)	5600	m2	0.04	224	40.00	1.60	8 960.00	0.04	224	8.60	0.34	1 926.40	9.65	54 040	11.59	64 926,40
Cable trenching and manholes	140	m	1.5	210	46.00	69.00	9 660.00	1.5	210	8.60	12.90	1 806.00	250.00	35 000.00	331.90	46 466.00
Misc. (civil works, etc) 10%	į	1.5.	718	718	50.00	35 900.00	35 900.00	718	718	10.00	7 180.00	7 180.00	35 031.00	35 031.00	78 111.00	78 111.00
Sub-Total				7900			\$370 528		7900			\$77 704		\$385 341		\$833 573
Total				14962			\$723 628		14962			\$189 964		\$4 316 081		\$5 259 373

Date: 93.05.07			Page: L of 7
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PR		ROJECT
Technology: 교	300+ kph - new R/W , 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item:	G - ELECTRIFICATION 4 - CONSTRUCTION 4.2 - 120 KV SUBSTATION
Geographical Variati	ion ? 🗹 no 🔲 yes If yes	, indicate segments ap	pplicable:
	·		
	·		
Prepared by:			continued

				4001 11	(3 0 10 3 2 3 10 3 4 7	TION - 2 IN	17.773848	AING LI	NIEC			SHAWINI	CAN NO.	005556	***************************************
CLIENT: CANARAIL CONSULTA		TITL							INEO			ESTIMATI		APRIL 19	93
PROJECT: HIGH SPEED TRAIN S	rudy				- ELECT	RICAL EQU) Helvi E.		ACCOUN'	•		SHEET NO		TER AUSES AV	1 ()1/3
LOCATION: ONTARIO - QUEBEC		MADE	BY:	R.G.		СПЕСК ВУ:		H.S.			11/		ERIAL	7()7	
			·	LABOR		r			EQUIPM					UNIT	AMOUNT
DESCRIPTION	QTY t	J UNIT	TOTAL	MH	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT		\\$1x\$ < 3 < 12 x
		MII	MII	RATE	COST		EU	EH	RATE	COST		COST	60 (1411 (15)	42 300.00	84 600,00
120kV Disconnect, 3ph., 1200A.c/w gind.sw.	2 u	n 130	260	50.00	6 500.00	13 000.00	130	260	10.00	1 300.00	2 600.00	34 500.00	69 000,00	42.100.00	2-1-0007.603
		1										UTILITY			
120kV current transf., 1ph., 2 windings	6 u		1				UTILI					UTILITY			
120kV potential transf., 1ph., 120/120V	2 บ			· · ·	. 550.00	.0.500.00	UTILI 35	210	10.00	350.00	2 100.00	16 800.00	100 800.00	18 900.00	113 400,00
120kV current transf., 1ph., 3 windings		n 35	1	50.00	1 750.00	10 500.00	33 40	80	10.00	400.00	800.00	7 250.00	14 500.00	9 650.00	19.3(6),(6)
120kV potential transf., 1ph., 120/120V	2 u	n 40	80	50.00	2 000.00	4 000.00	40	ວບ	10.00	400.00	300.00	7 250,00	14 200,00	, ,,	
		700	900	50.00	15 000.00	45 000.00	300	900	10.00	3 000.00	9 000.00	162 000	486 000.00	180 000.00	540 000,00
120kV circuit breaker, 3ph., 1200A SF6	.3 ti	n 300	900	50.00	15 (M).(a)	43 000.00	JUAN	21117	10.00		3 0				
	2 u	n 110	220	50.00	5 500,00	11 000.00	110	220	10.00	1 100.00	2 200.00	27 100.00	54 200.00	33 700.00	67 100,00
120kV disconnect, 3ph., 1200A, manual	2 11		180	50.00	4 500.00	9 000.00	90	180	10,00	900,00	1 800,00	26 000.00	52 000.00	31 4(R).(R)	62 800,00
120kV disconnect, 2ph., 1200A, motorised	2 "	11 90	100	.,0,0,0	4 500.00	, ,,,,,,,,,,				·					
200 March and insulators Lab	12 u	n 10	120	50.00	500.00	6 000.00	10	120	10.00	100.00	1 200.00	750.00	9 000.00	1 350.00	16 200.00
120kV station post insulators. 1ph.	'2 "	" ""	'-"	20,74				ì							
25kV disconnect, 2ph., 2000A motorised	2 11	n 60	120	50.00	3 000.00	6 000.00	60	120	10.00	600.00	1 200,00	14 300.00	28 600.00	17 900.00	35 800.00
Zik v disconnect; 2 july 2 month and												l		445-446	
Flexible bus work 1250kem ACSR	250 m	0.8	200	50.00	40.00	10 000.00	0.8	200	10.00	8.00	2 000.00	10.00	2.500.00	58.00	14 500.00
Fubular rigid aluminum bus work 75mm dia.	300 n	n 1	300	50.00	50.00	15 000		300	10.00	10.00	3 000.00	95.00	28 500.00	155.00	46.500.00
120 / 25kV Transformer, 2ph., 30MVA	2 u	n 915	1830	50.00	45 750.00	91 500.00	915	1830	25.00	22 875	45 750.00	480 000	960 000.00	548 625.00	1 097 250
1-current transf. 120kV, bushing type		1												one of the contract of the con	
4-current transf. 25kV, bushing type															
2-lightning arresters 120kV, 1 ph			1				ļ								
2-lightning arresters 25kV, 1 ph.,				1			1								
]					l				j				
								150	10.00	750.00	1 500.00	60 000.00	120 000.00	64 500.00	129 (NO.G)
Line protection panel	2 u	ı	L	50.00	3 750.00	7 500.00	75 60	150 180	10.00	600.00	1 800.00	40 000.00	120 000.00	43 600.00	130 800.00
Circuit breaker control panel	3 u	1	1	50.00	3 000.00	9 000.00	30	60	10.00	300.00	600.00	15 000.00	30 000.00	16 800.00	33.600.00
Fransformer control panel	2 u		1	50.00	1 500.00	3 000.00	200	200	10.00	2 000.00	2 000.00	10 000.00	10 000.00	22 000.00	22 (KN), (H
Power and control cabling	1 1		1	50.00	10 000.00 25 050.00	10 000.00 25 050.00	501	501	10.00	5 010.00	5 010.00	208 510	208 510.00	238 570.00	238 570.00
Misc. (brackets, supports, etc) 10%	1 1	.s. 501	1	50.00	23 U3U.00	 	301	 	10.00	3 070.00	 		\$2 293 610		\$2 651 720
Sub-Total		_	5511			275 550		5511			82 560		010 CK7 7¢		4.2.00.00
Total									<u></u>		<u> </u>	<u> </u>	<u> </u>		<u> </u>

CLIENT: CANARAIL CONSULTA	NTS		TITL	<u>:</u>	120kV	SUBSTAT	TON - 2 IN	COMN	AING LI	NES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S							STATION				,		ESTIMAT	ION DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC			MADE		R.G.	````	CHECK BY:		11.S.	ACCOUN	Т:		SHEET NO).;		2 OF 3
	1		1	- Ct.min-	LABOR	<u> </u>		1		EQUIPM	1.7		MAT	ERIAL	TOT	AL.
DESCRIPTION	QTY	u	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
			MII	МН	RATE	COST		EH	ЕН	RATE	COST		COST		COST	
25kV metalclad switchgear including:	1	un	200	200	50.00	10 000.00	10 000.00	200	200	10.00	2 000.00	2 000.00	40 500.00	40 500.00	52 500.00	52 500,00
(rated 46kV)																
-circuit breaker, Ipoles, 1200A c/w Cl's	N/A	un	incl.					incl.					36 000.00			
-circuit breaker, 2poles, 1200A c/w CI's	5	นก	incl.					incl.					40 000.00	200 000.00	40 000.00	200 000.00
motorised disconnect, Ipole, 1200A	N/A	un	incl.					incl.					16 000.00			
-motorised disconnect, 2poles, 1200A	2	un	incl.					incl.					20 000.00	40 000.00	20 000.00	40 (00),00
-manual disconnect, Ipole, 1200A	N/A	นก	incl.					incl.					12 000.00			
-manual disconnect, 2poles, 1200A	12	un	incl.					incl.					15 000.00	180 000,00	15 000.00	180 000,00
-potential transformer, 1ph., 25kV:120V	12	นก	incl.					incl.					4 500.00	54 000.00	4 500.00	54 (100.00
-outdoor bushing. Ipole	12	1111	incl.					incl.					3 500.00	42 000,00	3 500.00	42 000,00
-bus work, Ipole, 1200A (per cell)	N/A	un	incl.					incl.					3 000,00			
-bus work, 2pofes, 1200A (per cell)	19	un	incl.				1	incl.					5 000.00	95 000.00	5 000,00	95 (00),00
-neutral bus and links. Ipole, 1200A	7	un	incl.					incl.					1 500.00	10 500.00	1 5(K).0(I	£0 5(0).(n)
Section break:			40	80	50.00	2 000.00	4 000.00	40	80	10.00	400.00	800.00	6 500.00	13 000.00	8 900.00	17 800,01
25kV mot. disc. Ipole, I200A outdoor	11	un un	50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	8 500.00	17 000.00	11 500.00	23 000.00
25kV mot. disc. 2poles, 1200A outdoor	11	un un	.50 40	200	50.00	2 000.00	10 000.00	40	200	10.00	400.00	2 000.00	1 500.00	7 500.00	3 900.00	19 500.00
Structures & insulators	11		60	60	50.00	3 000.00	3 000,00	60	60	10.00	600.00	600.00	2 500.00	2 500,00	6 100.00	6 100.00
Bus work 25kV	1 '	1.5.	OU	00	00.00	.1 00.000	., 000.000	uo.	00	10.00	UKKE.GG	000.00	2 300.00	2500.00		
Catenary section break (see ITEM #2)	1						:									
25kV/240-120V, 1ph., transformer 50kVA	,	un	50	100	50.00	2.500.00	5 000.00	50	100	10.00	500.00	1 000.00	20 000.00	40 000.00	23 000.00	46 000.0X
Distribution panel 120/240V 1ph. 24cct	1	un	15	15	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00	2 400.00	2 400.00
Transformer 240V/240-120V Iph. 5 kVA	1	un	10	10	50.00	500.00	500.00	10	10	10.00	100.00	100.00	1 800.00	1 800	2 400.00	2 400.00
129V c.c.System (UPS) 12.5kVA	1		30	30	50.00	1 500.00	1.500.00	30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.0
Control and relays panels	II.	l.s.	85	85	50.00	4 250.00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100.00	35 (00)(0
Control and Icinya panera		• • • • • • • • • • • • • • • • • • • •														PLATE LANGE CONTRACTOR
Power and control cabling	1	1.5.	100	100	50.00	5 000.00	5 000	100	100	10.00	1 000.00	1 000.00	3 000.00	3 000.00	9 ()()()()	9 000,0
Mise (electrical works) 10%]	lot	98	98	50.00	4 900.00	4 900.00	98	98	10.00	980.00	980.00	79 330.00	79 330.00	85 210.00	85 210.00
Sous-Total				1078			53 900		1078			10 780		\$872 630		\$937.310
Total								<u> </u>					<u> </u>			

CLIENT: CANARAIL CONSULTAI	VTŠ	Ť	TITLE		120kV	SUBSTAT	10N - 2 IN	COMN	ing Li	NES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S			DESCR	IPTION:	CIVIL	WORKS /	ND EQUIP	MENT	FOUND	ATIONS			ESTIMATI	ION DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC			MADE	BY:	R.G.		СНЕСК ВУ:		II.S.	ACCOUN'	ľ:		SHEET NO).:		3 OF 3
		Τİ			LABO	k				EQUIPM	ENT		MAT	ERIAL	'['()'	ľ/\I,
DESCRIPTION	QTY	U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EII	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
	-	ı	MII	MII	RATE	COST		EH	EH	RATE	COST		COST		COST	
120kV circuit breaker foundations	3 ι	un	105	315	46.00	4 830.00	14 490,00	105	315	8.60	903	2 709.00	2 790.00	8 370.00	8 523.00	25 569.00
120kV motorised disconnect foundations	4 1	un	65	260	46.00	2 990.00	11 960.00	65	260	8.60	559.00	2 236.00	3 250.00	13 000.00	6 799.00	27 196.00
120kV manual disconnect foundations	4 1	un	65	260	46.00	2 990.00	11 960.00	65	260	8.60	559.00	2 236.00	3 250.00	13 000.00	6 799.00	27 196.00
120/25kV power transformer foundations	2 (un	500	1000	46.00	23 000	46 000.00	500	1000	8.60	4 300	8 600.00	12 000.00	24 000.00	39 300.00	78 600.00
120kV potential transformer foundations	4 1	un	20	80	46.00	920.00	3 680.00	20	80	8.60	172.00	688.00	975.00	3 900.00	2 067.00	8 268.00
120kV current transformer foundations	18 1	un	20	360	46.00	920.00	16 560.00	20	360	8.60	172.00	3 096.00	950.00	17 100.00	2 042.00	36 756.00
120kV station post insulator foundations	12 (un	25	300	46.00	1 150.00	13 800,00	25	300	8.60	215.00	2 580.00	1 150.00	13 800.00	2515.00	30 180.00
120kV incomming line structure foundations	2 ι	un	100	200	46.00	4 600,00	9 200.00	100	200	8.60	860.00	1 720.00	6 850,00	13 700.00	12310.00	24 620.00
25kV switchgear foundation	1 1	un	300	300	46.00	13 800.00	13 800.00	300	300	8.60	2 580.00	2 580.00	7 200.00	7 200.00	23 580.00	23 580.00
Oil recuperator and accessories	1 1	แก	280	280	46.00	12 880	12 880.00	280	280	8.60	2 408	2 408.00	15 000.00	15 000.00	30 288.00	30 288.00
er, and transport	4200	ա3	0.01	42	46.00	0.46	1 932.00	0.01	42	130.00	1.30	5 460.00	N/A		1.76	7 392.00
Site preparation and transport Fences and gates	1	m	0.8	212	46.00	36,80	9 752.00	0.8	212	8.60	6.88	1 823.20	30.00	7 950.00	73.68	19 525.20
Control building 15° x 40°	1	មព	600	600	46.00	27 600	27 600.00	600	600	8.60	5 160	5 160.00	25 000.00	25 000.00	57 760.00	57 760.00
Grounding loop and shieldwire	4200 1	m2	0.25	1050	50.00	12.50	52 500.00	0.25	1050	10.00	2.50	10 500.00	10.60	44 520.00	25.60	107 520.00
Substation gravel topping (500mm)	4200 1	m2	0.04	168	40.00	1.60	6 720.00	0.04	168	8.60	0.34	1 444.80	9.65	40 530	11.59	48 694,80
Cable trenching and manholes	100 (m	1.5	150	46.00	69.00	6 900.00	1.5	150	8.60	12.90	1 290.00	250.00	25 000,00	331.90	33 190.00
Misc. (civil works, etc) 10%	1 1	l.s.	558	558	50.00	27 900	27 900.00	558	558	10.00	5 580	5 580.00	27 207.00	27 207.00	60 687.00	60 687.UK
Sub-Total				6135		VII. 1	\$287 634		6135			\$60 111		\$299 277		\$647.022
Total				11646			\$563 184		11646		<u> </u>	\$153 451		\$3 465 517		\$4 236 052

CLIENT: CANARAIL CONSULTAT	ure	Titl	ı.	120kV	SURSTAT	TION - 2 IN	COMN	AING LI	NES			SHAWING	GAN NO:	005556	4 Your 10 10 10 10 10 10 10 10 10 10 10 10 10
PROJECT: HIGH SPEED TRAIN S'						RICAL EQU						ESTIMATI	ON DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC	10171	MADE		R.G.	13131301	СПЕСК ВУ:	, , , , , , , , , , , , , , , , , , ,	II.S.	ACCOUN	Γ:		SHEET NO			1 OF 3
EOCATION: ON ARIO - QUEBBEC	i —	111731713		LABOR	?	1	<u> </u>		EQUIPM	ENT		MĀT	ERIAL	TOT	AL.
DESCRIPTION	OTY U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EII	UNIT	AMOUNT	UNIT	AMOUNT	UNIT'	AMOUNT
DESCRIPTION	VII O	MH	MII	RATE	COST		ЕН	EH	RATE	cost		COST		COST	
120kV Disconnect, 3ph., 1200A,c/w grnd.sw.	2 11		260	50.00	6 500.00	13 000.00	130	260	10.00	1 300.00	2 600.00	34 500.00	69 000.00	42 300.00	84 600.00
120k v 121sconnect oping 1200 to a gra-															
120kV current transf., 1ph., 2 windings	6 u	n UTILI					UTILI					UTILITY			
120kV potential transf., 1ph., 120/120V	2 u	n UTILI					LHTU					UTILITY			
120kV current transf., 1ph., 3 windings	6 u	n 35	210	50.00	1 750.00	10 500.00	35	210	10.00	350.00	2 100.00	16 800.00	100 800.00	18 900.00	113 400.00
120kV potential transf., 1ph., 120/120V	2 u	n 40	80	50.00	2 000.00	4 000.00	40	80	10.00	400.00	800.00	7 250.00	14 500.00	9 650.00	19 300.00
		1					300	900	10.00	3 000.00	9 000.00	162 000	486 000.00	180 000.00	540 000,00
120kV circuit breaker, 3ph., 1200A SF6	3 11	a 300	900	50.00	15 000,00	45 000,00	300	900	10.00	3 000.00	9 00.00.00	102 000	400 000.00	100 00000	J 111 J 111 J
	2 u	a 110	220	50.00	5 500.00	11 000.00	110	220	10.00	1 100.00	2 200.00	27 100.00	54 200.00	33 700.00	67 400.00
120k V disconnect, 3ph., 1200A, manual	2 11		180	50.00	4 500.00	9 000.00	90	180	10.00	900.00	1 800.00	26 000.00	52 000.00	31 400.00	62 800.00
120kV disconnect, 2ph., 1200A, motorised	2 0	1 20	100	30,00	4 500.00		1		-		·				
120kV station post insulators, 1ph.	12 u	a 10	120	50.00	500.00	6 000.00	10	120	10.00	100.00	1 200.00	750.00	9 000.00	1.350.00	16 200.00
120k V station post insulators, that				1			•								
25kV disconnect, 2ph., 2000A motorised	2 u	n 60	120	50.00	3 000.00	6 000.00	60	120	10.00	600.00	1 200.00	14 300.00	28 600.00	17 900.00	35 800.00
					 		l					10.00	2 500 00	58.00	14 5(9).00
Flexible bus work 1250kem ACSR	250 m	0.8	200	50.00	40.00	10 000.00	0.8	200	10.00	8.00	2 000.00 3 000.00	10.00 95.00	2 500.00 28 500.00	155.00	46 500.00
Tubular rigid aluminum bus work 75mm dia.	300 m	1	300	50.00	50.00	15 000	1	300	10.00	10.00	3 000.00	95.00	20 300.00	100,00	40 500.00
			1830	50.00	45 750.00	91 500.00	915	1830	25.00	22 875	45 750.00	480 000	960 000.00	548 625.00	1 097 250
120 / 25kV Transformer, 2ph., 30MVA	2 и	n 915	18.10	30.00	4.5 750.00	91 300.00	"	100	25.00			,,,,			
4-current transf. 120kV, bushing type	İ	1		l			l				<u> </u>				and the state of t
4-current transf. 25kV, bushing type 2-lightning arresters 120kV, 1 ph.,	}	1					1								- Control of the Cont
2-lightning arresters 25kV, 1 ph		1]								minute list to the state of the
2-igning aresters 25 k v v v poor		1		ļ			1								A STATE OF THE STA
															CONTRACTOR OF THE PROPERTY OF
Line protection panel	2 u	n 75	150	50.00	3 750.00	7 500.00	. 75	150	10.00	750.00	1 500.00	60 000.00	120 000.00	64 500.00	129 (00).00
Circuit breaker control panel	3 u	п 60	180	50.00	3 000,00	9 000.00	60	180	10.00	600.00	1 800.00	40 000.00	120 000.00	43 600.00	130 800.00
Fransformer control panel	2 u	n 30	60	50.00	1 500.00	3 000.00	30	60	10.00	300.00	600.00	15 000.00	30 000.00	16 800.00	33 600.00 22 000.00
Power and control cabling	1 1.		200	50.00	10 000.00	10 000.00	200	200	10.00	2 000.00	2 000.00	10 000,00	10 000.00 208 510.00	22 000.00 238 570.00	23 000.00
Misc. (brackets, supports, etc) 10%	1 L	s. 501	501	50.00	25 050.00	25 050.00	501	501	10.00	5 010.00	5 010.00	208 510		2.70.27(7.00)	ł
Sub-Total			5511			275 550	 	5511			82 560		\$2 293 610		\$2 651 720
Total		<u> </u>		<u> </u>			<u> </u>				<u> </u>	<u> </u>	<u> </u>		

CLIENT: CANARAIL CONSULTAN	ITS	_	TITLI	<u> </u>	120kV	SUBSTAT	ION - 2 IN	COMN	IING LI	NES			SHAWINE	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S							STATION						ESTIMATI	ON DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC			MADE	****	R.G.		CHECK BY:			ACCOUN'	Γ:		SHEET NO).;		2 OF 3
DOCATION OF THE PARTY OF THE PA					LABOR		······································			EQUIPM		(vet)(MAT	ERIAL	TOT	AI,
DESCRIPTION	QTY	U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			MH	MII	RATE	COST		EH	EII	RATE	COST		cost		COST	
25kV metalelad switchgear including:	1	un	200	200	50.00	10 000.00	10 000.00	200	200	10.00	2 000.00	2 000.00	27 000.00	27 000.00	39 000.00	39 ()((0,()()
(rated 46kV)							,									
-circuit breaker, Ipoles, 1200A c/w CI's	5	นก	incl.					incl.					36 000.00	180 000.00	36 000.00	180 000.00
-circuit breaker, 2poles, 1200A c/w CT's	N/A	un	incl.					incl.					40 000.00			
-motorised disconnect, 1pole, 1200A	2	นก	inel.					incl.					16 000.00	32 000.00	16 000.00	32 000.00
-motorised disconnect, 2poles, 1200A	N/A	un	incl.					incl.					20 000.00			
-manual disconnect, 1pole, 1200A	12	un	incl.					incl.					12 000.00	144 000.00	12 000.00	144 000.00
-manual disconnect, 2poles, 1200A		un	incl.					incl.					15 000.00	27 000 00	4.500.00	27 (100).00
-potential transformer, 1ph., 25kV:120V		un	incl.					incl.					4 500.00	27 000.00	4 500.00 3 500.00	27 (1081.00 21 000.00
-outdoor bushing, 1pole	6		incl.					incl.					3 500.00 3 000.00	21 000.00 57 000.00	3 000.00	57 000.00
-bus work, Ipole, 1200A (per cell)	19		incl.					incl.					5 000.00	37 (0.00.00	3 900.00	37 ORAGEON
-bus work, 2poles, 1200A (per cell)		un	incl.					incl. incl.					1 500.00	10 500.00	1 500.00	10 500.00
-neutral bus and links, 1pole, 1200A	7	นท	incl.					inci.					1 300.00	10 300.00	1 300,00	10 200.00
Section break:							;									
25kV mot. disc. 1pole, 1200A outdoor	N/A	un	40		50.00			40		10.00			6 500.00			
25kV mot. disc. 2poles, 1200A outdoor	i	un	50		50.00			50		10.00			8 500.00			
Structures & insulators	N/A	นก	40		50.00			40		10.00			1 500.00			
Bus work 25kV	N/A	l.s.	60		50.00			60		10.00			2 500.00			
Catenary section break (see ITEM #2)																
			-				:									
25kV/240-120V, 1ph., transformer 50kVA	2	un	50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	20 000.00	40 000.00	23 000.00	46 000.00
Distribution panel 120/240V 1ph. 24cet	1	un	15	15	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00	2 400.00	2 400.00
Fransformer 240V/240-120V 1ph. 5 kVA	1	មព	10	10	50.00	500.00	500.00	10	10	10.00	00,001	100.00	1 800.00	1 800	2 400.00	2 400.00
129V c.c.System (UPS) 12.5kVA	1	แก	30	30	50.00	1 500.00	1 500.00	. 30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.00
Control and relays panels	1	l.s.	85	85	50.00	4 250.00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100.00	35 100.00
			100	100	50.00	£ 000 00	5 000	100	100	10.00	1 000.00	1 000.00	3 000,00	3 000.00	9 000.00	9 (00),00
Power and control cabling	ĵ	1.5.	100	100	50.00	5 000.00	3,000	100	100	10,00	, 000.00	1 000.00	_,, 0,00,,00	., 000,000	7 000.00	2
Misc (electrical works) 10%	1	lot	54	54	50.00	2 700.00	2 700.00	54	54	10.00	540.00	540.00	58 980.00	58 980.00	62 220.00	62 220.00
Sous-Total				594			29 700		594			5 940		\$648 780		\$684 420
Total																

CLIENT: CANARAIL CONSULTAN	NTS	Tiri	Æ:	120kV	SUBSTA	110N - 2 IN	COMN	AING LI	NES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S'	TUDY	DESC	RIPTION:	CIVIL	WORKS /	AND EQUIP	MENT	FOUND	ATIONS	;		ESTIMAT	ION DATE:	APRIL 19	193
LOCATION: ONTARIO - QUEBEC		MAD	E BY:	R.G.		СПЕСК ВУ;		H.S.	ACCOUN			SHEET NO			3 ()F 3
			_	LABO	R				EQUIPM	ENT		MAT	ERIAL	.1.()	TAL
DESCRIPTION	QTY	U UNI	TOTAL	MIL	UNIT	AMOUNT	UNIT	TOTAL	ЕН	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
		MII	MII	RATE	COST		EII	ЕН	RATE	COST		COST		COST	
120kV circuit breaker foundations	3 ι	n 105	315	46.00	4 830.00	14 490.00	105	315	8.60	903	2 709.00	2 790.00	8 370.00	8 523.00	25 569.00
120kV motorised disconnect foundations	4 ι	n 65	260	46.00	2 990.00	11 960.00	65	260	8.60	559.00	2 236.00	3 250.00	13 000.00	6 799.00	27 196.00
120kV manual disconnect foundations	4 ι	n 65	260	46.00	2 990.00	11 960.00	65	260	8.60	559.00	2 236.00	3 250.00	13 000.00	6 799.00	27 196.00
120/25kV power transformer foundations	2 ι	n 500	1000	46.00	23 000	46 000.00	500	1000	8.60	4 300	8 600.00	12 000.00	24 000.00	39 300.00	78 600.00
t20kV potential transformer foundations	4 ı	n 2(80	46.00	920.00	3 680.00	20	80	8.60	172.00	688.00	975.00	3 900.00	2 067.00	8 268.00
120kV current transformer foundations	18 u	n 20	360	46.00	920.00	16 560.00	20	360	8.60	172.00	3 096.00	950.00	17 100.00	2 042.00	36 756.00
120kV station post insulator foundations	12 u	n 25	300	46.00	1 150.00	13 800.00	25	300	8.60	215.00	2 580.00	1 150.00	13 800.00	2 515.00	30 180.00
120kV incomming line structure foundations	2 u	n 100	200	46.00	4 600.00	9 200.00	100	200	8.60	860.00	1 720.00	6 850.00	13 700.00	12 310.00	24 620.00
25kV switchgear foundation	l u	n 300	300	46.00	13 800.00	13 800.00	300	300	8.60	2 580.00	2 580.00	7 200.00	7 200.00	23 580.00	23 580.00
Oil recuperator and accessories	1 u	n 280	280	46.00	12 880	12 880.00	280	280	8.60	2 408	2 408.00	15 000.00	15 000.00	30 288.00	30 288.00
Site preparation and transport	4200 п	13 0.01	42	46.00	0.46	1 932.00	0.01	42	130.00	1.30	5 460.00	N/A		1.76	7 392.00
Fences and gates	265 n	0.8	212	46.00	36.80	9 752.00	0.8	212	8.60	6.88	1 823.20	30.00	7 950.00	73.68	19 525.20
Control building 15' x 40'	1 u	n 600	600	46.00	27 600	27 600.00	600	600	8.60	5 160	5 160.00	25 000.00	25 000.00	57 760.00	57 760.00
Grounding loop and shieldwire	4200 n	12 0.25	1050	50,00	12.50	52 500.00	0.25	1050	10.00	2,50	10 500.00	10.60	44 520.00	25,60	107 520.00
Substation gravel topping (500mm)	4200 n	12 0.04	168	40.00	1.60	6 720.00	0.04	168	8.60	0.34	1 444.80	9.65	40 530	11.59	48 694,80
Cable trenching and manholes	100 п	1.5	150	46.00	69.00	6 900.00	1.5	150	8.60	12.90	1 290.00	250.00	25 000.00	331.90	33 190.00
Misc. (civil works, etc) 10%	1 1.	s. 558	558	50.00	27 900	27 900.00	558	558	10.00	5 580	5 580.00	27 207.00	27 207.00	60 687.00	60 637.00
Sub-Total			6135	-1		\$287 634		6135			\$60 111		\$299 277		\$647 022
Total			11646			\$563 184		11646			\$148 611		\$3 241 667		\$3 983 162

Date: 93.05.0	27	more commerce phone exercises pomer enque properties de la cicla d		MORE THEFT HAVE SEED TO SEED TO THE A PART OF THE SEED TO SEED	Page: / of C
G	UEBE(EED RAIL PROMARY ROUTING	OJECT
Technology:	9 300	0+ kph - new R, 0+ kph - exist. F 0+ kph - exist. F	N/F	Sub-system: 6 Sector: 4 Item: 4,	- BLECTRIFICATION - CONSTRUCTION 3-PARMUSLIAN STATION.
Geographical V	ariation ?	☑no ☐yes	If yes, indic	ate segments app	licable:
	······································				
			•••••••••••••••••••••••••••••••••••••••		
		·			
Prepared by:					continued 🗵

CLIENT: CANARALL CONSULTAT	IENT: CANARAIL CONSULTANTS			3:	PARAL	LELING	& AUTO-TR	ANSF	ORMER	STATIO	N		SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S					25kV S	UBSTAT	ON - 2 x 2	5kV				••	ESTIMAT	ION DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC	10171		MADE		R.G.		CHECK BY:		II.S.	ACCOUN	T:		SHEET NO).:		1 ()1
Hoomion on the	T		1		LABOR	<u> </u>		<u> </u>		EQUIPM			MAT	ERIAL	707	'AL
DESCRIPTION	OTY	U	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	ЕН	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
			Mii	MII	RATE	COST		EH	EH	RATE	COST		COST		COST	
25kV metalclad switchgear including:	1	un	200	200	50.00	10 000.00	10 000.00	200	200	10.00	2 000.00	2 000.00	27 000.00	27 000.00	39 000.00	39 000.00
(rated 46kV)]						
-load break mot. disc., 1pole, 1200A	N/A	un	incl.					incl.					20 000.00			
-load break mot. disc., 2poles, 1200A	2	un	inci.	i				incl.					25 000.00	50 000.00	25 000.00	50 000.00
-motorised disconnect, Ipole, 1200A	N/A	un	inct.					incl.					16 000.00	;		
-motorised disconnect, 2poles, 1200A	2	un	incl.					incl.					20 000.00	40 000.00	20 000.00	40 (KK).(K)
-manual disconnect, 1pole, 1200A	N/A	un	incl.					incl.					12 000.00			
-manual disconnect, 2poles, 1200A	2	un	incl.					incl.					15 000.00	30 000.00	15 000.00	30 000.00
-potential transformer, 1ph., 25kV:120V	2	un	incl.					ìncl.					4 500.00	9 000.00	4 500.00	9 000,00
-outdoor bushing, 1pole	4	un	incl.					incl.					3 500.00	14 000.00	3 500,00	14 (8).(8)
-bus work, 1pole, 1200A (per cell)	N/A	un	incl.					incl.					3 000.00			
-bus work, 2poles, 1200A (per cell)	6	un	inel.					incl.					5 000.00	30 000.00	5 000.00	30 000,00
-neutral bus and links. Ipole, 1200A	5	un	incl.					incl.					1 500.00	7 500.00	1 500.00	7 500.00
-25kV auto transformer 10MVA	2	un	225	450	50.00	11 250.00	22 500.00	225	450				170 000	340 000.00	181 250.00	362 500.00
Phase break:			1													
25kV mot, disc. 1pole, 1200A outdoor	N/A	មក	50		50.00			50		10.00			6 500.00			
25kV mot. disc. 2poles, 1200A outdoor	N/A	បរា	40		50.00			40		10.00			8 500.00			
Structures & insulators	N/A	un	40		50.00			40		10.00			1 500.00			
Bus work 25kV	N/A	.5.	60		50.00			60		10.00			2 500.00			
Catenary section break (see ITEM #2)																
25kV/240-120V, 1ph., transformer 10kVA	,	un	50	50	50.00	2 500.00	2 500.00	50	50	10.00	500.00	500.00	12 000.00	12 000.00	15 000.00	15 000.00
Distribution panel 120/240V 1ph. 24cct	1	un	15	15	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00	2 400.00	2 400.00
Fransformer 240V/240-120V 1ph. 5 kVA	1	un	10	10	50.00	500.00	500.00	10	10	10.00	100.00	100.00	1 800.00	1 800.00	2 400.00	2 400.00
129V c.c.System (UPS) 12.5kVA	1	un	30	30	50.00	1 500.00	1 500.00	30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.00
Control and relays panels	ļ	l.s.	85	85	50.00	4 250.00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100.00	35 100.00
Power and control cabling	1	l.s.	100	100	50.00	5 000.00	5 000	100	100	10.00	1 000.00	1 000.00	3 000,00	3 000.00	9 000.00	9 000(8)
Misc (electrical works) 10%	1	lot	94	94	50.00	4 700.00	4 700.00	94	94	10.00	940.00	940.00	61 080.00	61 080.00	66 720.00	66 720.00
Sous-Total				1034			51 700		1034			5 840		\$671 880		\$729 420
Total				1034			51 700		1034			5 840	<u> </u>	\$671 880		\$729.420

Date: 93.05.07			Page: <u>/</u> of <u>Z</u>
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PR		ROJECT
Technology:	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item: 4	G - ELECTRIFICATION 4 - CONSTRUCTION 14 - INTERSACE SING.
Geographical Variation	on ? I no I yes If yes	, indicate segments ap	plicable:
Prepared by:			continued 🖳

					4 - 10111111	17.4.212.12.12	FREEN TODAY	CEAN	ann en	ATTION			SHAWINI	CANINO.	005556	
CLIENT: CANARAIL CONSULTAN			TITLE				UTO-TRAN								APRIL 19	0.3
PROJECT: HIGH SPEED TRAIN ST	<u>rudy</u>		DESCR	IPTION:		OBSTAT	ON - 2 x 25	KY IL					ESTIMATI			1061
LOCATION: ONTARIO - QUEBEC			MADE	BY:	R.G.		CHECK BY:			ACCOUN'			SHEET NO			
					LABOR	<u> </u>				EQUIPM	ENT			ERIAL	707	
DESCRIPTION	QTY	υ	UNIT	TOTAL	MH	UNIT	AMOUNT	UNIT	TOTAL	EII	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
	-		мн	MII	RATE	COST		EH	EII	RATE	COST		COST		COST	
25kV metalelad switchgear including:	1	មេន	200	200	50.00	10 000.00	10 000.00	200	200	10.00	2 000.00	2 000.00	27 000.00	27 000.00	39 000.00	(8),(30) (2)
(rated 46kV)													# 0 000 00	40,000,00	20.000.00	40.000.00
-load break mot. disc., 1pole, 1200A	2	un	incl.					incl.					20 000.00	40 000.00	20 000.00	, , , , , , , , , , , , , , , , , , , ,
-load break mot, disc., 2poles, 1200A	3	un	incl.					incl.					25 000.00	75 000.00	25 000.00	75 O(K).(K)
-motorised disconnect, 1pole, 1200A	N/A	un	inel.	·				incl.					16 000.00			
-motorised disconnect, 2poles, 1200A	N/A	un	incl.					incl.					20 000.00	10 000 00	10.000.00	40 (NV) (N)
-manual disconnect, 1pole, 1200A	4	un	incl.					incl.					12 000.00	48 000.00	12.000.00 15.000.00	48 (K)O,(K) 90 (K)O,(K)
-manual disconnect, 2poles, 1200A	6	un	incl.					incl.					15 000.00	90 000.00		18 000,00
-potential transformer, 1ph., 25kV:120V	4	นก	inel.					incl.					4 500.00	18 000.00	4 500.00	
-outdoor bushing, 1pole	6	un -	incl.					incł.					3 500.00	21 000.00	3 500.00	21 (000.00)
-bus work, Ipole, 1200A (per cell)	4	บก	incl.					incl.					3 000.00	12 000.00	3 000.00	12 (KH).(K) 45 (KH).(K)
-bus work, 2poles, 1200A (per cell)	9	นก	incl.					incl.					5 000.00	45 000.00	5 000,00	9 000.00
-neutral bus and links. Ipole, 1200A	6	un	incl.					incl.					1 500.00	9 000.00	1 500.00	
-25kV auto transformer 10MVA	2	บก	225	450	50.00	11 250.00	22 500.00	225	450				170 000	340 000.00	181 250.00	362 500.00
								1								
Phase break:																
25kV mot. disc. 1pole, 1200A outdoor	N/A	un	40		50.00			40		10.00			6 500.00			
25kV mot. disc. 2poles, 1200A outdoor	N/A	un	50		50.00		-	50		10.00			8 500.00			
Structures & insulators	N/A	un	40		50.00			40		10.00			1 500.00			
Bus work 25kV	N/A	l.s.	60		50.00			60		10.00			2.500.00			
Catenary section break (see ITEM #2)	İ															
												#00.00	10 000 00	42 000 00	16 000 00	15 000.00
25kV/240-120V, 1ph., transformer 10kVA	1	นก	50	50	50.00	2 500.00	2 500.00	50	50	10.00	500.00	500.00	12 000.00	12 000.00	15 000.00 2 400.00	2 400.00
Distribution panel 120/240V 1ph. 24cct	1	un	15	15	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00		2 4(K).(K)
Transformer 240V/240-120V 1ph. 5 kVA	1	un	10	10	50.00	500.00	500.00	10	10	10.00	100.00	100.00	1 800.00	1 800.00	2 400.00	
129V c.e.System (UPS) 12.5kVA	1	un	30	30	50.00	1 500.00	1.500.00	30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.00
Control and relays panels	1	1.s.	85	85	50.00	4 250.00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100.00	35 100.00
[]				200000	0.000.00	0.000.00
Power and control cabling	1	l.s.	100	100	50.00	5 000.00	5 000	100	100	10.00	1 000,00	1 000.00	3 000.00	3 000.00	9 000.00	9 (RJO.(R)
								1						5 0.000.00	04 /70 00	0 + 170 00
Misc (electrical works) 10%	1	lot	94	94	50.00	4 700.00	4 700.00	94	94	10.00	940.00	940.00	78 830.00	78 830.00	84 470.00	84 470,00
Sous-Total				1034			51 700		1034			5 840		\$867 130		\$924 670
Total				1034		<u> </u>	51 700	<u></u>	1034			5 840		\$867 130		\$924 670

Date: 93.05.	07			Page: L of 7
C	UEE	BEC-ONTARIO HIGH UNIT COSTS FOR PR		ROJECT
Technology:	Ø	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: Sector: Item: 4	G-ELECTRIFICATION 4-CONSTRUCTION 1.6-315 KU SUB-STATION
Geographical V	'ariatic	on ? Ino I yes If yes,	indicate segments ap	plicable:
	······································			
				a contract to the
	,			
Prepared by:		A STATE OF THE STA	and the second s	continued

