

I-405 Freeway (OC Line to LAX) HOV to HOT Conversion Feasibility Study

South Bay Cities Council of Governments

Infrastructure Working Group

April 16, 2014



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**PARSONS
BRINCKERHOFF**

Today's Agenda

- Update on Project Status
- Overview of Conceptual Alternatives
- Preliminary Evaluation and T&R Results
- Recommendation for Preliminary ConOps
- Next Steps

Study Purpose

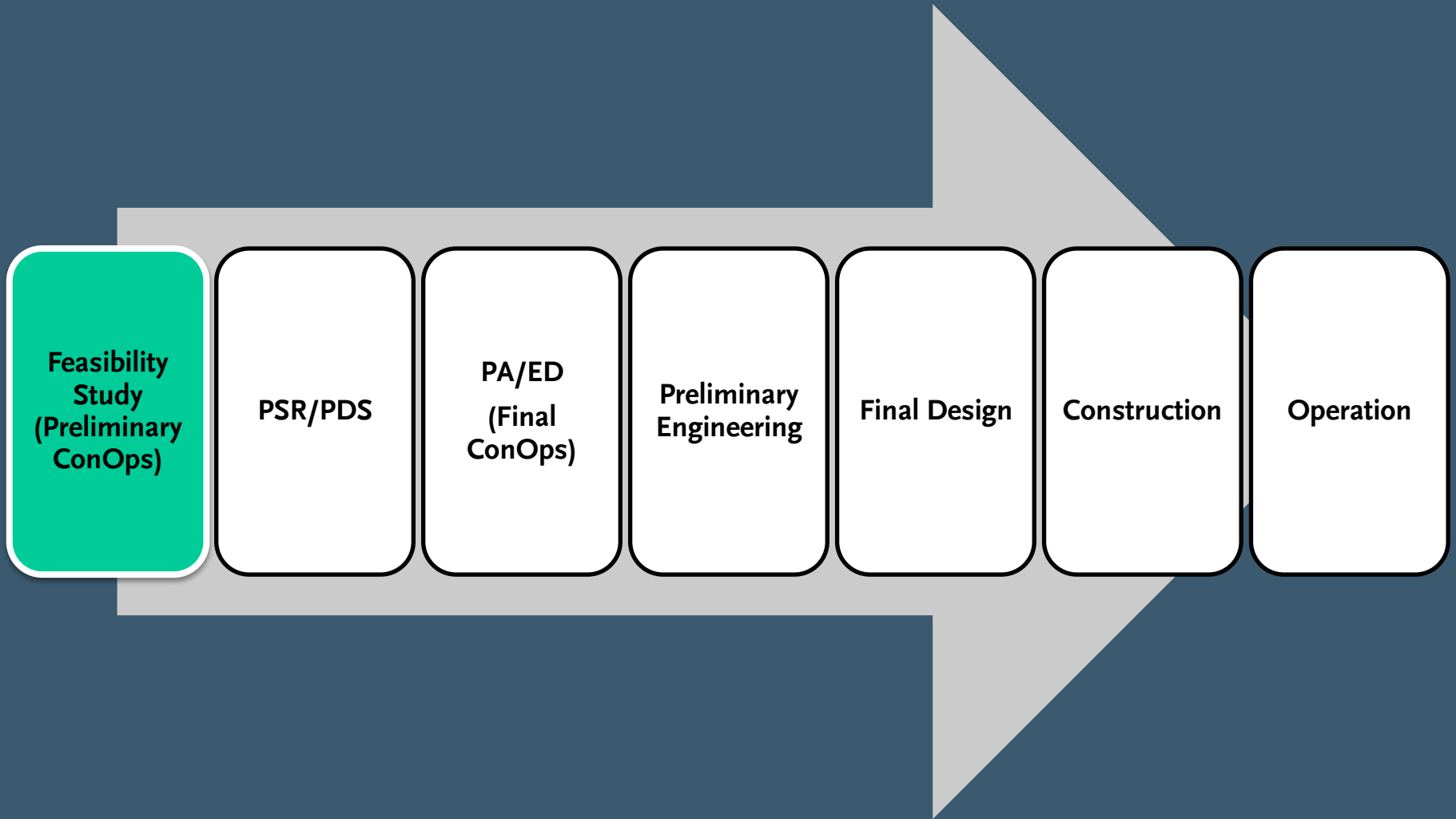
- **Purpose:** To evaluate feasibility of HOT Lanes on I-405 between OC Line and LAX; and define an initial concept of operations
- **Considerations:**
 - **Continuity and Inter-County Coordination** with OCTA's I-405 Improvement Project
 - **Coordination** with Gateways COG and SBCCOG
 - **Federal performance** requirement for HOV lanes per MAP-21 23 USC § 166 (d)
 - **High travel demand** may call for raising minimum occupancy requirement, pricing, and/or second HOT lane
 - **Widening** may require Caltrans design exceptions, modifications, and new ROW



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Project Context



Study Objectives

- Provide Continuity with the OCTA/Caltrans I-405 Improvement Project;
- Address MAP-21 HOV Lane Degradation;
- Explore Feasibility of HOT/Express Lane Link Between OC Line to LAX;
- Improve Mobility and Choices for Carpoolers, Bus Riders and Motorists Willing to Pay Who Travel Between OC and LAX;
- Build on the Foundation of the I-110/I-10 ExpressLanes;
- Screen Up to Four Conceptual HOT Lane Alternatives;
- Estimate Traffic and Toll Revenues from HOV Lane Conversions and/or HOT Lane Additions; and
- Prepare Preliminary ConOps for Selected Alternative



Study Corridors

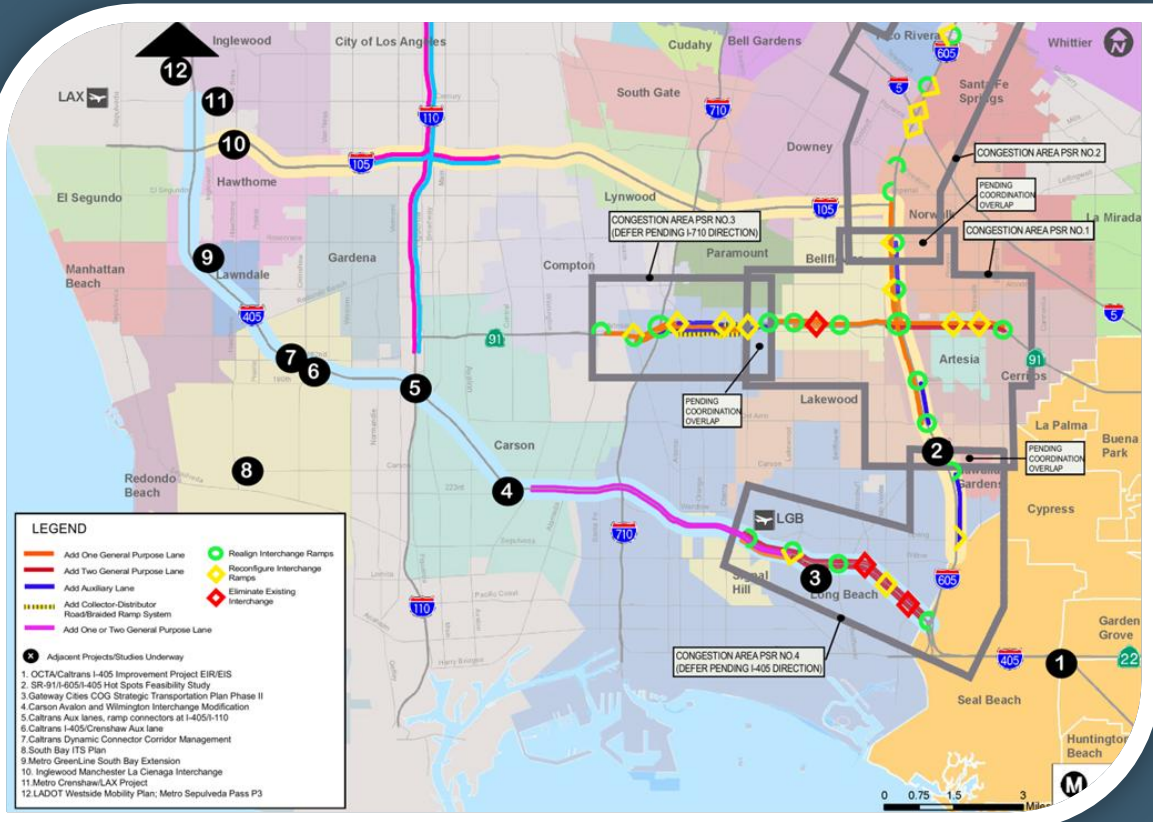


Conceptual Alternatives

- (No Build/Baseline) Alternative: SCAG 2012 RTP Baseline (Only committed improvements with Full funding; Baseline would be updated if study were to continue and projects in the RTIP baseline changed)
- Alternative 1 – I-405 Corridor Single HOT/Express Lane
- Alternative 2 – I-405 Corridor Dual HOT/Express Lanes
- Alternative 3 – I-605 (single) and I-105 (dual) HOT Lanes *without* Direct Connectors at NB I-605/WB I-105
- Alternative 4 – I-605 (single) and I-105 (dual) HOT Lanes *with* Direct Connectors at NB I-605/WB I-105



