Regional Freight Flows

Freight Performance Measures

Northeast Clean Freight Corridors Webinar #3

I-95 Corridor Coalition

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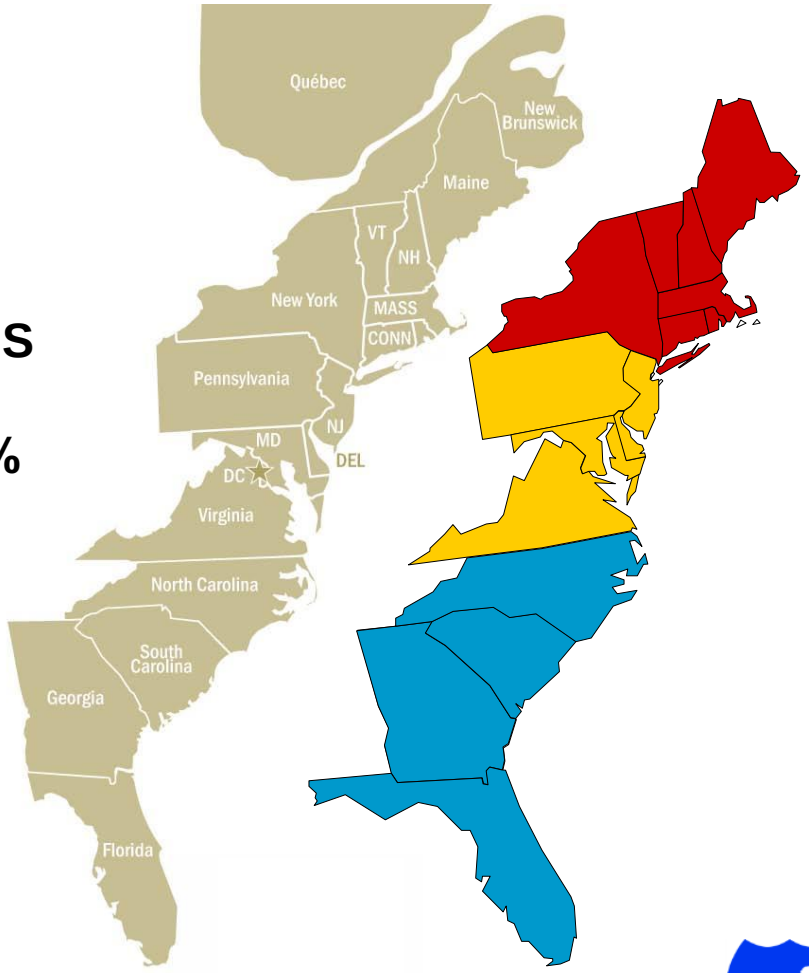
Why does I-95 Coalition Need to Understand Freight Corridors and Supply Chains?

Freight Corridors and Supply chains are multi-jurisdictional—so are we:

- **16 states with District of Columbia:**
  - **$4.7 trillion economy (40% of US GDP)**
  - **21% of nation's road miles; 35% of nation's VMT**
  - **5.3 billion tons of freight shipments annually**
  - **Multimodal corridor**
- **2 Canadian Provinces** (Quebec, New Brunswick)
- **3 economic regions** (Northeast, Mid-Atlantic, Southeast)



Regional Freight Challenges

- Many states in Northeast are still developing state freight plans
- Few (if any) of the Northeast states have detailed maps that document their freight flows across the region/corridor
- Many agencies face “data challenges” to develop regional freight profiles
- Need to “knit’ state freight plans into a regional plan/picture of the freight corridor – requires time, resources….
- Need to develop coordinated action and investment plans

NEDC and I-95 Coalition Goals

- **Both want to understand Freight Flows through their corridors to assist agencies in making "investment" decisions**
- **Both recognize need to reduce emissions from freight movements**
  - Significant portions of Corridor include non-attainment areas
- **Both need to support efforts for investments in freight projects that address mobility, travel reliability, resiliency, and "environmental impact mitigation" ("clean air" projects)**
- **Both need to encourage agencies to incorporate good data on environmental benefits as an element of every freight project's "public/private benefit" case**

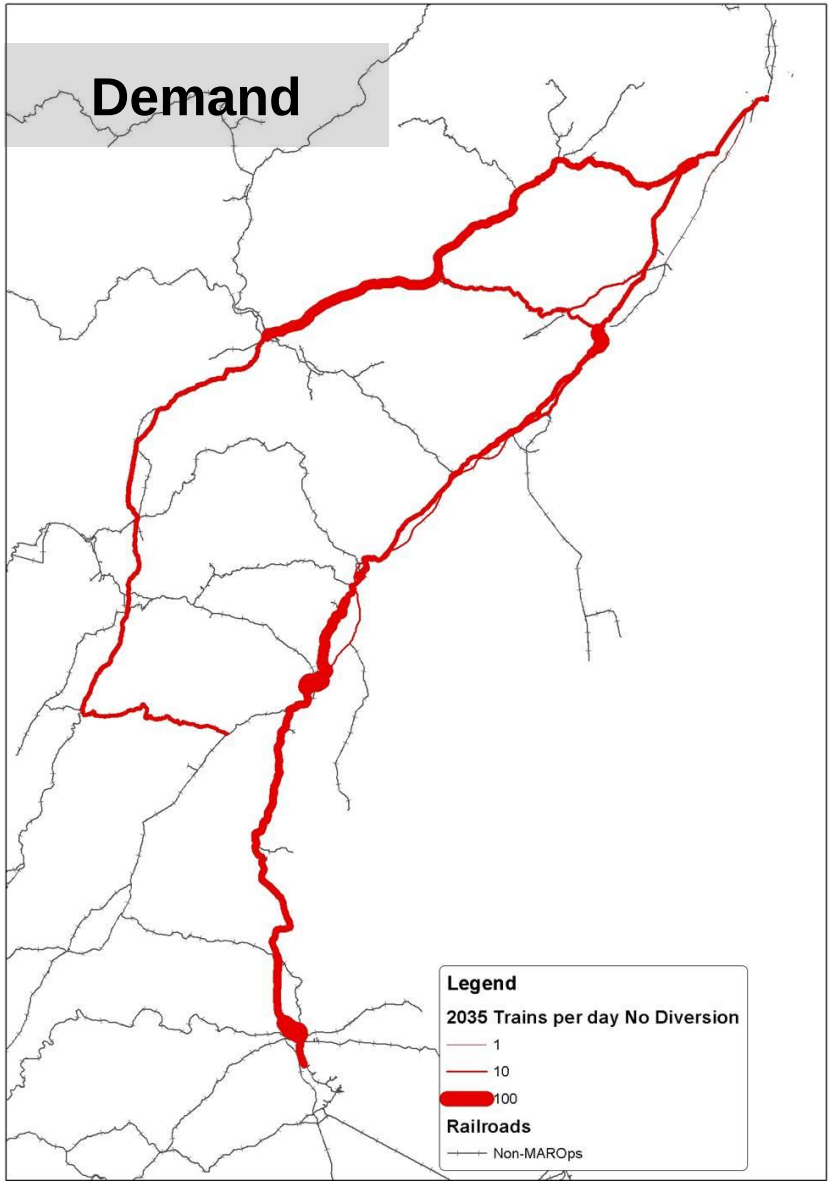
Freight Flows: Highway, Railway and Waterway