CLIENT: CANARAIL CONSULTA	VIS	1	TTL	C:	315kV	SUBSTAT	TON - 2 IN	COM	IING LI	NES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S		1)	ESCR	IPTION:	315kV	- ELECT	RICAL EQU	прме	NT				ESTIMATI	ON DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC		N	1ADE	BY:	R.G.		CHECK BY:		II.S.	ACCOUN	T:		SHEET NO). <u>:</u>		1 OF 3
					LABOR			l i		EQUIPM	ENT	was was	MAT	ERIAL	1()'I	ÅL
DESCRIPTION	QTY I	U T	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
	_		МП	МН	RATE	COST		ЕП	EH	RATE	COST		COST		COST	
315kV Disconnect, 3ph., 1200A,c/w grnd.sw.	2 ι	ın.	200	400	50.00	10 000,00	20 000.00	200	400	10.00	2 000.00	4 000.00	61 500.00	123 (000.00)	73 500.00	1.17 (100).(10
315kV current transf., 1ph., 2 windings	6 ι	ın U	тил					UTILI					UTILITY			
315kV potential transf., 1ph., 120/120V	2ι	ın U	וזוננו					UTILI					UTILITY			
315kV current transf., 1ph., 3 windings	6 ι	n	55	330	50.00	2 750.00	16 500.00	55	330	10.00	550.00	3 300.00	45 000.00	270 000.00	48 300.00	289 800.00
315kV potential transf., 1ph., 120/120V	2 ι	ın	60	120	50.00	3 000.00	6 000.00	60	120	10.00	600.00	1 200.00	22 000.00	44 000.00	25 600.00	51 200.(H)
315kV circuit breaker, 3ph., 1200A SF6	3 ι	n	450	1350	50.00	22 500.00	67 500.00	450	1350	10.00	4 500.00	13 500.00	310 000	930 000,00	337 000.00	[()] [()()(
315k∨ disconnect, 3ph., 1200∧, manual	2 ι	ın l	165	330	50.00	8 250.00	16 500.00	165	330	10.00	1 650.00	3 300.00	52 000.00	104 000.00	61 900.00	123 800,00
315kV disconnect, 2plf., 1200A, motorised	2 (i n	120	240	50.00	00.000	12 000.00	120	240	10.00	1 200.00	2 400.00	48 000.00	96 000.00	55 200,00	1 10 40(14)(
315kV station post insulators, 1ph.	12 ι	ın	20	240	50.00	1 000.00	12 000,00	20	240	10.00	200.00	2 400.00	1 900.00	22 800.00	3 100.00	37 200.00
25kV disconnect, 2ph., 2000A motorised	2 ι	ın	60	120	50.00	3 000.00	6 000.00	60	120	10.00	600.00	1 200.00	14 300.00	28 600.00	17 900.00	35 800,00
Flexible bus work 1250kem ACSR	250 r	n	0.8	200	50.00	40.00	10 000.00	0.8	200	10.00	8.00	2 000.00	10.00	2 500,00	58.00	14 500,00
Fubular rigid aluminum bus work 75mm dia.	300 i	n	1	300	50.00	50.00	15 000	,	300	10.00	10.00	3 000.00	95.00	28 500.00	155.00	46 \$00.00
315 / 25kV Transformer, 2ph., 30MVA 4-current transf. 315kV, bushing type	2 ı	ın	1450	2900	50.00	72 500.00	145 000,00	1450	2900	25.00	36 250	72 500.00	870 000	1 740 000	978 750.00	1 957 500
4-current transf. 25kV, bushing type																
2-lightning arresters 315kV, 1 ph																
2-lightning arresters 25kV, 1 ph.,																
Line protection panel	2 ι		75	150	50.00	3 750.00	7 500,00	75	150	10.00	750.00	1 500.00	90 000.00	180 000.00	94.5((0.(8)	189 000.00
Circuit breaker control panel	1	n	60	180	50.00	3 000.00	9 000.00	60	180	10.00	600.00	1 800.00	40 000.00	120 000.00	43 600.00	130 800.00
Transformer control panel	2 1		30	60	50.00	1 500.00	3 000.00	30	60	10.00	300.00	600.00	15 000.00	30 000.00	16 800.00	33 600.00
Power and control cabling	1 1	4	300	300	50.00	15 000.00	15 000.00	300	300	10.00	3 000.00	3 000.00	15 000.00	15 000.00	33 000.00	33 (8)0.00
Mise. (brackets, supports, etc) 10%	1 1	. 5.	722	722	50.00	36 100.00	36 100.00	722	722	10.00	7 220.00	7 220.00	373 440	373 440.00	416 760.00	416 760.00
Sub-Total				7942			397 100		7942			122 920		\$4 107 840		\$4 627 860
Total								<u> </u>								

CCLERT, CANADAH CONSULTAR	IENT: CANARAIL CONSULTANTS			₹•	230kV	SURSTAT	TON - 2 IN	COMN	IING LI	NES			SHAWINE	GAN NO:	005556	A CONTRACT OF THE PARTY OF THE
PROJECT: HIGH SPEED TRAIN S			TITLI				STATION						ESTIMAT	ION DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC	10171		MADE		R.G.		CHECK BY:			ACCOUN	 Г:		SHEET NO).:		2 ()F 3
EGEATION: ON ARTO - QUILLE			1.171172		LABOR			i		EQUIPM	ENT		MAT	ERIAL	TOT	λL
DESCRIPTION	QTY	n	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EII	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
DESCRIPTION	```		MIL	MII	RATE	COST		EII	ЕН	RATE	COST		cost		COST	
25kV metalelad switchgear including:	ı	un	200	200	50.00	10 000.00	10 000.00	200	200	10.00	2 000,00	2 000.00	40 500.00	40 500.00	52 500.00	52 500.00
(rated 46kV)																
-circuit breaker, Ipoles, 1200A c/w CFs	N/A	un	incl.					incl.					36 000.00		WH 2225	
circuit breaker, 2poles, 1200A c/w CT's	5	un	incl.					inel.					40 000.00	200 000.00	40 000.00	200 000.00
-motorised disconnect, Ipole, 1200A	N/A	นก	incl.					incl.					16 000.00			
motorised disconnect, 2poles, 1200A	2	นถ	incl.					incl.					20 000.00	40 000.00	20 (00.00	40 (100,00
-manual disconnect, 1pole, 1200A	N/A	un	incl.					incl.					12 000.00		_	
-manual disconnect, 2poles, 1200A	12	นก	incl.					incl.					15 000.00	180 000.00	15 000.00	150 000.00
-potential transformer, 1ph., 25kV:120V	12	u p	incl.					incl.					4 500,00	54 000.00	4 5(11).(11)	60.000 EZ
outdoor bushing, 1pole	12	นก	inct.					incl.					3 500.00	42 000.00	3.500.00	42 (R)0.00
-bus work, 1pole, 1200A (per cell)	N/A	un	incl.					incl.					3 000.00		5 400 0 0 0	25 200 (0)
-bus work, 2poles, 1200A (per cell)	19	un	incl.					incl.					5 000.00	95 000.00	5 000.00	95 0(0,00
-neutral bus and links, Ipole, 1200A	7	un	incl.					incl.					1 500.00	10 500.00	1 500.00	(O.500.00)
							:								THE SAME OF THE SA	
Section break:															0.000.00	27 52412 444
25kV mot. disc. 1pole, 1200A outdoor	2	un	40	80	50.00	2 000.00	4 000.00	40	80	10.00	400.00	800.00	6 500.00	13 000.00	8 900.00 11 5(x).(x)	17 800.00 23 000.00
25kV mot. disc. 2poles, 1200A outdoor	2	un	50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	8 500.00	17 000.00		
Structures & insulators	5	un	40	200	50.00	2 000,00	10 000.00	40	200	10.00	400.00	2 000.00	1 500.00	7 500.00	3 900.00	19 5(6),(8)
Bus work 25kV	Ţ	l.s.	60	60	50.00	3 000.00	3 000.00	60	60	10.00	600.00	600.00	2 500.00	2 500.00	6 100.00	0 1(K),(X)
Catenary section break (see ITEM #2)																
25k V/240-120V, 1ph., transformer 50k VA	2	un	50	100	50.00	2 500.00	5 000.00	50	100	10.00	500.00	1 000.00	20 000.00	40 000.00	23 000.00	46 (KK).00
Distribution panel 120/240V 1ph. 24cct	1	1	15	15	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00	2 400.00	2.4(10.01)
Fransformer 240V/240-120V 1ph. 5 kVA	,		10	10	50.00	500.00	500.00	10	10	00.01	100.00	100.00	1 800.00	1 800	2.400.00	2.400,00
129V e.c.System (UPS) 12.5kVA	· .		30	30	50.00	1.500.00	1.500.00	30	30	10.00	300.00	300.00	15 000.00	15 000.00	16 800.00	16 800.00
Control and relays panels	i		85	85	50.00	4 250.00	4 250,00	85	85	10.00	850,00	850.00	30 000,00	30 000.00	35 100.00	35 100.00
vinción ana iviaya panera	-														2002	
Power and control cabling	1	l.s.	100	100	50.00	5 000,00	5 000	100	100	10.00	1 000.00	1 000.00	3 000,00	3 000.00	9 (0,00,00)	9 (88),68
_					50.0 0	1.000.00	* 000 00	98	98	10,00	980,00	980.00	79 330.00	79 330.00	85 210.00	85 210.00
Mise (electrical works) 10%	11	lot	98	98	50.00	4 900.00	4 900.00	- 78		117,171	233,370		77 33,030			\$937 311
Sous-Total				1078			53 900	 	1078			10 780		\$872 630		DA31 211
Total								<u> </u>		<u> </u>	<u> </u>		<u> </u>		<u> </u>	

CLIENT: CANARAIL CONSULTAN	√TS	111	LE:	315kV	SUBSTA	TION - 2 IN	COM	AING LI	NES	1	<u> </u>	SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S'	FUDY	DES	CRIPTION:	CIVIL	WORKS /	AND EQUIP	MENT	FOUND	ATIONS			ESTIMAT	ION DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC		MA	E BY:	R.G.		CHECK BY:		II.S.	ACCOUN	T:		SHEET NO	D.:		3 OF 3
				LABO)R				EQUIPM	ENT		MAT	ERIAL	T()	TAL
DESCRIPTION	QTY	U UN	T TOTAL	MH	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
		M.	MII	RATE	COST		EII	EII	RATE	COST		COST		COST	
315kV circuit breaker foundations	3 u	n 1	5 495	46.00	7 590.00	22 770.00	165	495	8.60	1 419.00	4 257.00	4 400.00	13 200.00	13 409.00	40 227.00
315kV motorised disconnect foundations	4 u	n 1	0 400	46.00	4 600.00	18 400.00	100	400	8.60	860.00	3 440.00	5 100.00	20 400.00	10 560.00	42 240.00
315kV manual disconnect foundations	4 u	n I	0 400	46.00	4 600.00	18 400,00	100	400	8.60	860.00	3 440.00	5 100,00	20 400.00	10 560.00	42 240.00
													1		
120/25kV power transformer foundations	2 น	n 7	5 1550	46.00	35 650.00	71 300.00	775	1550	8.60	6 665.00	13 330.00	20 000,00	40 000.00	62 315.00	124 630.00
345kV potential transformer foundations	- 1 u	n	5 140	46.00	1 610.00	6 440.00	35	140	*8.60	301.00	1 204.00	1 500,00	6 000,00	3 411.00	13 614.00
315kV current transformer foundations	18 u	n .	5 630	46.00	1 610.00	28 980.00	35	630	8.60	301.00	5 418.00	1 400.00	25 200.00	3 311.00	59 598.00
315kV station post insulator foundations	12 u	n ·	0 480	46.00	1 840.00	22 080.00	40	480	8.60	344.00	4 128.00	1 800.00	21 600.00	3 984.00	47 808.00
315kV incomming line structure foundations	2 u	n 1	0 320	46.00	7 360.00	14 720.00	160	320	8.60	1 376.00	2 752.00	10 700.00	21 400.00	19 436.00	38 872.00
25kV switchgear foundation	1 u	n 30	0 300	46.00	13 800.00	13 800.00	300	300	8.60	2 580.00	2 580.00	7 200.00	7 200.00	23 580.00	23 580,00
Oil recuperator and accessories] tı	n 2	0 280	46.00	12 880.00	12 880.00	280	280	8.60	2 408.00	2 408.00	15 000.00	15 000.00	30 288.00	30 288.00
Site preparation and transport	6400 п	3 0.	1 64	46.00	0.46	2 944.00	0.01	64	130.00	1.30	8 320.00	N/A		1.76	11 264.00
Fences and gates	400 n	C	8 320	46.00	36.80	14 720.00	0.8	320	8.60	6.88	2 752.00	30.00	12 000.00	73.68	29 472.(X)
Control building 15' x 40'	1 u	n 6	0 600	46.00	27 600.00	27 600.00	600	600	8.60	5 160.00	5 160.00	25 000.00	25 000.00	57 760.00	57 760.00
Grounding loop and shieldwire	64 00 n	2 0.:	5 1600	50.00	12.50	80 000.00	0.25	1600	10.00	2.50	16 000.00	10.60	67 840.00	25.60	163 840.00
Substation gravel topping (500mm)	6400 n	2 0.0	4 256	40.00	1.60	10 240.00	0.04	256	8.60	0.34	2 201,60	9.65	61 760	11.59	74 201.60
Cable trenching and manholes	180 n	1	5 270	46.00	69.00	12 420.00	1.5	270	8.60	12.90	2 322.00	250.00	45 000.00	331.90	59 742.00
Misc. (civil works, etc) 10%	1 l.	s. 8	1 811	50.00	40 550.00	40 550.00	811	811	10.00	8 110.00	8 110.00	40 200.00	40 200.00	88 860.00	88 860.00
Sub-Total			8916			\$418 244	l	8916	,.		\$87 823		\$442 200		\$948 267
Total			16858			\$815 344		16858			\$221 523		\$5 422 670		\$6 513 437

CLIENT: CANARAIL CONSULTAI	NTS	TITL	ξ:	315kV	SUBSTAT	TION - 2 IN	COMN	AING LI	NES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S						RICAL EQU			·····	······		ESTIMAT	ION DATE:	APRIL IS	193
LOCATION: ONTARIO - QUEBEC		MADE		R.G.		CHECK BY:		II.S.	ACCOUN	 T:		SHEET NO).:	····	1 OF 3
	l			LABOR	<u> </u>				EQUIPM	ENT		MAT	ERIAL	101	'AL
DESCRIPTION	QTY U	UNIT	TOTAL	MH	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	LAMOUNT
		мн	MH	RATE	COST		EH	EH	RATE	COST		cost		COST	
315kV Disconnect, 3ph., 1200A,c/w grnd.sw.	2 ui		400	50.00	10 000.00	20 000.00	200	400	10.00	2 000.00	4 000.00	61 500.00	123 000.00	73 500.00	147 000.00
315kV current transf., 1ph., 2 windings	6 ur	UTILI					UTILI					UTILITY			Title Transaction
315kV potential transf., 1ph., 120/120V	2 us	UTILI					UTILI					UTILITY			draugungg
315kV current transf., 1ph., 3 windings	6 uı	55	330	50.00	2 750.00	16 500.00	55	330	10.00	550.00	3 300.00	45 000.00	270 000.00	48 300.00	289 800.00
315kV potential transf., 1ph., 120/120V	2 ա	1 60	120	50.00	3 000.00	6 000.00	60	120	10.00	600.00	1 200.00	22 000.00	44 000.00	25 600.00	51 200.00
															ermine
315kV circuit breaker, 3ph., 1200A SF6	3 ur	450	1350	50.00	22 500.00	67 500.00	450	1350	10.00	4 500.00	13 500.00	310 000	930 000.00	337 000.00	1011000
			220	50.00	0.350.00	47 500 50	165	330	*0.00		3 300.00	52 000.00	104 000.00	61 900.00	123 800.00
315kV disconnect, 3ph., 1200A, manual	2 ur		330 240	50.00	8 250.00 6 000.00	16 500.00 12 000.00	105	330 240	10.00	1 650.00 1 200.00	2 400.00	48 000.00	96 000.00	55 200.00	110 400.00
315kV disconnect, 2ph., 1200A, motorised	2 ար	120	240	50.00	\$ 000.00	12 000.00	120	240	10.00	1 200.00	2 400.00	40 000.00	90.000.00	33200.00	130 400.00
315kV station post insulators, 1ph.	12 ur	20	240	50.00	1 000.00	12 000.00	20	240	10.00	200.00	2 400.00	1 900.00	22 800.00	3 100.00	37 2(x),00
315k v station post hisulators, 17m.	12 11	20	240	30.00	1 000.00	12 000.00	2"	210	10.00	200.00	2 400.00	1 200.00	## 056.50	. 199.00	2 4 4
25kV disconnect, 2ph., 2000A motorised	2 ur	60	120	50.00	3 000.00	6 000.00	60	120	10.00	600.00	1 200.00	14 300.00	28 600.00	17 900.00	35.800.00
															O. Antonio
Flexible bus work 1250kcm ACSR	250 m	0.8	200	50.00	40.00	10 000.00	0.8	200	10.00	8.00	2 000.00	10.00	2 500.00	58.00	14 500.00
Fubular rigid aluminum bus work 75mm dia.	300 m	1	300	50.00	50.00	15 000	1	300	10.00	10.00	3 000.00	95.00	28 500.00	155.(X)	46 5(X).(X)
	<u> </u>														No.
315 / 25kV Transformer, 2ph., 30MVA	2 ur	1450	2900	50.00	72 500.00	145 000.00	1450	2900	25.00	36 250	72 500.00	870 000	1 740 000	978 750.00	1 957 500
4-current transf. 315kV, bushing type															eminoral libraria
4-current transf. 25kV, bushing type															and the same of th
2-lightning arresters 315kV, 1 ph.,															
2-lightning arresters 25kV, 1 ph.,															
		1 1													9
				50.00	2 250 12	5 500 00		1,50	10.00	750.00	1 500 40	90 000.00	180 000.00	94 5(K).(H)	189 (00).(8)
Line protection panel	2 111		150	50.00	3 750.00	7 500.00 9 000.00	75 60	150 180	10.00 10.00	750.00 600.00	£ 500.00 £ 800.00	40 000.00	120 000.00	43 600.00	130 800.00
Circuit breaker control panel	3 un	1	180	50.00 50.00	3 000.00 1 500.00	3 000.00	30	60	10.00	300.00	600.00	15 000.00	30 000.00	16 800.00	33 600,00
Transformer control panel	2 un		60 300	50.00 50.00	1 500.00	3 000.00 15 000.00	300	300	10.00	3 000.00	3 000.00	15 000.00	15 000.00	33 000.00	33 000.00
Power and control cabling	1 l.s 1 l.s		722	50.00 50.00	36 100.00	36 100.00	722	722	10.00	7 220.00	7 220.00	373 440	373 440.00	416 760.00	416 760.00
Misc. (brackets, supports, etc) 10% Sub-Total	1 1.3	. 1-22		54.00	,70 100.00	397 100		7942	10.00	. 220.00	122 920		\$4 107 840		\$4 627 860
	-	-	7942			397 100		1942			144 940		D-101040		4,
Total												<u> </u>			

CLUENT: CANARAH CONSULTAN	IENT: CANARAIL CONSULTANTS			E:	230kV	SUBSTAT	10N - 2 IN	COMN	AING LI	NES			SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN ST		寸					STATION						ESTIMAT	ION DATE:	APRIL 19	93
LOCATION: ONTARIO - QUEBEC	. 0171	-	MADE		R.G.		CHECK BY:			ACCOUN	 Т:		SHEET NO).:		2 OF 3
Externation College		\	1.01.00.00		LABOR					EQUIPM			MAT	ERIAL	1()1	ÅL.
DESCRIPTION	QTY	Ħ	UNIT	TOTAL	мн	UNIT	AMOUNT	UNIT	TOTAL	EII	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
PESCATION	4		MIL	MII	RATE	COST		EII	EII	RATE	COST		COST		COST	
25kV metalelad switchgear including:	1	un	200	200	50.00	10 000.00	10 000.00	200	200	10.00	2 000.00	2 000.00	27 000.00	27 000.00	39 000.00	39 000.00
(rated 46kV)																
circuit breaker, Ipoles, 1200A c/w CI's	5	นก	incl.			1		incl.					36 000.00	180 000,00	36 000.00	180 000.00
circuit breaker, 2poles, 1200A c/w CI's	N/A	un	incl.					incl.					40 000.00			
-motorised disconnect, Ipole, 1200A	2	un	incl.			•		incl.					16 000.00	32 000.00	16 000.00	32 000,00
-motorised disconnect, 2poles, 1200A	N/A	un	incl.					incl.					20 000.00			
-manual disconnect, 1pole, 1200A	12	un	inel.					incl.					12 000.00	144 000.00	12 (00).(R)	144 (000,00
-manual disconnect, 2poles, 1200A	N/A	un	incl.					incl.					15 000.00			
-potential transformer, 1ph., 25kV:120V	6	นก	incl.					incl.					4 500.00	27 000.00	4 500.00	27 (00).(0)
outdoor bushing, Ipole	6	un	incl.					inel.					3 500.00	21 000.00	3 500.00	21 000.00
-bus work, Ipole, 1200A (per cell)	19	un	incl.					incl.					3 000.00	57 000.00	3 000.00	57 (00).00
-bus work, 2poles, 1200A (per cell)	N/A	un	incl.					inel.					5 000.00			
-neutral bus and links, Ipole, 1200A	7	un	incl.					incl.					1 500.00	10 500.00	1.500.00	H1500,00
		Î													TO THE STATE OF TH	
Section break:													6 500 00			
25kV mot. disc. Ipole, 1200A outdoor	N/A		40		50.00			40		10.00			6 500.00 8 500.00			
25kV mot. disc. 2poles, 1200A outdoor		un	50		50.00			50	1	10.00			1 500.00			
Structures & insulators		นก	40		50.00			40		10,00			2 500.00		7	
Bus work 25kV	N/A	1.5.	60		50.00			60		10.00			2 300.00			
Catenary section break (see ITEM #2)												,				
25kV/240-120V, 1ph., transformer 50kVA	,	un	50	100	50.00	2 500.00	5 000.00	50	100	10,00	500.00	1 000.00	20 000.00	40 000.00	23 000.00	46 (100.00)
Distribution panel 120/240V 1ph. 24cct		un	15	15	50.00	750.00	750.00	15	15	10.00	150.00	150.00	1 500.00	1 500.00	2 400.00	2 400.00
Transformer 240V/240-120V 1ph. 5 kVA	l	un	10	10	50.00	500.00	500.00	10	10	10.00	100.00	100.00	1 800.00	008 1	2 400.00	2 400,00
129V c.c.System (UPS) 12.5kVA		un	30	31)	50.00	1 500.00	1.500.00	30	30	10.00	300.00	300.00	15 000.00	15 000,00	16 800.00	16 800.00
Control and relays panels	;	1	85	85	50,00	4 250,00	4 250.00	85	85	10.00	850.00	850.00	30 000.00	30 000.00	35 100.00	35 100,00
Control and territy panets	·		·													
Power and control cabling	1	l.s.	100	100	50.00	5 000.00	5 000	100	100	10.00	1 000.00	1 000.00	3 000.00	3 000.00	9 000,00	9 (RREUK)
·																
Mise (electrical works) 10%	1	lot	54	54	50.00	2 700.00	2 700.00	54	54	10.00	540.00	540.00	58 980.00	58 980.00	62 220.00	62 220.00
Sous-Total				594			29 700	 	594			5 940		\$648 780		\$684 420
Total																

CLIENT: CANARAIL CONSULTA	NTS	TITL	 Е:	315kV	SUBSTA	TION - 2 IN	ICOMN	AING LI	NES	11		SHAWINI	GAN NO:	005556	
PROJECT: HIGH SPEED TRAIN S		DESCI	RIPTION:			AND EQUIP				·			ION DATE:	APRIL 19	193
LOCATION: ONTARIO - QUEBEC		MADE		R.G.		CHECK BY:		II.S.	ACCOUN			SHEET NO	D.:		3 OF 3
				LABO	R		Ī		EQUIPM	ENT		MAT	ERIAL	T()	ľλL
DESCRIPTION	QTY t	UNIT	TOTAL	MII	UNIT	AMOUNT	UNIT	TOTAL	EH	UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT
		MII	MII	RATE	COST		EII	EII	RATE	COST		COST		COST	
315kV circuit breaker foundations	3 un	165	495	46.00	7 590.00	22 770.00	165	495	8.60	1 419.00	4 257.00	4 400.00	13 200.00	13 409.00	40 227.00
315kV motorised disconnect foundations	4 un	100	400	46.00	4 600.00	18 400.00	100	400	8.60	860.00	3 440.00	5 100.00	20 400.00	10.560.00	42 240.00
315kV manual disconnect foundations	4 un	100	400	46.00	4 600.00	18 400.00	100	400	8.60	860.00	3 440.00	5 100.00	20 400.00	10 560.00	42 240.00
120/25kV power transformer foundations	2 un	775	1550	46.00	35 650.00	71 300.00	775	1550	8.60	6 665.00	13 330.00	20 000.00	40 000.00	62 315.00	124 630.00
315kV potential transformer foundations	4 un	35	140	46.00	1 610.00	6 440.00	35	140	8.60	301.00	1 204.00	1 500.00	6 000.00	3 411.00	13 644.00
315kV current transformer foundations	18 un	35	630	46.00	1 610.00	28 980.00	35	630	8.60	301.00	5 418.00	1 400.00	25 200.00	3 311.00	59 598,00
315kV station post insulator foundations	12 un	40	480	46.00	1 840.00	22 080.00	40	480	8.60	344.00	4 128.00	1 800.00	21 600.00	3 984.00	47 808.00
315kV incomming line structure foundations	2 ແກ	160	320	46.00	7 360.00	14 720.00	160	320	8.60	1 376.00	2 752.00	10 700.00	21 400.00	19 436.00	38 872.00
25kV switchgear foundation	1 un	300	300	46.00	13 800.00	13 800.00	300	300	8.60	2 580.00	2 580.00	7 200.00	7 200.00	23 580.00	23 58().(X)
Oil recuperator and accessories	Lun	280	280	46.00	12 880.00	12 880.00	280	280	8.60	2 408.00	2 408.00	15 000.00	15 000.00	30 288.(K)	30 288.00
Site preparation and transport	6400 m3	0.01	64	46.00	0.46	2 944.00	0.01	64	130.00	1.30	8 320.00	N/A	-	1.76	11 264.0X)
Fences and gates	400 m	0.8	320	46.00	36.80	14 720.00	0.8	320	8.60	6.88	2 752.00	30.00	12 000.00	73.68	29 472.00
Control bulding 15' x 40'	1 un	600	600	46.00	27 600.00	27 600.00	600	600	8.60	5 160.00	5 160.00	25 000.00	25 000.00	<i>57 76</i> 0.00	57 760.00
Grounding loop and shieldwire	6400 m2	0.25	1600	50.00	12.50	80 000.00	0.25	1600	10.00	2.50	16 000.00	10.60	67 840.00	25.60	163 840.00
Substation gravel topping (500mm)	6400 n12	0.04	256	40.00	1.60	10 240.00	0.04	256	8.60	0.34	2 201.60	9.65	61 760	11.59	74 201.60
Cable trenching and manholes	180 m	1.5	270	46.00	69.00	12 420.00	1.5	270	8.60	12.90	2 322.00	250.00	45 000.00	331.90	59 742.00
Misc. (civil works, etc) 10%	1 l.s.	811	811	50.00	40 550.00	40 550.00	811	811	10.00	8 110.00	8 110.00	40 200.00	40 200.00	88 860.00	88 860.00
Sub-Total			8916			\$418 244		8916			\$87 823		\$442 200		\$948 267
Total			16858			\$815 344		16858			\$216 683		\$5 198 820		\$6 260 547

Date: 43.10.28			Page: <u></u> of <u></u>
QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PR		ROJECT
Technology: 델 델	300+ kph - new R/W 300+ kph - exist. R/W 200+ kph - exist. R/W	Sub-system: « Sector: Item:	G - ELECTRIFICATION 4 - CONSTR/INSTALL. 5 -
Geographical Variati	on?☑no ☐yes Ifyes	, indicate segments ap	plicable:
ELECTROMAGNE	TIC INDUCTION MITIGATI	ON	
	k on conventional and TGVs varied in cost from 6,000 rbanization.		
Taking into	account the predominance	of rural trackage, a co	ost of
22,5	00 FrF/km * 1 \$Cdn/4.5 Fr	F = <u>5,000 /km</u>	
to mitigate	the effects of electromagne	tic induction is retaine	d.
No. 10 1 10 10 10 10 10 10 10 10 10 10 10 1			
Prepared by:			continued

Date:					Page: 1 of 5	
	QU			I SPEED RAIL PF	ROJECT	
Technol	logy: \Box	300 + kph - ne 300 + kph - ex 200 + kph - ex	ist. R/W		H - STATIONS 4 - CONSTR/INSTALLAT	ION
Geograp	phical Variatio	n ? □ no □ ye	es If yes, inc	licate segments applica	ıble:	
A)	LINE STATIO	ONS AT INTERM	IEDIATE CEN	ITRES		
i)	Stations in t	his category:				
	a) London					
	b) Kitchene	r - Waterloo	(new ROV	V only)		
	c) Hamilton	- Burlington	(ex ROW	only)		
	d) Pickering	j - Whitby	(ex ROW	only)		
	e) Hwy 40	7/Markham E.	(new ROV	V only)		
	f) Kingston	1				
	g) Ottawa -	- Merivale				
	h) Lavai				e (Clause Live 18, 18, 18, 18 ann an Francis Commission (Commission Commission Commission Commission Commission	
	i) Trois - R					
	j) Ancienno	e - Lorette				
ii)	Primary con	nponents:				
	a) Property	,,,,,,				
	b) Station 6	3ldg.				
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	c) Access I	Roads				
	d) Grading	& Drainage	anna ann an t-aigh ann an t-aigh ann an t-aigh ann an t-aigh an t-aigh ann an t-aigh ann an t-aigh ann an t-ai	a persona como a monta a mante como como de describido de la decencia de la como de la como de la como de la c	er i i er generale i i e e e e e e e e e e e e e e e e e	
	e) Parking	Area/Bus Bays/K	iss & Ride			
	f) Platform	s and canopies				
	g) Vertical	circulation (Esca	iators/elevat	ors)		
	h) Pedestri	an Tunnels		and the second s		
,,	i) Fencing					
					•1	
Prepare	ed by:				continued L	<u> 1</u>

Date:				Page: <u>2</u> of <u>5</u>
usbarrowne i i i i i i i i i i i i i i i i i i i	QU	EBEC-ONTARIO HIGH UNIT COSTS FOR PRE		ROJECT
Technology	H - STATIONS 4 - CONSTR/INSTALLATION L -			
Geographic	al Variation	n? Ino I yes If yes, inc	licate segments applica	ble:
iii) D	evelopmen	t of unit costs for Line Statio	ns	
Ito	em			Est. Cost
a)	Property			
	Area ass	umed: 200 metres x 100 me	tres = 2ha	
	Land cos	ts are included in sub-system	1 A	-
b)	Station B	Bldg.		
	Passenge	er concourse containing:		
	• Tick	eting		
***************************************	• Wait	ting Areas		
	• Was	hrooms		
	• Serv	rice Rooms		
	• Con	cessions		
THE RESERVE TO A SHARE THE	• Circ	ulation		
	Area ass	umed for above elements =	1,000m²	
	Based or	GO Transit stat. costs, allo	w \$2,600/m²	\$2,600,000
C) Access F	Roads	Abrahaman maran na ang ang ang ang ang ang ang ang an	
	Allow 20	00 m of 2 lane road to acces	s parking/kiss & ride/bu	us bays etc
		Cost at \$400	D/m	\$80,000
d) Drainage	•	A-5-1	
	• Allo	wance for storm sewers, sul	o-drains, surface ditche	es,
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	mar	nholes, catchbasins.		\$400,000
A de la constanta de la consta				
Prepared b	oy:			continued 🗹

Date:			Page: <u>3</u> of <u>5</u>	
QUI	EBEC-ONTARIO HIGH UNIT COSTS FOR PR		ROJECT	
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sub-system; Sector: Item:	H - STATIONS 4 - CONSTR./INSTALLATI L -	<u>.</u>
Geographical Variation	n? 🔲 no 🔲 yes If yes, ind	dicate segments applica	ble:	
• Assu	ıme general site and station	track grading earthwork	(S	
aver	aging 1 metre over area requ	iired.		
i.e. (200 x 100) + (1,000 x 2 x	8) = 20,000 + 16,000	0 @ \$5/m³ \$180,00	00
e) Parking/E	Bus pays			
• Assu	ıme 250 spaces at \$1,600 e	ea.	\$400,00	00
• Assu	ıme 6-bay bus terminal/loop		\$100,00	00
• Kiss	& Ride area (Approx. 30 sp.	aces) + circ.lanes	\$ 70,00	00
f) Platforms	s & Canopies/Shelters			
As per C	IGGT Fax 13/4/93:			
2 single	sided platforms required: -	400 m long (+300)		
		300 m long (200 - 250)	,
400 m p	latforms : 2 @ \$160,000		\$320,0	00
Canopies	s/Shelters : Allowance		\$200,0	00
g) Vertical	Circulation			
Escalato	rs : 2 at \$350,000	(mechanical and struct	ures) \$700,0	00
Elevators	s : 2 at \$150,000	(mechanical and struct	ures) \$300,0	00
h) Pedestria	an Tunnels			
Structure	e and finishes to provide acc	cess from concourse		
to platfo	rms (under or over 4 tracks)		\$600,0	00
Prepared by:		W	continued	<u> </u>

Date:			Page: <u>4</u> of <u>5</u>
Ql	JEBEC-ONTARIO HIGH UNIT COSTS FOR PRI		ROJECT
Technology:	300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sub-system: Sector: Item:	H - STATIONS 4 - CONSTR/INSTALLATION 1 -
Geographical Variati	on ? \square no \square yes If yes, inc	licate segments applica	ble:
i) Fencing			
Assume	∍ 500 m @ \$20/m		\$10,000
j) Miscella	aneous items (allow 10%)		540,000
TOTAL	STATION COST (All compone	ents)	\$6,500,000
Prepared by:	The second secon		continued 🗹

Date:		Page: <u>5</u> of <u>5</u>							
QUEBEC-ONTARIO HIGH SPEED RAIL PROJECT UNIT COSTS FOR PRELIMINARY ROUTING									
Technology: [300 + kph - new R/W Sub-system: 300 + kph - exist. R/W Sector: 200 + kph - exist. R/W Item:	H - STATIONS A - CONSTR./INSTALLATION							
Geographical Varia	ation ? \square no \square yes If yes, indicate segments applica	able:							
B) TERMINA	AL STATION AT WINDSOR								
i) Primary c	components assumed to be as for Line Stations with ac	iditions as follows:							
a) 2 side	e platforms replaced by 3 island platforms between 4 to	racks i.e. equivalent to 4							
side p	latforms.								
b) Vert.	Circulation:								
Escala	ators - 2 for 3rd platform								
Elevat	tors - 1 for 3rd platform								
		t ti te es es este es table te e e e e es es es es este control dos comos comos comos comos de control e e e e							
	trian Tunnels:								
Additi	ional stair/escalator structure for 3rd platform length as	s for Line Stations.							
d) Statio	ın Bida:								
	me 20% increase in Bldg. area.								
ii) Summary	y of Unit Cost Components								
a) Line s	station total cost	\$ 6,500,000							
b) Addit	ion for platforms	\$ 320,000							
c) Allow	rance for additional canopies/shelters	\$ 120,000							
d) Vert.	Circ.	\$ 850,000							
e) Pedes	strian Tunnels	\$ 20,000							
f) Add f	for larger station bldg.	\$ 260,000							
g) Addit	ional misc. items	\$ 130,000							
TOTAL S	STATION COST (All components)	\$ 8,200,000							
Prepared by:	AND THE STATE OF T	continued							

Date:				Page:	of
	QUE	BEC-ONTARIO HIGH UNIT COSTS FOR PRI		ROJECT	
Fechnology:		300 + kph - new R/W 300 + kph - exist. R/W 200 + kph - exist. R/W	Sub-system: Sector: Item:		R. /INSTALLATION
Geographical V	ariatior	n? 🗆 no 🔲 yes If yes, inc	dicate segments applica	ıble:	
C) MODI	FICATI	ONS AT UNION STATION			
i)	Reco	nstruction of platform acces	s tunnel and vertical ci	rculation to p	olatforms
	Area	of tunnel to be reconstructe	$ed = 2000m^2$		
	Total	cost including new finishes	= 2000 x 1250	weren	\$2,500,000
	Assu	me 5 new elevators at \$100),000 each	=	\$ 500,000
	Assu	me 5 x 2 new escalators at	\$225,000 each	=	\$2,250,000
		Total access modification	direct cost	<u>-</u>	\$5,250,000
		Allowance for O/I	H and profit (15%)	=	<u>\$ 750,000</u>
matti paramamana ana ya 1 / A a a a a		Total access modification	cost		\$6,000,000
ii)	Upgr	ading and alternations to Ma	ain Concourse area	allow	\$5,000,000
iii)	Modi	ification and upgrading of tra	ain services area	allow	\$2,000,000
iv)	Expa	nsion of parking structure 1	00 bays at \$10,000		\$1,000,000
v)	Mod	ification to five HSR platforn	ns 5 x 1,200,000		\$6,000,000
	Tota	l order-of-magnitude cost			\$20,000,000
	11.1				
Prepared by:				co	ntinued \Box

APPENDIX - C DETAILED ESTIMATES WINDSOR-TORONTO

WINDSOR-TORONTO

C1. 200+ km/hr - EXISTING RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

Table 4.4

SUBSYSTEM/SECTOR C WINDSOR — TOI		DOR 2	200+, TILTING	G			
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A - Right-of-way Aquisition	\$24,493,603	\$255,141,700	N/A	N/A	see note c	\$279,635,303	\$27,276,967
B - Earthworks and Drainage	\$72,494,731	N/A	N/A	\$306,325,270	see note c	\$378,820,001	\$39,955,470
C - Bridges, Viaducts, and Tunnels	\$50,461,961	N/A	N/A	\$306,442,950	see note c	\$356,904,911	\$27,858,450
D - Grade Separations	\$47,394,727	N/A	N/A	\$287,816,400	see note c	\$335,211,127	\$47,969,400
E - Other Accom- modation works	\$10,992,170	see note a	see note a	\$66,752,719	see note c	\$77,744,890	\$15,404,474
F - Track	\$39,292,144	\$217,507,098	see note b	\$52,742,498	see note c	\$309,541,741	\$13,342,905
G - Electrification	\$37,730,822	see note a	see note a	\$229,129,910	see note c	\$266,860,732	\$29,886,510
H - Stations	\$3,568,399	see note a	see note a	\$21,670,000	see note c	\$25,238,399	\$1,970,000
Totals	\$286,428,558	\$472,648,798	\$0	\$1,270,879,748	see note c	\$2,029,957,104	\$ 203,664,176

NOTES: a) included in Construction / Installation

b) included in Equipment / Material

c) included in Other Studies

SUMMARY SHEET

technology: 200+, TILTING

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	SUBSYSTEM	A - RIG	HT-OF-WA	Y ACQUIS	ITION	
		WINDSOR -	- TORONTO CO	RRIDOR	200+, TILTING	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	MANAGEME	NT			-
1 Item 1	Professional Services					
1	1.1 - Surveying	%	\$255,141,700	8.0%	20,411,336	As a % of total cost of Sector 2
1	1.2 - Appraisal	%	\$255,141,700		0	included in Item 1.1
1	1.3 - Legal Expertise	%	\$255,141,700		Ō	included in Item 1.1
1 Item 2	Project Management	%	\$275,553,036		Ö	As % of Sector 2 total + item 1.1
1 Item X	Contingencies	%	\$20,411,336		4,082,267	7,2 7,2 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PR	ROJECT MAN	IAGEMENT		\$24,493,603	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2	Urban Land					
2 16911 1	1.1 — Residential				50 400 000	
2	1.1 - Residential	lump sum lump sum			53,490,000 7,600,000	unit cost not applicable unit cost not applicable
2	1.3 - Industrial	lump sum				unit cost not applicable
2 Item 2	Rural Land	iump sum			105,520,000	unit cost not applicable
		1			20 702 000	
2	2.1 Agricultural 2.2 Natural	lump sum			20,729,000	unit cost not applicable
2	—- -	lump sum			0	unit cost not applicable
2 Item 3	Purchase of Existing Rail ROW				40.047.000	0
2	3.1 — CN 3.2 — CP	lump sum			13,245,000	unit cost not applicable
2		lump sum			31,363,000	unit cost not applicable
2		lump sum			0	unit cost not applicable
2 Item X 2	Contingencies	%	\$231,947,000	10%	23,194,700	
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$255,141,700	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3		Not Applica	ble			
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	TION			\$0	
0 020.01.0		,,,,,,,				
4 SECTOR 4	CONSTRUCTION / INSTALLATION	A1_A A 17	1.4.			
4		Not Applica	(D)(0			
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATI	ON			<u> </u>	
E CECTOD S	START 119					
5 SECTOR 5	START-UP	سا لمماريمان	Other Studies			
5 5		arcinged IV	Outer Studies		-	
5 SECTOR 5	TOTAL: START-UP				\$0	
J SECTOR S	IOTAL START FOR				20	

