Doney Spur Commuter Rail Line

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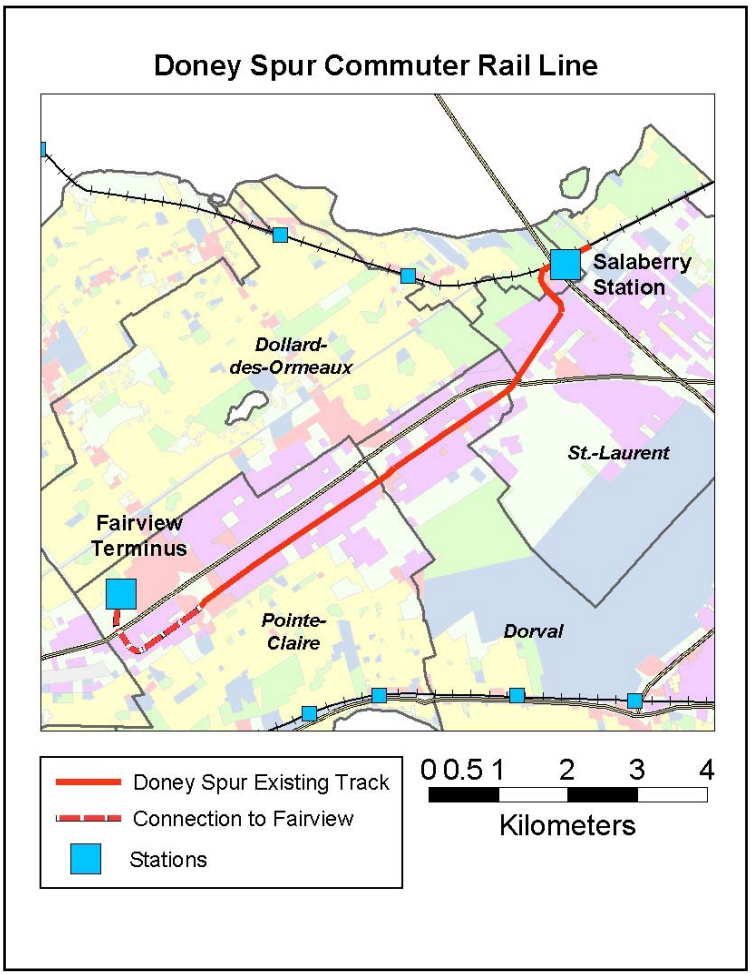
1. Introduction: The Doney Spur

One of the possible transportation options for the West Island is the establishment of an electric commuter rail line on the so-called Doney Spur. Such commuter lines have proven extraordinarily successful in recent years. The Deux-Montagnes line to downtown, from which the Doney Spur branches, currently sees 12,700 daily riders at AM Peak. In fact, the Deux-Montagnes line currently runs at full capacity, with an unmet latent demand of 3000 potential riders. Thus, there is a strong precedent for a similar line on the Doney Spur.

Location

The Doney Spur is a stretch of track running mostly along an old CN right-of-way just south of the Trans-Canada Highway (Highway 40.) The right-of-way branches off what is now the Deux-Montagnes commuter line between Highway 13 and Bois-Franc station. From there, it runs south and west, crossing the Trans-Canada Highway before turning west to run parallel to the T-Can as far as the Pointe Claire/Kirkland border.



The track itself does not exactly follow the right-of-way. In the east, the track has been diverted to share the Highway 13 underpass with the Deux-Montagnes line, before veering south and west to rejoin the right-of-way. As well, although the right-of-way runs as far as Stillview Avenue at the east end of Kirkland, the track itself stops at Boulevard St.-Jean.

Running as it does through the wide industrial corridor around the Trans-Canada Highway, it was initially thought that the Doney Spur could serve to bring commuters to the West Island during the AM Peak period from around the greater Montreal area. However, an investigation of travel demand caused that notion to be rejected, and the most viable function of the Doney Spur would be as a branch of the Deux-Montagnes line, bringing people from the West Island to downtown in the mornings and back in the evenings.

Current traffic on the Doney Spur

Although the Doney Spur currently sees some freight traffic, that traffic is mostly a matter of convenience: the track is used because it is there, not because it is needed. The industrial park at the east end off Highway 13 sees some intermodal freight traffic i.e. containers being moved from freight trains to trucks. Otherwise, the Doney Spur as a freight-hauling line has been made obsolete by the Trans-Canada Highway, which amply serves the industrial sites along its length.

Whatever limited freight traffic does require the use of the Doney Spur, could be accommodated by scheduling that traffic during off-peak hours, as is currently done with the other commuter lines. Thus, the Doney Spur may be considered freely available for a commuter-train line.

De Salaberry Station

The Doney Spur line would branch off from the Deux-Montagnes commuter line at a station at Highway 13 and De Salaberry. The Agence Metropolitaine du Transport has already begun planning this station; our scenario assumes that De Salaberry Station will be built.

Fairview Terminus

The terminus of the Doney Spur line would be just north and west of the Fairview Mall. This would require the construction of a rail viaduct crossing the Trans-Canada highway and of roughly a kilometer of new track, as well as a minor land acquisition from two current landowners. Nonetheless, the Fairview Mall was considered the most practical terminus for several reasons.

Firstly, the Fairview Mall is currently the principal public-transit nexus on the West Island. Most of the major bus lines on the West Island already converge here, presenting a natural location for another transit connection. Such opportunities are rare indeed in an area characterized by extremely low-density, dispersed development; to pass it up would be a tremendous waste.

Secondly, there is a large (23 hectares) vacant site directly west of the Fairview Mall. In addition to a station and a large park-and-ride facility, the site could accommodate a small transit-oriented housing development. It is hoped that the introduction of a commuter-rail stop, by raising the land values and making it more attractive to households whose heads work in downtown Montreal, may prompt more compact and environment-friendly development than might otherwise be seen on the site.

Thirdly, as the Spur runs almost entirely through a wide industrial corridor, the Fairview Mall is essentially the only potential terminus that is within walking distance of an existing residential area. Although commuter trains are generally dependent on park-and-rides, it is still desirable to put stations within walking distance of at least some users' homes whenever practical.

Thus, the best location in terms of transit connectivity happens also to be the best in terms of pedestrian access and future development options. For these reasons, despite the added cost of extending the Doney Spur and crossing the Trans-Canada Highway, the Fairview Mall stands out

as the most desirable terminus, and the relatively small added expense would pay off in the long term.

2. Cost Analysis

Constructing and operating a commuter rail require a large investment from the government, as well as the transportation operator (in this case, the AMT.) For this project, we study the costs needed to build the Doney Spur line with new stations, park-n-ride facilities and land acquisition for right-of-way.

Costs are divided into capital costs and operating costs. Capital costs are fixed costs that are paid at the initial stage of the construction of the commuter rail line; while operating costs represent the annual outlay needed to support the operation of the commuter line. Both sets of costs are based on 2002 values provided by the AMT.

The table below shows the capital unit cost for Doney Spur: $125 million, based on 2002 value. The park-n-ride space is based on the total 1600 required park-and-ride and 50 kiss-n-ride spaces planned between Fairview and/or De Salaberry. (See Appendix for a cost breakdown for park-and-rides.) The land acquisition cost is based on the land assessment by the City of Montreal in 2002. However, it must be noted that the land assessment value is usually under the market value. As a result, the total capital costs for the Doney Spur line will likely be somewhat higher than 125 million dollars estimated below.

Capital unit costs for the Doney Spur

Item no.	Description	Qty	Unit	Unit cost	Total cost
Station					
1	Station	1	station	700,000	700,000
2	Land acquisition for station & right-of-way	36,000	per sq meters	40	1,440,000
3	Park-n-ride land acquisition at Salaberry	10,625	per sq meters	18.7	198,688
4	Park-n-ride land acquisition at Fairview	17,425	per sq meters	40	697,000
5	Park-n-ride spaces	1,650	space	3000	4,950,000
Track					
6	New track from West of St-Jean to Fairview	2.09	per km	700,000	1,463,000
7	Track Renovation (East of St-Jean)	8.67	per km	600,000	4,758,000
8	Electrification	10.76	per km	600,000	6,456,000
9	Signalization	10.76	per km	800,000	8,608,000
10	Fences	10	km	80,000	800,000
11	Siding	0.28	per km	450,000	126,000
12	Switch	1	unit	200,000	200,000
13	Switch	1	unit	100,000	100,000
Rolling Stock					
14	"Rame" (5 x paired engine + car)	2	train	30,000,000	60,000,000

Crossing					
15	Viaduct (TransCanada)	85	per meter	40,000	3,400,000
16	At-grade crossing	2	per passage	250,000	500,000
Subtotal					***94,396,688***
Others					
17	Other expenses	% of total	3%		2,831,901
18	Plans	% of total	13.50%		12,743,553
19	Unexpected expenses	% of total	15.50%		14,631,487
TOTAL					**124,603,628**

Based on 2002 value

As well, note that the cost estimates *do not* include the station at De Salaberry and Highway 13, except for the additional park-and-ride spaces required there by the Doney Spur ridership. This station is already in the works by AMT, and depends on the doubling of the track between it and Bois-Franc. As a result, our analysis treats De Salaberry station as a separate project, already in place on the Deux-Montagnes line when the Doney Spur is built.

Operating costs for the Doney Spur line are estimated at $6 million/year based on 2002 value. Depending on the number of passenger and the number of trains used in the line, the operating costs will vary.

Operating Costs - Doney Spur Line				
	Unit cost per year	**Qty**	**Unit**	**Annual costs**
Crew	838,774	2	train	1,677,548
Utilization of right-of-way	49,222	10.76	per km	529,628
Energy	280,000	2	train	560,000
Insurance	52,200	2	train	104,400
Fare collectors/officers	87.33	3800	passenger, AM peak	331,854
Rolling stock maintenance	155,517	10	Element	1,555,170
Fixed installations maintenance	88,031	10.76	per km	947,213
Stations maintenance	118,908	1	station	118,908
Subtotal	*1,582,739*			*5,824,721*
Administration		6.90%	% of total	401,906
Total				**6,226,627**

Based on 2002 value

Thus, the Doney Spur will incur roughly $125 million in capital costs and $6 million annually in operating costs.

3. Performance Analysis

The performance of a commuter rail line depends partly on the type of system used, but also on other factors such as average operating speed, dwell time, frequency, etc. The following calculation shows the dwell time, headway, design capacity, and travel time between the new stations on the Doney Spur line.

Dwell time (t_d)

Dwell time (t_d) will vary by the number of passengers boarding and alighting at the maximum loading station and the corresponding unit time for each. For the Doney Spur line, the maximum loading station would be at the Fairview Terminus. The equation for t_d is

$$t_d = (P_a \times t_a) + (P_b \times t_b) + t_{oc}$$

Where

t_d= dwell time (seconds)
P_a = passengers alighting through the busiest door during the peak period (passengers)
t_a= alighting time per passenger (seconds/passenger)
P_b= passengers boarding through the busiest door during the peak period (passengers)
t_b= boarding time per passenger (seconds/passenger)
t_{oc}= door opening and closing time (seconds)

At the maximum load point, 40 passengers board and 1 passenger depart through the busiest car door during the peak period. Each passenger boarding and alighting takes 2.0 seconds, and the door opening and closing time is 4.0 seconds.

t_d = (40 passenger)(2 second/passenger) + (1 passenger)(2 second/passenger) + 4 seconds

t_d = 86 seconds

The dwell time of 86 seconds shows that at the maximum load station, Fairview terminus, the time needed for passengers to board or disembark is 1.4 minutes.

