Delivery Truck Route Planning

Data Science Capstone Project, October 9th Cohort

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What is the Problem?

Delivery Truck Route Map Inefficiencies

The Problem:

Delivery truck routes are created based on zip codes which can be an inefficient method of plotting routes.

Constructing delivery routes in this manner does not take into account the domain knowledge of city roads necessary to implement maximally efficient routes.

What is the Problem?

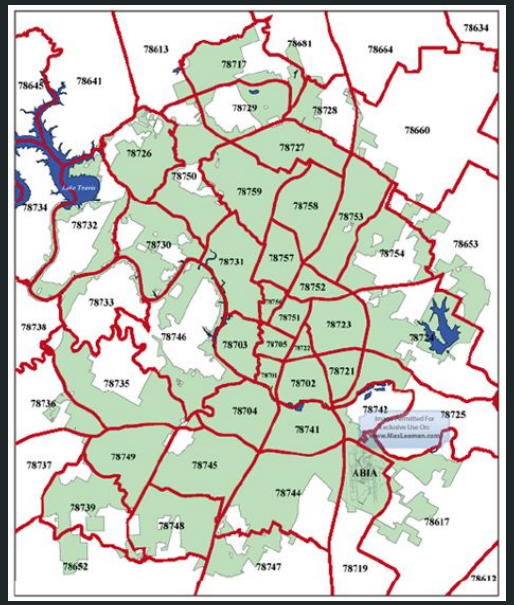
Delivery Truck Route Map Inefficiencies

<u>There are 88 Zip Codes in Austin</u>

Speaking with a local delivery business that has 36 routes in Austin, and that they plan their routes by zip code.

When we create route maps based purely on zip codes, we do not take traffic into account. While a gps may help one navigate this real time, it does not inform route planning.

If we could use common traffic patterns to better plan routes, this would improve efficiency and save time and money.



Who Can This Help?

Any Company Using Delivery Trucks

What Factors Can Affect Traffic?

Traffic incidents occur about once every 71 seconds in the state of Texas.
Even minor incidents can cause traffic build up for long stretches of time.
What are some variables at play when it comes to incidents and the timespan necessary to resolve them.

Where	Where in Austin are we driving
When	When in the day are we driving?
What	What is the type of incidents occur?
Why	Do we know why an incident occured?
How	How long does it take to resolve an issue?