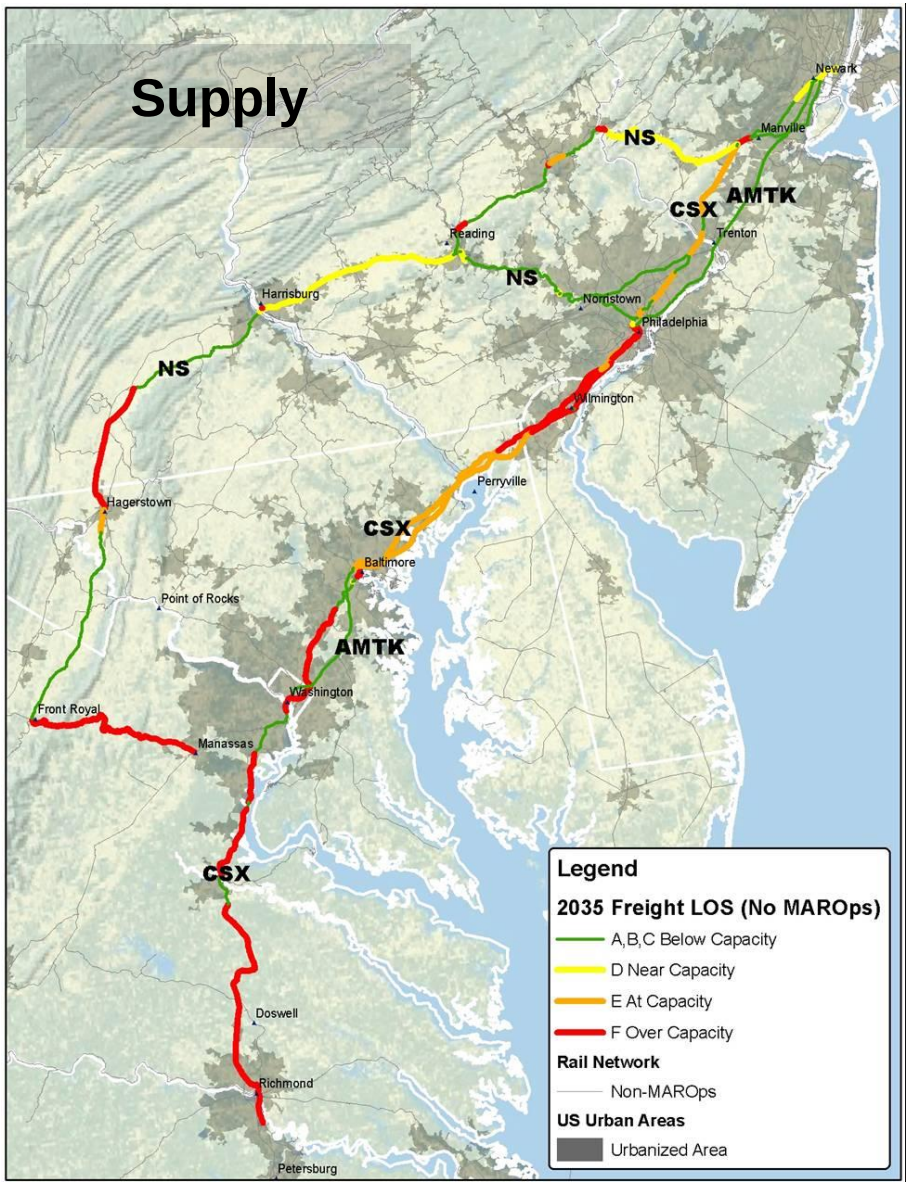
Freight Analysis Framework, 2010

Sources: Highways: U.S. Department of Transportation, Federal Highway Administration, *Freight Analysis Framework*, Version 3.4, 2013; **Rail:** Based on Surface Trvansportation Board, Annual Carload Waybill Sample and rail freight flow assignments done by Oak Ridge National Laboratory; **Inland Waterways:** U.S. Army Corps of Engineers, Institute or Water Resources, Annual Vessel Operating Activity and Lock Performance Monitoring System data, 2013.

