



**Transportation Research Forum**

---

Industry Issue Paper: Benefits, Costs, and Financing of Truck-Only Highway Lanes

Author(s): David J. Forkenbrock and Paul F. Hanley

Source: *Journal of the Transportation Research Forum*, Vol. 44, No. 2 (Summer 2005), pp. 99-109

Published by: Transportation Research Forum

Stable URL: <http://www.trforum.org/journal>

---

The Transportation Research Forum, founded in 1958, is an independent, nonprofit organization of transportation professionals who conduct, use, and benefit from research. Its purpose is to provide an impartial meeting ground for carriers, shippers, government officials, consultants, university researchers, suppliers, and others seeking exchange of information and ideas related to both passenger and freight transportation. More information on the Transportation Research Forum can be found on the Web at [www.trforum.org](http://www.trforum.org).

# **BENEFITS, COSTS, AND FINANCING OF TRUCK-ONLY HIGHWAY LANES**

---

*As increasing amounts of intercity freight are transported by trucking firms, the possibility of constructing truck-only lanes along selected rural Interstate highways warrants consideration. On heavily traveled sections, there is potential for improvements in safety and productivity if such lanes were added. In this paper, we explore the conditions under which investment in truck-only lanes could be considered and what sorts of benefits may accrue to both occupants of passenger vehicles and to operators of heavy trucks. Then we examine the available evidence regarding the nature and magnitude of these benefits to gain insight into the willingness of highway users to pay for these lanes. We conclude that the willingness to pay for truck-only lanes on the part of occupants of passenger vehicles appear to be quite limited and that support for these lanes on the part of trucking firms is likely to depend upon their being allowed to operate longer-combination vehicles (LCVs) on them. Trucking firms could be assessed tolls to travel in truck-only lanes, with these tolls representing some fraction of the increased productivity gained through being allowed to operate LCVs. Finally, we pose several questions that would need to be answered before an investment in truck-only lanes might be considered along a given Interstate segment.*

**by David J. Forkenbrock and Paul F. Hanley**

## **INTRODUCTION**

For almost 40 years, transportation planners have debated the efficacy of separating different types of traffic (see Flanagan 1966). Today, the argument for designating special-purpose lanes (often referred to as managed lanes) on major highways stems from two principal objectives: (1) to separate the growing volume of heavy trucks from lighter vehicles on rural Interstate highways and (2) to create incentives for those traveling in passenger vehicles on congested urban freeways to increase vehicle occupancy rates. While these objectives differ in many ways, they involve at least one common dilemma – how to finance such lanes. More precisely, how should the cost of constructing and operating special-purpose lanes be distributed among their users and the users of other, general-purpose lanes?

### **The Concept of Truck-Only Lanes**

The debate over whether to construct additional lanes along certain Interstate highways has been

ongoing for many years, but it has been receiving greater attention recently. For example, TRB (2003) has called on Congress to study the cost and market potential of exclusive truck lanes. In part, this growing interest is the steady increase in heavy truck traffic on rural Interstates as the U.S. economy grows (the 43.6 billion vehicle miles traveled by combination trucks on rural Interstate highways in 2003 represent a 41.9% increase from 1990 [FHWA 2003, Table VM-1; FHWA 1991, Table VM-1]). A related consideration is the dominant share of freight shipments within the country that trucking accounts for, as Table 1 highlights. In 2002, trucking accounted for 40% of the ton-miles and 74.3% of the value of freight shipped. Further, the Federal Highway Administration (FHWA) estimates that truck freight will increase by more than 50% by 2020 (FHWA, 2002). Trucking advocates contend that truck-only lanes would increase the opportunities for significant improvements in the effectiveness of this freight mode, in part because they assert that longer, multi-trailer trucks would become more feasible (TRB, 2002). Stokes and Albert (1986) and Mannering

**Table 1: Freight Shipped Within the U.S. by Mode, 1993–2002**

Mode	Quantity (ton-mile percentages)			Value (dollar percentages)		
	1993	1997	2002	1993	1997	2002
Trucking	35.9	38.5	40.0	75.3	72.0	74.3
Rail	38.9	39.4	40.2	4.2	4.6	3.7
Water	1.1	1.1	1.1	11.2	9.3	9.0
Other <sup>1</sup>	24.1	21.0	18.7	9.3	14.1	13.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

<sup>1</sup>Includes oil pipelines and domestic airways.

