

2. Transportation in Ottawa – Today and Tomorrow

2.1 Transportation System Overview

The City. The City of Ottawa is the largest municipality in the National Capital Region (NCR). Urban development covers 10% of its 2,760 square kilometres, while the remainder is rural and contains villages, agricultural lands, woodlands, wetlands and valleylands. Ottawa was home to about 923,000 people in 2011, while the City of Gatineau and its surrounding rural area, across the Ottawa River in the Province of Quebec, were home to 314,500 people. The NCR is the fourth-most populous metropolitan area in Canada after Toronto, Montréal and Vancouver.

Jurisdictional scope. Ottawa’s transportation system lies within three government jurisdictions, each of which has specific interests with respect to the planning, design, construction and maintenance of its own facilities. Most of the road, transit and pathway networks are owned and maintained by the City, but major intercity highways (Highways 416, 417 and 7) are the responsibility of the provincial government, and the NCC’s roads and multi-use pathways as well as five interprovincial road bridges are under federal jurisdiction. The city is also served by a taxi industry, one international airport, three general aviation airports, two passenger railway stations, an intercity bus terminal, two ferries and a freight rail yard.

Transportation features. The City is responsible for a multimodal transportation system with facilities and services for walking, cycling, public transit, roads and parking:

- About 6,000 kilometres of roads, including 1,400 km of arterials, 4,600 km of collectors, local streets and a freeway
- About 1,890 km of sidewalks and 340 km of on-road bicycle lanes;
- City operated off-street parking lots with 2,824 spaces, and 3,965 paid on-street parking spaces
- 936 standard, articulated and double-decker buses, a Transitway system (with 57 stations, 35.4 km of dedicated busway, 4.5 km of arterial road bus lanes, 12.7 km of freeway shoulder bus lanes, and 14 urban park-and-ride lots with 7,254 parking spaces) and the O-Train rail line (8 km long with five stations)

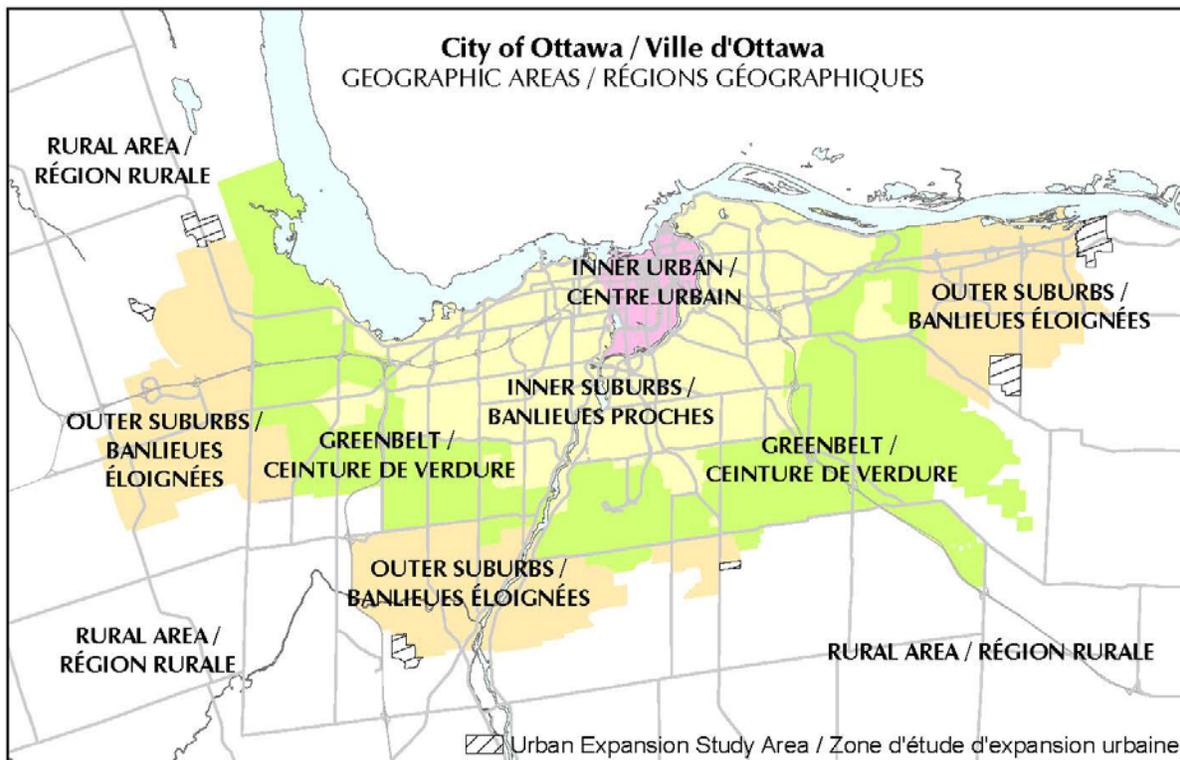
- 89 lift-operated minibuses and 80 contracted taxi vehicles (50 sedans and 30 accessible vans) providing specialized transit service for persons with disabilities

It is worth noting that OC Transpo, Ottawa’s transit service, provides some service to and from the City of Gatineau across the Ottawa River, and that the Société de transport de l’Outaouais (STO) as well as other transit services in adjacent Ontario municipalities provide some service to and from Ottawa.

