

1. The Rapid Ready report, amongst other things identified several conditions that have to exist for Hamilton to optimize its potential for a successful implementation of LRT. Can you identify the top areas where Hamilton is in good shape to support a LRT implementation and the top areas which should cause concern? What are we doing well, and what must we absolutely get right in order to succeed with LRT?

There are several things that a city like Hamilton can do to ensure they achieve the greatest possible return on investment for new rapid transit infrastructure. Back in 2011 we at MITL outlined some general lessons learned from experiences with LRT in 30 other cities across North America. Some later research also noted that there are important prerequisites for promoting land use development or change around rapid transit stations.

At the same time, the city's first attempt at planning for LRT was in full swing, and I was critical of the ability of this plan to achieve its goals. Crucially, LRT 1.0 called for running LRT on the side of the street (to maintain high-speed one-way car traffic with the very high potential for collisions as vehicles could cross the tracks at many locations) and a lack of any zoning changes along the corridor to promote TOD.

However, Hamilton's current rapid transit plans have significantly improved. Compared to version 1.0, the current 2.0 plans for LRT unveiled this past month adopt a 'transit-first' mentality. The key improvements to me include running transit in a centre median with associated two-way street conversions and, critically, the significant changes to zoning along the corridor that have recently been unveiled. The city is also experiencing a period of impressive growth, investment, and reinvestment, and the LRT project can complement that growth and help funnel it to the transit corridor.

That said, there is still more to do. The city's LRT plans are only one small part of a larger effort that must be undertaken to support rapid transit. The city's rapid ready report from 2013 was a major step in the right direction, as it states that three 'Rapid Ready Essentials' are necessary to support LRT:

1. *Improving Transit*: "Structuring the transit network around rapid transit corridors, increasing transit service, and improving the customer experience are essential to build ridership in anticipation of rapid transit and to position transit as a competitive mobility choice."
2. *Supportive Community Planning*: Promoting transit-supportive land use through changes to the city's zoning by-laws. This includes promoting higher-density, mixed-use, amenity-rich, and pedestrian-friendly development in identified transit nodes and corridors
3. *Multi-Modal Integration*: "Rapid transit will serve as the main transit spines in the city; however, it is just one aspect of expanded mobility choice. Integrating more travel options will maximize the impact of rapid transit and make it easier to get around the city." This means increasing mobility options and promoting a shift of travel from car to

transit and other modes. This includes improving the pedestrian environment, promoting cycling, and increasing transit options.

As noted above, major progress is being made on community planning to ensure that this city grows in a way to support rapid transit in line with the requirements of the Province's Growth Plan for the Greater Golden Horseshoe. Achieving the goals set out for improving transit and multi-modal integration will take more work. As for the latter, I look forward to the city's upcoming transportation master plan to outline how we will achieve greater multi-modality.

Regarding the former, implementing the City's 10-year transit strategy must take priority. However, this does not mean that 'we're not ready for LRT', and thus we shouldn't pursue it. Ridership along the B-Line corridor is already very high. On top of that, the Province of Ontario funded the A- and B-Line LRT project in 2015, and its scheduled opening day is sometime in 2024. This is nearly 10 years, which happens to line up nicely with our 10-year transit strategy for city-wide transit improvements.

In that sense, it is a shame that more than a year has been wasted already. The way I see it, this city has received a billion-dollar carrot, now it is up to us to use this incentive as a catalyst to close the gap. The cost of the strategy is a fraction of that for rapid transit. Whether funding it means changes to area-rating or dedicating more gas tax dollars to transit is another issue, but it seems like a discussion that will have to be had sooner rather than later.

2. What is the relationship between Land Value Uplift (LVU) and LRT? Does LRT bring an immediate benefit in terms of LVU and if so, how can that be quantized/projected? If not, at what stage would LVU materialize and peak, and what indicators would you look for that would set the stage en route on that incline?