Headway (h)

Headway represents the time between two trains including the acceleration and deceleration time, the dwell time in the departure station, and the operations safety factors that keep a minimum distance between transit units. Frequency is the number of trains scheduled in an hour.

$$h = \sqrt{\frac{2\,(L + D)}{a_s}} + \frac{L_t}{v_a} + \left(\frac{100}{K} + B\right)\left(\frac{v_a}{2_{ds}}\right) + \frac{a_s t_{os}^2}{2v_a}\left(1 - \frac{v_a}{v_{max}}\right) + t_{os} + t_{jl} + t_{br} + t_{om}$$

Where

h = station headway (s)
L_t = length of the longest train (260m)
D = Distance from front of stopped train to start of station exit block (10m)
v_a = station approach speed (m/s) (13.9m/s) (50km/h)
v_{max} = maximum line speed (m/s) (29.2m/s) (100km/h)
K = braking safety factor – worst case service braking is K% of specified normal rate – typically 75% (75)
B = separation safety factor – equivalent to number of braking distances plus a margin (surrogate for blocks) that separate trains (1.2)
t_{os} = time for overspeed governor to operate (3s)
t_{jl} = time lost to braking jerk limitation (0.5s)
t_{br} = operator and brake system reaction time (1.5s)
t_d = dwell time (86s)
t_{om} = operating margin (30s)
a_s = initial service acceleration rate (1.9m/sec^2)
d_s = service deceleration rate (1.9m/sec^2)

$$h = \sqrt{\frac{(2)(260+10)}{1.9}} + \frac{260}{13.9} + \frac{(100+1.2)}{75}\left[\frac{13.9}{2 \times 1.9}\right] + \frac{(1.9)(3)^2}{2(13.9)}\left[1-\frac{13.9}{29.2}\right] + 3.0 + 0.5 + 1.5 +$$

86+ 30

h = 16.859 + 18.705 + 9.267 + 0.322 + 3.0 + 0.5 + 1.5 + 86 + 30

h = 166.15 seconds

Headway of 166 seconds means that the maximum headway that can be used for the Doney Spur line is 2.8 minutes. It means that the minimum time between two trains is 2.8 minutes. It is useful for the AMT to know the headway to plan for the highest frequency if it is applicable in the future.

Design Capacity

For the purposes of this analysis, an headway of 180 seconds (3 minutes) is assumed. The design capacity (maximum capacity of the commuter rail line) for the line is:

$C_d = f \times N_c \times P_c$ passengers per hour

$$C_d = \frac{3600 \times N_c \times P_c}{h}$$

Where:

C_d = design capacity
f = frequency of service = 3600/headway
N_c = number of vehicles operated together in a "transit unit" (TU)
P_c = passenger capacity of each vehicle

$$C_d = \frac{3600 \text{ seconds/hour} \times 88 \text{ passengers/car} \times 10 \text{ cars/TU}}{180 \text{ seconds/TU}}$$

C_d = 17600 passengers/hour

Even though our ridership estimation for the Doney Spur line is only about 3800 riders, the maximum capacity for this line with headway of 3 minutes is 17600 passengers per hour. This number is useful for long-term development purposes, that is, for the AMT to know the maximum capacity of the commuter line for future development.

Travel time (Ti)

$$T_i = SM \left[\frac{V_{max}}{2} \left(\frac{1}{a} + \frac{1}{d} + t_{jl} + t_{br}\right) + \left(\frac{L_i + L_t}{v_{max}}\right)\right] + t_{di} + t_{om}$$

Where

SM = speed margin (range from 1.0-1.2) (1.1)
v_{max} = maximum speed on link i , meters/second (29.2m/s)
L_i = length of link i, meters i_1= 10670meters i_2 = 3600meters
L_t = length of train, meters (260m)
a = acceleration rate, meters/second2 (1.9m/s2)
d = deceleration rate, meters/second2 (1.9m/s2)
t_{di} = dwell time for station i, seconds (86 seconds)
t_{om} = operating margin, seconds (30 seconds)

T1= Fairview to De Salaberry
T2= De Salaberry to Bois Franc

$$T1 = (1.1) \left[\frac{29.2}{2} \left(\frac{1}{1.9} + \frac{1}{1.9} + 0.5 + 1.5 \right) + \left(\frac{10670 + 260}{29.2}\right)\right] + 86 + 30$$

T1 = (1.1) (3.05263 + 374.315) + 86 +30

T1 = 531.1 seconds
T1 = 8.85 minutes

$$T2 = (1.1)\left[\frac{29.2}{2}\left(\frac{1}{1.9}+\frac{1}{1.9}+0.5+1.5\right)+\left(\frac{3600+260}{29.2}\right)\right]+86+30$$

$$T2 = (1.1)\,(44.568 + 132.192) + 86 + 30$$

T2 = 310 seconds
T2 = 5.17 minutes

According to the AMT, the travel time from Bois Franc to Gare Centrale is 18 minutes. Thus the total travel time from Fairview Terminus to Gare Centrale will be (8.85 + 5.17 + 18) = 32 minutes. Our plan calls for a headway of 30 minutes during peak hours; therefore the line will require at least need 2 trains in the first stage.

Speed

The speed of the commuter line is related to the distance and time that will take the train from the terminus to the end of the line. It will depend on the dwell time, turnover time, the operating speed, etc. The travel time for Deux-Montagne and Dorion-Rigaud line is obtained from the AMT website, while the Doney Spur line travel time is calculated in the above section.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Deux-Montagne Line average speed} = \frac{31.27\ \text{km}}{0.667\text{hr}}$$

Deux-Montagne Line average speed = 46.89km/hr

$$\text{Doney Spur Line average speed} = \frac{27.64\ \text{km}}{0.533\text{hr}}$$

Doney Spur Line average speed = 51.86km/hr

4. Estimating Ridership on the Doney Spur line

The Doney Spur line: assumptions

It is assumed that the proposed Doney Spur line would be basically the same as the existing Deux-Montagnes line in the following respects:

- type of area served at the origin (middle- and upper-middle-class suburban neighbourhoods)
- destination served (Central Station terminus)
- physical and speed characteristics (electric train, sharing the Deux-Montagnes track south of the junction at De Salaberry & Hwy 13).

For these reasons, we began from the assumption that with the proposed Doney Spur line in place, the Doney Spur commutershed would see **roughly the same commuter-train mode share to downtown as the existing Deux-Montagnes commutershed**. Since the Deux-Montagnes train is an extremely popular line currently running at full capacity, it was expected that a similar mode split in the Doney Spur 'shed would be a substantial improvement.

The Doney Spur Commutershed

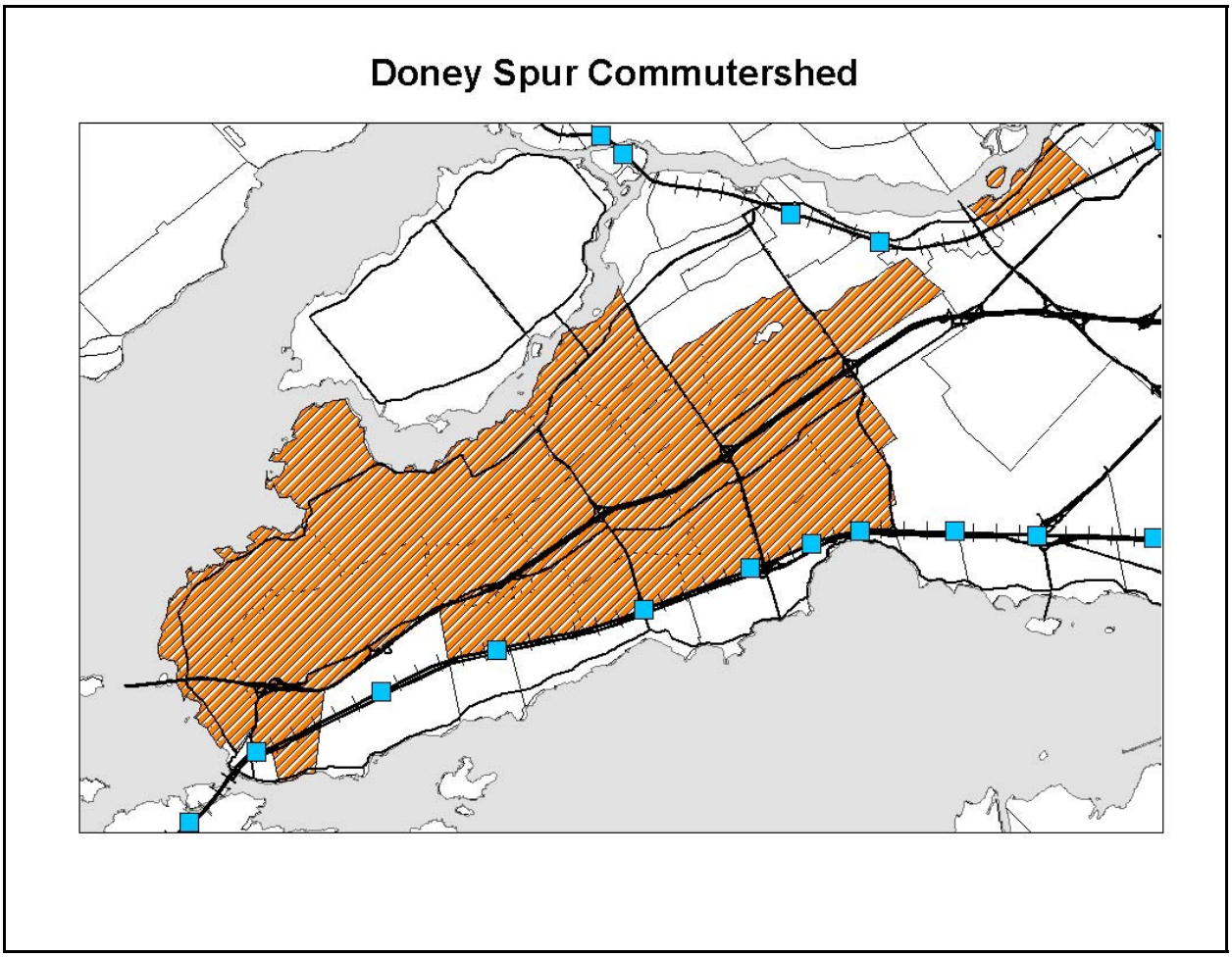
The Doney Spur commutershed, from which the Doney Spur would draw the great majority of its riders, was defined at the census tract level. It was defined as the set of origins from within which a **park-and-ride user bound for the CBD (census tract #462062)** would be more likely to choose a Doney Spur station than either a Deux-Montagnes or Rigaud station. (For our purposes, the proposed station at Autoroute 13 and De Salaberry is considered to be part of the Doney Spur.)

In the absence of data for logit/discrete-choice modeling, a more qualitative and intuitive set of criteria was used in setting the boundaries, based on:

- distance to station from home
- amount of traffic faced en route
- likelihood of getting a seat on the train (i.e. boarding at the beginning of the line is more attractive than boarding midway, where it will be more crowded)
- likelihood of finding a parking space in the park-and-ride. (Based on the observation that the park-and-rides on the Deux-Montagnes stations are currently full on a daily basis; all other things being equal, a potential train rider would then choose the Doney Spur.)
- whether a further mode switch will be required at the terminus. (This accounts for the Doney Spur commutershed's extending to the edge of the Rigaud line; as Rigaud runs to a terminus which, as far as a commuter bound for CT#462062 is concerned, is less convenient.)

Again, in the absence of data required for probability modelling, an either/or approach was taken. That is, where the Doney Spur and Deux-Montagnes commutersheds meet, ALL potential park-and-ride users are deemed to choose a station on "their" side of the line.

(For the sake of simplicity, transit-to-station users are deemed to behave in the same way as park-and-ride users, based on their origin. Users who walk to a station are more problematic, as described in Model 2, below.)



Correction Factors

It is assumed that while the bulk of passengers on the Doney Spur would come from the census tracts closest to it, i.e. the Doney Spur commutershed, clearly this area would not account for all the riders. Similarly, although the ALL_DOWNTOWN census tract set was considered the primary destination zone for AM Peak passengers, some passengers will be ultimately headed for destinations outside that zone. Thus, the trips predicted between the DSPUR and ALL_DOWNTOWN will only account for a certain percentage of total riders during AM Peak. To obtain the total ridership, then, some correction factor should be applied.

The case of the Deux-Montagnes line was used to determine an appropriate correction factor. In 1998, the year in which the O-D survey was taken, the DM line carried just over 11,000 passengers per day at AM Peak. The "Greater Deux-Montagnes" [DMONT2] origin zone

accounted for roughly 10,500 of the line's riders; of these, a total of 8,264 were bound for the ALL_DOWNTOWN destination zone. Thus, this origin-destination pair accounts for

(8,264/11,000) = 0.751 or 75% of total AM Peak ridership.

