

Appendix B

Kansas Long Range Transportation Plan Needs and Gaps Methodology

This appendix explains how the Needs and Gaps for the Kansas Long Range Transportation Plan were calculated. It includes methodologies for the following modes of transportation:

| | |
|------------------------------|----|
| Introduction | 2 |
| State Highways..... | 3 |
| Local Roads..... | 9 |
| Public Transit | 12 |
| Aviation | 17 |
| Rail Freight..... | 21 |
| Bicycle and Pedestrian | 25 |

Introduction

As part of the Kansas Long Range Transportation Plan (LRTP), needs estimates were developed for the state’s transportation system. The methodologies for how these needs were calculated are found within this appendix.

The purpose of developing these estimates is to identify needs without reference to the availability of funding. The needs estimates exceed the amount of funding that is available today or may be in the future. These needs, therefore, are a starting point for discussions about transportation priorities.

Because it can be difficult to distinguish between “needs” and “wants,” the needs estimates are based on both technical analysis and stakeholder discussions – discussions that frequently centered on whether improvements were, in fact, needs or wants. Needs estimates were adjusted throughout the LRTP process in an effort to be as responsive and realistic as possible.

There is inherent difficulty in analyzing needs on a statewide level over a 20-year future that is in many ways uncertain. So as not to overstate the accuracy of these estimates, many of the numbers were rounded for inclusion in the LRTP report.

Kansas Long Range Transportation Plan Needs & Gaps Methodology: STATE HIGHWAYS

Kansas State Highway needs were calculated in five categories: fixed costs and operations, road preservation, bridge preservation, modernization, and capacity improvements. Each category of needs was calculated using a different methodology, as explained briefly in the appropriate section below. Each need was calculated on a 20-year planning horizon, and then reduced to an annual needs number expressed in constant 2006 dollars for easy comparison.

The twenty year need for state highways as been projected at over \$30 billion in today's dollars. Annually, this equates to \$1.5 billion. These needs have been identified without reference to the availability of funding. These needs therefore, are a starting point for discussions of transportation investment priorities.

Revenue projections have been developed and indicate an average annual revenue of \$900 million in today's dollars. This results in an annual funding gap in state highways of over \$600 million.

How these needs and revenue projections were developed is discussed in the following pages.

NOTE: There is inherent difficulty in analyzing needs on a statewide level over a 20-year future that is in many ways uncertain. So as not to overstate the accuracy of these estimates, many of the numbers were rounded for inclusion in the LRTP report.

Fixed Costs and Operations

This category represents the expense of KDOT's daily operations and fixed costs, such as debt service and transfers to other agencies. Projected annual expenditures, by category between 2010 and 2030, are detailed below.

Routine maintenance is defined as expenditures on equipment, staff salaries, and materials used in snow/ice removal, and minor roadway repair. These types of activities are typically done entirely by KDOT forces. To calculate this need, historical expenditures were grown at 2.15 percent, which is less than the assumed standard inflation rate of 3.5 percent. The total 20-year need is estimated at \$2.4 billion, or \$117 million annually, in constant 2006 dollars.

Administrative Operations encompasses salaries for the agency's administrative and support personnel and daily operating costs of the agency, such as phone bills and building rent. These needs were calculated by projecting historical expenditures forward at a 2.15 percent growth rate. They were then converted to constant 2006 dollars to estimate the total 20-year need at \$1.3 billion, or \$67 million annually.

Debt Retirement reflects expenses related to the repayment of highway bonds. The projected cost is an average; the annual cost of debt service will vary widely. For the next few years, annual debt service will climb to \$155 million (in constant 2006 dollars), then gradually decline. By 2025, all projects will be paid off. The result is an average annual need for the 20-year time frame of the LRTP of \$78 million.

Transfers for certain transportation-related functions performed by other state agencies are financed by the State Highway Fund. KDOT transfers funds to the agencies to finance salary and operating costs of these functions. The Department of Revenue, for example, receives state highway funds for activities related to collection and enforcement of vehicle registrations, titles, driver licensing and motor fuel tax. The projected 20-year need to fund these transfers is \$1.10 billion, or \$56 million annually, in constant 2006 dollars.

These needs sum to a total of 6.4 billion, or \$320 million annually, in constant 2006 dollars.

Fixed Costs and Operations over 20-year horizon: \$320 million / year

Road Preservation

Road Preservation includes pavement reconstruction and resurfacing as well as things like signing, lighting, and pavement marking.

KDOT measures pavement status through a Statewide Maintenance Rating Report and a Pavement Condition Report. Over the last four years, the overall statewide maintenance rating has been approximately 90, which is the same as the maintenance target. The pavement condition report estimates the number of pavement miles in the highest condition (PL-1). The pavement performance analysis reveals that about 94 percent of the Interstate highway pavement and 86 percent of the Non-Interstate Highway pavement was in good condition in 2006. This is well within the targets of 85 percent and 80 percent for Interstate and Non-Interstate pavements, respectively.

It is assumed for this analysis that in order to continue to maintain the state's highways at these performance levels, future funding will need to match that of current and recent funding levels, which have equated to approximately \$200 million a year in constant dollars.

Road Preservation over 20-year horizon: \$200 million / year

Bridge Replacement and Rehabilitation

KDOT is responsible for maintaining the safety and operability of the state highway system's 4,987 bridges over 20 feet and an additional 2,941 structures of 10 to 20 feet. Each bridge is inspected regularly to track its condition and to identify replacement or rehabilitation needs, if any. Inspection results are summarized using a standard bridge health index (BHI) score, which expresses the condition of major sub-components of the structure such as deck, superstructure, and substructure as a single number on a scale of one to 100.

The BHI provides bridge engineers at KDOT with an approximate indication of upcoming bridge replacement and rehabilitation needs. Bridges with a BHI score of 95 to 100 typically require no action; bridges with a BHI score of between 90 and 94 require routine maintenance; bridges with a BHI score of between 80 and 89 require major repair work; and bridges with a BHI score of less than 80 should be replaced soon. If a bridge's BHI score slips below 80 and the structure is not replaced outright, measures such as posting of weight limits or "cribbing" are required to ensure safety is preserved, but may restrict the bridge use by large vehicles. The average BHI score in Kansas was 93.6 in 2007.

Bridge needs include routine maintenance for bridges with a BHI score below 95, major repair work for bridges with a BHI score below 90, and replacement of bridges with a BHI score below 80. To ensure the safety of road users and to maintain a manageable workload, KDOT seeks to ensure that 90 percent of all bridges have a BHI score over 80. This target has been adopted as part of KDOT’s overall performance measurement program and is reported on to Executive Staff regularly. In theory, the target means KDOT must replace about 10 percent, or 500 of its bridges each year. In practice, posting weight limits or cribbing of some bridges on routes with low commercial truck traffic volumes may be a more cost efficient solution than replacement.

Between 2000 and 2006, the Department has averaged 89 percent of bridges with a BHI score over 80 and it has spent an average of \$101 million per year in nominal dollars on meeting bridge needs. The nature of maintaining bridges means that one year’s spending can vary considerably from the average if one or more particularly large or complex structures are tackled:

| Year | Annual Spending on Bridges (In Nominal Dollars) | Annual Spending on Bridges (In constant 2006 dollars) | Percent of Bridges with BHI score above 80 |
|----------------|--|--|---|
| 2000 | \$ 122 million | \$ 171 million | 86% |
| 2001 | \$ 100 million | \$ 140 million | 86% |
| 2002 | \$ 105 million | \$ 150 million | 88% |
| 2003 | \$ 128 million | \$ 180 million | 89% |
| 2004 | \$ 100 million | \$ 129 million | 91% |
| 2005 | \$ 70 million | \$ 80 million | 92% |
| 2006 | \$ 84 million | \$ 84 million | 94% |
| Average | \$ 101 million | \$133 million | 89% |

The LRTP bridge replacement and rehabilitation spending needs estimate is based on the desired goal of maintaining a BHI of over 80 for 90 percent of bridges in Kansas. Based on historic performance and cost data over the last seven years this number is approximately \$100 million per year.

