

To: Mayor and Members of Hamilton City Council
From: Ted Gill, Hamilton ON
Date: March 28, 2014
Subject: Submission on Rapid Transit Planning in Hamilton

Please find attached a submission prepared by me that reviews rapid transit (RT) planning in Hamilton, and requests that Council direct staff to re-evaluate bus rapid transit (BRT) for use as an interim and/or permanent RT technology, in parallel with all existing efforts to obtain funding for light rail transit (LRT), and report back to the appropriate Committee(s) at the earliest opportunity.

Respectfully submitted,

A handwritten signature in black ink that reads "Ted Gill". The signature is written in a cursive, slightly slanted style.

Hamilton ON

Rapid Transit Planning in Hamilton – A Case to Re-evaluate BRT

Make no mistake – Hamilton needs to get on with implementing rapid transit (RT).

A great deal of planning has been undertaken to identify the optimum routes and station locations for RT, and among other challenges, the trade-offs of implementing reserved lanes in the space-constrained areas of our city have been fully explored.

Numerous studies have set out the key factors for growing a successful RT system. A network that is frequent, fast, comfortable and reliable is of paramount importance.

Consider living near a route that can connect you to the downtown, your workplace, or major attractions that has headways of less than ten minutes so that you never need to consult a schedule, runs in dedicated lanes with traffic signal priority, uses modern attractive energy-efficient vehicles, and has an excellent on-time record. Such a service would persuade many folks to reduce their reliance on the private automobile, especially for trip types such as home to work or school, or for social/recreational purposes.

Other key success factors for RT include policies, plans and legislation that encourage transit-oriented development, a growing real estate market, and a demonstrated commitment to implementing a robust transit network, including efficient feeder systems and park-and-ride lots where necessary. I believe that another key factor is the availability of sizeable land parcels or facilitated land assembly at or near station locations.

The City of Hamilton has been clear from the outset that RT is a necessary element in a growing sustainable community. In adopting the recommendations of a staff report dated January 8, 2009 (PW09007), City Council adopted the following vision statement for Rapid Transit:

“Rapid Transit is more than just moving people from place to place. It is about providing a catalyst for the development of high quality, safe, sustainable and affordable transportation options for our citizens, connecting key destination points, stimulating economic development and revitalizing Hamilton. Rapid transit planning strives to improve the quality of life for our community and the surrounding environment as we move Hamilton forward.”

Recall the financial crisis that began in 2008, including the US federal takeover of Freddie Mac and Fannie Mae and the Lehman Brothers bankruptcy in September 2008. These events helped precipitate the global recession that began in the latter part of 2008. Prior to that, the expectation of fulsome transit funding for GTHA communities from senior levels of government was high.

By the time City Council adopted the RT vision statement in January 2009, the City was well along the path toward a focus Light Rail Transit (LRT). A staff report dated May 28,

2008 (PW08043a) resulted in the approval of the recommendation, “that staff be directed to continue the Rapid Transit Feasibility Study (Phase 2) with a focus on Light Rail Transit”. Underlying themes were that transit funding for up to 100% of the capital cost of implementing an RT network could potentially be covered by senior levels of government, and that there was overwhelming public support for an LRT system.

Phrases contained in the body of report PW08043a included:

*“...90% of those that commented noted that they would not use a Bus Rapid Transit System, but would however utilize an LRT system...The belief of the public responding to on-line polls, web blogs and the City’s comment sheet was that a rapid transit system, particularly a LRT system would have positive implications in terms of economics (attracting new businesses and an increase in City revenue), the environment (less congestion and pollution), and the ability to provide the City with a better image (keeping up with other cities, clean, modern, hip and quiet)...Staff consistently heard that the time is now for LRT and that the City must seize the opportunity to move forward and to not miss out on the opportunity at hand to construct a rapid transit system that would compete with other world class cities, all of which have some sort of rail oriented transportation system, particularly with the Province supporting this initiative and proposing funds towards its capital costs...**It is not believed that a bus rapid transit system would have the same potential for economic prosperity of that of a light rail system** (emphasis added) and that a bus rapid system would not move the city forward in terms of meeting the goals and objectives of the policies that are included in GRIDS and the HTMP, as well as overall City visions i.e. the best place to raise a child...Based on the feedback to date, the general public’s belief was that a Light Rail Transit system could potentially breathe life into the economy of the City of Hamilton and that the issue of providing a rapid transit system in Hamilton was not a transit issue, but rather an issue of economic importance, revitalization and image changing...The media coverage of the public events continued to focus on the potential of a LRT system in Hamilton and the strong support for an LRT rapid transit system in Hamilton...There was also a focus on the Economic Summit that was held by the Chamber of Commerce on May 1, 2008, at which the key note speakers also addressed the need for a strong transportation system in Hamilton, and noted the potential impact of an LRT system over that of a BRT system. The potential for economic spin-offs, not only in terms of commercial investment in Hamilton, but in terms of the potential for new manufacturing opportunities given the city’s industrial base has been discussed...As noted above, there is significant public interest in rapid transit and sustainable transportation in Hamilton, with a strong preference for LRT. Continuing to focus on both technologies (BRT and LRT) has potential to delay making recommendations in terms of a workplan for implementation into Metrolinx’s five year capital plan. This alternative is not recommended.”*

