

**Improving the Ground Transportation  
Infrastructures near  
Montréal-Trudeau Airport**

**Environmental Impact Study  
Submitted to the Minister of the Environment**

**SUPPLEMENTARY INFORMATION  
PROJECT AND IMPACT MODIFICATIONS**

August 2005

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## 1. INTRODUCTION

This document contains supplementary information pertaining to the environmental impact study of the plan for improving the ground transportation infrastructures near Montréal-Trudeau Airport, which was tabled on September 24, 2004 by the Ministère des Transports du Québec (MTQ). Its purpose is to inform government officials and the public of the modifications that have been made to the plan since that study was released. It describes these modifications and reassesses the various impacts that are likely to occur in the area under study as a result of these changes.

It begins with a review of the background of the project and the changes made. It then goes on to describe the changes and to state the reasons for them. More specifically, this section deals with the physical and operational nature of the modifications. Finally, this document discusses all of the changes to the project's impact on both the human and biophysical environments resulting from these modifications.

## 2. BACKGROUND

The plan to improve the ground transportation infrastructures near Montréal-Trudeau Airport involves a complete redesign of Dorval Circle, primarily so that direct links can be created between Highway 20 and Montréal-Trudeau Airport, and between Highway 20 and Highway 520. The plan also calls for the creation of a rail right-of-way for VIA Rail's intercity trains, and a shuttle between the airport and downtown Montréal. It is important to note that the rail link is a separate project that has been developed in tandem with the road project. However, road and rail project developers have agreed on the value of harmonizing the two undertakings for both economic and environmental reasons.

The rail project partners (Aéroports de Montréal, VIA Rail Canada) intend to connect Montréal-Trudeau Airport to VIA Rail's intercity network in Eastern Canada, and to link the airport to downtown Montréal by a shuttle train.

It is important to note that the project to improve the ground transportation infrastructures was planned before the rail project. In fact, the studies related to the rail link have not yet been completed. Nevertheless, the results of certain studies, including such those relating to inserting the rail link into the future geometry of Dorval Circle and the feasibility study on running a shuttle train in the CN/CP corridor, made it necessary to modify certain features in the original plan for the roadwork.

Adjustments have also been made to the originally accepted geometry (preliminary proposal described in the impact study), following a safety audit that was conducted by a group of auditors, which is part of the roadwork planning process.

### 3. DESCRIPTION OF PROJECT MODIFICATIONS AND RATIONALE

A review of the railway track layout and the results of the safety audit led the Ministère des Transports and its partners to modify certain features of the original design. This led to a number of adjustments to the plan (see Figure 8), which are described in the following sections.

#### 3.1 MODIFICATIONS TO THE RAIL RIGHT-OF-WAY

Based on the preliminary results of the feasibility studies that were carried out by ADM and VIA Rail, the rail right-of-way will include two tracks built north of the existing CN/CP tracks. The original plan involved a single track south of the CN/CP tracks. As a result of, the rail link no longer has to go through a tunnel under the existing tracks.

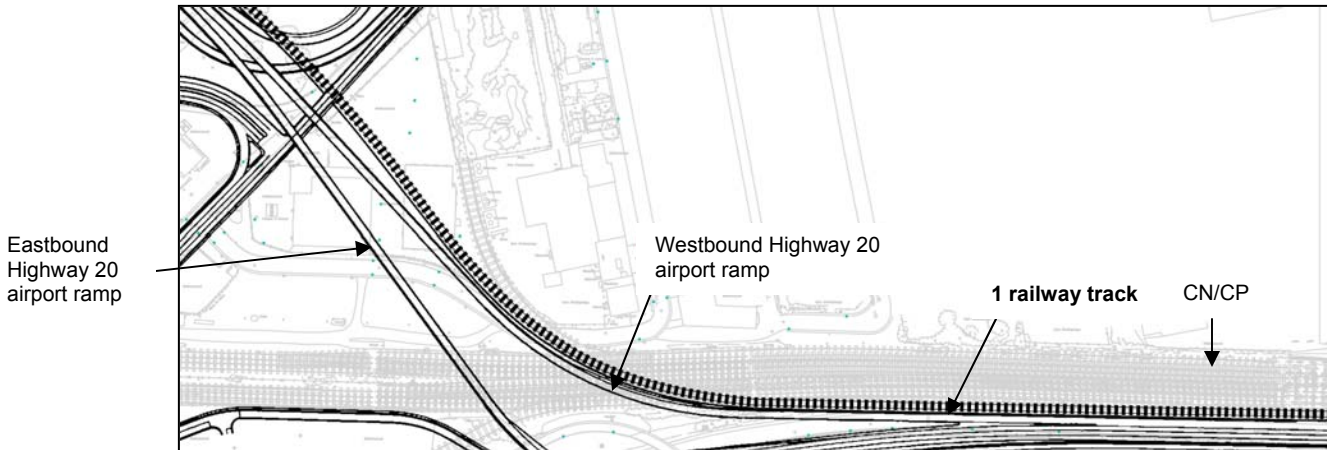
With respect to the profile of the track, the two new tracks will have an elevation that is similar to that of the existing ones, which are on a low rail embankment, running from the eastern boundary of the territory near Orly Street to Marshall Street. The tracks will change alignment starting at Marshall, and will descend into a trench that leads to the new station that will be built near the air terminal.