Source: BTS and U.S. Census (2004), Table 1b.

et al. (1993) argued that the benefits of truck-only lanes go beyond operational gains for trucking firms and include traffic safety improvements, reduced conflicts, and lower maintenance costs on general-traffic lanes. Forkenbrock (2003) observed that moving heavy trucks to separate lanes could improve the traveling experience of those traveling in passenger vehicles, which would have positive implications for the quality of life of these travelers.

Our analysis focuses on rural Interstate highways because (1) the bulk of truck-only lanes would be constructed in rural areas (including Interstate highways on the periphery of communities), and (2) the effects of these lanes can be generalized more completely in rural areas. The California Department of Transportation (Caltrans, 2004) conducted a generalized feasibility study of the conditions under which truck-only lanes would be most feasible. Specific conditions that would signal a possible need include:

- Truck volumes exceeding 30% of the vehicle mix.
- Peak-hour one-way traffic volumes greater than 1,800 vehicles per lane-hour.
- Off-peak volumes in each direction exceeding 1,200 vehicles per lane-hour.

Poole and Samuel (2004) used similar parameters – average daily traffic (ADT) of 40,000 in each direction, with 20% accounted for by heavy trucks. These conditions are not likely to be met on most rural Interstate highways, that truck-only lanes are likely to be a cost-effective solution for rural Interstate highways only

when traffic volumes are comparatively high and there is a sizable presence of heavy trucks. The analysis in this paper presupposes that rather stringent traffic mix and volume conditions not unlike those suggested by Caltrans and Poole and Samuels are met on candidate Interstate segments.

### Types of Truck-Only Lanes

A variety of proposals have been advanced for the construction of truck-only lanes. These proposals vary in design and hence capital cost, but all would be constructed along rural Interstate highways. The three most often discussed designs are:

- Two additional lanes in each direction for heavy trucks only. These lanes would be separated by barriers from existing lanes, which would be limited to passenger vehicles and trucks under some weight threshold, such as 25,000 pounds gross weight.
- One additional lane in each direction that would be limited to heavy trucks. There also would be a breakdown lane and an additional passing lane for trucks every few miles. Where feasible, the added lane would be located in the median, with a concrete barrier separating traffic flowing in opposite directions. Another barrier would separate the truck lane from existing lanes.
- One additional lane, for a total of three lanes in each direction. The right lane would be limited to trucks, the left lane to other types

of vehicles, and the middle lane could be used by both groups (a configuration already found in several eastern states).<sup>1</sup>

Proposals also vary in terms of how entrance and exit ramps would be configured. The most extensive designs preclude any interaction between heavy trucks and other vehicles. That implies that special entrance and exit ramps would need to be constructed. They probably would be spaced farther apart than are current general-purpose ramps. Most advocates of truck-only lanes call for substantially thicker pavement than is normally found on Interstate highways – up to 24 inches – to accommodate LCVs with higher axle loads.

### WHO WOULD BENEFIT FROM THESE LANES?

Our review of the literature indicates that, in principle, the concept of truck-only lanes has fairly broad appeal. Such lanes would be expensive to construct, however. Poole and Samuel (2004) estimate that, in general, it would cost approximately \$2.5 million per lane-mile (i.e., about \$10.0 million per route-mile for two lanes in each direction) to construct a truck-only facility alongside an existing Interstate highway, plus land acquisition costs, if applicable.<sup>2</sup> Of course, the cost would vary considerably depending on right-of-way availability, topography, the need for overpass construction, number of entrance and exit ramps needed, and a host of other factors.

Regarding financing, the central issue is what the relative cost burdens should be for (1) the trucks that use the special-purpose lanes and (2) other vehicles that continue to use existing lanes on which trucks would no longer travel. Normally, when new lanes are constructed, all vehicles using them share in the cost by paying road user charges. Highway cost allocation studies (see FHWA, 1997) determine the fair burden for each vehicle type based on its cost responsibility, which in turn is based primarily on the relative damage the vehicle type causes per mile traveled on various classes of roads. Truck-only lanes represent an unusual circumstance in that newly constructed lanes would not be used by all types of vehicles. In a technical sense, it would be possible to assign the full cost of

constructing and maintaining the truck-only lanes to the trucks that use them and the costs of maintaining the existing general traffic lanes to all vehicle classes except trucks.