Bridge Preservation over 20-year horizon: \$100 million / year

Modernization

A number of Kansas state highway miles don't meet modern design standards for such things as travel lane widths, medians, shoulders, and sight distances. It is also anticipated that while some roads that currently meet standards in these areas, they will be in need of modernization improvements as traffic volumes grow. The number of deficient miles projected in 2030 and the associated costs are as projected as follows:

Modernization Needs (constant 2006 dollars, in millions)

| Class | Current Miles | Future Additional Miles | Total Miles | Cost/Mile | Need |
|--------------|---------------|-------------------------|--------------|---------------|----------------------------------|
| B | 63 | 0 | 63 | \$ 1.2 | \$ 76 |
| C | 264 | 17 | 281 | \$ 1.6 | \$ 450 |
| D | 1,295 | 112 | 1,407 | \$ 2.6 | \$ 3,658 |
| Total | | | 1,751 | Annual | \$ 4,183 \$ 209 |

Improving all these miles would cost a total of about \$4.2 billion in constant 2006 dollars. If these are addressed over the next 20 years, the annual cost is \$210 million per year.

Modernization over 20-year horizon: \$210 million / year

Capacity Improvements

General Capacity Needs

Congestion is a growing issue on some urban and rural corridors in Kansas. One of the most long-standing and basic engineering methods for gauging congestion is the volume-to-capacity (V/C) ratio. KDOT has selected a V/C ratio of 0.7 as an indicator of whether a roadway is experiencing moderate congestion or worse. By applying average historical traffic growth rates to existing traffic volumes, and comparing them with existing roadway capacity figures, KDOT data estimates that by 2030 there will be about 265 congested urban highway miles and 1,724 congested rural highway miles. As shown in the following chart, by applying average costs per mile to these projected number of miles, it is estimated that general capacity needs will total \$8.6 billion, or \$429 million annually for 20 years, in constant 2006 dollars.

| Road Type | Miles | Avg. Cost/Mile | Estimated Cost |
|------------------|-------|----------------|-----------------|
| Urban, Class A-D | 265 | \$ 12.5 | \$ 3,313 |
| Rural, Class A | 84 | \$ 8.0 | \$ 672 |
| Rural, Class B-D | 1,640 | \$ 2.8 | \$ 4,592 |
| | | Total | \$ 8,577 |
| | | Annual | \$ 429 |

General Capacity Needs over 20-year horizon: \$429 million / year

The analysis above adequately captures the capacity needs at a generic statewide level. However, this type of dollars per mile analysis fails to capture some of the needed capacity improvement, such as large urban bottleneck improvements or new alignments, which can be much more expensive. In an attempt to capture these costs, a list of proposed improvements was developed. These improvements are in various stages of preliminary planning at KDOT. Planning and design work began on most of them already, many as part of the CTP. **This list is not meant to be all-inclusive or to incorporate every proposed improvement. Nor is it intended to suggest that these improvements take priority over one another or any that are not included.** It doesn't, for example, include improvements to the Fort Riley area outside of a new interchange, or any of the proposed corridor improvements in the Gardner area. Because this list isn't all-inclusive and doesn't capture some of these emerging and future special initiatives, this estimate was thought to be conservative by many stakeholders involved in the LRTP process. However, this list does capture some of the costs that can't be captured with a generic dollar per mile analysis.

- I-35, US-69 to state line, Kansas City Metro, Johnson County
- I-435, K-10 to I-35, Kansas City Metro, Johnson County
- US-69, I-435 to I-35, Kansas City Metro, Johnson County
- I-70/KTA/K-7 Interchange**, Kansas City Metro, Wyandotte County
- I-135/I-235/K-254 Interchange**, Wichita, Sedgwick County
- I-235/US-54 (Kellogg) Interchange**, Wichita, Sedgwick County
- K-7 Corridor**, Wyandotte and Johnson County
- NW Bypass**, Wichita, Sedgwick County
- US-69, I-435 to 199th St**, Kansas City Metro, Johnson County
- US-69 Bypass**, Pittsburg, Crawford County
- US-54 Bypass**, Pratt, Pratt County
- US-54 Bypass**, Kingman, Kingman County

I-70 Polk/Quincy Viaduct, Topeka, Shawnee County

I-35/KTA/ 47th Interchange, Wichita, Sedgwick County

K-10 Bypass, Lawrence, Douglas County

Gardner Interchange at I-35, Johnson County

KDOT has estimated that the cost of these improvements is \$5.5 billion in 2006 dollars. Over a 20-year planning horizon, the cost of fixing all of these bottlenecks will be roughly **\$273 million per year**. Adding the \$273 million for urban bottlenecks to the \$429 million for general capacity needs explained in the previous section, the total need for capital enhancements is about \$702 million

Total Annual Capacity Need over 20-year horizon: \$700 million / year

The Total State Highway Needs

As seen in the table below, the needs for the state highway system total over \$30 billion over the 20- year span of the LRTP, which equates to over \$1.5 billion annually.

| | Total Need (\$ millions) | Annual Need (\$ millions) |
|----------------------------|-------------------------------------|--------------------------------------|
| Fixed Costs and Operations | \$ 6,400 | \$ 320 |
| Road Preservation | \$ 4,000 | \$ 200 |
| Bridge Preservation | \$ 2,000 | \$ 100 |
| Modernization | \$ 4,200 | \$ 210 |
| Capacity Improvements | \$ 14,000 | \$ 700 |
| TOTAL | \$ 30,600 | \$ 1,530 |

Total State Highway Need over 20-year horizon: \$1.5 billion / year

Funding

By projecting forward current revenue sources, a comparison with needs can be made. In order to make a fair comparison, revenues were converted back to 2006 dollars. These projections are displayed in the following table.

Revenue Projections - Constant 2006 Dollars (in millions)

| Year | Revenues | | | | Reductions | | | Net |
|--------------|------------------|----------------|------------------|-------------------|-------------------|-------------------|------------------|--------------------|
| | State | Local | Federal | Subtotal | Local Allocations | Modal Allocations | Subtotal | Available Revenues |
| 2010 | \$ 897 | \$ 78 | \$ 327 | \$ 1,302 | -\$ 283 | -\$ 13 | -\$ 296 | \$ 1,006 |
| 2011 | \$ 869 | \$ 32 | \$ 321 | \$ 1,222 | -\$ 243 | -\$ 12 | -\$ 256 | \$ 966 |
| 2012 | \$ 867 | \$ 30 | \$ 316 | \$ 1,213 | -\$ 243 | -\$ 12 | -\$ 255 | \$ 957 |
| 2013 | \$ 865 | \$ 28 | \$ 310 | \$ 1,203 | -\$ 240 | -\$ 12 | -\$ 252 | \$ 951 |
| 2014 | \$ 859 | \$ 27 | \$ 305 | \$ 1,191 | -\$ 246 | -\$ 12 | -\$ 258 | \$ 934 |
| 2015 | \$ 854 | \$ 27 | \$ 300 | \$ 1,180 | -\$ 242 | -\$ 12 | -\$ 253 | \$ 927 |
| 2016 | \$ 849 | \$ 26 | \$ 295 | \$ 1,170 | -\$ 238 | -\$ 11 | -\$ 249 | \$ 920 |
| 2017 | \$ 843 | \$ 26 | \$ 290 | \$ 1,159 | -\$ 234 | -\$ 11 | -\$ 245 | \$ 914 |
| 2018 | \$ 839 | \$ 25 | \$ 285 | \$ 1,149 | -\$ 230 | -\$ 11 | -\$ 241 | \$ 907 |
| 2019 | \$ 834 | \$ 25 | \$ 280 | \$ 1,139 | -\$ 227 | -\$ 11 | -\$ 237 | \$ 901 |
| 2020 | \$ 829 | \$ 25 | \$ 275 | \$ 1,129 | -\$ 223 | -\$ 11 | -\$ 234 | \$ 895 |
| 2021 | \$ 825 | \$ 24 | \$ 271 | \$ 1,119 | -\$ 219 | -\$ 10 | -\$ 230 | \$ 890 |
| 2022 | \$ 820 | \$ 24 | \$ 266 | \$ 1,110 | -\$ 216 | -\$ 10 | -\$ 226 | \$ 884 |
| 2023 | \$ 816 | \$ 23 | \$ 261 | \$ 1,101 | -\$ 212 | -\$ 10 | -\$ 223 | \$ 878 |
| 2024 | \$ 812 | \$ 23 | \$ 257 | \$ 1,092 | -\$ 209 | -\$ 10 | -\$ 219 | \$ 873 |
| 2025 | \$ 809 | \$ 23 | \$ 253 | \$ 1,084 | -\$ 206 | -\$ 10 | -\$ 215 | \$ 868 |
| 2026 | \$ 805 | \$ 22 | \$ 248 | \$ 1,075 | -\$ 202 | -\$ 10 | -\$ 212 | \$ 863 |
| 2027 | \$ 801 | \$ 22 | \$ 244 | \$ 1,067 | -\$ 199 | -\$ 9 | -\$ 209 | \$ 859 |
| 2028 | \$ 798 | \$ 21 | \$ 240 | \$ 1,059 | -\$ 196 | -\$ 9 | -\$ 205 | \$ 854 |
| 2029 | \$ 795 | \$ 21 | \$ 236 | \$ 1,052 | -\$ 193 | -\$ 9 | -\$ 202 | \$ 850 |
| 2030 | \$ 792 | \$ 21 | \$ 232 | \$ 1,044 | -\$ 190 | -\$ 9 | -\$ 199 | \$ 845 |
| TOTAL | \$ 17,477 | \$ 572 | \$ 5,811 | \$23,860 | -\$ 4,693 | -\$ 224 | -\$ 4,917 | \$ 18,943 |
| AVG | \$832.26 | \$27.22 | \$ 276.70 | \$1,136.18 | -\$ 223.48 | -\$ 10.65 | -\$234.12 | \$902.05 |

