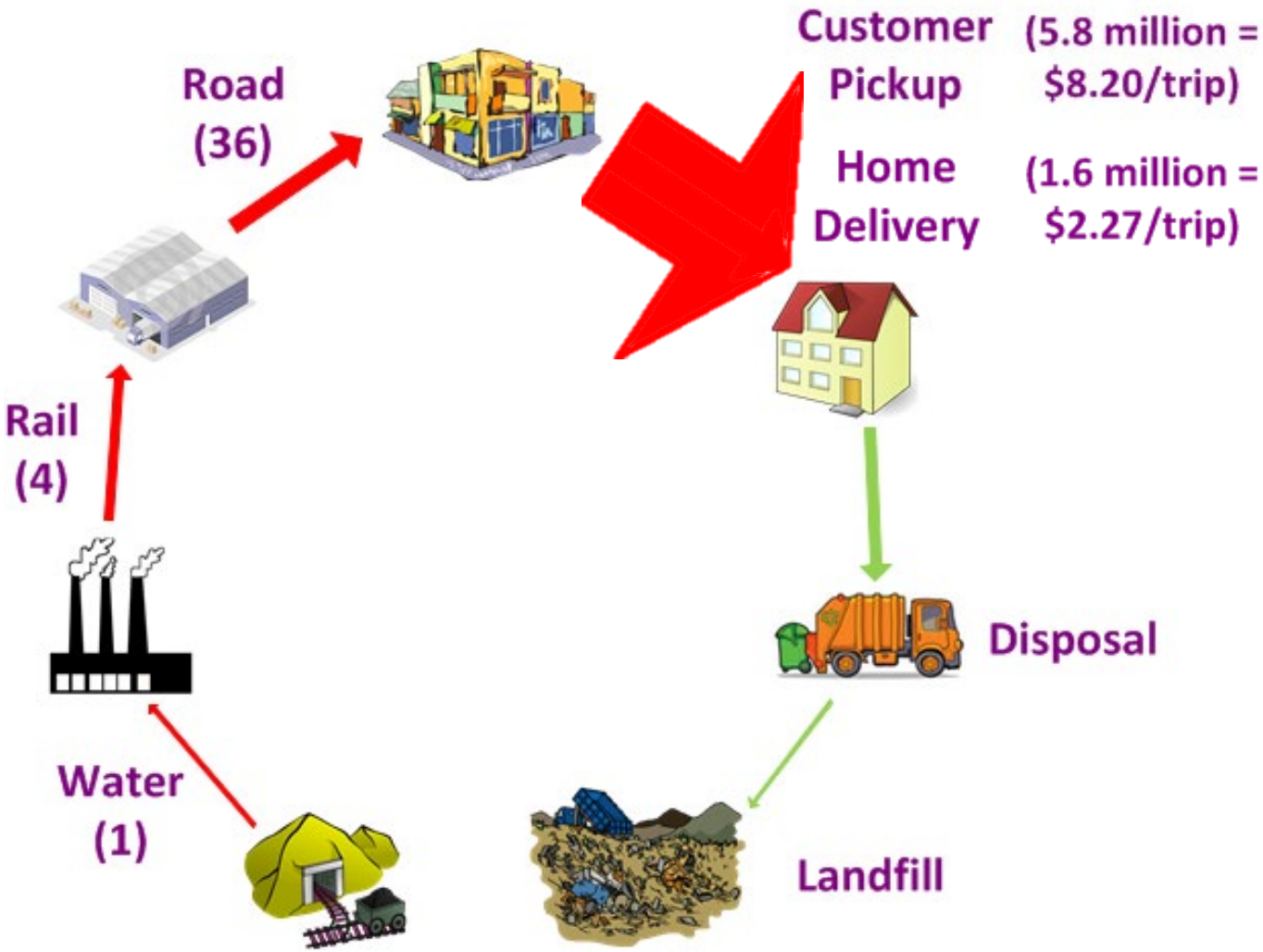
Overview of Freight Transport

Michael G. Kay

Transport Modes

Mode	Cost in Cents per Ton-Mile	Cost Relative to Water
Water	0.007	1
Rail	0.025	4
Road	0.251	36
Air	0.588	84

Dirt-to-Dirt Logistics Costs



($/ton-mi relative to water)

Carrier vs. Shipper

- Carrier:
  - Company that transports a shipment using its equipment
- Shipper:
  - Person or company that owns the shipment

Total 2016 U.S. Logistics Costs

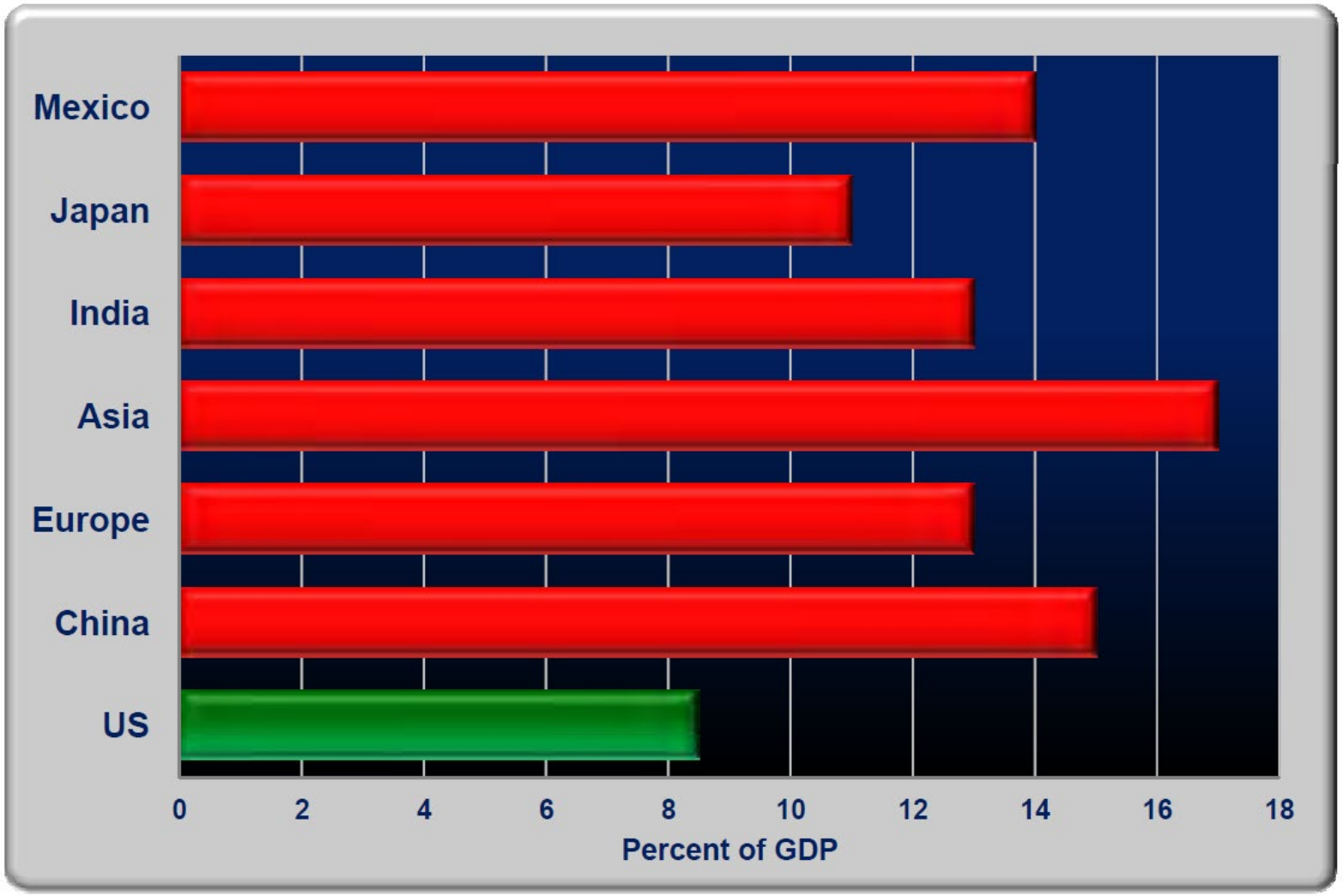
Transportation Costs		**$ Billion**
Motor Carrier:	Full truckload	269
	Less-than truckload	58
	Private or dedicated	268
Parcel		86
Rail:	Carload	53
	Intermodal	19
Airfreight		67
Water		41
Pipeline		34
	Total Transportation Costs	895
Inventory Carrying Costs ($2,512[6] billion total inv.)		
Financial cost (WACC × total inventory)		143
Storage		144
Other (obsolescence, shrinkage, insurance, others)		123
	Total Carrying Costs	410
Other Costs		
Carriers' support activities		45
Shippers' administrative costs		43
	Total Logistics Costs	1,393

