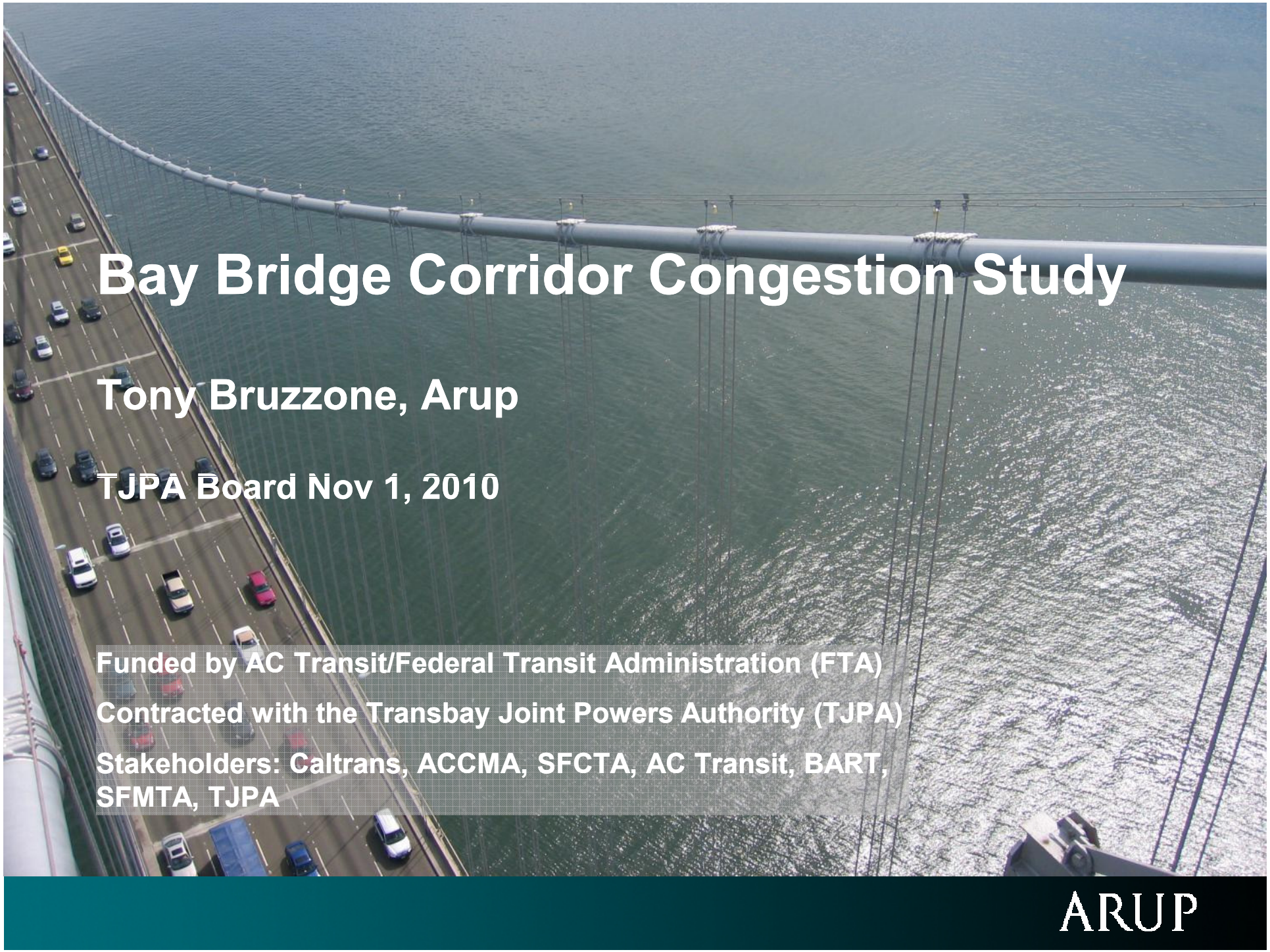


Bay Bridge Corridor Congestion Study

Tony Bruzzone, Arup

TJPA Board Nov 1, 2010

Funded by AC Transit/Federal Transit Administration (FTA)

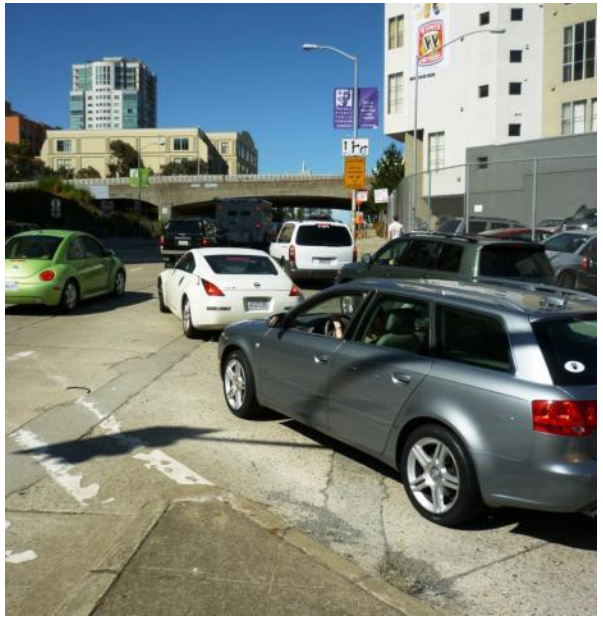
Contracted with the Transbay Joint Powers Authority (TJPA)

Stakeholders: Caltrans, ACCMA, SFCTA, AC Transit, BART, SFMTA, TJPA

ARUP

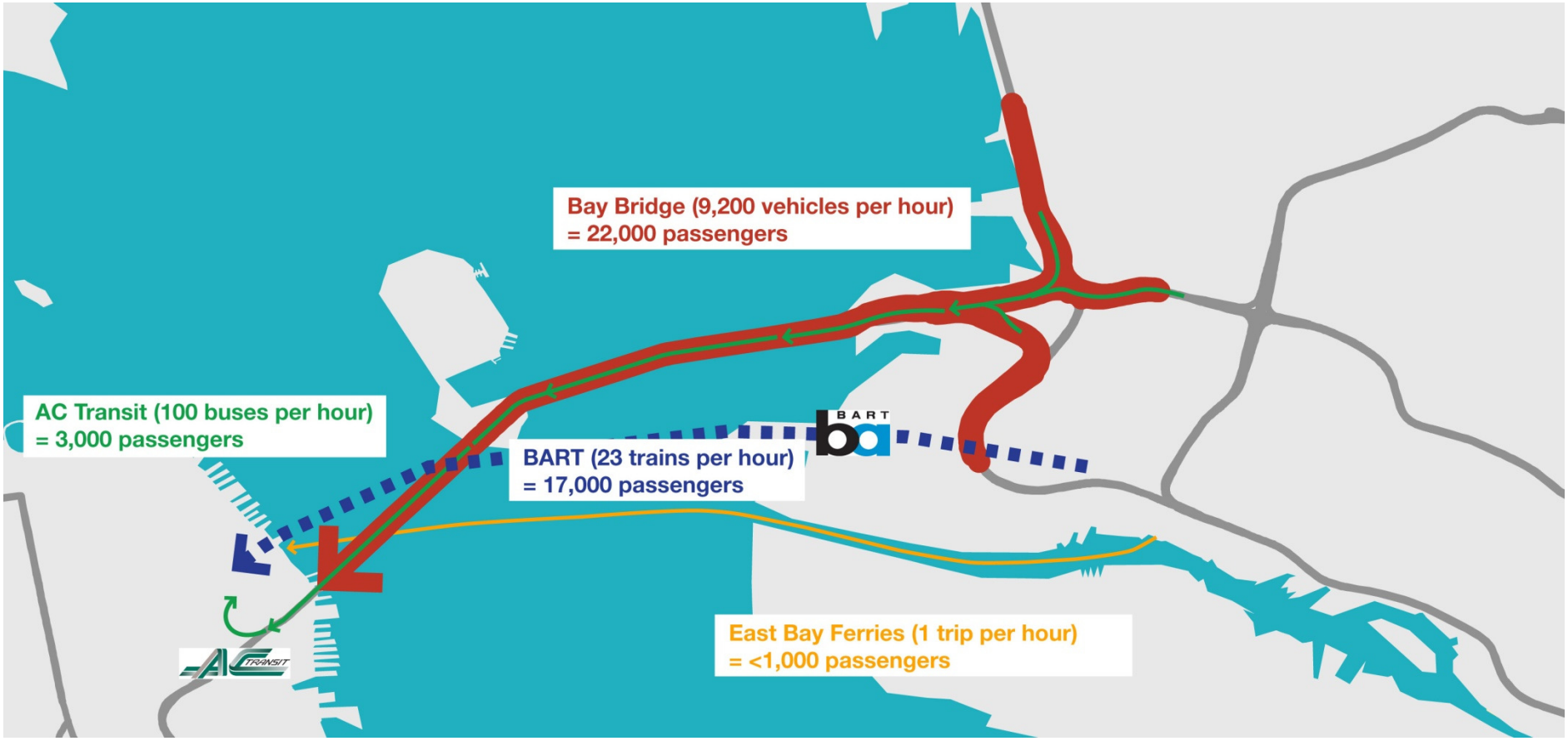
The Bay Bridge Corridor Congestion Study

