

Emerging Data Streams and Future Freight Applications

Jeff Short

Sr. Research Associate

**American Transportation
Research Institute**

ATRI

**Trucking industry's not-for-profit
research organization**

- **Safety**
- **Mobility**
- **Economic Analysis**
- **Technology**
- **Environment**

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Evolution of “Big” Truck Data ATRI Perspective

- **1990s – Trucking industry adopts asset tracking**
- **Early 2000s – FPM proof of concept**
- **2005-2010 – Growth in precision, frequency, variables**
- **2010 to Present – Data intake grows exponentially each year**

Evolution of Analysis Tools

■ 2001-2003

- ◆ Modest Desktop Computers
- ◆ Excel → SAS
- ◆ ArcGIS/Python

■ Today

- ◆ Hardware: Servers, Top-End Workstations, Significant Storage, Cloud
- ◆ Software: R, Python, SQL, GIS
- ◆ Actionable Information and Visualization

Components of “Big” Truck Data

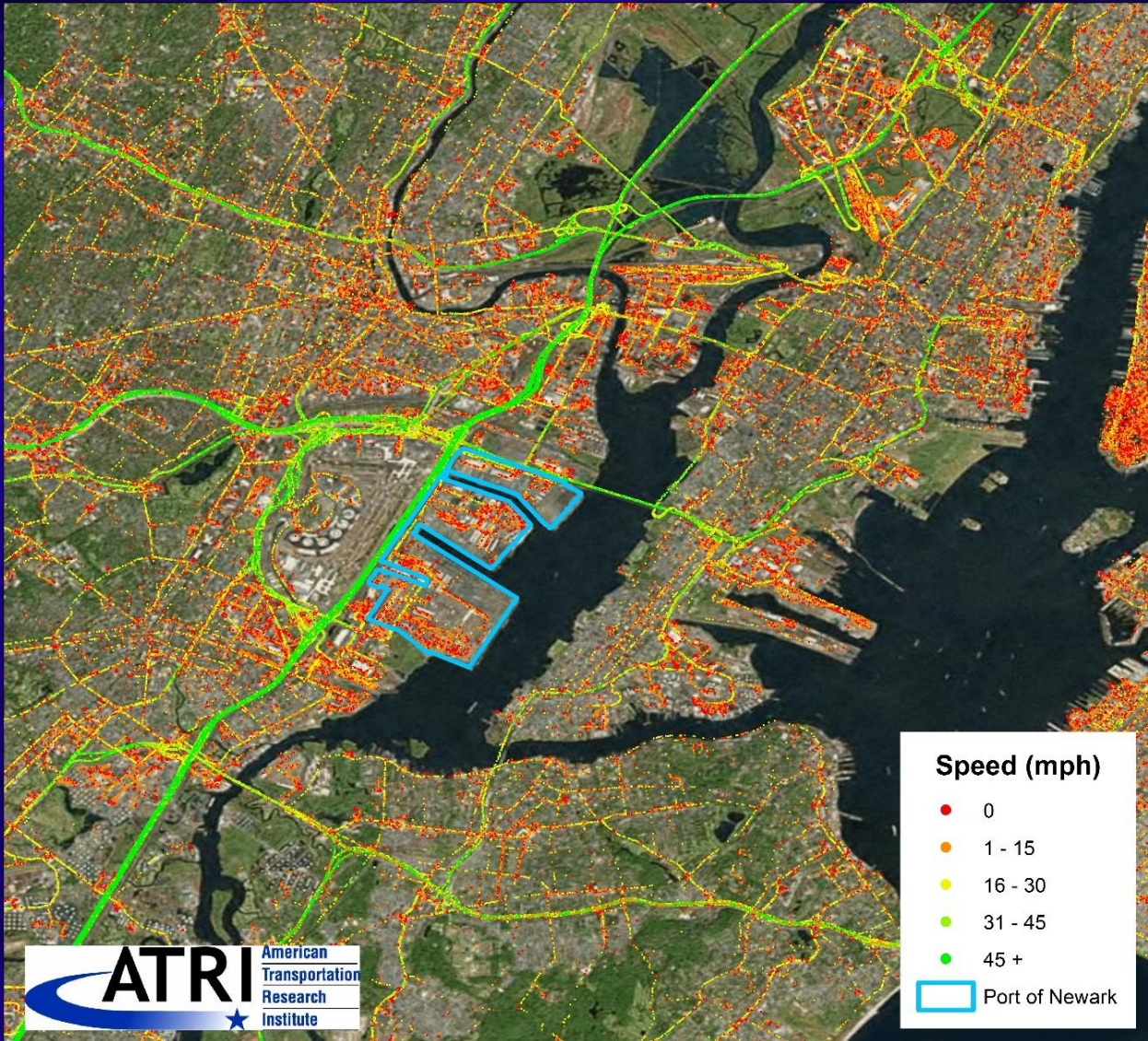
- **Truck GPS**
 - ◆ **Unique/Static Truck ID**
 - ◆ **Geographic: Precise Latitude/Longitude**
 - ◆ **Temporal: MM-DD-YYYY HH:MM:SS**
 - ◆ **Speed**
 - ◆ **Heading**

