Westside Subway Extension
Combined Presentation:
Alignments from Beverly Hills-Century City-Westwood/UCLA

Presented in Westwood: May 18, 2010
Presented in Beverly Hills: June 7, 2010
Where We are in the Process

- Alternatives Analysis: 18 Months
- Draft EIS/EIR: 18 Months
- Final EIS/EIR/PE: 12 Months
- Final Design Construction: Minimum 6 Years to ?*

17 Alternatives
- Modes
- Alignments

5 Subway Alternatives

LPA

The Project

We Are Here

* Depends on Funding Availability

= Metro Board Decision Point
Subway Alternatives Under Study in Draft EIS/EIR

Within Adopted LRTP/Measure R Funding
- Alt. 1: Westwood/UCLA Extension
- Alt. 2: Westwood/VA Hospital Extension

Beyond Adopted LRTP/Measure R Funding
- Alt. 3: Santa Monica Extension
- Alt. 4: Westwood/West Hollywood Extension
- Alt. 5: Santa Monica/West Hollywood Extension

LRTP: Long Range Transportation Plan for LA County
To be Built in Phases
Within Adopted LRTP/Measure R Funding

• LRTP/Measure R allocates $4.2 billion over approximately 30 years for the Westside Subway Extension
  - 2019: Phase 1 to Fairfax
  - 2026: Phase 2 to Century City
  - 2036: Phase 3 to Westwood/ UCLA or Westwood/ VA

• 30/10 Initiative
  - Goal is to fund the Measure R projects in 10 years
  - Metro is working with Federal government to find ways to accelerate funds
Purpose of Tonight’s Meeting

- Metro promised a focused community meeting on this topic
- Provide update on potential alignments and stations
- Present preliminary results of seismic investigations
- Describe alignment evaluation process
Why Operate Under Private Property?

- Need to connect to stations located at major centers and destinations
- Large radius turns needed for train operations and tunnel construction
- Shortest & straightest route between stations
  - Reduces travel time
  - Increases ridership
  - Reduces construction and operating costs
  - Reduces wheel-wear and noise
Metro Subway Tunnels Today

- Metro Gold Line to East LA built with new generation TBMs. No measurable surface subsidence or substantiated property damage claims.
- Metro Red/Purple lines run below ground, under multiple private properties.
- No noise/vibration complaints since subway opened.
Perception of Sound & Vibration

- Noise & vibration is generated from the track
- Dissipates with distance from track
- Dissipates sooner in soft soil; travels more in hard soil
- Influenced by train speed

<table>
<thead>
<tr>
<th>City</th>
<th>Year(s) built</th>
<th>Typical Depth (to tunnel bottom)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>1910 - Now</td>
<td>35’</td>
</tr>
<tr>
<td>BART (Bay Area)</td>
<td>1964 - 2003</td>
<td>50’-70’</td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>1970s - 1980s</td>
<td>50’-70’</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>1986 - 2000</td>
<td>50’-70’</td>
</tr>
</tbody>
</table>

Depths are generally more shallow at stations & deeper at tunnels in between
Existing Metro Red Line Subway Tunnels

- Union Station to Civic Center
  - 50’ - 100’ underground*
  - Passes under newly built apartments
  - Passes near historic El Pueblo and Cathedral of Our Lady of Angels

*depths to track/bottom of tunnel
Existing Metro Red Line Subway Tunnels

- Pershing Square to 7th St/ Metro Center
  - 60’ - 80’ underground*
  - Passes under high-density residential, commercial and retail

*depths to track/bottom of tunnel
Existing Metro Red Line Subway Tunnels

- **Wilshire/Vermont**
  - 30’-50’ underground (upper tunnel)*
  - 70’ - 110’ underground (lower tunnel)*
  - Passes under high-density residential, commercial and retail
  - TOD residential built above station

*depths to track/ bottom of tunnel
Existing Metro Red Line Subway Tunnels

- **Vermont/Sunset to Hollywood/Western**
  - 60’ - 70’ underground*
  - Adjacent to hospitals (Kaiser, Children’s Hospital, Hollywood Presbyterian)
  - Turns from Vermont to Hollywood under shopping center and park

*depths to track/bottom of tunnel
Existing Metro Red Line Subway Tunnels

- Hollywood/Highland to North Hollywood
  - 60’-80’ underground* on approaches to Santa Monica Mountains (hundreds of feet under mtns.)*
  - Under single-family homes
  - Adjacent to sensitive recording studios

*depths to track/ bottom of tunnel
Criteria for Deciding Alignment

- Connection to preferred stations
- Cost of construction
- Impact on travel time (which affects ridership)
- Geotechnical data including seismic
- Sub-surface easements
Connecting to Stations