- A first look at the Corridor's projected freeway performance between the East Bay and San Francisco
- **East Bay to San Francisco during the morning commute**
  - *Investigate* if the existing bus/HOV priority measures at the Bay Bridge toll plaza will continue to allow buses to bypass queues as conditions worsen in the future
- **San Francisco "South-of-Market" (SoMa) to the East Bay during the afternoon commute**
  - *Investigate* how to better manage Bay Bridge bound traffic that queues on local SoMa streets during the afternoon

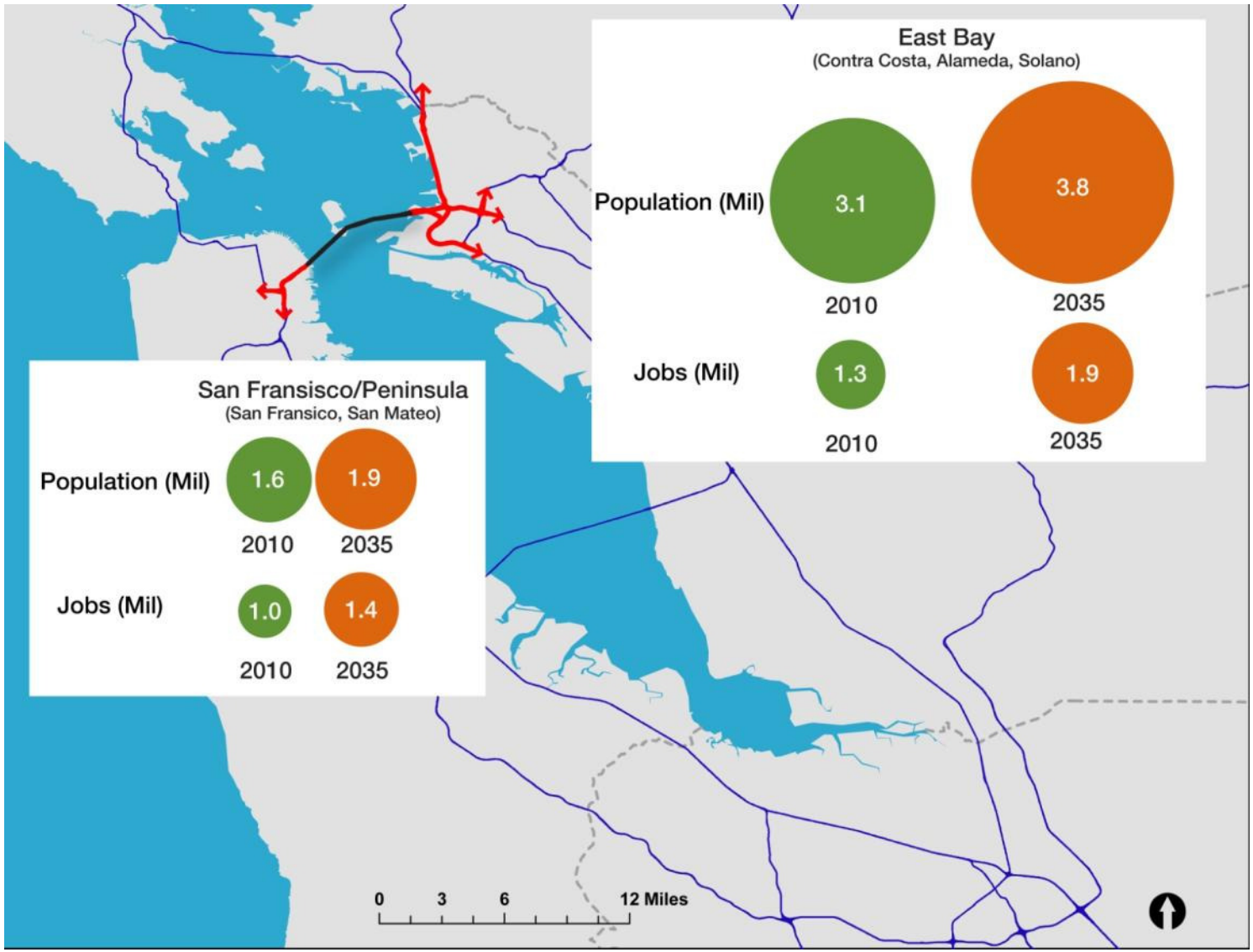


Bay Bridge Corridor

- East Bay residents commute to San Francisco using four modes
- Approximately 130,000 commuters; 42,000 AM peak hour trips