One issue that would need to be addressed if a traditional cost-based approach to financing truck-only lanes were to be applied is that because truck operators have helped pay the capital costs of current lanes, it is arguable that they have an equity position in them. To the extent that this is true, a credit for this equity could be applied to their cost responsibility regarding the additional lanes to be constructed. If during the time since the existing lanes were constructed, trucks have underpaid user charges, this underpayment would need to be deducted from the equity credit. A rather complex accounting of costs and credits would be required to determine how much if any credit for trucking firms should be applied. In most cases, however, it is doubtful that much equity credit at all would apply.

Rather than attempting to apply a cost-based approach, it is likely that a more workable basis for estimating what the relative cost burdens should be is to consider the nature and magnitude of benefits the two groups of users would be likely to derive if truck-only lanes were constructed. In principle, these benefits would form the basis for the willingness to pay on the part of each group. As a point of departure, we briefly catalog the sorts of benefits that would accrue to trucking firms and to passenger vehicle occupants.

**Benefits to Trucking Firms.** The key potential benefits to trucking firms would be fourfold:

- They would be far less exposed to the risk of car-truck crashes, many of which result from driving errors on the part of those operating autos and other passenger vehicles. According to the FHWA, in fatal crashes involving passenger vehicles and trucks on all types of highways, the passenger vehicle driver was the primary contributor to the crash in 72 to 89% of the cases investigated, depending on the type of crash (cited in ATA, 2004). Reduced involvement in serious crashes would be an economic benefit to the trucking industry.
- With lower traffic volumes in the lanes they would occupy, trucks could operate more efficiently. Less braking, acceleration, and

overtaking would reduce per-mile operating costs (TRB 2003). Furthermore, allowing longer-combination trucks (LCVs)—longer twin-trailer or three-trailer combination trucks with gross weights of up to 150,000 pounds—in truck-only lanes would reduce the total number of trucks operating on these facilities by about 25% (U.S. DOT 2004).<sup>3</sup>

- The added capacity would help alleviate congestion, which increases time en route and reduces the certainty of arrival time at a destination. FHWA (2002) estimates that in 2001, of the nation's 32,992 miles of rural Interstate highways, 523 miles (1.6%) were "severely congested," and another 1,299 miles (3.9%) also were congested, albeit not as severely. With projected growth in vehicle miles traveled on rural Interstates, congestion will grow, absent capacity increases, and trucking firms' costs increase. It should be stressed, however, that it is not likely congestion will be very widespread on rural Interstate highways in the foreseeable future. A good analysis of the average value of time savings to trucking firms is contained in Waters et al. (1995) who place the value at \$43.93 per hour (adjusted to 2005 dollars).
- The argument for greater use of LCVs would be strengthened because they would not need to operate in the same lanes as passenger vehicles. Various authors contend that LCVs have considerable potential for improving the productivity of the trucking industry (see, for example, TRB 1990; Sydec, Inc., 1990; Middendorf and Bronzini, 1994; and Walter, 1995).

**Benefits to Passenger Vehicles.** In general, passenger vehicles could benefit in three ways:

- Safety would improve— In 2001, 631 fatalities resulted from collisions involving combination trucks on non-interchange sections of rural Interstate highways (BTS, 2004). Using crash cost data from the U.S. DOT (2002), the annual societal cost of fatalities on these highway segments is approximately \$1.9 billion. Of all crashes involving large trucks and passenger vehicles, 79% of the fatalities were passengers in vehicles other than

the large truck FMCSA (2004). The great differential in size and mass generally places the occupants of the passenger vehicle at a major disadvantage in such collisions. Thus, separating trucks from passenger vehicles can be expected to substantially improve the safety of traveling on rural Interstates in passenger vehicles.

- Quality of the traveling experience would increase. Large trucks on Interstate highways can intimidate people traveling in passenger vehicles. It is not unusual for relatively small passenger vehicles to be boxed in with trucks in front, behind, and alongside of them. If essentially all vehicles in the general traffic lanes were roughly the same size, in some instances there would be less stress on the part of occupants in passenger vehicles.
- On rural Interstate segments with heavier traffic volumes, additional lanes would help improve speeds, especially with larger trucks operating in different lanes. Because the acceleration and braking performance of trucks is much lower than that of most passenger vehicles, removing trucks would substantially improve the flow of segments with heavy traffic. According to the Highway Capacity Manual (TRB 2000), one combination truck takes up approximately the same road capacity as 1.8 to 8.0 autos, depending on the terrain and traffic conditions. A caveat is that in some instances, improved traffic flow may induce additional traffic.

