



APPENDICES



CHAPTER 2: APPENDICES

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INTRODUCTION

The American Transportation Research Institute (ATRI) was tasked by HNTB to assess truck driver perspectives on truck parking issues, trends and capacity-related issues in the state of Kansas. The goal of this study is to assist in identifying new or improved truck parking solutions that better serve freight transportation providers traveling in and through Kansas. To help populate the state of knowledge on this issue, ATRI developed and pretested a truck driver survey that contained 27 questions relating to both driver demographics and truck parking in Kansas. The survey was then distributed via a web-based tool to carriers that operate in and around the state of Kansas; specifically, the survey was distributed through seven state trucking associations in the Midwest. In addition, the Owner Operator Independent Drivers Association (OOIDA) distributed the survey directly to drivers on behalf of ATRI. The survey was made available from May 15, 2015 to June 24, 2015.

More than 1300 surveys were originally received, coded and analyzed.

DEMOGRAPHIC RESULTS

The Kansas state truck parking survey commenced by asking a series of demographic questions:

Tables 1 and 2 show the gender and age distribution of survey respondents.

Table 1: Driver’s Gender

Gender	Response
Male	92.3 %
Female	7.7 %

Table 2: Driver’s Age

Age (years)	Response
Younger than 25	0.4 %
26 – 44	15.9 %
45 – 64	70.4 %
65 +	13.3 %

Based on several industry resources including ATA’s Trucking Trends and a recent ATRI assessment of “Driver Demographics,” both the age and gender break-outs are highly representative of the larger truck driver population.

That said, several noteworthy comments include:

- The Kansas survey response population for “Younger than 25” is several percentage points lower than the overall “Under 25” group nationally. Since this age group typically reflects future truck driver entries and employment levels, the consequence is that Kansas may experience a far worse truck driver shortage issue in the future than is being experienced nationally. Two factors negatively influence this age group:

1. Federal law prohibits interstate commercial truck drivers from obtaining a Commercial Drivers License (CDL) until they are 21;
2. The trucking industry’s ability to attract these younger drivers has declined substantially more so than the general workforce in this age group – resulting in a national truck driver shortage crisis; and
3. Ultimately it is believed that driver compensation increases, improvements in trucking industry operations (including improved parking opportunities), and better targeting of future truck driver candidate groups, including women, will help mitigate this issue.

Table 3 reflects the segment of the trucking industry in which survey participants operate. If individuals indicated they were in the for-hire segment, more specific sector information was requested. Table 4 shows a driver’s employment classification.

Table 3: Respondent’s Segment and Sector (if for-hire) of the Industry

Segment of Industry	Response
For-hire	91.3 %
Truckload	65.5 %
Less-than-truckload (LTL)	4.6 %
Specialized, flatbed	13.0 %
Specialized, tanker	5.6 %
Express / Parcel Service	0.8 %
Intermodal Drayage	0.7 %
Other (please specify)	8.8 %
Don’t know	1.0 %
Private	7.0 %
Don’t know	1.7 %

While these segments, or “sector” break-downs don’t perfectly mirror the industry based on freight tonnage or carrier registration type (e.g. LTL is typically 22% of tonnage moved), it does closely reflect those truck drivers who typically require over-the-road (OTR) truck parking. For instance, a large percentage of LTL mileage is local or regional, with only a small percentage of LTL “line-haul” requiring OTR parking. Alternatively, the largest percentage of Truckload drivers do operate over-the-road (OTR), often on trips of 500 + miles. This is further corroborated in Table 5.

Table 4: Driver’s type of Employment

Employment Type	Response
Employee Driver	20.2 %
Owner-Operator (O-O) with own authority	25.8 %
O-O/Independent Contractor leased to a motor carrier	51.6 %
Fleet executive / manager	2.2 %
Don’t know	0.3 %

A key conclusion that may be derived from Employment Type (Table 4) relates to truck parking reservation-for-fee systems that are being discussed in some trucking and truck-parking industry circles, as well as being tested by the Michigan DOT. Based on a recent survey of more than 1,400 truck drivers, ATRI discovered that 55 percent of owner-operators and independent contractors were not willing to pay anything for an advance parking reservation. Of those indicating a “willingness to pay,” 60 percent believe the motor carrier should be responsible for the fee, rather than the driver.

To better understand the survey respondents’ role in OTR parking, individuals were asked to indicate their average length of haul, as seen in Table 5.

Table 5: Driver’s Average Length of Haul

Average Length of Haul	Response
Local (Less than 100 miles per trip)	0.5 %
Regional (100-499 miles per trip)	15.1 %
Inter-regional (500-999 miles per trip)	35.5 %
Long-haul (1,000 + miles per trip)	48.5 %
Don’t know	0.4 %

As noted above, the trip lengths of survey respondents indicate that the critical truck parking target population was well represented; as more than 83% of the respondents regularly drove 500+ miles – a trip that usually requires a rest break or overnight stop.

If respondents classified themselves as an employee or leased driver, they were then asked how many total tractors their fleet operated. Table 6 shows the results. The majority of respondents indicated a total fleet size of less than 50 tractor trailer units in operation.

Table 6: Total Tractors in Fleet

Total Tractors in Operation	Response
Less than 50	49.0 %
51 – 250	18.3 %
251 – 1,000	11.5 %
1,001 +	17.6 %
Don't know	3.6 %

Table 7 indicates the primary vehicle configuration of respondents. Of the 11.9 percent of respondents who indicated “other,” the most popular responses were hopper trailers, livestock trailers, step deck trailers and dump trucks. In total, more than 92 percent of respondents drive a tractor-trailer combination truck.

Table 7: Driver’s Vehicle Configuration

Primary Vehicle Configuration	Response
5-axle Dry Van	37.3 %
5-axle Refrigerated Trailer	20.9 %
5-axle Flatbed	19.8 %
5-axle Tanker	6.3 %
Straight Truck	1.1 %
Longer Combination Vehicles (Doubles, Triples, etc.)	2.5 %
Other	11.9 %
Don't know	0.1 %

As demonstrated in Table 8, 91 percent of drivers indicated they were paid by load or per mile, reflecting the two most common compensation schema in the industry. Of the seven percent of respondents that answered “other,” the primary method of payment was a percentage of the line haul, a less common schema but one heavily favored by truck drivers.

Table 8: Respondents Method of Compensation

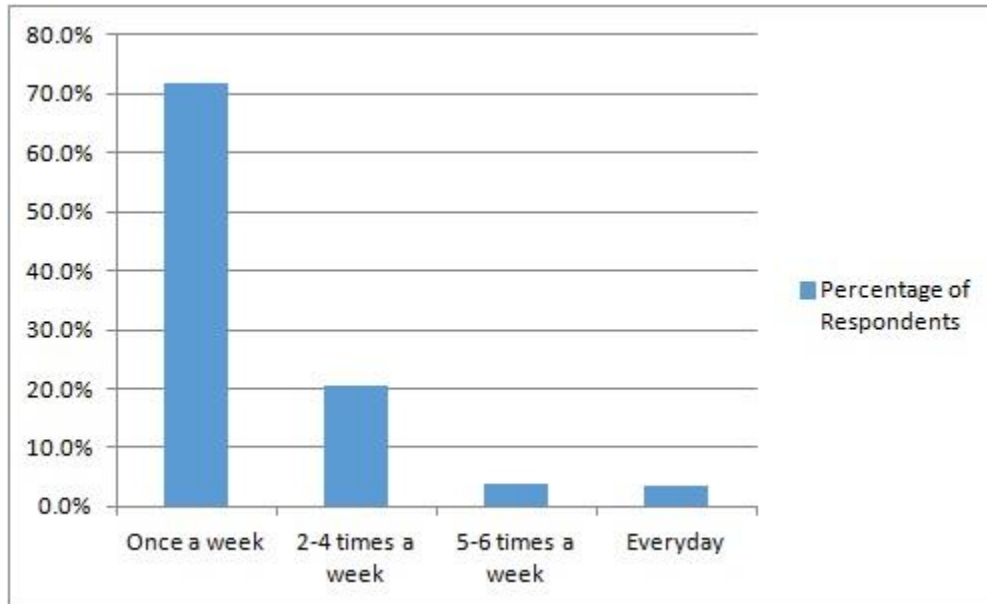
Method of Payment	Response
Per hour	1.9 %
Per load	44.8 %
Per mile	46.2 %
Other	7.0 %
Don't know	0.1 %

Finding Truck Parking in Kansas

Whether truck drivers are passing through Kansas or traveling within Kansas, truck parking is a necessity for OTR truck drivers for many different reasons. The ability to find safe parking is a common challenge nationally as well as in Kansas. The survey asked respondents a number of questions about their overall experience of truck parking in Kansas.

Figure 1 demonstrates the frequency at which participants of the survey need to find truck parking in Kansas.

Figure 1: Need for KS Truck Parking on a Weekly Basis



Seventy-eight percent of respondents indicated that it took over 30 minutes to find available truck parking in Kansas, as seen in Table 9. When this Figure is synthesized with other ATRI data on operational truck costs, a 30-minute delay equates to \$33.50 in 2013 dollars (Torrey, 2014).

Table 9: Average Length of Time to find Parking

Length of Time	Response
Less than 30 minutes	21.9 %
30 minutes to 1 hour	46.6 %
More than 1 hour	31.4 %

Many survey respondents indicated that the ability to find truck parking greatly depended on the time of day. If a driver was looking for parking after 8:00 PM, participants indicated it was far more difficult to find safe, available parking. This survey answer was also echoed nationally in the US DOT’s recently released Jason’s Law Truck Parking Survey Report (August 2015). The Jason’s Law Report aims to understand truck parking shortages nationwide by surveying state DOTs, truck stop operators, truck drivers, industry stakeholders and other trucking industry groups.

Driver respondents reveal that public and private rest stops present equal difficulty in finding parking availability. This is shown in Figure 2. After that, nearly a quarter indicated that private truck stop demand and parking availability was more problematic than at public rest stops.

Figure 2: Most Difficult Locations for Truck Parking

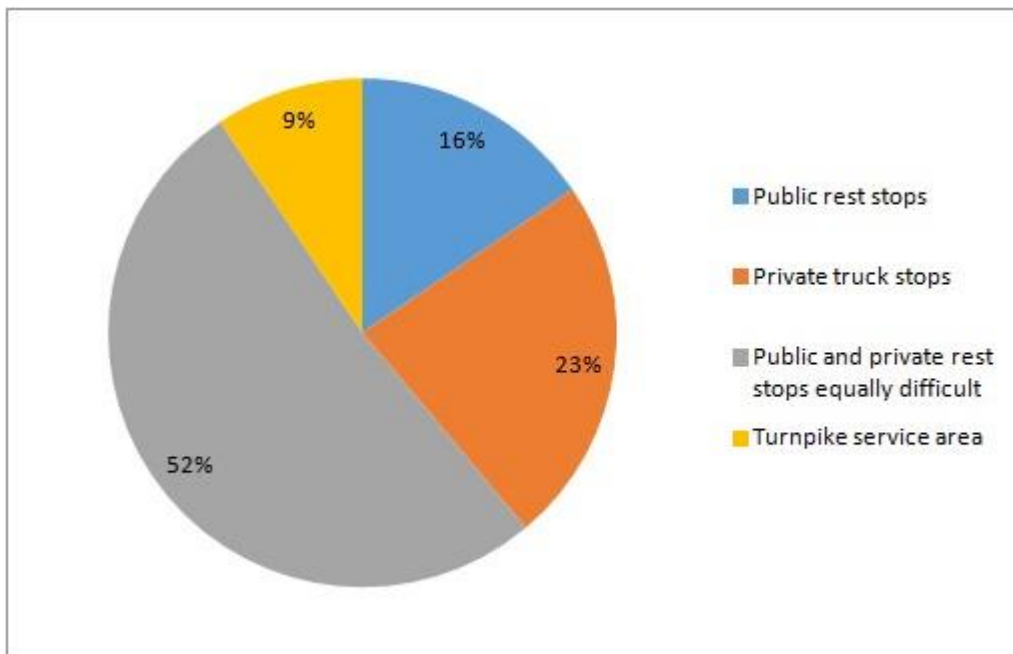


Figure 3 shows the breakdown of private and public rest stops for every ten rest stops a driver may make. For every 10 stops, survey participants were asked to record the breakdown of private and public rest stops in any given time period. For example, as seen in Figure 3, respondents indicate that they may stop at a private truck stop seven times, while the remaining three stops were likely to occur at a public rest stop. Over a quarter of respondents stop almost evenly at private and public rest stops (5 stops at a public rest stop, 5 stops at a private truck stop). However, there is an overall tendency for the majority of truck drivers to utilize private truck stops more than public rest areas.

Figure 3: For Every 10 Rest Stops, Number of Stops Made at Private or Public Rest Stops

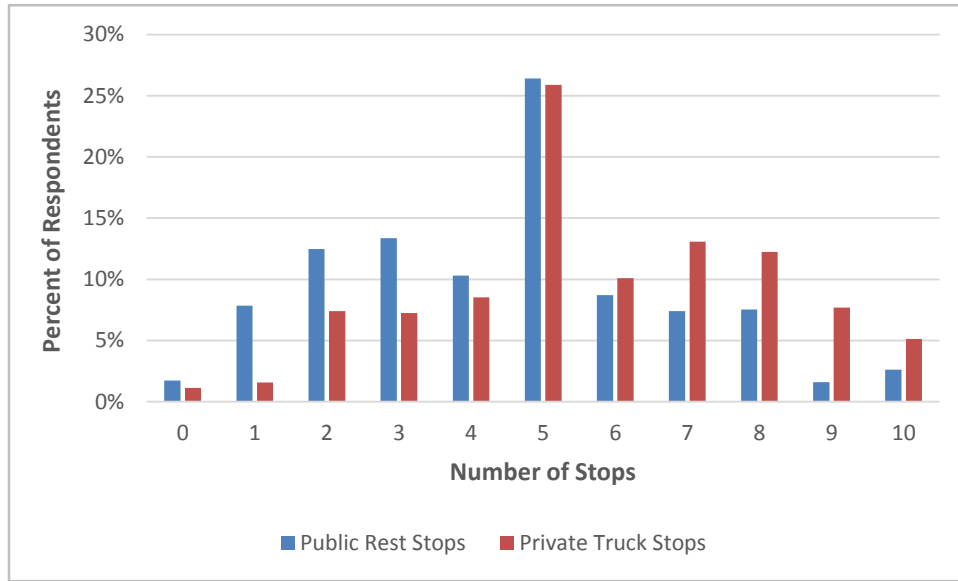


Figure 3 shows an interesting correlation to Figure 2. When looking at just public and private rest stops individually, survey respondents utilized private truck stops more often than public rest stops. However, as seen in Figure 2, private rest stops are more likely to be a challenge to find available truck parking. The results in Figure 3 are very similar to survey results from a national truck parking survey ATRI conducted at the Mid-America Truck Show in March, 2015 that yielded over 1,400 participants.

To better understand the relationship between Figures 2 and 3, the FHWA/DOT Jason’s Law Report broke down the number of parking spaces available from public and private truck stops throughout the United States. According to the report, there are over 272,000 parking spaces available from private truck stop parking facilities. Public truck parking locations only have about 36,000 truck parking spaces. These numbers indicate that private truck stop parking spaces are more numerous throughout the nation, but are equally difficult as public truck stops to find available and safe parking. Based on this survey, this was reflected on a smaller scale in the state of Kansas.

Drivers were asked about the ease of finding truck parking in different regions throughout Kansas. Table 10 shows the results. Respondents indicated rural areas as the least challenging type of region in which to find available truck parking.

Table 10: Regional Type Drivers are More Likely to find a Parking Spot

Region Type	Response
Major metropolitan area (Population ≥ 50,000)	4.9 %
Smaller metropolitan area (Population 10,000 – 49,999)	20.1 %
Rural area (Population < 10,000)	48.3 %
I am able to find a parking spot in all the above locations	13.7 %
I am not able to find parking in any of the above areas	13.0 %

This corroborates well with results from Mid-America Truck Show survey respondents. When drivers were asked a similar question about the regional type where they were most likely to reserve a parking spot, a majority of respondents said they would be more likely to use a reservation system in major metropolitan areas where parking demand is highest.

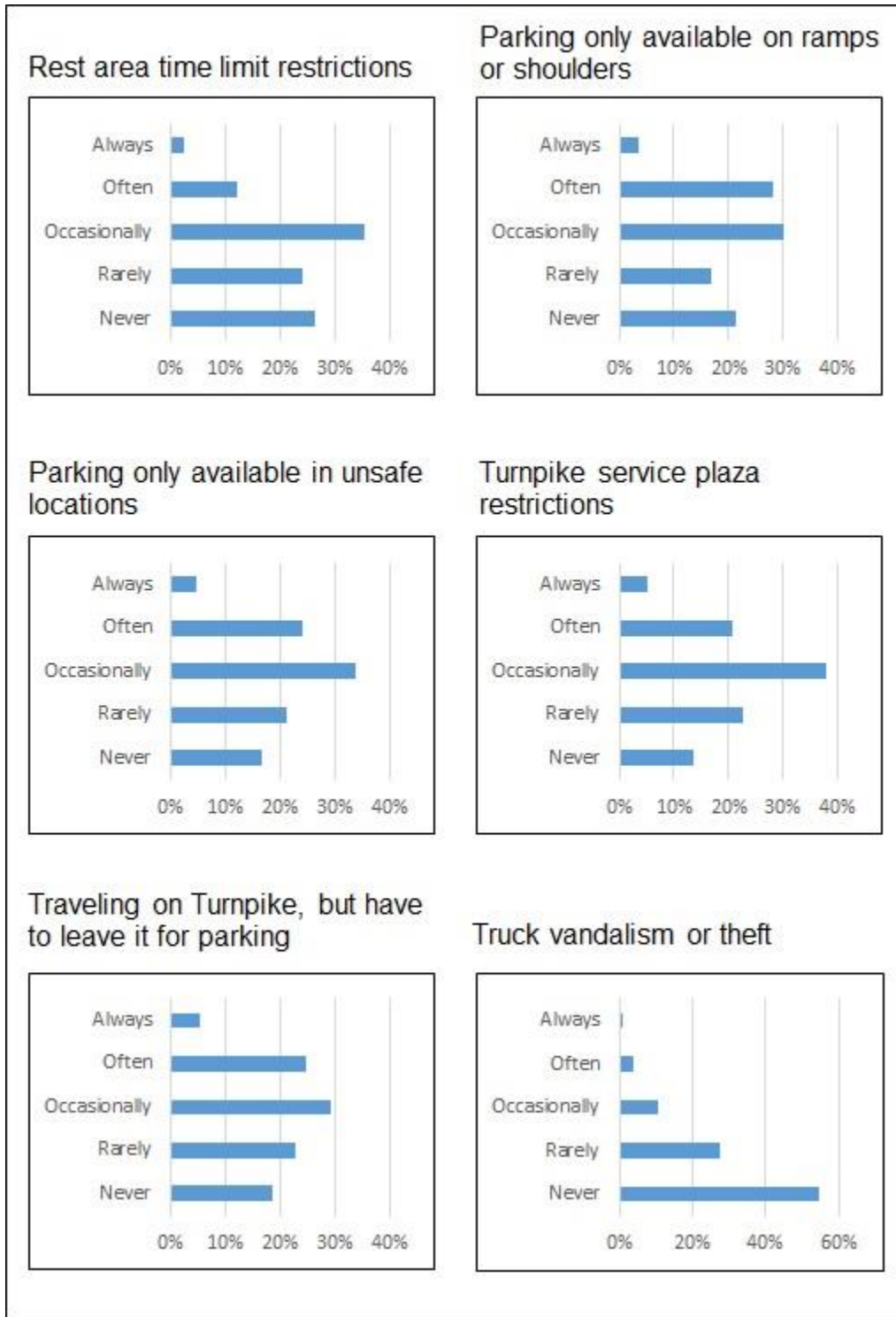
The Jason’s Law Report also indicated a need for parking closer to all metropolitan areas. In order to create more truck parking around urban areas, states reported some of the following challenges to overcome:

- 1) Cost of land
- 2) Bureaucratic review process for land use
- 3) Community opposition to land use
- 4) Property tax rates

Most of the primary roads utilized by trucks throughout Kansas serve major urban areas where, as indicated by survey respondents, a truck driver is least likely to find parking.

The following six graphs indicate potential challenges drivers encounter while parking – or looking for parking – in Kansas.

Figure 4: Frequency in which Drivers Experience Specific Issues



The amenities that are available at each truck parking location differ greatly. Survey respondents were asked to rank eleven parking amenities based on importance. The top three amenities that received a rank of number one are shown in Table 11.

Table 11: Top Ranked Amenities

Amenity	Response
Restrooms	47.5 %
Access to Interstate	20.5 %
Adequate Security	16.9 %

Table 11 results are key amenities that typically exist in both public and private facilities and are indicative of nationwide results as seen in the Jason’s Law Report. That said, the Jason’s Law Report indicated that drivers would prefer to take their long rest breaks at parking locations that have full amenities and adequate security – a combination that is more common at private facilities.

Survey respondents were asked if they agreed with the statement: “It is easy to find truck parking in Kansas in comparison to truck parking in other states.” Table 12 shows how participants reacted to the statement.

Table 12: Driver’s Reaction to Ease of Finding Truck Parking in Kansas versus Other States

Reaction to Statement	Response
Strongly Agree	4.8 %
Agree	22.3 %
Neutral	44.4 %
Disagree	24.0 %
Strongly Disagree	4.5 %

As seen in Table 12, survey participants were split on whether or not finding available truck parking in Kansas was easier than in other states. The majority of respondents indicated a neutral response, as many truck drivers feel the lack of truck parking is a nationwide problem. According to the Jason’s Law Report, the total number of spaces (private and public) in Kansas is over 4,800 spaces. States surrounding Kansas vary widely in their total spaces available to trucks. Colorado and Nebraska both have fewer total parking spaces than Kansas. However, Missouri has more than double the total number of parking spaces, and Oklahoma has about 50 percent more parking spaces than Kansas. These numbers are indicative of the Table 12 results – it may be easier to find parking in Kansas than in Colorado or Nebraska. However, it may be easier to find parking in Oklahoma or Missouri than in Kansas.

Finding available truck parking to accommodate a driver’s truck configuration presents many hurdles. The survey requested participants to determine whether parking spaces accommodated their individual truck configuration when they were able to find available parking. Parking spaces that adequately accommodate a truck driver’s vehicle configuration accounted for 66.8 percent of respondents; 33.2 percent of survey respondents disagreed. Figure 5 identifies which sector faces the most challenges to finding available and accommodating parking.

Figure 5: Truck Sector Breakdown – “Parking spots large enough to accommodate your truck configuration”

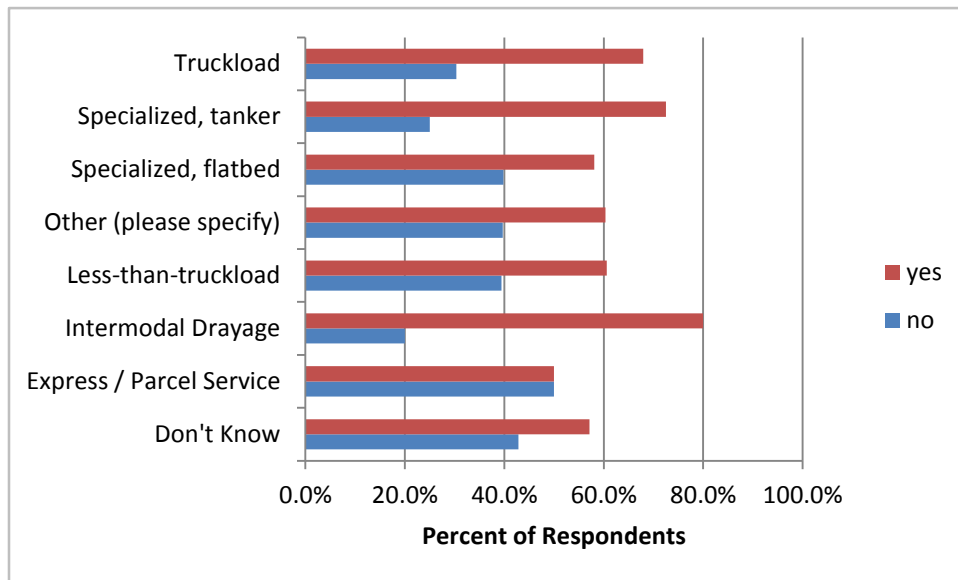
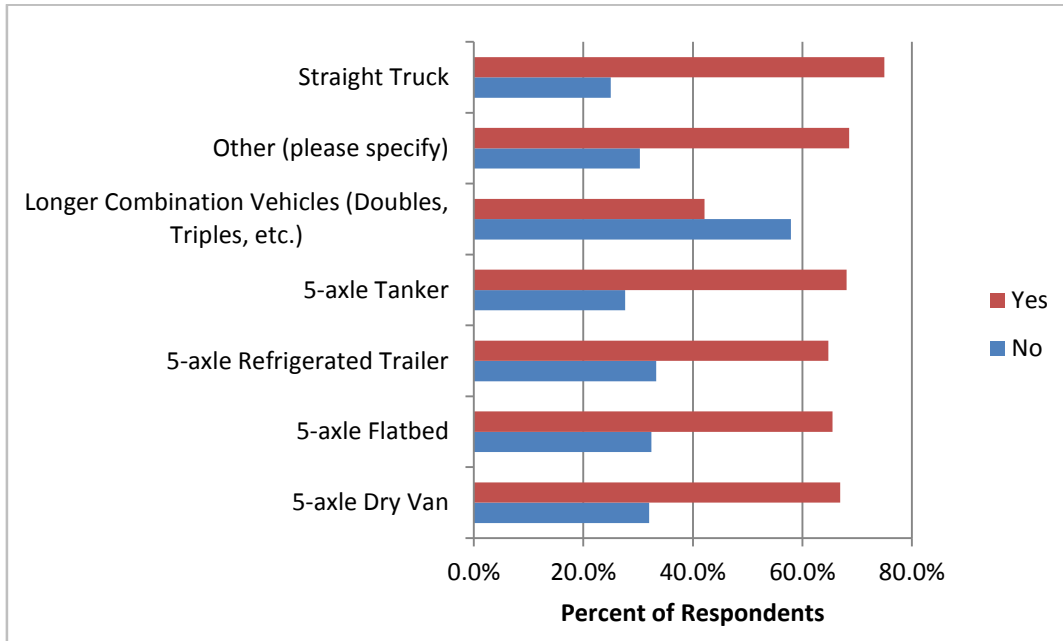


Figure 6 dissects the trucking sector further into the type of truck configuration respondents selected, and whether or not parking locations were accommodating to their specific load design. (Respondents that answered the vehicle configuration question as “don’t know,” (0.1 percent) were omitted in this graph to avoid distorting the results.) To be expected, drivers of longer combination vehicles were the only respondents who felt that parking spots do not accommodate their loads.

Figure 6: Parking Spots are Large Enough to Accommodate Truck Configuration Based on Vehicle Configuration



Kansas Truck Parking and Hours of Service

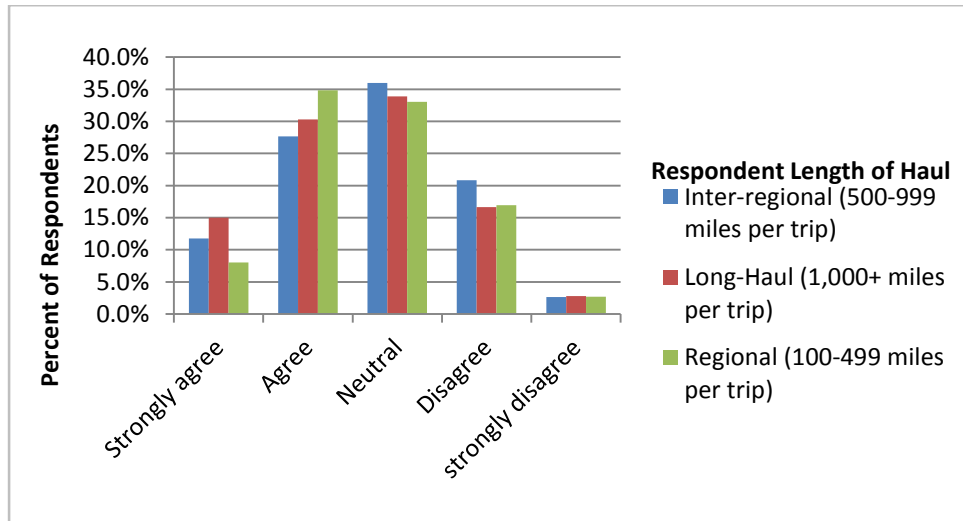
With Hours of Service (HOS) regulations, truck drivers are required to take a 30-minute rest break within their first eight hours of driving. This break often presents an additional challenge to drivers in finding available parking. The survey asked drivers to determine if they agreed or disagreed with the following statement: “It is difficult to find truck parking in Kansas for the Hours of Service 30 minute break.” Table 13 shows the results.

Table 13: Driver’s Reaction to Ease of Finding Truck Parking in Kansas for HOS 30 Minute Break

Reaction to Statement	Response
Strongly Agree	12.9 %
Agree	30.4 %
Neutral	35.4 %
Disagree	18.5 %
Strongly Disagree	2.7 %

Figure 7 demonstrates how drivers with a length of haul greater than 100 miles react to finding truck parking for the 30 minute Hours of Service rest break.

Figure 7: Driver Reactions to “It is Difficult to Find Truck Parking for the Hours of Service 30 Minute Rest Break”



Many drivers face tough decisions when looking for available parking for Hours of Service rest breaks. A driver is often confronted with two scenarios:

- 1) A driver is not able to find safe parking, and must continue driving beyond their legal Hours of Service.
- 2) A driver must park on the shoulder of an exit ramp (or other illegal location) to avoid violation of their Hours of Service.

This presents another hurdle for truck drivers – drivers may be ticketed for violating Hours of Service and/or ticketed for parking in an illegal and unsafe location.

When drivers were asked to rank the top reasons for seeking truck parking in Kansas, the “Hours of Service mandated rest / fatigue” category resulted in the highest percentage of number one rankings. Table 14 shows the top three number-one ranked reasons respondents seek truck parking.

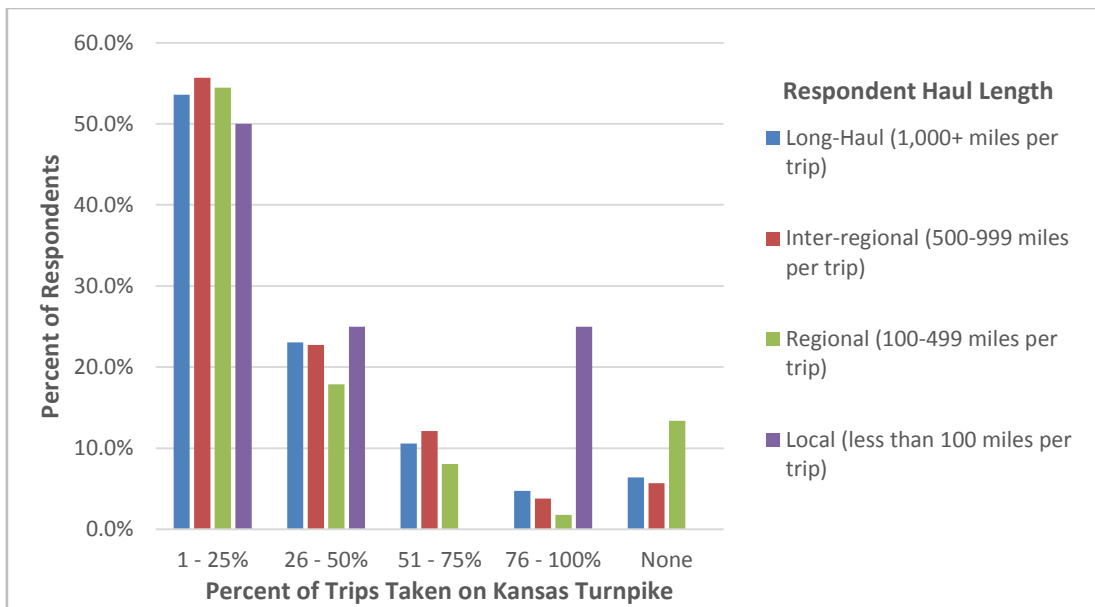
Table 14: Top Reasons for Seeking Truck Parking

Parking Reason	Response
Hours of Service Mandated Rest / Fatigue	82.6 %
Weather Related	8.7 %
Showering Restroom	7.7 %

Truck Parking and the Kansas Turnpike

The state of Kansas manages a 236-mile long turnpike that runs between Kansas City and the Oklahoma State border. A portion of the survey inquired about driver use of the Kansas Turnpike. To traverse the entire length of the Kansas Turnpike would cost a 5-axle truck about \$30. Therefore, it is no surprise to learn that the majority of drivers, no matter their average length of haul, use the turnpike for less than half of their loads. Figure 8 shows the percent of loads by length of haul that use the Kansas Turnpike. As can be viewed in Figure 8, about 56 percent of inter-regional respondents indicate that a quarter or less of their loads require travel on the Kansas Turnpike.

Figure 8: Percent of Trips Traveling on Kansas Turnpike based on Length of Haul



There are six service areas along the Kansas Turnpike. Survey participants were asked which service areas they frequently utilize for long-term parking (greater than four hours). Table 15 ranks the Topeka Service Area as the most frequented rest area; a finding confirmed by the Kansas Turnpike Authority’s (KTA) 2014 Annual Report.

Table 15: Service Plazas used for Long-term Parking (Survey participants had the ability to check more than one option)

Service Plaza	Response
Topeka Service Area (Mile Post 188)	29.0%
N/A	22.9%
Emporia Service Area (Mile Post 132)	18.8%
Belle Plaine Service Area (Mile Post 26)	17.0%
Lawrence Service Area (Mile Post 209)	16.2%
Towanda Service Area (Mile Post 65)	11.5%
Matfield Green Service Area (Mile Post 97)	7.4%

Technology and Parking Demand

Technology is an increasingly useful tool to help drivers plan and implement decisions about safe, convenient and available parking. A section of the survey focused on how drivers accessed the internet and obtained information while they were on the road. This same subject was also prevalent in the FHWA/DOT Jason’s Law Report. The ability to communicate truck parking availability and amenities was a common subject echoed throughout the report. Multiple industry stakeholders also acknowledged that this form of advance parking notice communication is still in the development and testing phase.

Table 16 shows the overall percentages from all survey participants on how the internet is accessed while they are on the road.

Table 16: Method of Accessing the Internet While on the Road (Survey participants had the ability to check more than one

Method of Accessing Internet	Response
Truck Stop / Rest Area Kiosk	10.6%
Hotel / Motel Business Center	3.3%
Onboard Communication	7.7%
In-cab Information system (e.g. PeopleNet, Qualcomm, etc.)	4.9%
Laptop in Vehicle	30.7%
Smartphone	42.9%
Other	4.6%

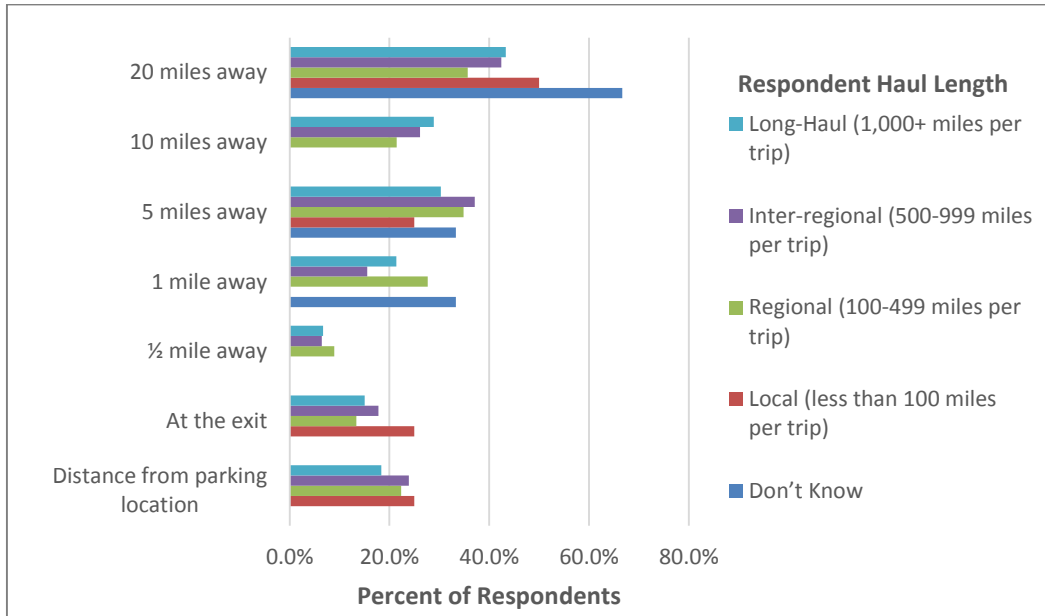
The Kansas Department of Transportation and Kansas Turnpike Authority are interested in learning how truck drivers obtain their information about parking availability. Survey participants were asked to determine a ranking of their preferred method of being notified of available parking. The high preference for the use of Changeable Message Signs (CMS) was independently corroborated in an ATRI survey of Minnesota truck drivers, where CMS was also the second most common preference.

Table 17: Preferred Method of Receiving Real-time Parking Information

Preferred Method	Response
Smartphone Application	51.9 %
Roadside Changeable Message Signs	39.1 %
Onboard Communication/Computer System	7.6 %
Internet/Website Information	6.0 %
511 System	5.5 %
Other:	5.1 %
Dispatcher Contact	2.5 %

Survey respondents were also asked how far in advance they would like to be notified of available parking spots. Figure 9 displays the distance drivers would prefer to be notified of available parking based on their length of haul. The majority of survey respondents indicated that trip planning played an integral role in their daily operations. As a result of the need to plan out stops and rest breaks, the majority of participants that drive 500 or more miles indicated they would prefer at least 20 miles notice of available parking. Those who answered “distance from exit” may not have a specific number of miles they would like to be notified, as it may depend on their delivery schedule or Hours of Service. While other survey participants indicated they preferred a time threshold (i.e. an hour before reaching parking location) of being notified before reaching available parking. Another comment echoed by several respondents was a desire of at least 60 miles notice for an available parking alert in order to better plan their schedule.

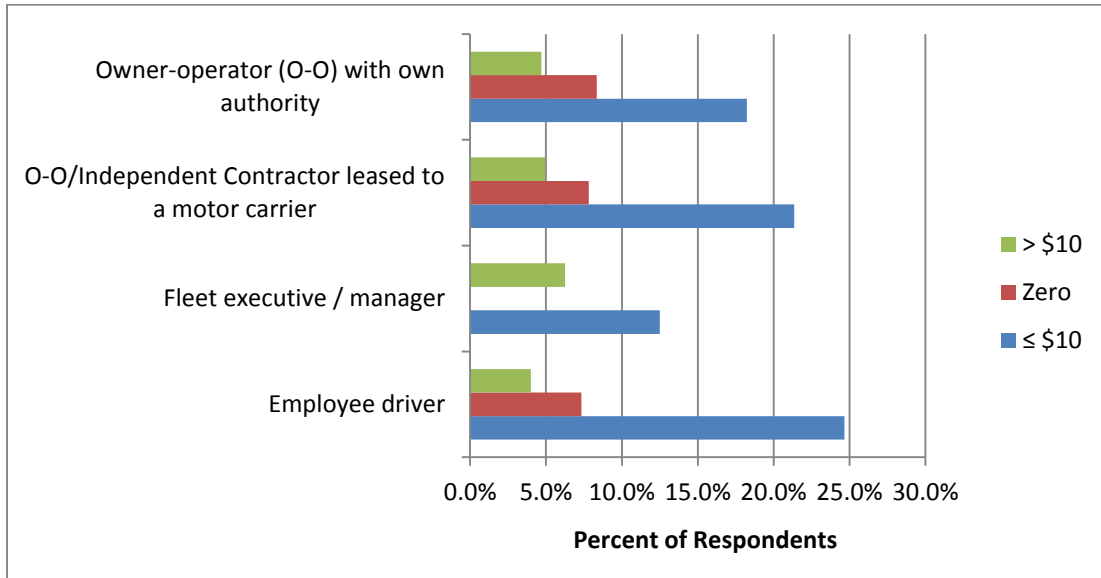
Figure 9: Preferred Notification Distance based on Length of Haul



Parking reservation systems are becoming a hot topic of discussion. Drivers were asked whether they would be willing to reserve a parking spot while traveling through Kansas. The majority of respondents (63.4%) indicated they did not want to reserve parking. Survey participants who indicated they were willing to reserve a parking space (36.6%) also indicated how much they were willing to pay for the reservation. Ten dollars and under was the most popular answer for how much drivers would be willing to pay to reserve a parking spot. Many participants said they would be willing to reserve a parking spot, but felt they should not be charged for doing so.

Figure 10 illustrates the dollar amount drivers are willing to pay in order to have a guaranteed reserved parking spot upon arrival based on their type of employment.

Figure 10: Amount Drivers are willing to Pay for a Reserved Parking Spot based on Driver's type of Employment



CONCLUSION

Safety in the trucking industry has always been the number one priority whether a driver is operating a truck on the road or parked during their 30-minute Hours of Service rest break. Truck drivers ranked “adequate security” as one of their top three amenities desired at a truck stop. To further meet truck driver expectations when they take a rest break, more overall parking capacity is needed. The general lack of truck parking in and around metropolitan areas stood out as one of the major issues that should be improved; although it is acknowledged that challenges such as right-of-way, zoning and air quality all exist. Nevertheless, with the density of truck trips in metropolitan areas and the strict delivery timetables most drivers must abide by, expanding truck parking capacity in and around metropolitan areas would allow drivers to be more efficient in their daily operations. Designated truck parking near highly populated areas would help drivers stage close to their destinations in the metropolitan areas without having to drive many extra miles to find available, safe and legal parking.

To assist with finding available parking, technology is becoming an ever-present tool utilized throughout the trucking industry. Smartphones and laptops were the two most popular tools drivers use to access the internet. Survey participants specified smartphones as their preferred method of receiving real-time parking information. However, Federal laws dramatically limit how technologies in trucks can be legally used. Changeable Message Signs with real-time parking information (at the roadside) were another popular method among truck drivers. Changeable Message Signs placed at a specific distance before a truck stop or rest area with space availability information would assist drivers in managing their next rest break.

The Kansas Truck Parking Survey analysis helps to identify critical issues and concerns related to truck parking from the truck driver perspective. Federal regulations for truck drivers often dictates when a break in driving must occur. Therefore, if there is a lack of safe and available truck parking, drivers are often stuck deciding whether they should continue driving while fatigued and/or beyond their Hours of Service, or stop in an unsafe or illegal location. An increase in the number of safe truck parking locations and the ability to communicate parking information to drivers effectively would help truck operators make safe and efficient decisions.

REFERENCES

Torrey, F.W. & Murray, D. (2014). *An Analysis of the Operational Costs of Trucking: A 2014 Update*. Arlington, VA: American Transportation Research Institute.

Jason's Law Truck Parking Survey Results and Comparative Analysis. Federal Highway Administration.

http://www.ops.fhwa.dot.gov/freight/infrastructure/truck_parking/jasons_law/truckparking_survey/index.htm#toc. Accessed August 24, 2015.

Kansas Turnpike Authority Annual Report 2014.

http://www.ksturnpike.com/assets/uploads/2014_KTA_Annual_Report_PRINT.pdf.

Accessed July 30, 2015

Kansas Freight Network Truck Parking Plan
Peer Organization Interview Process

Questionnaire

The Kansas Department of Transportation (KDOT) in partnership with the Kansas Turnpike Authority (KTA), are conducting interviews with peer organizations to better understand parking issues trends, tools and strategies that could potentially be applied in Kansas to improve freight network safety, efficiency and competitiveness.

(The following will be captured during the interview)

Name:

Title:

Organization:

Phone:

Address:

Email:

Date of Interview:

Interview Mode:

Questionnaire

Current Truck Parking Conditions and Issues

I'd like to start by talking about the current truck parking conditions and issues in your state.

1. How many designated truck parking facilities and parking spaces are you responsible for?
 - a. Do you have a count for designated public spaces?
2. Do you compile data on private truck parking?
 - a. If yes, can you provide a count for private truck parking spaces?
 - b. If specific counts are not available, do you have a general idea of the percentage of private vs. public designated truck parking spaces?
3. Which routes and highways do they serve?
 - a. Are these your busiest freight routes by Average Annual Daily Truck Traffic (AADTT)?
4. Which truck parking facilities are the busiest based on utilization?
 - a. Are they public, private or both? If both, what is the percentage of public vs. private?
 - b. Where are they located?
5. For your busiest lots, what are the busiest ...
 - a. Hours of day?
 - b. Days of week?
 - c. Time of month?
 - d. Time of year?
 - e. Are there seasonal variations? If so, please describe.
 - f. Are these long term trends?
6. Does usage differ for your less frequently used lots?
 - a. If so, how?
 - b. Why is that?

Questionnaire

7. What amenities do you provide in your lots (please describe).
 - a. Have you received feedback about the amenities and if they are meeting trucker needs?
 - b. If amenities are not provided, are there plans to improve amenities?
 - c. If so, what improvements will be made?
 - d. If so, is there a plan and timetable to improve the amenities?
 - e. What is the budget source?
8. What are your planned/committed freight improvement projects that could affect parking? If an improvement affects parking, what are the anticipated affects? Are there strategies to mitigate the anticipated affects?
9. What is budgeted annually for their upkeep/expansion?
 - a. If so, what is the budget source for this program?
10. Do you have enough legal/formal truck parking facilities given the demand?
11. What issues with illegal or informal truck parking do you have?
 - a. If yes, please describe the issue and trends.
 - b. How does law state and local enforcement deal with the issue?
 - c. Are they growing or declining? Why?
12. Have you heard from local jurisdictions or businesses that have issues with illegal or informal truck parking near your facilities?
 - a. How would you describe those issues?
 - b. How were they resolved? If they weren't resolved, what were the obstacles?
 - c. Are there local restrictions for truck parking that you are aware of that impact your facilities?
 - d. If yes, please describe the restrictions.
 - e. In your opinion do they work?

Questionnaire

13. Do you any special issues or challenges related to oversized/overweight (OSOW) loads as it relates to truck parking (both legal and illegal)?
- How would you describe those issues?
 - Do OSOW regulations in adjacent states (or systems/agencies/authorities) affect truck parking considerations on your system? If so, please explain those issues.
 - Are there anticipated changes to OSOW regulations in your state or adjacent states that have the potential to affect truck parking considerations on your system?
14. Overall, what are your biggest challenges with truck parking?
- How would you describe those challenges?
 - What has been done or is currently being contemplated to address those challenges?

Strategies and Solutions

Now let's talk about strategies and solutions you've considered or deployed.

15. Have you in the last three years conducted any studies that would shed light on your truck parking situation or potential solutions and opportunities?
- If so, what was the study?
 - Why was it undertaken?
 - Has it been implemented? If not, why?
 - If it has been implemented what is this an ongoing program and what is the budget source?
 - How may we get a copy?
16. As part of any study, or as a separate initiative, have you evaluated the economic or other impacts of truck parking in terms of local or statewide costs and benefits?
17. If you have...
- How did you undertake the assessment of economic or other impacts?
 - What did you discover?
 - How could we learn more about your methodology and results?

Questionnaire

18. Do you have a formal database/inventory of available truck parking for your system?

- a. If yes, is this within your agency, other agencies or in coordination with other agencies (please describe)?
- b. How is this data collected?
- c. How often is the data updated?
- d. Do you track availability/capacity?
- e. How do you use this information?
- f. Do you provide this information to the public?
- g. If no, would you consider providing this to the public in the future?

