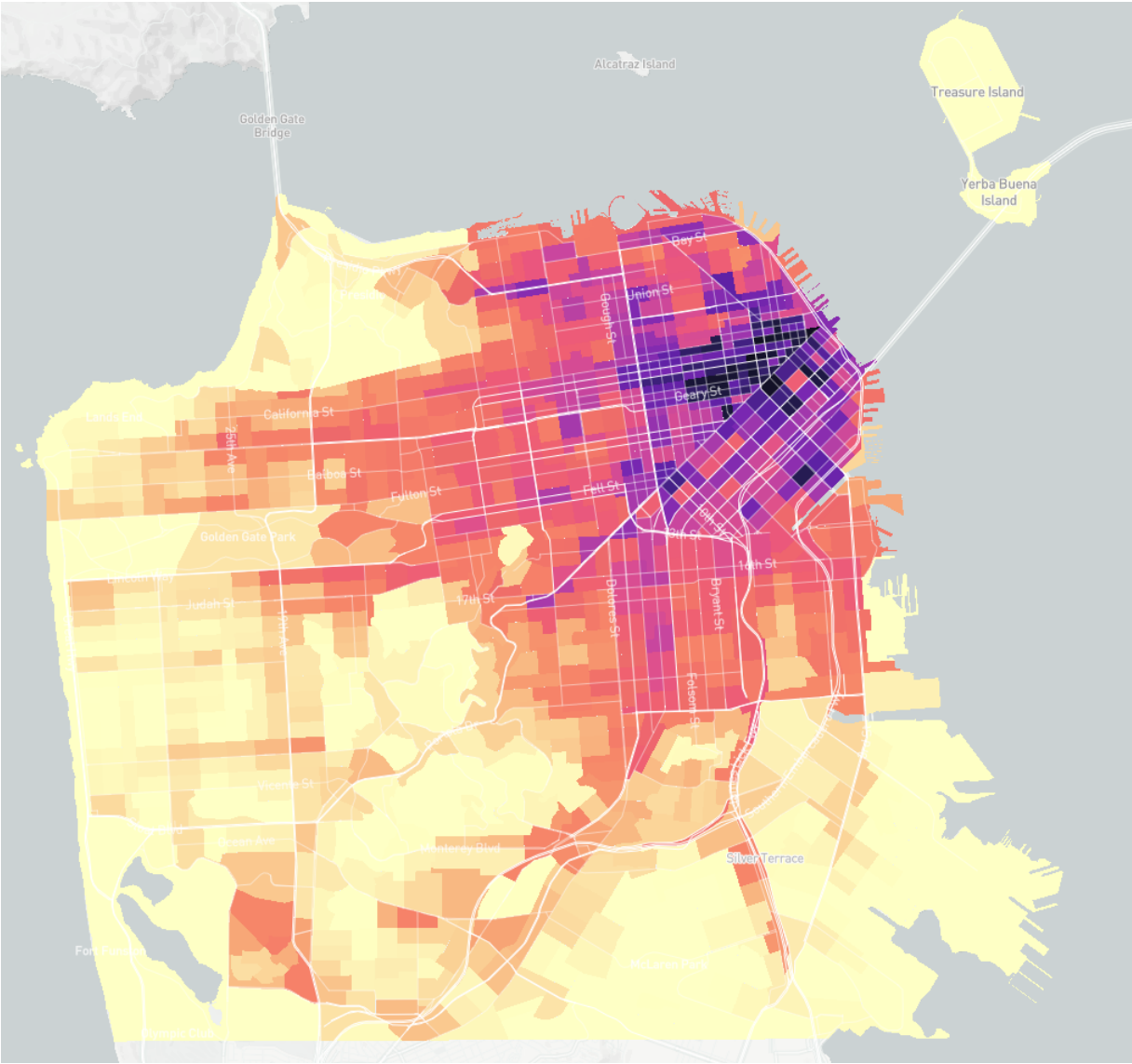
TNCs & Congestion

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

October 16, 2018

TNCs Today (Yesterday?)

- How many Ubers and Lyfts are on City streets?
- How many trips? When and where?

