# IMPLEMENTATION OF EXCLUSIVE TRUCK FACILITIES

*Edward Fekpe, PhD. PEng.*
*Research Leader, Transportation Market Sector*
*Battelle Memorial Institute, 505 King Avenue*
*Columbus, OH 43201, USA*
*Tel. 614-424-5343; Fax. 614-458-5343. fekpee@battelle.org*

**ABSTRACT**
The concept of exclusive truck facilities is becoming an attractive option to address issues relating to highway congestion, safety, and efficiency in freight movement. Potential benefits of exclusive truck facilities include reduced crashes, reduced congestion, travel time savings, vehicle operating cost savings, and improved efficiency in freight mobility. It is concluded that exclusive truck facilities are economically feasible at locations with traffic volume of 100,000 vehicles per day or more and with a truck volume of at least 25 percent of the traffic. In addition, consideration should be given to truck-involved fatal crash rate, the level of serve as well as proximity to intermodal facilities, ports, and processing centers. These criteria were developed based on benefit-cost analysis of a range of exclusive truck lane configurations, traffic, and site characteristics that are typical of urban and suburban locations.

## INTRODUCTION

The ability of the existing highway transportation system to support increasing capacity demand from truck traffic remains a challenge to

highway agencies. The growing need for more efficient freight movement while maintaining acceptable levels of service and safety on the highway system requires identification of innovative yet practical strategies. The concept of exclusive truck facilities (ETFs) is becoming an attractive option to help stabilize traffic flow, reduce congestion, enhance safety, and enhance efficiency in freight movement by trucks. The hypothesis behind ETFs is that, physically separating heavy trucks from light vehicles will improve highway safety by reducing the interactions between trucks and passenger vehicles at same time reducing congestion and improving efficiency in freight movement. Exclusive truck-only facilities can either be truck-only lanes or truckways. Truck-only lanes are lanes of a multi-lane highway that are designated for the exclusive use of trucks (i.e., exclusive truck lanes, ETLs). Truckways (or exclusive truck roadways ETRs) on the other hand, are roadways constructed for the exclusive use of trucks. Passenger cars may not use truck-only facilities.

According to a recent review in the U.S. [1], Federal, state, and local agencies have examined "truck-only" routes on some of the nation's busiest corridors for a number of years as a way to reduce traffic congestion, improve the flow of commerce, and increase safety on U.S. highways. Many states are pushing forward with plans to convince truckers and taxpayers that ETFs are an effective countermeasure to congestion and, more importantly, to the increasing number of truck-related fatalities on highways. A recent survey [2] noted that exclusive lanes for trucks and buses have been considered by 17 percent of the highway agencies, exclusive lanes for buses by 20 percent of the highway agencies, and exclusive roadways for heavy vehicles by 3 percent of highway agencies. However, few projects have come to fruition and many have been rejected outright as infeasible, environmentally unfriendly, or too costly. Taxpayers on the whole have been reluctant to fund a highway project that offers transportation to a small segment of highway vehicles.

This paper describes potential opportunities of implementation of ETFs, discusses institutional issues that need to be considered, and

describes criteria developed for selecting potential locations for their implementation.

## POTENTIAL USES AND OPPORTUNITIES FOR ETFS

The following is a summary of the major categories of potential opportunities for public benefit from ETF implementation [3]. These opportunities are illustrated with examples of studies or projects under consideration by various transportation agencies.

**System Management** – The goal is reduced impacts and occurrence of congestion, maximizing operational safety, and efficiency of highway users through:

- Transportation Demand Management – methods or strategies to reduce or control traffic congestion.

- Freeway Management – reduction of impacts and occurrence of recurring congestion, minimizing the duration and effects of non-recurring congestion, and maximizing the operational safety and efficiency of highway users.

- Environmental Improvements (e.g., air quality) – in theory, dedicated truck lanes will ease congestion and thus allow for the free flow of traffic (increased vehicle speed), which in turn would reduce air pollution resulting from vehicle emissions.

Examples of ETF projects that are designed primarily to achieve system management goals include:

- *Boston, Massachusetts* – Central Artery Tunnel, South Boston Haul Road – A 1.5 mile haul road, converted from an underutilized four-track rail line, was constructed to allow trucks and buses easy unobstructed travel from South Boston Expressway through residential neighborhoods [4].

- *California* – State Route 60, from I-710 to I-15, a distance of approximately 22 mile section includes adding exclusive truck lanes to the freeway at grade, and adding limited above-grade mixed-flow lanes where right-of-way acquisition would be

difficult. The goal is to reduce ease congestion and improve traffic flow [1], [5].

**Highway Freight System Safety and Efficiency Improvements** – the goal is improved mobility and safety on freight corridors including following.

