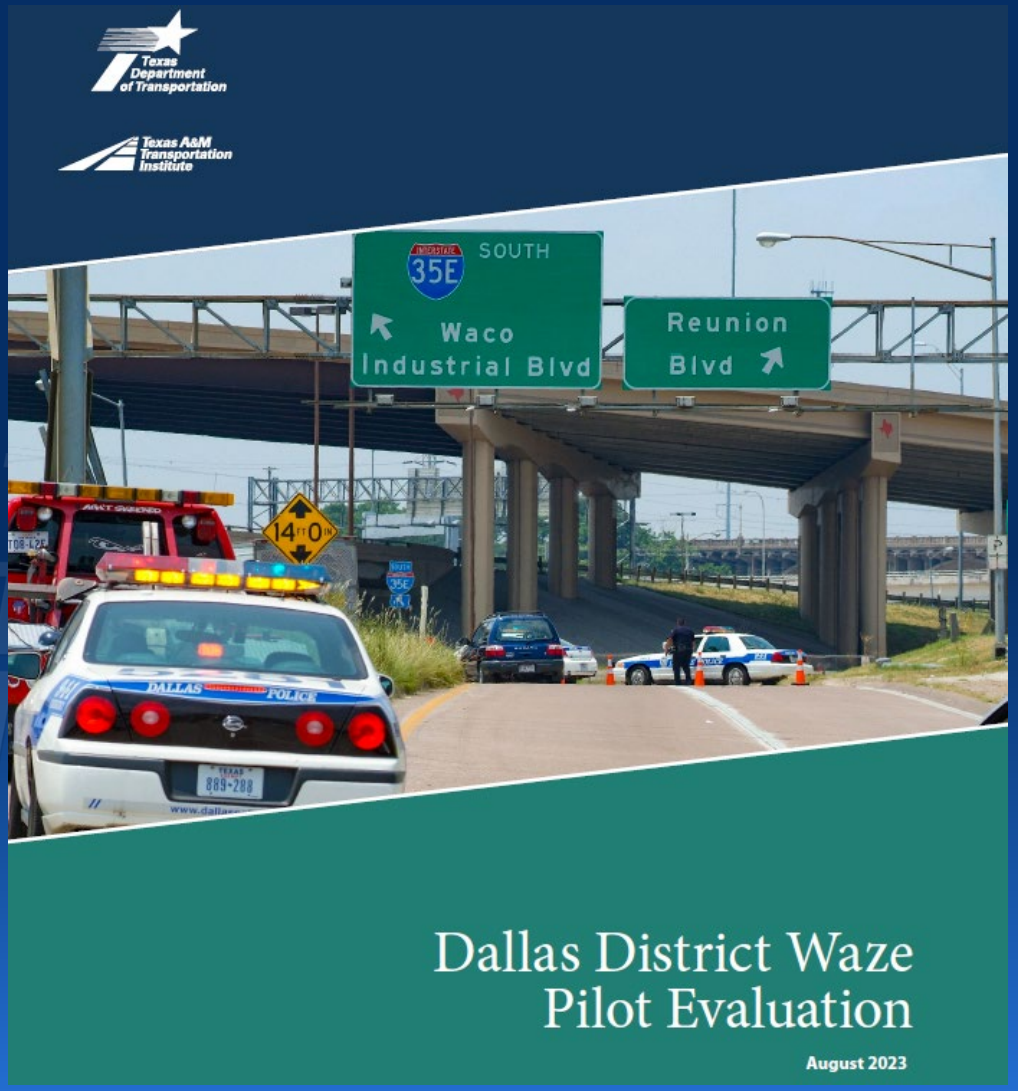
ITS Texas Annual Meeting
(Nov. 2023)

Dallas District Waze Pilot Evaluation



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746 Number of CCTVs in the Dallas District

143 Number of DMS in the Dallas District

4 **Maximum** Number TMC Operators on the floor during a shift (Day Shift)

