An Analytical and Data Visualization Framework to Identify High Priority Parking Needs from a Geographical and Temporal Demand and Supply Perspective

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Study Team

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Source: Texas Department of Transportation

Study Objectives

- Use Electronic Logging Device (ELD) data to develop an analytical framework for use by State Departments of Transportation to:

  - Assess truck parking needs.

  - Inform truck parking policy.

  - Prioritize investments in rest areas/facilities.

Truck Parking Needs Assessment Framework

- When and where do truck drivers stop because of HOS?
- Where are unauthorized truck parking clusters relative to the nearest truck parking facilities?
- What are the sizes of unauthorized truck parking clusters along the corridors?
- What is the capacity of truck parking facilities relative to the unauthorized truck parking clusters?
- Where are nearby truck parking facilities *when* the closest truck parking facility to the unauthorized parking cluster is completely full?

Truck Parking Needs Assessment Framework

- Selected two corridors in consultation with FMCSA
  - Current truck parking issues
  - Freight states (e.g., a state with port of entry)
  - States with urban centers (e.g., a state with consumers)
 - Rural state (e.g., state with rural areas)
  - Available data

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Truck Parking Needs Assessment Framework

- IH 35 Corridor
  - Texas
  - Oklahoma
  - Kansas
- IH 90 Corridor
  - Washington
  - Idaho
  - Montana

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Truck Parking Needs Assessment Framework

- ELD data
- Roadway Geometry data
  - Federal Highway Administration's Highway Performance Monitoring System (HPMS)
- Truck parking facilities data
 - American Truck Parking
  - Texas Truck Database
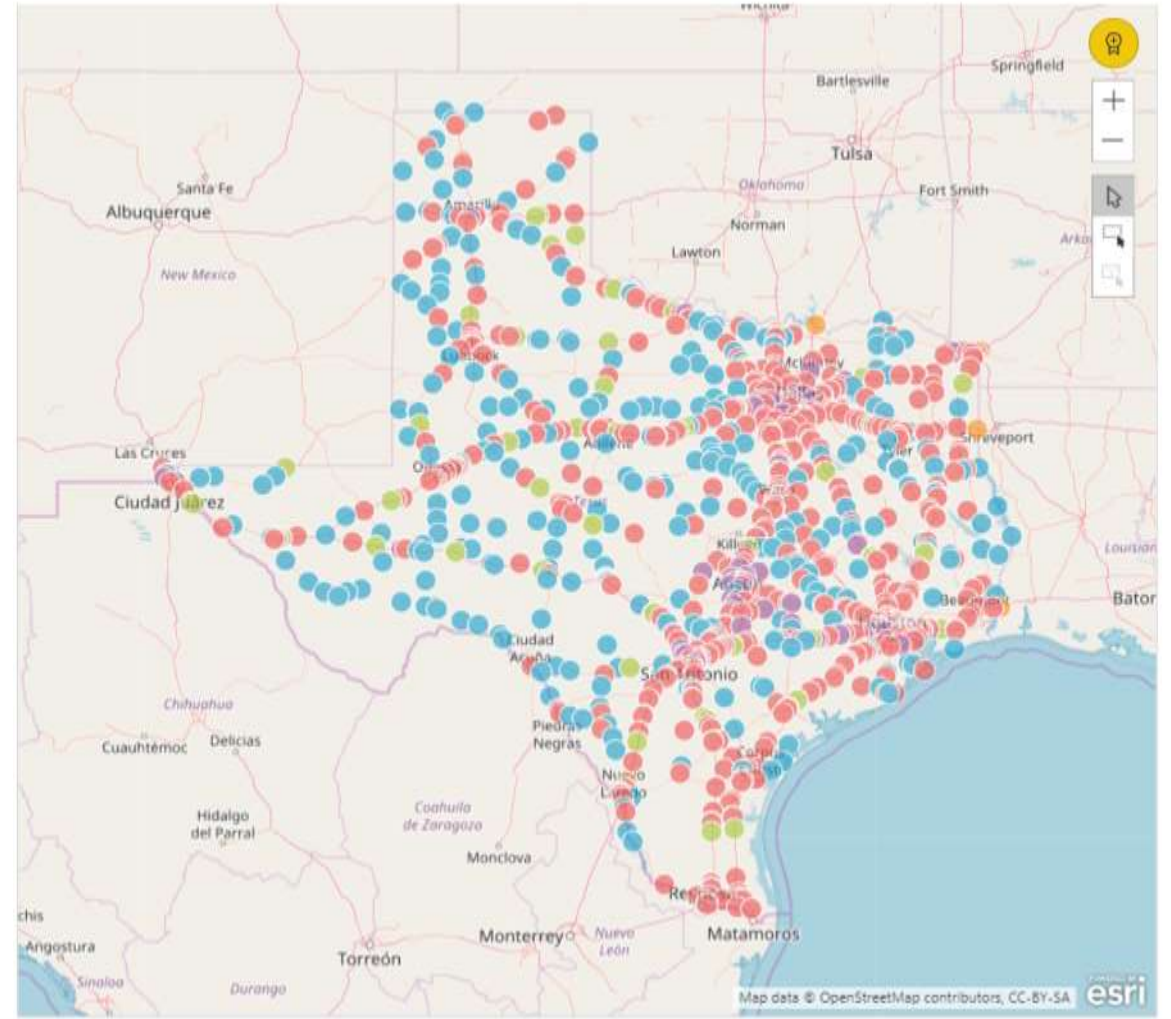
Truck Parking Needs Assessment Framework