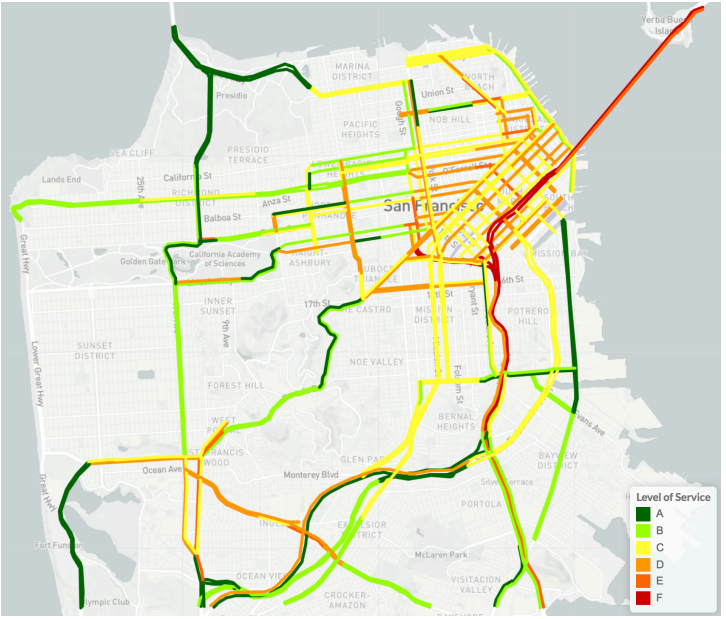


TNCs & Congestion

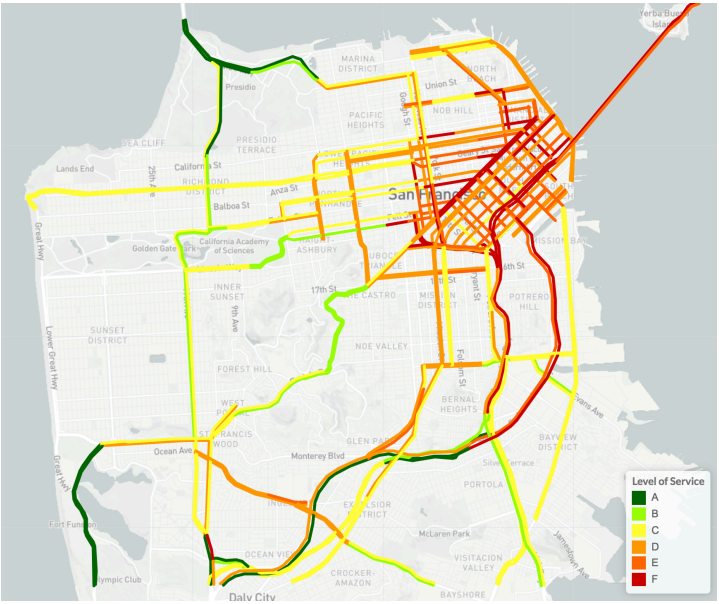
- Do TNCs affect roadway congestion in San Francisco?

- Report Contents
  - **Measures** of congestion
  - **Factors** that affect congestion
  - **Data** for quantifying changes in congestion
  - **Methods** for linking changes in congestion to factors
  - **Contributions of factors** to changes in SF congestion

