TOLL TRUCKWAYS:
Increasing Productivity and Safety in Goods Movement

By Robert W. Poole, Jr., and Peter Samuel
Trucks Are America’s Lifeblood

- Trucks carry 90% of all freight (by value).
- Truck shipment is a $600 billion/year business.
- 75% of truck shipping (ton-miles) crosses state boundaries.
- There’s no turning back to rail for most shipping.
But Trucking Faces Serious Problems

- Inadequate Highway Infrastructure
- Increasingly Congested Interstates
- Limited Productivity Gains
- Continued Safety Problems
Inadequate Highway Infrastructure

- From 1980 to 2000, VMT grew by 80%.
- From 1980 to 2000, lane-miles increased only 4%.
- Truck VMT is growing faster than car VMT.
- 46% of National Highway System will be at or over capacity by 2020.
Interstates Becoming Congested

- Severely congested (V/SF>.95) Interstates in 2001:
  Urban: 3,084 rt.-mi.
  Rural: 523 rt.-mi.

- Moderately congested Interstates (V/SF 0.8 to 0.95) in 2001:
  Urban: 2,392 rt.-mi.
  Rural: 1,299 rt.-mi.
Trucking Could Be Far More Productive

- Rail labor productivity has increased four-fold since 1980.
- But in trucking, one driver still hauls (mostly) one trailer.
- Longer combination vehicles (LCVs) can more than twice as much freight as conventional 18-wheelers.
- Truck shipping is $610 billion/year business; 10% saving is $61 billion.
What Are LCVs?

Figure 2-1: Current U.S. Truck-Trailer Combinations
- STAA Double
- Rocky Mountain Double
- Triple
- Turnpike Double
- Intermediate Double
- Standard Tractor - Semitrailer
Safety Issues Holding Up Change

- 5,000 deaths/year from car-truck crashes.
- Highway safety groups against expanding territory of LCVs.
Existing LCV Routes
Toll Truckways: a win-win proposition

- Heavy-duty lanes designed for LCVs
- Built in existing right of way on Interstate routes
- Open (voluntarily) to all trucks; mandatory for LCVs in non-LCV states
- Self-funding from tolls, charged electronically
Phase I Study: Simulation Modeling

Civil engineering team at CCNY

- Pavement design
- Productivity-gain estimates
- Economic feasibility
- Financial feasibility
Phase II Study: Pilot Long-Distance Corridors

- National FHWA database
  1. Freight Analysis Framework
  2. Hwy. Performance Monitoring System

- Relative Financial Feasibility:
  1. Revenue criteria
  2. Cost criteria
Revenue Criteria

- Gross truck volume (2020)
- Long hauls
- Congestion
- Connectivity to existing LCV routes
- Trucking industry input
Cost Criteria

- Right of Way Availability
  - Minimum 48 ft. median
  - One lane each direction plus shoulders
  - Concrete center and side barriers
  - Passing lanes every few miles

- Terrain Factors
  - Flat
  - Hilly
  - Mountainous
Proposed Toll Truckway Pilot Corridors
Phase III: Urban Toll Truckways

Need to quantify:
- Time savings
- Payload increase
- Higher-cost lane additions
# Urban Toll Truckway Productivity