Taking the inverse of this yields a correction factor of

(1/.751) = 1.33

Which, when applied to the trips generated between DMONT2 and ALL_DOWNTOWN, yields the observed ridership on the Deux-Montagnes line. Since the DMONT2 origin set accounts for over 90% of the ridership on the DM line, this expansion factor may be considered to account primarily for trips whose *destinations* lie outside the ALL_DOWNTOWN zone.

For this reason, we have assumed the same correction factor when dealing with the Doney Spur commutershed; this would account for trips generated from south of Highway 20 (DS_PLUS) and from off-island (e.g. Rigaud and Vaudreuil,) but to a greater extent for trips bound for outside the ALL_DOWNTOWN primary destination zone.

Three models

The three ridership models differ mainly in their definition of *what part* of the current Deux-Montagnes commutershed, as an origin, is most comparable to the proposed Doney Spur commutershed.

Model 1 assumes that the Doney Spur commuterhshed is comparable to the West Island part of the Deux-Montagnes commutershed. The resulting origin zone [DM_island] comprises the former municipalities of Pierrefonds, Ste.-Genevieve, Roxboro, Dollard-des-Ormeaux and part of Kirkland. This definition emphasizes distance-to-station as an important factor in determining mode split in a commutershed; in these respects, it closely resembles the Doney Spur commutershed.

DONEY SPUR RIDERSHIP: MODEL #1			
	TO CBD_WALK	TO OUTER_DT	TO ALL_DOWNTOWN
Projected total train ridership from Doney Spur commutershed, AM Peak to downtown:	1816.84	1276.92	3093.76
Current train ridership from Doney Spur to downtown, AM Peak:	1474.84	1070.56	2545.40
New train users, DSPUR to ALL_DOWNTOWN:	**342.00**	**206.36**	**548.36**
Correction factor			**1.33**
	TOTAL new train users generated by Doney Spur (Model #1):		**729.32**

Model 2 is also based on the above definition. However, it attempts to take into account differences in land use in Deux-Montagnes and the Doney Spur. While Sunnybrooke and Roxboro-Pierrefonds stations are located in residential areas, and thus are accessible on foot from commuters' homes, the Doney Spur runs through a wide industrial corridor. It was thus assumed that while the Doney Spur line may improve "park-and-ride" and "transit-to-station" mode shares, it is unlikely to increase the number of people choosing to walk to a train station.

DONEY SPUR RIDERSHIP: MODEL #2			
RIDERSHIP	TO CBD_WALK	TO OUTER_DT	TO ALL_DOWNTOWN
Projected total train ridership from Doney Spur commutershed, AM Peak to downtown:	1675.68	1210.57	2886.25
Current train ridership from Doney Spur to downtown, AM Peak:	1474.84	1070.56	2545.40
New train users, DSPUR to ALL_DOWNTOWN:	**200.84**	**140.01**	**340.85**
Correction factor			**1.33**
	TOTAL new train users generated by Doney Spur (Model #2):		**453.33**

DONEY SPUR RIDERSHIP: MODEL #3			
RIDERSHIP	**TO CBD_WALK**	**TO OUTER_DT**	**TO ALL_DOWNTOWN**
Projected total train ridership from Doney Spur commutershed, AM Peak to downtown:	1511.07	1070.56	2581.63
Current train ridership from Doney Spur to downtown, AM Peak:	1474.84	1070.56	2545.40
New Train Users, DSPUR to ALL_DOWNTOWN:	**36.23**	**0.00**	**36.23**
Correction factor			**1.33**
	TOTAL new train users generated by Doney Spur (Model #3):		**48.19**

Model 3 assumes that the greater Deux-Montagnes commutershed, which comprises not only part of the Island of Montreal but also parts of Laval, Ile-Bizard and St.-Eustache, is more comparable to the Doney Spur. This commutershed, [DMONT2,] accounts for about 80% of AM Peak Deux-Montagnes train riders.

It is assumed in this case that while the Deux-Montagnes commutershed is much larger, the greater distances-to-station are offset by the lack of traffic along these access routes. Thus, a long trip with light traffic in, for instance, Ste-Eustache is deemed to present about the same disutility as a shorter trip through heavier traffic on the West Island. In any case, all the commuters in the greater Deux-Montagnes commutershed can reach a station without having to cross any bridges; in this respect, the greater Deux-Montagnes commutershed is similar to the Doney Spur 'shed.

Captured Trips

A variation on ridership estimates based on matching the Deux-Montagnes line's mode share, involves current train users diverted from existing lines. Since the Doney Spur commutershed is overlapped almost entirely by these lines' catchment areas, it is expected that a substantial number of Doney Spur users will be people who currently use either the Deux-Montagnes or Rigaud lines. The "Captured Trips" sub model, then, should be considered an alternate means of determining how many of the predicted Doney Spur riders are in fact new train users.

TOTAL AM PEAK RIDERSHIP ON THE DONEY SPUR ("Captured Trips" submodel)			
	MODEL 1	MODEL 2	MODEL 3
Between DSPUR and ALL_DOWNTOWN	3093.76	2886.25	2581.63
Correction factor	1.33	1.33	1.33
TOTAL RIDERSHIP	**4114.70**	**3838.71**	**3433.57**
minus			
Captured trips (from DS_DM and DS_RG to ALL_DOWNTOWN)	*2106.87*	*2106.87*	*2106.87*
Correction factor	*1.33*	*1.33*	*1.33*
TOTAL CAPTURED TRIPS	*2802.14*	*2802.14*	*2802.14*
TOTAL NEW RIDERSHIP ON DONEY SPUR:	**1312.56**	**1036.58**	**631.43**

Since the Doney Spur 'shed was defined as the area within which a park-and-ride or transit-to-station user will choose to board at a station on the Spur, it is assumed that 100% of current park-and-ride and transit-to-station users within this shed will be drawn to the Doney Spur.

Discrepancies among the models

Models 1, 2 and 3, when new ridership is based strictly on the increase in mode share, yield new AM Peak riderships of 749, 453 and 48, respectively.

However, when new ridership is derived by subtracting captured trips from predicted ridership, the new ridership jumps to 1312, 1036 and 631 respectively. The question then arises: what causes this discrepancy, and by extension which model is more trustworthy?

NEW RIDERSHIP ON THE DONEY SPUR (AM Peak)			
	MODEL 1	MODEL 2	MODEL 3
TOTAL PREDICTED RIDERSHIP	**4114.70**	**3838.71**	**3433.57**
(a) New Ridership: Basic or "Increased Mode Share" submodel *NEW RIDERSHIP = Predicted ridership minus current train users.*	**729.32**	**453.33**	**48.19**
(b) New Ridership: "Captured Trips" submodel *NEW RIDERSHIP = Predicted ridership minus current park-and-ride and transit-to-station users diverted from existing lines.*	**1312.56**	**1036.58** *(best estimate)*	**631.43** *(best estimate)*

The original three models, wherein new ridership is simply the difference between predicted ridership minus current train users (the "Increased Mode Share" sub model,) essentially assumes that all current train riders in the Doney Spur commutershed will switch to the Doney Spur. While this is a reasonable assumption when applied to park-and-ride and transit-to-station riders, it becomes problematic when considering those users who currently walk to stations. It is not likely, for instance, that someone living just north of the Rigaud line who currently walks to a station on that line, will instead take a bus (much less walk!) to the Doney Spur line.

The "Captured Trips" sub model, while starting with the total ridership predicted by Models 1, 2 and 3, assumes that **only park-and-ride and transit-to-station riders** will be diverted from existing lines. Current walk-to-station users will continue to use their current train line. Meanwhile, the predicted walk-to-station mode share would come entirely from commuters living in the vicinity of the new stations on the Doney Spur—people who otherwise would drive, but will switch to the train, now that it's within walking distance.

For this to be true, the Doney Spur stations must necessarily be located adjacent to or inside a residential zone. Fortunately, the most effective location for the Spur's terminus in terms of connectivity to the existing transit network—that is, just off Brunswick on the north side of the Fairview mall—happens to be directly adjacent to a large residential zone.

New riders attracted by the Doney Spur: best estimate

Based on the above, we conclude that the most reliable models are Models 2 and 3, with new ridership determined by subtracting captured trips. It is not reasonable to expect walk-to-station mode share to rise substantially as suggested by Model 1, given the limited opportunities for pedestrian-friendly stations on the Doney Spur. However, given that the principal station will be located at the Fairview Mall, right next to a large residential zone, it is entirely possible that a substantial number of downtown-bound commuters in the immediate vicinity will switch to the train.

Thus, our best estimate is of between 3430 and 3840 eastbound daily riders at AM Peak, of which between 630 and 1030 will be new riders.

5. Conclusions based on ridership models

CONCLUSION #1: In the short term, the Doney Spur may generate a modest increase in total AM Peak train trips.

Our best estimate, based on the three models and two sub-models, is of between 3430 and 3840 eastbound daily riders at AM Peak, of which between 630 and 1030 will be new riders. Thus, between 18% and 27% of the ridership may comprise new ridership, with the rest coming at the expense of current train ridership.

If we include the 1588 new riders accommodated on the Deux-Montagnes line by shifting some demand to the Doney Spur line, the *system-wide* new ridership rises to between 2163 and 2463. (See Conclusion #4, below.)

As most if not all park-and-ride and transit-to-station riders on the Spur would be current train users diverted from existing train lines (see below ;) these estimates are largely predicated on a placement of stations which allows residents to walk to the train. That is, if we assume that no one will be able to walk to a Doney Spur station, and that everyone would have to either transit-to-station or park-and-ride, the projected new ridership drops considerably.

This is problematic, as most of the Doney Spur runs through a wide industrial corridor; the only location for a pedestrian-accessible station is at the Fairview Mall. As a result, both the total ridership and new ridership estimates may be overly generous by several hundred riders. A more detailed study, taking into account land use and population densities around the proposed stations, would have to be done before

CONCLUSION #2: Most Doney Spur users will be current train users diverted from either the Rigaud-Vaudreuil or Deux-Montagnes lines.

Counting all park-and-ride and transit-to-station users likely to be diverted from existing lines to the Doney Spur, we get a total of 2107 riders to downtown diverted from within the Doney Spur commutershed. Of these, 1138 would be diverted from the Deux-Montagnes line, and 969 from the Rigaud-Vaudreuil line.

Applying the correction factor of 1.33 to account for trips originating from DSPUR and/or bound for destinations outside of ALL_DOWNTOWN, we get a total diverted ridership of 2802 riders: 1533 from Deux-Montagnes, and 1288 from Rigaud.

This would account for between 73% and 82% of the total expected ridership on the Doney Spur line.

CONCLUSION #3: Many of the new train riders on the Doney Spur may in fact be diverted from current bus ridership, not from car users.

Lacking the data required for a discrete-choice model, we did not attempt to determine how many of these new train users would be diverted from existing *bus* ridership. Currently, the Doney Spur commutershed generates about 400 bus trips to downtown at AM Peak. Since the train is a considerably more attractive mode than the bus, it is reasonable to expect that some of these bus users will switch to the train. If a substantial number of these current bus users switch to the train, then some of the projected Doney Spur ridership would come at the expense of existing transit use, rather than from car users.

CONCLUSION #4: The Doney Spur will allow more passengers to ride the Deux-Montagnes line, but will cause a net loss of ridership on the Rigaud line.

At present, the Deux-Montagnes line is running at capacity; there is not enough supply to satisfy demand. By diverting those 1533 users from the Deux-Montagnes line, the Doney Spur should create room for an equal number of new riders on the Deux-Montagnes line. As AMT surveys indicate an unmet latent demand for 3000 train trips at AM Peak, the Doney Spur may generate up to 1533 new AM Peak train users.

Viewed this way, the Doney Spur could be considered to generate not the 630-1030 new riders predicted by the new model, but 2163-2563 new riders if we count the latent ridership on the Deux-Montagnes line.

On the other hand, the Rigaud line would see 1288 AM Peak riders diverted to the Doney Spur. Since the Rigaud line is currently running at well below capacity, there is clearly no excess demand for the Rigaud line, and these riders will not be made up by new users. Thus the Doney Spur will result in a net loss of ridership on the Rigaud line.

CONCLUSION #5: The Doney Spur will generate minimal counter flow (westbound) AM Peak ridership.

