SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS

East-West Freight Corridor Concept

Status Update

FREIGHTWORKS
SOUTHERN CALIFORNIA DELIVERS THE GOODS

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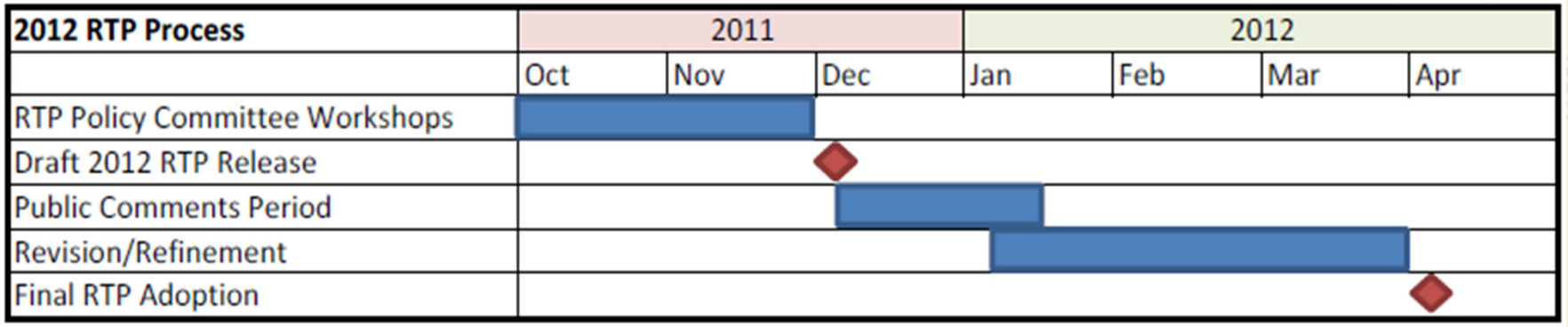
August 4, 2011

Today's Agenda Items

- Update on East-West Corridor Assessment
  - Re-cap of traffic analysis and additional analysis of UPRR/SJC/SR-57/I-10 hybrid alignment
  - Initial discussion of tolling strategies
- Zero-Emission Technology in the East-West Corridor
  - How do we best incorporate and address in the RTP?

2012 RTP and Beyond

2012 RTP Timeline



- **Now – Nov:** Incorporate SC feedback and guidance into staff's draft recommended GM strategy to SCAG's policy committees
- **Oct – Nov:** Staff recommendation to SCAG Transportation Committee
- **Dec:** Draft RTP release – strategies reflecting policy committees' decisions (Constrained and Strategic portions of the RTP)
- **Apr 2012:** Final RTP Adoption

2012 RTP and Beyond (cont.)

Beyond 2012 RTP

- Conduct more detailed feasibility studies for specific recommendations identified in the RTP as appropriate
  - Inclusion of proposed concepts in the constrained or strategic portions of the RTP allows for more detailed environmental and engineering study

Steering Committee Meeting Outlook

	August	September	October
Steering Committee	**Aug. 4th (Thursday)** 1:30 pm – 4:30 pm • East-West Freight Corridor Findings and Discussions (Continuation from June meeting) • Zero-/Near-zero Emission Technologies for EWFC Strategies	**Sep. 8th (Thursday)** 9:30 am – 12:30 pm • Bottleneck Relief Strategies • Packaging Rail Strategies • Rail Emission Reduction Strategies • Preliminary Regional Goods Movement Plan **Set. 28th (Wednesday)** 9:30 am – 12:30 pm • Proposed Draft Goods Movement Plan • Financial Plan • Implementation Strategy	**Oct. 13th (Thursday)** 1:30 pm – 3:30 pm • Draft Goods Movement Plan and Implementation Strategy for the 2012 Draft RTP
SCAG Policy Committee	**Aug. 4th (Thursday)** • TC Meeting	**Sep. 1st (Thursday)** • TC Workshop	**Oct. 6th (Thursday)** • TC Workshop

Update on East-West Freight Corridor Assessment

June Steering Committee Recap

- Presented Initial Screening Criteria for East-West Freight Corridor Alignments
- Presented Preliminary Alternatives #1-5
- Introduced two new scenarios for modeling:
  - Alt. #6 -- UPRR / SJC / SR - 57 / I-10
  - Alt. #7 -- Tolled Alt. #1 Scenario

Assessment Summary

- Consequences of “doing nothing”: high levels of truck traffic on general purpose lanes (more congestion, accidents, constrained economic development)
- Substantial traffic reduction benefits would accrue to the selected corridor and parallel facilities

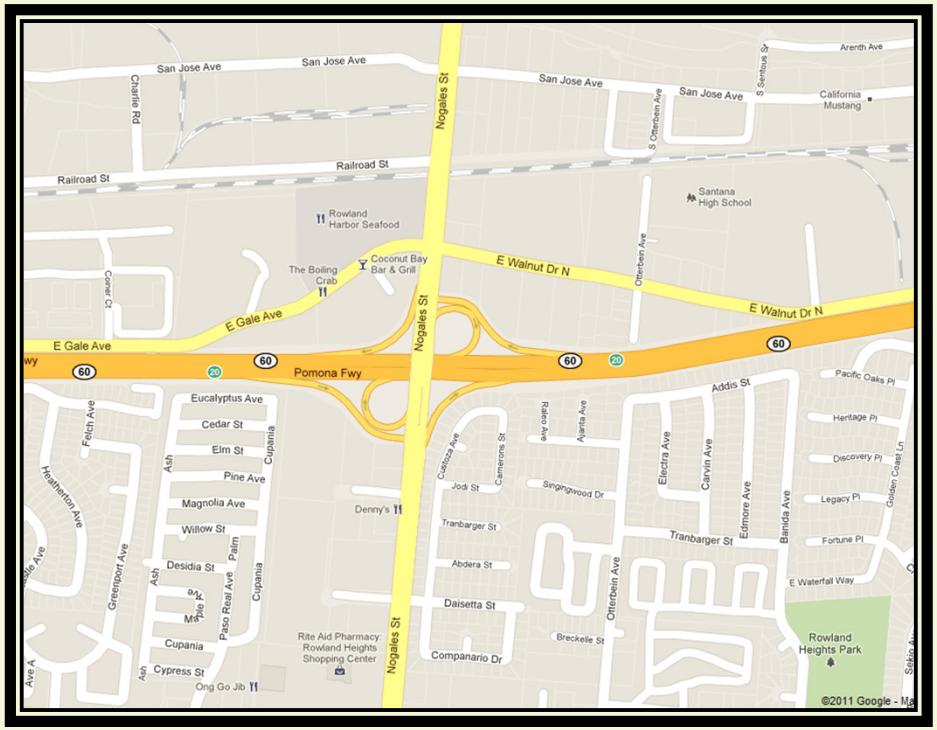
Doing Nothing: More Truck Traffic

Highway	Truck Counts and 2035 Forecasts (Trucks / Day)				
	To	From	2008 Bi-Directional HDT Volume	2035 Bi-Directional HDT Volume	Change (2008 – 2035)
I-210	I-605	SR-57	19,155	43,089	125%
	SR-57	SR-83	23,269	43,091	85%
SR-60	I-710	I-605	20,315	43,219	113%
	SR-57	SR-71	25,540	43,792	71%
	SR-71	I-15	34,154	55,363	62%
I-10	I-605	SR-57	13,628	34,587	154%
	SR-57	SR-83	23,813	44,212	86%
SR-91	I-710	I-605	17,025	30,873	81%
	SR-57	SR-55	11,988	27,410	129%
	SR-71	I-15	14,963	35,783	139%
I-710	SR-91	I-5	23,850	53,010	122%
	I-5	SR-60	15,804	45,189	186%