Regional Freight Rail Flows and Chokepoints

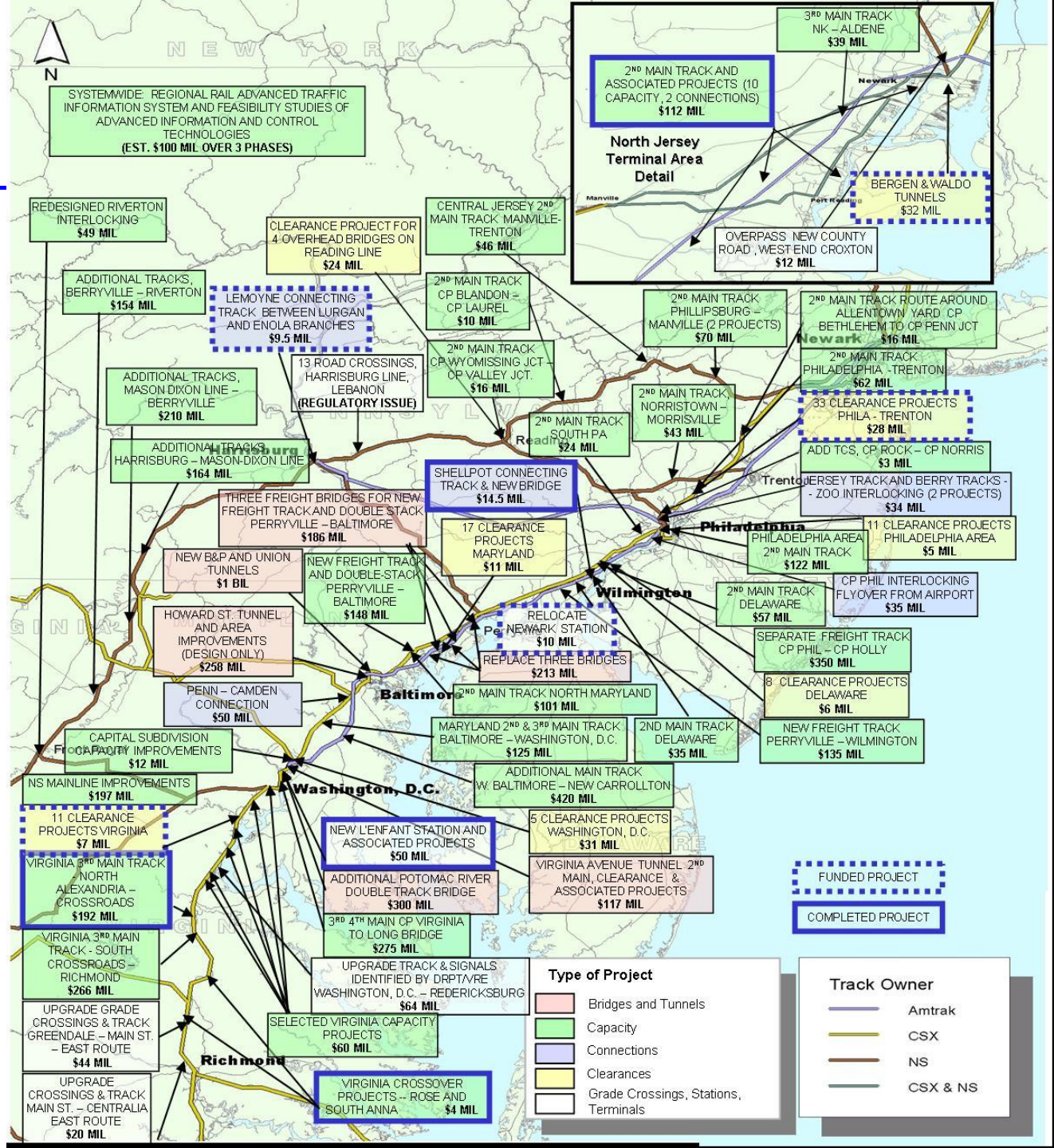
Mid-Atlantic Operations Studies I & II





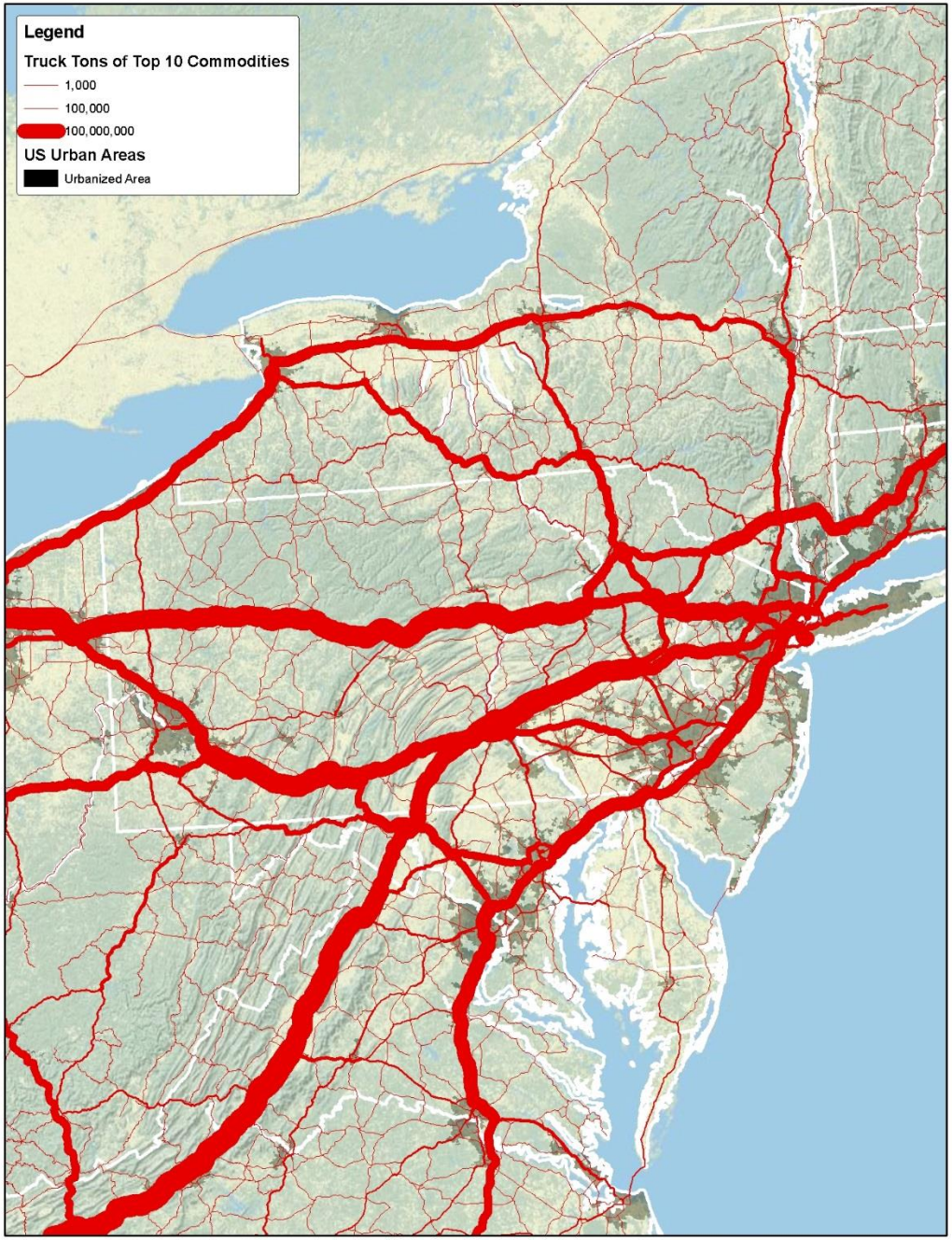
Regional Rail Projects