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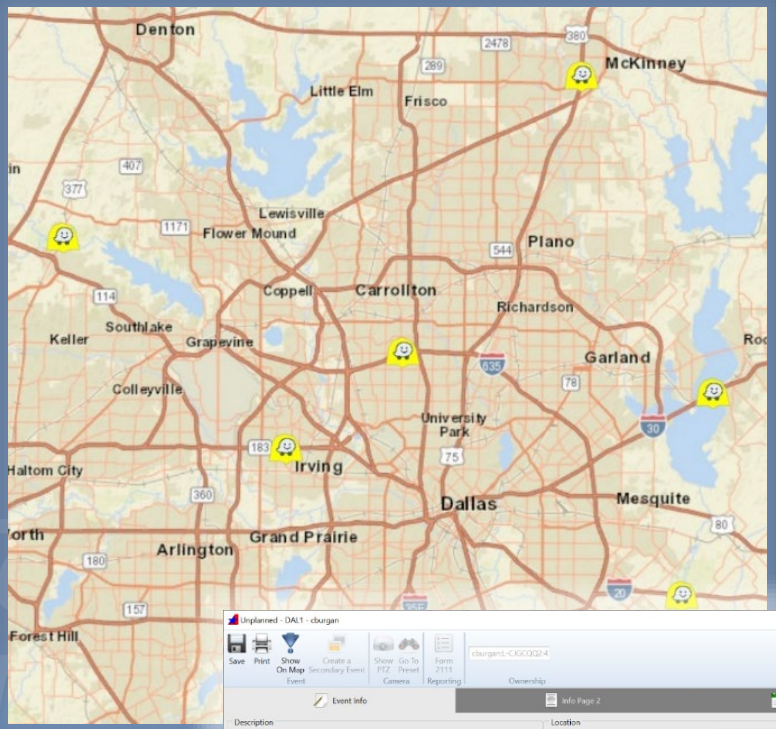
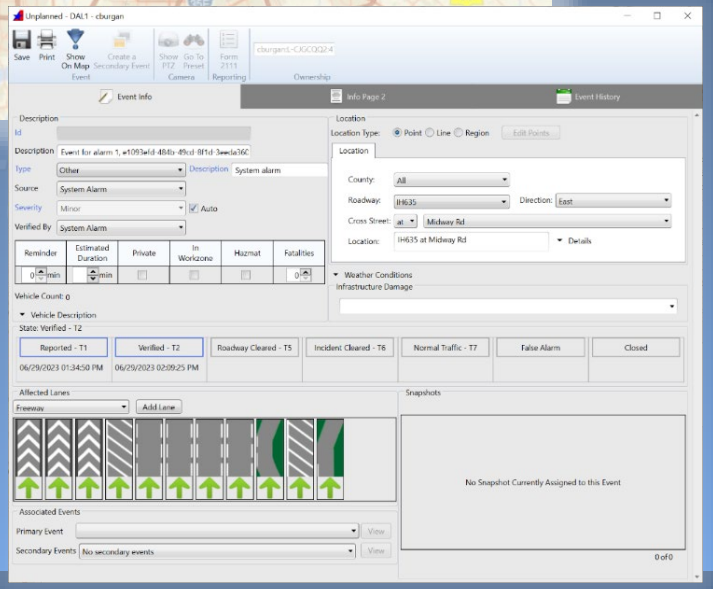
Background

- Goal was to evaluate if incidents can be detected sooner
- Dallas District started Waze pilot project in early 2021
- Required DalTrans traffic management center (TMC) operators to log in to a Waze test version of Lonestar, where the Waze data are displayed on a map





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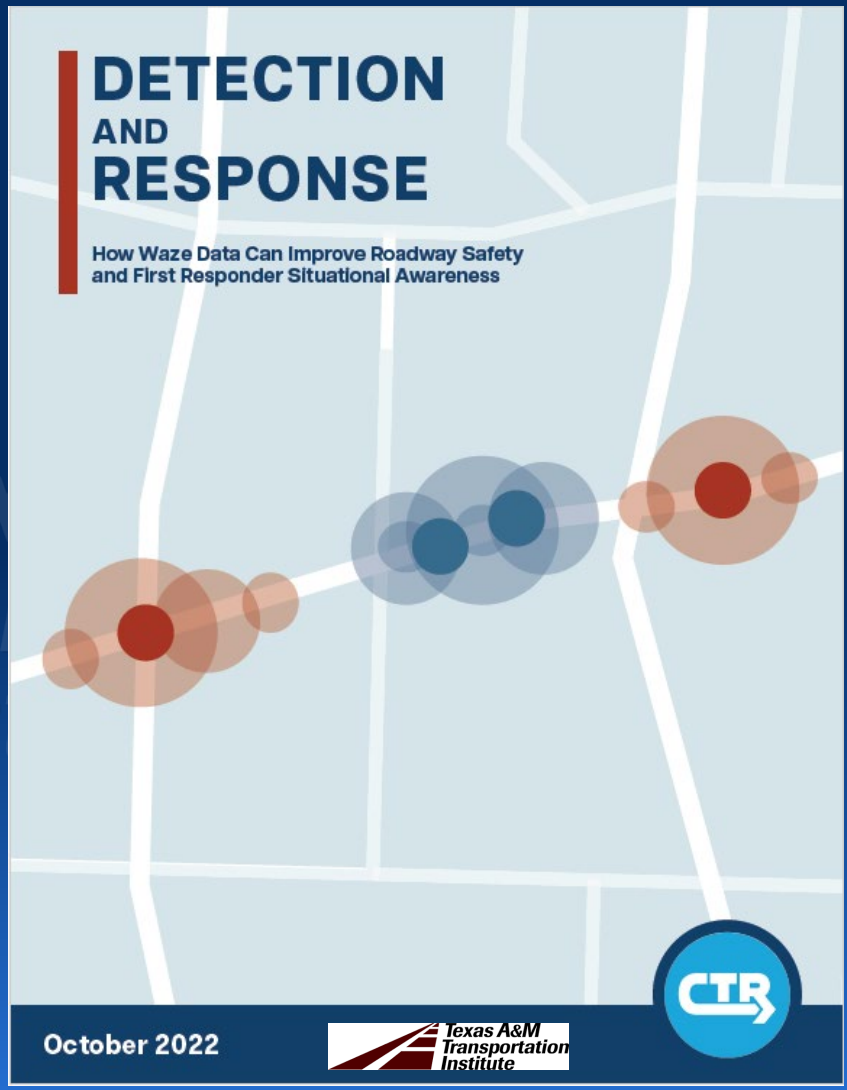
Analysis was built upon I-30 Waze Integration Pilot but differed by:

