

# **Cars, Roads, & Highways**

## **GGR424 - Transportation Geography & Planning**

Jeff Allen

University of Toronto

January 17, 2022

## Today:

- ▶ Cars & Highways - A Brief History
- ▶ Accessibility & Mobility
- ▶ Road Networks & Hierarchy
- ▶ Costs & Benefits of Auto-mobility
- ▶ Transportation Planning & Operations in Ontario

Toronto, before the car (1890s)



[https://upload.wikimedia.org/wikipedia/commons/d/dc/King\\_Street\\_East\\_1890s.jpg](https://upload.wikimedia.org/wikipedia/commons/d/dc/King_Street_East_1890s.jpg)



Via UofT Map & Data Library [https://maps.library.utoronto.ca/datapub/digital/NG/historicTOMaps/1893BarclayClark.Chromolithograph\\_of\\_City\\_of\\_Toronto.JPG](https://maps.library.utoronto.ca/datapub/digital/NG/historicTOMaps/1893BarclayClark.Chromolithograph_of_City_of_Toronto.JPG)

In 1911...



YONGE ST. NORTH FROM KING OCT 18 1911 1:30 PM

City of Toronto Archives, Series 372 s0372\_ss0100\_lt0239

## Increase in car ownership and auto-mobility in Canada

- *What's driving these trends?*

Year	Cars	People	Cars / person
1903	178	5,651,000	0.00
1913	54,380	7,632,000	0.01
1919	342,433	8,311,000	0.04
1930	1,061,500	10,208,000	0.10
1933	919,900	10,633,000	0.09
1941	1,281,200	11,507,000	0.11
1945	1,161,300	12,072,000	0.10
1956	3,200,000	16,081,000	0.20
1961	4,100,000	18,239,000	0.22
1982	10,500,000	25,118,000	0.42
2008	27,900,000	33,506,000	0.83
2013	31,046,000	35,158,300	0.88
2019	35,700,000	37,589,262	0.95

Sources:

- McNally, Larry. "Roads, Streets, and Highways," in Building Canada: a history of public works
- <https://www.statcan.gc.ca/en/topics-start/automotive>

## Personal Benefits of Cars:

- ▶ Improved *Mobility* and *Accessibility*
- ▶ Increased Capacity for *Activity Participation*
- ▶ Convenience, Freedom, etc.
- ▶ i.e. can decrease the negative *Utility* of travel

Overall, trends show increasing *Demand* for car-based travel over the past 120 years

e.g. having a car is associated with employment, job retention, and earning more money:

Transportation  
<https://doi.org/10.1007/s11116-018-9959-3>



## Disentangling the role of cars and transit in employment and labor earnings

Michael J. Smart<sup>1</sup> · Nicholas J. Klein<sup>2</sup>

© Springer Science+Business Media, LLC, part of Springer Nature 2018

### Abstract

We examine the relationship between transportation access on the one hand and individuals' employment and labor earnings on the other. We improve on existing studies by bringing a large national panel data set to bear on this question, attempting to disentangle the mechanisms by which individuals improve their economic standing and, finally, comparing the economic benefits to the direct costs of car ownership. To do this, we use nine waves from the Panel Study of Income Dynamics from 1999 to 2015. We find that access to a car is a strong predictor of future economic benefit for individuals, and that at very high levels of transit access, carless individuals can also fare equally well. Access to an automobile is strongly associated with employment, job retention, and earning more money over time. Though having a car is associated with economic benefits, owning and operating a car is expensive; yet, our findings suggest that the benefits may outweigh the costs for most people living outside neighborhoods with truly excellent transit service.

**Keywords** Economic mobility · Transit · Cars · PSID

<https://link.springer.com/article/10.1007/s11116-018-9959-3>

## Key Concepts in Urban Transportation

- ▶ Travel Demand
- ▶ Activity Participation
- ▶ Utility
- ▶ Travel Behaviour
- ▶ **Mobility**
- ▶ Accessibility

## Mobility

- ▶ *The ease of travelling*
- ▶ Measured via speeds and throughput

## Accessibility

- ▶ *The ease of reaching destinations*
- ▶ Depends on mobility, but also land-use (i.e. the proximity of destinations)
- ▶ Measurements:
  - ▶ minimum travel time to reach X
  - ▶ how many Y can you reach in Z minutes
  - ▶ combined indices (e.g. walkscore)
  - ▶ more on this in Week 5

# Mobility

Good Mobility



Bad Mobility



Transportation planning has historically focused on improving (auto)mobility

## Planning & Design Strategies for Improving (Auto)Mobility:

- ▶ Older strategies, e.g.
  - ▶ Building new roads/highways
  - ▶ Increase speeds/capacity of existing roads/highways
  - ▶ Cheaper gas
  - ▶ Lots of parking
- ▶ Newer strategies, e.g.
  - ▶ Real-time data (e.g. Google Maps, Waze, etc.)
  - ▶ ITS (Intelligent Transportation Systems)
  - ▶ Autonomous/Connected vehicles