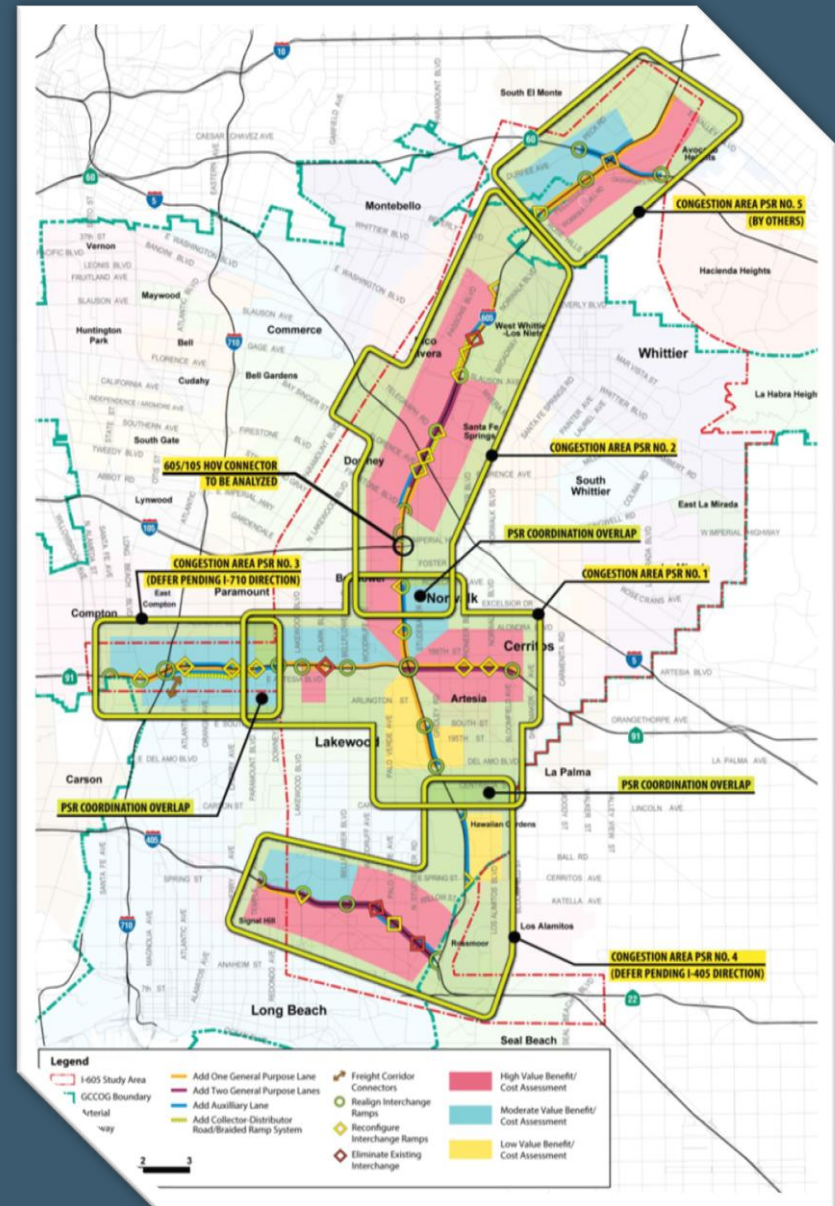
Adjacent Projects/Studies Underway



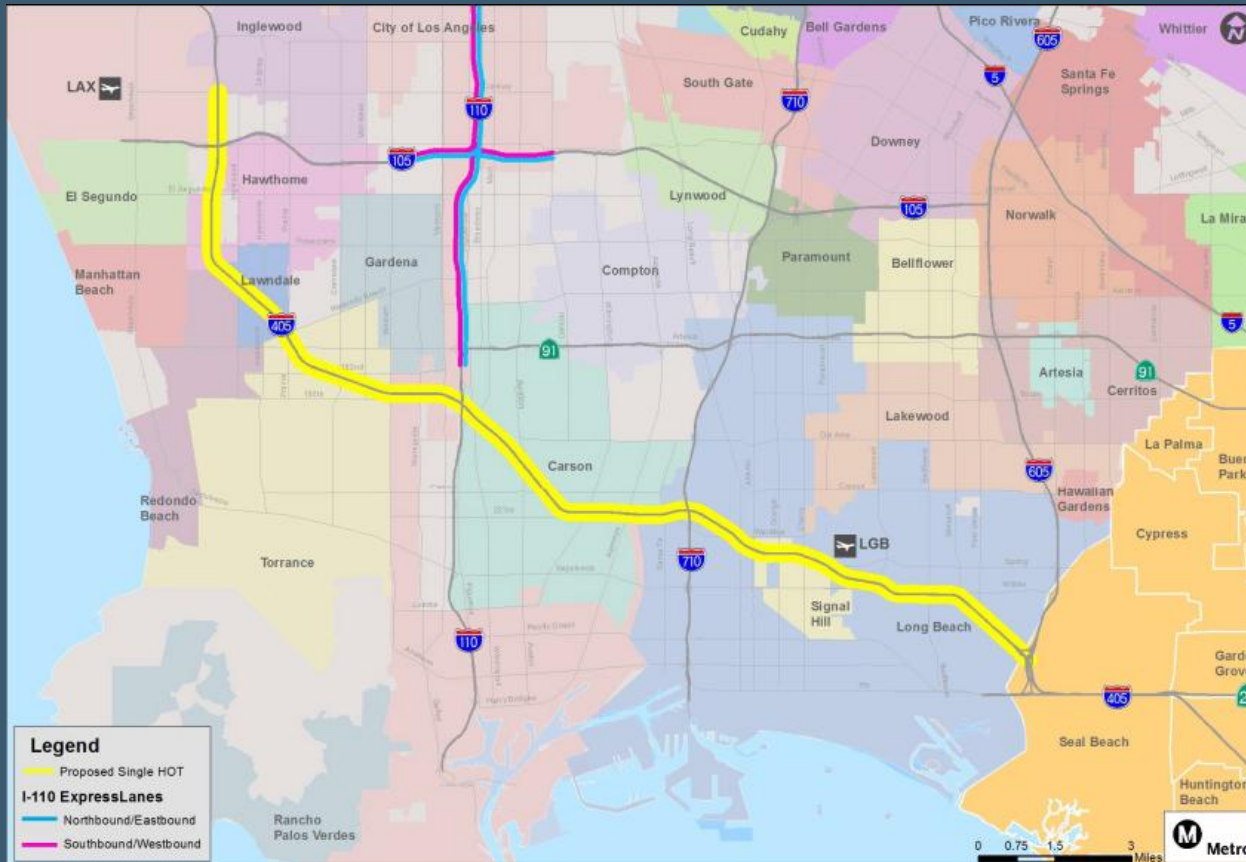
- OCTA/Caltrans I-405 Improvement Project EIR/EIS
- SR-91/I-605/I-405 Hot Spots Feasibility Study
- Gateway Cities COG Strategic Transportation Plan Phase II
- Carson Avalon and Wilmington Interchange Modification
- Caltrans Aux lanes, ramp connectors at I-405/I-110
- Caltrans I-405/Crenshaw Aux lane
- Caltrans Dynamic Connector Corridor Management
- South Bay ITS Plan
- Metro GreenLine South Bay Extension
- Inglewood Manchester La Cienaga Interchange
- Metro Crenshaw/LAX Project
- LADOT Westside Mobility Plan; Metro Sepulveda Pass P3

Gateway Cities COC Coordination

- Reviewed SR-91/I-605/I-405 Corridor Hot Spots Feasibility Study
- Alternatives considered same scenarios reviewed as part of Feasibility Study
- GCCOG proposed HOV direct connectors at I-605/I-105 incorporated as part of Alternative 4
- Incorporated capital costs for new HOV connectors from I-605/I-105 PSR-PDS
- Utilized same per lane mile unit cost for freeway mainline widening from Feasibility Study



Conceptual Alternative #1 (I-405 Corridor Single HOT Lanes)



Description:

- Convert existing HOV lane to single HOT Lane in each direction on I-405 (between OCL and LAX)

LOS Constraint:

- 45 mph

Pricing Method:

- Dynamic pricing (\$0.25 per VMT min toll and \$1.40 max toll)

Carpool Policy:

- HOV2+ and HOV3+ toll free

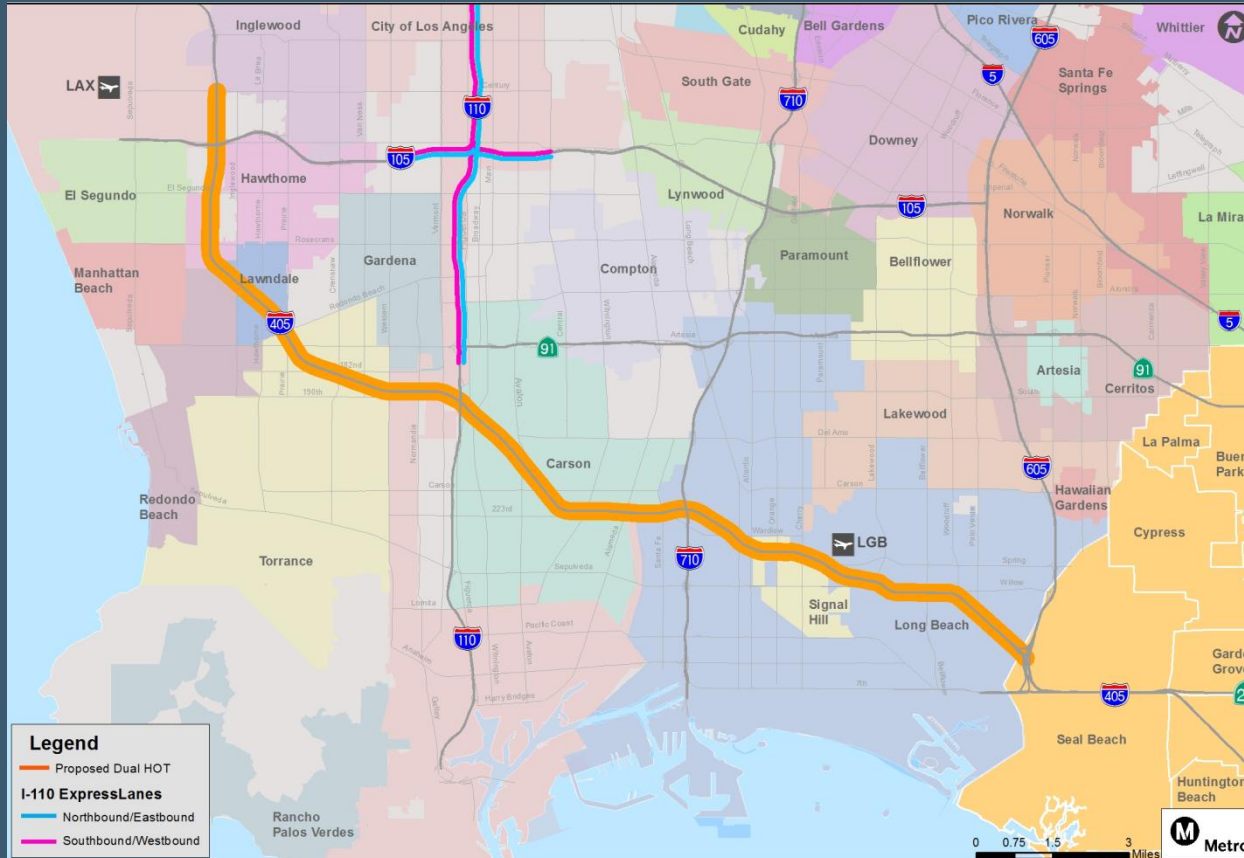
Lane Eligibility:

- All vehicle classes except med. and heavy duty trucks

Access:

- Limited access (existing HOV locations)

Conceptual Alternative #2 (I-405 Corridor Dual HOT Lanes)



Description:

- Add new HOT lanes adjacent to existing HOV lanes and convert HOV lanes to dual HOT lanes in each direction on I-405 (between OCL and LAX)

LOS Constraint:

- 45 mph

Pricing Method:

- Dynamic pricing (\$0.25 per VMT min toll and \$1.40 max toll)

Carpool Policy:

- HOV2+ and HOV3+ toll free

Lane Eligibility:

- All vehicle classes except med. and heavy duty trucks

Access:

- Limited access (existing HOV locations)

Conceptual Alternative #3 (I-605/I-105 Combined Corridor HOT Lanes, No Direct Connectors)

Description:

- Convert existing HOV lane to single HOT Lane in each direction on I-605 (between OCL and I-105) and dual HOT lanes on I-105 (between I-605 and I-405)
- Without direct HOT connectors at I-605/I-105

LOS Constraint:

- 45 mph

Pricing Method:

- Dynamic pricing (\$0.25 per VMT min toll and \$1.40 max toll)

Carpool Policy:

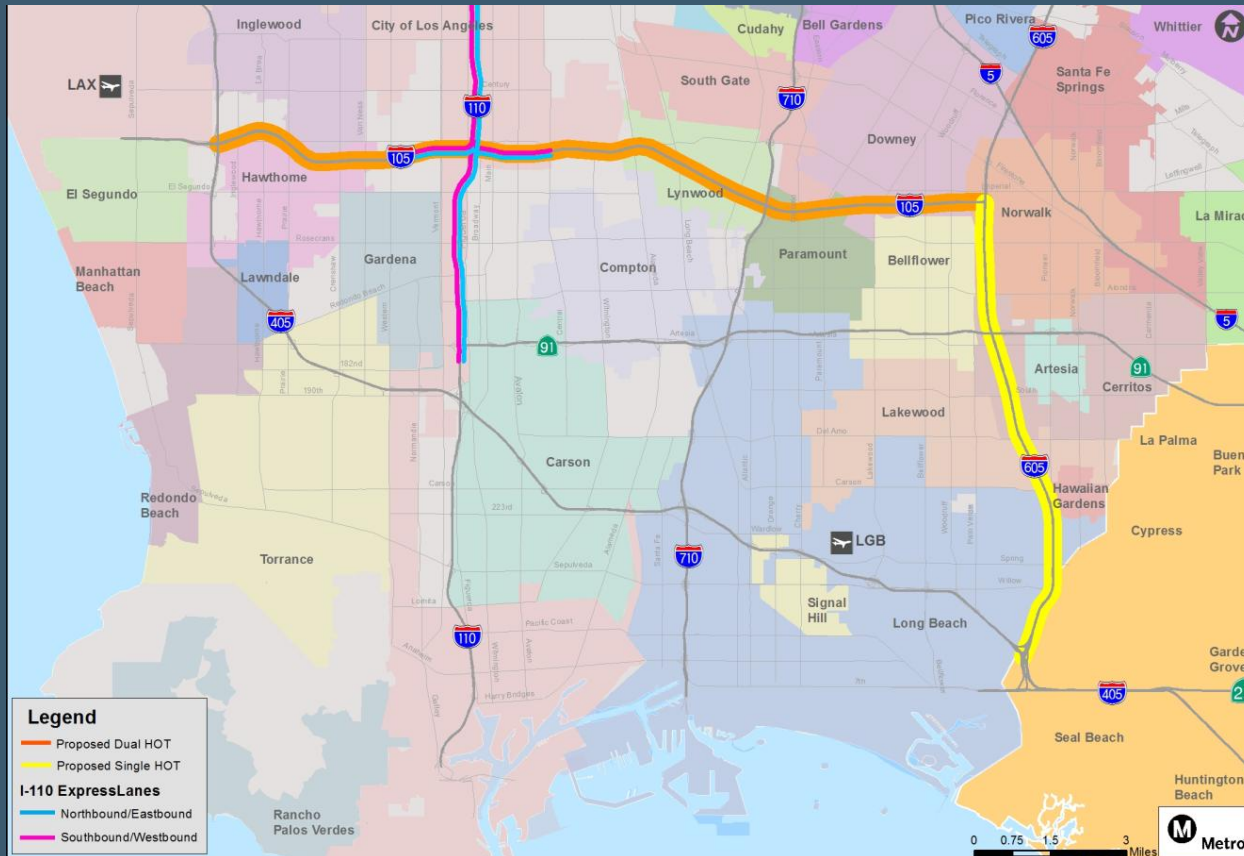
- HOV2+ and HOV3+ toll free

Lane Eligibility:

- All vehicle classes except med. and heavy duty trucks

Access:

- Limited access (existing HOV locations)



Conceptual Alternative #4 (I-605/I-105 Combined Corridor HOT Lanes, With Direct Connectors)

Description:

- Convert existing HOV lane to single HOT Lane in each direction on I-605 (between OCL and I-105) and dual HOT lanes on I-105 (between I-605 and I-405)
- With direct HOT connectors at I-605/I-105

