

# Rapid Implementation and Validation of DTA in the Doyle Drive Corridor

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**TRB Innovations in Travel Modeling Conference  
May 12, 2010**

# Overview

- 1. Presidio Parkway / Doyle Drive Replacement Project**
- 2. Stakeholder Concerns**
- 3. Modeling Approach**
- 4. Model Development and Validation**
- 5. Responses to Stakeholder Concerns**
- 6. Model Evaluation**
- 7. Conclusions**

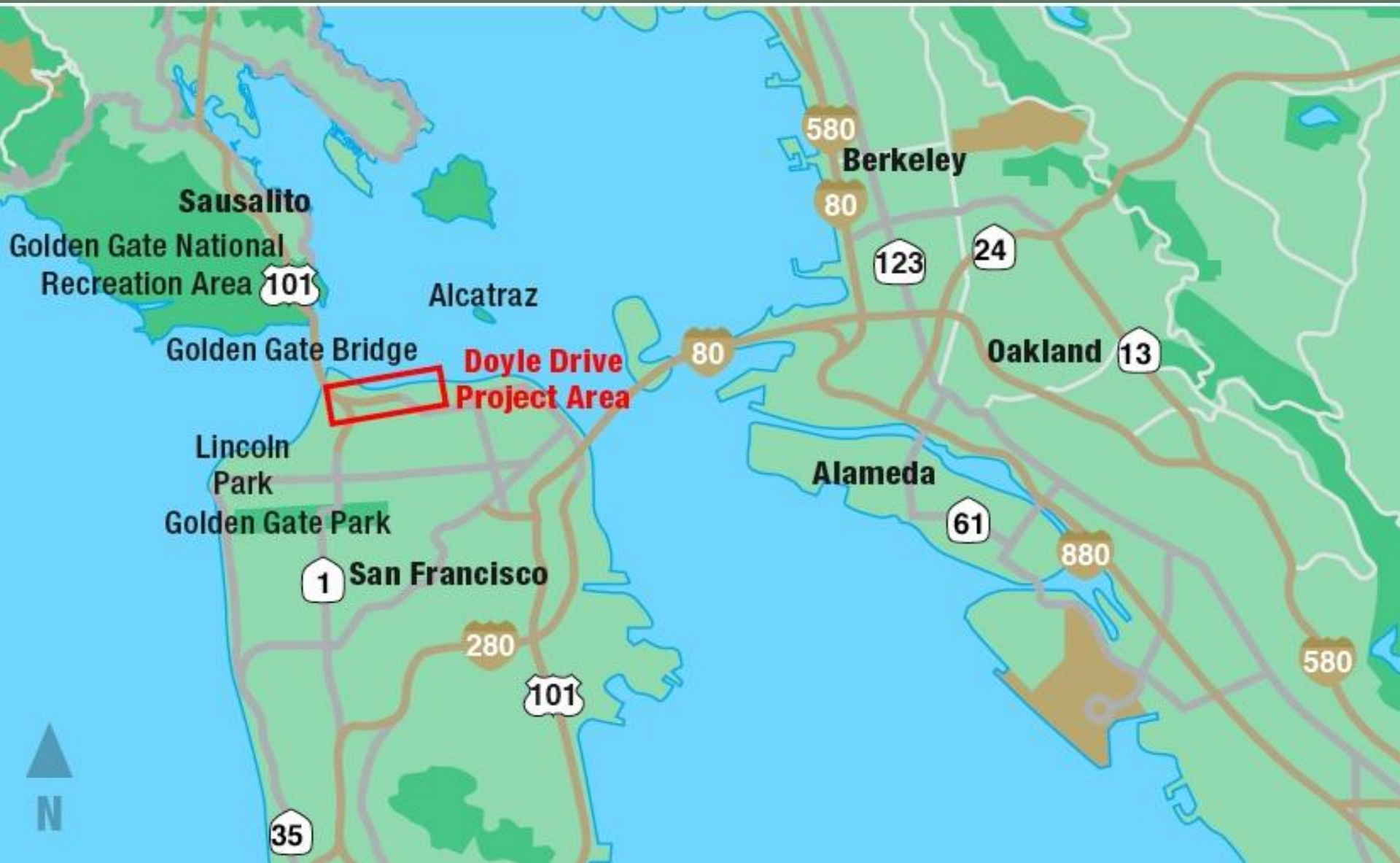


# Project Overview



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# Location



# Setting



# Phase I



2009	2010	2011	2012	2013
	[Orange Bar]			



# Phase I



# Weekend Closure



2009	2010	2011	2012	2013
		★		





# Phase II



2009	2010	2011	2012	2013



# Presidio Parkway -- Completed



2009	2010	2011	2012	2013

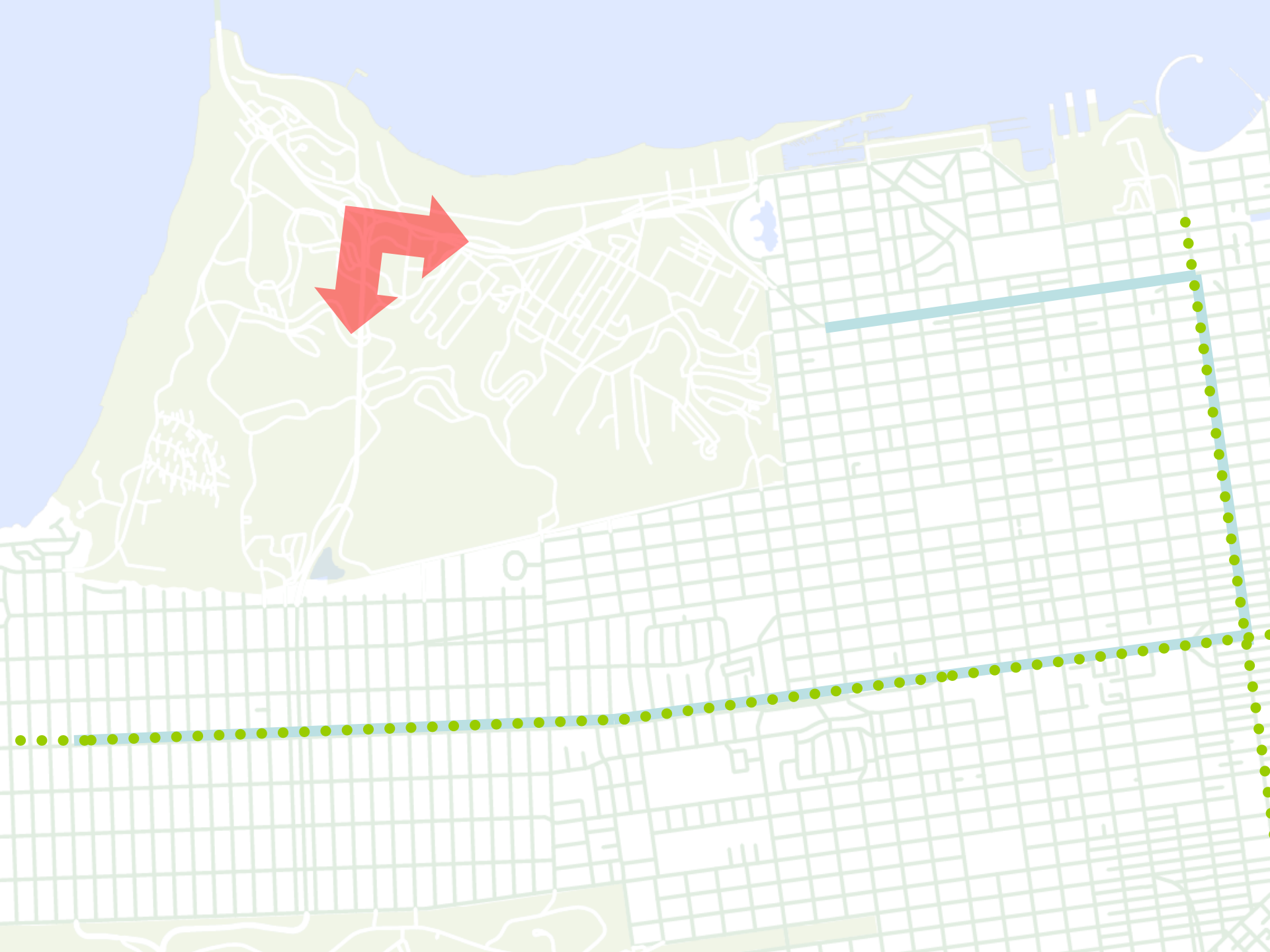


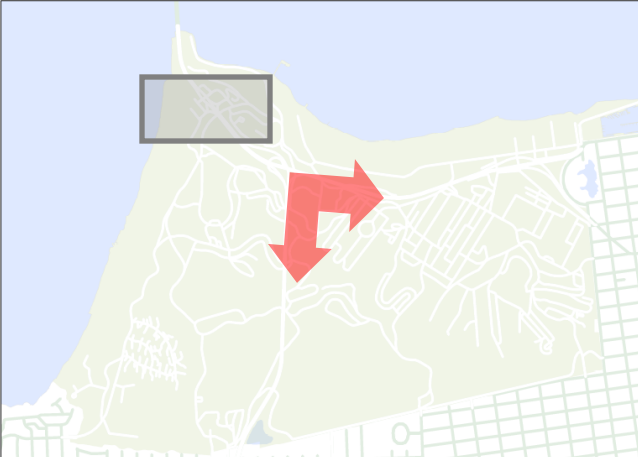
# Transportation Management Concerns During Construction



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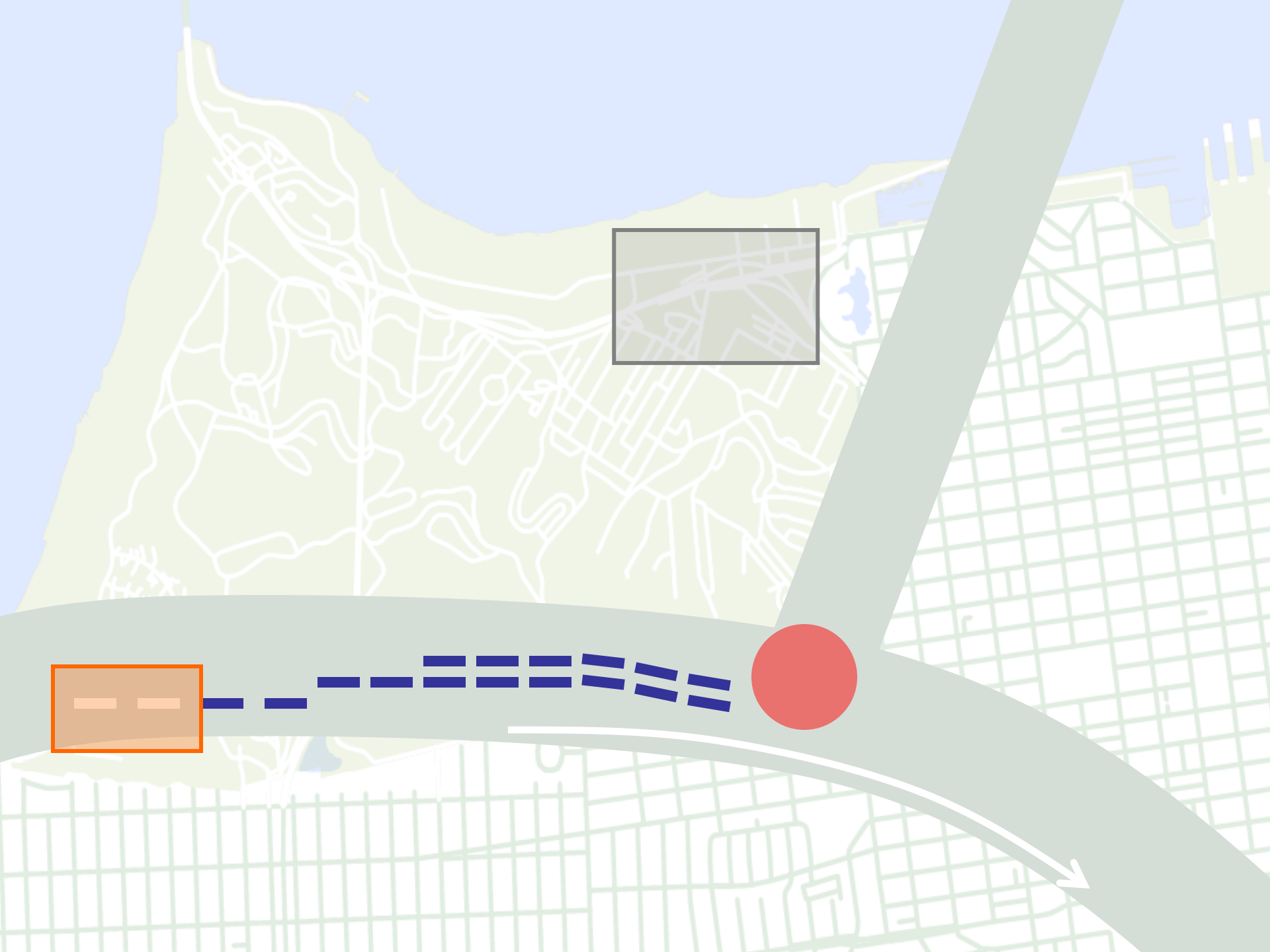