- Compared Waze data to TMC events (instead of public safety answering point-911 events)
- Evaluated multiple highways and evaluating by direction (broader samples with various corridors and more precise by accounting for direction)
- Adjusted the clustering and matching parameters (in red) and sequence

	Time	Distance
Cluster	+30 min	±2500 m
Matching	±30 min Crashes ±30 min Road H.	±2500 m



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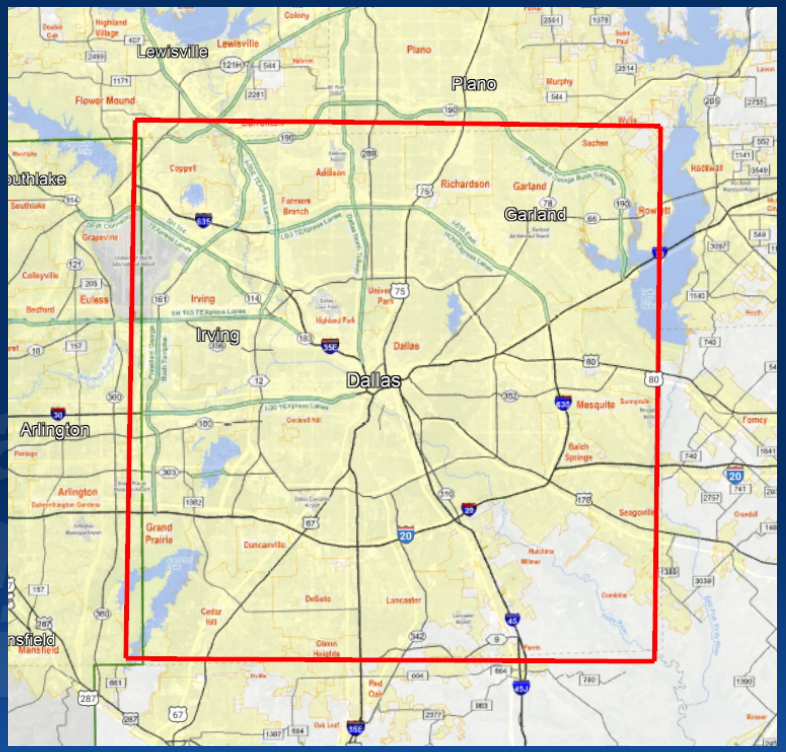
Methodology

- Data Collection:
  - Area: Dallas County
  - Period: 6 weeks; Feb 15 - Mar 28 (15.5M Waze records and 3.2K TMC records)
- Waze Data Preparation:
  - Kept start & end records and removed duplicates (498K records, avg. 31 duplicates per event)
  - Filtered for only TxDOT operated freeways and managed lanes (105K)
  - Focused on Top 6 Facilities by direction

(59K records or 56% of 743 unique street names)



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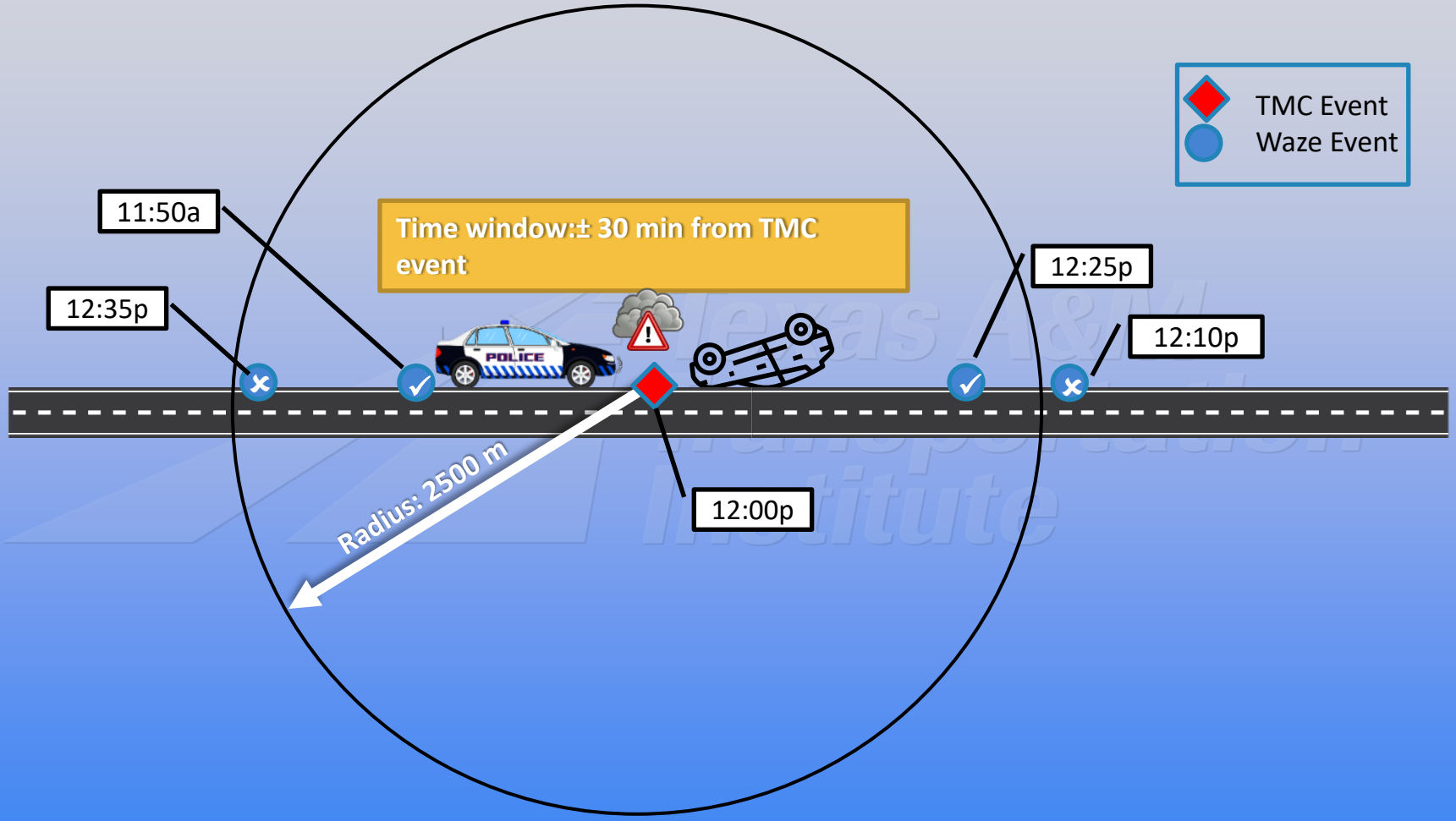
Methodology

