



Sustainable Cities



# Implications of Alternative Growth Patterns on Infrastructure Cost

- 
- Case Study – The City of Calgary
  - Introduction to the Infrastructure Costing Guide
  - Workshop
  - Session feedback



# Cost of Growth: The Calgary Experience

FCM Sustainable  
Communities  
Conference

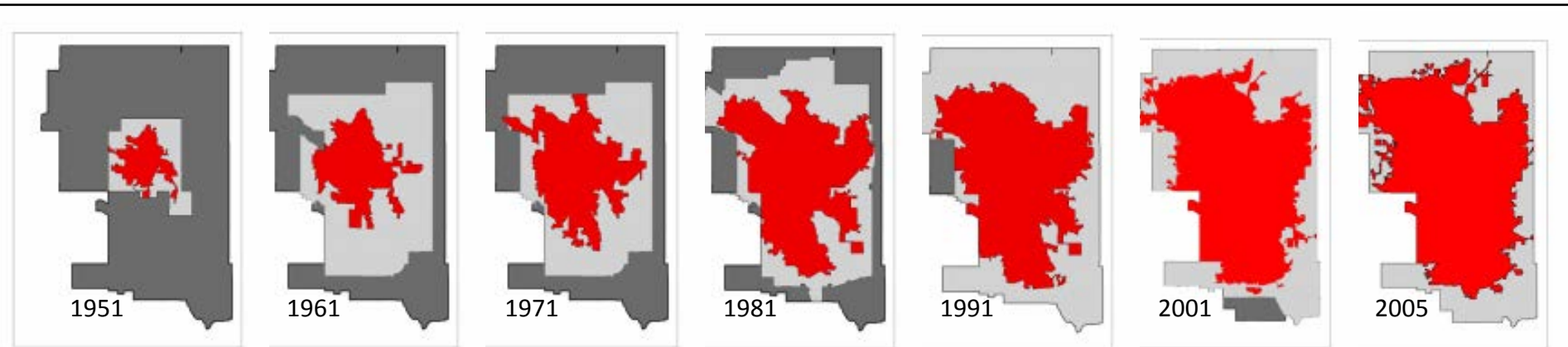
14 February 2013

# Overview

- The Case for Change
- The Cost of Growth
  - Scenario Planning
  - Measuring Infrastructure Costs

