

Regional Transit Implementation Plan – Commuter Corridors  
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## INTRODUCTION

The Mid-America Regional Council (MARC) has partnered to perform a number of studies exploring the possibility of rail transit in the Kansas City metropolitan area, including the Commuter Rail Feasibility Study, the I-35 Fixed Guideway Corridor Study, and the I-70 Corridor Alternatives Analysis. While none of these studies concluded that the prospect for rail transit should be abandoned, neither did they conclude that rail transit should be pursued immediately. In fact, along the I-35 south corridor the Alternatives Analysis selected Bus-on-Shoulder as the Locally Preferred Alternative (LPA). Even though the subject of rail transit has been previously studied, there are a number of reasons why it should be revisited:

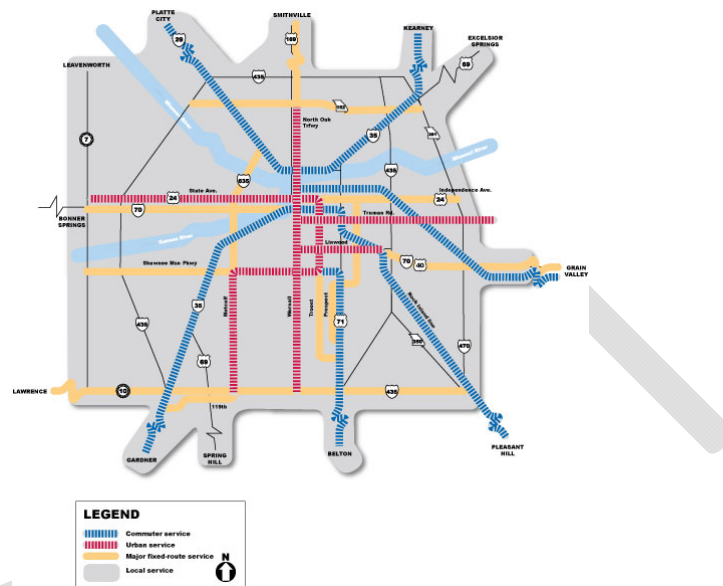
- The Commuter Rail Feasibility Study (2002) limited the potential rail corridors to rail currently carrying freight traffic, several of which carry high volumes of freight. The 2002 study did not review dormant and abandoned lines which could be utilized for transit without any conflict with freight traffic. Further, it did not envision how a relatively small amount of new rail alignment could supplement these under-utilized rail assets to form an effective commuter system, while bypassing some of the congested chokepoints of the existing freight rail system, such as the Kansas City Terminal Railway's "trench" and Kansas City Southern Railway's Knoche Yard. Consequently, a different commuter rail system could be developed that exploits Kansas City's underutilized rail assets.
- The I-35 and I-70 studies looked at these two corridors in isolation with an emphasis on transit for commuters living in the suburbs and working in downtown Kansas City, Missouri. While this traditional commute is still prevalent, it by no means addresses the majority of commute patterns existing today. Of the estimated 572,000 jobs within 25 miles of Kansas City's Central Business District (CBD – an 3 square mile area roughly bounded by 6<sup>th</sup> Street on the north, Troost Avenue on the east, 31<sup>st</sup> Street on the south and Summit Avenue on the west), only about 78,000-- less than 14%--are actually in the CBD itself. Since Kansas City's population and employment areas are spread out and most commuters need to go somewhere other than the CBD, a single corridor cannot capture a large percentage of commuters. Consequently, a more comprehensive system could be more effective than a series of isolated corridors (i.e., the whole is greater than the sum of the parts).
- The Federal Transit Administration (FTA), a major potential funding source for a commuter rail system, is changing its criteria for its New Starts program. Mobility improvements and cost effectiveness had been the primary criteria used in the past and, accordingly, had been the focus of previous studies. While these benefits will still be considered by the FTA, U.S. Transportation Secretary Ray LaHood recently announced that economic development opportunities and environmental benefits will be higher priority criteria. The goal of the new criteria is to promote more livable and sustainable communities. Since the FTA's priorities have changed, it is worthwhile to consider commuter rail opportunities from this new perspective.
- The urban and commuter services concept provides the opportunity for an integrated transit system. There is potential synergy between commuter services coming to a central hub and a complimentary downtown distribution service.

This Phase 2 Commuter Corridors report addresses the physical, operational and ownership components necessary to develop a commuter rail system in the Kansas City metropolitan area. In corridors where rail operations are deemed feasible, this report sets forth strategies for additional review of potential corridors and their initial system set up. Ridership, service feasibility, potential funding and community and political acceptance are also issues that must be considered. FTA New Starts program is a potential funding source for a commuter rail system. A new emphasis for these grants from the FTA includes economic development opportunities and environmental benefits. Finally, this report develops an implementation plan for the pursuit of commuter options along the various Commuter Corridors as defined by Smart Moves.

## Smart Moves Background

The 2008 Smart Moves Update crafted a new vision statement and set of goals to guide future corridor selection and service implementation that resulted in designation of regionally significant urban and commuter corridors as shown in Exhibit 1.1. The commuter corridors defined by Smart Moves are the basis for this Phase II modal analysis with an emphasis on providing additional definition to the potential for commuter rail in the future.

Exhibit 1.1 – Smart Moves Concept Map



### VISION STATEMENT

The Smart Moves Plan envisions a Kansas City region where public transit is a viable and cost effective transportation choice for all citizens and where public transit investments help shape the form of a regional community that is more accessible, walkable, healthy, efficient and attractive.

### GOAL STATEMENTS

- Goal 1 STRENGTHEN COMMUNITIES and improve the quality of life of residents and visitors throughout the region by making transit an equal or better option to automobile travel
- Goal 2 EXPAND AND ENHANCE MULTIMODAL TRANSIT SERVICE throughout the metropolitan region
- Goal 3 SUPPORT THE ECONOMY through accessible transportation options
- Goal 4 SAFEGAURD THE ENVIRONMENT and improve public health through increased transit ridership

The following selection criteria from Smart Moves help determine whether a corridor should be considered a regional or local corridor. To be selected as regional, a corridor must meet three or more of the selection criteria below:

- Regional corridors should be located on principal arterials, expressways, or interstate facilities.
  - One-way links on these facilities should have a daily volume greater than 7,300 vehicles per day
- Regional corridors should connect large retail/commercial centers
  - Large regional retail centers should have leasable space of 250,000 square feet or more.
  - Large commercial/office centers should have leasable space of 200,000 square feet or more.
- Where transit exists, routes should be operating at high levels
  - Average daily trips of 3,000 or more per day
  - Average daily trips at or above seated capacity of the service offered on at least 50 percent of the daily trips on a continuous basis throughout the year
- Regional corridors should connect at least two counties together

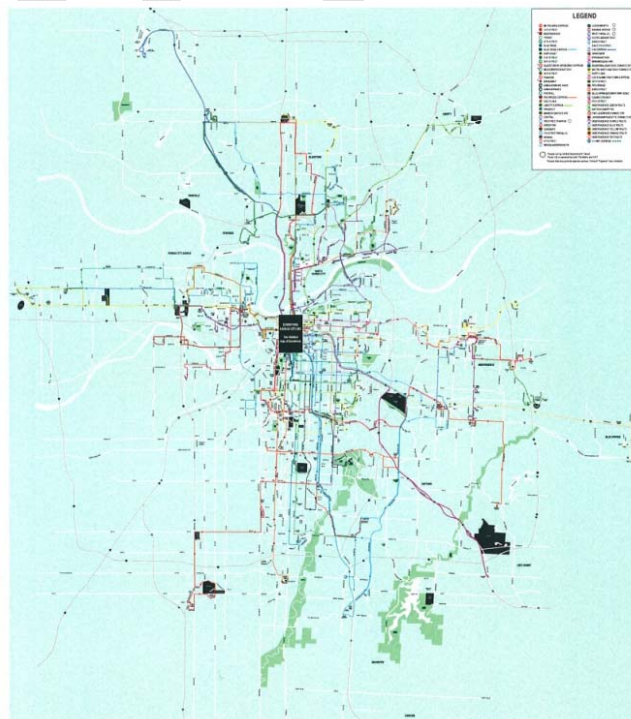
- Regional corridors should connect regional recreational and cultural sites such as museums, theme parks and sports venues, etc.
- Regional corridors should connect major employment centers:
  - Number of employees should be greater than 4,030 per zip code for 50 percent of the corridor
  - Number of employees should be greater than 665 per square mile
- Regional corridors should make use of abandoned or underused transportation infrastructure
  - Abandoned passenger rail corridors
  - Underutilized commercial rail corridors

Other transit advocate groups, such as the Regional Transit Alliance have also established goals and criteria that would create a robust regional transit network making public transit a viable transportation option for all the region's citizens. This would be accomplished by having transit plans that are consistent with regional plans and be adequately funded through a dedicated and reliable funding source. The plan should use appropriate transit modes and technologies suited to existing and projected demand in a cost effective manner, provide transit service appropriate to the population density and need within the respective counties, and meet federal and/or state requirements if such funding is sought. It is also recommended that a transit plan deliver measureable transit improvements in the first year with public engagement and voter research to ensure broad electoral support.

### Commuter Corridors

Smart Moves definition of commuter corridors places a general emphasis on highways currently served by express buses and several park-n-ride lots. Typically the express buses utilize the highway corridors to access the park-n-ride lots. An exception is a new commuter corridor referred to as I-70 West which overlaps the urban corridor along State Avenue. This urban corridor is currently served by a local bus route, however the Phase I Urban Corridor's report identifies enhancement to a Bus Rapid Transit (BRT) service with associated facilities along State Avenue. The regions bus transit service to the corridors under evaluation is by Kansas City's Area Transit Authority (KCATA). A regional map is shown in Exhibit 1.2.

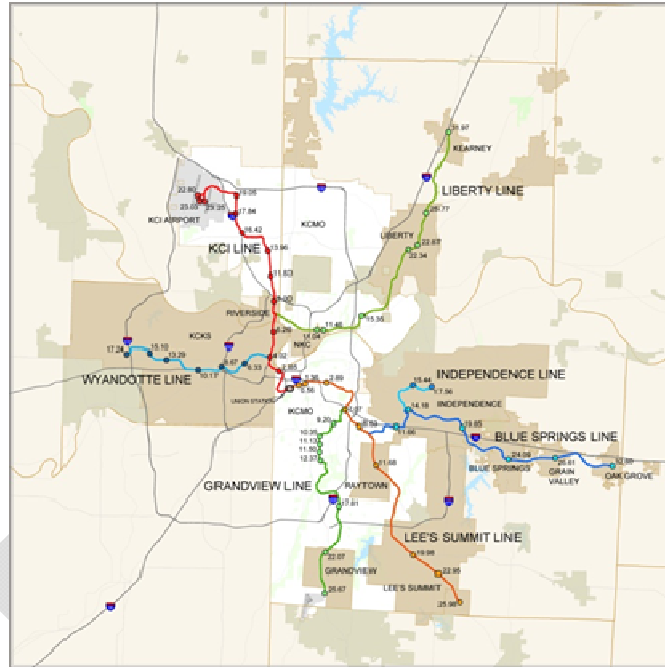
**Exhibit 1.2 – Regional Bus Transit Map (KCATA)**



## Commuter Rail

The commuter rail system assessed for Phase II begins by investigating existing rail corridors that relate to the identified commuter needs by Smart Moves. Several existing or former rail lines are in close proximity to the commuter corridors. In fact many of the regions roadways and highways are parallel to a railroad. Kansas City's rail system converges upon Union Station. Taking Union station as a hub, six lines radiate out to the region and, in general can be described as roughly following the highway corridors and rail lines serving particular destinations. The rail lines are shown in Exhibit 1.3.

Exhibit 1.3 – Commuter Rail System Map



The three rail lines east of Union Station in Jackson County are:

### ***The I-70 East Corridor (or Blue Springs Line)***

The rail line includes the existing rail of Kansas City Southern's (KCS) Mexico Subdivision as well as Union Pacific's Pixley Subdivision. Currently there are five (5) trains per day on the KCS line with 4 of those occurring at night. The majority of the new rail corridor involves a connection from the junction of the KCS and UP lines to the Rock Island Line. Preliminary discussions with KCS indicate the opportunity to obtain temporal separation for passenger rail operations for an annual fee (not yet determined). This corridor has the potential for further extension beyond Jackson County east to Odessa.

### ***The Rock Island Line (or Lee's Summit Line)***

This rail line includes Union Pacific's (UP) former Rock Island line. No trains have run on the Rock Island since 1982, yet track remains with most of it in good condition. The Rock Island line is also parallel to UP's Sedalia Subdivision which currently has 27 trains per day. A new rail corridor involves making a connection from Leeds junction to Union Station and is referred to as the common line. A portion of this new alignment could occur along Truman Road or in other locations. Details of any new alignment would need to be determined in future study phases. Preliminary discussions with UP indicate the opportunity to purchase the entire Rock Island line. It is estimated that approximately one-third of the rail track would need to be upgraded to passenger rail standards. New track could include sidings to allow for passing. The line has the potential for further extension to Pleasant Hill. Bike trails are also envisioned adjacent to the rail that could eventually connect with the Katy Trail system.

### ***US-71 Corridor (or Grandview Line)***

The rail line includes a combination of the existing Kansas City Southern's (KCS) Pittsburg Subdivision and its Grandview Branch. As the rail line heads northward, it swings to the east to join the Rock Island line at the "common line" portion near Leeds Junction. Currently there are thirteen (13) trains per day on the Pittsburg Subdivision and only one (1) train per week on the Grandview Branch. The new rail corridor involves a connection from Swope Park to Leeds Junction, and from approximately US-71 to I-435. Preliminary discussions with KCS indicate the need to add capacity along the Pittsburg Subdivision while having the opportunity to obtain temporal separation for passenger rail operations along the Grandview Branch for an annual fee (not yet determined). This corridor has the potential for further extension beyond Jackson County south to Pleasant Hill.

Three lines to the west of Union Station include:

### ***I-35 North Corridor (or Liberty Line)***

The rail line includes the BNSF Railway's Kearney Spur serving industrial plants. Currently there are two (2) trains per week that are switched by WATCO. A new rail corridor is needed before entering BNSF's Brookfield Subdivision because of heavy train traffic (32 trains per day). The new corridor could utilize portions of the former interurban rail corridor near North Kansas City. The operating plan seeks to obtain temporal operations for passenger rail service along the Kearney Spur. The new track alignment could mix with the former interurban rail corridor before connection to the Airport corridor in Riverside. Any future extension is limited because I-35 bisects the rail corridor north of MO Rte 92 in Kearney.

### ***The I-29 Corridor (or KCI/Airport Line)***

The rail line includes the former Interurban rail line from Riverside to St. Joseph. Portions of the former rail corridor (trolley service stopped in 1933) appear intact although the ownership may have reverted to adjacent properties. A new rail corridor is needed north of MO Rte 152 to the Airport, with a portion of the corridor consistent with previously planned transit corridors. In addition, new rail is needed to cross the Missouri and Kansas River along with a combination of connecting pieces to Union Station. This corridor bears the cost of major river crossings as well as significant portions of new track. Future extensions are possible to St. Joseph.

### ***I-70 West Corridor (or Wyandotte Line)***

The rail line includes just over three miles of the former Kansas City Northwestern (KCNW) line. A new rail corridor is needed between the Kansas Speedway and Park Avenue. Portions are contemplated to operate within the road right-of-way for State Avenue and/or Parallel Parkway. The operating plan includes purchase of the former KCNW line (cost not yet determined). This corridor has a significant portion of rail on new corridor. Future extensions are possible to Lawrence and Topeka, Kansas.

## CORRIDOR PLANNING

This section covers a multitude of topics and the varying perspectives that involve different modes of travel along the identified corridors. Smart Moves referred to nearly all of the commuter corridors as Interstate highway corridors. The only corridor without a highway name is the Rock Island Line which proposes utilizing a former rail line. The dual designations suggest the need to review modal options. Consequently, this section begins with a review of the highway perspective along the corridors including traffic volumes, future investments to be made through the Long Range Transportation Plan (LRTP), as well as prior investigations into managed lane concepts. Next the express bus perspective is discussed for the corridors and includes a review of demographic data (along the rail lines) for comparative purposes amongst the corridors. Finally the rail perspective is discussed and includes an overview of freight rail in the region as well as the potential for utilization of abandoned or underutilized freight rail lines to create a potential regional passenger rail network. Then each of the corridors and rail lines are discussed in terms of their physical attributes as it relates to associated cost components.