The changes made to the route of the tracks aim to improve the performance of the shuttle and to better meet the needs of the rail project partners. They are also intended to address the main constraints associated with the area crossed.

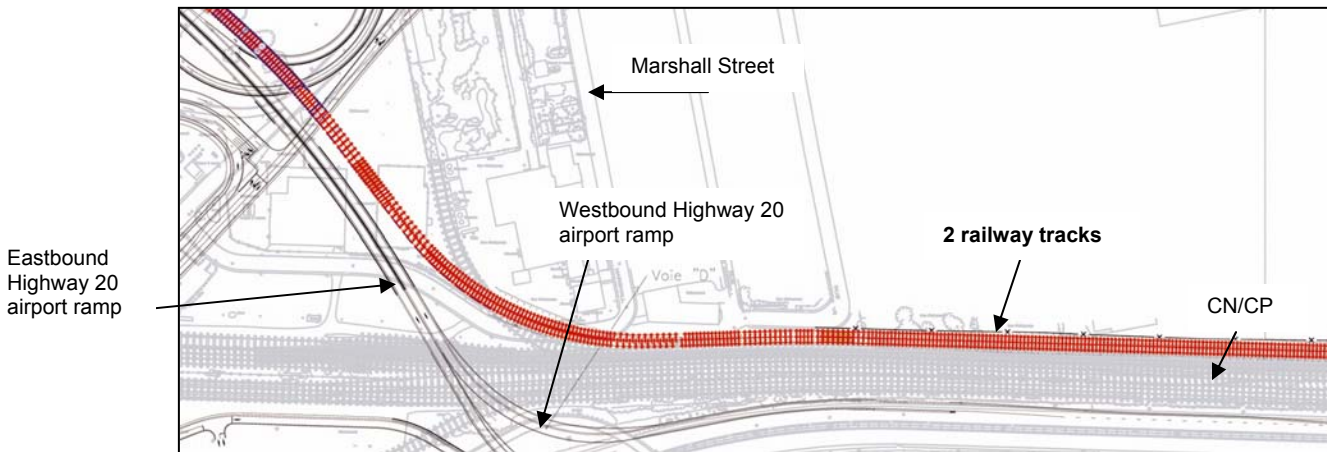
Here are the main reasons for these changes:

- Only the route to the north of the existing tracks provides the option of adding new tracks in order to ensure the reliability of the shuttle (schedule). With the route to the south, no additional tracks could be built because of the proximity of Highway 20, and another track between the CN and CP tracks is not feasible;
- This route is the best choice in terms of potential conflicts between passenger trains and freight trains, because they will be separated;
- This route also creates the possibility of 20-minute shuttle service;
- This route appears to be the least costly.

