Autonomous Truck Deployment – Impact of Road Construction

June 2025

Present by: Salah Uddin Momtaz

Presented to: Aurora

Construction Impact Analysis

Summary

- Data: US road construction data (2016-2021)
- Critical insights for AV deployment strategy
- Identifying high-impact zones and routes
- Predict affect of Construction

22.6K *Total Cities Analyzed*	5 *Self-driving Routes*
6.2M *Construction Projects*	2.7B *Construction Hours*
7.8M *Construction Length*	6Yr *Continuous Data*

Analysis Methodology

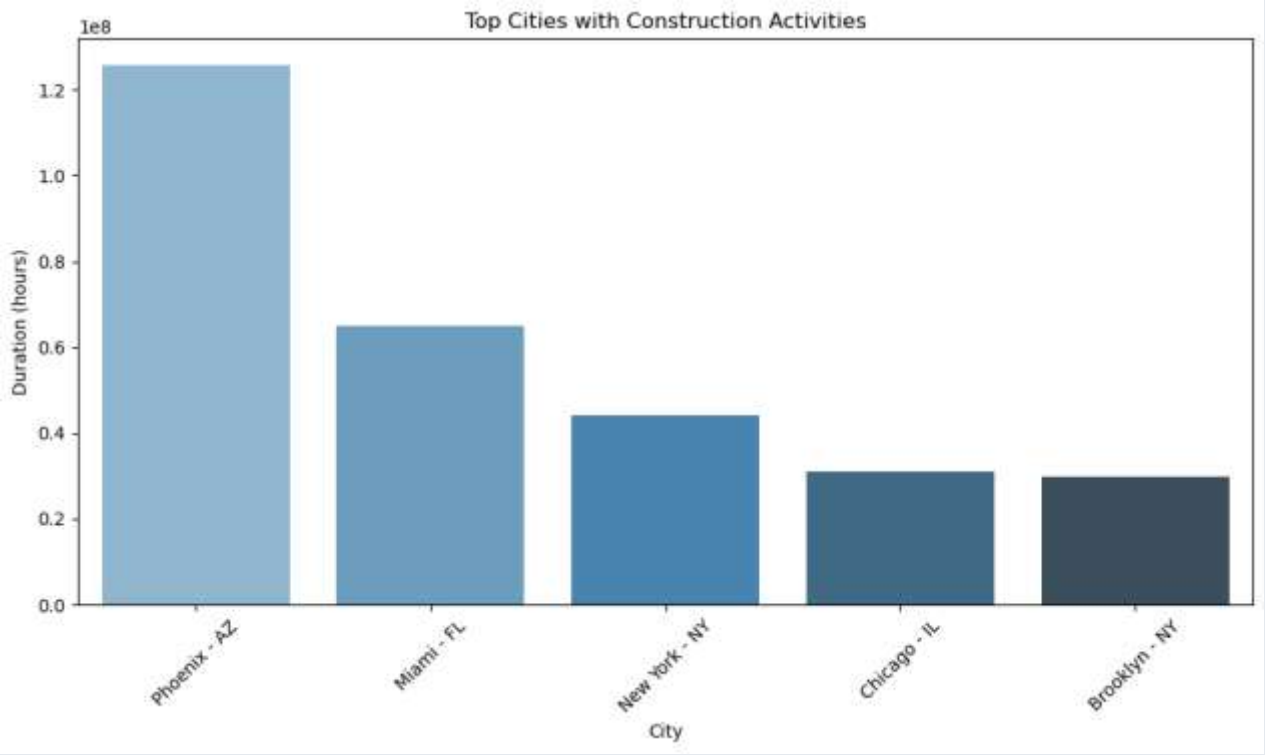
Data Processing Approach

- Ingest Kaggle data using API
- Get the additional data
- Census population, employment
- National Road network for freights: to get the road density of cities - generating city size to normalize
- Extract features from additional files