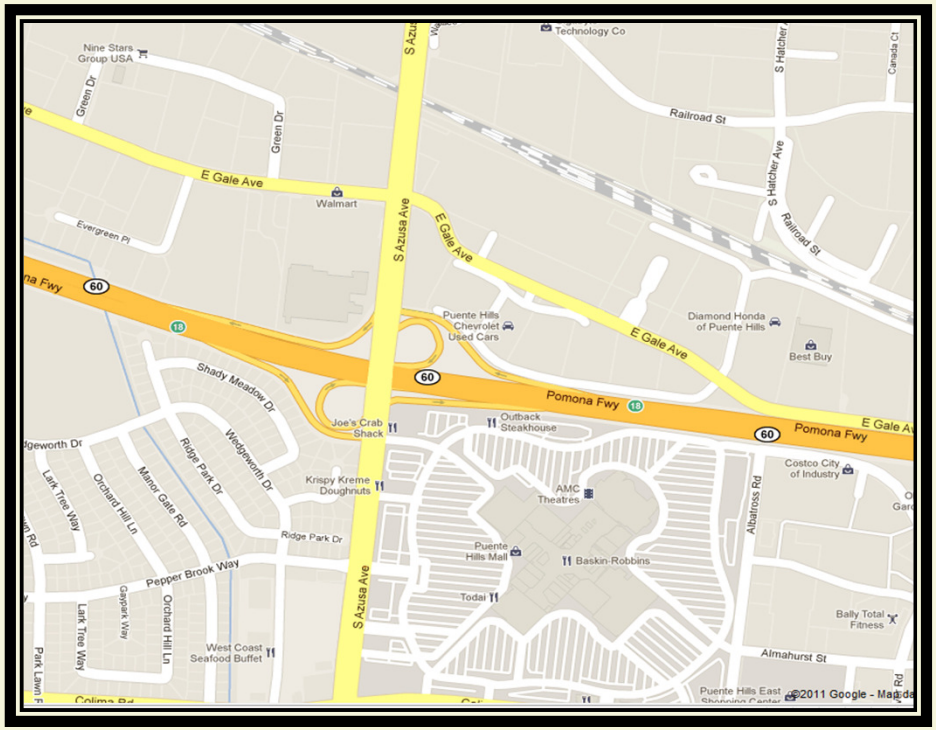
- **Highest truck volumes by 2035 are projected on SR-60 (55,363), I-710 (53,010), and I-10 (44,212)**

Truck Traffic Conditions on SR-60

EB-60 east of Nogales St. (PM)
May, 12, 2011



WB-60 west of Azusa Avenue (AM)
May, 12, 2011



Doing Nothing: Truck Involved Crashes

•Worst regional truck incident rates are on SR-60, I-605, I-5 and I-710.

Initial Screening Outcomes

Proximity to Goods Movement Markets	•Screened out I-210 •Screened out SR-91- (Later re-added and assessed for traffic impacts)
ROW Constraints / Limitations (Grades, etc.)	•Another factor to eliminate I-210 •Screened out SCE •Screened out UPRR as primary alignment
Traffic Impacts	•Confirmed need for E-W Corridor •Showed importance of SR-60 •Confirmed need to connect to I-710

Why "Hybrid" Alignments?

Potential to reduce conflicts with ROW proposed for other regional transportation improvements

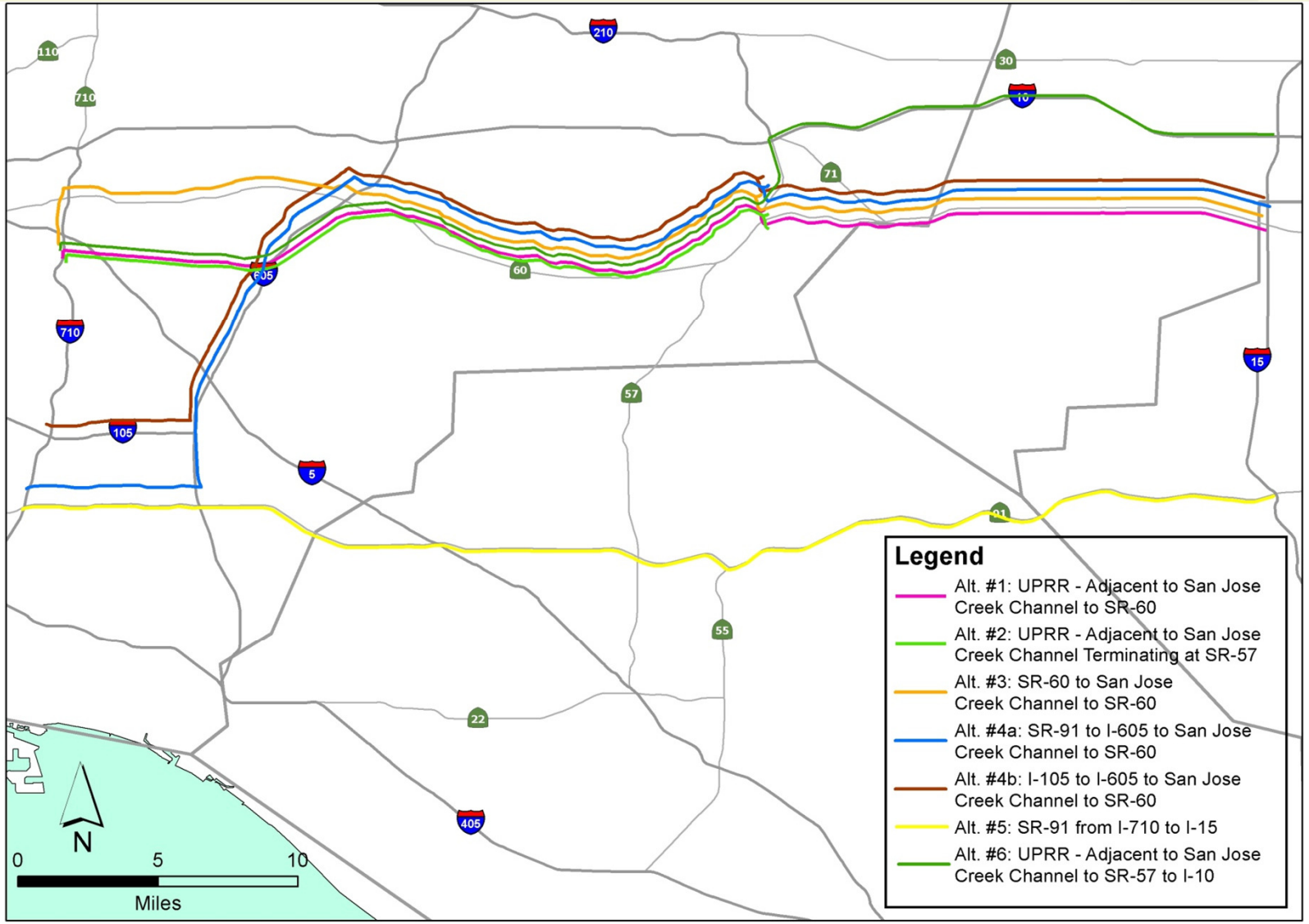
Minimize impacts to communities – fewer residential or other sensitive land uses along alignments

