Leveraging Data and Technology
to Efficiently Operate Managed Lane Corridors

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Metropolitan Transportation Commission

IBBTA Summit on AET, Managed Lanes & Interoperability
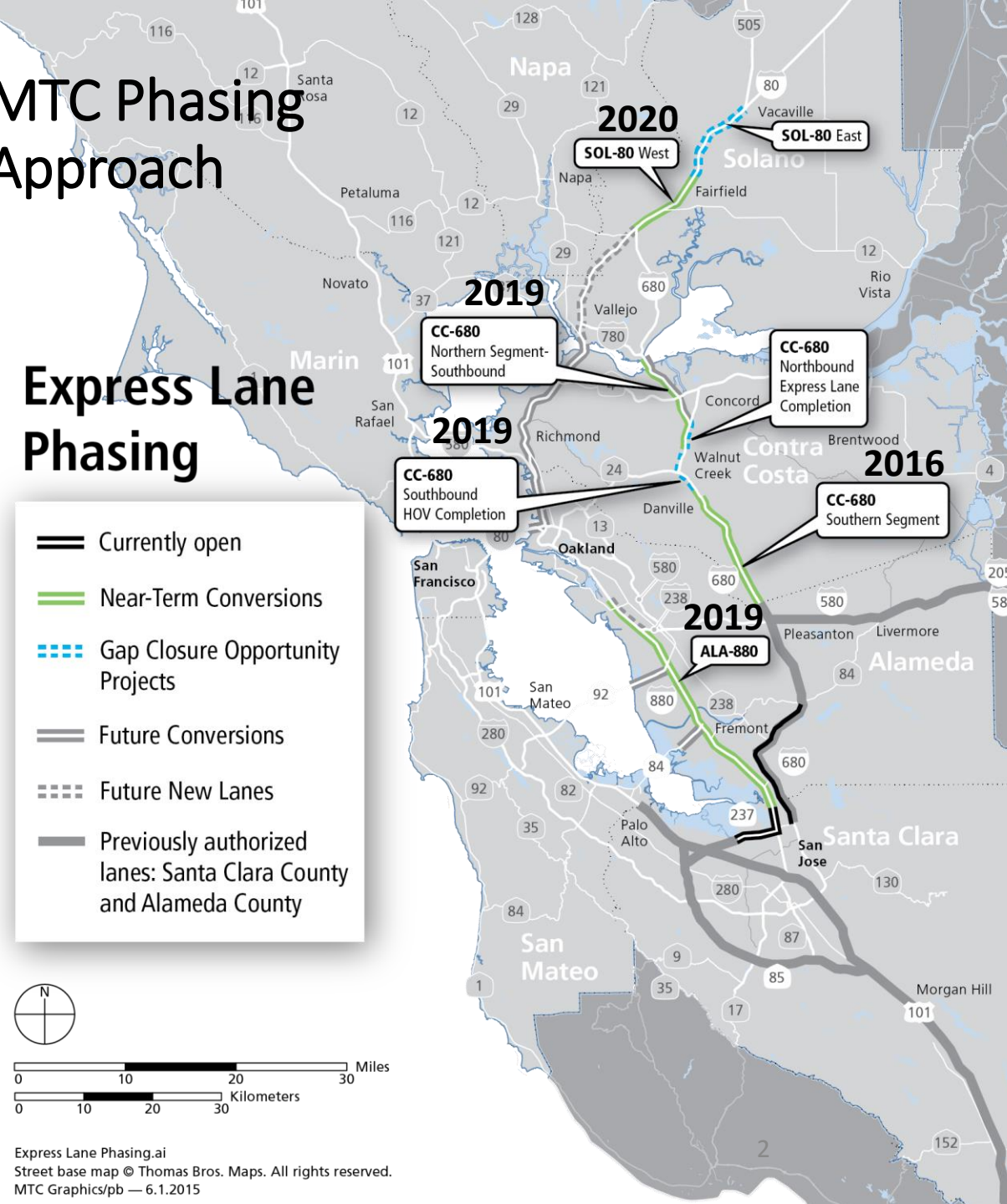July 12 - 14, 2015

Multiple Operators

LEGEND
— MTC LANES
— ACTC/Sunol JPA LANES
— VTA LANES

MTC Phasing Approach

**Express Lane Phasing**

2020 SOL-80 West / SOL-80 East

2019 CC-680 Northern Segment-Southbound

CC-680 Northbound Express Lane Completion

2019 CC-680 Southbound HOV Completion

2016 CC-680 Southern Segment

2019 ALA-880

Legend:
━━━ Currently open
━━━ Near-Term Conversions
┅┅┅ Gap Closure Opportunity Projects
━━━ Future Conversions
┅┅┅ Future New Lanes
━━━ Previously authorized lanes: Santa Clara County and Alameda County

N

0 10 20 30 Miles
0 10 20 30 Kilometers
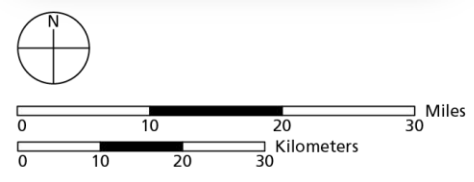
Express Lane Phasing.ai
Street base map © Thomas Bros. Maps. All rights reserved.
MTC Graphics/pb — 6.1.2015

Managed Lanes Implementation Plan
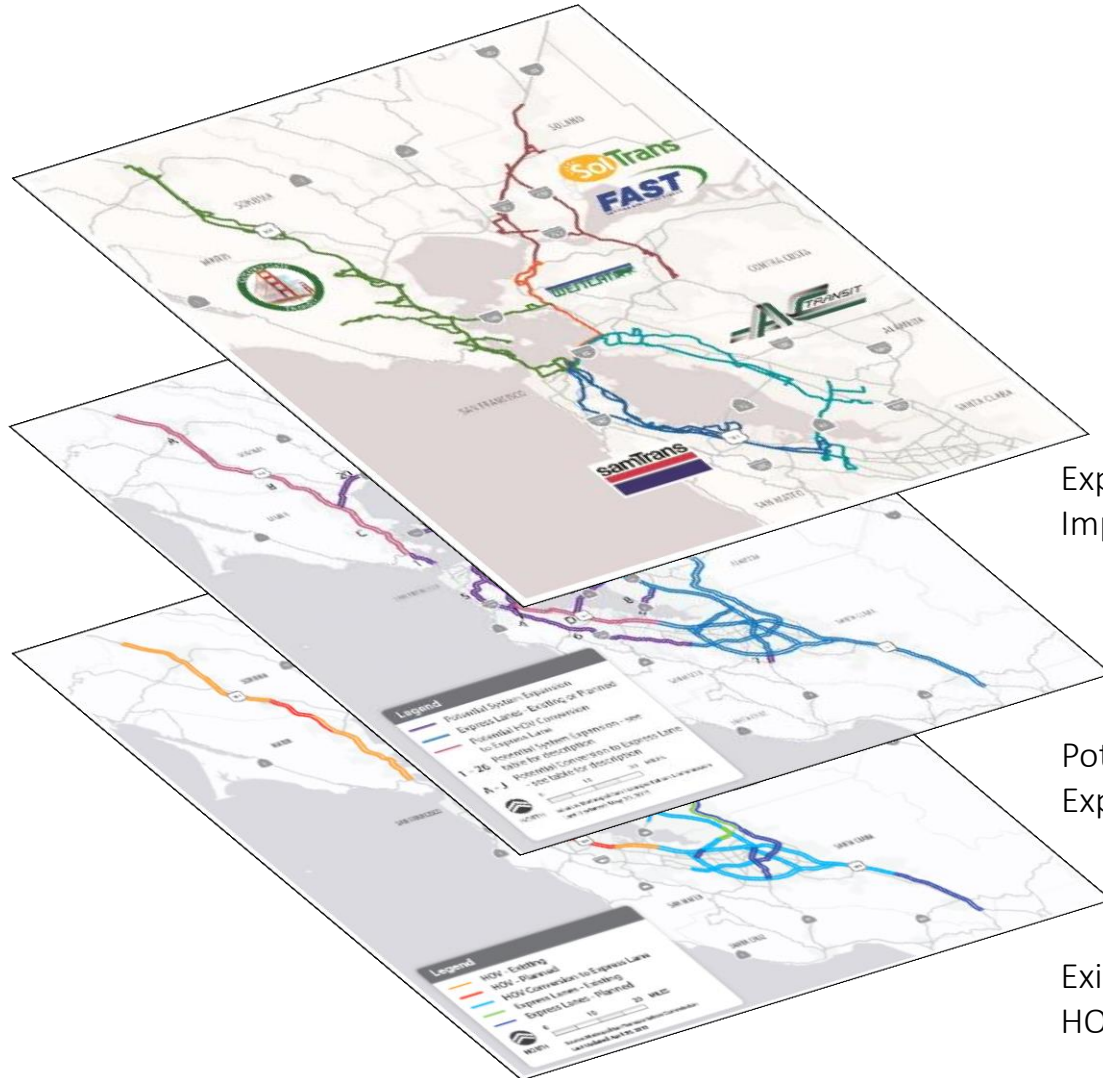
Express Bus and Park & Ride Improvements