UNITS

QUANTITY

SUMMARY SHEET

LOT / UNIT PRICE

technology:

200+, TILTING

ITEM

ITEM NUMBER

360.0 km. in length

TOTAL COST

SOURCE / REMARKS

	netriclentamp	mennen mennen mennen mennen diktoris et des selles de kolonis de k	NAME OF THE OWNER OWNER OF THE OWNER	WATER OF THE PROPERTY OF THE P	Waterostiniaeroniaesiierosiieroleeroleero		
		SUBSYSTEM	B – EART	THWORKS AN	D DRAINA	GE	stensio
			WINDSOR -	- TORONTO COF	RRIDOR 2	00+, TILTING	
SECTOR 1		PROFESSIONAL SERVICES / PROJECT !	MANAGEME				
ltem 1		Engineering	%	\$306,325,270	5.5%	16,847,890	As a % of total cost of Sector 2
ltem 2		Construction Supervision	%	\$306,325,270	5.0%	15,316,264	As a % of total cost of Sector 2
ltem 3		Environmental Assessment		\$1,743,528,546	0.2%	3,487,057	items 3 and 4 are %'s of entire
ltem 4		Feasibility Studies (Technical)		\$1,743,528,546	1.0%	17,435,285	project's cost less profes, fees
Item 5 Item X		Project Management Contingencies	% %	\$359,411,766 \$72,494,731	5.4% 0%	19,408,235 0	% of sector 2 total plus items 1-
SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PR	,-		•/•_	\$72,494,731	
		·					
SECTOR 2		EQUIPMENT / MATERIALS	Not Applicat	ole			
SECTOR 2		TOTAL: EQUIPMENT / MATERIALS			=	\$0	
SECTOR 3		TRANSPORTATION / DISTRIBUTION	Not Applical	nla.			
			• •	ole	-		
SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUT	ION		-	<u>so</u>	
SECTOR 4		CONSTRUCTION / INSTALLATION Clearing and Roadbed Preparation					
II.	1.1	- Type 1 Soils	route-km	282.3	\$142,000	40,086,600	
	1.2	- Type 2 Soils	route-km	73.1	\$627,000	45,833,700	
	1.3	- Type 3 Soils	route-km	4.7	\$1,035,000	4,864,500	
ltem 2		Embankment Construction					
	2.1	 Soft Excavated Material 	1000 m ^ 3	2937	\$3,000	8,811,000	
	2.2	 Hard Excavated Material (Rock) 	1000 m ^ 3	0	\$0	0	
	2.3		1000 m ^ 3	677	\$8,000	5,416,000	
	2.4		1000 m ^ 3	4420	\$5,500	24,310,000	
item 3		Haulage of Fill Material					
		(from Borrow or Excavation)	1000 m ^ 3-	- 0	\$0	0	Cost transferred to item B4-2
ltem 4		Sub- Ballast Layers					For TM2-B0,TM2-D0,TM1-B
	4.1	- New ROW	route-km	76.6	\$180,178	13,801,600	TM1-D0,TM0-B0,TM0-B1,
	4.2	 Existing ROW 	route-km	283.4	\$208,745	59,158,400	TM0-C0,and TM0-D0, \$152,0
ltem 5		Drainage Systems					used for cost of sub-ballast(it.
	5.1	- Normal ROW	route-km	351.2	\$25,000	8,780,000	
	5.2	 Major Watercourse Culverts 	ea.	110	\$35,000	3,850,000	
	5.3	 Environment Stormwater Controls 	route-km	351.2	\$7,000	2,458,400	
ltem 6		Roadbed Upgrade on Existing ROW	route-km	13.3	\$600,000	7,980,000	
Item 7		Retaining Structures					
	7.1	 Up to 3 metres in Height 	km.	0.3	\$2,500,000	750,000	
	7.2	 Over 3 metres in Height 	km.	2	\$5,000,000	10,000,000	
item 8		Intrusion Barriers	km.	55.1	\$0	0	Intrusion Barriers not required
ltem 9		Noise Attenuation Structures					
	9.1	Barriers	km.	0	\$0	0	
	9.2	– Berms	km.	0	\$0	0	
item 10		ROW Security Fencing (on both sides)	route-km	351.2	\$56,000	19,667,200	
ltem 11		Snow Control Measures	km.	0	\$0	0	Accounted for in Contingencie
item 12		Utility Interferences					
	12.1	 Major Hydro Relocation 	ea.	15	\$0	0	Accounted for in Contingencie
	12.2	· · · · · · · · · · · · · · · · · · ·	ea.	4	\$0	0	Accounted for in Contingencie
11 40	12.3	,	route-km	355	\$0	0	Accounted for in Contingencie
ltem 13	46-	Other Items	anish to	AP. 4		700 / 0-	
	13.1		route-km	351.2	\$2,000	702,400	
	13,2			15	\$500,000	7,500,000	
ltem X	13.3	 Minor Wildlife Passages (Culverts) Contingencies 	ea. %	24 \$266,369,800	\$100,000 15%	2,400,000 39,955,470	
		-			. 270		
SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATION	JIN.			\$306,325,270	
SECTOR 5		START-UP	Included in	Other Studies			
		TOTAL: START-UP				60	
SECTOR 5		COTAL GIANT TOP				\$0	

WINDSOR - TORONTO CORRIDOR	SUMMARY SHEET
technology:	
200+, TILTING	360.0 km. in length

	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS	
1				1				

		SUBSYSTEM	C - BRID	GES, VIADUC	TS, AND T	UNNELS	
			WINDSOD	TORONTO COR	B1DOB 20	0+, TILTING	
			MINDSON -	TORONTO CON	NIDON 20	70 T, 1)CT11VQ	
1	SECTOR 1	PROFESSIONAL SERVICES / PROJEC	T MANAGEMEN	NT			
1	item 1	Engineering	%	\$306,442,950	5.5%	16,854,362	As a % of total cost of Sector 2
1	ltem 2	Construction Supervision	%	\$306,442,950	5.0%	15,322,148	As a % of total cost of Sector 2
1	ltem 3	Project Management	%	\$338,619,460	5.4%	18,285,451	% of sector 2 total plus items 1 – 2
1	ltem X	Contingencies	%	\$50,461,961	0%	0	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MAN	AGEMENT		\$50,461,961	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2	520.07.2	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Not Applicat	ole			
2							
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
2	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3	SECTOR S	TRANSI CRIATION / BISTRIBOTION	Not Applicat	ole			
3			, , , , , , , , , , , , , , , , , , ,				
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIE	BUTION			\$0	
		CONSTRUCTION UNIOTAL LATION			•		
4	SECTOR 4 item 1	CONSTRUCTION / INSTALLATION Bridges					
4	item i	1.1 - Small Rivers (< 30 metres)	ea.	24	\$340,000	8,160,000	
4		1.2 - Extra at 1.1 for Height Over 10		0	\$0	0,100,500	
4		1.3 - Interm. Rivers (30 - 100 metres		1.055	\$23.500	24,792,500	
4		1.4 - Extra at 1.3 for Height Over 10		250	\$6,000	1,500,000	
4		1.5 - Large Rivers (100 - 250 metres		0	\$0	0	
4		1.6 - Extra at 1.5 for Height Over 10		ō	\$0	0	
4		1.7 - Major Rivers (over 250 m.)	lin. m.	0	\$0	0	
4		1.8 - Extra for Difficult Foundation Co	ond. lin.m.	0	\$0	0	
4		1.9 - Modif. to Exist. Bridges (new de	eck) lin.m.	14	\$13,000	182,000	
4		Viaducts					
4		2.1 - Viaducts over 250 metres in Le		4,200	\$27,000	113,400,000	
4		2.2 - Extra for Height Over 10 metres		2,100	\$8,000 \$0	16,800,000 0	
4	H 0	2.3 - Extra for Difficult Foundation Co	ond. lin.m.	U	\$0	Ū	
4	Item 3	Tunnels (Double Track) 3.1 — In Soft Ground	lin. m.	0	\$0	0	
4		3.2 - In Rock	lin. m.	3,250	\$35,000	113,750,000	
4		3.3 - Modifications to Existing Tunne		0,0	\$0	0	
4		3.4 - Noise Mitigation Measures	lump sum	0	\$0	0	Accounted for in Contingencies
4	Item X	Contingencies	%	\$278,584,500	10%	27,858,450	
4							
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	ATION		=	\$306,442,950	
p:	SECTOR 5	START-UP					
5		STAINT OF	Included in	Other Studies			
5			more account	-, G(G0)00	***		
•	SECTOR 5	TOTAL: START-UP				\$0	
-	32010110	. Service of the Serv			=		

technology: 200+, TILTING

SUMMARY SHEET

360.0 km. in length

SOURCE / REMARKS LOT / UNIT PRICE TOTAL COST UNITS QUANTITY ITEM NUMBER ITEM

		SUBSYSTEM	D - GRAD	E SEPARATI	ONS	A CONTRACTOR OF THE CONTRACTOR	
		<u> </u>					**************************************
			WINDSOR -	TORONTO COR	RIDOR 20	0+ TILTING	
	SECTOR 1	PROFESSIONAL SERVICES / PROJECT M	IANAGEMEN'	Т			
1	ltem 1	Engineering		\$287,816,400	5.5%	15,829,902	As a % of total cost of Sector 2
1	item 2	Construction Supervision		\$287,816,400	5.0%	14,390,820	As a % of total cost of Sector 2
i	Item 3	Project Management		\$318,037,122	5.4%	17,174,005	% of sector 2 total plus items 1-2
1	Item X	Contingencies	%	\$47,394,727	0%	0	
1	KOIII 7	391131139113133					
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PRO	DJECT MANA	GEMENT	=	\$47,394,727	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2		l	Not Applicabl	е			
2	050700.0	TOTAL . FOLHOMENT / MATERIAL C				\$0	
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS					
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applicabl	e	****		
3		######################################	ION .			\$0	
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUTE	ION		=		
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	New Grade Separations, Rural					
4		1.1 - 2 Lane Highways	ea.	19	\$2,200,000	41,800,000	
4		1.2 — 2 Lane Highways, Dual ROW	ea.	0	\$0	0	
4		1.3 - 4 Lane Highways	ea.	2	\$3,100,000	6,200,000	
4		1.4 - 4 Lane Highways, Dual ROW	ea.	0	\$0	0	
4		1.5 - Major Highways (401, 20, etc)	ea.	1	\$4,450,000	4,450,000 0	
4		1.6 - Extra for Difficult Foundation Cond.	ea.	0	\$0	v	
4	ltem 2	New Grade Separations, Urban			\$4,068,000	8,136,000	
4		2.1 - Secondary Highways (2-4 lanes)	ea. ea.	2 14	\$4,068,000	62,384,000	
4		2.2 - Second. Hwys (2-4 l.) Dual ROW 2.3 - Major Highways (over 4 lanes)	ea. ea.	0	\$4,430,000	02,304,000	
4		 2.3 – Major Highways (over 4 lanes) 2.4 – Extra for Difficult Foundation Cond. 		0	\$0 \$0	0	
4	Item 3	Modification of Exist. Grade Separations	. ea.	v	40	•	
4	Hein 2	3.1 — Urban	ea.	57	\$830,000	47,310,000	
4		3.2 - Rural	ea.	21	\$627,000	13,167,000	
4	Item 4	Automatic Crossing Protection	ea.	148	\$270,000	39,960,000	
4	item 5	Closure and Diversion of Roads	km. of road	3.0	\$280,000	840,000	
4	Item 6	Private Farm Crossings	ea.	52	\$300,000	15,600,000	
4	Item 7	Major Wildlife Passages	ea.	0	\$0	0	•
4	item X	Contingencies	%	\$239,847,000	20%	47,969,400	
4						0007 046 400	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATION	M		=	\$287,816,400	
5	SECTOR 5	START-UP					
5			Included in (Other Studies	-		
5	SECTOR 5	TOTAL: START-UP			2	\$0	

SUMMARY SHEET

technology:

200+, TILTING

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS
i				!		

		SUBSYSTEM	E - OTHE	R ACCOMOD	ATION WO	ORKS .	
			WINDSOR -	TORONTO COR	RIDOR 20	0+, TILTING	
1 1 1 1 1 1	SECTOR 1 Item 1 Item 2 Item 3 Item X	PROFESSIONAL SERVICES / PROJECT Engineering Construction Supervision Project Management Contingencies	MANAGEMEN % % % %	\$66,752,719 \$66,752,719 \$66,752,719 \$73,761,755 \$10,992,170	5.5% 5.0% 5.4% 0%	3,671,400 3,337,636 3,983,135 0	As a % of total cost of Sector 2 As a % of total cost of Sector 2 % of sector 2 total plus items 1 – 2
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MANA	GEMENT	-	\$10,992,170	
2 2 2	SECTOR 2	EQUIPMENT / MATERIALS	Included in C	onstruction / Inst	allation		
	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			-		
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	SO.				
4	SECTOR 4 Item 1 Item 2	CONSTRUCTION / INSTALLATION Removal of Rail Lines Construction of New Access Tracks	km. km.	75.9 57.3	\$21,134 \$644,750	1,604,071 36,944,175	
4 4	Item 3	Rail/Rail Grade Separation 3.1 — Rural 3.2 — Urban Other Particular Items:	ea. ea.	16 0	\$800,000 \$ 0	12,800,000 0	
4 4 4		4.1 - Sub-Item 4.2 - Sub-Item 4.3 - Sub-Item 4.4 - Sub-Item	lump sum lump sum lump sum lump sum	0 0 0		0 0 0	
4	Item X SECTOR 4	Contingencies TOTAL: CONSTRUCTION / INSTALLAT	% ION	\$51,348,246	30%	\$66,752,719	
5 5 5	SECTOR 5	START-UP TOTAL: START-UP	Included in C	Other Studies	_	\$00,732,719	

SUMMARY SHEET

technology: 200+, TILTING

360.0 km, in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
Same and the same	SUBSYSTEM	F - TRAC	CK			
	***************************************		 - TORONTO CO	RRIDOR :	200+, TILTING	200 200 200 200 200 200 200 200 200 200
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT					menodi
1	Engineering	%	\$270,249,597	3.5%	9,458,736	As % of total for Sectors 2 and 4
1 Item 2	Construction Supervision	%	\$52,742,498		5,274,250	As % of total for Sector 4
1 Item 3	Materials Procurement	%	\$217,507,098		8,700,284	As % of total for Sector 2
1 tem 4	Project Management	%	\$293,682,867		15,858,875	As % of Sectors 2,4 totals plus
1 Item X	Contingencies	%	\$39,292,144		00	items 1-3
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / F	PROJECT MAN	IAGEMENT		\$39,292,144	
2 SECTOR 2 2 Item 1	EQUIPMENT / MATERIALS Rail					
2	1.1 — Main Line	t.	88,140	\$773	68,169,239	
2	1.2 - Siding	t.	1,640		1,268,409	
2 Item 2	Ties	ea.	1,152,000		51,598,080	
2 Item 3	Ballast	m^3	1,565,000		33,444,050	
2 Item 4	Turnouts		,,000,000	7	55, 111,555	
2	4.1 - High Speed	ea.	40	\$280,000	11,200,000	
2	4.2 - Medium Speed	ea.	28	\$135,000	3,780,000	
2	4.3 - Yard	ea.	0	\$0	0	
2 Item 5	Other Track Material					
2	5.1 - Rail Fastening Assemblies	set	1,152,000	\$27	30,528,000	
2	5.2 - Bonded Insulated Joints	ea.	0	\$0	0	Included in Signalling costs
2	5.3 - Bumping Posts	ea.	7	\$3,120	21,840	
2 Item 6	Switch Heaters/ Snow Blowers					
2	6.1 - Main Line	ea.	68		7,140,000	
2	6.2 — Yard	ea. m ^ 2	C		0	
 Item 7 Item X 	Ballast Mats for Noise Attenuation Contingencies	m 2 %	\$207,149,618		10,357,481	
2	Ostaligonalos	,0	Q207, 140,010	, 3,0	10,007,407	
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$217,507,098	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	included in	Equipment / Ma	torial		
3		moidada m	Equipment, me			
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION			\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 Item 1	Track Construction					
4	1.1 - Main Line	km.	720.0		13,112,640	
4	1.2 - Siding	km.	13.2		583,110	
4 Item 2 4 Item 3	Field Welded Joints Turnout Construction	ea.	4,590	\$2,028	9,308,520	
4 item 3	3.1 - High and Med. Speed (Main Line	e) ea.	68	\$20,455	1,390,940	
4	3.2 — Yard	ea.		\$20,455		
4 item 4	Ballasting and Surfacing	m^3	1,565,000			
4 Item 5	Rail Grinding	track – km				
4 Item 6	Construction Bases	route-km	360.6			
4 Item X	Contingencies	%	\$49,757,07			
4	· ·		. , , , , , , ,			
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	TION .			\$52,742,498	
5 SECTOR 5	START-UP					
5		Included in	Other Studies			
5	WOTAL OTABE !:-					
5 SECTOR 5	TOTAL: START-UP				\$0	

SUMMARY SHEET

technology: 200+, TLTING

***************************************	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS	
							<u> </u>	

			SUBSYSTEM	G - ELEC	TRIFICATION	4	enanti Gazzet en un trataste et zon en en en en en en en en en en en en en	
				WINDSOR -	TORONTO COR	RIDOR 20	0+, TILTING	
1	SECTOR 1		PROFESSIONAL SERVICES / PROJECT I	MANAGEMEN %	T \$229,129,910	5.5%	12,602,145	As % of total for Sector 4
4	Item 2		Construction Supervision	%	\$229,129,910	5.0%	11,456,496	As % of total for Sector 4
1	Item 3		Project Management	%	\$253,188,551	5.4%	13,672,182	% of sector 4 total plus items 1-2
1	Item X		Contingencies	%	\$37,730,822	0%	0	,
1	aem A		o o , , and g e , o loo	, ,	40.), 40 , 40			
	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PR	OJECT MANA	GEMENT	==	\$37,730,822	
2	SECTOR 2		EQUIPMENT / MATERIALS					
2				Included in C	onstruction / ins	tailation		
2						***************************************		
	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS				\$0	
_								
3	SECTOR 3		TRANSPORTATION / DISTRIBUTION					
3				Included in C	onstruction / Ins	tallation		
3					, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
_	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUT	ION			\$0	
٠	000.0					-		
4	SECTOR 4		CONSTRUCTION / INSTALLATION					
4	Item 1		Typical Catenary					
4	icom :	1.1	• •	t. km.	0.0	\$0	0	
4		1.2	•	km.	360.0	\$350,000	126,000,000	
4		1.3	· · · · · · · · · · · · · · · · · · ·	km.	0.0	\$0	0	
4		1.4		km.	0.0	\$0	ō	
4		1.5	•	100 m.	0.0	\$0	Ö	
4		1.6	•	100 m.	40	\$13,500	540,000	
4		1.7		100 m.	0	\$0	0	
4		1.8	•	100 m.	92	\$17,500	1,610,000	
4	Item 2	1.0	Particular Catenary Installations	100 111.	32	417,000	1,510,000	
4	Kem 2	2.1		ea.	22	\$280,000	6,160,000	
-		2.2			6	\$369,000	2,214,000	
4		2.2		ea. ea.	5	\$1,052,000	5,260,000	
4	Item 3	4.0	Special Catenary Structures	ea.	3	Ψ1,002,000	3,200,000	
4	item 3	3.1	·	100 m.	0	\$0	0	
4		3.2	-	100 m.	0	\$0 \$0	0	
4	Item 4	3.2	Power Supply	ioo m.	U	φU	U	
4	item 4	4.1	,	ea.	3	\$5,355,000	16,065,000	
4		4.2			2	\$4,075,000	8,150,000	
4		4.3	•••	v ea. ea.	32	\$730,000	23,360,000	
4		4.4		ea. ea.	2	\$925,000	1,850,000	
4		4.5		ea.	0	\$0	0,000,000	
4		4.6		ea.	0	\$0 \$0	0	
4		4.7		ea.	ō	\$0	ō	
4		4.8		ea. km.	30	\$170,300	5,109,000	
		4.9		km.	7	\$132,200	925,400	
4		4.10	'''	кт. ea.	1	\$132,200	200,000	
	Item 5	4. IU	EMI Mitigation Measures	route – km	360.0	\$5,000	1,800,000	
4			Contingencies	%	\$199,243,400	15%	29,886,510	
-			Contingencies	70	\$199,240,400	1576_	29,000,010	
4			TOTAL: CONSTRUCTION / INSTALLATION	ИС		=	\$229,129,910	
-	OEOTOD 5		START-UP					
	SECTOR 5		SIANITUF	Included in	Other Studies			
5				incidaea in	Juler Studies	_		
5	SECTOR 5		TOTAL: START-UP				\$0	
,	- J10110		TOTAL STATE OF			=	<u>*</u> *	

SUMMARY SHEET

technology: 200+, TILTING

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
Teacher and the teacher the property of the teacher than	SUBSYSTEM	H - STA	TIONS	2 COSSOMOWOOD CONTRACTOR AND AND AND AND AND AND AND AND AND AND		
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT					A Of official for Contra C
1 tem 1	Engineering	%	\$21,670,000			As a % of total for Sector 2 As a % of total for Sector 2
1 Item 2	Construction Supervision	%	\$21,670,000		, ,	% of sector 2 total plus items 1-2
1 Item 3	Project Management	%	\$23,945,350			% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	\$3,568,399	0%		
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PI	ROJECT MA	NAGEMENT		\$3,568,399	
2 SECTOR 2 2	EQUIPMENT / MATERIALS	Included in				
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	Included in	Construction / I	nstallation		
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	TION			<u>so</u>	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 Item 1	Individual Station (location, name)	lump sum		\$19,700,000	19,700,000	
4 ltem 2	Individual Station (location, name)	lump sum		\$0		
4 Item 3	Individual Station (location, name)	lump sum		\$0		
4 Item 4	Individual Station (location, name)	lump sum		\$0		
4 Item X	Contingencies	%	\$19,700,000	10%	1,970,000	
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATI	ЮИ			\$21,670,000	
5 SECTOR 5	START-UP	Included in	Other Studies			
5 5 SECTOR 5	TOTAL: START-UP				\$0	

CI	urrent costs on file
Windsor Torc	nto Corridor
200 Ex. ROW	
segment	total cost
WT2-A0	\$714,379,544
WT2-B0	\$718,036,669
WT2-C0	\$547,572,870
WT1 – A0	\$0
WT1-B0	\$0
WT1-C0	\$0
WT0-A0	\$0
WT0-B0	\$0
WT0-C0	\$0
WT0-C1	\$0
WTS-1	\$16,135,838
WTS-2a	\$0
WTS-2b	\$20,706,614
WTS-3	\$13,125,569
WTS-4	\$0
WTS-5	\$0
WTR-01	\$0
WTR-02	\$0

TOTAL

\$2,029,957,104

WINDSOR-TORONTO

C2. 300+ km/hr - EXISTING RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

<u>Table 5.4</u>

SUBSYSTEM/SECTOR O	COST SUMMARY						
WINDSOR - TO	RONTO CORRI	IDOR	300+, EXISTI	NG ROW			indestante additional designation of the control of
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition	\$28,263,101	\$294,407,300	N/A	N/A	see note c	\$322,670,401	\$31,474,817
B – Earthworks and Drainage	\$84,428,418	N/A	N/A	\$352,880,950	see note c	\$437,309,368	\$46,027,950
C – Bridges, Viaducts, and Tunnels	\$60,727,628	N/A	N/A	\$368,783,800	see note c	\$429,511,428	\$33,525,800
D - Grade Separations	\$77,273,958	N/A	N/A	\$469,265,550	see note c	\$546,539,508	\$61,208,550
E - Other Accom- modation works	\$11,084, <u>670</u>	see note a	see note a	\$67,314,447	see note c	\$78,399,118	\$15,534,103
F – Track	\$40,285,248	\$224,663,613	see note b	\$52,951,011	see note c	\$317,899,872	\$13,695,494
G - Electrification	\$37,707,151	see note a	see note a	\$228,986,160	see note c	\$266,693,311	\$29,867,760
H - Stations	\$3,568,399	see note a	see note a	\$21,670,000	see note c	\$25,238,399	\$1,970,000
Totals	\$343,338,573	\$519,070,913	\$0	\$1,561,851,919	see note c	\$2,424,261,404	\$233,304,474

NOTES: a) included in Construction / Installation

b) included in Equipment / Material

c) included in Other Studies

SUMMARY SHEET

technology: 300+, EXISTING ROW

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS		
	SUBSYSTEM	A - RIG	HT-OF-WA	Y ACQUIS	TION	***************************************		
	WINDSOR - TORONTO CORRIDOR 300+, EXISTING RO							
1 SECTOR 1 1 Item 1	PROFESSIONAL SERVICES / PROJECT Professional Services		INT					
1	1.1 - Surveying	%	\$294,407,300		23,552,584 0	As a % of total cost of Sector 2 included in Item 1.1		
1	1.2 — Appraisal 1.3 — Legai Expertise	% %	\$294,407,300 \$294,407,300		0	included in Item 1.1		
1 tem 2	Project Management	%	\$317,959,884		0	As % of Sector 2 total + item 1.1		
1 Item X	Contingencies	%	\$23,552,584		4,710,517			
1	TOTAL DEOCEOGIONAL CERVICES / D	DO (EOT 144)	ACCIACNE.		200 020 101			
1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAP	NAGEMENI		\$28,263,101			
2 SECTOR 2	EQUIPMENT / MATERIALS							
2 Item 1	Urban Land							
2	1.1 - Residential	lump sum			57,690,000	unit cost not applicable		
2	1.2 - Commercial	lump sum			7,600,000	unit cost not applicable		
2	1.3 - Industrial	lump sum			116,020,000	unit cost not applicable		
2 Item 2	Rurai Land	·			F7 400 000	ittt oundinable		
2	2.1 - Agricultural 2.2 - Natural	lump sum			57,488,000 0	unit cost not applicable unit cost not applicable		
2 2 tem 3	Purchase of Existing Rail ROW	lump sum			U	dist cost not applicable		
2	3.1 - CN	lump sum			16,824,000	unit cost not applicable		
2	3.2 - CP	lump sum			12,021,000	unit cost not applicable		
2	3.3 - VIA	lump sum			0	unit cost not applicable		
2 Item X	Contingencies	%	\$267,643,000	10%	26,764,300	, ,		
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$294,407,300			
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION							
3		Not Applica	able					
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	JTION			<u>\$0</u>			
4 SECTOR 4	CONSTRUCTION / INSTALLATION							
4		Not Applicable						
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	TOTAL: CONSTRUCTION / INSTALLATION \$0						
5 SECTOR 5	START-UP	Included in	Other Studies					
5		atcluded in	Ottlet Strongs					
5 SECTOR 5	TOTAL: START-UP				\$0_			

UNITS

QUANTITY

SUMMARY SHEET

LOT / UNIT

technology:

ITEM

ITEM

NUMBER

300+, EXISTING ROW

365.0 km. in length

TOTAL COST SOURCE / REMARKS

			ORGINAL MARKETEN MANAGEM MERCHING.			Name of the second second second second second second second second second second second second second second	
						WWW.SWIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZAMIEROZ	xne
	A CONTRACTOR OF THE CONTRACTOR	SUBSYSTEM	B - EART	HWORKS AN	ID DRAINA	<u>GE</u>	
	L		WINDSOR -	TORONTO COP	RRIDOR 30	0+, EXISTING ROV	<u>√</u>
1 SECTOR 1	PR	OFESSIONAL SERVICES / PROJECT M	MANAGEMEN	ΝT			
1		gineering	%	\$352,880,950	5.5%	19,408,452	As a % of total cost of Sector 2
1 tem 2		enstruction Supervision	%	\$352,880,950	5.0%	17,644,048	As a % of total cost of Sector 2 Items 3 and 4 are %'s of entire
1 Item 3		vironmental Assessment asibility Studies (Technical)		\$2,080,922,832 \$2,080,922,832	0.2% 1.0%	4,161,846 20,809,228	project's cost less profes. fees
1 Item 4 1 Item 5		oject Management	%	\$414,904,524	5.4%	22,404,844	% of sector 2 total plus items 1-4
1 Item X		ontingencies	%	\$84,428,418	0%	0	·
1 1 SECTOR 1	тс	OTAL: PROFESSIONAL SERVICES / PR	OJECT MANA	AGEMENT	_	\$84,428,418	
2 SECTOR 2	EC	QUIPMENT / MATERIALS					
2 2			Not Applicab	ole	-		
2 SECTOR 2	TC	OTAL: EQUIPMENT / MATERIALS			-	\$0	
3 SECTOR 3	TR	RANSPORTATION / DISTRIBUTION	Not Applicab	ale			
3			TTOE Applicati				
3 SECTOR 3	TC	OTAL: TRANSPORTATION / DISTRIBUT	ION			80	
4 SECTOR 4		ONSTRUCTION / INSTALLATION					
4 item 1	1.1	earing and Roadbed Preparation — Type 1 Soils	route-km	278	\$142,000	39,476,000	
4	1.2	- Type 2 Soils	route-km	78.6	\$627,000	49,282,200	
4	1.3	- Type 3 Soils	route-km	13.1	\$1,035,000	13,558,500	
4 Item 2		mbankment Construction				(0.500.000	
4	2.1	- Soft Excavated Material	1000 m ^ 3	3500 0	\$3,000 \$0	10,500,000 0	
4	2.2 2.3	 Hard Excavated Material (Rock) Borrow Material 	1000 m ^ 3	3827	\$8,000	30,616,000	
4	2.4	Disposal of Unsuitable Material	1000 m ^ 3	4987	\$5,500	27,428,500	
4 Item 3	Ha	aulage of Fill Material	4000 0.0				- Cost transferred to item B4-2
4 4 Item 4	S.	(from Borrow or Excavation) ub – Bailast Layers	1000 m ^ 3-	- 0	\$0	0	For TM2-B0,TM2-D0,TM1-B0,
4 (6), 4	4.1	- New ROW	route-km	124.9	\$195,446	24,411,200	TM1-D0,TM0-B0,TM0-B1,
4	4.2	- Existing ROW	route-km	220.1	\$206,764	45,508,800	TM0-C0,and TM0-D0, \$152,00
4 Item 5	Di	rainage Systems					used for cost of sub-ballast(it. 4
4	5.1	- Normal ROW	route-km	356.4	\$25,000	8,910,000	
4	5.2	- Major Watercourse Culverts	ea.	123	\$35,000	4,305,000	
4 4 Item 6	5.3	 Environment, Stormwater Controls oadbed Upgrade on Existing ROW 	route-km	356.4 13.3	\$7,000 \$600,000	2,494,800 7,980,000	
4 item 7		etaining Structures	TOUTO-KIN	19.5	\$000,000	1,900,000	
4	7.1	- Up to 3 metres in Height	km.	0.6	\$2,500,000	1,500,000	
4	7.2	- Over 3 metres in Height	km.	2	\$5,000,000	10,000,000	
4 Item 8		trusion Barriers	km.	42.8	\$0	0	Intrusion Barriers not required
4 Item 9		oise Attenuation Structures	•	•			
4	9.1	- Barriers	km,	0		0	
4 tem 10	9,2	- Berms OW Security Fencing (on both sides)	km. route – km	0 356.4	\$0 \$56,000	19,958,400	
4 Item 11		now Control Measures	km.	0.00.4	\$00,000	0	Accounted for in Contingencies
4 Item 12		tility Interferences		·	*-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•
4	12.1	- Major Hydro Relocation	ea.	21	\$0	. 0	Accounted for in Contingencies
4	12.2	 Major Oil/Gas Relocation 	ea.	5	\$0	0	Accounted for in Contingencies
4	12.3	- Minor Pipe or Wire Crossings	route – km	359.6	\$0	0	Accounted for in Contingencies
4 Item 13		ther Items — Audit for Contaminated Soil	route – km	361,8	\$2,000	723,600	·
4	13.1 13.2	Audit for Contaminated Soil Audit for Contaminated Rail Yards		301.8	\$500,000	7,500,000	
4	13.3	- Minor Wildlife Passages (Culverts)		27	\$100,000	2,700,000	
4 Item X		ontingencies	%	\$306,853,000	15%	46,027,950	
4 4 SECTOR 4	. т	OTAL: CONSTRUCTION / INSTALLATION	ON			\$352,880,950	
		TART UR			-		
5 SECTOR 5	, s	TART-UP	Included in	Other Studies	-		
5 5 SECTOR 5	; т	OTAL: START-UP				\$0	
J J_J	. '	<u></u> v ·					

UNITS

QUANTITY

SUMMARY SHEET

LOT / UNIT PRICE

technology:

ITEM

ITEM NUMBER

300+, EXISTING ROW

365.0 km. in length

TOTAL COST

SOURCE / REMARKS

annovirus paresentus	rooma or one of the contract o			WANTE WATER BEING TO THE TRANSPORTED BY	***************************************		CONTRACTOR OF THE PROPERTY OF
		_					
		SUBSYSTEM	C - BRID	GES, VIADUC	TS. AND 1	UNNELS	
							44 ***
			WINDSOR -	· TORONTO COR	RIDOR 30	0+, EXISTING RO	<u> </u>
1 SECT	- CD 1	PROFESSIONAL SERVICES / PROJEC	T MANAGEME	NIT"			
	tem 1	Engineering	%	\$368,783,800	5.5%	20,283,109	As a % of total cost of Sector 2
	tem 2	Construction Supervision	%	\$368,783,800	5.0%	18,439,190	As a % of total cost of Sector 2
	tem 3	Project Management	%	\$407,506,099	5.4%	22,005,329	% of sector 2 total plus items 1-2
	tem X	Contingencies	%	\$60,727,628	0%	0	
1 1 SECT	OR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MAN	AGEMENT		\$60,727,628	
1 3501	On I	TOTAL THOSE EGGIONAL DESTRICES	THOSE OF WIAN	AGEMENT	=	000,127,020	
2 SECT	OR 2	EQUIPMENT / MATERIALS					
2			Not Applicat	ole	_		
2		TOTAL COURDS FOR A STEDIAL O				\$0	
2 SECT	OH 2	TOTAL: EQUIPMENT / MATERIALS			==	40	
3 SECT	TOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applicat	ble			
3		TOTAL TO A MODORTATION A DIOTOID	:: ITION			* **	
3 SECT	OR 3	TOTAL: TRANSPORTATION / DISTRIB	NOITON		<u></u>	\$0	
4 SECT	TOR 4	CONSTRUCTION / INSTALLATION					
4 1	ltem 1	Bridges					
4		1.1 - Small Rivers (< 30 metres)	ea.	24	\$340,000	8,160,000	
4		1.2 - Extra at 1.1 for Height Over 10 r		0	\$0	0	
4		1.3 - Interm. Rivers (30 - 100 metres		1,180	\$23,500	27,730,000	
4		1.4 - Extra at 1.3 for Height Over 10 r		300	\$6,000	1,800,000	
4		1.5 - Large Rivers (100 - 250 metres		100	\$42,000	4,200,000	
4		1.6 - Extra at 1.5 for Height Over 10 i		50	\$10,500	525,000	
4		1.7 - Major Rivers (over 250 m.)	lin. m.	0	\$0	0	
4		1.8 - Extra for Difficult Foundation Co		0	\$0	0	
4		 1.9 — Modif. to Exist. Bridges (new de Viaducts 	eck) lin. m.	11	\$13,000	143,000	
4 !	ltem 2	2.1 - Viaducts over 250 metres in Lei	noth lin.m.	4,200	\$27,000	113,400,000	
4		2.2 - Extra for Height Over 10 metres		2,100	\$8,000	16,800,000	
4		2.3 — Extra for Difficult Foundation Co		2,100	\$0,000	0	
4 I	Item 3	Tunnels (Double Track)		J	••	•	
-7 I		3.1 — in Soft Ground	lin, m.	0	\$0	۵	For 300+ technology, Rock
т А		3.2 - in Rock	lin. m.	3.250	\$50,000	162,500,000	Tunnels speed restricted by local
4		3.3 - Modifications to Existing Tunne		0	\$0	0	conditions are \$35,000/lin m.
4		3.4 - Noise Mitigation Measures	lump sum	ō	\$0	ō	Accounted for in Contingencies
4 1	ltem X	Contingencies	·%	\$335,258,000	10% _	33,525,800	
4							
4 SECT	TOR 4	TOTAL: CONSTRUCTION / INSTALLA	ITION		=	\$368,783,800	
5 SEC	TOR 5	START-UP					
5		GIABLE OF	Included in	Other Studies			
5					-		
5 SEC	TOR 5	TOTAL: START-UP			-	\$0	
					-		

technology:

300+, EXISTING ROW

SUMMARY SHEET

365.0 km. in length

ITEM ITEM UNITS QUANTITY LOT / UNIT TOTAL SOURCE / PRICE COST REMARKS

		SUBSYSTEM	D _ GRA	DE SEPARAT	IONS	DODO-LOTTOCKO (SPORTMENTO CONTRACTOR CONTRAC	XXXIII
		SUBSTSTEM	<u>D</u> GIM	UL OLI ANA	10140		
			WINDSOR -	- TORONTO CO	RRIDOR 3	00+, EXISTING RO	<u>M</u>
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEME	NT			
1	item 1	Engineering	%	\$469,265,550	5.5%	25,809,605	As a % of total cost of Sector 2
1	ltem 2	Construction Supervision	%	\$469,265,550	5.0%	23,463,278	As a % of total cost of Sector 2
1	item 3	Project Management	%	\$518,538,433	5.4%	28,001,075	% of sector 2 total plus items 1-2
1	item X	Contingencies	%	\$77,273,958	0% _	0	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / I	PROJECT MAN	IAGEMENT	=	\$77,273,958	
,	SECTOR 2	EQUIPMENT / MATERIALS					
2			Not Applica	ble			
2					-		
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			=	\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applica	ble	_		
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	LITION			so	
3	SECTOR	TOTAL, MANOS ORTATION / DISTRIB	01.01		=	Ψ.	
4		CONSTRUCTION / INSTALLATION					
4	Item 1	New Grade Separations, Rural					
4		1.1 - 2 Lane Highways	ea.	91	,	200,200,000	
4		1.2 - 2 Lane Highways, Dual ROW	ea.	11	\$2,800,000	30,800,000	
4		1.3 - 4 Lane Highways	ea.	3	\$3,100,000	9,300,000	
4		1.4 - 4 Lane Highways, Dual ROW	ea.	0	\$0	0	
4		1.5 - Major Highways (401, 20, etc)	ea.	5	\$4,450,000	22,250,000	
4		1.6 — Extra for Difficult Foundation Co	nd. ea.	4	\$180,000	720,000	
4	item 2	New Grade Separations, Urban	-\	0	#4 0en 000	10 004 000	
4		2.1 - Secondary Highways (2~4 lane 2.2 - Second. Hwys (2~4 l.) Dual RO		3 13	\$4,068,000 \$4,456,000	12,204,000 57,928,000	
4		2.3 - Major Highways (over 4 lanes)	vv ea. ea.	0	\$4,456,000	57,920,000	
4		2.4 — Extra for Difficult Foundation Co		0	\$0	0	
4	item 3	Modification of Exist. Grade Separation		v	40	J	
4	item 5	3.1 - Urban	ea.	46	\$830,000	38,180,000	
4		3.2 - Rural	ea.	13	\$627,000	8,151,000	
4	Item 4	Automatic Crossing Protection	ea.	o o	\$0	0	
4	Item 5	Closure and Diversion of Roads	km. of road		\$280,000	7,924,000	
4	ltem 6	Private Farm Crossings	ea.	68	\$300,000	20,400,000	
4	Item 7	Major Wildlife Passages	ea.	0	\$0	0	
4	łtem X	Contingencies	%	\$408,057,000	15%	61,208,550	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	TION		<u>-</u>	\$469,265,550	
5	SECTOR 5	START-UP					
5			included in	Other Studies	-		
5	SECTOR 5	TOTAL: START-UP			=	\$0	

technology: 300+, EXISTING ROW

SUMMARY SHEET

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS
					THE RESERVE OF THE PERSON OF T	рук-министрукатория и политура при при при при при при при при при при

