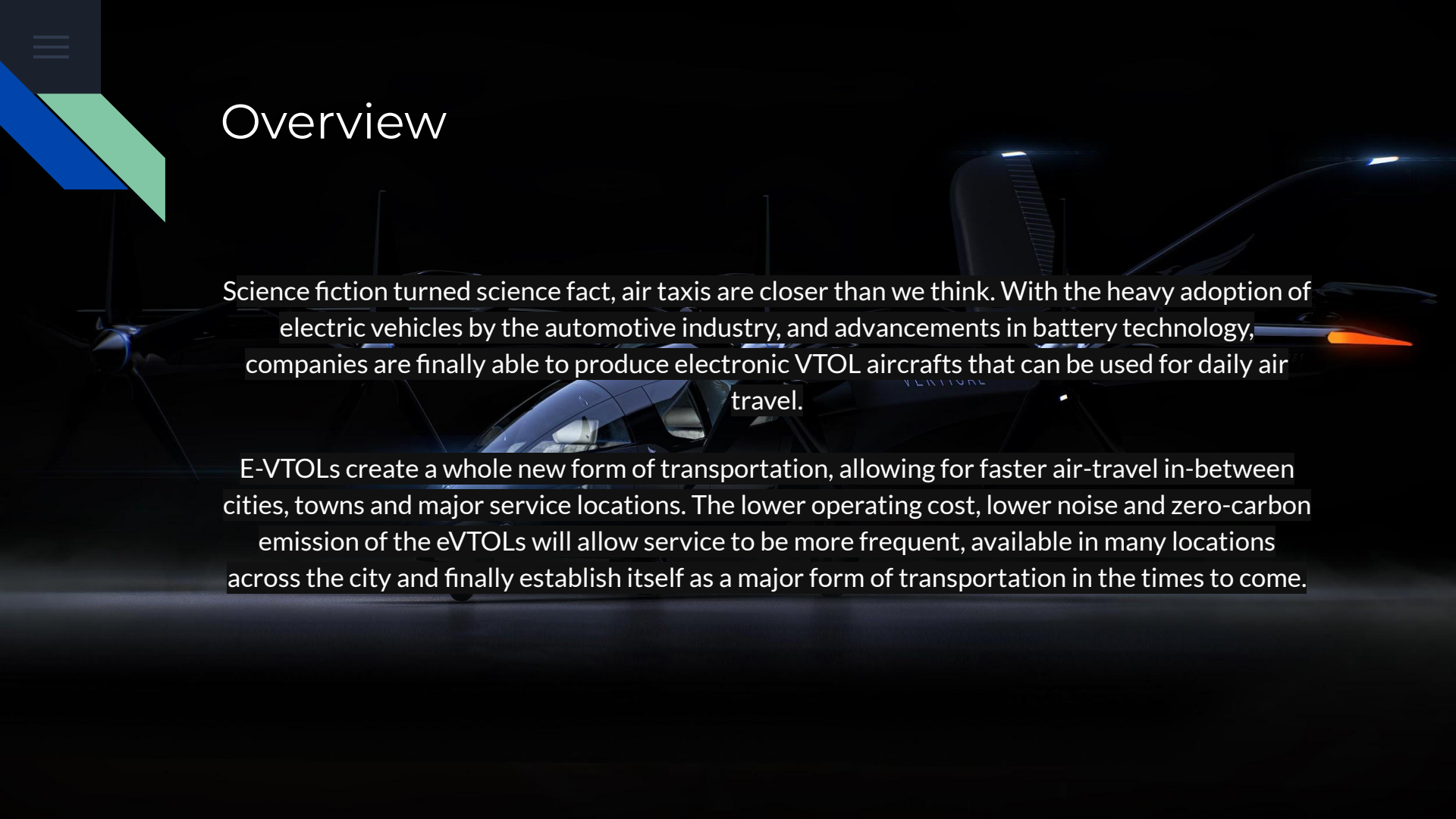
Predicting demand and location for Air-Taxi services

