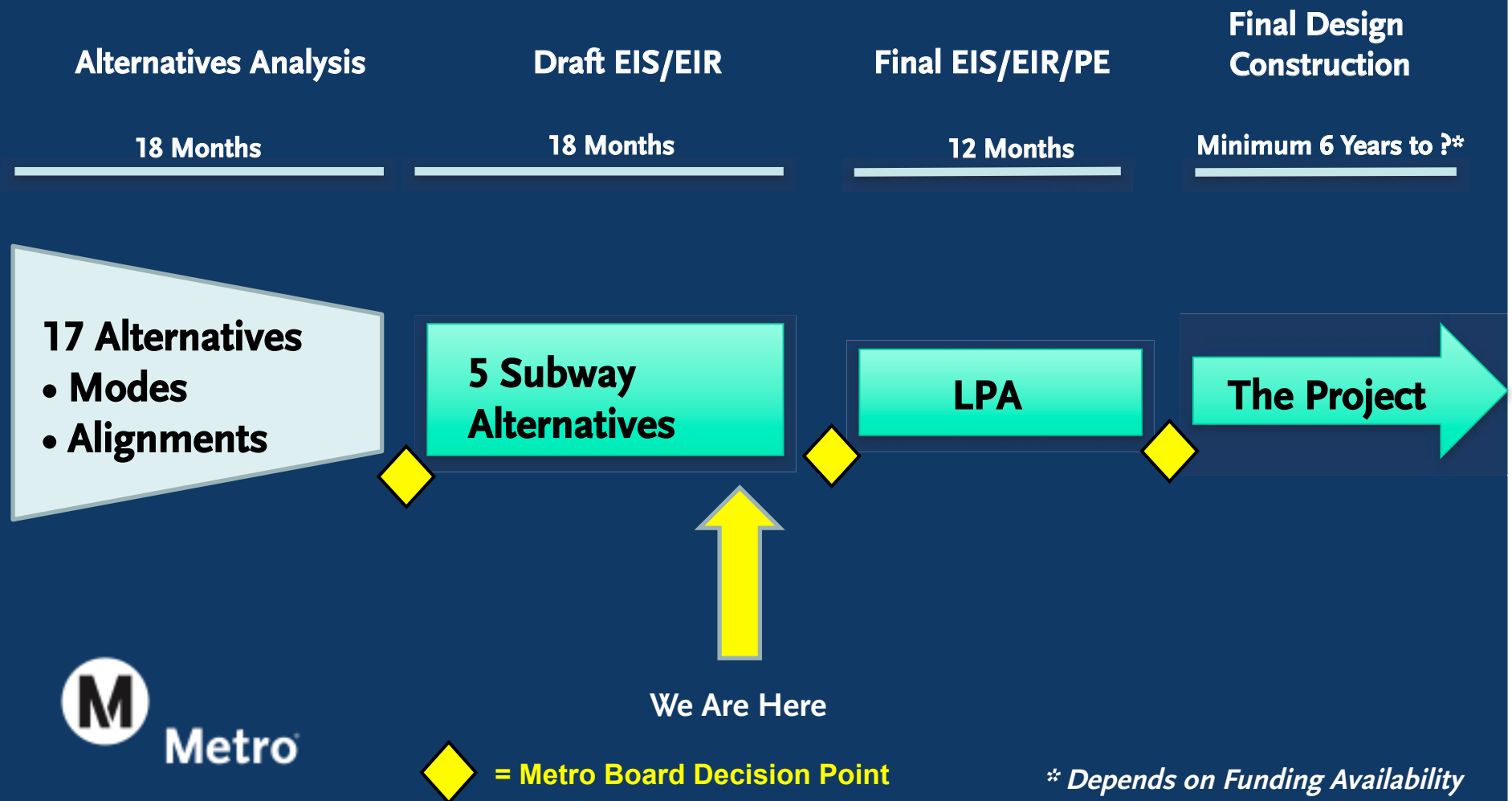


# Westside Subway Extension

*Beverly Hills Alignments Meeting – June 7, 2010*



# Where We are in the Process



# 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



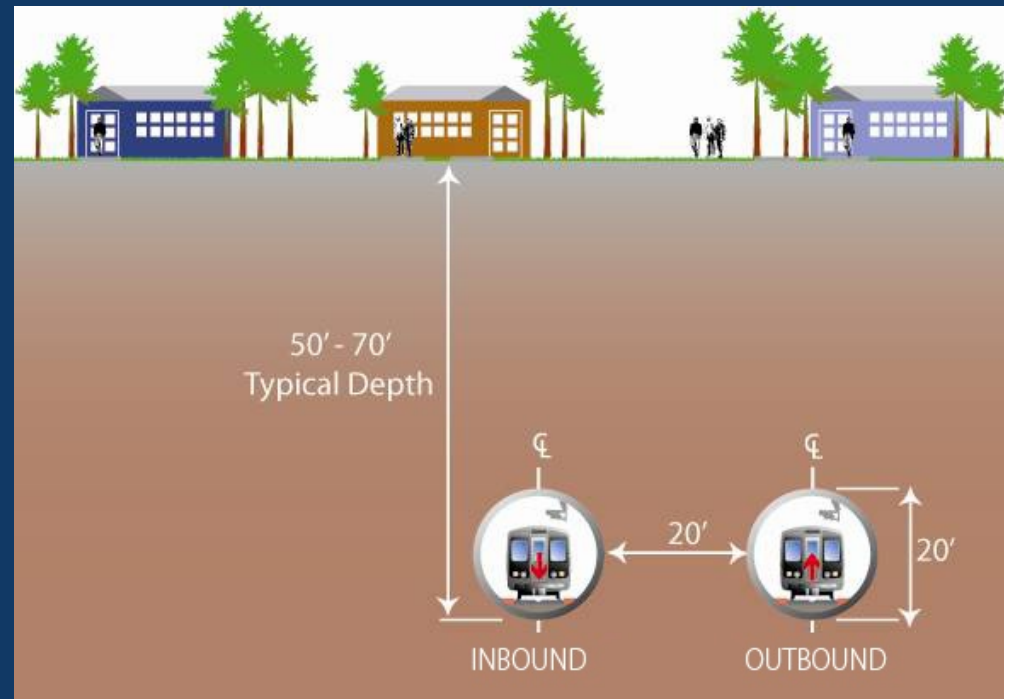
# Why Operate Under Private Property?

- 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

City	Year(s) built	Typical Depth (to tunnel bottom)
New York	1910 - Now	35'
BART (Bay Area)	1964 - 2003	50'-70'
Washington, D.C.	1970s - 1980s	50'-70'
Los Angeles	1986 - 2000	50'-70'

*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 7<sup>th</sup> 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