17. Do you partner with businesses/private interests to provide information on available designated private parking facilities in your state?

- a. If so, please describe the partnership and how information is made available to the public?

18. What are your specific statewide or system restrictions for truck parking, if any?

- a. Please describe the restrictions.
- b. In your opinion do they work? If no, why not?

19. Are there potential further restrictions being contemplated?

- a. What kind?
- b. What is motivating the change?

Questionnaire

Future Issues and Opportunities

Finally, let's talk about parking issues and opportunities in the next 10 years.

20. What is your future truck freight demand (in terms of an increase in AADTT) expected to be in the next 5 years? 10 Years? 20 Years?
 - a. In your opinion, is this a significant change?
 - b. Why the change?
 - c. Which highways/routes will be most affected?
 - d. How will that affect your truck parking?
21. Do you have existing technology/traveler information that truckers can use for finding truck parking, reserving a parking spot, etc.
 - a. If so, please describe the success and challenges with the system.
 - b. If not, are there plans to implement such a system in the next 3-5 years?
22. Do you have a truck parking improvement program currently in place?
 - a. If so, how is it structured?
 - b. Has it been successful?
 - c. Have you experienced any setbacks or difficulties with the program?
 - d. If not, do you plan to implement such a plan within the next 3-5 years?
23. Do you currently partner with neighboring states to coordinate traveler information, technology and/or facilities for truck parking?
 - a. Which state(s) do you partner with?
 - b. How do you partner?
 - c. Please describe the most successful parts of the partnership.
 - d. In what ways could the partnership be improved?

Questionnaire

24. If you do not currently partner with neighboring states to coordinate traveler information, technology and/or facilities for truck parking ...
- a. In what areas would you be interested in partnering?
 - b. Why have you not already partnered in that area?
 - c. What would it take to change that situation?
 - d. How difficult would it be to make that change?
25. Is there anything we haven't discussed that you think will help me better understand how you are addressing truck parking in ways that minimize impacts and increase benefits?

Statewide Truck Parking Analysis - Advisory Committee Members

Title	First Name Last Name	Title	Business Name	City
Ms. Kimberly	Bonhart	Vice President - Government Affairs	UPS	Overland Park
Mr. Mike	Bowen, P.E.	Division Administrator	FHWA - Kansas Division	Topeka
Mr. Tom	Palace	Executive Director	Petroleum Marketers & Convenience Store Assoc of Kansas	Topeka
Mr. Josh	Roe	KDA Economist	Kansas Department of Agriculture	Manhattan
Mr. Steve	Kelly	Deputy Secretary	Kansas Department of Commerce	Topeka
Capt. Chris	Turner	Commander Troop 1	Kansas Highway Patrol	Topeka
Ms. Susan	Cadoret	Business and Community Development	Kansas Department of Commerce	Topeka
Mr. Tom	Whitaker	Executive Director	Kansas Motor Carriers Association	Topeka
Mr. John	Prather	Vice President Corporate Relations	Groendyke Transport, Inc.	El Dorado
Mr. Mike	Kelley	Chief Sustainability Officer	YRC Worldwide	Overland Park
Mr. Ron	Achelphohl	Director of Transportation	Mid-America Regional Council	Kansas City
Mr. Joe	Pimple	President/General Manager	Sauder Fabrication	Emporia
Mr. Mike	Matousek		Owner-Operator Independent Drivers Association	Grain Valley
Mr. Mike	Miller	President	Miller Trucking LTC	LaCrosse
Ms. Lori	Borgan	Director of Safety	Convoy Systems, LLC	Kansas City
Mr. Mark	Augustine		Triplett, inc.	Salina

Project Name/Number
Kansas Statewide Truck Parking Study

Date of Meeting
April 30, 2015



Participants
Advisory Panel – Kansas Statewide Freight
Network Parking Plan; KDOT; KTA; HNTB

Time
10:30 a.m. – 1:30 p.m.

MEETING PURPOSE

Engage key Kansas truck freight stakeholders in improving the effectiveness of the Kansas Statewide Freight Network Parking Plan through discussions that: **(1)** generate feedback about current/future Kansas truck parking trends, needs and preferences; **(2)** help shape recommendations for addressing truck parking needs; and **(3)** result in effective strategies for improving the state’s freight network safety, efficiency and competitiveness.

MEETING AGENDA

10:00 a.m. Registration

10:30 a.m. Welcome – Sec. Mike King, Kansas Dept. of Transportation

1. Welcome
2. Introductions
3. Meeting overview

10:45 a.m. Project Overview – Gretchen Ivy, HNTB

1. Summary review of project purpose, scope and schedule
2. Group discussion of advisory group role and responsibilities
3. Handouts: Study description, Schedule

**11:15 a.m. Current Needs: “How does truck parking affect you and Kansas?”
Michael DeMent/Eric Strack, HNTB**

1. Summary of truck parking inventory
2. Group discussion of perceptions/experiences regarding current needs/issues, including:
 - Parking availability/locations/conditions/amenities
 - Public/private roles and collaboration
 - Local/state/federal rules and regulations
3. Boards/Handouts
 - Boards: Preliminary results from Kansas statewide parking inventory

12:00 p.m. Lunch

**12:30 p.m. Future Issues/Solutions: “How should truck parking change in Kansas?”
Eric Morris/Brian Comer, HNTB**

1. Group discussion of attendees’ perceptions/experiences regarding emerging trends/solutions, including:
 - Trends (business, demographic, other) affecting truck volume, parking needs
 - Best practices seen in other jurisdictions, states
 - Regulatory improvements
 - Technology trends and solutions
2. Handouts: Key peer interview/literature review themes; ATRI E-survey

1:30 p.m. Open Discussion – Gretchen Ivy, HNTB

1. Open discussion
2. Recap of actions/follow-up
3. Next steps

2:00 p.m. Meeting Close – KDOT

Kansas Freight Network Truck Parking Plan

Schedule

		February	March	April	May	June	July	August	September	October	November	December	January
ID	Task Name	2/1	3/1	4/1	5/1	6/1	7/1	8/1	9/1	10/1	11/1	12/1	1/1
1	KTA-KDOT project kickoff meeting	2/1	2/8	2/15	2/22	3/1	3/8	3/15	3/22	3/29	4/5	4/12	4/19
2	1. Define truck parking conditions, usage & issues	<p>2/26 ♦ KTA-KDOT project kickoff meeting</p> <p>1. Define truck parking conditions, usage & issues</p> <p>4/30 ♦ Technical advisory panel meeting 1</p> <p>♦ Deliverable: Existing Conditions Technical Memorandum</p> <p>2. Identify & analyze truck parking choices & needs</p> <p>♦ KTA-KDOT team meeting</p> <p>♦ Deliverable: Truck Parking Factors & Trends Technical Memorandum</p> <p>3. Develop & Evaluate Initial Range of Solutions</p> <p>♦ Technical advisory panel meeting 2</p> <p>♦ KTA-KDOT team meeting</p> <p>♦ Deliverable: Initial Solutions Technical Memorandum</p> <p>4. Develop & evaluate preferred range of solutions</p> <p>♦ KTA-KDOT team meeting</p> <p>♦ Deliverable: Truck Parking Implementation Plan</p>											
14	Technical advisory panel meeting 1												
15	Deliverable: Existing Conditions Technical Memorandum												
16	2. Identify & analyze truck parking choices & needs												
24	KTA-KDOT team meeting												
25	Deliverable: Truck Parking Factors & Trends Technical Memorandum												
26	3. Develop & Evaluate Initial Range of Solutions												
37	Technical advisory panel meeting 2												
38	KTA-KDOT team meeting												
39	Deliverable: Initial Solutions Technical Memorandum												
40	4. Develop & evaluate preferred range of solutions												
53	KTA-KDOT team meeting												
54	Deliverable: Truck Parking Implementation Plan												

Kansas Statewide Freight Network Parking Plan

Study Description

Purpose

The Kansas Department of Transportation and Kansas Turnpike Authority are undertaking a study of the state's truck parking capacity, issues, trends and opportunities in order to develop a plan for addressing existing and potential future parking needs in ways that improve statewide freight network safety, efficiency and competitiveness. The focus is on the Kansas Primary and Secondary Freight Networks, with a special emphasis on I-70, I-35 and the Kansas Turnpike. The effort will assess: (1) existing public and private truck parking locations, capacity and usage; (2) physical barriers and information needs (signage, education, technology) affecting truck parking choices; and (3) opportunities for improving parking capacity and services in ways that benefit safety, efficiency and/or economic growth throughout Kansas.

Tasks

1. Define truck parking conditions, usage and issues in Kansas

Task 1 defines existing truck parking availability, issues and needs through:

- An advisory panel of truck parking stakeholders for feedback on issues, needs, results and recommendations.
- An inventory of current legal/formal public and private assets and usage.
- An inventory of illegal/informal truck parking trends and issues they present.
- A literature review of studies regarding truck parking decision factors.
- State department of transportation and other stakeholder interviews regarding truck parking decision-making factors.
- Electronic surveys of truck parking stakeholders to identify factors affecting their truck-parking decisions.

2. Identify and analyze factors likely to affect future truck parking choices and needs in Kansas

Task 2 analyzes projected truck freight flows, issues and needs affecting truck parking in Kansas by:

- Identifying freight movements, trends and regulations affecting truck parking demand.
- Reviewing related studies/plans regarding future highway freight trends, flows and projections.
- Looking at freight network plans/construction/regulations affecting future Kansas freight flows and truck parking needs.

3. Develop and evaluate an initial range of potential solutions

Task 3 develops the initial range of potential truck parking solutions for the Kansas freight network by:

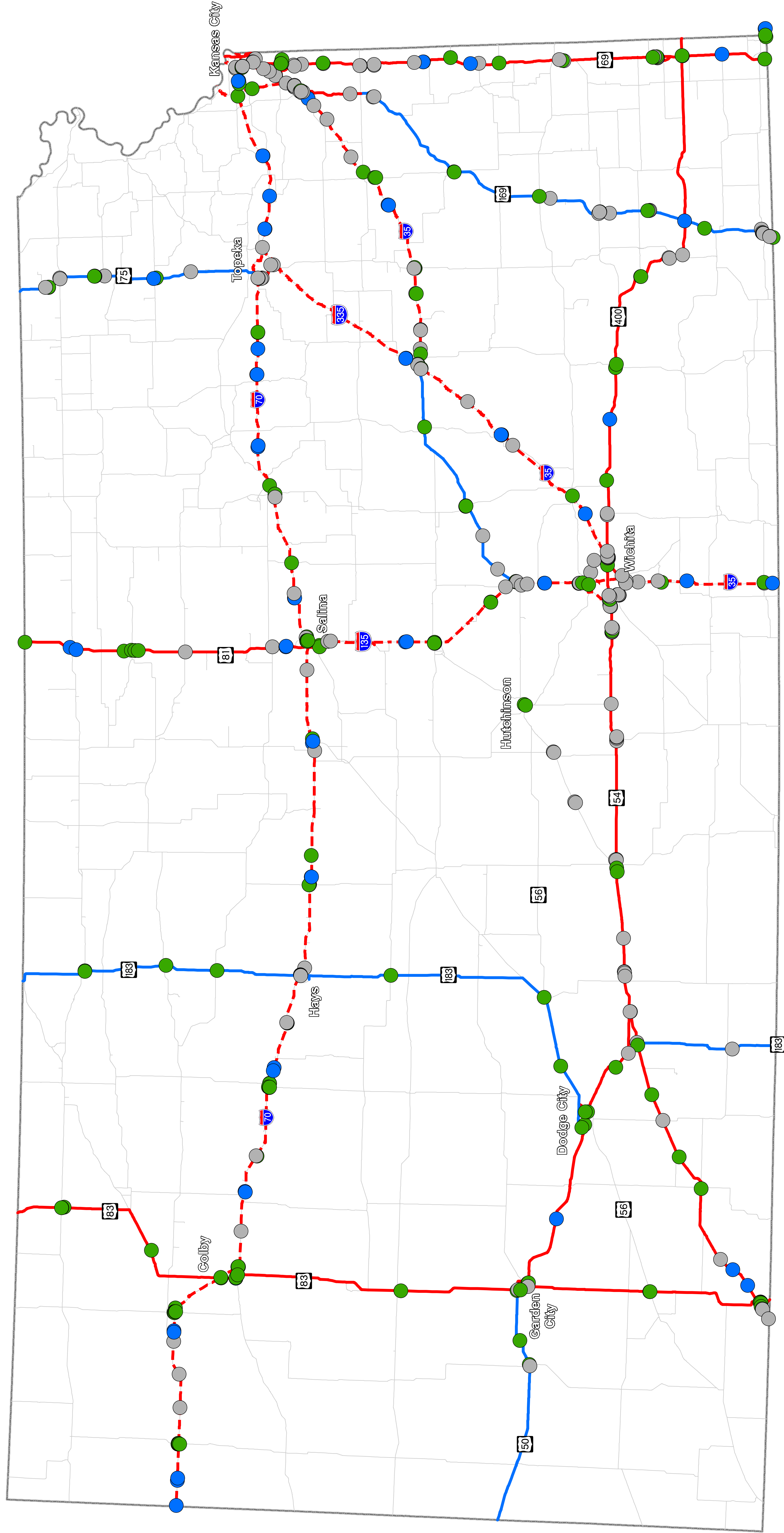
- Identifying opportunities for locating new or improving existing public and private truck parking assets in Kansas.
- Assessing ways to overcome barriers to using existing formal/legal parking facilities in urban/rural areas.
- Identifying information/technology/service solutions for moving truckers to formal/legal sites.
- Exploring partnerships with border states and the private sector to increase/improve parking facilities and amenities.
- Perform a qualitative cost-benefit analysis of initial solutions versus potential economic benefits.

4. Develop and evaluate a preferred range of solutions

Task 4 will select the preferred range of truck parking solutions for Kansas by:

- Creating a set of evaluation criteria for screening the initial range of potential solutions.
- Narrowing the initial potential truck parking solutions to a preferred range of solutions.
- Ranking solutions based on cost/benefit analysis, screening criteria and advisory panel input.
- Identifying strategies/tools to meet needs of motor carrier industry/professionals traveling in Kansas.
- Identifying range of potential federal, state, local and private opportunities for funding preferred range of solutions.

Parking Ownership



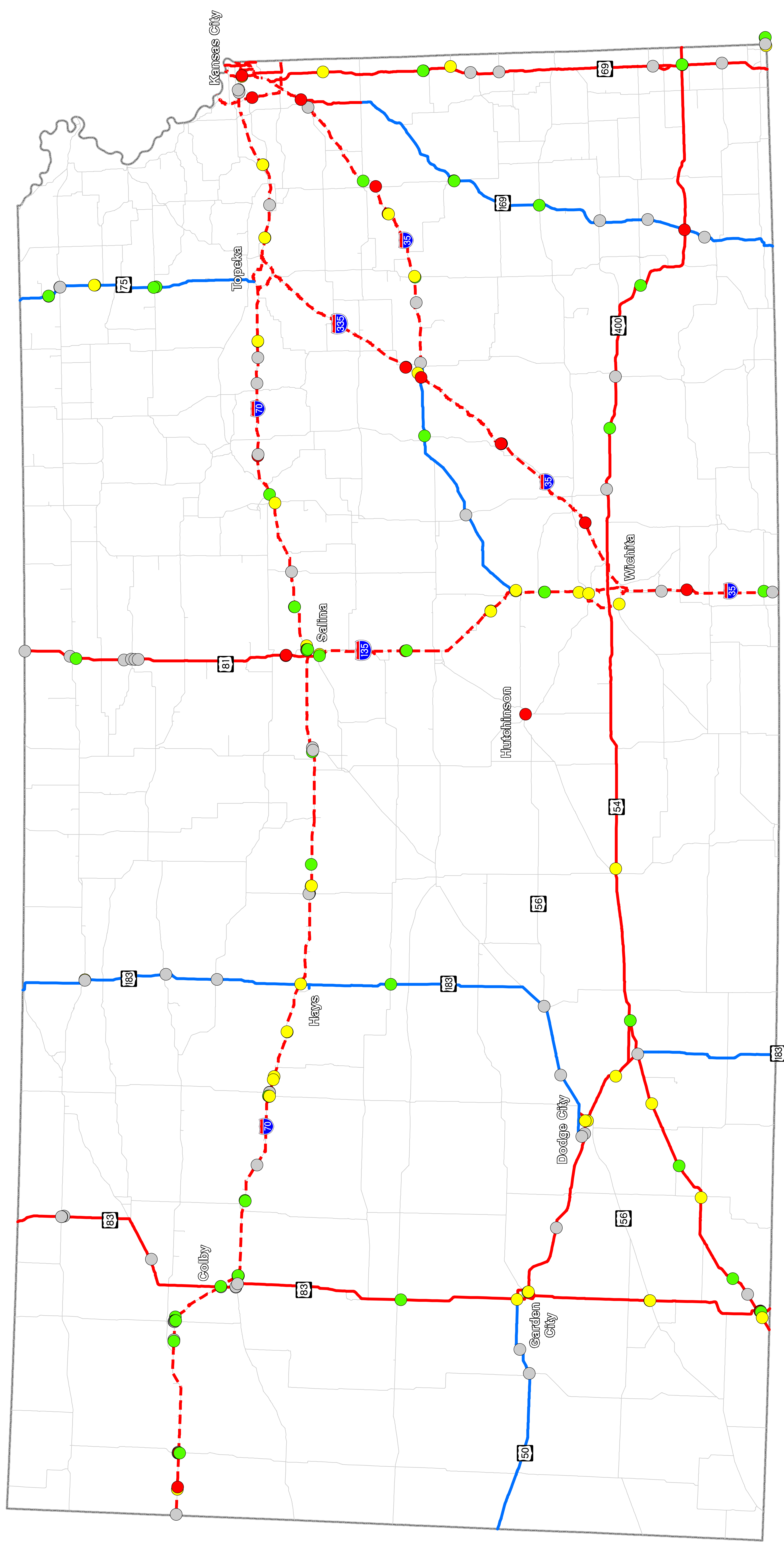
Kansas Statewide Freight Network
Parking Plan

Freight Corridors
of Significance

- Public
- Private
- Illegal
- Interstate
- Primary
- Secondary



Parking Facility Utilization

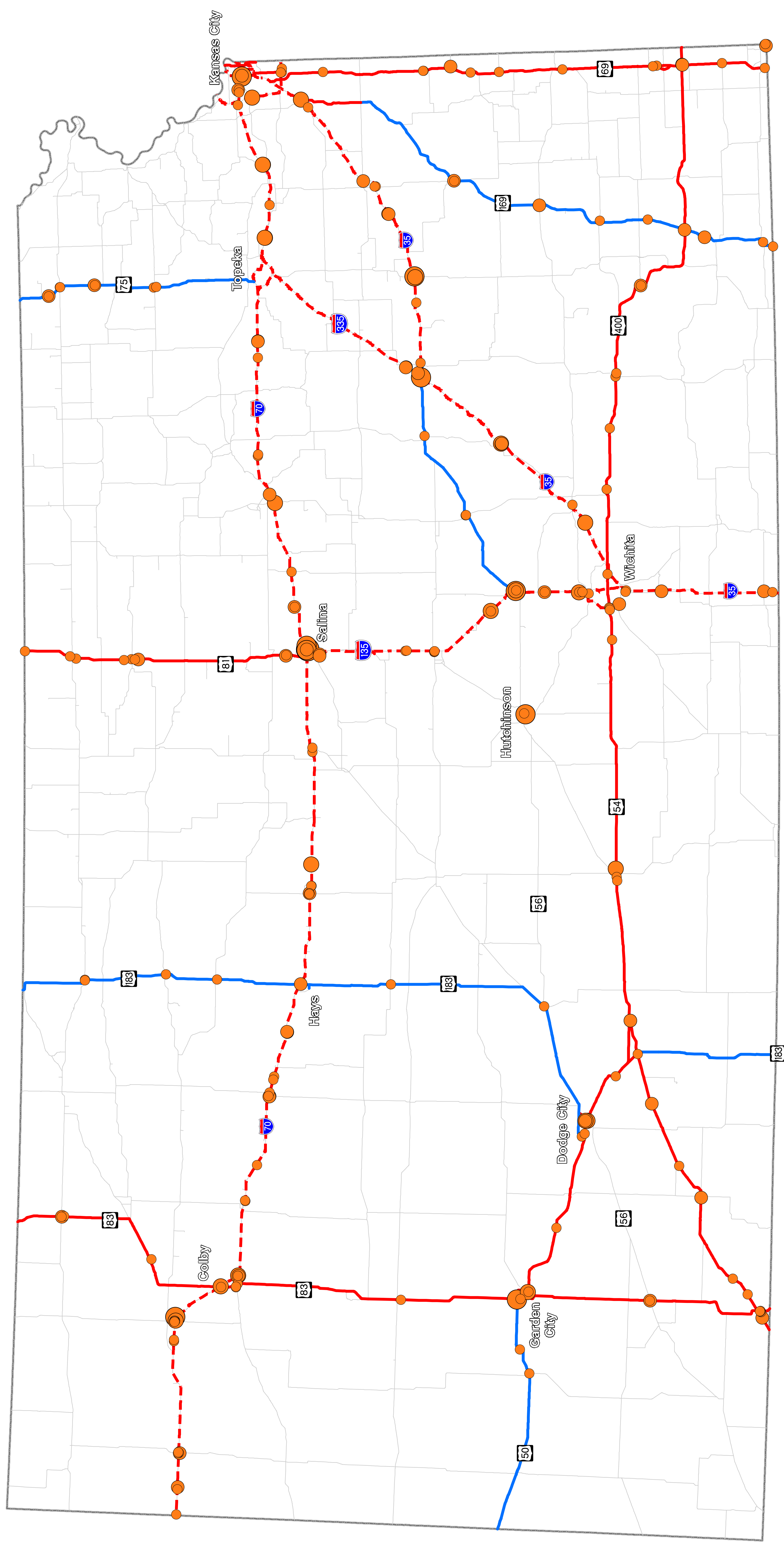


Kansas Statewide Freight Network
Parking Plan

- Usage Classification**
- Over Utilized - 100% or greater
 - Fully Utilized - 70% - 100%
 - Moderately Utilized - 40% - 70%
 - Under Utilized - 0% - 40%
- Freight Corridors of Significance**
- Interstate
 - Primary
 - Secondary



Truck Parking Concentrations



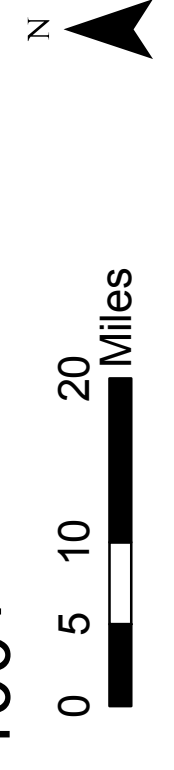
Kansas Statewide Freight Network
Parking Plan

Freight Corridors
of Significance

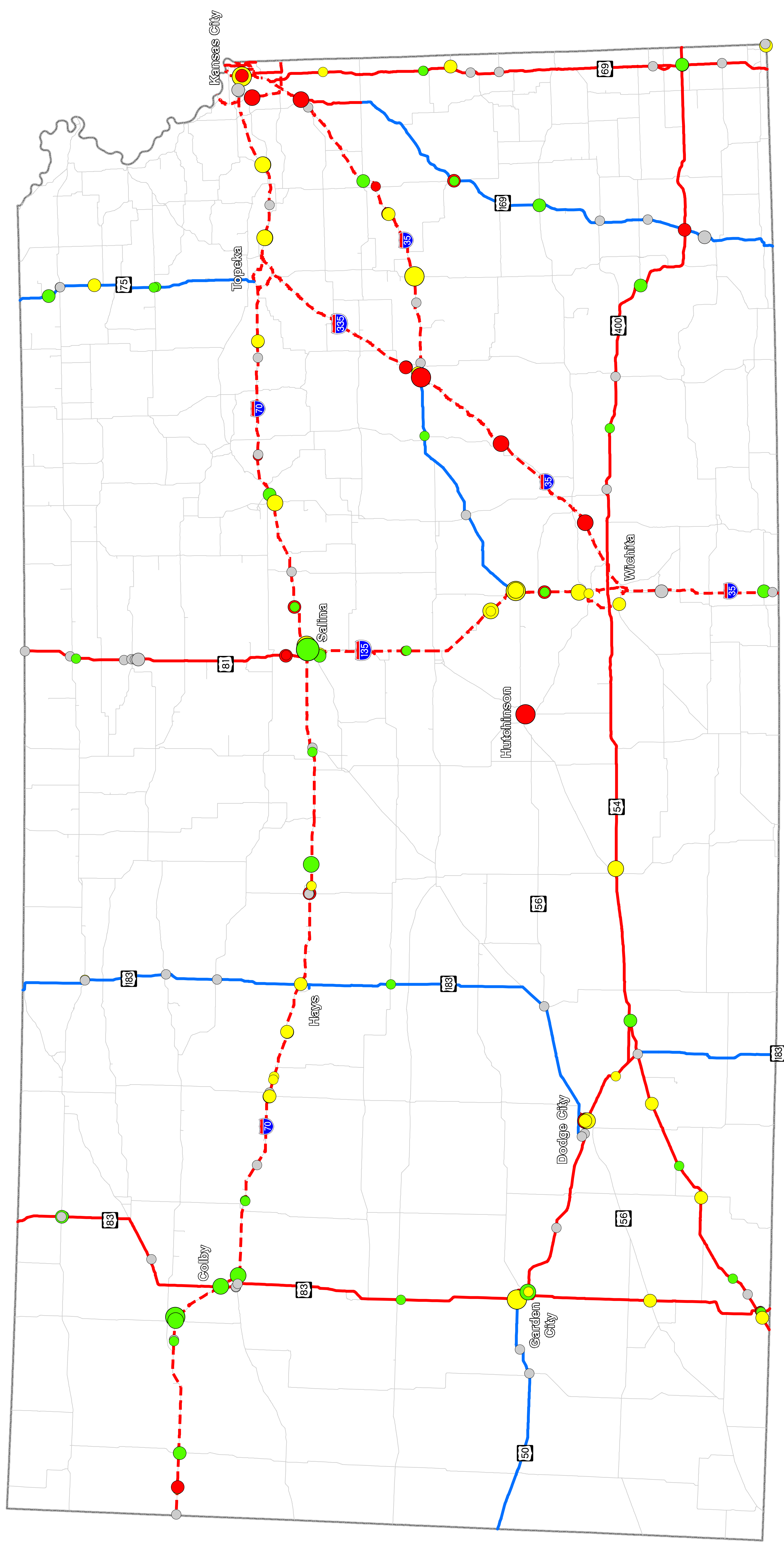
- Interstate
- Primary
- Secondary

Total Trucks

- 0 - 10
- 10 - 30
- 30 - 60
- 60 - 100
- 100+



Parking Facility Utilization and Concentration



Utilization Classification

- Over Utilized - 100% or greater
- Fully Utilized - 70% - 100%
- Moderately Utilized - 40% - 70%
- Under Utilized - 0% - 40%

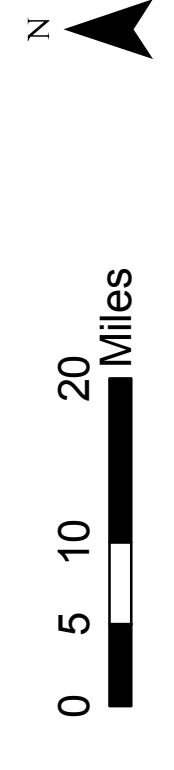
Total Trucks

- 0 - 10
- 10 - 30
- 30 - 60
- 60 - 100
- 100+

Freight Corridors of Significance

- Interstate
- Primary
- Secondary

Kansas Statewide Freight Network
Parking Plan



Kansas Freight Network Truck Parking Plan

Peer Organization Interviews and Literature Review Summary

Introduction

A literature review and peer organization interviews are underway to review studies, common needs/issues and best practices regarding truck parking decision factors. The review includes academic research studies, articles, and web-sources as well as peer interviews with state DOTs and the Mid-America Freight Coalition. Major highlights from the literature review and peer discussions are provided below:

Current National Truck Parking Conditions and Issues

- Truck volumes are projected to double over the next 20 years on interstate facilities.
- A vast majority of truck parking is private, typically located at truck stops.
- Most designated public truck parking is provided at Rest Areas and Welcome Centers.
- Amenities at public truck parking-only facilities are typically restrooms and basic lighting.
- Most DOTs are not interested in providing the level of amenities typically found at truck stops (showers, convenience retail, etc.).
- The amenities most requested by operators are Wi-Fi and electrical hook ups.
- Busiest times for truck parking are from 11 PM to 6 AM. Busiest times of the week are Tuesday through Thursday. Busiest times of year are August through December.
- Most DOTs have a count of existing parking spaces, typically collected by their maintenance divisions. However, there is limited data available on usage.
- Parking facilities on fringes of major metropolitan areas tend to be the busiest and are often at excess capacity.
- Illegal or informal parking tends to occur on highway ramps and highway shoulders.
- The biggest challenges with truck parking are not enough dedicated parking on the fringes of major metropolitan areas, lack of dedicated funding and lack of detailed information on utilization.

Strategies and Solutions

- Truck parking utilization is not actively tracked. Minnesota DOT (MnDOT) is in the process of evaluating technology to track truck parking utilization and effectively distribute information to the public.
- Missouri DOT (MoDOT) has converted closed rest areas into designated truck-only parking.
- Colorado DOT (CDOT) and MoDOT provide paved expanded/improved shoulder areas for designated truck parking. Trucks are already using the shoulders and CDOT would prefer they have areas to do this safely.
- Truck parking is becoming a more common component of statewide freight plans.

Future Issues and Opportunities

- DOTs are interested in partnering with adjacent states to improve parking. Multiple states considering coordination on a TIGER Grant to assess the potential for use of technology to assess real time parking availability (through video and/or sensors) and provide information to operators through Intelligent Transportation Systems (ITS), including dynamic message signs as well as web portal, on board computer systems, and/or mobile applications. If operators have better information on the availability of truck parking they can make more efficient use of the truck parking that is available.
- There is interest from long-haul operators in the ability to reserve parking spots (potentially for a fee) as part of pre-trip and/or en-route planning.
- MnDOT is investigating public-private partnership opportunities for new and/or improved truck parking facilities. This could include shared areas/facilities with private vendors.

The American Transportation Research Institute (ATRI), the trucking industry's not-for-profit research Institute, is helping the Kansas Department of Transportation and Kansas Turnpike Authority survey drivers regarding truck parking issues within the state. The survey is designed to assist KDOT and KTA in identifying new or improved truck parking solutions that better serve freight transportation providers traveling in and through Kansas.

All responses to this survey will be kept strictly confidential and will only be reported in aggregate form. Due to the sensitivity of this research, under NO circumstances will we release any of your personal or organizational information.

Demographics

1. Gender
 - Female
 - Male

2. What is your age?
 - Younger than 25
 - 26-44
 - 45-64
 - 65 +

3. In what segment of the trucking industry do you primarily operate? (check one)
 - For-hire
 - Private
 - Don't know

4. If for-hire, which sector best describes your operation? (check one)
 - Truckload
 - Less-than-truckload
 - Specialized, flatbed
 - Specialized, tanker
 - Express / Parcel Service
 - Intermodal Drayage
 - Other (please specify): _____
 - Don't know

5. Which of the following best describes your employment: (check one)
 - Employee driver
 - Owner-operator (O-O) with own authority
 - O-O / Independent Contractor leased to a motor carrier
 - Fleet executive / manager
 - Don't know

6. What is your average length of haul? (check one)

- Local (less than 100 miles per trip)
 - Regional (100-499 miles per trip)
 - Inter-regional (500-999 miles per trip)
 - Long-haul (1,000+ miles per trip)
 - Don't know
7. If you are an employee or leased driver, how many total tractors does your fleet operate? (check one)
- Less than 50
 - 51-250
 - 251-1,000
 - 1,001+
 - Don't know
8. What is the primary vehicle configuration that you typically operate? (check one)
- 5-axle Dry Van
 - 5-axle Refrigerated Trailer
 - 5-axle Flatbed
 - 5-axle Tanker
 - Straight Truck
 - Longer Combination Vehicles (Doubles, Triples, etc.)
 - Other (please specify): _____
 - Don't know
9. How are you primarily paid? (check one)
- Per hour
 - Per load
 - Per mile
 - Other (please specify): _____
 - Don't know

Kansas State Parking

10. How often do you need to find truck parking in Kansas?
- Once a week
 - 2-4 times a week
 - 5-6 times a week
 - Everyday
11. On average, how long does it take for you to find parking in Kansas?
- Less than 30 minutes
 - 30 minutes – 1 hour
 - More than 1 hour

12. When parking in Kansas, where is it more difficult to find available truck parking? (check one)

- Public rest stops
- Private truck stops
- Public and private rest stops equally difficult
- Turnpike service area

13. For every 10 parking stops you make in Kansas, how many are public rest stops and how many are private truck stops? (Sum total must equal 10)

Rest Stop Type	Number of Stops
Public	
Private	
TOTAL	10

14. While traveling through Kansas, where are you more likely to find a parking spot?

- Major metropolitan area (Population \geq 50,000)
- Smaller metropolitan area (Population 10,000 – 49,999)
- Rural area (Population < 10,000)
- I am able to find a parking spot in all the above areas
- I am not able to find parking in any of the above areas

15. How often do you personally experience the following issues in Kansas (check one response for each row)?

Condition	Never	Rarely	Occasionally	Often	Always
Rest area time limit restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Parking only available on ramps or shoulders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Parking only available in unsafe locations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turnpike service plaza restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traveling on Turnpike but have to leave it for parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Please rank order (1-11) the following reasons for seeking truck parking in Kansas with 1 being the MOST important.

Truck Parking Reasons	Rank (1-11)
HOS Mandated Rest / Fatigue	

Awaiting Dispatch	
Avoiding Congestion	
Mechanical Issues/Failures	
Restaurant/Eating	
Showering/Restroom	
Staging/Waiting for Loads	
Obtaining Directions	
Safety Checks/Load Securement	
Personal Communication (e.g. cell, internet)	
Weather-related	

17. Please rank order (1-11) the following truck parking amenities with 1 being the MOST important.

Truck Parking Amenities	Rank (1-11)
Restrooms	
Fueling Services	
Restaurant	
Vending Machines	
Showers	
Retail Store	
Adequate Lighting	
Adequate Security	
Internet Access/Wi-Fi	
Access to the Interstate	
Hotel / Motel	
Other:	

18. It is easy to find truck parking in Kansas in comparison to truck parking in other states.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

19. It is difficult to find truck parking in Kansas for the Hours of Service 30 minute break.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

20. If you are able to find truck parking in Kansas, are the parking spots large enough to accommodate your truck configuration?

- Yes
- No

21. What percent of your loads require travel on the Kansas Turnpike?

- 1 – 25%
- 26 – 50%
- 51 – 75%
- 76 – 100%
- None

22. While traveling on the Kansas Turnpike, which service plazas do you typically park at for long-term (greater than 4 hours) rest? (check all that apply)

- Belle Plaine Service Area (Mile Post 26)
- Towanda Service Area (Mile Post 65)
- Matfield Green Service Area (Mile Post 97)
- Emporia Service Area (Mile Post 132)
- Topeka Service Area (Mile Post 188)
- Lawrence Service Area (Mile Post 209)

23. How do you access the internet while on the road? (check all that apply)

- Truck Stop/Rest Area Kiosk
- Hotel/Motel Business Center
- Onboard Communication
- In-cab Information system (e.g. PeopleNet, Qualcomm)
- Laptop in Vehicle
- Smartphone
- Other (please specify) _____

24. KDOT and the KTA are interested in studying the benefits of a real-time truck parking availability system. Please rank order (1-6) your preferred method for receiving real-time parking availability information, with 1 being the MOST preferred:

Method	Rank (1-6)
Onboard Communications/Computer System	
Internet/Website Information	
Roadside Changeable Message Signs	
Dispatcher Contact	
511 System	
Smartphone Application	
Other:	

25. Please indicate how much in advance you would like to receive information about available parking spots. (check all that apply)

- Distance from parking location
- At the exit
- ½ mile away
- 1 mile away
- 5 miles away
- 10 miles away
- 20 miles away
- Other: _____

26. When traveling through Kansas, would you like the ability to reserve a parking spot?

- Yes
- No
- If yes, how much, if any, would you be willing to pay to have a guaranteed reservation? _____

27. Do you have any additional thoughts on finding safe and legal parking in Kansas?

DRAFT



MEETING DATE: April 30, 2015

PROJECT: Kansas Statewide Freight Network Truck Parking Plan

MEETING TOPIC: Kansas Freight Parking Advisory Panel Summary

NOTES TAKEN BY: HNTB

ATTENDEES:

- Kansas Freight Parking Advisory Panel
- KDOT
- KTA
- HNTB Corporation

MEETING SUMMARY

The first Advisory Panel meeting was held for the Kansas Statewide Freight Network Parking Plan on April 30, 2015 at the Eisenhower State Office Building in Topeka. The purpose of the meeting was to engage key Kansas truck freight stakeholders in improving the effectiveness of the Kansas Statewide Freight Network Parking Plan through discussions that: (1) generate feedback about current/future Kansas truck parking trends, needs and preferences; (2) help shape recommendations for addressing truck parking needs; and (3) result in effective strategies for improving the state's freight network safety, efficiency and competitiveness. The meeting focused on three key topics:

1. Project Overview
2. Current Needs
3. Future Issues/Solutions

1. Project Overview

The meeting was initiated with a welcome by Secretary Mike King and introductions by members of the advisory panel. The Secretary provided an overview of the meeting purpose and goals for the panel members and shared his vision for creating a "vibrant Kansas", with the goal of achieving increased goods movement, economic development and population growth for the state. He said improving freight flows and truck parking within and through the state was a key step in realizing this vision.

Gretchen Ivy, HNTB, led the advisory panel through an overview of the Kansas Statewide Freight Network Parking Plan and its key purpose, tasks and schedule. The key goals of the study were highlighted, including:

- Ensuring corridors are viewed as whole units when thinking about trucking and parking needs;
- Matching economic development with future truck parking locations and amenities; and
- Attracting more freight traffic to the major corridors in the state.

During this discussion, handouts on the study description and schedule were provided to the panel members for reference. Then the advisory panel was briefed on what their roles and responsibilities would be for the project and how the study team would be gathering input and coordinating with the panel members throughout the study process.

2. Current Needs

The current needs discussion was led by Eric Strack and Michael DeMent of HNTB. The discussion focused on the results of the multi-team, multi-day truck parking inventory (two teams over four nights) conducted the week of March 16, 2015. During the inventory overview, maps showing truck parking locations, type, utilization and concentration were referenced, and input from the advisory panel on the results of the inventory were discussed. The team identified the parking type (public, private or illegal), utilization and concentration between 10 PM and 6 AM. The inventory was done on weekdays with good weather conditions; weekends and other seasonality conditions were not accounted for with this inventory (i.e. construction, harvest, etc.). This time period was determined through coordination with the American Transportation Research Institute (ATRI) and project experience with similar inventories in Michigan and Florida.

As part of the inventory discussion, members of the advisory panel suggested potential follow up truck parking inventories/utilization during the summer and fall harvest and the holiday season to better understand the influences of these events on truck parking needs and conditions.

The advisory panel members also provided input on their perceptions and experiences regarding current needs and issues with truck parking in Kansas, including:

- Parking availability/locations/conditions/amenities
- Public/private roles and collaboration
- Local/state/federal rules and regulations

Advisory panel feedback included comments about the following key topics:

Policy and Regulation:

- Comparison of tax rates between neighboring states that influence truck routing and parking decisions.
- Ratio of truck volume to needed truck parking stalls.
- Local city/state partnerships to build secure long-term parking facilities for truck drivers since they are not allowed to park in local neighborhoods or streets in their town of residence.
- Regulatory harmonization between the states and FHWA with regards to oversize/overweight.
- Policy and regulations are key drivers of truck volume/route choice.
- Conflict between service hours, destination readiness to accept delivery and proximity of parking options.

Routing/Parking Locations of Need:

- Cost per mile for goods movement influences routing and truck parking needs.

- Tolls cause re-routing, especially for independent owner-operators (tolls are not reimbursable, but other taxing measures/fees are reimbursable).
- Most drivers take the path of least resistance.
- Travel time reliability is important.
- Use KC Scout traveler information for routing decisions in the Kansas City area.
- Truck traffic shifts on weekends vs. weekdays – different lot utilization.
- Seasonality of parking needs, including influences of harvest and the holiday season.
- Rail/intermodal parking needs.
- Factors in determining where to locate new parking facilities.

Security:

- Most drivers feel safe parking in Kansas.
- Municipal regulation of parking is an issue; need secure parking in small towns because of prohibitions of parking in neighborhoods and local streets.
- Security for special permit drop-offs/hazardous materials needs to be considered.

3. Future Issues/Solutions

The future issues discussion was led by Brian Comer and Eric Morris of HNTB. A facilitated discussion of advisory panel members' perceptions and experiences regarding emerging trends and solutions was held, including:

- Trends (business, demographic, other) affecting truck volume and parking needs.
- Regulatory improvements and trends.
- Technology trends and solutions.
- Best practices for truck parking seen in other jurisdictions/states.

During the future issues and solutions discussion, handouts on recent peer State DOT interviews, truck parking literature review key themes and trends, and the ATRI electronic truck parking survey instrument were referenced and discussed.

Advisory panel feedback included comments about the following key topics:

Potential Future Solutions:

- Need for signage with parking availability numbers for drivers.
- Over capacity truck parking facilities to have more parking added.
- Low hanging fruit solutions to reduce ramp parking.
- Two different audiences to target for truck parking needs: 1) Those that want amenities (e.g., showers, restaurants, fuel, hotels, Wi-Fi, etc.); 2) Those that want quiet parking and ability to maximize hours of service prior to parking.
- KDOT/KTA assets that could be repurposed into parking.
- Partnership opportunities with convenience stores – adjacent land that could potentially be developed as lots (e.g., DOT/Turnpike develops; private sector provides amenities & maintenance).

- Partnership opportunities with local municipalities to create long-term parking as amenity for resident truck drivers.
- Ensuring that technology for highways catches up with truck technology while still accommodating legacy drivers/system.
- Consider future freight industry demographics and needs when determining future truck parking improvements.
- Future trends for fuel types for fleet turnover still in flux (diesel fuel still needed with potential changes to LNG/CNG fuels).

This final segment included a discussion of the ATRI electronic survey to be sent out in mid-May; advisory panel members' input focused on:

- Adding survey questions on why truckers choose to park in particular locations.
- OOIDA – cooperative distribution of survey once finalized.
- More in-field truck parking inventory (summer, fall to catch harvest and the holiday season) – possibly 2 more field surveys.
- Interview with recreational visits/vehicles to understand their parking needs.

4. Open Discussion and Meeting Close

The advisory panel meeting ended with a discussion of next steps and open discussion with the panel members. It was highlighted that the key next steps for the study included the following activities:

- Electronic survey to be finalized and distributed by mid-May via ATRI.
- Analysis of truck freight flows on Kansas Primary and Secondary Freight Network using ATRI GPS data to better understand truck origins, destinations and parking influences.
- Development of initial range of potential truck parking solutions.
- Follow up truck advisory panel meeting in July timeframe to share and get feedback on initial range of solutions.

Project Name
Kansas Statewide Truck Parking Study

Date of Meeting
8/6/2015



HNTB Project #
08618 DS 017

Location
KDOT ESOB - 4th Floor, Auditorium A

Participants
Study Advisory Panel
KDOT; KTA; HNTB

Time
10:30 a.m. - 1:30 p.m.
(Registration from 10:00-10:30 a.m.)

MEETING PURPOSE

Review study progress and get panel input on potential strategies and tactics for addressing truck parking needs and issues. Engage panel in prioritizing strategies and tactics for further refinement and selection of preferred parking solutions for Kansas.

MEETING AGENDA

- 10:00 a.m. **Registration**
- 10:30 a.m. **Welcome & meeting overview – Mike King, KDOT Secretary of Transportation**
- 10:40 a.m. **Progress update – Gretchen Ivy, HNTB**
- Tech Memo 1 summary
 - ATRI research summary (trucker survey, truck movements)
 - Development of initial range of truck parking strategies
- 11:15 a.m. **Discussion: key strategy/tactic packages – Gretchen Ivy/Michael DeMent/Matt Junak, HNTB**
- Overview of strategy packages
 - Strengthen parking safety and security
 - Create public-private partnership opportunities for expanding parking
 - Establish regionally consistent freight/parking policies and procedures
 - Develop integrated tax policies for adding freight traffic and parking
- 12:00 p.m. **Lunch – discussion continues**
- 1:00 p.m. **Prioritize key strategy/tactics packages for refinement – Michael DeMent, HNTB**
- 1:15 p.m. **Open discussion and next steps – Gretchen Ivy, HNTB**
- 1:30 p.m. **Meeting adjourns**

Meeting Materials

- Summary of Task 1 findings
- ATRI summaries: trucker survey; truck movements analysis and seasonal variations
- Summary matrix of initial strategies/tactics with strategy/tactic package fact sheets

SUMMARY

Technical Memorandum No. 1 summarized the activities and findings stemming from Task 1 of the Kansas Statewide Freight Network Parking Study. The Kansas Dept. of Transportation (KDOT) and the Kansas Turnpike Authority (KTA) undertook the study of Kansas truck parking capacity, issues and trends in order to develop a plan for addressing parking needs in ways that improve statewide freight network safety, efficiency and competitiveness.

The study's focus is on the Kansas Primary and Secondary Freight Networks, with a special emphasis on Interstate 70, Interstate 35 and the Kansas Turnpike. In Task 1, the study examined truck parking issues through a number of activities, including:

- An advisory panel of truck parking stakeholders for feedback on issues and strategies;
- An inventory of current legal/formal public and private assets and usage;
- An inventory of illegal/informal truck parking trends and issues they present;
- A literature review of studies regarding truck parking decision factors;
- Interviews with peer transportation agencies regarding truck parking issues; and
- Electronic surveys of truck-parking stakeholders regarding truck-parking decisions.

Key Findings

These activities resulted in a number of insights into Kansas truck parking needs:

1. Kansas Parking Conditions and Factors

- a. Peak parking times for trucks are between 12 a.m. and 4 a.m.
- b. Trucks park anywhere that can accommodate them, including parking lots, side roads or ramps.
- c. Parking decisions are made based on service time, lot amenities and target destination.
- d. Drivers are challenged to find legal truck parking locations in a timely manner.
- e. Most large legal parking areas, especially near urban areas, are regularly at or over capacity.
- f. A majority of the large parking facilities holding 60 or more trucks are fully or over utilized.
- g. In southern Kansas, almost all parking facilities holding 30 or more trucks are at least fully utilized; in the southeast region many of those facilities are over utilized.
- h. Only a few routes have very little overnight parking; mostly north/south routes.
- i. A significant number of drivers report parking in illegal locations that can be unsafe, particularly just outside urban areas.
- j. Truck parking capacity at KTA facilities are in many cases over utilized - all parking spaces are full and trucks continue parking by creating spaces along ramps and in drive aisles.
- k. Southern I-135 has fully utilized facilities throughout, which means parking was near 100% full.
- l. Parking areas just outside of toll plazas are underutilized, perhaps because drivers are reluctant to leave the toll system to gain access to the parking areas.

2. National Parking Conditions and Factors

- a. The Kansas truck parking experience is mirrored across the U.S. in terms of appropriately placed and funded parking assets.
- b. Peer state and federal studies suggest that the lack of safe truck parking is a problem that will continue to increase due to the growth in truck freight movements.
- c. Peer state and federal studies indicate that the need for expanded truck parking far exceeds available funding, which is unlikely to grow significantly in the future.