Table of Contents

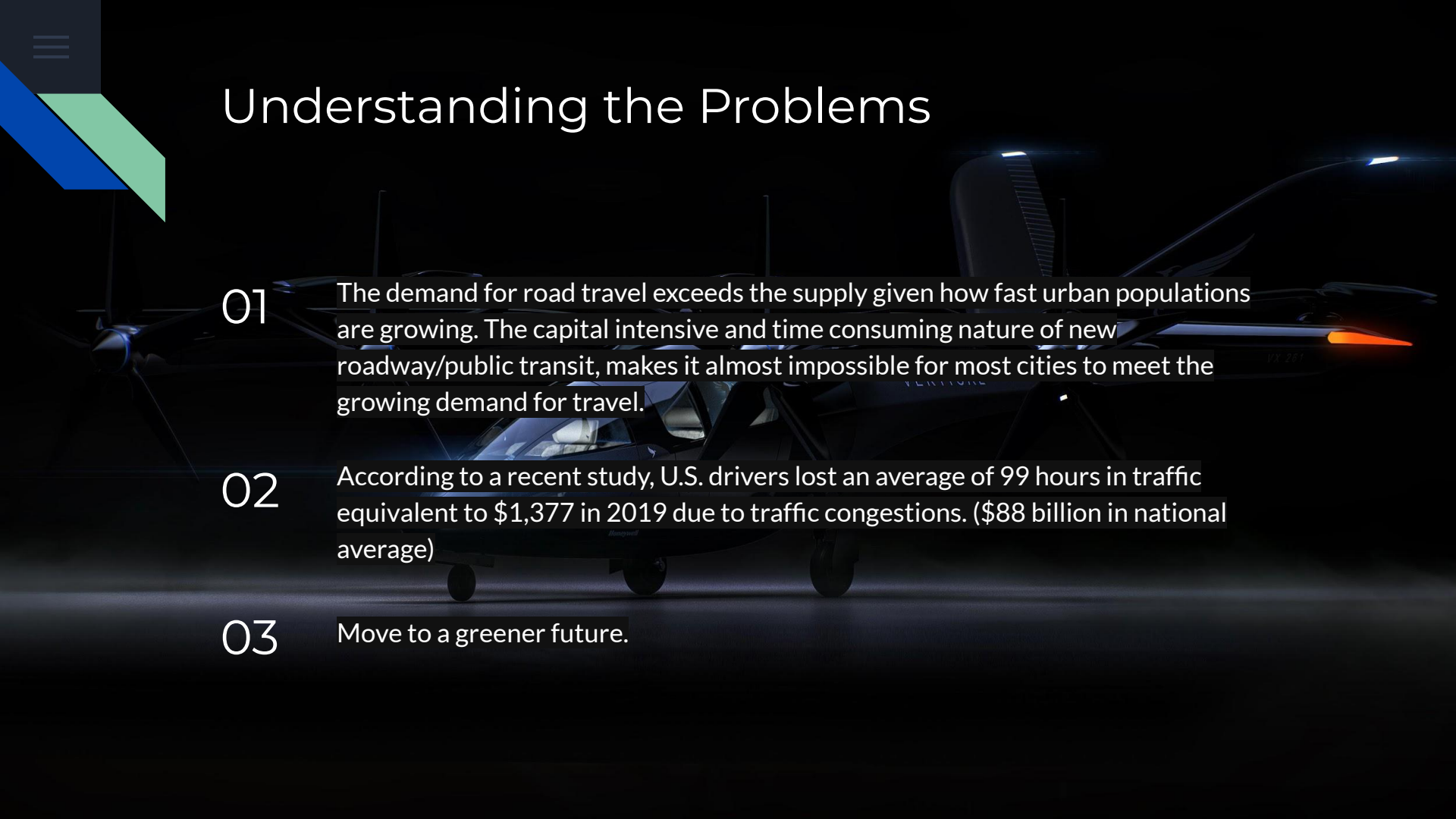
Overview



Science fiction turned science fact, air taxis are closer than we think. With the heavy adoption of electric vehicles by the automotive industry, and advancements in battery technology, companies are finally able to produce electronic VTOL aircrafts that can be used for daily air travel.

E-VTOLs create a whole new form of transportation, allowing for faster air-travel in-between cities, towns and major service locations. The lower operating cost, lower noise and zero-carbon emission of the eVTOLs will allow service to be more frequent, available in many locations across the city and finally establish itself as a major form of transportation in the times to come.

Understanding the Problems



01 The demand for road travel exceeds the supply given how fast urban populations are growing. The capital intensive and time consuming nature of new roadway/public transit, makes it almost impossible for most cities to meet the growing demand for travel.

02 According to a recent study, U.S. drivers lost an average of 99 hours in traffic equivalent to $1,377 in 2019 due to traffic congestions. ($88 billion in national average)

03 Move to a greener future.

Project Objective

- Explore FasTrak data to analyze traffic movement and density in the Bay Area.

