



*ROUTE 710 TUNNEL  
TECHNICAL FEASIBILITY  
ASSESSMENT*



Metro



# Tunnel Feasibility Assessment Objectives



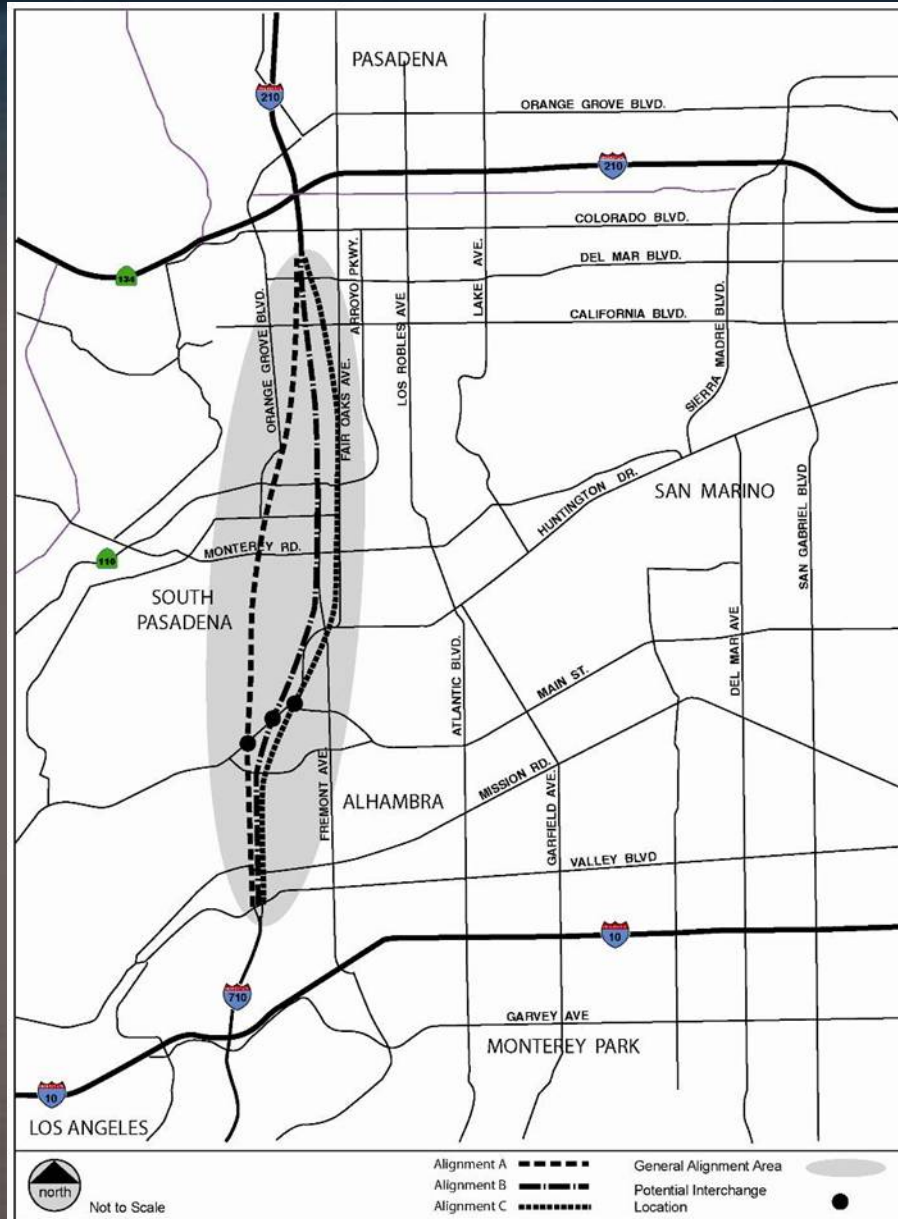
- *Whether a Tunnel is Technically, Operationally and Financially Feasible.*
- *Identify the Preliminary Potential Physical, Environmental and Financial Impacts.*