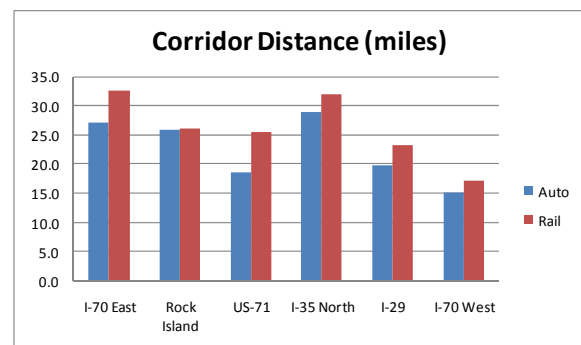
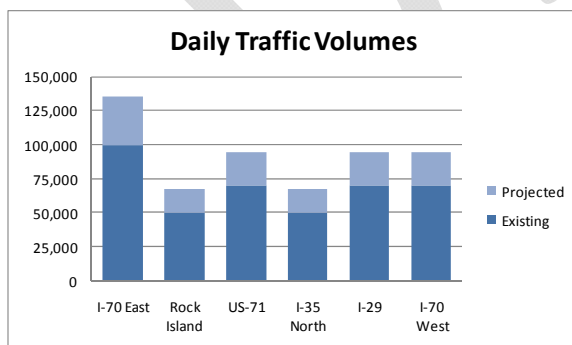
### Highway Perspective

Smart Moves identified each of the commuter corridors (as well as the State Avenue urban corridor) as having the potential in the future to continue investigation and evaluation of potential passenger rail transit, specifically:

- I-70 East Corridor – “continue pursuit of commuter rail”
- MO Rte 350 / US-50 (Rock Island) – “Long term, rail has the potential”
- US-71 Corridor – “Service could be elevated to support rail”
- I-35 North Corridor – “identified to support rail in the future”
- I-29 North Corridor – “Could be upgraded to rail in the future”
- I-70 West Corridor – “in long term, potentially support rail”

In relative terms, the Downtown Loop is where each of the Interstates effectively join and the highway lengths vary as they radiate outwards. Typically these highway corridors in the region have six lanes, though as they reach farther out the number of basic lanes can drop to four lanes (two lanes in each direction). A notable exception is the I-35 North corridor where south of I-35’s merge with I-29 is six-lanes I-35 North is essentially (in terms of basic lanes) a four-lane highway for a majority of its length. Exhibit 2.1 shows, in a comparative manner, representative traffic volumes (MoDOT 2008 and KDOT 2007). With the individual corridor descriptions, variations in the traffic volumes for each corridor are shown between major interstate junctions. In attempts to provide equal treatment of the corridors, the Rock Island line is represented by traffic volumes along highways MO Rte 350 and US- 50. Traffic volumes are projected at 1.5% per year compounded growth rate.

Exhibit 2.1 – Distances and Daily Traffic Volumes by Corridor





Through MARC's Outlook 2040 process, the region has developed a list of candidate projects with associated costs throughout the metropolitan area. The LRTP was reviewed to identify projects along the highway corridors and found over a dozen projects with a construction cost totaling more than \$1.7 billion of investment in the next 30 years. The majority of the investment would occur along the I-70 East corridor. Exhibit 2.2 summarizes the LRTP by each corridor in a time period (in ten year increments) and includes the LRTP project number. It also distinguishes between funded costs (or fiscally constrained) and the balance remaining to complete the original cost. In certain cases, such as along I-29/I-35 where corridors merge, a partial cost split (shown shaded) was assumed.

**Exhibit 2.2 –LRTP Projects and Costs by Corridor**

	LRTP #		FUNDED COSTS				Balance to Complete Construction				
			2010	2020	2030	TOTAL	2010	2020	2030	TOTAL	
			Millions	Millions	Millions	Millions	Millions	Millions	Millions	Millions	Millions
<b>I-70 East Corridor</b>											
2010	184	I-470 / I-70 interchange	\$ 167.5								
	227	I-435 / I-70 interchange	\$ 135.5								
	182	I-470 east to County Line (phased)	\$ 45.0								
	182	I-470 east to County Line (phased)						\$ 283.2			
2020											
2030	194	Downtown Loop			\$ 66.0						
	192	I-70 Tracy to Topping (phased)			\$ 133.8						
	192	I-70 Tracy to Topping (phased)								\$ 104.8	
	191	I-435 to Lee's Summit Road (phased)			\$ 100.0						
	191	I-435 to Lee's Summit Road (phased)								\$ 37.3	
			<b>\$ 348.0</b>	<b>\$ -</b>	<b>\$ 299.8</b>	<b>\$ 647.8</b>	<b>\$ 283.2</b>	<b>\$ -</b>	<b>\$ 104.8</b>	<b>\$ 388.0</b>	
<b>Rock Island</b>			Millions	Millions	Millions	Millions					
2010	654	MO Rte 350 / Blue Ridge Blvd	\$ 20.0								
	188	I-470 US 50 / MO 350 to US 40 (partial 1/6th)	\$ 11.0								
2020	527	Blue Parkway (Elmwood to Eastwood)		14.5							
	163	US-50 (I-470 to MO 291)		176.2							
2030											
			<b>\$ 31.0</b>	<b>\$ 190.7</b>	<b>\$ -</b>	<b>\$ 221.7</b>					
<b>US-71 Corridor</b>			Millions	Millions	Millions	Millions					
2010											
2020	147	South of MO Rte 150 at \$34.6 million									
2030	160	Triangle interchange			\$ 33.2						
			<b>\$ -</b>	<b>\$ -</b>	<b>\$ 33.2</b>	<b>\$ 33.2</b>					
<b>I-35 North</b>			Millions	Millions	Millions	Millions	Millions	Millions	Millions	Millions	Millions
2010											
2020	156	I-29 / 35 split to MO Rte 33 (phased)		200.0							
	156	I-29 / 35 split to MO Rte 33 (phased)						77.4			
	585	M-291 interchange improvements		12.5							
	146	Pleasant Valley interchange (incl. #'s 234 & 631)		31.6							
2030	150	MO Rte 210 to I-29/35 split (partial)			\$ 40.0						
			<b>\$ -</b>	<b>\$ 244.1</b>	<b>\$ 40.0</b>	<b>\$ 284.1</b>	<b>\$ -</b>	<b>\$ 77.4</b>	<b>\$ -</b>	<b>\$ 77.4</b>	
<b>I-29 Airport</b>			Millions	Millions	Millions	Millions					
2010	729	64th Street interchange	\$ 16.7								
	689	Tiffany Springs Parkway	\$ 15.3								
2020											
2030	150	I-29 / 35 split to I-635 (partial)			\$ 52.0						
	624	72nd Street interchange			\$ 12.8						
			<b>\$ 32.0</b>	<b>\$ -</b>	<b>\$ 64.8</b>	<b>\$ 96.8</b>					
<b>I-70 West Corridor</b>			Millions	Millions	Millions	Millions					
2010											
2020	407	Turner Diagonal interchange		20.0							
2030											
			<b>\$ -</b>	<b>\$ 20.0</b>	<b>\$ -</b>	<b>\$ 20.0</b>					
						<b>TOTAL</b>	<b>\$ 1,303.6</b>				<b>\$ 465.4</b>

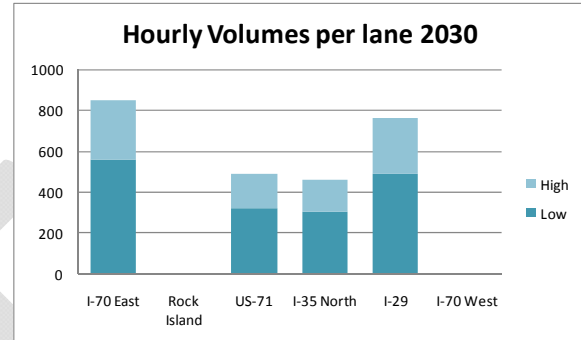
MARC recently completed its Managed Lane Study in 2009 that evaluated a series of potential strategies including:

- Bus on Shoulder (BOS)
- High Occupancy Vehicle (HOV) Conversion, and
- High Occupancy Vehicle (HOV) Construction.

General construction costs were also developed on a per mile basis as well as forecasted peak hour per lane volumes along various corridors as shown in Exhibit 2.3. The recommendations for the corridors were:

Exhibit 2.3 – Low and High Hourly Volumes per Lane

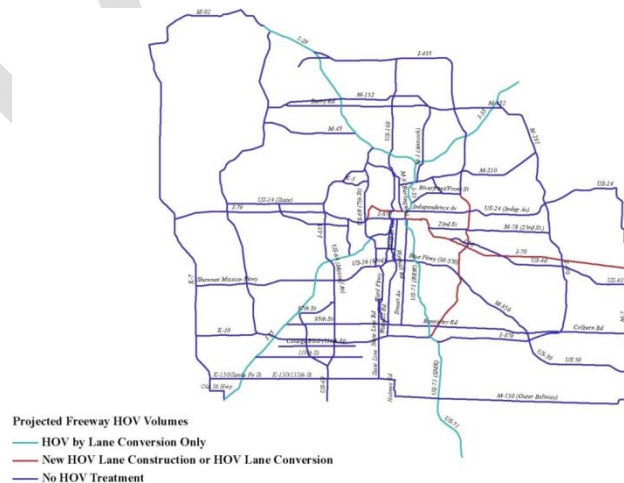
- I-70 East Corridor – HOV Construction
- MO Rte 350 / US-50 (Rock Island) – Not applicable
- US-71 Corridor – HOV Conversion
- I-35 North Corridor – HOV Conversion
- I-29 North Corridor – HOV Conversion
- I-70 West Corridor – Not applicable



The recommended actions are shown on a map in Exhibit 2.4.

The potential for HOV conversion on the I-35 North Corridor is very limited because, as previously noted, this is the only interstate corridor with only four basic lanes. Converting one lane to HOV would leave only one general purpose lane in each direction and typically HOV lanes are accompanied by at least two general purpose lanes. However, L RTP project 156 includes more than \$250 million to widen I-35 from 4 to 6 lanes for approximately 11 miles. A more cost effective short-term strategy could be bus on shoulder but it should be noted that the costs shown in the Managed Lane report may best apply to KDOT facilities rather than MoDOT facilities. This is because KDOT facilities have a full width shoulder (10 feet) and pavement thickness similar to the travel lanes to effectively support the weight of buses. MoDOT facilities typically have shoulder widths less than 10 feet and thinner pavement thickness than the travel lanes. Additionally shoulder widths may narrow at bridges (both in the underpass and overpass condition). Consequently, the unit cost per mile may vary between states in the region. Another difference between the states is the enabling legislation allowing use of bus on shoulder which has been addressed in Kansas with the planned implementation of the bus on shoulder concept on I-35 for Johnson County Transit.

Exhibit 2.4 – Managed lane map



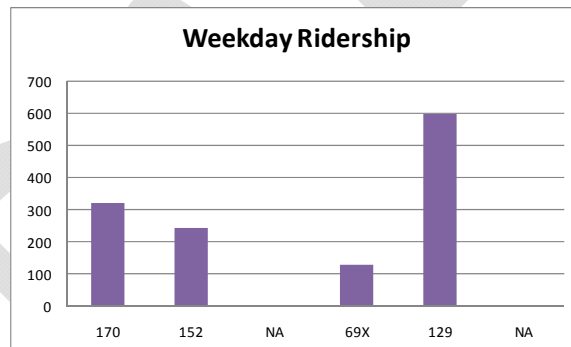
### Express Bus Perspective

Several express buses as well as other local bus service are operated by KCATA along the corridors. The specific express bus routes include:

- I-70 East Corridor –170 Blue Springs
- MO Rte 350 / US-50 (Rock Island) –150 Lee's Summit
- US-71 Corridor –471 (and former 28X – Red Bridge)
- I-35 North Corridor –69X
- I-29 North Corridor –129 X
- I-70 West Corridor –101 State Avenue (local)

It is important to note that while the MARC travel demand forecasting model contains a transit model with the region's bus routes, bus routes can change. Consequently, the model may not accurately reflect the current bus routes. This is the case with the 471 route in the US-71 Corridor as well as the 101 and 103 in the I-70 West Corridor. Exhibit 2.5 shows daily weekday ridership (2008 data) for the routes. The highest daily ridership is on the 129X route along the I-29 Corridor. Many of the express bus routes have park-n-ride lots ranging from distinct and separate facilities to shared use facilities with private properties including shopping centers, churches and residential complexes. The facilities also range in size in terms of parking spaces.

Exhibit 2.5 – Express Bus Weekday Ridership



## Demographic Data

This demographic data has been developed along the proposed rail lines however because of the rails proximity to the interstate corridors the data is equally applicable to the highway system. Exhibit 2.6 shows existing (2005/2008) and future (2040) population and employment data for a band width of ½ mile on either side of the rail line. In general this information indicates which corridor has the most or least population, greater employment and associated densities. Some corridors are nearly equal in terms of population and employment such as those corridors in Jackson County while other corridors are much heavier in terms of employment. The future data illustrates a trend towards higher growth in Platte, Clay and Wyandotte counties though the relative density relationships remain similar between existing and projected conditions. In the future, the population and employment in I-29 and I-35 corridors are projected to top the existing leading corridor along I-70 East. Activity centers by corridor are also shown in Exhibit 2.7 – definition by MARC in future 2040, are sizes of activity centers identified?

Exhibit 2.6 – Population and Employment and Densities (per acre) by corridor

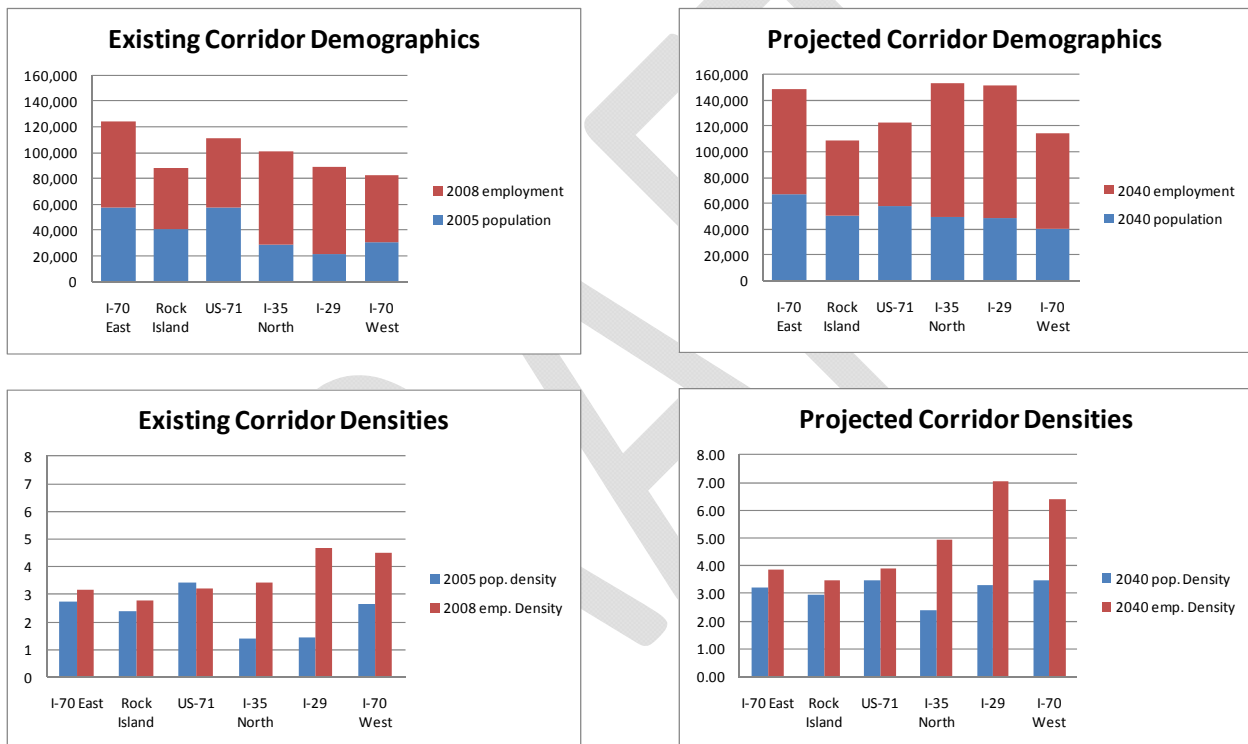
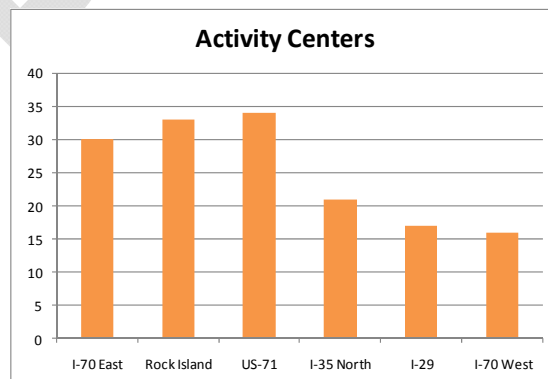