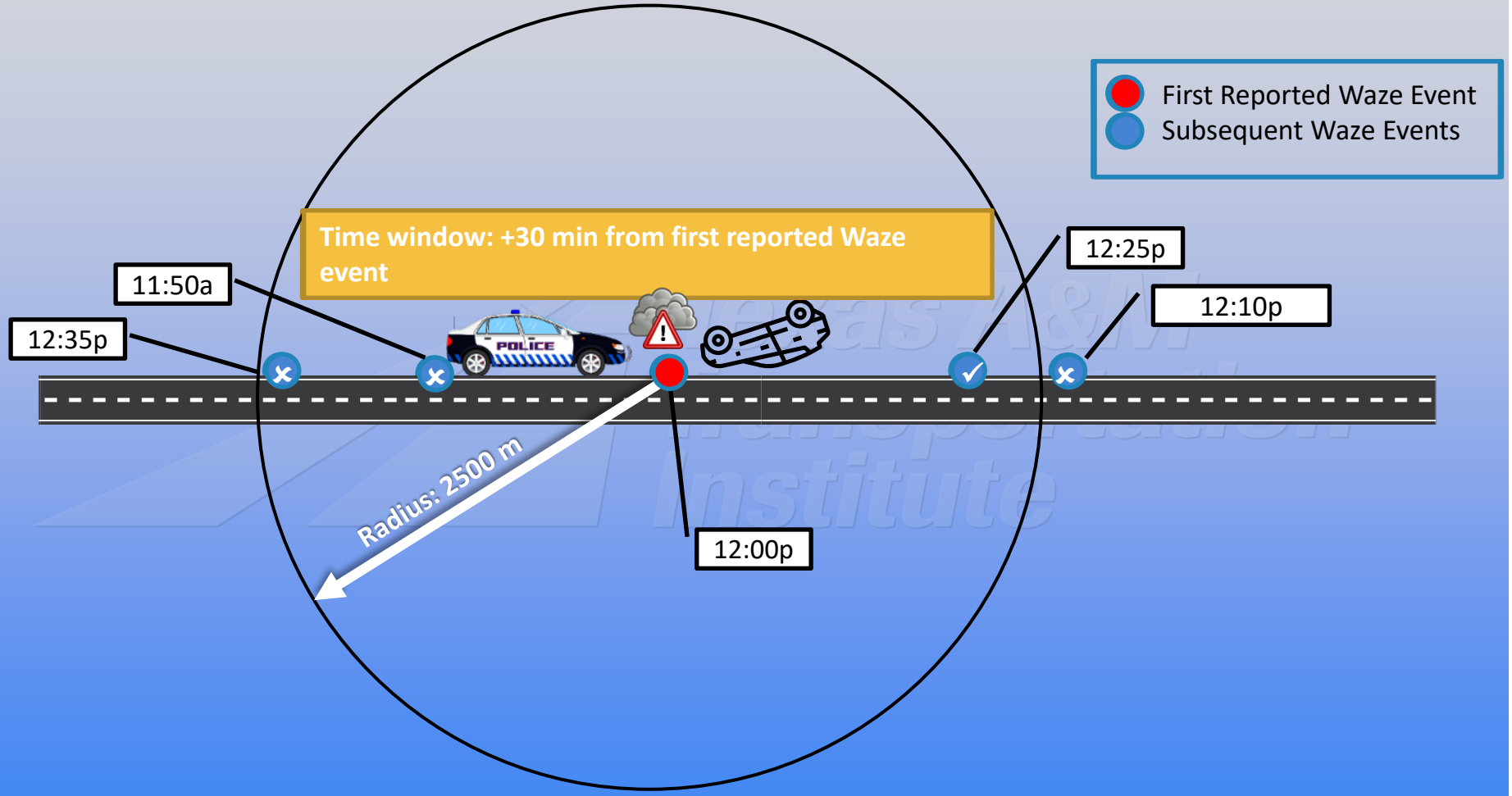
- Mapped TMC events to Waze events
- Matched TMC and Waze events - Waze events that most likely represent the same TMC event
- Clustered Waze events - Wazers may report the same event multiple times instead of confirming an event previously created by another user => duplicate Waze events
- Calculated Key Performance Indicators
  - Matched events
  - Matching efficiency
  - Waze to TMC ratio
  - Frequency of first detection
  - Average time difference of first detection