Metro



# Study Area & Illustrative Alignments



**NO SPECIFIC  
ALIGNMENTS ARE  
RECOMMENDED AT  
THIS STAGE**



# PHYSICAL FEASIBILITY



Metro



# Physical – Traffic Modeling/Analysis



- *Tunnel Scenarios Analyzed with 3- and 4-Lanes/Direction with and without Truck Traffic Allowed.*
- *Also Considered Tunnel Scenarios with and without an Interchange at Huntington Drive.*
- *Evaluated the Effects on the Route 710, Adjacent Freeways and Local Arterials.*



Metro



# Tunneling Methods Considerations



- *Size and geometry of the tunnel cross-section,*
- *Alignment and length,*
- *Geologic and groundwater conditions,*
- *Possible impacts on the adjacent structures*
- *Compatibility with final ground support,*
- *Safety, and*
- *Economy.*



Metro



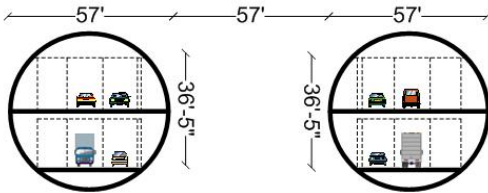


# Physical – Subsurface Conditions

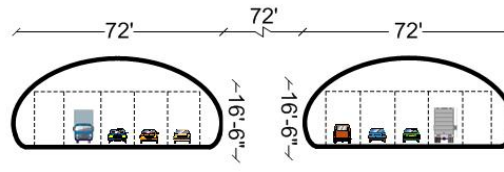
- *Geologic Characterization*

| <i>Geologic Formations</i>       | <i>Description</i>   | <i>Properties<br/>(to be further investigated)</i>              |
|----------------------------------|--|---|
| <i>Alluvial soils</i>            | <i>silt, sand, gravel</i>  | <i>Dense</i>  |
| <i>Shales (unnamed)</i>          | <i>Sandstone with interbedded Shale</i>  | <i>Soft, Friable</i>  |
| <i>Fernando Formation</i>        | <i>Shales, sandstone and silt stone</i>  | <i>Soft, Friable</i>  |
| <i>Monterey/Puente</i>           | <i>Shale and siltstone</i>   | <i>Soft to mod. Hard, slake potential</i>                       |
| <i>Topanga</i>                   | <i>Sandstone interbedded with Shale with Conglomerates, cobbles and boulders</i> | <i>Conglomeratic sandstone beds, can contain boulders</i>       |
| <i>Crystalline Basement Rock</i> | <i>Quartz diorite</i>  | <i>Moderately hard to hard with localized hard quartz veins</i> |

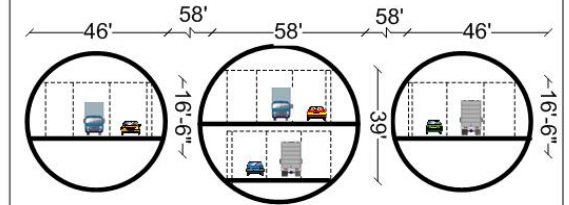
# Physical - Alternative Tunnel Cross-Sections



