

Using Moveable Barrier to improve the Safety of BRT (Bus Rapid Transit)

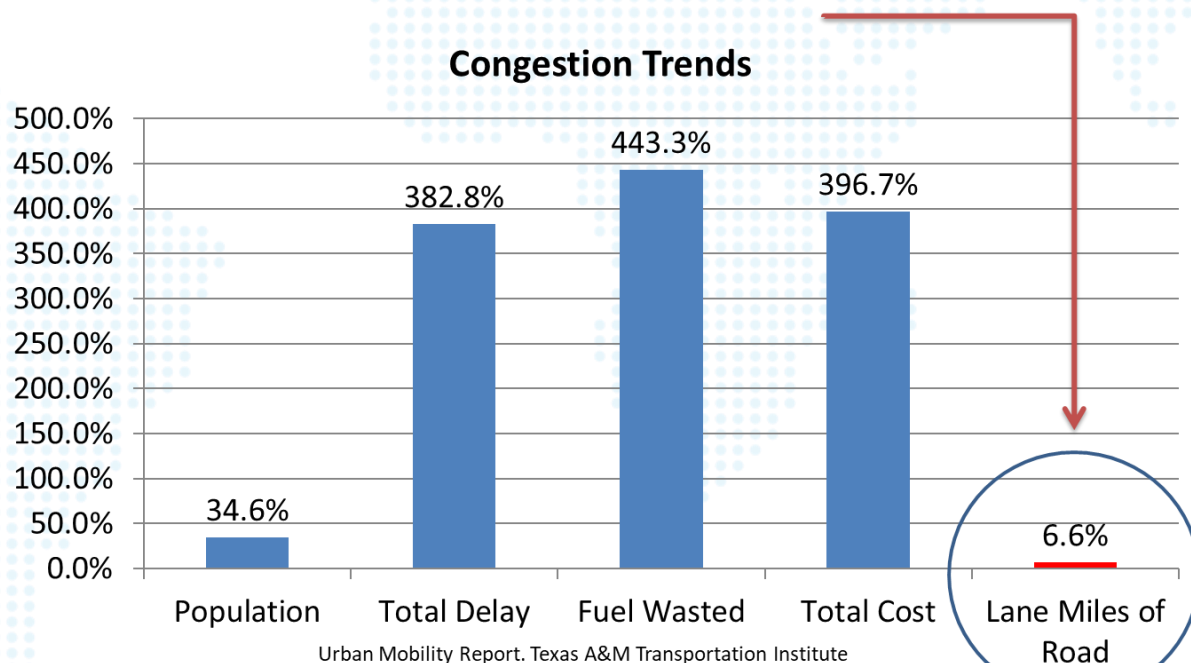
Lindsay Transportation Solutions

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What is the problem?

Worldwide, there has been double-digit growth in every transportation metric. **At the same time, the lane miles of new roads have only marginally increased.**



The Cost of Congestion Will Rise

- By 2030, there will be an additional 1 billion people on the planet.
- Additional stress on transportation systems

Cost of Congestion:

- Asia > US\$50 billion
- US > US\$100 billion
- Europe > €200 billion

Its not going to get better



The problem:

More vehicles with lower occupancy



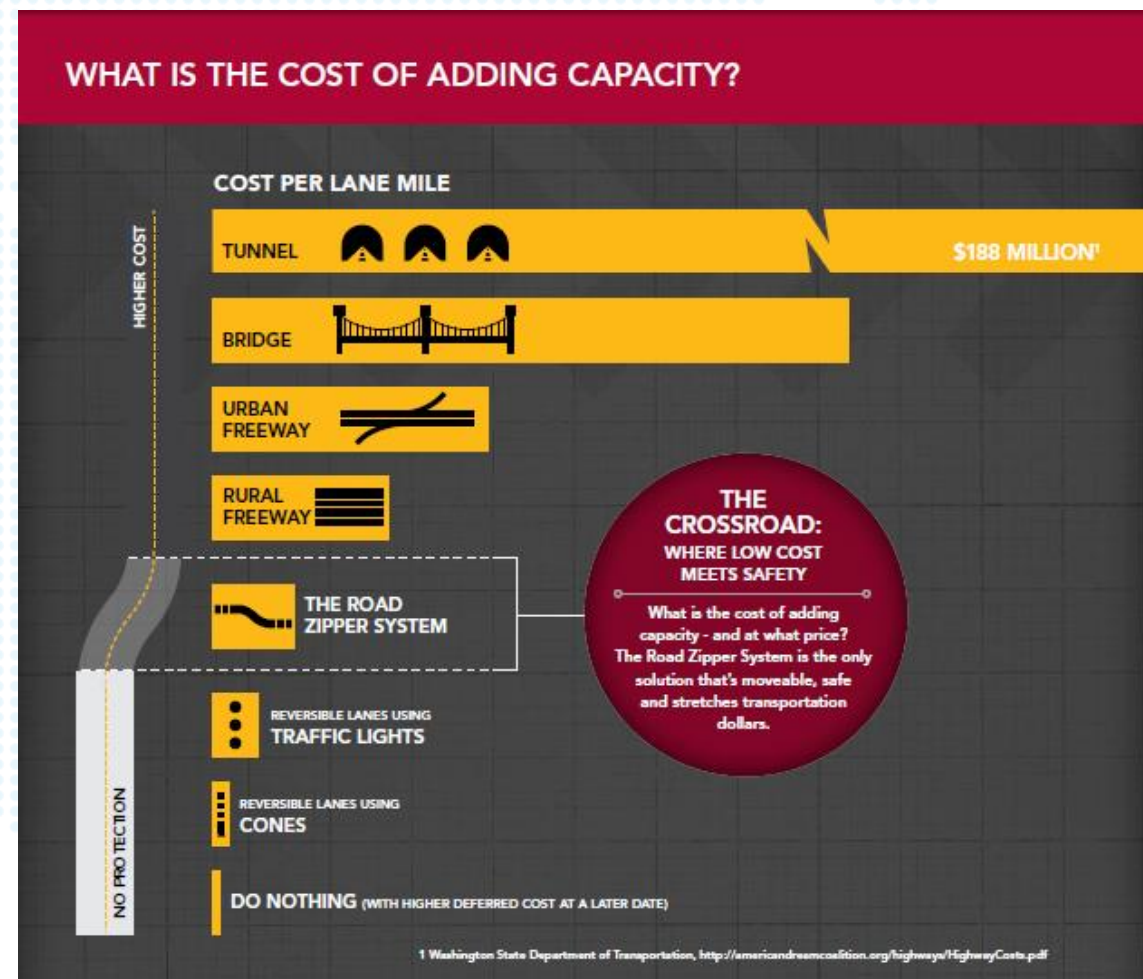
Bus

Cycle Pedestrian

Single occupant car

New construction is costly

- The dollar cost of various types of construction
- The time cost and delays of
 - Funding
 - Environmental approval delays



Solution

Lots of alternatives some old and some new

- Smart Roads
- Real time traveler information and updates
- Message boards and improved incident management reporting
- Traffic control centers
- Congestion pricing – to maintain level of service
- License plate restrictions
- Downtown access fees (London)
- Direct Access ramps , improved merging and weaving.
- Ramp metering
- Synchronized signals
- Electronic Toll collection
- **More Mass Transit including Bus rapid transit (BRT)**



BRT Lanes



Vision Zero for the Balkans
June 1 – 2, 2022

Ways Cities Benefit from Bus Rapid Transit

Around the world, cities are searching for sustainable ways to transport residents quickly, efficiently, and safely throughout their streets.

One such solution is bus **rapid transit (BRT)**, a city-based, high-speed bus transit system in which buses travel on dedicated routes.

BRT is already widely implemented in both the developed and developing worlds.

Benefit from Bus Rapid Transit

The new research from EMBARQ examines global evidence as well as four in-depth case studies of BRT systems in Bogotá, Colombia; Mexico City, Mexico; Johannesburg, South Africa; and Istanbul, Turkey.

It concludes that BRT **improves quality of life in cities** in at least 3 keyways:

- saving travel time,
- reducing local air pollutant emissions,
- improving traffic safety

Different types of BRT lanes

City Roads

Effective and safe

Motorway contraflows

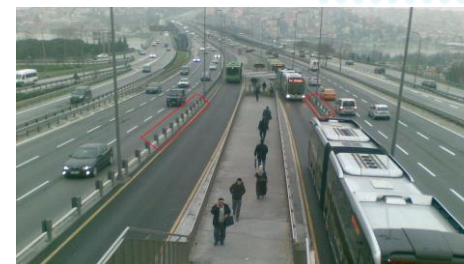
Designed for temporary peak period solutions

Not as Safe as good practices, cross overs can be catastrophic

Dedicated BRT routes

Expensive but efficient

Generally safe



City BRT lanes

- Dedicated lane taken from general purpose lanes
- Not flexible or adjustable for special traffic conditions or events.