MAROps I Completed/ Programmed Projects



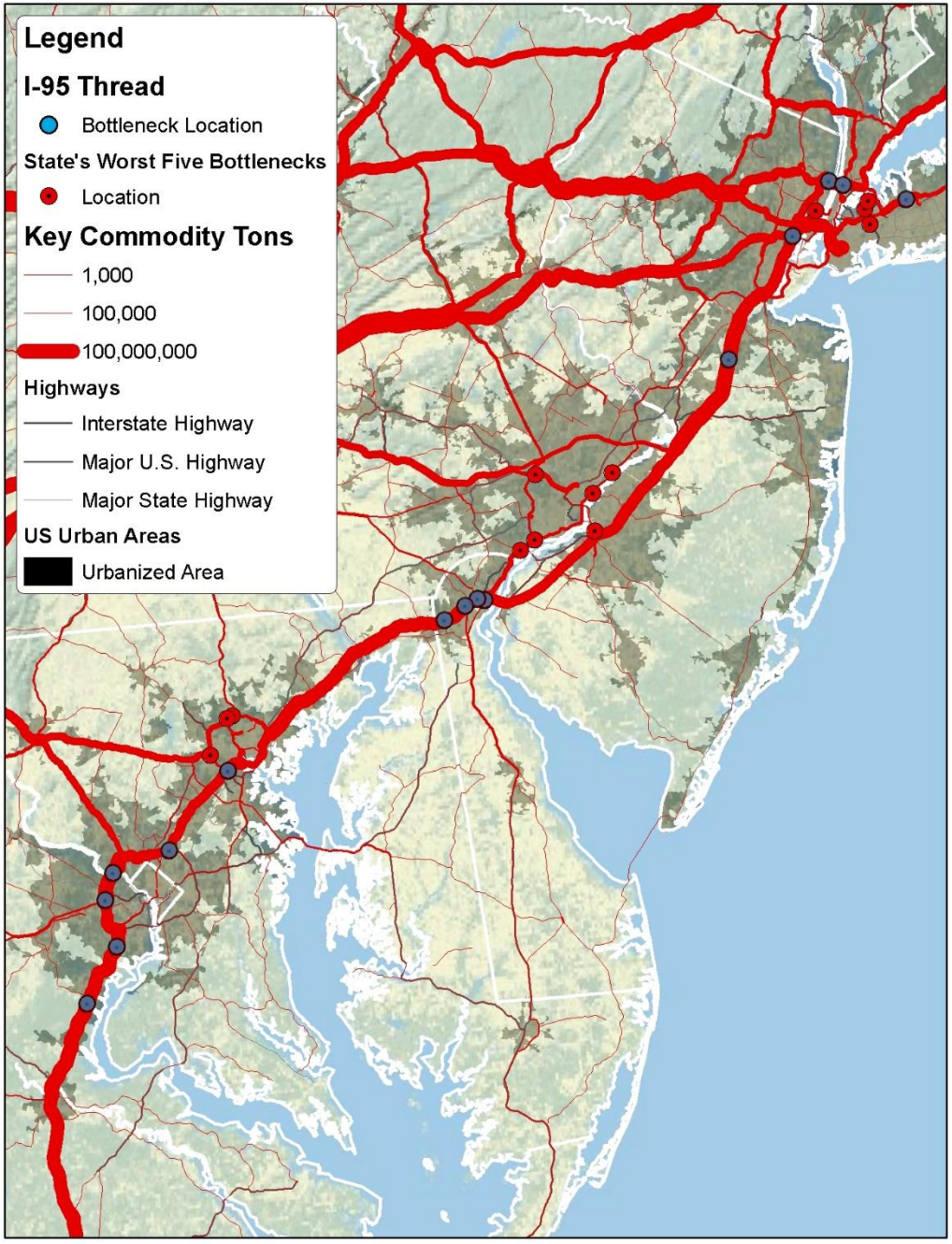
Regional Truck Flows

Critical Commodity Corridors in the Mid-Atlantic Region



Regional Truck Bottlenecks

