

RTD FASTRACKS

**Responses to Questions
from the RTD Board of Directors**

July 23, 2007

East Corridor Cost and Schedule Delay for DMU Analysis

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Explain the additional cost and schedule delay to the East Corridor project for adding DMU back into the analysis.

- *Schedule impact is estimated to be 8 months*
- *Cost impact is estimated at \$1,046,000*

The following tables show these estimates

East: Additional Cost for DMU analysis

<i>Activity</i>	<i>Cost</i>
Committee Meetings	\$18,000
Corridor Wide Meetings	\$25,000
Agency Coordination Meetings	\$18,000
Environmental Analysis	\$225,000
Operational Analysis	\$70,000
DEIS and Technical Report Rewrites	\$250,000
Engineering	\$320,000
Project Management/QA	\$120,000
Total	\$1,046,000

East: Additional Schedule for DMU Analysis

<i>Activity</i>	<i>Schedule</i> (With EMU Decision)	<i>Schedule</i> (Adding DMU)
DEIS RTD Review	Completed	March 2008
DEIS Completed for public review	February 2008	August 2008
FEIS	August 2008	March 2009
Record of Decision	December 2008	August 2009

Gold Line Cost and Schedule Delay for DMU Analysis

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Explain the additional cost and schedule delay to the Gold Line Corridor for adding DMU back into the analysis.

- *Schedule impact is estimated to be 8 months*
- *Cost impact is estimated at \$1,096,000*

The following tables show these estimates

Gold Line: Additional Cost for DMU analysis

<i>Activity</i>	<i>Cost</i>
Public Involvement	\$320,000
Environmental	\$150,000
Cost Estimate	\$70,000
Agency Meetings	\$10,000
Level 3 Screening Technical Evaluation	\$200,000
Reselection of Preferred Alternative	\$50,000
Value Engineering	\$46,000
Engineering	\$160,000
Project Management/QA	\$90,000
Total	\$1,096,000

Gold Line: Additional Schedule for DMU analysis

<i>Activity</i>	<i>Schedule (With EMU Decision)</i>	<i>Schedule (Adding DMU)</i>
Level 3 Screening Analysis	Completed	November 2007
2 Public & 2 Agency Workshops for Level 3 Screening	Completed	December 2007
Preferred Alternative (PA)	Completed	January 2008
2 Public & 2 Agency Workshops for PA Selection	Completed July, 2007	February, 2008
DEIS FTA & RTD Reviews	January, 2008	August, 2008
DEIS Release to public	February, 2008	September, 2008
FEIS	August, 2008	March, 2009
Record of Decision	December, 2008	July, 2009

Operating and Maintenance Estimates

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Please explain what the factors are that go into an operational and maintenance cost estimate.

The following slide shows the components of an O&M cost estimate

Components of an Commuter Rail O&M Cost Estimates

Operational Costs:

- **Energy/Fuel**: fuel consumption based on travel times (accel/decel), ridership, number of trains and cost of fuel (diesel at \$2.52 gal, electric at \$.085 kWh, inflated at 3.4% per year)
- **Labor**: based on fleet size, labor required for operators, conductors, fare inspectors

Maintenance Costs:

- **Materials**: based on fleet size, required vehicle inspections, schedules for component replacement
- **Labor**: based on fleet size
- **Electrification Service (required for EMU only)**: based on length of corridor, inspection and maintenance schedule, labor, materials and equipment required

O&M Estimates for Gold and East

Please explain what the actual O&M costs that were used for the Gold Line and East Corridor in the EMU and DMU analysis

The following table shows the Gold Line and East Corridor O&M costs assumed in the analysis

How were energy/fuel estimates developed?

Annual Fuel Consumption and Costs

<u>East Corridor</u>				
	<u>KwH(EMU)/ gal(DMU)</u>	<u>Cost(2006\$)</u>	<u>Average Annual Cost(2006\$)</u>	<u>Average Annual Cost Inflated</u>
EMU	30,252,400 x	\$0.085 =	\$2.57 M	————→ \$4.8 M
DMU	2,360,200 x	\$2.52 =	\$5.95 M	————→ \$11.3M
<u>Gold Line</u>				
EMU	13,202,050 x	\$0.085 =	\$1.12 M	————→ \$1.9 M
DMU	1,045,000 x	\$2.52 =	\$2.63 M	————→ \$4.4 M

Average Annual O&M Costs for Gold Line and East Corridors (M Inflated\$)



	East Corridor		Gold Line	
	EMU	DMU	EMU	DMU
Operations				
Energy/Fuel	\$4.8	\$11.3	\$1.9	\$4.4
Labor	\$6.3 ¹	\$7.4 ¹	\$5.8 ²	\$5.8 ²
Maintenance³	\$11.9 ⁴	\$13.3 ⁴	\$8.3 ⁵	\$7.8 ⁵
Total	\$23 M	\$32 M	\$16 M	\$18 M

¹Travel time savings associated with faster acceleration characteristic of EMU, result in one fewer train required for operation on the East Corridor compared with DMU, resulting in lower labor costs for operations on the East Corridor

²The number of trains required to operate the Gold Line is the same for EMU and DMU, so labor costs for operations are the same.

³EMU maintenance costs include vehicle maintenance and maintenance of the electrification systems. DMU maintenance costs include only the cost of vehicle maintenance.

⁴East Corridor EMU maintenance costs are less than DMU because there are fewer vehicles that need to be maintained with EMU operations, more than offsetting the costs of maintaining the electrification system.

⁵Gold Line EMU maintenance costs are higher because the number of vehicles being maintained is the same, but the cost of maintaining the electrification system for EMU drives total maintenance costs slightly higher.

O&M Costs: Average Annual over 30 years

Scenario	Average Annual O&M Costs
All EMU •East •Gold Line •North Metro •Northwest Rail	\$75 M
All DMU •East •Gold Line •North Metro •Northwest Rail	\$90 M
Mixed Fleet •EMU-East & Gold Line •DMU-North Metro & Northwest Rail	\$79 M

Differential Capital Costs for Vehicle Technology

Scenario	Capital Cost Least to Most (\$2006)	Difference from all DMU
All DMU	\$296 M	---
Mixed Fleet*	\$379 M	\$83 M (more than all DMU)
All EMU	\$504 M	\$208 M (more than all DMU)

*Current staff recommendation

Document the cost assumptions that went into the GS/JP analysis

- Operating Costs went into the analysis
- Capital Costs went into the analysis
- GS/JP analysis includes annual O&M for both modes which more than offsets the additional capital costs for EMU on the East and Gold Line Corridors