Texas A&M Transportation Institute

2025 ITS Texas Annual Meeting

Infrastructure-Independent Queue Detection System at At-Grade Level Crossings

CASE STUDY OF HEARNE, TEXAS

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November 21, 2025

INTRODUCTION

Challenges of Rural TX

Infrastructure

- Connectivity
- Aging

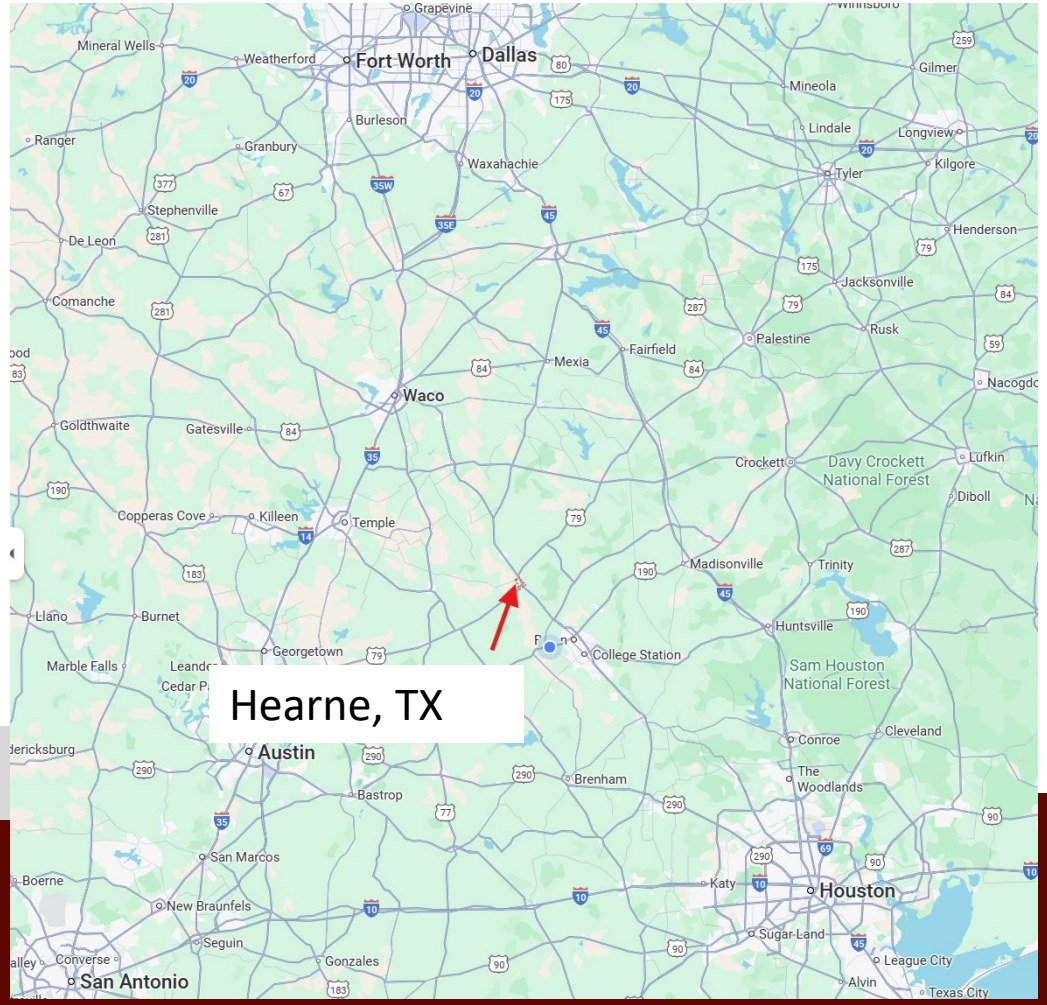
Unpredictable Traffic

- Times of year
- Acts of nature

Safety Risks

- 2.52 per 100M VMT in 2022

INTRODUCTION



Challenges of Hearne, TX

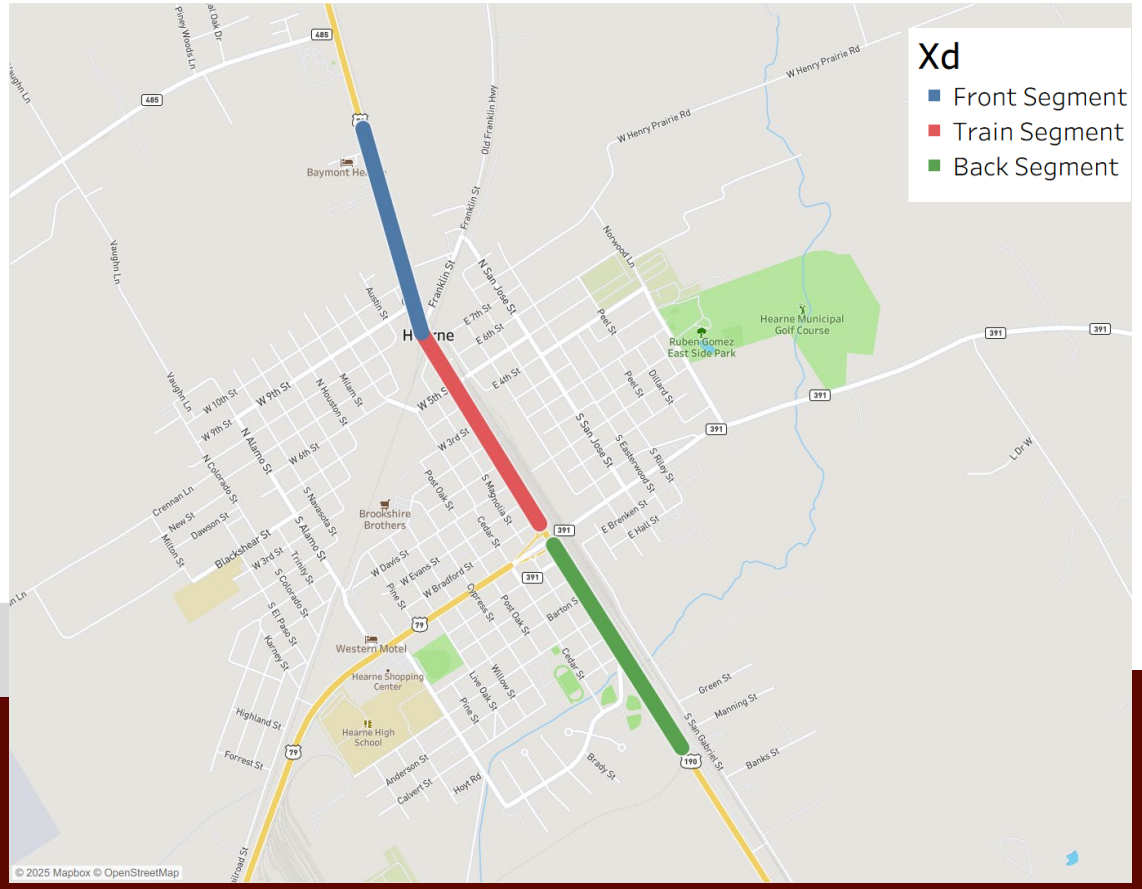
- TAMU ⟷ Dallas
- Railroad with 12-15 trains a day
- Lots of truck traffic
- Infrastructure does not exist

