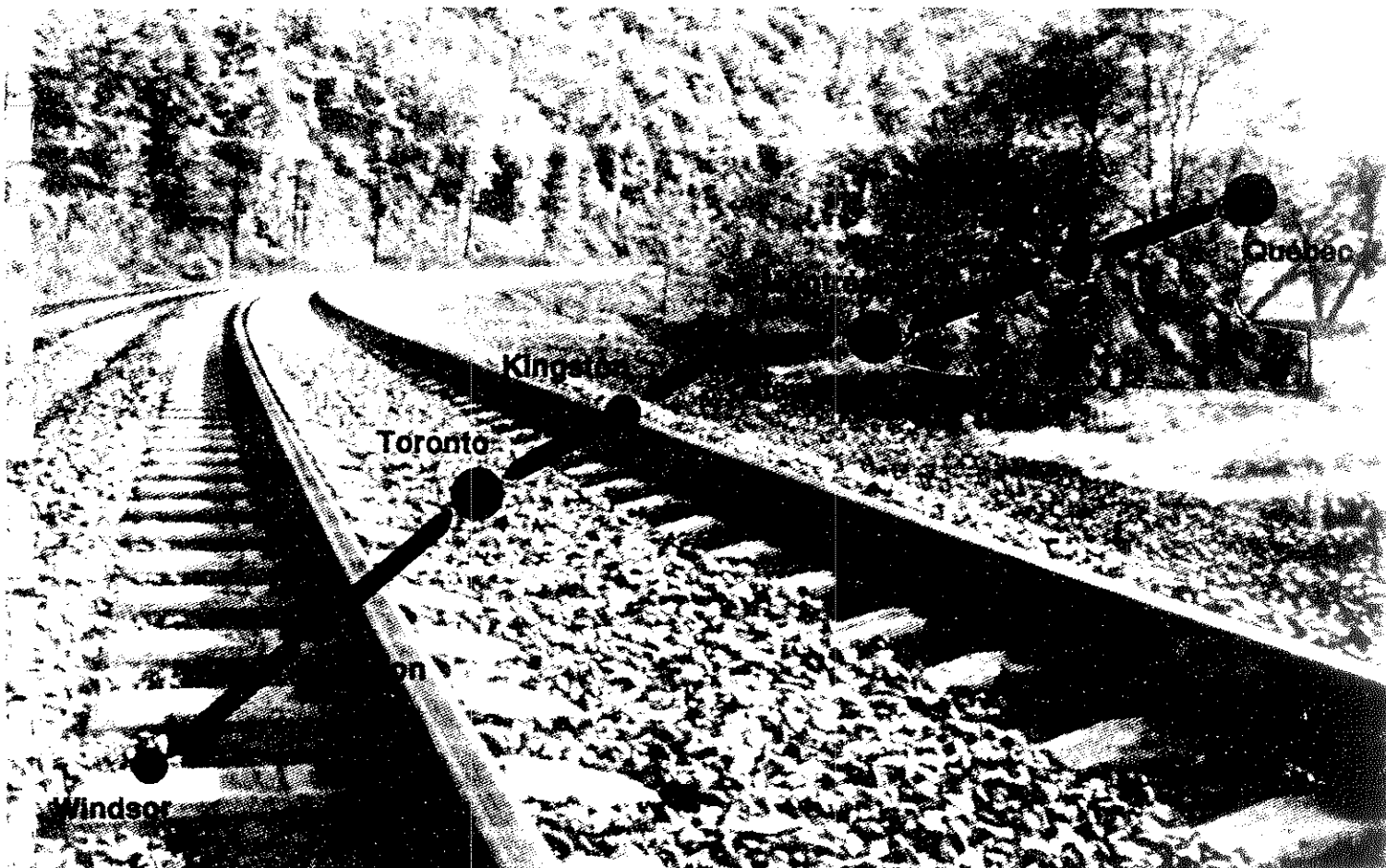


Quebec-Ontario High Speed Rail Project

Preliminary Routing Assessment and Costing Study

Interim Report No. 2 Detailed Routing Analysis Appendix B - Infrastructure Quantity Tables May, 1993



SNC-LAVALIN and DELCAN

in association with:

- CANARAIL
- SOFRERAIL
- SWEDERAIL

APPENDIX B

INFRASTRUCTURE QUANTITY TABLES

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200-250 KPH TILTING TECHNOLOGY

WINDSOR - OSHAWA

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

Station (km)	B1.1 Clearing and roadbed prep. in Type 1 Soils (route-km)	B1.2 Clearing and roadbed prep. in Type 2 Soils (route-km)	B1.3 Clearing and roadbed prep. in Type 2 Soils (route-km)	B2.1 Embankment from ROW cut in soft material (000's cubic-m)	B2.2 Embankment from ROW cut in rock (000's cubic-m)	B2.3 Embankment from borrow material (000's cubic-m)	B2.4 Disposal of unsuitable material (000's cubic-m)	B3.0 Haulage of fill material (000's cubic-m)	B4.1 Sub-ballast layers; new ROW (route-km)	B4.2 Sub-ballast layers; existing ROW (route-km)
2000-2020	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2020-2040	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2040-2060	17.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	14.8
2060-2080	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7	7.3
2080-2100	3.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	9.5
2100-2120	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2120-2140	9.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2140-2160	15.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2160-2180	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2180-2185	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
Windsor-London	129.0	56.0	0.0	0.0	0.0	0.0	0.0	0.0	28.4	156.6
2185-2200	11.6	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	15.0
2200-2220	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	16.3
2220-2240	18.7	0.0	1.3	0.0	0.0	0.0	0.0	0.0	14.8	5.2
2240-2260	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6	10.4
2260-2280	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.9	6.1
2280-2300	12.7	7.4	0.0	0.0	0.0	0.0	0.0	0.0	5.8	14.2
2300-2305	3.7	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	4.6
London-Hamilton	106.6	8.7	4.7	0.0	0.0	0.0	0.0	0.0	48.2	71.8
2305-2320	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
2320-2340	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2340-2360	11.7	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
Hamilton-Union Sta	46.7	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.0
2360-2380	17.7	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2380-2400	6.8	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2400-2420	5.9	11.8	1.5	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2420-2440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	30.3	27.4	1.5	0.0	0.0	0.0	0.0	0.0	0.0	60.0
Total	312.6	100.4	6.2	0.0	0.0	0.0	0.0	0.0	76.6	343.4

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

Station (km)	B5.1 Normal ROW drainage system (route-km)	B5.2 Major Watercourse Culverts (each)	B5.3 Environmental stormwater controls (each)	B6.0 Upgrade of Exist. Roadbed on Exist. ROW (route-km)	B7.1 Retaining Structures up to 3 m Height (Km)	B7.2 Retaining Structures over 3 m Height (Km)	B8.1 Noise Attenua- tion Structures Barriers (Km)	B8.2 Noise Attenua- tion Structures Berms (Km)	B9.0 ROW Security Fencing (2-sided) (route-km)	B10.0 Snow Control Measures (Km)
2000-2020	20.0	2.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
2020-2040	20.0	0.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
2040-2060	19.9	0.0	19.9	14.8	0.0	0.0	0.0	0.0	19.9	0.0
2060-2080	19.8	1.0	19.8	7.3	0.0	0.0	0.0	0.0	19.8	0.0
2080-2100	20.0	3.0	20.0	9.5	0.0	0.0	0.0	0.0	20.0	0.0
2100-2120	20.0	0.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
2120-2140	20.0	0.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
2140-2160	20.0	0.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
2160-2180	20.0	5.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
2180-2185	4.9	0.0	4.9	5.0	0.0	0.0	0.0	0.0	4.9	0.0
Windsor-London	184.6	11.0	184.6	156.6	0.0	0.0	0.0	0.0	184.6	0.0
2185-2200	15.0	2.0	15.0	15.0	0.0	0.0	0.0	0.0	15.0	0.0
2200-2220	19.9	15.0	19.9	16.3	0.0	0.0	0.0	0.0	19.9	0.0
2220-2240	18.8	8.0	18.8	5.2	0.0	0.0	0.0	0.0	18.8	0.0
2240-2260	19.9	10.0	19.9	10.4	0.0	0.0	0.0	0.0	19.9	0.0
2260-2280	19.8	18.0	19.8	6.1	0.0	0.0	0.0	0.0	19.8	0.0
2280-2300	16.8	19.0	16.8	14.2	0.0	0.0	0.0	0.0	16.8	0.0
2300-2305	3.3	7.0	3.3	4.6	0.0	0.0	0.0	0.0	3.3	0.0
London-Hamilton	113.5	79.0	113.5	71.8	0.0	0.0	0.0	0.0	113.5	0.0
2305-2320	13.5	11.0	13.5	15.0	0.0	0.0	0.0	0.0	13.5	0.0
2320-2340	19.5	7.0	19.5	20.0	0.0	0.0	0.0	0.0	19.5	0.0
2340-2360	19.8	2.0	19.8	20.0	0.6	2.0	0.0	0.0	19.8	0.0
Hamilton-Union Sta	52.8	20.0	52.8	55.0	0.6	2.0	0.0	0.0	52.8	0.0
2360-2380	19.9	2.0	19.9	20.0	0.0	0.0	0.0	0.0	19.9	0.0
2380-2400	18.8	4.0	18.8	20.0	1.0	0.0	0.2	0.0	18.8	0.0
2400-2420	17.9	6.0	17.9	20.0	0.0	0.0	0.0	0.0	17.9	0.0
2420-2440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	56.6	12.0	56.6	60.0	1.0	0.0	0.2	0.0	56.6	0.0
Total	407.6	122.0	407.6	343.4	1.6	2.0	0.2	0.0	407.6	0.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

Station (km)	B11.1 Utilities- Major Hydro Relocation (each)	B11.2 Utilities- Major Oil/Gas Relocation (each)	B11.3 Minor pipe or Wire Crossings (route-km)	B12.0 Other Items (Lump-Sum)	C1.1 Small River Crossings (L < 30 m) (each)	C1.2 Extra over C1.1 for Height over 10 m (Linear metre)	C1.3 Intermediate River Crossings (30 < L < 100) (Linear metre)	C1.4 Extra over C1.3 for Height over 10 m (Linear metre)	C1.5 Large River Crossings (100 < L < 250) (Linear metre)	C1.6 Extra over C1.5 for Height over 10 m (Linear metre)
2000-2020	1.0	0.0	20.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
2020-2040	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2040-2060	1.0	0.0	20.0	0.0	2.0	0.0	100.0	0.0	0.0	0.0
2060-2080	1.0	0.0	20.0	0.0	2.0	0.0	200.0	0.0	0.0	0.0
2080-2100	3.0	0.0	20.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
2100-2120	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2120-2140	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2140-2160	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2160-2180	0.0	0.0	20.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
2180-2185	0.0	0.0	5.0	0.0	0.0	0.0	75.0	0.0	0.0	0.0
Windsor-London	6.0	0.0	185.0	0.0	9.0	0.0	375.0	0.0	0.0	0.0
2185-2200	1.0	0.0	15.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
2200-2220	0.0	0.0	20.0	0.0	4.0	0.0	50.0	0.0	0.0	0.0
2220-2240	2.0	0.0	20.0	0.0	1.0	0.0	50.0	25.0	0.0	0.0
2240-2260	0.0	0.0	20.0	0.0	1.0	0.0	50.0	0.0	0.0	0.0
2260-2280	2.0	0.0	20.0	0.0	4.0	0.0	100.0	50.0	0.0	0.0
2280-2300	4.0	3.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2300-2305	0.0	1.0	5.0	0.0	0.0	0.0	50.0	25.0	0.0	0.0
London-Hamilton	9.0	4.0	120.0	0.0	12.0	0.0	300.0	100.0	0.0	0.0
2305-2320	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2320-2340	0.0	0.0	20.0	0.0	2.0	0.0	250.0	125.0	0.0	0.0
2340-2360	0.0	0.0	20.0	0.0	1.0	0.0	130.0	25.0	0.0	0.0
Hamilton-Union Sta	0.0	0.0	55.0	0.0	3.0	0.0	380.0	150.0	0.0	0.0
2360-2380	0.0	0.0	20.0	0.0	0.0	0.0	90.0	0.0	0.0	0.0
2380-2400	0.0	0.0	20.0	0.0	2.0	0.0	170.0	85.0	0.0	0.0
2400-2420	0.0	0.0	20.0	0.0	2.0	0.0	60.0	30.0	0.0	0.0
2420-2440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	0.0	0.0	60.0	0.0	4.0	0.0	320.0	115.0	0.0	0.0
Total	15.0	4.0	420.0	0.0	28.0	0.0	1375.0	365.0	0.0	0.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

Station (km)	C1.7 Major River Crossings (L > 250 m) (Linear metre)	C1.8 Extra over C1.1 C1.7 for Difficult Foundations (Linear metre)	C1.9 Modifications to existing bridges (each)	C2.1 Viaducts of length greater than 250 m (Linear metre)	C2.2 Extra over C2.1 for height over 10 m (Linear metre)	C2.3 Extra over C2.1 for difficult Foundations (Linear metre)	C3.1 Double Track Tunneling in Soft ground (metre)	C3.2 Double Track Tunneling in Rock (metre)	C3.3 Modifications to existing Tunnels (Lump sum)	D1.1a 2-lane rural hwy Crossing New/ Aband. ROW (each)
2000-2020	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2020-2040	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
2040-2060	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2060-2080	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2080-2100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2100-2120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
2120-2140	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2140-2160	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2160-2180	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2180-2185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Windsor-London	0.0	0.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0
2185-2200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2200-2220	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2220-2240	0.0	0.0	0.0	1100.0	0.0	0.0	0.0	0.0	0.0	4.0
2240-2260	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2260-2280	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
2280-2300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3250.0	0.0	0.0
2300-2305	0.0	0.0	0.0	1600.0	2100.0	0.0	0.0	0.0	0.0	0.0
London-Hamilton	0.0	0.0	0.0	2700.0	2100.0	0.0	0.0	3250.0	0.0	10.0
2305-2320	0.0	0.0	0.0	1500.0	0.0	0.0	0.0	0.0	0.0	0.0
2320-2340	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2340-2360	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hamilton-Union Sta	0.0	0.0	0.0	1500.0	0.0	0.0	0.0	0.0	0.0	0.0
2360-2380	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2380-2400	0.0	0.0	0.0	900.0	0.0	0.0	0.0	0.0	0.0	0.0
2400-2420	0.0	0.0	0.0	1100.0	0.0	0.0	0.0	0.0	0.0	0.0
2420-2440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	0.0	0.0	0.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	14.0	6200.0	2100.0	0.0	0.0	3250.0	0.0	19.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

Station (km)	D1.1b 2-lane rural hwy Cross Shared Existing ROW (each)	D1.2a 4-lane rural hwy Crossing New/ Aband. ROW (each)	D1.2b 4-lane rural hwy Cross Shared Existing ROW (each)	D1.3a Major rural hwy Crossing New/ Aband. ROW (each)	D1.3b Major rural hwy Cross Shared Existing ROW (each)	D2.1a 2-4 lane urban hwy cross New/ Aband. ROW (each)	D2.1b 2-4 lane urban hwy cross shar- ed Exist. ROW (each)	D2.2a Major urban hwy cross New/ Aband. ROW (each)	D2.2b Major urban hwy cross shar- ed Exist. ROW (each)	D3.1a Modif. of exist urban grade se Shared ROW (each)
2000-2020	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	8.0
2020-2040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2040-2060	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2060-2080	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2080-2100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2100-2120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2120-2140	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2140-2160	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2160-2180	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	3.0
2180-2185	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	4.0
Windsor-London	0.0	1.0	0.0	0.0	0.0	0.0	7.0	0.0	0.0	15.0
2185-2200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
2200-2220	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2220-2240	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
2240-2260	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2260-2280	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
2280-2300	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0
2300-2305	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
London-Hamilton	0.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	0.0	9.0
2305-2320	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	9.0
2320-2340	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	9.0
2340-2360	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	15.0
Hamilton-Union Sta	0.0	0.0	0.0	0.0	0.0	1.0	5.0	0.0	0.0	33.0
2360-2380	0.0	0.0	0.0	0.0	0.0	3.0	0.0	4.0	0.0	18.0
2380-2400	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	9.0
2400-2420	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	9.0
2420-2440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	0.0	0.0	0.0	0.0	0.0	3.0	2.0	4.0	0.0	36.0
Total	0.0	1.0	0.0	1.0	0.0	5.0	15.0	4.0	0.0	93.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

Station (km)	D3.1b Modif. of exist urban grade se Aband ROW (each)	D3.2a Modif. of exist rural grade Shared ROW (each)	D3.2b Modif. of exist rural grade sep Aband ROW (each)	D4.0 Closure Diversion of Roads (km of road)	E1.0 Removal of Rail (km)	E2.0 New Rail Construction (km)	E3.1 New Rail/Rail Grade Separation (each)	E3.2a Modif. exist. Rail/Rail Grade Sep. New ROW (each)	E3.2b Modif. exist. Rail/Rail Grade Shared ROW (each)	
2000-2020	0.0	0.0	0.0	0.0	0.0	8.6	6.0	1.0	0.0	
2020-2040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2040-2060	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	
2060-2080	0.0	0.0	0.0	0.0	0.0	6.5	1.0	0.0	0.0	
2080-2100	0.0	0.0	0.0	0.0	7.0	3.5	1.0	0.0	0.0	
2100-2120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2120-2140	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2140-2160	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2160-2180	0.0	0.0	1.0	0.0	2.0	2.0	0.0	1.0	1.0	
2180-2185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Windsor-London	0.0	0.0	1.0	0.0	16.5	20.6	8.0	2.0	1.0	
2185-2200	0.0	1.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	
2200-2220	0.0	1.0	0.0	0.5	0.0	0.0	1.0	0.0	0.0	
2220-2240	0.0	1.0	0.0	2.5	2.5	0.0	1.0	0.0	0.0	
2240-2260	0.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
2260-2280	0.0	1.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	
2280-2300	0.0	4.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	
2300-2305	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
London-Hamilton	0.0	10.0	0.0	3.0	4.5	0.0	8.0	0.0	0.0	
2305-2320	0.0	0.0	0.0	0.0	2.0	4.1	0.0	0.0	0.0	
2320-2340	0.0	0.0	0.0	0.0	26.6	23.5	0.0	0.0	0.0	
2340-2360	0.0	0.0	0.0	0.0	28.3	9.2	0.0	0.0	0.0	
Hamilton-Union Sta	0.0	0.0	0.0	0.0	56.9	36.7	0.0	0.0	0.0	
2360-2380	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	
2380-2400	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	
2400-2420	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
2420-2440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Union Sta-Oshawa	0.0	0.0	0.0	0.0	4.4	4.0	0.0	1.0	0.0	
Total	0.0	10.0	1.0	3.0	82.2	61.3	16.0	3.0	1.0	

200-250 KPH TILTING TECHNOLOGY

OSHAWA - RICHMOND

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex. ROW			Upgrade Ex. Roadbed (route-km)
			50m (route-km)	50–60m (route-km)	60–70m (route-km)	70–80m (route-km)	>80m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0–20Km	20.000	–	20.000	0.000	0.000	0.000	0.000	7.000	13.000	0.000	0.000	0.000	0.000	0.000
20–40Km	20.000	–	20.000	0.000	0.000	0.000	0.000	14.000	6.000	0.000	0.000	0.000	0.000	0.000
40–60Km	20.000	–	20.000	0.000	0.000	0.000	0.000	10.000	6.960	2.600	0.000	0.000	0.000	0.000
60–80Km	20.000	–	20.000	0.000	0.000	0.000	0.000	12.000	2.000	6.000	0.000	0.000	0.000	0.000
80–100Km	20.000	–	20.000	0.000	0.000	0.000	0.000	16.500	1.500	2.000	0.000	0.000	0.000	0.000
100–120Km	20.000	–	20.000	0.000	0.000	0.000	0.000	10.800	9.000	0.000	0.000	0.000	0.000	0.000
120–140Km	20.000	–	20.000	0.000	0.000	0.000	0.000	3.000	16.710	0.000	0.000	0.000	0.000	0.000
140–160Km	20.000	–	20.000	0.000	0.000	0.000	0.000	2.340	17.500	0.000	0.000	0.000	0.000	0.000
160–180Km	20.000	–	20.000	0.000	0.000	0.000	0.000	11.465	7.950	0.500	0.000	0.000	0.000	0.000
180–195.6	15.600	Item No. 5	15.600	0.000	0.000	0.000	0.000	11.500	3.500	0.000	0.000	0.600	0.000	0.600
Sub-total	195.600	1	195.600	0.000	0.000	0.000	0.000	98.605	84.120	11.100	0.000	0.600	0.000	0.600
195.6–200	4.400	–	4.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.400	0.000	4.400
200–220Km	20.000	–	20.000	0.000	0.000	0.000	0.000	2.390	13.500	4.000	0.000	0.000	0.000	0.000
220–240Km	20.000	–	19.500	0.500	0.000	0.000	0.000	8.000	11.420	0.500	0.000	0.000	0.000	0.000
240–260Km	20.000	–	19.500	0.000	0.500	0.000	0.000	2.000	14.500	3.500	0.000	0.000	0.000	0.000
260–280Km	20.000	–	18.500	0.000	1.500	0.000	0.000	12.000	8.000	0.000	0.000	0.000	0.000	0.000
280–300Km	20.000	–	20.000	0.000	0.000	0.000	0.000	2.780	0.000	3.500	8.220	0.000	5.500	0.000
300–320Km	20.000	–	20.000	0.000	0.000	0.000	0.000	7.375	2.500	3.200	3.625	1.500	1.500	0.000
320–321.015	1.015	–	1.015	0.000	0.000	0.000	0.000	1.015	0.000	0.000	0.000	0.000	0.000	0.000
Sub-total	125.415	0	122.915	0.500	2.000	0.000	0.000	35.560	49.920	14.700	11.845	5.900	7.000	4.400
321.015–340	18.985	–	18.985	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.485	0.000	10.500	0.000
340–360Km	2.780	–	2.780	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.440	0.000	1.340	0.000
Sub-total	21.765	0	21.765	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.925	0.000	11.840	0.000
Total	342.780	1	340.280	0.500	2.000	0.000	0.000	134.165	134.040	25.800	21.770	6.500	18.840	5.000