		SUBSYSTEM	E – OTHE	R ACCOMOD	ATION WO	DRKS	
			WINDSOR -	TORONTO COR	RIDOR 30	0+, EXISTING ROV	<u>√</u>
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEMEN	т			
1	Item 1	Engineering	%	 \$67,314,447	5.5%	3.702.295	As a % of total cost of Sector 2
· i	Item 2	Construction Supervision	%	\$67,314,447	5.0%	3,365,722	As a % of total cost of Sector 2
i	Item 3	Project Management	%	\$74,382,464	5.4%	4,016,653	% of sector 2 total plus items 1-2
1	item X	Contingencies	%	\$11,084,670	0%	0	
1		y			_		
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / F	ROJECT MANA	GEMENT	******	\$11,084,670	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2			included in C	onstruction / inst	allation		
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
-	02010112	1017th, had on martin more and					
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Included in C	onstruction / Inst	allation		
3							
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	JTION			<u> </u>	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	ltem 1	Removal of Rail Lines	km.	43.8	\$21,134	925,669	
4	item 2	Construction of New Access Tracks	km.	55.3	\$644,750	35,654,675	
4	item 3	Rail/Rail Grade Separation					
4		3.1 - Rurai	ea.	19	\$800,000	15,200,000	
4		3.2 - Urban	ea.	0	\$0	O	
4	ltem 4	Other Particular Items:					
4		4.1 - Sub-Item	lump sum	0		0	
4		4.2 - Sub-Item	lump sum	0		0	
4		4.3 - Sub-Item	lump sum	0		0	
4		4.4 - Sub-Item	lump sum	0		0	
4	ltem X	Contingencies	%	\$51,780,344	30%	15,534,103	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ion		=	\$67,314,447	
5	SECTOR 5	START-UP					
5			Included in (Other Studies			
5	SECTOR 5	TOTAL: START-UP			_	\$0	

WINDSOR - TORONTO CORRIDOR SUMMARY SHEET

technology:
300+, EXISTING ROW 365.0 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS
			***************************************	lare market areas and		

1			1		viewe.		
house		SUBSYSTEM	F - TRAC	enemanista enemanista en en en en en en en en en en en en en			
		33337372		== TORONTO COR	RRIDOR :	300+, EXISTING ROW	
	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	7		The second second	dental de la constantina del constantina de la constantina de la constantina del constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de la con	ud
	Item 1	Engineering	%	\$277,614,624	3.5%	9.716.512	As % of total for Sectors 2 and 4
1			%	\$52,951,011	10.0%	5,295,101	As % of total for Sector 4
1	item 2 item 3	Construction Supervision Materials Procurement	%	\$224,663,613	4.0%	8,986,545	As % of total for Sector 2
1	Item 4	Project Management	% %	\$301,612,782	5.4%	16,287,090	As % of Sectors 2,4 totals plus
1	Item X	Contingencies	% %	\$40,285,248	0%	0	items 13
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MANA	AGEMENT		\$40,285,248	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2	Item 1	Rail					
2		1.1 - Main Line	t.	89,370	\$773	69,120,545	
2		1.2 - Siding	t.	1,520	\$773	1,175,598	
2	ltem 2	Ties	ea.	1,261,800	\$45	56,516,022	
2	Item 3	Ballast	m ^ 3	1,572,000	\$21	33,593,640	
2	item 4	Turnouts	•	.,	*	., ,	
2	itom 4	4.1 - High Speed	ea.	36	\$280,000	10,080,000	
2		4.2 — Medium Speed	ea.	26	\$135,000	3,510,000	
2		4.3 - Yard	ea.	0	\$0	0	
2	Item 5	Other Track Material	ca.	·	40	•	
2	item o	5.1 — Rail Fastening Assemblies	set	1,261,800	\$27	33,437,700	
2		5.2 — Bonded Insulated Joints	ea.	1,201,000	\$0	0	Included in Signalling costs
2		5.3 — Bumping Posts	ea.	7	\$3,120	_	modern management
	ltem 6	Switch Heaters/ Snow Blowers	ea.	,	40,120	21,040	
2	Rem 0	6.1 — Main Line	ea.	62	\$105,000	6,510,000	
2		6.2 - Yard	ea.	0	\$100,000		
2	11 ***			0	\$0 \$0	o o	
2	Item 7	Ballast Mats for Noise Attenuation	m ^ 2	-			
2	Item X	Contingencies	%	\$213,965,346	5%	10,096,201	
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$224,663,613	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Included in E	Equipment / Mate	erial		
3							
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	JTION			<u>\$0</u>	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	ltem 1	Track Construction					
4		1.1 — Main Line	km.	730.0	\$18,212		
4		1.2 - Siding	km.	12.2	\$44,175	538,935	
4	item 2	Field Welded Joints	ea.	4,570	\$2,028	9,267,960	
4	ltem 3	Turnout Construction					
4		3.1 - High and Med. Speed (Main Line	e) ea.	62	\$20,455	1,268,210	
4		3.2 - Yard	ea.	0	\$0	0	
4	ltem 4	Ballasting and Surfacing	m ^ 3	1,572,000	\$8.47	13,314,840	
4	item 5	Rail Grinding	track – km	742.2	\$4,545	3,373,299	
4	item 6	Construction Bases	route-km	365.0	\$24,372	8,895,780	
4		Contingencies	%	\$49,953,784	6%		
4		•					
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			\$52,951,011	
5	SECTOR 5	START-UP					
5			Included in	Other Studies			
5							
	SECTOR 5	TOTAL: START-UP				\$0	
•	J						

SUMMARY SHEET

technology: 300+, EXISTING ROW

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
			=/1+0=4=00\\v=10/21100\pi=21000000000000000000000000000000000000	!	and the second s	

				C _ EI EC	TRIFICATION	XI	9774600000000000000000000000000000000000	
			SUBSYSTEM	G - ELEC	INIFICATIO	<u> </u>		
				WINDSOR -	TORONTO COF	RRIDOR 3	100+, EXISTING ROV	<u>M</u>
1	SECTOR 1		PROFESSIONAL SERVICES / PROJECT M	IANAGEMEN	ıτ			
1	Item 1		Engineering	%	\$228,986,160	5.5%	12,594,239	As % of total for Sector 4
1	Item 2		Construction Supervision	%	\$228,986,160	5.0%	11,449,308	As % of total for Sector 4
1	Item 3		Project Management	%	\$253,029,707	5.4%	13,663,604	% of sector 4 total plus items 1-2
1	Item X		Contingencies	%	\$37,707,151	0%	0	
1	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PRO	DIFCT MANA	GEMENT		\$37,707,151	
				30E31 1111 (14)	TOLINE TT	=	401,107,1501	
	SECTOR 2		EQUIPMENT / MATERIALS			4 14 14		
2			· ·	included in C	onstruction / Ins	taliation _		
2			TOTAL COLUMNICATION OF				••	
2	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS			=	<u>\$0</u>	
3	SECTOR 3		TRANSPORTATION / DISTRIBUTION					
3				Included in C	Construction / Ins	stallation		
3						-		
3	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUTI	ON		=	\$0_	
4	SECTOR 4		CONSTRUCTION / INSTALLATION					
4	Item 1		Typical Catenary					
4		1.1	- Single Track - Independent Struct.	. km.	0.0	\$0	0	
4		1.2	 Double Track – independ, Struct. 	km,	365.0	\$350,000	127,750,000	
4		1.3	- Double Track - Portal Structures	km.	0.0	\$0	0	
4		1.4	Triple Track - Portal Structures	km.	0.0	\$0	0	
4		1.5	 Yard Catenary 	100 m.	0	\$0	0	
4		1.6	- · · · · · · · · · · · · · · · · · · ·	100 m.	30	\$13,500	405,000	
4		1.7	· · · · · · · · · · · · · · · · · · ·	100 m.	0	\$0	0	
4		1.8		100 m.	92	\$17,500	1,610,000	
4	item 2		Particular Catenary Installations					
4		2.1	, , , , , , , , , , , , , , , , , , , ,	ea.	19	\$280,000	5,320,000	
4		2.2	•	ea.	6	\$369,000	2,214,000	
4		2.3		ea.	5	\$1,052,000	5,260,000	
4	item 3	3.1	Special Catenary Structures	100 m.	•	\$0	0	
4		3.2		100 m. 100 m.	0	\$0 \$0	0	
4	ltem 4	3.2	Power Supply	100 111,	U	40	V	
4	itelli 4	4.1		ea.	3	\$5,355,000	16,065,000	
4		4.2			2	\$4,075,000	8,150,000	
4		4.3		ea.	32	\$730,000	23,360,000	
4		4.4	5	ea.	1	\$925,000	925,000	
4		4 5		ea.	0	\$0	0	
4		4.6		ea.	Ō	\$0	0	
4		4.7		ea.	0	\$0	0	
4		4.8		km.	30	\$170,300	5,109,000	
4		4.9		km.	7	\$132,200	925,400	
4		4.10	- Control Center	ea.	1	\$200,000	200,000	
4	ltem 5		EMI Mitigation Measures	route-km	365.0	\$5,000	1,825,000	
4	ltem X		Contingencies	%	\$199,118,400	15%	29,867,760	
4								
4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO	N			\$228,986,160	
5	SECTOR 5		START-UP					
5				included in (Other Studies			
5							.,,,,	
5	SECTOR 5		TOTAL: START-UP				<u>\$0</u>	

SUMMARY SHEET

technology: 300+, EXISTING ROW

365.0 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
FORESCO WILLIAM STATE OF THE ST	SUBSYSTEM	H - STA	TIONS			one
		WINDSOR	- TORONTO CO	DRRIDOR	300+. EXISTING ROV	M
1 SECTOR 1	PROFESSIONAL SERVICES / PROJEC	T MANAGEME	ENT			
1 Item 1	Engineering	%	\$21,670,000			As a % of total for Sector 2
1	Construction Supervision	%	\$21,670,000			As a % of total for Sector 2
1 Item 3	Project Management	%	\$23,945,350			% of sector 2 total plus items 1 – 2
1 Item X	Contingencies	%	\$3,568,399	0%	0	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / F	PROJECT MAI	NAGEMENT		\$3,568,399	
2 SECTOR 2	EQUIPMENT / MATERIALS	Included in	Construction / I	nstallation		
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3 SECTOR 3 3 3	TRANSPORTATION / DISTRIBUTION	Included in	Construction / I	nstallation		
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION			\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 item 1	Individual Station (location, name)	iump sum		\$19,700,000		
4 Item 2	Individual Station (location, name)	lump sum		\$0		
4 Item 3	•	lump sum		\$0		
4 Item 4		lump sum		\$0		
4 Item X	Contingencies	%	\$19,700,00	10%	1,970,000	
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	TION			\$21,670,000	
5 SECTOR 5	START-UP	Included in	Other Studies			
5 5 SECTOR 5	TOTAL: START-UP				<u>\$0</u>	

CL	rrent costs on file
Windsor Toro	nto Corridor
300 Ex. ROW	
segment	total cost
WT2-A0	\$0
WT2-B0	\$0
WT2-C0	\$0
WT1-A0	\$1,003,294,584
WT1-B0	\$841,232,227
WT1-C0	\$529,766,572
WT0-A0	\$0
WT0-B0	\$0
WT0-C0	\$0
WT0-C1	\$0
WTS-1	\$16,135,838
WTS-2a	\$0
WTS-2b	\$20,706,614
WTS-3	\$13,125,569
WTS-4	\$0
WTS-5	\$0
WTR-01	\$0
WTR-02	\$0

TOTAL

\$2,424,261,404

WINDSOR-TORONTO

C3. 300+ km/hr - NEW RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

SUBSYSTEM/SECTOR C		DOR	300+, NEW R	ow			and the state of t
	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included ir TOTAL
A - Right-of-way Aquisition	\$18,215,261	\$189,742,300	N/A	N/A	see note c	\$207,957,561	\$20,285,177
B – Earthworks and Drainage	\$96,299,595	N/A	N/A	\$411,708,165	see note c	\$508,007,760	\$53,701,068
C – Bridges, Viaducts, and Tunnels	\$42,626,517	N/A	N/A	\$258,860,250	see note c	\$301,486,767	\$23,532,750
D - Grade Separations	\$93,276,902	N/A	N/A	\$566,447,450	see note c	\$659,724,352	\$73,884,450
E - Other Accom- modation works	\$13,074,833	see note a	see note a	\$79,400,211	see note c	\$92,475,043	\$18,323,126
F - Track	\$42,061,242	\$234,967,397	see note b	\$55,014,672	see note c	\$332,043,312	\$14,302,962
G - Electrification	\$38,071,007	see note a	see note a	\$231,195,770	see note c	\$269,266,777	\$30,155,970
H - Stations	\$37,259,881	see note a	see note a	\$226,270,000	see note c	\$263,529,881	\$20,570,00
Totals	\$380,885,238	\$424,709,697	\$0	\$1,828,896,518	see note c	\$2,634,491,453	\$254,755,49

NOTES: a) included in Construction / Installation

b) included in Equipment / Material

c) included in Other Studies

technology: 300+, NEW ROW

SUMMARY SHEET

375.0 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	SUBSYSTEM	A - RIG	HT-OF-WA	Y ACQUISI	ΓΙΟΝ	ACTION A
		WINDSOR -	- TORONTO CO	RRIDOR	300+, NEW ROW	
1 SECTOR 1 1 Item 1	PROFESSIONAL SERVICES / PROJECT Professional Services			0.00/	45 +70 004	As a % of total cost of Sector 2
1	1.1 — Surveying 1.2 — Appraisal	% %	\$189,742,300 \$189,742,300	8.0% 0%	15,179,384 0	included in Item 1.1
1	1.3 - Legal Expertise	%	\$189,742,300		ŏ	included in Item 1.1
: 1 tem 2	Project Management	%	\$204,921,684		0	As % of Sector 2 total + item 1.1
1 Item X	Contingencies	%	\$15,179,384		3,035,877	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAN	NAGEMENT		\$18,215,261	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2 Item 1	Urban Land					
2	1.1 — Residential	lump sum			5,940,000	unit cost not applicable
2	1.2 - Commercial	lump sum			20,490,000	unit cost not applicable
2	1.3 - Industrial	lump sum			28,300,000	unit cost not applicable
2 Item 2	Rural Land				95,948,000	unit cost not applicable
2	2.1 – Agricultural 2.2 – Natural	lump sum			99,946,000	unit cost not applicable
2 tem 3	Purchase of Existing Rail ROW	lump sum			•	will cost the applicable
2 Item 3 2	3.1 - CN	lump sum			17,315,000	unit cost not applicable
2	3.2 - CP	lump sum			4,500,000	unit cost not applicable
2	3.3 - VIA	lump sum			0	unit cost not applicable
2 Item X	Contingencies	%	\$172,493,000	10%	17,249,300	
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$189,742,300	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	Not Applica	ıble			
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	ITION			\$0	
4 SECTOR 4 4	CONSTRUCTION / INSTALLATION	Not Applica	able			
4 4 SECTOR 4	TOTAL; CONSTRUCTION / INSTALLAT	ION			\$0	
5 SECTOR 5	START-UP	Included in	Other Studies			
5 5 SECTOR 5	TOTAL: START-UP				\$0	

SUMMARY SHEET

technology: 300+, NEW ROW

anna Karama and Salahah da da da	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS	
8				1	1 Managaran yang dipanggan salah salah salah salah salah salah salah salah salah salah salah salah salah salah s	 		
							и	
		SUBSYSTEM	B - EAR	THWORKS A	ND DRAINA	(GE		

		Букуанты	SUBSYSTEM	B – EART	HWORKS AN	D DRAINAG	ìΕ	
		Kommuni	A second	WINDSOR ~	TORONTO COR	RIDOR 3	00+, NEW ROW	
1	SECTOR 1	f	PROFESSIONAL SERVICES / PROJECT M	1ANAGEMEI	VT.			
1	Item 1		Ingineering	%	\$411,708,165	5.5%	22,643,949	As a % of total cost of Sector 2
1	Item 2	(Construction Supervision	%	\$411,708,165	5.0%	20,585,408	As a % of total cost of Sector 2
1	Item 3		nvironmental Assessment	% :	\$2,253,606,215	0.2%	4,507,212	Items 3 and 4 are %'s of entire
- 1	ltem 4	1	easibility Studies (Technical)		\$2,253,606,215	1.0%	22,536,062	project's cost less profes, fees
1	Item 5	1	roject Management	%	\$481,980,797	5.4%	26,026,963	% of sector 2 total plus items 1 – 4
1	ltem X	•	Contingencies	%	\$96,299,59 5	0% _	0	
1	SECTOR 1		OTAL: PROFESSIONAL SERVICES / PRO	DJECT MAN	AGEMENT	<u></u>	\$96,299,595	
2	SECTOR 2		EQUIPMENT / MATERIALS					
2	SECTOR 2			Not Applicat	ale			
2								
2	SECTOR 2		FOTAL: EQUIPMENT / MATERIALS			***	\$0	
	SECTOR 3		FRANSPORTATION / DISTRIBUTION					
3				Not Applicat	ole	-		
3	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUTI	ON		=	\$0	
4	SECTOR 4		CONSTRUCTION / INSTALLATION					
4	item 1		Clearing and Roadbed Preparation					
4		1.1	– Type 1 Soils	route-km	279.7	\$142,000	39,717,400	
4		1.2	– Type 2 Soils	route-km	94	\$627,000	58,938,000	
4		1.3	- Type 3 Soils	route-km	1.3	\$1,035,000	1,345,500	
4	ltem 2		Embankment Construction	1000 m ^ 3	2070	00.000	10.010.000	
4		2.1			6070	\$3,000	18,210,000	
4		2.2		1000 m ^ 3 1000 m ^ 3	1104 4234	\$18,000 \$8,000	19,872,000 33,872,000	
4		2.3	=	1000 m ^ 3	983	\$5,500 \$5,500	5,406,500	
4	Item 3		Haulage of Fill Material	1000 111 3	900	Ψ3,000	3,400,500	
4	item o			1000 m ^ 3-	. 0	\$0	0	Cost transferred to item B4-2
4	Item 4		Sub - Ballast Layers			, .		For TM2-B0,TM2-D0,TM1-B0,
4		4.1	- New ROW	route-km	336.8	\$228,000	76,790,400	TM1-D0,TM0-B0,TM0-B1,
4		4.2	 Existing ROW 	route-km	38.2	\$228,000	8,709,600	TM0-C0,and TM0-D0, \$152,000
4	ltem 5		Drainage Systems					used for cost of sub-ballast(it. 4)
4		5.1		route – km	369.4	\$25,000	9,235,000	
4		5,2	 Major Watercourse Culverts 	ea.	156	\$35,000	5,460,000	
4		5.3	 Environment, Stormwater Controls 		180,5	\$7,000	1,263,500	
4	ltem 6		· · · · · · · · · · · · · · · · · · ·	route – km	6.6	\$600,000	3,960,000	
4	item 7		Retaining Structures	km.	6 1	en E00 000	15 750 000	
4		7.1 7.2	 Up to 3 metres in Height Over 3 metres in Height 	km.	6.1 3.9	\$2,500,000 \$5,000,000	15,250,000 19,500,000	
4	item 8	7.2	- Over 3 metres in neight Intrusion Barriers	km.	13	\$0,000,000	0 - 19,000,000	Intrusion Barriers not required
4	item 9		Noise Attenuation Structures	Kiii.	10	ΨΟ	v	madion barriera nervaquia
4		9.1	- Barriers	km.	17.2	\$660,000	11,352,000	
4		9.2	- Berms	km.	Ö	\$0	0	
4	Item 10		ROW Security Fencing (on both sides)	route-km	369,4	\$56,000	20,686,400	
4	Item 11		Snow Control Measures	km.	0	\$0	0	Accounted for in Contingencies
4	ltem 12		Utility interferences					
4		12.1	 Major Hydro Relocation 	ea.	33	\$0	0	Accounted for in Contingencies
4		12.2	- Major Oil/Gas Relocation	ea.	10	\$0	0	Accounted for in Contingencies
4		12.3	,	route-km	375	\$0	0	Accounted for in Contingencies
4		101	Other Items Audit for Contaminated Soil	routekm	369.4	\$2,000	738,800	
4		13.1	- Audit for Contaminated Soil - Audit for Contaminated Rail Yards	ea.	309.4	\$500,000	4,500,000	
4		13.3		ea.	32	\$100,000	3,200,000	
4			Contingencies	%	\$358,007,100	15%	53,701,065	
4			-		-			
4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATION)N			\$411,708,165	
8			START-UP					
5				Included in	Other Studies			
5	S SECTOR 5		TOTAL: START-UP				\$0	

SUMMARY SHEET

technology: 300+, NEW ROW

TOTAL: START-UP

375.0 km. in length

\$0

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
the same of the sa		C – BRID	GES, VIADU	ICTS AND	ΠINNE! S	nationg &
	SUBSYSTEM	C - BNID	GES, VIADO	OTO, AND	IOMALLO	
		WINDSOR -	- TORONTO CC	RRIDOR	300+, NEW ROW	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	MANAGEME	NT			
1	Engineering	%	\$258,860,250	5.5%	14,237,314	As a % of total cost of Sector 2
1 item 2	Construction Supervision	%	\$258,860,250		12,943,013	As a % of total cost of Sector 2
1	Project Management	%	\$286,040,576		15,446,191	% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	\$42,626,517	0%	0	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PI	ROJECT MAN	AGEMENT		\$42,626,517	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2		Not Applica	ble			
2					**	
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				<u>\$0</u>	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3		Not Applica	ble			
3						
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUTION					
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 Item 1	Bridges					
4	1.1 - Small Rivers (< 30 metres)	ea.	65			
4	1.2 - Extra at 1.1 for Height Over 10 m.		2		·	
4	1.3 - Interm. Rivers (30 - 100 metres)	lin. m.	620			
4	1.4 - Extra at 1.3 for Height Over 10 m.		C			
4	1.5 - Large Rivers (100 - 250 metres)	lin. m.	450			
4	1.6 - Extra at 1.5 for Height Over 10 m.		175			
4	1.7 - Major Rivers (over 250 m.)	lin. m.	(
4	1.8 - Extra for Difficult Foundation Con 1.9 - Modif, to Exist, Bridges (new dec		(
4 4 Item 2	1.9 — Modif. to Exist. Bridges (new dec Viaducts	ку шк. ш.	,	, 40	·	
4 (1011) 2	2.1 - Viaducts over 250 metres in Leng	ath lin.m.	1,650	\$27,000	44,550,000	
4	2.2 - Extra for Height Over 10 metres	lin. m.	1,650		, ,	
4	2.3 - Extra for Difficult Foundation Con	d, lin.m.	, (s so	0	
4 Item 3	Tunnels (Double Track)					
4	3.1 - In Soft Ground	lin. m.	() \$0		For 300+ technology, Rock
4	3.2 - In Rock	lin. m.	2,400			Tunnels speed restricted by local
4	3.3 - Modifications to Existing Tunnels			3 \$0		conditions are \$35,000/lin m.
4	3.4 - Noise Mitigation Measures	lump sum		0 \$0		Accounted for in Contingencies
4 Item X	Contingencies	%	\$235,327,50	0 10%	23,532,750	
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			\$258,860,250	
5 SECTOR 5	START-UP					
5	STAIL OF	Included in	Other Studies			
5						
S CECTOD S	TOTAL · START-LIP				\$0	

5 SECTOR 5

technology: 300+, NEW ROW

SUMMARY SHEET

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS

			<u>annument estamentolokulususus</u>			Quillian market service and the service and th	account
		SUBSYSTEM	D - GRAD	DE SEPARATI	<u>ONS</u>		action and the second
			WINDSOR -	TORONTO COR	RIDOR 30	0+, NEW ROW	
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT I	MANAGEMEN	ır			
1	item 1	Engineering	%	\$566,447,450	5,5%	31,154,610	As a % of total cost of Sector 2
1	ltem 2	Construction Supervision	%	\$566,447,450	5.0%	28,322,373	As a % of total cost of Sector 2
1	ltem 3	Project Management	%	\$625,924,432	5.4%	33,799,919	% of sector 2 total plus items 1 –
1	item X	Contingencies	%	\$93,276,902	0%	0_	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PR	OJECT MANA	AGEMENT		\$93,276,902	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2			Not Applicab	le			
2							
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			=	\$0_	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applicab	ole			
3		•					
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUT	ION		-	\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	Item 1	New Grade Separations, Rural					
4		1.1 - 2 Lane Highways	ea.	135	\$2,200,000	297,000,000	
4		1.2 — 2 Lane Highways, Dual ROW	ea.	0	\$0	0	
4		1.3 - 4 Lane Highways	ea.	5	\$3,100,000	15,500,000	
4		1.4 - 4 Lane Highways, Dual ROW	ea.	0	\$0	0	
4		1.5 - Major Highways (401, 20, etc)	ea.	6	\$4,450,000	26,700,000 0	
4		1.6 - Extra for Difficult Foundation Cond	l. ea.	0	\$0	U	
4	item 2	New Grade Separations, Urban			04 000 000	24 000 000	
4		2.1 - Secondary Highways (2-4 lanes)	ea.	15 0	\$4,068,000 \$0	61,020,000 0	
4		2.2 - Second. Hwys (2-4 l.) Duai ROW	ea. ea.	4	\$5,300,000	21,200,000	
4		2.3 - Major Highways (over 4 lanes) 2.4 - Extra for Difficult Foundation Cond		0	\$3,300,000 \$0	21,200,000	
4	(4	Modification of Exist. Grade Separations	. ea.	U	φυ	v	
4	ltem 3	3.1 — Urban	ea.	38	\$830,000	31,540,000	
4		3.1 - Orban 3.2 - Rural	ea.	5	\$627,000	3,135,000	
4	Item 4	Automatic Crossing Protection	ea.	o o	\$0	0,100,000	
4	ltem 5	Closure and Diversion of Roads	km. of road	30.6	\$280,000	8,568,000	
4	Item 6	Private Farm Crossings	ea.	93	\$300,000	27,900,000	
4	Item 7	Major Wildlife Passages	ea.	0	\$0	0	
4	item X	Contingencies	%	\$492,563,000	15%_	73,884,450	
4		•					
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATION	NC		=	\$566,447,450	
8	SECTOR 5	START-UP					
5	;		Included in	Other Studies	-		
5	SECTOR 5	TOTAL: START-UP				\$0	
•	02010110				=		

technology: 300+, NEW ROW

SUMMARY SHEET

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
----------------	------	-------	----------	---------------------	---------------	---------------------

	SUBSYSTEM	E – OTHE	R ACCOMO	OW NOITAC	RKS	THE REAL PROPERTY OF THE PROPE
		WINDSOR -	TORONTO COR	RIDOR 30	00+, NEW ROW	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJEC	T MANAGEMEN	IT			
1 tem 1	Engineering	%	\$79,400,211	5.5%	4,367,012	As a % of total cost of Sector 2
1	Construction Supervision	%	\$79,400,211	5.0%	3,970,011	As a % of total cost of Sector 2
1	Project Management	%	\$87,737,233	5.4%	4,737,811	% of sector 2 total plus items 1 – 2
1 Item X	Contingencies	%	\$13,074,833	0%	0	
1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / 1	PROJECT MANA	AGEMENT		\$13,074,833	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2		Included in C	Construction / Ins	tallation		
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			-	\$0_	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3		Included in C	Construction / Ins	tallation		
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION		=	\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 tem 1	Removal of Rail Lines	km.	17.8	\$21,134	376,185	
4 item 2	Construction of New Access Tracks	km.	68,4	\$644,750	44,100,900	
4 tem 3	Rail/Rail Grade Separation					
4	3.1 — Rural	ea.	17	\$800,000	13,600,000	
4	3.2 - Urban	ea.	3	\$1,000,000	3,000,000	
4 Item 4	Other Particular Items:					
4	4.1 - Sub-item	lump sum	0		0	
4	4.2 - Sub-item	lump sum	0		0	
4	4.3 - Sub-Item	lump sum	0		0	
4 "	4.4 - Sub-Item	lump sum	0		0	
4 item X 4	Contingencies	%	\$61,077,085	30% _	18,323,126	
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	TION		-	\$79,400,211	
5 SECTOR 5	START-UP					
5 5		Included in (Other Studies			
5 SECTOR 5	TOTAL: START-UP			=	\$0	

SUMMARY SHEET

300+, NEW ROW

375.0 km. in length

***************************************	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
		SUBSYSTEM	F - TRAC	·V			
		SUBSTSTEM	1 - 11040	<u> </u>			
			WINDSOR -	TORONTO CO	RRIDOR :	300+, NEW ROW	
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT N	MANAGEME	NΤ			
1		Engineering	%	\$289,982,070	3.5%	10,149,372	As % of total for Sectors 2 and 4
1		Construction Supervision	%	\$55,014,672	10.0%	5,501,467	As % of total for Sector 4
1	item 3 Item 4	Materials Procurement Project Management	% %	\$234,967,397	4.0% 5.4%	9,398,696	As % of total for Sector 2 As % of Sectors 2,4 totals plus
1		Contingencies	%	\$315,031,605 \$42,061,242	0%	17,011,707 0	items 1-3
1		•			*·*·		
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PR	OJECT MAN	AGEMENT	:	\$42,061,242	
2	SECTOR 2	EQUIPMENT / MATERIALS Rail					
2		1.1 - Main Line	t.	91,820	\$773	71,015,424	
2		1.2 - Siding	t.	1,770	\$773	1,368,953	
2		Ties	ea.	1,299,400		58,200,126	
2		Baliast Turnouts	m ^ 3	1,619,000	\$21	34,598,030	
2		4.1 - High Speed	ea.	44	\$280,000	12,320,000	
2		4.2 - Medium Speed	ea.	30		4,050,000	
2		4.3 - Yard	ea.	0	\$0	0	
2		Other Track Material 5.1 - Rail Fastening Assemblies	ant	1 200 400	\$27	24 424 100	
2		5.2 — Bonded Insulated Joints	set ea.	1,299,400	\$27 \$0	34,434,100 0	Included in Signalling costs
2		5.3 - Bumping Posts	ea.	7	-	21,840	KIND BOOK IN SIGNAMING TOOK
2		Switch Heaters/ Snow Blowers					
2		6.1 — Main Line 6.2 — Yard	ea.	74		7,770,000	
2		Ballast Mats for Noise Attenuation	ea. m ^ 2	0	• -	0	
2		Contingencies	···	\$223,778,474	•	11,188,924	
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS					
						\$234,967,397	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION	Included in I	Equipment / Ma	torial		
3			meiaded iii	_quipment / wa	teriai		
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUT	ION			<u> </u>	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	Track Construction					
4		1.1 — Main Line 1.2 — Siding	km.	750.0	,	13,659,000	
4		1.2 - Siding Field Welded Joints	km. ea.	14.2 4,820	· · · · · ·	627,285 9,774,960	
4	Item 3	Turnout Construction	να.	4,020	\$2,020	3,774,500	
4	,	3.1 - High and Med. Speed (Main Line)	ea.	74	\$20,455	1,513,670	
4	} !!	3.2 - Yard	ea.	0			
4	item 4 Item 5	Ballasting and Surfacing Rail Grinding	m ^ 3 track - km	1,619,000			
4		Construction Bases	route-km	764.2 375.0			
4		Contingencies	%	\$51,900,634			
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATIO)N			\$55,014,672	
_	SECTOR 5	START-UP					
5		517611 = 01	Included in	Other Studies			
5							
5	S SECTOR 5	TOTAL: START-UP				\$0	

WINDSOR - TORONTO CORRIDOR

technology: 300+, NEW ROW

SUMMARY SHEET

375.0 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
----------------	------	-------	----------	---------------------	---------------	---------------------

			SUBSYSTEM	G - ELEC	TRIFICATION			1
				WINDSOR -	TORONTO COR	RIDOR 3	00+, NEW ROW	
1	SECTOR 1 tem 1 tem 2		PROFESSIONAL SERVICES / PROJECT MEngineering	MANAGEMEN % %	\$231,195,770	5.5% 5.0%	12,715,767	As % of total for Sector 4 As % of total for Sector 4
1 1 1	item 2 item 3 item X		Construction Supervision Project Management Contingencies	% % %	\$231,195,770 \$255,471,326 \$38,071,007	5.4% 5.4% 0% _	11,559,789 13,795,452 0	% of sector 4 total plus items 1-2
	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PRO	OJECT MANA	AGEMENT	=	\$38,071,007	
2	SECTOR 2		EQUIPMENT / MATERIALS	Included in C	Construction / Inst	allation		
2	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS			==	\$0	
3	SECTOR 3		TRANSPORTATION / DISTRIBUTION	Included in C	Construction / Inst	allation		
3 3	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUTI	ION		=	\$0	
4	SECTOR 4		CONSTRUCTION / INSTALLATION Typical Catenary					
4		1.1	 Single Track - Independent Struct. Double Track - Independ. Struct. 	km.	0.0 375.0	\$0 \$350,000	0 131,250,000	
4 4 4		1.3 1.4 1.5	- Triple Track Portal Structures	km. km. 100 m.	0.0 0.0 0	\$0 \$0 \$0	0 0 0	
4		1.6	- Sidings Catenary	100 m. 100 m.	30 0	\$13,500 \$0	405,000 0	
4 4	ltem 2	1.8	Particular Catenary Installations	100 m.	112	\$17,500	1,960,000	
4		2.1	- Xover Double (with section breaks)		21 8	\$280,000 \$369,000	5,880,000 2,952,000	
4 4 4	item 3	2.3	Special Catenary Structures	ea. 100 m.	4	\$1,052,000 \$0	4,208,000	
4	item 4	3.2	• • • • • • • • • • • • • • • • • • • •	100 m.	ŏ	\$0	Ö	
4		4.1 4.2 4.3	- Main Supply Station, 138 - 120 kV		4 1	\$5,355,000 \$4,075,000	21,420,000 4,075,000	
4 4 4		4.4 4.5	- 2x25 - 1x25 Interface Station	ea. ea. ea.	33 0 0	\$730,000 \$0 \$0	24,090,000 0 0	
4		4.6 4.7	7 - 315 kV Supply Line	ea. ea.	0	\$0 \$0	0 0	
4		4.8 4.9 4.10	- 120 kV Supply Line	km. km. ea.	16 0 1	\$170,300 \$0 \$200,000	2,724,800 0 200,000	
4	item 5 Item X	7.10	EMI Mitigation Measures Contingencies	route – km %	375.0 \$201,039,800	\$5,000 15%	1,875,000 30,155,970	
4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO	N		;	\$231,195,770	
5			START-UP	Included in (Other Studies			
5	SECTOR 5		TOTAL: START-UP			:	\$0	

WINDSOR - TORONTO CORRIDOR

SUMMARY SHEET

technology:

300+, NEW ROW

375.0 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	SUBSYSTEM	H - STA	TIONS	HANNON MARKE SHE CANADA SA TURNO CONTRAINA	VZZANOGEZANNIHA GETTETETETETETETETETETETETETETETETETETE	
	THE RESIDENCE OF THE PROPERTY	WINDSOR	- TORONTO CO	DRRIDOR 3	00+, NEW ROW	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	Γ MANAGEME	ENT			
1 Item 1	Engineering	%	\$226,270,000	5.5%	12,444,850	As a % of total for Sector 2
1 Item 2	Construction Supervision	%	\$226,270,000	5.0%	11,313,500	As a % of total for Sector 2
1 item 3	Project Management	%	\$250,028,350	5,4%	13,501,531	% of sector 2 total plus items 1-2
t Item X	Contingencies	%	\$37,259,881	0% _	0	
1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / F	ROJECT MAI	NAGEMENT		\$37,259,881	
2 SECTOR 2 2	EQUIPMENT / MATERIALS	Included in	Construction / li	nstallation _		
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0_	
3 SECTOR 3 3	TRANSPORTATION / DISTRIBUTION	Included in	Construction / le	nstailation _		
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	NOITU		5	\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 item 1	Individual Stations	lump sum		\$27,700,000	27,700,000	
4 Item 2	People Movers	lump sum		\$178,000,000	178,000,000	used at Pearson and Dorval only
4 Item 3	Not used	lump sum		\$0	0	
4 tem 4	Not used	lump sum		\$0	ō	
4 Item X	Contingencies	%	\$205,700,000		20,570,000	
4				-		
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION		=	\$226,270,000	
5 SECTOR 5	START-UP	Included in	Other Studies			
5 5 SECTOR 5	TOTAL: START-UP			.	\$0	

	current costs on file
	ronto Corridor
300 New ROW	
segment	total cost
WT2-A0	\$0
WT2-B0	\$0
WT2-C0	\$0
WT1-A0	\$0
WT1-B0	\$0
WT1-C0	\$0
WT0-A0	\$886,630,624
WT0-B0	\$1,163,674,373
WT0-C0	\$0
WT0-C1	\$287,176,656
WTS-1	\$16,135,838
WTS-2a	\$0
WTS-2b	\$20,706,614
WTS-3	\$0
WTS-4	\$15,190,095
WTS-5	\$24 4,977,252
WTR-01	\$0
WTR-02	\$0

TOTAL

\$2,634,491,453

WINDSOR-TORONTO

C4. TOTAL COSTS FOR SUB-SEGMENTS

		(000's \$)
WT2-A0	Windsor - London	714,380
WT2-B0	London - Hamilton	718,037
WT2-C0	Hamilton - Union Station	547,573
WT1-A0	Windsor - London	1,003,295
WT1-B0	London - Hamilton	841,232
WT1-C0	Hamilton - Union Station	529,767
WT0-A0	Windsor - London	886,631
WT0-B0	London - Pearson Airport	1,163,674
WT0-C0	Pearson Airport - North Toronto Station	267,728
WT0-C1	Pearson Airport - Union Station	287,177
WTS-1	Windsor - New Station	16,136
WTS-2a	London - New Downtown Station	11,045
WTS-2b	London - New Suburban Station	20,707
WTS-3	Hamilton/Burlington - New Station	13,126
WTS-4	Kitchener/Cambridge - New Station	15,190
WTS-5	Pearson International Airport - New Station	244,977

APPENDIX - D DETAILED ESTIMATES TORONTO-MONTRÉAL

TORONTO-MONTRÉAL

D1. 200+ km/hr - EXISTING RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

Table 4.6

SUBSYSTEM/SECTOR (COST SUMMARY								
TORONTO - MONTRÉAL ALIGNMENT 200+, TILTING TORONTO - MONTRÉAL									
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in TOTAL		
A - Right-of-way Aquisition	\$20,952,695	\$218,257,243	N/A	N/A	see note c	\$239,209,938	\$23,333,683		
B – Earthworks and Drainage	\$154,422,587	N/A	N/A	\$714,165,134	see note c	\$868,587,721	\$93,151,974		
C – Bridges, Viaducts, and Tunnels	\$62,417,093	N/A	N/A	\$379,043,500	see note c	\$441,460,593	\$34,458,500		
D - Grade Separations	\$86,590,073	N/A	N/A	\$525,840,000	see note c	\$612,430,073	\$87,640,000		
E - Other Accom- modation works	\$3,079,464	see note a	see note a	\$18,700,819	see note c	\$21,780,283	\$4,315,574		
F - Track	\$69,407,733	\$385,103,211	see note b	\$92,565,850	see note c	\$547,076,794	\$23,577,82 5		
G - Electrification	\$68,204,110	see note a	see note a	\$414,186,616	see note c	\$482,390,726	\$54,024,341		
H - Stations	\$26,898,845	see note a	see note a	\$163,350,000	see note c	\$190,248,845	\$14,850,000		
Totals	\$491,972,599	\$603,360,453	\$0	\$2,307,851,920	see note c	\$3,403,184,972	\$33 5,351,897		

