Using Freight Data to Inform the 2018 Texas 100 Most Congested Road Segments….
….and Beyond

Innovations in Freight Data Workshop

Irvine, California

Bill Eisele

Texas A&M Transportation Institute

https://mobility.tamu.edu/

Texas A&M Transportation Institute

Texas Department of Transportation

Freight Performance Measurement

The measures

- What measures are used and what do they show?

Texas 100 Most Congested Road Sections

- Where are the most congested sections of road?

Other uses for Texas 100

- Where is truck congestion across entire state?

Other uses for truck mobility data

- Where are trucks coming from and going to?
- How far can trucks travel in a given time period?

Texas A&M Transportation Institute

Texas Department of Transportation

Freight Mobility (Trucks)

Three key data elements

- Where are the trucks?
- How is their performance?
- What are they carrying?
- From where to where?

The key mobility performance measures

- Delay (volumes and performance)
- Congestion Cost (values of wasted time and fuel)
- Planning Time Index (volatility)

Commodity value

- Can estimate it, but still need much more information

Texas A&M Transportation Institute

Texas Department of Transportation

Data and Measures

- Two (2) freight big data sources:
  - Speed dataset & volume dataset – combined to find the biggest problems
- “Total magnitude” measures
  - Hours of delay (“all vehicle”)
  - Hours of truck delay (truck only)
  - Delay per mile (“all vehicle” and truck only) – 24x7x365!
- “Individual” traveler measures (peak periods)
  - Travel time index (Texas congestion index)
  - Planning time index (reliability)

Texas Truck 100

Rk	Section	Annual Delay per Mile (Hrs)	Annual Cong. Cost $M
1	I-35 (US290E to SH71)	92,571	$38.2
2	SL-20 (border to I-35)	77,555	$11.1
3	I-69 (SH288 to I-10)	51,812	$8.2
4	I-610 (I-10 to I-69)	50,575	$9.5
5	I-35W (SH183 to I-30)	45,818	$8.1
6	I-10 (I-45 to I-69)	43,393	$3.6
7	I-30 (Jeff Viaduct to SL12)	40,436	$16.8
8	I-35 (SH71 to Slaughter)	38,841	$8.0
	1,829 Texas 100 Sections - Truck		$1,224
	1,829 Texas 100 Sections – All Travel		$11,654

….allows for telling the freight story….

Texas A&M Transportation Institute

Texas Department of Transportation

Texas Truck 100

Rank	Section	Annual Delay per Mile (Hrs)	Wasted Fuel (k-gal)	Excess CO2(k-lb)	Planning Time Index-95
1	I-35 (US290E to SH71)	108,645	1,265.7	28,086.5	4.39
2	SL20 (border to I-35)	68,893	335.4	7,462.9	2.07
3	I-69 (SH288 to I-10)	51,604	278.2	6,137.0	3.43
4	I-610E (I-10 to I-69)	49,538	317.0	6,945.5	4.32
5	I-35W (SH183 to I-30)	48,855	296.7	6,594.7	2.79
6	I-10 (I-45 to I-69)	46,744	135.4	3,002.6	2.88
7	I-30 (Jeff Viaduct to SL12)	45,469	607.2	13,332.9	2.19
8	I-35 (SH71 to Slaughter)	44,400	239.0	5,273.8	2.20
9	I-45 (I-10 to I-610S)	39,713	607.4	13,458.3	2.49
10	I-69 (I-610W to SH288)	38,295	328.3	7,215.2	3.59
	All (totals)	23.5M	41.2M	894.9M	