Exhibit 2.1 illustrates some of the key geographic terms used in this chapter, namely:

- *Inner Area* – Ottawa’s downtown core and its adjacent neighbourhoods, bounded by the Ottawa River, Rideau River and O-Train line
- *Inner Suburbs* – the remaining urban area inside the Greenbelt, but outside the Inner Area
- *Outer Suburbs* – Ottawa’s urban areas lying outside the Greenbelt, including the communities of Kanata/Stittsville, South Nepean, Riverside South/Leitrim, and Orléans

Exhibit 2.1 Location of Inner Area, Inner Suburbs and Outer Suburbs

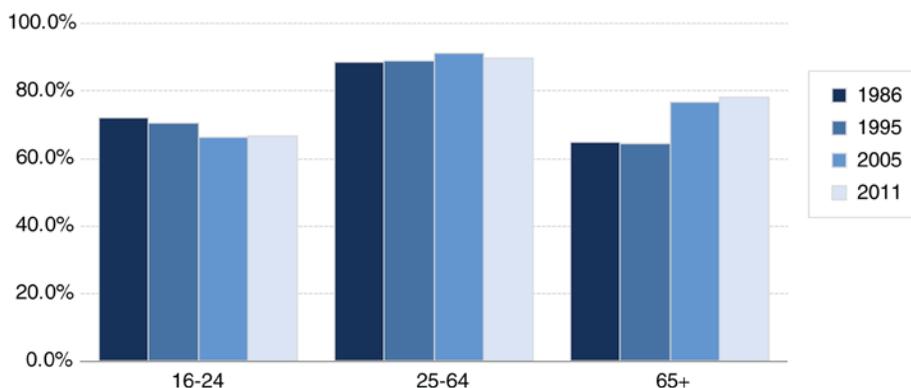


2.2 Key Travel Trends and Influences

Since 1986, four major household travel surveys in the National Capital Region have collected information on residents’ daily trips, choice of travel mode, trip origins and destinations, and other information. The latest survey in the fall of 2011 collected data on 153,000 trips from 25,000 households in the region (a 5% sample). These travel surveys help the City understand when, where, why and how National Capital Region residents get around. This section identifies some key trends over the last 25 years.

Personal access to an automobile. Individuals who own a car are far more likely to use it to travel than they are to use another mode. Ottawa residents owned 508,000 vehicles in 2011, up from 482,000 in 2005. However, between 2005 and 2011, the average number of vehicles per household decreased from 1.39 to 1.34, and the proportion of households that owned at least one vehicle decreased from 87% to 84%. Exhibit 2.2 shows that while the overall proportion of residents with a driver’s licence has been relatively constant since 1986, the likelihood of having a licence is decreasing among young adults and increasing among seniors.

Exhibit 2.2 Residents Holding a Driver's Licence (% by age)



Travel within suburban communities. Communities that have a good balance between homes, jobs, schools, shopping and recreation typically have high rates of trip internalization—that is, a high proportion of all trips that begin in the community also end there. Exhibit 2.3 shows the rate of trip internalization for suburban communities outside of the Greenbelt in 2005 and 2011 for the AM peak period (6:30–8:59 AM), as

well as the percentage of trips leaving the community and the percentage of those arriving from elsewhere. The data show a marked increase in the rate of trip internalization for all suburban communities, while the rates of trips departing or arriving have decreased. This is indicative of the fact that Ottawa’s suburban communities are maturing—they are becoming less reliant on Ottawa’s older communities for employment, education, retail service and recreation opportunities.

Exhibit 2.3 Internal, Departing and Arriving Trip Rates
 (% of all trips to/from the community in the morning peak period)

Community	Trips staying in the community		Trips departing the community		Trips arriving in the community	
	2005	2011	2005	2011	2005	2011
Kanata/Stittsville	36%	42%	37%	36%	28%	22%
South Nepean	25%	36%	61%	51%	14%	13%
Riverside South/Leitrim	5%	26%	68%	52%	27%	22%
Orléans	36%	41%	50%	48%	14%	12%

Trip lengths. Exhibit 2.4 illustrates the number of daily trips of varying lengths that Ottawa residents make using different modes of travel. The average trip lengths are 10.7 km for automobile drivers, 9.1 km for automobile passengers, 13.4 km for transit customers, 5.1 km for cyclists, and 1.3 km for pedestrians. The exhibit shows that many auto driver and passenger trips are shorter than 2 km (which is often cited as a practical distance limit for many walking trips), and that an even more substantial number are shorter than 4 km (i.e. the average length of cycling trips). This confirms that the objective of attracting more pedestrians and cyclists is feasible, assuming that suitable facilities are in place.

Travel by different modes – overall. Ottawa residents’ choice of travel mode is one of the most important aspects of travel behaviour. Exhibit 2.5 presents the morning peak period and 24-hour shares of travel using the five main travel modes in Ottawa in 2005 and 2011. During the morning peak period, the sustainable mode share (i.e. walking, cycling, transit and automobile passenger) decreased slightly (from 45.7% to 45.3%) due to declines in walking and automobile passengers. However, on a 24-hour basis the sustainable mode share increased slightly (from 41.5% to 42.1%) due to growing transit and cycling travel.

Exhibit 2.4 Trip Volumes by Length and Mode (2011, morning peak period)

