




# Peninsula Corridor Electrification Project

## Cost / Schedule Update

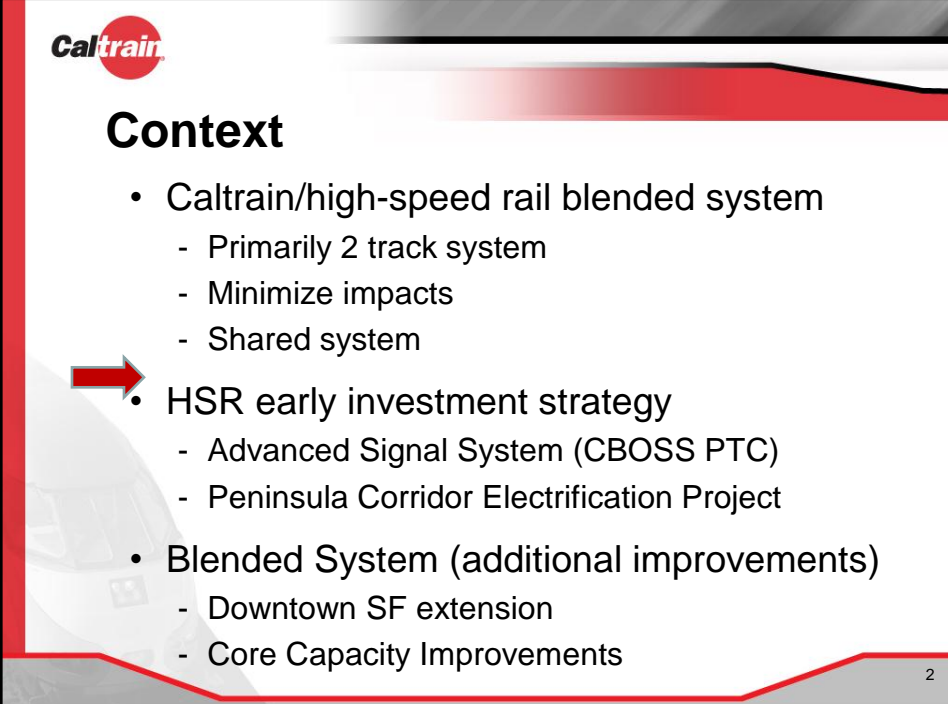
LPMG Meeting  
November 20, 2014



## Context

- Caltrain/high-speed rail blended system
  - Primarily 2 track system
  - Minimize impacts
  - Shared system
- ➔ • HSR early investment strategy
  - Advanced Signal System (CBOSS PTC)
  - Peninsula Corridor Electrification Project
- Blended System (additional improvements)
  - Downtown SF extension
  - Core Capacity Improvements

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## Funding Partners

- 9-party Regional Funding MOU (2012)
- \$1.5 billion
- Partners
  - CA High Speed Rail Agency
  - Metropolitan Transportation Commission
  - Peninsula Corridor Joint Powers Board
  - San Francisco
  - San Francisco County Transportation Authority
  - San Jose
  - Santa Clara Valley Transportation Authority
  - San Mateo County Transportation Authority
  - Transbay Joint Powers Authority


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## Summary

Program	Based on MOU	Update
CBOSS PTC	\$231M (Contract)	\$231M (Contract)
Electrification Project	\$1,225M (2008) Revenue Service 2019	\$1,474M - \$1,531M (2014) Revenue Service Winter 2020 – Spring 2021
<b>Total</b>	<b>\$1,456M</b>	<b>\$1,705M - \$1,762M</b>


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## Partner Discussions




- State Support / MTC Leadership
- Funding Ideas
  - JPB Financing / TIFIA Loan
  - JPB Fare
  - Regional Measure 2
  - State Cap & Trade
  - FTA Core Capacity
  - FTA Vehicle Replacement

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## Electrification Project




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## Key Elements

- 51+ miles corridor electrification
- ~75% diesel vehicle to EMUs (96)
- 2040 ridership forecast: 100,000 (weekday)
- More service / improved performance
  - Restore service
  - Increase peak and non-peak service
  - More station stops/reduced travel time

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## Process / Method

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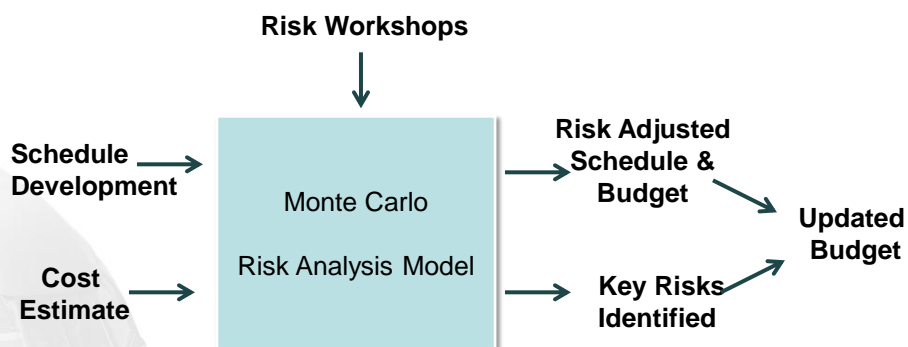
## Update Approach