3. Implications of Findings

- a. Commonly identified solutions for truck parking challenges include:
 - i. Expand or improve public rest areas;
 - ii. Expand or improve commercial truck stops and travel plazas through reduction in regulations and incentives;
 - iii. Encourage the formation of public-private partnerships;
 - iv. Educate or inform drivers about available spaces through technology and other means; and
 - v. Change parking enforcement rules.
- b. Many believe public-private partnerships offer potential for addressing additional truck parking needs. Having the public and private sectors share the benefits – and costs – of truck parking needs and opportunities may be an important way to provide parking in the future in a timely, flexible and cost-effective manner. However, this will require identifying legal, financial and other risks and making sure they are addressed by the most appropriate party.
- c. Kansas may be able to gain a “first mover” advantage by undertaking its truck parking decision-making in a regional context. A truck driver may pull into a parking spot outside Wichita because the driver knew it was available. But he or she is more likely to have entered Kansas in the first place if they can make effective routing, travel and parking decisions hundreds of miles away from that parking lot. The likelihood of that truck crossing the Kansas border is enhanced by being able to take advantage of regional consistency in travel costs, business processes, trip-time predictability and driver services availability.



Truck Parking Technical Memorandum 1

EXISTING TRUCK PARKING AVAILABILITY, ISSUES AND NEEDS

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EXECUTIVE SUMMARY

The purpose of Technical Memorandum No. 1 is to summarize the activities and findings stemming from Task 1 of the Kansas Statewide Freight Network Parking Study undertaken by the Kansas Dept. of Transportation (KDOT) and the Kansas Turnpike Authority (KTA).

The agencies undertook the study of Kansas truck parking capacity, issues, trends and opportunities in order to develop a plan for addressing parking needs in ways that improve statewide freight network safety, efficiency and competitiveness. The study's focus is on the Kansas Primary and Secondary Freight Networks, with a special emphasis on Interstate 70, Interstate 35 and the Kansas Turnpike.

In the study, Task 1 examined existing truck parking availability, issues and needs through a number of activities, including:

- An advisory panel of truck parking stakeholders for feedback on issues and strategies;
- An inventory of current legal/formal public and private assets and usage;
- An inventory of illegal/informal truck parking trends and issues they present;
- A literature review of studies regarding truck parking decision factors;
- Interviews with peer transportation agencies regarding truck parking issues; and
- Electronic surveys of truck parking stakeholders regarding truck-parking decisions.

These activities resulted in a number of insights into Kansas truck parking needs:

1. Peak parking times for trucks are between 12 a.m. and 4 a.m.
2. Trucks park anywhere that can accommodate them: parking lots, side roads or ramps.
3. Parking decisions are made based on service time, lot amenities and target destination.
4. Most large legal parking areas, especially near urban areas, are at or over capacity regularly.
5. Drivers are challenged to find legal truck parking locations in a timely manner.
6. A significant number of drivers report parking in illegal locations that can be unsafe, particularly just outside urban areas.
7. Peer state and federal studies suggest that the lack of safe truck parking is a problem that will continue to increase due to the growth in truck freight movements.
8. Peer state and federal studies indicate that the need for expanded truck parking far exceeds available funding, which is unlikely to grow significantly in the future.
9. Drivers, peer states and the federal government identified potential affordable truck parking strategies: expand or improve public rest areas, commercial truck stops and travel plazas; encourage creation of public-private partnership (P3s) solutions; inform drivers about available spaces through technology and other means; and change parking enforcement rules.
10. Kansas may be able to gain a "first mover" advantage by undertaking its truck parking decision-making in a regional context wherever possible. Drivers may be more likely to make routing decisions favorable to Kansas in terms of efficient use of its parking assets and potential economic impact if they can take better advantage of regional consistency in travel costs, business process, trip-time predictability and driver services availability.

1. INTRODUCTION

1.1. Project Description

In 2015, the Kansas Department of Transportation (KDOT) and Kansas Turnpike Authority (KTA) undertook a study of the state's truck parking capacity, issues, trends and opportunities on the Kansas Primary and Secondary Freight Networks (Figure 1.1), with a special emphasis on Interstate 70, Interstate 35 and the Kansas Turnpike.

The purpose of the study is to provide data and analysis leading to development of a plan for addressing existing and potential future parking needs in ways that improve statewide freight network safety, efficiency and competitiveness. When completed, the study will assess:

- Existing public and private truck parking locations, capacity and usage;
- Physical barriers and information needs (signage, education, technology) affecting truck parking choices; and
- Opportunities for improving parking capacity and services in ways that benefit safety, efficiency and/or economic growth throughout Kansas.

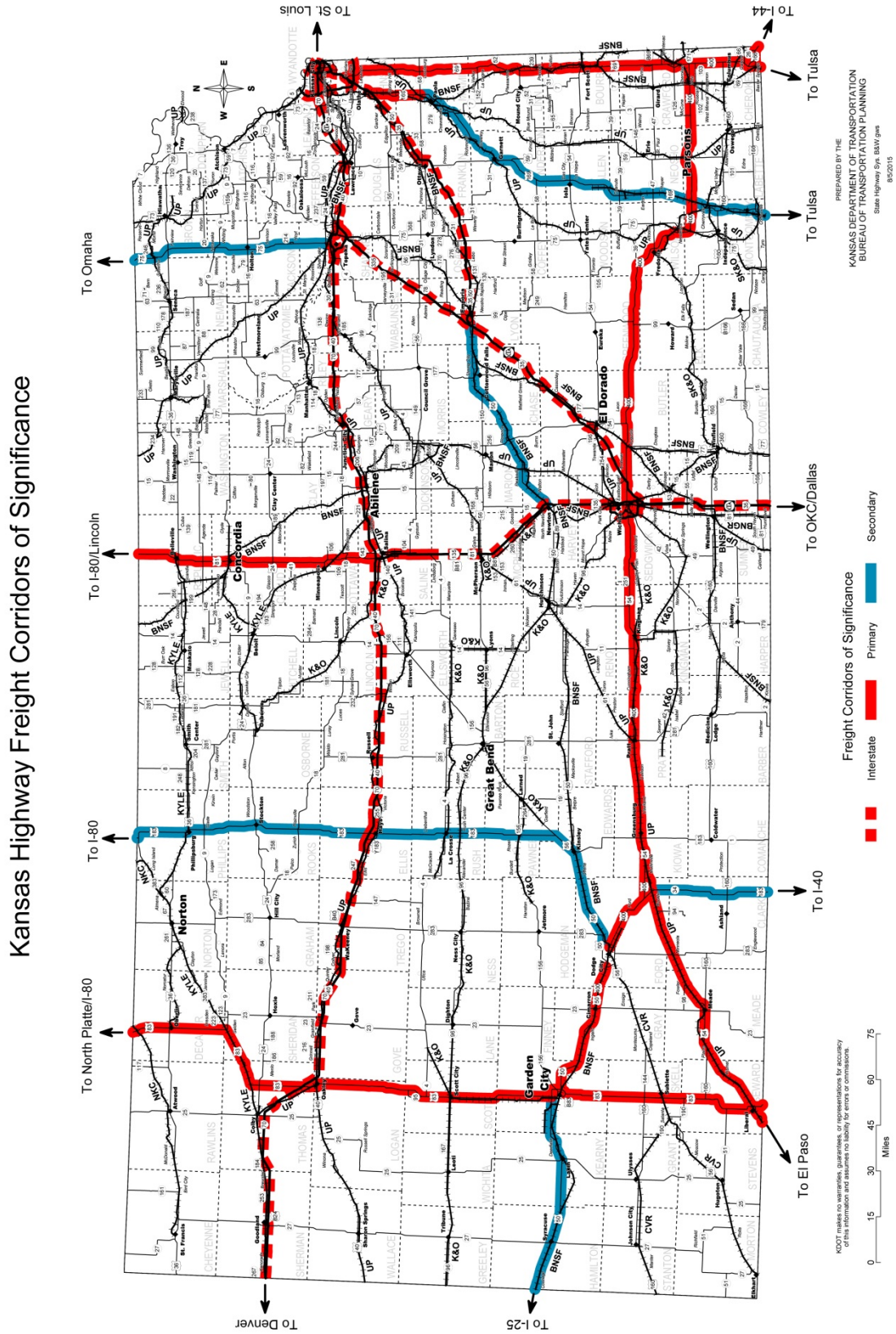
1.2. Task 1 – Defining Truck Parking Conditions, Usage and Issues in Kansas

As summarized in this Technical Memorandum, activities were conducted in Task 1 to better:

- Define truck parking conditions, usage and issues in Kansas;
- Describe factors determining where and when truckers choose to park in Kansas; and
- Identify existing issues and preferences shaping uses and needs for truck parking Kansas.

This memorandum recaps these activities (including a parking inventory, peer interviews, literature review and trucker surveys) and their key findings.

Figure 1.1 - Highway Freight Corridors of Significance



2. CURRENT TRUCK PARKING INVENTORY AND USAGE

2.1. Introduction

A detailed truck parking inventory of the Kansas Primary and Secondary Freight Networks (see Figure 1.1) was completed. This inventory assessed legal/formal and illegal/informal truck parking use throughout Kansas. Data was gathered first via a desktop Google Earth aerial review to determine all legal parking facilities and the number of spaces available as well as to identify any potential illegal parking “hot spots.” This was followed by a field review of truck parking utilization and field verification of illegal parking locations. After the field observations were completed, the data was further analyzed to seek a better understanding of truck parking across the state.

2.2. Methodology

2.2.1. Desktop Aerial Review of Legal Truck Parking Facilities

Google Earth aerial imagery was used to identify truck parking facilities and allow an accurate count of parking spaces. Early identification of parking lots and spaces ensured thorough investigation of lots and their utilization in the field, increasing field teams’ efficiency by optimizing their routing and eliminating the need to count parking spaces on site. This also allowed much of the GIS work to be done in the office by creating a geographic database of legal parking facilities along the study corridors. Estimations of the number of truck parking spaces in legal parking areas where pavement markings were indeterminate or not present were made using visual inspection.

The legal parking geographic database created during the desktop review guided the field team and much of the information was input prior to beginning the field work. This allowed the field team to input field information into forms developed for each parking location and then have it change status and color to complete.

2.2.2. Field Review

Upon completion of the desktop aerial review, the field review and usage study began. The team conducted a trial run of the proposed field work procedures and methodology. This trial run was conducted on two truck parking areas along I-70 near Kansas City, Kansas, to confirm the efficiency and efficacy of the assessment approach.

The actual assessment was conducted by two two-person teams, each of which drove assigned portions of the Kansas Primary and Secondary Freight Networks. Both networks were driven by the teams during the week of March 16th – March 20th, 2015. The review was conducted overnight and collected data on the number of trucks parked at different facilities legal and illegal, formal and informal between the hours of 10 p.m. and 6 a.m.

As part of the review, one team member drove the field vehicle through parking lots, calling attention to parking utilization and other lot attributes. The data-collection member of the team would enter the data into a Global Positioning System (GPS)-enabled iPad equipped with ArcGIS online. ArcGIS online is a fully web-enabled version of GIS which allowed the staff to edit the original maps. Truck parking field data was input as follows:

- If a truck was found parked, the team assessed whether it was a legal parking facility or not.
- The field reviewer placed a point in GIS and input the information in the predefined fields set up during the desktop review for either the parking facility or the illegally parked truck.
- The point was marked for additional review in the office if there was a question about the location that could not be determined in the field.

Figures 2.1 through 2.4 show different truck parking situations and how they would be handled as far as legal/illegal and formal/informal.

Figure 2.1 shows trucks parked at a rest area; all are legally parked under our study definition. Several trucks have created informal parking spaces in a legal parking facility. This photo also represents what would be considered an over-utilized parking facility.

Figure 2.1 – Trucks Parked at Rest Area



Figure 2.2 features a similar rest area in under-utilized conditions. As can be seen there are still trucks parked informally even with plenty of formal spaces available.

Figure 2.2 – Trucks Parked at Rest Area



Figure 2.3 shows a truck informally parked across numerous car parking stalls. Whether this is legal depends upon the business associated with the lot. A truck was classified as parking legally if it was in a restaurant or hotel parking lot; it was assumed the business was allowing this use to gain a customer. The truck was classified as illegal if it was parked in a retail parking lot (i.e. Wal-Mart).

Figure 2.3 – Truck Parked Illegal in a Parking Lot



Trucks found parked on freeway on- and off-ramps, as shown in Figure 2.4, were classified as illegal parking.

Figure 2.4 – Truck Parked on Freeway Ramp



Figure 2.5 illustrates the various scenarios for coding a truck-parking facility in the field. This chart shows the information which was collected, if readily available, in our ArcGIS online form to accompany each parking location. After the assessment is made about whether or not a facility is a legal truck parking area, then based upon the parking area scenario a series of items will be cataloged.

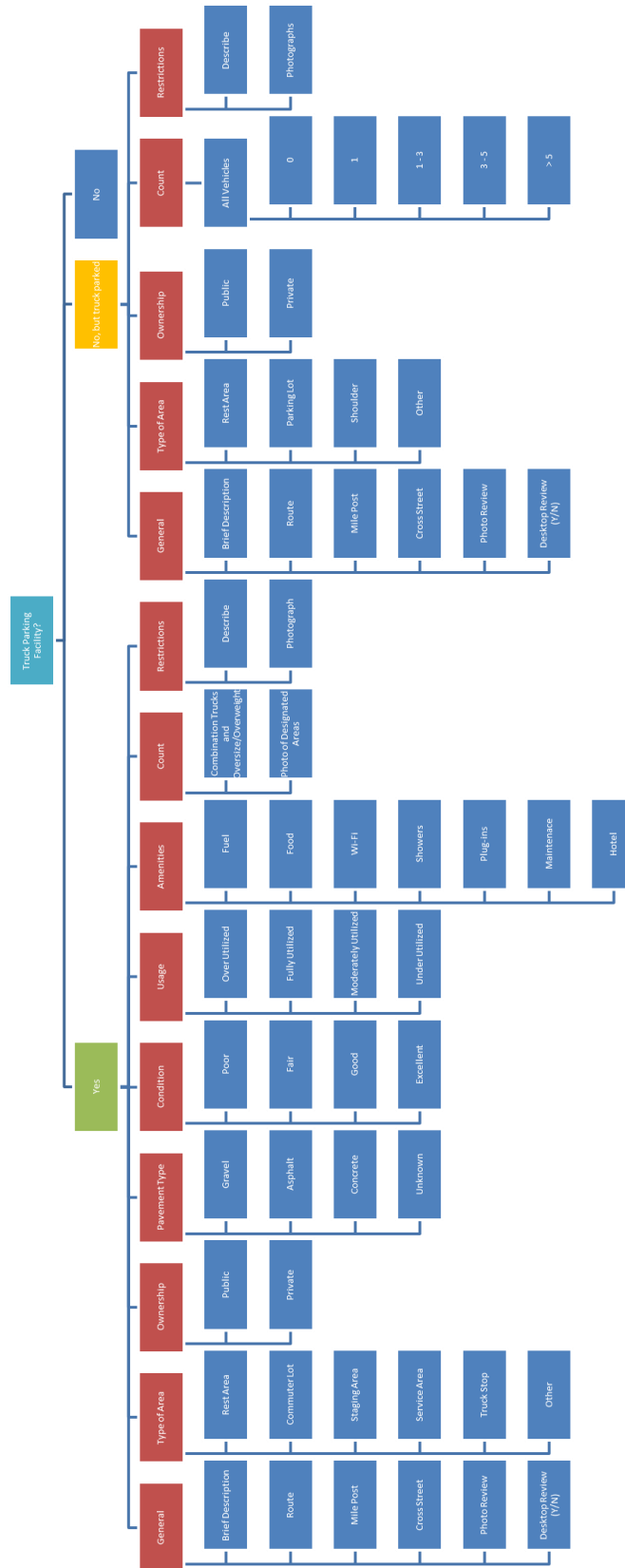
For a legal parking facility, the cataloging is based on the answers to a number of questions:

- What type of area is the facility?
- What is its overall condition?
- What amenities does the facility offer?
- Is the lot public or private?
- How utilized is it?

If the parking is illegal, then there are different questions asked, which include:

- What type of area is the parking in?
- Is the area public or private?
- How many trucks are parked there?

Figure 2.5 – Truck Parking Coding Scenarios



In addition to Figure 2.5, a Parking Facility Condition Rating Matrix (Figure 2.6) and a Parking Facility Usage Matrix (Figure 2.7) were developed to guide the inventory of the legal truck parking facilities. These ratings were established in order to allow the teams in the field to make minimal subjective decisions about the condition of pavements providing uniform results from each team.

Figure 2.6: Parking Facility Condition Rating Matrix

Condition Rating	Pavement	Striping	Lighting
Excellent	No signs of distress (cracking)	Clearly visible	Well Lit, video surveillance
Good	Minor cracking	Partially faded	Well Lit
Fair	Major cracking and minor potholes	Faded	Some Lighting
Poor	Major cracking and potholes	None	No Lighting

Figure 2.7: Parking Facility Usage Matrix

Usage Rating	Percent Full	Description
Over Utilized	100% or greater	Drivers are creating extra parking
Fully Utilized	70% - 100%	Most spaces are filled
Moderately Utilized	40% - 70%	About half of the spaces are filled
Under Utilized	0% - 40%	Most spaces are available

Each field team had to make decisions in the field about utilization and parking facility condition which are outlined in the tables above. The team would count the trucks in each lot, then estimate the number of vacant spaces and calculate the percentage utilization before logging it in the correct usage rating category. After the field review was completed the data was compiled and processed to help draw conclusions on the results which are discussed in the next section.

2.3. Field Review Results

Figure 2.8 through Figure 2.11 show the results of the field review in map format. These maps are set up to show different things. Figure 2.8 is designed to show the distribution of parking facilities by ownership type, whether public or private. Locations where illegally parked trucks were found are also shown. Because this graphic shows the illegal parking in addition to legal facilities it paints a complete picture of where trucks were found parked in the state of Kansas during the study week.

Based upon the data found in the field as shown in Figure 2.8 there are some observations that can be made about illegal parking. First is that most illegal parking is concentrated at the perimeter of the urban areas. The second main observation is that trucks utilized freeway on and off ramps heavily for parking throughout the state. When the truck traffic was on a road with at-grade intersections there was often a truck or two parked at the grain facility in each small town along the

route. The final observation to note is that a majority of the publically owned facilities are along Interstate routes with only a handful located along other primary truck routes throughout the state.

Figure 2.9 shows the utilization, percent of parking spaces filled, at a particular legal public and private truck parking facility throughout the state of Kansas. It should be noted that the field team also looked at the truck parking along U.S. 50 through Hutchinson, which was not along the routes but was included at the request of KDOT. Truck parking sites along the KTA facilities are in many cases over utilized, which means that all parking spaces were full and trucks were continuing to park by creating spaces along ramps and in drive aisles. Also the southern portion of I-135 has fully utilized facilities along it, which means parking was near 100% full. The final thing to note is that in general parking facilities were fairly full on the perimeter of urban areas throughout the state.

Figure 2.10 shows the concentration of trucks, number parked, at a particular legal truck parking facility. The first thing that jumps off the map is the large number of trucks parked in or near urban areas. The next item to point out is that large numbers of trucks are also parked at major junctions in the freight network whether urban or rural. There are also a few of the routes which have very little overnight parking; these are mostly minor north/south routes through the state.

Figure 2.11 shows the utilization and number of trucks parked at a particular legal truck parking facility. As shown a majority of the large parking facilities holding 60 or more trucks are fully to over utilized throughout the state of Kansas. Looking more regionally the southern half of the state has almost all parking facilities which can hold 30 or more trucks at least fully utilized; in the southeast region many of those facilities which are over utilized. This map helps to identify where most of the trucks are parking and where new facilities or larger facilities may be most needed.

There are several general trends which were noticed by the field teams and confirmed with the technical advisor panel. Those observations are discussed below:

- Truck parking location is a personal driver's choice with many things affecting the drivers' available information and decision on where to park and when. In general, there are two groups of truck drivers; those who want amenities and will stop at truck stops to have those amenities and other drivers who just want to drive until there time is up. For those who prefer the amenities of truck stops they stop at one with amenities and once the decision was made to stop the drivers would create spaces if none are available. For drivers who focus on making their maximum time there are trends which indicate they like to park outside of cities where things are built at large scale and their trucks can make easy in and out movements. This is also the appeal of parking on interchange ramps, where the truck can just pull to the side and then start driving straight to start-up again the next driving period. This can partially explain the pattern of drivers stopping outside the cities wherever they can find space and there being a notable absence of trucks in the urban areas.
- Parking lot condition was not a driving factor in where drivers parked. When a parking lot was in an area where the trucks wanted to stop they would be near capacity whether it was brand new concrete or severely rutted gravel. The key was more the location than the parking lot condition.

Figure 2.8 - Parking Type

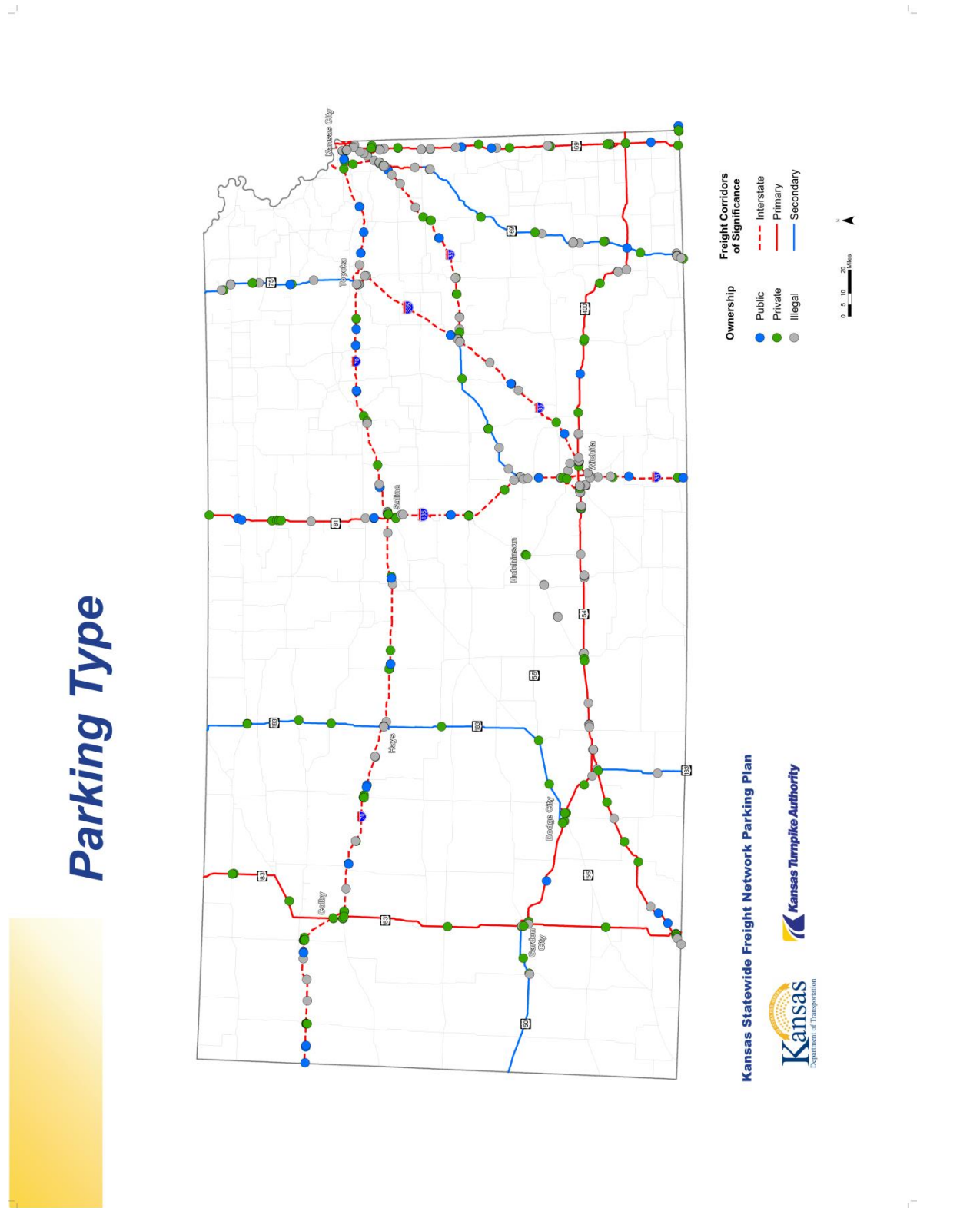


Figure 2.9 – Parking Facility Utilization

Parking Facility Utilization

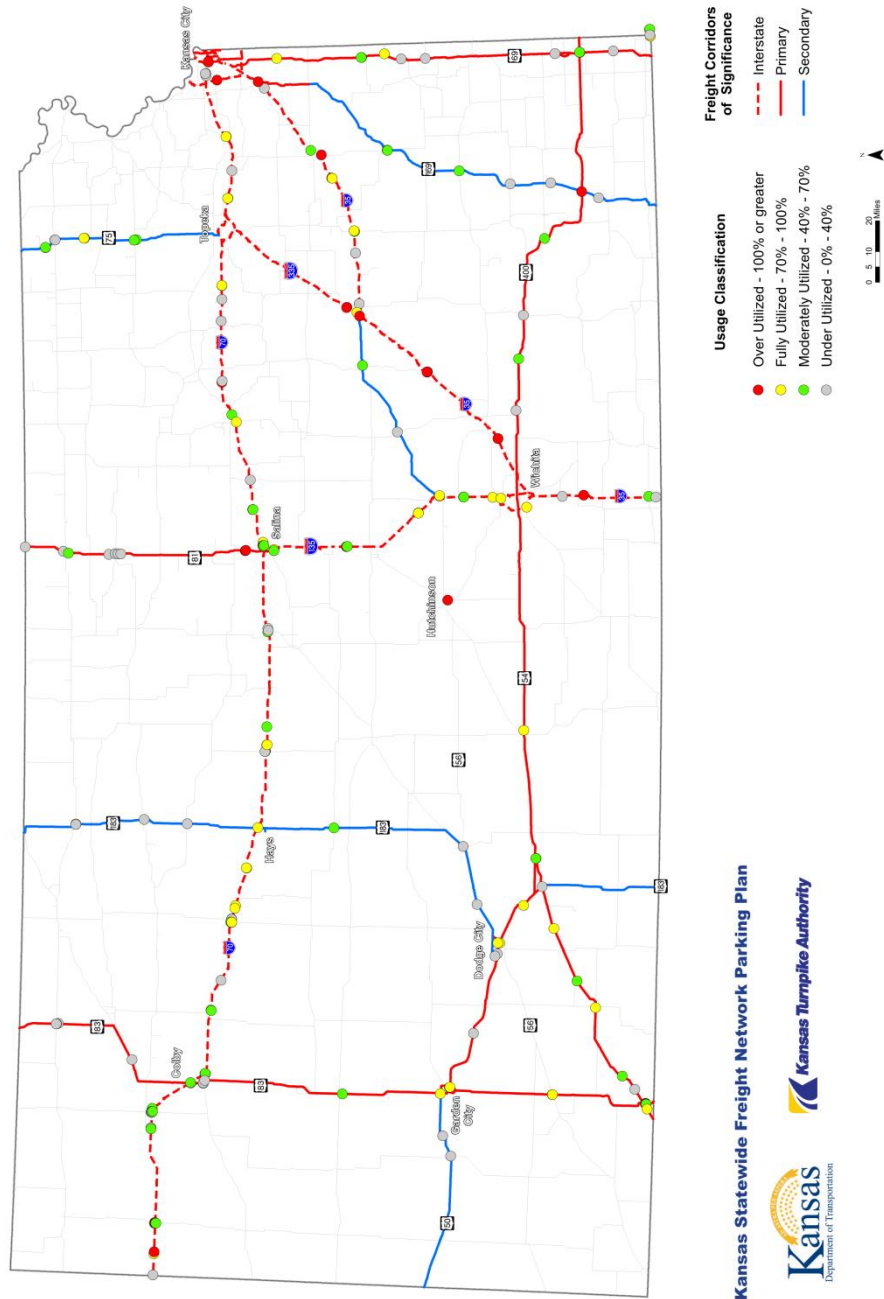


Figure 2.10 – Parking Concentrations

Truck Parking Concentrations

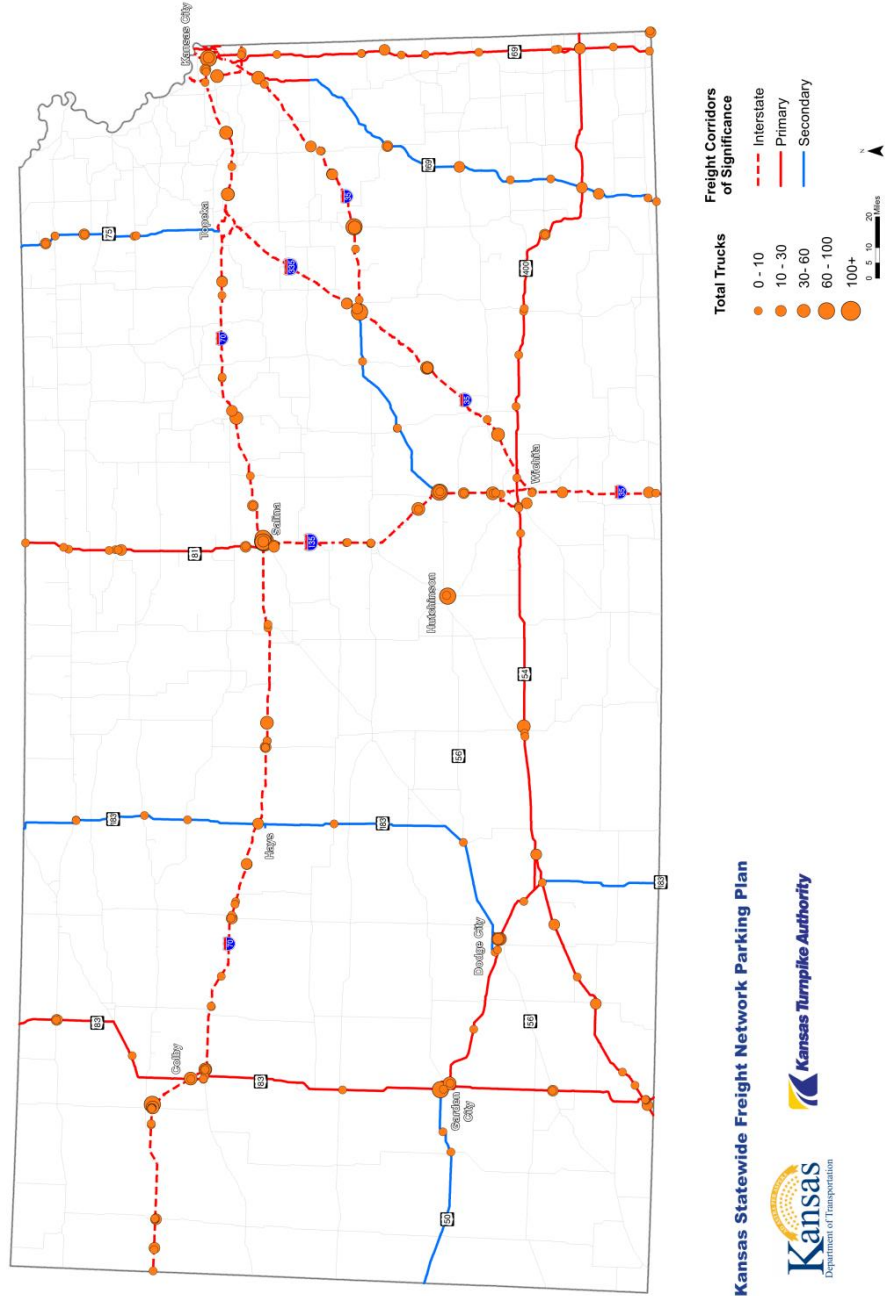
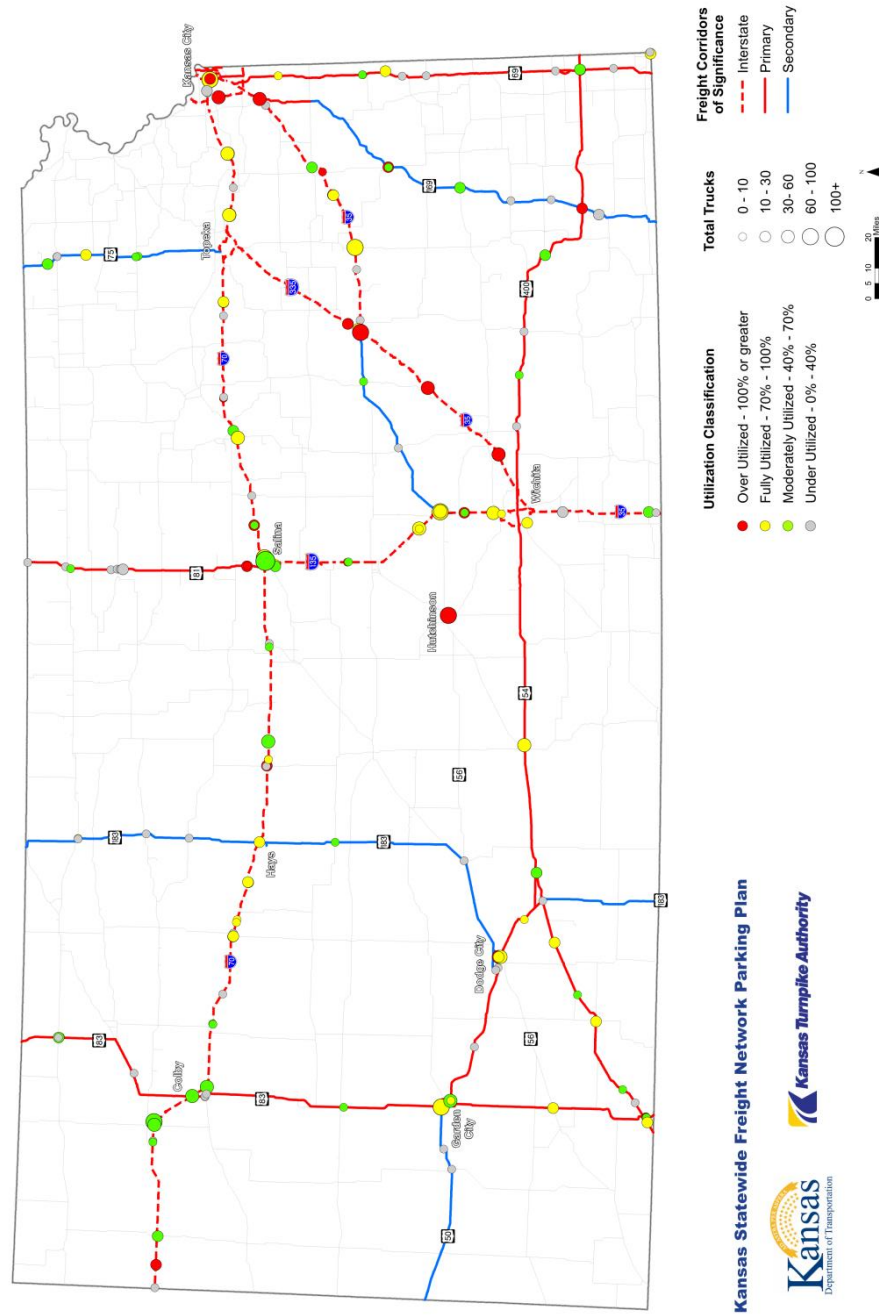


Figure 2.11 – Parking Facility Utilization and Concentration

Parking Facility Utilization & Concentration



- The peak time for trucks to park was observed to be between 12 a.m. and 4 a.m. Today trucks are parked anywhere which is built to accommodate trucks; whether a parking lot, side road or ramp. With freight tonnages only expected to increase and with hours of service regulations limiting travel the truck parking situation is only expected to become more of an issue in the future.
- Along the KTA facility it was observed that parking areas outside of the toll plazas were underutilized.

This truck parking inventory provided numerous insights into the behavior of truck driver parking but does not paint a complete picture of what affects the driver's choice. To supplement this information a survey of truck drivers, discussed in Section 5, was conducted to help understand driver behavior. Also because of the short duration of the truck parking inventory a study of GPS data from trucks is being done to determine when and where trucks are parking overnight and for their thirty minute break. This GPS data is being collected and processed for four two-week windows strategically placed throughout the year to capture seasonality.

3. LITERATURE REVIEW AND PEER INTERVIEWS

3.1. Introduction

This literature and peer review section provides a summary of reviewed studies and best practices regarding truck parking decision factors. The review has been conducted through an investigation of research studies, articles, newsletters, and web-sources. The review also includes information gathered from peer interviews with the following organizations:

- Iowa Department of Transportation (Iowa DOT),
- Minnesota Department of Transportation (MnDOT),
- Missouri Department of Transportation (MoDOT),
- Colorado Department of Transportation (CDOT),
- Wisconsin Department of Transportation (WisDOT) and
- Mid-America Freight Coalition.

3.2. Defining the Need

3.2.1. Mandated Hours of Service

Truck drivers must comply with the U.S. Department of Transportation's Federal Motor Carrier Safety Administration (FMCSA) mandated "hours of service" (HOS) regulations if they drive a commercial motor vehicle (CMV). The HOS Drivers Final Rule was published in the Federal Register on December 27, 2011. The effective date of the Final Rule was February 27, 2012, and the compliance date of remaining provisions was July 1, 2013. HOS regulations, as of June 2015, are as follows¹:

- 11-Hour Driving Limit: May drive a maximum of 11 hours after 10 consecutive hours off duty.
- 14-Hour Limit: May not drive beyond the 14th consecutive hour after coming on duty, following 10 consecutive hours off duty. Off-duty time does not extend the 14-hour period.
- Rest Breaks: May drive only if 8 hours or less have passed since end of driver's last off-duty or sleeper berth period of at least 30 minutes.
- 60/70-Hour Limit: May not drive after 60/70 hours on duty in 7/8 consecutive days. A driver may restart a 7/8 consecutive day period after taking 34 or more consecutive hours off duty.

The Consolidated and Further Continuing Appropriations Act of 2015 was enacted on December 16, 2014, suspending enforcement of requirements for use of the 34-hour restart.

The regulations are strictly enforced and violations can include state and local law enforcement fines, civil penalties on a driver or carrier and downgrading of the carrier's safety rating. To meet these regulations, commercial truck drivers need safe and convenient parking options along their route. To maximize travel time and distance, truckers will often wait as long as possible to stop and rest. Without viable parking options, some truckers will park wherever possible, including entrance and exit ramps or other locations convenient at that time.

¹ www.fmcsa.dot.gov/regulations/hours-service/summary-hours-service-regulations

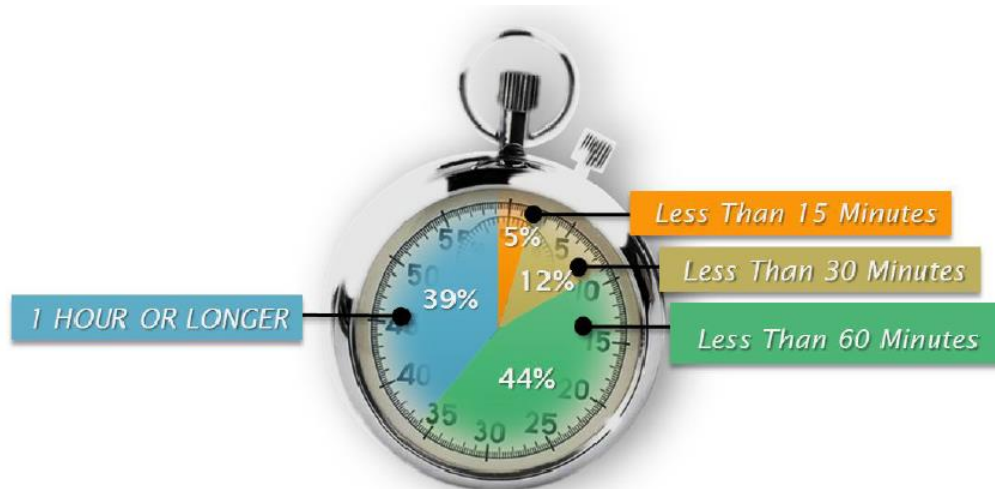
3.2.2. Jason's Law

Truck driver Jason Rivenburg was 12 miles away from his final destination when he needed to find truck parking. He was ahead of schedule, and as is often the case with just in time deliveries, trucks are not allowed to show up at delivery sites early. The only place he had to park was an abandoned gas station. Tragically, Rivenburg was robbed and murdered because of the unsafe location he unknowingly chose. Through the persistence of Hope Rivenburg, Jason's widow, and others, "Jason's Law" made its way into the Moving Ahead for Progress in the 21st Century Act (MAP-21) highway bill². SEC. 1401, Jason's Law, establishes a national priority for projects that address shortage of long-term parking for commercial motor vehicles on the National Highway System to improve the safety of motorized and non-motorized users and for commercial motor vehicle operators. The provision includes a research mandate to survey and assess the availability of parking facilities, the capability to provide adequate parking and rest facilities, the motor carrier traffic volume through each state, and a system of metrics to measure the adequacy of parking facilities³.

3.2.3. 2013 Safe Truck Parking Survey

To help fulfill this research mandate, in 2013, a volunteer group including Hope Rivenburg and Desiree Wood of REAL Women in Trucking, Inc., and Andrew Warcaba & Associates conducted an independent survey of nearly 4,000 truckers nationally regarding the ability to park safely. The goal of the survey was to bring awareness to the fact that there is a significant lack of safe available commercial vehicle parking space, on or near interstates, for truck drivers who want or need to park. As shown in Figure 3.1, the survey revealed that eighty-three percent of the respondents routinely took longer than 30 minutes to find parking; thirty-nine percent took longer than one hour to find safe parking in order to comply with federal HOS regulations. Drivers who haven't found parking before running out of driving hours are often forced to park illegally and unsafely, often on the shoulder of the highway or an off-ramp⁴.

Figure 3.1 - Time Looking for Parking



Graphic courtesy of PowerPoint by Desiree Wood, Andrew Warcaba Associates and Hope Rivenburg

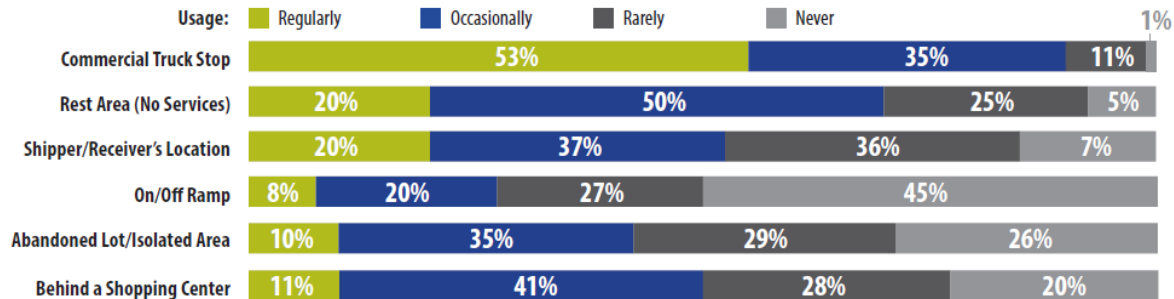
² <http://truckerdesiree.com/2013/05/30/2013-national-truck-parking-survey/>

³ <http://www.fhwa.dot.gov/map21/legislation.cfm>

⁴ 2013 Safe Truck Parking Survey PowerPoint by Desiree Wood, Hope Rivenburg, and Andrew Warcaba Associates

As shown in Figure 3.2 below, most truckers regularly park at commercial truck stops, but still 10 percent to 30 percent of truckers park in unsafe areas such as on/off ramps, isolated areas, and behind shopping centers.

Figure 3.2 - Locations Where Truckers Normally Park



Graphic courtesy of PowerPoint by Desiree Wood, Andrew Warcaba Associates and Hope Rivenburg

3.2.4. Federal Reports Concerning Truck Parking

Since the year 2000, there have been several reports published by Federal agencies. The focus of the report and the conclusions are summarized below.

3.2.4.1. Commercial Motor Vehicle Parking Shortage, FHWA Report To Congress, May 2012

This report was produced to comply with a request for FHWA to study the shortage of commercial motor vehicle parking and its impact. The request was included as a Conference Report that accompanied the Consolidated and Further Continuing Appropriations Act of 2012, Pub. L. No. 112-55, 125 Stat. 552. The report updates major findings from previous studies with current estimates and forecasts of long-distance truck activity, information from the Truck Parking Pilot Grant Program and observations made by the safety enforcement community. It reported the following:

- The volume of freight nationally increased by 12 percent from 2002 to 2007.
- Based on the estimated tonnage of freight movement in 2007 and an estimated percentage of that freight traveling over 500 miles, it is estimated that nationally 173,000 trucks per day need to parking during their journey.
- Based on a projected growth in freight tonnage of 11 percent by 2020, it is estimated that 190,000 long-haul trucks will need a place to park en route every day.
- Demand at an example high volume truck stop was reported to peak between 12:00 midnight and 4:00 a.m. The low point in demand was at 12:00 noon.
- Even though truck parking expansion is eligible for Federal-aid Highway Program funding, truck parking enhancements have had to complete with other high priorities such as bridge preservation. Most truck parking capacity has been provided as part of full service commercial truck stops.
- Section 1005 of SAFETEA-LU provided \$30 million for a pilot program to address truck parking shortages. Most projects funded through the program involved implementing of technology to better inform truck drivers of available parking. Some projects have added parking spaces for a total 325 new spaces nationwide.

- Demand for parking pilot program grant money exceeded available funding by eight times.
- A project awarded to the State of Florida funded construction of additional parking spaces adjacent to a privately owned and operated truck parking facility.
- Evidence indicates that a truck parking shortage remains widespread and will be exacerbated by anticipated growth in truck movements. Investments to reduce the shortage must be made to facilitate better utilize existing capacity and provide additional capacity.

3.2.4.2. Study of Adequacy of Commercial Truck Parking Facilities, FHWA, March 2002

This study was undertaken in response to Section 4027 of the Transportation Equity Act for the 21st Century (TEA-21). The law required that a study investigate the adequacy of commercial truck parking facilities serving the National Highway System (NHS). The study used a two-pronged approach. One area of focus was on clarifying truck drivers' parking related needs and decision making process. The second focus area was comparing supply and demand of truck parking.

Based on these two areas of study, recommendations for improvements to mitigate the existing and future truck parking problems were developed. (It should be noted that this study was conducted prior to the significant change in hours-of-service requirements implemented in 2012 and 2013.) The study made the following recommendations:

- Expand or improve public rest areas.
 - Increase the number of parking spaces
 - Improve geometric design of public rest areas to increase convenience for drivers using these facilities.
- Expand or improve commercial truck stops and travel plazas.
 - Increase yearly truck registration fees with the stipulation that these special funds can be used only by States on initiatives to address the truck parking issue.
 - Implement a program that allows States to close rest areas in locations that are well served by private-sector business and shift funds to areas where additional development is desirable.
 - Remove cost-prohibitive road improvement requirements imposed by State DOTs upon developers attempting to open new facilities.
- Encourage the formation of public -private partnerships.
 - Provide low-interest loans or grants to commercial truck stops to increase capacity.
 - Construct State-owned lots adjacent to commercial truck stops and travel plazas and enter into agreements with these owners to lease or maintain the lots.
 - Work with owners of commercial truck stops to help them promote the availability of parking in large lots close to the Interstate highway (e.g., provide signage on the highway).
- Educate or inform drivers about available spaces.
 - Develop Intelligent Transportation System deployments that provide drivers with real-time information on the location and availability of parking spaces. For example, investigate using cellular phones and radio frequencies to broadcast parking locations and availability to drivers.