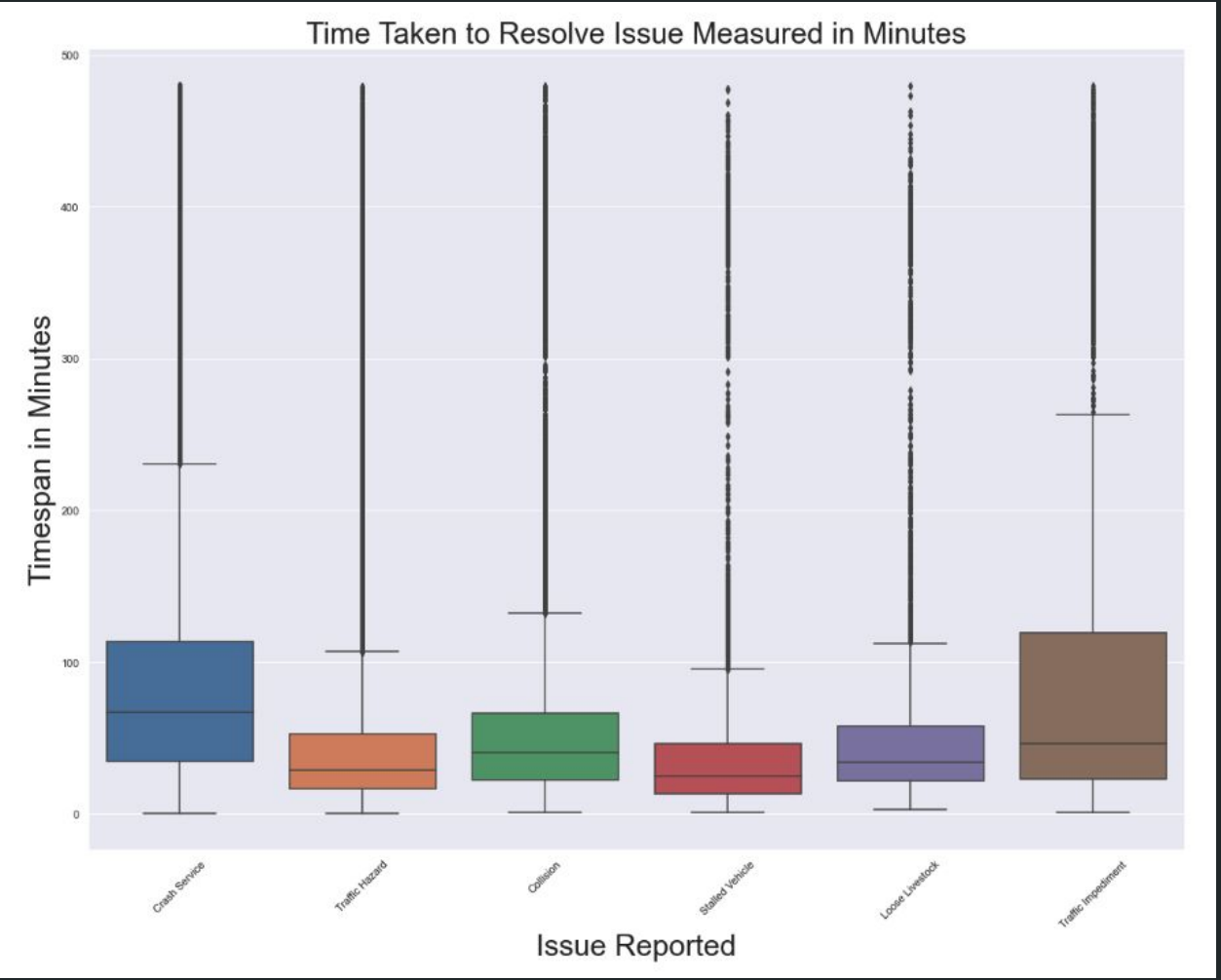
Data Information

The data for this project was collected by the city of Austin and obtained from the Austin's Open Data Portal

The specific dataset is titled Real-Time Traffic Incident Reports

Period of Data Collection	The dataset has a start date of 2017-09-26 and an end date of 2021-12-13
Original Number of Rows	There are 249,650 incidents
Original Number of Features	9

What Were the Key Takeaways After Examining the Data?



