Overview
The Kansas City Regional Freight Outlook (RFO) was prepared to sustain existing momentum and further expand the region’s presence in transportation and logistics. The overall vision for the Kansas City RFO is to positively impact and accommodate the growth of freight transportation and logistics in the 18-county study area.

The Mid-America Regional Council and Kansas City SmartPort initiated the Kansas City Regional Freight Outlook. The Kansas City RFO was developed in collaboration with the Kansas and Missouri Departments of Transportation.

The overall study included a series of deliverables focused on identifying freight infrastructure needs and assessing Kansas City’s regional transportation advantages, resulting in targeted strategies and messages for the region. The following list details each of the study deliverables:

- **Freight Directory**: Inventory of the region’s 40 freight zones including modes, volumes, existing industries and presence of foreign trade zones
- **Business Survey**: Summary of 427 survey responses of businesses on freight topics important to the region
- **Focus Group Summary**: Major findings from five focus groups conducted with the general public, business and elected officials
- **Freight Infrastructure Investment Plan**: Focuses upon transportation infrastructure by freight mode and provides a set of transportation priorities for the region.
- **Regional Freight Assessment**: A comparative assessment of Kansas City against other cities in the U.S. in terms of freight activities and site selection characteristics.
- **Freight Flow Analysis**: A summary of the volume and value of freight flows in, out and through Kansas City by truck, rail, air and barge.
- **Freight and the Environment in Kansas City**: A brief white paper on environmental topics related to freight and the region.

Using the data and research from each element, a series of findings are outlined that help inform the Strategic Plan development. This Strategic Plan draws on the data and research completed as part of the overall Kansas City RFO elements related to infrastructure, freight flows and economics to create objectives, strategies, and tactics that support the regional vision. The freight Strategic Plan was created to help the region remain a vital national freight transportation hub attracting freight growth.

Finally, the Kansas City RFO Summary is a culmination of all the work completed on each individual element. The summary provides an overview of the study effort, information on infrastructure and freight flows, as well as, a summary of the surveys and comparative cities analysis. Key recommendations and critical actions are provided to narrow the focus on the near term and help to initiate and maintain the regional vision to positively impact and accommodate the growth of freight transportation and logistics in the 18-county study area.
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Introduction

This freight infrastructure investment plan as part of the overall Kansas City Regional Freight Outlook (RFO) focuses upon transportation infrastructure by freight mode. It begins by reviewing the current ability of the transportation system to accommodate current demand as well as projected growth. Then different evaluation processes are discussed to assist in determining an appropriate set of transportation priorities for the region. It concludes with an investment plan that has recommendations for entities directly involved at the local and regional level with freight transportation.

The Regional Freight Infrastructure discussion focuses on the highway, rail, air and barge modes, yet also acknowledges the role of ITS (Intelligent Transportation Systems) through such entities as Kansas City SCOUT and SmartPort’s Trade Data Exchange (TDE) initiative. In several instances, some data is currently available to define and assess existing conditions, yet significantly more detailed analysis is necessary before a specific action can be identified. For example, our region has more than 1,100 at-grade highway-rail crossings where the interaction between freight trains and passenger vehicles or trucks may present safety concerns. Yet further analysis of the crossings is needed to review the number of trains and the number of vehicles per day as well as the type of control at a crossing to determine where and what kind of actions are needed.

The Investment Plan is framed around strategic initiatives that will improve the region’s goods movement infrastructure. It is acknowledged that the study area go beyond MARC’s planning boundaries and encompasses several other Metropolitan Planning Organizations (MPOs). Consequently the reader is reminded that while the discussion of freight-related infrastructure includes the larger regional system, the recommendations for transportation strategies are made only for the MARC area. In the example of the at-grade highway-rail crossings, the strategic initiative is to enhance safety through the tactics of conducting corridor analyses that will assist in identifying problem areas and remediation measures. In essence, conducting the corridor analysis is an action resulting in the identification of potential projects. The next step would be an implementation process that would review costs, funding sources and priorities within that corridor.

Throughout this plan the terms “goods movement," “freight system," and “freight-related infrastructure” are often used. While the terms may appear similar, the meanings vary according to the context of the topic. Goods movement denotes goods or produce transported by barge, plane, train or truck, in other words by any and all modes. Freight systems encompass the strategic planning efforts for freight investments as well as managing programs. The systems perspective reviews trade flows (volume and commodity), industries relying on freight system and the distribution of products. The U.S. Government Accountability Office (GAO) in setting the Framework for a National Freight Policy refers to freight-related infrastructure when discussing the role, goals and degree of involvement of public and private stakeholders in supporting freight-related investments. From a private industry perspective, supply chain management is term that encompasses the planning and management of all activities involved in sourcing, procurement, conversion and logistics activities. Supply chain management addresses issue of the distribution network configuration including the number, location and network of distribution centers as well as distribution strategy including the delivery scheme, mode of transportation and transportation control. The purpose of supply chain management is to improve trust and collaboration amongst supply chain partners, thus improving efficiency. Similarly, the purpose of this freight infrastructure investment plan is to improve the trust and collaboration amongst the region’s freight stakeholders by maintaining and enhancing the region’s infrastructure.
Regional Freight Infrastructure: Review and Progress

Kansas City has a vast transportation network encompassing highways, railroads, airports and the Missouri River system. These modes provide a strong base for the supporting freight transportation infrastructure in the region.

Highway

The region’s highway system encompasses three interstate highways (I-29, I-35, and I-70) traversing multiple states, numerous interstate beltways or links (including but not limited to I-435 in Kansas City, I-335 in Topeka and I-229 in St. Joseph) within the metropolitan area and 10 U.S. highways with several cross state (such as U.S. 71) and local routes providing direct access to industry. Generally, highway freight transportation volumes, represented by trucks, concentrate on the higher functional classifications like the interstate highways but the “last mile” to access facilities is just as important to overall efficiency and reliability of truck transportation. Exhibit 1 (next page) shows truck volumes, or average daily traffic (ADT), throughout the region.

The truck volumes in the region are heavily concentrated on the higher classification routes in the region – the interstate and US Highways. Interstate 70 in Missouri is the most heavily traveled truck route in the region with some segments exceeding 12,000 trucks per day. Other routes with important connectivity functions are K-7 and US 50. More local routes directly serving industry provide needed access for the region and include K-68/MO 2 and MO 92 that generally serve between 500 and 1000 trucks per day. According to the Regional Commercial Vehicle Origin and Destination Survey (2008), a significant portion of truck traffic has one of its trip ends external to the Kansas City region. Overall, the percentage of locally destined traffic is 52.5%. Of the six approaches surveyed, only the I-70 westbound truck traffic had a majority of through traffic. Based upon responses, the majority of trucks (40%) weighed between 30 and 40 tons. The data suggests that the average weight of a truck traveling on the corridors studied would weigh more than 25 tons.

Reports from other regions in the United States with freight congestion issues have indicated that truck traffic exhibits a different peaking characteristic in an effort to avoid peak period congestion. Respondents to the RFO industry survey also indicate a concern with peak period travel conditions. Consequently, data from three traffic stations with hour by hour truck traffic volumes were reviewed to determine if the hourly truck profile varied from the “all traffic” hourly profile in the Kansas City region. Three routes reviewed are all in Kansas and include I-70 west of K-7, I-35 north of K-33, and K-10 between Lawrence and Eudora. Exhibit 2 lists the daily and peak hour traffic by direction and combined total for traffic counts conducted in October 2007 from Kansas Department of Transportation (KDOT) data.

