OLSSON ASSOCIATES

I-70 Corridor Transit Feasibility Study

Final | March 20th, 2014

Kansas Department of Transportation | METROPOLITAN TOPEKA PLANNING ORGANIZATION | Lawrence - Douglas County MPO | MARC Mid-America Regional Council

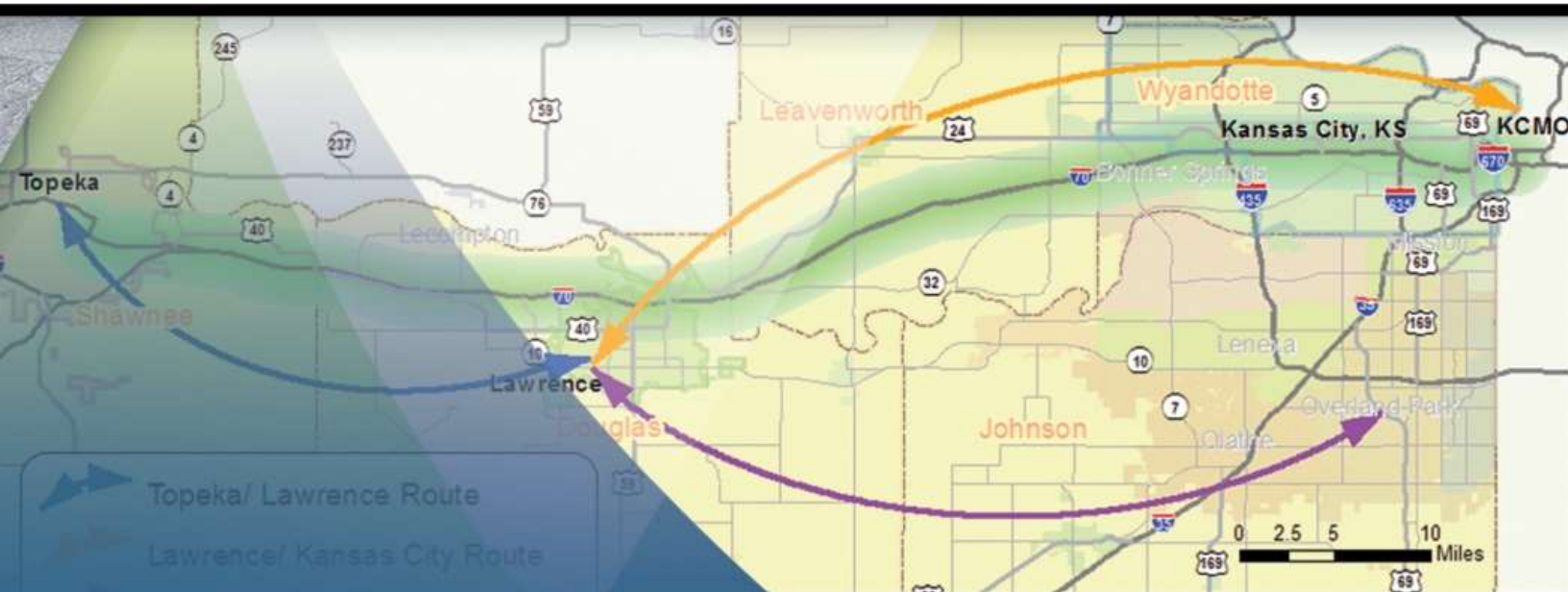


Table of Contents

Executive Summary iv
Chapter 1 Introduction 1
1.1 Purpose of the Study 1
1.2 Study Team Organization 1
1.3 Study Area 2
1.4 Existing Transit Service 2
1.5 K-10 Connector 8
1.6 Long-Range Plans 9
Chapter 2 Market Potential 11
2.1 Corridor Characteristics Population 11
2.2 Major Employers 12
2.3 Commuter Travel Patterns 16
2.4 Travel Patterns on the Kansas Turnpike 21
2.5 Summary of Commute Travel 21
2.6 Non-work Attractions 22
2.7 Potential Transit Ridership 24
Chapter 3 Service Concepts 28
3.1 Introduction 28
3.2 Range of Transit Options 28
3.3 Range of Concepts 29
3.4 Initial Concept Evaluation 35
Chapter 4 Operations Strategy 37
4.1 Introduction 37
4.2 Evaluation of Route Segments 37
4.3 Operating Plan 39
4.4 Facilities 40
4.5 Capital Costs 41
4.6 Marketing 43
Chapter 5 Funding Analysis 46
5.1 Introduction 46
5.2 Funding Sources 46
5.3 Project Phasing Strategies 54

5.4 Transit Service Impacts 54
5.5 Recommendation 56
Appendix A-1
Operations Cost Methodology A-2
Operating Cost Recovery Methodology A-3

Tables

Table 1 State Employee Vanpools 7
Table 2 Current KCATA AdVANtage Service in the I-70 Corridor 8
Table 3 K-10 Connector Route Average Daily Ridership 9
Table 4 Population of Cities in I-70 Corridor 11
Table 5 Employment of Cities in I-70 Corridor 12
Table 6 Major Employers in Topeka 13
Table 7 Major Employers in Lawrence 14
Table 8 Major Employers in Kansas City, Kansas 15
Table 9 Work Trip Movements 16
Table 10 Daily Two-Axle Vehicle Movement between KTA Toll Stations 21
Table 11 Events/Activity Centers in I-70 Corridor 24
Table 12 Coefficients of Commuter Mode Choice Model 27
Table 13 Transit Ridership Forecast Home-to-Work Trip Table 27
Table 14 Commuter Mode Choice User Cost Comparison 29
Table 15 Potential Daily Transit Ridership Demand by Segment 30
Table 16 Operating Characteristics for Concept A 32
Table 17 Operating Characteristics for Concept B 33
Table 18 Operating Characteristics for Concept C 34
Table 19 Operating Characteristics for Concept D 35
Table 20 Operating Characteristics Summary 35
Table 21 Expected Farebox Recovery 39
Table 22 Capital Costs 42
Table 23 Preferred Concept Summary 43
Table 24 Summary of Revenue Sources 47
Table 25 Revenue Sources 53

Figures

Figure 1 Study Area 2
Figure 2 Topeka Transit Routes 3
Figure 3 Lawrence Transit Routes 4
Figure 4 Wyandotte County Transit Routes 5
Figure 5 Transit Routes for Downtown Kansas City, Missouri 6

Figure 6 Rideshare van in Lawrence 8
Figure 7 K-10 Connector Route 9
Figure 8 Major Employers in Topeka 13
Figure 9 Major Employers in Lawrence 14
Figure 10 Major Employers in Kansas City, Kansas 15
Figure 11 Work Trip Movement Flow Map 17
Figure 12 State Employees Commuting to Topeka 18
Figure 13 State Employees Commuting to Lawrence 19
Figure 14 State Employees Commuting to Kansas City, Kansas 20
Figure 15 Ridership Estimation Study Areas 25
Figure 16 Model Nest Structure 26
Figure 17 Concept A Strategy 31
Figure 18 Concept B Strategy 32
Figure 19 Concept C Strategy 33
Figure 20 Concept D Strategy 34
Figure 21 Preferred Concept 37
Figure 22 Over-the-Road Coach 42
Figure 23 JCT Brand Distinctions 44

Executive Summary

The *I-70 Corridor Transit Feasibility Study* examined the feasibility of providing transit service operating in the I-70 corridor between downtown Kansas City, Missouri; Lawrence, Kansas; and Topeka, Kansas.

Using data from major employers (included the Kansas state government), U.S. Census, and the KTA, the following major movements were identified:

- There was not substantial daily travel between KU in Lawrence and KUMC in Kansas City, Kansas.
- The largest commuter travel movement in the I-70 corridor is from residents of the Lawrence area to workplaces in downtown Topeka. This level of movement would support regularly scheduled commuter transit service.
- There is also movement between residents of Topeka to KU and other major employers in Lawrence. This level of movement would also support regularly scheduled commuter transit service.
- The movement between the CBDs of Kansas City, Kansas, and Kansas City, Missouri, with Lawrence and Topeka is less than the movement between Lawrence and Topeka. The movement between Lawrence and the Kansas City, Missouri, CBD is not large enough to consider some level of regularly scheduled transit service.
- The movement between Topeka and Overland Park was larger than the movement between Topeka and the Kansas City area (Kansas City, Kansas and Kansas City, Missouri). For that reason, coordination of service between the K-10 Connector and a possible extension of service between Lawrence and Topeka could accommodate this need.

Potential transit modes for addressing this movement include expanding carpooling opportunities, working to create more vanpools, providing bus service on a fixed schedule, and providing fixed guideway options such as commuter rail. The level of transit demand is expected to be large enough to operate bus service. Commuter rail has been studied as an option in the past, and the level of demand estimated in this project is consistent with the past findings, which

suggest that bus transit would be the most cost-effective strategy in the near term.

A series of bus transit options were developed that had different operating characteristics. The concept recommended in this report is a system of two independent commuter bus routes that would meet and interact in Lawrence. The recommended service levels for the initial service between Topeka and Lawrence are to provide three trips at a one hour frequency in each direction in the morning and evening peak periods. Service between Overland Park and Lawrence, already exists in the form of the K-10 Connector, which is operated by JCT. These service levels can be increased with demand.

The most important facility issue related to corridor transit service is identifying a suitable facility and location in Lawrence. Ideally, this location would accommodate the two routes, converging to allow passengers to transfer. Secondly, it would also be beneficial if the site also allowed passengers easy transfer access to the local Lawrence system.

Park and ride locations are also needed throughout this intercity transit system. This would include locations in Lawrence and Topeka. Other facilities would include two stops with bus shelters in Topeka and additional stop locations in Lawrence.

The estimated operating cost for the segment between Lawrence and Topeka is $563,000. The estimated capital cost, including the purchase of vehicles, is estimated at $2.08 million.

Chapter 1 Introduction

1.1 Purpose of the Study

The purpose of the project is to examine the feasibility of transit service operating in the I-70 corridor between downtown Kansas City, Missouri; Lawrence, Kansas; and Topeka, Kansas. In order to assess feasibility, this study examines existing travel markets along this corridor and the ridership potential generated by these markets. The report also describes potential transit service concepts, estimates operating and capital costs, describes funding alternatives, and lists marketing strategies. The Kansas Department of Transportation (KDOT) has led this project with participation from the Mid-America Regional Council (MARC), the Lawrence-Douglas County Metropolitan Planning Organization (L-DC MPO), and the Metropolitan Topeka Planning Organization (MTPO).

This project was preceded by the 5-County Regional Transportation Study, which studied transportation needs in Douglas, Johnson, Leavenworth, Miami, and Wyandotte counties. The 5-County Study provided an assessment of multimodal transportation needs for the 5-county area, prioritized those needs, and developed strategies to address the needs. Transit strategies were identified in a number of the major travel corridors. The I-70 corridor was found to have the most transit-demand potential of the major regional corridors and was identified as the next intercity corridor to be assessed.

1.2 Study Team Organization

Olsson Associates is completing this project under contract to the KDOT. Two committees were formed to assist in the development and review of the feasibility study.

Core Team

A core team, comprised of KDOT, MTPO, MARC, and L-DC MPO, provided direct input on tasks being completed.

Advisory Committee

The advisory committee was comprised of current transit providers and the Kansas Turnpike Authority (KTA), which operates and oversees this section of I-70. Transit providers in the study corridor included Topeka Metropolitan Transit Authority (TMTA), Unified Government Transit (UGT), Lawrence Transit (which coordinates service with KU On Wheels, also known as KUOW), Johnson County

Transit (JCT), and the Kansas City Area Transportation Authority (KCATA). The advisory committee provided input on transit recommendations and information on how to coordinate with local transit systems.

1.3 Study Area

The study area is the I-70 corridor located between Topeka, Kansas, and Kansas City, Missouri. Olsson obtained data and information for the communities adjacent to I-70, including Topeka, Lawrence, Tonganoxie, Edwardsville, and Kansas City, Kansas; and Kansas City, Missouri. Some information has also been obtained for Overland Park, Kansas, because it is a major employment destination and because service concepts may potentially interline with the K-10 Connector transit service. The study area is shown in Figure 1.

Figure 1 Study Area

1.4 Existing Transit Service

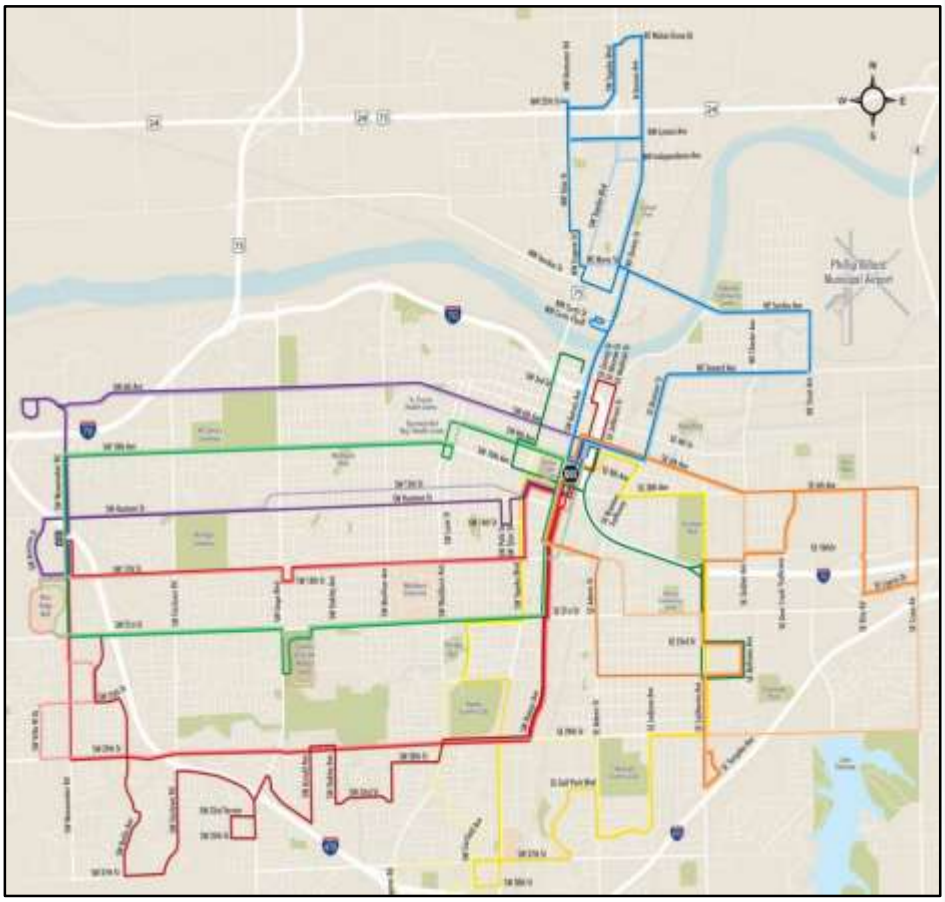
Public transportation is provided in the corridor but is primarily provided within the three metropolitan areas. A transit route does operate on K-10 between Lawrence and Overland Park. The existing transit services in individual communities are summarized below in order to indicate the potential for local circulation that could be connected with an I-70 service. The local transit service includes The Metro, which provides services in Topeka; Lawrence Transit and KUOW, which coordinate service in Lawrence; and UGT, which operates service in Kansas City, Kansas. The KCATA provides transit service in Kansas City, Missouri, as well as portions of Kansas City,

Kansas, and Johnson County, Kansas. Vanpools provide the only commuter oriented public transportation through the corridor.

