INTRODUCTIONS
STATEWIDE UPDATE
Ben Tripousisis
Caltrain Electrification Groundbreaking Event
Geotechnical Study in the Pacheco Pass

Click here to view: https://www.youtube.com/watch?v=GE94LInosLk
RANGE OF ALTERNATIVES: DOWNTOWN ALIGNMENT
Gary Kennerley, Jimmy Thompson & James Tung
SAN JOSE DIRIDON PROGRAM ALIGNMENT: 2008

Program Alignment (2008)

- Dedicated high-speed rail within existing Caltrain right of way through Gardner neighborhood
- Impact to Fuller Park
- Elevated station at Diridon Station
SAN JOSE DIRIDON UNDERGROUND STATION HISTORY

Shallow Tunnel (2010)
- Conflicts with BART Station
- Impacts to residential development and Los Gatos Creek
- National Register archeological site
- Cost 5 times base case
- Reconstruction of Tamien Station & SR 87 Northbound ramp

Thread the Needle (2010)

5100m Tunnel (2010)

Deep Tunnel (2010)

Modified Tunnel (2011)
Thread the Needle (2010)
- Construction of high-speed rail station beneath existing rail lines and station
- Increased travel time compared to Deep Tunnel
- Limited space to construct portal within SR 87/I-280 interchange
- Agreed with neighborhood group to eliminate in favor of Deep Tunnel

Shallow Tunnel (2010)

5100m Tunnel (2010)

Deep Tunnel (2010)

Modified Tunnel (2011)
SAN JOSE DIRIDON UNDERGROUND STATION HISTORY

Construction of high-speed rail station beneath active rail lines and station

Increased travel time compared to Deep Tunnel

Agreed with neighborhood group to eliminate in favor of Deep Tunnel

5100m Tunnel (2010)
- Construction of high-speed rail station beneath active rail lines and station
- Increased travel time compared to Deep Tunnel
- Agreed with neighborhood group to eliminate in favor of Deep Tunnel

Deep Tunnel (2010)

Modified Tunnel (2011)
SAN JOSE DIRIDON UNDERGROUND STATION HISTORY

Shallow Tunnel (2010)

Thread the Needle (2010)

5100m Tunnel (2010)

Deep Tunnel (2010)
- Construction complexity/risks
- National Register archaeological site
- Costs 7 times base case
- Reconstruction of Tamien Station & SR 87 Northbound ramp

Modified Tunnel (2011)
SAN JOSE DIRIDON UNDERGROUND STATION HISTORY

- Modified Tunnel (2011)
  - Medium depth tunnel needing extensive design coordination with future BART station
  - Construction complexity to provide vertical circulation
  - Ground conditions not suitable for mined construction
  - Four tracks with crossovers close to station needed to fulfill service criteria
  - Increased station footprint constrains future development

- Shallow Tunnel (2010)
- Thread the Needle (2010)
- 5100m Tunnel (2010)
- Deep Tunnel (2010)

**Legend**
- Proposed HSR Station
- Existing Caltrain Station
- BART Extension
SAN JOSE DIRIDON: CURRENT

SR 87 / I-280 (2010)
- Elevated station at Diridon Station
- High-speed rail on viaduct mostly within existing public right of way
- Visual Design Guidelines

At-Grade (Under study)
SAN JOSE DIRIDON: CURRENT

SR 87 / I-280 (2010)

At-Grade (Under study)

- Extending blended services through Diridon Station
- Evaluating station and neighborhood impacts
- Evaluating blended service operations
STATION/TUNNEL UNDERGROUND CONSTRUCTION METHODS

- Cut and Cover
- Shafts
- Tunnel Boring Machine
- Sequential Excavation Method
- Pipe Roof Arch
STATION/TUNNEL CONSTRUCTION METHODS: CUT AND COVER

- Long term surface disruption
- Ground water management
  - Base must be:
    » Watertight
    » Strengthened
STATION/TUNNEL CONSTRUCTION METHODS: SHAFTS

- Shafts up to 150 feet diameter to access tunnel
  - Slurry wall
- Construct using:
  - Slurry wall
  - Ground freezing
- Base must be:
  - Watertight
  - Strengthened
STATION/TUNNEL CONSTRUCTION METHODS: TUNNEL BORING MACHINE