- Investigate using mailings related to credentials administration for the International Registration Plan and the International Fuel Tax Agreement as a means of distributing information on the location and type of parking spaces within the base State to participating motor carriers.
- Publish and distribute a “trucker’s map,” in both paper and electronic format, that pinpoints parking facilities for drivers (both public and commercial), including lot capacity and space availability.
- Change parking enforcement rules.
 - Implement more stringent enforcement of parking rules to remove vehicles from locations such as interchange ramps.
 - Change parking limits to permit trucks more time to park at public rest areas.
 - Encourage local government and business support for constructing and operating commercial truck stop and travel plaza facilities in or near their community industrial and business parks (i.e., zoning).
- Conduct additional studies.
 - Refine the results from the present study and develop more detailed assessment strategies at specific highway locations (e.g. target heavily traveled truck corridors).
 - Establish a multi-State committee to evaluate alternatives and recommend solutions that would address the “staging” of trucks at certain locations in response to “just-in-time” delivery.
 - Conduct additional research to further refine the demand model (e.g., to accommodate local factors that can influence demand, such as a higher rate of parking near major distribution centers).

3.2.4.3. NCHRP Synthesis 317 - Dealing with Truck Parking Demands, Transportation Research Board, 2003

The National Cooperative Highway Research Program synthesis contains a review of the successful practices used by transportation agencies to evaluate and deal with truck parking demand. The primary sources of data for the synthesis were detailed questionnaires distributed to highway maintenance engineers at state departments of transportation. Completed questionnaires were provided by 24 states. The synthesis developed the following conclusions:

- Commercial vehicle travel demand is large and growing—as is parking demand.
- Because of parking shortages and limits on stays in public facilities, truck drivers needing rest may create unsafe situations by parking on roadway access ramps and shoulders.
- Drivers are responsible for obtaining long-term rest, but no single agency or organization is responsible for providing required facilities.
- Survey results confirmed other findings that the truck parking shortage is nationwide.
- Most supply of truck parking is located in commercial truck parking lots and plazas.
- The problem is concentrated in public rest areas. Rapid increases in truck traffic, combined with a limited expansion of public rest areas, have resulted in a shortage of available truck parking in public rest areas.

- A multipronged approach is required, which includes 1) expand or improve public rest areas, 2) educate or inform drivers about available spaces, and 3) make better use of the private sector and private truck spaces.

3.2.4.4. Highway Special Investigation Report - Truck Parking Areas, National Transportation Safety Board (NTSB), May 2000

The major issue addressed by this Safety Board special investigation report is the lack of safe available commercial vehicle parking on or near interstates for truck drivers who want or need it. This report also discusses the lack of information about parking available to truck drivers and the State-enforced parking time limits. Other conclusions summarized in the report:

- Shippers, brokers, and consignees frequently influence truck schedules and should be an integral part of any solution to the truck parking area dilemma.
- Testimony at the National Transportation Safety Board's four public hearings and available research indicate that not enough adequate truck parking spaces are available to accommodate traffic patterns in certain locations.
- The Federal and State governments have the responsibility to maintain highway safety and that the lack of available truck parking or the truck drivers not knowing where parking would be available can negatively impact safety.
- The prohibition against private development of rest area facilities on interstates may be an impediment to the construction of adequate truck parking.
- While existing guides and mapping programs may list the private truck stops and public rest areas, they are not all-inclusive of the available truck parking, such as alternative locations like park-and-ride lots and weigh stations.
- Some truck drivers do not have enough information on parking locations and need to be made aware of all available parking, both in advance of and during trips.
- Global positioning systems (GPS) technology, combined with electronic maps and the ability to communicate that information to truck drivers, could help drivers locate parking areas.
- Parking time limits for public rest areas can result in drivers returning to the roadway without obtaining adequate rest or parking

3.3. Best Practices

Interviews with the state DOTs and the Mid America Freight Coalition were conducted. An interview questionnaire was developed (Appendix A - Questionnaire) and representatives from each organization were interviewed via telephone or email. Items discussed included truck parking issues, solutions to issues they have dealt with and best practices for evaluating the economic benefits of truck parking improvements. Studies they have completed along with other relevant data were also requested. Below is a summary of the information obtained.

3.3.1. Michigan

The State of Michigan is a leader in the development of smart truck parking. MDOT leveraged \$4.48 million in funding from Federal Highway Administration (FHWA) Truck Parking Facilities Discretionary Grants Program to develop and install a Truck Parking Information and Management

System (TPIMS) along I-94 in southwest Michigan⁵. This corridor carries some of the highest freight volumes in the Midwest. Trucks account for approximately 23 to 30 percent of all traffic in the corridor, making it the highest concentration of commercial vehicles on interstate highways in Michigan. Truck parking is a major safety concern along the I-94 corridor. Commercial truck drivers routinely park on rest area entrance and exit ramps, in designated car parking areas, and on interstate entrance and exit ramps. Meanwhile, a significant number of truck parking spaces at private parking facilities such as truck stops are empty or underutilized. The goal of TPIMS is to identify available parking for both public and private facilities and share that information with truck drivers. To collect parking availability data detection cameras and other sensors were deployed at public rest areas and private facilities. Parking availability information is then sent to a cloud service and distributed to drivers through:

- MDOT's Mi Drive website: www.michigan.gov/drive (see Figure 3.3),
- Truck Smart Parking Services website: www.trucksmaparkingservices.com,
- dynamic roadside truck parking signs (see Figure 3.4),
- smart-phone applications, and
- and third-party data services

To address driver distraction considerations features like text-to-speech were implemented in smartphone and connected vehicle applications to reduce driver distraction and improve safety.

Figure 3.3 - Mi Drive Website

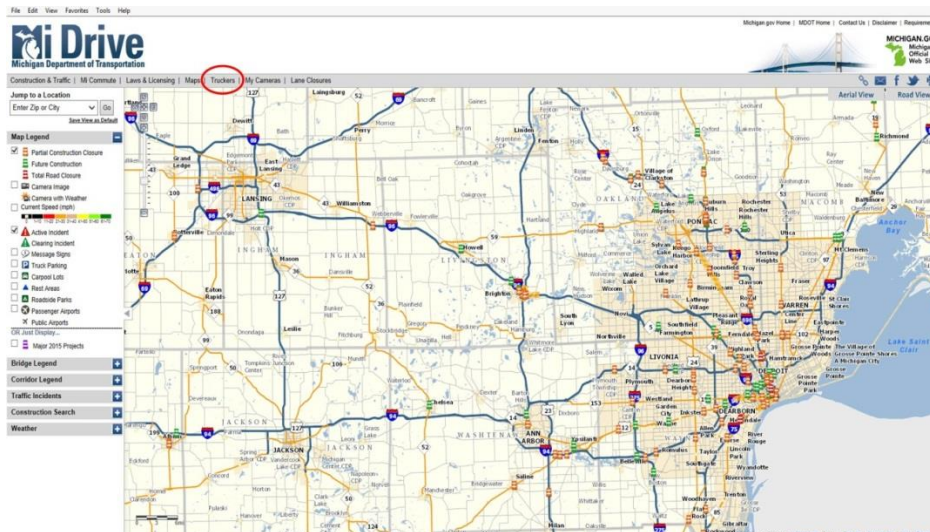


Figure 3.4: TPIMS Dynamic Message Sign in Michigan on I-94

⁵ www.michigan.gov/mdot/0,4616,7-151--336551--,00.html



3.3.2. Minnesota

A peer interview was conducted with MnDOT staff on April 6, 2015. Staff provided a copy of relevant studies including the *Minnesota Interstate Truck Parking Study*⁶ (2008) and the *Truck Parking Study Phase 2*⁷ (2010). The 2008 study documented the state of truck parking issues throughout Minnesota, while examining the supply and demand of public and private commercial vehicle parking along Minnesota's three primary Interstate corridors: I-35, I-90, and I-94.

The study revealed parking capacity issues at many of the state's rest area facilities and concluded that further research would be necessary to identify potential remedies to improve truck parking. The Phase 2 study determined opportunities for expanding truck parking where needed. The study determined that parking in urban core as the key problem. Other highlights:

Current Truck Parking Conditions and Issues

- MnDOT inventoried the Interstate truck parking supply using various information sources: aerial photographs; Google Earth™; The Trucker's Friend; a national truck stop directory, and direct contact with truck stops. MnDOT has about 400 public truck parking spaces.
- The inventory included field observations and usage records from the Truck Parking Capacity Usage Database maintained by the MnDOT Rest Area Program. The database uses truck count data collected by rest area maintenance crews during late night hours between 11:00 PM and 3:00 AM to count numbers of trucks parked at each facility. Overall, 20 facilities were deemed to have significant capacity issues during the busiest time of day.
- The busiest hours of day are overnight.
- The busiest days of the week are Tuesdays through Thursday.
- The busiest time of year is September through Christmas.
- There are fluctuations in these trends, particularly during the harvest season. Particularly September, October and November.

⁶ Wilbur Smith Associates and the Center for Transportation Research and Education, *Minnesota Interstate Truck Parking Study*, MnDOT, St. Paul, MN, 2008.

⁷ Center for Transportation Research and Education Iowa State University, *Minnesota Truck Parking Study: Phase 2*, 2010.

- The Statewide freight movement is projected to grow by at least 30 percent by 2030. Over 63 percent of goods (by volume) moved in Minnesota are carried by truck.⁸ The state's busiest truck freight routes by average annual daily traffic (AADT) are I-35, I-90, and I-94.
- Truck parking amenities are limited to rest areas, mainly restrooms, vending, information. Private facilities provide amenities (showers, safety, lighted parking, patrols, etc.).
- There has been some limited discussion about public private partnerships (P3s) with sharing areas with private facilities; however, these discussions are very preliminary.
- MnDOT has assessed parking usage and is in the process of evaluating use of video technology to assess and provide information on the number of available spaces.
- The biggest issue with truck parking anecdotally is parking on ramps; however, MnDOT does not actively track or enforce this issue.
- Truck parking in urban areas was overwhelmingly identified as the key truck parking problem in Minnesota and was the focus of the *MnDOT Truck Parking Study Phase II*.
- In Minneapolis, some trucks decide to come into the city and park on frontage roads. This is not breaking laws but there is an abundance of parked trucks – as many as 60 to 70 per night. The city is asking if trucks should be allowed to park on frontage roads. The trucks idle, concern with environmental issues, etc.
- The biggest issue with oversized/overweight truck loads involves large wind blades. They come into rest area and will occupy more than one space. Wisconsin to east and North Dakota and Iowa and Canada have higher truck allowances than regulations than Minnesota.
- The biggest challenge with truck parking is getting the right data on demand. Minnesota is dependent on performance measures. If improvements are made, the DOT needs to benchmark targets. MnDOT is currently evaluating data sources. ATRI data could be very useful in assessing freight movement.

Strategies and Solutions

- The *Truck Parking Phase II Study* identified capacity improvements including increasing the number of truck parking spaces at key locations, coordination with WisDOT in providing parking information along I-94, and improved truck parking information statewide.

Future Issues and Opportunities

- Currently assessing smart truck parking technologies similar to the Michigan TPIMS system.
- Exploring partnership with WisDOT who is also assessing smart truck parking technologies.

3.3.3. Missouri

A peer interview was conducted with MoDOT staff on April 6, 2015. Staff provided a copy of relevant studies including the *Missouri State Freight Plan*⁹ (2014) as well as information on existing truck parking facilities in the state. Highlights from the interview and relevant studies include:

⁸ 2015 Statewide Freight Plan Fact Sheet, <http://www.dot.state.mn.us/planning/freightplan/index.html>

⁹ <http://www.mofreightplan.org/wp-content/uploads/2015/02/Missouri-Freight-Plan-Executive-Summary-FINAL-small-version.pdf>

Current Truck Parking Conditions and Issues

- MoDOT has approximately 1,150 public truck parking spaces. 24 Interstate rest areas and 24 truck parking only spots.
- MoDOT has rest areas on Interstates 29, 35, 44, 55, 70 and 270. Truck-only facilities on Interstates 29, 35, 44, 55, 57, 70 and one on U.S. 36. I-44 and I-70 have the heaviest truck volumes by AADT.
- Truck tonnage is forecast to increase from 500 million in 2011 to 778 million in 2030, an increase of 55.6 percent.
- The highest demand for truck parking is on the fringe of the Kansas City and St. Louis metropolitan areas.
- The busiest hours of day are from 11:00 PM to 6:00 AM.
- The busiest time of year is August through December.
- There is a slight peak of truck volumes during the harvest season; however, these are short-haul trips with less demand for parking.
- Truck parking amenities are limited to rest areas and welcome centers. Rest areas have restrooms, maps and picnic tables. Welcome centers have larger restrooms, tourism information, playgrounds and picnic tables. Truck-only parking facilities are limited to vault toilets and basic lighting. They are a combination concrete, asphalt and gravel.
- MoDOT has more than doubled the availability of truck parking in last decade, mostly through the conversion of closed rest areas or weight stations.
- Trucker has expressed the need for running water and toilets; however, the most pressing need is for parking.
- Existing truck parking spaces are all not 100 percent utilized, however, they are over capacity on the fringes of Kansas City and St. Louis. Therefore, the issue is not the total number of spaces available in the state; it is the location of parking in relation to demand.
- Truck parking issues at the local level are typically during harvest season.
- Issues with oversize/overweight truck loads have to do with different regulations/requirements in each state. How escorts are handled, requirements, etc. This can cause increase pressure for parking and/or mobilization at the border.
- The biggest challenge with truck parking is the lack of dedicated funding to build and maintain parking.

Strategies and Solutions

- MoDOT completed a Statewide Freight Plan which identifies improving the availability of truck parking as a strategic policy recommendation.
- Exploring potential opportunities to partner with private truck stops.
- Work with the Missouri Trucking Association to send e-alerts and information, surveys, etc.
- MoDOT is using groundhog sensors at some rest areas. However, with this technology, it is difficult to provide an accurate assessment of available parking.

- The 2014 Freight Study identified a number strategies and recommendations for truck parking including:
 - Study public and private truck parking spaces placement and availability (short term).
 - Partner with the Highway Patrol to develop an education and enforcement program to reduce prohibited parking where parking facilities are readily available (intermediate).
 - Use technology to provide real-time parking availability at upcoming public and private facilities (long-term).
 - Increase truck parking capacity along key corridors - public and private (long-term).

Future Issues and Opportunities

- Diminished funding will hamper MoDOT's ability to make significant safety improvements in the future. Key issues include: the lack of an information system that conveys available truck parking locations to commercial drivers and need for safety and security at truck parking locations
- MoDOT has long been a leader in innovative ideas such as dedicated truck lanes.

3.3.4. Wisconsin

A peer interview was conducted with WisDOT staff on April 22, 2015. Staff provided a copy of relevant studies including a summary of a *WisDOT BHM CMV Parking Study (2014)* as well as information on existing truck parking facilities in the state. The highlights from the interview and relevant studies are provided below:

Current Truck Parking Conditions and Issues

- WisDOT has approximately 29 rest areas (one under construction). All rest areas are located on the primary interstate system and operate 24 hours a day, 365 days of the year. There are 737 truck parking stalls at rest areas and 179 at State Patrol Safety and Weight Enforcement Facilities (SWEFs).
- Wisconsin has extensive and escalating oversize/overweight loads, wind towers in particular. Biggest domestic manufactures of wind, over 1,000 shipments. Over 200' in length and 200,000 lbs. All loads to neighboring states. Permit conditions and hours of service in other states challenge safe harbor and parking problems. WisDOT has a separate oversize/overweight permit unit within the DOT.
- Major trucking corridors are between Minneapolis to Chicago and Green Bay through Milwaukee down to Chicago.
- A video study of six rest areas along the I-90/I-94 corridor from Minnesota to Illinois on I-90 and I-94 collected data and video clips at the top of every hour at each rest area for a duration of seven days. Collected data and video clips of CMVs parked on the off ramp, on ramp, and CMV parking area. Recorded the number of available CMV parking stalls at each rest area every hour.
- The average duration of stay for a single CMV during the daytime is approximately one hour or less. The average duration of stay for a single CMV during nighttime/early morning hours is approximately four hours.

- The inventory has indicated a need for additional truck parking to accommodate HOS needs and just in time deliveries.
- Lack of funding is the biggest current issue with truck parking.

Strategies and Solutions

- Current Rest Area Plan is out of date (1989). In the final stages of awarding a comprehensive study to evaluate the role and mission of all rest areas and truck scales. Truck parking is a significant consideration of this study. Technology change and more traveler resources negate the value of public rest areas for the general public. However, this is not the case for truck parking. User experiences are different. Passenger vehicles stay short periods of time; trucks need overnight parking. More truck parking is needed to accommodate HOS as well as staging for delivery windows in adjacent metropolitan area, traffic conditions to clear or waiting for dispatch direction.

Future Issues and Opportunities

- The long term solution for oversize/overweight loads is harmony in permit conditions at border crossings.
- WisDOT is evaluating a real time truck parking communication platform in cooperation with Minnesota and Michigan on the I-94 corridor. The objective is to identify for safe harbor and park, enhancing parking availability and spur on behavior changes of parking on ramps or shoulders. Are considering integrating the private sector in the platform. Detection hardware at private sector truck stop and signage on system using cloud based communications. If full, signage would indicate spots available elsewhere. The objective to provide options to truckers and precludes need to add parking to system. WisDOT recognizes that it is impossible to build their way out of the parking problem.
- Could partner with truck stops to provide excess DOT property or right-of-way for parking. DOTs do not provide amenities found at typical truck stops (showers, retail, services, etc.).
- Private sector sponsorship is a significant opportunity. This could go include sponsorships that would offset operating costs.

3.3.5. Colorado

A peer interview was conducted with CDOT staff on April 8, 2015. Staff provided a copy of relevant studies including the *Truck Parking Issues at State Facilities in Colorado* (2007) and statewide truck parking facilities map. The highlights from the interview and relevant studies are provided below:

Current Truck Parking Conditions and Issues

- Truck parking is available on the major interstates through the state including I-70, I-25 and I-76. These are also the busiest freight routes by AADT.
- CDOT does not actively monitor usage of truck parking.
- Some public truck parking is provided at designated pull outs. Due to the topographical issues in parts of the state, there is a lack of available space for large truck parking areas. Parking areas include restrooms. Are considering electrical hook-ups at some locations.
- There is no dedicated source of funding to build or maintain truck parking.

- There is informal truck parking on entrance and exit ramps; however, this type of parking is not actively discouraged by the state patrol as long as it is deemed safe. The state patrol would rather they be parked on a ramp than driving tired and out of hours.
- Some local jurisdictions are concerned about truck parking; however, the trucking industry typically finds alternate places to park.
- The busiest hours of day are from early evening to early morning. There is some fluctuation during harvest time.
- Lack of funding is biggest issue with truck parking. Also, in Colorado, topography divides the state providing unique different needs and challenges within each region.

Strategies and Solutions

- *2007 Truck Parking Issues in Colorado, Final Report* identified the need for additional dedicated truck parking including expanding existing rest areas.
- CDOT provides public truck parking locations through a Truck Parking Guide.

Future Issues and Opportunities

- There is expected to be a statewide increase in truck freight tonnage of 70 percent by 2040. The Ports-to-Planes Corridor connecting Denver to Mexico is a larger driver of this traffic.
- CDOT is considering how to provide truck parking information through real time ITS. However, a specific timeline has not been established for this system.

3.3.6. Iowa

Iowa DOT staff provided a copy of their *Statewide Rest Area Management Plan* (2013). The highlights from the plan are provided below:

Current Truck Parking Conditions and Issues

- There are 40 full service rest areas in the state, all but one are open year round.
- All of the services provided at each rest area are available 24 hours per day. Amenities include parking, restrooms, picnic facilities, pet exercise areas, telephones, traveler information and Wi-Fi.
- Twenty-four hour daily traffic counts, including truck percentages, were conducted at each interstate rest area during year 2012. Rest areas on I-80 and I-380 had the highest average hourly volumes. Rest areas on I-680 had the lowest average hourly volumes. The peak traffic volumes generally occurred between 9:00 AM and 3:00 PM.
- The parking utilization for trucks was highest during the overnight hours (approximately 10:00 PM to 8:00 AM). During much of this time, the number of trucks parking at a rest area exceeded the number of available parking spaces. When parking spaces were full, trucks parked on the shoulders of the rest area entry/exit ramps or in the areas designated for cars. The peak time for truck parking generally occurred between 2:00 AM and 6:00 AM.
- The 2007 study reviewed alternative parking locations for trucks. These locations included parking only rest areas, weigh stations and Alternative Service Locations (ASLs) that

provide truck parking. ASLs are businesses or public facilities near interstate service interchanges where travelers can find services similar to those provided at rest areas. Approximately 85 alternative truck parking locations were identified along Iowa interstate rest area corridors, equating to nearly 4,700 truck parking spaces.

- A review of truck travel between major freight hubs was performed to identify probable locations where truck drivers would stop to rest throughout Iowa. This review focused on truck travel within a single day from major freight hubs. The review identified 11 freight routes between major freight hubs where drivers would end their first day of travel on Iowa interstates. Probable locations for truck drivers along these routes to stop and rest were primarily located near the Des Moines metropolitan area.
- Of the services provided at rest areas, truck parking is the most over utilized service at rest areas throughout the state.
 - Truck parking demand exceeds capacity at most full service rest areas at peak times.
 - Truck parking demand exceeds capacity at over half of the parking only rest areas during peak times.
 - Weigh stations are sparsely used for truck parking during overnight hours.
 - Truck parking at ASLs was observed to be 70 percent to 90 percent utilized.

Strategies and Solutions

- Strategies and solutions identified in the study include a review of P3s, evaluation of parking expansion opportunities at rest areas and weigh stations, and ways to provide additional traveler information.
- Traveler information dissemination technologies are being considered to provide information on truck parking availability. Dynamic, real-time truck parking availability technologies are currently being investigated by other DOTs and FHWA. However, the study noted that these systems are still in their infancy and can be costly.

Future Issues and Opportunities

- P3's are a potential consideration to address additional truck parking needs, however, DOTs need to be mindful of several challenges: Title 23, Section 111 of the United States Code (23 USC 111) prohibits commercial development at travel information centers or rest areas. 23 USC 111 also prohibits private commercial development located on the interstate system. Additionally, businesses located at service interchanges along interstate corridors and the National Organization of Truck Stop Operators (NATSO) are strongly opposed to commercial development at rest areas because of the loss of business/revenues that they would likely incur at existing businesses along interstates. Despite the challenges listed above there are a variety of P3s that could be implemented with the appropriate legislation.
- Parking is available at weigh stations, however, many truck drivers are hesitant to use parking at weigh stations due to potential of inspection that may otherwise be avoided. Currently there are no methods available for truck drivers to park at a weigh station without the potential for being inspected upon arrival or departure of the weigh station. To ensure use of available parking at weigh stations, parking availability signage at weigh

stations would need to be incorporated as well as educating drivers of the availability of parking at weigh stations.

- Park-and-ride lots could be used for truck parking during overnight hours. Coordination with the agencies controlling these lots would be necessary to determine the availability of parking at these locations, and to ensure that trucks leave the park-and-ride lot before commuters start using it in the morning. Similar challenges of providing parking at weigh stations would also exist for providing parking at park-and-ride lots including providing appropriate signage, etc.
- To address dissemination traveler information on truck parking, truck parking availability technology is currently being investigated. A review of existing programs, funding, projects and research was conducted on truck parking availability technology. There are currently several demonstration and pilot projects, funded through FHWA, that are on-going related to real-time truck parking availability technologies. However, there are no current commercial off the shelf truck parking availability systems available. Based on the work completed to date, it is difficult to estimate the costs to deploy a real-time truck parking availability system. Most of the systems to date are being deployed for \$5 million per corridor. As this technology advances and systems are developed it is reasonable to assume that this cost will decrease.

3.3.7. Mid-America Freight Coalition

An interview was conducted with Mid-America Freight Coalition staff on April 16, 2015. The highlights from the interview are provided below:

Current Truck Parking Conditions and Issues

- For the trucking industry, it is important to know what parking is available, is it public or private and what amenities are available.
- Truckers like to plan the route as much as possible. Accurate dissemination of parking availability information is critical.
- The Mid-America Freight Coalition is currently doing a literature review of truck parking issues and opportunities and what other states are currently considering. The timeline for an initial draft is early July 2015.
- The biggest demands on truck parking are early evening though late night.
- Overall, there is not enough truck parking on the fringes of major metropolitan areas. Just in time deliveries drive the need for parking close in to major metropolitan areas.
- Long-haul truck drives may not know areas as well as local drivers. This means they may not know where to look for parking. Also, parking on the fringes of metropolitan areas is often full by the time long-haul drivers approach their destinations. This may necessitate consideration of a truck parking reservations system. Another consideration with long haul truckers is the potential need to relay loads at intermediate points in order to allow both drivers to return to their respective homes, essentially, shuttling back and forth between their home parking/rest places and a swap point¹⁰. This would put additional pressure to provide additional truck parking at these points.

¹⁰ Truckers' Park/Rest Facility Study, ICT-R27-16, Illinois Institute of Technology, 2008

Strategies and Solutions

- Use ITS and other technology for the dissemination of truck parking information in advance allowing truckers to plan their route in advance. Take advantage of opportunities for integration with truck technology systems. Evaluate possible options include dynamic message signs, websites, mobile apps, etc.
- Seek P3 opportunities to expand truck parking options.

Future Issues and Opportunities

- Need to build awareness with elected officials and the general public. Explore environmental perspective when justifying truck parking improvements. Potential reduction of urban congestion by providing model to park outside of major metropolitan areas.
- Need to get a handle on the right corridors for prioritization of deployment. Not just about AADT. Need to overlay major truck hubs and urban centers.
- Evaluate long-haul vs. short-haul truck needs.
- Long-term future could include dedicated truck lanes. Need to evaluate how truck parking would be integrated in a future truck network.

4. TECHNICAL ADVISORY PANEL

As part of the study, an advisory panel of subject-matter experts was convened to help advise KDOT and the KTA as to whether truck parking improvements – and what kind – are needed to better serve the current and projected future needs of the freight community. The advisory panel consisted of stakeholders from manufacturers, emergency services, trucking companies and other groups and industries affected by the health of freight trucking in Kansas (Appendix B – Roster). The intent was that members of the Technical Advisory Panel would help examine and discuss the state’s truck parking capacity, conditions, trends and opportunities, then refine emerging recommendations for improving parking safety, way finding and availability across the state based on their real-world experience.

4.1. Methodology

The 18 members of the Technical Advisory Committee were drawn from trucking, manufacturing, law enforcement, government, distributors and retailers in order to provide a broad spectrum of perspectives and advocacy around the subject of truck parking.

The first Advisory Panel meeting was held April 30, 2015 (Appendix C – Meeting Summary and Meeting Notes) to:

- Generate feedback about current/future Kansas truck parking trends, needs and preferences;
- Help shape recommendations for addressing truck parking needs; and
- Begin crafting effective strategies for improving the state’s freight network safety, efficiency and competitiveness.

4.2. Findings

Members of the advisory panel provided a number of insights and suggestions for follow-up in Tasks 2-4 of the study or in follow-up activities yet to be determined, including:

- Refine truck parking inventories/utilization during the summer and fall harvest and the holiday season to better understand the influences of these events on parking needs and conditions;
- Compare tax rates between neighboring states to determine influence on truck routing and parking decisions;
- Determine the ratio of truck volume to needed truck parking stalls to help guide policy decisions and investments;
- Examine need for/value of local city/state partnerships to build secure long-term parking facilities for truck drivers for safety and economic development benefits, particularly in small towns;
- Explore regulatory harmonization between the states and FHWA with regards to oversize/overweight loads to determine impact on Kansas truck parking;
- Refine understanding of interplay between service hours, destination readiness to accept delivery and proximity of parking options;

- Quantify impacts of cost-per-mile for goods movement, tolling, travel-time reliability and other factors as influences on routing and truck parking needs;
- Develop criteria for determining where to locate new parking facilities;
- Consider and take into account trends (business, demographic, technological, other) affecting truck volume and parking needs;
- Identify KDOT/KTA assets that could be repurposed into parking;
- Investigate partnership opportunities with convenience stores, municipalities and others that potentially could be developed as joint-constructed/maintained lots; and
- Make sure technological solutions still accommodate legacy drivers/system.

5. TRUCKER SURVEYS

An electronic survey was created and distributed to truckers operating within and through Kansas to help better identify factors affecting their decision-making process regarding parking, including parking locations, type (legal/formal versus illegal/informal), routing, regulatory requirements, costs, security, amenities, over dimensional and/or overweight loads requirements, and type of ownership (public versus private).

5.1. Methodology

The electronic survey was prepared (Appendix D – Electronic Survey) and distributed by American Transportation Research Institute (ATRI), the trucking industry's not-for-profit research Institute. Questions were developed to capture demographic, vehicle, freight, routing and other influences on driver parking decision making. The survey instrument prepared for an earlier Michigan Department of Transportation study was used as a baseline for survey development to improve instrument reliability. The web-based survey was electronically distributed through directly to state trucking association members from Kansas and surrounding states, as well as members of the Owner Operator Independent Drivers Association. The survey was available between May 15, 2015 and June 24, 2015.

5.2. Findings

Nearly 750 completed surveys were returned by truckers who regularly travel within and through Kansas. Of those surveys returned, respondents were:

- Primarily middle-aged male drivers;
- Predominately operators of for hire, truckload rigs that they owned;
- Mostly operating on inter-regional or long-haul routes; and
- Predominately users of Kansas truck parking of up to four times a week.

A stratified analysis of the survey results will be available as part of Task 2 activities; however, initial survey findings regarding truck parking issues and opportunities within Kansas include:

- 82.6 percent of respondents cited hours of service as the top reason for seeking to park;
- 78 percent require up to one hour or more to find adequate parking;
- 51.6 percent found it equally difficult to find parking in public or private rest stops;
- 48.3 percent were most likely to find parking in rural areas versus only 25 percent in metropolitan areas; and
- 27.1 percent said it was easier to find parking in Kansas versus 24 percent who said other states were easier.

6. TASK 1 FINDINGS AND IMPLICATIONS

Task 1 offers or suggests a number of insights into current and future truck parking needs. Here is a summary of the insights:

- A. The truck parking inventory and usage survey found the following
 - a. Illegal truck parking occurs across the state with high number of illegally parked trucks just outside urban areas.
 - b. Truck parking sites along the KTA facilities are in many cases over utilized, which means that all parking spaces were full and trucks were continuing to park by creating spaces along ramps and in drive aisles.
 - c. The southern portion of I-135 has fully utilized facilities along it, which means parking was near 100% full.
 - d. In general parking facilities were fairly full on the perimeter of urban areas throughout the state.
 - e. A large number of trucks are parked in or near urban areas.
 - f. A large numbers of trucks are also parked at major junctions in the freight network whether urban or rural.
 - g. There are also a few routes which have very little overnight parking; these are mostly minor north/south routes through the state.
 - h. A majority of the large parking facilities holding 60 or more trucks are fully to over utilized throughout the state of Kansas.
 - i. In the southern half of the state almost all parking facilities which can hold 30 or more trucks at least fully utilized; in the southeast region many of those facilities which are over utilized.
 - j. Parking lot condition was not a driving factor in where drivers parked.
 - k. The peak time for trucks to park was observed to be between 12 a.m. and 4 a.m. Today trucks are parked anywhere which is built to accommodate trucks; whether a parking lot, side road or ramp.
 - l. Along the KTA facility it was observed that parking areas outside of the toll plazas were underutilized.
- B. Demand for truck parking in Kanas is similar to what is expected across the nation. At certain locations parking demand exceeds supply creating a parking problem that needs to be address.
- C. The Moving Ahead for Progress in the 21st Century Act (MAP-21) highway bill included Jason's Law that made addressing storage of long-term parking for commercial motor vehicles on the National Highway System a priority.
- D. National surveys have shown that finding a truck parking location in a timely manner can be challenging and a significant number of truckers report parking in illegal locations that can be unsafe.
- E. Several studies by Federal agencies have concluded that the lack of safe truck parking is a problem across the nation that will continue to be exacerbated by the growth in freight movement by truck.

- F. The Federal studies also observed that while funding eligible for projects to expand truck parking, the amount spent on new truck parking is limited because those available funds are needed for other priorities. The need far exceeds the funding being spent.
- G. National studies suggest the following ideas to address the truck parking challenges: expand or improve public rest areas, expand or improve commercial truck stops and travel plazas through reduction in regulations and incentives, encourage the formation of public-private partnerships, educate or inform drivers about available spaces through technology and other means, and change parking enforcement rules.
- H. Other state DOTs experience similar problems of growing truck traffic and truck parking demand exceeding supply at some locations that are often near urban areas. To address these problems the DOTs have added parking capacity and begun to use technology to provide parking availability information to truckers. Other potential strategies being evaluated include public/private partnerships. All DOTs also reported limited funding to address truck parking concerns.
- I. The interview with the Mid-America Freight Coalition provided a similar assessment of truck parking issues as the state DOTs reported. They stress the need for truckers to have information on parking availability and amenities to allow them to plan their trip. Suggested solutions included the use of technology to provide real time parking information and the need to leverage public/private partnerships. The need to educate the public and politician about the need for truck parking was also mentioned.
- J. The advisory panel convened for the project provided suggestions on things to consider when assessing the truck parking challenges and developing solutions. Unique suggestions were consideration of the impact to regulations on truck parking demand and the ability to address issues.
- K. The survey of truckers found.....

Based on the truck parking inventory and usage assessment and input from other studies, peer state interviews, advisory panel input and the trucking community the following implications can be drawing:

- A. Growing parking demand in new and existing locations will strain constrained state budgets. Transportation agencies such as KDOT and the KTA already see funding challenges driven by state budget issues, shifting travel patterns, more fuel-efficient vehicles and lack of long-term, sustainable federal support. In such an environment, it is unlikely that any agency can afford to build its way out of all truck-parking needs.
- B. Technological solutions that improve driver decision-making regarding parking should be considered. Fleet operators and younger drivers are comfortable with using technology investments that improve their return on investment and driver quality of life. Part of the truck parking issue may be solved by giving drivers the tools to make better parking choices that result in existing assets being better utilized.
- C. Public-Private Partnerships (P3s) offer potential for addressing additional truck parking needs. Having the public and private sectors share the benefits – and costs – of truck parking needs and opportunities may be an important way to provide parking the future in a timely, flexible and cost-effective manner. However, this will require identifying legal, financial and other risks and making sure they are addressed by the most appropriate party.
- D. Truck driver routing and parking decisions are the result of a complex formal and informal negotiation over the value of time, expense, regulation, personal preference and other

considerations. State policy or investment decisions suggested by these Task 1 findings would have some impact on that negotiation. However, a key factor in how big an impact they have is whether those decisions are confined only to Kansas or take place instead in a regional or national context.

- E. A theme heard and seen throughout Task 1 activities is that routing and parking decisions are often made hundreds of miles away from where a truck finally stops. Truck driver may pull into a parking spot outside Wichita because the driver knew it was open. But the fact that the truck entered Kansas at all will be determined by many other factors. What is clear is that the likelihood of that truck crossing the Kansas border is enhanced by being able to take advantage of regional consistency in travel costs, business process, trip-time predictability and driver services availability. Given the fractured nature of those elements right now, Kansas may be able to gain a “first mover” advantage by undertaking its truck parking decision-making in a regional context wherever possible.

Appendix A

Peer Organization Interview Questionnaire

Kansas Freight Network Truck Parking Plan
Peer Organization Interview Process

Questionnaire

The Kansas Department of Transportation (KDOT) in partnership with the Kansas Turnpike Authority (KTA), are conducting interviews with peer organizations to better understand parking issues trends, tools and strategies that could potentially be applied in Kansas to improve freight network safety, efficiency and competitiveness.

(The following will be captured during the interview)

Name:

Title:

Organization:

Phone:

Address:

Email:

Date of Interview:

Interview Mode:

Questionnaire

Current Truck Parking Conditions and Issues

I'd like to start by talking about the current truck parking conditions and issues in your state.

1. How many designated truck parking facilities and parking spaces are you responsible for?
 - a. Do you have a count for designated public spaces?
2. Do you compile data on private truck parking?
 - a. If yes, can you provide a count for private truck parking spaces?
 - b. If specific counts are not available, do you have a general idea of the percentage of private vs. public designated truck parking spaces?
3. Which routes and highways do they serve?
 - a. Are these your busiest freight routes by Average Annual Daily Truck Traffic (AADTT)?
4. Which truck parking facilities are the busiest based on utilization?
 - a. Are they public, private or both? If both, what is the percentage of public vs. private?
 - b. Where are they located?
5. For your busiest lots, what are the busiest ...
 - a. Hours of day?
 - b. Days of week?
 - c. Time of month?
 - d. Time of year?
 - e. Are there seasonal variations? If so, please describe.
 - f. Are these long term trends?
6. Does usage differ for your less frequently used lots?
 - a. If so, how?
 - b. Why is that?

Questionnaire

7. What amenities do you provide in your lots (please describe).
 - a. Have you received feedback about the amenities and if they are meeting trucker needs?
 - b. If amenities are not provided, are there plans to improve amenities?
 - c. If so, what improvements will be made?
 - d. If so, is there a plan and timetable to improve the amenities?
 - e. What is the budget source?
8. What are your planned/committed freight improvement projects that could affect parking? If an improvement affects parking, what are the anticipated affects? Are there strategies to mitigate the anticipated affects?
9. What is budgeted annually for their upkeep/expansion?
 - a. If so, what is the budget source for this program?
10. Do you have enough legal/formal truck parking facilities given the demand?
11. What issues with illegal or informal truck parking do you have?
 - a. If yes, please describe the issue and trends.
 - b. How does law state and local enforcement deal with the issue?
 - c. Are they growing or declining? Why?
12. Have you heard from local jurisdictions or businesses that have issues with illegal or informal truck parking near your facilities?
 - a. How would you describe those issues?
 - b. How were they resolved? If they weren't resolved, what were the obstacles?
 - c. Are there local restrictions for truck parking that you are aware of that impact your facilities?
 - d. If yes, please describe the restrictions.
 - e. In your opinion do they work?

Questionnaire

13. Do you any special issues or challenges related to oversized/overweight (OSOW) loads as it relates to truck parking (both legal and illegal)?
- How would you describe those issues?
 - Do OSOW regulations in adjacent states (or systems/agencies/authorities) affect truck parking considerations on your system? If so, please explain those issues.
 - Are there anticipated changes to OSOW regulations in your state or adjacent states that have the potential to affect truck parking considerations on your system?
14. Overall, what are your biggest challenges with truck parking?
- How would you describe those challenges?
 - What has been done or is currently being contemplated to address those challenges?

Strategies and Solutions

Now let's talk about strategies and solutions you've considered or deployed.

15. Have you in the last three years conducted any studies that would shed light on your truck parking situation or potential solutions and opportunities?
- If so, what was the study?
 - Why was it undertaken?
 - Has it been implemented? If not, why?
 - If it has been implemented what is this an ongoing program and what is the budget source?
 - How may we get a copy?
16. As part of any study, or as a separate initiative, have you evaluated the economic or other impacts of truck parking in terms of local or statewide costs and benefits?
17. If you have...
- How did you undertake the assessment of economic or other impacts?
 - What did you discover?
 - How could we learn more about your methodology and results?

Questionnaire

18. Do you have a formal database/inventory of available truck parking for your system?

- a. If yes, is this within your agency, other agencies or in coordination with other agencies (please describe)?
- b. How is this data collected?
- c. How often is the data updated?
- d. Do you track availability/capacity?
- e. How do you use this information?
- f. Do you provide this information to the public?
- g. If no, would you consider providing this to the public in the future?

17. Do you partner with businesses/private interests to provide information on available designated private parking facilities in your state?

- a. If so, please describe the partnership and how information is made available to the public?

18. What are your specific statewide or system restrictions for truck parking, if any?

- a. Please describe the restrictions.
- b. In your opinion do they work? If no, why not?

19. Are there potential further restrictions being contemplated?

- a. What kind?
- b. What is motivating the change?

Questionnaire

Future Issues and Opportunities

Finally, let's talk about parking issues and opportunities in the next 10 years.

20. What is your future truck freight demand (in terms of an increase in AADTT) expected to be in the next 5 years? 10 Years? 20 Years?
 - a. In your opinion, is this a significant change?
 - b. Why the change?
 - c. Which highways/routes will be most affected?
 - d. How will that affect your truck parking?
21. Do you have existing technology/traveler information that truckers can use for finding truck parking, reserving a parking spot, etc.
 - a. If so, please describe the success and challenges with the system.
 - b. If not, are there plans to implement such a system in the next 3-5 years?
22. Do you have a truck parking improvement program currently in place?
 - a. If so, how is it structured?
 - b. Has it been successful?
 - c. Have you experienced any setbacks or difficulties with the program?
 - d. If not, do you plan to implement such a plan within the next 3-5 years?
23. Do you currently partner with neighboring states to coordinate traveler information, technology and/or facilities for truck parking?
 - a. Which state(s) do you partner with?
 - b. How do you partner?
 - c. Please describe the most successful parts of the partnership.
 - d. In what ways could the partnership be improved?

Questionnaire

24. If you do not currently partner with neighboring states to coordinate traveler information, technology and/or facilities for truck parking ...
- a. In what areas would you be interested in partnering?
 - b. Why have you not already partnered in that area?
 - c. What would it take to change that situation?
 - d. How difficult would it be to make that change?
25. Is there anything we haven't discussed that you think will help me better understand how you are addressing truck parking in ways that minimize impacts and increase benefits?

Appendix B

Advisory Panel Roster

Statewide Truck Parking Analysis - Advisory Committee Members

Title	First Name Last Name	Title	Business Name	City
Ms. Kimberly	Bonhart	Vice President - Government Affairs	UPS	Overland Park
Mr. Mike	Bowen, P.E.	Division Administrator	FHWA - Kansas Division	Topeka
Mr. Tom	Palace	Executive Director	Petroleum Marketers & Convenience Store Assoc of Kansas	Topeka
Mr. Josh	Roe	KDA Economist	Kansas Department of Agriculture	Manhattan
Mr. Steve	Kelly	Deputy Secretary	Kansas Department of Commerce	Topeka
Capt. Chris	Turner	Commander Troop 1	Kansas Highway Patrol	Topeka
Ms. Susan	Cadoret	Business and Community Development	Kansas Department of Commerce	Topeka
Mr. Tom	Whitaker	Executive Director	Kansas Motor Carriers Association	Topeka
Mr. John	Prather	Vice President Corporate Relations	Groendyke Transport, Inc.	El Dorado
Mr. Mike	Kelley	Chief Sustainability Officer	YRC Worldwide	Overland Park
Mr. Ron	Achelphohl	Director of Transportation	Mid-America Regional Council	Kansas City
Mr. Joe	Pimple	President/General Manager	Sauder Fabrication	Emporia
Mr. Mike	Matousek		Owner-Operator Independent Drivers Association	Grain Valley
Mr. Mike	Miller	President	Miller Trucking LTC	LaCrosse
Ms. Lori	Borgan	Director of Safety	Convoy Systems, LLC	Kansas City
Mr. Mark	Augustine		Triplet, inc.	Salina

Appendix C

April 30, 2015

Advisory Panel Meeting Summary & Notes



MEETING DATE: April 30, 2015

PROJECT: Kansas Statewide Freight Network Truck Parking Plan

MEETING TOPIC: Kansas Freight Parking Advisory Panel Summary

NOTES TAKEN BY: HNTB

- ATTENDEES:
- Kansas Freight Parking Advisory Panel
 - KDOT
 - KTA
 - HNTB Corporation

MEETING SUMMARY

The first Advisory Panel meeting was held for the Kansas Statewide Freight Network Parking Plan on April 30, 2015. The purpose of the meeting was to engage key Kansas truck freight stakeholders in improving the effectiveness of the Kansas Statewide Freight Network Parking Plan through discussions that: (1) generate feedback about current/future Kansas truck parking trends, needs and preferences; (2) help shape recommendations for addressing truck parking needs; and (3) result in effective strategies for improving the state's freight network safety, efficiency and competitiveness. The meeting focused on three key topics:

1. Project Overview
2. Current Needs
3. Future Issues/Solutions

1. Project Overview

The meeting was initiated with welcome and introductions by Secretary Mike King. The Secretary provided an overview of the meeting purpose and goals for the panel members and shared his vision for creating a "vibrant Kansas", with the goal of achieving increased goods movement, economic development and population growth for the state. He mentioned that improving freight flows and truck parking within and through the state was a key step in realizing this vision.

Gretchen Ivy, HNTB, led the advisory panel through an overview of the Kansas Statewide Freight Network Parking Plan and its key purpose, tasks and schedule. The key goals of the study were highlighted, including:

- Ensuring we look at corridors as whole units when thinking about trucking and their parking needs;
- Matching economic development with future truck parking locations and amenities; and
- Attracting more freight traffic to the major corridors in the state.

During this discussion, handouts on the study description and schedule were provided to the panel members for reference.

Then the advisory panel was briefed on what their roles and responsibilities are for the project and how the study team would be gathering input and coordinating with the panel members throughout the study process.

2. Current Needs

The current needs discussion was led by Eric Strack and Michael DeMent of HNTB. The discussion focused on the results of the multi-team, multi-day truck parking inventory (two teams over four nights), held the week of March 16, 2015. During the inventory overview, maps showing truck parking locations, type, utilization and concentration were referenced, and input from the advisory panel on the results of the inventory were discussed. The team identified the parking type (public, private or illegal), utilization and concentration between 10 PM and 6 AM. The inventory was done on weekdays with good weather conditions; weekends and other seasonality conditions were not accounted for with this inventory (i.e. construction, harvest, etc.). This time period was determined through coordination with the American Transportation Research Institute (ATRI) and project experience with similar inventories in Michigan and Florida.

As part of the inventory discussion, members of the advisory panel suggested potential follow up in-field truck parking inventories in the summer and fall during harvest and the holiday season to better understand the influences of these events on truck parking needs and conditions.

The advisory panel members also provided input on their perceptions and experiences regarding current needs and issues with truck parking in Kansas, including:

- Parking availability/locations/conditions/amenities
- Public/private roles and collaboration
- Local/state/federal rules and regulations

Advisory panel feedback included comments about the following key topics:

Policy and Regulation:

- Comparison of tax rates between neighboring states that influence truck routing and parking decisions.
- Ratio of truck volume to needed truck parking stalls.
- Local city/state partnerships to build long-term parking for truck drivers since they are not allowed to park in local neighborhoods or streets in their town of residence.
- Regulatory harmonization with regards to oversize/overweight.
- Policy and regulations are key drivers of truck volume/route choice.
- Conflict between service hours, destination readiness to accept delivery and proximity of parking options.

Routing/Parking Locations of Need:

- Cost per mile for goods movement influences routing and truck parking needs.
- Tolls cause re-routing, especially for independent owner-operators (tolls are not reimbursable, but other taxing measures/fees are reimbursable).

- Most drivers take the path of least resistance.
- Travel time reliability is important.
- Use KC Scout traveler information for routing decisions in the Kansas City area.
- Truck traffic shifts on weekends vs. weekdays – different lot utilization.
- Seasonality of parking needs, including influences of harvest and the holiday season.
- Rail/intermodal parking needs.
- Factors in determining where to locate new parking facilities.

Security:

- Most drivers feel safe parking in Kansas.
- Municipal regulation of parking is an issue; need secure parking in small towns since prohibitions of parking in neighborhoods and local streets.
- Security for special permit drop-offs/hazardous materials needs to be considered.

