Commission Briefing Paper 6B-04

Observations on Scenario 4: Exclusive Passenger and Freight Facilities

Prepared by: Section 1909 Commission Staff
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Introduction

This paper is part of a series of briefing papers to be prepared for the National Surface Transportation Policy and Revenue Study Commission authorized in Section 1909 of SAFETEA-LU.

Section 1909 requires the final report of the Commission to include an assessment of future needs over 15-, 30-, and 50-year time horizons. A number of alternative scenarios are being developed that make different assumptions about future transportation system emphasis. This paper describes selected observations pertaining to Scenario 4, the "Exclusive Passenger and Freight Facilities" scenario.

Background

Like Scenario 3, Scenario 4 envisions substantial capacity enhancements, but in this case the enhancements are focused on establishing systems of dedicated passenger and freight facilities to reduce inefficiencies associated with accommodating both passenger and freight traffic on the same facilities and networks. For highways, this capacity expansion would take the form of an interconnected network of dedicated truck lanes on which larger and heavier vehicles would be allowed. While the analysis of this scenario is currently limited to highways, it is ultimately envisioned to cover commuter rail, intercity passenger rail, and freight rail as well, with separate dedicated freight and passenger rail lines providing service on high volume corridors.

The analyses for this scenario are drawn from the U.S. DOT's 2000 Comprehensive Truck Size and Weight Study (CTSWS), which included a scenario that would allow longer and heavier multi-trailer combination vehicles (LCVs) to operate on most Interstate highways. While the CTSWS did not assume dedicated truck lanes, the estimated benefits in terms of improved truck productivity do not depend on truck traffic being separated from passenger traffic. The cost to construct separate truck facilities would be higher than costs estimated to accommodate the LCVs in the CTSWS, but there would be offsetting safety benefits. Staging facilities would be constructed at entrances and exits from the dedicated facilities where LCVs could be assembled and disassembled since they would not be allowed to operate in mixed traffic except on those routes where they already operate. This strategy would principally benefit freight, but would also impact metropolitan mobility and safety by removing large trucks from automobile traffic flows on many routes.

In developing this analysis, an assumption was made that in order for this type of arrangement to be effective, it would be necessary to establish these dedicated truck lanes as 4-lane, barrier separated facilities (2 lanes in each direction), in order to keep trucks separated from oncoming trucks while allowing trucks to pass one another in the same direction (owing to the differences

in speeds among some trucks). It was assumed that the right-of-way for such expansions would be available in rural and small urban areas. For urban areas with populations between 200,000 and 1,000,000, it was assumed that right-of-way would be readily for half of the mileage, and that the other half of the mileage would need to be built using a higher cost strategy such as double-decking. For major urbanized areas of greater than 1,000,000 in population, it was assumed that the exclusive truck lanes would go around the urban area. (This assumption does tend to understate network extent, as it does not consider exclusive truck lanes serving ports or other major freight generators in major metropolitan areas, but on the other hand it may overestimate the extent of an exclusive truck lane network serving smaller areas.). It was also assumed that exclusive truck lanes would only be routed in areas with relatively flat terrain; the costs of implementing such lanes in mountainous areas would be substantially higher. The total price tag for the implementation of this network was estimated to be slightly over $1 trillion dollars over the analysis period; however, the costs could be higher or lower depending on how and where the network was routed. (For example, approximately $400 million could be saved by re-routing around urban areas where right-of-way is not readily available, rather than building high cost alternatives).

In terms of staging areas on rural freeways, this analysis assumed that they would be situated every 15 miles and be able to accommodate 6 LCVs. On urban freeways, staging areas capable of accommodating 20 LCVs were assumed to be required on routes entering and leaving each metropolitan area.

Findings and Observations

Consistent with estimates from the CTSWS, this analysis assumed a 60 percent reduction in combination truck traffic on the existing Interstate system and a 46 percent reduction in combination truck traffic on other existing facilities would occur in response to the development of a network of exclusive truck lanes. Such a shift would be expected to have positive impacts on the performance of existing facilities, in terms of reduced congestion and pavement deterioration, and improved safety.

While the overall price tag of Scenario 4 is higher than the base case or Scenario 1, the shift in truck traffic assumed under this scenario would reduce average delay on urban principal arterials, and would reduce the total number of new lane miles that would need to be added to the existing mixed use highway system.

At the Medium funding level, the total number of lane miles added under Scenario 4 through 2020 would be approximately 91,000 more than Scenario 1 (this includes the net difference between the addition of approximately 94,000 ETL's and 3,000 fewer regular lane miles than under Scenario 1). By 2035, this difference would grow to approximately 170,000 lane miles (the net difference between the addition of approximately 187,000 ETL's and 17,000 fewer regular lane miles than under Scenario 1). By 2055, this difference relative to Scenario 1 would shrink to approximately 154,000 (187,000 more ETL's and 23,000 less regular lane miles than under Scenario 1). The difference in average annual investments between Scenario 4 and Scenario 1 would decline over time, as Scenario 4 assumes that the network of exclusive truck

lanes would be built by 2035. Hence the difference between the average annual medium funding levels for Scenario 4 compared to Scenario 1 would be $36 billion higher through 2020, $30 billion higher through 2035 and $17 higher billion through 2055.

At the High funding level, average delay under Scenario 4 would be slightly lower than under Scenario 1 through 2020, 2035, and 2055. This improvement in performance does come at a cost, as the average annual investment level under this scenario for each of these time periods would exceed the base case and Scenario 1 (see above paragraph). The total number of lane miles added under this scenario would be higher than under Scenario 1 with a difference of approximately 87,000 in 2020 growing to 168,000 in 2035 before dropping to 135,000 in 2055. (As was the case for the Medium Funding level, the scenario assumes the buildout of the ETL network by 2035, so that the lower figure in 2055 is a function of the reduced number of lane miles required to be added to the existing highway system in the absence of the truck traffic diverted to the ETL network).

This analysis does not capture the potential benefits, in terms of reduced bridge preservation costs, of removing heavy trucks from many existing routes. The transfer of heavy trucks from existing facilities to facilities designed to handle the heavier loads of trucks could contribute to longer facility life and lower maintenance costs over the analysis period.

The safety benefits of removing trucks from automobile traffic flows are significant but are calculated outside of the HERS process. These benefits are described in a separate briefing paper in this series that focuses on the safety impacts of all the scenarios studied.

General Observations

Many of the direct benefits of freight and passenger separation onto dedicated facilities are not readily quantifiable using existing tools and data. However, the preliminary results of this analysis suggest that there are substantial benefits to be gained on some individual facilities from the diversion of freight traffic to other networks. It also raises the question as to what extent the implementation of such facilities would be desirable, given their relative higher cost.

If implementing a network of dedicated truck lanes as extensive as assumed in this scenario is deemed undesirable or unaffordable, lesser networks focusing on key freight corridors might still be feasible. However, there are certain economies of scale of designing such a system on a comprehensive basis rather than piecemeal, and the potential benefits of isolated truck only facilities may well be lower than they would be if the same facilities were integrated into a more comprehensive network.