- High-Priority Corridors on the National Highway System – i.e., Interstate routes of major national significance that carry high volumes of truck traffic generally through more than one state, and connect with routes of continental importance in Canada and Mexico.

- TEA-21 Designated Trade Corridors – the impact of trade policies and agreements is evident in the growth of truck traffic along various interstate corridors, particularly those along the U.S.-Mexico border.

- International Border Crossings – crossing points on the Canada-U.S. and Mexico-U.S. borders, following implementation of NAFTA in 1994, have become choke points in the highway transport of international freight.

Examples of ETF proposed projects that are intended primarily to improve freight mobility and safety include the following.

- *Texas* – This a 4,000 mile corridor that includes Trans Texas Corridor parallels I-35, I-37, and I-69 from Denison to the Rio Grande Valley, I-69 from Texarkana to Houston to Laredo, I-45 from Dallas-Fort Worth to Houston, and I-10, El Paso to Orange. The corridor will include separate tollways for passenger vehicles and trucks, as well as passenger and freight rail and dedicated utility zones [1], [6].

- *Virginia* – The objective is to separate passenger vehicles and heavy trucks using physical barriers in the I-81 corridor; the proposal is to add truck climbing lanes, as well as longer on- and off-ramps; and toll heavy commercial vehicles [1].

- *Washington* – The corridor from Lewis County extending to the Canadian border containing I-5 is a possible alternative passenger and truck transportation route to I-5. This is a proposed project and might be financed by tolls and could also be used by rail and utilities [1].

- *Iowa* – This is a proposed self-financing toll 300-mile open corridor truckway along I-80 from Illinois – Iowa to connect States allowing long combination vehicles (LCVs). The proposed truckway will have one or more lanes in each direction and separated from existing lanes by concrete barriers [7].

**Access to freight facilities** – the goal is to improve access to trade zones and facilities for freight transfer such as:

- Foreign-Trade Zones (FTZs) – these are isolated, enclosed and policed sites within the U.S. where foreign and domestic merchandise is considered (by U.S. Customs) to be international commerce.

- Urban Port or Intermodal Facilities – generally, ports and other intermodal facilities are located in urban areas. Access corridors and streets to these facilities experience high truck traffic volumes.

- Trade Zones or Commercial Zones – sections of corridors near these facilities experience some of the greatest amounts of truck traffic because the trucks are the means by which all of the freight must be distributed from these locations.

- *Regional Distribution Centers* – a recent development for freight transportation is the movement from urban core distribution centers to regional, suburban distribution centers. This creates a need to manage truck operations to control congestion in suburban residential neighborhoods in and around the facilities. Some examples in the manufacturing industry of major companies consolidating goods into regional centers include Nike and The Limited. Nike ships all of its shoes and apparel

from three distribution centers: two in Memphis, Tennessee and one in Beaverton, Oregon; The Limited has a single, massive distribution center near its headquarters in Columbus, Ohio.

A good example of ETL is the Port of New Orleans Tchoupitoulas Roadway or the Clarence Henry Truckway. This is a 2 lane 3.5-mile intermodal connector reserved for port-related truck traffic. The truckway relieved congestion and improved movement of in and out of the port's intermodal facilities and intermodal rail yard [4].

## CRITERIA FOR SELECTING POTENTIAL LOCATIONS

In considering ETFs, it is important to identify the cost and potential benefit elements and evaluate the economic feasibility of all possible configurations that can effectively address the problem under consideration. A FHWA study [3] updated and enhanced an existing benefit-cost (B/C) model designed to examine the economic feasibility of ETFs. Several types or configurations of ETFs have been proposed. These proposals vary in design including configuration of entry and exit ramps, and hence the capital cost and operational differences. The B/C model includes the following ETL configurations.

- Re-designate the functions of existing lanes. For example, one lane of an existing 4-mixed lane highway may be designated as an ETL and the other three lanes kept as mixed lanes. No new lanes are added.

- Increase the capacity of the roadway by adding new mixed lanes (i.e., no dedicated lanes).

- Increase the total number of lanes and designate at least one lane for the exclusive use of a certain vehicle class. Trucks are restricted to truck-only lanes that are not barrier separated.

- Increase the total number of lanes and designate at least one lane for the exclusive use of a certain vehicle class. Trucks are

allowed in the mixed lanes when the capacity of the dedicated lane is exceeded. The additional lane is not barrier-separated from the mixed lanes. This configuration recognizes the problem of speed differentials among trucks especially when restricted to a single lane.

- Increase the total number of lanes and designate at least one lane for the exclusive use of a certain vehicle class. The additional exclusive lane is barrier-separated from the existing lanes and trucks are restricted to use the ETL only.

