Can We Give Up Vehicle Lanes in Downtown Ottawa?

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ABSTRACT

The paper examines the feasibility of reallocating roadway space from vehicular use to other uses in the Ottawa downtown area with the purpose of achieving long term land use, transportation, and urban design objectives. The analysis is based on a review of historic travel trends to Ottawa's downtown area and anticipated future changes in travel behaviour.

The analysis of trends concludes that over the past 20 years, there had been a gradual decline in the number of vehicles travelling to and from downtown, while the number of people travelling downtown had steadily increased. This healthy trend is at least partly the result of past policies related to land use, infrastructure development priorities, and parking policies. If the trend continues, it will support future reallocation of roadway space to streetscaping, walking and cycling facilities, or a combination of these.

The paper concludes that the gradual reallocation of some roadway space from vehicle travel to other uses is not only possible but is also required to achieve the Transportation Master Plan and Official Plan objectives related to sustainability, quality of life, and mobility. The opening of the Light Rail Transit Line will serve as a catalyst for transforming downtown Ottawa; improved access to and from transit stations and other downtown destinations by walking and cycling are essential ingredients for a successful LRT system.

BACKGROUND

The implementation of the 12.5 km Confederation Light Rail Transit line from Tunney's Pasture Station to Blair Station (City of Ottawa, 2016)[i] will more than double the capacity of the existing Bus Rapid Transit system through downtown Ottawa, which was reached about 15 years ago. The increased person carrying capacity of transit to and from downtown is expected to significantly increase transit ridership and will create a unique opportunity to reallocate roadway space from vehicle movement to other uses, such as walking, cycling, landscaping, street furniture, or a combination of the above.

Over the years, there were a number of studies and visioning exercises that looked at the potential of reconfiguring downtown streets facilitated by the opening of the underground LRT line. The City's Downtown Moves Study (City of Ottawa, 2013)[ii] developed a vision for creating a people-oriented environment with a network of high quality public spaces. It envisioned repurposing the freed up bus lanes on Albert and Slater Streets to create a pedestrian and cycling friendly environment, and also identified opportunities for improved pedestrian/cycling connections on other roads throughout the downtown.

Figure 1: Study Area

The reconstruction of Rideau Street based on the Community Design Plan (City of Ottawa, 2015a)[iii] has already reallocated some roadway space from vehicles to pedestrians to enhance the pedestrian environment. Other ongoing initiatives, such as the O'Connor Street Bikeway (City of Ottawa, 2016b)[iv] project, the upcoming reconstruction of Elgin Street, and the reconfiguration of Albert Street, Slater Street, and parts of Scott Street after the implementation of the LRT will also require the reallocation of roadway space. Most of the above studies and projects recognised the implications on vehicular capacity, but focused on localised issues.

ANALYSIS & FINDINGS

Given the need for a more holistic review of lane reallocation impacts within a broader area, a study was undertaken to examine the feasibility of pursuing the vision for downtown Ottawa from a transportation capacity perspective. First, it examines past trends in travel to downtown Ottawa (Figure 1) based on data collected by the City over roughly the past 20 years and then - by considering past trends, current and likely future changes in travel behaviour, the City's infrastructure investments, and long term vision - extends the projections into the planning horizon of 2031.

The number of people travelling to the Central Business District (CBD) and the downtown area has increased, while the number of cars has declined.

The study reveals that since 1995, the number of vehicles (mostly passenger cars) travelling to the downtown area has been gradually decreasing. The overall rate of decrease over this period is in the order of 0.5 to 1.5% per year in the peak direction of travel (i.e. into the downtown during the morning, and out of the downtown during the afternoon), depending on the location where the data was collected. A higher rate of decrease has been observed during the last decade and a half compared to the late 1990's when volumes were relatively flat (Figure 2).