<table>
<thead>
<tr>
<th>Locations</th>
<th>I-70</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>WB</td>
<td>15,354</td>
<td>14,289</td>
<td>29,643</td>
</tr>
<tr>
<td>EB</td>
<td>11,142</td>
<td>10,604</td>
<td>21,746</td>
</tr>
<tr>
<td>All Trucks</td>
<td>22.6%</td>
<td>22.8%</td>
<td>22.7%</td>
</tr>
<tr>
<td>% Trucks</td>
<td>23.2%</td>
<td>22.9%</td>
<td>23.1%</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>14,541</td>
<td>14,596</td>
<td>29,137</td>
</tr>
<tr>
<td>Peak Hour</td>
<td>223</td>
<td>233</td>
<td>416</td>
</tr>
<tr>
<td>Peak Hour Trucks</td>
<td>125</td>
<td>181</td>
<td>344</td>
</tr>
<tr>
<td>Peak Hour Percent</td>
<td>6.4 %</td>
<td>7.2%</td>
<td>6.2%</td>
</tr>
</tbody>
</table>

Source: TranSystems derived from KDOT data.
Exhibit 1 Truck Volumes in the Region

Kansas City Metro Regional City Index

<table>
<thead>
<tr>
<th>City</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atchison</td>
<td>C2</td>
</tr>
<tr>
<td>Belton</td>
<td>D5</td>
</tr>
<tr>
<td>Blue Springs</td>
<td>D4</td>
</tr>
<tr>
<td>Chillicothe</td>
<td>E1</td>
</tr>
<tr>
<td>Excelsior Springs</td>
<td>D3</td>
</tr>
<tr>
<td>Gardner</td>
<td>C5</td>
</tr>
<tr>
<td>Gladstone</td>
<td>D3</td>
</tr>
<tr>
<td>Grandview</td>
<td>D5</td>
</tr>
<tr>
<td>Higginsville</td>
<td>E4</td>
</tr>
<tr>
<td>Independence</td>
<td>D4</td>
</tr>
</tbody>
</table>

Source: TranSystems.
Extensive vehicle classification data is available at the count stations in Kansas, however for this summary review, the truck data is aggregated to include single unit, single trailer and multi-trailer trucks. The most prevalent truck category is the five-axle, single trailer unit. The data does not appear to reveal an avoidance of peak hour traffic, yet the peaking patterns are different for trucks than all vehicles, particularly on routes that have a significant volume of trucks.

Exhibit 3 utilizes a consistent vertical axis (3,000 vehicles per hour) to illustrate the peaking characteristics of all vehicles and trucks throughout the day. Equally important to understanding the truck peaking patterns is to review the percentage of trucks per hour on each facility. The daily percentage of trucks can misrepresent the presence of trucks during certain periods of the day. For example, it is obvious that both I-70 and I-35 (at approximately 6,700 and 5,000 trucks per day) have a greater amount of trucks than K-10 (at approximately 1,650 trucks per day), yet it is interesting to note that during the early morning hours, the percentage of trucks on I-70 and I-35 both exceed 50%, while the percentage of trucks on K-10 never exceeds 15%. These peaking characteristics can assist in distinguishing levels of freight corridors and strongly supports the need to conduct a 24-hour truck Origin-Destination (O-D) survey on significant freight corridors. The location of the O-D survey stations should also be reviewed to determine appropriate locations that serve to enhance MARC’s regional travel demand model including the issue of internal truck trips.

Source: TranSystems derived from KDOT data.
Since crashes can have significant effect upon travel flow, safety is a key element to consider when evaluating freight transportation characteristics in the region. Truck crashes can result in injuries and cause significant delays and/or backups along highways. KC Scout, the Kansas City region's traveler information system, identified three clusters with high crash experience for all vehicle types along the metropolitan network that it administers including:

- Downtown Loop (Missouri)
- I-70 east of I-435 (Missouri)
- I-435 between I-35 and US-69 (Kansas)

KC Scout also tracks and reports on “big rig” incidents; however, the current published reports do not indicate where these big rig incidents occur. A review of KC Scout monthly reports indicate that big rig accidents have continued to increase over time from 184 in Fiscal Year (FY) 2006\(^1\) to 292 in FY 2008, with a high of 327 big rig accidents in FY 2007. Big rig incidents represent between 5% and 9% of all incidents; however, in FY 2008, they represented approximately one-third of the level 3 incidents, defined as an incident having duration in excess of two hours. Incidents involving hazardous materials are very few with none to three accidents per reporting period. Exhibit 4 shows big rig involvement in major incidents that involved major delays or complete roadway closure. Over the reporting period, big rigs were involved in 20 to 50% of the major incidents.

Exhibit 4
KC Scout “Big Rig” Crash Data

<table>
<thead>
<tr>
<th>Incident Information</th>
<th>Fiscal Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
</tr>
<tr>
<td>All Incidents</td>
<td>2,045</td>
</tr>
<tr>
<td>Major Incidents (Level 3)</td>
<td>49</td>
</tr>
<tr>
<td>Incidents involving “Big Rigs”</td>
<td>184</td>
</tr>
<tr>
<td>Fatal “Big Rig” Incidents</td>
<td>3</td>
</tr>
<tr>
<td>Critical or Multiple Injury “Big Rig” Incidents</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: KC Scout Annual and Monthly Reports.

Exhibit 5 shows selected KC Scout Accident data for FY 2008. The graph illustrates monthly variation and the potential corresponding relationship between big rig incidents and level 3 incidents.

Exhibit 5 KC Scout Accident Data FY 2008

\(^1\) July 2005 to June 2006.
Rail

Kansas City’s rail system consists of four Class I railroads and several regional or shortline carriers. The extensive rail network throughout the region serves local industry, major intermodal yards and provides connection to international markets. Exhibit 6 shows rail volumes, or number of trains per day, throughout the region.

The BNSF Railway’s Transcontinental Route runs diagonally through the region from the southwest to the northeast. This route, the “transcon,” connects the Ports of Los Angeles and Long Beach to Chicago via Kansas City. This is a major intermodal route carrying between 80 and 90 trains per day. The Union Pacific (UP) Railroad’s major coal route runs east-west through the region from Topeka into Missouri where it parallels the Missouri River. This route carries upwards of 80 trains per day of loaded unit coal trains – a unit train is typically one mile long. Other significant routes in the region include the Kansas City Southern’s north-south route that connects to Mexico at Laredo, Texas and the Norfolk Southern’s east-west route that ends in Kansas City.

There are currently five intermodal yards in Kansas City. The BNSF, KCS and NS each have one facility and the UP has two facilities in the region. However, with the recent downturn in the market there are indications that the UP Armourdale Yard intermodal operations in Kansas City, Kansas, will cease and all intermodal activity will occur at the Neff Yard in Kansas City, Missouri. Along with intermodal activity there are numerous switching yards, classification yards, transload facilities and other rail operations that occur in the region. Due to constraints at existing facilities and opportunities with new traffic lanes, the Kansas City Southern recently moved their intermodal operations from the Knoche Yard on Front Street to Richards Gebaur. This move also allowed for more opportunities for complimentary development or the Centerpoint-KCS Intermodal Center. The BNSF intermodal operations at the Argentine Yard are also constrained and new development opportunities are limited in this area. Therefore, the BNSF facility will move to Logistics Park KC near Gardner, Kansas in the near future.

The sheer volume of train activity in the region indicates that the interaction between the railroads and highway traffic can cause significant impacts to the traveling public and railroad operations. One way to understand this interaction is to review the Federal Railroad Administration’s (FRA) Office of Safety Analysis database which lists over 1,100 public at-grade highway-rail crossings within the 18 counties comprising the study area.

The majority of at-grade crossings are listed in Missouri, although this is also proportional with the number of Missouri counties in the study area. Jackson County, Missouri has the greatest number of at-grade crossings at 225. This accounts for approximately 35% of the at-grade crossings in the Missouri study area. The majority (46%) of these at-grade crossings are along the Union Pacific tracks. Wyandotte and Shawnee counties in Kansas are the top counties with 105 and 100 at-grade crossing respectively. The majority (> 55%) of these at-grade crossings are along the Union Pacific tracks and are controlled by crossbucks.

Varying levels of warning devices are used at the regions at-grade crossings. The highest level of control is a grade separation – this type of control provides the highest-level of mobility and safety for rail and passenger traffic, although it is the most costly of all measures. The next level of active warning devices is flashing lights and gates contrasted with passive devices like stop signs or crossbucks. Closing a crossing is an additional measure that provides greater mobility for the railroad and safety for all traffic but can limit mobility for the highway modes.

The recently passed Rail Safety Improvement Act (2008) requires railroads to report information, including information about warning devices and signage, on grade crossings to enable the FRA to maintain an accurate inventory of such crossings. The current data should be reviewed carefully as the voluntary reporting system in place today may not be as accurate or up-to-date as desired for a thorough review of crossing information.
Exhibit 7 provides a summary of railroad crossing data by ownership as well as type of control.

**Exhibit 7: Summary of Railroad Crossing Data**

**Note:** The FRA database lists railroad ownership that may have changed or has not been recently updated.

Source: TranSystems derived from FRA data.