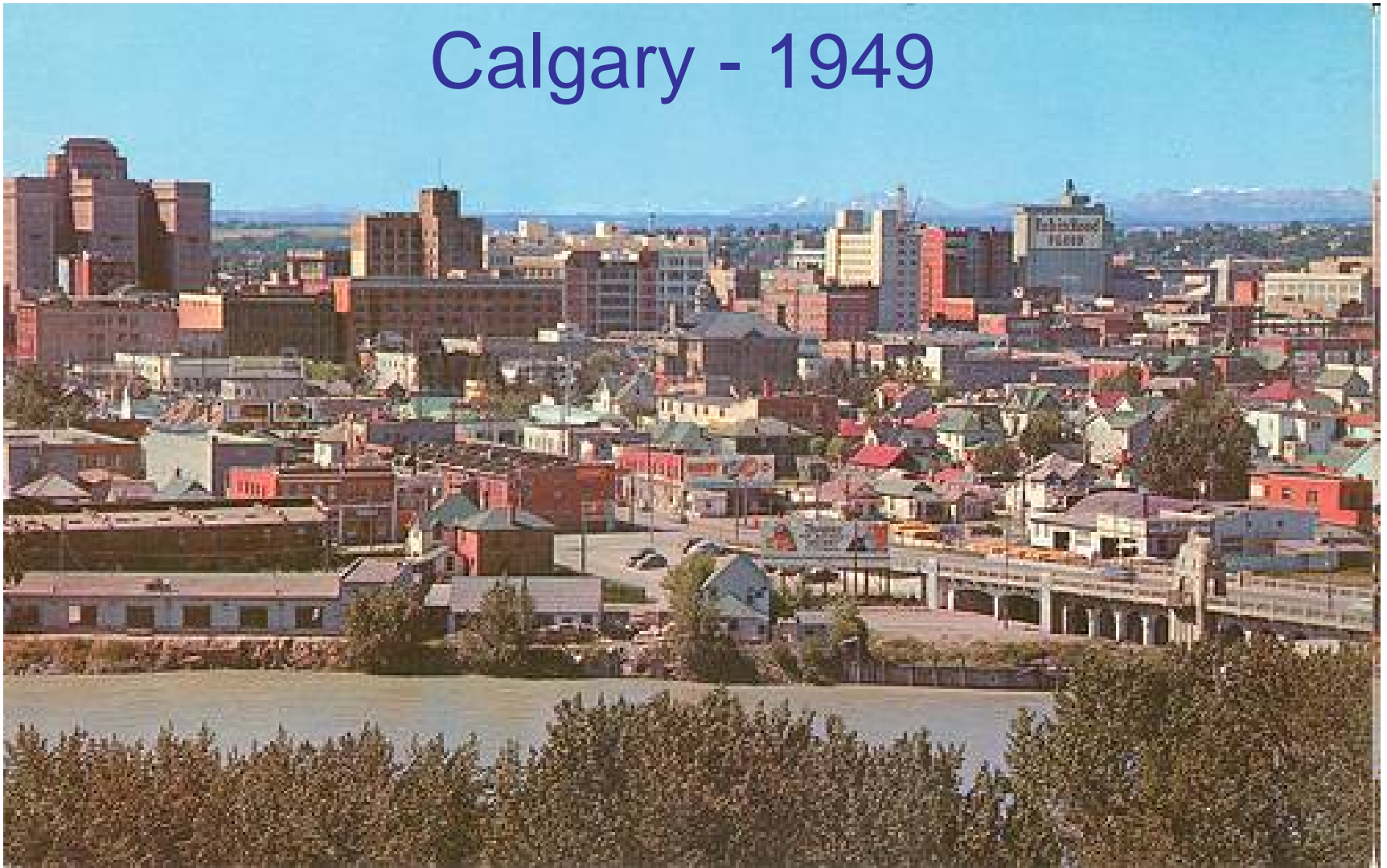


# A Fast Growing City



<b>1951</b>	–	4,000 ha	<b>1959</b>	–	218,000
<b>1971</b>	–	16,300 ha	<b>1967</b>	–	335,000
<b>1991</b>	–	31,600 ha	<b>1979</b>	–	530,000
<b>2005</b>	–	47,100 ha	<b>1995</b>	–	749,000
			<b>2011</b>	–	1,100,000

# Calgary - 1949



# Calgary - 2012



Now add another 1.3 million people...



# *The Case for Change*

Calgary's population is changing:

- 1333% increase in people 85+ over next 60 years
- Growth reliant on international immigration in 20 years

*Means changes in the way we live and travel*



An aerial photograph of a suburban residential development. The image shows a dense cluster of houses with light-colored siding and brown roofs, arranged in a grid-like pattern with winding roads. The houses are surrounded by green lawns and some trees. The overall scene depicts a typical suburban neighborhood.

# Urban Expansion leads to...



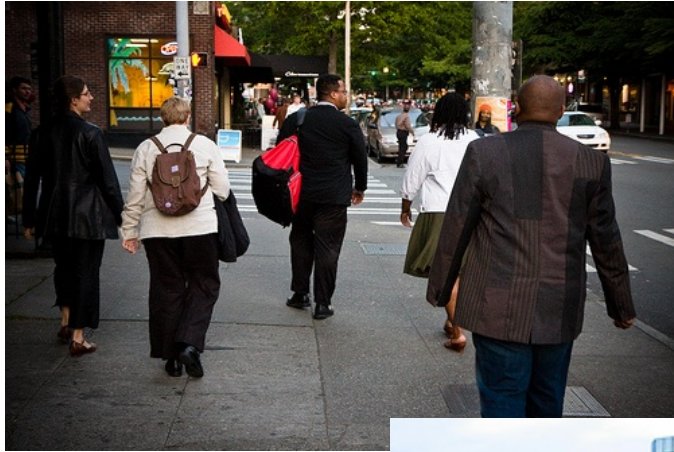
**...congestion**



# While urban intensification...







...allows  
this.



