East-West Freight Corridor Concept

Status Update

Michael Fischer
Gill Hicks
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
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

<table>
<thead>
<tr>
<th></th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steering Committee</strong></td>
<td><strong>Aug. 4&lt;sup&gt;th&lt;/sup&gt; (Thursday)</strong>&lt;br&gt;1:30 pm – 4:30 pm&lt;br&gt;• East-West Freight Corridor Findings and Discussions (Continuation from June meeting)&lt;br&gt;• Zero-/Near-zero Emission Technologies for EWFC Strategies</td>
<td><strong>Sep. 8&lt;sup&gt;th&lt;/sup&gt; (Thursday)</strong>&lt;br&gt;9:30 am – 12:30 pm&lt;br&gt;• Bottleneck Relief Strategies&lt;br&gt;• Packaging Rail Strategies&lt;br&gt;• Rail Emission Reduction Strategies&lt;br&gt;• Preliminary Regional Goods Movement Plan</td>
<td><strong>Oct. 13&lt;sup&gt;th&lt;/sup&gt; (Thursday)</strong>&lt;br&gt;1:30 pm – 3:30 pm&lt;br&gt;• Draft Goods Movement Plan and Implementation Strategy for the 2012 Draft RTP</td>
</tr>
<tr>
<td><strong>SCAG Policy Committee</strong></td>
<td><strong>Aug. 4&lt;sup&gt;th&lt;/sup&gt; (Thursday)</strong>&lt;br&gt;• TC Meeting</td>
<td><strong>Sep. 1&lt;sup&gt;st&lt;/sup&gt; (Thursday)</strong>&lt;br&gt;• TC Workshop</td>
<td><strong>Oct. 6&lt;sup&gt;th&lt;/sup&gt; (Thursday)</strong>&lt;br&gt;• TC Workshop</td>
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</tbody>
</table>
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

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

- 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
• 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

Legend
- Alt. #1: UPRR - Adjacent to San Jose Creek Channel to SR-60
- Alt. #2: UPRR - Adjacent to San Jose Creek Channel Terminating at SR-57
- Alt. #3: SR-60 to San Jose Creek Channel to SR-60
- Alt. #4a: SR-91 to I-605 to San Jose Creek Channel to SR-60
- Alt. #4b: I-105 to I-605 to San Jose Creek Channel to SR-60
- Alt. #5: SR-91 from I-710 to I-15
- Alt. #6: UPRR - Adjacent to San Jose Creek Channel to SR-57 to I-10
# Measures of Effectiveness (MOEs)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Truck Volumes</strong></td>
<td>The volumes of trucks that would be carried by each of the potential alignments in 2035</td>
</tr>
<tr>
<td><strong>Delay (All Traffic)</strong></td>
<td>Impact on delay of all traffic within the influence area</td>
</tr>
<tr>
<td><strong>Delay (Truck Traffic)</strong></td>
<td>Impact on delay of all heavy-duty truck traffic within the influence area</td>
</tr>
<tr>
<td><strong>Impact on Parallel Routes</strong></td>
<td>Effectiveness of each alignment to reduce the truck volumes and congestion on parallel routes</td>
</tr>
</tbody>
</table>
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)
### 2035 Freight Corridor Truck Volumes

<table>
<thead>
<tr>
<th>Screenline</th>
<th>Alt. #1 UP/SJC/60</th>
<th>Alt. #2 UP/SJC</th>
<th>Alt. #3 60/SJC/60</th>
<th>Alt. #4a 105/605/ SJC/60</th>
<th>Alt. #4b 91/605/ SJC/60</th>
<th>Alt. #5 SR-91</th>
<th>Alt. #6 UP/SJC/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL1</td>
<td>58,700</td>
<td>58,600</td>
<td>60,700</td>
<td>57,100</td>
<td>60,700</td>
<td>78,600</td>
<td>59,900</td>
</tr>
<tr>
<td>SL2</td>
<td>58,200</td>
<td>55,400</td>
<td>57,800</td>
<td>54,700</td>
<td>55,300</td>
<td>62,300</td>
<td>57,700</td>
</tr>
<tr>
<td>SL3</td>
<td>70,300</td>
<td>N/A</td>
<td>71,000</td>
<td>70,100</td>
<td>69,300</td>
<td>55,200</td>
<td>56,500</td>
</tr>
</tbody>
</table>

• All truck lane alignments show heavy use of trucks at all screenlines
Study Influence Area
## 2035 Impacts on Delay