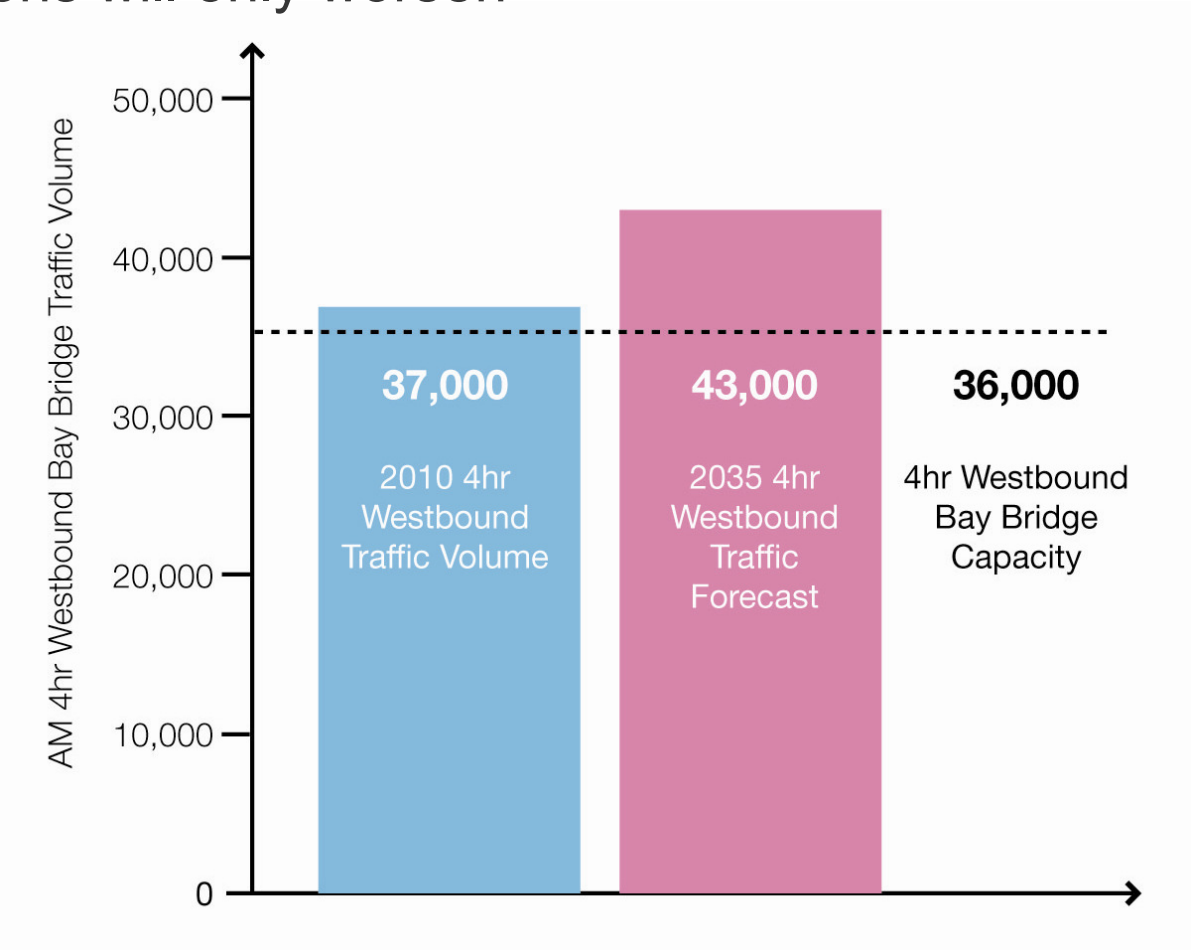


East Bay Commuters Needed to Fill These Jobs

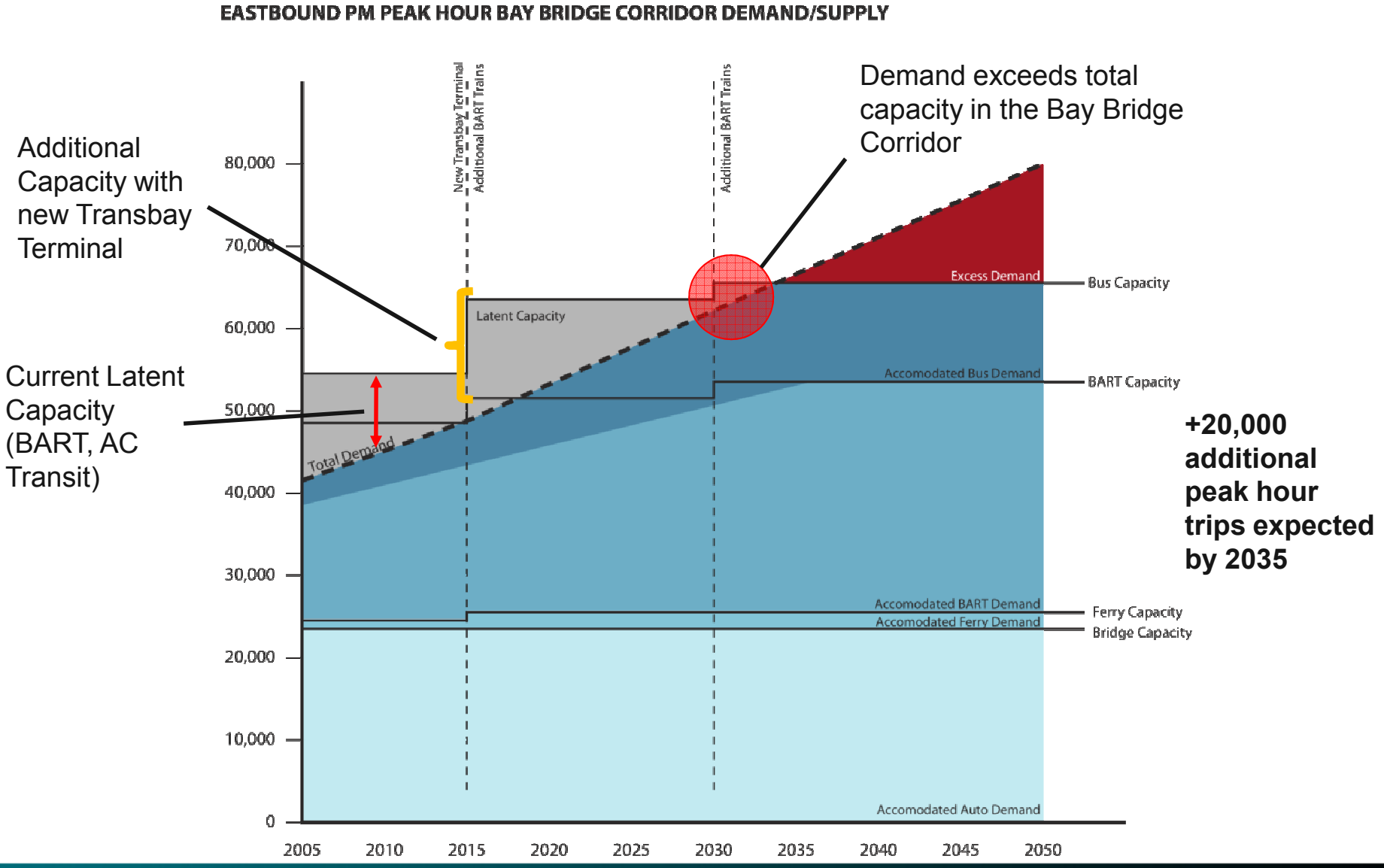


Auto Demand Already Exceeds Capacity

- Auto demand on the Bay Bridge already exceeds capacity and conditions will only worsen



But the Corridor is Close to Exceeding Capacity



ARUP

The Challenge in the Bay Bridge Corridor

How can we increase capacity in the Corridor to serve 20,000 additional peak hour trips?

- **BART**
  - Expects to increase peak hour capacity by 8,000 – 12,000 riders
- **Additional bus service to the new Transbay Terminal Center (TTC)**
  - Bus deck can handle over 300 buses in the peak hour
  - Could serve upwards of 15,000 – 20,000 additional riders
- The **TTC** requires reliable access from the East Bay so it can be fully utilized

Bay Bridge Constraints

- Queuing at the Bay Bridge toll plaza and metering lights lasts from 6:30 to 10:00 AM or later
- Buses and HOVs currently use bypass lanes on most days

