STUDY OF CN AND CP'S RAIL NETWORKS BETWEEN MONTRÉAL AND THE U.S. BORDER (TOWARDS NEW YORK AND BOSTON)

STATUS REPORT AND ASSESSMENT OF THE RAIL NETWORKS FOR PASSENGER TRAINS TRAVELLING AT SPEEDS OF 95, 127 AND 160KM/H

Executive Summary - November 2013

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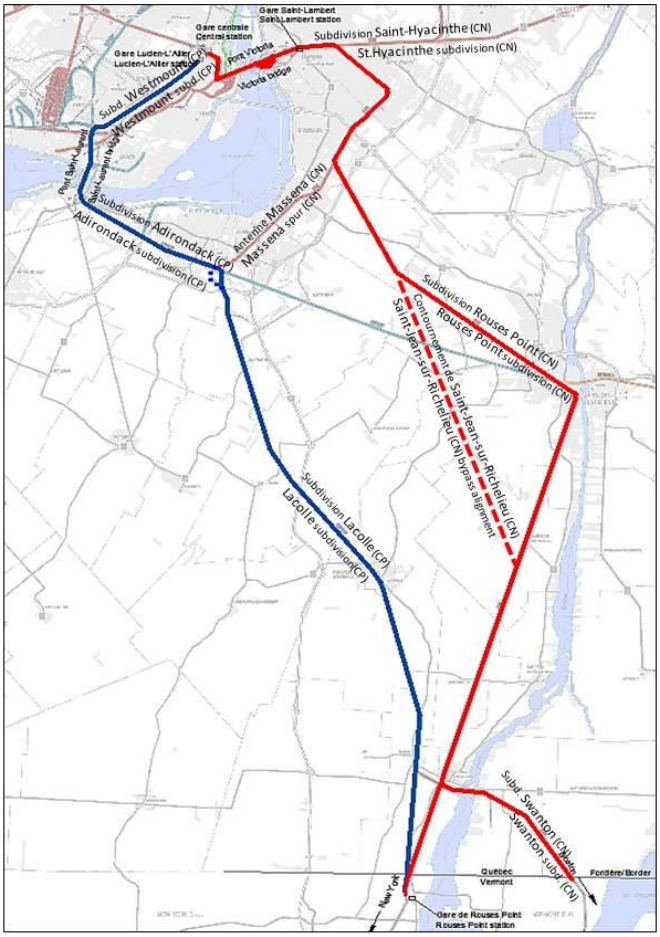
EXECUTIVE SUMMARY

In 2003, the ministère des Transports du Québec (MTQ) and the New York State Department of Transportation (NYSDOT) each conducted a prefeasibility study on the implementation of a high speed rail in the Montréal – New York corridor. In view of the high cost of implementing high speed rail systems, conclusions of the studies recommended more modest improvements to the infrastructures as a means to reduce travel time.

In that context, the MTQ issued a call for tender for a mandate to, first, update data on the rail networks of Canadian National (CN) and Canadian Pacific (CP) between Montréal and the U.S. border, then identify the improvements to be made to the routes to enable passenger trains to reach speeds of 95 km/h (59 mi/h), 127 km/h (79 mi/h) and 160 km/h (100 mi/h). The mandate also includes assessing the cost of work and identifying the most adequate improvement scenarios. Lastly, an additional objective of the mandate is to assess alternative scenarios for accessing downtown Montréal.



The plan on the left presents the routes that were analyzed in this study. The red route between the Montréal Central station, in the north, and Rouses Point in the south, is CN's main route, that is, a section of the Saint-Hyacinthe subdivision and the whole Rouses Point subdivision.

The dotted line schematically shows the diversion track bypassing Saint-Jean-sur-Richelieu that was considered to remedy specific problems related to the route crossing this town.

The blue route, which is composed, from north to south, of sections of the Westmount, South Junction Lead and Adirondack subdivisions, then of the whole Lacolle subdivision, is CP's route.