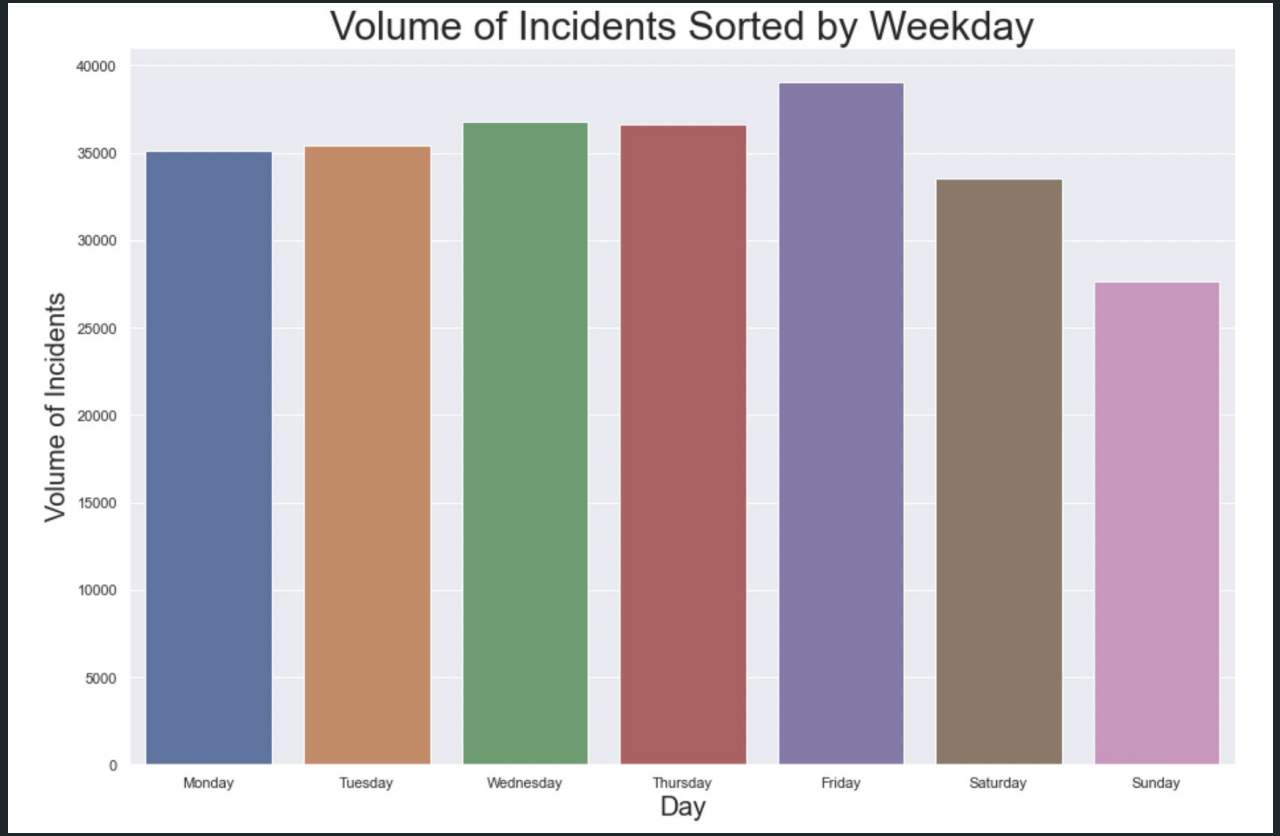
Looking at this boxplot we of how long each traffic issues takes to resolve, we can draw the following conclusions:

1. Crash Service, Traffic Impediment and Injury/Fatality take the longest time to resolve.

2. Stalled Vehicle and Traffic Hazard take the least time to resolve.

3. Collision and Loose Livestock take a moderate amount of time to resolve

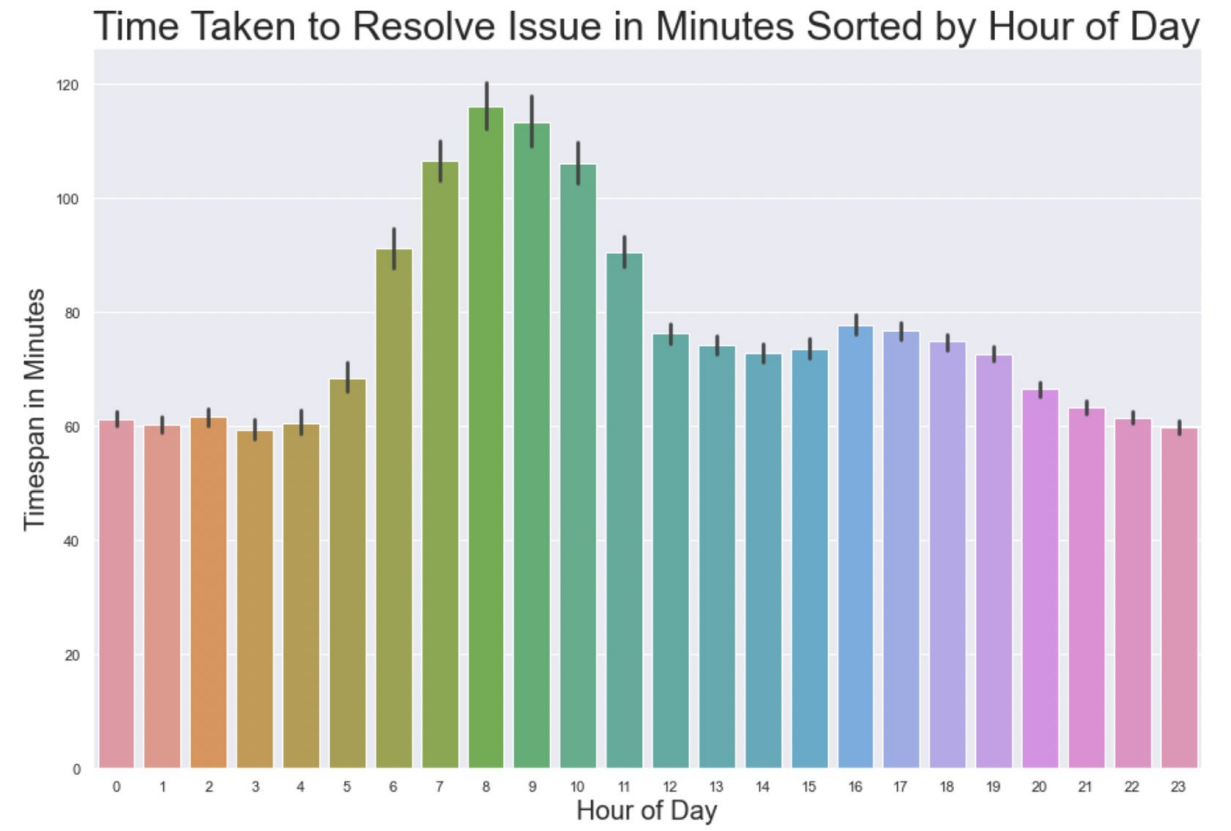
Taking a Look at the Volume of Traffic Incidents Sorted by Day