Yearly Logistics Costs	Percent of GDP (Tran/Inv%)
1981	16.2% (45/51)
2000	10.2%
2004	8.6%
2007	9.9%
2009	7.4%*
2011	8.6%
2013	8.2%
2016	7.5% (64/29)

*Record low

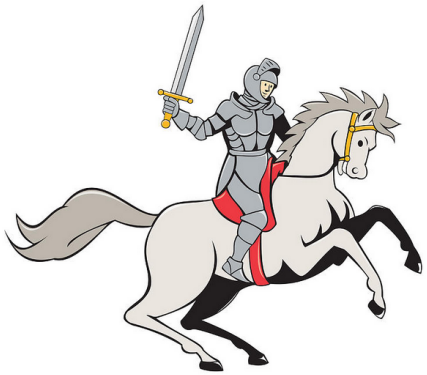
$$h \approx \frac{410}{2512} = 16.32\%$$

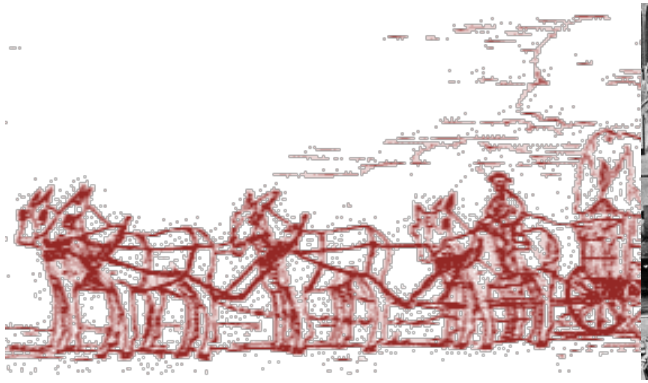
Logistics Cost as a Percent of GDP



Why Are U.S. Logistics Costs Low?

- Major reason is geography:
  1. Many natural harbors on both coasts
  2. Long-distance navigable inland waterways
  3. Many 500+ mile hauls $\Rightarrow$ rail feasible
- Reason U.S. drives on right due to wide-spread early use of freight mule trains (and limited use of swords)





Who is this person?

- He is, arguably, one of the two or three people who have had the biggest impact on global trade since WWII
- He patented his innovation, and then immediately gave it away
- He was a trucker from Maxton, North Carolina

BORN: 1914, Maxton, NC
DIED: 2001, New York, NY

DID YOU KNOW?

As McLean's first container ship left Newark harbor, a man asked Freddy Fields, a top official of the International Longshoremen's Association, "What do you think of that new ship?" Fields replied, "I'd like to sink that sonofabitch." Longshoremen strikes ensued, but the cost of shipping dropped by a factor of a hundred.

Photos: (left) Time Life Pictures/Getty Images; (right) Edward Burtynsky

Malcom McLean

Containerized Shipping

While his name is relatively unknown today, this North Carolina trucker invented container shipping, an method now indispensable to the modern world of global trade.

Start in Trucking

Malcom McLean was born into a North Carolina farming family in 1914. Struggling to assist his family during the Great Depression, he started a small trucking company to transport farmers' goods and supplies. His resourcefulness enabled him to expand to thirty trucks by 1940, and he was eventually able to sell McLean Trucking, a $12 million company with over 1700 trucks, by the mid-1950s.

Truck to Ship to Truck

His years in the transportation business showed McLean the need for an easier method of shipping goods. He had watched dock workers unloading goods from trucks and transferring them to ships, and marveled at the inefficiency of the process. "Wouldn't it be great," he asked himself, "if my trailer could simply be lifted up and placed on the ship?" In 1955, he gambled big on a container venture, buying two oil tankers and securing a bank loan to buy $42 million worth of docking, shipbuilding, and repair facilities. He refitted the ships and designed trailers to stack below or on the decks. In April 1956, his first container ship, the *Ideal X*, departed Port Newark, New Jersey, headed for Houston.

Sea-Land

McLean named his new company Sea-Land, and rushed to expand it, exposing the business to financial instability. The venture required a lot of capital. His aggressive investment was rewarded by the Port of New York Authority's decision to develop a new container port in Elizabeth, New Jersey, anointing cargo shipping as the method of the future.

ISO Container

40 ft = 2 TEU

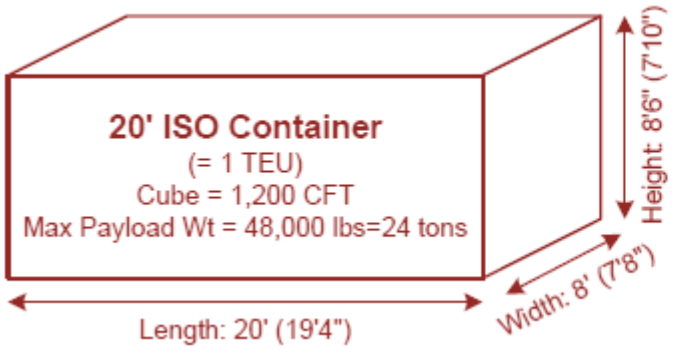
BIC Code

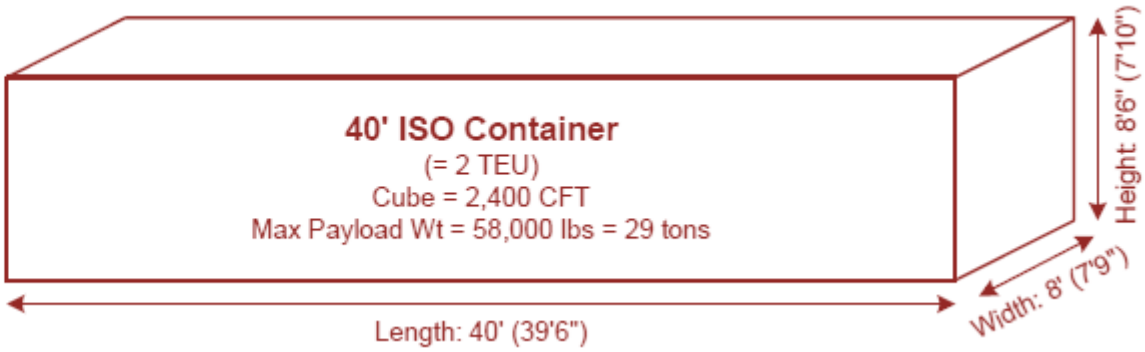
Owner Code (3 letters): UES
Product Group Code (1 letter): U
Registration Number (6 digits): 485812
Check Digit (1 digit): 5
Size & Type Code (4 digits/letters): LEG1

Operational Characteristics
Maximum weight: 34,000 kg
Container weight: 4,860 kg
Payload weight: 29,140 kg
Cubic capacity: 3,153 cubic feet