Aside from the conventional commuter-train pattern of carrying suburban residents to downtown in the morning and back at night, the possibility of counter-flow ridership was considered. The Doney Spur parallels the Trans-Canada highway, which is home to a number of work destinations; as well, the Lakeshore General Hospital in the west end of Pointe-Claire is a major employer. It was hypothesized that the Doney Spur would thus benefit from substantial westbound ridership in the morning and eastbound ridership in the evening.

A fairly generous estimate of the census tracts whose work destinations would be within walking distance of the Doney Spur was taken. For the purposes of this model, we considered CT's 462452, 462453.01 and 462453.02 to be within walking distance of the Spur (at least as work

destinations.) These CT's are otherwise labeled PCWEST, PCNORTH and FAIRVIEW; taken together, they compose the zone DS3CT.

The possible "origin commutershed" for DS3CT was defined on the basis of ease of access to commuter train stations at the origin end. Census tracts whose residents could either take a short metro ride to Central Station, or else park-and-ride at another station, before riding to DS3CT and walking to their final destination, were taken as the zone "ORIGIN2DS3CT."

Unfortunately, while DS3CT is a major destination for AM Peak commuters, relatively few of these (503) come from the ORIGIN2DS3CT zone. Assuming a total train mode share of 15%[1] we can expect 75 westbound train riders to DS3CT during the AM Peak.

Summary of conclusions:

1. The Doney Spur would see between 3430 and 3840 daily riders to downtown during the AM Peak period.
2. Of those, between 630 and 1030 would be new train riders, with the rest diverted from current train ridership.
3. A substantial number of these new train riders may come at the expense of current *bus* ridership to downtown, rather than from car users.
4. By diverting train users from Deux-Montagnes, the Doney Spur would make room for an additional 1533 riders on the Deux-Montagnes line, bringing a total system-wide increase of between 2163 and 2463 AM Peak riders.
5. The 1288 train users diverted from the Rigaud-Vaudreuil line would represent a net loss to that line, as there is currently no latent demand on that line.

[1] The 15% figure is based on the existing mode share for the Deux-Montagnes line during the counter-flow period (i.e. PM Peak to downtown.) In addition, it makes more sense to take this lower figure (rather than the 35% peak-hour to work figure suggested elsewhere) due to the absence of certain factors encouraging transit use during those times i.e. traffic congestion in the desired direction.

6. A Long-Term Plan for the Doney Spur

The ridership analysis based on current travel patterns and land uses may argue against the immediate construction of a commuter-train line on the Doney Spur. However, several other factors come into play when we consider a longer time horizon.

Induced Demand

This analysis has not taken the rearrangement of travel demand caused by new infrastructure. In the long term, households relocate in part to take advantage of improved transport opportunities. Thus, the relatively low *immediate* ridership increase prompted by the Doney Spur should not be confused with what, in all likelihood, would be much greater ridership in the long term.

Infill and Intensification on the West Island

The new master plan for the City of Montreal calls for development to be focused in areas that are already served by transit and infrastructure. This is particularly relevant to the west end of the Doney Spur, where a great deal of vacant and underused land is to be found. Even if we ignore the amount of land that is currently devoted to parking at the head of the Spur, there is a tremendous amount of land that is sitting empty, overgrown with weeds and scrub. The long-term intensification of these areas--and especially the insertion of medium-density residential development near potential rail stations—may attract households whose heads work downtown and are seeking homes with good transit service to the CBD.

The large (23 hectare) parcel of land immediately west of the Fairview Mall presents a special opportunity. The site is a logical place for the Doney Spur terminus, as the Fairview Mall is already the primary transit node on the West Island. And in this case, the large vacant site provides an added bonus, namely, the potential for a large transit-oriented development (TOD.) As land value is a key factor in determining dwelling density, the increase in land value prompted by a commuter-rail station on the site would likely stimulate more dense and compact development than would otherwise be seen on the site. Again, considering that such a development would be extremely attractive to homebuyers for whom transit service to downtown is an issue, we might expect that such a stop may well create its own ridership.

In this respect, we put the horse back in front of the cart, where it belongs. Instead of standing by and allowing low-density development to occur, and then trying to provide transit in the face of a *fait accompli,* we can instead proactively influence the form of development before it happens.

Interim plans for the Doney Spur

However, political resistance to such a proactive approach may still block the immediate construction of the Doney Spur, even if it could be justified in the long term.

This presents the problem of how to keep the Doney Spur right-of-way until it *can* be used. At present, the Spur sees very little rail traffic, and is gradually being dismantled; indeed, the tracks west of St-Jean have already been torn up, and the right-of-way encroached upon by informal gravel parking lots. If we do not soon use this long corridor of land, we risk losing it for good.

To be politically viable, an interim plan for the Doney Spur right-of-way would have to be both (1) cheap to implement, and (2) of immediate and visible use.

The Doney Spur Bikeway

The factors that make the Spur practical for rail traffic, also make it ideal for a functional bicycle route. It is a long corridor of land, running from Kirkland-Pointe-Claire border to the Deux-Montagnes commuter line; it sees very few crossings; and it runs through a long stretch of industrial and commercial development. Joined to the residential street network, a bike lane on the Doney Spur right-of-way would allow a cyclist to reach most of the West Island's employment destinations without having to face the danger, exhaust and general unpleasantness of the auto-dominated road network.

Seasonal use

Skeptics and opponents of bikeways often point out that cycling in Canada is only a practical option for half the year.

This is not necessarily true. Bicycle couriers work year-round; and even bicycle commuters often "push the envelope," winterizing their bikes and adapting their wardrobe in order to keep riding until snow accumulation forces them to stop. However, even assuming the conservative stance that a bikeway will only see use from May to October, it would still be justified.

Firstly, there is the issue of keeping the Spur in obvious use in order to prevent its being dismantled; in terms of keeping future options open, this is a worthwhile goal in itself. But in a more immediate context, it is during the warm summer months that air quality becomes a problem; the combined effect of heat and car exhaust makes it especially important to reduce auto use during the summer months. Every West Island commuter who can bike to work during July and August is one less sport-utility vehicle adding to the island's growing smog problem.

Phasing and costs[2]

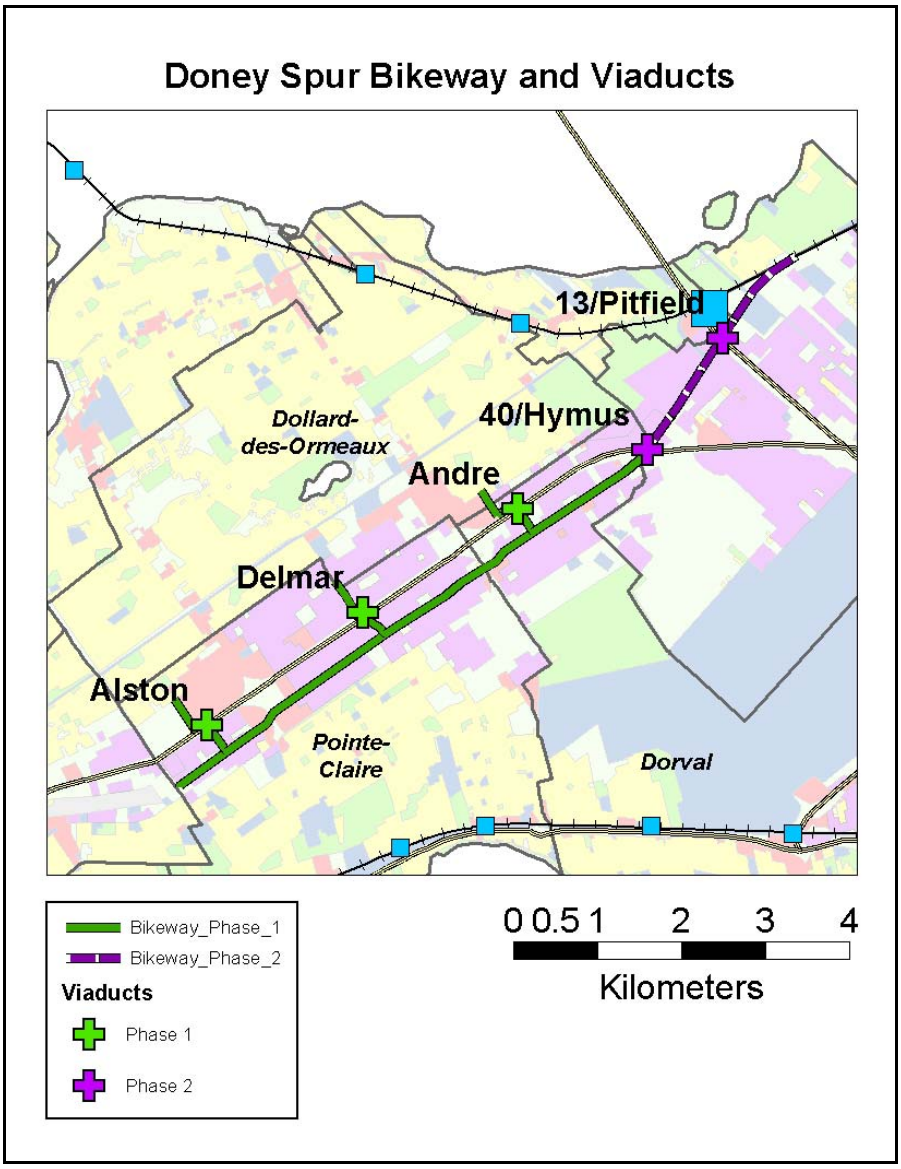
If necessary, the bikeway project could be broken into two phases. The first phase would build the bikeway from the Pointe-Claire/Kirkland border in the west to the Trans-Canada Highway near Hymus in the east—a distance of seven kilometers. Based on the success of the first phase, the second phase could extend the bikeway by 2.5 km, over the Trans-Canada and over Highway 13 to the commuter-rail station at Highway 13 and De Salaberry (currently under development by AMT.)

[2] Per-unit construction costs obtained from Marc Panneton, Ministere de Transport de Quebec.

A pair of asphalt bike lanes (1.5 meters wide, one in each direction) running alongside the rail bed would allow cyclists from the residential neighbourhoods below the Trans-Canada Highway a safe, pleasant east-west trip by bicycle, as far as the proposed De Salaberry-Highway 13 commuter station. Based on similar bike routes along rail beds in Laval and Blainville, which cost $200,000/km, the seven-kilometer stretch in Phase 1 would cost $1.4 million. Phase two, extending the bikeway to De Salaberry station, would cost another $500,000 (plus the cost of viaducts.)

With the addition of bicycle (and pedestrian) viaducts crossing the Trans-Canada Highway at strategic points, the utility of the bikeway could be extended to households north of the Trans-Canada highway. Phase 1 calls for viaducts crossing the Trans-Canada Highway at Alston, Delmar and Andre streets, at $500,000 each, for a total of $1.5 million. Phase 2 would require viaducts to cross the Trans-Canada at Hymus, as well as Highway 13, for a total of $1 million.

Thus, with Phase 1 costing a total of $2.9 million and Phase 2 costing another $1.5 million, the bikeway is an extremely cost-effective alternative to the Doney Spur rail line. As well, it would provide further benefits in terms of health, recreation and overall quality of life.



Ridership

Ridership for bikeways is difficult to predict, simply because there are so few effective examples in place. Most bikeways are short, disconnected, and do not take people from where they live to where they want to go.

AM Peak bicycle commuters

The Doney Spur Bikeway, by contrast, is perfectly placed to connect many West Island residents with their places of work. Thus, we may expect substantially higher bicycle mode share during the AM Peak than along other, less-well-connected bikeways. Our estimates assume a bicycle mode share of between 3% and 16%, depending on the origin-destination pair.