**Figure 1: Rail right-of-way**



**Original plan**

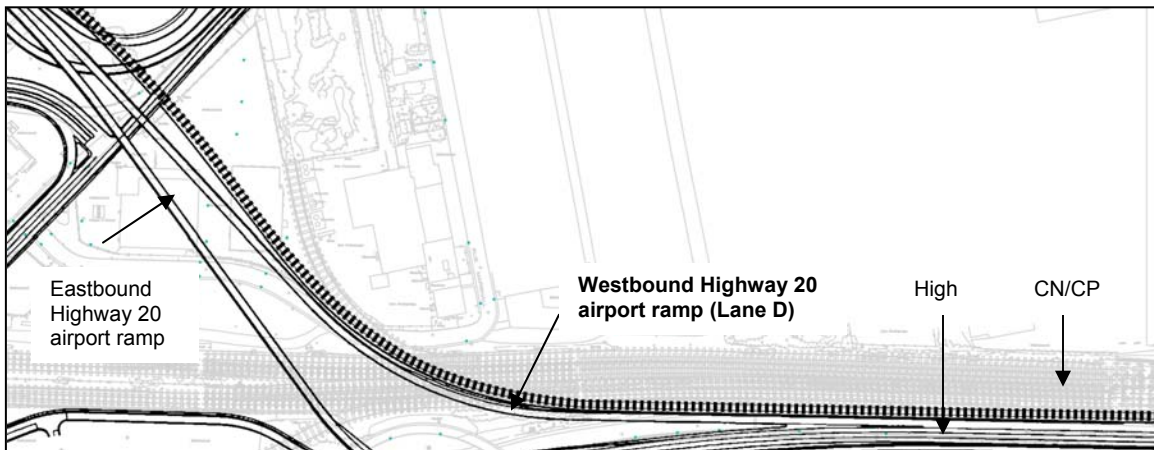


**Modified plan**

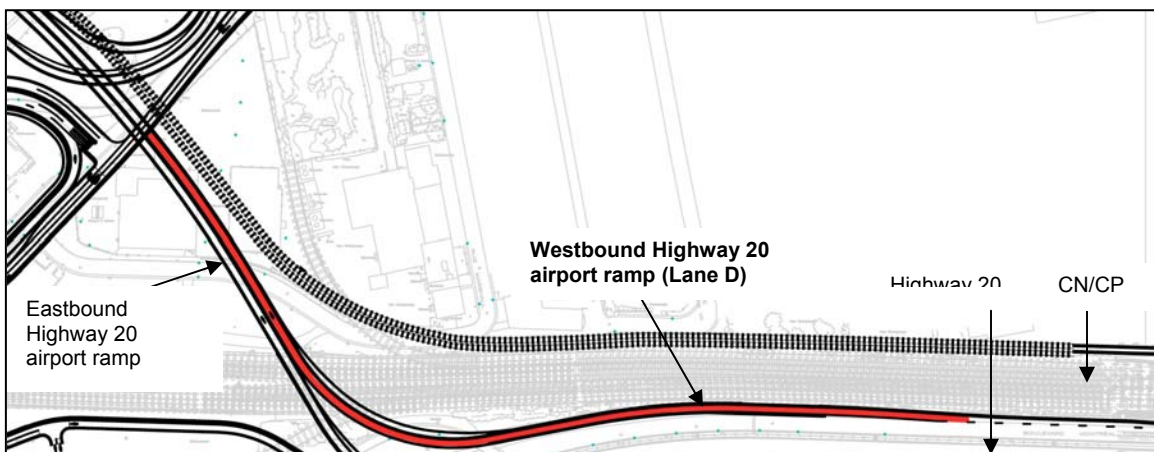
### 3.2 MODIFICATION TO THE NEW WESTBOUND HIGHWAY 20 AIRPORT RAMP

Since the railway tracks will be built north of the existing CN/CP ones and construction of a tunnel is no longer necessary, there is no point in building the new ramp from westbound Highway 20 to the airport (Lane D) sunken under the tracks. Lane D will therefore be elevated and shifted slightly southwest close to the ramp from the airport to eastbound Highway 20 (Lane C) to minimize construction costs. Note that Lane D's profile will resemble Lane C's. A related advantage is streamlining the structures by joining Lanes C and D along part of their routes.

**Figure 2: Westbound Highway 20 airport ramp**



**Original plan**



**Modified plan**



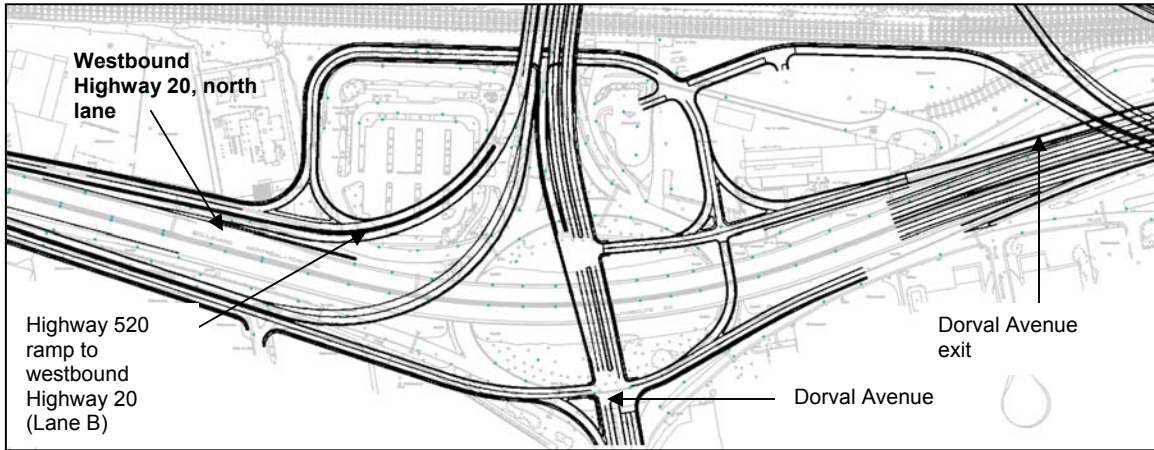
### **3.3 IMPROVED ROAD SAFETY**

In response to the safety audit that was carried out in connection with this project, the original design was modified to improve road safety. As a result, some routes were substantially altered. In order to provide a clear understanding of the changes made to those routes, the following sections briefly describe and illustrate each modification.