3. Future Issues/Solutions

The future issues discussion was led by Brian Comer and Eric Morris of HNTB. A facilitated discussion of advisory panel members' perceptions and experiences regarding emerging trends and solutions was held, including:

- Trends (business, demographic, other) affecting truck volume and parking needs
- Regulatory improvements and trends
- Technology trends and solutions
- Best practices for truck parking seen in other jurisdictions/states

During the future issues and solutions discussion, handouts on recent peer State DOT interviews, truck parking literature review key themes and trends, and the ATRI electronic truck parking survey instrument were referenced and discussed.

Advisory panel feedback included comments about the following key topics:

Potential Future Solutions:

- Need for signage with parking availability numbers for drivers.
- Over capacity truck parking facilities to have more parking added.
- Low hanging fruit solutions to improve ramp parking.
- Two different audiences to target for truck parking needs: 1) Those that want amenities (e.g., showers, restaurants, fuel, hotels, Wi-Fi, etc.); 2) Those that want quiet parking and ability to maximize hours of service prior to parking.
- KDOT/KTA assets that could be repurposed into parking.
- Partnership opportunities with convenience stores – adjacent land that could potentially be developed as lots (e.g., DOT/Turnpike develops; private sector provides amenities & maintenance).
- Partnership opportunities with local municipalities to create long-term parking as amenity for resident truck drivers.

- Ensuring that technology for highways catches up with truck technology while still accommodating legacy drivers/system.
- Consider future freight industry demographics and needs when determining future truck parking improvements.
- Future trends for fuel types for fleet turnover still in flux (diesel fuel still needed with potential changes to LNG/CNG fuels).

This final segment included a discussion of the ATRI electronic survey to be sent out in mid-May; advisory panel members' input focused on:

- Adding survey questions on why truckers choose to park in particular locations.
- OOIDA – cooperative distribution of survey once finalized.
- More in-field truck parking inventory (summer, fall to catch harvest and the holiday season) – possibly 2 more field surveys.
- Interview with recreational visits/vehicles to understand their parking needs.

4. Open Discussion and Meeting Close

The advisory panel meeting ended with a discussion of next steps and open discussion with the panel members. It was highlighted that the key next steps for the study included the following activities:

- Electronic survey to be finalized and distributed by mid-May via ATRI.
- Analysis of truck freight flows on Kansas Primary and Secondary Freight Network using ATRI GPS data to better understand truck origins, destinations and parking influences.
- Development of initial range of potential truck parking solutions.
- Follow up truck advisory panel meeting in July timeframe to share and get feedback on initial range of solutions.

Appendix D

Electronic Survey Questions

The American Transportation Research Institute (ATRI), the trucking industry's not-for-profit research Institute, is helping the Kansas Department of Transportation and Kansas Turnpike Authority survey drivers regarding truck parking issues within the state. The survey is designed to assist KDOT and KTA in identifying new or improved truck parking solutions that better serve freight transportation providers traveling in and through Kansas.

All responses to this survey will be kept strictly confidential and will only be reported in aggregate form. Due to the sensitivity of this research, under NO circumstances will we release any of your personal or organizational information.

Demographics

1. Gender
 - Female
 - Male

2. What is your age?
 - Younger than 25
 - 26-44
 - 45-64
 - 65 +

3. In what segment of the trucking industry do you primarily operate? (check one)
 - For-hire
 - Private
 - Don't know

4. If for-hire, which sector best describes your operation? (check one)
 - Truckload
 - Less-than-truckload
 - Specialized, flatbed
 - Specialized, tanker
 - Express / Parcel Service
 - Intermodal Drayage
 - Other (please specify): _____
 - Don't know

5. Which of the following best describes your employment: (check one)
 - Employee driver
 - Owner-operator (O-O) with own authority
 - O-O / Independent Contractor leased to a motor carrier
 - Fleet executive / manager
 - Don't know

6. What is your average length of haul? (check one)

- Local (less than 100 miles per trip)
 - Regional (100-499 miles per trip)
 - Inter-regional (500-999 miles per trip)
 - Long-haul (1,000+ miles per trip)
 - Don't know
7. If you are an employee or leased driver, how many total tractors does your fleet operate? (check one)
- Less than 50
 - 51-250
 - 251-1,000
 - 1,001+
 - Don't know
8. What is the primary vehicle configuration that you typically operate? (check one)
- 5-axle Dry Van
 - 5-axle Refrigerated Trailer
 - 5-axle Flatbed
 - 5-axle Tanker
 - Straight Truck
 - Longer Combination Vehicles (Doubles, Triples, etc.)
 - Other (please specify): _____
 - Don't know
9. How are you primarily paid? (check one)
- Per hour
 - Per load
 - Per mile
 - Other (please specify): _____
 - Don't know

Kansas State Parking

10. How often do you need to find truck parking in Kansas?
- Once a week
 - 2-4 times a week
 - 5-6 times a week
 - Everyday
11. On average, how long does it take for you to find parking in Kansas?
- Less than 30 minutes
 - 30 minutes – 1 hour
 - More than 1 hour

12. When parking in Kansas, where is it more difficult to find available truck parking? (check one)

- Public rest stops
- Private truck stops
- Public and private rest stops equally difficult
- Turnpike service area

13. For every 10 parking stops you make in Kansas, how many are public rest stops and how many are private truck stops? (Sum total must equal 10)

Rest Stop Type	Number of Stops
Public	
Private	
TOTAL	10

14. While traveling through Kansas, where are you more likely to find a parking spot?

- Major metropolitan area (Population \geq 50,000)
- Smaller metropolitan area (Population 10,000 – 49,999)
- Rural area (Population $<$ 10,000)
- I am able to find a parking spot in all the above areas
- I am not able to find parking in any of the above areas

15. How often do you personally experience the following issues in Kansas (check one response for each row)?

Condition	Never	Rarely	Occasionally	Often	Always
Rest area time limit restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Parking only available on ramps or shoulders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Parking only available in unsafe locations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turnpike service plaza restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traveling on Turnpike but have to leave it for parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Truck vandalism or theft	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Please rank order (1-11) the following reasons for seeking truck parking in Kansas with 1 being the MOST important.

Truck Parking Reasons	Rank (1-11)
HOS Mandated Rest / Fatigue	
Awaiting Dispatch	
Avoiding Congestion	
Mechanical Issues/Failures	
Restaurant/Eating	
Showering/Restroom	
Staging/Waiting for Loads	
Obtaining Directions	
Safety Checks/Load Securement	
Personal Communication (e.g. cell, internet)	
Weather-related	

17. Please rank order (1-11) the following truck parking amenities with 1 being the MOST important.

Truck Parking Amenities	Rank (1-11)
Restrooms	
Fueling Services	
Restaurant	
Vending Machines	
Showers	
Retail Store	
Adequate Lighting	
Adequate Security	
Internet Access/Wi-Fi	
Access to the Interstate	
Hotel / Motel	
Other:	

18. It is easy to find truck parking in Kansas in comparison to truck parking in other states.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

19. It is difficult to find truck parking in Kansas for the Hours of Service 30 minute break.

- Strongly agree
- Agree
- Neutral

- Disagree
- Strongly disagree

20. If you are able to find truck parking in Kansas, are the parking spots large enough to accommodate your truck configuration?

- Yes
- No

21. What percent of your loads require travel on the Kansas Turnpike?

- 1 – 25%
- 26 – 50%
- 51 – 75%
- 76 – 100%
- None

22. While traveling on the Kansas Turnpike, which service plazas do you typically park at for long-term (greater than 4 hours) rest? (check all that apply)

- Belle Plaine Service Area (Mile Post 26)
- Towanda Service Area (Mile Post 65)
- Matfield Green Service Area (Mile Post 97)
- Emporia Service Area (Mile Post 132)
- Topeka Service Area (Mile Post 188)
- Lawrence Service Area (Mile Post 209)
- N/A

23. How do you access the internet while on the road? (check all that apply)

- Truck Stop/Rest Area Kiosk
- Hotel/Motel Business Center
- Onboard Communication
- In-cab Information system (e.g. PeopleNet, Qualcomm)
- Laptop in Vehicle
- Smartphone
- Other (please specify) _____

24. KDOT and the KTA are interested in studying the benefits of a real-time truck parking availability system. Please rank order (1-6) your preferred method for receiving real-time parking availability information, with 1 being the MOST preferred:

Method	Rank (1-6)
Onboard Communications/Computer System	
Internet/Website Information	
Roadside Changeable Message Signs	
Dispatcher Contact	
511 System	
Smartphone Application	

Other:	
--------	--

25. Please indicate how much in advance you would like to receive information about available parking spots. (check all that apply)

- Distance from parking location
- At the exit
- ½ mile away
- 1 mile away
- 5 miles away
- 10 miles away
- 20 miles away
- Other: _____

26. When traveling through Kansas, would you like the ability to reserve a parking spot?

- Yes
- No
- If yes, how much, if any, would you be willing to pay to have a guaranteed reservation? _____

27. Do you have any additional thoughts on finding safe and legal parking in Kansas?

Kansas State Truck Parking Summary Statistics

The American Transportation Research Institute (ATRI), the trucking industry's not-for-profit research Institute, is helping the Kansas Department of Transportation and Kansas Turnpike Authority survey drivers regarding truck parking issues within the state. The survey is designed to assist KDOT and KTA in identifying new or improved truck parking solutions that better serve freight transportation providers traveling in and through Kansas.

All responses to this survey will be kept strictly confidential and will only be reported in aggregate form. Due to the sensitivity of this research, under NO circumstances will we release any of your personal or organizational information.

Methodology

ATRI asked state trucking association members from Kansas and the surrounding states, as well as members of the Owner Operator Independent Drivers Association, to complete a web-based survey about truck parking in Kansas. The survey was available between May 15, 2015 and June 24, 2015.

Demographics

1. Gender
 - 7.7 % Female
 - 92.3 % Male

2. What is your age?
 - 0.4 % Younger than 25
 - 15.9 % 26-44
 - 70.4 % 45-64
 - 13.3 % 65 +

3. In what segment of the trucking industry do you primarily operate? (check one)
 - 91.3 % For-hire
 - 7.0 % Private
 - 1.7 % Don't know

4. If for-hire, which sector best describes your operation? (check one)
 - 65.5 % Truckload
 - 4.6 % Less-than-truckload
 - 13.0 % Specialized, flatbed
 - 5.6 % Specialized, tanker
 - 0.8 % Express / Parcel Service
 - 0.7 % Intermodal Drayage
 - 8.8 % Other (please specify): _____
 - 1.0 % Don't know

5. Which of the following best describes your employment: (check one)
- 20.2 % Employee driver
 - 25.8 % Owner-operator (O-O) with own authority
 - 51.6 % O-O / Independent Contractor leased to a motor carrier
 - 2.2 % Fleet executive / manager
 - 0.3 % Don't know
6. What is your average length of haul? (check one)
- 0.5 % Local (less than 100 miles per trip)
 - 15.1 % Regional (100-499 miles per trip)
 - 35.5 % Inter-regional (500-999 miles per trip)
 - 48.5 % Long-haul (1,000+ miles per trip)
 - 0.4 % Don't know
7. If you are an employee or leased driver, how many total tractors does your fleet operate? (check one)
- 49.0 % Less than 50
 - 18.3 % 51-250
 - 11.5 % 251-1,000
 - 17.6 % 1,001+
 - 3.6 % Don't know
8. What is the primary vehicle configuration that you typically operate? (check one)
- 37.3 % 5-axle Dry Van
 - 20.9 % 5-axle Refrigerated Trailer
 - 19.8 % 5-axle Flatbed
 - 6.3 % 5-axle Tanker
 - 1.1 % Straight Truck
 - 2.5 % Longer Combination Vehicles (Doubles, Triples, etc.)
 - 11.9 % Other (please specify): _____
 - 0.1 % Don't know
9. How are you primarily paid? (check one)
- 1.9 % Per hour
 - 44.8 % Per load
 - 46.2 % Per mile
 - 7.0 % Other (please specify): _____
 - 0.1 % Don't know

Kansas State Parking

10. How often do you need to find truck parking in Kansas?
- 71.9 % Once a week
 - 20.6 % 2-4 times a week
 - 3.8 % 5-6 times a week

- 3.7 % Everyday

11. On average, how long does it take for you to find parking in Kansas?

- 21.9 % Less than 30 minutes
- 46.6 % 30 minutes – 1 hour
- 31.4 % More than 1 hour

12. When parking in Kansas, where is it more difficult to find available truck parking? (check one)

- 15.5 % Public rest stops
- 23.4 % Private truck stops
- 51.6 % Public and private rest stops equally difficult
- 9.5 % Turnpike service area

13. For every 10 parking stops you make in Kansas, how many are public rest stops and how many are private truck stops? (Sum total must equal 10)

Number of Stops	Rest Stop Type: Public	Rest Stop Type: Private
0	1.7%	1.1%
1	7.8%	1.6%
2	12.5%	7.4%
3	13.4%	7.3%
4	10.3%	8.5%
5	26.4%	25.9%
6	8.7%	10.1%
7	7.4%	13.1%
8	7.5%	12.2%
9	1.6%	7.7%
10	2.6%	5.1%

14. While traveling through Kansas, where are you more likely to find a parking spot?

- 4.9 % Major metropolitan area (Population ≥ 50,000)
- 20.1 % Smaller metropolitan area (Population 10,000 – 49,999)
- 48.3 % Rural area (Population < 10,000)
- 13.7 % I am able to find a parking spot in all the above areas
- 13.0 % I am not able to find parking in any of the above areas

15. How often do you personally experience the following issues in Kansas (check one response for each row)?

(Results are in Percentages)

Condition	Never	Rarely	Occasionally	Often	Always
Rest area time limit restrictions	26.3	24.1	35.2	12.1	2.3

Parking only available on ramps or shoulders	21.5	16.8	30.1	28.1	3.6
Parking only available in unsafe locations	16.7	21.1	33.7	24.0	4.5
Turnpike service plaza restrictions	13.5	22.7	37.7	20.9	5.2
Traveling on Turnpike but have to leave it for parking	18.5	22.6	29.2	24.7	5.1
Truck vandalism or theft	54.6	27.6	10.4	3.7	0.9

16. Please rank order (1-11) the following reasons for seeking truck parking in Kansas with 1 being the MOST important.

(Results are in Percentages)

Truck Parking Reasons	Rank (1-11)										
	1	2	3	4	5	6	7	8	9	10	11
HOS Mandated Rest / Fatigue	82.6	4.2	1.8	1.1	1.2	1.9	0.9	1.1	0.9	1.4	3.0
Awaiting Dispatch	1.6	17.8	8.8	11.8	9.4	7.2	5.8	7.0	7.0	10.6	13.0
Avoiding Congestion	1.7	11.8	12.6	7.5	11.0	8.5	8.9	9.7	8.3	10.4	9.5
Mechanical Issues/Failures	1.4	3.7	4.2	5.8	5.9	5.6	7.3	7.8	11.9	11.1	35.3
Restaurant/Eating	4.0	17.1	19.0	14.1	14.4	8.2	7.8	3.8	4.6	4.2	2.9
Showering/Restroom	7.7	18.5	20.3	16.2	11.7	9.7	4.8	3.2	3.4	2.9	1.6
Staging/Waiting for Loads	2.9	7.1	8.8	8.2	12.2	10.6	13.0	12.4	10.2	8.9	5.7
Obtaining Directions	2.8	2.6	3.5	4.0	5.5	7.1	9.2	17.3	14.2	14.4	19.4
Safety Checks/Load Securement	5.7	9.9	10.6	14.1	12.8	9.4	9.8	10.6	9.4	4.2	3.4
Personal Communication (e.g. cell, internet)	2.5	3.5	9.3	6.8	10.2	12.1	8.3	10.2	9.4	14.8	12.8
Weather-related	8.7	8.7	9.0	9.0	11.2	9.7	9.9	7.6	8.2	9.2	8.7

17. Please rank order (1-11) the following truck parking amenities with 1 being the MOST important.

(Results are in Percentages)

Truck Parking Amenities	Rank (%)										
	1	2	3	4	5	6	7	8	9	10	11
Restrooms	47.5	23.8	11.8	5.4	4.6	2.0	1.2	0.6	0.6	1.0	1.6
Fueling Services	15.5	21.3	16.9	14.9	9.8	6.4	4.4	3.4	3.2	2.4	1.8
Restaurant	6.3	13.3	25.0	10.6	9.5	10.8	8.7	6.5	5.5	2.5	1.3
Vending Machines	1.1	2.1	1.3	5.7	6.1	5.1	9.7	13.6	14.8	16.5	24.1
Showers	6.5	14.3	15.0	19.4	16.0	9.7	7.2	5.9	3.8	1.9	0.4
Retail Store	0.5	3.1	3.4	4.9	13.1	14.3	11.8	15.6	15.2	13.2	4.7
Adequate Lighting	3.9	11.9	9.6	14.6	11.9	15.6	15.4	7.9	5.6	2.7	0.8
Adequate Security	16.9	10.7	9.2	10.5	11.7	11.4	12.3	10.5	3.8	1.6	1.4
Internet Access/Wi-Fi	2.6	3.3	3.5	4.0	6.9	8.1	6.9	12.1	20.0	22.8	9.8
Access to the Interstate	20.5	8.6	10.9	8.5	9.7	8.9	8.6	7.0	5.8	9.2	2.2
Hotel / Motel	3.3	0.9	2.7	2.8	5.5	3.7	4.6	8.0	8.6	14.8	45.0

18. It is easy to find truck parking in Kansas in comparison to truck parking in other states.

- 4.8 % Strongly agree
- 22.3 % Agree
- 44.4 % Neutral
- 24.0 % Disagree
- 4.5 % Strongly disagree

19. It is difficult to find truck parking in Kansas for the Hours of Service 30 minute break.

- 12.9 % Strongly agree
- 30.4 % Agree
- 35.4 % Neutral
- 18.5 % Disagree
- 2.7 % Strongly disagree

20. If you are able to find truck parking in Kansas, are the parking spots large enough to accommodate your truck configuration?

- 66.8 % Yes
- 33.2 % No

21. What percent of your loads require travel on the Kansas Turnpike?

- 55.3 % 1 – 25%
- 22.4 % 26 – 50%
- 10.7 % 51 – 75%
- 4.1 % 76 – 100%
- 7.5 % None

22. While traveling on the Kansas Turnpike, which service plazas do you typically park at for long-term (greater than 4 hours) rest? (check all that apply)

- 17.0 % Belle Plaine Service Area (Mile Post 26)
- 11.5 % Towanda Service Area (Mile Post 65)
- 7.4 % Matfield Green Service Area (Mile Post 97)
- 18.8 % Emporia Service Area (Mile Post 132)
- 29.0 % Topeka Service Area (Mile Post 188)
- 16.2 % Lawrence Service Area (Mile Post 209)
- 22.9 % N/A

23. How do you access the internet while on the road? (check all that apply)

- 10.6 % Truck Stop/Rest Area Kiosk
- 3.3 % Hotel/Motel Business Center
- 7.7 % Onboard Communication
- 4.9 % In-cab Information system (e.g. PeopleNet, Qualcomm)
- 30.7 % Laptop in Vehicle
- 42.9 % Smartphone
- 4.6 % Other (please specify) _____

24. KDOT and the KTA are interested in studying the benefits of a real-time truck parking availability system. Please rank order (1-6) your preferred method for receiving real-time parking availability information, with 1 being the MOST preferred:

(Results are in Percentages)

Method	Rank (1-6)					
	1	2	3	4	5	6
Onboard Communications/Computer System	7.6	10.5	17.5	15.9	25.6	22.9
Internet/Website Information	6.0	26.5	26.5	23.6	12.9	4.5

Roadside Changeable Message Signs	39.1	22.0	19.1	12.4	5.3	2.2
Dispatcher Contact	2.5	3.8	7.2	11.9	22.6	52.1
511 System	5.5	16.6	19.4	20.1	21.5	16.9
Smartphone Application	51.9	19.8	9.0	6.5	5.3	7.5

25. Please indicate how much in advance you would like to receive information about available parking spots. (check all that apply)

- 12.6 % No specific distance from parking location given
- 9.6 % At the exit
- 4.1 % ½ mile away
- 12.2 % 1 mile away
- 20.2 % 5 miles away
- 16.0 % 10 miles away
- 25.4 % 20 miles away
- 4.3 % Other: _____

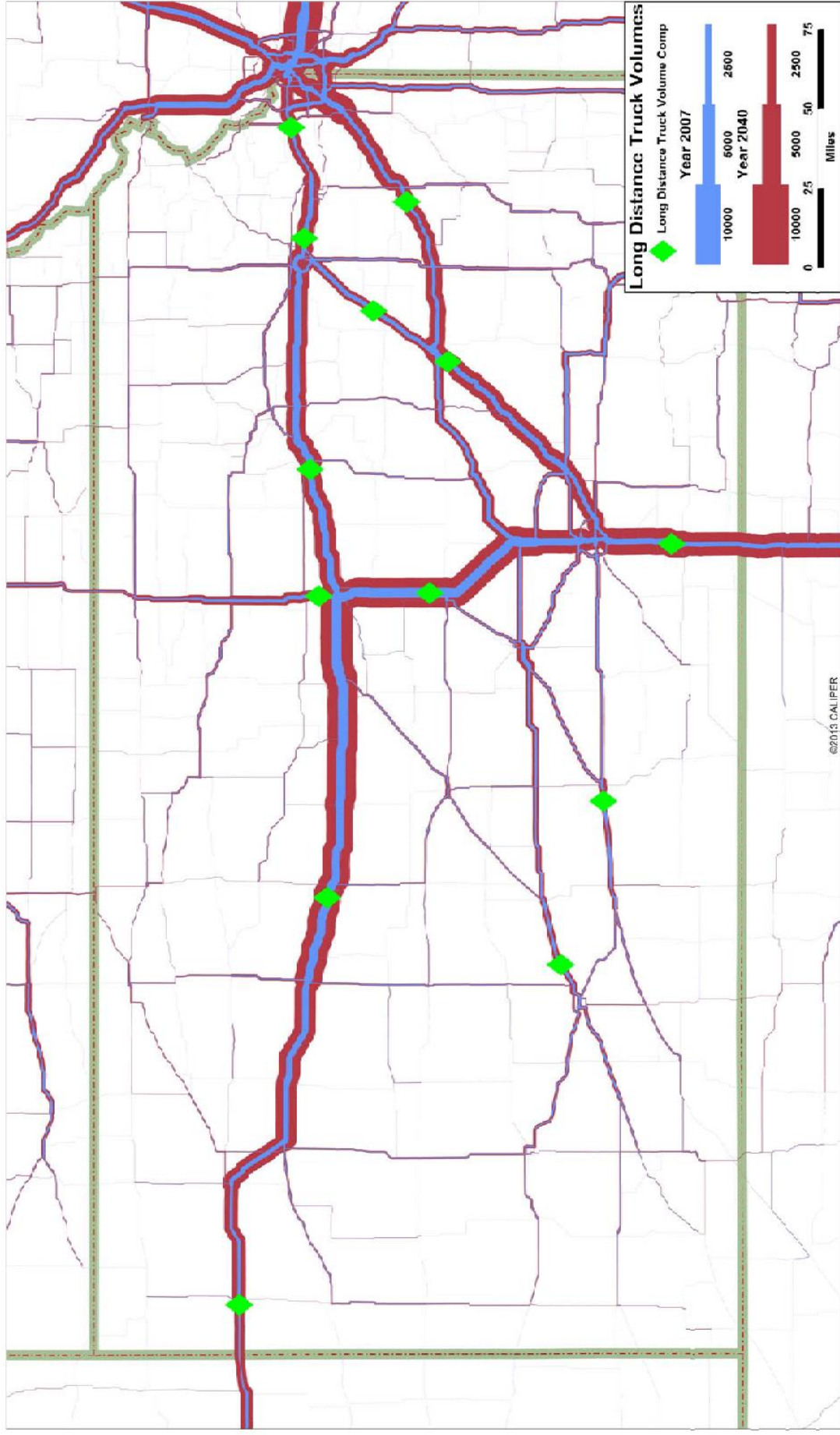
26. When traveling through Kansas, would you like the ability to reserve a parking spot?

- 0.0 % Yes
- 63.4 % No
- 36.6 % If yes, how much, if any, would you be willing to pay to have a guaranteed reservation? _____

27. Do you have any additional thoughts on finding safe and legal parking in Kansas?

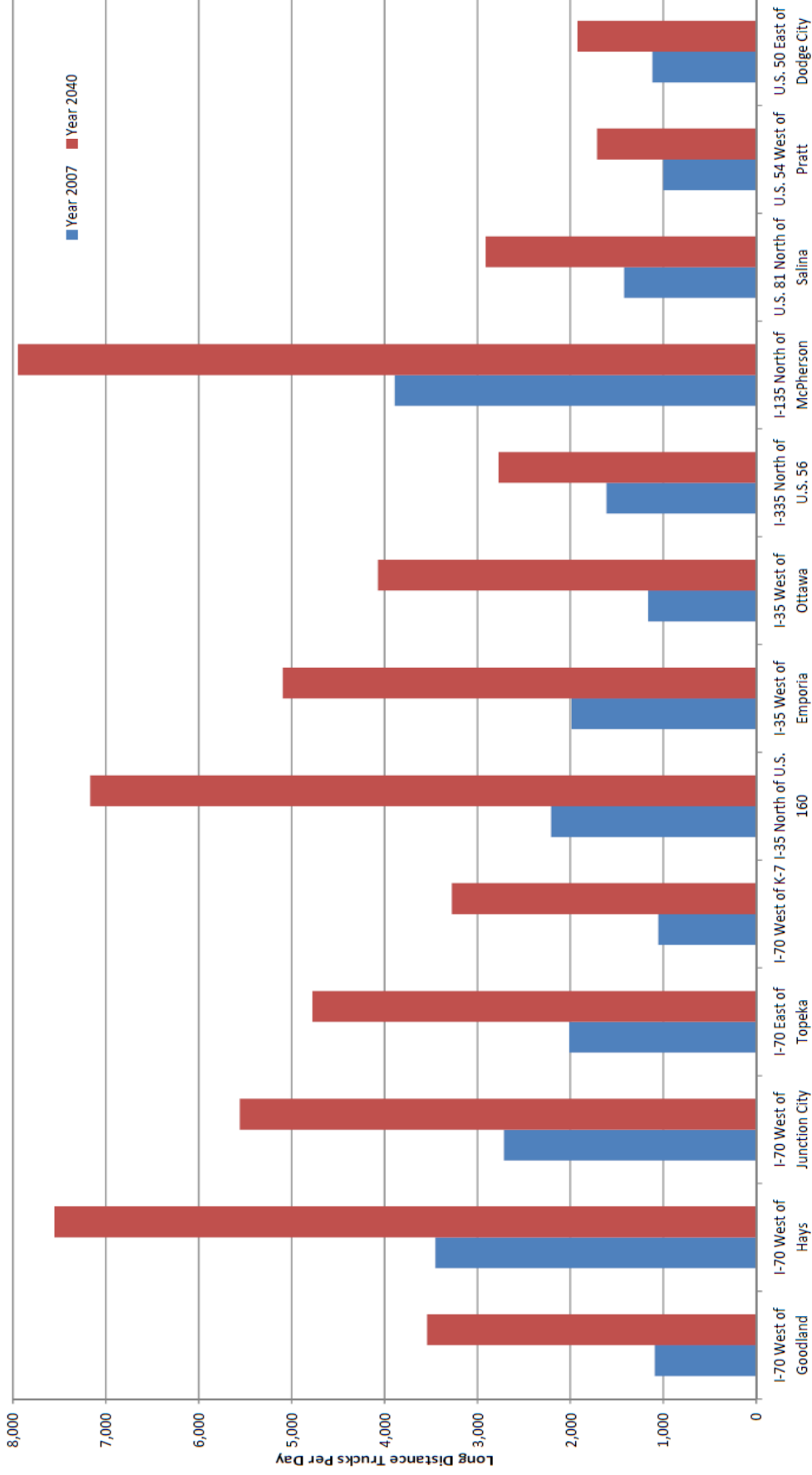
***American Transportation
Research Institute
Truck and Parking Movements***

Kansas Long Distance Truck Volumes



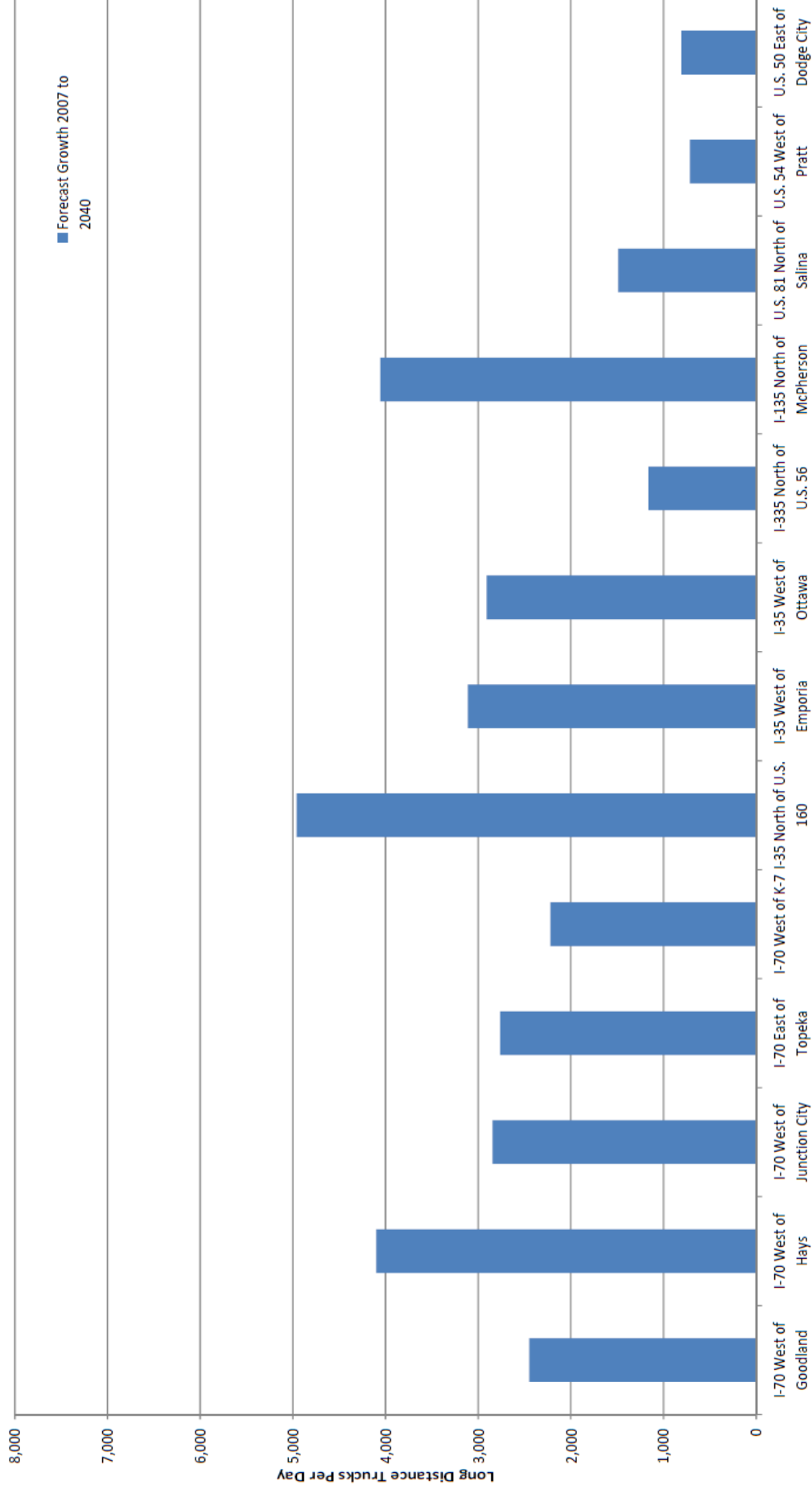
* Long distance (> 50 miles) truck volumes estimated based on Freight Analysis Framework 3.4 origin-destination truck tonnage including empty trucks.

Kansas Truck Volume Growth (2007 - 2040)



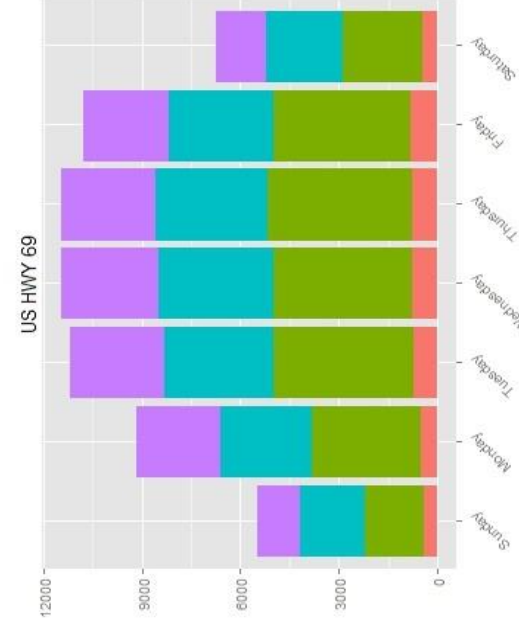
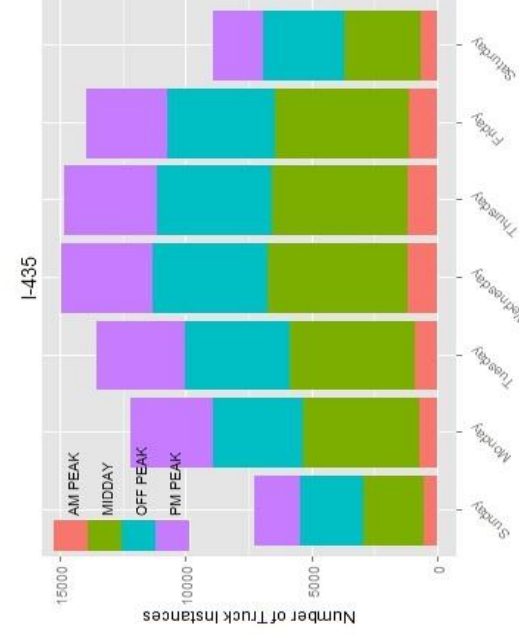
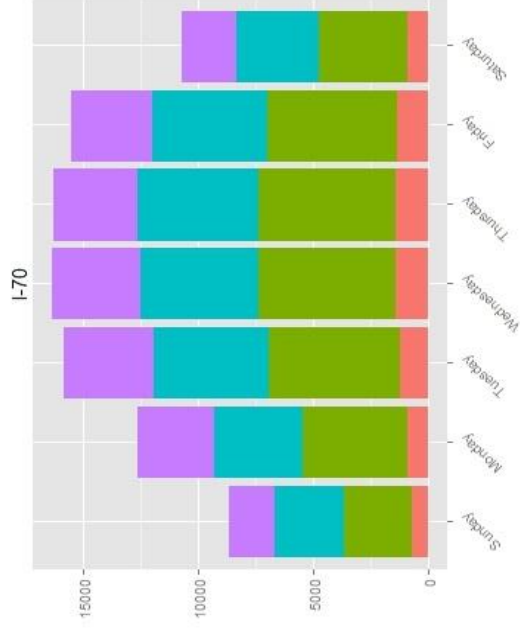
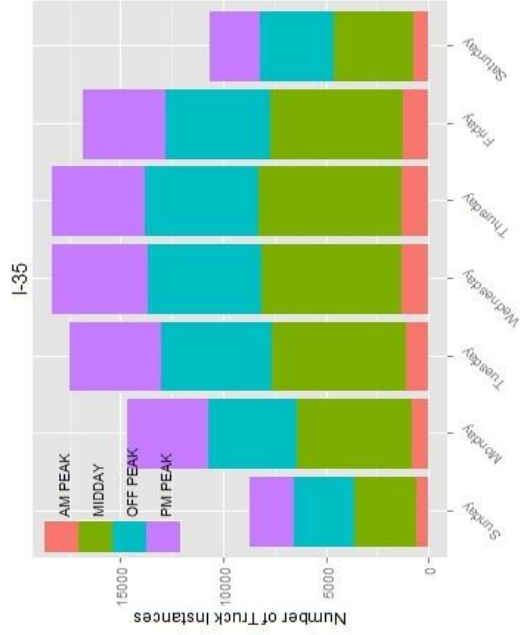
* Long distance (> 50 miles) truck volumes estimated based on Freight Analysis Framework 3.4 origin-

Kansas Truck Volume Growth (2007 - 2040)



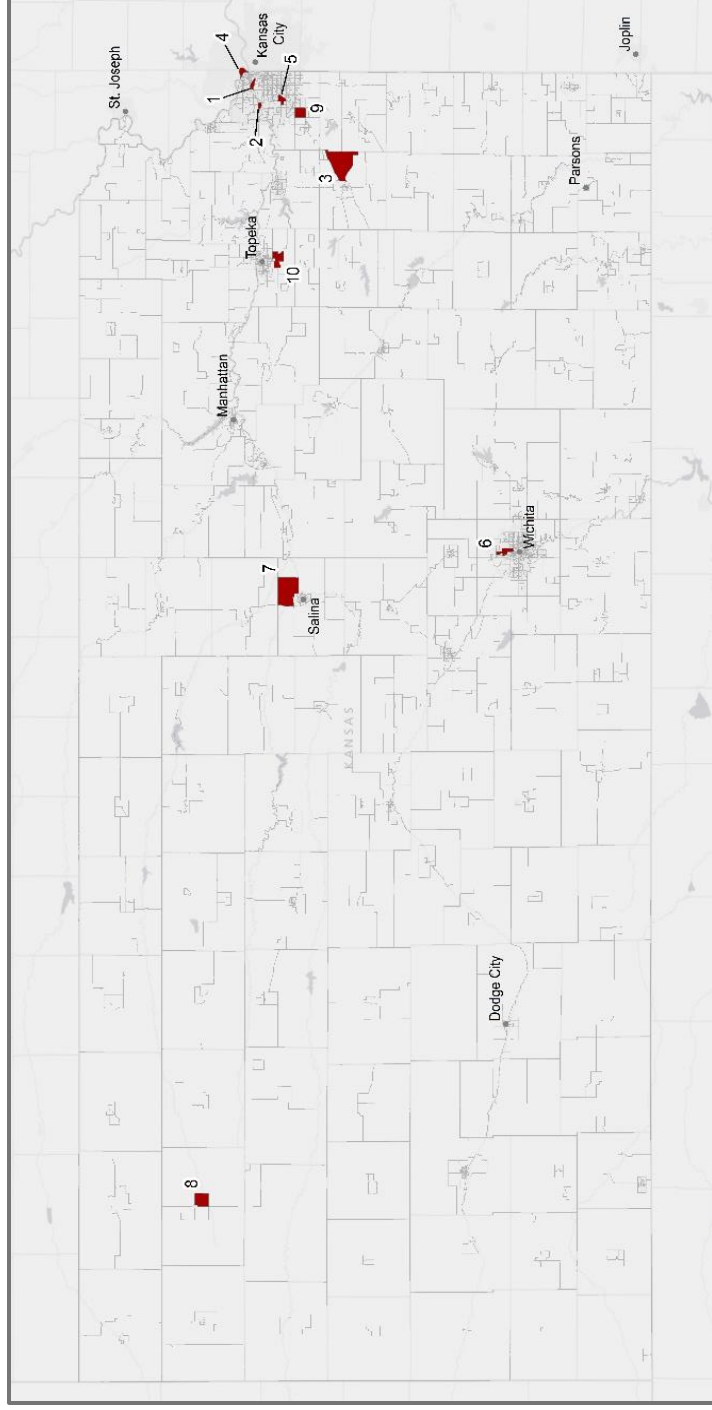
* Long distance (> 50 miles) truck volumes estimated based on Freight Analysis Framework 3.4 origin-

Kansas Top Truck Corridors (Time of Day and Day of Week)



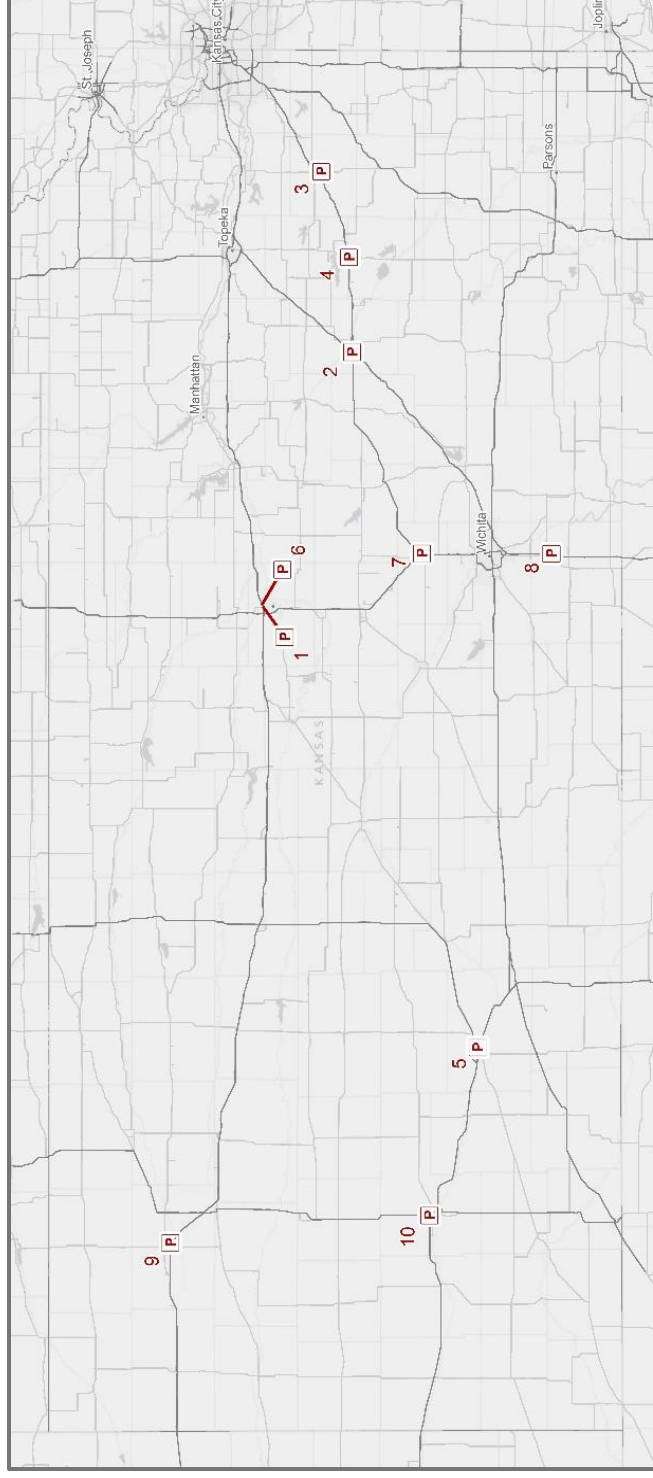
Kansas Top 10 Census Block Group Destinations

Rank	Number of Stops
1	3,399
2	3,274
3	1,829
4	1,737
5	1,467
6	1,055
7	1,041
8	869
9	807
10	806



Kansas Top Parking Locations (Average Stop Time & Relative Volume)

Parking Rank	Average Time Stopped (hours)	Frequency (per 1000 trucks)	Public vs. Private Facility
1	12.39	136	Private
2	12.78	125	Private
3	12.39	111	Private
4	11.75	106	Private
5	12.96	100	Private
6	12.17	96	Private
7	12.23	84	Private
8	11.04	82	Public
9	11.67	80	Private
10	13.40	79	Private



Discussion Draft - Initial Strategies for Improving Truck Parking on the Kansas Statewide Freight Network

<u>Strategies</u>	<u>Tactic 1</u>	<u>Tactic 2</u>	<u>Tactic 3</u>	<u>Tactic 4</u>	<u>Tactic 5</u>	<u>Tactic 6</u>	<u>Tactic 7</u>
Strategy 1 Maximize the use and efficiency of existing parking assets.	Provide drivers with truck parking map, parking guide and related information at credentialing, through informational campaign and other mechanisms.	Place static signing at parking areas (entrances and exits) showing other nearby parking options if lot is full.	Place signs on public right of way showing distance and direction to private parking facilities.	Install dynamic signing to promote location and parking capacity and availability at nearby public or private lots.	Implement real-time system to monitor public truck parking availability and disseminate availability information through roadside signs and on-line mechanisms.	Plan on parking layout improvements to boost parking ease and efficiency as part of facility maintenance and rehabilitation planning.	Restripe rest areas for additional truck parking.
Strategy 2 Add or improve parking access, capacity and amenities.	Build more lots in areas where significant over-utilization or illegal parking occurs.	Add capacity at lots in areas where significant over-utilization occurs.	Identify KDOT/KTA facilities and ROW that can be repurposed for parking areas; develop plan and funding for repurposing.	Improve interchange geometrics where current conditions dissuade drivers from leaving highway/ramps to seek nearby parking areas.	Develop plan for better accommodating overweight, oversize vehicles in current or future parking facilities.	Allow expanded overnight truck parking in selected KDOT or KTA rest and services areas.	
Strategy 3 Strengthen parking safety and security	Place signage at high-density ramp parking areas directing truckers to nearby formal parking facilities.	Work with Highway Patrol and others to clarify ramp parking enforcement and communicate results to trucking community.	Establish consultation program involving Highway Patrol, other agencies and truckers to identify and address enforcement issues that may affect parking decisions.	Collaborate with Dept. of Commerce, other state agencies, to create aid or micro-loan programs to assist small towns in building secure parking areas for resident truck drivers.	Partner with Dept. of Commerce, Division of the Budget and Kansas Dept. of Revenue to develop tax incentives for improving parking facilities' security (CCTVs, fencing, patrols, other).	Work with local communities to adopt regulations requiring secure truck parking for industrial/warehouse development similar to car parking requirements for commercial developments.	
Strategy 4 Create partnerships that improve and expand parking offerings and choices	Generate and share information real-time parking information for use in KDOT/KTA platforms, 511, driver-focused applications and with fleet management systems.	Convert parking inventory in map layer and provide to Google, Apple and other mapping applications as a layer in their mapping service.	Work with major distribution centers to better coordinate policies for scheduling truck arrivals combined with opening their yards to truck parking to alleviate area parking issues.	Develop and implement a P3 program for building and maintaining private lots using a combination of public and private funding, maintenance and risk sharing.	Develop policies and processes for selling advertising, marketing and branding rights for lots, signage and amenities.	Partner with the Department of Commerce's Travel & Tourism Division to incorporate truck parking areas in new tourist information sites.	Create "Parking Liaison" role in KDOT to find partners and solutions for locally specific truck parking issues.
Strategy 5 Implement policy changes that increases economic impact of freight truck activity and related parking usage	Collaborate with the Dept. of Commerce, Division of the Budget, Kansas Dept. of Revenue and others to develop tax incentives for private investments in new or expanded parking facilities.	Collaborate regionally on coordinating corridor-specific truck freight and truck parking policies and regulations to increase truck routing through Kansas.	Collaborate regionally on putting Kansas freight parking signage in other states (and vice versa) where initial truck routing and parking decisions are made.	Review and eliminate legislative/regulatory barriers to regional harmonization.	Partner with Dept. of Commerce, Division of the Budget, Kansas Dept. of Revenue and others to develop tax incentives for locating distribution centers and other generators of large truck freight volumes in Kansas.	Develop urban land bank options for creating opportunities to aggregate blighted land for added urban truck parking.	Engage Kansas Congressional Delegation in advocating for federal aid program for dealing with truck parking impacts on rural/small town areas.