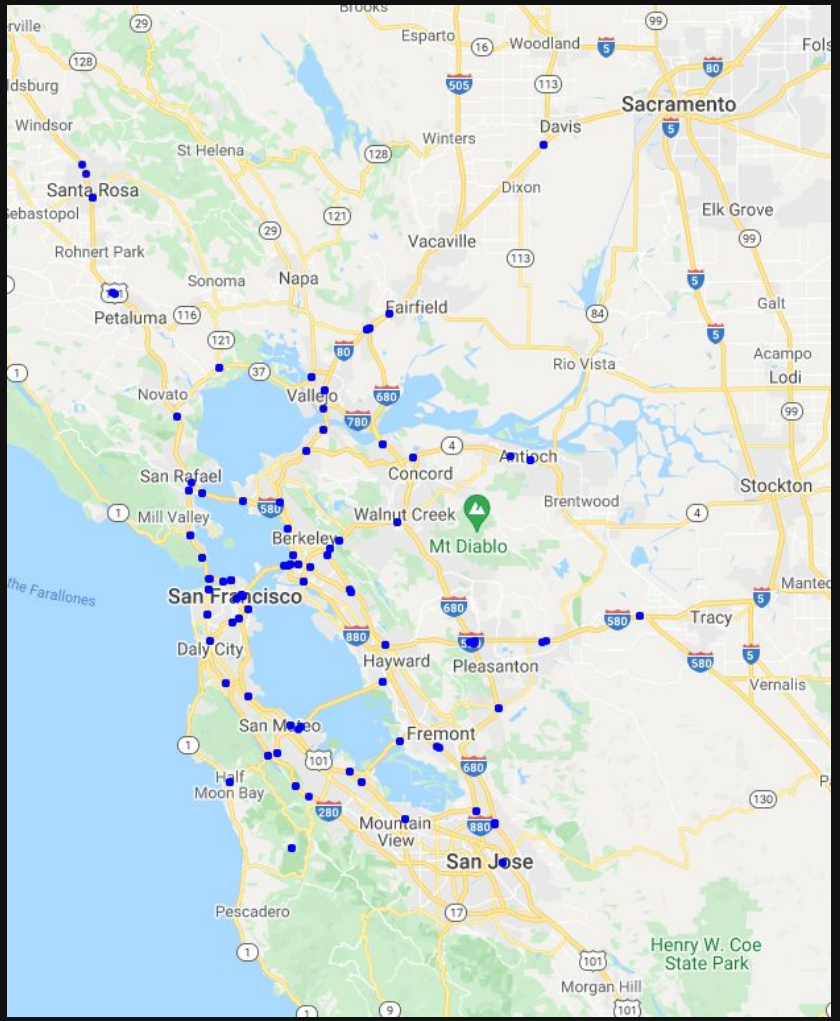
- Find traffic hotspots to serve as air-taxi hubs.

- Analyze transportation needs at each location.

- Recommend optimal location, service routes and hours of operations for air-taxi service.

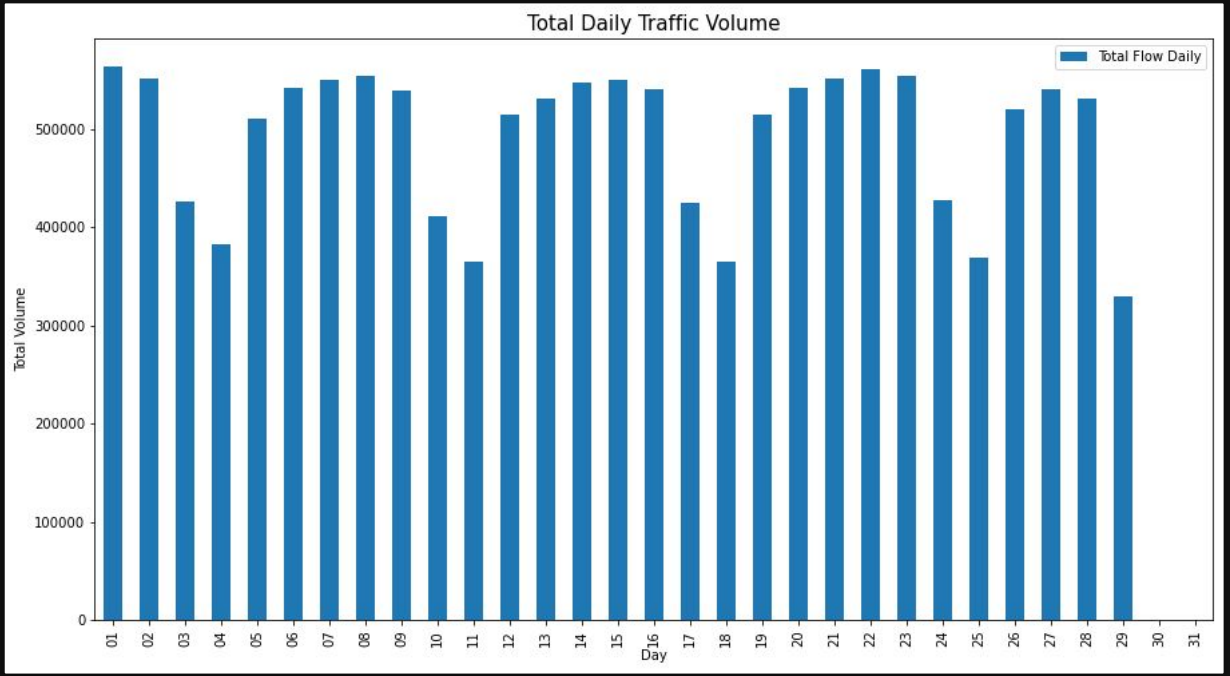
Data/Assumptions

- FasTrak toll services.
- Demand is forecasted using 10% estimate on volumes observed at each FasTrak locations.
- Information received at each FasTrak location is the most accurate representation of demand at that location.