Exhibit 2.7 –Activity Centers (1/2 mile) by corridor

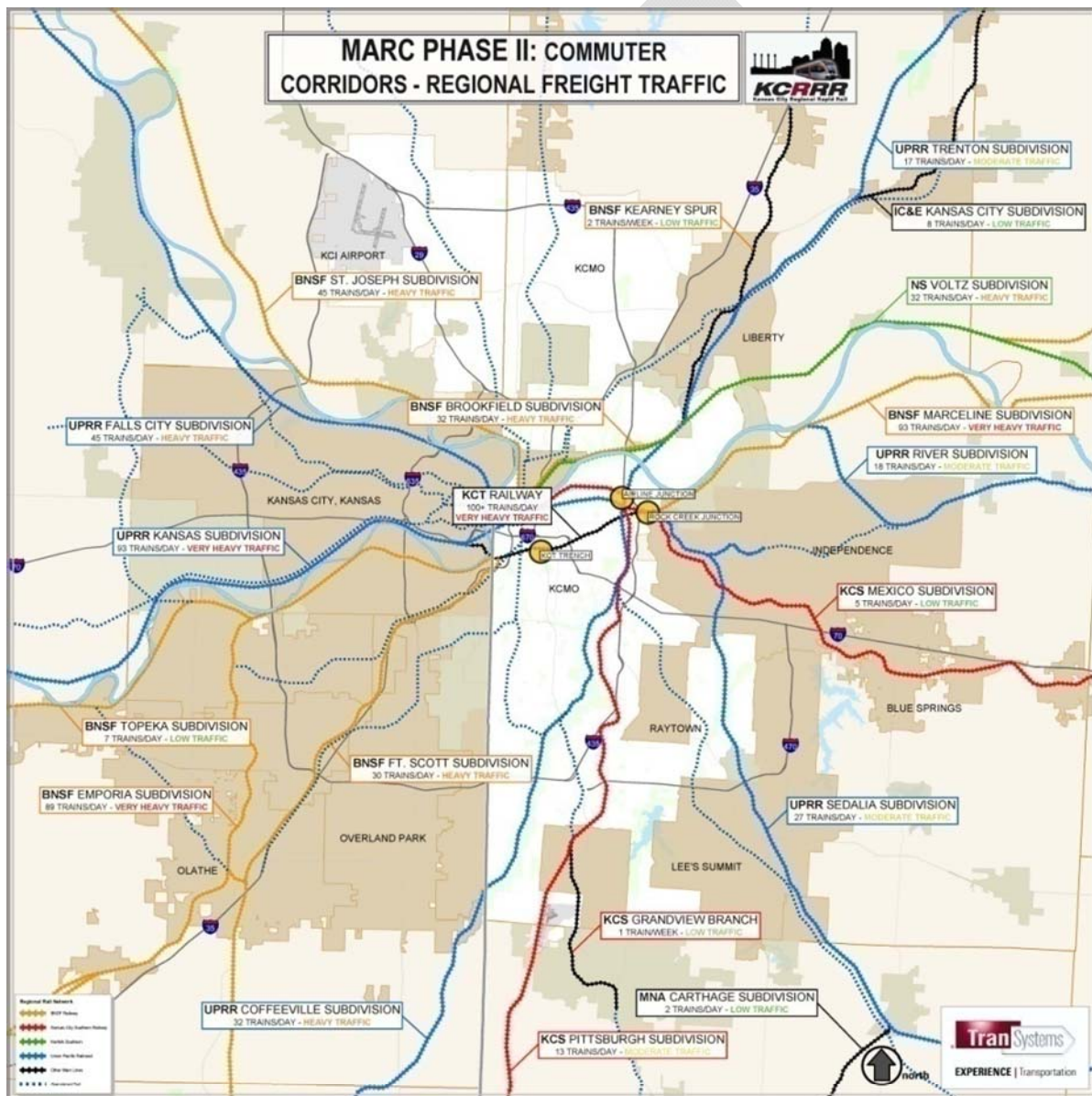


## Railroad Perspective

Kansas City is recognized as a major railroad hub in the nation. Numerous Class I railroad companies have rail lines and yards in the Kansas City region to serve local customers as well as to distribute freight on a national level. Exhibit 2.8 shows the radial spokes of the rail system in the region including abandoned rail. Rail ownership includes:

- Kansas City Southern (KCS)
- Union Pacific Railroad (UP)
- BNSF Railway
- Norfolk Southern (NS)
- Iowa Chicago and Eastern (IC&E)
- Missouri North Arkansas (MNA), and
- Kansas City Terminal (KCT)

Exhibit 2.8 – Rail lines (active and inactive) with Railroad Ownership



MARC's recent Regional Freight Outlook (RFO) identifies strategies to maintain and foster the region's strength in freight mobility and distribution. The RFO, as shown in Exhibit 2.9, shows trains per day along the freight rail system. It is worth noting that in the Kansas City Terminal section, freight train traffic is in excess of 100 trains per day. With high volumes of existing freight traffic and freight traffic projected to double in the next 20 years, little if any excess capacity could be anticipated along the heavily traveled corridors of national significance.

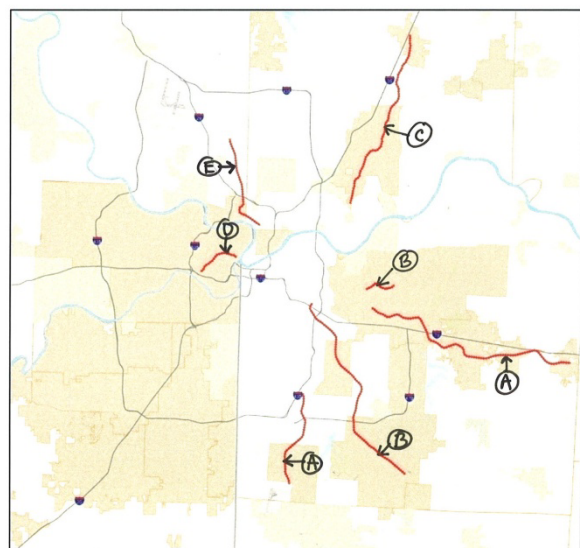
**Exhibit 2.9 – Trains per day in Kansas City Region**



However, not all of the rail lines are national corridors and with a long history of railroad activity in the region, several former or abandoned rail lines remain. In addition, railroad rights-of-way often have the ability to add another track within or adjacent to the existing right-of-way. Consequently, the potential for shared use operations (freight and passenger rail operations on the same track) is possible. Several opportunities exist in the region along or near the corridors discussed and include as shown in Exhibit 2.10:

**Exhibit 2.10 – Underutilized or abandoned rail lines**

- A - Kansas City Southern  
Mexico Subdivision  
Pittsburg Subdivision
- B- Union Pacific  
Rock Island Line  
Pixley Spur
- C - BNSF  
Kearney Spur (operated by WATCO)
- D - Kansas City Northwestern (former)
- E - Interurban (former) Platte County

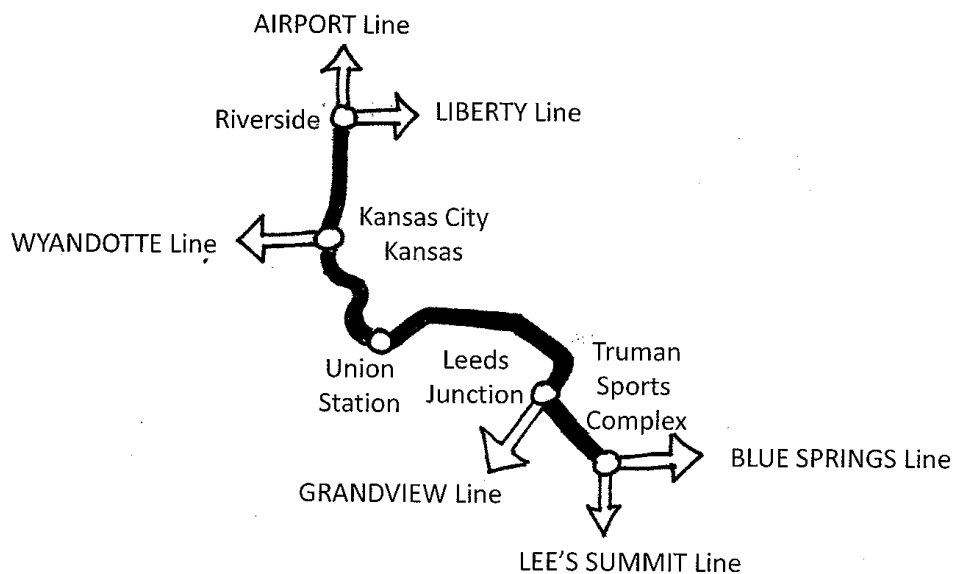


Portions of Kansas City Terminal railway are also utilized in and around Union Station

Shared use requires a negotiated agreement with the host railroad with payments typically structured on an annual fee basis. In certain cases the negotiations may stipulate the construction of additional capacity (such as siding, passing tracks, etc...) as necessary to maintain the efficiency and safety of both freight rail and passenger rail operations. In other cases, with limited freight activity, temporal separation may be the only stipulations. And of course the possibility of outright purchase may also arise.

Considering the availability of these rail assets and their location throughout the region, the question was asked "Could the assets be linked and utilized to make a potential passenger rail system?" The answer is the regional rapid rail system map that utilizes a common line with Union Station as its hub. The system configuration acknowledges that the specific location of new connections will be determined through further study, such as an Alternatives Analysis. The common line is important as it physically allows branching of the rail lines both east and west of Union Station while operationally providing transfers as well as increased rail service within a core area and is shown in Exhibit 2.11. The common line essentially extends east from Union Station to Leeds Junction with a branch to the Grandview Line and then further east to the Truman Sports Complex where it branches to the Blue Springs Line and the Rock Island / Lee's Summit Line. The common line also extends west from Union Station to a branch point in Kansas City, Kansas for the Wyandotte Line. The common line then continues northerly across the Missouri River towards Riverside where the Airport line and the Liberty Line branch.

Exhibit 2.11 – Rail Common Segments and Departure Points



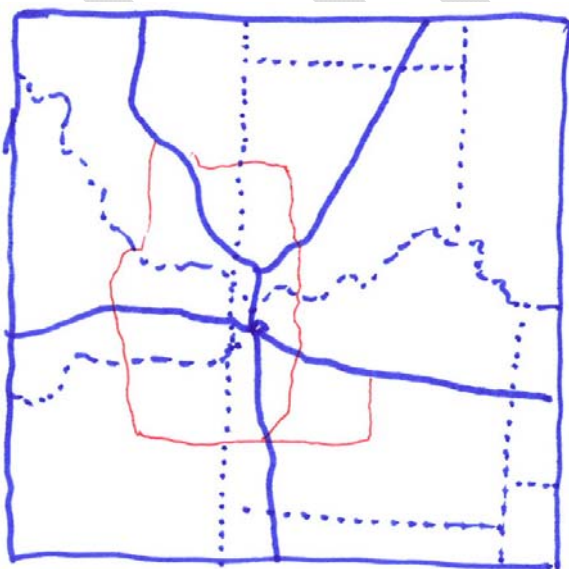
At this stage of planning, conceptual station locations have been determined in a manner suitable for the travel demand model with actual locations not yet determined. The number of stations per line would likely vary and respond to adjacent land uses, accessibility, as well as land availability and cost. Station locations for lines that have been previously investigated (such as Oak Grove and Grain Valley in the 2002 Commuter Rail study) could remain the same. The primary purpose of stations is to provide a means of access to and from destinations for rail transit travelers. The rail-side aspect of the station includes a platform of 400-foot length (capable of accommodating up to two train sets or 4 cars). Each platform is assumed to include an enclosed structure of approximately 50-foot length that would be conditioned space. All elements of the station would meet accessible design standards. Operating elements at the station would include automated ticketing booths. Security elements and other amenities would likely include lighting, trash receptacles, bike racks, benches, and kiosks and potentially vending.

The location of the stations are shown conceptually and chosen to allow for modeling operations through the conceptual operating plan. Many of the locations are subject to change though key stations such as Union Station, the Airport and the Trumans Sports Complex are essentially fixed. The exact location of a station would be determined later at an advanced corridor planning stage. Various modes of access are possible and include walk access, bus transfer, drop off (or kiss-n-ride) and park-n-ride. All of the stations require walk access and many of the stations are envisioned to have opportunities for bus transfer. The extent and sizing of facilities to accommodate kiss-n-ride as well as park-n-ride will be determined later. Several basic types of stations are envisioned ranging from large stations with approximately 200 or more surface parking spaces to small stations with a nominal area for transfers and accessible parking. The cost for acquiring land for the station and other site amenities are not included. End of the line stations could also include an additional area to serve as a layover facility. These costs are addressed as part of a system cost including a centralized maintenance facility, though the operations of such facilities may be contracted out to a third party.

It is envisioned that the station locations would support or encourage transit oriented development and be located in walkable areas and/or have access to the regional highway system. Existing opportunities for walkable stations include Liberty near Liberty Square and the Clay County government offices just 800 feet from the existing rail line and a potential station. Similarly in Independence, a station along the existing rail line could be located within 800 feet of Independence's current transit center. The location of these stations is philosophically in support of MARC's Quality Places initiative. In addition, rail stations could be integrated with planned but not yet constructed mixed use development along the South Liberty Parkway (Liberty Line) or along Line Creek Parkway (Airport Line). Some special or unique stations include Union Station, Truman Sports Complex, and the Airport. These further illustrate the range of station types from an existing rail station at Union Station, to adjacent to a former rail line at Truman Sports Complex to new rail service at the Airport. Rail access at Union Station contemplates use of the northern most tracks (currently not in use) with pedestrian access to Union Station via the existing pedestrian bridge over the railroad tracks.

The following discussions of the system and assessment of modal options are described by corridor and rail line as shown in Exhibit 2.12. The rail corridor description focuses upon the use of existing rail as well as the location for new rail alignment and includes summary information on the number of stations and other pertinent data utilized for cost estimating in the following section.

**Exhibit 2.12 – Comparative Highway Corridors and Rail Lines under Evaluation**





Construction costs (presented in the next section) are based upon a cost per mile basis that includes track (ballast, ties and rail) as well as signal control systems and structures (crossing manmade and natural features). In the description of the rail lines four categories are described.

- **Former rail** corridors are often similar to new alignments though grading for the rail is typically in place. In terms of right-of-way along former rail corridors, the ownership status is unclear and requires further investigation to determine if the right-of-way may be intact or may have reverted to adjacent property owners.
- **Rail upgrade** means that a portion of the rail corridor will likely require new rail though the ties and ballast are likely to be usable. In certain cases rail upgrade can involve new rail and track.
- **Existing rail** can mean either use of existing freight track or in certain instances that new track is to be installed within the existing railroad right-of-way. The acquisition of the right-of-way can vary from outright purchase (such as the Rock Island) to an annual fee for track usage to be negotiated with the railroad owner.
- **New rail** construction includes track as well as signal control systems and structures. The new alignment could be through private property or within roadway and/or highway right-of-way. Costs to acquire private property are likely to vary significantly by corridor yet for budgeting purposes a range of costs from \$1.0 to \$2.0 million per mile is used. This was derived from a typical right-of-way width of 100 feet and a cost of nearly \$2.00 to \$3.75 per square foot. For alignments within roadway and/or highway right-of-way no right-of-way cost is assigned.

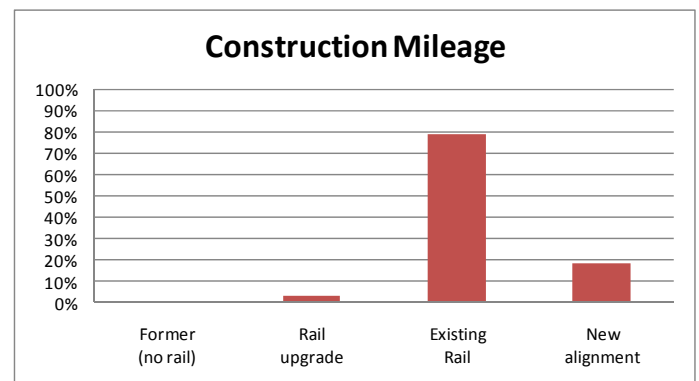
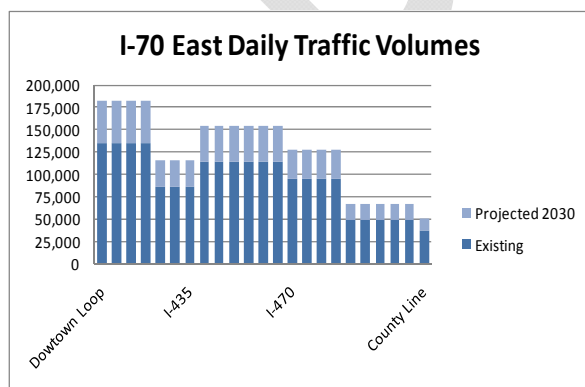
### The I-70 East Corridor (or Blue Springs Line)