MATOps Truck Bottlenecks Studies I & II



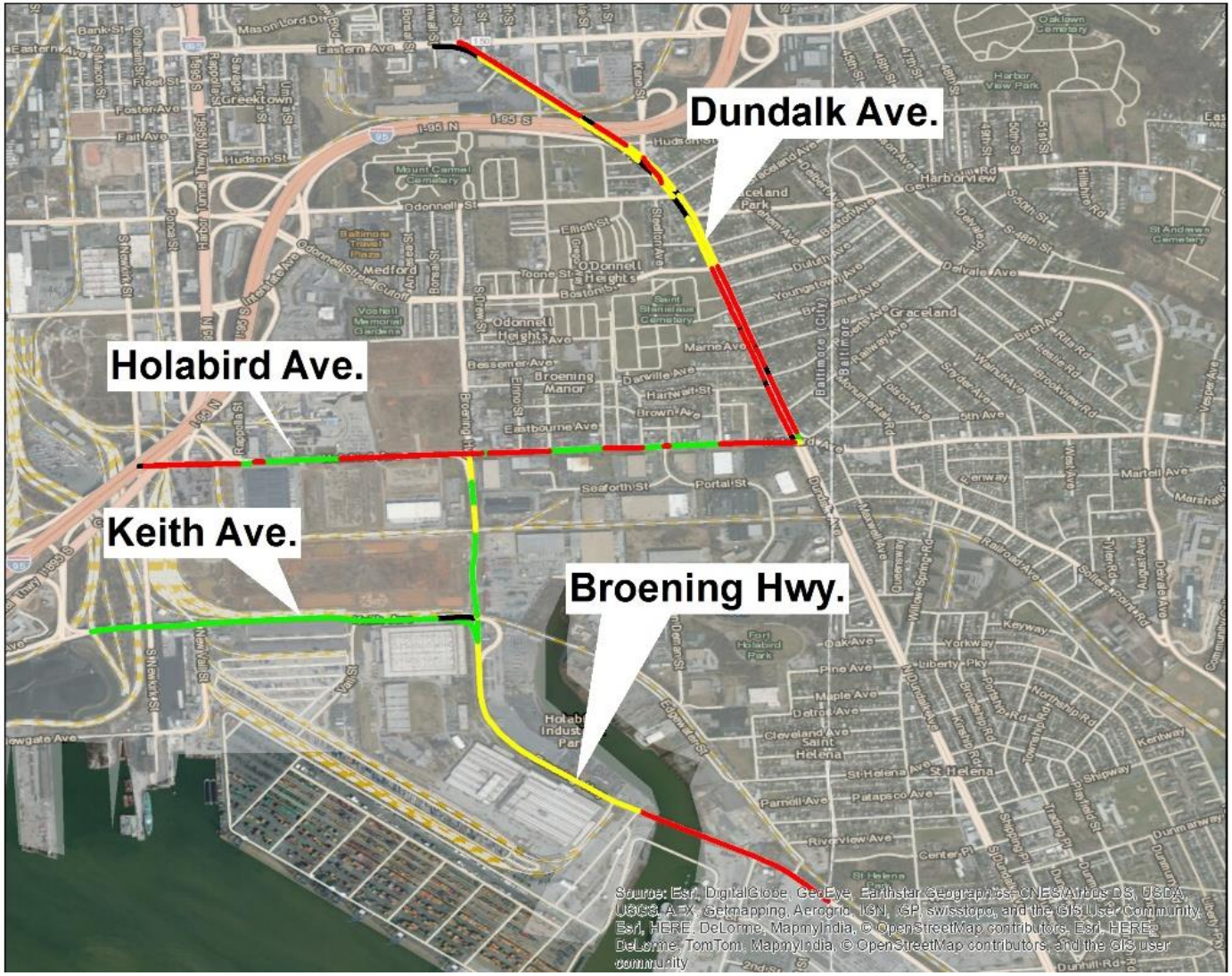
Truck Travel Speeds

Port of Baltimore Intermodal Connectors, 2014

Legend

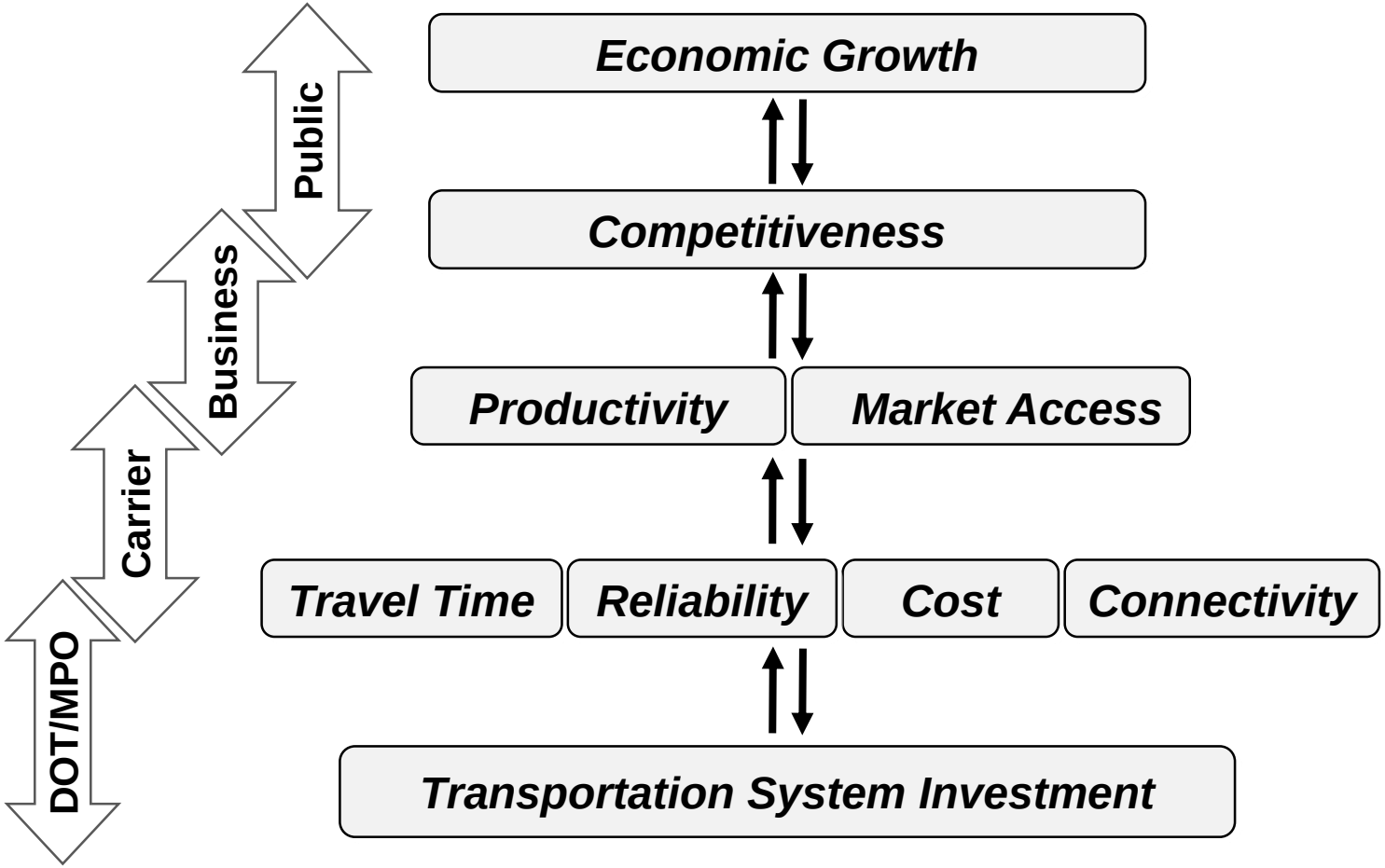
Midday Peak (MPH)

