

Exploring A Green Alternative for Container Transport

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Container Movement Forum and Technical Roundtable

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EXPLORING
Freight Transportation
ALTERNATIVES

21st Century Freight Transportation System Requirements

VIABLE FREIGHT TRANSPORTATION SYSTEMS MUST BE:

- Low-cost and have a long operating life – rugged and simple
- Based on known-understood technology
- Well-suited to the task at hand
- Reliable – reduce supply-chain uncertainty
- High Capacity – increases throughput
- Interconnected with the existing intermodal system
- Environmentally sound
 - Air
 - Noise
- Segregated; freight from passenger traffic
 - Reduces roadway congestion
 - Improves safety
- Secure

Freight Transportation is a Cost Minimizing Industry

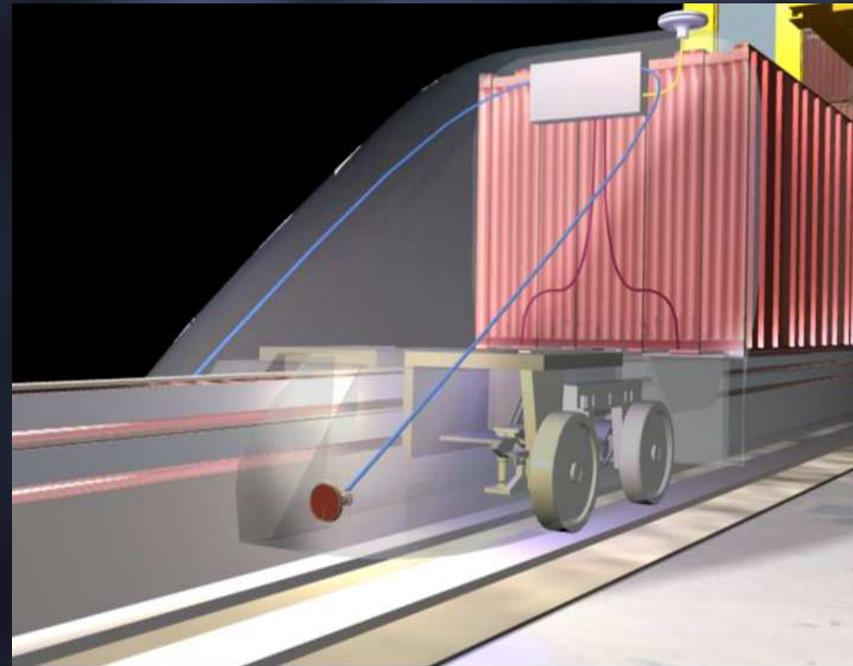
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ALTERNATIVES

The SAFE Freight Shuttle



The SAFE Freight Shuttle

- High reliability
 - LIM – linear motion from vehicle-track interaction
 - Small number of moving parts
 - Automated control system
 - Steel-on-steel for low rolling friction/low cost