# Approach & Schedule



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**SUE**



**Discussions with  
Stakeholders**



**Decision Makers**

**DTA**



**Count  
Assembly**



**Calibration  
of Demand**



**Network  
Preparation**



**Validation**

# Timeline

July



August

Data Assembly  
Data Assembly  
Data Assembly  
Network Preparation

September

Network Preparation  
Network Preparation  
Calibration  
Calibration

October

Calibration ★  
Alternatives Analysis  
Alternatives Analysis  
Alternatives Analysis

November

Ramps close!

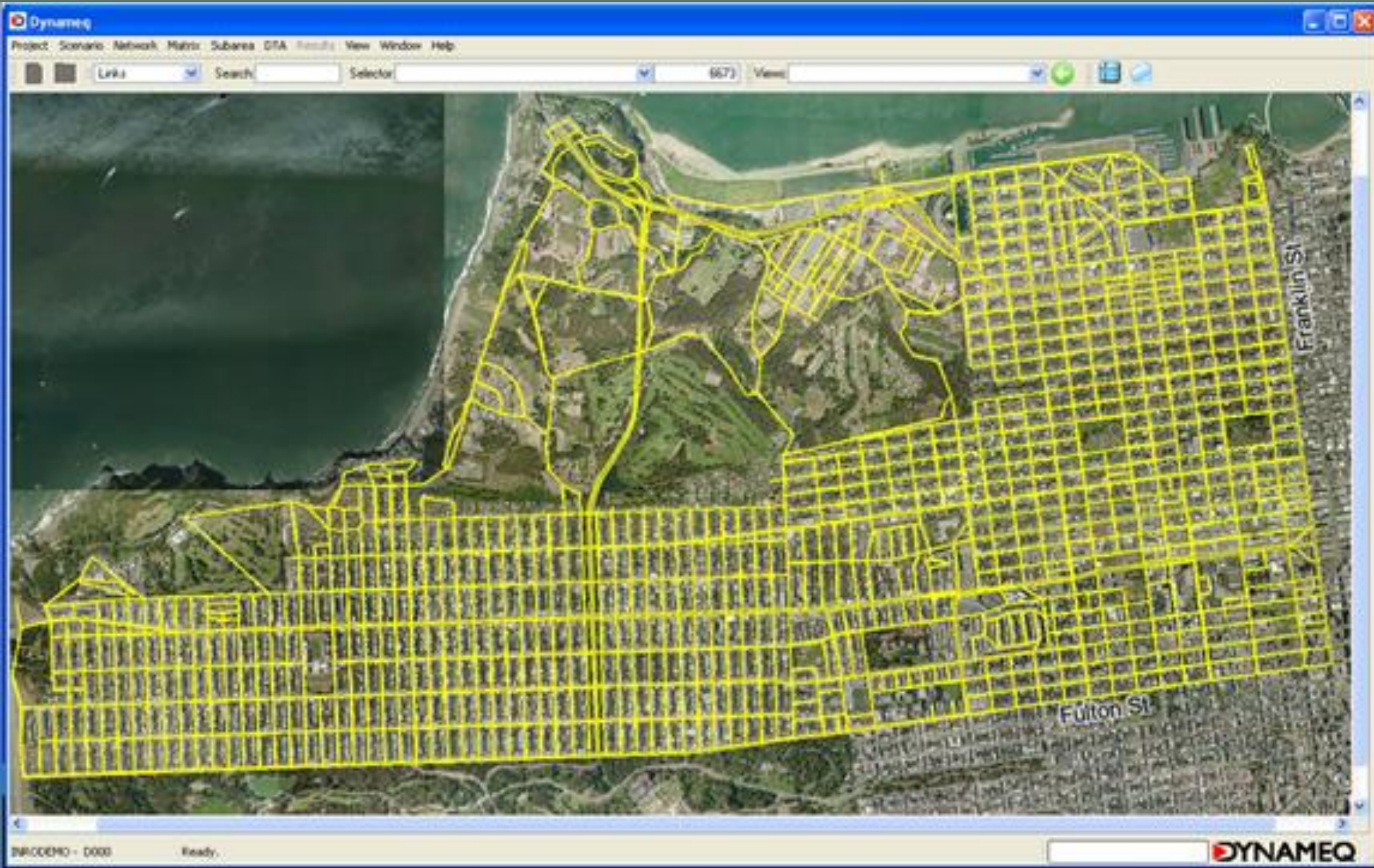


# Model Development: Networks



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# DTA Study Area



# By the numbers....

Zones	240
Links	7,000
Nodes	2,000
Signals	240
Transit Lines	84
Vehicles	160,000 in 3-hour PM Peak





# Model Development: Demand Calibration



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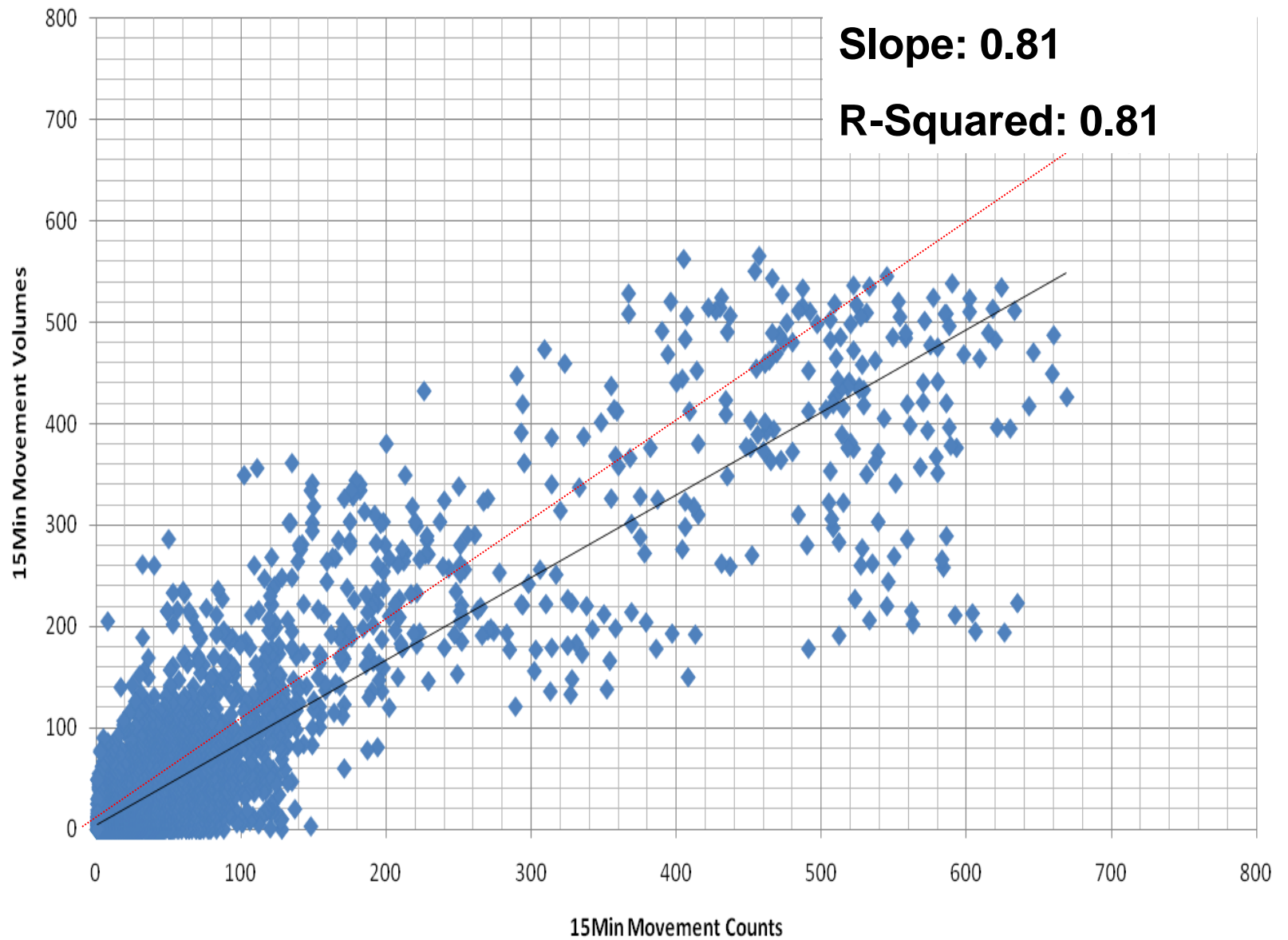
# Traffic Counts

## Counts Used

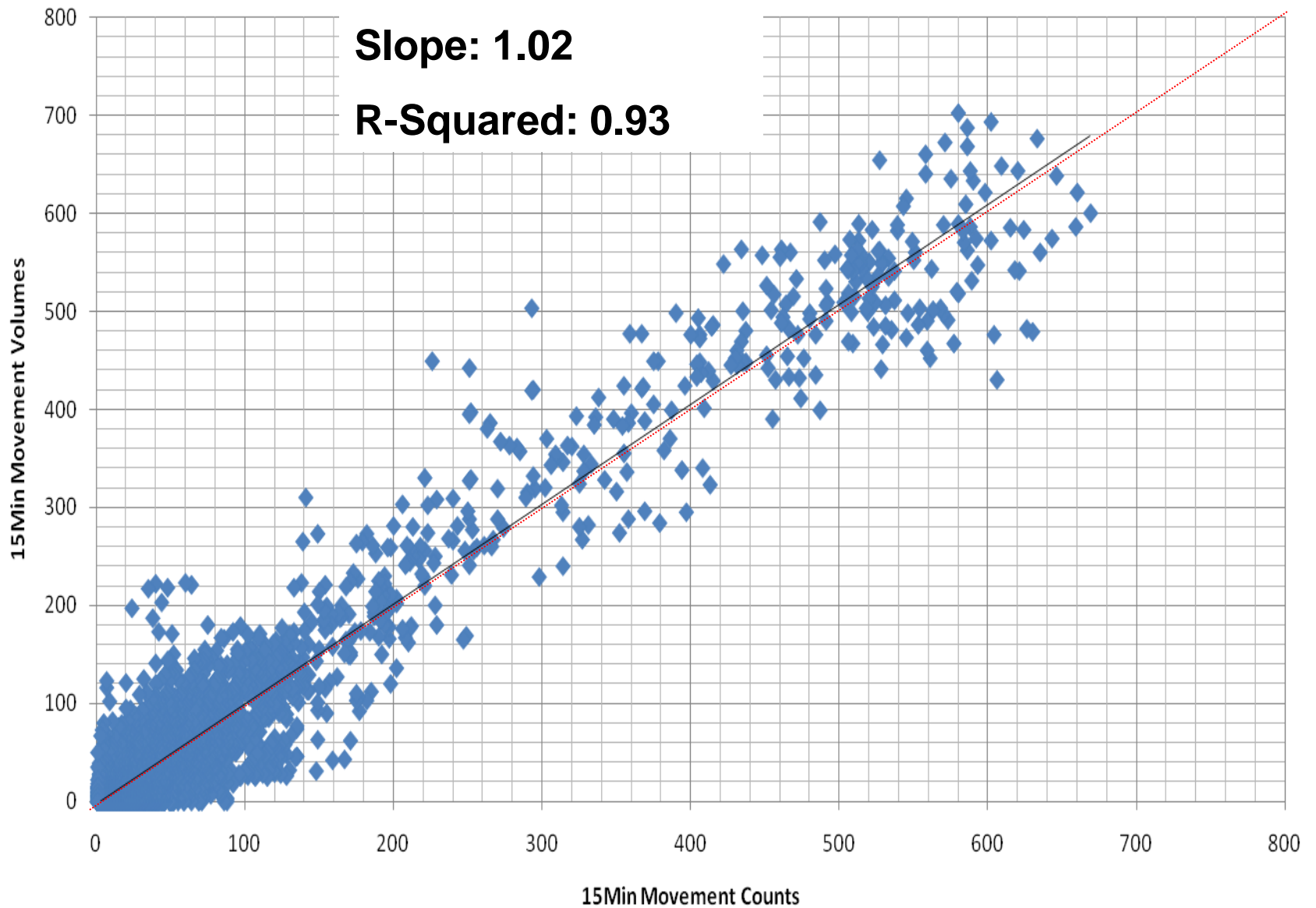
- ▶ 74 Mainline Counts
- ▶ 700+ Turn Counts



