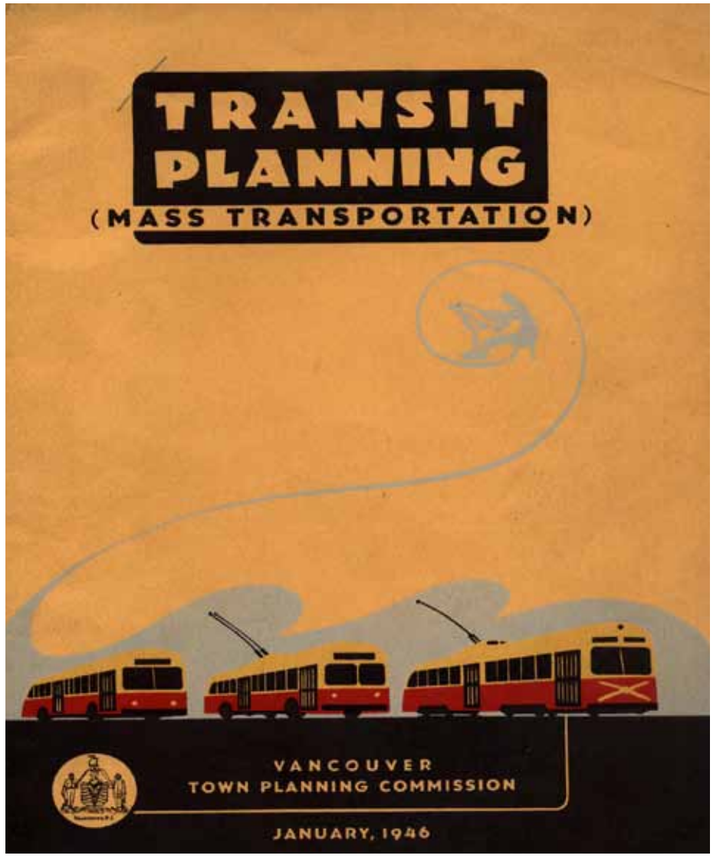
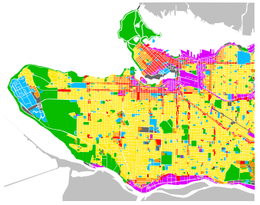
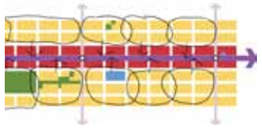
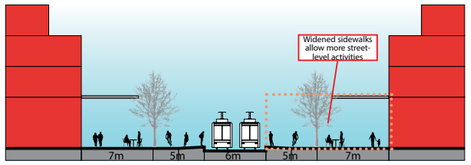








The City of Vancouver has both a challenge and an opportunity. The opportunity? Continue to lead North America toward a more sustainable future. The challenge? Do so in a way that cuts per capita greenhouse gas production 80% by 2050, all while improving our quality of life and reducing the cost of getting around. To meet this challenge we must dramatically change transportation, as transportation is this city's biggest single contributor of greenhouse gas. It's bigger than building energy use, bigger than industry, bigger than anything. The most practical way to achieve this goal is to gradually shift citizens away from single occupancy vehicles to zero to very low GHG transit, bikes and shoe leather.

Interestingly there was a time, not so long ago, when our city operated this way. Our city is in the form of a "transit city", the evenly spaced arterials originally designed such that every home was an easy walk to a streetcar line, and every streetcar line provided easy connections to rest of the city. This condition adhered between 1901 when the population of the city was only 30,000, until 1951 when the population of the city had grown to 345,000. Now when the city is twice that size, and increasing at a rate where a city of greater than 1 million inhabitants is not out of reach, the question arrises: what lessons can we learn from the streetcar era as we try to build a city around transit?

This chapter revisits the history and possible contemporary relevance of the streetcar as a primary mode of public transport within Vancouver. It explores the evolution of public transit within the city from horse-drawn carriages, track systems, streetcars, trolleys, to buses. This chapter also elucidates the role that the streetcar system played in shaping the current form of the city, its neighbourhoods and its suburbs, as well as qualities of resultant nodes and corridors within Vancouver. We move on to international examples of the morphology of transit cities. The chapter then explores the demise of the streetcar system in Vancouver and subsequent attempts at revitalizing this system. Finally, this chapter looks at the role of various transit technologies in a transit system.

Opposite, clockwise from top left:
Front cover of the 1946 Transit Plan for the City of Vancouver ; Toronto horsecar, early public transit; Vancouver land use circa 1980; streetcar routes circa 1940; diagram of a typical corridor; section of an international example of a transit neighbourhood.

history and morphology of the vancouver

TRANSIT CITY

1.0

The streetcar has played a valuable role in the formation of Vancouver neighbourhoods and we hope it will continue to do so in the future

Key characteristics in the evolution of the transit city:

- Changes in transit technology and the rise of internal combustion travel led to the demise of the streetcar.
- The streetcar played a vital role in the creation of Vancouver's grid and initiating the spread of urbanization
- The physical morphology of transit neighbourhoods was locally and internationally significant in creating complimentary yet functionally different corridors and nodes

WORLD TIMELINE

Toronto - Horsecar [1]

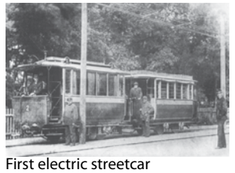
1828

London - Cable rail drums [2]

1840

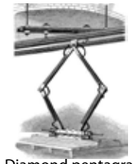
Austria - Electric trackless trolley [3]

1881



First electric streetcar Austrian Southern Railway [4]

1883



Diamond pentagraph [5]

1895

London - trolley and autobus in operation [6]

1920

Toronto - PCC tram [7]

1938

The earliest horse-drawn public transit system is implemented in Nantes, France. London begins omnibus services in 1829.

