San Mateo US 101 Express Lane Feasibility Study

Draft Report

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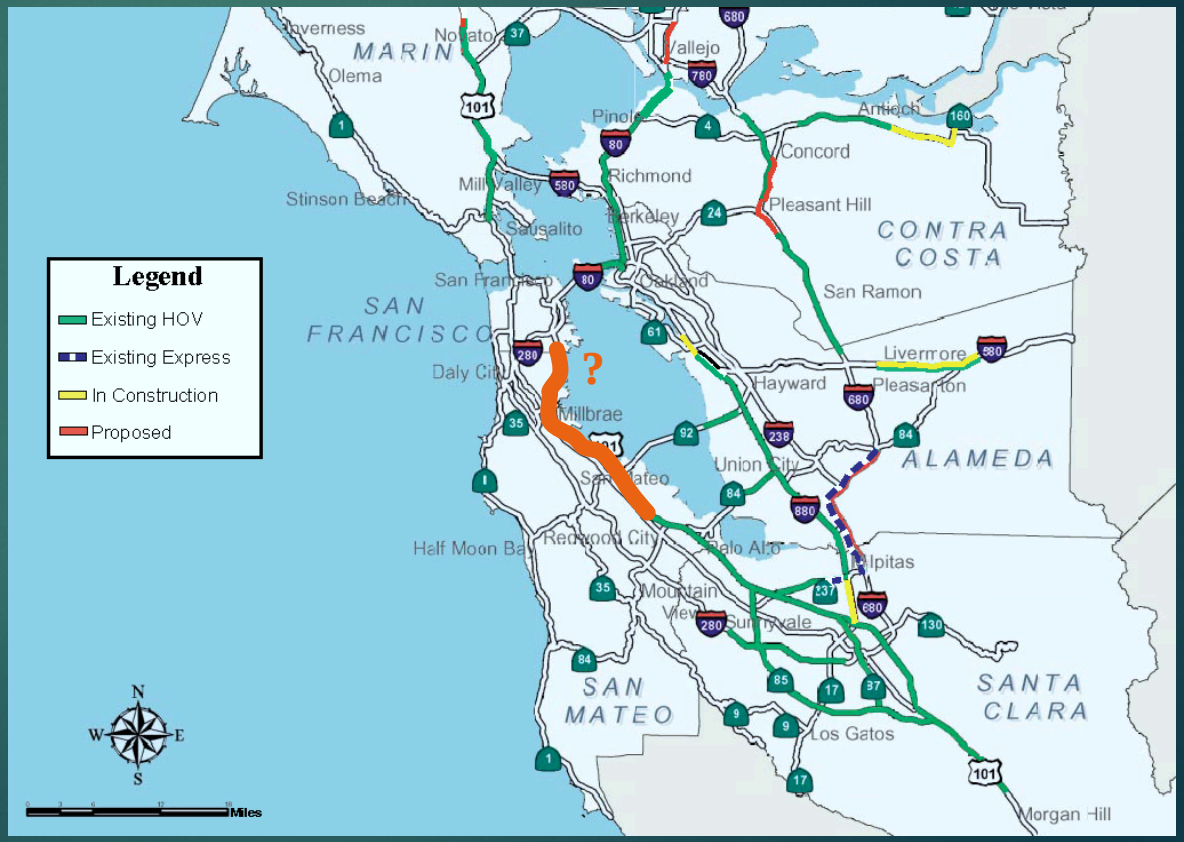
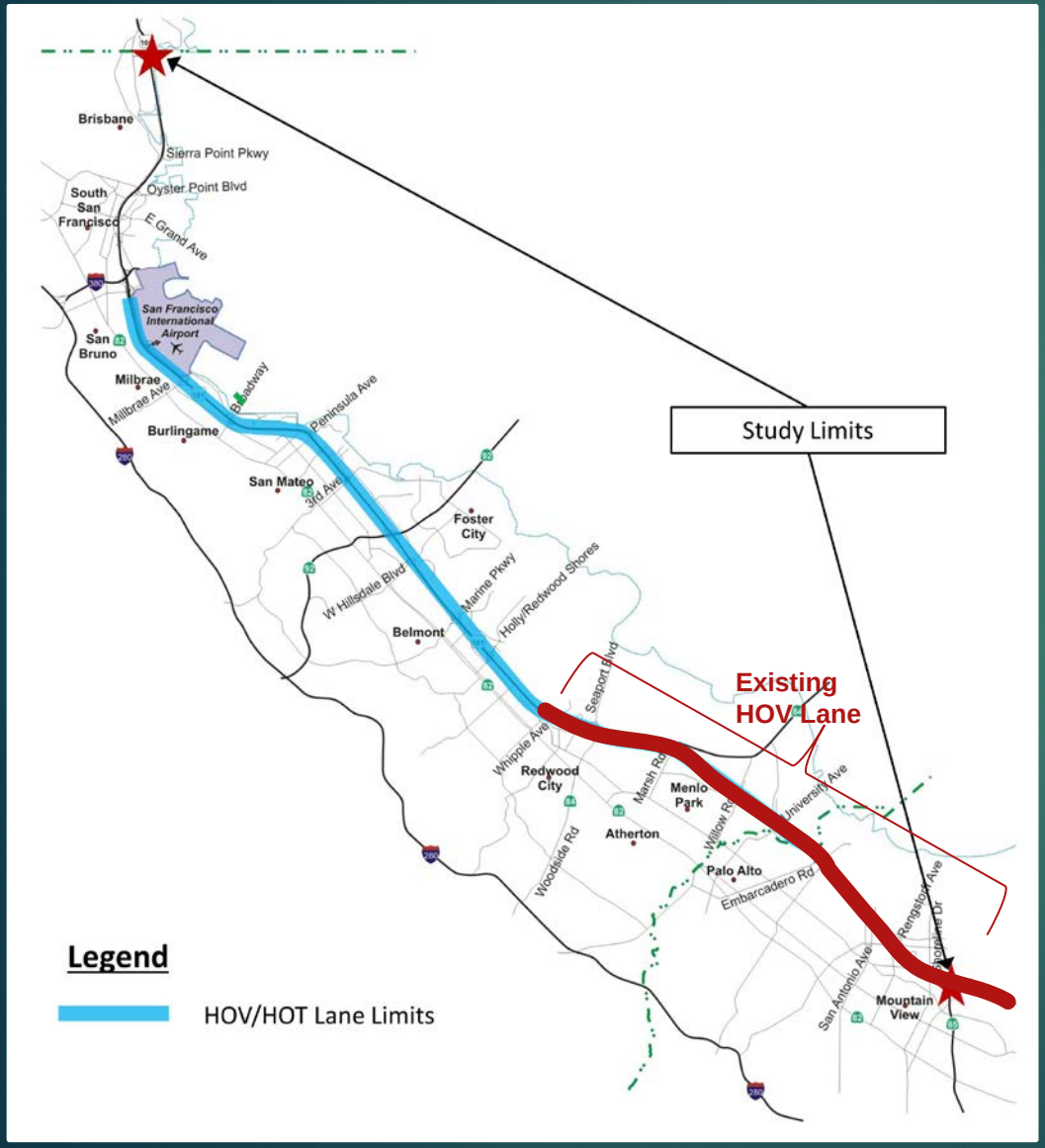
C/CAG Presentations - February, 2015

