



# From BRT to Better Buses: Applying Individual Elements of BRT To Improve Service

**John Niles**, Global Telematics

**Elizabeth Delmont**, Breakthrough Technologies Institute

TRB Bus Committee  
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MINETA TRANSPORTATION INSTITUTE

## From Buses to BRT: Case Studies of Incremental BRT Projects in North America



MTI Report 09-13



- Funded by Mineta Transportation Institute
- Examined five BRT implementations
- Ranged from light to heavy
- Framed “incremental BRT” for bus service improvement network wide

Posted at <http://www.bettertransport.info/brt>

# BRT is Incremental Already

“BRT systems should be capable of early action and amenable to staged (incremental) development.”

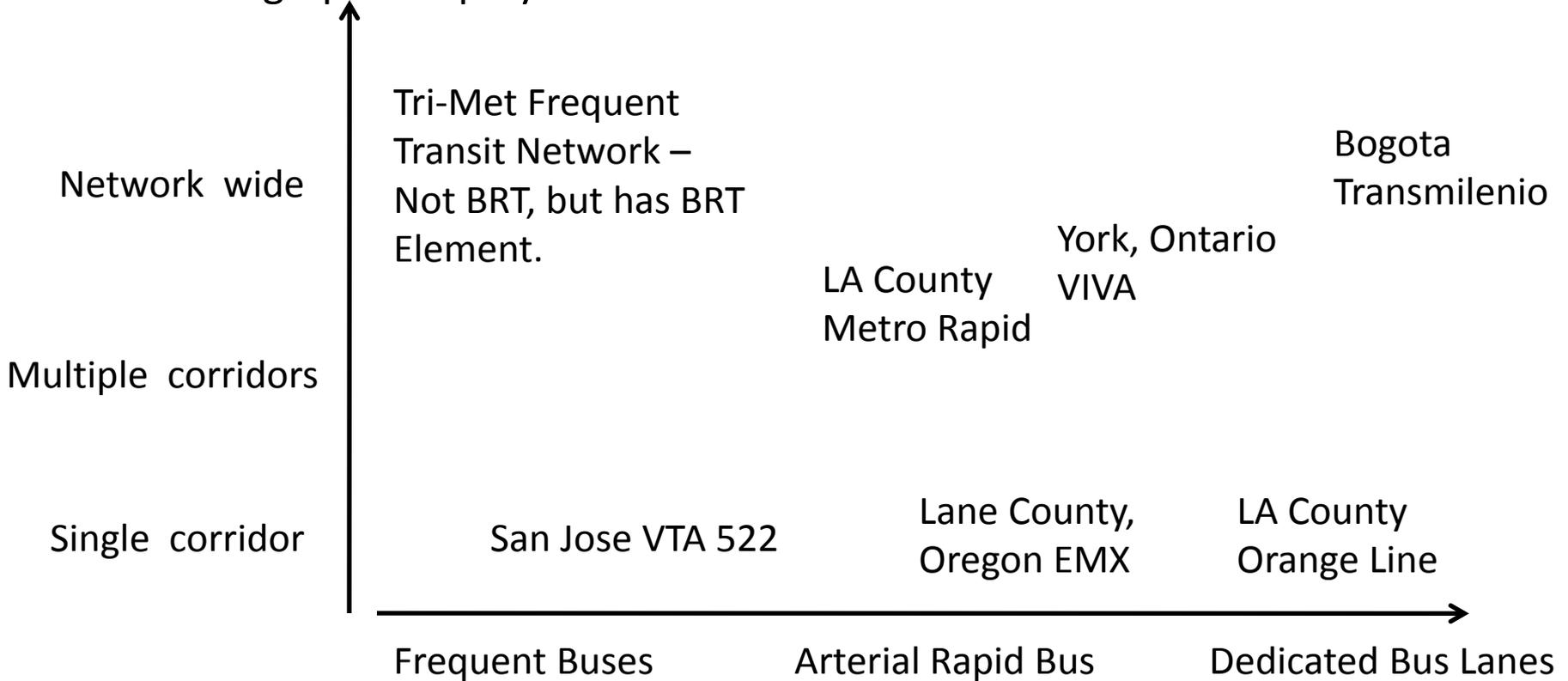
TCRP REPORT 90 Bus Rapid Transit Volume 2: Implementation Guidelines, Chapter 2, Planning Principles

“Elements of the BRT system may be added incrementally as funding or staff support is available.”