**Air**

The Kansas City International Airport (KCI) is the air cargo terminal in the region. KCI is currently updating its Airport Master Plan. While the implementation of some of the major components of this plan such as a new passenger terminal supplemented by regional highway access to the south via MO 152 may be 15 to 20 years in the future, some other elements of the plan are more immediate and are intended to expand service capabilities and enhance the attractiveness of aviation facilities associated with manufacturing and industrial operations. These elements are associated with new taxiways and aprons on the east runway to accommodate ancillary development. An initial phase of the development is part of a 800-acre master planned site, KCI Intermodal BusinessCentre, which could include upwards of 5 million square feet of big box distribution centers, air cargo and on-ramp, airport-related logistics buildings.

Other airports in the region whose runways are of sufficient length and are capable of supporting large aircraft suitable for air cargo operations include Kansas City Downtown airport, Rosecrans in St. Joseph, Missouri, as well as New Century AirCenter, Johnson County and Forbes Field in Topeka, Kansas. Currently these facilities do not handle air cargo. Several of these aviation facilities are supported by activities with Foreign Trade Zone designation.

**Barge**

The Missouri Department of Transportation’s (MoDOT) *Update of Missouri Port Authority Assessment* places its 14 public port authorities into four categories with one of those categories being the Missouri River Port Authorities. In the RFO’s study area, there are two port authorities, Kansas City and St. Joseph, considered to be “developed” as they have land, facilities, equipment, and business; however, these ports are considered limited due to the lack of commercial waterway transportation on the Missouri River. In general, the ports biggest need is for waterway traffic rather than port development. The Assessment states that “to stay in business, the port authorities are primarily focused on businesses that do not depend upon waterways (and) without waterway traffic, they are more interested
in funding landside development rather than waterside development.”

Numerous private ports or sand dredging operations are also located along the Missouri River within the study region.

The Kansas City Port is located in downtown Kansas City, just east of the confluence of the Missouri and Kansas Rivers. Its property extends partly into Kansas. It has excellent multimodal connections with a railway in the port, paved access to Interstate 70, and even nearby access to the Kansas City Downtown Airport. The only waterway related cargoes in the last few years were too big or too heavy to move by any other modes. Facilities are being used primarily for agriculture-related, land-based shipping. It was reported that shipments likely go to Tulsa, Oklahoma and the Arkansas River rather than on the Missouri River.

The St. Joseph Port is developed, with room to further develop existing land and the potential to expand into new land. It is located in downtown St. Joseph, well positioned to serve the commerce of the city and farms of surrounding counties and states. It has excellent multimodal connections with a railway in the port, paved access to highways, a good bridge into Kansas, and even nearby access to the St. Joseph Airport. The port facilities are currently used for transferring commercial goods from either railway or waterway to truck for local delivery. A common commodity is wire coil. The port authority is an active part of local industrial economic development efforts with many of its objectives related to infrastructure such as a new roadway connector. As railway traffic passes through the waterfront area, it blocks all roadways. A new overpass connector would improve commerce and safety of the entire area by preventing trains from blocking deliveries or emergency vehicles.

The Assessment also identified the potential for a modern port in Northwest Missouri serving bio-fuel needs. While this might increase barge traffic along the Missouri River through the region, it is thought unlikely that it would directly affect other ports within the region.

Past Regional Freight Investments

The list of potential freight-related infrastructure projects from the initial Intermodal Freight Strategies Study (1995) was developed from review of various resources including the long range transportation plan (LRTP), responses from an industry survey, prior reports from the Kansas City Industrial Council, and the then on-going call for National Highway System (NHS) intermodal connectors. Many of the identified projects were grouped by industrial areas such as the Northeast Industrial District, Blue Valley and the Central Industrial District. As part of the IFSS recommendations, a list of ten “jump start” projects was suggested as low cost means to improve goods movement as well as creating high visibility to increase awareness of freight. While several of the projects from that list have been accomplished or initiated, the majority were not implemented. However, that does not mean that progress has not occurred for the broader freight-related infrastructure strategies which encompassed:

- Continue region-wide transportation improvements
- Perform on-going maintenance
- Establish NHS Intermodal Connectors
- Establish and Implement Jump Start Program
- Concentrate Freight Transportation Improvements in the Northeast Industrial District
- Foster new opportunities

To measure progress over the last ten years, the intent of the strategies has to be open to interpretation. In many ways region-wide transportation improvements continue, as well as performing on-going maintenance, that indirectly improve freight transportation. Also, while several roadways were designated as NHS Intermodal Connectors, other critical freight links were deemed unable to meet the guidelines for the National Highway System, yet these play a significant role in the region’s freight mobility and should be recognized as such. The difficulty with the Jump Start program was most likely associated with the lack of unified commitment by the various jurisdictions. A Goods Movement Committee was formed at the Mid-America Regional Council (MARC) Metropolitan Planning Organization (MPO) and has met on several occasions. In comparison to Kansas City SmartPort which was also created around

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the same time, the Goods Movement committee has not become as well recognized and influential. The Goods Movement Committee is believed to be an effective mechanism to engage freight stakeholders directly in MARC’s metropolitan planning process as well as stakeholder input via SmartPort. The strategic investments identified later in this paper should provide activities that will engage freight stakeholders. The recommendation to concentrate transportation improvements in Northeast Industrial District was achieved from the rail perspective, yet significantly less so from a highway or trucking perspective. Many new opportunities arose and are continuing to be developed from integrating technology with ITS applications through KC Scout, as well as SmartPort’s infrastructure initiative on the development of an international trade processing center, the planning and development of two new intermodal facilities, as well as many rail to rail and rail to road grade separations that improved mobility and safety.

A key concern more than ten years ago was with deferred maintenance, particularly with the City of Kansas City, Missouri. While some progress had been made to reduce the backlog of deferred maintenance, recent reviews by the Greater Kansas City Chamber of Commerce and others suggest that more should have been done and that more is currently needed in this regard.

Numerous specific projects were noted in the IFSS that were developed from industry surveys as well as the Kansas City Industry Council (KCIC) recommendations. Several of these have been completed or are underway, though some are still many years from completion such as widening Front Street. Some other projects are on the list to be started in the near future, while others have been significantly altered, such as the 22nd/23rd Street Connector, and should be removed from the list. Several of the major rail transportation improvements were made possible through MoDOT’s assistance with financing that helped make economically viable these key projects to the railroad companies. While the Chouteau bridge is complete, widening the roadway to points further north is still in progress.

The KCIC is still active and prepared in November 2007 its Infrastructure Survey and Industrial Area Priorities report. The priorities are discussed in relationship to six industrial areas, all within Kansas City, Missouri with the exception of the Bi-State Turkey Creek Association. A list of 19 priority projects was identified. Several of those projects are now (Spring 2009) complete, while others such as widening of Front Street do not have an assigned construction cost or timeline. While more than half of the listed projects are associated with transportation elements, the majority of cost (more than 85%) is associated with flood and drainage protection. With the exception of Front Street, the transportation projects are not located on corridors with significant truck traffic volumes.

**On-Going Regional Freight Investments**

A review of the Kansas City Metropolitan Region Transportation Improvement Program (TIP) 2008-2012 identifies a variety of projects from planning to construction. Some may appear to be just maintenance projects that involve bridges, pavement, shoulder, and safety issues like installing guardrail. Yet overall these issues are important as they focus upon system preservation and maintenance. The current list in MARC’s TIP alone could total over $1.0 billion in investment for freight mobility as it includes projects such as:

- US-24 over Union Pacific RR
- I-70 bridge over Manchester Trafficway
- I-470 and Strother Road
- Botts Road (MO 150)
- I-35 and 159th and Lone Elm Rd Interchange
- I-435 Traffic Management
- K-7 Corridor

Major projects on the interstate system include the kcICON project to replace the Paseo Bridge (I-29/35 over the Missouri River) as well as other bridge rehabilitations and several new interchanges including I-435 and Front Street. In addition, the current U.S. 71 is proposed to be upgraded from a four-lane expressway into a four-lane freeway with the designation of Interstate 49. This project is part of a multi-state initiative to create a north-south interstate from Missouri to New Orleans, Louisiana. Preliminary estimates to upgrade U.S. 71 to interstate standards were $200
million, though funding is not committed. By utilizing the “Practical Design” concept, MoDOT will maximize the funds that are available and also pursue other funding. No specific construction dates have been established.