In some cases (San Jose Creek Channel) majority of land is owned by the public sector (LA County DPW and USACE)

Preliminary "hybrid" alignments under consideration:

- UP-adjacent to San Jose Creek
- I-105 to I-605 to San Jose Creek
- SR-91 to I-605 to San Jose Creek
- UP-adjacent to San Jose Creek to I-10

New Model Run: UP / SJC / I-10



Measures of Effectiveness (MOEs)

Truck Volumes	The volumes of trucks that would be carried by each of the potential alignments in 2035
Delay (All Traffic)	Impact on delay of all traffic within the influence area
Delay (Truck Traffic)	Impact on delay of all heavy-duty truck traffic within the influence area
Impact on Parallel Routes	Effectiveness of each alignment to reduce the truck volumes and congestion on parallel routes

Locations for Analysis

- MOEs assessed at three different locations - “Screenlines”
  - **Screenline (SL) #1:** Between I-710 and I-605
  - **Screenline (SL) #2:** West of SR-57. Located roughly at Raymond Ave. (SR-91) and just East of Azusa Ave. (SR-60)
  - **Screenline (SL) #3:** West of I-15. Located roughly at Auto Center Dr. (SR-91) and just East of Grove Ave. (SR-60)

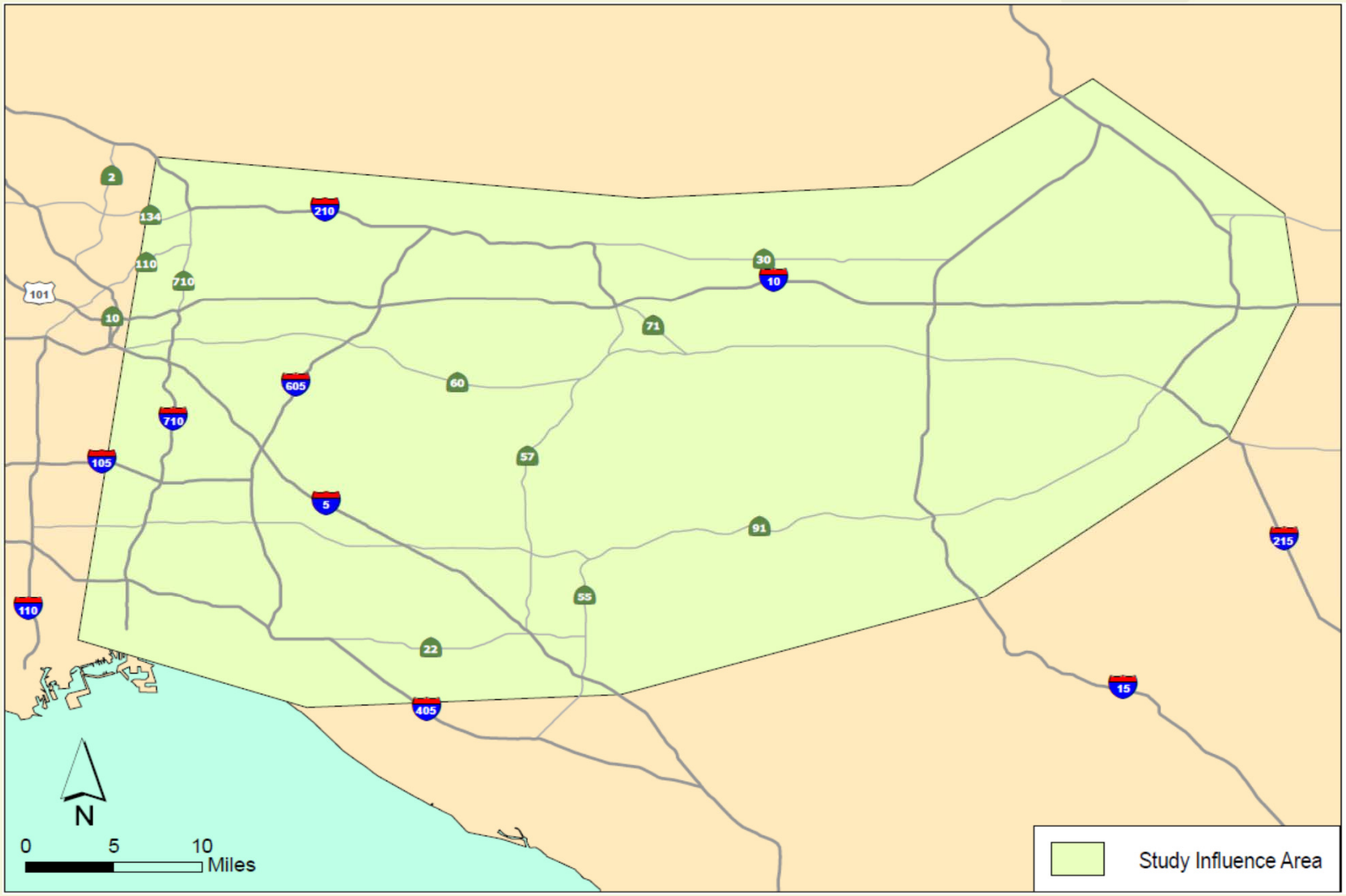
Screenline Locations for Analysis

2035 Freight Corridor Truck Volumes

Screenline	2035 Truck Lane Usage (Trucks / Day)						
	Alt. #1 UP/SJC/60	Alt. #2 UP/SJC	Alt. #3 60/SJC/60	Alt. #4a 105/605/ SJC/60	Alt. #4b 91/605/ SJC/60	Alt. #5 SR-91	Alt. #6 UP/SJC/10
SL1	58,700	58,600	60,700	57,100	60,700	78,600	59,900
SL2	58,200	55,400	57,800	54,700	55,300	62,300	57,700
SL3	70,300	N/A	71,000	70,100	69,300	55,200	56,500

- **All truck lane alignments show heavy use of trucks at all screenlines**

Study Influence Area



2035 Impacts on Delay

Screenline	2035 Percentage Change in Delay on Study Influence Area						
	Alt. #1 UP/SJC/60	Alt. #2 UP/SJC	Alt. #3 60/SJC/60	Alt. #4a 105/605/SJC/60	Alt. #4b 91/605/SJC/60	Alt. #5 SR-91	Alt. #6 UP/SJC/10
Heavy Truck	-9.9%	-6.9%	-9.1%	**-10.9%**	-10.7%	-10.6%	**-11.1%**
All Truck	-8.6%	-5.9%	-7.9%	-9.5%	-9.5%	**-10.2%**	**-9.7%**
All Traffic	**-4.3%**	1.0%	-3.7%	-0.8%	-0.8%	-1.2%	**-5.0%**

- **Heavy truck delay is reduced by as much as -11.1% (Alt. #6)**
- **All truck delay is reduced by as much as -10.2% (Alt. #5) and -9.7% (Alt. #6)**
- **All traffic delay is reduced by as much as -5.0% (Alt #6) and -4.3% (Alt#1)**

