4.0 Transit Alternatives Costs

4.0 TRANSIT ALTERNATIVES COSTS

Capital, operating and maintenance costs were estimated for the three alternatives being considered to improve transit service in the I-70 corridor. The TSM Alternative and Express Bus Alternative include bus capital, operating and maintenance costs. The Commuter Rail Alternative includes costs for bus and rail service. The bus costs for the three alternatives are discussed together in the following section. The cost for the rail service is discussed in the Section 4.2.

4.1 Bus Capital and Operating Costs

Estimates of bus and related facilities' capital and annual operating and maintenance (O&M) cost differentials for the TSM Alternative, the Express Bus Alternative and the Commuter Rail Alternative have been developed. Assumptions used to prepare these cost estimates are described below.

4.1.1 ASSUMPTIONS FOR VEHICLE AND RELATED FACILITIES' CAPITAL COSTS

For the bus capital cost estimates, it is assumed that new express services will utilize 40-foot over-the-road (OTR) coaches; and, as the Kansas City Area Transportation Authority (KCATA) operates today, local services will use a combination of 30-foot urban coaches and 22-foot "Metroflex" vehicles. The following unit capital costs are assumed:

- 40-foot OTR Coach $438,000
- 30-foot Urban Coach $275,000
- 22-foot Metroflex Vehicle $64,000

Source: *APTA 2004 Public Transit Factbook, 2003-04 average costs inflated by 3 percent annually to reflect 2006 costs.*

The peak bus requirements have been calculated based on the operating plans for each alternative. The fleet vehicle requirements were estimated by adding a 20 percent spare ratio to the peak bus requirement.

The related bus facilities' capital costs include new and upgraded park and ride (P&R) lots and transit centers. The Mid-America Regional Council (MARC) 2004-2007 Transportation Improvement Program (TIP) includes the rehabilitation of the Blue Springs P&R lot/transit center, and this project is included in all three alternatives as already programmed (i.e., no additional cost). It is assumed that the Grain Valley transit center and P&R lot would cost $600,000 (the Red Bridge P&R lot/transit center facility in the MARC TIP was used to estimate the cost). A joint use agreement and paving is assumed to cost $350,000 for the Oak Grove P&R lot. Upgrading the existing MoDOT P&R lot in Odessa is assumed to cost $250,000.

4.1.2 ASSUMPTIONS FOR ANNUAL BUS O&M COSTS

The daily platform bus-miles and bus-hours were calculated from the operating plans for each alternative. Since the commuter rail service is initially proposed as a weekday only service, the

bus operating statistics are average weekday as well. The annual bus O&M costs were estimated from the KCATA 2005 O&M spreadsheet which contains the following three cost components:

- Direct labor charge,
- Direct mileage charge, and
- Indirect mileage charge.

The KCATA annualization factor is 255 weekdays per year. The costs were increased 3 percent to produce cost estimates in 2006 dollars. The KCATA cost model differentiates costs by large bus, small bus and Metroflex vehicle. However, KCATA pays for the Independence Intra-City service at the small bus labor rate regardless of whether small buses or Metroflex vehicles are utilized. Therefore, the annual O&M cost estimates are based on the large bus rates for the proposed express services and the small bus rates for the proposed local services.

4.1.3 ALTERNATIVES BUS COST ESTIMATES

4.1.3.1 TSM ALTERNATIVE

The TSM Alternative would require no additional vehicles for operation nor would it incur any additional costs for facilities.

The annual O&M costs are estimated to be $1,570,000. Table 4-1 provides a summary of the annual O&M cost considerations for the TSM Alternative.

Table 4-1
TSM Alternative O&M Cost Estimate
(2006 Dollars)

Bus Type	Daily Platform Miles	Daily Platform Hours	Annual Platform Miles	Annual Platform Hours	Annual Direct Labor Charge	Annual Direct Mileage Charge	Annual Indirect Mileage Charge	Total Annual O&M Cost
Large Bus	744	33.2	189,720	8,466	$296,000	$87,000	$267,000	$650,000
Small Bus	1,006	72.1	256,530	18,386	$459,000	$100,000	$361,000	$920,000
Metroflex	0	0.0	0	0	$0	$0	$0	$0
Total	1,750	105.3	446,250	26,852	$755,000	$187,000	$628,000	$1,570,000

NOTES:
Annual Direct Labor Charge Rate LB=$34.972 SB=$24.965 M=$21.425
Annual Direct Mileage Charge Rate LB=$0.448 SB=$0.389 M=$0.219
Annual Indirect Mileage Charge Rate LB=$1.407 SB=$1.407 M=$1.407

4.1.3.2 EXPRESS BUS ALTERNATIVE

The bus fleet requirements for the Express Bus Alternative would be five OTR coaches at $438,000 each, six Urban Coaches at $275,000 each, and five additional Metroflex vehicles at $64,000 each. The total vehicle capital costs for this alternative are estimated to be $4,160,000.

This alternative would incur all of the facilities costs at Grain Valley, Oak Grove and Odessa totaling $1,200,000.

The annual O&M costs for this alternative are estimated to be $2,759,000. Table 4-2 provides a summary of the annual O&M cost considerations for the Express Bus Alternative.

