BUILD – BETTER UTILIZING INVESTMENTS TO LEVERAGE DEVELOPMENT

NCTCOG Awarded $25 Million for the North Texas Multimodal Operations, Velocity, Efficiency, and Safety Program (NT MOVES). Projects Total Cost $55 Million. NT MOVES projects include:

Double Track Medical Market Center to Stemmons Freeway - Double tracking a distance of about 1.2 miles in addition to rehab/replacement of three bridges (Knights Branch, Inwood, and Obsession).

Double Track Handley Ederville Road to Precinct Line Road - Replace bridges at Walkers Creek and Mesquite Creek and construct 2.4 miles of a new second track from east of Handley Ederville Road to east of Precinct Line Road.

Implement Regional Rail Information System Technology - Design, develop concept of operations, and implement hardware and software backbone structure that will enable all rail agencies of the DFW regional rail system to exchange timely, accurate, and actionable information on train movements in North Texas.

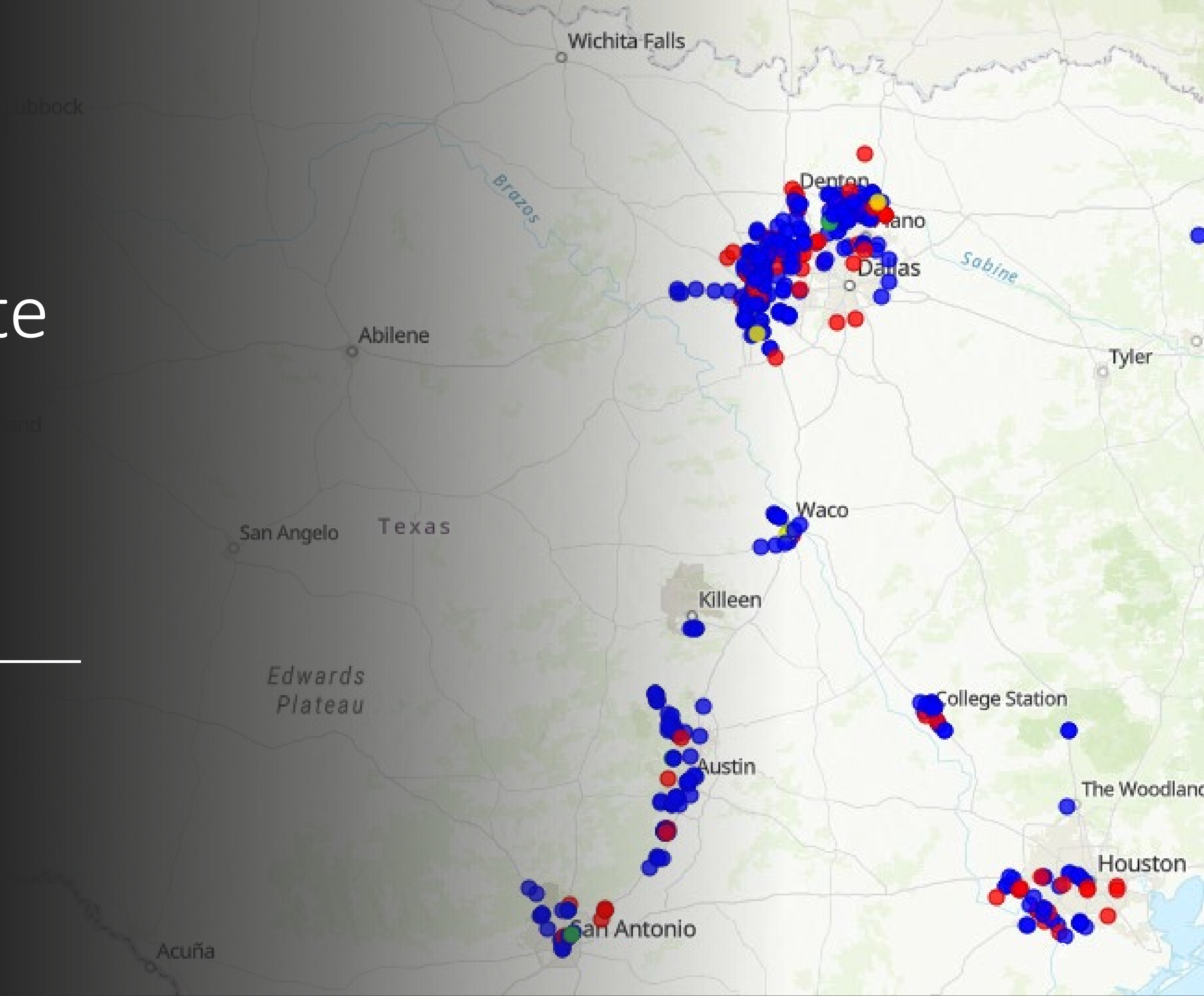
Beneficial Legislation for Truck Drivers at Roundabouts

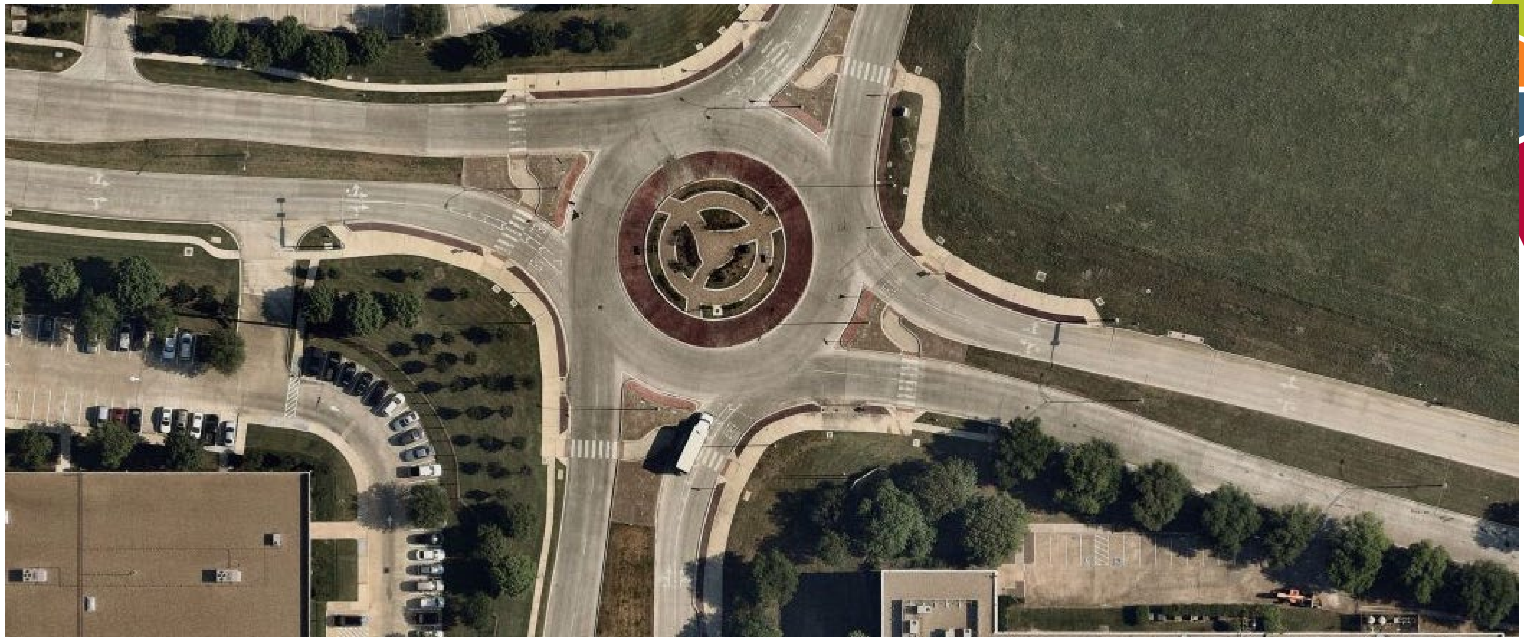
11/10/2020

NCTCOG – Regional Freight Advisory Committee

Presented by: Jay VonAhsen, P.E.

Accelerated rate of roundabout construction in Texas





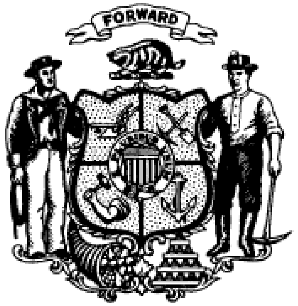
All Types of Contexts

How to Keep Truck Drivers Safe in RABs?

- Truck drivers face harsh penalties when a crash occurs – even when it was not their fault
- The counter-clockwise movement in a roundabout prohibits the ability of a truck driver to use the passenger-side mirror
- Many truck drivers do not understand Case Design – an idea engineers created with little input from the trucking community
- A majority of truck drivers prefer to overtake both lanes in a traditional MLR instead of using the inside lane (for U-turns, LTs, and Thrus).
- A majority of truck drivers avoid using the truck apron when making a left-turn at a MLR.

