Texas A&M Transportation Institute

THE TEXAS A&M UNIVERSITY SYSTEM

FREIGHT SHUTTLE INTERNATIONAL

Freight Shuttle System

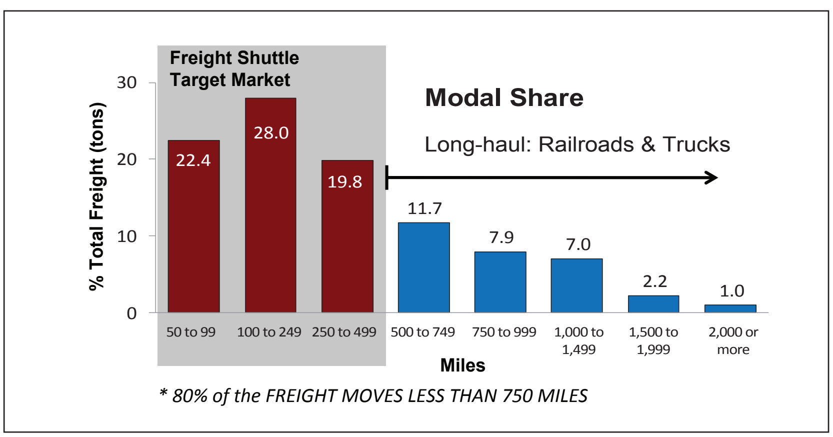
Freight Movement Redefined

www.freightshuttle.com

FREIGHT TRANSPORTATION SYSTEM CHALLENGES

In 2014, more than 2 billion tons of freight moved in Texas, and this volume is anticipated to increase to nearly 3.8 billion tons by 2040. Today, almost all commercial cargo moving less than 500 miles is moved by truck, and this represents 70 percent of freight moved in the United States. To add to the challenge, trucks share public roads with private vehicles. The volume of cargo traffic and private vehicle traffic in many areas has grown faster than the public road infrastructure. Texas has seven of the top 25 freight bottlenecks in the nation, located in Austin, Dallas, Fort Worth and Houston. Truck traffic over congested public roads contributes to major economic and quality-of-life challenges such as:

- Increased congestion in high-traffic, metropolitan areas.
- Bottlenecks at border crossings, seaport regions and major intermodal cargo hubs.
- Air pollution from engine exhaust.
- Injuries and deaths from vehicle crashes.
- Wear and tear on roads.



Freight Shuttle System Target Market: Short and Intermediate Distances

These common issues will only grow more serious in the future. The U.S. has reached what many transportation experts believe is a critical situation for our national transportation infrastructure. Over the past three decades, the volume of freight transported in the U.S. has accelerated rapidly, while investments in transportation infrastructure have lagged behind considerably. These challenges point to the necessity for an innovative solution.

THE SOLUTION: THE FREIGHT SHUTTLE SYSTEM

The Freight Shuttle System (FSS) was conceived to resolve freight transportation's most pressing needs: a dedicated system suitable for high-volume traffic between two points located less than 500 miles apart and one that ideally segregates freight from passenger traffic. This situation occurs frequently at seaports, landside ports of entry, and congested urban and rural freight corridors.

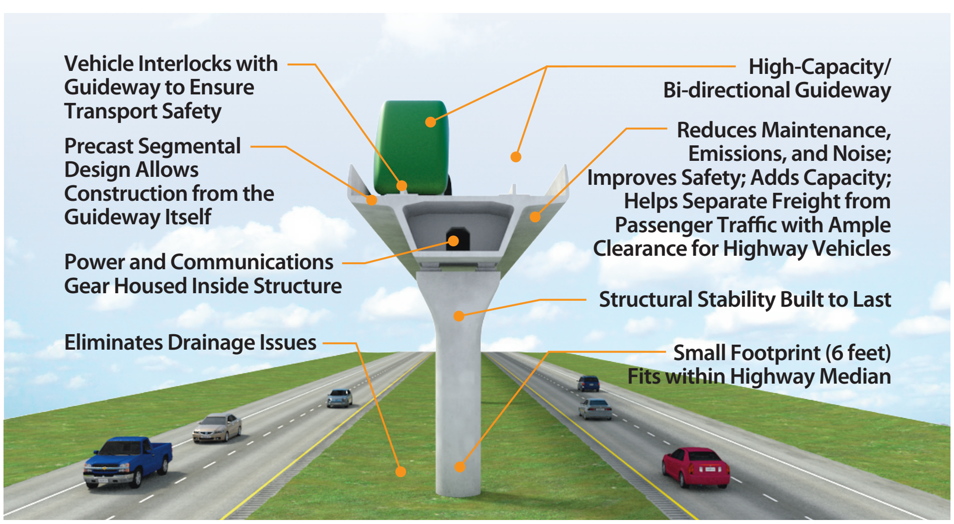
The FSS is designed to blend into today's intermodal network, integrating proven technologies with novel, patented designs into a new mode of transportation. The FSS transports 53- and 54-foot truck trailers and up to 45-foot ocean containers that would normally move by truck, taking them off congested roads and onto an elevated guideway built within existing highway right of way.