BRT Information Clearinghouse

# The Two Dimension of Incremental BRT

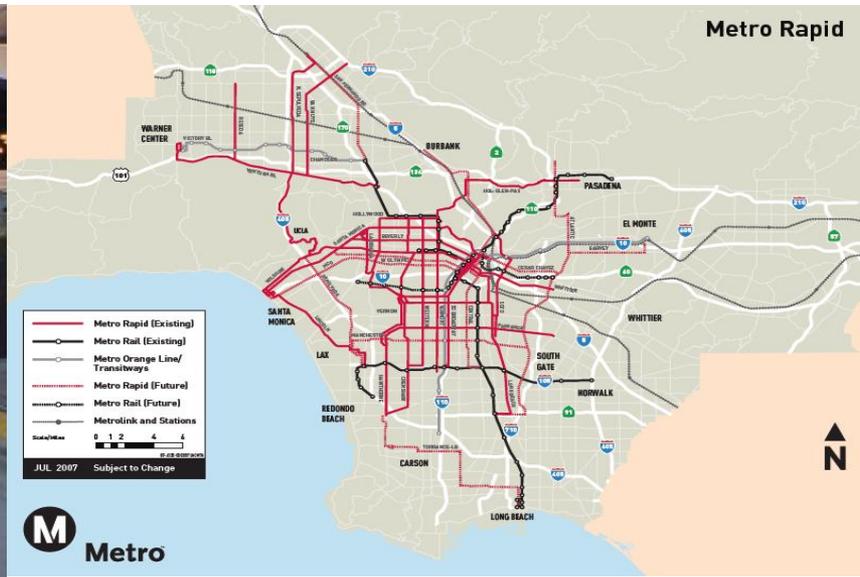
Geographic deployment



Light to Heavy with BRT elements & characteristics

# Table 1 Performance of Five BRT Development Experiences

L.A. Metro Orange Line	Lane County EMX Green Line	York Viva	VTA Route 522 Rapid	L.A. Metro Rapid
Median busway with TSP	Median busway with TSP	On-street running with TSP	On-street running with TSP	On-street running with TSP



Route miles	13.5	4	50	26	450
Cost per mile (millions)	\$26	\$6.1	CA\$3.4	\$0.13	\$0.24
Cost per new daily rider	\$16,700	\$9,100	CA\$6,600	\$1,100	\$620

# Incremental BRT Concept Expanded

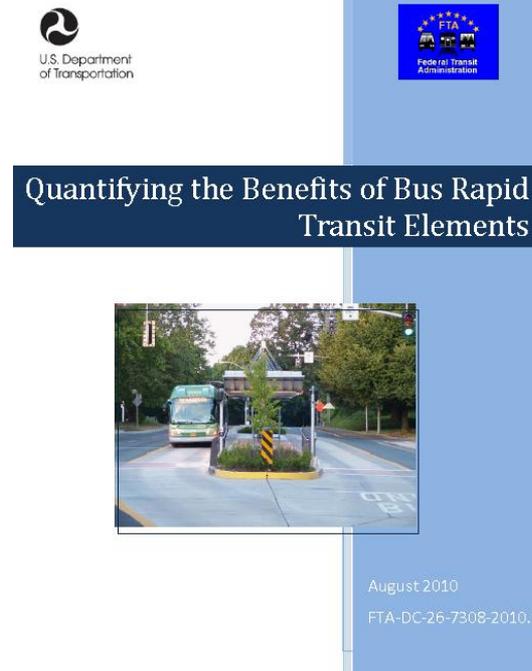
- In addition to BRT as a new mode, consider it as defining a portfolio of many elements available to improve a bus network.
- Focus on overall network performance instead of single corridor optimization.
- Applying a few BRT elements widely does not necessarily mean evolving to more train-like.

# BRT Elements Available for All Routes

- Off-coach fare payment
- Attractive, comfortable shelters for waiting customers
- Low-floor level loading
- Enhanced comfort on new coaches
- Fuel-efficient, low-emission propulsion
- Branding or color coding to differentiate routes
- Centralized management of bus locations & headways
- Bus priority at traffic signals
- Real-time information to customers
- Visible safety and security features

# Phase Two: Quantifying the Benefits from Bus Rapid Transit Elements FTA Sponsored

- Objective: Provide guidance on which BRT elements appear to have the greatest impact on bus route time.



# Thanks to agencies for data!



- Los Angeles, Orange Line and Metro Rapid
- King County
- TransLink, Vancouver British Columbia
- Chicago Transit Authority
- Washington, DC., WMATA
- Las Vegas, MAX
- Eugene, EmX
- Kansas City, MAX
- York Region, VIVA