<table>
<thead>
<tr>
<th>Screenline</th>
<th>Alt. #1 UP/SJC/60</th>
<th>Alt. #2 UP/SJC</th>
<th>Alt. #3 60/SJC/60</th>
<th>Alt. #4a 105/605/SJC/60</th>
<th>Alt. #4b 91/605/SJC/60</th>
<th>Alt. #5 SR-91</th>
<th>Alt. #6 UP/SJC/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Truck</td>
<td>-9.9%</td>
<td>-6.9%</td>
<td>-9.1%</td>
<td>-10.9%</td>
<td>-10.7%</td>
<td>-10.6%</td>
<td>-11.1%</td>
</tr>
<tr>
<td>All Truck</td>
<td>-8.6%</td>
<td>-5.9%</td>
<td>-7.9%</td>
<td>-9.5%</td>
<td>-9.5%</td>
<td>-10.2%</td>
<td>-9.7%</td>
</tr>
<tr>
<td>All Traffic</td>
<td>-4.3%</td>
<td>1.0%</td>
<td>-3.7%</td>
<td>-0.8%</td>
<td>-0.8%</td>
<td>-1.2%</td>
<td>-5.0%</td>
</tr>
</tbody>
</table>

- **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

<table>
<thead>
<tr>
<th>HW</th>
<th>SL #</th>
<th>Alternative Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No-Build</td>
</tr>
<tr>
<td>I-210</td>
<td>SL1</td>
<td>44,700</td>
</tr>
<tr>
<td></td>
<td>SL2</td>
<td>40,900</td>
</tr>
<tr>
<td></td>
<td>SL3</td>
<td>27,300</td>
</tr>
<tr>
<td>I-10</td>
<td>SL1</td>
<td>21,500</td>
</tr>
<tr>
<td></td>
<td>SL2</td>
<td>36,400</td>
</tr>
<tr>
<td></td>
<td>SL3</td>
<td>39,100</td>
</tr>
<tr>
<td>SR-60</td>
<td>SL1</td>
<td>42,500</td>
</tr>
<tr>
<td></td>
<td>SL2</td>
<td>41,000</td>
</tr>
<tr>
<td></td>
<td>SL3</td>
<td>51,000</td>
</tr>
<tr>
<td>SR-91</td>
<td>SL1</td>
<td>51,200</td>
</tr>
<tr>
<td></td>
<td>SL2</td>
<td>36,100</td>
</tr>
<tr>
<td></td>
<td>SL3</td>
<td>29,600</td>
</tr>
</tbody>
</table>

- 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

Percent Change in Daily Truck Volume

-0% -20% -40% -60% -80% -100%

SL1 SL2 SL3

E-W Corridor Truck Lanes SR-60 I-10 I-210 SR-91 Arterials
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

[Graphs showing percent change in daily truck volume for different routes and scenarios.]
2035 Impacts on Parallel Routes

Alt #6 UP / SJC / I-10

Percent Change in Daily Truck Volume

SL1
SL2
SL3

E-W Corridor Truck Lanes
SR-60
I-10
I-210
SR-91
Arterials
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

<table>
<thead>
<tr>
<th>Screenline</th>
<th>2035 Truck Lane Usage (Trucks / Day)</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alt. #1</td>
<td>Alt. #7</td>
</tr>
<tr>
<td></td>
<td>UP/SJC/60</td>
<td>Tolled</td>
</tr>
<tr>
<td>SL1</td>
<td>58,700</td>
<td>44,800</td>
</tr>
<tr>
<td>SL2</td>
<td>58,200</td>
<td>39,400</td>
</tr>
<tr>
<td>SL3</td>
<td>70,300</td>
<td>47,900</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>Screenline</th>
<th>2035 Percentage Change in Delay on Study Influence Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alt. #1</td>
</tr>
<tr>
<td></td>
<td>UP/SJC/60</td>
</tr>
<tr>
<td>Heavy Truck</td>
<td>-9.9%</td>
</tr>
<tr>
<td>All Truck</td>
<td>-8.6%</td>
</tr>
</tbody>
</table>

- 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.
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
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)
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

<table>
<thead>
<tr>
<th>On-Vehicle Energy Storage ⇒ Electric Motor</th>
<th>100% Battery</th>
<th>Both require recharging replacement/ disposal infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100% Hydrogen Fuel Cell (or equal/better)</td>
<td></td>
</tr>
<tr>
<td>Wayside Energy Distribution on Guideway</td>
<td>Electric Traction power ⇒ Propulsion / Battery Recharge (overhead catenary or embedded electromagnetic induction)</td>
<td>Both require: On-vehicle energy storage when off guideway and Power generation and transmission infrastructure</td>
</tr>
<tr>
<td></td>
<td>Embedded Linear Synchronous Motor ⇒ Reactive Propulsion</td>
<td></td>
</tr>
</tbody>
</table>
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 Seamless
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
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)

Available (Total: 70,048,770 Sq Ft)
Undeveloped (Total: 95,578,950 Sq Ft)
Occupied (Total: 344,272,768 Sq Ft)
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