One of the main contributions of my Ph.D. thesis is that LVU is difficult to predict as there are so many moving parts. However, the theory of how rapid transit increases land values is clear. Like subways or bus-rapid transit, LRT can generate LVU for properties around stations in two ways:

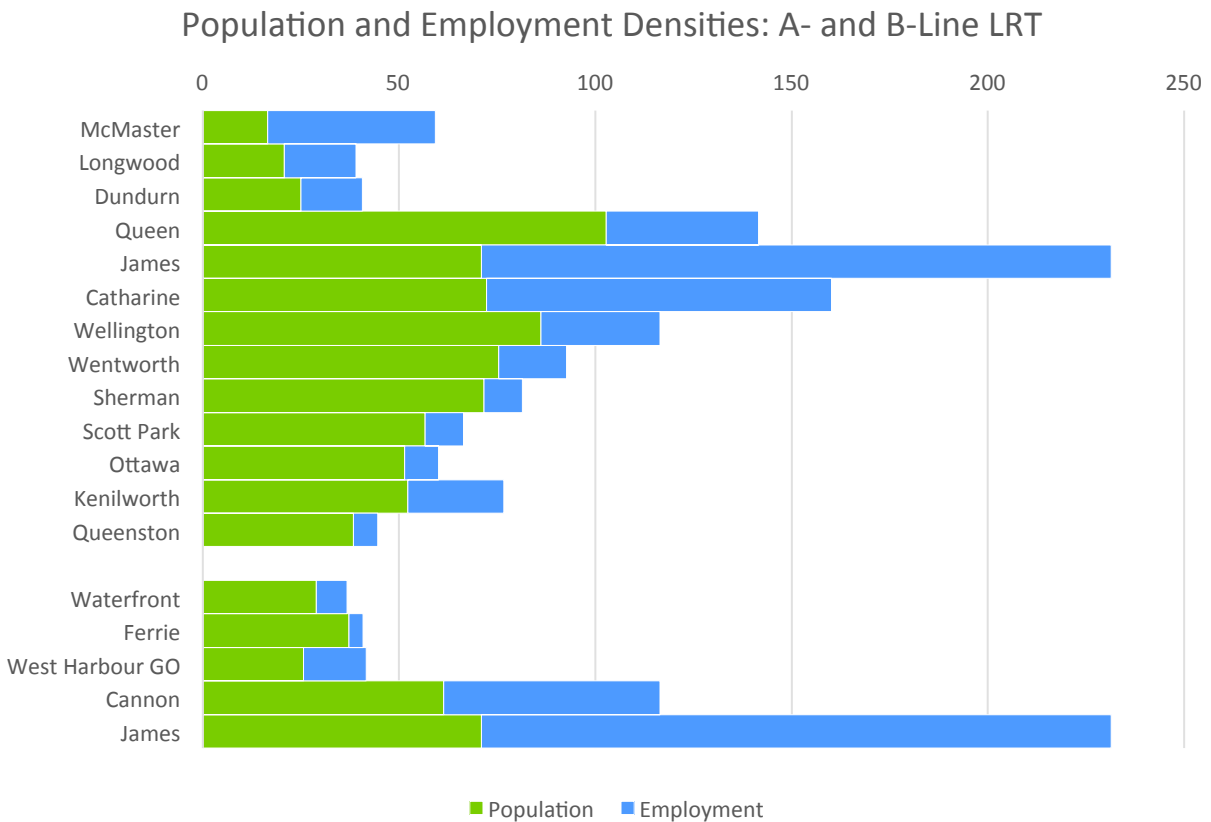
Accessibility: The first is by offering increases in relative accessibility. This means providing a modal option that offers competitive travel in terms of cost and travel time (plus other factors like comfort and reliability) relative to other modes (primarily the private automobile). For example, a dedicated right-of-way with traffic signal priority can help ensure LRT is fast and reliable, while factors like traffic congestion and the cost and availability of parking can shift trips to transit. This relative accessibility offers a 'locational advantage' for properties around transit and is a natural incentive for higher-density development.