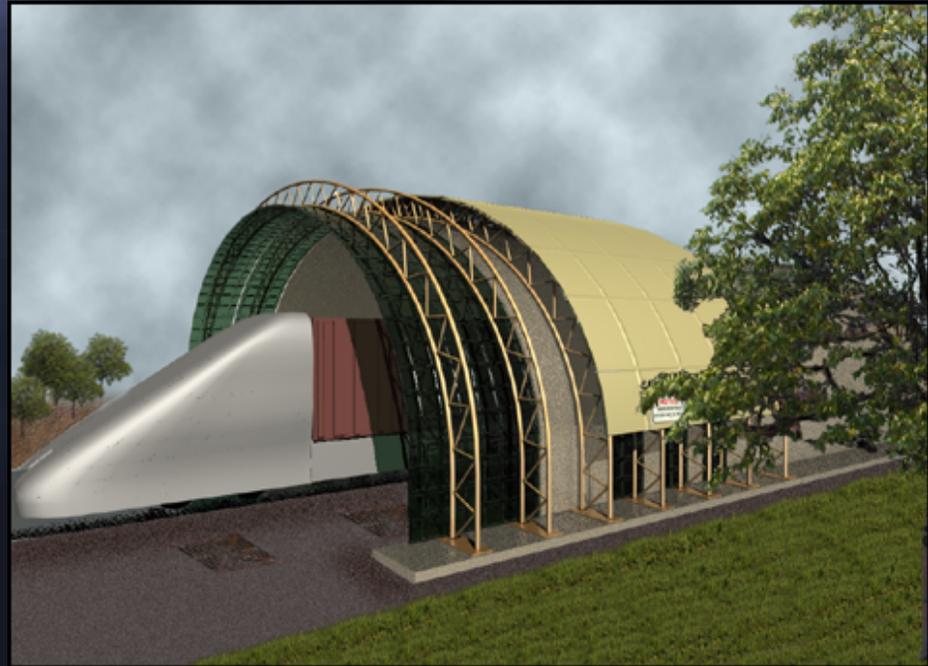
Technical Elements

- Four systems interact to provide functionality:
 - 1. Vehicle
 - 2. Guide way
 - 3. Communications/ command/ control
 - 4. Terminal layout and design

Technical Elements

1. Vehicle

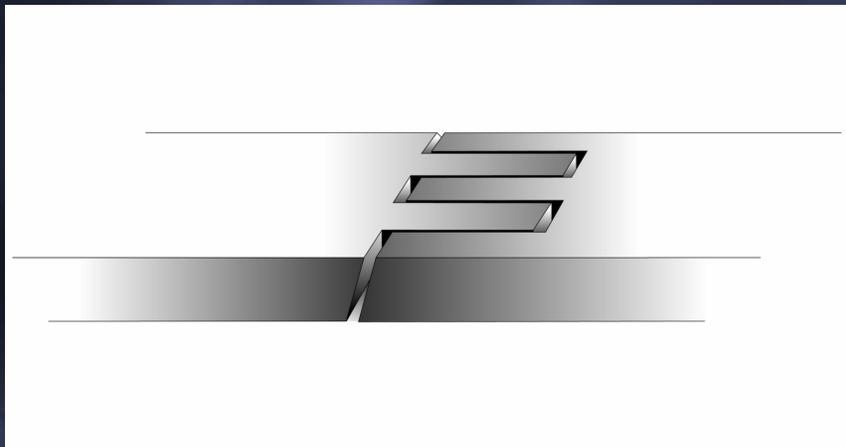
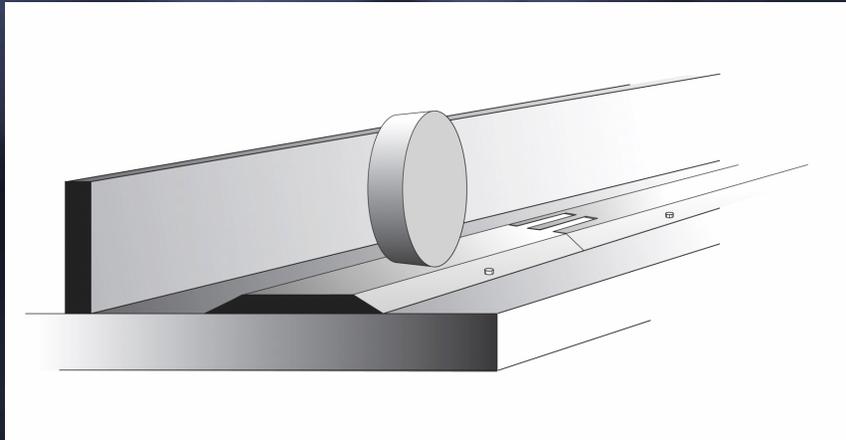
- Automated
- Aerodynamic leading and trailing ends
- Moderate speeds (30-70 mph)
- Electric LIM propulsion
- Design simplicity



