



EV Queue

Optimizing Electric Vehicle Charging Stations for Increased Use

Electric Vehicles

1.8 % Market Share in 2020

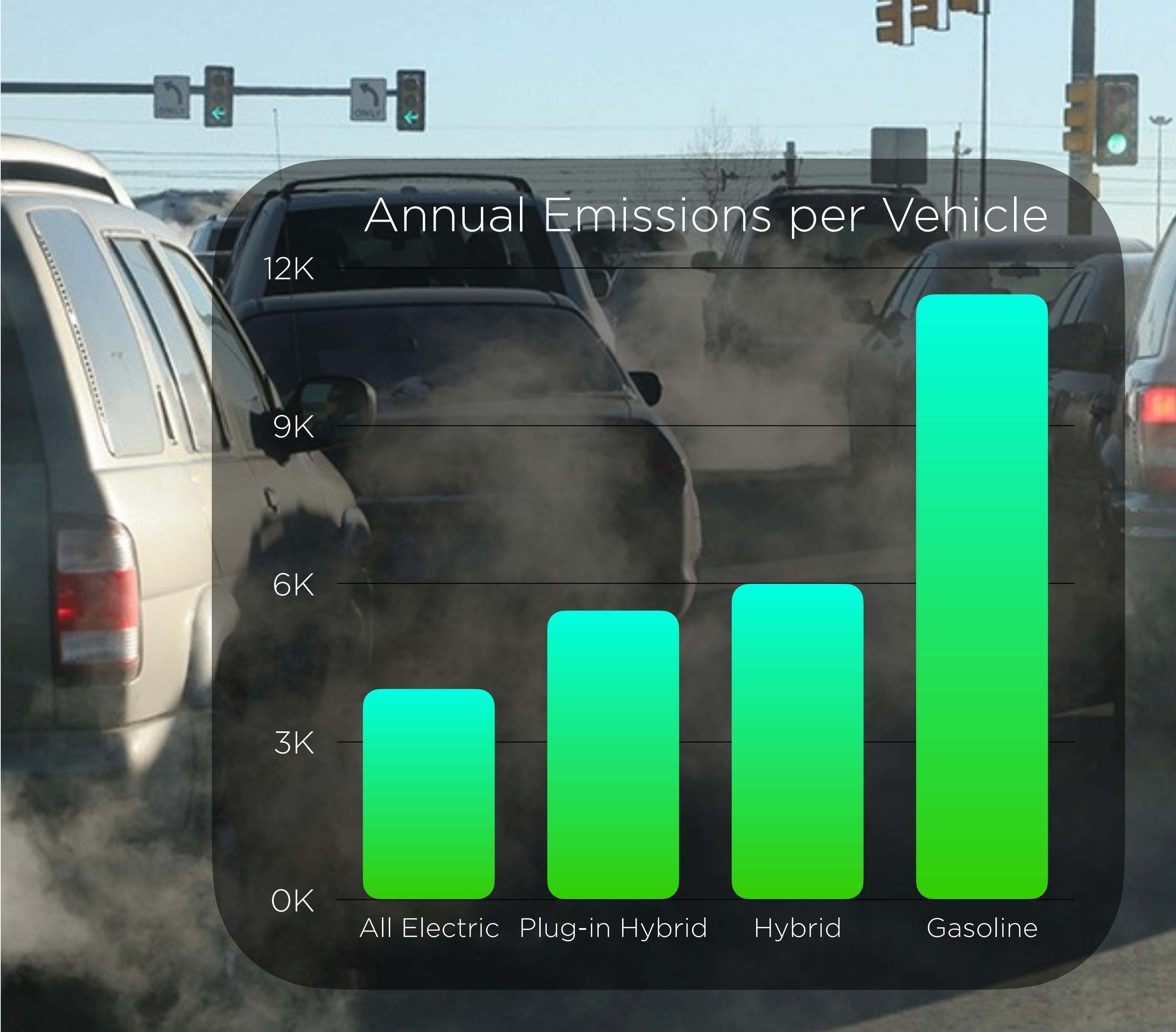
2.5% Market Share in 2021

One in every 40 New Cars is
Electric



Lower Emissions

Dependent on the source of Electricity.



Range Anxiety

- Running out of power
- Not being able to find charge



Electric Vehicle Route Planning

Trip Planning + EV Charge Points

Model S 100D

San Francisco, CA, USA

New York, NY, USA

San Francisco, CA, USA

Truckee, CA - Donner Pass Road 55 min charge

Winnemucca, NV 35 min charge

Elko, NV 25 min charge

West Wendover, NV 35 min charge

South Salt Lake City, UT 50 min charge

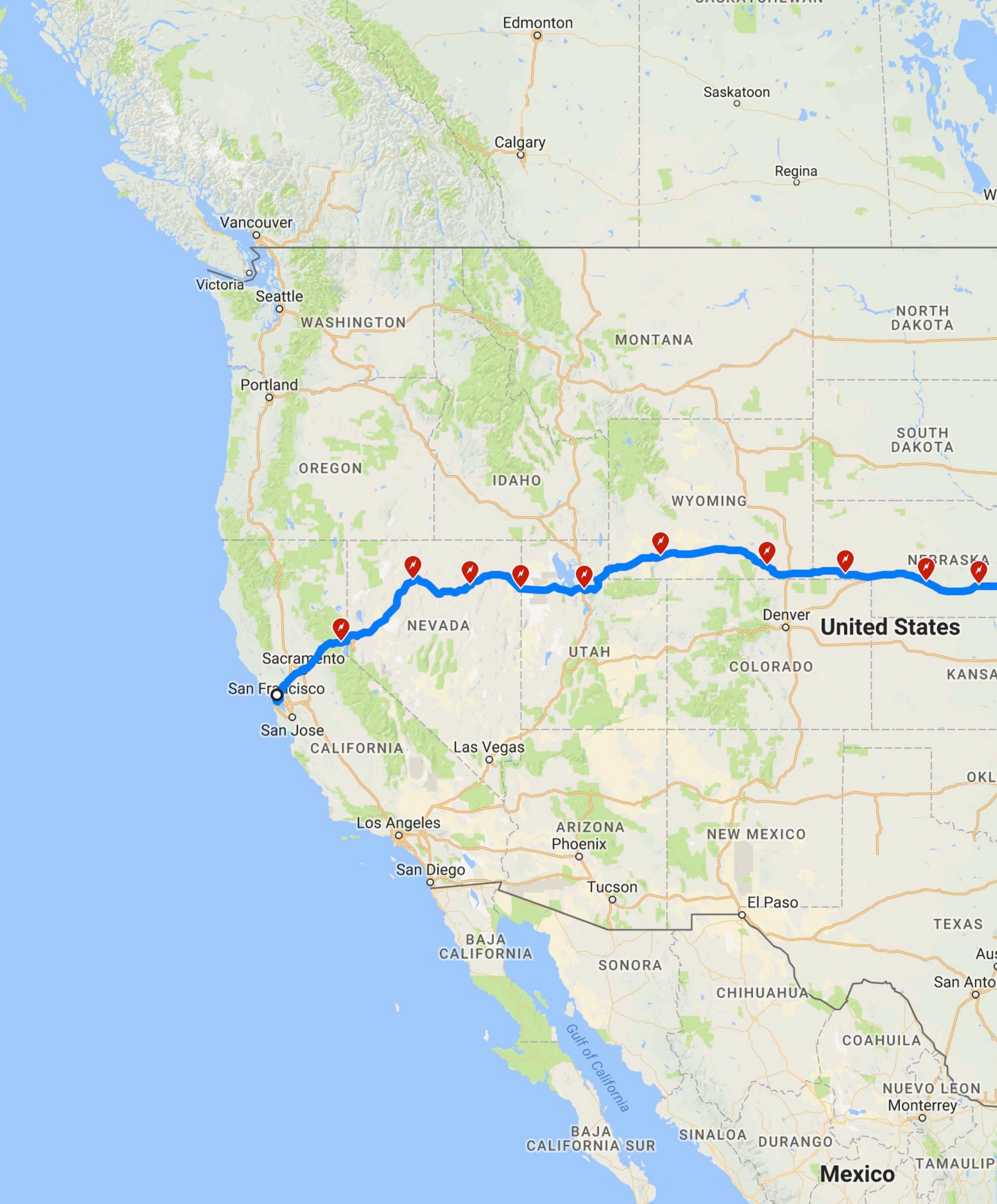
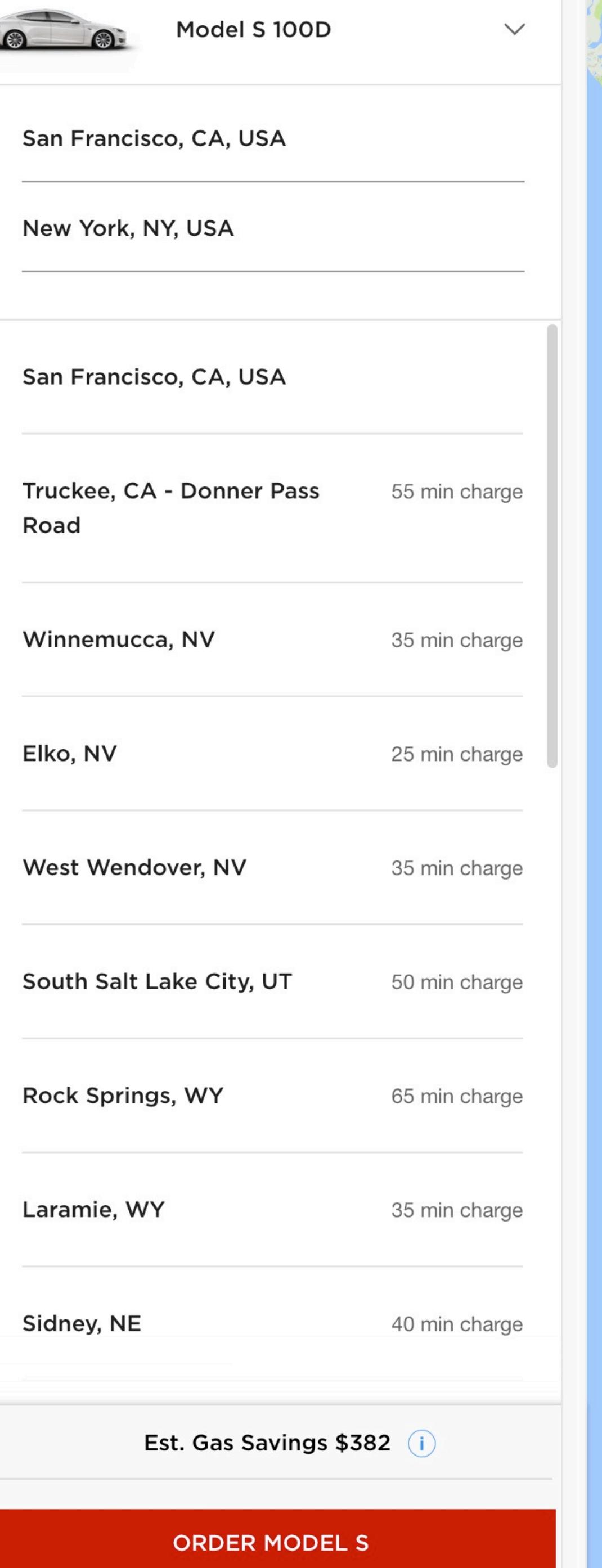
Rock Springs, WY 65 min charge