TMC Event Type	Waze Events	Type Used in This Study
Collision	ACCIDENT	Crash
Overturn	ACCIDENT	
VehicleOnFire	ACCIDENT	
Construction	ROAD_CLOSED	Construction
Maintenance	ROAD_CLOSED	
Abandonment	WEATHERHAZARD	Road Hazard
DisabledVehicle	WEATHERHAZARD	
HazmatSpill	WEATHERHAZARD	
HighWater	WEATHERHAZARD	
RoadDebris	WEATHERHAZARD	
Stall	WEATHERHAZARD	
WrongWayDriver	WEATHERHAZARD	
Ice	WEATHERHAZARD	

Matching Parameters: Time and Distance



Clustering Parameters: Time and Distance



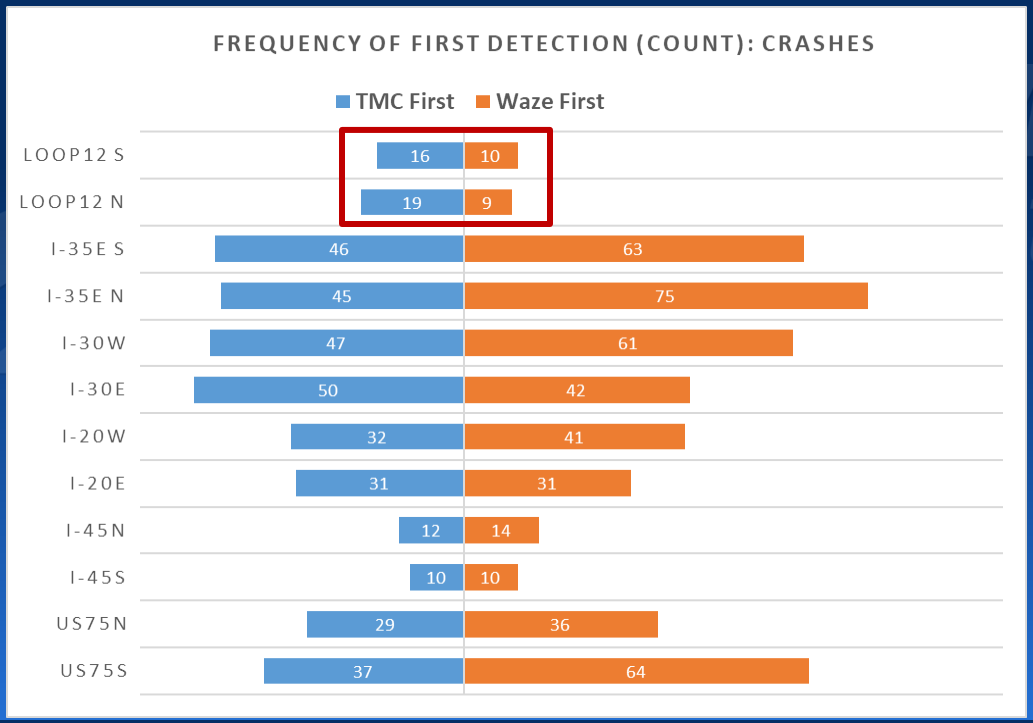
Crash KPIs

Matching

	TMC	Waze
Total events:	928	3494
Matched events:	830	1595
Matching efficiency:	**89%**	**46%**

Waze to TMC ratio for matched events: 2

Unseen events potential: 1899 (or 988 using ratio)



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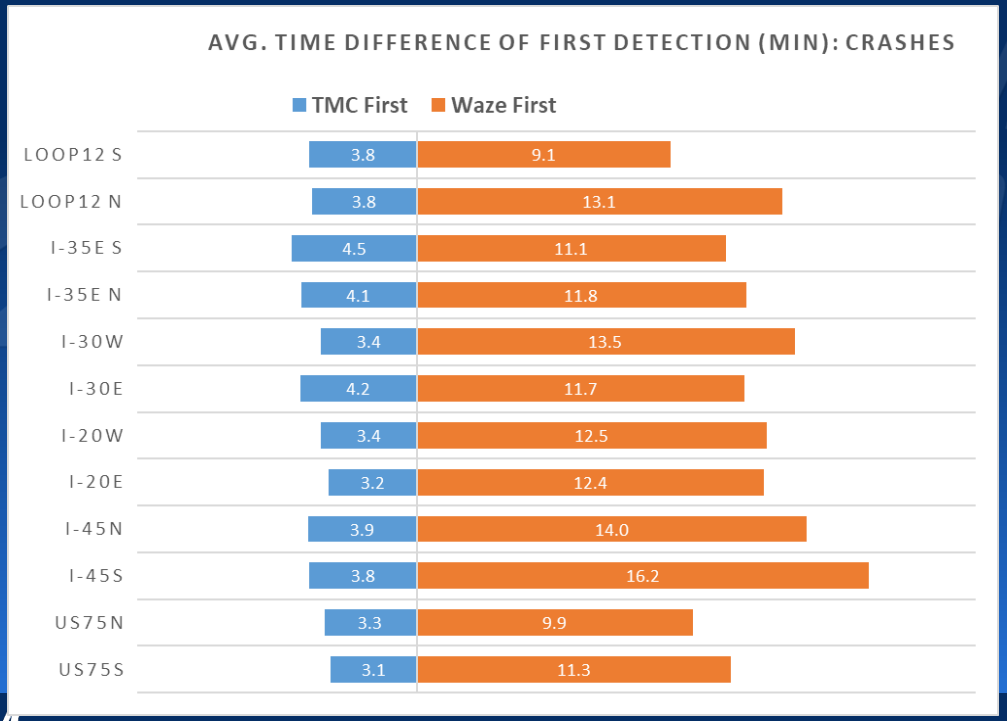
Crash KPIs