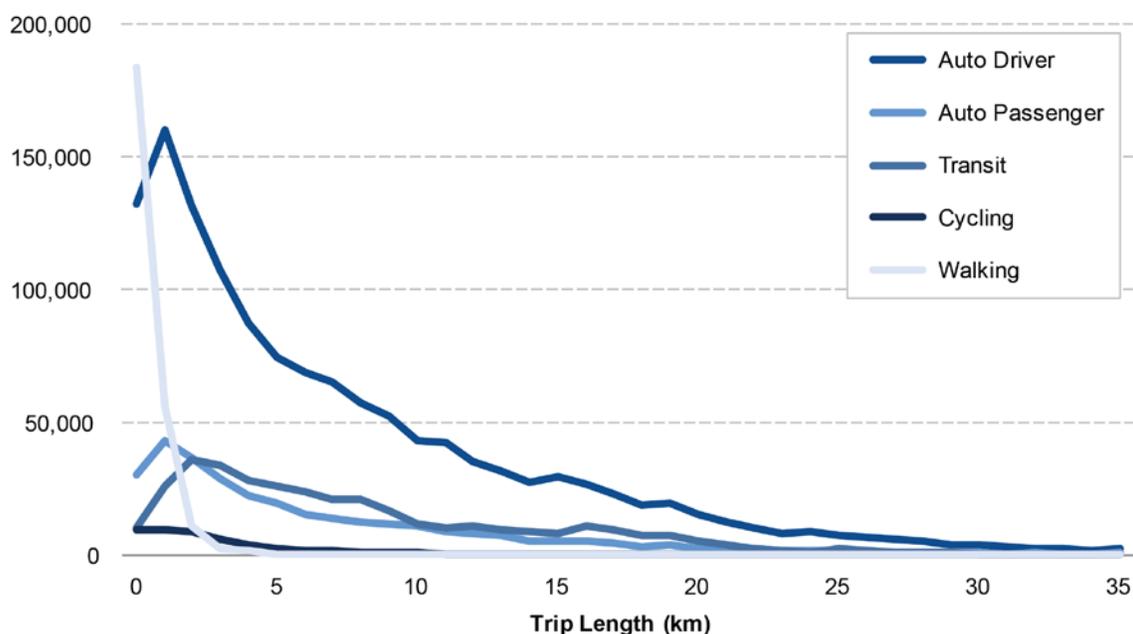
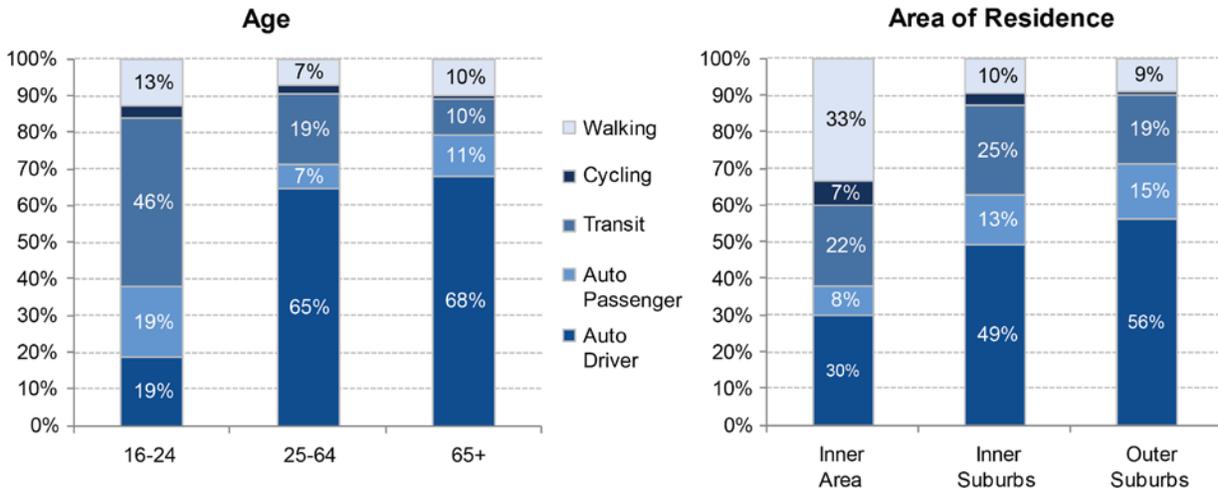


Exhibit 2.5 Mode Shares in 2005 and 2011

Travel mode	Morning peak period		24-hour	
	2005	2011	2005	2011
Walking	9.9%	9.5%	11.4%	11.0%
Cycling	1.9%	2.7%	1.5%	2.0%
Transit	22.4%	22.4%	15.0%	15.5%
Automobile passenger	11.5%	10.7%	13.6%	13.6%
<i>Subtotal</i>	<i>45.7%</i>	<i>45.3%</i>	<i>41.5%</i>	<i>42.1%</i>
Automobile driver	54.3%	54.6%	58.6%	57.9%
Total	100.0%	100.0%	100.0%	100.0%

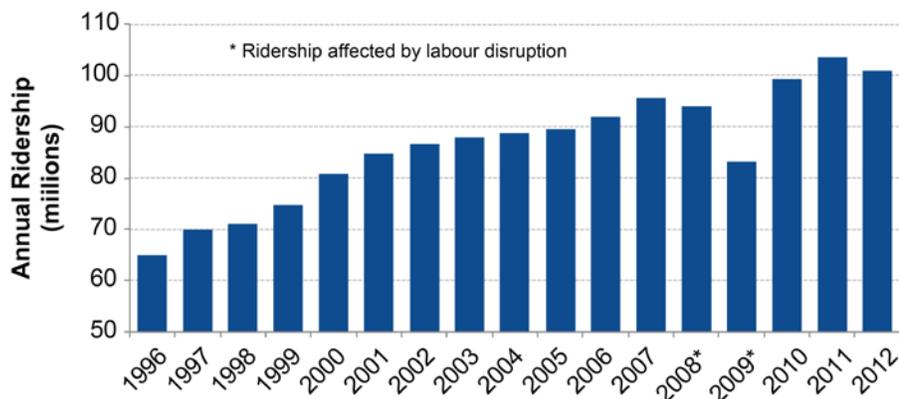
Travel by different modes – by age and area. Exhibit 2.6 shows how mode shares varied by the age and home location of residents in 2011. Younger adults are far less likely than others to drive, possibly because they lack the financial means to own a car, they live in areas where driving is less convenient, or they are more conscious of the environmental impacts of car use. Residents of Ottawa’s Inner Area are also much less likely than other residents to travel by car—in fact, they have the same rate of car use (38%) in the morning peak period as young adults aged 16 to 24 across Ottawa. An interesting note is that residents of Inner Suburbs are more likely to travel by transit than residents of either the Inner Area or the Outer Suburbs.

Exhibit 2.6 Mode Choice by Age and Area of Residence (2011, morning peak period)