In the early 1800s horse cars placed on steel rail tracks were developed. They allowed fewer horses to be harnessed to pull a car and provided a more comfortable ride along a fixed route. By 1840, they were a major transportation mode in cities across North America.

1828 Baltimore, Maryland introduces one of the earliest streetcar systems, a tram car pulled by horses. New York installs a similar system in 1832.

1830 Steam-powered buses are developed in England. They are faster and more efficient than horse trams but are heavily restricted by legislation.

1840 The London and Blackwall cable railway opens in London. It closes eight years later due to lack of durablity of rope used to pull the cars.

1873 San Francisco begins operation of a cable car system. The *Hallidie Cable Cars* are effective in hilly terrain, but have high infrastructure costs and safety issues.

1880 Frank J. Sprague develops the spring-loaded trolley pole in Menlo Park, New Jersey, which allows a conducting wheel to roll along an overhead power transmission cable.

1882 Ernst Werner von Siemens in Austria developed his *Elektromote*, an early trackless trolley. The vehicle used a *Kontaktwagen* or contact cart, that rolled along the two overhead wires and was connected to the vehicle with a flexible cable. This device became the foundation of the first electric streetcar in Mödling and Hinterbrühl 1883, and later the trackless-trolley or trolley-bus systems that became the norm in urban areas during the 20th century.

1888 The new Sprague Electric Railway & Motor Company puts the first successful large electric street railway system into operation in Richmond, Virginia.

1895 The pantograph is developed by *Baltimore and Ohio Railroad*, allowing faster travel than previously possible with trolley pole systems.

1901 Max Schiemann opens the world's first trolley-bus line in Dresden, Germany.

1910 Two cities in the UK, Leeds and Bradford, begin operating electric trolley bus systems. Los Angeles begins operating one of the first trolley bus systems in North America.

1936 Manufacturing of the iconic PCC Tram design begins in the United States. This was the first standardized and modular streetcar design and after WWII it was licensed for manufacturing to other countries, mainly in Europe. *Fiat* developed the Madrid tramway in 1942. An earlier iteration of *Bombardier* in Belgium built hundreds of streetcars. Utilizing new acceleration controls and braking mechanisms, as well as noise reduction components, the PCC tram was capable of speeds up to 80 km/h. By 1950, most remaining streetcar systems were converted to PCC systems.

emergence of TECHNOLOGY 1.1

TEAM MEMBERS: Niall MacRae and Nicci Theroux

VANCOUVER TIMELINE

1890

First streetcars in Vancouver [9]

1913

Hobble Shirt Car - a "stepless" streetcar - accessible transit that accommodates women's fashion [10]

1915

BC Electric operates streetcars on 116.25 km of streets in Greater Vancouver [11]

1948

Vancouver begins to phase out its trams, replacing them with both diesel and electric trolley buses. [8]