Laramie, WY 35 min charge

Sidney, NE 40 min charge

Est. Gas Savings \$382

ORDER MODEL S





Full Charging Stations

As Market Share increases, so do
the number of drivers using EV
Stations

- Long Wait Times
- Charge Anxiety
- Range Anxiety

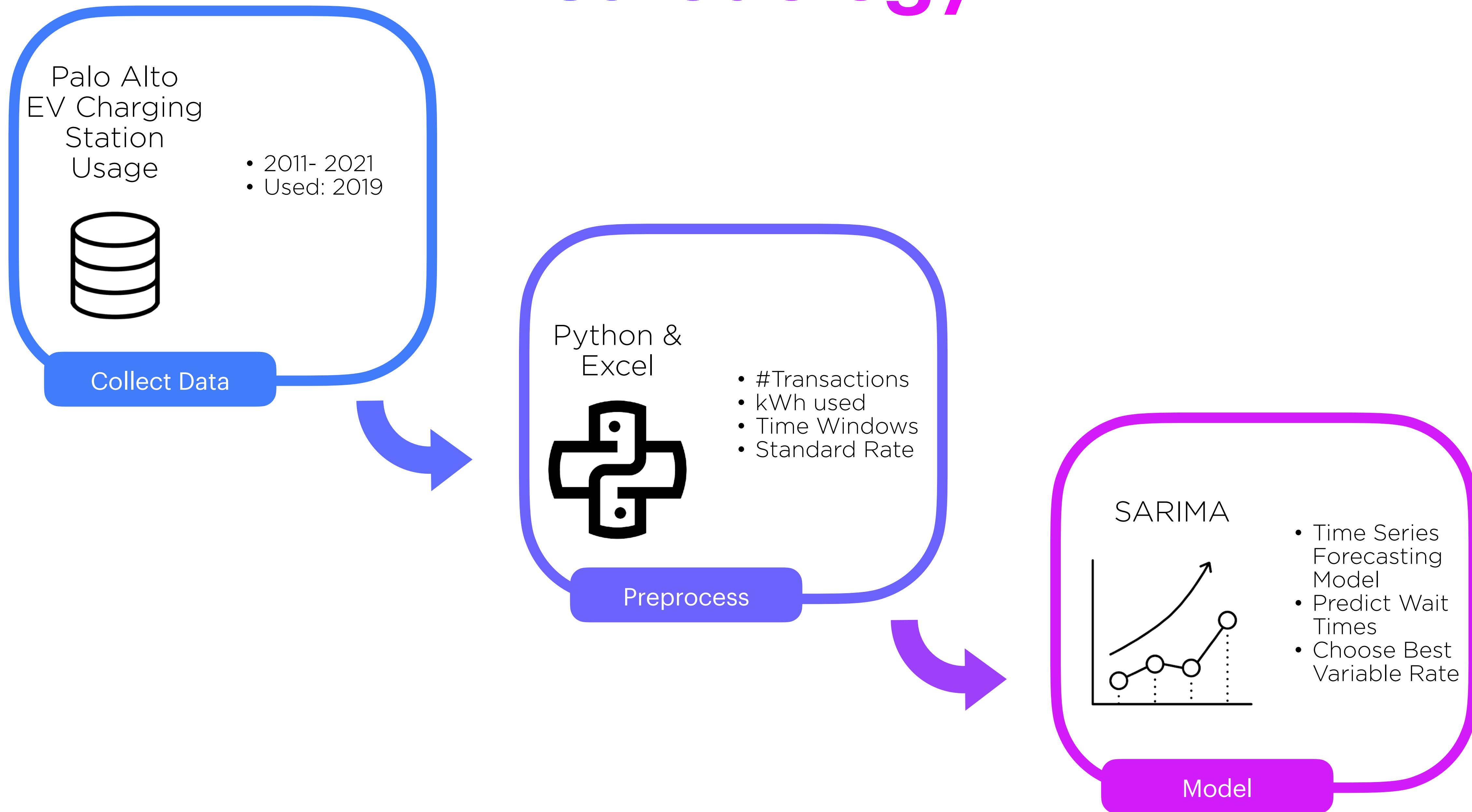


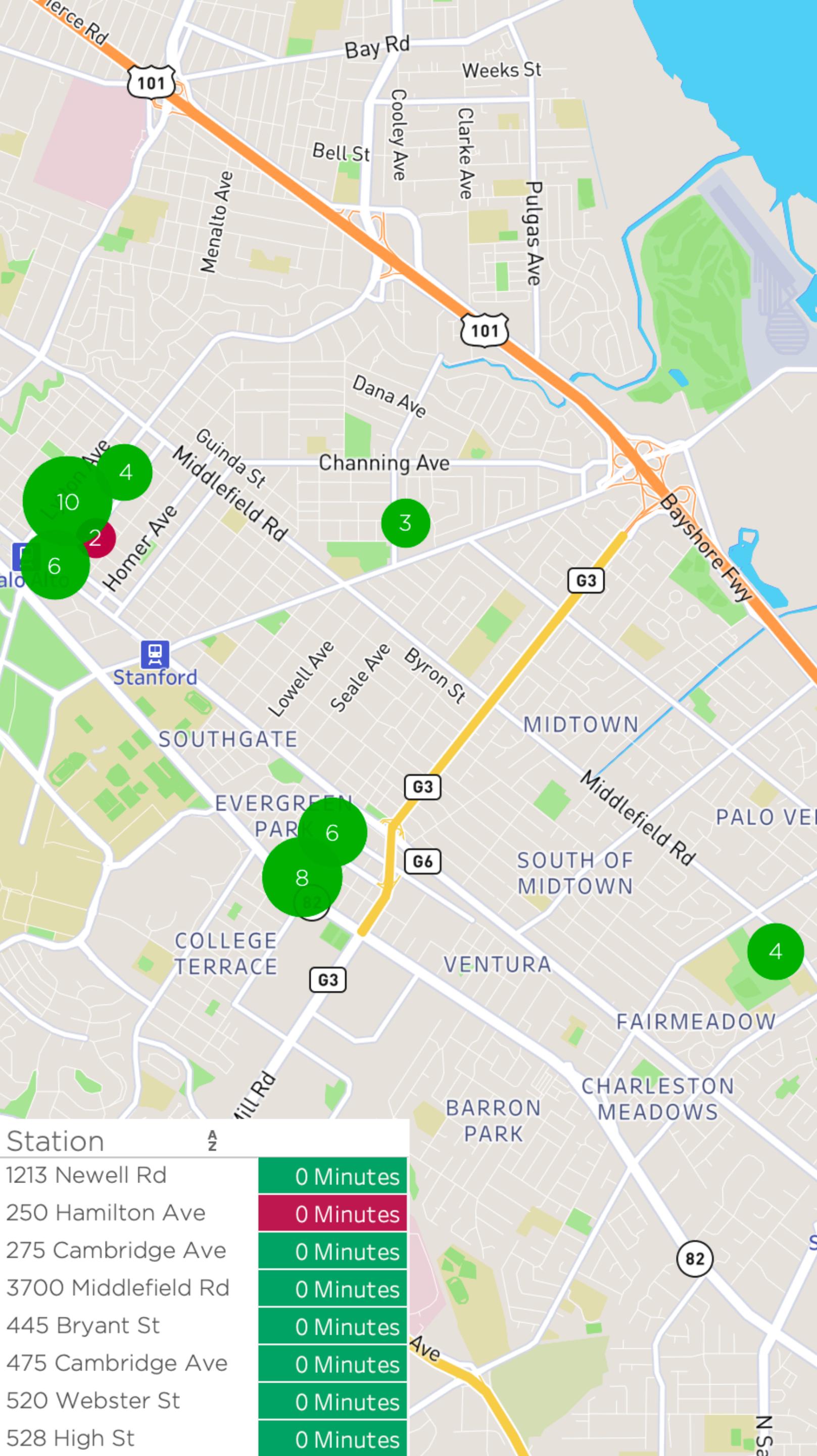
Two-Fold Solution

1. Predict Wait Times
2. Apply Variable Rate



Methodology



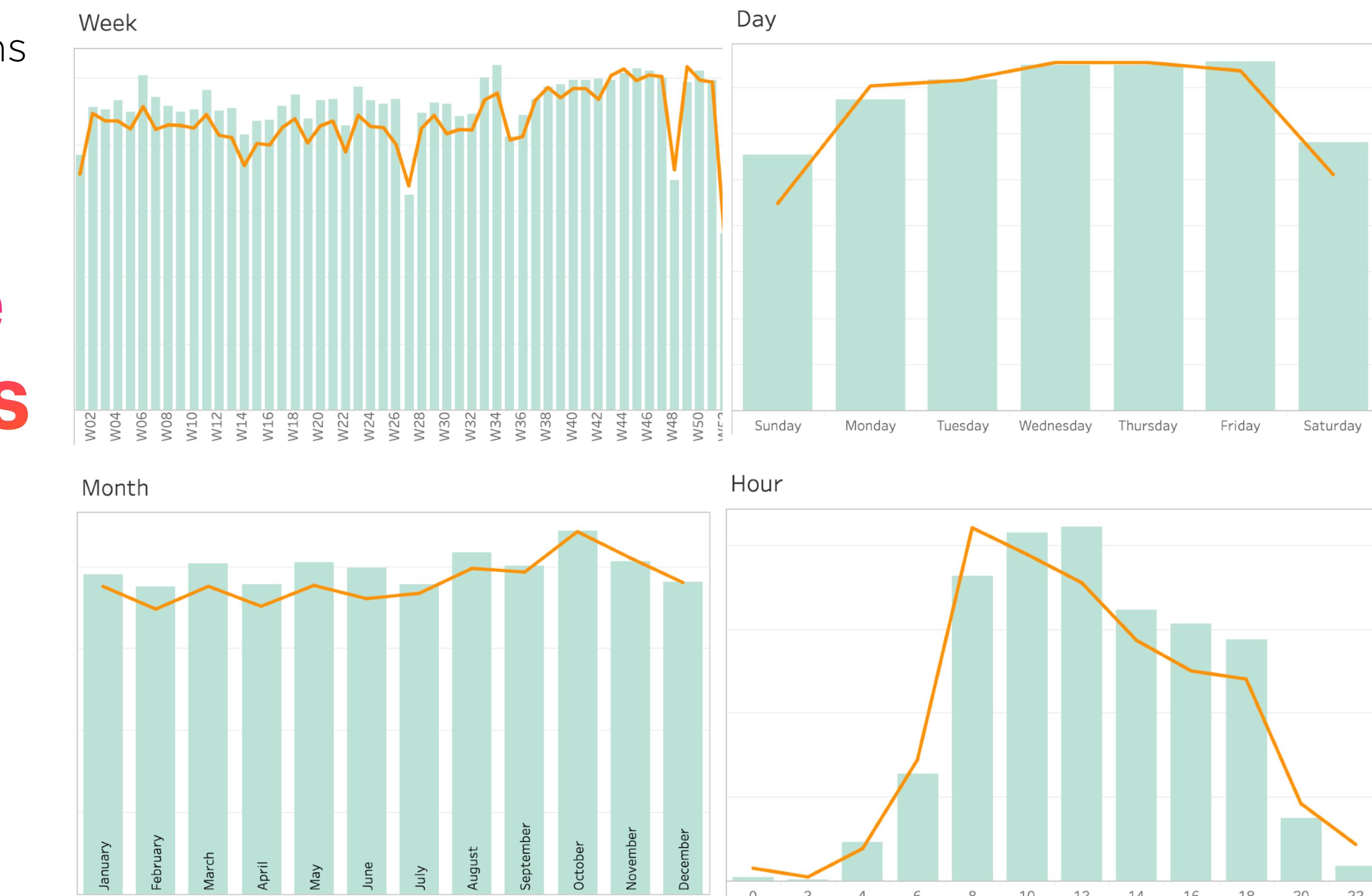