# Alignment Alternatives between Wilshire/Rodeo and Century City

- Santa Monica
- Lasky
- Direct Connection



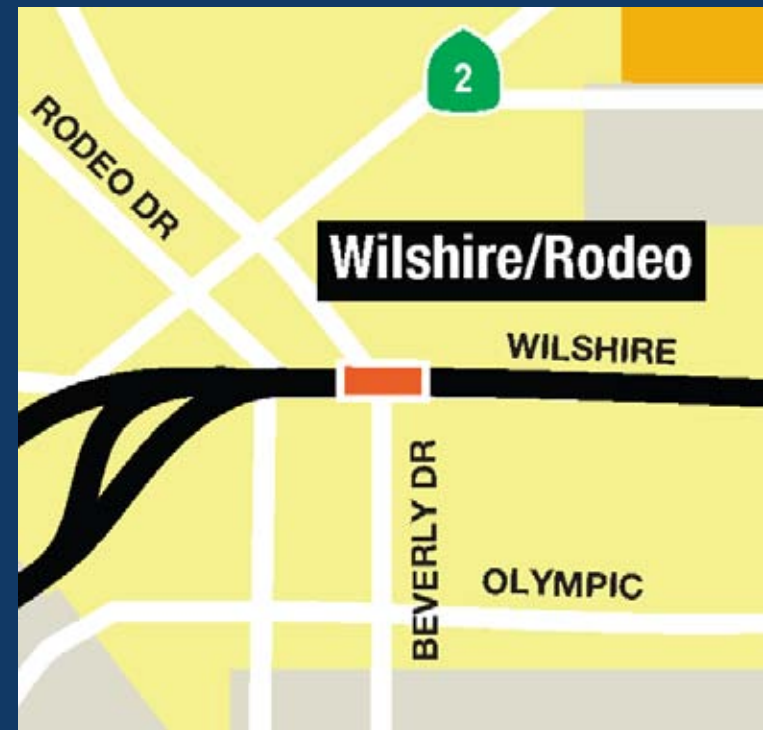
# Criteria for Deciding Alignment

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



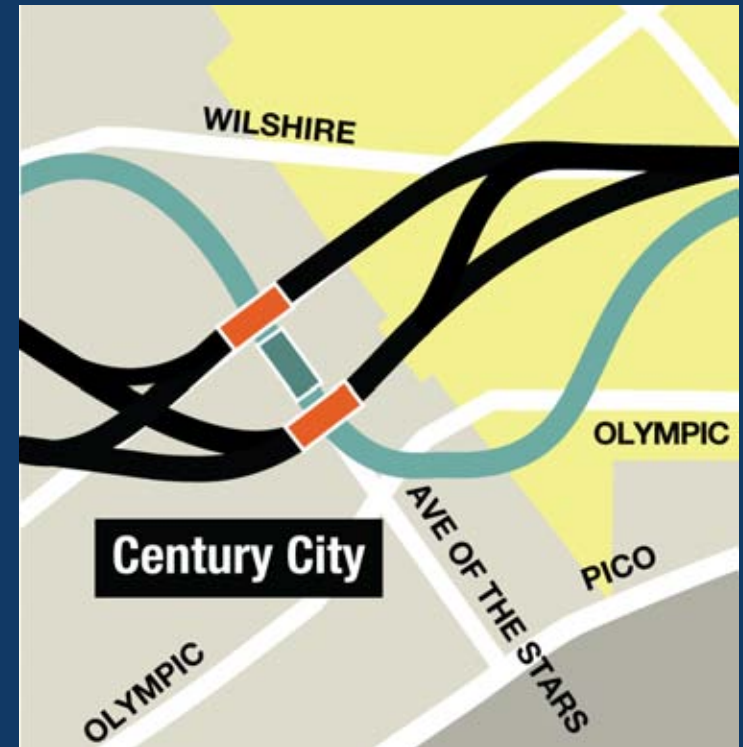
# Wilshire/Rodeo Station

- 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 properties than other alignment options



# Distance & Cost Estimates

3'

<b>Alignment</b>	<b>Length (feet)</b>	<b>Cost (\$M 2010)</b>
Santa Monica	6,860	\$472
Lasky	6,370	\$471
Direct Connection	5,925	\$455



# Properties Above Tunnels (Preliminary Estimates)

2'

Alignment	Residential Properties	Non-Residential Properties	Total Number of Properties
Santa Monica	0	3	3
Lasky	4	18	22
Direct Connection	23	13	36