Table 4-2
Express Bus Alternative O&M Cost Estimate
(2006 Dollars)

Bus Type	Daily Platform Miles	Daily Platform Hours	Annual Platform Miles	Annual Platform Hours	Annual Direct Labor Charge	Annual Direct Mileage Charge	Annual Indirect Mileage Charge	Total Annual O&M Cost
Large Bus	1,603	63.3	408,765	16,142	$565,000	$187,000	$575,000	$1,327,000
Small Bus	1,575	111.7	401,625	28,484	$711,000	$156,000	$565,000	$1,432,000
Metroflex	0	0.0	0	0	$0	$0	$0	$0
Total	1,750	175.0	446,250	44,625	$1,276,000	$343,000	$1,140,000	$2,759,000

NOTES: Annual Direct Labor Charge Rate LB=$34.972 SB=$24.965 M=$21.425
Annual Direct Mileage Charge Rate LB=$0.448 SB=$0.389 M=$0.219
Annual Indirect Mileage Charge Rate LB=$1.407 SB=$1.407 M=$1.407

4.1.3.3 COMMUTER RAIL ALTERNATIVE BUS SERVICE

The Commuter Rail Alternative would require six additional Urban Coaches and five additional Metroflex vehicles, resulting in an additional vehicle cost for this alternative of $1,970,000.

The estimated annual O&M costs for this alternative are $1,452,000. Table 4-3 provides a summary of the annual O&M cost considerations for the Commuter Rail Alternative.

Table 4-3
Commuter Rail Alternative O&M Cost Estimate
(2006 Dollars)

Bus Type	Daily Platform Miles	Daily Platform Hours	Annual Platform Miles	Annual Platform Hours	Annual Direct Labor Charge	Annual Direct Mileage Charge	Annual Indirect Mileage Charge	Total Annual O&M Cost
Large Bus	0	0.0	0	0	$0	$0	$0	$0
Small Bus	1,618	111.7	412,590	28,484	$711,000	$161,000	$580,000	$1,452,000
Metroflex	0	0.0	0	0	$0	$0	$0	$0
Total	1,618	111.7	412,590	28,484	$711,000	$161,000	$580,000	$1,452,000

NOTES: Annual Direct Labor Charge Rate LB=$34.972 SB=$24.965 M=$21.425
Annual Direct Mileage Charge Rate LB=$0.448 SB=$0.389 M=$0.219
Annual Indirect Mileage Charge Rate LB=$1.407 SB=$1.407 M=$1.407

4.1.4 ALTERNATIVES BUS COST ESTIMATES SUMMARY

As shown in Table 4-4, the vehicle capital costs for the Express Bus Alternative are approximately $4,160,000 more than the TSM Alternative and approximately $2,190,000 more than the Commuter Rail Alternative. The Express Bus Alternative incurs all of the facilities costs at $1,200,000. The annual bus O&M costs for the Commuter Rail Alternative are $118,000 less than the TSM Alternative and $1,307,000 less than the Express Bus Alternative.

Table 4-4
Summary of Bus Capital Cost and Annual O&M Cost Estimates
(Year 2006 Dollars)

Characteristic	Bus Operations Alternatives		
	TSM	Express Bus	Commuter Rail
Additional Peak Vehicles Required			
Over-the-Road Coach	0	4	0
Small Bus	0	5	5
Metroflex Vehicle	0	4	4
Additional Fleet Vehicle Requirements			
Over-the-Road Coach	0	5	0
Small Bus	0	6	6
Metroflex Vehicle	0	5	5
Vehicle Capital Costs			
Over-the-Road Coach	$0	$2,190,000	$ 0
Small Bus	0	1,650,000	1,650,000
Metroflex Vehicle	0	320,000	320,000
Total	**$0**	**$4,160,000**	**$1,970,000**
Facilities Costs			
Rehab. Blue Springs P&R	Programmed in TIP	Programmed in TIP	Programmed in TIP
Grain Valley P&R	n/a	$ 600,000	n/a
Oak Grove P&R	n/a	350,000	n/a
Upgrade Odessa MoDOT P&R	n/a	250,000	n/a
Total	**$0**	**$1,200,000**	**$0**
Total Vehicle and Facilities Costs			
Total Capital Costs	**$0**	**$5,360,000**	**$1,970,000**
Difference (vs. TSM)	n/a	**$5,360,000**	**$1,970,000**
Difference (vs. Baseline)	n/a	n/a	**-$3,390,000**
Annual O&M Cost Estimates			
Large Bus	$ 650,000	$1,327,000	$ 0
Small Bus/ Metroflex Vehicle	920,000	1,432,000	1,452,000
Total	**$1,570,000**	**$2,759,000**	**$1,452,000**
Difference (vs. TSM)	n/a	**$1,189,000**	**-$118,00**
Difference (vs. Baseline)	n/a	n/a	**-$1,307,000**

4.2 Commuter Rail Capital and Operating Costs

The costs to implement and operate commuter rail service include the cost to upgrade the track and signals in the corridor, the cost for the rolling stock, and the cost to operate and maintain the commuter rail service in the corridor. The estimated capital cost to upgrade the track and signals to facilitate the service was developed by the Kansas City Southern (KCS) railway company. The KCS estimate was reviewed by the study team and a phased implementation of improvements is recommended by the study team. The phasing was based on the premise that initially the number of commuter rail trains in operation will be minimal, so all improvements are not needed initially. As demand on the I-70 corridor increases and commuter rail service in other corridors that use the same tracks to access downtown are implemented, the remaining improvements can be implemented. The capital cost estimate for rolling stock and the annual O&M costs were developed for commuter rail service utilizing three and four train sets in each peak hour. All costs shown are in 2006 dollars.