Wisconsin Roundabout Bill

State of Wisconsin



2015 Assembly Bill 451

Date of enactment: **February 4, 2016**
Date of publication*: **February 5, 2016**

2015 WISCONSIN ACT 139

AN ACT *to create* 346.13 (5) and 346.18 (8) of the statutes; **relating to:** right–of–way in roundabouts.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

SECTION 1. 346.13 (5) of the statutes is created to read:

346.13 **(5)** Notwithstanding sub. (1), the operator of a vehicle or combination of vehicles with a total length of not less than 40 feet or a total width of not less than 10 feet may, with due regard for all other traffic, deviate from the lane in which the operator is driving to the extent necessary to approach and drive through a roundabout.

SECTION 2. 346.18 (8) of the statutes is created to read:

346.18 **(8)** ROUNDABOUT. (a) The operator of a vehicle shall yield the right–of–way to any vehicle or combination of vehicles with a total length of not less than 40 feet or a total width of not less than 10 feet when approaching or driving through a roundabout at approximately the same time or so closely as to constitute a hazard of collision and, if necessary, shall reduce speed or stop in order to so yield.

(b) If 2 vehicles or combinations of vehicles each having a total length of not less than 40 feet or a total width of not less than 10 feet approach or drive through a roundabout at approximately the same time or so closely as to constitute a hazard of collision, the operator of the vehicle or combination of vehicles on the right shall yield the right–of–way to the vehicle or combination of vehicles on the left and, if necessary, shall reduce speed or stop in order to so yield.

* Section 991.11, WISCONSIN STATUTES: Effective date of acts. "Every act and every portion of an act enacted by the legislature over the governor's partial veto which does not expressly prescribe the time when it takes effect shall take effect on the day after its date of publication."

Indiana Roundabout Bill

HOUSE ENROLLED ACT No. 1039

AN ACT to amend the Indiana Code concerning motor vehicles.

Be it enacted by the General Assembly of the State of Indiana:

SECTION 1. IC 9-13-2-157.5 IS ADDED TO THE INDIANA CODE AS A **NEW** SECTION TO READ AS FOLLOWS [EFFECTIVE JULY 1, 2017]: **Sec. 157.5. "Roundabout" means a circular intersection or junction in which road traffic flows almost continuously in one (1) direction around a central island.**

SECTION 2. IC 9-21-8-10 IS AMENDED TO READ AS FOLLOWS [EFFECTIVE JULY 1, 2017]: Sec. 10. A vehicle passing around a ~~rotary traffic island~~ **roundabout** shall be driven only to the right of the ~~rotary traffic~~ **roundabout's central** island.

SECTION 3. IC 9-21-8-10.5 IS ADDED TO THE INDIANA CODE AS A **NEW** SECTION TO READ AS FOLLOWS [EFFECTIVE JULY 1, 2017]: **Sec. 10.5. (a) When approaching or driving through a roundabout, a person driving a vehicle shall yield the right-of-way to the driver of a vehicle with a total length of at least forty (40) feet or a total width of at least ten (10) feet that is driving through the roundabout at the same time or so closely as to present an immediate hazard, and shall slow down or stop if necessary to yield. However, this subsection does not require a person who is driving a vehicle through a roundabout to yield the right-of-way to the driver of a vehicle with a total length of at least forty (40) feet or a total width of at least ten (10) feet that is approaching the roundabout.**

HEA 1039

(b) If two (2) vehicles each having a total length of at least forty (40) feet or a total width of at least ten (10) feet approach or drive through a roundabout at the same time or so closely as to present an immediate hazard, the driver on the right shall yield the right-of-way to the driver on the left, and shall slow down or stop if necessary to yield.

Washington Roundabout Bill

(5) Pursuant to subsection (1) of this section, the operator of a commercial motor vehicle as defined in RCW 46.25.010 may, with due regard for all other traffic, deviate from the lane in which the operator is driving to the extent necessary to approach and drive through a circular intersection.

http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/Senate%20Passed%20Legislature/6084-S.PL.pdf?q=20200814064906

Layman's Terms

- If you are approaching a multilane roundabout at the same time as a large truck and the large truck will be entering the roundabout at approximately the same time as you, yield to the large truck and do not drive side-by-side with a large truck in the proximity of the roundabout. The large truck may overtake your lane.
- If two large trucks are approaching a multilane roundabout at the same time, the truck on the right shall yield allowing the truck on the left to enter, circulate and exit while possibly using both lanes. This avoids a side-by-side driving scenario for two large trucks.

Examples

https://www.youtube.com/watch?v=oPK7FFssKzY

Left turning truck, MLR, truck apron avoidance

https://www.youtube.com/watch?v=3kV94feKi0s

Large truck outer lane, MLR, thru movement, passenger car yield

The Request

- If you are so willing, contact your local and state officials requesting legislation to protect truck drivers at roundabouts. Refer to the 2015 Wisconsin Act 139.

  https://www.commoncause.org/find-your-representative/addr/
  (link to find your representatives)

- This should be the easiest piece of legislation the State will pass in the 87th Regular Session.

The Challenge

- Public education and understanding of this type of legislation
- Update to the Texas Driver Handbook (Texas DPS)
- Enforcement (training and citations)

Thank You!

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Texas A&M Transportation Institute

Roundabouts for High-Speed Intersections with Trucks

Marcus Brewer, Project Supervisor

TxDOT RTI Project 0-7036

November 10, 2020

Project Objectives

Investigate operational / safety benefits and best practices of modern roundabouts and selected innovative intersection designs for high-speed locations

Technical Objectives

1. For roundabouts:
   a. Collect data at existing intersections with high OSOW to provide basis for simulation of alternatives.
   b. Study performance of existing rural RBTs in Texas (and elsewhere).
   c. Develop design guidelines.
2. For innovative intersections:
   a. Identify existing locations in Texas.
   b. Obtain crash data to study patterns and trends.
   c. Collect field data for operational study.
   d. Develop suggestions for design guidelines, along with suggestions for signing and marking treatments.

What we have learned in Task 2

A. This car is yielding properly. If it enters now, it will cause an accident.

B. This car is entering properly. There is no one to yield to.

C. This car is yielding to nobody for no reason, because it thinks it has to yield if ANY car is in the circle ANYWHERE.

D. This car hates car C.

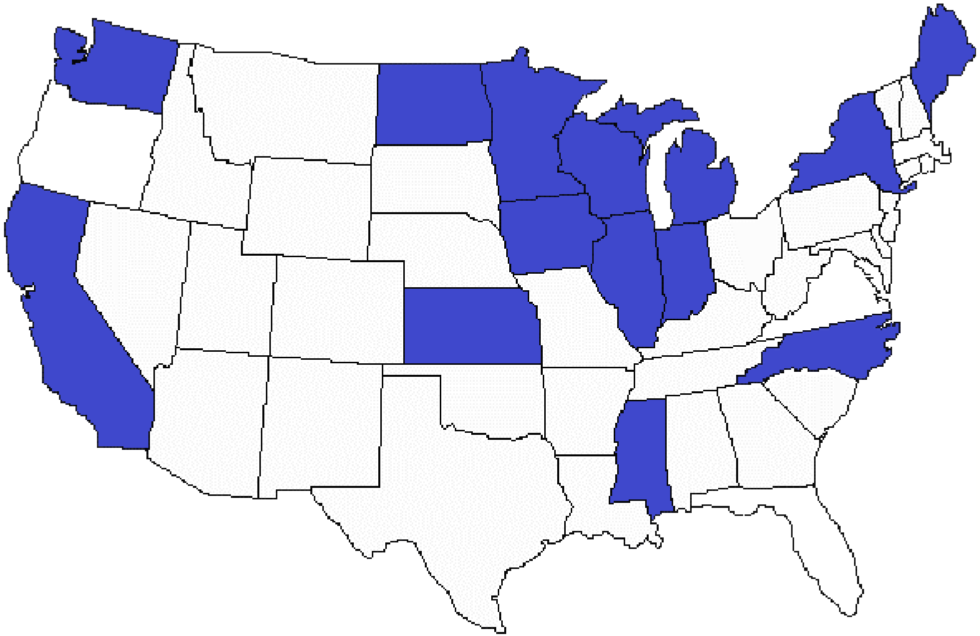
Roundabouts

- Commonly found in urban/ suburban locations, also used for high-speed/rural intersections

Image Credits: Marcus Brewer

Existing Roundabouts with High Speed

- TRB Committee listserv:
  - CA, IL, IN, KS, MN, ME, MI, MS, NY, WA, WI
- Additional sources:
  - IA, KS, NC, ND