- Detailed analysis of project affect on customers
- Consideration of reliability of service with aging fleet
- Efficient cost-effective construction process
- Changes in cost factors since 2008 cost estimate

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## Reexamination Process




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# Integrated Program Schedule



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# Schedule Scenarios

Scenarios	Schedule Assumption	Non-peak Headways	Revenue Service Date	Variance
A	<b><u>Worst Case</u></b> - OCS installation performed in geographical sequence - Most restrictive work windows with restriction on long zones, 54-hour weekend single track - Initial Design Durations	60-minute Headways	December 2024	+\$340M
B	<b><u>Changes to establish base line schedule</u></b> - Split into 4 work areas for OCS installation with restriction on 8 long zones, 54-hour weekend single track with extensive blackout periods - Revised Design Durations by 12 months	60-minute Headways	February 2023	+\$232M
C	<b><u>Refinements to base line schedule</u></b> - Concurrent work areas, 54-hour weekend single track with less stringent blackouts limited to pre- through post-event times, restricted 8 long zones - Revised workflow sequence to get to Segment 4 testing sooner breakout of testing by segment	60-minute Headways	July 2022	+\$230M
D	<b><u>Refinements to Scenario C</u></b> - Segment boundaries modified to balance OCS workflow - Remove restriction on 8 zones with 90-minute headway - Further refinements to testing - Revision to OCS procurement duration by 6 months	90-minute Headways	April 2021	Baseline

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## Electrification Work Segments



- Segment Boundaries
  - Segment 1 (MP 0.2 to MP 8.0)
  - Segment 2 (MP 8.0 to MP 29.1)
  - Segment 3 (MP 29.1 to MP 44.5)
  - Segment 4 (MP 44.5 to MP 51.1)
  
- Work Direction
  - Two concurrent, not adjacent work areas
  - Working south to north starting with segments 4 and 2



## Schedule: Scenario D


ACT	DESCRIPTIONS	Y	2014				2015				2016				2017				2018				2019				2020				2021			
		Q	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
	<b>PCEP with EMU</b>																																	
1	Environmental Planning																																	
2	Permit and Approvals																																	
3	DB Procurements and Award																																	
4	Design/Engineering																																	
5	Material and Equipment Delivery																																	
6	Vehicle Manufacturing and Delivery																																	
7	Construction/Installation																																	
8	Testing and Start Up																																	
9	Operational Readiness Phase																																	
10	Revenue in Service																																	

<b>Start OCS Construction</b>	<b>March 2016</b>
<b>EMU Pilot Train Set Delivered</b>	<b>September 2018</b>
<b>Last EMU Delivered</b>	<b>July 2020</b>
<b>Revenue Service Date</b>	<b>April 2021</b>



# Contingency Analysis

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## Contingency Analysis: Method 1

Top 10 risks of 205 identified in Monte Carlo analysis shown below with a total of \$70M within a calculated risk contingency of \$168M.

Risk	Expected Value
TASI support and coordination (track access)	\$21.8M
FTA requires ADA compliance at all stations	\$10.5M
Risk associated with start-up and testing with operating system	\$9.38M
Impact of electrical load flow study on traction power system	\$4.95M
General impact of UPRR agreements	\$4.95M
Increased tunnel modification costs	\$3.75M
Delay of CBOSS / PTC Revenue in Service of 12-31-15	\$3.75M
Inefficient sequencing of OCS construction due to access constraints	\$3.75M
Insufficient time for integrated testing	\$3.75M
Complex Agency internal review and decision making processes	\$3.75M

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## Contingency Analysis: Method 2

Contingency calculated on individual program components with a total of \$152M with \$106M for Electrification and \$46M for vehicles.

Element	Contingency
OCS/TPS (15%)	\$53M
Vehicle cost (10%)	\$46M
Signals (20%)	\$22M
Communications (15%)	\$1M
Utilities (15%)	\$1M
Environmental (15%)	\$4M
Real Estate (20%)	\$6M
TASI Support (20%)	\$12M
Owner's PM/CM (10%)	\$8M

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## Electrification Component Cost Update

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## Electrification Estimate Basis

- Total re-evaluation of 2008 cost estimate
- Quotes from manufacturers
- Productivity rates from like projects in the North East Corridor
- Labor adjustments for night work/active railroad/type of work
- Local labor rates
- Industry standards
- Revenue service date April 2021
- 3% annual escalation

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## Electrification Project Elements

Program Element	\$ Estimate
Contractors includes DB Incentive	\$628M
Utilities, Real Estate, TASI	\$103M
Owner's Management Oversight	\$100M
Contingency	\$106M
Previous Electrification Project Phase Actuals	\$21M
<b>Total</b>	<b>\$958M</b>

