

# **Palo Alto:**

## **Caltrain Fully Open Viaduct Grade Separations**

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Criteria from Appendix E, City Council Staff Report, Meeting Date 9/5/17  
 Alternatives from Funding White Paper, 11/20/17, plus addition of Elevated Tracks Option

Criteria V V	Alternatives >> Church = Churchill M = Meadow C = Charleston	1a Open Trench Entire City	1b Cut & Cover Tunnel Entire City	1c Twin Deep Bored Tunnels	2a Open Trench, M&C	2b Open Trench, Only C	Individual Roads Lowered (all 3)	Elevated Tracks over Church. and over M&C
Improve East/West Connectivity for All Transportation Modes								
Reduce Traffic Congestion								
Pedestrian/Bike Circulation: Clear, Safe, Separate from Auto Traffic								
Support Continued Rail Operations, Improvement			? (Freight)	? (Freight)				
Finance Cost with Feasible Funding Sources								
Reduce Rail Noise and Vibration (1)		? (1)	? (1)	? (1)	? (1)	? (1)	? (1)	? (1)
Minimize Visual Changes								(2)
Maintain or Improve Access to Neighborhoods, Parks, Schools, etc.								
Minimize Right-of-Way Acquisition by Eminent Domain		?	?		?	?		
Minimize Disruption and Duration of Construction								
Overall Cost								
Cost for Palo Alto (\$M; 2018)		\$2,400-\$2,900	\$3,300-\$4,000	\$2,800-\$3,400	\$750-\$1,000	\$500-\$700	\$302-\$523	\$150-\$200
Cost Per Palo Alto Property Owner (\$)		? (3)	? (3)	? (3)	? (3)	? (3)	? (3)	? (3)

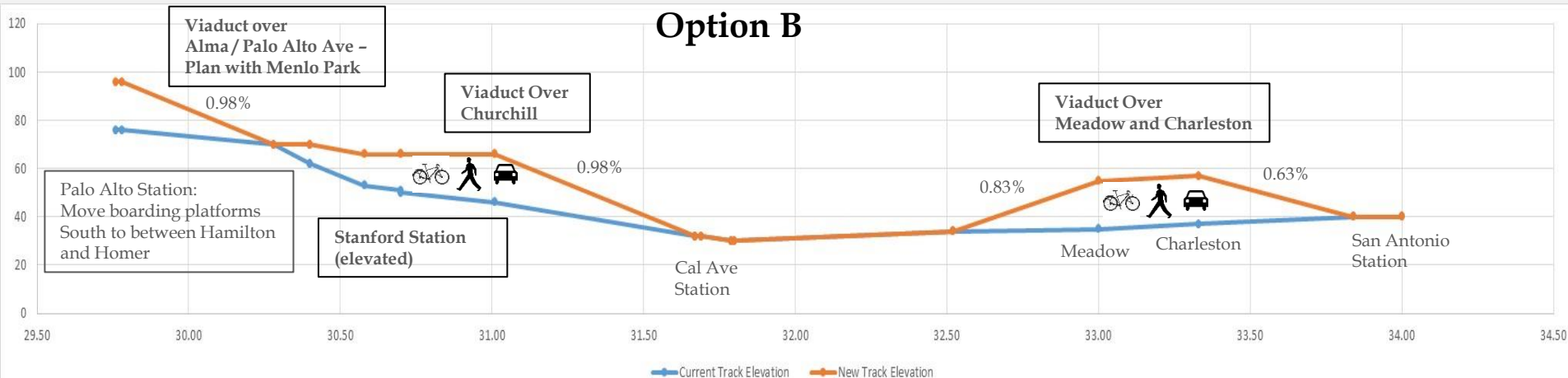
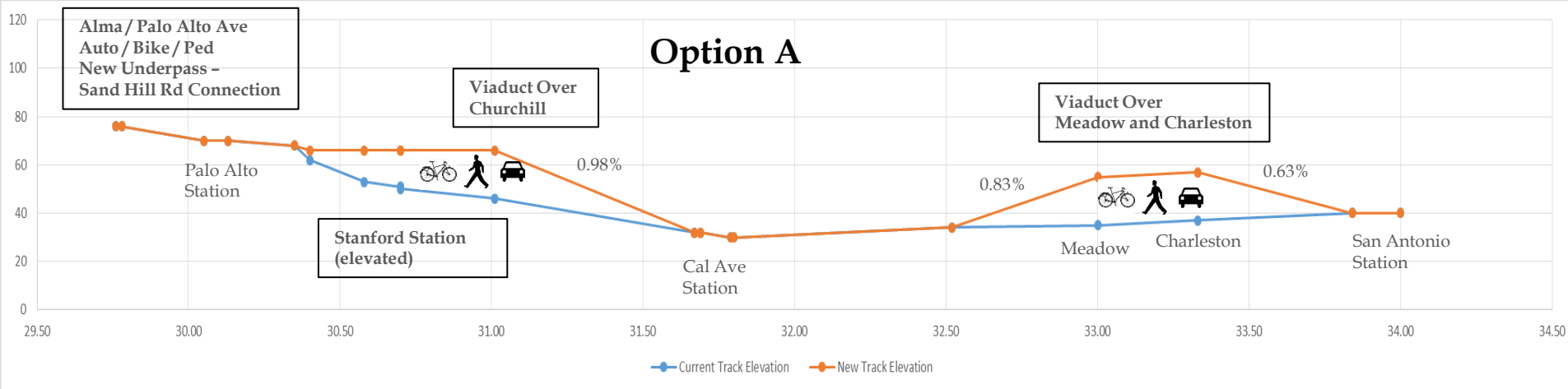
(1) Electrification will reduce noise drastically and reduce vibration some, a larger impact than any of these grade separation alternatives.

