Kansas LONG RANGE TRANSPORTATION PLAN

Chapter 3

Roads, Streets and Highways – Condition and Needs

Roads, Streets, and Highways - Conditions and Needs

With 134,724 miles of public roads, Kansas ranks fourth among the states in number of public road miles. The magnitude of the Kansas road network is attributable to the fact that the State is large in terms of geographic size and has few natural barriers such as mountain ranges to impede the building of roads. The State developed from an agricultural base that saw a family farm on every 80 or 160 acres, which in turn dictated the need for a road every mile. The map on page 3-2 demonstrates the density of existing Kansas roads.

Even though the State has a large number of roads, the majority of them fall under city and county jurisdiction. The following table presents the breakdown of jurisdictional responsibility and travel on all roads in Kansas. The State Highway System and City Connecting Links (that portion of any State route going through a city) make up 10,380 miles, or just 8 percent of the more than 134,000 miles of public roads in Kansas, yet they accommodate over 50 percent of the travel in the State.

The Interstate System (including 238 miles on the Kansas turnpike) in Kansas comprises less than 1 percent of the road mileage total in the State (874 miles), but carries almost 23 percent of the miles traveled at 18,019,524 daily vehicle miles traveled (DVMT).

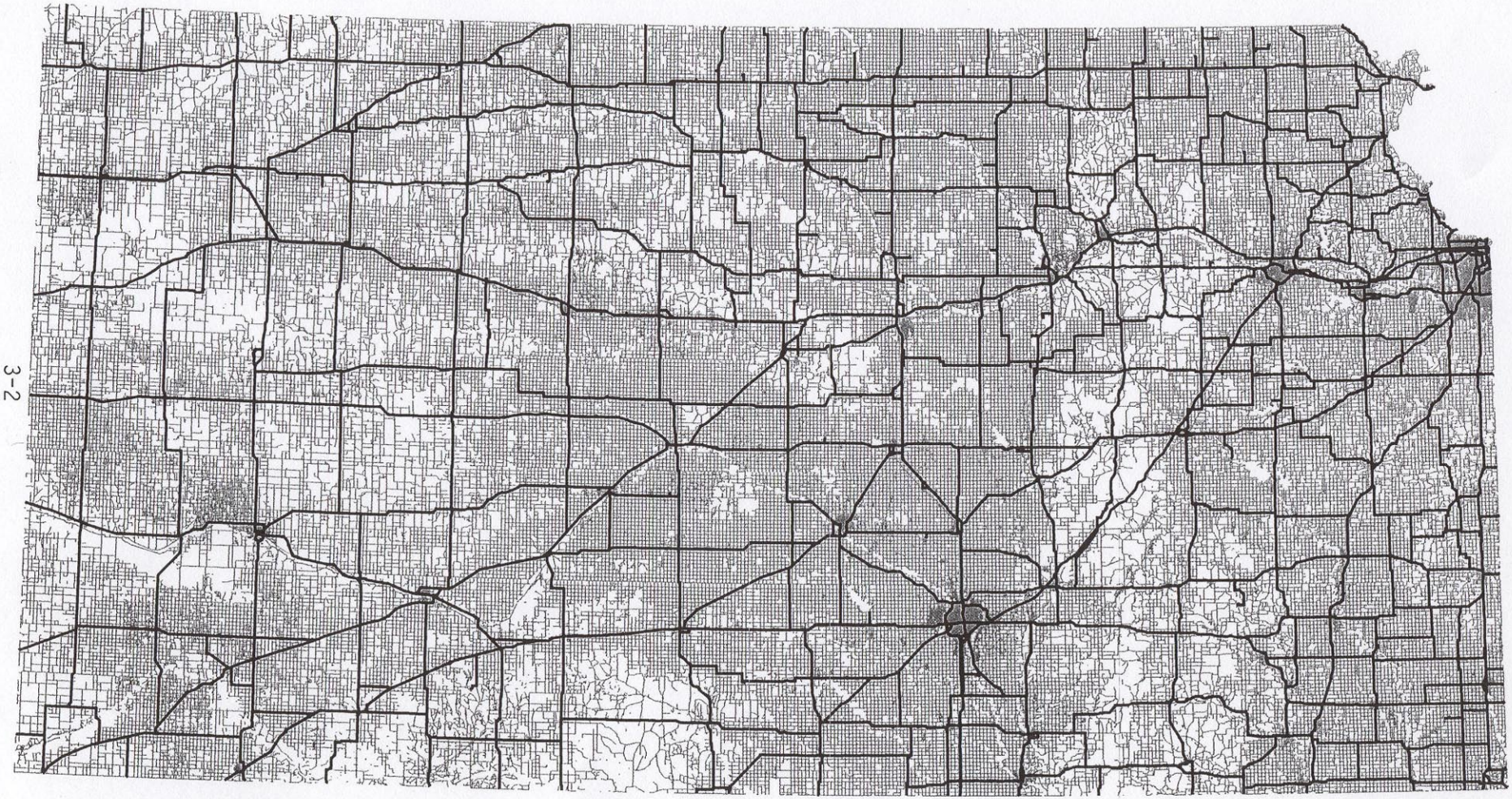
Table 3-1: Kansas Public Road Miles & Travel By Jurisdiction - 2001

SYSTEM	CENTER LINE MILES	% OF TOTAL MILES	DAILY VEHICLE MILES	% OF TOTAL TRAVEL
State Highway	9,564	7.1	26,913,269	34.2
City Connecting Links	816	0.6	14,772,557	18.8
County/Township	110,036	81.7	12,113,108	15.4
Municipal	13,834	10.2	20,828,768	26.4
Turnpike	238	0.2	3,929,950	5.0
State Park Roads	236	0.2	196,888	0.2
TOTAL	**134,724**	**100.0**	**78,754,540**	**100.0**

Source: KDOT Selected Statistics, 2001

Figure 3-1

ALL ROADS IN KANSAS 2000



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State Highway System

All Other Roads (source: US Census 2000 Tiger Files)

10 0 10 20 30
MILES

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ALLROADS2000.DGN AUGUST 14, 2002

The majority of the roads in Kansas are in rural areas of the State. These roads allow access to farms, movement between towns and cities, and travel across the State. Of the 134,724 public road miles in the State, 124,301 are in rural areas and 10,423 miles are in urban areas (areas of greater than 5,000 population). In 2001, the DVMT on the rural system was 42,260,212 compared to 36,494,328 on the urban system. This is a key element since roads in urban areas constitute only 8% of the total road miles in the State, but account for 46% of the travel. In Kansas, good roads in both rural and urban areas are a necessity for travel and access to all parts of the State.