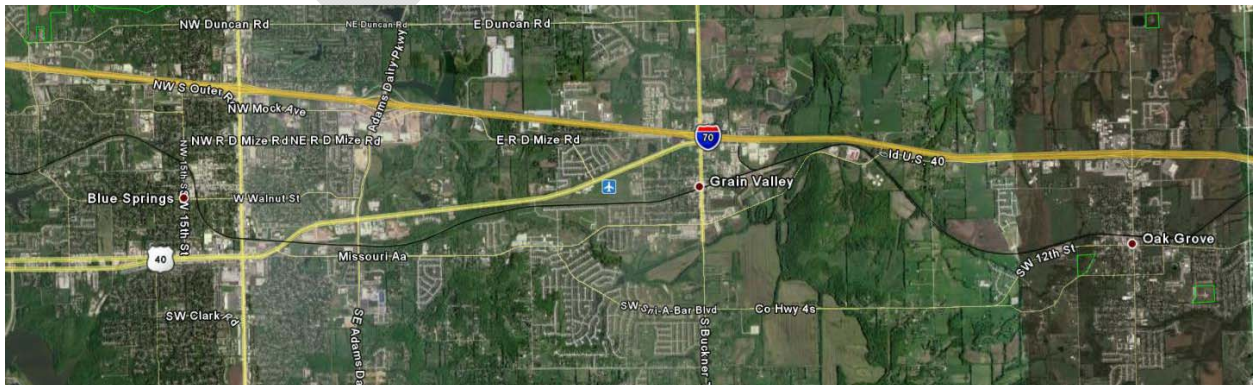
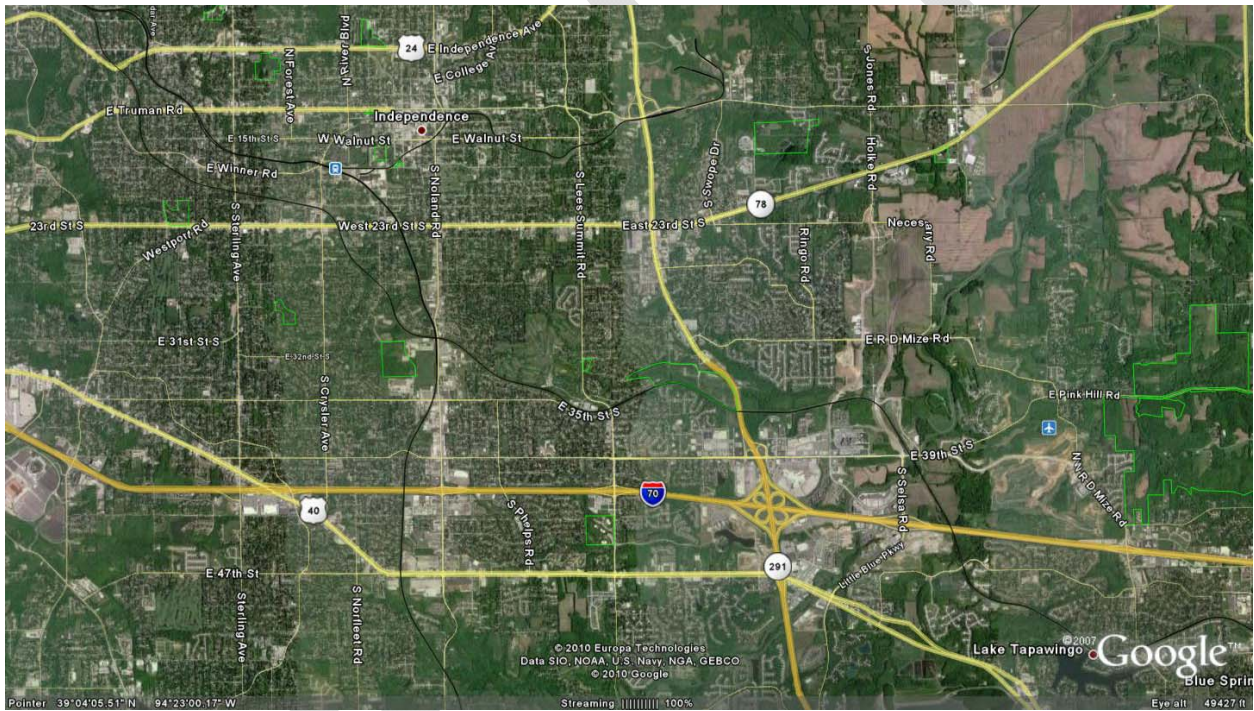
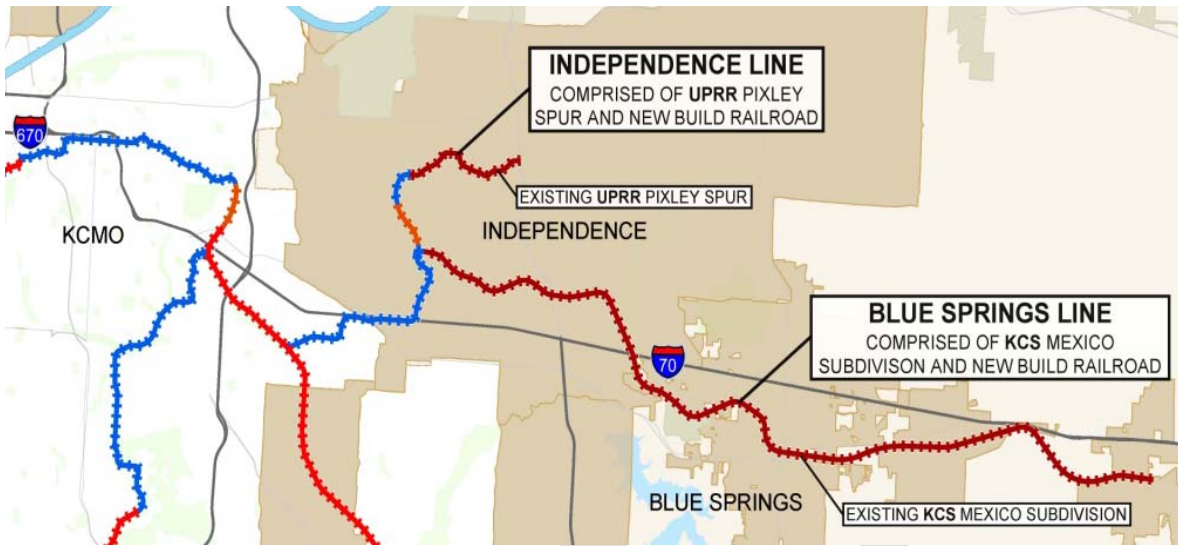
Existing traffic volumes along the corridor are high, often in excess of 100,000 vehicles per day (vpd). The highest traffic volumes are closest to the Downtown Loop, with volumes diminishing at points farther east.

The rail line includes the existing rail of Kansas City Southern's (KCS) Mexico Subdivision as well as Union Pacific's Pixley Subdivision. Currently there are five (5) trains per day on the KCS line with 4 of those occurring at night. The majority of the new rail corridor involves a connection from the junction of the KCS and UP lines to the Rock Island Line. Preliminary discussions with KCS indicate the opportunity to obtain temporal separation for passenger rail operations for an annual fee (not yet determined). Annual fees are accounted for in the operations and maintenance costs. The new rail line represents the largest element of capital costs. Eight (8) stations are budgeted along the line with one large station anticipated near the crossing of US-40 and I-70. Right-of-way cost for the new rail includes just over 4 miles of new track on private land and just fewer than 2 miles in the public realm. With extensive use of existing rail (nearly 80%), this line has the lowest cost per mile.

This rail line has the potential for further extension beyond Jackson County east to Odessa.

Exhibit 2.13 – I-70 East Corridor / Blue Springs Line



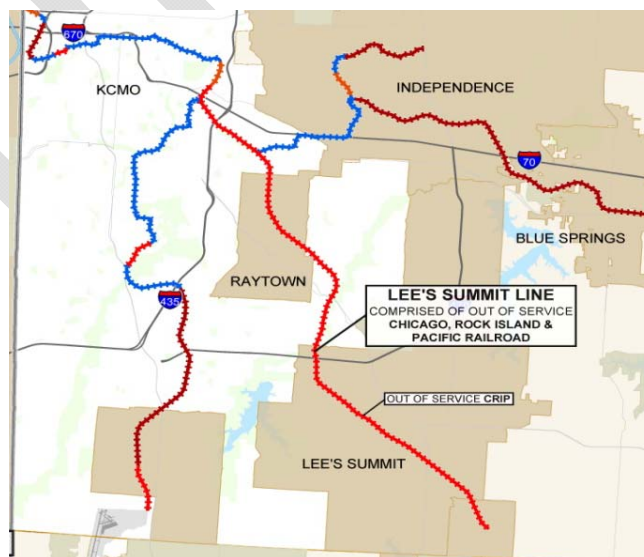
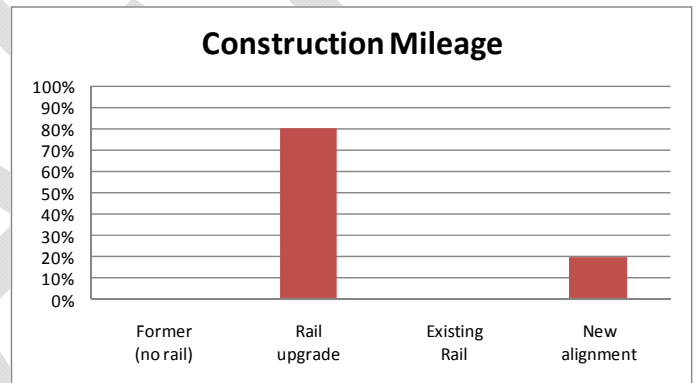
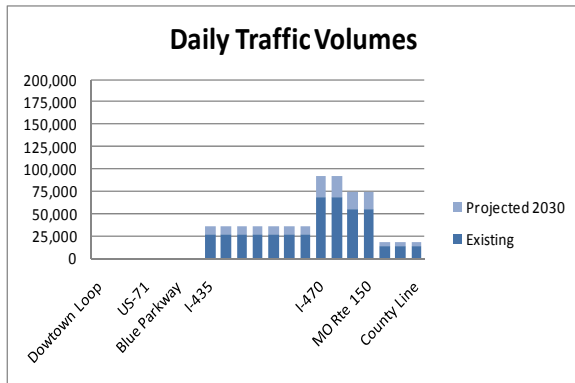


### The Rock Island Corridor (or Lee's Summit Line)

This rail line includes Union Pacific's former Rock Island line. No trains have run on the Rock Island since 1982, yet track remains with most of it in good condition. A new rail corridor involves making a connection from Leeds Junction to Union Station and is referred to as the common line. A portion of this new alignment could occur along Truman Road or in other locations, not yet determined. Details of any new alignment would need to be defined in future study phases. Preliminary discussions with UP indicate the opportunity to purchase the entire Rock Island line. It is estimated that approximately one-third of the rail track would need to be upgraded to passenger rail standards. New track could include sidings to allow for passing. Nine (9) stations are budgeted with three large stations envisioned including the Union Station hub, the Truman Sports Complex (designed to accommodate event surges) and a park-n-ride facility near the crossing with MO Rte 291. Right-of-way cost for the new rail includes the outright purchase of the rail line. However, with extensive use of existing rail, the cost per mile is estimated below the system average. The line has the potential for further extension to Pleasant Hill. Bike trails are also envisioned adjacent to the rail that could eventually connect Kansas City with the Katy Trail system.

From a highway perspective, this line is adjacent to portion of MO Rte 350 and US 50. Existing traffic volumes along the corridor are low for a multi-lane roadway except between I-470 and MO Rte 291.

Exhibit 2.14 – Rock Island Line / MO Rte 350 Corridor



## Aerial map of the existing rail corridor



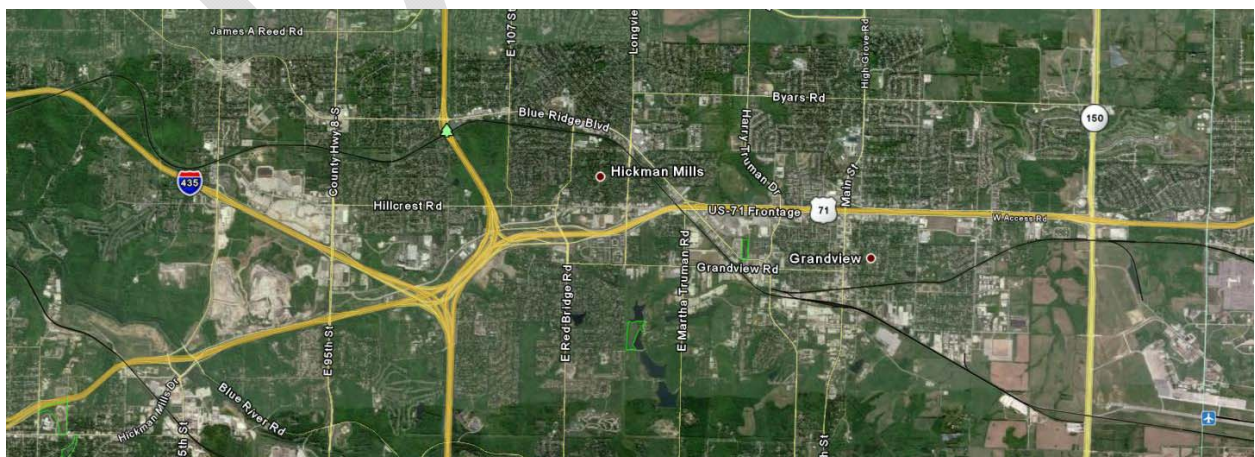
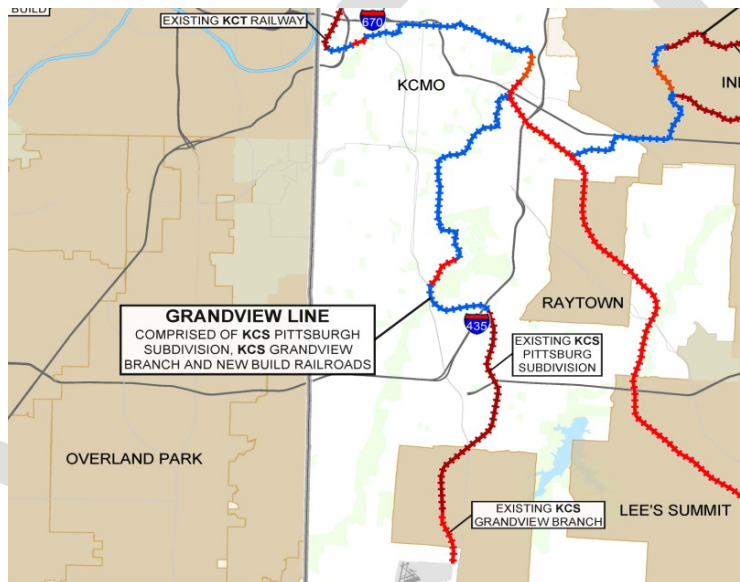
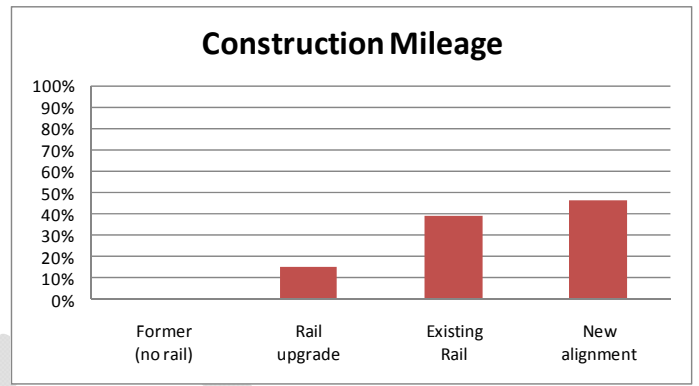
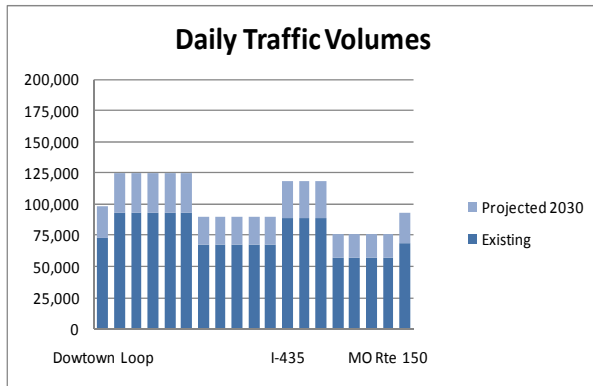
### US-71 Corridor (or Grandview Line)

Existing traffic volumes along the corridor are moderate for a multi-lane highway ranging between 50,000 and 75,000 vehicles per day (vpd). The traffic volumes are relatively stable throughout the corridor's length.

The rail line includes a combination of the existing KCS's Pittsburg Subdivision and its Grandview Branch. As the rail line heads northward, it swings to the east to join the Rock Island line at the "common line" portion near Leeds Junction. Currently there are thirteen (13) trains per day on the Pittsburg Subdivision and only one (1) train per week on the Grandview Branch. The new rail corridor involves a connection from Swope Park to Leeds junction, and from approximately US-71 to I-435. Preliminary discussions with KCS indicate the need to add capacity along the Pittsburg Subdivision while having the opportunity to obtain temporal separation for passenger rail operations along the Grandview Branch for an annual fee (not yet determined). Annual fees are accounted for in the operations and maintenance costs. Along the existing KCS rail corridor, costs are included to construct new rail within the railroad right-of-way. Seven (7) stations are budgeted with one large station envisioned near the former Bannister Mall where the rail line would cross I-435. The majority of new right-of-way is envisioned within the public realm. To advance some redevelopment concepts, right-of-way may even be donated. The cost per mile is estimated at the system average.

This corridor has the potential for further extension beyond Jackson County south to Belton.

Exhibit 2.15 – US-71 Corridor / Grandview Line



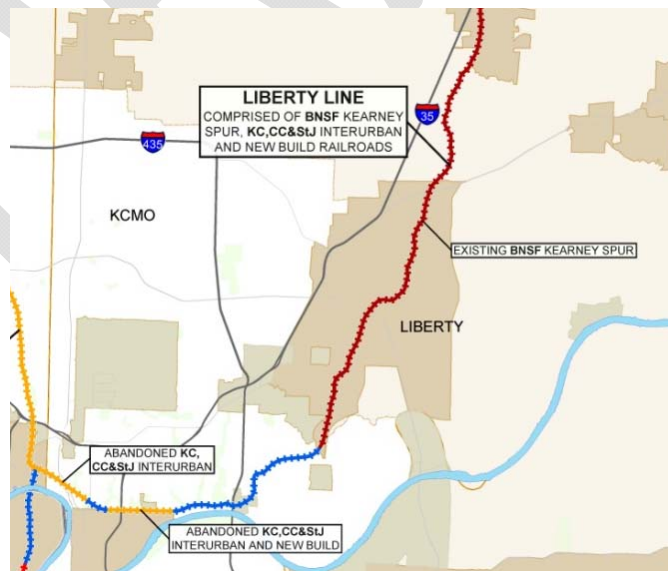
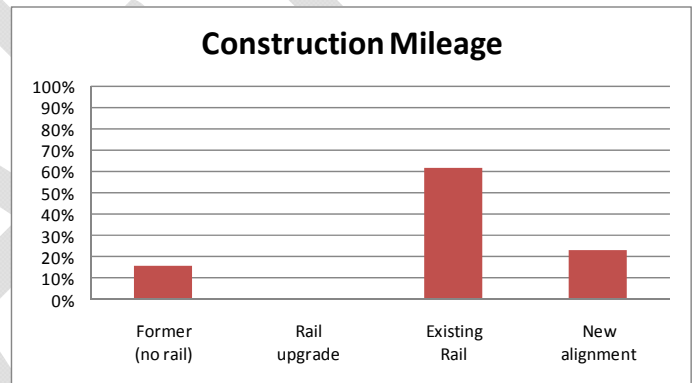
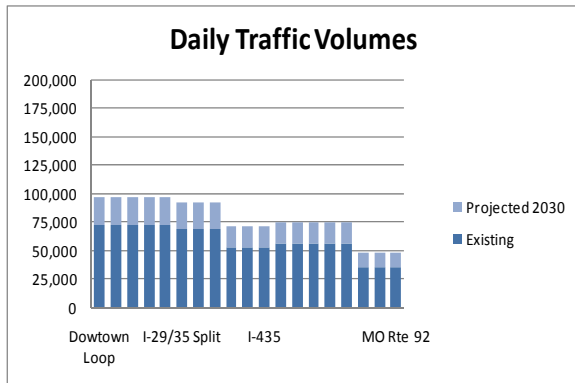
### I-35 North Corridor (or Liberty Line)

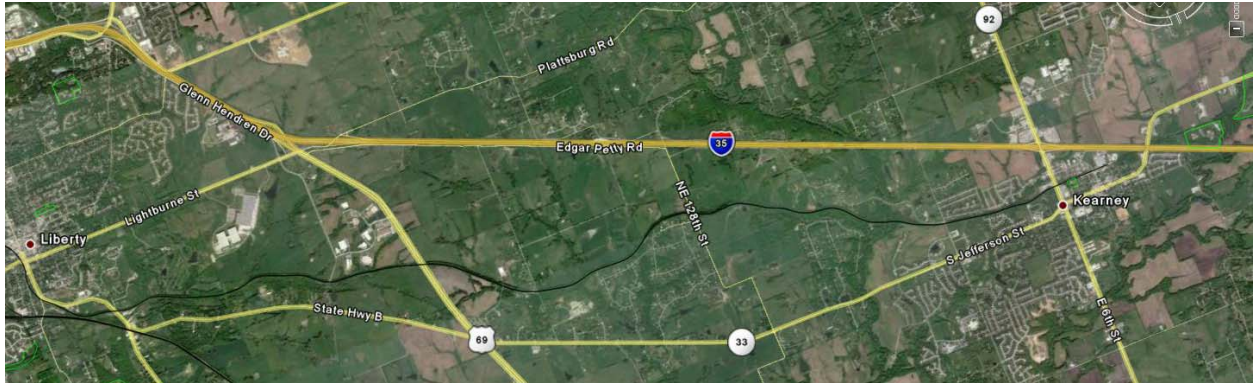
Existing traffic volumes along the corridor are moderate for a multi-lane highway ranging between 50,000 and 75,000 vehicles per day (vpd). Traffic volumes increase closer to the Downtown Loop.