Photo: Dr. Jean-Paul Rodrigue

Used to transport 90% of international trade





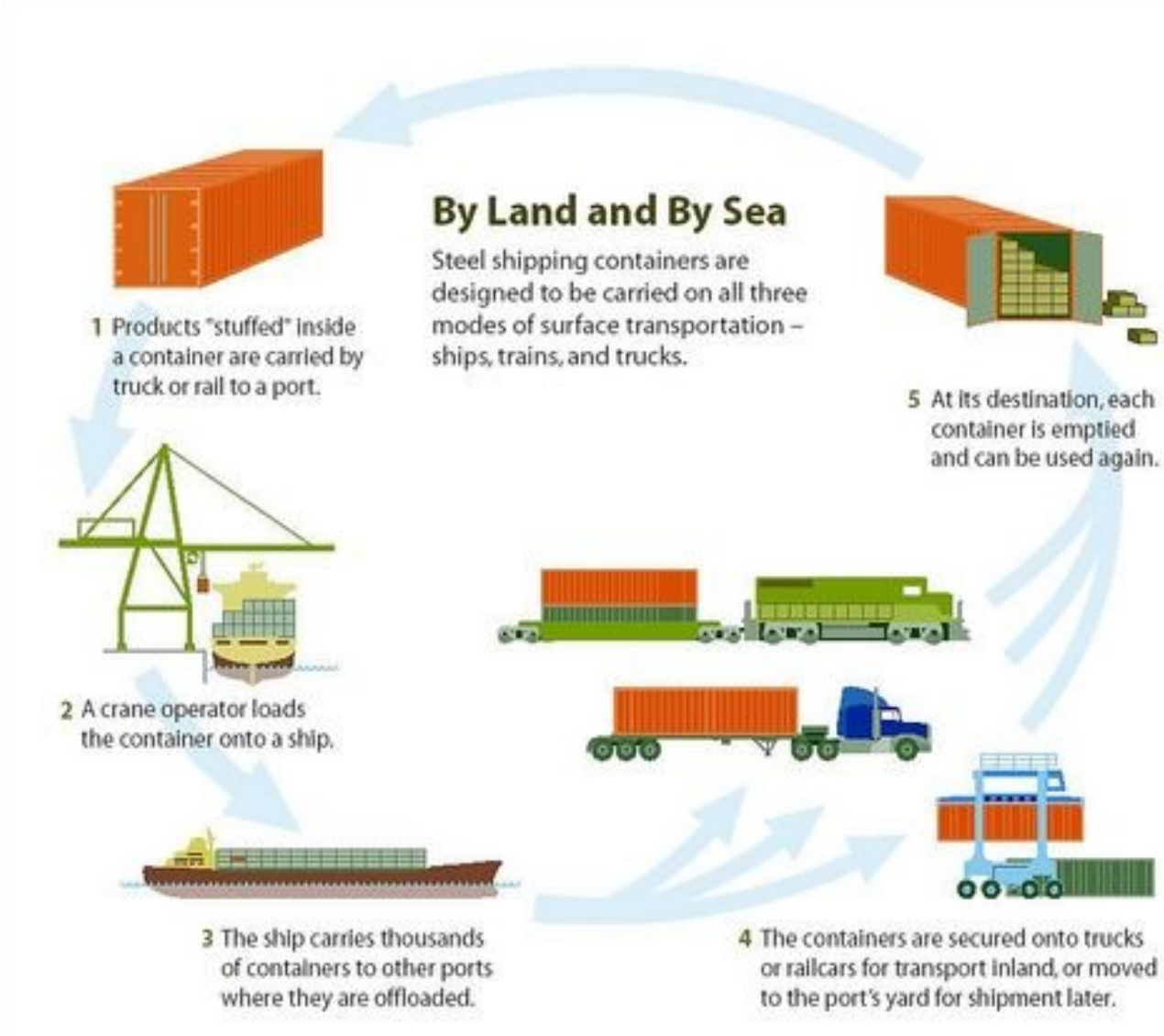
Twistlock

Corner casting on a shipping container. The twistlock proper is done through a larger oval hole on the bottom.

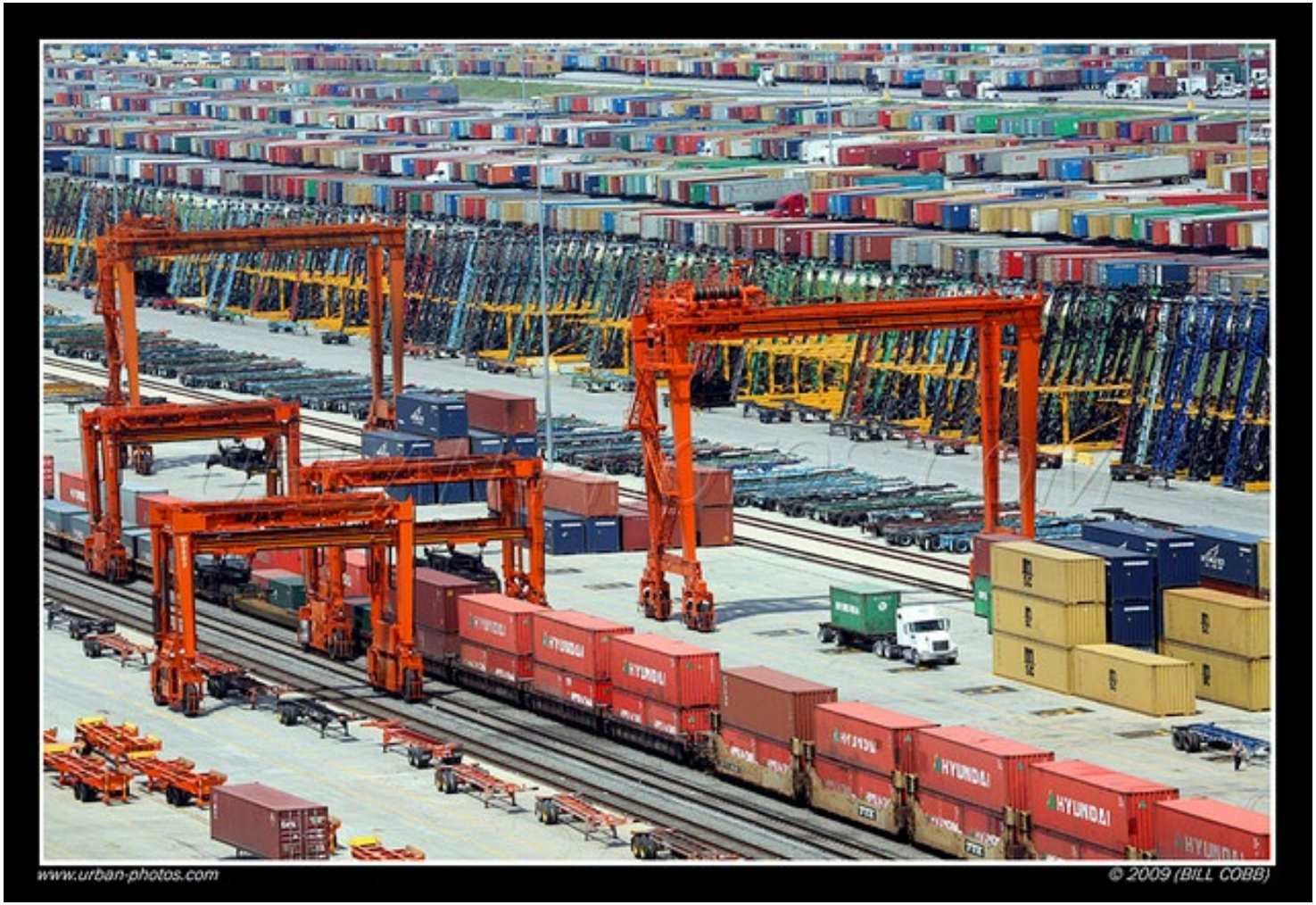
Twistlocks on the base of a container ship. Foreground: unlocked; background: locked. The turnbuckles are "lashing rods" used for additional stability

