Managed Lanes, Managed Arterials, and Enhanced Transit

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Introduction: the search for more cost-effective transit

- New rail is very costly, serves mostly radial, suburb-to-CBD routes.
- Predominant U.S. commuting pattern is suburb-to-suburb.
- Much larger rail network might serve suburb-to-suburb trips, but very costly:
  - 250-mile heavy rail: $85B (2012 $)
Advantages of Express Bus and Bus Rapid Transit (BRT)

- Faster to implement than rail
- Lower capital costs (and sometimes lower operating costs)

Network connectivity/one-seat rides:
- *Less so* if used as *trunk only*, from station to station.
- *More so* if used for *direct service*, from origin to destination.
Three types of Enhanced Bus

- **Express Bus**: Local pickups, nonstop service on dedicated ROW, local drop-offs (like Miami’s 95 Express)
- **BRT Heavy**: dedicated ROW, off-board ticketing, signal priority, etc. (like Curitiba)
- **BRT Lite**: in mixed traffic, signal priority, limited stops (like LA’s Metro Rapid)
Expressway Managed Lanes and Enhanced Bus

- Variable pricing makes ML a “virtual exclusive busway.”
- Transit agency gets uncongested guideway at no capital cost, and no charge to use.
- Miami’s I-95 Express quadrupled express bus ridership in five years, using new I-95 Managed Lanes.
Network for Express Bus and BRT?

- Express Toll Lanes network on expressways a good start.
- Complete network requires major arterials, as well.
- But how could you do ETLs on arterials?
Bus-Only Lanes on arterials?

Three alternatives, none good:

- Convert median to one-lane reversible—safety problems
- Convert one lane each direction—large negative impact on traffic, congestion
- Add one lane each direction—costly, and under-uses most of new capacity.
Managed Arterials

- Series of tolled (AET) grade separations at intersections of major arterials
- Either underpass or overpass
- Charge only for using the new capacity
- All current alternatives still available at signalized intersection, for those not using the grade separation.
Idea originated in Lee County, FL in 2002

- Value priced queue jump study
- Funded by FHWA Value Pricing Pilot Program, FDOT, and Lee County
- Implementation deferred due to recession.
### Enhanced bus on arterials

<table>
<thead>
<tr>
<th></th>
<th>Restriping</th>
<th>Convert GP</th>
<th>Add Lanes</th>
<th>Managed Arterial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right of way cost</td>
<td>None</td>
<td>None</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Construction cost</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Reduced left turns</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Impact on auto throughput</td>
<td>Minor, negative</td>
<td>Major, negative</td>
<td>Minor, positive</td>
<td>Major, positive</td>
</tr>
<tr>
<td>Under-utilized bus lane(s)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Impact on congestion</td>
<td>Minor, negative</td>
<td>Major, negative</td>
<td>Minor, positive</td>
<td>Major, positive</td>
</tr>
<tr>
<td>Safety impact</td>
<td>Some, negative</td>
<td>Minor, negative</td>
<td>Minor, positive</td>
<td>Minor, positive</td>
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<tr>
<td>Revenue generation</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes, significant</td>
</tr>
</tbody>
</table>
Typical arterial underpass
Capacity advantage of M.A.

- Six-lane arterial: 51,800 vpd
- Eight-lane arterial: 67,000 vpd
- 6-lane Managed Arterial: 87,450 vpd

Limiting factor for arterial throughput is traffic signals more than number of lanes.
Potential busway conversion

South Miami-Dade Busway:
- Built on former railroad ROW (100 ft.)
- Adjacent to very congested arterial (U.S. 1)
- Many cross-streets, signalized intersections
- Many accidents at those intersections
- Hence: speed restrictions, low performance
Potential busway conversion, cont.

Conversion studies:

- Preliminary feasibility study, 2008
  - Grade separations at (some) intersections
  - Widen, and allow toll-paying SOVs
  - Congestion relief to parallel U.S. 1
- PD&E study commissioned by Miami-Dade Expressway Authority
- Tier 1 report, December 2012
Tier 1 Busway findings

- Highest car, bus demand in northern 12 miles.
- 2 lanes each way, grade separations at all 22 intersections.
- 20-year toll revenues would cover construction cost.
- Bus service assumed same as today—not Express Bus or BRT.
Negative local political reactions

- Overpass drawings = “visual eyesores”
- Overpasses every half-mi. = “roller coaster”
- “Where is our promised light rail transit?”

Tier 2 work carried out, but not released.
Alternative Busway concept

- Underpasses, not overpasses
- Semi-depressed main line to prevent “roller coaster” effect
- Non-stop Express Bus to Metrorail station at north end.
- 30-year toll revenue nearly covers construction and O&M costs.
Figure 2, Underpass Cross-Section
Figure 3, Underpass Side View
Figure 4, Cross-Section at Bus Station

- Bike / Ped. lane
- 5’ width
- 22.5’ between bus stops
- 2’ gap between buses
- 12’ distance from bus to bus stop
- 11.5’ between buses
- 11’ distance from bus to bus stop
- 22.5’ width of bus stops
- 50’ length of bus stops
- 100’ overall length of cross-section
Conclusions on Managed Arterials

- Comparable benefits to Managed Lanes on expressways: congestion relief plus Express Bus and BRT
- Avoids negative impacts of bus-only lanes on arterials.

Applications:
- Congested arterials where widening is difficult
- Alternative to adding bus-only lanes to arterials
- Conversion of low-performing busways
Questions?

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