

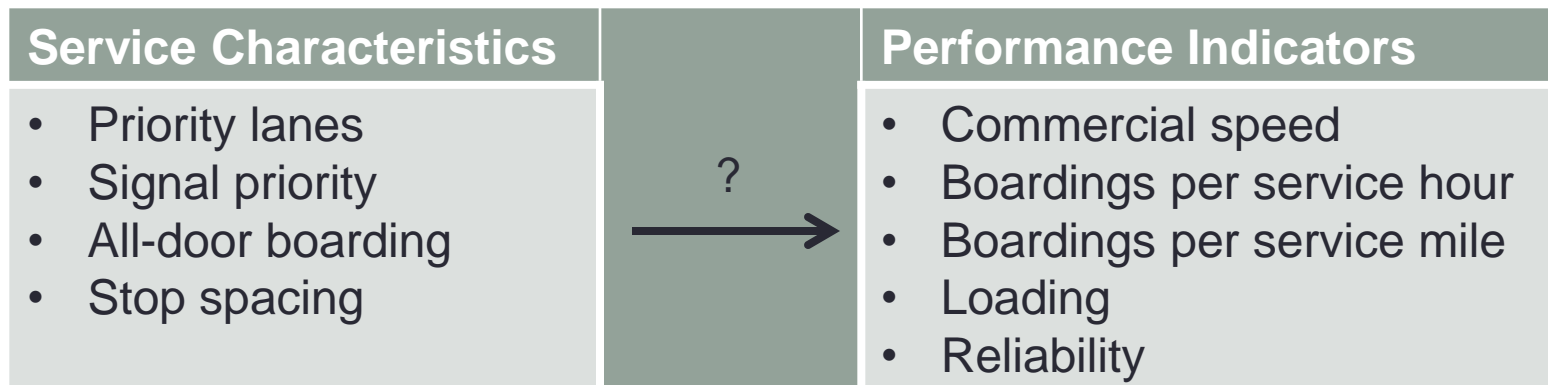
LT4: Analysis of High-quality Bus Services in Larger Developed Cities