Commencing Chainage : 2000+000 Chainage for Kingston Segment : 2195+600

End Chainage : 2342+780 Chainage for Smiths Falls Segment : 2321+015

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m ³)	Haulage (x1000m ³ -km)	Retaining Structures		Disposal of	
								Borrow Material (x1000m ³)	ROW cut in soft (x1000m ³)	ROW cut in rock (x1000m ³)			up to 3m in ht. (km)	over 3m in ht. (km)	Suitable Soft (x1000m ³)	Material Rock (x1000m ³)
0-20Km	20.000						20.000	0.00	43.17	0.00	368.06	0.00	0.00	0.00	111.53	0.00
20-40Km	20.000						20.000	0.00	58.79	0.00	186.90	0.00	0.00	0.00	303.59	0.00
40-60Km	20.000						20.000	0.00	143.96	0.00	196.25	0.00	1.00	0.00	55.02	0.00
60-80Km	20.000						20.000	0.00	35.77	0.00	123.72	0.00	0.00	0.00	184.28	0.00
80-100Km	20.000						20.000	0.00	69.17	0.00	88.73	0.00	0.00	0.00	204.73	0.00
100-120Km	20.000						20.000	0.00	29.90	0.00	105.02	0.00	0.00	0.00	197.81	196.40
120-140Km	20.000						20.000	0.00	85.72	206.12	44.17	0.00	0.00	0.00	0.00	97.32
140-160Km	20.000						20.000	0.00	33.22	119.89	54.71	0.00	0.00	0.00	0.00	229.46
160-180Km	20.000						20.000	0.00	207.82	69.89	471.53	0.00	0.00	0.00	0.00	168.10
180-195.6	15.600						15.600	0.00	0.00	0.00	97.44	0.00	0.00	0.00	61.68	235.01
Sub-total	195.600						195.600	0.00	707.52	395.90	1,736.53	0.00	1.00	0.00	1,118.64	926.29
195.6-200	4.400						4.400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200-220Km	20.000						20.000	0.00	12.75	55.76	166.99	0.00	0.00	0.00	0.00	415.09
220-240Km	20.000						20.000	0.00	37.17	200.43	37.61	0.00	0.00	0.00	0.00	428.78
240-260Km	20.000						20.000	0.00	10.95	105.01	597.31	0.00	0.00	0.00	0.00	74.84
260-280Km	20.000						20.000	0.00	28.14	157.13	544.49	0.00	0.00	0.00	0.00	135.21
280-300Km	20.000						20.000	0.00	19.35	226.99	163.36	0.00	0.00	0.00	0.00	0.00
300-320Km	20.000						20.000	0.00	40.28	386.06	67.12	12,444.45	0.00	0.00	0.00	0.00
320-321.015	1.015						1.015	0.00	0.00	7.21	0.00	144.20	0.00	0.00	0.00	0.00
Sub-total	125.415						125.415	0.00	148.64	1,138.59	1,576.88	12,588.65	0.00	0.00	0.00	1,053.92
321.015-340	18.985						18.985	0.00	1.38	2.40	106.30	0.00	0.00	0.00	0.00	106.76
340-360Km	2.780						2.780	0.00	0.00	0.00	20.53	0.00	0.00	0.00	0.00	20.93
Sub-total	21.765						21.765	0.00	1.38	2.40	126.83	0.00	0.00	0.00	0.00	127.69
Total	342.780	0	0	0	0	0	342.780	0.00	857.54	1,536.89	3,440.24	12,588.65	1.00	0.00	1,118.64	2,107.90

Commencing Chainage : 2000+000 Chainage for Kingston Segment : 2195+600
End Chainage : 2342+780 Chainage for Smiths Falls Segment : 2321+015

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	30–100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100–250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0–20Km	20.000	0.000	20.000	16	2	0	0	0	0	0	0	0	0
20–40Km	20.000	0.000	20.000	26	0	0	0	0	0	0	0	0	0
40–60Km	19.560	0.000	19.560	15	0	0	0	40	0	0	0	0	0
60–80Km	20.000	0.000	20.000	21	0	0	0	0	0	0	0	0	0
80–100Km	20.000	0.000	20.000	15	0	0	0	0	0	0	0	0	0
100–120Km	19.800	0.000	19.800	11	0	0	0	50	0	0	150	0	0
120–140Km	19.710	0.000	19.710	8	0	0	0	0	0	0	290	0	0
140–160Km	19.840	0.000	19.840	8	0	0	0	0	0	0	160	0	0
160–180Km	19.915	0.000	19.915	13	0	0	0	85	0	0	0	0	0
180–195.6	15.000	0.600	15.600	6	0	0	0	0	0	0	0	0	0
Sub-total	193.825	0.600	194.425	139	2	0	0	175	0	0	600	0	0
195.6–200	0.000	4.400	4.400	2	0	0	0	0	0	0	0	0	0
200–220Km	19.890	0.000	19.890	6	0	0	0	0	0	0	110	0	0
220–240Km	19.920	0.000	19.920	6	0	0	0	80	0	0	0	0	0
240–260Km	20.000	0.000	20.000	2	0	0	0	0	0	0	0	0	0
260–280Km	20.000	0.000	20.000	7	0	0	0	0	0	0	0	0	0
280–300Km	6.280	13.720	20.000	7	0	0	0	0	0	0	0	0	0
300–320Km	13.075	6.625	19.700	3	1	0	1	0	0	0	0	0	0
320–321.015	1.015	0.000	1.015	1	0	0	0	0	0	0	0	0	0
Sub-total	100.180	24.745	124.925	34	1	0	1	80	0	0	110	0	0
321.015–340	0.000	18.985	18.985	10	0	0	0	0	0	0	0	0	0
340–360Km	0.000	2.780	2.780	2	0	0	0	0	0	0	0	0	0
Sub-total	0.000	21.765	21.765	12	0	0	0	0	0	0	0	0	0
Total	294.005	47.110	341.115	185	3	0	1	255	0	0	710	0	0

Commencing Chainage : 2000+000 Chainage for Kingston Segment : 2195+600
End Chainage : 2342+780 Chainage for Smiths Falls Segment : 2321+015

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

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Section	Major River Crossings			Modifications of Ex. Rail Crossings (each)	Acquired ROW Removal of Rail Lines (km)	Rail Crossing on Ex /Shared ROW			Rail Crossing on New ROW			Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)			Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0–20Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
20–40Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
40–60Km	400	0	400	0	0.000	3/2km*	0	2	0	0	0	0	0	0	0
60–80Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
80–100Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
100–120Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
120–140Km	0	0	0	0	0.000	0	0	0	1	0	0	0	0	0	0
140–160Km	0	0	0	0	0.000	2km*	0	0	0	0	0	0	0	0	0
160–180Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
180–195.6	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
Sub-total	400	0	400	0	0.000	3/4km*	0	2	1	0	0	0	0	0	0
195.6–200	0	0	0	0	0.000	1	0	0	0	0	0	0	0	0	0
200–220Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
220–240Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
240–260Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
260–280Km	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
280–300Km	0	0	0	0	13.720	0	0	0	1	0	1	0	0	0	0
300–320Km	300	0	300	0	6.625	0	0	0	1	0	0	0	0	0	0
320–321.015	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0
Sub-total	300	0	300	0	20.345	1	0	0	2	0	1	0	0	0	0
321.015–340	0	0	0	0	18.985	0	0	0	0	0	0	0	0	0	0
340–360Km	0	0	0	0	2.780	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	0	21.765	0	0	0	0	0	0	0	0	0	0
Total	700	0	700	0	42.110	4/4km*	0	2	3	0	1	0	0	0	0

Commencing Chainage : 2000+000 Chainage for Kingston Segment : 2195+600
 End Chainage : 2342+780 Chainage for Smiths Falls Segment : 2321+015

Note :
 * denotes realignment of existing rail track
 # denotes rearrangement of existing yards

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO – NATIONAL CAPITAL REGION
TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

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Section	Highway Crossing																			
	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings										Rural Level Crossing (each)	Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings						Urban Level Crossing (each)
		2-lane (each)		E.O. for diff. fdn.		4-lane (each)		E.O. for diff. fdn.		Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)			Sec.2-4 (each)		E.O. for diff. fdn.		Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	
		Single ROW	Dual ROW	Single ROW	Dual ROW	Single ROW	Dual ROW	Single ROW	Dual ROW					Single ROW	Dual ROW					
																Single	Dual			
0-20Km	5	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
20-40Km	8	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
40-60Km	2	0	1	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	8
60-80Km	1	0	1	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
80-100Km	2	0	2	0	0	0	0	0	0	2	0	10	0	0	0	0	0	0	0	0
100-120Km	3	0	3	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
120-140Km	0	0	2	0	0	0	0	0	0	0	0	3	0	0	2	0	0	1	0	2
140-160Km	0	1	2	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	2
160-180Km	1	0	3	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
180-195.6	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Sub-total	22	1	17	0	0	0	0	0	0	2	0	55	5	0	5	0	0	1	0	12
195.6-200	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
200-220Km	0	0	2	0	0	0	0	0	0	1	1	3	0	0	1	0	0	0	0	0
220-240Km	0	0	2	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
240-260Km	1	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
260-280Km	0	3	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
280-300Km	0	1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0
300-320Km	0	2	2	1	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
320-321.015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	1	6	12	1	1	0	0	0	0	1	1	24	0	0	2	0	0	0	0	0
321.015-340	0	1	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
340-360Km	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Sub-total	0	1	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
Total	23	8	29	1	1	0	0	0	0	3	1	85	5	0	7	0	0	1	0	12

Commencing Chainage :
End Chainage :

2000+000
2342+780

Chainage for Kingston Segment :
Chainage for Smiths Falls Segment :

2195+600
2321+015

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO – NATIONAL CAPITAL REGION
TECHNOLOGY : 200 KM/H PLUS ON EXISTING ROW

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track Tunnelling		Noise Attenu- ation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0–20Km	0.00	2	0	0	0	0	0.00	0	20.000		4	0	3.5	0
20–40Km	0.00	4	0	0	0	0	0.00	0	20.000		0	0	0.0	0
40–60Km	0.00	1	0	0	0	0	0.00	0	19.560		0	0	8.7	0
60–80Km	0.00	0	0	0	0	0	0.00	0	20.000		0	0	2.6	0
80–100Km	0.00	3	0	0	0	0	4.00	0	18.000		0	0	9.7	0
100–120Km	0.00	4	0	0	0	0	0.00	0	19.800		0	0	3.4	0
120–140Km	0.00	1	0	0	0	0	0.00	0	19.710		0	0	13.0	0
140–160Km	0.00	8	0	0	0	0	3.50	0	18.090		2	1	2.2	0
160–180Km	0.00	5	0	0	0	0	3.00	0	18.415		3	1	0.6	0
180–195.6	0.00	0	0	0	0	0	0.00	0	15.600		0	0	2.0	0
Sub-total	0.00	28	0	0	0	0	10.50	0	189.175		9	2	45.7	0
195.6–200	0.00	0	0	0	0	0	0.00	0	4.400		3	0	1.5	0
200–220Km	0.00	2	0	0	0	0	0.00	0	19.890		3	0	0.0	0
220–240Km	0.00	9	0	0	0	0	0.00	0	19.920		0	0	4.8	0
240–260Km	0.00	4	0	0	0	0	0.00	0	20.000		0	2	1.2	0
260–280Km	0.00	6	0	0	0	0	4.00	0	18.000		2	4	0.9	0
280–300Km	0.00	0	0	0	0	0	0.00	0	20.000		2	0	0.0	0
300–320Km	0.00	4	0	0	0	0	0.00	0	19.700		1	0	1.5	0
320–321.015	0.00	0	0	0	0	0	0.00	0	1.015		0	0	0.0	0
Sub-total	0.00	25	0	0	0	0	4.00	0	122.925		11	6	9.9	0
321.015–340	0.00	4	0	0	0	0	0.00	0	18.985		1	0	0.0	0
340–360Km	0.00	1	2	0	0	0	0.00	0	2.780		0	0	0.0	0
Sub-total	0.00	5	2	0	0	0	0.00	0	21.765		1	0	0.0	0
Total	0.00	58	2	0	0	0	14.50	0	333.865	0	21	8	55.6	Incl.

Commencing Chainage : 2000+000 Chainage for Kingston Segment : 2195+600
End Chainage : 2342+780 Chainage for Smiths Falls Segment : 2321+015

Note :
* denotes realignment of utility lines

200-250 KPH TILTING TECHNOLOGY

RICHMOND - OTTAWA

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO - OTTAWA

TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Existing ROW			Upgrade Ex Roadbed (route-km)
			30m	30-35m	35-40m	40m	>40m	Type 1 Soils	Type 2 Soils	Type 3 Soils	Type 1 Soils	Type 2 Soils	Type 3 Soils	
			(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	
0-20Km	20		6.6	4.0	5.7	0.0	3.7	5.6	4.3	4	1.6	4.5		
20-40Km	16.8	1	15.4	0.0	0.4	0.0	1.0				4.6	11.4		
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	36.8	1	22.0	4.0	6.1	0.0	4.7	5.6	4.3	4	6.2	15.9	0	0

Commencing Chainage : 0+000

End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining Structures	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)			up to 3m (km)	over 3m (km)
0-20Km								139 73	394 67	66 18	93 23		0 0	0 0
20-40Km								34 86	442 68	0 00	345 22		0 6	0 7
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	104 87	837 35	66 18	438 45	0	0 6	0 7

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km			20	13				45					
20-40Km			16.7	8							150		
40-60Km													
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0	0	36.7	21	0	0	0	45	0	0	150	0	0

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Major River Crossings			Modifications of Ex Rail Crossings (each)	Rail Crossing						Modifications to Ex Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff fdn. (m)		Single Track (each)	E.O. for ht over 10m (each)	E.O. for diff fdn (each)	Double Track (each)	E.O. for ht over 10m (each)	E.O. for diff fdn (each)		>250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff fdn (m)
0-20Km														
20-40Km					1									
40-60Km														
60-80Km														
80-100Km														
100-120Km				*										
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings							Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings				
		2-lane (each)	E.O. for diff. fdn. (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	At Grade Crossings (each)		Secondary (2-4 lanes) (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	
0-20Km								5		4		1		
20-40Km									9	8				
40-60Km														
60-80Km														
80-100Km														
100-120Km			4											
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	5	9	12	0	1	0	

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex Tunnels (m)	Double Track Tunnelling		Noise Attenu-ation Structure		ROW Security Fencing (km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0-20Km	0.6	3					5.4		34.6					
20-40Km									33.4			7	1	
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0.6	3	0	0	0	0	5.4	0.0	68.0	0	0	7	1	0

Commencing Chainage : 0+000
End Chainage : 36+775

200-250 KPH TILTING TECHNOLOGY

OTTAWA - DORION

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Existing ROW			Upgrade Ex Roadbed (route-km)
			30m	30-35m	35-40m	40m	>40m	Type 1 Soils	Type 2 Soils	Type 3 Soils	Type 1 Soils	Type 2 Soils	Type 3 Soils	
			(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	
0-20Km	20.0		10.1	9.1	0.8	0.0	0.0				8.4	11.6		
20-40Km	20.0		6.1	5.8	4.4	0.0	3.7		6.6		1.0	12.4		
40-60Km	20.0		7.5	6.6	5.7	0.0	0.2	2.9	9.7		4.8	2.6		
60-80Km	20.0		15.6	1.9	0.4	0.0	2.1	2.1	3.0	3.1	3.5	8.0	0.3	
80-100Km	20.0		8.4	4.8	3.7	0.0	3.1		2.0		9.0	9.0		
100-120Km	20.0		8.0	1.6	1.9	0.0	8.5	5.4	8.5			4.0		
120-140Km	16.0		7.3	2.2	1.0	0.0	5.5	5.0	4.8			6.2		
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	136.0	0	63.0	32.0	17.9	0.0	23.1	15.4	34.6	3.1	26.7	53.8	0.3	0

Commencing Chainage : 0+000
End Chainage : 136+020

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining Structures	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)			up to 3m (km)	over 3m (km)
0-20Km								-45 63	195 16	0 00	100 83		0	0
20-40Km								327 28	45 76	0 00	45 71		0	0
40-60Km								90 83	12 62	0 00	27 73		0	0
60-80Km								9 37	256 30	33 51	210 12		0	0
80-100Km								-196 20	630 71	0 00	378 97		0	0
100-120Km								282 38	1246 57	0 00	96 30		0	0
120-140Km								3 25	809 11	0 00	90 13		0	0
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	471 28	3196 23	33 51	949 79	0	0	0

Commencing Chainage : 0+000
End Chainage : 136+020

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section		Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)		Small River Crossings			Intermediate River Crossings			Large River Crossings		
		New ROW	Ex. ROW				up to 30m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
		(route-km)	(route-km)												
0-20Km				20	8		60								
20-40Km				20	15										
40-60Km				20	5		90								
60-80Km				20	4		60								
80-100Km				20	5		30								
100-120Km				17	11		60								
120-140Km				16	3										
140-160Km															
160-180Km															
180-200Km															
200-220Km															
220-240Km															
240-260Km															
260-280Km															
280-300Km															
300-320Km															
320-340Km															
340-360Km															
Total		0	0	133	51		300	0	0	0	0	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 136+020

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Major River Crossings			Modifications of Ex. Rail Crossings (each)	Rail Crossing						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn (each)	Double Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn (each)		>250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn (m)
0-20Km														
20-40Km														
40-60Km														
60-80Km														
80-100Km														
100-120Km												950		
120-140Km												300		
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	0	0	0	0	1250	0	0

Commencing Chainage : 0+000
End Chainage : 136+020

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Modifications of Ex Rural Gr. Separation (each)	Rural Highway Crossings							Modifications of Ex Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn (each)	At Grade Crossings (each)		Secondary (2-4 lanes) (each)	E.O. for diff. fdn (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn (each)
0-20Km								8	4				
20-40Km		1						15					
40-60Km		3						7					
60-80Km								6					
80-100Km	1	3						3					
100-120Km		6				1		3					
120-140Km		1		3				2	2				
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	1	14	0	3	0	1	0	44	6	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 136+020

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 200+ Km/Hr ON EXISTING R.O.W.

