THE HIGH-PERFORMANCE RAIL OPTION

A Transport Action Ontario Discussion Paper

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Abstract

In 2014, two divergent proposals were made for improved rail service on separate portions of the Quebec-Windsor Corridor. The Government of Ontario proposed a new high-speed rail (HSR) service between Toronto and Windsor via Pearson International Airport, Kitchener and London. An unrelated VIA proposal calls for an approach it has labelled high-frequency rail (HFR), which would operate on dedicated track between Montreal, Ottawa and Toronto.

What has not been examined is the potential for a broader, cost-effective series of incremental investments and improvements for the entire Quebec-Windsor Corridor. This approach, which has been taken on many corridors around the world, is known as high-performance rail (HPR).

With HPR, the current VIA service would be progressively improved corridor-wide to reduce journey times, increase the service frequency and expand ridership. It would be a combination of new equipment, upgrading of the existing infrastructure, construction of selective new line segments, a revised service pattern and improved connectivity with other modes of travel.

Rather than focusing just on the maximum speed, HPR is defined by its multiple service attributes, including:

- frequency;
- price vis-à-vis other modes;
- comfort and onboard amenities;
- on-time performance;
- station convenience;
- connectivity with other public modes; and
- door-to-door travel time.

Based on the benefits realized on other rail corridors where it has been applied, there is reason to believe HPR could be the preferred option for corridor-wide rail passenger investment and improvement.

Also to be considered is the practicality of combining the best elements of all three rail passenger improvement options into a single program that would bring broad economic, social and environmental benefits to all the routes in the current VIA Quebec-Windsor Corridor.

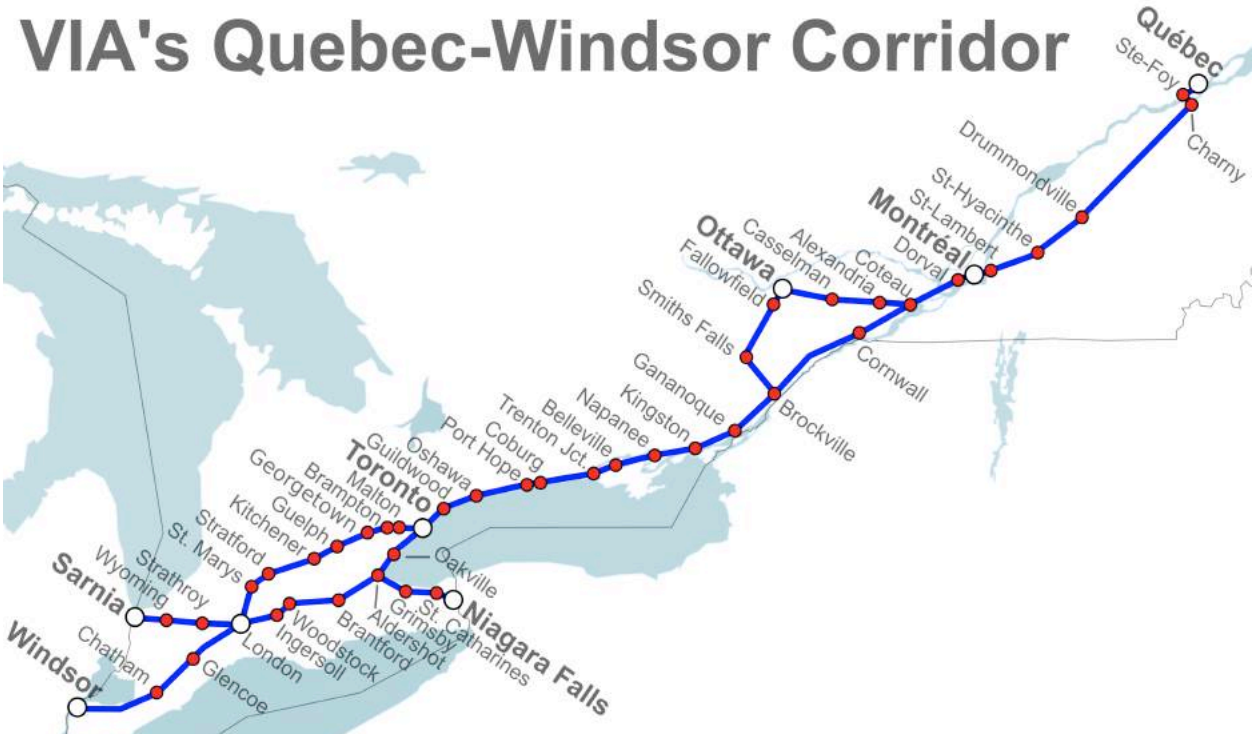
This discussion paper has been commissioned to encourage decision makers to undertake a detailed analysis of the HPR option alongside Ontario's HSR and VIA's HFR proposals.

The Case for High-Performance Rail Investment

If a case for investment in modern rail passenger service were to be made in Canada, it would be in the Quebec-Windsor Corridor. This region is home to more than half of Canada's population and it is the nation's economic core. It is also part of the trans-border Great Lakes Mega-Region, which further expands its economic impact. On the basis of demographics, travel demand and the distances between its numerous well-developed communities, this corridor is ideally positioned to make full use of fast, frequent and cost-effective intercity rail service.