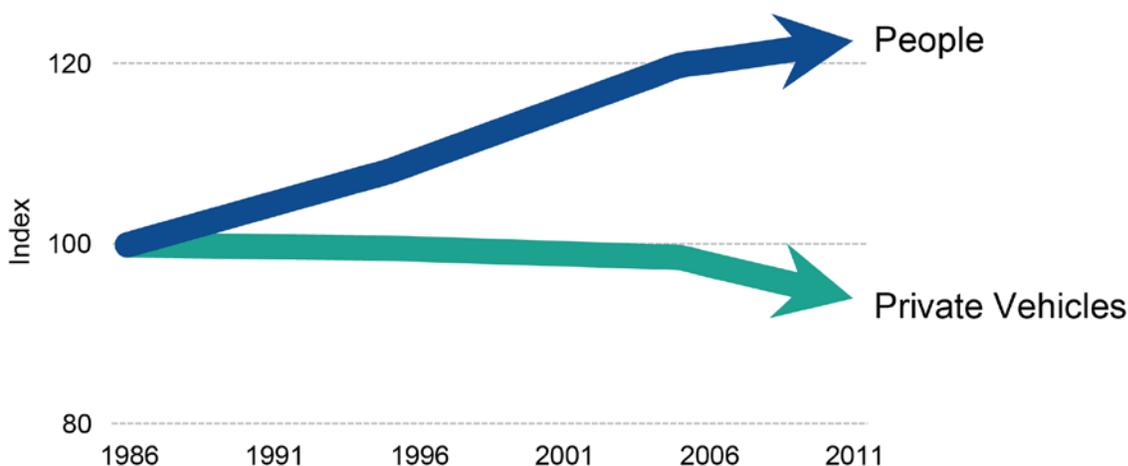
Transit travel. On a typical weekday in 2011, Ottawa residents made 325,000 transit trips, with more than half occurring in the morning and afternoon peak periods (note this figure would be higher if it included Gatineau residents and visitors). The downtown core attracted a significant portion of transit trips because of its high levels of transit service, limited road capacity, and dense concentration of employment. In the morning peak period, about one-third of all transit trips made by Ottawa residents are to the downtown core, and about 50% of all trips arriving downtown are by transit. Except for 2008 and 2009, which were both affected by a labour disruption, transit ridership has increased fairly steadily for more than 15 years (see Exhibit 2.7). In 2012, OC Transpo carried 101 million riders—making its annual average of about 110 rides per capita the highest of any comparably-sized city in North America.

Exhibit 2.7 Annual OC Transpo Ridership



Downtown travel. In 2013, Council approved *Downtown Moves*, an urban design and transportation study of ways to support increasing demand for walking, cycling and transit in the downtown core, and to integrate future light rail stations into the streetscape. This focus on walking, cycling and transit reflects the changing preferences of downtown travellers. Since 1986, the number of cars arriving downtown in the morning peak period has decreased while the number of people arriving downtown has increased (see Exhibit 2.8). For this reason, future planning of the downtown transportation system will focus on improving the capacity and quality of service for people, rather than private vehicles. This goal supports the reallocation of limited rights of way from private vehicles to other uses.

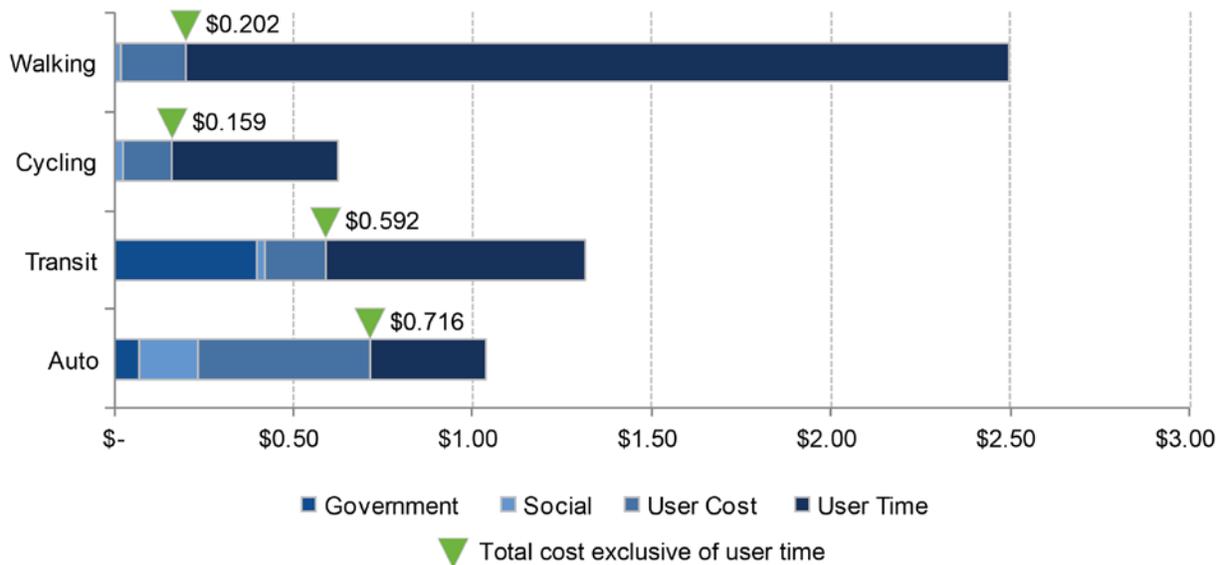
Exhibit 2.8 Trips Entering the Downtown Core (1986-2011, morning peak period, 1986=100)



Walking and cycling travel. Ottawa residents made 296,000 daily walking or cycling trips in 2011, an increase of about 6% from 280,000 in 2005. Most of those trips were made by foot, but the number of daily bicycle trips grew sharply from 30,350 to 43,350 in six years (an increase of 43%). Walking and cycling trips usually cover short distances, with 88% of all trips beginning or ending in the same area of the city. The Inner Area is home to a disproportionate share of walking and cycling, with 44% of all active trips starting and/or ending there.

Cost of travel. A recent update to Ottawa’s cost of travel model identified the average cost to carry one person one kilometre by different modes throughout the city (see Exhibit 2.9). It shows that, considering government costs, users’ financial costs, and the social costs of collisions and pollution (but excluding the cost of user time), the average cost per person-km is \$0.159 for cycling, \$0.202 for walking, \$0.592 for transit, and \$0.716 for cars. Cycling and walking are the most affordable options for moving people if the cost of user time is excluded, and cycling is the cheapest option even if user time is included. For these reasons, and because the affordability of travel is a major concern, it is desirable to minimize growth in automobile use and maximize growth in other modes—particularly walking and cycling, which also offer health benefits. Transit use is also important, because even though it has higher government costs (all levels) than automobile use, it is more affordable for individuals and society as a whole.