Kansas ranks third in the number of bridges among the 50 states, totaling 25,983 bridges in 2000. Of the 25,983 bridges, 3,445 (13.2%) are classified as structurally deficient and 2,912 (11.2%) bridges are classified as functionally obsolete. A structurally deficient bridge is defined as a bridge that is (1), closed because of structural inadequacies; (2), posted with a weight limit; or, (3), in immediate need of rehabilitation to remain open. A bridge is defined as functionally obsolete if, although structurally sound, it is no longer adequate to handle the traffic for the road on which it is built. Bridges are also considered to be functionally obsolete if the bridge is narrower than the road it is on, including shoulders.

Kansas Bridges
By jurisdiction

- State- 4,913
- City- 1,084
- County- 19,646
- KTA- 340

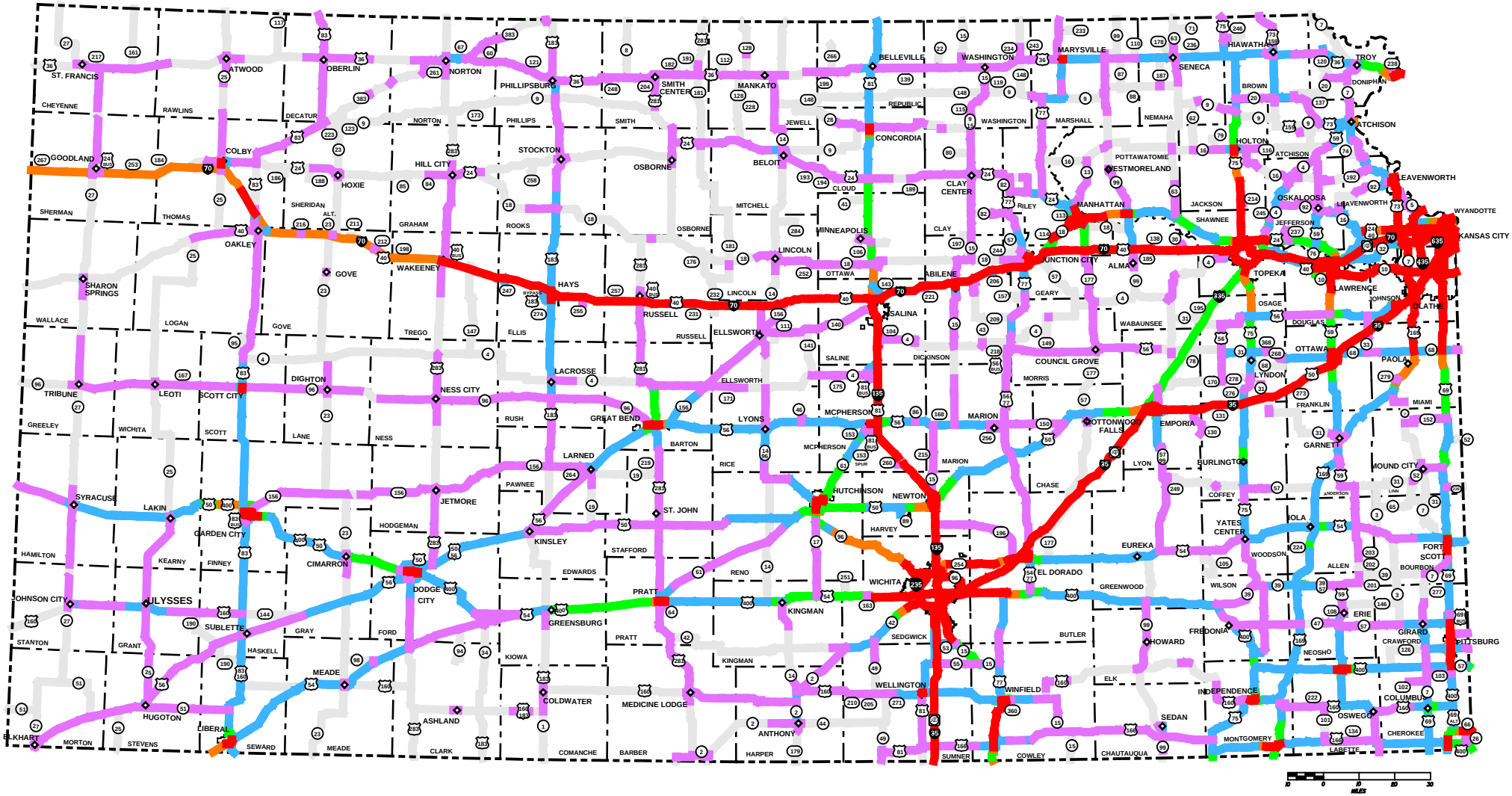
State Highway System

The rural State Highway System consists of 9,564 miles, and includes the Interstate, U.S. route numbered highways, and Kansas route numbered highways. KDOT has jurisdictional responsibility over all of these routes, except for the portions of these routes carried by Kansas Turnpike. Interstate, U.S., and Kansas routes have the same funding sources and have similar importance for transportation in Kansas. For the most part, the U.S. routes were named in the 1930's and 1940's to aid travelers in cross-country travel, but have no added significance for funding as compared to Kansas routes.

Travel on the State Highway System has continued to grow over the years and that growth shows no sign of abatement. Between 1970 and 2000, the population of Kansas grew at one-half percent annually, while travel on the State Highway System grew seven times as rapidly, averaging 3.2 percent annually. The maps on page 3-4 and 3-5 display the average daily traffic and truck traffic, respectively, on the State Highway System, and the Kansas Turnpike.

Commercial truck traffic on the rural State System has grown at a faster rate than that of passenger vehicles. In the 15 years between 1986 and 2001, commercial truck travel increased 73 percent while car and pickup truck travel grew by 49 percent. In 2001, commercial truck travel comprised 18% of all vehicle miles on the rural State System.