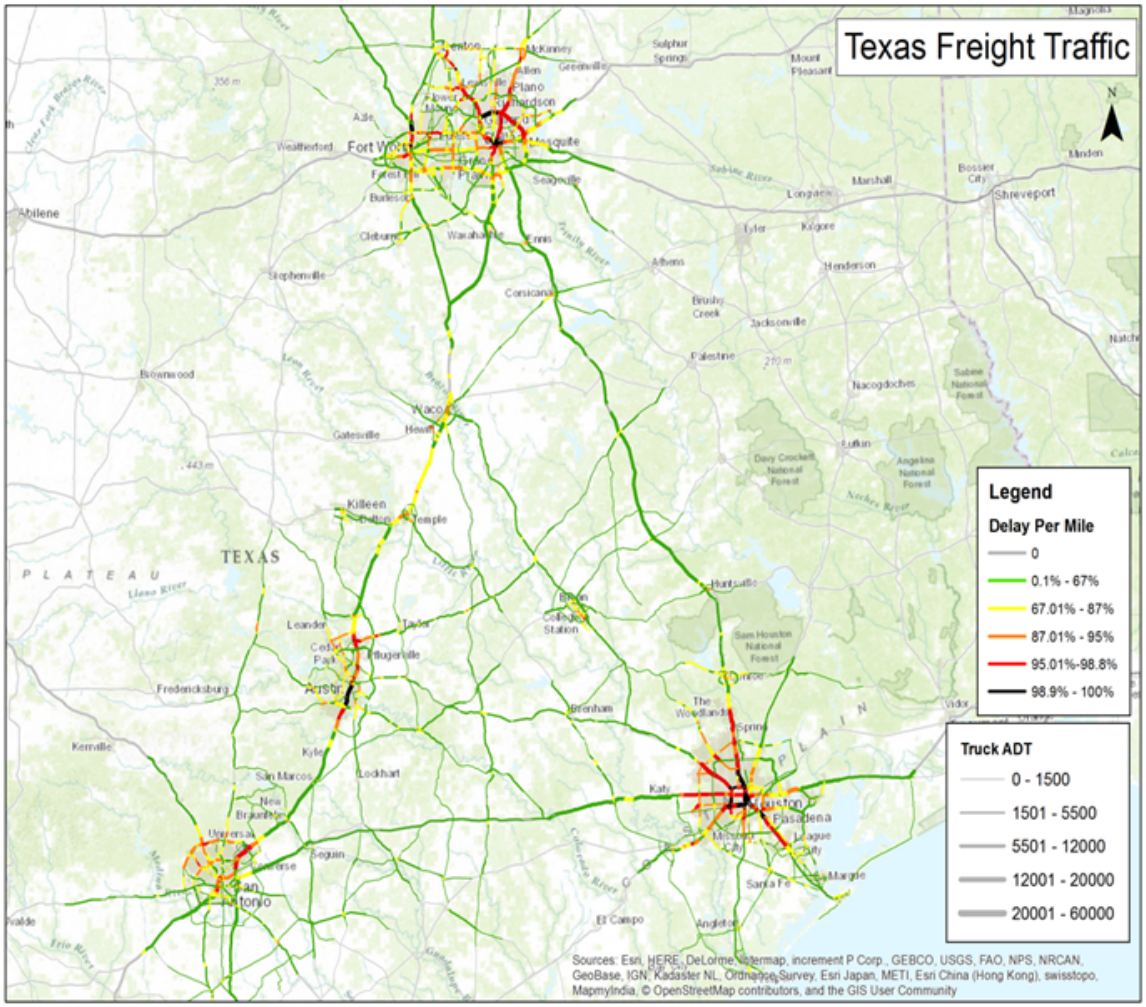
….what is the impact of the congestion? (above)

….how can I visualize specific aspects of it? (next)