# Original CHAMP



# Adjusted OD Matrix

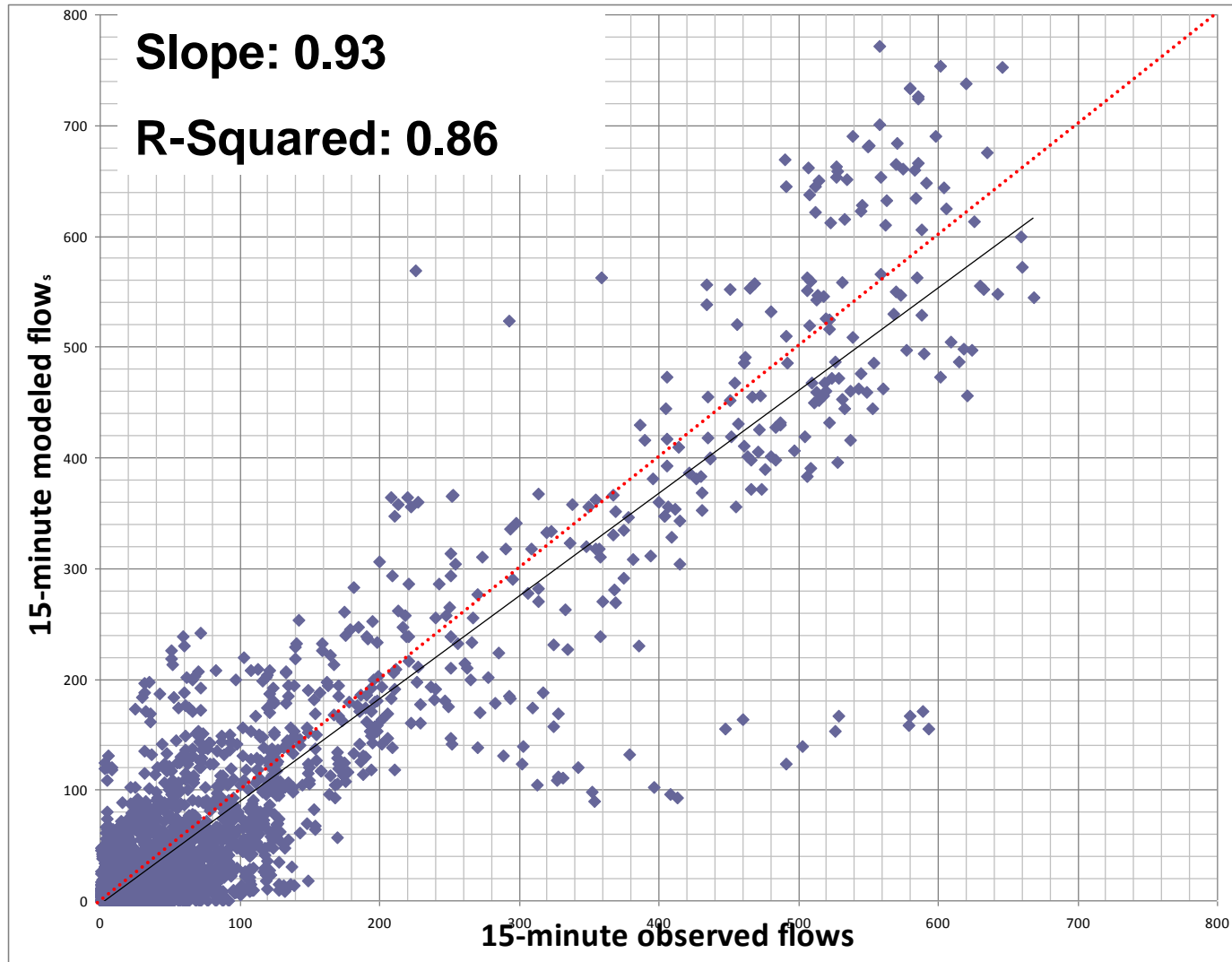


# Demand Validation Summary

<b>Demand Matrix</b>	<b>Slope</b>	<b>R-squared</b>	<b>%RMSE</b>
<b>Original CHAMP</b>	<b>0.81</b>	<b>0.80</b>	<b>49</b>
<b>Calibrated Demand</b>	<b>1.02</b>	<b>0.94</b>	<b>29</b>
<b><i>Improved CHAMP*</i></b>	<b><i>0.93</i></b>	<b><i>0.86</i></b>	<b><i>45</i></b>