- **Key ELD Components**
 - ◆ **Duty status/time line**
 - ◆ **Location**
 - ◆ **Anonymous truck/driver**
 - ◆ **Operation type**
 - ◆ **Additional remarks**

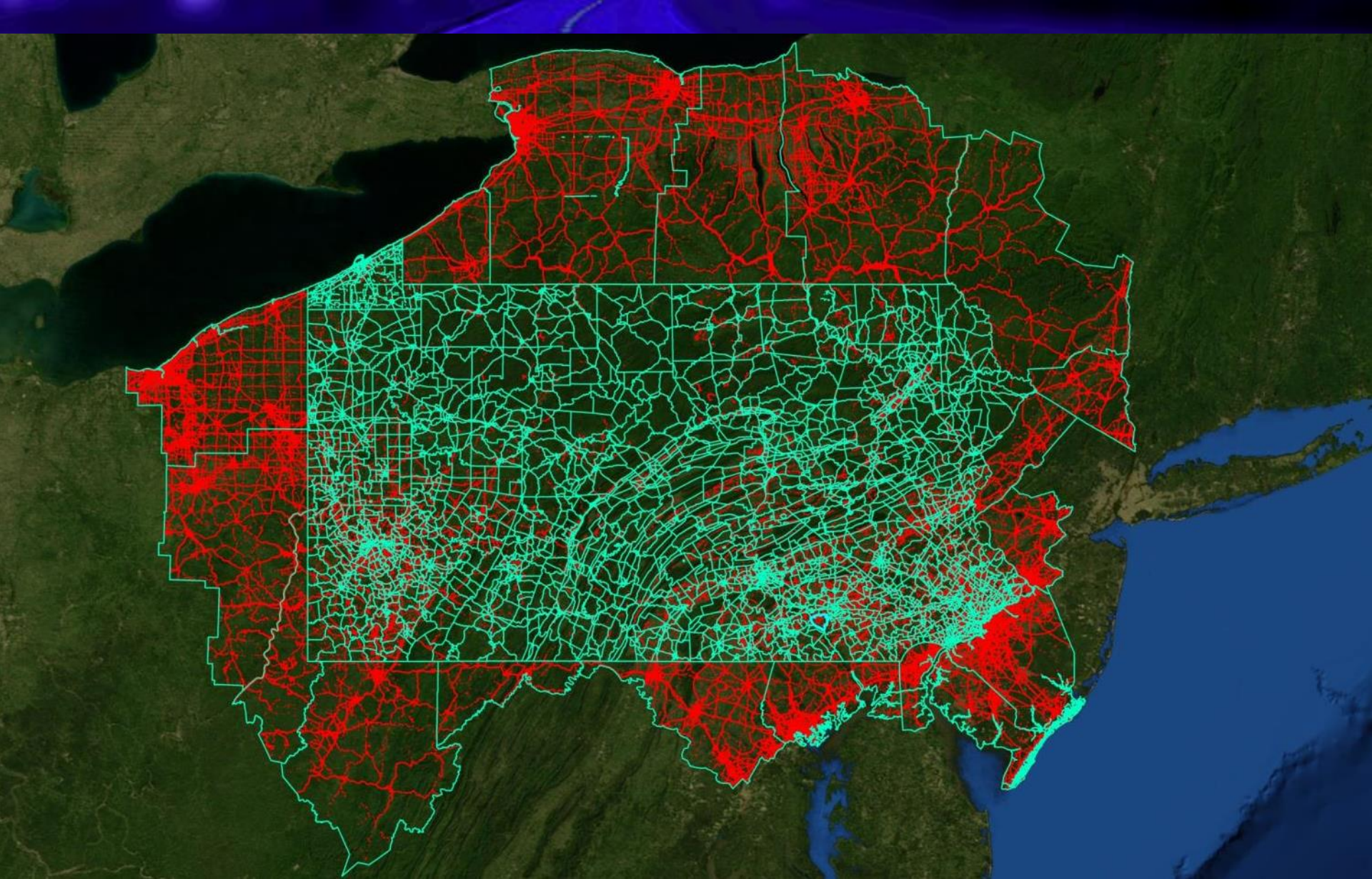
Evolution of Data Analysis Applications

- **Space-mean-speed performance measurement**
- **Focused spot-speed analysis**
- **Static unique IDs:**
 - ◆ **Origin/destination**
 - ◆ **Truck parking analysis**
- **Emerging – Truck GPS and ELD:**
 - ◆ **Detention time/HOS**
 - ◆ **Accurate Volumes**
 - ◆ **Commodity-based analysis**
 - ◆ **E-Commerce**