2009 PM PEAK LEVEL-OF-SERVICE



2017 PM PEAK LEVEL-OF-SERVICE



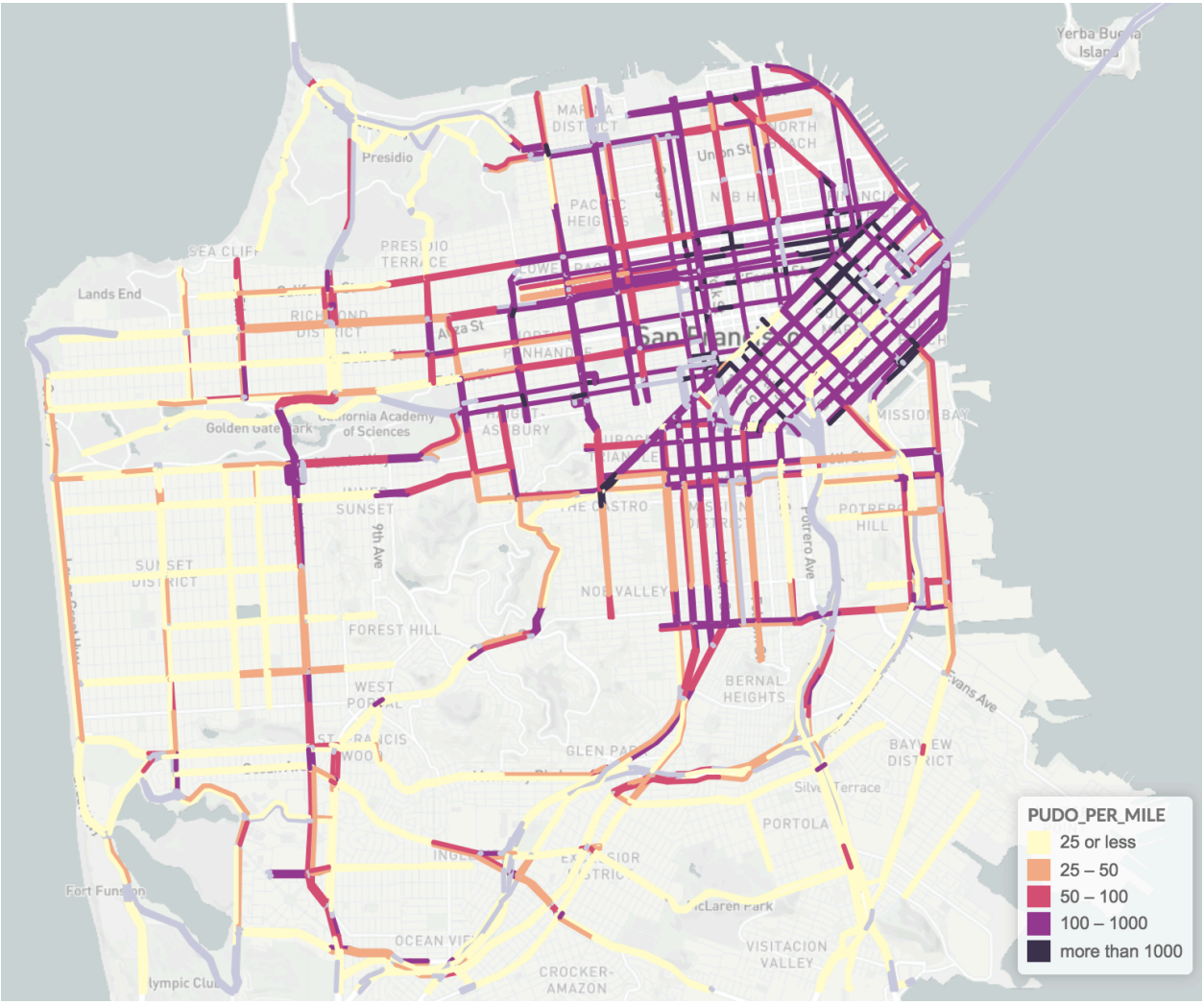
Factors that Affect Congestion

- How could TNCs decrease congestion?
  - Increased **vehicle occupancy**
  - Mode **shift to transit** due to easier access (first/last mile)
  - Mode **shift away from auto** due to reduced auto ownership
- How could TNCs increase congestion?
  - Add “dead head” or **out-of-service vehicle miles**
  - Mode **shift away from transit and non-motorized** modes
  - **Disrupt traffic flow** due to pickups and drop-offs