Why Are We Here?

- US 101 in San Mateo is the longest and most congested stretch of freeway in Bay Area without an HOV lane
- C/CAG, MTC, Caltrans Studies



Study Limits



- HOV/HOT Lane Limits
- Study Limits
- Extension Beyond Study Limits to Capture Effects of Queues

Shoehorning HOV on 101

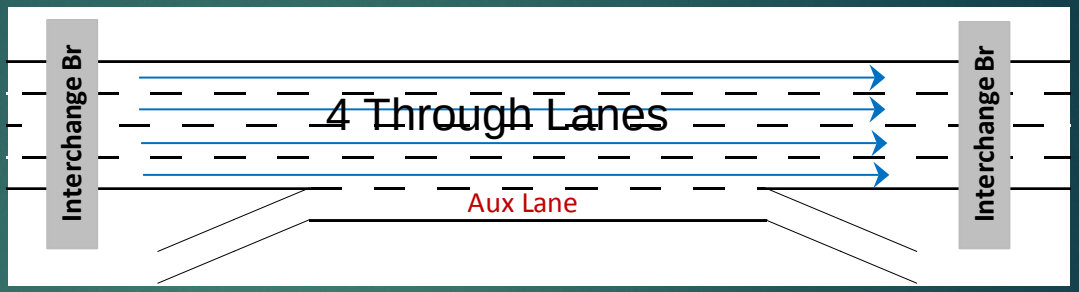
- Figuring out how to fit HOV Lanes onto US 101
  - Add/Convert HOV Lane (March 2011)
    - All the way from Whipple to SF County Line
    - Add HOV lane : Cost Prohibitive
    - Convert regular lane to HOV: Creates unacceptable added delay
  - Looked at various options to improve cost-effectiveness.
  - Staged Innovative Add (Hybrid)HOV Lane (June 2012)
    - Only go from Whipple to I-380: $156 million