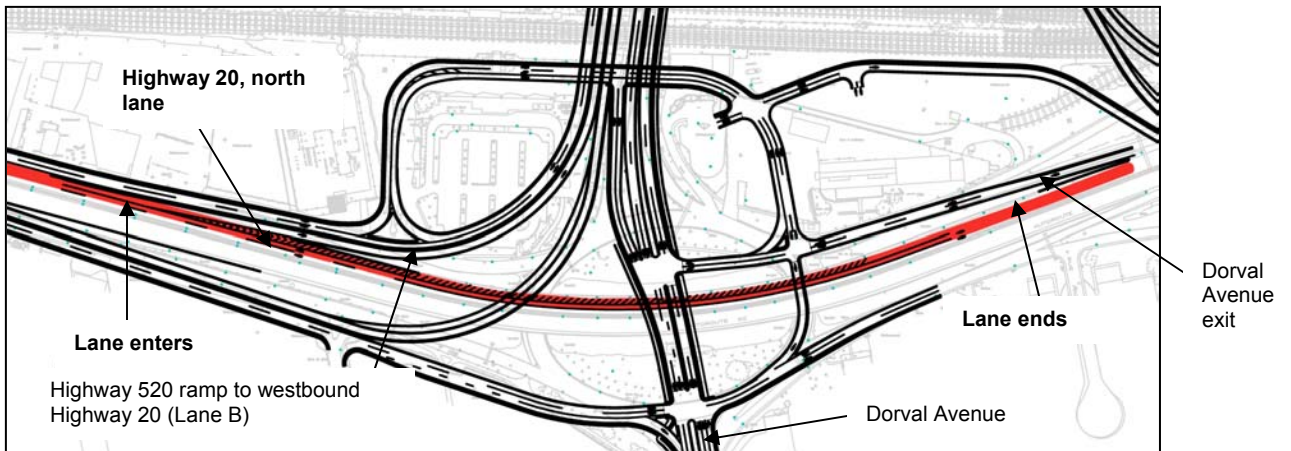
#### **3.3.1 Westbound Highway 20**

A modification was needed in order to facilitate safe merging of the vehicles coming from westbound Highway 520 (Lane B) with those on Highway 20. In light of this, the right-hand lane on westbound Highway 20 (north side) will end at the Dorval Avenue exit (northeast service road). Beyond the exit, the right-hand lane merges with the middle lane, reducing the highway from three lanes to two lanes beyond that point. West of Dorval Avenue, the on-ramp from westbound Highway 520 joins the two lanes, creating a third lane from a dedicated entrance. While the main reason for changing the original design was a safety improvement, this modification also has the advantage of avoiding expropriation of a strip of land from the properties located along the northwest service road.

**Figure 3: Westbound Highway 20**



**Original plan**



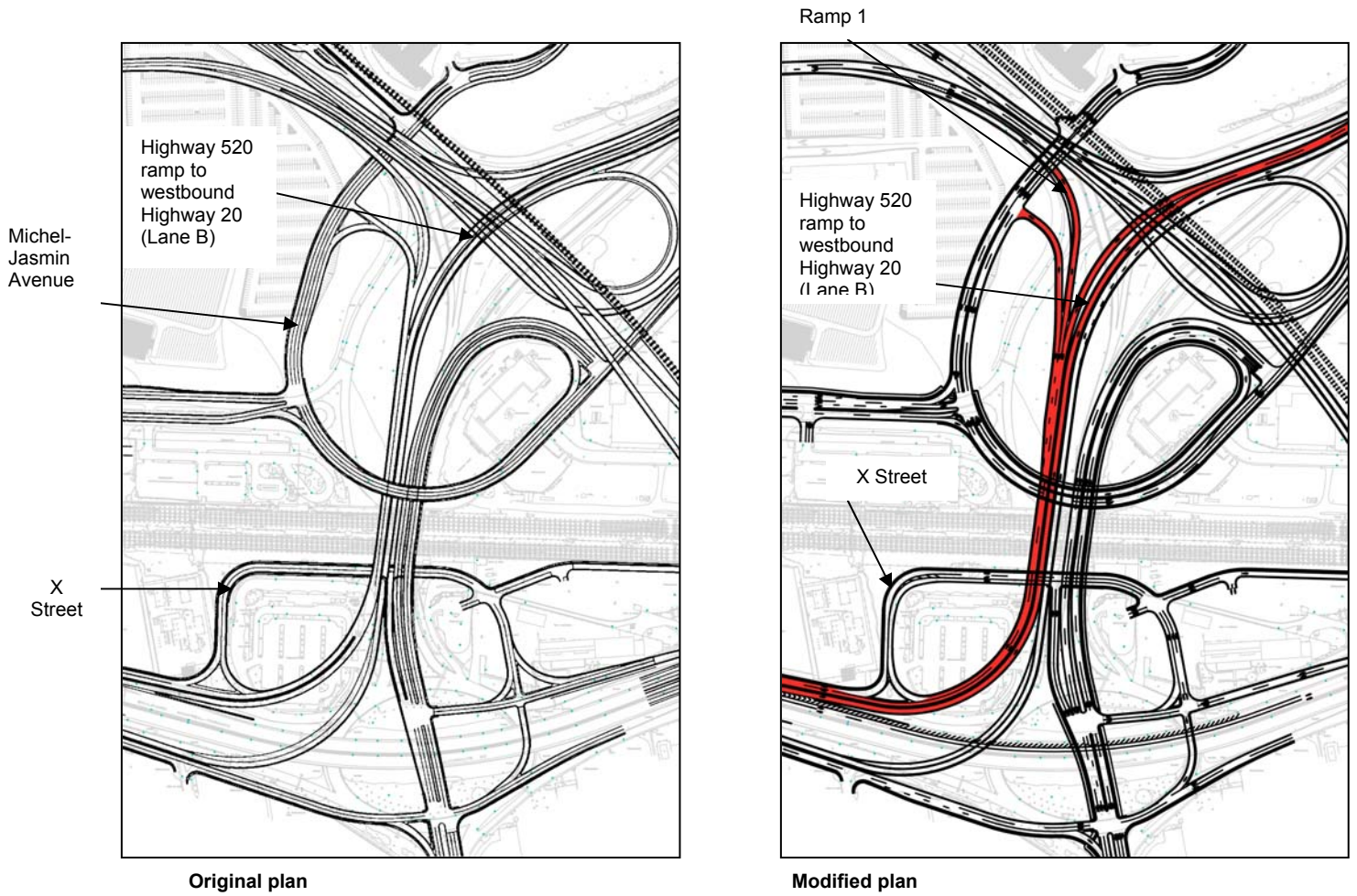
**Modified plan**

### **3.3.2 Traffic from westbound Highway 520 to Highway 20 and from Michel-Jasmin Avenue to westbound Highway 20**

The modified plan calls for physically separating the traffic coming from westbound Highway 520 toward westbound Highway 20 (Lane B) from local traffic coming from the airport (Ramp 1) and Michel-Jasmin Avenue. This modification aims to improve functionality over the original design, which would have meant rapid merging followed by a stretch of weaving that could cause safety problems. These two features have been eliminated in the modified plan, which allows for the safe flow of vehicles coming from the airport on Ramp 1, coming from Michel-Jasmin Avenue, and coming from Highway 520.