# Improving (auto)mobility - Public Infrastructure



**FIGURE 3.** (a) The Middle Road before 1930.

SOURCE: Ontario Archives

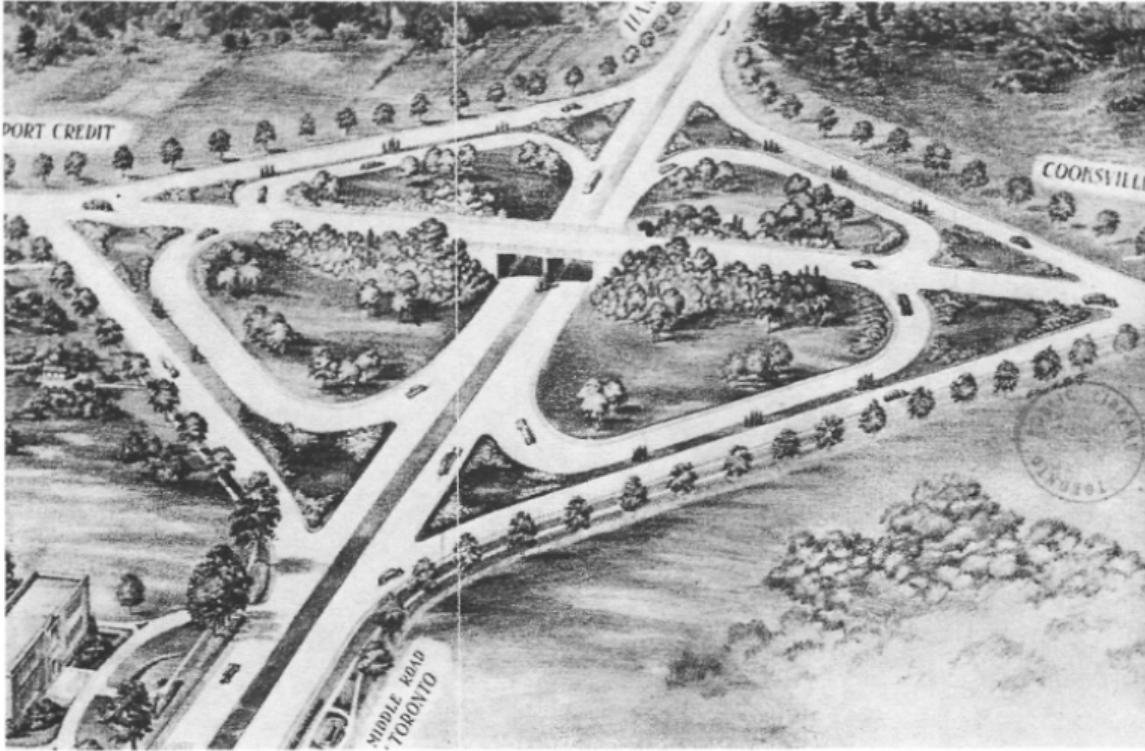


FIGURE 3. (b) The Middle Road after it was widened in 1939 to form the Queen Elizabeth Way.

