

# Land Use Impacts of New Bus and Subway Services

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Transportation Research Board  
Best Practices: Coordination of Transit, Regional Transportation Planning and  
Land Use

Denver, CO  
27 August 2007



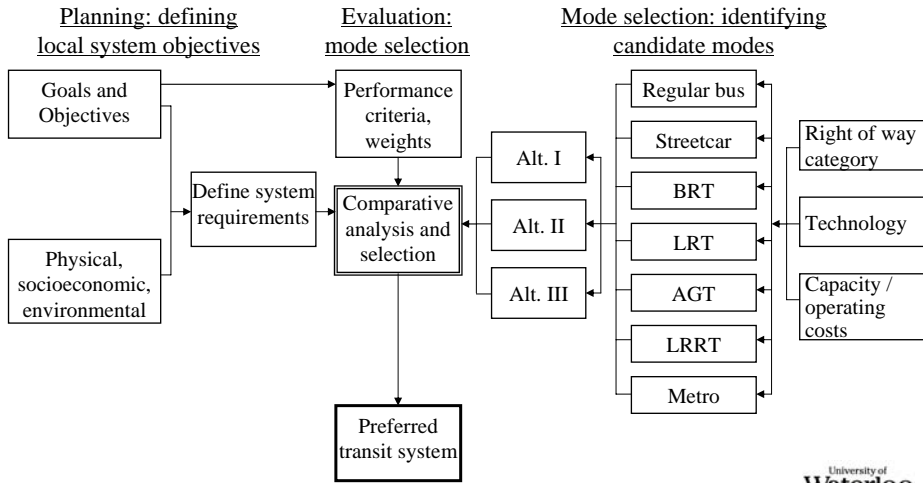
## Presentation Outline

- I. Introduction and Research Motivation
- II. Literature Review / Research Method
- III. Region of Waterloo Case Study
- IV. Toronto Sheppard Line Case Study
- V. Data Analysis
- VI. Results and Discussion



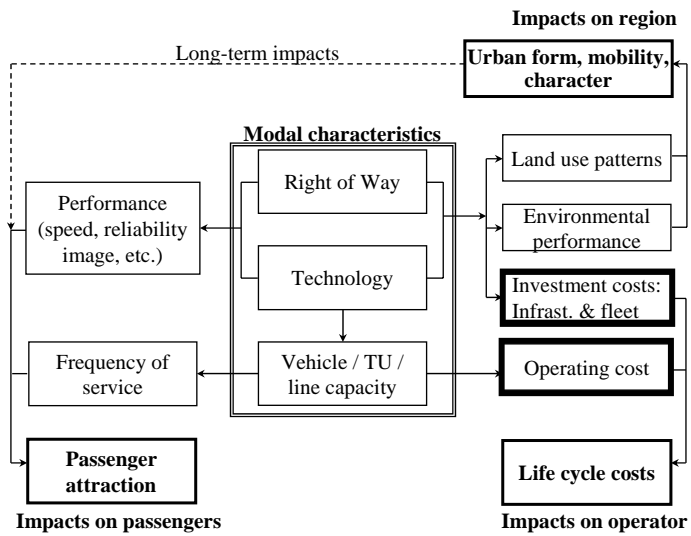
# I. Research Motivation

## Transit Planning Process:



# I. Research Motivation

## Mode Selection



## I. Research Motivation

Cities: choice largely between Regular Bus, BRT, Rail

Mode	Regular Bus	Bus Rapid Transit	Rail Transit
System characteristics:			
Investment costs	Very low	Medium	High
Operating costs	Sensitive to demand	Sensitive to demand	Less sensitive to demand
Flexibility	Very high	Moderate	Low
System image	Variable	Good	Excellent
Passenger attraction	Limited	Good	Strong
Land use impacts	Low	Moderate	Strong