# Summary Results

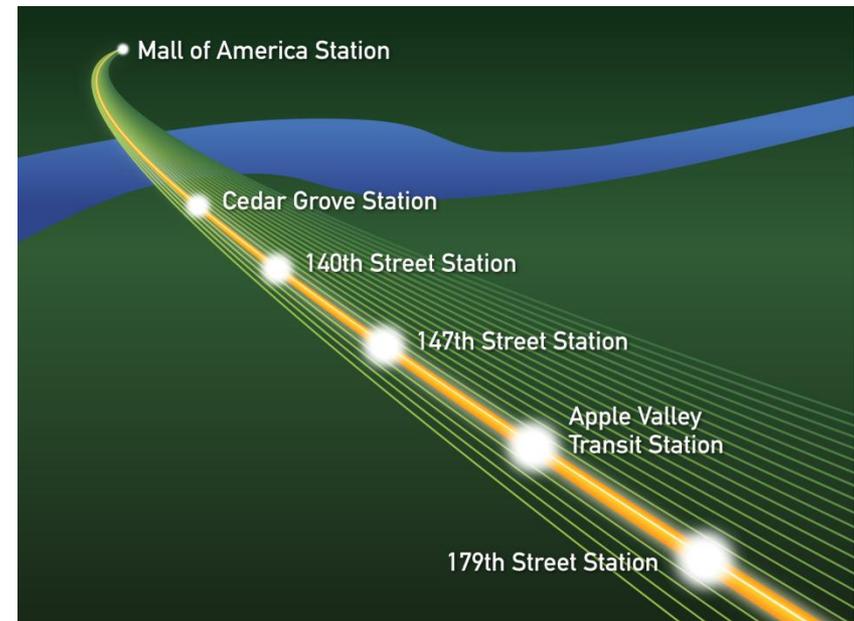


Characteristic	Effect	Confidence Level
Station density (Stations per mile)	1.4 - 2.2 minute increase in route time per station added per mile	95% in all six data sets
Use of low floor buses	8.2 – 9.8 minute decrease in route time where fleets consist of all low floor buses	95% in four of the six data sets
Dedicated bus lanes	6.1 – 7.0 minute increase in route time where no dedicated bus lanes are used compared with a high level of dedicated bus lanes	95% in two of the six data sets
Transit signal priority	Varied across data sets and levels of TSP density, showing both increases and decreases in route time	95% in three of the six data sets
Number of boarding doors	0.7 – 11.8 minute increase in route time for one boarding door compared with two boarding doors	95% confident in one data set; 90% confident in another data set

# Example: Station Density



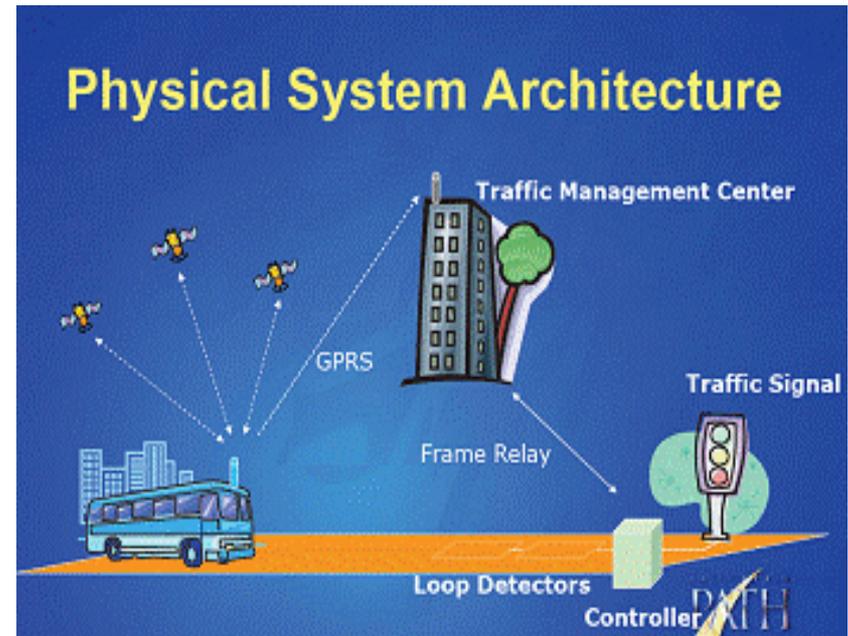
- Sample included station densities from one to seven stations per mile, with a high of 11 and low of 0.80.
- All data sets found positive relationship between decreased station density and speed
- 1.4 to 2.2 minute increase in total route time per added station
- Tradeoff between speeding up a route and the walkable convenience of transit access for customers



# Example: Transit Signal Priority



- Four categorical variables
  - “high,” “medium,” “low,” and “none.”
- Effects varied across datasets and levels of TSP
  - Presence of TSP was correlated with both increases and decreases in route time
- Consistent with literature
  - E.g., Las Vegas, TriMet



# Conclusion

- Benefits of BRT elements are measurable when available, assembled, and analyzed.
- Individual BRT elements can provide improvements to existing routes even when implemented on non BRT routes
- Affordable network-wide bus performance improvements both visible to customers *and* efficiency enhancing more important than ever.



Both reports at

<http://www.bettertransport.info/brt>

John Niles

Email: [niles@globaltelematics.com](mailto:niles@globaltelematics.com)

Phone: 206-781-4475

Elizabeth Delmont

Email: [elizabeth@fuelcells.org](mailto:elizabeth@fuelcells.org)

Phone: 202-785-4222, ext. 31