SOURCE: Ontario Archives

The Queen Elizabeth Way: Public Utility Versus Public Space =

<https://www.erudit.org/en/journals/uhr/1900-v1-n1-uhr0860/1018953ar.pdf>



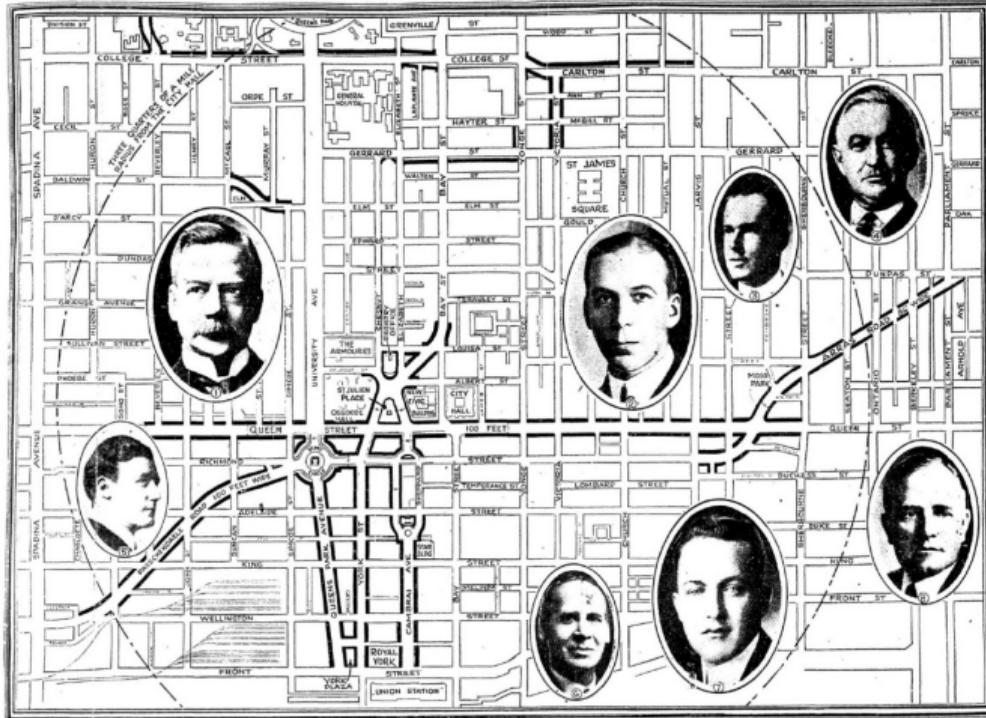
**FIGURE 4.** (a) Sketch for a cloverleaf at the intersection of the Middle Road and Hurontario Street, the first of its kind in Canada.

SOURCE: Toronto Public Library

The Queen Elizabeth Way: Public Utility Versus Public Space =

<https://www.erudit.org/en/journals/uhr/1900-v1-n1-uhr0860/1018953ar.pdf>

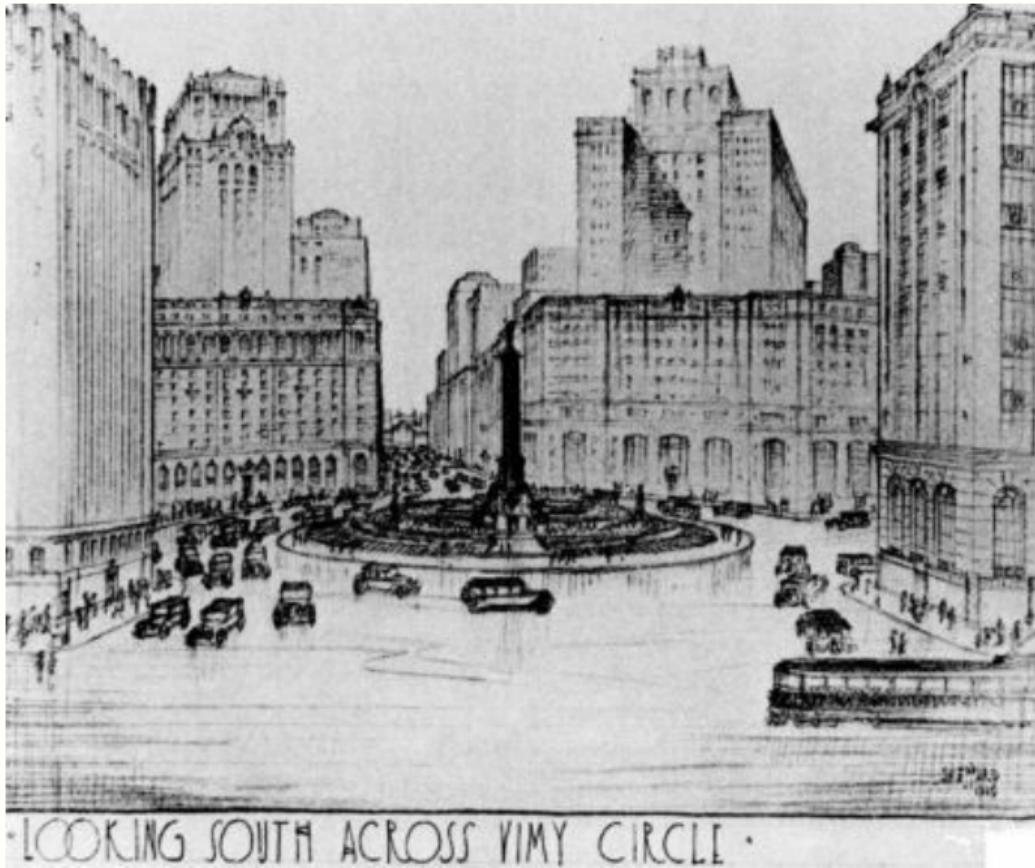
## **City Planning Commission's \$13,000,000 Plans For Improving Downtown Toronto**



The map contains practically the whole city planning development recommended by the city council. Twenty Ave. is shown extending south 200 feet west to Young Card, where the proposed government is said to be a new government, then southward to "Queen's Park" and the Devil's hole at a new place at the end of the street. York St. is widened and linked up with Bay "Highway Street." Cambrian Ave. extends 200 feet south from Queen and the Royal York.