AM PEAK TRIPS BY ORIGIN AND DESTINATION SET			
ORIGIN	**TO FAIRVIEW**	**TO G_DEST**	**TOTAL**
K_SOUTH	560.80	781.36	1342.16
G_SOUTH	458.70	749.78	1208.48
K_NORTH	872.88	1640.74	2513.62
G_NORTH	736.52	1908.92	2645.44
ALL ORIGIN	**2628.9**	**5080.8**	**7709.7**

PROJECTED BIKEWAY USERS (AM Peak, May-Oct)			
ORIGIN	**TO FAIRVIEW**	**TO G_DEST**	**TOTAL**
K_SOUTH	89.73	39.07	128.80
G_SOUTH	36.70	22.49	59.19
K_NORTH	87.29	82.04	169.33
G_NORTH	36.83	57.27	94.09
ALL ORIGIN	**250.54**	**200.87**	**451.40**

Off-peak bikeway users

Another advantage of the bikeway is its utility during off-peak hours. CT#462453.02 contains the Fairview Mall, making it one of the major destinations for daytime trips on the West Island. In estimating bicycle ridership during off-peak hours, we have assumed much lower mode share (3%-5%), to reflect the fact that many shopping trips may be impractical by bicycle.

TRIPS TO FAIRVIEW (CT#462453.02) BY TIME PERIOD					
	ORIGIN ZONE				
TIME PERIOD	**K_SOUTH**	**G_SOUTH**	**K_NORTH**	**G_NORTH**	**TOTAL**
before 6 am	31.16	0	95.65	56.86	183.67
AM PEAK	560.8	458.7	872.88	736.52	2628.9
9:00 am - noon	982.98	552.73	830.96	1157.98	3524.65
noon - 15:30	1136.61	386.3	1015.02	639.79	3177.72
PM PEAK	891.07	324.87	576.3	691.83	2484.07
18:30-midnight	724.43	343.63	712.12	584.14	2364.32
midnight - 4 am x	0	0	23.33	27.74	51.07
TOTAL	**4327.05**	**2066.23**	**4126.26**	**3894.86**	**14414.4**

PROJECTED BIKEWAY USERS TO FAIRVIEW (May-October)					
	ORIGIN ZONE				
TIME PERIOD	**K_SOUTH**	**G_SOUTH**	**K_NORTH**	**G_NORTH**	**TOTAL**
before 6 am	1.56	0.00	2.87	1.71	6.13
AM PEAK	89.73	45.87	69.83	36.83	242.25
9:00 am - noon	49.15	27.64	24.93	34.74	136.45
noon - 15:30	56.83	19.32	30.45	19.19	125.79
PM PEAK	142.57	32.49	46.10	34.59	255.75
18:30-midnight	36.22	17.18	21.36	17.52	92.29
midnight - 4 am x	0.00	0.00	0.70	0.83	1.53
TOTAL DAILY	**376.06**	**142.49**	**196.25**	**145.41**	**860.21**

North-South connectivity

Aside from trips using the east-west bikeway itself, the viaducts crossing the Trans-Canada Highway would substantially improve north-south connectivity for cyclists. Currently, the highway is a major barrier; anyone traveling from north to south or vice-versa is essentially forced onto the high-traffic crossings at St.-Charles, St.-Jean and Des-Sources. Cycling under these circumstances is dangerous and unpleasant at best, and impossible at worst. Anyone wanting to cross the Trans-Canada Highway, then, is essentially forced to drive.

The viaducts, in addition to bringing riders to the bikeway, would then enable cyclists to travel between Pointe-Claire and Pierrefonds or Dollard-des-Ormeaux.

DAILY TRIPS CROSSING TRANS-CANADA HIGHWAY (NORTHBOUND)			
ORIGIN	***DESTINATION***		
	K_NORTH	**G_NORTH**	**TOTAL TO NORTH**
K_SOUTH	2760	2489.03	5249.03
G_SOUTH	1145.06	2629.69	3774.75
TOTAL FROM SOUTH	**3905.06**	**5118.72**	**9023.78**

PROJECTED DAILY SOUTH-NORTH BIKE TRIPS USING VIADUCTS			
ORIGIN	***DESTINATION***		
	K_NORTH	**G_NORTH**	**TOTAL TO NORTH**
K_SOUTH	331.20	199.12	530.32
G_SOUTH	91.60	131.48	223.09
TOTAL FROM SOUTH	**422.80**	**330.61**	**753.41**

Total ridership

Based on projected bicycle mode splits of 3% to 16% applied to current daily trips between zones, we may expect 860 daily trips to Fairview from the residential zones north and south of the Trans-Canada highway; and 753 trips from Pointe-Claire and southern Kirkland to Dollard-des-Ormeaux and Pierrefonds; for a total of 1613 daily users from May to October. Multiplying this figure by two to account for the return trips yields a total of 3226 trips which are currently made by motorized modes, especially single-occupant automobiles.

These figures only take into account "functional" trips, i.e. trips made for some reason other than for their own sake. When we add the number of people who might use the bikeway just for the sake of exercise and recreation, we may expect the Doney Spur bikeway to see a lot of use.

Future developments

Eventually, if development and travel demand warranted it, the rail bed could be adapted to electric commuter-rail service, while keeping the bikeway running alongside. Alternately, if the rail bed stops being used for freight hauling and the bicycle path becomes too popular, the entire right-of-way may be taken over for a "bicycle superhighway."

7. Recommendations

Based on the findings of this report, we tentatively conclude that in and of itself, the Doney Spur commuter-rail project would be justified, for the following reasons:

1. It would generate an immediate system-wide increase of 2160 and 2560 train users at AM Peak. Counting the return trips made in the evening, this represents between 4320 and 5120 new train trips per day (not counting counter flow and off-peak ridership.) Even considering that up to 400 of these users (or 800 trips) would come at the expense of current bus ridership; this still represents a substantial reduction in auto use.

2. It would likely attract even more riders in the long-term, as more households relocate to take advantage of improved transit to downtown.

3. A train station at Fairview would enhance that area's position as "the downtown West Island," providing a stronger focus for development and possibly encouraging more compact and/or infill development there. This is particularly important, in light of the new City of Montreal's plan to channel new development into areas already served by transit, and considering the amount of vacant land around Fairview.

4. Building the line to Fairview Terminus would connect the commuter-train network with the hub of the West Island's existing bus network—possibly the single most effective place for a commuter-train station on the entire West Island.

5. A park-and-ride at Fairview would reduce the total vehicle-kilometers driven by park-and-ride users from the western half of the Doney Spur commutershed, allowing them to stop at Fairview instead of at Roxboro or Sunnybrooke.

6. By intercepting these park-and-ride users further upstream, the Fairview Terminus would alleviate road congestion further east on Autoroute 40, St.-Jean and Des Sources.

7. Although the price tag of $125 million is substantial, nearly half of this cost would go to rolling stock. As AMT is already in the process of acquiring more trains to run on the Deux-Montagnes line between De Salaberry and Gare Centrale, and as the Doney Spur would essentially serve the same purpose (i.e. satisfying unmet demand in the Deux-Montagnes commutershed), this $60 million may be considered "already spent." That is, if we view the Doney Spur as simply extending the distance traveled by the new trains that are already being purchased, the incremental cost of the Spur falls to $65 million.

8. Finally, building the Doney Spur would improve transportation choice on the West Island, making it easier for people to choose a more environmentally-friendly travel mode. It would lay the groundwork for a transportation system that will continue to function far into the future, through economic, environmental and geopolitical changes that will eventually make mass auto dependency unworkable.

However, we understand that various factors—notably political opposition, and the unspectacular immediate ridership on the Spur compared to the gross cost—may militate against the construction of the Doney Spur in the short term. In that case, it is essential to take action to preserve the Doney Spur right-of-way, so that it may be available in the future, when the line is more easily justified. The best means to that end is to devise a project for the Spur that would be (1) of immediate and visible utility, and (2) relatively cheap to implement.

Thus, should the Doney Spur commuter-rail project not be realized, the right-of-way should be adapted to a bikeway. The Doney Spur Bikeway to De Salaberry, together with several bicycle viaducts crossing the Trans-Canada Highway, would cost a total of $4.4 million, or about 3.5% as much as the proposed rail line.

By appropriating the Spur right-of-way for the bikeway, the Doney Spur would not only remove cars from the road and improve quality of life, but would serve to keep the Doney Spur in use and protected from further encroachment until such time as a rail line becomes politically viable.

APPENDIX A: Doney Spur Zone Key

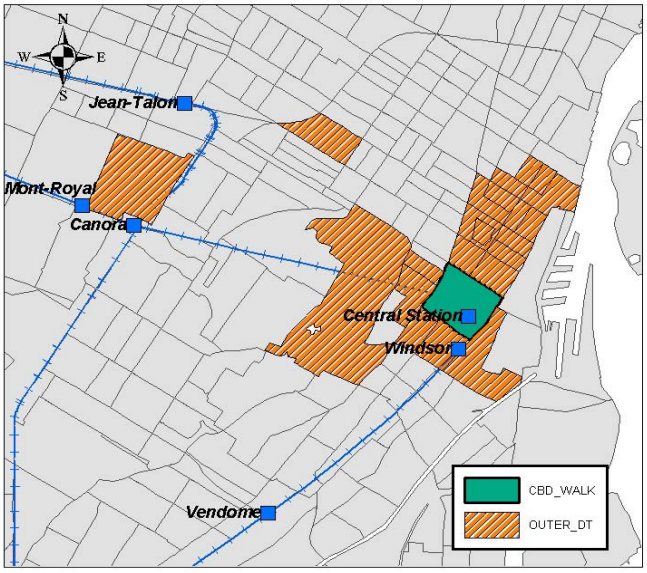
For this report, travel was examined by grouping census tracts into zones, which were named and defined as follows:

Name	Abb.	Description
CBD_WALK	CW	CT#462062; the census tract in which Gare Centrale is located, and which is mostly "walking distance" from the station
OUTER_DT	OD	"Outer Downtown" is the larger definition of downtown, in terms of being a viable destination for riders on the Deux-Montagnes train line. Defined as census tracts seeing over 150 trips at AM Peak from the DMONT2 commutershed, and where commuter-train mode split is 20% or higher. Does not include CT#462062; includes two industrial tracts north of Van Horne.
ALL_DOWNTOWN	DT	Combined zone comprising OUTER_DT and CBD_WALK.
WINDSOR	WS	CT#462063, in which Windsor Station (terminus for the Rigaud line) is located.
DSPUR	DS	The estimated primary commutershed of the proposed Doney Spur line.
RIGAUD	RG	The observed origin commutershed of the Rigaud line, based on the Enquete a Bord, September 12, 2001
DMONT2	DM	The "Greater Deux-Montagnes" commutershed; the observed origin commutershed of the Deux-Montagnes line, based on the Enquete a Bord, September 12, 2001. As an origin, this commutershed accounts for 10,500 train trips at AM Peak, or about 83% of Deux-Montagnes ridership during that period.
DM_island	DMI	More restricted definition of the Deux-Montagnes commutershed, intended to be more comparable to DSPUR in terms of distances-to-station. Comprises the part of DMONT2 that is on the West Island, i.e. in Pierrefonds, Ste.-Genevieve, Roxboro, Dollard and part of Kirkland.
DS_DM	DD	Doney Spur-Deux-Montagnes overlap. Where DMONT2 and DSPUR overlap.
DS_RG	DR	Doney Spur-Rigaud overlap. Where RIGAUD and DSPUR overlap.
DS_PLUS	DP	Extension to the Doney Spur commutershed. South of

		Highway 20 and west of Pointe-Claire; not considered part of the main Doney Spur commutershed, but may produce significant ridership among users headed to CBD_WALK
DS3CT	D3	The three census tracts at the west end of the Doney Spur; containing substantial industrial and commercial space, it was thought that these might be a counter flow destination during AM Peak i.e. people from downtown or the Borough of Mount-Royal might take the train to work here. Comprises FAIRVIEW, PCWEST and PCNORTH.
FAIRVIEW	FV	CT#462453.02. Contains the Fairview Mall and some industrial/office space along the Trans-Canada Highway.
DORVAL	DV	CT#462433. Contains Dorval Airport, Bombardier, and two other industrial zones.
PCWEST	WP	"West Pointe Claire." CT#46245. Contains Lakeshore General Hospital.
PCNORTH	NP	"North Pointe Claire." CT#462453.01. Residential.
ORIGIN2DS3CT		The set of census tracts likely to generate AM Peak counter flow riders to DS3CT.
GWI	GW	The Greater West Island; all census tracts on the island and Ile-Bizard from the middle of Lachine west; also includes the large industrial census tract in Ville-St.Laurent.