Existing Roundabouts with High Speed

- Many also have high truck volumes and/or accommodate OSOW

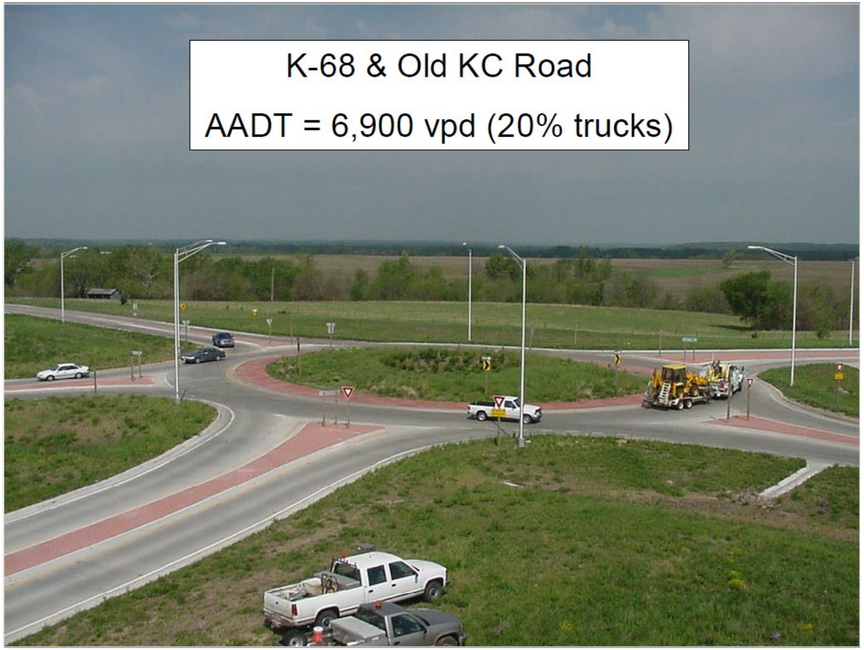


Image Credit: Jim Tobaben, WSP/PB

Image Credit: Iowa DOT & Hillary Isebrands

Existing Roundabout Design Guidance

- NCHRP 672 = current national reference
  - Discussion of high-speed
  - Discussion of OSOW
- Selected states as primary (KS, WA, WI)
- Other states from those (GA, LA, ME, MN)

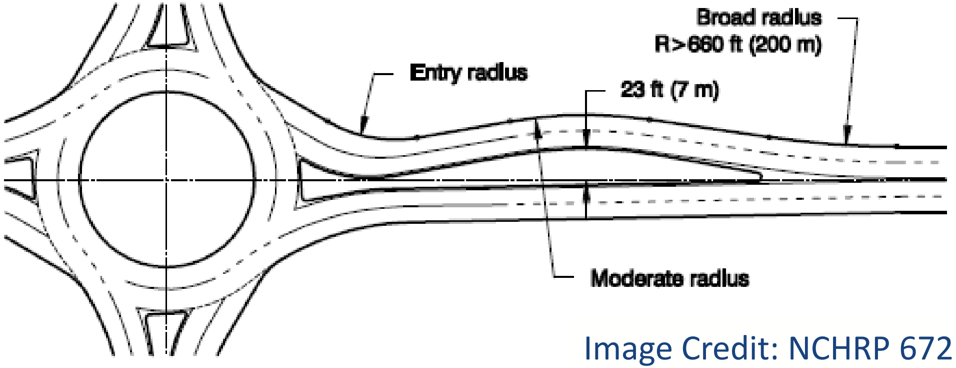
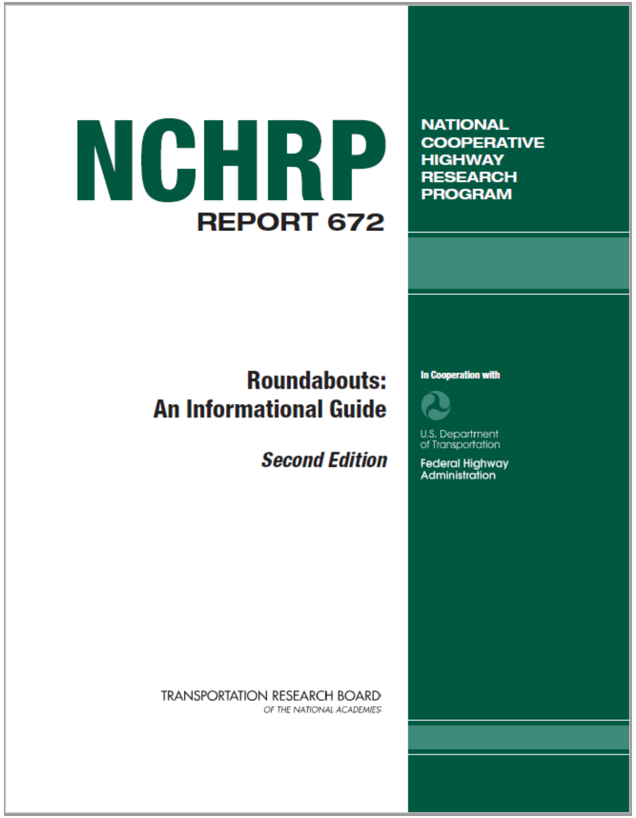


Image Credit: NCHRP 672



Existing Roundabout Design Guidance

- Key features:
  - Balance lower circulating speeds with higher approach speeds
  - Selection of appropriate design vehicle(s)
  - Speed reduction elements on approaches (curves, extended splitter island with curb)
  - Larger central island, truck apron, wider lanes compared to urban / low-speed
  - Supplemental TCDs and lighting in advance and at the intersection

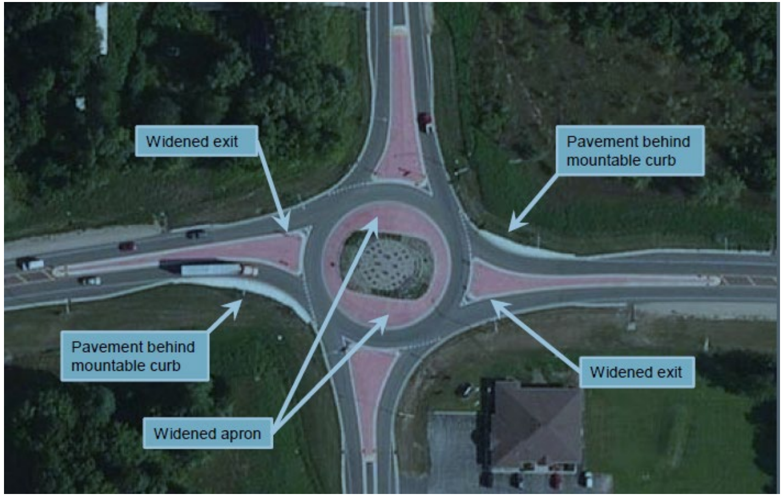


Image Credit: Mark Lenters & Hillary Isebrands

Existing Roundabout Design Guidance

- Research supports:
  - Specific design elements on approach and in intersection
  - TCDs to supplement design and provide advance notice
  - Improvements in crash reduction and injury reduction

Image Credit: NCHRP 672

Existing Sites

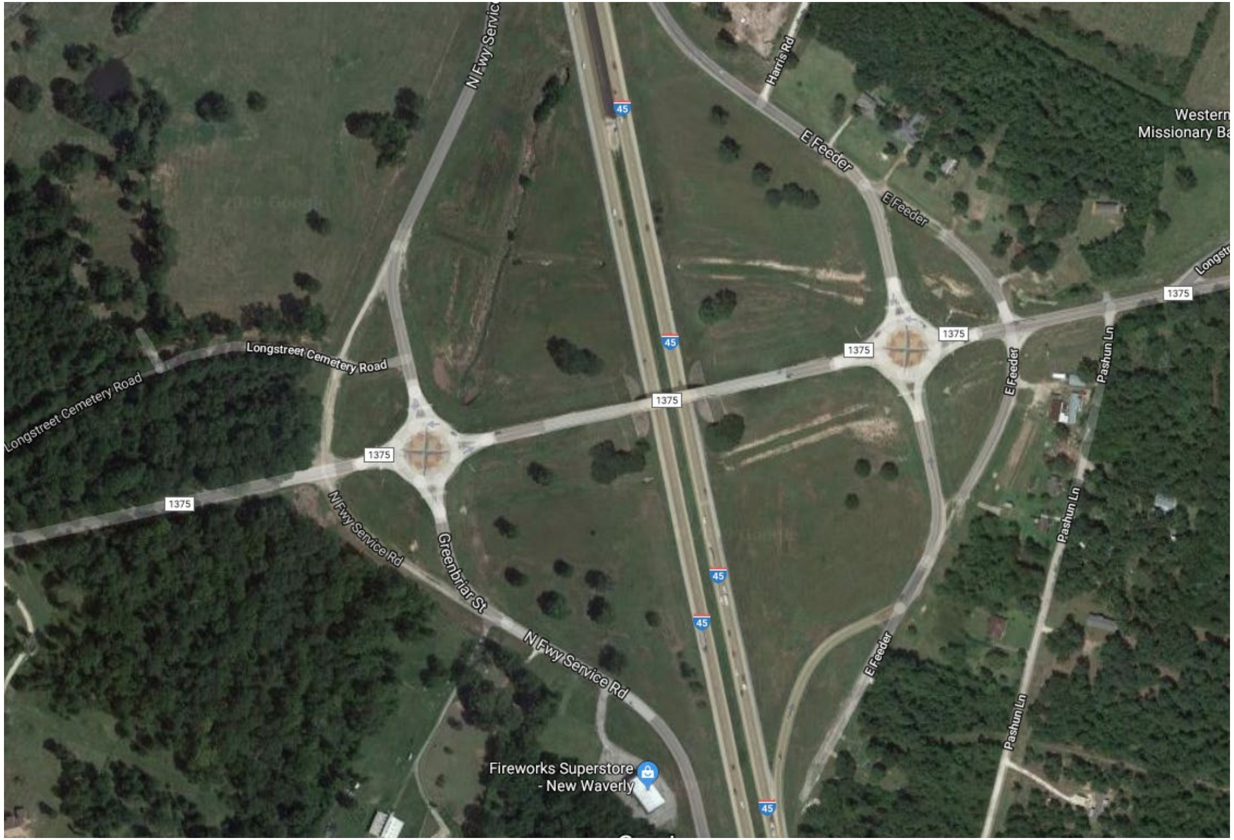
- Desired criteria:
  - Rural or suburban area
  - At least one approach with posted speed limit of 45 mph or higher
  - High demand of large vehicles, especially OSOW vehicles