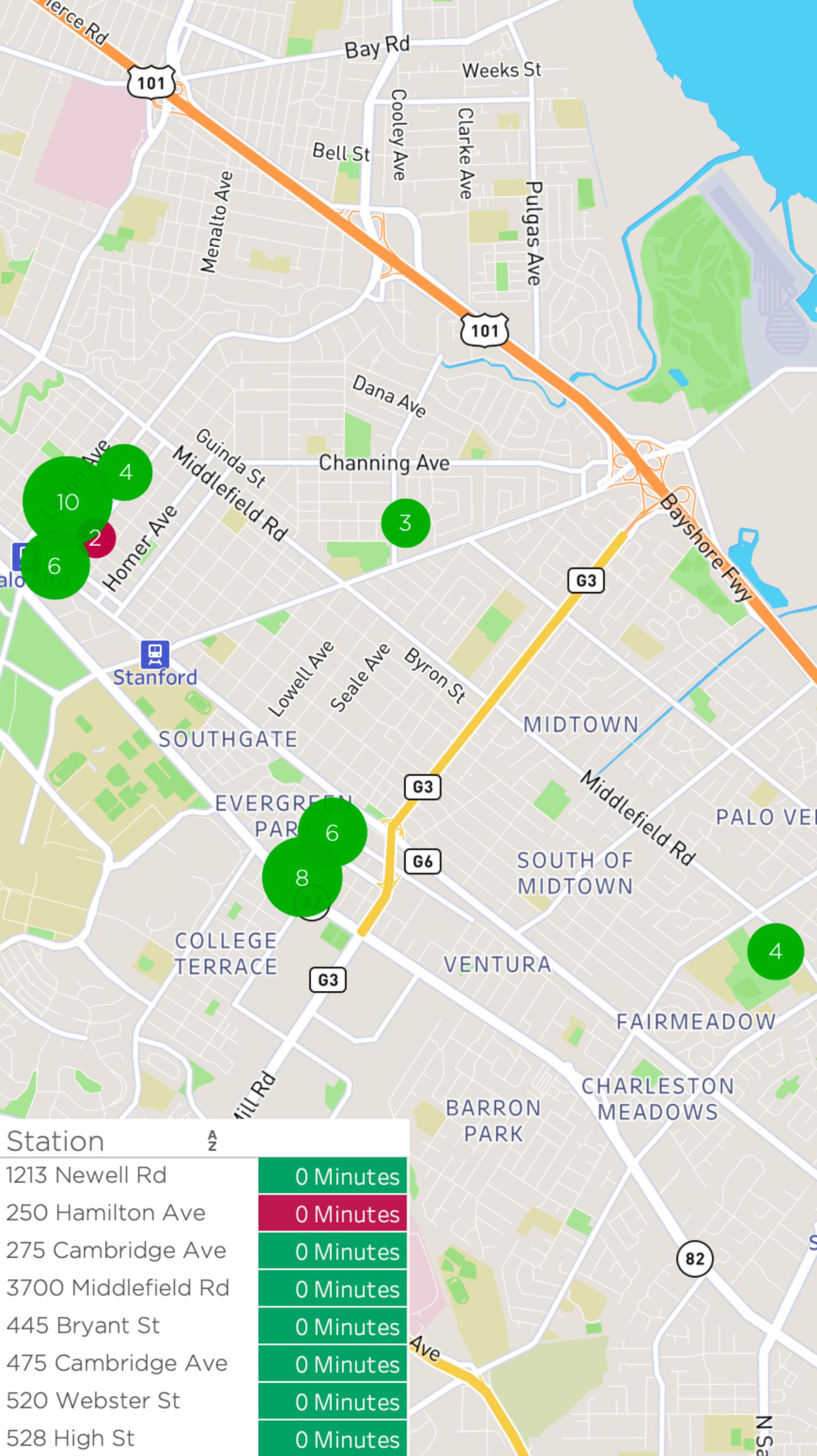
Analysis

- 8 Stations
- 59 Individual Plugs
- 47,000+ Transactions

Time Series

- Week
- Day
- Month
- Hour



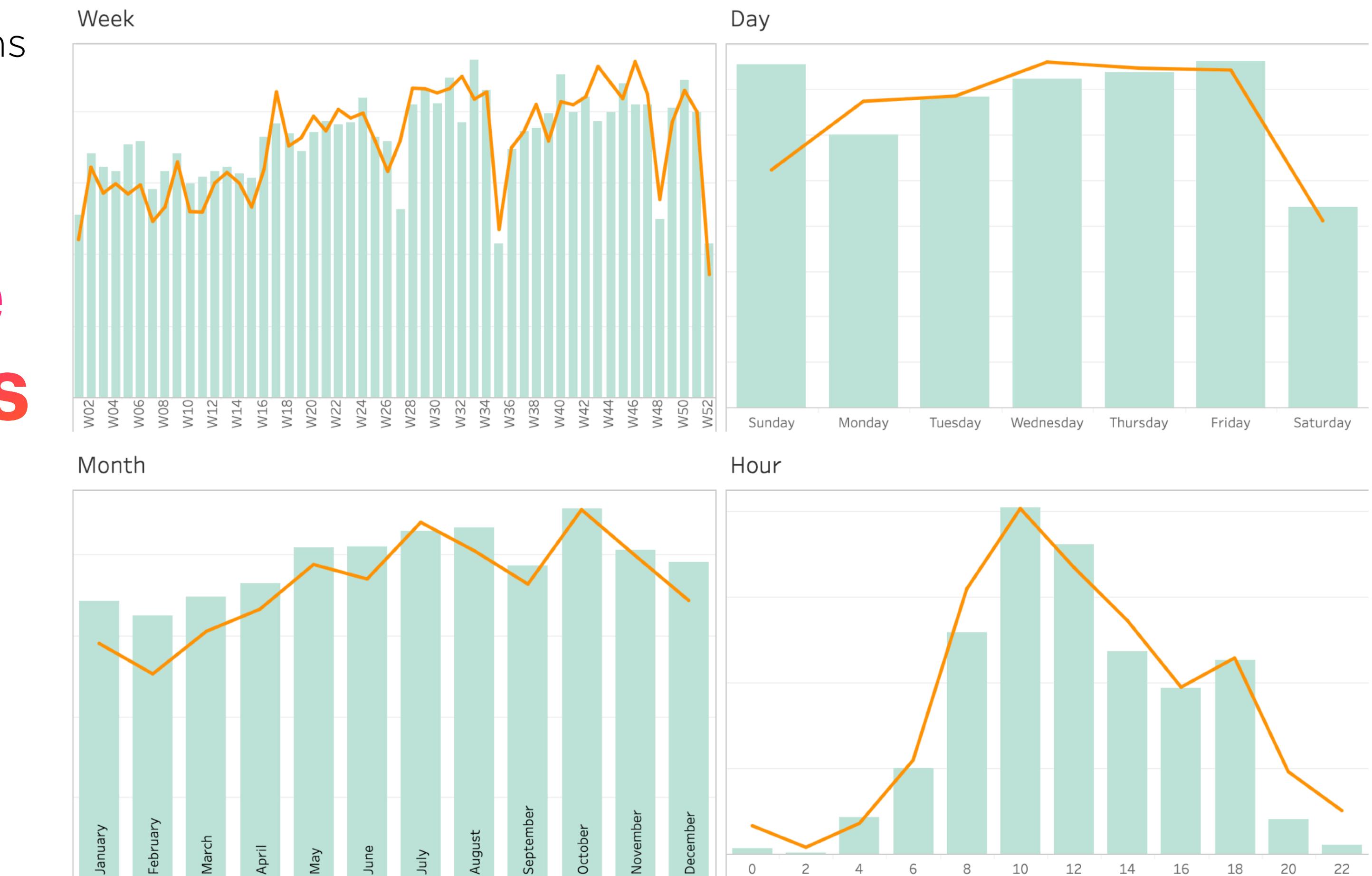