Texas A&M Transportation Institute

Texas Department of Transportation

Truck Delay in Texas Triangle on Freight Network



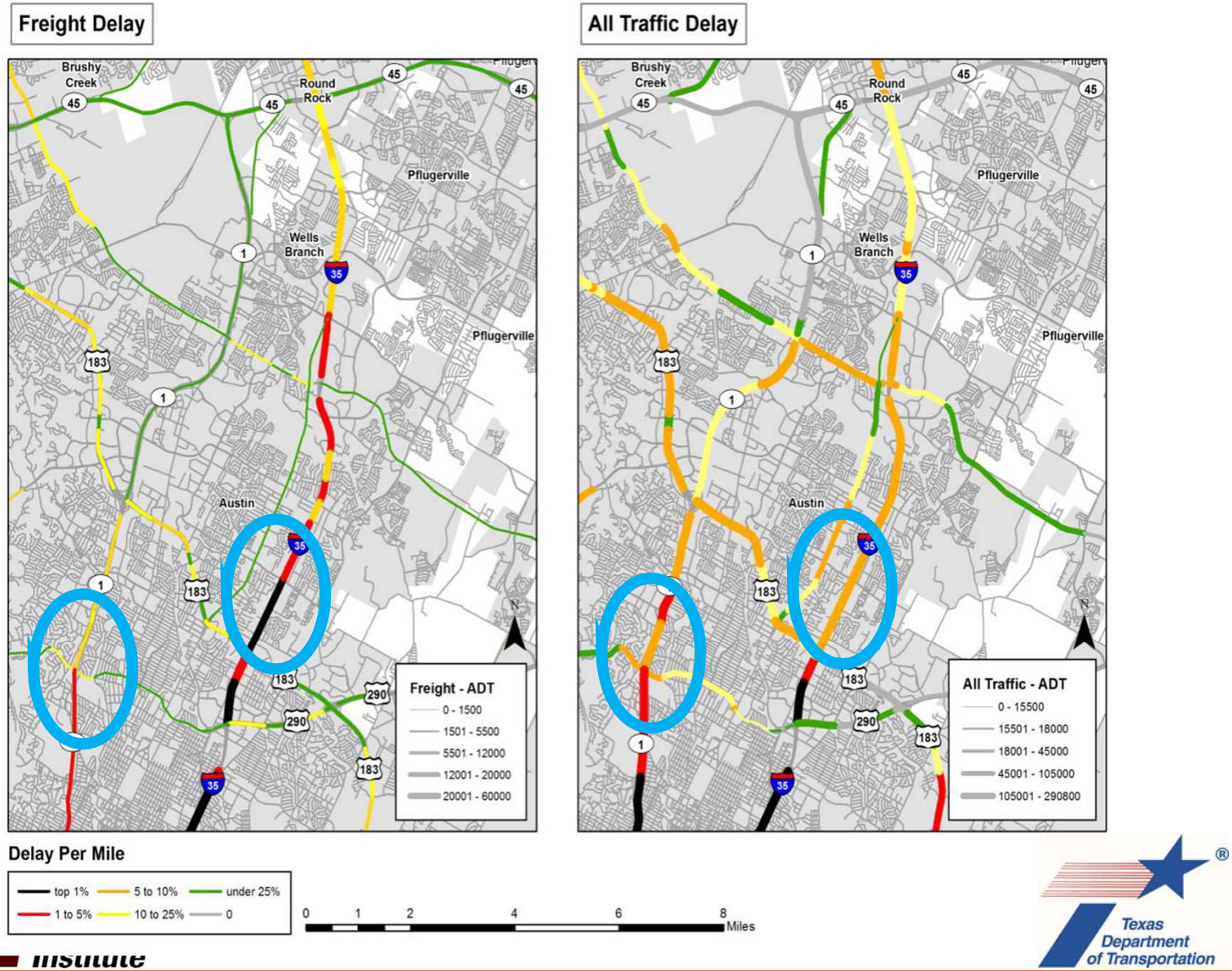
Statewide Truck Congestion Map

- Delay per mile (color) and
- Volumes (line width)

Texas A&M Transportation Institute

Texas Department of Transportation

Truck Delay in Austin

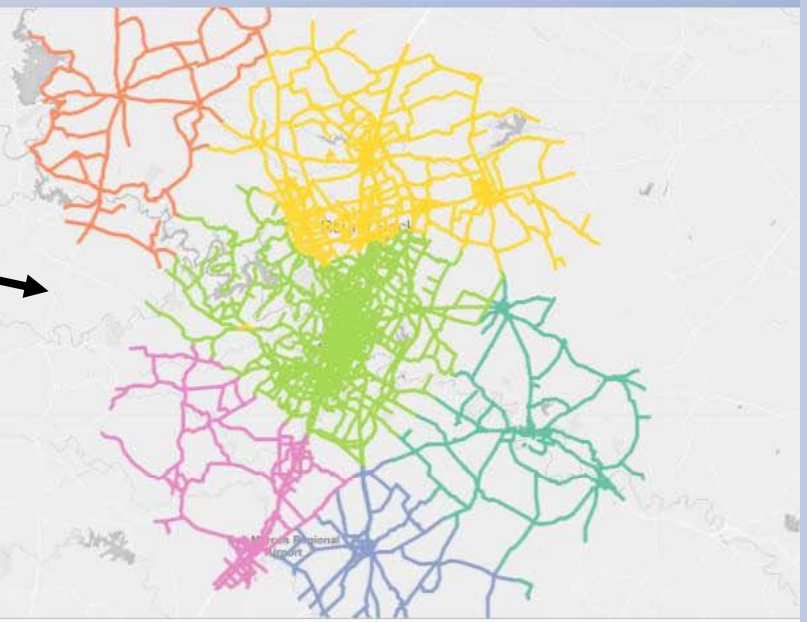


Texas Department of Transportation

Truck Mobility for MPOs

CONGESTION MANAGEMENT PROCESS ASSESSMENT TOOLS (COMPAT)