The route for vehicles coming from the airport or from the entrance from Michel-Jasmin Avenue toward westbound Highway 20 on Ramp 1 has been slightly altered. In the original plan, these vehicles could directly enter Lane B, and then westbound Highway 20, whereas in the modified plan, they must take the northwest service road in order to enter Highway 20. The distance that they have to travel remains the same. The total number of vehicles affected by the route changes in 2016 will be approximately 175 per hour during the morning rush, and 265 per hour during the evening rush.

**Figure 4: Traffic coming from westbound Highway 520 toward Highway 20 and from Michel-Jasmin Avenue toward westbound Highway 20**



### 3.3.3 Added lane on Ramp 11 linking Michel-Jasmin Avenue to eastbound Highway 520

A lane has been added to Ramp 11 in order to improve the transition from Michel-Jasmin Avenue to the Highway, because of the heavy traffic in that direction (approximately 1,750 vehicles per hour in the morning). The two lanes go on to merge at a safe distance before eastbound Highway 520.

Figure 5: Additional lane on Ramp 11



### **3.3.4 Route of the new local street leading to the bus terminal (X Street)**

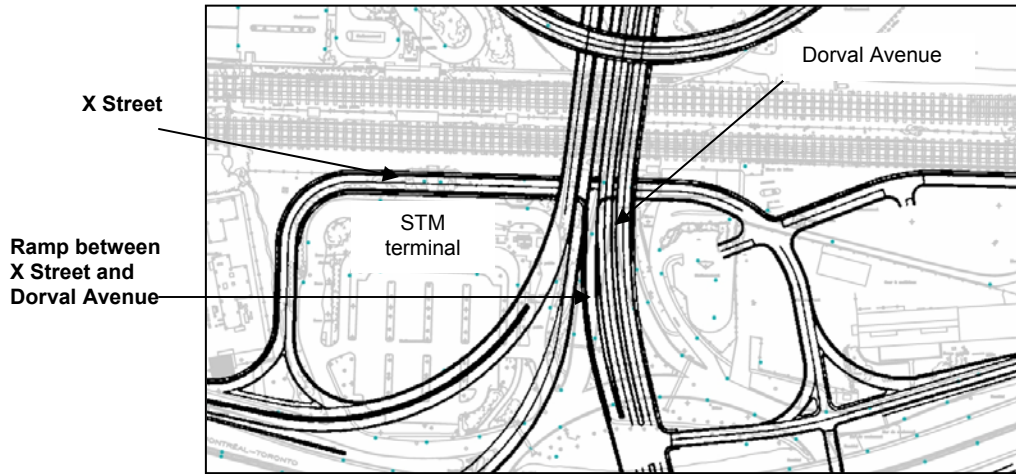
The new route for X Street calls for an additional westbound lane in order to allow for safe left turns to access the bus terminal and incentive parking (see Figure 6). These turns can also be made without blocking the flow of vehicles continuing on toward the northwest service road.

### **3.3.5 Added lane on the ramp between the new local street (X Street) and Dorval Avenue**

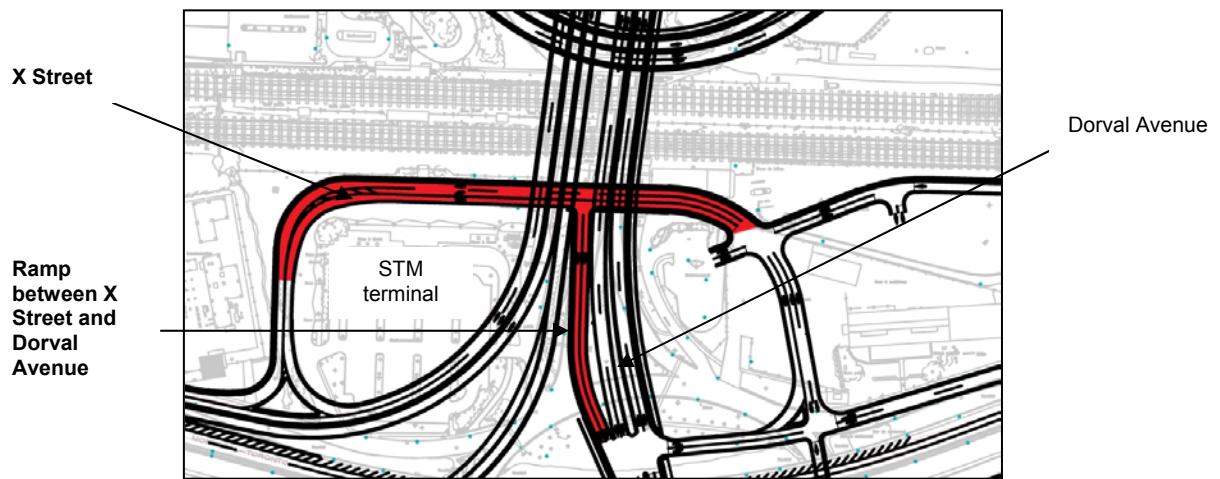
A second lane has been added to this ramp for two reasons. First, increasing the effective width will make right turns off X Street easier for southbound buses coming from the STM terminal. Second, the capacity of the Dorval Avenue/northeast service road intersection at the end of the ramp will be increased by the extra lane, which will mean that it will be capable of handling the projected traffic in 2016.