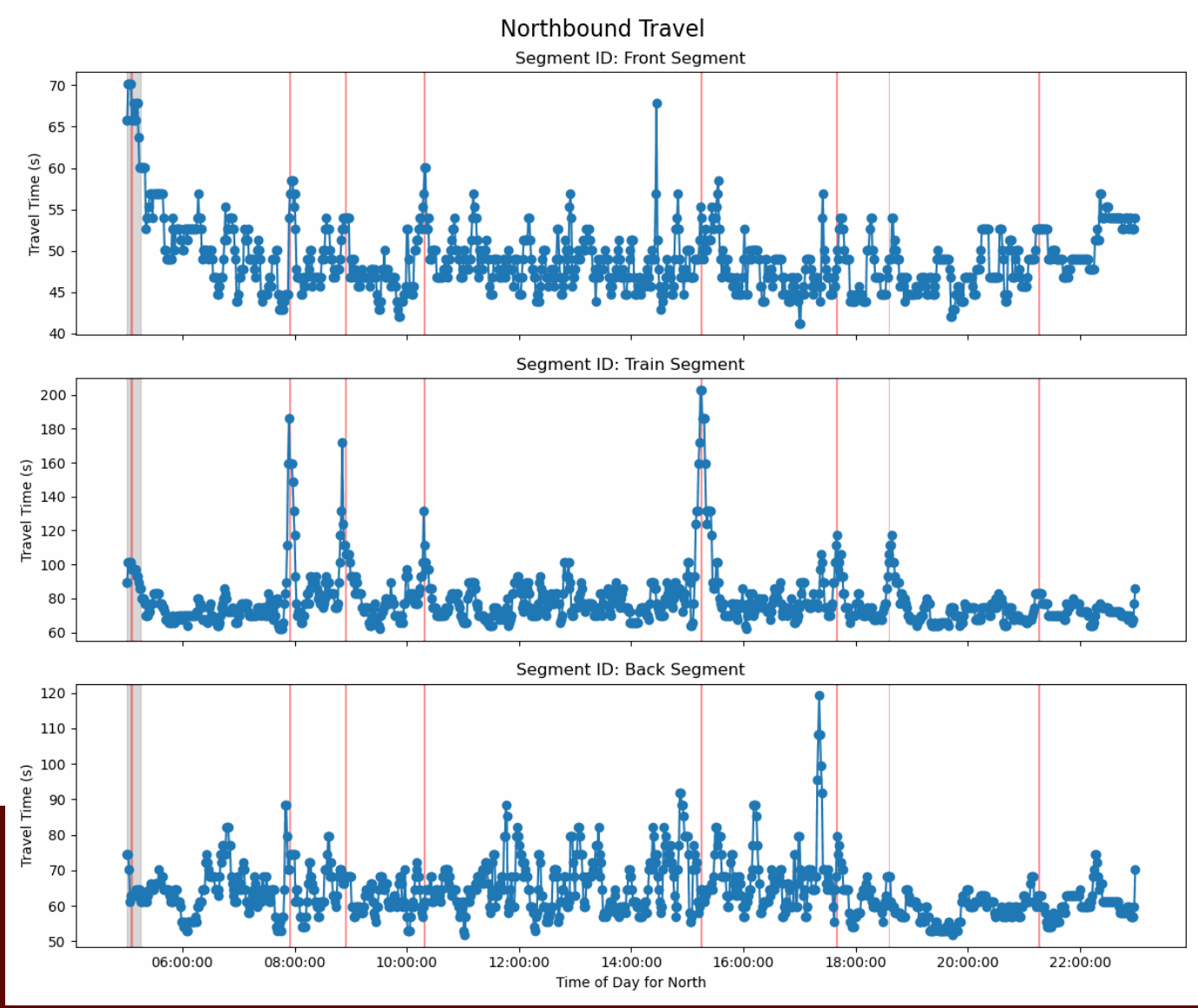
METHODOLOGY

- **When** are the trains coming?
- **Do** they affect the traffic?
- **How** long do they affect the traffic?