LEGEND

Bold Face Statewide application
 Non-bold face Site-specific application



MEETING DATE: August 6, 2015

PROJECT: Kansas Statewide Freight Network Truck Parking Plan

MEETING TOPIC: Kansas Freight Parking Advisory Panel Summary

NOTES TAKEN BY: HNTB

ATTENDEES:

- Kansas Truck Parking Advisory Panel
- KDOT
- KTA
- HNTB Corporation

MEETING SUMMARY

The second Advisory Panel meeting was held for the Kansas Statewide Freight Network Parking Plan on August 6, 2015 at the Eisenhower State Office Building in Topeka. The purpose of the meeting was to get input from key Kansas truck freight stakeholders on potential strategies and tactics for addressing truck parking needs and issues in Kansas. Additionally, the meeting focused on getting the panel's feedback on prioritizing strategies and tactics for further refinement and selection of preferred parking solutions for Kansas as the study moves forward.

The meeting focused on the following key agenda items:

1. Welcome and meeting overview
2. Progress update
3. Key strategy/tactic packages
4. Prioritize key strategy/tactics packages
5. Open discussion and next steps

Welcome and Meeting Overview

The meeting was initiated with a welcome by Secretary Mike King and introductions by members of the advisory panel. The Secretary provided an overview of the meeting purpose and goals and thanked the panel for participating in the process. He also noted that this process feeds well into other current multimodal freight transportation initiatives within the state, including the Transload Facility.

Sec. King asked about what role the changes to hours of service requirements had on truck parking. Matt Junak with HNTB responded that the key change is truckers are required to break for 11 consecutive hours. Because these break hours cannot be broken up truck drivers often drive until they are out of hours then need to find the nearest place to park.

Progress Update

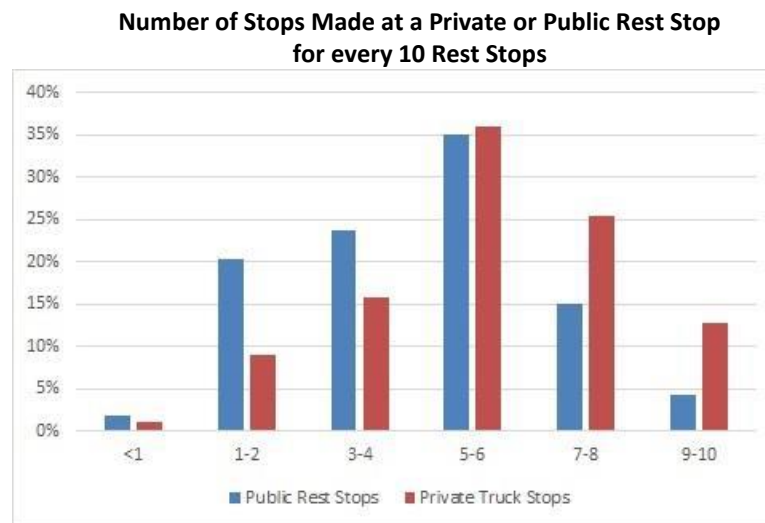
Gretchen Ivy, HNTB, led the advisory panel through a progress update of the Kansas Statewide Freight Network Parking Plan since the Advisory Panel last met in April. Below is a summary of the panel discussion:

- The first meeting outlined truck parking needs and issues. This meeting focuses on a review of ATRI truck driver survey results, existing and future freight flows in Kansas, and the draft strategies and tactics to address those needs and issues.
- Truck parking needs are summarized in the Task 1 Summary Report. This report also summarizes the field inventory of truck parking facilities, peer interviews with DOTs and a literature review that identifies best practices from similar truck parking studies and initiatives around the country. A Task 1 summary handout was distributed as part of the meeting materials.
- As part of Task 1, the American Transportation Research Institute (ATRI) developed and administered a truck driver survey to assess truck parking perspectives, trends and capacity issues in the state of Kansas. A handout of the survey findings was distributed with the meeting materials. The survey was distributed to carriers that operate in and around the state of Kansas. In addition, the Owner Operator Independent Drivers Association (OOIDA) distributed the survey directly to drivers on behalf of ATRI.

The survey had over 750 fully completed responses. The survey questions had two audiences: those looking for amenities while they have their hours of service (HOS) breaks, and those looking for parking after they have reached their maximum hours of service. These audiences are often divided along generational lines. In addition, the survey found that hours of service requirements influenced the decisions on truck parking needs, issues and preferences more than any other factor. Initial survey findings discussed during the meeting include:

- Approximately 68 percent of truck drivers take between 30 to 60 minutes on average to find parking. This costs the driver time and money. It also has environmental impacts on emissions. John Maddox, KDOT, asked if costs in extra fuel or emissions could be calculated to determine the benefits of a truck parking information system. Matt Junak noted that this was calculated as part of the Benefit-Cost Analysis for the MAASTO TIGER Grant application and would be done for the parking plan preferred parking strategies as well.
- Several panel members were interested in knowing if the survey reflected Kansas vs. national parking conditions and trends. A question was asked about if there were any survey results that were surprising or outside industry norms. Gretchen Ivy noted that ATRI was somewhat surprised by the low percentage of less-than-truckload (4.6%) respondents. Typically similar surveys have respondents in the range of 20%. Panel members noted that these are local trips and would have less need for truck parking and may not have seen the survey as applicable to them. The larger percentage of truckload respondents tie in well with users that have truck parking needs.

- It was noted that Question #13, which asked about utilization of public vs. private rest stops was confusing and should be further explained or clarified in the summary. ATRI is clarifying the responses to this survey question within their final summary document. Additionally, the figure below clarifies the breakdown between public and private rest stops usage per number of rest stops. When looking at just public and private rest stops individually, survey respondents indicated the utilization of private truck stops more often than public rest stops (Question #12). However, private rest stops are more likely to be a challenge to find available truck parking. The results in the figure are very similar to national survey results collected by ATRI from a truck parking survey conducted at the Mid-America Truck Show in March 2015 that yielded over 1,400 participants.



- A question was asked about what other types of truck sizes were included in the “other” category on Question #8. Gretchen Ivy noted that livestock and hopper trucks were the top types mentioned.
- It was noted by Mike Matousek of OOIDA that their Michigan drivers found the real-time truck parking information referred to in Question #24 helpful when making decision on parking. Mike also mentioned that the more information that can be provided on specific parking locations, number of spaces and amenities/convenience services on real-time truck parking information boards, the more effective truck drivers would find a truck parking information system and signage.
- ATRI is also in the process of collecting and analyzing data on truck freight flows and parking for the Kansas Primary and Secondary Freight Network. A handout was provided on the initial findings related to truck freight flows, seasonality of flows and parking usage as a result of ATRI’s analysis. Some of the key discussion items included the following:

- Findings were shared on the top trucking destinations in Kansas. Five (5) of the top 10 trucking destinations were within the Kansas City metropolitan area. This includes the BNSF Intermodal and Logistics Park in the Gardner area. It was noted that #3 is a large Wal-Mart distribution facility outside of Ottawa. Other key destinations included Salina, northern Wichita, Garden City and Topeka. Some panelists were surprised that Wichita and Topeka were not higher on the list with more destinations in the top 10 findings.
- Findings were shared on the top truck parking locations in Kansas. The top 10 truck parking locations were surprisingly not on the fringes of large metropolitan areas in Kansas City and Wichita, but were identified at intersections along the major freight corridors within the state, such as at Salina, Emporia, Dodge City, and Garden City. Tom Whitaker with the Kansas Motor Carriers Association noted that some truck drivers prefer not to park in some urban areas due to safety concerns. Other key locations included along the I-35 corridor between Kansas City and Emporia, and south of Wichita.
- Joel Skelley with KDOT asked about the use of the GIS data and mapping to determine parking priorities. Specifically, where are there gaps (areas not served by truck stops or private businesses) and what amenities need to be provided. Joel also asked how the private industry determined the need and location for future truck stops. Tom Palace said that the key site selection criterion is Average Daily Traffic (ADT) count. It was noted that the GIS parking inventory, usage and capacity data collected in Task 1 would be utilized to help identify where best to locate new or improved parking facilities as the study moves forward with the selection of parking improvement strategies.

Key Strategy/Tactic Packages

The overview of the key strategies and tactics being considered to improve truck parking in Kansas was led by Michael DeMent and Brian Comer, HNTB. A handout matrix showing the potential truck parking strategies and tactics was provided with the meeting materials. Below is a summary of the panel discussion related to the key strategies and tactic packages:

- Michael DeMent acknowledged that based on the Task 1 summary results, peer interviews, the literature review and initial ATRI survey results, it was apparent that there is no silver bullet to address truck parking needs. A multi-tiered approach is needed to address the diverse parking needs of different truck parking users. This was the approach used by the study team to develop the potential truck parking improvement strategies.
- The strategies and tactics are organized in a matrix. Five broad strategies were identified with a number of corresponding tactics. The tactics increased in complexity of coordination needs and resources moving from left to right.
- Strategy 1: Maximize the use and efficiency of existing parking assets.
 - It was noted that the MAASTO TIGER Grant, if successful, would help fund truck parking information and signage in eight states. This could include

technology similar to the Michigan I-94 example with real-time parking information. Chris Herrick with KDOT noted that the MAASTO TIGER Grant application could be provided to members of the panel. It was suggested that a copy of the MAASTO TIGER Grant application be included in the report appendix.

- Mike Matousek with OOIDA noted that initial feedback from the I-94 Michigan truck parking information system was very positive and had helped drivers make better parking decisions. Feedback or suggestions for improvement of the system were 1) it did not necessarily add new truck parking capacity, 2) the system did not provide specific information on which truck stop had the available parking, and 3) the signage did not provide enough detail on how much parking was available. For example, the sign would have an exit number with a corresponding parking count of low rather than a specific number.
- There were some questions from the panel about how truck parking information would be shown on the signs. Would this include specific number of spots by number or general information such as low?
- Tom Palace with the Petroleum Marketers and Convenience Store Association of Kansas indicated that there is a concern with showing low or full. Additionally, there were questions about who would be included and how specific to get with the destinations. Would this include specific truck stops or an exit number (like the Michigan example)? Competition between businesses was noted as an influence on truck parking signage and what level of information it should provide.
- Mike Matousek from OOIDA noted a lot of factors go into truck driver's considerations of where to park including the specific fuel card the truck stop accepts as well as available amenities. As a result, the more specific information the signs can provide, the better for truck drivers.
- It was noted that there are trade-offs to these different approaches and the views between the drivers and the business owners. However, it is clear that the parameters need to be defined by user needs. The system should direct trucks to specific parking locations for driver convenience and benefit. Providing information is ok, however, advertising should be left to private businesses.
- In general, panel members were very supportive of truck parking signage. There was mixed interest in truck parking applications and websites. In most instances, truckers are required to lock their phones in box for liability reasons. Jennifer Szambecki with the KTA noted there is voice to text options for these technologies. Panelists noted that some of the technology utilization fell along generational lines. Some older truckers may still use flip phones or older phones incapable of accessing the internet or receiving data.
- Jennifer Szambecki asked the panel how they would like to receive parking information – would some truck drivers use web-based information, smart phone applications or would some still prefer something printed. Tom

Whitaker noted that some truckers still use the road atlas while others find what they need with Garmin and other GPS systems. Disseminating parking information via multiple platforms was seen as key to reaching all audiences.

- Strategy 2: Add or improve parking access, capacity and amenities.
 - It was noted that the Task 1 truck parking inventory, which included an evaluation of truck parking capacity and utilization would be used as a base for establishing where to improve parking access and capacity on the Kansas Freight Network.
 - Michael DeMent noted during the peer review there were numerous examples where DOTs utilized excess right-of-way or repurposed underutilized or vacant state facilities for parking, such as vacant rest areas and weigh stations. John Maddox with KDOT noted that this is something that Missouri does along their freight corridors. It was discussed that these sites may not need to incorporate amenities, but just provide basic parking needs. That way, they offer excess available parking but do not compete with private businesses.
- Strategy 3: Strengthen parking safety and security.
 - In general, parking locations throughout Kansas were considered by panel members to be safe.
 - For longer-combination vehicles, the dropping and transferring of loads was discussed related to security and safety. However, it was noted that trucks do not typically leave their loads in truck parking lots for extended periods of time so overnight safety of loads is not a great concern.
 - Capt. Chris Turner with the State Highway Patrol noted that the weigh stations are not typically used for truck parking even though they have available parking capacity. Other panel members agreed that their drivers typically do not park at weigh stations. Legally, the State Highway Patrol cannot agree not to inspect trucks parking in these areas. However, trucks that choose to park there are not be targeted during their break periods. One benefit the State Highway Patrol noted they could provide at weigh stations is increased patrols to address safety and security. Mike Matousek of OOIDA noted that most truck drivers will still likely avoid parking at weigh stations.
- Strategy 4: Create partnerships that improve and expand parking offerings and choices.
 - Tom Palace with the Petroleum Marketers and Convenience Store Association of Kansas noted that the petroleum marketers and convenience store operators may be willing to partner with the state on shared lots. This could include excess state-owned right-of-way near truck stops or private facilities. It was noted that for the truck stop operator, the return on truck parking investment is very low; therefore, they tend not to overbuild truck parking. A partnership could include agreements between the state and

- private operator where the state provides the land and potentially parking lot which would be maintained by the private operator.
- Mike Matousek from OOIDA noted that New York State was currently evaluating incentives to provide truck parking.
- Strategy 5: Implement policy changes that increases economic impact of freight truck activity and related parking usage.
 - Hours of service regulations were viewed as the key policy that influenced truck parking decisions and behaviors.
 - It was noted that truck distribution facilities do not provide parking or staging due to liability concerns. Therefore, they typically provide specific timetables to drivers for arrival, pickups, drop-offs and departures.
 - Brian Comer from HNTB noted that local governments could consider amending their regulations to require that truck parking and staging needs be addressed for new warehouse and distribution facilities. Often, traffic impacts are assessed with these facilities, however, temporary truck parking needs are not considered.
 - The panel also acknowledged the need for safe and secure truck parking in small communities and rural areas. Many local towns do not allow truck parking within the city limits.

Prioritize Key Strategy/Tactics Packages for Refinement

Michael DeMent from HNTB led an exercise to get the panel's feedback on prioritizing strategies and tactics for further refinement and selection of preferred parking solutions for Kansas as the study moves forward.

- Michael asked the panel to prioritize the strategies and tactics. Each member of the panel was provide a green dot for their highest priority, yellow dot for the next highest priority and a red dot for a Strategy/Tactic that they thought should not be pursued. The results of the prioritization exercise are attached for reference to the meeting minutes.
- Chris Herrick with KDOT noted that it is important to define what value these strategies provide, specifically in addressing 1) safety, 2) commerce and economic development potential, and 3) efficiency.






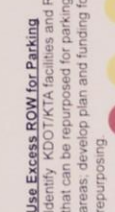







Open Discussion and Next Steps

The advisory panel meeting ended with a discussion of next steps and open discussion with the panel members led by Gretchen Ivy from HNTB. It was highlighted that the key next steps for the study included the following activities:

- Finalize the analysis of truck freight flows on Kansas Primary and Secondary Freight Network using ATRI GPS data to better understand truck origins, destinations and parking influences. (spring/summer complete; harvest and holiday results underway)

- Evaluate and screen the initial range of potential truck parking solutions to the preferred strategy package for the project. Input received from panel on strategy and tactic priorities will be used as a part of the screening.
- Develop costs and perform the economic benefits analysis of the preferred strategy package.
- Follow up with truck advisory panel in the fall to share the findings of the truck parking plan and get feedback on the preferred strategy package for improving truck parking in Kansas.

Kansas Truck Parking Plan: Initial Strategies Matrix Prioritization Exercise

Strategies	Tactic 1	Tactic 2	Tactic 3	Tactic 4	Tactic 5
<p>Strategy 1: Improve Parking Information Sharing</p>	<p>Create/Distribute Truck Parking Guides Provide drivers with truck parking map, parking guide and related information at credentialing, through informational campaign and other mechanisms. Distribute in paper and electronic versions (apps, website, 511, etc.)</p> 	<p>Post Parking Info Via Multiple Signage Place static parking signage at driver decision points (highway junctions, exits, parking areas) showing nearby parking options.</p> 	<p>Offer Real-Time Dynamic Parking Information Provide real-time dynamic parking information regarding public and private truck parking availability through electronic signage and on-line mechanisms.</p> 		
<p>Strategy 2: Add or Improve Parking Assets</p>	<p>Expand Parking Lot Numbers and Capacity Improve parking layouts to boost parking efficiency as part of facility maintenance and rehabilitation planning. Restripe rest areas for additional truck parking. Add capacity at existing lots. Build more lots in areas where significant over-utilization or illegal parking occurs.</p> 	<p>Improve Longer/Larger Vehicle Parking. Develop plans for better accommodating overweight, oversize vehicles in current or future parking facilities.</p> 	<p>Use Excess ROW for Parking Identify KDOT/KTA facilities and ROW that can be repurposed for parking areas; develop plan and funding for repurposing.</p> 	<p>Improve Geometrics for Better Parking Improve interchange geometrics where current conditions dissuade drivers from leaving highway/ramps to seek nearby parking areas.</p> 	
<p>Strategy 3: Create Parking Improvement Partnerships</p>	<p>Partner with Highway Patrol on Parking Work with Highway Patrol and others to clarify ramp parking enforcement and communicate results to trucking community. Establish consultation program involving Highway Patrol, other agencies and truckers to identify and address enforcement issues that may affect parking decisions.</p>	<p>Work with Agencies to Expand Parking Partner with other state agencies to open existing facilities to truck parking or expand acceptable truck parking opportunities at peak hours.</p> 	<p>Sell Banding Rights to Fund Parking Develop policies and processes for selling advertising, marketing and branding rights for lots, signage and amenities to fund improvements.</p>	<p>Create Regional Truck Parking Policies Collaborate regionally on coordinating corridor-specific truck freight and truck parking policies and regulations to increase truck routing through Kansas.</p>	<p>Expand Parking Via P3s Develop and implement a P3 program for building and maintaining private lots using a combination of public and private funding, maintenance and risk sharing.</p> 
<p>Strategy 4: Develop Pro-Parking Policies for Freight Trucks</p>	<p>Develop Pro-Freight Truck Tax Policies Partner with Dept. of Commerce, Division of the Budget, Kansas Dept. of Revenue and others to develop tax incentives for locating distribution centers and other generators of large truck freight volumes in Kansas. Collaborate to develop tax incentives for private investments in new or expanded parking facilities.</p> 	<p>Develop Integrated Local Parking Policies Work with local communities to adopt regulations requiring secure truck parking for industrial/warehouse development similar to car parking requirements for commercial developments.</p> 	<p>Coordinate Delivery Policies/Parking Work with major distribution centers to better coordinate policies for scheduling truck arrivals combined with opening their yards to truck parking to alleviate area parking issues.</p> 	<p>Create Frisight Parking Liaison Create "Parking Liaison" role in KDOT to find partners and solutions for locally specific truck parking issues.</p> 	



CHAPTER 3: APPENDICES

Appendix 3.A: Kansas Freight Operations Analysis

Appendix 3.B: MAASTO Tiger Grant 2015

American Transportation Research Institute
Atlanta, GA

November 06, 2015



INTRODUCTION

The American Transportation Research Institute (ATRI) was tasked by the Kansas Department of Transportation (KDOT) to analyze the state's freight truck operations. In order to accomplish this task ATRI's unique and proprietary truck GPS dataset was used to better understand freight truck operational patterns and their potential impacts on Kansas truck parking demands and needs. Additionally, the analysis provides insight regarding the location of key freight generators within the state.

DATASET

ATRI's Freight Performance Measures (FPM) database was utilized to analyze Kansas freight generators, truck movements and parking habits. In response to requests from the study's advisory panel, two consecutive weeks were selected for the analyses from four different periods in the 2014 calendar year: March 1-15; May 1-15; July 16-30; and October 1-15. The intent of selecting a two-week time period in each quarter of 2014 was to take into account potential seasonal variations that might have been missed had the data been collected from one contiguous block of eight weeks.

The ATRI team then captured, processed and analyzed the truck GPS data from the four two-week periods based on:

- Kansas Census Block Groups
- Primary/Secondary Road Names
- Truck Parking Locations (identified in the Task 1 truck parking inventory)

ANALYSIS ONE: KANSAS TRUCKING OPERATIONS – (TASK 2.1.1)

The goal of Analysis One was to identify:

- freight demand/utilization of freight-significant roadways;
- statistics on where trucks entered and exited the state;
- statistics on trucks stopping in Kansas versus trucks passing through Kansas without a stop, and
- statistics on key freight generators within the state.

Freight Demand/Utilization of Freight-Significant Roadways

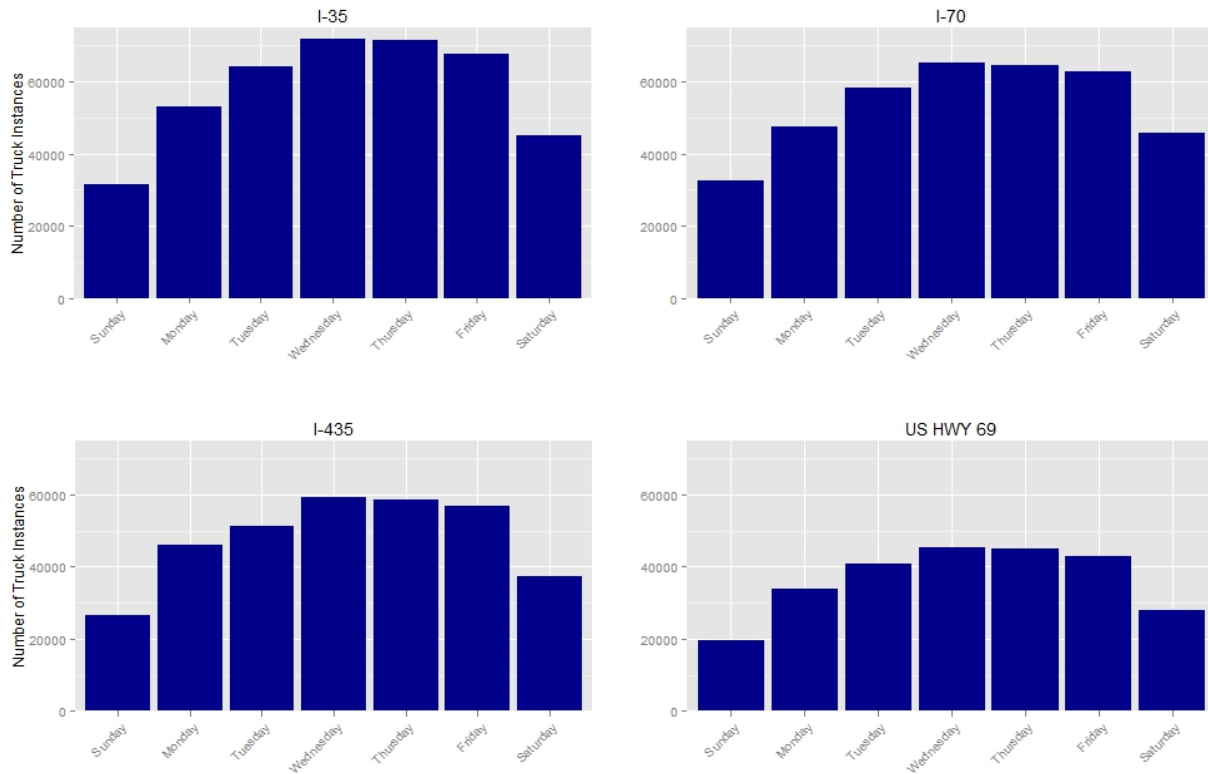
The research team first assessed road utilization in Kansas. To do this, ATRI applied the following analytics to GPS data that fell within the study period for each of the roadways:

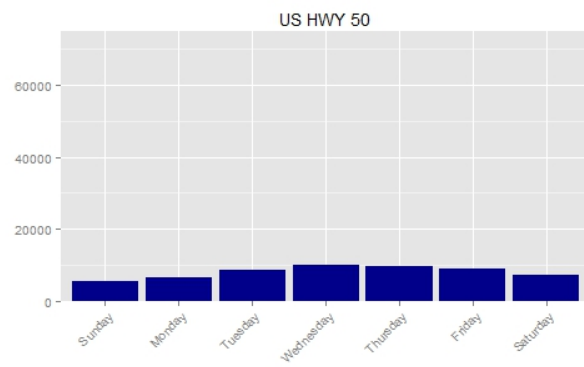
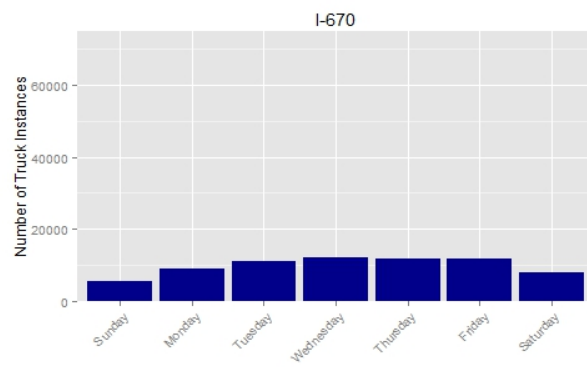
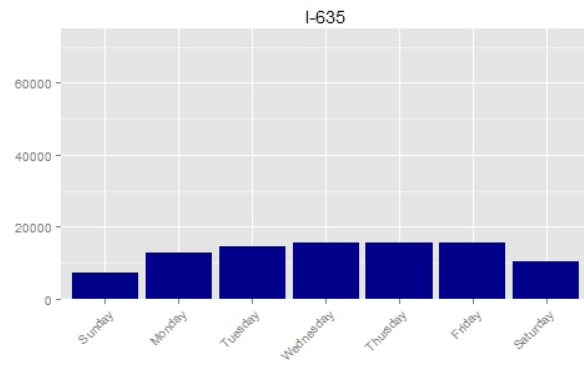
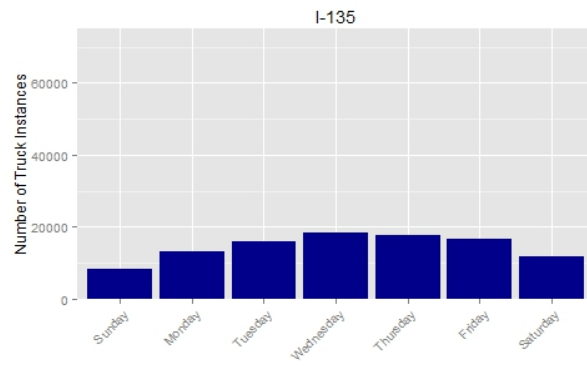
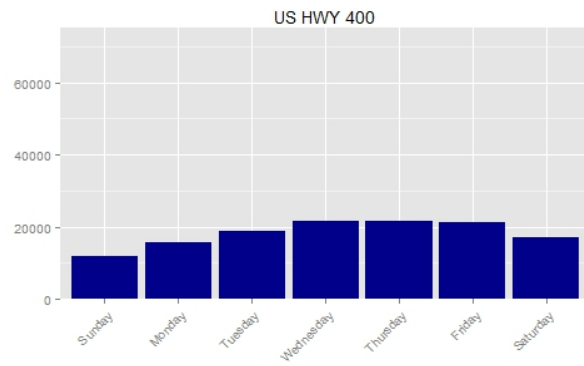
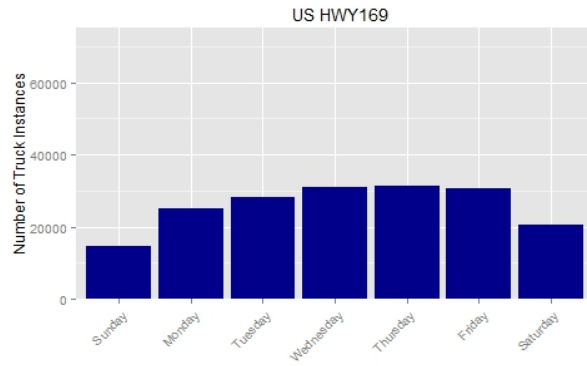
- 1) Truck GPS data points falling along each roadway were identified from the 8 week statewide database, and were compiled in a new database.
-

- 2) Within that database the first instance where a unique truck entered a unique roadway was identified.
- 3) Each instance represented a unique trip on a unique roadway. This approach allowed unique trucks to have multiple trips across the 8-week study period, and each trip was exclusive to a single roadway.
- 4) Truck trip summary statistics were developed for individual roadways by day of week and time of day.

The frequency of trips by weekday was graphed using a static y-axis scale based on the most frequently used road to visually convey the frequency of use for each of the displayed roadways. The frequency of the pings by weekday and time of day was also shown graphically using a stacked histogram with a dynamic y-axis scale to show the detail of the time bins. Figure 1 documents the top-ten utilized roadways and the number of instances a truck accesses each road per day of week during the study period.

Figure 1: Top 10 Kansas Roads Utilized by Trucks by Day of Week



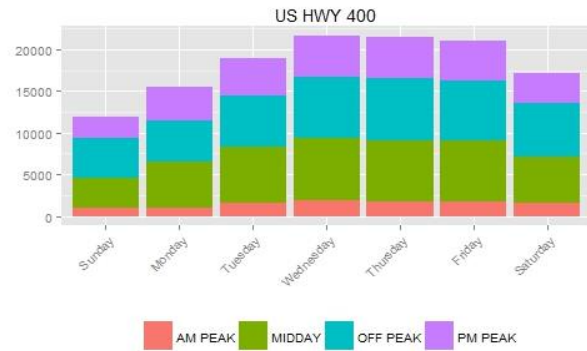
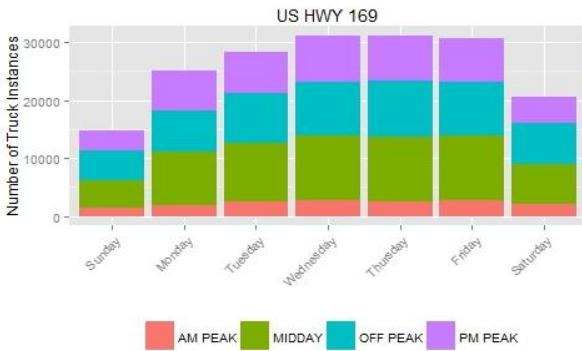
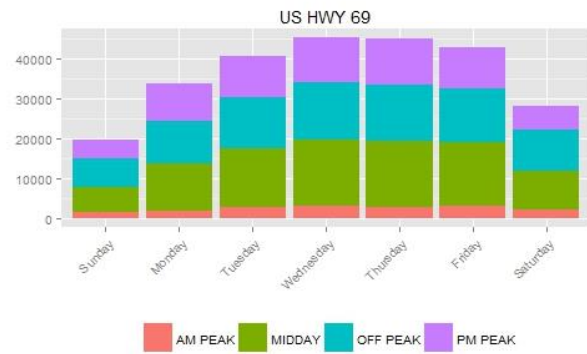
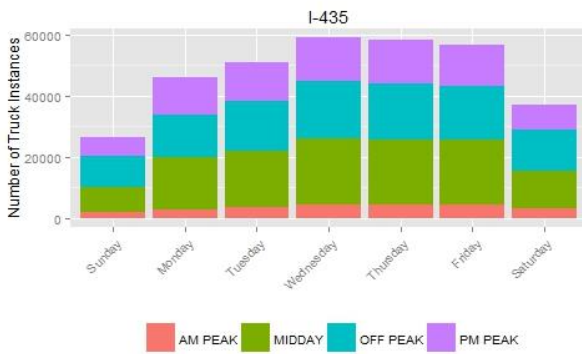
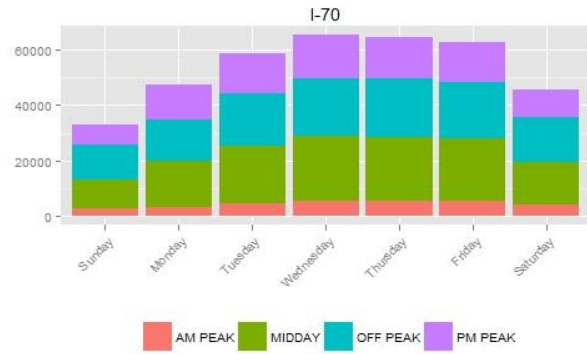
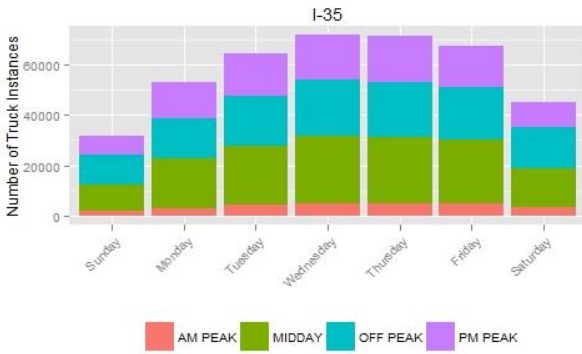


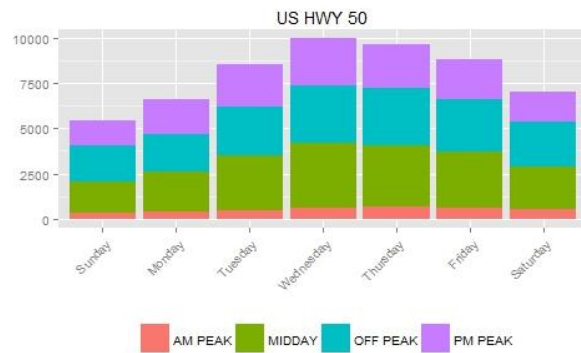
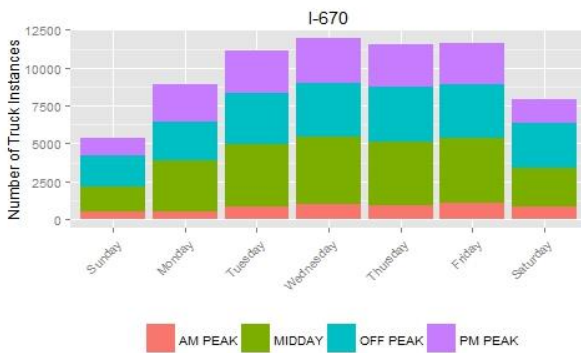
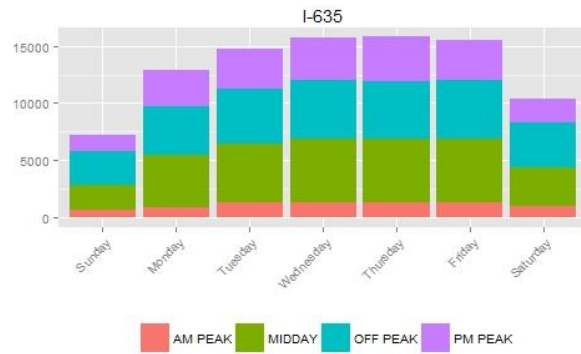
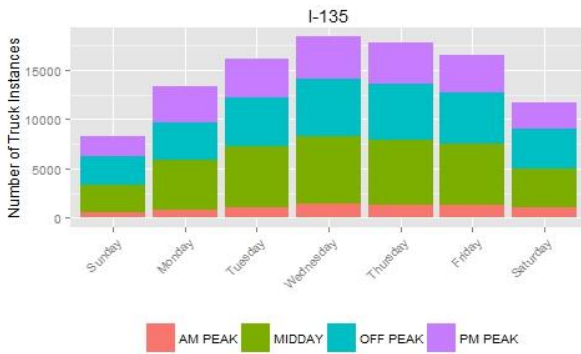
The time of day assessment was conducted next; time-of-day bins were defined as follows:

- 12:00 am – 6:00 am Off Peak
- 6:00 am – 9:30 am AM Peak
- 9:30 am – 5:00 pm Midday
- 5:00 pm – 8:30 pm PM Peak
- 8:30 pm – 12:00 am Off Peak

The top ten accessed roadways, based on the day of week and time of day, are displayed in **Figure 2**.

Figure 2: Top 10 Kansas Roads Utilized by Trucks by Time of Day and Day of Week





Measures for Figures 1 and 2 analyzed by month can be found in **Appendix A**.

Kansas Main Exit/Entrance Locations; Service Stops and Through Trucks

The ATRI team next assessed each designated exit stations for the State of Kansas. There were a total of 15 pre-determined catchment areas leading to major cities or interstates in adjacent states. To identify the number of trucks entering, leaving or simply passing through Kansas, truck GPS data was once again processed and analyzed. Each exit station was assigned an identifying number. The research team defined a service stop to be between 45 minutes and 4 hours. If a truck entered an exit station and then had a stop in Kansas, it was classified as an “incoming” trip. If a truck pinged in Kansas and then stopped in the exit station or buffer area, it was considered to be an “outgoing” trip. Lastly, if a truck pinged in an exit station and then another ping was transmitted in a separate exit station, without a sufficient stop in Kansas, this was classified as a “through” trip. **Figure 3** illustrates the locations of all the exit stations surrounding Kansas:

Figure 3: Exit Stations Surrounding the State of Kansas

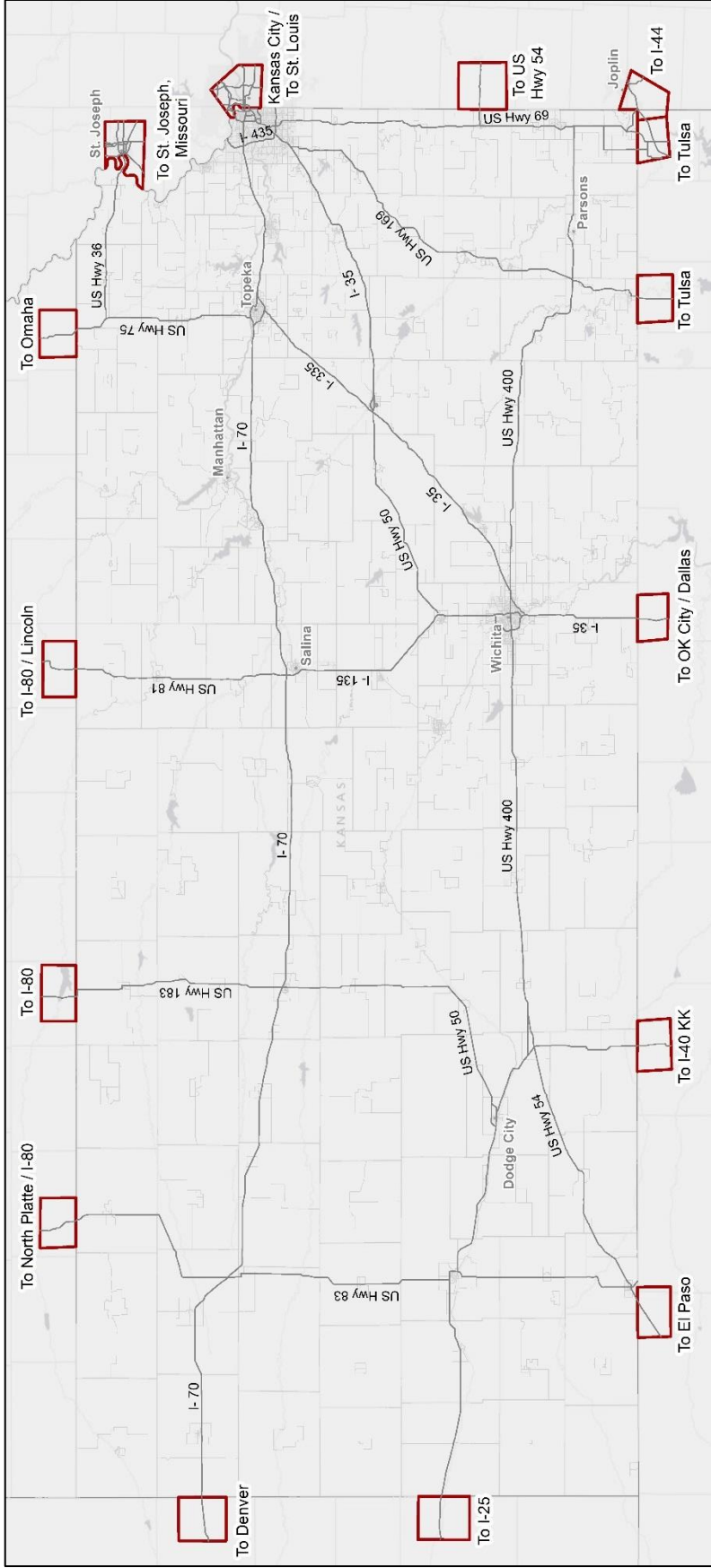


Table 1 offers the results of incoming, outgoing and through trips for each exit station surrounding Kansas. Approximately 57 percent of trips are through trips according to the findings. It should be noted that while through trips do not directly tie to goods movement within the state, apportioned registration fees and fuel taxes are paid to the state by through trucks based on miles driven within Kansas.

Table 1: Exit Station Counts for Full 2014 Sample

All Months Exit Stations Counts

	Road / City Identifier	March, May, July, October 2014			
		Incoming	Outgoing	Through	Total
North	To North Platte / I-80	436	492	424	1,352
	To I-80	500	733	548	1,781
	To I-80 / Lincoln	1,941	2,459	2,699	7,099
	To Omaha	1,266	1,631	1,800	4,697
West					
	To Denver	6,510	8,425	4,861	19,796
	To I-25	1,459	506	705	2,670
South					
	To El Paso	4,143	4,925	3,654	12,722
	To I-40KK	167	222	237	626
	To OK City / Dallas	8,306	10,931	10,089	29,326
	To Tulsa	2,278	2,479	2,686	7,443
	To Tulsa	3,193	3,673	18,208	25,074
	To I-44	6,316	4,474	28,502	39,292
East					
	To US Hwy 54	608	857	681	2,146
	To Kansas City / To St. Louis	34,354	39,088	105,246	178,688
	To St. Joseph, Missouri	7,582	8,805	44,205	60,592
Totals		79,059	89,700	224,545	393,304

Exit station counts for each of the four two-week samples can be found in **Appendix B**.

Key Freight Generators

The ATRI team then analyzed truck trips in relation to the Kansas census block groups. As previously noted, a stop was considered to be between 45 minutes and 4 hours.

Table 2 shows the overall top-ten census block groups and the number of truck starts within those census block groups.

Table 2: Top Ten Census Block Group Origins

Rank	Number of Truck Starts	Town	Possible Origin Reason
1	13,675	Kansas City	Rail/Intermodal Facility
2	13,077	Edwardsville	Multiple Shipping Facilities – including Fedex Freight, Old Dominion, Fastenal
3	7,296	Kansas City	Multiple Shipping/Rail and Industrial Facilities – Including General Motors Assembly Plant, Con-way Freight
4	5,914	Ottawa	Wal-Mart Distribution Center
5	5,384	Lenexa	UPS Facility and JCPenny Distribution Center
6	4,230	Wichita	Rail/Intermodal Facility
7	4,036	Salina	Truck Stops; Near Intermodal Facility
8	3,296	Olathe	Multiple Shipping and Industrial Facilities – including Fedex, Tyson Food Distribution
9	3,230	Colby	Industrial Facilities
10	3,029	Emporia	Multiple Shipping/Rail/Intermodal and Industrial Facilities – including Tyson Meats

Figure 4 displays the geographical location of each of the top ten census block groups, labeled by their corresponding rank number. Census block counts for each of the four two-week samples can be found in Appendix C. Additionally **Figure 5 and 6** show the density of freight origins and destinations by location.