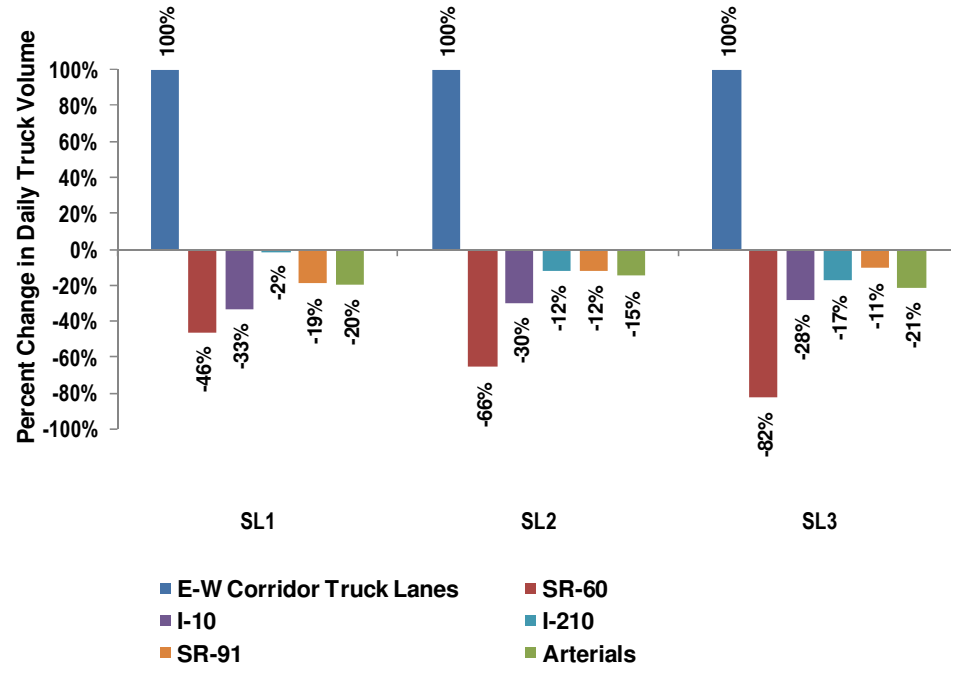
2035 Impacts on Parallel Routes

HW	SL #	Alternative Description							
		No-Build	Alt. #1 UP/SJC/60	Alt. #2 UP/SJC	Alt. #3 60/SJC/60	Alt. #4a 105/605/SJC/60	Alt. #4b 91/605/SJC/60	Alt. #5 SR-91	Alt. #6 UP/SJC/10
I-210	SL1	44,700	44,000	43,500	43,800	43,700	43,900	43,400	44,600
	SL2	40,900	36,000	37,500	37,000	35,300	35,900	38,600	34,200
	SL3	27,300	22,600	25,900	23,400	21,700	22,200	24,900	18,900
I-10	SL1	21,500	14,300	15,000	12,900	15,900	15,800	18,600	14,593
	SL2	36,400	25,600	28,000	26,700	26,500	26,700	32,800	25,657
	SL3	39,100	28,100	34,700	28,800	28,700	28,700	34,800	10,367
SR-60	SL1	42,500	22,900	21,800	11,400	29,000	29,300	33,200	22,300
	SL2	**41,000**	**14,100**	11,300	**12,000**	17,000	18,000	31,400	16,500
	SL3	**51,000**	**9,000**	60,300	**7,000**	9,200	10,700	39,000	45,100
SR-91	SL1	51,200	41,500	42,700	43,700	38,500	34,500	14,600	41,000
	SL2	36,100	31,700	32,700	32,600	32,600	31,300	7,200	32,300
	SL3	29,600	26,400	28,800	26,700	26,700	25,900	6,500	26,900

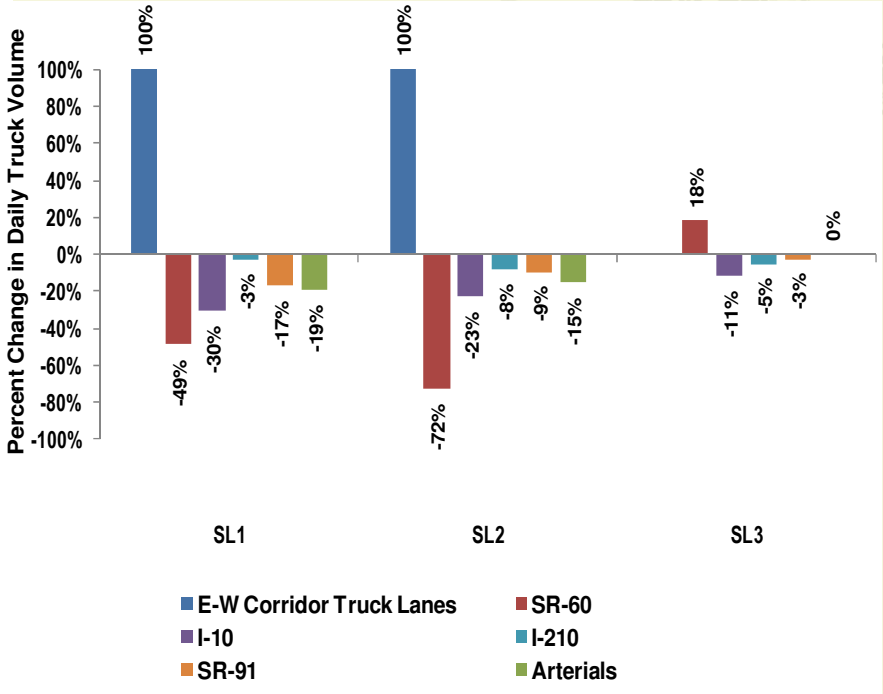
- SR-91 has least impact on parallel routes – less regional impact
- Largest impact is on SR-60 under Alt.#1 and Alt. #3