- Background traffic and roadway performance
  - **Network** changes (increases or decreases in roadway capacity)
  - **Population** changes
  - **Employment** changes
- Other

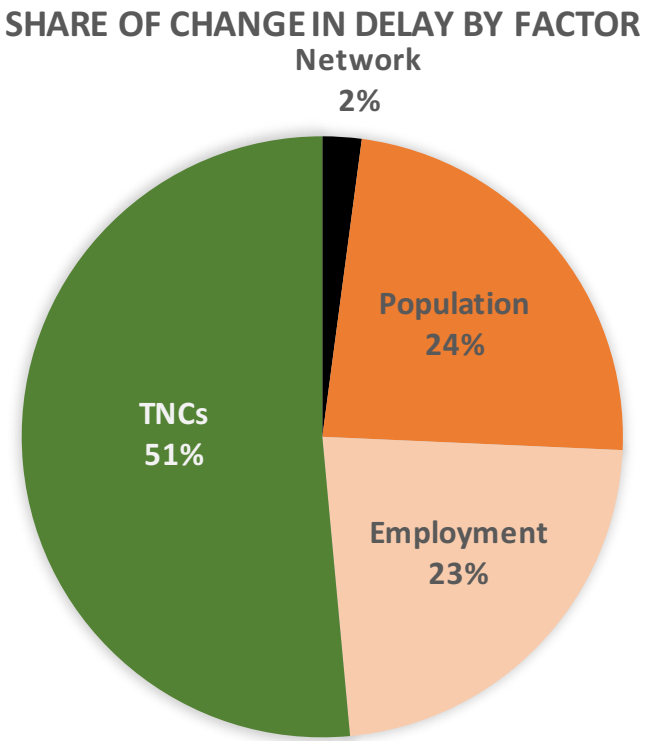
Data

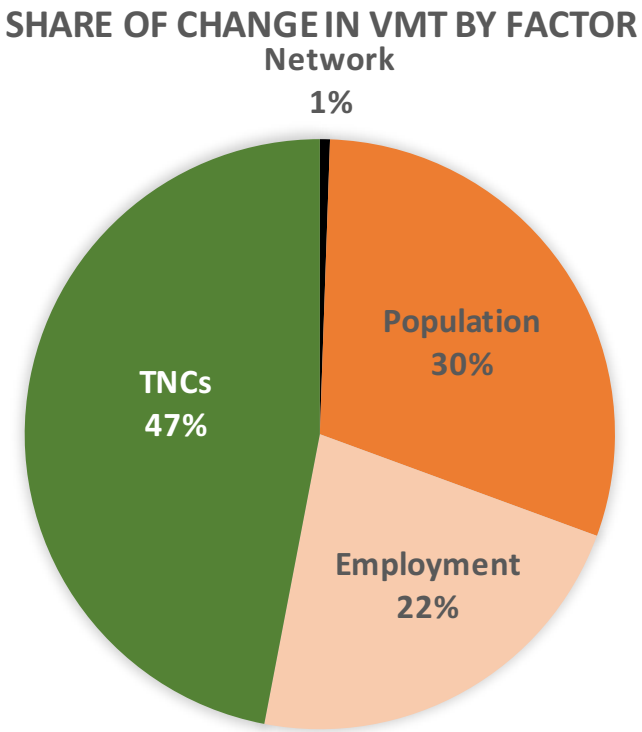
- Congestion (INRIX)
  - Nov / Dec 2010 & 2016
  - 1400 “TMCs” (segments) in SF
  - Speeds, imputed volumes
- TNCs
  - Nov / Dec 2016
  - In-service and out-of-service volumes
  - Pick up and drop off locations
- Background traffic (CHAMP)
  - 2010, 2016 (adjusted from 2015)
  - All streets in SF
  - Volumes, imputed speeds