Anna Matías and Anson Stewart

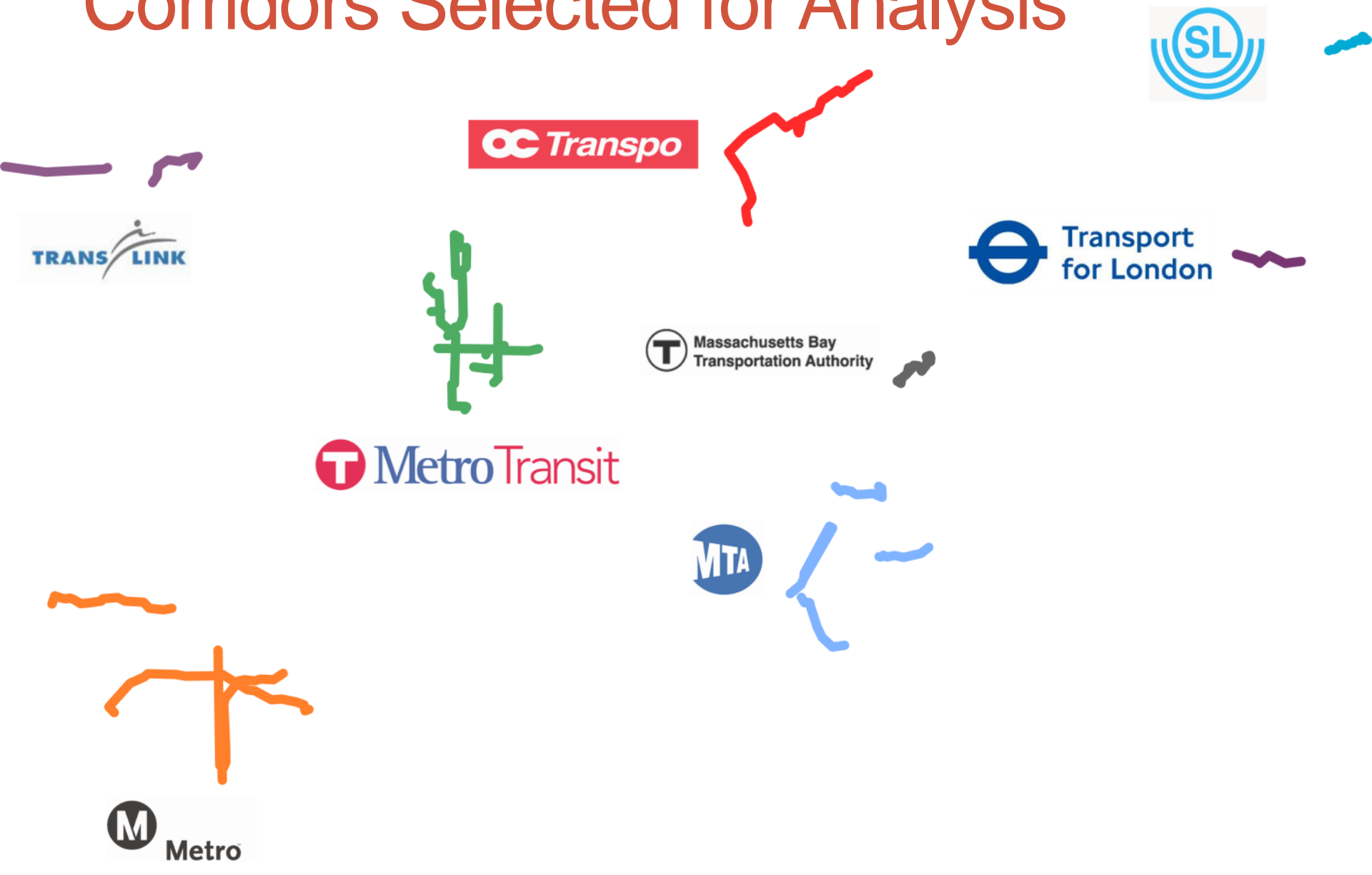
January 25th, 2012

Objective

- Determine which incremental upgrades to conventional bus service most effectively improve productivity and quality in the context of larger more developed cities



Corridors Selected for Analysis
































































Corridors Selected for Analysis

- New York
 - 1st/2nd Avenue
 - Fordham Rd/Pelham Pkwy
 - Flatbush Avenue
 - Sanford Ave/Northern Blvd
- Vancouver
 - Broadway
 - Coquitlam/Lougheed
- Boston
 - Washington Street
 - Waterfront
 - Masspike
- London
 - 207/607/427
- Los Angeles
 - Wilshire/Whittier
 - Vermont
 - Silver Line
 - Orange Line
- Minneapolis
 - Central
 - Lake
 - Snelling
 - 35W
- Ottawa
 - Transitway
- Stockholm
 - Blue Buses



Service Characteristics

Agency	Corridor	Priority Lanes	Transit Signal Priority	All-door boarding	Avg. Stop Spacing (Miles)
 Massachusetts Bay Transportation Authority	Washington St.				0.21, 0.19
	Waterfront				0.6
	Masspike				
 Metro	Wilshire/Whittier				0.7
	Vermont				0.57
	Silver Line				1.4
	Orange Line				1.0
 Metro Transit	Chicago				
	Central				
	Lake				
	Snelling				
	35W				
 Transpo	Transitway				
 MTA	1st/2nd Ave				0.5
	Fordham Road-Pelham Parkway				
	Flatbush Ave				
	Sanford Ave/Northern Blvd				
 TRANS LINK	Coquitlam/Lougheed				
	Broadway				0.8

Legend:

	exclusive lanes		has signal priority
	some		limited
	none		none
			all-door boardings
			front door

New York

- Select Bus Service
 - M15 SBS on 1st/2nd Avenues
 - Bx12 SBS on Fordham Road
 - Pre-board fare collection
 - Boarding through all doors
 - Dedicated Bus Lanes
 - Traffic Signal Priority
- Other local bus lines
 - Q12, B41