**Figure 6: New local street ("X") and added lane**



**Original plan**



**Modified plan**

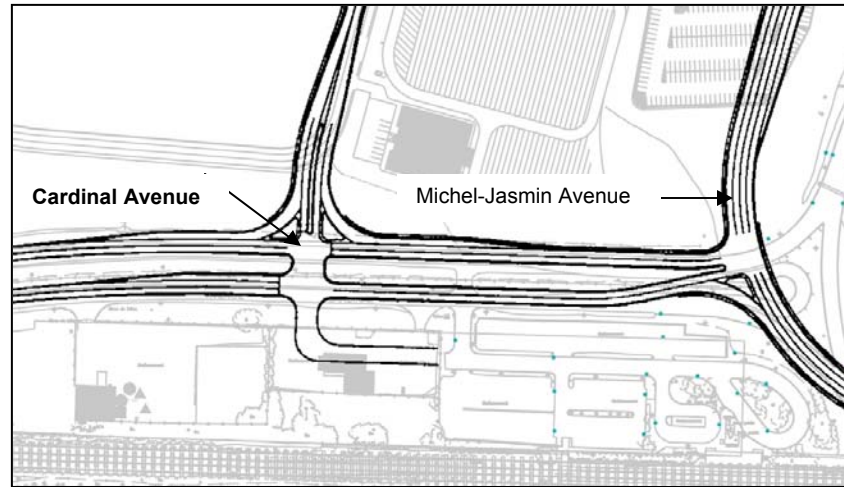
### 3.3.6 Redesign of Cardinal Avenue and the Cardinal/ Michel-Jasmin intersection

In the modified plan, the axis of the south side of Cardinal Avenue (eastbound) is shifted toward the north side. This change to the route maximizes the area of the land along the south side of Cardinal Avenue. In particular, the increased area will make land available for other uses. This route also allows for a number of design options for improving the city gateway.

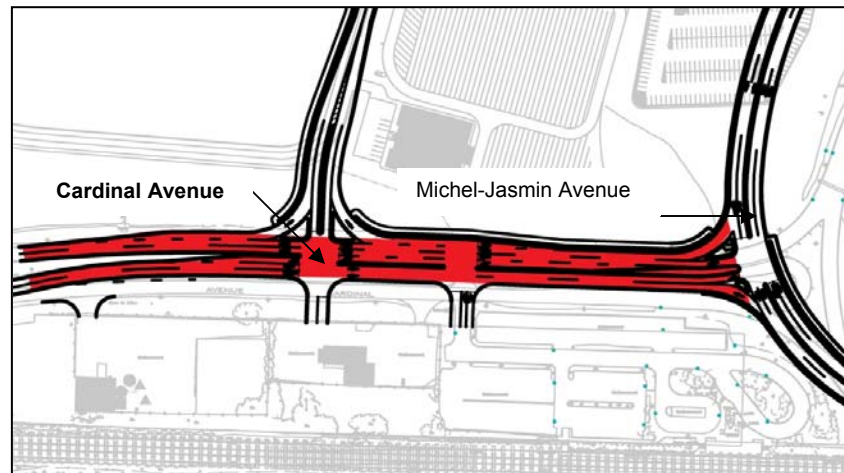
The Cardinal/Michel-Jasmin intersection is slightly altered in the modified plan. In fact, there was a discontinuity for southbound traffic in the original plan, where two lanes ended up facing a single lane beyond the circle. The modification restores continuity (two lanes continue). A turn island has also been added to the northern approach to the intersection in order to handle the heavy traffic flow in that direction.



**Figure 7: Cardinal Avenue and the Cardinal/Michel-Jasmin intersection**



**Original plan**



**Modified plan**

Figure 8 on the next page shows the entire modified plan.

11 x 17 drawing

## 4.0 IMPACT CHANGES

The purpose of this section is to describe the changes to the impacts described in the documents related to the environmental impact study, which were published in 2004 and the spring of 2005.

It should be pointed out that the general impacts identified in the impact study remain the same. However, the changes made to the plan have a direct effect on certain elements of the surroundings, and it is clear that they will greatly reduce the nuisances, and in particular, improve road safety.

### 4.1 SOCIAL IMPACT OF THE CONSTRUCTION PHASE

Putting the rail right-of-way north of the existing tracks (see section 3.1) means that it is no longer necessary to move a section of Highway 20 (shift southwards), as called for in the original plan. This will effectively maintain the north-south connections throughout the work period, because the traffic flow on the Bouchard overpass will not be interrupted.