Potential New HOV → Express Lane Conversions

Existing and Planned HOV and Express Lanes

MLIP
**Bay Area
Managed Lanes
Implementation Plan**

Utilize potential of "Big Data"
Example: INRIX Travel Times & Express Lanes Hours of Operation

- Larger datasets can provide more insights than data previously available

- Can be used to better understand and communicate what's happening

- Operators shouldn't limit their questions to what they're used to seeing
  - Analytics should be tailored to operators questions, not what's easy to summarize

- Magnitude of INRIX data provides ability to look at:
  - Variable vs "typical" conditions
  - Day of Week
    - Friday traffic on recreational corridors
  - Seasonality
  - Annual growth
  - Location of delays

- Observed data analytics are more insightful than model outputs
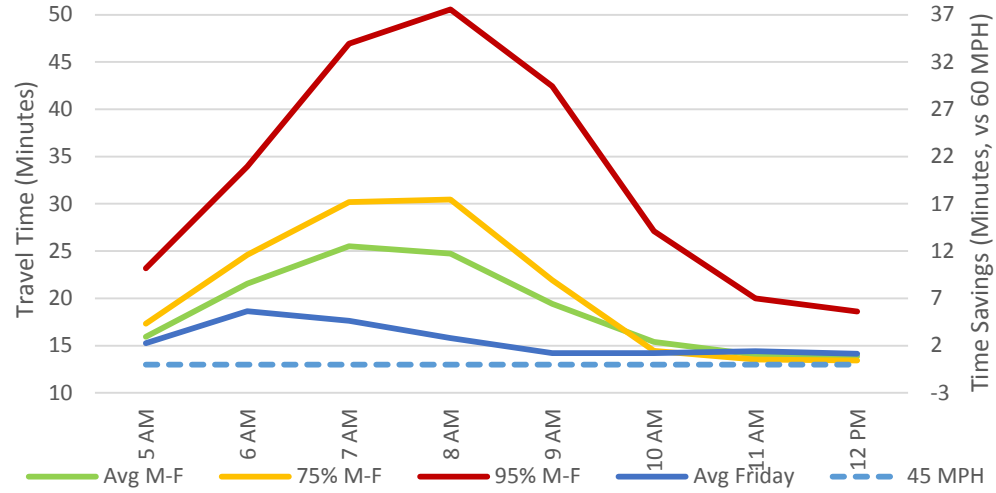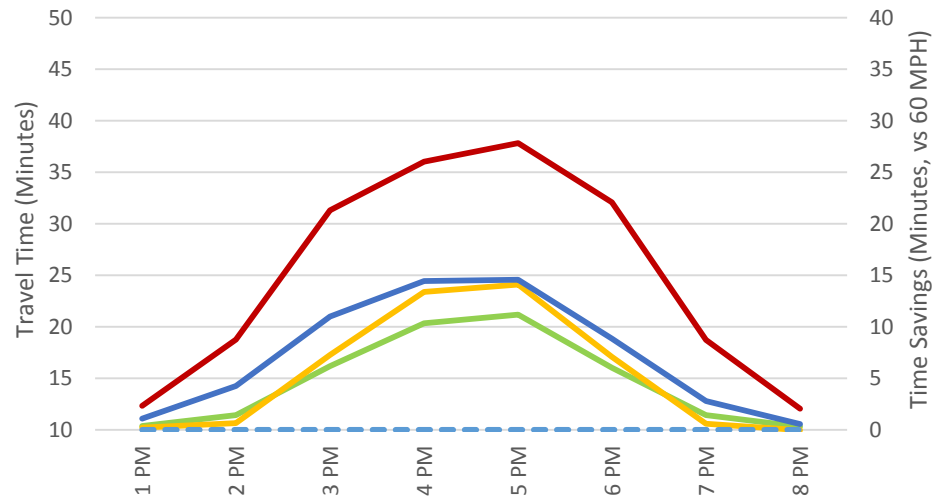
Travel Time Variation