PRINCIPAL SYSTEM

Vancouver Electric Railway and Light Company
1890

Consolidated Railway and Light Company
1894

Consolidated Railway Company
1896

BC Electric Railway Company
1897

BC Hydro and Power Authority
1962

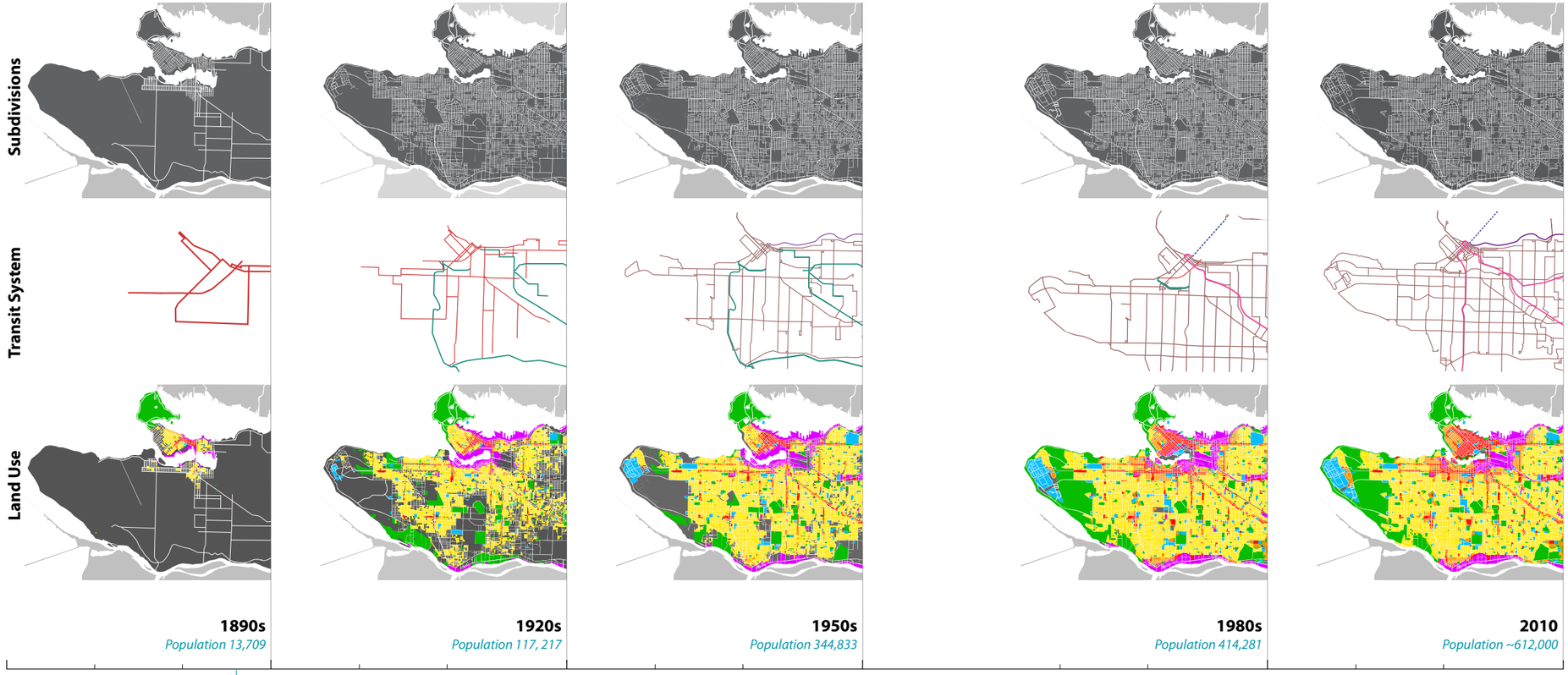
Greater Vancouver Transit
1973

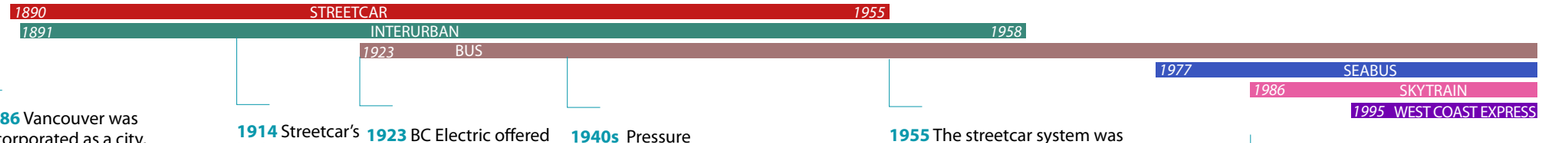
Vancouver Regional Transit System
1983

Translink
1999

Cities with streetcars in Canada include:

1890 - Vancouver, Victoria
1891 - Ottawa
1892 - Toronto, Hamilton, Winnipeg
1894 - Montreal
1895 - Belleville, Guelph, Kitchener
1896 - Halifax
1897 - Québec
1900 - St. John's
1908 - Edmonton
1909 - Calgary





1858 Gold rush of 1858 brought transient miners to the region. Land of up to 160 acres could be bought cheaply on the condition settlers stay and maintain their lot.

1870s Speculation on the terminus location of CPR railway spurred development.

1886 Vancouver was incorporated as a city, burned down, and rebuilt the same year.

1914 Streetcar's highest ridership recorded at 3.5 million riders per month.

1923 BC Electric offered its first bus service as an extension of its streetcar service.

1940s Pressure to provide housing during and after WWII led to new subdivisions.

1955 The streetcar system was dismantled by BC Electric and completely replaced by the trolley bus system.

Data source:
Macdonald, Bruce. Vancouver: a Visual History. Vancouver: Talon, 1992. Print.

1986 Vancouver hosted the World Expo.

the relational HISTORY of subdivisions and transit

1.2

TEAM MEMBERS: Paula Livingstone and Mary Wong

Development of Vancouver:
Incremental change between land subdivisions + the transit system was the foundation of the city's footprint

- The initial grid of the city was based primarily on 160-acre rural lots.
- Early transit traveled on the edges of large lot parcels, defining main arterials and catalyzing further development.
- Public transit enabled the spread of urbanization including residential and commercial uses. In turn, land use created points of interest that created further demand for transit.

- Low-density residential
- Mid-density residential
- High-rise, mix used, commercial
- Parks, agricultural lands
- Institutional
- Industrial
- Undeveloped

Melbourne makes an interesting comparison to Vancouver. Both cities were founded in the mid 19th century at the British Empire's zenith. However, the two cities have taken somewhat different paths toward transportation in recent decades. Examining two Melbourne neighbourhood nodes- the Swanston/La Trobe junction and the Acland/Carlise junction, particularly their land use patterns, urban form, programs and connectivity- helps one better understand the relation between tram-oriented corridors and place-making.

Swanston/La Trobe Junction. Swanston Street is the civic spine that connects neighbourhoods north and south of the Central Business District. The Swanston/ La Trobe junction is characterized by educational institutions like RMIT University and The State Library, commercial venues like the Melbourne Central Shopping Centre, and mid- and high-density housing. Because it includes the Melbourne Central Train Station, the junction is an inter-modal transport node. Chinatown and Greek Town are no more than 5 minutes away. Swanston Street has 9 tram lines and 56 million passenger trips annually. On January 27, 2010, Mayor Robert Doyle declared Swanston Street car-free; this entails reducing road width to fit just 2 trams and widening the sidewalks to allow more activities like al fresco dining.[1]

Acland/Carlise Junction. The No. 16 tram traveling from Swanston Street reaches the Acland/Carlise Junction, the heart of the inner city suburb of St. Kilda Beach Community, in about 40 minutes. This junction is characterized by public venues like the Palais Theatre, Luna Park and the St. Kilda Night Market, all of which are anchors drawing visitors to the neighbourhood. Acland Street itself has numerous eateries, night spots and shops housed in 2 to 5 storey buildings. The 3000m^2 Peanut Farm Community Garden is nearby. The area also has mid- to high-density housing less than 5 minutes away, at spots across the lane, and even on the same block as the shops.