- No coverage
- < 10
- 10 - 20
- > 20



Framework

Linking Transportation and the Economy



Framework

Transportation System Elements

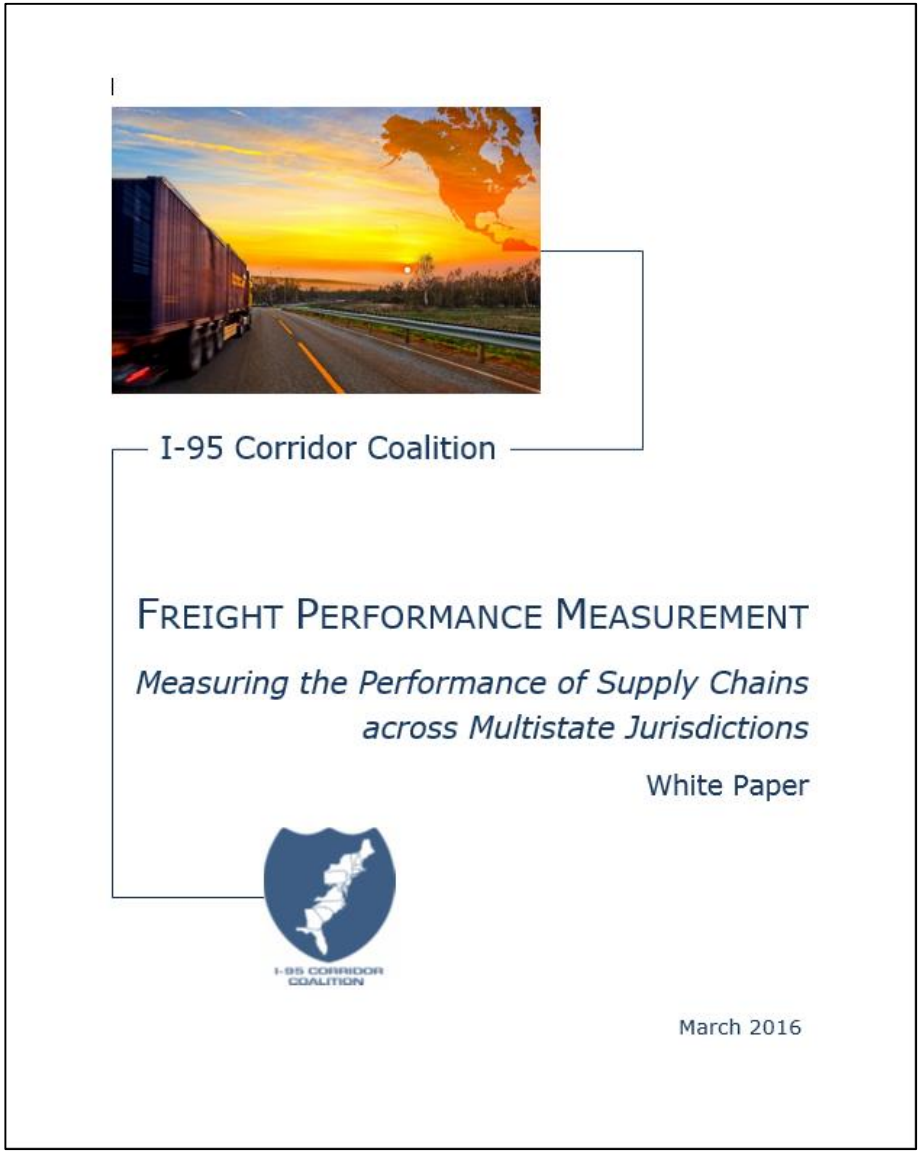
Economy
Types of Industries, Number of Households,
Types and Volumes of Commodities

Logistics
Supply Chains, Distribution Networks

Transportation
Infrastructure: Highways, Rail Lines, Ports, Airports...
Vehicles/Flows: Trucks, Planes, Rail Cars, Ships...

Policy and Regulation
Ownership, Use, Pricing, Taxation…

Measuring Supply Chain Performance



Sponsors

- I-95 Corridor Coalition
- FHWA Office of Freight
- Secretary of Commerce's National Advisory Committee on Supply Chain Competitiveness

Objective

Demonstrate the feasibility of measuring transportation supply-chain performance to determine if and where public investment might improve freight system performance and support economic competitiveness and growth.