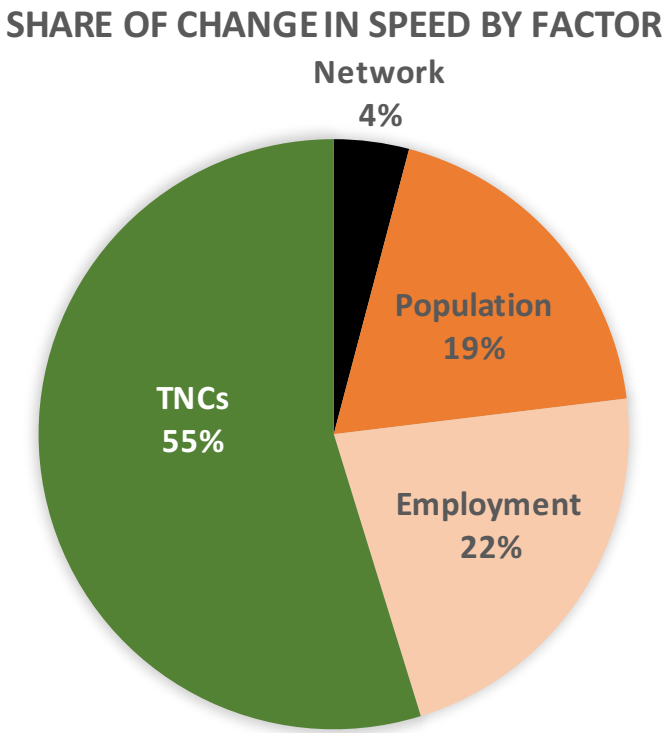
TNCs Pickup/Dropoff per Mile



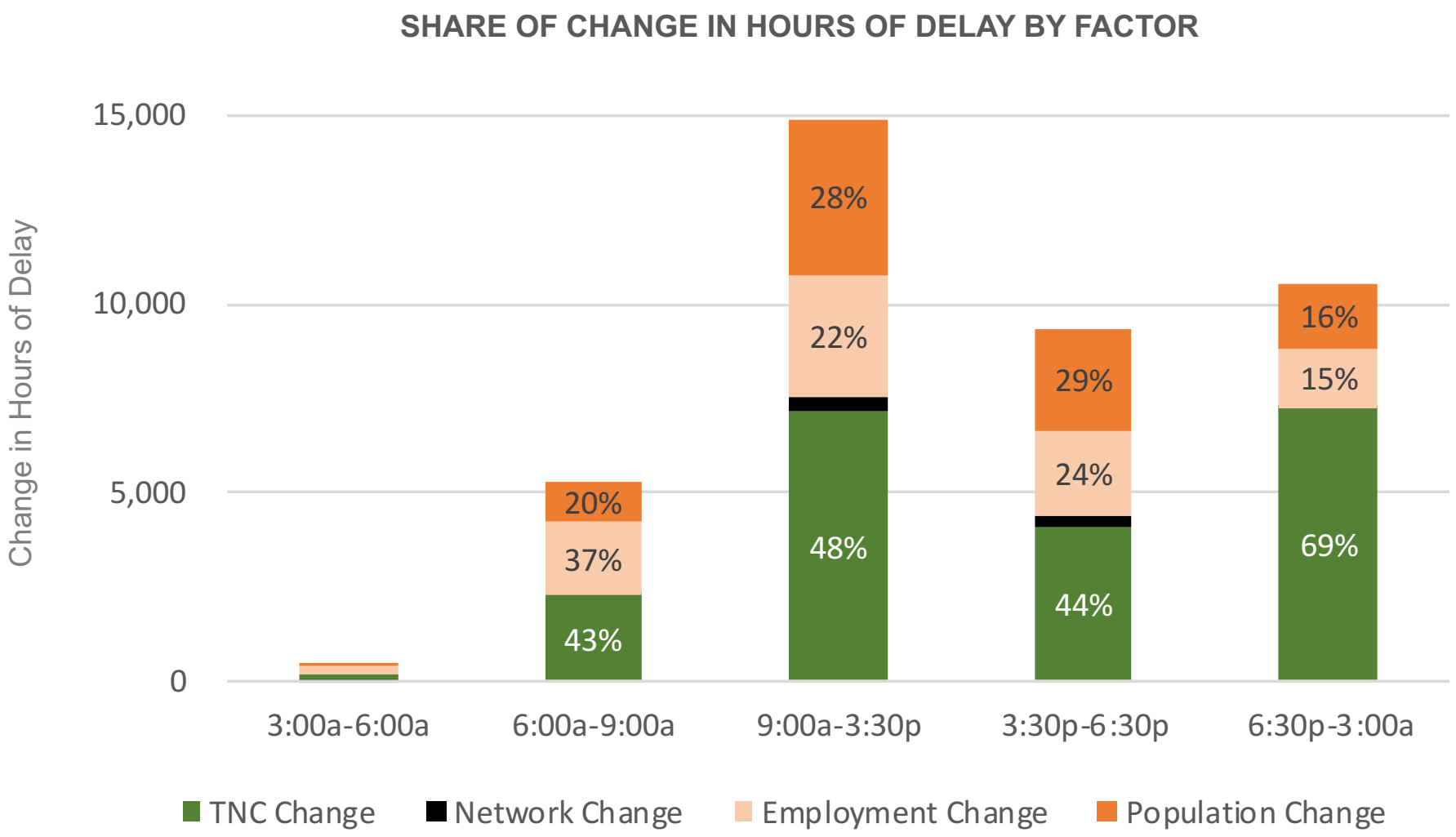
Causes of Changes in Congestion (2010-2016)