Properly integrated into existing rail and trucking products, the system can help regional economic stakeholders improve their end-to-end transportation solution by easing the flow of freight through congested areas and traffic chokepoints and across borders. The FSS also supports a scan-in-motion technology to promote secure trade at border crossings. Scanning stations will allow for 100 percent inspection of each FSS vehicle using high-energy scanning equipment.

FSS TECHNOLOGY

Unlike any other freight transportation mode, the FSS uses efficient, linear-induction motors. The FSS transporters are autonomous, not requiring an onboard driver, but have multiple redundant safety measures incorporated. Each transporter has its own set of two motors and travels independently of other transporters. Because these motors are electrically powered, the FSS will not add to existing pollution. At cruise speed, which can be 65 mph for some systems, transporters use about one-third the energy required by diesel trucks.

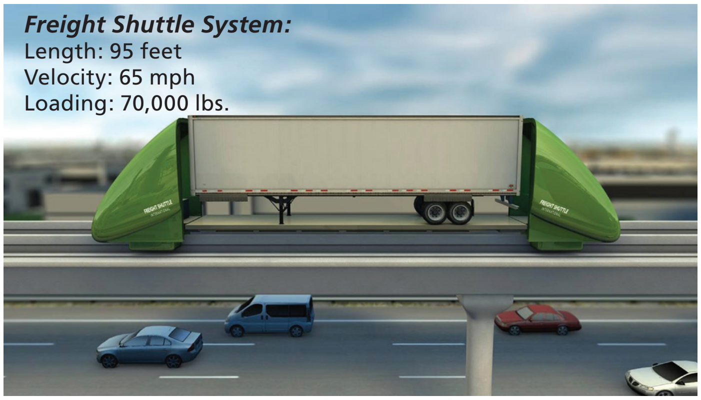
In addition to transporters, the FSS consists of an elevated guideway, high-efficiency terminals, and a communication, command and control system that effectively manages shipments in facilities and in transit, ensuring time-certain delivery for shippers.



Freight Shuttle System Guideway

The FSS's propulsion system involves both the vehicle and the guideway as inherent components of the linear-induction-motor assembly and, as a result, has virtually no moving parts to wear out or fail. The system can draw from any available source of energy, including solar and wind power, to help conserve energy. To support their load, transporters use flangeless steel wheels that run on a steel running surface, which also reduces energy consumption.

GPS and wireless communications, in conjunction with a fiber-optic backbone, will provide a constant flow of information on shipment status, position and operating conditions to help ensure maximum safety and efficiency and on-time delivery.



Freight Shuttle System

Interfaces with Existing Intermodal Cargo System

FSS HISTORY

The FSS was designed at the Texas A&M Transportation Institute (TTI) beginning in 1998. Steve Roop, Ph.D., then program manager for TTI's Multimodal Freight Transportation Program, first researched the technical and economic feasibility of an underground freight transportation system. His team determined that although an underground system could be designed to work technically, it was not economically feasible to build.

In the early 2000s, the TTI team took what they learned from research on the underground system and explored the possibility of an autonomous vehicle on a dedicated, elevated guideway that would transport tractor-trailers and containers. The preliminary evaluation indicated that this type of system could be both technically feasible and economically sustainable.

In 2005, Freight Shuttle International, LLC, (FSI) was formed to license the FSS technology from The Texas A&M University System and transform the concept into a commercial reality. By 2010, a business model emerged based on obtaining private investments and licensing the technology for application in appropriate settings.

In 2013, FSI assembled a development team of industry leaders to begin building a prototype of the FSS, including Figg Bridge Engineering, Zamtek Engineering and Kapsch, among other partners.

In 2015, the U.S. Congress passed the Fixing America's Surface Transportation (FAST) Act. The FSS meets the definition of an intelligent freight transportation system under the act and is eligible for federal funding (reimbursement) in most applications. This provides the opportunity for public-private partnerships to enhance the flow of goods and support economic growth.

In June 2016, the alpha FSS transporter was completed and successfully tested for the first time. Currently, 17 patents are associated with the FSS, awarded in 12 countries.

Freight Shuttle System Fabrication Center in Webster, Texas

FSS NEXT STEPS

The prototype alpha FSS transporter and an initial section of guideway are complete and in pilot testing at the 34-acre Freight Shuttle Test and Evaluation Site in Bryan, Texas.

The FSS development team is in the process of design and development planning for the building of actual systems tailored to the needs of specific economic communities. FSI is creating a vehicle design tailored to containers and seaports and is working on plans to manufacture the first commercial fleet of vehicles.

FSS BENEFITS

- Zero point-of-service emissions — dramatically lower overall emissions than trucking.
- Reduces congestion from trucks — increases reliability and dependability for on-time delivery.
- Reduces the potential for vehicle crashes and deaths on congested roadways.
- Primarily privately funded and provides revenue to taxpayers for lease of air space over public roads.
- Eligible for Federal Highway Reimbursement Funds if structured as a public-private venture.
- Proven segmental guideway construction technology allows rapid construction.
- Powerful and flexible linear-induction motors with no moving parts.

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Freight Shuttle Test and Evaluation Site in Bryan, Texas