EXERCISE 3 – STITCHING THE CORRIDOR TOGETHER

San Francisco to San Jose on the Caltrain Corridor

OBJECTIVES

The purpose of Exercise 3, "stitching the corridor together" is to engage the TWG/PWG in an iterative process to:

* Narrow the range of vertical alternatives to frame the range of impacts needed for analysis in the EIR/S
* Identify a coherent corridor rail system alternative with local design options that are technically feasible, achievable and desirable with a corridor and statewide systems perspective
* Coordinate vertical options with adjacent communities
* Identify design implications of community priorities for TWG/PWG consideration
* Identify additional information needed (operations, constructability, phasing corridor costs & design)
* Set expectations on 15 percent engineering

EXERCISE

Given the information available in the Preliminary Alternatives Analysis, this exercise is to graphically draw a stitched together corridor from San Francisco to San Jose Diridon and annotate a table that describes the basis for selection of grade separation methods, why and what additional information is needed. This exercise both narrows what is desirable (community goals, corridor equity) with what is feasible (systems design criteria, minimizing environmental impacts, alignment constraints), and tests community desirability based on feasibility.

STEPS

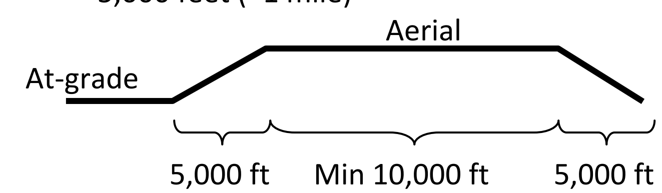
1. Identify 4-mile minimum segments for above or below grade options and draw on tracing paper the location of the selected grade separation method(s). Keep in mind what best balances community desirability and system feasibility while taking into account:
   a. Available ROW
   b. Cross-rail connectivity
   c. Minimizing environmental impacts (noise, vibration, visual, natural resources)
   d. Potential opportunities and benefits (connectivity, TOD)
   e. Sub-section and corridor equity
2. For each grade separation method chosen, identify:
   a. Design considerations that drove the selection of the grade separation method (right-of-way width/property acquisition, length of construction period, Caltrain operations during construction, or visual/noise and vibration impacts)
   b. Which of the following are reasons for why the chosen grade separation method differs from the existing Caltrain grade:
      - ☐ ROW width too narrow for 4-track
      - ☐ Grade separations currently do not exist
      - ☐ Minimize/reduce noise/visual impacts
      - ☐ Protect natural systems/habitat and/or historic/cultural resources
      - ☐ Increase cross-rail connectivity
   c. The cities in which transitions and tunnel portals are located. If possible, identify possible limitations to cross-rail connectivity due to transitions and/or portals.
3. Provide feedback

NEXT STEPS

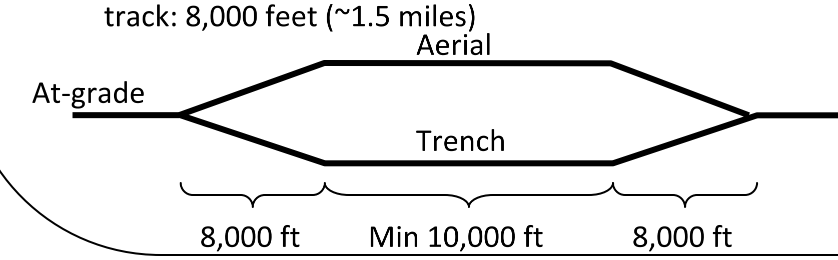
The graphic and table outputs from the TWG meeting will be presented to the PWG. PWG members will review, discuss and provide feedback on the desirability implications of a coherent corridor vertical alignment with design options. Based on this, PWG will provide feedback on local community priority trade-offs, principles for corridor equity and priorities for areas for further study and additional information.