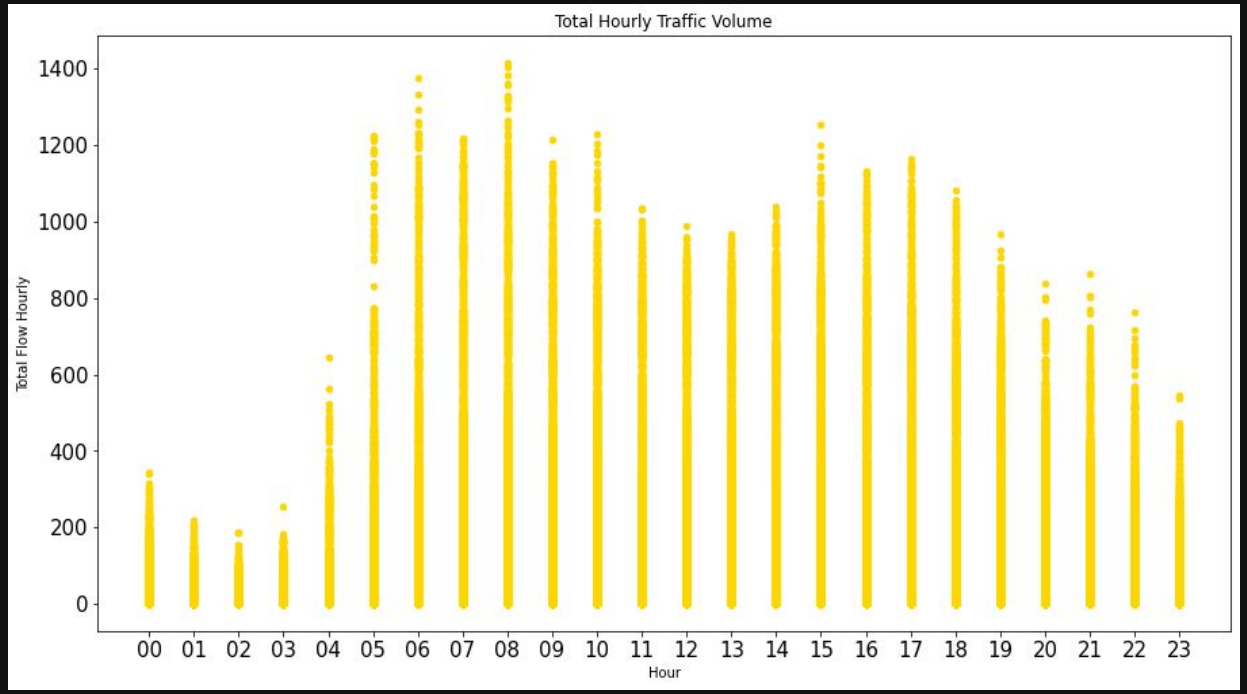
Traffic Trends - Daily

Exploring the data we can see clear trends on daily and hourly volume of traffic in the Bay Area.



- Traffic shows an increasing trend Monday through Friday.
- There is a sharp decrease in traffic during the weekends.