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

START-UP

TOTAL: START-UP

SUMMARY SHEET

technology: 200+, TILTING

636.135 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	SUBSYSTEM	A - RIG	HT-OF-WA	Y ACQUISI	TION	annue Company
		TORONTO	– MONTRÉAL A	LIGNMENT 2	200+, TILTING	
1 SECTOR 1 1 item 1	PROFESSIONAL SERVICES / PROJECT Professional Services	MANAGEME	ENT			
1	1.1 - Surveying	%	\$218,257,243	8%	\$17,460,579	As a % of total cost of Sector 2
1	1.2 - Appraisal	%	\$218,257,243	0%	\$0	included in item 1.1
1	1.3 - Legal Expertise	%	\$218,257,243	0%	\$0	included in Item 1.1
1	Project Management	%	\$235,717,822	0%	\$0	As % of Sector 2 total + item 1.1
1 Item X	Contingencies	%	\$17,460,579	20% _	\$3,492,116	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAI	NAGEMENT	=	\$20,952,695	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2 Item 1	Urban Land					
2	1.1 - Residential	lump sum			78,732,250	unit cost not applicable
2	1.2 - Commercial	lump sum			1,500,000	unit cost not applicable
2	1.3 – Industrial	lump sum			35,886,000	unit cost not applicable
2 Item 2	Rural Land					
2	2.1 - Agriculturai	lump sum			3,322,575	unit cost not applicable
2	2.2 - Natural	lump sum			710,250	unit cost not applicable
2 Item 3	Purchase of Existing Rail ROW					
2	3.1 - CN	lump sum			74,976,625	unit cost not applicable
2	3.2 - CP	lump sum			2,450,000	unit cost not applicable
2	3.3 - VIA	lump sum			837,975	unit cost not applicable
2 Item X	Contingencies	%	\$198,415,675	10%	19,841,568	
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$218,257,243	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	Not Applica	able			
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU				\$0	
4 SECTOR 4 4	CONSTRUCTION / INSTALLATION	Not Applica	able			
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			\$0	

Included in Other Studies

5 SECTOR 5 5 5 SECTOR 5

technology: 200+, TILTING

SUMMARY SHEET

636.135 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS	
			Troopies and comment of the comment			The state of the s	

		SUBSYSTEM	B – EARTI	HWORKS AN	D DRAINA	GE	2,00000
			TORONTO -	MONTRÉAL ALI	GNMENT 20	00+, TILTING	
4	SECTOR 1	PROFESSIONAL SERVICES / PROJE	CT MANAGEMEN	т			
1	item 1	Engineering	%	\$714,165,134	5.5%	39,279,082	As a % of total cost of Sector 2
1	Item 2	Construction Supervision	%	\$714,165,134	5.0%	35,708,257	As a % of total cost of Sector 2
1	Item 3	Environmental Assessment		2,911,212,373	0.2%	5,822,425	Items 3 and 4 are %'s of entire
1	item 4	Feasibility Studies (Technical)		2,911,212,373	1.0%	29,112,124	project's cost less profes, fees
1	item 5	Project Management	%	\$824,087,022	5.4%	44,500,699	% of sector 2 total plus items 1-4
1	ltem X	Contingencies	%	\$154,422,587	0%	0	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES	/ PROJECT MANA	GEMENT		\$154,422,587	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2			Not Applicabl	ө			
2					_		
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applicabl	е			
3							
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRI	BUTION			\$0	
	0507084	CONCEDUCTION / INCEAL LATION					
4	SECTOR 4	CONSTRUCTION / INSTALLATION Clearing and Roadbed Preparation					
4	icem i	1.1 - Type 1 Soils	route-km	245.2	142,000	34,819,110	
4		1.2 - Type 2 Soils	route-km	305.6	627,000	191,586,120	
4		1.3 - Type 3 Soils	routekm	57.9	1,035,000	59,936,850	
4	Item 2	Embankment Construction		0,10	.,,555,555	00,000,000	
4		2.1 - Soft Excavated Material	1000 m ^ 3	5,079	3,000	15,238,200	
4		2.2 - Hard Excavated Material (Roc	k) 1000 m ^ 3	1,639	18,000	29,502,000	
4		2.3 - Borrow Material	1000 m ^ 3	645	8,000	5,157,920	
4		2.4 - Disposal of Unsuitable Materia	ıl 1000 m ^3	6,006	5,500	33,033,220	
4	item 3	Haulage of Fill Material					
4		(from Borrow or Excavation)	1000 m ^ 3-	0	0	0	Cost transferred to item B4-2
4	Item 4	Sub - Ballast Layers					For TM2-B0, TM2-D0, TM1-B0,
4		4.1 - New ROW	routekm	394.8	190,690	75,287,120	TM1-D0,TM0-B0,TM0-B1,
4	item 5	4.2 - Existing ROW Drainage Systems	route-km	217.5	220,186	47,898,240	TM0-C0,and TM0-D0, \$152,000 used for cost of sub-ballast(it. 4)
4	aem 3	5.1 - Normal ROW	route-km	607.0	25,000	15,174,375	used for cost of sub-bandst(it. 4)
4		5.2 - Major Watercourse Culverts	ea.	269	35,000	9,415,000	
4		5.3 - Environment, Stormwater Con		572.1	7,000	4,004,455	
4	Item 6	Roadbed Upgrade on Existing ROW	route-km	52.4	600,000	31,416,000	
4	Item 7	Retaining Structures			•	, , ,	
4		7.1 - Up to 3 metres in Height	km.	2.6	2,500,000	6,500,000	
4		7.2 - Over 3 metres in Height	km.	0.7	5,000,000	3,500,000	
4	item 8	Intrusion Barriers	km.	0.0	0	0	Intrusion Barriers not required
4	ltem 9	Noise Attenuation Structures					
4		9.1 - Barriers	km.	19.9	660,000	13,134,000	
4		9.2 - Berms	km.	0.0	0	0	
4	Item 10	ROW Security Fencing (on both side		601.6	56,000	33,690,720	A
4	item 11 item 12	Snow Control Measures Utility Interferences	km.	0.0	0	0	Accounted for in Contingencies
4	118111 12	12.1 — Major Hydro Relocation	ea.	42	0	0	Accounted for in Contingencies
4		12.2 - Major Oil/Gas Relocation	ea,	13	ő	0	Accounted for in Contingencies
4		12.3 - Minor Pipe or Wire Crossings	route-km	116.0	ŏ	Ö	Accounted for in Contingencies
4	Item 13	Other items				•	
4		13.1 - Audit for Contaminated Soil	route-km	609.9	2,000	1,219,830	
4		13.2 - Audit for Existing Rail Yards	ea.	11	500,000	5,500,000	
4		13.3 - Minor Wildlife Passages (Culv	•	50	100,000	5,000,000	
4	Item X	Contingencies	%	\$621,013,160	15% _	93,151,974	
4	OFOTOR:	TOTAL CONOTOLOTION (MICTOR)	ATION			6744 107 15	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALL	ATION		<u></u>	\$714,165,134	
5	SECTOR 5	START-UP					
5		UIAIII VI	Included in C	Other Studies			
5					-		
	SECTOR 5	TOTAL: START-UP				\$0	
_	_				=		

TORONTO - MONTRÉAL ALIGNMENT SUMMARY SHEET technology: 200+, TILTING 636.135 km. in length

ITEM NUM		ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
Ĭ	1				ļ.	l	

		SUBSYSTEM	C - BRID	GES, VIADUC	rs, and i	TUNNELS	
			TORONTO -	MONTRÉAL ALIG	NMENT 2	00+, TILTING	
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	MANAGEMEN	NT			
1	Item 1	Engineering	%	\$379,043,500	5.5%	20,847,393	As a % of total cost of Sector 2
1	ltem 2	Construction Supervision	%	\$379,043,500	5.0%	18,952,175	As a % of total cost of Sector 2
1	ltem 3	Project Management	%	\$418,843,068	5.4%	22,617,526	% of sector 2 total plus items 1-2
1	Item X	Contingencies	%	\$62,417,093	0%	0	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PR	ROJECT MANA	AGEMENT	***	\$62,417,093	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2			Not Applicab	ele	_		
2	0505000	TOTAL - FORUMENT / MATERIAL O				\$0	
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				9U_	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applicab	ole			
3						•	
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	TION		=	\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	Item 1	Bridges					
4		1.1 - Small Rivers (< 30 metres)	ea.	17	340,000	5,780,000	
4		1.2 - Extra at 1.1 for Height Over 10 m.	ea.	0	0	0	
4		1.3 - Interm. Rivers (30 - 100 metres)	lin. m.	620	23,500	14,570,000	
4		1.4 - Extra at 1.3 for Height Over 10 m.	lin. m.	115	6,000	690,000	
4		1.5 - Large Rivers (100 - 250 metres)	lin. m.	860	42,000	36,120,000	
4		1.6 - Extra at 1.5 for Height Over 10 m.	lin. m.	0	0	0	
4		1.7 - Major Rivers (over 250 m.)	lin. m.	700	50,000	35,000,000	
4		1.8 - Extra for Difficult Foundation Cond	±i. lin.m.	725	5,000	3,625,000	
4		1.9 - Modif. to Exist. Bridges (new deck	d) lin.m.	1,350	13,000	17,550,000	
4	Item 2	Viaducts 2.1 Viaducts over 250 metres in Leng	th lin. m.	3,250	27,000	87,750,000	
4		2.2 - Extra for Height Over XX metres	lin. m.	3,230	27,000	0,730,000	
4		2.3 - Extra for Difficult Foundation Con-		0	ō	0	
4	item 3	Tunnels (Double Track)	a. nu	· ·	v	•	
4 A	Rem 3	3.1 - In Soft Ground	lin. m.	2.050	70,000	143,500,000	•
4		3.2 - In Rock	lin. m.	0	0	0	
4		3.3 - Modifications to Existing Tunnels	lump sum	0	-	0	
4		3.4 - Noise Mitigation Measures	lump sum	0		0	Accounted for in Contingencies
4	ltem X	Contingencies	'%	\$344,585,000	10%	34,458,500	
4 4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATI	ON		=	\$379,043,500	
5	SECTOR 5	START-UP					
5			included in	Other Studies			
5					-		
5	SECTOR 5	TOTAL: START-UP			2	\$0	

NI

SUMMARY SHEET

technology:

200+, TILTING

636.135 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL	SOURCE / REMARKS
	OLD OVOTES!	D COAL	DE SEPARAT	TONE	and the second s	
	SUBSYSTEM	U - GNAL	<u>JE SEFANAI</u>	IONO		TAXABLE PROPERTY OF TAXABL
		TORONTO ~	MONTRÉAL A	LIGNMENT 2	200+, TILTING	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT I	MANAGEMEN	IT.			
1 Item 1	Engineering	%	\$525,840,000	5.5%	28,921,200	As a % of total cost of Sector 2
1 Item 2	Construction Supervision	%	\$525,840,000	5.0%	26,292,000	As a % of total cost of Sector 2
1 Item 3	Project Management	%	\$581,053,200	5.4%	31,376,873	% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	\$86,590,073	0%_	0	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PR	OJECT MANA	AGEMENT	:	\$86,590,073	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2		Not Applicab	le			
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
2 SECTOR 2	TOTAL EQUIPMENT / WATERIALS			=	ΨΟ	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3		Not Applicab	le			
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUT	ION		:	\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4	New Grade Separations, Rural					
4	1.1 - 2 Lane Highways	68.	22	\$2,200,000	48,400,000	
4	1.2 - 2 Lane Highways, Dual ROW	ea.	29			
4	1.3 - 4 Lane Highways	еа.	3			
4	1.4 - 4 Lane Highways, Dual ROW	ea.	0	-		
4 4	1.5 - Major Highways (401, 20, etc) 1.6 - Extra for Difficult Foundation Cond	ea. . ea.	4	, ,, ,		
4 Item 2	New Grade Separations, Urban		3	ψ100,000	0,0,000	
4	2.1 - Secondary Highways (2-4 lanes)	ea.	15	\$4,068,000	61,020,000	
4	2.2 - Second. Hwys (2-4 l.) Dual ROW	ea.	9			
4	2.3 - Major Highways (over 4 lanes)	ea.	6			
4	2.4 - Extra for Difficult Foundation Cond	. ea.	0	\$0	0	
4 Item 3	Modification of Exist. Grade Separations 3.1 — Urban	ea.	56	\$830,000	46,480,000	
4	3.1 - Orban 3.2 - Rural	ea.	54			
4 Item 4	Automatic Crossing Protection	ea.	151			
4 Item 5	Closure and Diversion of Roads	km, of road	3	\$280,000		
4 Item 6	Private Farm Crossings	ea.	84			
4 Item 7	Wildlife Passages	ea.	2	,		
4 Item X	Contingencies	%	\$438,200,000	20%	87,640,000	
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATION	ON			\$525,840,000	

Included in Other Studies

\$0

5 SECTOR 5 5 5 SECTOR 5

START-UP

TOTAL: START-UP

TORONTO - MONTREAL ALIGNMENT	SUMMARY SHEET
technology: 200+. TILTING	636.135 km. in length

TEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
§			:			

		SUBSYSTEM	E – OTHE	R ACCOMO	OM MOITAC)RKS	
			TORONTO -	MONTRÉAL AL	IGNMENT 20	0+, TILTING	
1 1 1 1 1 1	SECTOR 1 Item 1 Item 2 Item 3 Item X	PROFESSIONAL SERVICES / PROJECT Engineering Construction Supervision Project Management Contingencies TOTAL: PROFESSIONAL SERVICES / F	% % % %	\$18,700,819 \$18,700,819 \$20,664,405 \$3,079,464	5.5% 5.0% 5.4% 0%	1,028,545 935,041 1,115,878 0 \$3,079,464	As a % of total cost of Sector 2 As a % of total cost of Sector 2 % of sector 2 total plus items 1-2
2	SECTOR 2	EQUIPMENT / MATERIALS	Included in C	onstruction / Ins	stallation		
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			-	\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION	Included in C	onstruction / Ins	stallation		
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	иоітц		220	\$0	
4 4 4 4 4 4	SECTOR 4 Item 1 Item 2 Item 3	CONSTRUCTION / INSTALLATION Removal of Rail Lines Construction of New Access Tracks Rail/Rail Grade Separation 3.1 - Rural 3.2 - Urban Other Particular Items: 4.1 - Sub-Item	km. km. ea. ea. lump sum	86.5 8.0 3 5	\$21,134 \$644,750 \$800,000 \$1,000,000	1,827,246 5,158,000 2,400,000 5,000,000	
4 4 4 4 4	Item X	4.2 - Sub-Item 4.3 - Sub-Item 4.4 - Sub-Item Contingencies TOTAL: CONSTRUCTION / INSTALLAT	lump sum lump sum lump sum %	0 0 0 \$14,385,246	30% _	0 0 0 4,315,574 \$18,700,819	
5 5	SECTOR 5	START-UP	Included in C	Other Studies	-	\$0	

technology:

200+, TILTING

SUMMARY SHEET

636.135 km. in length

ITEM ITEM UNITS QUANTITY LOT/UNIT TOTAL SOURCE/
NUMBER PRICE COST REMARKS

		SUBSYSTEM	F - TRAC	K	SECTION AND ASSESSMENT OF THE SECTION OF THE SECTIO	darana ayaka darah darah darah darah darah darah darah darah darah darah darah darah darah darah darah darah d	
			TORONTO -	MONTRÉAL ALI	GNMENT 20	00+, TILTING	
1	SECTOR 1	PROFESSIONAL SERVICES / PROJ	ECT MANAGEMEN	ίΤ			
1	item 1	Engineering	%	\$477,669,061	3,5%	16,718,417	As % of total for Sectors 2 and 4
1	item 2	Construction Supervision	%	\$92,565,850	10.0%	9,256,585	As % of total for Sector 4
1	ltem 3	Materials Procurement	%	\$385,103,211	4.0%	15,404,128	As % of total for Sector 2
1	Item 4	Project Management	%	\$519,048,191	5.4%	28,028,602	As % of Sectors 2,4 totals plus
1	Item X	Contingencies	%	\$69,407,733	0%	0	items 1-3
	SECTOR 1	TOTAL: PROFESSIONAL SERVICES	7 PROJECT MANA	AGEMENT	<u></u>	\$69,407,733	
2	SECTOR 2	EQUIPMENT / MATERIALS Rail					
2	ILC:III	1.1 - Main Line	t.	150,870	\$773	116,685,875	
		1.2 - Siding	t.	4,060	\$773	3,140,085	
2	h 0	•					
2	ltem 2	Ties	ea.	1,988,800	\$45	89,078,352	
2	Item 3	Ballast	m ^ 3	2,701,000	\$21	57,720,370	
2	item 4	Turnouts					
2		4.1 - High Speed	ea.	80	\$280,000	22,400,000	
2		4.2 - Medium Speed	ea.	68	\$135,000	9,180,000	
2		4.3 - Yard	ea.	5	\$46,000	230,000	
2	ltem 5	Other Track Material					
2		5,1 - Rail Fastening Assemblies	set	1,988,800	\$27	52,703,200	
2		5.2 - Bonded Insulated Joints	ea.	0	\$0	0	Included in Signalling costs
2		5.3 - Bumping Posts	ea.	9	\$3,120	28,080	
2	ltem 6	Switch Heaters/ Snow Blowers					
2		6.1 - Main Line	ea.	148	\$105,000	15,540,000	
2		6.2 - Yard	ea.	5	\$11,800	59,000	
2	ltem 7	Ballast Mats for Noise Attenuation	m^2	ō	\$0	0	
2	Item X	Contingencies	%	\$366,764,963	5%	18,338,248	
2	ROTHA	Contingention	70	φοσο, r σ - 7,500	J/5 _	10,000,240	
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$385,103,211	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION	N				
3 3			Included in E	Equipment / Mate	rial _		
	SECTOR 3	TOTAL: TRANSPORTATION / DISTR	RIBUTION		=	\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	Item 1	Track Construction					
4	ILEIII I	1.1 - Main Line	km.	1,232.3	18,212	22,441,737	
4		1.2 — Siding	km.	32.6	44,175	1,440,105	
4	Item 2	Field Welded Joints		8,260	2,028		
4	Item 3		ea.	0,200	2,026	16,751,280	
4	item 5	Turnout Construction	131	440	00.455	2 007 240	
4		3.1 - High and Med. Speed (Main 3.2 - Yard		148	20,455	3,027,340	
4			ea.	5	4,680	23,400	
4	ltem 4	Ballasting and Surfacing	m.^3	2,701,000	8	22,877,470	
4	Item 5	Rail Grinding	track – km.	1,264.9	4,545	5,748,743	
4	ltem 6	Construction Bases	route – km	616.1	24,372	15,016,199	
4	ltem X	Contingencies	%	\$87,326,274	6%_	5,239,576	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTAL	LATION			\$92,565,850	
					-		
5 5	SECTOR 5	START-UP	Included in	Other Studies	_		
5 5	SECTOR 5	TOTAL: START-UP				\$0	

SUMMARY SHEET

technology:

200+, TILTING

636,135 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS	
***************************************				 -			

			SUBSYSTEM	3 - ELEC	TRIFICATION			
			Î	ORONTO -	MONTRÉALALI	GNMENT 20	0+, TILTING	
	SECTOR 1		PROFESSIONAL SERVICES / PROJECT M			5 E0/	20 700 004	As 9/ of total for Contor 4
1	ltem 1 ltem 2		Engineering Construction Supervision	% %	\$414,186,616 \$414,186,616	5.5% 5.0%	22,780,264 20,709,331	As % of total for Sector 4 As % of total for Sector 4
1	Item 3		Project Management	%	\$457,676,211	5.4%	24,714,515	% of sector 4 total plus items 1-2
1	Item X		Contingencies	%	\$68,204,110	0%	0	75 07 000(0), 1 15160 p100 1151110
1	adii X	,	oonungenoes	70	400,204,110	• · · · ·		
-	SECTOR 1	•	TOTAL: PROFESSIONAL SERVICES / PRO	JECT MANA	GEMENT	-24-24-24	\$68,204,110	
2	SECTOR 2	Į	EQUIPMENT / MATERIALS					
2			I	ncluded in C	onstruction / Inst	allation		
2	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS				\$0_	
3	SECTOR 3		TRANSPORTATION / DISTRIBUTION					
3	020.00			ncluded in C	onstruction / Inst	allation		
3			·					
	SECTOR 3	•	TOTAL: TRANSPORTATION / DISTRIBUTE	ON		<u></u>	\$0	
4	SECTOR 4		CONSTRUCTION / INSTALLATION					
4	ltem 1	•	Typical Catenary					
4		1.1	- Single Track - Independent Struct,	km.	0.0	0	0	
4		1.2	 Double Track – Independ. Struct. 	km.	616.1	350,000	215,643,750	
4		1.3	 Double Track — Portal Structures 	km.	0.0	0	0	
4		1.4	 Triple Track — Portal Structures 	km.	0.0	0	0	
4		1.5	- Yard Catenary	100 m.	0	0	0	
4		1.6	 Sidings Catenary 	100 m.	60	13,500	810,000	
4		1.7	- Garage Area Catenary	100 m.	0	0	0	
4	14 m- O	1.8	- In-Station Catenary	100 m.	266	17,500	4,655,000	
4	Item 2	2.1	Particular Catenary Installations - Xover Single (with section breaks)	ea.	44	280,000	12,320,000	
4		2.2	Xover Single (with section breaks) Xover Double (with section breaks)	ea.	15	369.000	5,535,000	
4		2.3	- Phase Break	ea.	10	1,052,000	10,520,000	
4	ltem 3		Special Catenary Structures	04.	,,	1,002,000	10,020,000	
4	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	3.1	- Underbridge	100 m.	0	0	0	
4		3.2		100 m.	0	0	0	
4	Item 4		Power Supply					
4		4.1		ea.	5	5,355,000	26,775,000	
4		4.2	 – Main Supply Station, 138 – 120 kV 	ea.	5	4,075,000	20,375,000	
4		4.3	5	ea.	58	730,000	42,340,000	
4		4.4		ea.	7	925,000	6,475,000	
4		4.5		ea.	3	0	0	
4		4.6		ea.	0	0	0	
4		4.7	1	ea.	0	170 300	•	
4		4.8 4.9	11.7	km. km.	45 27	170,300 132,200	7,663,500 3,569,400	
4		4.10		ea.	2	200,000	400.000	
4	ltem 5		EMI Mitigation Measures	route-km	616.1	5,000	3,080,625	
4	Item X		Contingencies	%	\$360,162,275	15%	54,024,341	
4	nom x			~	4000,100,00		0.110-110-11	
4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO	N		=	\$414,186,616	
5	SECTOR 5		START-UP					
5				Included in (Other Studies			
5							,,,	
5	SECTOR 5		TOTAL: START-UP			=	\$0	

TORONTO - MONTREAL ALIGNMENT	SUMMARY SHEET
technology: 200+ TILTING	636.135 km in length

	Albahund berkendik berkendik berkending berkeland berkel	·	i		and the state of t	
ITEM	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL	SOURCE /
NUMBER			j	PRICE	COST	REMARKS

	SUBSYSTEM	H – STAT	<u> TIONS</u>			
		TORONTO	- MONTRÉAL ALIGI	NMENT 200)+, TILTING	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJEC	T MANAGEME	NT			
1 Item 1	Engineering	%	\$163,350,000	5.5%	8,984,250	As a % of total for Sector 2
1 item 2	Construction Supervision	%	\$163,350,000	5.0%	8,167,500	As a % of total for Sector 2
1 Item 3	Project Management	%	\$180,501,750	5.4%	9,747,095	% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	\$26,898,845	0%	0	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MAN	IAGEMENT	-	\$26,898,845	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2		Included in	Construction / Install	lation		
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION			12		
3		included in	Construction / Instal	lation		
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIE	IUTION		***************************************	\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 item 1	Individual Stations	lump sum		\$0	71,500,000	
4 Item 2	People Movers	lump sum		\$0	77,000,000	used at Pearson and Dorval only
4 ltem 3	not used	lump sum		\$0	0	
4 ltem 4	not used	lump sum		\$0	0	
4 Item X	Contingencies	%	\$148,500,000	10%	14,850,000	
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	TION			\$163,350,000	
5 SECTOR 5	START-UP					
5		Included in	Other Studies			
5 5 SECTOR 5	TOTAL: START-UP			*******	\$0	

Toronto – Mo	ontréal Corridor	200+, TILTING	
segment	total cost	segment	total cost
TM2-A0	\$505,756,142	TMS-3a	\$19,239,160
TM2-B0	\$849,270,351	TMS-3b	\$26,939,577
TM2-C0	\$528,080,137	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	TM1-10	\$0
TM1-C0	\$0	TM1-I1	\$0
TM1-D0	\$0	TM1-J0	\$0
TM1-E0	\$0	TMO-FO	\$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	\$0
TMS-2	\$15,438,462	TMR-03	\$0
		TMR-04	\$0
		WTR-02	\$0
		WT0-C1	\$0
		WTS-5	\$0

TOTAL \$3,403,184,972

TORONTO-MONTRÉAL

D2. 300+ km/hr - EXISTING RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

<u>Table 5.6</u>

SUBSYSTEM/SECTOR COST SUMMARY								
TORONTO - MONTRÉAL ALIGNMENT 300+, EXISTING ROW TORONTO - MONTRÉAL								
Subsystem							Contingency reserve included in TOTAL	
A – Right-of-way Aquisition	\$23,756,855	\$247,467,243	N/A	N/A	see note c	\$271,224,098	\$26,456,498	
B – Earthworks and Drainage	\$170,418,455	N/A	N/A	\$772,515,818	see note c	\$942,934,273	\$100,762,933	
C – Bridges, Viaducts, and Tunnels	\$87,284,033	N/A	N/A	\$530,054,250	see note c	\$617,338,283	\$48,186,75 0	
D - Grade Separations	\$143,604,384	N/A	N/A	\$872,073,750	see note c	\$1,015,678,134	\$113,748,750	
E - Other Accom- modation works	\$4,375,171	see note a	see note a	\$26,569,324	see note c	\$30,944,49 5	\$6,131,382	
F - Track	\$69,089,825	\$387,099,143	see note b	\$89,593,375	see note c	\$545,782, 342	\$23 ,504,616	
G - Electrification	\$66,154,714	see note a	see note a	\$401,741,144	see note c	\$467,895,858	\$52,401,019	
H - Stations	\$14,672,097	see note a	see note a	\$89,100,000	see note c	\$103,772,097	\$8,100,000	
Totals	\$579,355,534	\$634,566,386	\$0	\$2,781,647,660	see note c	\$3,995,569,581	\$3 79,291,948	

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

technology:

SUMMARY SHEET

300+, EXISTING ROW

591,065 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	SUBSYSTEM	A - RIG	HT-OF-WA	Y ACQUISI	TION	
		TORONTO	– MONTRÉAL A	LIGNMENT	300+, EXISTING ROV	<u> </u>
1 SECTOR1	PROFESSIONAL SERVICES / PROJECT	MANAGEME	ENT			
1 1	Professional Services				•	
1	1.1 - Surveying	%	\$247,467,243	8%	\$19,797,379	As a % of total cost of Sector 2
1	1.2 - Appraisal	%	\$247,467,243	0%	\$0	included in Item 1.1
1	1.3 - Legal Expertise	%	\$247,467,243	0%	\$0	included in Item 1.1
1	Project Management	%	\$267,264,623	0%	\$0	As % of Sector 2 total + item 1.1
1 Item X	Contingencies	%	\$19,797,379	20%	\$3,959,476	
1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAN	NAGEMENT		\$23,756,855	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2 Item 1	Urban Land					
2	1.1 - Residential	lump sum			100,034,534	unit cost not applicable
2	1,2 - Commercial	lump sum			1,251,200	unit cost not applicable
2	1.3 - Industrial	lump sum			94,760,500	unit cost not applicable
2 Item 2	Rural Land					, ,
2	2.1 - Agricultural	lump sum			14,354,265	unit cost not applicable
2	2.2 - Natural	lump sum			542,508	unit cost not applicable
2 tem 3	Purchase of Existing Rail ROW				,	1.1
2	3.1 - CN	lump sum			13,482,375	unit cost not applicable
2	3.2 - CP	lump sum			68,214	unit cost not applicable
2	3.3 - VIA	lump sum			476,625	unit cost not applicable
2 Item X	Contingencies	%	\$224,970,221	10%	·	
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$247,467,243	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3 3		Not Applica	able			
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	ITION			\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4		Not Applica	able			
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			so_	
5 SECTOR 5	START-UP					
5		Included in	Other Studies		-	
5 5 SECTOR 5	TOTAL: START-UP				\$0	

technology: 300+, EXISTING ROW

SUMMARY SHEET

591.065 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS	
			_	1			ĺ

		1	SUBSYSTEM	R FARTH	WORKS AND) DRAINA	GF	,
								İ
		١		TORONTO - I	MONTRÉAL ALIC	SNMENT 30	00+, EXISTING ROW	<u>√</u>
1	SECTOR 1		PROFESSIONAL SERVICES / PROJECT N	ANAGEMENT	Г			
1	Item 1		Engineering		\$772,515,818	5.5%	42,488,370	As a % of total cost of Sector 2
1	Item 2		Construction Supervision		\$772,515,818	5.0%	38,625,791	As a % of total cost of Sector 2
1	Item 3		Environmental Assessment	% \$3	3,416,214,047	0.2%	6,832,428	Items 3 and 4 are %'s of entire
1	ltem 4		Feasibility Studies (Technical)		3,416,214,047	1.0%	34,162,140	project's cost less profes, fees
1	item 5		Project Management		\$894,624,547	5.4%	48,309,726	% of sector 2 total plus items 1-4
1	item X		Contingencies	%	\$170,418,455	0%	0	
1	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PR	OJECT MANA	GEMENT	-	\$170,418,455	
_								
	SECTOR 2		EQUIPMENT / MATERIALS	Not Applicable				
2				NOL Applicable	3	_		
	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS			<u></u>	\$0	
	0505050		TO A NICOCOTATION / DICTOID ITION					
3	SECTOR 3		TRANSPORTATION / DISTRIBUTION	Not Applicable	a			
3				Not Applicable	G	****		
	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUT	ION		_	\$0_	
						-		
	SECTOR 4		CONSTRUCTION / INSTALLATION					
4	ltem 1		Clearing and Roadbed Preparation		000.0	440.000	00 470 000	
4		1.1		route-km route-km	268.8 256.5	142,000 627,000	38,173,860 160,806,690	
4		1.2	- Type 2 Soils - Type 3 Soils	route-km	256.5 49.5	1,035,000	51,273,900	
4	item 2		Embankment Construction	:Oute-kill	49.5	1,000,000	31,210,300	
4	item 2	2.1		1000 m ^ 3	7,003	3,000	21,008,430	
4		2.2		1000 m ^ 3	4,653	18,000	83,754,000	
4		2.3	, ,	1000 m ^ 3	2,374	8,000	18,992,080	
4		2.4	 Disposal of Unsuitable Material 	1000 m ^ 3	5,967	5,500	32,820,370	
4	Item 3		Haulage of Fill Material					
4			(from Borrow or Excavation)	1000 m ^ 3-	0	0	0	Cost transferred to item B4-2
4	Item 4		Sub - Ballast Layers		400.0	100.010	70 750 400	For TM2 - B0,TM2 - D0,TM1 - B0,
4		4.1		route-km	409.5	192,316	78,753,480 36,231,480	TM1-D0,TM0-B0,TM0-B1, TM0-C0,and TM0-D0, \$152,000
4	Item 5	4.2	- Existing ROW Drainage Systems	route-km	166.2	218,045	30,231,400	used for cost of sub-ballast(it. 4)
4	item 5	5.1		route-km	571.2	25,000	14,281,000	4004101 0001 01 000 0 0 0 0 0 0 0 0 0 0
4		5.2		ea.	271	35,000	9,485,000	
4		5.3	•		539.3	7,000	3,775,065	
4	ltem 6		Roadbed Upgrade on Existing ROW	route-km	37.1	600,000	22,251,000	
4	ltem 7		Retaining Structures					
4		7.1		km.	3.0	2,500,000	7,575,000	
4		7.2	~	km.	3.4	5,000,000	17,050,000	Internal Demine antroquized
4	Item 8		Intrusion Barriers	km.	0.0	0	0	Intrusion Barriers not required
4	Item 9	9.1	Noise Attenuation Structures - Barriers	km.	52.4	660,000	34,584,000	
4		9.1		km.	0,0	000,000	0	
4	Item 10	٠.ـ	ROW Security Fencing (on both sides)	route-km	548.6	56,000	30,721,880	
4	item 11		Snow Control Measures	km.	0.0	. 0	0	Accounted for in Contingencies
4	item 12		Utility Interferences					
4		12.1		ea.	43	0	0	Accounted for in Contingencies
4		12.2		ea.	9	0	0	Accounted for in Contingencies
4	Item 13	12.3	 – Minor Pipe or Wire Crossings Other Items 	route-km	111.0	0	0	Accounted for in Contingencies
4	Rem 13	13.1		route-km	557.8	2,000	1,115,650	
Æ		13.2		ea.	9	500,000	4,500,000	
4		13.3			46	100,000	4,600,000	
4	item X		Contingencies	%	\$671,752,885	15%	100,762,933	
4	. =					,		
4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATION	ON			\$772,515,818	
5	SECTOR 5		START-UP					
5			werest wi	Included in C	Other Studies			
5								
	SECTOR 5		TOTAL: START-UP				\$0	

technology:

300+, EXISTING ROW

SUMMARY SHEET

591.065 km. in length

ITEM ITEM UNITS QUANTITY LOT / UNIT TOTAL SOURCE / PRICE COST REMARKS

		SUBSYSTEM	C – BRID	GES, VIADUC	rs, and t	UNNELS	CONTROL CONTRO
			TORONTO -	MONTRÉAL ALIG	NMENT 30	0+, EXISTING RO	N
1	SECTOR 1	PROFESSIONAL SERVICES / PROJEC				00.450.004	4 0/ 252-6-1 4 0 0
1	item 1	Engineering	%	\$530,054,250	5.5% 5.0%	29,152,984 26,502,713	As a % of total cost of Sector 2 As a % of total cost of Sector 2
1	Item 2 Item 3	Construction Supervision Project Management	% %	\$530,054,250 \$585,709,946	5.4%	31,628,337	% of sector 2 total plus items 1-2
1	Item X	Contingencies	% %	\$87,284,033	0%	0	70 El 00015. E 1010. p. 1-1 1-1 1-1 1-1
1	ILOSH A	Contingencies	,0	Ψ07, <u>20</u> -1,000			
	SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MANA	AGEMENT		\$87,284,033	
2	SECTOR 2	EQUIPMENT / MATERIALS	Not Applicab	le			
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			2002	\$0	
	SECTOR 3	TRANSPORTATION / DISTRIBUTION		_			
3			Not Applicat	ole	-		
3 3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION			\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	ltem 1	Bridges					
4		1.1 - Small Rivers (< 30 metres)	ea.	17	340,000	5,780,000	
4		1.2 - Extra at 1.1 for Height Over 10 r		0	0	0	
4		1.3 - Interm. Rivers (30 - 100 metres		465	23,500	10,927,500	
4		1.4 - Extra at 1.3 for Height Over 10 r		115	6,000	690,000	
4		1.5 - Large Rivers (100 - 250 metres		860 150	42,000 10,500	36,120,000 1,575,000	
4		1.6 - Extra at 1.5 for Height Over 10 r 1.7 - Major Rivers (over 250 m.)	n. lin.m. lin.m.	3,250	50,000	162,500,000	
4		1.7 — Major Hivers (over 200 fft.) 1.8 — Extra for Difficult Foundation Co		1,100	5,000	5,500,000	
4		1.9 - Modif. to Exist. Bridges (new de		510	13,000	6,630,000	
Ā	ltem 2	Viaducts	, on,	010	15,455	0,000,000	
7 A	ROM Z	2.1 - Viaducts over 250 metres in Ler	ath lin.m.	3,100	27.000	83,700,000	
4		2.2 - Extra for Height Over XX metres		700	8,000	5,600,000	
4		2.3 - Extra for Difficult Foundation Co	ond. lin. m.	2,900	4,000	11,600,000	
4	Item 3	Tunnels (Double Track)					
4		3.1 - In Soft Ground	lin. m.	0	0	0	For 300+ technology, Rock
4		3.2 - In Rock	lin. m.	3,807	39,728	151,245,000	Tunnels speed restricted by local
4		3.3 - Modifications to Existing Tunne		0		0	conditions are \$35,000/lin m.
4		3.4 - Noise Mitigation Measures	lump sum	0		0	Accounted for in Contingencies
4	ltem X	Contingencies	%	\$481,867,500	10% _	48,186,750	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	NOIT		=	\$530,054,250	
5	SECTOR 5	START-UP					
5		,	Included in	Other Studies	_		
-	SECTOR 5	TOTAL: START-UP			=	\$0	

TORONTO - MONTREAL ALIGNMENT	SUMMARY SHEET
technology:	
300+, EXISTING ROW	591.065 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
----------------	------	-------	----------	---------------------	---------------	---------------------

		SUBSYSTEM	D - GRAI	DE SEPARAT	IONS	
			TORONTO -	– MONTRÉAL AI	IGNMENT 3	00+, EXISTING RC
1	SECTOR 1	PROFESSIONAL SERVICES / PROJE	ECT MANAGEME	NT		
1	:	Engineering	%	\$872,073,750	5.5%	47,964,056
1	item 2	Construction Supervision	%	\$872,073,750	5.0%	43,603,688
1	Item 3	Project Management	%	\$963,641,494	5.4%	52,036,641
1		Contingencies	%	\$143,604,384	0%_	0
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES	/ PROJECT MAN	AGEMENT	=	\$143,604,384
,	SECTOR 2	EQUIPMENT / MATERIALS				
2		E dedit tricker / mixt tricker	Not Applicat	ole		
2		TOTAL COMPMENT (MATERIALO			-	45
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			==	\$0
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION	I			
3			Not Applicat	ole		
3	SECTOR3	TOTAL: TRANSPORTATION / DISTR	IBUTION			\$0
		·			***	
	SECTOR 4	CONSTRUCTION / INSTALLATION				
4		New Grade Separations, Rural				
4		1.1 - 2 Lane Highways	ea.		\$2,200,000	400,400,000
4	i I	1.2 — 2 Lane Highways, Duai ROW 1.3 — 4 Lane Highways	ea.	31		86,800,000
	k	1.4 — 4 Lane Highways, Dual ROW	ea. ea.	5 0	\$3,100,000	15,500,000 0
,	•	1.5 — Major Highways (401, 20, etc)		. 6	\$0 \$4,450,000	26,700,000
2	r L	1.6 — Extra for Difficult Foundation (. 0	\$180,000	1,980,000
2	tem 2	New Grade Separations, Urban	Jona. ea.	11	\$100,000	1,900,000
4		2.1 - Secondary Highways (2-4 lai	nes) ea.	16	\$4,068,000	65,088,000
4	I	2.2 - Second, Hwys (2-41.) Dual R		8	\$4,456,000	35,648,000
4	•	2.3 - Major Highways (over 4 lanes		5	\$5,300,000	26,500,000
4	Į.	2.4 - Extra for Difficult Foundation (Dond. ea.	ō	\$0	0
4	ltem 3	Modification of Exist. Grade Separati	ions			
4	į.	3.1 - Urban	ea.	55	\$830,000	45,650,000
4	Į.	3.2 - Rural	ea.	19	\$627,000	11,913,000
4	ltem 4	Automatic Crossing Protection	ea.	28	\$270,000	7,560,000
4	ltem 5	Closure and Diversion of Roads	km. of road	15	\$280,000	4,186,000
4	t item 6	Private Farm Crossings	ea.	98	\$300,000	29,400,000
4	ltem 7	Wildlife Passages	ea.	2	\$500,000	1,000,000
•	tem X	Contingencies	%	\$758,325,000	15% _	113,748,750
•	SECTOR 4	TOTAL: CONSTRUCTION / INSTALL	ATION		=	\$872,073,750
:	SECTOR 5	START-UP				
;	5	- · · · · · · · · · · · · · · · · · · ·	included in	Other Studies	_	
	S CECTOR E	TOTAL: START-UP			•	**
,	SECTOR 5	TOTAL: START-UP			=	\$0

SUMMARY SHEET

technology: 300+, EXISTING ROW

591,065 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS	
NAME OF THE PERSON NAME OF THE P	<u></u>				TOTAL CONTRACTOR OF THE PARTY O	The control of the co	

