

San Mateo US 101 Express Lane Feasibility Study

Draft Report



Kittelson & Associates



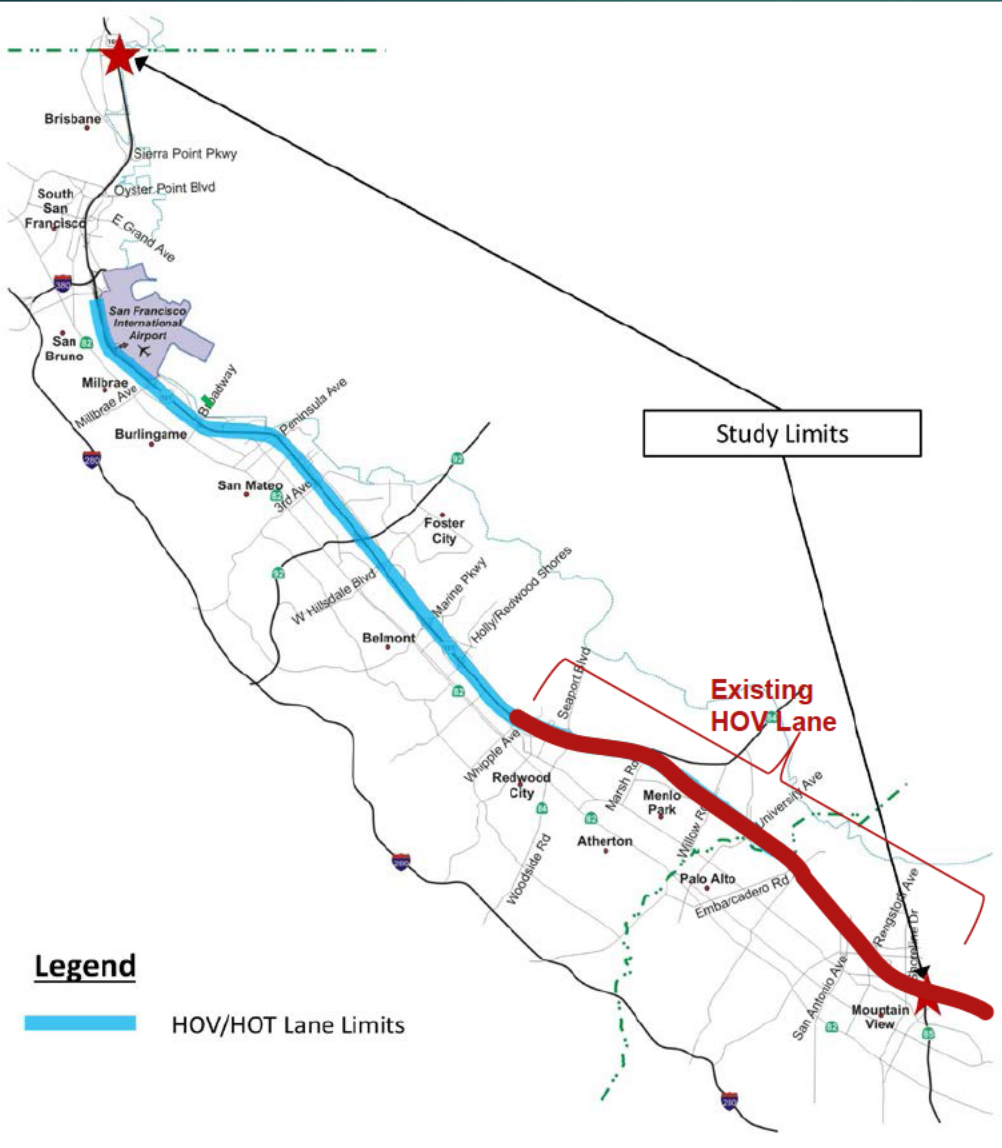
C/CAG Presentations - February, 2015

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

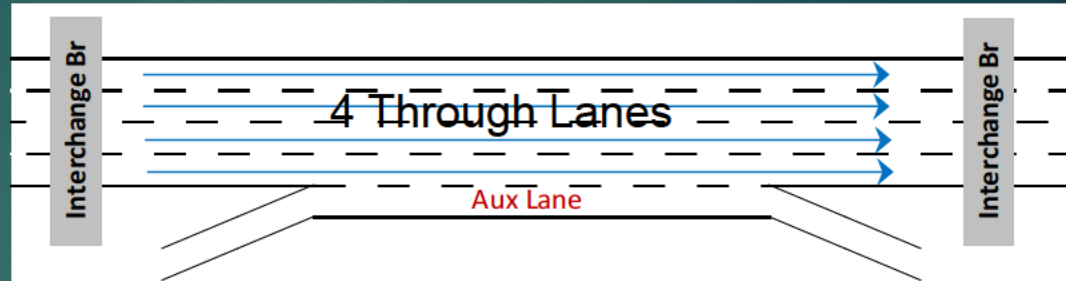
- ▶ Figuring out how to fit HOV Lanes onto US 101
 - ▶ Add/Convert HOV Lane (March 2011)
 - ▶ All the way from Whipple to SF County Line
 - ▶ Add HOV lane : Cost Prohibitive
 - ▶ Convert regular lane to HOV: Creates unacceptable added delay