There is a slight **spike** in traffic incidents on **Friday**

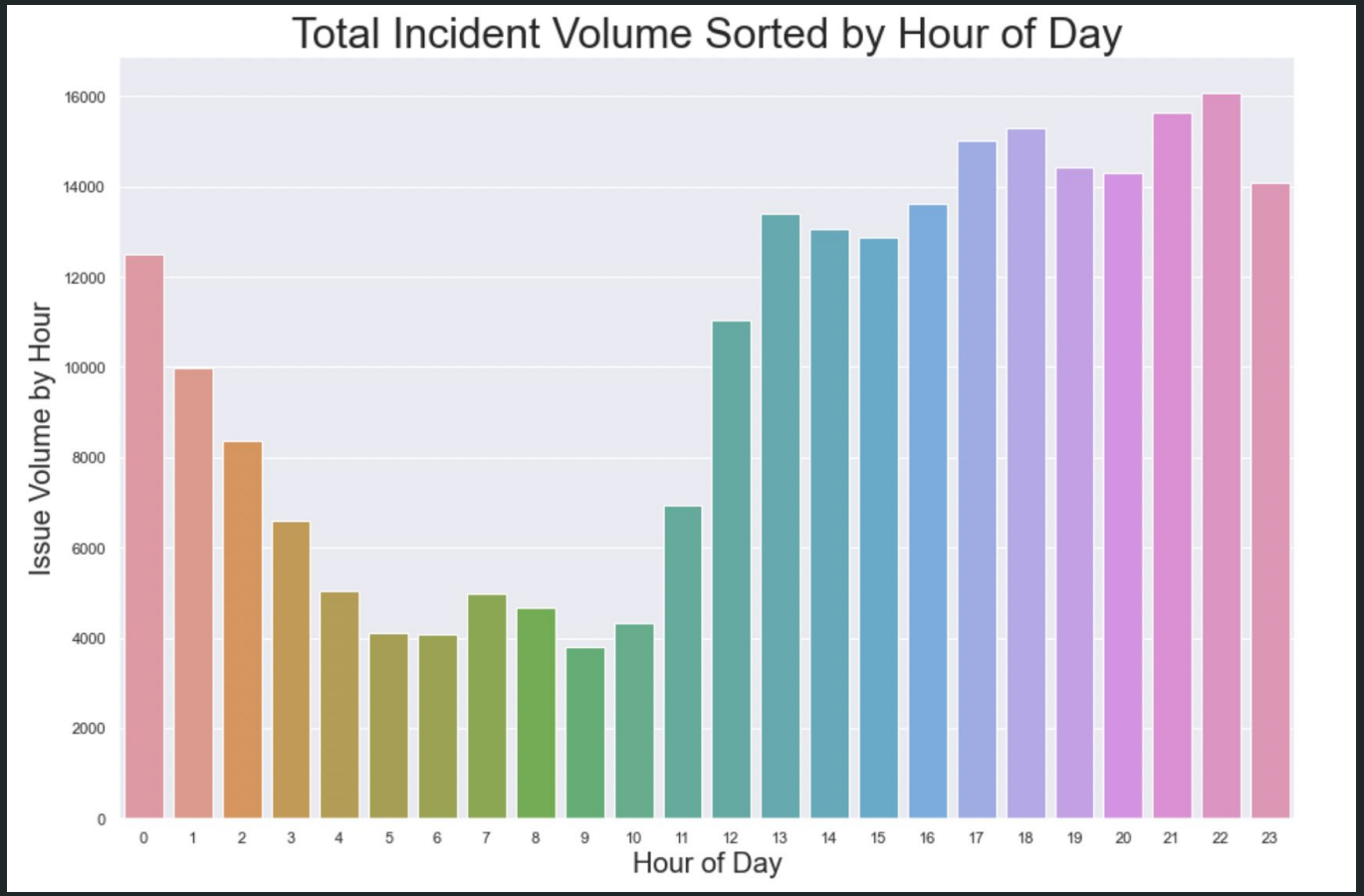
There is a slight **dip** in traffic incidents on **Sunday**