The Roads by County
In the Austin MPO



Stats by Road by County

Hover over a road

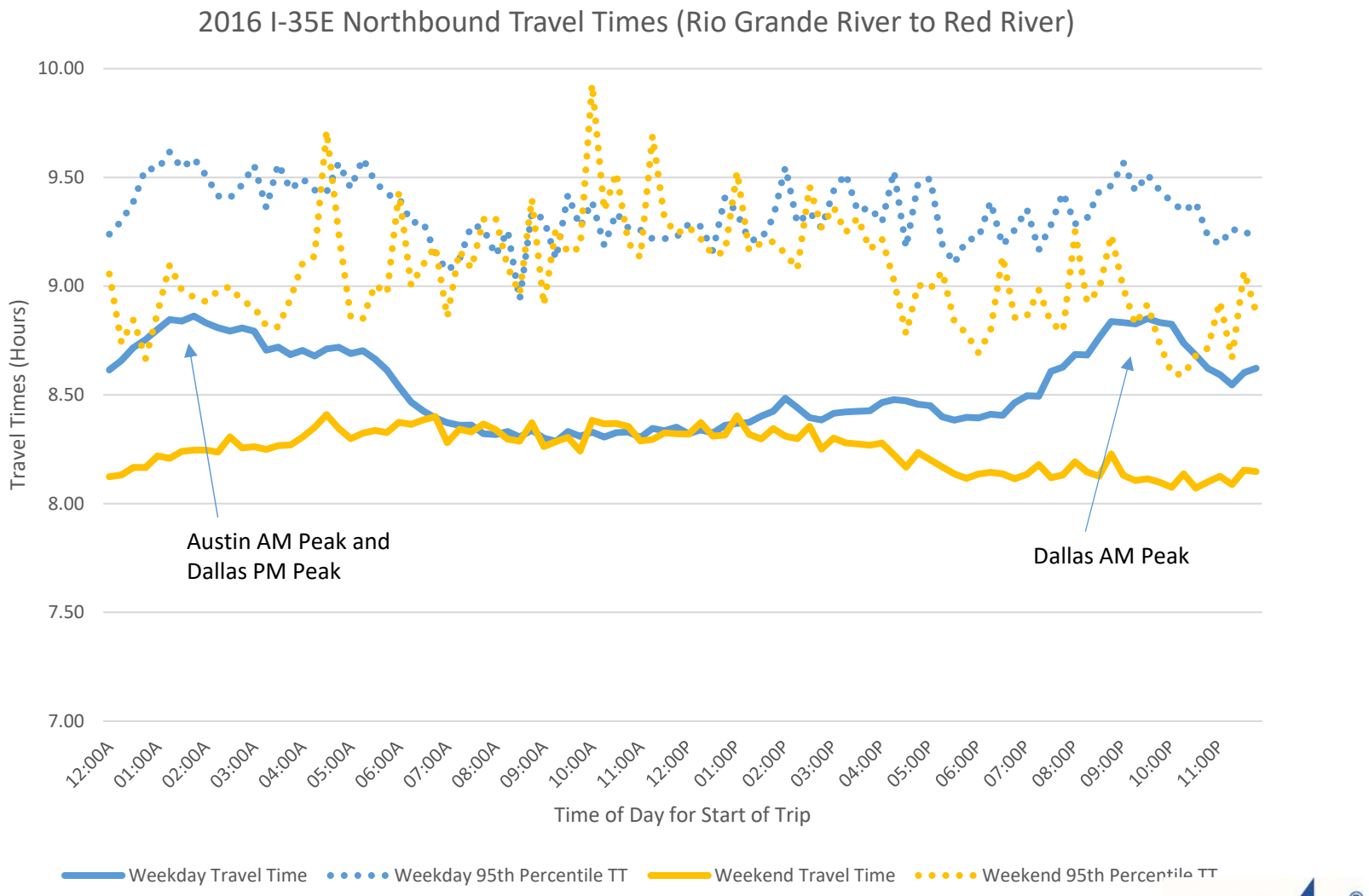
Regional summary | Monitored road sections | Select a road section