Technical Elements

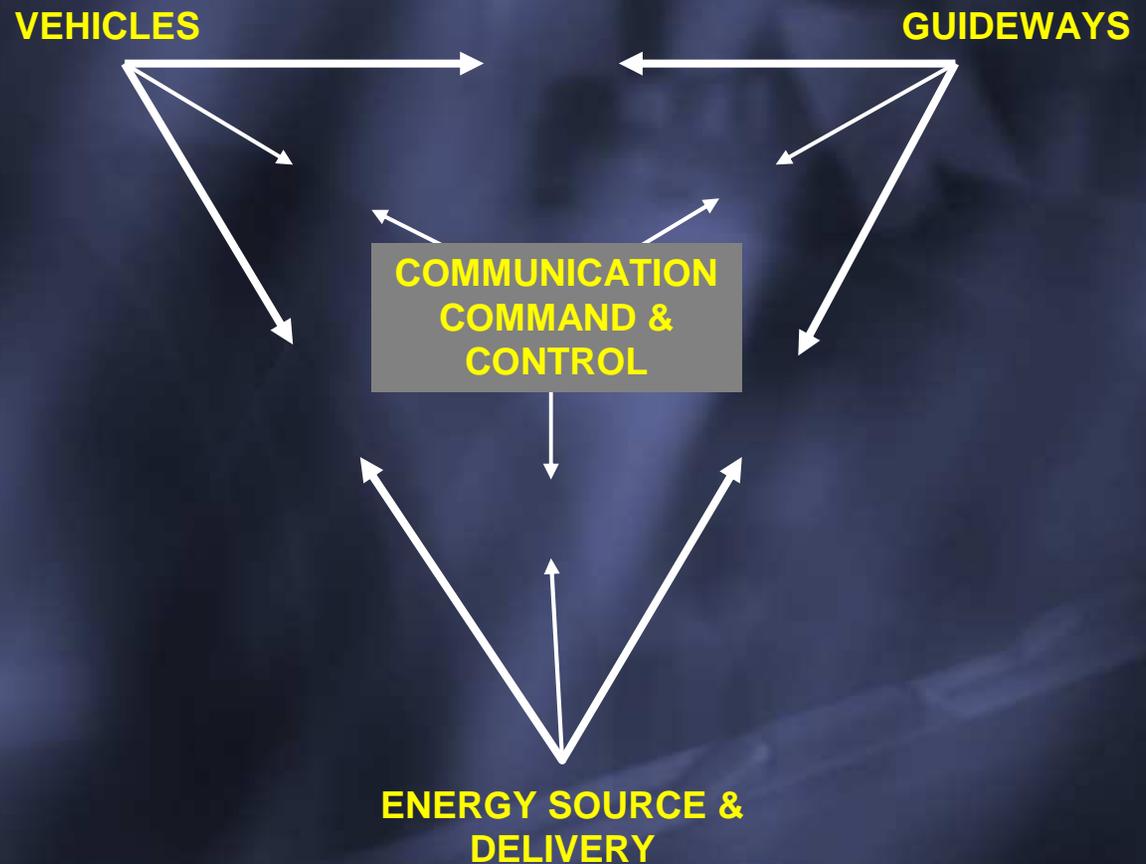
2. Guide way

- Concrete track bed
- Steel running surface
- Small footprint
- Rail expansion joints