METHODOLOGY

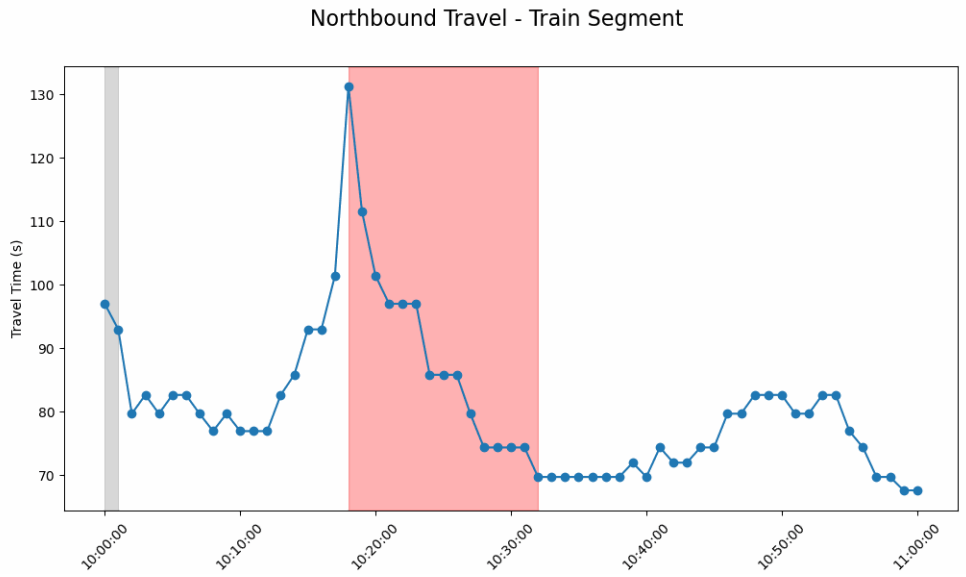
- **When** are the trains coming?
- **Do** they affect the traffic?