Based on revenue estimates calculated in 2006.

Average Revenues for State Highways over 20 year horizon: \$900 million / year

Gap

Based on the needs and funding identified above, the annual gap for state highways is over \$600 million in constant 2006 dollars.

Kansas Long Range Transportation Plan Needs & Gaps Methodology: LOCAL ROADS

Needs estimates for local roads are divided into two categories: local roads maintenance and local road construction. Data on local road conditions and expenditures are very fragmented. There is no consistent inventory of local road conditions, nor is there consistent tracking of expenditures across the many jurisdictions with road construction and maintenance responsibilities. Therefore, the needs were calculated with a mixture of quantitative and qualitative methods. A Local Roads Costs Index was created using construction costs and truck counts, projected into 2030. The estimated needs from this index were then adjusted after a series of informal interviews with statewide local roads stakeholders. This methodology is explained more in the following section. The local roads need estimate for both categories is listed in Table 1 below.

NOTE: There is inherent difficulty in analyzing needs on a statewide level over a 20-year future that is in many ways uncertain. So as not to overstate the accuracy of these estimates, many of the numbers were rounded for inclusion in the LRTP report.

| | |
|-------------------------|-------------------------|
| Local Roads Maintenance | \$ 666 million |
| Local Road Construction | \$ 438 million |
| Total Need | \$ 1,104 million |

Local Roads Maintenance and Construction Needs

The local road estimates were created using a two-step process.

1. Creating a “Local Roads Cost Index” to predict the maintenance and construction needs based on average construction cost and truck traffic, and
2. Adjusting the calculated costs with data gathered during informal interviews with local roads stakeholders, as well as from current expenditures for local road and Regional Transportation Plans (RTPs) in metropolitan areas.

There are three situations in which the state is heavily involved with local agencies: (1) bridge inventories, (2) City Connecting Links, and (3) local federal aid projects. However, there is no data source

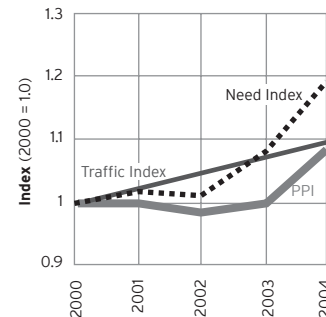
that relates these needs to current local agency spending or to needed levels in these areas. Therefore, rather than looking at individual elements of local road programs, this needs estimate solely considers construction and maintenance in the aggregate. Needs for these two areas have been calculated based on an index of need and effort which relates inflation and traffic to maintenance needs per mile of road and overall construction effort.

Development of a Local Roads Cost Index

The two major determinants of local road maintenance needs are construction costs (typically represented by the Producer Price Index, or PPI) and the amount of truck traffic using local roads. The basic sources for existing construction and maintenance expenditures on local roads are the Federal Highway Administration Highway Statistics databases from 2000 through 2004. The source for the truck Daily Vehicle Miles Traveled (DVMT) data is KDOT. Table 2 shows the combined index of inflation and truck DVMT growth. These results show a very steep growth index- for example, between 2000 and 2004, maintenance per road-mile would have had to rise 19 percent in current dollars just to stay even with inflation and growth in truck traffic.

Table 2: Needs Index for Local Road Maintenance and Construction

| | HW PPI ¹ | PPI Index | Traffic (Truck DVMT) ² | Traffic Index | Resulting Need Index ³ |
|------|---------------------|-----------|-----------------------------------|---------------|-----------------------------------|
| 2000 | 136.5 | 1.00 | 8,498,568 | 1.00 | 1.00 |
| 2001 | 137.0 | 1.00 | 8,698,711 | 1.02 | 1.03 |
| 2002 | 133.7 | 0.98 | 8,898,854 | 1.05 | 1.03 |
| 2003 | 136.6 | 1.00 | 9,098,998 | 1.07 | 1.07 |
| 2004 | 148.2 | 1.09 | 9,299,141 | 1.09 | 1.19 |
| 2005 | 166.8 | 1.22 | 9,499,284 | 1.12 | 1.37 |
| 2006 | 184.8 | 1.35 | 9,699,427 | 1.14 | 1.55 |
| 2010 | 212.1 | 1.55 | 10,500,000 | 1.24 | 1.92 |
| 2015 | 251.9 | 1.85 | 11,706,950 | 1.38 | 2.54 |
| 2020 | 299.1 | 2.19 | 13,052,637 | 1.54 | 3.37 |
| 2025 | 355.3 | 2.60 | 14,553,007 | 1.71 | 4.46 |
| 2030 | 422.0 | 3.09 | 16,225,841 | 1.91 | 5.90 |



¹ Producer Price Index (PPI) for Road Construction, Bureau of Labor Statistics. Source: Bureau of Labor Statistics, growth after 2006 assumes 3.5% annual inflation.

² Truck DVMT statistics and forecasts from KDOT data.

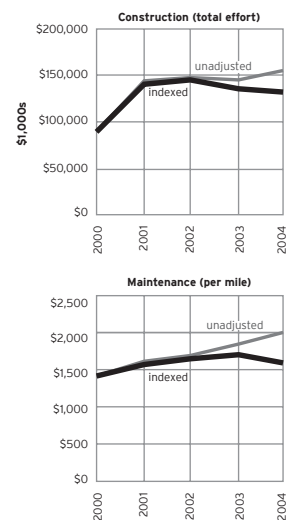
³ Need index is obtained by multiplying the PPI and traffic indices.

This Local Road Cost Index was extended to 2030 based on projected traffic increases and an annual inflation rate of 3.5 percent. As Table 2 indicates:

- Road construction and maintenance costs were 1.35 times as high in 2006 as they were in 2000; by 2030 they are anticipated to be 3.09 times as high.
- Heavy truck traffic in 2006 was 1.14 times as high as it was in 2000, and will be 1.91 times as high by 2030.
- The combined index indicates that the level of maintenance and construction required in 2006 for the same results as achieved in 2000 would cost 1.55 times as much. By 2030, it will cost nearly six times as much as it took in 1998 to construct and maintain roads to the same relative level.
- In Table 3, the Local Road Index is applied to construction (total effort) and maintenance (per mile) expenditures. This analysis produced a local road construction need of \$219 million, and a local roads maintenance figure of \$333 million. These numbers were then advanced through a qualitative process as described in the text following the table.