## II. Literature Review

**EXHIBIT 6-1 Land Value Results of Selected Price Model Studies**

Author(s)	Data Source	Selected Results
<i>Heavy Rail Rapid Transit</i>		
Cervero and Duncan, 2002b	3,802 sales of properties in multi-family housing in Los Angeles in 2000	No evidence of appreciable effects
Lewis-Workman and Brod, 1997	All recorded single family property sales (263) within 1.61 km of BART's Pleasant Hill station from the 1984-1996 period	Premium of \$1,578 for every 0.03 km closer to BART station
Benjamin and Sirmans, 1996	250 residential apartment rental prices in Washington during 1992	Premium of 2.4% to 2.6% for every 0.16 km closer to Metro station
Landis et al., 1995	2,359 sales of single-family homes in Alameda and Contra Costa Counties during 1990	Premium of \$100-\$200 per 0.1 km closer to the station
McDonald and Osuji, 1995	79 blocks in Chicago during 1980 and 1990	Premium of 17% for location within 0.5 mile of a station
Smith, 1978	300 new home sales in Chicago for 1971	Premium of \$450 for every 0.8 km closer to rail transit station
Damm et al., 1980	286 single-family and 771 multi-family housing sales from 1969 to 1976 in Washington, D.C.	Dummy variables indicating location within 0.16 km of a station: elasticities of -0.19 for multi-family housing and between -0.06 to -0.13 for single-family housing sales



## II. Literature Review

### *Light Rail Transit/Trolley Service*

Dueker and Bianco, 1999	Population Census' median house value in Portland between 1980 and 1990	Premium of \$2,300 for properties within 0.06 km of a MAX station
Lewis-Workman and Brod, 1997	Cadastral information for nearly all properties (4,170) within 1.6 km of three MAX stations in Portland	Premium of \$75 per 0.03 km closer to the station
Forrest et al., 1995	795 house sales in Manchester (UK) during 1990	Premium ranging from 2.1% to 8.1% depending on distance to station
Cervero and Duncan, 2002c	1,495 sales of properties in multi-family housing in San Diego in 2000	Premium for multi-family units ranging from 2% to 6%
Landis et al., 1995	134 single-family sales in San Diego during 1990	Premium of \$272 for every 0.1 km closer to station
Dabinett, 1998	Sheffield (UK) Supertram	No evidence of appreciable effects
Al-Mosaind et al., 1993	235 single-family home sales in Portland during 1988	Premium of \$663 per 0.03 km closer to station

NOTE: Results apply to area and properties studied only. Refer to each source study for details.

SOURCE: The Value of Accessibility to Bogotá's Bus Rapid Transit System (4)



## II. Literature Review

### **EXHIBIT 6-2 Reported Land Development Benefits of BRT**

<b>BRT System</b>	<b>Land Development Benefits</b>
Adelaide Guided Busway	Tea Tree Gully area is becoming urban village.
Bogotá TransMilenio	For every 5 minutes of additional walking time to a BRT station, the rental price of a property decreases between 6.8% and 9.3% after controlling for structural characteristics and neighborhood attributes
Boston Silver Line (rebuilt Washington Street)	\$700+ million in new investment within two to three blocks of BRT line
Brisbane South East Busway	Up to 20% gain in property values near busway. Property values in areas within 6 miles of station grew two to three times faster than those at greater distances. Higher increase in median home values around busway than other suburban areas.
Ottawa Transitway System	\$1 billion (Canadian) in new construction at Transitway Stations.
Pittsburgh East Busway	59 new developments within 1,500 feet of stations. \$302 million in land development benefits of which \$275 million was new construction. 80% clustered at stations.
Pittsburgh West Busway	Land development focused on six park-and-ride lots.

SOURCE: The Value of Accessibility to Bogotá's Bus Rapid Transit System (4) and TCRP Report 90 (5)



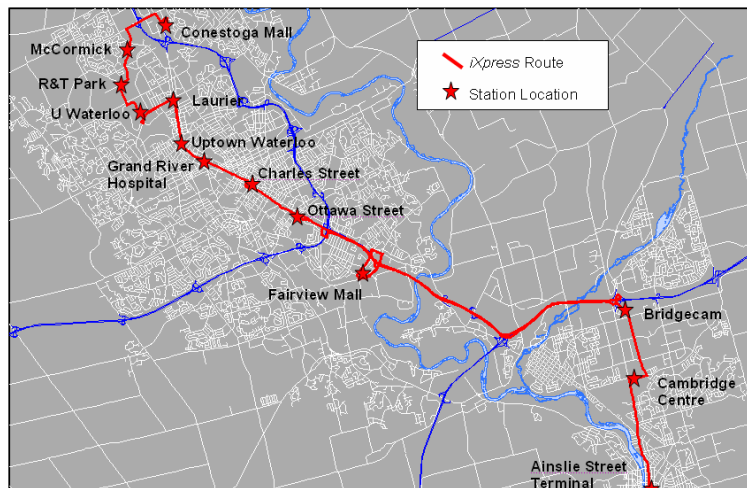
## II. Literature Review / Research Method