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex Tunnels (m)	Double Track Tunnelling		Noise Attenu- alion Structure		ROW Security Fencing (km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0-20Km	0.5	2							40.0		4			
20-40Km		4							40.0		1			
40-60Km	1.0	4							40.0		1			
60-80Km		4							40.0		1			
80-100Km		4							40.0					
100-120Km		4			2050				36.0		3	1		
120-140Km	0.5	1							32.0			3		
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	2.0	23	0	0	2050	0	0.0	0.0	268.0	0	10	4	0	0

Commencing Chainage : 0+000
End Chainage : 136+020

200-250 KPH TILTING TECHNOLOGY

DORION - MONTREAL

Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex. ROW			Upgrade Ex. Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20,00	1	18,39	N/A	N/A	0,61	N/A	0,00	0,61	0,00	1,81	16,27	0,20	N/A
20-40Km	20,00	0	20,00	N/A	N/A	0,00	N/A	0,00	0,00	0,00	3,26	11,83	4,17	N/A
40-60Km	0,56	1	0,56	N/A	N/A	0,00	N/A	0,00	0,00	0,00	0,00	0,31	0,00	N/A
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	40,56	2	39,95	0,00	0,00	0,61	0,00	0,00	0,61	0,00	5,07	28,41	4,37	0,00

Commencing Chainage : 7965+740

End Chainage : 8006+300

Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining up to 3m (km)	Structures over 3m (km)
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)				
0-20Km	40,00	TO BE	TO BE	TO BE	TO BE	N/A	N/A	35,85	0,00	0,00	0,00	N/A	0,00	0,00
20-40Km	40,00	DEFINED	DEFINED	DEFINED	DEFINED	N/A	N/A	31,05	87,40	0,00	57,04	N/A	0,00	0,00
40-60Km	1,12	BY km	BY km	BY km	BY km	N/A	N/A	0,84	0,00	0,00	0,00	N/A	0,00	0,00
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	81,12	0	0	0,00	0,00	0	0,00	67,74	87,40	0,00	57,04	0,00	0,00	0,00

Commencing Chainage : 7065+740
End Chainage : 8006+300

Section	Sub-ballast	Layers	Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,61	18,28	18,89	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
20-40Km	0,00	18,26	18,26	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
40-60Km	0,00	0,31	0,31	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0,61	37,85	38,46	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Commencing Chainage : 7965+740

End Chainage : 8006+300

Section	Major River Crossings			Modifications of Ex. Rail Crossings (each) *	Rail Crossings (New)						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	Double Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	990,00	0,00	N/A	N/A
20-40Km	0,00	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	360,00	0,00	N/A	N/A
40-60Km	0,00	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0,00	0,00	0,00	0	0	0	0	0	0	0	1 350,00	0,00	0,00	0,00

Commencing Chainage : 7965+740
End Chainage : 8006+300

*: Railway sidings to abandoned

Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings (New)							Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn. (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	At-grade level crossing		Secondary (2-4 lanes) (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)
0-20Km	5	0	N/A	0	N/A	SEE 4-LANE	N/A	2	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
20-40Km	20	0	N/A	0	N/A	SEE 4-LANE	N/A	1	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
40-60Km	1	0	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	26	0	0	0	0	0	0	3	0	0	0	0	0

Commencing Chainage : 7965+740
End Chainage : 8006+300

Section	Closure & Diversion of Roads (each)	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track Soft Ground (m)	Tunnelling Rock (m)	Noise Attenuation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Crossings (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
								Barriers (km)	Berms (km)						
0-20Km	0	0,00	0	TO BE	0,00	0,00	0,00	0,00	N/A	18,89	N/A	2	N/A	TO BE	TO BE
20-40Km	0	0,00	0	DEFINED	0,00	0,00	0,00	0,00	N/A	19,04	N/A	2	N/A	DEFINED	DEFINED
40-60Km	0	0,00	0	BY km	0,00	0,00	0,00	0,00	N/A	0,53	N/A	0	N/A	BY km	BY km
60-80Km															
80-100Km															
100-120Km															
120-140Km															
140-160Km															
160-180Km															
180-200Km															
200-220Km															
220-240Km															
240-260Km															
260-280Km															
280-300Km															
300-320Km															
320-340Km															
340-360Km															
Total	0	0,00	0	0	0,00	0,00	0,00	0,00	0,00	38,46	0,00	4	0	0,00	0,00

Commencing Chainage : 7965+740
End Chainage : 8006+300

200-250 KPH TILTING TECHNOLOGY

MONTREAL - QUEBEC

Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex. ROW			Upgrade Ex. Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20,00	1	12,89	N/A	N/A	7,11	N/A	0,00	0,00	0,00	1,08	6,14	0,00	N/A
20-40Km	20,00		17,60	N/A	N/A	2,40	N/A	0,00	1,03	1,37	0,00	16,97	0,18	N/A
40-60Km	20,00		20,00	N/A	N/A	0,00	N/A	0,00	0,00	0,00	0,30	17,01	2,30	N/A
60-80Km	20,00		20,00	N/A	N/A	0,00	N/A	0,00	0,00	0,00	2,70	4,30	13,00	N/A
80-100Km	20,00		20,00	N/A	N/A	0,00	N/A	0,00	0,00	0,00	7,45	12,45	0,00	N/A
100-120Km	20,00		4,64	N/A	N/A	15,36	N/A	5,22	10,04	0,00	0,00	4,64	0,00	N/A
120-140Km	20,00		1,28	N/A	N/A	18,72	N/A	18,21	0,00	0,40	1,28	0,00	0,00	N/A
140-160Km	20,00		0,19	N/A	N/A	19,81	N/A	14,77	0,00	4,40	0,00	0,00	0,19	N/A
160-180Km	20,00		17,94	N/A	N/A	2,06	N/A	2,06	0,00	0,00	15,82	0,00	1,70	N/A
180-200Km	20,00		19,21	N/A	N/A	0,79	N/A	0,79	0,00	0,00	11,65	4,60	2,10	N/A
200-220Km	20,00		12,73	N/A	N/A	7,27	N/A	5,77	1,50	0,00	9,46	0,20	3,00	N/A
220-240Km	20,00		4,71	N/A	N/A	15,29	N/A	15,13	0,00	0,00	4,71	0,00	0,00	N/A
240-260Km	20,00		12,12	N/A	N/A	7,88	N/A	7,88	0,00	0,00	12,12	0,00	0,00	N/A
260-280Km	12,51	1	11,02	N/A	N/A	1,49	N/A	0,00	0,00	0,00	10,50	0,00	0,00	N/A
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	272,51	2	174,33	0,00	0,00	98,18	0,00	69,83	12,57	6,17	77,07	66,31	22,47	0,00

Commencing Chainage : 2006+300
End Chainage : 2278+810

Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m³)	Haulage (x1000m³-km)	Retaining up to 3m (km)	Structures over 3m (km)
								Borrow Material (x1000m³)	ROW cut In soft (x1000m³)	ROW cut in rock (x1000m³)				
0-20Km	40,00	TO BE	TO BE	TO BE	TO BE	N/A	N/A	12,15	0,00	0,00	0,00	N/A	1,05	2,13
20-40Km	40,00	DEFINED	DEFINED	DEFINED	DEFINED	N/A	N/A	399,19	17,19	0,00	17,19	N/A	0,00	0,00
40-60Km	40,00	BY km	BY km	BY km	BY km	N/A	N/A	240,96	28,47	0,00	28,47	N/A	0,00	0,00
60-80Km	40,00					N/A	N/A	62,31	206,60	0,00	206,60	N/A	0,00	0,00
80-100Km	40,00					N/A	N/A	106,99	9,51	0,00	5,85	N/A	0,00	0,00
100-120Km	40,00					N/A	N/A	188,64	87,71	0,00	28,06	N/A	0,00	0,00
120-140Km	40,00					N/A	N/A	80,20	112,44	0,00	11,24	N/A	0,00	0,00
140-160Km	40,00					N/A	N/A	180,86	26,48	0,00	2,65	N/A	0,00	0,00
160-180Km	40,00					N/A	N/A	516,94	306,68	0,00	32,14	N/A	0,00	0,00
180-200Km	40,00					N/A	N/A	196,02	42,80	0,00	5,50	N/A	0,00	0,00
200-220Km	40,00					N/A	N/A	115,82	378,68	0,00	76,08	N/A	0,00	0,00
220-240Km	40,00					N/A	N/A	349,22	69,56	0,00	6,96	N/A	0,00	0,00
240-260Km	40,00					N/A	N/A	184,91	135,91	0,00	13,59	N/A	0,00	0,00
260-280Km	25,02					N/A	N/A	18,95	0,00	0,00	0,00	N/A	0,44	1,46
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	546,02	0	0	0,00	0,00	0	0,00	2 653,16	1 422,03	0,00	434,33	0,00	1,49	3,59

Commencing Chainage : 2006+300
End Chainage : 2278+810

Section	Sub-ballast	Layers	Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	7,22	0,00	7,22	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
20-40Km	2,40	17,15	19,55	2	2,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
40-60Km	0,00	19,61	19,61	5	4,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
60-80Km	0,00	20,00	20,00	2	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
80-100Km	0,00	19,90	19,90	8	1,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
100-120Km	15,26	4,64	19,90	8	15,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
120-140Km	18,61	1,28	19,89	0	14,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
140-160Km	19,17	0,19	19,36	1	6,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
160-180Km	2,06	17,52	19,58	3	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
180-200Km	0,79	18,35	19,14	1	9,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
200-220Km	7,27	12,66	19,93	0	14,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
220-240Km	15,13	4,71	19,84	1	6,00	N/A	N/A	40,00	N/A	N/A	120,00	N/A	N/A
240-260Km	7,88	12,12	20,00	1	19,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
260-280Km	0,00	10,50	10,50	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	95,79	158,63	254,42	32	90,00	0,00	0,00	40,00	0,00	0,00	120,00	0,00	0,00

Commencing Chainage : 2006+300
End Chainage : 2278+810

Section	Major River Crossings			Modifications of Ex. Rail Crossings (each) *	Rail Crossings (New)						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	Double Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	N/A	N/A	2	0	N/A	N/A	N/A	N/A	N/A	300,00	0,00	N/A	N/A
20-40Km	0,00	N/A	N/A	1	0	N/A	N/A	N/A	N/A	N/A	200,00	0,00	N/A	N/A
40-60Km	0,00	N/A	N/A	1	1	N/A	N/A	N/A	N/A	N/A	280,00	0,00	N/A	N/A
60-80Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
80-100Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	100,00	0,00	N/A	N/A
100-120Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
120-140Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
140-160Km	280,00	N/A	N/A	0	2	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
160-180Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	370,00	0,00	N/A	N/A
180-200Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	790,00	0,00	N/A	N/A
200-220Km	0,00	N/A	N/A	0	1	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
220-240Km	0,00	N/A	N/A	1	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
240-260Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
260-280Km	0,00	N/A	N/A	6	0	N/A	N/A	N/A	N/A	N/A	250,00	0,00	N/A	N/A
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	280,00	0,00	0,00	11	4	0	0	0	0	0	2 290,00	0,00	0,00	0,00

Commencing Chainage : 2006+300
End Chainage : 2278+810

*: Railway sidings to abandoned

Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings (New)							Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn. (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	At-grade level crossing		Secondary (2-4 lanes) (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)
0-20Km	7	1	N/A	0	N/A	SEE 4-LANE	N/A	1	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
20-40Km	5	2	N/A	1	N/A	SEE 4-LANE	N/A	1	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
40-60Km	0	3	N/A	0	N/A	SEE 4-LANE	N/A	4	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
60-80Km	2	0	N/A	0	N/A	SEE 4-LANE	N/A	3	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
80-100Km	0	1	N/A	0	N/A	SEE 4-LANE	N/A	7	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
100-120Km	0	2	N/A	0	N/A	SEE 4-LANE	N/A	6	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
120-140Km	0	1	N/A	0	N/A	SEE 4-LANE	N/A	10	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
140-160Km	0	4	N/A	1	N/A	SEE 4-LANE	N/A	6	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
160-180Km	0	1	N/A	0	N/A	SEE 4-LANE	N/A	4	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
180-200Km	0	1	N/A	0	N/A	SEE 4-LANE	N/A	4	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
200-220Km	0	1	N/A	0	N/A	SEE 4-LANE	N/A	9	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
220-240Km	0	2	N/A	0	N/A	SEE 4-LANE	N/A	6	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
240-260Km	1	2	N/A	0	N/A	SEE 4-LANE	N/A	7	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
260-280Km	9	1	N/A	0	N/A	SEE 4-LANE	N/A	4	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	24	22	0	2	0	0	0	72	0	0	0	0	0

Commencing Chainage : 2008+300
End Chainage : 2278+810

Section	Closure & Diversion of Roads (each)	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track		Tunnelling		Noise Attenuation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Crossings (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
						Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)								
0-20Km	0	0,00	0	TO BE	5 070,00	0,00	4 557,00	0,00	N/A	7,22	N/A	1	N/A	TO BE	TO BE		
20-40Km	2	0,10	0	DEFINED	0,00	0,00	0,00	0,00	N/A	19,55	N/A	4	N/A	DEFINED	DEFINED		
40-60Km	0	0,00	23	BY km	0,00	0,00	0,00	0,00	N/A	19,65	N/A	2	N/A	BY km	BY km		
60-80Km	2	6,05	4		0,00	0,00	0,00	0,00	N/A	20,00	N/A	1	N/A				
80-100Km	2	0,10	3		0,00	0,00	0,00	0,00	N/A	19,90	N/A	1	N/A				
100-120Km	0	0,00	0		0,00	0,00	0,00	3,00	N/A	18,32	N/A	1	N/A				
120-140Km	0	0,00	2		0,00	0,00	0,00	1,00	N/A	19,39	N/A	3	N/A				
140-160Km	7	12,25	4		0,00	0,00	0,00	18,60	N/A	10,06	N/A	6	N/A				
160-180Km	3	6,10	3		0,00	0,00	0,00	0,00	N/A	19,58	N/A	0	N/A				
180-200Km	0	0,00	5		0,00	0,00	0,00	0,00	N/A	19,14	N/A	0	N/A				
200-220Km	6	18,15	4		0,00	0,00	0,00	0,00	N/A	19,93	N/A	2	N/A				
220-240Km	1	6,00	0		0,00	0,00	0,00	0,00	N/A	19,84	N/A	3	N/A				
240-260Km	0	0,00	23		0,00	0,00	0,00	0,00	N/A	20,00	N/A	0	N/A				
260-280Km	0	0,00	0		0,00	0,00	260,00	0,00	N/A	10,50	N/A	5	N/A				
280-300Km																	
300-320Km																	
320-340Km																	
340-360Km																	
Total	23	48,75	71	0	5 070,00	0,00	4 817,00	22,60	0,00	243,07	0,00	29	0	0,00	0,00		

Commencing Chainage : 2006+300
End Chainage : 2278+810

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN EXISTING RAIL CORRIDORS**

WINDSOR - OSHAWA

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

Station (km)	B1.1 Clearing and roadbed prep. in Type 1 Soils (route-km)	B1.2 Clearing and roadbed prep. in Type 2 Soils (route-km)	B1.3 Clearing and roadbed prep. in Type 2 Soils (route-km)	B2.1 Enbankment from ROW cut in soft material (000's cubic-m)	B2.2 Enbankment from ROW cut in rock (000's cubic-m)	B2.3 Enbankment from borrow material (000's cubic-m)	B2.4 Disposal of unsuitable material (000's cubic-m)	B3.0 Haulage of fill material (000's cubic-m)	B4.1 Sub-ballast layers; new ROW (route-km)	B4.2 Sub-ballast layers; existing ROW (route-km)
1000-1020	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
1020-1040	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
1040-1060	17.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	14.8
1060-1080	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7	7.3
1080-1100	3.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	9.5
1100-1120	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
1120-1140	9.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
1140-1160	15.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	12.0
1160-1180	14.8	5.2	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
1180-1195	11.3	0.0	3.7	0.0	0.0	0.0	0.0	0.0	15.0	0.0
Windsor-London	130.1	61.2	3.7	0.0	0.0	0.0	0.0	0.0	71.4	123.6
1195-1200	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
1200-1220	16.6	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.3	19.7
1220-1240	18.7	0.0	1.3	0.0	0.0	0.0	0.0	0.0	18.5	1.5
1240-1260	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	15.0
1260-1280	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5	1.5
1280-1300	16.8	3.2	0.0	0.0	0.0	0.0	0.0	0.0	2.3	17.7
1300-1310	4.5	5.5	0.0	0.0	0.0	0.0	0.0	0.0	3.9	6.1
London-Hamilton	101.6	8.7	4.7	0.0	0.0	0.0	0.0	0.0	53.5	61.5
1310-1320	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
1320-1340	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
1340-1360	16.3	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
1360-1365	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
Hamilton-Union Sta	46.3	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.0
1365-1380	13.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
1380-1400	11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
1400-1420	5.9	14.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
1420-1440	0.0	2.3	1.5	0.0	0.0	0.0	0.0	0.0	0.0	3.8
Union Sta-Oshawa	30.3	27.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	58.8
Total	308.3	105.6	9.9	0.0	0.0	0.0	0.0	0.0	124.9	298.9

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

Station (km)	B5.1 Normal ROW drainage system (route-km)	B5.2 Major Watercourse Culverts (each)	B5.3 Environmental stormwater controls (each)	B6.0 Upgrade of Exist. Roadbed on Exist. ROW (route-km)	B7.1 Retaining Structures up to 3 m Height (Km)	B7.2 Retaining Structures over 3 m Height (Km)	B8.1 Noise Attenua- tion Structures Barriers (Km)	B8.2 Noise Attenua- tion Structures Berms (Km)	B9.0 ROW Security Fencing (2-sided) (route-km)	B10.0 Snow Control Measures (Km)
1000-1020	20.0	2.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
1020-1040	20.0	0.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
1040-1060	19.9	0.0	19.9	14.8	0.0	0.0	0.0	0.0	19.9	0.0
1060-1080	19.8	1.0	19.8	7.3	0.0	0.0	0.0	0.0	19.8	0.0
1080-1100	20.0	3.0	20.0	9.5	0.0	0.0	0.0	0.0	20.0	0.0
1100-1120	20.0	0.0	20.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
1120-1140	20.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
1140-1160	20.0	4.0	20.0	12.0	0.0	0.0	0.0	0.0	20.0	0.0
1160-1180	19.8	7.0	19.8	0.0	0.0	0.0	0.0	0.0	19.8	0.0
1180-1195	14.8	8.0	14.8	0.0	0.0	0.0	0.0	0.0	14.8	0.0
Windsor-London	194.3	25.0	194.3	103.6	0.0	0.0	0.0	0.0	194.3	0.0
1195-1200	5.0	1.0	5.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
1200-1220	19.9	14.0	19.9	19.7	0.0	0.0	0.0	0.0	19.9	0.0
1220-1240	18.7	9.0	18.7	1.5	0.0	0.0	0.0	0.0	18.7	0.0
1240-1260	19.9	11.0	19.9	15.0	0.0	0.0	0.0	0.0	19.9	0.0
1260-1280	19.9	14.0	19.9	1.5	0.0	0.0	0.0	0.0	19.9	0.0
1280-1300	17.7	14.0	17.7	17.7	0.0	0.0	0.0	0.0	17.7	0.0
1300-1310	7.3	15.0	7.3	6.1	0.0	0.0	0.0	0.0	7.3	0.0
London-Hamilton	108.6	78.0	108.6	61.5	0.0	0.0	0.0	0.0	108.6	0.0
1310-1320	8.5	9.0	8.5	10.0	0.0	0.0	0.0	0.0	8.5	0.0
1320-1340	19.8	8.0	19.8	20.0	0.0	0.0	0.0	0.0	19.8	0.0
1340-1360	19.7	3.0	19.7	20.0	0.6	1.9	0.0	0.0	19.7	0.0
1360-1365	5.0	0.0	5.0	5.0	0.0	0.1	0.0	0.0	5.0	0.0
Hamilton-Union Sta	53.0	20.0	53.0	55.0	0.6	2.0	0.0	0.0	53.0	0.0
1365-1380	14.9	0.0	14.9	15.0	0.0	0.0	0.0	0.0	14.9	0.0
1380-1400	19.8	4.0	19.8	20.0	1.0	0.0	0.0	0.0	19.8	0.0
1400-1420	18.9	6.0	18.9	20.0	0.0	0.0	0.2	0.0	18.9	0.0
1420-1440	2.7	1.0	2.7	3.8	0.0	0.0	0.0	0.0	2.7	0.0
Union Sta-Oshawa	56.4	11.0	56.4	58.8	1.0	0.0	0.2	0.0	56.4	0.0
Total	412.3	134.0	412.3	278.9	1.6	2.0	0.2	0.0	412.3	0.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