4.2.1 TRACK AND SIGNALS UPGRADE COSTS

A plan to upgrade the existing KCS tracks and signals to allow commuter rail operations was developed by TranSystems on behalf of KCS. The proposed rail upgrade plan was reviewed by the study team and a proposed phased improvement approach was developed. The objective of the phased improvement plan was to reduce the required initial investment in track upgrades. As commuter rail demand grows the latter phases can be implemented.

4.2.1.1 KCS-PROPOSED CAPITAL IMPROVEMENTS

The KCS commuter rail improvement plan envisions several commuter rail corridors joining together to access the Riverfront Station from the east. Along with the I-70 corridor, these could include an Airport corridor using a former Rock Island alignment, a Kearney corridor via Burlington Northern Santa Fe (BNSF) and a Pleasant Hill corridor using a former Rock Island line.

The stated objective of the capital improvements plan was to devise exclusive passenger trackage (no freight train use) with minimum at-grade crossings of freight railroads, using railroad-owned right-of-way to a maximum extent in order to enhance the constructability of the proposed plan.

The plan for track and signal upgrades developed by KCS is presented in detail along with the estimated capital costs. A detailed review by the study team of the estimated costs for the KCS-proposed plan is then provided. Finally, an evaluation of the KCS plan is presented.

Overview of KCS Trackage Improvement Plan

The following is a summary description of the KCS proposal to improve the existing trackage between Odessa and Rock Creek Junction and develop an exclusive commuter rail track between Rock Creek Junction and Riverfront Station, as presented by its consultant.

KCS Mexico Subdivision Track Improvements from Odessa to Rock Creek – Install continuous welded rail (CWR) in the entire commuter service area between Odessa and Rock Creek Junction as follows: purchase 4.5 miles of new 115-pound rail, then remove the existing rail, crop (trim the ends off), weld and reinstall it. The purchased rail makes up for the loss when cropping the existing rail. Necessary tie and surface work also would be performed.

New Commuter Route from Rock Creek to Sheep Junction – Construct a new commuter line starting at Rock Creek Junction connected to the KCS Mexico Subdivision, located south of and roughly paralleling the Union Pacific (UP) line. Cross the east-west Kansas City Terminal (KCT) line at-grade and turn north paralleling and running east of the KCS line. Cross Big Blue River on a new bridge and pass under the Sheep Jump viaduct through an existing opening.

New Commuter Route from Sheep Junction to East Knoche – The commuter line would begin climbing before going under Sheep Jump viaduct. Once sufficient height is reached, it would cross above the KCS and UP tracks on a new bridge while turning onto an east-west alignment. It then would descend to grade and continue on the east-west alignment along the south edge of the present Knoche Yard.

New Commuter Route from East Knoche to I-35 – Construct a new passenger route along the south edge of Knoche Yard. KCS would reconfigure Knoche Yard to have six long interchange tracks and would relocate switching activities to the new Richards-Gebauer facility. A new grade separation of Kansas Avenue would be constructed at the west end of the Knoche Yard.

New Commuter Route from I-35 to Riverfront Station (2nd Street & Grand Blvd.) – West of the Knoche Yard near the I-35 overpass, the commuter line would climb again. It would cross over KCS, the BNSF-KCS interchange track and four UP main tracks. The west end of the bridges would connect with the former KCS Second Street spur line right-of-way under the Heart of America Bridge/Missouri Route 9 near the former power plant.

Riverfront Station – The commuter line would expand to three stub platform tracks on the former KCS right-of-way alongside the public parking lot between Second and Third Streets along Grand Avenue.

KCS Freight Improvements – KCS proposes to relocate its primary freight car switching activity from the Knoche Yard to Richards-Gebauer. This will be done in part to free up room for the proposed commuter track along the south side of the present Knoche Yard and make available other space within the present yard footprint.

The estimated total cost of the KCS plan is $120 million (2006 dollars). The cost estimate was developed by KCS's consultant. Total costs summarized by item are provided in Table 4-5.

Table 4-5
KCS Commuter Rail Improvement Plan Cost Estimate
(Year 2006 Dollars)

Item	Base	12 Percent Engineering	20 Percent Contingency	Signal	Total
Odessa – Rock Creek	$ 9,186,200	$ 1,102,344	$ 1,837,240	$ 2,550,000	$ 14,675,800
Rock Creek – Sheep Jump	4,574,300	548,916	914,860	570,000	6,608,100
Sheep Jump – East Knoche	17,023,100	2,042,772	3,404,620	150,000	22,620,500
East Knoche – I-35	10,068,300	1,208,196	2,013,660	390,000	13,680,200
Kansas Ave Separation	9,030,000	1,083,600	1,806,000	0	11,919,600
I-35 – Riverfront	26,380,600	3,165,672	5,276,120	0	34,822,400
Riverfront Station	299,200	35,904	59,840	180,000	574,900
KCS Freight Improvements	11,274,400	1,352,928	2,254,880	75,000	14,957,200
Totals	**$87,836,100**	**$10,540,332**	**$17,567,220**	**$3,915,000**	**$119,858,700**
				Flagging	219,000
				Project Total	**$120,077,700**

Sources: TranSystems June 31, 2006 worksheet; RLBA Calculations.

Review of KCS Plan Cost Estimates

The cost estimate provided by KCS was reviewed based on an initial field inspection of the proposed service area on June 23, 2006. Mobilization estimates are allotted and seem appropriate. Unit costs were in line with industry standards when broken out and not part of a lump sum determination (such as with construction of bridges). Some minor inconsistencies involving unit costs exist between the Odessa to Rock Creek area estimate and the remainder of the areas[1]. Those inconsistencies are minor when taken in context of the entire project. Engineering estimates of twelve percent and contingencies of twenty percent are common within the industry at this level of planning. Costs associated with flagging broken out in the summary sheet allow for one full year of flag protection and appear appropriate for the level of work estimated. Individual points of interest associated with each item are broken out below.