KANSAS STATE HIGHWAY SYSTEM
2001 DAILY TRAFFIC



0 – 999	1000 – 2499	2500 – 4999	5000 – 7499	7500 – 9999	> 10,000

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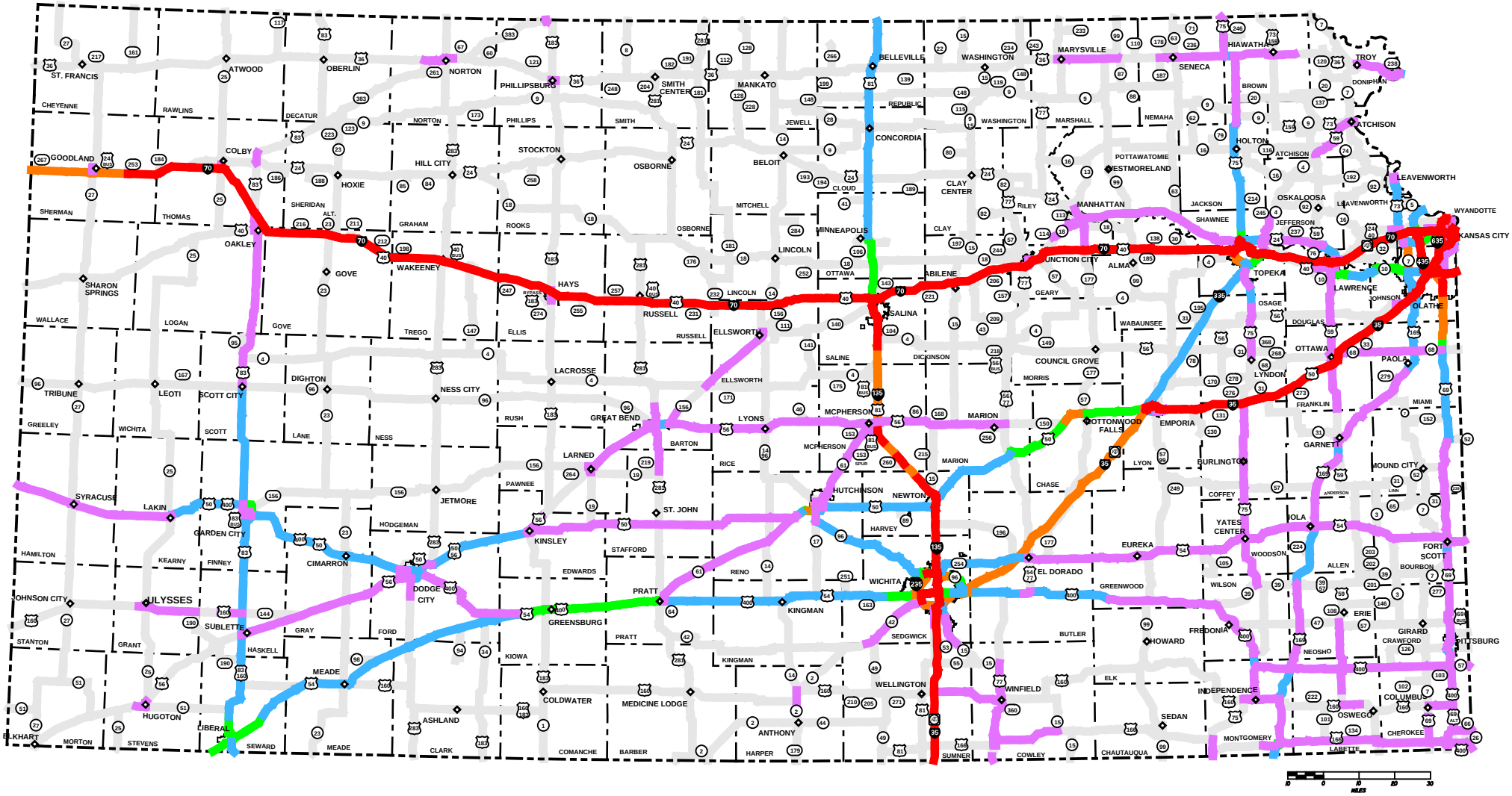
KANSAS STATE HIGHWAY SYSTEM
2001 DAILY HEAVY COMMERCIAL VEHICLE TRAFFIC



0 – 499	500 – 999	1000 – 1499	1500 – 1999	2000 – 2999	> 3,000

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In addition to the rapid growth in number of trucks using the State Highway System, the average weight of trucks has grown as well. In 1959, the average weight of all loaded and empty trucks was 28,175 pounds. In 2001, the average truck weight was 50,900 pounds - an increase of more than 80 percent. This is significant because many facilities were designed and built prior to 1959. Many factors have led to the increased weight of trucks during this time, including the fact that size and weight limits have changed, back-haul restrictions have been lifted, and deregulation of the trucking industry has occurred.

KDOT Route Classification System

In order to better manage and address the diversity of the Kansas State Highway System, in 1988 KDOT developed and adopted a route classification system based on daily traffic, route continuity, access to major cities, trip length and route spacing. The System is divided into five classification levels (A through E routes) as described below. The map on page 3-7 displays the route classification system.

The principal purpose of the route classification system is to ensure that limited resources are directed to the highest priority routes and to ensure that the highest percentage possible of the traveling public drives on roadways appropriate to the purpose of their trip. The Route Classification System is one of the factors considered in a variety of department activities including project selection, establishing priorities in the Railroad Grade Separation program, and setting design standards.

CLASS A -- The Interstate System, including the Kansas Turnpike.

CLASS B -- This class, along with Class A Routes, serves the most important corridors of statewide and interstate travel. Nearly all cities with a population over 10,000 are within ten miles of one of these routes. There is a higher proportion of drivers that are unfamiliar with the particular features of the route, making continuity of design over major sections of the route very important.