<u>DESIGN GUIDELINES AND SYSTEMWIDE REQUIREMENTS</u>

- Four tracks required for operations
  - 2 tracks for HST
  - 2 tracks for Caltrain
- 4-tracks at same elevation will maximize interoperability
- Minimum 4 miles for each grade separation method
  - Minimum distance at given elevation: 10,000 feet (~2 miles)
    - Minimum length required to remain at given elevation before another vertical transition can be made
  - Distance for <u>4-track</u> single level transition (i.e. 4-track at-grade to aerial or trench): 5,000 feet (~1 mile)



  - Distance for <u>stacked</u> solution transition 4-track: 8,000 feet (~1.5 miles)



- Transitions
  - Avoid locating vertical transitions where street grade separations are desired
  - Stacked vertical options require a 120 foot wide ROW cross section to transition to 4-tracks
  - Minimize number of transitions to avoid "roller coaster effect"
- Temporary Construction Easements
  - Planning goal is for most construction to occur along the Caltrain right-of-way
  - Where ROW is constrained, area required for construction or Caltrain operations will depend on the vertical option, Caltrain operations and constructability analysis
  - Bored tunnel – area required at portals for construction lay-down
    - 4-5 acres at tunnel start (~150 feet wide by 1,500 feet long)
    - 2 acres at end of tunnel (~150 feet wide by 750 feet long)

<u>MAP LEGEND</u>

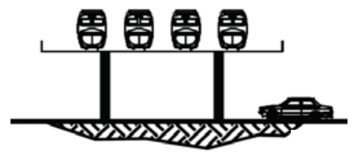
ALIGNMENT CONSTRAINTS
<u>(NOTED IN RED ON BASE MAP)</u>
Creeks
Hwy/Fwy Infrastructure
Transit Infrastructure
ROW < 80 feet
Freight Spurs (requires At-grade Caltrain)
Existing 4-track sections

SINGLE VERTICAL ALIGNMENT OPTIONS
<u>(NOTED IN BLACK ON TRACE)</u>
Locations with only one alternative such as the
San Bruno Grade Separation Project
Millbrae Station
San Mateo at Bay Meadows
Santa Clara

EXISTING GRADE
<u>(NOTED IN YELLOW ON TRACE)</u>
Ground level

TYPICAL GRADE SEPARATION METHODS

Aerial Viaduct



Aerial High-Speed Rail in Urban Setting

Aerial Viaduct Structure

COLOR CODE:

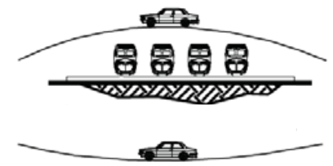
WIDTH: approx. 80 - 105 feet

CONSTRUCTION COST: approx. 3 times At-Grade

PROS: Improved or New East/West Connections, Narrow Width, Pleasant for Riders, Available Space Below Structure, Constructability

CONS: Visual Impact, Noise Impact

At-Grade



At-Grade Caltrain Tracks

Existing Road Under Caltrain At-Grade Tracks (Jefferson Ave. in RWC)

COLOR CODE:

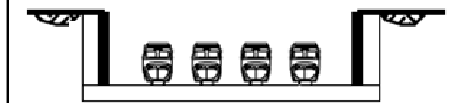
WIDTH: approx. 95 - 105 feet

CONSTRUCTION COST: 1 - all cost relative to At-Grade

PROS: Pleasant for Riders, Less Visibility, Constructability, and Least Effect on Freight

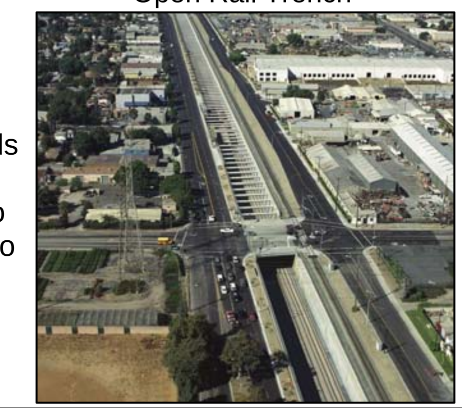
CONS: Right of Way Needs, Impacts to Properties at Grade Crossings