- ## ELD Data
  - Covered April 1, 2018 to March 31, 2019
  - Trucks stopping > 30 minutes because of HOS requirements
  - Buffer zone of 1,000 meters (i.e., one kilometer)
    - Helped to better distinguish unauthorized parking clusters from authorized parking clusters
  - Truck parking clusters:
    - 380 parking clusters along IH 35
    - 276 parking clusters along IH 90

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Truck Parking Needs Assessment Framework

- Data Analytics Dashboards to visualize data
  - Where, when, and for how long truck drivers stop
  - Unauthorized parking clusters relative to parking facilities
  - Capacity of truck parking facilities along corridor
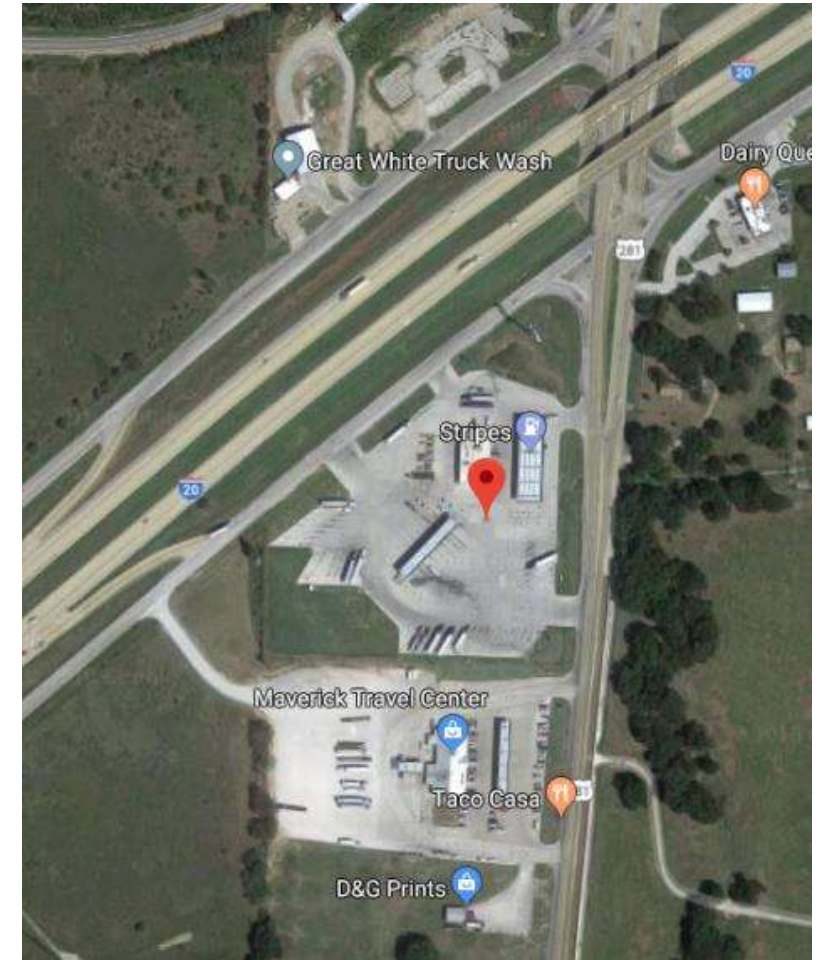
IH 35 Corridor