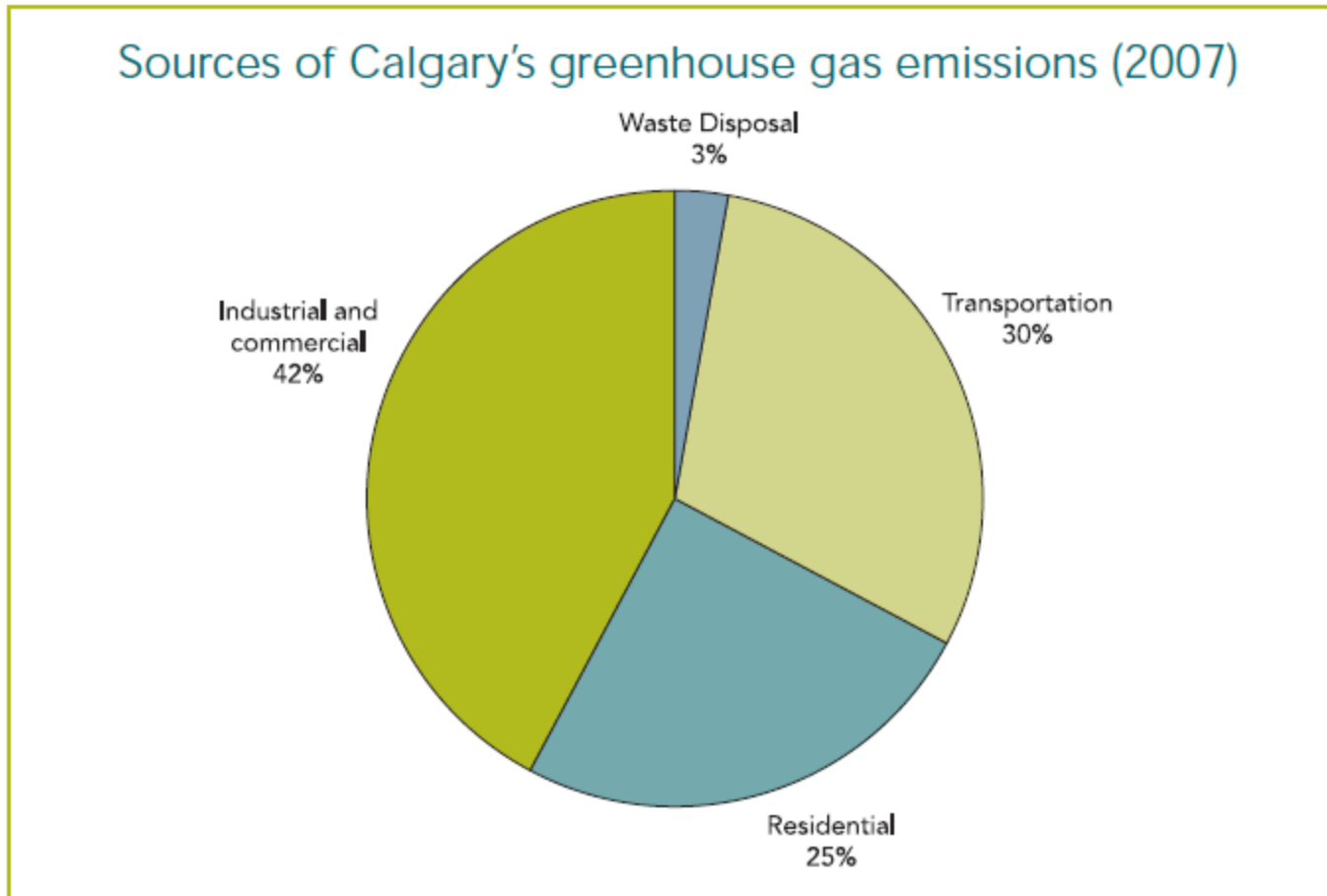


# *Social & Environmental Impacts*

- Health / rising obesity levels
- Consuming prime agricultural land
- Growing water consumption



# Environmental Impact



Pembina Institute

# Energy Demand

- Energy supply growth out to 2050 could boost energy production by 50%
  - Includes 20% savings from energy efficiencies
- Still leaves a **gap of around 400 EJ/a** – the size of the whole energy industry in 2000.