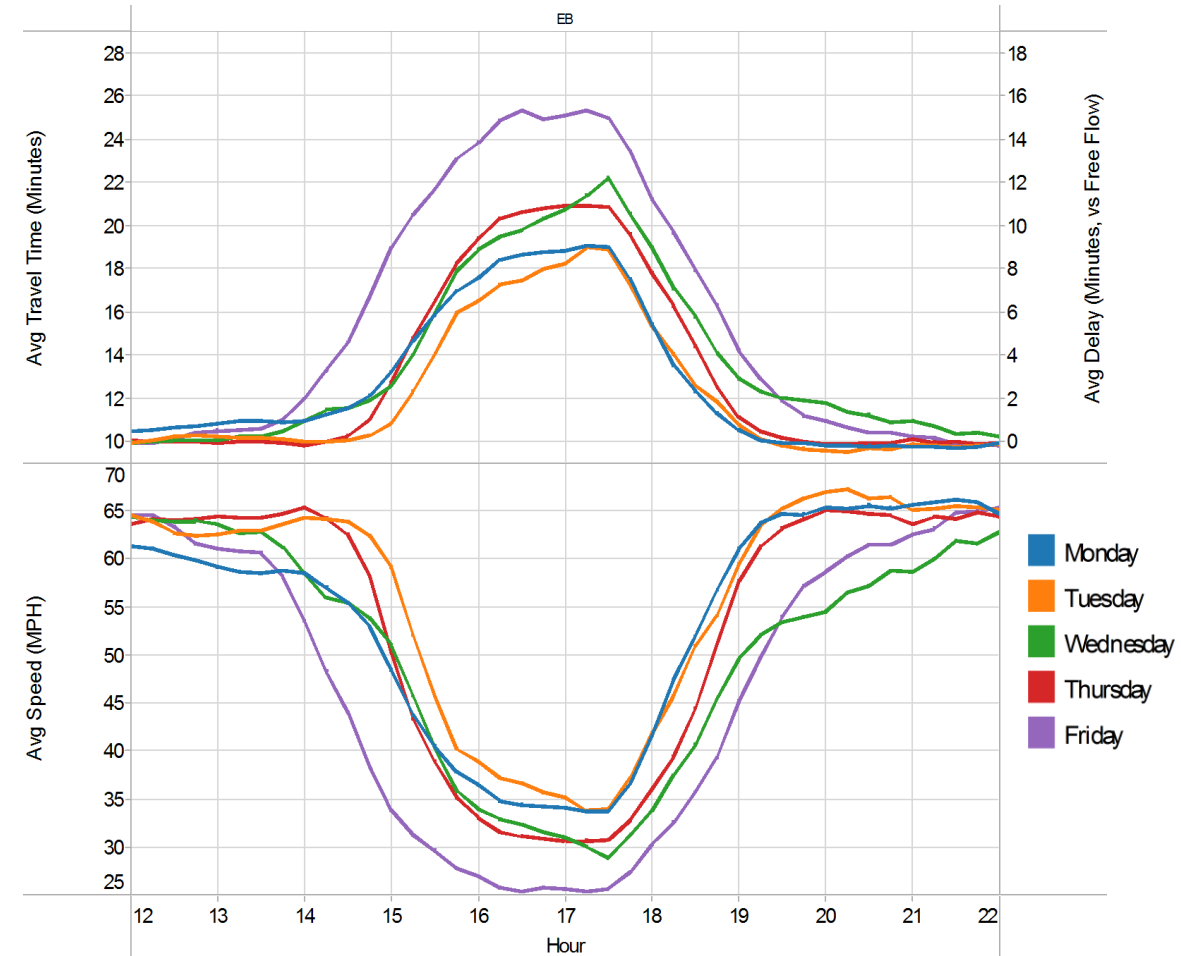Express lanes should address Friday and irregular congestion
- 75% = 1/4 days ≈ 5x/month
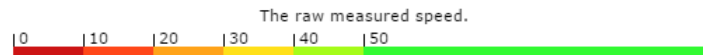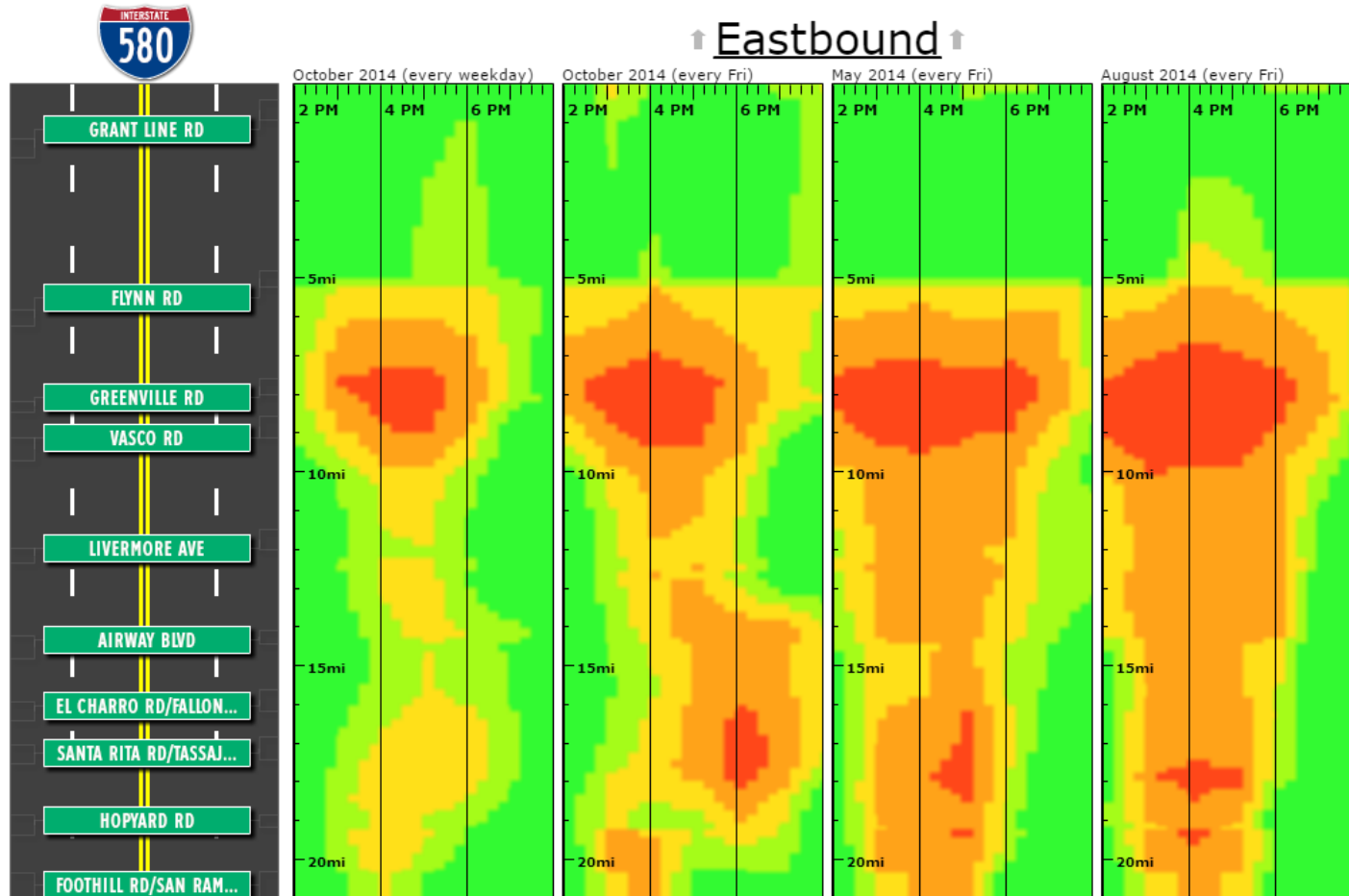- 95% = 1/20 days ≈ 1x/month

Travel Time – Day of Week

Fridays have longer and more severe peaks than "typical" weekdays (M-Th)

Congestion Seasonality

Speed on I-580 between Foothill Rd/San Ramon Rd and I-205
Averaged by 1 hour for October 2014 (every weekday), for October 2014 (every Fri), for May 2014 (every Fri), and for August 2014 (every Fri)
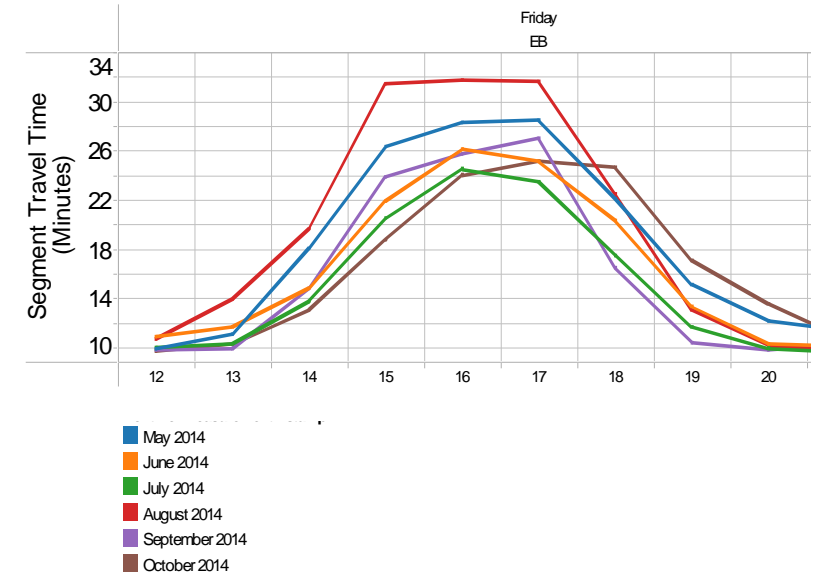
↑ Eastbound ↑