- Variety of sites outside Texas (per practitioners on TRB listserv)
- Inside Texas…

Sample of Identified Sites

District	City	Intersection	Approaches	# Lanes	Year Completed
Bryan	New Waverly	FM 1375 Rd./I-45 SB Frontage Rd.	4	Single-Lane	2015
Bryan	New Waverly	FM 1375 Rd./I-45 NB Frontage Rd.	4	Single-Lane	2015
Houston	Katy	Cane Island Pkwy./Commerce Pkwy./ Parkside St.	4	Multilane (2 Lane)	2016

FM 1375 @ I-45 in New Waverly



Tasks 4 and 5

Develop Preliminary Design Guidance and Identify Key Research Questions

Roundabouts

Innovative Intersections

- Produce guidance based on existing best practices and research findings
- Provide opportunity for TxDOT to consider preferred format and content
- Identify any additional guidance needs that may not be addressed in Tasks 2 and 3

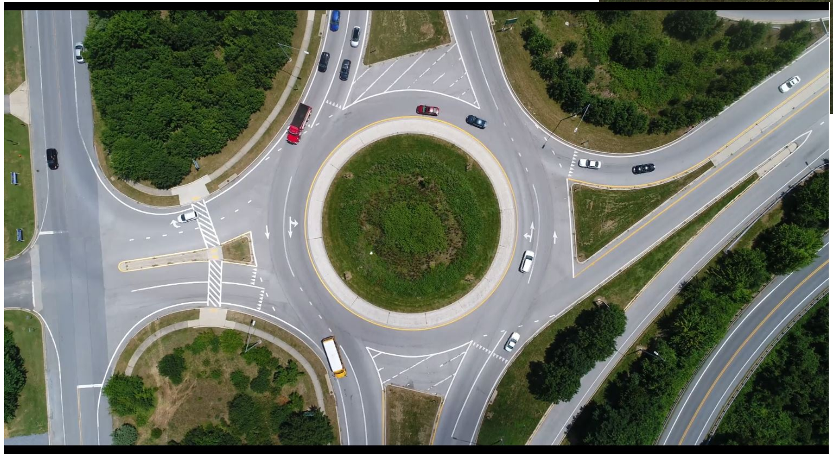
Task 6 and 7

Conduct Field Studies

Roundabouts

Innovative Intersections

- Collect field data
- Process field data
- Conduct operational analysis
- Conduct safety analysis (Task 7)



Tasks 8 and 9

Refine Design Guidance

Roundabouts

Innovative Intersections

- Bring together findings from previous tasks
- Revise guidance from Tasks 4 and 5
- Develop summary brochure
- Develop webinar content

System Modification | Geometric Design | Innovative Intersections

INNOVATIVE INTERSECTIONS

Superstreet with Median U-Turn in Leland, NC (innovativeintersections.org)

Description

Intersections are crucial to a street's performance; they control the road's speed, safety, cost, and efficiency. Accommodating turns can directly affect safety and efficiency, making left turns the key design factor in intersection improvement. Traditional left-turn lanes, however, are not always feasible or able to adequately resolve congestion problems at some intersections.

A number of innovative intersection designs have been developed in recent years to provide alternative ways for accommodating left-turning vehicles.[1] Many of them incorporate elements that seem similar to interchanges, but their at-grade design saves the cost of constructing overpasses. Some designs may also deliberately reduce average vehicle speeds while serving more vehicles and shortening travel times through the intersection and along the corridor.

Cost:	●●●●○
Time:	Medium/Long
Impact:	Spot/Corridor
Who:	City/State
Hurdles:	Right-of-Way

Target Market

Suburban Major Streets

Innovative intersection designs are typically intended for major streets in suburban and exurban areas. These roadways frequently have higher speeds and serve higher volume corridors.

How Will This Help?

Several types of innovative intersections can help divert left turns away from the main intersection and allow more green time for through traffic. Options include:

- A two-stage left-turn. Before the intersection, vehicles turn left onto a road that is parallel to their initial road; they travel toward their desired road and turn left while the traffic on the main road has a green signal.
- A right turn followed by a U-turn. These are typically for traffic from minor cross streets; all vehicles are required to turn right at the major street. Vehicles that wish to travel in the opposite direction can make a U-turn through the median approximately 500 to 1000 feet away and join the major street traveling in the desired direction.
- Use an adjacent minor roadway to handle turning movements. A separate road away from the intersection can be used to route left turning traffic and simplify the signal system.

These intersection designs can reduce the number of vehicles and/or the number of conflicting movements using the main intersection, providing for simpler and more efficient signalization, shorter cycle lengths, fewer conflict points, shorter delays, and improved traffic flow.[2,3]

For more information, please refer to: http://mobility.tamu.edu/mip/strategies.php.

mobility

General Discussion Items

Experiences with Texas roundabouts?

Potential study site locations?

Desired guidance?

Questions?

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The Impact of Increased Adverse Weather Events on Freight Movement:

Understanding freight activities during Hurricane Harvey

Sponsored by TranSET, US DOT

University of Texas at Arlington
Assistant Professor, Civil Engineering
Kate Hyun

Motivation

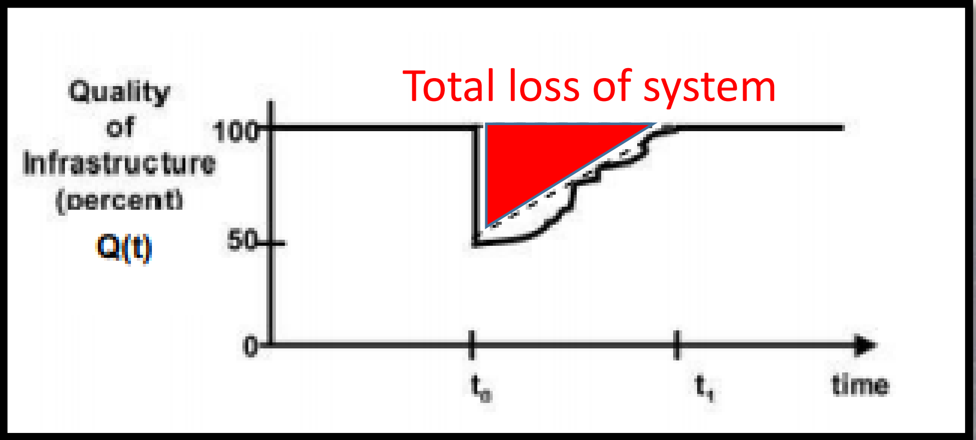
- Adverse weather events
  - **Hurricane Harvey** (category 4 storm), caused catastrophic flooding in the Houston area and inflicted $125 billion in damage in 2017.
  - Affected nearly **10 percent** of all US trucking throughout the Texas coastal area due to flooded roadways and damaged infrastructure
- Economic and social impacts from severe weather events on port truck traffic represent significant concerns to local, regional, and state agencies.

Strategic plans to optimize freight system

Aims to reduce direct impacts or damages from a disaster event and **enhancing the system's overall resilience** based on a simulation, optimization, and impact analysis

- Ta et al. (2010) created **a set of actions** for state DOTs including
  - organizational processes information dissemination → infrastructure improvements
- Bekkem et al. (2011) evaluated the highway corridor resilience to identify high-risk segments

Literature Review – Resilience metrics



Rely on simple performance metrics that captured changes in physical functionality

Measure	Definition
Risk	Combination of probability of an event and its consequences in terms of system performance
Vulnerability	Susceptibility of the system to threats and incidents causing operational degradation
Reliability	Probability that a system remains operative at a satisfactory level post-disaster
Robustness	Ability to withstand or absorb disturbances and remain intact when exposed to disruptions
Flexibility	Ability to adapt and adjust to changes through contingency planning in the aftermath of disruptions
Survivability	Ability to withstand sudden disturbances to functionality while meeting original demand
Resilience	Ability to resist, absorb and adapt to disruptions and return to normal functionality

Research Objectives

- Develop **performance metrics that characterize disaster impacts** and capture the variabilities in operations over time.

- Investigate the level of operation changes during an event and measure the flexibility of the system **to prepare, absorb, and recover** from the disruption.

- Develop **an adaptable resilience assessment framework** that evaluates the impact of a disruptive event.

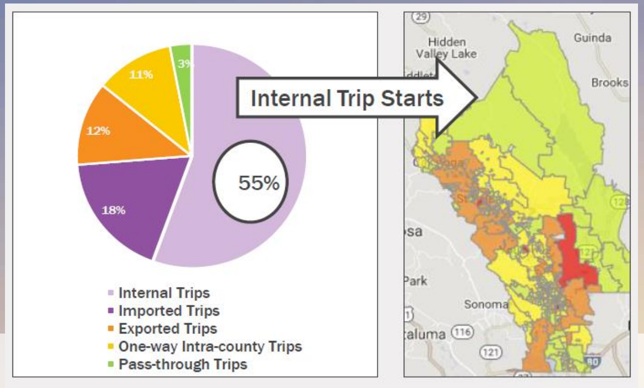
- **Analyze the magnitude and depth of impacts** to develop more effective strategic plans for freight operations that remain resilient and adaptable to unexpected disruptions.