Trench



Freight Train in Open Trench

Open Rail Trench



COLOR CODE:

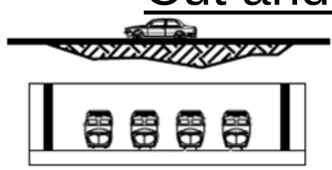
WIDTH: approx. 100 feet

CONSTRUCTION COST: approx. 3.5 times At-Grade

PROS: Option for Connectivity Over Trench, Limited Visual Impact, Limited Ventilation Needs

CONS: Minimal Improvement to Connectivity, Potential Impacts to Waterways and Utilities, Cost, Right of Way Needs

Cut and Cover Tunnel



Entrance to Cut and Cover Tunnel

Construction of Cut and Cover Tunnel

COLOR CODE:

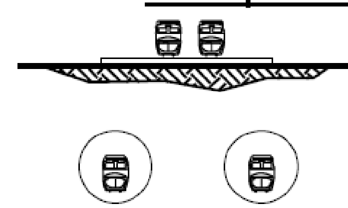
WIDTH: approx. 100 – 140 feet

CONSTRUCTION COST: approx. 5 times At-Grade

PROS: Limited Visual Impact, Improved Connectivity, Reduced Noise at Covered Areas, Useable Space At Grade

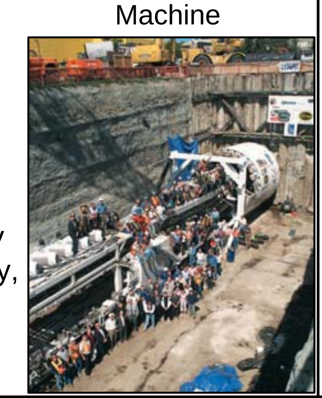
CONS: Requires Ventilation System and Fire/Life Safety Emergency Egress, Decrease in Rider Safety, Potential Impacts to Waterways and Utilities, Cost, Right of Way Needs

Deep Bored Tunnel



Portal for Deep Bored Tunnel

Tunnel Boring Machine



COLOR CODE:

WIDTH: approx. 70 – 115 feet

CONSTRUCTION COST: approx. 7 times At-Grade

PROS: Limited Visual and Noise Impact, Improved Connectivity

CONS: Centralized Noise Impacts at Required Ventilation System, Fire/Life Safety Emergency Egress, Decrease in Rider Safety, Potential Impacts to Waterways and Utilities, Cost, Right of Way Needs

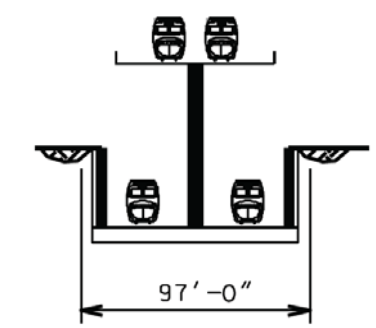
Stacked "Hybrid" Solutions

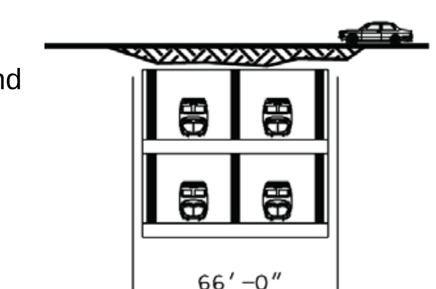
WIDTH: approx. 66 – 100 feet

CONSTRUCTION COST: approx. 3.5 to 4.5 times At-Grade

PROS: Narrower ROW Requirements, Minimizes Visual Impact,

CONS: Longer Construction Period, Transition to 4-Track Requires Additional Width and Length, No Interoperability, Cost, Minimal Improvement to Connectivity, Potential Impacts to Waterways and Utilities, Decrease in Rider Safety (For Tunnel)





Note: Provided widths are finished widths. Additional width required during construction.