Table 3: Indexed Local Road Construction and Maintenance
(\$000's, except where noted)

| | Need Index | Historic Construction ¹ | Construction Effort / Need | Historic Maintenance & Traffic ¹ | Maintenance Effort / Need | Local Road Needs |
|------|------------|------------------------------------|----------------------------|---|---------------------------|------------------|
| 2000 | 1.00 | \$ 81,107 | | \$ 175,147 | | |
| 2001 | 1.03 | \$ 140,570 | | \$ 204,174 | | |
| 2002 | 1.03 | \$ 145,078 | \$ 145,078 | \$ 212,048 | | |
| 2003 | 1.07 | \$ 143,758 | \$ 151,558 | \$ 231,050 | \$ 231,050 | |
| 2004 | 1.19 | \$ 155,668 | \$ 168,045 | \$ 244,712 | \$ 256,184 | |
| 2005 | 1.37 | | \$ 193,207 | | \$ 294,543 | |
| 2006 | 1.55 | | \$ 218,567 | | \$ 333,204 | \$ 551,770 |
| 2010 | 1.92 | | \$ 271,512 | | \$ 413,918 | \$ 685,430 |
| 2015 | 2.54 | | \$ 359,538 | | \$ 548,114 | \$ 907,652 |
| 2020 | 3.37 | | \$ 476,103 | | \$ 725,817 | \$ 1,201,919 |
| 2025 | 4.46 | | \$ 630,459 | | \$ 961,132 | \$ 1,591,591 |
| 2030 | 5.90 | | \$ 834,859 | | \$ 1,272,739 | \$ 2,107,598 |



¹ Historical Data Source: FHWA Highway Statistics Databases.
Values have been reduced to exclude Federal and state expenditures for grade-crossing improvements.

Qualitative Analysis of Needs Numbers Arising out of Cost Index

The numbers suggested by the cost indexing exercise were then validated through a few different qualitative means, including:

- Interviews with local roads stakeholders, including city engineers, MARC staff, and other city and regional representatives,
- Historical estimates of road construction expenditures and Regional Transportation Plans (RTP) were both reviewed,
- Review of metropolitan transportation plans.

While none of these sources were able to directly quantify the actual needs numbers, they were unanimous in concluding that only about one-half of the local road construction needs are being addressed under current funding arrangements. Therefore, the existing expenditures in both local roads categories were doubled from their existing levels. This resulting in an estimated local road construction need estimate of **\$438 million**, and a local roads maintenance figure of **\$666 million**, both in constant 2006 dollars.

Kansas Long Range Transportation Plan Needs & Gaps Methodology: PUBLIC TRANSPORTATION

Public Transportation Needs

Public transportation needs were established separately for Metropolitan Public Transportation, rural transit, and intercity rail and bus transit. Needs for metropolitan public transportation were drawn largely from the existing Long Range Plans of metropolitan transit providers, and therefore needed very little manipulation before being translated into a need estimate. Rural transit needs, on the other hand, were created using methodology created by the Federal Transit Administration to estimate rural Kansas demand, and then multiplied by the average cost per rider of a trip to arrive at a need estimate. Intercity transit needs estimates were drawn from existing studies and reports that recently looked at the possibility of intercity passenger rail and bus services in Kansas. All four categories are summarized in Table 1, and described more in the appropriate section below.

NOTE: There is inherent difficulty in analyzing needs on a statewide level over a 20-year future that is in many ways uncertain. So as not to overstate the accuracy of these estimates, many of the numbers were rounded for inclusion in the LRTP report.

Table 1: LRTP Metropolitan, Rural and Intercity Transit Needs Estimate
(Annualized, constant 2006 dollars, in millions)

| | |
|------------------------------------|-----------------------|
| Metropolitan Public Transportation | \$ 96 million |
| Rural Transit | \$ 65 million |
| Intercity Rail | \$ 15 million |
| Intercity Bus | \$ 1 million |
| Total Need | \$ 177 million |

Metropolitan Public Transportation Needs

Metropolitan transit needs were derived by adding existing annual capital and operation expenditures to the expenditures required for completing transit elements of Regional Transportation Plans (RTPs). RTPs are long-range, multimodal planning documents meant to serve as “blueprints” for regional transportation system growth. They are federally mandated to cover a minimum planning horizon of 20 years, and often extend into the 30-year horizon. The long-range RTP forms the basis upon which an annual, short-range Transportation Improvement Program (TIP) is developed. Two of the five metropolitan providers – Johnson County Transit and Unified Government Transit - are located within the Mid America Regional Council (MARC) and therefore included in the Kansas City, Missouri, regional plan. Numbers for the remaining three transit providers - Wichita, Topeka, and Lawrence - were drawn from each region’s RTP. The resulting costs are summarized in Table 2.

Table 2: Cost to Implement Transit Elements of RTPs

| | | | Annual | | Total Annual Cost |
|---|--------------------|-------|-------------------|-------------------|-------------------|
| | Capital | Years | Annual Capital | Operating Costs | |
| Wichita | | | | | |
| Increase evening hours by 6 hrs per day | | | | 1,173,600 | 1,173,600 |
| Add special services | | | | 180,000 | 180,000 |
| Upgrade stops | 900,000 | 3 | 300,000 | | 300,000 |
| Total | 900,000 | | 300,000 | 1,353,600 | 1,653,600 |
| Topeka | | | | | |
| Expand service hrs, boundaries, frequency | 15,400,000 | 12 | 1,283,333 | 3,150,000 | 4,433,333 |
| Lawrence | | | | | |
| Create off-system hub | 10,000,000 | 10 | 1,000,000 | | 1,000,000 |
| Transit accommodations in new roadways | 8,000,000 | 10 | 800,000 | | 800,000 |
| Total | 18,000,000 | | 1,800,000 | | 1,800,000 |
| Johnson County | | | | | |
| Share of Smart Moves | 52,124,160 | 10 | 5,212,416 | 36,524,160 | 41,736,576 |
| Wyandotte County | | | | | |
| Share of Smart Moves | 23,068,300 | 10 | 2,306,830 | 14,168,300 | 16,475,130 |
| Total Annual Unmet Need | 109,492,460 | | 10,902,579 | 55,196,060 | 66,098,639 |

Since the RTP is a planning document, it does not generally include current transit system expenditures. Therefore, in order to create an accurate need number, the current operating and capital expenditures must be added to expenses projected in the RTP. Current expenditures for 2004 are shown in Table 3.

Table 3: Operating and Capital Expenditures, 2004

| | Johnson County | Lawrence | Topeka | Wichita (a) | Wyandotte County (b) | Total |
|--|---------------------------|------------------|------------------|--------------------|---------------------------------|-------------------|
| Total Operating | 6,034,960 | 2,585,473 | 5,052,804 | 8,260,061 | 3,271,584 | 25,204,882 |
| Total Capital | 675,767 | 205,185 | 247,294 | 2,050,254 | 890,329 | 4,068,829 |
| Total Expenditures | 6,710,727 | 2,790,658 | 5,300,098 | 10,310,315 | 4,161,913 | 29,273,711 |
| <i>(a) estimated from 2003 data</i> | | | | | | |
| <i>(b) estimated from KCATA expenditure data</i> | | | | | | |

The needs number was calculated by adding together the additional costs of expanding services (Table 2) with the costs to maintain and operate the current system (Table 3). This yields a total needs estimate of **\$96 million** in constant 2006 dollars, as shown in Table 1.

Metropolitan Public Transportation Needs: \$96 million / year

Funding

As shown in Table 3, the existing annual funding for metropolitan transit systems in Kansas is **\$29 million** in constant 2006 dollars.

Gap

Based on the needs and funding identified above, the estimated gap is **\$67 million** (\$96m – \$29m). Since federal programs are the primary source of transit funding, and the state funds are not directly tied to the CTP, it is not anticipated that this gap would increase as a function of the CTP ending.

Rural Transit Needs

Because rural transit in Kansas is provided by nearly 200 agencies, spending needs for these systems are poorly understood and difficult to calculate at an aggregate level. For the purposes of this Long Range Plan, the needs were calculated using a Federal Transit Administration estimation procedure published in the TCRP Report 3 *Workbook for Estimating Demand for Rural Passenger Transportation*¹. This report establishes rural transit demand as a function of factors including the numbers of elderly, mobility challenged, or low-income people living in the area, as well as the number of existing

¹TCRP Report 3: *Workbook for Estimating Demand for Rural Passenger Transportation*, Transportation Research Board, 1995. Retrieved from: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_03-a.pdf

programs, developmental services, health clinics, group homes, job training, nursing homes and similar attractions for rural residents dependent on transit. Assuming that a relatively high level of service was available in all rural areas, and allowing for projected growth in transit-dependant populations, the estimation procedure yielded a passenger demand estimate of eight million riders per year.