No documentation was provided for the $12.0 million estimated to be utilized in construction of an overpass at Kansas Avenue, so a detailed review was not possible.

KCS Mexico Subdivision Track Improvements from Odessa to Rock Creek Junction – Cost estimates reflect rehabilitation of the entire 33.8 miles of main track contained within those limits along with refurbishment and/or extension of some passing sidings, totaling about 36.8 miles.

Track Labor and Material – As presented at the June 23, 2006 meeting, cost estimates reflect the purchase of new 115-pound per yard CWR. After replacement with the new rail, relay quality rail taken up will be cropped and flash butt welded (in the field) to cascade to the next area for replacement. This is a cost-effective approach. Along with installing CWR between Odessa and Rock Creek Junction, cost estimates reflect replacing, on average, over 1,200 ties per mile.

[1] Some minor inconsistencies involving unit costs exist between Item 1 and the remainder of the areas involving: 1) Ties, 7" x 9" x 9'; 2) Anchors, 115# SH; 3) Spikes, new (240 per Keg); 4) Ballast, Mainline and 5) Ballast, Side Track.

Signal – Signal related costs are specified on the summary sheet and the $2,550,000 figure seems reasonable given the distance covered and the potential differences from existing freight to proposed passenger speeds.

New Commuter Route from Rock Creek to Sheep Junction – As noted, this is the only section of the improvements that required property acquisition under the KCS improvement plan.

Property – Only two acres of property acquisition is estimated in this item.

Track Material – See note above concerning differences in unit costs between Item 1 and all others.

Bridges & Culverts – It should be noted that the lump sum amount allotted to construct a bridge over the Big Blue River is over half of the subtotal of this item before additives.

New Commuter Route from Sheep Junction to East Knoche – As can be seen below, two line items account for 96 percent of the cost of this item before additives.

Site Preparation – Heavy amounts of "Borrow and Haul" are allocated to this item and this one line item amounts to almost ten percent of the subtotal before additives. This line item most likely augments the bridge construction below.

Bridges & Culverts – It should be noted that the lump sum amount allotted to construct a bridge over the UP track is over 86 percent of the subtotal of this item before additives.

New Commuter Route from East Knoche to I-35 – This portion of the project poses the greatest concern noted during analysis of the cost estimates. While the cost estimates reflect existing track removal and new track construction, no money is credited to the estimated total for residual value of existing rail and ties to be removed that may be used elsewhere in the project. Salvage could approximate $900,000 or more for rail in this item alone. Some ties also may have relay value.

Track Work Labor – The cost estimate reflects removal of about 25.54 miles of track (134,851 TF) and constructing approximately 5.24 miles of new track, which accounts for the majority of this subset, about 79 percent. Sixteen miles are estimated to require surface, lining and tamping during this subset. It appears that some of the existing yard tracks are to be realigned to make the long transfer tracks without requiring new construction. Further clarification is needed regarding this and the next item.

Track Material – For the estimated 3.5 mile "passenger only" track it is estimated that about 4.2 miles of new 136-pound CWR and about 7.8 miles of 115-pound CWR second hand rail will be purchased from the tonnage estimates provided[2]. If the commuter rail sponsor is paying for the second hand rail from inventory as well as new ties, then it should receive credit for the relay rail and ties taken up. The same principle applies to turnouts taken up.

[2] RLBA scaled off the proposed alignment of the "passenger only" track and estimated it to approximate 3.5 miles.

New Commuter Route from I-35 to Riverfront Station (2nd Street & Grand Blvd.) – Again, as can be seen below, two line items account for 96 percent of this area before additives.

Site Preparation – Large amounts of "Borrow and Haul" are allocated to this item and this one line item amounts to almost ten percent of the subtotal before additives.

Bridges & Culverts – It should be noted that the lump sum amount allotted to construct a bridge over the KCS, BNSF and UP tracks is almost 85 percent of the subtotal of this item before additives.

Miscellaneous – A $200,000 lump sum allowance was estimated for utility protection/relocation and most likely is appropriate.

Riverfront Station – There are no real issues or concerns contained within this item.

KCS Freight Improvements – This item coincides with the relocation of yard tracks from the Knoche Yard to the proposed new yard at Richards-Gebauer and again causes concern about the use of second hand rail from inventory while not giving credit for relay materials taken up from existing yard tracks.

Site Preparation – Some site preparation is required to accomplish the yard relocation and accounts for just over twelve percent of the subtotal before additives.

Track Work Labor – Cost estimates reflect constructing about 19.16 miles (101,177 TF) and surface, line and tamping the same track footage.

Track Material – Cost estimates reflect purchasing about 24.5 miles of 115# CWR, second hand from KCS inventory. Again, no credit for any value of relay rail and ties to be taken up is reflected.

Bridges & Culverts – A $309,000 lump sum allotment is estimated for culverts in this subset. This is the only allotment for culverts in the provided estimate.

Signal – KCS appears to share the cost (50 percent) of a new control point with the commuter rail sponsor in conjunction with this area of the project.

Generally, the cost estimate is accurate and unit costs appear along industry lines. The greatest cause of concern centers around the apparent lack of credit given to the commuter rail sponsor for relay rail and ties taken up from existing yard tracks that may be used elsewhere either on this project or another.