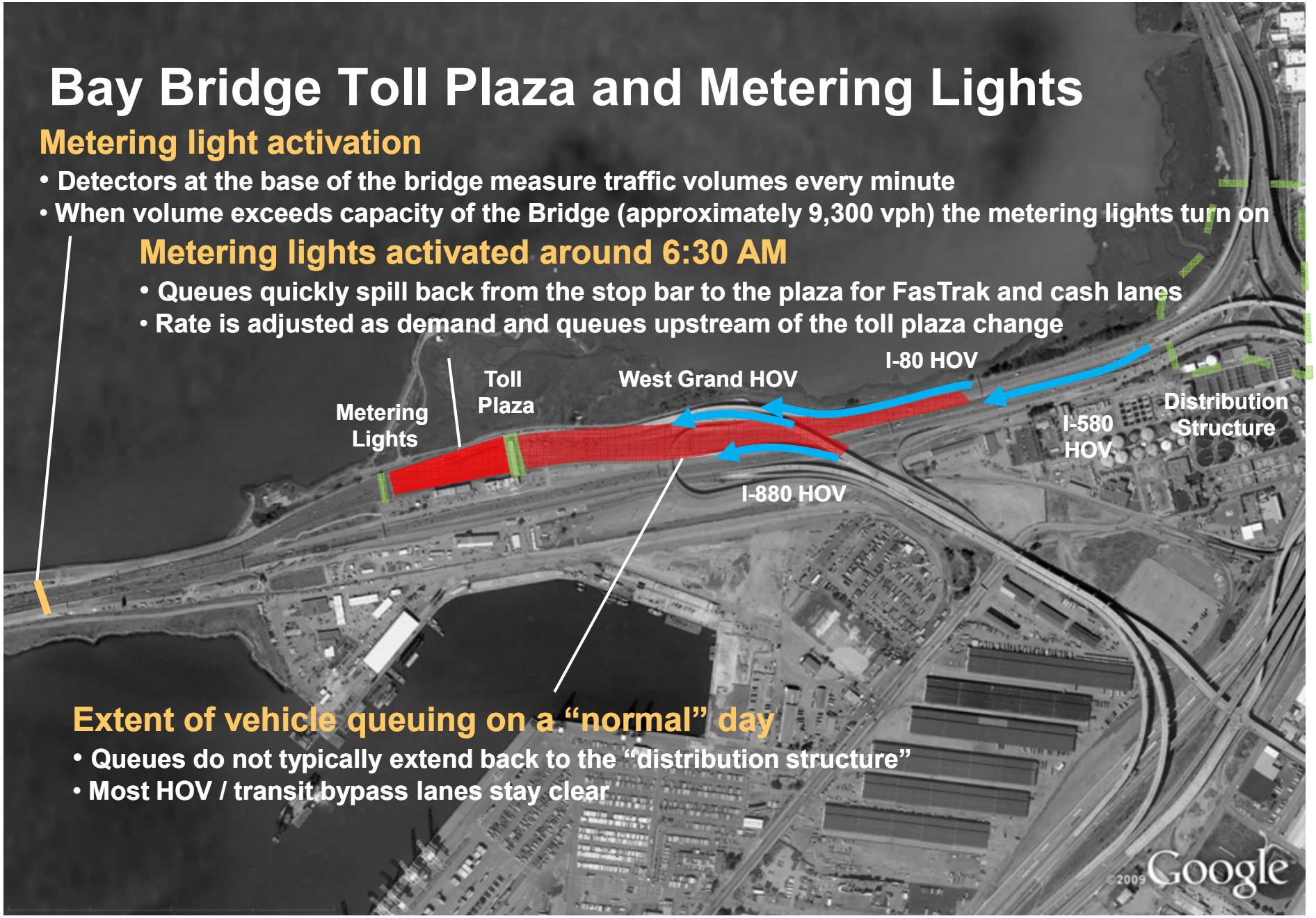
Bay Bridge Toll Plaza and Metering Lights

Metering light activation

- Detectors at the base of the bridge measure traffic volumes every minute
- When volume exceeds capacity of the Bridge (approximately 9,300 vph) the metering lights turn on

Metering lights activated around 6:30 AM

- Queues quickly spill back from the stop bar to the plaza for FasTrak and cash lanes
- Rate is adjusted as demand and queues upstream of the toll plaza change



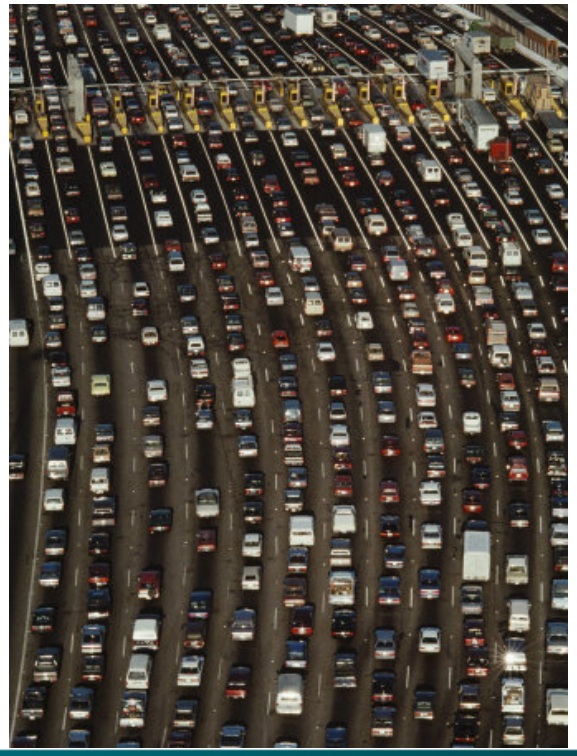
Extent of vehicle queuing on a "normal" day

- Queues do not typically extend back to the "distribution structure"
- Most HOV / transit bypass lanes stay clear

The Challenge in the Bay Bridge Corridor

However, an increase in future traffic congestion could block the HOV bypass lanes that buses use to jump the toll plaza queues

- This could degrade bus operations and limit transit capacity

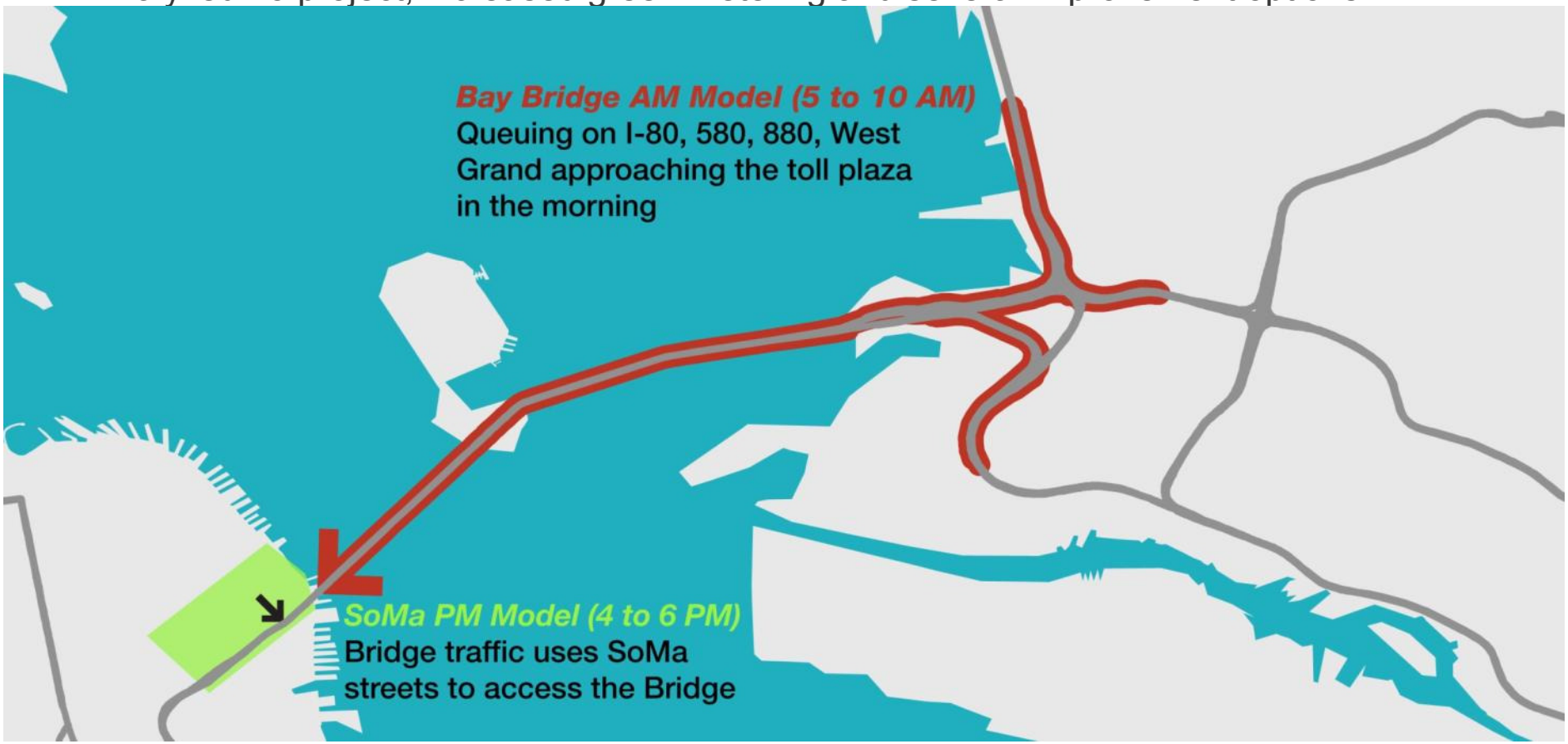


Study Limitations

- Improvements recommended in the study have undergone a basic feasibility review by Arup's engineering staff
- However, they are considered *conceptual* at this stage of the analysis (further study is required)
- Congestion pricing is not considered
- BART capacity is not constrained
- The effects of *induced demand* are not considered