Traffic Trends - Hourly

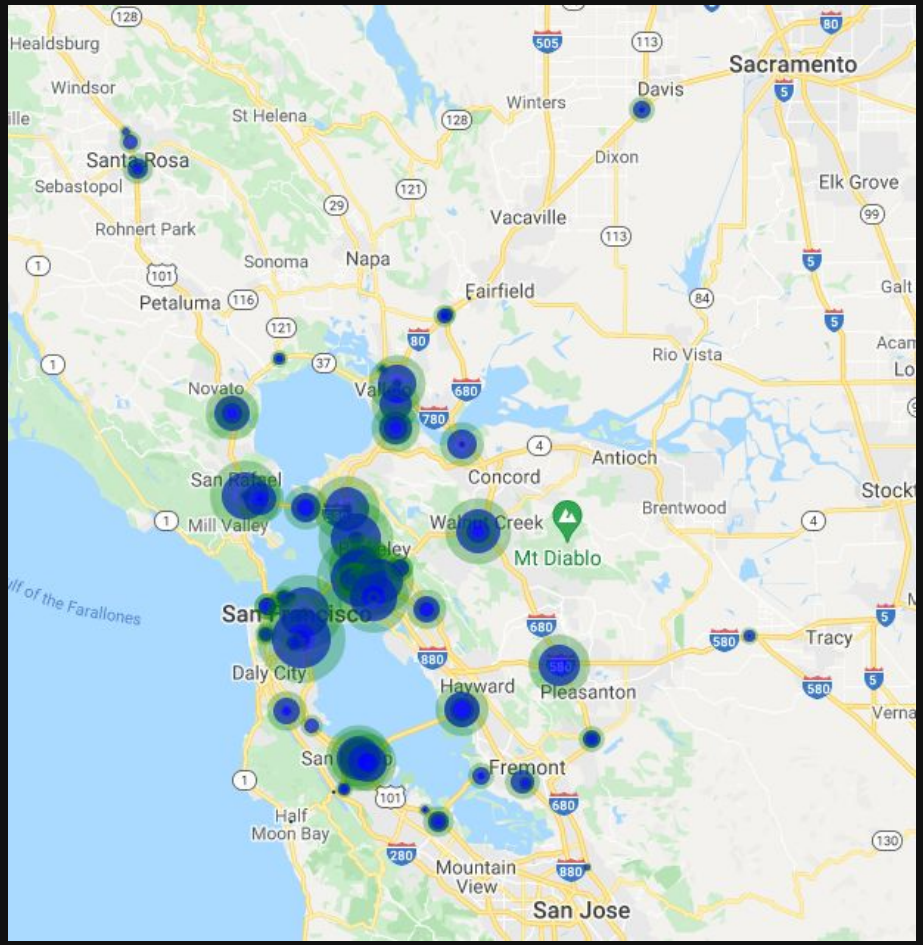


- Traffic starts from 5 am in the morning.
- There is an average traffic of over 1000 per hour throughout the day.
- Traffic begins to fall off from 5 pm the evening until midnight.

Location Modelling

Plotting the volume of traffic observed at each locations, we can see some patterns emerging on where we might need air-taxi services the most.

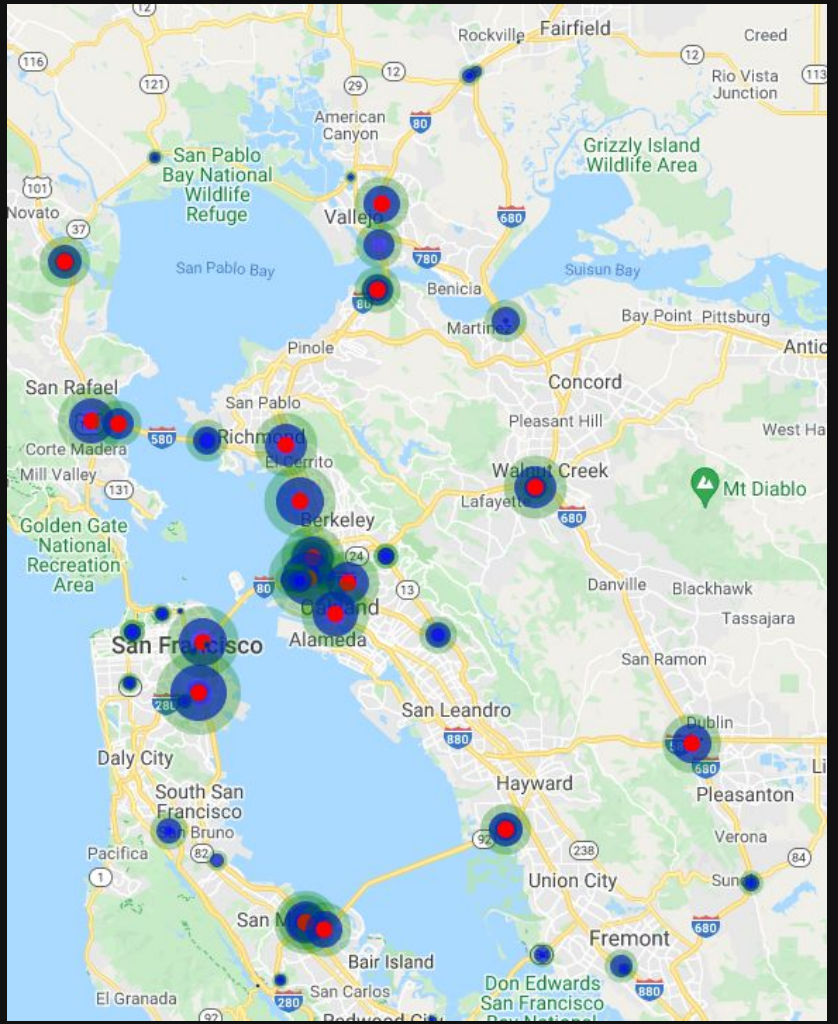
Blob scale is between (1 - 20) representing daily traffic flow between (20,000 - 400,000) approx.