Select summary category: County Name ▾ Customize table

Summary Table

All vehicle Stat. ☐ Truck Stat. ☑

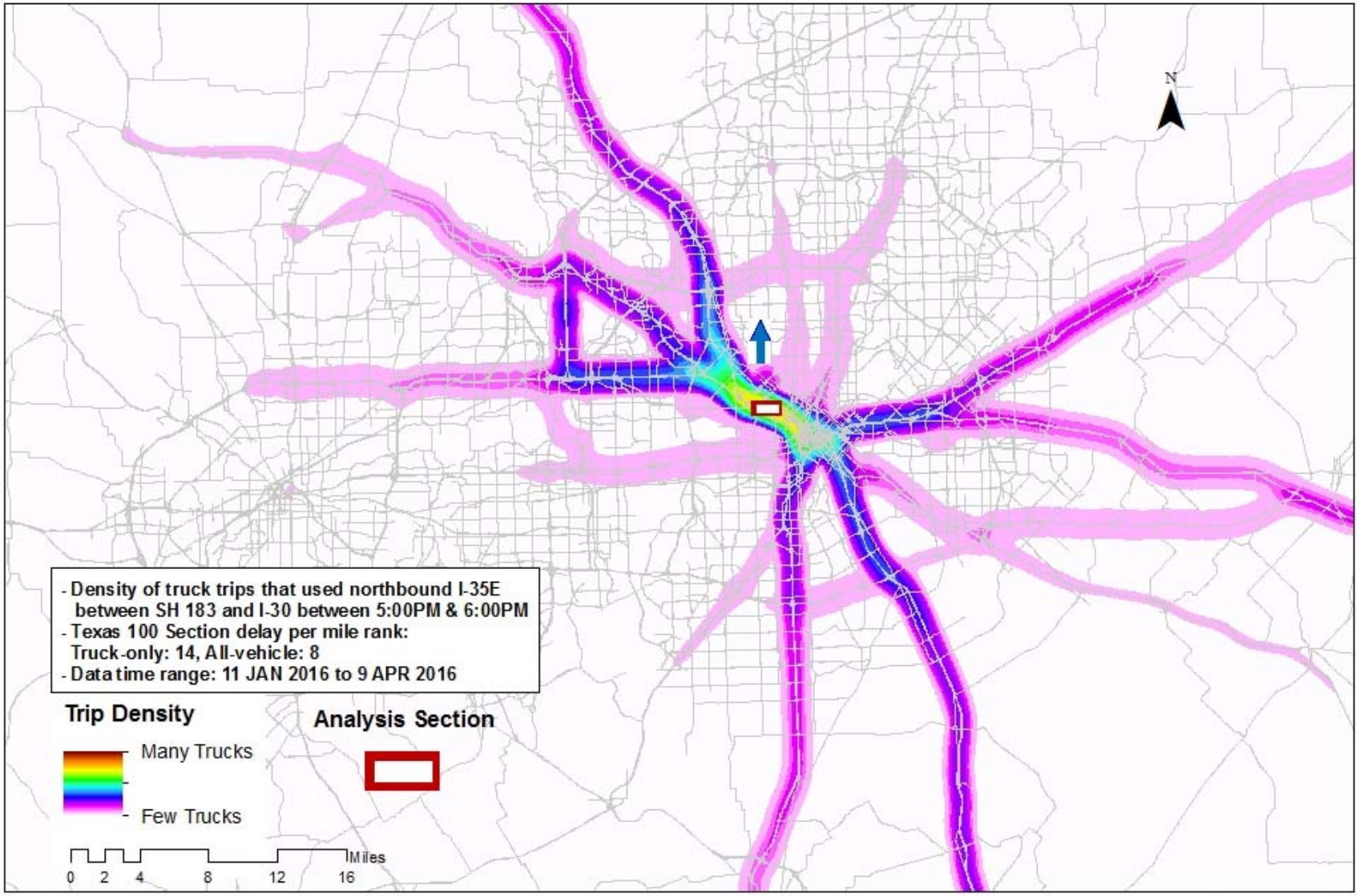
Category	Truck Vehicle Hours of Delay	Truck Planning Time Index 80	Truck Planning Time Index 95	Estimated Coverage - VMT	Estimated Coverage - Miles
Bastrop	121,620	1.11	1.14	8.46%	24.05%
Burnet	96,725	1.11	1.14	25.2%	39.13%
Caldwell	62,407	1.11	1.16	16.06%	34.73%
Hays	251,696	1.13	1.19	25.89%	41.53%
Travis	4,100,108	2.13	2.43	17.46%	35.86%
Williamson	798,762	1.21	1.28	27.62%	46.11%
All	5,431,318	1.56	1.72	20.46%	38.26%