		SUBSYSTEM	E - OTHE	R ACCOMOD	ATION WO	RKS	
			TORONTO -	MONTRÉAL ALI	GNMENT 30	0+, EXISTING RO	<u>w</u>
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	MANAGEMEN	т			
1	Item 1	Engineering	%	\$26,569,324	5.5%	1,461,313	As a % of total cost of Sector 2
1	Item 2	Construction Supervision	%	\$26,569,324	5.0%	1,328,466	As a % of total cost of Sector 2
1	ltem 3	Project Management	%	\$29,359,103	5.4%	1,585,392	% of sector 2 total plus items 1-2
1	ltem X	Contingencies	%	\$4,375,171	0%	0	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / F	PROJECT MANA	GEMENT	WYST MICH.	\$4,375,171	
2	SECTOR 2	EQUIPMENT / MATERIALS	Included in C	onstruction / Inst	allation		
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION	Included in C	onstruction / Inst	allation		
3 3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	иоіті			\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	Removal of Rail Lines	km.	79.5	\$21,134	1,679,942	
4	ltem 2 ltem 3	Construction of New Access Tracks Rail/Rail Grade Separation	km.	8.0	\$644,750	5,158,000	
4		3.1 - Rural	ea.	17	\$800,000	13,600,000	
4		3.2 - Urban	ea.	0	\$0	0	
4	ltem 4	Other Particular Items:				_	
4		4.1 - Sub-item	lump sum	0		0	
4		4.2 - Sub-Item	lump sum	0		0	
4		4.3 - Sub-Item	lump sum	0		0	
4	Item X	4.4 - Sub-Item Contingencies	lump sum %	0 \$20,437,942	30%	6,131,382	
4	Item A	Contaitgensies	/0	340,104,030	- 0070	0,701,002	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			\$26,569,324	
5	SECTOR 5	START-UP	Included in C	Other Studies			
5	SECTOR 5	TOTAL: START-UP				\$0_	

technology:

300+, EXISTING ROW

SUMMARY SHEET

591.065 km. in length

ITEM ITEM UNITS QUANTITY LOT / UNIT TOTAL SOURCE / PRICE COST REMARKS

		SUBSYSTEM	F - TRAC	<u>K</u>	**************************************		gmany, or other states of the
		orentellistatulmentelleminentellemis eretismis eretismis eretismis eretismis eretismis eretismis eretismis ere	TORONTO -	MONTRÉAL ALI	GNMENT 3	00+, EXISTING ROW	
1 9	ECTOR 1	PROFESSIONAL SERVICES / PROJECT	MANAGEMEN	Т			
1	item 1	Engineering	%	\$476,692,518	3.5%	16,684,238	As % of total for Sectors 2 and 4
1	item 2	Construction Supervision	%	\$89,593,375	10.0%	8,959,337	As % of total for Sector 4
1	item 3	Materials Procurement	%	\$387,099,143	4.0%	15,483,966	As % of total for Sector 2
1	item 4	Project Management	%	\$517,820,059	5.4%	27,962,283	As % of Sectors 2,4 totals plus
1	ltem X	Contingencies	%	\$69,089,825	0%	0	items 1-3
1				***************************************			
1 8	ECTOR 1	TOTAL: PROFESSIONAL SERVICES / PF	ROJECT MANA	GEMENT	=	\$69,089,825	
2 S 2	ECTOR 2	EQUIPMENT / MATERIALS Rail					
2	100(1)	1.1 - Main Line	t.	144,740	\$773	111,944,811	
2		1.2 - Siding	t.	4,180	\$773	3,232,896	
2	ltem 2	Ties	ea.	2,067,600	\$45	92,607,804	
2	Item 3	Ballast	m ^ 3	2,578,000	\$21	55,091,860	
2	Item 4	Turnouts	0	2,310,000	Ų <u>2</u> i	40,001,000	
2	10111 7	4.1 - High Speed	ea.	88	\$280,000	24,640,000	
2		4.2 - Medium Speed	ea.	70	\$135,000	9,450,000	
2		4.3 - Yard	ea.	5	\$46,000	230,000	
2	item 5	Other Track Material	ea.	3	346,000	230,000	
2	item 5	5.1 - Rail Fastening Assemblies	set	2.067,600	\$27	54,791,400	
		5.1 - hall rasterling Assemblies 5.2 - Bonded Insulated Joints			\$27 \$0	0 0	Included in Pignelling seets
2			ea.	0	• -		Included in Signalling costs
2			ea.	9	\$3,120	28,080	
2	ltem 6	Switch Heaters/ Snow Blowers		450	2405 200	40 500 000	
2		6.1 - Main Line	ea.	158	\$105,000	16,590,000	
2	IA 7	6.2 - Yard	9 a.	5	\$11,800	59,000	
2	Item 7	Ballast Mats for Noise Attenuation	m ^ 2	0	\$0	0	
2	ltem X	Contingencies	%	\$368,665,850	5% _	18,433,293	
2 2 \$	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			=	\$387,099,143	
2 (SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3	SECTORS	TRANSPORTATION / DISTRIBUTION	le aludadie C	Service mane / Mate	ei a l		
3			included in E	quipment / Mate	ııaı -		
_	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	TION		ŧ	\$0	
4 9	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	Item 1	Track Construction					
4		1.1 - Main Line	km.	1,182.1	18,212	21,528,587	
4		1.2 - Sidina	km.	33.6	44,175	1,484,280	
à	ltem 2	Field Welded Joints	ea.	8,130	2,028	16,487,640	
À	Item 3	Turnout Construction	ou.	4,	2,020	10,101,010	
4		3.1 - High and Med. Speed (Main Line)	ea.	158	20,455	3,231,890	
4		3.2 - Yard	ea.	5	4,680	23,400	
4	Item 4	Ballasting and Surfacing	m^3	2,578,000	8	21,835,660	
À	Item 5	Rail Grinding	track - km.	1,215.7	4,545	5,525,402	
4	Item 6	Construction Bases	route-km	591.1	24,372	14,405,192	
4	Item X	Contingencies	%	\$84,522,052	6%	5,071,323	
4		009000	,,,	\$54,0EE,00E	0,0	0,011,020	
4 5						600 500 075	
	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATION	ON		:	\$89,593,375	
5.5			ON		:	\$69,393,373	
5 S	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATION START-UP		Other Studies	;	\$69,393,373	
				Other Studies		303 ,393,373	

technology: 300+, EXISTING ROW

SUMMARY SHEET

591.065 km. in length

PROGRAMMENT PROGRAMMENT AND A			i	:		
TEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS

		ľ	SUBSYSTEM	3 – ELEC	TRIFICATION	may recting the second	arrerrances (Annual Composition of the Composition	
				ORONTO -	MONTRÉAL ALIC	SNMENT 30	00+, EXISTING ROV	<u>v</u>
1 1 1 1	SECTOR 1 Item 1 Item 2 Item 3 Item X	i	PROFESSIONAL SERVICES / PROJECT M Engineering Construction Supervision Project Management Contingencies	ANAGEMEN' % % % %	T \$401,741,144 \$401,741,144 \$443,923,964 \$66,154,714	5.5% 5.0% 5.4% 0%	22,095,763 20,087,057 23,971,894 0	As % of total for Sector 4 As % of total for Sector 4 % of sector 4 total plus items 1-2
1	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PRO		•		\$66,154,714	
2	SECTOR 2		EQUIPMENT / MATERIALS	ncluded in C	onstruction / Insta	allation		
2			TOTAL: EQUIPMENT / MATERIALS			7772	\$0	
3		,	TRANSPORTATION / DISTRIBUTION	ncluded in C	onstruction / Insta	allation		
3	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUTI	ON		=	\$0	
4	SECTOR 4 ltem 1		CONSTRUCTION / INSTALLATION Typical Catenary		2.0	0	0	
4 4 4		1.1 1.2 1.3	 Double Track – Independ, Struct. Double Track – Portal Structures 	km. km.	0.0 591,1 0.0	0 350,000 0	206,869,250 0	
4		1.4 1.5 1.6	- Yard Catenary	km. 100 m. 100 m.	0.0 0 50	0 0 13,500	0 0 675,000	
4		1.7	 Garage Area Catenary In – Station Catenary 	100 m. 100 m.	0 286	0 17,500	0 5,005,000	
4		2.1 2.2	- Xover Double (with section breaks)	ea. ea.	43 18	280,000 369,000	12,040,000 6,642,000	
4		2.3	Special Catenary Structures	ea. 100 m.	10	1,052,000	10,520,000	
4	ltem 4	3.2	- Overbridge Power Supply	100 m. ea.	0	0 5,355,000	0 21,420,000	
4		4.1 4.2 4.3 4.4	 Main Supply Station, 138 – 120 kV Paralleling and Auto-transf. Stn 2x25 – 1x25 Interface Station 	ea. ea. ea.	5 61 4	4,075,000 730,000 925,000	20,375,000 44,530,000 3,700,000	
4	, , ,	4.5 4.6 4.7 4.8	 – Main Supply Station, 315 kV – 315 kV Supply Line 	ea. ea. ea. km.	0 1 0 25	0 6,380,000 0 170,300	0 6,380,000 0 4,257,500	
4	l I I Item 5	4.8 4.9 4.10	- 120 kV Supply Line	km. ea. route-km	26 3 591.1	132,200 200,000 5,000	3,371,100 600,000 2,955,275	
	item X		Contingencies	%	\$349,340,125	15%	52,401,019 \$401,741,144	
,	SECTOR 4 SECTOR 5		TOTAL: CONSTRUCTION / INSTALLATIO			2	940 I ₁ / 4 I ₁ I44	
	5			included in (Other Studies		*	
,	SECTOR 5		TOTAL: START-UP			:	\$0	

TORONTO - MONTREAL ALIGNMENT SUMMARY SHEET technology: 300+, EXISTING ROW 591.065 km. in length

ITEM	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS
NUMBER						nemanas

	SUBSYSTEM	H - STAT	IONS		·	
		TORONTO -	- MONTRÉAL ALIGI	NMENT 300)+, EXISTING RO	<u>w</u>
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEME!	ΝT			
1	Engineering	%	\$89,100,000	5.5%	4,900,500	As a % of total for Sector 2
1 item 2	Construction Supervision	%	\$89,100,000	5.0%	4,455,000	As a % of total for Sector 2
1 Item 3	Project Management	%	\$98,455,500	5.4%	5,316,597	% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	\$14,672,097	0%	0	, , , , , , , , , , , , , , , , , , ,
1	50000 g 500000	, -	* · · · · · · · · · · · · · · · · · · ·			
1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / I	PROJECT MAN	AGEMENT		\$14,672,097	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2		included in (Construction / Instal	lation		
2						
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3	TRANSFORTATION / DISTRIBUTION	included in (Construction / Instal	lation		
3		arciaded ar v	oonstruction / mater			
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION			\$0	
5 52515115						
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 item 1	Individual Stations	lump sum		\$0	81,000,000	
4 Item 2	People Movers	lump sum		\$0	0	used at Pearson and Dorval only
4 Item 3	not used	lump sum		\$0	0	
4 ltem 4	not used	lump sum		\$0	0	
4 Item X	Contingencies	%	\$81,000,000	10%	8,100,000	
4						
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	TION		-	\$89,100,000	
5 SECTOR 5	START-UP					
5		Included in	Other Studies			
5						
5 SECTOR 5	TOTAL: START-UP				\$0	
- -						

Toronto – Mo	ontréal Corridor	300+, EXISTING F	ROW
segment	total cost	segment	total cost
TM2-A0	\$0	TMS-3a	\$19,239,160
TM2-B0	\$0	TMS-3b	\$26,939,577
TM2-C0	\$0	TMS-DIV	
TM2-D0	\$0	TM2-G0	\$0
TM2-E0	\$0	TM2-H0	\$0
T M 2-F0	\$0	TM1-H0	\$207,831,571
TM1-A0	\$523,802,011	TM1-H1	\$0
TM1-B0	\$1,330,388,161	TM1-I0	\$162,420,364
TM1-C0	\$549,504,663	TM1-I1	\$0
TM1-D0	\$88,665,935	TM1-J0	\$212,551,924
TM1-E0	\$262,187,935	TM0-F0	\$0
TM1-F0	\$399,672,943	TM0-F1	\$0
TM1-G0	\$75,502,243	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	\$18,961,954
TM0-D0	\$0	TMS-5a	\$18,659,014
TM0-E0	\$0	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	\$0
TMS-2	\$15,438,462	TMR-03	\$0
		TMR-04	\$0
		WTR-02	\$0
		WT0-C1	\$0
***		WTS-5	\$0

TOTAL \$3,995,569,581

TORONTO-MONTRÉAL

D3. 300+ km/hr - NEW RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

Table 6.6

SUBSYSTEM/SECTOR (COST SUMMARY					nder, men men bestelske konstrukte state proper broke de processie state for en seksen en seksen state fran se	
TORONTO - MC	<u>NTRÉAL ALIG</u>	<u>NMENT</u>	300+, NEW F	row	TORONTO - MO	ONTRÉAL	A THE STATE OF THE
Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included in TOTAL
A – Right-of-way Aquisition	\$18,664,318	\$194,419,975	N/A	N/A	see note c	\$213,084,292	\$20,785,263
B — Earthworks and Drainage	\$203,304,073	N/A	N/A	\$878,814,814	see note c	\$1,082,118,887	\$114,628,019
C – Bridges, Viaducts, and Tunnels	\$281,538,975	^ N/A	N/A	\$1,709,716,250	see note c	\$1,991,255,225	\$155,428,75 0
D – Grade Separations	\$133,203,778	N/A	N/A	\$808,913,450	see note c	\$942,117,228	\$105,510,45 0
E - Other Accom- modation works	\$7,524,806	see note a	see note a	\$45,696 <u>,2</u> 80	see note c	\$53,221, 086	\$ 10,545,295
F - Track	\$71,120,904	\$398,311,251	see note b	\$92,340,882	see note c	\$561,773,037	\$24 ,194,045
G – Electrification	\$68,339,927	see note a	see note a	\$415,011,396	see note c	\$483,351,323	\$54,131,921
H – Stations	\$14,672,097	see note a	see note a	\$89,100,000	see note c	\$103,772,097	\$8,100,000
Totals	\$798,368,877	\$592,731,226	\$0	\$4,039,593,072	see note c	\$5,430,693,175	\$493,323,743

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

echnology:

300+, NEW ROW

SUMMARY SHEET

613.015 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS	

			: 		A THE RESIDENCE OF THE PROPERTY OF THE PROPERT	
		A - RIGI	HT-OF-WAY A	COLUCIT	IANI	energy E
	SUBSYSTEM	A - nigi	III-OL-AAWI W	ICGOIO!!	UN	2022 2022 2022 2022 2022 2022 2022 202
		TORONTO	– MONTRÉAL ALIGI	NMENT 30	0+. NEW ROW	100 H
						romid
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEME	NT			
1	Professional Services					
1	1.1 - Surveying	%	\$194,419,975	8%	\$15,553,598	As a % of total cost of Sector 2
1	1.2 - Appraisal	%	\$194,419,975	0%	\$0	included in Item 1.1
1	1.3 - Legal Expertise	%	\$194,419,975	0%	\$0	included in Item 1.1
1	Project Management	%	\$209,973,573	0%	\$0	As % of Sector 2 total + item 1.1
1 Item X	Contingencies	%	\$15,553,598	20%	\$3,110,720	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / (РРОЛЕСТ МАХ	JAGEMENT		\$18,664,318	
1 SECTOR I	TOTAL THOU ESSIONAL SERVICES (HOOLOT MAN	ACCINENT	·	\$10,004,010	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2 Item 1	Urban Land					
2	1.1 - Residential	lump sum			77,656,185	unit cost not applicable
2	1,2 - Commercial	lump sum			9,051,200	unit cost not applicable
2	1.3 - Industrial	lump sum			47,546,917	unit cost not applicable
2 Item 2	Rural Land					
2	2.1 - Agricultural 2.2 - Natural	lump sum			22,302,660	unit cost not applicable unit cost not applicable
2 2 Item 3	2.2 - Natural Purchase of Existing Rail ROW	lump sum			1,222,010	unit cost not applicable
2 (1911) 3	3.1 - CN	lump sum			18,905,542	unit cost not applicable
2	3.2 - CP	lump sum			60.918	unit cost not applicable
2	3.3 - VIA	lump sum			0	unit cost not applicable
2 Item X	Contingencies	%	\$176,745,432	10%	17,674,543	
2	3					
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			_	\$194,419,975	
0.0507000	TRANSPORTATION / DISTRIBUTION					
3 SECTOR 3	THANSPORTATION / DISTRIBUTION	Not Applica	hle			
3		HOL Applied	IDIC .	_		
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION			\$0	
				=		
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4		Not Applica	able	_		
4	TOTAL CONOTRACTION (MOTAL)	T1011			20	
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	HON		-	\$0	
5 SECTOR 5	START-UP					
5		included in	Other Studies			
5				_		
5 SECTOR 5	TOTAL: START-UP			_	\$0	

technology: 300+, NEW ROW

SUMMARY SHEET

 $613.015\,\mathrm{km}$ in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS	

		r	SUBSYSTEM	B – FART	HWORKS AN	D DRAINA	GF	elitro.
			•					100 TO TO THE TOTAL THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE T
		L		TORONTO -	- MONTRÉAL ALI	GNMENT 3	00+, NEW ROW	
1	SECTOR 1	F	PROFESSIONAL SERVICES / PROJECT M	1ANAGEMEN	NΤ			
1	ltem 1		Engineering	%	\$878,814,814	5.5%	48,334,815	As a % of total cost of Sector 2
1	ltem 2		Construction Supervision	%	\$878,814,814	5.0%	43,940,741	As a % of total cost of Sector 2
1	item 3	_	nvironmental Assessment		\$4,632,324,298	0.2%	9,264,649	Items 3 and 4 are %'s of entire
1	item 4		Feasibility Studies (Technical)		\$4,632,324,298	1.0%	46,323,243	project's cost less profes, fees
1	Item 5 Item X		Project Management Contingencies	%	\$1,026,678,261 \$203,304,073	5.4% 0%	55,440,626 0	% of sector 2 total plus items 1-4
1	If GILLY	•	Zontingencies	/0	\$200,504,073	0.76	<u>v</u>	
i	SECTOR 1	7	OTAL: PROFESSIONAL SERVICES / PR	OJECT MAN	AGEMENT		\$203,304,073	
2	SECTOR 2	E	EQUIPMENT / MATERIALS					
2				Not Applicat	ole			
2						****	· · ·	
2	SECTOR 2	٦	FOTAL: EQUIPMENT / MATERIALS				\$0	
	OFOTOR 2	,	COANCOCITATION / DISTRIBUTION					
3	SECTOR 3	1	FRANSPORTATION / DISTRIBUTION	Not Applicab	ala.			
3			•	Not Applicat	ne.	_		
	SECTOR 3	٦	TOTAL: TRANSPORTATION / DISTRIBUT	ION			\$0	
4	SECTOR 4	(CONSTRUCTION / INSTALLATION					
4	item 1		Clearing and Roadbed Preparation					
4		1.1	Type 1 Soils	route-km	391.5	128,989	50,502,980	
4		1.2	- Type 2 Soils	route-km	147.6	556,403	82,136,240	
4	ltem 2	1.3	- Type 3 Soils Embankment Construction	route-km	40.4	1,000,141	40,385,700	
4	Reili Z	2.1	Soft Excavated Material	1000 m ^ 3	16,024	3,000	48,073,230	
4		2.2	- Hard Excavated Material (Rock)	1000 m ^ 3	10,676	18,000	192,168,000	
4		2.3	- Borrow Material	1000 m ^ 3	683	8,000	5,464,080	
4		2.4	 Disposal of Unsuitable Material 	1000 m ^ 3	6,042	5,500	33,232,870	
4	item 3	ı	Haulage of Fill Material					
4			(from Borrow or Excavation)	1000 m ^ 3-	- 0	0	0	Cost transferred to item 84-2
4	Item 4	4.1	Sub – Ballast Layers – New ROW	route km	E44.0	185,751	04.060.200	For TM2-B0,TM2-D0,TM1-B0,
4		4.1	- Existing ROW	route-km	511.2 84.0	205,666	94,962,380 17,272,900	TM1-D0,TM0-B0,TM0-B1, TM0-C0,and TM0-D0, \$152,000
4	item 5		Drainage Systems	TOUTO KILL	04.0	200,000	17,272,000	used for cost of sub-ballast(it. 4)
4		5.1	- Normal ROW	route-km	576.8	25,000	14,420,750	,
4		5.2	 Major Watercourse Culverts 	ea.	300	35,000	10,500,000	
4		5.3	 Environment, Stormwater Controls 		561.9	7,000	3,933,615	
4	ltem 6		Roadbed Upgrade on Existing ROW	route-km	45.2	600,000	27,111,000	
4	ltem 7		Retaining Structures — Up to 3 metres in Height	km.	10.0	2.500.000	22 A7E 000	
4		7.1 7.2	Over 3 metres in Height	km.	13.2 10.7	5,000,000	33,075,000 53,550,000	
4	Item 8		Intrusion Barriers	km.	0.0	0,000,000	0.000,000	Intrusion Barriers not required
4	Item 9		Noise Attenuation Structures	******		•	·	, , , , , , , , , , , , , , , , , , ,
4		9.1	– Barriers	km.	23.4	660,000	15,444,000	
4		9.2	- Berms	km.	0.0	0	0	
4	Item 10		ROW Security Fencing (on both sides)	route-km	583.8	56,000	32,693,080	
4	Item 11		Snow Control Measures	km.	0.0	0	0	Accounted for in Contingencies
4	item 12	12.1	Utility Interferences - Major Hydro Relocation	ea.	47	0	0	Accounted for in Contingencies
4		12.2	Major Oil/Gas Relocation	ea.	13	0	0	Accounted for in Contingencies
4		12.3	- Minor Pipe or Wire Crossings	routekm	82.0	ŏ	ő	Accounted for in Contingencies
4	Item 13		Other Items			,	•	
4		13.1	 Audit for Contaminated Soil 	route-km	580.5	2,000	1,160,970	
4		13.2	- Audit for Existing Rail Yards	ea.	6	500,000	3,000,000	
4		13.3		ea.	51	100,000	5,100,000	
4	Item X		Contingencies	%	\$764,186,795	15%	114,628,019	
4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO)N			\$878,814,814	
	32070117			•••		:	40.0,017,017	
5	SECTOR 5		START-UP					
5				Included in	Other Studies			
5			TATAL ATART UR					
5	SECTOR 5		TOTAL: START-UP			:	\$0	

technology: 300+, NEW ROW

SUMMARY SHEET

613.015 km. in length

ITEM NUMBER	ITEM	UNITS	VTITHAUQ	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS

		SUBSYSTEM	C – BRII	DGES, VIADUC	TS. AND	TUNNELS	
				– MONTRÉAL ALIC			
	ocoron d	PROFESSIONAL SERVICES / PROJECT			OTALIS CIVI	OUT, NEW HOW	- -1
1	SECTOR 1	Engineering	WANAGEWI	\$1,709,716,250	5.5%	94,034,394	As a % of total cost of Sector 2
1	Item 2	Construction Supervision	% %	\$1,709,716,250	5.0%	85,485,813	As a % of total cost of Sector 2
i	Item 3	Project Management	%	\$1,889,236,456	5.4%	102,018,769	% of sector 2 total plus items 1-2
i	Item X	Contingencies	%	\$281,538,975	0%	0	76 Of BOSTON E COLOR PIGO (COMP)
1	ROTH	Ommigenace	75	W201,000,310	V/0	<u>~</u>	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAI	NAGEMENT		\$281,538,975	
	SECTOR 2	EQUIPMENT / MATERIALS					
2			Not Applica	able	_		
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			<u></u>	\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applica	abie	_		
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	ITION			\$0	
		·			2		
	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	Bridges				5 455 555	
4		1.1 - Small Rivers (< 30 metres) 1.2 - Extra at 1.1 for Height Over 10 m.	ea. . ea.	18	340,000	6,120,000	
4		1.2 - Extra at 1.1 for Height Over 10 m. 1.3 - Interm. Rivers (30 - 100 metres)	. ea. lin.m.	5 605	85,000 23,500	425,000	
4		1.4 — Extra at 1.3 for Height Over 10 m		50 50	6,000	14,217,500 300,000	
4		1.5 - Large Rivers (100 - 250 metres)	in. m.	1,350	42,000	56,700,000	
4		1.6 - Extra at 1.5 for Height Over 10 m		500	10,500	5,250,000	
4		1.7 - Major Rivers (over 250 m.)	lin. m.	4,100	50,000	205,000,000	
- A		1.8 - Extra for Difficult Foundation Con		1,160	5,000	5,800,000	
4		1.9 - Modif, to Exist. Bridges (new dec		510	13,000	6,630,000	
4	ltem 2	Viaducts	.,	0.10	, 5,000	*,,	
4		2.1 - Viaducts over 250 metres in Leng	ath lin.m.	5.700	27,000	153,900,000	
4		2.2 - Extra for Height Over XX metres	lin. m.	1,900	8,000	15,200,000	
4		2.3 - Extra for Difficult Foundation Con	ıd. lin.m.	. 0	0	. 0	
4	item 3	Tunnels (Double Track)					
4		3.1 - in Soft Ground	lin. m.	3,400	70,000	238,000,000	For 300+ technology, Rock
4		3.2 - in Rock	lin. m.	17,357	47,747	828,745,000	Tunnels speed restricted by local
4		3.3 - Modifications to Existing Tunnels	lump sum	0		18,000,000	conditions are \$35,000/lin m.
4		3.4 - Noise Mitigation Measures	lump sum	0		0	Accounted for in Contingencies
4	Item X	Contingencies	%	\$1,554,287,500	10%	155,428,750	-
4 4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION		:	\$1,709,716,250	
F	SECTOR 5	START-UP					
5		#111111 W1	Included in	Other Studies			
5							
5	SECTOR 5	TOTAL: START-UP			:	\$0	

SUMMARY SHEET

technology: 300+, NEW ROW

613.015 km, in length

# *	TEM JUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL	SOURCE / REMARKS
Minimiza							manne E
		SUBSYSTEM	U - GHA	DE SEPARA	HONS		Account was
			TORONTO -	– MONTRÉAL A	LIGNMENT	300+, NEW ROW	
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	MANAGEME	NT			
1	ltem 1	Engineering	%	\$808,913,450	5.5%	44,490,240	As a % of total cost of Sector 2
1	Item 2	Construction Supervision	%	\$808,913,450	5.0%	40,445,673	As a % of total cost of Sector 2
1	Item 3	Project Management	%	\$893,849,362	5.4%	48,267,866	% of sector 2 total plus items 1-2
1	Item X	Contingencies	%	\$133,203,778	0%	0	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PR	OJECT MAN	IAGEMENT		\$133,203,778	
2	SECTOR 2	EQUIPMENT / MATERIALS				•	
2		,	Not Applicat	ble			
2							
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3	020.01.0	Thinter officially blottings from	Not Applica	ble			
3			.,				
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUT	ION			\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	ltem 1	New Grade Separations, Rural					
4	ROIII I	1.1 - 2 Lane Highways	ea.	215	\$2,200,000	473,000,000	
4		1.2 - 2 Lane Highways, Dual ROW	ea.	2 2			
4		1.3 - 4 Lane Highways	ea.	4			
4		1.4 - 4 Lane Highways, Dual ROW	ea.	ò			
4		1.5 - Major Highways (401, 20, etc)	ea.	3	• •		
4		1.6 - Extra for Difficult Foundation Cond		9			
4	Item 2	New Grade Separations, Urban		•	* . - • 1 • • •	1,020,000	
4		2.1 - Secondary Highways (2-4 lanes)	ea.	15	\$4,068,000	61,020,000	
4		2.2 - Second. Hwys (2-41.) Dual ROW	ea.	8	\$4,456,000	35,648,000	
4		2.3 - Major Highways (over 4 lanes)	ea.	1	\$5,300,000	5,300,000	
4		2.4 - Extra for Difficult Foundation Cond	i, ea.	O	\$0	0	
4	ltem 3	Modification of Exist. Grade Separations					
4		3.1 - Urban	ea.	40			
4		3.2 - Rural	ea.	13			
4	ltem 4	Automatic Crossing Protection	ea.	24			
4	item 5	Closure and Diversion of Roads	km. of road				
4	ltem 6 ltem 7	Private Farm Crossings	ea.	140			
4		Wildlife Passages	ea.	2700 400 000			
4	Item X	Contingencies	%	\$703,403,000	15%	105,510,450	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLATION	O N			\$808,913,450	
5	SECTOR 5	START-UP					
5		. / ****	Included in	Other Studies			
5 5	SECTOR 5	TOTAL: START-UP				\$0	

TORONTO - MONTREAL ALIGNMENT SUMMARY SHEET technology: 300+, NEW ROW

613.015 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS	

		SUBSYSTEM_	E – OTHE	R ACCOMO	unider.		
			TORONTO -	MONTRÉAL AL	IGNMENT 3	00+, NEW ROW	uvus
1	SECTOR 1	PROFESSIONAL SERVICES / PROJEC	T MANAGEMEN	т			
1	item t	Engineering	%	\$45,696,280	5.5%	2,513,295	As a % of total cost of Sector 2
1	item 2	Construction Supervision	%	\$45,696,280	5.0%	2,284,814	As a % of total cost of Sector 2
1	ltem 3	Project Management	%	\$50,494,389	5.4%	2,726,697	% of sector 2 total plus items 1-2
1	ltem X	Contingencies	%	\$7,524,806	0% _	0	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MANA	GEMENT		\$7,524,806	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2			Included in C	onstruction / Ins	stallation	· · · · · · · · · · · · · · · · · · ·	
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			<u></u>	\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Included in C	onstruction / In:	stallation		
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION		=	\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	Removal of Rail Lines	km.	50.9	\$21,134	1,075,509	
4	Item 2	Construction of New Access Tracks	km.	36.1	\$644,750	23,275,475	
4	Item 3	Rail/Rail Grade Separation 3.1 — Bural					
4		3.1 — Rural 3.2 — Urban	ea.	11	\$800,000	8,800,000	
4	ltem 4	Other Particular Items:	ea.	2	\$1,000,000	2,000,000	
4	Hom 4	4.1 - Sub-Item	lump sum	0		0	
4		4.2 - Sub-Item	lump sum	ő		o o	
4		4.3 - Sub-Item	lump sum	0		0	
4		4.4 - Sub-Item	lump sum	ō		ŏ	
4	ltem X	Contingencies	%	\$35,150,984	30% _	10,545,295	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	TION		z.	\$45,696,280	
5	SECTOR 5	START-UP					
5			Included in C	ther Studies	-		
5 5	SECTOR 5	TOTAL: START-UP			=	\$0	

technology: 300+, NEW ROW

SUMMARY SHEET

613.015 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS

		SUBSYSTEM	F – TRAC	K	enditerration of the second of	richtschaft nicht er eine eine eine eine eine eine eine e		
		OODOTOTEM.			A	os . NEW BOW		
		AND THE RESIDENCE OF THE PROPERTY OF THE PROPE	- OHONIO	MONTRÉAL ALI	GNMENI 3	00+, NEW ROW		
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEMEN	ŧΤ				
1	item 1	Engineering	%	\$490,652,133	3.5%	17,172,825	As % of total for Sectors 2 and 4	
1	Item 2 Item 3	Construction Supervision Materials Procurement	% %	\$92,340,882	10.0%	9,234,088	As % of total for Sector 4	
1	Item 4	Project Management	% %	\$398,311,251 \$532,991,496	4.0% 5.4%	15,932,450 28,781,541	As % of total for Sector 2 As % of Sectors 2,4 totals plus	
1	Item X	Contingencies	% %	\$71,120,904	3.4% 0%	20,701,041	items 1-3	
1		5 thin 9 thin 5	,3	41 1,120,50 4	0,0_		Komb i o	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / F	ROJECT MAN	AGEMENT	=	\$71,120,904		
	SECTOR 2	EQUIPMENT / MATERIALS						
2		Rail			****			
2		1.1 — Main Line 1.2 — Siding	t. t.	150,100	\$773	116,090,342		
2		Ties	ea.	4,050 2,140,400	\$773 \$45	3,132,351 95,868,516		
2		Ballast	m^3	2,668,000	\$45 \$21	57,015,160		
2		Turnouts	0	2,000,000	Ψ£. i	47,414,100		
2		4.1 - High Speed	ea.	88	\$280,000	24,640,000		
2		4.2 - Medium Speed	ea.	68	\$135,000	9,180,000		
2		4.3 - Yard	ea.	5	\$46,000	230,000		
2		Other Track Material						
2		5.1 - Rail Fastening Assemblies	set	2,140,400	\$27	56,720,600		
2		5.2 - Bonded Insulated Joints	ea.	0	\$0	0	Included in Signalling costs	
2		5.3 - Bumping Posts Switch Heaters/ Snow Blowers	ea.	9	\$3,120	28,080		
2		6.1 - Main Line	ea.	156	\$105,000	16,380,000		
2		6.2 - Yard	ea.	5	\$103,000	59,000		
2		Ballast Mats for Noise Attenuation	m^2	ō	\$11,000	03,000		
2		Contingencies	%	\$379,344,049	5%	18,967,202		
2		•			_			
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			=	\$398,311,251		
	SECTOR 3	TRANSPORTATION / DISTRIBUTION						
3			included in I	Equipment / Mate	rial			
3	SECTOR 3	TOTAL TRANSPORTATION / PROTECTS	ITION			••		
3	SECTORS	TOTAL: TRANSPORTATION / DISTRIBI	JIION		=	\$0_		
4	SECTOR 4	CONSTRUCTION / INSTALLATION						
4	Item 1	Track Construction						
4		1.1 - Main Line	km.	1,226.0	18,212	22,328,094		
4		1.2 - Siding	km.	32.6	44,175	1,440,105		
4		Field Welded Joints	ea.	8,320	2,028	16,872,960		
4		Tumout Construction						
4		3.1 - High and Med. Speed (Main Line 3.2 - Yard	,	156	20,455	3,190,980		
4		Ballasting and Surfacing	ea. m ^ 3	5 2.668.000	4,680 8	23,400 22,597,960		
4	item 5	Rail Grinding	track – km.	1,258.6	4.545	5,720,382		
4		Construction Bases	route-km	613.0	24,372	14,940,158		
4	Item X	Contingencies	%	\$87,114,039	6%	5,226,842		
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION		•	\$92,340,882		
					,			
	SECTOR 5	START-UP						
5			Included in	Other Studies				
5	SECTOR 5	TOTAL: START-UP			;	\$0		

technology:

300+, NEW ROW

SUMMARY SHEET

613,015 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS	California de Caracana de Cara
		Marie and the second se					į

			SUBSYSTEM	G – ELEC	TRIFICATION		ACCESTONES DE SECURIOS DE SECURIOS DE COMPANSA DE COMPANSA DE COMPANSA DE COMPANSA DE COMPANSA DE COMPANSA DE C	Name of the state
				TORONTO -	MONTRÉAL ALI	GNMENT 3	00+, NEW ROW	
1 1 1 1 1 1	SECTOR 1 Item 1 Item 2 Item 3 Item X		PROFESSIONAL SERVICES / PROJECT & Engineering Construction Supervision Project Management Contingencies	MANAGEMEN % % % %	\$415,011,396 \$415,011,396 \$458,587,593 \$68,339,927	5.5% 5.0% 5.4% 0% _	22,825,627 20,750,570 24,763,730 0	As % of total for Sector 4 As % of total for Sector 4 % of sector 4 total plus items 1-2
•	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PR	OJECT MANA	AGEMENT	200	\$68,339,927	
2 2 2	SECTOR 2		EQUIPMENT / MATERIALS	Included in C	onstruction / Inst	allation		
	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS			=	\$0_	
3 3 3	SECTOR 3		TRANSPORTATION / DISTRIBUTION	Included in C	construction / inst	allation		
	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUT	ION		=	. \$0	
4 4 4	SECTOR 4 Item 1		CONSTRUCTION / INSTALLATION Typical Catenary — Single Track — independent Struct	. km.	0.0	0	0	
4 4		1.2 1.3	 Double Track - Independ. Struct. Double Track - Portal Structures 	km. km.	613.0 0.0	350,000 0	214,551,750 0	
4		1.4 1.5 1.6	- Yard Catenary	km. 100 m. 100 m.	0.0 0 40	0	0 0 540,000	
4		1.7	 Garage Area Catenary 	100 m.	0	13,500	0	
4 4 4	Item 2	1.8 2.1	Particular Catenary Installations	100 m. ea.	286 40	17,500 280,000	5,005,000 11,200,000	
4		2.2		ea. ea.	19 11	369,000 1,052,000	7,011,000 11,572,000	
4	item 3	3.1	Special Catenary Structures - Underbridge	100 m.	0	0	O	
4	ltem 4	3.2	- Overbridge Power Supply	100 m.	0	0	0	
4 4 4		4.1 4.2 4.3 4.4	 Main Supply Station, 138 - 120 kV Paralleling and Auto-transf. Stn 2x25 - 1x25 Interface Station 	ea. ea.	4 7 56 3	5,355,000 4,075,000 730,000 925,000	21,420,000 28,525,000 40,880,000 2,775,000	
4		4.5 4.6 4.7	 – Main Supply Station, 315 kV 	ea. ea. ea.	0 1 0	0 6,380,000 0	0 6,380,000 0	
4		4.8 4.9 4.10	– 230 kV Supply Line – 120 kV Supply Line	km. km. ea.	30 19 2	170,300 132,200 200,000	5,109,000 2,445,700 400,000	
4	Item 5 Item X	-1.10	EMI Mitigation Measures Contingencies	route-km %	613.0 \$360,879,475	5,000 15%	3,065,025 54,131,921	
-	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO	N		=	\$415,011,396	
5			START-UP	Included in	Other Studies			
5	SECTOR 5		TOTAL: START-UP			:	\$0	

TORONTO - MONTRÉAL ALIGNMENT

UNITS

SUMMARY SHEET

technology:

ITEM

ITEM NUMBER 300+, NEW ROW

613.015 km. in length

LOT / UNIT PRICE TOTAL COST SOURCE/ REMARKS

		1000 (Mars 100) (Mars 100) (Mars 100)			A CONTRACTOR OF THE PROPERTY O	
		H – STAT	*10Ate	SESSENTANCES ESTRESCONO CONTRACTOR DE CONTRACTOR DE CONTRACTOR DE CONTRACTOR DE CONTRACTOR DE CONTRACTOR DE C	- The photographic and the second statement of the sec	D00007750
	SUBSYSTEM	II - SIAI	IONS			1
		TORONTO -	- MONTRÉAL ALIG	NMENT 300)+, NEW ROW	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJE	CT MANAGEME!	NT			
1 item 1	Engineering	%	\$89,100,000	5.5%	4,900,500	As a % of total for Sector 2
1 item 2	Construction Supervision	%	\$89,100,000	5.0%	4,455,000	As a % of total for Sector 2
1 tem 3	Project Management	%	\$98,455,500	5.4%	5,316,597	% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	\$14,672,097	0%	0	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES	PROJECT MAN	AGEMENT		\$14,672,097	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2		Included in (Construction / Instal	llation		
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0_	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3 3		Included in (Construction / Instai	llation		
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRI	BUTION			\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 Item 1	Individual Stations	lump sum		\$0	81,000,000	
4 item 2	People Movers	lump sum		\$0	0	used at Pearson and Dorval only
4 Item 3	not used	lump sum		\$0	0	
4 Item 4	not used	lump sum		\$0	0	
4 Item X	Contingencies	%	\$81,000,000	10%	8,100,000	
4					400 400 000	
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALL	ATION			\$89,100,000	
5 SECTOR 5	START-UP					
5		Included in	Other Studies			
-	TOTAL: START-UP				\$0	
5 5 5 SECTOR 5	TOTAL: START-UP	Included in	Other Studies		\$0_	