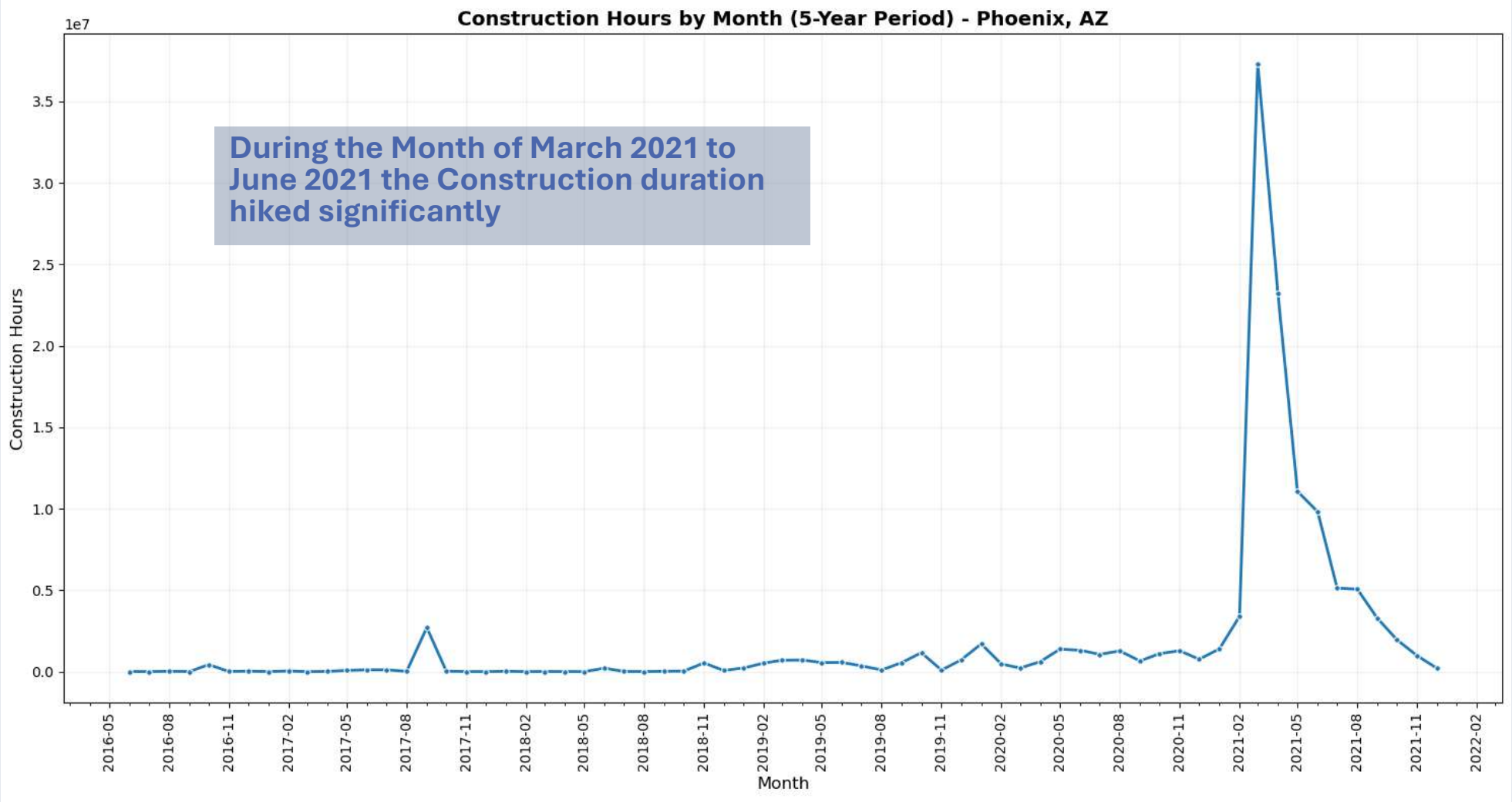
Insight 1: **City With Highest Construction Activity**