Location Modelling

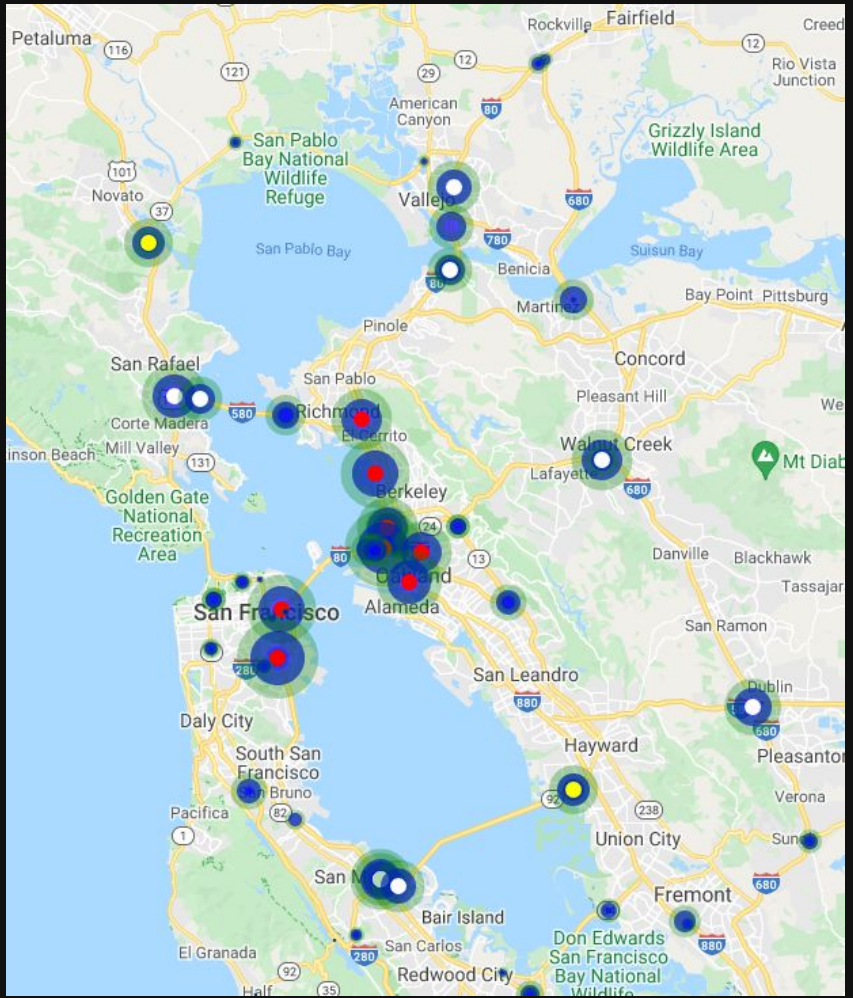
Sorting for the top 20 locations where traffic is seen the most, we can identify hubs spots or demand in each town and city.

Each of these locations have more than 230,000 of daily traffic volume.



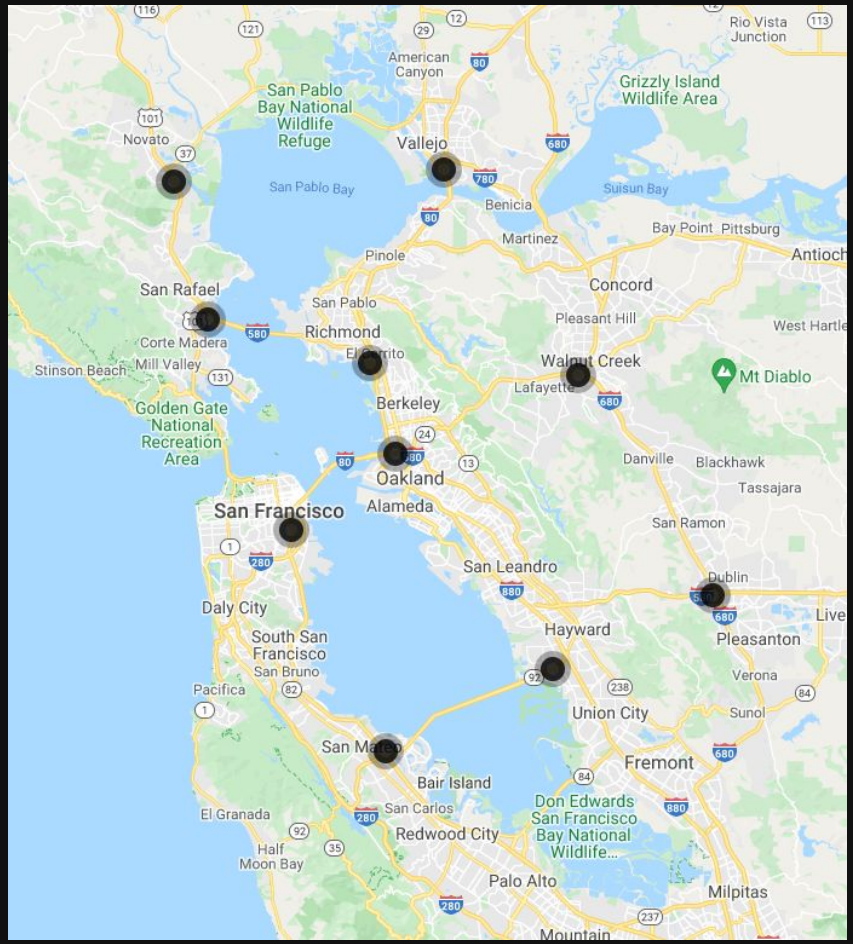
Location Modelling

Using K-means clustering we are able to identify 10 clusters or optimal locations that can service the most traffic or demand for air taxi in the Bay area.