Lastly a mixed route composed, in the north, of the CN track, up to Antenne Massena, and, in the south, of the Lacolle subdivision.

Figure 1: Plan of CN and CP's routes from Montréal to the border

Status report on the existing rail networks
Thorough review of the documentation provided by CN and CP, as well as a rail-road vehicle inspection and exhaustive photographic documentation on both routes helped map the current status of the two networks, including segments that would only be used in mixed routes or for routes towards Boston through CN's Swanton subdivision.

The study showed that the most problematic areas on CP's route were as follows:

- The whole Westmount subdivision, from the Lucien-L'Allier station to the Montréal-Ouest station, because of the heavy train traffic resulting from AMT's operations;
- The 25 mi/h curve in the South Junction Lead subdivision because of the nature of the land and the proximity with buildings inside the curve;
- The Saint-Laurent railway bridge with its 25mi/h speed limit and the possible disruptions caused by the passage of ships, which requires lifting of the mobile section of the bridge over the St. Lawrence Seaway;
- The curve at the south exit of the Saint-Laurent railway bridge because of road structures supporting access roads to the Mercier bridge;
- The curve at the spur track of the Lacolle subdivision in Delson, because of residential development inside the curve;
- The two "S" curves under autoroute 30, south of Delson;
- The curve in Napierville because of industrial activities and a grade crossing;
- The presence of many private grade crossings and farm crossings in the Lacolle subdivision, where density is very high in certain areas.

On CN's route, the study showed that the most problematic areas were as follows:

- The whole portion of the St-Hyacinthe subdivision, between the Victoria bridge and the Central station, mainly because of the strong curves of the tracks and the difficulty to rectify them because of the neighbouring urban area;
- The Victoria bridge itself, because of the bridge's restrictions, heavy traffic, and the risk of disruptions caused by ships passing through the St. Lawrence Seaway;
- The curve at the spur track of the St-Hyacinthe and Rouses Point subdivisions, because the railway bridge reduces the possibilities of low-cost redevelopment;
- The curve at the spur track of Antenne Massena and the Rouses Point subdivision, because of the residential development inside the curve;
- The diamond crossing at P.M 23.17 between CP's lines and MMA's;
- The whole densely populated area of Saint-Jean-sur-Richelieu, because of the strong curve at the centre, the high number of grade crossings and the buildings located very close to the track.
- The basic orientation of the switch in Cantic, towards Swanton, forces trains travelling towards Rouses Point to reduce their speed;
- A great number of private and farm crossings in the Rouses Point subdivision, where density can sometimes be high.

Analysis of mitigation measures and integrated upgrading scenarios
The problems causing speed restrictions were presented, corrective measures were suggested and the costs of these measures were assessed for each of the specific situations described for each route. In most cases, the most severe speed restrictions are due to curves located in densely populated urban areas or in areas where low-cost redevelopment is difficult.

Once specific corrective solutions were examined, two or three integrated implementation scenarios were suggested for each route and each target speed. The benefits of each scenario were quantified based on a travel time reference and the estimated costs. The cost-benefit ratio, expressed in million dollars per minute of travel time saved, was also calculated and is used as a basis for comparing the different scenarios.

Main track routes of CN and CP

The reference travel time used for comparison purposes is 1h 23min; it is the travel time simulated by reproducing permanent speed limits and the current route of Amtrak's train in Québec, on CN's tracks.

The advantage of CN's route between Rouses Point and the Central station is that it offers direct access to a station that is currently used as a terminus for passenger trains bound for major cities in Canada. However, the route is not quite direct and presents a significant number of curves that restrict train movements. In addition, the section of the Saint-Hyacinthe subdivision that includes the Victoria bridge poses additional issues because of the very dense traffic flow and the interaction with St. Lawrence Seaway operations. The integrated implementation options offer travel times of 1h 17min to 1h 5min, with estimated investments of $47 to $112 million.