So there you have it. In the positive economic climate of early 2008, there was every expectation on the part of most participants that others would pay for the LRT system, and public and special interest group input was very strongly on the side of LRT. As a result, City Council agreed with staff, and BRT was not considered again in subsequent studies.

Let's look more closely at the public input. A Public Survey Summary containing the results of many months of public input was published in October 2008, noting that 1,900 responses had been received via surveys, emails, and letters. Some of the survey questions included:

If you do support a rapid transit system, which mode would you prefer - rapid bus only, light rail only, either one, neither?

If you support LRT, BRT or both, what was your selection based on (check all that apply) - environmental impact, potential to attract new ridership, potential economic benefit, sustainability, operating cost, life-cycle analysis, other, vehicle cost, construction cost?

Would you be in favour of implementing additional rapid transit routes in the future, once the recommended routes are established - yes, no, not sure?

The 1,900 respondents surely represented a broad cross-section of the public, special interest groups, and other engaged and concerned stakeholders. However, the structure of the public survey program was never intended to result in a statistically valid random sample survey, and the responses were influenced by the agendas of respondents, and the available reports and presentations that cast LRT in a positive light relative to BRT.

For example, fairly early on, the preliminary analysis of alternatives set out in the Rapid Transit Feasibility Study (April 14, 2008) compared LRT and BRT for a number of factors on a scale of "most favourable – neutral – least favourable". At that time, LRT was rated "most favourable" for environmental impact, potential to attract new ridership, and potential economic benefit, while BRT was rated "neutral" on those factors. However, LRT was rated "least favourable" for construction cost, vehicle cost, and operating cost, while BRT was rated "most favourable" on those factors. Rankings for sustainability and life cycle analysis were ranked neutral for both LRT and BRT.

Let's compare that to some of the content of the staff report dated October 7, 2008 (PW08043d): *"Research has continuously indicated that operating costs of LRT are significantly lower than that of BRT...The two highest operating costs with BRT being the number of buses in service in addition to the cost of fuel...Less buses along a corridor, due to the higher capacity of LRT, automatically results in cost savings...Although there is potentially significant cost savings between LRT and BRT, all municipalities as part of the GTHA have requested operating costs from Metrolinx in the future for when the corridors identified in the RTP are realized."* The recommendations, adopted by Council, supported the pursuit of LRT only.

Since October 2008, there have been progressively detailed studies undertaken to build the business case for LRT, and to complete environmental assessment and preliminary design work. Some of the studies compared features of LRT and BRT, and other

studies estimated the social, economic, and environmental impact of implementing LRT. Let's look at some of those studies in chronological order.

The HAMILTON RAPID TRANSIT INITIATIVE: ECONOMIC POTENTIAL STUDY (IBI Group, March 2009) found that:

*“Light Rail Transit will require a greater capital investment than Bus Rapid Transit but will provide greater long term benefits to the City. Due to more costly vehicles and the need for rail infrastructure, Light Rail has greater up-front capital costs than Bus Rapid Transit (BRT). During the initial years of service, LRT is also projected to be more expensive to operate than BRT, about 30% more on a cost per passenger basis, but the difference will diminish over time as ridership levels increase. However, **it is generally accepted that LRT has a greater impact on investment decisions and economic growth than BRT** (emphasis added), and the long term capacity of LRT is greater.”*

The Hamilton Rapid Transit Preliminary Design and Feasibility Study, B-LINE ENVIRONMENTAL PROJECT REPORT v1.0 October 2011, noted that:

*“In November 2007 the City of Hamilton initiated a Rapid Transit Feasibility Study (RTFS) to review the constraints and opportunities for the development of either a BRT or LRT higher order transit system, along the A-Line and B-Line corridors. The Rapid Transit Feasibility Study, Phase 1 investigated the major considerations in route selection including such things as land use, existing transit service, rights of way (widths, users, infrastructure [surface and subsurface], construction impacts), timing, signal priority, dedicated lanes, as well as an analysis of the feasibility and requirements for the implementation of a rapid transit system to assist in the determination of the type of technology, LRT or BRT that should ultimately be implemented. However, **LRT was determined to generate the highest user benefits** (emphasis added).*

Based on the need to further investigate opportunities to address the constraints identified as part of Phase 1, Phase 2 of the Rapid Transit Feasibility Study primarily focused on the B-Line corridor given its higher priority in The Big Move and looked at means by which to address the constraints identified as part of Phase 1, with a focus strictly on LRT. The decision to focus on LRT was a result of overwhelming support for LRT identified during an aggressive public consultation component and was supported unanimously by City Council.

Following the release of the Regional Transportation Plan, the City initiated Phase 3 of its Rapid Transit Feasibility Study in order to prepare for the benefits case analysis that was required to be undertaken by Metrolinx. Phase 3 focused strictly on LRT along the B-Line corridor ...”

Clearly, one of the key attractions was the belief that LRT would generate more economic benefit than BRT, in addition to more positive environmental impacts (in particular, fuel use) and the potential to attract new ridership.

Although BRT was ruled out in 2008, I believe that BRT is a viable option for Hamilton and should be re-evaluated as an interim and/or permanent technology for RT. When the decision to pursue only LRT was made, it may well have been the right decision for the times, but the economic, political, and technical climates have changed since 2008. In addition, the notion that LRT would be clearly superior in terms of economic benefits is a notion that should be challenged.

Various reports from 2008 contain phrases like, *“It is not believed that a bus rapid transit system would have the same potential for economic prosperity of that of a light rail system”* and *“it is generally accepted that LRT has a greater impact on investment decisions and economic growth than BRT”*, that I have referenced with added emphasis earlier in this submission. However, two studies published in 2012 help to shed some light on the topic.

The study, Light Rail Transit in Hamilton: Health, Environmental and Economic Impact Analysis, Center for Engineering and Public Policy, McMaster University (April 2012) noted that: *“Fixed track systems such as light rail have the largest benefit, especially over bus rapid transit, because they typically do not travel in traffic and operate similar to heavy rail at road crossings (Cervero and Duncan 2002)”*. In other words, the operating models for light rail vs. bus rapid transit are assumed to be different.

Another study, The North American Light Rail Experience, McMaster Institute for Transportation and Logistics (April 2012) noted that: *“Transit-oriented development (TOD) relies on the notion that people value living in areas with access to rapid transit, which makes the redevelopment of properties around station-areas much more likely. Heavy rail is thought to provide the largest capitalization of accessibility benefits into property values followed by commuter rail. Light rail is third, and other technologies such as bus-based systems and streetcars are **thought to** (emphasis added) provide less of a benefit than LRT. But despite even the best transit and TOD intentions, property values will not rise if the market does not value access to transit. For TOD in general, research has shown that land value increases require proactive planning, network development, and transit system maturation. Another disappointment with the Buffalo system has been its inability to drive any sort of development or redevelopment along its alignment and revitalize declining neighbourhoods. The property value impact of LRT was also found to be negligible, with small increases in some station areas and a negative influence in others. The Buffalo example suggests strongly that a healthy local real estate market and existing and future demand for new development, irrespective of transit service, are necessary prerequisites for the success of TOD along any rapid transit line. LRT itself should be understood as a tool to guide development more so than one that generates development in and of itself, and likewise TOD is not a product of transit alone, but the interaction between a complex set of local factors. Apart from making travel by private automobile less attractive, a comprehensive array of planning incentives will likely be necessary to induce new investment along the route”*. In other words, the technology is but one of many factors influencing the success of rapid transit, and LRT will not guarantee success, in and of itself.

I strongly believe that LRT may not necessarily result in greater economic benefit than BRT in Hamilton, all other things being equal...station locations, dedicated lanes, traffic signal priority for RT vehicles, high-quality urban design and streetscaping, modern efficient vehicles, and a proof-of-payment fare system. Furthermore, it would be possible to implement a BRT system that could be converted to LRT in future, if conditions warrant, as is happening in York Region's new VIVA system.



Rendering of VIVA from vivanext website

It would be very instructive for the City to undertake a comprehensive review and to convene an expert panel or focus group to address the potential attractiveness of LRT or BRT for investment and development, with representation from the Hamilton area real estate and development communities. The station locations for the B-line are essentially givens, as shown in the graphic below, and station locations for the A-line would have similar spacing, and would include key destinations such as the waterfront, GO Stations, St. Joseph's Hospital, Mohawk College, and intersecting bus routes.