Star offices and links up with Queen Street and the York St. extension. There are two new diagonal streets. These are: *Finsen* St., 80' road wide and *Arvid* St., 80' road wide, whose position is made visible on the map. Queen St. road and the Beverley and St. George St. is eliminated. Oxford is widened in the south end between Bloor and Queen Streets. The new street is 100' wide. The west side for the block between Bloor and Yonge Streets is reserved for improvements. Carlton St. is washed away from the west end of Yonge Street and the new street Yonge Street disappears. Victoria St. becomes the main entrance of the

nearby, traffic may experience severe delays. The Western Bypass is planned northward to Niagara and Buffalo St. through Victoria St. In the east, beyond Parliament St., Eastern Ave. is carried from Trinity St. to Front St. by a small trumpet interchange, the Western Bypass is planned northward to Niagara and Buffalo St. through Victoria St. In the east, beyond Parliament St., Eastern Ave. is carried from Trinity St. to Front St. by a small trumpet



• LOOKING SOUTH ACROSS VIMY CIRCLE •

Source: Hayes (2008) Historical Atlas of Toronto



1959 - Source: U of T Map and Data Library



U of T Map and Data Library: <https://maps.library.utoronto.ca/datapub/digital/NG/FY/1961GardinerExpresswayConstructionAerialFortYork.S3f189fo2xf.jpg>