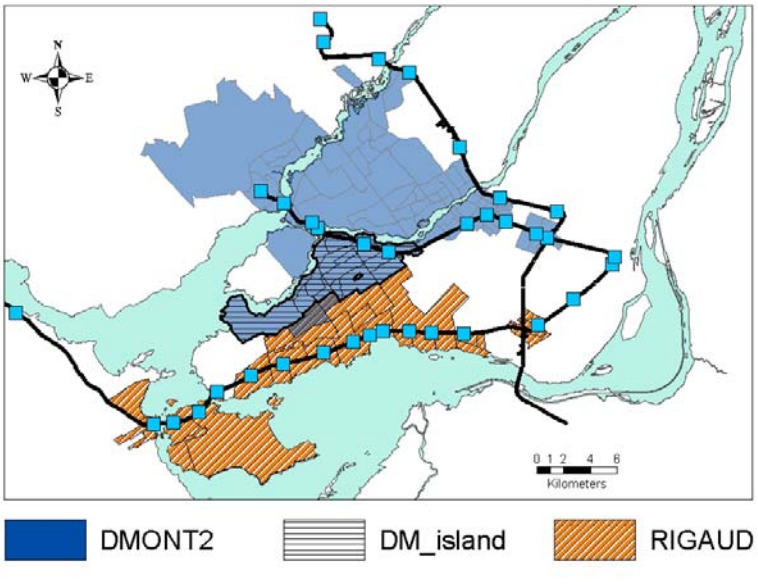
APPENDIX B: Commutershed

DOWNTOWN MONTREAL
Commuter-rail destinations.



Census tracts currently seeing over 20% commuter-train mode share for AM Peak trips from Deux-Montagnes commutershed.

EXISTING COMMUTERSHEDS (Train de Banlieue)



APPENDIX C: Ridership Estimate Algorithm

1. Formulate basic model

(a) Treat Doney Spur as an extension of the Deux-Montagnes rail line.
(b) For all estimates, concentrate on AM Peak ridership, as this (and the resulting return trips during the evening) will account for the majority of train users.
(c) Determine current mode split in the Deux-Montagnes commutershed [DMONT2 or DM_island] for trips to downtown [ALL_DOWNTOWN.]
(d) Determine current mode split in Doney Spur commutershed [DSPUR] for trips to downtown [ALL_DOWNTOWN.]
(e) For each of three models, assume that train mode share from Doney Spur commutershed will rise to match mode share from Deux-Montagnes commutershed.

- MODEL 1: Assumes that DSPUR train mode share (including park-and-ride, transit-to-station and walk-to-station) will rise to match the West Island portion of the Deux-Montagnes commutershed [DM_island.]

- MODEL 2: Assumes that DSPUR train mode share (including park-and-ride and transit-to-station, **but not walk-to-station**) will rise to match the West Island portion of the Deux-Montagnes commutershed [DM_island.]

- MODEL 3: Assumes that DSPUR train mode share (including park-and-ride and total non-park-and-ride share) will rise to match current mode share from Greater Deux-Montagnes [DMONT2.]

2. Calculate "correction factor" to account for train users originating from, or bound for, destinations outside of the defined commutersheds. (Using the DMONT2 and ALL_DOWNTOWN zones as the model, this yields a correction factor of 1.33.)

3. For each model, calculate new ridership.

(a) "Mode Share Increase" sub model:

- Subtract current train users from predicted train users to yield total new train users going from DSPUR to ALL_DOWNTOWN.
- Apply correction factor (x1.33) to account for new train users coming from outside DSPUR and/or going to outside ALL_DOWNTOWN.

(b) "Captured Trips" sub model:

- Add up all trips likely to be diverted from current train ridership ("captured trips"), i.e. park-and-ride and transit-to-station users bound for CBD_WALK.

- Apply correction factor (x1.33) to ridership estimates from Models 1, 2 and 3 to yield total ridership, to account for trips originating from outside DSPUR and/or bound for destinations outside of ALL_DOWNTOWN.
- Apply correction factor to (x1.33) to "captured trips" total to account for train trips currently originating from outside DSPUR and/or bound for destinations outside of ALL_DOWNTOWN.
- For each of Models 1, 2 and 3, subtract corrected "captured trips" total from corrected total ridership to yield total new riders.

4. Calculate AM Peak counter flow (i.e. westbound) ridership.

(a) Count all trips currently going at AM Peak from the potential origin commutershed [ORIGIN2DS3CT] to the west end of the Doney Spur line [DS3CT.]
(b) Apply assumed potential train mode share (10%, 15% or 35%) to yield total number of AM Peak counter flow train riders.

APPENDIX D: Ridership Models 1-3

MODEL 1: PREDICTED RIDERSHIP ON DONEY SPUR LINE (AM Peak)

Assumption: commuter-train mode share in Doney Spur commutershed will match the West Island portion of the existing Deux-Montagnes commutershed [DM_island].

Current mode split: West Island Deux-Montagnes commutershed (AM peak to downtown)						
MODE*	TO CBD_WALK	%	TO OUTER_DT	%	TO ALL_DOWNTOWN	%
UNDETERMINED	0	0.0%	0	0.0%	0	0.0%
BUS	385.69	15.2%	588.43	19.9%	974.12	17.7%
CAR	914.36	35.9%	1477.7	49.9%	2392.06	43.5%
METRO	0	0.0%	0	0.0%	0	0.0%
OTHER	56.75	2.2%	62.97	2.1%	119.72	2.2%
ALL TRAIN ("TRAIN=1")**	1509.08	59.3%	1077.27	36.4%	2586.35	47.0%
parknride	839.12	33.0%	516.61	17.5%	1355.73	24.6%
walk-to-station	348.9	13.7%	313.9	10.6%	662.8	12.0%
transit-to-station	321.06	12.6%	246.76	8.3%	567.82	10.3%
TOTAL TRIPS	**2544.82**	***	**2959.61**	***	**5504.43**	***

Current mode split: Proposed Doney Spur Commutershed (AM peak to downtown):						
MODE*	TO CBD_WALK	%	TO OUTER_DT	%	TO ALL_DOWNTOWN	%
UNDETERMINED	0	0.0%	24.77	0.7%	24.77	0.4%
BUS	418.1	13.6%	674.98	19.2%	1093.08	16.6%
CAR	1503.9	49.1%	2070.52	59.0%	3574.42	54.4%
METRO	0	0.0%	0	0.0%	0	0.0%
OTHER	0	0.0%	19.01	0.5%	19.01	0.3%
ALL TRAIN ("TRAIN=1")**	1474.84	48.1%	1070.56	30.5%	2545.4	38.7%
parknride	862.9	28.2%	413.12	11.8%	1276.02	19.4%
walk-to-station	278.9	9.1%	305.72	8.7%	584.62	8.9%
transit-to-station	333.04	10.9%	351.72	10.0%	684.76	10.4%
TOTAL TRIPS	**3063.8**	***	**3508.12**	***	**6571.92**	***

Projected mode split: Doney Spur commutershed (AM peak to downtown) Assuming same mode split in Doney Spur and West Island Deux-Montagnes commutersheds; no induced travel						
MODE	TO CBD_WALK	%	TO OUTER_DT	%	TO ALL_DOWNTOWN	%
ALL TRAIN ("TRAIN=1")**	1816.84	59.3%	1276.92	36.4%	3093.76	47.1%
parknride	1010.25	33.0%	612.35	17.5%	1622.60	24.7%
*walk or transit to train****	806.59	26.3%	664.57	18.9%	1471.16	22.4%

DONEY SPUR RIDERSHIP: MODEL #1			
	TO CBD_WALK	TO OUTER_DT	TO ALL_DOWNTOWN
Projected total train ridership from Doney Spur commutershed, AM Peak to downtown:	1816.84	1276.92	3093.76
Current train ridership from Doney Spur to downtown, AM Peak:	1474.84	1070.56	2545.40
New train users, DSPUR to ALL_DOWNTOWN:	**342.00**	**206.36**	**548.36**
Correction factor	**1.33**	**1.33**	**1.33**
	TOTAL new train users generated by Doney Spur (Model #1):		**729.32**

* MODE is defined by the first mode taken, EXCEPT the following:
MODE="parknride "IF [(d_mode1=1 or d_mode1=2) AND {(d_mode2=8) or (d_mode2=17 AND d_mode3=8)}]
MODE="walk-to-station" IF [d_mode1=8]
TRAIN=1 IF [d_modeX=8], for ANY X=1 to 6
MODE="transit-to-station" IF [(TRAIN=1) AND (MODE<>"parknride") AND (MODE<>"walk to train")]
MODE="CAR" IF [(d_mode1=1 or d_mode1-2) AND [(d_modeY=1 OR d_modeY=2 OR d_modeY=NULL), for ANY Y=2 to 6]
** The "TRAIN" field was generated separately from the MODE field, resulting in some overlap.
*** Because of the criteria described above, mode shares do not add up to 100%
**** Due to differences in street layouts, it is not practical to predict exact breakdowns of train riders by mode-to-station.

MODEL 2: PREDICTED RIDERSHIP ON DONEY SPUR LINE (AM Peak)

Assumption: "Park-and-ride" and "other commuter train" mode share, but not "walk to train" mode share in Doney Spur commutershed will increase to match the West Island portion of the existing Deux-Montagnes commutershed [DM_island].

Current mode split: West Island Deux-Montagnes commutershed (AM peak to downtown)

MODE*	TO CBD_WALK	%	TO OUTER_DT	%	TO ALL_DOWNTOWN	%
UNDETERMINED	0	0.0%	0	0.0%	0	0.0%
BUS	385.69	15.2%	588.43	19.9%	974.12	17.7%
CAR	914.36	35.9%	1477.7	49.9%	2392.06	43.5%
METRO	0	0.0%	0	0.0%	0	0.0%
OTHER	56.75	2.2%	62.97	2.1%	119.72	2.2%
ALL TRAIN ("TRAIN=1")**	1509.08	59.3%	1077.27	36.4%	2586.35	47.0%
parknride	839.12	33.0%	516.61	17.5%	1355.73	24.6%
walk-to-station	348.9	13.7%	313.9	10.6%	662.8	12.0%
transit-to-station	321.06	12.6%	246.76	8.3%	567.82	10.3%
TOTAL TRIPS	**2544.82**	***	**2959.61**	***	**5504.43**	***

Current mode split: Proposed Doney Spur commutershed (AM peak to downtown)

MODE*	TO CBD_WALK	%	TO OUTER_DT	%	TO ALL_DOWNTOWN	%
UNDETERMINED	0	0.0%	24.77	0.7%	24.77	0.4%
BUS	418.1	13.6%	674.98	19.2%	1093.08	16.6%
CAR	1503.9	49.1%	2070.52	59.0%	3574.42	54.4%
METRO	0	0.0%	0	0.0%	0	0.0%
OTHER	0	0.0%	19.01	0.5%	19.01	0.3%
ALL TRAIN ("TRAIN=1")**	1474.84	48.1%	1070.56	30.5%	2545.4	38.7%
parknride	862.9	28.2%	413.12	11.8%	1276.02	19.4%
walk-to-station	278.9	9.1%	305.72	8.7%	584.62	8.9%
transit-to-station	333.04	10.9%	351.72	10.0%	684.76	10.4%
TOTAL TRIPS	**3063.8**	***	**3508.12**	***	**6571.92**	***

Projected mode split: Doney Spur commutershed (AM peak to downtown)						
MODE	**TO CBD_WALK**	**%**	**TO OUTER_DT**	**%**	**TO ALL_DOWNTOWN**	**%**
parknride	1010.25	33.0%	612.35	17.5%	1622.60	24.7%
walk-to-station	278.90	9.1%	305.72	8.7%	584.62	8.9%
transit-to-station	386.54	12.6%	292.49	8.3%	679.03	10.3%
ALL TRAIN ("TRAIN=1")**	1675.68	54.7%	1210.57	34.5%	2886.25	43.9%

DONEY SPUR RIDERSHIP: MODEL #2				
RIDERSHIP	**TO CBD_WALK**	**TO OUTER_DT**	**TO ALL_DOWNTOWN**	
Projected total train ridership from Doney Spur commutershed, AM Peak to downtown:	1675.68	1210.57	2886.25	
Current train ridership from Doney Spur to downtown, AM Peak:	1474.84	1070.56	2545.40	
New train users, DSPUR to ALL_DOWNTOWN:	**200.84**	**140.01**	**340.85**	
Correction factor	**1.33**	**1.33**	**1.33**	
	TOTAL new train users generated by Doney Spur (Model #2):		**453.33**	

* MODE is defined by the first mode taken, EXCEPT the following:
MODE="parknride "IF [(d_mode1=1 or d_mode1=2) AND {(d_mode2=8) or (d_mode2=17 AND d_mode3=8)}]
MODE="walk-to-station" IF [d_mode1=8]
TRAIN=1 IF [d_modeX=8], for ANY X=1 to 6
MODE="transit-to-station" IF [(TRAIN=1) AND (MODE<>"parknride") AND (MODE<>"walk to train")]
MODE="CAR" IF [(d_mode1=1 or d_mode1-2) AND [(d_modeY=1 OR d_modeY=2 OR d_modeY=NULL), for ANY Y=2 to 6]
** The "TRAIN" field was generated separately from the MODE field, resulting in some overlap.
*** Because of the criteria described above, mode shares do not add up to 100%
**** Due to differences in street layouts, it is not practical to predict exact breakdowns of train riders by mode-to-station.