One important project is the KC freight congestion-air quality improvement demonstration. The description states that Federal Highway Administration’s (FHWA) Cross-town Improvement Project (C-TIP) would be integrated with the KC Scout to provide trucking companies with real-time travel information that will support truck trip reduction and improved routing resulting in reductions in freight congestion and improvements in air quality. This region-wide project is classified as traffic management and is funded for Federal Fiscal year 2009 at $250,000. The study continues to evolve over time and now includes the design and operational testing of the freight transportation and international trade strategy totaling over $7.7 million.

Specific improvements included in the TIP for the Logistics Park KC (BNSF Gardner Intermodal Facility) are $500,000 for preliminary engineering of a location and design concept study with a new interchange at I-35. Nearly $2.5 million are allocated in 2010 for adding a lane to the southbound I-35 ramp at Gardner Road, the widening of Gardner Road and installation of traffic signals.

Rebuilding I-70 across Missouri to include truck-only lanes will be studied as part of a new federal program. In September 2007, the US Department of Transportation announced that I-70 is among six nationwide corridors in its “Corridors of the Future” program that will look at innovative ways to reduce congestion and improve freight delivery. More than 13 million miles are travelled on I-70 every day in Missouri; up to 40 percent of that is truck traffic. The cost for rebuilding I-70 with eight lanes, including four for trucks, is estimated at $3.5 billion and MoDOT doesn’t currently have available funding. The truck-only lane concept is being evaluated in comparison to widening I-70 to a minimum of six lanes across Missouri. A MoDOT news release states that “the idea of separating long-haul trucks from everyday traffic has come out of public input on I-70, along with a national emphasis on creating greater efficiencies for the farms, stores, and businesses that depend on trucks to ship their goods.”

While the region is supportive of improvements to I-70, the truck-only lane concept requires further and more detailed review by MoDOT from a physical, operational and financial perspective. The current assessment essentially only reviewed that the typical section of the truck-only lanes would fit within the footprint defined by the I-70 environmental documents. Physical issues that remain undetermined include the location of the transition between the existing general purpose lanes and the proposed truck only lanes as the dedicated lanes enter/exit the urbanized area. Some physical issues have associated operational issues including the effects of left-hand merging with large vehicles dictating the location of and distance between such access points. Other operational issues include determining the size, weight and the limitation on tandem truck configurations. Financial issues are more numerous and include identifying the funding mechanisms and financial strategies, such as the potential for tolling. Would such a facility attract more truck traffic from other existing parallel routes? Or would it divert truck traffic to other existing routes? How might tolls influence the attraction or diversion? These issues suggest that a large-scale economic review be conducted at least at the statewide level, if not at a multi-state level.
Taking a Corridor Approach

An organizational framework is necessary to review conditions, assess needs and provide direction for prioritizing infrastructure investments. Designating Corridors of Freight Significance (COFS) is that framework. The corridor approach is applicable across all modes and all transportation systems. Three corridor classifications are proposed and include:

- national corridors of significance,
- regional corridors of significance, and
- local corridors of significance.

FHWA’s Freight Story 2008 discusses how freight flows are concentrated on a relatively small number of corridors. Nationally, the major freight corridors are identified as carrying more than 50 million tons per year. This is applicable for all modes. For trucks this translates to 8,500 trucks per day at an assumed 16 tons per truck. Exhibit 8 illustrates the major freight corridors. For highways, only I-70 and I-29 in Missouri as well as a parallel rail and highway corridor along US 69 in Kansas are included. For rail, Union Pacific’s coal route across Kansas and Missouri from the Powder River Basin is included. Other U.S. Department of Transportation criteria to identify truck corridors have been significantly less than 8,500 trucks per day.

Exhibit 8 Major Freight Corridors


Similarly, while a standard weight may be an applicable measurement for review at a national level, the criteria can nonetheless vary by mode. The 2007 National Rail Freight Infrastructure Capacity and Investment Study prepared for the Association of American Railroads (AAR) identifies a set of primary corridors as designated by the Class I railroads. These primary corridors represent higher-volume corridors for rail freight, as shown in Exhibit 9.
The various modal flows (truck, rail, air and barge) can be represented by units, tonnage or value. Each method has its meaning, validity and pertinence to different reviewers. The criteria suggested for the RFO region are deemed applicable to the ultimate goal of prioritizing needs with a focus on infrastructure investments from a public agency perspective.

The corridors of freight significance have been identified for four freight modes referred to here as highway, rail, air and barge. The highway system is defined by the number of trucks per day, while the rail system is defined by the number of trains per day. Air transportation is defined by current air cargo service and the physical and operational ability to accommodate cargo planes. Barge transportation is defined by navigable waterway. While barge transportation can be viewed as a corridor-based system the infrastructure perspective is focused upon landside access to the marine terminals along the waterway. Aviation is not a corridor based system, yet a similar landside access approach is proposed. Exhibit 10 summarizes the criteria for each mode and classification of significance.

The proposed corridors of freight significance are different than the National Highway System (NHS) Intermodal Connectors that are the public roads connecting major intermodal terminals to the highway network. Several criteria are considered including the level of activity of an intermodal facility and its importance to the state’s economy. It is worth noting that the Connectors are specific to a facility. On the other hand, the Corridors access freight zones with numerous facilities. The Corridors do not replace the Connectors. However it is suggested that the freight-related Intermodal Connectors be reviewed for updating. For example, the former Southern Pacific intermodal facility on Bayard in Kansas City, Kansas which is not longer active should be removed. The route to KCS’s Knoche Yard can remain as it shares this connection with UP’s Neff Yard, yet a new connector will likely need to be added via Mo Route 150 west from U.S. 71 to the Richards Gebaur intermodal facility. A similar revision will need to occur when BNSF’s intermodal facility in the Argentine Yard will be supplanted by the new intermodal facility in Gardner, Kansas.
### Exhibit 10
Criteria or Designation of Corridors of Freight Significance by Mode

<table>
<thead>
<tr>
<th>Corridor Designation</th>
<th>Highway</th>
<th>Rail</th>
<th>River</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>Roadways with greater than 4,000 trucks per day</td>
<td>Primary Rail Corridor per AAR</td>
<td>Mississippi River</td>
<td>None</td>
</tr>
<tr>
<td>Regional</td>
<td>Roadways with 1,000 to 3,999 trucks per day</td>
<td>None</td>
<td>None</td>
<td>Kansas City International (MCI)</td>
</tr>
<tr>
<td>Local</td>
<td>Roadways with 500 to 999 trucks per day</td>
<td>Rail lines with less than 10 trains per day</td>
<td>Missouri River</td>
<td>Forbes Field, New Century AirCenter, and Rosecrans</td>
</tr>
</tbody>
</table>

Source: TranSystems.

The hierarchical approach allows for the assessment and focus on transportation systems that may be similar in nature yet vary according to degree for each classification. While each of the corridors may review elements such as mobility and safety, the corridors of national significance may have a greater focus upon reliability (expressed in terms of system speed) as a means to assess mobility, while the corridors of regional significance may be balancing congestion and access to assess mobility, and the corridors of local significance may focus upon physical conditions such as bridge and pavement ratings to assess mobility. Many of these freight corridors overlay on the NHS and MARC’s Congestion Management System (CMS), yet it is not a completely repetitive network. A description of the three types of corridors by mode follows.

**Corridors of National Significance**

The corridors of national significance are typically long-haul corridors that afford the opportunity to cross state lines and accomplish next day travel of 500 miles or more.

**Highway**

All of the national corridors are along Interstate routes, with the exception of US-71. However US-71 is currently being reviewed for upgrades that would allow it to be re-designated as I-49. Three directional corridors and three circumferential corridors (the majority of I-435, I-470, and I-635) are also identified. Overall the total mileage for the region’s corridors of national significance is estimated at 443 miles. The three directional corridors are each over 100 miles long. The three circumferential highways total over 75 miles.

Foreign Trade Zones (FTZ) may be directly accessed by the corridors of national significance, such as the FTZ 15-3 at the Kansas City International Airport via I-29 and the National Highway System Intermodal Connector of Mexico City Avenue, as noted in a following section on regional air facilities.

