

# APPENDIX I COSTING DETAIL



JACKSON COUNTY  
**COMMUTER CORRIDORS**  
ALTERNATIVES ANALYSIS

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**CAPITAL COSTING (LPA)**

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March 2013



As part of the analysis of the alternatives, planning-level capital costing was completed on each of the Tier 2 Alternatives (TSM, Express Bus, Bus Rapid Transit, Enhanced Streetcar and Diesel Multiple Unit). This report provides details on the cost estimation for the identified locally preferred alternative, Diesel Multiple Unit (DMU). Costing output for the other alternatives is available upon request.

The costing for the DMU alternative was vetted through numerous sources to provide the most reliable range of costs. Three separate costing analyses were completed on this mode:

- Alternatives Analysis costing using the FTA Standard Cost Categories
- Unit costing based on typical projects in Kansas City
- Third party costing from contractors

### GENERAL APPROACH

Each alternatives that was evaluated as part of the project has a schematic drawing(s) showing general alignment and station locations. In addition, each alternative is described in the Definition of Alternatives report. Based on this information, a set of assumptions were made as to quantities for each of the major composite construction components. These planning documents form the basis for the identification of the various infrastructure elements that were used to prepare the capital cost estimates. Prototypical infrastructure unit costs were then developed for elements that are typically associated with a typical cross-section and applied over a given length of alignment or based on a conceptual scope of work developed as appropriate for a specific typical facility. The typical facility composite unit cost is developed by combining the costs for all individual construction elements applicable to a given typical section or facility and creating a representative composite unit cost.

The analysis of costs was divided into three segments:

- Common Segment: (Figures 1, 2 and 3 provide an overview of the alignment through this segment.) The portion of the alignment between the 3<sup>rd</sup> and Grand terminus and the KCS line (East corridor). This segment contains the most constructability challenges, including:
  - New-build rail through the entire route
  - Building into the bottom of the cliff at Kessler Park/Neff Yard will require retainage walls to eliminate erosion on the cliff.
  - Property acquisitions (industrial) will be required to build the rail.
  - A fly-over structure will be required for the rail to pass the busy freight yard and cross the river.
- East Segment: Along the existing Kansas City Southern rail line, this segment contains limited challenges. Construction will including pass locations, station and platforms and rail upgrades.
- Southeast Segment: Along the Rock Island Railroad, the segment will require new rail and improvements to some structures and crossings.

The following sections provide output from the different costing methodologies.



Figure 1: DMU Alignment - Kessler Park/Neff Yard







**JCCCAA - REGIONAL RAIL COMMON CORRIDOR - RIVER MARKET OPTION** MARCH 27, 2012



6

Figure 3: DMU Alignment Connection to the River Marke

## **ALTERNATIVES ANALYSIS COSTING (FTA STANDARD COST CATEGORIES)**

This estimate was developed in general accordance with FTA guidelines for estimating capital costs. Part of the FTA guidelines call for cost estimates to be prepared and reported using the latest revision of the FTA's Standard Cost Categories (SCC). In the estimates, cost components for the various alternatives were developed and summarized using the SCC format. These cost categories form the basis for the capital cost detail and summary sheets that were used.

### **Allocated Contingency**

Contingency is typically included in an estimate as an allowance for the level of engineering design completed or to address imperfections in the conceptual estimating methods that are associated with a project's development stage. Contingency, in the statistical sense, is an estimated percentage by which a calculated value may differ from its true or final value. A contingency add-on is used to account for those items of work (and their corresponding costs) which may not be readily apparent or cannot be quantified at the current level of design, such as unknown project scope items, or a potential project change resulting from public/political issues or environmental or technical requirements. For the purposes of these estimates, contingency will be assigned into two major categories – allocated and unallocated. Allocated contingency is assigned based on the level of design information available for individual items of work, as well as the relative difficulty in establishing unit prices for these items. The allocated contingency allowance, in the range of 15 percent to 50 percent, is assigned according to the FTA construction or procurement cost categories. The percentage selected for each cost category is based on professional judgment and experience related to the cost variability typically seen for items of work within a particular cost category. Unallocated contingency is similar in nature to allocated contingency in that it is primarily applied as an allowance for unknowns and uncertainties due to the level of project development completed. The major difference is that allocated contingencies are intended to address uncertainties in the estimated construction, right-of-way, and vehicle costs that typically occur based on the level of engineering and design completion, while unallocated contingency is typically much broader in nature and often address potential changes in the project scope or schedule. Unallocated contingency is calculated as a percentage of the total of cost categories 10 thru 80.