Station (km)	B11.1 Utilities- Major Hydro Relocation (each)	B11.2 Utilities- Major Oil/Gas Relocation (each)	B11.3 Minor pipe or Wire Crossings (route-km)	B12.0 Other Items (Lump-Sum)	C1.1 Small River Crossings (L < 30 m) (each)	C1.2 Extra over C1.1 for Height over 10 m (each)	C1.3 Intermediate River Crossings (30 < L < 100) (Linear metre)	C1.4 Extra over C1.3 for Height over 10 m (Linear metre)	C1.5 Large River Crossings (100 < L < 250) (Linear metre)	C1.6 Extra over C1.5 for Height over 10 m (Linear metre)
1000-1020	1.0	0.0	20.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
1020-1040	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1040-1060	1.0	0.0	20.0	0.0	2.0	0.0	100.0	0.0	0.0	0.0
1060-1080	1.0	0.0	20.0	0.0	2.0	0.0	200.0	0.0	0.0	0.0
1080-1100	3.0	0.0	20.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
1100-1120	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1120-1140	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1140-1160	0.0	1.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1160-1180	3.0	0.0	20.0	0.0	2.0	0.0	50.0	0.0	100.0	50.0
1180-1195	3.0	0.0	15.0	0.0	1.0	0.0	150.0	50.0	0.0	0.0
Windsor-London	12.0	1.0	195.0	0.0	11.0	0.0	500.0	50.0	100.0	50.0
1195-1200	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1200-1220	1.0	0.0	20.0	0.0	4.0	0.0	50.0	0.0	0.0	0.0
1220-1240	2.0	0.0	20.0	0.0	1.0	0.0	100.0	50.0	0.0	0.0
1240-1260	0.0	0.0	20.0	0.0	1.0	0.0	50.0	0.0	0.0	0.0
1260-1280	2.0	0.0	20.0	0.0	2.0	0.0	50.0	25.0	0.0	0.0
1280-1300	1.0	1.0	20.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
1300-1310	3.0	2.0	10.0	0.0	0.0	0.0	50.0	25.0	0.0	0.0
London-Hamilton	9.0	3.0	115.0	0.0	10.0	0.0	300.0	100.0	0.0	0.0
1310-1320	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1320-1340	0.0	1.0	20.0	0.0	1.0	0.0	150.0	75.0	0.0	0.0
1340-1360	0.0	0.0	20.0	0.0	2.0	0.0	230.0	75.0	0.0	0.0
1360-1365	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hamilton-Union Sta	0.0	1.0	55.0	0.0	3.0	0.0	380.0	150.0	0.0	0.0
1365-1380	0.0	0.0	15.0	0.0	0.0	0.0	90.0	0.0	0.0	0.0
1380-1400	0.0	0.0	20.0	0.0	2.0	0.0	120.0	60.0	0.0	0.0
1400-1420	0.0	0.0	20.0	0.0	1.0	0.0	110.0	55.0	0.0	0.0
1420-1440	0.0	0.0	3.8	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	0.0	0.0	58.8	0.0	4.0	0.0	320.0	115.0	0.0	0.0
Total	21.0	5.0	423.8	0.0	28.0	0.0	1500.0	415.0	100.0	50.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

Station (km)	C1.7 Major River Crossings (L > 250 m) (Linear metre)	C1.8 Extra over C1.7 C1.7 for Difficult Foundations (Linear metre)	C1.9 Modifications to existing bridges (Linear metre)	C2.1 Viaducts of length greater than 250 m (Linear metre)	C2.2 Extra over C2.1 for height over 10 m (Linear metre)	C2.3 Extra over C2.1 for difficult Foundations (Linear metre)	C3.1 Double Track Tunneling in Soft ground (metre)	C3.2 Double Track Tunneling in Rock (metre)	C3.3 Modifications to existing Tunnels (Lump sum)	D1.1a 2-lane rural hwy Crossing New/ Aband. ROW (each)
1000-1020	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
1020-1040	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0
1040-1060	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
1060-1080	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0
1080-1100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0
1100-1120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
1120-1140	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0
1140-1160	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0
1160-1180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
1180-1195	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
Windsor-London	0.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	68.0
1195-1200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
1200-1220	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
1220-1240	0.0	0.0	0.0	1100.0	0.0	0.0	0.0	0.0	0.0	11.0
1240-1260	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
1260-1280	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0
1280-1300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2250.0	0.0	0.0
1300-1310	0.0	0.0	0.0	1600.0	2100.0	0.0	0.0	1000.0	0.0	0.0
London-Hamilton	0.0	0.0	0.0	2700.0	2100.0	0.0	0.0	3250.0	0.0	23.0
1310-1320	0.0	0.0	0.0	1500.0	0.0	0.0	0.0	0.0	0.0	0.0
1320-1340	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1340-1360	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1360-1365	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hamilton-Union Sta	0.0	0.0	0.0	1500.0	0.0	0.0	0.0	0.0	0.0	0.0
1365-1380	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
1380-1400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1400-1420	0.0	0.0	0.0	900.0	0.0	0.0	0.0	0.0	0.0	0.0
1420-1440	0.0	0.0	0.0	1100.0	0.0	1800.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	0.0	0.0	0.0	2000.0	0.0	1800.0	0.0	0.0	0.0	3.0
Total	0.0	0.0	11.0	6200.0	2100.0	1800.0	0.0	3250.0	0.0	94.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

Station (km)	D1.1b 2-lane rural hwy Cross Shared Existing ROW (each)	D1.2a 4-lane rural hwy Crossing New/ Aband. ROW (each)	D1.2b 4-lane rural hwy Cross Shared Existing ROW (each)	D1.3a Major rural hwy Crossing New/ Aband. ROW (each)	D1.3b Major rural hwy Cross Shared Existing ROW (each)	D2.1a 2-4 lane urban hwy cross New/ Aband. ROW (each)	D2.1b 2-4 lane urban hwy cross shar- ed Exist. ROW (each)	D2.2a Major urban hwy cross New/ Aband. ROW (each)	D2.2b Major urban hwy cross shar- ed Exist. ROW (each)	D3.1a Modif. of exist urban grade se- Shared ROW (each)
1000-1020	0.0	0.0	0.0	0.0	0.0	1.0	6.0	0.0	0.0	8.0
1020-1040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1040-1060	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1060-1080	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1080-1100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1100-1120	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1120-1140	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1140-1160	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1160-1180	1.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
1180-1195	0.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Windsor-London	2.0	3.0	0.0	4.0	0.0	1.0	6.0	0.0	0.0	8.0
1195-1200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1200-1220	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1220-1240	2.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
1240-1260	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
1260-1280	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1280-1300	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0
1300-1310	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	3.0
London-Hamilton	9.0	0.0	0.0	1.0	0.0	2.0	2.0	0.0	0.0	4.0
1310-1320	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0
1320-1340	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	9.0
1340-1360	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	16.0
1360-1365	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
Hamilton-Union Sta	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	34.0
1365-1380	0.0	0.0	0.0	0.0	0.0	2.0	0.0	1.0	0.0	18.0
1380-1400	0.0	0.0	0.0	0.0	0.0	1.0	1.0	3.0	0.0	4.0
1400-1420	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	15.0
1420-1440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	0.0	0.0	0.0	0.0	0.0	3.0	2.0	4.0	0.0	37.0
Total	11.0	3.0	0.0	5.0	0.0	6.0	15.0	4.0	0.0	83.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

Station (km)	D3.1b Modif. of exist urban grade sep Aband ROW (each)	D3.2a Modif. of exist rural grade Shared ROW (each)	D3.2b Modif. of exist rural grade sep Aband ROW (each)	D4.0 Closure Diversion of Roads (km of road)	E1.0 Removal of Rail (km)	E2.0 New Rail Construction (km)	E3.1 New Rail/Rail Grade Separation (each)	E3.2a Modif. exist. Rail/Rail Grade Sep. New ROW (each)	E3.2b Modif. exist. Rail/Rail Grade Shared ROW (each)	D1.6 Extra for difficult Foundation Conditions (each)
1000-1020	0.0	0.0	0.0	0.0	0.0	8.6	6.0	1.0	0.0	0.0
1020-1040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1040-1060	0.0	0.0	0.0	2.4	7.5	0.0	0.0	0.0	0.0	0.0
1060-1080	0.0	1.0	0.0	0.0	0.0	6.5	1.0	0.0	0.0	0.0
1080-1100	0.0	0.0	0.0	0.0	7.0	3.5	1.0	0.0	0.0	0.0
1100-1120	0.0	0.0	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0
1120-1140	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0
1140-1160	0.0	0.0	0.0	1.4	0.0	0.0	1.0	0.0	0.0	0.0
1160-1180	0.0	2.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
1180-1195	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0
Windsor-London	0.0	3.0	0.0	17.1	14.5	18.6	11.0	1.0	0.0	2.0
1195-1200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1200-1220	0.0	2.0	0.0	7.0	0.0	0.0	2.0	0.0	0.0	1.0
1220-1240	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0
1240-1260	0.0	3.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
1260-1280	0.0	0.0	0.0	0.9	0.0	0.0	1.0	0.0	0.0	0.0
1280-1300	0.0	5.0	0.0	3.3	0.0	0.0	3.0	0.0	0.0	0.0
1300-1310	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
London-Hamilton	0.0	10.0	0.0	11.2	0.0	0.0	8.0	0.0	0.0	2.0
1310-1320	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1320-1340	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
1340-1360	0.0	0.0	0.0	0.4	16.5	25.0	0.0	0.0	0.0	0.0
1360-1365	0.0	0.0	0.0	0.0	20.5	11.7	0.0	0.0	0.0	0.0
Hamilton-Union Sta	0.0	0.0	0.0	0.7	37.0	36.7	0.0	0.0	0.0	0.0
1365-1380	0.0	0.0	0.0	0.0	18.2	0.0	0.0	0.0	0.0	0.0
1380-1400	0.0	0.0	0.0	1.8	9.2	4.0	0.0	0.0	0.0	0.0
1400-1420	0.0	0.0	0.0	0.0	3.4	0.0	0.0	1.0	0.0	0.0
1420-1440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Union Sta-Oshawa	0.0	0.0	0.0	1.8	30.7	4.0	0.0	1.0	0.0	0.0
Total	0.0	13.0	0.0	30.8	82.3	59.3	19.0	2.0	0.0	4.0

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN EXISTING RAIL CORRIDORS**

OSHAWA - RICHMOND

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex. ROW			Upgrade Ex. Roadbed (route-km)
			50m (route-km)	50-60m (route-km)	60-70m (route-km)	70-80m (route-km)	>80m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	19.960	-	19.480	0.000	0.500	0.000	0.000	5.000	13.460	1.500	0.000	0.000	0.000	0.000
20-40Km	20.000	-	18.500	1.000	0.500	0.000	0.000	13.500	6.350	0.000	0.000	0.000	0.000	0.000
40-43.6Km	3.600	-	3.600	0.000	0.000	0.000	0.000	3.500	0.000	0.100	0.000	0.000	0.000	0.000
Sub-total	43.560	0	41.560	1.000	1.000	0.000	0.000	22.000	19.810	1.600	0.000	0.000	0.000	0.000
43.6-60Km	16.400	-	13.900	0.500	0.000	1.000	1.000	6.700	7.300	0.700	0.000	0.000	0.000	0.000
60-80Km	20.000	-	20.000	0.000	0.000	0.000	0.000	12.000	2.000	6.000	0.000	0.000	0.000	0.000
80-100Km	20.000	-	20.000	0.000	0.000	0.000	0.000	16.500	1.500	2.000	0.000	0.000	0.000	0.000
100-120Km	20.000	-	20.000	0.000	0.000	0.000	0.000	10.800	9.000	0.000	0.000	0.000	0.000	0.000
120-140Km	20.000	-	20.000	0.000	0.000	0.000	0.000	3.000	16.710	0.000	0.000	0.000	0.000	0.000
140-160Km	20.000	-	20.000	0.000	0.000	0.000	0.000	2.000	18.000	0.000	0.000	0.000	0.000	0.000
160-180Km	20.000	-	18.500	0.500	1.000	0.000	0.000	15.700	3.000	0.950	0.000	0.000	0.000	0.000
180-196.1	16.100	Item No. 5	16.100	0.000	0.000	0.000	0.000	10.500	5.600	0.000	0.000	0.000	0.000	0.000
Sub-total	152.500	1	148.500	1.000	1.000	1.000	1.000	77.200	63.110	9.650	0.000	0.000	0.000	0.000
196.1-200	3.900	-	3.900	0.000	0.000	0.000	0.000	2.000	1.900	0.000	0.000	0.000	0.000	0.000
200-220Km	20.000	-	19.500	0.000	0.500	0.000	0.000	6.880	12.900	0.000	0.000	0.000	0.000	0.000
220-240Km	20.000	-	19.000	0.500	0.500	0.000	0.000	8.920	8.780	1.100	0.000	0.000	0.000	0.000
240-260Km	20.000	-	17.000	1.500	0.500	0.500	0.500	14.000	3.500	2.500	0.000	0.000	0.000	0.000
260-280Km	20.000	-	20.000	0.000	0.000	0.000	0.000	12.000	0.000	8.000	0.000	0.000	0.000	0.000
280-289.575	9.575	-	9.575	0.000	0.000	0.000	0.000	3.160	0.000	3.150	2.915	0.000	0.000	0.000
Sub-total	93.475	0	88.975	2.000	1.500	0.500	0.500	46.960	27.080	14.750	2.915	0.000	0.000	0.000
289.575-300	10.425	-	10.425	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.925	0.000	7.500	0.000
300-320Km	11.340	-	11.340	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.000	0.000	4.340	0.000
Sub-total	21.765	0	21.765	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.925	0.000	11.840	0.000
Total	311.300	1	300.800	4.000	3.500	1.500	1.500	146.160	110.000	26.000	12.840	0.000	11.840	0.000

Commencing Chainage : 1000+040 Chainage for Cobourg Segment : 1043+600

End Chainage : 1311+340 Chainage for Kingston Segment : 1196+100

Chainage for Smiths Falls Segment : 1289+575

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining up to 3m in ht. (km)	Structures over 3m in ht. (km)	Disposal of	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)					Suitable Soft (x1000m^3)	Material Rock (x1000m^3)
0-20Km	19.960						19.960	376.20	286.78	152.48	831.91	0.00	0.00	0.00	0.00	0.00
20-40Km	20.000						20.000	757.32	477.70	13.76	325.82	0.00	0.00	0.00	0.00	0.00
40-43.6Km	3.600						3.600	0.00	66.74	0.00	17.74	0.00	1.00	0.00	0.00	0.00
Sub-total	43.560						43.560	1,133.52	831.22	166.24	1,175.47	0.00	1.00	0.00	0.00	0.00
43.6-60Km	16.400						16.400	0.00	594.07	572.01	638.75	0.00	0.00	1.50	0.00	226.03
60-80Km	20.000						20.000	0.00	23.03	0.00	320.04	0.00	0.00	0.00	239.46	0.00
80-100Km	20.000						20.000	0.00	0.00	0.00	106.65	0.00	0.00	0.00	313.91	0.00
100-120Km	20.000						20.000	0.00	54.40	0.00	105.80	0.00	0.00	0.00	195.07	196.17
120-140Km	20.000						20.000	0.00	110.70	190.63	52.75	0.00	0.00	0.00	0.00	279.98
140-160Km	20.000						20.000	0.00	29.89	191.97	137.34	0.00	0.00	0.00	0.00	150.70
160-180Km	20.000						20.000	0.00	250.84	268.35	54.20	0.00	0.00	0.00	0.00	777.16
180-196.1	16.100						16.100	0.00	41.22	98.62	45.47	0.00	0.00	0.00	0.00	168.72
Sub-total	152.500						152.500	0.00	1,104.15	1,321.58	1,461.00	0.00	0.00	1.50	748.44	1,798.76
196.1-200	3.900						3.900	0.00	9.44	0.00	7.15	0.00	0.00	0.00	16.77	334.12
200-220Km	20.000						20.000	0.00	174.51	87.82	54.16	0.00	0.00	0.00	0.00	902.04
220-240Km	20.000						20.000	0.00	396.88	156.57	159.00	0.00	0.00	0.00	0.00	294.12
240-260Km	20.000						20.000	0.00	57.97	909.68	276.09	0.00	0.00	0.00	0.00	0.00
260-280Km	20.000						20.000	0.00	3.66	887.39	80.56	16,336.95	0.00	0.00	0.00	0.00
280-289.575	9.575						9.575	0.00	14.63	643.39	12.62	17,044.30	0.00	0.00	0.00	0.00
Sub-total	93.475						93.475	0.00	657.09	2,664.85	589.58	33,381.25	0.00	0.00	16.77	1,530.28
289.575-300	10.425						10.425	0.00	1.87	4.93	77.35	0.00	0.00	0.00	0.00	38.74
300-320Km	11.340						11.340	0.00	0.00	8.24	34.36	0.00	0.00	0.00	0.00	49.36
Sub-total	21.765						21.765	0.00	1.87	13.17	111.71	0.00	0.00	0.00	0.00	88.10
Total	311.300						311.300	1,133.52	2,594.33	4,165.84	3,337.76	33,381.25	1.00	1.50	765.21	3,417.14

Commencing Chainage : 1000+040 Chainage for Cobourg Segment : 1043+600
End Chainage : 1311+340 Chainage for Kingston Segment : 1196+100
Chainage for Smiths Falls Segment : 1289+575

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	30–100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100–250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0–20Km	18.860	0.000	18.860	16	2	0	0	0	0	0	0	0	0
20–40Km	19.850	0.000	19.850	25	0	0	0	0	0	0	150	150	0
40–43.6Km	3.600	0.000	3.600	0	0	0	0	0	0	0	0	0	0
Sub-total	42.310	0.000	42.310	41	2	0	0	0	0	0	150	150	0
43.6–60Km	14.700	0.000	14.700	11	3	0	0	0	0	0	0	0	0
60–80Km	20.000	0.000	20.000	19	0	0	0	0	0	0	0	0	0
80–100Km	20.000	0.000	20.000	14	0	0	0	0	0	0	0	0	0
100–120Km	19.800	0.000	19.800	11	0	0	0	50	0	0	150	0	0
120–140Km	19.710	0.000	19.710	9	0	0	0	0	0	0	290	0	0
140–160Km	20.000	0.000	20.000	13	0	0	0	0	0	0	0	0	0
160–180Km	19.650	0.000	19.650	9	0	0	0	50	0	50	0	0	0
180–196.1	16.100	0.000	16.100	7	0	0	0	0	0	0	0	0	0
Sub-total	149.960	0.000	149.960	93	3	0	0	100	0	50	440	0	0
196.1–200	3.900	0.000	3.900	2	0	0	0	0	0	0	0	0	0
200–220Km	19.780	0.000	19.780	5	0	0	0	0	0	0	120	0	0
220–240Km	18.800	0.000	18.800	10	0	0	0	0	0	0	0	0	0
240–260Km	20.000	0.000	20.000	9	0	0	0	0	0	0	0	0	0
260–280Km	20.000	0.000	20.000	6	0	0	0	0	0	0	0	0	0
280–289.575	6.310	2.915	9.225	3	0	0	0	0	0	0	0	0	0
Sub-total	88.790	2.915	91.705	35	0	0	0	0	0	0	120	0	0
289.575–300	0.000	10.425	10.425	4	0	0	0	0	0	0	0	0	0
300–320Km	0.000	11.340	11.340	8	0	0	0	0	0	0	0	0	0
Sub-total	0.000	21.765	21.765	12	0	0	0	0	0	0	0	0	0
Total	281.060	24.680	305.740	181	5	0	0	100	0	50	710	150	0

Commencing Chainage : 1000+040 Chainage for Cobourg Segment : 1043+600
End Chainage : 1311+340 Chainage for Kingston Segment : 1196+100
Chainage for Smiths Falls Segment : 1289+575

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON EXISTING ROW

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Section	Major River Crossings			Acquired ROW Removal of Rail Lines (km)	Rail Crossings on Ex./Shared ROW				Rail Crossings on New ROW				Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Modifications of Ex. Rail Crossings (each)	Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	Modifications of Ex. Rail Crossings (each)	Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0–20Km	0	0	0	0.000	0	0	0	0	0	5	0	0	0	1,100	700	1,100
20–40Km	0	0	0	0.000	0	0	0	0	0	4	1	0	0	0	0	0
40–43.6Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	0.000	0	0	0	0	0	9	1	0	0	1,100	700	1,100
43.6–60Km	500	500	300	0.000	0	0	0	0	0	0	0	0	0	0	0	0
60–80Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
80–100Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
100–120Km	0	0	0	0.000	0	0	0	0	1	1	0	0	0	0	0	0
120–140Km	0	0	0	0.000	0	0	0	0	0	1/2km*	0	0	0	0	0	0
140–160Km	0	0	0	0.000	0	0	0	0	0	2km*	0	0	0	0	0	0
160–180Km	300	100	0	0.000	0	0	0	0	0	1	0	0	0	0	0	0
180–196.1	0	0	0	0.000	0	0	0	0	0	1	0	0	0	0	0	0
Sub-total	800	600	300	0.000	0	0	0	0	1	4/4km*	0	0	0	0	0	0
196.1–200	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
200–220Km	100	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
220–240Km	1,200	1,150	400	0.000	0	0	0	0	0	0	0	0	0	0	0	0
240–260Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
260–280Km	0	0	0	0.000	0	0	0	0	0	1	0	1	0	0	0	0
280–289.575	350	0	350	2.915	0	0	0	0	0	2	0	0	0	0	0	0
Sub-total	1,650	1,150	750	2.915	0	0	0	0	0	3	0	1	0	0	0	0
289.575–300	0	0	0	10.425	0	0	0	0	0	0	0	0	0	0	0	0
300–320Km	0	0	0	11.340	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	21.765	0	0	0	0	0	0	0	0	0	0	0	0
Total	2,450	1,750	1,050	24.680	0	0	0	0	1	16/4km*	1	1	0	1,100	700	1,100

Commencing Chainage : 1000+040
End Chainage : 1311+340

Chainage for Cobourg Segment : 1043+600
Chainage for Kingston Segment : 1196+100
Chainage for Smiths Falls Segment : 1289+575