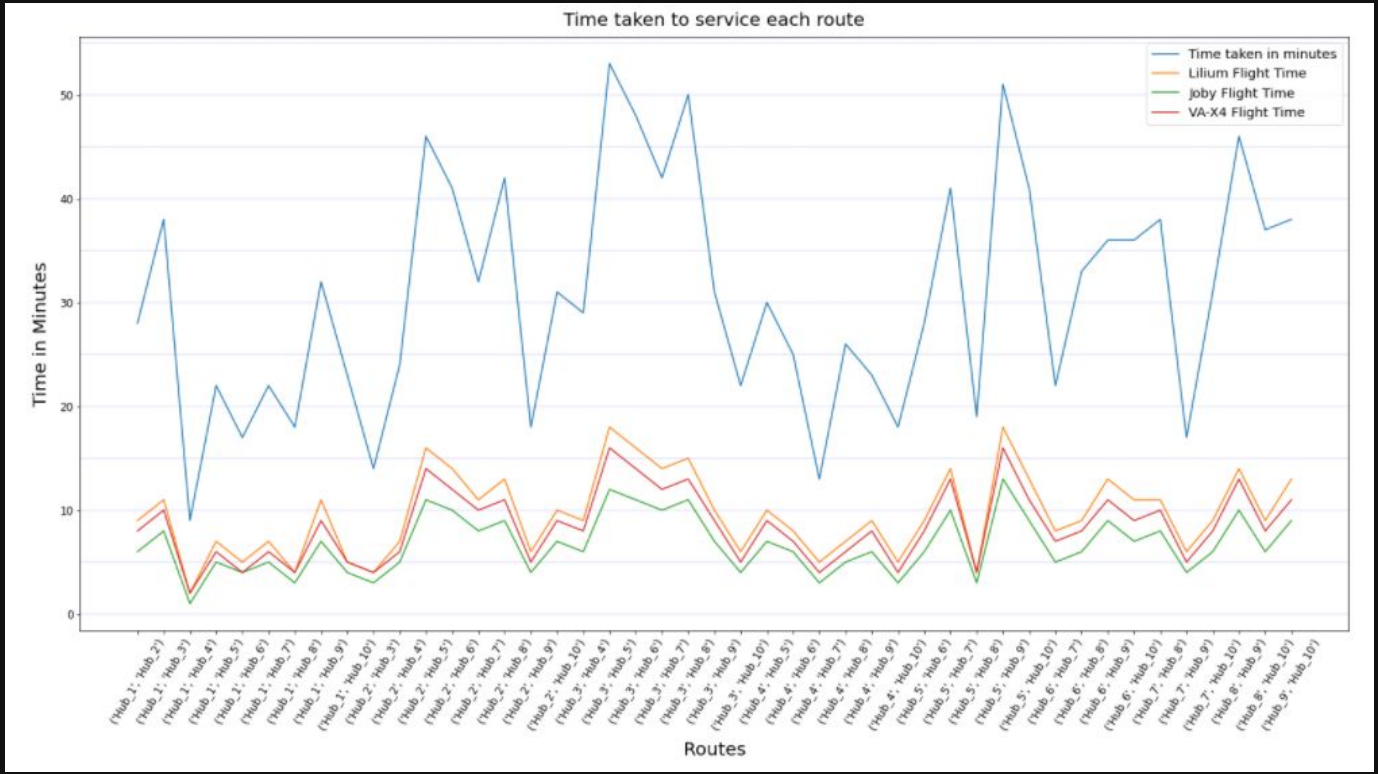


Location Modelling

Averaging out those locations, we come up with our final hubs where we can set up the air-taxi ports.



Air-taxi vs Conventional travel



Identify service routes

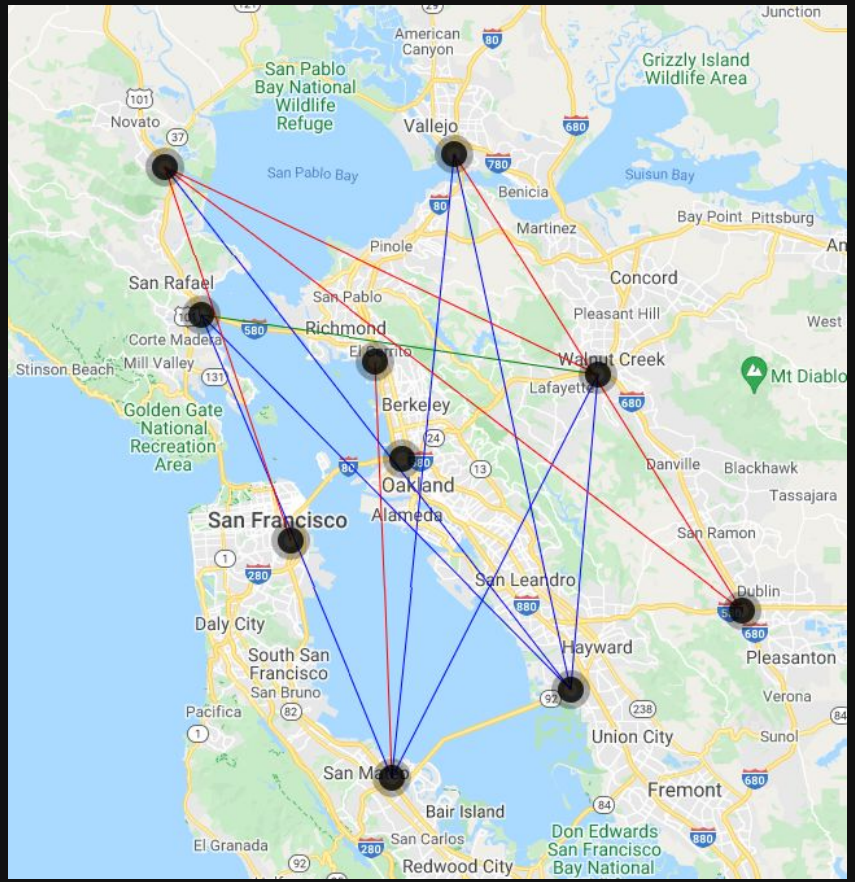
Looking at routes that take more than 8 minutes of flight time, we have the following combinations.