This number was then multiplied by the industry average cost-per-trip of eight dollars per trip. This yielded an annual need estimate of \$65 million in 2006 dollars.

Rural Transit Needs: \$65 million / year

Funding

The data on rural transit expenditures is also incomplete, as many rural systems are operated by non-profit organizations for which transit is tracked more as a social or medical service than as transportation. To develop an estimate of existing rural transit spending, the estimated \$8 passenger trip cost was applied to KDOT's annual ridership data (2004) of 2.6 million passengers, yielding an estimate of **\$21 million** in 2006 dollars.

Gap

Based on the needs and funding identified above, the estimated gap is **\$44 million** (\$65m – \$21m). Since federal programs are the primary source of transit funding, and the state funds are not directly tied to the CTP, it is not anticipated that this gap would increase as a function of the CTP ending.

Intercity Passenger Rail Needs

The Kansas City-Topeka-Wichita route is the most often discussed alternative for expansion of Amtrak services in Kansas. KDOT's *Kansas Rail Feasibility Study* (2000) indicates that capital investment in rolling stock to establish this route would be in the neighborhood of \$220 million, assuming a 110-mph operating speed scenario. See Table 3 below (extracted from the Intercity Ground Passenger Transportation Services Overview prepared as part of Phase I of the LRTP). Annualizing this over 20 years yields an annual need of \$11 million per year. Net operating costs are estimated at an additional \$4 million per year, based on the high-end operating cost of \$20 million less the anticipated fare revenue of \$16 million included in the feasibility study. Together, the capital costs and operating costs sum to approximately \$15 million a year.

**Table3: Anticipated Costs and Fare Revenues for Potential Amtrak Routes in Kansas
(\$ Millions, except where noted)**

| Route | Average Fare (\$) | Operating Cost* | Capital Cost** | 79-mph Scenario | | | | 110-mph Scenario | | | | |
|---------------------------|-------------------|---------------------|----------------|-----------------|------|-----------------|---------|------------------|--------------|-----------------|----------|----------|
| | | | | Revenue** | | Operating Ratio | | Revenue | | Operating Ratio | | |
| | | | | 2000 | 2020 | 2000 | 2020 | 2000 | 2020 | 2000 | 2020 | |
| 1: KC - Ft. Scott - Tulsa | 45 | 16.83-23.56 | 66 | 5.80 | 8.10 | .25-.34 | .34-.48 | 254 | 11.70 | 16.20 | .50-.70 | .69-.96 |
| 2: KC - Wichita | 40 | 14.40- 20.16 | 53 | 7.60 | 9.60 | .37-.40 | .48-.66 | 219 | 16.00 | 20.00 | .79-1.11 | .99-1.39 |
| 3: KC - Denver | 70 | 10.26-14.36 | 456 | 7.00 | 8.89 | .49-.68 | .62-.86 | 685 | -- | -- | -- | -- |
| 4: KC - Topeka - Tulsa | 63 | 13.47-18.86 | 98 | 7.56 | 9.45 | .40-.56 | .50-.70 | 384 | -- | -- | -- | -- |
| 5: KC - Oklahoma City | 65 | 12.70- 7.79 | 68 | 8.45 | 10.7 | .47-.66 | .61-84 | 373 | -- | -- | -- | -- |
| 6: KC - Topeka | 14 | 4.41-6.18 | 24 | 1.68 | 2.17 | .27-.38 | .35-.49 | 90 | 3.50 | 3.92 | .57-.63 | .63-.89 |

*Operating Costs were calculated for two scenarios: (1) assuming the routes would be integrated with the Midwest Regional Rail System (low-end), and (2) assuming the routes would be "freestanding" (high-end).

**Capital Costs include infrastructure and rolling stock costs but do not include station costs, which can vary from \$1-\$10 million

Intercity Passenger Rail Needs: \$15 million / year

Funding

There are no current revenues, nor any existing Kansas program, from which such needs could be financed. However, future funding could be shared by Amtrak and Kansas as is done in other states.

Gap

Based on the lack of an identified funding source, the gap is equal to the need: \$15 million annually.

Intercity Bus Needs

As an example of need, Table 4 below is based on calculations by the Kansas University Transportation Center as part of analysis for reestablishment of intercity bus services in Southwest Kansas. The table is extracted from the Intercity Ground Transportation Overview prepared in Phase I of the LRTP. A Wichita-Hutchison-Garden City route is assumed to be the best candidate (Items 2 and 3 in Table 4), with a net total cost (operations and administration) of \$403,825 (= 325,060 + 78,765).

These services would be in addition to existing subsidized services operated or funded by rural and small city transit providers using federal Section 5311(f) funding (which amounted to \$211,000 in 2004). KDOT administers these funds for the rural districts. In addition to funding going into intercity services today, additional 5311(f) funding could be used for this purpose, but would have to be

taken from other local rural and small city services. For the purposes of a needs estimate, the existing 5311(f) subsidies are also assumed to be a part of the need, resulting in a total estimated need of \$614,825. This is rounded up to \$1 million for purposes of this need estimation.

Table 4: Potential Intercity Bus Service in Southwest Kansas - Forecasted Statistics (2005 KUTC)

| | 1: Hutchinson to Wichita (by S.H. 96) | 2: Hutchinson to Wichita (through Newton) | 3: Hutchinson to Garden City | 4: Garden City to Wichita | 5: Newton to Wichita |
|---------------------|--|--|---------------------------------|------------------------------|-------------------------|
| Route Length (mi.) | 58 | 74 | 175 | 207 | 27 |
| Weekly Round Trips | 3-5 | 3-5 | 5-10 | 5-10 | 3-5 |
| One-Way Fare | \$2 - \$5 | \$2 - \$5 | \$15 - \$47 | \$15 - \$37 | \$2 - \$5 |
| Monthly Passengers | 135-325 | 170-411 | 216-686 | 149-474 | 80-192 |
| Vehicles Required | 2 | 2 | 2-4 | 2-4 | 2 |
| Annual Costs | | | | | |
| Operating | \$ 35,482 - \$ 59,136 | \$ 40,643 - \$ 67,738 | \$ 139,776 - \$ 279,552 | \$ 111,821 - \$ 223,642 | \$ 37,740 - \$ 62,899 |
| Administrative | \$ 5,776 - \$ 9,627 | \$ 6,616 - \$ 11,027 | \$ 22,754 - \$ 45,508 | \$ 18,203 - \$ 36,407 | \$ 6,144 - \$ 10,239 |
| Total | \$ 41,258 - \$ 68,763 | \$ 47,259 - \$ 78,765 | \$ 162,530 - \$ 325,060 | \$ 130,024 - \$ 260,048 | \$ 43,883 - \$ 73,139 |
| Annual Fare Revenue | \$ 7,800 - \$ 12,240 | \$ 9,864 - \$ 15,456 | \$ 51,840 - \$ 290,460 | \$ 35,820 - \$ 157,630 | \$ 4,608 - \$ 7,200 |
| Annual Deficit | \$ 33,158 - \$ 60,963 | \$ 37,059 - \$ 68,901 | \$ 40,706 - \$ 273,220 | \$ 27,596 - \$ 224,228 | \$ 39,083 - \$ 68,531 |

Intercity Bus Needs: \$1 million / year

Funding

The 5311(f) funding is the sole state/federal funding mechanism currently applied to intercity bus services. Therefore, the total funding used for this analysis is **\$211,000**.

Gap

Based on the estimated needs and funding described above, the estimated annual gap is about **\$.8 million** (\$1 million – \$211,000).

However, there are certainly other existing and future needs that are not included in the needs estimate, and which could increase the gap. These include:

- Additional cutbacks in intercity bus services;
- Aging population demands for alternatives to long-distance passenger car travel.
- Currently underserved areas not formally identified (such as areas of northwestern Kansas)

Kansas Long Range Transportation Plan Needs & Gaps Methodology: AVIATION

Needs

The needs estimates for aviation were drawn from two existing studies that quantified aviation needs, as well as from existing federal subsidies, and ongoing expenditures quantified with consultation and guidance from the KDOT Division of Aviation. Of the two referenced studies, one of them quantified aviation needs at a nation-wide level, and the other was completed specifically for Kansas with KDOT as a partner:

1. The Federal Aviation Administration’s 2006 National Plan of Integrated Airport Systems (NPIAS), and
2. KDOT’s and Wichita State University’s (WSU) 2002 Small Aircraft Transportation System (SATS) report.