Shell – February 2011



# Infrastructure Costs

## Unsustainable growth in municipal spending

- \$3.4 billion capital infrastructure gap
- \$3.2 billion maintenance gap

Key issue for municipalities and the public





# CALCULATING THE COST OF GROWTH

plan|it|calgary  
integrate · grow · sustain

- Where will the next 1.3 million Calgarians live?
- Where will they work?
- How will they travel?
- What are the implications of these choices?

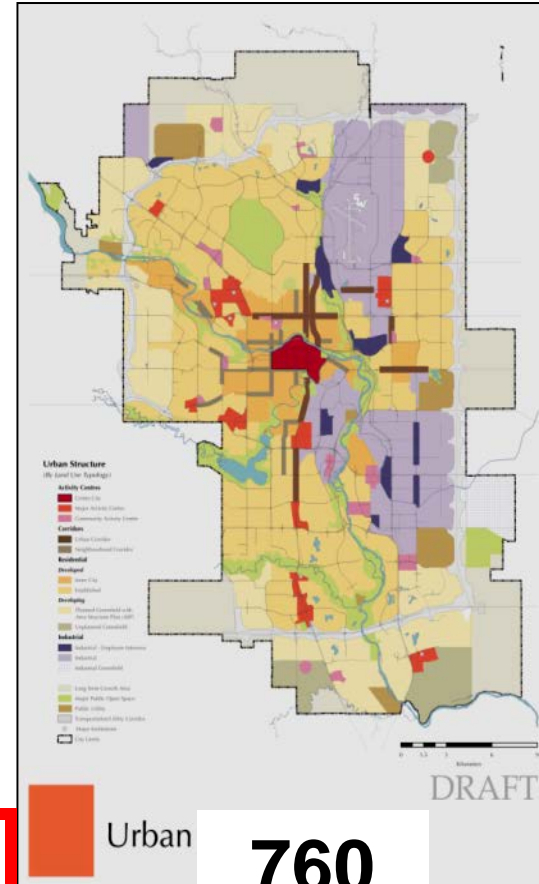
# Dispersed Scenario (Business as Usual)



**1,010**  
sq. km.

**250 sq.**  
**km. saved**

# Recommended Direction



**760**  
sq. km.



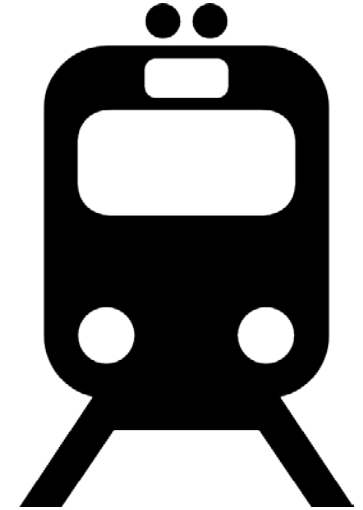
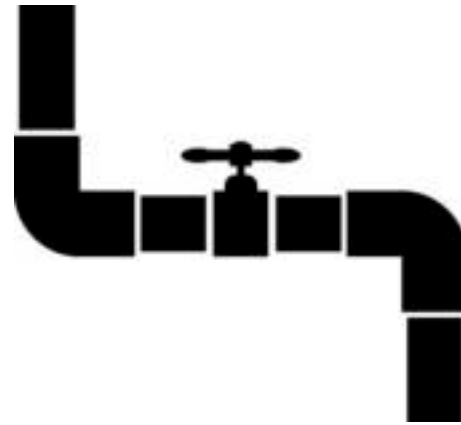
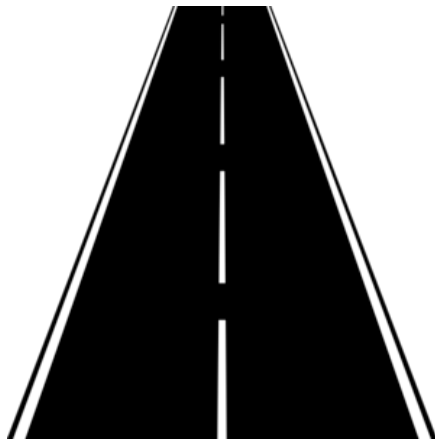
# Transit Oriented Development