Figure 4: Top Ten Census Block Origins

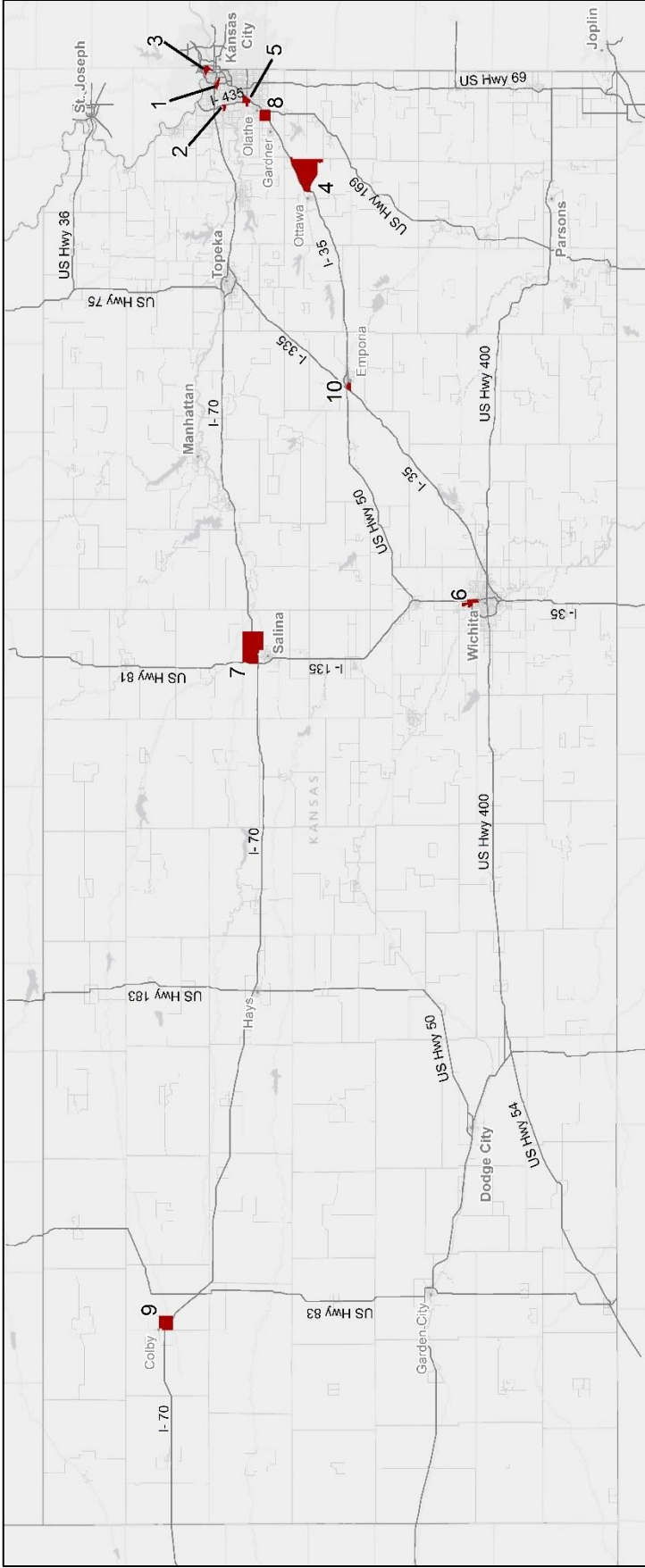


Figure 5: Trip Origins Scale

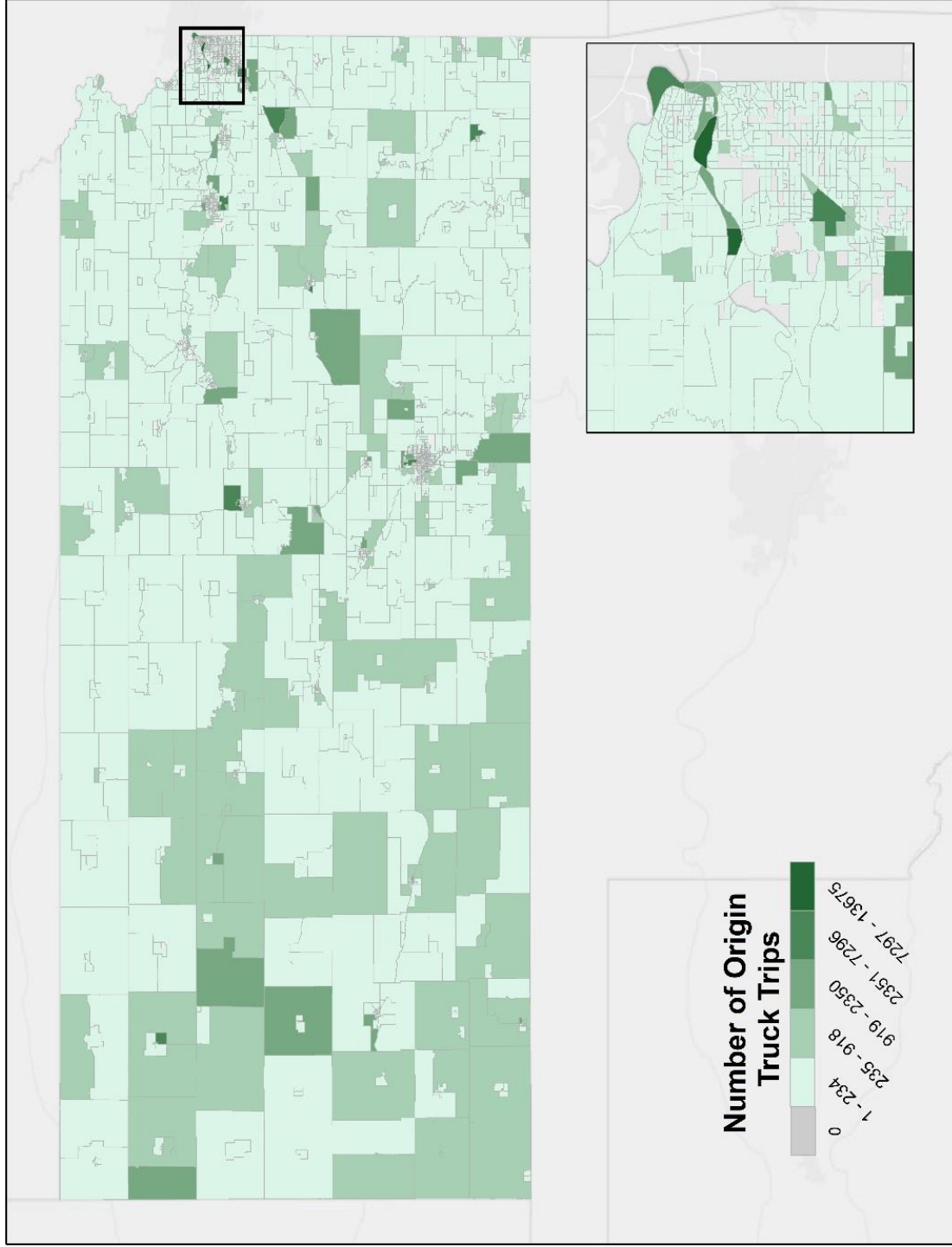
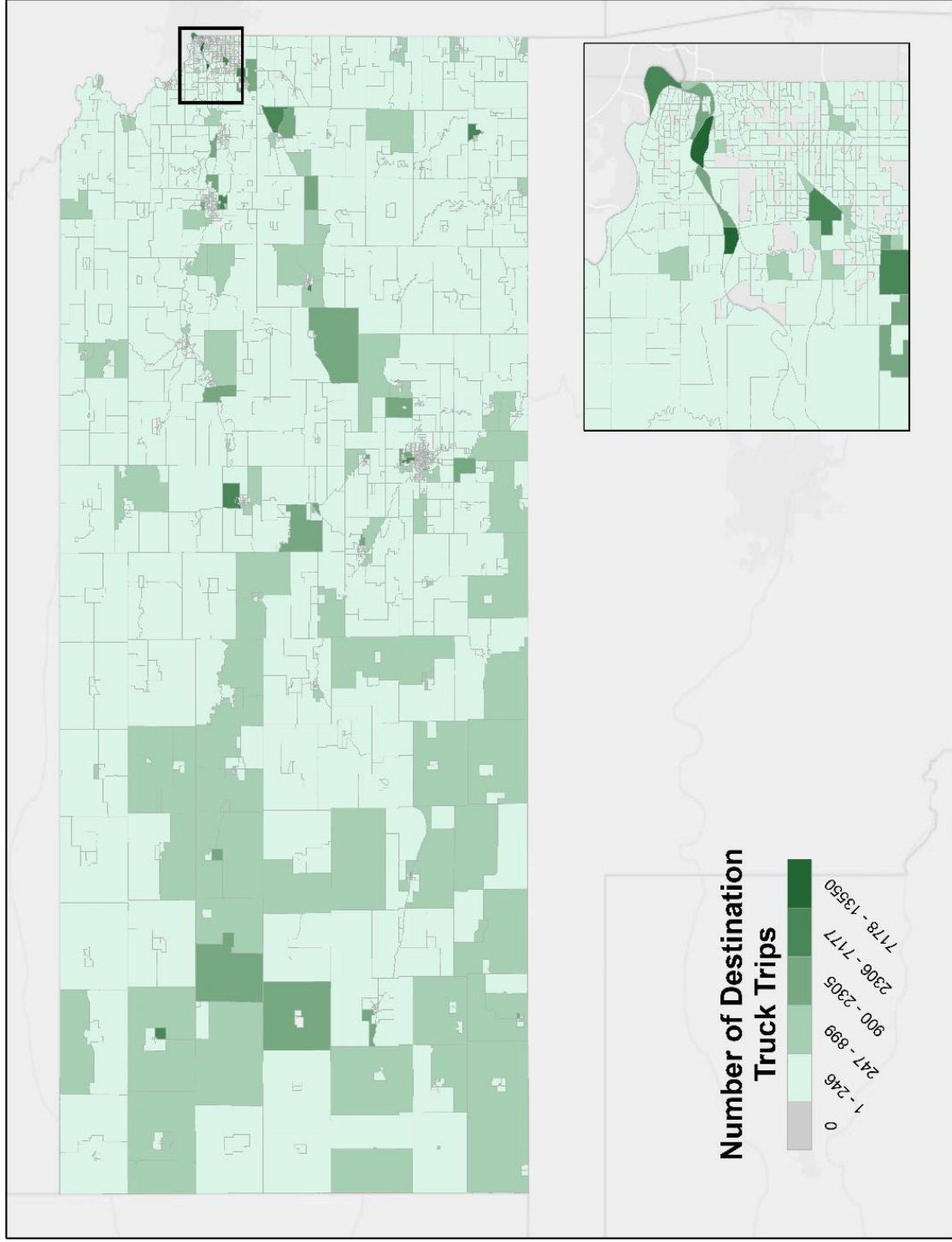


Figure 6: Trip Destinations Scale

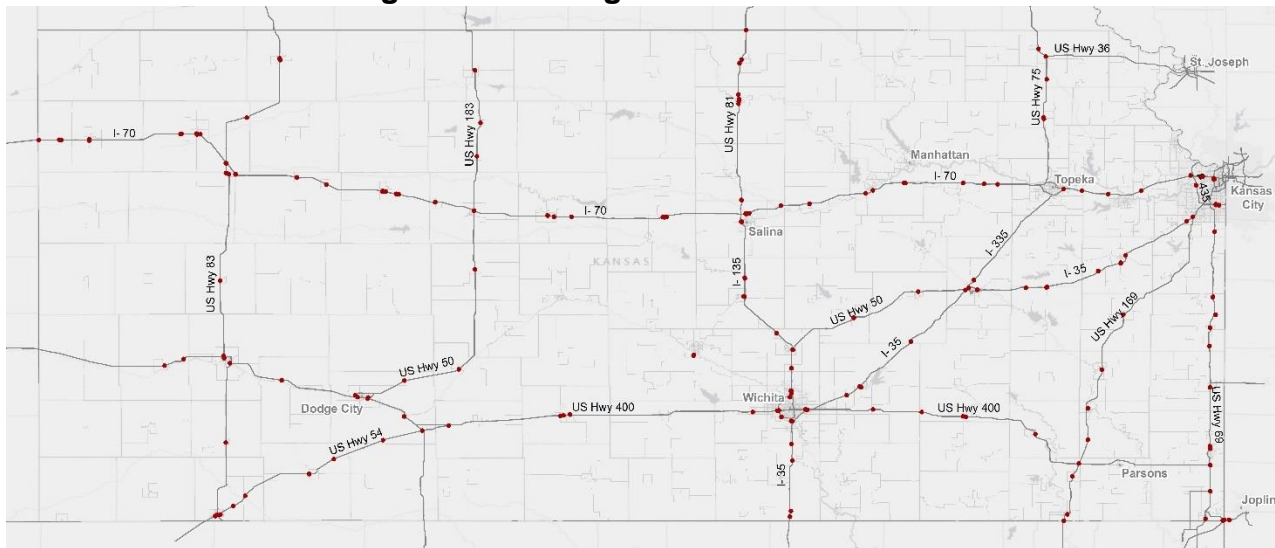


ANALYSIS TWO: TRUCK PARKING DEMAND – (TASK 2.1.2)

Kansas Truck Parking

The project team created geospatial data for approximately 200 private and public parking locations throughout Kansas to support the truck parking analysis. The locations studied are depicted in **Figure 7**.

Figure 7: Parking Locations Studied



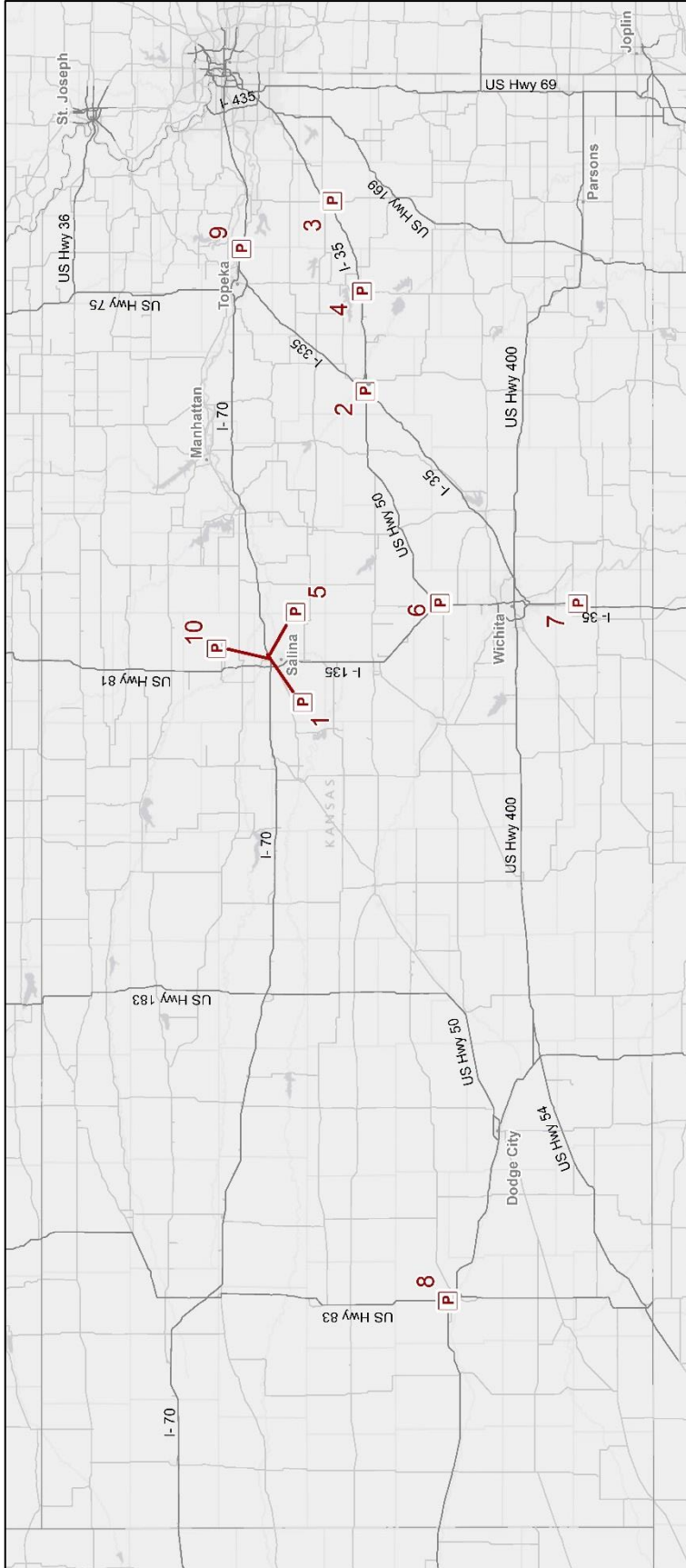
ATRI truck GPS data and the parking location file were processed together in order to identify the top parking locations. The ATRI team classified a stop at a parking location to be between 8 and 38 hours. This stop time is partially based on historic experience as well as by the Hours of Service regulations. The minimum of 8 hours is to account for the 8 to 10 hour rest break required of drivers after driving a full 11 hours. The maximum of 38 hours is to account for the 34 hour restart required of drivers after driving 60/70 hours for 7/8 consecutive days. For each month, a base line of 1,000 trucks was applied in order to determine the parking rate of the top ten parking locations. The team also studied the average length of time (duration) that truck drivers remained at one parking location. Both results, relative volume and average length of time at the parking location, are presented in **Table 3**.

Table 3: Parking Location Average Stop Time and Relative Volume

Parking Rank	Average Time Stopped (hours)	Frequency (per 1000 trucks)	Public / Private
1	12.67	134	Private
2	12.79	126	Private
3	12.52	116	Private
4	11.83	112	Private
5	12.31	99	Private
6	12.50	86	Private
7	11.16	84	Public
8	13.16	81	Private
9	11.39	81	Public
10	12.34	80	Private

Figure 8 shows the geographical location of each of the top-ten parking areas labeled by their corresponding rank in relative volume.

Figure 8: Top 10 Parking Locations



SUMMARY

This report demonstrates the importance to the trucking industry of the primary road network in Kansas. The top three utilized roadways, Interstate 35, Interstate 70 and Interstate 435, are all significant arteries that carry commodities throughout the state. In addition, these primary roads all intersect with Kansas City, demonstrating the important role this urban area plays with the transportation network. This is also evident with the census block origin/destination rankings. The census block groups surrounding Kansas City are highly ranked destinations for truck trips.

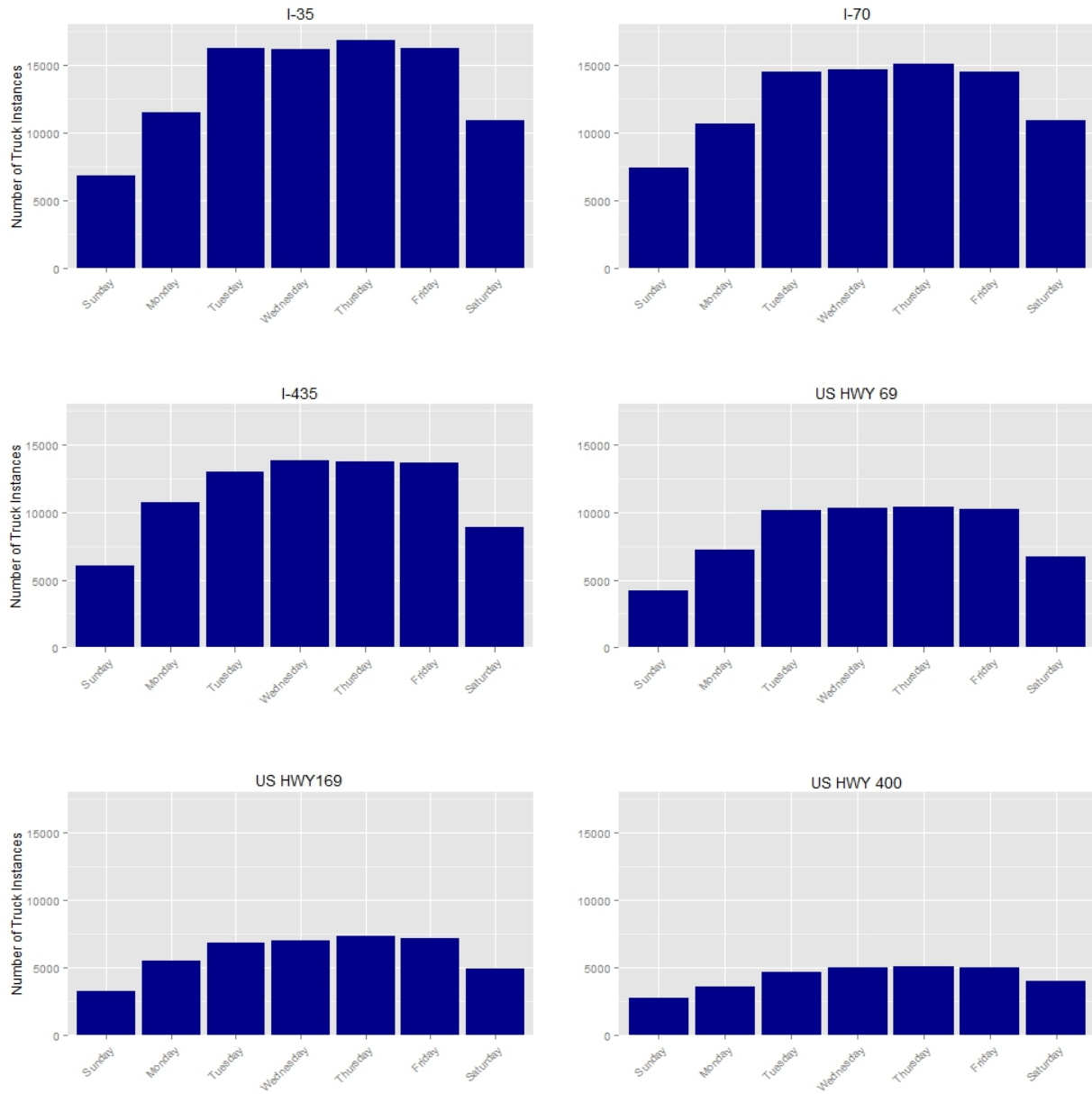
The secondary road network, in particular, in the southwestern part of Kansas, plays a vital role in truck parking operations. As this area of the state is not as highly populated as the northeastern part of the state, it is still extremely important to truck operations. With fewer truck trip destinations occurring in census block groups in this region, truck drivers require a location to take their 34-hour restart or 30-minute rest break. July is the only month in which a parking location does not rank in the top ten in the southwestern region of Kansas. This may be a result of longer daylight hours during the summer months that allow drivers to stay alert for longer during their driving hours.

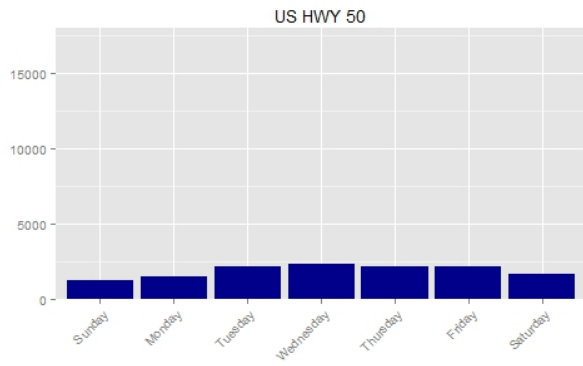
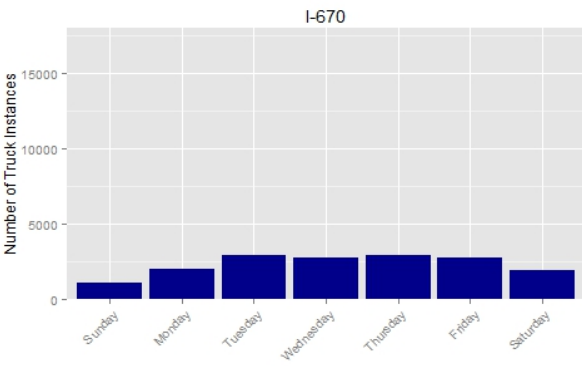
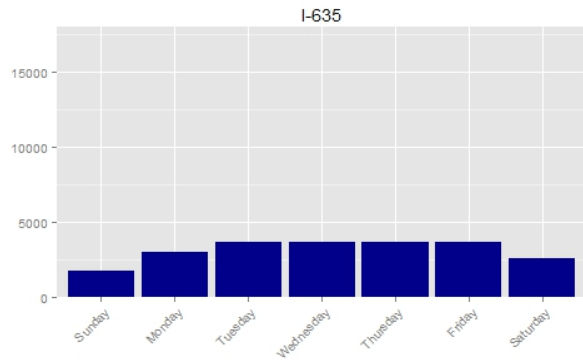
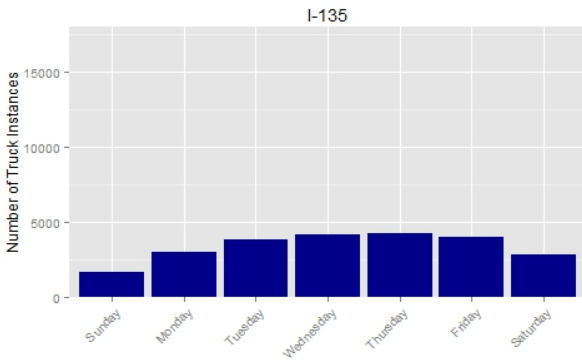
The top ten parking locations during all four time periods also align with the results of the Kansas Truck Parking Survey. This survey helped to understand driver perspectives of truck parking issues throughout the state of Kansas. Truck GPS data shows what truck drivers portrayed in the survey – it is much easier to find parking in rural areas, as opposed to urban areas. As the data indicates in each month, the top parking locations are all around small towns and rural areas, but along the primary road network.

ATRI analyzed truck operations and parking preferences in Kansas to identify freight demand, utilization of freight-significant roadways, statistics on where trucks entered and exited the state, and statistics on trucks stopping in the state versus trucks passing through without a stop. This research will help to inform decision makers where truck parking improvements should occur.

Appendix A

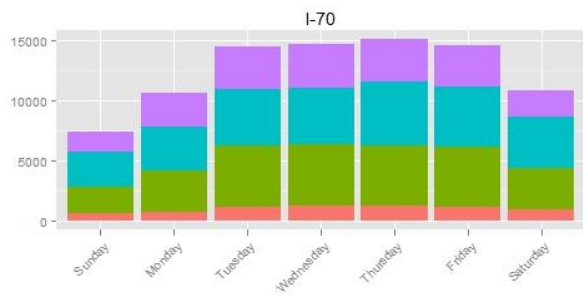
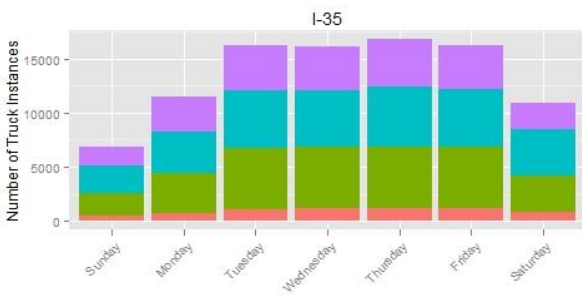
Figure A1: Top 10 Kansas Roads Utilized by Trucks in March 2014 by Day of Week





The top ten roadways accessed based on the day of week and time of day are displayed in Figure A2.

Figure A2: March 2014 Top 10 Kansas Roads Utilized by Trucks by Time of Day and Day of Week



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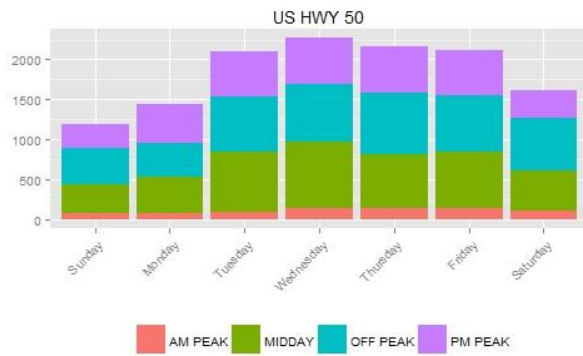
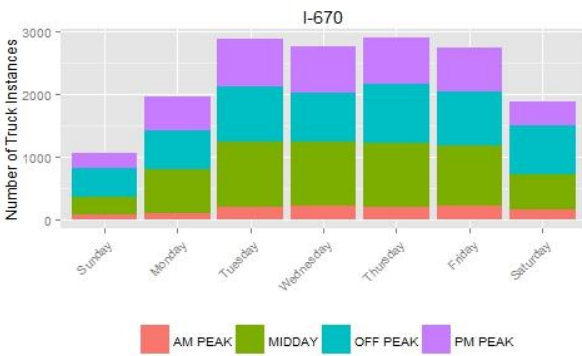
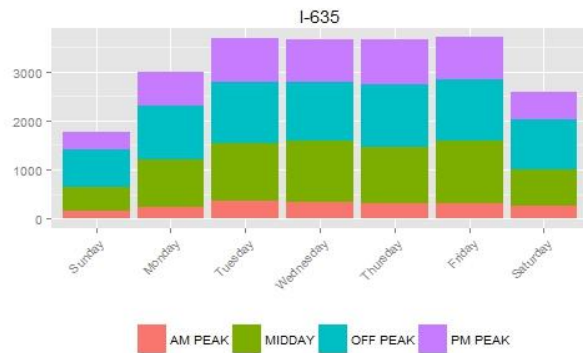
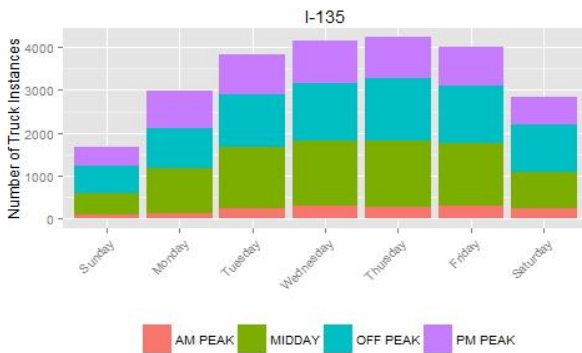
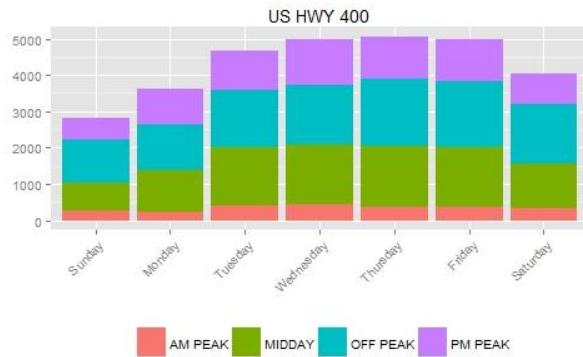
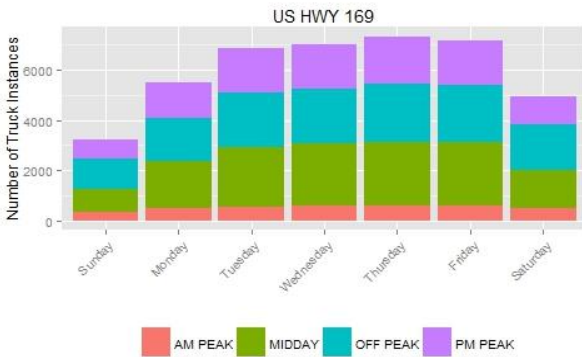
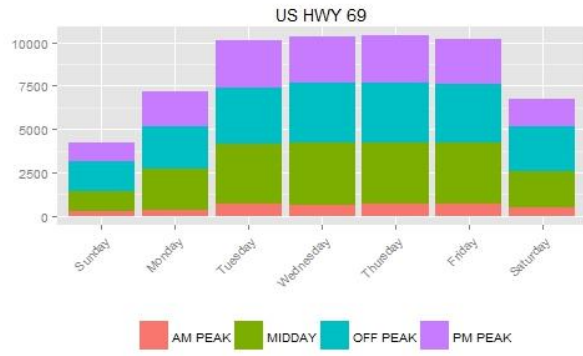
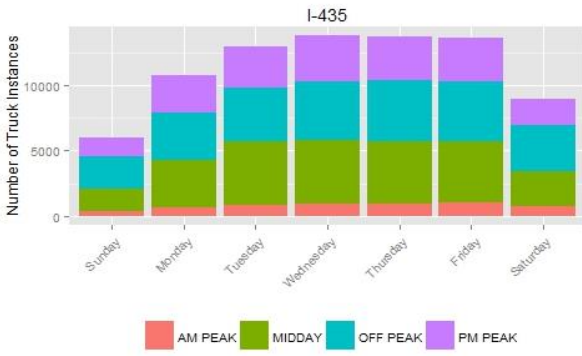
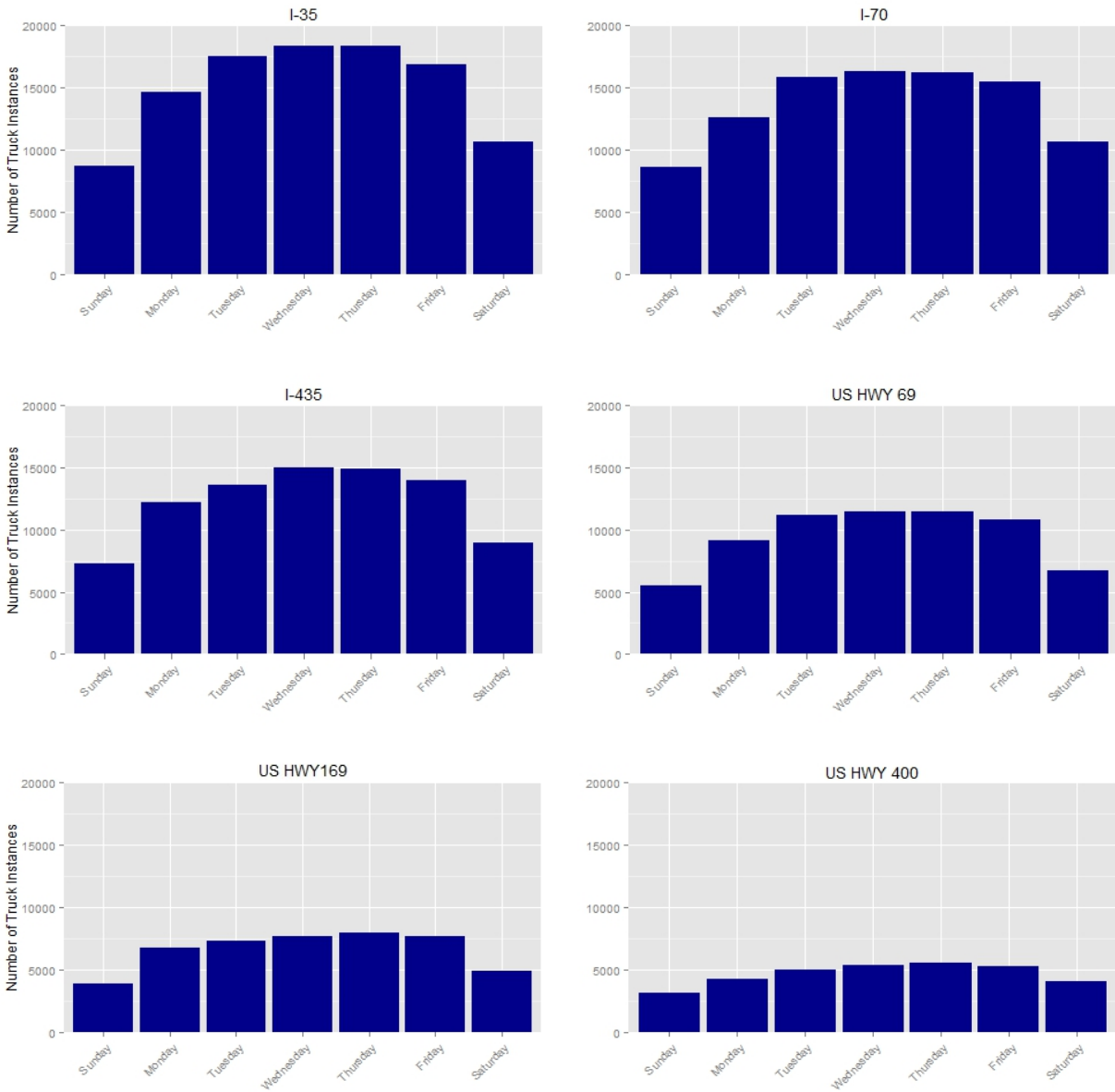
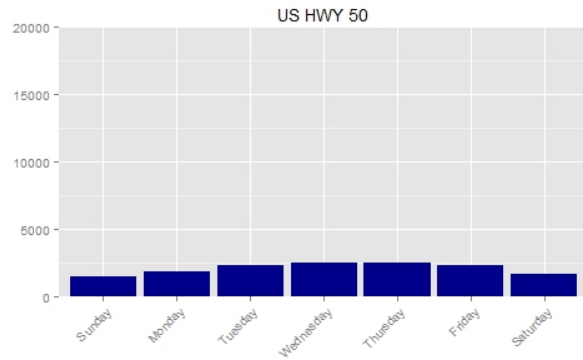
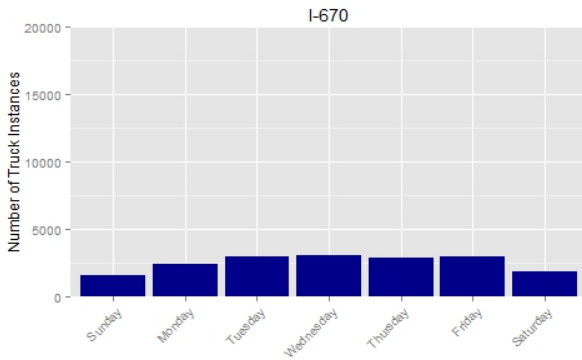
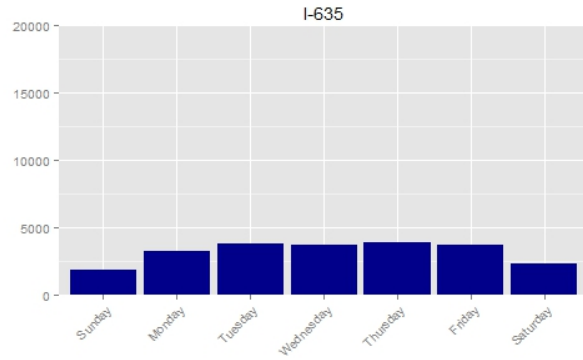
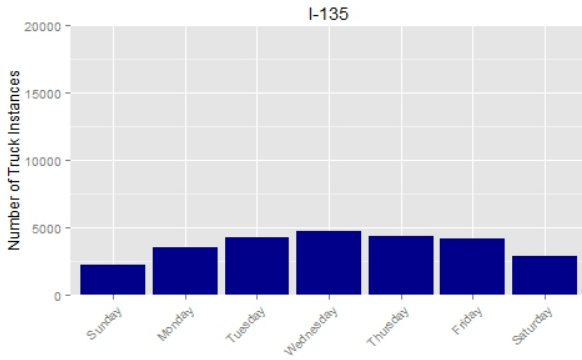


Figure A3 demonstrates the top ten utilized roadways and the number of instances a truck accesses each road per day of week during May 2014.

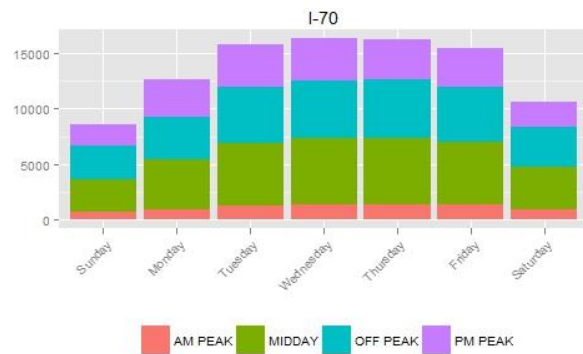
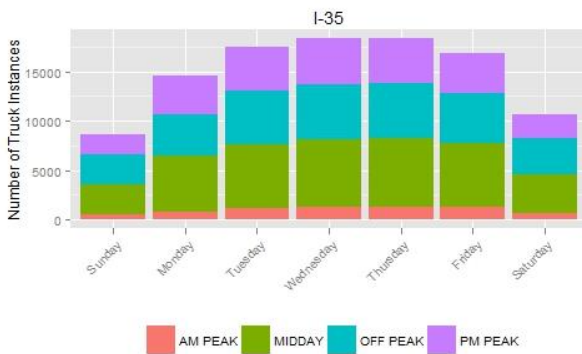
Figure A3: Top 10 Kansas Roads Utilized by Trucks in May 2014 by Day of Week





The top ten roadways accessed during May 2014, based on the day of week and time of day are displayed in Figure A4.

Figure A4: Top 10 Kansas Roads Utilized by Trucks in May 2014 by Time of Day and Day of Week

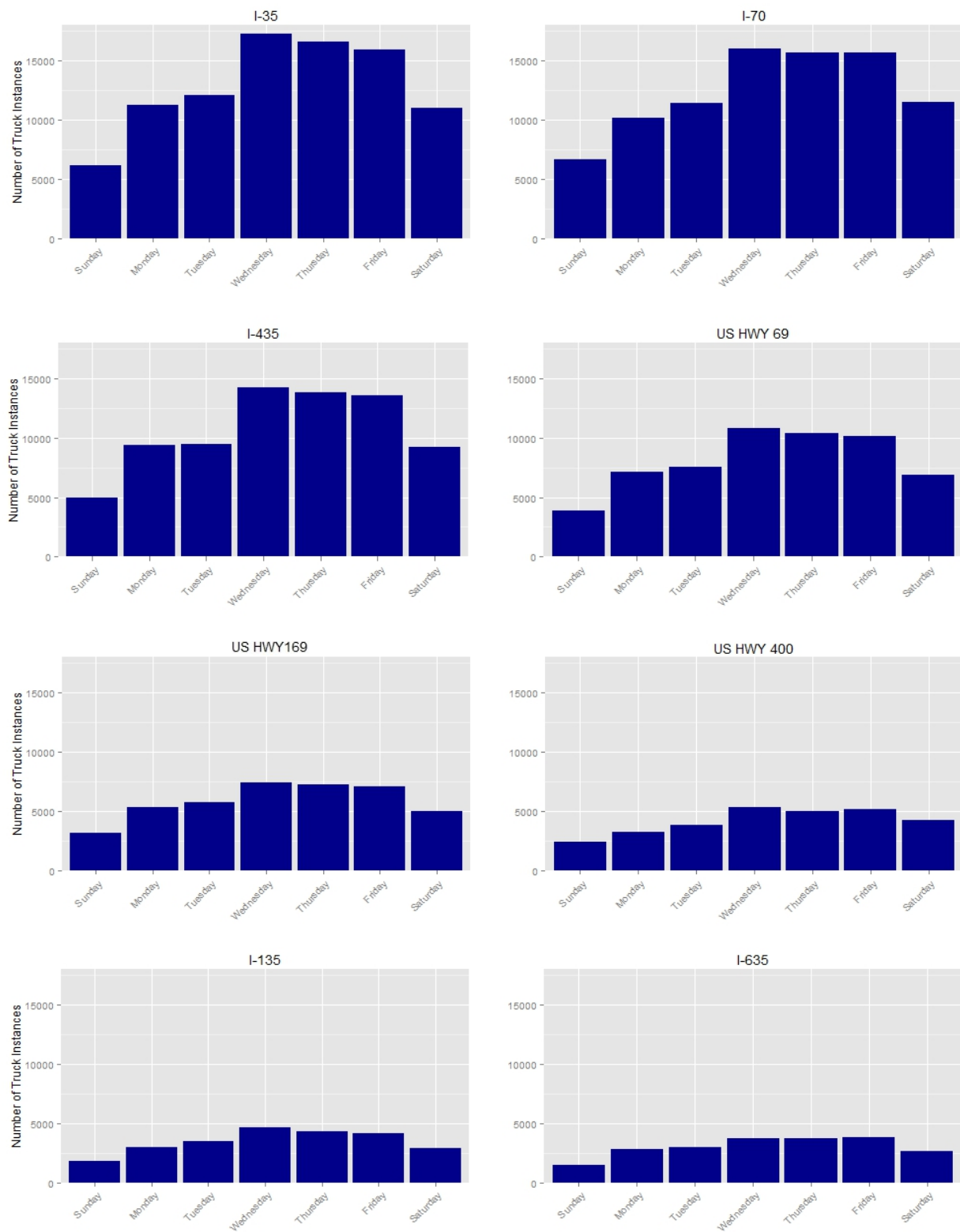


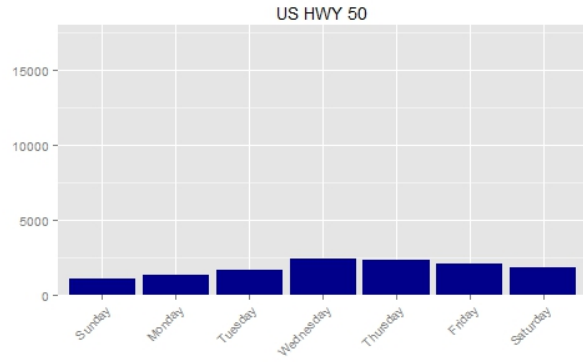
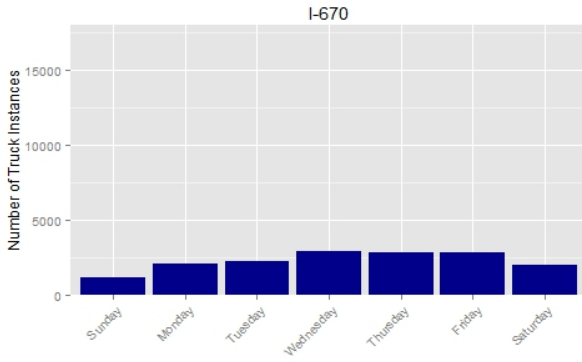
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The July 2014 top ten roads accessed by trucks shown by day of week are in Figure A5.

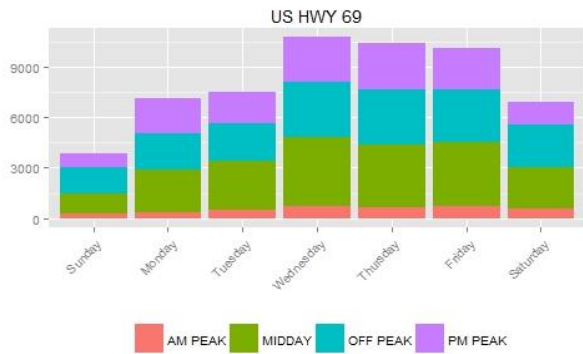
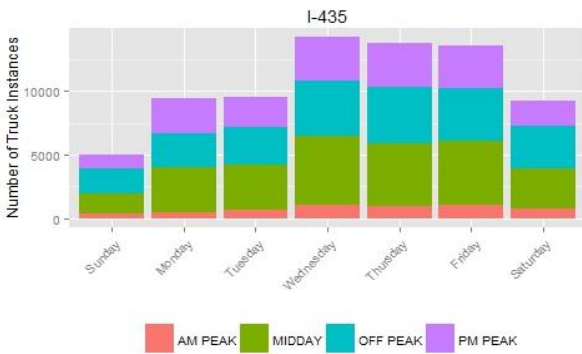
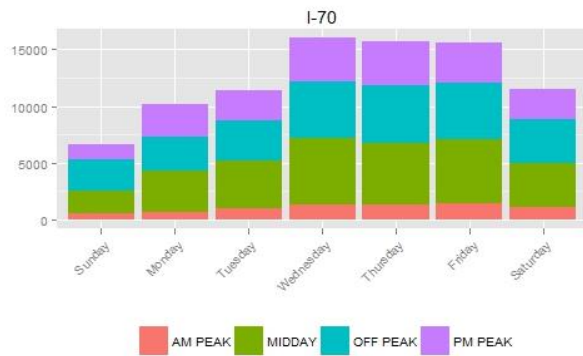
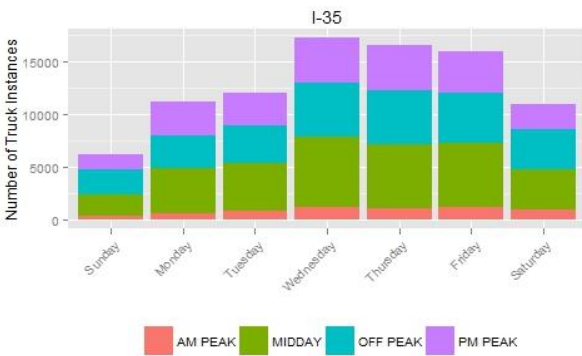
Figure A5: Top 10 Kansas Roads Utilized by Trucks in July 2014 by Day of Week





The July 2014 top ten roads accessed by trucks shown by day of week and time of day in Figure A6.