### **Evidence of the Magnitude of Benefits**

Somewhat different approaches are needed to estimate the benefits to occupants of passenger vehicles versus operators of heavy trucks. In the former case, the issue is willingness to pay to enjoy the aforementioned benefits of driving on Interstate highways without trucks. For trucking firms, the gains are related to productivity improvements; if LCVs are permitted, these gains are net of the cost of acquiring LCVs.

**Willingness to Pay by Passenger Vehicle Occupants.** The amount operators of passenger vehicles would be willing to pay to have trucks

moved to separate lanes was explored by Bambe and McMullen (1996). Using contingent valuation analysis, a method for estimating non-market prices, they found that motorists would be willing to pay about \$35 (1995 dollars, equating to approximately \$41 in 2004 dollars) annually to remove triple-trailer combination trucks from the highways of Oregon. Their analysis has the advantage of not being hypothetical because triple-trailer trucks are allowed in the State of Oregon, so respondents were familiar with the circumstances addressed in the study.<sup>4</sup> Also, contingent valuation is an especially appropriate approach for gauging benefits because it involves asking participants about their willingness to pay for a good or a policy change (Mitchell and Carson 1989).

Further research using this methodology could be structured to estimate how this willingness to pay varies with attributes of the Interstate highway being traveled, such as the fraction of vehicles in the traffic stream that are large trucks, overall traffic volume, speed, and presence of rolling topography. Another option would be to selectively apply revealed preference analysis. In a few situations, data are available as to how drivers of passenger vehicles make trade-offs between different types of costs. For example, if the anticipated time en route on a facility that does not allow trucks is greater than on one that allows trucks, a trade-off must be made between time savings and driving in the company of trucks. Using accepted estimates of the value of time, it would be possible to gain insights into the implicit value of avoiding trucks.

The New Jersey Tollway is a potential case study of revealed preference regarding travel choices by operators of passenger vehicles in auto-only and auto-truck lanes. This facility has lanes that are available only to autos and other lanes that are open to autos and other types of vehicles, including heavy trucks.

**Improvements in Productivity for Trucking Firms.** An analysis by Weinblatt (1991) concluded that on a cost-per-ton basis in comparison to a standard 53-foot, five-axle combination truck with a gross vehicle weight of 78,000 pounds:

- A seven-axle, triple 28-foot trailer truck with a gross vehicle weight of 116,000 pounds

would be 20.1% more productive in terms of cost per ton shipped.

- A nine-axle, twin 48-foot trailer truck (turnpike double) with a gross vehicle weight of 127,400 pounds would be 23.8% more productive.

Maio (1986) estimated that for volume-limited cargo, a national LCV network would result in 23 to 42% productivity gains, while for weight-limited cargo the increase in productivity would be about 17 to 32%. Note that for maximum productivity increases to be realized, a national network of highways on which LCVs would be permitted would be necessary. Thus, constructing truck-only lanes in a limited number of locations would most likely produce productivity increases at more modest levels.

## FINANCING MECHANISMS

The foregoing discussion explored the potential benefits both to users of general-traffic lanes and to operators of heavy trucks to assess what the relative cost burden for truck-only lanes should be for both groups. A related issue is how these cost burdens should be paid. Two questions are at the center of this issue:

- Should rural Interstate highways to which truck-only lanes are added be converted to toll facilities? Should the toll only be assessed to users of the truck-only lanes or to the passenger vehicle lanes as well?
- In the case of heavy trucks, should a credit be given for the tax already paid on the fuel consumed while operating on tolled lanes? Whether or not such a credit is applied, the amount paid by the truck operator via a toll and/or through the fuel tax should total the figure established as a matter of policy. However, if both methods of collection are used simultaneously, some may regard this as double taxation.

To raise the necessary capital for the construction of the truck-only lanes, a state probably would choose to issue revenue bonds, which mainly would be secured by the revenue forthcoming from tolls. Below are two alternative scenarios. The first involves toll payment only by large trucks and the second entails payment of tolls by passenger vehicles, as well.