Transit-oriented Development: The second is through transit-oriented development (TOD). This refers to a built form that is higher-density, features mixed land uses, is amenity-rich in terms of goods and services, and is pedestrian-friendly (through the use of Complete Streets features). Studies have shown that this type of development is particularly valued by certain segments of the population, namely young professionals

and empty-nesters looking to downsize and reduce their vehicle dependency into retirement. TOD is promoted through zoning.

From this, a light rail project like Hamilton’s that is designed to offer high levels of transit access and promotes TOD through changes to land use zoning in the LRT corridor has laid the framework to achieve LVU. As in other cities, I would expect this process of value uplift may have already begun as people speculate about the LRT and it should only increase as the system matures and the city grow around transit.

There are other factors to consider as well. Traffic congestion and reduced parking availability stand to increase the accessibility and LVU benefits of rapid transit (see question 3). In terms of TOD conditions, some of my previous research has shown that the corridor’s existing built environment is already transit-supportive with an average density of 84 people and jobs per hectare. This is among the highest-density transit corridors in the region – higher than many other LRT and even subway projects in the region.



Mass transit requires *mass* to be successful. Above you can see the distribution of people and jobs per hectare in each station area, and the A- and B-Lines have an average density of 84. With a total of 96,000 people and 51,000 jobs within walking distance of a station (using census data from 2011), the A- and B-Line plan serves the most transit-supportive corridor in

Hamilton.¹ To me this means the corridor has good TOD 'bones', and the LRT project can activate this built form to produce LVU over time.

I should clarify though that when the Mayor and others talk about 'economic uplift' from LRT, they are speaking of two things. The first is LVU – increases in the value of land and higher-intensity development around rapid transit stations that decreases the tax burden on other areas of the city.

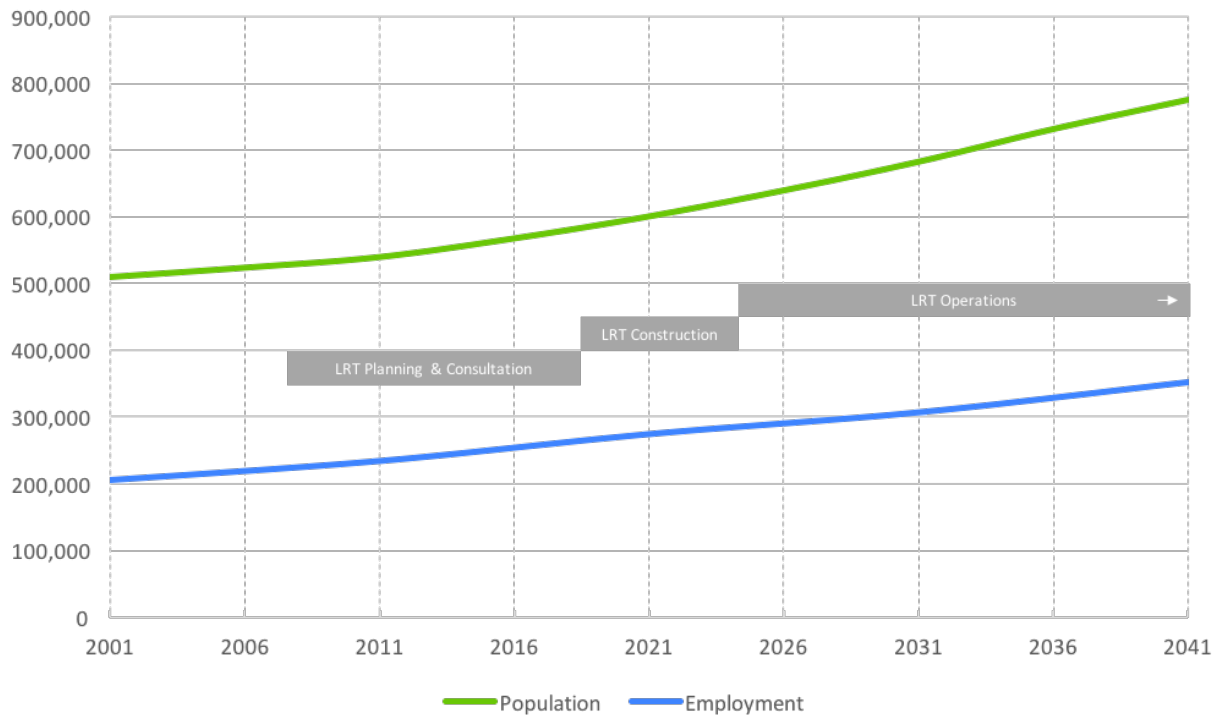
The second uplift is from is an overall direct and indirect boost to the economy. This comes from the direct injection of 1 billion dollars to support construction and other jobs in the city over the short term. Economic uplift also occurs indirectly through economic development in the years and decades ahead. A city that lays the framework to foster and attract new businesses and jobs in the post-industrial economy. Rapid transit in and of itself cannot not cause this growth to occur, but it can certainly play a very large part in an overall package of elements that makes cities like Hamilton attractive to young professionals, entrepreneurs, or businesses that are increasingly looking to high-density and amenity-rich downtown areas to work and live.