<table>
<thead>
<tr>
<th></th>
<th>Mixed freeway semi-trailer</th>
<th>Mixed freeway double-shorts</th>
<th>Truckway semi trailer</th>
<th>Truckway double-short</th>
<th>Truckway triple-short</th>
<th>Truckway double-long</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payload</td>
<td>45,000 lbs</td>
<td>45,000 lbs</td>
<td>45,000 lbs</td>
<td>45,000 lbs</td>
<td>67,500 lbs</td>
<td>90,000 lbs</td>
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<tr>
<td>metric tons</td>
<td>20t</td>
<td>20t</td>
<td>20t</td>
<td>20t</td>
<td>30t</td>
<td>40t</td>
</tr>
<tr>
<td>100 mile delivery - 2004 freight rates</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
<td>$750</td>
<td>$1,000</td>
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<tr>
<td>Average speed on the road</td>
<td>38mph</td>
<td>38mph</td>
<td>60mph</td>
<td>60mph</td>
<td>60mph</td>
<td>60mph</td>
</tr>
<tr>
<td>Miles driven in 8-hr shift (6 hrs driving)</td>
<td>228 miles</td>
<td>228 miles</td>
<td>360 miles</td>
<td>360 miles</td>
<td>360 miles</td>
<td>360 miles</td>
</tr>
<tr>
<td>Revenue from 6 hrs payload at 2004 rates</td>
<td>$1,140</td>
<td>$1,140</td>
<td>$1,800</td>
<td>$1,800</td>
<td>$2,700</td>
<td>$3,600</td>
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<tr>
<td>Variable costs</td>
<td>$684</td>
<td>$684</td>
<td>$684</td>
<td>$684</td>
<td>$1,007</td>
<td>$1,165</td>
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<tr>
<td>Available for overhead, profits, tolls</td>
<td>$456</td>
<td>$456</td>
<td>$1,116</td>
<td>$1,116</td>
<td>$1,693</td>
<td>$2,435</td>
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<tr>
<td>Extra earnings from using truckway/shift/day</td>
<td>$660</td>
<td>$660</td>
<td>$1,237</td>
<td>$1,237</td>
<td>$1,979</td>
<td></td>
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<tr>
<td>Drop assumption of no change in freight rates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assume the extra productivity split 3 ways</td>
<td>3x$220</td>
<td>3x$220</td>
<td>3x$412</td>
<td>3x$660</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shipper's savings on 100 mile delivery, %</td>
<td>$61 12.2%</td>
<td>$61 12.2%</td>
<td>$76 15.2%</td>
<td>$91 18.3%</td>
<td>$412 90%</td>
<td>$660 x1.45</td>
</tr>
<tr>
<td>Additional for trucker overhead &amp; profit/day</td>
<td>$220 43%</td>
<td>$220 43%</td>
<td>$412 90%</td>
<td>$660 x1.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck tollway - possible toll per mile</td>
<td>61c/mile</td>
<td>61c/mile</td>
<td>$1.15/mile</td>
<td>$1.83/mile</td>
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</table>
Key Urban Truckway Features

- Two (14’) lanes each way
- Concrete jersey barrier separation
- Separate access/egress ramps
- Nodes (make-up/breakdown yards)
- Variable tolling, all-electronic
- Voluntary for conventional rigs, mandatory for LCVs
- Located in existing freeway corridors
Twin Ports to Nevada Truckway

- I-710, I-210, SR 60, I-10 among top 7 truck volumes nationally (2020)
- Trucks often 10% of traffic, 30% of capacity
- 4-lane truckway ports to I-15, 2-lane (+ passing lanes) I-15 to NV border
- Urban segment: 292 lane-mi., $8.4B
- Rural segment: 380 lane-mi., $2.0B
Ports - Nevada Toll Truckway
Analysis of Ports-Nevada Truckway

- Assume 3% annual truck traffic growth
- Medium-term urban: 50% of trucks @ $1.00/mi (2004) average toll
- Medium-term rural: 60% of trucks @ $0.40/mi. (2004) average toll
- Results: both segments financially feasible (urban NPV = $16.7B, rural NPV = $5.5B)
Oakland-Valleys Truckway

- Link Port of Oakland to Silicon Valley and Stockton/Tracy
- 80% of Bay Area goods-movement is by truck
- 325 lane-miles, all 4-lane
- $9.1B construction cost (using SCAG figures)
Oakland – Valleys Toll Truckway
Analysis of Oakland-Valleys Truckway

- Truck traffic from federal FAF
- Medium-term: 60% of truck traffic
- $1.00/mile average toll (2004)
- Results: financially feasible (NPV of $12.4B vs. cost of $11.9B, in 2004 $)
Needed Policy Changes

- Provision of right of way in Interstate and freeway corridors (federal and state)
- Liberalized size & weight limits on Toll Truckway lanes (federal and state)
- Removal of ban on Interstate tolling for Toll Truckway lanes (federal and state)
- State enabling legislation for tolling, regional joint powers authorities
Conclusion: toll truckways could be a win-win proposition

- Increased goods-movement capacity, paid for by users
- Reductions in shipping costs
- Increased highway safety
- Reduced highway emissions
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