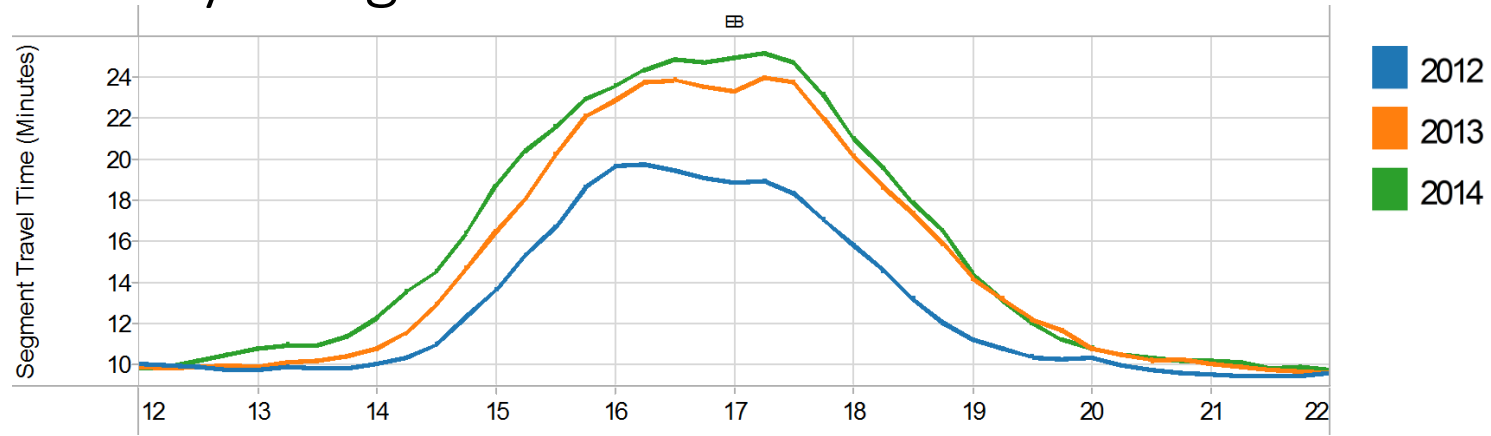October Weekdays | October Fridays | May Fridays | August Fridays

Congestion varies both seasonally and by day of week.

October Friday congestion is longer in duration and more severe than October weekdays.

Friday congestion is also more severe May-August than in October.

Friday Congestion Growth
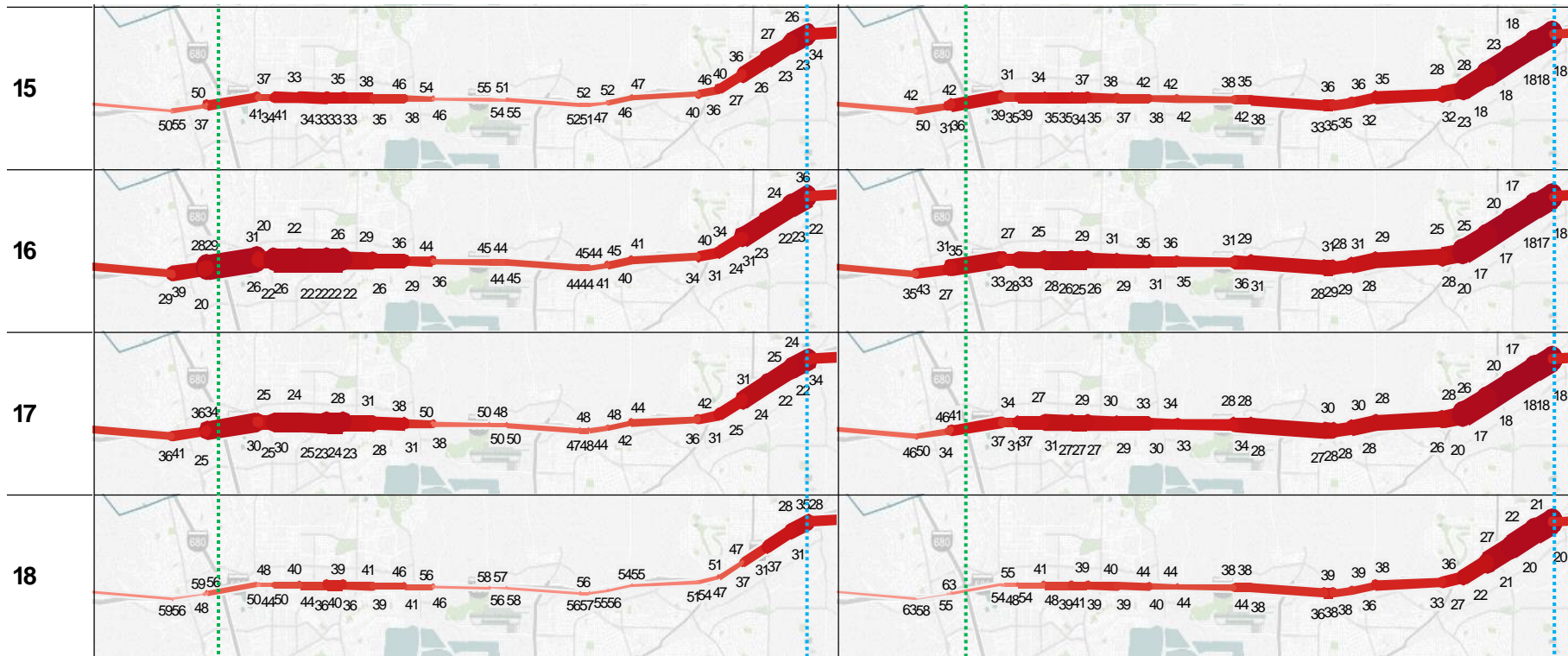
US 101 – San Mateo
Connects San Francisco & Silicon Valley Economies