**Scenario 1: Tolls Paid Only by Large Trucks.**

Bonds would be issued to cover the share of the capital cost to be defrayed by large trucks, with the share to be covered by passenger traffic paid by the state's road use tax fund (RUTF). The RUTF in most states depends heavily on general user charges (primarily motor fuel taxes and registration fees). General user charges paid into the RUTF by large trucks would be used for operation and maintenance (O & M) of the truck-only lanes. Presumably, such O & M charges would be comparable to those paid by trucking firms prior to the construction of truck-only lanes, but they may actually be less because the thicker pavement envisioned for these lanes would be better able to withstand the axle loads imposed by heavy trucks. Tolls assessed to users of truck-only lanes would be dedicated to paying off the bonds issued to cover construction of the lanes. On balance, of course, large trucks would pay more for traveling on truck-only lanes than on other roads.

**Scenario 2: Tolls Paid by All Vehicles.**

Another scenario would require passenger vehicles traveling in the general-traffic lanes to pay tolls, just as large trucks operating in the truck-only lanes would. Tolls paid by passenger vehicles would need to be justified on the basis of people being able to travel without the safety risks from heavy trucks operating in the same traffic stream, by faster and more consistent speeds, and by the more relaxed environment made possible by the elimination of large trucks from their lanes. In short, the occupants of the passenger vehicles would be offered a higher-quality service than if there were no truck-only lanes, and they would be asked to pay a premium for this higher quality of service. It is unclear, however, whether motorists would be willing to pay tolls on rural Interstates simply to help finance truck-only lanes. If they were not, the tolls they would be required to pay would amount to a reduction in their economic welfare.

**Setting Toll Levels**

We discussed earlier how the cost of truck-only lanes could reasonably be borne by passenger vehicles and by large trucks at levels related to the magnitude of the benefits each group of

road users would derive. Such magnitudes can be estimated through analyses of the benefits and by applying approaches such as contingent valuation analysis which are aimed at gauging how much various road users would be willing to pay for the separation of heavy trucks into different lanes. We now turn to several practical issues in setting the levels of tolls that could be applied to assign cost burdens on road users to finance the construction and O & M of truck-only lanes.

**The Issue of Diversion.** If a trucking firm believes that the economic benefits of traveling on a highway with truck-only lanes are not commensurate with the magnitude of the toll for using the facility, it will search for an alternate route that entails lower overall costs. The likelihood of diversion, then, depends on several factors, including:

- Availability of alternative routes that are not excessively circuitous and would allow an acceptable speed and level of safety.
- Length of the haul – longer trips are more likely to have more choices of routes and thus diversion would be more likely.
- Level of the toll for traveling on the highway with truck-only lanes.
- Whether or not longer combination vehicles (LCVs) are allowed and whether use of an LCV is appropriate for the trip(s) in question.
- Time sensitivity of freight – truck-only lanes are likely to produce a comparatively low amount of variability in time en route.

Reebie Associates (2004) estimated the likely diversion if truck-only lanes were established on I-81 in Virginia. Their modeling effort led them to conclude that, to a point, the numbers of heavy trucks that would divert from a truck-only facility is approximately linear with the cost of tolls per mile. Reebie estimated that toll levels above 20 cents per mile would bring about sufficient diversion that such tolls would be counterproductive. Rather, they concluded that toll levels in the range of 15 to 20 cents per mile probably would produce optimal results. Their analysis, of course, applies to circumstances where diversion is possible (i.e., the trucks operating in truck-only lanes would be permitted on other roads). Otherwise, trucking firms would

have to assess the economic consequences of using conventional combination trucks in lieu of LCVs, as well as diverting from the tolled truck-only lanes.

**Heavy Truck Tolls that are Commensurate with Economic Gains.** We have discussed that operators of heavy trucks stand to gain economically by truck-only lanes constructed along rural Interstate highways. A key policy question is what portion of that economic gain should be retained by trucking firms and what portion should be contributed to the agency providing the improvement that enabled this gain to materialize.

Increased productivity on the part of trucks traveling in truck-only lanes would stem from two separate but related sources:

- Reduced costs due to traveling on the improved facility.
- The possible use of LCVs, which can enhance trucking productivity.