Topeka

The city of Topeka operates The Metro, which consists of 12 bus routes providing all-day service covering much of the city. The Metro is a hub-based system operating out of the Quincy Street Station in downtown Topeka. Headways are between 45 minutes and one hour. The transit system map for Topeka Transit is shown in Figure 2.

Figure 2 Topeka Transit Routes



Source: www.topekametro.org

Lawrence

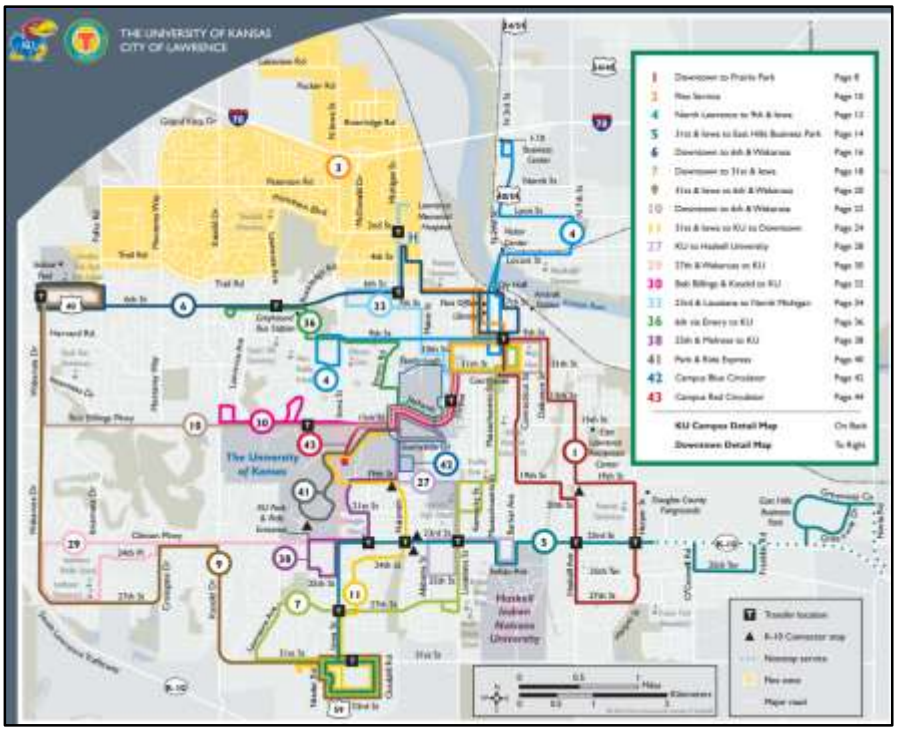
The city of Lawrence operates the Lawrence Transit, which consists of nine routes providing all-day service into early evenings and on Saturdays. Lawrence Transit is a hub-based system that operates to and from Lawrence's downtown hub currently 7th and Vermont

Streets. The system covers much of the city of Lawrence with 30- to 60-minute headways. A new, general public reservation-only night service offers rides between 8:00 p.m. and 6:00 a.m. Transit facilities are moderately developed with numerous map-and-schedule-equipped bus shelters available throughout the system. Olsson is currently conducting a separate study to identify a location for the construction of a new transit center.

University of Kansas (KU) Transit operates KU on Wheels (KUOW), which uses 10 fixed routes to serve the campus area. Except for limited weekend night service, KUOW does not operate on evenings, weekends, or days when KU is not in session. Peak headways range from six minutes for the campus circulator system to 30 minutes for routes accessing off-campus destinations. A major park and ride lot is located in the southwest portion of the KU campus, which is served by a park and ride express route. The transit system map for Lawrence Transit and for KUOW is shown in Figure 3.

A high degree of coordination exists between Lawrence Transit and KUOW. The city of Lawrence and KUOW jointly operate one route. In addition, bus passes are accepted between the two systems, and both schedules are published as one booklet.

Figure 3 Lawrence Transit Routes



Source: www.lawrencetransit.org

Wyandotte County

Transit service within Wyandotte County is provided by Unified Government Transit's (UGT) "The Bus" and through service contracted to the KCATA. Through both service providers, the more-urbanized areas within the county have all-day transit service with weekend and evening service. The Bus operates four fixed routes and jointly operates one route with KCATA. The KCATA service operates five routes into Wyandotte County that connect with Jackson County, Missouri. A route with many of the characteristics of Bus Rapid Transit (BRT)—branded as a Connex Route—operates between Village West (Kansas City, Kansas) and downtown Kansas City, Missouri, primarily along State Avenue in Kansas City, Kansas. Transit stations are located along the route, with a route transfer center located near I-635 and State Avenue and in downtown Kansas City, Kansas. The transit routes servicing Wyandotte County are shown on the map in Figure 4.

Figure 4 Wyandotte County Transit Routes

Source: www.kcata.org

Kansas City Downtown Area

Transit service in the downtown area of Kansas City, Missouri, is provided by the KCATA. The KCATA operates transit routes throughout much of Kansas City, Missouri, and other communities. Two BRT lines operate out of downtown Kansas City, Missouri on Main Street and Troost Avenue. A downtown transfer station is located at 10th and Main streets. A two-mile-long streetcar line is now under construction, extending between Third Street and Grand Boulevard to Union Station at Main and Pershing. All of these services will provide circulation to many destinations in the Kansas City downtown area. Figure 5 displays the downtown route system.

Figure 5 Transit Routes for Downtown Kansas City, Missouri

Source: www.kcata.org

Vanpools and Carpools

Current transit service between Topeka and Kansas City is provided by ridesharing. Ridesharing includes both carpooling and vanpooling. A carpool is where two or more people share a ride in a private vehicle. Carpools generally have two or more passengers who live in the same neighborhood or along the same route and who use a private vehicle to travel to common or nearby destinations. A vanpool is a larger group of people who share a ride in a prearranged vehicle.

MARC's RideShare program provides resources for commuters to organize either carpools or vanpools. Commuters interested in carpooling can be matched with commuters of similar travel patterns using the free web portal "RideShare Connection."

The Kansas state government operates vanpools for state employees. Table 1 lists the number of vanpools that are serving state employee vanpool users.

Table 1 State Employee Vanpools

Trip Origin	Vans	Seats
Lawrence	8	120
Shawnee	1	12
Bonner Springs	1	15
Kansas City, Kansas	1	15
Total	**11**	**162**

Additionally, a firm called vRide leases vans for vanpooling purposes. There are four vRide vanpools in the I-70 corridor:

- One from Lawrence to Topeka
- One from Topeka to Lawrence
- One from Lawrence to Kansas City
- One from the Kansas City area to Topeka.

Rideshare (not connected with MARC's RideShare program), shown in Figure 6, is operated by the Enterprise rental car company. This service is another vanpool leasing option that is marketed to private and government employers, as well as to individuals.

Figure 6 Rideshare van in Lawrence

Source: Olsson

The KCATA operates the AdVANtage vanpool program. Participants can utilize the commuter service if there are at least six participants and if one of the trip ends occurs in the KCATA service area.

Table 2 Current KCATA AdVANtage Service in the I-70 Corridor

Trip	# of Seats
Lawrence to Hallmark in Kansas City, Missouri	8
Lawrence to Aptuit (102nd and Hickman Mills)	11
Leavenworth to Crown Center	7
Lawrence to downtown Kansas City	8
Topeka to Kansas City Social Security Administration	8
Topeka to Hallmark	7
Lawrence to Hallmark	7
Leavenworth to Federal Building in Kansas City, Missouri	7

1.5 K-10 Connector

The transit service in the K-10 corridor between Lawrence and Overland Park provides an example of a regional intercity public transit service that could be emulated in the I-70 corridor. The K-10 Connector is an all-day, limited-access, long-haul route between

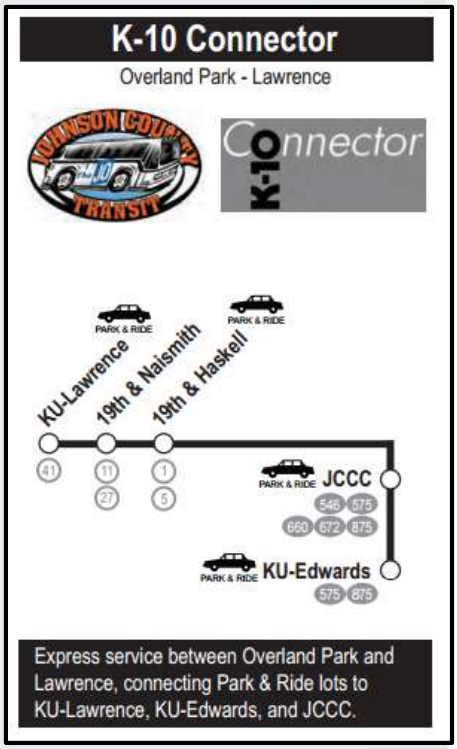
Lawrence and Overland Park. The service connects the KU main campus in Lawrence with the KU Edwards Campus located at 127th Street and Quivira Road in Overland Park. The service also provides a connection to the Johnson County Community College, as well as being available for other trip types for the general public. The route has 30-minute peak frequency and 60-minute off-peak frequency, with a service span of 6:00 a.m. to 11:20 p.m. from Monday to Thursday. Night service is not offered on Fridays. Reduced schedules operate during the summer and other school breaks. While average daily ridership was 606 in 2013, it ranged, depending on the time of year, from 1,100 during the first few weeks of the school semester to 90 on Spring Break. This success has led to the consideration of additional regional connection routes, such as service within the I-70 corridor being evaluated as part of this project. Additional ridership information for the K-10 Connector Route can be found in Table 3.

Table 3 K-10 Connector Route Average Daily Ridership

Time of Year	Average Daily Ridership
Regular Schedule	813
Summer Schedule	330
Spring Break	90
Average Daily Ridership	606

Source: Johnson County Transit

Figure 7 K-10 Connector Route



Source: www.thejo.com

1.6 Long-Range Plans

Each of the long-range transportation plans completed by the three Metropolitan Planning Organizations located in the I-70 corridor (MTPO, MARC, and L-DC MPO) includes consideration of commuter transit service on I-70.

Transit service on I-70 is specifically identified in the *MTPO 2040 Long-Range Transportation Plan*. This service is shown as part of a regional transit concept. The full-service concept includes regional transit connections between Topeka and Manhattan, Emporia, Lawrence, and Kansas City.

The *L-DC MPO Long-Range Transportation Plan* encourages developing and funding commuter bus services between Douglas County and the Topeka and Kansas City metropolitan areas. The plan also notes that there have been local/regional discussions in recent years about the desire for commuter rail services between Topeka, Lawrence, and metro Kansas City locations. Service options with a Kansas City rail hub have been mentioned, but commuter-oriented passenger rail service running through Lawrence has not moved

beyond initial feasibility discussions. *The Long-Range Transportation Plan* concludes that the focus of commuter services for the foreseeable future will be in the form of express bus services instead of rail.

MARC developed the Kansas City area long-range transportation plan and transit plan entitled *Smart Moves*, which indicates express transit service along I-70 from the western edge of the metropolitan area and potentially further west to Lawrence and Topeka, to the Central Business District (CBD) of Kansas City, Missouri. MARC and member organizations are moving to implement corridors identified in *Smart Moves*. The I-70 service and the connections provided are important to the implementation of the overall *Smart Moves* plan.

Chapter 2 Market Potential

The purpose of this chapter is to describe the potential use of public commuter-oriented transportation in the I-70 corridor. This includes an overview of population and employment characteristics. Information has been obtained from major employers (including the Kansas state government), U.S. Census, and the KTA that shows current commuter travel patterns with particular attention given to longer-distance travel in the I-70 corridor. From this information, potential markets along the I-70 corridor have been identified and potential ridership estimated.

2.1 Corridor Characteristics Population

The population of the cities located in the I-70 corridor is listed in Table 4. City population provides a broad indication of the overall scale and potential related to the origin trip end for transit service. Populations for the Village West area in Kansas City, Kansas, and the downtown core areas of Kansas City, Missouri, Kansas City, Kansas, and Lawrence, are also provided.

Table 4 Population of Cities in I-70 Corridor

Location	Population
Kansas City, Missouri	459,787
Downtown Area[1]	8,393
Kansas City, Kansas	145,786
Downtown Area[2]	1,507
Village West Area[3]	19
Edwardsville	4,340
Bonner Springs	7,314
Tonganoxie	4,996
Lawrence	87,643
Core Area[4]	8,600
Topeka	127,473
Total (excluding sub-areas)	**837,339**

Source: 2010 U.S. Census

(1) ***Geographical Boundary: Within the I-670 downtown loop***
(2) ***Geographical Boundary: Washington Boulevard, I-70, Tauromee Avenue, and N. 10th Street***
(3) ***Geographical Boundary: Parallel Parkway, I-435, I-70, and N. 118th Street***
(4) ***Includes portions of North Lawrence, downtown, and west campus of KU***

Employment

Since the potential service would cater primarily to commuters, attention has been given to the type and location of employment in the I-70 corridor. The number of employees who work in the cities located in the I-70 corridor is listed in Table 5. These figures provide broad indication of the overall scale and potential related to the destination trip end for transit service. The employment in the downtown areas has been listed separately for the larger communities and indicates a higher employment concentration in these areas.

Table 5 Employment of Cities in I-70 Corridor

Location	Employment
Kansas City, Missouri	265,472
Downtown Area[1]	69,677
Kansas City, Kansas	64,170
Downtown Area[2]	9,494
Village West Area[3]	5,237
Edwardsville	1,993
Bonner Springs	2,912
Tonganoxie	1,072
Lawrence	43,480
Core Area[4]	14,140
Topeka	89,446
Downtown Area[5]	14,623
Total (excluding sub-areas)	**468,545**

Source: U.S. Census Bureau. 2013. OnTheMap Application. Longitudinal-Employer Household Dynamics Program. http://onthemap.ces.census.gov/

Notes:

(1) Geographical Boundary: Within the I-670 downtown loop

(2) Geographical Boundary: Washington Boulevard, I-70, Tauromee Avenue, and N. 10th Street

(3) Geographical Boundary: Parallel Parkway, I-435, I-70, and N. 118th Street

(4) Includes portions of North Lawrence, downtown, west campus of KU

(5) Per MTPO and U.S. Census

2.2 Major Employers

Table 6 through Table 8 list the major employers in the I-70 corridor, and Figure 8 through Figure 10 show where they are located. Larger concentrations of employment provide additional opportunities for commuter-related transit. The largest employer is the State of Kansas in Topeka, KU in Lawrence, and the University of Kansas Hospital and Medical Center (KUMC) in Kansas City, Kansas. Other large employers include Stormont-Vail HealthCare and General Motors.