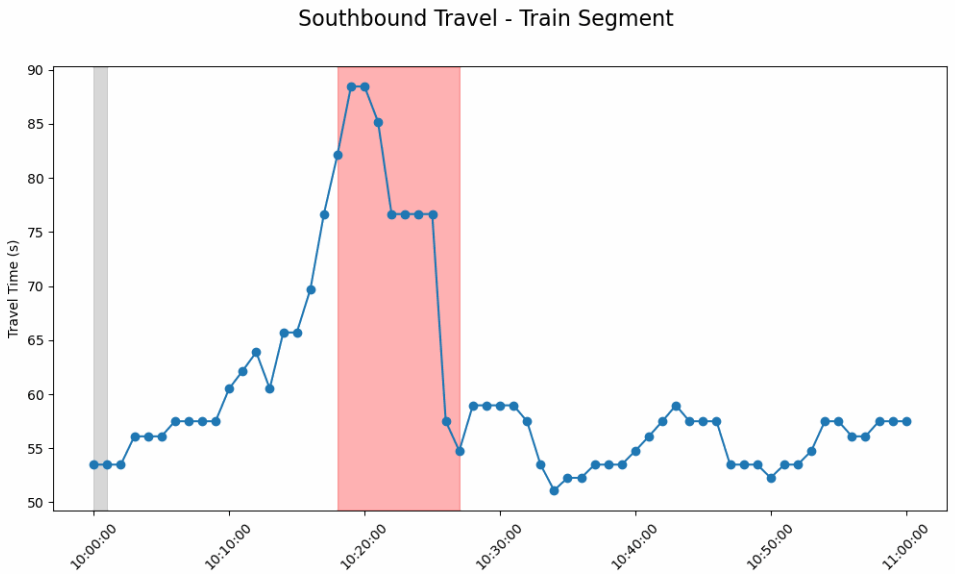




METHODOLOGY

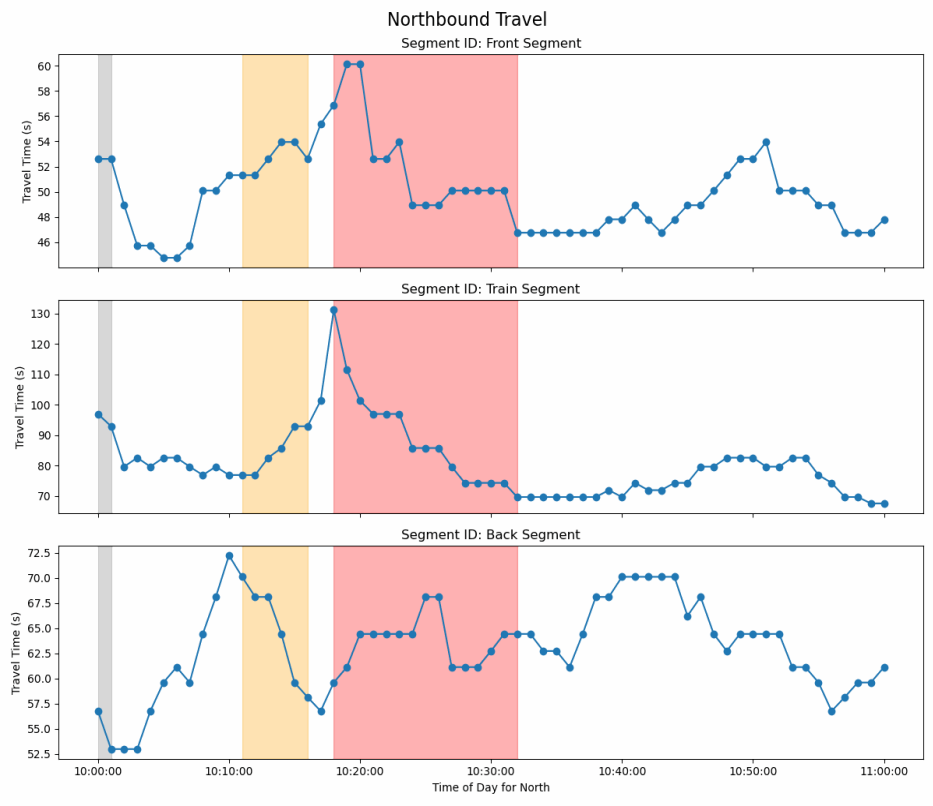
- **How** long do they affect the traffic?