The general types of costs that could be saved were listed above; they mainly relate to improved safety and less variability in speeds. Productivity gains to trucking firms that could be attributed to allowing LCVs to operate on a national system of highways have been estimated by Samuel et al. (2002; also see Holguin-Veras et al. 2003). Using a specific set of conditions, Samuel et al. (2002) estimated the productivity gain for various combination trucks, including LCVs. One of their two cases involves operations on a truck-only facility that allows axle loads that are 50% higher than those currently allowed in the United States (i.e., 39,780 pounds per tandem axle). Under the assumptions of that case, the authors conclude that a \$3.04 per vehicle-mile increase in productivity would result for a turnpike double (120 feet in length, maximum gross weight of 175,000 pounds, and average cargo weight of 66,000 pounds).

Samuel et al. (2002) suggest that the toll assessed to LCVs operating in truck-only lanes should be half of the productivity gains experienced by the trucking firm by virtue of their being allowed to (1) operate in relatively unencumbered truck-only lanes and (2) operate LCVs. Their reasoning is that 50% of productivity gains is a reasonable return to trucking firms, given that:

- In many instances new rolling stock would have to be procured.
- LCVs would have to be broken down into shorter rigs once off the special facility.
- Within a given firm, multiple varieties of trucks would be required to operate on these and other facilities.

The authors' analysis of potential productivity gains leads them to conclude that a per-mile toll of up to \$1.50 would be possible, which would amount to half of the productivity gain. Whether the toll for heavy trucks should be set at half of the productivity gains trucking firms would realize from truck-only lanes or at some other level is an open question. More information is needed on:

- Productivity gains likely in various segments of the trucking market with and without LCVs being permitted.
- How the trucking industry and shippers would respond to the option of operating on truck-only lanes and to the associated option of using LCVs on these routes.<sup>5</sup> A related issue is the extent to which truck traffic would divert from Interstate highways with truck-only lanes to avoid the toll.
- Capital and O & M costs of adding truck-only lanes under various conditions (e.g., number and configurations of overpasses, right-of-way limits, and topography).
- Willingness to pay for a higher quality traveling environment on the part of occupants of passenger vehicles and therefore the toll that could be assessed to them.

## CONCLUSION

We have explored the complex issue of how truck-only lanes added to rural Interstate highways could be financed. These lanes would be expensive enough that it is highly unlikely that sufficient resources could be found from traditional sources, particularly a state's RUTF. Tolls would need to be assessed to users of the improved facility. In terms of financing, the central policy questions are who should pay these tolls and how high they should be. For heavy trucks that would operate on the newly constructed truck-only lanes, tolls

can be established to capture a portion of the productivity gains that the lanes would enable.

For each potential project of adding truck-only lanes (typically between a pair of metropolitan areas), a feasibility analysis should be carried out that takes into account the following:

- Current traffic volume by time of day, percentage of traffic that is heavy trucks, flow speed, and safety record.
- Potential for productivity gains on the part of trucking firms (1) if the truck-only lanes were added and (2) if LCVs were allowed to operate on newly added truck-only lanes.
- Possible toll levels, taking into account the productivity gains, which perhaps could reach \$1.50 per mile for LCVs, and the potential for diversion that in part would depend upon the availability of alternative routes.
- Connectivity of LCV facilities – adding truck-only lanes that enable LCV use are bound to be more productive if they connect to other such facilities to constitute a continuous system.

- Cost of adding the lanes with a suitable number of entry and exit points.
- Cost and location of LCV breakdown facilities outside metropolitan areas.

The evidence leads to the conclusion that tolls assessed to truck operators would have to generate the preponderance of revenue necessary to retire the bonds that almost certainly would be needed to finance truck-only lanes. Unless the traffic stream contained a sufficient number of heavy trucks, the toll levels for these special-purpose lanes may be high enough to prompt diversion. If, however, LCVs were permitted in these lanes and if these vehicles could contribute sufficient productivity improvements, use of conventional combination trucks on other routes may no longer become the cost-effective solution for trucking firms and shippers. The primary issue that this analysis poses is whether truck-only lanes would be economically viable along a sufficient number of rural Interstate highways to encourage investment in LCVs, without which financing truck-only lanes would be extremely difficult.