MODEL 3: PREDICTED RIDERSHIP ON DONEY SPUR LINE (AM Peak)

Assumption: commuter-train mode share in Doney Spur commutershed will match the existing greater Deux-Montagnes commutershed [DMONT2.]

Current mode split: Greater Deux-Montagnes commutershed (AM peak to downtown)						
MODE*	TO CBD_WALK	%	TO OUTER_DT	%	TO ALL_DOWNTOWN	%
UNDETERMINED	13.4	0.1%	12.14	0.1%	25.54	0.1%
BUS	1431.21	14.9%	3234.87	24.9%	4666.08	20.7%
CAR	3505.68	36.6%	6331.9	48.8%	9837.58	43.6%
METRO	125.83	1.3%	106.49	0.8%	232.32	1.0%
OTHER	279.39	2.9%	392.86	3.0%	672.25	3.0%
ALL TRAIN ("TRAIN=1")**	4729.42	49.3%	3534.6	27.2%	8264.02	36.6%
parknride	2853.43	29.8%	1475.65	11.4%	4329.08	19.2%
walk-to-station	1380.26	14.4%	1424.33	11.0%	2804.59	12.4%
transit-to-station	495.73	5.2%	634.62	4.9%	1130.35	5.0%
TOTAL TRIPS	9589.2	***	12978.24	***	22567.44	***

Current mode split: Proposed Doney Spur commutershed (AM peak to downtown)						
MODE*	TO CBD_WALK	%	TO OUTER_DT	%	TO ALL_DOWNTOWN	%
UNDETERMINED	0	0.0%	24.77	0.7%	24.77	0.4%
BUS	418.1	13.6%	674.98	19.2%	1093.08	16.6%
CAR	1503.9	49.1%	2070.52	59.0%	3574.42	54.4%
METRO	0	0.0%	0	0.0%	0	0.0%
OTHER	0	0.0%	19.01	0.5%	19.01	0.3%
ALL TRAIN ("TRAIN=1")**	1474.84	48.1%	1070.56	30.5%	2545.4	38.7%
parknride	862.9	28.2%	413.12	11.8%	1276.02	19.4%
walk-to-station	278.9	9.1%	305.72	8.7%	584.62	8.9%
transit-to-station	333.04	10.9%	351.72	10.0%	684.76	10.4%
TOTAL TRIPS	3063.8	***	3508.12	***	6571.92	***

Simple projected mode split: Proposed Doney Spur commutershed (AM peak to downtown) *Assuming identical mode split in Doney Spur and Deux-Montagnes commutersheds; no induced travel*						
MODE	TO CBD_WALK	%	TO OUTER_DT	%	TO ALL_DOWNTOWN	%
ALL TRAIN ("TRAIN=1")**	1511.07	49.3%	955.43	27.2%	2406.59	36.6%
parknride	911.69	29.8%	398.88	11.4%	1260.68	19.2%
walk-to-station	441.00	14.4%	385.01	11.0%	816.73	12.4%
transit-to-station	158.39	5.2%	171.54	4.9%	329.17	5.0%

"Common sense" proj. mode split: Doney Spur commutershed (AM peak to downtown) *Assumes that Doney Spur will not cause net drop in ridership; no induced travel.*						
MODE	**TO CBD_WALK**	**%**	**TO OUTER_DT**	**%**	**TO ALL_DOWNTOWN**	**%**
ALL TRAIN ("TRAIN=1")**	1511.07	49.3%	1070.56	30.5%	2581.63	39.3%
parknride	911.69	29.8%	398.88	11.4%	1310.57	19.9%
walk or transit to train***	599.39	19.6%	671.68	19.1%	1271.07	19.3%

DONEY SPUR RIDERSHIP: MODEL #3			
RIDERSHIP	**TO CBD_WALK**	**TO OUTER_DT**	**TO ALL_DOWNTOWN**
Projected total train ridership from Doney Spur commutershed, AM Peak to downtown:	1511.07	1070.56	2581.63
Current train ridership from Doney Spur to downtown, AM Peak:	1474.84	1070.56	2545.40
New Train Users, DSPUR to ALL_DOWNTOWN:	**36.23**	**0.00**	**36.23**
Correction factor			**1.33**
	TOTAL new train users generated by Doney Spur (Model #3):		**48.19**

APPENDIX E: Captured Trips

Trips "captured" from existing train ridership: Park-and-Ride users				
FROM INSIDE DONEY SPUR COMMUTERSHED				
TRIPS CAPTURED FROM DEUX-MONTAGNES RIDERSHIP	**VALUE FROM:**	**TRIPS**	**%CAPT.**	**TOTAL CAPTURED TRIPS**
Current park-and-ride users going from (DS_DM overlap) to (ALL_DOWNTOWN) :	APDD2DT WHERE MODE=PARKNRIDE	777.8	100%	777.8
SUBTOTAL: FROM DS_DM OVERLAP				***777.8***
TRIPS CAPTURED FROM RIGAUD RIDERSHIP				
Current park-and-ride users going from (DS_RG overlap) to (CBD_WALK)	APDR2CW WHERE MODE=PARKNRIDE	442.99	100%	442.99
Current park-and-ride users going from (DS_RG overlap) to (OUTER_DT)	APDR2OD WHERE MODE=PARKNRIDE	202.22	100%	202.22
MINUS				
Current park-and-ride users going from (DS_RG overlap) to (WINDSOR)	APDR2WS WHERE MODE=PARKNRIDE	48.97	-100%	-48.97
SUBTOTAL: FROM DS_RG OVERLAP				***596.24***
TOTAL CAPTURED TRIPS (P&R):				**1374.04**

Trips "captured" from existing train ridership: transit-to-station train users.				
FROM INSIDE DONEY SPUR COMMUTERSHED				
TRIPS CAPTURED FROM DEUX-MONTAGNES RIDERSHIP	**VALUE FROM:**	**TRIPS**	**%CAPT.**	**TOTAL CAPTURED TRIPS**
Current transit-to-station users users going from (DS_DM overlap) to (ALL_DOWNTOWN) :	APDD2DT where (TRAIN=1) AND (MODE<>TRAIN) AND (MODE<>PARKNRIDE)	360.04	100%	360.04
SUBTOTAL: FROM DS_DM OVERLAP				***360.04***
TRIPS CAPTURED FROM RIGAUD RIDERSHIP				
Current transit-to-station users going from (DS_RG overlap) to (CBD_WALK)	APDR2CW where (TRAIN=1) AND (MODE<>TRAIN) AND (MODE<>PARKNRIDE)	160.5	100%	160.5
Current transit-to-station users going from (DS_RG overlap) to (OUTER_DT)	APDR2OD where (TRAIN=1) AND (MODE<>TRAIN) AND (MODE<>PARKNRIDE)	212.29	100%	212.29
MINUS				
Current transit-to-station users going from (DS_RG overlap) to (WINDSOR)	APDR2WS where (TRAIN=1) AND (MODE<>TRAIN) AND (MODE<>PARKNRIDE)	0	-100%	0
SUBTOTAL: FROM DS_RG OVERLAP				***372.79***
TOTAL CAPTURED TRIPS (Transit-to-station):				**732.83**

TRIPS CAPTURED FROM CURRENT TRAIN RIDERSHIP	
	From within DSPUR
Park-and Ride from Deux-Montagnes	777.80
Park-and-Ride from Rigaud-Vaudreuil	596.24
Total (Park-and-Ride):	**1374.04**
Transit-to-station from Deux-Montagnes	360.04
Transit-to-station from Rigaud-Vaudreuil	372.79
Total (Transit-to-station):	**732.83**
Total from Deux-Montagnes line:	**1137.84**
Total from Rigaud-Vaudreuil line:	**969.03**
TOTAL CAPTURED TRIPS:	**2106.87**

APPENDIX F: Counterflow ridership

PREDICTED COUNTER-FLOW RIDERSHIP TO WEST ISLAND*

Current 24-hour trip distribution to Doney Spur* (all modes)				
TIME PERIOD	TO PCWEST (462452)	TO PCNORTH (462453.01)	TO FAIRVIEW (462453.02)	TO DS3CT (total)
before 6 am	54.08	0	0	54.08
AM PEAK	190.08	0	312.94	503.02
9:00 am - noon	77.76	15.13	256.82	349.71
noon - 15:30	48.54	0	210.02	258.56
PM PEAK	375.54	307.84	306.38	989.76
18:30-midnight	187.2	43.98	148.12	379.3
midnight - 4 am x	15.49	0	0	15.49
24 HOUR TOTAL	**948.69**	**366.95**	**1234.28**	**2549.92**

AM peak counterflow ridership*, by assumed mode share				
Assumed mode share for train	TO PCWEST (462452)	TO PCNORTH (462453.01)	TO FAIRVIEW (462453.02)	TO DS3CT (total)
10%	19.01	0.00	31.29	50.30
15%	28.51	0.00	46.94	75.45
35%	66.53	0.00	109.53	176.06

Total counterflow ridership to DS3CT, by assumed train mode share				
TIME PERIOD**	TO DS3CT (total)	10%	15%	35%
before 6 am	54.08	5.41	8.11	18.93
AM PEAK	503.02	50.30	75.45	176.06
9:00 am - noon	349.71	34.97	52.46	122.40
TOTAL:	**906.81**	**90.68**	**136.02**	**317.38**

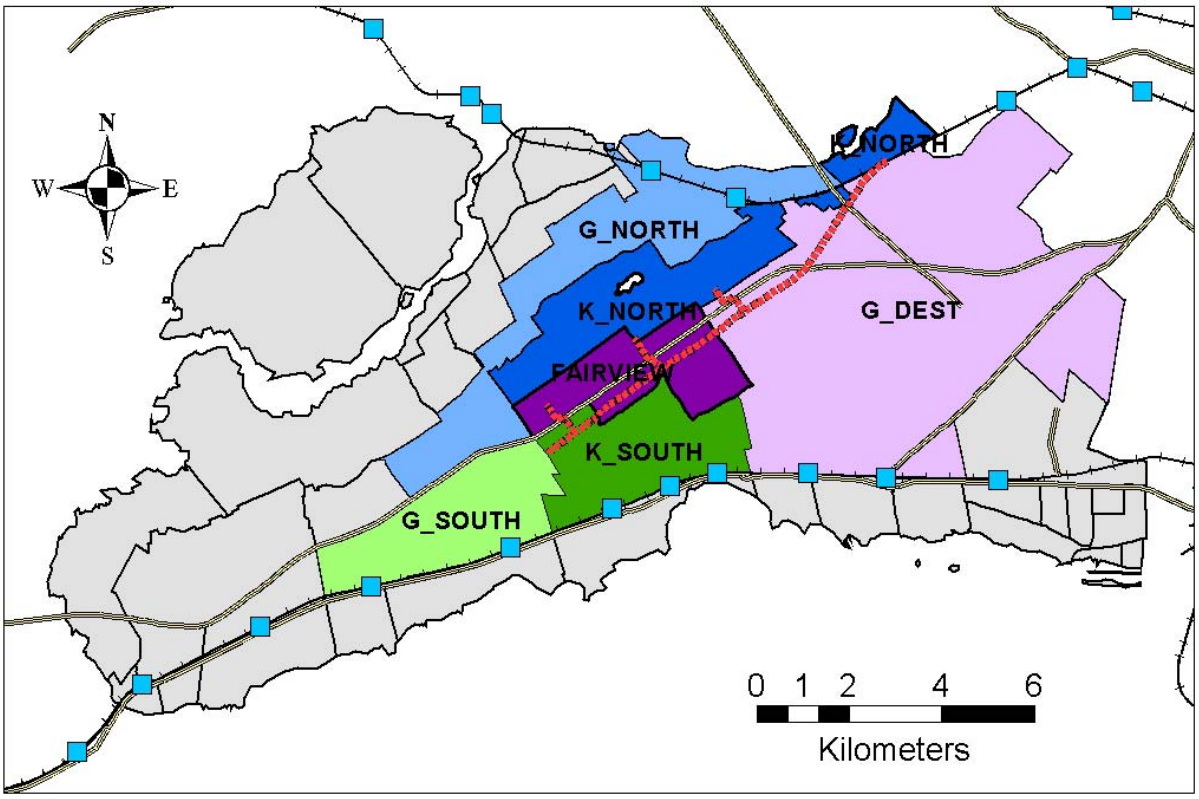
* Trips originating from census tract set "ORIGIN2DS3CT" during the AM Peak.
** Afternoon and evening trips to Doney Spur are considered regular-flow, not counterflow.