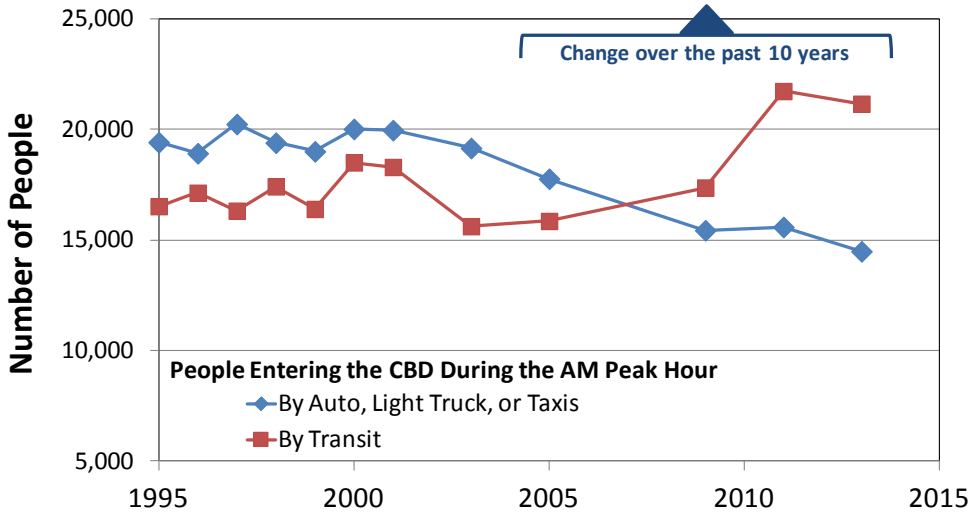

Figure 2: The number of people entering the CBD during the AM peak hour by mode of travel

The reduction in cars travelling to downtown does not mean that the downtown has been declining. Despite the decreasing number of vehicles, the number of people travelling to downtown, as well as the number of jobs and residents located downtown, have been gradually increasing. The number of people travelling to the CBD during the morning rush hour has increased by roughly 1% per year over the past 10 years, and this increase can be mostly attributed to travel by transit. In conjunction with this increase in travel activity, there are more people living and working in the downtown area today compared to 20 years ago. Between 1995 and 2013, employment in the Central Business District grew by 19% (1.3% p.a.) while population grew by 50% (4.1% p.a.) (Figure 3). These changes in travel behaviour in the downtown area are in the right direction and are fully aligned with the City's past efforts to decrease reliance on car travel.

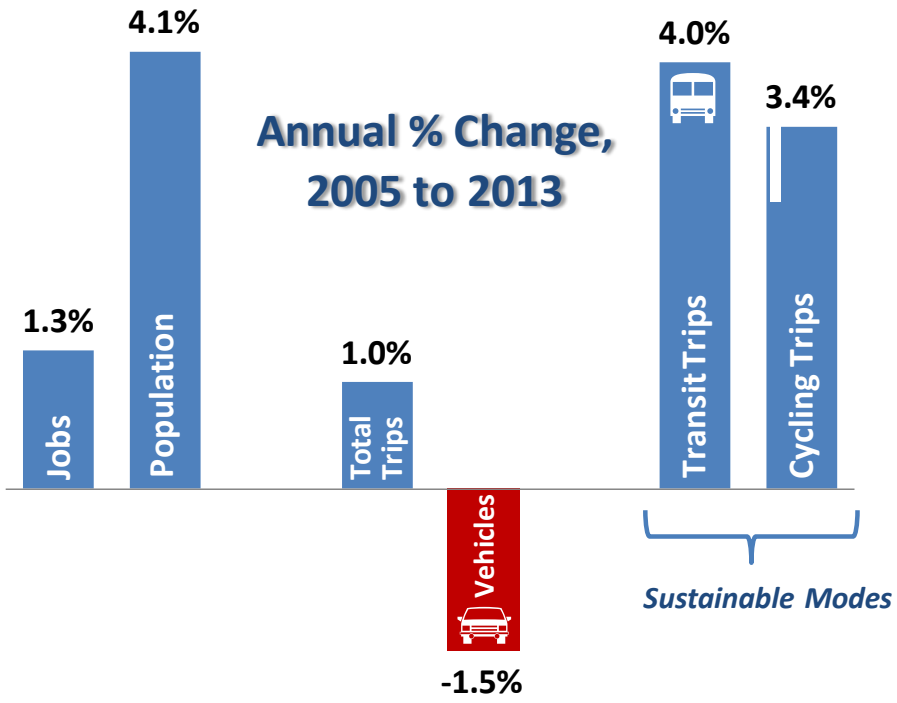

Figure 3: Historical trends between 2005 and 2013

The observed trends in the downtown are not unique to Ottawa. Vancouver's downtown population and employment have experienced a 75% and 26% increase respectively since 1996. However, the overall number of vehicles entering the downtown has decreased by 20% over this same time period. Smaller decreases in total traffic demands have also been documented for the City as a whole (City of Vancouver, 2012)[v].