## Promoting (auto)mobility - Parking!



City of Toronto Archives Series B s0008\_ss0004\_R0004\_I00011

## Promoting (auto)mobility - Corporate Interests: Retail



# Promoting (auto)mobility - Corporate Interests: Gas Companies

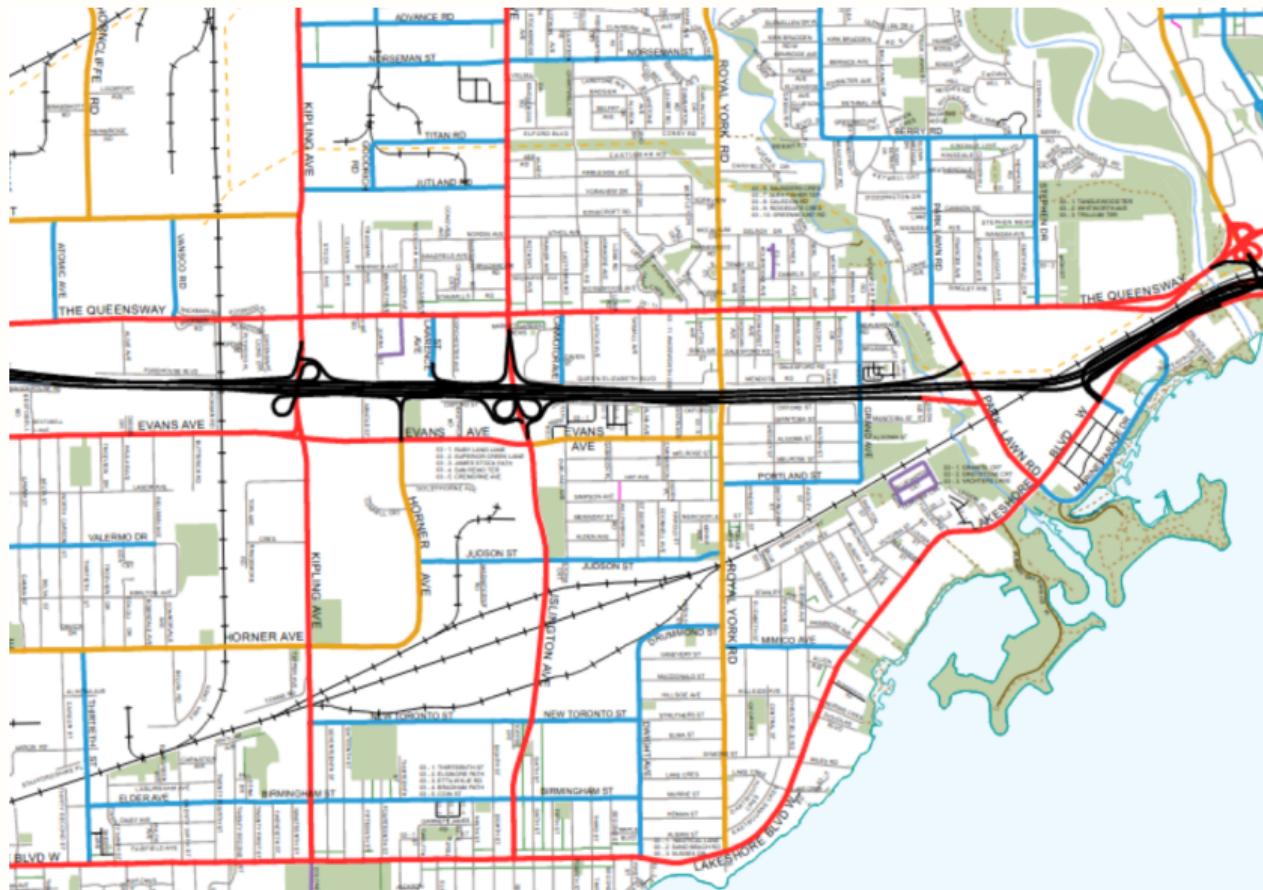




## Road Hierarchy

- ▶ Ranking of roads based on their functions and characteristics
- ▶ Historically (and still usually) based on mobility-based attributes like vehicle speeds and throughput
- ▶ e.g. common hierarchy
  1. Highway / Motorway
  2. Major Arterial
  3. Minor Arterial
  4. Collector
  5. Local
- ▶ Used for design and maintenance of road networks

# Current Road Hierarchy in Toronto:



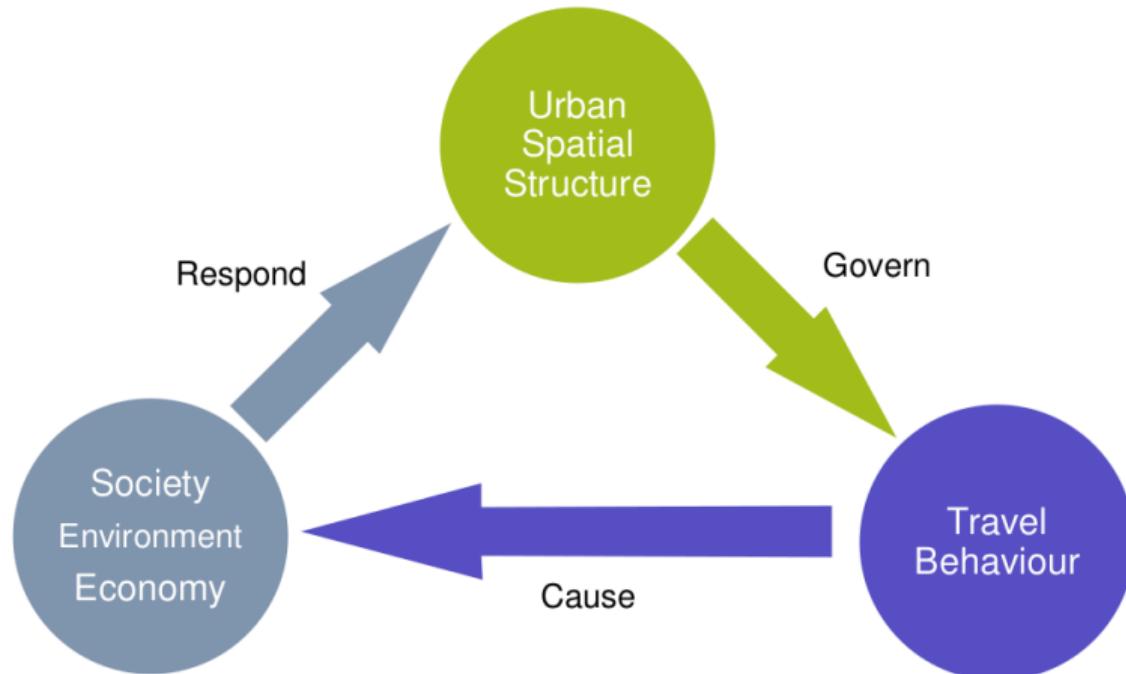
Arterial Roads = Stroads?



The Ugly, Dangerous, and Inefficient Stroads found all over the US & Canada [ST05]

<https://www.youtube.com/watch?v=0RzNZUeUHAM>

## What are the effects of expanding our road and highway networks? (i.e. continuing to plan for auto-mobility)



**1) What are the effects of expanding our road and highway networks on travel behaviour?**

People will drive more, but why?

**Induced demand** - as supply increases, costs drop, and demand increases

*"the tailor's remedy for obesity — letting out the seams of trousers and loosening the belt. [T]his does nothing to curb the greedy appetites that have caused the fat to accumulate."*

- Lewis Mumford

**What does this mean for transportation?**

See this weeks reading: [https://www.bloomberg.com/news/features/2021-09-28/why-widening-highways-doesn't-bring-traffic-relief](https://www.bloomberg.com/news/features/2021-09-28/why-widening-highways-doesn-t-bring-traffic-relief)