Exhibit 2.9 Cost of Travel in Ottawa (\$/person-km)

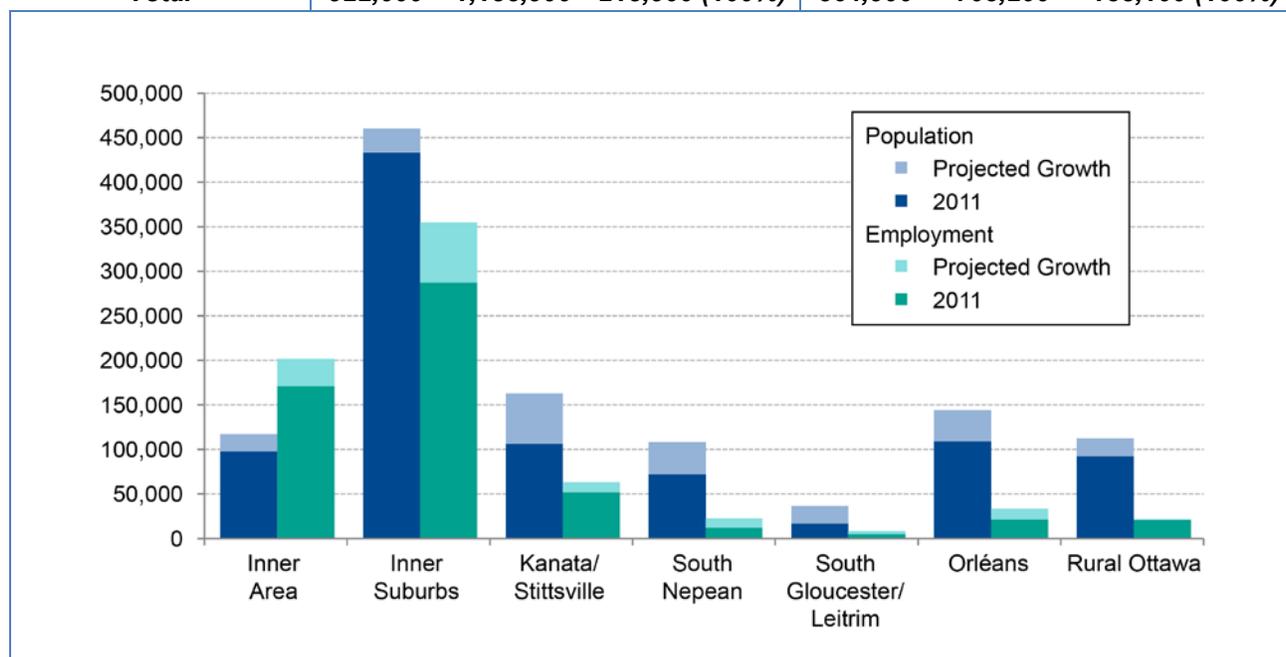


2.3 Population and Employment in 2031

Where growth will occur. The City has prepared population and employment growth projections for the period from 2011 to 2031 (see Exhibit 2.10). The City expects a 23% increase in population from 922,000 to 1.14 million people, and a 24% increase in employment from 565,000 to 703,000 jobs. Although infill development and intensification are forecast to increase the population of Ottawa’s Inner Area and Inner Suburbs by about 46,000 people over the next 18 years, most growth (about 168,000 people) will occur in the Outer Suburbs. In contrast, 72% of employment growth will occur inside the Greenbelt.

Exhibit 2.10 Population and Employment: 2011 Actual and 2031 Projections

Area	Population			Employment		
	2011	2031	Growth and distribution	2011	2031	Growth & distribution
Inner Area	97,200	116,400	19,200 (9%)	170,600	201,800	31,200 (23%)
Inner Suburbs	432,500	459,300	26,800 (13%)	287,400	355,300	67,900 (49%)
Kanata/Stittsville	105,200	162,000	56,800 (27%)	51,300	62,500	11,200 (8%)
Barrhaven	71,200	107,400	36,200 (17%)	11,100	21,800	10,700 (8%)
Riverside South/Leitrim	15,900	35,800	19,900 (9%)	4,000	7,800	3,800 (3%)
Orléans	108,200	143,400	35,200 (16%)	20,600	33,000	12,400 (9%)
Rural Ottawa	91,400	111,700	20,300 (9%)	20,000	20,900	900 (1%)
Total	922,000	1,135,900	213,900 (100%)	564,900	703,200	138,100 (100%)



2.4 Travel Demand in 2031

The projections in this section were made using a transportation demand model that estimates how future residents of Ottawa will travel in the morning peak period on a typical weekday, given projected changes in land use, population, employment, transportation infrastructure, transit fares and service levels, and fuel and parking costs. These modelling results help the City identify how to meet the needs of pedestrians, cyclists, transit users, automobile drivers and passengers, and commercial vehicles.

Time-shifting of travel within the peak period. Over recent decades in Ottawa and other major cities, travel demand within peak periods (the busiest two- to three-hour periods each weekday morning and afternoon) has slowly become less concentrated within a single peak hour; this phenomenon is referred to as “peak spreading.” Conventional transportation planning and design have accommodated a single peak hour of demand, which does not account for unused capacity in the shoulders of the peak, to the extent that it exists. This practice is both costly and inefficient, and this TMP update is based on a desire for a more efficient, “flattened” peak period travel demand in 2031—that is, for a level of demand that remains more or less constant throughout the morning peak period (7:00 to 9:30 a.m.). This will lead to planning for fewer new or widened roads than would be warranted to serve a single peak hour of more concentrated demand like the one Ottawa has today, but it will also have the effect of encouraging automobile users to travel at less busy times (i.e. a little earlier or later), thus using the transportation network more efficiently. Transportation Demand Management (TDM) programs such as encouraging flexible work hours will help to facilitate this.

Growth in trips. Exhibit 2.11 illustrates the projected growth in travel demand between key areas of Ottawa from 2011 to 2031. It shows that the Inner Area will continue to attract a decreasing proportion of all trips during the morning peak period, following the trend of recent decades as Ottawa’s suburbs have added jobs as well as population. Exhibit 2.11 also shows significant growth in travel across the Greenbelt from outer suburban communities, particularly Kanata and Stittsville. Several other key observations can be made:

- The greatest growth in trips occur within the Outer Suburbs (35% of all new trips), then trips from the Outer Suburbs to Inner Suburbs (19% of all new trips) and then from the Outer Suburbs to the Inner Area (9% of all trips)
- The focus of new trip origins will be the Outer Suburbs (67% of new trips), followed by the Inner Suburbs (12% of new trips) and Inner Area (7% of new trips)
- The focus of new trip destinations will be the Outer Suburbs (39% of new trips), followed by the Inner Suburbs (32% of new trips) and Inner Area (21% of new trips)

Based on current assumptions, the Outer Suburbs will be the dominant force behind city-wide travel growth between 2011 and 2031. This poses a challenge to the goal of increasing transit, walking and cycling trips because it is more difficult to provide efficient and cost-effective facilities and services for those modes in lower-density suburban environments.