LOS Constraint:

- 45 mph

Pricing Method:

- Dynamic pricing (\$0.25 per VMT min toll and \$1.40 max toll)

Carpool Policy:

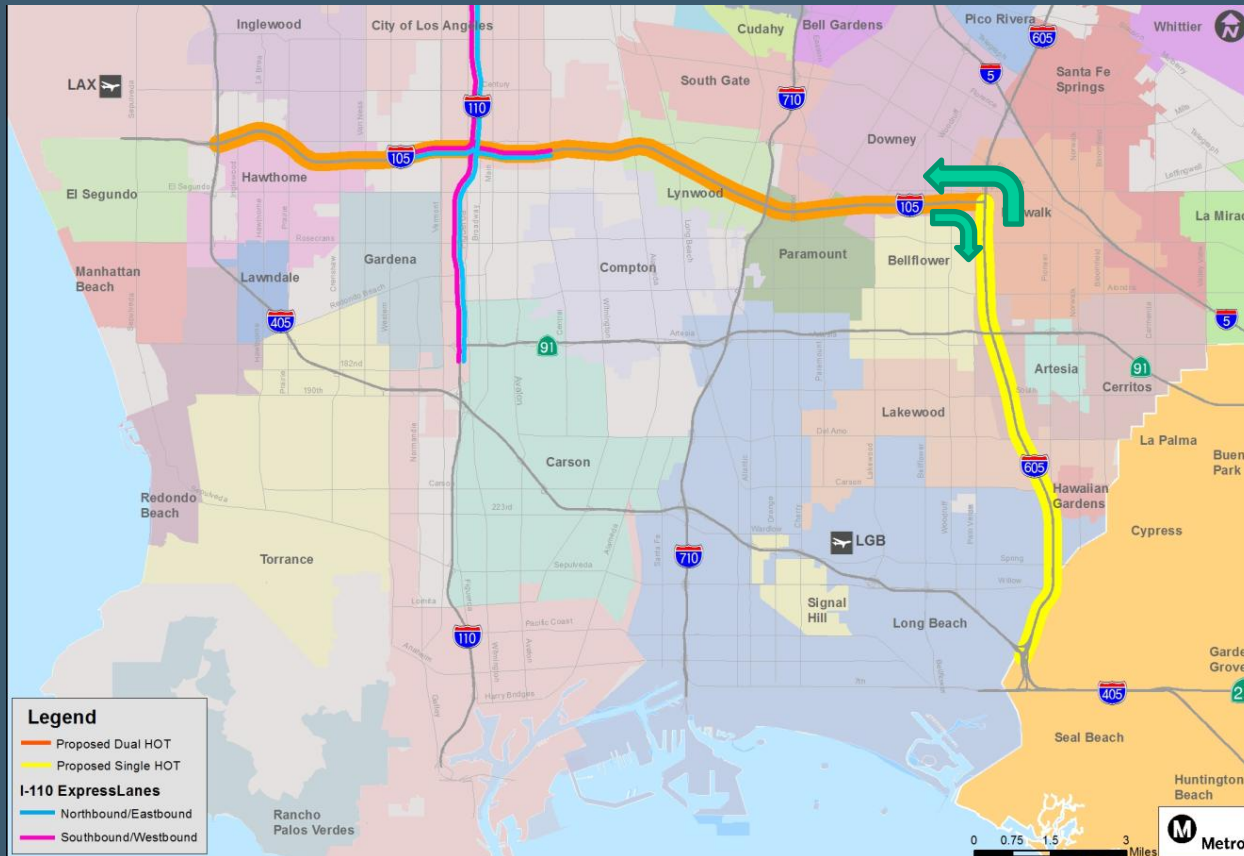
- HOV₂₊ and HOV₃₊ toll free

Lane Eligibility:

- All vehicle classes except med. and heavy duty trucks

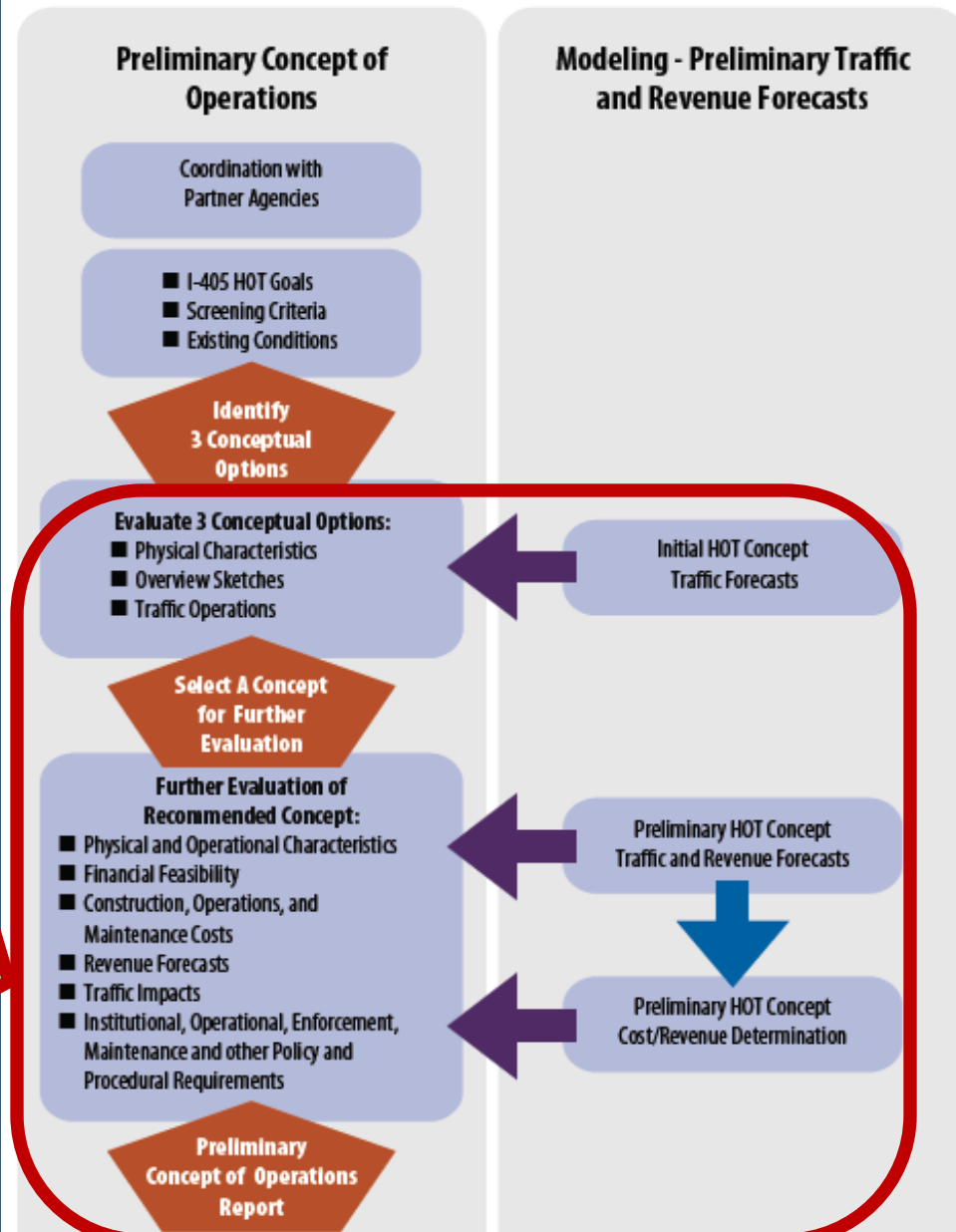
Access:

- Limited access (existing HOV locations)



Where Are We in the Study Process?