Study Approach

- Build two separate peak period VISSIM microsimulation models to analyze the traffic and transit constraints along the corridor
- Calibrated to 2009 traffic; forecast to 2035 volumes (about 0.42% annual increase).
- Analyzed no project, increased green metering and several improvement options.



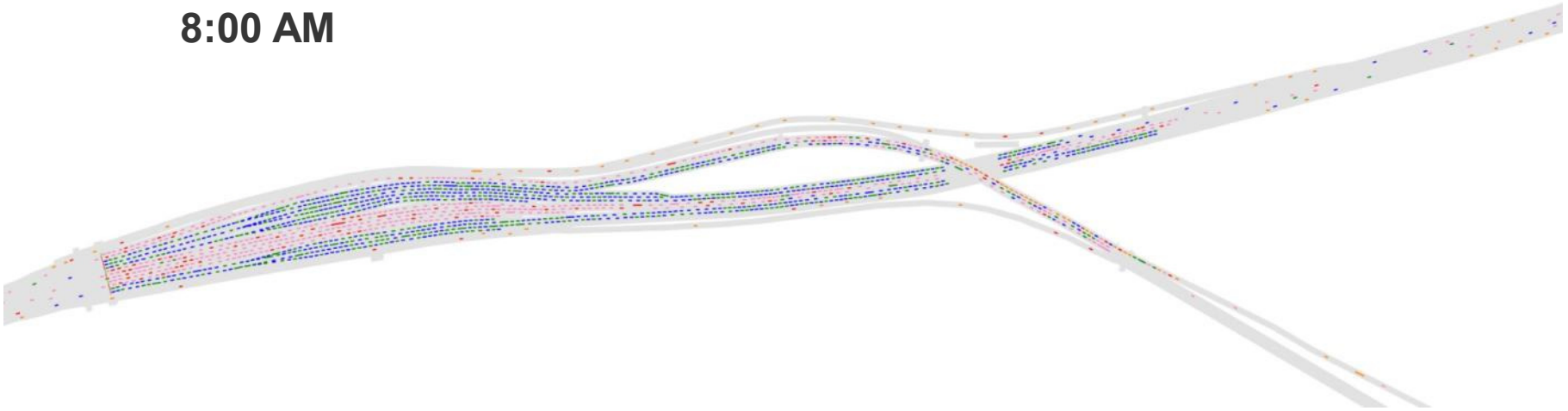
Bay Bridge AM Model – Performance Measures

- **Congestion**
  - The length of the Toll Plaza queue *should not* extend beyond the distribution structure
  - Total vehicle-hours of delay and person-hours of delay in each 2035 improvement scenario *should be less* than the 2020 and 2035 No Project condition
- **Transit Travel**
  - Transit speeds should average *not less* than 42 miles-per hour (mph) between the distribution structure and the TTC
  - Notes: The distance from the distribution structure to the TTC is approximately seven miles. A bus traveling at 42 mph will cover this distance in about 10 minutes.
- **Transit Reliability**
  - No individual peak period transit trip *should exceed* 14 minutes between the distribution structure and the TTC.