The needs estimation procedure contained within these two reports are explained briefly below, as well as the conclusions and implications for Kansas arising out of each report. Any input or guidance from KDOT Division of Aviation is included within these descriptions. The aviation needs arising from this analysis equal about \$104 million dollars a year. They are summarized below in Table 1:

**Table 1: LRTP Aviation Needs Estimate
(Annualized, constant 2006 dollars, in millions)**

| | |
|-----------------------------|-----------------------|
| Runways & taxiways | \$ 63 million |
| Other airport capital costs | \$ 6 million |
| Terminal & ground access | \$ 14 million |
| Navigational aids | \$ 2 million |
| Airfare Subsidies | \$ 19 million |
| Total Need | \$ 104 million |

NOTE: There is inherent difficulty in analyzing needs on a statewide level over a twenty year future that is in many ways uncertain. So as not to overstate the accuracy of these estimates, many of the numbers were rounded for inclusion in the LRTP report.

National Plan of Integrated Airport Systems (NPIAS)

The NPIAS (FAA, 2006) looks at five-year needs from 2007 through 2011 at all of the nation’s airports eligible for funding through FAA’s Airport Improvement Program (AIP). NPIAS divides needs into nine categories, as shown in Table 2.

Table 2 also details the NPIAS five-year needs estimate for Kansas in each of the nine categories. The NPIAS report provides the nine subcategory costs at an aggregate, “national” number. Therefore, these Kansas numbers were derived from the national totals by looking at the Kansas share of airport type (general aviation, reliever, small hub, etc.) compared to the national totals for each type. The appropriate share of the aggregate need estimate was then allotted to each airport category within Kansas.

The final column of Table 2 groups these needs into categories used in the Kansas LRTP estimate. As the table indicates, the total five-year need estimate is \$383 million. Annualizing this amount over the five study years yields an annual estimate of \$77 million. The assumption was then made that a similar magnitude of annual need can be expected for each of the next 20 years of the LRTP planning horizon. This methodology was confirmed by the KDOT Division of Aviation as being an accurate measure of the 20-year aviation needs within Kansas.

NPIAS estimate over 20-year horizon: \$77 million / year

Small Aircraft Transportation System (SATS)

The purpose of SATS is to bring new technologies and improved air access to small communities. Wichita State University (WSU) and KDOT have cooperatively developed an initial report (2002) and database to assess costs to upgrade Kansas airports to SATS standards. Table 2 shows the seven categories used in the SATS needs estimates, along with the needs identified and the corresponding LRTP category. Unlike the NPIAS report, SATS provided per-airport breakdowns into categories.

As Table 2 indicates, the study identified nearly \$103 million in needs. If spread over a 20-year planning horizon, this is equal to about \$5 million per year for the first ten years. After ten years, additional runways will need to be maintained and repaved. If the goal of reaching a pavement rating of 70 or greater on all runways is to be realized, this will require an addition \$2 million a year from year 11-20. This brings the average expenditure over 20 years to \$6 million a year.

SATS estimate over 20-year horizon: \$6 million / year

Essential Air Service (EAS) Program

The purpose of the Federal EAS program is to guarantee a minimal level of scheduled service to communities that would otherwise not be profitable. These funds take the form of subsidies to airlines. The current annual level of funding for the EAS is \$7 million. This amount is not sufficient to provide all the needs for the commercial air service airports in Kansas. According to the KDOT Division of Aviation, the additional subsidy requirements throughout Kansas are an additional \$12 million a year. That produces an LRTP needs estimate of \$19 million a year for the next 20 years.

EAS estimate over 20-year horizon: \$19 million / year

Table 1: Published Needs Estimates for Kansas Airports

| Need category | Kansas Need estimate | LRTP Needs category |
|---|----------------------|------------------------------|
| NPIAS (79 airports), 2007-2011 | | |
| Safety | \$ 17,643,588 | Other aviation capital costs |
| Security | \$ 8,728,068 | Other aviation capital costs |
| Reconstruction | \$ 85,961,468 | Runways and taxiways |
| Standards | \$ 175,886,183 | Runways and taxiways |
| Environment | \$ 16,805,850 | Other aviation capital costs |
| Capacity | \$ 31,297,608 | Runways and taxiways |
| Terminal | \$ 32,950,718 | Terminal and ground access |
| Access | \$ 11,138,530 | Terminal and ground access |
| Other | \$ 2,684,851 | Other aviation capital costs |
| Subtotal NPIAS | \$ 383,096,865 | |
| SATS (145 airports), no horizon specified, \$2002 | | |
| Fueling | \$ 18,840,000 | Other aviation capital costs |
| Hangar | \$ 16,150,000 | Other aviation capital costs |
| Lighting | \$ 16,613,000 | Other aviation capital costs |
| Parking | \$ 2,308,000 | Terminal and ground access |
| Runway | \$ 41,339,000 | Runways and taxiways |
| Terminal | \$ 7,200,000 | Terminal and ground access |
| Tie-Down | \$ 231,000 | Other aviation capital costs |
| Subtotal SATS | \$ 102,681,000 | |
| NPIAS & SATS aggregated and grouped by LRTP needs category | | |
| Runways & Taxiways | \$ 62,762,952 | |
| Terminal & Ground Access | \$ 14,355,871 | |
| Other Airport Capital Costs | \$ 6,000,000 | |

Affordable Airfare Program

In June of 2006, the Governor signed legislation creating the State Affordable Airfare Fund, a program which provides \$5 million dollars a year for five years. The program focuses on the Wichita Mid-Continent Airport, and includes maintaining discount carrier services to the eastern U.S. as well as development of a similar program to the western U.S. For the purposes of the LRTP analysis, this annual funding of \$5 million is included in the needs estimate as it is serving a defined need.

Affordable Airfare Program estimate over 20-year horizon: \$5 million / year

Navigational Aids

None of the estimates listed above include upgrades to ground-side navigational aids such as weather information systems and emerging GPS-based navigational technologies. Based on information provided by KDOT staff, to upgrade 49 existing airports (all lacking GPS approaches) to the Wide Area Augmentation System (WAAS) - including surveys, Automated Weather Observing Systems (AWOS), and Ground Communications Outlets (GCOs) – would cost an estimated \$10 million. In addition, with the advent of Automatic Dependent Surveillance-Broadcast (ADS-B), Kansas will be responsible for providing ground stations throughout Kansas. The estimated cost of providing these ground stations is an additional \$1 million per year. If annualized over 20 years, the needs estimate for all navigational aids combined is about \$2 million a year.

Navigational Aids estimate over 20-year horizon: \$2 million / year

Funding

Four primary revenue streams currently support Kansas airports:
FAA Airport Improvement Program (AIP): The AIP provides grants for the planning and development of public-use airports that are included in the NPIAS, based on a national priority formula.

Essential Air Service (EAS) Program: As already mentioned in the Needs section, the EAS currently provides \$7 million in annual funds.

Affordable Airfare Program: As already mentioned in the Needs section, this program currently provides \$5 million in annual funds.

**Table 3:
Current Funding Sources
(Annual)**

| | |
|----------------------|----------------------|
| FAA AIP ('05) | \$ 32 million |
| FAA EAS ('06) | \$ 7 million |
| Affordable Airfare | \$ 5 million |
| KAIP ('07) | \$ 3 million |
| Total Funding | \$ 47 million |

Kansas Airport Improvement Program (KAIP): KDOT’s KAIP currently provides approximately \$3 million per year to airports for maintenance, geometric improvements, facilities, and equipment.

Table 3 summarizes the current annual amounts received from these sources. As the table indicates, the total funding from these programs is **\$47 million**. However, after the CTP is concluded, it is anticipated that the KAIP might not be reinstated unless a new program is initiated. Therefore, an estimated of post-CTP funding is **\$44 million** (\$47 - \$3 million).

Gap

Based on the needs and funding information presented above, an estimated gap of **\$57 million** would exist if current funding were to continue. Without the CTP, this gap would increase to an estimated **\$60 million**.

