The Crenshaw/LAX Project...
Foundation for Metro Green Line to LAX

- 8.5 mile extension
- Metro Exposition Line (Crenshaw Exposition) to Metro Green Line (Aviation/LAX Station)
- 6 new stations (+2 stations as construction bid options)
- New maintenance facility
- Builds first mile of Metro Green Line Extension to Aviation/Century Station
- Forecasted opening: 2018

Metro
Metro Green Line to LAX

Project Overview

- Goal: Connect the regional transit network to LAX
- Connection can take many forms
- Long Range Transportation Plan
  - Metro funding: $200 M (Measure R)
  - Opening year 2028 (could be as soon as 2018-2020 with funding from America Fast Forward, the airport and/or other sources)
- Additional non-Metro funding will need to be secured
Additional funding is required

- Measure R funded project: $200M ($2008) → All rail alternatives (including light rail and automated people mover) require much more than this
- Project is contingent upon additional contributions from Los Angeles World Airports (LAWA) and/or other sources
- This planning process identifies feasible alternatives and develops preliminary cost estimates to determine funding needs
- Until funding is secured, no project can be adopted for construction
- Less expensive projects may have a higher likelihood of implementation

*Metro*
## Funding U.S. Airport Transit Systems

**March 2012**

<table>
<thead>
<tr>
<th>Airport System</th>
<th>Total Capital Cost ($M) (indexed to 2010$)</th>
<th>Funding Contributions ($M) (indexed to 2010$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisco (SFO)</td>
<td>$2,347</td>
<td>$770 Local</td>
</tr>
<tr>
<td>New York (JFK)</td>
<td>$2,338</td>
<td>$2,338 Airport</td>
</tr>
<tr>
<td>Miami (MIA)</td>
<td>$1,014</td>
<td>$557 Local</td>
</tr>
<tr>
<td>Minneapolis (MSP)</td>
<td>$724</td>
<td>$85 Local</td>
</tr>
</tbody>
</table>

*Annual Airport Passengers (2010)*

- 59.1 million annual passengers passed through LAX in 2010
Types of Connections

Direct Light Rail Transit (LRT) Branch
- Metro goes to the airport
- Metro Green Line direct connection

Circulator
- Airport (Circulator) goes to Metro
- New transit system tailored to address the airport’s unique travel demands/operating environment

Intermediate LRT and Circulator
- Metro (LRT) and Airport (Circulator) meet in the middle

Modified LRT Trunk
- Metro goes through the airport
- Direct connection for Metro Green & Crenshaw/LAX lines
- Parallels an alignment to be constructed as part of the Crenshaw/LAX line
Modes

Light Rail Transit (LRT)

Automated People Mover (APM)

Bus Rapid Transit (BRT) (Elevated Busway)
Alignments

On-Airport (in Terminal area)
Two-Stage Screening Process

March 2012

Initial Connection Concepts
- Direct LRT Branch
  - Mode + Alignments
- Circulator
  - Mode + Alignments
- Intermediate LRT & Circulator
  - Mode + Alignments
- Modified LRT Trunk
  - Mode + Alignments

Stage I Screening

Screened Alternatives (27)
- Alternative
- Alternative
- Alternative

Stage II Screening

Alternatives Carried into EIS/EIR
Additional Funding needs to be Identified
- Build Alternative
- Build Alternative

Initial Connection Concepts
- Direct LRT Branch
  - Mode + Alignments
- Circulator
  - Mode + Alignments
- Intermediate LRT & Circulator
  - Mode + Alignments
- Modified LRT Trunk
  - Mode + Alignments
We Screen Alternatives Using Common Evaluation Criteria

<table>
<thead>
<tr>
<th>Stage I – Emphasizes Feasibility</th>
<th>Stage II – Emphasizes Performance and Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>Travel Time</td>
</tr>
<tr>
<td>• Appropriate for Connection Type</td>
<td>Reliability</td>
</tr>
<tr>
<td>Off-Airport</td>
<td>Convenience</td>
</tr>
<tr>
<td>• Physical fit and constructability</td>
<td>Construction Cost</td>
</tr>
<tr>
<td>• Avoid encroachment into Runway Protection Zone (RPZ)</td>
<td>• (Metro only has $200M available, all rail alternatives cost much more than this)</td>
</tr>
<tr>
<td>On-Airport</td>
<td>Potential Environmental Impacts (e.g., visual, traffic)</td>
</tr>
<tr>
<td>• Walking distance from station to terminal</td>
<td>Operating Characteristics</td>
</tr>
<tr>
<td>• Average total travel time (transit ride + walk)</td>
<td></td>
</tr>
<tr>
<td>• Construction cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Stage I
Screening
Off-Airport Options – Direct LRT Branch