**Rail**

Freight rail corridors typically accommodate long-haul movements. In Kansas City there are numerous rail lines that literally crisscross through the region and provide service to destinations coast to coast in all directions. Consequently, it could be said that the majority of the region’s rail corridors are of national significance, which is what the Association of American Railroad’s (AAR’s) *National Rail Freight Infrastructure Capacity and Investment Study* indicates. The BNSF St. Joseph Subdivision from St. Joseph to Kansas City was added to the AAR’s map of primary rail freight corridors because of its significant volume in St. Joseph as well as it connectivity. The length of the national rail corridor network within the RFO region is more than 800 miles.
A unique element of freight rail transportation is its private ownership which complicates the public agency perspective to determine where public funds can and should be invested. While the Kansas City Terminal railway has utilized an innovative financing mechanism of a Transportation Corporation through the Missouri Highway Commission to assist in funding two major rail grade separation projects (the Sheffield Junction and the Argentine Flyover), most public funds for Class I railroads are related to crossing safety. Even the recent “Raising the Rails” project that grade separated four public streets along BNSF’s Fort Scott subdivision in Olathe began as a single grade separation project over one roadway, Santa Fe. A key criteria in identifying this location was the product of the number of trains per day times the number of vehicles per day to represent delays experienced by motorists independent of empty or full rail cars.

**Air and Barge**

No navigable waterway is identified as having national significance is located within the region. The Mississippi River is considered a corridor of national significance from both its capacity and access to international markets through New Orleans. While the Mississippi River forms the eastern edge of the state of Missouri, the Kansa City region only has access to the Mississippi River via the local barge corridor of the Missouri River.

No air cargo facilities are included in the category of national significance. To be an air cargo facility of national significance would require international flights or a significant volume of air cargo transferring to an international airport.

**Corridors of Regional Significance**

The regional corridors typically serve as feeders to the national corridors and as collectors from the local corridors.

**Highway**

There are numerous regional corridors some of which function in a nodal manner, meaning that they serve the communities of Topeka, Kansas and St. Joseph, Missouri. The majority of the remaining regional corridors act as a feeder system within the Kansas City metropolitan area. An exception is the US-36 corridor connecting St. Joseph with Chillicothe. A total of 18 regional corridors have been identified ranging in length from 10 miles to over 60 miles long. The average length is over 25 miles. Overall the total mileage for the Regional COFS is estimated at approximately 530 miles. From a VMT perspective it is estimated that these regional freight corridors while of longer length than the national corridors, have less than one-quarter of all truck miles traveled. This relationship is consistent with the function of the corridors to provide access. These corridors range from four-lane highways with interchanges, to two-lane high speed roadways, to arterial street corridors.

It is worth noting that these corridors often provide the direct connection to freight-related activities. Several of the regional corridors offer access to Foreign Trade Zones (FTZ) including, but not limited to:

- FTZ 15-2: Hunt Midwest Underground, Kansas City, MO from MO 210
- FTZ 15-4: Carefree Industrial Park, Sugar Creek from MO 291
- FTZ 15-9: Pony Express Warehousing, St. Joseph, MO from US 59
- FTZ 17-2: Speaker Road, Kansas City, KS from K-32
- FTZ 17-6: Forbes Field, Topeka, KS from US-75

Consequently, the regional corridors offer the opportunity to review industrial land use development and patterns. It is suggested that comparisons of development patterns be made between corridors that are considered “emerging” corridors, typically with a nodal freight development pattern, to “established” corridors where development patterns are typically contiguous.

**Rail**

Because of the region’s position within the United States, the majority of rail corridors are defined as national corridors, no rail corridors are assigned to the Regional system.
Air and Barge
The region’s air cargo operations from a facility perspective occur at KCI airport. The “on airport” air cargo facilities are accessed via Mexico City Avenue, a NHS intermodal connector. Although airports are technically a node within the transportation system for the RFO, KCI is considered a Regional COFS.

No navigable waterway is identified as having regional significance is located within the region.

Corridors of Local Significance
The local corridors serve as feeder roads to the regional corridors though on several occasions they can provide direct access to national corridors; for example MO-92 between I-29 and I-35 and K-68/MO-2 between I-35 and US-71.

Highway
There are ten corridors considered to be local corridors ranging in length from 20 miles to over 60 miles. The average length is just over 40 miles. Overall the total mileage for the region’s corridors of local significance is estimated at approximately 360 miles.

These corridors are typically two-lane highways with at-grade intersections. Several corridors traverse through communities and often expand to four-lane roadways with lower posted speeds and traffic signal controls at major intersections. As a local corridor, the emphasis is on access. A visual review of the network pattern suggests that the local corridors are used for community based freight trips as well as access to the main freight corridors. Several of these corridors run parallel to the corridors of national significance including US-24 from Topeka to Kansas City (parallel to I-70) as well as US 169 from St. Joseph to Kansas City (parallel to I-29). Several of the local corridors offer access to FTZ’s including, but not limited to:

- FTZ 15-7: Richards-gebaur, Kansas City, MO from MO-150*
- FTZ 17-3: 30 Funston Road, Kansas City, KS from K-5
- FTZ 17-5: 1298 Eisenhower, Leavenworth, KS from K-7
- FTZ 17-7: Ballard Airport, Topeka, KS from K-4

Rail
The local rail corridors consist of relatively short connecting or service links, such as the 5-mile long New Century AirCenter Railroad (NCA), the 1.2 mile long Southgate connection along the BNSF in Olathe, and a 15-mile long portion of Union Pacific railroad in Atchison County, Kansas. The NCA services a 2,300 acre area and interchanges with the BNSF railway main line. NCA provides switching to meet intra-plant requests. The 11-mile long Baldwin City line is not included as a freight corridor as it is only a passenger excursion train run by volunteer operators.

Other local rail corridors with ten trains or less per day include:
- ICE in Clay and Livingston Counties, Missouri for approximately 52 miles
- KAW in Clay County, Missouri for approximately 24 miles
- BNSF in Ray and Livingston Counties, Missouri for approximately 34 miles
- KCS in Jackson and Lafayette County, Missouri for approximately 70 miles
- MNA in Cass County, Missouri for approximately 24 miles
- BNSF in Shawnee, Douglas and Johnson Counties, Kansas for approximately 78 miles

The length of the local rail corridor network within the RFO region is more than 280 miles.
Air and Barge

Forbes Field in Topeka, New Century AirCenter in Johnson County and Rosecrans Memorial Airport in St. Joseph have runway lengths suitable for air cargo operations, however, they do not have air cargo service today. Charles Wheeler (Downtown) Airport in Kansas City, Missouri also provides air cargo service. Since these airports are capable of providing air cargo service they are considered Local COFS. The landside access to these facilities is often accomplished through the regional and local highway corridors of freight significance.

The level of the Missouri River’s water flow to support barge traffic is limited in duration to eight months per year. With this limitation, and the low tonnage moved on the waterway, this study classifies the Missouri River as a Local COFS. Numerous marine docks provide access to the river, including two public port authorities. The landside access to these facilities is often accomplished through the regional and local highway corridors of freight significance.

The Corridors of Freight Significance are illustrated in Exhibit 11 (next page).

An Initial Corridor Assessment

An initial assessment of operations along the identified corridors of freight significance point to two areas of primary focus: mobility and safety. As previously noted the elements affecting freight mobility may vary depending upon the corridor and can include elements such as congestion, which in turn can affect reliability, as well as physical conditions. Current data collection and recording practices provide some needed information but more robust data, especially for freight-related safety issues, is needed to make a full assessment.

Highway

Highway congestion affects every vehicle on the system, not just trucks. So the current processes already in place to identify regional and local government projects, as well as review, evaluation and inclusion on the regional Transportation Improvement Plan would suggest that freight-related transportation issues (from the trucking perspective on highways) are in many ways already being addressed.

While each MPO in the region may utilize a different methodology, MARC’s capacity project evaluation matrix involves the following six factors:

- System Efficiency
- System Preservation
- Access to Opportunity
- Regional Economy
- Quality Built and Natural Environment
- Safety

Each of these elements is further subdivided into more definitive items including daily traffic volumes and levels of service as well as impacts on goods movement, intermodal connectors and providing access to regional activity centers such as industrial zones where employment is served. Consequently, the overall determination of improvements to the system incorporates means and measures that address freight-related issues.