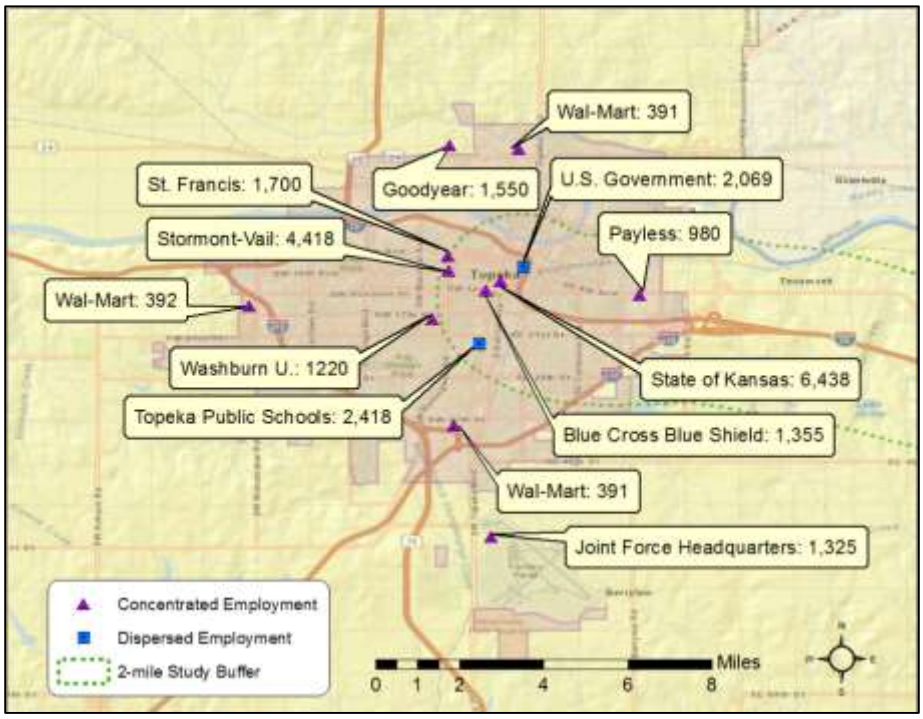
Major employers in each city were approached to gather additional information about potential employee demand for transit service in the corridor. Through discussions, the employers were supportive of the project, and provided basic information on commuting patterns. As this project moves forward, the major employers should be contacted to further coordinate operational details.

Table 6 Major Employers in Topeka

Rank	Name	Employees
1	State of Kansas	6,438
2	Stormont-Vail HealthCare	4,418
3	Topeka USD 501 (public schools)	2,418
4	U.S. Government	2,069
5	St. Francis Health Care	1,700
6	Goodyear Tire and Rubber	1,550
7	Joint Force Headquarters	1,325
8	Blue Cross and Blue Shield of Kansas	1,355
9	Wal-Mart and Sam's Club	1,175
10	Washburn University	1,220
Total		**23,668**

Source: CJOnline, 2013-03-09

Figure 8 Major Employers in Topeka

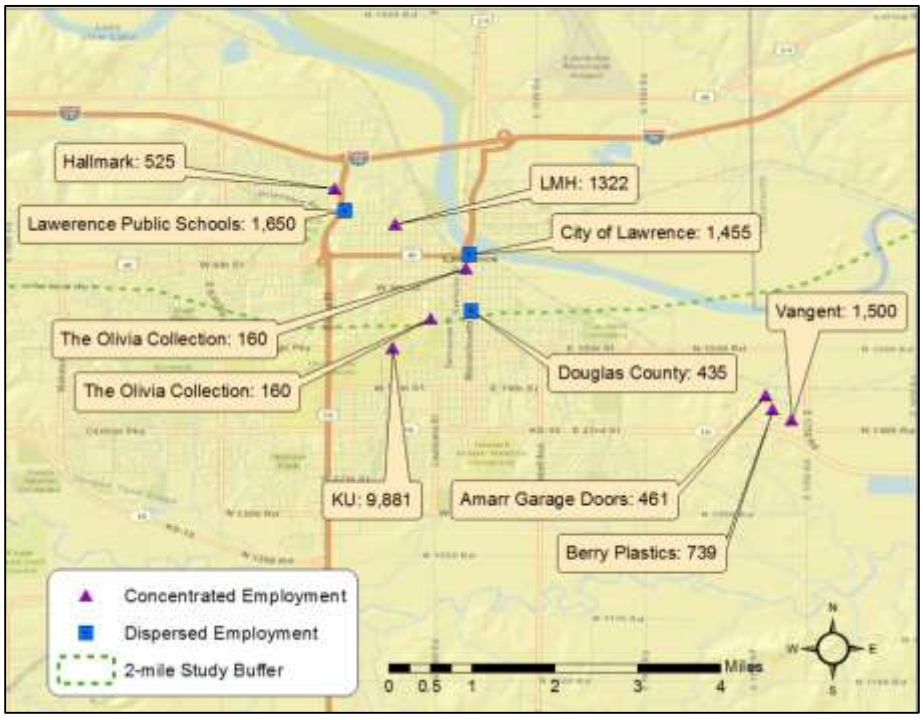


Source: CJOnline. 2013-03-09

Table 7 Major Employers in Lawrence

Rank	Name	Employees
1	KU	9,881
2	Lawrence Public Schools	1,650
3	Vangent	1,500
4	City of Lawrence	1,455
5	Lawrence Memorial Hospital (LMH)	1,322
6	Berry Plastics	739
7	Hallmark Cards, Inc.	525
8	Amarr Garage Doors	461
9	Douglas County	435
10	The Olivia Collection	320
Total		**18,288**
Source: www.businessforlawrence.com		

Figure 9 Major Employers in Lawrence



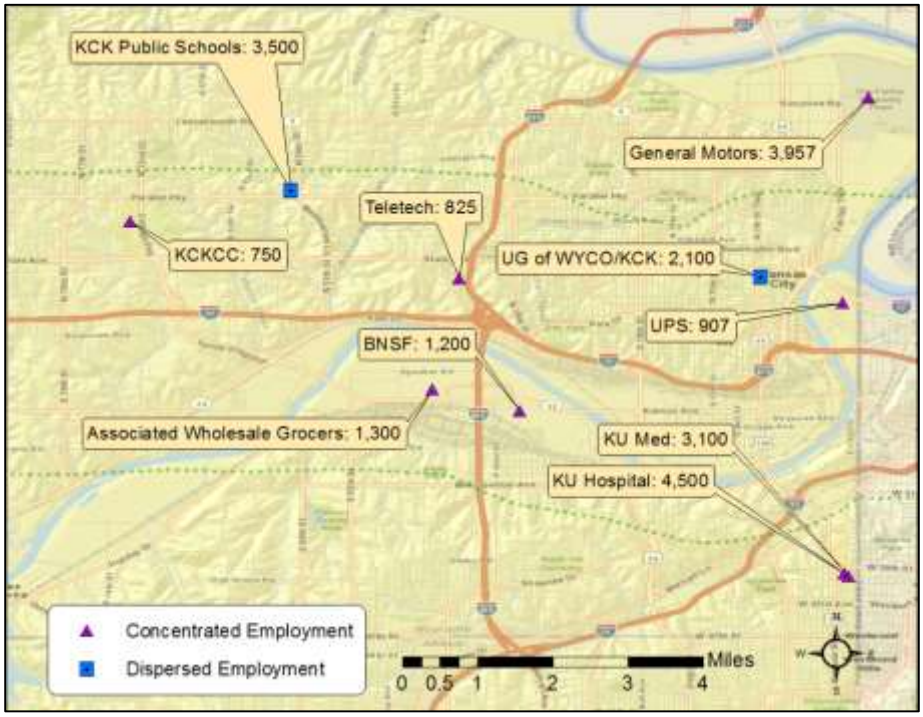
Source: www.businessforlawrence.com

Table 8 Major Employers in Kansas City, Kansas

Rank	Name	Employees
1	University of Kansas Hospital	4,500
2	General Motors	3,957
3	Kansas City, Kansas, Public Schools, USD #500	3,500
4	University of Kansas Medical Center (KU Med)	3,100
5	Unified Government of Wyandotte County/Kansas City, Kansas	2,100
6	Associated Wholesale Grocers	1,300
7	Burlington Northern-Santa Fe Railroad	1,200
8	United Parcel Service	907
9	Teletech	825
10	Kansas City, Kansas, Community College	750
Total		**22,139**

Source: www.wycokck.org

Figure 10 Major Employers in Kansas City, Kansas



Source: www.wycokck.org

2.3 Commuter Travel Patterns

Commuter travel patterns indicate the connection between where people live and where they work. These patterns were determined from the Year 2010 Census Longitudinal Employer-Household Dynamics (LEHD) program. The LEHD program produces public-use information combining federal, state, and Census Bureau data on employers and employees under the Local Employment Dynamics (LED) Partnership. The LEHD data provides a dataset that describes geographic patterns of employees by their employment locations and residential locations as well as the connections between the two locations.

The work trip travel movements reported by LEHD for communities located in the I-70 corridor are shown in Table 9 and Figure 11. The information shows the number of workers living in each community and then the location of their employment. The larger intercity movements are Lawrence to Topeka (2,611), Lawrence to Overland Park (2,049), Topeka to Lawrence (1,611), Overland Park to Topeka (1,054), and Overland Park to Lawrence (1,042).

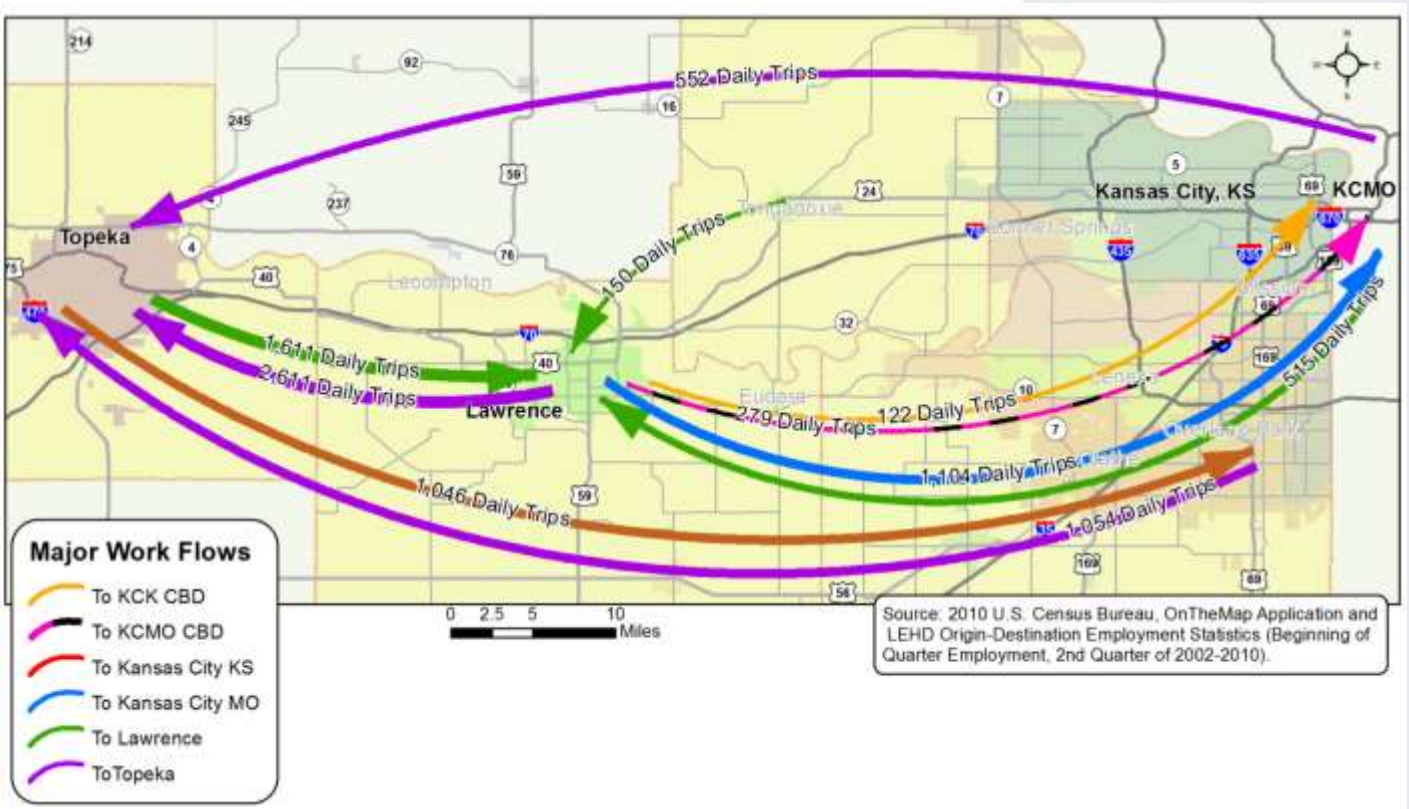
Table 9 Work Trip Movements

Residents of	Working In: Topeka	Topeka CBD	Lawrence	Lawrence Core Area	Tonganoxie	Bonner Springs	Edwardsville	Legends / Western KCK	KCK CBD*	KCMO CBD*	Overland Park		Kansas City, KS Entire	Kansas City, MO Entire
Topeka	35,934	14,085	1,611	858	5	46	14	39	83	46	1,046		533	184
Lawrence	2,611	1,023	20,803	11,078	67	71	16	58	122	279	2,049		784	1,104
Tonganoxie	60	24	150	80	161	27	12	16	33	32	95		211	125
Bonner Springs	39	15	21	11	5	348	67	45	95	78	420		611	311
Edwardsville	-	-	-	-	-	74	87	28	60	48	247		382	190
Legends / Western KCK*	0	0	0	0	0	0	0				1			
KCK CBD*	8	3	4.68	2	0	4	4				77			
KCMO CBD*	10	4	9.40	5	0	2	3				204			
Overland Park	1,054	413	1,042	555	17	145	90	331	701	3,310	24,390		4,495	13,118
Kansas City KS Entire	796	284	453	241	37	402	401	1,189	2,520	2,094	7,459		16,155	8,298
Kansas City MO Entire	552	197	515	274	6	118	178	685	1,451	24,292	11,150		9,301	96,265
Total Primary Jobs	82,799	29,505	39,968	21,284	980	2,698	1,914	4,758	10,083	67,696	111,239		64,643	268,624

*Determined by mulitplying OnTheSheet total, with ratio of residents within the defined area.

Source: 2010 U.S. Census Bureau OnTheMap LEHD Origin-Destination Statistics (Beg. Of Quarter Employment, 2nd Quarter of 2002-2010)

Figure 11 Work Trip Movement Flow Map



Trip Patterns of Selected Major Employers

Additional information on commuting patterns was obtained from the home zip codes of state agency employees. This information provided residence zip codes for state employees who work in Topeka, Lawrence, and Kansas City. The pattern of employment distribution is similar to that provided by the 2010 Census. However, the information provides additional detail and specific commuting information for specific employers. Figure 12, Figure 13 and Figure 14 display the state employee commuting patterns to Topeka, Lawrence, and Kansas City. In addition, the major employers of the corridor—St. Francis Medical Center and Stormont-Vail Healthcare in Topeka, Barry Plastic in Lawrence, and Cerner Corporation in the Village West area of Kansas City, Kansas—were inquired regarding the trip patterns of their employees.