Top 5 Cities

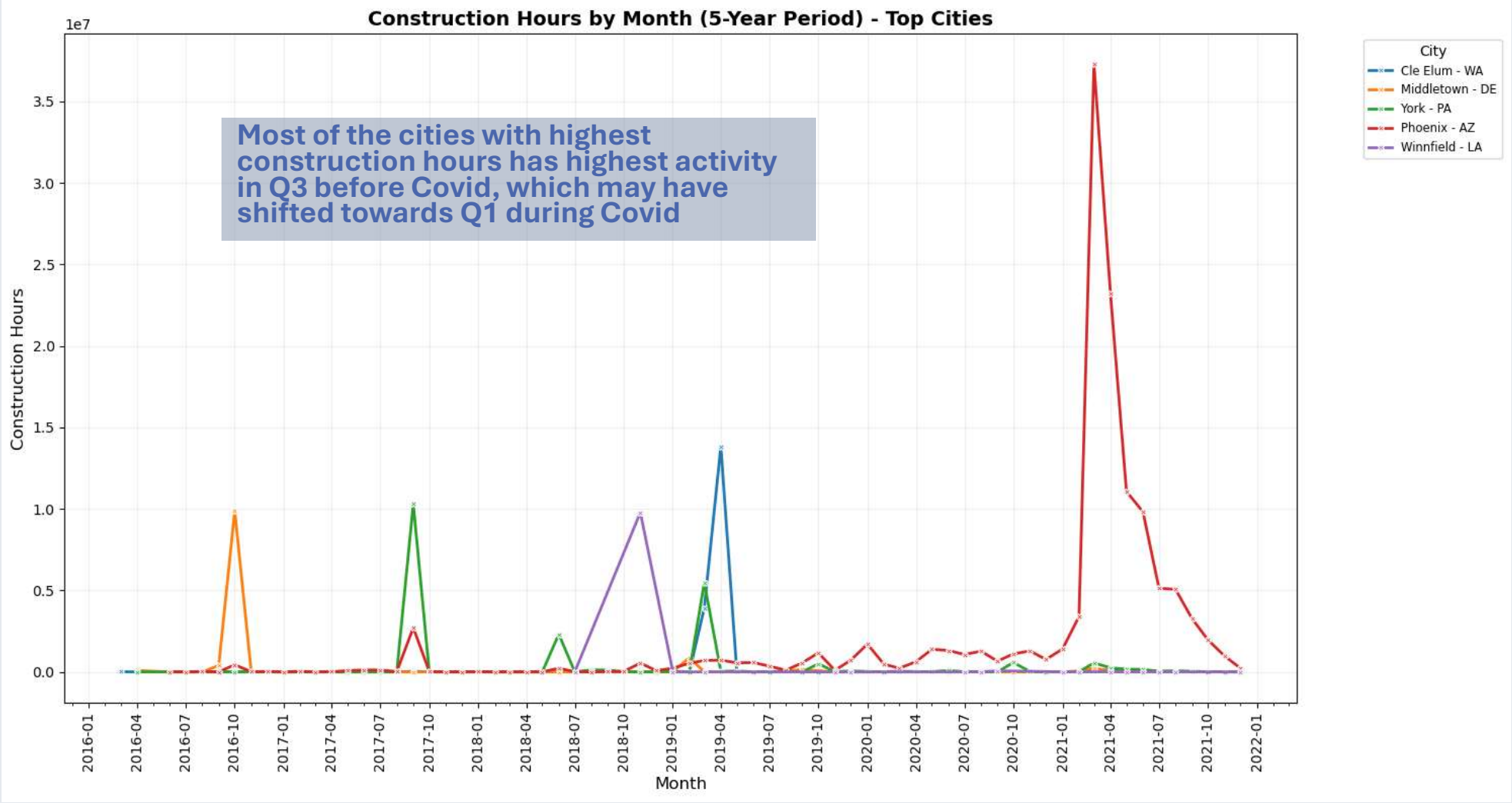
Rank	City	Hours	Site	Avg Duration



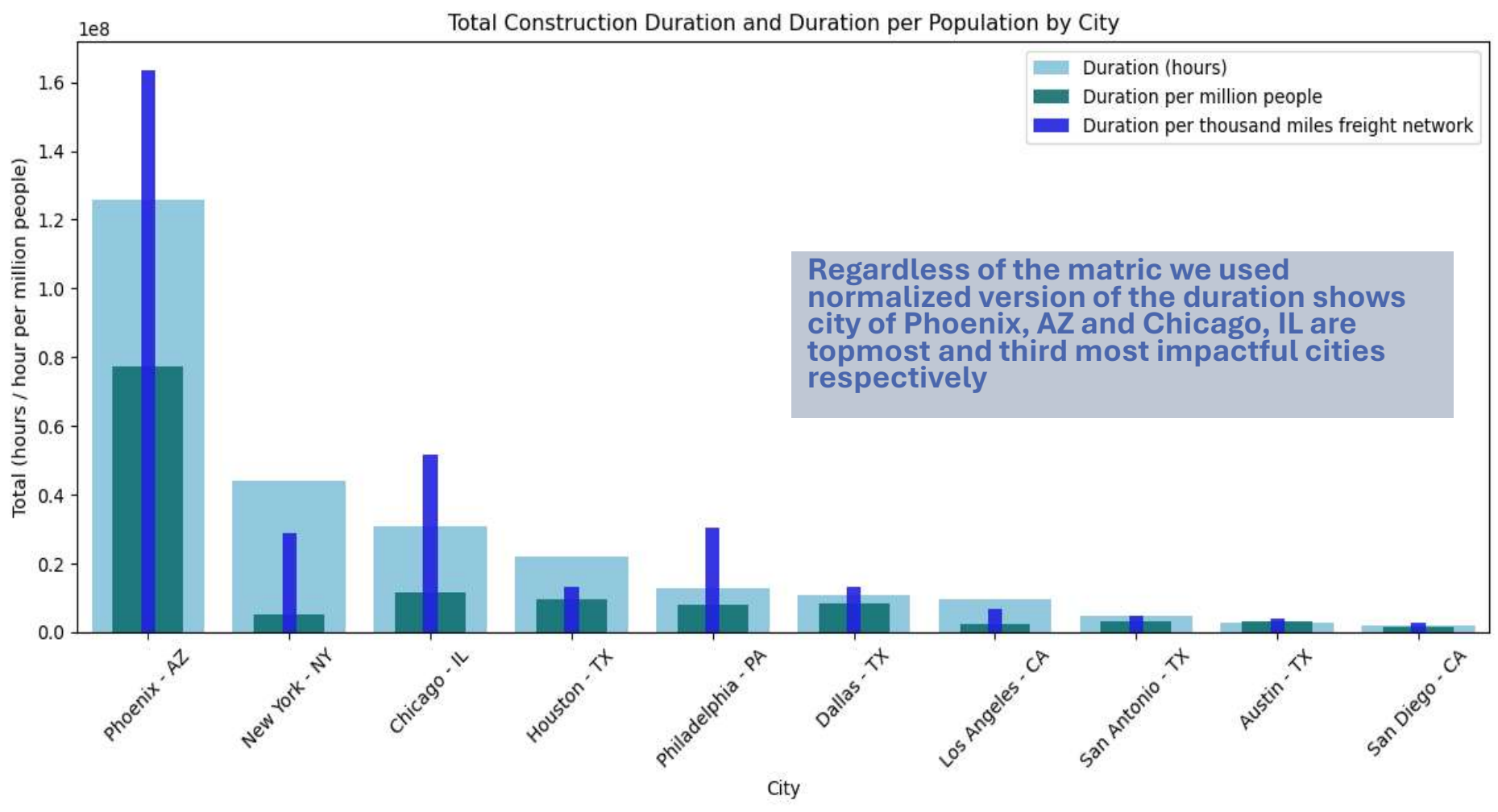