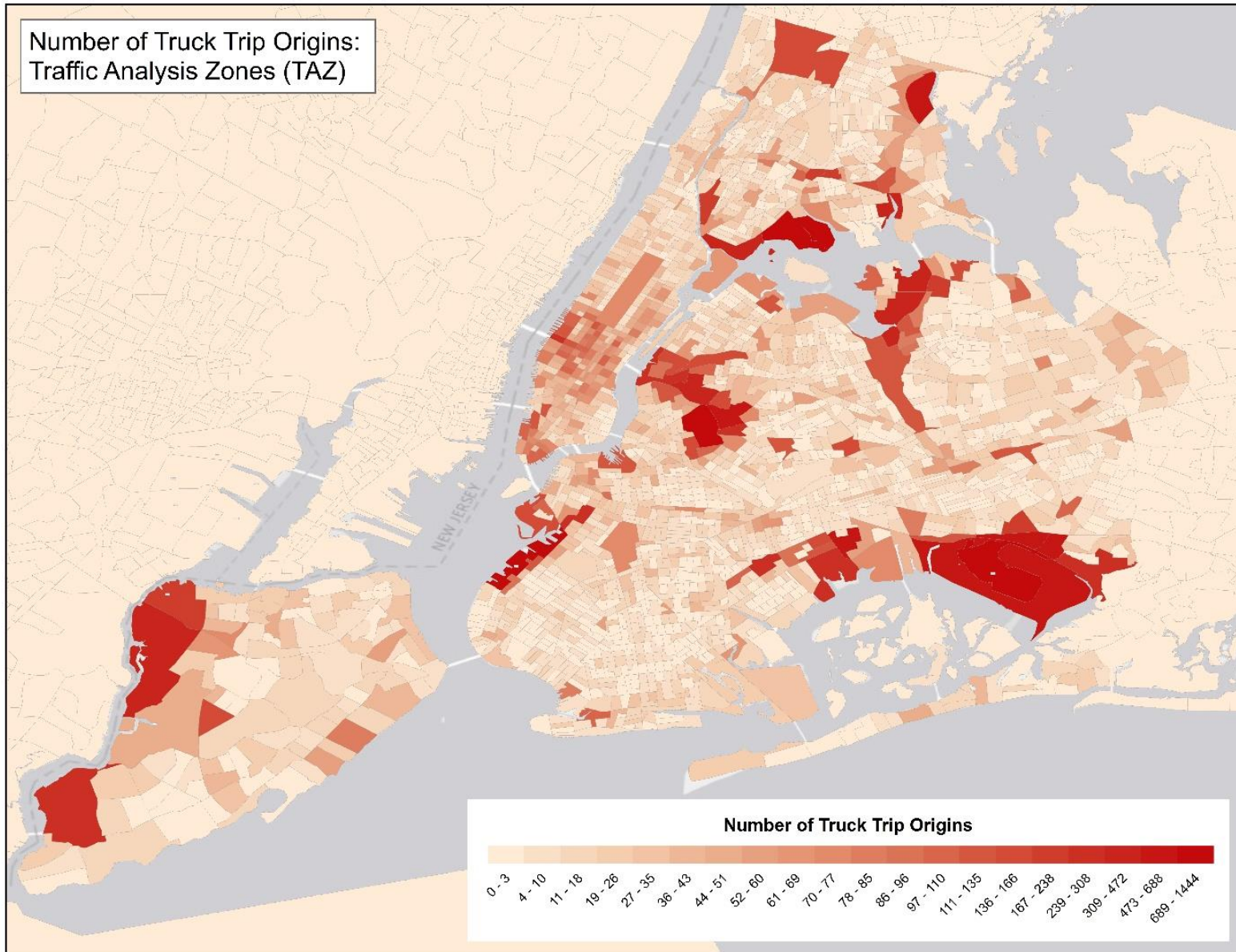




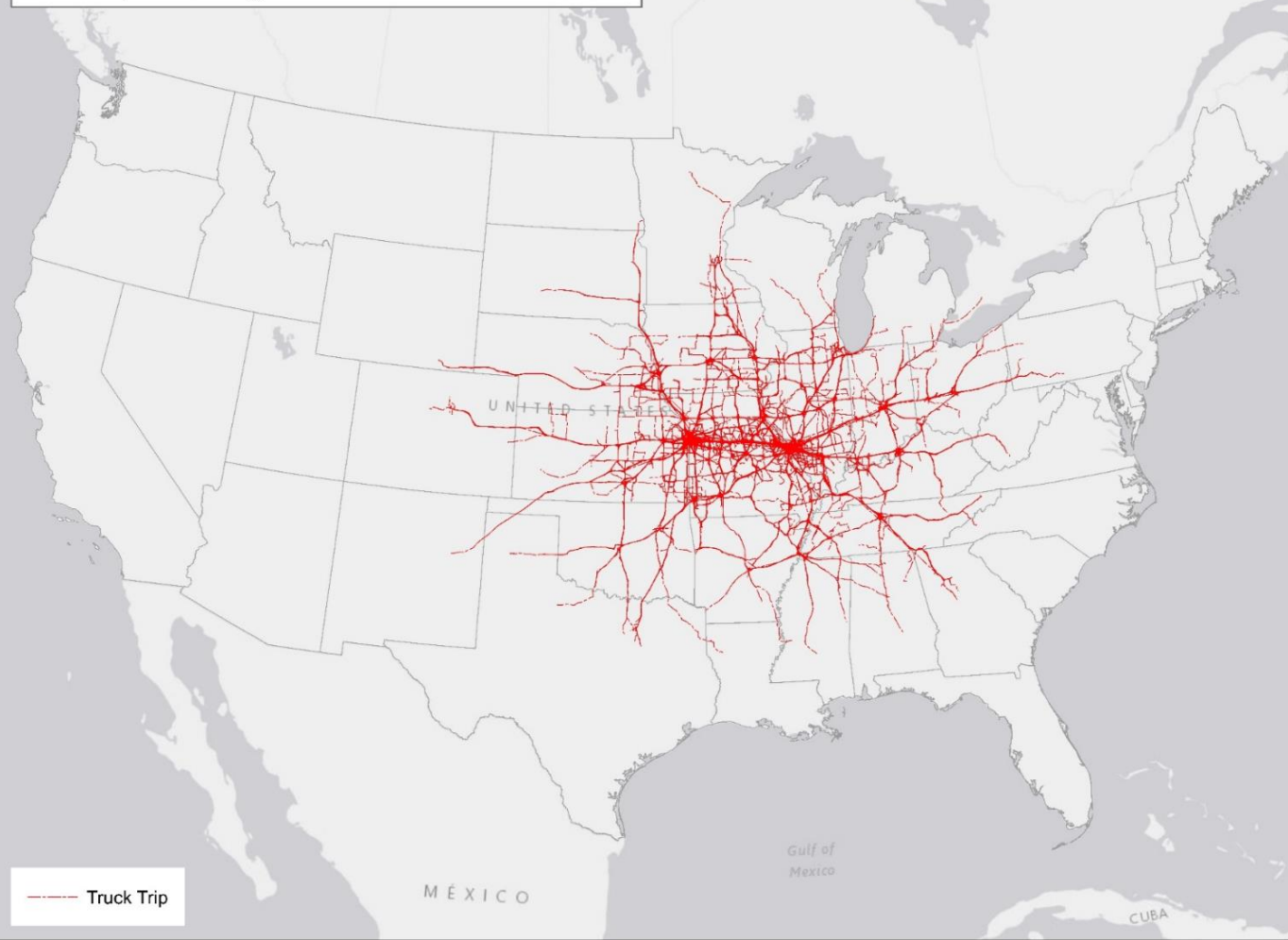




Number of Truck Trip Origins:
Traffic Analysis Zones (TAZ)

