Project Summary

Texas Department of Transportation

9-1528: The SAFE Freight Shuttle: A Proposal to Design, Build, and Test an Alternative Container Transport System

Background

This project advanced the Freight Shuttle System (FSS) from a design concept to a "ready for development" commercially viable system.

The FSS represents a unique combination of the best features of rail and truck transportation designed to mitigate many of the adverse impacts of over-the-road truck transportation: pavement damage, diesel emissions, congestion, and safety issues. Operating 24/7 at a constant 62 mph without generating emissions, the system ensures the timely delivery of shipments while saving fuel, tires, and time. Perhaps most importantly, the all-electric propulsion system will represent the first large-scale step away from oil in our transportation sector—a strategic national priority.

What the Researchers Did

The FSS developed along multiple fronts: technical, commercial, and financial. On the technical front, the project development team defined the operating plan, scoped terminal layouts and cargo-exchange strategies, and advanced patent protection of several features important for commercialization. In February 2010, the U.S. Patent Office issued U.S. Patent No. 7654308 to The Texas A&M University System. This patent defines the FSS and spells out critical elements such as the linear induction propulsion system, steel wheels and steel running surfaces, and automated control within the context of goods movement as unique to the FSS.

On the commercial front, the team cataloged and factored the needs and constraints of shippers and trucking companies into the pricing, operating plan, and service offerings of the system to ensure commercial viability. On the financial front, the team used business case analyses and operating plans to help arrange institutional financing at levels that will allow the infrastructure and operating systems to be built on a purely private basis. In addition, researchers developed a business model for the FSS that lends itself to private financing and operations, in keeping with the commercial nature of goods movement.

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Project Completed: 8-31-10

What They Found

Researchers found that the FSS will help relieve adverse impacts associated with over-the-road freight transport: highway congestion and safety, infrastructure damage, air quality, carbon emissions, and fossil fuel dependency. It will help lower the cost of everyday consumer goods by enabling trucking interests, retailers, and manufacturers to improve their supply chain efficiency.

To show specific benefits, the research team conducted an economic benefit analysis for one typical 250-mile FSS structure. With a 25 percent initial market capture rate, 15 percent growth for the next five years, and 3 percent annual growth thereafter, the assessment showed that the total value of avoided costs and economic stimulus over a 10-year period amounted to more than $15 billion. In addition, the research team estimated that the same 250-mile FSS, with an initial capture of 2,500 shipments daily, could achieve the following public benefits:

- **Improve Highway Safety:** Reduce traffic fatalities involving trucks. One out of nine traffic fatalities in 2007 resulted from a collision involving a large truck.
- **Reduce Infrastructure Damage:** Prevent millions of dollars in truck-induced infrastructure damage every year.
- **Reduce Congestion:** Create 12,000 to 22,800 highway "slots" for passenger traffic daily.
- **Improve Air Quality:** Reduce air pollution and eliminate the known and suspected carcinogens that are by-products of diesel trucks and will not be present in use of the FSS.
- **Decrease Greenhouse Gas Emissions:** Cut CO_2 emissions by millions of tons each year.
- **Decrease Oil Dependency:** Reduce diesel fuel consumption by 97 million gallons per year.

What This Means

Implementing use of the FSS will require a demonstration of the system's technical/operational, commercial, financial, and public safety aspects. The research team recommends that the demonstration focus on the following attributes:

- **Public Safety:** Systems that co-locate in public rights-of-way, particularly those that are automated or driverless, must demonstrate a level of system safety that ensures the system provides large net improvements over traditional transportation strategies.
- **Reliability:** Systems must demonstrate a level of operational reliability and availability that ensures consistent service to their customer base.
- **Throughput:** Systems must demonstrate the technical basis in operations for traffic throughput sufficient to positively impact the highway system by inducing freight traffic, that would otherwise have only an over-the-road option, to use the alternative system.
- **Environmental impacts:** One main reason for encouraging alternative freight transportation system development is to mitigate adverse impacts of diesel emissions on air quality in heavily traveled freight corridors.
- **Constructability:** The use of existing highway rights-of-way suggests that an alternative system must be constructed within or above current established boundaries and should minimize traffic interruption that could result from construction.
- **Removability:** The ability for components to be removed from public rights-of-way should be demonstrated either directly or indirectly through modular construction techniques.

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