Research Method:

- ❖ For Express Bus Service (iXpress) and Subway (Sheppard Line), analyze property values adjacent to infrastructure compared to areas away from transit;
- ❖ For both cases analyze changes in property values;
- ❖ Isolate infrastructure related change by “control” area comparisons;
- ❖ Analysis of some external variables in Toronto case;
- ❖ Determine relative magnitude of property value change as surrogate for “image” and “land use impacts.”

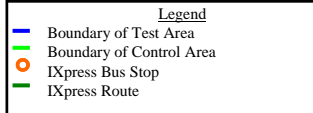
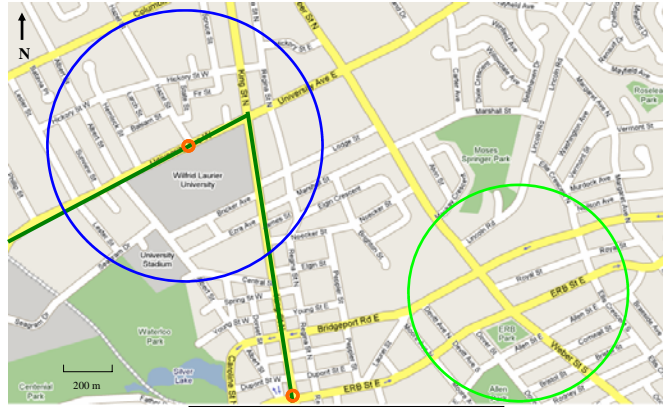


## III. Waterloo Case Study



### III. Waterloo Case Study

Test and Control Areas:



### III. Waterloo Case Study

Waterloo location:

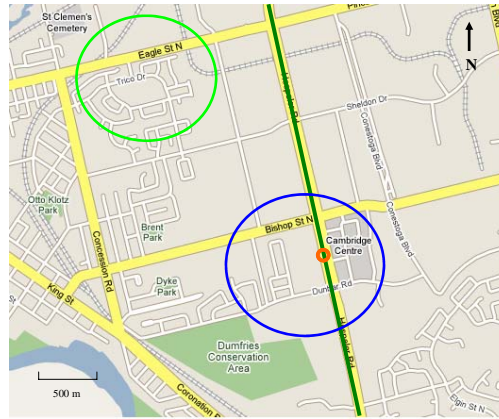
- ❖ 118 parcels in test group; 111 parcels in control group;

	Test Area	Control Area
Average property value	\$200,586	\$182,943
Average change %	58.7	43.7
Max change	196.1	144.0
Min change	-6.7	-0.6
Standard deviation	49.3	17.4
Average change (residential)	66.0	44.6
Average change (commercial & industrial)	26.3	38.8



### III. Waterloo Case Study

Test and Control Areas:



Legend	
	Boundary of Test Area
	Boundary of Control Area
	IXpress Bus Stop
	IXpress Route



### III. Waterloo Case Study

Cambridge:

❖ 148 parcels in test group; 130 parcels in control group;

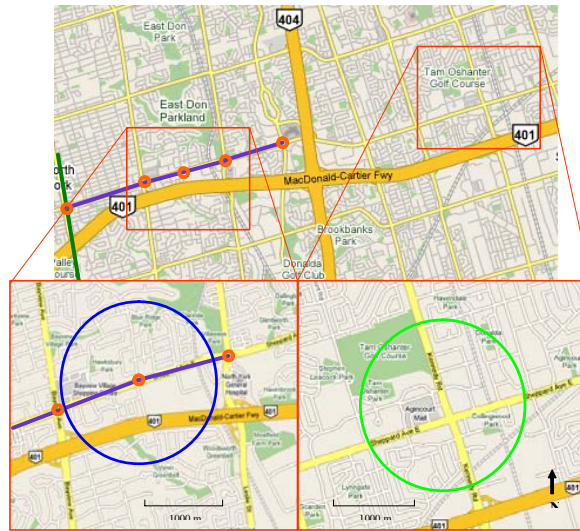
	Test Area	Control Area
Average property value	\$258,182	\$413,729
Average change %	36.3	65.2
Max change	59.5	386.0
Min change	-38.6	-6.5
Standard deviation	8.6	76.9
Average change (residential)	37.0	70.1
Average change (commercial / industrial)	37.1	42.1