Does it Take Longer to Resolve an Issue Depending on the Hour of the Day?



In general, issues take longer to resolve in the morning hours between 6:00 am and noon.

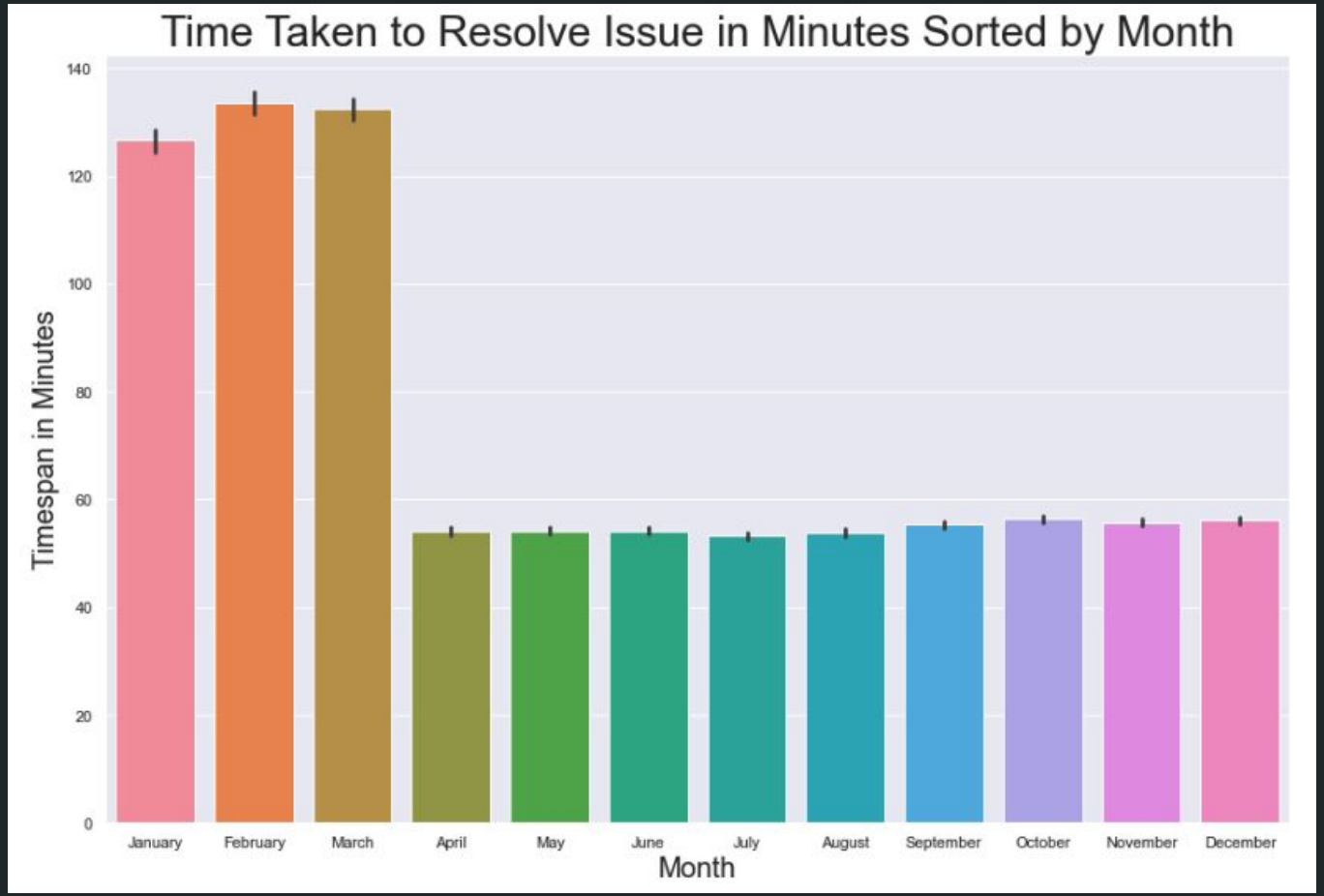
Are Traffic Incidents More Likely During Certain Hours?