Early Detection

	TMC First	Waze First
Frequency of first detection:	374 (45%)	456 (55%)
Avg time diff of first detection:	0:03:44	0:11:55



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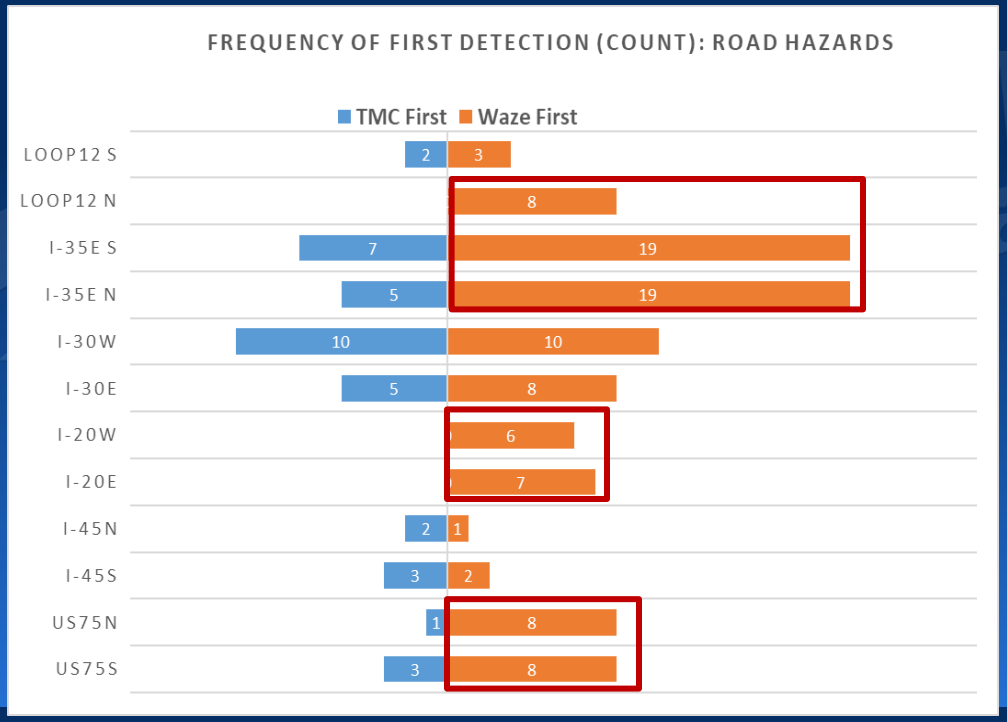
Road Hazard KPIs

Matching

	TMC	Waze
Total events:	151	56724
Matched events:	137	430
Matching efficiency:	**91%**	**1%**

Waze to TMC ratio for matched events: 3

Unseen events potential: 56,294 (or 17,936 using ratio)



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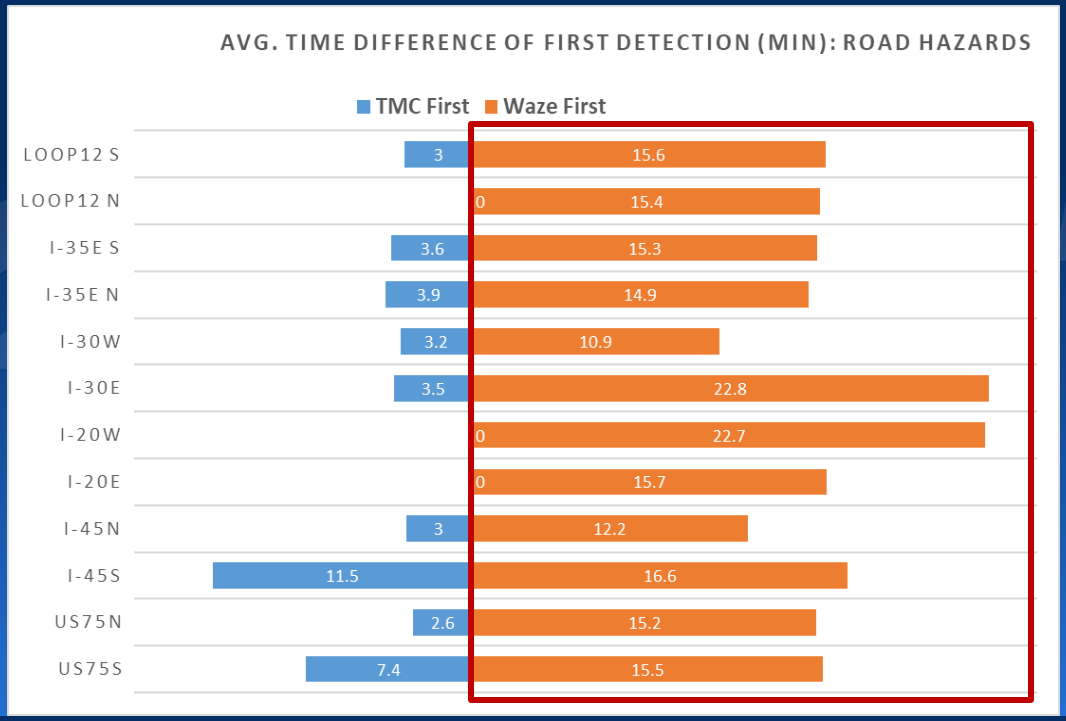
Road Hazard KPIs