Truck Parking Needs Assessment Framework

- 215 truck parking facilities
- 9,042 truck parking spaces
- Average distance between truck parking facilities is 5.5 miles
- 380 sample truck parking clusters obtained
  - 61 unauthorized parking clusters (or 16 % of the sample clusters)
- Average size (number of trucks) of unauthorized parking clusters is 1.2 trucks
- Average distance between the unauthorized parking clusters and the nearest truck parking facility 4.62 miles

Distance Between Truck Parking Facilities Along IH 35

Truck Parking Needs Assessment Framework
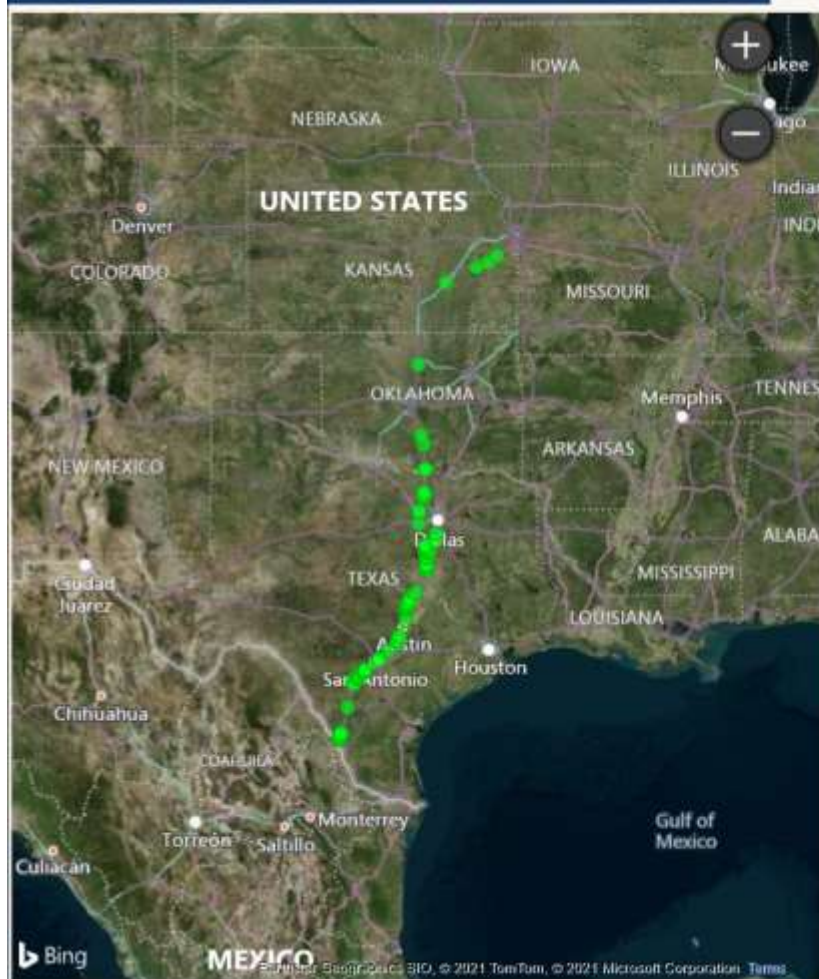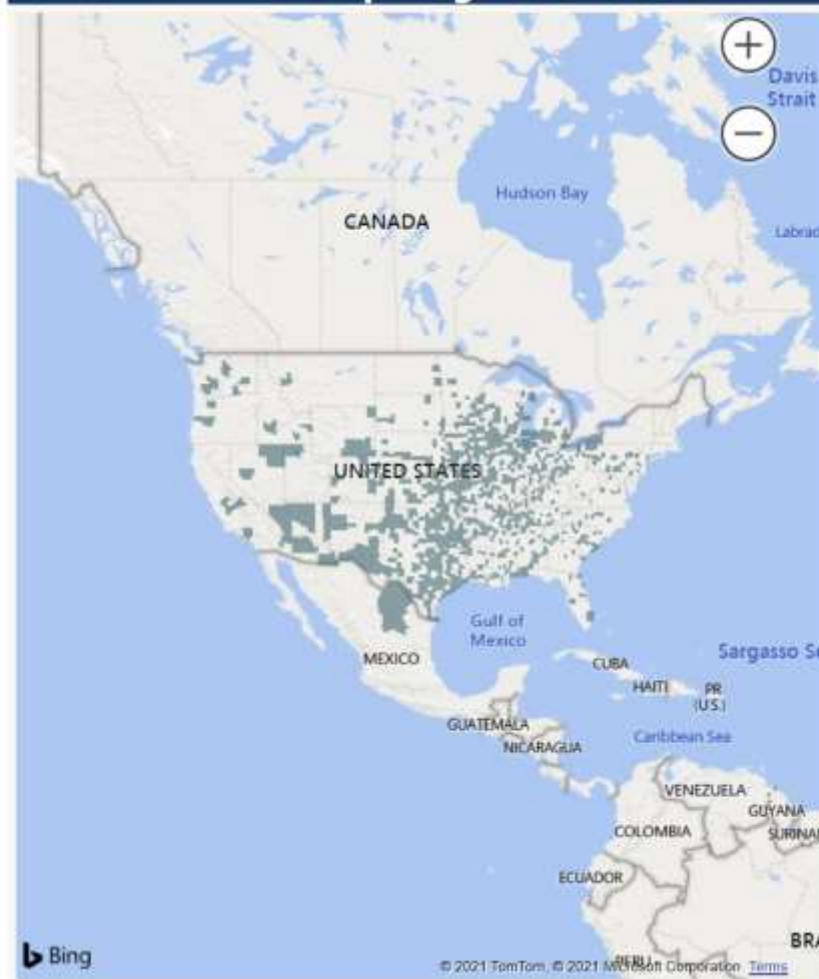
I-35 Corridor - Arrivals at Parking Clusters