- Constant diameter
- Sealed pipe
- Earth pressure balance TBM
  - Positive pressure to balance unexcavated ground
  - Up to 100’ water pressure
- Slurry TBM
  - Slurry used to balance earth and water
  - Complex separation fine spoils
STATION/TUNNEL CONSTRUCTION METHODS: SEQUENTIAL EXCAVATION METHOD

• Support elements designed for specific ground conditions
• Size of drifts based on “standup time” of ground
• Well suited for variable ground conditions
• Groundwater must be controlled
  » Surface dewatering
  » Surface grouting
  » Grouting from tunnel
STATION/TUNNEL CONSTRUCTION METHODS: PIPE ROOF ARCH

- Can be used to expand tunnel width at platforms
- Similar to SEM but with roof supported by horizontal pipes jacked from shaft at both ends of platforms
- Arch support depends on ground conditions
- Groundwater must be controlled
DESIGN CRITERIA: TUNNEL STATION CONFIGURATION

LEGEND

△ Railroad Switches
☐ Mined Caverns

<2 miles
<2 miles

6,000' (Minimum)

1,410'

Platform

Platform

*Schematic: not to scale

Schematic Plan View
DESIGN CRITERIA: UNDERGROUND STATION EXCAVATION

2295’ min. Platform Track

1410’ Platform

2295’ min. Platform Track

80’
DESIGN CRITERIA: TUNNEL STATION EXCAVATION

150’ Deep Tunnel Option

Shallow Tunnel With 75’ Deep Station Box Option
EXISTING CONDITIONS: SOIL

- Extensive existing geotechnical information available
- Groundwater table near surface
- Highly permeable sands and gravels
- Ground treatment needed to prevent Station collapse
- Protect Guadalupe River and Los Gatos Creek
GROUND TREATMENT: GROUTING INJECTION

- Cement grout injected from surface under high pressure
- High ground water flows dilute cement grout
- 2008 Grouting trial:
  » Injected cement slurry grout over several days
  » Sample cores to verify treatment
  » Only traces of grout remained
GROUND TREATMENT: FREEZING

- Typically 2 months to freeze
- Closer spacing of pipes needed if groundwater is moving
- Large chillers, pumps and generators at surface to circulate refrigerant
- High risk of unfrozen pockets in variable ground
- Subject to ground heave
SIMULATION OF MINED STATION COLLAPSE

Click here to view: https://www.youtube.com/watch?v=92qpfrC0YmU&feature=youtu.be
# COMPARISON: HIGH-SPEED TRAIN VS. BART TWIN TUNNEL

<table>
<thead>
<tr>
<th>Facility Component</th>
<th>HST (LxWxD)</th>
<th>BART (LxWxD) for same total length as HST</th>
<th>Volume HST Tunnel/Station (Cubic Yards)</th>
<th>Volume BART Tunnel/Station (Cubic Yards)</th>
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</thead>
<tbody>
<tr>
<td>Tunnels</td>
<td>21,200 LF x 30 ft Diameter</td>
<td>8,800 LF x 15 ft Diameter</td>
<td>554,700</td>
<td>115,200</td>
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<tr>
<td>Station</td>
<td>1,400 LF x 140 FT x 60 FT</td>
<td>900 FT x 70 FT x 60 FT</td>
<td>436,000</td>
<td>140,000</td>
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<tr>
<td>Track Transition Structures</td>
<td>North of HST station box = 600 FT x 150 FT x 60 FT</td>
<td>None Required</td>
<td>555,000</td>
<td>N/A</td>
</tr>
<tr>
<td>Tunnel Crossers, Vent Shafts, Access Shafts</td>
<td>9 each x 40 FT x 30 FT Diameter</td>
<td>None required in Diridon Station Area</td>
<td>9,420</td>
<td>N/A</td>
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</tbody>
</table>

**Total Volume**

<table>
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<tr>
<th></th>
<th>HST</th>
<th>BART</th>
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<tbody>
<tr>
<td>Ratio of Volumes</td>
<td>6.10</td>
<td>1.00</td>
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</tbody>
</table>

*Note: This table is for comparison purposes only*

**Relative tunnel size**

- 18’ dia.
- 28’ dia.