2035 Impacts on Parallel Routes

Alt #1: UP / SJC / SR-60

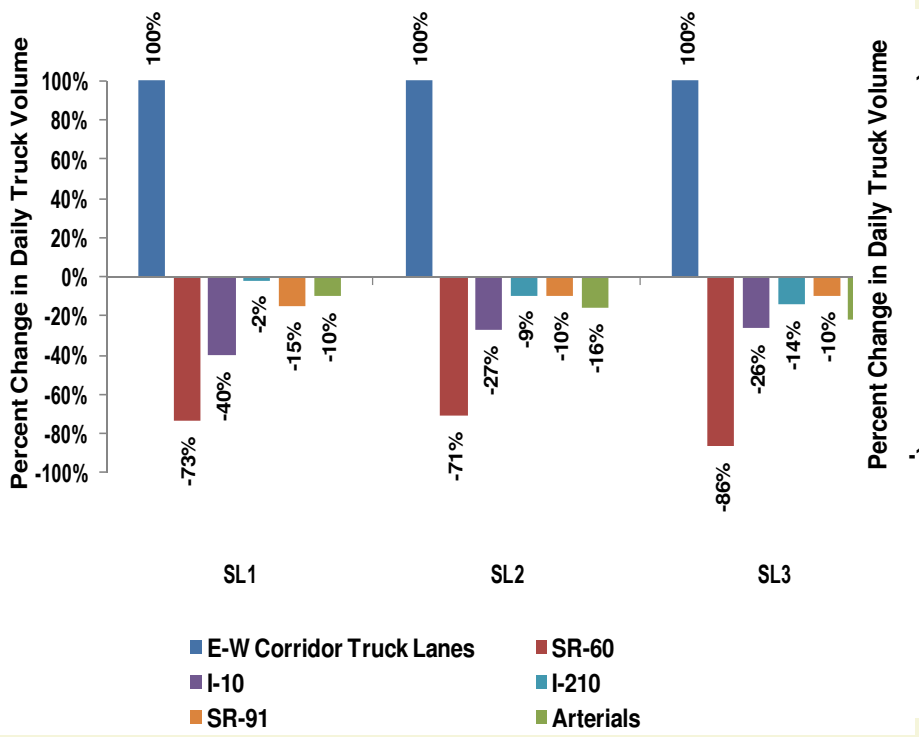


Alt #2: UP / SJC

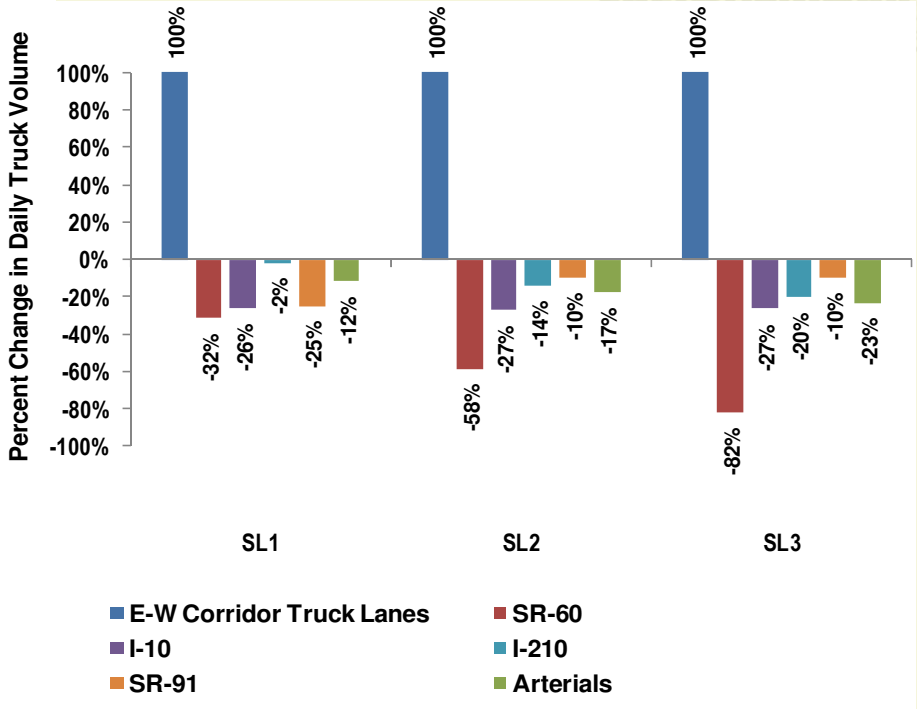


2035 Impacts on Parallel Routes

Alt #3: SR-60 / SJC / SR-60

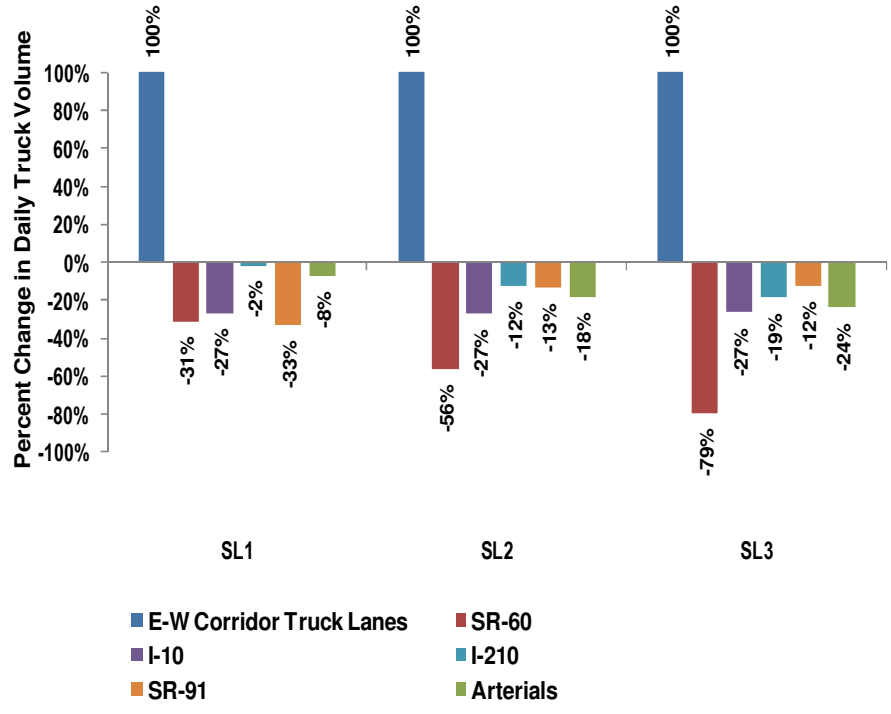


Alt #4a: 105 / 605 / SJC / SR-60

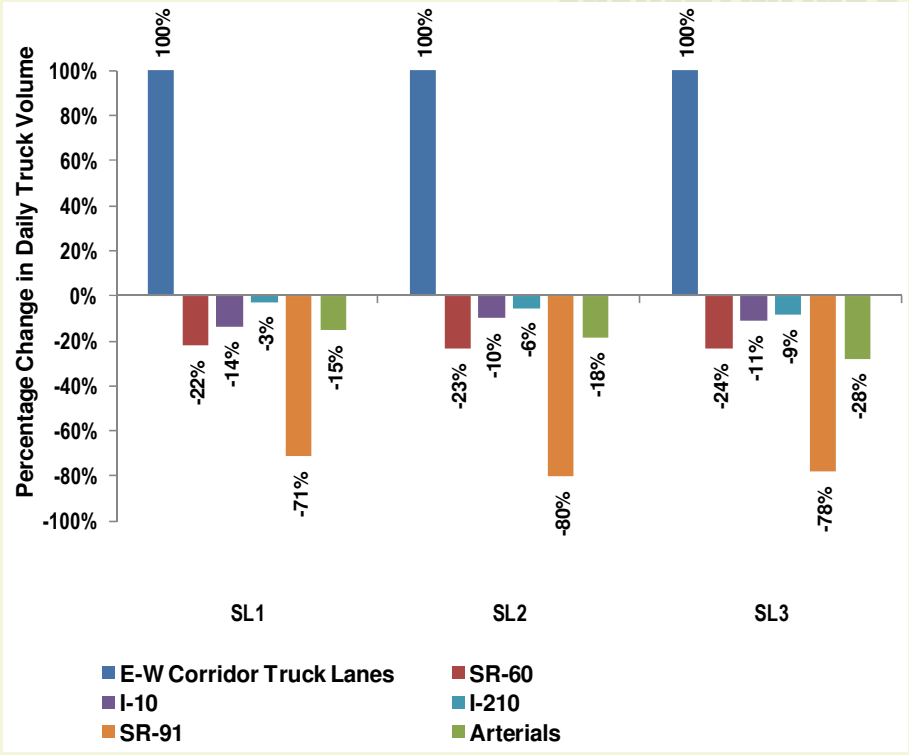


2035 Impacts on Parallel Routes

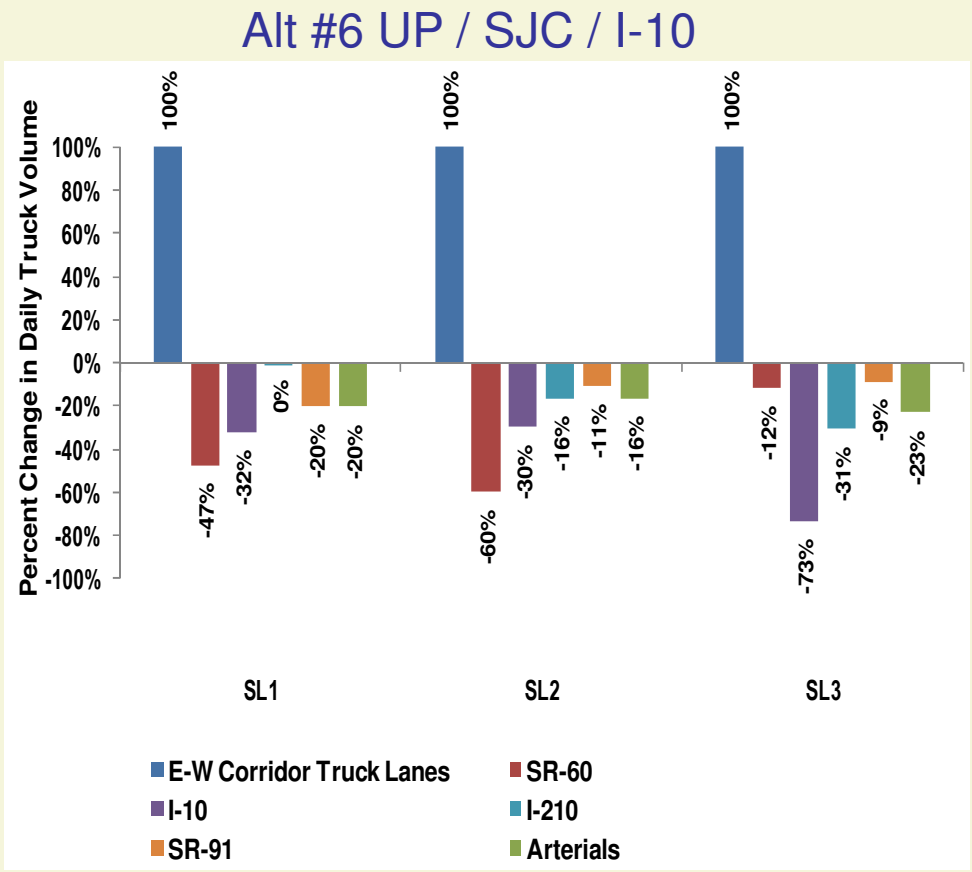
Alt #4b: SR-91 / 605 / SJC / SR-60



Alt #5: SR-91



2035 Impacts on Parallel Routes

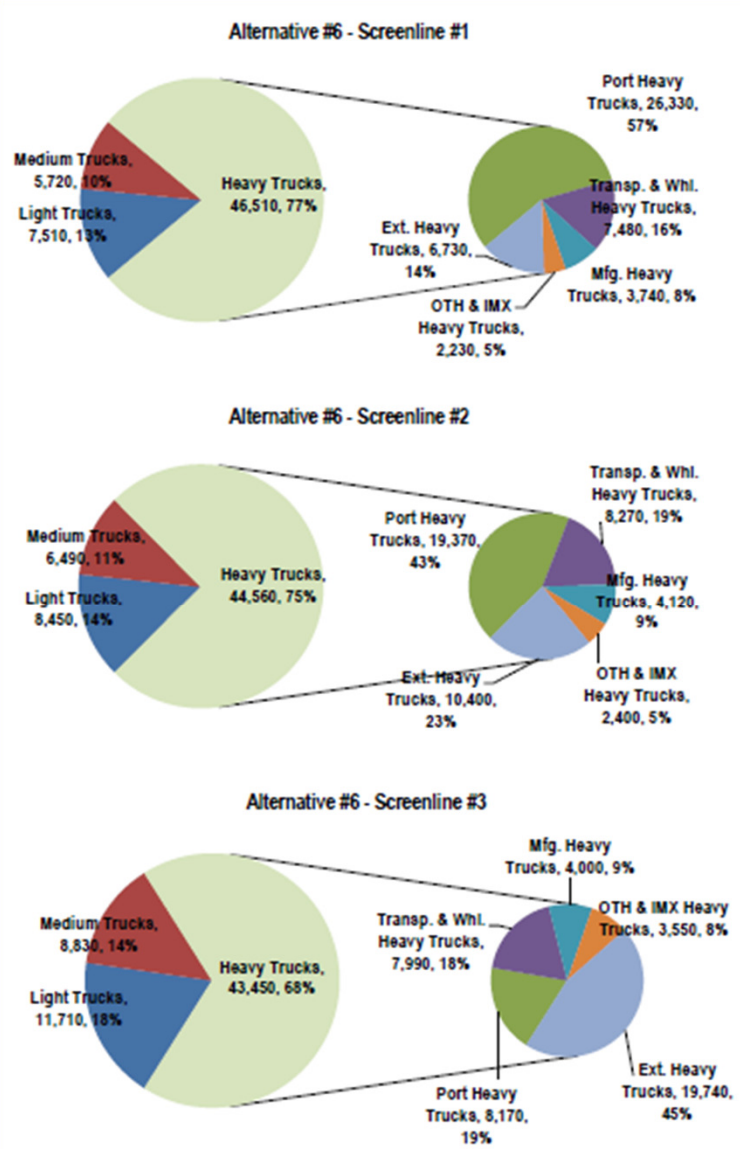


ROW Review / Summary

ROW Constraints Analysis: Side by Side Comparison
East-West Alignments [I-10, SR-60, and UPRR-Adjacent]

Alt. #6 (I-10) ROW Constraints East of SR-57 outweigh the positive traffic MOEs from model run

Markets Served by Truck Lanes



- All Alts. show similar market usage:
  - Port trucks decline as share moving east
  - One-third to one-half of trucks serve local industries
  - High share of usage is inter-regional trade moving east

Tolling

- Should provide an important component to a financial plan for the Freight Corridor System
- Tolls will cause traffic to divert from Freight Corridor – traffic analysis to examine toll rates/structures and MOE/revenue tradeoffs
- Policy levers can supplement toll strategies (e.g., peak hour restrictions on parallel facilities)

New Model Run: Trial Toll Scenario

- Alt. #7: Trial Tolling Scenario
  - Trial tolling run- using Alt. #1 as base
  - Tolling scenario consistent with I-710 EIR
- Conducted as initial step in evaluating how tolls affect use of the Freight Corridor
  - Results suggest directions for finding optimum toll rates and structure (maybe different than I-710)
  - Additional analysis will be done to test policy options complementing tolling strategies

Alt. #7: Trial Tolling Scenario Results

Screenline	2035 Truck Lane Usage (Trucks / Day)		
	Alt. #1 UP/SJC/60	Alt. #7 Tolled	% Change
SL1	58,700	44,800	-24%
SL2	58,200	39,400	-32%
SL3	70,300	47,900	-32%

- Trial tolled scenario using I-710 toll structure shows that up to 48,000 trucks would still use the truck lane

- However, this is a reduction of truck volumes using the truck lane by 24 – 32% over Alt. #1.

- Diversion similar to that observed in I-710 EIR.