The rail line includes the BNSF's Railway Kearney Spur serving industrial plants. Currently there are two (2) trains per week that are switched by WATCO. A new rail corridor is needed before entering BNSF's Brookfield Subdivision because of heavy train traffic (32 trains per day). The new corridor could utilize portions of the former interurban rail corridor near North Kansas City. The operating plan seeks to obtain temporal operations for passenger rail service along the Kearney Spur. The new track alignment could mix with the former interurban rail corridor before connection to the Airport corridor in Riverside. Seven (7) stations are budgeted along this line including one large station near the crossing of US-69. Right-of-way cost for the new rail includes costs for the former interurban line whose ownership status is uncertain, meaning that portions of the right-of-way may be intact or may have reverted to adjacent land owners. With extensive use of existing rail (nearly 60%), this line is estimated to cost less than the system average.

Any future extension is limited because I-35 bisects the rail corridor north of MO Rte 92 in Kearney.

Exhibit 2.16 - I-35 North Corridor / Liberty Line





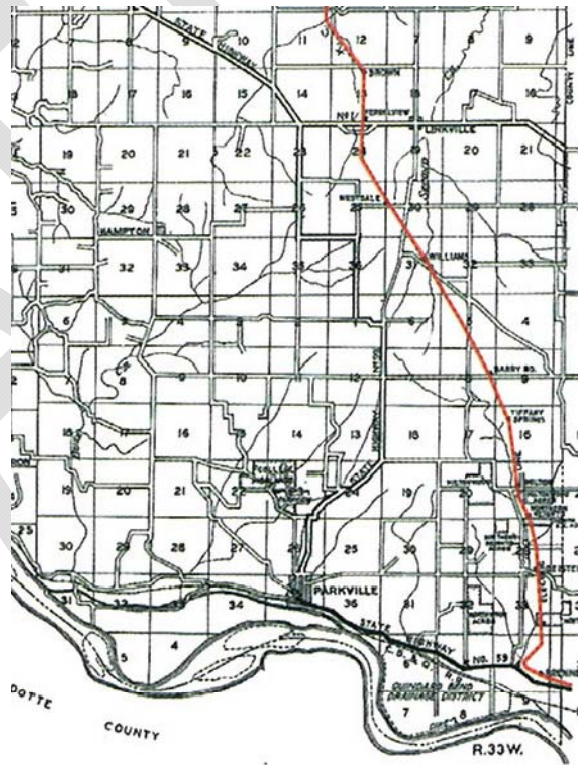
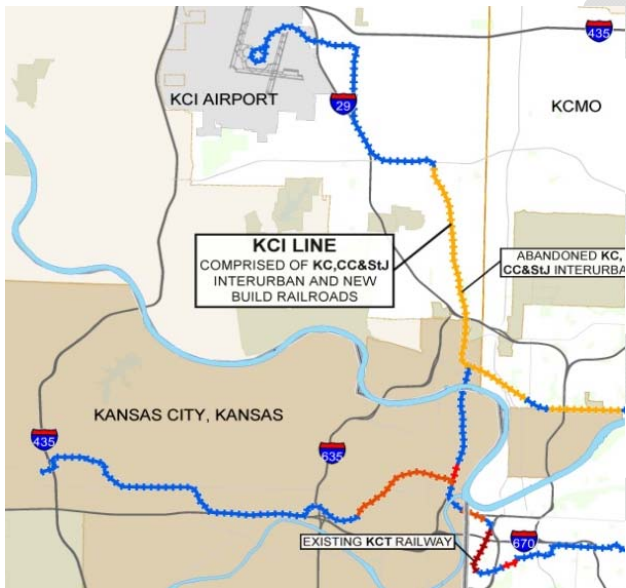
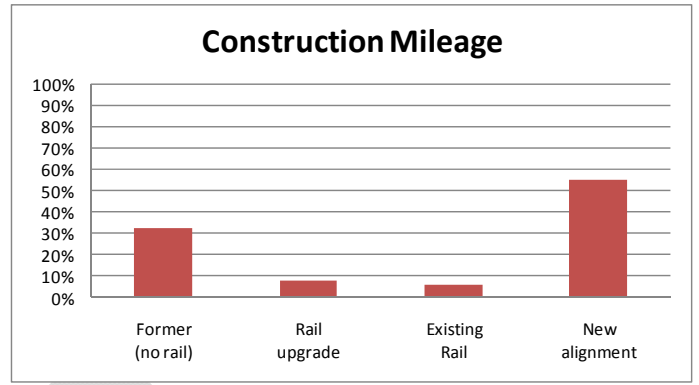
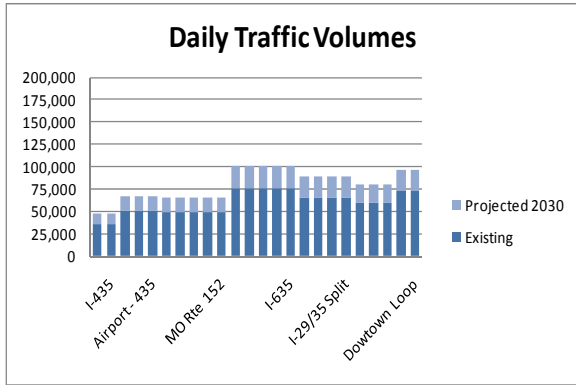
**The I-29 Corridor (or KCI/Airport Line)**

Existing traffic volumes along the corridor are moderate for a multi-lane highway ranging between 50,000 and 75,000 vehicles per day (vpd). Traffic volumes are highest between MO Rte 152 and I-635.

The rail line includes the former Interurban rail line from Riverside to St. Joseph. Portions of the former rail corridor (trolley service stopped in 1933) appear intact although the ownership may have reverted to adjacent properties. A new rail corridor is needed north of MO Rte 152 to the Airport, with a portion of the corridor consistent with previously planned transit corridors. In addition, new rail is needed to cross the Missouri and Kansas River along with a combination of connecting pieces to Union Station. This corridor bears the cost of major river crossings as well as significant portions of new track. Ten (10) stations are budgeted, although three of those are at each of the existing three airport terminals. Since the Airport’s Master Plan incorporates an access way for fixed guideway transit, an extension to the potential future consolidated terminal would be possible. Right-of-way cost for the new rail includes costs for the former interurban line whose ownership status is uncertain, meaning that portions of the right-of-way may be intact or may have reverted to adjacent land owners. With extensive new alignment and the total cost of a new Missouri River bridge included with this line, this corridor has the highest cost per mile for the entire system. Future extensions are possible to St. Joseph.

Previous corridors have shown the portion of existing rail lines with an aerial background. This corridor utilizes the former interurban rail line. A map of Platte County with the interurban line is repeated here from [A Splendid Ride The Streetcars of Kansas City 1870-1937](#) by Monroe Dodd.

### Exhibit 2.17 – I-29 Corridor / Airport Line





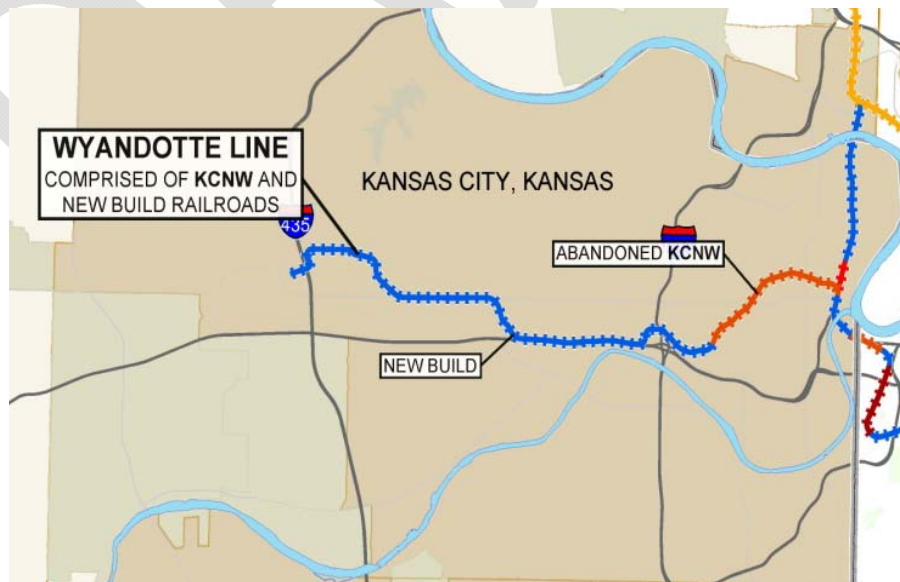
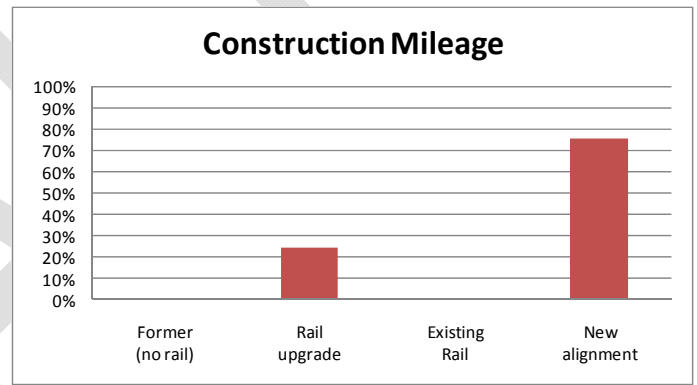
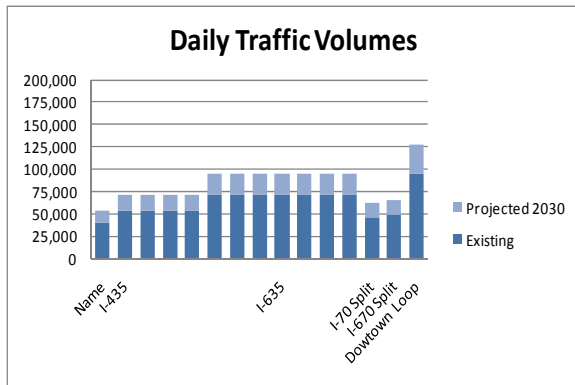
### I-70 West Corridor (or Wyandotte Line)

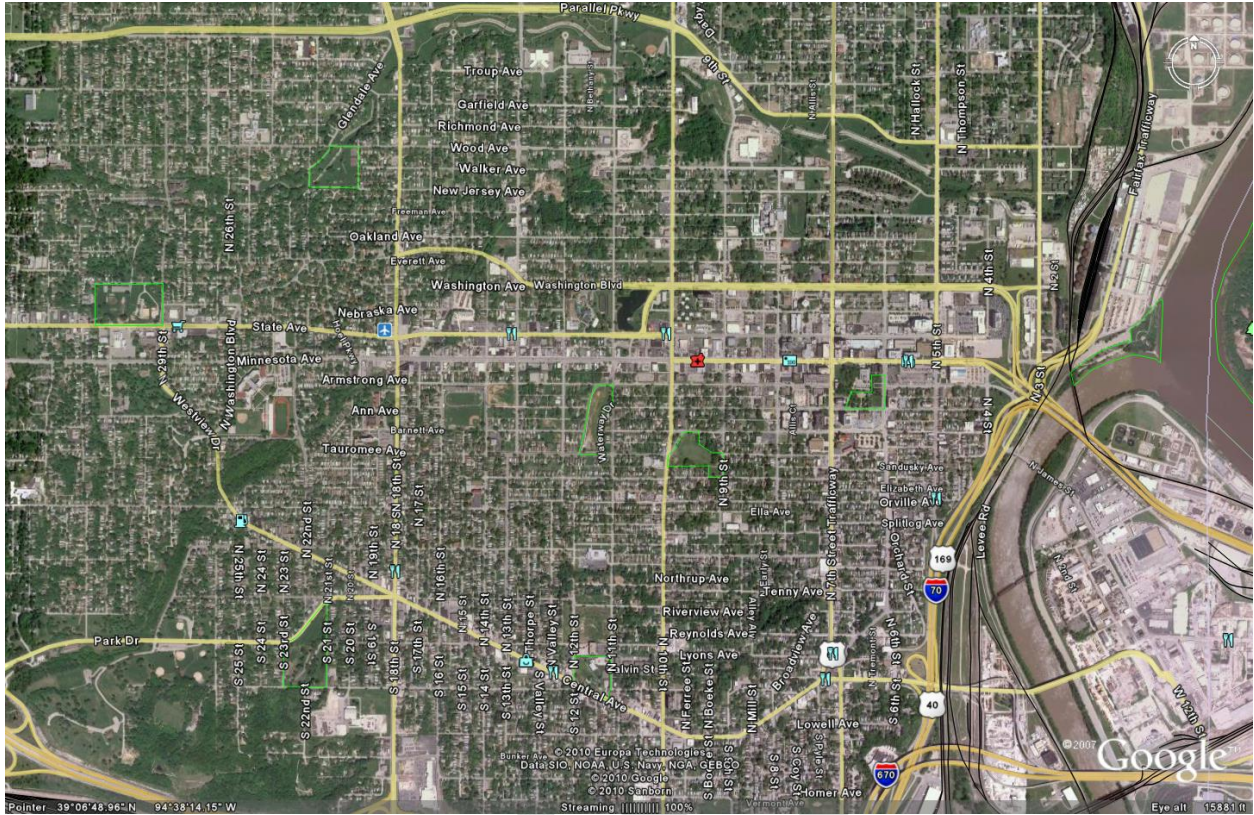
Existing traffic volumes along the corridor are moderate for a multi-lane highway ranging between 50,000 and 75,000 vehicles per day (vpd). Traffic volumes, outside the Downtown Loop, are highest between Turner Diagonal and 18<sup>th</sup> Street Expressway.

The rail line includes just over three miles of the former Kansas City Northwestern (KCNW) line. A new rail corridor would be required between the Kansas Speedway and Park Avenue. Portions are contemplated to operate within the road right-of-way for State Avenue and/or Parallel Parkway. The operating plan includes purchase of the former KCNW line (cost not yet determined). This corridor has a significant portion of rail on new corridor. Five (5) stations are budgeted and all are assumed to be small stations. Right-of-way cost for the new rail includes costs for the former rail line whose ownership status is uncertain, meaning that portions of the right-of-way may be intact or may have reverted to adjacent land owners. With extensive new alignment (near 75%), this line's cost per mile is above the average system cost per mile.

Future extensions are possible to Lawrence and Topeka, Kansas.

Exhibit 2.18 – I-70 West Corridor / Wyandotte County Line





## SERVICE PLAN

This section describes the proposed service characteristics of the commuter rail system including a schedule of local and express trains based upon the initial corridor definition and the operating parameters of the potential rolling stock. Several operating plans are described that could respond to passenger travel patterns as well as the selected vehicle (or vehicles) and the potential for sharing track with freight rail operations. The section concludes with a summary of the travel demand forecast to 2030 including a comparison to the “no-build” option with the same express bus operations that currently exist (in the travel demand model).

### Schedule

The proposed operating schedule for the passenger rail system would vary slightly from one corridor to another, with more significant differences in the KCI line. Service would entail six trains in the weekday peak hour (three-hour peak periods in the morning and evening) in the peak direction and three trains in the reverse-commute direction using a mix of local and express trains. “Locals” will stop at every station along the line, while “express” trains will stop at select stations, roughly every third station. Peak headways for most lines will be 30 minutes, while the Kearney/Liberty and Grandview lines would have 40-minute headways. In order to achieve the 30-minute headways without inordinate increases to the equipment requirements, on the Blue Springs and Lee’s Summit legs of the system not every peak service train will extend to the lines’ outermost stations. Off-peak service will also be offered, consisting of local trains only with 60- or 75-minute headways. Service on all legs except the KCI line will be offered approximately 16 hours per day weekday. Saturday and Sunday (off-peak) service will be offered approximately 15 and 9 hours per day, respectively.