## IV. Toronto Case Study



## IV. Toronto Case Study



## **IV. Toronto Case Study**

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Toronto Data:

- ❖ 1175 parcels in test group; 1130 parcels in control group;

	Test Area	Control Area
Average Property Value	\$617,228	\$447,690
Average change %	29.8	25.0
Max change	173.1	228.8
Min change	-33.0	-53.7
Standard deviation	16.4	0.2
Average change (residential)	29.9	23.9
Average change (commercial / industrial)	26.3	42.8



## **IV. Toronto Case Study**

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Controlling for External Impacts:

- ❖ Aesthetics;
- ❖ Demographics: ethnicities / race;
- ❖ School qualities;
- ❖ Property tax / development charges.



## V. Data Analysis

Pertinent Questions:

- ❖ Are property values higher adjacent to the transit lines than in areas away from the transit services?
- ❖ Do properties adjacent to the transit lines grow in value more rapidly?
- ❖ Do the findings hold true for commercial and residential subsets of the data?
- ❖ Is there evidence that the transit technology (rail v. bus) impacts the property values or their rate of change?



## V. Data Analysis

- ❖ Transit proximity associated with higher housing values?
- ❖ Test areas (with Transit) consistently higher
- ❖ Cambridge – market related explanation

Residential Property Values				
average property values (thousands of \$)				
	Waterloo	Cambridge	Toronto	
	2006	2006	2003	2003
Test (transit)	200.6	191.8	418.4	
Control	182.9	206.9	277.8	
% Difference	9.6%**	-7.3%*	50.6%*	
df	96	125	1597	

Commercial Property Values				
	Waterloo	Cambridge	Toronto	
	2006	2006	2003	2003
Test (transit)	871.3	769.4	7040.4	
Control	427.9	1419.7	1439.7	
% Difference	103.6%*	-45.8%*	389.0%*	
df	30	32	15	

\* Statistically Significant at 95%

\*\* Statistically Significant at 90%



## V. Data Analysis

### Magnitude of Change in Residential Property Values:

Area	Mean Change in Value	Baseline change	Difference
Waterloo Test	\$85,900	\$57,500	\$28,400
Waterloo Control	\$54,300	\$57,500	-\$3,200
Cambridge Test	\$51,800	\$57,500	-\$5,700
Cambridge Control	\$69,500	\$57,500	\$12,000
Toronto Test	\$89,200	\$83,700	\$5,500
Toronto Control	\$51,600	\$83,700	-\$32,100



## V. Data Analysis

- Transit proximity contributes to greater increases in property values over time

Change in Residential Property Values				
average property values (thousands of \$)				
<b>Waterloo</b>				
	2002	2006	% Difference	df
Test	114.7	200.6	74.9%*	86
Control	128.6	182.9**	42.3%*	86
<b>Cambridge</b>				
	2002	2006	% Difference	df
Test	140.0	191.8**	37.1%*	130
Control	137.4	206.9	50.5%*	130
<b>Toronto</b>				
	1997	2003	% Difference	df
Test	329.2	418.4	27.1%*	1111
Control	226.2	277.8**	22.8%*	1111
Regional average difference in property values over time frame used in matched pairs t-test - Waterloo/Cambridge 57.5 (thousands \$) - Toronto 83.7				
* Statistically Significant avg. difference at 95%				
** Difference less than regional avg. difference				



## **VI. Results and Discussions**

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We can conclude:

- ❖ For two of our three areas, proximity to transit resulted in statistically significant higher property values.
- ❖ Greater evidence of impact for commercial properties.
- ❖ For two of our three areas, residential property values adjacent to transit increased faster than the control areas;
- ❖ For two of three areas, growth rates exceeded regional growth rates in a statistically significant way.