### **Costing Output**

The following table provides output from the Standard Cost Category analysis.

Table 1: Costing Output using FTA Standard Cost Categories

Jackson County Commuter Corridors  
 ALTERNATIVES ANALYSIS - Regional Rail  
 Order of Magnitude Capital Cost Estimate - FTA Methodology  
 (2012 Dollars in Millions)

CAT No.	Description	Common Line - River Market		East Line		Southeast Line		Maintenance Facility & Vehicles	
		Low	High	Low	High	Low	High	Low	High
10	GUIDEWAY & TRACK ELEMENTS	\$113.69	\$133.67	\$63.61	\$75.61	\$94.14	\$113.74		
20	STATIONS, STOPS, TERMINALS, INTERMODAL	\$2.66	\$3.13	\$13.94	\$16.50	\$17.41	\$20.63		
30	SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$20.25	\$50.63
40	SITWORK & SPECIAL CONDITIONS	\$13.87	\$16.88	\$13.80	\$19.65	\$15.95	\$22.71		
50	SYSTEMS	\$7.84	\$9.27	\$39.31	\$47.79	\$44.55	\$54.06		
	<b>Construction Subtotal (Sum Categories 10 - 50)</b>	<b>\$138.06</b>	<b>\$162.95</b>	<b>\$130.65</b>	<b>\$159.55</b>	<b>\$172.05</b>	<b>\$211.14</b>	<b>\$20.25</b>	<b>\$50.63</b>
60	ROW, LAND, EXISTING IMPROVEMENTS	\$0.00	\$0.00	\$5.17	\$6.29	\$16.07	\$18.95	\$7.29	\$18.23
70	VEHICLES	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$108.68	\$124.20
80	PROFESSIONAL SERVICES	\$40.04	\$47.25	\$37.89	\$46.27	\$49.89	\$61.23	\$5.87	\$14.68
90	UNALLOCATED CONTINGENCY	\$17.81	\$21.02	\$17.37	\$21.21	\$23.80	\$29.13	\$14.21	\$20.77
	<b>Total Project Cost</b>	<b>\$195.90</b>	<b>\$231.22</b>	<b>\$191.08</b>	<b>\$233.32</b>	<b>\$261.81</b>	<b>\$320.45</b>	<b>\$156.30</b>	<b>\$228.50</b>

[Kansas City Unit Pricing](#)

A costing analysis was completed using Kansas City area costs for freight railroad improvements. These costs were based on completed projects and were analyzed at the unit cost level. The following table provides output from this analysis.