Infrastructure -> Land Use  
e.g. 17<sup>th</sup> Ave SE Corridor

# Infrastructure evaluated:



# Capital Cost Comparison

## Total Cost (\$billion)

	Dispersed Scenario	Recommended Direction	Difference	Percent Difference
Road Capital Cost	\$17.6	\$11.2	\$6.4	-36%
Transit Capital	\$6.8	\$6.2	\$0.6	-9%
Water and Wastewater	\$5.5	\$2.5	\$3.0	-54%
Fire Stations	\$0.5	\$0.3	\$0.2	-46%
Recreation Centres	\$1.1	\$0.9	\$0.2	-19%
Schools	<u>\$3.0</u>	<u>\$2.2</u>	<u>\$0.8</u>	-27%
<b>Total</b>	<b>\$34.5</b>	<b>\$23.3</b>	<b>\$11.2</b>	<b>-33%</b>

**33% less**

**NOTE: All forms of growth still incur new costs**

# Annual Operating Cost Comparison

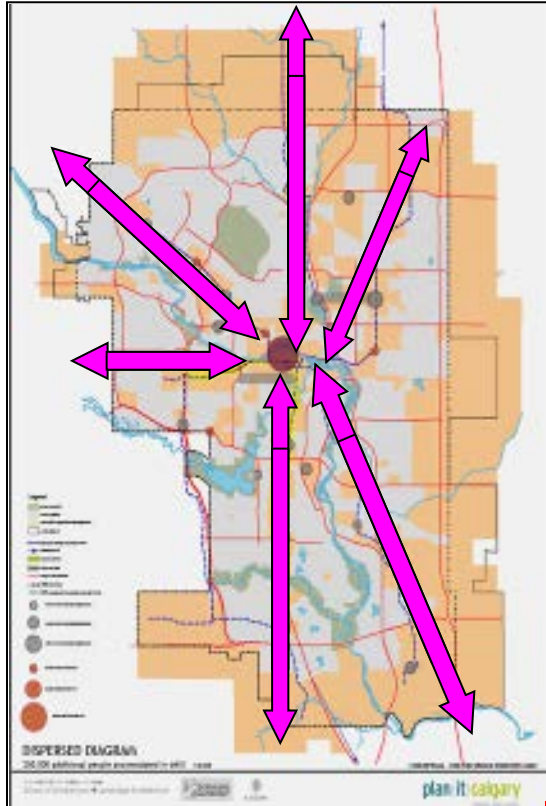
## Total Cost (\$billion)

	Dispersed Scenario	Recommended Direction	Difference	Percent Difference
Road Operations	\$0.23	\$0.19	\$0.04	-18%
Transit Net Operating	\$0.30	\$0.30	\$0.00	0%
Water and Wastewater	\$0.06	\$0.03	\$0.03	-55%
Fire Stations	\$0.28	\$0.23	\$0.05	-18%
Parks	<u>\$0.13</u>	<u>\$0.12</u>	<u>\$0.01</u>	<u>-9%</u>
Total	\$0.99	\$0.86	\$0.13	<b>-14%</b>