3. Do you think Hamilton's degree of traffic congestion is sufficiently dire to drive out more transit use?

There are three dimensions to this issue in my mind. The first is that the reason traffic moves fairly well throughout the day in Hamilton, at present, is its network of large one-way streets and timed signals. From a traffic engineering or mathematical perspective, this design maximizes the throughput of these streets, allowing large numbers of vehicles to traverse the city relatively free of delay. However, research led by a colleague of mine concluded that this emphasis on throughput also comes at a cost, namely a compromised pedestrian environment and suppressed economic vitality. This is not to say cars should be banished from the lower city, only that a balance needs to be struck between competing demands on our public space.

Second, it's not a matter of *if* the corridor will be congested, but *when*. We are already seeing some congestion during peak periods for east-west travel in the lower city, even with its current road design. This congestion will only get worse as this city adds more than 200,000 people and 100,000 jobs over the next 25 years, well on its way to a population of 1 million. Put another way, this is like adding Kitchener on top of Hamilton.

City of Hamilton Population and Employment Projections



The challenge then becomes accommodating this new growth on top of the delays we are already seeing. Traditionally this growth would have been in auto-dependent suburbs near the Greenbelt whose residents then fill up the Linc, Red Hill, and 403. In response, we could expand our highways even further, but it has been proven time and time again that adding capacity doesn't result in less congestion – just more drivers.

However, under the Province's Growth Plan for the Greater Golden Horseshoe, much of that growth will be within the existing built-up area, funneled to key nodes and corridors. How to manage all this new corridor traffic? Downtown roads could be widened even further, but if you think the slivers of land slated for expropriation to accommodate LRT are bad, how much more land would be required to widen Main or King Streets, particularly at the international village bottleneck?

Traffic models show that traffic congestion in this city will increase - with or without LRT. The trick then is how to best manage it. Given that traffic congestion can't be moderated by adding road capacity for more *vehicles*, LRT is a smart tool that allows us to increase the capacity of the corridor to move more *people*.

The third issue is parking. This city has dedicated ¼ of its downtown land to the storage of private automobiles. While often overlooked, this is a key element that makes travel by car cheap and easy in this city. However, parking is not the most productive use of land, especially

land in the downtown core. New zoning rules will make this land easier and more profitable to develop, improving the economic vibrancy of downtown and increasing commercial and residential tax revenue for the city, but decreasing available parking spots and increasing the cost of spots that remain as demand increases.