Notes:

[1] City of Melbourne, *Future Melbourne Committee Report - Redevelopment on Swanston Street* (2 February 2010)

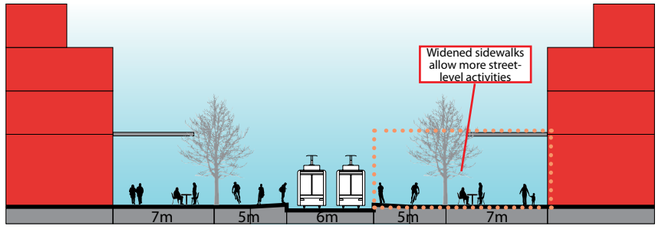
Opposite, top and bottom:
Respective 5 minute walking circles and street sections at the Swanston/La Trobe and Acland/ Carlise junctions showing land use and typical street activities.

Below, top:
Typical street section of the proposed Swanston Street Redevelopment Plan showing widened sidewalks to provide off-street bike lanes and more space for street furniture and street-level activities like special events, performers and al fresco dining. The redevelopment aims to make Swanston more walkable and bikeable by becoming uncumbered by motor vehicles.[1]

Below, bottom:
Melbourne's contemporary tram network covers essentially the same parts of the city as it did in 1908.

Melbourne Tram System
28 Routes
245 KM
593,000 Passengers per day

Melbourne Metro System
16 Lines
372 km
733,000 Passengers per day.



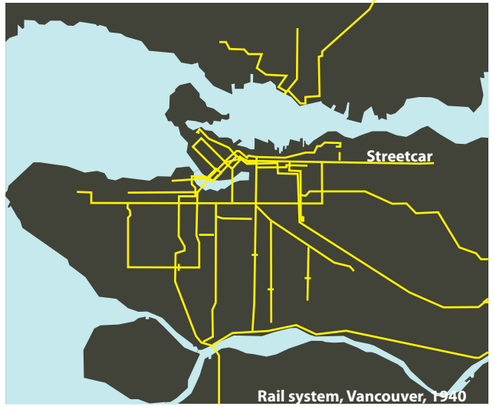
the physical
MORPHOLOGY
of transit neighbourhoods as they emerged around the world

1.3

TEAM MEMBERS: Pat Chan and Jingjing Sun

Key neighbourhood characteristics:
Urban form on Swanston Street and in the St. Kilda Beach Community

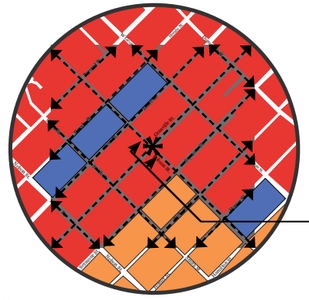
- Swanston and Acland Streets are characterized by 2 to 6-storey streetwalls with ground-level commercial retail units and upper floors set back from the streetwall.
- Both have residential developments aligning commercial strips, often on upper floors of mixed use buildings.
- Both areas have corridors with 2 middle tram lanes flanked by a car lane on either side. Additionally, the trams act as traffic calming devices: driving on tram lines is not permitted except when overtaking, thus the streets have only 2 fully functioning car lanes.



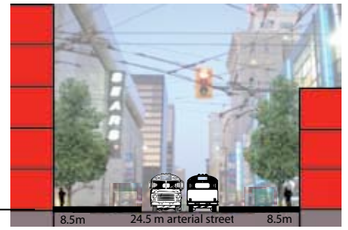
Vancouver underwent a transportation revolution at the turn of the 20th century, adopting the streetcar system as its predominant mode of transit. Though streetcars were replaced by motor vehicles and bus systems by the 1950's, their network has had a permanent and profound impact on the neighbourhood morphology of the city, creating a grid pattern with a high degree of connectivity. As it was intended from the inception of the transit city, the current grid system allows pedestrians to access a wider area in 5 minutes of walking compared with the accessible area provided by the typical suburban cul-de-sac. Cities with streetcar-inspired urban form can support a higher density than their suburban counterparts. A more sustainable future city will utilize lessons learned from the positive impact of streetcars. As illustrated below, Granville Street has maintained an important role as a vibrant commercial and entertainment thoroughfare. Even in the absence of streetcar systems today, neighbourhoods touched by the historical streetcar have maintained walkable, transit oriented neighbourhoods.

Above, left and right:
Vancouver's streetcar system in 1940 was extensive and accessed most of the lower mainland as well as Richmond and North Vancouver. Today, the Skytrain and west coast express are the only rail systems now in use.

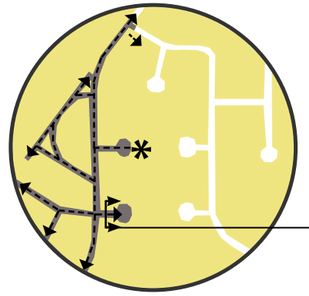
Below, left to right:
Granville Street has undergone many changes over the last century. In 1906, observe the streetcar and crowd of people using the street; By 1950 at the end of the street car era, cars dominated the street and people were pushed to the slim sidewalks. In 2010, people were allowed back in the street when it was closed to vehicular traffic for the Olympics.



Streetcar neighbourhood, downtown

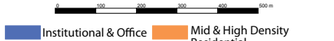


Above, left: At Granville and Robson, the grid pattern of the streetcar has given life to a walkable, high density, transit oriented neighbourhood. A pedestrian is able to reach many more destinations within 5 minutes.
Above, right: A typical section of Granville, showing the mixed use buildings and street layout.