The distinct advantage of CP's route is that the route is shorter and runs across a territory with fewer constraints related to severe curves and built-up environments. The route portion near Montréal is also used intensively and the interaction with maritime traffic may have a significant impact, because the rail route does not have any alternative in the event of ships passing. The shortest route includes integrated scenarios allowing travel times of 53 to 36 minutes between Lucien-L'Allier station and Rouses Point, with investments of $27 to $110 million. The costs related to investments needed to make the Lucien-L'Allier station the terminus station, were not considered in the study.

Route bypassing Saint-Jean-sur-Richelieu

To get round the challenges specific to the CN route running across the town of Saint-Jean-sur-Richelieu and the difficulties limiting speed in the urban area because of the high number of grade crossings, the proximity to residential buildings and a particularly pronounced curve at the centre, an alternative was examined to bypass the town. The advantage of this option is that it reduces the total length of the route and offers less major constraints regarding the target speeds. However, it requires additional costs for the construction of a new track over several kilometres. The scenarios that were considered offer travel times of 1h 7min to 52 minutes, with investments of $96 to $156 million.

Mixed routes

Another alternative route was examined: a mixed route using tracks of CN's current route from Central station to Antenne Massena, then Antenne Massena linking Brossard to Delson, then the tracks of CP's Lacolle subdivision to Rouses Point. This route combines some of the advantages of the above-mentioned routes: the terminus in Montréal is the Central station and its services that are already in place; it bypasses the town of Saint-Jean-sur-Richelieu without requiring the construction of a new long track segment; and it is shorter than CN's current route. There is however one major difficulty: the crossing of CP's busy tracks in Delson, which will require either the installation of a diamond crossing that was recently removed from that location, or the building of an overpass, which involves significant geometric constraints. The estimated travel times for that route range from 1h 4min to 56 minutes, with investments of $58 to $117 million.

Towards Boston through the Swanton subdivision

The analysis of the costs and of the travel times also took into account routes connecting Montréal and Boston through the Swanton subdivision. Costs were considered as optional additions to the estimated costs of the routes towards New York via Rouses Point. For a reference time of 25 minutes between Cantic and East Alburgh at the speeds currently allowed on that segment, an investment of $7 to $21 million would help reach travel times of 12 to 8 minutes. A connection to the CP tracks, in the case where the Lacolle subdivision was used by the Amtrak service, would cost an additional $2 and $3 million and would prolong the travel time by 1min 21sec up to 2min 38sec depending on the options. The option to remotely control the bridge over rivière Richelieu was also examined as, even without a CCC system, it would prevent trains from having to stop on the bridge at all times, while allowing maritime traffic. The cost of the proposed system was assessed at $2.9 million.

Alternative access to downtown

Four ways of accessing the town centre, other than the above-mentioned options, were broadly examined to assess the advantages they could offer in facilitating and/or speeding up train movements between the U.S. border and downtown Montréal. Two of them stand out:

First, the creation of a junction between CP's Adirondack subdivision and CN's Montréal subdivision would allow, if technically feasible, to combine the significant amount of time saved using the CP route with access to a station already used for intercity trains on CN's route, while bypassing the busiest segments of both networks. The spur track should be made in a sector strongly affected by the Turcot interchange redevelopment work, which clearly poses challenges, but maybe also opportunities.

Figure 2: Option No. 2 for an access to the Montréal Central station

The second alternative that stands out also requires infrastructure work, but this time, it involves an electric light-rail transit system referred to as LRT (light rail transit) on the bridge that will replace the current Champlain bridge; this option consists in the construction of a LRT-train intermodal station at the junction of the CN route (Rouses Point subdivision) and the LRT route, near the intersection with the Lapinière and Chevrier boulevards. There are many unknowns regarding the relevance of this alternative, but the advantages would be direct service for the Montréal south shore residents, quick downtown access through a system at the leading edge of technology, and the possibility to build customs facilities in the Montréal region, but outside of the area where access by conventional rail is compromised due to the high number of commuter trains and others.

Figure 3: Option No. 3 for an access to the Montréal Central station