Numerous proposals for major rail passenger service improvements throughout the Quebec-Windsor Corridor have been brought forward in the past, but none has been adopted. Without assured and predictable multi-year funding, VIA has been unable to optimize the efficiencies and attractiveness of rail to reduce journey times and increase frequency to significantly boost ridership and revenue on its seven corridor routes. While some erratic and inadequate investment has occurred, there has been no comprehensive plan for major improvement. Consequently, VIA attracts a relatively small percentage of the total passenger traffic on a corridor-wide basis, although its impact is respectable in some market sub-segments.

Where rail passenger service has been funded and developed progressively in numerous other corridors around the world, it has offered levels of speed, convenience and accessibility that have attracted high ridership and revenue. This has made rail a credible alternative to highway and aviation investment, generating broad on- and off-corridor benefits economically, socially and environmentally. In many instances, actual passenger demand has been far greater than forecasted in the studies that supported these rail investments.



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What is High-Performance Rail?

High-performance rail (HPR) is a commercially-proven middle ground between VIA's current conventional service, which operates at a maximum of 160 km/hour, and high-speed rail (HSR), which is generally defined as a passenger service operating on dedicated infrastructure at speeds of 240 km/hour or more. To bring it down to its simplest terms, HPR is the phased improvement of all aspects of a conventional rail passenger service to make the best use of the existing infrastructure without fully separating it from the freight and any other passenger services that continue to share the bulk of the route.

To deliver true HSR service, it is necessary to construct new "greenfield" line segments to separate it from the other traffic types and safely enable the HSR trains to operate at their maximum speeds, which are typically three to four times higher than those of freight trains. The exception is in constrained urban terminal areas, where shared corridors often must be used because it would be physically and financially difficult to replicate the existing infrastructure to achieve full separation.

Prior to building their impressive HSR lines, many European and Asian railways implemented HPR services on existing rail corridors. There, it continues to operate at speeds of 160 to 200 km/hour on many main and secondary routes, complementing and feeding traffic to the HSR lines. In some cases, HPR and HSR are operationally intertwined on the same routes to provide a combination of high-speed express service for major points and lower-speed local service for smaller intermediate communities.

In addition to operating at progressively higher speeds than conventional rail passenger service, HPR is defined by its multiple service attributes, including:

- increased frequency;
- competitive user costs vis-à-vis other modes;
- enhanced comfort and onboard amenities;
- higher on-time performance;
- all-weather reliability;
- greater station convenience and accessibility;
- higher connectivity with other public modes; and
- reduced door-to-door travel times.

A key feature of HPR is that it isn't a "big bang" approach that takes years to deliver any benefits before the entire project is completed, as is the case with HSR. It delivers service improvements at numerous points along what is a phased pathway to full build-out. As well, HPR can initially be diesel powered and, where justified, be converted to electric traction at a later date. On the other hand, HSR requires full electrification at the outset.

HPR is often described as an affordable "higher speed" option for today, while HSR is a longer-range and costlier option for tomorrow. As has been demonstrated around the world, HPR can be an effective and incremental platform on which to construct a future HSR service.

HPR in North America Today

There are six examples of HPR in operation in North America now. The most highly developed is Amtrak's electrified Boston-Washington Northeast Corridor (NEC). It offers high frequencies, operates at up 240 km/hour and makes numerous connections with other Amtrak routes, commuter rail systems, intercity bus feeders and urban transit networks. The NEC also handles a complex mix of slower intercity passenger and commuter trains, plus some freight.

Connected to the NEC is the electrified Philadelphia-Harrisburg Keystone Corridor, which is operated at 176 km/hour and provides 14 daily roundtrips. Amtrak plans to increase the speed to 200 km/hour and the State of Pennsylvania is studying the possibility of extending the corridor west with diesel-hauled service to Pittsburgh.

There are four additional Amtrak routes which meet the HPR criteria. These are:

ROUTE	END POINTS	MAXIMUM SPEED (KM/HOUR)	WEEKDAY ROUNDTRIPS
Empire Corridor	New York-Albany	176	13
Hiawatha Service	Chicago-Milwaukee	127	7
Pacific Surfliner	Los Angeles-San Diego	144	11
Capitol Corridor	San Jose-Sacramento	127	14

TWO OF HPR'S MANY FACES: Amtrak's electrified Northeast and Keystone corridors (above) represent the upper end of HPR operation in North America today, handling a mixture of higher-speed express services and lower-speed regional intercity trains, as well as heavy commuter and limited freight traffic. An alternate, lower-cost example is the San Jose-Sacramento Capitol Corridor (below), which offers frequent diesel-powered service with bi-level rolling stock on a line that comfortably handles heavy rail traffic. Photos from Wikipedia

All four of these HPR services are diesel powered and they interconnect with numerous feeder buses, urban transit systems, commuter rail lines and other Amtrak routes. Other Amtrak HPR upgrading projects now under way in partnership with the relevant state governments include:

Downeaster Service	Boston-Portland-Brunswick, ME
Knowledge Corridor	New Haven, CT-Springfield, MA
Empire Corridor	Albany-Niagara Falls, NY
Piedmont Corridor	Raleigh, NC-Charlotte, NC
Wolverine Corridor	Pontiac, MI-Detroit-Chicago
Lincoln Corridor	Chicago-St. Louis
San Joaquin Corridor	Bakersfield, CA-Oakland/Sacramento
Cascades Corridor	Eugene, OR-Portland-Seattle-Vancouver, BC