Non-streetcar neighbourhood, Coquitlam

Above, left: A typical suburban neighbourhood in Coquitlam shows the cul-de-sac dominated street pattern and low density residential homes.
Above, right: A typical suburban street in Coquitlam with large setbacks and single family homes.



Notes
Patrick Condon. *Seven Rules for Sustainable Communities.* (Washington, DC: Island Press, 2010).

Photo Credits:
Cornish, Columbia Street 1890, Vancouver Online Archive.
Granville Street Postcard 1950, Vancouver Museum Collection.
Granville Street 2010, Beyond Robson Online.
Philip T. Timms, Granville Street 1906, Vancouver Online Archive.
Robert Jago, June 11, 2007, New Westminster, A Dime a Dozen Online Blog.

New Westminster, 1890

Below, left to right:
New Westminster has retained its walkable nature in part due to the prior existence of the streetcar, unlike the Coquitlam neighbourhood featured in Figures 8-9.

New Westminster, 2007

the physical MORPHOLOGY of the transit neighbourhood in vancouver

1.4

TEAM MEMBERS: Rebecca Colter and Sam Mohamad-Khany

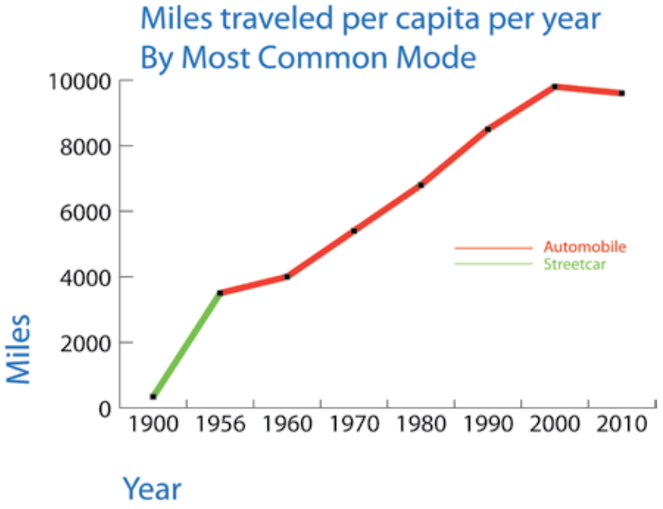
Key morphology characteristics:
The transit grid creates walkable, transit oriented neighbourhoods.

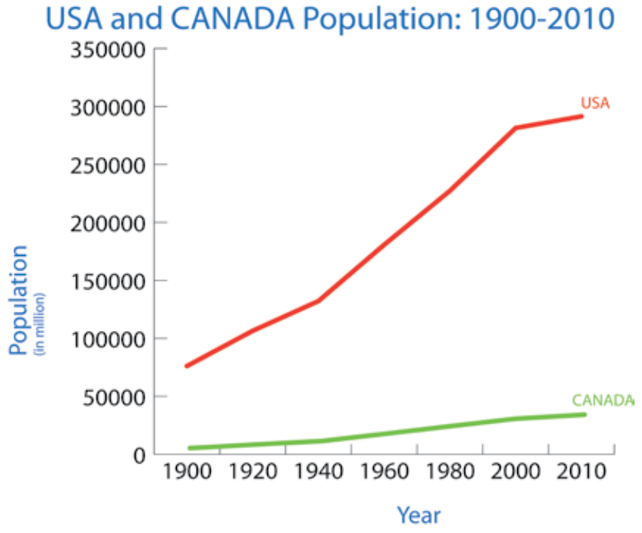
- Transit neighbourhoods are comprised of grids, producing dense, walkable, transit-oriented streets.
- The morphology of the streetcar still exists in Vancouver, despite the death of the streetcar system in the 1950's.

Population boom. Energy use increases see no stop in sight. It's time for a change. Speaking of change, make sure you have exact change for your next ride on public transit!

The increased efficiency of our modes of travel has done little to curb our appetite for energy. There are more of us and we are traveling farther and more frequently than ever before. In the 1940's, travel to work accounted for 40% of all automobile trips: by 2009 only 27% of trips were to and from work. The communities that we live in are more dispersed so that a vehicle is needed for activities that- during the streetcar era- could have been accomplished by walking or public transit.

When considering the planning of a public transit system, it is critical to understand the relationship between the mode of transportation, land use and density. Population and job density are directly related to mode of travel. As density decreases, gas consumption will increase because the land uses become more spread out, making the operation and expansion of public transit less economical.



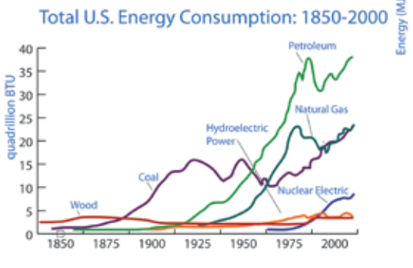


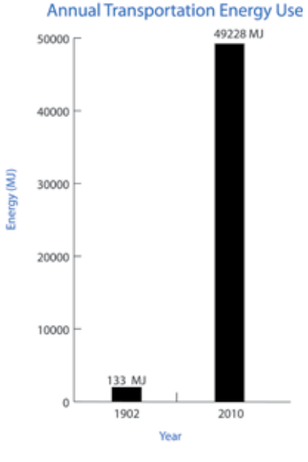
Opposite, clockwise from top to bottom:
Streetcars were the most common mode of transportation for most North American cities between 1900 and 1950. The gradual reduction in average urban density in almost all North American metropolitan regions, including the Vancouver region, has corresponded with an increase in the average length and number of trips per household, and a corresponding drop in the use of all transit, as well. In 1900 the average American travelled 340 miles per year for local travel, most of it on foot or by streetcar, while in 2010 that number had increased 27 times to nearly 9,000 miles, most of that by car. The numbers are similar for Canada.