Supply Chain Case Studies

- **Retail – Target® consumer goods**
  - From Ports of Los Angeles/Long Beach and Seattle/Tacoma via Chicago to metropolitan New York
- **Autos – General Motors auto parts**
  - From US and NAFTA suppliers to auto assembly plant in Tennessee
- **Food – Perdue processed chicken**
  - From DelMarVa region to Mid-Atlantic markets
- **Agriculture – Soybean exports**
  - From Illinois farms to Louisiana port
- **Electronics – Panasonic electronics**
  - Between manufacturing and assembly facilities in San Diego and Tijuana

Scope

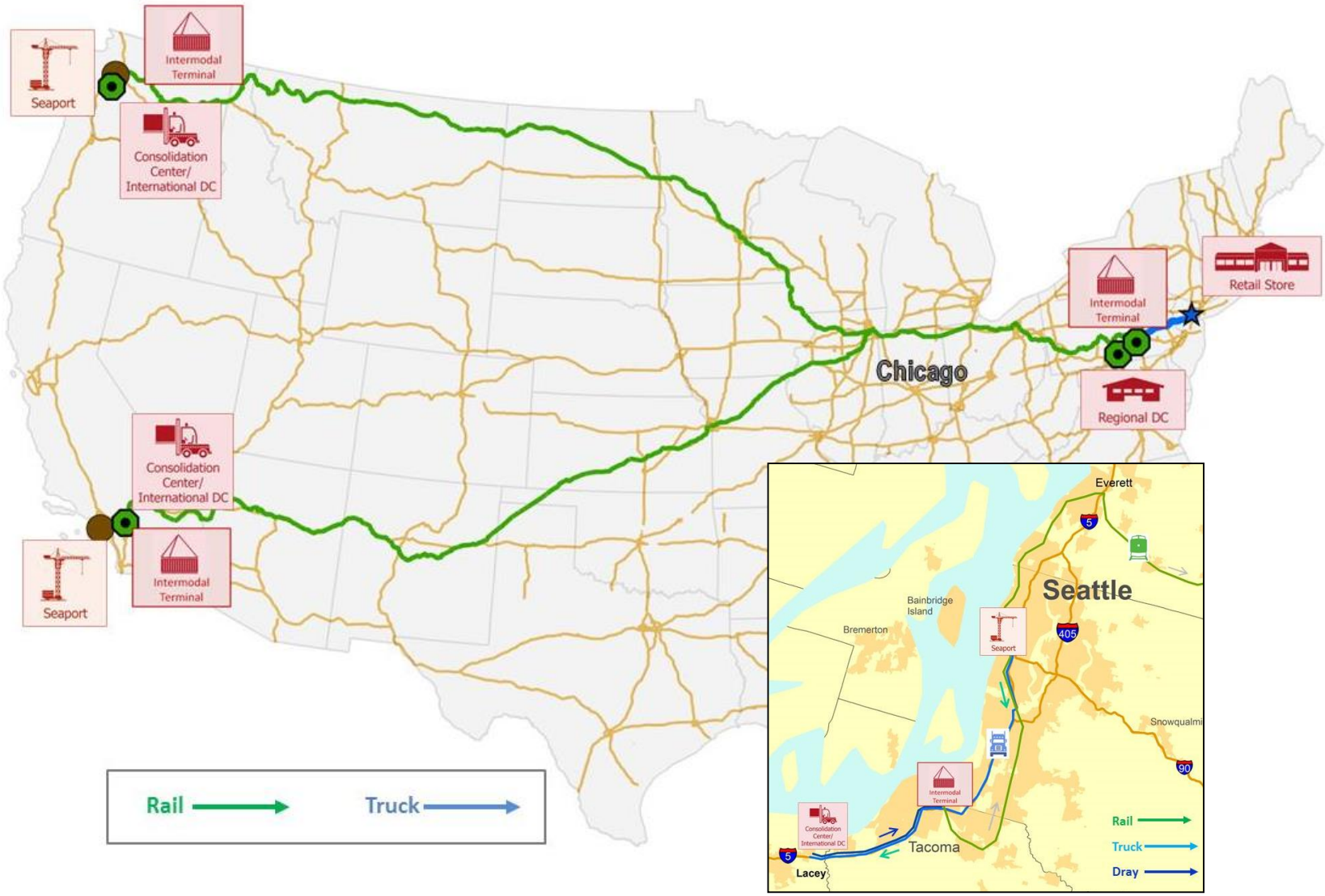
- **Address performance of supply chains**
  - But not the performance of modes, networks, etc., or environmental and economic impacts
- **Address performance of public and quasi-public links and nodes**
  - Include ports, highways, rail lines, airports, etc., but not private-sector manufacturing, warehousing or distribution nodes
- **Use measures and metrics that are common across supply chains and "drill down"**
- **Focus on high-level performance of representative supply chains to inform national policy**
  - Cover key industries, national regions, major trade lanes, but do not duplicate firm-, carrier- and agency-level analysis

Performance Measures and Metrics

Market-Driven Factors

Measure	Metric
Transit time	Travel time in days (or hours)
Reliability	95% travel time in days (or hours)
Cost	Dollars
Safety	Fatality and injury rate
Risk	Cargo loss and damage *(accidents, poor handling, theft…)*
	Disruption *(storms, labor, political forces…)*
	Capacity expansion delays *(physical, regulatory limitations and delays…)*

Retail Supply Chain *(Target)*



Retail Supply Chain Measures

Seattle to New York

Links and Nodes	Sources	Notes
West Coast port (Seattle)	U.S. Army Corp of Engineers	AIS data
Dray move	ATRI, Chainalytics	
Transload or Consolidation Center		
Dray move	ATRI, Chainalytics	
West Coast rail intermodal terminal	TransCore, Chainalytics	
Rail move	TransCore, Chainalytics	
Midwest rail intermodal interchange	TransCore, Chainalytics	
Rail move		Available for purchase
East Coast rail intermodal terminal		Available for purchase
Dray move	ATRI, Chainalytics	
East Coast Regional Distribution Center		
Truck P&D move	ATRI, Chainalytics	
Retail Store		