A review of the roadway capacity deficiencies from the various MPOs in the region shows a series of segments as well as spot locations scattered throughout the region. Some congestion occurs along Interstate highway system and therefore along National corridors of freight significance. These include but are not limited to sections of I-435 near US-69 in Johnson County, Kansas as well as just north of the 3-Trails Crossing Memorial Highway (formerly named the Grandview Triangle) in Jackson County, Missouri. Other congestion areas on the interstate system include I-29 at the junction of I-635 as well as M-45 in Platte County, Missouri and I-35 at 119th Street in Johnson County, Kansas. A significant portion of Downtown Kansas City’s Loop is shown under moderate congestion as well as portions of I-70 in Jackson County, Missouri and US-71 immediately south of the Downtown Loop.
Other highway corridors expected to experience congestion include Regional corridors of freight significance such as portions of K-7 both north and south of I-35. In St. Joseph, portions of US-36, US-59, and US-169 as well as a portion of I-29 and Business I-29 are projected to be approaching, or are at or above capacity. In Topeka, critical segments of I-70 and 470, as well as US-75 and K-4 are shown to have a high volume to capacity ratio. In Lawrence, the majority of US-59 in the City as well as portions of K-10 (23rd Street) are shown as either “congesting” or “congested.” Few, if any, of the local corridors of freight significance are currently experiencing congestion throughout the day, although some intersections may experience peak period congestion.

From a macro-scale perspective considering the 1,300 miles of the freight highway system, it appears that there are only a few areas of potentially moderate to heavy congestion. This may in part be associated with the myriad of proposed LRTP projects that will improve roadways limiting congestion impacts. The forecasted level of service for the region without the proposed projects could be significantly worse. Having only relatively few congestion problems is a benefit to the region as the highway’s freight corridors, truck efficiency and freight mobility should be maintained into the future. Of course, each of the MPOs in the planning boundary needs to continue its investigation into the means of ensuring a reliable and safe freight transportation system under its jurisdiction.

With regards to physical condition, it can be general said that the highway freight corridors with the highest classification (National) are likely to be in good physical condition. At the other end of the spectrum, the Local corridor classification may have bridge condition issues and associated weight limit restrictions which adversely affect goods movement mobility. The Regional corridor classification is the likely part of the system where specific infrastructure needs can be defined in association with freight transportation through a programmatic process of detailed corridor evaluations.

An estimate of Vehicle Miles Travelled (VMT) in millions of miles has been made for the highway corridors of national significance for comparative purposes with the regional and local corridors. The national system accounts for over 70% of the truck VMT. Historic trends are valuable resources for reviewing growth. The years 1997 and 2002 were chosen as data points to compare truck VMT on the national system, Truck data for 1997 in Missouri was estimated based upon the 2000 traffic volume map. The growth rate in VMT over a ten year period is on the order of 3.0% per year, which is higher than national forecasts. Exhibit 12 shows the estimated daily truck vehicle miles traveled (in millions) for the various corridors as well as the data points (2007 only) for the regional and local freight corridors.

Exhibit 12 Daily Truck Million Vehicle Miles Traveled

![Daily Truck MVMT](image-url)
Most travel demand models focus upon passenger car volumes and while some models attempt to account for trucks by converting them to the equivalent number of passenger cars, MARC’s travel demand model utilizes the total traffic volume on a link. From a freight perspective this reduces the ability to monitor, assess or project truck operations. While truck-specific issues may not be dominant right now, it may likely become more important to be able to review truck travel growth as well as develop forecasts to prevent specific issues from developing. The region would benefit from a more rigorous monitoring of truck traffic data and a separate truck traffic demand model is a beneficial monitoring tool with the flexibility to do projections. Historic data would also be helpful to monitor trends and review forecasted data.

Rail

The review of rail freight includes both a public and private perspective to address mobility and safety issues. Public initiatives include highway-rail grade crossing safety programs. Private initiatives may rely on creative financing leverage by a public authority or completed in cooperation with public authorities. It is valuable to consider both public and private needs when evaluating rail infrastructure.

A review of the safety experience at all of the region’s at-grade crossings, particularly for the identified corridors of freight significance starting at the highest classification, is important to address the public’s demand for safety and accountability. Critical to at-grade highway-rail crossing analysis is the volume of trains and vehicles that traverse an at-grade crossing each day, as well as the type of warning device as these data points can be used to develop a rail crossing exposure and/or safety index rating. KDOT utilizes a hazard index formula that has a warning device factor that takes into account the presence of flashing lights, gates or crossbucks. An index, such as what KDOT uses, could allow the region to track over time the impact that improvements to crossings along the corridors of freight significance provide to the region. As warning devices are upgraded, crossings consolidated or eliminated, or grade separations are constructed the index will decrease reflecting less exposure between highway and rail traffic.

There are other perspectives related to highway and rail crossing interface, such as grade separated facilities (either railroads over highways or highways over railroads) that have low clearance issues. While there may be numerous locations with low clearances, the critical corridors are those identified with freight significance. One such example is the Kansas City Terminal Railroad over Independence Avenue (US 24). Truck traffic volumes identify US 24 as a corridor of regional significance. Exhibit 13 illustrates that even though restrictions are clearly marked at this underpass, the route is important to trucks in the region. Improvements to this particular location would take a great effort but it is important to consider these conditions when assessing mobility in the region.

Exhibit 13 Truck Clearance Issues in Region – Independence Avenue at the KCT

![Exhibit 13 Truck Clearance Issues in Region – Independence Avenue at the KCT](source: TranSystems)
Congestion on the rail network is also a consideration for the region as it impacts delivery reliability and inefficient train operations may cause delays on the transportation network when trains wait on sidings to enter yards or pass other trains on the network. The 2007 National Rail Freight Infrastructure Capacity and Investment Study for the AAR compared current train volumes to current train capacity and assigned the network a level of service rating from “A to F.” The study region has one of the few “F” ratings in the nation – the Missouri River crossing on the BNSF Transcontinental Route. There are several other “D” and “E” ratings in the region along the major BNSF and UP routes. Exhibit 14 shows the current levels of service based on the AAR study.

Exhibit 14 Current Train Volumes Compared to Current Train Capacity

The region has seen the development of an intermodal facility at Richards Gebaur by the Kansas City Southern and the BNSF is planning to relocate their Argentine operations to Logistics Park KC in the near future. These intermodal facilities are in direct response to provide more efficient operations and to accommodate growth projected in intermodal traffic in the Kansas City region. Without a similarly robust intermodal container route through KC, it is unlikely that Union Pacific will be creating a new major intermodal facility. However, there are other future potential railroad mergers or shifts to underutilized lines (i.e., ICE, Carthage, Brookfield subdivision) that may dramatically affect the regions’ rail network in the future.

Air and Barge
For these two modes, mobility and safety for actual air and river activity often fall under the jurisdiction of Federal authorities. For air cargo operations, mobility related to air operations is generally good as air cargo operators are scheduled as passenger airlines. Airport safety is also managed by the airport itself and is adequately maintained in this region. For water transportation, maintaining mobility requires advocacy for maintaining current water flows on the Missouri River and the mandated river channel’s depth and width by dredging. Having a reliable and dependable Missouri River flow for the eight month navigation period is essential for all ports with waterside access.
As a region, a greater impact on the air and river system may be felt by focusing on landside access. For air cargo related activities, providing a consistent level landside access and mobility to the air cargo facilities would maintain the high level of service provided today. Providing acceptable regional land access to clusters or groupings of water-related facilities would also help to maintain our region’s multimodal capabilities. A simple landside access assessment could include a recording pavement condition, travel lane and shoulder widths, curb radii suitable for large vehicles, culvert and bridge structure conditions and load ratings, and control devices at railroad crossings. Needs identified by the assessment could turn into projects associated with a site specific development or established industry. It would then be the responsibility of a “local” government, or even the industry generating the traffic, to champion the projects that would provide the most suitable landside access for air and barge COFS.
Identification and Priority Evaluation Processes

This section reviews a variety of potential methods for use or in use throughout the country for identifying and prioritizing potential freight-related improvements on the public transportation system. These methods are reviewed to highlight their basic approaches and data requirements as well as issues learned when implementing such processes. Key elements of the plans are noted and then assimilated into a public infrastructure planning process suitable for the Regional Freight Outlook.

While there are many methods suggested with the potential to determine freight transportation priorities at a regional level, a review of several methods reveals elements that are necessary and common throughout as well as elements that represent challenges in terms of data collection both from an availability and cost perspective. In general, research and review of available prioritization methods show that none are simple. Most methods were cited as being very labor intensive and costly to implement and maintain. This suggests that coordination with existing programs and sharing data is important. As more infrastructure decisions are desired to be based upon economic potential, the economics of freight become more important to understand and to integrate into the decision-making process.