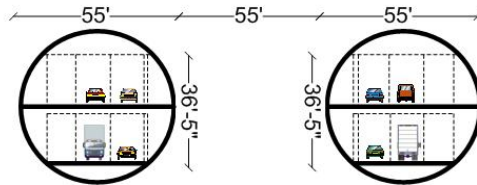
OPTION A1



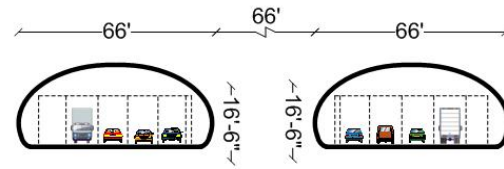
OPTION A2



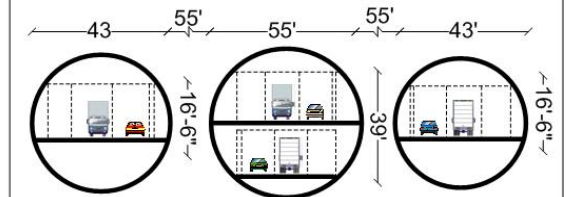
OPTION A3



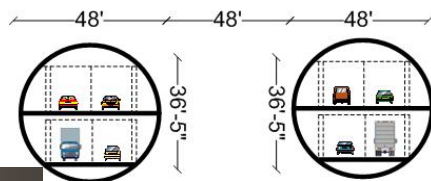
OPTION B1



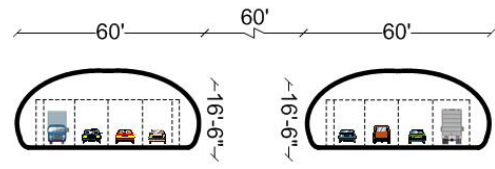
OPTION B2



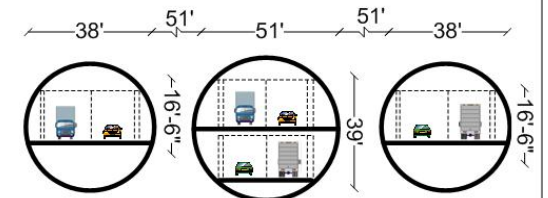
OPTION B3



OPTION C1



OPTION C2



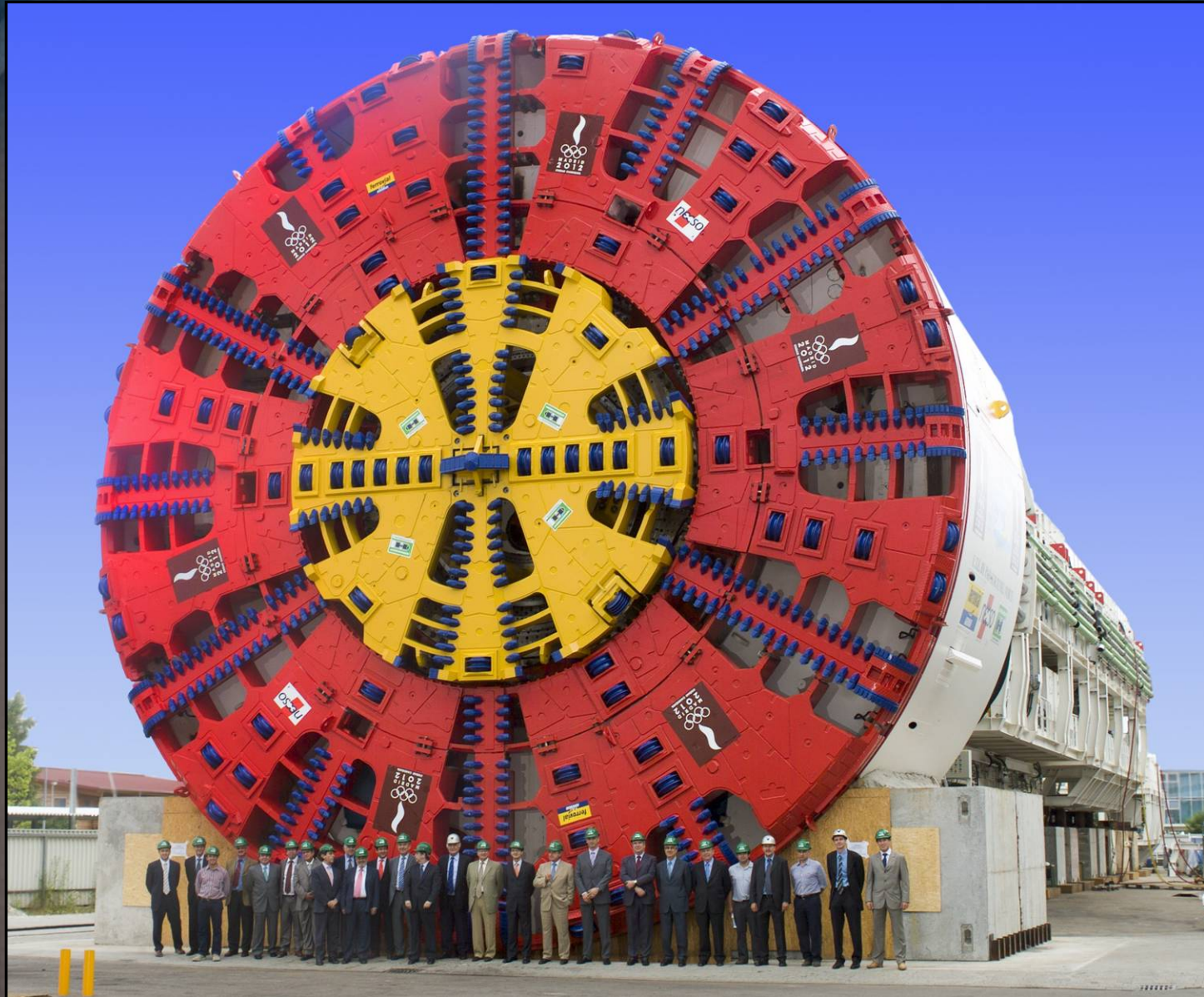
OPTION C3



Metro



# Very Large Diameters Possible: Largest EPB TBM 50 ft diameter, Madrid, Spain for M30



Metro



# Huntington Drive Interchange Option



- *Considered 1 or 2 lane ramps in each direction*
- *The deep main tunnel profile would require long ramp lengths*
- *Would be physically feasible to construct*
- *Right-of-way impacts at surface where ramps meet Huntington Drive*
- *Would require more complex ventilation systems and additional vent buildings / stack*
- *Would increase traffic on Huntington Drive and some local arterial roads*
- *Would have significant additional cost*
- *Would require some cut-and-cover construction*



Metro



# Huntington Drive Interchange Option



- *Environmental/Community Impacts Related to the Huntington Drive Interchange:*
  - *Any interchange would require R/W Acquisition and Surface Disruption for the Ramps.*
  - *Traffic Operations on Huntington Drive near the Interchange would get worse unless this Arterial Road was improved or widened.*
  - *Widening Huntington Drive would Add Capacity but could affect the Character of the Parkway.*
  - *Likely to Require additional Ventilation Building Near the Interchange.*
  - *Potentially High Cost of the Interchange*



Metro





# Operations



Metro