Bay Bridge AM Model – Calibrated Model Queues

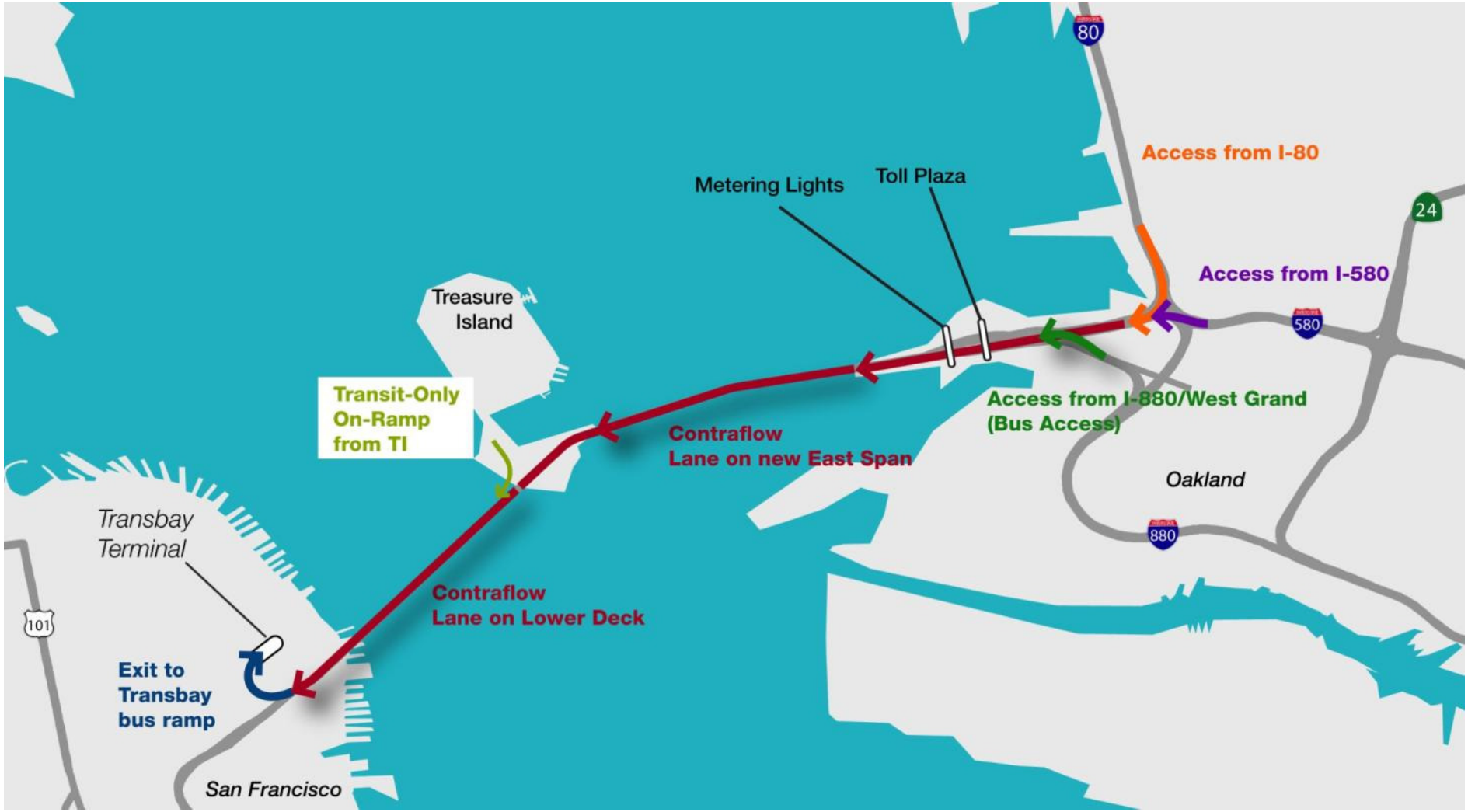
7:00 AM

8:00 AM



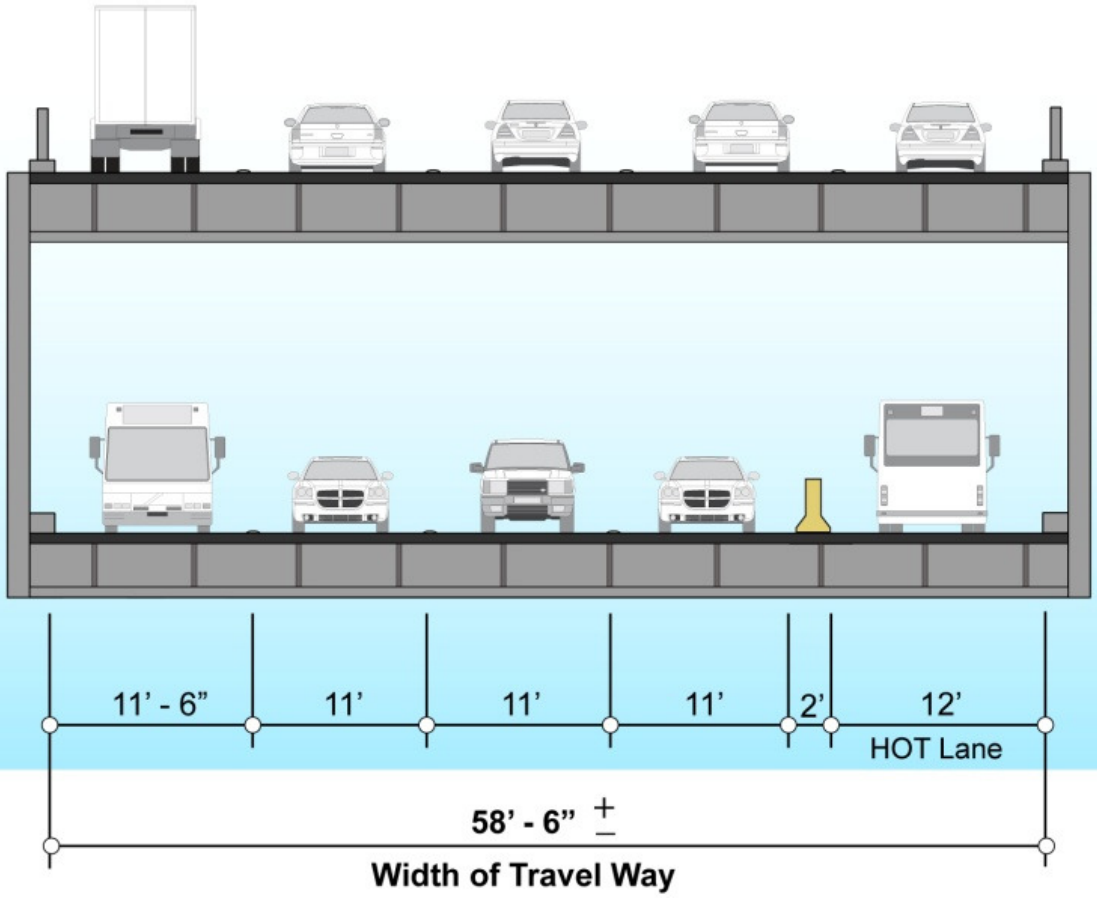
Bay Bridge AM – No Project VISSIM Video

Bay Bridge Physical Improvements



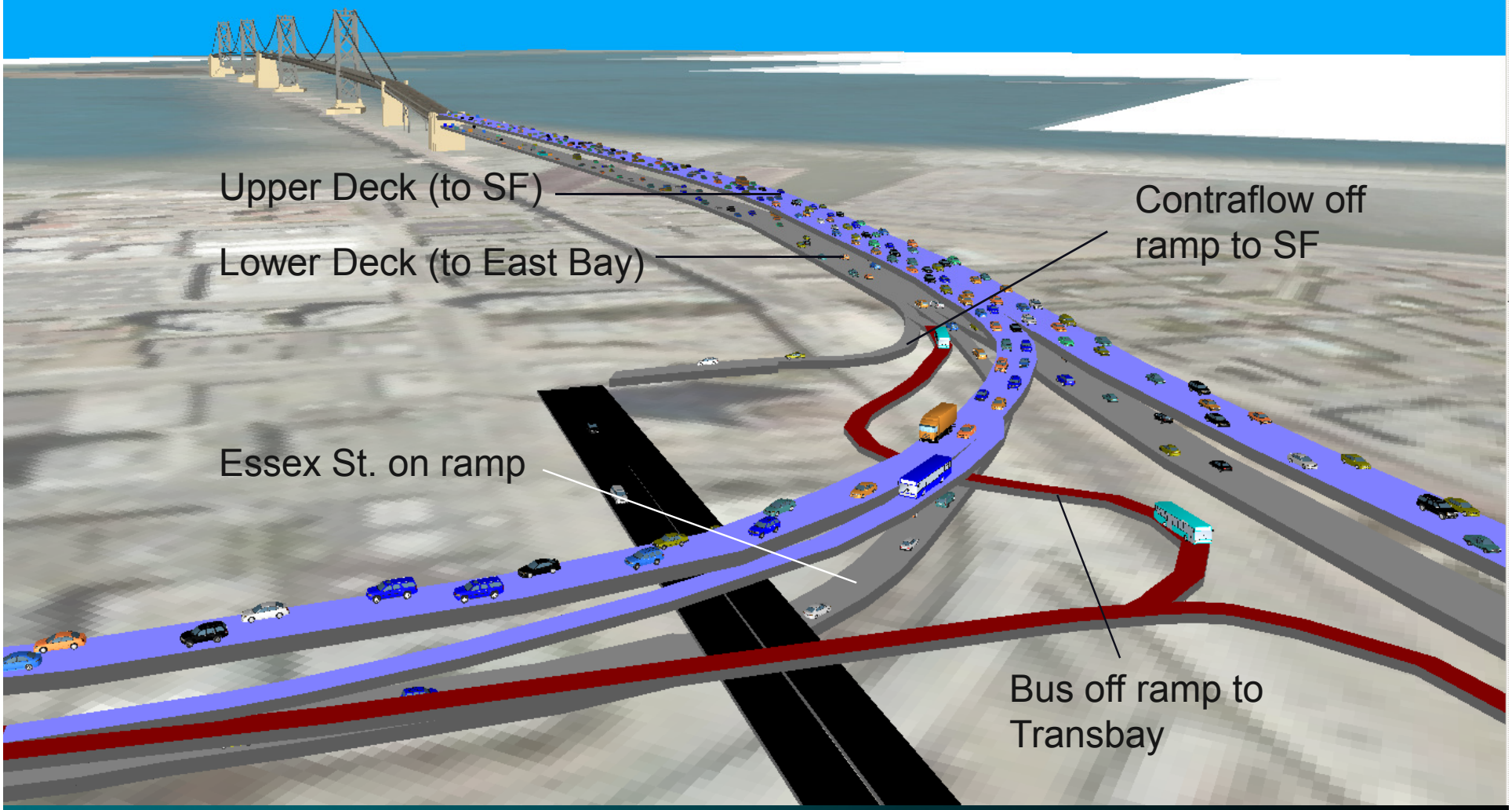
Bay Bridge Improvements – Contraflow Lane

2. Contra-Flow Configuration
(AM Peak)



ARUP

Bay Bridge Improvements – SF Exit



ARUP

Bay Bridge Improvements – Cost Estimates
(add 25% for contingencies)