 - ▶ Looked at various options to improve cost-effectiveness.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

Latest Study – Go beyond HOV to HOT

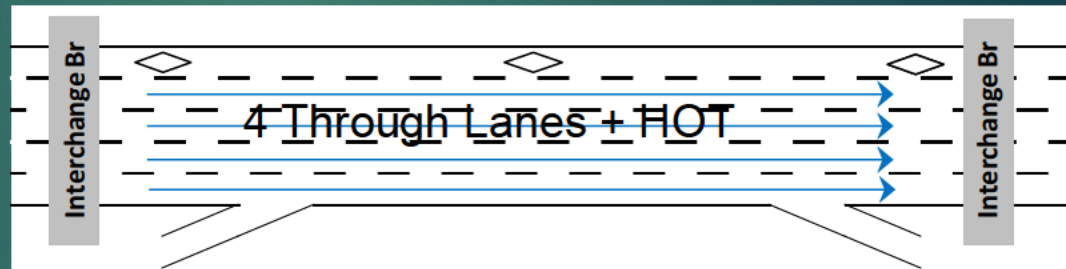
- ▶ Purpose of Latest Study
 - ▶ Preliminary High Level Express Lane Feasibility Assessment
- ▶ Two Concepts
 - ▶ Concept 1: HOV-to-HOT (Innovative Add HOT Lane)
 - ▶ \$259 million
 - ▶ \$156 million to build HOV lanes
 - ▶ \$103 million to convert to express lane operation
 - ▶ Concept 2: GP-to-HOT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