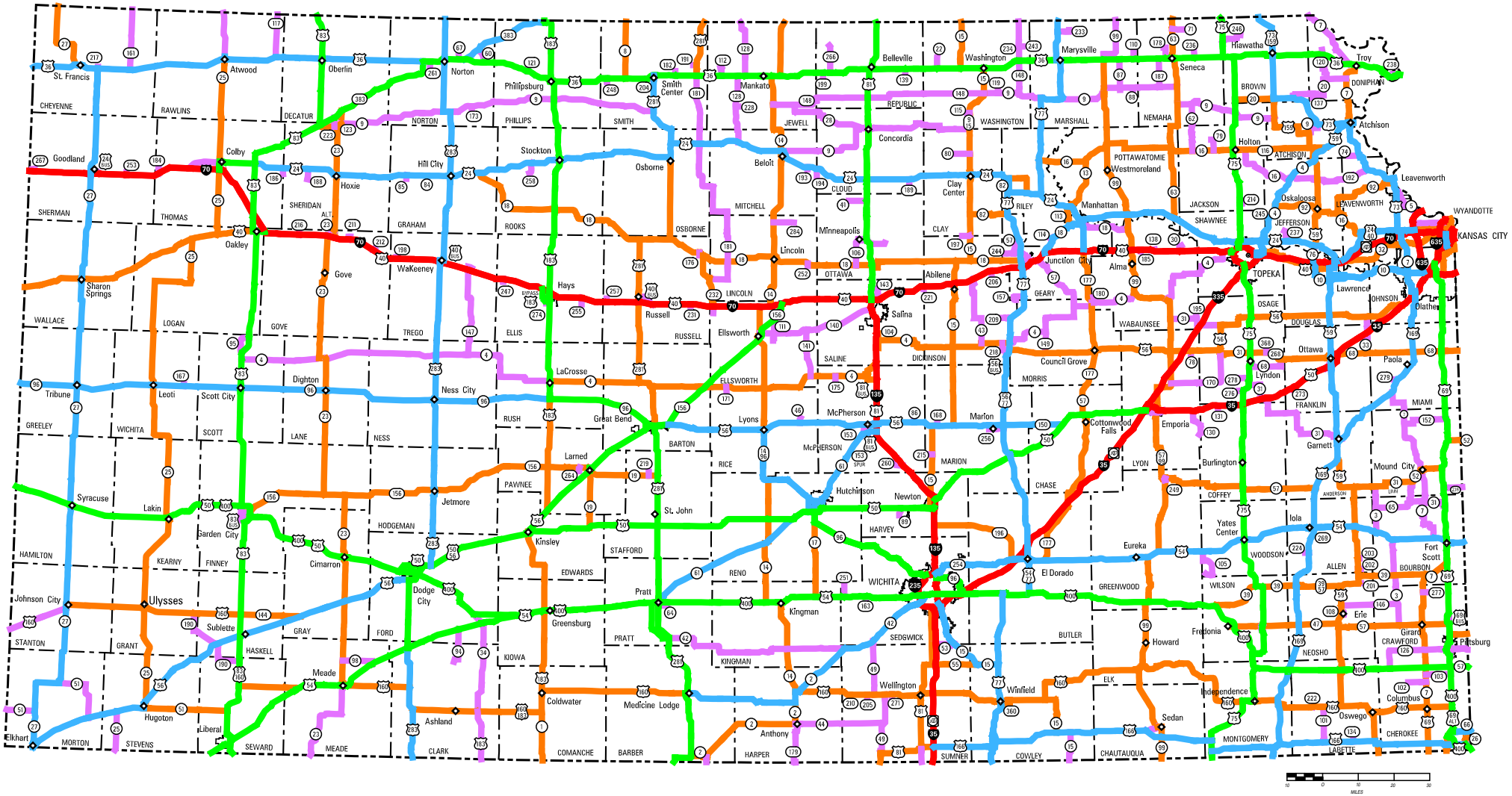
CLASS C – The principal function is to provide person and commodity movement between regions of the State. Route continuity is less important than for Class B Routes and design elements of the routes can change at major activity points and major junctions.

CLASS D – This class contains routes that serve the combined role of inter-county movement and access to smaller cities. Almost no interstate service is provided, except as access to an Interstate route.

CLASS E – This class is made up of stub routes and routes whose service is limited almost exclusively to local travel. The average trip length is generally very short but may vary widely, depending on the nature of the local area served.

KDOT Route Classification System

Revised July 7, 1999



A Route

B Route

C Route

D Route

E Route

Table 3-2: Miles and Travel by Route Classification, 2001

ROUTE CLASSIFICATION	MILES	% OF MILES	TOTAL DAILY VEHICLE MILES TRAVELED (VMT)	% OF TOTAL VMT	TOTAL DAILY TRUCK MILES TRAVELED	% of TOTAL TRUCK VMT
A	874.540	8.2	18,021,508	39.5	2,854,732	41.9
B	2,175.968	20.5	10,712,605	23.5	1,864,972	27.4
C	2,459.406	23.2	9,223,054	20.2	1,171,404	17.2
D	3,275.414	30.8	6,043,9555	13.2	741,716	10.9
E	1,833.505	17.3	1,621,570	3.6	181,788	2.7
TOTAL	10,619.833	100.0	45,622,692	100.0	6,814,612	100.0

Notes: Includes the Kansas Turnpike and City Connecting Links.
Source: Kansas Department of Transportation CANSYS Database, December 31, 2001

