Rob de Geus
Deputy City Manager

Welcome & Introduction

Wednesday
November 28, 2018
6:00 - 8:00 pm
Railroad crossing ideas to be discussed:
• Charleston Road
• Meadow Drive

Wednesday
January 23, 2019
6:00 - 8:00 pm
Railroad crossing ideas to be discussed:
• Churchill Avenue
• Palo Alto Avenue
• Citywide Tunnel
Welcome & Introduction
Project Background & Purpose
Overview of Charleston / Meadow Ideas
Q & A
Stations
  • Charleston / Meadow Hybrid
  • Charleston / Meadow Viaduct
  • Charleston / Meadow Trench
  • Other Crossings
  • Creeks/Drainage
  • Noise/Vibration
  • Traffic
Station Report Out
Next Steps
Goals for Meeting

- Inform the public about the project
- Identify existing features and constraints
- Begin funding conversation
- Answer questions
- Obtain your input about ideas and options
Community Meeting Topics

Community Meeting - August 23, 2018
- Why separate the road from the tracks?
- Review current design ideas

Community Meeting - November 28, 2018
- Feedback on the Charleston / Meadow ideas
- 3D photo visuals
- Begin funding conversation

Community Meeting - January 23, 2019
- Feedback on Palo Alto Avenue, Churchill Avenue and City-wide Tunnel ideas
- 3D visuals
- Continue Funding Conversation
- Next Steps

Comments from each Community Meeting will be summarized and posted on the project web page for review along with the materials and PowerPoints used at the meetings for those who cannot attend or for people who do attend to be able to refer back to the materials.
What is an at-grade crossing?

Also known as a “railroad crossing”… a location where a roadway and sidewalk cross railroad tracks at grade (same level as the street).

Drop-down gates and red flashing lights are used to stop traffic when a train approaches.
Palo Alto Existing At-Grade Crossings

- University Ave
- Embacadero Rd
- Oregon Expwy
- San Antonio Rd

- Palo Alto Ave Crossing
- Churchill Ave Crossing
- Meadow Dr Crossing
- Charleston Rd Crossing
Near Miss: Vehicle Stopped on Tracks
Why is the City undertaking this effort?

**Improve Traffic Circulation/Mobility**
- Reduce traffic delays caused by gate down times
- Improve traffic flow across railroad crossing

**Increase Public Safety (vehicular, bicycle, and pedestrian)**
- Eliminates pedestrian, bicyclist and motor vehicle conflicts with the railroad... this eliminates the potential for accidents
- Improve pedestrian and bicycle access

**Safer Facility + Less Congestion = Higher Quality of Life**
What is a grade separation?

A bridge or structure that allows the public to travel under (or over) the railroad or a railroad to travel under (or over) the roadway.

- **Hybrid**
  - Partially lower the roadway and partially elevate the railroad tracks

- **Trench**
  - Lower the railroad in a trench and leave the roadway at its existing elevation

- **Viaduct**
  - Raise the railroad tracks above the roadway on structure and leave the roadway at its existing elevation

- **Tunnel**
  - Lower the railroad below the roadways in a tunnel
### Weekday Train Traffic

#### Total Number of Trains (per Weekday)

<table>
<thead>
<tr>
<th></th>
<th>Northbound (NB)</th>
<th>Southbound (SB)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Caltrain</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PM: 26</td>
<td>PM: 26</td>
<td>PM: 52</td>
</tr>
<tr>
<td></td>
<td>Total: 46</td>
<td>Total: 46</td>
<td>Total: 92</td>
</tr>
<tr>
<td><strong>Caltrain</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2022 Projection #)</td>
<td></td>
<td></td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>57</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td><strong>High Speed Rail</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2029 Projection +)</td>
<td>128 trains per day to/from San Francisco with an additional 24 trains starting at San Jose</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Union Pacific</strong></td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

# 2022 Projected Values based on Completion of the Peninsula Corridor Electrification Project (from FEIR, December 2014) (Prototypical Schedule)
+ 2029 Projected Values based on Blended Service and Completion of the High Speed Rail Project and 2014 CHSRA Business Plan
Ideas to Review - Finding Solutions

Meadow / Charleston Trench
- Lower the railroad below the roadways at Meadow and Charleston

Meadow / Charleston Hybrid
- Partially lower the roads and partially elevate the tracks at Meadow and Charleston

Meadow / Charleston Viaduct
- Raise the railroad above the roadways at Meadow and Charleston on structure
Design Criteria

- **Design**
  - Based on published design criteria and regulations

<table>
<thead>
<tr>
<th>Identify Design Exceptions Where Design Criteria Cannot Be Met:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Railroad Profile Grade = 1% maximum</td>
</tr>
<tr>
<td>• Minimum Vertical Clearance = 24.5 feet for Trains</td>
</tr>
<tr>
<td>• Minimum Vertical Clearance = 15.5 feet for Roadways</td>
</tr>
</tbody>
</table>
Meadow / Charleston Trench