However, there are certainly other existing and future needs that are not included in the needs estimate, and which could increase the gap. These include:

- **Increased demand for air ambulance and air taxi services.** Very Light Jets (VLJs) are expected to open up many smaller airports to commercial aviation, but the effects have not been studied in detail. VLJs require runways around 5,000 feet long, which most Kansas airports currently can’t accommodate.
- **Air freight growth.** Lighter, time-sensitive, costlier items tend to be shipped by air. Wichita is currently a significant cargo airport; demand for these services could increase. Data on air freight in Kansas is not currently collected comprehensively.
- **Growth of medium-sized metropolitan areas, like Wichita.** Across the U.S., such areas have seen recent increases in commercial air service. City growth, coupled with this market trend, could increase the need.
- **Potential need for increased airfare subsidies.** The federal subsidies may not be completely covering the existing need. Further study would be needed to evaluate this need.

Kansas Long Range Transportation Plan Needs & Gaps Methodology: RAIL FREIGHT

The rolling stock and infrastructure of Kansas railroads are funded almost entirely through private companies, usually the railroads themselves. However, there are two categories where public funding may be able to play a role: (1) safety improvements (crossings and grade separations) at rail/roadway grade crossings; and, (2) assistance to short-line railroads, via infrastructure or rolling stock investments. Needs in both categories were estimated using existing data and studies and historical expenditures and system performance data. They were then checked against the Kansas share of a national railroad needs number established in the American Association of State Highway and Transportation Officials (AASHTO) *Freight Rail Bottom Line Report*. Needs methodologies in both categories are described more below. The resulting needs numbers are summarized in Table 1.

NOTE: There is inherent difficulty in analyzing needs on a statewide level over a 20-year future that is in many ways uncertain. So as not to overstate the accuracy of these estimates, many of the numbers were rounded for inclusion in the LRTP report.

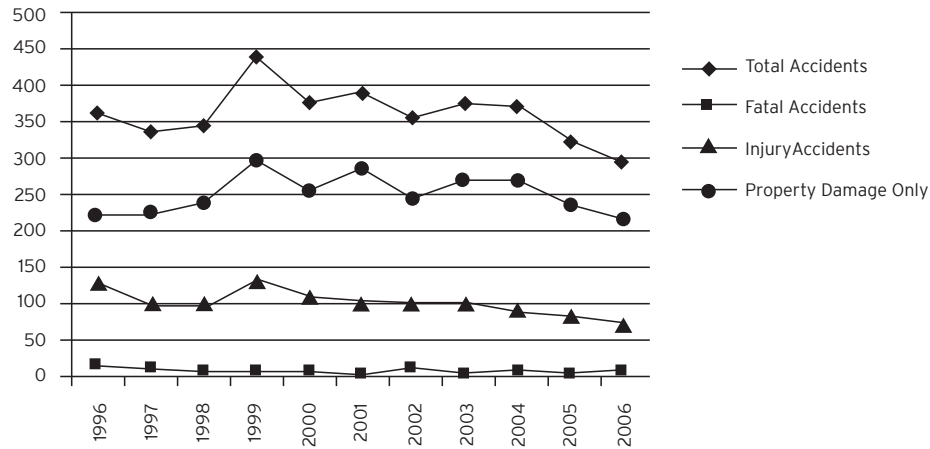
Table 1: Freight Rail Needs Estimate
(Annualized, 2006 dollars in millions)

| | |
|------------------------------------|----------------------|
| Railroad Safety Improvements | |
| Railroad Crossings | \$ 14 million |
| Railroad Separations | \$ 27 million |
| Short Line Rail Assistance Program | \$ 18 million |
| Total Need | \$ 59 million |

Railroad Safety Improvement Needs

Needs estimates for both grade crossings and grade separations are based on the presumption that current expenditures are sufficient for protecting the safety of Kansas citizens. There are currently no performance targets to measure the safety of the rail system. However, automobile/train crash statistics are kept each year by KDOT. Looking at the 11-year crash statistics seem to suggest that the current investment level is causing the crash rate to trend slightly downwards, so that each year there are fewer crashes. Lacking more specific data, this is a decent indicator that the current level of investment is providing for the public's safety. These trends can be observed in Figure 1 on the following page.

Figure 1: Kansas Automobile / Train Crash Statistics, 1996-2007



Grade Crossings

Current KDOT programs address protection at about 1.5 percent of the state’s grade crossings (about 77 locations) per year and address surfacing at about 19 locations per year. For the purposes of the LRTP analysis, this level of effort constitutes a reasonable need estimate. Based on review of KCC cost data on crossings, the cost to protect a crossing or significantly upgrade its protection would average \$150,000 through the end of the CTP. (A higher figure of \$180,000 was used for 2010 and later.) Surfacing would average \$39,000 per crossing. Combining these estimates, current grade crossing upgrade needs are calculated at **\$14 million** in constant 2006 dollars.

Grade Crossing Needs: \$14 million / year

Grade Separation

Current KDOT programs fund grade separations at about 0.15 percent of the state’s grade crossings (nearly 5 locations) per year; for the purposes of the LRTP, this level of effort constitutes a reasonable need estimate. Based on an estimated average grade separation cost of \$5 million, the annual need estimate is **\$27 million** in constant 2006 dollars.

Grade Separation Needs: \$27 million / year

Total Rail Safety Needs: \$41 million / year

This needs estimate can be compared to the Kansas share of the AASHTO identified national crossings. There are currently 5,313 at-grade crossings on Kansas highways, roads, and streets. According to the Federal Railroad Administration, this is about 4 percent of the total grade crossings in the entire nation. According to AASHTO, the nationally-identified grade crossing and grade separation needs come to about \$13.8 billion, or \$690 million a year. The Kansas needs estimate of \$41 million dollars is about 6 percent of the nationally identified needs. Therefore, Kansas approximates 4 percent of the national rail infrastructure and 6 percent of the national needs estimate. Though not a precise check, this percentage-based comparison to national sources does suggest that \$41 million is a good needs estimate for Kansas grade crossing and grade separation needs.

Short Line Rail Assistance Needs

Short line rail system needs were initially estimated from an academic report entitled: *Economic Impacts of Railroad Abandonment on Rural Kansas Communities, Final Report* (Kansas State University, July 2003, Michael Babcock). This study estimated the cost of track replacement and rehabilitation needs to bring short-line railroad infrastructure to a standard that could accommodate 286,000 pound cars at \$308 million. Recognizing that all improvements would not be required immediately, and that many could be accomplished in the course of normal maintenance, it was assumed this could be accomplished over 20 years – resulting in an annualized need estimate of \$15 million. This would be in addition to the existing \$3 million a year spent in upgrading and maintaining shortlines. Therefore, the total short line rail needs number is estimated to be **\$18 million** in constant 2006 dollars.

Total Short Line Rail Assistance Needs: \$18 million / year

Funding

Current public revenue streams applying to the rail freight system in Kansas largely fall into two categories: grade crossing improvements and short-line assistance.

Grade-Crossing Improvements

Currently, KDOT funds or administers grade crossing improvement, protection, and separation through a variety of programs as shown in Table 1, which also aggregates improvements by type (surfacing, protection, separation) and by funding source. The sources include state, federal, and private funds. The federal government provides approximately \$11 million per year that is used for grade crossings and separations (the first five rows of Table 1). The railroads contribute approximately 20 percent of the

³FRA Office of Safety Analysis <http://safetydata.fra.dot.gov>

remaining costs, except for crossing resurfacing where they contribute approximately 50 percent. Total annual funding under these programs is **\$36 million**.