Similarly, the population of Seattle grew by 13% between 2000 and 2013. Over the same time period, transit ridership increased by 34% and citywide average daily traffic decreased by 7% (Seattle Department of Transportation, 2012)[vi] .

Why have traffic volumes in downtown Ottawa decreased?

The National Capital Region Travel Trends Study (IBI Group, 2015a)[vii] identifies several trends which are contributing to the overall decrease in vehicle traffic in downtown Ottawa:

- Millennials in the National Capital Region are less likely to drive and more likely to use transit and active modes than previous generations (Figure 4)
- Compared to earlier decades, residents are making fewer trips per day
- Active transportation is becoming increasingly popular
- After years of steady increase, vehicle ownership has stabilized and has started to decline

Other factors influencing downtown traffic include:

- Traffic congestion beyond the downtown area combined with convenient rapid transit connections from the outer suburbs of Kanata, Barrhaven, and Orleans to downtown that provide a relatively reliable and competitive alternative for commuters.
- A gradual reduction in the number of parking spaces per downtown employee since 1995 which further supports the use of transit for downtown commuter trips (HDR Corporation 2010)[viii] , (HDR Corporation 2013) [ix].

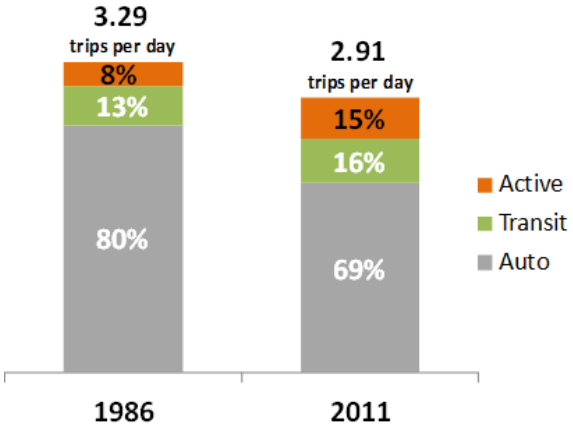

Figure 4: Daily trip rates and modal shares among residents aged 25-34

Fewer cars downtown does not mean unimpeded vehicle travel.

The reduction of vehicle volumes in the downtown area does not mean that there is no congestion anywhere during peak times. The increased population and employment in the downtown generates additional internal travel demand mostly by walking and cycling, increasing the amount of crossing activity and number of signal controls. Measures which give greater priority to pedestrians and cyclists have also been introduced, such as advanced pedestrian and cyclist phases, vehicle turning restrictions, and the addition of bicycle lanes. All these create more friction for vehicle travel, longer wait times at intersections, and overall slower travel speeds.

While the majority of roads within the downtown operate under capacity during peak periods, drivers may still experience intersection delays. Congestion slowdowns (where demand exceeds capacity for periods of time) occur primarily at intersection bottlenecks on King Edward, Sussex, and Queensway on/off ramps. However, the removal of most of these bottlenecks is neither feasible nor desirable. The capacity bottlenecks at the outskirts of the downtown, especially at the exits of Highway 417, constrain the amount of traffic that is fed into the downtown road network during the peak hours. The removal of these bottlenecks is often not feasible due to the lack of right-of way. Even if the removal of some of the capacity bottlenecks was technically feasible, an increase in system-wide vehicle capacity would be unlikely due to the formation of new downstream bottlenecks. Furthermore, the removal of capacity bottlenecks by squeezing in

additional travel lanes would leave even less space for walking and cycling and would also make downtown streets less attractive for both residents and businesses.

The decreasing trend of traffic volumes observed within the downtown is not replicated outside of the downtown. Although traffic volumes have remained relatively stable along some arterial roadways, traffic volumes have generally increased over time as the distance from the downtown increases. This can be explained by the associated land use/transportation characteristics, including lower land use density, less diversity of land use, lower levels of transit service, less convenient walking and cycling, and more car oriented development and roadway design.

The continuation of past trends in the downtown area is desirable.