Evaluation of KCS Plan

KCS developed its own projection as to what rail lines might host commuter rail in the future. It apparently screened out all lines that experience high levels of freight use. The projections do not reflect the findings of the Kansas City Region Commuter Rail Study prepared on behalf of MARC in 2002.

The KCS plan does a very good job of meeting its stated objectives. West of Rock Creek Junction, the plan creates a dedicated passenger route to Riverfront Station. The proposed

route crosses only one railroad at grade, that being the extreme east end of the KCT Main Track near its connection with UP. The plan uses only one piece of non-railroad property, and that is a small segment of an industrial operation that can be readily obtained.

The KCS plan includes two elements that may be set aside for separate consideration. One is KCS freight improvements and the second is providing a grade separation at Kansas Avenue. As presented, KCS would like to construct six long interchange tracks at the Knoche Yard site and relocate all switching activities to newly constructed trackage at Richards-Gebauer. On the surface, this provides little benefit to commuter rail. It was indicated that space would be freed up at Knoche Yard, which might be a good site for commuter rail shop facilities. There was no clear statement that any land would be swapped for this $14 million item. In addition, a commuter rail shop would require only a fraction of the space to be made available at Knoche Yard.

Grade separation at Kansas Avenue is the other element that should receive separate analysis. Other remedies such as crossing closure or improved signalization may be appropriate at Kansas Avenue, and other funding avenues may be available.

The KCS plan proposes elimination of all passenger-freight track sharing and reduction in at-grade crossings to one. These enhancements would minimize passenger-freight conflicts, to the benefit of both services. Passenger service would be more reliable due to the absence of freight trains sharing and crossing the passenger route. Freight interests also are well served, especially given that once service is implemented freight trains generally are expected to yield to passenger trains.

Commuter rail must operate reliably on-time to attract and maintain riders. This is particularly true of new-start commuter services where riding trains has not had time to become ingrained into commuters' lifestyle, habits, job and housing decisions and automobile buying choices. The need to provide reliable service makes the KCS plan to minimize passenger-freight conflicts quite attractive.

The question of what a project can justify is not easily answered. If, in 2036, numerous commuter trains were operating over the corridors identified by KCS and were streaming into Riverfront Station, passing over significantly increased volumes of freight trains without delay, one could conclude that the KCS plan was cost effective. But in 2007, it is difficult to justify the entire KCS plan to support start-up service levels on the single proposed corridor linking Odessa and Kansas City. Indeed, the question of what expenditure is justified should be addressed only once all results of this study are available to be considered in light of needs and resources region-wide.

4.2.1.2 POTENTIAL PHASING PLAN

A normal and logical approach to implementing any high-cost project is to consider doing so in phases or increments. In that context, the KCS plan was reviewed to determine whether there were any reasonable opportunities to achieve it in phases. It must be remembered that KCS is under no obligation to implement commuter service on any terms other than its own, and it may reject any phasing plan. But if KCS becomes convinced that it is necessary to phase the railroad improvements in order to have a commuter rail project, it may consider that alternative. Accordingly, a phasing plan has been developed. While certainly open to modification, it can serve to support the determination as to whether the parties would be interested in proceeding under similar conditions. If so, the phasing plan could be revisited and refined.

The study team believes that the worst potential location in terms of potential passenger-freight interference for commuter rail using KCS trackage would be the crossing of the UP River Subdivision and UP Coffeyville Subdivision. Each of these lines consists of two main tracks, in the vicinity of Gillis Street and East 1st Street about 0.6 miles east of Riverfront Station. The crossings are known as Gillis Street and Troost Avenue in railroad parlance. Both UP lines connect Neff Yard (east of River Market) with UP lines and connections to the west. Both are heavily used, hosting 30 or more freight trains per day each[3]. The Coffeyville Subdivision maximum speed is believed to be 40 mph and the River Subdivision maximum is believed to be 15 mph in this area. Trains are often moving slowly on both lines because of traffic congestion. Typical train length is in excess of one mile. The combination of slow speeds, long trains and traffic delays makes the freight train occupancy of those crossings a severe impediment to reliable commuter rail service.

Just east of this location, commuter trains using existing KCS tracks would encounter conflicts with freight train movements where KCS track connects with UP and BNSF.

The proposed phasing plan adopts the bridge over the UP, BNSF and KCS lines in the first phase, but scales back other aspects of the KCS proposal. An overview of the proposed phasing plan is included in the following section:

Phase 1 – In the first phase, commuter trains would utilize (1) existing (upgraded as necessary) KCS tracks on the east end of the route between Odessa and Air Line Junction, and (2) newly constructed, dedicated commuter track between Air Line Junction and Riverfront Station. Specific provisions, from east to west, include:

- Install CWR and ties on KCS line between Odessa and Rock Creek Junction as proposed.
- Operate initial commuter trains from Odessa into Knoche Yard on the existing KCS freight route. This entails entering UP trackage from the south side at Rock Creek Junction, crossing over the UP tracks, entering KCS trackage and crossing UP at grade at Air Line Junction before entering the Knoche Yard.
- Construct a single new passenger main track along the south edge of Knoche Yard. This track would diverge from the KCS trackage west of but as close to Air Line Junction as possible. The diverging switch should be a power switch. Reconfiguration of tracks may be necessary in the vicinity of the present intermodal facility, which is to be relocated by KCS. This could include installing a switch in the passenger track to give access to the intermodal tracks, if still present. An option might be to construct a new passenger track along the north side of Knoche Yard. In the long term, this would conflict with KCS's desire to construct six long interchange tracks along the north side, but the initial passenger track probably could be designed for easy conversion to freight use if/when those KCS plans materialize. The commuter trains would operate over the single new passenger track through Knoche Yard.
- Make street and signal improvements at the Kansas Avenue crossing in lieu of constructing a grade separation.