Red: Southbound

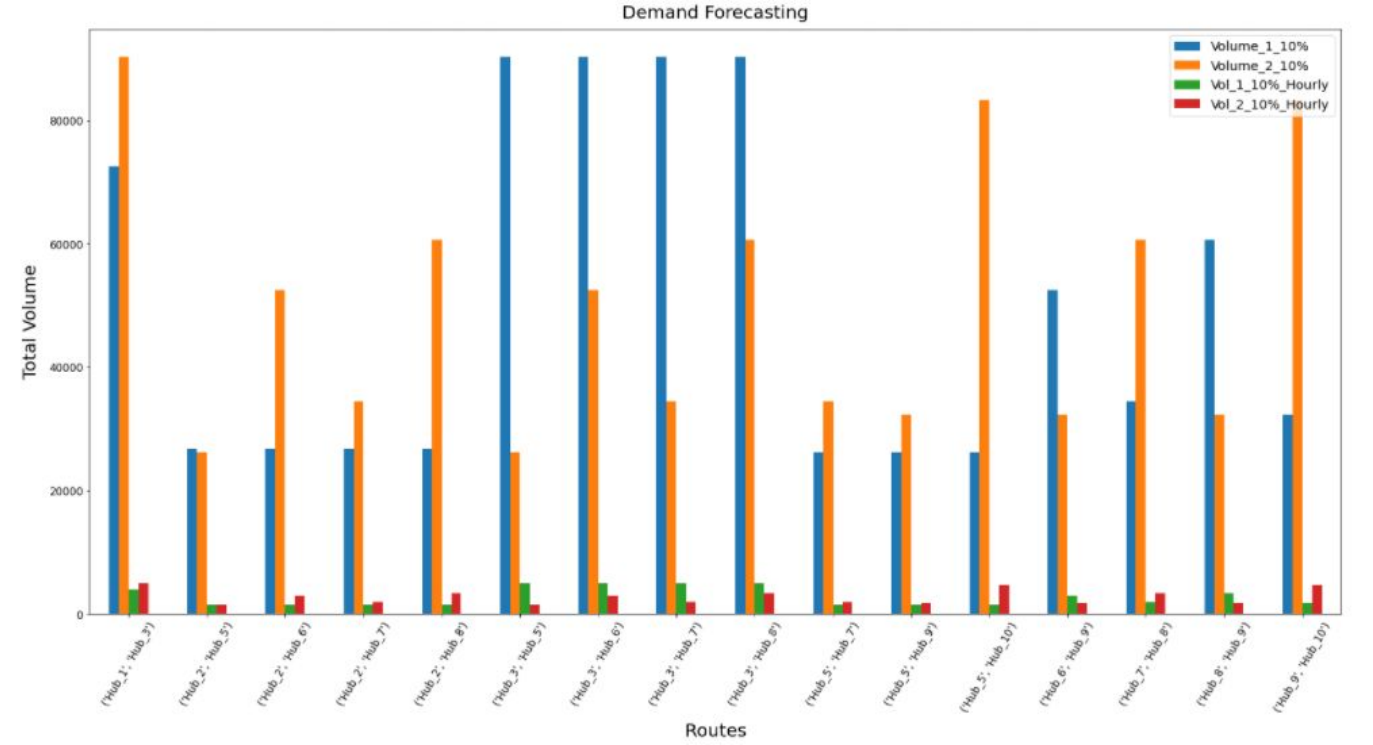
Blue: Northbound

Green: Westbound

Black: Eastbound



Predicting demand



At 10% of service estimate, we still have average daily volumes of 30,000 - 40,000 vehicles.

We are also looking at hourly mean of 1800 - 2400.

Conclusion/ Recommendations

1. On an average there seems to be an hourly demand of about 2000 customers at all locations.
2. An operating schedule between the hours of 6AM - 12AM would benefit the most travellers.
3. We identified 10 locations that would be optimal to cover all movements across the area.
4. Each of these routes will be at least 4x faster than conventional travel.

Thank you!

Appendix

- Availability of more data would allow us to map locations across the entire nation.
- Using different sources and other data points, we could cross reference the results and come up with a more robust plan.
- Pricing analysis can also be performed with sufficient data regarding the aircrafts.