Improvement Option	Low Range Cost	High Range Cost
Core Items (Contraflow Lane, access from I-80/580/880, HOV extensions)	$40,300,000	$73,400,000
East Bay Options		
West Grand Option A	$12,300,000	$19,700,000
West Grand Option B	$8,200,000	$19,700,000
West Grand Option C	$17,500,000	$28,000,000
West Grand Option D	$31,700,000	$60,300,000
San Francisco Options		
Exit Option A/B	$25,400,000	$42,900,000
Total Improvement Costs		
Total Low Range Improvement Cost	**$73,900,000**	
Total High Range Improvement Cost	**$176,700,000**	

Source: Arup, 2010

Bay Bridge AM Model – Future Scenario Analysis

Performance Measures (8-9AM) Summary

Category	Measure	2009 Base Year	2020 No Project Target Met?	2035 No Project Target Met?	2035 Alternative Metering Target Met?	2035 With Physical Improvements Target Met?	2035 With Reduced Set of Physical Improvements Target Met?
Congestion	Toll Plaza queue - Not Beyond Dist Structure	Pass	Pass	Fail	Pass	Pass	Pass
	Total Vehicle Hrs of Delay	2,350	2,725	3,208	3,680	2,168	2,288
	Chg from 2009 Base Year (%)	N/A	16%	37%	57%	-8%	-3%
	Chg from 2035 Base Case (%)	N/A	N/A	N/A	15%	-32%	-29%
	Total Person Hrs of Delay	3,583	3,937	4,720	6,256	3,254	3,426
	Chg from 2009 Base Year (%)	N/A	10%	32%	75%	-9%	-4%
	Chg from 2035 Base Case (%)	N/A	N/A	N/A	33%	-31%	-27%
Transit Travel	Transit speeds should average not less than 42 mph (measured from I-80)	47 mph = Pass	46 mph = Pass	37 mph = Fail	27 mph = Fail	53 mph = Pass	53 mph = Pass
Transit Reliability	No individual peak period transit trip should exceed 14 minutes (measured from I-80)	11.5 min = Pass	12 min = Pass	15 min = Fail	20 min = Fail	10 min = Pass	10 min = Pass

ARUP

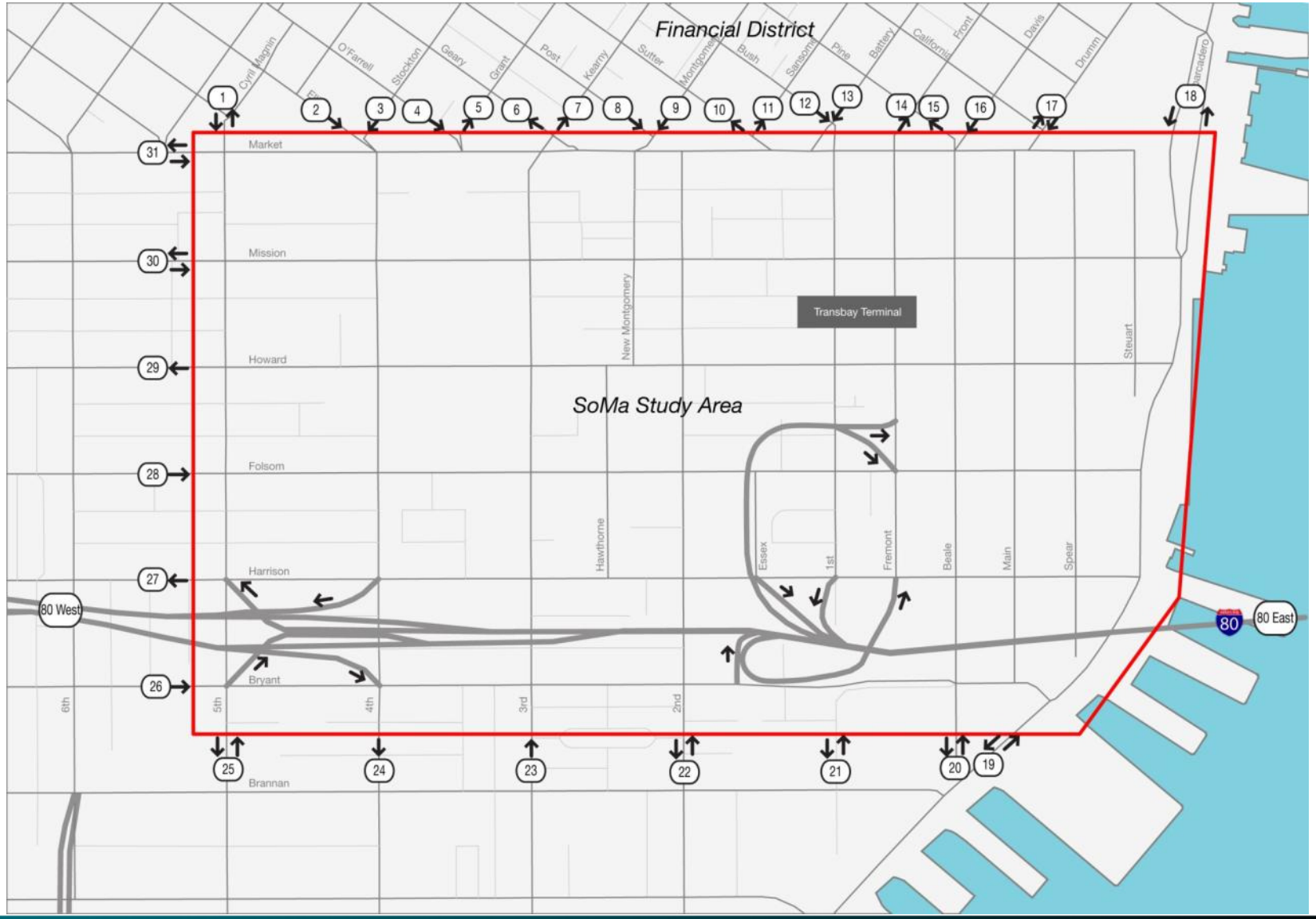
Bay Bridge AM Summary

- Bay Bridge corridor is approaching capacity for all modes
- Capacity for 20,000 additional peak hour trips from the East Bay is required to meet the regional job forecasts
- Additional bus service to the new Transbay Terminal would provide the necessary capacity
- But future traffic growth will block bypass lanes, degrade transit operations, and limit bus capacity to San Francisco
- *A contraflow lane with entry/exit improvements would maintain bus operations*

SoMa PM Analysis – Purpose

- Identify improvements that better manage Bay Bridge queues
- Keep Bridge queues from blocking transit service
- Improvements should mesh with AM contraflow project
- The modeling has limitations and requires additional work beyond this study
- Large model: 80 intersections, 9 freeway ramps.