Retail Supply Chain Performance

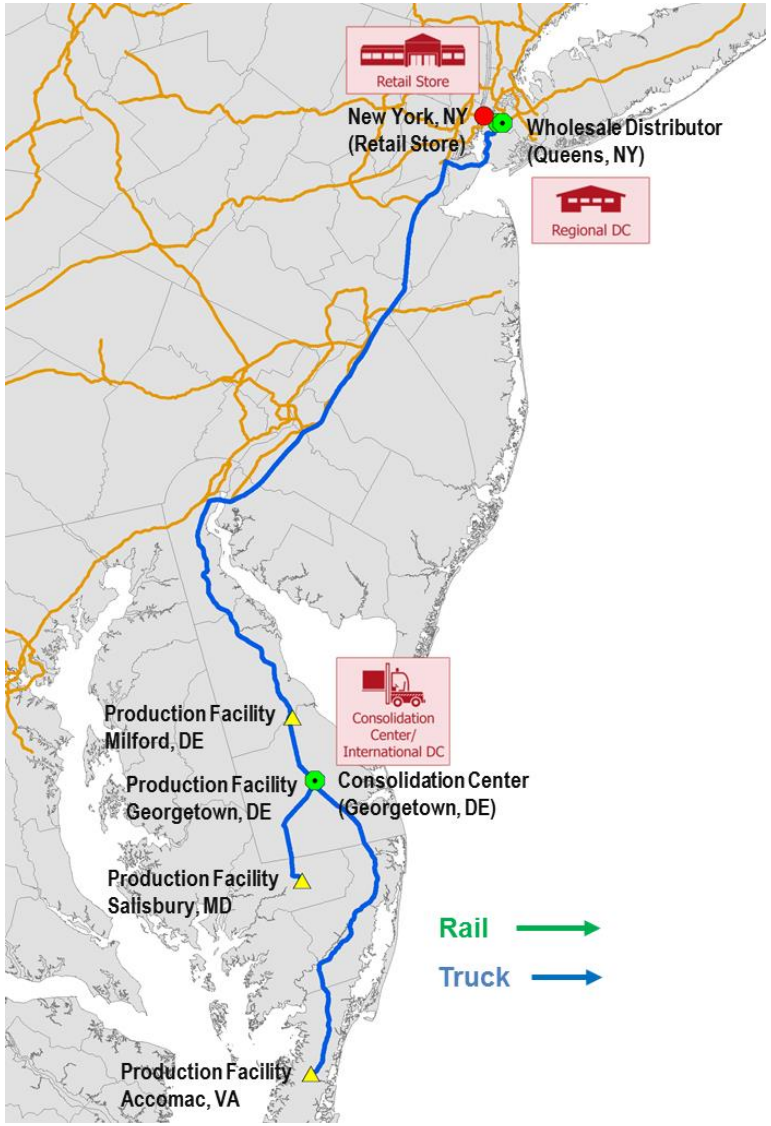
Seattle to New York

Links and Nodes	Transit Time/Dwell Time *(Hours)*	Reliability *(95% travel time)*	***Cost*** *(2014 $'s)*
West Coast port (Seattle)	36	86	
Dray move	1.0	1.4	$299
Transload or Consolidation Center			
Dray move	1.0	2.25	$308
West Coast rail intermodal terminal	20		
Rail move	104	154	$3,178
Midwest rail intermodal interchange	71	160	
Rail move	*	*	
East Coast rail intermodal terminal	*	*	
Dray move	1.1	1.4	$318
East Coast Regional Distribution Center			
Truck P&D move	6.0	9.5	$775
Retail Store			
Totals	*	*	**$4,878**

*Estimated using **ATRI data for truck transit times, TransCore data for rail times, Chainalytics data for costs.** Reliability factor for Midwest interchange was produced for sum of West Coast plus Midwest dwell, but most of delay is in Midwest (Chicago) .*

* The table does not display estimates for transit/dwell time and reliability for these links and nodes because the data were not purchased for the study.

Processed Food Supply Chain *(Perdue)*



Processed Food Supply Chain Measures

Links and Nodes	Source	Notes
Production Facility, Accomac, VA		
Truckload move	NPMRDS (FHWA) data Chainalytics (commercial) cost data	Truck travel time data sparse; used all vehicle travel times as proxy; computation intensive Chainalytics cost data for temperature controlled TL move
Consolidation Facility, Georgetown, DE		
Truckload move	NPMRDS (FHWA) data Chainalytics (commercial) cost data	Truck travel time data sparse; used all vehicle travel times as proxy; computation intensive Chainalytics cost data for temperature controlled TL move
Distribution Facility, Brooklyn, NY		

Processed Food Supply Chain Performance

Links and Nodes	Transit Time/ Dwell Time *(Hours)*	Reliability *(95% travel time)*	Cost *(2013)*
Production Facility, Accomac, VA			
Truckload move	1.6 hours	1.8 hours	$580
Consolidation Facility, Georgetown, DE			
Truckload move	3.7 hours	4.4 hours	$886
Distribution Facility, Brooklyn, NY			
Totals	**5.3 hours**	**6.2 hours**	**$1,466**

Conclusions

- **We can measure and track the high-level performance of representative supply chains with market-driven metrics**
  - Demonstrated feasibility
- **Key measures and metrics are common across supply chains and can be scaled for national, multistate and metropolitan use**
  - Travel time and travel time reliability are available from public and private sources, but “some assembly is required…”
  - Cost data can be purchased from private suppliers
  - Safety data are available, but not readily accessible
  - Risk data can be estimated, but are not readily available

Opportunities for I-95CC and NEDC Collaboration

- **Examine state freight plans to assess how to “knit” freight demand across the corridor**
- **Assess with states what type of projects might create benefits that are realistic and measurable**
- **Establish a list of projects to achieve an improved freight corridor (e.g., travel time reliability, reduced congestion, improved air quality)**

Contact Information

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