Latest Study – Go beyond HOV to HOT

- Purpose of Latest Study
  - Preliminary High Level Express Lane Feasibility Assessment
- Two Concepts
  - Concept 1: HOV-to-HOT (Innovative Add HOT Lane)
    - $259 million
      - $156 million to build HOV lanes
      - $103 million to convert to express lane operation
  - Concept 2: GP-to-HOT (Convert HOT Lane)
    - $108 million to convert to express lane operation
    - Traffic diversion or mode shift needed to mitigate travel delay impacts.

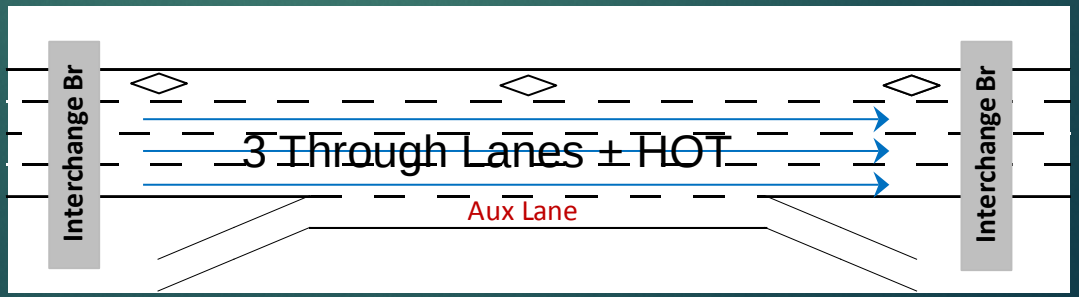
Concept Schematics

Existing



Concept 1 -
Hybrid HOV/HOT

Concept 2 -
Convert HOV/HOT



How do they compare to Now?

- Do Nothing
  - Increased congestion on US 101, I-280, streets -
  - Increased crowding on SamTrans, Caltrain -
  - Increased greenhouse gas emissions -
- Concept 1 – Add Express Lane
  - Decreased congestion on US 101, I-280, streets +
  - Minor new revenues to invest in mitigations +
  - Lesser increase in transit crowding, increased HOVs +
  - Lesser increase in GHG +
- Concept 2 – Convert Lane to Express Lane
  - Increased congestion on US 101, I-280, streets -
  - Minor new revenues to invest in mitigations +
  - Greatly increased transit ridership/service, increased HOVs +
  - Lesser increase in GHG +

The Bottom Line

- Find some way to do the Express Lane.
  - It is better than doing nothing.

How to do the Express Lane?

- Depends on your objectives, and tolerance for pain.
- If increased GP Lane auto congestion OK (worse than now)
  - Then concept 2, Convert Lane
- If increased GP Lane auto congestion not OK
  - Then concept 1, Add Lane

Can we make congestion better on 101 with Concept 2?

- What would it take in transit investments to make Concept 2 as good as Concept 1, in terms of auto congestion on US 101?
  - Can we carry all of the people that would need to be diverted from US 101, in order to make Concept 2 = Concept 1.
  - $238 million for 20 years of transit service.
    - This does not include capital costs to buy the extra buses and train sets.
    - This assumes enough people would switch, does not take into account what it might take to "attract" new riders

The Details

- Vehicle Capacity
- Freeway Congestion
- Freeway Performance
- Mixed Flow Lane travel times