2013 Jobs Estimates for Sub-County Areas
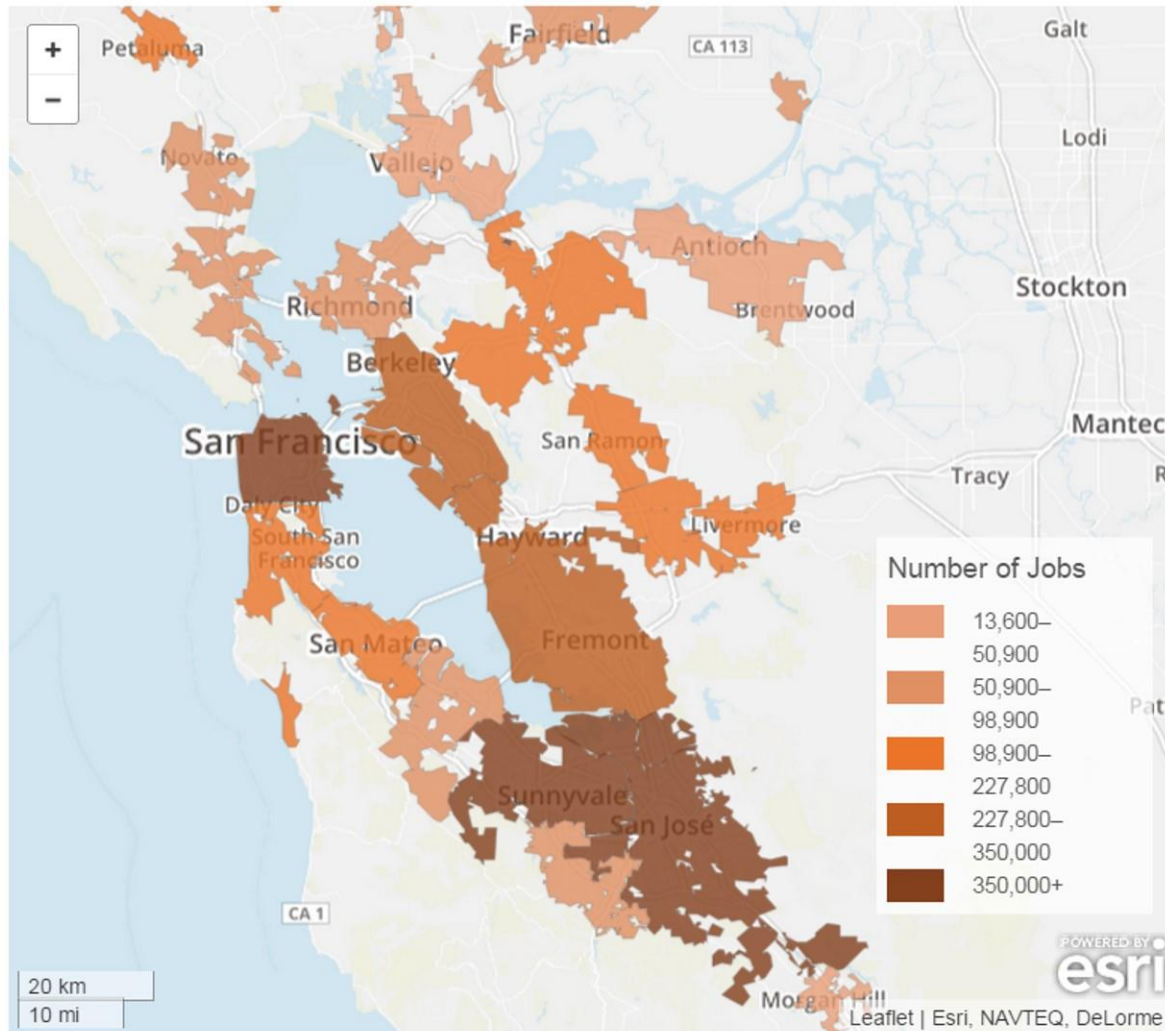
Top Job Centers

1. San Francisco: **608,600** jobs
2. North Santa Clara: **410,300** jobs
3. San Jose: **396,300** jobs
4. North Alameda: **314,600** jobs
5. South Alameda: **242,800** jobs
6. Central Contra Costa County: **222,800** jobs
7. Central San Mateo County: **132,700** jobs
8. South Sonoma County: **126,400** jobs
9. East Alameda County: **106,600** jobs
10. North San Mateo County: **104,000** jobs

Number of Jobs

- 13,600–50,900
- 50,900–98,900
- 98,900–227,800
- 227,800–350,000
- 350,000+

US-101 Congested & Getting Worse

Frequent & Variable Congestion

Growing Every Year

101 - NB - Travel Time Distribution

Legend: Average Travel Time — 95th Percentile Travel Time (1x/month) — -1

101 NB Travel Time Growth

Legend: 2011, 2012, 2013, 2014, 2020 (Extrapolated)

101 - SB - Travel Time Distribution
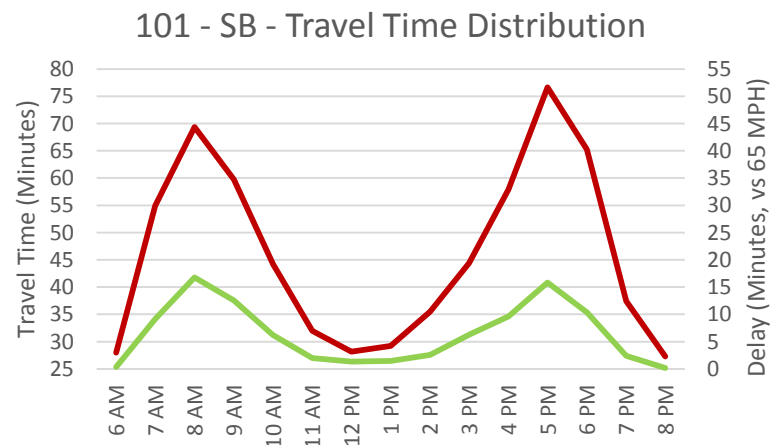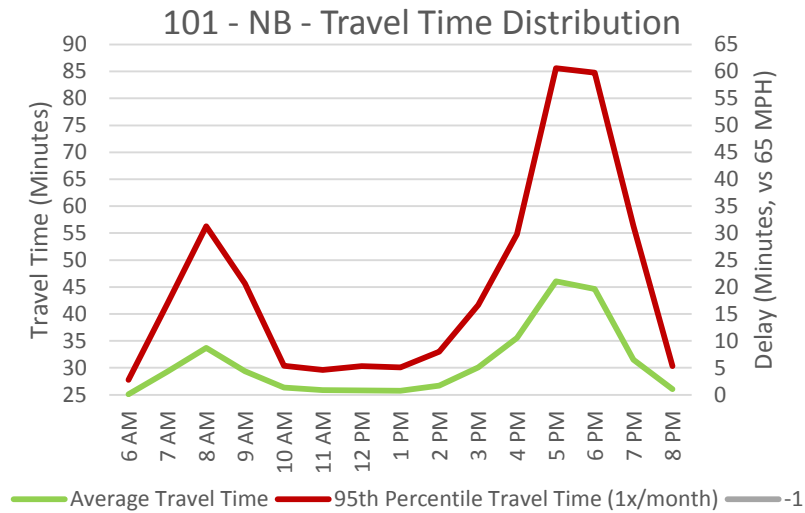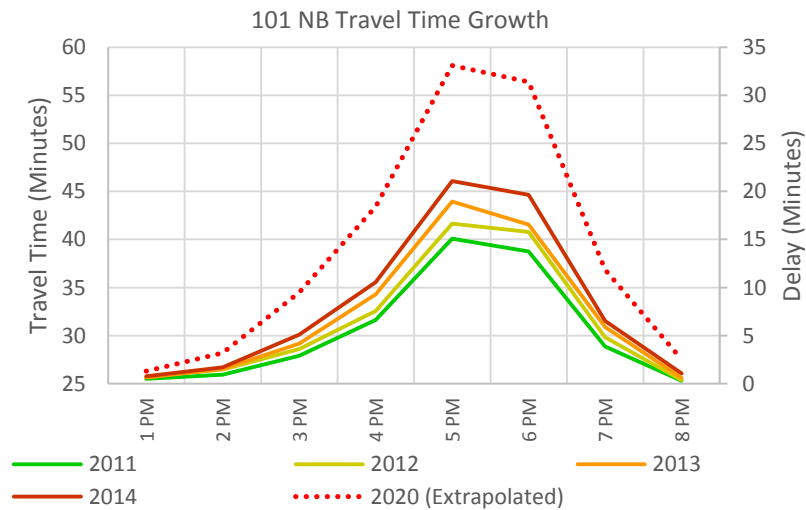
Flat traffic profile → Midday will get congested too

US 101 Whipple Ave to San Francisco - Hourly Volumes

Legend: NB, SB
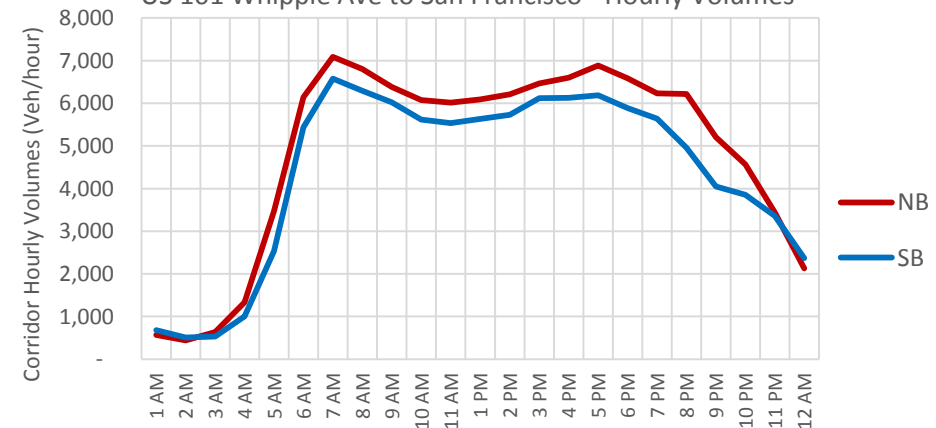
Transit Service Potential

Express bus ridership dropped because of service cuts, not lack of demand.