locked

Intermodal Transport



CenterPoint Intermodal Center, Chicago

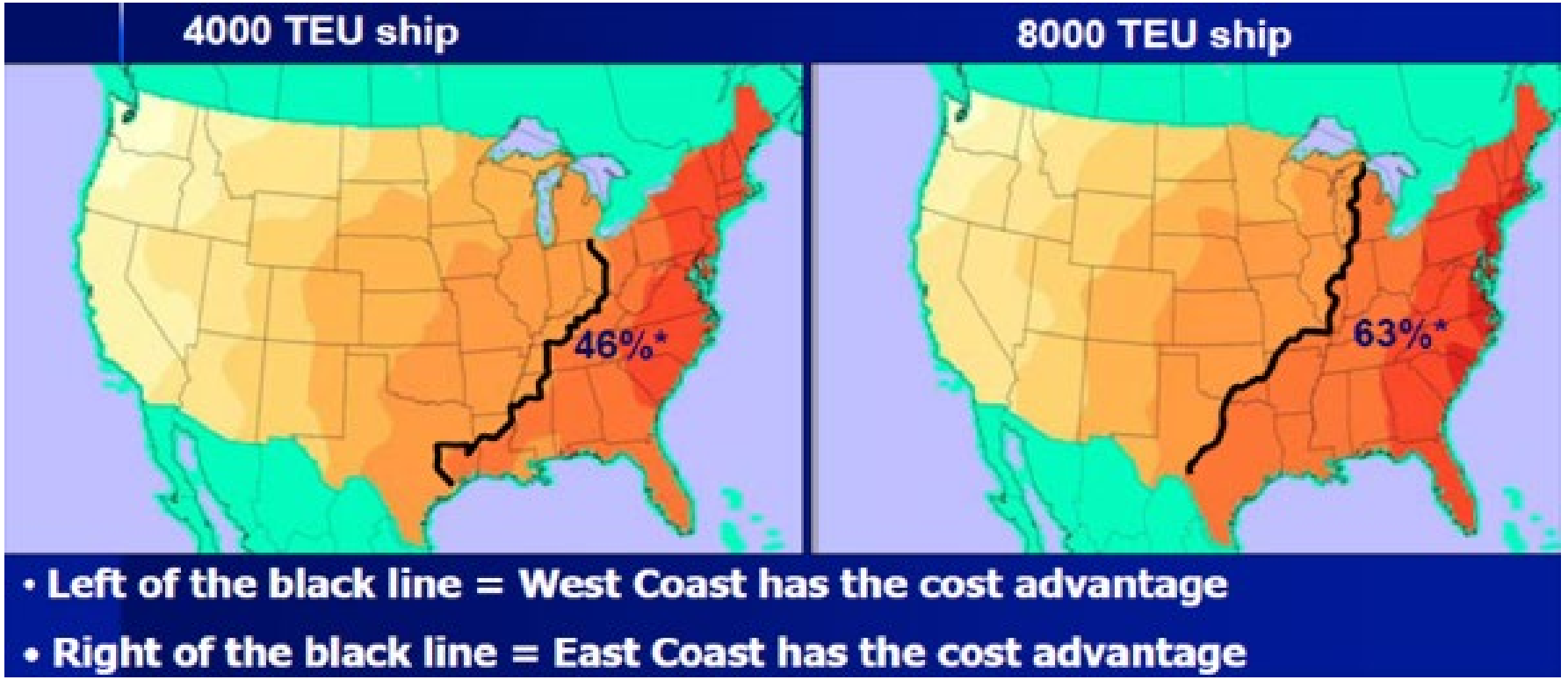


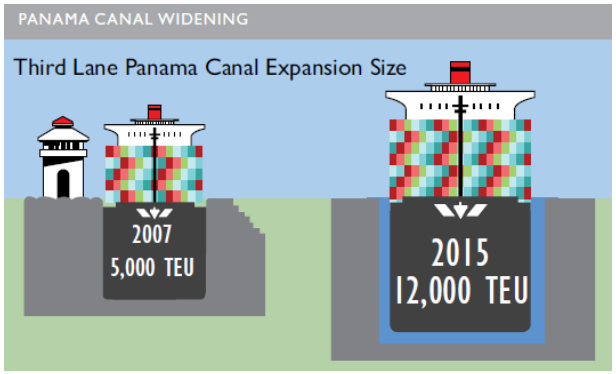
Maritime Transportation Rates for a 40 Foot Container between Selected Ports, 2010

Source: Drewry Shipping Consultants. Note: Rates are for full container loads and include the base ocean shipping rate, port charges both at origin and at destination, fuel surcharges and all other surcharges.

Transit Times from Shanghai and North American Routing Options (in Days)

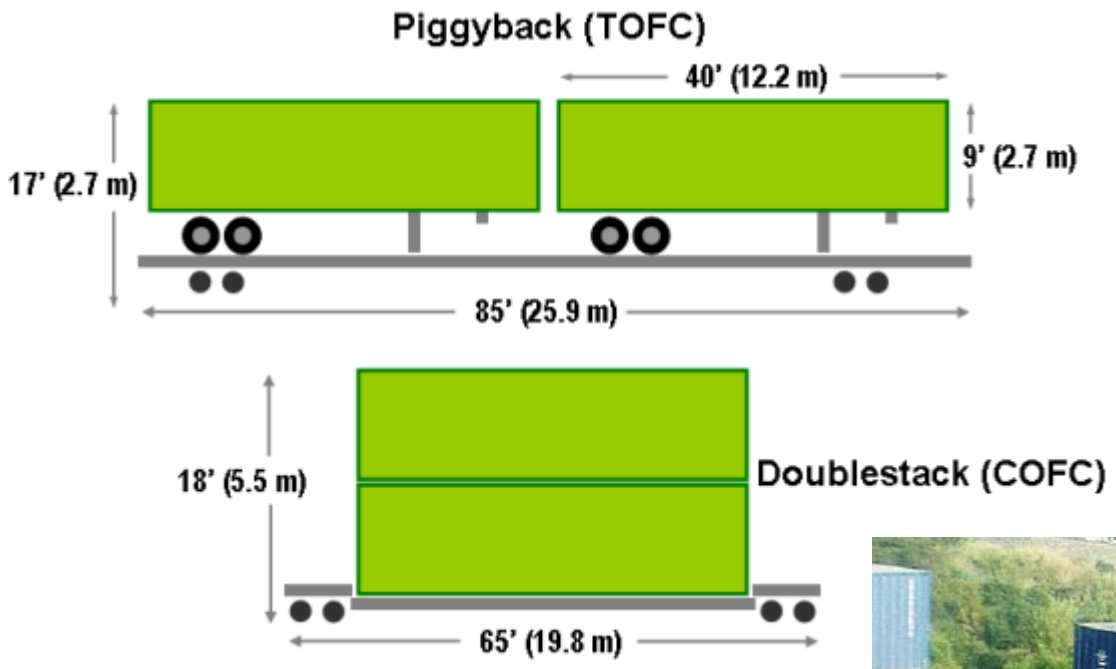
Far Reaching Effects of Canal Expansion



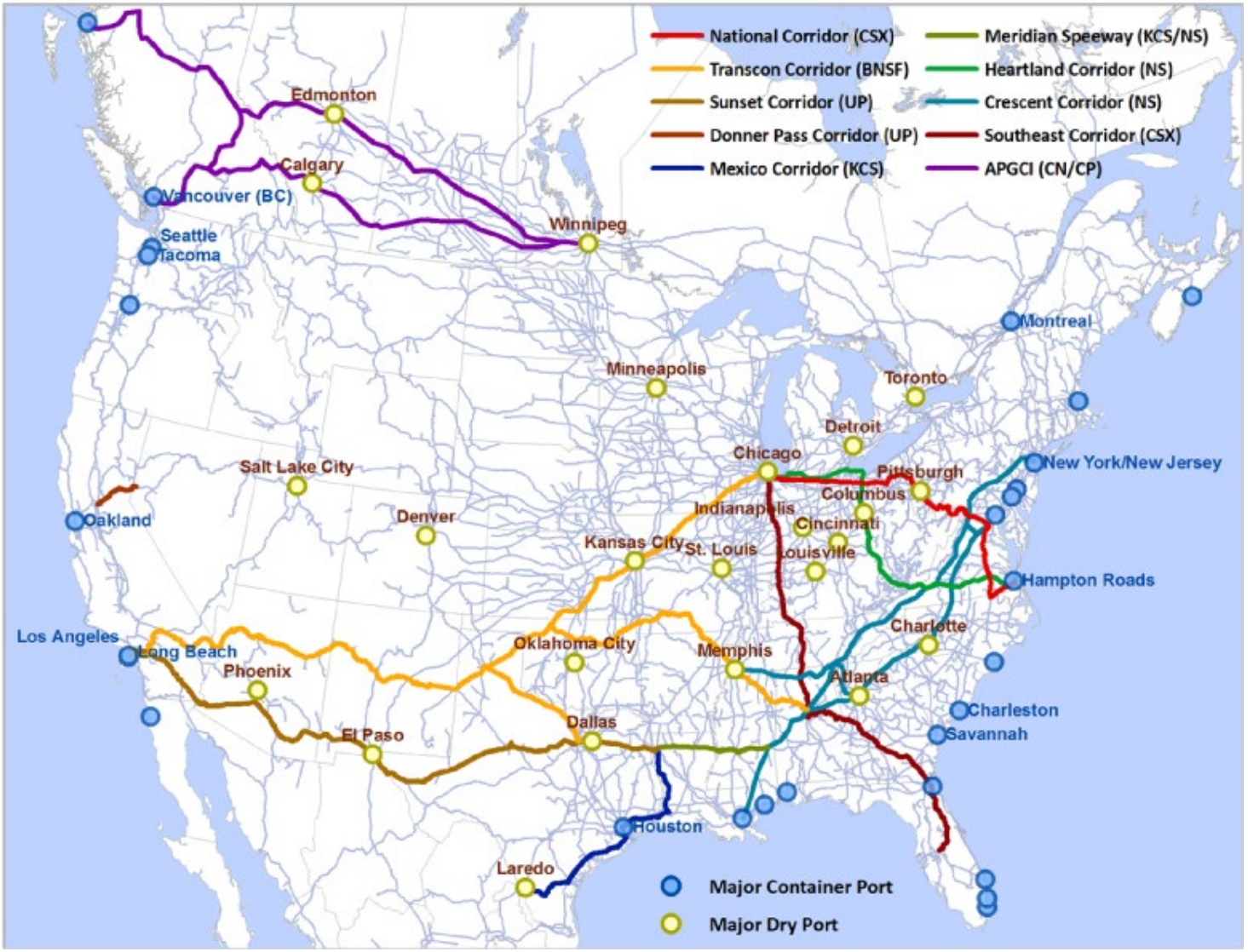


"Panamax" ship = 4000-5000 TEU Capacity
post-Panamax = too big to fit (Nimitz)
"New Panamax" = 12,000 TEU