# Improved CHAMP Demand



Problem:  
Too many turns in paths

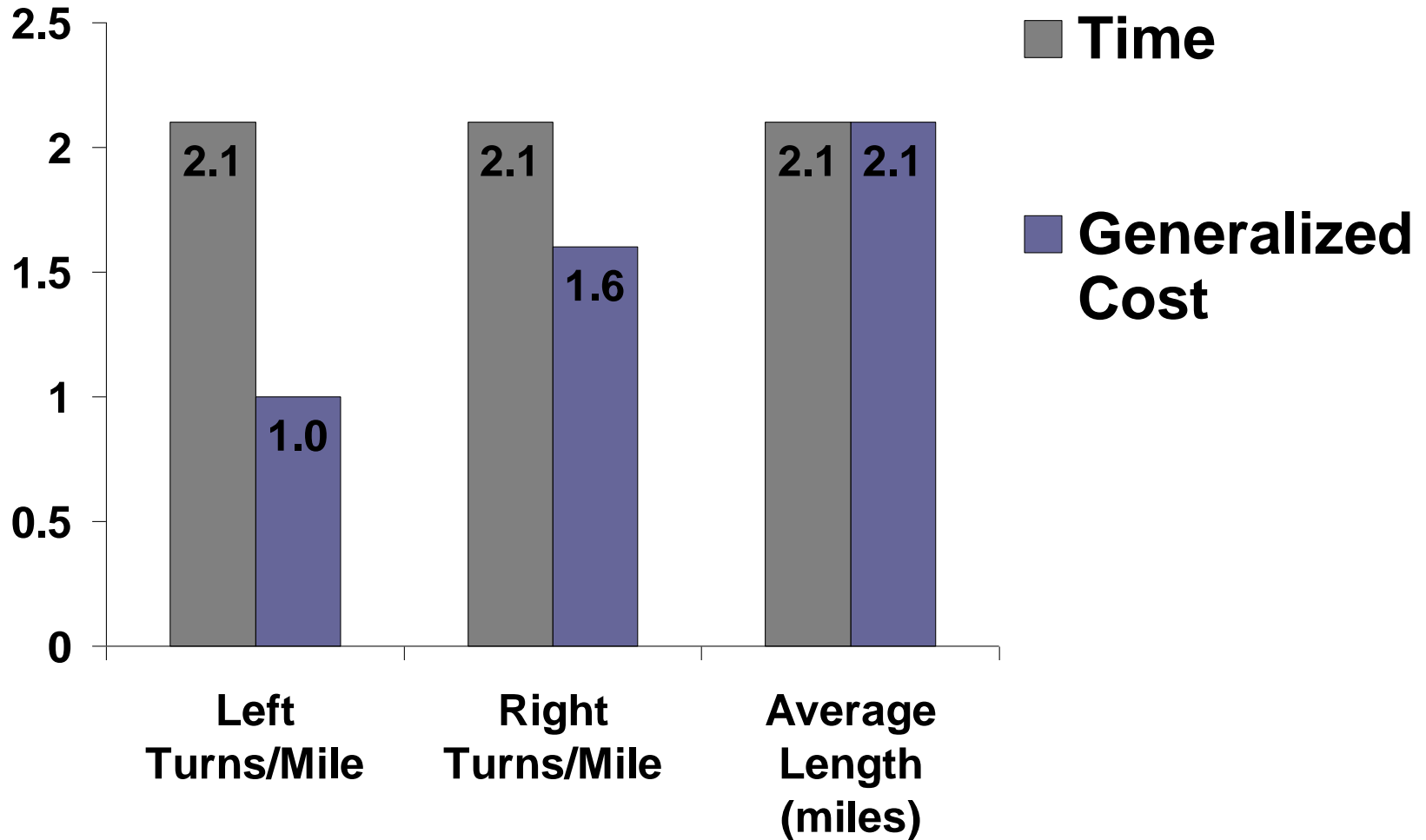


Solution:  
Use a Generalized Cost with Turn Penalties

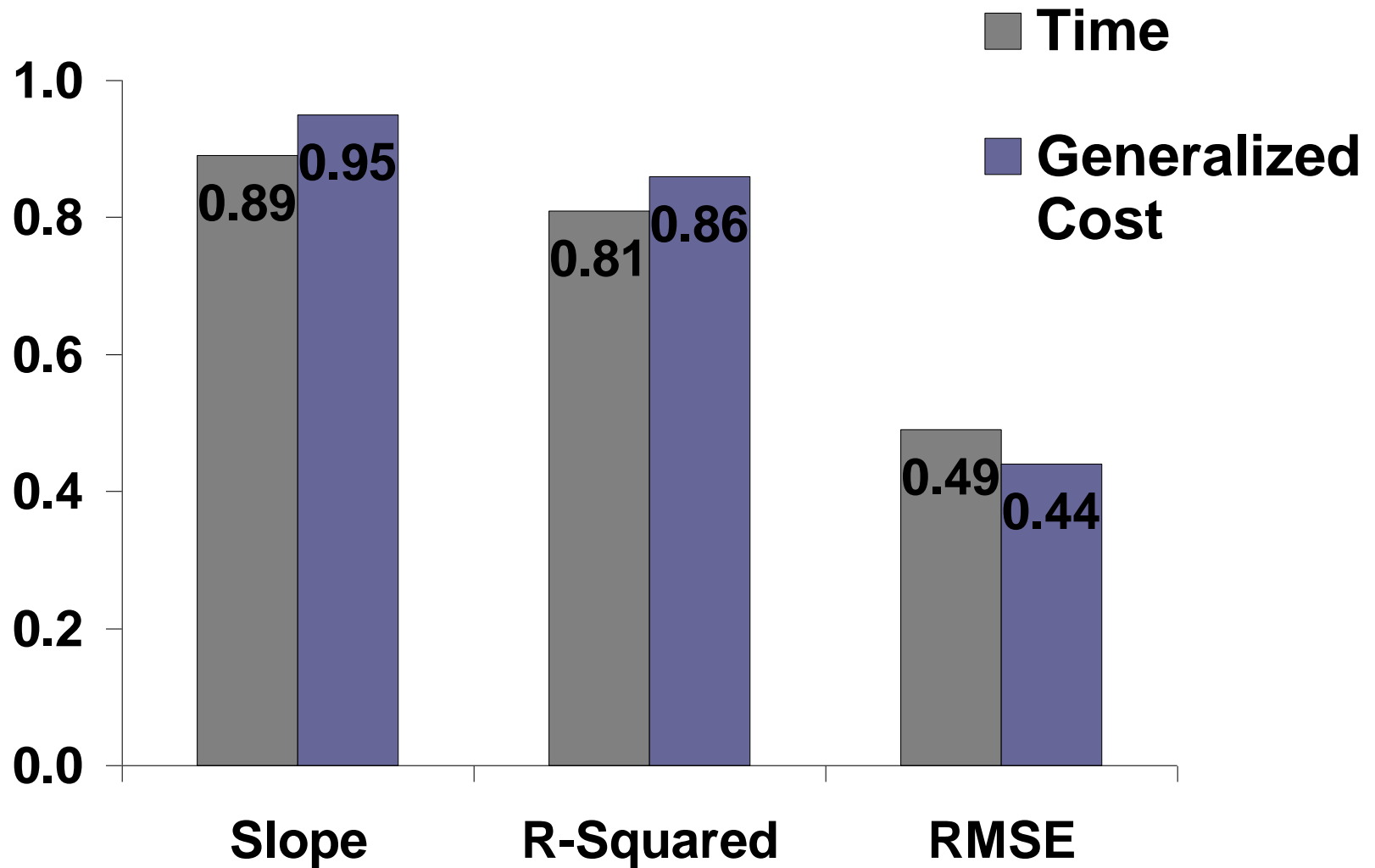




# Link Cost Function – Time versus Generalized Cost



# Link Cost Function – Time versus Generalized Cost



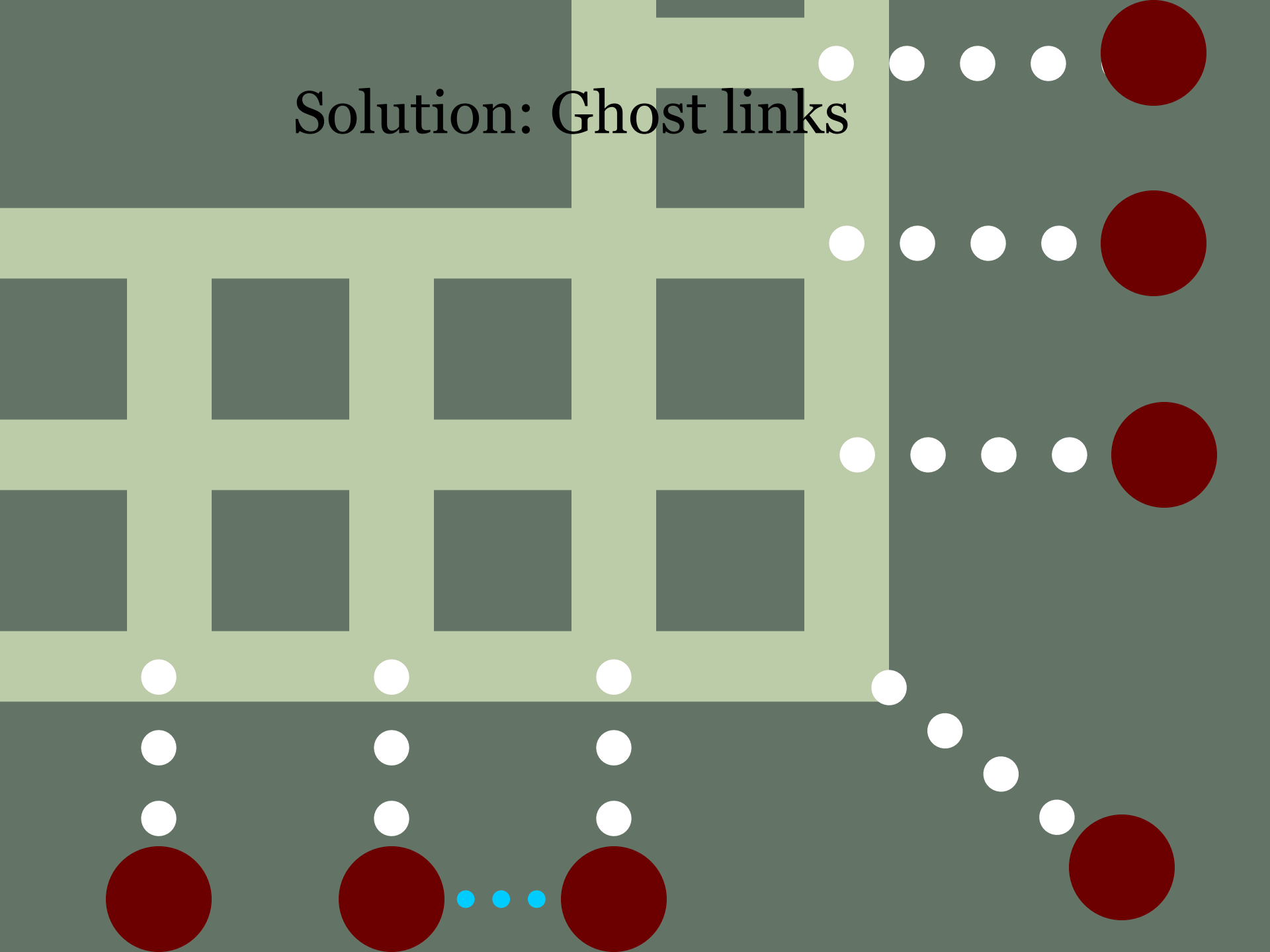
# Problem:

Many vehicles waiting at one connector while adjacent one is free flowing

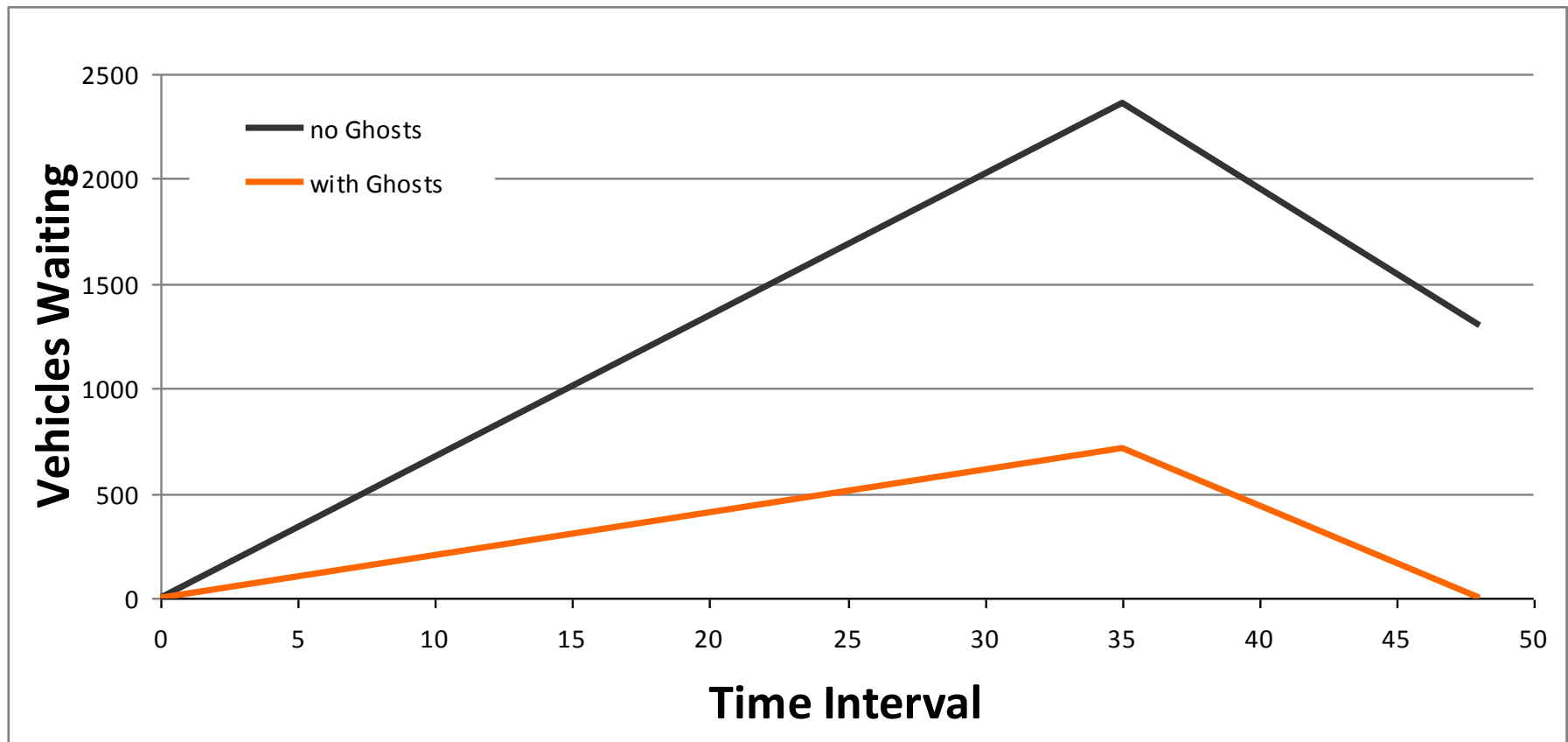


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Solution: Ghost links



# Ghost links – Effect on Vehicles Waiting



# Model Development: Travel Time Validation



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# Speed / Travel Time Data

Source: SFCTA  
 Spring 2009  
 LOS Monitoring

## Legend

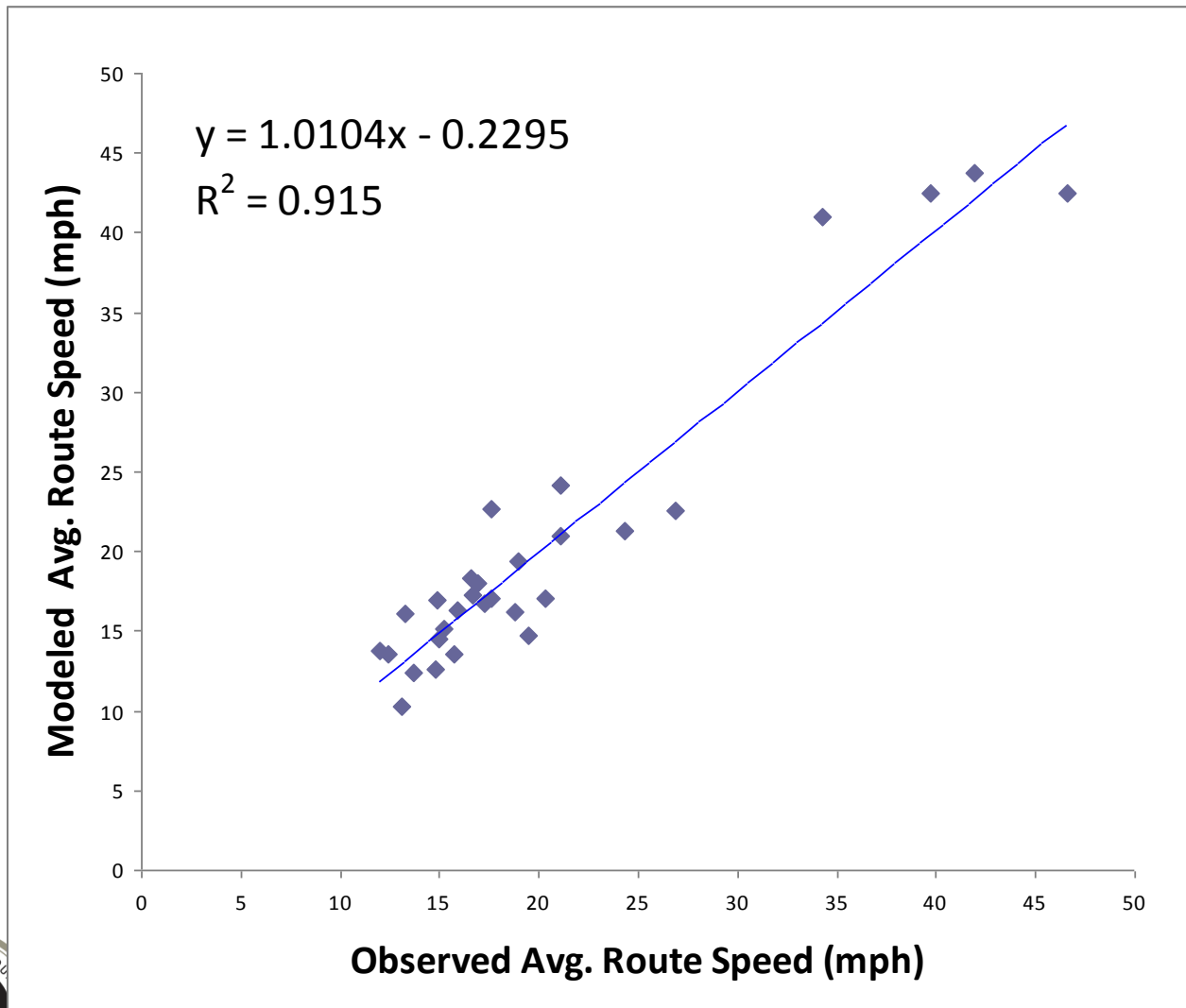
### PM Average Speed

- 2.33 - 10.00
- 10.01 - 20.00
- 20.01 - 30.00
- 30.01 - 40.00
- 40.01 - 50.00
- 50.01 - 60.00
- 60.01 - 70.00



# Validation of Travel Time/Speed

## All Routes

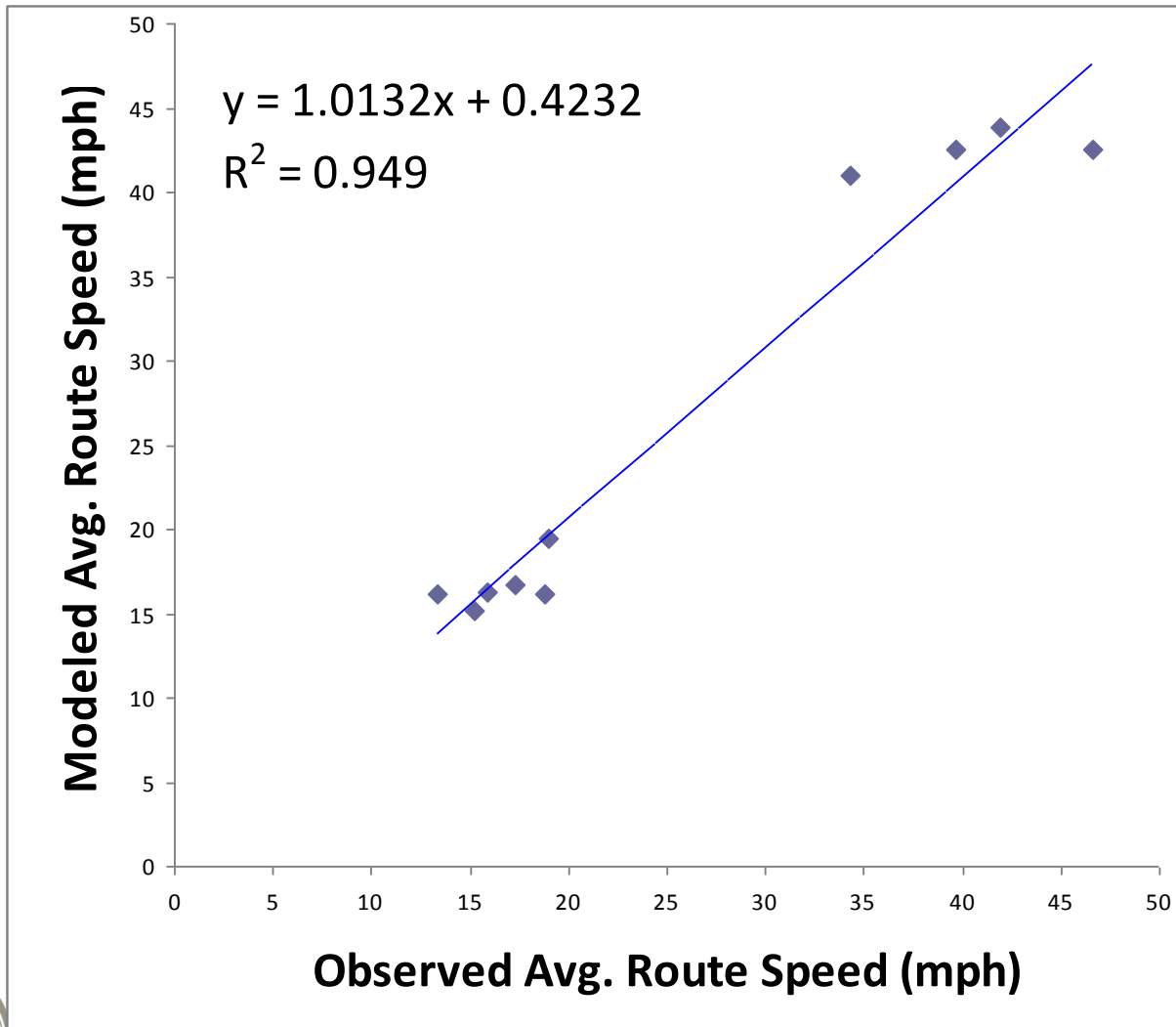


Source: SFCTA  
Spring 2009  
LOS Monitoring





# Validation of Travel Time/Speed Important Routes



Source: SFCTA  
Spring 2009  
LOS Monitoring

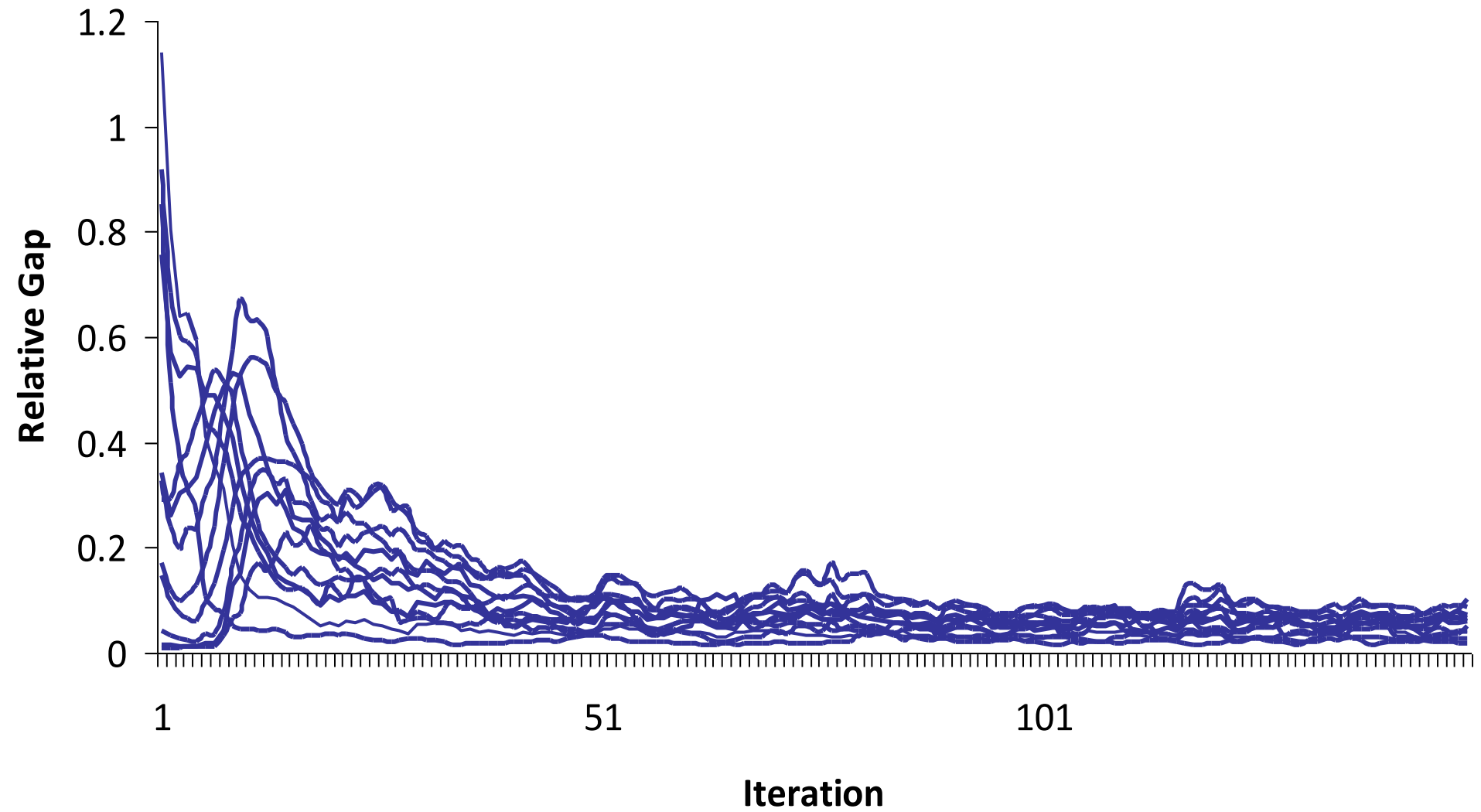


# Model Development: DTA Solution Quality



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# Relative Gap



# Computational Resources

	<b>DTA</b>	<b>SUE</b>
<b>Processor</b>	3.3 Ghz Nehalem Xeon	2.5 Ghz AMD Opteron
<b>Iterations</b>	150	24
<b>Relative Gap</b>	2.5-6%	0.5%
<b>Time (sec) /Iteration</b>	120	38