# Operations & Control Center



Me



# Tunnel Operations

- *Safety within the tunnel is paramount*
- *Traffic would be controlled by Variable Message Signs and lane control*
- *Tunnel patrolled by breakdown crews and law enforcement*
- *CCTV would assist a monitoring center to control traffic and deal with incidents*
- *Exclusive truck lanes would be considered if trucks were allowed*



Metro



# Tunnel Operations - Systems



- *Fire hydrants and deluge systems would be considered*
- *Ventilation systems designed to provide fresh air & control smoke*
- *Incident Management, Fire and AQ monitors/alarms*
- *Emergency telephones and radio/cell backbone for communication in tunnel*
- *Emergency exit guidance signs/systems*



Metro





# ENVIRONMENTAL FEASIBILITY



Metro





# Environmental Issues



- *Likely Environmental Issues Include Noise, Air Quality, Historic Properties, Aesthetics, Hazardous Waste, Soil Disposal and Storm Water Discharge.*
- *Impacts During Construction and Operation.*



Metro



# Environmental - Noise



- *During Construction*

- Use of Noise Barriers and Landscaping Installed During Early Construction Phase to Mitigate Visual and Noise Impacts at Each Portal and Vent Shaft
- Permanent Barriers and Landscape Mitigation could be installed at start of construction in place of temporary barriers
- Inclusion of interchange would have impact on Huntington Drive and surroundings area

- *During Operation*

- Traffic Noise at Portals would be Controlled Using Sound Absorptive Materials
- Ventilation Fans would be Equipped with Sound Attenuators
- Sound Walls would be used to Abate Traffic Noise Along Surface Roadways