The observed downtown traffic trends should be viewed as positive developments, and their continuation into the future is both possible and desirable. Such trends support the TMP vision and modal share targets as well as other City initiatives involving the re-design (and enhancement) of public space. The successful implementation of the LRT line requires population and employment increases in the downtown area and along the LRT line. This growth will generate further demand for better walking and cycling facilities to/from transit stations, and for better access to the many land uses in the downtown area by active transportation. These improvements to walking and cycling facilities cannot be provided without re-allocating more space to these activities.

The continuation of favourable past trends is achievable.

A number of initiatives are underway which support the TMP vision and will help achieve a continued reduction in automobile travel within the downtown (e.g. land use policies to encourage intensification and mixed-use development, transit-oriented development, active transportation plans, parking policies, transit service enhancements, etc.). These initiatives, combined with demographic and other social-economic trends, suggest that further reductions in downtown vehicular traffic are achievable, allowing roadway space to be converted to other uses. The study estimates that by extending past trends into the future, vehicles entering the Central Business District during the morning peak hour could decline by roughly 24% between 2013 and 2031, at the same time as employment in the CBD increases by 26% and population increases by 23% as projected in the City's Official Plan (Figure 5). In the larger downtown area, a 13% decline in vehicular traffic is anticipated assuming current trends continue.

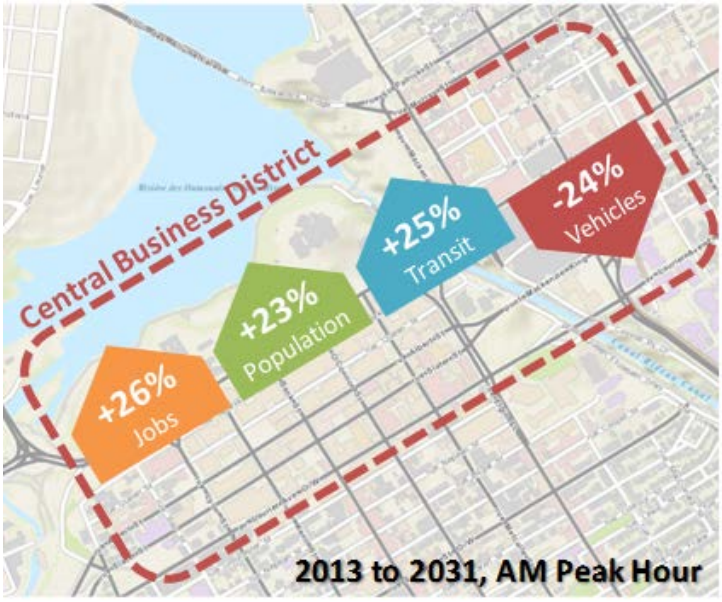

Figure 5: Projected changes in the CBD from 2013 to 2031, AM peak hour

Opportunities exist to design better public spaces for all travel modes.

With the extension of past downtown travel trends into the future, vehicular capacity can be gradually reduced without having major impacts on vehicle travel. Such transformation is possible due to the expected change in modal share in favour of non-car modes as transit capacity increases and as the walking and cycling environment improves.

The concept of removing roadway capacity has been applied in many cities, and the consequences were analysed and documented by Cairns et al. in a comprehensive report (Cairns, S., et al.,1998)[x] and a subsequent update (Cairns, S. et al., 2002)[xi]. The research examined 70 case studies of roadway capacity reduction around the world, including two in Canada. Some of these capacity reductions were temporary due to construction or special events, while others were implemented permanently with the intent of making cities more liveable (e.g. Oxford and Cambridge). It was found that the removal of roadway capacity in most cases reduced overall traffic volumes. However, the amount of traffic reduction varies due to a number of factors:

- When sufficient roadway capacity remains to accommodate traffic, there is little or no impact on traffic volume (Level 1 in Figure 6).

- When there is insufficient capacity to accommodate existing volumes, short and long term changes in travel behaviour are likely to occur, depending on the level of capacity reduction (Levels 2 and 3 in Figure 4). Initially, drivers change travel routes. In the months that follow, changes in the time of travel may occur as drivers begin their trip earlier or later to avoid delays. Over the longer term, a shift in travel modes may occur, and eventually, some commuters may change the destination or the origin of their travel, often in connection with other life events.