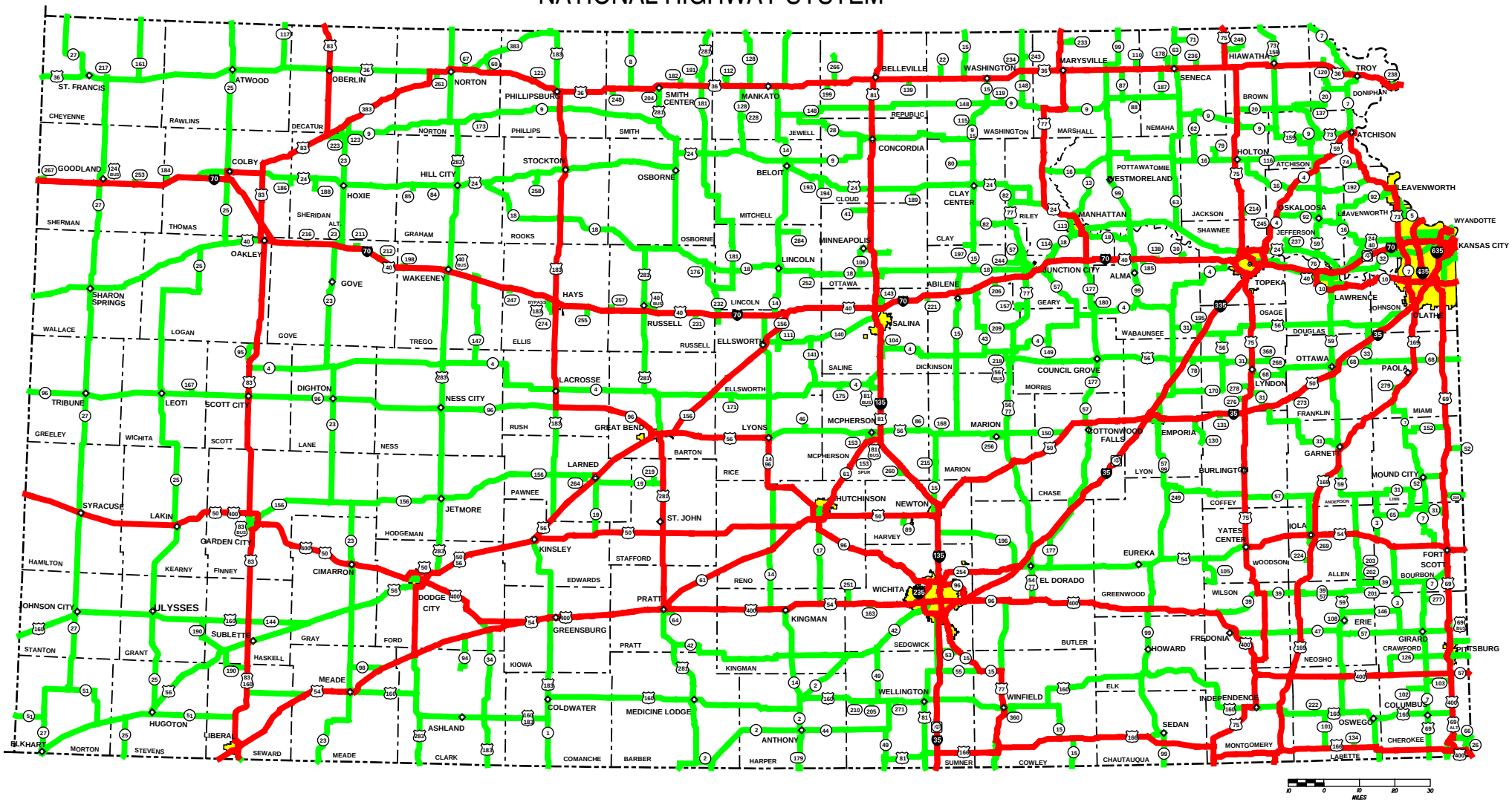
National Highway System

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 eliminated the historical Federal-aid System and created the National Highway System (NHS) and other Federal-aid highway categories. The NHS was selected in consultation with appropriate local officials; it consists of highway routes and connections to transportation facilities depicted on the maps submitted by the Secretary of Transportation to Congress on May 24, 1996. Highways designated as part of the Interstate System are included in the NHS.

FHWA describes the NHS as the backbone of our nation's transportation network in the 21st Century. As described in ISTEA, the purpose of the NHS is to "*provide an interconnected system of principal arterial routes which will serve major population centers, international border crossings, ports, airports, public transportation facilities and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel*."

The NHS is not a system of new highways. In fact, 98 percent of the NHS mileage already exists. The approximate size of the NHS is over 160,000 miles nationwide, which is roughly 4 percent of all U.S. roads. In 2000, the NHS included 118,876 rural miles and approximately 41,915 urban miles.

NATIONAL HIGHWAY SYSTEM



NATIONAL HIGHWAY SYSTEM

NON-NATIONAL HIGHWAY SYSTEM

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Nationally, the NHS carries approximately 40 percent of all vehicle traffic, 75 percent of commercial truck traffic, and 80 percent of the tourist traffic. In addition, it is estimated that 95 percent of the nation's businesses are located within five miles of the National Highway System.

The NHS in Kansas consists of 3,737 miles, representing only 2.8 percent of all public roads in the State. Of this total, 3,321 miles are located in rural areas, and 416 miles are located in urban areas. The daily travel on the National Highway System in Kansas for 2001 was 33.4 million daily vehicle miles of travel. This amounts to about 42 percent of the daily travel in Kansas. In 2001, the heavy commercial traffic on the NHS was 5.2 million daily vehicle miles of travel, which is over 60 percent of the commercial traffic in Kansas.

Highway System Planning

Kansas and its neighboring states have several corridors that are experiencing growth in both commercial truck traffic and overall traffic. While some of these routes are contained totally within a state, many cross state borders. In order for these highways to continue to move traffic safely and efficiently, additional capacity in the form of additional lanes or the construction of passing lanes will be needed within the next 20 years.

The importance of maintaining adequate capacity on a highway system is to provide smooth traffic flow. The benefits of smooth traffic flow include reduced travel time, reduced driver fatigue, increased reliability and enhanced safety. Increased reliability is becoming more important to businesses that rely on “Just-in-Time” delivery of materials as part of the manufacturing process.

Planning for the long-range vision of a highway allows individual projects, selected through KDOT’s priority formula process, to be designed to fit the ultimate goal for the route. Consideration can be made to preserving sufficient right-of-way for long-range improvements and establishing access control before significant development occurs. In the long run, this lowers right-of-way costs and is less disruptive to businesses that locate near highway access points.

Being located in the geographic center of the 48 contiguous United States, travel patterns in Kansas are heavily influenced by out-of-state traffic and the corridors available to that traffic. The Interstate routes such as I-70 and I-35 are obvious major carriers for this traffic, but other routes carry travelers and freight for long distances. For the purposes of this long-range plan, Colorado, Nebraska, Missouri, and Oklahoma were contacted regarding their plans for expanding routes that lead to Kansas. A map showing these plans is shown on page 3-12.