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Stop Type
☐ Authorized
☐ Unauthorized

Direction
☐ NB
☐ SB
☐ Unclassifiable

Number of Arrivals
43754

Avg. Distance from Nearest Facility (mi)
4.51

Total Number of Clusters
380

Stop Duration (hr)
0 — 20

Unauthorized Category
All ⌄

I-35 Unauthorized Clusters
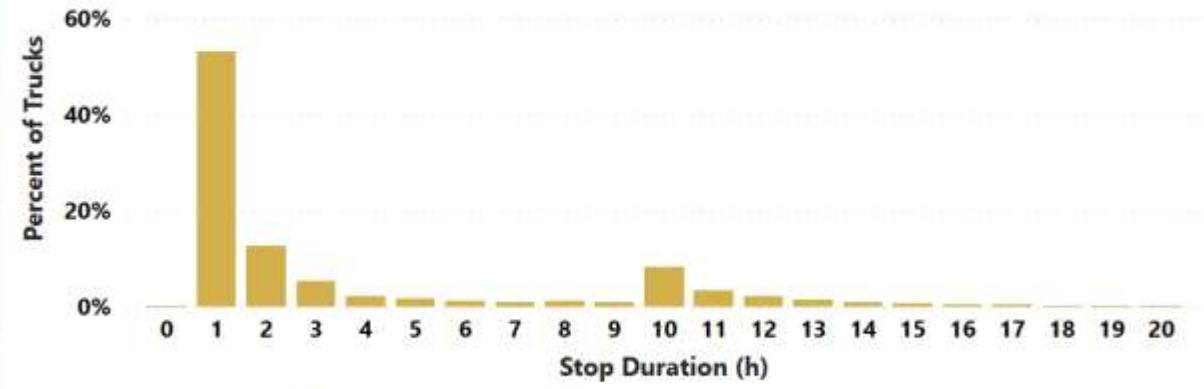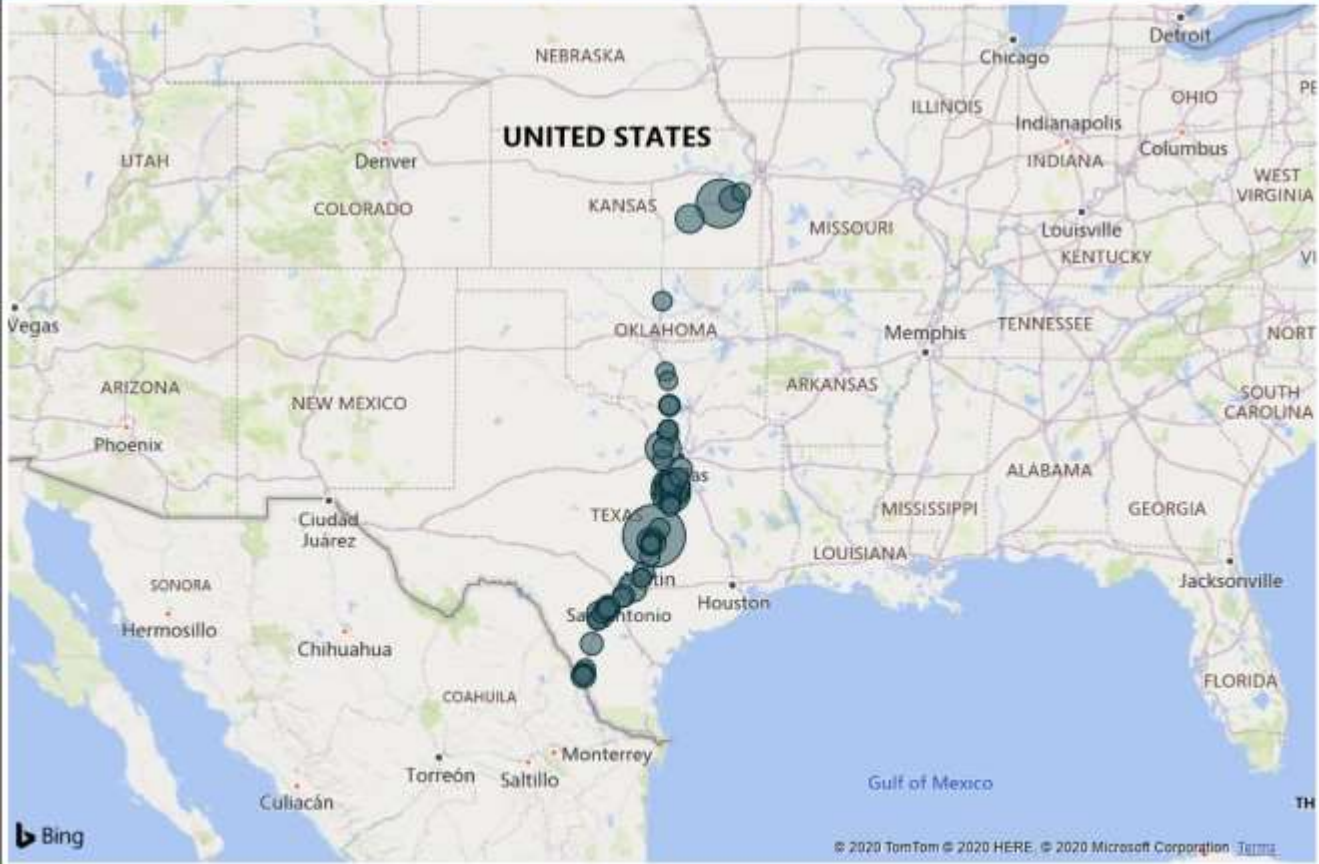