The city of Vancouver, as opposed to the region of Vancouver, has fared better, with only one period during the 1970s when density decreased slightly. During other decades density has steadily increased with transit ridership remaining robust and trip lengths remaining fairly stable.

Below, left:
Over the last 150 years the types of energy sources have grown. Each of these different energy sources have different rates of consumption. The development of petroleum as a fuel resource was directly related to the growth and popularity of the automobile as a desired means of transportation.

Below, right:
Although the fuel efficiency of motor vehicles has increased over time, these gains have been lost to ever increasing average trip distances.





ENERGY USE
in the streetcar era compared to the current era

1.5

TEAM MEMBERS: Margaret M. Soulstein and Neda Roohnia

Fuel efficiency gains undercut by travel distances:
Travel less. A lot less.

- Our appetite for travel has increased so fast that it dramatically outstrips increases in efficiency.
- Autos, once used largely to get to work, are now used mostly for everyday needs.
- Increased density and a wider distribution of affordable housing and jobs has been shown to be the most efficient way to reduce our appetite for travel.
- A shift toward low GHG transit (electric) combined with appropriate and equitable land uses seems the most practical long term solution.

References:

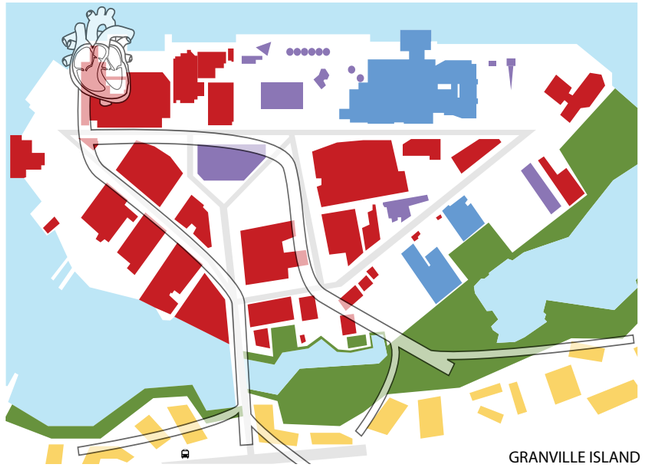
American Public Transit Association, 1998 Transit Fact Book, Washington, DC, 1998.; Coffey, R.A. and Lowson, M.V. 1996. A Comparative Analysis of Energy Usage and Emissions of Transport Systems. in Urban Transport and The Environment II, eds. Baldasano Recio, J.M. and Scharov, L.J. Computational Mechanics Publications. ; Condon, P.M. and Dow, K. 2008. Foundational Research Bulletin, no. 7 (September). http://www.sxd.sala.ubc.ca/8_research/sxd_FRB07Cost_Comparisons%20Jan%209.pdf.; Dickens, M. and Neff, J. 2010. 2010 Public Transportation Fact Book. American Public Transportation Association. ; Jones, JR., D. 1985. Urban Transit Policy: An Economic and Political History. Prentice-Hall, INC., Englewood Cliffs, New Jersey 07632 ;http://cta.ornl.gov/data/chapter8.shtml ;http://en.wikipedia.org/wiki/Demographics_of_Canada; http://en.wikipedia.org/wiki/Demographics_of_the_United_States; http://graphics8.nytimes.com/images/2010/05/02/business/02metrics/02metrics-popup-v3.jpg; http://nhts.ornl.gov.; http://www.bts.gov/publications/national_transportation_statistics/html/table_04_23.html; http://www.eia.doe.gov/emeu/rtecs/contents.html; http://www.epa.gov/otaq/fetrends.htm#report; http://www.lafn.org/~dave/trans/energy//fuel-eff-20th-1.html; http://www.nhtsa.gov/cars/rules/CAFE/HistoricalCarFleet.htm

Nodes, such as Granville Island, act as gathering points, drawing in people from surrounding areas. Whether through their status as a major commercial centre, or one specializing in industrial uses, nodes contain specific services not found in other locations. As a result, activity increases the closer to the centre of the node one gets and the experiences created in the node will be shared by all users. In this sense the node operates much like a heart. By their very characteristics however, nodes result in a stratification of services, with different zoning types separating one another, creating increased travel distances.

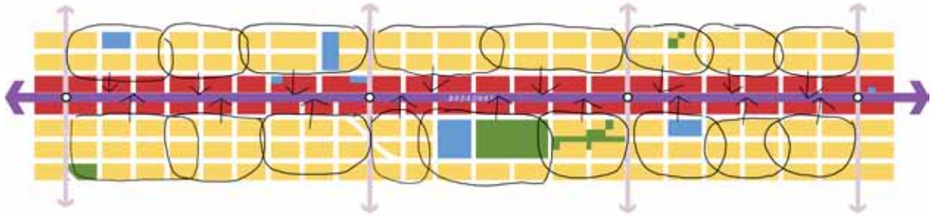
Corridors, such as Broadway in Vancouver, are typically found in most North American cities. To the untrained eye a corridor can appear as a perfunctory stretch of undifferentiated space, but it has the potential to provide a shared sense of place to all residents along it. A corridor is actually made up of smaller, overlapping parcels of neighbourhood blocks. Contiguous parcels allow for similar but not identical experiences and these subtle nuances along the corridor may only be visible to the residents themselves.