Taken together, finding a better balance between automobile traffic and other uses can help the vitality of our neighbourhoods and downtown. Vibrant streets like Yonge or Queen and King in Toronto or even our own James street do not feature skinny sidewalks inches from multiple lanes of high-speed one-way traffic. One cannot lament the challenges facing the downtown core and east- and west-end lower city while simultaneously seeking to maintain this status quo.

On top of that, more congestion and less parking thanks to population and employment growth will result in increased transit use among drivers over the coming years. Just think of Toronto – if you want to go see a Blue Jays game, you accept that the 403 will be congested and stressful and that parking downtown will be expensive, so many will choose to take the GO train. Not everyone has to take transit, but if the GO train didn't exist, all of that traffic would be right beside you on the 403 and fighting you for a spot in the city.

Hamilton has the unique opportunity of implementing a fully-funded LRT *before* the city is mired in gridlock – an opportunity many cities could only dream of.

4. Those who may not have the expertise or understanding of how transit systems work, may be wondering if it would not be less disruptive and more cost efficient and more flexible to work with Bus Rapid Transit rather than LRT. Can you help us understand whether there is any truth to that?

I am encouraged to see support for rapid transit in Hamilton, whether it is LRT or BRT. However, assertions that the two options are radically different from one another are not accurate. The B-Line as we know it today is not BRT, it is an express bus, and it is 'express' because it skips some stops. In contrast, BRT – like LRT – is designed to run in a separate right-of-way with full stations at similar spacing and signal priority at intersections. These features are what enable the 'Rapid' in Bus Rapid Transit, just like LRT. And like LRT, investments in BRT work best when the same supportive plans and policies are in place. So aside from trains on tracks or buses on concrete or pavement the two modal options are fairly similar in terms of operation and potential construction disruption.² No matter which is chosen, there is still \$80 million worth of underground infrastructure that will need to be replaced over the coming years, and the funded LRT project covers that cost.



LRT in Houston, Texas



BRT in Nantes, France

However, there are some other important differences between the two modes that should be considered. Below is a nice summary table from Vukan Vuchic, who has been doing this a lot longer than I have:

Mode characteristic	Bus transit system BTS	Bus rapid transit BRT	Light rail transit LRT	Superior mode
Investment cost	Medium	High	Very high	BTS
Implementation Complexity and time	Short	Medium	Long	BTS
Operating cost	Lower for low passenger volumes	Lower for low passenger volumes	Lower for high passenger volumes	Depends
Operating speed	Medium	High	High	Depends
Ability to accommodate service options	Low	Some with four-lane stops	Low except with four-track stops	BRT
Capacity	Low	Medium	High	LRT
Type of energy and traction	Internal comb. engine	Internal comb. engine	Electric	LRT
Vehicle performance	Good	Good	Excellent	LRT
Air pollution and noise	Poor	Poor	No local pollution, low noise	LRT
System image and passenger attraction	Fair	Good	Excellent	LRT
Potential to influence land development	Limited	Fair	Very good	LRT
Contribution to livable urban environment	Some	Limited	Excellent	LRT

You'll notice that LRT comes out ahead in many ways. While it has a larger up-front cost and is more complex to implement, it offers superior performance to BRT across a number of important indicators.

The only real toss-ups are on capital and operating costs and service options.³ The major reason cities typically pursue BRT is savings on short-term capital costs at the expense of long-term operating costs. In Hamilton's case, the larger capital costs of LRT are being funded 100% from the Province's *Move Ontario Forward* plan. On the operations front, it costs the same amount of driver salary to operate an empty vehicle - bus or train. However, the higher capacity of a train means this cost can be spread over more riders. One topic not mentioned above is maintenance costs, and again Light Rail Vehicles have an advantage over buses in that less wear and tear from tracked operation means they last significantly longer.

Taken together, LRT as a technology offers very high quality ride performance, a superior image that has a track record of attracting more by-choice riders, better long-term cost performance, and characteristics that contribute to a more transit-oriented and livable urban corridor.⁴ And the city, Metrolinx, and Government of Ontario know this – don't forget that we compared LRT and BRT for Hamilton in 2010 and found that despite the higher capital cost, LRT was the best investment.