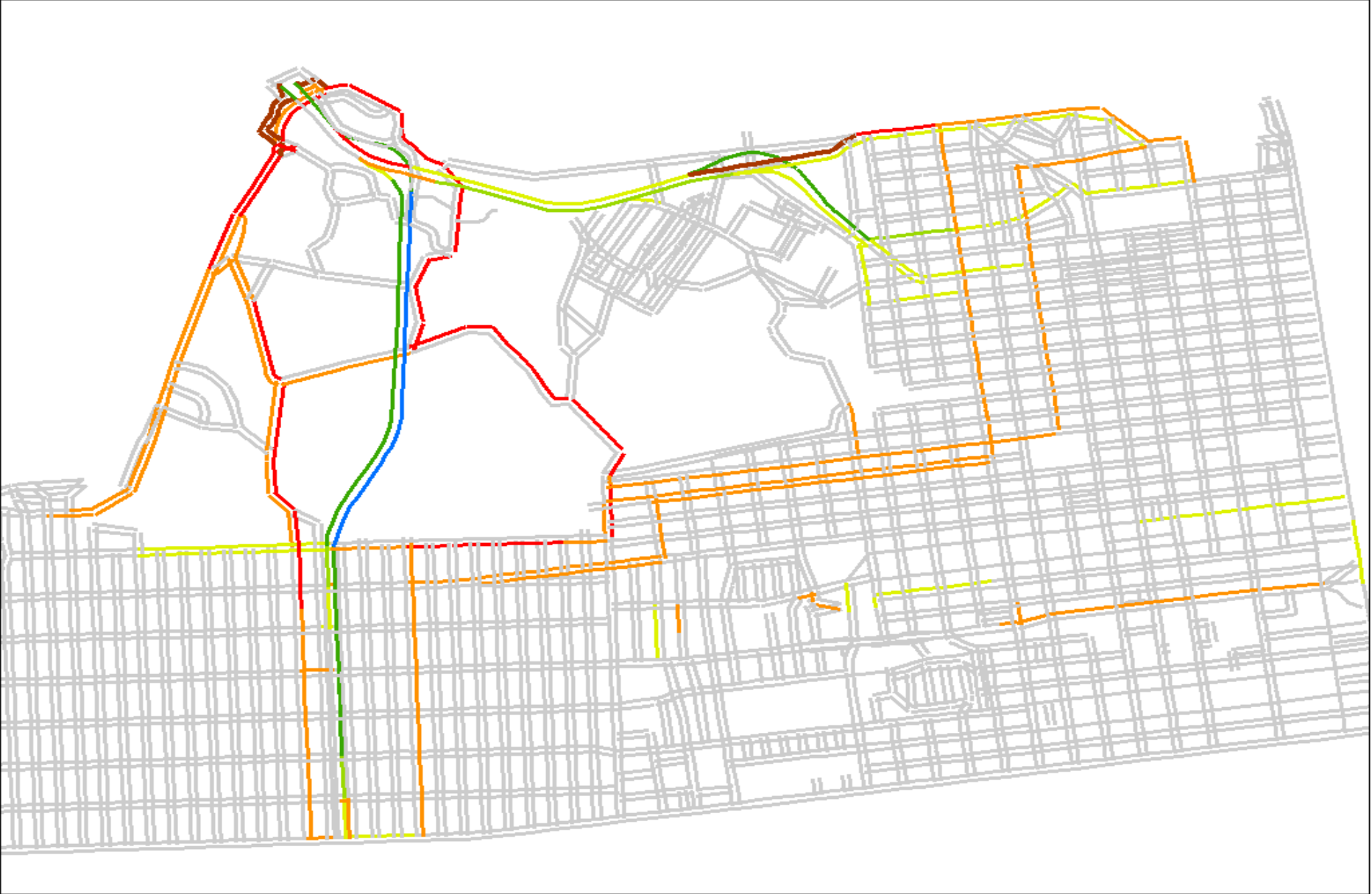


Now about those stakeholders....



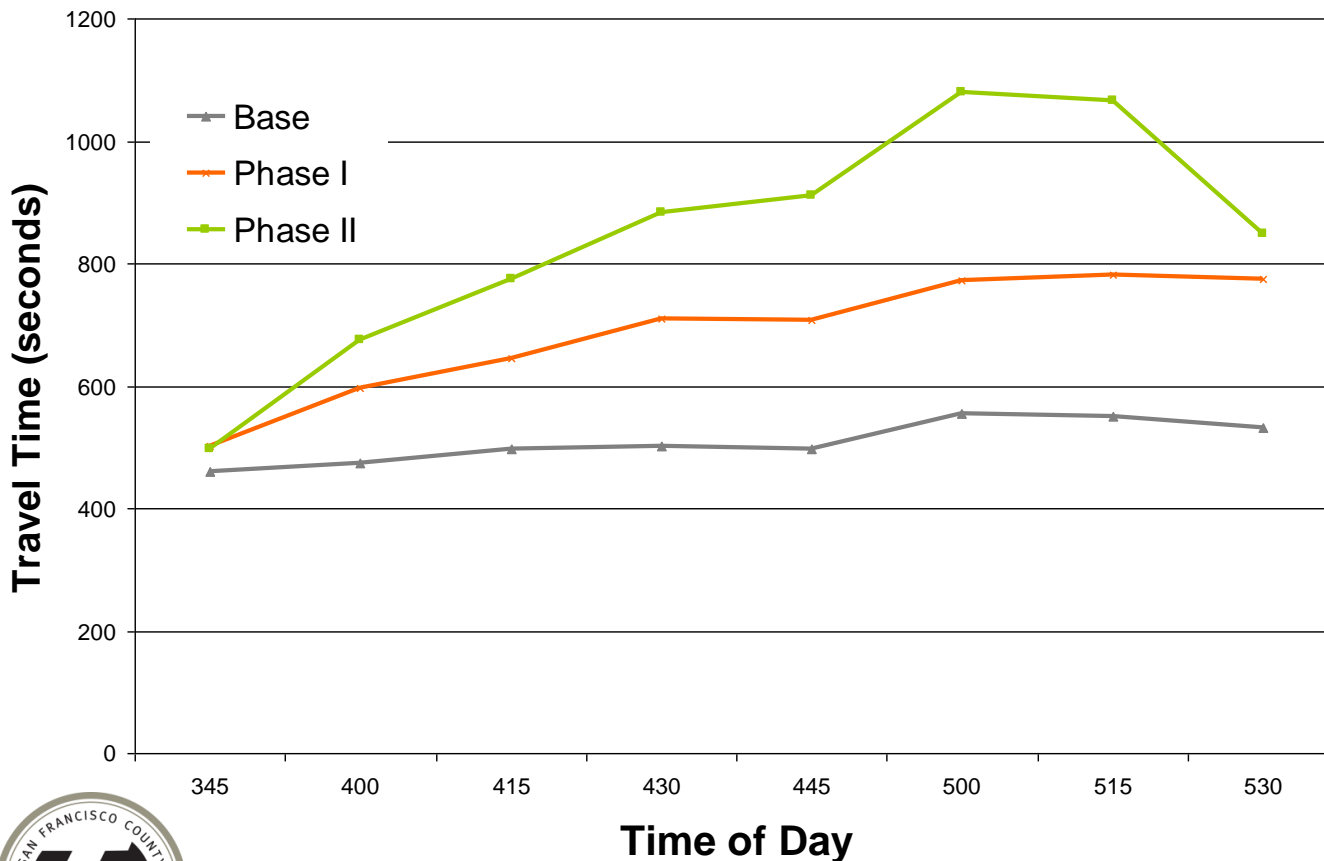
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# DTA Predicted Volume Differences and Diversions