Percent of Trucks vs Stop Duration (h)

Monthly Average of Arrivals During Each Hour

Arrival Hour	Value
00:00	229
01:00	230
02:00	185
03:00	164
04:00	132
05:00	98
06:00	72
07:00	58
08:00	52
09:00	55
10:00	60
11:00	71
12:00	80
13:00	100
14:00	135
15:00	156
16:00	181
17:00	206
18:00	226
19:00	225
20:00	224
21:00	237
22:00	234
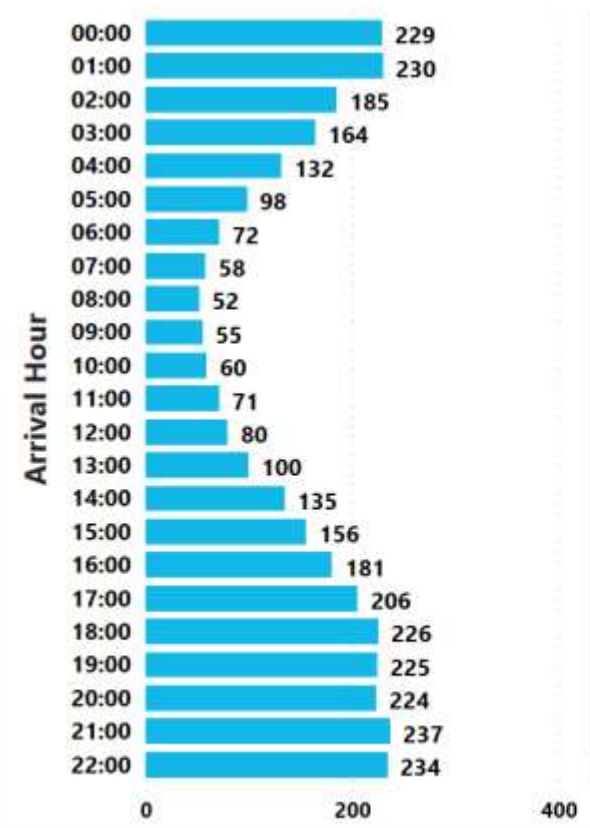
Number of Arrivals by Month