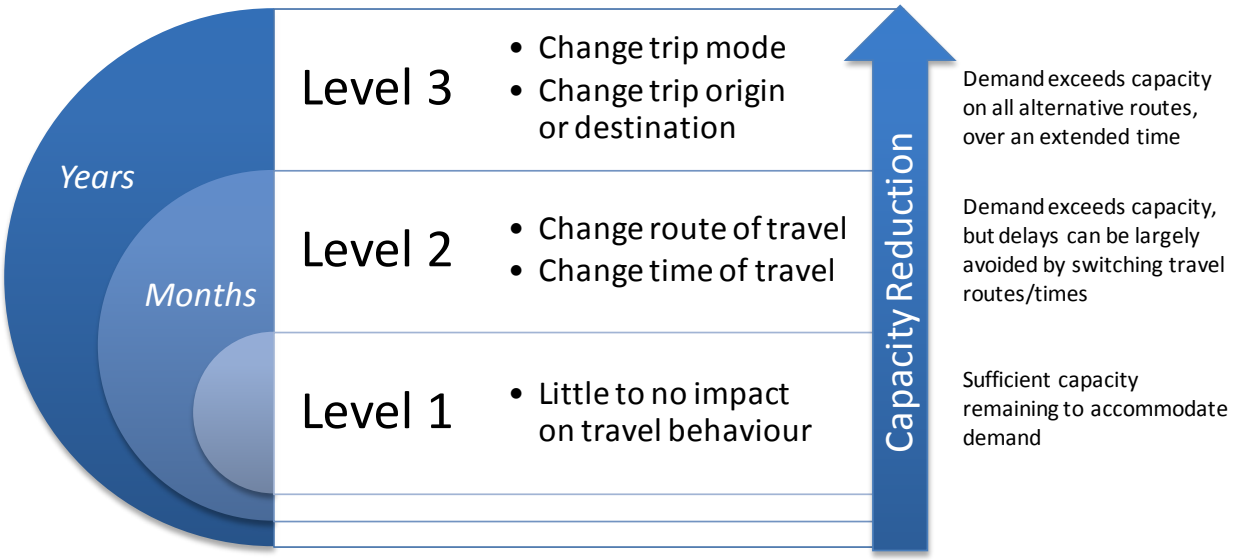

Figure 6: Levels of travel behaviour change in response to capacity reductions

Converting trends to lane reductions across specific screenlines

The vehicular capacity across the CDB and downtown screenlines that could be gradually removed is presented in Table 1 and Table 2. The “in” and “out” numbers correspond to the vehicular capacity that can be removed from the network in the inbound and outbound direction based on the existing road configuration. The corresponding number of lanes that can be removed depends on the road type in question, and the corresponding lane capacities are shown in

Figure 7 and Figure 8 . A lane of traffic typically ranges in width from 3 to 4 meters, which is sufficient space to provide cycling facilities in both directions of travel, wider pedestrian space, or enhanced landscaping. If used for cycling or walking, the space reallocation will increase the person carrying capacity of the streets.

The reduction in vehicular capacity shown in Table 1

Figure 7and Table 2 follows the trend of gradually declining vehicle volumes, and would have relatively minor impacts on travel behaviour, falling into the Level 1 or 2 category described in Figure 6. As a result, some re-routing of traffic to other corridors and changing of departure times is expected to happen, as drivers take advantage of available capacity in the network. Since such diversion has the potential to increase cut-through traffic in residential neighbourhoods, the installation of traffic calming measures along with reducing the speed limit may be beneficial in certain instances to remove the incentives for diversion of traffic into neighbourhood streets.

Overall, however, these changes to the downtown road network are relatively minor in light of the anticipated reduction in vehicle traffic and by themselves are not expected to have a significant impact on modal shares. Should the reduction in traffic be less than

expected, or should capacity be reduced beyond the levels indicated, a greater impact on travel behaviour may occur as drivers respond to higher levels of congestion and delay (Level 3 in Figure 6).