SoMa PM Analysis – Study Area

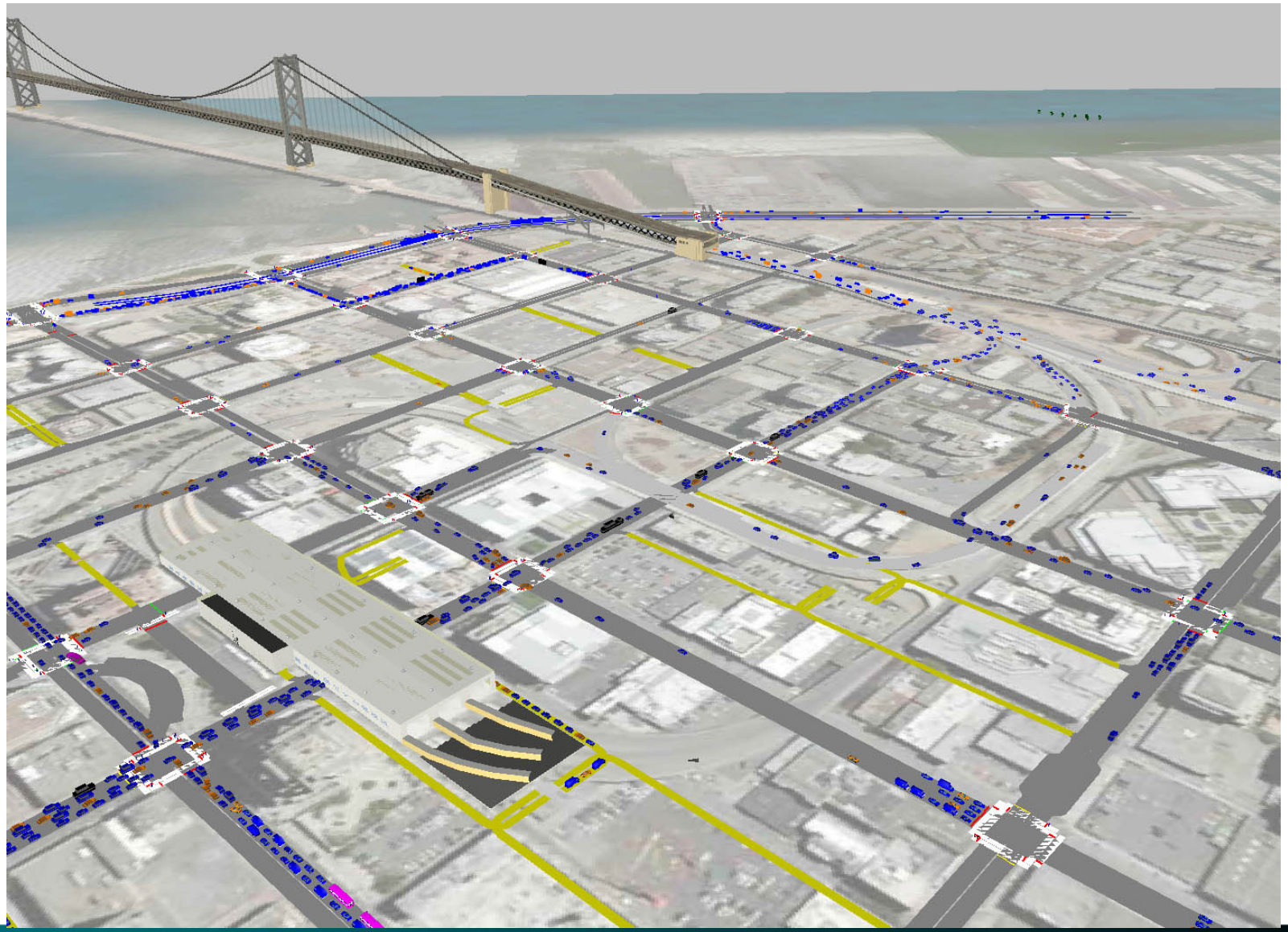


ARUP

SoMa PM Model: Desired Outcomes

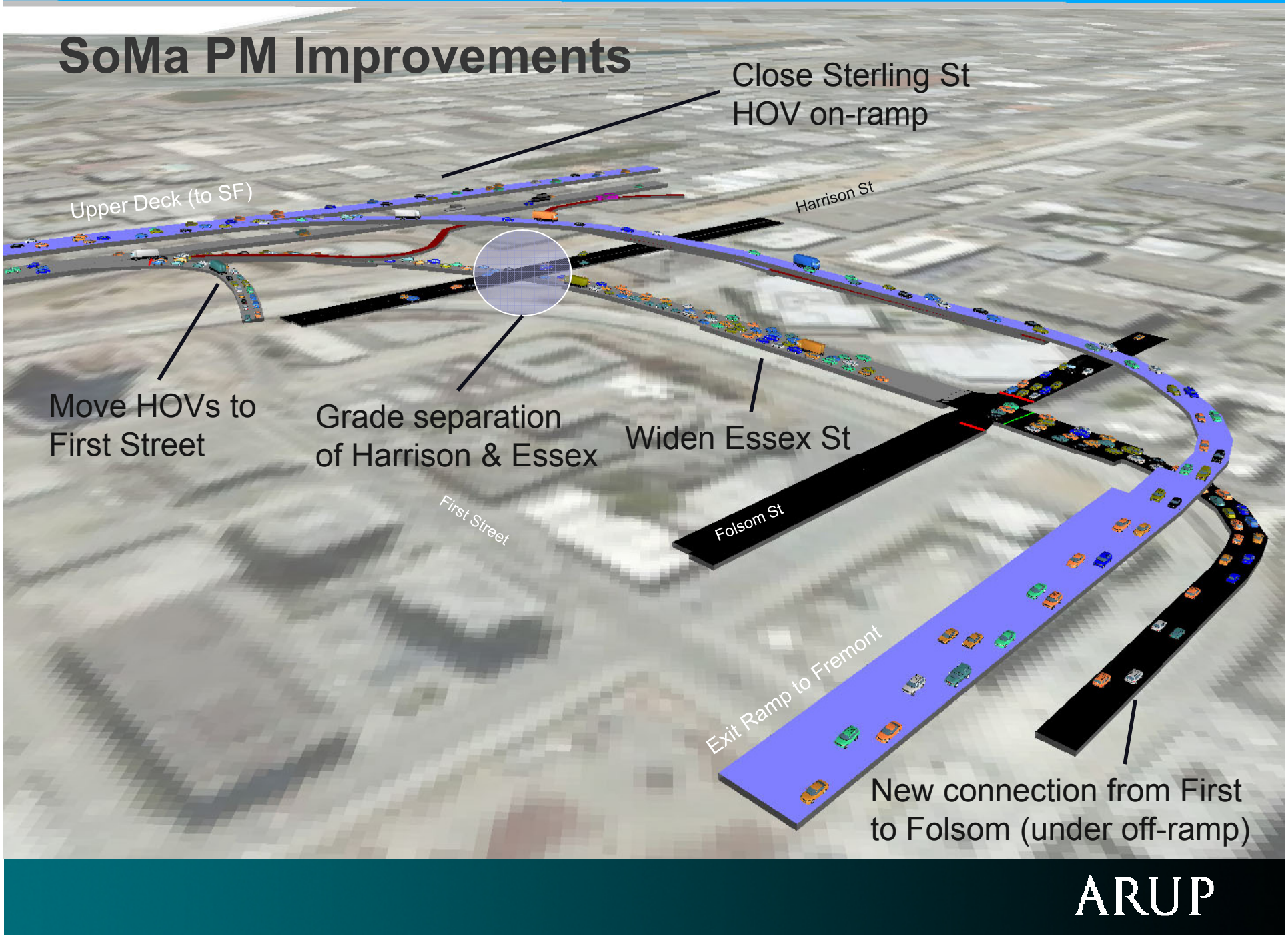
- The following desired outcomes will become performance measures when the model is further developed
- **Congestion**:
  - Bridge queue on 1st Street/ 2nd Street, and Beale should not extend beyond Howard at any time.
  - Bridge queues on 1st Street/2nd Street, and Beale should be reduced in the improvement option (compared to the base alternative).
  - The total vehicle-hours/person-hours of delay should be reduced in the improvement option.
- **Transit Travel**:
  - Transit travel times on Mission Street, First Street, 2nd Street and Folsom Street should decrease with any improvement option.

SoMa PM Existing Conditions VISSIM



ARUP

SoMa PM Improvements



ARUP

SoMa PM Model Summary

- Improvements and circulation changes show promise (results still preliminary)
- The exit options proposed in the AM contraflow scheme will help afternoon conditions
- Grade separation and other changes at Essex could provide sufficient queuing capacity during the PM peak hour

Next Steps

- Better understanding of operational issues related to the contraflow lane
- Survey of Best Practices
- Transit and overall corridor demand
- Continue feasibility analysis of improvement options
- Eastbound analysis
- Implementation options
- Further development and refinement of SoMa model

Questions

- Tony Bruzzone (anthony.bruzzone@arup.com)
- Mike Iswalt (michael.iswalt@arup.com)

- Report Link:
- www.actransit.org/
- www.transbaycenter.org/