- ◆ Select HOT lane concept for further evaluation
- ◆ Prepare schematic plans, typical cross-sections and identify design considerations
- ◆ Perform model run and generate performance metrics
- ◆ Outputs of traffic model will seed RapidTOM for revenue forecasts
- ◆ Prepare Preliminary Concept of Operations Report



Screening and Evaluation

Screening and Evaluation

- Screen and evaluate four HOV to HOT conversion alternatives based on traffic and revenue performance, constructability and feasibility to meet Metro's LRTP goal of improved mobility
 - Qualitative assessment to validate corridors are candidates for HOT conversion and confirm there are no fatal flaws
 - Quantitative assessment of traffic and revenue modeling
 - Ranking and selection of build alternative to move forward into preparation of the Preliminary Concept of Operations based on Evaluation



Initial Screening and Evaluation

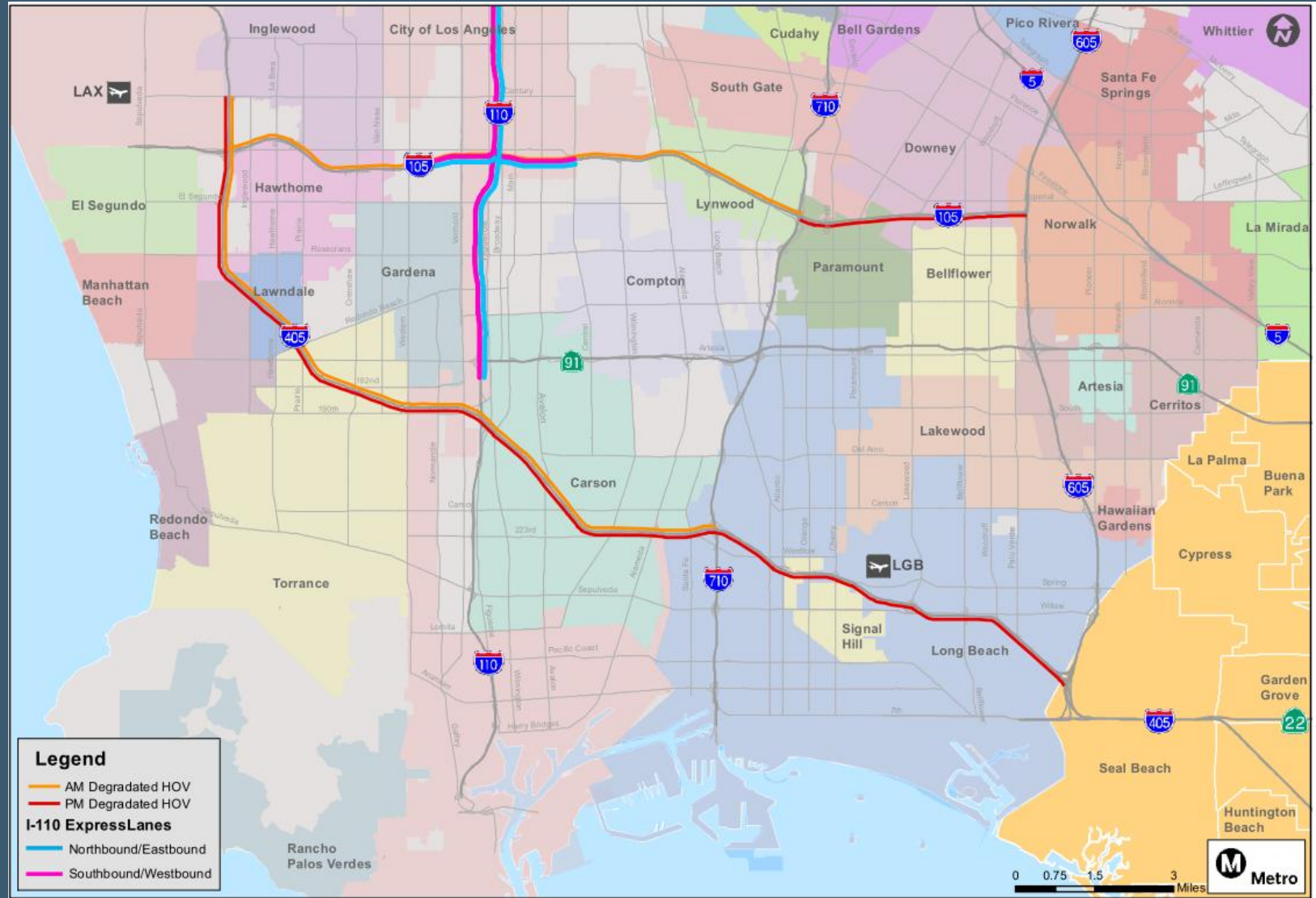
A. Screening Criteria

- A. Degradation
- B. HOV Utilization

B. Evaluation Criteria

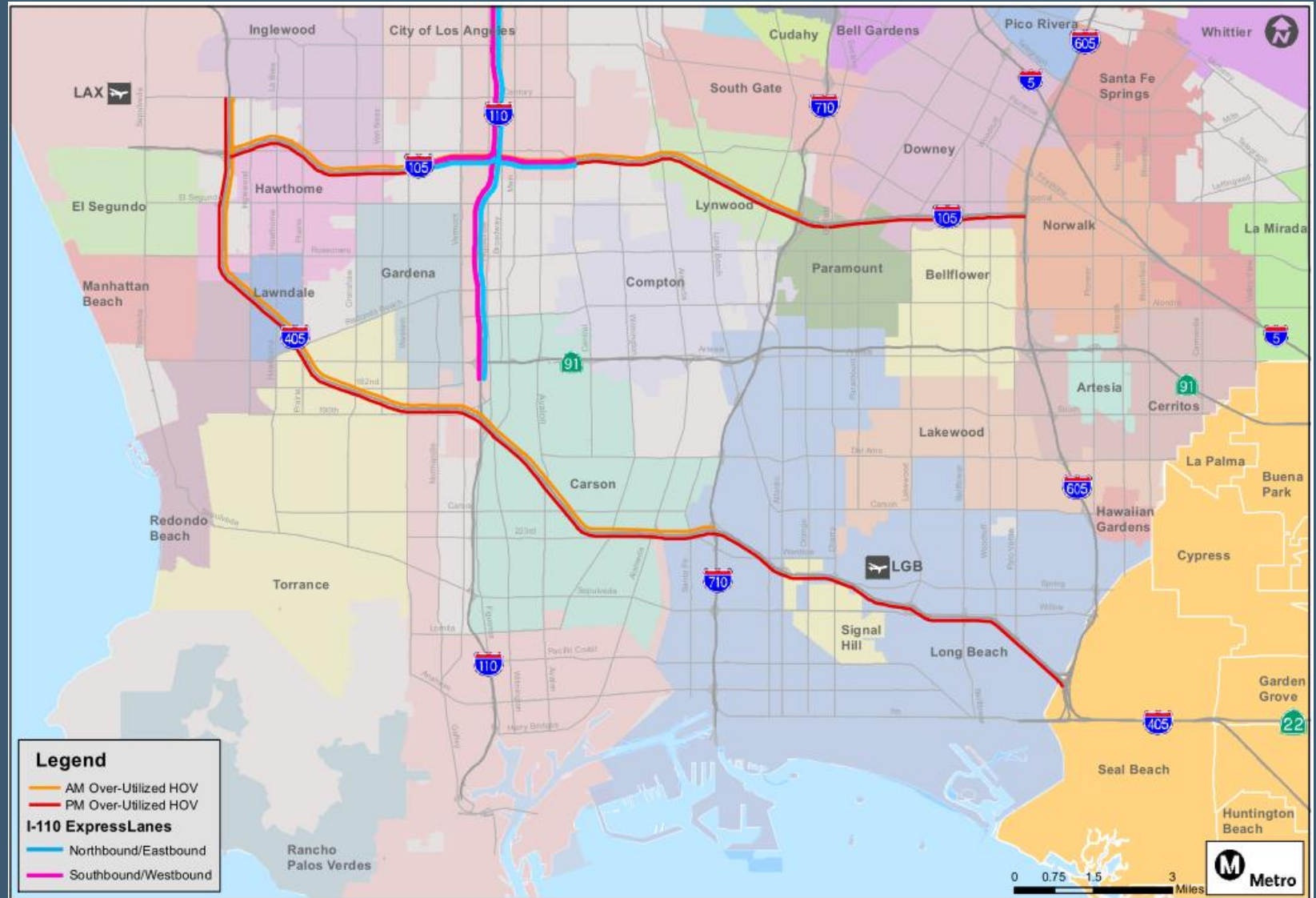
- A. Mobility
- B. Constructability
- C. Connectivity
- D. Transit Potential
- E. Revenue Potential
- F. Minimize Environmental Affects
- G. Construction Cost

Existing AM/PM Period HOV Degradation



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Existing AM/PM Period Over-Utilized HOV



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Traffic and Revenue Analysis (T&R)

- T&R analysis uses a special model (*RapidTOM*©)
 - Draws on adopted SCAG 2012 RTP model, which was validated for the I-405/I-605/I-105 corridors for this study
 - RapidTOM solves simultaneously for optimal tolls, revenue, traffic, and speeds
- Accommodates alternative agency objectives
 - Maximization of revenue from the HOT lanes
 - Minimization of the value of time spent by users in both general purpose (GP) and HOT lanes
- Implements agency policy constraints
 - Carpool policies (2+ vs. 3+), minimum LOS requirements, etc.
- Qualifications of T&R forecasts
 - HOT lane revenue is *extremely* sensitive to corridor traffic volume
 - This is important to bear in mind when designing the funding plan



Overall Ratings (HOV2+ Toll Free under Cost Minimization Scenario) – Consistent with Current HOV Occupancy Policies