Note :
* denotes realignment of existing rail track

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Section	Highway Crossings																		
	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings										Rural Road Closures (each)	Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings					
		2-lane (each)		E.O. for		4-lane (each)		E.O. for		Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)			Sec.2-4 (each)		E.O. for		Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)
		Single ROW	Dual ROW	diff. fdn.		Single ROW	Dual ROW	diff. fdn.						Single ROW	Dual ROW	diff. fdn.			
				Single	Dual			Single	Dual							Single	Dual		
0-20Km	0	10	1	0	1	1	0	0	0	0	0	6	0	0	0	0	0	0	0
20-40Km	0	11	0	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0
40-43.6Km	0	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Sub-total	0	24	1	0	1	1	0	0	0	1	0	11	0	0	0	0	0	0	0
43.6-60Km	0	10	0	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
60-80Km	1	1	11	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0
80-100Km	2	0	11	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0
100-120Km	4	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120-140Km	2	1	2	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0
140-160Km	0	5	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
160-180Km	0	9	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
180-196.1	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	9	35	30	2	4	0	0	0	0	4	0	8	1	0	5	0	0	0	0
196.1-200	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200-220Km	0	9	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
220-240Km	0	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
240-260Km	0	7	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
260-280Km	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
280-289.575	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	0	34	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
289.575-300	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300-320Km	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	9	100	31	6	5	1	0	0	0	5	0	22	1	0	5	0	0	0	0

Commencing Chainage : 1000+040
End Chainage : 1311+340

Chainage for Cobourg Segment : 1043+600
Chainage for Kingston Segment : 1196+100
Chainage for Smiths Falls Segment : 1289+575

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track Tunnelling		Noise Attenu- ation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0-20Km	2.05	8	0	0	0	0	19.50	0	9.110		4	0	3.0	0
20-40Km	1.30	3	0	0	0	0	9.00	0	15.350		0	0	0.0	0
40-43.6Km	0.40	2	0	0	0	0	0.00	0	3.600		0	0	0.7	0
Sub-total	3.75	13	0	0	0	0	28.50	0	28.060		4	0	3.7	0
43.6-60Km	0.45	7	0	0	0	1,200	4.00	0	12.700		0	0	7.7	0
60-80Km	0.40	2	0	0	0	0	0.00	0	20.000		0	0	2.6	0
80-100Km	0.80	5	0	0	0	0	4.00	0	18.000		0	0	9.6	0
100-120Km	0.00	4	0	0	0	0	0.00	0	19.800		0	0	3.4	0
120-140Km	0.00	1	0	0	0	0	2.00	0	18.710		0	0	13.0	0
140-160Km	0.00	6	0	0	0	0	7.00	0	16.500		2	1	0.6	0
160-180Km	2.80	1	0	0	0	0	0.00	0	19.650		0	1	0.0	0
180-196.1	0.00	1	0	0	0	0	1.50	0	15.350		4	1	1.3	0
Sub-total	4.45	27	0	0	0	1,200	18.50	0	140.710		6	3	38.2	0
196.1-200	0.00	1	0	0	0	0	0.00	0	3.900		1	1	3.0	0
200-220Km	1.00	7	0	0	0	0	0.00	0	19.780		0	4	2.0	0
220-240Km	0.20	10	0	0	0	0	0.00	0	18.800		0	0	0.6	0
240-260Km	0.65	0	0	0	0	0	0.00	0	20.000		3	0	0.0	0
260-280Km	0.00	3	0	0	0	0	0.00	0	20.000		0	0	0.3	0
280-289.575	0.00	2	0	0	0	0	0.00	0	9.225		0	0	2.8	0
Sub-total	1.85	23	0	0	0	0	0.00	0	91.705		4	5	8.7	0
289.575-300	0.00	1	0	0	0	0	0.00	0	10.425		0	0	0.0	0
300-320Km	0.00	4	2	0	0	0	0.00	0	11.340		1	0	0.0	0
Sub-total	0.00	5	2	0	0	0	0.00	0	21.765		1	0	0.0	0
Total	10.05	68	2	0	0	1,200	47.00	0	282.240		15	8	50.6	Incl.

Commencing Chainage : 1000+040 Chainage for Cobourg Segment : 1043+600
 End Chainage : 1311+340 Chainage for Kingston Segment : 1196+100
 Chainage for Smiths Falls Segment : 1289+575

Note :
 * denotes realignment of utility lines

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN EXISTING RAIL CORRIDORS**

RICHMOND - OTTAWA

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W.

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Existing ROW			Upgrade Ex Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20		6.6	4.0	5.7	0.0	3.7	5.6	4.3	4	1.6	4.5		
20-40Km	16.8	1	15.4	0.0	0.4	0.0	1.0				4.6	11.4		
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	36.8	1	22.0	4.0	6.1	0.0	4.7	5.6	4.3	4	6.2	15.9	0	0

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W.

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining Structures	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)			up to 3m (km)	over 3m (km)
0-20Km								139.73	394.67	66.18	93.23		0.0	0.0
20-40Km								34.86	442.68	0.00	345.22		0.6	0.7
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	104.87	837.35	66.18	438.45	0	0.6	0.7

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)
0-20Km			20	13				45					
20-40Km			16.7	8							150		
40-60Km													
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0	0	36.7	21	0	0	0	45	0	0	150	0	0

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W.

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Section	Major River Crossings			Modifications of Ex Rail Crossings (each)	Rail Crossing						Modifications to Ex Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn (each)	Double Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn (each)		>250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn (m)
0-20Km														
20-40Km					1									
40-60Km														
60-80Km														
80-100Km				4										
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W.

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Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings						Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn. (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)		Secondary (2-4 lanes) (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)
0-20Km		2		3					4		1	
20-40Km								9	8			
40-60Km												
60-80Km												
80-100Km												
100-120Km												
120-140Km												
140-160Km												
160-180Km												
180-200Km												
200-220Km												
220-240Km												
240-260Km												
260-280Km												
280-300Km												
300-320Km												
320-340Km												
340-360Km												
Total	0	2	0	3	0	0	0	9	12	0	1	0

Commencing Chainage : 0+000
End Chainage : 36+775

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO - OTTAWA
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W.

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track Tunnelling		Noise Attenuation Structure		ROW Security Fencing (km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0-20Km	0.6	4					5.4		34.6					
20-40Km									33.4		7	1		
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0.6	4	0	0	0	0	5.4	0.0	68.0	0	7	1	0	0

Commencing Chainage : 0+000
End Chainage : 36+775

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN EXISTING RAIL CORRIDORS**

OTTAWA - CP LACHUTE

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL BYPASS

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Existing ROW			Upgrade Ex Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20.0		10.1	9.0	0.8	0.0	0.0				8.4	11.6		
20-40Km	20.0		6.1	5.8	4.3	0.0	3.6		6.6		1.0	12.4		
40-60Km	20.0		7.6	6.5	5.7	0.0	0.2	2.9	9.7		4.8	2.6		
60-80Km	20.0		15.7	1.8	0.4	0.0	2.1	2.1	3.0	3.1	3.5	8.0	0.3	
80-100Km	20.0		7.2	4.6	4.2	0.0	4.0	6.7	6.4		2.9	4.0		
100-120Km	20.0		4.0	3.8	1.7	0.0	10.5	12.0	8.0					
120-140Km	14.4		6.2	6.3	0.2	0.0	1.7	5.6	1.5		6.8	0.5		7.3
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	134.4	0	56.9	37.8	17.3	0.0	22.1	29.3	35.2	3.1	27.4	39.1	0.3	7.3

Commencing Chainage : 0+000
End Chainage : 134+400

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL BYPASS

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining Structures	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)			up to 3m (km)	over 3m (km)
0-20Km								45 65	195 16	0 00	100 83		0	0
20-40Km								327 28	45 76	0 00	45 76		0	0
40-60Km								90 83	112 62	0 00	27 73		0	0
60-80Km								9 37	256 30	33 51	210 12		0	0
80-100Km								380 71	984 49	0 00	429 47		0	0
100-120Km								1237 11	752 91	0 00	106 31		0	0
120-140Km								424 17	0 00	0 00	0 00		0	0
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	1662 40	2347 24	33 51	920 22	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+400

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL BYPASS

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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)
0-20Km			20	8	60								
20-40Km			20	15									
40-60Km			20	5	90								
60-80Km			20	4	60								
80-100Km			20	8									
100-120Km			19.3	8	30								
120-140Km			14.4	8	30								
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0	0	133.7	56	270	0	0	0	0	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+400

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL BYPASS

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Section	Major River Crossings			Modifications of Ex Rail Crossings (each)	Rail Crossing						Modifications to Ex Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht over 10m (each)	E.O. for diff fdn (each)	Double Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff fdn (m)
0-20Km														
20-40Km														
40-60Km														
60-80Km														
80-100Km				4	1									
100-120Km	800				1									
120-140Km					1									
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	800	0	0	0	3	0	0	0	0	0	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+400

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL BYPASS

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Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings						Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn (each)	4-lane (each)	E.O. for diff. fdn (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn (each)		Secondary (2-4 lanes) (each)	E.O. for diff. fdn (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn (each)
0-20Km		7						4	1			
20-40Km		16										
40-60Km		10										
60-80Km		6										
80-100Km	1	7										
100-120Km		7				1						
120-140Km	1	5										
140-160Km												
160-180Km												
180-200Km												
200-220Km												
220-240Km												
240-260Km												
260-280Km												
280-300Km												
300-320Km												
320-340Km												
340-360Km												
Total	2	58	0	0	0	1	0	4	1	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+400

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL BYPASS

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track Tunnelling		Noise Attenu- ation Structure		ROW Security Fencing (km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0-20Km	0.5	4							40.0		4			
20-40Km		5							40.0		1			
40-60Km	1.0	5							40.0		1			
60-80Km		5							40.0		1			
80-100Km		4							40.0					
100-120Km		3							38.6		5			
120-140Km		3							28.8		3			
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	1.5	29	0	0	0	0	0	0	267.4	0	15	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+400

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL STATION

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Existing ROW			Upgrade Ex Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20.0		10.1	9.0	0.8	0.0	0.0				8.4	11.6		
20-40Km	20.0		6.1	5.8	4.3	0.0	3.6		6.6		1.0	12.4		
40-60Km	20.0		7.6	6.5	5.7	0.0	0.2	2.9	9.7		4.8	2.6		
60-80Km	20.0		15.7	1.8	0.4	0.0	2.1	2.1	3.0	3.1	3.5	8.0	0.3	
80-100Km	20.0		7.2	4.6	4.2	0.0	4.0	6.7	6.4		2.9	4.0		
100-120Km	20.0		4.0	3.8	1.7	0.0	10.5	12.0	8.0					
120-140Km	14.8		2.9	8.5	1.1	0.0	2.3	12.8	2.0					
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	134.8	0	53.6	40.0	18.2	0.0	22.7	36.5	35.7	3.1	20.6	38.6	0.3	0

Commencing Chainage : 0+000
End Chainage : 134+830

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL STATION

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining Structures	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)			up to 3m (km)	over 3m (km)
0-20Km								-45 65	195 16	0 00	100 83		0	0
20-40Km								327 28	45 76	0 00	45 76		0	0
40-60Km								90 83	112 62	0 00	27 73		0	0
60-80Km								9 37	256 30	33 51	210 12		0	0
80-100Km								-380 71	984 49	0 00	429 47		0	0
100-120Km								1237 11	752 91	0 00	106 31		0	0
120-140Km								245 39	179 44	0 00	0 00		0	0
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	1483 62	2526 68	33 51	920 22	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+830

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL STATION

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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn. (m)
0-20Km			20	8	60								
20-40Km			20	15									
40-60Km			20	5	90								
60-80Km			20	4	60								
80-100Km			20	8									
100-120Km			19.3	8	30								
120-140Km			14.8	10									
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0	0	134.1	58	240	0	0	0	0	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+830

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL STATION

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Section	Major River Crossings			Modifications of Ex. Rail Crossings (each)	Rail Crossing						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn (each)	Double Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn (each)		>250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn. (m)
0-20Km														
20-40Km														
40-60Km														
60-80Km														
80-100Km					1									
100-120Km	800				1									
120-140Km					2									
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	800	0	0	0	4	0	0	0	0	0	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+830

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL STATION

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Section		Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings						Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
			2-lane (each)	E.O. for diff. fdn (each)	4-lane (each)	E.O. for diff fdn (each)	Major (over 4 lanes) (each)			E.O. for diff. fdn (each)	Secondary (2-4 lanes) (each)	E.O. for diff fdn (each)	Major (over 4 lanes) (each)
0-20Km			7						4	1			
20-40Km			16										
40-60Km			10										
60-80Km			6										
80-100Km		1	7										
100-120Km			7				1						
120-140Km		1	8										
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total		2	61	0	0	0	1	0	4	1	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+830

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON EXISTING R.O.W. - MIRABEL STATION

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track Tunnelling		Noise Attenuation Structure		ROW Security Fencing (km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0-20Km	0.5	4							40.0		4			
20-40Km		5							40.0		1			
40-60Km	1.0	5							40.0		1			
60-80Km		5							40.0		1			
80-100Km		4							40.0					
100-120Km		3							38.6		5			
120-140Km		3							29.6		3			
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	1.5	29	0	0	0	0	0	0	268.2	0	15	0	0	0

Commencing Chainage : 0+000
End Chainage : 134+830

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN EXISTING RAIL CORRIDORS**

CP LACHUTE - MONTREAL

Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex. ROW			Upgrade Ex. Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20,00	1	15,77	N/A	N/A	4,23	N/A	0,00	0,00	0,00	1,08	8,22	1,10	N/A
20-40Km	20,00	0	8,34	N/A	N/A	11,66	N/A	4,80	6,86	0,00	2,60	3,83	1,70	N/A
40-60Km	2,73	0	0,00	N/A	N/A	2,73	N/A	1,20	1,53	0,00	0,00	0,00	0,00	N/A
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	42,73	1	24,11	0,00	0,00	18,62	0,00	6,00	8,39	0,00	3,68	12,05	2,80	0,00

Commencing Chainage : 5006+300
End Chainage : 4049+030

Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining up to 3m (km)	Structures over 3m (km)
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)				
0-20Km	40,00	TO BE	TO BE	TO BE	TO BE	N/A	N/A	19,37	0,20	0,00	0,20	N/A	0,43	1,21
20-40Km	40,00	DEFINED	DEFINED	DEFINED	DEFINED	N/A	N/A	158,91	90,17	0,00	89,19	N/A	0,00	0,00
40-60Km	5,46	BY km	BY km	BY km	BY km	N/A	N/A	4,30	0,00	0,00	0,00	N/A	0,00	0,00
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	85,46	0	0	0,00	0,00	0	0,00	182,58	90,37	0,00	89,39	0,00	0,43	1,21

Commencing Chainage : 5008+300
End Chainage : 4049+030

Section	Sub-ballast	Layers	Normal ROW Drainage	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	10,40	10,40	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
20-40Km	11,66	8,13	19,79	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
40-60Km	2,73	0,00	2,73	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	14,39	18,53	32,92	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Commencing Chainage : 5006+300
End Chainage : 4049+030

Section	Major River Crossings			Modifications of Ex. Rail Crossings (each) *	Rail Crossings (New)						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. ldn. (m)		Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. ldn. (each)	Double Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. ldn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. ldn. (m)
0-20Km	0,00	N/A	N/A	5	N/A	N/A	N/A	N/A	N/A	N/A	300,00	0,00	N/A	N/A
20-40Km	0,00	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	210,00	0,00	N/A	N/A
40-60Km	0,00	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0,00	0,00	0,00	5	0	0	0	0	0	0	510,00	0,00	0,00	0,00

Commencing Chainage : 5006+300
End Chainage : 4049+030

*: Railway sidings to abandoned

Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings (New)							Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn. (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	At-grade level crossing		Secondary (2-4 lanes) (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)
0-20Km	7	3	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
20-40Km	2	10	N/A	1	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
40-60Km	0	1	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	9	14	0	1	0	0	0	0	0	0	0	0	0

Commencing Chainage : 5006+300

End Chainage : 4049+030

Section	Closure & Diversion of Roads (each)	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track		Tunnelling		Noise Attenuation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Crossings (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
						Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)	Barriers (km)	Berms (km)						
0-20Km	0	0,00	0	TO BE	5 070,00	0,00	2 607,00	0,00	N/A	10,41	N/A	3	N/A	TO BE	TO BE		
20-40Km	1	0,05	0	DEFINED	0,00	0,00	0,00	0,00	N/A	19,79	N/A	3	N/A	DEFINED	DEFINED		
40-60Km	0	0,00	0	BY km	0,00	0,00	0,00	0,00	N/A	2,73	N/A	2	N/A	BY km	BY km		
60-80Km																	
80-100Km																	
100-120Km																	
120-140Km																	
140-160Km																	
160-180Km																	
180-200Km																	
200-220Km																	
220-240Km																	
240-260Km																	
260-280Km																	
280-300Km																	
300-320Km																	
320-340Km																	
340-360Km																	
Total	1	0,05	0	0	5 070,00	0,00	2 607,00	0,00	0,00	32,93	0,00	8	0	0,00	0,00		

Commencing Chainage : 5006+300

End Chainage : 4049+030

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN EXISTING RAIL CORRIDORS**

MONTREAL - QUEBEC

Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex. ROW			Upgrade Ex. Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20,00	1	12,89	N/A	N/A	7,11	N/A	0,00	0,00	0,00	1,08	6,23	0,00	N/A
20-40Km	20,00		14,35	N/A	N/A	5,65	N/A	0,00	4,25	1,37	0,00	13,75	0,18	N/A
40-60Km	20,00		20,00	N/A	N/A	N/A	N/A	0,00	0,00	0,00	0,30	16,99	2,30	N/A
60-80Km	20,00		20,00	N/A	N/A	N/A	N/A	0,00	0,00	0,00	2,70	4,30	13,00	N/A
80-100Km	20,00		20,00	N/A	N/A	N/A	N/A	0,00	0,00	0,00	8,34	11,48	0,00	N/A
100-120Km	20,00		4,64	N/A	N/A	15,36	N/A	5,08	10,04	0,00	0,00	4,60	0,00	N/A
120-140Km	20,00		1,28	N/A	N/A	18,72	N/A	18,28	0,00	0,40	1,28	0,00	0,00	N/A
140-160Km	20,00		0,27	N/A	N/A	19,73	N/A	14,44	0,00	4,51	0,00	0,00	0,27	N/A
160-180Km	20,00		11,89	N/A	N/A	8,31	N/A	8,31	0,00	0,00	9,63	0,00	1,80	N/A
180-200Km	20,00		2,81	N/A	N/A	17,19	N/A	10,56	5,17	1,26	1,04	0,13	1,64	N/A
200-220Km	20,00		4,92	N/A	N/A	15,08	N/A	8,54	5,50	0,89	4,58	0,20	0,00	N/A
220-240Km	20,00		1,95	N/A	N/A	18,05	N/A	11,51	6,35	0,00	0,00	1,95	0,00	N/A
240-260Km	20,00		7,91	N/A	N/A	12,09	N/A	7,89	4,20	0,00	7,91	0,00	0,00	N/A
260-280Km	11,38	1	9,89	N/A	N/A	1,49	N/A	0,00	0,00	0,00	9,19	0,00	0,00	N/A
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	271,38	2	132,60	0,00	0,00	138,78	0,00	84,61	35,51	8,43	48,05	59,63	18,99	0,00

Commencing Chainage : 1006+300

End Chainage : 1277+680

Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining up to 3m (km)	Structures over 3m (km)
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)				
0-20Km	40,00	TO BE	TO BE	TO BE	TO BE	N/A	N/A	12,15	0,00	0,00	0,00	N/A	1,05	2,13
20-40Km	40,00	DEFINED	DEFINED	DEFINED	DEFINED	N/A	N/A	351,80	17,19	0,00	17,19	N/A	0,00	0,00
40-60Km	40,00	BY km	BY km	BY km	BY km	N/A	N/A	190,06	15,11	0,00	15,11	N/A	0,00	0,00
60-80Km	40,00					N/A	N/A	54,12	202,07	0,00	202,07	N/A	0,00	0,00
80-100Km	40,00					N/A	N/A	144,99	9,43	0,00	5,77	N/A	0,00	0,00
100-120Km	40,00					N/A	N/A	205,69	102,39	0,00	39,48	N/A	0,00	0,00
120-140Km	40,00					N/A	N/A	294,70	52,29	0,00	5,23	N/A	0,00	0,00
140-160Km	40,00					N/A	N/A	34,73	115,54	0,00	11,55	N/A	0,00	0,00
160-180Km	40,00					N/A	N/A	231,88	49,97	0,00	7,18	N/A	0,00	0,00
180-200Km	40,00					N/A	N/A	145,86	98,64	0,00	35,78	N/A	0,00	0,00
200-220Km	40,00					N/A	N/A	40,74	562,98	0,00	108,16	N/A	0,00	0,00
220-240Km	40,00					N/A	N/A	505,15	74,08	0,00	7,41	N/A	0,00	0,00
240-260Km	40,00					N/A	N/A	404,23	74,20	0,00	21,26	N/A	0,00	0,00
260-280Km	22,76					N/A	N/A	10,95	0,00	0,00	0,00	N/A	0,44	1,46
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	542,76	0	0	0,00	0,00	0	0,00	2 627,05	1 373,89	0,00	476,19	0,00	1,49	3,59