**14% less**



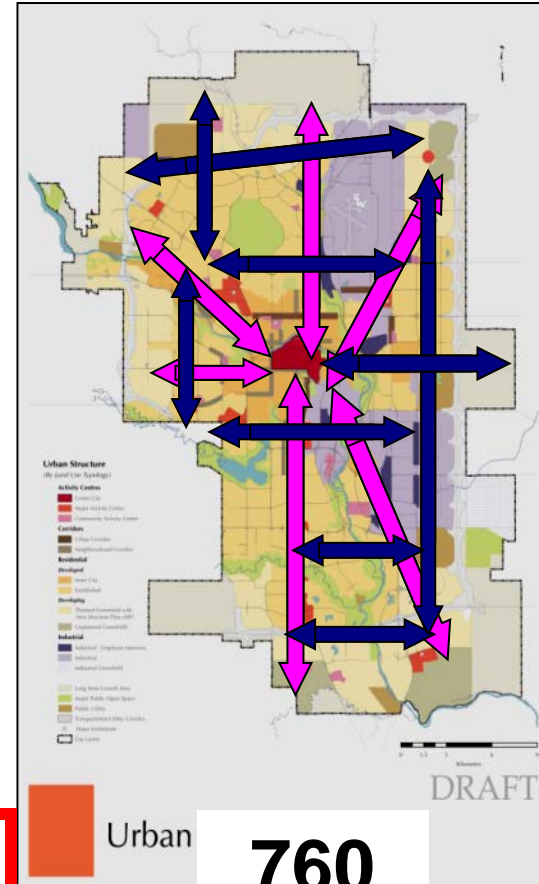
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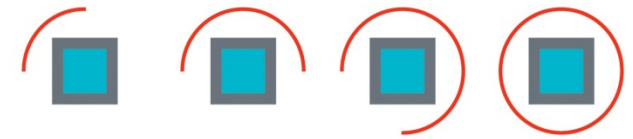


Urban

**760**  
sq. km.

## Benefits of the Cost of Growth Study

- Understand the fiscal implications of different growth choices
  - Meaningful topic for decision makers in Calgary
  - Citizens can relate to costs, which are paid through taxes, utility rates, or cost of a new home
- Demonstrates the relative cost differences
- Builds capacity within corporation



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# Implications of Alternative Growth Patterns on Infrastructure Cost



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# the problem



## Canadian Infrastructure Report Card 2012



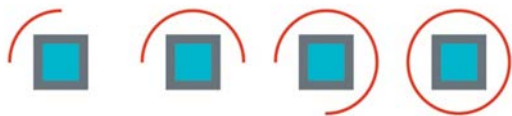
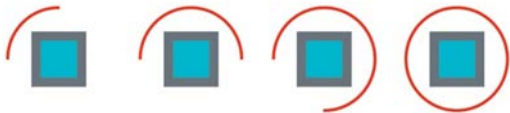


Figure 7 – Summary of the physical condition assessment of the infrastructure studied, extrapolated to the entire country

Infrastructure	Replacement value of all assets (2009-10) (Note 1)	Rating (Note 2)	Assets in very poor and poor physical condition (Note 3)		Assets in fair physical condition (Note 3)	
			%	Replacement value	%	Replacement value
Municipal roads	\$173.1 billion	Fair: requires attention	20.6%	\$ 35.7 billion	32.0%	\$ 55.4 billion
Drinking water	\$171.2 billion	Good: adequate for now	2%	\$ 3.4 billion	13.1%	\$ 22.5 billion
Wastewater	\$121.7 billion	Good: adequate for now	6.3%	\$ 7.7 billion	25.7%	\$ 31.3 billion
Storm water	\$69.1 billion	Very good: fit for the future	5.7%	\$ 3.9 billion	17.2%	\$ 11.9 billion
<b>Total</b>	<b>\$538.1 billion</b>			<b>\$50.7 billion</b>		<b>\$121.1 billion</b>