Concept Schematics

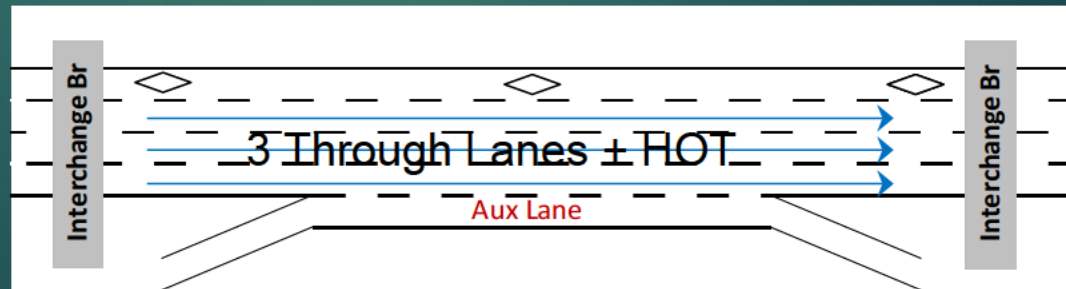
Existing



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

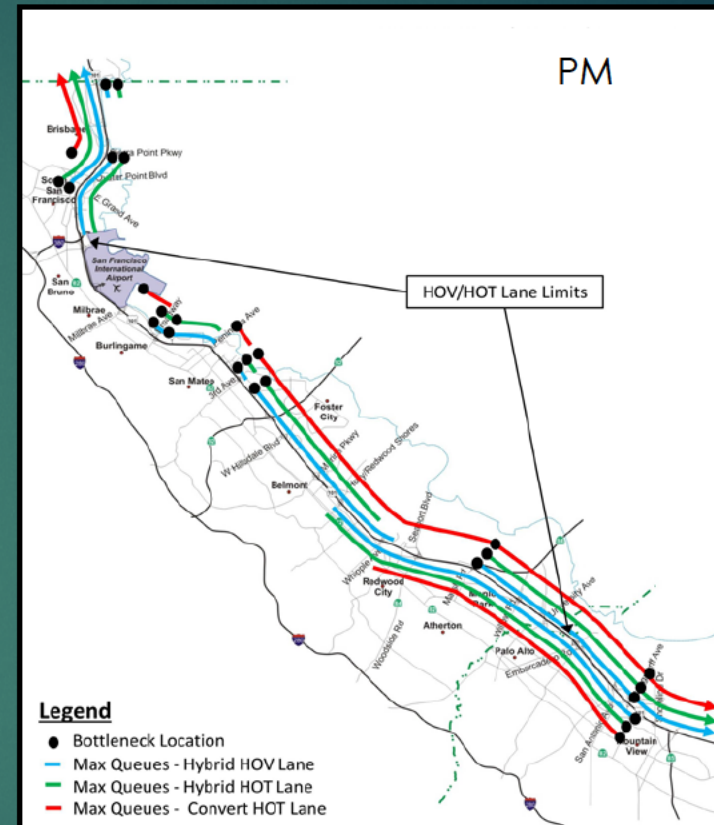
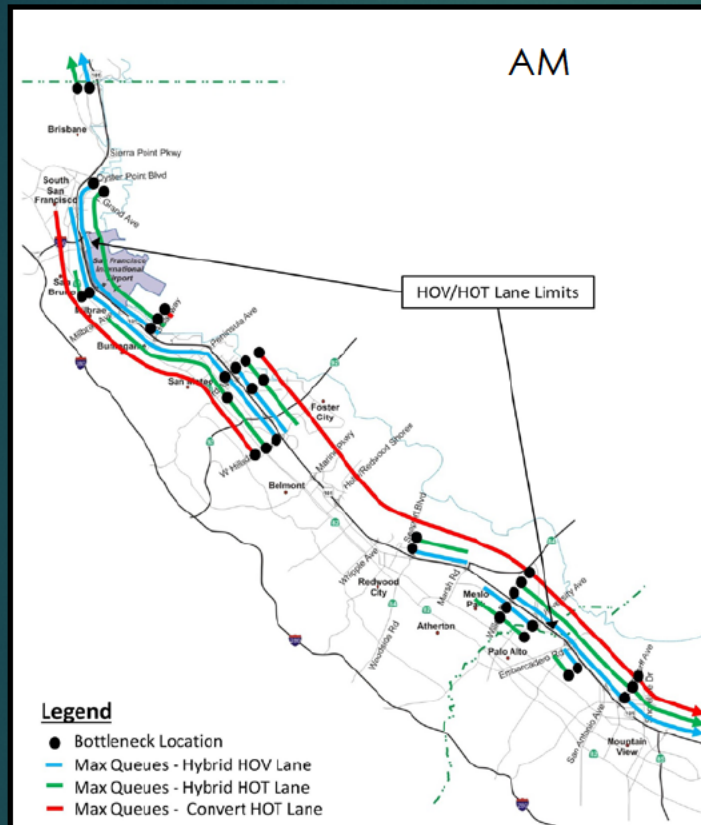
Caveats:

- 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