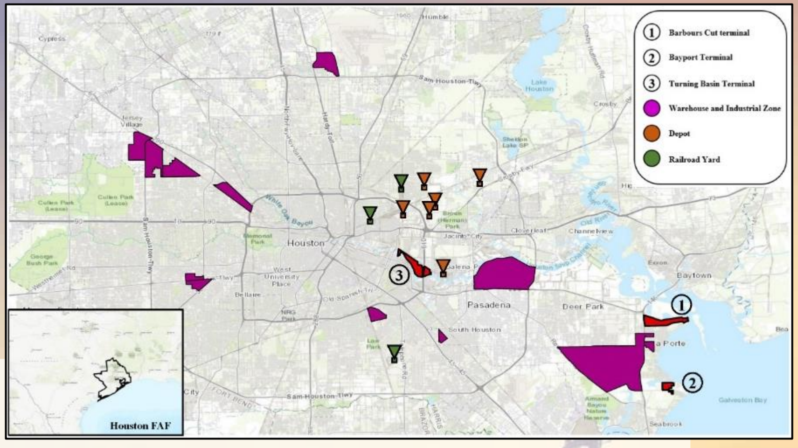
Background

Background – Port of Houston

- Located in the fourth-largest city in the US
- The busiest U.S. port in terms of foreign tonnage; sixteenth-busiest in the world.
- Consists of eight public terminals that handle multiple cargo types and over 100 private terminals that handle bulk cargoes.
- The total tonnage throughput of this port complex was over 269 million in 2018, which is 3.4% and 8.5% higher than 2017 and 2016, respectively.

Data





- Metric-based GPS dataset collected by Streetlight.
    - Reports to process over 12% of commercial vehicles nationally.
    - Widely adopted in the US and Canada including all top 25 MSAs in the U.S. and top 15 MSAs in Canada.
- Collected 68 weeks of data in 2017:
    - Four weeks of the Hurricane Harvey period (from August 18th to September 14th) and
    - 64 weeks of preparation (normal) periods from May 1st to December 31st in 2017.
    - Includes Major holidays - July 4th and Thanksgiving.

Study Approach

Step 1: Response phase identification

Step 2: Metric development

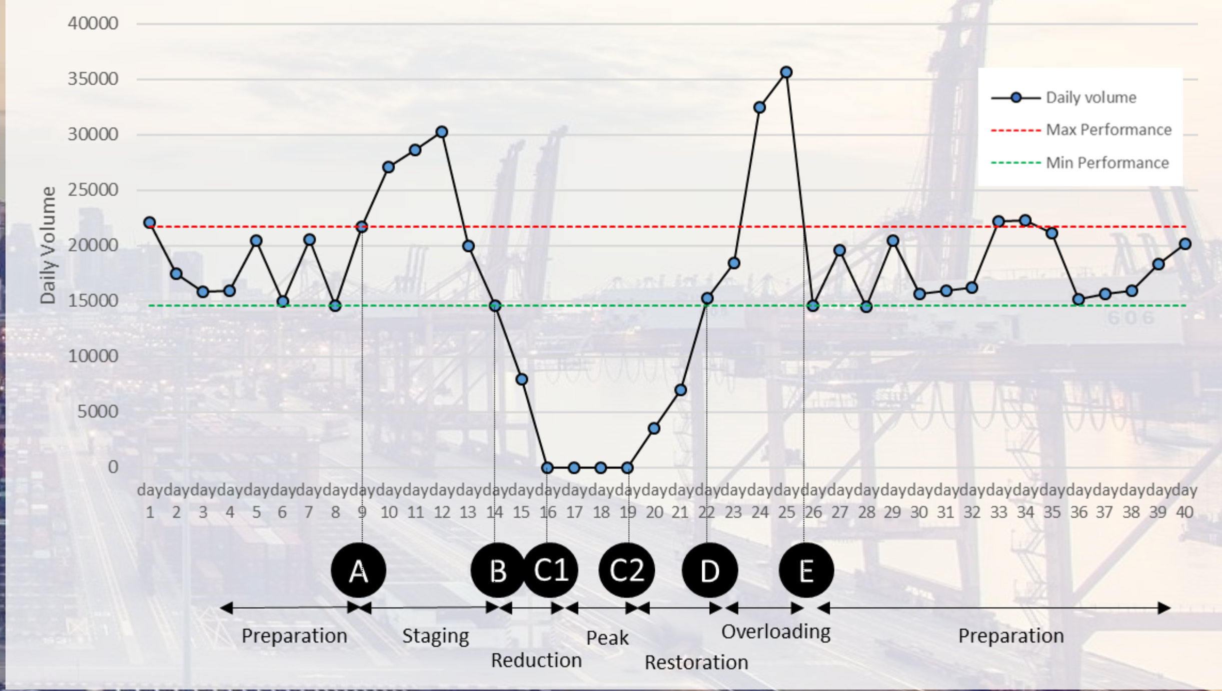
Step 3: Metric application

Step 4: Economic assessment

Study Approach– Step 1

Step 1: Response phase identification

- Use performance profiles to capture behavioral or operation changes during a disaster event, in comparison to preparation (normal) states
- Identify six point of impacts
  - Staging
  - Reduction
  - Peak
  - Recovery
  - Overloading phases