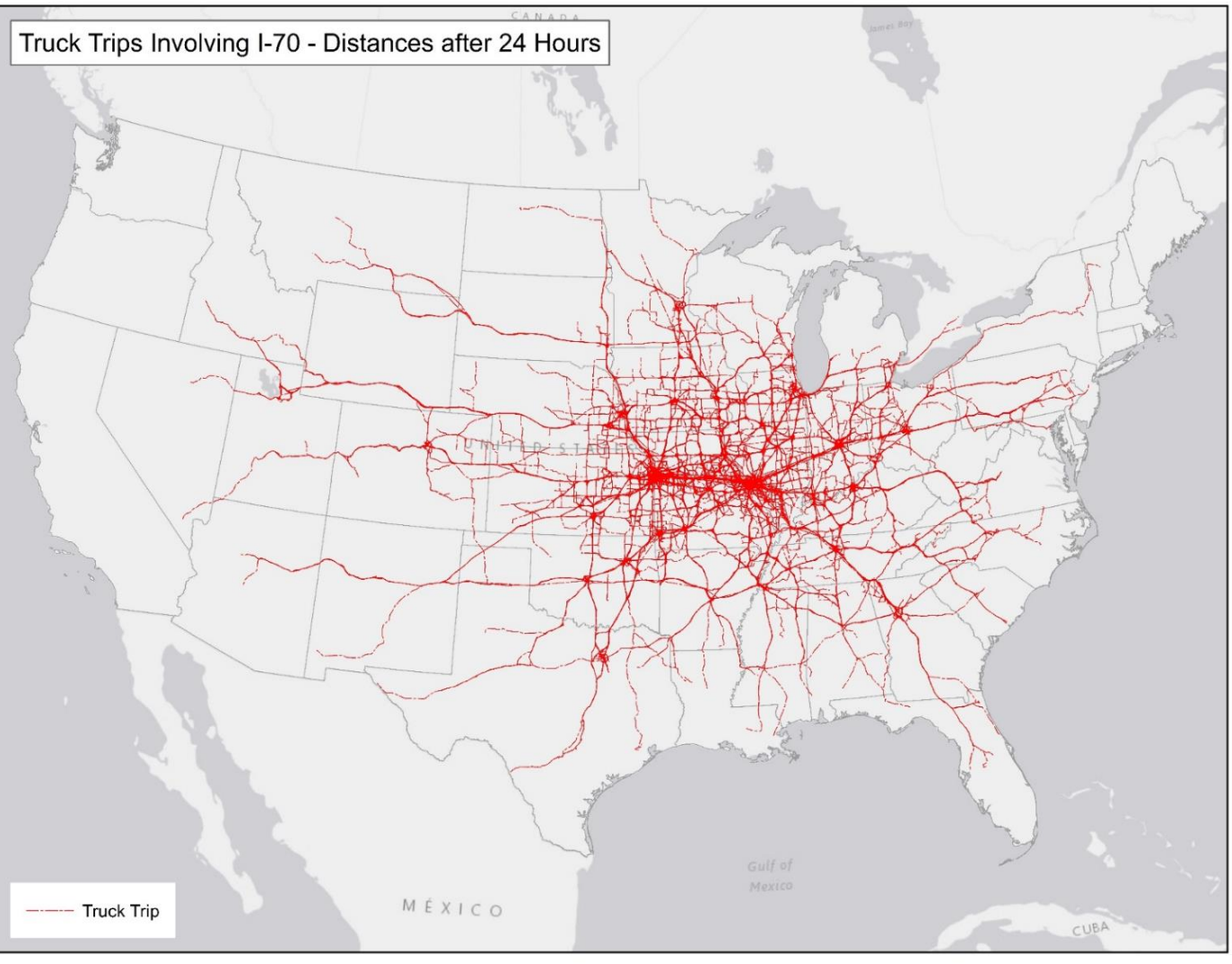


Truck Trips Involving I-70 - Distances after 12 Hours

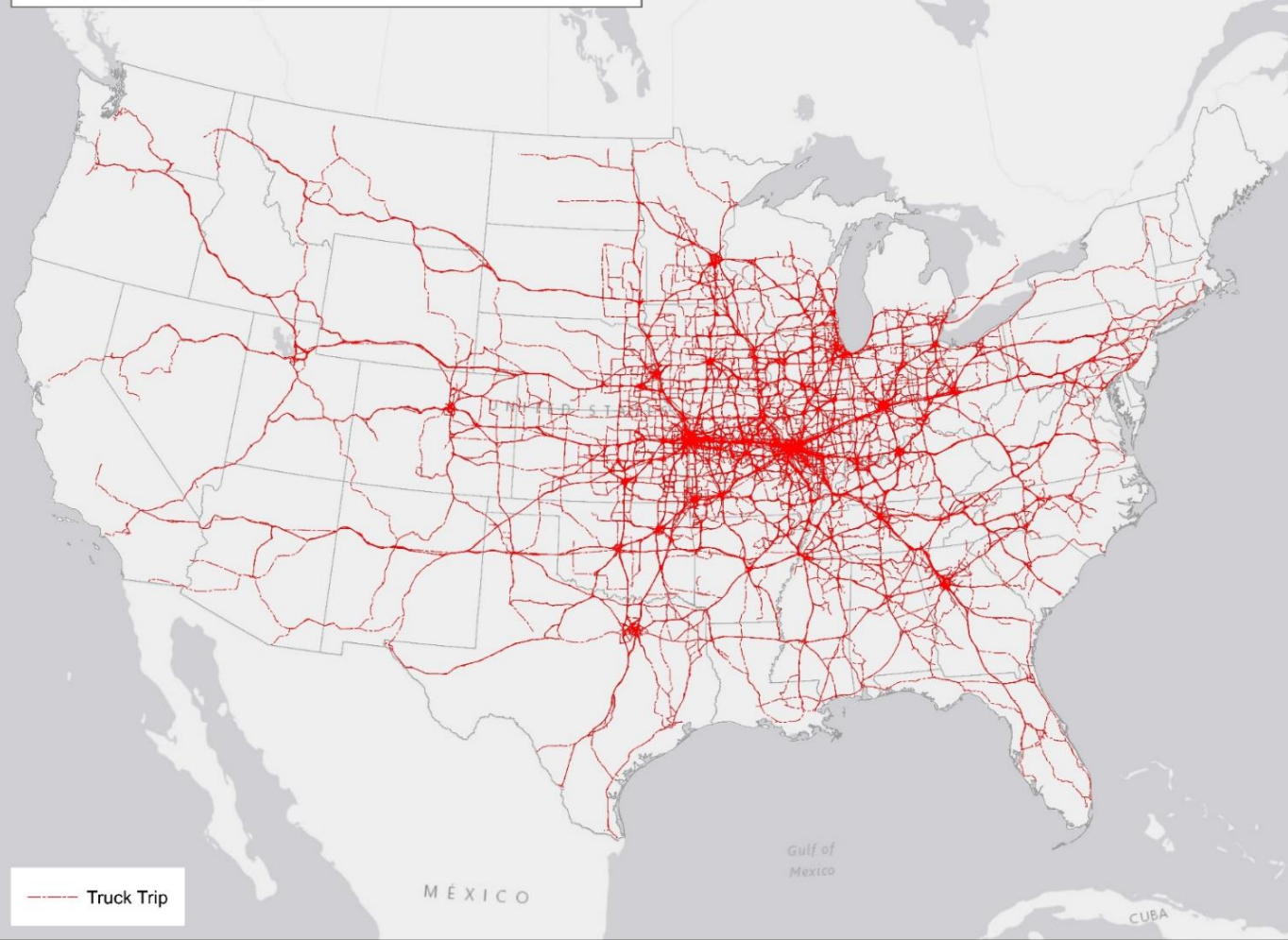


Truck Trip

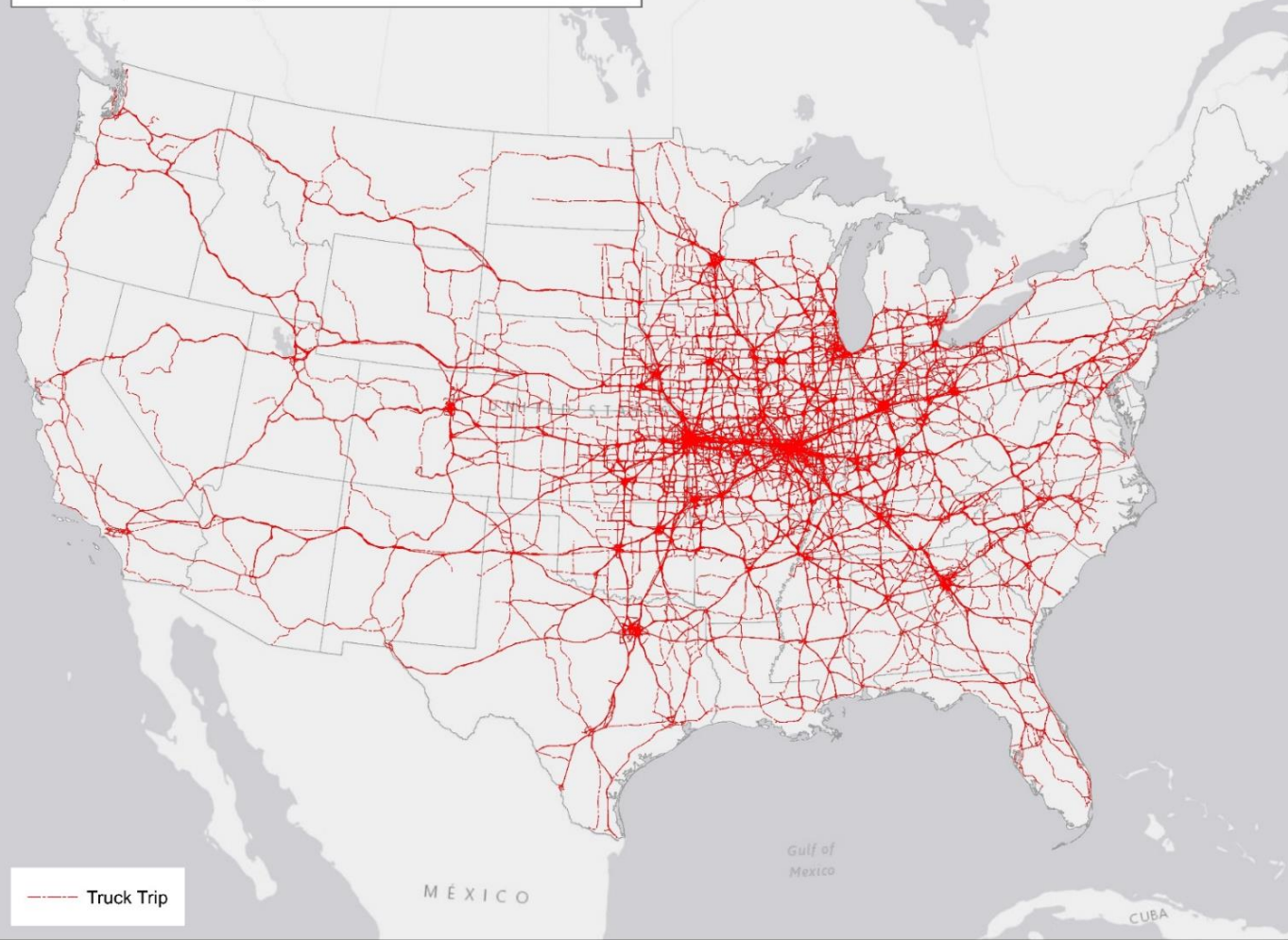
Truck Trips Involving I-70 - Distances after 24 Hours



Truck Trips Involving I-70 - Distances after 36 Hours



Truck Trips Involving I-70 - Distances after 48 Hours



Cost of Congestion

- Congestion on U.S. NHS cost trucking industry \$74.5B in 2016
- Lost productivity = 1.2 billion hours
 - ◆ Equates to 425,533 commercial drivers sitting idle for entire year

Cost of Congestion to the Trucking Industry: 2018 Update

October 2018



Prepared by the American Transportation Research Institute



Congestion Costs the Economy

ATRI research findings:



\$74.5 billion

Annual cost to the trucking industry as a result of congestion on the nation's highways