Travel by mode – city-wide. Mode share is the proportion of all trips that people make using a given mode. In Ottawa in 2011, the share of morning peak period travel by sustainable modes (walking, cycling, transit and automobile passenger) was about 45% (9.5% for walking, 2.7% for cycling, 22.4% for transit, 10.7% for automobile passenger). This updated TMP proposes a 2031 target of 50% (10% for walking, 5% for cycling, 26% for transit, 9% for automobile passenger). Exhibit 2.12 illustrates these changes. The implication is that the proportion of all trips made by automobile drivers will decrease from about 55% in 2011 to 50% in 2031. Because the the total number of trips is projected to grow by 32% over the same period, the total number of driving trips will also increase (by 21%).

There are several important notes on the mode share targets:

- *Walking* – The new target (10%) is the same as in the 2008 TMP
- *Cycling* – The new target (5% city-wide, including a sub-target of 8% within the Greenbelt) is a substantial increase over the 2008 TMP of 3%
- *Transit* – The 26% mode share target is equivalent to the target in the 2008 TMP¹
- *Automobile passenger and automobile driver* – The 9% automobile passenger and 50% automobile driver targets had no direct precedent in the 2008 TMP, although that plan did project that about 61% of morning peak hour travel demand would be

¹ The 2008 TMP used an equivalent target of 30% of trips by motorized modes, which was the same as 26% of trips by all modes.

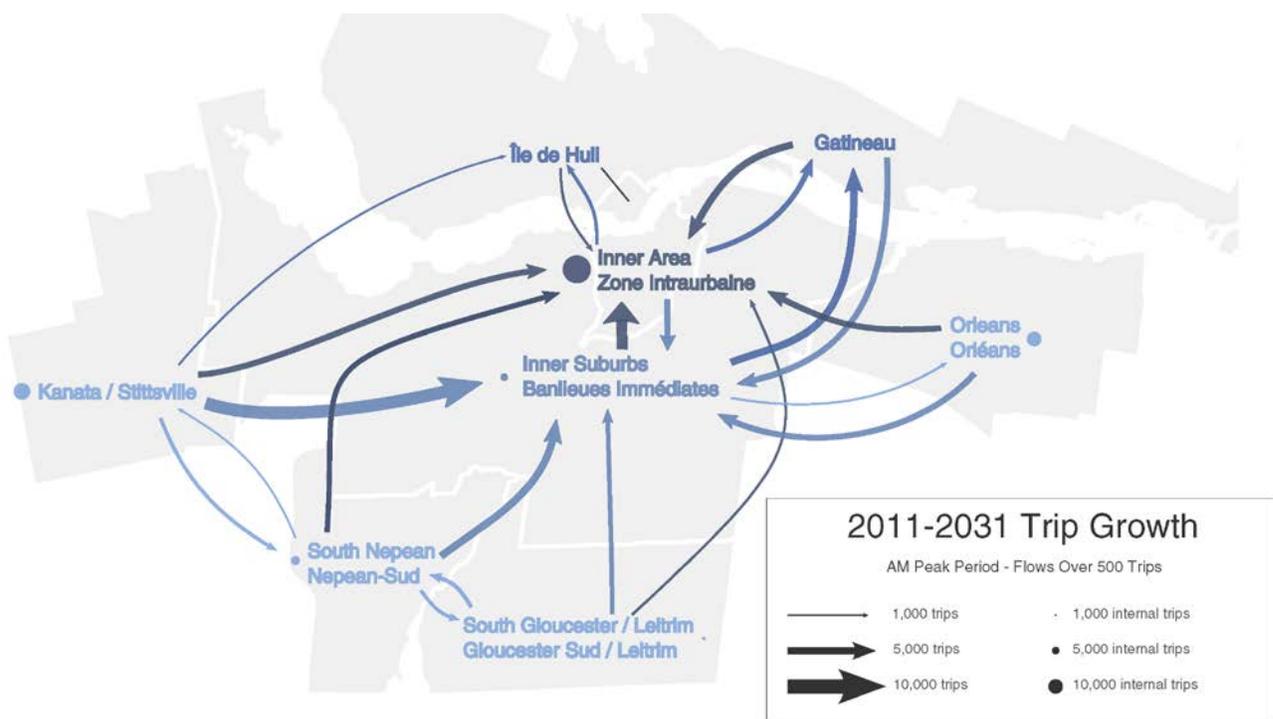
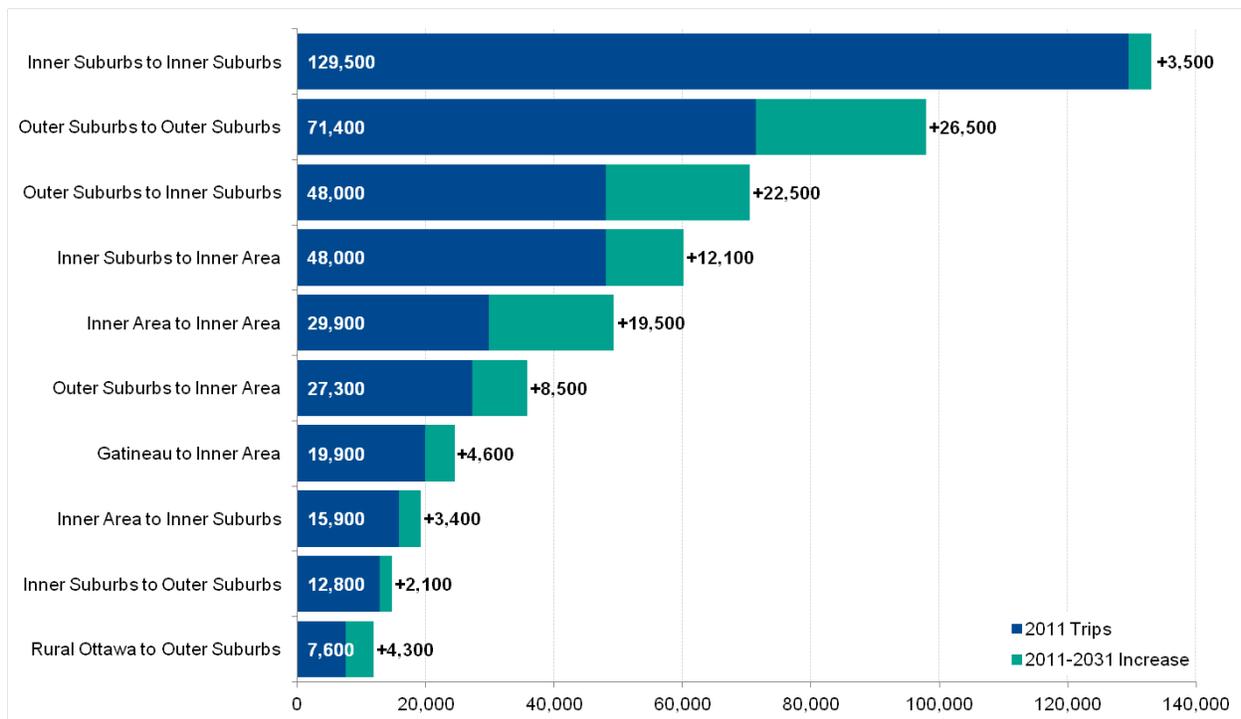
met by automobile (i.e. drivers and passengers, combined). Therefore, the new target represents a more ambitious objective with respect to managing the growth in automobile trips.