The two Midwest projects are components of a planned Chicago hub network of six 176-km/hour HPR routes and six conventional services. Other HPR services throughout the U.S. will follow as multi-route regional systems are built on the foundation of current Amtrak conventional routes. Among those targeted for upgrading to HPR are:

Vermonter Service	Springfield, MA-Montreal
Inland Route	Boston-Springfield, MA
DC2RVA Corridor	Washington, DC-Richmond, VA
Keystone West	Harrisburg, PA-Pittsburgh
Southeast Corridor Phase I	Richmond, VA-Raleigh, NC
Southeast Corridor Phase II	Charlotte, NC-Atlanta
Southeast Corridor Spur	Richmond, VA-Hampton Roads, VA
Northern Lights Express	Twin Cities-Duluth, MN

It should be noted that California has embarked on North America's only HSR project, which will link Los Angeles and San Francisco by 2029. As part of that plan, the state's three HPR routes will not only continue to operate, but they will play expanded roles as feeders to the HSR line.

Ontario's High-Speed Rail Proposal

Prior to the June 2014 provincial election, Premier Kathleen Wynne announced her government would, in concert with major GO Transit expansion in the Greater Toronto and Hamilton Area (GTHA), build a 300-km/hour, electrified Toronto-London HSR line, which would also serve Pearson International Airport and Kitchener-Waterloo. It would be a hybrid route using existing GO Transit and CN rights-of-way, plus an all-new Kitchener-London alignment.

A cost of $2.5 billion and an estimate of up to 12 years for the service's start-up were given, based on a pre-feasibility study that lacked detailed analysis and was done without any on-the-ground inspection of the route. That study also indicated the proposed HSR line could attract about 6 million passengers annually and operate profitably, repaying most of its capital cost.

There is no doubt that an HSR project such as this one could be a dazzling prospect. Since the world's first true high-speed train pulled out of Tokyo for Osaka on the all-new Tokaido Line in 1964, it has become the gold standard of intercity rail passenger service. In addition to growing into an extensive, multi-line system in its birthplace, it has taken root in nations as diverse as France, Turkey and China. HSR has become a global phenomenon.

However, HSR is expensive and time-consuming to build. It also requires concentrations of passengers on dense corridors and complementary rail, bus and transit services to draw traffic from off-line points. When it's part of a seamless network of integrated services, HSR can offer a highly attractive alternative to car and air travel.

Despite these impressive credentials and the headline-making power of any HSR proposal, the provincial announcement drew a mixed public reaction. Some of the skepticism may have resulted from the fact that HSR has been studied repeatedly in Canada for more than 30 years. These studies have all proved HSR is technically feasible and it could divert large numbers of travellers from air, bus and, to a lesser extent, the highways. But the studies have also determined HSR would have to be publicly funded, with at best a small percentage of private investment. That funding has never materialized.

Following the June 2014 provincial election, the HSR proposal was reconfirmed and expanded west to include Windsor. Premier Wynne announced the government would undertake environmental assessments and planning for the proposed HSR line. She also said she hoped the federal government would contribute, inasmuch as it already funds conventional VIA service in the same market. The private sector would be also expected to shoulder a large portion of the cost through a public-private partnership.

The HSR proposal was advanced with the appointment of former federal Minister of Transport David Collenette as the project's advisor. His task is to present recommendations to Queen's Park based on a business case analysis by November 2016. Should Mr. Collenette deliver a positive recommendation, the next step would be three or more years of design work and environmental assessments, with construction requiring another four to six years.

At his first round of presentations explaining the study process to be followed, Mr. Collenette emphasized that nothing has yet been decided and a wide range of options will be explored regarding routing, technology, financing and many other issues. An initial modification of the 2014 pre-feasibility study was the inclusion of 200-km/hour or "higher speed" diesel and electric options within the current analysis. This is, in fact, HPR, not HSR.

Also to be resolved are several physical and operational challenges. One is the ability of the constrained, CN-owned Bramalea-Georgetown route section to accommodate HSR in addition to the all-day, two-way GO service the province has promised for Kitchener. Delivery of the latter has proven difficult, causing the government to push back the estimated service date from 2019 to 2025. The impact of this bottleneck on the cost and time line of the HSR project will need to be addressed, as will CN's refusal to allow any electrification of its lines.

Questions have also been raised about the HSR line's routing. Because of constraints on the existing lines, it would require an all-new alignment around Acton and Rockwood. It might also bypass downtown Guelph in favour of a new station south of the city near Highway 401.

The new HSR alignment would also exclude Stratford and St. Marys, although the original Toronto-London pre-feasibility study did suggest that some lower-speed Kitchener-London service could be maintained on the current line to connect with the HSR trains at either end. Similar suggestions were made concerning the possible maintenance of the conventional service now provided by VIA on the Toronto-Brantford-London and London-Sarnia routes.

As well, the route proposed in the 2014 pre-feasibility study would not directly serve Pearson International Airport, but would require an interchange station near the Woodbine Racetrack, where HSR passengers would make cross-platform connections with the Union Pearson Express trains that now serve the airport.

Providing a direct HSR connection to Pearson would be extremely difficult and expensive, requiring a loop line off the existing GO-owned rail corridor and a considerable amount of tunneling. This was not considered in the original pre-feasibility study, although connectivity with Pearson remains a key objective of the HSR proposal.