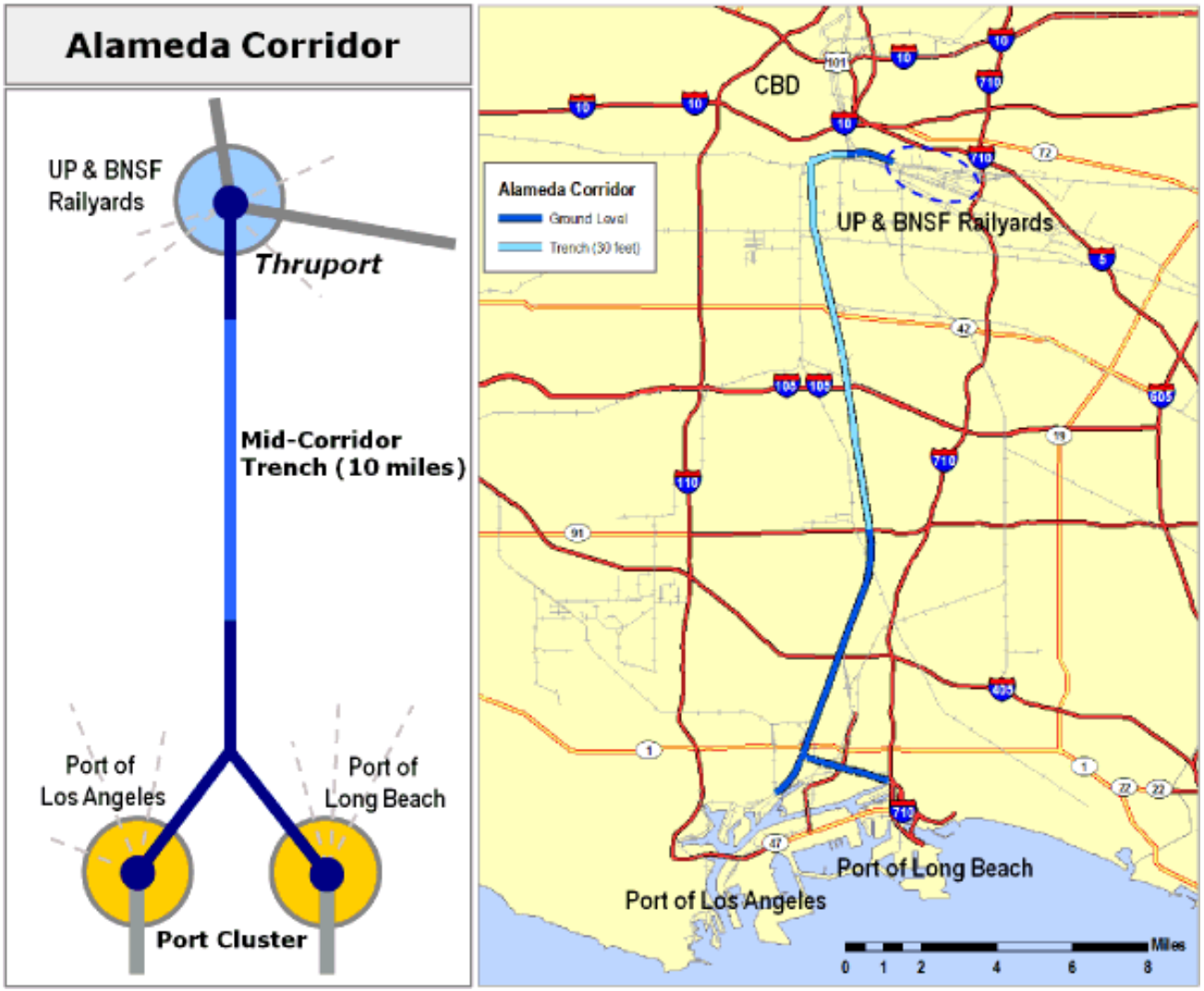
Piggyback and Doublestack Train Cars

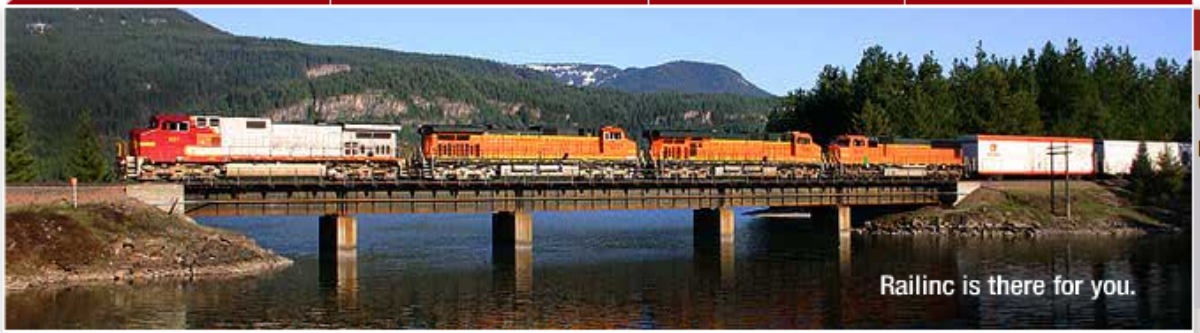


Major North American Rail Corridors Improved since 2000



Alameda Rail Corridor





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QUICK LINKS

- CEPM Project Site
- DDCT System Project Site
- Railinc IRFi Website
- Embargoes and Permits Site
- Merger and Acquisition Notices
- Careers at Railinc

LATEST NEWS

CEPM Webinars Announced

Aug. 22 - Railinc has announced the webinar schedule for CEPM Wheelsets.

CEPM-Wheelsets On-Schedule

Aug. 8 - The first phase of the CEPM project is on-track for launch in January 2012.

Newsroom

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Railinc is the railroad industry's most innovative and reliable resource for IT and information services. We support business processes and provide business intelligence that help railroads and rail equipment owners increase productivity, achieve operational efficiencies and keep their assets moving.

RAILINC SHORT LINE INDEX

July 2011 - 334,986

July 2010 - 328,102

Carloads Up Two Percent, Metallic Ores, Nonmetallic Minerals, & Lumber & Wood Products Lead Gains

See details

UMLER EQUIPMENT INDEX

2nd Qtr 2011 - 1,948,957

1st Qtr 2011 - 1,949,315

North American Fleet Size Remains Steady During 2nd Quarter 2011

See details

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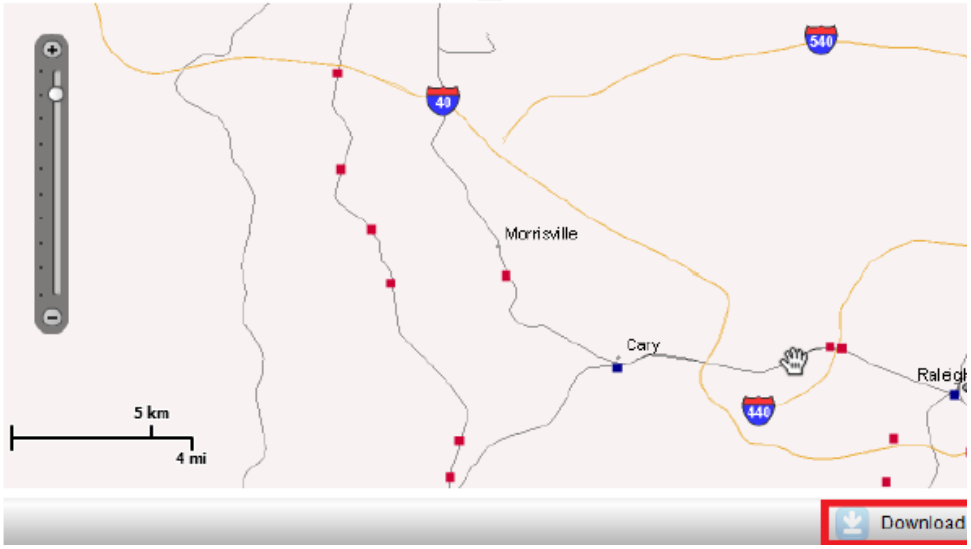