Note: \$785 million (2008)

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## Electrification Cost Drivers

Description	\$ Change
Wayside Signal (Escalation and Scope)	+\$85M
TPS (Escalation)	+\$45M
OCS ( Escalation)	+\$75M
Environmental Mitigation & Real Estate (Scope)	+\$40M
Communication (Scope decrease)	-\$15M
Contingency, Escalation, Owner's Costs (Reallocation)	-\$87M
Power Control Center, CEMOF, Incentives	+\$30M
<b>Net Variance</b>	<b>+\$173M</b>

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## Electrification Scope Reduction

Schedule: From April 2021 to December 2020

Considerations	
Eliminate Electrification of UP MT-1 and Controlled Siding, from Santa Clara to south of Tamien	\$13.0M
Eliminate Electrification beyond Michael Yard south of Tamien	\$5.3M
Revise Design Concept to shared pole foundations for Guy-Wires	\$5.5M
Reduce Owner's Oversight resulting from above reductions	\$3.8M


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## Electrification Scope Change

Considerations	
Defer Electrification of Michael Yard south of Tamien	\$ 5.0M
Defer Electrification - San Francisco Yard – all storage tracks	\$ 1.8M
Reduced Owner's Oversight based on deferral of above	\$1.2M

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## Funding Partner Considerations

- Increase escalation from 3% to 3.5% to 4%:
  - Recommend no change
  - Local escalation has been less than 3% for past 5 years
- Add management reserve:
  - Change made and included in cost estimate
  - Add 3% (\$28M)
- Increase weekend shutdowns from 3 to 30
  - Recommend no change
  - Change would result in reduction in schedule by less than one week with negligible change in cost

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## Summary

Schedule	April 2021	December 2020
<b>Program Elements</b>	<b>Base</b>	<b>Adjusted</b>
Contractors includes DB Incentive	\$628M	\$597M
Utilities, Real Estate, TASI	\$103M	\$103M
Owner's Management Oversight	\$100M	\$95M
Contingency	\$106M	\$106M
Previous Electrification Project Phase Actuals	\$21M	\$21M
Management Reserve	\$0M	\$28M
<b>Total</b>	<b>\$958M</b>	<b>\$950M</b>

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## Vehicles (EMUs)

Based on in-service  
bi-level EMU with 25" floor threshold

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## Vehicle Elements

Program Element	\$ Estimate
Vehicle Manufacturer 96 vehicles	\$458M
TASI	\$4M
Owner's Management Oversight	\$65M
Contingency	\$46M
<b>Total</b>	<b>\$573M</b>

Note: \$440 million (2008)

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## Vehicle Cost Drivers

Description	\$ Change
Vehicle Cost	+\$118M
Test Equipment and Spare Parts	+\$12M
Mock up	+\$1M
CBOSS PTC	+\$3M
Contingency, Escalation, Owner's Costs	-\$5M
TASI and Commissioning facility	+\$4M
<b>Net Variance</b>	<b>+\$133M</b>

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## Vehicle Scope Reduction

Considerations	
Defer purchase of one 6-car (EMU protect) train set for North Terminal / Off set need by purchase of 3 used electric locos	\$20M
Reduce amount of spare parts plus test equipment from 10% to 5% (Incorporate balance of spare parts into separate maintenance contract)	\$21M
Reduce staff support costs associated with EMUs	\$ 8M
<b>TOTAL EMU CONSIDERATIONS</b>	<b>\$49M</b>

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## Vehicle Program

Program Element	Base	Adjusted
Vehicle Manufacturer	\$458M	\$415M
TASI	\$4M	\$4M
Owner's Management Oversight	\$65M	\$57M
Contingency	\$46M	\$46M
<b>Total</b>	<b>\$573M</b>	<b>\$524M</b>

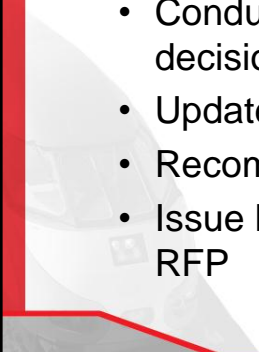

Note: Funding partner consideration to add management reserve – not recommended given current vehicle pricing

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## Next Steps

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## Key Tasks

- Certify FEIR
- Complete analysis of cost reduction measures
- Conduct shared platform analysis/conclude decision on future boarding height
- Update funding plan
- Recommendation to JPB
- Issue Electrification DB RFP and Vehicle RFP

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## Shared Platform Analysis

- Current approach
  - HSR at 50" / Caltrain at 25" boarding height
  - Dedicated platforms at 3 – 5 stations
- Consider alternative vehicles to achieve same boarding height
- Key Considerations
  - Trade offs (ex. capacity, performance, operations)
  - Compatibility with current 8" platform
  - Compatibility with existing diesel fleet (interim period)
  - Compatibility with existing tenants and freight
  - Regulatory CPUC and ADA requirements
  - Station modifications with 50" versus 25" platforms

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Q/A

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