- Nebraska, in addition to creating a US-81 expressway corridor from Kansas to Yankton, South Dakota, is also considering a connection from US-81 at Norfolk to I-29 at Sioux City, Iowa, which could facilitate Canadian traffic as well as traffic from the Twin Cities. Kansas has completed the 4-lane expressway expansion of US-81 from Concordia north to Nebraska. The Nebraska Department of Roads also plans to create a 4-lane expressway from Omaha south to Auburn on US-75. While

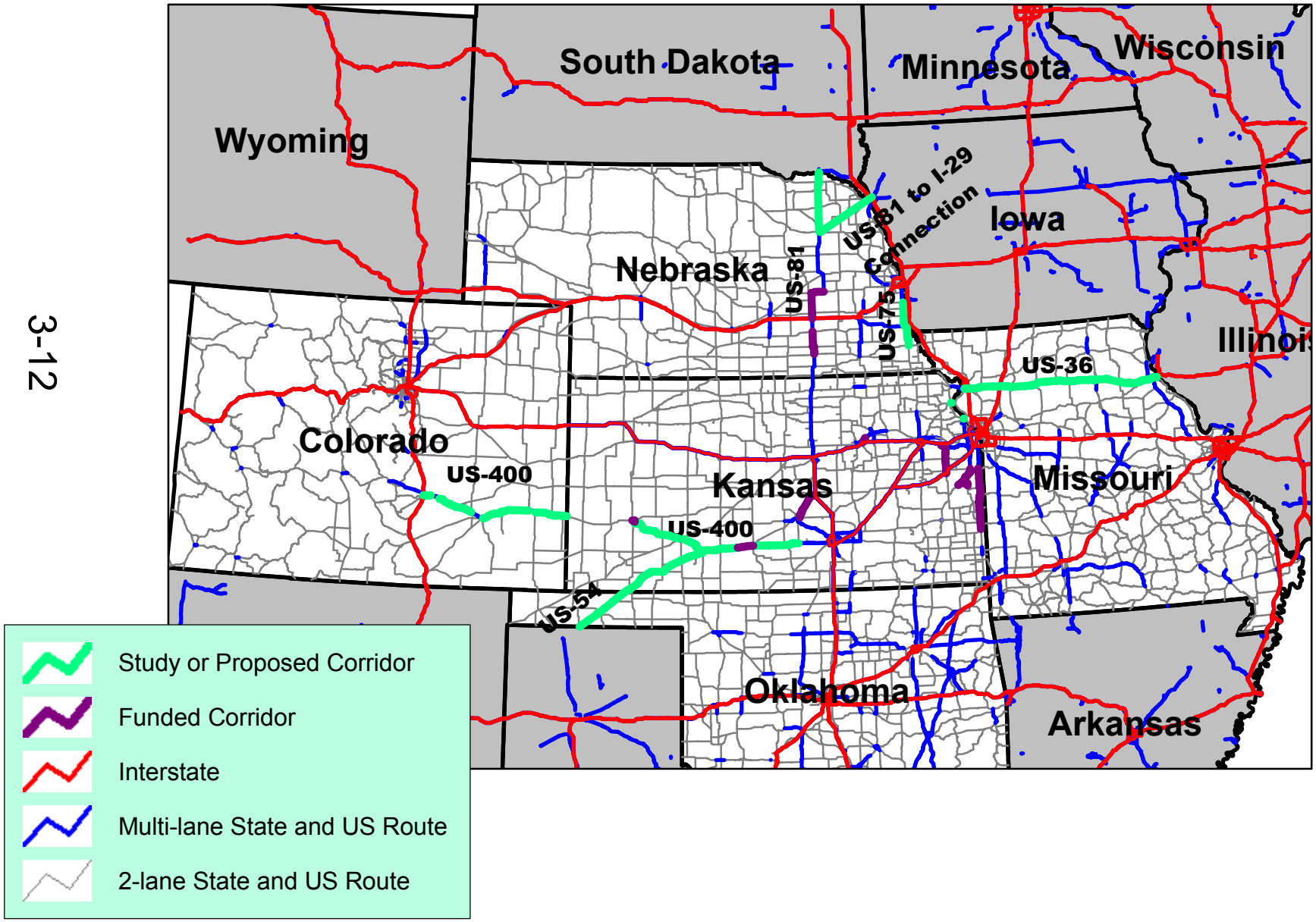
this would not connect to Kansas, traffic should be monitored along the US-75 corridor as Holton and the Native American casinos have generated considerable growth in traffic.

- The Missouri border is by far the largest source of interstate traffic to Kansas. The most traveled border crossings are already four lanes: the Interstates in Kansas City, and US-36 in St. Joseph. Missouri River crossings are two points of expansion: the US-59 bridge at Atchison and the K-92 bridge at Leavenworth. The US-59 bridge at Atchison will be replaced as a System Enhancement. This will facilitate traffic moving between St. Joseph and Topeka. The Leavenworth bridge is the western end of the S.R. 92 corridor being considered for improvement by the Missouri Department of Transportation (MoDOT). This is a vital intermodal route linking Leavenworth with the Kansas City International Airport. MoDOT is also considering expansion of the east-west corridors, including widening of I-70 between Kansas City and St. Louis and improving US-36 to freeway standards across the state. US-36 may serve as a relief route for I-70 traffic from Kansas City to Chicago, but it may also direct more traffic toward northern Kansas along US-36.

- Oklahoma does not have expansion plans for any north-south routes leading to Kansas, but it is worth noting that US-75 is mostly four lanes from Tulsa north to Kansas. US-75 and US-169 both lead to Tulsa, but only US-169 connects to Kansas City. Oklahoma has plans to expand US-54 in the Panhandle to four lanes; combined with Texas and New Mexico's improvement plans this is a vital section to connect US-54 to Interstate 40 near Tucumcari, New Mexico.

- Colorado plans to expand US-400 to a 4-lane expressway from Pueblo to La Junta. Other sections near Lamar and Las Animas are already expressways. Along with KDOT's plans to study US-400 from Garden City east, this could possibly create a key corridor connecting Wichita to the Front Range of the Rocky Mountains.