- **Effectively no SF or SC commute bus service**
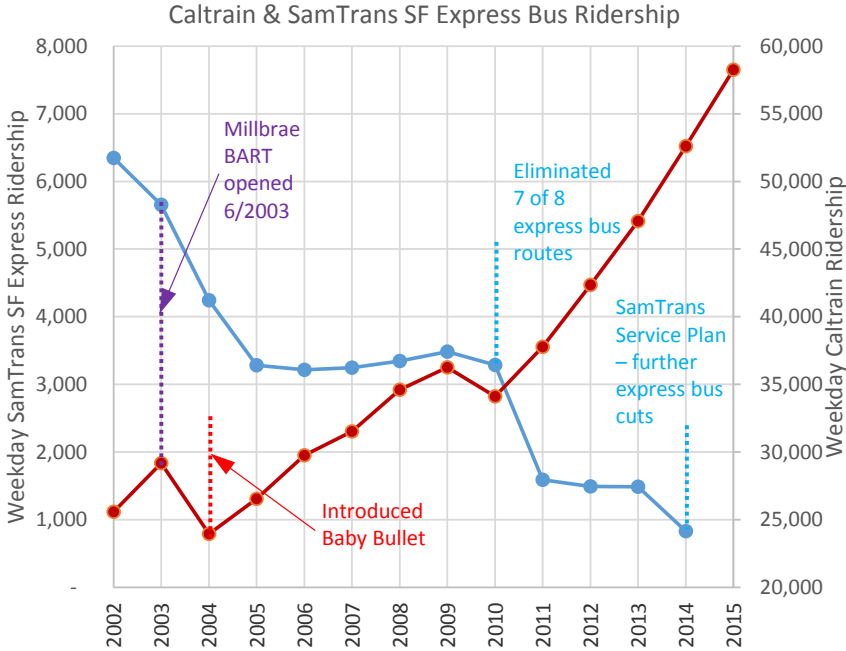
4th & King St. not the ultimate destination for many commuters

Caltrain & SamTrans SF Express Bus Ridership

Millbrae BART opened 6/2003

Eliminated 7 of 8 express bus routes

SamTrans Service Plan – further express bus cuts

Introduced Baby Bullet

Caltrain Thursday AM Peak Trips By Destinations Per Acre

All Trips starting 6AM-9AM

- 0 - 0.2
- 0.3 - 0.6
- 0.7 - 1.4
- 1.5 - 2.6
- 2.7 - 4.7

- Transbay Terminal
- Caltrain Station
- BART Station

Source: MTC Onboard Survey 2015

Significant Existing HOV & Private Transit

1 Bus Capacity = 50+ Passengers = 40 Cars

Existing US 101 PM Traffic Data (NB + SB)

Share by Classification & Occupancy

Legend: SOV | HOV2 | HOV3+ | Vanpool | Motorcycle | Truck | Bus

Assumed ridership: bus = 30 passengers, vanpool = 8 passengers
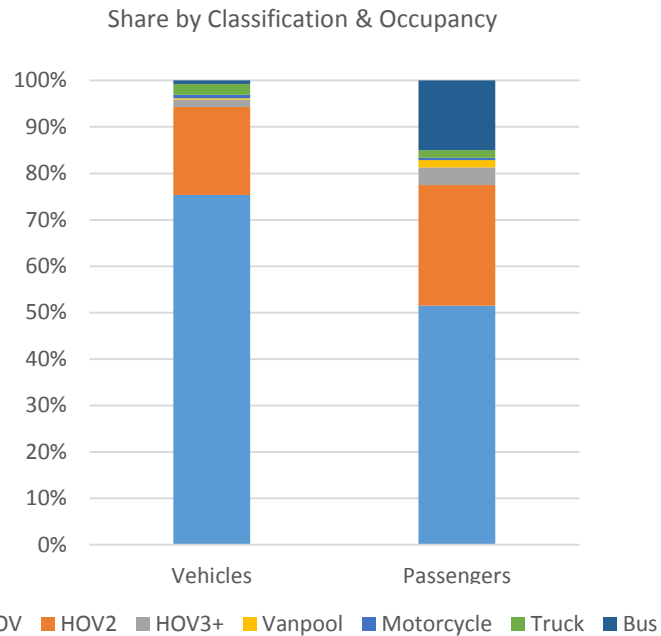
- SOVs are 75% of vehicles but only 52% of the passengers in the corridor
- Buses are less than 1% of the vehicles but are estimated to carry 15% of the passengers
- HOV3+ eligible vehicles (HOV3+, vanpool, bus) make up less than 3 % of the traffic and an estimated 20% of passengers

How to achieve vehicle reduction: Increase Carpools

- Currently no incentive to carpooling

- Many carpools will form naturally:
    - Express lanes will provide time savings and travel time reliability to eligible HOVs
    - Roundtrip gas ≈ $7 (full operating cost is higher)
    - SF Financial District parking = $30+/day, $400+/month

- Technology can be used to facilitate quicker and wider adoption than on other corridors
    - 511 rideshare (important but less nimble than private companies)
    - Bay Area Council & employers can coordinate with private providers
    - SFO is a significant rideshare market

How to achieve vehicle reduction: Parking & First/Last Mile Service

- Improve ease of use and access to Caltrain/Express Bus/Carpool via:
  - Establish new park-ride lots to support SamTrans Express Bus and employer shuttles
    - Efficient management of existing parking
    - Parking real time info
    - Pricing to encourage use of all facilities
  - On-demand shuttle service targeted at commuters from low-density areas to access SamTrans/Caltrain/Shuttle stops
    - Bridj (Boston & DC) dynamically routes minibuses based on demand, the same concept could be applied focused on serving single Caltrain/SamTrans/Shuttle stops.
    - VTA is testing a dynamic transit service pilot program

Managing Congestion

Causes of Congestion

[CATEGORY NAME] [PERCENTAGE]

[CATEGORY NAME] [PERCENTAGE]