Corridors are often compared (somewhat incorrectly) to arteries, but they share more likeness to neurons: they should not be thought of as expressways shunting people from node to node, but like neurons firing in succession, and each parcel plays an important part of the whole.

Thus, while nodes and corridors are functionally different, each plays an equally important role and operates at a different scale within the city. It is essential to provide both types of experience for residents to allow for a rich sense of place.



GRANVILLE ISLAND



KITSILANO AND THE BROADWAY CORRIDOR

NODAL SYSTEM

CORRIDOR SYSTEM

Top, Left:
Granville Island is one of the major nodes in Vancouver. Its *heart*, the market and shops in the northwest (red), draws in people along *arterials* from residences (yellow) and bus stops along the periphery of the island. Some traffic also directs to industrial (purple) and civic (blue) areas.

Middle, Left:
The Broadway corridor as it operates throughout Kitsilano. It is made up of smaller parcels of neighbourhoods that connect residences (yellow) to commercial and mixed use places (red) along the main corridor.

Bottom, Left:
A diagram comparing a nodal system to the heart and a corridor system to a neuron pathway

Below:
(top) The market, Granville Island's heart, sees much higher traffic than its peripheral areas, such as the green space in the South East.

(bottom) Two views showing different parts along the Broadway corridor, each with a distinctly different character.

the qualitative public realm of
NODES & CORRIDORS
in transit city neighbourhoods

1.6

TEAM MEMBERS: James Godwin and Lisa Lang

In the anatomical city, nodes are the heart and corridors are the neurons: **They are of equal importance within the fabric of the city and are functionally complimentary to one another**

- Nodes act as key areas with distinct characteristics that draw people in from surrounding regions through the specialized services they offer
- The lack of mixed use zoning in nodal planning results in large distances that must be traversed in order to access each node
- Corridors are composed of linear parcels of micro-neighbourhoods, each with its own sense of place along the corridor
- Corridors and nodes compliment one another nicely in city planning to create distinct areas and rich experiences for residents and visitors

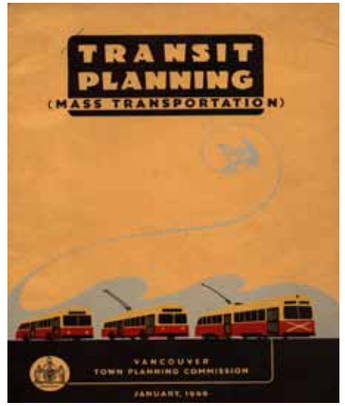
The complete disappearance of streetcars from Vancouver's urban landscape was unanticipated even by those who facilitated the demise. The BC Electric Railway Company decided in the 1940's to modernize Vancouver's transportation system by converting portions of the electric streetcar and interurban networks to trolley coaches and motorized buses provided by the Pacific Stage Lines bus company. These plans were reinforced by the 1946 Transit Plan, as is demonstrated in the excerpt in the box to the right.[1]

The plan further emphasized the importance of providing efficiency and convenience with a modernized transportation system. A strategic framework was thus set facilitating the development of an overarching perception that a bus dominated transportation system was the best option. The ability of rubber-tired vehicles to move freely over streets without being tied to tracks, as well as the ability of buses to use the sidewalk for boarding and alighting (rather than forcing passengers to get on and off in the middle of the street), were compelling reasons for the switch.

Suburbs, of which streetcars ironically catalyzed development, were continuing to grow, requiring the expansion of transit lines. It proved cheaper to convert to trolley coaches or motorized buses instead of expanding the streetcar network. This cost effectiveness was achieved in comparison to the higher initial infrastructure costs required by streetcars. The street paving programs initiated by the 1946 Transit Plan under the joint leadership of the City of Vancouver and BC Electric reinforced the preference for rubber-wheeled vehicles. Finally, all of these factors supported the central objective to modernize Vancouver's transportation system to make it more like comparable US cities, which had previously rid themselves of their streetcars and were pursuing auto-centric planning aspirations.

Therefore when repaving streets, BC Electric chose to do so without rails. Trolley coaches made their debut with "a new, faster, more silent look" on August 14th, 1948 as streetcars were stripped, thrown to their sides and burned next to the Kitsilano shop and barn.[2] In 1949, a total of 48 streetcars had been burned and the network had been reduced to eight lines. Vancouver streetcars made their last trip on April 24th, 1955 accompanied by a celebratory aura of nostalgia.[3] Contradiction was inherent in the public's bittersweet longing for a recent past made joyful with the presence of the streetcar and the simultaneous desire for the technological prowess of diesel powered buses and trackless trolleys. Fortunately the urban network of the transit city remains inherent in Vancouver's form, and trolley buses running along historic streetcar lines still serve as a vital component of the city's transit system.

> *The business district and other major objectives of traffic must be properly served and the routes must be related to the desirable future pattern of population. The routes should be located upon the major street system, since wide, direct and well paved streets are fundamental to an efficient transit system.*[1]



Notes

1 Vancouver Town Planning Commission *Transit Planning.* Vancouver: City of Vancouver, 1946.

2 "50 Trolley Buses Start Fraser Service on Monday" *Vancouver Province* Saturday August 14, 1948

3 Ewert, Henry. The Story of the BC Electric Railway Company Vancouver: Whitecap Books, 1986.

Above:
A series of images taken from early 1950's video footage of streetcars being torched beside the Kitsilano car barn under the Burrard bridge. (image: Now & Then: British Columbia Electric Rail Video)

Top, left:
An ad for electric trolley coaches (image: http://www.trams.bc.ca/galleries.html)