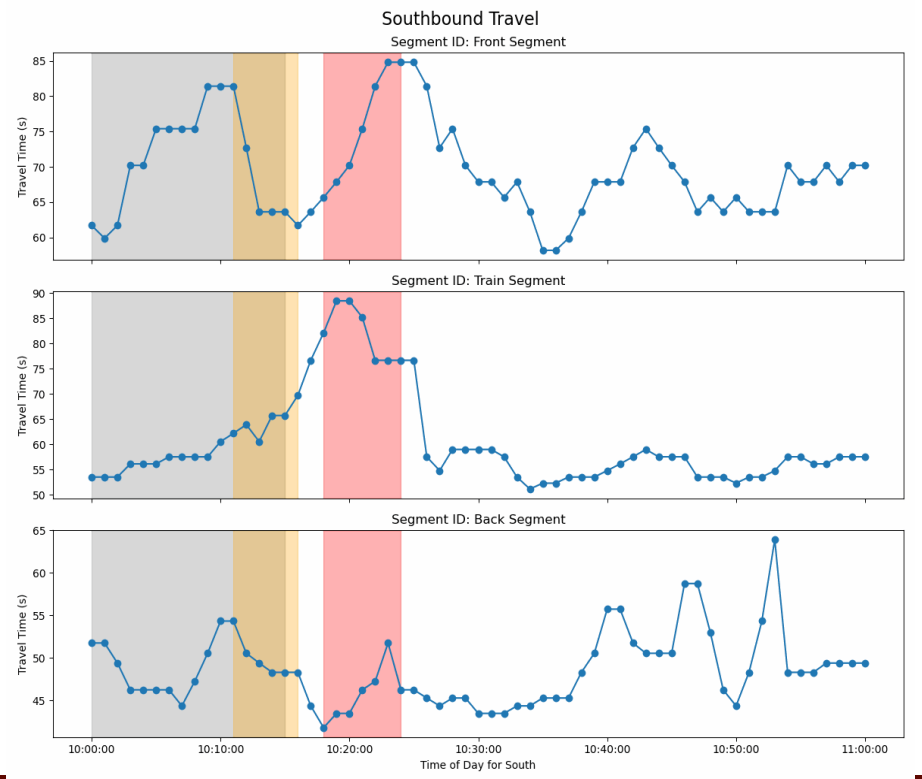




METHODOLOGY

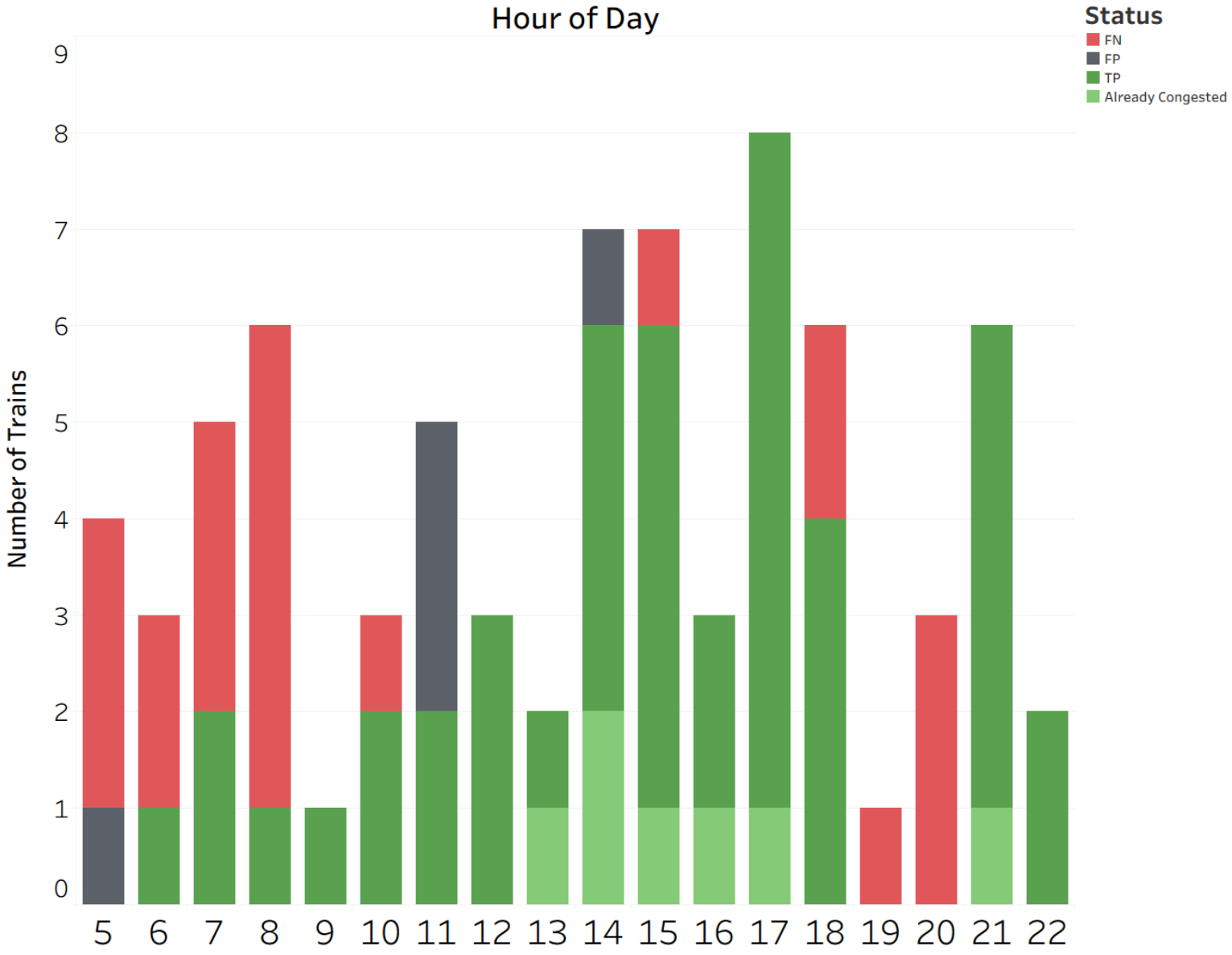
Example of Train vs RITIS data





RESULTS

Validation of the Algorithm



Issue	Reason
False Negatives	Not enough traffic to cause significant congestion (early AM)
False Positives	Train not present but congestion exists (weather, traffic)