Technical Elements

3. Communications Command Control (C3)



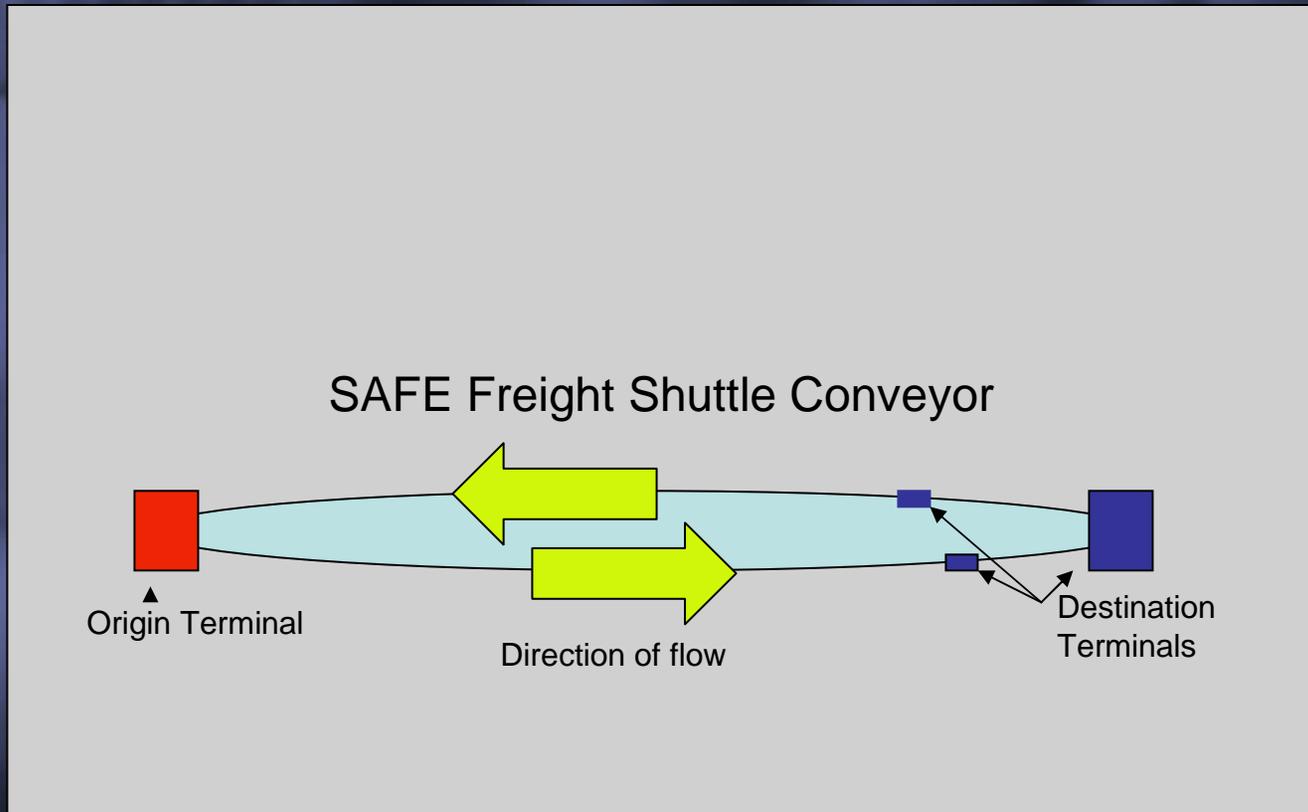
Technical Elements

4. Terminal Layout and Design

- Highway access considerations
- Warehousing
- Crane configurations
- Acreage
- Services
 - Fueling
 - Maintenance



SAFE Freight Shuttle System Operations



The SAFE Freight Shuttle



Energy Needs for The SAFE Freight Shuttle

SAFE Freight Shuttle weighing 14,000 pounds and loaded with a 71,500 pound 40 foot container:

- At 40 mph, the shuttle energy requirements are:
 - Acceleration energy to arrive at system speed
 - 2.57 KWH or 8,774 BTU
 - Continuous running energy
 - 0.42 KWH per mile to maintain a constant speed of 40 miles per hour (1,434 BTU)
 - Average energy consumption per mile for a 100 mile terminal to terminal trip
 - 0.44 KWH or 1,502 BTU per mile
- A 70 mph operation will use:
 - Acceleration energy to arrive at system speed
 - 6.56 KWH or 22,396 BTU
 - Continuous running energy
 - 0.85 KWH per mile to maintain a constant speed of 70 miles per hour (2,902 BTU)
 - Average energy consumption per mile for a 100 mile terminal to terminal trip
 - 0.91 KWH or 3,107 BTU per mile

Freight Transportation is a Cost Minimizing Industry

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21st Century Freight Transportation Challenges

- Public Safety
- Environmental Impact
 - Air
 - Noise
- System Capacity
- System Maintenance & Preservation
- Adverse Impact on Quality of Life
- Oil Dependency
- Security