**Metro purchases easements**



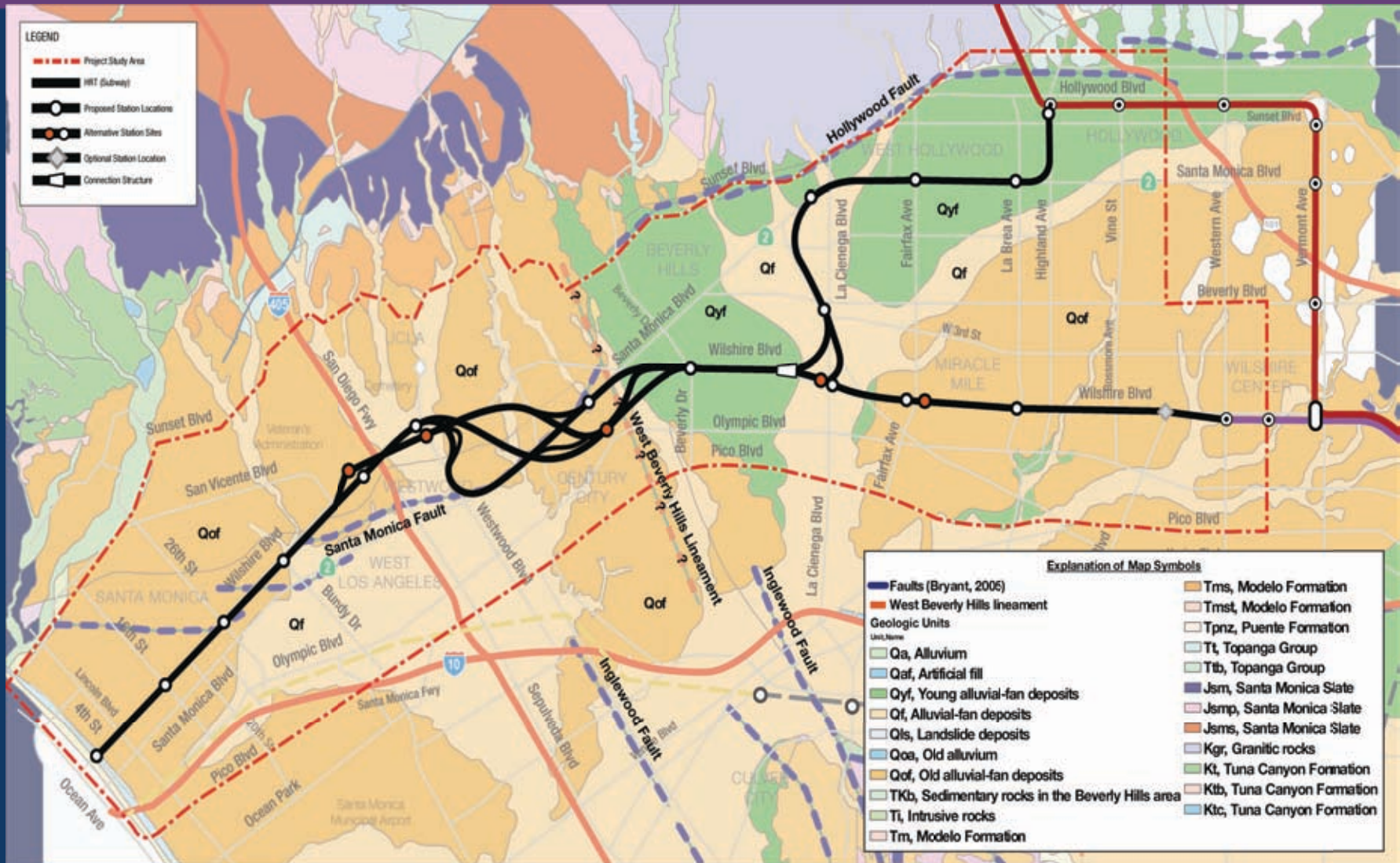
# Tunnel & Station Depth Estimates



# 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

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

# 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



# 21<sup>st</sup> 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

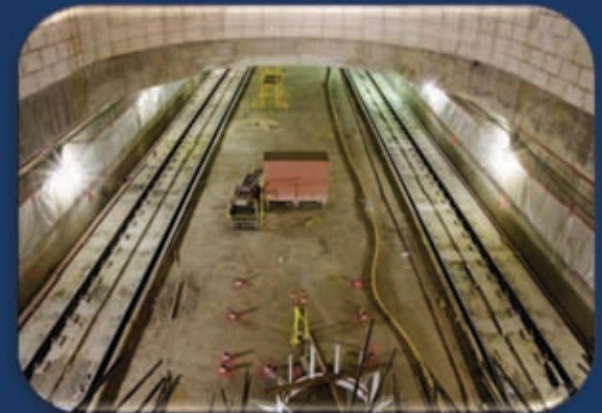