B-line Station Locations

If Hamilton built an LRT system, except that the vehicles were initially BRT vehicles without the need for rails and electrical supply infrastructure, it is probable that the economic benefits would be similar, but cost and operating flexibility would be more favourable. The experience in York Region is that high-quality BRT infrastructure and stations are substantial, permanent, and supportive of higher density land use.



Warden BRT Station



Hwy 7 at Town Centre Blvd

Another important factor in previous decisions has been the environmental benefit of electric propulsion for LRT, versus the most common energy source for BRT – fossil fuels.

A report from Yale (e360 digest, May 12, 2011), reported that: *“More than 50 percent of the 64,000 new transit buses expected to arrive on roadways worldwide by 2015 will be fueled by alternative sources of energy, compared with 28 percent of new bus deliveries in 2010, according to a report by U.S.-based Pike Research. The most significant growth will occur in North America and Asia, where more than 60 percent of all new buses will be powered with alternative fuels within five years. “Of the various options available for making mass transit cleaner, buses are the easiest to implement because changes can be completed without significant new or upgraded infrastructure,” said Dave Hurst, a senior analyst at Pike. According to the report, hybrid electric buses will have the smallest impact on infrastructure since they usually use diesel fuel; while natural gas buses are less expensive, they require fueling stations. While the number of hydrogen fuel cell buses will continue to increase, their growth will be small compared with other alternative fuels because they require hydrogen refueling points”.*

New Flyer Industries, a major bus manufacturer in Winnipeg, sells diesel-electric hybrids that are 20-50% more fuel-efficient than diesel alone, and a hydrogen cell option is offered, with a 450 km range between refuelings (www.newflyer.com). In 1998, Ballard joined forces with New Flyer Industries to produce a full-sized, 12-metre electric bus powered by a hydrogen fuel cell. Between 1999 and 2001, transit operators ran six of these buses in Vancouver, British Columbia, and in Chicago, Illinois. Information and experience gained during the project has helped Ballard develop the next-generation engine, which weighs 50 percent less than the previous generation. (Natural Resources Canada website – Alternative Fuels – Fuel Cells and Hydrogen).

Electric battery-powered buses operate in a number of jurisdictions, and although operating range is limited, quick-charge technology and swappable battery packs are possible, although there would be costs for the infrastructure, and time would be required for charging or battery swaps. Montreal and Nova Bus (Volvo Group) recently announced a demonstration project of three electric buses and two charging stations to be implemented in 2015 (cbcnews.ca).

Bi-articulated buses fueled by 100% bio-diesel, with passenger capacities of up to 180 persons, have been introduced in Curitiba, Brazil. In Hamilton's colder climate, heating of the entire biodiesel fuel delivery system would most likely be required.



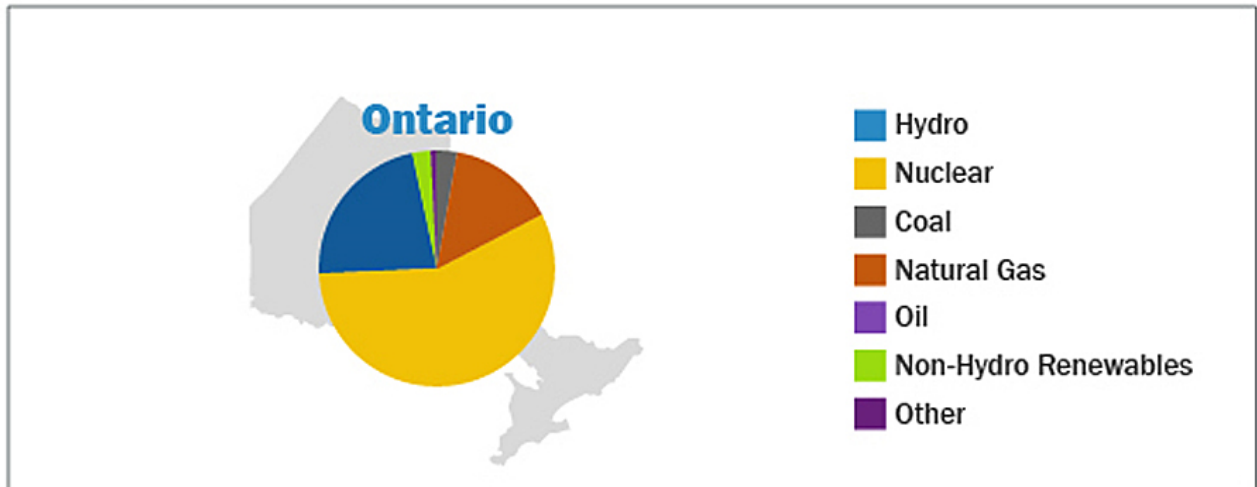
This Picture Source - Wikipedia

To be clear - BRT vehicle technology is evolving!