Trench Length = 6300 ft
Temporary Track (Shoofly) Length = 8400 ft

Trench Excavation Depth: 0 to 37 ft
Trench Length = 6300 ft

Utility Relocations
Pump Station
Lift Station - Creek Diversion

To San Francisco
To San Jose
Trench Example Section with Temporary Track - Phase 1
Landscaping and Obstructions removed above ground anchors
See website for link to Meadow/Charleston Trench Animation
Example Trench Grade Separations

Alameda Corridor East (ACE) Project
San Gabriel, CA

Alameda Corridor East (ACE) Project
Compton, CA
**Pros**
- Less visual impact with trains below existing grade between Charleston and Meadow
- May reduce rail noise

**Cons**
- Blocks creeks at Adobe and Barron – potential flooding issues and right-of-way impacts
- Major utility relocations for utilities located in Caltrain corridor, Meadow and Charleston
- Requires subsurface right-of-way acquisition for trench wall structural system
- Requires high fence along trench walls for safety to protect high-voltage lines
- Highest long-term maintenance cost
- Requires design exception from Caltrain for 2% grade
- Closes Meadow and Charleston for construction of roadway bridges
- Longest construction time
Meadow / Charleston Hybrid

Embankment Length = 5000 ft

Temporary Track (Shoofly) Length = 6400 ft

Embarkment Height: 0 to 14 ft

Embarkment Length = 5000 ft

Temporary Track (Shoofly) Length = 6400 ft

To San Francisco

To San Jose
Hybrid Example Section with Temporary Track - Phase 4

100 FT. CALTRAIN RIGHT-OF-WAY

20 FT.
TO NEAREST HOME

18 FT.

PERMANENT TRACK
(RETAINED EARTH FILL)

OVERHEAD CONTACT SYSTEM
30 FT. HIGH MAX

SOUND WALL BARRIER

EXISTING BACKYARD FENCE

WALL

15 FT. MAX

EXISTING GROUND

TRACK

TRACK
See website for link to Meadow/Charleston Hybrid Animation
**Meadow + Charleston - Hybrid**

**Pros**
- Does not impact creeks
- Restore landscaping with trees at completion of construction
- Shorter shoofly than trench
- Lower long-term maintenance costs than trench

**Cons**
- Stage construction severely impacts traffic
  - Closes portions of Alma, Meadow and Charleston for lowered roadways
    - Alma Street reduced to 2 lanes during construction
    - Meadow and Charleston reduced to 2 lanes during construction
- Visual impact with raised railroad
- Major utility relocations for utilities located in Alma, Meadow and Charleston
- Minor right-of-way impacts at driveways
- Caltrain design exception for temporary roadway vertical clearance of 12 feet during construction
Rail starts to rise

Meadow / Charleston Viaduct

Meadow Dr

Rail Height: 0 to 20 ft
Viaduct Length = 6300 ft
Construction Length = 8400 ft

To San Francisco

To San Jose
Viaduct Example Section - Existing

100 FT. CALTRAIN RIGHT-OF-WAY

20 FT. TO NEAREST HOME

EXISTING BACKYARD FENCE

EXISTING GROUND

EXISTING TRACK

EXISTING TRACK
Viaduct Example Section - Phase 2

100 FT. CALTRAIN RIGHT-OF-WAY

20 FT.
TO NEAREST HOME

Approximately 60 ft

PERMANENT TRACK

OVERHEAD CONTACT SYSTEM
30 FT. HIGH MAX

SOUND WALL BARRIER
CABLE DUCT

CONCRETE BOX GIRDER
CONCRETE COLUMN
See website for link to Meadow/Charleston Viaduct Animation
Example Viaduct Grade Separations

Ohlone Greenway
BART Viaduct, El Cerrito, CA

BART Viaduct, Concord, CA
Meadow + Charleston - Viaduct

Pros
- Minimal impact to roadways during construction
- No temporary railroad tracks (shoofly)
- Landscaping can be fully restored with trees
- Does not impact creeks
- Low long-term maintenance costs
- No major utility relocations

Cons
- Requires design exception from Caltrain for 1.4% grade
- Visual impact with raised railroad
Evaluation Criteria

Refining Process for Decisions

**Tier 1 Criteria: Most Important**

- East-West connectivity: facilitate movement across the corridor for all modes of transportation
- Traffic congestion: reduce delay and congestion for automobile traffic at rail crossings
- Ped/Bike circulation: provide clear and safe routes for pedestrians and bicyclists seeking to cross the rail corridor, separate from automobile traffic
- Rail operations: support continued rail operations and Caltrain service improvements
- Cost: finance with feasible funding sources