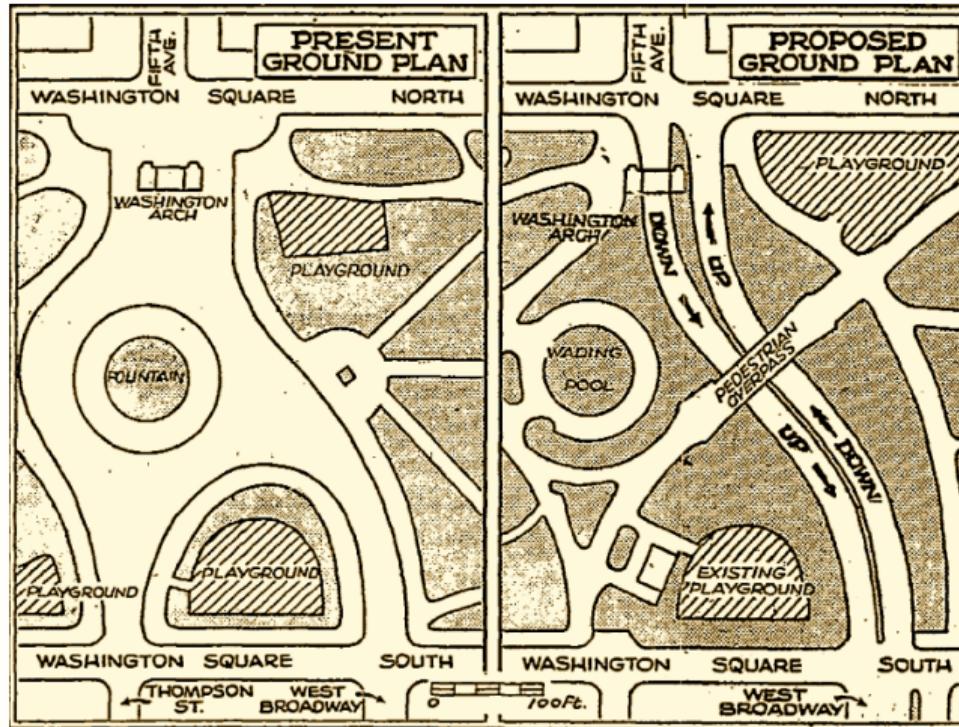
*Erosion of cities ...*  
(Jacobs, 1961)

Also see Robinson, R. (2011) The Spadina Expressway Controversy in Toronto, Ontario. *Canadian Historical Review*

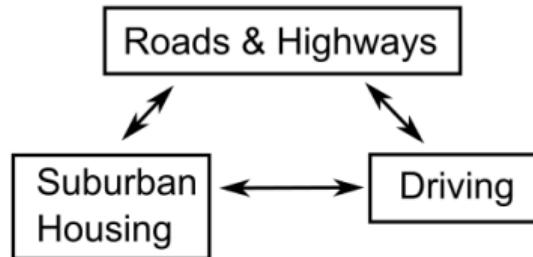
Image source: *The BAD TRIP, The Untold Story of the Spadina Expressway*



e.g. Washington Square ... *attrition of automobiles* (Jacobs, 1961)