There is a dip in incidents in the early hours of the day

Most traffic incidents occur after 12:00 pm

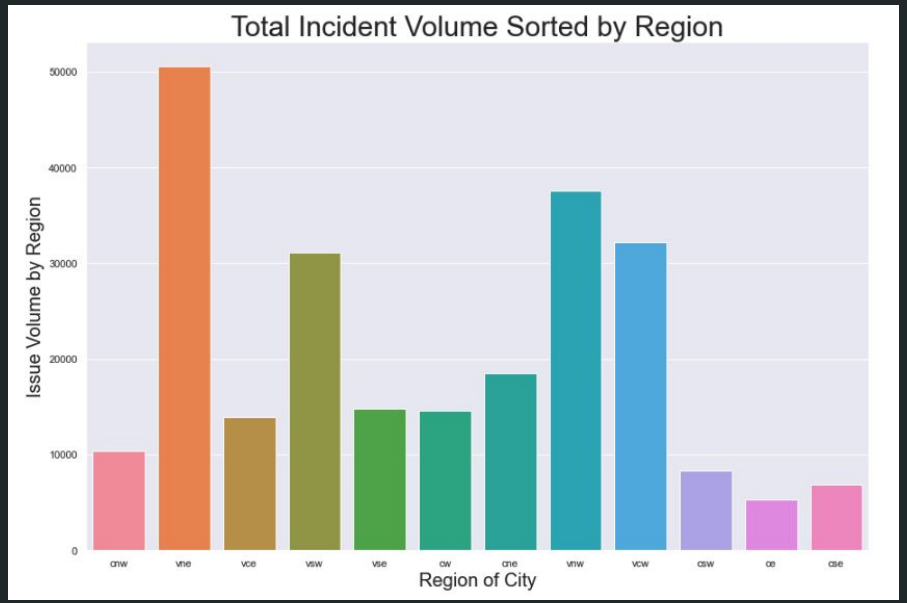
Does it Take Longer to Resolve an Issue Depending on the Month?