**Tier 2 Criteria: Also Important**

- Environmental impacts: reduce rail noise and vibration along the corridor
- Environmental impacts: minimize visual changes along the rail corridor
- Local access: maintain or improve access to neighborhoods, parks, schools and other destinations along the corridor while reducing regional traffic on neighborhood streets
- Cost: minimize right-of-way acquisition by eminent domain
- Construction: minimize disruption and the duration of construction
# Meadow + Charleston Evaluation Matrix

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Trench (MCT)</th>
<th>Hybrid (MCL)</th>
<th>Viaduct (MCV)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Improve East-West Connectivity</td>
<td></td>
<td></td>
<td></td>
<td>Same connectivity for all three in final configuration</td>
</tr>
<tr>
<td>B Reduce traffic congestion and delays</td>
<td></td>
<td></td>
<td></td>
<td>Same traffic improvements for all three in final configuration</td>
</tr>
<tr>
<td>C Provide clear, safe routes for pedestrians and bikes</td>
<td></td>
<td></td>
<td></td>
<td>Reduced conflicts for bikes/peds for all three in final configuration</td>
</tr>
<tr>
<td>D Support continued rail operations</td>
<td></td>
<td></td>
<td>Viaduct can be built without a temporary railroad detour (shoofly)</td>
<td>Viaduct and Hybrid do not increase long-term maintenance or risk to operations</td>
</tr>
<tr>
<td>E Finance with feasible funding sources</td>
<td></td>
<td></td>
<td></td>
<td>Based on estimated range of construction costs (K)</td>
</tr>
<tr>
<td>F Minimize right-of-way acquisition</td>
<td></td>
<td></td>
<td></td>
<td>Trench requires subsurface acquisition for structural elements and impacts to creeks will require right of way to construct pumps</td>
</tr>
<tr>
<td>G Reduce rail noise and vibration</td>
<td></td>
<td></td>
<td></td>
<td>All alternatives eliminate train horn noise and warning bells</td>
</tr>
<tr>
<td>H Maintain or improve local access</td>
<td></td>
<td></td>
<td></td>
<td>Same improvement for all three in final configuration</td>
</tr>
<tr>
<td>I Minimize visual changes along the corridor</td>
<td></td>
<td></td>
<td></td>
<td>Trench has train below grade – landscaping option limited to bushes or plants with shallow root systems</td>
</tr>
<tr>
<td>J Minimize disruption and duration of construction</td>
<td>6 years</td>
<td>4 years</td>
<td>2 years</td>
<td>Trench has extended road closures at Meadow and Charleston during construction</td>
</tr>
<tr>
<td>K Order of Magnitude Cost</td>
<td>$800M to 950M*</td>
<td>$200M to $250M*</td>
<td>$400M to 500M*</td>
<td>Total Preliminary Construction Costs in 2018 dollars (Subject to Change)</td>
</tr>
</tbody>
</table>

*Total Preliminary Construction Costs in 2018 dollars (Subject to Change)
Financing and Funding Options

- Sources
- Funding and financing options
- Estimates for funding and financing options
- Scenario I
- Scenario II
**Financing**
Financing refers to money that must be repaid. For example, municipal bond financing or public or private loans.

**Funding**
Funding refers to money that is available on hand or that will be collected over time that does not need to be repaid. For example, private or public grants would be a form of funding.
## Financing and Funding

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Funding/Financing Program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>Transportation Finance and Innovation Act (TIFIA) Program Loans</td>
<td>Direct loans, loan guarantees, and standby lines of credit provided to public and private transit, highway, rail, and port projects.</td>
</tr>
<tr>
<td>Federal</td>
<td>BUILD Transportation Discretionary Grants</td>
<td>$1.5 billion for the overall program is available for infrastructure improvement projects.</td>
</tr>
<tr>
<td>State</td>
<td>Highway Railroad Crossing Safety Account (HRCSA)</td>
<td>The HRCSA provides $150 million annually for grade separation projects.</td>
</tr>
<tr>
<td>Regional</td>
<td>Measure B</td>
<td>Current sales tax increment that will allocate $700 million to fund 8 grade separation projects for Sunnyvale, Mountain View, and Palo Alto.</td>
</tr>
<tr>
<td>Local</td>
<td>Public Private Partnerships</td>
<td>Public-private partnerships between a government agency and private-sector company can be used to finance, build and operate projects, such as public transportation networks, parks and convention centers.</td>
</tr>
<tr>
<td>Local</td>
<td>Mello-Roos Community Facilities District (CFD)</td>
<td>A special tax will be applied to property owners within two blocks of the Caltrain corridor.</td>
</tr>
<tr>
<td>Local</td>
<td>Property Taxes</td>
<td>Increase property taxes for city residents 0.05%-0.25%</td>
</tr>
<tr>
<td>Local</td>
<td>Business license taxes or fees</td>
<td>Flat fee per employee</td>
</tr>
<tr>
<td>Local</td>
<td>Per employee tax</td>
<td>A progressive tax system for companies based on the number of employees. Businesses with less than some # of employees are exempted.</td>
</tr>
</tbody>
</table>
## Financing and Funding