The original plan called for a period of approximately one month during which traffic would have to detour through local streets while the Bouchard overpass was demolished (the period during which the lanes of Highway 20 would be moved). Therefore, we note that this improvement will have a positive impact (better quality of life) on residents who live in the southern section of the territory during the roadwork, because automobiles and emergency vehicles will no longer have to use local streets in a residential area.

### 4.2 VISUAL IMPACT OF THE OPERATIONAL PHASE

The only modification that is likely to affect assessment of the visual impact is the change made to the new ramp leading from westbound Highway 20 to the airport (Lane D). With the modified route, the ramp will be elevated (see section 3.2). This creates a visual obstacle in the area where it stands, particularly for people who live around Marshall Street. However, in the context of the entire project, this change should not have any additional visual impact, because the ramp will be adjacent and similar in profile to the one leading from the airport to eastbound Highway 20 (Lane C), which was designed as an elevated structure in the original plan.

#### 4.3 IMPACT ON PROPERTY (LAND AND BUILDINGS)

##### More developable land

Altering Cardinal Avenue by moving the south lanes closer to the north ones (see section 3.3.6) maximizes the developable area of land on the south side of Cardinal Avenue.

##### Partial expropriation of land belonging to Harland Pontiac-Buick

The modified plan eliminates the need to expropriate a parcel of land owned by Harland Pontiac-Buick. Originally, a strip of land along the highway, measuring approximately 58 m<sup>2</sup>, would have been expropriated for construction of the northwest service road. With the changes made to westbound Highway 20 (see section 3.3.1), the property remains intact.

#### 4.4 IMPACT ON SOIL AND GROUNDWATER IN THE CONSTRUCTION PHASE

The changes to the plan will have no significant additional impact on soil and groundwater. The excavated area will be approximately the same size as in the original plan. The difference lies in the changes made to the ramp leading from westbound Highway 20 to the airport (Lane D) and the rail right-of-way (see sections 3.1 and 3.2).

In this respect, the excavation required to build Lane D, which is now elevated, is minimal compared to the original plan, which called for it to be sunken. However, the excavated area will be larger, due to construction of the railway portion, which now includes two tracks.

#### 4.5 NOISE IMPACT

Simulations that take into account the modified geometry (see sections 3.1 and 3.2) indicate that the route changes will mean a slight reduction in road noise in the northeast section, as compared to the level indicated in the impact study. We note a slight improvement in the projected acoustic environment in 2016 (isocontour 55 L<sub>Aeq, 24h</sub> moved away from the residential area). For more details, see the supplementary report to the noise and air quality impact study (July 2005) in Appendix A.

With respect to railway noise, the minor changes (0.10 dB) in level indicated in the impact study and the responses to the Ministère de l'Environnement du Québec are insignificant. The conclusions pertaining to road and rail noise in the study that was tabled in

August 2004 and the responses to questions from federal and provincial officials are not affected by this update.

#### 4.6 IMPACT ON AIR QUALITY

The changes made to the route of Lane D have no effect on the conclusions of the impact study in terms of CO, NO<sub>2</sub>, and benzene. In terms of PM<sub>2.5</sub>, they produce an improvement in the 98th-percentile concentration (i.e.: a reduction in the concentration of inhalable PM<sub>2.5</sub>). There will be a 6% reduction (3.6% of the national standard) from the projected level before the revision. In comparison with the present situation, the 98<sup>th</sup>-percentile PM<sub>2.5</sub> concentration will drop by 2.6 %. Therefore, this change to the original plan for Lane D will only produce benefits.

With respect to the railway, air quality in relation to the railroad was assessed qualitatively in the impact study that was tabled in August 2004, based on the available numbers. No quantitative analysis of atmospheric dispersion was carried out for that phase of the study. This phase includes a comparison of the current and projected situations. The railway's impact on air quality was assessed by summarily comparing road and rail emissions.

Adding a second track to the planned railroad without increasing the number of trains does not alter the results pertaining to atmospheric pollutant emission rates that were described in the study that was tabled in August 2004. However, the locomotive speed indicated in the drawing of the new route for the tracks is not the same as what was estimated by SNC-Lavalin in 2004, which affects the results obtained in 2004. Therefore, taking into account the new speeds for the shuttle train, railway emissions of the observed pollutants will be approximately 14% lower than the earlier figures.

**Table 1: Railway emissions of pollutants before and after revision**

Pollutant	Emissions (kg/day)		Change <sup>(2)</sup> (%)
	Railway – Before 2005 revision	Railway – after 2005 revision	
NO <sub>x</sub>	166.6	143.2	- 14.0
CO	30.9	26.4	- 14.6
HC <sup>(1)</sup>	8.0	6.9	- 13.8
PM <sub>2.5</sub>	3.6	3.1	- 13.9

(1) Total hydrocarbons

(2) Difference between emissions before the revision and emissions after the revision

## 4.7 IMPACT ON TRAFFIC

The changes to the original plan were made based on key factors for interchange traffic. Many factors were considered, including traffic flow, trajectories from Point A to Point B, and the response to certain specific requirements, especially for buses. Knowledge of these factors when modifying the initial design made it possible to develop solutions that entail either no impact or a positive impact in comparison to the original plan.

### **Putting the rail right-of-way north of the existing tracks (see section 3.1):**

Putting the rail right-of-way north of the existing tracks eliminates the need to move a section of Highway 20, as described in the original plan. This effectively maintains the north-south links throughout the construction phase, because the traffic flow along the Bouchard overpass will not be interrupted. Maintaining the north-south links will make it easier for traffic, and especially emergency vehicles, to get through.