Bottlenecks 50%

Traffic Incidents 25%
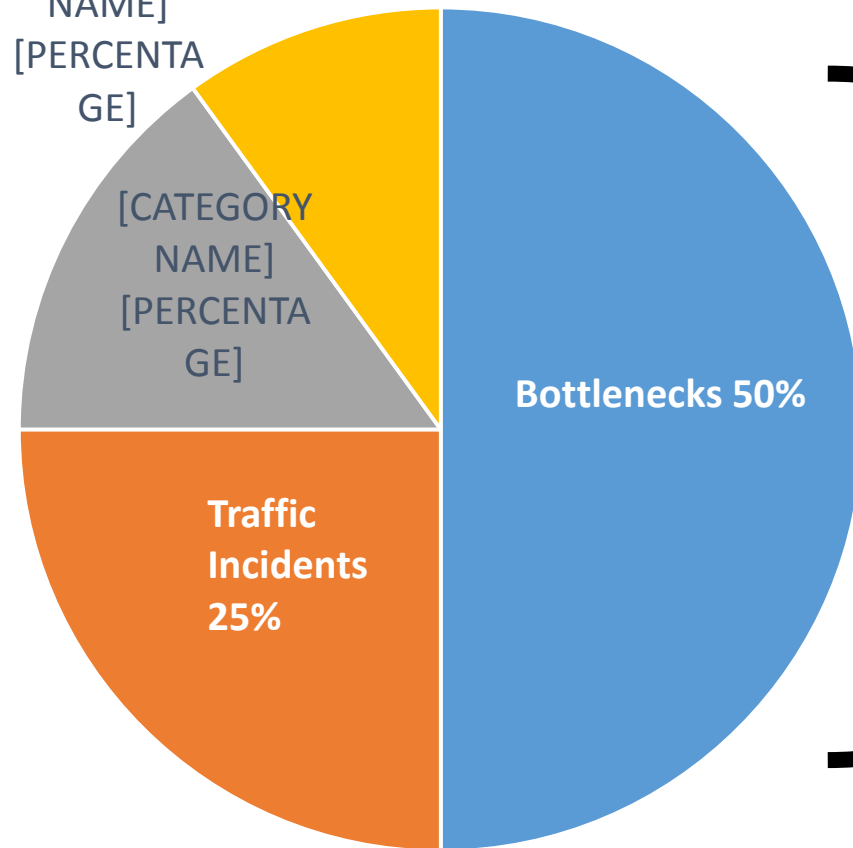
**Congestion Mitigation:
Active Operational Management and Traveler Information**

Columbus Day Initiative	Next Gen 511
Transportation Management System	Next Gen Rideshare
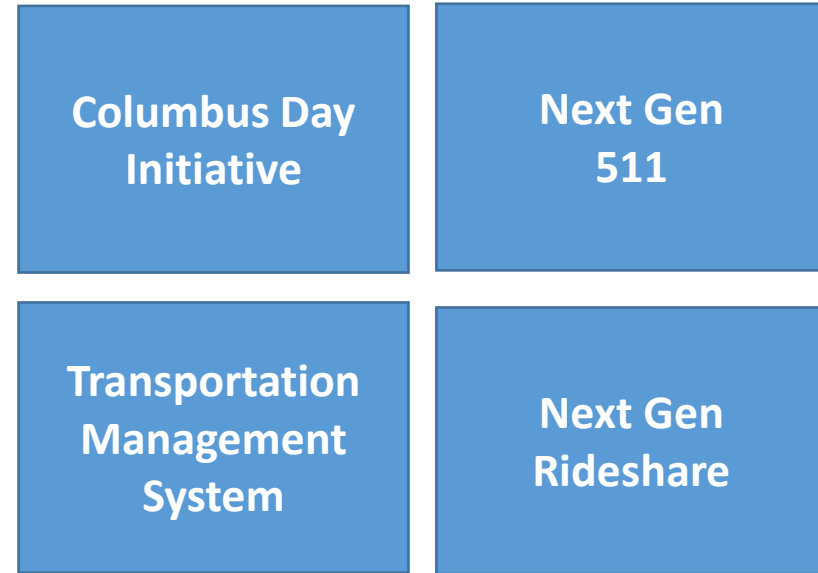
Make Every Day Columbus Day

3% to 5% Lower Traffic Demand on Columbus Day Yields 50% to 70% Less Delay

Alameda I-80 Eastbound

I-80 EB
Traffic Volume vs. Delay

- 21.9
- 20,138
- 19,410 (-3.6%)
- 18,840 (-6.4%)
- 10.6 (-52%)
- 1.1 (-95%)
- Volume: PM Peak (3-7 PM)
- Delay: PM Peak (3-7 PM)

X-axis: Typical Weekday (2013), Columbus Day (2013), Presidents Day (2013)

* Travel Time: From I-80/580/880 (The Maze) to Carquinez Bridge (Total Length = 20 Miles)
** Volume: I-80 EB @ Carlson Blvd (Richmond)
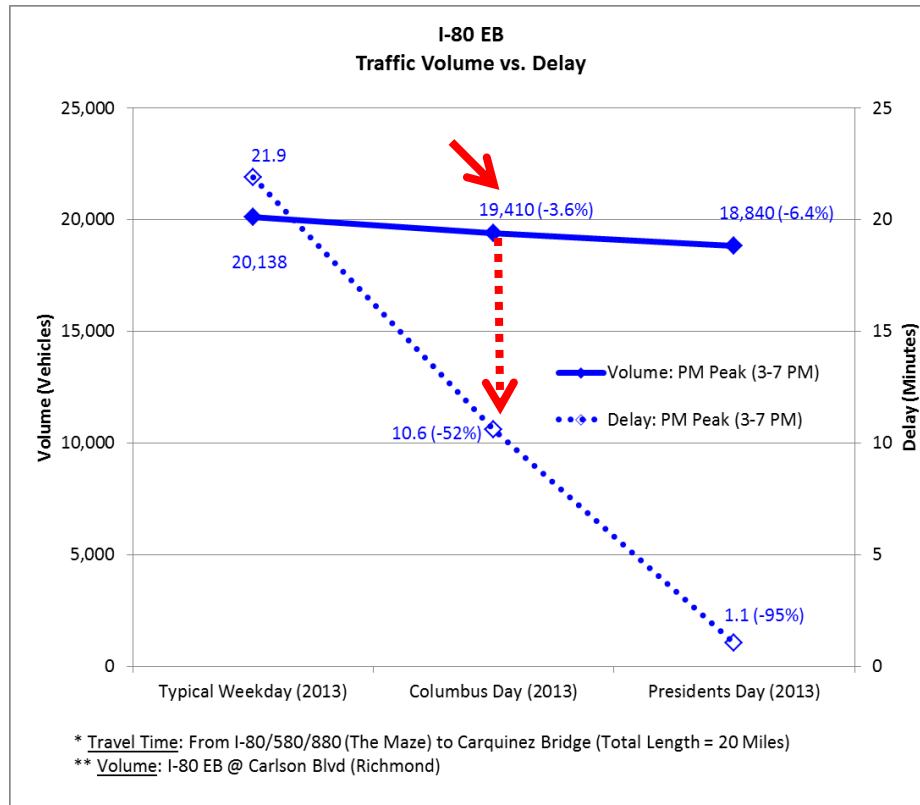
San Mateo US-101 Northbound

U.S. 101 NB
Traffic Volume vs. Delay

- 28,156
- 10.5
- 26,814 (-4.8%)
- 18,821 (-33.2%)
- 3.1 (-70%)
- 0.0 (-100%)
- Volume: AM Peak (5-10 AM)
- Delay: AM Peak (5-10 AM)

X-axis: Typical Weekday (2013), Columbus Day (2013), Presidents Day (2013)

