Bus Only Shoulders in the Twin Cities

Colorado DOT

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Mn/DOT Team Transit Project Manager

Outline

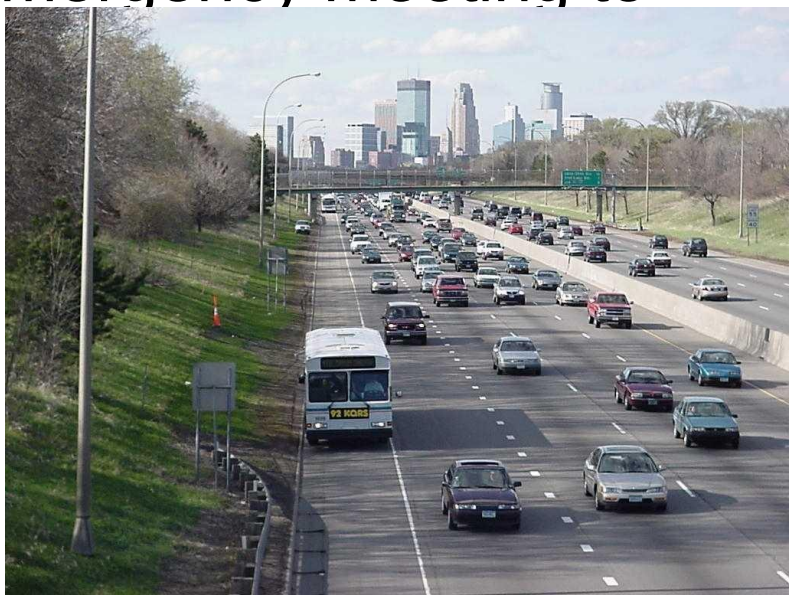
- Background
- History
- Safety
  - Law
  - Enforcement
- Benefits
- Design
- Maintenance
- Funding
- Driver Training

BACKGROUND

- Increasing **congestion** in the Twin Cities
- Not possible to “build” out of congestion
- Need for innovative ways to increase **capacity**
- Use existing infrastructure
- **Team Transit** a partnership of Mn/DOT, Metro Transit, Cites, Counties and other and other stakeholders.

HISTORY OF BOSs

- First pilot project on Highway 252 (arterial)
- First use of freeway shoulder during spring flood of 1993
  - Governor Carlson called emergency meeting to find a solution
- Authority to Law



SAFETY
Safety Statistics by Mn/DOT

- In Jan 2001 Mn/DOT conducted crash analysis* on the existing 175 miles of BOS. Over nine years there were only 20 crashes involving a bus, and each crash involved property damage only.

- In 2009, 17 years of operation, over 290 miles of BOS, and only one injury crash.

*crashes recorded by State Patrol

SAFETY
Safety Statistics by Mn/DOT update 2011

- Mn/DOT updated the crash findings in Mid 2011, records from 2007 to 2009 on the existing miles of BOS, which is now 296 miles. There has been 1 additional injury accident, the driver of the SOV was at fault.

*crashes recorded by State Patrol

Safety Statistics by Metro Transit for 2003

- Collisions 21
- Sideswipes /mirror hits 19
- Total Losses $7,680
- Largest Loss $3000

- 1718 express trips per day can use shoulders
- 36,500 express trips per month
- Monthly express trips per collision =13,908
- Single trip collision probability: Once every 27.3 years.

Why is it safe?