Figure 3.6: Regional Corridors Affecting Kansas



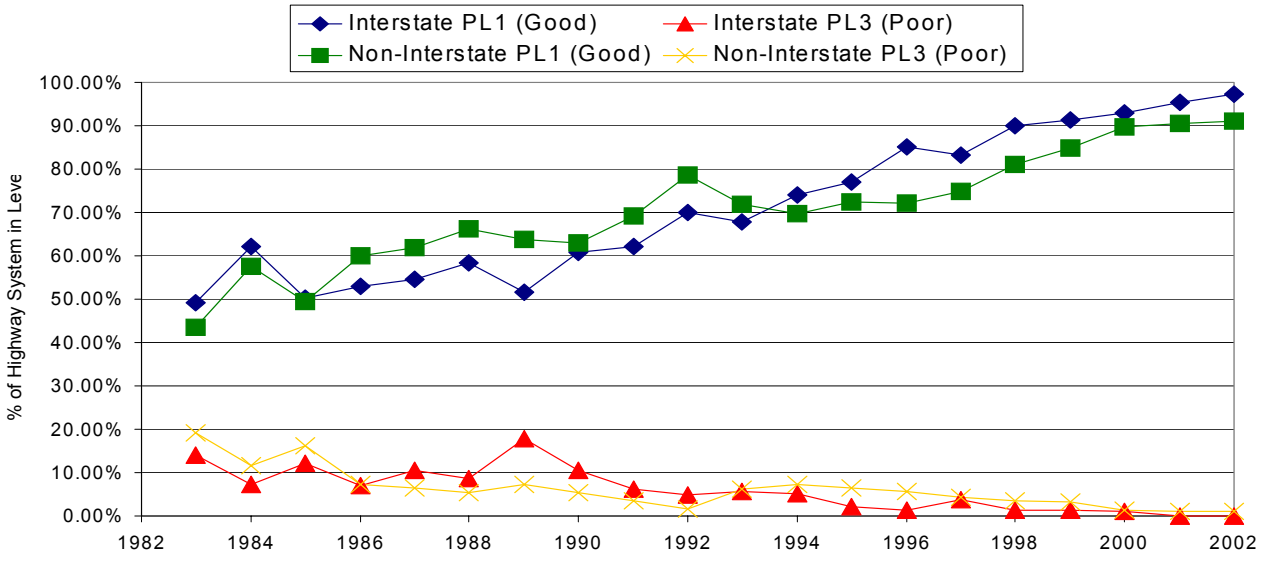
Conditions and Needs

Pavement

Surface needs have been and will continue to be KDOT's highest priority. Efforts to maintain and improve surfaces consume a large portion of KDOT's time, energy, and resources. Routine maintenance efforts and substantial (contractor-performed) maintenance and major modifications programs all have as their primary objective to maintain or improve the pavements of the State Highway System.

KDOT annually measures the condition of our highway pavement surfaces. The primary use of this data is decision support for project selection, but it also serves as an indicator of performance provided to the traveling public. Data elements include roughness, cracking, and rutting on asphalt surfaces and roughness, joint distress, and faulting on concrete surfaces. The roughness and distress data are combined into a three-level index called performance level. Performance Level One is for pavements that are in good condition and only need routine or light preventative maintenance. Performance Level Three pavements are in poor condition and need significant work. The data elements and performance level definitions have been kept stable since KDOT began collecting this data so changes in condition could be tracked over time. The following chart shows how the percentage of KDOT managed roadways in the good and poor performance levels have changed over time for both the Interstate and non-Interstate highways. Clearly, the percentage of highways with good pavement surfaces has improved and the corresponding poor highway surface mileage has decreased.

Figure 3-7 Kansas Pavement Performance Level (PL)



Shoulders

The shoulder is that portion of the roadway adjacent to the travel lanes, and may be turf, gravel, or paved. Shoulders provide lateral support to the pavement as well as safety benefits. In some cases, the shoulder can accommodate bicyclists and other slow-moving vehicles.

As part of the External Survey in 2001, KDOT conducted "Road Rallies" in which citizen volunteers determined what attributes are important on Kansas roads, and how expectations differ by route classification. For example, the public has higher expectations for the smoothness of Interstates (Class A) than it holds for Class E routes. However, shoulder type and width proved to be important, regardless of classification. The condition or type of the shoulder can significantly affect a driver's perception of safety (as a means of crash avoidance) and therefore, comfort level. The participants surveyed did not consider turf shoulders to be acceptable, even for Class D and E routes. Also, for 2-lane B and C routes, eight feet appeared to be the minimum acceptable paved shoulder width. By these standards, a very large percentage of the State Highway System does not meet our customers' expectations.

Capacity

Traffic has increased on the majority of Kansas highways. Growth has occurred at an even faster rate on highways in urban areas and routes connecting the larger, growing cities. For a given highway, its level of service generally declines as traffic increases. On two-lane highways, this level of service is measured by the percent of time that a vehicle spends following another vehicle. In the rolling terrain of eastern Kansas, the vehicles are more likely to spend time following a slower vehicle because large vehicles have more difficulty climbing hills, and also the hills decrease opportunities for passing by restricting sight distances. Some of the Major Modification projects improve these situations by flattening roads and adding intermittent passing lane sections, but as traffic volumes increase, these improvements become ineffective. For very high-volume roads, widening to four-lane expressways or freeways may be the only improvement that would significantly relieve congestion and improve safety. The Major Modification and System Enhancement programs contain several of these expansion projects; some are funded for construction, while others look toward the future by providing funds for preliminary engineering and/or right-of-way acquisition, so that when traffic volumes warrant and construction funds become available, a feasible corridor is available. This preservation of a corridor also allows local governments to make prudent land-use decisions.

Bridge Needs

The State Highway System contains 4,913 bridges, of which 3,199 are span bridges and 1,714 are box bridges. Of the 3,199 span bridges, 776 will be over 50 years old and an additional 804 will be over 40 years old when the CTP ends in 2009. Bridges, in general, have a life expectancy of 50 to 75 years depending on the bridge type. Span bridges generally have a life of 50 years, but their decks generally are considered to have a life of

only 30 years. At anticipated funding levels, KDOT could only perform bridge replacement or major rehabilitation work on an 80-year cycle.