* Exact route and station location dependent on future LAX plans in area
Off-Airport Options – Circulator

Century Blvd
98th St

Metro Crenshaw/LAX Transit Corridor
Metro Green & Crenshaw/LAX Line and Station (Shared)

Planned
APM/BRT/Alignment Advances to Stage II
Alignment does not Advance to Stage II
Potential Station

Metro

March 2012
Off-Airport Options – Intermediate LRT & Circulator

* Exact route and station location dependent on future LAX plans in area
Off-Airport Options
Modified LRT Trunk

Stage I
Stage II

Through LAX
Connection to Existing Metro Green Line Aerial Structure near Douglas St

Airport Blvd with Circulator

March 2012
On-Airport Options*
Rail & BRT Alignments and Station Options

* Apply to Direct LRT Branch, Circulator and Intermediate Connection Types

TBIT  Tom Bradley International Terminal

- Rail Alignment
- Bus Alignment
- Potential Station

Stage I  Stage II

Aerial
Or Tunnel

Aerial

At-grade
On-Airport Options – Balancing Cost and Travel Time

With More Stations…

- Capital Costs increase
- Walk distance and walk time decrease
- Total travel times (transit ride + walk)
  - decrease from 1 to 3 stations
  - but then increase with 4 or more stations
On-Airport Options –
4 Alignments Carried Forward
All rail options require additional funding

Lowest Rail Cost
Aerial (Rail)

Balances Cost and Travel Time
Aerial (Rail)

Best Average Travel Time
Tunnel (Rail)

Lowest Cost and Walk Time
At-Grade (BRT)
Stage I Screening Results

- Direct LRT Branch
  - 6 Alternatives
- Circulator
  - 8 Alternatives
- Intermediate LRT & Circulator
  - 8 Alternatives
- Modified LRT Trunk
  - 5 Alternatives

27 Alternatives Carried into Stage II Screening
Stage II Screening
# Trade-offs: Passenger Convenience

**March 2012**

**Alternative Connection Types**

<table>
<thead>
<tr>
<th>Direct LRT Branch</th>
<th>Circulator (APM/BRT)</th>
<th>Intermediate LRT &amp; Circulator</th>
<th>Modified LRT Trunk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Transfers</td>
<td>0-1</td>
<td>1</td>
<td>1-2</td>
</tr>
<tr>
<td>Vertical Level Changes</td>
<td>2-4</td>
<td>1-4</td>
<td>4-6</td>
</tr>
<tr>
<td>Average Travel Time Saved (min)</td>
<td>11</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Airport Transit Riders per Day**</td>
<td>4,900-5,400</td>
<td>4,600-5,100</td>
<td>3,600-4,300</td>
</tr>
<tr>
<td>Capital Cost ($M) ($200M is available)</td>
<td>$540 - $1,160</td>
<td>$624-$1,250 (APM)</td>
<td>$680-$1,370 (APM)</td>
</tr>
</tbody>
</table>

**Notes:**
- **Depending on future airport plans, alternatives have 5,000-10,000 additional riders who drive to the LAX area and ride to terminals.**
- Average travel time saved/added dependent on station location.
Ridership and travel time savings go up as the number of transfers for airport transit riders goes down.

Direct LRT Branch and Modified LRT Trunk have fewest transfers, most travel time savings and highest ridership for airport passengers.

Circulator (APM/BRT) ridership is slightly lower, since all Metro Rail passengers transfer.

Intermediate LRT and Circulator Alternative has the most transfers and level changes, and the lowest ridership.

All Alternatives, except the BRT Circulator, require funding in excess of the $200M available from Metro.