Figure 12 displays the home zip code locations in the I-70 corridor for state employees working in Topeka. The map indicates that the largest concentration of employees live in Topeka, with another sizable concentration of several hundred in Lawrence. The numbers of employees working in Topeka and living east of Lawrence are significantly fewer than those living in Topeka or Lawrence.

Figure 12 State Employees Commuting to Topeka

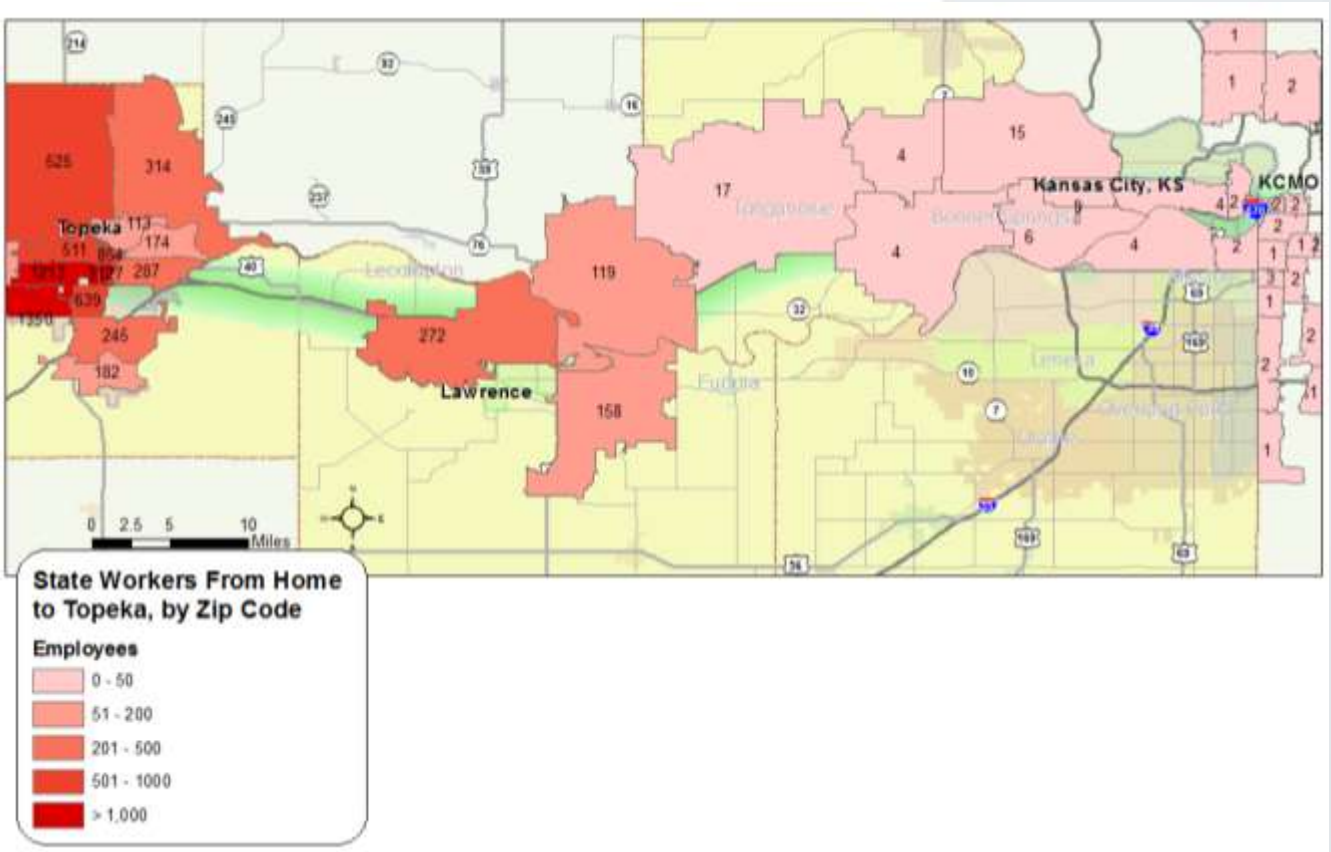


Figure 13 displays the home zip code locations in the I-70 corridor for state employees working in Lawrence. The map indicates that the largest concentration of employees live in Lawrence, with concentrations in both Topeka and the area east of Lawrence and a fewer number in Kansas City, Missouri.

Figure 13 State Employees Commuting to Lawrence

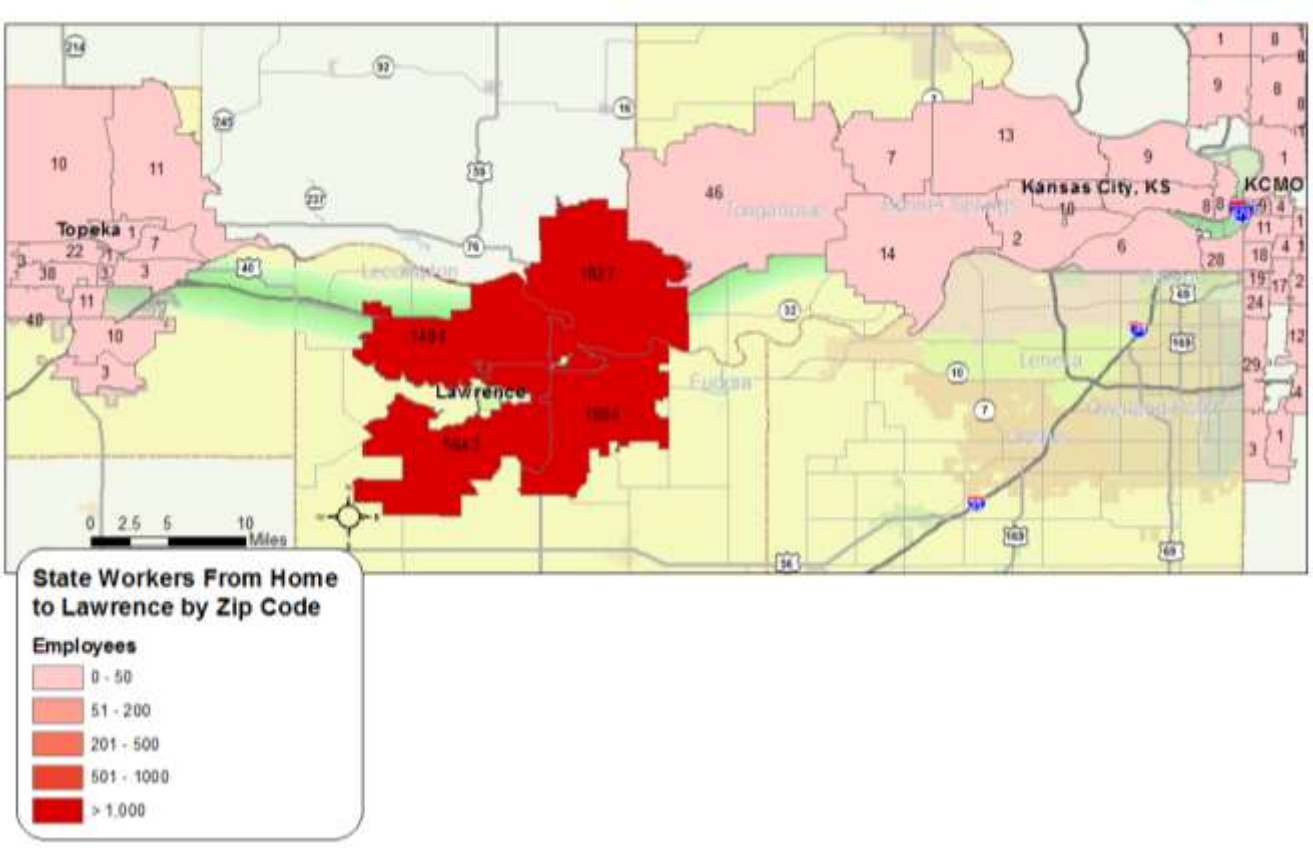
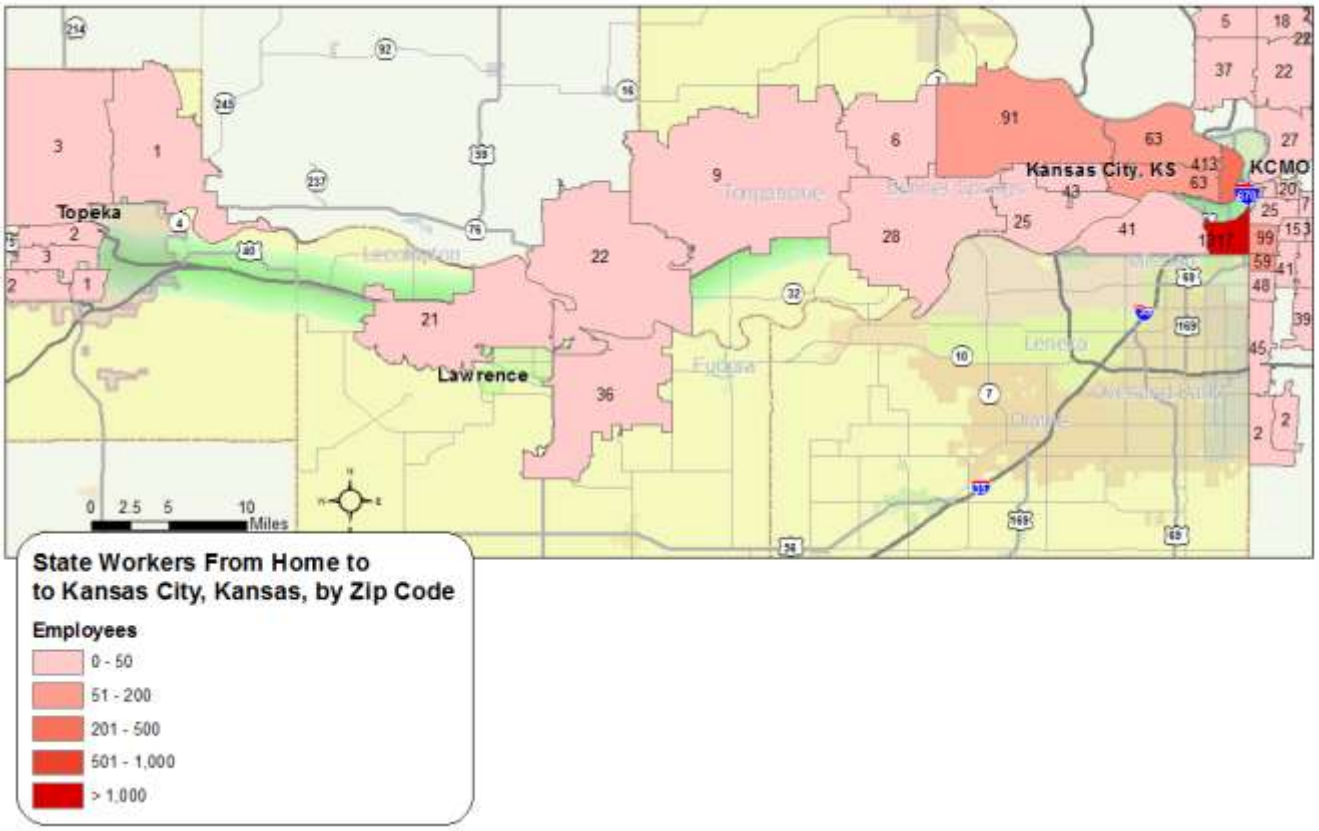


Figure 14 displays the home zip code locations in the I-70 corridor for state employees working in Kansas City, Kansas. The map indicates that the largest concentration of employees live in Kansas City, Kansas, and Kansas City, Missouri. Some employees live in Lawrence, and few employees who work in Kansas City, Kansas, live in Topeka.

Figure 14 State Employees Commuting to Kansas City, Kansas



2.4 Travel Patterns on the Kansas Turnpike

Information on travel between toll stations was provided by the KTA and is presented in Table 10. This represents the movement on an average weekday during 2012 for two-axle vehicles. The data highlights a major movement through each end of the I-70 corridor (stations 183 and 236) as well as a major movement between Lecompton (station 197) and East Topeka (station 183).

Table 10 Daily Two-Axle Vehicle Movement between KTA Toll Stations

KTA Station	177 South Topeka	183 East Topeka	197 Lecompton	202 West Lawrence	204 East Lawrence	212 Tonganoxie	224 Bonner Springs	236 Eastern Terminal
177 South Topeka	-	8	1,328	697	285	106	113	1,951
183 East Topeka	7	-	3,509	1,844	664	273	259	7,209
197 Lecompton	1,343	3,592	-	56	135	62	36	572
202 West Lawrence	668	1,843	49	-	620	236	156	2,758
204 East Lawrence	296	686	124	352	-	64	72	1,831
212 Tonganoxie	103	286	62	222	47	-	16	314
224 Bonner Springs	131	304	42	161	78	18	-	0
236 Eastern Terminal	1,885	7,057	554	2,607	1,757	324	0	-

Source: KTA

2.5 Summary of Commute Travel

A market analysis was completed in order to estimate transit service needs between Lawrence and Topeka, between Overland Park and Topeka, and between Topeka/Lawrence and Kansas City. This market analysis used input from state employee commuting patterns, employer surveys, census data, and major non-commuter destinations. The primary focus of this project is longer-distance commute trips in the I-70 corridor. Beginning at a larger scale, the higher place-to-place movements for daily person trips in the I-70 corridor are:

- Lawrence to Topeka (2,611)
- Lawrence to Overland Park (2,049)
- Topeka to Lawrence (1,611)
- Overland Park to Topeka (1,054)
- Overland Park to Lawrence (1,042)
- Lawrence to Kansas City, Kansas (784)

Looking closer at movement to employment centers, these are the larger travel markets:

- Between residential areas in the Lawrence area to employment in the Topeka core area (930 workers)
- Between residential areas in Topeka to employment in Lawrence at KU or downtown (480 workers)
- Between residential areas in Kansas City, Kansas, to employment in Lawrence at KU or downtown (450 workers)
- Between residential areas in Overland Park to employment in the Topeka core area (376 workers)
- Between residential areas in Kansas City, Kansas, to employment in Topeka CBD (284 workers)
- Between residential areas in the Lawrence area to employment in the Kansas City core area (279 workers)
- Between residential areas in Topeka to employment in Kansas City, Kansas/Missouri CBD (130 workers)

Review of the state employee data indicated a number of employees by travel movements. This data provides specific employer-based location information, which can be representative of other employment-home distributions. This information shows the following travel movements:

- State workers to Topeka – from Lawrence and Tonganoxie (566 employees)
- State workers to Lawrence – from the Village West area, with connections from the State Avenue BRT (171 employees)
- To KUMC (the portion of this travel market that is outside the local transit service area is small, with 159 employees located west of I-435)

2.6 Non-work Attractions

While this feasibility study is primarily focused on commuter travel, a secondary market for non-work travel to major activities or destinations is possible. Retail and recreational activities are also located in the I-70 corridor. The largest activities where large numbers of patrons gather at a concentrated time are primarily sporting events.