Rank	Alternative	Cost (\$ mil)	Overall Score	Rating						
				Mobility	Constructability	Connectivity	Transit Potential	Revenue	Environmental	Cost
3	Alternative 1	\$88	3.4	Fair	Very Good	Good	Fair	Good	Very Good	Very Good
4	Alternative 2	\$2,935-\$3,522	2.6	Very Good	Poor	Good	Fair	Very Good	Fair	Poor
1	Alternative 3	\$134	3.9	Very Good	Very Good	Very Good	Excellent	Good	Good	Very Good
2	Alternative 4	\$495*	3.8	Very Good	Very Good	Excellent	Excellent	Good	Good	Good

*Includes \$350 million for cost of HOV connectors

- Excellent
- Very Good
- Good
- Fair
- Poor



Overall Ratings (HOV3+ Toll Free under Cost Minimization Scenarios) – For Information Only, HOV3 Require Legislative Change

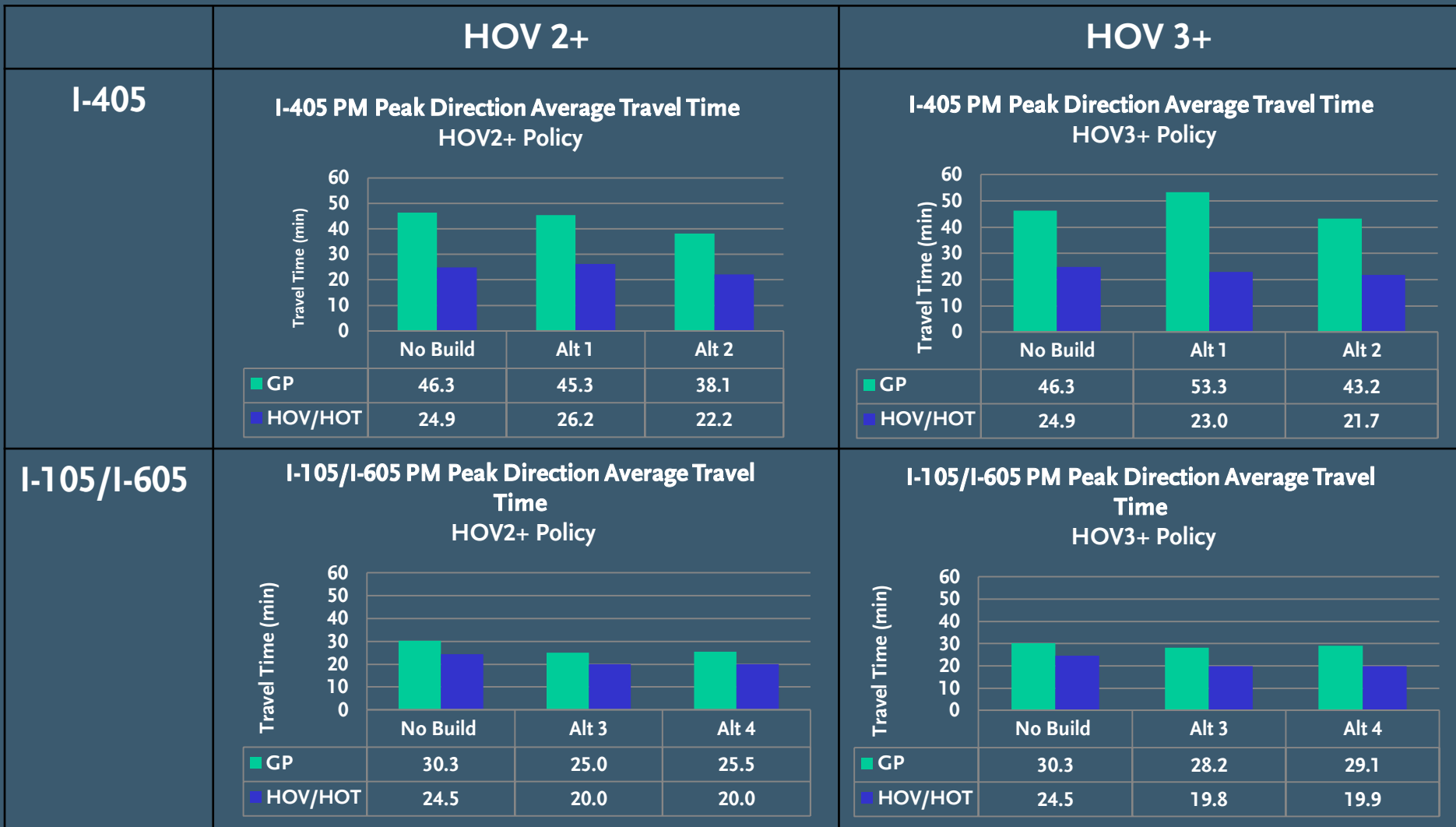
Rank	Alternative	Cost (\$ mil)	Overall Score	Rating						
				Mobility	Constructability	Connectivity	Transit Potential	Revenue	Environmental	Cost
2	Alternative 1	\$88	3.3	●	●	○	◐	○	◑	●
4	Alternative 2	\$2,935-\$3,522	2.3	○	●	○	◐	◑	◐	●
1	Alternative 3	\$134	3.4	◐	◑	◑	●	●	○	◑
3	Alternative 4	\$495*	3.2	◐	◑	●	●	●	○	○

*Includes \$350 million for cost of HOV connectors

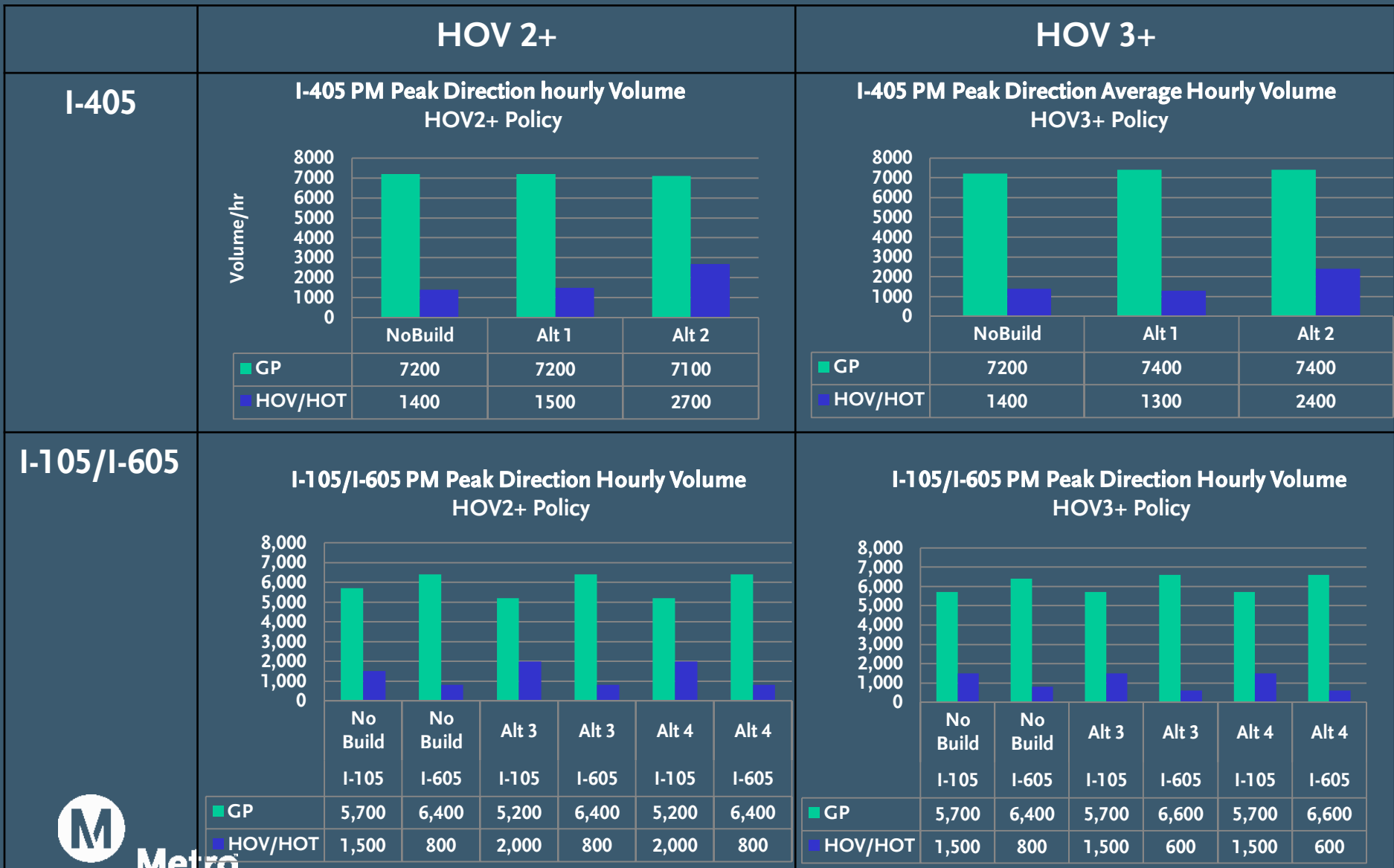
- Excellent
- Very Good
- Good
- Fair
- Poor