[3] Reported by TranSystems.

- Construct a passenger line between I-35 and the Riverfront Station as proposed by KCS, including overpasses over KCS, BNSF and UP (two double-track lines). Construct Riverfront Station tracks as proposed or in an alternate configuration.

Capital Costs associated with Phase 1 as presented would include all of rail replacement from Odessa to Rock Creek Junction, a portion of the East Knoche to I-35 improvements, all of I-35 to Riverfront Station improvements and the Riverfront Station improvements. The approximate costs would be $54 million.

Phase 2 – A likely Phase 2 scenario, which would be prompted by significantly more commuter trains, would be the construction of the KCS-proposed improvements between Rock Creek Junction and East Knoche. These improvements consist of providing a dedicated passenger rail line along the UP and KCT, with new bridges over Big Blue River and the KCS and UP near Airline Junction. This would include the Rock Creek to Sheep Jump improvements and the Sheep Jump to East Knoche improvements of the KCS plan, for an approximate cost of $29 million.

Phase 3 – Phase 3 might include making improvements to relocate KCS yard activities to the Richards-Gebauer site, provided that the commuter service were to recognize commensurate benefits such as transfer of property at Knoche Yard or other benefits. Those benefits are not clear at this time. The relocation cost would include a portion of the East Knoche to I-35 improvements and all of the KCS Freight improvements, at an approximate amount of $26 million.

Kansas Avenue – The study team believes that improvements should be made at Kansas Avenue in the course of commuter rail implementation. As indicated previously, the range of improvements includes closing, improved signaling and grade separation. Because of the uncertainty as to what improvements are appropriate, Kansas Avenue improvement costs are not incorporated in any of the potential phases.

The KCS plan is effective in establishing a route that minimizes freight-passenger conflicts, but also is expensive. The route would provide increasing benefits as the number of commuter trains and routes increased, but if and when that might happen is uncertain. Elements of the plan that call for relocation of freight facilities and grade separation at Kansas Avenue require further analysis to examine benefits and potential alternatives.

It is possible to split the KCS plan into phases that could be implemented over time, sustaining viable commuter service at each level. However, there is no assurance that KCS would agree to such a plan. Table 4-6 summarizes the estimated cost for each phase.

Table 4-6
Phased Implementation Cost Summary
(Year 2006 Dollars)

Phase	Capital Cost
1	$54,000,000
2	$29,000,000
3	$26,000,000

4.2.2 NON-TRACK AND NON-SIGNAL CAPITAL COSTS

Capital costs associated with passenger rail stations, equipment and a layover facility were estimated. These costs along with the capital cost required to upgrade and implement track and signal improvements represent the required initial investment to implement commuter rail in the I-70 corridor.

4.2.2.1 STATION CAPITAL COSTS

Stations typically are commuter-oriented, with connections to local bus and shuttle routes and more limited facilities than traditional intercity rail stations. Access to and from these stations will be primarily via private automobile, although some passengers also will travel by bus, bicycle and foot. Station facilities can be basic, with simple platforms and basic amenities such as public phones, benches, along with an information kiosk, passenger drop-off area and a bus or shuttle stop.

Commuter rail stations located outside of an established area should be located and designed to optimize:

- visibility from major roadways,
- safe and convenient access along well defined access routes with adequate capacity,
- safe and efficient on-site traffic operations both for cars and for local and express bus services,
- safe and efficient parking,
- convenience and safety for pedestrians walking between their cars and the commuter rail platform,
- facilities for dropping off and picking up (kiss-and-ride) car passengers, and
- adequate and comfortable facilities available for waiting and alighting commuter rail passengers.

The Music City Star commuter rail service, which operates between Lebanon and Nashville, Tennessee, began operation in September, 2006. Station costs related to this service average $2.4 million per station, typically including one 300-foot platform, three canopies and a 200 space parking lot. A temporary station in Martha has been included in the Music City Star system at a cost of $138,681, featuring a single platform, three paved ADA parking spaces and a gravel parking lot for 80 vehicles. However, there is already concern that the parking will be inadequate and that costs will rise considerably when the issue is addressed.

Station costs, of the Rail Runner Commuter Rail Service between Albuquerque and Belen, New Mexico which began June, 2006, averaged about $2 million according to the Director of Transportation and Planning Services of the Mid-Region Council of Governments. Costs varied according to parking lot size and length of access roads, with the cheapest costing about $1.8 million. Stations feature one 300-foot platform with two canopies covering about half of its length. Parking varies at each station, with the largest facility having over 250 spaces.

Given the commuter rail service scenario, an estimated station cost of $2 million is used for each of the outlying stations such as at the Odessa, Oak Grove, Grain Valley, Blue Springs, Independence-Mall and Independence Central. The station at downtown Kansas City (Riverfront) was estimated to cost about $1 million due to the existence of parking and other amenities. It should be noted that any new service can choose to spend as much or as little as it may want in the start-up time period.

4.2.2.2 LAYOVER FACILITY COSTS

Layover facilities (associated with regular commuter passenger service) are required in conjunction with overnight train storage, light servicing and cleaning. It is preferable to locate these as close as possible to a commuter rail line's end terminals. It is assumed that a layover facility for nighttime layover would be constructed near Odessa depending on land availability. Daytime layover would likely be accomplished at the Riverfront Station area. Estimated to cost about $1.8 million (plus land acquisition cost), it would include the following:

- Sufficient tracks for three or four trainsets, with additional space to expand considering the possibility of future fleet size increases;
- 480 volt standby power (required to maintain train heat and cooling and operate lights and doors without running the train's locomotive);
- Crew and maintenance building;
- Fencing and security;
- Lighting;
- Roadway vehicle access to all tracks, and
- Level storage tracks with drip pans for locomotives.