Early Detection

	TMC First	Waze First
Frequency of first detection:	38 (28%)	99 (72%)
Avg time diff of first detection:	0:04:22	0:15:52



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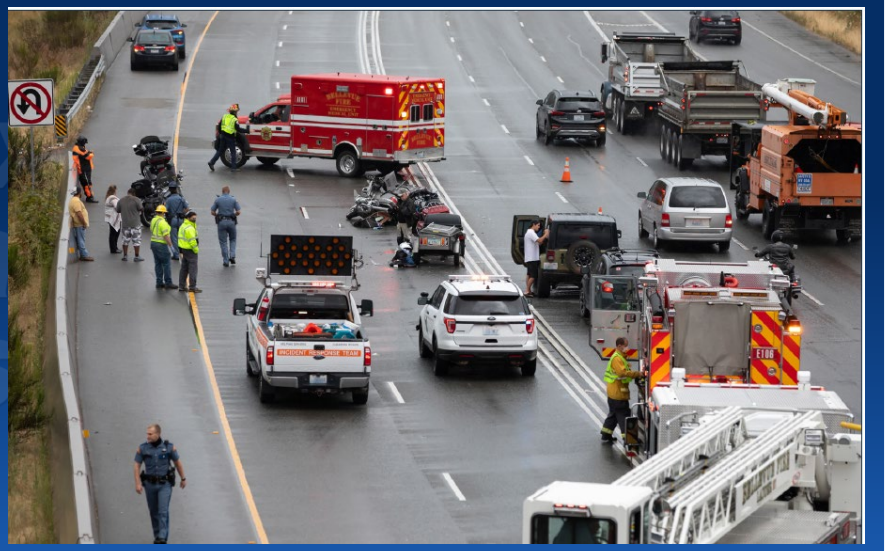
Key Findings

Crashes:

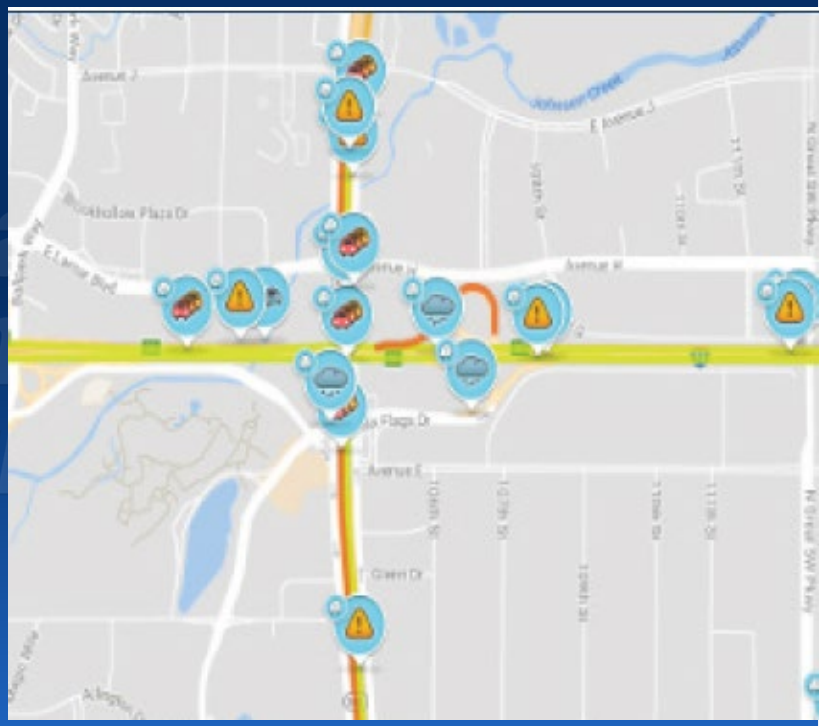
- Waze is highly accurate for crashes
- Matching efficiency:
  - 89% TMC events = Waze events (Waze captured most TMC events)
  - 46% of Waze events = TMC events
- 2 to 1 Waze to TMC ratio (before clustering)
- Opportunity for using Waze:
  - Identify undetected crashes (54% may go undetected by the TMC)
  - Identify some crashes faster (average 12 min)



Key Findings

Road Hazards:

- Waze reports more road hazards than TMC: *TTI to investigate*
- Matching efficiency:
  - 91% TMC events = Waze events (Waze captured most TMC events)
  - 1% of Waze events = TMC events
- 3 to 1 Waze to TMC ratio (before clustering)
- Opportunity for using Waze:
  - Identify undetected road hazards (up to 99% may go undetected) before they become crashes
  - Identify some road hazards faster (average 16 min)



Lessons Learned: Dallas Integration

- Waze data has to be significantly filtered so that TMC operators are not overwhelmed, e.g.
  - Only kept alerts on freeways and on mainlanes (i.e. no events on shoulders)
  - Filtered out events with a confidence score <5 (score based on other user's reactions ('Thumbs up', 'Not there'), ranging between 0 and 10. A higher score indicates more positive feedback from Waze users.)