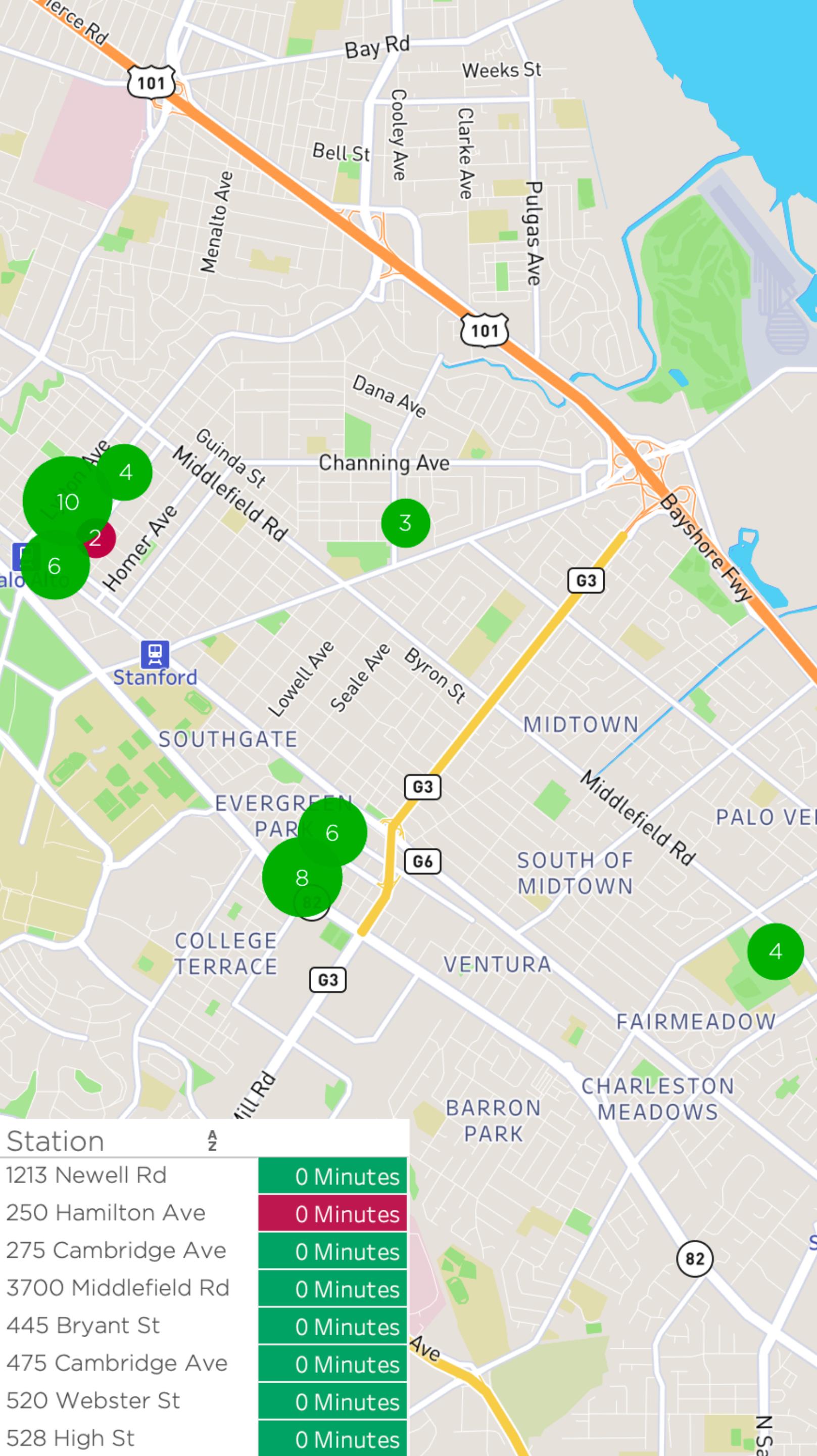
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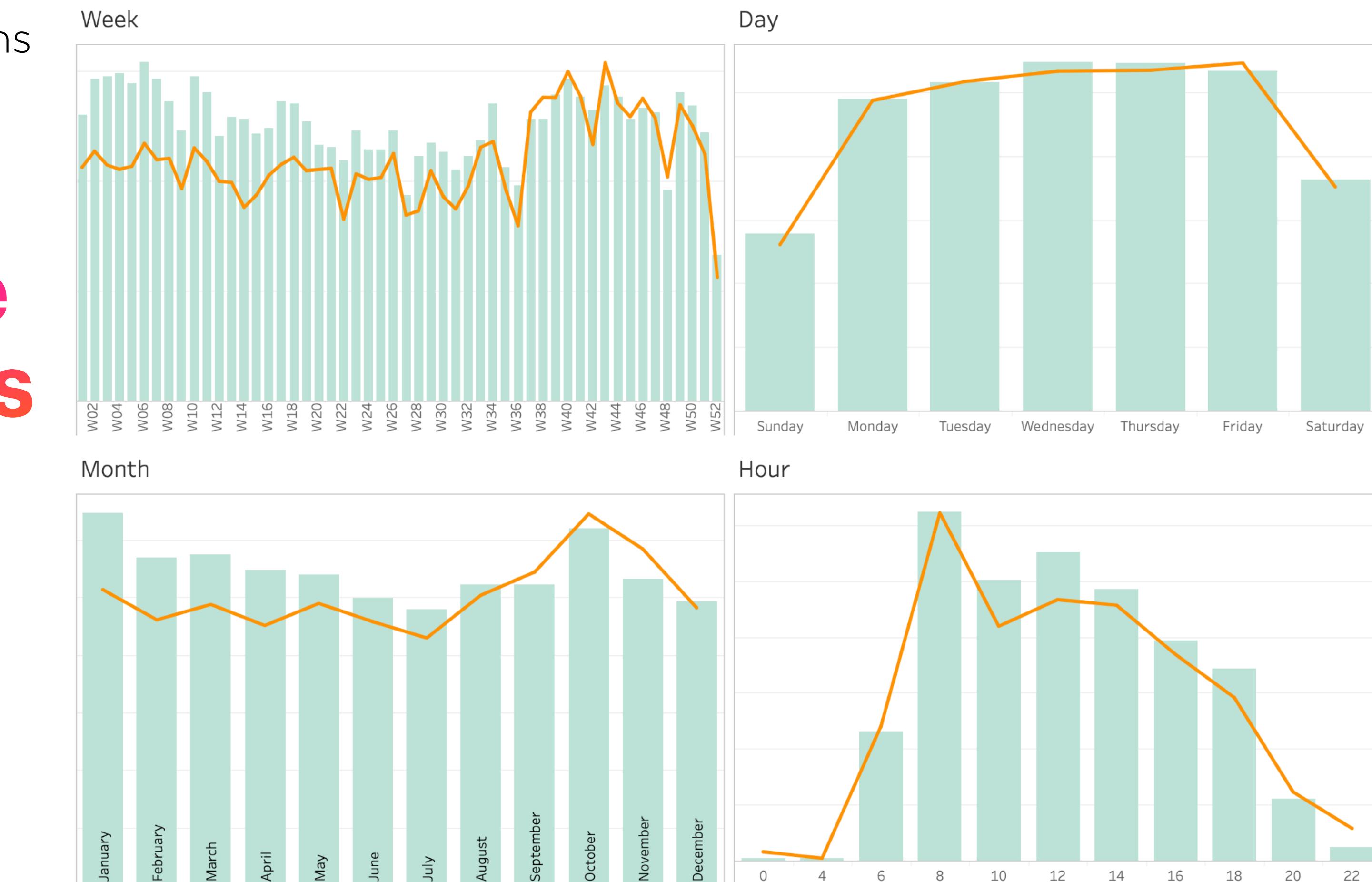


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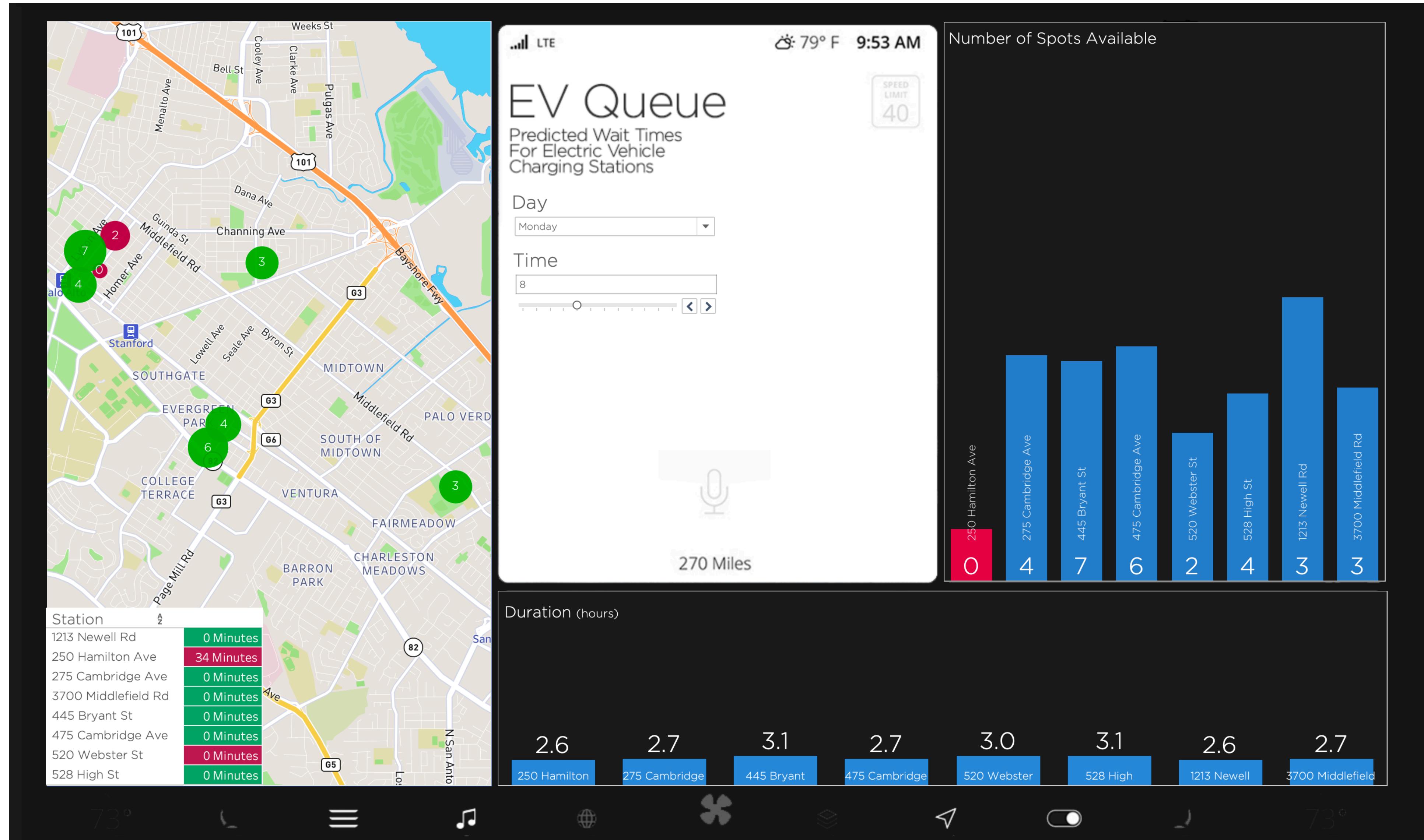
Time Series