Study Approach– Step 2

Step 2: Metric Development

- Temporal duration

$$t^s = t_i^s - t_j^s$$

- Magnitude of impacts

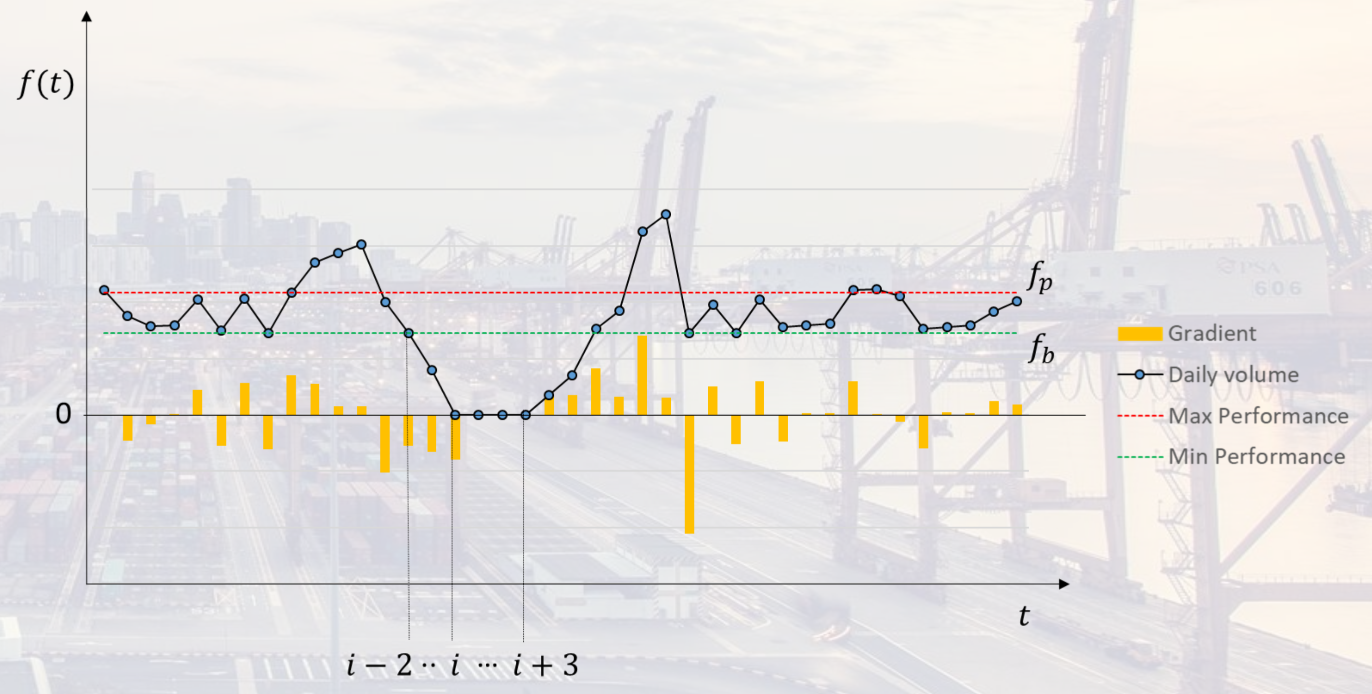
$$D^s = f(t^s) - f_b$$

- Total impacts

$$I^{ds} = \int f_b - f(t)\ dt$$

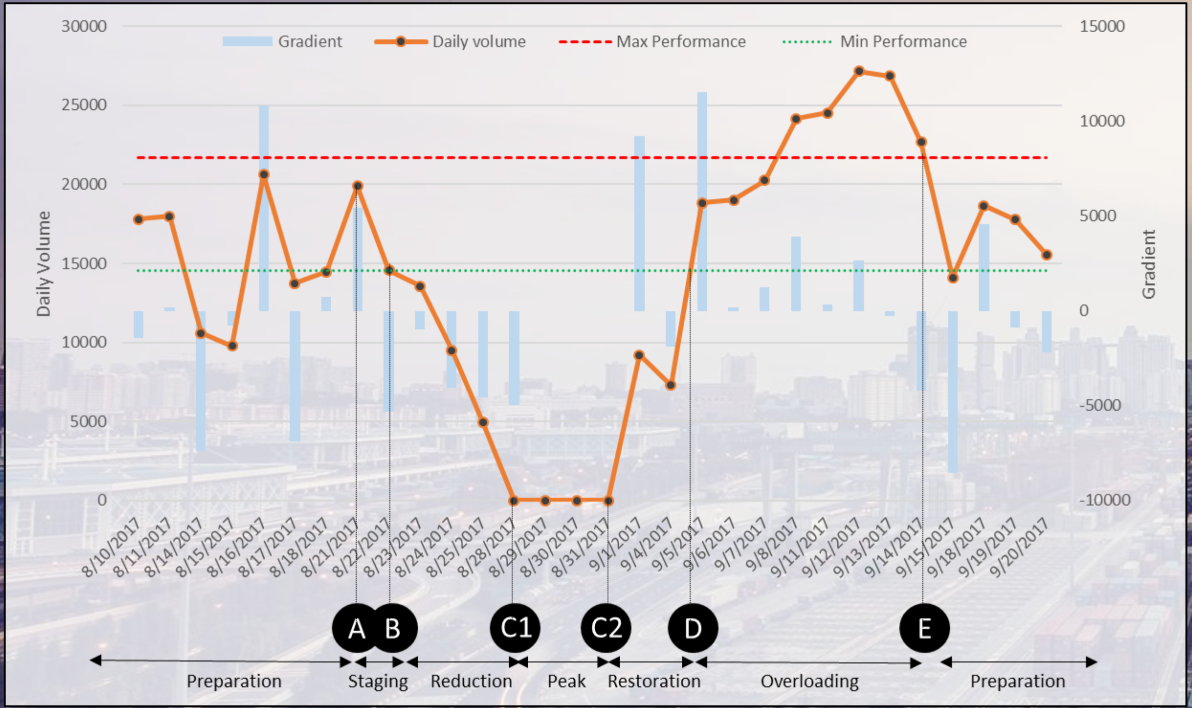
- Stability

$$g_t = \frac{f(t+k) - f(t)}{k}$$

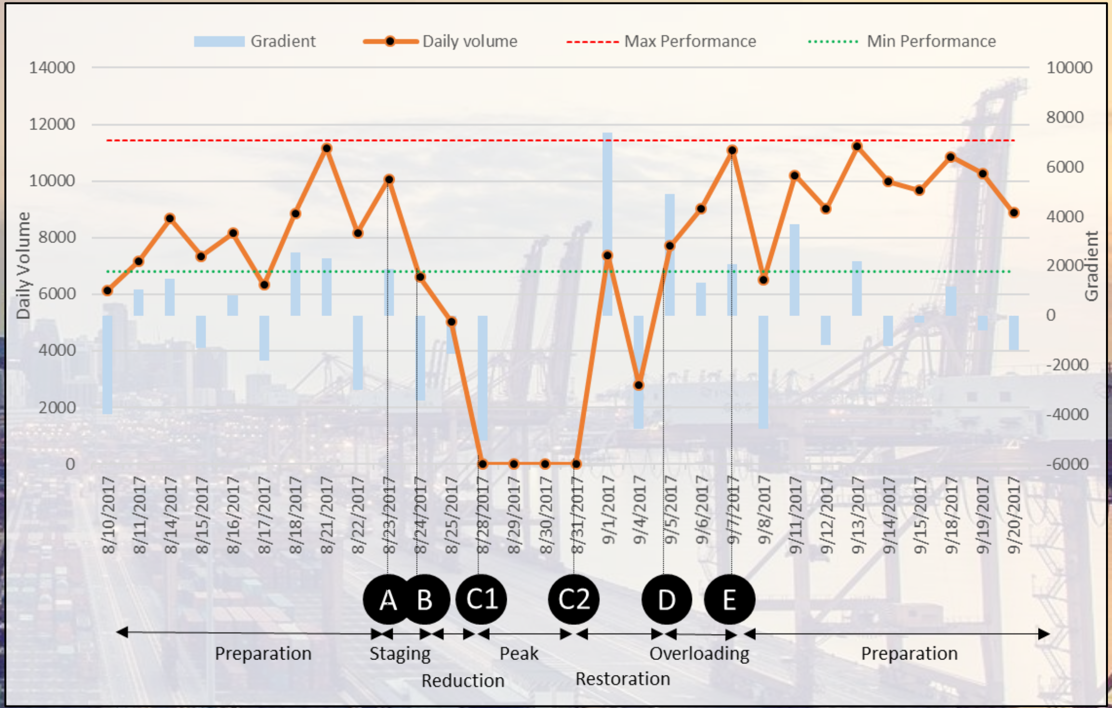


Results

Results – Hurricane Harvey



Bayport terminal to Houston

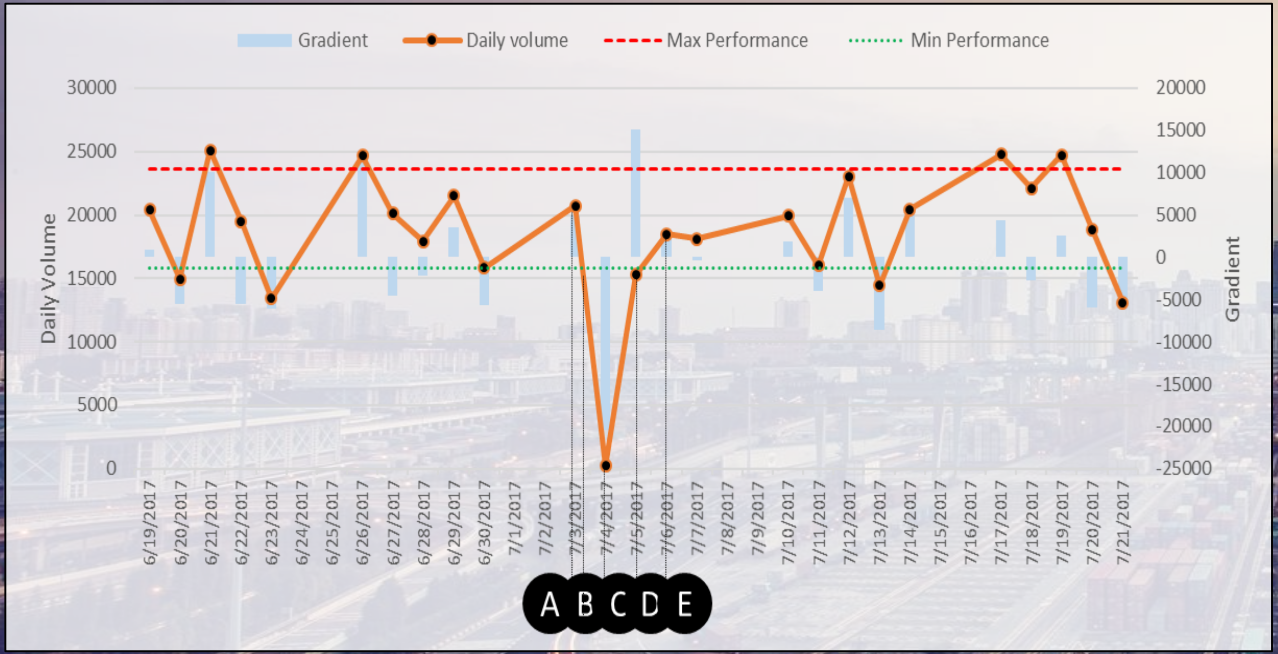


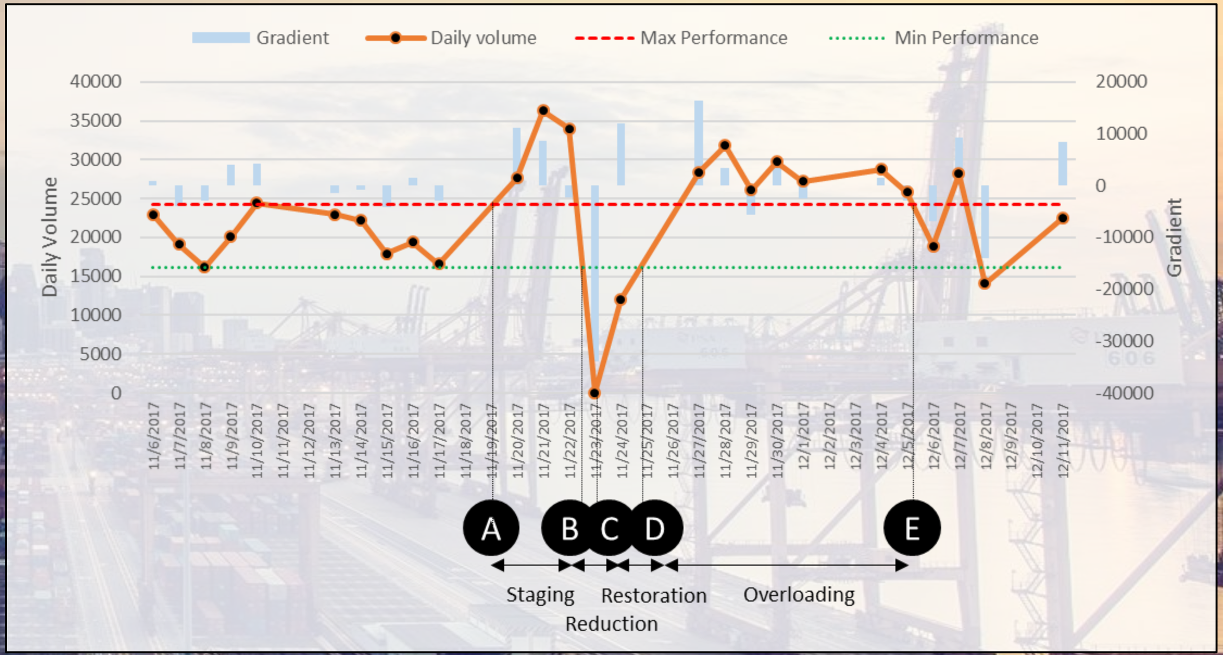
Barbours Cut terminal to local facilities

Results – Hurricane Harvey

Phase	Metric	Houston FAF			Local	
		Barbours Cut	Bayport	Turning Basin	Barbours Cut	Bayport
Minimum (Baseline) Performance (trips/day)		31,200	14,800	8,400	6,700	3,600
Staging (Proactive Response)	Depth	14%	34%	71%	31%	54%
	Duration	1	1	3	1	2
	Total	7%	17%	98%	18%	54%
Reduction	Depth	100%	100%	100%	100%	100%
	Duration	2	4	1	2	3
	Total	150%	200%	50%	100%	150%
	Stability	100%	100%	100%	100%	150%
Recovery	Depth	100%	100%	100%	100%	100%
	Duration	5	3	3	5	3
	Total	250%	150%	150%	250%	150%
	Stability	80%	67%	67%	80%	80%
Overload (Reactive Response)	Depth	29%	72%	54%	44%	53%
	Duration	2	7	1	2	1
	Total	29%	338%	27%	44%	11%

Results – Bayport terminal to Houston





July 4th

Thanksgiving

Results – Holiday Events (Bayport)

Phase	Metric	July 4th		Thanksgiving	
		Houston	Local	Houston	Local
Minimum (Baseline) Performance (trips/day)		15,800	7,700	15,800	7,700
Staging (Proactive Response)	Depth	32%	36%	130%	72%
	Duration	1	1	3	1
	Total	4%	5%	265%	15%
Reduction	Depth	100%	100%	100%	100%
	Duration	1	1	1	1
	Total	38%	35%	25%	30%
	Stability	100%	100%	100%	100%
Recovery	Depth	100%	100%	100%	100%
	Duration	1	1	2	2
	Total	50%	50%	63%	80%
	Stability	100%	100%	100%	100%
Overload (Reactive Response)	Depth	17%	88%	102%	52%