The KCI line will be served about 20 hours per day, every day of the week. It will have 30-minute headways throughout the day and night and utilize a mix of express and local trains (i.e., no difference between peak and off-peak service). The proposed operating schedule is summarized in Exhibit 3.1 as follows:

Exhibit 3.1 – Rail Schedule

Rail Line	Miles	Headway (minutes)		Time from End of Line to Union Station (minutes)		Average Speed (mph)	
		Peak	Off-Peak	Local	Express	Local	Express
Blue Springs	32.60	30	60	52	38	37.6	51.5
Lee’s Summit	25.98	30	60	43	33	36.3	47.2
Grandview	25.67	40	75	54	47	28.5	32.8
Liberty	31.97	40	75	58	45	33.1	42.6
KCI / Airport	23.25	30	30	50*	38*	27.9	36.7
Wyandotte	17.24	30	60	38	29	27.2	35.7

\* Time reflects five minutes taken out of calculated schedule, assuming KCI trains will be given priority over Liberty and Wyandotte trains at train meets.

In developing the proposed operating schedule, the capabilities of the Stadler DMU were considered, including:

- Speeds of up to 75 mph,
- 0.238 miles or 33.48 seconds required to reach 75 mph
- 0.183 miles or 25.86 seconds required to stop (from 75 mph)

Speeds of up to 75 mph were not assumed to be achievable along all segments of a corridor. Speed reductions are anticipated, particularly when operating in city streets, crossing bridges shared with more than one line, or along segments with numerous at-grade crossings. An average of 25 mph was assumed in the following areas:

- Between Truman Road station and Union Station (the common line portion of the Blue Springs, Lee's Summit and Grandview lines);
- Between Swope Park transfer and Leeds Junction on the Grandview line;
- Between Liberty transfer and Union Station on the KCI and Liberty/Kearney lines; and
- Between Minnesota Avenue station and Union Station on the Wyandotte line.

Further speed reductions (to 15 mph) were applied between the three airport terminals. In addition, one minute for interim station stops, two minutes for airport stops and a minimum of eight minutes when trains are changing direction were included in the calculation. Then the total calculation was rounded up to the next full minute. This conservative approach was purposely built into the schedule to allow for train meets and other unforeseen circumstances.

In those cases where the rail could operate on city streets, a top speed of 25 mph is assumed. As a conservative estimate of speed that acknowledges the uncertainty of the route location, the speed on the entire common line is 25 mph independent of the location of the envisioned route. This lower speed may also help to facilitate train operations when several lines are combined. The number of stations and the spacing of stations as envisioned are not directly related to the 25 mph operating speed and do not imply a frequency of stops yet since multiple lines would converge headways would improve. If rail were to operate on city streets, the operations would comply with applicable guidelines, codes and best practices.

Preliminary timetables have been conceptualized that typically include an alternating pattern of local and express service during peak periods of operation. The peak periods typically fall within the window of 5:30 AM to 8:00 AM and within 3:45 PM to 6:00 PM. To establish a consistent schedule, departure times typically fall on the hour, quarter hour or half hour. Consequently an initial inbound start at Blue Springs of 5:30 AM is followed by departures on the half-hour at 6:00, 6:30, 7:00, 7:30 and 8:00 AM. A local Blue Springs departure at 7:00 AM would arrive at Union Station at 7:41 AM while the express departure at 7:30 AM would arrive at Union Station at 7:59 AM.

The travel times have been estimated based upon conceived station locations and the mileage in between those stations. Times and distances for acceleration and deceleration are included as well as a dwell time of 1 minute per station (stop). The travel time between stations is calculated based upon the potential assumed maximum speed. The total time between stations has been added and rounded up to the nearest minute. The following is an example of the types of calculations made that illustrates the difference between an express and a local timetable.

Each segment between stations represents a fixed amount of time to accelerate leaving the station, decelerate to the next station and dwell at the station to allow departure and boarding. Travel time is a function of the distance between stations, and the assumed top speed. If an express train were to travel a distance of 12.0 miles between stations (at an assumed top speed of 75 mph) then the total time in minutes is (0.5 minutes acceleration, 9.6 minutes travel, 0.5 minutes deceleration and 1.0 minute dwell) 11.6 minutes rounded up to 12 minutes. If the local train has three stations each 4 miles apart then the travel time remains the same, yet additional acceleration and deceleration as well as dwell times must be included. Each station adds another two minutes of travel time for a total of 16 minutes over the same distance. The average speed for the express would be 60 mph (12 miles in 12 minutes) while the local train has an average speed of 45 mph. Not all segments of the rail lines are assumed to reach a top speed of 75 mph. Exhibit 3.2 shows a conceptualized inbound peak timetable for each rail line under the in-out operating scenario.

### **Rolling Stock**

The Federal Railroad Administration (FRA) has established safety guidelines for passenger equipment that is operated on track which is part of the general railroad system and applies to the passenger rail system proposed here. These requirements, found in Section 238 of Chapter 49 of the Code of Federal Regulations, cover a myriad of safety aspects including fire safety, electronics, inspection/maintenance, emergency access, and more. The

requirements also cover the equipment's structural standards, or crashworthiness, which vary depending on the top speeds at which equipment is operated. In general, the FRA requires vehicles to be able to withstand an impact with a semi-tractor trailer. Equipment compliant with FRA's structural requirements is considered "heavy" or "conventional" rail, while other equipment is considered "light" rail, regardless of its method of propulsion. Locomotives, Amtrak-style coach cars and U.S. Railcar's (formerly Colorado Railcar's) diesel multiple units (DMUs) are FRA-compliant. U.S. Railcar is the only manufacturer currently producing DMUs that are FRA-compliant.

**Exhibit 3.2 – Conceptual Timetable**

	Blue Springs		Lee's Summit		Grandview		Liberty		Airport		Wyandotte	
	Express	Local	Express	Local	Express	Local	Express	Local	Express	Local	Express	Local
Depart	6:30	7:00	6:15	6:45	6:20	7:00	6:10	6:50	6:27	6:45	5:50	6:20
footnotes	1		2		3							
Arrive at Union Station	6:59	7:41	6:43	7:23	7:02	7:49	6:55	7:48	7:05	7:35	6:19	6:58
distance (miles)	32.6		26.0		25.7		32.0		23.3		17.2	
Time (min)	0:29	0:41	0:28	0:38	0:42	0:49	0:45	0:58	0:38	0:50	0:29	0:38
# stops	4	11	3	9	3	11	4	11	4	11	3	8
	1 Schedule shows train departing from Blue Springs. Travel times from Oak Grove are 38 minutes express and 52 minutes local											
	2 Schedule shows train departing from Lee's Summit. Travel times from Greenwood are 33 minutes express and 43 minutes local											
	3 Schedule shows train departing from Grandview. Travel times from Centerpoint are 47 minutes express and 54 minutes local											

Waivers from FRA requirements can be requested. Temporal (i.e., time) separation of conventional rail from light rail operations is one condition under which waivers have consistently been granted. Another situation for which a waiver may be granted is for the shared use of right-of-way, but not of tracks. In such cases light rail operations would utilize one track, while conventional freight and/or passenger service would utilize another track within the same right-of-way. The FRA reviews waiver requests on a case by case basis, taking into consideration the public benefits, as well as all safety measures in place.

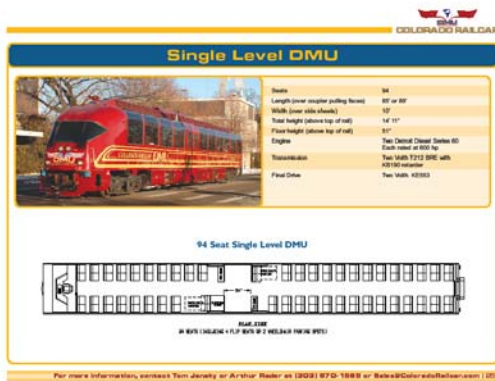
When choosing between locomotives pulling coach cars and DMU's, fuel efficiency is a major factor. Generally, shorter passenger trains do not require 3500 horsepower, which many locomotives provide. The excess horsepower uses more fuel than is necessary. US Railcar touts 50% less fuel consumption with a DMU compared to a locomotive pulling coach passenger cars. A 30% maintenance savings is also claimed since the engines are less expensive and easier to maintain. Further, the use of DMUs allows the addition of passenger and motive capacity with a single vehicle and produces fewer emissions and noise than does a locomotive.

Stadler's non-compliant DMUs have certain advantages over those produced by U.S. Railcar. Because Stadler's DMUs are of shorter stature than U.S. Railcar's by over 12 inches, they create fewer clearance issues along the proposed system. Appropriate clearance for U.S. Railcar equipment can be achieved, but at a higher capital cost than what is necessary for Stadler equipment. Stadler equipment can be powered with either diesel or electricity and its diesel DMUs can be converted to electric. Based upon the operating plan (yet to be chosen) and negotiations with the host railroads, either the US Railcar or the Stadler vehicle could operate on the commuter rail system proposed. Both vehicles are depicted in Exhibit 3.3.

### Exhibit 3.3 - Potential Passenger Rail Vehicles

US Rail Car

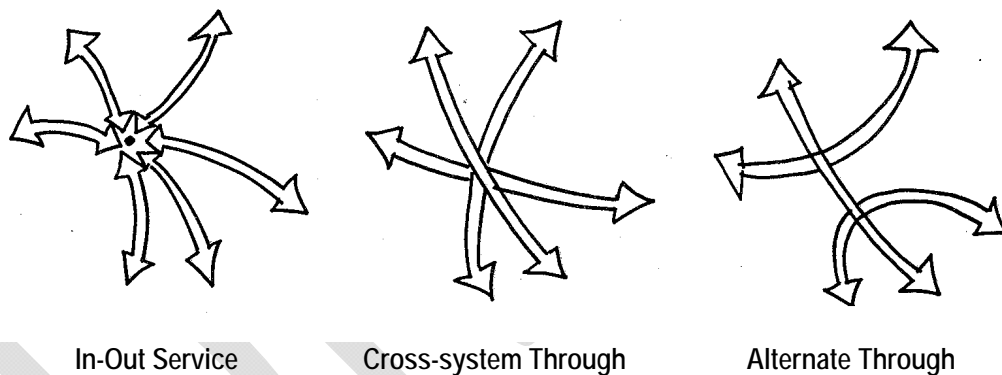
Stadler



### Operating Plans

Three different operating plans were considered which are described below and are shown schematically in Exhibit 3.4.

EXHIBIT 3.4 – Schematic of Potential Operating Plans



**In-Out Service** – Under this operating plan, trains would travel from the outermost stations to Union Station, then reverse direction for the return trip. Accordingly, any passengers desiring to travel from one leg of the system to another would have to change trains, most likely at Union Station, though transfers would also be possible at Truman Sports Complex (to the Blue Springs or Lee’s Summit Line), Leeds Junction (to the Grandview Line), Downtown KCK (to the Wyandotte Line) and Riverside (to the Liberty Line) stations.

**Cross-system Through Train Service** – Under this operating plan, opposing legs of the system would be paired to make three longer “through” routes, as follows: Blue Springs-Wyandotte, Lee’s Summit-KCI, and Grandview-Kearney. With through routes, passengers can travel further on the system without having to transfer trains, as long as their origin and destination are both on a single route. Accordingly, passengers are likely to deem through train service more desirable. Passengers destined for a station not on their originating through route would have opportunities to change trains not only at Union Station, but at other locations noted above. Only one transfer would be required for a passenger to get anywhere on the system. Because trains would not be changing directions at Union Station, stops at Union Station would not necessarily need to be any longer than at other stations, affording slight efficiencies to the operation.

**Alternate Through Train Service** – An alternative to cross-system through train service is to pair four of the legs of the system differently: Blue Springs-Grandview Lines and the Wyandotte-Liberty Lines. The Lee's Summit-KCI through route would be the same as for the cross-system through train service. This alternative pairing was considered because Federal Railroad Administration (FRA) rules dictate that passenger trains sharing track with freight trains, as passenger trains on the Blue Springs and Grandview lines would with Kansas City Southern Railway's trains, must use FRA-compliant equipment which can better withstand collision with other vehicles. (Locomotives, Amtrak-style coach cars and U.S. Railcar DMUs are FRA-compliant, while light rail vehicles and current Stadler DMU models are not.) The alternate through train operating plan would allow most of the system to operate with Stadler equipment, while the Blue Springs-Grandview route would utilize FRA-compliant vehicles.

The Blue Springs-Grandview lines and the Wyandotte-Liberty lines would not travel to Union Station, but rather divert from one route to another at Leeds Junction and the Downtown KCK stations, respectively. Accordingly, not only will more transfers be required under this operating plan, some trips would require two transfers between origin and destination stations.

The service concept is based on the following:

- Trains will consist of modern diesel multiple unit (DMUs) in push-pull operation. The DMUs will be Americans with Disabilities Act (ADA)-compliant without the need for additional ramps, lifts or other devices.
- An engineer will run the trains and a second crew member will assist passengers, as necessary, and provide security.

The proposed system will have layover facilities near the end of each line, with the possible exception of the KCI line. Since it is anticipated that the first train of the day on the KCI line may be outbound, Union Station tracks may serve as its overnight layover. Layover facilities will be secured and will allow for cleaning and light maintenance. Fueling using a truck may also be performed at layover facilities. Heavier maintenance and direct fueling will be conducted at a maintenance facility located somewhere along the common route. Spare equipment will be fueled and swapped out with equipment in revenue service throughout the day in order to achieve the service schedule.

## Demand Forecast

**THIS SECTION IS UNDER DEVELOPMENT AND WILL BE REFLECTING  
A CHANGE FROM 2030 DEMOGRAPHIC DATA TO 2040 DEMOGRAPHIC DATA  
MORE MATERIAL WILL BE ADDED AS IT BECOMES AVAILABLE**

The MARC travel demand model is currently being updated to incorporate a recent regional household travel survey. The new model may also have the capability to address other variables, such as fuel prices, that will more readily allow assessment of "what if" scenarios. The ridership forecasting for the commuter rail has coordinated with MARC on pertinent updates to the travel demand model including adjustments to the distribution of travelers to and from the airport.

Essentially the ridership forecasts for the future year demographics are to allow the comparison on two alternatives, a no-build and a build alternative. The no-build alternative maintains the existing bus service while incorporating committed transportation improvements. For the build alternative, coding adjustments have been made to add in the commuter rail alignment including transfers between bus and rail transit at station locations. The existing commuter express bus service along the rail line is then removed, specifically express bus routes 129X (airport), 28X (Blue Ridge), 170 (Blue Springs), and 152 (Lee's Summit). However, local bus service (such as that along route 101 Minnesota/State Ave.) is assumed to remain unchanged. The transit model for the future forecast includes the existing MAX service on Main Street as well as the committed BRT on Troost. No modifications have been made to the future highway network.

The model represents weekday travel patterns. Weekend and event generated traffic is developed “off model” to arrive at an annual ridership estimate. Three operating plans have been conceived and are being tested through the ridership model to determine which plan achieves the best ridership results. Assumptions that are consistent under each of the three operating plans include a fare set at \$2.50, with free transfers within two hours. A typical commuter type travel pattern (home-work-home) over an 8-hour working day would have a round trip fare of \$5.00. Parking at stations is assumed to be free at all stations.

An additional model run is proposed to utilize the “best” operating plan with all of the assumptions described above **plus** a CBD transit distribution system, generally in a north/south orientation running from the River Market through Union Station to the Plaza. The basic assumption is that this Downtown distribution system will run along Main Street with Union Station as a central terminal and will have convenient connections with other transit service.

Exhibit 3.5 compares the existing and future year daily weekday ridership for the express bus routes along the various corridors. The existing ridership is based upon actual counts, and the base year travel demand model output may be different. In general, only slight changes in ridership are expected except for the Blue Springs 170 express bus along the I-70 East corridor which grows five-fold. The model provides output on the 28X bus route. Data reviewed for existing bus ridership did not distinguish between the 28 route and the 28X route.

**Exhibit 3.5 – Express Bus (2008 and 2030) – No-Build**

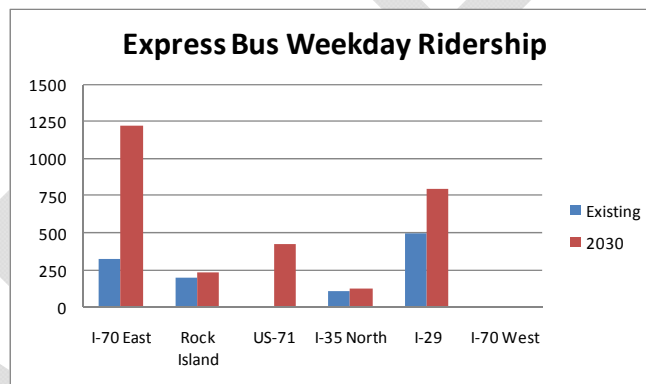


Exhibit 3.6 presents the future year daily weekday ridership for the commuter rail lines under the best operating plan which has yet to be determined. Exhibit 3.8 shows the change in forecast ridership when a premium Downtown distribution service is provided from Union Station between City Market and the Plaza.

**Exhibit 3.6 – Weekday commuter rail ridership (by corridor)  
(under best operating plan)**

TO BE ADDED after comparison of operating plans



The Downtown Distribution System is conceived as providing transit distribution between River (or City) Market and the Country Club Plaza (Plaza). This concept is similar to KCATA's Regional Transit Distribution Connectivity Plan, shown in Exhibit 3.7 from River Market to near 27<sup>th</sup>/31<sup>st</sup> Streets with an extension to the Plaza most likely on Main Street to a point between 47<sup>th</sup> street and Brush Creek. The map shows a shaded area that essentially overlaps the existing MAX Main bus route. MARC's travel demand model has an alignment from previously studied transit service options of light rail with a route that extends north of the River Market to a point near Vivion Road and North Oak Trafficway and south to the Plaza to a point near 63<sup>rd</sup> Street and US-71 (Bruce R. Watkins). Consequently the light rail route has been modified to include ONLY the approximately six-mile long linear stretch between River Market and the Plaza.