4.2.2.3 LOCOMOTIVE HAULED, BI-LEVEL PASSENGER RAIL CARS

Bi-level cars are fairly typical of commuter rail systems that feature locomotive hauled passenger rail cars. As seen in recent sales to systems in California, New Mexico and Rhode Island, average current costs of such cars approach around $2 million, as displayed in Table 4-7 below.

Table 4-7
Locomotive Hauled Bi-Level Passenger Rail Cars
(Year 2006 Dollars)

System	Manufacturer	Seating	Approx. Cost (Millions)
Metrolink, Los Angeles, CA	Rotem	140-150	$2.02
Rail Runner Albuquerque, NM	Bombardier	140	2.30
MBTA, RI	Kawasaki	182	2.00

Source: Manufacturers, service operators and various media.

Locomotives such as Wabtec Corporation's MPXpress model have been purchased at a cost of approximately $2.5 million each as in the case of New Mexico's Rail Runner service. Subsequently, a train made up of a locomotive and three bi-level passenger cars would cost approximately $8.5 million and seat between 420 and 546 passengers, depending on configuration, ADA compliance and/or crash management systems. Fleet costs covering three locomotives and one spare and nine passenger cars and two spares would total $32 million. That would allow operation on three trains in each peak period. To increase service to four peak period trains, the cost would increase to $40.5 million assuming that the same number of spares would be needed. Table 4-8 summarizes the cost calculations for each scenario.

Table 4-8
Rolling Stock Capital Costs
(Year 2006 Dollars)

Cost Item	3 Peak Trains	4 Peak Trans
Locomotive	$2.5	
Bi-level Passenger Car	$2.0	
Number of Passenger Cars	3	
Total Passenger Cars	$6.0	
Total Train Set	$8.5	
Number of Trainsets	3	4
Operating Trainsets Total	$25.5	$$34.0
Spare Locomotives	1	1
Spare Passenger Cars	2	2
Spare Total	$6.5	$6.5
Total Cost	$32.0	$40.5

The used rail passenger equipment market including passenger cars and locomotives can vary widely depending on a number of factors. Occasionally passenger rail agencies, such as Chicago's Metra have sold surplus bi-level railcars for as little as one dollar or just a few thousand dollars. Nashville was able to procure locomotives for $400,000 each for the Music City Star service. However, such opportunities are not regularly available and, while worth investigating at the time of procurement, such a market may not exist when the next would-be passenger rail service looks to acquire rolling stock.

Self-propelled diesel multiple units (DMUs) provide an alternative to traditional locomotive hauled trainsets. The benefit of DMU railcars can include fuel economy, flexibility and efficient handling of small passenger loads. The current arguments against DMU railcars include reduced efficiency under large passenger volumes and a market currently limited to a single supplier of compliant equipment, with a relative short service history of its equipment[4]. It is the study team's opinion that for the purposes of this study conventional equipment (locomotive-hauled rail cars) should be assumed as it is currently the standardized procurement practice and the conservative planning approach. DMUs are becoming more utilized and there should be an increasing amount of real-world performance data available in the intervening time the Kansas City region is considering its options. Consequently, it would be prudent to revisit the availability, cost and advantages of DMUs as service implementation nears.

4.2.2.4 TOTAL NON-TRACK AND NON-SIGNAL CAPITAL COSTS SUMMARY

Total non-track and non-signal capital costs of the corridor are displayed in Table 4-9. Included are seven stations, three and four train sets and related spares as well as allowance for one layover facility.

[4] Compliant equipment meets FRA passenger car safety standards, so it can be operated on rail lines that carry freight rail traffic.

Table 4-9
Corridor Non-Track and Non-Signal Capital Costs
(Year 2006 Dollars)

	3 Peak Trains	4 Peak Trains
Stations & Parking	$13,000,000	$13,000,000
Layover Facility	$1,800,000	$1,800,000
Equipment Cost	$32,000,000	$40,500,000
Total	$46,800,000	$55,300,000

Source: RLBA Estimates

4.2.3 TOTAL RAIL CAPITAL COSTS

The capital cost estimate to make track and signal improvements ranges from $54.0 million to complete the recommended Phase 1 improvements to $120.1 million to implement the complete KCS plan. The number of trains running in each peak hour results in the non-track and non-signal costs that range from $46.8 million to $55.3 million. Table 4-10 provides a total cost for the four possible combinations of capital improvements.

Table 4-10
Total Rail Capital Cost Matrix
(Millions of Year 2006 Dollars)

Track and Signal Improvement Scenario	3 Peak Trains	4 Peak Trains
KCS Proposal	$166.9	$175.4
Recommended Phase 1	$100.8	$109.3

4.2.4 OPERATIONS AND MAINTENANCE COSTS

Estimated operating costs are based upon the recommended service plan, consisting of three or four round trips per day upon start-up. The inputs required to operate the service, such as labor hours and outputs, such as locomotive-miles, were calculated. Next, appropriate unit costs from passenger railroad experience were applied. Finally, adjustments were made as appropriate, to reflect any unique characteristics of the proposed service. Principal operating cost components examined include:

Train Operations Costs include crew wages, fuel, clerical support, supplies, dispatching and supervision. Crew wages were estimated based upon train schedules, crew assignments and typical compensation. Fuel and other remaining costs were estimated based upon train-miles to be operated under each service plan.