Century City Station Options
- Santa Monica Blvd & Ave of the Stars
- Constellation Blvd & Ave of the Stars

Westwood/UCLA Station Options
- Off Street under UCLA Lot 36
- Under Street at Wilshire/Westwood Blvd

4 station pairs, each with 3 alignment options
Wilshire/Rodeo Station

- Station box located in between El Camino and Canon
- Public interest in placing station & portal as close to Rodeo as possible
- Many other portal locations suggested
- Challenging area to identify construction staging location
Century City Station Options

- **Strong support for Constellation station**
  - Located in “center” of Century City
  - Higher ridership at this location

- **Santa Monica Boulevard station**
  - Located at north end of Century City, adjacent to golf course

- **Alignment under golf course already studied and ruled out**
  - Requires station under Ave of the Stars with north-south alignment
  - Requires extremely long tunnel and greater expense
  - Travels under the same, or more number of properties than other alignment options
Westwood/UCLA Station Options

- UCLA off-street station reduces construction impacts
- Wilshire/Westwood Boulevard located more in “center” of area
  - Intersection is already very congested
- Stations closer to UCLA studied & ruled out
  - Even greater impacts constructing in Village
  - Can’t tunnel under cemetery
Alignment Alternatives between Wilshire/Rodeo and Century City

- Santa Monica
- Constellation North
- Constellation South
Constellation to Westwood/UCLA Options

Constellation to Westwood/UCLA (Under-Street)

Constellation to Westwood/UCLA (Off-Street)
Santa Monica Blvd to Westwood/ UCLA Options

Santa Monica Blvd to Westwood/ UCLA (Under-Street)

Santa Monica Blvd to Westwood/ UCLA (Off-Street)
# Distance & Cost Estimates
(Wilshire/ Rodeo to Century City)

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Length (feet)</th>
<th>Cost ($M 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Monica</td>
<td>6,860</td>
<td>$472</td>
</tr>
<tr>
<td>Constellation North</td>
<td>6,370</td>
<td>$471</td>
</tr>
<tr>
<td>Constellation South</td>
<td>5,925</td>
<td>$455</td>
</tr>
</tbody>
</table>
## Distance, Cost and Travel Time Estimates

*(Century City to Westwood/ UCLA)*

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Length (feet)</th>
<th>Cost ($M 2010)</th>
<th>Travel Time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>9,100 - 11,900</td>
<td>$680 - 720</td>
<td>2.0 - 2.5</td>
</tr>
<tr>
<td>Central</td>
<td>11,300 - 12,100</td>
<td>$690 - 730</td>
<td>~ 2.5</td>
</tr>
<tr>
<td>West</td>
<td>14,600 - 15,000</td>
<td>$820 - 830</td>
<td>~ 4.9</td>
</tr>
</tbody>
</table>
## Properties Above Tunnels
*(Preliminary Estimates - Wilshire/Rodeo to Century City)*

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Residential Properties</th>
<th>Non-Residential Properties</th>
<th>Total Number of Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Monica</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Constellation North</td>
<td>4</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>Constellation South</td>
<td>23</td>
<td>13</td>
<td>36</td>
</tr>
</tbody>
</table>

*Metro purchases easements*
### Properties Above Tunnels
(Preliminary Estimates - Century City to Westwood/UCLA)

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<th>Alignment</th>
<th>Residential Properties</th>
<th>Non-Residential Properties</th>
<th>Total Number of Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>56-69</td>
<td>5-13</td>
<td>61-82</td>
</tr>
<tr>
<td>Central</td>
<td>75-110</td>
<td>8-11</td>
<td>83-121</td>
</tr>
<tr>
<td>West</td>
<td>30-65</td>
<td>18-24</td>
<td>51-86</td>
</tr>
</tbody>
</table>

**Metro purchases easements**
Tunnel & Station Depth Estimates
(Century City to Westwood/ UCLA)

- **Westwood/UCLA (off-street)**: 49’
- **Westwood/UCLA (on-street)**: 46’
- **Century City (Santa Monica)**: 50’
- **60’ to 135’**
- **58’ to 104’**
- **65’ to 120’**
- **Century City (Constellation)**: 60’
Easement Acquisition Process

- After tunnel alignment selected, easement area/envelope will be defined
  - Easement will be limited to just above top of tunnel
  - Easement will not extend to the surface or below bottom of tunnel
- Value of easement will be determined by independent appraisal based on following factors
  - Depth of tunnel below the surface
  - Impact to surface
  - Ability to develop or redevelop the surface
- Timing of easement acquisition
  - After Final EIS/EIR approval
  - During Final Design
We Live in Earthquake Country
Recent Geotechnical Investigations Results

- Fault zone runs parallel to/along Santa Monica Blvd in this location
- Building along a fault requires special measures along greater distance
- More complex and expensive than avoiding or crossing a fault