## Endnotes

1. Vidunas and Hoel (1997) discuss variations of these configurations, focusing on I-81 in Virginia.
2. Poole and Samuel (2004) suggest one new lane plus a breakdown lane, with passing lanes added every few miles. It should be noted that if substantially heavier gross vehicle weights were allowed that some bridges on rural Interstate highways would need to be reconstructed.
3. Common forms of LCVs include (1) a tractor and three 28-foot trailers, with a total length of about 110 feet; (2) a Rocky Mountain double, consisting of a tractor, a 48-foot trailer, and a 28-foot trailer, with a total length of about 100 feet; and (3) a turnpike double, consisting of two 48-foot trailers, with a total length of about 120 feet.
4. The non-hypothetical nature of Bambe and McMullen (1996) is important. As a practical matter, it usually is difficult to accurately estimate willingness to pay for a good or service that is not currently available because there is no functioning market. In hypothetical situations, there can be a tendency for people to misstate their willingness to pay either because the situation is not one with which they are sufficiently familiar or because it may not be in their economic self interest to express their full willingness to pay. Also, there is no consequence of making a statement about one's preference because of the hypothetical nature of the situation.
5. Moody (1991) speculated that up to 4% of combination truck traffic would shift to LCVs annually and that this shift would be cumulative. He also conjectured that a similar rate of diversion would occur from rail.

---

**References**

- American Trucking Associations (ATA). "FHWA Study Shows Passenger Vehicle Drivers Contribute More Often to Fatal Truck Crashes." *Truckline Safety Net*. Available at [http://www.truckline.com/safetynet/highway/umtri\\_execsummary.html](http://www.truckline.com/safetynet/highway/umtri_execsummary.html) (2004).
- Bambe, Anita and B. Starr McMullen. "Measuring Non-Pecuniary Costs of Triple Trailer Operation in Oregon: A Contingent Valuation Approach." *Journal of the Transportation Research Forum* 36 (1), (1996): 19-28.
- California Department of Transportation (Caltrans). *Truck-Only Lanes*. Fact Sheet on the Southern California Truck-Only Lane Feasibility Study. Caltrans, Traffic Operations Program, Office of Truck Services. Sacramento, CA. Available at <http://www.dot.ca.gov/hq/traffops/trucks/trucksizes/fs-trucklanes.htm> (2004).
- Federal Highway Administration (FHWA). *The Freight Story: A National Perspective on Enhancing Freight Transportation*. Washington, D.C., 2002.
- Federal Highway Administration (FHWA). *1997 Federal Highway Cost Allocation Study*. Washington, D.C., 1997.
- Federal Highway Administration (FHWA). *Highway Statistics 2003*. Washington, D.C., 2004. Available at <http://www.fhwa.dot.gov/policy/ohim.hs03/vm1.htm>
- Federal Highway Administration (FHWA). *Highway Statistics 1990*. Publication HPM-40/10-91(3.8M)P. Washington, D.C., 1991.
- Federal Motor Carrier Safety Administration (FMCSA). *2002 Large Truck Crash Overview*. Washington, D.C., 2004.
- Flanagan, W.J. "Necessity of Separating Commercial and Passenger Traffic." Presented at the World Meeting of International Road Federation. London, September 22, 1966.
- Forkenbrock, David J. *Transportation Policy Strategies for Iowa to Advance the Quality of Life*. University of Iowa, Public Policy Center, Iowa City, IA, 2003.
- Holguin-Veras, Jose, David Sackey, Sajjad Hussain, and Victor Ochieng. "Economic and Financial Feasibility of Truck Toll Lanes." *Transportation Research Record 1833*. National Research Council, Transportation Research Board. Washington, D.C. (2003): 66-72.
- Mannerling, F.L., J.L. Koehne, and J. Araucto. "Truck Restriction Evaluation: The Puget Sound Experience." WA-RD307.1. Washington State Transportation Center, Seattle, WA, 1993.
- Maio, D.J. *The Feasibility of a Nationwide Network for Longer Combination Vehicles*. U.S. Department of Transportation, Cambridge, MA, 1986.
- Middendorf, David P. and Michael S. Bronzini. *The Productivity Effects of Truck Size and Weight Policies*. Oak Ridge National Laboratory, Center for Transportation Analysis, Oak Ridge, TN, 1994.
- Mitchell, R.M. and R.T. Carson. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Resources for the Future. Washington, D.C., 1989.
- Moody, Eric D. "Fuel Consumption and System Costs Related to Longer Combination Vehicle Operation on the Interstate Network." *Journal of the Transportation Research Forum* 32 (1), (1991): 41-51.
- Poole, Robert W., Jr. and Peter Samuel. *Corridors for Toll Truckways: Suggested Locations for Pilot Projects*. Reason Public Policy Institute, Los Angeles, CA, 2004.