RESULTS

Usual Trends – Average congestion per train

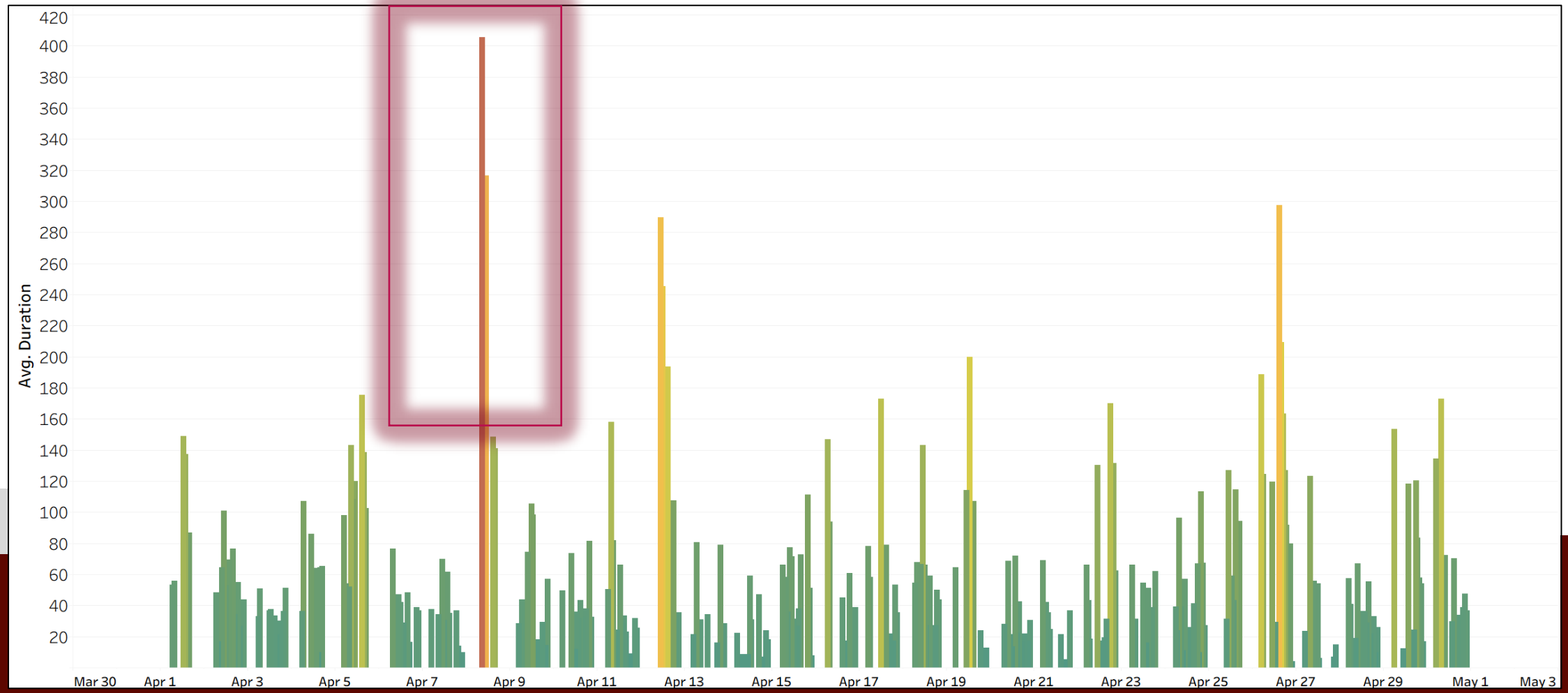
Day of Week	
Sunday	66.9
Monday	110.2
Tuesday	99.8
Wednesday	93.9
Thursday	119.0
Friday	169.7
Saturday	59.2

Month	
January	119.16
February	107.34
March	136.80
April	126.74
May	142.06
June	107.49
July	134.12
August	50.87
September	53.97
October	114.88
November	59.83
December	51.13

Hour	
5	111.81
6	117.13
7	110.36
8	112.64
9	107.32
10	112.42
11	119.08
12	111.34
13	97.50
14	95.17
15	98.43
16	96.36
17	93.18
18	101.82
19	97.64
20	98.48
21	80.01
22	37.77