Future Needs

Although the CTP is often called the largest public works program in Kansas' history, deficiencies will remain in our highway system in 2010 after the projects funded by the ten-year CTP have been constructed. In addition, many more needs will accrue in the years after 2010 as traffic volumes continue to grow and pavements and bridges continue to deteriorate. Furthermore, there will be needs for new facilities such as additional interchanges, bypasses, or additional capacity modifications such as new four-lane corridors or the addition of lanes on existing two-lane roads.

Kansas Turnpike

The 238-mile Kansas Turnpike connects the four largest cities in the State. The facility runs from the Kansas City area west through Lawrence to Topeka, then south to Wichita, ending at the Oklahoma State line. It was opened to traffic in 1956 and preceded the building of the Interstate system. Operation of the Kansas Turnpike is governed by the Kansas Turnpike Authority (KTA), a five person board which consists of two members from the general public, each appointed for a four-year term by the Governor, and three members who serve on the KTA by virtue of their respective leadership positions in other transportation concerns: the Secretary of the Kansas Department of Transportation; the Chairman of the Kansas Senate Transportation and Utilities Committee; and a member of the Kansas House Transportation Committee appointed by the Speaker of the House.

Over 25 million passenger cars and nearly four million commercial vehicles traveled on the Turnpike in 2001. The average trip length on the Turnpike for all vehicles in 2001 was 44 miles. Passenger vehicles comprised 86 percent of the total number of vehicles and 81 percent of the total miles traveled on the Kansas Turnpike during the year.

Since its beginning, the Kansas Turnpike has continued to evolve in response to the needs of the traveling public. Interchanges have been added and service areas have been expanded and modernized. System wide improvements have been made for increased motorist safety such as the addition of a concrete barrier median to the entire length of the Turnpike. Recent improvements include the addition of the K-96 interchange in Wichita, the construction of the I-70/K-4 system interchange in east Topeka, the total rebuild of the East Topeka service area, and the relocation/reconstruction of the East Terminal toll plaza.

As one of the recommendations from the previous Kansas Long-Range Transportation Plan, KDOT has included the Turnpike Authority in joint planning efforts. The largest example of this joint planning is the KawConnects Major Corridor Study, which examined all modes of transportation between the Topeka and Kansas City metro areas from

the present to the year 2025. The jointly funded study was precipitated by the rapid travel growth on east-west roadways in the area, as well as new large developments in the corridor, such as the Kansas Speedway and the former Sunflower Ammunition Depot south of DeSoto. A travel-demand computer model was created to simulate traffic on the highways, and this allowed for the analysis of different highway improvements, such as building new highways or widening existing ones. While non-highway improvements (commuter rail, inter-city transit) were also studied, significant congestion reduction for the year 2025 cannot be achieved without adding capacity to I-70 (carried by the Kansas Turnpike) and K-10 between Lawrence and the southern Kansas City metro area.

KTA recently completed a Long-Term Needs Study, which examined the Turnpike's maintenance and construction needs for the next 10 to 20 years. The study indicated that the section of roadway between Topeka and Lawrence would need to be widened to six lanes if an acceptable level of service is to be maintained. The remaining section from Lawrence to Kansas City may have to be widened depending upon future Kansas Department of Transportation projects on parallel roadways and other developments in the corridor.

Another concern for the Turnpike is the condition of the Kansas River bridges in Lawrence. According to the Long-Term Needs Study, these bridges must be replaced by 2012 and currently need strengthening on some of the critical members of the truss sections. As a continuation of the planning process, Turnpike officials have begun work on preliminary assessments and conceptual designs for widening and the complete bridge replacements.

The chart below shows usage trends for the KTA for selected years from 1957 to 2001.

Table 3-3: KTA Usage 1957-2001

	ANNUAL NUMBER OF VEHICLES (in 1000's)			**MILES TRAVELED (in 1000's)**		
Year	**Passenger Vehicles**	**Commercial Vehicles**	**Total Vehicles**	**Passenger Vehicles**	**Commercial Vehicles**	**Total Vehicles**
1957	3,411	202	3,613	199,688	15,789	215,477
1967	6,858	991	7,849	334,949	60,702	395,651
1977	9,467	2,237	11,704	418,095	115,334	533,429
1987	13,585	2,734	16,319	565,619	155,973	721,592
1997	23,979	3,598	27,577	947,407	215,391	1,162,798
2001	25,811	3,975	29,786	1,006,696	245,598	1,312,294

Source: 2001 Selected Statistics, page 37 and KTA Annual Report.

Local Roads and Bridges

Cities and counties across the State have an enormous task in maintaining and upgrading their roads and bridges. The cities have jurisdiction over 13,834 miles of road and 1,084 bridges. The counties have jurisdiction over 110,036 miles of roadway and 19,646 bridges. In total, 90 percent of the roads and 80 percent of the bridges in the State are the direct responsibility of cities and counties.

Since there are 105 counties and 627 incorporated cities in the State, it is often difficult to assemble information on local road conditions and needs. However, more information is available on local bridges because they are inspected on a two-year cycle using a standardized format developed in conjunction with the National Bridge Inventory (NBI) program.

Even though most of the local bridges are located in rural areas and carry a low volume of traffic, they are necessary components of the local transportation network. Of the State's 20,730 local jurisdiction bridges, over 75 percent (15,307) carry fewer than 100 vehicles per day. Over 90 percent of those bridges (18,636) carry fewer than 500 vehicles per day. Unfortunately, many of these bridges were not designed to carry today's vehicle weights and are posted with a load or other-use restriction.

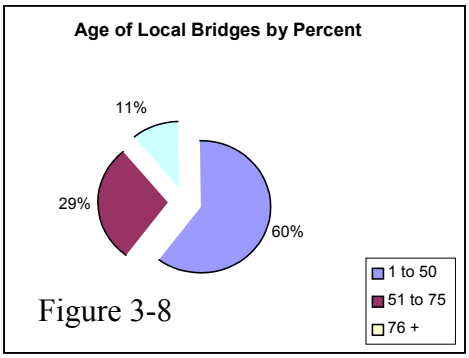


Figure 3-8

As Figure 3-8 indicates, 40 percent of the local city and county bridges are over 50 years old. More local bridges (3,305) were built in the 1930's than any other decade. Because of these factors, bridge maintenance and replacement funding is a constant challenge for local officials.