- *Seasonality* – The demand for all modes varies from one season to another, and this Plan uses autumn as the baseline for travel demand observations and projections. In the summer, cycling and walking shares rise and transit use drops; in the winter, the reverse is true. Surveys show that 70% of Ottawa’s summer cyclists either continue to bicycle in winter (16%) or shift to walking or transit (54%). The aggregation of walking, cycling and transit shares into a single “sustainable mode” target of 50% (versus a 2011 observed level of 45%) is, in part, an attempt to set a target that is relatively independent of season.

Travel by mode – key areas and corridors. The average mode shares shown in Exhibit 2.12 will not apply for trips to and from all areas of Ottawa. The actual transit use in any area will depend on the quality of service, land use densities, and other factors. Some areas will exceed the average, and others will not. Exhibit 2.13 shows how the overall target transit mode share would vary for trips between different areas in 2031; these diverse transit mode shares will, in total, yield the overall target of 26%. This exhibit clearly highlights the importance of Ottawa’s downtown in achieving the overall transit target. With substantial planned improvements to transit service downtown and limited planned increases to road capacity, transit’s share of the travel market will continue to increase. High transit ridership to, from and within the inner suburbs is expected to continue.

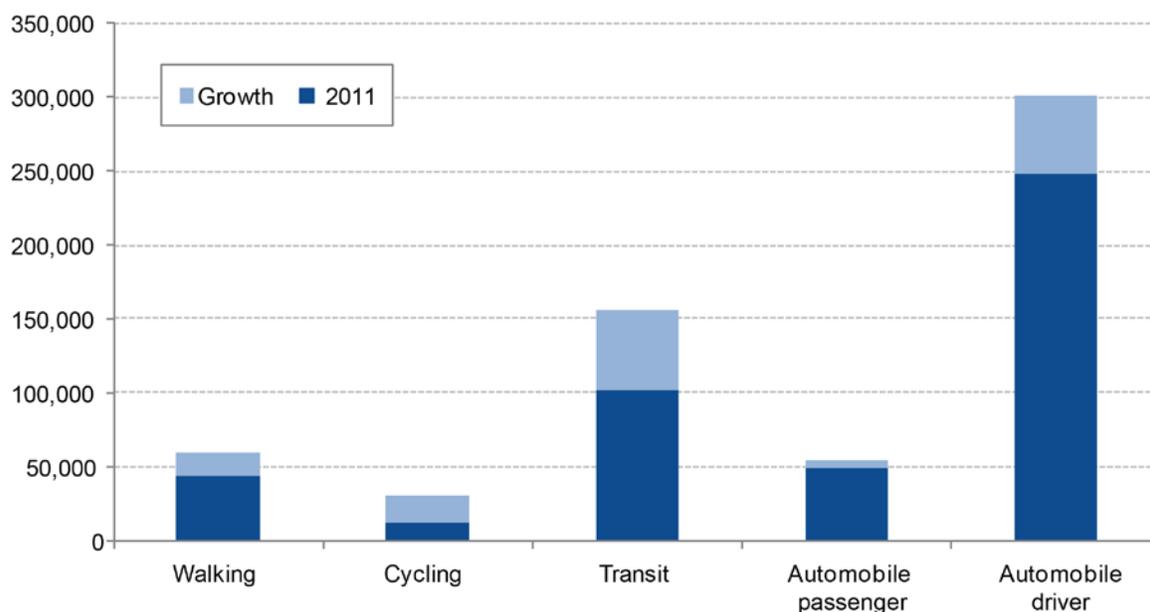
The share of travel by walking and cycling (with a combined city-wide target of 15%) will also vary across Ottawa. These trips are usually made over shorter distances than automobile and transit trips, so areas of high densities with mixed land uses typically achieve higher mode shares. This is clearly illustrated in Exhibit 2.14, which shows walking and cycling mode shares for internal trips—that is, those that start and end in the same district—in different parts of the city that are consistent with the city-wide targets. It shows, for instance, that the combined walking and cycling mode share in the Inner Area—which includes the downtown core, Centretown, Lowertown, Sandy Hill, and other older neighbourhoods—would be nearly four times higher than in other parts of the city.