# Travel Time Changes

## Golden Gate Bridge to Lombard/Franklin



14 minutes

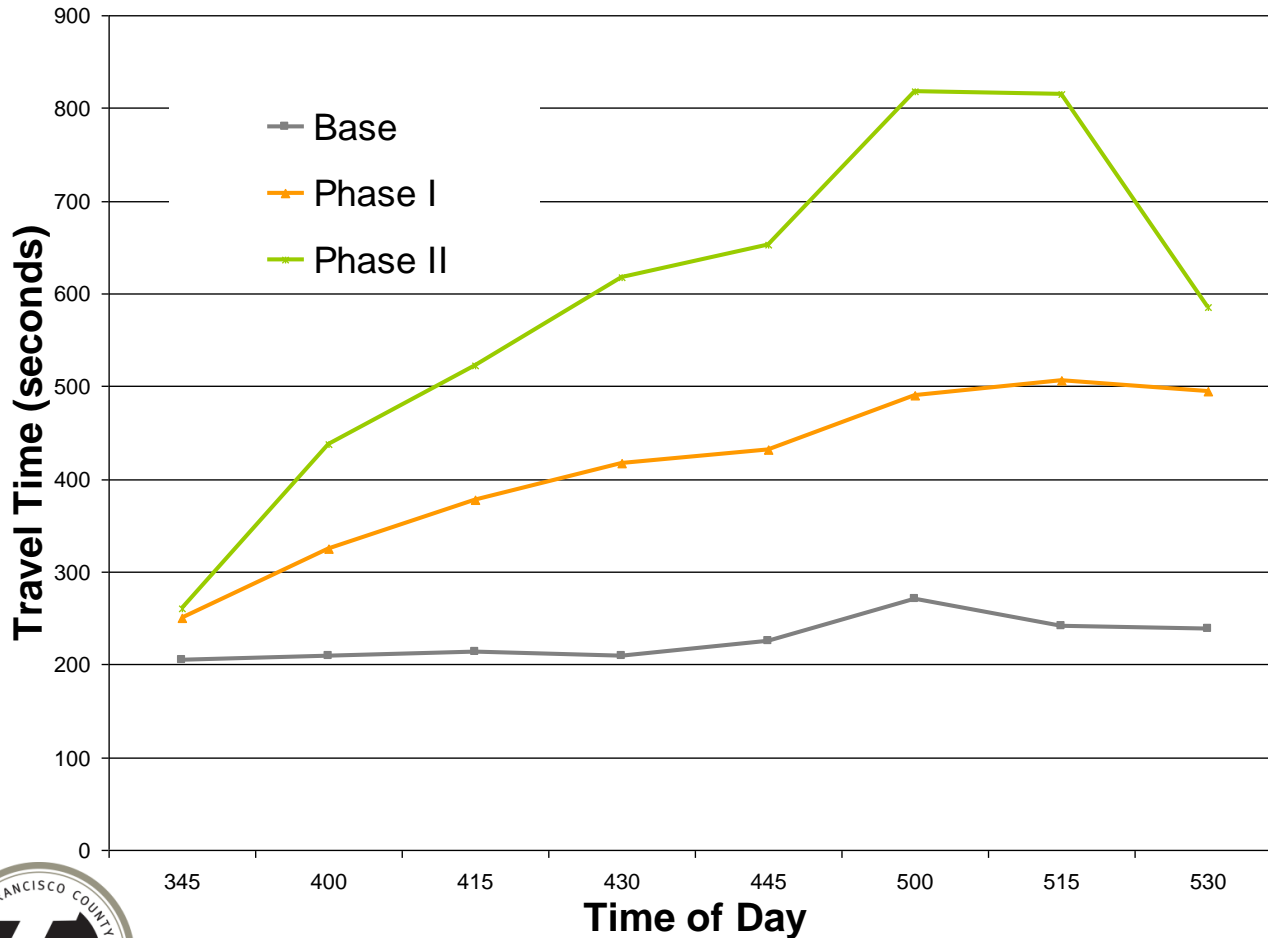
11 minutes

8 minutes



# Travel Time Changes

## Golden gate Bridge to Park/Presido/Geary



10 minutes

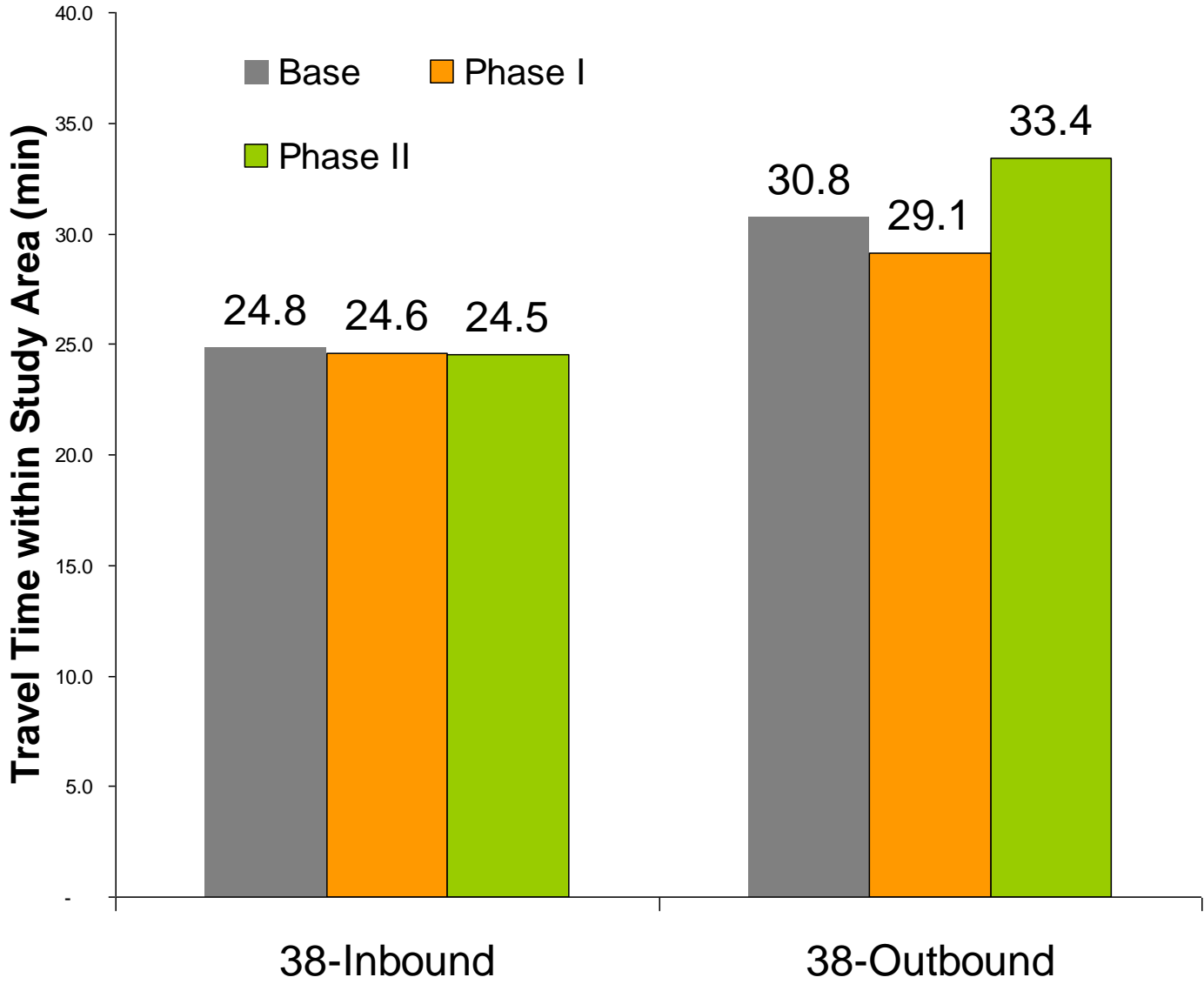
7 minutes

4 minutes

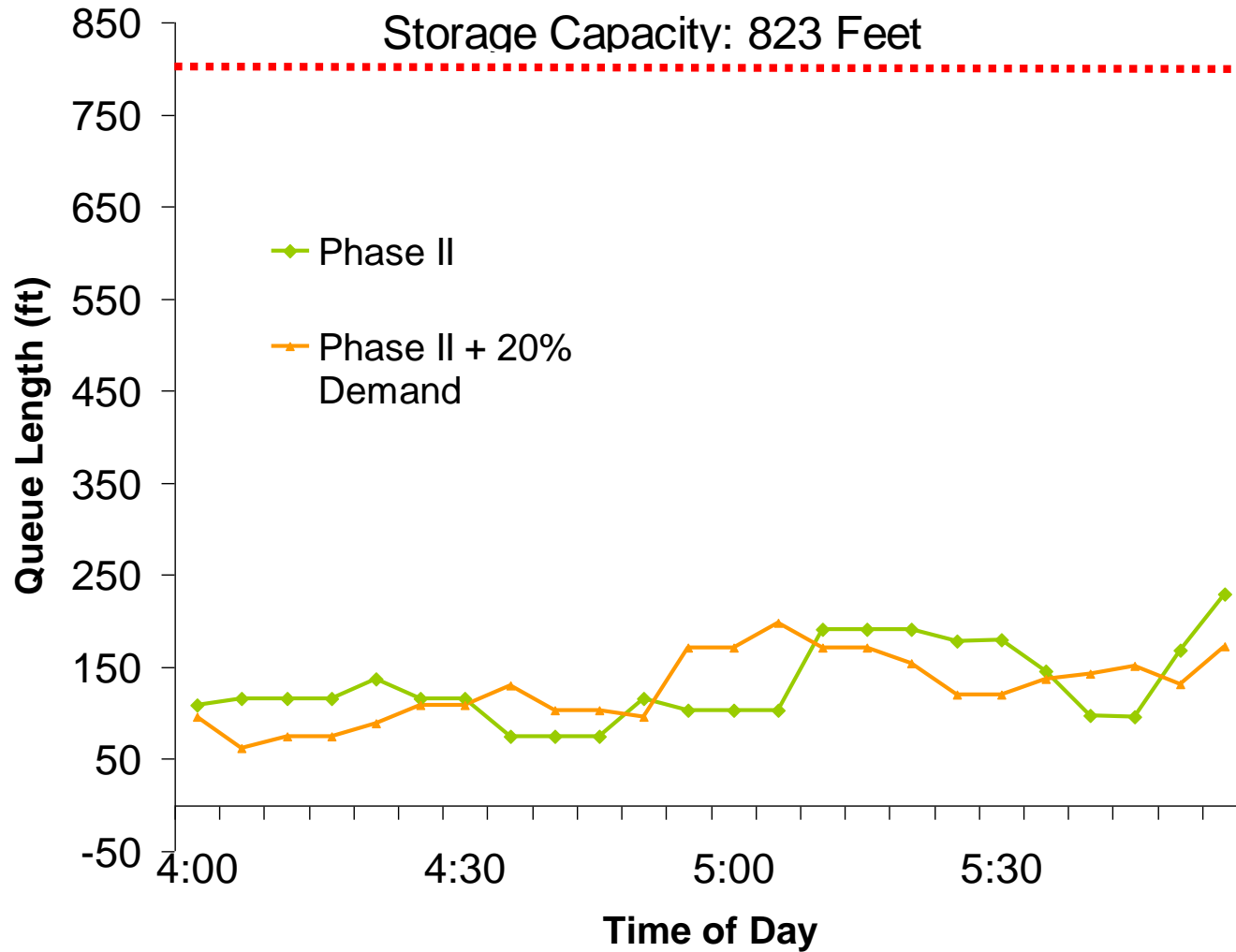




# Bus Travel Times



# Queue Lengths at Temporary Signal



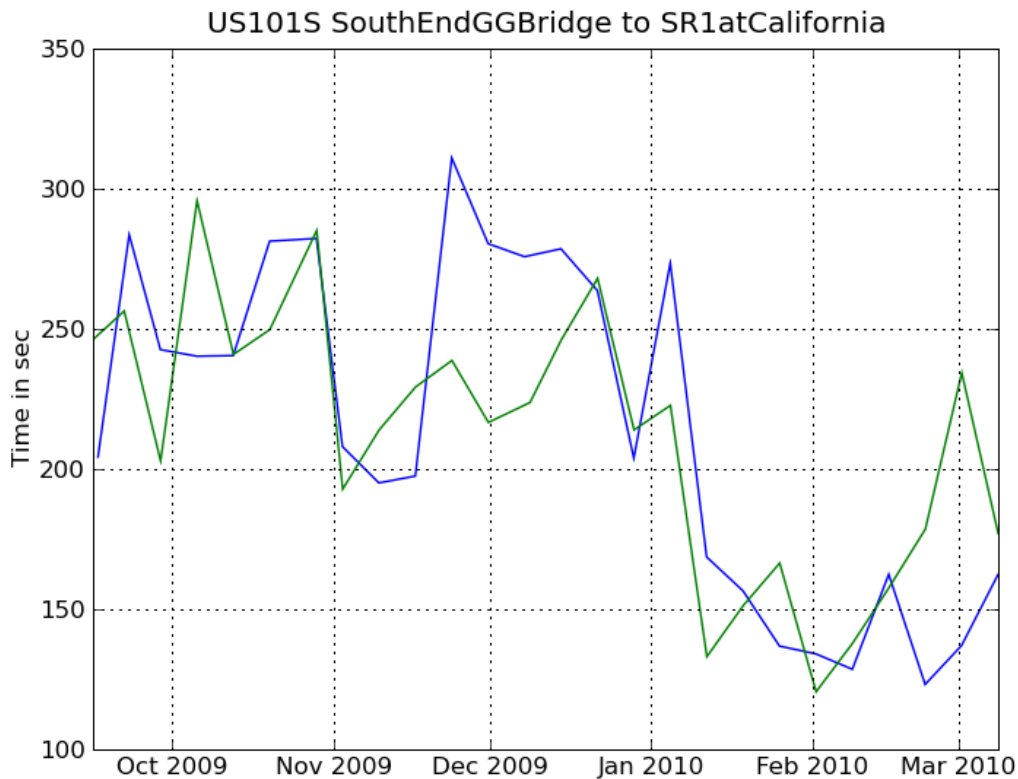
# Model Evaluation: Did we get it right?



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# Travel Times

## Observed A→B from Toll Tag Readers



Source: PeMS

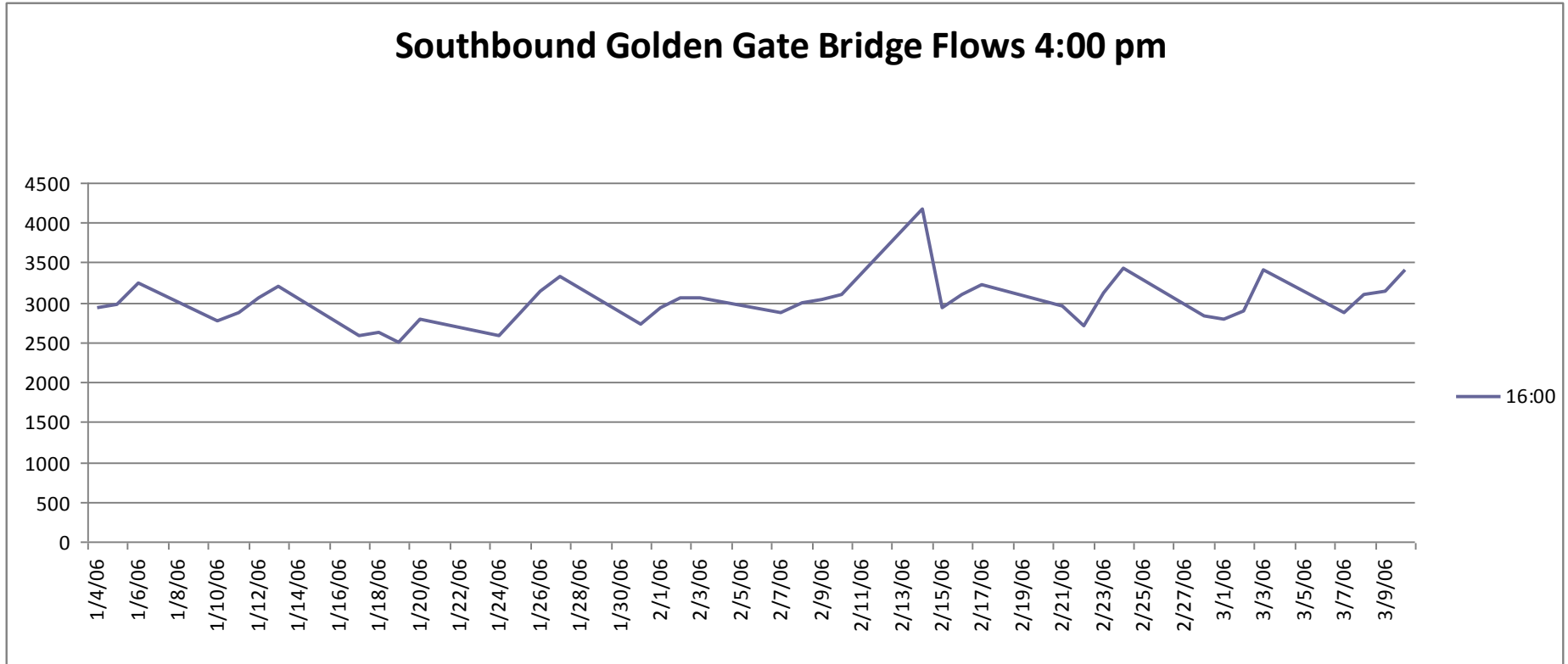
**Issue I:**  
Toll tag (ETC)  
Reader travel  
times