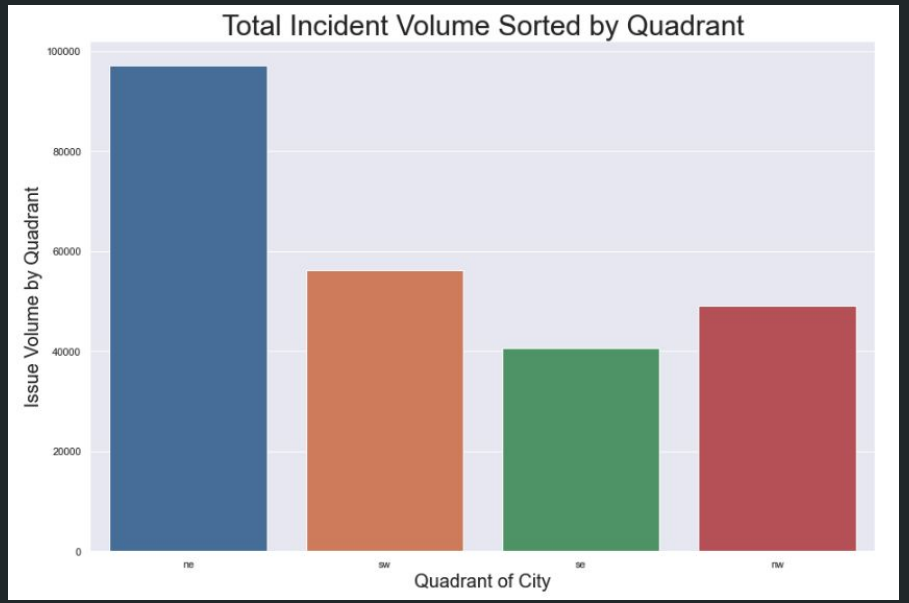


Issues appear to take much longer to resolve based on whether or not they occur in the first quarter of the year.

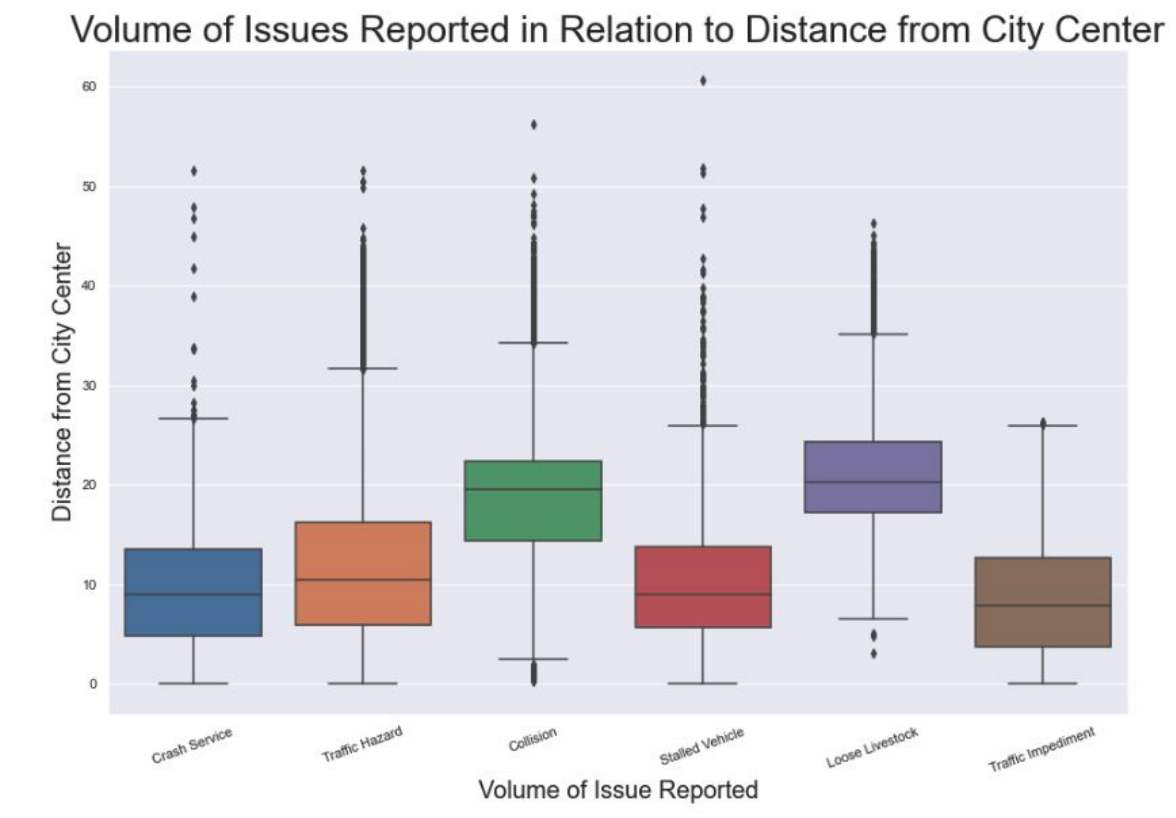
Are Traffic Incidents Evenly Distributed Across All Areas of the City?