Table 11 displays the attendance data or other information for the various events or major attractions in the I-70 corridor.

The percentage share of transit riders has been taken from area experience and with comparison of mode share at major events.[1]

Several events within the I-70 corridor area have potential for attracting riders onto a transit service scheduled to coincide with the event. Sporting events such as races at the Kansas Speedway or football and basketball at KU could potentially be served by transit service. These events would not coincide with commuter transit service, and so additional service would need to be provided if the riders to these events are to be served.

The strongest market for non-commute transit travel is university-related trips to KU in Lawrence not currently being served by the K-10 Connector. The other markets do not appear as strong. A separate study completed for KUMC indicated very limited student travel from outside the Kansas City metropolitan area. Likewise, travel to Washburn University is concentrated in the Topeka area. There also does not appear to be significant movement between KUMC or Washburn and KU.

[1] Studies in Milwaukee, Wisconsin, and Cedar Rapids, Iowa

Table 11 Events/Activity Centers in I-70 Corridor

Name	Time Period	Measure	Daily Trips	Mode Share	Transit Trips
Kansas City					
Legends Outlets Kansas City	Year-round	1.2 million square feet (sq. ft.)	31,908	1%	319
Nebraska Furniture Mart	Year-round	450,000 sq. ft.	2,277	1%	23
Cabela's	Year-round	180,000 sq. ft.	752	1%	8
Hollywood Casino	Year-round	128,000 sq. ft.	1,719	1%	17
Kansas Speedway	Two weekends annually	72,000 (capacity)	82,000	0.25%	205
Schlitterbahn Waterpark	Late May to early September	26-acre park	2,960	1%	30
Sporting Park	19 home games	18,467 (capacity for soccer games)	18,400	1%	184
	Additional concerts	25,000 (capacity for concerts)	25,000	1%	250
Community America Ballpark	54 home games	6,537 (capacity)	6,530	1%	65
Lawrence					
KU Football	7 home games	50,250 (capacity)	50,250	2%	1,005
KU Basketball	16 home games	16,300 (capacity)	16,300	2%	326
Lied Center	Year-round	2,020 (capacity)	2,020	0%	5
KU Lawrence Campus	Academic Year	27,939 (2012 enrollment)	24,939	4%	1,118
Topeka					
Landon Arena	Year-round	7,450 (capacity)	7,450	2%	149
Washburn University	Academic Year	7,204 (2012 enrollment)	7,204	4%	288

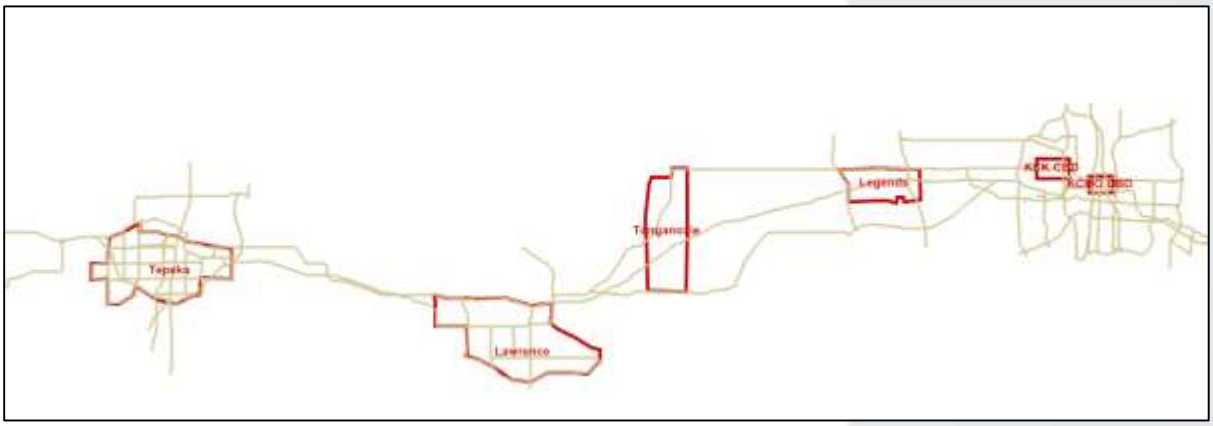
Sources:
www.wikipedia.org
http://www.legendsshopping.com/about/
http://www.nfm.com/default.aspx
http://www.cabelas.com/stores/store_info.jsp?pageName=008
http://www.tbonesbaseball.com/
http://www.kansasspeedway.com/Articles/2010/04/HC-groundbreaking.aspx
www.kuathletics.com
http://www2.ljworld.com/news/2012/sep/27/ku-enrollment-falls-freshman-class-grows-first-tim/
http://www.oursportscentral.com/services/releases/?id=3586091
http://lied.ku.edu/about/technicalSpecs.shtml
http://www.washburn.edu/about/facts/institutional-research/enrollment.html

2.7 Potential Transit Ridership

Once the overall person commuting trip travel movements were understood, the next step was to estimate the share of the trips that could potentially use the public transit mode of travel. The daily commuter ridership forecast estimated the number of daily boardings that would be anticipated if commuter bus service were provided between Topeka, Lawrence, and Kansas City, Kansas; and Kansas City, Missouri. This initial forecast was used to identify general levels of transit demand and the movement by transit between districts. As transit operating plans are refined, the ridership forecasts will also be refined.

The ridership forecast was conducted at a district level to meet the needs of the feasibility study. The districts are aggregations of census blocks along the I-70 corridor within Topeka, Lawrence, and Kansas City, Kansas; and Kansas City, Missouri. The use of districts facilitated an abbreviated travel demand model process in which district-to-district travel times, trip interactions, and mode decisions could be estimated. The six districts comprising the ridership estimation study area are shown in Figure 15.

Figure 15 Ridership Estimation Study Areas

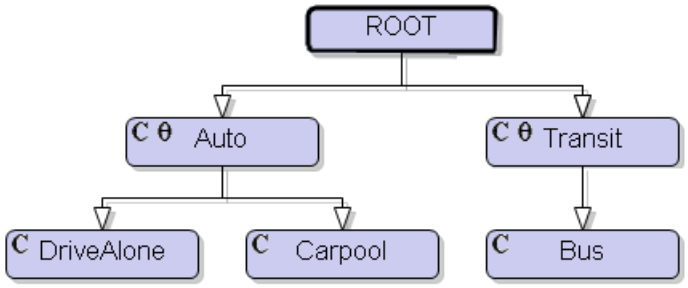


Ridership Forecast Methodology

The mode analysis was conducted using methodologies outlined in the National Cooperative Highway Research Program (NCHRP) Report 716, *Travel Demand Forecasting: Parameters and Techniques*. The functional form known as a nested logit model was used for the mode choice analysis. The estimation of commuter bus ridership requires an estimation of the sensitivity of the area's commuters to the differential between the utility of the competing

modes, such as drive along and carpool. The nest structure for this model is shown in Figure 16.

Figure 16 Model Nest Structure



The equation to calculate the potential of district-to-district commuter trips using the different modes is as follows:

$$P_n = \frac{\exp(V_n)}{\sum_{Alternatives\_n'}(V_n')}$$

Where:

P_n: the probability that alternative *n* is chosen

V_n': utility of alternative *n*

$V_n = \beta_n - 0.025(in\ vehicle\ time) - 0.0021(access\ time) - 0.053\ (Waiting\ Time) - 0.0031\ (fare\ cost) - .0031\ (drive\ cost)$

The probabilities are then applied as shares of the market segments to which they apply; that is, if a mode has a 75-percent probability of being chosen by a market segment (e.g., work trips for an origin destination zone pair), 75 percent of the travelers in that segment are allocated to that mode.

The decision to utilize the commuter bus service depends upon the utility of that service compared to other available services, namely the personal automobile (drive alone or carpool). The utility is a function of the explanatory variables used in the 5-county regional travel demand model. These variables used in the ridership forecast model are shown in Table 12.

Table 12 Coefficients of Commuter Mode Choice Model

In-Vehicle Time	Varied
Travel Time (station to station)	Varied
Transit Wait Time	10 Minutes
Access Time to/from Station (including bus, auto, and walk)	5 - 7 Minutes
Fare	$3.00 - $4.00
Vehicle Operating Cost	$0.28 per mile
Toll Cost	$0.75 - $2.25

Ridership Forecasts

The transit ridership was estimated for a transit service that provided connections between all of the districts. The methodology found that there is a general transit demand for between 500 – 600 daily commuter transit trips, depending on the combination of service and travel time assumptions. This equated to approximately 3 to 4 percent of the daily commuter trips within the study area. A typical mode share for a metropolitan area can be assumed to be between 3 to 5 percent. The home-to-work trip table for projected transit riders is shown in Table 13. The work-to-home would be the reverse of these tables.

The greatest potential for transit demand was shown between Lawrence and the Topeka CBD in both directions, with the larger share being the Lawrence-to-Topeka CBD movement. There also appears to be aggregated peak demand movement in the direction east from Topeka and Lawrence, to the CBDs of Kansas City, Kansas, and Kansas City, Missouri. Another key movement was between Topeka and Overland Park. There appears to be less movement from the Kansas City area west to Lawrence or Topeka.

Table 13 Transit Ridership Forecast Home-to-Work Trip Table

Origin / Destination – Return	Forecasted Trips
Lawrence to Topeka / Return	145
Topeka to Lawrence / Return	90
Lawrence to Kansas City, Missouri, CBD / Return	70
Topeka to Kansas City, Kansas, CBD / Return	40
Lawrence to Kansas City, Kansas, CBD / Return	35
Topeka to Kansas City, Missouri, CBD / Return	20
Topeka to Overland Park / Return	80
Overland Park to Topeka / Return	80
Tonganoxie to Topeka / Return	20

Chapter 3 Service Concepts

3.1 Introduction

This chapter describes a range of possible fixed-route transit service concepts for the I-70 corridor. Once the overall commuting trip movements using transit were understood, the study team looked at a range of transit concepts, which were described in terms of mode, market served, route frequency, and cost. A cost model utilizing local operational costing factors was used to project future operating costs based on service level assumptions. Based upon this evaluation, operational assumptions were further explored.

3.2 Range of Transit Options

Public transit can be provided in a number of forms. The service can vary from operating formal bus routes, to providing transit routes for pre-arranged passengers, to more informal methods such as carpooling or vanpooling. All these options address commuter travel, but guaranteed midday service can be provided for each option. A cost comparison of commuter mode options is summarized in Table 14. Each option is described below:

Ridesharing

Ridesharing includes both carpooling and vanpooling. A carpool is where two or more people share a ride in a private vehicle to a common destination. A vanpool is where a larger group of people share a ride in a prearranged vehicle. A longer-distance commute, such as that along the I-70 corridor, provides incentives for ridesharing. Travel costs can be significantly reduced by carpooling and vanpooling. Cost estimates prepared by AAA indicate the total costs of driving alone for a 30-mile roundtrip commute to be approximately $4,500 annually using current fuel costs. If carpooling participants take turns driving, the operating costs can be reduced by nearly half. A typical vanpool arrangement is usually a fixed monthly cost to cover operating expenses. A six-person vanpool would cost approximately $850 a year per person.

Fixed-Route Transit

Fixed-route transit provides designated public transportation that is operated along a prescribed route according to a fixed schedule. For the I-70 corridor, fixed-route transit would have the characteristics of express bus transit, having limited stops and providing for higher travel speeds and travel times that would be close to that provided by

drive-alone vehicles. Fixed-route transit can use existing or new transit amenities such as bus shelters, park and ride lots and technology that provide real-time information on bus arrival times. Buses can also be equipped with on-board Wi-Fi capabilities. A $3.75 one-way fare would result in an annual direct-cost to the user of $1,910, which does not include the amount saved by not driving a car.

Commuter Rail Transit

Commuter rail passenger transportation moves along railway tracks, with scheduled service on fixed routes on a non-reservation basis. Travel is primarily regional between cities, often connecting to a city center or CBD. Commuter rail connections between Lawrence and Kansas City have been previously studied. This study focuses on lower-cost, more-flexible transit service such as fixed-route transit or ridesharing, both of which can be implemented in a shorter time than commuter rail. Commuter rail costs would depend on the fare charged. Costs to the user would be similar to fixed-route transit unless a higher fare was required.

Table 14 compares the annual and monthly user costs by commuter mode.

Table 14 Commuter Mode Choice User Cost Comparison

Commuting Mode	Cost/Rider/Month	Cost/Rider/Year
Drive-alone	$375	$4,505
Carpool	$190	$2,250
Fixed Route ($3.75 Fare)	$150	$1,910
Vanpool	$70	$840

Source <www.rideshareonline.com>

3.3 Range of Concepts

Four fixed-route transit concepts were developed to examine service options for the corridor. Each includes three segments that are part of the overall corridor concept:

- Between Topeka and Lawrence
- Between Lawrence and Overland Park
- Between Lawrence and Kansas City

An estimated ridership by segment was obtained by adding together the individual place-to-place transit demand listed in Table 13 and assigning the trips to the relevant service segment. Table 15 shows the estimated total ridership for each segment as well as the origins and destinations of these riders.

The service concepts were developed based upon this general level of transit demand with the understanding that these estimates, which are based on the census, appear to be conservative. The service concepts developed also reflect other market information such as the state employee zip code data that indicate a higher level of travel between communities than captured by the census.

The forecasts provide an indication of the potential transit demand for commuter travel. It is also recognized that ridership would be influenced by a number of operating characteristics such as service frequency and ease of transfers, the location of stops, and other factors. These factors will need to be further considered in project implementation.

Table 15 Potential Daily Transit Ridership Demand by Segment

Segment	Ridership	Boardings	
Topeka – Lawrence	455	Lawrence – Topeka Topeka – Overland Park Topeka – Kansas City	235 160 60
Lawrence – Kansas City	165	Lawrence – Kansas City Topeka – Kansas City	105 60
Lawrence – Overland Park	450	Lawrence – Overland Park Topeka – Overland Park	290 160

Operating cost estimates for each concept were developed using the KCATA's cost allocation model, which provides for the full allocation of both direct and indirect costs associated with operating this type of transit service. For this analysis, all potential indirect costs were considered and accounted for in the allocation methodology. It is possible that the indirect costs associated with each concept could be less, depending on who the service operator is and where the service is operated from.

Concept A

This concept, presented in Figure 17, represents a system serving I-70 and connecting three separate routes at a major transfer point in Lawrence. The three routes would include a route between Topeka and Lawrence, a route between Lawrence and Kansas City, and a route between Lawrence and Overland Park. This concept involves the most transfers, but it has the greatest flexibility. The segment between Lawrence and Overland Park is already in service now, operated by JCT as the K-10 Connector.

Figure 17 Concept A Strategy

As the Lawrence/Overland Park and Topeka/Lawrence segments have higher forecasted ridership than the Lawrence/Kansas City segment, these two segments could potentially be operated more frequently. The service level included in this concept is three trips in each direction in both the morning peak and afternoon peak between Topeka and Lawrence. Two trips would run in each direction for both morning and afternoon peaks between Lawrence and Kansas City. The Lawrence to Overland Park service would remain as currently provided. Table 16 lists the operating characteristics of this concept. The cost per rider designated for the Topeka – Lawrence segment is lower than that of the segment connecting Lawrence with Kansas City, due to a higher forecasted ridership between Topeka and Lawrence.