- Operational Guidelines:
  - Low speeds, <35 mph
  - Speeds not >15 mph faster than adjacent traffic
  - Must yield to any vehicle entering, merging within, or exiting through the shoulder
  - Must re-enter mainline where shoulder is obstructed (vehicle, debris, incident, etc.)
- Accountable, Professional Drivers
- BOS use not required
- Visible, big bus
- High vantage point for bus drivers
- Small number of vehicles, large number of people moved

BOS into Law

- Uniform Vehicle Code
  - prohibits driving on shoulders
  - Operational Guidelines & Alternate Standard
- Originally, buses operated on the shoulder under the authority of the Commissioner of Transportation (pilot projects)
- Passage of a BOS law in codified regulations and standards and made it possible for law enforcement to issue tickets for improper use
- Charter buses

Enforcement

- Tickets not typically to bus drivers
  - Garage supervisors go out and radar “clock” buses and fix any problems
- Gradation of realization (started without public awareness campaigns)
- Copycat fear not realized
- “Jealous Motorist”

  occasional problem

Bus-Only Shoulder Benefits

- **Move** the most **people** through congestion on existing infrastructure

- **Travel time** savings =advantage for rider AND $$ for transit provider
- **Reliability**, buses on schedule despite congestion
- **Ridership** increased =less people in cars
- **Rider perception** time savings 2X greater than actual

Economic Benefits

Capital Cost comparison

- LRT projects vary in cost from $15 million to $100 million per mile, with the average cost per mile approximately $46 million
- Cheapest BRT option - $2.5 million to $2.9 million per mile, mixed flow with general traffic, excluding any cost associated with acquiring the right of way.
- **BOS in the Twin Cities range from as little as $1,500 per mile to $200,000 per mile (2007 dollars: avg $150,000 per mile)**

- Operational costs (actual numbers difficult)
  - fewer buses and drivers needed

DESIGN

- BOS width
  - 10’ min (absolute value)
  - 11.5’ min next to barriers like bridges (12’ preferred)
  - 12’ new construction
- Thickness
  - Determined by analysis based on soil conditions and the number of buses that will be using the segment
  - As a rule of thumb, the minimum thickness is 7” of bituminous
    - Enough to compensate for variety of underlying material
    - Matches curb and gutter for good compaction
  - Full depth concrete for constructability
- Catch basins
  - Reinforced as caution
  - Sump reduced from 0.33’ (4”) to 0.1’ (1.5”) or less with Water Resources review.

DESIGN

- Noise Walls
  - Due to updates in 23 CFR 772 a noise analysis is required if the project will be using Federal Funds.
  - The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a HOV lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane.
  - As of January 2012, we have not used any Federal Funds on a stand alone bus shoulder project. We believe that an analysis would not require the installation of noise walls with a bus shoulder project.
- Rumble Strips
- Ramp volumes

Watch for Buses on Shoulder sign (posted at entrance ramps or cross streets)

Signs

Exception sign (posted at “pinch point” on BOS)

Typical Shoulder sign (posted approx every 1 mile) “Begin” or “End” signs may be posted above this sign

No Special Pavement Markings

MAINTENANCE

- Maintenance, Snow Removal and Plowing
  - Shoulders cleared of obstructions and snow as part of normal maintenance activities.
  - Routine done in off-peak hrs
  - Maintain BOS (adequate thickness) with mainline

- Emergency Response
  - Non-issue
  - Bus moves out of way for ANYTHING in the shoulder