Cross referencing confirms that most traffic incidents take place in the northeast part of the city





Are Certain Incidents More Likely to Happen Downtown?

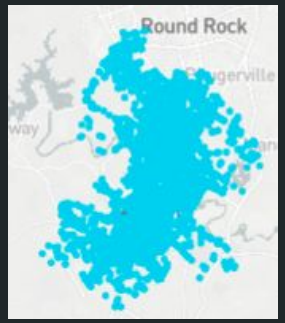


The stalled vehicle, crash service and traffic impediment issues are more prevalent in the central part of the city.

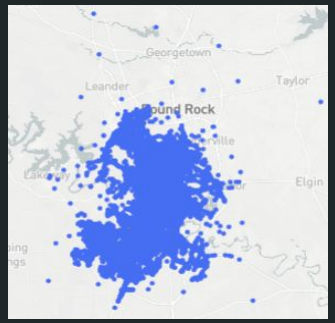
The injury/fatality, vehicle fire and loose livestock issues appear mostly farther from the city center.

What is the Geographic Distribution of the Different Issues?

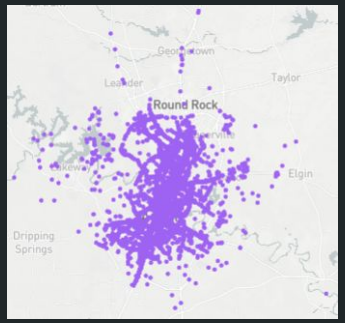
Traffic Impediment



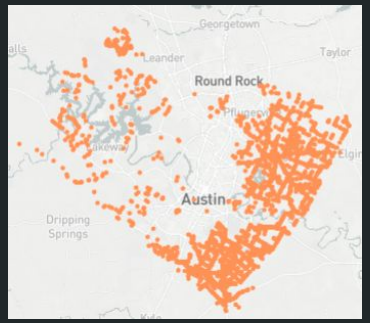
Crash Service



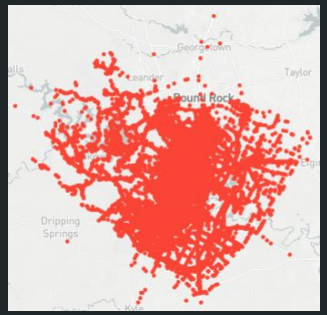
Stalled Vehicle



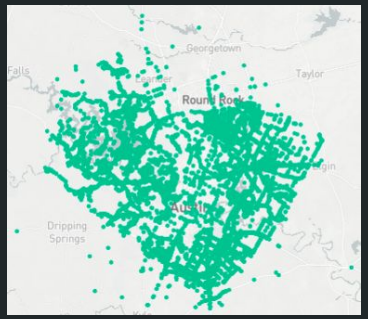
Loose Livestock



Traffic Hazard



Collision



Recommendation for Route Planning

- All route planning should avoid travelling long distances on the east side of town if not necessary for specific delivery. All travel routes should start and end away from high volume areas like the northeast.

- Work weeks should consist of four 10 hour days rather than five 8 hour days. This way Friday can be avoided entirely as we know this is a high incident volume day.

- Routes should depart as early as possible to avoid rush hour and the lengthy time spans associated with incidents at that time.