## Positive Feedback Loops:

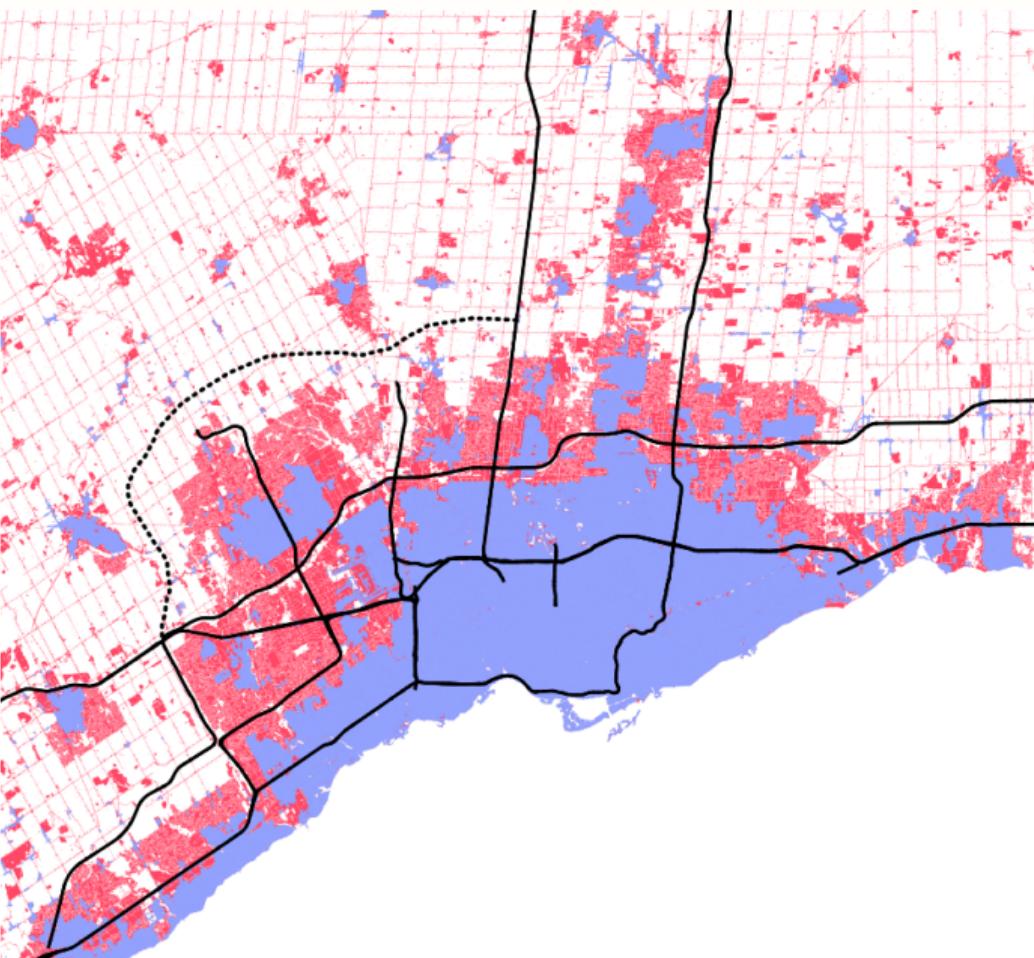


Research example: <https://www.jstor.org/stable/25098858>

### DID HIGHWAYS CAUSE SUBURBANIZATION?\*

NATHANIEL BAUM-SNOW

Between 1950 and 1990, the aggregate population of central cities in the United States declined by 17 percent despite population growth of 72 percent in metropolitan areas as a whole. This paper assesses the extent to which the construction of new limited access highways has contributed to central city population decline. Using planned portions of the interstate highway system as a source of exogenous variation, empirical estimates indicate that one new highway passing through a central city reduces its population by about 18 percent. Estimates imply that aggregate central city population would have grown by about 8 percent had the interstate highway system not been built.



# Debates over new highways continue ...



<https://www.highway413.ca/>

[https://www.inthehills.ca/wp-content/uploads/2020/11/413\\_GTA\\_WestCorridor14\\_withLEGEND\\_CORRECTED.jpg](https://www.inthehills.ca/wp-content/uploads/2020/11/413_GTA_WestCorridor14_withLEGEND_CORRECTED.jpg)

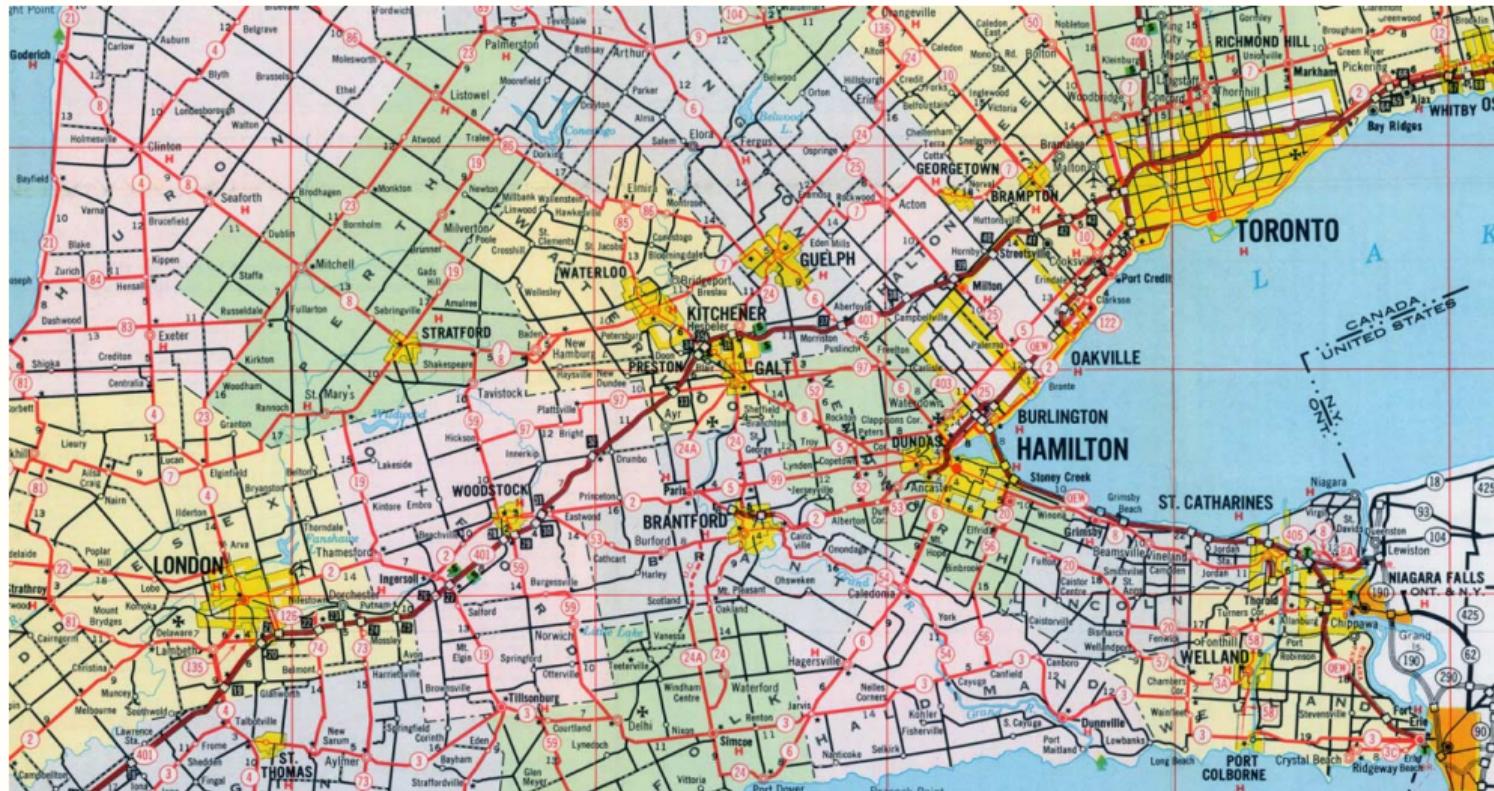
TVO (2018) Highways and our Transportation Future <https://www.tvo.org/video/highways-and-our-transportation-future>