Excavation footprints in cubic yards (cy)
TUNNEL STATION: GOING FORWARD

- Tunnel station withdrawn because:
  » Infeasible due to construction complexity and risks:
    • Poor soils/potential settlement
    • Groundwater issues/infiltration
    • Soil improvement challenges
    • No comparable high-speed rail mined station in the world
    • 7-16 years to build
    • Surface disruption
  » Impacts to archeological site
  » Impacts to Caltrain Tamien station

- Description in Draft Environmental Document
  » Tunnel alternatives described in Chapter 2, Alternatives
  » Study materials and reports included in appendices

REF: PAA, Appendix C Table 3, Page 18
SAN JOSE DIRIDON: Alternatives Under Study

SR 87 / I-280 (2010)

At-Grade (Under study)

- Extending blended services through Diridon Station
- Evaluating station and neighborhood impacts
- Evaluating blended service operations
AT-GRADE CONCEPTS: DIRIDON STATION

• Blended HSR service at existing Diridon Station
  » Assumes existing operators implement proposed service expansions through 2040 (Caltrain, UPRR, Amtrak, ACE, Capital Corridor)
  » Multiple conflicts due to single track sections north of station and Vasona lead to the south
  » Timetable analysis identified total 53 minutes of delay per peak hour across all passenger services, unrecoverable

• HSR at-grade station west of existing Diridon Station
• HSR at-grade station east of existing Diridon Station
See PDF for greater detail
AERIAL ALTERNATIVES: LONG OR SHORT VIADUCT

Click here to view: https://www.youtube.com/watch?v=Tno7JkemsGw
MONTEREY CORRIDOR: WHY NOT 101?

US 101 Constraints
- US 101 Median: Avoided due to slow-speed curves and Caltrans’ plans for future expansion in median
- West Side of US 101: Avoided due to significant impacts to park lands and PG&E Metcalf Transmission Substation

LEGEND
- Conceptual Alignments
  * Alignments cross from Monterey Rd to US 101 either along Blossom Hill Rd or SR 85
  ** Minimum design speed of 125mph

Current Range of Alternatives
- Monterey At-Grade
- Monterey Viaduct

[Map showing alternative alignments from Monterey to US 101]
NEXT STEPS
Leah Robinson-Leach
<table>
<thead>
<tr>
<th>DATE</th>
<th>LOCATION</th>
<th>POTENTIAL DISCUSSION TOPICS</th>
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<tbody>
<tr>
<td>July 12</td>
<td>Southside Community Center</td>
<td>• Evaluation Criteria &amp; Monterey Corridor Alternatives</td>
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<tr>
<td>August 2</td>
<td>San Jose State University Student Union</td>
<td>• Review Downtown Alignment Alternatives: Underground, At-grade, Aerial</td>
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<td>(Today)</td>
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<tr>
<td>August 30</td>
<td>City Hall Wing 118-120</td>
<td>• Environmental Impacts: Property Acquisition Process, Noise, Construction Impacts,</td>
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<tr>
<td>September 27</td>
<td>City Hall Wing 118-120</td>
<td>• Monterey Underground Concept</td>
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<td>• Wildlife Connectivity Assessment</td>
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<tr>
<td>October 26</td>
<td>MLK Library Meeting Room 255</td>
<td>• Diridon Station Planning</td>
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<tr>
<td></td>
<td></td>
<td>• Structural Feature Architecture/Aesthetics</td>
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<tr>
<td></td>
<td></td>
<td>• System Operations</td>
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<tr>
<td>November 16</td>
<td>MLK Library Meeting Room 255</td>
<td>• Confirm Downtown/Diridon and Monterey Corridor Alternatives for EIR/EIS</td>
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<tr>
<td>December 14</td>
<td>City Hall Wing 118-120</td>
<td>• City of San Jose Peer Review Results</td>
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<tr>
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<td></td>
<td>• Summary and Next Steps</td>
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*Meeting details are subject to change.*
QUESTIONS & COMMENTS
Questions & Comments

Please limit your comments and questions to **two minutes**

Thank you!
THANK YOU & STAY INVOLVED

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