Month	Value
Jan	3424
Feb	3145
Mar	6185
Apr	6337
May	2801
Jun	2997
Jul	2945
Aug	2649
Sep	3264
Oct	3623
Nov	3237
Dec	3147

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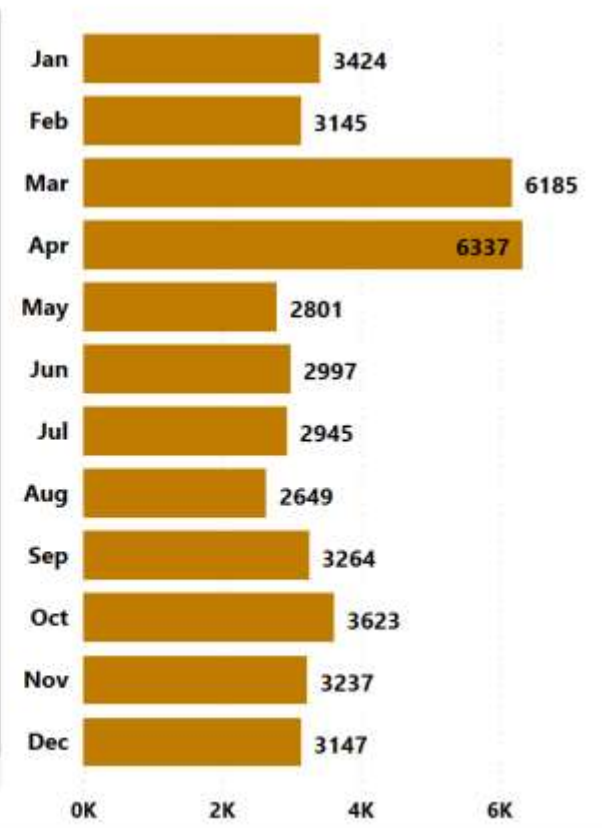
I-35 Corridor - Parking Clusters

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Stop Type
- ☐ Authorized
- ☑ Unauthorized

Direction
- ☐ NB
- ☐ SB
- ☐ Unclassifiable

Arrival Hour
0   23

Unauthorized Category
All ▾

Number of Clusters by weekday:
- Mon: 52
- Tue: 55
- Wed: 58
- Thu: 58
- Fri: 55
- Sat: 49
- Sun: 50
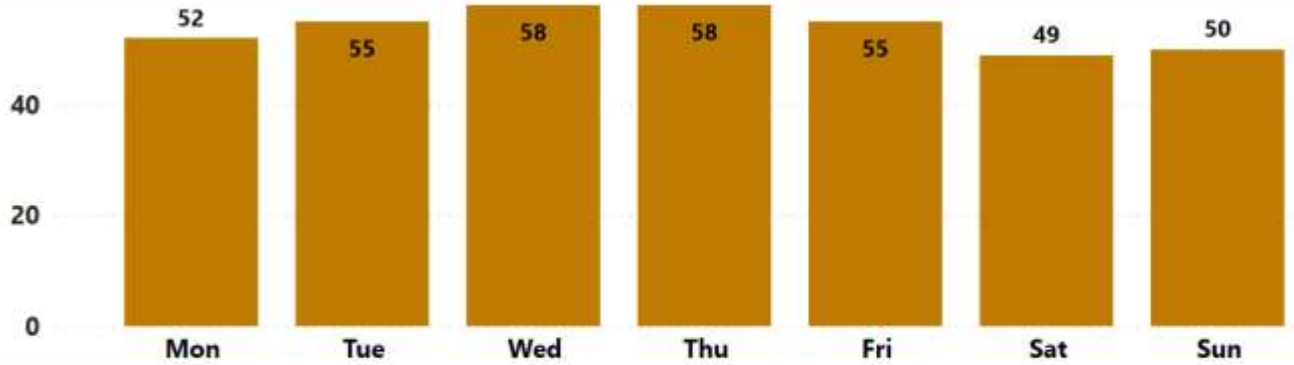
I-35 Unauthorized Clusters