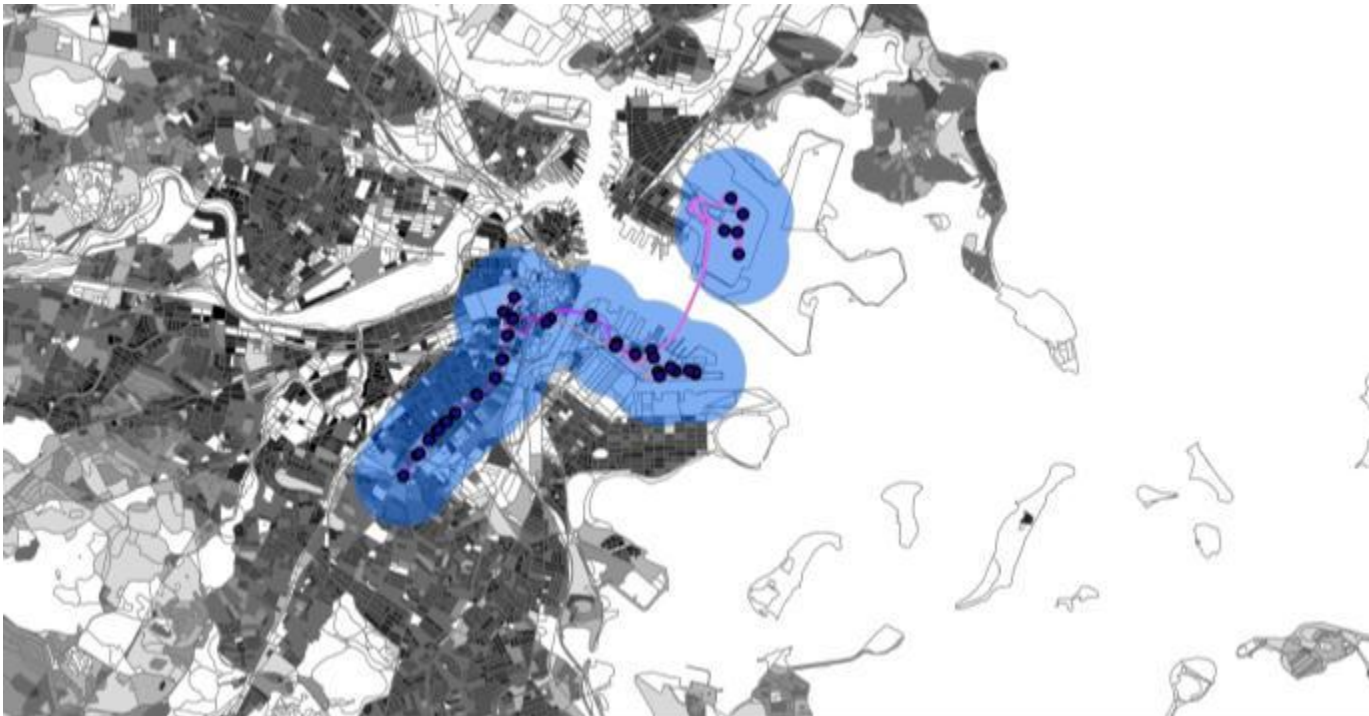
Vancouver

- B-Line Bus Routes
 - 99 B-Line (Broadway)
 - 97 B-Line (Coquitlam)
 - All-door boarding
 - Limited Stops
 - Priority Lanes



Boston

- Silver Line Washington Street
- Silver Line Waterfront
- Masspike Freeway Express Services