	Duration	1	1	7	1
	Total	9%	44$	512%	10%

Economic Analysis

In 2018, marine cargo activity at the Port of Houston Authority (PHA) terminals supported a total of $173.4 billion of total economic value in the state of Texas.

- $5.4 billion is the direct business revenue received by the firms directly
- $164.1 billion represents the value of the output to the state of Texas
- $4.0 billion represents the personal re-spending and local personal consumption impact.

Terminal	Revenue Tonnage (2018)	Share of Tonnage	Economic Output
Barbours Cut	10,738,674	21.5%	$145,714,960
Bayport	20,430,131	40.9%	$277,197,296
Turning Basin	5,527,888	11%	$74,551,840
Total	49,989,913	-	-

Total Economic Output of PHA:
$169,436 million/year
$ 679 million/day

Economic Impact Analysis - Harvey

Phase	Metric	Houston FAF			Local	
		Barbours Cut	Bayport	Turning Basin	Barbours Cut	Bayport
Economic Output		$140M	$271M	$71M	$42M	$62M
Staging (Proactive Response)	Duration	1	1	2	1	2
	Economic impact	-$9M	-$23M	+$26M	-$4M	-$7M
Reduction	Duration	2	4	1	2	3
	Economic impact	-$158M	-$635M	-$43M	-$50M	-$135M
Inactive	Economic impact	-$422M	-$1,356M	-$354M	-$125M	-$311M
Recovery	Duration	5	3	3	5	3
	Economic impact	-$395M	-$476M	-$155M	-$114M	-$126M
Overload (Reactive Response)	Duration	2	7	1	2	1
	Economic impact	-$11M	+$460M	+$8M	+$1M	-$3M

Conclusion

- Evaluate port truck activities during disruptive events such as Hurricane Harvey
  - Important step for maintaining highway infrastructure
  - Designing plans for a fast system recovery
- Framework quantifies cross-sectional and total impacts from disruptions by estimating performance changes
- Methodology allows agencies or freight industry to characterize
  - System preparedness for a disaster
  - System response to a disaster
  - Minimize the impacts from a disruptive event

Thank you!