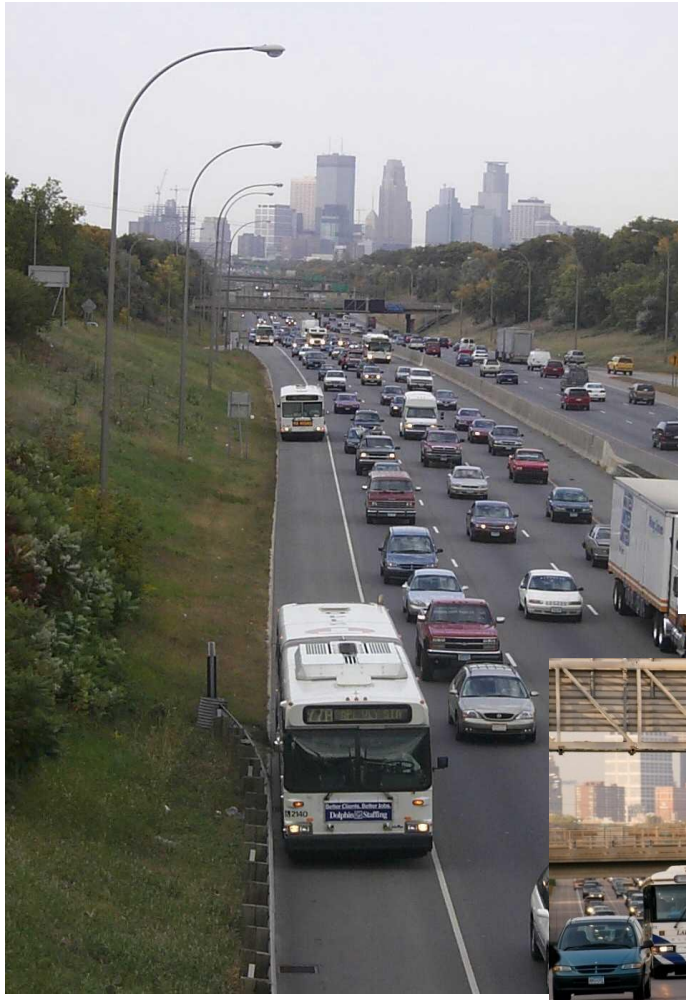
FUNDING

- **Capital Costs**
  - Mn/DOT – construction
    - $2 million budget
  - Metro Transit – park and rides
  - 1996 – Mn/DOT contributes directly to transit projects
  - 1997 – Team Transit Set-Aside of $2 million/year
  - 2003 bonding package - $46 million to capital costs
  - 2006 – Team Transit budget halved to $1 million
  - 2008 – Bonding Package of $20 million for transit advantages
  - Current budget – varies form $1 to $3 million/year

- **Operational Costs**
  - Transit Providers (like Metro Transit)
  - FTA – Fixed-guideway funding – $14.7 million in 2002
    - FTA no longer classifies Bus Only Shoulders as a fixed-guideway

Driver Training

- Training Manual
- Class time
- Route & Safety Pamphlets
- Video
- On-board training



OPERATORS GUIDE TO
BUS-ONLY SHOULDERS

Website

http://www.dot.state.mn.us/teamtransit/

Transit providers in the metro area

Metro Transit
Metro Commuter Services
Anoka Traveler
Hiawatha Light Rail Transit Maple Grove
Minnesota Valley
Plymouth Metrolink
Southwest Transit
BlueXpress

Planned Transit Corridors

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Bus-only shoulders

Current and Planned Bus-Only Shoulders

Click map for the PDF file.

Photos
Bus-only shoulders video clips
Click on the image or a link to see a short video

Bus driving on shoulder heavy traffic

- Merging into traffic
- Shoulder and through entrance ramp
- Avoiding stalled car
- Auxiliary lane and through exit ramp
- Navigating past exit
- Through entrance ramp
- Moving onto shoulder
- HOV Ramp meter bypass
- Going around incident

Goal: To move the most people through congestion

- To invest in highway transit advantage capital improvements that will support and encourage transit use in congested corridors
- To interact with local agencies involved in transit for a seamless system of information sharing and project coordination
- To preserve the more than 296 miles of bus shoulders in the Metro
- To inform other DOTs on the cost-effective advantages and other transit advantages of bus shoulder use

Training for bus drivers (video)

General Information

- Transit advantages fact sheet
- Bus only shoulders fact sheet
- MnPASS

Statutory and Regulations

- Bus shoulder law
- Commissioner's order
- Guidelines on shoulder use by buses
- Operating rules
- FAQs

Technical Information

- Geometric design statements

History

- History of bus shoulders in the Twin Cities (pdf)

Park and Ride Lots

- General information
- Metropolitan Council 2030 Park and Ride Plan
- Outside Metro Area

Thank You

Minnesota Department of Transportation

www.dot.state.mn.us/metro/teamtransit/

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