Table 1: Current Rail-Highway Grade Crossing Improvement Funding (\$ millions)

| | Amount | Years | Annual | % |
|--|---------------------------------|-------------------|--------------------|----------|
| By Program | | | | |
| Railroad Crossing Surfacing (RRS) | \$ 7.47 | 10 | \$ 0.75 | 2.1% |
| Railroad Crossing Protection (RRX) | \$ 14.10 | 10 | \$ 1.41 | 3.9% |
| Local Railroad Grade Separations (RSL) | \$ 63.74 | 10 | \$ 6.37 | 17.7% |
| New Railroad Grade Separations (RSP) | \$ 48.25 | 10 | \$ 4.82 | 13.4% |
| Railroad Crossing Off-System (RXR) | \$ 97.47 | 10 | \$ 9.75 | 27.1% |
| Wichita Separation Crossing | \$ 125.00 | 10 | \$ 12.50 | 34.8% |
| Small State Program (formerly KCC) | \$ 3.60 | 10 | \$ 0.36 | 1.0% |
| Total | | | \$ 35.96 | |
| By Type | | | | |
| Surfacing | | | \$ 0.74 | 2.1% |
| Protection | | | \$ 11.52 | 32.0% |
| Separation | | | \$ 23.70 | 65.9% |
| By Funding Source | | | | |
| State | | | \$ 14.28 | 39.7% |
| Federal | | | \$ 15.54 | 43.2% |
| Local/Private | | | \$ 6.14 | 17.1% |
| | Average Cost per Project | # per year | % of system | |
| Surfacing | \$0.04 | 19 | 0.35% | |
| Protection | \$0.15 | 77 | 1.45% | |
| Separation | \$2.96 | 8 | 0.15% | |

Short-Line Assistance

State Rail Service Improvement Funds (SRSIF) are a revolving loan program for short-line railroads, mainly for track rehabilitation. Currently, this program provides about \$3 million per year in loans. The loans are on a 10-year revolving basis, so no net new capital is currently being invested by the state. The program will continue after the end of the Comprehensive Transportation Program.

Gaps

The annual needs listed in the first section total to **\$59 million**, while the funding listed in the second section total **\$39 million**. This results in an annual estimated gap of **\$20 million**. However, post-CTP funding levels are only expected to include the Railroad Crossing Surfacing program (RRS), the Small State Program, and Federal portions of the Railroad Crossing Off-System (RXR) and Railroad Crossing Protection (RRX) Programs. Including the SRSIF revolving loan program, this translates to annual **post-CTP funding of \$14 million**, resulting in an annual **post-CTP gap of \$45 million**.

However, there are certainly other existing and future needs that are not included in the needs estimate, and which could increase the gap. These include:

- Growth of rail traffic generally
- Pressure on short lines from increased car weights, steel prices, and service requirements of mainlines
- Location of new energy producers and other shippers on short line railroads

In addition, it must again be noted that needs and funding, and by implication the gap, do not include many items that are currently being borne by private industry (mainly the railroad companies). This is a byproduct of the nature of the rail mode, which is a largely private system that serves many public needs.

Kansas Long Range Transportation Plan Needs & Gaps Methodology: BICYCLE AND PEDESTRIAN SYSTEMS

Bicycle and Pedestrian System needs were estimated in two categories: metropolitan systems and rural/micropolitan systems. Needs for both categories were calculated using existing studies, plans, and funding applications. These methodologies are described more in their appropriate sections below. The results of this needs estimation is shown below in Table 1.

NOTE: There is inherent difficulty in analyzing needs on a statewide level over a 20-year future that is in many ways uncertain. So as not to overstate the accuracy of these estimates, many of the numbers were rounded for inclusion in the LRTP report.

**Table 1: LRTP Bicycle and Pedestrian Systems Needs Estimate
(Annualized, constant 2006 dollars)**

| | |
|--|------------------------|
| Metropolitan Bicycle and Pedestrian System Needs | \$ 5 million |
| Rural and Micropolitan Bicycle and Pedestrian System Needs | \$ 8.5 million |
| Total Need | \$ 13.5 million |

Metropolitan System Needs

Metropolitan Bicycle and Pedestrian Systems needs for Lawrence, MARC (Kansas City metro area), Topeka-Shawnee and WAMPO (Wichita metro area) are based on the Regional Transportation Plans (RTPs) of the respective Metropolitan Planning Organizations (MPOs). RTPs are long-range, multi-modal planning documents meant to serve as “blueprints” for regional transportation system growth. They are federally mandated to cover a minimum planning horizon of 20 years, and often extend into the 30-year horizon. The long-range RTP forms the basis upon which an annual, short-range Transportation Improvement Program (TIP) is developed. The MARC figures include only those planned bicycle paths that are within Kansas, and therefore do not reflect all of the bicycle paths within the Kansas City region. The funding estimated for each MPO area on a 20-year planning horizon is shown in Table 2.

Table 2: Metropolitan Bicycle and Pedestrian Needs

| System | Estimated 20 year Need | Annual Need |
|----------------|-------------------------------|---------------------|
| Lawrence | \$ 20 million | \$ 1 million |
| MARC (Kansas) | \$ 17 million | \$ 1 million |
| Topeka-Shawnee | \$ 42 million | \$ 2 million |
| WAMPO | \$ 17 million | \$ 1 million |
| TOTAL | \$ 96 million | \$ 5 million |

Metropolitan Bicycle and Pedestrian System needs over 20-year horizon: \$5 million / year

Rural and Micropolitan Needs

Rural and micropolitan needs reflect the level of applications for state-administered STP Enhancement funds received in the past year. These are shown in Table 2. The estimated annual need of \$8.5 million is the sum of funded (\$2 million) and unfunded (\$6.5 million) enhancement applications. The unfunded portion is shown in Table 2. This is only a rough approximation of need as projects may be submitted for funding more than once, thus reducing the need estimate, while, on the other hand, some jurisdictions may have needs for which they are not applying for Enhancement funds.

Rural / Micropolitan Bicycle and Pedestrian System needs over 20-year horizon: \$8.5 million / year

Current Funding

A significant source of funding for bicycle and pedestrian facilities is the Transportation Enhancements (TE) Program, for which ten percent of annual STP funds are federally required to be set aside. Table 3 shows historical bicycle/pedestrian expenditures from the TE Program, indicating an average annual expenditure of \$5 million. According to KDOT, approximately \$3 million of this amount funds urban projects, and approximately \$2.0 million funds rural projects.

Furthermore, it is known that pedestrian and bicycle facilities are funded by other means especially in urban areas. Examples include bike-lane striping or sidewalks installed in conjunction with roadway widening or improvements. In urban areas, these “other sources” are estimated at \$2.0 million per year.

The annual funding levels listed above are expected to continue into the foreseeable future.

Gap

The needs described above outstrip the currently available funding by a relatively significant amount. In metropolitan areas, a gap of \$2 million is estimated. In rural areas, the estimated gap is \$6.5 million. However, there are certainly other existing and future needs that are not included in the needs estimate, and which could increase the gap. These include:

- Local needs, including both bicycle and pedestrian facilities, that are (or will be) funded by local sources. These needs are not systematically tracked across the state, and therefore are difficult to identify or forecast.
- Increased demand for non-motorized transportation caused by energy price increases. Such increases are market-driven and difficult to predict.
- Increasing trend toward incorporating multi-modal solutions into transportation projects (e.g. adding pedestrian/bicycle facilities to a roadway widening project).

Table 2: Unfunded Rural Trail Applications for Enhancement Funds

| Fiscal Year(s) | Unfunded Applications |
|------------------------------|-----------------------|
| 2008 | \$ 9,464,900 |
| 2007 | \$ 3,845,000 |
| 2005 | \$ 5,661,000 |
| 2003 | \$ 7,091,000 |
| Total for all 6 years | \$ 26,061,900 |
| Average per year | \$ 6,515,475 |

Table 3: Historical Transportation Enhancement Expenditures

| Program Year | Project Cost/ Estimate | Federal Funding |
|----------------|------------------------|----------------------|
| 1993 | 250,000 | 200,000 |
| 1994 | 9,482,369 | 7,584,308 |
| 1996 | 5,179,914 | 3,799,617 |
| 1997 | 7,720,078 | 5,783,126 |
| 1998 | 1,718,979 | 1,205,740 |
| 1999 | 556,061 | 200,000 |
| 2000 | 8,787,972 | 5,965,932 |
| 2001 | 3,631,994 | 3,377,966 |
| 2002 | 479,284 | 383,426 |
| 2003 | 6,576,885 | 3,124,040 |
| 2005 | 18,325,248 | 11,571,743 |
| 2006 | 6,958,334 | 5,346,499 |
| 2007 | 6,958,334 | 5,346,499 |
| 2008 | 3,171,380 | 2,058,527 |
| TOTAL | \$ 79,796,829 | \$ 55,947,428 |
| Average | \$ 4,987,302 | \$ 3,496,714 |