QUANTITY

Toronto – Mo	ontréal Corridor	300+, NEW ROW	
segment	total cost	segment	total cost
TM2-A0	\$0	TMS-3a	\$19,239,160
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	\$0	TM1-H1	\$0
TM1-B0	\$0	TM1-I0	\$0
TM1-C0	\$0	TM1-I1	\$0
TM1-D0	\$0	TM1-J0	\$0
TM1-E0	\$0	TM0-F0	\$1,867,505,348
TM 1-F0	\$0	TM0-F1	\$0
TM1-G0	\$0	TM0-F2	\$0
TM0-A0	\$0		
TM0-A1	\$418,951,674	TM0-G0	\$162,414,989
TM0-A2	\$270,736,574	TM0-G1	\$0
TM0-B0	\$0	TM0-H0	\$209,268,240
TM0-B1	\$1,308,639,523	TMS-3c	\$32,061,531
TM0-C0	\$583,713,106	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	\$0
TMS-2	\$15,438,462	TMR-03	\$0
		TMR-04	\$0
		WTR-02	\$0
		WT0-C1	\$0
		WTS-5	\$0

TOTAL \$5,430,693,175

TORONTO-MONTRÉAL

D4. TOTAL COSTS FOR SUB-SEGMENTS

		(000's \$)
TM2-A0	Union Station - Oshawa	505,756
TM2-B0	Oshawa - Kingston	849,270
TM2-C0	Kingston - Smith Falls (via Brockville Sub)	528,080
TM2-D0	Smith Falls - Richmond	87,408
TM2-E0	Richmond - Ottawa	249,303
TM2-F0	Ottawa - Ontario/Québec border	339,612
TM2-G0	Ontario/Québec border - Dorion	388,549
TM2-H0	Dorion - Montréal (Central Station)	194,990
TM1-A0	Union Station - Oshawa	523,802
TM1-B0	Oshawa - Kingston	1,330,388
TM1-C0	Kingston - Smith Falls	549,505
TM1-D0	Smith Falls - Richmond	88,666
TM1-E0	Richmond - Ottawa	262,188
TM1-E1	Ottawa By-pass (developed only as a general alignment)	
TM1-F0	Ottawa - Van Kleek Hill	400,000
TM1-G0	Van Kleek Hill - Ottawa River (Ontario/Québec border)	75,502
TM1-H0	Ontario/Québec border - Mirabel	207,832
TM1-H1	Ont./Qué. border - Mirabel By-pass	201,170
TM1-I0	Mirabel - St. Martin Jct.	162,420
TM1-l1	Mirabel By-pass - St. Martin Jct.	151,656
TM1-J0	St. Martin Jct Montréal (Central Station)	212,552

TORONTO-MONTRÉAL

D4. TOTAL COSTS FOR SUB-SEGMENTS (Continued)

TM0-A0	North Toronto Station - East Toronto Station	459,706
TM0-A1	Union Station - East Toronto Station	418,952
TM0-A2	East Toronto Station - Oshawa	270,737
TM0-B0	Oshawa - Coburg (x-over to lakeshore route)	1,376,586
TM0-B1	Oshawa - Kingston	1,308,640
TM0-C0	Kingston - Smith Falls	583,713
TM0-D0	Smith Falls - Richmond	88,673
TM0-E0	Richmond - Hull (Ontario/Québec border)	332,627
TM0-F0	Hull - Mirabel	1,867,505
TM0-F1	Hull - Mirabel By-pass	1,862,001
TM0-F2	Hull - Mirabel (Lachute Alignment)	738,591
TM0-G0	Mirabel - St. Martin Jct.	162,415
TM0-G1	Mirabel By-pass - St. Martin Jct.	149,087
тмо-но	St. Martin Jct Montréal (Central Station)	209,268
TMS-1a	Union Station - Modifications	34,652
TMS-1b	Yonge St. Station - New on North Toronto Sub.	47,602
TMS-1c	E. Toronto Suburban - New Station	12,516
TMS-2	Kingston - New Station	15,438
TMS-3a	Ottawa South - New Station	19,239
TMS-3b	Ottawa - Modifications	26,940
TMS-3c	Hull - New Station	32,061
TMS-4	Mirabel Airport - New Station	18,962
TMS-5a	Laval - New Station	18,659
TMS-5b	Central Station - Modifications	36,636
TMS-5c	Dorval Airport - Modifications	114,796

APPENDIX - E DETAILED ESTIMATES MONTRÉAL-QUÉBEC

MONTRÉAL-QUÉBEC

E1. 200+ km/hr - EXISTING RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

Table 4.8

SUBSYSTEM/SECTOR O	_	IDOD	200+, TILTIN	G			
MONTREAL — Q Subsystem	Professional Serv./ Proj. Management	Equipment/ Material	Transportation/	Construction/ Installation	Start - up	TOTAL	Contingency reserve included in 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	\$63,051,753	N/A	N/A	\$288,940,220	see note c	\$351,991,972	\$37,687,855
C – Bridges, Viaducts, and Tunnels	\$45,093,150	N/A	N/A	\$273,839,500	see note c	\$318,932,650	\$24,894,500
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	\$1,473,727	see note a	see note a	\$8,949,577	see note c	\$10,423,304	\$2,065,287
F - Track	\$30,480,904	\$169,126,599	see note b	\$40,647,053	see note c	\$240,254,557	\$10,354,424
G - Electrification	\$31,848,198	see note a	see note a	\$193,406,195	see note c	\$225,254,393	\$25,226,895
H - Stations	\$5,343,542	see note a	see note a	\$32,450,000	see note c	\$37,793,542	\$2,950,000
Totals	\$208,240,306	\$236,195,630	\$0	\$987,078,146	see note c	\$1,431,514,081	\$1 35,156,850

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material
c) Included in Other Studies

MONTREAL - QUÉBEC CORRIDOR technology: 200+, TILTING

SUMMARY SHEET

272.51 km. in length

ITEM UNITS QUANTITY LOT / UNIT TOTAL SOURCE / PRICE COST REMARKS

,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				* *******	0001	arm onestrates
Commence of the Commence of th	SUBSYSTEM	A - RIGI	HT-OF-WA	Y ACQUIS	ITION	
		MONTREAL	. – QUÉBEC COI	RRIDOR	200+, TILTING	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEME	NT			
1	Professional Services					
1	1.1 - Surveying	%	\$67,069,031	8%		As a % of total cost of Sector 2
1	1.2 — Appraisal 1.3 — Legal Expertise	% %	\$67,069,031 \$67,069,031	0% 0%		included in Item 1.1 included in Item 1.1
: 1	Project Management	%	\$72,434,553	0%		As % of Sector 2 total + item 1.1
1 Item X	Contingencies	%	\$5,365,522	20%	-	, to jo of coolor 2 local 1 local 1.
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MAN	AGEMENT		\$6,438,627	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2 Item 1	Urban Land					
2	1.1 - Residential	hectare	120.1	\$182,114		
2 2	1.2 - Commercial 1.3 - Industrial	hectare	7.5	\$453,400		
2 Item 2	Rural Land	hectare	37.5	\$293,605	11,010,200	
2	2.1 - Agricultural	hectare	555	\$17,688	9,816,902	
2	2.2 - Natural	hectare	138	\$1,083		
2 Item 3	Purchase of Existing Rail ROW					
2 2	3.1 - CN 3.2 - CP	hectare		N/A	0	
2	3.3 - VIA	hectare hectare	283.4	\$51,951 N/A	14,722,887 0	
2 Item X	Contingencies	%	\$60,971,846	10%		
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$67,069,031	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	Not Applica	ble			
3		riot Applica				
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION			N/A	
4 SECTOR 4	CONSTRUCTION / INSTALLATION	Not Applica	ble			
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	TION			\$0	
5 SECTOR 5	START-UP	Included in	Other Studies			
5 5 SECTOR 5	TOTAL: START-UP	more designation of the second	-uiei Gradica		\$0	

technology:

200+, TILTING

SUMMARY SHEET

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS	
Basedon and a second se	en menten modern ett en manne ett kommune om modern kommune med ett ett ett ett ett ett ett ett ett e	anguali and an angual and an an an an an an an an an an an an an		от в при на при		AND THE PROPERTY OF THE PROPER	

			SUBSYSTEM	R - FARTI	-WORKS AN	IN NRAINA	GF	noney d
								en de la companya de
				MONTREAL -	- QUÉBEC COR	RIDOR 2	00+, TILTING	
1 1 1	SECTOR 1 item 1 ltem 2		PROFESSIONAL SERVICES / PROJECT & Engineering Construction Supervision	%	T \$288,940,220 \$288,940,220	5.5% 5.0%	15,891,712 14,447,011	As a % of total cost of Sector 2 As a % of total cost of Sector 2
1	Item 3 Item 4		Environmental Assessment		1,223,273,775	0.2% 1%	2,446,548	items 3 and 4 are %'s of entire project's cost less profes, fees
1	item 5		Feasibility Studies (Technical) Project Management		1,223,273,775 \$333,958,228	5.4%	12,232,738 18,033,744	% of sector 2 total plus items 1-4
1	Item X		Contingencies	%	\$63,051,753	0%	0	
1	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PRO	OJECT MANA	GEMENT	_	\$63,051,753	
2	SECTOR 2		EQUIPMENT / MATERIALS	Not Applicabl	e	•		
2	SECTOR 2		TOTAL; EQUIPMENT / MATERIALS			=	\$0	
3	SECTOR 3		TRANSPORTATION / DISTRIBUTION	Not Applicabl	e			
3	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUTI	ON		****	\$0_	
4	SECTOR 4 Item 1		CONSTRUCTION / INSTALLATION Clearing and Roadbed Preparation					
4		1.1	- Type 1 Soils - Type 2 Soils	route-km route-km	146.91 78.88	\$142,000 \$627,000	20,861,220 49,457,760	
4		1.3	- Type 3 Soils	route-km		\$1,035,000	29,642,400	
4	Item 2		Embankment Construction	1000 0.0	4400.00	00.000	4 000 000	
4		2.1	 Soft Excavated Material Hard Excavated Material (Rock) 	1000 m ^ 3 1000 m ^ 3	1422.03 0	\$3,000 \$0	4,266,090 0	
4		2.3	- Borrow Material	1000 m ^ 3	1665.46	\$8,000	13,323,680	
4	h a	2.4	- Disposal of Unsuitable Material	1000 m ^ 3	434.33	\$5,500	2,388,815	
4	Item 3		Haulage of Fill Material (from Borrow or Excavation)	1000 m ^3-	0	\$0	0	Cost transferred to item B4-2
4	item 4		Sub - Ballast Layers		-	**	•	For TM2-B0,TM2-D0,TM1-B0,
4		4.1 4.2	- New ROW - Existing ROW	route-km route-km	95.79 158.63	\$228,000 \$228,000	21,840,120 36,167,640	TM1-D0,TM0-B0,TM0-B1, TM0-C0,and TM0-D0, \$152,000
4	item 5	₩	Drainage Systems	TOULE-KIII	130.03	\$226,000	30,101,040	used for cost of sub-ballast(it. 4)
4		5.1	- Normal ROW	route-km	254.42	\$25,000	6,360,500	,
4		5.2 5.3	•	ea.	32 0	\$35,000 \$0	1,120,000 0	
4	item 6	5,3	Roadbed Upgrade on Existing ROW	route-km	19.839	\$600,000	11,903,400	
4	Item 7		Retaining Structures	,	/	*******	,,	
4		7.1	- Up to 3 metres in Height	km.	1.49	\$2,500,000	3,725,000	
4	Item 8	7.2	Over 3 metres in Height Intrusion Barriers	km. km.	3.59 0	\$5,000,000 \$0	17,950,000 0	Intrusion Barriers not required
4	Item 9		Noise Attenuation Structures		J	45	•	made and the control of the control
4		9.1	- Barriers	km.	22.6	\$660,000	14,916,000	
4	Item 10	9.2	- Berms ROW Security Fencing (on both sides)	km.	0 243.08	\$0 \$56,000	0 13,612,480	
4	item 11		Snow Control Measures	km.	243.00	\$50,000	13,012,460	Accounted for in Contingencies
4	Item 12		Utility Interferences					-
4		12.1 12.2	 Major Hydro Relocation Major Oil/Gas Relocation 	ea.	29 0	\$0 \$0	0	Accounted for in Contingencies Accounted for in Contingencies
4		12.3	· · · · · · · · · · · · · · · · · · ·	ea. route-km	0	\$0 \$0	0	Accounted for in Contingencies
4	item 13		Other Items					-
4		13.1 13.2		route-km ea	158.63 2	\$2,000 \$500,000	317,260 1,000,000	
4		13.3		ea.	24	\$100,000	2,400,000	
4	Item X		Contingencies	%	\$251,252,365	15%	37,687,855	
4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO	ON			\$288,940,220	
5			START-UP	Included in C	Other Studies			
5 5	SECTOR 5		TOTAL: START-UP				\$0	

MONTREAL - QUÉBEC CORRIDOR SUMMARY SHEET technology:
200+, TILTING 272.51 km. in length

9							
CANADA CANADA MANAGAMA	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS
A STANSON AND A					PRICE		NEWANNO

		400TH-777FRAM77FRATTUUTTANIASTINGTEETTANIASTANIA		Carlotte and the same of the s			
		SUBSYSTEM	C - BRID	GES, VIADUC	CTS, AND T	UNNELS	
			MONTREAL	- QUÉBEC COR	RIDOR 20	0+, TILTING	numona.
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEME	NT			
1	Item 1	Engineering	%	\$273,839,500	5.5%	15,061,173	As a % of total cost of Sector 2
1	ltem 2	Construction Supervision	%	\$273,839,500	5.0%	13,691,975	As a % of total cost of Sector 2
1	Item 3	Project Management	%	\$302,592,648	5.4%	16,340,003	% of sector 2 total plus items 1-2
1	Item X	Contingencies	%	\$45,093,150	0%	0	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAN	AGEMENT	==	\$45,093,150	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2			Not Applica	ble			
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3	020.0		Not Applica	ble			
3		TOTAL TRANSPORTATION (BIOTRIP)	Inter as a c				
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	TION			\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	ltem 1	Bridges					
4		1.1 - Small Rivers (< 30 metres)	ea.	90	\$340,000	30,600,000	
4		1.2 - Extra at 1.1 for Height Over 10 m		0	\$0	0	
4		1.3 - Interm. Rivers (30 - 100 metres)		40	\$23,500	940,000	
4		1.4 - Extra at 1.3 for Height Over 10 m		0	\$0	0	
4		1.5 - Large Rivers (100 - 250 metres)		120	\$42,000	5,040,000	
4		1.6 - Extra at 1.5 for Height Over 10 m		0	\$0	0	
4		1.7 — Major Rivers (over 250 m.) 1.8 — Extra for Difficult Foundation Cor	lin. m.	280	\$50,000	14,000,000	
4		 1.8 ~ Extra for Difficult Foundation Cor 1.9 ~ Modif. to Exist. Bridges (new dec 		0 2.290	\$0 \$13.000	29,770,000	
4	item 2	Viaducts	:K) ea.	2,290	\$13,000	29,770,000	
4		2.1 - Viaducts over 250 metres in Lend	gth lin.m.	0	so	0	
4		2.2 - Extra for Height Over XX metres	lin. m.	Ō	\$0	0	
4		2.3 - Extra for Difficult Foundation Cor	nd. lin.m.	0	\$0	0	
4	Item 3	Tunnels (Double Track)					
4		3.1 - In Soft Ground	lin. m.	0	\$0	0	
4		3.2 – In Rock	lin. m.	4,817	\$35,000	168,595,000	
4		3.3 - Modifications to Existing Tunnels	,	0		0	
4		3.4 - Noise Mitigation Measures	lump sum	0		0	Accounted for in Contingencies
4	Item X	Contingencies	%	\$248,945,000	10% _	24,894,500	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			\$273,839,500	
_	SECTOR 5	START-UP		.			
5 5			included in	Other Studies			
_	SECTOR 5	TOTAL: START-UP				\$0	

technology: 200+, TILTING

SUMMARY SHEET

	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
ŝ	The state of the s		MORPH AND ADDRESS OF THE PARTY	ZARSHUJI (CIRILO PERMANDAN	WEINING THE STATE OF THE STATE	THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE OW	zamonem conjugación de la constantida del constantida de la constantida de la constantida del constantida de la constantida de la constantida de la constantida de la constantida de la constantida del constantida de la constantida del constantida del constantida del constantida del constantida del constantida del constantida del constantida del constantida del constantida del constantida

		SUBSYSTEM	D – GRA	DE SEPARAT	IONS	entrumanium entrum entrum entrum entrum entrum entrum entrum entrum entrum entrum entrum entrum entrum entrum e	Monthly G
		Vilamina in the control of the contr		- QUÉBEC COI		00+, TILTING	
		kanna managan mana mana mana mbanda da da da da da da da da da da da da d				***************************************	
1	SECTOR 1	PROFESSIONAL SERVICES / PROJEC					
1	item 1	Engineering	%	\$148,845,600	5.5%	8,186,508	As a % of total cost of Sector 2
1	Item 2	Construction Supervision	%	\$148,845,600	5.0%	7,442,280	As a % of total cost of Sector 2
1	Item 3	Project Management	% %	\$164,474,388	5.4% 0%	8,881,617 0	% of sector 2 total plus items 1-
1	Item X	Contingencies	70	\$24,510,405	0%_	<u> </u>	
	SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MAN	AGEMENT	=	\$24,510,405	
_	SECTOR 2	EQUIPMENT / MATERIALS	*1 > 4 - 2 - 1				
2			Not Applical	pie	_		
	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			===	\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applica	ble	-		
_	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIE	BUTTON		=	\$0	
	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	ltem 1	New Grade Separations, Rural			** *** ***	10 100 000	
4		1.1 - 2 Lane Highways 1.2 - 2 Lane Highways, Dual ROW	ea. ea.	22 0	\$2,200,000 \$0	48,400,000	
4		1.3 - 4 Lane Highways	ea. ea.	2	\$3,100,000	6,200,000	
4		1.4 - 4 Lane Highways, Dual ROW	ea.	ō	\$0	0	
4		1.5 - Major Highways (401, 20, etc)	ea.	ò	\$0	0	
4		1.8 - Extra for Difficult Foundation Co	ond. ea.	0	\$0	0	
4	ltem 2	New Grade Separations, Urban					
4		2.1 - Secondary Highways (2-4 land		0	\$0	0	
4		2.2 - Second. Hwys (2-4 l.) Dual RC		0	\$0	0	
4		2.3 - Major Highways (over 4 lanes)	ea.	0	\$0	0	
4		2.4 - Extra for Difficult Foundation C		0	\$0	0	
4		Modification of Exist. Grade Separation 3.1 — Urban	ea.	o	\$0	0	
4		3.1 — Orban 3.2 — Rural	ea. ea.	24	\$627,000	15,048,000	
4		Automatic Crossing Protection	ea.	72	\$270,000	19,440,000	
4		Closure and Diversion of Roads	km. of road	. –	\$280,000	13,650,000	
4		Private Farm Crossings	ea.	71	\$300,000	21,300,000	
4	Item 7	Major Wildlife Passages	ea.	0	\$0	0	
4	ltem X	Contingencies	%	\$124,038,000	20%	24,807,600	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	ATION		=	\$148,845,600	
5	SECTOR 5	START-UP					
5			Included in	Other Studies	-		
5	SECTOR 5	TOTAL: START-UP			-	SO_	

technology:

200+, TILTING

SUMMARY SHEET

272.51 km. in length

ITEM ITEM UNITS QUANTITY LOT / UNIT TOTAL SOURCE / REMARKS

		SUBSYSTEM	E - OTHE	RACCOMOD			
		anna ann an t-ann an t-ann an t-ann an t-ann an t-ann an t-ann an t-ann an t-ann an t-ann an t-ann an t-ann an	MONTREAL -	- QUÉBEC CORI	RIDOR 20	0+,TILTING	
1	SECTOR 1	PROFESSIONAL SERVICES / PROJECT		T \$8,949,577	5.5%	492,227	As a % of total cost of Sector 2
+	item 1	Construction Supervision	% %	\$8,949,577 \$8,949,577	5.0%	492,227 447,479	As a % of total cost of Sector 2
4	Item 3	Project Management	% %	\$9,889,283	5,4%	534,021	% of sector 2 total plus items 1-2
1	Item X	Contingencies	%	\$1,473,727	0%	0	70 01 00010) 2 total plac nonito 1 a
1			,•	¥1,110,1 ±1	•,•		
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / F	PROJECT MANA	GEMENT		\$1,473,727	
2	SECTOR 2	EQUIPMENT / MATERIALS	turdorde d'in O	onstruction / Inst	-11-4:		
2			included in Co	onstruction / inst	allation		
	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Included in Co	onstruction / Inst	allation		
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	JTION			\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	item 1	Removal of Rail Lines	km.	174	\$21,134	3,684,290	
4	ltem 2	Construction of New Access Tracks	km.	0	\$0	0	
4	item 3	Rail/Rail Grade Separation					
4		3.1 — Rural	ea.	4	\$800,000	3,200,000	
4		3.2 - Urban	ea.	0	\$0	0	
4	Item 4	Other Particular Items:		_			
4		4.1 - Sub-Item	lump sum	0		0	
4		4.2 — Sub-Item 4.3 — Sub-Item	lump sum	0		0	
4		4.3 — Sub-Item 4.4 — Sub-Item	lump sum	0		0	
4	Item X	Contingencies	lump sum %	\$6,884,290	30%	2,065,287	
4	Hem X	Contingencies	76	30,004,290	30%	2,000,201	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION		_	\$8,949,577	
5	SECTOR 5	START-UP					
5			Included in O	ther Studies			
5 5	SECTOR 5	TOTAL: START-UP			-	\$0	

MONTREAL — QUÉBEC CORRIDOR SUMMARY SHEET technology: 272.51 km. in length

ITEM NUMBER	l	17	TEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
			UBSYSTEM	F - TRA	MARION MA			
		=			. – QUÉBEC CC	אסמיסס	ann i Tillia	
				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		/nniuun	200+, TILTING	-al
1 SECTOR 1 Item			FESSIONAL SERVICES / PROJECT Neering	MANAGEME %	NT \$209,773,652	3,5%	7,342,078	As % of total for Sectors 2 and 4
1 Item			truction Supervision	%	\$40,647,053		4,064,705	As % of total for Sector 4
1 Item			ials Procurement	%	\$169,126,599		6,765,064	As % of total for Sector 2
1		•	ct Management ngencies	% %	\$227,945,500 \$30,480,904		12,309,057 0	As % of Sectors 2,4 totals plus items 1 - 3
1 item	^	CON	ngericles	76	430,460,904	0 /8	<u></u>	itelia (o
1 SECTOR	1	TOTA	L: PROFESSIONAL SERVICES / PR	OJECT MAN	IAGEMENT		\$30,480,904	
2 SECTOR 2 Item		EQUI Rail	PMENT / MATERIALS					
2 Item 2			- Main Line	ŧ.	66,720	\$773	51,602,582	
2			- Siding	t.	1,550		1,198,801	
2 Item		Ties		ea.	876,200		39,244,998	
2 Item 2 Item	_	Balla: Turno	** =	m ^ 3	1,191,000	\$21	25,451,670	
2 Item 2			- High Speed	ea.	36	\$280,000	10,080,000	
2			- Medium Speed	ea.	27		3,645,000	
2			- Yard	ea.	0	\$0	0	
2 Item	-		r Track Material - Rail Fastening Assemblies	set	876,200	\$27	23,219,300	
2 2	_		- Bonded Insulated Joints	ea.	0/0,200		23,219,300	Included in Signalling costs
2			- Bumping Posts	ea.	5		15,600	• •
2 Item			h Heaters/ Snow Blowers					
2 2			- Main Line - Yard	ea. ea.	63 0		6,615,000 0	
2 Item	-	-	st Mats for Noise Attenuation	m ^ 2	0			
2 Item	X		ingencies	%	\$161,072,951	5%	8,053,648	
2 2 SECTOR	2	TOTA	AL: EQUIPMENT / MATERIALS				\$169,126,599	
3 SECTOR	3	TRAN	SPORTATION / DISTRIBUTION					
3 3				Included in	Equipment / Ma	terial		
3 SECTOR	3	TOTA	AL: TRANSPORTATION / DISTRIBUT	ION			<u>\$0</u>	
4 SECTOR			STRUCTION / INSTALLATION					
4 Item			c Construction	Long			0.005.004	
4			- Main Line - Siding	km. km.	545 12			
4 Item			Welded Joints	ea.	3,610			
4 Item			out Construction					
4			- High and Med. Speed (Main Line) - Yard	ea.	63 0			
4 Item			- таго sting and Surfacing	ea. m ^ 3	1,191,000	• • •		
4 Item			Grinding	track-km	557			
4 Item			truction Bases	route-km	273			
4 Item	X	Cont	ingencies	%	\$38,346,277	7 6%	2,300,777	
4 4 SECTOF	ł 4	TOTA	AL: CONSTRUCTION / INSTALLATIO	NC			\$40,647,053	
5 SECTOR	3 5	STAF	RT-UP					
5	-	<i></i>		Included in	Other Studies			
5	. =	TOT	AL - START_LIP				ŧ^	
5 SECTOR	15	101/	AL: START-UP				\$0	

MONTREAL - QUÉBEC CORRIDOR	SUMMARY SHEET
technology:	
200+. TILTING	272.51 km, in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	22.11.21.2 HORO 30/00 20/10 20		 			///

		SUBSYSTEM	BSYSTEM G - ELECTRIFICATION				
			MONTREAL	- QUÉBEC COP	RRIDOR 2	00+, TILTING	500M
1 1 1 1 1 1	SECTOR 1 Item 1 Item 2 Item 3 Item X	PROFESSIONAL SERVICES / PROJECT Engineering Construction Supervision Project Management Contingencies	MANAGEMEN % % % %	\$193,406,195 \$193,406,195 \$193,406,195 \$213,713,845 \$31,848,198	5.5% 5.0% 5.4% 0% _	10,637,341 9,670,310 11,540,548	As % of total for Sector 4 As % of total for Sector 4 % of sector 4 total plus items 1 – 2
	SECTOR 1	TOTAL: PROFESSIONAL SERVICES / PF	OJECT MAN	AGEMENT	==	\$31,848,198	
2	SECTOR 2	EQUIPMENT / MATERIALS	Included in (Construction / Ins	stallation _		
2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			=	\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION	Included in (Construction / Inc	stallation		
3 3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBUT	TION			\$0	
4	SECTOR 4 Item 1	CONSTRUCTION / INSTALLATION Typical Catenary				_	
4 4 4 4 4		1.1 - Single Track - Independent Struct. 1.2 - Double Track - Independ. Struct. 1.3 - Double Track - Portal Structures 1.4 - Triple Track - Portal Structures 1.5 - Yard Catenary 1.6 - Sidings Catenary 1.7 - Garage Area Catenary	km. km. km. 100 m. 100 m. 100 m.	0 273 0 0 0 30	\$0 \$350,000 \$0 \$0 \$0 \$13,500 \$0	95,378,500 0 0 0 0 405,000	
4 4 4 4	item 2	1.8 - In-Station Catenary Particular Catenary Installations 2.1 - Xover Single (with section breaks) 2.2 - Xover Double (with section breaks) 3 - Phase Break		94 10 4 5	\$17,500 \$280,000 \$369,000 \$1,052,000	1,645,000 2,800,000 1,476,000 5,260,000	
4 4	Item 3	Special Catenary Structures 3.1 — Underbridge 3.2 — Overbridge	100 m. 100 m.	0	\$0 \$0	0 0	
4 4 4 4	Item 4	Power Supply 4.1 - Main Supply Station, 230 kV 4.2 - Main Supply Station, 138 - 120 k 4.3 - Paraileling and Auto-transf. Stn 4.4 - 2x25 - 1x25 Interface Station 4.5 not used 4.6 - Main Supply Station, 315 kV	ea. ea. ea.	2 1 24 4 0	\$5,355,000 \$4,075,000 \$730,000 \$925,000 \$0	10,710,000 4,075,000 17,520,000 3,700,000 0	
4 4 4 4 4	ltem 5	4.6 — Main Supply Station, 315 kV 4.7 — 315 kV Supply Line 4.8 — 230 kV Supply Line 4.9 — 120 kV Supply Line 4.10 — Control Center EMI Mitigation Measures	ea. ea. km. km. ea. route-km	3 12 8 0 2 273	\$6,380,000 \$252,500 \$170,300 \$0 \$200,000 \$5,000	19,140,000 3,030,000 1,277,250 0 400,000 1,362,550	
4	Item X SECTOR 4	Contingencies TOTAL: CONSTRUCTION / INSTALLATION	% NI	168,179,300	15%	25,226,895	
5	SECTOR 5	START-UP			=	\$193,406,195	
5		TOTAL: START-UP	Included in	Other Studies	•	\$0	

technology:

200+, TILTING

SUMMARY SHEET

ITEM NUMBER	TEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	SUBSYSTEM	H - STA	TIONS			TOTAL MANAGEMENT AND AND AND AND AND AND AND AND AND AND
		MONTREAL	_ QUÉBEC CO	ORRIDOR :	200+, TILTING	
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	T MANAGEME	ENT			
1 Item 1	Engineering	%	32,450,000	5.5%	1,784,750	As a % of total for Sector 2
t Item 2	Construction Supervision	%	32,450,000	5.0%	1,622,500	As a % of total for Sector 2
1 Item 3	Project Management	%	35,857,250		1,936,292	% of sector 2 total plus items 1 -
1 Item X	Contingencies	%	5,343,542	0%	0	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / F	PROJECT MAI	NAGEMENT	:	\$5,343,542	
2 SECTOR 2 2	EQUIPMENT / MATERIALS	Included in	Construction / I	nstallation		
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	Included in	Construction / I	nstallation		
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	MOIT			\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 Item 1	Individual Stations	lump sum		\$29,500,000	29,500,000	
4 Item 2	Not used	lump sum		\$0	0	
4 Item 3	Not used	lump sum		\$0	0	
4	Not used	lump sum		\$0	0	
4 Item X	Contingencies	%	29,500,000	10%	2,950,000	
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			\$32,450,000	
5 SECTOR 5	START-UP					
5 5		Included in	Other Studies			
5 SECTOR 5	TOTAL: START-UP				\$0	

10-Feb-94 curre	ent costs on file
<u>Montréal - Qu</u>	rébec Corridor
200+, TILTING	
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	\$0
MQR-02	\$0
TMR-04	\$0

\$1,431,514,081

MONTRÉAL-QUÉBEC

E3. 300+ km/hr - EXISTING RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

Table 5.8

SUBSYSTEM/SECTOR (COST SUMMARY					man and a second			
MONTREAL – QUÉBEC CORRIDOR 300+, EXISTING ROW									
Subsystem	, totaliana and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second a second and a second and a second and a second and a second and a						Contingency reserve included in 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	\$60,833,297	N/A	N/A	\$277,340,262	see note c	\$338,173,559	\$36,174,817		
C - Bridges, Viaducts, and Tunnels	\$27,065,491	N/A	N/A	\$164,362,000	see note c	\$191,427,491	\$14,942,000		
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	\$28,009,913	\$155,959,121	see note b	\$36,983,810	see note c	\$220,952,843	\$9,520,048		
G - Electrification	\$27,022,929	see note a	see note a	\$ 164,103,534	see note c	\$191,126,463	\$21,404,809		
H - Stations	\$4,166,151	see note a	see note a	\$25,300,000	see note c	\$29,466,151	\$2,300,000		
Totals	\$204,780,866	\$214,842,624	\$0	\$984,056,506	see note c	\$1,403,679,996	\$132,704,102		

NOTES: a) Included in Construction / Installation

b) Included in Equipment / Material c) Included in Other Studies

SUMMARY SHEET

technology:

300+, EXISTING ROW

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	SUBSYSTEM	A - RIG	HT-OF-WA	Y ACQUIS	ITION	
		MONTREAL	_ — QUÉBEC CO	RRIDOR	300+, EXISTING ROV	<u></u>
1 SECTOR 1 1 Item 1	PROFESSIONAL SERVICES / PROJECT Professional Services	MANAGEME	ENT			
1	1.1 - Surveying	%	\$58,883,503		4,710,680	As a % of total cost of Sector 2
1	1.2 - Appraisal	%	\$58,883,503		0 0	included in Item 1.1
1	1.3 - Legal Expertise	%	\$58,883,503		0	As % of Sector 2 total + item 1.1
1	Project Management	% %	\$63,594,183		942,136	AS % Of Sector 2 total + item 1.1
1 Item X	Contingencies	%	\$4,710,680	20%	942,130	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAI	NAGEMENT		\$5,652,816	
2 SECTOR 2 2 Item 1	EQUIPMENT / MATERIALS Urban Land					
2	1.1 - Residential	hectare	124.1	\$147,691	18,328,430	
2	1.2 ~ Commercial	hectare	7.5	\$453,400	3,400,500	
2	1.3 - Industrial	hectare	41.5	\$311,295	12,918,750	
2 Item 2	Rural Land					
2	2.1 - Agricultural	hectare	692.57	\$12,063	8,354,729	
2	2.2 - Naturai	hectare	200.5	\$1,254	251,361	
2 Item 3	Purchase of Existing Rail ROW					
2	3.1 - CN	hectare	C	N/A	0	
2	3.2 - CP	hectare	231.58	\$44,376	10,276,687	
2	3.3 - VIA	hectare	C	N/A	0	
2 Item X	Contingencies	%	\$53,530,457	10%	5,353,046	
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$58,883,503	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	Not Applic	able			
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	JTION			N/A	
4 SECTOR 4	CONSTRUCTION / INSTALLATION	Not Applic	able			
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			\$0	
5 SECTOR 5 5 5	START-UP	included in	n Other Studies			
5 SECTOR 5	TOTAL: START-UP				\$0	

SUMMARY SHEET

300+, EXISTING ROW

Annual of the latest of the la	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS	
6			ACCOUNTY OF THE PARTY OF THE PA					
		N .						

			OLIDOVOTEM	TO A TO	IMODIC AN	ID DDAIL	. ← F	
			SUBSYSTEM	b - EARII	HWORKS AN	ID DHAINA	<u> </u>	
				MONTREAL -	- QUÉBEC COP	RIDOR 3	00+, EXISTING ROW	
1 1 1 1 1	SECTOR 1 Item 1 Item 2 Item 3 Item 4 Item 5		PROFESSIONAL SERVICES / PROJECT M Engineering Construction Supervision Environmental Assessment Feasibility Studies (Technical) Project Management Contingencies	% % % \$	T \$277,340,262 \$277,340,262 1,198,899,130 1,198,899,130 \$320,847,779 \$60,833,297	5.5% 5.0% 0.2% 1% 5.4% 0%	15,253,714 13,867,013 2,397,798 11,988,991 17,325,780	As a % of total cost of Sector 2 As a % of total cost of Sector 2 Items 3 and 4 are %'s of entire project's cost less profes, fees % of sector 2 total plus items 1 -4
1	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PRO	OJECT MANA	GEMENT	_	\$60,833,297	
2	SECTOR 2		EQUIPMENT / MATERIALS	Not Applicabl	ie			
2	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS			=	\$0	
3	SECTOR 3		TRANSPORTATION / DISTRIBUTION	Not Applicabl	le			
3 3	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUTI	ON			\$0	
4 4 4	SECTOR 4 Item 1	1.1	CONSTRUCTION / INSTALLATION Clearing and Roadbed Preparation - Type 1 Soils	route-km	129.58	\$142,000	18,400,360	
4 4 4	ltem 2	1.3	,·	route-km route-km	89.585 27.42	\$627,000 \$1,035,000	56,169,795 28,379,700	
4 4		2.1 2.2 2.3	Hard Excavated Material (Rock) Borrow Material	1000 m ^3 1000 m ^3 1000 m ^3	1373.89 0 1718.325	\$3,000 \$0 \$8,000	4,121,670 0 13,746,600	
4 4	item 3	2.4	Haulage of Fill Material	1000 m ^3	476.19	\$5,500	2,619,045	
4	ltem 4		(from Borrow or Excavation) Sub – Ballast Layers	1000 m ^ 3 -	0	\$0	0	Cost transferred to item B4-2 For TM2-B0,TM2-D0,TM1-B0,
4 4 4	ltem 5	4.1 4.2		route-km route-km	128.55 118.035	\$228,000 \$228,000	29,309,400 26,911,980	TM1 - D0, TM0 - B0, TM0 - B1, TM0 - C0, and TM0 - D0, \$152,000 used for cost of sub - ballast(it. 4)
4 4 4	nom o	5.1 5.2 5.3	Normal ROW Major Watercourse Culverts	route-km ea. route-km	246.585 28 0	\$25,000 \$35,000 \$0	6,164,625 980,000 0	,,
4 4	Item 6 Item 7	7.1	Roadbed Upgrade on Existing ROW Retaining Structures	route-km	7.754 1.06	\$600,000 \$2,500,000	4,652,400 2,650,000	
4 4	Item 8 Item 9	7.2		km. km.	2.38	\$5,000,000 \$0	11,900,000	Intrusion Barriers not required
4 4	item 10	9.1		km. km. route∽km	28 0 232,925	\$660,000 \$0 \$56,000	18,480,000 0 13,043,800	
4	item 11 Item 12	10.	Snow Control Measures Utility Interferences	km.	0	\$0	0	Accounted for in Contingencies Accounted for in Contingencies
4 4 4 4	Item 13	12.1 12.2 12.3	Major Oil/Gas Relocation Minor Pipe or Wire Crossings Other Items	ea. ea. route – km	27 0 0	\$0 \$0 \$0	0 0	Accounted for in Contingencies Accounted for in Contingencies
4 4 4 4		13.1 13.1 13.0	 Audit for Contaminated Rail Yards 	route – km ea. ea. %	118.035 2 24 \$241,165,445	\$2,000 \$500,000 \$100,000 15%	236,070 1,000,000 2,400,000 36,174,817	
4 4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO	N			\$277,340,262	
5	SECTOR 5		START-UP	Included in (Other Studies		- JAMINIA AND AND AND AND AND AND AND AND AND AN	
5 5	SECTOR 5		TOTAL: START-UP				\$0	

MONTREAL - QUÉBEC CORRIDOR	SUMMARY SHEET
technology:	
300+, EXISTING ROW	255.14 km. in length

	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS			
-										

		The state of the s	SZERTTANA SZERAN GUZ EZZSZSZA GZE CENTENIGY VIII INTÓNIŲ CENTONICIZZ (STANIONIUM POLICA INTONIO IN	ordinal deliberate del				7
		SUE	BSYSTEM (? – BRIDO	GES, VIADUC	IS, AND	IUNNELS	ommittee et al-la
				MONTREAL -	- QUÉBEC COR	RIDOR 3	00+, EXISTING RO	<u>√</u>
1	SECTOR 1	PROFES	SSIONAL SERVICES / PROJECT M	IANAGEMEN	IT			
1	Item 1	Enginee	•	%	\$164,362,000	5.5%	9,039,910	As a % of total cost of Sector 2
1	item 2	Constru	ction Supervision	%	\$164,362,000	5.0%	8,218,100	As a % of total cost of Sector 2
1	item 3		Management	%	\$181,520,010	5.4%	9,807,481	% of sector 2 total plus items 1 - 2
1	Item X	Conting	encies	%	\$27,065,491	0% _	00	
•	SECTOR 1	TOTAL:	PROFESSIONAL SERVICES / PRO	DJECT MANA	AGEMENT		\$27,065,491	
2	SECTOR 2	EQUIPM	IENT / MATERIALS					
2			·	Not Applicab	le			
2	OFOTOR O	TOTAL	EQUIDMENT /MATERIALS				\$0	
2	SECTOR 2	TOTAL	EQUIPMENT / MATERIALS			==	30	
3	SECTOR 3	TRANSF	PORTATION / DISTRIBUTION					
3			ı	Not Applicab	le	_		
3	SECTOR 3	TOTAL:	TRANSPORTATION / DISTRIBUTION	ON			so	
ی	SECTION 3	IOIAL.	THANGE GREATHON / DISTRIBUTE	OIY		==	<u> </u>	
4	SECTOR 4		RUCTION / INSTALLATION					
4	item 1	Bridges						
4			mail Rivers (< 30 metres)	ea.	82	\$340,000	27,880,000	
4			xtra. at 1,1 for Height Over 10 m.	ea.	0	\$0	0	
4			eterm. Rivers (30 – 100 metres)	lin. m.	40	\$23,500 \$0	940,000 0	
4			xtra at 1.3 for Height Over 10 m. arge Rivers (100 - 250 metres)	lin. m. lin. m.	0 325	\$42.000	13.650.000	
4			xtra at 1.5 for Height Over 10 m.	in. m.	0	\$0	000,000,00	
4			lajor Rivers (over 250 m.)	lin. m.	280	\$50,000	14,000,000	
4			xtra for Difficult Foundation Cond.		0	\$0	0	
4			lodif. to Exist. Bridges (new deck)	ea.	1,200	\$13,000	15,600,000	
4	ltem 2	Viaduct	s					
4			iaducts over 250 metres in Length		0	\$0	0	
4			xtra for Height Over XX metres	lin. m.	0	\$0	0	
4			xtra for Difficult Foundation Cond.	lin. m.	0	\$0	0	
4	Item 3		(Double Track)	1-			•	F 000 L technology Peak
4			n Soft Ground n Rock	lin. m. lin. m.	0 2,210	\$0 \$35,000	0 77,350,000	For 300 + technology, Rock Tunnels speed restricted by local
4			nock Iodifications to Existing Tunnels	lump sum	2,210 0	\$35,000	77,350,000	conditions are \$35,000/lin m.
4			loise Mitigation Measures	lump sum	o o		Ô	Accounted for in Contingencies
4	ltem X	Conting	-	%	\$149,420,000	10%	14,942,000	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
4			,		* , ,			
4	SECTOR 4	TOTAL:	CONSTRUCTION / INSTALLATIO	N		=	\$164,362,000	
5	SECTOR 5	START-	-UP					
5				Included in (Other Studies			
5 5	SECTOR 5	TOTAL:	START-UP			÷	\$0	