Note: In addition to “pure” airport transit riders shown, there will likely be 5,000-10,000 additional riders who drive to the LAX area and then use the project alternatives to access the airport terminals.
### Trade-offs

**Direct LRT Branch vs. Through LAX**

**March 2012**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Average Travel Time* (minutes)</th>
<th>Ridership (Transit Riders per Day)</th>
<th>Capital Cost ($M) ($200M is available)</th>
<th>Constructability Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct LRT Branch</td>
<td>29-30</td>
<td>5,300-5,400</td>
<td>$540-$1,160</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Average from Norwalk, Expo, and South Bay</td>
<td><strong>Add 5,000 to 10,000 for airport area park and ride passengers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Through LAX</td>
<td>25</td>
<td>6,100</td>
<td>$940-$1,130</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Average from Norwalk, Expo, and South Bay</td>
<td><strong>Add 5,000 to 10,000 for airport area park and ride passengers</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Trade-offs related to the Type of LRT Connection (Branch v. Trunk)

> Because Modified LRT Trunk Alternative (Through LAX) has shorter travel time, ridership is higher than Direct LRT Branch for airport passengers

> The Through LAX Alternative requires some additional travel time for non-airport bound passengers traveling between Expo (Crenshaw Corridor) and South Bay (Redondo Beach)

> For the Through LAX Alternative, the single station in the terminal area requires a long walk (0.3 to 0.4 miles) to reach western terminals (T3, T4, TBIT), or potential transfer to a circulator (e.g., bus, moving walkway, shuttle) to shorten walk

> Constructability issues for Through LAX Alternative:
  - Parallels portion of Crenshaw/LAX Line that is scheduled to begin construction in 2013
  - Requires a complex connection to existing Metro Green Line in El Segundo that would have operational impacts during construction
## Trade-offs: Alignments in the Airport Terminal Area

### On-Airport Options

<table>
<thead>
<tr>
<th>Options</th>
<th>Capital Cost ($M) ($200M is available)</th>
<th>Average Total Travel Time to Terminal (min)</th>
<th>Average Walk Dist. to Terminal (feet)</th>
<th>Potential Visual Impacts to Theme Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial (Rail)</td>
<td>$620-$740</td>
<td>32.2</td>
<td>820</td>
<td></td>
</tr>
<tr>
<td>Tunnel (Rail)</td>
<td>$1,040-$1,250</td>
<td>31.5</td>
<td>820</td>
<td></td>
</tr>
<tr>
<td>Aerial (Rail)</td>
<td>$1,060-$1,270</td>
<td>31.2</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>At-Grade (BRT)</td>
<td>$110-$130</td>
<td>34.3</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

Add 5-10 minutes under severe traffic congestion.
Trade-offs Among Alignments within the Airport Terminal Area

> For LRT and APM, the 2 station aerial option
  - Costs approximately $450 million less than the 2 station subway and 3 station aerial options
  - Runs adjacent to the Theme Building, leading to potential visual impacts

> The 3 station aerial loop option provides the shortest walk distances to terminals among the rail alignments, but extra travel time around the loop leads to comparable total travel times (ride + walk) to terminals.

> BRT is the least costly and has shorter walking distances than the rail (LRT and APM) alignments, but...
  - Involves the longest total travel times (ride + walk) to airport terminals
  - Is subject to airport roadway congestion
## Trade-offs
### Century Boulevard vs. 98th Street

<table>
<thead>
<tr>
<th>Alternative</th>
<th>98th St Century Blvd</th>
<th>Direct LRT Branch</th>
<th>Circulator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Number of Vertical Level Changes</td>
<td>Average Travel Time (minutes)</td>
<td>Capital Cost (millions)</td>
</tr>
<tr>
<td>Direct LRT Branch</td>
<td>2</td>
<td>29-30</td>
<td>540-1,160</td>
</tr>
<tr>
<td>Circulator</td>
<td>3.3</td>
<td>31-32</td>
<td>470-1,080</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>31-32</td>
<td>620-1,270</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>29-30</td>
<td>600-1,240</td>
</tr>
</tbody>
</table>

Average from Norwalk, Expo, and South Bay
Trade-Offs Related to Century Blvd & 98 Street Alignments

> Century Blvd LRT
  • Requires a second station at Aviation/Century
  • Results in transfers, additional level changes, longer walks and longer travel times

> For both Direct LRT Branch and Circulator,
  the aerial structure along Century Blvd may result in:
  • Visual impacts
  • Impacts to traffic circulation and access to businesses
Breakout Sessions

- Ten minutes per station
- Bell will ring when it is time to move to the next station
- Rotate clockwise through the tables
- Return to seats for a recap

#1
Passenger Convenience

#2
Direct LRT Branch vs. Through LAX

#3
On-Airport Alignments

#4
Century Blvd. vs. 98th Street

Metro
Upcoming Activities

March 2012

- Community Workshops (February-March)
- Metro Board Meeting (April)
- Environmental Scoping Meetings (Late Spring)
- Environmental Document Preparation (2012-2013)

Stakeholder Outreach and Coordination with LAWA