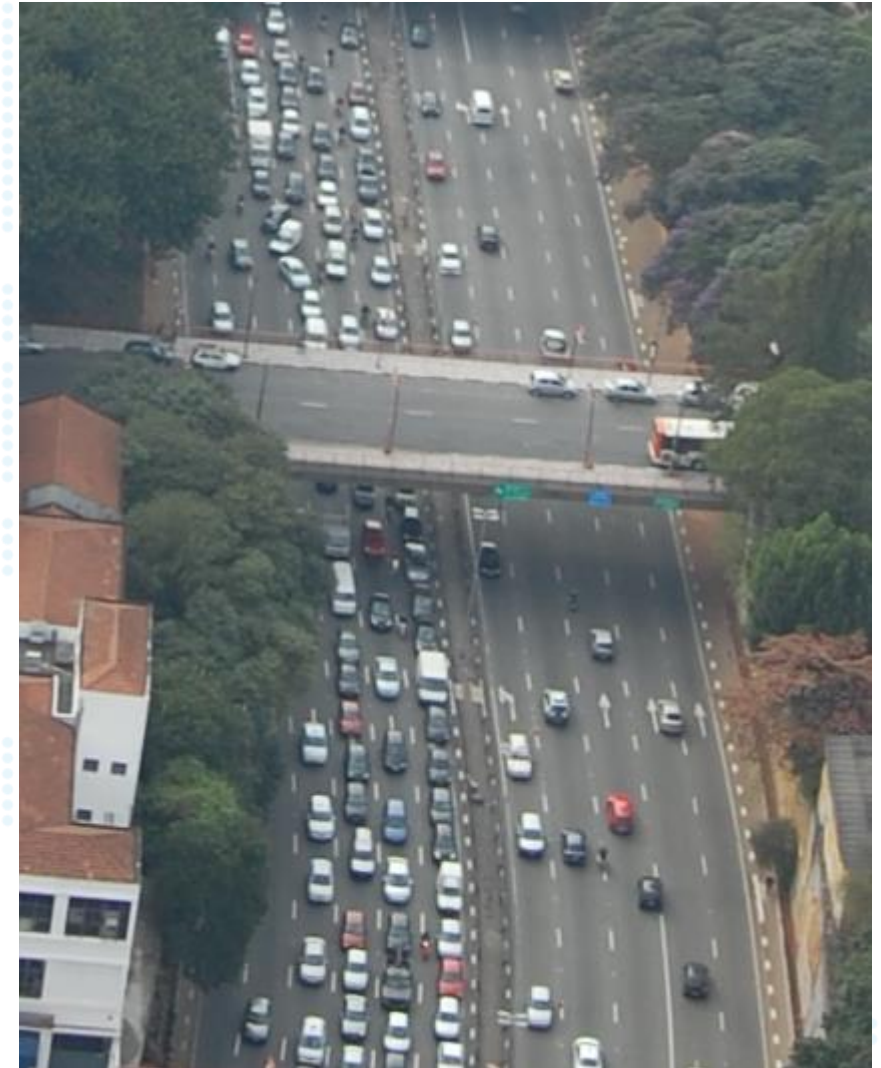
Contraflow BRT lanes

- Dedicated lanes for buses
 - usually at peak periods
- Not recommended on higher speed motorways
- Accidents can be very dangerous with multi passenger vehicles



Contraflow BRT lanes

Many Latin American cities use this strategy on major arterials and motorways with buses



Unprotected Contraflows

Issues

- NO positive protection
- Motorcycles
- Drivers that do not follow the rules
- Potential for higher speeds



Dedicated BRT lanes

- Dedicated lanes at all times
- Quite expensive with stations and infrastructure
- Needs major ridership to support build cost
- What if you could connect other bus corridors to these main lines to inexpensively expand the network



Alternative safe BRT Strategies

- Used existing lanes during tidal flow
- No build solution
- Use for buses and other specialty vehicles
- Run bus lines through chokepoints to connect to other dedicated BRT lines



Alternative safe BRT Strategies



HOV Lanes – Dallas, USA

- 15,000 drivers save 14 min/day
- Carpools increased 300%, 2.9 Avg. vehicle occupancy
- Bus ridership increased 38%
- In 2010 TX A&M University reported the HOV lane carried 17,735 persons/day
- Safety benefits of using Movable barrier as opposed to pylons and double white stripes to separate HOV and BRT lanes – barrier protects moving traffic from crashes on either side.

Moveable concrete barrier creates reversible lanes with positive barrier separation, returns lanes to general purpose traffic in off-peak



Bus Rapid Transit (BRT) Lane - Boston , USA

- In operation since 1995
- 6 Miles in Length
- Very narrow corridor, minimal shoulders in contraflow lane
- Operating Schedule

5:00 am to 10:00 am

3:00 pm to 8:00 pm

2+ HOV

- Time savings up to 15 min (am) and 10 min (pm)



Conclusions

Road Zipper and moveable barrier presents another **SAFE** option to municipalities, Bus companies and DOTs's

Creates adjustable and flexible lanes for buses and other transit vehicles

Allows you to quickly and cost effectively connect special corridors to central business districts or other BRT lanes.

Utilizes existing pavement and infrastructure when there is tidal flow of traffic

Improves reliability of transit schedules and can reduce capital equipment costs through better utilization.

Other applications for Moveable Barrier.



Flexible Positive Protection



Other applications for Moveable Barrier.



Road Zipper System[®]

- Max Speed 8Km/h (1km of barrier in 8 mins)
- Transfer widths 2.9 meters to 5.5 meters
- Enables one and half lanes to be reconfigured in a single pass
- Minimum Turning Radius: 36m



System Components

Unanchored Barrier, Barrier Transfer Machine

18" wide Reactive Tension System (RTS) Barrier

- NCHRP 350
- MASH
- EN1317






Overview

- Global provider of **infrastructure solutions**.
- Presence in **70 different countries** through distributors, agents, and reps.
- **Three operations in Europe**, with plants in Italy and Turkey, and one sales office in The Netherlands.
- **Market leader** on Road Safety and Road Marking.
- Premier provider of **innovative and customizable solutions**.





Thanks for your time!

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