## **Administration of roads and highways**

Usually tiered by government, e.g. in Ontario:

- 1.** Government of Ontario, Ministry of Transportation (MTO)
  - ▶ 400 Series Highways
  - ▶ "King's" Highways - "primary" highways (i.e. major rural routes)
  - ▶ 500/600 "secondary" highways (mainly in Northern Ontario)
- 2.** Local Governments (*Transportation Services in Toronto*)
  - ▶ Most Local Roads (e.g. see road hierarchy in previous slide)
  - ▶ Can include private access highways (e.g. DVP)

Ontario highways in red:



Common responsibilities of local and provincial transportation authorities

- ▶ Daily maintenance
- ▶ Resurfacing
- ▶ Signage and traffic signals
- ▶ Street furniture / sidewalks
- ▶ On-street parking
- ▶ On-street patios
- ▶ Redesign / reconstruction
- ▶ Planning & designing new infrastructure
- ▶ And more!

e.g. snow plowing in Toronto



The City of Toronto is ready with a snow clearing plan. Download this year's [information brochure](#) to learn more.

The City has a comprehensive and highly coordinated snow and ice clearing plan that prioritizes the safety and movement of everyone above all else. The winter service program is based on winter contract commitments, long-term weather patterns/average snowfall data, and more.

#### PlowTO Map

Real-time tracking to help you find out when roads have been salted and plowed in your neighbourhood.

#### When/How we Clear Snow & Ice

Learn about when and how the City clears snow and ice, including the approved levels of service.

#### Clearing Snow & Ice from the Sidewalk

Learn about what the City does to clear snow, what residents and business owners must do and a service for seniors and people with disabilities.

e.g. road redesign and construction

## Port Union Road Improvements



To learn more about the project, see the [presentation materials](#) from the Virtual Project Update Meeting held on November 30, 2021.

The City of Toronto will be widening Port Union Road from Lawrence Avenue East to Island Road. Work will include:

- addition of a second northbound lane
- complete sidewalks on both sides
- raised cycle track
- centre-turn lanes in some locations

<https://www.toronto.ca/community-people/get-involved/public-consultations/infrastructure-projects/portunionroad/>

## Case Study: Don Valley Parkway

- ▶ Major auto route into downtown Toronto
- ▶ 3 lanes in each direction, 12 exits
- ▶ Approximately 135,000 (weekday average) vehicles per day
- ▶ Original design of only 60,000 vehicles per day
- ▶ Ample congestion (i.e. high social and economic costs)
- ▶ Traverses environmentally sensitive area (Don Valley)



## Options for the Don Valley Parkway:

1. Maintain
2. Adapt, by adding tolls/congestion charges
3. Adapt, by increasing transit capacity
4. Widen highway
5. Remove entirely
6. Other/Combination



## **Next Week**

### Cycling & Walking:

- ▶ Walking and cycling in the city
- ▶ Health benefits of active travel
- ▶ Safety issues
- ▶ Streets as public spaces
- ▶ Designing "complete streets"