FREIGHT PERFORMANCE MEASURES

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Federal Highway Administration

PURPOSE

- Freight Performance Management

- National Freight Performance Measure for Travel Time Reliability

- Travel Time Data for Bottleneck Identification

- Monitoring Performance Moving Forward

PERFORMANCE AREAS RELATED TO FREIGHT

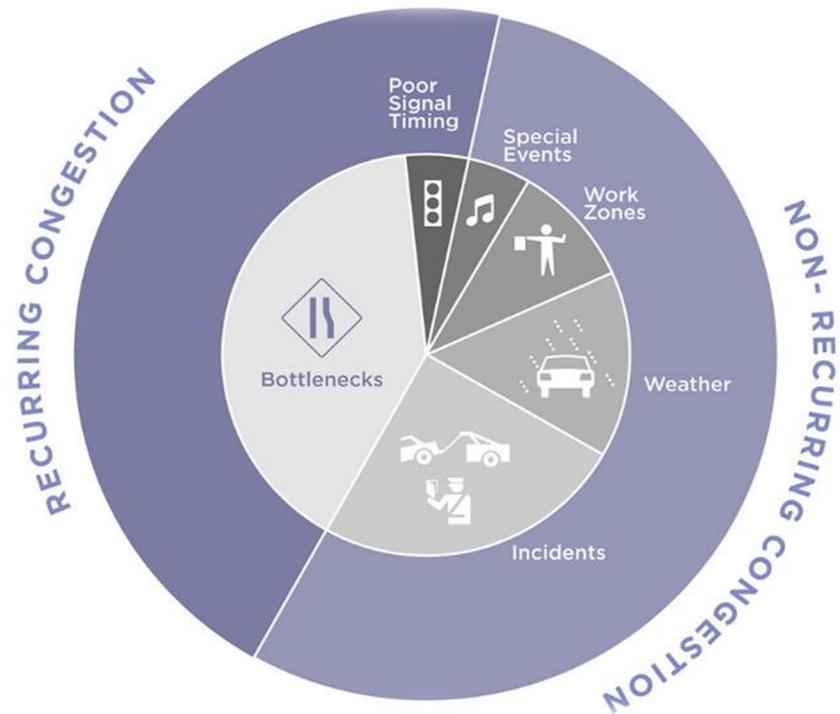|	
Safety	Motor carrier crash rate
	Number of heavy truck-related fatalities
	Truck parking area demand and capacity
Maintenance/ Preservation	National highway system (NHS) pavement conditions
	National highway bridge conditions
	Intermodal connector condition
Mobility Reliability	Reliability Index (95th percentile/average travel time)
	Travel Time Index (peak travel time/average travel time)
	Planning Time Index (95th percentile/free-flow travel time)
	Buffer Index (travel time - free-flow travel time)
	Average hours of delay on freight-significant links
	Percent of NHS mileage that is uncongested
Accessibility/ Connectivity	Percent of large generators with access to major highways
	Percent of shippers with access to national network
Environment	Emissions reduced from congestion mitigation projects
	Increase in energy consumed/costs
	Increase in air pollution impacts

- Non-recurring congestion may cause greater delay than recurring congestion.

- Often overlooked in planning.

- Public sentiment.
  - Traveling public.
  - Freight and trucking.

- Constraints on building new roadway capacity.

Source: FHWA

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National Performance Management Research Data Set (NPMRDS) derived from vehicle/passenger probe data:

- Average travel times for all passenger vehicles and trucks.
- Average travel times for 5-minute time periods for a roadway segment.

Uses:

- Performance measures.
- Identifying transportation improvements.
- Monitoring effectiveness of projects.