Metro



# Environmental – Air Quality



- *Regional Benefits*

- Reducing Congestion and Increasing Average Travel Speed would improve Regional Air Quality

- *Local Impacts*

- Minimize concentration of emissions by Design of the Vent System.
- Ventilation Buildings would be designed and located to disperse pollutants
- Huntington Drive interchange would require additional ventilation buildings and stack



Metro



# Air Cleaning Technologies



- *Vehicular Emissions are Typically Dispersed into the Atmosphere Through Tall Vent Stacks.*
- *A Number of Major Foreign Highway Tunnels make Some Use Air Systems or Electrostatic Precipitators (ESPs) to Control Particulate Matter.*
- *No Scrubbers are in Use on U.S. Tunnels.*
- *Scrubbers are still a developing technology and will need to be further examined.*



Metro



# Environmental - Aesthetics



- *Architectural Treatments Should Consider Context Sensitive Design to Blend Portal Structures and Vent Shafts into Communities.*
- *Other Things to Consider in Design Include Visual Quality, Safety and Operational Requirements, Security, Appropriate Lighting, Architectural Treatments, and Landscape Interfaces.*
- *Workshops could be used to Address Key Design Issues with Stakeholders*
- *Comprehensive Landscape Plan can be Developed to Integrate Physical Structures with Communities' Character .*



Metro





# Portals & Vents Stacks



Metro



# Environmental – Portal Aesthetics

- *Aesthetics and Design are Flexible.*
- *Community Involvement and Input would Enhance Acceptance.*
- *Integration of Landscape and Local Themes*



Metro



# Environmental – Portal Aesthetics



Metro



# Mt. Baker Ridge Portal



Metro



# Environmental – Vent Stack Aesthetics



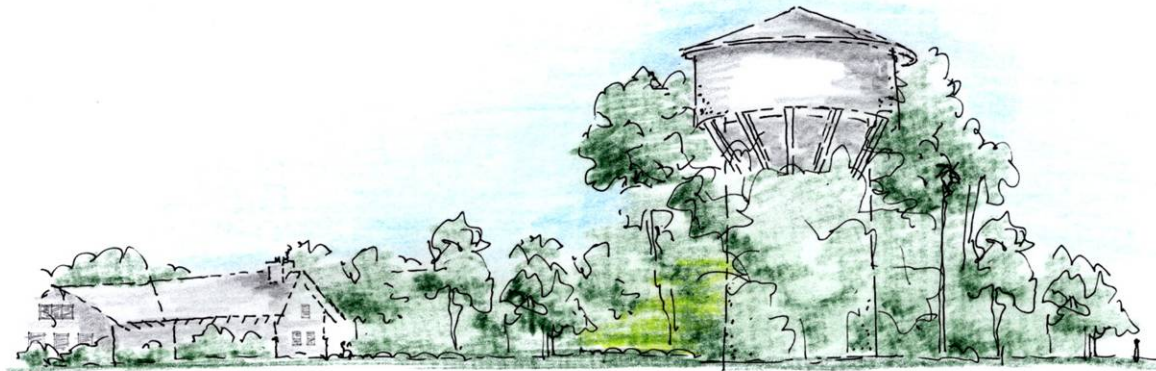
- *Sensitivity in Location and Setting.*
- *Context Sensitive Design.*
- *Camouflage Structure to Blend in with its Surroundings.*
- *Mask Ventilation Stack with Landscaping.*
- *Acquire Additional Properties to Create a Buffer or Set-back.*



Metro



# Environmental – Vent Stack Aesthetics



Metro



# Financial Feasibility - Summary

- *Range of Initial Construction Cost Estimate: \$2.3 Billion to \$3.6 Billion (in 2006 dollars)\*.*

*\* Without the Huntington Drive Interchange*

- *The Financial Feasibility of the Tunnel Concept to Close the Route 710 Gap Requires Further Study.*



Metro