Insight 2: **Time Series Trends**



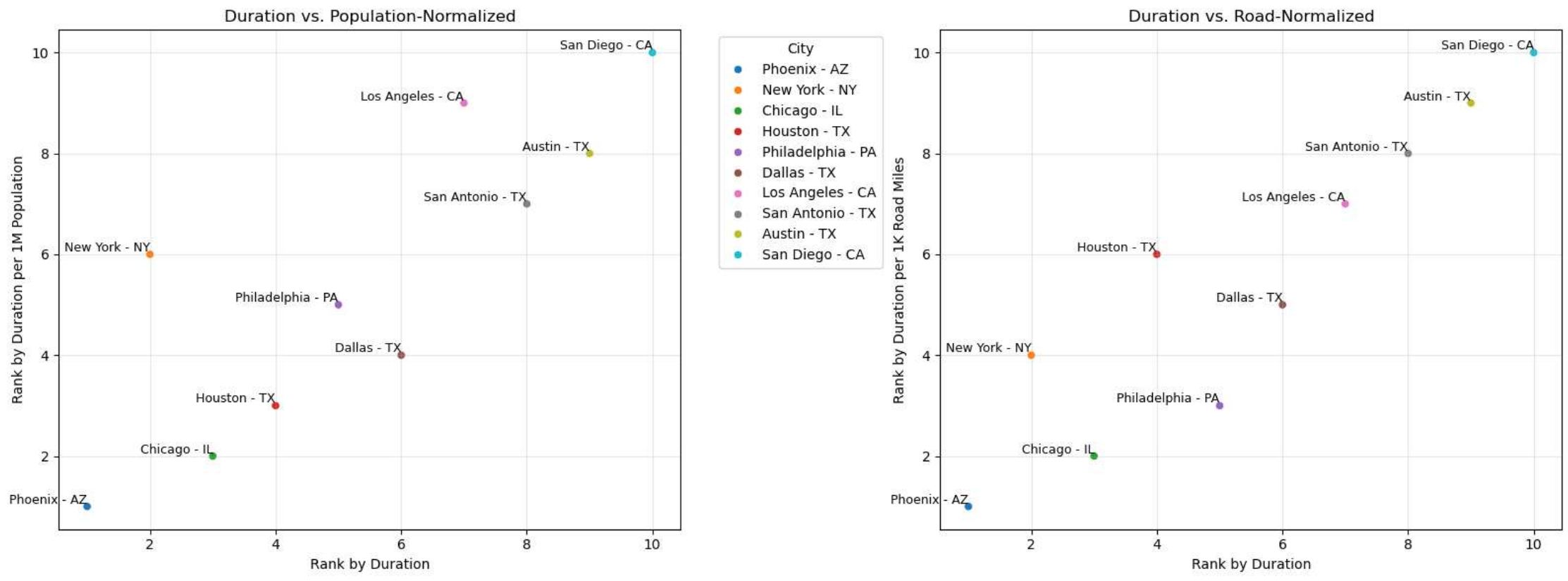
Insight 2: **Time Series Trends (Contd.)**