- Allow operators to 'dismiss' Waze events in Events Manager
- Iterative process – solicit feedback; e.g. operators found it is useful and beneficial after first couple of Waze plug-in iterations

Lessons Learned: Dallas Integration

- Helpful Waze Plug-in features or Alerts
  - Event (alarm) manager feature
  - Configurable Alert Notifications, e.g. some operators have it 'chime' every time an alert pops up
  - Collision alerts help the most
  - Actionable road hazards such as stalled vehicle, debris, and potholes are most helpful

- Filter out alerts on roadways without cameras; operators don't enter road closures that cannot be visually verified – *TTI investigating what metrics can be used to validate Waze events on these corridors*

Questions?

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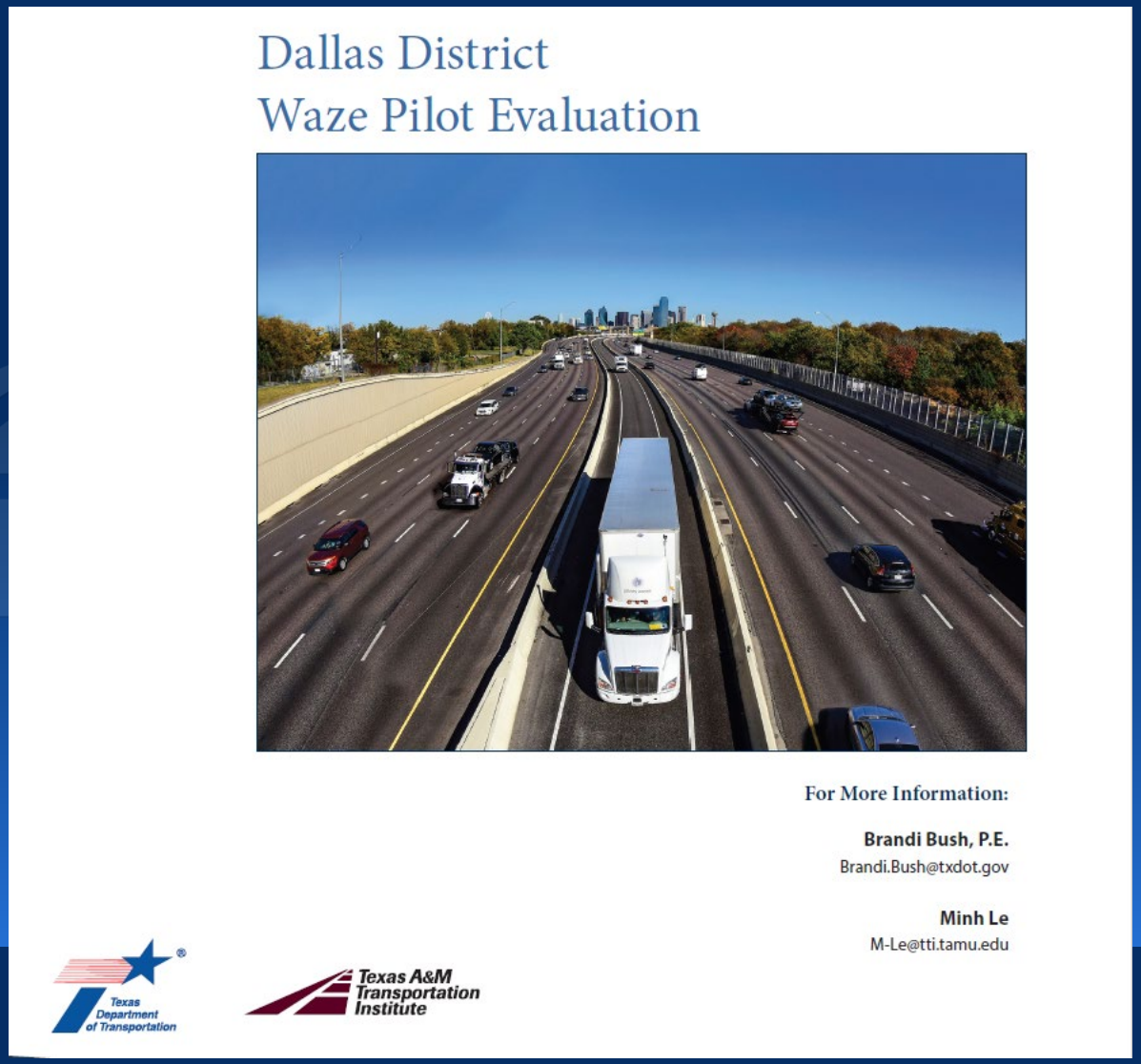

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