SUMMARY SHEET

technology:

300+, EXISTING ROW

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS	
		Demination demonstration of the contraction of th	Eorifoldyddolaiddiaeth ac ar ar ar ar ar ar ar ar ar ar ar ar ar	Security of the Control of the Contr		MANAGARIAN MINISTERIO (MANAGARIA MANAGARIA MAN	

		_					
		SUBSYSTEM	D – GRAI	DE SEPARAT	IONS	ACCUPANT OF THE PROPERTY OF TH	
			MONTREAL	– QUÉBEC COI	RRIDOR	300+, EXISTING RO	<u> </u>
4	SECTOR 1	PROFESSIONAL SERVICES / PROJECT	CT MANAGEMEN	NT			
1	Item 1	Engineering	%	\$307,453,650	5.5%	16.909.951	As a % of total cost of Sector 2
1	Item 2	Construction Supervision	%	\$307,453,650	5.0%	15,372,683	As a % of total cost of Sector 2
1	item 3	Project Management	%	\$339,736,283	5.4%	18,345,759	% of sector 2 total plus items
1	item X	Contingencies	%	\$50,628,393	0%		•
1	11011171	- Containing Containin		+++1,,			
	SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MAN	AGEMENT		\$50,628,393	
	SECTOR 2	EQUIPMENT / MATERIALS					
2			Not Applicat	ole			
	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3			Not Applicat	ole			
-	SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	BUTION			\$0	
4	SECTOR 4	CONSTRUCTION / INSTALLATION					
4	ltem 1	New Grade Separations, Rural					
4		1.1 - 2 Lane Highways	ea.	90	\$2,200,000		
4		1.2 - 2 Lane Highways, Dual ROW	ea.	0	\$0		
4		1.3 - 4 Lane Highways	ea.	4	\$3,100,000		
4		1.4 - 4 Lane Highways, Dual ROW	ea.	0	\$0		
4		1.5 - Major Highways (401, 20, etc)	ea.	0	\$0		
4		1.6 - Extra for Difficult Foundation C	ond. ea.	0	\$0	0	
4	Item 2	New Grade Separations, Urban		_			
4		2.1 - Secondary Highways (2-4 lan		0	\$0		
4		2.2 - Second. Hwys (2-41.) Dual RC		0	\$0		
4		2.3 - Major Highways (over 4 lanes)	ea.	0	\$0 \$0	-	
4	(s a	2.4 - Extra for Difficult Foundation C		U	\$0	U	
4	item 3	Modification of Exist. Grade Separation 3.1 — Urban		0	\$0	0	
4		3.1 — Urban 3.2 — Rural	ea. ea.	19	\$627,000	_	
4	Item 4	Automatic Crossing Protection	ea. ea.	19	\$027,000		
4	Item 4	Closure and Diversion of Roads	ea. km. of road	78	\$280,000		
4	item 5	Private Farm Crossings	ea.	76	\$300,000		
4		Major Wildlife Passages	ea. ea.	0	\$300,000		
4	Item 7	Contingencies	ea. %	\$267,351,000	15%	·	
4	item X	Commigencies	70	9207,331,000	: 570	40,102,000	
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	ATION			\$307,453,650	
	SECTOR 5	START-UP					
5			Included in	Other Studies			
5	SECTOR 5	TOTAL: START-UP				\$0	

technology:

300+, EXISTING ROW

SUMMARY SHEET

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS

	SUBSYSTEM	E - OTHE	R ACCOMOL	DATION WO	RKS			
		MONTREAL -	- QUÉBEC COR	RIDOR 30	0+, EXISTING RO	w		
	Department of the Control of the Con							
1 SECTOR 1 1 Item 1	PROFESSIONAL SERVICES / PROJEC	I MANAGEMEN %	S8.513.251	5.5%	468,229	As a % of total cost of Sector 2		
1 Item 2	Engineering Construction Supervision	% %	\$8,513,251	5.0%	425,663	As a % of total cost of Sector 2		
1 Item 3	Project Management	%	\$9,407,143	5.4%	507,986	% of sector 2 total plus items 1		
1 Item X	Contingencies	%	\$1,401,877	0%				
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MANA	GEMENT		\$1,401,877			
				31112				
2 SECTOR 2 2	EQUIPMENT / MATERIALS	Included in C	onstruction / Ins	taliation				
2			ondia addictity ind					
2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS			_	\$0			
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	TRANSPORTATION / DISTRIBUTION Included in Construction / Installation						
3								
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIB	UTION		\$0				
4 SECTOR 4	CONSTRUCTION / INSTALLATION							
4 Item 1	Removal of Rail Lines	km.	121	\$21,134	2,548,655			
4 item 2 4 item 3	Construction of New Access Tracks Rail/Rail Grade Separation	km.	0	\$0	0			
4	3.1 — Rural	ea.	5	\$800,000	4,000,000			
4	3.2 — Urban	ea.	0	\$0	0			
4 Item 4	Other Particular Items:	luman aum	0		o			
4	4.1 - Sub-item 4.2 - Sub-item	lump sum lump sum	0		0			
4	4.3 — Sub-Item	lump sum	Ö		0			
4	4.4 - Sub-Item	lump sum	ō		ō			
4 Item X	Contingencies	%	\$6,548,655	30%	1,964,596			
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	TION		•	\$8,513,251			
5 SECTOR 5	START-UP							
5	2	Included in C	ther Studies					
5 SECTOR 5	TOTAL: START-UP				\$0			

technology:

300+, EXISTING ROW

SUMMARY SHEET

ITEM NUMBER	ITEM	UNITS	GUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS		
	SUBSYSTEM	F - TRA	^ K	HE TABLE - 18 (18 (18 (18 (18 (18 (18 (18 (18 (18		*		
	3050731LM							
		MONTREAL	. — QUÉBEC CC	RRIDOR (300+, EXISTING RO	<u> </u>		
1 SECTOR 1	PROFESSIONAL SERVICES / PROJEC	T MANAGEME	NT					
1	Engineering	%	\$192,942,930	3.5%	6,753,003	As % of total for Sectors 2 and 4		
1	Construction Supervision Materials Procurement	% %	\$36,983,810	10.0% 4.0%	3,698,381 6,238,365	As % of total for Sector 4 As % of total for Sector 2		
1 Item 3 1 Item 4	Project Management	- %	\$155,959,121 \$209,632,679	5.4%	11,320,165	As % of Sectors 2,4 totals plus		
1 Item X	Contingencies	%	\$28,009,913		0	items 1-3		
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES /	PROJECT MAN	AGEMENT		\$28,009,913			
2 SECTOR 2 2 Item 1	EQUIPMENT / MATERIALS							
2	1.1 - Main Line	t.	62,470	\$773	48,315,547			
2	1.2 - Siding	t.	1,180		912,636			
2 tem 2	Ties	ea.	883,700		39,580,923			
2 Item 3 2 Item 4	Ballast Turnouts	m ^ 3	1,102,000	\$21	23,549,740			
2	4.1 - High Speed	ea.	20	\$280,000	5,600,000			
2	4.2 - Medium Speed	ea.	21		2,835,000			
2	4.3 - Yard	ea.	0	\$0	0			
2 item 5 2	Other Track Material . 5.1 — Rail Fastening Assemblies	set	883,700	\$27	23,418,050			
2	5.2 — Bonded Insulated Joints	ea.	0		0	Included in Signalling costs		
2	5.3 - Bumping Posts	ea.	5	\$3,120	15,600			
2	Switch Heaters/ Snow Blowers 6.1 — Main Line		41	\$105,000	4,305,000			
2 2	6.2 - Yard	ea. ea.	41		4,305,000			
2 Item 7	Ballast Mats for Noise Attenuation	m^2	0		0			
2 Item X	Contingencies	%	\$148,532,496	5%	7,426,625			
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$155,959,121			
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION							
3 3		Included in	Equipment / Ma	terial				
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIE	BUTION			\$0			
4 SECTOR 4 4 Item 1	CONSTRUCTION / INSTALLATION Track Construction							
4	1.1 — Main Line	km.	510	\$18,212	9,293,401	v.		
4	1.2 - Siding	km.	9		415,245			
4 Item 2 4 Item 3	Field Welded Joints Turnout Construction	ea.	3,170	\$2,028	6,428,760			
4 (em 3	3.1 — High and Med. Speed (Main Li	ne) ea.	41	\$20,455	838,655			
4	3.2 - Yard	ea.	Č					
4 item 4	Ballasting and Surfacing	m^3	1,102,000					
4 Item 5 4 Item 6	Rail Grinding Construction Bases	track-km route-km						
4 Item X	Contingencies	10ute-kiii %	\$34,890,386					
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLA	ATION			\$36,983,810			
= 0E0T00 =	CTART LIR							
5 SECTOR 5	START-UP	F−UP Included in Other Studies						
5		i icidaed II	, onler orderes					
5 SECTOR 5	TOTAL: START-UP				\$0			

technology:

300+, EXISTING ROW

SUMMARY SHEET

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
		nidhionn biridh Saidean mailithic			TO THE RESIDENCE OF THE PROPERTY OF THE PROPER	

							NATURE DESIGNATION CONTRACTOR CON	WAGE WANDERSOMMEND FITTE STATE FROM NOW WAND FOR STATE FROM NOW WAND FRO	NAC235
			SUBSYSTEM	<u>G - E</u>	LEC	TRIFICATIO	4		
				MONTR	EAL -	- QUÉBEC COP	RIDOR	300+, EXISTING RO	M
1 S	ECTOR 1		PROFESSIONAL SERVICES / PRO	DJECT MANAGE	EMEN	T			
1	Item 1		Engineering	%		\$164,103,534	5.5%	9,025,694	As % of total for Sector 4
1	Item 2		Construction Supervision	%		\$164,103,534	5.0%	- 1	As % of total for Sector 4
1	ltem 3		Project Management	%		\$181,334,405	5.4%		% of sector 4 total plus items
1	Item X		Contingencies	%		\$27,022,929	0%	0	
1 1 S	ECTOR 1		TOTAL: PROFESSIONAL SERVIC	ES / PROJECT I	MANA	GEMENT		\$27,022,929	
2 5	ECTOR 2		EQUIPMENT / MATERIALS	Include	d in C	onstruction / Ins	tallation		
2					u ,,, ,	Office dollors / mic			
	ECTOR 2		TOTAL: EQUIPMENT / MATERIAL	s				\$0	
3 5	ECTOR 3		TRANSPORTATION / DISTRIBUTI	ON					
3			1,0,0,0		d in C	onstruction / Ins	tallation		
3 3	SECTOR 3		TOTAL: TRANSPORTATION / DIS	TRIBUTION				so	
	SECTOR 4								
4 9	ltem 1		CONSTRUCTION / INSTALLATIO Typical Catenary	14					
4		1.1	••	nt Struct. km		0	\$0	0	
4		1.2	 Double Track – Independ. 	Struct. km		255	\$350,000	89,300,750	
4		1.3			-	0	\$0		
4		1.4	•			0	\$0		
4		1.5	•	100 t		0	\$0		
4		1.6		100 1		20	\$13,500	· ·	
4		1.7		100 r		0	\$(
4		1.8		100 1	m.	74	\$17,500	1,295,000	
4	item 2		Particular Catenary Installations			6	8000 000	1 660 000	
4		2.1				1	\$280,000		
4		2.2		•		3	\$369,000 \$1,052,000	•	
4	O	2.3	3 — Phase Break Special Catenary Structures	e a.	•	ა	\$1,052,000	3,150,000	
4	item 3	3.1		100	nn	٥	\$(0	
4		3.2		100		ŏ	\${	-	
4	item 4	J.2	Power Supply	100		U	ψι		
4	1,0111 4	4.1	· · ·	.v ea		2	\$5,355,000	10,710,000	
4		4.2				ō	\$(
4		4.3				20	\$730,000	-	
4		4.4				3	\$925.000		
4		4.5	,	ea.		ō	\$1		
4		4.6			•	2	\$6,380,00		
4		4.7		ea		12	\$252,50		
4		4.8		km	١.	8	\$170,30		
4		4.9		km	۱.	0	\$		
4		4.10		ea		1	\$200,00		
4	item 5		EMI Mitigation Measures	route-	-km	255	\$5,00		
4	Item X		Contingencies	%		142,698,725	15%	% 21,404,809	
	SECTOR 4		TOTAL: CONSTRUCTION / INST	ALLATION				\$164,103,534	
	SECTOR 5		START-UP						
5 5				Include	ed in (Other Studies			
	SECTOR 5		TOTAL: START-UP					<u>\$0</u>	

technology: 300+, EXISTING ROW

SUMMARY SHEET

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS			
BO/SOCIAL PROPERTY OF THE PROP	SUBSYSTEM	H – STA	TIONS		mbocszezzasznoswarzyznomim krómim wskilliwa kirk				
	mission and the second	MONTREAL	. – QUÉBEC CO	DRRIDOR	300+, EXISTING RO	W			
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT								
1 tem 1	Engineering	%	25,300,000	5.5%	1,391,500	As a % of total for Sector 2			
1 tem 2	Construction Supervision	%	25,300,000		1,265,000	As a % of total for Sector 2			
1 tem 3	Project Management	%	27,956,500		1,509,651	% of sector 2 total plus items 1 -2			
1 Item X	Contingencies	%	4,166,151	0%	0	•			
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAN	AGEMENT		\$4,166,151				
2 SECTOR 2 2	EQUIPMENT / MATERIALS	Included in	Construction / I	nstaliation					
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0				
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION	Included in	Construction /	netallation					
3	Included in Construction / Installation								
3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	JTION			\$0				
4 SECTOR 4	CONSTRUCTION / INSTALLATION								
4 Item 1	Individual Stations	lump sum		\$23,000,000	23,000,000				
4 Item 2	Not used	lump sum		\$0					
4 Item 3	Not used	lump sum		\$0					
4 Item 4	Not used	lump sum		\$0	0				
4 Item X	Contingencies	%	23,000,000	10%	2,300,000				
4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ION			\$25,300,000				
5 SECTOR 5	START-UP								
5		Included in	Other Studies						
5 5 SECTOR 5	TOTAL: START-UP				\$0				

10-Feb-94 d	current costs on file
	Québec Corridor
300+, EXISTIN	IG ROW
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	\$0
MQR-02	\$0
TMR-04	\$0

\$1,403,679,996

MONTRÉAL-QUÉBEC

E3. 300+ km/hr - NEW RIGHTS-OF-WAY

Segment Summary Cost Table

Segment Detailed Cost Report

Table 6.8

SUBSYSTEM/SECTOR	COST SUMMARY						
MONTREAL - Q	UÉBEC CORR	IDOR	300+, NEW F	row			Veillemontenstratives in de la veillemontenstratives in de la veillemontenstratives in de la veillemontenstratives in de la veillemontenstratives in de la veillemontenstrative in de la v
Subsystem	Professional Serv./ Equipment/ Proj. Management Material		Transportation/ distribution	Construction/ Installation	Start – up	TOTAL	Contingency reserve included ir TOTAL
A - Right-of-way Aquisition	\$4,711,328	\$49,076,328	N/A	N/A	see note c	\$53,787,656	\$5,246,706
B – Earthworks and Drainage	\$63,781,405	N/A	N/A	\$292,870,615	see note c	\$356,652,020	\$38,200,515
C – Bridges, Viaducts, and Tunnels	\$33,731,332	N/A	N/A	\$204,842,000	see note c	\$238,573, 332	\$18,622,000
D - Grade Separations	\$47,371,409	N/A	N/A	\$287,674,800	see note c	\$335,046,209	\$37,522,800
E - Other Accom- modation works	\$1,281,884	see note a	see note a	\$7,784,564	see note c	\$9,066,448	\$1,796,438
F - Track	\$28,421,103	\$158,461,606	see note b	\$37,382,375	see note c	\$224,265,084	\$9,661,774
G – Electrification	\$27,400,931	see note a	see note a	\$166,399,049	see note c	\$193,799,980	\$21,704,224
H - Stations	\$4,166,151	see note a	see note a	\$25,300,000	see note c	\$29,466,151	\$2,300,000
Totals	\$210,865,544	\$207,537,934	\$0	\$1,022,253,403	see note c	\$1,440,656,880	\$135 ,054,456

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

MONTREAL - QUÉBEC CORRIDOR SUMMARY SHEET
technology:
300+, NEW ROW 257.39 km. in length

8 -	TEM (UMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
		SUBSYSTEM	According 1				
			MONTREAL	_ QUÉBEC CO	RRIDOR	300+, NEW ROW	ACCESSARIANCE AND ACCESSARIANC
		Benjamanya manazanya ang ngangya kacaman kacaman karaman manazar ana ang manazar ang manazar ang managan kacaman da kaban ka ka sa sa sa sa sa sa sa sa sa sa sa sa sa	**************************************	***************************************			annian statement and the state
1 1	SECTOR 1	PROFESSIONAL SERVICES / PROJE Professional Services	CT MANAGEME	NT			
1	100111	1.1 - Surveying	%	\$49,076,328	8%	3,926,106	As a % of total cost of Sector 2
1		1.2 - Appraisal	%	\$49,076,328		0	included in Item 1.1
1		1.3 - Legal Expertise	%	\$49,076,328		0	included in Item 1.1
1	ltem 2	Project Management	%	\$53,002,435		0	As % of Sector 2 total + item 1.1
1	Item X	Contingencies	%	\$3,926,106	20%	785,221	
1	SECTOR 1	TOTAL: PROFESSIONAL SERVICES	/ PROJECT MAN	NAGEMENT		\$4,711,328	
2	SECTOR 2	EQUIPMENT / MATERIALS					
2	Item 1	Urban Land					
2	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1.1 - Residential	hectare	88.6	\$231,237	20,487,615	
2		1.2 - Commercial	hectare	5		2,267,000	
2		1.3 - Industrial	hectare	20.5		8,411,200	
2	item 2	Rural Land					
2		2.1 - Agricultural	hectare	752,39	\$11,845	8,912,429	
2		2.2 - Natural	hectare	372.5	\$12,179	4,536,600	
2	Item 3	Purchase of Existing Rail ROW					
2		3.1 - CN	hectare	0	N/A	0	
2		3.2 - CP	hectare	0	N/A	0	
2		3.3 - VIA	hectare		N/A	0	•
2	Item X	Contingencies	%	\$44,614,844	10%	4,461,484	
2 2	SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$49,076,328	
3	SECTOR 3	TRANSPORTATION / DISTRIBUTION	Not Applica	ahle			
3							
3	SECTOR 3	TOTAL: TRANSPORTATION / DISTRI	BUTION			N/A	
4 4	SECTOR 4	CONSTRUCTION / INSTALLATION	Not Applica	able			
4			, 151, (ppine)				
4	SECTOR 4	TOTAL: CONSTRUCTION / INSTALL	ATION			\$0	
	SECTOR 5	START-UP	handards 12	0.00			
5			included in	Other Studies			
5	SECTOR 5	TOTAL: START-UP				\$0	

MONTREAL - QUÉBEC CORRIDOR technology:

SUMMARY SHEET

300+, NEW ROW 257.39 km. in length

ITEM ITEM UNITS QUANTITY LOT / UNIT TOTAL SOURCE / REMARKS	•
--	---

			SUBSYSTEM	R - FARTH	WORKS AN	ID DRAINA	in the second se	
					QUÉBEC COF		800+, NEW ROW	
	araran 4					STIDON C	300 T. 14E VV 11O VV	en en en en en en en en en en en en en e
1	SECTOR 1		PROFESSIONAL SERVICES / PROJECT M Engineering		 \$292,870,615	5.5%	16,107,884	As a % of total cost of Sector 2
1	Item 2		Construction Supervision		\$292,870,615	5.0%	14,643,531	As a % of total cost of Sector 2
1	item 3		Environmental Assessment		229,791,337	0.2%	2,459,583	Items 3 and 4 are %'s of entire
1	Item 4		Feasibility Studies (Technical)		,229,791,337	1%	12,297,913	project's cost less profes, fees
1	item 5		Project Management		\$338,379,526	5.4%	18,272,494	% of sector 2 total plus items 1−4
1	item X		Contingencies	%	\$63,781,405	0% _	0	
1	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PRO	DJECT MANA	GEMENT	=	\$63,781,405	
2	SECTOR 2		EQUIPMENT / MATERIALS					
2				Not Applicable	e	_		
2	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS			=	\$0	
3	SECTOR 3		TRANSPORTATION / DISTRIBUTION					
3	OLO I O I I O			Not Applicable	2			
3					_	=	· ·····	
3	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUTI	ON		=	\$0	
4	SECTOR 4		CONSTRUCTION / INSTALLATION					
4	item 1		Clearing and Roadbed Preparation					
4	,	1.1	- Type 1 Soils	route-km	112.48	\$142,000	15,972,160	
4		1.2	- Type 2 Soils	route-km	100.02	\$627,000	62,712,540	
4		1.3	- Type 3 Soils	route-km	36.41	\$1,035,000	37,684,350	
4	Item 2	2.1	Embankment Construction - Soft Excavated Material	4000 0.0	100001		4 500 700	
4		2.1		1000 m ^ 3 1000 m ^ 3	1632.91 0	\$3,000 \$0	4,898,730 0	
4		2.3		1000 m ^ 3	1935.445	\$8,000	15,483,560	
4		2.4		1000 m ^ 3	689.58	\$5,500	3,792,690	
4	item 3		Haulage of Fill Material					
4	Hama d			1000 m ^3~	0	\$0	0	Cost transferred to item B4-2
4	item 4	4.1	Sub - Ballast Layers - New ROW	route-km	231.35	\$228,000	52,747,800	For TM2 B0,TM2 D0,TM1 B0,
4		4.2	- Existing ROW	route~km	17.56	\$228,000	4,003,680	TM1-D0,TM0-B0,TM0-B1, TM0-C0,and TM0-D0, \$152,000
4	Item 5		Drainage Systems			V,V	,,,,	used for cost of sub-ballast(it. 4)
4		5.1		route-km	248.91	\$25,000	6,222,750	, ,
4		5.2	• • • • • • • • • • • • • • • • • • • •	98.	30	\$35,000	1,050,000	
4	ltem 6	5.3		route-km route-km	0	\$0	0	
4	Item 7		Retaining Structures	routekm	7.754	\$600,000	4,652,400	
4		7.1	- Up to 3 metres in Height	km.	1.06	\$2,500,000	2,650,000	
4		7.2	 Over 3 metres in Height 	km.	2.38	\$5,000,000	11,900,000	
4	Item 8		Intrusion Barriers	km.	0	\$0	0	Intrusion Barriers not required
4	item 9	9.1	Noise Attenuation Structures - Barriers	1.mm	04.4	0000 000	******	
4		9.1		km. km.	21.4	\$660,000 \$0	14,124,000	
4	Item 10			route-km	238.22	\$56,000	13,340,320	
4	Item 11		Snow Control Measures	km.	0	\$0	0	Accounted for in Contingencies
4	item 12		Utility Interferences					
4		12.1	 Major Hydro Relocation Major Oil/Gas Relocation 	ea.	26	\$0	0	Accounted for in Contingencies
4		12.3		ea. route-km	0	\$0 \$0	0	Accounted for in Contingencies Accounted for in Contingencies
4	ltem 13		Other Items		ū	00	•	Accounted for in Contingencies
4		13.1	 Audit for Contaminated Soil 	route-km	17.56	\$2,000	35,120	
4		13.2		ea.	2	\$500,000	1,000,000	
4	Item X	13.3	• ,	ea.	24	\$100,000	2,400,000	
4	item X		Contingencies	%	\$254,670,100	15%	38,200,515	
	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO	N		:	\$292,870,615	
	SECTOR 5		START-UP					
5				Included in O	ther Studies			
5 5	SECTOR 5		TOTAL: START-UP				\$0	

MONTREAL - QUÉBEC CORRIDOR technology:

SUMMARY SHEET

300+, NEW ROW 257.39 km. in length

dado	470				CONTRACTOR CONTRACTOR		:	
	ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT	TOTAL COST	SOURCE / REMARKS	
	l						1	

		para		Poulti-	Dimensional de la company de 	e consessamento de la consessamento del consessamento de la consessamento de la consessamento de la consessamento de la consessamento del consessamento de la consessamento del consessamento de la consessamento de la consessamento del consessamento de la consessamento de la consessamento de la consessamento del consessamento de la consessamento del consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de la consessamento de		SHEDDLE
			SUBSYSTEM	C - BRID	GES, VIADUC	TS, AND T	UNNELS	**************************************
				MONTREAL	- QUÉBEC COR	RIDOR 30	0+, NEW ROW	
1	SECTOR 1	Pi	ROFESSIONAL SERVICES / PROJECT N	/ANAGEMEN	NT		•	
1	item 1		ngineering	%	\$204,842,000	5.5%	11,266,310	As a % of total cost of Sector 2
1	item 2	C	onstruction Supervision	%	\$204,842,000	5.0%	10,242,100	As a % of total cost of Sector 2
1	Item 3	Pi	roject Management	%	\$226,350,410	5.4%	12,222,922	% of sector 2 total plus items 1 − 2
1	Item X	C	ontingencies	%	\$33,731,332	0%	0	
1	SECTOR 1	T	OTAL: PROFESSIONAL SERVICES / PR	OJECT MAN	AGEMENT	_	\$33,731,332	
2	SECTOR 2	E	QUIPMENT / MATERIALS					
2		-	· · · · · · · · · · · · · · · · · · ·	Not Applicat	ole			
2		_						
2	SECTOR 2	11	OTAL: EQUIPMENT / MATERIALS			_	\$0	
3	SECTOR 3	TI	RANSPORTATION / DISTRIBUTION					
3				Not Applicat	ole			
3								
3	SECTOR 3	T	OTAL: TRANSPORTATION / DISTRIBUT	ION			\$0	
4	SECTOR 4	С	ONSTRUCTION / INSTALLATION					
4	ltem 1	В	ridges					
4		1.1	- Small Rivers (< 30 metres)	ea.	92	\$340,000	31,280,000	
4		1.2	 Extra at 1.1 for Height Over 10 m. 	ea.	0	\$0	0	
4		1.3	 Interm. Rivers (30 – 100 metres) 	lin. m.	520	\$23,500	12,220,000	
4		1.4	 Extra at 1.3 for Height Over 10 m. 	lin. m.	0	\$0	0	
4		1.5	- Large Rivers (100 - 250 metres)	lin. m,	610	\$42,000	25,620,000	
4		1.6	 Extra at 1.5 for Height Over 10 m. 	lin. m.	0	\$0	0	
4		1.7	- Major Rivers (over 250 m.)	lin. m.	730	\$50,000	36,500,000	
4		1.8	- Extra for Difficult Foundation Cond.		0	\$0	0	
4	ltem 2	1.9 V	 Modif. to Exist. Bridges (new deck) iaducts 	ea.	250	\$13,000	3,250,000	
4		2.1	- Viaducts over 250 metres in Length	ı lin.m.	0	\$0	0	
4		2.2	- Extra for Height Over XX metres	lin. m.	ō	\$0	Ó	
4		2.3	- Extra for Difficult Foundation Cond.	. lin. m.	Ö	\$0	0	
4	item 3	1	unnels (Double Track)					
4		3.1	 in Soft Ground 	lin. m.	0	\$0	0	For 300+ technology, Rock
4		3.2	- In Rock	lin. m.	2,210	\$35,000	77,350,000	Tunnels speed restricted by local
4		3.3	 Modifications to Existing Tunnels 	lump sum	0		0	conditions are \$35,000/lin m.
4		3.4	 Noise Mitigation Measures 	lump sum	0		0	Accounted for in Contingencies
4	Item X	Ç	ontingencies	%	\$186,220,000	10%_	18,622,000	
4	SECTOR 4	Т	OTAL: CONSTRUCTION / INSTALLATIO	N		-	\$204,842,000	
5	SECTOR 5	s	TART-UP					
5				Included in	Other Studies	_		
5 5	SECTOR 5	т	OTAL: START-UP				\$0	

SUMMARY SHEET

technology:

300+, NEW ROW

257.39 km. in length

ITEM NUMB	ER		ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
Buzzestanoketsentisetsent	Control (14) pour co	ili Cultur (IVA)		Hebrahaman and Andreas				
			<u>SUBSYSTEM</u>	F - TRAC	JK.			770
				MONTREAL	- QUÉBEC CO	RRIDOR	300+, NEW ROW	
1 SECTO	78 1		PROFESSIONAL SERVICES / PROJECT	MANAGEME	NT			
	em 1		Engineering	%	\$195,843,981	3.5%	6,854,539	As % of total for Sectors 2 and 4
	am 2		Construction Supervision	%	\$37,382,375			As % of total for Sector 4
	em 3 em 4		Materials Procurement Project Management	% %	\$158,461,606		6,338,464 11,489,862	As % of total for Sector 2 As % of Sectors 2.4 totals plus
	em X		Contingencies	%	\$212,775,222 \$28,421,103			items 1 – 3
1			-					
1 SECTO	OR 1		TOTAL: PROFESSIONAL SERVICES / PR	OJECT MAN	IAGEMENT		\$28,421,103	
2 SECTO	OR 2 em 1		EQUIPMENT / MATERIALS Rail					
2 Ite 2	Att: 1	1.1		t.	62,860	\$773	48,617,181	
2		1.2		ŧ.	1,180			
2 Ite	em 2		Ties	ea.	889,200			
_	em 3		Ballast	m ^ 3	1,109,000	\$21	23,699,330	
2 ite 2	em 4	4.1	Turnouts - High Speed	ea.	24	\$280,000	6,720,000	
2		4.2		ea.	21			
2		4.3		ea.	0			
_	em 5		Other Track Material					
2		5.1 5.2		set	889,200 0			Included in Cignalling each
2 2		5.3		ea. ea.	5			Included in Signalling costs
	em 6		Switch Heaters/ Snow Blowers	****	_	72,72	,	
2		6.1		ea.	45		· ·	
2		6.2		ea.	Q			
	em 7 em X		Ballast Mats for Noise Attenuation Contingencies	m^2 %	\$150,915,815			
2			-	,-	0,00,0,0,0	• • • • • • • • • • • • • • • • • • • •		
2 SECT	OR 2		TOTAL: EQUIPMENT / MATERIALS				\$158,461,606	
3 SECTO	OR 3		TRANSPORTATION / DISTRIBUTION					
3 3				Included in	Equipment / Ma	terial		
3 SECT	OR 3		TOTAL: TRANSPORTATION / DISTRIBUT	TON			\$0	
4 SECTO	OB 4		CONSTRUCTION / INSTALLATION					
	em 1		Track Construction					
4		1.1		km.	514	\$18,212	9,352,408	
4	_	1.2		km.	9			
	em 2 em 3		Field Welded Joints Turnout Construction	ea.	3,230	\$2,028	6,550,440	
4	6111 5	3.1		ea.	45	\$20,45	920,475	
4		3.2	, ,	ea.	Č			
	em 4		Ballasting and Surfacing	m^3	1,109,000			
	em 5 em 6		Rail Grinding Construction Bases	track-km route-km	520			
	em X		Contingencies	1001e-km	25) \$35,266,39;			
4			•	••	, + 4 - 4			
4 SECT	OR 4		TOTAL: CONSTRUCTION / INSTALLATION	DΝ			\$37,382,375	
5 SECT	OR 5		START-UP					
5				Included in	Other Studies			
5 5 SECT	OR 5		TOTAL: START-UP				\$0	

SUMMARY SHEET

technology: 300+, NEW ROW

257.39 km. in length

	ITEM	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
-	NUMBER						

						950700000000000000000000000000000000000		
			SUBSYSTEM	G - ELEC	TRIFICATION	4		
			N	MONTREAL -	- QUÉBEC COR	RIDOR 3	0+, NEW ROW	
		ì						аскиоф
1	SECTOR 1		PROFESSIONAL SERVICES / PROJECT M			E 50/	9,151,948	As % of total for Sector 4
1	Item 1		Engineering	% %	\$166,399,049 \$166,399,049	5.5% 5.0%	8,319,952	As % of total for Sector 4
1	item 2		Construction Supervision Project Management	% %	\$183,870,949	5.4%	9,929,031	% of sector 4 total plus items 1 -
1	Item 3 Item X		Contingencies	%	\$27,400,931	0%	0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
1	IIIII V		Oonangen clea	,0				
1	SECTOR 1		TOTAL: PROFESSIONAL SERVICES / PRO	DJECT MANA	GEMENT	=	\$27,400,931	
2	SECTOR 2		EQUIPMENT / MATERIALS					
2			l	Included in C	onstruction / Ins	tallation		
2			TOTAL FOLUDATENT / MATERIAL C				\$0	
2	SECTOR 2		TOTAL: EQUIPMENT / MATERIALS				Ψ.	
-	SECTOR 3		TRANSPORTATION / DISTRIBUTION					
3				included in C	Construction / Ins	tailation		
3	SECTOR 3		TOTAL: TRANSPORTATION / DISTRIBUTI	ON		_	\$0	
			CONCEDUCTION / INSTALLATION			-		
4	SECTOR 4		CONSTRUCTION / INSTALLATION Typical Catenary					
4	ilein i	1.1		km.	0	\$0	Q	
4		1.2		km.	257	\$350,000	89,867,750	
4		1.3	- Double Track - Portal Structures	km.	0	\$0	0	
4		1.4	 Triple Track — Portal Structures 	km.	0	\$0	0	
4		1.5		100 m.	0	\$0	0	
4		1.6		100 m.	20	\$13,500	270,000 0	
4		1.7		100 m.	0 74	\$0 617 500	1,295,000	
4	11 0	1.8		100 m.	/4	\$17,500	1,295,000	
4	Item 2	2.1	Particular Catenary Installations - Xover Single (with section breaks)	ea.	6	\$280,000	1,680,000	
4		2.2			2	\$369,000	738,000	
4		2.3	•	ea.	4	\$1,052,000	4,208,000	
4	Item 3		Special Catenary Structures			, , ,		
4		3.1	•	100 m.	0	\$0	0	
4		3.2	- Overbridge	100 m.	0	\$0	0	
4	Item 4		Power Supply					
4		4.1		ea.	2	\$5,355,000	10,710,000	
4		4.2			0	\$0	14,600,000	
4		4.3	.	ea. ea.	20 3	\$730,000 \$925.000	2,775,000	
4		4.4 4.5		ea.	0	\$925,000	2,775,000	
4		4.5		ea.	2	\$6,380,000	12,760,000	
4		4.7		ea.	12	\$252,500	3,030,000	
4		4.8		km.	8	\$170,300	1,277,250	
4		4.9	, , ,	km.	0	\$0	0	
4		4.10	- Control Center	ea.	1	\$200,000	200,000	
4	item 5		EMI Mitigation Measures	route-km	257	\$5,000	1,283,825	
4	item X		Contingencies	%	144,694,825	15%	21,704,224	
4	SECTOR 4		TOTAL: CONSTRUCTION / INSTALLATIO	N.			\$166,399,049	
5	SECTOR 5		START-UP					
5	i			Included in	Other Studies			
5	SECTOR 5		TOTAL: START-UP				\$0_	

SUMMARY SHEET

technology:

300+, NEW ROW

257.39 km. in length

ITEM NUMBER	ITEM	UNITS	QUANTITY	LOT / UNIT PRICE	TOTAL COST	SOURCE / REMARKS
	SUBSYSTEM	H – STA	TIONS	311234TH-027774	ery vininery pomina (posició), a pojeti sa desta a moderna de consessor.	
		MONTREAL	QUÉBEC CO	RRIDOR	300+, NEW ROW	-
1 SECTOR 1	PROFESSIONAL SERVICES / PROJECT	MANAGEME	:NT			
1 Item 1	Engineering	%	25,300,000		1,391,500	As a % of total for Sector 2
1 Item 2	Construction Supervision	%	25,300,000			As a % of total for Sector 2
i item 3	Project Management	%	27,956,500			% of sector 2 total plus items 1-2
1 Item X	Contingencies	%	4,166,151	0%	0	
1 1 SECTOR 1	TOTAL: PROFESSIONAL SERVICES / P	ROJECT MAI	NAGEMENT		\$4,166,151	
2 SECTOR 2	EQUIPMENT / MATERIALS					
2		Included in	Construction / I	nstallation		
2 2 SECTOR 2	TOTAL: EQUIPMENT / MATERIALS				\$0	
3 SECTOR 3	TRANSPORTATION / DISTRIBUTION					
3		included in	Construction / I	nstallation		
3 3 SECTOR 3	TOTAL: TRANSPORTATION / DISTRIBU	TION			\$0	
4 SECTOR 4	CONSTRUCTION / INSTALLATION					
4 ltem 1	Individual Stations	lump sum		\$23,000,000	23,000,000	
4 item 2	Not used	lump sum		\$0		
4 ltem 3	Not used	lump sum		\$0		
4 ltem 4	Not used	lump sum		\$0		
4 Item X	Contingencies	%	23,000,000	10%	2,300,000	
4 4 SECTOR 4	TOTAL: CONSTRUCTION / INSTALLAT	ON			\$25,300,000	
5 SECTOR 5	START-UP					
5		Included in	Other Studies			
5 SECTOR 5	TOTAL: START-UP				\$0	

10-Feb-94 curi	
<u>Montréal – Q</u>	uébec Corridor
300+, NEW ROW	ŗ
segment	total cost
MQ2-A0	\$0
MQ2-B0	\$0
MQ1-A0	\$0
MQ1-B0	\$0
MQ1-C0	\$0
MQ0-A0	\$0
MQ0-B0	\$708,975,021
MQ0-C0	\$682,479,658
MQS-1	\$0
MQS-2	\$14,270,328
MQS-3a	\$13,979,869
MQS-3b	\$20,952,005
MQR-01	\$0
MQR-02	\$0
TMR-04	\$0

\$1,440,656,880

MONTRÉAL-QUÉBEC

E4. TOTAL COSTS FOR SUB-SEGMENTS

MQ2-A0	Montréal - Trois-Rivières	799,444
MQ2-B0	Trois-Rivières - Québec City (Gare du Palais)	564,209
MQ1-A0	Montréal - St. Martin Jct.*	210,775
MQ1-B0	St. Martin Jct Trois-Rivières	667,087
MQ1-C0	Trois-Rivières - Québec City (Gare du Palais)	687,391
MQ0-A0	Montréal - St. Martin Jct.*	210,781
MQ0-B0	St. Martin Jct Trois-Rivières	708,975
MQ0-C0	Trois-Rivières - Québec City (Gare du Palais)	682,480
MQS-1	Laval - New Station**	18,659
MQS-2	Trois-Rivières - New Station	14,270
MQS-3a	Ancienne Lorette - New Station	13,980
MQS-3b	Québec City/Gare du Palais - Modifications	20,952

only required when considering Montréal - Québec alone

only required for 300+ option when considering Montréal - Québec alone