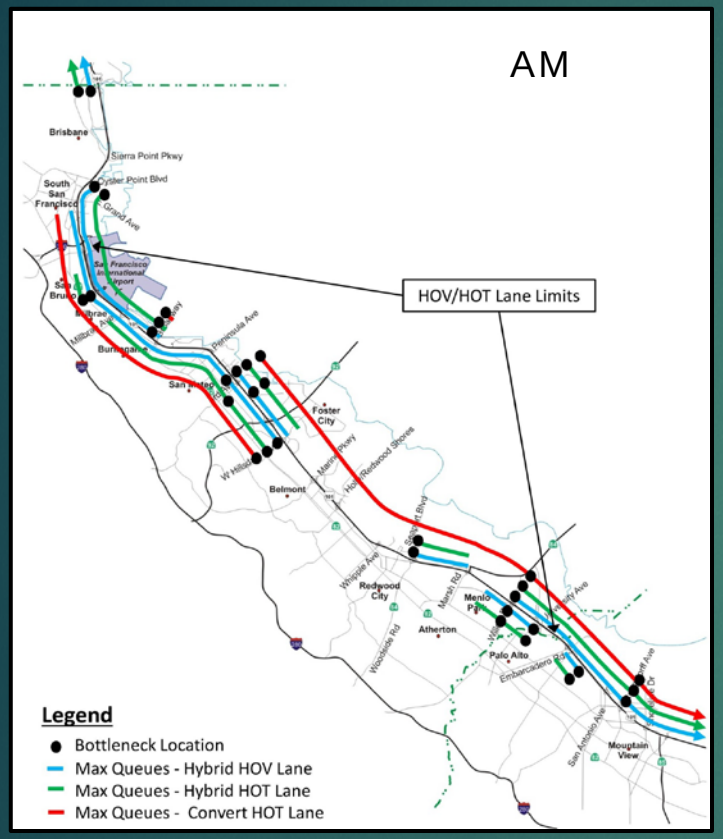
Caveats:

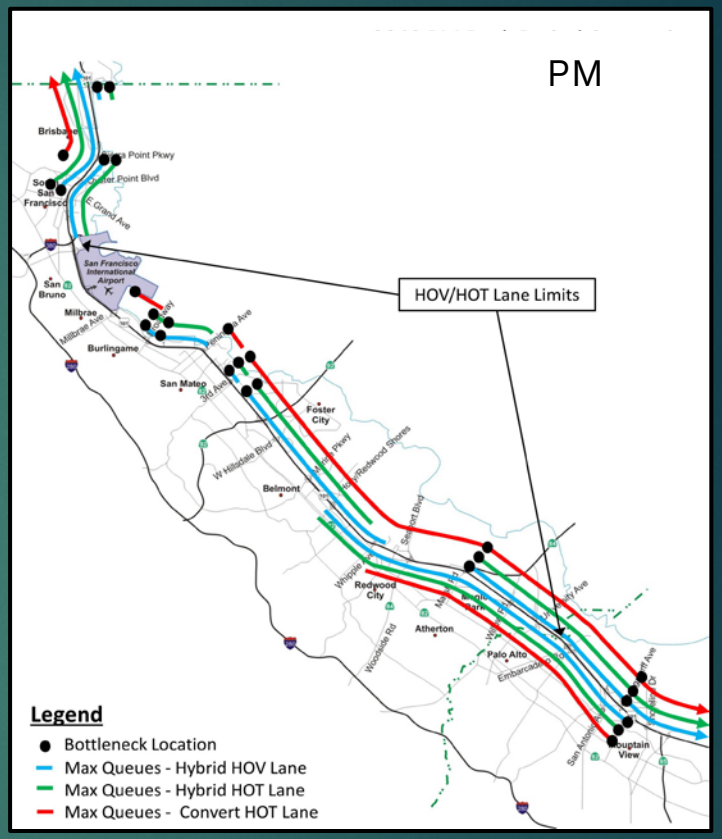
- Its tough modeling how people react to extreme congestion.
- Numbers may change (cheap gas?)

Available Capacity for Tolled Vehicles

- Concept 1 and Concept 2 Similar
- Northbound
  - More Capacity Available in Shoulder Hours
    - 6:00-7:00 and 9:00-10:00 AM
    - 2:30-3:30 and 6:30-7:30 PM
- Southbound
  - No Capacity south of Holly

Freeway Congestion





- Concept 1 Congestion Similar to Hybrid HOV
- Longer Queues with Concept 2

Freeway Performance Measures

Performance Measures	Staged Hybrid HOV	Concept 1 - Hybrid HOT	Concept 2 - Convert HOT	Concept 1 vs Staged Hybrid HOV	Concept 2 vs Staged Hybrid HOV
Vehicle Miles Travelled	5,145,600	5,166,500	4,836,400	0.4%	-6.0%
Vehicle Hours Travelled	187,000	184,000	187,400	-1.6%	0.2%
Vehicle Hours of Delay	107,800	104,400	113,000	-3.2%	4.7%
Person Miles Travelled	5,839,900	5,901,700	5,573,000	1.1%	-4.6%
Person Hours of Delay	109,200	105,800	113,400	-3.2%	3.8%
Average Vehicle Speed	27.5	28.1	25.8	2.1%	-6.2%
Average Person Speed	29.3	30.0	28.0	2.3%	-4.6%