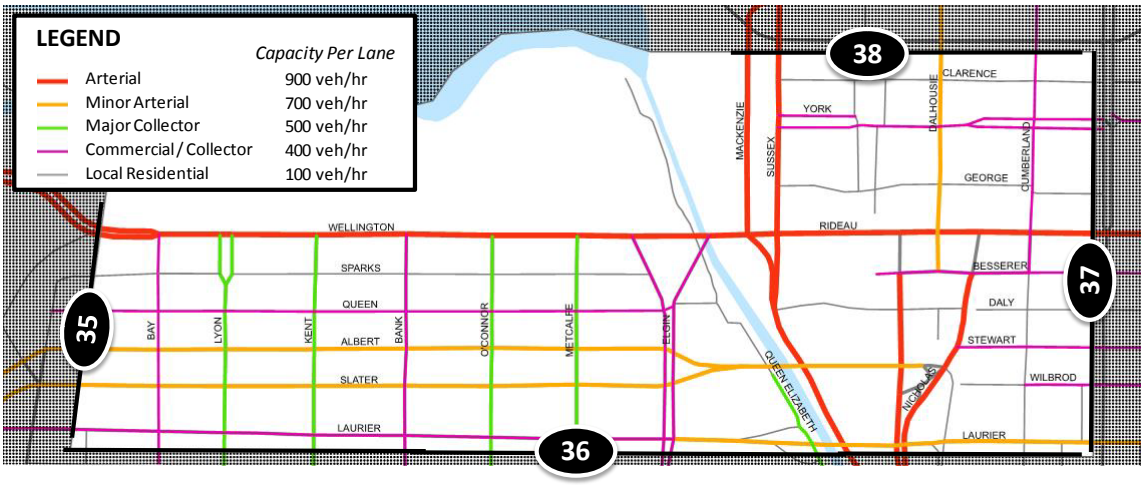

Figure 7: CBD screenlines and lane capacities

Capacity Available for Lane Re-allocation (veh/hr)									
Screenline		2013		2018		2023		2031	
		In	Out	In	Out	In	Out	In	Out
35	West of CBD, at Bronson	625	875	850	1175	1075	1425	1400	1775
36	South of CBD, at Laurier	700	1200	975	1325	1225	1775	1800	2400
37	East of CBD, at King Edward	450	725	500	775	625	950	800	1175
38	North of CBD at Murray / St. Patrick	200	575	550	700	700	875	875	1125