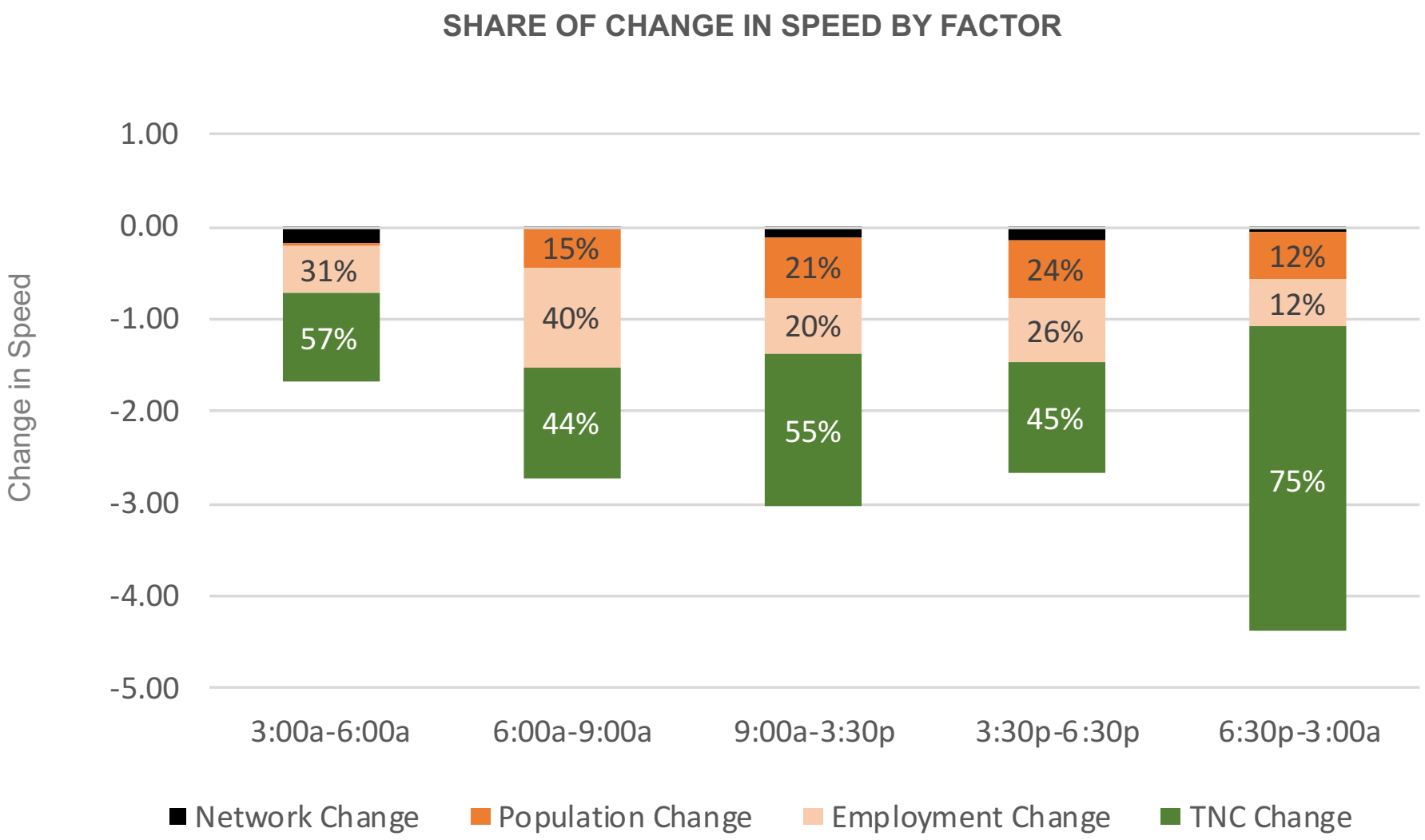




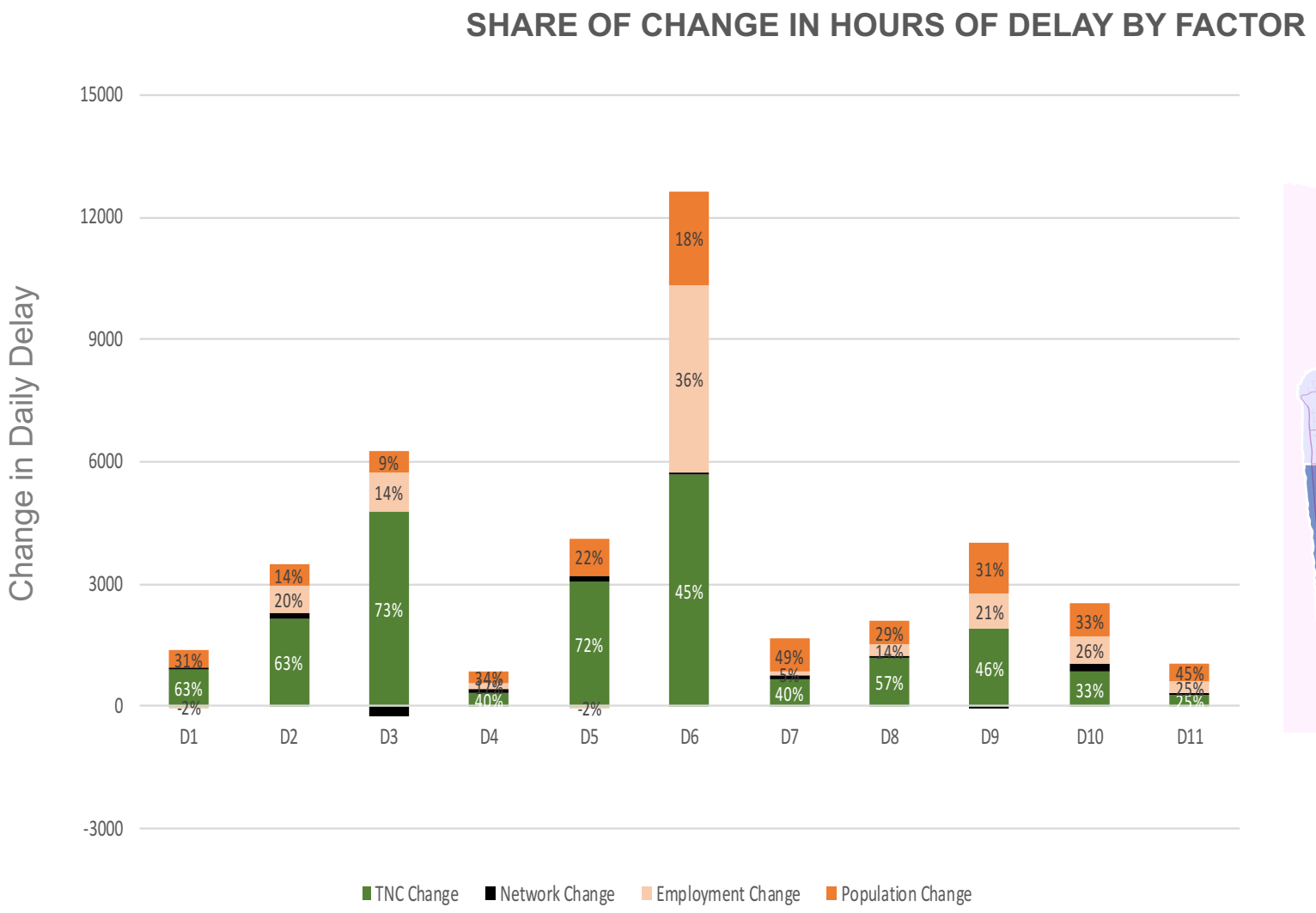
Factors Affecting Hours of Delay by Time Period