(2) Hidden by tall trees in residential areas.

(3) [To be estimated for each alternative; e.g., \$1.7M-\$6M per property owner (white paper, page 11)]

# Palo Alto: Fully Open Viaduct Grade Separations - Options

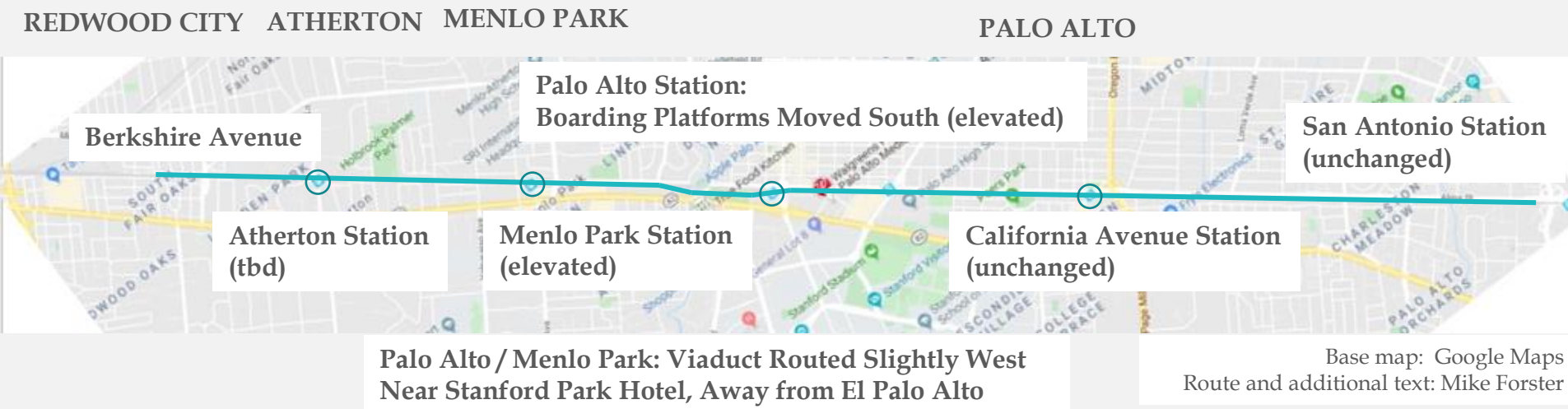
- **Elevated – with arches or other pleasant supports (not a berm)**



# Palo Alto / Menlo Park / Atherton / Redwood City: Fully Open Viaduct Grade Separations - Coordination

A coordinated plan would have significant benefits:

- Continue Palo Alto Option B viaduct north from Palo Alto through Menlo Park and Atherton into Redwood City
- Flexibility in Palo Alto / Menlo Park border options at Alma / Palo Alto Ave and San Francisquito Creek
- Economies of scale: One project rather than 3 or 4 separate projects





# Visually Attractive Examples of Fully Open Viaduct Grade Separations (1 of 2)

- Elevated tracks do not have to be berms that might divide cities.

(Images from Google Earth / Streetview)



Montessoro, Italy



Paris, France - Bercy



Sunnyside, NY



Paris, France - Blvd. St. Jacques



San Carlos (from MP Feasibility Study 2003)



Union City, CA - Kennedy Park - BART

# Visually Attractive Examples of Fully Open Viaduct Grade Separations (2 of 2)

- Elevated tracks do not have to be berms that might divide cities



Palo Alto architect Joe Bellomo's vision for high-speed rail  
<http://www.paloaltoonline.com/news/2009/11/27/architect-calls-for-design-contest-for-high-speed-rail>



Near Ralston and Old County Road, looking west.

City of Belmont, Staff Report, High Speed Rail (HSR)  
Project Update, August 24, 2010  
<http://www.belmont.gov/home/showdocument?id=2232#page=6&zoom=auto,-146,754>

# Fully Open Viaduct Grade Separations – Functional Advantages

- **Eliminates Potential Rail vs. Auto/Bike/Pedestrian Conflicts**
- **Improves East/West Connectivity, Ped/Bike Access –**  
Many possibilities under open structures
- **Recovers land use for other purposes – examples:**
  - Parks and /or community gardens, under and beside open structures
  - Parking, freeing up existing parking lots for other purposes
  - Open air markets
- **Visual impacts perhaps increased but mitigated -** increased height but open beneath
- **Property/Driveway Impacts eliminated –** no road changes
- **Disruption and traffic impact during construction reduced**  
No permanent road changes
- **Improve Traffic Pattern Predictability –** No permanent road changes

# Cost Savings of Fully Open Viaduct Grade Separations

- **Incremental cost is low to fully elevate tracks on viaduct(s)**  
vs. cost to partially elevate tracks or trench/tunnel
- **Large cost savings from not lowering the roadway at all.**
  - Avoids the cost to lower the roadway.
  - Avoids the cost to construct the lowered roadway and change nearby intersections.
  - Avoids the cost of changing utilities under the roadways.
  - Avoids the possible cost of adding pumps for lowered roadways –
    - Also avoids introducing a permanent maintenance and operational issue.
  - Avoids or minimizes the cost for land acquisition for expanded road footprint.
  - Shorter timeframe, higher probability for financing due to lower cost.
- **Efficient, minimal disruption construction might be possible**
  - Construct viaduct entirely over existing tracks on weekends while Caltrain operation continues
  - On one long weekend, install inclines at each end of viaduct(s) ... like Bay Bridge east section
- **Major issue for any option: How to address newly-installed electrification infrastructure?**