VIA's High-Frequency Rail Proposal

In isolation from the Ontario HSR plan for Southwestern Ontario, VIA brought forward a scheme for the Montreal-Ottawa-Toronto segment of the corridor in late 2014. It is partially HPR, but most of it can be characterized as HSR – without the high speed.

Dubbed high-frequency rail (HFR), it arises from VIA's contention that it can't offer frequent, reliable and cost-effective service so long as it uses infrastructure owned by the freight railways. To overcome this, VIA proposes a combination of the trackage it now owns with new trackage on abandoned and active freight rights-of-way to create a dedicated, passenger-only line providing up to 15 roundtrips daily on a contiguous Montreal-Ottawa-Toronto routing.

Although the specifics of the routing have not been made public, internal documents indicate the HFR trains would operate from Montreal Central Station on the existing CN route to De Beaujeu, Quebec, where they would access the VIA-owned line to Ottawa and Smiths Falls. To this point, HFR is actually HPR.

Beyond Smiths Falls, the HFR proposal more closely resembles HSR due to its reliance on all-new passenger infrastructure, albeit on existing rights-of-way. Leaving VIA's current line at Smiths Falls, the HFR route would be on dedicated track built beside CP's Montreal-Toronto freight main line to Glen Tay. There, it would veer off to the abandoned portion of CP's Havelock Subdivision, with the 150 km of missing track rebuilt.

West of Havelock, VIA would build on CP's active freight corridor through Peterborough to Toronto's Leaside area, where the HFR trains would proceed to Union Station on a mothballed ex-CP line owned by GO Transit.

Although no cost-benefit analysis has been released, VIA has said HFR on a contiguous Montreal-Ottawa-Toronto routing would be profitable, increasing ridership from the current 2.3 million passengers to 6.8 million within 12 years. As for the capital cost of up to $4 billion, VIA has suggested the government would invest $1 billion in new equipment and private-sector investors might fund the rest. VIA would use the privately-financed infrastructure on a toll basis that would generate a profit for the investors. While VIA has provided no firm timeline, the corporation has suggested it could be implemented by 2021.

ROUTE SEGMENT	JOURNEY TIME
Montreal-Ottawa	1:20
Ottawa-Toronto	2:30
Montreal-Toronto	3:50

It is impossible to determine the soundness of the HFR proposal because so little data has been made public and changes have been made since it was first announced. VIA originally said it would be a diesel-powered, 176-km/hour operation, which would save the high cost of electrification. VIA later altered the proposal to include electrification and operation at 200 km/hour, raising the estimated cost by $1 billion.

Other major questions about the HFR proposal that have not yet been answered include:

- Would VIA continue to serve Brockville, Kingston, Belleville and other high-volume points on its current route along the CN Montreal-Toronto main line?

- Would there be enough revenue generated on the HFR route to cross-subsidize service on the existing routes, if they were retained?

- Would the value of the $400 million VIA recently invested to expand capacity on CN's Toronto-Montreal main line to allow for more passenger service be lost?

- Although it wouldn't be part of the HFR route, why did VIA spend roughly $40 million upgrading and then acquiring CP's Smiths Falls-Brockville line?

More needs to be known about the HFR Montreal-Ottawa-Toronto proposal before it can be fairly weighed as part of an analysis of the full range of options applicable to the entire Quebec-Windsor Corridor.

Until such an investigation is performed, HFR remains an untested and unfunded concept.

Rail Passenger Improvement Pre-Requisites

Whether HPR, HSR or HFR, there are three basic requirements before any rail passenger service improvement plan can proceed: policy, partnerships and plans. The most vital is the development and adoption of a federal policy recognizing modern rail passenger service as part of a multi-modal transportation system. It has been the failure of previous governments to adopt such a policy that has led to the conventional VIA service never being properly funded, developed and sustained.

Even in the case of the provincially-proposed Southwestern Ontario HSR project, such a federal policy will be required because it will depend to some degree on federal funding and cooperation. As well, the HSR project would have to be executed with full consideration of the future role of the federally-funded VIA services, from which it would divert a considerable amount of ridership and revenue.

The new federal government's statements about its desire to deal with issues such as climate change, economic stimulus through public investment and the need to better connect Canadian communities could all bode well for the development of the required policy decision.

A substantially improved VIA service could assist in addressing these government priorities, as has been demonstrated in other countries where rail modernization and upgrading has occurred. While there has been no indication the new government has come to this realization, it may be unrealistic to expect such a commitment to rail service this early in its mandate.

Another prerequisite for effective rail passenger investment will be inter-governmental partnerships. HPR, HSR and HFR would all require improvements to the other modes, which would have to work in conjunction with the rail passenger service to deliver the maximum mobility benefits. Responsibility for these other modes – commuter rail, urban transit and intercity bus service – is scattered between the three levels of government. There must be a shared vision and coordinated action by all levels of government to produce a cohesive solution wrapped around any rail passenger improvement plan.

There must also be private sector buy-in. In the case of the existing and future intercity bus services that could boost ridership by acting as integrated feeders to the core rail service, they are regulated by the provinces and delivered on a for-profit basis by private companies. For maximum effectiveness, the bus operators must approve and participate in any rail plan.

Even more necessary is the cooperation of the freight railways, particularly CN. All three passenger improvement concepts will require the expanded use of some railway-owned infrastructure and a less adversarial relationship between the freight and passenger operators than is now the case. The freight railways must be convinced that this will not harm their own services and will be, at the very least, "freight neutral." Even better would be a plan providing both freight and passenger benefits, which has been the case with many U.S. HPR projects.