# Recent Metro Tunneling Experience

## 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



Gold Line Eastside Extension Tunnel



Soto Street Station  
Under Construction



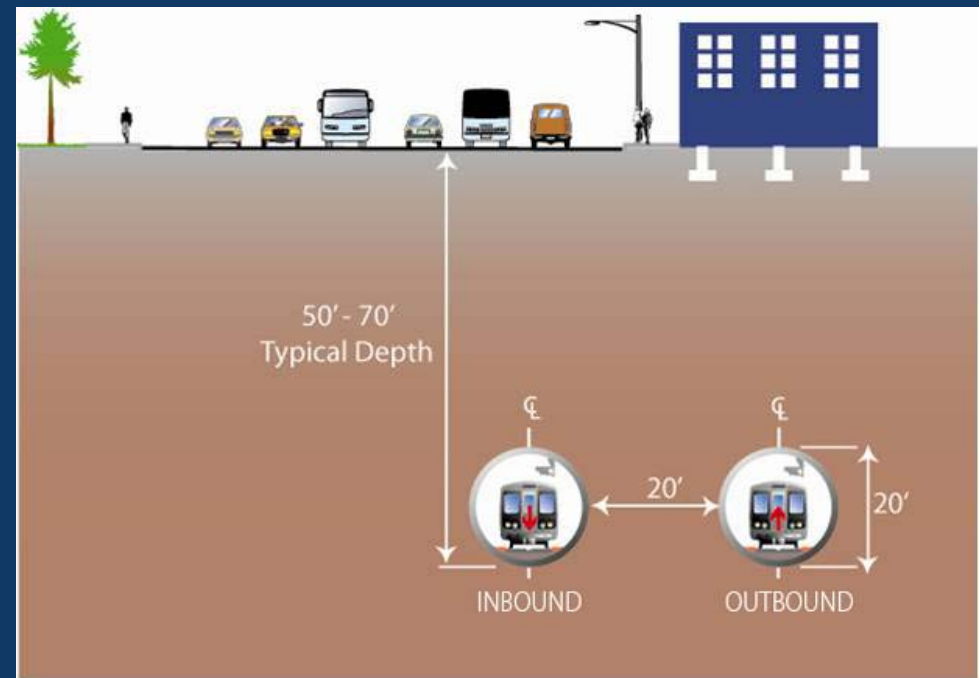
# Oil Fields & Wells

- 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](http://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.*



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# Questions & Comments