Texas A&M Transportation Institute

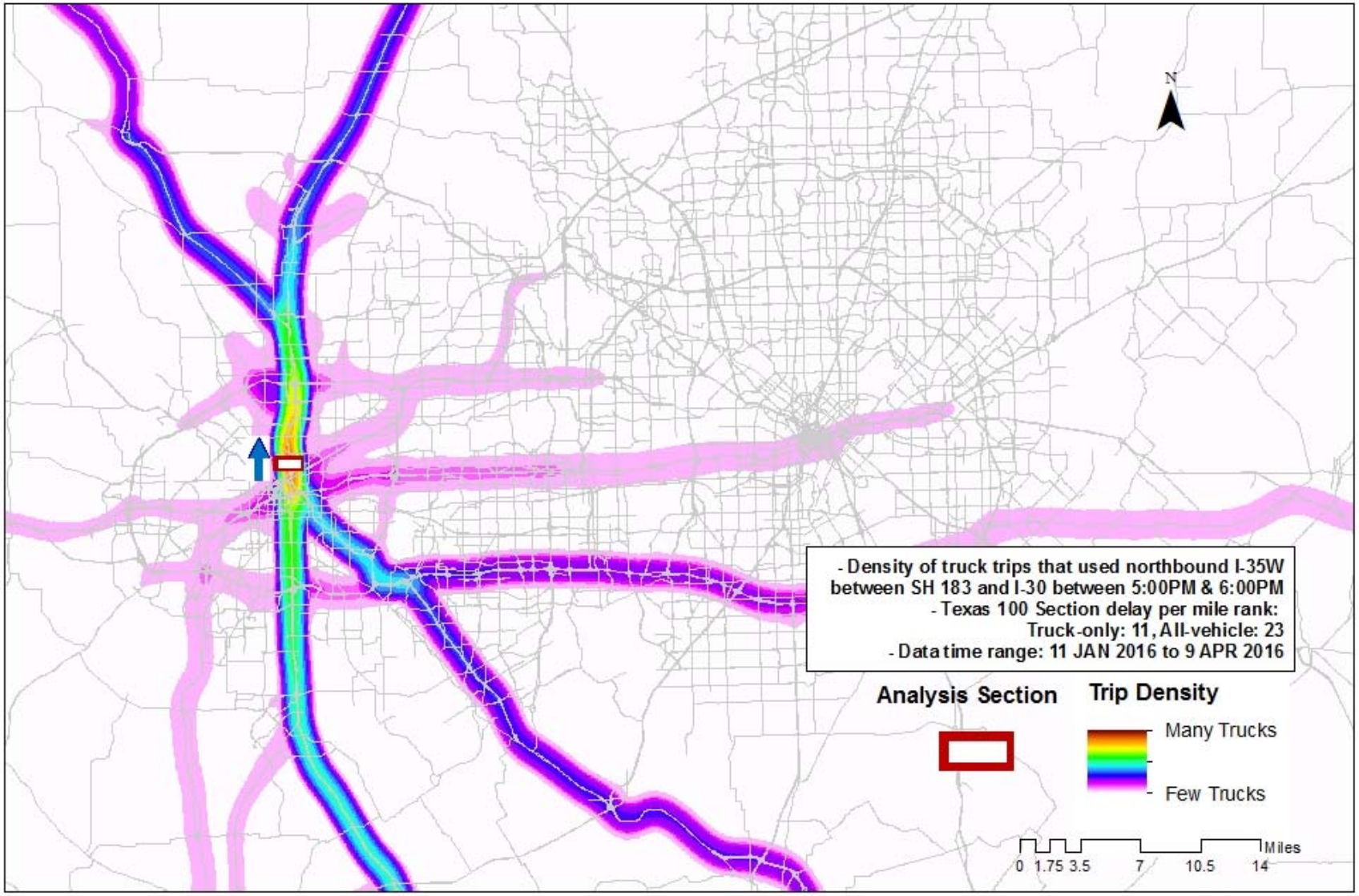
Texas Department of Transportation

Truck Trip Patterns (for All Trucks Using I-35E Northbound in Downtown Dallas)