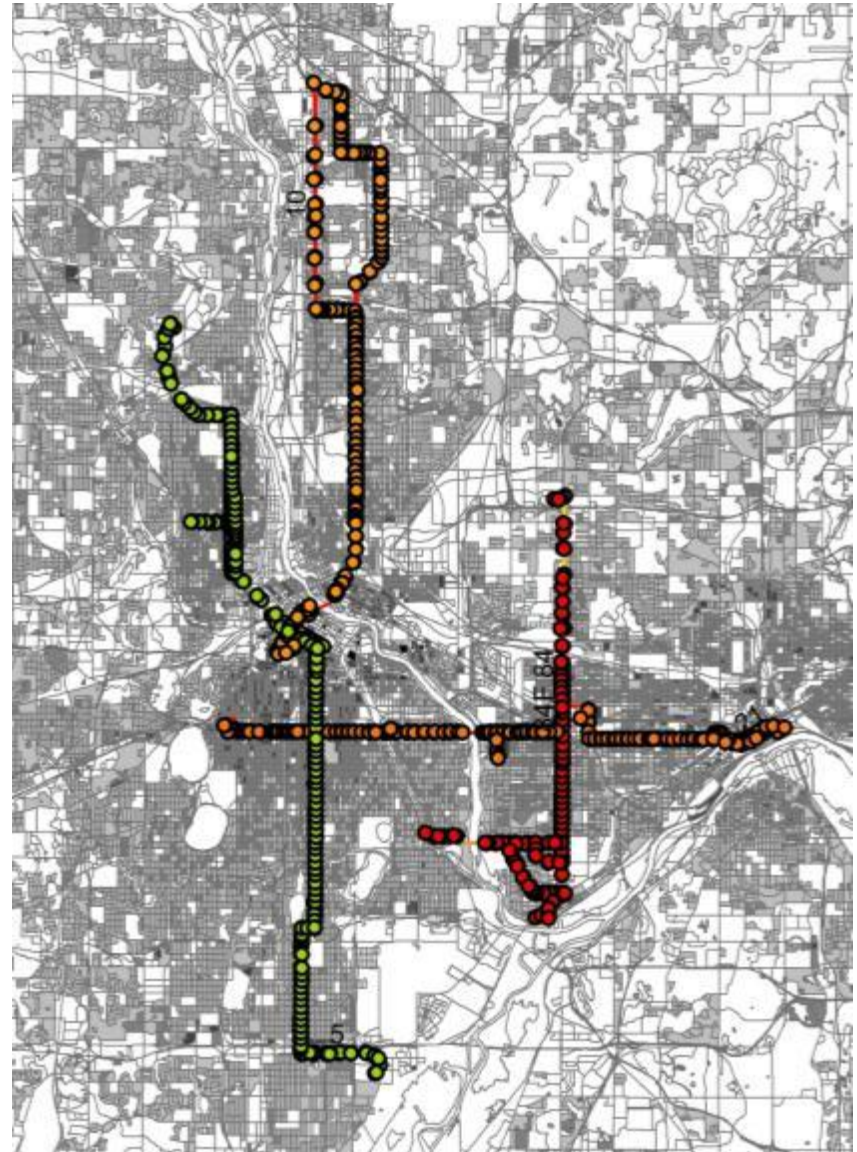
Los Angeles

- Orange Line
- Metro Rapid (720) – Wilshire/Whittier Boulevards
- Metro Rapid (754) – Vermont Avenue
- Silver Line Freeway Express Service



Minneapolis

- Chicago (5)
- Central (10)
- Lake (21)
- Snelling (84)
- I-35W Freeway
Express
Services



Methodology

- Data Collection
- Benchmarking/data normalization
 - Possibly controlling for land use and demographics
 - Cervero et al. 2010. “Direct Ridership Model of Bus Rapid Transit in Los Angeles County, California.”
 - GIS Approach
 - Scheduled data based on GTFS
- Cross-sectional across cities
 - Regression
- Longitudinal within cities