Literature Review


This national analytical framework reviews the freight trade reorganizational effects related to highway freight improvements. The research goal was to identify regional data points that would estimate freight benefits of specific highway performance improvements at a regional level. The methodology identified two types of elasticities: performance and price elasticity. Data on corridor performance, demand for freight movement, freight prices, and regional economic activity was then constructed and the elasticities of demand were calculated.

The research experienced issues with the completeness of data, associated with a range of route types, from heavily urban to more rural and from a variety of areas within each region. The availability and quality of data reduced regional disaggregation. Commodity flow data was used for metropolitan area city pairs. Performance data came from the states’ Highway Performance Management System (HPMS) including daily truck traffic, as well as peak and off-peak commercial vehicle percentages. Numerous problems were noted with the data. In summary, it was concluded that the demand for trucking and the rates that carriers charge shippers was directly related to the measure of highway performance. This suggests that the commonly available volume/capacity ratio on a highway can serve as a reliable proxy to freight facility performance.

An Initial Assessment of Freight Bottlenecks on Highways, FHWA, October 2005

This report states that freight transportation capacity is directly measured in terms of congestion, pressure on prices, and less reliable trip times. An important relationship identified is where transcontinental freight lanes intersect congested urban freight routes. Highway bottlenecks are estimated to account for 40% of vehicle hours of delay with the remainder of delays associated with construction work zones, crashes, breakdowns, and extreme weather conditions. A bottleneck is defined as a combination of three features: the type of constraint, the type of roadway, and the type of freight route.

Highway truck bottlenecks can and should be differentiated from general traffic bottlenecks. They are measured by total truck hours of delay, delays to longer distance trips, and the tonnage and value of commodities in the trucks. They are also distinguished by freeway and arterial roadways, and as urban freight corridor, intercity freight corridor, truck access route, and intermodal connector. Highway interchange bottlenecks were determined to account for the most truck hours of delay. While delaying metropolitan and local truck traffic, the nation’s long-haul and transcontinental freight corridors are of interest to the Federal government. It is suggested to work with FHWA to monitor truck delay at interstate interchange bottlenecks of freight routes of national significance with improvements focused at these locations.
Making the Case for Freight Investments, Public Roads, May/June 2008

This article notes the demand for more flexible and timely service thereby increasing the importance of an efficient and reliable freight system. The value of transit time is an indication of the overall importance of logistics to business productivity and economic growth. While economic benefits can be measured for on-road users and carriers, the same is not true for shippers such as manufacturers. These secondary economic benefits are referred to as industrial reorganization. It is suggested that freight partnerships be framed around statewide plans. Technically, freight modeling goes beyond the standard four-step travel demand model process which often focuses upon first order benefits. Second order benefits spill over into the complex logistics industry with information management and exchange activities. These are incremental occurring over time and as such make the benefits difficult to quantify.

The economics of freight transportation investments includes infrastructure, cost, productivity, and growth. The report suggests coordination with surrounding states with dedicated freight models that use a benefits estimation tool. The framework focuses upon freight significant corridors through regression analysis, estimating the dollar value of time associated with different types of freight movement and vehicle operating costs. It is concluded that as highway performance improves, demand for freight movement increases. This in turn suggests that projects be chosen to improve reliability and predictability of travel times. Institutionally, the research recommends incorporating freight into the process through policy discussions, outreach, public awareness, technical analysis, and tool development. Private sector involvement is necessary to understand freight needs and build support for critical freight projects.

Options for Benchmarking Performance Improvements Achieved from Construction of Freight Mobility Projects, Washington State Transportation Center, July 2005

This research identifies data in speed and volume improvements that resulted from completed freight mobility projects for use in both the project selection process and for reporting. The data was collected from CVISN electronic truck transponders or GPS data downloaded every 5 seconds from volunteer trucks. The research indicated that data quality is based on the number of instrumented vehicles passing over the roadways and that there is a need for more of these vehicles.

Return on Investment on Freight Rail Capacity Improvement, AASHTO, April 2005

This report is a follow up to the 2002 Freight Rail Bottom Line Report which developed four scenarios with vastly different levels of investment ranging from not meeting the needs to encouraging shifts from trucks to rail transport. The research reviewed various case studies, methods and potential funding sources categorized into five areas; economic, environmental, security/safety, transportation and other. It is noted that considerable overlap occurs between the five criteria which could result in “double counting.”

The case studies cite highway maintenance costs and reduction in shipper logistics costs as two most frequently mentioned benefits. The subjective benefits noted were air quality and safety improvements while mentioning other benefits such as national significance. The review of methods distinguished between generating and supporting a benefit calculation. The most useful are transportation impact and economic impact from travel demand models, although these models do not incorporate freight rail. Other models can be used to examine strategic investment and operational changes along freight rail corridors, but they do not determine public benefits. It suggests that revenue sources be targeted that require air improvements or safety improvements (reduction in accidents at at-grade crossings or reducing the risk associated with hazardous material shipments).

The research determined that what is missing is a framework that captures multiple impacts attributable to public investments in freight rail capacity improvements. It suggests developing a benefit stream with a generic structure for evaluating transportation investments with various modules including: alternatives design, mode choice, highway, rail and net transportation impacts, land use, external impacts, economic impacts, and a cost module that would result in a benefit-cost ratio comparison. All of this is attempting to answer the question, will freight rail investment lead to decreased highway congestion in this corridor?
Application to the Region

The literature review focused on identification and prioritization of freight projects identifies these common themes that the region should consider when implementing the investment plan.

- Available data is limited or difficult to collect on a system-wide basis, nonetheless the freight system’s performance must be measured,
- The economics of freight related business should play a role in prioritizing projects, with the use of corridors as one method to establish a hierarchy, and
- Goods movement stakeholders should be involved in the process and decision-making while institutionalizing freight into the transportation planning process.
Investment Plan

A common element in the review of the various identification and prioritization methodologies is to focus upon the role that freight transportation in the overall transportation prioritization process. Freight desires to be fully integrated into the existing transportation improvements selection process. As a player in that process, part of its policy is to respect and support the myriad of other factors that influence project selection including:

- the environment with efforts to improve air quality,
- security and safety issues such as reducing truck-related crashes on the highway and highway-rail grade crossing accidents, and
- economic effects of freight transportation.

Freight-related transportation investments are not just bricks and mortar but investments in infrastructure that can support security and safety, the region’s economy, and the environment. This investment plan takes into consideration more than just “hard” infrastructure improvements so that a holistic approach is recognized. And as previously noted, the following strategies while applicable to the regional freight transportation system are specifically associated with the MARC planning area.

Strategic Investments

Institutionalize freight in the transportation planning process

The emphasis on improving the transportation system to benefit freight has only recently been acknowledged but it continues to receive minor attention in prioritization of project selection. The region does include factors related to freight in scoring criteria but many times these factors do not highlight the importance of freight in the region.

MoDOT’s Engineering Policy Guide also has a set of prioritization factors that wrap up into a Total Point Value (TPV). Included are such freight-related elements as freight bottlenecks (defined as load posted bridges, inadequate vertical or horizontal clearances, or gaps in the freight movement system), intermodal freight connectivity with an emphasis on facilities where freight changes modes, strategic economic corridors including I-29, I-35, I-70, U.S. 50, U.S. 71, and MO 13 that include access to St. Joseph, Kansas City and Warrensburg, as well as truck usage and truck volumes. Factors like those used by MoDOT should be considered by the region’s transportation agencies to fully integrate freight into the transportation improvement process.

The focus of this investment is to begin recognizing that freight plays a part in most transportation projects and that by improving the overall system – freight sees a benefit, too. Promotion of freight-related projects, either by listing or calculating the cumulative dollar investment will illustrate to the freight community inside and outside of the region that a total transportation system is important.

The RFO study region would also benefit from a coordinated effort between the MPOs and the States in completing the next freight strategy update on a bi-state and multi-region level.

Foster Public/Private Partnerships (PPPs)

Within any freight transportation investment plan there is a distinction amongst three different entities: public agencies responsible for roadways, quasi public authorities owning and operating ports and related facilities, as well as private owners. The intent of this freight investment plan is to foster partnerships between all of these entities. The entire freight community, public and private, ought to be the “champion” for transportation projects that have a direct influence upon regional freight mobility and access.