<table>
<thead>
<tr>
<th>Funding/Financing Program</th>
<th>Estimate ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Finance and Innovation Act (TIFIA) Program Loans</td>
<td>$384</td>
</tr>
<tr>
<td>Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants</td>
<td>$12</td>
</tr>
<tr>
<td>Highway Railroad Crossing Safety Account (HRCSA)</td>
<td>$150</td>
</tr>
<tr>
<td>Measure B</td>
<td>$350</td>
</tr>
<tr>
<td>Public Private Partnership</td>
<td>$50</td>
</tr>
<tr>
<td>Mello-Roos Community Facilities District (CFD)</td>
<td>$12</td>
</tr>
<tr>
<td>Property Tax Increase</td>
<td>$143</td>
</tr>
<tr>
<td>Business license per employee</td>
<td>$0.9</td>
</tr>
<tr>
<td>Per employee tax</td>
<td>$3.0</td>
</tr>
<tr>
<td>Total</td>
<td>$1,092</td>
</tr>
</tbody>
</table>

**Probability**

- **High**
- **Medium**
- **Low**
### Hypothetical Scenario I

<table>
<thead>
<tr>
<th>Funding/Financing Program</th>
<th>Abbreviation</th>
<th>Estimate ($ millions)</th>
</tr>
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<tbody>
<tr>
<td>Transportation Finance and Innovation Act (TIFIA) Program Loans</td>
<td>TIFIA</td>
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<td>Highway Railroad Crossing Safety Account (HRCSA)</td>
<td>HRCSA</td>
<td>$ 150</td>
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<tr>
<td>Measure B</td>
<td>Measure B</td>
<td>$ 350</td>
</tr>
<tr>
<td>Property Tax Increase</td>
<td>Property Tax</td>
<td>$ 143</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$ 1,027</strong></td>
</tr>
</tbody>
</table>

**Probability**

- High
- Medium
- Low
## Hypothetical Scenario II

<table>
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<tr>
<th>Funding/Financing Program</th>
<th>Abbreviation</th>
<th>Estimate ($ millions)</th>
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<tr>
<td>Transportation Finance and Innovation Act (TIFIA) Program Loans</td>
<td>TIFIA</td>
<td>$ 384</td>
</tr>
<tr>
<td>Measure B</td>
<td>Measure B</td>
<td>$ 350</td>
</tr>
<tr>
<td>Property Tax Increase</td>
<td>Property Tax</td>
<td>$ 143</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$ 877</strong></td>
</tr>
</tbody>
</table>

**Probability**
- High
- Medium
- Low
Financing and Funding

Capital Infrastructure Needs and Interests beyond Grade Separations

- 101 Bike / Pedestrian Bridge
- Public Safety Building
- California Ave Garage
- Downtown Garage
- Byxbee Park
- Bike and Pedestrian Master Plan
- Fire Station 3
- Fire Station 4
- Parks, Trails, Natural Open Space and Recreation Master Plan
- Junior Museum and Zoo
- Palo Alto Animal Shelter
- Cubberley Community Center
Summary of Ideas

Meadow / Charleston Trench
- Lower the railroad below the roadways at Meadow and Charleston

Meadow / Charleston Hybrid
- Partially lower the roads and partially elevate the tracks at Meadow and Charleston

Meadow / Charleston Viaduct
- Raise the railroad above the roadways at Meadow and Charleston on structure
Question & Answers
Stations

- Charleston / Meadow - Hybrid
- Charleston / Meadow - Trench
- Charleston / Meadow - Viaduct
- Other Crossings
- Traffic
- Finance
- Creeks/Drainage
- Noise/Vibration
Next Steps

NEXT MEETING
January 23, 2018, 6-8pm

Website, Factsheet Direct Mailings and Outreach Support

COM City Community Meeting
CAP Community Advisory Panel Meeting
TAC Technical Advisory Committee
RC Rail Committee Meeting
CC City Council Meeting
?

Preferred Solution — Advance to Environmental Clearance
Narrow Master List of Ideas to Alternatives of Study
Stay Engaged

Visit our website at: www.cityofpaloalto.org/ConnectingPaloAlto

Contact us at: transportation@cityofpaloalto.org
(650) 329-2520
Thank You