Commencing Chainage : 1006+300

End Chainage : 1277+680

Section	Sub-ballast	Layers	Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	7,31	7,31	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
20-40Km	5,62	13,93	19,55	2	2,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
40-60Km	0,00	19,59	19,59	5	4,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
60-80Km	0,00	20,00	20,00	2	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
80-100Km	0,00	19,82	19,82	8	1,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
100-120Km	15,12	4,60	19,72	8	15,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
120-140Km	18,68	1,28	19,96	0	14,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
140-160Km	18,95	0,27	19,22	1	6,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
160-180Km	8,31	11,23	19,54	2	2,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
180-200Km	16,99	2,81	19,80	0	10,00	N/A	N/A	0,00	N/A	N/A	205,00	N/A	N/A
200-220Km	14,93	4,78	19,71	0	11,00	N/A	N/A	40,00	N/A	N/A	0,00	N/A	N/A
220-240Km	17,86	1,95	19,81	0	5,00	N/A	N/A	0,00	N/A	N/A	120,00	N/A	N/A
240-260Km	12,09	7,91	20,00	0	12,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
260-280Km	0,00	9,19	9,19	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	128,55	124,67	253,22	28	82,00	0,00	0,00	40,00	0,00	0,00	325,00	0,00	0,00

Commencing Chainage : 1006+300

End Chainage : 1277+680

Section	Major River Crossings			Modifications of Ex. Rail Crossings (each) *	Rail Crossings (New)						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	Double Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	N/A	N/A	2	0	N/A	N/A	N/A	N/A	N/A	300,00	0,00	N/A	N/A
20-40Km	0,00	N/A	N/A	1	0	N/A	N/A	N/A	N/A	N/A	200,00	0,00	N/A	N/A
40-60Km	0,00	N/A	N/A	1	1	N/A	N/A	N/A	N/A	N/A	280,00	0,00	N/A	N/A
60-80Km	0,00	N/A	N/A	2	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
80-100Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	100,00	0,00	N/A	N/A
100-120Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
120-140Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
140-160Km	280,00	N/A	N/A	0	2	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
160-180Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	370,00	0,00	N/A	N/A
180-200Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
200-220Km	0,00	N/A	N/A	0	1	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
220-240Km	0,00	N/A	N/A	0	1	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
240-260Km	0,00	N/A	N/A	1	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
260-280Km	0,00	N/A	N/A	6	0	N/A	N/A	N/A	N/A	N/A	250,00	0,00	N/A	N/A
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	280,00	0,00	0,00	13	5	0	0	0	0	0	1 500,00	0,00	0,00	0,00

Commencing Chainage : 1006+300
End Chainage : 1277+680

*: Railway sidings to abandoned

Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings (New)							Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn. (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	At-grade level crossing		Secondary (2-4 lanes) (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)
0-20Km	7	1	N/A	1	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
20-40Km	5	3	N/A	1	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
40-60Km	0	6	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
60-80Km	2	4	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
80-100Km	0	8	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
100-120Km	0	8	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
120-140Km	0	11	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
140-160Km	0	10	N/A	2	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
160-180Km	2	5	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
180-200Km	0	4	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
200-220Km	0	11	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
220-240Km	0	8	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
240-260Km	1	9	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
260-280Km	8	4	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	25	92	0	4	0	0	0	0	0	0	0	0	0

Commencing Chainage : 1006+300

End Chainage : 1277+680

Section	Closure & Diversion of Roads (each)	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track		Tunnelling		Noise Attenuation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Crossings (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
						Soft Ground	Rock	Barriers	Berms	Barriers	Berms						
					(m)	(m)	(m)	(km)	(km)								
0-20Km	0	0,00	0	TO BE	5 070,00	0,00	4 557,00	0,00	N/A	7,31	N/A	1	N/A	TO BE	TO BE		
20-40Km	2	0,10	0	DEFINED	0,00	0,00	0,00	0,00	N/A	19,55	N/A	4	N/A	DEFINED	DEFINED		
40-60Km	1	6,00	23	BY km	0,00	0,00	0,00	0,00	N/A	19,65	N/A	2	N/A	BY km	BY km		
60-80Km	1	0,05	5		0,00	0,00	0,00	0,00	N/A	20,00	N/A	1	N/A				
80-100Km	2	0,10	3		0,00	0,00	0,00	0,00	N/A	19,90	N/A	1	N/A				
100-120Km	0	0,00	0		0,00	0,00	0,00	3,00	N/A	18,25	N/A	1	N/A				
120-140Km	0	0,00	3		0,00	0,00	0,00	1,00	N/A	19,46	N/A	2	N/A				
140-160Km	4	24,00	6		0,00	0,00	0,00	18,60	N/A	9,92	N/A	6	N/A				
160-180Km	0	0,00	5		0,00	0,00	0,00	0,00	N/A	19,53	N/A	0	N/A				
180-200Km	6	24,10	3		0,00	0,00	0,00	3,40	N/A	18,10	N/A	0	N/A				
200-220Km	2	12,00	7		0,00	0,00	0,00	2,00	N/A	18,62	N/A	2	N/A				
220-240Km	1	6,00	0		0,00	0,00	0,00	0,00	N/A	19,81	N/A	3	N/A				
240-260Km	1	6,00	22		0,00	0,00	0,00	0,00	N/A	20,00	N/A	0	N/A				
260-280Km	0	0,00	0		0,00	0,00	260,00	0,00	N/A	9,28	N/A	5	N/A				
280-300Km																	
300-320Km																	
320-340Km																	
340-360Km																	
Total	20	78,35	77	0	5 070,00	0,00	4 817,00	28,00	0,00	239,58	0,00	28	0	0,00	0,00		

Commencing Chainage : 1006+300
End Chainage : 1277+680

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN NEW CORRIDORS**

WINDSOR - OSHAWA

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

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QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

Station (km)	B5.1 Normal ROW drainage system (route-km)	B5.2 Major Watercourse Culverts (each)	B5.3 Environmental stormwater controls (each)	B6.0 Upgrade of Exist. Roadbed on Exist. ROW (route-km)	B7.1 Retaining Structures up to 3 m Height (Km)	B7.2 Retaining Structures over 3 m Height (Km)	B8.1 Noise Attenua- tion Structures Barriers (Km)	B8.2 Noise Attenua- tion Structures Berms (Km)	B9.0 ROW Security Fencing (2-sided) (route-km)	B10.0 Snow Control Measures (Km)
00-20	20.0	5.0	20.0	10.0	0.0	0.0	0.0	0.0	20.0	0.0
20-40	20.0	5.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
40-60	19.8	3.0	19.8	0.0	0.0	0.0	0.0	0.0	19.8	0.0
60-80	19.9	1.0	19.9	0.0	0.0	0.0	0.0	0.0	19.9	0.0
80-100	20.0	2.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
100-120	20.0	16.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
120-140	20.0	12.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
140-160	20.0	14.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
160-180	20.0	9.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
180-190	10.0	4.0	10.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0
Windsor-London	189.6	71.0	189.6	10.0	0.0	0.0	0.0	0.0	189.6	0.0
190-200	9.9	0.0	9.9	0.0	0.0	0.0	0.0	0.0	9.9	0.0
200-220	20.0	11.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
220-240	20.0	12.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
240-260	20.0	12.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
260-280	17.2	6.0	17.2	0.0	0.0	0.0	0.0	0.0	17.2	0.0
280-300	19.9	4.0	19.9	0.0	0.0	0.0	0.0	0.0	19.9	0.0
300-320	20.0	13.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
320-340	19.9	20.0	19.9	0.0	0.0	0.0	0.0	0.0	19.9	0.0
340-345	5.0	4.0	5.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
London-Pearson	151.9	82.0	151.9	0.0	0.0	0.0	0.0	0.0	151.9	0.0
345-360	15.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0
360-380	20.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
380-385	5.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
Pearson-N.Con End	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0
385-400	15.0	13.0	15.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0
400-420	20.0	25.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
420-440	0.3	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0
N.Con.End-Oshawa	35.3	39.0	35.3	0.0	0.0	0.0	0.0	0.0	35.3	0.0
Total	416.9	192.0	416.9	10.0	0.0	0.0	0.0	0.0	416.9	0.0
CONNECTORS										
Pearson-N.Toronto	24.0	3.0	24.0	23.2	8.6	3.6	0.0	0.0	24.0	0.0
N.Toronto-E.Toronto	28.0	8.0	28.0	27.2	9.7	13.3	0.0	0.0	28.0	0.0
Pearson-Union	29.0	3.0	29.0	28.2	6.1	3.9	0.0	0.0	29.0	0.0
Union-E.Toronto	29.0	8.0	29.0	30.0	10.0	8.0	0.0	0.0	29.0	0.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

Station (km)	B11.1 Utilities- Major Hydro Relocation (each)	B11.2 Utilities- Major Oil/Gas Relocation (each)	B11.3 Minor pipe or Wire Crossings (route-km)	B12.0 Other Items (Lump-Sum)	C1.1 Small River Crossings (L < 30 m) (each)	C1.2 Extra over C1.1 for Height over 10 m (each)	C1.3 Intermediate River Crossings (30 < L < 100) (Linear metre)	C1.4 Extra over C1.3 for Height over 10 m (Linear metre)	C1.5 Large River Crossings (100 < L < 250) (Linear metre)	C1.6 Extra over C1.5 for Height over 10 m (Linear metre)
00-20	1.0	20.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0
20-40	1.0	20.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0
40-60	4.0	20.0	0.0	0.0	1.0	0.0	220.0	0.0	0.0	0.0
60-80	1.0	20.0	0.0	0.0	10.0	0.0	100.0	0.0	0.0	0.0
80-100	3.0	20.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0
100-120	1.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120-140	0.0	20.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
140-160	1.0	20.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0
160-180	1.0	20.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0
180-190	2.0	10.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0
Windsor-London	15.0	190.0	0.0	0.0	38.0	0.0	320.0	0.0	0.0	0.0
190-200	1.0	10.0	0.0	0.0	4.0	1.0	50.0	0.0	0.0	0.0
200-220	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
220-240	1.0	20.0	0.0	0.0	7.0	0.0	0.0	0.0	0.0	0.0
240-260	0.0	20.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0
260-280	5.0	20.0	0.0	0.0	0.0	0.0	150.0	0.0	150.0	75.0
280-300	2.0	20.0	0.0	0.0	0.0	0.0	50.0	0.0	100.0	0.0
300-320	4.0	20.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0
320-340	1.0	20.0	0.0	0.0	4.0	0.0	50.0	0.0	0.0	0.0
340-345	0.0	5.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
London-Pearson	14.0	155.0	0.0	0.0	24.0	1.0	300.0	0.0	250.0	75.0
345-360	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
360-380	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
380-385	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pearson-N.Con End	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
385-400	0.0	15.0	0.0	0.0	3.0	2.0	0.0	0.0	0.0	0.0
400-420	3.0	20.0	0.0	0.0	5.0	2.0	0.0	0.0	0.0	0.0
420-440	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.Con.End-Oshawa	3.0	35.3	0.0	0.0	8.0	4.0	0.0	0.0	0.0	0.0
Total	32.0	420.3	0.0	0.0	70.0	5.0	620.0	0.0	250.0	75.0

CONNECTORS

Pearson-N.Toronto	3.0	1.0	25.0	0.0	2.0	1.0	100.0	50.0	200.0	100.0
N.Toronto-E.Toronto	2.0	2.0	29.0	0.0	4.0	1.0	100.0	50.0	800.0	400.0
Pearson-Union	4.0	1.0	29.0	0.0	3.0	1.0	0.0	0.0	200.0	100.0
Union-E.Toronto	1.0	2.0	30.0	0.0	4.0	1.0	100.0	50.0	400.0	200.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

Station (km)	C1.7 Major River Crossings (L > 250 m) (Linear metre)	C1.8 Extra over C1.1 C1.7 for Difficult Foundations (Linear metre)	C1.9 Modifications to existing bridges (Linear metre)	C2.1 Viaducts of length greater than 250 m (Linear metre)	C2.2 Extra over C2.1 for height over 10 m (Linear metre)	C2.3 Extra over C2.1 for difficult Foundations (Linear metre)	C3.1 Double Track Tunneling in Soft ground (metre)	C3.2 Double Track Tunneling in Rock (metre)	C3.3 Modifications to existing Tunnels (Lump sum)	D1.1a 2-lane rural hwy Crossing New/ Aband. ROW (each)
00-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
20-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
40-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0
60-80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0
80-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
100-120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
120-140	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
140-160	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
160-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0
180-190	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0
Windsor-London	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.0
190-200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
200-220	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0
220-240	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0
240-260	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0
260-280	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2400.0	0.0	4.0
280-300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
300-320	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
320-340	0.0	0.0	0.0	0.0	1650.0	0.0	0.0	0.0	0.0	10.0
340-345	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
London-Pearson	0.0	0.0	0.0	0.0	1650.0	0.0	0.0	2400.0	0.0	67.0
345-360	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
360-380	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
380-385	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pearson-N.Con End	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
385-400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
400-420	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0
420-440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.Con.End-Oshawa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0
Total	0.0	0.0	0.0	0.0	1650.0	0.0	0.0	2400.0	0.0	163.0
CONNECTORS										
Pearson-N.Toronto	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.Toronto-E.Toronto	0.0	0.0	0.0	1900.0	1900.0	0.0	0.0	0.0	0.0	0.0
Pearson-Union	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Union-E.Toronto	0.0	0.0	0.0	1900.0	1900.0	0.0	0.0	0.0	0.0	0.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

Station (km)	D1.1b 2-lane rural hwy Cross Shared Existing ROW (each)	D1.2a 4-lane rural hwy Crossing New/ Aband. ROW (each)	D1.2b 4-lane rural hwy Cross Shared Existing ROW (each)	D1.3a Major rural hwy Crossing New/ Aband. ROW (each)	D1.3b Major rural hwy Cross Shared Existing ROW (each)	D2.1a 2-4 lane urban hwy cross New/ Aband. ROW (each)	D2.1b 2-4 lane urban hwy cross shar- ed Exist. ROW (each)	D2.2a Major urban hwy cross New/ Aband. ROW (each)	D2.2b Major urban hwy cross shar- ed Exist. ROW (each)	D3.1a Modif. of exist urban grade se Shared ROW (each)
00-20	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	6.0
20-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60-80	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
80-100	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
100-120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120-140	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
140-160	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
160-180	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
180-190	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Windsor-London	0.0	2.0	0.0	4.0	0.0	4.0	0.0	0.0	0.0	6.0
190-200	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200-220	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
220-240	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
240-260	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
260-280	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	4.0
280-300	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
300-320	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0
320-340	0.0	2.0	0.0	0.0	0.0	10.0	0.0	2.0	0.0	0.0
340-345	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
London-Pearson	0.0	3.0	0.0	2.0	0.0	11.0	0.0	4.0	0.0	4.0
345-360	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
360-380	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
380-385	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pearson-N.Con End	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
385-400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400-420	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
420-440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.Con.End-Oshawa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	5.0	0.0	6.0	0.0	15.0	0.0	4.0	0.0	10.0

CONNECTORS

Pearson-N.Toronto	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0
N.Toronto-E.Toronto	0.0	0.0	0.0	0.0	0.0	3.0	1.0	0.0	0.0	24.0
Pearson-Union	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0
Union-E.Toronto	0.0	0.0	0.0	0.0	0.0	3.0	1.0	0.0	0.0	20.0

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : WINDSOR TO TORONTO
TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

Station (km)	D3.1b Modif. of exist urban grade sep Aband ROW (each)	D3.2a Modif. of exist rural grade Shared ROW (each)	D3.2b Modif. of exist rural grade sep Aband ROW (each)	D4.0 Closure Diversion of Roads (km of road)	E1.0 Removal of Rail (km)	E2.0 New Rail Construction (km)	E3.1 New Rail/Rail Grade Separation (each)	E3.2a Modif. exist. Rail/Rail Grade Sep. New ROW (each)	E3.2b Modif. exist. Rail/Rail Grade Shared ROW (each)	D1.6 Extra for difficult Foundation Conditions (each)
00-20	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	
20-40	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	
40-60	0.0	1.0	0.0	4.3	0.0	0.0	2.0	0.0	0.0	
60-80	0.0	1.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	
80-100	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
100-120	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	
120-140	0.0	2.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	
140-160	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
160-180	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	
180-190	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
Windsor-London	0.0	4.0	0.0	11.3	0.0	0.0	6.0	1.0	0.0	
190-200	0.0	0.0	0.0	1.4	0.0	0.0	2.0	0.0	0.0	
200-220	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	
220-240	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	
240-260	0.0	0.0	0.0	0.7	0.0	0.0	1.0	0.0	0.0	
260-280	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	
280-300	0.0	0.0	0.0	3.0	0.0	0.0	1.0	0.0	0.0	
300-320	0.0	1.0	0.0	2.9	0.0	0.0	3.0	0.0	0.0	
320-340	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
340-345	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
London-Pearson	0.0	1.0	0.0	19.3	0.0	0.0	11.0	0.0	0.0	
345-360	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
360-380	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
380-385	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Pearson-N.Con End	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
385-400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
400-420	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
420-440	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
N.Con.End-Oshawa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total	0.0	5.0	0.0	30.6	0.0	0.0	17.0	1.0	0.0	

CONNECTORS

Pearson-N.Toronto	0.0	0.0	0.0	0.0	12.6	63.3	3.0	0.0	0.0	
N.Toronto-E.Toronto	0.0	0.0	0.0	0.0	6.3	29.7	2.0	0.0	0.0	
Pearson-Union	0.0	0.0	0.0	0.0	17.8	68.4	3.0	0.0	0.0	
Union-E.Toronto	0.0	0.0	0.0	0.0	2.1	36.1	2.0	0.0	0.0	

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN NEW CORRIDORS**

OSHAWA - RICHMOND

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

Page 1 of 6

Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex. ROW			Upgrade Ex. Roadbed (route-km)
			50m (route-km)	50–60m (route-km)	60–70m (route-km)	70–80m (route-km)	>80m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0–20Km	21.460	–	19.460	0.500	1.000	0.500	0.000	11.760	9.500	0.000	0.000	0.000	0.000	0.000
20–40Km	20.000	–	15.500	1.500	2.000	0.500	0.500	13.100	6.500	0.000	0.000	0.000	0.000	0.000
40–43.6Km	3.600	–	3.100	0.500	0.000	0.000	0.000	3.500	0.000	0.100	0.000	0.000	0.000	0.000
Sub-total	45.060	0	38.060	2.500	3.000	1.000	0.500	28.360	16.000	0.100	0.000	0.000	0.000	0.000
43.6–60Km	16.400	–	14.900	0.500	1.000	0.000	0.000	8.200	6.400	0.100	0.000	0.000	0.000	0.000
60–80Km	20.000	–	15.000	2.000	2.000	1.000	0.500	20.000	0.000	0.000	0.000	0.000	0.000	0.000
80–100Km	20.000	–	15.000	1.000	2.500	1.000	0.000	17.000	1.000	2.000	0.000	0.000	0.000	0.000
100–120Km	20.000	–	19.000	0.000	0.500	0.500	0.000	8.150	9.000	0.500	0.000	0.000	0.000	0.000
120–140Km	20.000	–	20.000	0.000	0.000	0.000	0.000	9.000	10.850	0.000	0.000	0.000	0.000	0.000
140–160Km	20.000	–	19.500	0.000	0.000	0.500	0.000	12.800	6.500	0.500	0.000	0.000	0.000	0.000
160–180Km	20.000	–	19.500	0.000	0.500	0.000	0.000	17.050	2.500	0.000	0.000	0.000	0.000	0.000
180–197.1	17.100	Item No. 5	16.600	0.000	0.500	0.000	0.000	13.500	2.600	0.940	0.000	0.000	0.000	0.000
Sub-total	153.500	1	139.500	3.500	7.000	3.000	0.500	105.700	38.850	4.040	0.000	0.000	0.000	0.000
197.1–200	2.900	–	2.900	0.000	0.000	0.000	0.000	1.000	0.400	1.500	0.000	0.000	0.000	0.000
200–220Km	20.000	–	18.000	0.500	0.000	1.500	0.000	6.400	12.200	1.000	0.000	0.000	0.000	0.000
220–240Km	20.000	–	19.000	0.000	1.000	0.000	0.000	7.000	11.500	1.100	0.000	0.000	0.000	0.000
240–260Km	20.000	–	18.000	0.500	1.500	1.000	1.000	13.700	4.000	1.500	0.000	0.000	0.000	0.000
260–280Km	20.000	–	19.500	0.000	0.500	0.000	0.000	12.500	0.000	7.500	0.000	0.000	0.000	0.000
280–293.165	13.165	–	13.165	0.000	0.000	0.000	0.000	5.250	0.000	4.600	2.915	0.000	0.000	0.000
Sub-total	96.065	0	88.565	1.000	3.000	2.500	1.000	45.850	28.100	17.200	2.915	0.000	0.000	0.000
293.165–300	6.835	–	6.835	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.835	0.000	5.000	0.000
300–320Km	14.930	–	14.930	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.090	0.000	6.840	0.000
Sub-total	21.765	0	21.765	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.925	0.000	11.840	0.000
Total	316.390	1	287.890	7.000	13.000	6.500	2.000	179.910	82.950	21.340	12.840	0.000	11.840	0.000