Table 2: Costing Based on Unit Costs for Kansas City Area Projects

**ESTIMATED COST FOR TRACK CONSTRUCTION**  
**Jackson County Commuter Corridors**  
**SUMMARY**

DESCRIPTION	QTY	ESTIMATE - August 2012					
		Common Line		East Line		Southeast Line	
		Segment 1	Segment 1	Segment 2	Segment 3	Segment 1	Segment 2
<i>Segment Location</i>		River Market to Common Connection	Common Connection to Rock Creek Jct.	KCS Segment 1 - Rock Creek to Blue Springs	KCS Segment 2 - Blue Springs to Oak Grove	Common Connection to Rock Island Railroad	Rock Island Connection to View High Drive#470
<b>Segment Totals</b>		\$113,355,800	\$74,922,100	\$57,567,315	\$35,352,165	\$64,041,700	\$79,924,000
<b>Line Totals</b>		\$113,355,800		\$167,841,580		\$143,965,700	
<b>Vehicle and Maintenance Totals</b>		\$15,000,000		\$22,400,000		\$16,000,000	
<b>Project Total</b>				\$478,563,080			
<b>PROPERTY</b>							
ACQUISITION		\$3,152,000	\$1,427,500	\$0	\$0	\$742,500	\$13,200,000
33% CONTINGENCIES		\$1,040,200	\$471,100	\$0	\$0	\$245,100	\$4,356,000
<b>PROPERTY TOTALS</b>		\$4,192,200	\$1,898,600	\$0	\$0	\$987,600	\$17,556,000
<b>CONSTRUCTION</b>							
SITE PREPARATION		\$12,433,100	\$2,325,000	\$6,346,300	\$4,311,800	\$6,963,200	\$6,699,500
TRACK WORK (Material and Labor)		\$8,380,900	\$8,795,500	\$16,165,700	\$12,021,800	\$9,410,000	\$8,311,000
SIGNAL		\$2,010,000	\$2,950,000	\$4,603,850	\$2,326,900	\$1,444,000	\$3,815,000
AT GRADE CROSSINGS		\$827,200	\$0	\$4,073,100	\$2,568,400	\$2,557,200	\$2,020,200
STRUCTURES		\$43,680,000	\$36,265,000	\$1,825,000	\$880,000	\$18,832,000	\$6,911,000
STATIONS		\$4,000,000	\$0	\$11,000,000	\$4,000,000	\$2,000,000	\$12,000,000
MISCELLANEOUS (Drainage, Utilities, other)		\$5,949,500	\$1,176,000	\$337,000	\$199,200	\$3,316,000	\$1,590,000
5% CONSTRUCTION MOBILIZATION		\$3,553,600	\$2,428,100	\$1,420,600	\$989,100	\$2,054,000	\$1,276,600
20% CONTINGENCIES		\$16,126,900	\$10,788,000	\$6,033,600	\$4,194,100	\$9,315,300	\$11,164,700
OVERHEAD CHARGES		\$0	\$0	\$3,348,665	\$2,183,165	\$0	\$0
<b>CONSTRUCTION TOTAL</b>		\$96,761,200	\$64,727,600	\$55,153,815	\$33,674,465	\$55,891,700	\$53,788,000
<b>PROFESSIONAL SERVICES</b>							
15% DESIGN, CONSTRUCTION MANAGEMENT, PROFESSIONAL SERVICES		\$12,098,200	\$8,091,000	\$2,413,500	\$1,677,700	\$6,986,500	\$8,373,500
PERMITTING		\$307,200	\$204,900	\$0	\$0	\$175,900	\$206,500
<b>PROFESSIONAL SERVICES TOTALS</b>		\$12,405,400	\$8,295,900	\$2,413,500	\$1,677,700	\$7,162,400	\$8,580,000
<b>SEGMENT TOTALS</b>		\$113,355,800	\$74,922,100	\$57,567,315	\$35,352,165	\$64,041,700	\$79,924,000
		\$113,355,800		\$167,841,580		\$143,965,700	
<b>MAINTENANCE AND VEHICLES</b>							
MAINTENANCE FACILITY		\$15,000,000		N/A		N/A	
VEHICLES		N/A		\$22,400,000		\$18,000,000	
<b>PROFESSIONAL SERVICES TOTALS</b>		\$15,000,000		\$22,400,000		\$16,000,000	
<b>PROJECT TOTAL - 2012 \$</b>		<b>\$478,563,080</b>					
<b>TM</b>		4.05	1.96	15.1	9.4	3.36	10.9
<b>Per Mile Cost</b>		\$27,989,086	\$38,225,561	\$3,812,405	\$3,760,869	\$19,060,030	\$7,332,477

### Third Party Cost Estimates

In order to verify the cost estimates, two third-party entities were asked to provide cost estimates. Herzog Contracting Cooperation provided a third party estimate for the entire corridor. Clarkson Construction Company provided a third party estimate for the rail flyover in the common segment.

The third party cost estimation process found that the costs identified in the Kansas City Unit Cost methodology were more consistent with what the third party estimators found to be the constructible cost. However, the estimations did increase the cost identified in the Kansas City Unit Cost methodology by approximately \$20,000,000. Below is the output from the Third Party Cost Estimations.