Improved Mobility - Travel Time



Improved Mobility – Hourly Vehicle Throughput

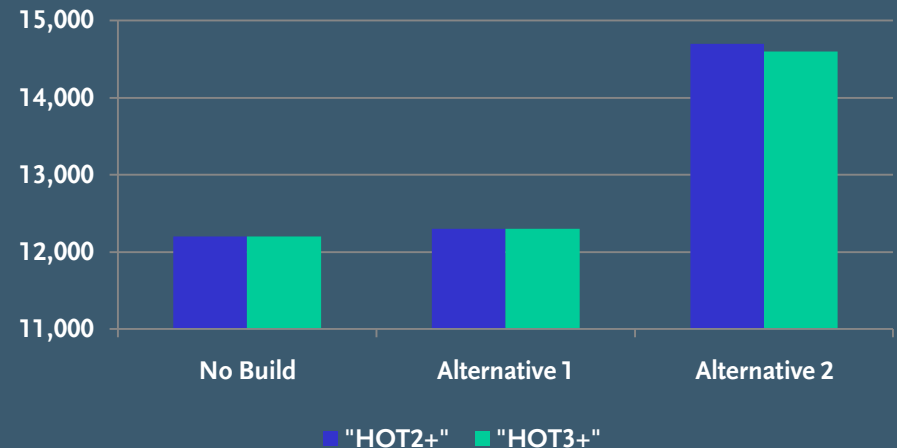


I-405 Person Throughput

- Both alternatives result in at least as many people using the corridor during peak hours, compared to No Build conditions
- Under Alternative 2, more people use the corridor while average speed improves for all

I-405 SB PM Peak, Cost Minimization

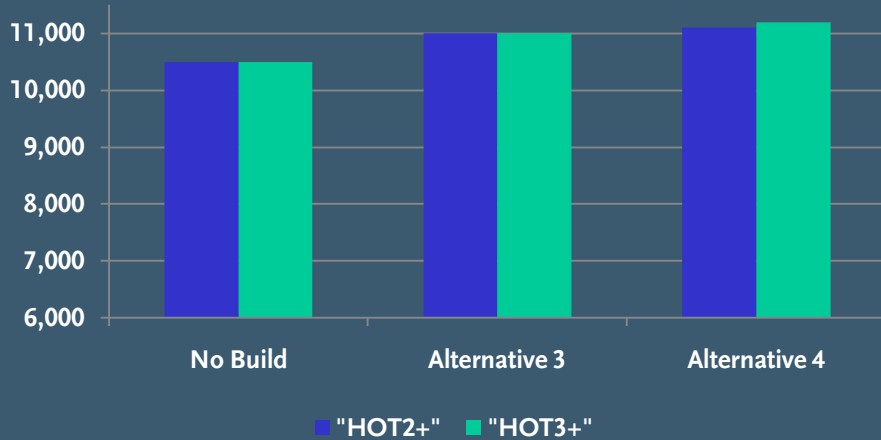
Person Throughput - Year 2035
(persons/hr)



I-105 / I-605 Person Throughput

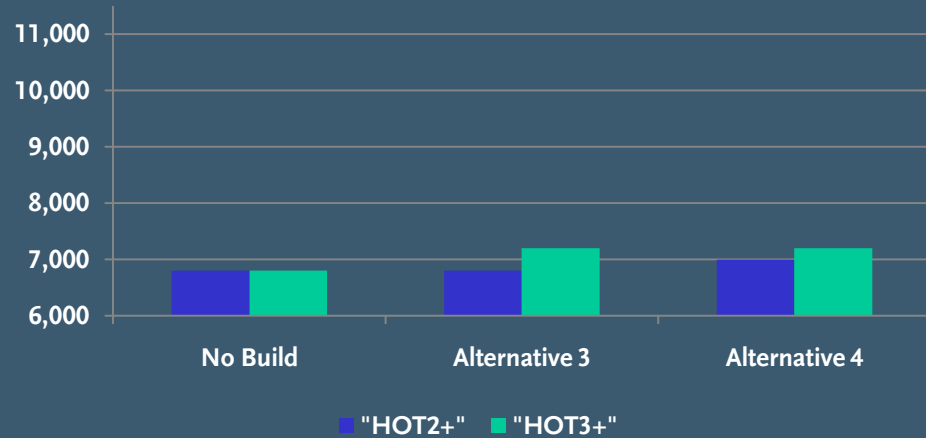
I-105 EB PM Peak, Cost Minimization

Person Throughput - Year 2035
(persons/hr)



I-605 NB PM Peak, Cost Minimization

Person Throughput - Year 2035
(persons/hr)



Constructability

- Alternatives 1, 3 and 4 can be built within the existing pavement section, if non-standard lanes are permitted
 - Only minor spot widening, restriping, and provision of tolling equipment needed.
- Alternative 2 requires widening beyond the existing pavement section in order to add second HOV/HOT lane and would involve major reconstruction of interchanges, ramps, bridges, soundwalls/ retaining walls, and impacts to local streets.



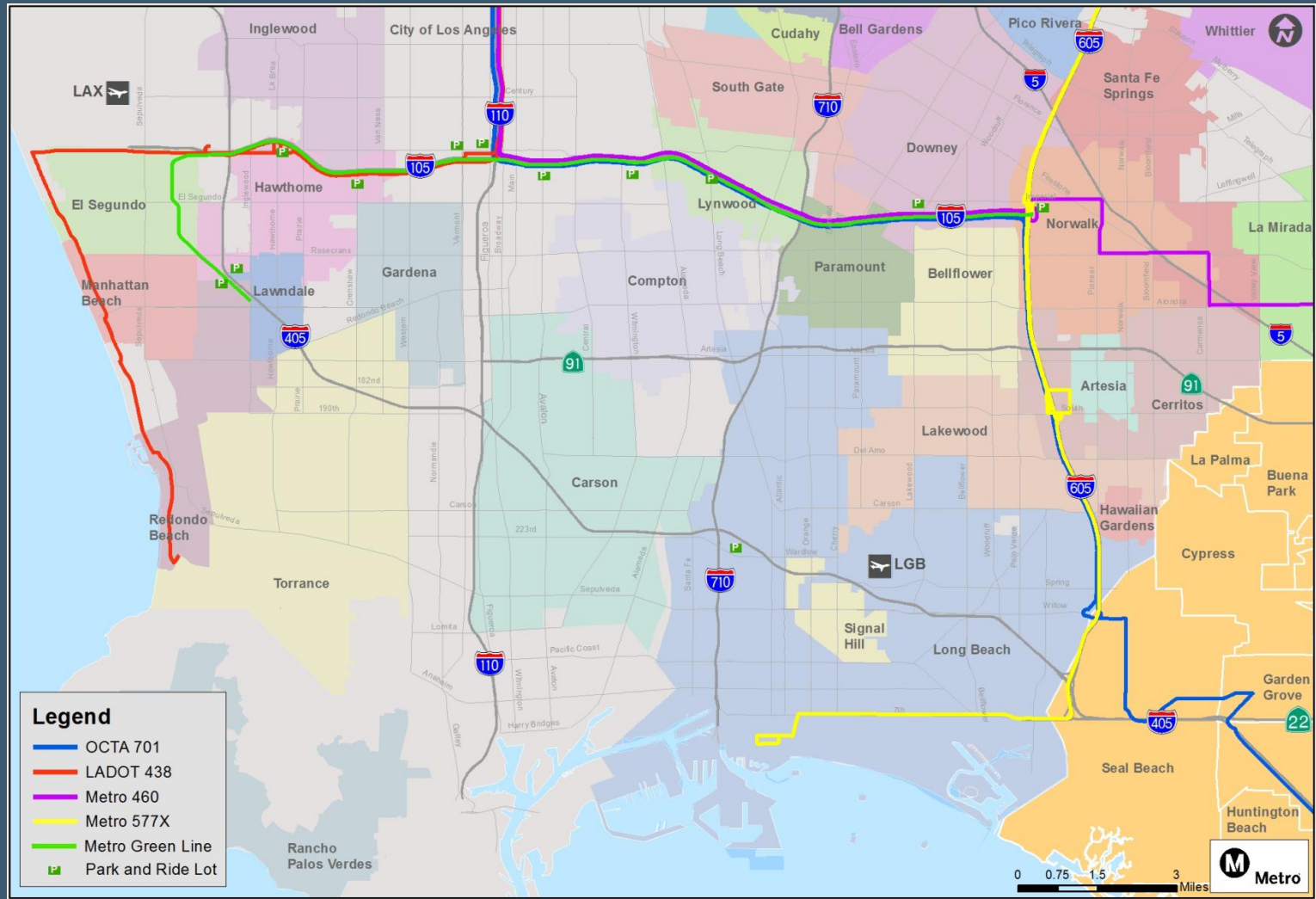
Connectivity

- Alternatives 3 and 4 provide the greatest improvement in HOV/HOT system connectivity.
- Connects with existing I-110 ExpressLanes and extends the I-105 HOV/HOT transition lanes.
- Connections to Metro Bus/Rail, Norwalk Station and several park-and-ride lots along I-105.