Alt. #7: Trial Tolling Scenario Results

Screenline	2035 Percentage Change in Delay on Study Influence Area	
	Alt. #1 UP/SJC/60	Alt. #7 Tolled
Heavy Truck	-9.9%	-5.5%
All Truck	-8.6%	-5.1%

- **Trial tolled scenario still shows truck delay reduction benefits**
- **However, benefits are less than Alt. #1**
- **Need to experiment with "levers" – i.e. impact of changing toll rate, enforcement, restrictions on parallel routes, etc.**

Assessment Summary (Cont).

Alignment (Alt. #1):

- Avoids significant residential property impacts.
- Offers good connectivity to warehouse & manufacturing facilities.
- Results in greatest traffic reduction on parallel routes and high reductions in total & heavy truck delay.
- Provides “win-win” opportunity to improve the flood control channel.
- Provides opportunities to redevelop UP-adjacent industrial property between I-710 and I-605 and to mitigate rail impacts in area.

Assessment Summary (Cont).

Connecting the SJC to SR-60:

- Full- length corridor is important to realize maximum benefits
- SR-60 has fewer ROW constraints east of SR-57 compared to I-10
- Near SR-57, connection to SR-60 is challenging
- Initial engineering work underway to address potential residential impacts in vicinity of SR-57/SR-60

UP- Adjacent as a Connector to I-710:

- Less residential property impacts than 91 / 105 / 605
- More engineering work would be required to lessen impacts to industrial facilities

Assessment Summary (Cont).

Alt. #7 – Tolling Assessment:

- Trial tolling scenario suggests usage of 40,000 – 47,000 trucks, and delay reduction for trucks.
- However, volumes using truck lanes are lower than Alt. #1
- Delay reduction less than Alt. # 1
- Recommend additional analysis of tolling policy options.

- Levers to explore
  - Different pricing scenarios
  - Different policy and enforcement options
  - Impacts of restricting truck traffic on parallel routes and other options.

Next Steps

- Continued evaluation of ROW impacts
  - Complete assessment of SR-91
  - Identification of impacts on adjacent residential properties
- Continued evaluation of connection options between SJC and I-710 (west) and SR-60 or I-10 (east)
- Tolling analysis/revenue estimates
  - Test additional toll rates
  - Conduct test with peak period restrictions on parallel freeways

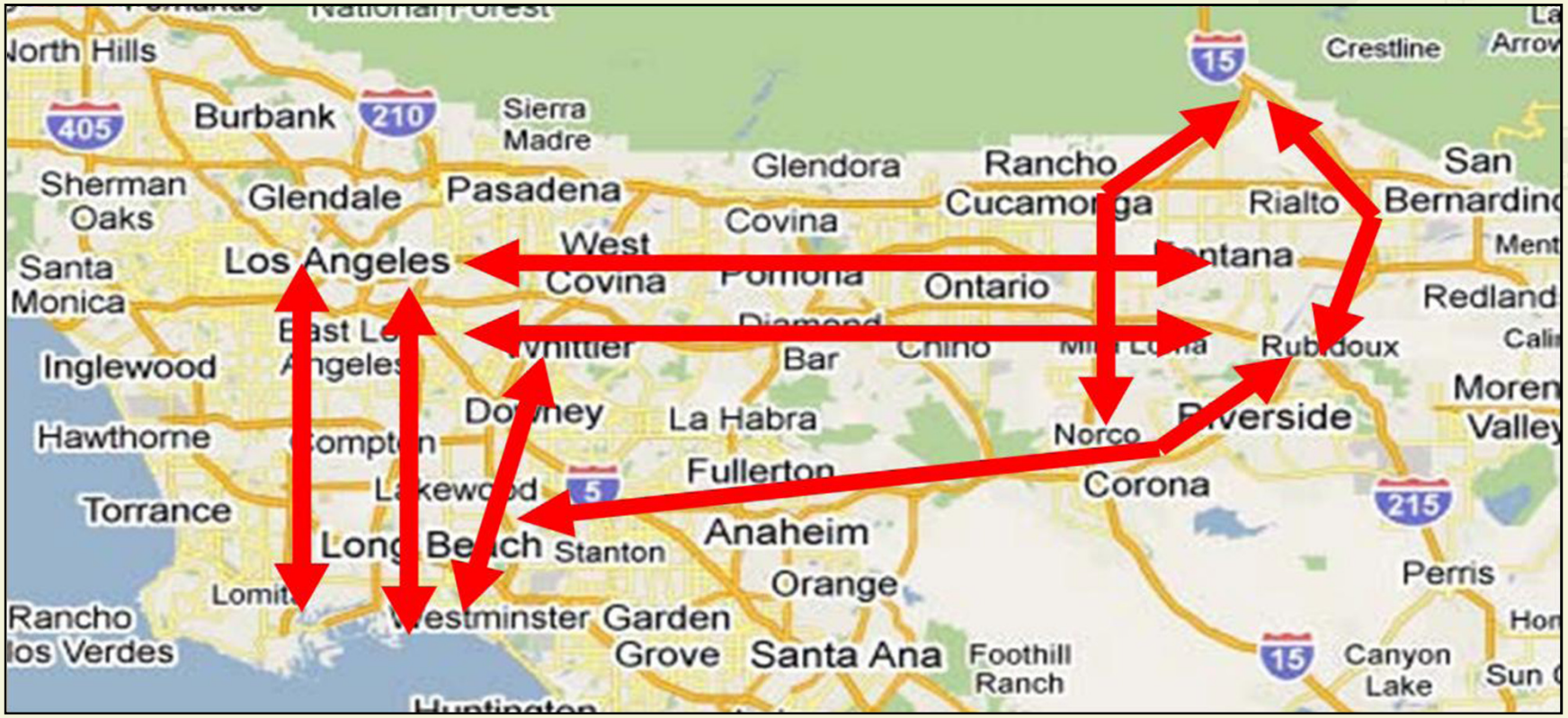
Incorporating Zero-Emission Goals into the Freight Corridor

How to Incorporate Zero-Tailpipe-Emission Goals?

- Fixed guideway systems (i.e. rail, maglev) inappropriate to serve diverse markets
  - Consume inordinate real estate
  - Inflexible- do not serve dispersed origins / destinations
- Energy storage capability of current battery technology limits operating range
  - Wayside power extends the range of battery, may enable simultaneous battery charging
  - May not be restricted to freight corridors

Markets favor independent ZTE trucks (100% battery, 100% fuel cell, or hybrid with wayside-powered guideway)

Wayside Power and a Regional System



- Major goods movement freeways only account for 20% of regional truck VMT
- Battery power requires supplemental charging or battery changeout stations – what is the appropriate balance between this and wayside power systems?