- Week
- Day
- Month
- Hour
- Station



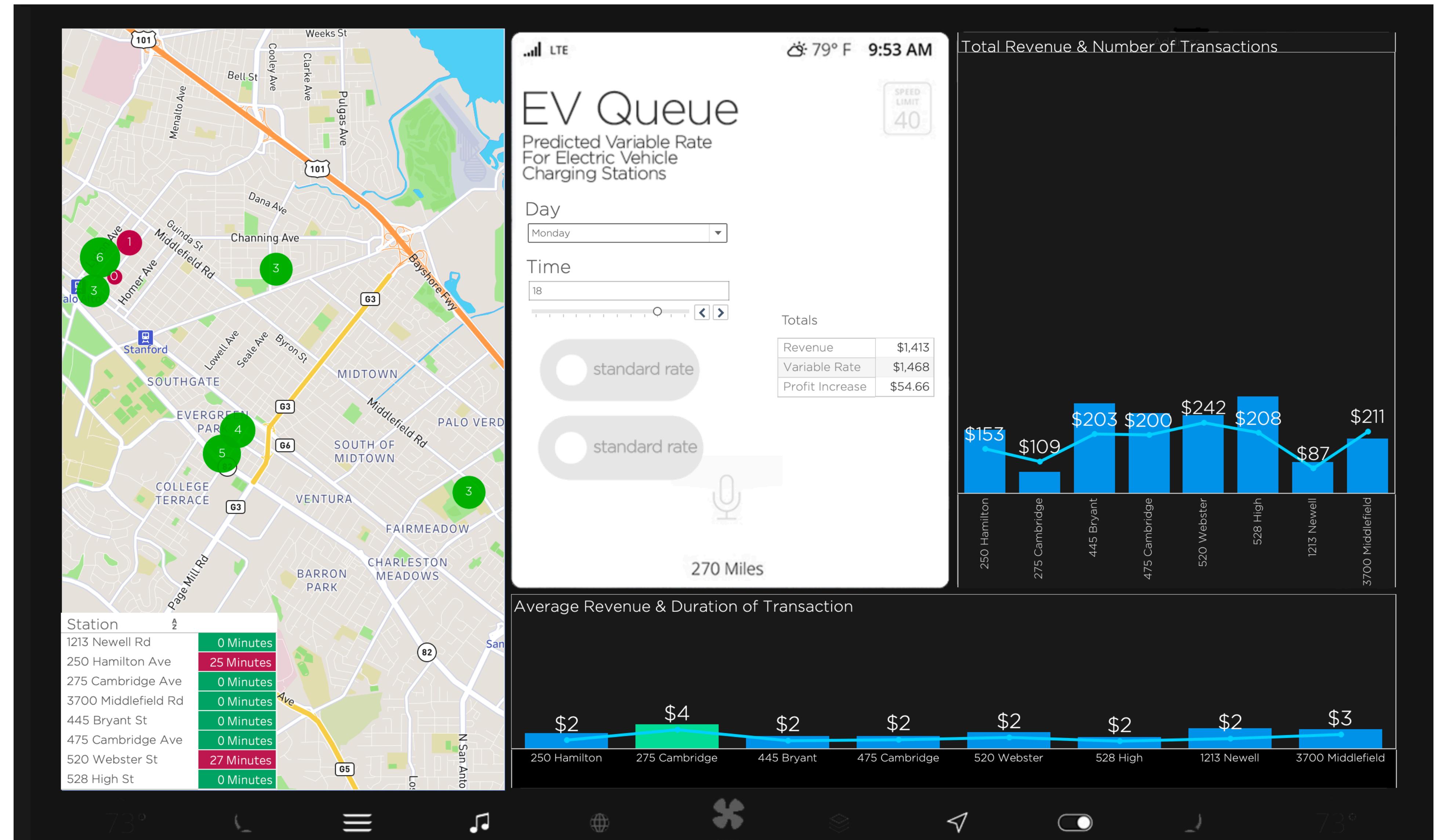
User Dashboard

- Number of spots available
- Predicted Wait Time
- Average Duration
- 95% Reduction in Wait Time