* Travel Time: From SR-92 to I-80 (Total Length = 19 Miles)
** Volume: U.S. 101 NB @ Cesar Chevaz St (S.F.)
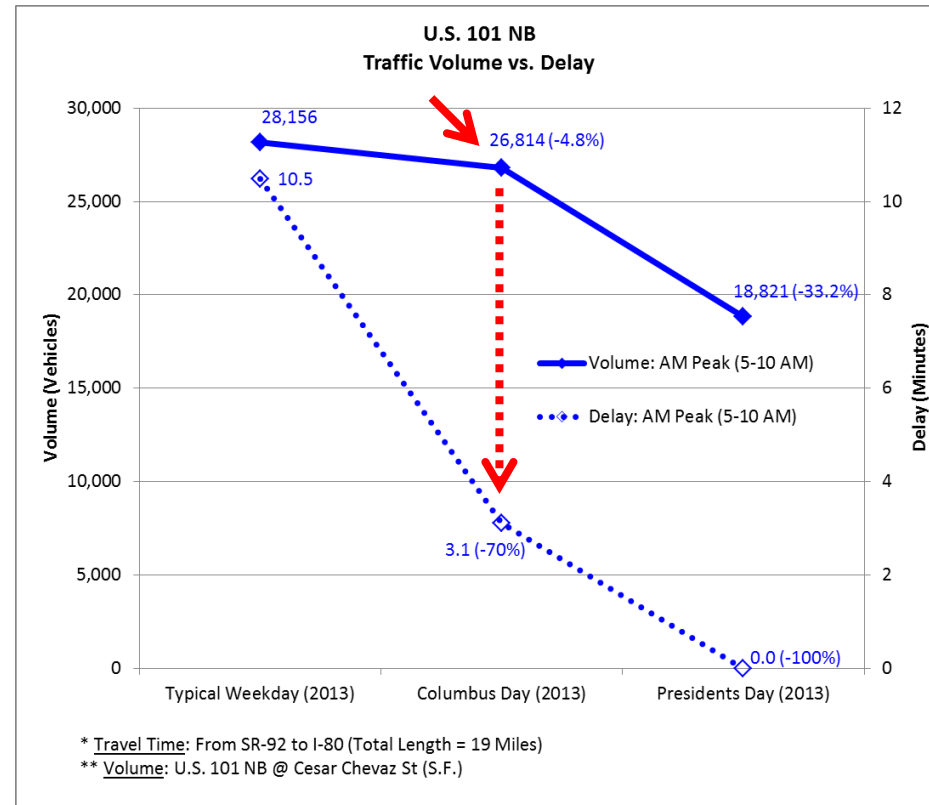
Active Operational Management
Freeways and Arterials

Pursue Additional Operational Strategies
"Columbus Day Initiative"

Adaptive Ramp Metering

Queue Warning

Hard Shoulder Running

Adaptive Traffic Signals w/Transit Signal Priority

Connected Vehicles/Corridors

Maintain and Operate Existing Investments
"Transportation Management Systems"

Highway Signage

Transportation Management Center

Detection/ Metering Systems

Highway Cameras

Communication Infrastructure

Incident Management

Next Gen 511 Plan: Key Changes

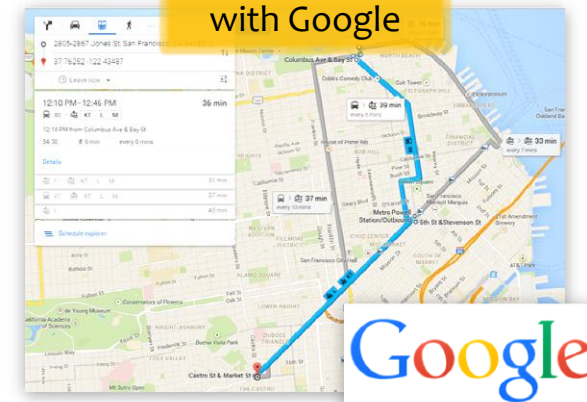|		
• Modally siloed websites	→	Single site, responsive design + new content
• 511 Transit Trip Planner	→	3rd party, multi-modal trip planner
• Custom driving times	→	Purchased driving times/speeds
• 24x7 operations center	→	Consolidated, peak hour operations center
• Manual incident collection	→	Automated incident data
• Limited data sharing	→	Open data & new developer portal
• Separate agency data feeds	→	Consolidated 511 standard feed to Google

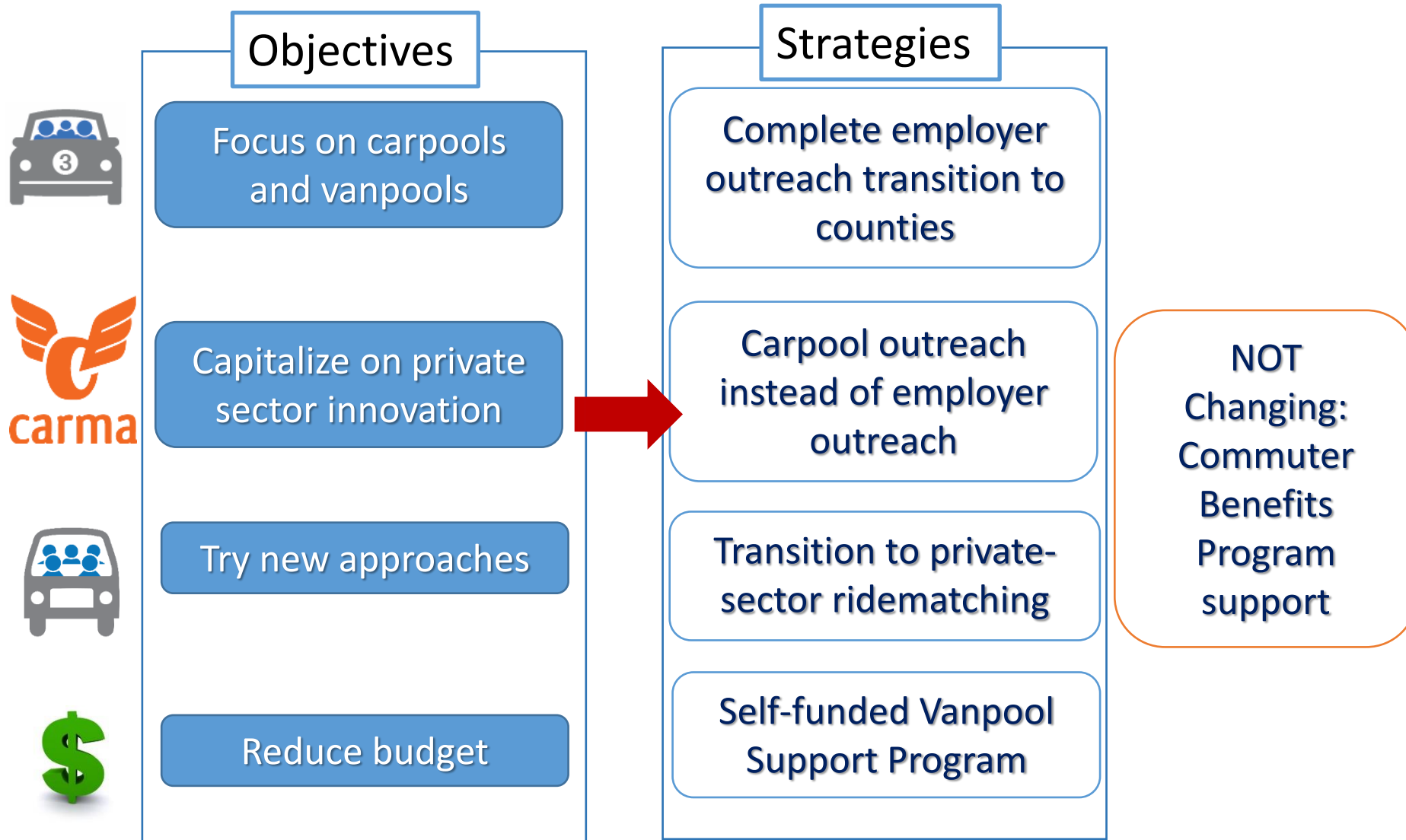Responsive Design for All Devices

Trip Planning & Interactive Map

Incidents & Closures

Construction & Events

Parking & P&R Lots

Cameras & Signage

Traffic Speeds

HOV & Express Lanes

Tolls & Bridges

New Content

Data Sharing with Google

Google

Proposed Changes

Objectives

- Focus on carpools and vanpools
- Capitalize on private sector innovation
- Try new approaches
- Reduce budget

Strategies

- Complete employer outreach transition to counties
- Carpool outreach instead of employer outreach
- Transition to private-sector ridematching
- Self-funded Vanpool Support Program

NOT Changing: Commuter Benefits Program support

Questions?