Source: NPMRDS

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- National Performance Measure to Assess Freight Movement on the Interstate
  - Truck Travel Time Reliability (TTTR) Index
    - $$TTTR_i = \frac{95th\ Percentile\ Travel\ Time_i}{50th\ Percentile\ Travel\ Time_i}$$
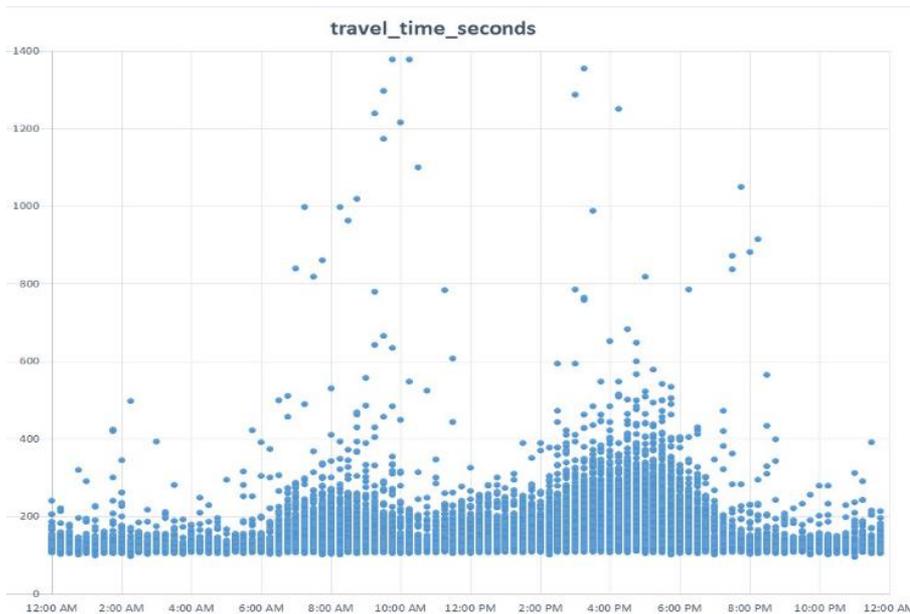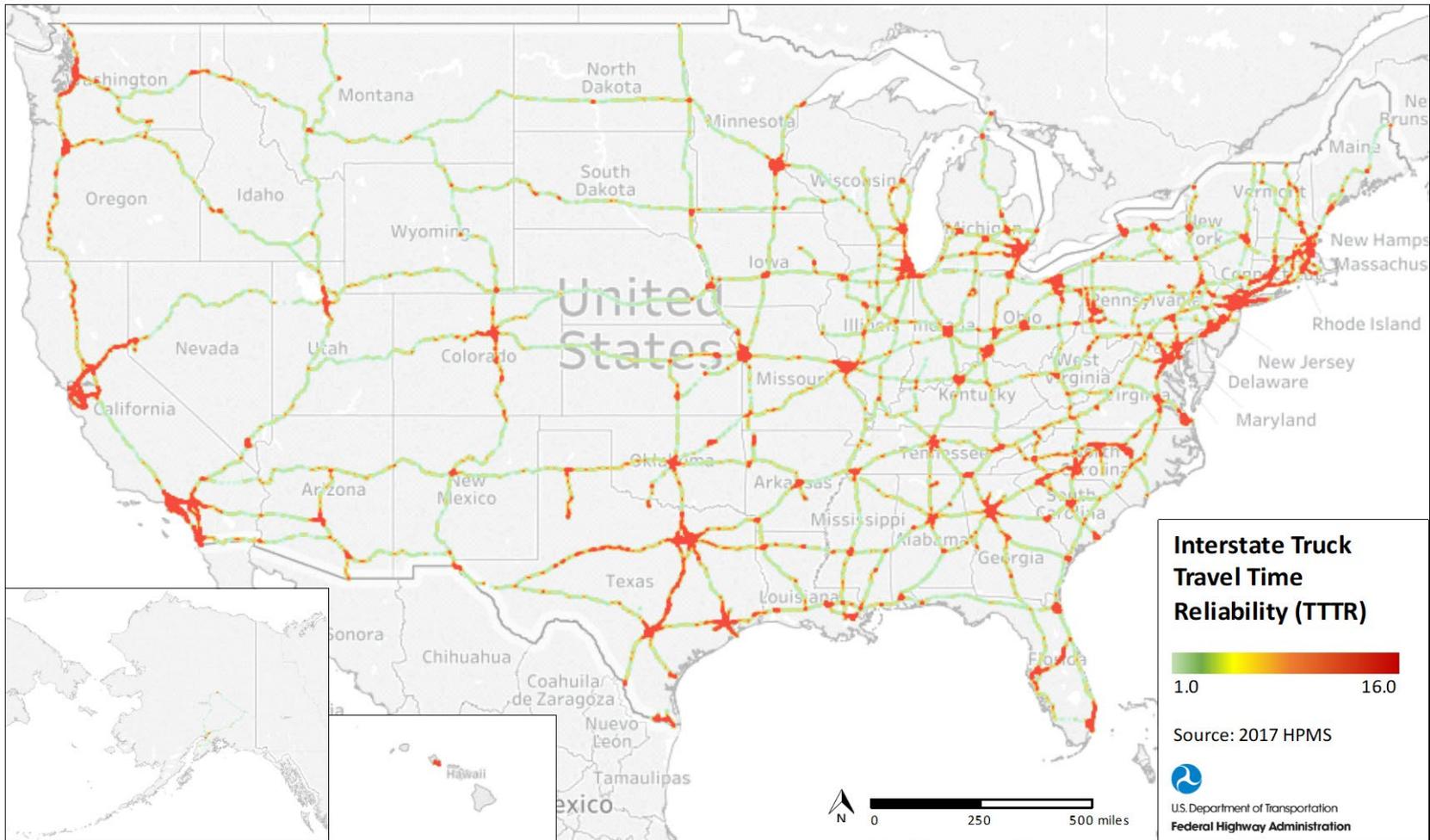