Table 16 Operating Characteristics for Concept A

Segments	Headway	Total Trips	Buses	Cost (per rider)	Total Operating Cost
Topeka - Lawrence	1 hour	12	2	$4.85	$563,000
Lawrence - Kansas City	1 hour	8	2	$12.62	$531,000
Lawrence - Overland Park	30 minutes to 1 hour	N/A	N/A	N/A	N/A
Total		**20**	**4**	**$6.92**	**$1,094,000**

Concept B

Concept B provides continuous routes that would provide one-seat rides through Lawrence between Topeka and Kansas City and Topeka and Overland Park. This would allow riders in Topeka, for example, to choose between a one-seat ride to Kansas City and a one-seat ride to Overland Park. Figure 18 displays the concept; operating characteristics are displayed in Table 17.

Figure 18 Concept B Strategy

This concept provides a similar level of transit service for all the route segments. In this concept, three trips would run in each direction in the morning and in the afternoon peak periods. In order to provide hourly service, eight buses would be in use, with four buses originating in Lawrence, two in Topeka and one each in Kansas City and Overland Park.

Table 17 Operating Characteristics for Concept B

Segment	Headway	Total Trips	Buses	Cost (per rider)	Total Operating Cost
Overland Park - Lawrence – Topeka - Kansas City	1 hour	12	8	$8.34	$2,614,000

Concept C

Concept C operates a single route along I-70 connecting Topeka, Lawrence, and Kansas City. This route is assumed to coordinate with the operations of the K-10 Connector to enable riders wanting to commute between Topeka and Overland Park. This concept relies on a central transfer location in Lawrence. Figure 19 displays the concept; operating characteristics are displayed in Table 18.

Figure 19 Concept C Strategy

In this concept, three trips would run in each direction in the morning and in the afternoon peak periods. In order to provide hourly service, four buses would be in use.

Table 18 Operating Characteristics for Concept C

Segments	Headway	Total Trips	Buses	Cost (per rider)	Total Operating Cost
Topeka - Lawrence-Kansas City	1 hour	12	4	$8.59	$1,358,000
K-10 Connector	30 minutes to 1 hour	N/A	N/A	N/A	N/A

Concept D

Concept D assumes two separate routes will operate, allowing connections to all four of the major destination cities. One route would travel between Topeka, Lawrence, and Overland Park, while the other route would travel between Lawrence and Kansas City, Missouri. Those wanting to travel between Topeka and the Kansas City area would transfer at a designated transfer location in Lawrence. Figure 20 displays the concept; operating characteristics are displayed in Table 19.

Figure 20 Concept D Strategy

In order to limit the amount of transfers where there is strong ridership and allow for more flexibility to accommodate changes in ridership, Concept D combines aspects of each of the first three alignment options. While three trips would be made in each direction in both the morning peak and afternoon peak between Topeka, Lawrence, and Overland Park, only two trips would run in each direction between

Lawrence and Kansas City, as was done in Concept A. The operating characteristics are shown in Table 19.

Table 19 Operating Characteristics for Concept D

Segments	Headway	Total Trips	Buses	Cost (per rider)	Total Operating Cost
Topeka - Lawrence - Overland Park	1 hour	12	4	$4.85	$563,000
Lawrence - Kansas City	1 hour	8	2	$12.62	$531,000
Total		**20**	**6**	**$6.92**	**$1,094,000**

3.4 Initial Concept Evaluation

Table 20 summarizes the operating characteristics for each concept, followed by a description of benefits and disadvantages of each concept:

Table 20 Operating Characteristics Summary

Concepts	Total Trips	Buses	Cost (per rider)	Total Operating Cost
Concept A	20	4	$6.92	$1,094,000
Concept B	12	8	$8.34	$2,614,000
Concept C	12	4	$8.59	$1,358,000
Concept D	20	6	$6.92	$1,094,000

Concept A

Concept A is designed to match the level of service provided with the estimated ridership, leading to the lowest cost per rider. Passengers traveling between Topeka and Kansas City or between Topeka and Overland Park would be required to transfer in Lawrence, adding time and inconvenience to riders. Transferring would likely result in a reduction in forecasted ridership between Kansas City and Topeka of approximately 8 percent. The service would build upon the existing K-10 Connector service, with alignment modifications in Lawrence. This concept may also face the fewest administrative and jurisdictional hurdles, as each segment can be developed, funded, and operated relatively independently of the other segments. Modifications to the

existing K-10 Connector would be relatively minor and may consist of minimal route or timing adjustments to facilitate passenger transfer to other segments.

Concept B

Concept B requires more vehicles than Concept A and has the highest cost to operate. It would require changes to the operations of the K-10 Connector, as the morning and afternoon runs would not terminate in Lawrence but would continue through to Topeka and Kansas City.

Concept C

Concept C would provide a one-seat ride between Topeka, Lawrence, and the Kansas City area. The K-10 Connector service would be unchanged. The operating costs would be higher than Concept A, as the service level for the route segment between Lawrence and Kansas City would be the same as between Lawrence and Topeka, even though there would be fewer riders.

Concept D

Concept D would provide a one-seat ride between Topeka, Lawrence, and Overland Park. This would provide the segments of the highest forecasted ridership with a one-seat ride, while still providing for travel between Lawrence and Kansas City. Along with Concept A, this concept would be less expensive than either Concept B or Concept C. To be successfully implemented, this concept would require a higher degree of coordination and inter-governmental cooperation between several different entities and jurisdictions.

Concept Evaluation Outcome

After evaluating the four concepts, the study team agreed that Concept A, which involves three separate routes connecting Topeka and Lawrence, Lawrence and the Kansas City area, and Lawrence and Overland Park, would be the commuter transit concept to be further evaluated. This concept would face the fewest administrative and jurisdictional hurdles, as each segment can be developed, funded, and operated relatively independently of the other segments. Modifications to the existing K-10 Connector would be relatively minor and may consist of minimal route or timing adjustments to facilitate passenger transfer to other segments.

Chapter 4 Operations Strategy

4.1 Introduction

The purpose of this chapter is to determine appropriate service levels of the preferred concept and present an operating strategy. This operation strategy describes the operating details, potential facilities, costs, and general marketing strategies associated with this service. Figure 21 displays the preferred concept.

Figure 21 Preferred Concept

4.2 Evaluation of Route Segments

As part of this further evaluation, the projected performance of each segment was examined to determine the appropriate type and amount of service that could be applied to each segment. Each segment's projected performance was determined by calculating the expected fare box recovery (the percentage of cost covered by fare revenue) and comparing it to the actual fare box recovery. This analysis assumes that a $3.75[2] fare would equate to a $2.33 net fare after monthly pass discounts and reduced fares for senior citizens, youth,

[2] The current K-10 Connector fare is $3.50. A $3.75 regional fare could result from policy decisions and/or inflation.

and persons with disabilities are taken into account. Refer to the Appendix for the methodology used in acquiring the final net fare.

The results of the fare box recovery analysis were compared to similar long-distance commuter express routes operated by the KCATA in the Kansas City Metro. Two commuter routes operated by the KCATA were chosen for comparative purposes; however, both KCATA routes only provide service in one direction, correlated to the peak commute movement, while the concept routes would provide bi-directional service. To account for this difference, comparisons were made only to the productive trips of the KCATA routes. The results showed the KCATA service was then similar and comparable to the recommended concept routes. These two KCATA commuter routes were determined to have an average cost recovery of 40 percent. These results are consistent with industry standards for expected commuter route cost recovery rates in the Midwest. The expected standards would likely increase in regions where urbanized density is far greater.

The estimated cost recovery of the two Concept A segments showed that the Lawrence-Topeka and the Lawrence-Overland Park segments are comparable to the KCATA commuter routes with recovery rates of 48 percent and 40 percent, respectively. Using the initial operating level assumptions, the Lawrence-Kansas City segment had a fare recovery rate of 18 percent.

Given this lower fare recovery rate, service level modifications were considered for the Lawrence-Kansas City segment. When the service level assumptions on the Lawrence-Kansas City segment were modified by reducing the number of transit round trips from four (two a.m. and two p.m.) to two (one a.m. and one p.m.) to match with transit demand, this yielded a projected fare box recovery of 37 percent. While this results in a higher recovery rate than initially estimated, it is still marginal in terms of financial viability. Additionally, one round trip per peak period will severely limit the appeal of the service to passengers that may desire a wider choice of trip times. Therefore, an introduction of service along this segment, even at the reduced service level, should not be considered as part of a near-term commuter transit strategy in the corridor. Table 21 provides a summary of these various routes. The midpoint from the forecasted range of ridership presented in Chapter 3 was utilized to obtain the cost per rider and a cost-recovery ratio. For a more comprehensive explanation of the operating cost methodology, refer to the Appendix.

Table 21 Expected Farebox Recovery

Route	Daily Ridership	Yearly Ridership	Peak Freq.	Daily Hours	Daily Miles	Daily Trips	Cost/ Rider	Cost Recovery Ratio
Recommended Concept Routes								
Topeka - Lawrence	455	116,025	~60 min	12	354	12	$4.85	48%
Lawrence - Kansas City	165	42,075	1 roundtrip per peak period	4	174	4	$6.32	37%
*Lawrence - Overland Park (existing K-10 Connector)	450	114,750	~60 min	12	428	12	$5.90	40%
Current KCATA Metro Routes								
Lee's Summit/ Raytown Express	224	57,120	~30 min	6.55	165	10	$3.50	40%
Blue Springs Express	253	64,515	~30 min	8.1	184	8	$3.70	40%

Notes: Deadhead multiplier of 1.1, Regular fare of $3.75, Net fare of $2.33
**Only K-10 Connector trips that would meet Lawrence-Topeka trips are presented and analyzed. The actual peak frequency for the K-10 Connector is currently at 30 minutes.*

4.3 Operating Plan

Development of the operating plan involved determining operating details such as amount of service and general locations of major stops for new service along the route segment operating between Topeka and Lawrence. The preferred concept assumes that the K-10 Connector will continue its current frequency and general alignment.

The Topeka to Lawrence route segment is described below:

Topeka - Lawrence

This route segment would operate as a fixed-route transit service between a new transit station in Lawrence (likely located along Iowa Street) and the hospital/medical center in Topeka (located along 10th Street). Three westbound trips and three eastbound trips would be provided in the morning, and three westbound trips and three eastbound trips would be provided in the evening. The stops assumed for this route segment are:

- Stormont-Vail Rehab Institute, Eighth Street and SW Washburn Avenue, Topeka, Kansas
- Quincy Street Station, Eighth Street and Quincy, Topeka, Kansas
- Lawrence Transit Center, Iowa Street, Lawrence, Kansas. This location would function as the transfer point between the two new routes serving Topeka and the Kansas City, Kansas, and Kansas City, Missouri area; and the existing K-10 Connector serving Overland Park

Operating Hours: 6:00 a.m. – 9:00 a.m. / 3:30 p.m. – 6:30 p.m.

Number of Trips: Six morning / six afternoon

Frequency: Approximately 1 hour

Number of Buses: 2

Annual Operating Cost: $563,000

Annual Net Operating Cost: $294,600

These costs include $4,100 in annual turnpike tolls necessary for the Topeka – Lawrence segment in annual. The current toll rates for a three-axle bus traveling on the Kansas Turnpike (I-70) in the Topeka-Lawrence corridor are described below. These toll rates were included in the operating costs identified throughout this report.

Topeka to/from Lawrence

- $1.05 – East Topeka (183) to/from Lecompton (197)
- $1.35 – East Topeka (183) to/from West Lawrence (202)
- $1.35 – East Topeka (183) to/from East Lawrence (204)

4.4 Facilities

Facilities needed to serve the routes would range from simple street-side stop markers, to more substantial stations, to full park and ride lots with amenities. The routes could use many facilities that already exist to serve the existing transit system in Lawrence and Topeka.

The largest facility issue related to corridor transit service is in Lawrence where the three routes would converge at a centralized location to allow for riders to transfer to other segments of the service or to transfer to the local Lawrence transit service. Currently, Lawrence Transit is evaluating the location of a new transit center and is focusing search efforts on a corridor centered on Iowa Street, bounded by Ninth Street and 23rd Street. This facility may feature on-

street bus pull-outs in addition to a transit center, which could serve as a safe point for passengers transferring between these different regional service segments and/or to local transit routes in Lawrence. Currently, conceptual plans for this facility do not include park and ride elements such as off-street parking. An existing 1,500 space park and ride lot at Clinton Parkway and Iowa Street serves KU students, but this space may be redeveloped into another use in the relatively near future. Additional off-street parking and pedestrian connections can be added to a future transit center to facilitate its use as a park and ride. Additional locations where the commuter service can be accessed may also be needed. This could include a proposed park and ride lot in North Lawrence near the I-70/KTA/US 59/40 interchange.

In Topeka, the service would serve the Quincy Street station as well as the medical cluster along Washburn Avenue between Sixth Avenue and 10th Street. Washburn Avenue currently has a basic stop (pole-sign only) at the southwest corner of Washburn Avenue and Eighth Avenue. In addition, the service would stop at the capitol complex along Eighth Street.

Currently, TMTA does not have designated park and ride facilities. TMTA maintains a staff parking lot with approximately 12 parking spaces at the Quincy Street station. In addition, several city-owned parking garages exist in the immediate vicinity around the Quincy Street Station. These include the Ninth Street garage at 215 SE Ninth Street, directly across the street from the Quincy Street Station; the Coronado Garage, which is a half a block south of the transit station; and the Centre City Garage one block west of the garage. Current monthly parking rates for these garages range from $35.00 to $68.00. Spare capacity at these parking garages has not been evaluated.

4.5 Capital Costs

Capital costs would include costs for the facilities described above plus the costs of acquiring buses. Two buses would be needed for the proposed service levels between Topeka and Lawrence. A third bus would serve as a spare.

The buses assumed to operate this service are 40-foot-long over-the-road coaches, each costing approximately $600,000[3]. These buses

[3] Kansas City Smart Moves Implementation Plan, Phase III

generally have seating and features more suitable and comfortable for longer trips at highway speeds than low-floor variants. It should be noted that using over-the-road coaches, while more comfortable for passengers than standard coaches, limits the operational flexibility of transit agencies as these vehicles could not be reassigned to local routes. Figure 22 shows an over-the-road coach utilized on the K-10 Connector.

Figure 22 Over-the-Road Coach

Total capital costs are identified below in Table 22. These costs include developing park and ride elements and minimal upgrades to existing stop locations to add amenities for commuters. Table 23 summarizes the operating characteristics and costs of the preferred concept.

Table 22 Capital Costs

Location	Item	Quantity	Unit Cost	Total	Comment
Topeka	Basic shelter and pole sign	2	$15,000	$30,000	To serve the capitol complex, medical cluster, and local routes
Lawrence	Pole sign	2	$100	$200	For signs at transit center and one other location
Lawrence	Park and ride	1	$250,000	$250,000	To add park and ride elements to future transit center
Corridor-wide	Over-the-road coaches	3	$600,000	$1.8 million	
Project Total Capital Costs:				**$2.08 million**	
Note: For totals, Lawrence capital costs are evenly split between the two segments.					