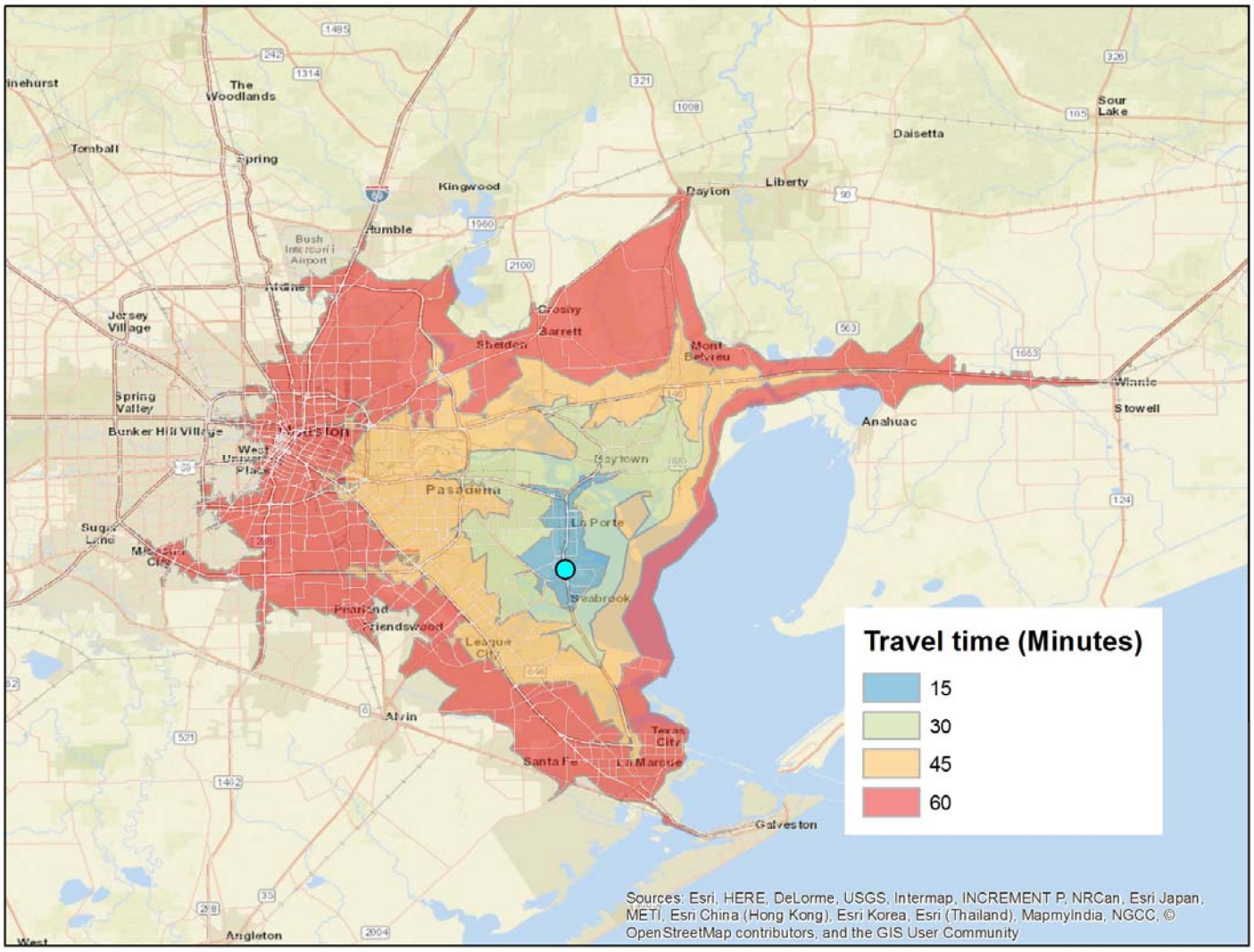
*35E selected area coordinate (-96.843 32.81 ; -96.837 32.802)

Truck Trip Patterns (for All Trucks Using I-35W Northbound in Downtown Fort Worth)