APPENDIX G: Land Costs for Park-and-Rides

Land Costs for Park-and-Rides				
	Total Park-and-ride + Kiss-and-ride spaces	**Gross Land area needed (sq meters)***	**$ per sq meter****	**Land acquisition costs**
Park-and-ride at De Salaberry	625	10,625	18.7	198,688
Park-and-ride at Fairview	1,025	17,425	40	697,000
TOTAL	**1,650**	**28,050**	**58.7**	**895,688**

*Gross Area needed for park-n-ride per space = 17 sq meters
**The land assessment for the land at Fairview is not available. Taking the average land assessment around the immediate area, the average cost per sq meter is $40

APPENDIX H: Doney Spur Bikeway Zones



O-D ZONES: DONEY SPUR BIKEWAY

Appendix I: Bikeway Ridership AM Peak

POTENTIAL BIKEWAY USERS BY ORIGIN AND DESTINATION SET*			
ORIGIN	**TO FAIRVIEW**	**TO G_DEST**	**TOTAL**
K_SOUTH	560.8	781.36	1342.16
G_SOUTH	458.7	749.78	1208.48
SOUTH OF T-CAN	1019.5	1531.14	2550.64
K_NORTH	872.88	1640.74	2513.62
G_NORTH	736.52	1908.92	2645.44
NORTH OF T-CAN	1609.4	3549.66	5159.06
CONSERVATIVE	1433.68	2422.1	3855.78
GENEROUS	1195.22	2658.7	3853.92
ALL ORIGIN	**2628.9**	**5080.8**	**7709.7**

ASSUMED INCREASE IN BICYCLE MODE SHARE		
ORIGIN	**TO FAIRVIEW**	**TO G_DEST**
K_SOUTH	16%	5%
G_SOUTH	8%	3%
K_NORTH	10%	5%
G_NORTH	5%	3%

PROJECTED BIKEWAY USERS (AM Peak, May-Oct)*			
ORIGIN	**TO FAIRVIEW**	**TO G_DEST**	**TOTAL**
K_SOUTH	89.728	39.068	128.796
G_SOUTH	36.696	22.4934	59.1894
SOUTH OF T-CAN	126.424	61.5614	187.9854
K_NORTH	87.288	82.037	169.325
G_NORTH	36.826	57.2676	94.0936
NORTH OF T-CAN	124.114	139.3046	263.4186
CONSERVATIVE	177.016	121.105	298.121
GENEROUS	73.522	79.761	153.283
ALL ORIGIN	**250.538**	**200.866**	**451.404**

* Counts only one-way (going) trips; multiply by 2 to get return trips as well.

TRIPS TO FAIRVIEW (CT#462453.02) BY TIME PERIOD*					
	ORIGIN ZONE				
TIME PERIOD	**K_SOUTH**	**G_SOUTH**	**K_NORTH**	**G_NORTH**	**TOTAL**
before 6 am	31.16	0	95.65	56.86	183.67
AM PEAK	560.8	458.7	872.88	736.52	2628.9
9:00 am - noon	982.98	552.73	830.96	1157.98	3524.65
noon - 15:30	1136.61	386.3	1015.02	639.79	3177.72
PM PEAK	891.07	324.87	576.3	691.83	2484.07
18:30-midnight	724.43	343.63	712.12	584.14	2364.32
midnight - 4 am x	0	0	23.33	27.74	51.07
TOTAL	**4327.05**	**2066.23**	**4126.26**	**3894.86**	**14414.4**

INCREASE IN BICYCLE MODE SHARE				
	ORIGIN ZONE			
TIME PERIOD	**K_SOUTH**	**G_SOUTH**	**K_NORTH**	**G_NORTH**
before 6 am	5%	5%	3%	3%
AM PEAK	16%	10%	8%	5%
9:00 am - noon	5%	5%	3%	3%
noon - 15:30	5%	5%	3%	3%
PM PEAK	16%	10%	8%	5%
18:30-midnight	5%	5%	3%	3%
midnight - 4 am x	5%	5%	3%	3%

PROJECTED BIKEWAY USERS (May-October)*					
	ORIGIN ZONE				
TIME PERIOD	**K_SOUTH**	**G_SOUTH**	**K_NORTH**	**G_NORTH**	**TOTAL**
before 6 am	1.56	0.00	2.87	1.71	6.13
AM PEAK	89.73	45.87	69.83	36.83	242.25
9:00 am - noon	49.15	27.64	24.93	34.74	136.45
noon - 15:30	56.83	19.32	30.45	19.19	125.79
PM PEAK	142.57	32.49	46.10	34.59	255.75
18:30-midnight	36.22	17.18	21.36	17.52	92.29
midnight - 4 am x	0.00	0.00	0.70	0.83	1.53
TOTAL DAILY	**376.06**	**142.49**	**196.25**	**145.41**	**860.21**

* Counts only one-way ("going") trips; multiply by 2 to get total trips between zones.

Appendix J: Viaducts users

DONEY SPUR BIKE VIADUCTS AND NORTH-SOUTH TRAVEL

DAILY TRIPS CROSSING TRANS-CANADA HIGHWAY (NORTHBOUND)*

ORIGIN	*DESTINATION*		
	K_NORTH	G_NORTH	TOTAL NORTH
K_SOUTH	2760	2489.03	5249.03
G_SOUTH	1145.06	2629.69	3774.75
TOTAL SOUTH	**3905.06**	**5118.72**	**9023.78**

ASSUMED INCREASE IN BICYCLE MODE SHARE (May-October)

ORIGIN	*DESTINATION*		
	K_NORTH	G_NORTH	TOTAL NORTH
K_SOUTH	12%	8%	
G_SOUTH	8%	5%	
TOTAL SOUTH			

PROJECTED DAILY SOUTH-NORTH BIKE TRIPS USING VIADUCTS*

ORIGIN	*DESTINATION*		
	K_NORTH	G_NORTH	TOTAL NORTH
K_SOUTH	331.20	199.12	530.32
G_SOUTH	91.60	131.48	223.09
TOTAL SOUTH	**422.80**	**330.61**	**753.41**

* Counts only one-way ("going") trips; multiply by 2 to get total trips

APPENDIX K: Connection to Dorval Airport

A scenario favored by the AMT involves a commuter-train stop serving the Dorval International Airport terminal from the north. However, analyzing the utility of such a stop is complicated by a number of factors.

Grain of Origin-Destination Survey

The large areas into which the OD survey is divided are problematic. The census tract which contains Dorval Airport is extremely large; it contains large industrial sites and a residential pocket, all of which are separated from each other. Therefore it is very difficult to draw firm conclusions about where, exactly, the trips going to and from the census tract are going. (In this case, even data at the Enumeration Area level would face the same problem; CT #462433 comprises only one enumeration area, due to its relatively small residential component.)

Absence of airport users from OD Survey due to sampling methodology

One of the possible arguments for a rail link from Dorval to downtown along the Deux-Montagnes line is that airline passengers coming into town will use it to go to their hotels downtown.

Unfortunately, the ridership from this cohort is difficult to estimate due to the methodology of the OD survey--namely, telephone interviews that ask households about trips taken in the very recent past. Montreal-area residents who have flown out of Dorval airport during the reference period *may* have returned home in time to get the phone call; and if not, other members of their household *may* count them during the interview. However, visitors *from out of town* who have made trips to Montreal through Dorval airport will not be counted at all—they do not live within the survey area and will not be called!
For this reason, it is difficult to quantify and analyze the travel behavior of airport users. Aside from the question of whether air passengers will actually use a commuter train—an issue that is addressed, below—there is no firm data on which to model the behavior of people flying into or out of Dorval airport, and thus no quantitative basis on which to argue for or against a Doney Spur stop at Dorval.

Potential ridership generated by a Dorval Airport commuter station

Planning the Doney Spur line to serve Dorval International Airport may be justified on the basis of two sets of potential users: airport employees and airline passengers entering and leaving Montreal through Dorval.

Airport employees

Census tract #462433 generates just over 80,000 trips daily, roughly half of which occur during the AM and PM peak periods. At first glance, this may suggest that the area sees enough use to justify a commuter-train stop, even if we cannot estimate how many of those trips go to the airport itself.

However, the nature of airport employment is such that most airport employees are unlikely to use the commuter train to go to work.

Firstly, airports run twenty-four hours a day; service and ground staff work in shifts, and pilots' schedules are even more erratic. A commuter train that ran at high frequency, around the clock, may serve such people (assuming those workers live close to commuter-train stations to begin with.) Needless to say, it is extremely unlikely that trip behavior will be consistently high enough to warrant such service!

Secondly, airport workers often work swing-shifts: nights for several days, then days for a number of days. Such workers have adapted to patterns that require travel when there is no transit service—that is to say, they all have cars. And although a park-and-ride may be attractive

to workers on the day shift (perhaps a third to a half of the staff at any given time,) public transit is best-suited to people who have extremely regular schedules.

Given the above; and given that commuter trains rely heavily on park-and-rides, that park-and-ride users by definition own cars, and that the main reason to use a commuter train is to avoid AM and PM peak traffic; it is unlikely that any but a small minority of airport employees would use a commuter train on a regular basis.

Airline passengers

The other potential source of riders is airline passengers. The image is alluring; upscale travelers get off the plane and take a comfortable, attractive train straight to their hotels in the downtown core.

Unfortunately, there are several problems with this. There is a $16 shuttle that runs between the airport and the Voyageur terminal at Berri-UQAM. There are the lines of taxis and limousines, costing anywhere from $25 to $40. Finally, the Rigaud commuter line already serves Dorval from the south (although, in fairness, its terminus at Windsor Station is less than ideal for hotel-bound riders.)

In any case, airline passengers are probably about the least transit-oriented travelers there are. The investment of time and energy to plan a trip by transit is only worthwhile for people who intend to make that same trip over and over again. Most airline passengers do not fly every day, or even every week—air travel is, for all intents and purposes, a one-shot affair. Airline passengers come and go at all hours; they have luggage; they are tired and jet-lagged and cranky. And the typical airline passenger has just spent hundreds or thousands of dollars on travel—under those circumstances, the twenty or thirty dollars she would save by taking the train instead of a taxi just aren't worth it. (This is particularly true for the kind of people most likely to be going to downtown hotels: business travelers, whose expenses are paid by their employer to begin with!)

Put another way, the only air travelers who are likely to use a commuter train are those who travel very frequently, whose planes always arrive and leave during the AM and PM peak periods, and who pay for their trips out of their own pocket. To base a station on such a rarified demographic would be unwise.

Taken together, the two potential ridership bases for such a station almost certainly do not justify the expense; especially since a Dorval stop on the Doney Spur would require a detour of several kilometers, adding further expense to the project for very, very little return.