Technology Options

Zero-Tailpipe Emissions (ZTE) Technologies		
On-Vehicle Energy Storage ⟹ Electric Motor	100% Battery	*Both require recharging replacement/ disposal infrastructure*
	100% Hydrogen Fuel Cell (or equal/better)	
Wayside Energy Distribution on Guideway	Electric Traction power ⟹ Propulsion / Battery Recharge (overhead catenary or embedded electromagnetic induction)	*Both require: On-vehicle energy storage when off guideway and Power generation and transmission infrastructure*
	Embedded Linear Synchronous Motor ⟹ Reactive Propulsion	

Supplementary Technologies

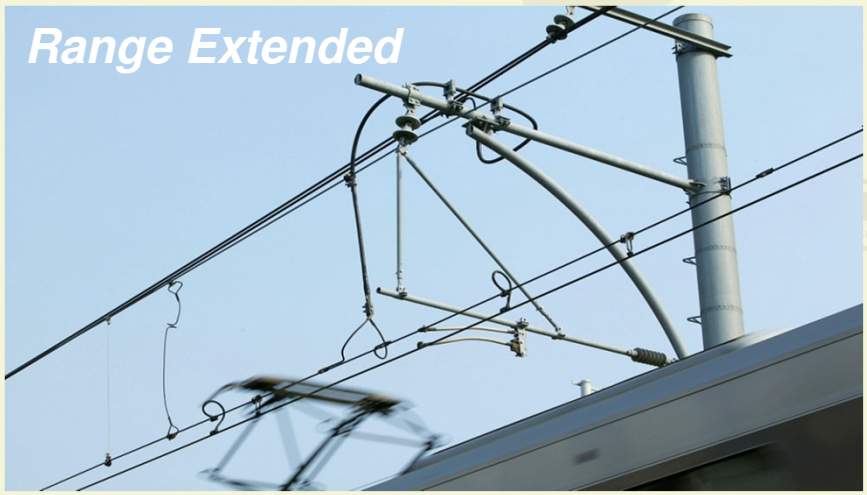
- **Regenerative braking** to translate vehicle kinetic energy into electricity and feed it to on-board storage
- Applications of **ITS technology** (vehicle automation and platooning), to maximize capacity
- **Real-time TDM strategies** to distribute demand and consumption
- **Battery or fuel cell** recharging/replacement/disposal
- **Alternative energy storage** (e.g. flywheel) on-board or wayside

System Performance Requirements

- Zero Tailpipe Emissions – power generation
- Serve Terminal/Freight Facility Needs
  - Power supply
  - Loading/unloading
  - Storage and sorting of cargo
- Serve Freight Corridor Operations Needs
  - Mixing of electric and standard trucks
  - Diverse trip end locations and types
  - Throughput and maneuverability
- Enter and Exit the Freight Corridor Seamlessly

Range Extended with Wayside Power

- Currently deployed at some Port of Los Angeles terminals
- Deliver loaded 40-foot container up to 30 miles
- Top speed is 40 MPH
- Performance should improve as technology matures
- Slow battery charge systems



- Overhead or embedded conductor on freeway dedicated truck lanes
- Can significantly extend ranges for electric trucks across region and increase vehicle availability through on-road charging
- May be transitional technology until longer range/quick charge battery systems
- Zero local emissions

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Advantages of Extended Range

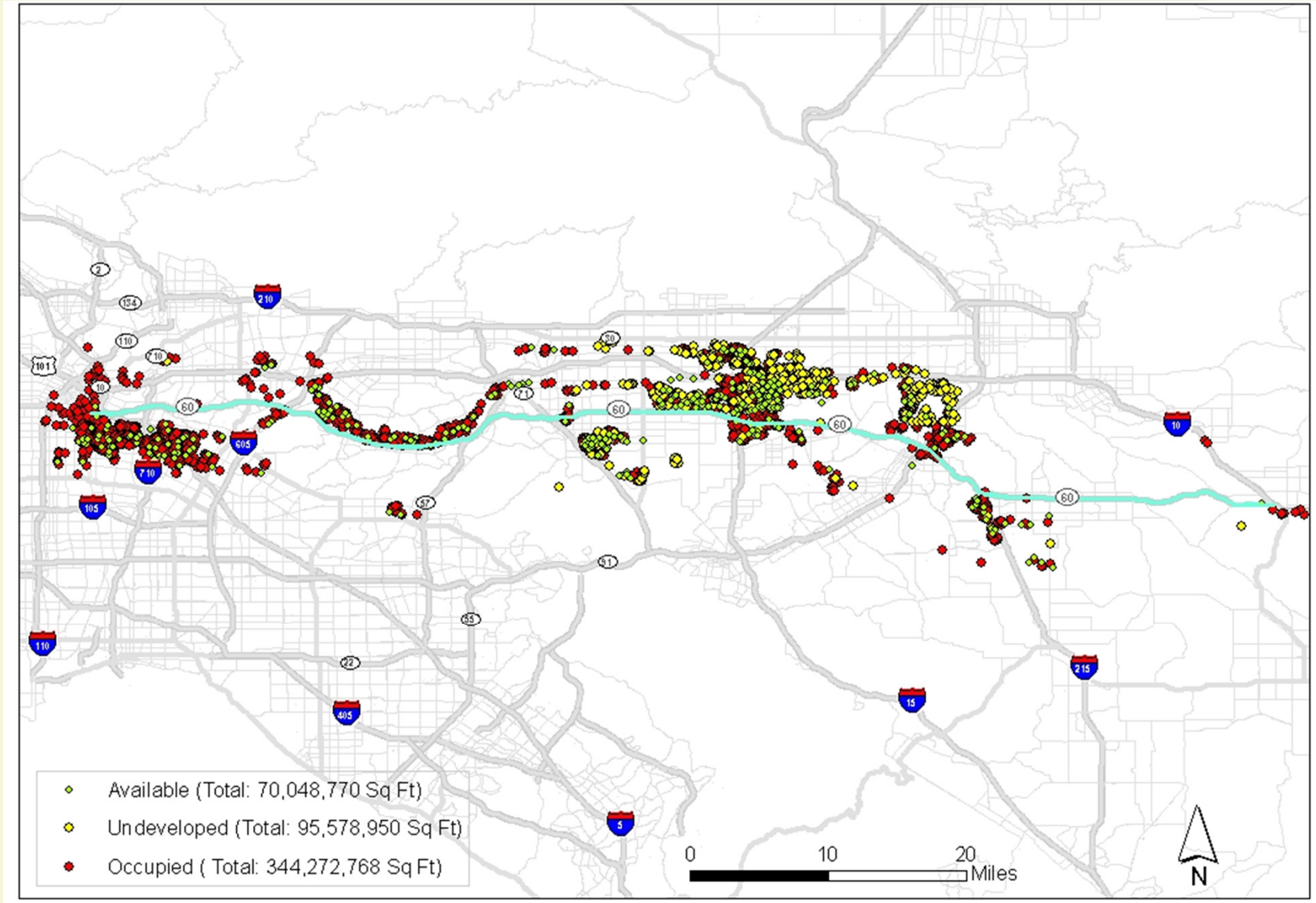
- Impacts on current public and private infrastructure are minimal, compared to other technology options
  - Wayside power and catenary systems are the primary required infrastructure
  - Major cost advantages over fixed guideway systems, which would require substantial new infrastructure investments
- Technology is reasonably mature
  - Speed and range of electric trucks is expected to improve in the next several years

Can work hand in hand with current electric truck developments, including hybrid heavy-duty trucks and battery advances

System Characteristics

- Selected technology must be able to serve the needs of the east-west freight corridor:
  - Corridor length (to I-15) – ~60 miles (could extend with addition of I-15)
  - 2 lanes each direction (100' ROW)
  - Limited access
  - Typical daily truck traffic (2035) – ~55,000-75,000
  - Many destinations within 5-10 miles of candidate alignments - some markets for freight corridor may be difficult to serve

Warehouse Square Footage Along SR-60 (5 Mile Buffer)



Continuing Assessment

- Zero-emission technology as transitional technology
- Attractiveness to private-sector investment
- Potential of policy to restrict the corridor to zero-emission trucks
- Comparison between zero-emission technology and incremental improvements to combustion or hybrids