Santa Monica Fault
# Affect of Seismic Activity on Subway Tunnels

<table>
<thead>
<tr>
<th>Earthquake</th>
<th>Date</th>
<th>Magnitude</th>
<th>Impact on Subway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico City</td>
<td>1985</td>
<td>8.1</td>
<td>No damage to tunnels. Some power disruption. Patrons evacuated safely. Used to transport rescue personnel.</td>
</tr>
<tr>
<td>Loma Prieta (SF)</td>
<td>1989</td>
<td>6.9</td>
<td>No damage to tunnels. Subway served as lifeline structure.</td>
</tr>
<tr>
<td>Northridge</td>
<td>1994</td>
<td>6.7</td>
<td>No damage</td>
</tr>
<tr>
<td>Kobe, Japan</td>
<td>1995</td>
<td>7.2</td>
<td>No damage to tunnels. Damage to station and sewer pipes - attributed to 1962 design with moderate seismic provision</td>
</tr>
<tr>
<td>Taipei</td>
<td>2002</td>
<td>6.8</td>
<td>No damage</td>
</tr>
<tr>
<td>Chile</td>
<td>2010</td>
<td>8.8</td>
<td>Running next day. Some damage at entrance to stations</td>
</tr>
</tbody>
</table>
Tunnel Construction Around Faults

- Goal is to avoid tunnel exposure to faults
- Where fault is unavoidable:
  - Reduce exposure to fault as much as possible
  - Design tunnels to withstand anticipated magnitude of seismic event in order to:
    - Minimize damage
    - Ease repairs if necessary
    - Allow for swift return to normal service
- Possible tunnel design features for fault crossing
  - Larger diameter tunnel - eases repairs if needed
  - Different tunnel liner material - minimizes damage should earth movement occur
- Will be determined during Final EIS/EIR
21st Century Subway Tunneling

- New generation TBMs maintain pressure in surrounding earth
- Reduces risk of settlement
- “It is possible to tunnel and operate a subway along the Wilshire Corridor safely” (APTA Peer Review, 2005)
- Tunnels built underground using tunnel boring machines
- Stations built excavating from above off-street or under “decked-over” streets

TBM maintains pressure in surrounding earth as it tunnels
Recent Metro Tunneling Experience

Gold Line Eastside Extension:
- Opened Fall 2009
- 1.8 mile tunnel segment
- Used pressurized face TBMs
- Two underground subway stations
- No measurable surface subsidence
- No substantiated property damage claims
- Excellent safety record
Oil Fields & Wells

- Los Angeles is an oil producing area
- Significant underground construction experience in LA
  - Subways
  - Sewer tunnels & storm drains
  - Buildings with deep basements/foundations
- Draft EIS/EIR has researched locations of active & abandoned wells
  - Oil fields are much deeper than tunnels
  - Unlikely to encounter active or abandoned wells
  - Further investigation during Final EIS/EIR & Design
  - Standard procedures for dealing with wells if found
  - Metro Gold Line Eastside Extension successfully tunneled in former Boyle Heights oil field
Anticipated Refinements during Final EIS/EIR

- Further engineering analysis
- Further geotechnical investigation
- Refine tunneling technique
- Potential minor alignment adjustments
- Refine cost estimates including seismic-related expenses
- No new impacts anticipated due to refinements
- Determine mitigation measures
Review of Construction Outreach

- Survey/inspect properties before work begins to assess conditions
- Process for reviewing damage complaints
- Construction project will carry insurance to address such issues
Where We’re Heading

• **Selection of the Locally Preferred Alternative (LPA)**
  - Project to seek final environmental clearance
  - Project to be engineered for construction
  - Meets FTA’s “New Starts” funding guidelines
  - Fiscally constrained (i.e. can be built and operated within projected funding)
  - Phasing plan
Where We Go From Here

- **June 2010: Community Update**
  - Results of further analysis of alternatives including cost estimates, user benefits & cost effectiveness
- **Summer 2010: Public Hearings on Draft EIS/EIR**
  - Results of technical analyses
- **Fall 2010: Metro Board Consideration**
  - Staff recommendations
  - Adopt Locally Preferred Alternative (LPA)
  - Authorize preparation of Final EIS/EIR
  - Seek FTA approval to enter New Starts Preliminary Engineering
Upcoming Meetings

- Monday, June 14 - LACMA West
- Thursday, June 17 - West Hollywood - Plummer Park
- Monday, June 28 - Westwood United Methodist Church
  Live web-cast of this meeting available at metro.net/Westside
- Tuesday, June 29 - Beverly Hills Library Auditorium
- Thursday, July 1 - Santa Monica Main Library Multipurpose Room

All meetings 6pm-8pm. Content will be identical.
Contact us

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