Most advocates for ETFs propose substantially thicker pavements than standard pavements for interstate highways. The premise is for such pavements to accommodate heavier trucks that would operate at higher weight limits. The higher weight limits have being proposed as incentives to truckers especially for intercity truckways where the goal is to enhance freight mobility and improve interconnectivity among LCV states.

The B/C model was used to examine the sensitivity of the model to changes in the key variables namely, total traffic volume, truck percent, and crash rates. The analysis simulated the ETL configurations described above under different traffic and site characteristics. The results of this analysis formed the basis for developing the following criteria (Table 1) for identifying candidate locations for ETL implementation [3]. These criteria were developed based on analysis of data for urban and suburban locations where ETLs are focused on bottlenecks, intermodal connectors, and regional distribution centers which are typically less than 5-miles in length. As such, the criteria may not necessarily be suitable for rural and intercity truckways.

1. The traffic criteria should be some combination of total traffic volume and the proportion of trucks in the traffic stream. The suggested traffic threshold values are an average annual daily traffic (AADT) of 100,000 or more with a truck volume of 25 percent or higher.

**Table 1. Suggested ETL Evaluation of Criteria**

| Measure | Suggested Threshold | Remarks |
|---|---|---|
| AADT | ≥100,000 vpd | To be used in combination with truck percent |
| Truck percent | ≥ 25% | To be used in combination with AADT |
| Level of Service (LOS) | E or lower i.e., v/c ratio ≥ 1 | To rank potential locations that satisfy traffic criteria |
| Truck-involved fatal crash rate | ≥ national average (e.g., 2.3 per 100 MVMT, 1999) | To rank potential locations that satisfy traffic criteria |
| Proximity to Intermodal Facilities / Processing Centers | ≤ 2 miles from interstate or X tons of freight or Y TEUs of containers | To be considered with other criteria No data available to determine the values for X or Y |

2. The level of service (LOS) should be used to evaluate and prioritize potential locations that satisfy the traffic criteria. The suggested threshold LOS is E (i.e., volume/capacity ratio ≥ 1.0).

3. A suggested measure of safety is the average rate of truck-involved fatal crashes. The national average could serve as the benchmark against which all safety analysis comparisons can be made. This measure could be used to prioritize preliminary candidate locations.

4. The existence of freight intermodal terminals and processing centers as well as regional distribution centers in close proximity to freeways and interstate highways should be sufficient

justification for consideration together with other criteria. The suggested threshold distance of 2 miles is based on the fact that the intermodal terminals are typically located within 2 miles of freeways or interstate highways. In addition, these facilities should handle a certain minimum volume of freight measured in tons or twenty-foot equivalent unit (TEU) containers.

## INSTITUTIONAL ISSUES

Even though a potential ETF project may be demonstrated to be economically feasible, it is important to consider certain institutional issues. The specific circumstances of a given ETF project/proposal will determine applicable technical and non-technical issues worth considering. The following are potential institutional issues that should be taken into consideration in the implementation of ETFs

### Resource Allocation and Financing

Budget limitations, legislative priorities, project prioritization criteria, and the source of funding for the additional cost of construction are major barriers to ETF implementation. Ideally, transportation finance for a facility should balance three objectives: (i) raise adequate revenues, (ii) encourage efficient use of the facility, and (iii) be easy to understand and administer. Recent research studies on financing ETFs focused on tolling as a potential funding mechanism for ETFs. These studies arrived at different conclusions which reflect the assumptions underlying the analyses. Fischer et al. [8] in exploring the feasibility of ETFs on SR-60 and I-710 in California concluded that almost 70% of the potential users of the truck lanes would divert to the mixed flow lanes and revenues were only able to cover 30% of the amortized capital cost and maintenance cost of the facility. Holguin-Veras et al. [9] analyzed the economic and financial feasibility of toll truckways and found that the maximum toll that would be attractive to trucking companies would be one that captures 50% of the direct operational cost savings. The remaining 50% should be considered as incentive to the trucking firm. Reason Public Policy Institute [7] proposed a self-financing intercity barrier-separated toll truckway with one or more lanes in each direction for the sole use by trucks. The analysis assumes that trucking firms

would be willing to pay a toll of up to one-half of the cost savings that would be generated from the use of such truckways. Trucks using the truckways would be rebated federal and state fuel taxes for the mileage traveled on the truckways. The study recommends that, since trucks using the truckways would pay tolls to cover the costs of building and operating the lanes, those trucks should not be charged ordinary state or federal fuel taxes or other truck user taxes for the miles they actually drive on the truckways. The analysis of the costs of constructing and operating these facilities and corresponding returns indicate that these truckways might be economically feasible.