Mixed-Flow Lane Travel Times

Direction/Peak Period	Comparison of Mixed-Flow Travel Times		
	Concept 1 vs Staged Hybrid HOV % (mins.)	Concept 2 vs Staged Hybrid HOV % (mins.)	Concept 2 vs Concept 1 % (mins.)
Average Peak Period Travel Time			
Northbound AM	0% (-0.1)	16% (17.2)	16% (17.3)
Northbound PM	-1% (-1.8)	24% (32.5)	26% (34.3)
Southbound AM	-10% (-6.4)	25% (16.2)	39% (22.6)
Southbound PM	-1% (-0.7)	-17% (-17.3)	-17% (-16.6)

- Concept 1 Slightly better travel times than Hybrid HOV
- Concept 2 Up to 32 minutes longer travel time (NB PM), 17 minutes shorter travel time for SB PM

Mode Shift Needed for Concept 2

To get same congestion improvement on US 101 as Concept 1

Direction	Time Period	No. of Vehicle Trip Reduction on US 101	Additional Trips			
			Alternate Routes (El Camino Real)	Samtrans Buses	Caltrain	BART
Peak Period Total						
Northbound	AM (6 - 10 AM)	1,704	0	545	1,159	0
Northbound	PM (2:30 - 7:30 PM)	1,163	0	372	791	0
Southbound	AM (6 - 10 AM)	4,551	1,138	1,092	1,741	580
	Total	**7,418**	**1,138**	**2,010**	**3,690**	**580**
Maximum Hour						
Northbound	AM (7 - 8 AM)	468	0	150	318	0
Northbound	PM (5:30 - 6:30 PM)	764	0	244	520	0
Southbound	AM (8 - 9 AM)	1,697	424	407	649	216
	Total	**2,929**	**424**	**802**	**1,487**	**216**

Mode Shift Analysis – Transit Costs

Transit Operator	Additional Daily Riders	Operating Expense per Passenger Trip	Additional Annual Operating Expense
BART	580	$4.12	$622,000
Caltrain	3,690	$7.50	$7,196,000
Samtrans	2,010	$7.73	$4,039,000
Total	6,280		$11,900,000
20-Year Operating Cost			**$238,000,000**

Additional Buses on US 101

- Maximum/Worse Case Scenario
  - No mode shifts to Caltrain and BART
  - No route shift to El Camino Real
- Seating Capacity: 58 passengers/bus
- AM Peak Hour: 38 buses
  - 2,165 Passenger Trips
- PM Peak Hour: 14 buses
  - 764 Passenger Trips

Cost Estimates Summary

Options	Cost Item	Subtotal	Total
Concept 1	Stage Hybrid HOV Lane Construction Cost	$156 mil*	$259 mil
	HOV to Express Lane Conversion Cost	$103 mil	
Concept 2 **	Mixed-Flow Lane to Express Lane Conversion Cost	$108 mil	$346 mil
	Additional Transit O & M Cost (20-Year)	$238 mil	

* Based on Staged HOV Lane Analysis Memorandum, June 15, 2012.

** Capital costs associated with providing additional bus services not included.

Further Considerations

A. Update Existing Conditions
B. Update Traffic Forecasts
C. Expand Operations Analysis to include Alternate Routes
D. Provide Capital Cost Estimates for Additional Transit Service
E. Logistics for Support Services for Transit (PNR, Shuttles, etc.)
F. Transit Trips Origin/Destination Analysis
G. Private Shuttles
H. Express Lanes O&M and Revenue Analysis

General Conclusions

- Concept 1 performs better than both Hybrid HOV and Concept 2
- Concept 2 performs worse than Concept 1 due to loss of freeway capacity
- Concept 2 requires additional transit capital and operating costs
- Further mode shift analysis is required for Concept 2
- Further operational analysis is required for Concepts 1 and 2
- Next steps for study to be determined

Cost Estimates – Assumptions

- Continuous Access to/from Express Lane
- Costs include:
  - Staged Hybrid HOV Lane Construction (Concept 1)
  - Roadway Signage and Traffic Delineation
  - Toll System Infrastructure
  - Additional Soft Costs for Preliminary Engineering, Design, and Construction Administration
  - 20-year Additional Transit O&M Costs (Concept 2)
- Costs exclude:
  - Backhaul Network
  - Tolling System O&M
  - Transit Capital