Table 3: Cost Estimates Provided by Third Party Contractors

	Common Line (along Kessler Park)	East Line		Southeast Line
Segment Location	From River Market to East and Southeast Lines	From Common line to Blue Springs	From Blue Springs to Oak Grove	From Common Line to View High/470
<b>Segment Totals</b>	<b>\$114,716,100</b>	<b>\$124,269,540</b>	<b>\$31,352,165</b>	<b>\$139,513,475</b>
<b>Maintenance, Vehicles, and Stations Total</b>	<b>\$19,000,000</b>	<b>\$33,400,000</b>	<b>\$4,000,000</b>	<b>\$30,000,000</b>
<b>Total Cost for Line</b>	<b>\$133,716,100</b>	<b>\$157,669,540</b>	<b>\$35,352,165</b>	<b>\$169,513,475</b>
<b>Total Project Cost for East and SE Lines</b>	<b>\$496,251,280</b>			

### Analysis

The three distinct costing methodologies used provided the study team with various views on cost estimation. The FTA SCC provides the FTA-allowable costing framework that would be required for use in an FTA New Starts submission. It also provides consistency, since it is based on costs from systems throughout the United States. The Kansas City Unit Cost estimate is based on freight rail construction and unit costs from Kansas City and provides insight into the specific Kansas City market. The Third Party Cost Estimates provide a view from the eye of the contractor – how much they would need to deliver the construction project. Given this information, the study team determined that a range would be the best way to depict these cost estimates. The following are the estimate ranges for the two projects:

- East (with common segment): \$327,000,000-\$434,000,000
- Southeast: \$170,000,000-\$225,000,000

Based on this analysis, the following is the finalized capital cost estimate for the East and Southeast segments of the Jackson County Commuter Corridors Alternatives Analysis.

Table 4: Final DMU Cost Estimate for the Jackson County Commuter Corridors Alternatives Analysis

**Jackson County Commuter Corridors**  
**ALTERNATIVES ANALYSIS - Regional Rail**  
**Order of Magnitude Capital Cost Estimate - KCMO Specific Costs**  
**(2012 Dollars in Millions)**

CAT No.	Description	Common Line - River Market		East Line		Southeast Line		Maintenance Facility & Vehicles	
		Low	High	Low	High	Low	High	Low	High
10	GUIDEWAY & TRACK ELEMENTS	\$70.49	\$86.88	\$39.44	\$49.15	\$58.37	\$73.93		
20	STATIONS, STOPS, TERMINALS, INTERMODAL	\$1.65	\$2.03	\$8.64	\$10.73	\$10.79	\$13.41		
30	SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$12.56	\$32.91
40	SITWORK & SPECIAL CONDITIONS	\$8.60	\$10.97	\$8.55	\$12.77	\$9.89	\$14.76		
50	SYSTEMS	\$4.86	\$6.03	\$24.37	\$31.06	\$27.62	\$35.14		
<b>Construction Subtotal (Sum Categories 10 - 50)</b>		<b>\$85.60</b>	<b>\$105.92</b>	<b>\$81.01</b>	<b>\$103.71</b>	<b>\$106.67</b>	<b>\$211.14</b>	<b>\$15.69</b>	<b>\$40.13</b>
60	ROW, LAND, EXISTING IMPROVEMENTS	\$0.00	\$0.00	\$3.20	\$4.09	\$9.96	\$12.32	\$4.52	\$11.85
70	VEHICLES	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$67.38	\$80.73
80	PROFESSIONAL SERVICES	\$24.82	\$30.72	\$23.49	\$30.07	\$30.93	\$39.80	\$3.64	\$9.54
90	UNALLOCATED CONTINGENCY	\$10.54	\$13.66	\$10.27	\$13.79	\$14.26	\$18.94	\$8.31	\$13.50
<b>Total Project Cost</b>		<b>\$120.96</b>	<b>\$150.29</b>	<b>\$117.97</b>	<b>\$151.66</b>	<b>\$161.82</b>	<b>\$282.19</b>	<b>\$121.10</b>	<b>\$181.11</b>