Reebie Associates. *I-81 Toll Impact Analysis*. Reebie Associates for the Commonwealth of Virginia, Stamford, CT, 2004.

Samuel, Peter, Robert W. Poole, Jr., and Jose Holguin-Veras. *Toll Truckways: A New Path Toward Safer and More Efficient Freight Transportation*. Reason Public Policy Institute, Los Angeles, CA, 2002.

Stokes, R.W. and S. Albert. "Preliminary Assessment of the Feasibility of an Exclusive Truck Facility for Beaumont-Houston Corridor." FHWA/TX-86/+393-2. Texas Transportation Institute, College Station, TX, 1986.

Sydec, Inc. *Productivity and Consumer Benefits of Longer Combination Vehicles (LCVs)*. Prepared for the American Trucking Associations Foundation, Inc. Reston, VA, 1990.

Transportation Research Board. *Freight Capacity for the 21<sup>st</sup> Century*. Special Report 271. National Research Council, Transportation Research Board. Washington, D.C., 2003.

Transportation Research Board. *Regulation of Weights, Lengths, and Widths, Commercial Motor Vehicles*. Special Report 267. National Research Council, Transportation Research Board. Washington, D.C., 2002.

Transportation Research Board. *Highway Capacity Manual 2000*. National Research Council, Transportation Research Board. Washington, D.C., 2000.

Transportation Research Board. *New Trucks for Greater Productivity and Less Road Wear*. Special Report 227. National Research Council, Transportation Research Board. Washington, D.C., 1990.

U.S. Bureau of Transportation Statistics (BTS). *Fatality Analysis Reporting System (FARS)*. TransStats: The Intermodal Transportation Database. Available at [http://www.transtats.bts.gov/Tables.asp?DB\\_ID=185&DB\\_Name=Fatality%20Analysis%20Reporting%20System%20%28FARS%29&DB\\_Short\\_Name=FARS](http://www.transtats.bts.gov/Tables.asp?DB_ID=185&DB_Name=Fatality%20Analysis%20Reporting%20System%20%28FARS%29&DB_Short_Name=FARS) (2004).

U.S. Bureau of Transportation Statistics and U.S. Census Bureau. *Transportation, 2002 Commodity Flow Survey*. Series EC02TCF-US(P). Washington, D.C., 2004. Available at <http://www.census.gov/prod/ec02/ec02tcf-us.pdf>

U.S. Department of Transportation. *Western Uniformity Scenario Analysis: A Regional Truck Size and Weight Scenario Requested by the Western Governors' Association*. Washington, D.C., 2004.

U.S. Department of Transportation. *Revised Departmental Guidance: Treatment of Value of Life and Injuries in Preparing Economic Evaluations*. Washington, D.C., 2002.

Vidunas, Joseph E. and Lester A. Hoel. "Exclusive Lanes for Trucks and Cars on Interstate Highways." *Transportation Research Record* 1576. National Research Council, Transportation Research Board. Washington, D.C. (1997): 114-122.

Walter, Clyde K. "Longer Combination Vehicles: Issues and User Attributes." *Journal of the Transportation Research Forum* 34 (2), (1995): 102-118.

Waters, W.G., II, Cary Wong, and Kevin Megale. "The Value of Commercial Vehicle Time Savings for the Evaluation of Highway Investments: A Resource Saving Approach." *Journal of the Transportation Research Forum* 35 (1), (1995): 97-113.

Weinblatt, Herbert. *The Effect of Size and Weight Limits on Truck Costs*. Working paper prepared by Jack Faucett Associates for the Federal Highway Administration. Washington, D.C., 1991.

---

**Acknowledgements**

This research was funded by the Federal Highway Administration, Office of Transportation Policy Development. Michael Babcock made several suggestions that materially improved the article. Excellent research assistance was provided by Erin North, Daniel Nelson, and Li Zhang.

*David J. Forkenbrock is director of the University of Iowa Public Policy Center and a professor of urban and regional planning and civil and environmental engineering. His research centers on transportation finance and the estimation of social and economic impacts of transportation investments. His current research involves designing a mileage-based road user charge as a possible long-term replacement for the motor fuel tax.*

*Paul F. Hanley is an assistant professor of urban and regional planning and civil and environmental engineering and holds an appointment at the Public Policy Center. His research is focused on methods for assessing the role of transportation investments in advancing state and local policy initiatives, particularly safety.*