Table 23 Preferred Concept Summary

Segment	Service Span	Frequency	Number of Trips	Annual Operating Cost	Net Annual Operating Cost*	Capital Cost
Topeka - Lawrence	6:00 a.m. – 9:00 a.m. 3:30 p.m. – 6:30 p.m.	~60 minutes	Six morning / six afternoon	$563,000	$294,600	$2.08 million
Lawrence - Overland Park	*- Existing -*					
Total				**$563,000**	**$294,600**	**$2.08 million**

**Net annual operating costs are annual operating cost minus fare revenue.*

4.6 Marketing

Marketing can be an important component of a service operating between multiple jurisdictions and multiple transit agencies. Marketing also serves to differentiate the service for consumers and distinguish it between local services within a single jurisdiction.

JCT differentiates its three different levels of express service. The K-10 Connector has its own logo under the brand "Commuter Express." Express routes that start near the urbanized core of Johnson County and that use both major arterials and grade-separate facilities are branded under "The Jo Standard Express." Express routes that start from the edge of the urban areas, such as Olathe and Gardener, and that primarily stay on grade-separate freeways, are branded under "The Jo Xpress" with a distinct logo.

JCT also operates the Jo Connex using distinct branding. This distinct branding includes the separate name and logo, distinct stations along the route, and distinct BRT-style vehicles. "Connex" has become a brand of its own across the region with Connex routes operating on both Metcalf Avenue in Johnson County and State Avenue in Kansas City, Kansas. Like the KCATA brand "MAX," which has become a suffix for BRT routes (Main Street MAX, Troost MAX, Prospect MAX), the "Connex" suffix denotes BRT “lite” routes with many of the same features.

Figure 23 displays the JCT brands for individual routes.

Figure 23 JCT Brand Distinctions

KCATA brands their peak-oriented, limited-stop trips as "Express." These include a variety of routes, some of which have significant portions of their alignment on major arterials before accessing grade-separated freeways, and others with the majority of alignment on arterials. KCATA generally identifies these routes as "Express" through the incorporation of "X" after the route number, such as 36X or 28X. The "X" suffix distinguishes those commuter-oriented routes that have limited stops in the peak periods from their counterparts, which may have much the same alignment but more-frequent stops and an overall lower travel speed.

Neither Topeka Metro, Lawrence Transit, nor UGT currently operates express service. Topeka Metro identifies its routes through a color designation, number, and descriptor, such as the "Green #4 - West 10th." Routes with the "S" suffix generally indicate routes with one or two daily runs oriented toward specific demand peaks such as school end times and whose alignments are variants of regular routes.

Transit in Lawrence operates under two brands: Lawrence Transit ("The T") or KUOW. Generally, routes funded by KU are operated with KU-colored buses, and routes funded by the city have their own color scheme. The joint systems share a map book and website.

The service recommendations could be marketed as individual routes or as a system of routes. A system operating between Topeka, Lawrence, Kansas City, and Overland Park would have taken into account the transit brands already existing in each jurisdiction. The recommended concept may operate as separate routes, but may—at a later phase—incorporate interlining to increase efficiency or to meet increased demand. This could involve a new branding or simply a continuation of branding individual routes.

The brand for this system could have a geographical tie-in similar to how the K-10 Connector denotes a service operating on K-10. Service operating on I-70 could then note the I-70 connection. A system-wide brand encompassing all transit service on I-70 could be created, with sub-brands created for individual route segments. Doing this would also allow any commuter bus service that eventually connects Manhattan / Junction City to Topeka to be introduced into the system. A possible brand name is identified below:

I-70 Connector Topeka – Lawrence

On trips interlined to Topeka, the K-10 Connector could be newly identified as the K-10 / I-70 Connector Overland Park – Lawrence-Topeka.

The I-70 Connector brand could be conveyed to users primarily through route stickers applied to existing bus stop signs and through logos in the existing systems brochures. The brand could also be conveyed through route-specific, branded bus passes that are unique from other area agencies. The system brand could be applied to vehicles, but that begins to require addressing operational issues such as which agency would operate the system. Route-specific brand application to vehicles removes operational flexibility to reassign vehicles to different routes to change frequency or to address maintenance issues. Having a branded, route-specific vehicle may also make it difficult to balance resources in the off-peak period. A vehicle branded in vehicle wrap for the I-70 Connector may create passenger confusion if it's used for local routes in off-peak service.

Social media can act both as a public relations conduit to market the route and also as a method to contact riders regarding operational issues such as detours or route delays. JCT currently utilizes Facebook and Twitter.

To make sure that potential riders are aware of the route, outreach efforts can be targeted to potential beneficiaries of the route, including the chambers of commerce in all three urban areas, major employers, cycling groups, students, and the existing transit community. In addition, major employers in the corridors should be made aware of what's commonly referred to as the "Commuter Tax Benefits" under Section 132(f) of the Internal Revenue Code. This section allows employers to provide transit and vanpool tax-free benefits to their employees up to $245 a month. These targeted outreach efforts can be coordinated as part of a broader campaign to spread awareness about all transit options in a community, not just the commuter route.

Chapter 5 Funding Analysis

5.1 Introduction

The purpose of this chapter is to discuss funding options for implementing and operating new transit service in the I-70 corridor. This includes a review of funding sources from federal, state, and local levels. The chapter also discusses fare recovery, project phasing, and the economic impact of this potential investment in transit.

5.2 Funding Sources

This section discusses possible federal, state, and local government funding sources and expected fare recovery that could be allocated toward the commuter transit route. Table 24 summarizes the opportunities and how they could apply to each individual route. The table also summarizes funding types and identifies whether program funds can be applied toward capital or operating costs.

Federal

The Congestion Mitigation and Air Quality (CMAQ) Improvement Program

The primary purpose of the CMAQ program is to fund projects and programs which reduce transportation-related emissions in air quality nonattainment and maintenance areas for ozone, carbon monoxide (CO), and small particulate matter (PM-10).

CMAQ funds may be used to establish new or expanded transportation projects or programs that reduce emissions, including capital investments in transportation infrastructure, congestion relief efforts, diesel engine retrofits, or other capital projects. These funds can be used for capital expenditures related to the creation of a commuter transit route, and they would be applicable as match to any federal capital funding awarded to the project. CMAQ funds may also be used for operating assistance, including all costs of providing new transportation services. Previously, CMAQ funding was limited to three years. Interim guidance for the new federal transportation program, MAP-21, allows the same amount of funding to be spread out over five years. Applications for this program would be sent from the transit provider to the appropriate MPO.

Table 24 Summary of Revenue Sources

Route	Topeka – Lawrence		Lawrence – Overland Park		
Total Annual Operating Cost	$563,000		N/A		
Cost Recovery	48%		N/A		
Cost Remaining	$294,600		N/A		
Total Capital Costs	$2.08 million		N/A		
Funding Source	Operating	Capital	Operating	Capital	Comments
FEDERAL					
TIGER	-	X	-	X	
TIGGER	-	X	-	X	
CMAQ	X	X	X	X	80/20 local match
FTA Section 5307	X	X	X	X	Federal match: - 80% net project cost - 90% vehicle equipment - 50% operating cost
FTA Section 5339	-	X	-	X	Federal match is 80%, but is flexible for certain Americans with Disabilities (ADA), Clean Air, or bicycle projects.
STP	-	X	-	X	
STATE					
T-WORKS	X	X	X	X	Diverse eligibility requirements
LOCAL					
TDD	-	X	-	X	
TIF	-	X	-	X	
CID	-	X	-	X	
Sales Tax	X	X	X	X	
Property Tax	X	X	X	X	
Income Tax	X	X	X	X	
General Fund	X	X	X	X	
Fuel Tax	X	X	X	X	
Business Tax	X	-	X	-	
Special Assessments	-	X	-	X	
Impact Fees	-	X	-	X	
Farebox	X	-	X	-	Consider elasticity of fare rates

Notes:
Transportation Investment Generating Economic Recovery program (TIGER)
Transit Investment for Greenhouse Gas & Energy Reduction program (TIGGER)
Congestion Mitigation and Air Quality Improvement program (CMAQ)
Federal Transit Administration (FTA)
Surface Transportation Program (STP)
Transportation Works for Kansas (T-WORKS)
Transportation Development District (TDD)
Tax Increment Financing (TIF)
Community Improvement District (CID)

The K-10 Connector was initially implemented and operated using CMAQ funding. In fiscal year (FY) 2013, the State of Kansas received $9.5 million from this program, before set asides[4]. Typically, most of these funds go toward the Kansas City and Wichita metropolitan areas. For the federal fiscal year (FFY) 2013 – 2014, MARC anticipates $3.4 million per year from Kansas, with 34 percent of funds going toward transit[5].

Federal Transit Administration Section 5307 Urban Area Formula Grants

This program provides funding to urban areas for transit capital, job access and reverse commute projects, transportation-related planning, and operating expenses in some cases. Funds from this source could be used for such capital expenditures as vehicle acquisition, station development, traffic signal priority, other technology infrastructure, and park and ride facilities. Federal shares cover 80 percent for capital assistance and 50 percent for operating assistance[6]. The former FTA Section 5316 Job Access and Reverse Commute (JARC) projects are now eligible under the MAP-21 Section 5307 funding program. JARC was designed to help address unique transportation issues of low-income workers who are attracted to an increasing number of jobs located in suburban areas away from the inner city, urban, or rural areas where they may reside.

Allocation of Section 5307 funds depends on an urban area's size. Funding for urban areas of 50,000 to 199,999 in population is based on population, population density, and number of low-income individuals; whereas, areas over 200,000 in population receive funds based on the level of public transportation service provision in addition to population levels.

[4] Federal Highway Administration. Revised Apportionment of Federal-aid Highway Program Funds for FY 2013. <http://www.fhwa.dot.gov/legsregs/directives/notices/n4510765/n4510765_t1.cfm>

[5] Mid-America Regional Council. Congestion Mitigation/Air Quality Program. <http://www.marc.org/transportation/cmaq/index.htm>

[6] Federal Transit Administration. MAP-21: Urbanized Area Formula Grants. <http://www.fta.dot.gov/documents/MAP-21_Fact_Sheet_-_Urbanized_Area_Formula_Grants.pdf>

In FY 2012, MARC received over $15.4 million for the Kansas City urbanized area, while Lawrence received over $1.8 million and Topeka received nearly $2 million[7].

Localities or transit providers can send applications for these funds to their MPO or to KDOT if their area's population is between 50,000 and 200,000.

Federal Transit Administration Section 5339 Bus and Bus Facilities Program

The Bus and Bus Facilities program provides capital assistance for new and replacement buses, related equipment, and facilities. Eligible capital projects include the purchasing of buses for fleet and service expansion, bus maintenance and administrative facilities, transfer facilities, bus malls, transportation centers, intermodal terminals, park and ride stations, acquisition of replacement vehicles, bus rebuilds, bus preventive maintenance, passenger amenities such as passenger shelters and bus stop signs, accessory and miscellaneous equipment such as mobile radio units, supervisory vehicles, fare boxes, computers, and shop and garage equipment. FY 2014 has authorized funding for $428 million. Annually, $65.5 million is to be allocated, where a minimum of $1.25 million is available for each state. Remaining funds are distributed by a formula based on population, vehicle revenue miles, and passenger miles[8].

Applications for this program should be sent from the transit provider directly to the FTA and would require a 20 percent local match.

Surface Transportation Program (STP)

The Federal Highway Administration (FHWA) allocates STP funds to be used toward various types of multimodal and roadway projects on federal-aid highways. These funds can be used for transit capital costs, Intelligent Transportation Systems (ITS) capital improvements, bicycle/pedestrian infrastructure, car and vanpool projects, fringe and corridor parking facilities, and intercity/intracity bus terminals and facilities. After deductions for Transportation Alternatives (TA) and State Planning and Research (SPR), the FHWA sub-allocates 50 percent of

[7] Federal Transit Administration. FY 2012 Funding by State. http://www.fta.dot.gov/grants/12853.html

[8]Federal Transit Administration. MAP-21 Transit Programs Summary. http://www.fta.dot.gov/documents/MAP21_essay_style_summary_v5_MASTER.pdf

the state's remaining funds to areas based on their share of the state's population. The remaining 50 percent is allocated to any area of the state. Transit typically competes with other road and bridge projects for these funds.

MARC typically allocates an annual amount of $12 – 14 million from Kansas and $24 – 30 million from Missouri. No Kansas STP funds are programmed for transit projects currently, but past projects have received funds from around $1 – 16 million. In 2014, funds are expected near $6.4 million for MTPO and $1.6 million for the city of Lawrence. Both state and local governments are eligible for funds. While MARC is responsible for awarding funds to communities in their region, Topeka and Lawrence receive funds from KDOT.

State

State of Kansas Transit Program Funding

The Kansas Urban Public Transit component of the state Coordinated Transportation Program (CTP) provides annual funding for transit operators. Starting in 2013, transit funding will increase from $6 million to $11 million annually through T-WORKS. These funds can be used for capital and/or operations costs related to the creation of a commuter transit route, and they would be applicable as match to any federal capital funding awarded to the project. Annual statewide funding of $825,000 is available for funding commuter services[9].

Local

Numerous sources of local funding could be used for transit operations and/or capital investments. These include sales taxes, property taxes, general fund transfers, or special taxing districts. Coordinating funding from the different local entities throughout the project corridor would be a challenge. A funding allocation formula deemed fair and equitable would have to be determined and agreed upon by city and county governments as well as the involved transit agencies that would interact with the service in the corridor. Each entity would then have to determine the locally preferred option for generating the agreed-upon amount.

[9] Kansas Department of Transportation. http://kdotapp.ksdot.org/TWorks/docs/doing-biz_transit.pdf

Sales taxes, property taxes, or transfers from general funds

Local funding strategies could include funds from dedicated sales taxes, property taxes, or the general fund.

Currently, the local funding for the city transit system in Lawrence comes from a quarter-cent sales tax. KU students pay a $73.50 semester fee to support the KU on Wheels portion of the coordinated KU – City transit system in Lawrence.

The first three years of the K-10 Connector operating costs were funded through the CMAQ program. Currently the route is funded, along with the rest of the JCT system, through transfers from the Johnson County general fund. Discussions continue with the city of Lawrence, Douglas County, KU, and Johnson County Community College regarding financial commitment to fund the K-10 Connector.

The local portion of TMTA funding comes from a $4.2 million property tax. This property tax will be reduced for 2015 and subsequent years to $3 million[10].

The local portion of UGT funding comes from appropriations from the general revenue fund. KCATA also provides service in Kansas City, Kansas. The primary source of local KCATA funding is a 3/8-cent sales tax in Kansas City, Missouri.

Taxing Districts

A Transportation Development District (TDD) is a special taxing district whereby a petitioner of 100 percent of the landowners in an area request either the levy of special assessments or the imposition of a sales tax of up to 1 percent on goods and services sold within a given area. Upon creation of a TDD by a municipality, the revenue generated by TDD special assessments or sales taxes under Kansas law may pay the costs of transportation infrastructure improvements in and around the new development or as match to any federal capital funding awarded to the project.