**Issue II:**  
Volume varies  
By 20% daily!

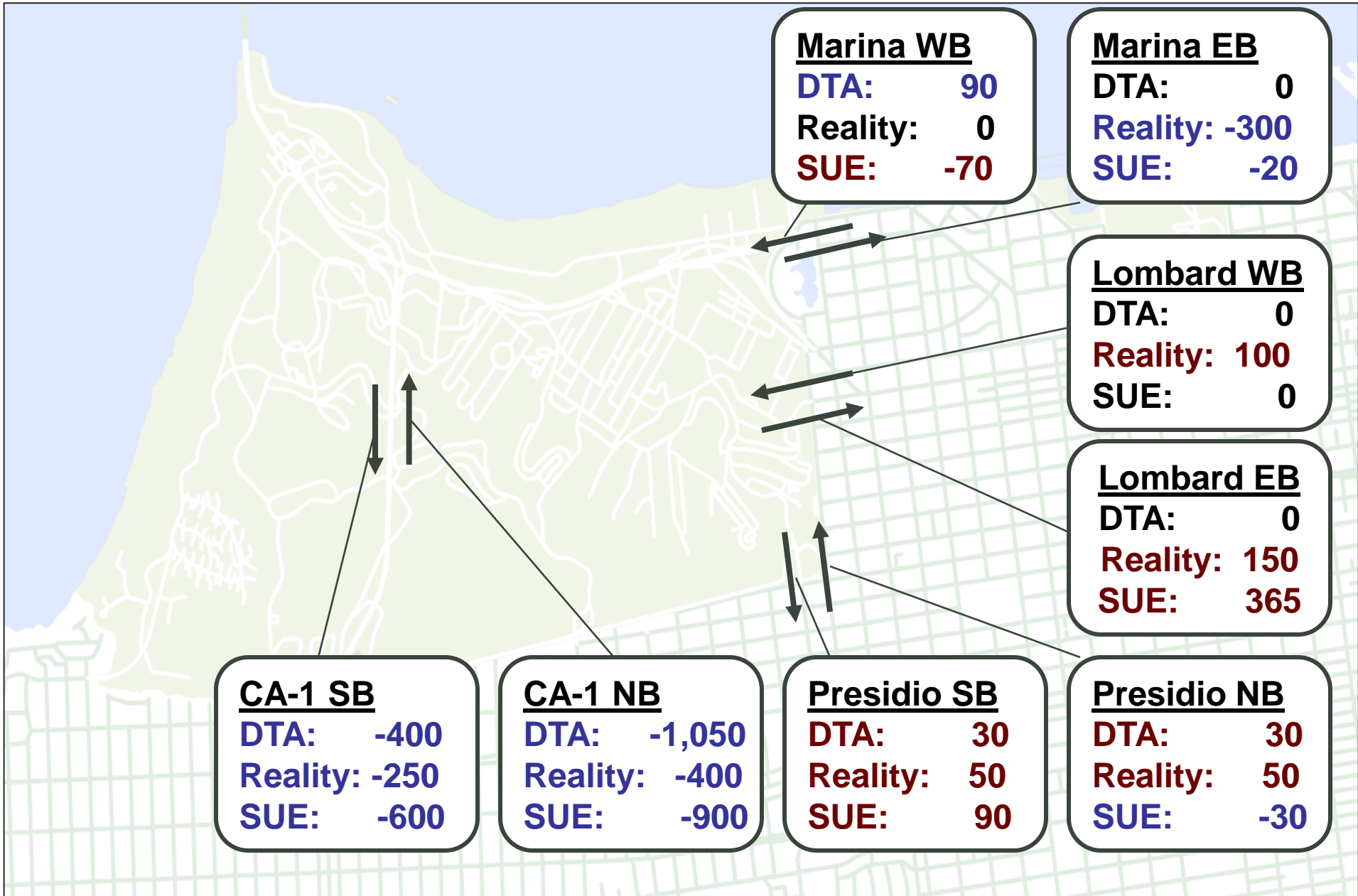
**Issue III:**  
Holidays odd  
(but when isn't)

# Weekday Flow Variation

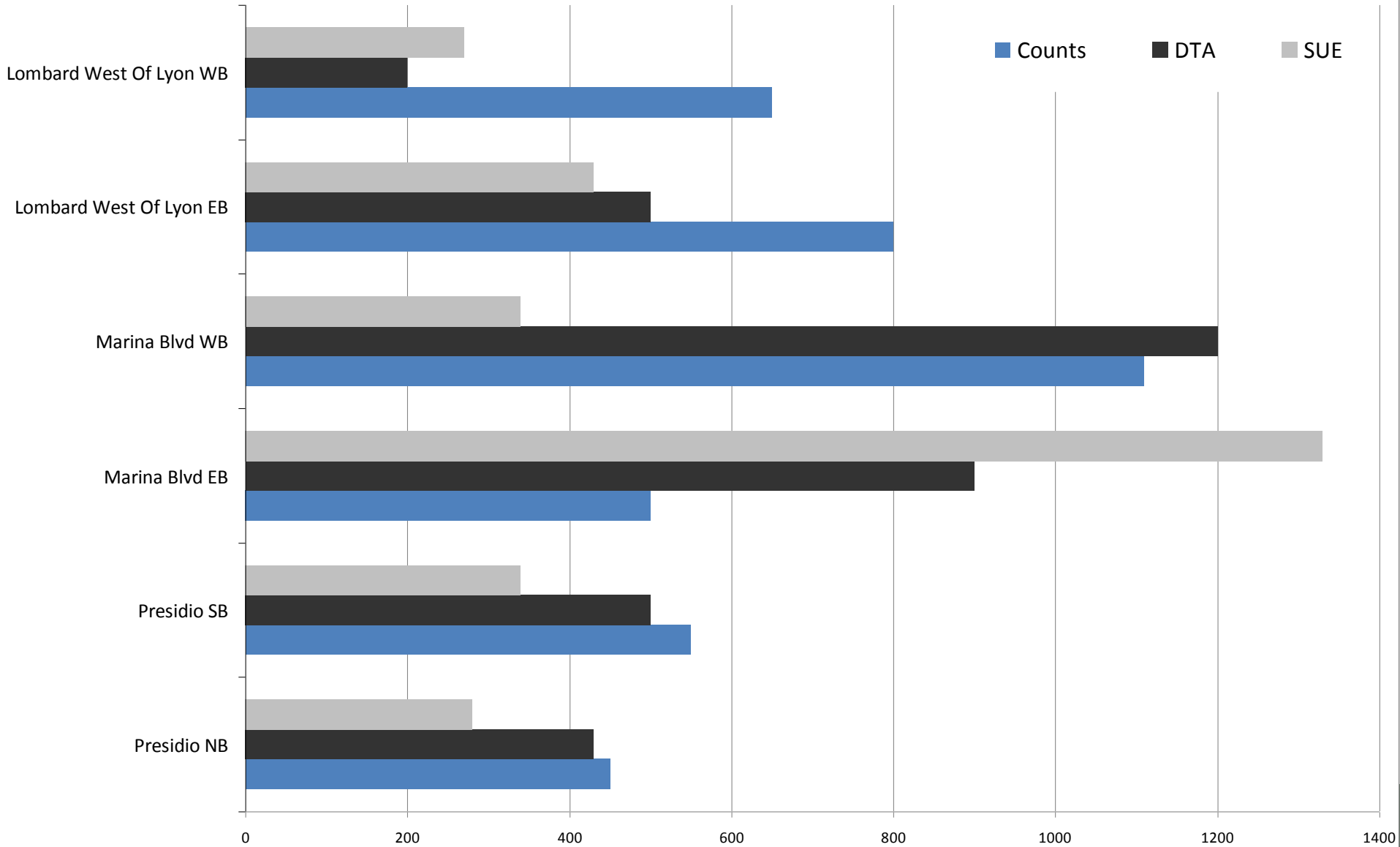
## Southbound Golden Gate Bridge Flows 4:00 pm



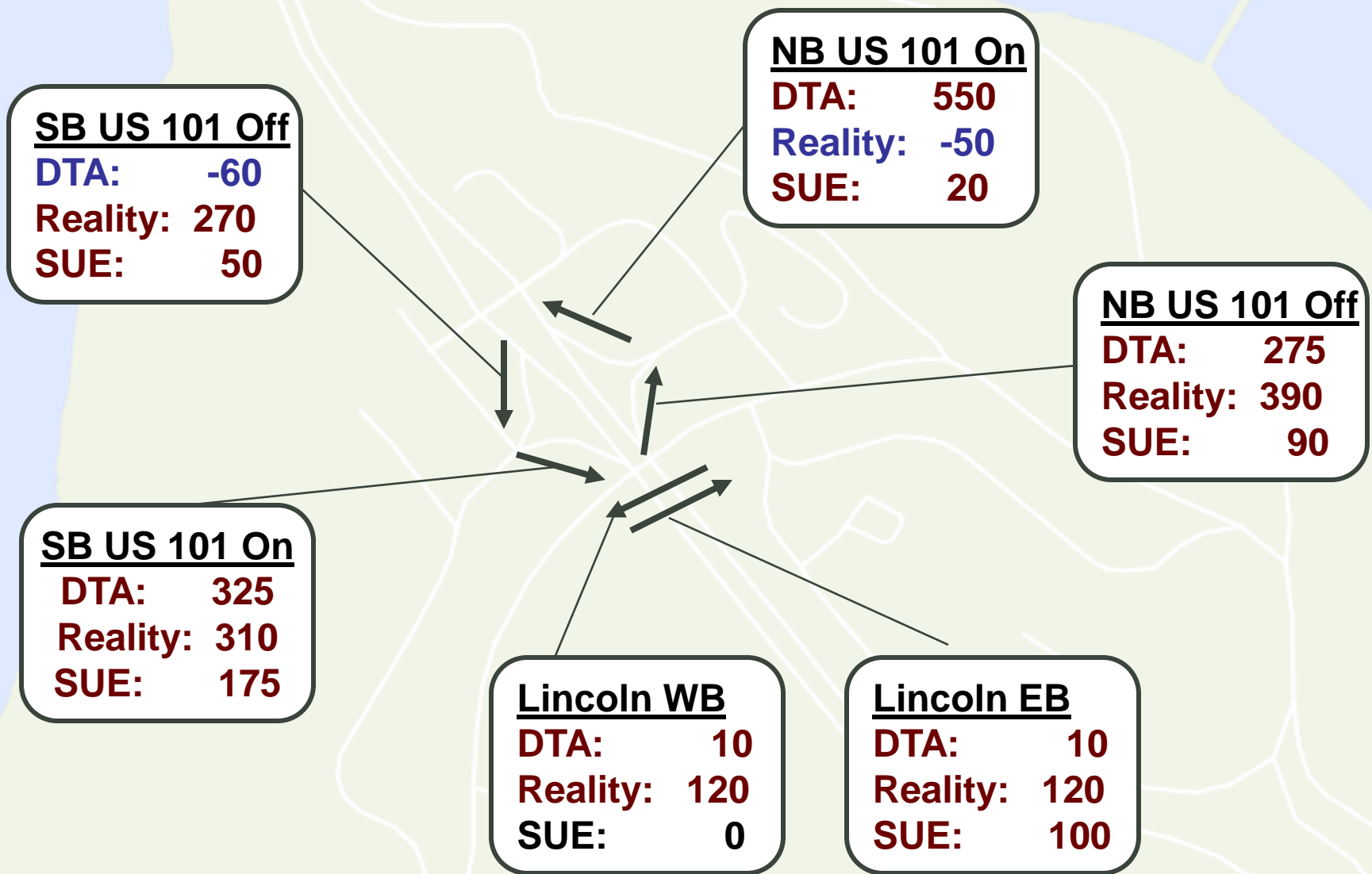
# Volume Differences Base → Phase I



# Phase I Condition: Model versus Counts



# Volume Differences Base → Phase I





# Conclusions



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Thanks!

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415.522.4810



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# Ghost links

## Slopes

No Ghosts 0.9484

Ghosts 0.9274

## R-Squared

No Ghosts 0.8561

Ghosts 0.8600