A Hamilton-centred system of solar and wind powered generation of electricity to recharge batteries or to generate hydrogen to fuel BRT vehicles is not out of the question in the medium to longer term. Also, consider that BIOX Corporation operates a 67 million litre per annum biodiesel plant right here in Hamilton. Such resources could also be used for other Hamilton fleet, to reduce reliance on non-renewable fuel sources.

Electrical generation in Ontario is not nearly as “green” as in Manitoba or Quebec, where almost all electricity is hydro-electric generation. In Ontario, notwithstanding good efforts to eliminate coal-powered plants and grow solar and wind generation, a substantial component of generation uses non-renewable resources. Systems like LRT, powered from the grid, effectively use the same electricity generation mix.

Electricity Generation Mix



2011 Generation Mix, Ministry of Energy website

The technology for self-driving vehicles is advancing quickly, and automated vehicle guidance systems could reduce the space needed for BRT vehicles within reserved lanes and at stations to similar clearances as those necessary for LRT.

There are many other benefits in considering BRT as the initial phase of a Hamilton RT system:

- No immediate need for electrical sub-stations, catenary wires and supports, or pantographs on vehicles
- No immediate need to remove, repair, or replace all underground infrastructure located 1.5m-3m below and beside LRT rails prior to implementation
- The ability to provide more frequent service in early phases, because of smaller vehicle capacities. LRT vehicles are projected to be 32m long, with a capacity of 178 passengers (50 seated and 128 standing) (B-line LRT Environmental Project Report), whereas buses range from single units to articulated vehicles. The new TTC articulated buses have a passenger capacity of 77, and the Nova articulated bus being introduced in the Outaouais Region has a stated (likely “crush”) capacity of 115 passengers. Hamilton staff report PW13014 dated February 25, 2013, noted that, *“There may be a need for some reduction in service frequency to fully utilize the available train capacity”* for an LRT B-line route.

- Potential to proceed with the A-line concurrently with the B-line, to serve the new developments on the waterfront, at Fennell/West 5th, and elsewhere along the route
- No immediate need to build rail connections to a maintenance facility on Wentworth Street North (that used to be an HSR bus facility), or to a potential alternate site in the Tiffany Block (between Barton and Stuart, west of Bay)
- Ability to use James Mountain Road (the recommended route, with a grade of approximately 10.7%) instead of a new tunnel or less desirable routes such as the Claremont Access. LRT maximum grade - 5% sustained, 6% for 250m (B-line LRT Environmental Project Report)
- Ability to temporarily divert routes, such as on James Street North for Supercrawl, or for road or utility replacement and maintenance.

In summary, a re-evaluation of BRT as an interim and/or permanent RT technology should occur, in parallel with all existing efforts to secure funding for LRT in Hamilton. The investigation of BRT should look closely at the economic, environmental, and social benefits and costs relative to LRT in the context of the current economic, political, and technical climates. Should BRT be shown to be the preferred technology, Council can determine appropriate next steps in securing funding, ideally without going back to square one in the process.

Therefore, I request that Council direct staff to re-evaluate bus rapid transit (BRT) for use as an interim and/or permanent rapid transit (RT) technology, in parallel with all existing efforts to obtain funding for light rail transit (LRT), and to report back to the appropriate Committee(s) at the earliest opportunity.

Should Committee wish to have me appear as a delegation to discuss this submission, notwithstanding that it is a standalone submission, I would be pleased to do so.

Respectfully submitted,



Ted Gill is a professional engineer (P. Eng.) and professional planner (MCIP, RPP). He was a senior transportation professional with the Region of Hamilton-Wentworth until December 2000, and has been providing transportation planning and engineering consultant services since. He has been involved in the preparation of a number of Transportation Master Plans, including Hamilton, Winnipeg, and Woodstock, and worked on the Hamilton Rapid Transit Feasibility Studies as a member of the MRC consultant team. He served as a Council-appointed member of the Board of the Hamilton Waterfront Trust for 10 years, and has lived in the Kirkendall South Neighbourhood in Hamilton for 33 years.