With all of these conditions met, the next step would be advanced planning. This process is already under way on the Ontario HSR proposal. Given the low level of detail made public by VIA, it is impossible to say how far this process has advanced for the HFR option.

As for HPR, there is no indication anyone is now studying or even considering it for inclusion in the analysis of the range of corridor improvement options. In fact, this has only ever been done once. The result was a 2002 plan known as VIAFast, which covered the full Quebec-Windsor Corridor. That HPR plan was endorsed by the government of Prime Minister Jean Chretien and then rejected by the succeeding government of Prime Minister Paul Martin.

A few of the infrastructure elements of VIAFast were implemented under the $1-billion capital funding package VIA began receiving from the government of Prime Minister Steven Harper in 2007. However, this fell far short of the full VIAFast plan and the various projects exceeded their budgets and schedules, with some ultimately dropped. Had all of the projects in the first phase of the VIA capital investment plan been implemented and the second phase approved, it would have notched VIA closer to providing HPR-style service on all three routes that comprise the Montreal-Ottawa-Toronto triangle.

It is tempting to suggest that VIAFast just be dusted off and resubmitted to Prime Minister Justin Trudeau's government, but many changes have occurred in the past 14 years that would make it difficult to implement it as originally proposed. As a result, a new HPR concept plan would need to be developed, although VIAFast contains some concepts and elements that remain applicable.

Every rail corridor improvement project presents its own set of specific challenges that vary to some degree from all the others; there is no one-size-fits-all blueprint to implement HPR or any other rail service without modification. However, basic patterns and service-proven lessons have emerged from the successful projects undertaken in other countries that could be applied in the development of a Quebec-Windsor Corridor HPR plan.

Also to be factored in would be the unique geographic and demographic characteristics of the corridor, key points from the VIAFast plan, the current state of VIA and the impact of the recent investments made in the existing infrastructure.

On that basis, it is suggested that a Quebec-Windsor Corridor HPR plan could follow the course outlined below.

Getting Started on HPR

Converting VIA's Quebec-Windsor Corridor to HPR would not require starting from scratch, as some route segments already offer service that is near HPR levels. On some portions of the network, the maximum permissible speed is 160 km/hour and other segments could be brought up to that level with relatively small infrastructure investments. Service frequency is high on some route segments, with Toronto-Kingston topping the list with as many as 11 eastbound arrivals and 15 westbound departures on certain days.

On the Montreal-Ottawa route, the frequency will be improved in the near future thanks to a $102-million funding announcement made two days before the Harper government dropped the writ for the 2015 election. This project will result in a slightly reduced running times and an increase from six daily roundtrips to eight.

However, the one aspect of VIA's current operation that will forever prevent it from providing true HPR service is its motive power and rolling stock. VIA operates the oldest frontline fleet in the industrialized world and it is a key factor in its high operating costs. While safe and comfortable, the VIA corridor fleet is inefficient, inflexible and commercially life-expired, with some of the coaches dating back to 1946. VIA spent more than $300 million refurbishing a large percentage of its corridor fleet under the $1-billion capital funding package it received from the Harper government. At best, this was a short-term Band-Aid approach to a serious problem.

VIA has only recently started the process of investigating its fleet renewal options. The current plan, which as yet has no federal funding commitment, wouldn't produce new motive power and rolling stock for seven or more years.

If VIA is to deliver HPR service and reduce its high operating costs, this equipment replacement initiative would need to be accelerated. A new fleet would embody the same service-driven design principles that have produced the equipment now used on several Amtrak corridor routes and soon to be deployed on others. It should be capable of service at up to 200 km/hour, offer maximum per-car passenger capacity and onboard comfort, high levels of reliability and availability, and greater operational flexibility than VIA's conventional fleet.

A major requirement of a new HPR corridor fleet should be its ability to provide bi-directional, push-pull service. One of the main problems affecting the flexibility, utilization and cost-effectiveness of VIA's conventional trainsets is that they can operate in revenue service in one direction only and they must be physically turned around at their terminals. This is a time-consuming process that keeps the trains and crews out of revenue-producing service for long periods and prevents quick turnarounds at end terminals.

The alternative is push-pull operation, which is standard for commuter service and is applied widely by Amtrak. With a locomotive at one end and a fully-equipped control or cab car at the other, a push-pull trainset arriving at its terminal can be ready to head in the opposite direction within the time it takes to disembark and board passengers, and for the locomotive crew to walk to the opposite end of the train.

As well, a decision would need to be made as to whether the new rolling stock would be single-level or bi-level. Bi-level equipment offers reduced costs thanks to its higher capacity. For the HPR upgrading of the corridors where it is not restricted to single-level cars by the dimensions of tunnels, bridges and road overpasses, Amtrak has selected a bi-level design similar to the cars it now employs on three routes in California. This basic design could be adapted and produced in Canada for the Quebec-Windsor Corridor, which has no clearance restrictions necessitating the use of single-level equipment.

LOW-COST, MAKESHIFT PUSH-PULL OPERATION: In the absence of purpose-built HPR equipment, there are short-term methods for converting VIA's uni-directional trainsets to push-pull operation. One is the Amtrak approach (above), which involves converting life-expired locomotives to un-powered cab cars. Another one that has been occasionally employed by VIA (below) simply uses locomotives on both ends of a trainset. Photos by Jamie West (above) and Ray Farand (below)

As for new motive power, the only North American intercity passenger locomotive currently in production is the Siemens Charger, which has been ordered by a coalition of state departments of transportation for use on the Amtrak corridor trains they support financially. It is a high-performance, 4,400-HP unit designed for a maximum speed of 200 km/hour.