Hourly Distribution of Number of Clusters

Arrival Hour	Number of Clusters
00:00	45
01:00	43
02:00	46
03:00	43
04:00	44
05:00	43
06:00	38
07:00	38
08:00	37
09:00	35
10:00	33
11:00	31
12:00	40
13:00	38
14:00	38
15:00	42
16:00	42
17:00	43
18:00	40
19:00	45
20:00	44
21:00	49
22:00	49
23:00	41

Number of Clusters by Month

Month	Number of Clusters
Jan	50
Feb	44
Mar	55
Apr	53
May	52
Jun	45
Jul	48
Aug	48
Sep	52
Oct	51
Nov	47
Dec	50

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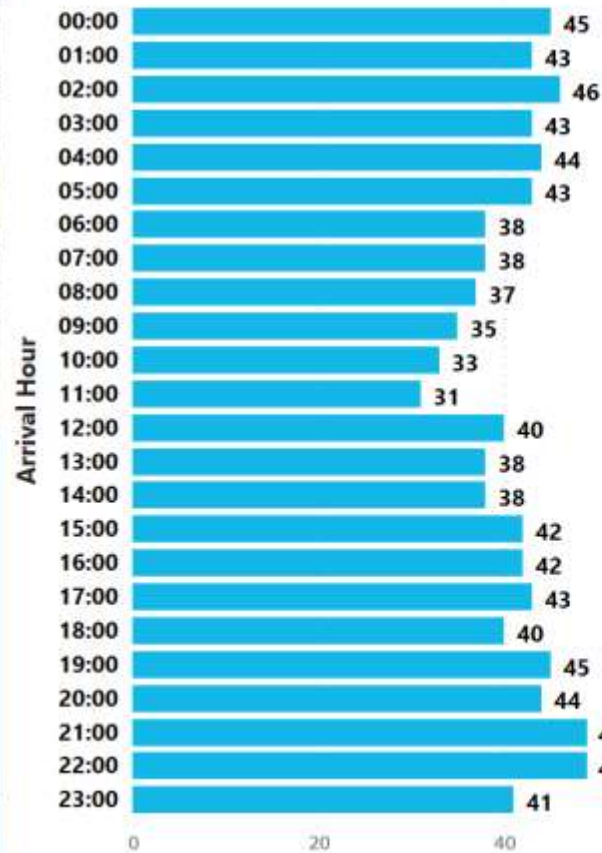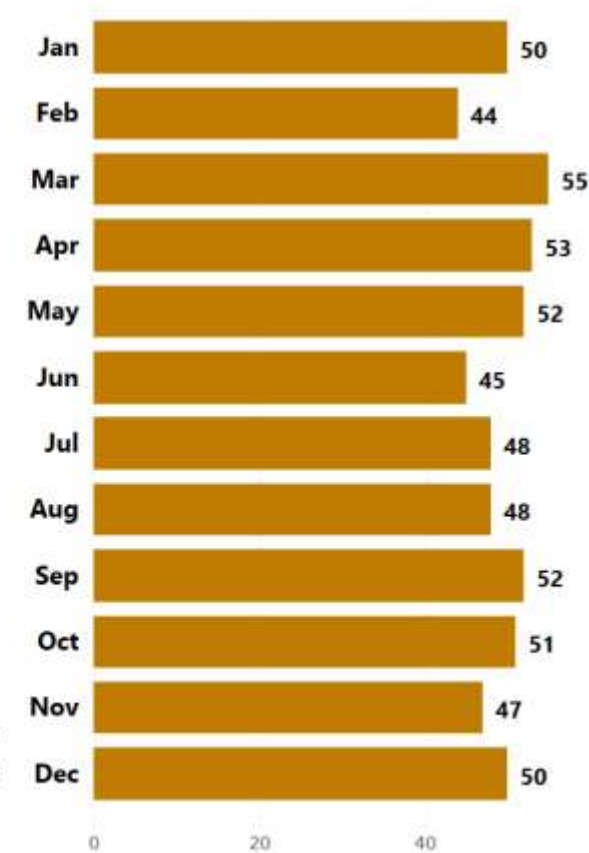
I-35 Corridor - Unauthorized Parking Clusters