**Exhibit 3.7 – Regional Transit Downtown Connectivity Plan**



The service characteristics of light rail are similar to the MAX line with an arrival every 10 minutes at peak times and 15 to 30 minute headways most other times. A significant difference is the number of stations/stops. The MAX has 22 stations between its terminus at 3<sup>rd</sup> and Grand (River Market) and the Plaza. The light rail route has only nine stations in this corridor.

**Exhibit 3.8 – Weekday commuter rail ridership (by corridor)  
With Downtown distribution system  
(under best operating plan)**

TO BE ADDED LATER

## PROBABLE COSTS

The potential commuter rail system under review consists of six (6) rail corridors with Union Station as a hub. The corridors utilize existing rail as well as new rail connections. The use of existing rail corridors has the potential for a greater degree of certainty, while new corridors are likely to have a lesser degree of certainty. Consequently this opinion of probable capital costs should be considered preliminary and subject to change as specific alignment options remain to be studied. It must be acknowledged that this Phase II is at a systems planning level and not at the level of detail of Alternative Analysis. Nonetheless, rail corridors have been identified that provide input into the travel demand modeling process including travel time (associated with distance, vehicle speeds, number of stops, etc...) as well as locations of stations. The process intends to utilize the ridership as a means of refining the corridor assumptions potentially changing physical aspects (such as the number and location of stops) or operational (service) parameters. The operating plan is another factor that can greatly influence costs. The operating plan describes how trains will run and could affect ridership which in turn can modify headways and subsequently influence the need for specific infrastructure related to passing opportunities. This opinion of probable cost is presented for the entire six line system and could be modified depending upon initial implementation strategies.

### Capital Costs

This opinion of probable costs is expressed in current 2010 dollars. Since the costs are based upon concepts, a 20% contingency and a 15% Engineering Administration is added to provide a programming level budget. The costs are presented in categories consistent with FTA cost breakdowns for annualizing costs. This includes a useful life and an equivalent annual payment at the discount rate keeping with Office of Management and Budget (OMB) practice as shown in Exhibit 4.1:

**Exhibit 4.1 – Useful Life and Annualization Factors for Capital Costs**

<u>ITEM</u>	<u>Useful Life (yrs)</u>	<u>Annualization Factor</u>
Right-of-way	100	0.070
Track (including structures, etc)	30	0.081
Stations	20	0.094
Rail Vehicles	25	0.086

While information is presented by corridor, some elements are best considered at the system level, such as rolling stock and a system maintenance facility. Common to the system's capital costs is a maintenance facility (at \$10.0 million) and three overnight storage yards for the six corridors at \$500,000 each. The total cost is split equally to each corridor at \$1,920,000. With regards to potential access costs, several corridors anticipate acquiring temporal rights of access to utilize existing freight rail tracks from several railroad companies. This acquisition is typically an annual fee represented in the Operations and Maintenance section of probable costs. However as a negotiated cost with the host railroad, the annual fee is essentially unknown at this stage.

The categories are subdivided into elements where unit costs are anticipated to change. Four right-of-way categories are described. Consistent with earlier planning efforts, right-of-way costs for stations are not specifically included.

- Existing Railroad – This consists of use along the existing rails or within an existing rail right-of-way. The acquisition of the right-of-way can vary from outright purchase (such as the Rock Island) to an annual fee for track usage to be negotiated with the railroad owner.
- Former Railroad – This consists of right-of-way along former rail corridors whose ownership status would require further investigation. The right-of-way may be intact or may have reverted to adjacent property owners. At this stage a budgeting number is provide yet is subject to change.
- Private new – This is all new alignment. Probable costs are likely to vary significantly by corridor yet for budgeting purposes a range of costs from \$1.0 to \$2.0 million per mile is used. This was derived from a typical right-of-way width of 100 feet and a cost of nearly \$2.00 to \$3.75 per square foot.

- Public new – This consists of alignment within roadway and/or highway right-of-way. At this stage, mileage is estimated yet no right-of-way cost is assigned to this category.

Right-of-way costs vary by corridor from a low \$3.2 million to a high of \$26.4 million. As a system, the average cost for right-of-way expressed as a percentage of construction cost is 11%, prior to contingencies. For each corridor the percentage ranges from 3% to 21%. The corridor with the highest right-of-way cost is associated with the purchase of the Rock Island line from Union Pacific. Corridors with lower right-of-way costs utilize the existing rail lines or other existing transportation facilities.

Construction costs are based upon a cost per mile basis that includes track (ballast, ties and rail) as well as signal control systems and structures (crossing manmade and natural features).

- **Former rail** corridors are often similar to new alignments though grading for the rail is typically in place.
- **Rail upgrade** means that a portion of the rail corridor will likely require new rail though the ties and ballast are likely to be usable. In certain cases rail upgrade can involve new rail and track.
- **Existing rail** can mean either use of existing freight track or in certain instances that new track is to be installed within the existing railroad right-of-way.
- **New rail** construction includes track as well as signal control systems and structures.

Another important capital cost is rolling stock. At this stage, a preliminary estimate of the number of rail vehicles is 50 units which include spares. Recent purchase of a set (2 units) by the Austin Metro of the Stadler rail vehicle was \$5.1 million. This represents \$127.5 million in capital cost. Again, ridership estimates can influence this estimate of the number of rail vehicles. System costs such as rolling stock and maintenance facilities have been equally distributed to each corridor. The programming budget includes a contingency percentage on construction costs as well as engineering and construction fees on right-of-way and construction costs. A summary of capital costs by the above described categories is shown in Exhibit 4.2 below.

**Exhibit 4.2 – Summary of Capital Costs**

Corridor	Blue Springs	Lee's Summit	Grandview	Liberty	KCI	Wyandotte	Total
Mileage	28.7	26.0	17.8	26.0	23.3	13.2	135.0
Stations	8	9	7	7	10	5	46
Right-of-way	\$ 8,400,000	\$ 26,400,000	\$ 3,200,000	\$ 15,400,000	\$ 25,100,000	\$ 6,000,000	\$ 84,500,000
Construction							
Rail	\$ 48,250,000	\$ 87,400,000	\$ 95,800,000	\$ 73,000,000	\$ 219,350,000	\$ 91,400,000	\$ 615,200,000
Stations	\$ 7,170,000	\$ 9,795,000	\$ 6,420,000	\$ 6,795,000	\$ 7,545,000	\$ 3,795,000	\$ 41,520,000
Subtotal	\$ 63,820,000	\$ 123,595,000	\$ 105,420,000	\$ 95,195,000	\$ 251,995,000	\$ 101,195,000	\$ 741,220,000
Programming Budget	\$ 22,739,600	\$ 42,214,100	\$ 39,483,600	\$ 33,402,100	\$ 91,240,100	\$ 37,374,100	\$ 266,453,600
Sub-Total	\$ 86,559,600	\$ 165,809,100	\$ 144,903,600	\$ 128,597,100	\$ 343,235,100	\$ 138,569,100	\$ 1,007,673,600
Rolling Stock	\$ 21,250,000	\$ 21,250,000	\$ 21,250,000	\$ 21,250,000	\$ 21,250,000	\$ 21,250,000	\$ 127,500,000
<b>TOTAL</b>	<b>\$ 107,809,600</b>	<b>\$ 187,059,100</b>	<b>\$ 166,153,600</b>	<b>\$ 149,847,100</b>	<b>\$ 364,485,100</b>	<b>\$ 159,819,100</b>	<b>\$ 1,135,173,600</b>
	Blue Springs	Lee's Summit	Grandview	Liberty	KCI	Wyandotte	Total
Cost per mile (millions \$)	\$ 3.76	\$ 7.19	\$ 9.33	\$ 5.76	\$ 15.64	\$ 12.11	\$ 8.41
						SYSTEM COST	\$1.2 billion

The overall costs sum to approximately \$1.2 billion. Right-of-way costs represent approximately 11% of total construction costs with stations and facilities representing another 6%. The remaining 83% of the construction cost is associated with rail track and signal work. On a cost per mile basis, costs range from a low of \$3.8 million per mile to a high of \$15.6 million per mile. The average capital cost for the entire system is approximately \$8.4 million per mile.

## Operating and Maintenance Costs

In general terms, the operating and maintenance costs have been developed based upon the operating plan previously described on an annual basis. Four basic categories have been reviewed and include:

- vehicle operations consisting of fuel costs, crew costs (including security), and host railroad dispatch charges, equipment maintenance per vehicle
- maintenance-of-way on a physical per mile basis and a gross ton per mile basis to account for wear, and
- general and administration estimated on a percentage basis of cash costs.

Cash operating costs are estimated from total operating costs less non-cash depreciation on equipment and maintenance of way. The total annual cash operating and maintenance cost is estimated at \$33.3 million. Vehicle operations account for approximately 55% of the budget, followed by equipment at 20% and administration at 15%. Maintenance of way is calculated at 10%. A summary of operating and maintenance costs by the above described categories is shown in Exhibit 4.3 below.

**Exhibit 4.3 – Summary of Annual Operating and Maintenance Costs**

	Blue Springs	Lee's Summit	Grandview	Liberty	KCI	Wyandotte	Total System		
Trainsets operating	3	3	3	3	4	3	19		
Annual Train-miles:	374,141	332,984	281,664	350,791	685,503	226,347	2,251,430		
Annual Train-hours	11,005	11,392	11,961	11,788	27,490	11,219	84,854		
Million Gross Ton Miles (MGTM)	51.2	26.9	22.8	28.3	55.4	18.3	202.8		
Fuel (per DMU-mile)	\$ 1,609,728	\$ 845,779	\$ 715,427	\$ 891,009	\$ 1,741,178	\$ 574,922	\$ 6,378,042		
Payroll	\$ 1,446,576	\$ 1,548,458	\$ 2,016,260	\$ 1,593,326	\$ 3,447,183	\$ 1,528,776	\$ 11,580,580		
KCS dispatch charge	\$ 200,000		\$ 200,000				\$ 400,000		
<b>Vehicle Operations</b>							<b>\$ 18,358,622</b>		
Equipment Mntc (per DMU)	\$ 2,070,000	\$ 920,000	\$ 920,000	\$ 690,000	\$ 1,150,000	\$ 920,000	\$ 6,670,000		
							\$ 6,670,000		
Maintenance of Way (MoW)									
MoW per mile (excl deprec)	\$ 811,197	\$ 646,469	\$ 638,755	\$ 795,520	\$ 578,538	\$ 428,989	\$ 3,899,469		
Less Common miles	\$ (180,404)	\$ -	\$ (175,925)	\$ (194,339)	\$ -	\$ (100,031)	\$ (650,699)		
MoW per GTM (excl deprec)	\$ 10,890	\$ 5,722	\$ 4,840	\$ 6,028	\$ 11,779	\$ 3,889	\$ 43,146		
							\$ 3,291,916		
Administration	\$ 1,038,237	\$ 713,957	\$ 741,484	\$ 680,678	\$ 1,247,162	\$ 604,178	\$ 5,025,697		
							\$ 5,025,697		
<b>TOTAL CASH OPERATING COSTS</b>								<b>\$ 33,346,234</b>	
Equipment Deprec (non-cash)	\$ 696,000	\$ 928,000	\$ 928,000	\$ 928,000	\$ 1,160,000	\$ 928,000	\$ 5,568,000		
MoW Deprec (non-cash)	\$ 2,220,795	\$ 4,017,528	\$ 2,500,000	\$ 2,500,000	\$ 4,375,000	\$ 2,500,000	\$ 18,113,323		
DEPRECIATION								\$ 23,681,323	
									\$ 57,027,557

## NEXT STEPS AND STRATEGIES

This section integrates the information compiled and described in the previous sections into a series of defined actions over time (next steps) based upon the strategies derived from the analysis and evaluation of the data. As previously noted, the Smart Moves Commuter Corridors were often named as highway corridors (except the Rock Island Line) yet identified for future rail potential. Indeed the strategic initiative for several corridors is to further advance the commuter rail planning efforts.

The benefits of the overall rail system and a review of a total system is the way in which it assists in determining critical rail lines and potential priorities. However it is worth noting that because the limits of the system could be refined, probable costs could change based upon how the costs of the common line are assigned (whether to one corridor or divided proportionally through the number of connecting lines) as well as system costs for rolling stock and maintenance facilities. This type of cost assignment could also change the costs per mile as previously presented, particularly for an initial start up network.

A successful commuter rail system is dependent upon three critical elements including railroad coordination, governance, and funding. These elements are all potential issues in developing an overall implementation plan. Several implementation scenarios could occur ranging from getting started in a single corridor to a starter “network” in more than one corridor to a regional system with multiple rail lines in operation. All scenarios assume use of existing rail lines and railroad coordination to share track.

The getting started scenario would focus upon implementing commuter rail in a single corridor and could have several benefits including a less complex coordination with freight railroad companies, potential low cost of entry, and a more straight forward approach to governance, administration and funding. The degree of railroad coordination is dependent upon the rail corridor chosen as a starter line. If the Rock Island line were chosen, then outright purchase of the rail line could occur with resulting in less railroad coordination over time. However with other lines, railroad coordination would be essential. An example of a single corridor is the NorthStar Commuter Rail in Minneapolis. The line utilizes existing track and right-of-way owned by BNSF Railway. The cost for this 40-mile system is \$309 million or roughly \$8 million per mile.

A starter “network” could include multiple corridors and could possibly serve several counties. The benefits for the starter network approach include showcasing the ability to expand the system over time. This scenario may have a more complex approach to governance, administration and funding depending upon the number of participating jurisdictions. The level of effort is dependent upon the corridors chosen. When viewing Union Station as the “hub” of the overall system, it is critical that a portion of the “common” line from Union Station be constructed. An example of a Starter Network would include Salt Lake City Commuter Rail, with a 45-mile line from Ogden/Pleasant View (April 2008) and a second 80-mile long line to Provo. This system operates primarily on its own track constructed in a parallel corridor to the existing Union Pacific line. The implementation cost for the Ogden line was at \$9.1 million per mile.

The regional system would focus upon implementing commuter rail on multiple corridors simultaneously and serve a large portion of the metropolitan region. This larger scope would provide the region with several social and environmental benefits including improving transportation mobility, promoting sustainability, and helping to shape regional growth. However this scenario would be the most costly and would be the most complex of the three scenarios in regards to governance, administration and funding. An example of a regional system is Denver FasTracks transit expansion program. This regional system includes four new commuter rail corridors. The implementation cost is projected to be approximately \$20 million per mile.

The commuter corridors can be reviewed as individual lines, yet it is important to note the systemic elements of the common line. For example, since the cost of the common line east of Union Station are included in the Rock Island line, a single line “getting started” scenario for either the Blues Springs or the Grandview line would need to be adjusted to account for the common line costs. A similar situation occurs with the common line west of Union Station, where those common line costs have been assigned to the Airport line. Various modal options as part of a transportation strategy can be discussed for the corridor if rail is not implemented as a short term strategy. Eventually, as Smart Moves has indicated rail is seen as a long-term strategy in each corridor in the future. The commuter corridors have been considered from a variety of perspectives and several have been found worthy of implementing rail as a short-term strategy.

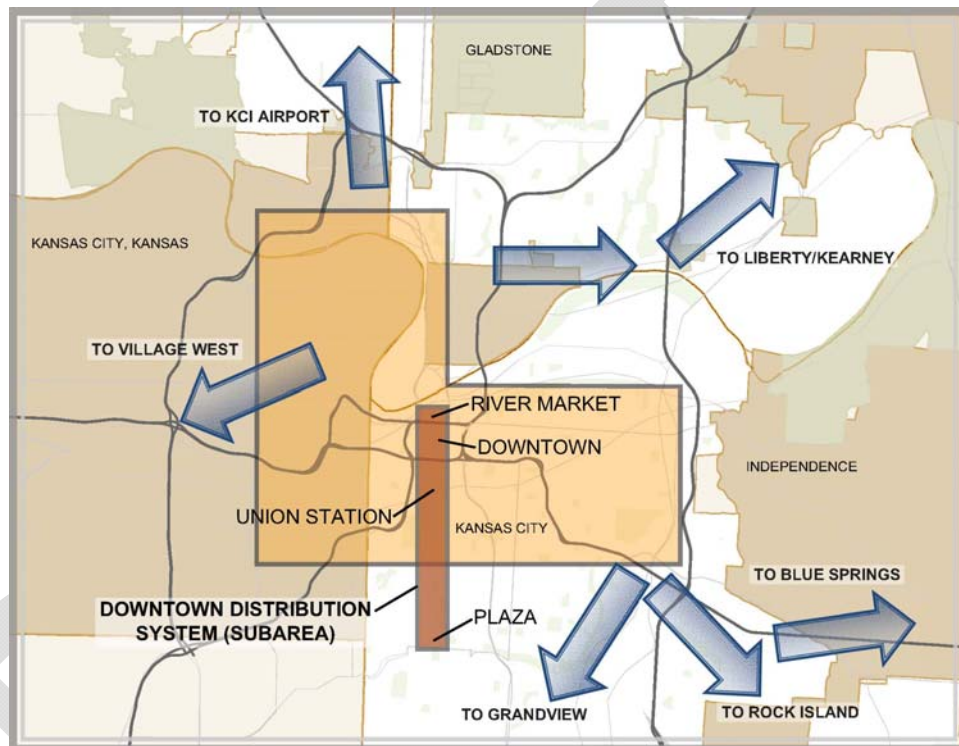
The commuter corridors are discussed by corridor and summarized in Exhibit 5.1. The strategies have been defined based upon time implementation (short term, mid-term or long term) as well as by mode as either passenger rail or express bus with its supporting facility type, such as an HOV lane or other options such as bus on shoulder and travel in general purpose lanes. The modal discussion is supplemented with implementation time periods.