**Transportation Planning and Project Development**

The benefits of dedicated truck facilities in moving freight in and out of urban freight centers (such as ports and warehouses) led to the development of the concept of Truckways or Portways planned for implementation by the Port of New Orleans. However, the lack of emphasis on performance measures of freight-specific projects in highway needs assessment is considered a potential impediment to ETF implementation. There is the need for specific focus on freight transportation in the planning process in order for the anticipated benefits of ETFs (e.g., improved highway safety and freight mobility) to be realized.

**Environmental Externalities**

Environmental issues are important in evaluating the ETFs because of the potential for citizen opposition if they perceive adverse environmental impacts. Public awareness of potential benefits of ETFs can help dissuade opposition. An example of potentially positive environmental impacts to construction of ETFs is the Tchoupitoulas Corridor Project in New Orleans, Louisiana. The new truck-only facility is intended to remove three heavy-truck routes that pass through residential neighborhoods and average more than 1,500 trucks per day [10].

**Public Participation/Role Issues**

Identification and involvement of key stakeholders prior to the feasibility study phase is considered critical to ETF projects with a potential for generating controversy. The California State Route 60

(SR 60) feasibility study [11] is an example of a successful, formal public participation process that was incorporated into the annual updating of the Regional Transportation Plan. The Alameda Corridor Project provides an example of how the public and private sector can work together to advance a concept to implementation. The partnership between the private rail and port interests and the public sector was able to gain local, state, and Federal support and to secure funding to undertake the project that will benefit the economy without degrading the environment of the region. The issues addressed by the Alameda Corridor partnership are likely to be involved in ETF partnerships.

## CONCLUDING REMARKS

Given the range of potential opportunities for implements and benefits that ETFs offer, transportation agencies are increasingly turning to ETF as a feasible strategy in safety improvement, transportation system management (e.g., congestion mitigation at bottlenecks), improving access to freight facilities (e.g., portways and truckways to intermodal facilities), and improving efficiency in freight movement along corridors of national importance. A major impediment to ETF implementation is the source of financing. While self-financing toll facilities have been proposed, the success of such an approach needs to be tested.

The proposed criteria for identifying potential locations can be used to select demonstration or pilot projects. These criteria together with the benefit-cost model could serve as a valuable tool in evaluating potential ETF locations and configurations. The criteria can then be refined based on field data when they become available.

## REFERENCES

[1]. Urban Transportation Monitor. *Consideration of Exclusive Truck Lanes Moves Forward in U.S.* December 2004 Issue.

[2]. Harwood, D.W., Potts, I.B., Torbic, D.J., Glauz, W.D. *Commercial Truck and Bus Safety Synthesis 3* on Highway/

Heavy Vehicle Interaction. Federal Motor Carrier Safety Administration, Washington, DC, 2003

[3]. Battelle. *Investigation of Potential Safety and Other Benefits of Exclusive Facilities for Trucks* Final Report prepared for U.S. Department of Transportation, FHWA Office of Transportation Policy Studies. 2002.

[4]. Reich, S., Davis, J., Catala, M., Ferraro, A., Concas, S., *Potential for Reserved Truck Lanes and Truckways in Florida,* Center for Urban Transportation Research University of South Florida, Final report submitted to Florida Department of Transportation. Report # BC 353-16. September 2002. http://ntl.bts.gov/lib/12000/12200/12209/12209.pdf

[5]. KAKU Associates, Inc. *SR-60 Truck Lane Feasibility Study*. Report submitted to the Southern California Association of Governments (SCAG). November, 1999.

[6]. HNTB Corporation and Wilbur Smith Associates Team. *I-35 Trade Corridor Study Recommended Corridor Investment Strategies*. Final report submitted to Texas Department of Transportation I-35 Steering Committee. September 30, 1999.

[7]. Samuel, P., Poole, R.W. Jr., and Holguin-Veras J. *Toll Truckways: A New Path Toward Safer and More Efficient Freight Transportation*. Policy Study N0. 294. Reason Public Policy Institute. 2002. http://www.rppi.org/ps294.doc

[8]. Fischer M J; Ahanotu, D N; Waliszewski, J M. *Planning Truck-Only Lanes: Emerging Lessons From The Southern California Experience.* Transportation Research Record No. 1833. pp. 73-78. 2003.

[9]. Holguin-Veras, J; Sackey, D; Hussain, S; Ochieng, V. *Economic and Financial Feasibility of Toll Truckways*, Transportation Research Record No. 1833. pp. 66-72. 2003.

[10]. World Trade Center of New Orleans. *Tchoupitoulas Corridor Project.* On-line available 12/5/00. http://www.wtc-no.org/transport/ip-pnotc.htm.

[11]. Southern California Association of Governments (SCAG). *Appendix E -Goods Movement*, Draft 2001 RTP Update Technical Appendix. 2001.