Equipment Maintenance Costs were developed based upon equipment fleet size as well as miles operated. There initially is no corresponding capital cost for a maintenance facility as it is expected that the service initially would contract equipment maintenance to one of the railroads or equipment maintenance contractors in the region. It is not deemed economical to construct a shop facility for the small start-up fleet, but it may be desirable to do so as additional trains or lines are added and the fleet increases.

Access and Maintenance Costs pay for access to track owned by others. Rail passenger services operating over freight railroad tracks generally pay for track access in two ways: 1) by making capital improvements or contributions to improve line condition or increase line capacity, or both and 2) by means of a variable cost approach which recognizes both the use of existing facilities and the additional resources needed to maintain facilities to support passenger service. The first component is included in the infrastructure portion of the capital cost estimate elsewhere in this report.

The second component based on the amount of use measured by train-miles includes the compensation paid to the track owner for a share of track maintenance, dispatching, supervision and overhead costs in addition to an incentive payment, as well as a host railroad profit component, all of which are included in the operating estimate. The rate used in the I-70 estimate is based upon current agreements governing other commuter rail operations. It is too early to know whether KCS would retain ownership of the proposed new commuter rail trackage (which is located for the most part on KCS right-of-way), or whether it would be public-owned. The per-mile access fee is appropriate in the former case; in the latter, the public would be responsible for the maintenance cost, which would be somewhat higher than the amount shown under Access and Maintenance Costs.

Establishing the appropriate access and maintenance cost reimbursement through negotiations between the commuter rail sponsor and KCS can be anticipated to be a lengthy and contentious process.

Insurance expense and general and administrative (G&A) expenses were projected based on the experience of other commuter and light rail services, with particular attention to experience typical of the first years of operation. G&A costs reflect establishment of a modest administrative and funding agency, or a new adjunct to an existing governmental or transit entity. This new agency would be responsible for marketing, public outreach, contract administration, security coordination and financial matters.

A summary of total operating costs applied to the I-70 Commuter Rail service appears in Table 4-11.

Table 4-11
Annual Rail Service Operating Costs
(Year 2006 Dollars)

Description	3 Trains	4 Trains
Operating Costs:		
Train operations	$1,126,000	$1,401,000
Equipment maintenance	4,110,000	5,453,000
Railroad Access Fees	993,000	1,324,000
Station maintenance & operations	280,000	280,000
Subtotal Operating Costs	$6,509,000	$8,458,000
General and Administrative	$1,811,000	$1,811,000
Insurance	810,000	810,000
Contingency (5 Percent)	457,000	554,000
Total	$9,587,000	$11,633,000

Source: RLBA.

In estimating the operating costs associated with operating three or four trains during each peak period, the estimates are based on the operating premise that a trainset and crew would be required to operate each of the trainsets. The study team does not believe that it is prudent to assume that the first peak period train could complete its trip, operate in service or deadhead to the opposite terminal and make another trip in the peak direction. In addition to running time, the schedule would have to account for turnaround time at each end and time required to meet commuter and/or freight trains on the single track portions of the line.

The concept of turning a peak period train to make a second trip is worth evaluating in implementation planning and taking up with the host railroad. The concept is more feasible if a train operating somewhat outside the peak period is deemed useful, allowing a greater opportunity to turn a trainset. Another possible operating scenario is operating a morning "short turnback" train that would offload at Riverfront Station and turn back only as far as Grain Valley or Independence, for example, and then make a second inbound trip from that location.

4.3 Alternatives Cost Estimate Summary

The total capital and annual O&M costs for each of the alternatives are presented in Table 4-12. The capital cost for equipment and facilities are summarized separately. Equipment cost includes the cost for bus or rail vehicles. The facilities cost includes track, station, and associated infrastructure improvements. For the TSM Alternative and the Express Bus Alternative no variations are provided for either alternative. For the Commuter Rail Alternative cost estimates are provided for four variations reflecting varying levels of track and signal improvements and varying number of trains being run in the peak period. The Commuter Rail Alternative costs include the supportive transit service recommended as part of the alternative.

Table 4-12
Detailed Alternatives Cost Summary
(Millions of Year 2006 Dollars)

Alternative	Equipment Capital	Facilities Capital	Total Capital	Annual O & M
TSM	$0.0	$0.0	$0.0	$1.6
Express Bus	$4.2	$1.2	$5.4	$2.8
Commuter Rail:				
- Phased Plan / 3 Trains	$34.0	$68.8	$102.8	$11.0
- Phased Plan / 4 Trains	$42.5	$68.8	$111.3	$13.1
- KCS Plan / 3 Trains	$34.0	$134.9	$168.9	$11.0
- KCS Plan / 4 Trains	$42.5	$134.9	$177.4	$13.1

Given the expected limited initial demand for the commuter rail service, the costs for providing three trains in the peak direction best reflects expected initial operation. The level of initial track and signal improvements will depend on KCS's willingness to accept a phased improvement approach. In assessing the viability of the alternatives both the track and signal improvement scenarios should be considered, so a range of capital cost for the Commuter Rail Alternative is provided. Table 4-13 summaries the recommended costs for comparison of alternatives.

Table 4-13
Alternatives Cost Summary
(Millions of Year 2006 Dollars)

Alternative	Capital	Annual O & M
TSM	$0.0	$1.6
Express Bus	$5.4	$2.8
Commuter Rail	$102.8 - $168.9	$11.0