In Kansas, Tax Increment Financing (TIF) can use city sales taxes, city franchise fees, and increased property taxes that have been generated by a real estate development within a tax increment financing district to pay for certain eligible costs associated with that development. Eligible

[10] Section A9-2, Levy of Tax, of The Code of the City of Topeka

project costs that may be subsidized in TIF districts include land acquisition, demolition, public and site improvements, and certain consulting and administrative costs. Sales Tax Revenue bonds, commonly known as STAR bonds, may also be issued prior to the redevelopment of a TIF district if financing assistance is required before construction begins. The bonds would then be paid off with the additional revenue generated by that district. This source of funding is not typically used for fixed-route type transit operations.

A Community Improvement District (CID) enables financing of certain projects through special assessments or a sales tax. Eligible projects include the acquisition, construction, and refurbishing and equipping of transportation facilities, streetscaping, and landscaping. Projects can be funded with general or special obligation bonds or on a pay-as-you-go basis.

Traditionally, special taxing districts such as TDDs, TIFs, or CIDs have not been used to fund highway-oriented commuter transit services.

Table 25 summarizes the possible local funding sources. Included in the table are the local revenue sources, whether those sources can be used toward capital or operating costs, and both the advantages and disadvantages of each source of revenue.

Table 25 Revenue Sources[11]

Revenue Source	Use	Advantages	Disadvantages
Sales Tax	• Operating • Capital	• Generates significant revenue at low rates • Easy to administer • Successfully implemented by many transit agencies	• Requires state action and/or voter approval • Hurts retailers • Can be regressive • Subject to economic cycles
Wage/Income Tax	• Operating • Capital	• Generates significant revenue at low rates • Long-run growth potential • Wage tax can capture commuter beneficiaries	• Unpopular with voters and the business community • Subject to economic cycles • Difficult to administer
Property Tax	• Operating • Capital	• Broad coverage of business and individuals • Easy to administer • Generates significant revenue at low rates • More reliable than sales tax	• Requires voter approval • Generally unpopular with taxpayers • Heavy competition from school districts and other beneficiaries of tax
Motor Fuel Tax	• Operating • Capital	• Possible deterrent to driving • Less visible to taxpayers • Significant revenues from small increment • Easy to administer	• Requires state action (constitutional amendment in Missouri) • Revenues subject to decline as fuel economies improve
Vehicle Registration Fee/Tax	• Operating • Capital	• Possible deterrent to driving • Easy to administer	• Requires state action • No direct link to transit • Regressive, depending on structure
Fare Box Revenue	• Operating	• Direct users pay • Ease of revenue collection	• Limited revenues • Regressive
Business Tax(es)	• Operating	• Employers pay for labor force mobility	• Unpopular with business • Disincentive for business location decisions
Special Assessments	• Capital	• Revenue tied to development • Direct beneficiaries of improvement pay • Small base of opposition	• May counter location incentives • Limited revenues • Complex administration
Impact Fees	• Capital	• Revenues tied to development • Direct users pay • Small base of opposition	• Possible legal challenges • Limited revenues
Tax Increment Financing	• Capital	• Revenue tied to economic development • Can tie to transit development specifically • No direct new effect on taxpayers	• Limited and less-certain revenues • Complex administration • Competition from school and other local governments

[11] TCRP Report 89, Financing Capital Investment: A Primer for the Transit Practitioner. Washington D.C.: TRB. 2003.

5.3 Project Phasing Strategies

The near-term strategy for introducing commuter bus transit service in the project study area would include the following:

- Service between Topeka and Lawrence operating on a 60-minute frequency for three hours in the morning peak period and for the same amount of time in the afternoon peak period
- Continuation of the existing Overland Park to Lawrence service at current service levels

As demand for the service in each corridor increases, longer-term opportunities to introduce new service or increase service levels to meet the increasing demand would be considered. In the Kansas City-Lawrence segment, the introduction of a base level of service may be re-evaluated, followed by increasing service frequency in all three segments to meet demand.

Coordination opportunities between the Overland Park-Lawrence service and the Topeka-Lawrence service should be explored and pursued with the idea of eventually creating a single route that would operate between Overland Park and Topeka via Lawrence. This would make the service more attractive to commuters making the trip in either direction between Overland Park and Topeka, without affecting trips between Overland Park and Lawrence or Topeka and Lawrence.

Finally, as demand for midday travel along the corridor grows, the introduction of some level of midday service should be considered. Midday service would also make the peak service more attractive by providing commuters an alternative if they had to leave work early and return home if needed.

5.4 Transit Service Impacts

Transit services can have diverse economic impacts including both impacts to those using the service and to the community at large. Some economic benefits result from the existence of the service, some from reduced automobile travel, and others from the effects that transit has on land use development patterns. Conventional transportation economic evaluation tends to overlook some of the transit benefits, focusing primarily on vehicle travel speeds and operating costs. Transit benefits can extend beyond vehicle metrics to include mobility benefits, vehicle ownership and parking cost savings, or efficient land development benefits.

A commuter express service serves a relatively low level of demand but would provide mobility for non-drivers and an opportunity for users to reduce the high cost of private vehicle operation over a long-distance commute. High-capacity transit can provide additional benefits of stimulating transit-oriented development in compact, multimodal neighborhoods where residents tend to own fewer vehicles, drive less, and rely more on alternative modes than in more automobile-oriented communities. This synergy between land use and transit can leverage additional travel reductions and benefits (besides just the travel shifted to transit).

Direct economic impacts can be relatively straightforward. According to www.publictransportation.org, a Kansas City to Topeka commuter would have an annual savings of $3,971.72[12]. The annual savings would increase to $9,547.72 if the household reduced their number of cars by one. This savings could result in a higher consumption of consumer goods or services or higher rates of savings.

Transit impacts and benefits also tend to increase if transit improvements are implemented with support strategies such as walking and cycling improvements, commuter trip reduction programs, parking incentives, and improved user information. Even transit serving a lower level of demand can have an impact on the costs of providing parking. Another societal benefit is that active transport (walking and cycling) and public transit are complements to one another; transit travel tends to increase public fitness and health[13].

Both the aging generation and the most recent generation entering the labor force tend to resist rising fuel prices, increasing urbanization, increasing traffic congestion, and rising roadway expansion costs. These changing consumer preferences and increasing health and environmental concerns are shifting travel demand from automobile to alternative modes.

Economic benefits of the commuter express options include:

- User benefits related to lower transportation costs

[12] Assumption of 126-mile round trip in a medium-sized car that gets 22 miles per gallon, with a $7.50 round trip bus fare, no parking charges, and a cost of $3.00/gallon gasoline.
[13] Litman, Todd. (2010). Evaluating Public Transportation Health Benefits. *Victoria Transport Policy Institute* for *The American Public Transportation Association*. Downloaded at http://www.apta.com/resources/reportsandpublications/Documents/APTA_Health_Benefits_Litman.pdf

- Improved mobility that makes people who are also economically, socially, or physically disadvantaged relatively better off
- Reduced parking problems and non-residential parking facility costs
- Changes in crash costs, personal security, and improved health and fitness due to increased walking and cycling
- Changes in energy consumption, air, noise, and water pollution

5.5 Recommendation

This project examined the feasibility of providing transit service operating in the I-70 corridor between downtown Kansas City, Missouri; Lawrence, Kansas; and Topeka, Kansas.

For transit to be effective, concentrations of activity are needed particularly at the destination end of the trip. Work travel provides the greatest opportunity for this concentration both in terms of location and in terms of travel times. The origins can be dispersed for a commuter service if served by a park and ride lot. The transit need is enhanced if there are parking limitations at the destination end, traffic congestion on the route, or if the service provides an opportunity to reduce vehicle operation costs for longer-distance travel.

To be successful, however, the service needs to be frequent enough, provide a good location point to access the system, and then deliver the passengers near the ultimate destination.

Commuter travel provides the largest concentration of potential transit use. Non-commute travel was investigated and could be provided on a case-by-case basis, but the feasibility of transit service will be determined by service to commute travel.

The largest concentrations of employment activity that could be served by transit in the I-70 corridor are the Kansas City CBD, KU, and the state and medical employees located in or near the Topeka CBD.

Trip movements in the corridor are summarized below:

- There was not substantial daily travel between KU in Lawrence and KUMC in Kansas City, Kansas.
- The largest commuter travel movement in the I-70 corridor is from residents of the Lawrence area to workplaces in downtown Topeka. This level of movement would support regularly scheduled commuter transit service.

- There is also movement between residents of Topeka to KU and other major employers in Lawrence. This level of movement would also support regularly scheduled commuter transit service.
- The movement between the CBDs of Kansas City, Kansas, and Kansas City, Missouri, with Lawrence and Topeka is less than the movement between Lawrence and Topeka. The movement between Lawrence and the Kansas City, Missouri, CBD is not currently large enough to consider some level of regularly scheduled transit service.
- The movement between Topeka and Overland Park was larger than the movement between Topeka, Kansas and the Kansas City, Kansas or Kansas City, Missouri area. For that reason, coordination of service between the K-10 Connector and a possible extension of service between Lawrence and Topeka could accommodate this need.

Potential transit modes for addressing this movement include expanding carpooling opportunities, working to create more vanpools, providing bus service on a fixed schedule, and providing fixed guideway options such as commuter rail. The level of transit demand between Topeka, Kansas and Lawrence, Kansas is expected to be large enough to operate bus service. Commuter rail has been studied as an option in the past, and the level of demand estimated in this project is consistent with the past findings, which suggest that bus transit would be the most cost-effective strategy in the near term.

A series of bus transit options were developed that had different operating characteristics. The concept recommended in this report is a system of two independent commuter bus routes that would meet and interact in Lawrence. The recommended service levels for the initial service between Topeka and Lawrence are to provide three trips at a one hour frequency in each direction in the morning and evening peak periodsThe second segment, between Overland Park and Lawrence, already exists in the form of the K-10 Connector, which is operated by JCT. These service levels can be increased with demand.

The most important facility issue related to corridor transit service is identifying a suitable facility and location in Lawrence. Ideally, this location would accommodate the two routes, converging to allow passengers to transfer. Secondly, it would also be beneficial if the site also allowed passengers easy transfer access to the local Lawrence system.

Park and ride locations are also needed throughout this intercity transit system. This would include locations in Lawrence and Topeka. Other

facilities would include two stops with bus shelters in Topeka and additional stop locations in Lawrence.

The estimated operating cost for the segment between Lawrence and Topeka is $563,000. The estimated capital cost, including the purchase of vehicles, is estimated at $2.08 million.

Appendix

Operations Cost Methodology

For the purpose of developing operating cost estimates for the service concepts that were evaluated as part of the study effort, the Kansas City Area Transportation Authority (KCATA) service cost allocation model was utilized. The KCATA operates four commuter express routes in the Kansas City metro. These routes have operating characteristics similar to the study concepts. Direct operating costs and indirect operating costs were determined for each of these routes using the KCATA cost allocation model. A cost-per-service mile was calculated for each route (see Table A1). These costs per mile were then used to calculate an estimated operating cost for the study concepts seen in Table A2.

Table A1 KCATA Commuter Route Operating Costs

KCATA Route	Direct Cost	Indirect Cost	Total Cost	Annual Miles	Direct Cost per Mile	Indirect Cost per Mile	Total Cost per Mile	Indirect Cost Rate
Liberty Express	$92,186	$136,782	$228,968	37,995	$2.43	$3.60	$6.03	60%
Lee's Summit/ Raytown Express	$187,055	$302,022	$489,077	83,895	$2.23	$3.60	$5.83	62%
Blue Springs Express	$224,115	$336,906	$561,021	93,585	$2.39	$3.60	$5.99	60%
71 Highway Express	$197,866	$282,744	$480,610	78,540	$2.52	$3.60	$6.12	59%
Total	**$701,222**	**$1,058,454**	**$1,759,676**	**294,015**	**$2.38**	**$3.60**	**$5.98**	**60%**

Table A2 Recommended Concept Route Operating Costs

Concept Route	Annual Miles	Direct Cost per Mile	Indirect Cost per Mile	Total Cost per Mile	Estimated Annual Cost
Lawrence/Topeka	93,506	$2.38	$3.60	$5.98	$559,167
Lawrence/Kansas City	44,243	$2.38	$3.60	$5.98	$264,310

Operating Cost Recovery Methodology

Route – The routes are separated into two groups. The first group includes KCATA commuter routes. These routes were selected because they are both a good comparison to the operational characteristics of the recommended concept routes. The second group includes the three recommended concept routes for the I-70 and K-10 corridors.

Annual Operating Cost – The annual operating cost is defined as the funds needed to operate a given route on a weekday only schedule for one calendar year.

Operating Cost Recovery Rate – The operating cost recovery rate shows what rate of the operating cost is recovered by the total amount of fares paid by riders.

Potential Revenue (Full Fare) – The potential revenue is the amount of funds collected if all riders paid the full fare.

Full Fare – The full fare is the amount charged for a one-way trip for riders who are ineligible for reduced fares. While the full fare for the KCATA routes differ depending on the route, the fares for the recommended concept routes all use the current full-fare charge for a one-way trip on the K-10 Connector, plus an additional 25 cents to accommodate for any future inflation and/or fare increase.

Actual Revenue – The actual revenue shows the total amount of money recovered from the fares paid by riders.

Net Fare – The net fare is the average amount charged for each rider when including those paying reduced fares (e.g., riders who have a monthly pass, senior citizens, youths, and those with disabilities). This amount was found by multiplying the net fare ratio by each route's full fare cost.

Net Fare Ratio – The net fare ratio is the ratio of the full fare received when the reduced fares are included. The ratios for the KCATA were found by dividing the actual revenue by the potential revenue. The average of the four KCATA net fare ratios were used in determining which net fare ratio should be used for the recommended concept routes. The average net fare ratio of 62 percent was also used to determine the expected revenue and the operating cost recovery rate for each of the three recommended concept routes.

Refer to Table A3 for a comparison of the four KCATA routes and the recommended concept routes in reference to operating cost recovery.

Table A3 Operating Cost Recovery

Route	Annual Cost	Op. Cost Recovery Rate	Potential Revenue (Full Fare)	Full Fare	Actual Revenue (Net Fare)	Net Fare	Net Fare Ratio
KCATA COMMUTER ROUTES							
71-Hwy Express	$211,186	24%	$81,855	$2	$51,107	$0.94	62%
Blue Springs Express	$239,351	49%	$193,545	$3	$117,282	$1.82	61%
Lee's Summit/ Raytown Express	$199,920	51%	$171,360	$3	$102,759	$1.80	60%
Liberty Express	$98,175	40%	$58,905	$3	$38,779	$1.98	66%
						Average	**62%**
RECOMMENDED CONCEPT ROUTES							
Topeka - Lawrence	$559,167	48%	$435,094	$3.75	$270,338	$2.33	62%
Lawrence - Kansas City	$264,310	37%	$157,781	$3.75	$98,035	$2.33	62%
Lawrence - Overland Park	$677,587	40%	$430,313	$3.75	$267,368	$2.33	62%