To provide a high-frequency HPR service, VIA would require a minimum of 30 four-car bi-level trainsets, plus enough extra equipment to respond to traffic fluctuations on a day-to-day basis. Based on the current U.S. HPR projects, this would require an investment of at least $750 million for rolling stock and $250 million for locomotives.

Until new equipment is acquired, VIA would have to optimize its current fleet to deliver the higher service levels necessary to lay a foundation for intensified HPR operation. The addition of cab cars to VIA's corridor trainsets to convert them to push-pull operation is one example of the type of short-term fleet optimization undertaken by other passenger railways.

More than 20 years ago, Amtrak undertook an in-house project to convert some life-expired locomotives to un-powered cab cars at low cost. A similar program is now under way using retired GO locomotives for use on North Carolina's Piedmont Corridor trains. Compared with VIA's fleet, these homemade push-pull trainsets run more miles and produce more revenue daily, while also reducing operating costs and enabling frequency increases within a limited budget. A similar approach could be undertaken by VIA as a stopgap measure pending the delivery of a new HPR fleet.

An optimized VIA fleet would make it possible to address one of the key aspects of HPR service: improved frequency. While major infrastructure investment will be required before the service frequencies can be raised substantially, small increases should be possible through improved fleet utilization and more efficient use of the existing track capacity. VIA does have the right to add a limited number of frequencies on the three legs of the Montreal-Ottawa-Toronto triangle under agreements already in place with CN.

Building the Market for HPR

With an optimized fleet of conventional equipment and moderately increased frequency, the next step would be the phased introduction of clock-face scheduling, starting with the three routes in the Montreal-Ottawa-Toronto triangle. With trains departing at consistent intervals, this makes it easier for passengers to memorize their schedules because departure times repeat at the same point on the clock throughout the day.

Employed on other HPR operations around the world, this concept spreads demand over the full day by attracting more passengers to the off-peak trips, particularly if they are priced lower than the peak trips. From an operator's perspective, clock-face scheduling makes better use of personnel, the infrastructure and the equipment, which in turn makes operational resource planning easier. It would also create better inter-route connectivity, making it possible for passengers to reliably and easily transfer between trains on the seven-route corridor network.

Coupled with the increased frequencies and the clock-face schedule revision, there would also be expanded marketing efforts to help increase ridership by building public awareness of the pre-HPR improvements and those that would occur throughout its implementation.

Innovative, demand management ticket pricing would also be conducted in the build-up to HPR. VIA has already done much on this front, offering various fare incentives to attract passengers to trains that have unused, revenue-producing capacity that is lost as soon as those train depart. While across-the-board fare reductions would be impossible until costs were substantially cut through the efficiencies provided by the new equipment, as much experimentation as possible with ticket pricing would be encouraged.

There would also be a need for the early development of a closer working relationship with the transit agencies that serve VIA's stations and provide the necessary "first and last mile" component of seamless, car-free journeys. Part of the problem has been VIA's generally low service levels and the feeling that its future is far from secure. If VIA vanished, this would strand any investments transit operators made to better connect with the rail service.

With a strong pro-rail passenger policy statement by the new government and a demonstrable commitment to the VIA HPR plan, that notion would begin to retreat. Even a marginal increase in service in the early stages of the plan would demonstrate that VIA would be an integral and permanent part of Canada's transportation system in the future.

Where necessary, capital investments would be made at stations to enable transit and intercity bus operators to more efficiently use VIA's facilities. In some locations, the connectivity is already high, with the stations VIA shares with GO in the GTHA and agence métropolitaine de transport (AMT) in Montreal being the prime examples. In other locations, connections with other local transit agencies and private bus operators are deficient.

Work to correct this situation throughout the corridor would be undertaken early in the HPR program in close cooperation with the municipalities, their transit agencies, GO and AMT.

HPR Phase I Infrastructure Projects

Several infrastructure improvement projects spread throughout VIA's Quebec-Windsor Corridor would be required to provide HPR levels of speed, frequency and reliability. Many are related to the available capacity of the CN-owned track segments and CN's unwillingness to prioritize its use for VIA in preference to its own freight trains, which is understandable.

There would be two objectives in undertaking VIA-funded infrastructure expansion and upgrading. The first would be minimizing conflicts with CN freight traffic. The other would be to reduce VIA's running times without increasing its maximum speed, which is 160 km/hour on many route segments. Because of safety concerns, CN will not allow passenger operation above this speed. Therefore, the aim would be a reduction in the number of locations where the passenger trains must operate at less than their maximum speed to increase the average end-to-end speeds and reduce the journey times.

To accomplish these twin goals, a series of siding extensions and additions on single-track lines and the addition of several third main line track segments on double-track lines would be required. Some of this work was undertaken as part of the recent VIA capital investment program, but it would need to go much further for HPR service levels.

Extending several main line sidings and adding new ones at strategic locations on single-track line segments would allow for frequency increases, running time reductions and on-time performance improvements on VIA's Quebec-Montreal, Toronto-Sarnia and Toronto-Niagara Falls routes.