Many of the region’s bottlenecks or projects potentially identified through the assessments of the COFS will need strong support to be implemented. As with past projects, like the rail bottleneck improvements at the Sheffield Junction and Argentine Flyover, public and private entities must collaborate to accomplish the project goal. Recently, Missouri identified a need for improved Amtrak passenger service from Kansas City to St. Louis along the UP corridor. By working together with the railroad and legislators, funding was identified that provides siding extensions in the state to better accommodate passing movements.
Finding ways to continue to have private and public entities take a role in the transportation planning process, express interests in projects, and actively participate in policy development will provide for public and private benefits. Kansas City SmartPort and the MARC Goods Movement committee are two established ways that could continue to foster PPPs in the region.

**Study COFS to identify freight-specific projects**

Freight is a part of the overall system but there are projects that distinctively benefit industry or freight modes more than general traffic. Therefore, as a region it is important to systematically begin identifying these projects so that the region can improve the freight system, specifically, while allowing for mobility and access needs to be met. Using the assessments of the corridors of freight significance is a systematic way to identify these projects on the overall system.

**Corridors of National Significance**

These corridors provide service across many state lines and generally for long distances of travel. Many of these corridors provide access to international ports of entry and export. While these corridors are considered the highest level of classification, they are often characterized by a high percentage of through trips, which may never stop in the region to receive added value. From the highway perspective, these national corridors are primarily Interstate routes. It is worth noting though that the level of truck traffic on these facilities can significantly vary from 4,000 trucks per day to nearly 15,000 trucks per day.

From the rail perspective, these national corridors reflect the type of goods moved as well as the distance traveled and the market served (such as international ports as well as direct access to Mexico and Canada). While coal routes move raw materials across many states, the access to international ports afforded by intermodal corridors is the key to identifying transportation corridors of national importance. These long distance termini include Los Angeles/Long Beach, CA, Tacoma, WA, Chicago, IL, Laredo, TX with access to Mexico and New Orleans, LA.

**Corridors of Regional Significance**

These corridors provide service across the region, in both Kansas and Missouri, and are identified within the defined regional boundary of the 18 counties, as well as connecting across counties (such as US 36 from St. Joseph to Chillicothe, Missouri). These corridors have been selected as they provide supplementary service for distances of travel as well as providing direct access to regional freight-related facilities including, manufacturing and distribution centers as well as intermodal terminals. These corridors are identified as the middle classification level as they balance access with mobility. For highways many of these regional corridors are US numbered routes. For air, KCI is considered of regional significance.

**Corridors of Local Significance**

These corridors provide service across the region, in both Kansas and Missouri, and are identified within the defined regional boundary of the 18 counties. These corridors have been selected as they provide connecting links to higher level facilities as well as providing direct access to freight-related facilities often found in industrially zoned areas. These corridors are identified as the third classification level as they focus primarily on access. For highways, many of these local corridors are state numbered or lettered routes as well as a few US numbered routes. In certain locations, city owned and maintained streets are included as they meet a minimum threshold of truck volumes per day. For rail lines these corridors include the MNA, ICE and other routes with low train volumes. From a water-based transportation perspective, the Missouri River is considered a local corridor even though it provides service to several states. The Mississippi River would be considered a corridor of national significance because of its reach along many states and its access to international markets via ports in the Gulf.

To start with, corridor assessments could look at on-going as well as recent and older corridor studies in the region. Hopefully, these studies contain sufficient information to identify specific transportation improvements and potentially those with benefits to the freight community. Then as further definition of a corridor assessment scope is made, specific corridor studies should be conducted. After the initial corridors have been reviewed, the process can be...
refined to modify scope elements and the necessary level of detail. To maintain updates and monitor changes the information could be summarized in a database. As corridors are chosen for assessments it should be noted that established corridors are often contiguous and continuous in nature, while new emerging corridors may be more nodal or have intermittent development. Balancing the need for retention and recruitment of industry will be important in corridor selection.

As a starting point, a typical freight corridor study along the highway might include the following:

- A review of existing conditions that illustrates the number of travel lanes, posted speeds, traffic control devices, and warning signs so that an assessment of physical conditions including pavement ratings and bridge sufficiency ratings could be compiled.
- Field observations for geometric design on both horizontal and vertical and traffic operations like volume, driver behavior and congestion points.
- Data collection on safety (i.e., crash reports or statistics) and capacity (i.e., level of service based on peak hour or daily traffic volumes).
- Identification of adjacent industrial uses as well as access points to warehousing, distribution, manufacturing and intermodal facilities along the main corridor. Identify at-grade railroad crossings (including those on adjacent side streets) as well as connections to freight generators including river ports or airports.

**Increase data collection efforts to track freight performance**

Much of the discussion included in this plan regarding freight is limited by the data that is available. Many times the data is not available or the collection method has changed over time making trend information invalid. However, as discussed in the literature review, up-to-date and pertinent data is relevant and required to identify and prioritize freight-transportation projects fairly and accurately.

For the RFO 18-county study region, data was presented in a consistent manner for all the reporting agencies that were included. Each MPO and State measured information differently. It is important to recognize that priorities shift from location to location and therefore data collection is tailored to those differing priorities; however, seeking consistent reporting metrics across MPOs and the states for freight performance could still allow each area to set their individual priorities.

One basic way the region can begin monitoring freight system trends and performance is with a truck travel demand model. This type of model requires origin-destination data, truck volume counts, and an understanding of Economics of the region. After building this type of model, the region will be able to monitor growth, identify areas of truck-specific congestion and project future truck traffic volumes as well as monitoring the effects of new intermodal facilities that have recently come on-line or are proposed to come on-line soon. All of this information will be invaluable for tracking performance over time.

Safety experience, travel speeds, and vehicle-miles traveled are important measures that can provide important information on the performance of the freight corridors. The region’s traveler information system, KC Scout, already has the data collection infrastructure in place on many of the region’s national freight corridors. Expanding and enhancing the capabilities of KC Scout to systematically collect data important to the freight community utilizes existing infrastructure and provides a consistent data collection system across the region (KC Scout is a bi-state effort).

**Seek a balance between the land use and transportation relationships with freight development**

As new development is built outside of the traditional industrial areas of the region more information is needed to understand the land use and transportation implications of these moves. New development requires significant and immediate changes to the transportation system placing a burden on government to respond with infrastructure. However, the cost of addressing deferred maintenance in established areas may equal new investments.

The region’s well established industrial areas are already heavily developed. In several circumstances, land may not either be available or would be politically and financially difficult to obtain for expansion in the established yet
confined areas. On the other hand, redevelopment opportunities may exist. These can either be development consistent with the existing industrial areas or it can be adaptive reuse to residential or commercial development such as lofts or galleries. A new site location often referred to as a Greenfield can be more attractive. While industrial redevelopment in established areas is often referred to as Brownfields that term generally refers to a site on which there has been or there is suspected to have been a discharge of contamination. Business generally takes the path of least resistance and new, unconstrained sites can be more attractive than an existing facility that will need to be retrofitted to accommodate their operations.

It is important that the region seek a balance between the land use and transportation relationships with freight development. The region ought to maintain an adequate supply of industrial land while finding means to reduce traffic conflicts, such as designating truck access routes through non-residential areas. The land use and transportation relationship may vary based upon established industrial areas, newer industrial areas and industrial areas yet to be. For older industrial areas, adaptive reuse can be expected. However, it is important that former warehousing and manufacturing buildings be converted into uses compatible with their location. If demolition becomes necessary, any site redevelopment should be compatible with the neighborhood context. In the newer industrial areas, good neighbor policies are necessary to protect nearby residential areas. While the vast majority of industrial operations are good neighbors and good corporate citizens, communities must wrestle, from time to time, with issues raised by neighborhood residents concerning potential impacts from nearby industrial operations. Consequently, effective ordinances should be accurately defined according to measurable, quantitative thresholds. Communities may also wish to consider along major travel corridors means to enhance the development’s overall image, often through landscaping consistent with their location. Even modest industrial development can have significant road frontage and exposure. For industrial areas yet to be, competition from other sectors has driven up the cost of remaining opportunity sites. Identifying freight corridors that include a focus of coordinated land use policies and capital investments can help to create quality industrial areas.