Insight 3: **Compare 10 largest US cities**

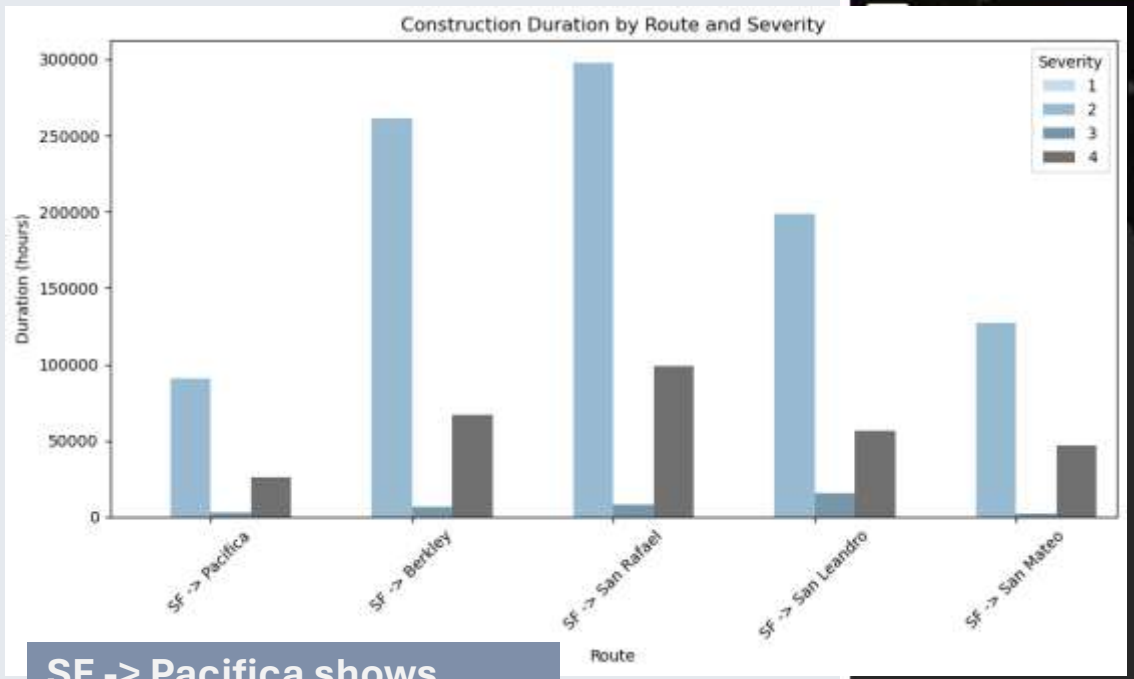


Insight 3: **Compare 10 largest US cities**

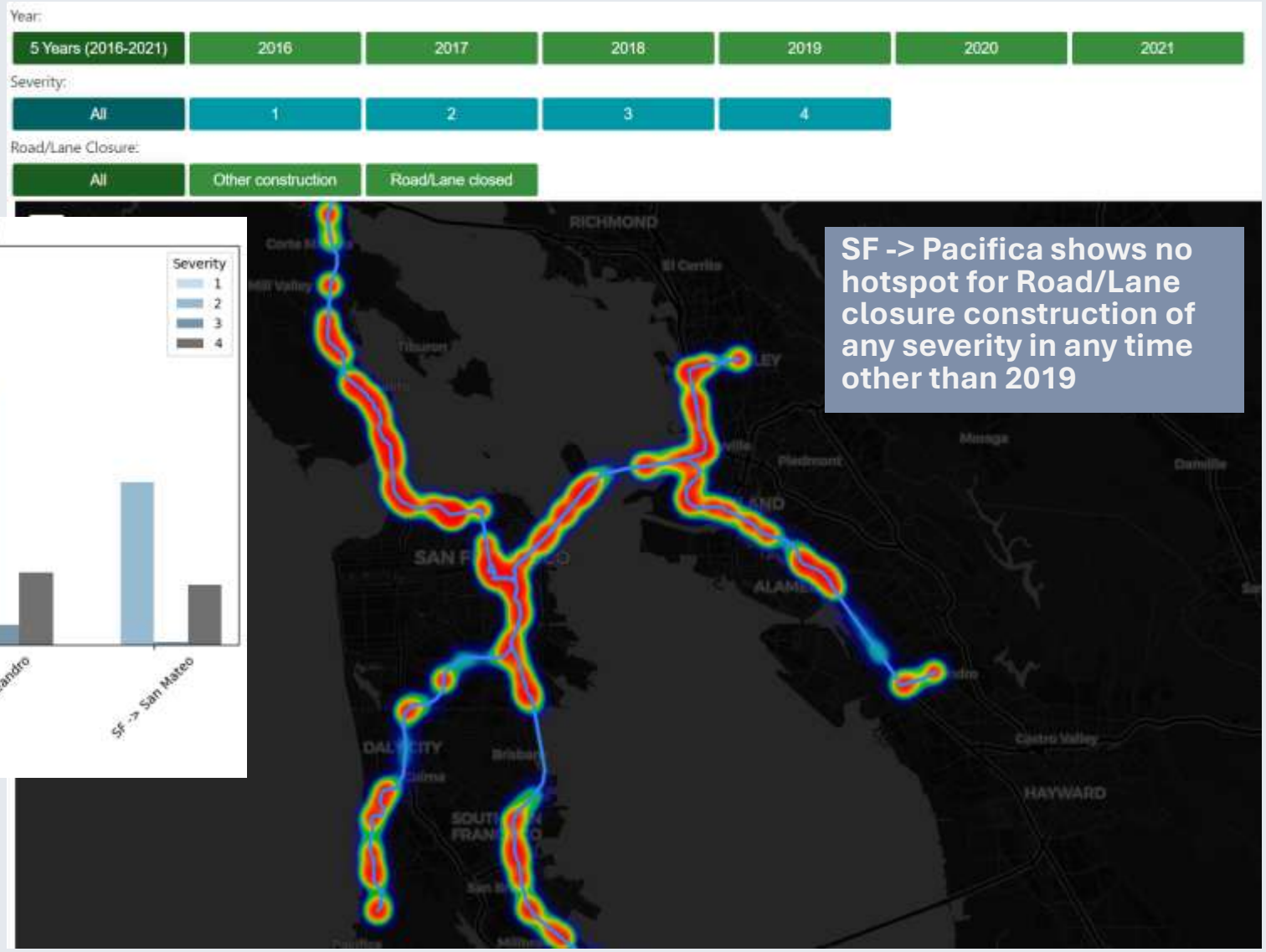


- **Normalization methodology significantly affects how construction impacts appear across different cities**
- **Freight road length KPI reveals higher impacts in major port cities like NYC, and LA due to their extensive freight infrastructure**

Insight 4: **Self-driving Routes' Risk Assessment**



SF -> Pacifica shows lowest number of construction with higher severity



SF -> Pacifica shows no hotspot for Road/Lane closure construction of any severity in any time other than 2019

Insight 5: **Duration Prediction Model**

Log Linear Regression Model

- Training, Test data split 80% - 20%
- Performs poorly
  - MAE: 1.645
  - RMSE: 2.132
  - R^2: 0.076

Random Forest Regressor

- Training, Test data split 80% - 20%
- Performs Decently Good
  - MAE: 1.2344
  - RMSE: 1.851
  - R^2: 0.303