Table 1: Capacity available for lane re-allocation across the CBD screenlines

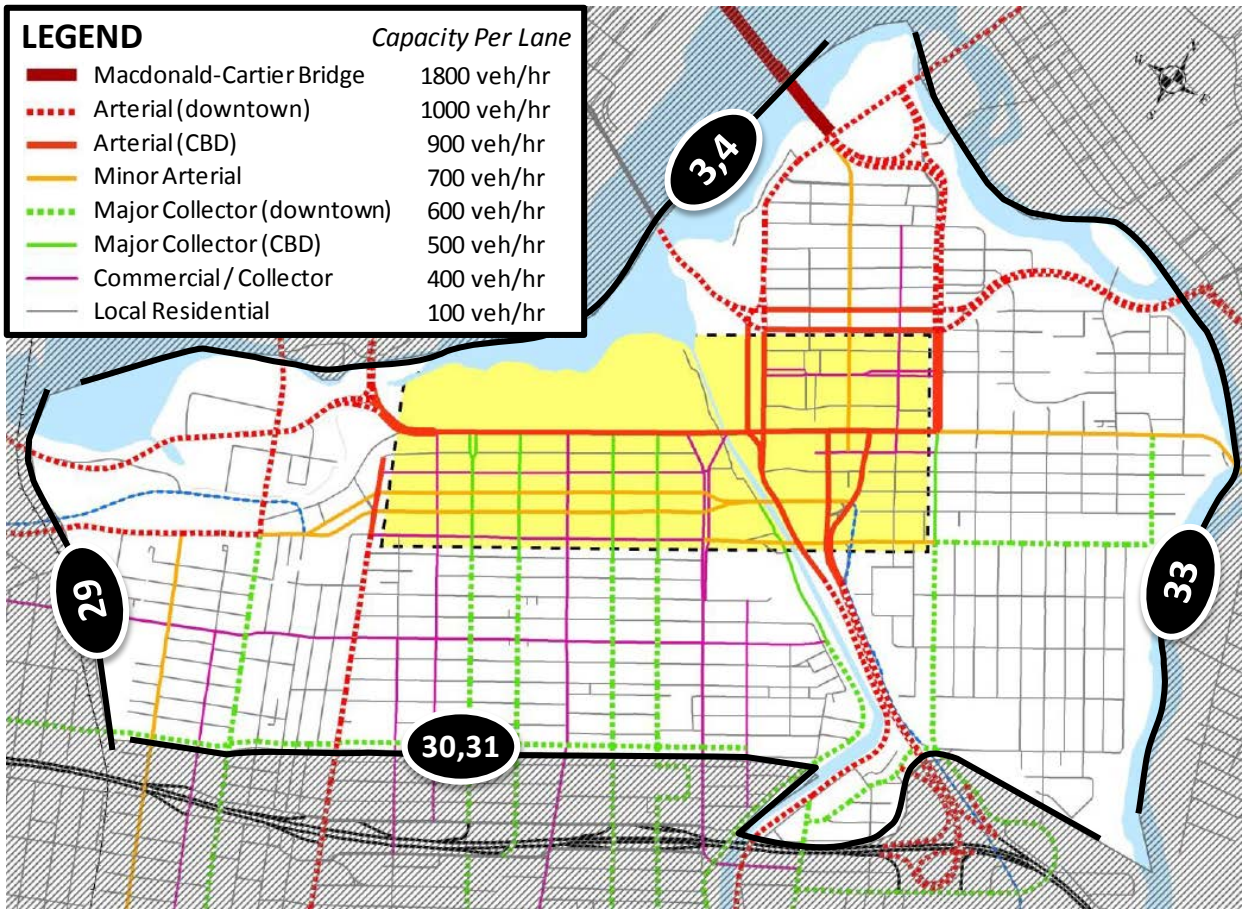

Figure 8: Downtown screenlines and lane capacities

Capacity Available for Lane Re-allocation (veh/hr)									
Screenline		2013		2018		2023		2031	
		In	Out	In	Out	In	Out	In	Out
29	West of downtown, at O'Train	900	475	1375	1325	1475	1450	1625	1650
30, 31	South of downtown, at Gladstone / Hwy 417	850	3150	1750	3500	2150	3950	2750	4725
33	East of downtown, at Rideau River	1275	1050	1500	1400	1625	1550	1800	1800
3,4	North of downtown, at Ottawa River	--	--	100	675	400	1050	875	1600

Table 2: Capacity available for lane reallocation across downtown screenlines

In estimating the potential for lane reallocation in downtown Ottawa, an allowance was made to ensure adequate reserve capacity was available in the network for accommodating construction or other special events. For analysis purposes, a 20% reserve capacity was assumed, providing network resiliency. However, this value is considered to be conservative and may be adjusted as more experience is gained with lane reallocation in the downtown area.

From a multimodal perspective, the reallocation of roadway space to walking and cycling will improve the safety and comfort of these modes, enhancing the quality of service. Transit service will likewise improve with the introduction of LRT, with further improvements possible if space from lane reductions is used for bus priority or improved pedestrian and cycling access to transit stops. Although buses operating in mixed traffic within the downtown could see somewhat slower travel times with the removal of traffic lanes even if demand remains below capacity, especially in the initial stages, it is anticipated that over time, downtown will become increasingly more pedestrian and cycling friendly for shorter trips, and more transit friendly for longer trips which is expected to increase the overall transit modal share. Opportunities to mitigate potential negative impacts on transit travel times (through signal priority, shifting of bus stops, etc.) should be an important consideration in the planning and design of lane reallocation projects. It is also important to note that transit modal share is positively correlated with the relative advantage of transit travel times compared to car travel times and not with the absolute speed of moving transit vehicles.

Summary and Conclusions

The historic trends show that the number of vehicles traveling to and from downtown Ottawa has gradually declined during the last two decades. In the same time period, the number of people living, working, and travelling to and from the same area has increased. These historic trends are partly due to past policy and planning efforts of the City and partly the results of demographic and behavioural changes. More importantly, these past trends are healthy from the city building perspective, and it is desirable to have them continue in the future; thus most of the City's policies and investments should continue to support them.

The reduction of vehicles in the downtown area is not only an outcome, but it is also a necessity in terms of being able to reallocate roadway space so that street improvements to support active transportation and enhance the public realm can take place. Such reallocation of space will support the design of public spaces that provide safe and convenient travel options for all modes throughout the downtown area. It is also possible that with appropriate policies and targeted investments, the trends observed in the downtown area could expand to other areas of the city in the future.

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