At several stations, VIA's trains need to be able to stop without impeding the freight service. On single-track lines, these stops to disembark and board passengers halt the freight traffic flow in both directions. On double-track lines, they often complicate operations due to the lack of station platforms on the far side of the tracks. This requires the passenger trains to cross back and forth to serve these single-platform locations, eating up track capacity. Even where narrow platforms now exist between the two main line tracks and crossover moves are not made, this requires the halting of trains on the other main line track during VIA's station stops for safety reasons.

This situation could be eliminated at Cornwall, Brockville, Brantford and Woodstock – all of them on double-track route segments – by rearranging the two main line tracks, constructing platforms to serve the side of the tracks opposite the station buildings and linking them with fully-accessible under-track passenger tunnels or overhead walkways.

At Kingston, a strategic section of triple-track would need to be built so CN freight traffic may pass when VIA's trains are stopped on both tracks at this twin-platform station. Inserting this triple-track segment would require shifting the south side platform, modifying the under-track passenger access tunnel and replacing the structure that now serves the south track.

A $125-million project that was omitted from VIA's most recent capital investment program would also be included in the first phase of the HPR project. This is at Coteau, Quebec, where the lines from Toronto and Ottawa meet on the approach to Montreal. It is also the site of a busy CN freight yard.

The work involved at Coteau would include reconfiguring CN's yard and the main line tracks, as well as grade separating a highway crossing at the west end of the yard. Without this project, the number of Montreal-Ottawa and Montreal-Toronto frequencies that could be added by VIA would be severely restricted by CN.

Additionally, a program of grade separations and grade crossing improvements would proceed across the corridor. Grade crossings often impose restrictions on passenger trains because of obstructed sight lines that require the trains to reduce speed for safety reasons. By lifting these speed restrictions through a program of grade separations, crossing safety improvements and the closure of lightly-used crossings, time would be wrung out of VIA's schedules progressively. This would also have broad public safety benefits.

HPR PHASE I: Additional sections of triple-track, lengthened sidings, grade separations and more station improvement projects at strategic locations would eliminate chokepoints and speed restrictions throughout the Quebec-Windsor Corridor on a progressive basis. These projects would build on similar ones undertaken on CN route segments under VIA's recent capital investment plan, drawing out the full value of those previous, publicly-funded improvements and lead to full HPR service. Images courtesy of VIA Rail Canada

Based on VIA's recent capital investment program and similar projects in the U.S., the estimated cost of the first phase of the HPR project would bring the infrastructure total to a minimum of $2 billion. The vitally necessary fleet acquisitions would add another $1 billion to the capital budget, not including options for more equipment to accommodate future growth.

Using the U.S. Department of Commerce formula for measuring the impact of rail investment, HPR's first phase would generate a minimum of $9 billion in economic stimulus during its construction phase. There would be additional and continuous economic and environmental benefits throughout the operating life of the assets and the service they would provide.

All of these capital investments and major service improvements could be implemented within five years of the project being approved. The result would be a rail service offering more frequencies on each of the seven corridor routes, lower operating costs, higher ridership and revenue, greater connectivity with other modes of public transportation and no negative impact on current freight operations.

HPR Phase II Infrastructure Projects

Additional projects could form a second wave of HPR investment and service expansion. These would only be undertaken once the expected levels of ridership, revenue and cost recovery were generated by the project's first phase. The second phase would consist of several major projects that would be expected to produce even larger reductions in journey times, more frequency increases and substantial ridership and revenue gains. Some of them would add more dedicated, passenger-only track to the current VIA-owned network.

On the three track segments now owned by VIA (De Beaujeu-Smiths Falls, Smiths Falls-Brockville and Chatham-Windsor), the focus would be on increasing the maximum speed from 160 km/hour to 200 km/hour. This would substantially reduce many of the improved running times made possible by the first wave of HPR investments. For safety reasons, this would require the elimination of all the remaining grade crossings, either through grade separation projects or closure.

Additional projects would add all-new mileage to this 200-km/hour VIA-owned network. One possibility is a sub-project contained in the shelved 2002 VIAFast plan that called for the construction of a new 67-km cutoff between Smiths Falls and Gananoque. The cutoff would be used only by an expanded express service, with a multiple local and semi-express Ottawa-Toronto roundtrips still operated on the current route through Brockville. It would cut up to 15 minutes from VIA's current four-hour express running time on the Ottawa-Toronto route.

Construction of the Gananoque Cutoff would be subject to a full environmental assessment (EA) and it would likely require a minimum of five years for the complete approval and construction process. Based on similar projects that have been studied in the U.S. recently, it would cost approximately $500 million.

An even larger project could consolidate and expand the capacity of the parallel CN and CP Montreal-Toronto main lines from a point just east of Belleville, at Shannonville, to the east side of Newcastle. The result would be a 114-km line segment for passenger service only and an adjacent, freight-only line segment shared by CN and CP; both would be double-tracked.

This project would also allow for the elimination of CP's route along Belleville's waterfront, shifting the CP freight traffic to the CN corridor and eliminating 18 grade crossings within the city limits. With the separation of the passenger and freight traffic, and the elimination of all grade crossings, VIA would be able to operate at 200 km/hour on this route segment, reducing the current Montreal-Toronto and Ottawa-Toronto running times by up to 30 minutes.

This project would cost an estimated $1 billion and an EA would be required. It would be contingent on gaining the approval of CN and CP, which would have no reason to contemplate a project of this nature based purely on their own freight operating needs. However, the fact that both railways would not be required to fund the project and it could improve their freight operations would be among its selling points.