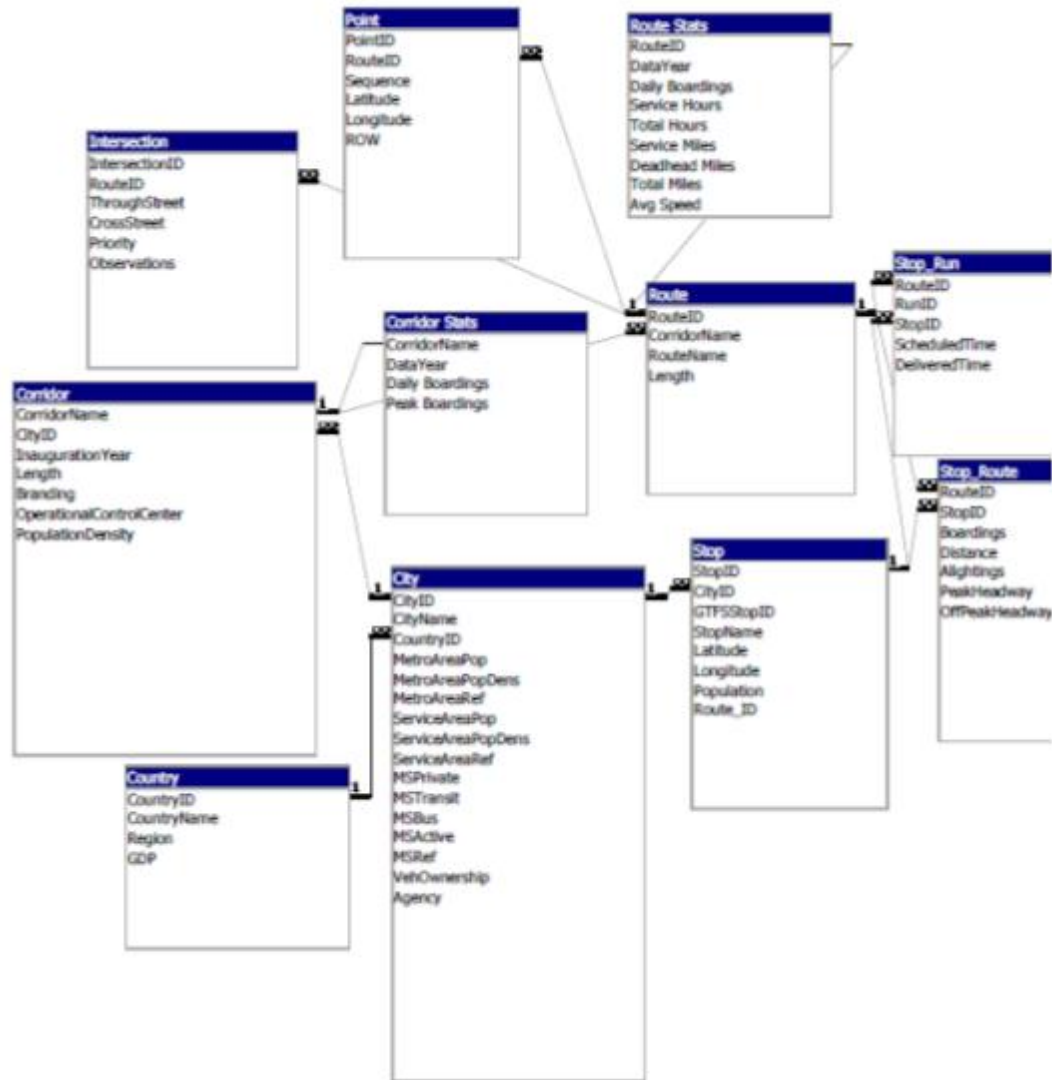
Multivariate Regression

- Dependent Variables – Performance Indicators
 - Boardings per service hour and route km
 - Passenger-km per service hour and route km
 - Commercial speed
 - Reliability
 - Loading
- Independent Variables
 - Priority lanes
 - Signal priority
 - All-door boarding
 - Stop spacing
 - Population density along corridor
 - Auto ownership along corridor
 - Route length

Relational Database

- Multiple routes in a given corridor
- Multiple years for different routes
- Interfaces with other tools
 - GIS for demographic
 - GTFS for transfer analyses

Relational Database



Relational Database

Microsoft Access 2010 interface showing a relational database table named 'Stop' in the 'Comparison1: Database (Access 2007 - 2010)'.

The ribbon includes: File, Home, Create, External Data, Database Tools, Fields, and Table. The 'Table Tools' ribbon is active, showing options for Filter, Sort & Filter, Records, Find, and Text Formatting.

The 'All Access Objects' pane on the left shows a list of tables: City, Corridor, Corridor Stats, Country, Intersection, Point, Route, Route Stats, Stop, Stop_Route, and Stop_Run. The 'Stop' table is selected.

The main window displays the 'Stop' table data with the following columns: StopID, CityID, GTFSSStopID, StopName, Latitude, Longitude, Population, Route_ID, and Click to Add. The table contains 1101 records, with the current view showing records 492 to 707.