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Transit Potential



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Potential Environmental Effects

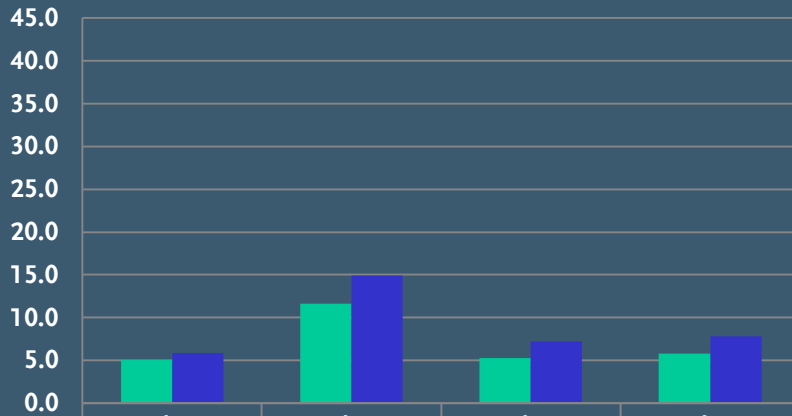
Noise/Air Quality Effects	Effect to sensitive receptors within vicinity of the project alignment				
	Major	High	Moderate	Low	Minor
Alternative 1				X	
Alternative 2		X			
Alternative 3				X	
Alternative 4			X		

- Alternative 2 has the most environmental concerns, because of the likely need for ROW acquisition.
- Alternatives 1, 3 and 4 have minimal concerns, because they can potentially be built within the pavement section.
- Direct connector structure (flyover) could affect construction air quality, and operational noise.

Potential Revenue

2035 Annual Toll Revenue under HOV2+ Policy

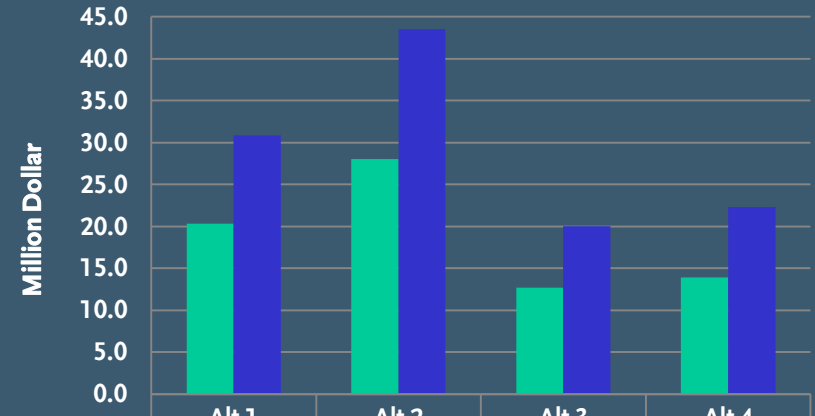
Annual Toll Revenue (in \$ millions)



	Alt 1	Alt 2	Alt 3	Alt 4
Cost Min.	5.0	11.6	5.3	5.8
Revenue Max.	5.9	14.9	7.2	7.8

2035 Annual Toll Revenue under HOV3+ Policy

Annual Toll Revenue (in \$ millions)

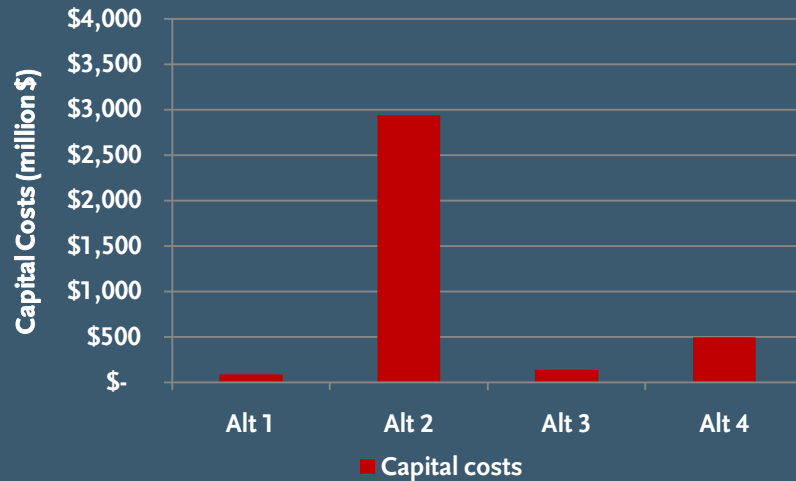


	Alt 1	Alt 2	Alt 3	Alt 4
Cost Min.	20.4	28.0	12.7	13.9
Revenue Max.	30.9	43.5	20.0	22.3

Rough Order of Magnitude Capital Costs

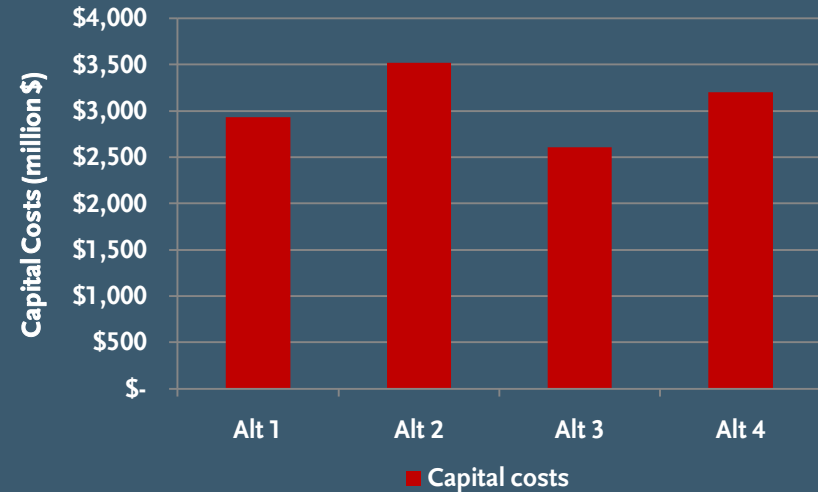
Non-Standard Capital Costs

Non-Standard Cost



Full-Standard Capital Costs

Full-Standard Cost



*Cost of Alternative 4 I-605/I-105 HOV direct connectors included as part of cost evaluation, but costs assumed to be born by others.

Rough Order of Magnitude Capital Costs

	Alt 1	Alt 2	Alt 3	Alt 4
Construction Capital Costs (excluding ROW)				
Scenario 1: Non-Standard (Low Cost)	\$87.8	\$2,935.7	\$133.9	\$144.9
Scenario 2: Standard (High Cost)	\$2,935.7	\$3,522.8	\$2,608.5	\$2,855.5
<i>I-605/I-105 HOV Direct Connectors</i>				<i>\$350.0*</i>
Total Alt 4 Cost Including Connectors Scenario 1:				\$494.9
Total Alt 4 Cost Including Connectors Scenario 2:				\$3,205.5

*Cost of Alternative 4 I-605/I-105 HOV direct connectors included as part of cost evaluation, but costs assumed to be born by others.

Overall Findings

- Alternative 1 is the least expensive and most constructible, but results in fair to moderate improvement in mobility, connectivity, transit potential and revenue.
- Alternative 2 has the highest revenue potential and strong mobility benefits, but requires significant widening at a cost of between \$2.9-\$3.5 Billion.
- Alternatives 3 and 4 provide very good mobility benefits, connectivity, and transit potential, but revenue potential is moderate; however, Alternative 3 can be easily implemented and at a reasonable cost.
- Alternative 4 primary benefit is the elimination of weaving and merging and enhanced system connectivity, but the total cost including connectors is high. Incremental cost to toll the



Next Steps

- Prepare Preliminary ConOps Report
 - Refine schematic design
 - Legislative authorization
 - Operational policies
 - Vehicle eligibility
 - Tolling/pricing
 - Business rules