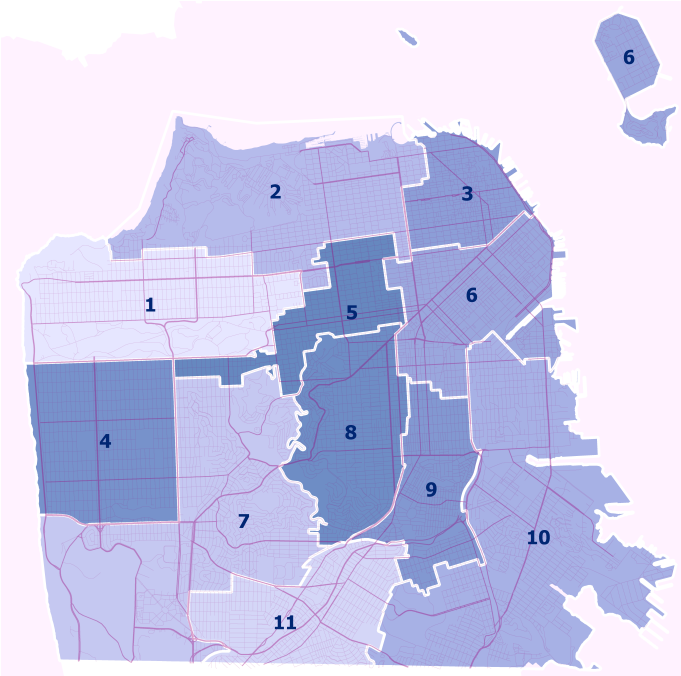


Factors Affecting Speed by Time Period

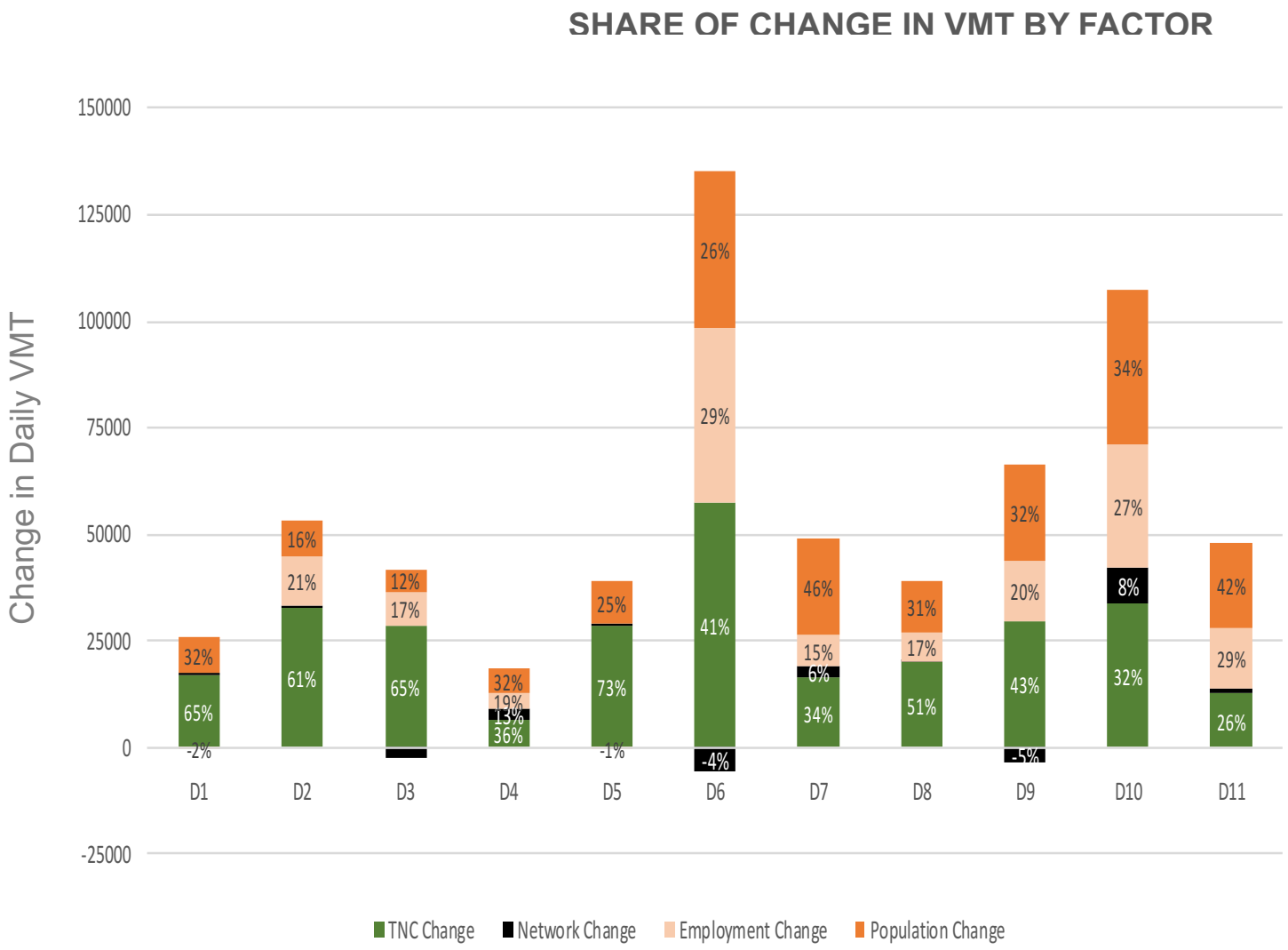


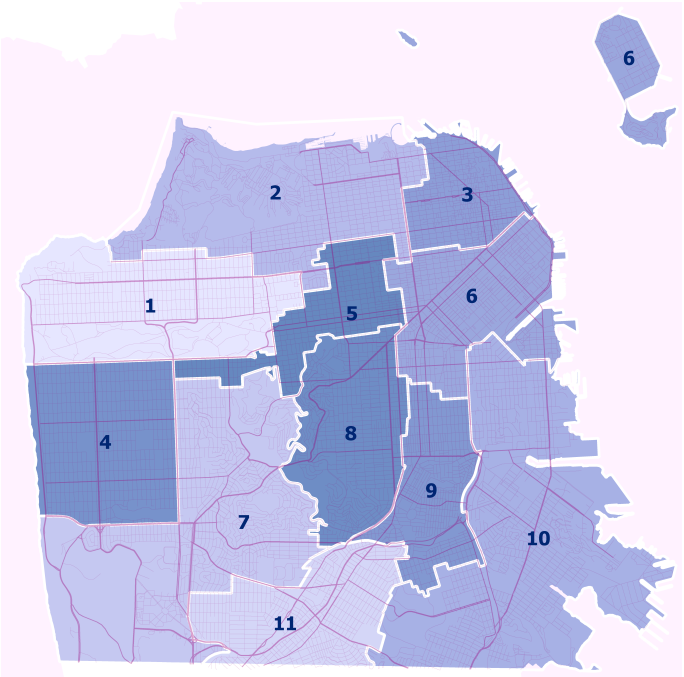
Factors Affecting Hours of Delay by District