Source: FHWA
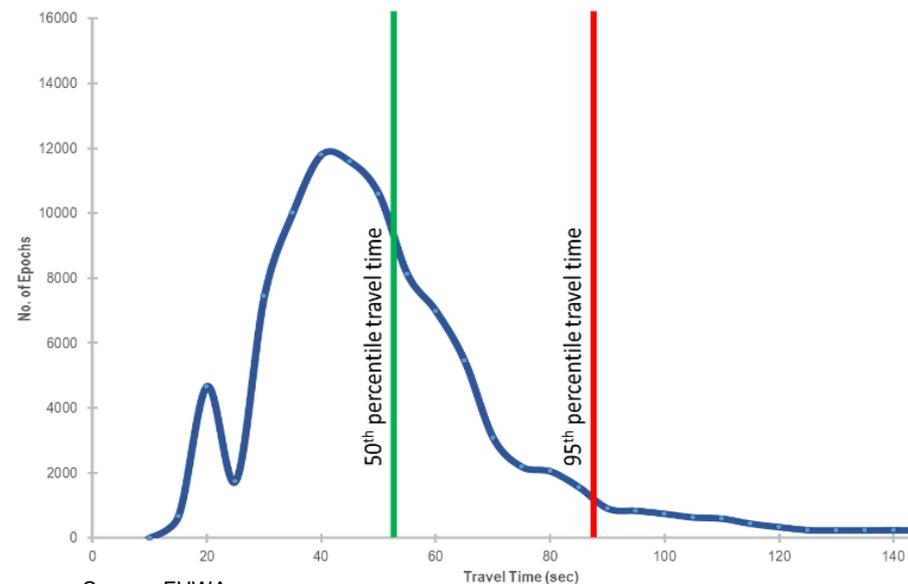
Source: FHWA

INTERSTATE TRUCK TRAVEL TIME RELIABILITY

U.S. Department of Transportation
Federal Highway Administration

Interstate Truck Travel Time Reliability (TTTR)

1.0 — 16.0

Source: 2017 HPMS

U.S. Department of Transportation
Federal Highway Administration

Source: FHWA

FREIGHT BOTTLENECKS

- **Travel Speed-Based Delays**
  - Reduced speeds and delays due to recurring influence or nonrecurring event.
    - Travel speed
    - Reliability

- **Truck-Based Delays**
  - Reduced speeds, delays, or rerouting that are specific to truck movements.
    - Restricted access for legal loads
    - Clearance restriction

Source: FHWA

BOTTLENECK MEASURES

Measure	Description
Total delay per segment	Vehicle-hours per segment.
Total delay per mile per segment	Delay per segment, normalized by segment length.
Hours of delay per truck	Vehicle-hours of delay normalized by number of trucks.
Frequency of congestion	How often time intervals of speed data are congested.
Hours when congestion is present	Sum of time intervals meeting a congestion threshold.
Travel Time Index	Ratio of the actual travel time to the uncongested travel time.
Truck Travel Time Reliability Index	The ratio of the 95th percentile travel time to the 50th percentile travel time (planning time index).
Commuter Stress Index	Same as Travel Time Index except for the peak direction rather than both directions.
Value of wasted time and fuel	Calculated as congestion delay multiplied by the value of time or by the value of excess fuel consumption.

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CONGESTION LOCATIONS

Source: NPMRDS

TRAVEL TIME DATA TO MEASURE DELAY

Freight Bottlenecks based on Delay/Mile in Maryland

Hover or click the table to see the segment. Click again to cle..

Urban Area	Road	Lengt..	AADT ..	Delay ..	Delay/..	PTI	..	BI	TTI	TTTR	Cong. ..	FAF ..
Baltimore, MD	I-95	3.0	17,994	43,224	14,670	8.45	180.7%	2.96	2.29	$5.1M	######
Baltimore, MD	I-695	1.5	21,876	18,964	12,425	3.83	169.4%	1.41	2.68	$2.1M	######
Washington, DC--VA--MD	I-495	5.2	18,847	61,842	11,895	3.28	119.8%	1.47	1.63	$6.9M	######
Washington, DC--VA--MD	I-495	4.1	18,341	39,742	9,723	3.28	128.3%	1.42	1.68	$4.6M	######
Washington, DC--VA--MD	I-495	3.5	14,115	33,190	9,471	4.14	180.4%	1.48	2.87	$3.7M	######

How Many to Rank?
500

Rank by Performance
Delay/Mile

What Time of Day?
All

Source: FHWA

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STRATEGIES MOVING FORWARD

- Transportation system management and operations.

- Targeted improvements to address bottlenecks.

- Transportation safety, security, and resiliency.

- Multijurisdictional and multimodal collaboration.

- Improved public and private sector coordination.

- Better freight data and transportation models.

- Multimodal supply-chain, end-to-end analytical framework.

- Multimodal solutions to address performance.

- Multimodal infrastructure at intermodal connections.

- Research and new technologies.

Integrated Corridor Management (ICM)
Agencies in ICM areas work cooperatively to share data and coordinate transportation operations.

In an ICM corridor, a highway camera monitors traffic conditions and detects congestion due to a disabled vehicle.

Source: USDOT Intelligent Transportation Systems - Joint Program Office

MORE INFORMATION

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https://ops.fhwa.dot.gov/freight/freight_analysis/perform_meas/index.htmURL