Bottom, left:
Front cover of the 1946 Transit Plan for the City of Vancouver (image: http://www.taylornoonan.com/nextstop/PHP/tms_doc_search_html.php)

the REMOVAL of streetcars in Vancouver

1.7

TEAM MEMBERS: Sara Orchard and Tate Francesca White

Out with the old:
Rationale for removing Vancouver's streetcars can be attributed to the following factors

- Changes in urban form: suburban growth required the expansion of transit lines.
- Cost benefits: it proved cheaper to convert to trolley coaches or motorized buses instead of expanding the streetcar lines.
- Road paving: street paving programs reinforced the appropriateness of rubber-wheeled vehicles.
- Modernization: the streetcar infrastructure was aging and required replacement by what was considered more modern technology.
- Flexibility: Rubber-tired vehicles could move freely over streets without being tied to tracks, which improved the operation of vehicles on increasingly busy streets.
- Accessibility and Safety: The ability of buses to use the sidewalk for boarding and alighting (rather than forcing passengers to get on and off in the middle of the street) increased passenger safety and comfort.

Comparative Analysis of Transit Options

Shorter stop distance = more accessible to passengers who live along the corridor.

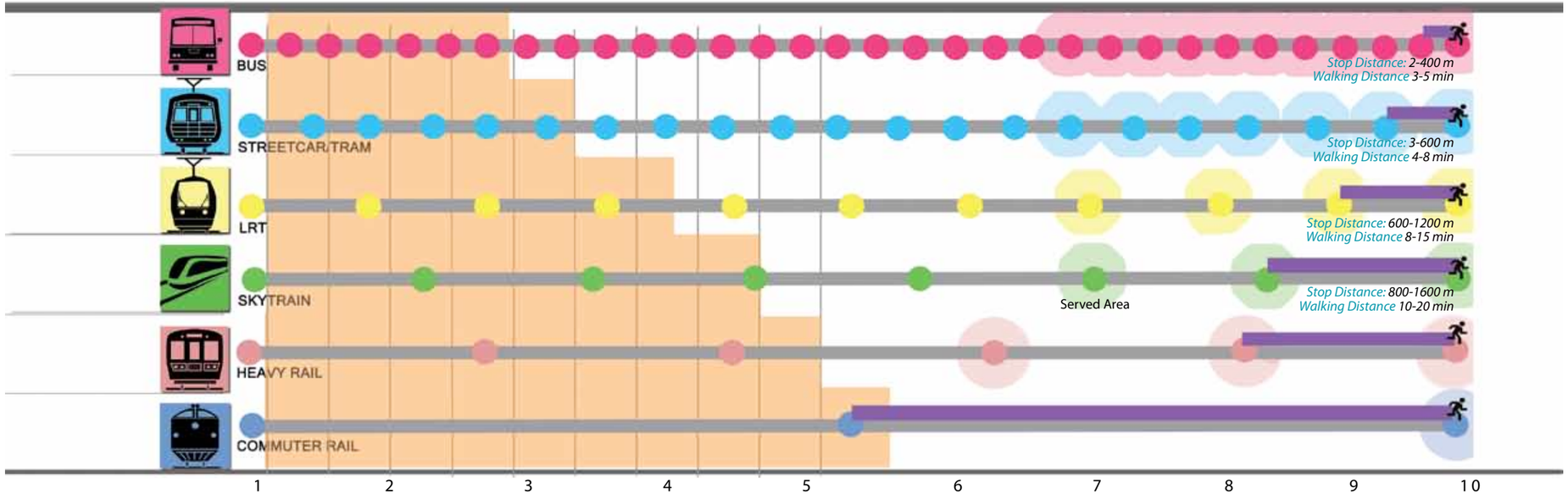


Image credit: Jia Cheng and Cindy Hung

Aligning land use and transportation planning is critical to creating cities with sustainable transportation systems. The most important aspect of this is to encourage land use where many key origins and destinations are close together, allowing people to travel as much as possible by active modes such as walking and cycling. In a large region like Vancouver, longer trips will still be necessary, and city-wide and regional land use should encourage those longer trips to be made by transit.

For public transit to be successful it needs to provide both accessibility and mobility. Ideally, a more sustainable Vancouver would include a range of transit services that serve different needs, with local services both providing direct access to where people need to travel and tying into the larger backbone of a fast, high-capacity transit network that serves the larger region.

At the most intimate scale, a fine grained network of buses and trams provides the ability to access transit service close to where people live, work and play.

For trips that require greater distances to be traveled, the local network ties in with rapid services such as bus rapid transit (BRT), light rail transit (LRT), and heavy rail (or metro) systems. These fast, high-capacity services make transit competitive with driving, which is key to getting people out of their cars.

At the regional scale, commuter rail ties one community to the next, providing alternatives to long distance car travel.

energy use, capacity and operations costs:
COMPARISON
with other transport modes

1.8

Ideally, a more sustainable city of Vancouver would include a range of transit technologies that serve different needs.

In the City of Vancouver, buses provide local service while the "Skytrain" metro system provides cross city and cross region trips. Also available are commuter rail line (the West Coast Express) for workers commuting to downtown Vancouver, and the SeaBus service across the Burrard Inlet.

A more sustainable Vancouver would be one where, as it grows, we shift more trips toward low to no GHG transit, and away from high GHG personal automobiles. The City is now engaged in a discussion around how best to accomplish this, and what the best mix of technologies might be. The list would include: trolly busses and trams, LRT, BRT, expanded Metro, and additional water transit. Even gondolas, which have been successfully installed in Portland OR, may have a role to play.

References:

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