Station Detail

Station Master Detail | OPSL Notes

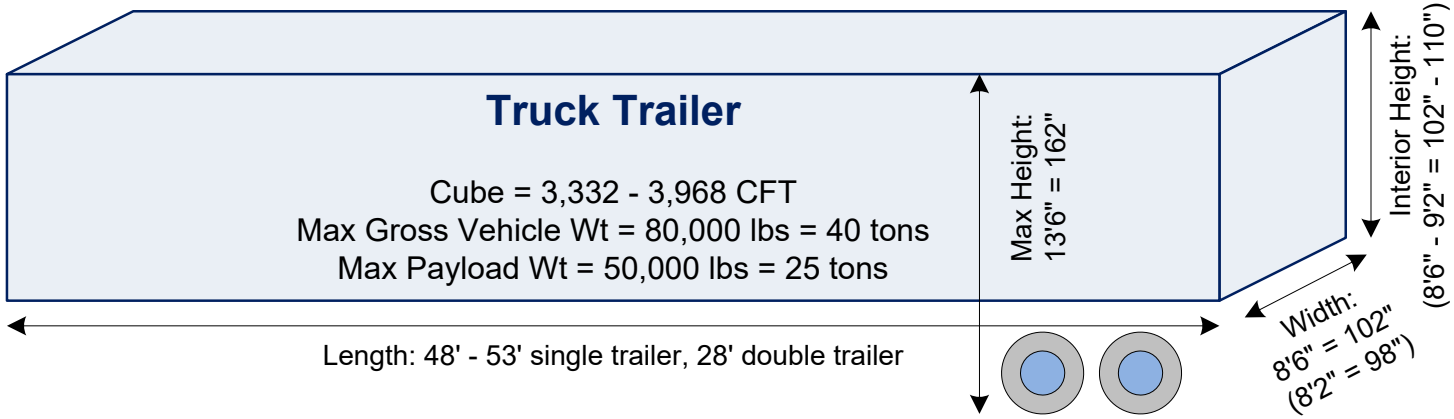
SCAC	CSXT
FSAC	21603
Effective Date	08/12/1997
Expiration Date	12/31/9999
SPLC	411853000
Location Name	EAST DURHAM
Location Type	OR
Rule 260 Junc Abbrev	
Location County	DURHAM
Location State	NC
Latitude	+035.978772
Longitude	-078.876680
Zip/Postal Code	

Trucking

U.S. For-Hire Trucking Services

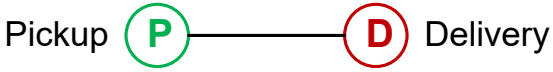
	TL	LTL	PX
Minimum payload	10,000 lb	150 lb	2 lb
Average payload[12]	30,000 lb	1000 lb	10 lb
Maximum payload	50,000 lb	10,000 lb	70 (UPS) – 150 lb
Average length of haul	294 mi	752 mi	894 mi
Average value	$775/ton	$7002/ton	$37,538/ton

Truck enclosed van semi-trailer (interior dimensions in parenthesis)

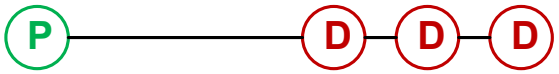


Trucking Operations

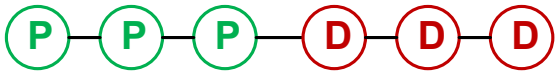
TL routing alternatives



(a) Point-to-point (P2P)

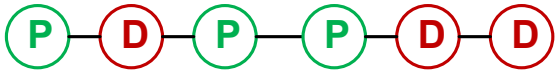


(b) Peddling (one-to-many)



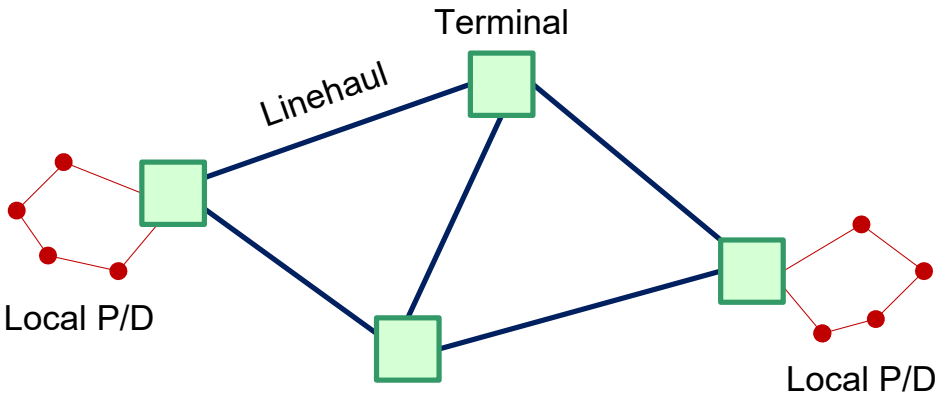
(d) Many-to-many

(c) Collecting (many-to-one)