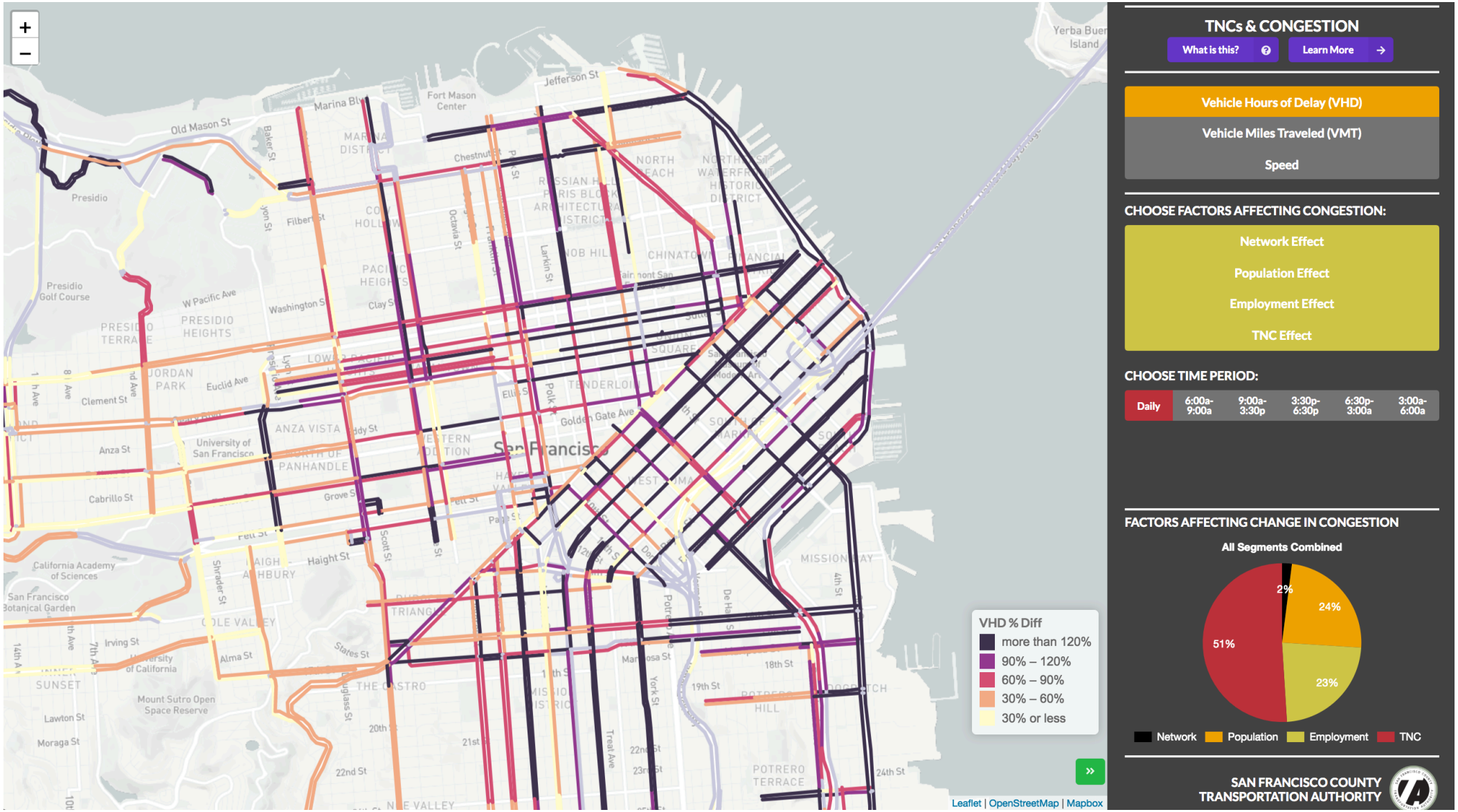


Causes of Increased VMT by District





Interactive Data Visualization



Additional Resources

- Science Advances publication: http://advances.sciencemag.org/
- TNCs & Congestion Report: https://www.sfcta.org/projects/tncs-and-congestion
- TNCs & Congestion Visualization: http://tncsandcongestion.sfcta.org/
- TNCs Today Report: https://www.sfcta.org/projects/tncs-today
- TNCs Today Visualization: https://tncstoday.sfcta.org/

Questions?

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SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

Analysis Limitations

- Freight
  - No observed data on changes in freight / commercial / delivery activity
  - Increase traffic due to more deliveries?
  - Reduce traffic due to fewer shopping trips?
  - Use SF-CHAMP / MTC simplified commercial vehicle model
- Visitors
  - 56% increase in annual visitor travel
  - About 4.5% of total SF travel
  - Highest use modes are transit, though TNC share is certainly increasing
- Pedestrians impeding traffic flow
  - No data
- Non-permitted, short term construction capacity impacts
  - No data

How do we analyze changes in congestion?

- Empirical analysis
  - Before (2010) and after (2016)
  - Panel regression model
- Scenario analysis
  - Factors affecting change
  - CHAMP-based
- Combined analysis
  - Total change from empirical
  - Shares of change from scenario

Empirical Model Parameters

Variable	Parameter	StdErr	T-stat
SF-CHAMP background volume	0.9172	0.0541	16.952
Presidio Parkway scaling factor	-0.3648	0.0189	-19.327
TNC Volume	0.6864	0.072	9.5387
Avg Impact Duration of TNC PUDO on major arterials	144.75	7.7195	18.751
Avg Impact Duration of TNC PUDO on minor arterials	79.486	12.114	6.5617

Share of Change in Congestion Due to TNCs

Metric	Empirical	Scenario
VHD	64%	51%
VMT	44%	47%
Speed	65%	55%
Reliability	63%	41%