### **Moving the westbound Highway 20 airport ramp (Lane D):**

No change to trajectories, flow, or capacity (see section 3.2).

### **Westbound Highway 20 (see section 3.3.1):**

One lane of westbound Highway 20 will end between the Dorval Avenue exit and Lane B. Although vehicular trajectories and flow remain the same, the capacity of Highway 20 is lower than in the original plan. The remaining capacity is adequate, but there will be a decline in the level of service for traffic on that Highway for approximately 500 metres. On the other hand, this change produces a major gain in terms of road safety by resolving the problem of the inadequate distance for merging from Lane B to westbound Highway 20 (see impact on safety). The impact is considered to be low and minor.

### **Traffic from westbound Highway 520 to westbound Highway 20 and from Michel-Jasmin Avenue to westbound Highway 20 (see section 3.3.2):**

The number of vehicles affected by this change in trajectory in 2016 will be approximately 175 per hour during the morning rush and 265 per hour during the evening rush. The change to the trajectory for vehicles headed for westbound Highway 20 from Michel-Jasmin Avenue and from the airport will not increase the distance they travel. The impact is considered to be low and minor.

### **X Street route (see section 3.3.4):**

Trajectories and flow have not been modified. In the STM terminal area, westbound vehicles waiting to turn left toward the terminal will have an extra lane, and will no longer block traffic. The impact is considered to be positive.

**Redesign of Cardinal Avenue and the Cardinal/Michel-Jasmin intersection (see section 3.3.6):**

Trajectories and flow have not been modified. Right-turn capacity from north to west is increased by the installation of a turn island. The impact is positive.

**Additional lane on Ramp 11 between Michel-Jasmin Avenue and eastbound Highway 520 (see section 3.3.3):**

Trajectories and flow have not been modified. This change creates a stretch for merging from two lanes to one before entering eastbound Highway 520, whereas the original plan called for a single lane without any merging. The impact is considered to be positive.

**Additional lane on the ramp between X Street and Dorval Avenue (see section 3.3.5):**

Trajectories and flow have not been modified. In addition, there is an increase in capacity at the intersection of Dorval Avenue, the northeast service road, and the X Street ramp as a result of adding a lane to one of the approaches. The impact is positive.

#### 4.8 IMPACT ON ROAD SAFETY

Many of the changes to the original plan were prompted by issues related to road safety, and result from the safety audit. Therefore, the solutions that have been devised have a direct effect in this area, and as a result, the revised plan has a positive impact in comparison to the original.

**Westbound Highway 20 (see section 3.3.1):**

The purpose of this modification is to lengthen the merge distance between Lane B and westbound Highway 20, which was too short in the original plan. The objective is attained by creating a dedicated on-ramp, which eliminates merging. On the other hand, ending one westbound lane requires merging from three lanes to two. The distance available for merging is sufficient to do it safely. The impact is positive.

**Traffic from westbound Highway 520 to westbound Highway 20 and from Michel-Jasmin Avenue to westbound Highway 20 (see section 3.3.2):**

This modification eliminates a weaving zone that was too short in the original plan, which eliminates conflicts between vehicles. The impact is considered to be positive.

**X Street route (see section 3.3.4):**

Adding a westbound lane increases capacity and reduces conflicts in the area of the STM terminal by providing a haven for traffic turning left toward the terminal. The impact is positive.

**Redesign of Cardinal Avenue and the Cardinal/Michel-Jasmin intersection (see section 3.3.6):**

Restoring continuity on southbound Michel-Jasmin Avenue has a positive impact on safety.

**Additional lane on Ramp 11 between Michel-Jasmin Avenue and eastbound Highway 520 (see section 3.3.3):**

Adding a lane to the ramp makes it possible provide adequate distance for merging, which was not the case in the original plan. The impact is considered to be positive.

**Additional lane on the ramp between X Street and Dorval Avenue (see section 3.3.5):**

Adding a lane to the ramp has no impact on road safety.

#### **4.9 IMPACT ON PUBLIC TRANSIT DURING THE OPERATIONAL PHASE**

The bus trajectories for entering and leaving the terminal and reaching the various areas of the interchange remain the same following the changes made to the original plan. Therefore, there is no impact in that regard. However, adding a second lane to the ramp between X Street and Dorval Avenue (see section 3.3.5) makes it easier for buses to make a right turn, which has a positive impact.



## 5. CONCLUSION

The changes made to the original plan not only improve road safety but also improve the overall environmental impact. With respect to safety, we find that the adjustments made to the plan help to eliminate potential areas of conflict between vehicles that were mainly created by merge and weave zones. With respect to impact on traffic, the capacity of some thoroughfares is increased. The only reduction in capacity is the result of ending the lane on westbound Highway 20 between the Dorval Avenue exit and Lane B. However, this impact is offset by the improvement to road safety that result from the change.

With respect to impacts on air quality and noise, the results indicate no significant change from the assessment that was carried out during the environmental impact study. However, there is a slight improvement in the acoustic environment in the northeast sector (Marshall Street), as well as a slight reduction in PM<sub>2.5</sub> concentration.

## **APPENDIX A**

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