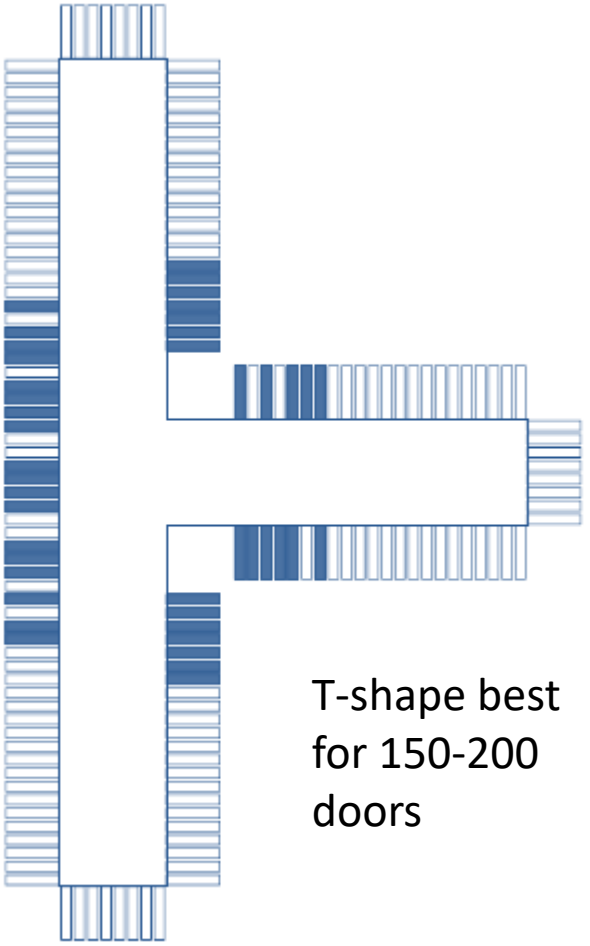


(e) Interleaved

Logistics network used for LTL and PX

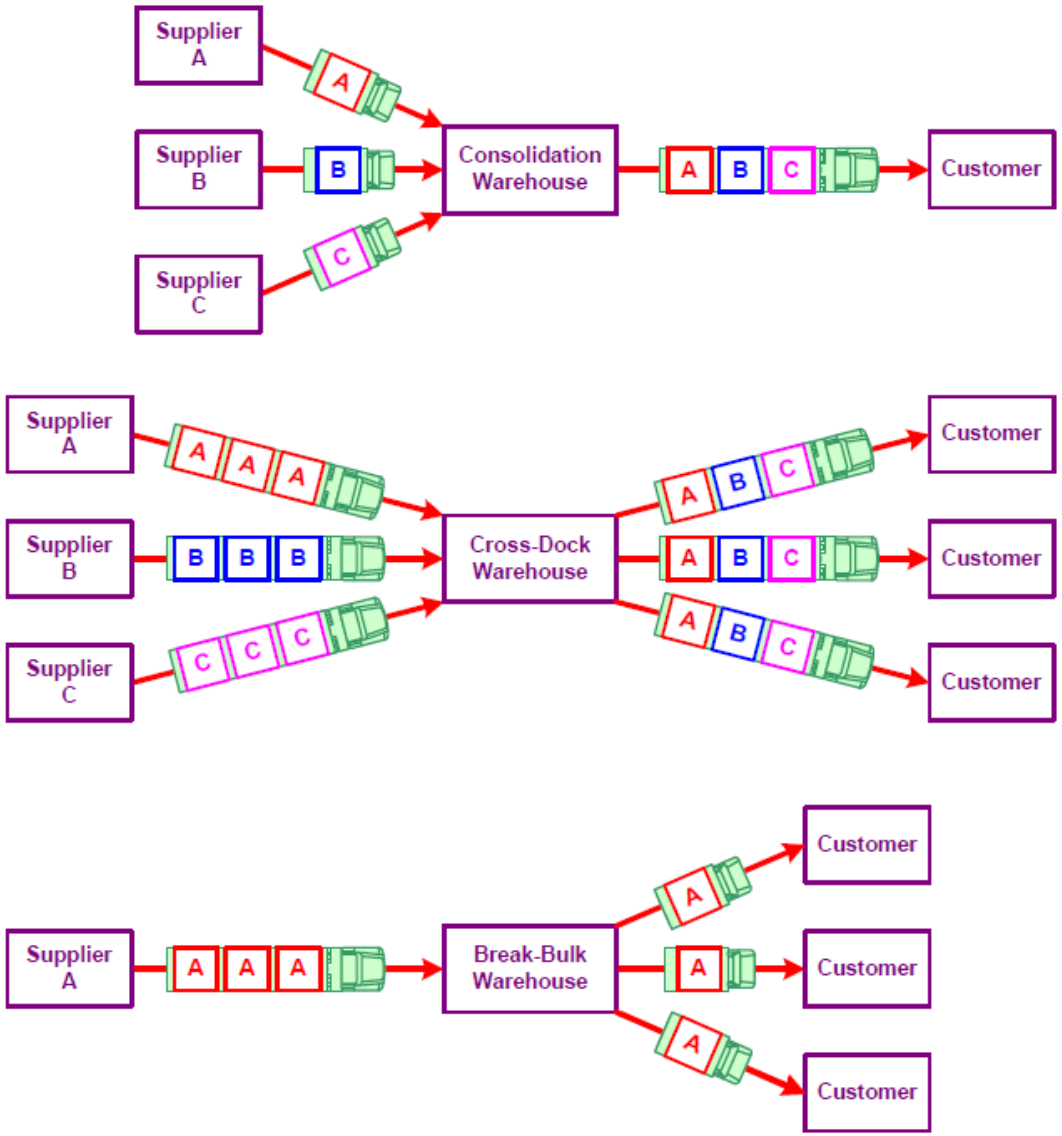


LTL Terminal



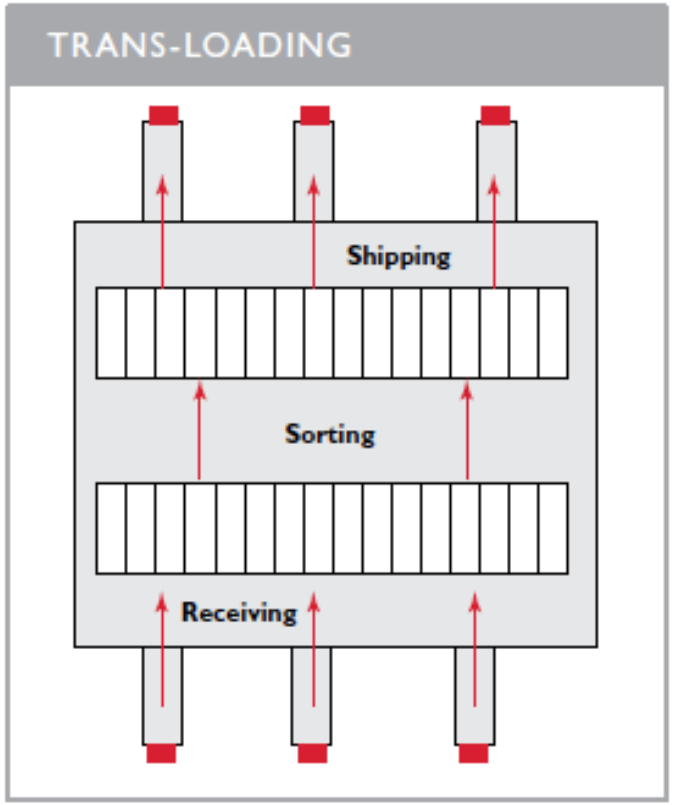
T-shape best for 150-200 doors

Types of Warehouses

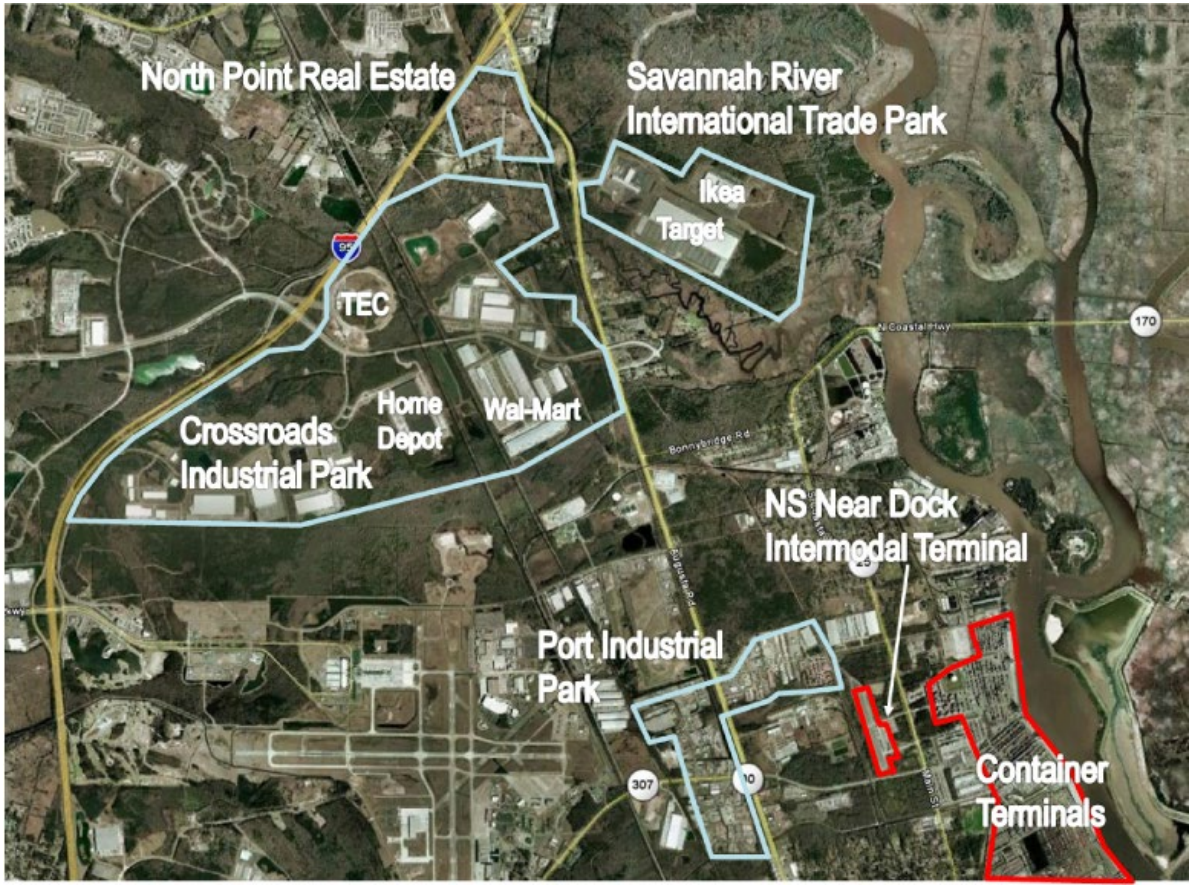


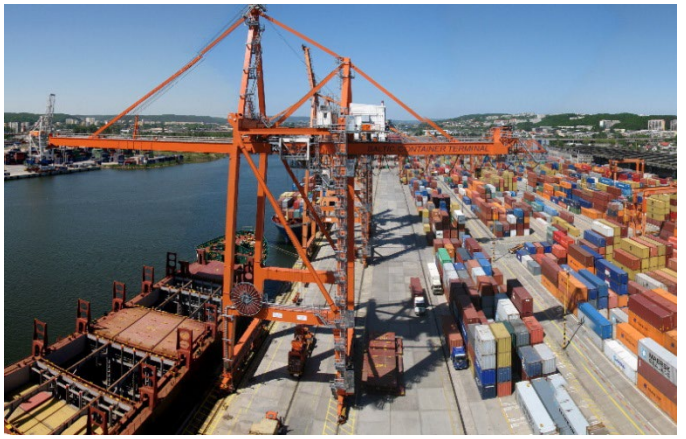
Transloading

- Process of transferring a shipment from one transport vehicle to another
  - a.k.a. (or similar to) transshipping
- Advantages of transloading at a port prior to transport to inland distribution centers (DCs):
  - Contents of four 40-ft containers fit into three 53-ft domestic containers or semi-trailers
  - Empty 40-ft containers don't need to be returned from DC
  - Can re-sort and delay final assignment to DCs instead of shipping full contents to a single DC
- Disadvantage: Increased handling (cost and damage)