The SAFE Freight Shuttle

- Community Benefits
 - Separates freight and passenger traffic
 - Safety - Saves lives
 - Congestion - Saves time
 - Non-polluting propulsion system - Saves environment
 - Separate Corridor - Saves wear on roads and bridges
 - Low noise System - Reduces impact on community

Provides an approach to container transport that serves both public and commercial interests

SAFE Freight Shuttle:

Cost per Mile By Comparison to Rail Infrastructure

- Track
 - ROW acquisition
 - Ballast
 - Ties
 - Rail
 - Signal System
- Vehicles
 - Number required
 - Estimated cost
- Grade Separation Structures
- Command and Control Systems
 - Centralized Dispatch
- Terminal requirements
 - Land
 - Equipment

The SAFE Freight Shuttle

- A new approach to regional Intermodal Freight transport
 - Concept developed over the last 6 years at the Texas Transportation Institute
 - Based on known and understood technology
 - May effectively address both community and commercial needs

Combines technology and innovation to meet basic freight transportation requirements in an environmentally responsible manner



The SAFE Freight Shuttle

- Secure
- Automated
- Fast
- Environmentally-clean



***Hybrid System Combining the
Best Features of Rail and Trucks***

The SAFE Freight Shuttle

- Automated Freight Shuttles
 - Single-container transports
 - Linear induction motors (LIMs)
 - Designed for steel wheels-on-steel running surface
 - Dedicated, small footprint guide way
 - Surface operations, elevated, or subterranean

24/7 operations offer an option that may overcome throughput, capacity, and impact issues affecting marine terminals

The SAFE Freight Shuttle

- Design features enhance system viability
 - High capacity / continuous operation
 - Simplicity of design / system reliability
 - Energy efficiency / low operating cost
 - Reduce supply-chain uncertainty / increase control
- And mitigate the most pressing adverse impacts of high levels of truck traffic
 - Grade separation of alignment
 - Segregation of freight from passenger traffic
 - Non-polluting propulsion system

The SAFE Freight Shuttle

- Public financial benefits*

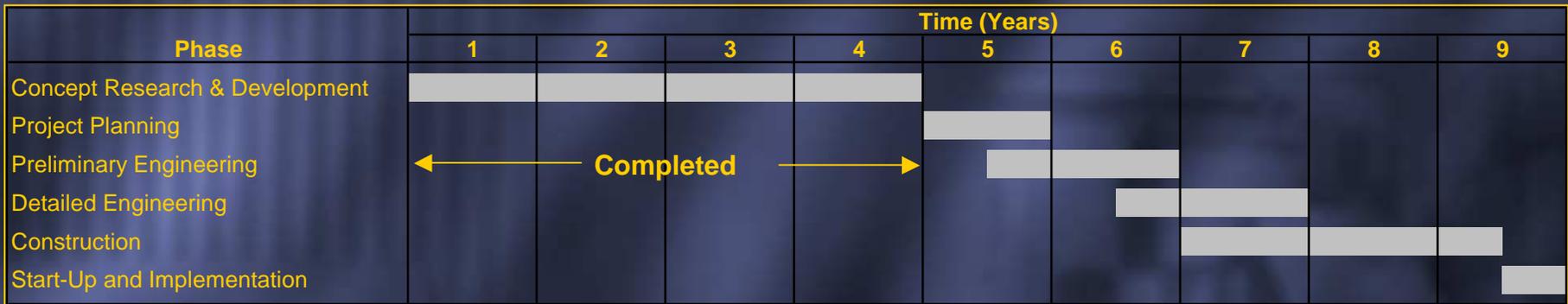
	<u>per mile cost</u>
– Congestion	\$.2006
– Pavement/infrastructure damage	\$.4090
– Air quality	\$.0449
– Safety	\$.0115
– Noise	\$.0304

***Accruing at a net rate of \$0.62 per mile
for fully loaded trucks on urban roadways, relocation of truck
VMT creates a real opportunity for public-private collaboration***