**\$50.7 billion**

**\$121.1 billion**



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# cost of growth study



Report on the  
impact of growth  
patterns on the  
cost of  
Infrastructure



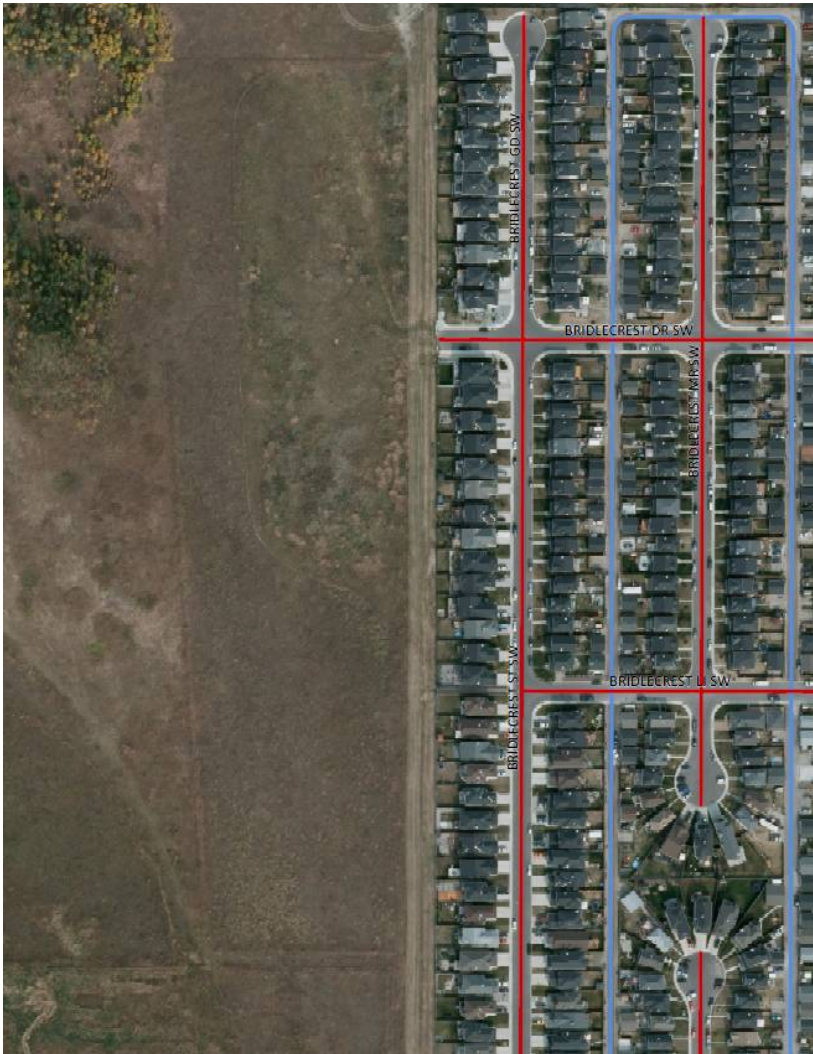
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# guide now available



**Website for download:  
[sustainablecities.net](http://sustainablecities.net)**

**Supported by:  
SIEMENS and  
CIDA**



- Each table to design two scenarios
- 30 year time horizon
- Business as Usual Scenario
- Vision Scenario
- Distribute 40 new housing units
- Measure infrastructure
- Feedback



# Business as Usual Scenario

## Business as Usual Scenario

Over the next 30 years this community will require 40 additional housing units. For the past 3 decades your city has grown only on the edges with all of the growth occurring in suburban greenfield development. Most of this growth is single family homes with some duplex units. There is currently no regular transit service to these areas.

## On the Map:

- Distribute 40 new housing units in total
- 30 single family (using yellow/gold 'post its' each = 1 units)
- 5 duplex (using pink 'post its' each = 2 units)
- Use only greenfield land
- Draw roads (red), alleys (blue), and any transit (green) you might wish to include
- Measure roads, alleys and transit using the ruler





# Vision Scenario

## Vision Scenario

Over the next 30 years this community will require 40 additional housing units. To meet your sustainability goals you want to achieve 75% of this growth within your current built area in a mix of duplex and four-plex units. You want to introduce a regular transit service to the areas where higher density occurs.

## On the Map:

- Distribute 40 new housing units in total
- In the greenfield area distribute 10 single family homes (each yellow/gold post it note = 1 units)
- In the built up area distribute 30 units with any combination of duplex and fourplex units (pink/purple duplex = 2 units, green fourplex = 4 units)
- You will have to subtract any single unit in the redevelopment area
- Draw roads (red), alleys (blue), and any transit (green) you might wish to include
- Measure roads, alleys and transit using the ruler