**Exhibit 5.1 – Summary of Strategies**

CORRIDORS		I-70 East	Rock Island	US-71	I-35 North	I-29	I-70 West	
<b>CHARACTERISTICS</b>								
Length (miles)								
	Existing Length (Auto Distance)	27.1	25.8	18.6	29.0	19.7	15.2	135.4
	Existing Length (Union Station to end of line) (1)	32.6	26.0	25.4	32.0	23.3	17.2	156.5
	Rail construction length (miles)	28.7	26.0	17.8	26.0	23.3	13.2	135.0
<b>RAIL</b>								
Frequency (minutes)								
	Peak	30	30	40	40	30	30	
	Off-peak	60	60	75	75	30	60	
Costs (2010 \$)								
	Capital Costs (millions \$)	\$ 107.8	\$ 187.1	\$ 166.2	\$ 26.0	\$ 364.5	\$ 159.8	\$ 1,011.4
	Footnotes	2	3	2	2	2	2	
	Operating Costs (millions \$)	\$ 7.0	\$ 4.7	\$ 5.1	\$ 4.5	\$ 8.2	\$ 3.9	\$ 33.4
Stations								
	Number	8	9	7	7	10	5	46
Daily Ridership Potential								
	2030 Rail (In-Out operations)	3,167	1,617	1,058	609	3,951	573	10,975
	2040 Rail (best operating plan with DDS)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
<b>BUS</b>								
Frequency (minutes)								
	Peak (minutes)	5 to 32 AM, 30 to 35 PM	30 to 40 AM and PM	9 to 21 AM, 14 to 29 PM	28 AM, 27 PM	13 to 30 AM, 15 to 30 PM	NA	
	Time (minutes)	68	60	59	55	42, reverse 34		
Costs (2010 \$)								
	Capital Costs (millions \$)	\$ -	\$ -	\$ -	\$ -	\$ -	NA	\$ -
	Footnotes	4	4	4	4	4	5	
	Operating Costs (millions \$) - actual						NA	\$ -
Park-n-Ride Lots								
	Number	4	2	2	2	2	NA	12
Daily Ridership								
	Existing Express Bus (actual)	320	241	254	129	600	NA	1,544
	2030 Express Bus	1,219	237	423	125	797	NA	2,801
<b>SUMMARY</b>								
Short Term Strategy		Rail	Rail	Express Bus	Express Bus	Express Bus / Pursue rail implementation	NEW Express Bus	
Mid-Term Strategy				Express Bus	Express Bus	Rail	Express Bus	
Long Term Strategy				Rail	Rail		Rail	
1 Individual corridor lengths duplicate common line length of overall system length								
2 Includes estimated rolling stock costs equally distributed to each corridor								
3 Annual fee to host railroad included with O&M costs								
4 As an existing route with facilities and equipment, only replacement costs based upon fleet average could be assumed								
5 Text								

The entire length of the common line is estimated at 15 miles (the portion west of Union Station at approximately 7.8 miles, and the portion east of Union Station at 7.1 miles). An L-shaped study area map, shaded in orange, for the common line (including the Downtown Distribution System sub area) is shown in Exhibit 5.2. This study area is based upon the map included with the Alternative Analysis application. The purpose of the Alternatives Analysis process is to develop with stakeholder and agency input the appropriate limits for analysis. The rail vehicles under evaluation provide flexibility and allow for the alignment to be within a city street. For new rail corridors several options should be explored including but not limited to arterial streets, adjacent or within highway (interstate) right-of-way, adjacent or within railroad right-of-way, as well as new alignment. All corridor alignments may require acquisition of right-of-way. While it is premature to identify a specific route and in turn costs for specific features, in unique situations, such as a Missouri River bridge crossing, a unique cost is applied to a specific situation.

**Exhibit 5.2 – Common Line Study Area Map**



**The I-70 East Corridor (or Blue Springs Line)**

This heavily trafficked corridor is proposed to be advanced for further analysis with a rail line in the near future as a short term strategy. This rail line is proposed in conjunction with the Rock Island line as a starter “network”. These rail lines are viewed as critical in terms of providing a larger rail service area and viable in terms of cooperation with host railroads willing to either sell an existing rail line or negotiate access to or along an existing rail line.

**The Rock Island Corridor (or Lee’s Summit Line)**

This rail line along Union Pacific’s former Rock Island line is proposed to be advanced for further analysis with a rail line in the near future as a short term strategy. This rail line is proposed in conjunction with the Blue Springs line as a starter “network”. This line includes the portion of the common line east of Union Station to Leeds Junction. These rail lines are viewed as critical in terms of providing a larger rail service area and viable in terms of cooperation with host railroads willing to either sell an existing rail line or negotiate access to or along an existing rail line. The Rock Island line also provides significant operational opportunities in terms of establishing passenger rail maintenance facilities as well as testing rail car equipment and training rail operators.

### **US-71 Corridor (or Grandview Line)**

This corridor with the second highest population and employment characteristics has had limited ability in attracting ridership. Review of demographic data over various forecast years indicates a significant shift in both population and employment in various zones along the corridor including the Bannister Federal Complex, Bannister Mall and the new intermodal facility at Richards Gebaur. Other rail alignments could be explored that utilize more existing rail corridors in an effort to improve rail travel times. While this corridor will continue to be reviewed, the short term transportation strategy is likely to continue the 471 express bus while continuing coordination with major redevelopment sites along the corridor to plan for an integrate rail transit into the land use development program. From an operational perspective, express bus service is likely to be the focus for the US-71 corridor. Congestion levels are not at this time approaching the need for HOV conversion. Stop -and-go traffic operations do occur along the segment of US-71 controlled by traffic signals that could suggest the need to implement bus priority elements such as bus on shoulder (BOS) or queue jumpers. Consequently from a planning perspective, any opportunities to implement bus priority elements would be beneficial particularly if bus operations were to be expanded or enhanced.

### **I-35 North Corridor (or Liberty Line)**

This corridor probably represents the modal dichotomy and potential paradigm shift necessary for the region to discuss and determine its potential future. The LRTP includes \$200 million for widening I-35 from the I-29/35 split north to MO Rte 33 near the north edge of Liberty. The Liberty rail line is estimated to cost only \$125 million (albeit without the cost of the west portion of the common line from Union Station). The ridership forecast for this Liberty line is only moderate so it certainly cannot be said that the rail line could replace a vehicular travel lane in each direction on I-35, yet the opportunity for changes in terms of density and character are certainly available along with the potential use of an under capacity rail line. An HOV conversion (without widening to six-lanes) is not applicable, and HOV construction has too low a forecast of traffic volumes. Bus on shoulder operations would require some construction and no doubt bridge modifications, yet forecasted travel times suggest little change in the level of congestion. Nonetheless as Smart Moves noted, commuter rail has potential in the future. It could also be said that commuter rail has the potential to influence the future. Certainly the existing rail corridor ought to be preserved and additional planning would be appropriate to determine corridor preservation for a future passenger rail connection.

### **I-29 Corridor (or KCI/Airport Line)**

This corridor is viewed as a critical link across the Missouri River allowing access to both Platte and Clay counties. Consequently, it is proposed to continue advancing this rail line for further analysis as a short-term strategy and thereby allow implementation as a mid-term strategy. A critical component of this rail line is the ridership generated by access to the airport. Equally critical is determining the ownership status of the former interurban line. The ownership status is uncertain, meaning that portions of the right-of-way may be intact or may have reverted to adjacent land owners. If this is not a viable corridor location, then other locations would need to be explored and comparative assessments made. While the corridor is costly and has a need for new right-of-way, the process for review, clearance and implementation over time require that the process activities of planning, design and acquisition be initiated in the short-term. In the mid-term period, passenger rail to the airport along the I-29 Corridor / Airport Line is recommended as a critical link to the regional context as well as bearing the elements of the common line west of Union Station. From a current operational perspective, express bus service would still be the focus for the I-29 corridor. Congestion levels are not at this time approaching the need for HOV conversion. Nor do stop-and-go traffic operations occur (except at river crossings) that suggest the need (or afford the physical capability) to implement bus on shoulder (BOS). However from a planning perspective, any opportunities to allow or afford such BOS operations would be beneficial particularly if bus operations were to be expanded or enhanced in the near-term.

### **I-70 West Corridor (or Wyandotte Line)**

Adjacent to this corridor and along the Wyandotte line alignment is the proposed Bus Rapid Transit (BRT) system along State Avenue. This corridor has recently had and is expected to continue to have significant additional growth. The travel demand model is being reviewed in attempts to best reflect the anticipated changes in population and employment in the area, particularly near I-70 and I-435. It is worth noting that the travel demand model's estimate for transit ridership along the 101 State Avenue bus route in 2030 are projected to be less than half of the current day



ridership. Congestion levels are not at this time approaching the need for HOV conversion. Nor do stop-and-go traffic operations occur that suggest the need for bus on shoulder (BOS). However from a planning perspective, bus on shoulder operations would likely be easy to implement considering the design of KDOT highways and the enabling legislation. This bus service would be a new express bus route. And as Smart Moves noted, in the long term this corridor could potentially support rail.

The identified process for comparing transit modes at this stage of evaluation is to compare future bus transit service to a potential future rail service. The future bus service includes committed transit improvements such as the MAX on Troost. The future bus service does not change bus routing, station locations or service characteristics. Consequently the bus service strategies on the corridors for short- and mid-term ranges are extrapolated from a long-term assessment (to 2030 and now 2040) and do not have the benefit of specific forecasts with a shorter time period, such as 2015 or 2020. While modifications to the express bus service characteristics could alter ridership, the comparison between existing and future express bus ridership forecast suggest the need for few changes.

The majority of the express bus service along the commuter corridors does not experience a significant change between the existing (actual) bus ridership and the forecast bus ridership. Only minor increases in the corridor express bus service is projected in the Rock Island line, US-71 and I-35 North. Consequently the capital and operating costs (expressed in 2010 dollars) would remain the same as currently invested. However, the Rock Island line corridor is projected to have an increase in ridership with commuter rail operations. For this particular corridor, rail service is recommended. The new 471 express bus along US- 71 currently has just over 250 daily riders. However this recent bus route addition is not included with the MARC model. The 2030 forecast for the 28X route is over 400 daily riders. Observations of usage at the recently constructed park-n-ride facility at Red Bridge Road and US-71 with parking spaces for just under 200 vehicles suggest approximately one-third of the spaces are in use.

The I-70 West corridor currently does not have any express bus service. New BRT service is proposed in the urban State Avenue corridor which is parallel and physically close to the I-70 West corridor. The service area is also potentially similar with Village West seen as a terminus point. However, the extent of the corridor presents the opportunity for express service. And with recent legislation passed in Kansas allowing bus operations on shoulders, and the general availability of adequate shoulder width and pavement thickness based upon typical KDOT design and construction practices, the opportunity for a new express bus service with the ability to utilize BOS operations is feasible. No specific bus routing or service characteristics have been estimated for this suggestion. The demand for the forecast bus service along State Avenue through the travel demand model is projected to be less than the actual existing ridership, making an assessment of near-term conditions difficult. However the BOS concept remains potentially valid and could be explored in more detail after the BRT service has begun and further evaluation could be conducted.

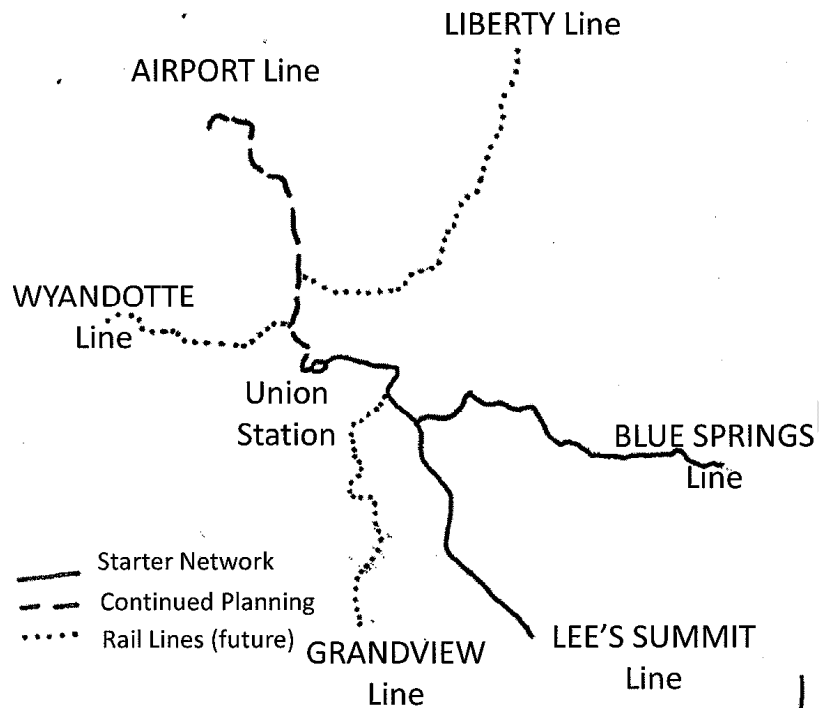
I-29 express bus route is shown as the express bus route with the highest ridership. The forecast is for ridership to grow from 600 daily riders to 800 daily riders. While this represents an increase of 33%, the existing bus occupancy and available spaces at existing park-n-ride facilities would suggest that the current operations could at least handle any increase in riders in the next several years for a short-term period of the next 5 years. This increase begins to suggest that operational changes in the near- to mid-term may be warranted and supports the recommendation to pursue planning implementation in the near-term for implementation in the mid-term period.

The I-70 East corridor with the Blue Springs express bus route (170) is projected to increase nearly four-fold in the next 20 years, from 300 to 1,200 daily riders. Ridership projections with rail service show a further increase in transit ridership along this corridor. Consequently, the near-term recommendation is to pursue commuter rail. However, it is worth noting that for the eight buses operating daily, the buses would need to operate in an excess of current capacity.

A commuter rail implementation map for the corridors is illustrated in Exhibit 5.3. It shows a starter network along the Blue Springs and Rock Island rail lines with continued planning efforts in the short term along the I-29 Corridor to the

airport. This approach would provide for the common line elements both east and west of Union Station. It could be anticipated that with success of the starter network and the common line elements, additional line could be more easily implemented.

Exhibit 5.3 – Implementation Map



A Passenger Rail Authority (PRA) is a legal entity needed in order to implement commuter rail on existing railroad corridors. An “authority” is essential in developing the agreements necessary with the railroad that owns the rail line where access or purchase is desired for another use such as commuter rail. Commuter rail service normally utilizes vehicles that can safely operate on the same track and often during the same time as freight. An understanding of commuter rail access agreements is therefore important.

There are two broad categories of agreements; sale agreements and capacity rights agreements. Sale agreements involve outright sale of the corridor to the sponsoring agency. This would likely be the case with Rock Island line. Otherwise, sale agreements typically only occur when the level of freight service is low or minimal. Capacity agreements involve sale by the owning railroad of a right to run a specific number of passenger trains, or commit the railroad to providing a specific window for commuter service. Adjacent right-of-way to a main line corridor may be sold. The capacity right can be expressed as a real estate interest such as a lease or easement or be expressed as a contractual or license right. As with any agreement there are many issues including but not limited to:

- Compensation – discussions are typically held in the strictest confidence by all parties
- Level of service – the number of trains that may operate at given period of time
- Rail freight rights – railroad retain right and obligation to serve rail freight customers
- Capacity improvements – where the level of freight service is minimal and is not projected to increase, then the railroad may agree to a specified night time freight window.

- Indemnification and Insurance – railroads insist that no additional risk or liability exposure is assumed by the railroad. In addition to strict liability provisions, multi-million dollar insurance coverage are required naming the railroad as an additional insured.
- Maintenance and dispatch – maintenance may become the responsibility of the authority or remain with the railroad. In either case standards for track condition must be met. Dispatch protocol (what train has priority) is negotiated, as well as compensation for dispatch services.
- Environmental conditions – As part of a sale agreement a due diligence period for Phase I and/or II environmental assessments can occur. The authority must obtain any environmental clearance necessary to construct and operate the passenger service. Noise and vibration issues are sometime raised and with recent FRA regulations on quiet zones, such implementation can become the responsibility of the authority.
- Train Operations – The authority may issue requests for a third party to operate and maintain the trains.

Yet in order to negotiate an access agreement, railroads require that the regional/local agencies demonstrate the viability of the project through political agreements, designation of funding for implementation and action towards the resolution of (any) legal issues (including possible new legislation).

A challenge to implement commuter rail in a region with multiple jurisdictions is the question of who will be the responsible party. A critical element is the administration of the system when corridors pass through several jurisdictions. Review of several new commuter rail systems currently in operation allow for analysis of possible governance structures. Regional agencies such as the MPO have often taken the lead in initiating this coordination. Generally the institutional arrangements throughout the country range from state-run regional rail operations to large single-purpose regional rail authorities that extend service into multiple political jurisdictions, to regional transit authorities that are responsible for multimodal services, to sub-regional agreements between cities that contribute to the management of a rail service in a common corridor.

Another key step is to develop funding implementation with probable funding options for governments at local, state and federal levels. The policy positions of the involved agencies and possible implementation responsibilities should be thoroughly considered as should those of other local entities included in the project area. Ultimately, the critical financial issue at the local level is the annual requirement for local funds to meet capital, operating and maintenance costs.