Commencing Chainage : –1+460 Chainage for Cobourg Segment : 43+600
End Chainage : 314+930 Chainage for Kingston Segment : 197+100
Chainage for Smiths Falls Segment : 293+165

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m³)	Haulage (x1000m³-km)	Retaining up to 3m in ht. (km)	Structures over 3m in ht. (km)	Disposal of	
								Borrow Material (x1000m³)	ROW cut in soft (x1000m³)	ROW cut in rock (x1000m³)					Suitable Soft (x1000m³)	Material Rock (x1000m³)
0-20Km	21.460						21.460	0.00	908.11	0.00	708.77	0.00	0.00	0.00	19.11	333.06
20-40Km	20.000						20.000	0.00	1,124.35	0.00	684.49	0.00	0.00	0.00	255.02	1,066.65
40-43.6Km	3.600						3.600	0.00	0.00	0.00	52.18	0.00	1.00	0.00	469.59	98.20
Sub-total	45.060						45.060	0.00	2,032.46	0.00	1,445.44	0.00	1.00	0.00	743.72	1,497.91
43.6-60Km	16.400						16.400	0.00	625.92	222.63	423.60	0.00	0.00	0.50	0.00	44.88
60-80Km	20.000						20.000	0.00	1,661.57	46.36	184.62	0.00	0.00	0.00	0.00	519.48
80-100Km	20.000						20.000	0.00	1,331.54	1,172.27	220.54	12,684.50	0.00	0.00	0.00	0.00
100-120Km	20.000						20.000	0.00	409.33	0.00	595.66	0.00	0.00	0.00	0.00	0.00
120-140Km	20.000						20.000	0.00	210.72	209.95	43.18	0.00	0.00	0.00	0.00	166.81
140-160Km	20.000						20.000	0.00	44.50	300.69	200.93	0.00	0.00	0.00	0.00	634.57
160-180Km	20.000						20.000	0.00	185.76	319.20	53.68	0.00	0.00	0.00	0.00	1,006.27
180-197.1	17.100						17.100	0.00	104.34	0.00	85.71	0.00	0.00	0.00	8.10	1,088.68
Sub-total	153.500						153.500	0.00	4,573.68	2,271.10	1,807.92	12,684.50	0.00	0.50	8.10	3,460.69
197.1-200	2.900						2.900	0.00	7.46	170.53	24.77	99.64	0.00	0.00	0.00	0.00
200-220Km	20.000						20.000	0.00	223.42	202.62	239.37	0.00	0.00	0.00	0.00	1,151.29
220-240Km	20.000						20.000	0.00	156.98	402.37	78.21	0.00	0.00	0.00	0.00	0.00
240-260Km	20.000						20.000	0.00	139.13	1,498.64	587.88	0.00	0.00	0.00	0.00	0.00
260-280Km	20.000						20.000	0.00	12.13	328.91	170.02	0.00	0.00	0.00	0.00	0.00
280-293.165	13.165						13.165	0.00	8.43	1,527.72	0.94	69,749.00	0.00	0.00	0.00	0.00
Sub-total	96.065						96.065	0.00	547.55	4,130.79	1,101.19	69,848.64	0.00	0.00	0.00	1,151.29
293.165-300	6.835						6.835	0.00	1.37	8.20	38.61	0.00	0.00	0.00	0.00	18.41
300-320Km	14.930						14.930	0.00	0.00	5.30	74.05	0.00	0.00	0.00	0.00	76.64
Sub-total	21.765						21.765	0.00	1.37	13.50	112.66	0.00	0.00	0.00	0.00	95.05
Total	316.390						316.390	0.00	7,155.06	6,415.39	4,467.21	82,533.14	1.00	0.50	751.82	6,204.94

Commencing Chainage : -1+460 Chainage for Cobourg Segment : 43+600
End Chainage : 314+930 Chainage for Kingston Segment : 197+100
Chainage for Smiths Falls Segment : 293+165

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

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Section	Sub-ballast Layers		Normal ROW Drainage	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	30–100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100–250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0–20Km	21.260	0.000	21.260	21	0	0	0	0	0	0	200	200	0
20–40Km	19.600	0.000	19.600	20	0	0	0	0	0	0	0	0	0
40–43.6Km	3.600	0.000	3.600	0	0	0	0	0	0	0	0	0	0
Sub-total	44.460	0.000	44.460	41	0	0	0	0	0	0	200	200	0
43.6–60Km	14.700	0.000	14.700	9	3	0	0	0	0	0	0	0	0
60–80Km	20.000	0.000	20.000	22	0	0	0	0	0	0	0	0	0
80–100Km	20.000	0.000	20.000	9	0	0	0	0	0	0	0	0	0
100–120Km	17.650	0.000	17.650	10	0	0	0	0	0	0	0	0	0
120–140Km	19.850	0.000	19.850	6	0	0	0	0	0	0	150	0	0
140–160Km	19.800	0.000	19.800	5	0	0	0	0	0	0	200	100	0
160–180Km	19.550	0.000	19.550	9	0	0	0	0	0	0	0	0	0
180–197.1	17.040	0.000	17.040	3	0	0	0	60	0	60	0	0	0
Sub-total	148.590	0.000	148.590	73	3	0	0	60	0	60	350	100	0
197.1–200	2.900	0.000	2.900	3	0	0	0	0	0	0	0	0	0
200–220Km	19.600	0.000	19.600	8	0	0	0	100	0	0	0	0	0
220–240Km	19.600	0.000	19.600	14	0	0	0	0	0	0	0	0	0
240–260Km	19.200	0.000	19.200	10	0	0	0	0	0	0	0	0	0
260–280Km	20.000	0.000	20.000	5	0	0	0	0	0	0	0	0	0
280–293.165	9.850	2.915	12.765	3	0	0	0	0	0	0	0	0	0
Sub-total	91.150	2.915	94.065	43	0	0	0	100	0	0	0	0	0
293.165–300	0.000	6.835	6.835	4	0	0	0	0	0	0	0	0	0
300–320Km	0.000	14.930	14.930	8	0	0	0	0	0	0	0	0	0
Sub-total	0.000	21.765	21.765	12	0	0	0	0	0	0	0	0	0
Total	284.200	24.680	308.880	169	3	0	0	160	0	60	550	300	0

Commencing Chainage : -1+460 Chainage for Cobourg Segment : 43+600
End Chainage : 314+930 Chainage for Kingston Segment : 197+100
Chainage for Smiths Falls Segment : 293+165

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

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Section	Major River Crossings			Acquired ROW Removal of Rail Lines (km)	Rail Crossings on Ex./Shared ROW				Rail Crossings on New ROW				Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Modifications of Ex. Rail Crossings (each)	Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	Modifications of Ex. Rail Crossings (each)	Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0–20Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
20–40Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	400	0	0
40–43.6Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	0.000	0	0	0	0	0	0	0	0	0	400	0	0
43.6–60Km	500	500	300	0.000	0	0	0	0	0	0	0	0	0	0	0	0
60–80Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
80–100Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
100–120Km	550	450	0	0.000	0	0	0	0	0	1	0	0	0	0	0	0
120–140Km	0	0	0	0.000	0	0	0	0	0	1	0	0	0	0	0	0
140–160Km	0	0	0	0.000	0	0	0	0	0	1	0	0	0	0	0	0
160–180Km	450	450	0	0.000	0	0	0	0	0	1	0	0	0	0	0	0
180–197.1	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	1,500	1,400	300	0.000	0	0	0	0	0	4	0	0	0	0	0	0
197.1–200	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
200–220Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	300	0	0
220–240Km	400	350	400	0.000	0	0	0	0	0	0	0	0	0	0	0	0
240–260Km	800	800	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
260–280Km	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0
280–293.165	400	0	400	2.915	0	0	0	0	0	3	0	0	0	0	0	0
Sub-total	1,600	1,150	800	2.915	0	0	0	0	0	3	0	0	0	300	0	0
293.165–300	0	0	0	6.835	0	0	0	0	0	0	0	0	0	0	0	0
300–320Km	0	0	0	14.930	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	21.765	0	0	0	0	0	0	0	0	0	0	0	0
Total	3,100	2,550	1,100	24.680	0	0	0	0	0	7	0	0	0	700	0	0

Commencing Chainage : –1+460

End Chainage : 314+930

Chainage for Cobourg Segment : 43+600

Chainage for Kingston Segment : 197+100

Chainage for Smiths Falls Segment : 293+165

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

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Section	Highway Crossings																					
	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings										Rural Road Closures (each)	Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings								
		2-lane (each)		E.O. for		4-lane (each)		E.O. for		Major (over 4 lanes)	E.O. for			Sec.2-4 (each)		E.O. for		Major (over 4 lanes)	E.O. for			
		Dual ROW	Single ROW	diff. fdn.		Dual ROW	Single ROW	diff. fdn.						Dual ROW	Single ROW	diff. fdn.	Dual ROW			Single ROW	diff. fdn.	Dual ROW
				Dual	Single			Dual	Single													
0-20Km	2	2	17	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0			
20-40Km	0	0	10	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0			
40-43.6Km	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0			
Sub-total	2	2	30	0	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0			
43.6-60Km	0	0	11	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0			
60-80Km	0	0	10	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0			
80-100Km	0	0	8	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0			
100-120Km	0	0	9	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0			
120-140Km	0	0	8	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0			
140-160Km	0	0	8	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0			
160-180Km	0	0	8	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0			
180-197.1	0	0	9	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sub-total	0	0	71	0	3	0	0	0	0	2	0	14	0	0	0	0	0	0	0			
197.1-200	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
200-220Km	0	0	7	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0			
220-240Km	0	0	8	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0			
240-260Km	0	0	7	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0			
260-280Km	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
280-293.165	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sub-total	0	0	31	0	5	0	0	0	0	0	0	5	0	0	0	0	0	0	0			
293.165-300	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
300-320Km	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sub-total	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Total	2	2	139	0	9	0	0	0	0	3	0	24	0	0	0	0	0	0	0			

Commencing Chainage : -1+460

End Chainage : 314+930

Chainage for Cobourg Segment :

Chainage for Kingston Segment :

Chainage for Smiths Falls Segment :

43+600

197+100

293+165

QUEBEC – ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO – NATIONAL CAPITAL REGION

TECHNOLOGY : 300 KM/H PLUS ON NEW ROW

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track Tunnelling		Noise Attenu- ation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0–20Km	0.80	4	0	0	0	0	1.00	0	20.760		0	3	1.9	0
20–40Km	0.30	8	0	0	0	0	7.00	0	16.100		1	0	0.5	0
40–43.6Km	0.40	2	0	0	0	0	0.00	0	3.600		0	0	0.5	0
Sub-total	1.50	14	0	0	0	0	8.00	0	40.460		1	3	2.9	0
43.6–60Km	0.45	7	0	0	0	1,200	5.00	0	12.200		0	0	3.2	0
60–80Km	0.00	13	0	0	0	0	0.00	0	20.000		0	0	1.0	0
80–100Km	1.75	2	0	0	0	0	1.00	0	19.500		2	2	2.5	0
100–120Km	0.90	6	0	0	0	1,800	3.00	0	16.150		2	0	1.8	0
120–140Km	0.90	7	0	0	0	0	1.00	0	19.350		4	0	0.1	0
140–160Km	0.00	2	0	0	0	0	0.00	0	19.800		0	0	0.0	0
160–180Km	3.60	3	0	0	0	0	0.00	0	19.550		0	0	0.0	0
180–197.1	0.00	5	0	0	0	0	0.00	0	17.040		4	2	0.5	0
Sub-total	7.60	45	0	0	0	3,000	10.00	0	143.590		12	4	9.1	0
197.1–200	0.00	0	0	0	0	0	0.00	0	2.900		0	0	0.0	0
200–220Km	1.30	6	0	0	0	0	0.00	0	19.600		1	0	0.1	0
220–240Km	0.20	9	0	0	0	0	0.00	0	19.600		0	0	1.0	0
240–260Km	0.65	1	0	0	0	0	0.00	0	19.200		3	0	0.0	0
260–280Km	0.00	2	0	0	0	0	0.00	0	20.000		0	0	0.0	0
280–293.165	0.00	3	0	0	0	0	0.00	0	12.765		0	0	3.1	0
Sub-total	2.15	21	0	0	0	0	0.00	0	94.065		4	0	4.2	0
293.165–300	0.00	0	0	0	0	0	0.00	0	6.835		0	0	0.0	0
300–320Km	0.00	5	2	0	0	0	0.00	0	14.930		1	0	0.0	0
Sub-total	0.00	5	2	0	0	0	0.00	0	21.765		1	0	0.0	0
Total	11.25	85	2	0	0	3,000	18.00	0	299.880		18	7	16.2	Incl.

Commencing Chainage : -1+460 Chainage for Cobourg Segment : 43+600
 End Chainage : 314+930 Chainage for Kingston Segment : 197+100
 Chainage for Smiths Falls Segment : 293+165

Note :
 * denotes realignment of utility lines

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN NEW CORRIDORS**

RICHMOND - OTTAWA

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO -OTTAWA
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W.

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Existing ROW			Upgrade Ex Roadbed (route-km)
			30m	30-35m	35-40m	40m	>40m	Type 1 Soils	Type 2 Soils	Type 3 Soils	Type 1 Soils	Type 2 Soils	Type 3 Soils	
			(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	(route-km)	
0-20Km	20		6.6	4.0	5.7	0.0	3.7	5.6	4.3	4	1.6	4.5		
20-40Km	18.8	1	14.4	0.2	0.6	0.2	3.4				7.1	10.7		7.8
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	38.8	1	21.0	4.2	6.3	0.2	7.1	5.6	4.3	4	8.7	15.2	0	7.8

Commencing Chainage : 0+000
End Chainage : 38+790

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO -OTTAWA
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W.

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining Structures	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)			up to 3m (km)	over 3m (km)
0-20Km								139.73	394.67	66.18	93.23		0.0	0.0
20-40Km								1.74	247.76	0.00	186.90		1.8	1.0
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	141.47	642.43	66.18	280.13	0	1.8	1

Commencing Chainage : 0+000
End Chainage : 38+790

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO -OTTAWA
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W.

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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)
0-20Km			20	13				45					
20-40Km			17	6				100			150		
40-60Km													
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0	0	37	19	0	0	0	145	0	0	150	0	0

Commencing Chainage : 0+000
End Chainage : 38+790

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO -OTTAWA
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W.

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Section	Major River Crossings			Modifications of Ex. Rail Crossings (each)	Rail Crossing						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn. (each)	Double Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn. (m)
0-20Km														
20-40Km	1000				2									
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	1000	0	0	0	2	0	0	0	0	0	0	0	0	0

Commencing Chainage : 0+000
End Chainage : 38+790

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS

SECTION : TORONTO -OTTAWA

TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W.

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Section	Modifications of Ex Rural Gr Separation (each)	Rural Highway Crossings						Modifications of Ex Urban Gr Separation (each)	Urban Highway Crossings				
		2-lane (each)	E.O. for diff. fdn (each)	4-lane (each)	E.O. for diff. fdn (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn (each)		Secondary (2-4 lanes) (each)	Sec (2-4 lanes) Dual ROW (each)	E.O. for diff. fdn (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn (each)
0-20Km		2		3					4			1	
20-40Km								17	5	1			
40-60Km													
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0	2	0	3	0	0	0	17	9	1	0	1	0

Commencing Chainage : 0+000

End Chainage : 38+790

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : TORONTO -OTTAWA
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W.

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex Tunnels (m)	Double Track Tunneling		Noise Attenu-ation Structure		ROW Security Fencing (km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0-20Km	0.6	5					5.4		34.6					
20-40Km				600			0.0		34.0		7	1		
40-60Km														
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0.6	5	0	600	0	0	5.4	0	68.6	0	7	1	0	0

Commencing Chainage : 0+000
End Chainage : 38+790

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN NEW CORRIDORS**

OTTAWA - MIRABEL

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL BYPASS

03-May-93
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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Existing ROW			Upgrade Ex Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20		9.9	10.1	0.0	0.0	0.0	7.0			13.0			13.0
20-40Km	20		6.3	1.2	1.8	0.0	10.7	19.3						
40-60Km	20		4.5	1.8	1.8	0.0	11.9	20.0						
60-80Km	20		10.0	0.9	2.1	0.0	7.0	11.7						
80-100Km	20		8.6	2.9	1.2	0.0	7.3	13.3						
100-120Km	20		4.2	4.7	2.6	0.0	8.5	16.0	4.0					
120-140Km	20		7.2	2.9	2.3	0.0	8.4	6.5	5.5		5.5	2.5		8.0
140-160Km	4.8		4.8	0.0	0.0	0.0	0.0				4.8			4.8
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	144.8	0	55.5	24.5	11.8	0.0	53.8	93.8	9.5	0	23.3	2.5	0	25.8

Commencing Chainage : 0+000
End Chainage : 144+75

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL BYPASS

03-May-93
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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining Structures	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)			up to 3m (km)	over 3m (km)
0-20Km								-238 83	238 83	0 00			0	0
20-40Km								1393 90	566 44	367 53			0	0
40-60Km								-1417 71	3226 47	0 00			0	0
60-80Km								-1970 38	0 00	2725 06			0	0
80-100Km								487 82	741 57	1099 22			0	0
100-120Km								2080 37	325 16	0 00	85 68		0	0
120-140Km								65 56	291 12	0 00	86 38		0	0
140-160Km								0 00	0 00	0 00			0	0
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	400 73	5389 59	4191 81	172 06	0	0	0

Commencing Chainage : 0+000
End Chainage : 144+75

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL BYPASS

03-May-93
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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km			20	6	30						250		
20-40Km			20	16	30								
40-60Km			20	12									
60-80Km			11.5	6	30								
80-100Km			13.9	7				100					
100-120Km			20	5				100					
120-140Km			20	10	30								
140-160Km			4.8										
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0	0	130.2	62	120	0	0	200	0	0	250	0	0

Commencing Chainage : 0+000
End Chainage : 144+75

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL BYPASS

03-May-93
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Section	Major River Crossings			Modifications of Ex. Rail Crossings (each)	Rail Crossing						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn (each)	Double Track (each)	E.O. for ht over 10m (each)	E.O. for diff. fdn (each)		>250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn (m)
0-20Km														
20-40Km					1									
40-60Km												1250		
60-80Km														
80-100Km												1550		
100-120Km					1							300		
120-140Km														
140-160Km					1									
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	3	0	0	0	0	0	0	3100	0	0

Commencing Chainage : 0+000
End Chainage : 144+75

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL BYPASS

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Section	Modifications of Ex. Rural Gr Separation (each)	Rural Highway Crossings						Modifications of Ex. Urban Gr Separation (each)	Urban Highway Crossings				
		2-lane (each)	E.O for diff. ldn (each)	4-lane (each)	E.O. for diff. ldn. (each)	Major (over 4 lanes) (each)	E.O for diff. ldn. (each)		Secondary (2-4 lanes) (each)	Sec (2-4 lanes) (Dual ROW) (each)	E.O for diff. ldn (each)	Major (over 4 lanes) (each)	E.O for diff. ldn (each)
0-20Km								3	3	6			
20-40Km		4											
40-60Km		5											
60-80Km		3											
80-100Km		2											
100-120Km	1	5											
120-140Km	1	6											
140-160Km		1											
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	2	26	0	0	0	0	0	3	3	6	0	0	0

Commencing Chainage : 0+000
End Chainage : 144+75

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL BYPASS

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track Tunnelling		Noise Attenuation Structure		ROW Security Fencing (km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)						
0-20Km		3							39.5		2			
20-40Km		5				750			40.0		1			
40-60Km	1.4	5							40.0					
60-80Km	0.3	5				8300			23.0		3			
80-100Km		5			3400	2700			27.8					
100-120Km	0.3	5							40.0		3			
120-140Km	0.9	6							40.0		3	0		
140-160Km		2							9.6					
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	2.9	36	0	0	3400	11750	0	0	259.9	0	12	0	0	0