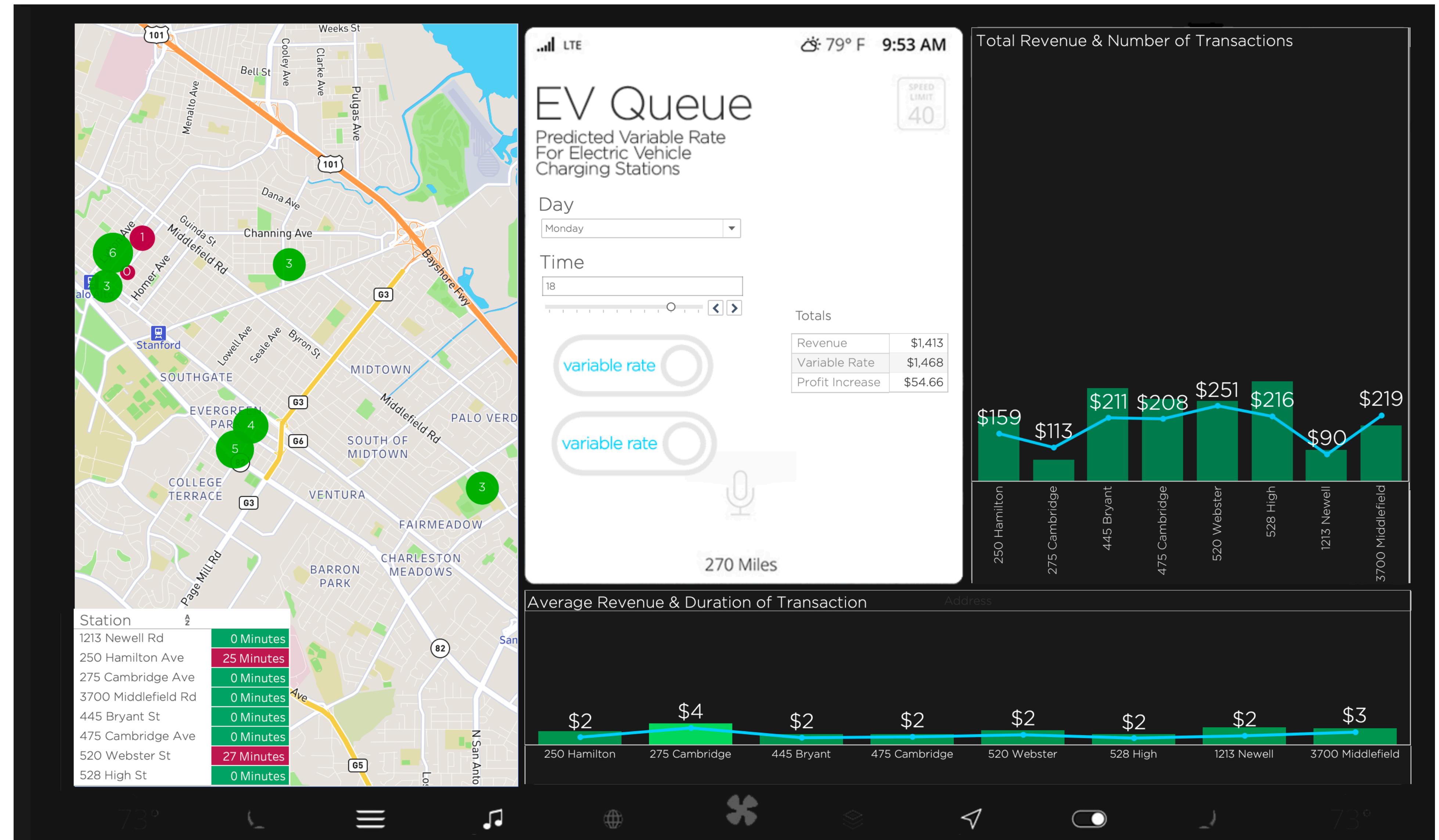
Station Dashboard

- Revenue
- Transactions
- Duration



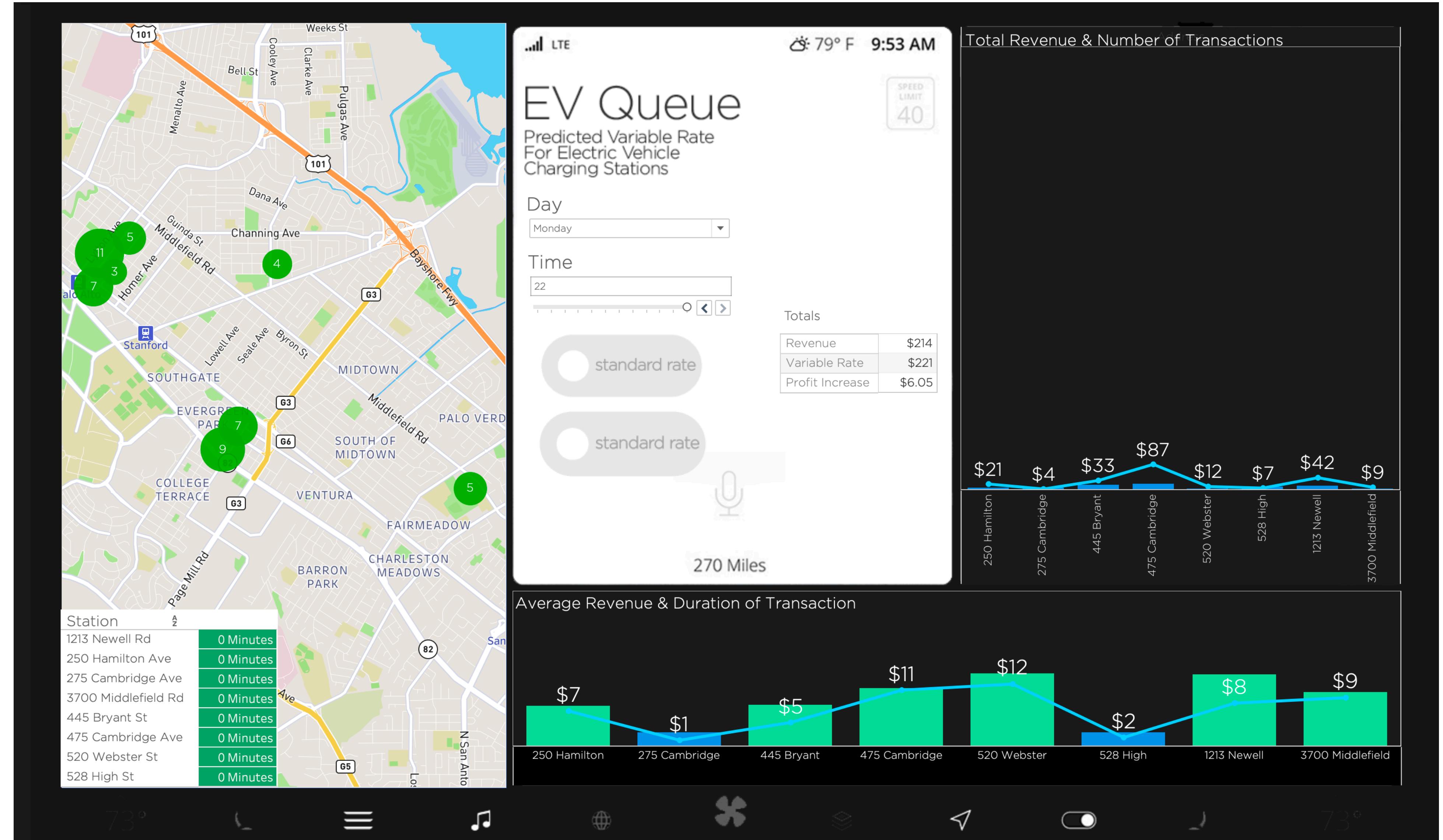
Station Dashboard

- Apply Variable Rate
- Profit Increase



Variable Rate Opportunity

- Overnight charging
- Longest duration
- Highest Revenue
- Emptiest lots

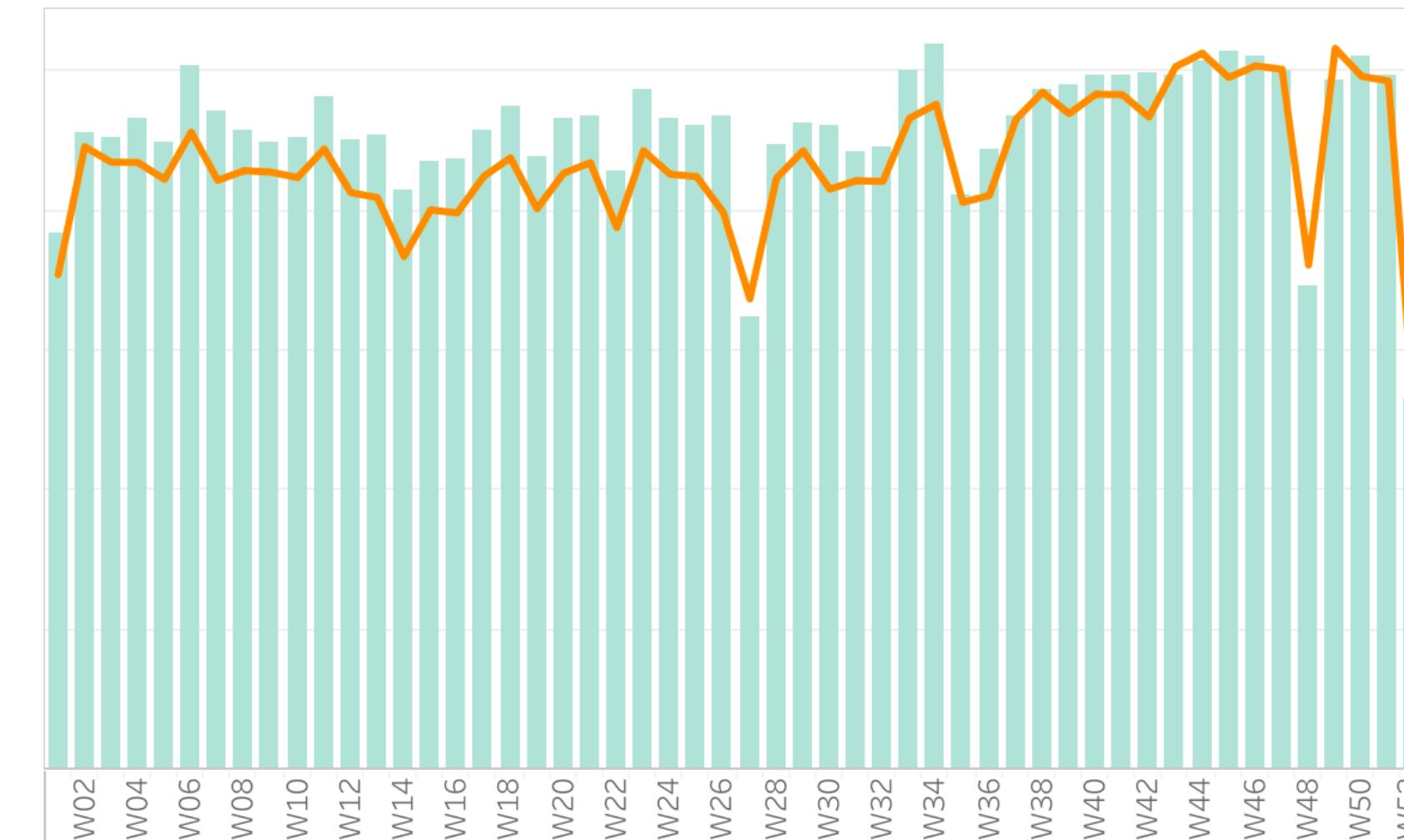


Time Series Dashboard

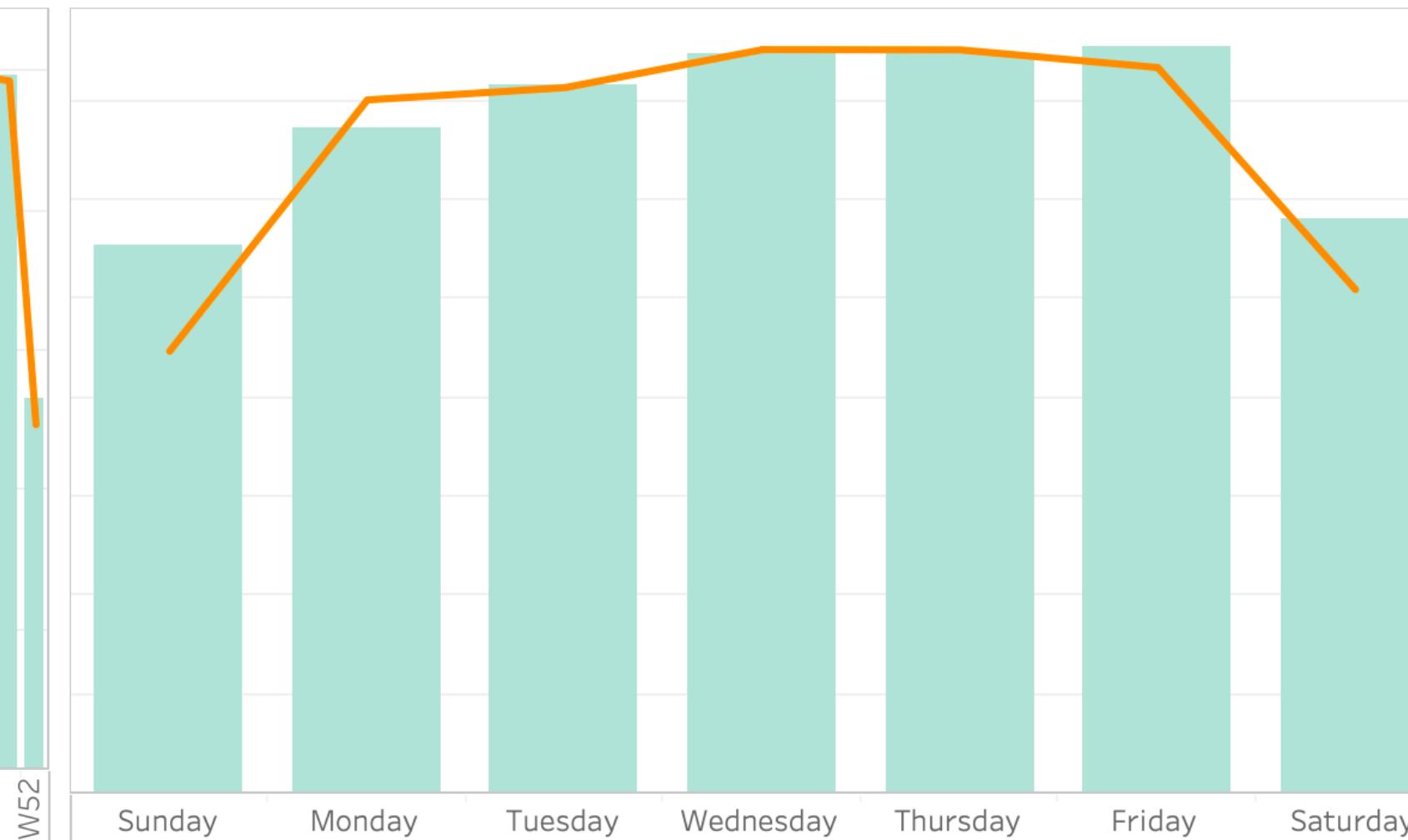