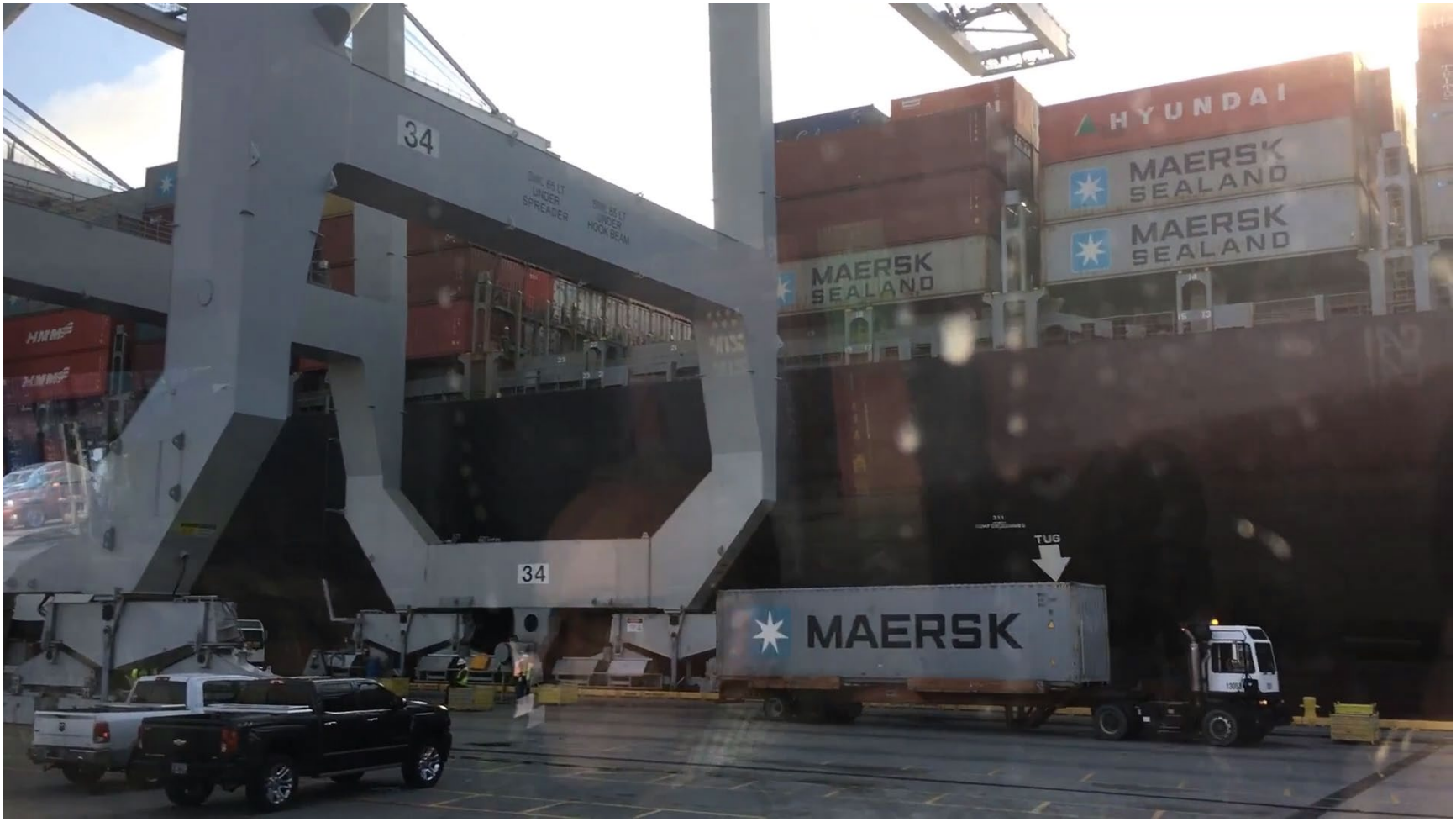


Savannah Logistics Cluster





Port of Savannah

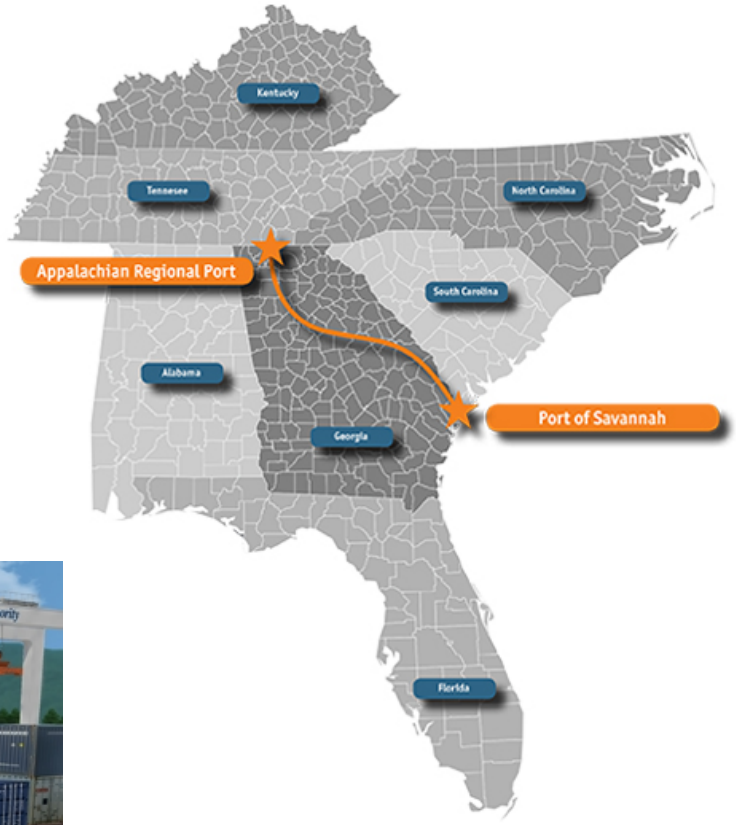


I-75 Commercial Vehicle Lanes

- Heavy truck traffic between just south of Atlanta and Port of Savannah
- Proposed project would consist of two barrier-separated commercial vehicle only lanes along I-75 median
- Would reduce
  - Congestion
  - Truck/car accidents
  - Maintenance cost of general purpose lanes
- Open to traffic in 2029
- Cost estimate is $1.8 billion

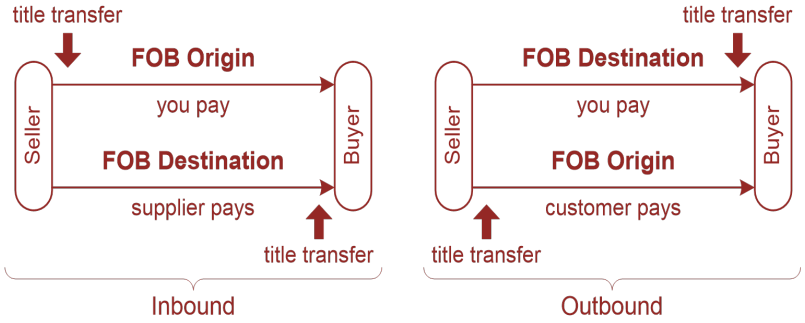
Appalachian Regional Port

- Example of an *inland port*
- Provides direct 388-mile rail route to/from Port of Savannah
- Bypasses Atlanta congestion
- Reduces truck congestion at port
- Eliminates need for transloading
- Opened August 2018



Misc. Freight Terms

- **Demurrage**
- per-day fee to keep container/trailer
- **Drayage**
- short-distance transport (dray horse)
- **Dunnage**
- material to secure cargo in container (air bag, “popcorn”)
- **Bill of Lading** (blockchain)
- contract between carrier and shipper that serves as title for shipment
- **FOB** (Free-on-Board)
- indicates when seller transfers title to buyer



- **Truck** vs. **Tractor-Trailer**

- **Reefer**
- refrigerated container or trailer
- **Bobtail**

- **Common Carrier** (vs Private Carrier)
- carrier that serves general public
- **3PL** (third-party logistics provider)
- firm that specializes in providing warehousing and transportation services for hire

Misc. Freight Terms (cont)

- **Deadheading**
- truck travel without a load
- **Doubles**

- **Fifth Wheel** (and Kingpin)

- **Hours-of-Service** (HOS) regulations
- "Drivers may drive up to 11 hours in the 14-hour on-duty window after they come on duty following 10 or more consecutive hours off duty"
- **Sleeper, Driver Team**
- allows non-stop travel with one person driving while other sleeps
- **Tare Weight**
- Tare = Gross vehicle weight – Payload
- **Lumper**
- laborer hired by a trucker to unload freight at a warehouse