StopID	CityID	GTFSSStopID	StopName	Latitude	Longitude	Population	Route_ID	Click to Add
683	LOS	104702	Wilshire / Bundy	34.044067	-118.46772		720-13050	
684	LOS	104703	5th / Main	34.046597	-118.248215		720-13050	
685	LOS	104704	Wilshire / 2nd	34.017365	-118.500282		20-13050	
686	LOS	104705	Wilshire / 6th	34.020473	-118.496445		20-13050	
687	LOS	104706	Wilshire / Bundy	34.043839	-118.467567		20-13050	
688	LOS	104707	Wilshire / Barringto	34.049263	-118.460953		20-13050	
689	LOS	104708	Wilshire / Federal	34.050583	-118.459244		20-13050	
690	LOS	104710	7th / Hill	34.045929	-118.254257		20-13050	
691	LOS	10696	Garfield / Flotilla	34.005966	-118.131203		18-13050	
692	LOS	10846	Harbor Transitway /	33.90202	-118.286842		910-13050	
693	LOS	10848	Harbor Transitway /	34.017811	-118.280319		910-13050	
694	LOS	10853	Harbor Transitway /	33.959629	-118.281044		910-13050	
695	LOS	10855	Harbor Transitway /	33.928719	-118.28083		910-13050	
696	LOS	10994	Harbor Transitway /	33.988857	-118.280746		910-13050	
697	LOS	11247	Vermont / Martin L	34.011127	-118.291397		754-13050	
698	LOS	11426	Le Conte / Broxton	34.063583	-118.446739		20-13050	
699	LOS	11690	Vermont / Melrose	34.08387	-118.291565		754-13050	
700	LOS	11917	Spring / 1st - City Ha	34.053879	-118.243477		910-13050	
701	LOS	1198	El Monte Station - L	34.071507	-118.04332		910-13050	
702	LOS	1204	5th / Wall	34.044865	-118.245552		18-13050	
703	LOS	1209	6th / Gladys	34.040108	-118.242035		18-13050	
704	LOS	1210	6th / Central	34.039349	-118.240753		720-13050	
705	LOS	1210	6th / Central	34.039349	-118.240753		18-13050	
706	LOS	1211	6th / Mateo	34.038124	-118.232849		18-13050	
707	LOS	1212	6th / Central	34.03867	-118.239548		720-13050	

Record: 492 of 1101. No Filter. Search

Preliminary Findings

By Boardings per Service Mile

City	Route	Corridor	Average Speed (mph)	Average Weekday Boardings	Boardings/Service Hours	Boardings/Service Miles
VAN	B-99	Broadway	13.7	57,050	193.8	14.1
NYC	Bx12 SBS	Fordham	7.6	30,490	94.5	12.5
NYC	M15 SBS	1st/2nd Ave	6.7	33,467	77.9	11.6
NYC	B41	Flatbush	6.5	33,948	52.0	8.0
BOS	SL4/5	Washington St.	8.5	14,709	56.0	6.6
VAN	B-97	Coquitlam/Lougheed	14.3	10,947	85.5	6.0
MSP	21	Lake	10.0	12,886	58.8	5.9
NYC	Q12	Sanford Ave/Northern Blvd	8.2	10,571	47.9	5.8
MSP	5	Chicago	12.2	16,325	57.6	4.7
MSP	10	Central	13.0	7,330	43.9	3.4
MSP	84	Snelling	16.0	3,583	38.2	2.4

Preliminary Findings

By Boardings per Service Hour

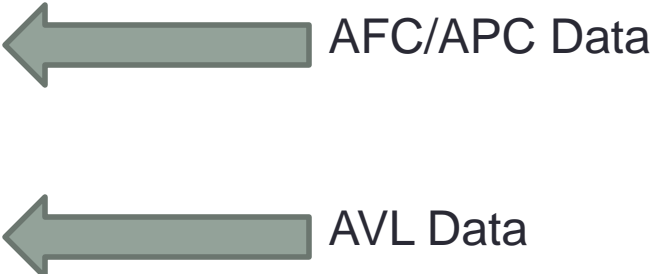
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Preliminary Findings

Corridor	Pop. within 0.5 miles of stop	Land Area within 0.5 miles of stop	Pop. Density within 0.5 miles of stop
Waterfront	13,203	3.0	4,432
Washington	69,886	3.1	22,241
Wilshire/Whittier	467,172	27.4	17,053
Vermont	324,595	14.0	23,244
Orange	94,206	10.7	8,837
Silver	109,335	11.2	9,779
Chicago	131,871	19.1	6,899
Central	85,055	16.9	5,020
Lake	103,233	12.9	→ 8,020
Snelling	60,107	12.2	4,934
New York City (Overall)			→ 26,403

Population Data from Canada's 2011 Census will be released on February 8, 2012

Next Steps

- Transfers
 - Loading
 - Reliability
 - COV of Headway
 - Reliability Buffer Time
 - Freeway Express Corridors
 - Regression Analyses
 - Continued collaboration with EMBARQ Team
- 
- AFC/APC Data
- AVL Data

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