Commencing Chainage : 0+000
End Chainage : 144+75

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL STATION

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Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Existing ROW			Upgrade Ex Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20		9.9	10.1	0.0	0.0	0.0	7.0			13.0			13.0
20-40Km	20		6.3	1.2	1.8	0.0	10.7	19.3						
40-60Km	20		4.5	1.8	1.8	0.0	11.9	20.0						
60-80Km	20		10.0	0.9	2.1	0.0	7.0	11.7						
80-100Km	20		8.6	2.9	1.2	0.0	7.3	13.3						
100-120Km	20		4.2	4.7	2.6	0.0	8.5	16.0	4.0					
120-140Km	20		11.8	2.9	1.7	0.0	3.6	6.5	5.5		5.5	2.5		0.5
140-160Km	4.7		1.5	1.5	1.1	0.0	0.6				4.7			4.7
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	144.7	0	56.8	26.0	12.3	0.0	49.6	93.8	9.5	0	23.2	2.5	0	18.2

Commencing Chainage : 0+000
End Chainage : 144+675

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL STATION

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Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining Structures	
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)			up to 3m (km)	over 3m (km)
0-20Km								-238 83	238 83	0 00			0	0
20-40Km								1393 90	566 44	367 53			0	0
40-60Km								-1417 71	3226 47	0 00			0	0
60-80Km								-1970 38	0 00	2725 06			0	0
80-100Km								487 82	741 57	1099 22			0	0
100-120Km								2080 37	325 16	0 00	85 68		0	0
120-140Km								186 23	531 23	0 00	218 1		0	0
140-160Km								-506 77	506 77	0 00			0	0
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	0	0	0	14 63	6136 47	4191 81	303 78	0	0	0

Commencing Chainage : 0+000
End Chainage : 144+675

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL STATION

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Section	Sub-ballast Layers		Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn (m)
0-20Km			20	6	30						250		
20-40Km			20	16	30								
40-60Km			20	12									
60-80Km			14.5	6	30								
80-100Km			13.9	7				100					
100-120Km			20	5				100					
120-140Km			20	12	0								
140-160Km			4.7	1									
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	0	0	130.1	65	90	0	0	200	0	0	250	0	0

Commencing Chainage : 0+000
End Chainage : 144+675

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL STATION

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Section	Major River Crossings			Modifications of Ex. Rail Crossings (each)	Rail Crossing						Modifications to Ex Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff. fdn (m)		Single Track (each)	E.O. for ht over 10m (each)	E.O. for diff fdn (each)	Double Track (each)	E.O. for ht over 10m (each)	E.O. for diff fdn (each)		>250m in length (m)	E.O. for ht over 10m (m)	E.O. for diff fdn (m)
0-20Km														
20-40Km					1									
40-60Km												1250		
60-80Km														
80-100Km												1550		
100-120Km					1							300		
120-140Km					1									
140-160Km					1									
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0	0	0	0	4	0	0	0	0	0	0	3100	0	0

Commencing Chainage : 0+000
End Chainage : 144+675

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL STATION

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Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings						Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings				
		2-lane (each)	E.O. for diff. fdn (each)	4-lane (each)	E.O. for diff. fdn (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn (each)		Secondary (2-4 lanes) (each)	Sec (2-4 lanes) (Dual ROW) (each)	E.O. for diff. fdn (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn (each)
0-20Km								3	3	6			
20-40Km		4											
40-60Km		5											
60-80Km		3											
80-100Km		2											
100-120Km	1	5											
120-140Km	1	6											
140-160Km		5											
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	2	30	0	0	0	0	0	3	3	6	0	0	0

Commencing Chainage : 0+000
End Chainage : 144+675

QUEBEC - ONTARIO H.S.R. STUDY : ROUTING AND INFRASTRUCTURE ANALYSIS
SECTION : OTTAWA - MONTREAL
TECHNOLOGY : 300+ Km/Hr ON NEW R.O.W. - MIRABEL STATION

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Section	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track		Tunnelling		Noise Attenuation Structure		ROW Security Fencing (km)	Snow Control Measures (km)	Major Hydro Relocation (each)	Major Oil/Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
					Soft Ground (m)	Rock (m)			Barriers (km)	Berms (km)						
0-20Km		3									39.5		2			
20-40Km		5				750					40.0		1			
40-60Km	1.4	5									40.0					
60-80Km	0.3	5				8300					23.0		3			
80-100Km		5			3400	2700					27.8					
100-120Km	0.3	5									40.0		3			
120-140Km	0.9	6									40.0		3			
140-160Km		2									9.5					
160-180Km																
180-200Km																
200-220Km																
220-240Km																
240-260Km																
260-280Km																
280-300Km																
300-320Km																
320-340Km																
340-360Km																
Total	2.9	36	0	0	3400	11750			0	0	259.8	0	12	0	0	0

Commencing Chainage : 0+000
End Chainage : 144+675

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN NEW CORRIDORS**

MIRABEL - MONTREAL

Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex ROW			Upgrade Ex. Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20,00	1	15,77	N/A	N/A	4,23	N/A	0,00	0,00	0,00	1,08	8,22	1,10	N/A
20-40Km	20,00	0	8,34	N/A	N/A	11,66	N/A	4,90	6,76	0,00	3,10	3,33	1,70	N/A
40-60Km	8,16	1	0,00	N/A	N/A	8,16	N/A	1,50	6,66	0,00	0,00	0,00	0,00	N/A
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	48,16	2	24,11	0,00	0,00	24,05	0,00	6,40	13,42	0,00	4,18	11,55	2,80	0,00

Commencing Chainage : 4006+300

End Chainage : 4054+460

Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining up to 3m (km)	Structures over 3m (km)
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)				
0-20Km	40,00	TO BE	TO BE	TO BE	TO BE	N/A	N/A	12,76	11,61	0,00	11,61	N/A	0,43	1,21
20-40Km	40,00	DEFINED	DEFINED	DEFINED	DEFINED	N/A	N/A	317,37	153,19	0,00	107,12	N/A	0,00	0,00
40-60Km	16,32	BY km	BY km	BY km	BY km	N/A	N/A	29,88	30,61	0,00	30,61	N/A	0,00	0,00
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	96,32	0	0	0,00	0,00	0	0,00	360,01	195,41	0,00	148,34	0,00	0,43	1,21

Commencing Chainage : 4006+300
End Chainage : 4054+460

Section	Sub-ballast	Layers	Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	10,40	10,40	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
20-40Km	11,66	8,13	19,79	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
40-60Km	8,16	0,00	8,16	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	19,82	18,53	38,35	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Commencing Chainage : 4006+300
End Chainage : 4054+460

Section	Major River Crossings			Modifications of Ex. Rail Crossings (each) *	Rail Crossings (New)						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	Double Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	N/A	N/A	5	N/A	N/A	N/A	N/A	N/A	N/A	300,00	0,00	N/A	N/A
20-40Km	0,00	N/A	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	210,00	0,00	N/A	N/A
40-60Km	0,00	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
60-80Km														
80-100Km														
100-120Km														
120-140Km														
140-160Km														
160-180Km														
180-200Km														
200-220Km														
220-240Km														
240-260Km														
260-280Km														
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	0,00	0,00	0,00	7	0	0	0	0	0	0	510,00	0,00	0,00	0,00

Commencing Chainage : 4006+300
End Chainage : 4054+460

*: Railway sidings to abandoned

Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings (New)							Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn. (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	At-grade level crossing		Secondary (2-4 lanes) (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)
0-20Km	7	3	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
20-40Km	2	9	N/A	1	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
40-60Km	0	4	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
60-80Km													
80-100Km													
100-120Km													
120-140Km													
140-160Km													
160-180Km													
180-200Km													
200-220Km													
220-240Km													
240-260Km													
260-280Km													
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	9	16	0	1	0	0	0	0	0	0	0	0	0

Commencing Chainage : 4006+300
End Chainage : 4054+460

Section	Closure & Diversion of Roads (each)	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track		Tunnelling		Noise Attenuation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Crossings (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
						Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)	Barriers (km)	Berms (km)						
0-20Km	0	0,00	0	TO BE	5 070,00	0,00	2 607,00	0,00	N/A	10,41	N/A	3	N/A	TO BE	TO BE		
20-40Km	0	0,00	0	DEFINED	0,00	0,00	0,00	0,00	N/A	19,79	N/A	3	N/A	DEFINED	DEFINED		
40-60Km	1	0,05	0	BY km	0,00	0,00	0,00	0,00	N/A	8,16	N/A	0	N/A	BY km	BY km		
60-80Km																	
80-100Km																	
100-120Km																	
120-140Km																	
140-160Km																	
160-180Km																	
180-200Km																	
200-220Km																	
220-240Km																	
240-260Km																	
260-280Km																	
280-300Km																	
300-320Km																	
320-340Km																	
340-360Km																	
Total	1	0,05	0	0	5 070,00	0,00	2 607,00	0,00	0,00	38,36	0,00	6	0	0,00	0,00		

Commencing Chainage : 4006+300
End Chainage : 4064+480

**OVER 300 KPH NON-TILTING TECHNOLOGY
IN NEW CORRIDORS**

MONTREAL - QUEBEC

Section	Route Length (route-km)	Station (each)	ROW Width					Roadbed Preparation on New ROW			Roadbed Preparation on Ex. ROW			Upgrade Ex. Roadbed (route-km)
			30m (route-km)	30-35m (route-km)	35-40m (route-km)	40m (route-km)	>40m (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	Type 1 Soils (route-km)	Type 2 Soils (route-km)	Type 3 Soils (route-km)	
0-20Km	20,00	1	12,89	N/A	N/A	7,11	N/A	0,00	0,00	0,00	2,87	4,35	0,00	N/A
20-40Km	20,00		8,22	N/A	N/A	11,79	N/A	0,00	8,18	3,33	0,00	8,21	0,00	N/A
40-60Km	20,00		N/A	N/A	N/A	20,00	N/A	0,30	17,40	2,00	0,00	0,00	0,00	N/A
60-80Km	20,00		N/A	N/A	N/A	20,00	N/A	2,70	4,30	13,00	0,00	0,00	0,00	
80-100Km	20,00		N/A	N/A	N/A	20,00	N/A	6,77	12,61	0,00	0,00	0,00	0,00	
100-120Km	20,00		N/A	N/A	N/A	20,00	N/A	0,00	19,86	0,00	0,00	0,00	0,00	
120-140Km	20,00		N/A	N/A	N/A	20,00	N/A	5,80	14,10	0,00	0,00	0,00	0,00	
140-160Km	20,00		N/A	N/A	N/A	20,00	N/A	13,22	1,86	4,28	0,00	0,00	0,00	
160-180Km	20,00		N/A	N/A	N/A	20,00	N/A	10,23	1,97	7,30	0,00	0,00	0,00	
180-200Km	20,00		N/A	N/A	N/A	20,00	N/A	10,06	5,50	4,30	0,00	0,00	0,00	
200-220Km	20,00		N/A	N/A	N/A	20,00	N/A	10,40	7,26	2,20	0,00	0,00	0,00	
220-240Km	20,00		N/A	N/A	N/A	20,00	N/A	19,66	0,00	0,00	0,00	0,00	0,00	
240-260Km	20,00		1,60	N/A	N/A	18,40	N/A	18,40	0,00	0,00	1,60	0,00	0,00	
260-280Km	13,63	1	7,66	N/A	N/A	5,97	N/A	4,38	0,00	0,00	7,17	0,00	0,00	
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	273,63	2	30,37	0,00	0,00	243,27	0,00	101,92	93,02	36,41	11,64	12,56	0,00	0,00

Commencing Chainage : 6+300
End Chainage : 279+930

Section	Main Line Track Length (route-km)	Double Crossover (each)	Single Crossover (each)	Layover Track (m)	Turnout (m)	Substation (each)	Electrification (route-km)	Embankment Construction			Disposal of Unsuitable Material (x1000m^3)	Haulage (x1000m^3-km)	Retaining up to 3m (km)	Structures over 3m (km)
								Borrow Material (x1000m^3)	ROW cut in soft (x1000m^3)	ROW cut in rock (x1000m^3)				
0-20Km	40,00	TO BE	TO BE	TO BE	TO BE	N/A	N/A	11,35	0,00	0,00	0,00	N/A	1,05	2,13
20-40Km	40,00	DEFINED	DEFINED	DEFINED	DEFINED	N/A	N/A	131,31	65,16	0,00	65,16	N/A	0,00	0,00
40-60Km	40,00	BY km	BY km	BY km	BY km	N/A	N/A	93,96	17,31	0,00	17,31	N/A	0,00	0,00
60-80Km	40,00					N/A	N/A	343,60	43,62	0,00	43,62	N/A	0,00	0,00
80-100Km	40,00					N/A	N/A	125,46	49,65	0,00	36,32	N/A	0,00	0,00
100-120Km	40,00					N/A	N/A	190,52	168,27	0,00	168,27	N/A	0,00	0,00
120-140Km	40,00					N/A	N/A	307,07	43,31	0,00	12,48	N/A	0,00	0,00
140-160Km	40,00					N/A	N/A	255,72	121,21	0,00	14,80	N/A	0,00	0,00
160-180Km	40,00					N/A	N/A	147,28	87,24	0,00	58,28	N/A	0,00	0,00
180-200Km	40,00					N/A	N/A	275,83	18,19	0,00	9,82	N/A	0,00	0,00
200-220Km	40,00					N/A	N/A	306,01	341,62	0,00	195,78	N/A	0,00	0,00
220-240Km	40,00					N/A	N/A	368,46	322,08	0,00	32,21	N/A	0,00	0,00
240-260Km	40,00					N/A	N/A	313,76	355,25	0,00	35,53	N/A	0,00	0,00
260-280Km	27,26					N/A	N/A	19,38	0,00	0,00	0,00	N/A	0,44	1,46
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	547,26	0	0	0,00	0,00	0	0,00	2 889,71	1 632,91	0,00	689,58	0,00	1,49	3,59

Commencing Chainage : 8+300
End Chainage : 279+930

Section	Sub-ballast	Layers	Normal ROW Drainage (route-km)	Major Watercourse Culverts (each)	Small River Crossings			Intermediate River Crossings			Large River Crossings		
	New ROW (route-km)	Ex. ROW (route-km)			up to 30m in length (each)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	30-100m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)	100-250 in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	7,22	7,22	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
20-40Km	11,49	8,21	19,70	3	2,00	N/A	N/A	0,00	N/A	N/A	160,00	N/A	N/A
40-60Km	19,70	0,00	19,70	0	8,00	N/A	N/A	110,00	N/A	N/A	100,00	N/A	N/A
60-80Km	20,00	0,00	20,00	0	2,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
80-100Km	19,38	0,00	19,38	0	7,00	N/A	N/A	90,00	N/A	N/A	100,00	N/A	N/A
100-120Km	19,86	0,00	19,86	0	21,00	N/A	N/A	105,00	N/A	N/A	0,00	N/A	N/A
120-140Km	19,90	0,00	19,90	0	19,00	N/A	N/A	95,00	N/A	N/A	0,00	N/A	N/A
140-160Km	19,36	0,00	19,36	0	7,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
160-180Km	19,50	0,00	19,50	0	5,00	N/A	N/A	30,00	N/A	N/A	0,00	N/A	N/A
180-200Km	19,86	0,00	19,86	0	13,00	N/A	N/A	0,00	N/A	N/A	140,00	N/A	N/A
200-220Km	19,86	0,00	19,86	0	15,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
220-240Km	19,66	0,00	19,66	0	8,00	N/A	N/A	90,00	N/A	N/A	110,00	N/A	N/A
240-260Km	18,40	1,60	20,00	0	12,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
260-280Km	4,38	7,17	11,55	0	0,00	N/A	N/A	0,00	N/A	N/A	0,00	N/A	N/A
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	231,35	24,20	255,55	3	119,00	0,00	0,00	520,00	0,00	0,00	610,00	0,00	0,00

Commencing Chainage : 6+300

End Chainage : 279+930

Section	Major River Crossings			Modifications of Ex. Rail Crossings (each) *	Rail Crossings (New)						Modifications to Ex. Bridges new deck (m)	Viaducts		
	over 250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)		Single Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)	Double Track (each)	E.O. for ht. over 10m (each)	E.O. for diff. fdn. (each)		>250m in length (m)	E.O. for ht. over 10m (m)	E.O. for diff. fdn. (m)
0-20Km	0,00	N/A	N/A	2	0	N/A	N/A	N/A	N/A	N/A	300,00	0,00	N/A	N/A
20-40Km	0,00	N/A	N/A	1	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
40-60Km	0,00	N/A	N/A	0	1	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
60-80Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
80-100Km	0,00	N/A	N/A	0	3	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
100-120Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
120-140Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
140-160Km	280,00	N/A	N/A	0	1	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
160-180Km	450,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
180-200Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
200-220Km	0,00	N/A	N/A	0	1	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
220-240Km	0,00	N/A	N/A	0	1	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
240-260Km	0,00	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	0,00	0,00	N/A	N/A
260-280Km	0,00	N/A	N/A	4	0	N/A	N/A	N/A	N/A	N/A	250,00	0,00	N/A	N/A
280-300Km														
300-320Km														
320-340Km														
340-360Km														
Total	730,00	0,00	0,00	7	7	0	0	0	0	0	550,00	0,00	0,00	0,00

Commencing Chainage : 6+300
End Chainage : 279+930

*: Railway sidings to abandoned

Section	Modifications of Ex. Rural Gr. Separation (each)	Rural Highway Crossings (New)							Modifications of Ex. Urban Gr. Separation (each)	Urban Highway Crossings			
		2-lane (each)	E.O. for diff. fdn. (each)	4-lane (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)	At-grade level crossing		Secondary (2-4 lanes) (each)	E.O. for diff. fdn. (each)	Major (over 4 lanes) (each)	E.O. for diff. fdn. (each)
0-20Km	7	2	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
20-40Km	3	4	N/A	2	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
40-60Km	0	7	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
60-80Km	1	3	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
80-100Km	0	8	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
100-120Km	0	7	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
120-140Km	0	11	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
140-160Km	0	11	N/A	1	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
160-180Km	0	5	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
180-200Km	0	4	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
200-220Km	0	8	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
220-240Km	0	6	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
240-260Km	1	7	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
260-280Km	8	5	N/A	0	N/A	SEE 4-LANE	N/A	0	SEE RURAL	SEE RURAL	N/A	SEE RURAL	N/A
280-300Km													
300-320Km													
320-340Km													
340-360Km													
Total	20	88	0	3	0	0	0	0	0	0	0	0	0

Commencing Chainage : 6+300
End Chainage : 279+930

Section	Closure & Diversion of Roads (each)	Closure & Diversion of Roads (km of road)	Private Farm Crossings (each)	Wild Life Passages (each)	Modifications to Ex. Tunnels (m)	Double Track		Tunnelling		Noise Attenuation Structure		ROW Security Fencing (route-km)	Snow Control Measures (km)	Major Hydro Crossings (each)	Major Oil/ Gas Line Relocation (each)	Minor Pipe Crossings (route-km)	Minor Wire Crossings (route-km)
						Soft Ground (m)	Rock (m)	Barriers (km)	Berms (km)								
0-20Km	0	0,00	0	TO BE	5 070,00	0,00	4 557,00	0,00	N/A	7,22	N/A	1	N/A	TO BE	TO BE		
20-40Km	2	0,10	0	DEFINED	0,00	0,00	0,00	0,00	N/A	19,70	N/A	5	N/A	DEFINED	DEFINED		
40-60Km	2	12,00	23	BY km	0,00	0,00	0,00	0,00	N/A	19,70	N/A	2	N/A	BY km	BY km		
60-80Km	0	0,00	14		0,00	0,00	0,00	7,40	N/A	18,30	N/A	1	N/A				
80-100Km	0	0,00	5		0,00	0,00	0,00	0,00	N/A	19,33	N/A	1	N/A				
100-120Km	0	0,00	4		0,00	0,00	0,00	2,00	N/A	18,95	N/A	2	N/A				
120-140Km	1	6,00	4		0,00	0,00	0,00	0,00	N/A	19,90	N/A	0	N/A				
140-160Km	6	24,10	11		0,00	0,00	0,00	10,00	N/A	14,36	N/A	5	N/A				
160-180Km	1	0,05	0		0,00	0,00	0,00	0,00	N/A	19,50	N/A	0	N/A				
180-200Km	2	0,10	0		0,00	0,00	0,00	0,00	N/A	19,86	N/A	1	N/A				
200-220Km	4	6,15	0		0,00	0,00	0,00	2,00	N/A	18,86	N/A	1	N/A				
220-240Km	1	0,05	14		0,00	0,00	0,00	0,00	N/A	19,66	N/A	2	N/A				
240-260Km	1	6,00	17		0,00	0,00	0,00	0,00	N/A	20,00	N/A	1	N/A				
260-280Km	0	0,00	0		0,00	0,00	260,00	0,00	N/A	11,53	N/A	5	N/A				
280-300Km																	
300-320Km																	
320-340Km																	
340-360Km																	
Total	20	54,55	92	0	5 070,00	0,00	4 817,00	21,40	0,00	244,85	0,00	27	0	0,00	0,00		

Commencing Chainage : 6+300

End Chainage : 279+930