A smaller project that would have an impact on VIA's competitiveness in Southwestern Ontario would be the reconstruction of CN's 18-km Brantford Bypass between Lynden and Paris Junction. The bypass would be used by new, peak-hour express trains on the Toronto-London route. It would also allow for the re-routing of through CN freight trains that aren't required to set off or lift cars at the Brantford Yard, taking them off the existing 27-km line that loops through the city and serves VIA's station. This would free up capacity on the existing line segment for local and semi-express passenger service, which would be expanded to provide Brantford with several more roundtrip frequencies than VIA is currently able to provide.

Because rail service was abandoned on this right-of-way decades ago, reconstructing it would be subject to an EA. It is estimated that the Brantford Bypass project would cost $150 million, which would include the construction of a new, double-track bridge over the Grand River.

A project that would geographically expand the corridor would be an extension of its Toronto-Windsor service by way of CP's Detroit River Tunnel to tap the Southeastern Michigan market. It would also allow for a direct connection with Amtrak's Pontiac-Detroit-Chicago Wolverine Corridor, which is currently being improved to provide HPR service.

The 2002 VIAFast plan included a Detroit extension using a new connection from the current VIA-owned Chatham Subdivision to CP's Windsor Subdivision west of Chatham, with the 72 km of CP track to Windsor upgraded. This would have included a new Windsor station closer to downtown. VIA's trains would have operated through the CP tunnel to the line leading to Amtrak's station in Detroit's Midtown District at Woodward Avenue.

Other suggestions for connecting the VIA and CP lines at points closer to or within Windsor have been examined in other rail studies. Whichever route might be chosen, this project would cost a minimum of $200 million. It would restore an international rail connection that was broken when the joint VIA-Amtrak Toronto-Sarnia-Chicago train was discontinued in 2004.

The HPR Project in Full

The HPR project could result in VIA owning five 200-km/hour track sections totalling 402 km within the Montreal-Ottawa-Toronto triangle. This would allow for dedicated operation with no freight conflicts on nearly half of the trackage required by the three routes that comprise the triangle. Capacity expansion on the remainder of the seven-route corridor system would minimize conflicts, producing reduced running times and higher frequencies with no freight impact.

At a minimum, the completion of these two phases of the HPR project would make possible the following frequencies and end-to-end running times:

ROUTE	DAILY ROUNDTRIPS	FASTEST RUNNING TIME
Quebec-Montreal	10	2:30
Montreal-Ottawa	15	1:45
Montreal-Toronto	15	3:45
Ottawa-Toronto	15	3:15
Toronto-Brantford-London	15	1:45
Toronto-Stratford-London	8	2:15
Toronto-Windsor	8	3:30
Toronto-Detroit	6	3:50
Toronto-Sarnia	5	2:45
Toronto-Niagara Falls	5	1:45

If all of the improvements suggested for the second phase of the HPR project were undertaken, the cost would be about $3 billion and the time required for their concurrent construction and implementation would be an estimated five years. This would be in addition to the cost of the new fleet and the infrastructure upgrading contained in the first phase of the project, which would cost $3 billion and require five years to complete.

In total, this two-phase HPR project would cost $6 billion and require 10 years to implement fully, with numerous service and economic benefits delivered incrementally throughout that period. These benefits would be spread throughout the seven routes in the Quebec-Windsor Corridor. The total economic spin-off would be $18 billion to $24 billion.

Conclusions

There are no easy, quick or inexpensive solutions for bringing improved rail passenger service – or any other form of transportation – to the Quebec-Windsor Corridor. The question is whether rail can supply the answer in preference to major investment in the other modes and, if so, with which approach and technologies. As the congestion, mobility and transportation-produced environmental challenges of this mega-region increase, important policy and spending decisions will need to be made by all stakeholders, public and private.

Based on extensive international experience, it is apparent that the HPR approach can provide numerous benefits that make it worthy of consideration as one of the rail options. Its chief characteristics – incremental applicability, optimization of existing infrastructure, cost-effectiveness and speed of implementation – make it a potentially potent and proven option.

However, whether HPR is the definitive answer is a question that can only be answered through high-level study and analysis by parties who have access to the required, and often confidential, data. As the Government of Ontario examines its own HSR proposal for the Southwestern Ontario market and VIA promotes its HFR concept for the Montreal-Ottawa-Toronto triangle, there needs to be an in-depth examination of HPR as an option for these routes and all the others that comprise the Quebec-Windsor Corridor network.

What should also be considered is the possibility of combining the two rail options now under study with a fully-developed, corridor-wide HPR plan. Could an extensively upgraded Montreal-Ottawa-Smiths Falls route, which forms part of VIA's HFR proposal, and portions of the 200-km/hour Toronto-London-Windsor option now being studied by Ontario be welded into an HPR program that would blanket the entire corridor?

Ultimately, the new federal government will have the largest say in which approach is taken, if any. Once that decision is made, it will reverberate for generations, affecting the future economic, social and environmental prosperity of the Quebec-Windsor Corridor and the nation. That decision would also come with a considerable public investment, even if Ottawa did not assume all the direct costs.

Therefore, it behooves the federal government and all the other affected public and private stakeholders to make an informed and objective decision that will be in the public interest. On the basis of evidence evaluated in the preparation of this discussion paper, it is recommended that HPR receive a comprehensive and objective evaluation.