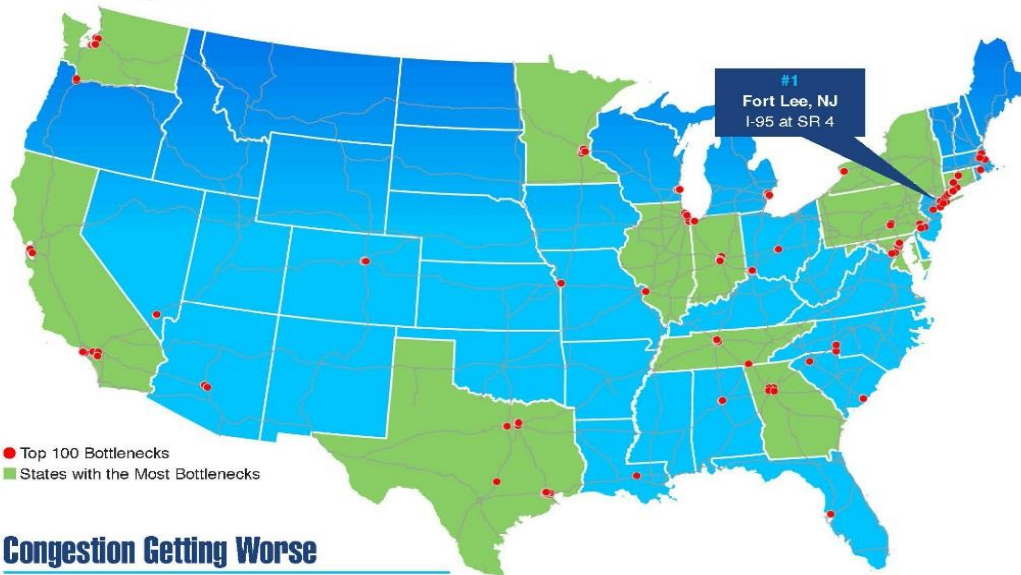
1.2 billion

Lost hours of trucking industry productivity due to congestion



425,533

Equivalent number of truck drivers sitting idle for an entire year



● Top 100 Bottlenecks
■ States with the Most Bottlenecks

Congestion Getting Worse

▼ Year-over-year average truck speeds at the top 10 locations dropped by **nearly 9%**

States with Most Bottlenecks

TX13	GA6	MN5	IL4
CA7	WA6	NY5	IN4
CT6	MD/DC...5	PA5	TN4



To view the top 100 list of truck bottlenecks along with detailed profiles for each location, please visit ATRI's website:
TruckingResearch.org



The Nation's Top Truck

BOTTLENECKS

2019



2019 Top 10 Truck Bottlenecks

Rank	Location	Average Peak Speed	Y-o-Y Change in Average Peak Speed
1	Fort Lee, NJ: I-95 at SR 4	23.0	-7.65%
2	Atlanta, GA: I-285 at I-85 (North)	22.9	-7.35%
3	Atlanta, GA: I-75 at I-285 (North)	27.4	-9.91%
4	Los Angeles, CA: SR 60 at SR 57	34.5	1.05%
5	Houston, TX: I-45 at I-69/US 59	24.2	-9.46%
6	Cincinnati, OH: I-71 at I-75	36.2	-7.42%
7	Chicago, IL: I-290 at I-90/I-94	17.6	-16.74%
8	Nashville, TN: I-24/I-40 at I-440 (East)	28.1	-11.75%
9	Atlanta, GA: I-20 at I-285 (West)	38.3	-5.06%
10	Los Angeles, CA: I-710 at I-105	26.8	-12.35%

Fort Lee, NJ: I-95 at SR 4

Average Speed by Time of Day
I-95 at SR 4



Summary

National Ranking by Congestion Index	1
Average Speed	31.7
Peak Average Speed	23
Nonpeak Average Speed	35.2
Nonpeak/Peak Ratio	1.53
Peak Average Speed Percent Change 2017 - 2018	-7.65%



Atlanta, GA: I-285 at I-85 (North)

Average Speed by Time of Day
I-285 at I-85 (North)