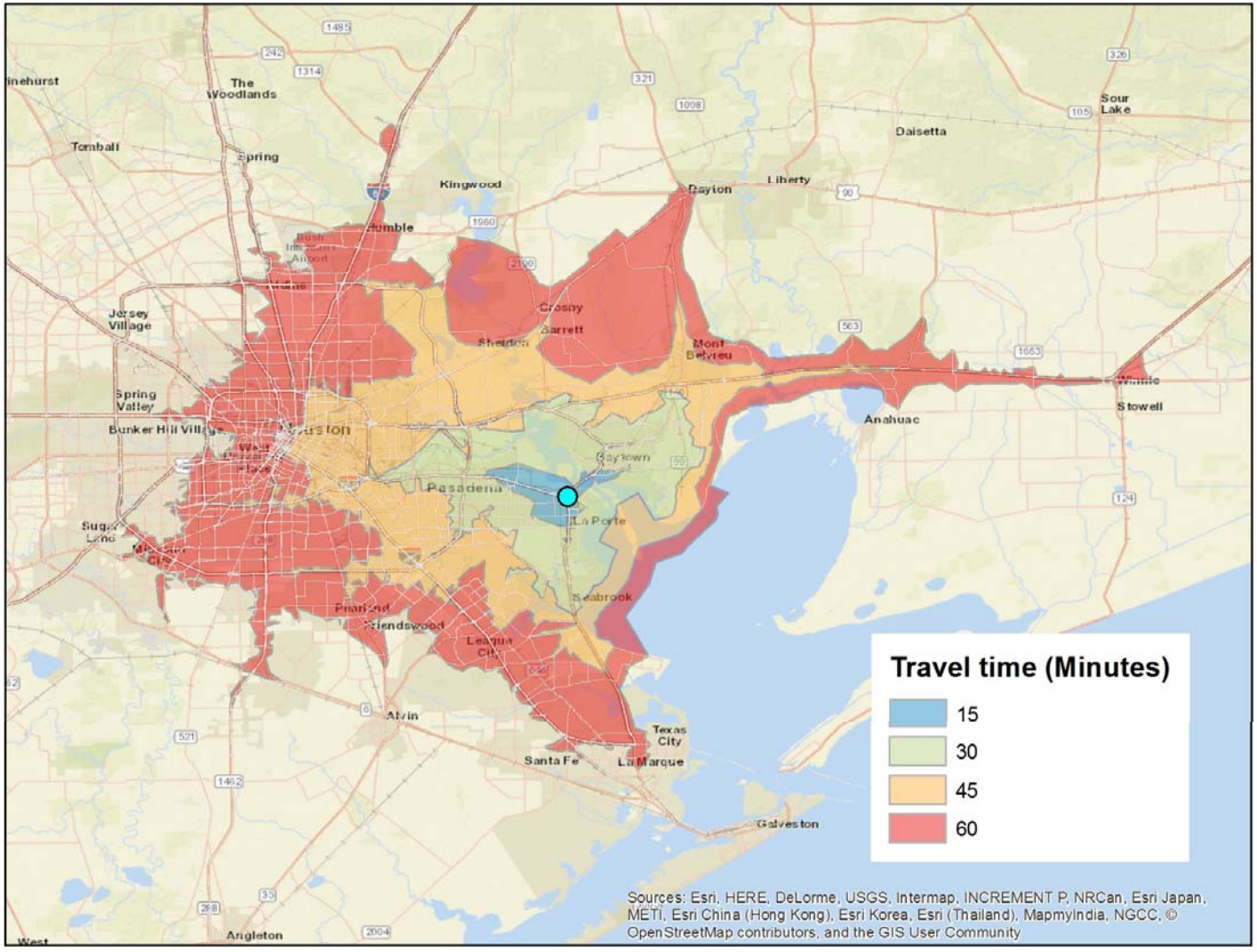
Port of Houston (Bayport)
P.M. Peak Hour Travel Shed

Wednesday Afternoon Peak Hour (5pm-6pm) Travel time Contour from Bayport Terminal



Port of Houston (Barbours Cut)
P.M. Peak Hour Travel Shed

Wednesday Afternoon Peak Hour (5pm-6pm) Travel time Contour from Barbours Cut Terminal



Commodity Value

- Need better information to make better decisions
- All efforts are “estimates”
- Our approximation methods
  - Put value on each truck based on Freight Analysis Framework
    - Where it is (state, region)
    - Functional class of road
    - Average load on each truck

What Have We Learned?

- Data, measures and methods are available to tell the freight story….and there is room for improvement
- Key word = “supply chains”
- Use supply chain performance information/measures to inform freight transportation policy and target strategic investments in the freight transportation system (across modes)
- Use travel time, travel-time reliability, and cost as the key measures of supply chain performance *(aspirational goal: incorporate productivity/throughput and economic return)*

Texas A&M Transportation Institute

Texas Department of Transportation

What Have We Learned?

- Seek public-private partnership opportunities to facilitate data (and information) exchange

- Provide standardized analytical methods and tools to cost-effectively measure end-to-end supply chain performance and identify critical bottlenecks for improvement
  - NCHRP Report 854 (“Guide for Truck Freight Bottlenecks”)

- Public agencies need to train/keep data scientists

Reflections with Bill

- We don't (can't?) monitor what travelers/shippers really want to do – we see what they have to do, given the transport system *we* supplied
- So, how do we get information on where people/goods truly want to go?
  - Search engines?
  - Bills of lading? Business transactions?
  - Blockchain? IoT?
  - Drones ("as the crow flies")?
  - Mine V2I or V2V? (AV/CV)
  - Other?
  - *….Probably "all," plus others currently unknown!*

….Something for us to figure out this week

Texas A&M Transportation Institute

Texas Department of Transportation

Bill Eisele

Texas A&M Transportation Institute

Tel: 979-317-2461 (This is new!!)

Email: b-eisele@tti.tamu.edu

(and find me on LinkedIn)

Texas A&M Transportation Institute

Texas Department of Transportation