5. What do you say to those who may argue that LRT is not enough to convince them to leave their vehicles at home?

LRT does not require anyone to give up their car, it simply provides another option for travel in Hamilton - one that many individuals will benefit from directly and indirectly. A family may find for example that improved transit allows them to get by just fine with 1 car instead of 2 or 3, which adds up to a significant direct cost savings.

Indirectly, this city is and will continue to grow and change. Above I noted that we will see new population and employment growth, added density, increased traffic congestion, and removed parking, all of which will influence transit use. One thing I have not yet mentioned is changing mobility throughout a person's life cycle. People cannot rely on their cars to get them around forever, and transit access is a key component in the quality of life of many seniors. Taken together, you, your family, or your neighbour's family may one day find that rapid transit fits your needs and will be glad you have the option.

6. Is there anything you'd like to add?

While there has been some passionate debate in this city over the past few months, remember that rapid transit is just a tool for a job, and it is in my opinion an important one for Hamilton's future. There are outstanding questions on the nitty-gritty details, but at this early stage of the game there *should* be, and like me you should have no reason not to believe that answers are coming as the project progresses. Nevertheless, the conditions are ripe: the city is growing and revitalizing, new zoning rules have been proposed to support rapid transit, and increasing congestion means we will need rapid transit to move more people in the near future.

We should also rationalize the debate to start with some common realities about how and where this city is growing, and the economics of higher-density intensification versus low-density sprawl. LRT is a key part of a smart long-term strategy for managing growth in this city - infrastructure to grow around over the coming decades - not to mention elements like economic uplift that I touched on here, plus other things like reductions in air pollution and healthier neighbourhoods that I have not covered.

On top of that, discussions of BRT versus LRT need to take the specifics of each mode into account. They are simply not that different. With that in mind, supporting more express bus service should not be equated with supporting rapid transit. Likewise, other options will continue to be limited by road capacity. Whether or not a car is electric, driven by someone else, or driver-less - there is only so much space.

People in this community should be suspicious of the intentions of anyone ignoring these facts as it emphasizes short-term views and politics over responsibly planning for the longer-term future of your city and does a disservice to you as a taxpayer. There is nothing inherently wrong with being anti-LRT, but the onus is on these groups to provide an alternative. To put it more bluntly, the challenges this city faces over the coming years require more constructive thought and articulation than just 'NO'. And beyond taking the above into account, any alternative must also acknowledge the opportunity costs involved in losing all the work, engagement, political

capital, and momentum from unanimous and near-unanimous votes required to bring the present plan to fruition over the past 10 years.

Finally, I would encourage people to refocus on the bigger picture. In many ways this lively debate has taken our eyes off the ball. The A- and B-Line LRT is a *long-term* project, the cornerstone of the city's growth plans and the start of the BLAST rapid transit network that will span the city. The most important *short-term* issue is not BRT versus LRT, two-thirds majorities, or referendums - it is council working together to implement the 10-year transit plan to expand transit service throughout Hamilton in the critical window prior to LRT and working on securing local, federal, and provincial funding for the first extensions.

NOTES

1. For comparison, the average density of the B-Line phase 2 to Eastgate square is 46 people and jobs per hectare, and the A-Line from downtown to the airport is 36.
2. Compared to LRT, the right-of-way for BRT is wider than that for LRT as it has to allow for more lateral movement of the bus.
3. Service options basically means the ability to accommodate express services that skip stops and requires 4 lanes or 4 tracks like express trains on the New York City subway – not something Hamilton could fit in the corridor or that it needs.
4. Regarding electric propulsion for BRT, one could employ the electric trolley buses or the hybrid buses we currently use, but the weight, range, cost, and capacity constraints of today's full battery-electric buses make them ill-suited for rapid transit.