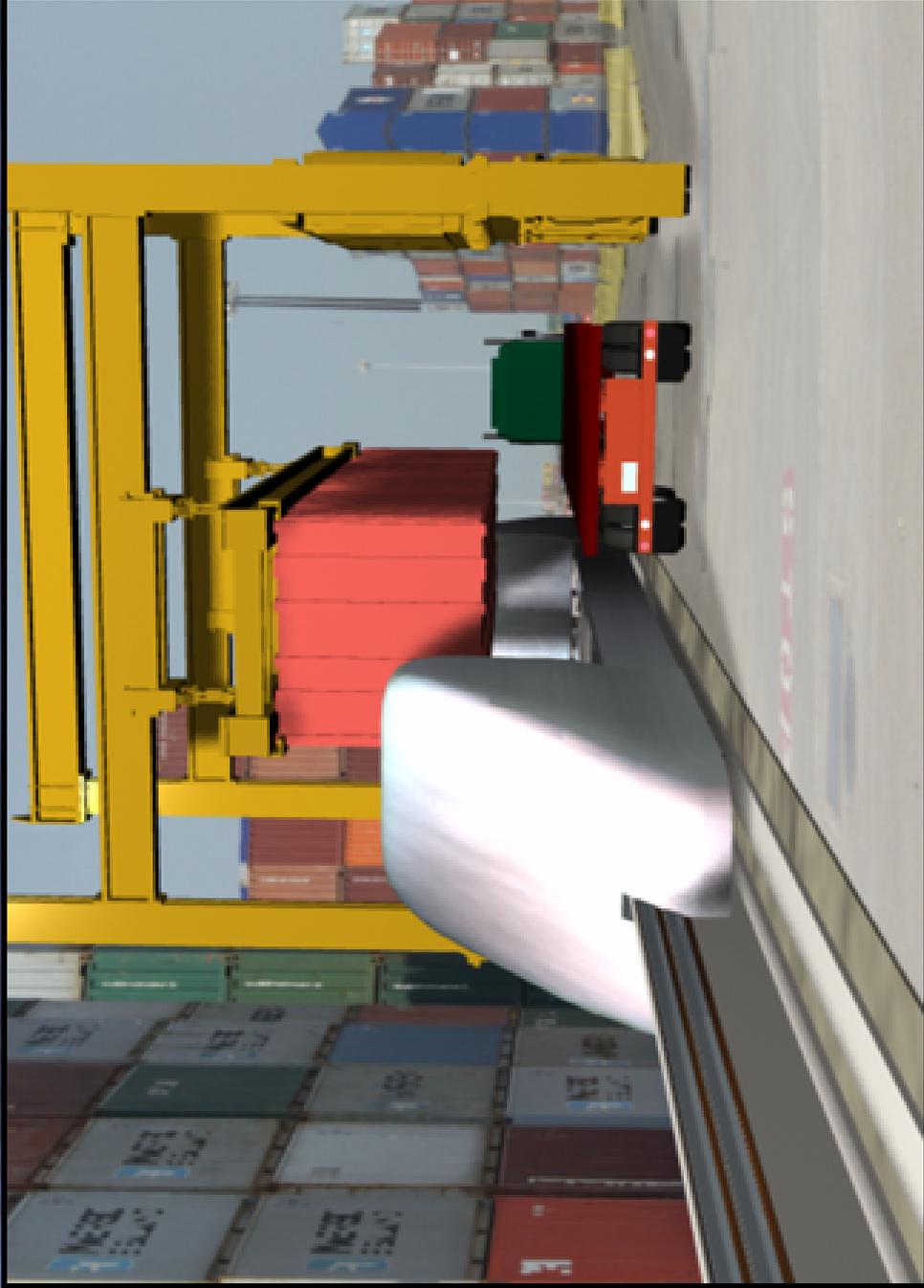
* Federal Highway Administration

The SAFE Freight Shuttle





**More than 6 years of Development and Planning
have been completed**



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Freight Transportation ALTERNATIVES

Texas
Transportation
Institute