- SARIMA Time Series Predictive Model
- Accurate Rates and Wait Times

EV Charging Stations - Time Series

Week



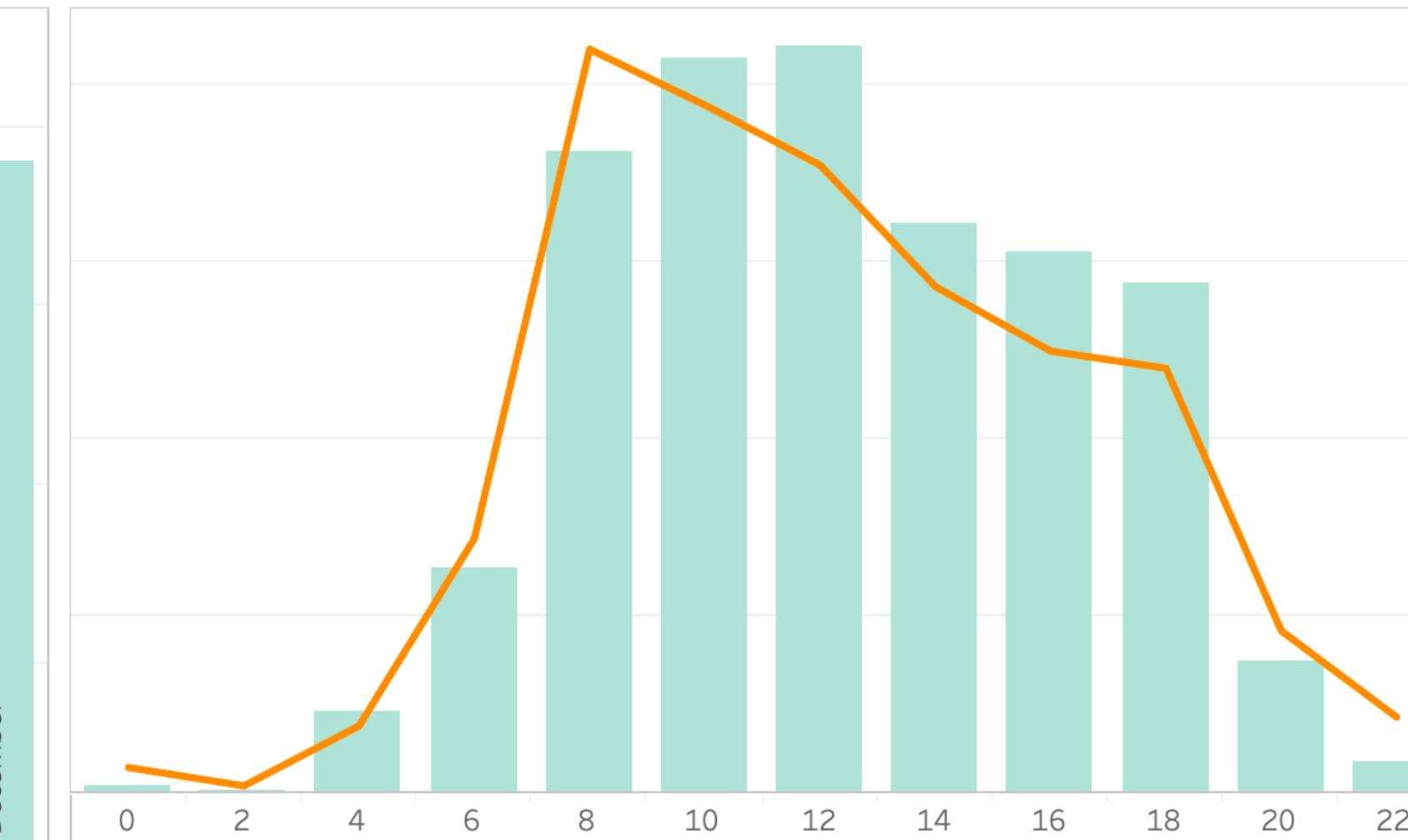
Day



Month



Hour



Address
(All)

Measure Names
Revenue
Transactions

Next Steps

1. Use a Seasonal Time Series Model to accurately predict wait times
2. Test different variable rate models





EV Queue

Questions?