Exhibit 2.11 Projected Growth in Key Travel Markets (morning peak period)



**Exhibit 2.12 Mode Shares and Person-trip Volumes:
2011 Observations and 2031 Targets (morning peak period)**

Travel mode	Mode share		Person-trips		
	2011	2031	2011	2031	Growth
Walking	9.5%	10.0%	43,200	60,100	39%
Cycling	2.7%	5.0%	12,300	30,100	145%
Transit	22.4%	26.0%	101,900	156,300	53%
Automobile passenger	10.7%	9.0%	48,700	54,100	11%
Automobile driver	54.6%	50.0%	248,400	300,500	21%
Total	100.0%	100.0%	455,000	601,000	32%



**Exhibit 2.13 Transit Mode Shares Within and Between Areas:
2011 Observations and 2031 Targets (morning peak period)**

Mode shares for 2011 (top) and 2031 (bottom)									
Trips to Trips from	Inner Area	Inner Suburbs	Orléans	Riverside South/Leitrim	Barrhaven	Kanata/Stittsville	Rural Ottawa	Gatineau	All areas
Inner Area	15%	28%	28%	9%	5%	31%	1%	29%	20%
	20%	35%	30%	15%	15%	35%	2%	32%	22%
Inner Suburbs	49%	16%	12%	5%	8%	13%	1%	30%	24%
	54%	22%	16%	18%	12%	15%	2%	33%	28%
Orléans	61%	19%	8%	4%	10%	6%	0%	27%	24%
	65%	22%	11%	7%	12%	7%	0%	30%	26%
Riverside South/Leitrim	36%	7%	0%	0%	0%	0%	0%	0%	9%
	40%	16%	2%	10%	10%	5%	2%	13%	16%
Barrhaven	62%	16%	5%	0%	5%	1%	0%	53%	20%
	70%	20%	7%	5%	10%	6%	2%	55%	26%
Kanata/Stittsville	53%	12%	6%	0%	3%	5%	2%	36%	15%
	56%	20%	6%	4%	4%	10%	2%	40%	21%
Rural Ottawa	31%	4%	3%	0%	2%	1%	1%	7%	6%
	39%	8%	10%	2%	3%	3%	1%	8%	11%
Gatineau	47%	13%	0%	0%	0%	3%	0%	-	32%
	50%	14%	7%	3%	5%	7%	1%	-	33%
All areas	42%	16%	9%	2%	6%	6%	1%	31%	22%
	44%	21%	13%	9%	11%	11%	2%	32%	26%

**Exhibit 2.14 Walking and Cycling Mode Shares for Internal Trips:
2011 Observations and 2031 Targets (morning peak period)**

Mode	Mode shares for 2011 (top) and 2031 (bottom)					
	Inner Area	Inner Suburbs	Orléans	Riverside South/Leitrim	Barrhaven	Kanata/Stittsville
Walking	51%	14%	19%	18%	23%	22%
	52%	16%	20%	21%	24%	23%
Cycling	8%	3%	2%	0%	2%	1%
	12%	6%	3%	3%	4%	4%
Total	59%	17%	21%	18%	25%	23%
	64%	22%	23%	24%	28%	27%

Note: The relatively low walking mode share for internal trips within the Inner Suburbs reflects the large size of that district. Division of the Inner Suburbs into smaller sub-areas would yield a higher walking mode share for each.

Travel by automobile – vehicle-kilometres travelled. Vehicle-kilometres travelled (VKT) is one way to measure motor vehicle use in a given time period. It is important because it is directly correlated to personal travel costs, environmental impacts, social costs and public health. Modelling conducted for the TMP update suggests that, on average, Ottawa residents drove 18.6 km/day/person in 2011, and that the mode share targets for 2031 would yield a lower average driving distance of 17.4 km/day/person (a decrease of 6.5%). When this change was considered with future population growth, the model estimated a 16% increase in total daily VKT between 2011 and 2031, from 17.1 million VKT to 19.8 million VKT.

Performance of 2031 Network Concepts and the Affordable Network. Section 6.1 and Section 7.2 identify two versions of future rapid transit, transit priority and road networks for Ottawa in 2031: the 2031 Network Concepts include the infrastructure that achieves the TMP’s targets for travel behaviour and level of service for roads and transit; the Affordable Networks include a strategic subset of the 2031 Network Concept that are affordable. Models of the Affordable Networks showed that, in combination, they would achieve similar overall mode shares as the 2031 Network Concept (although with some differences, such as a higher share of automobile drivers to and from the outer suburbs with the Affordable Networks). The main performance difference between the 2031 Network Concept and the Affordable Network is that the Affordable Network would have slower average speeds for automobile and transit travel (10% slower for automobiles, and 3% slower for transit).

Exhibit 2.15 2031 Mode Shares and Person-trips: Network Concept vs. Affordable Network (morning peak period)

Travel mode	Mode share		Person-trips	
	Network Concept	Affordable Network	Network Concept	Affordable Network
Walking	10.3%	10.2%	62,000	61,000
Cycling	5.0%	4.8%	30,000	29,000
Transit	25.6%	24.6%	154,000	148,000
Automobile passenger	11.2%	12.0%	67,000	72,000
Automobile driver	47.9%	48.4%	288,000	291,000
Total	100.0%	100.0%	601,000	601,000

Note: The values presented in this table are the results of network simulations. The values presented in Exhibit 2.12 represent mode share targets for 2031.

Environmental performance – greenhouse gas emissions. Transport Canada’s Urban Transportation Emissions Calculator (UTECE) was used to estimate Ottawa’s greenhouse gas emissions from automobile and transit travel for 2011, and for 2031 with the Affordable Road and Transit Networks. The UTECE model bases forecasts on vehicle-kilometres of travel, an output of Ottawa’s TRANS Mode, and incorporates information on vehicle technologies and fuel types. It is a high-level model and therefore does not explicitly account for congestion at the corridor level. The model estimated that per-capita greenhouse gas emissions per person from transportation would decrease by 14%, from 3.6 tonnes/person/year in 2011 to 3.1 tonnes/person/year in 2031. However, population growth over that period would lead overall emissions to rise by 6%, from 3.3 megatonnes/year to 3.5 megatonnes/year. Even when more efficient technologies are assumed, Ottawa’s targeted shift from automobile trips to walking, cycling and transit trips will not compensate for the impact of population growth. It should be noted, however, that the UTECE model includes assumptions about future changes in vehicle and fuel technologies; these assumptions are approximate, and faster improvements could yield significant reductions in both per-capita and total emissions.