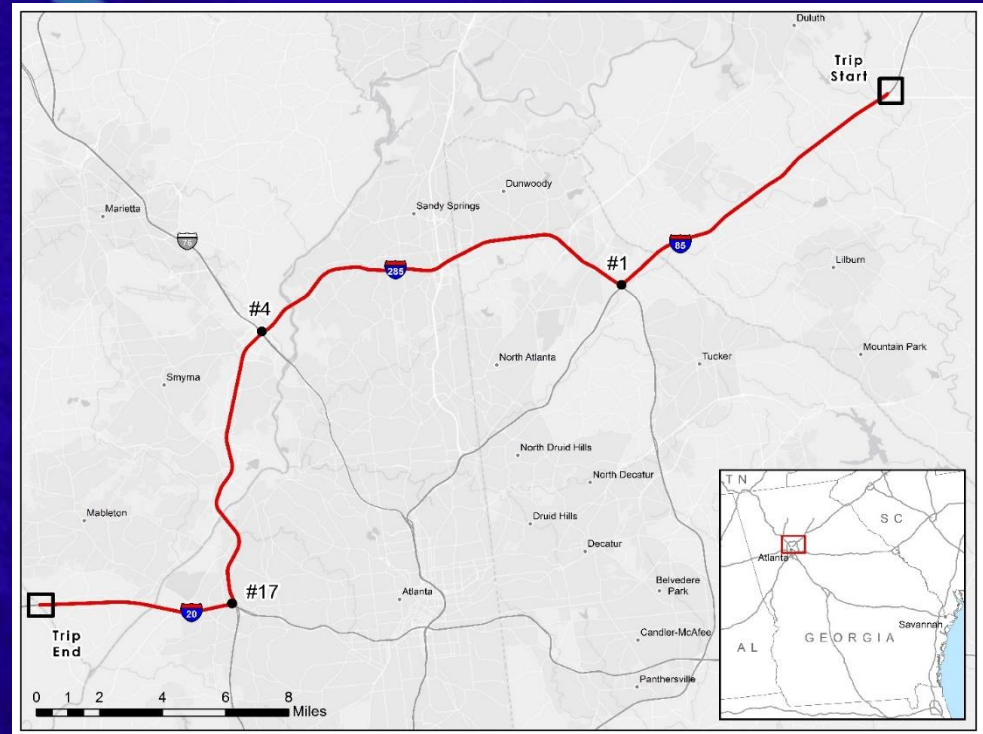
Summary

National Ranking by Congestion Index	2
Average Speed	34.8
Peak Average Speed	22.9
Nonpeak Average Speed	40.6
Nonpeak/Peak Ratio	1.77
Peak Average Speed Percent Change 2018 - 2019	-7.35%

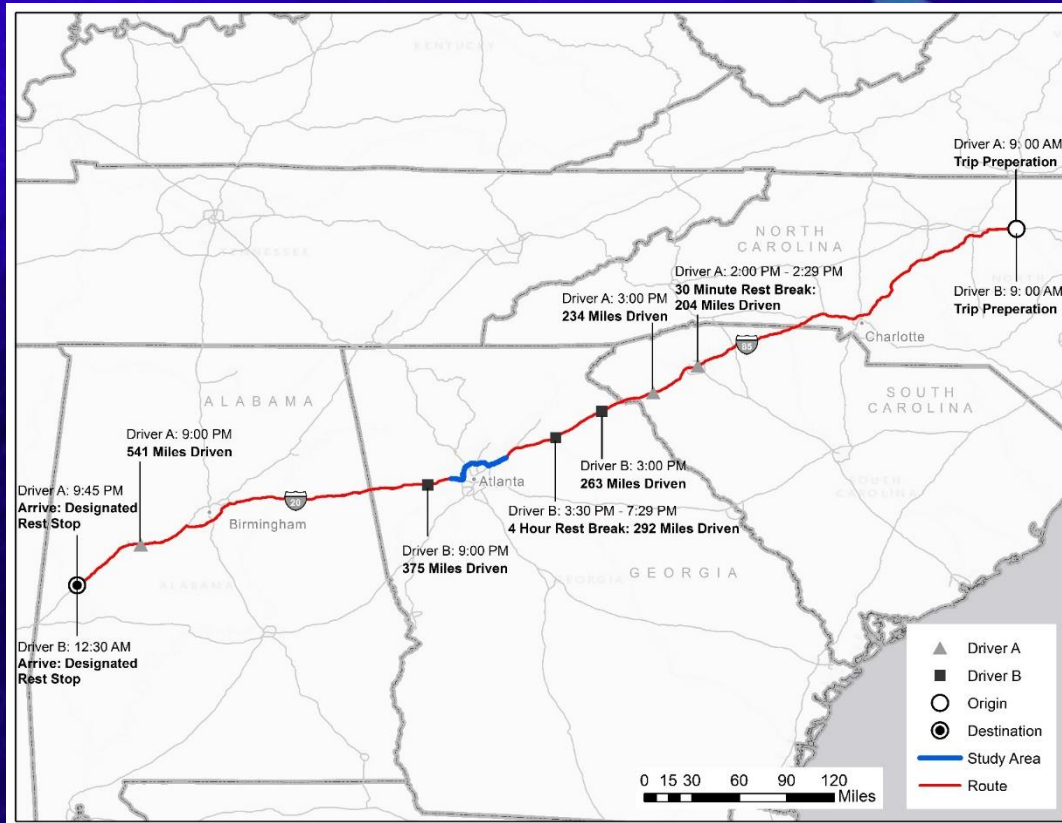


Hours-of-Service Flexibility

- **Would flexibility in HOS rules provide opportunity to improve congestion?**
- **Depending on time of day – 40 mile trip can range from 40 minutes to over 93 minutes**
- **Cost for one trip ranges from \$42.32 to \$99.11**



Two Trips Modeled Current HOS and 6/4 Split



Driver B – Flex HOS Rules – logged 45.5 minutes less drive time and 75.5 minutes less on-duty time

No Vacancy

Cumberland County, PA Rest Area: I-81 Northbound
January, 2017



Questions?

Jeffrey Short

jshort@trucking.org

770-432-0628

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