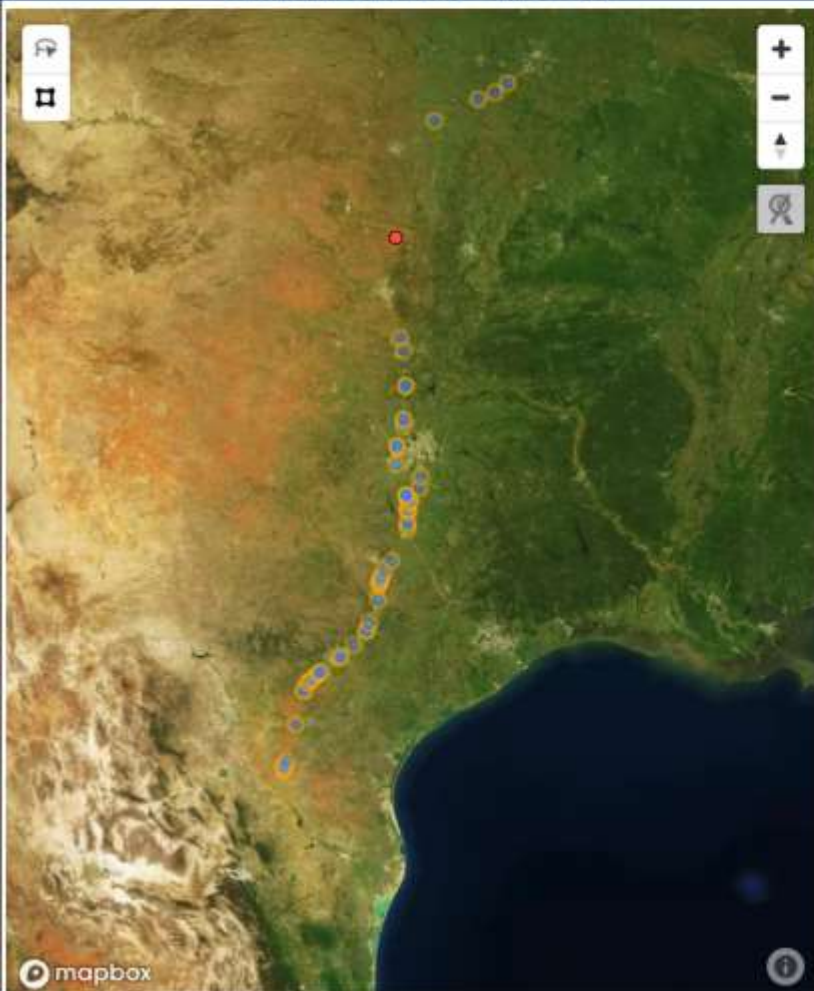Texas A&M Transportation Institute

Number of Truck Spaces within Selected Distance
948

Avg. Truck Volume for Nearest Highway Section
5,832

Unauthorized Clusters

Maximum Driving Distance from Selected Cluster (mi)

60

Truck Parking Facilities

Facility ID	Distance from Cluster (mi) ▲	Truck Spaces
F35-212	0.07	5
F35-117	0.99	23
F35-141	8.45	10
F35-142	9.45	10
F35-211	12.17	10
F35-210	13.61	4
F35-209	15.63	5
F35-213	16.90	23
F35-144	22.53	16
F35-143	22.60	16
F35-214	25.05	95
F35-215	28.16	124
F35-116	29.00	105
F35-137	37.70	17
F35-136	37.71	18

Truck Spaces	within Driving Distance (mi) ▲
48	10
62	15
90	20
122	25
446	30
446	35
513	40
513	45
720	50

Truck Parking Needs Assessment Framework

- Interesting differences:
  - Number and percentage of unauthorized truck parking clusters
  - Size of the unauthorized truck parking clusters
  - Categories of unauthorized parking clusters
  - Temporal distribution of the truck arrivals
  - Average distance between the unauthorized parking clusters and the nearest truck parking facilities
  - Average stopped time at the unauthorized truck parking clusters
    - Demand for short term parking is evident

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Future Research

- Short-term and long-term parking needs
- Emerging pay-to-park business model
- Use of truck parking capacity by time of day, day of week, or month

Source: Texas Department of Transportation

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Questions

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