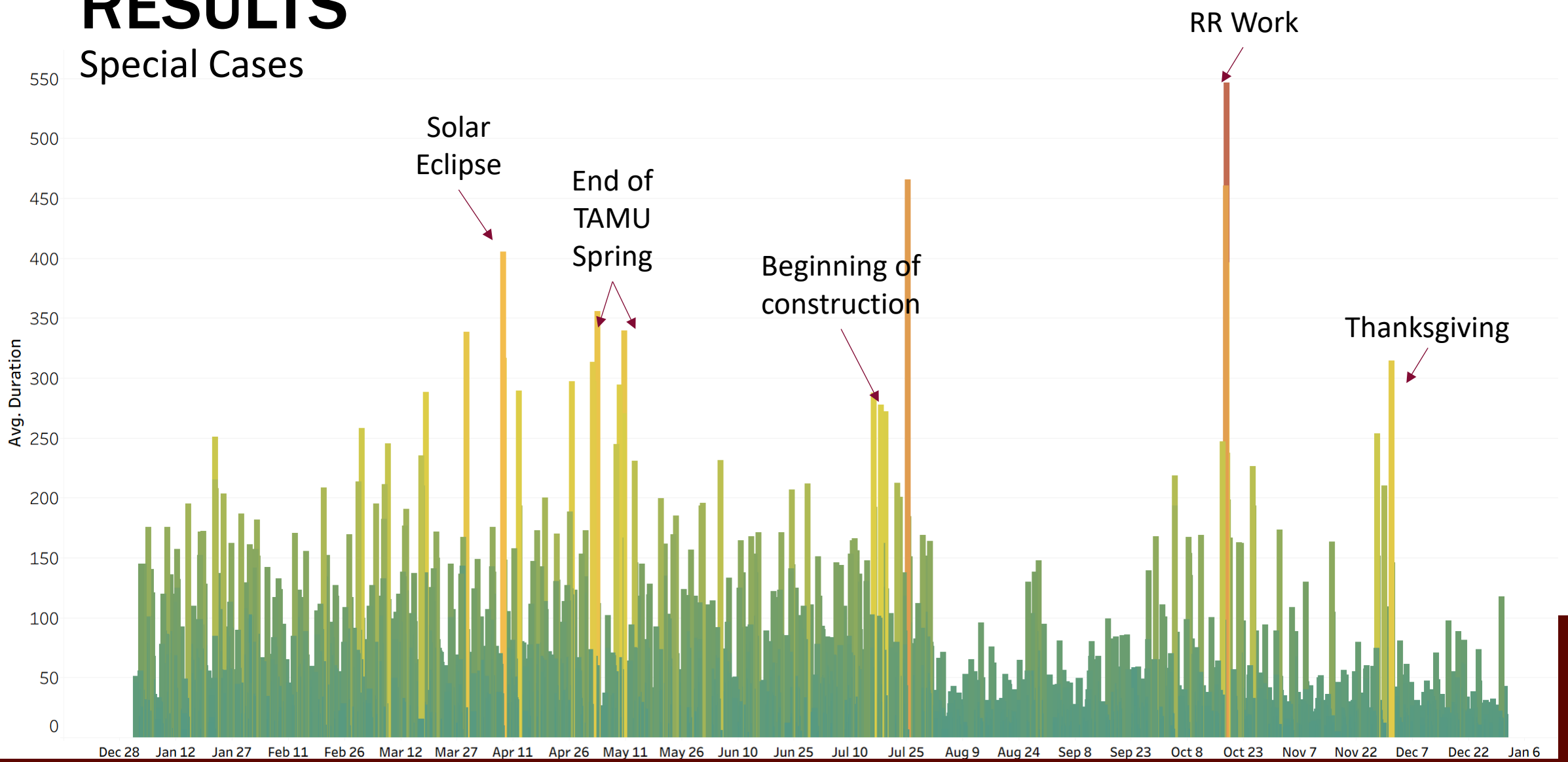
RESULTS

Special Cases – Average Congestion on Solar Eclipse Day



RESULTS

Special Cases



CONCLUSIONS

- Congestion induced by train
- Causational Analysis
- Applications
  - ✓Before-after
  - ✓School-zone compliance studies
  - ✓Moving work-zone analysis
  - ✓Ramp meter effectiveness

THANK YOU VERY MUCH

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