Questions? Kate.hyun@uta.edu

Optimized Freight Movement Project

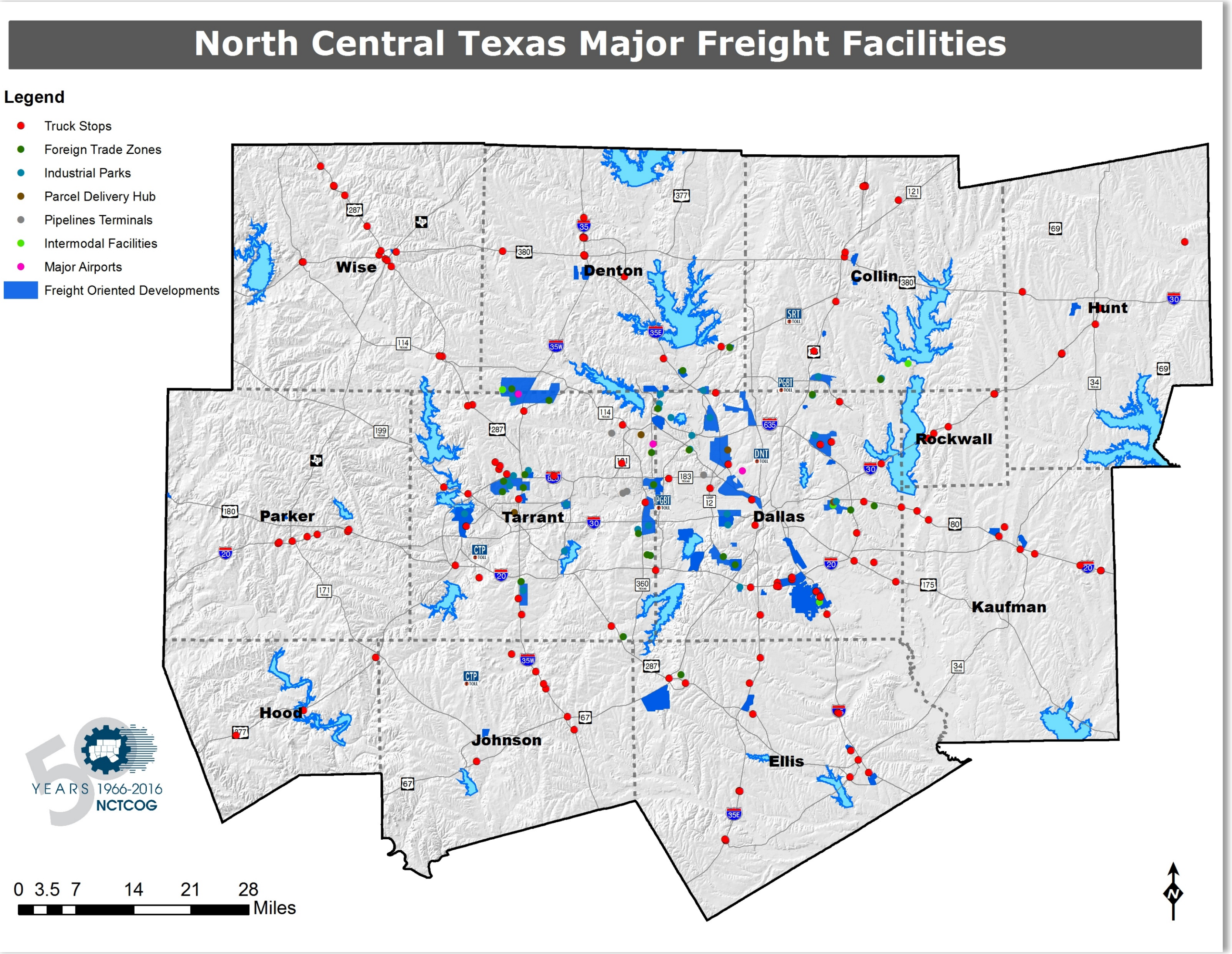
Regional Freight Advisory Council

November 10, 2020

Clint Hail

Transportation Planner, Automated Vehicles

North Central Texas Council of Governments



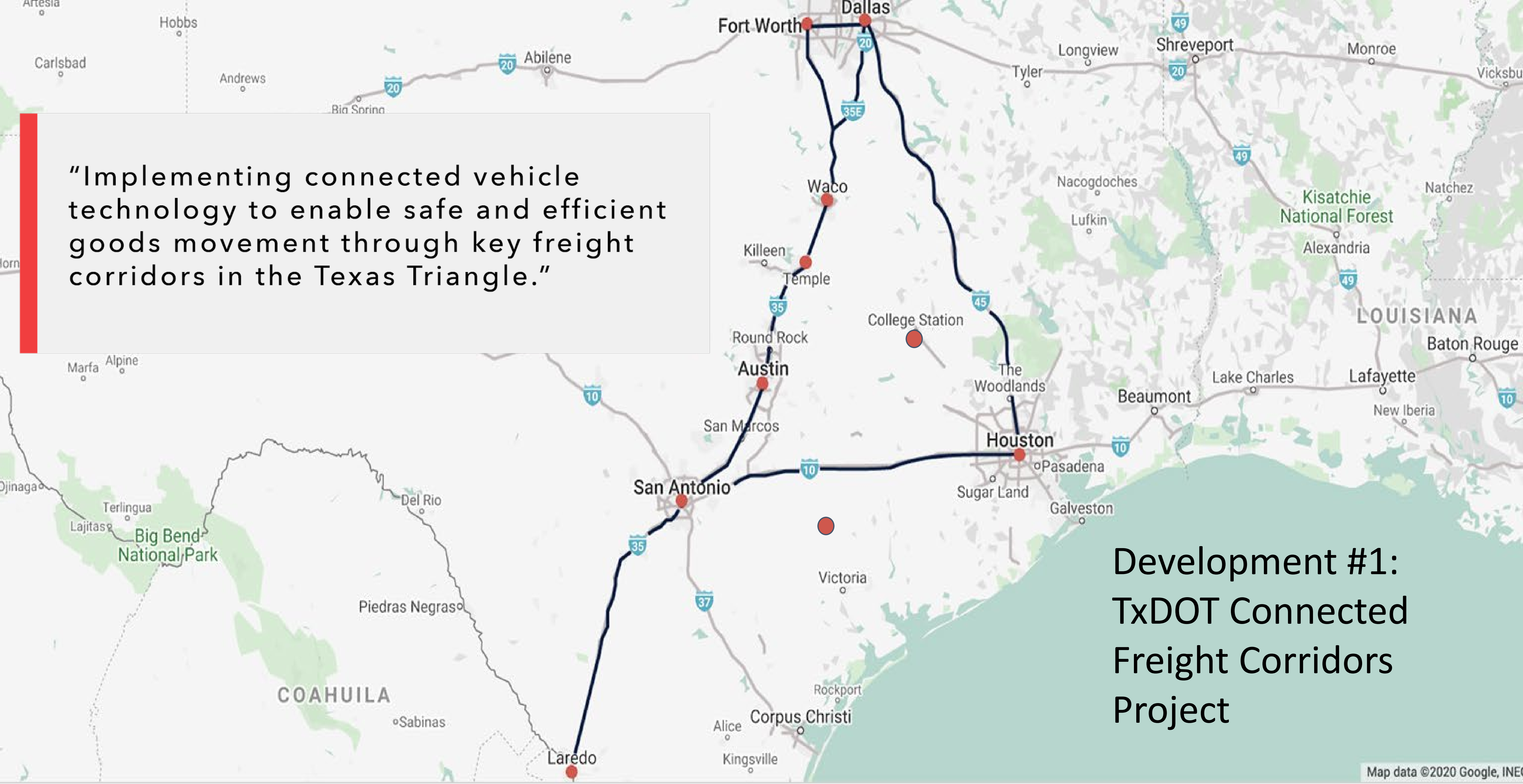
DFW, an inland port

Freight hubs linked to expressways

Connections signalized

Optimizing truck flow = opportunity

Truck Travel Time Reliability (PM3) Support



"Implementing connected vehicle technology to enable safe and efficient goods movement through key freight corridors in the Texas Triangle."

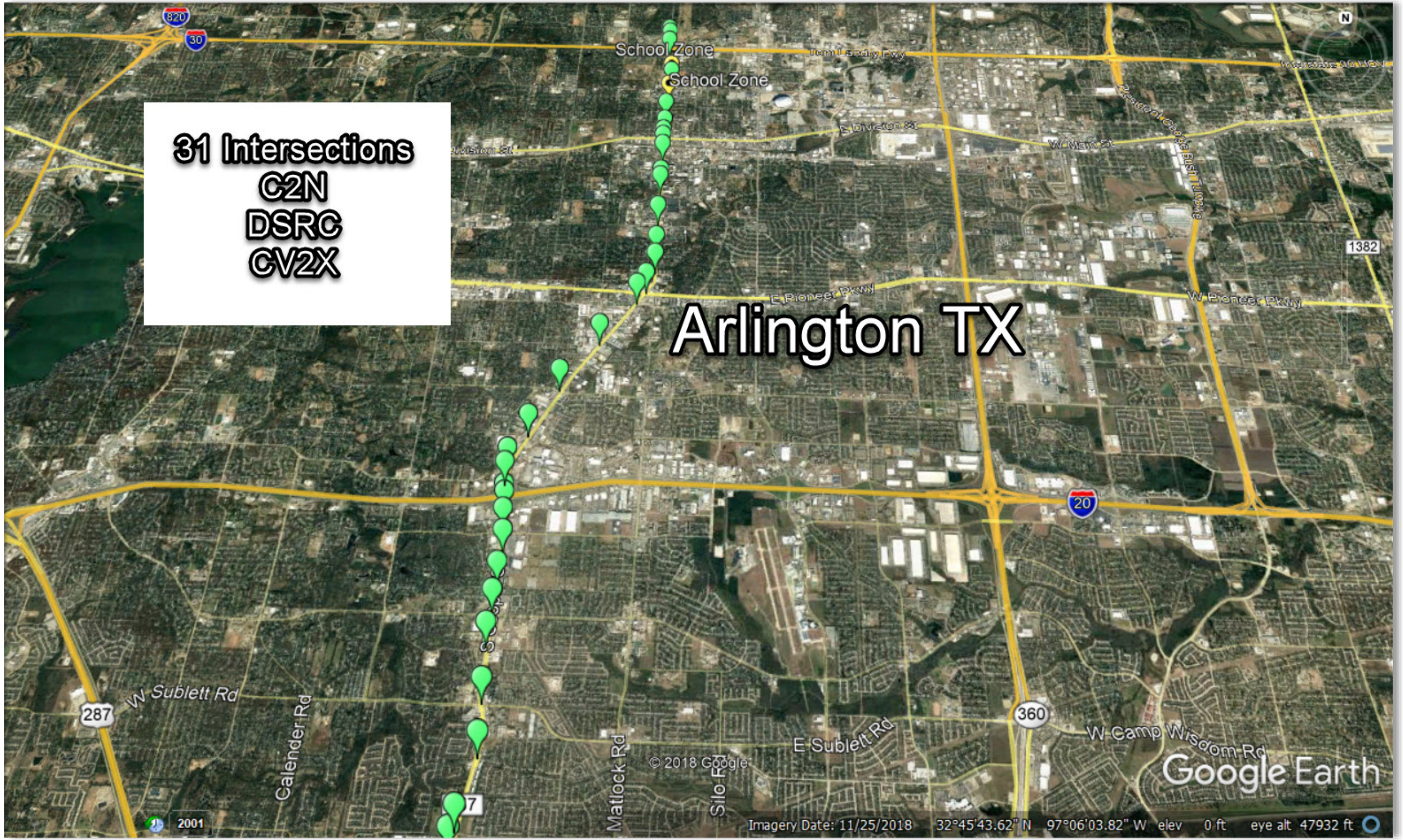
Development #1: TxDOT Connected Freight Corridors Project

Optimization = Freight Industry Priority

TIERS				
01	Work Zone Warning	Queue Warning	Wrong-Way Drivers	Truck Signal Priority
02	Advance Traveler Information System (ATIS)	Road Weather Warning	Truck Parking Availability	Bridge Height Warning
03	Emergency Electronic Brake Light	Pedestrian & Animal Warning	Eco-Dynamic Routing	Border Wait Times

= *Highlighted applications are prioritized for development*

Development #2: Arlington Connected Vehicle Corridor



Development #3: Georgia Regional Connected Vehicle Program (and other such programs)

Georgia Department of Transportation

- Collaboration between GDOT & Atlanta MPO
- 1000+ intersections
- Dual mode
- Freight priority application
- Recent Request for Proposals

Optimized Freight Movement Project Elements

1. Technology to optimize the flow of trucks from hubs to expressways
2. Benefit-cost analysis to identify where tech will do the most good:
    - Truck travel time savings
    - Improved traffic flow
    - Public health
    - Any adverse impacts—e.g., cross-traffic delay
    - Compare with alternative solutions—e.g., signal retiming
3. Coordination with local agencies/freight industry
4. Monitor performance and adapt

Contact

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