Figure A6: Top 10 Kansas Roads Utilized by Trucks in July 2014 by Time of Day and Day of Week



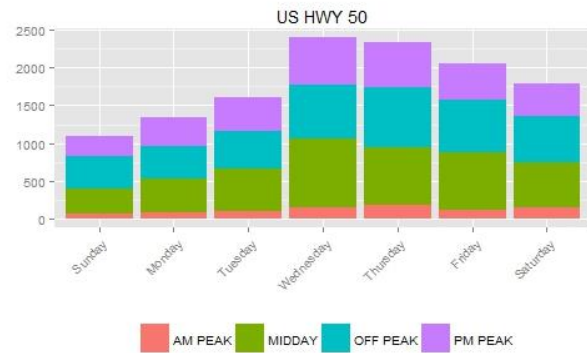
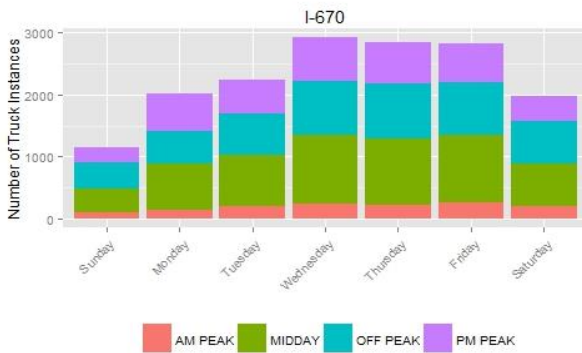
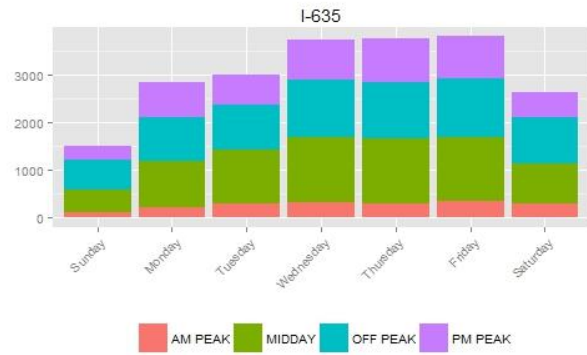
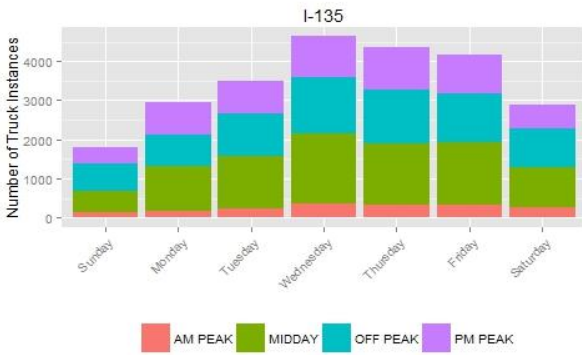
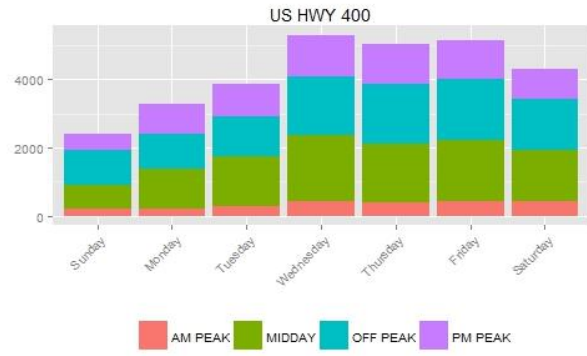
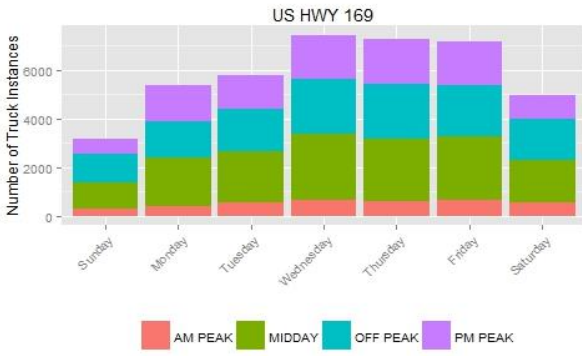
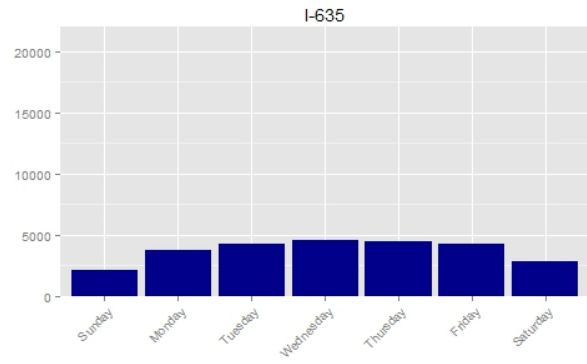
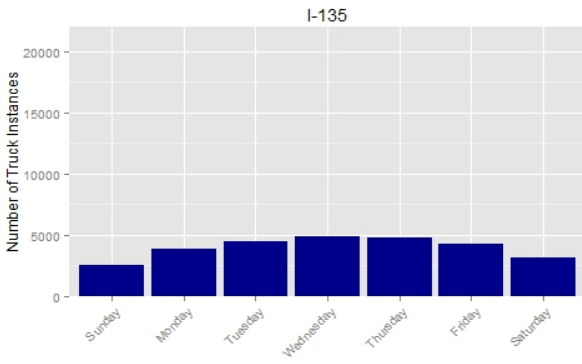
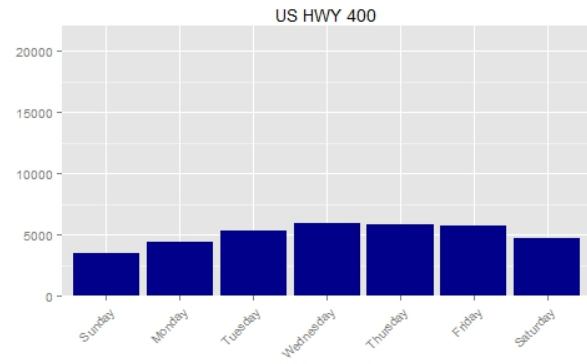
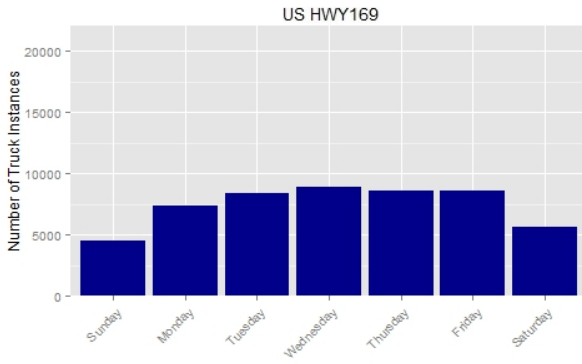
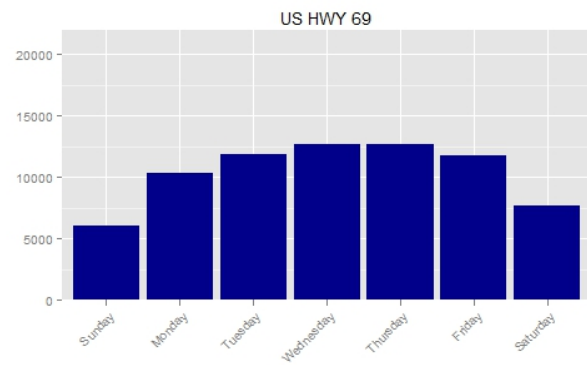
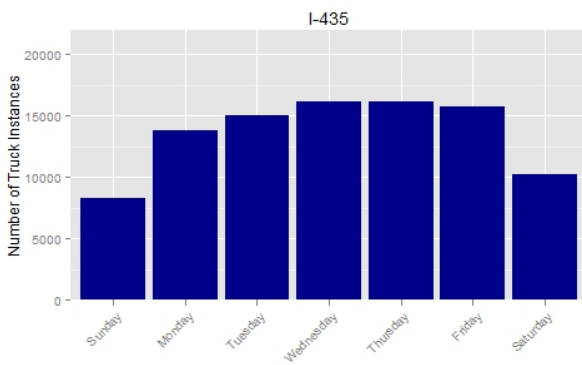
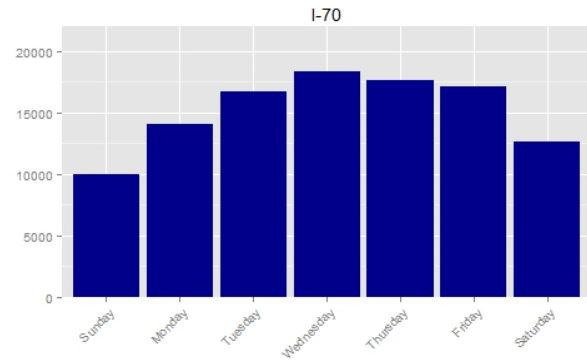
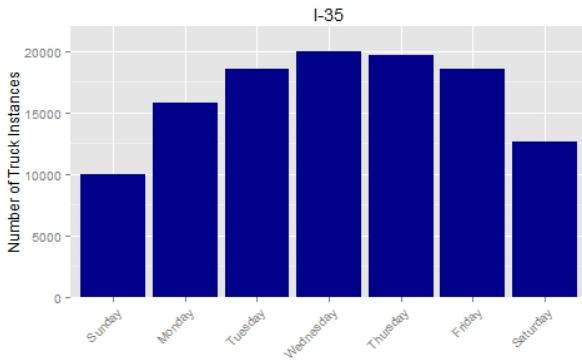


Figure A7 represents the top ten roads during the first two weeks of October and the number of instances trucks accessed each road by day of week.

Figure A7: Top 10 Kansas Roads Utilized by Trucks in October 2014 by Day of Week



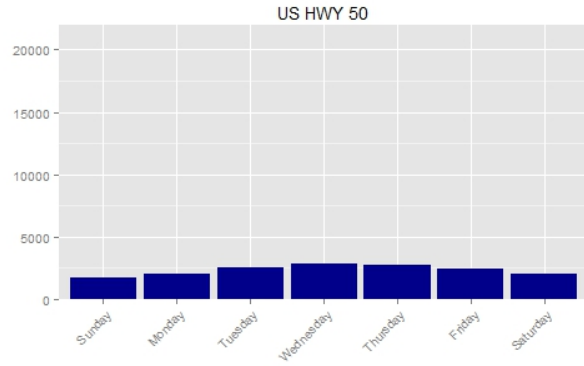
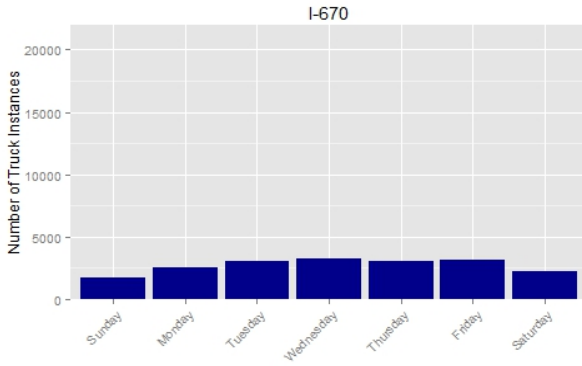
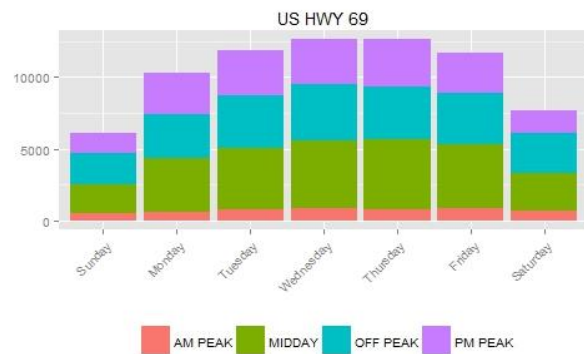
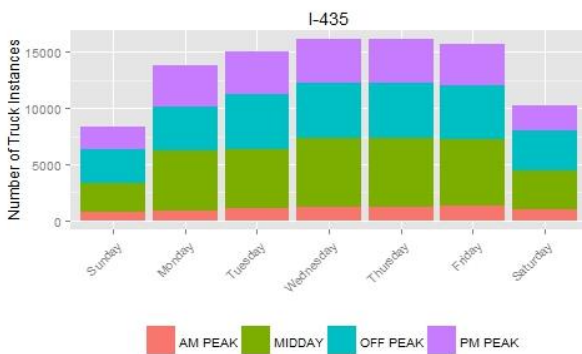
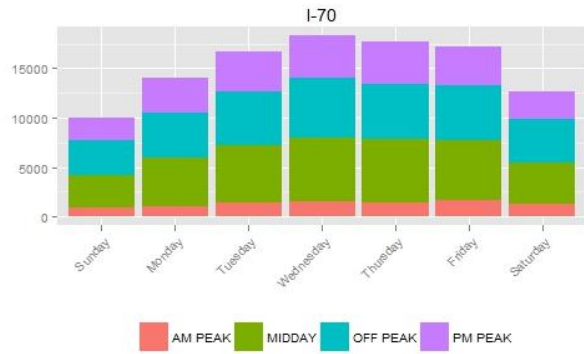
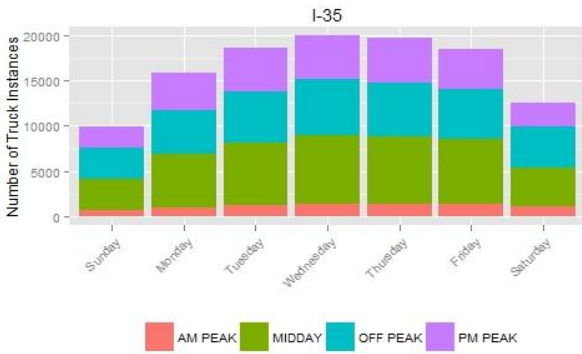
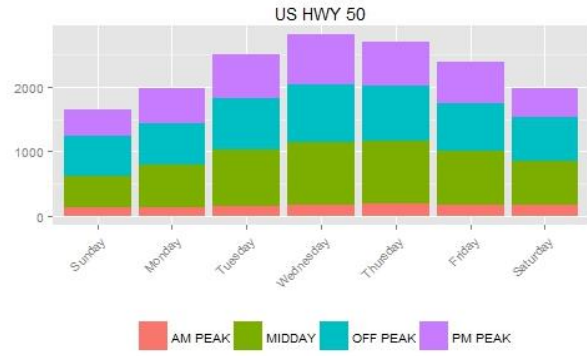
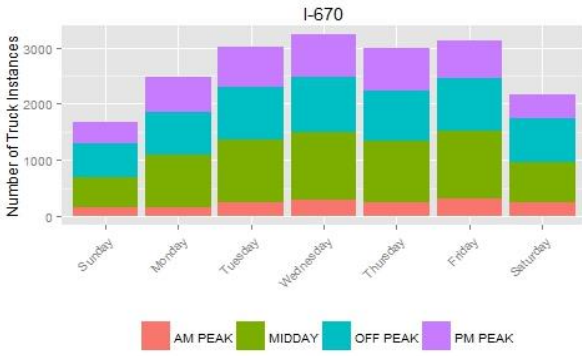
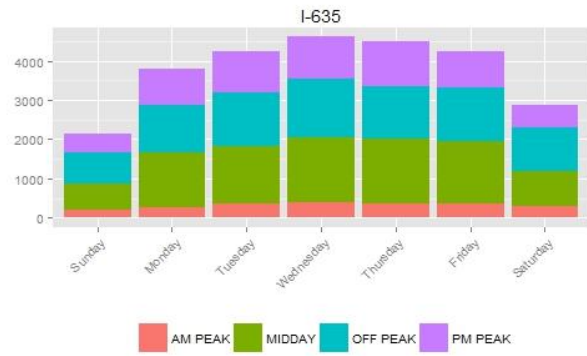
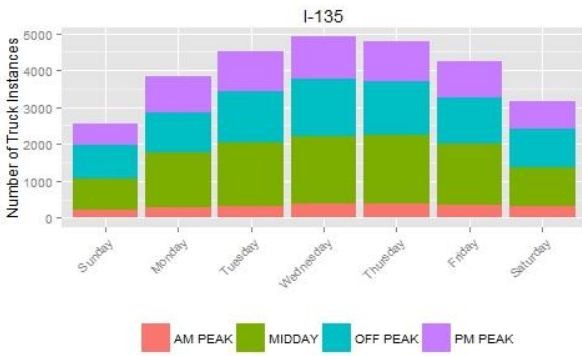
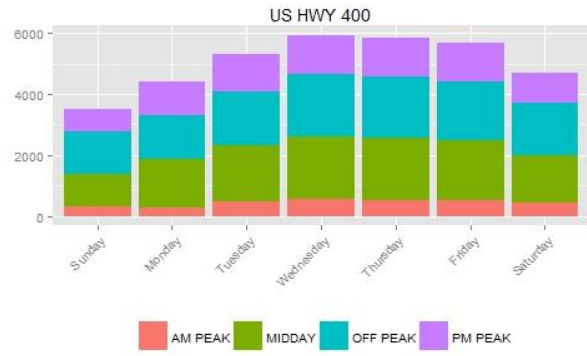
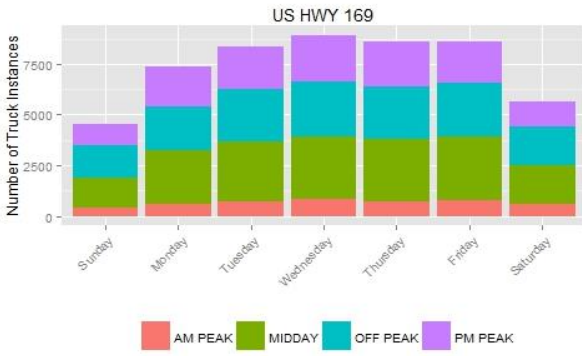


Figure A8 displays the top ten roads during the first two weeks of October and the number of instances trucks accessed each road by day of week and time of day.

Figure A8: Top 10 Kansas Roads Utilized by Trucks in October 2014 by Time of Day and Day of Week





Appendix B

Table B1 shows the results of incoming, outgoing and through trips for each exit station surrounding Kansas.

Table B1: March 2014 Exit Station Counts

	Road / City Identifier	March, 2014			
		Incoming	Outgoing	Through	Total
North	To North Platte / I-80	109	109	97	315
	To I-80	115	156	114	385
	To I-80 / Lincoln	394	592	583	1,569
	To Omaha	256	349	336	941
West	To Denver	1,230	1,573	929	3,732
	To I-25	246	109	130	485
South	To El Paso	919	1,039	760	2,718
	To I-40KK	50	50	50	150
	To OK City / Dallas	1,758	2,291	2,001	6,050
	To Tulsa	514	548	625	1,687
	To Tulsa	754	838	4,021	5,613
	To I-44	3,166	774	3,486	7,426
East	To US Hwy 54	138	188	154	480
	To Kansas City / To St. Louis	7,282	8,492	21,556	37,330
	To St. Joseph, Missouri	1,676	1,865	8,627	12,168
Totals		18,607	18,973	43,469	81,049

Table B2 reports the exit station counts during the first two weeks of May 2014.

Table B2: May 2014 Exit Station Counts

	Road / City Identifier	May 2014			
		Incoming	Outgoing	Through	Total
North	To North Platte / I-80	114	124	128	366
	To I-80	139	211	154	504
	To I-80 / Lincoln	541	617	738	1,896
	To Omaha	341	420	525	1,286
West	To Denver	1,890	2,300	1,330	5,520
	To I-25	430	143	210	783
South	To El Paso	1,024	1,284	969	3,277
	To I-40KK	39	57	65	161
	To OK City / Dallas	2,226	2,808	2,617	7,651

	To Tulsa	633	678	713	2,024
	To Tulsa	914	981	4,867	6,762
	To I-44	1,079	1,244	8,375	10,698
East					
	To US Hwy 54	144	246	192	582
	To Kansas City / To St. Louis	9,265	10,226	27,782	47,273
	To St. Joseph, Missouri	2,028	2,318	11,555	15,901
Totals		20,807	23,657	60,220	104,684

Incoming, outgoing and through truck trips during the last two weeks of July are reported in Table B3.

Table B3: July 2014 Exit Station Counts

	Road / City Identifier	July 2014			
		Incoming	Outgoing	Through	Total
North	To North Platte / I-80	94	125	91	310
	To I-80	115	182	121	418
	To I-80 / Lincoln	414	579	577	1,570
	To Omaha	277	349	393	1,019
West					
	To Denver	1,493	1,993	1,148	4,634
	To I-25	357	116	188	661
South					
	To El Paso	848	1,106	773	2,727
	To I-40KK	29	60	54	143
	To OK City / Dallas	1,899	2,611	2,322	6,832
	To Tulsa	545	592	595	1,732
	To Tulsa	718	886	4,224	5,828
	To I-44	961	1,195	7,385	9,541
East					
	To US Hwy 54	140	178	157	475
	To Kansas City / To St. Louis	7,709	9,096	24,410	41,215
	To St. Joseph, Missouri	1,694	2,016	10,250	13,960
Totals		17,293	21,084	52,688	91,065

Table B4 reports inbound, outbound and through truck trips during October 2014.

Table B4: October 2014 Exit Station Counts

	Road / City Identifier	October 2014			
		Incoming	Outgoing	Through	Total
North	To North Platte / I-80	119	134	108	361
	To I-80	131	184	159	474

	To I-80 / Lincoln	592	671	801	2,064
	To Omaha	392	513	546	1,451
West					
	To Denver	1,897	2,559	1,454	5,910
	To I-25	426	138	177	741
South					
	To El Paso	1,352	1,496	1,152	4,000
	To I-40KK	49	55	68	172
	To OK City / Dallas	2,423	3,221	3,149	8,793
	To Tulsa	586	661	753	2,000
	To Tulsa	807	968	5,096	6,871
	To I-44	1,110	1,261	9,256	11,627
East					
	To US Hwy 54	186	245	178	609
	To Kansas City / To St. Louis	10,098	11,274	31,498	52,870
	To St. Joseph, Missouri	2,184	2,606	13,773	18,563
Totals		22,352	25,986	68,168	116,506

APPENDIX C: Monthly Service Stops and Through Trucks

Table C1 ranks the top ten census block group destinations during March 2014.

Table C1: Top Ten Census Block Group Destinations, March 2014

Rank	Number of Stops
1	3,201
2	2,901
3	1,688
4	1,298
5	1,118
6	944
7	866
8	784
9	721
10	708

Figure C1 displays the geographical location of each of the top ten census block groups, labeled by their corresponding rank number.

Figure C1: Top Ten Census Block Destinations, March 2014

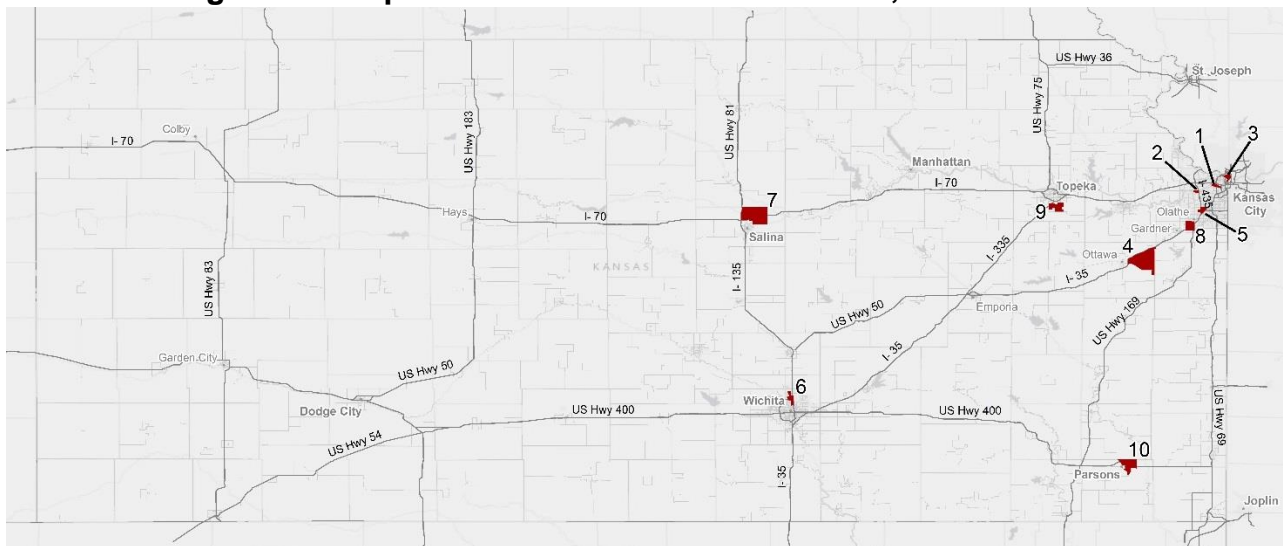


Table C2 ranks the top ten census block group destinations during May 2014.

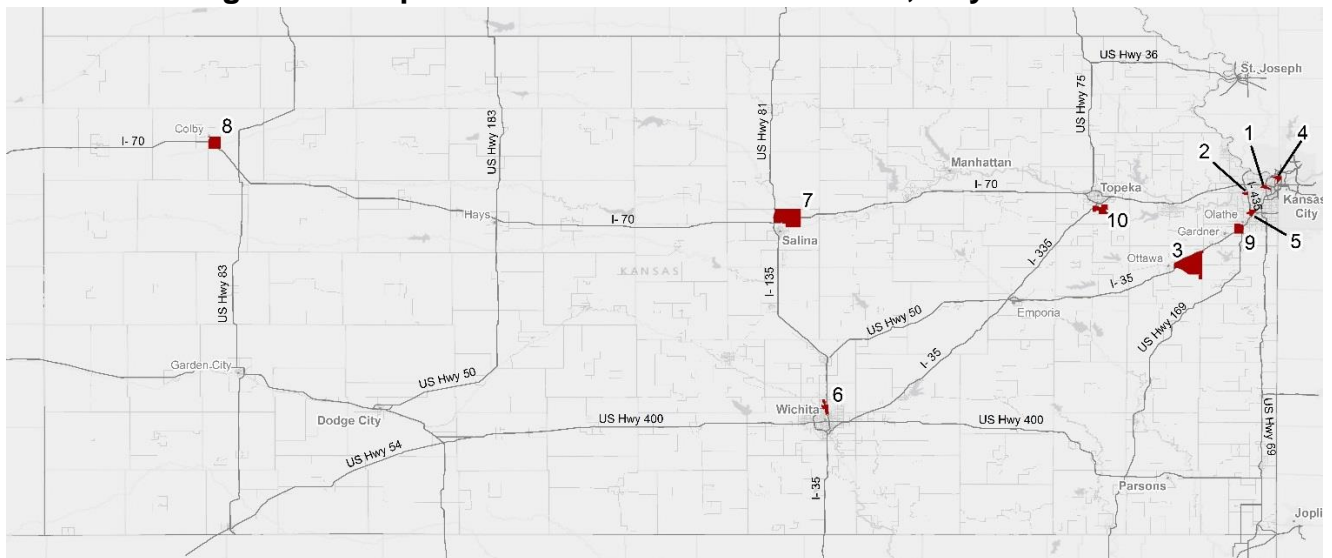
Table C2: Top Ten Census Block Group Destinations, May 2014

Rank	Number of Stops
------	-----------------

1	3,399
2	3,274
3	1,829
4	1,737
5	1,467
6	1,055
7	1,041
8	869
9	807
10	806

Figure C2 displays the top ten census block group destinations for May 2014, with their corresponding rankings.

Figure C2: Top Ten Census Block Destinations, May 2014



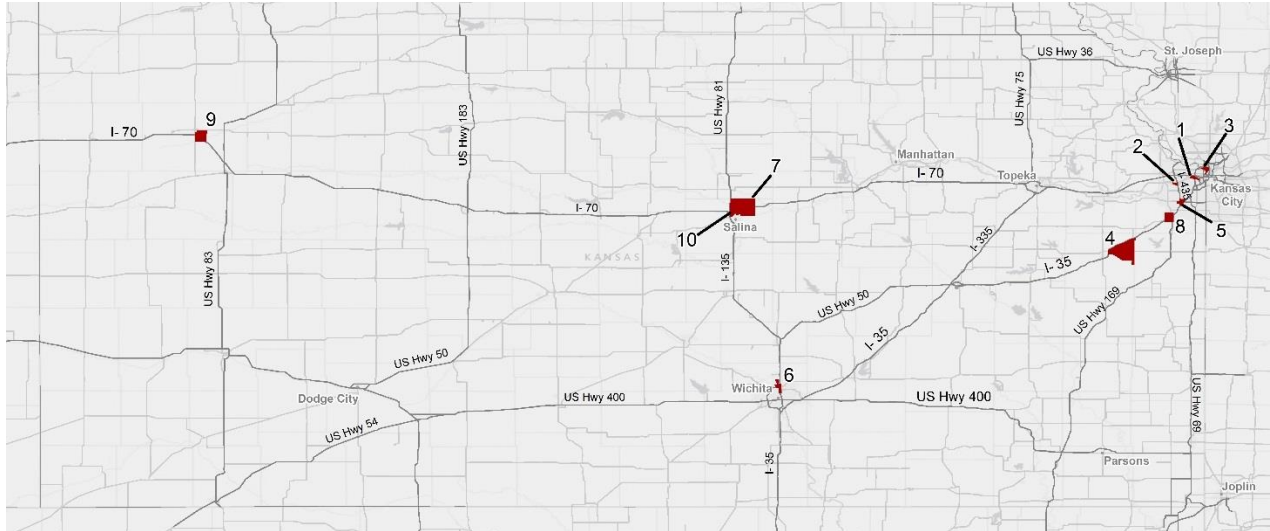
The top ten census block group destinations for July are reported in Table C3.

Table C3: Top Ten Census Block Group Destinations, July 2014

Rank	Number of Stops
1	3,246
2	3,170
3	1,732
4	1,232
5	1,197
6	1,037
7	948
8	870
9	825
10	785

Figure C3 indicates the location of the top ten census block group truck destinations during the last two weeks of July 2014.

Figure C3: Top Ten Census Block Destinations, July 2014



The top ten census block groups are listed in Table C4, and geographically seen in Figure C4 for October 2014.

Table C4: Top Ten Census Block Group Destinations, October 2014

Rank	Number of Stops
1	3,762
2	3,699
3	2,048
4	1,509
5	1,481
6	1,149
7	1,096
8	866
9	857
10	851

Figure C4: Top Ten Census Block Destinations, October 2014



APPENDIX E: Monthly Truck Parking Demand

Table E1 shows the top ten parking location rankings and the average time stopped at each location during the first two weeks of March 2014.

Table E1: Parking Location Average Stop Time and Relative Volume, March 2014

Parking Rank	Average Time Stopped (hours)	Frequency (per 1000 trucks)	Public / Private
1	12.56	131	Private
2	13.08	118	Private
3	12.74	114	Private
4	12.51	107	Private
5	11.67	101	Private
6	12.65	92	Private
7	13.25	91	Private
8	11.29	83	Public
9	14.01	82	Private
10	12.24	82	Private

Figure E1 displays the geographical location of each of the top ten parking areas labeled by their corresponding rank in relative volume.

Figure E1: Top 10 Parking Locations March 2014

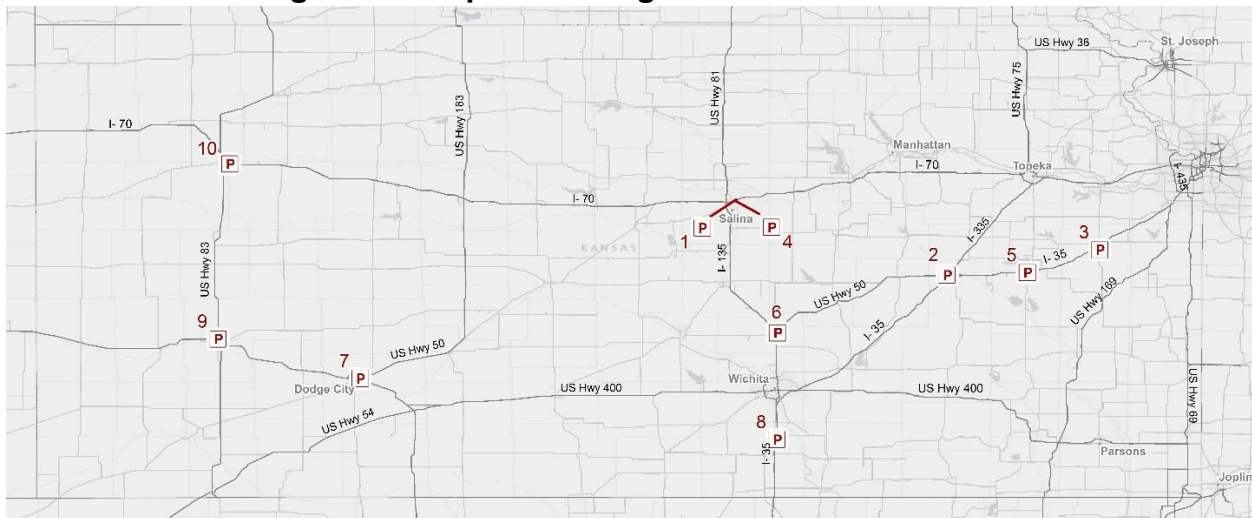


Table E2 shows the top ten parking location rankings and the average time stopped at each location during the first two weeks of May 2014.

Table E2: Parking Location Average Stop Time and Relative Volume, May 2014

Parking Rank	Average Time Stopped (hours)	Frequency (per 1000 trucks)	Public / Private
1	12.39	136	Private
2	12.78	125	Private
3	12.39	111	Private
4	11.75	106	Private
5	12.96	100	Private
6	12.17	96	Private
7	12.23	84	Private
8	11.04	82	Public
9	11.67	80	Private
10	13.40	79	Private

Figure E2 indicates the geographical location of the top parking locations utilized by truck drivers in May 2014. Each location is labeled with the corresponding rank.

Figure E2: Top 10 Parking Locations May 2014

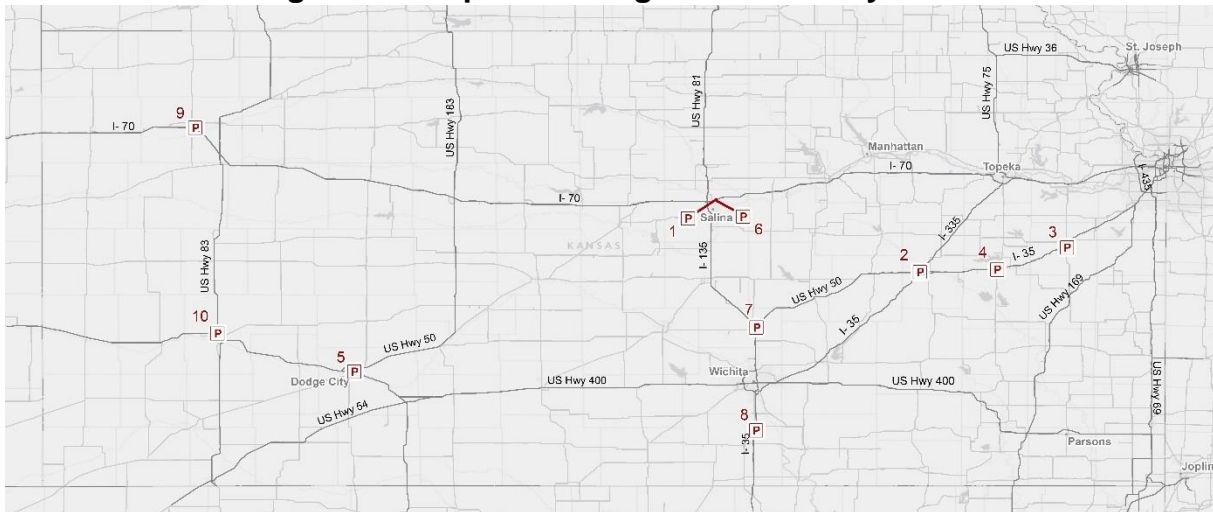


Table E3 indicates July 2014 top ten rankings, average length of time trucks remain at each parking location and frequency per 1000 trucks.

Table E3: Parking Location Average Stop Time and Relative Volume, July 2014

Parking Rank	Average Time Stopped (hours)	Frequency (per 1000 trucks)	Public / Private
1	12.78	135	Private
2	12.40	122	Private
3	11.96	121	Private
4	12.56	118	Private
5	12.14	96	Private
6	11.02	88	Public
7	11.40	87	Public
8	12.48	80	Private
9	12.16	77	Private
10	11.73	77	Private

Figure E3 shows the geographical locations of the results from Table 3, during July 2014.

Figure E3: Top 10 Parking Locations July 2014

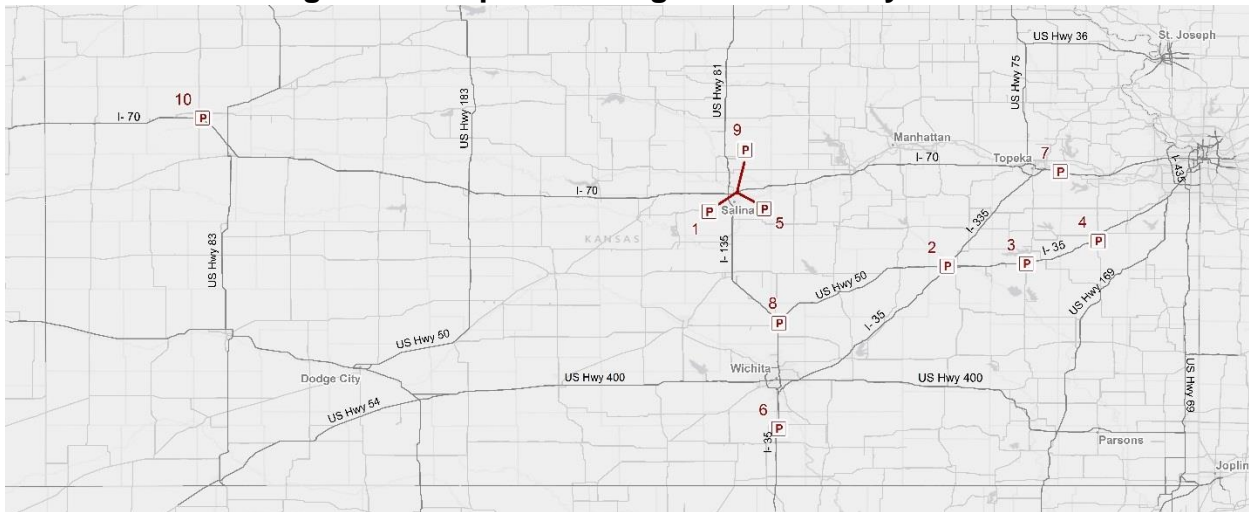


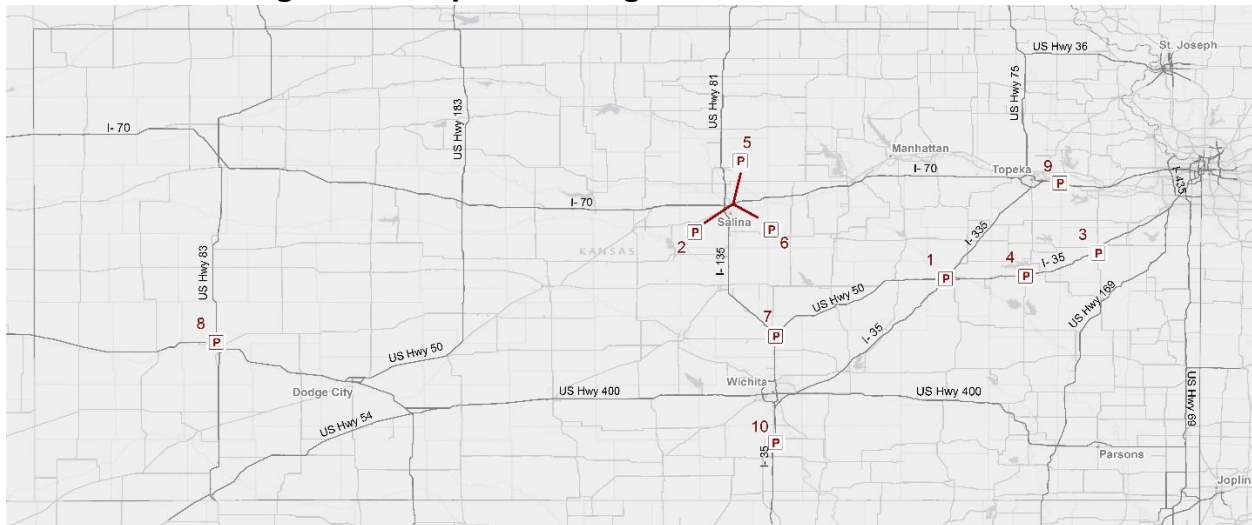
Table E4 indicates the top ranked parking locations in Kansas during October 2014.

Table E4: Parking Location Average Stop Time and Relative Volume, October 2014

Parking Rank	Average Time Stopped (hours)	Frequency (per 1000 trucks)	Public / Private
1	12.91	129	Private
2	12.94	125	Private
3	12.45	115	Private
4	11.88	112	Private
5	12.18	95	Private
6	12.41	94	Private
7	12.67	84	Private
8	12.93	84	Private
9	11.37	84	Public
10	11.30	78	Public

The geographical locations of the top ten parking locations in Kansas are shown in Figure E4.

Figure E4: Top 10 Parking Locations October 2014



TIGER PROPOSAL 2015

Regional Truck Parking and Information and Management System (TPIMS)

CONTACT INFORMATION

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Grant Request: \$36.6 million

Grant Type: Rural Application



AVAILABLE PARKING
TRUCK AREA
EXIT 112
EXIT 110





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A. PROJECT DESCRIPTION

To improve the efficiency, economic competitiveness and safety of the national freight network, the State of Kansas in partnership with Indiana, Iowa, Kentucky, Michigan, Minnesota, Ohio, Wisconsin and the Mid America Association of State Transportation Officials (MAASTO), has developed a proposal for a multi-state Truck Parking Information and Management System (TPIMS). This project, sponsored by the eight-state MAASTO TPIMS Partnership, provides an opportunity to create a new and collaborative way for the Midwest region to address truck parking information and availability needs along its busiest freight corridors. When deployed, this system will provide truck drivers with reliable, real-time information to make smarter, more efficient truck parking decisions. In addition, **the innovative application of existing, shovel-ready technologies assembled in this project will provide a benefit-cost ratio of over 4.27. Approximately \$37 million in deployment costs will generate over \$403 million in benefits for the motoring public over the life of the system.**

The cooperation exhibited by the partnership drives value further for freight customers through a commitment to develop a unified regional system. Over-the-road truck drivers typically travel at least 500 miles in a day, therefore the partner states are committed to developing common design criteria and standards for information dissemination to enable seamless system use across state lines. This lays the groundwork for this regional deployment to be expanded in the future to additional freight corridors and states, improving overall economic productivity and efficiency of the national freight network.

Deployment of a TPIMS is a critical need for the Mid-American region to improve truck safety, efficiency and way-finding, as well as to better align with the needs for truck drivers to meet Federal Motor Carrier Safety Administration's (FMCSA) Hours of Service (HOS) requirements. Trucks parked along a number of significant freight corridors throughout the MAASTO region often overflow onto the shoulders of rest area ramps, freeway ramps and adjacent roads, creating safety concerns for other motorists and for the commercial vehicle operators. This park-

ing behavior is often not due to a lack of available parking, but rather because there is no real-time information regarding parking availability for drivers to make informed decisions on where to park.

The MAASTO TPIMS Partnership believes that the existing spaces along these corridors can be utilized more efficiently through better communication of parking availability and way-finding to the trucking community. As a result, the primary needs to be addressed by this project include:

- Identifying available parking options using advanced parking technologies, and
- Communicating parking availability in real-time to commercial vehicle operators so that they can make informed parking decisions.



Lack of information about availability of safe truck parking is a significant issue for truckers and motorists

Truck parking, along a number of significant freight corridors throughout the MAASTO Region, overflow onto the shoulders of rest area ramps, freeway ramps and adjacent roads, creating safety concerns for commercial vehicle operators and motorists.

The MAASTO TPIMS Partnership proposes to deploy the system throughout the eight-state region on high volume freight corridors including: I-35, I-64, I-65, I-70, I-71, I-75, I-80, I-94, and I-135. The proposed project is a system that uses existing ITS infrastructure and capabilities, along with emerging vehicle detection and data collection technologies to address these needs. This project will monitor the availability of truck parking and will provide real-time information to commercial vehicle operators using multiple information dissemination methods, including dynamic truck parking signs, smart phone applications, and traveler information websites .

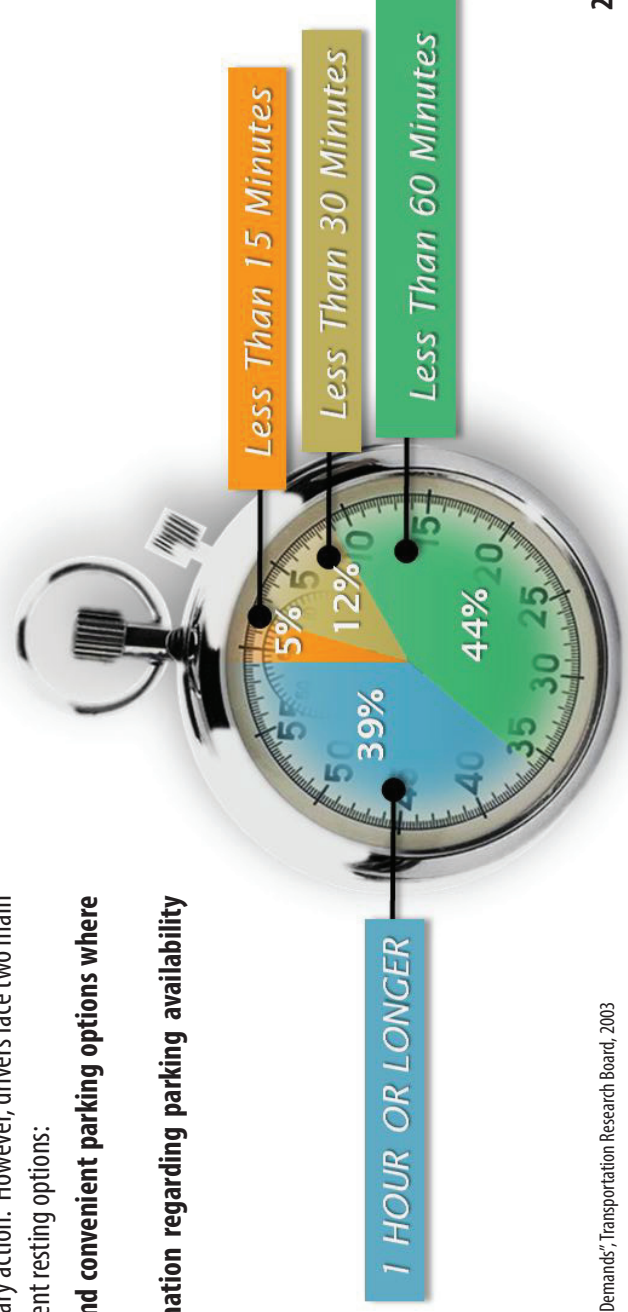
The Need for Action

Nationally, there is a large and growing problem with truck parking along the national highway system and other freight corridors of statewide and national significance. Access to safe and convenient parking areas for trucks is essential for a robust freight transportation network, yet truck drivers consistently have difficulty finding areas to safely rest. The FMCSA regulates Hours of Service for drivers and mandates rest periods for them – at least 10 hours per day after every 14 hour shift or risk fines and disciplinary action. However, drivers face two main issues when seeking safe and convenient resting options:

- **There are not enough safe and convenient parking options where needed, and**
- **There is no real-time information regarding parking availability and way-finding.**

The seriousness of this situation was addressed in Section 1401 of MAP-21; a section called “Jason’s Law”. In 2009, Jason Rivenburg, a commercial truck driver, sought a safe spot to rest before delivering a load of milk early the next morning. Tragically, Jason’s unfamiliarity to parking options nearby led him to park at an abandoned gas station, ultimately resulting in his murder. Jason left behind a young son and a wife pregnant with twins. As a result of this incident Hope Rivenburg, Jason’s wife, championed “Jason’s Law”, which takes solving the truck parking crisis from an industry issue to a national issue, expanding eligibility for states to use federal highway funds for truck parking projects.

In addition to driver security, a **2003 study by the National Cooperative Highway Research Program (NCHRP) estimated that driver fatigue contributed to 15% of fatal crashes involving trucks.**¹ Truck drivers need access to safe parking to battle the fatigue of operating on a daily basis.



Graphic courtesy of PowerPoint by Desiree Wood, Andrew Warcaba Associates and Hope Rivenburg

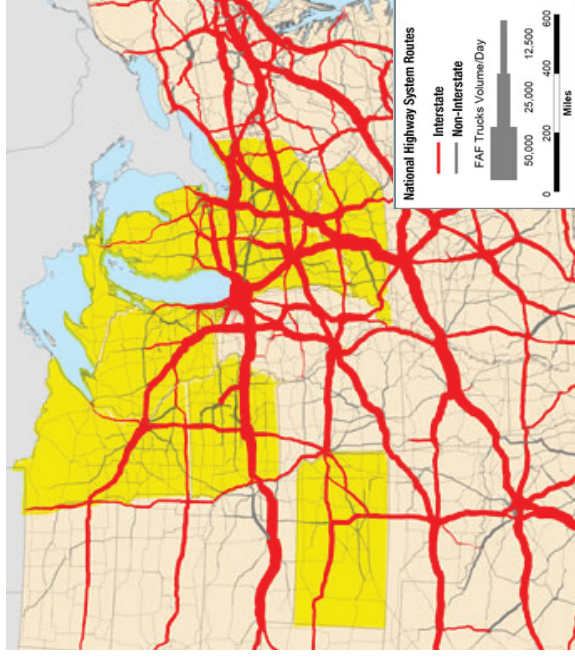
¹NCHRP Synthesis 317 – Dealing with Truck Parking Demands”, Transportation Research Board, 2003

Without reliable, real-time information about parking availability, drivers often end their shift early and travel from lot to lot looking for available parking. In October 2013, a survey of nearly **4,000 truck drivers revealed that eighty-three percent (83%) of the respondents routinely took longer than 30 minutes to find parking; thirty-nine percent (39%) took longer than one hour.** Drivers who have not located parking before reaching their hours of service limits are often forced to park illegally and/or unsafely, often on the shoulder of the highway, on an off-ramp or an abandoned facility, to avoid fines or discipline from their employer.² **Taking the roughly \$120 per hour operational cost of a truck and applying it across the nearly 400,000 national parking events that occur on a daily basis, the economic cost of 83% of drivers spending 30 minutes or more each day to find parking is over \$7 billion annually.**

As seen in **Figure 1**, there are many corridors in the Midwest with truck volumes exceeding 25,000 trucks per day. These high truck volumes create congestion at parking sites, making it difficult for truck traffic to locate parking during peak travel hours.

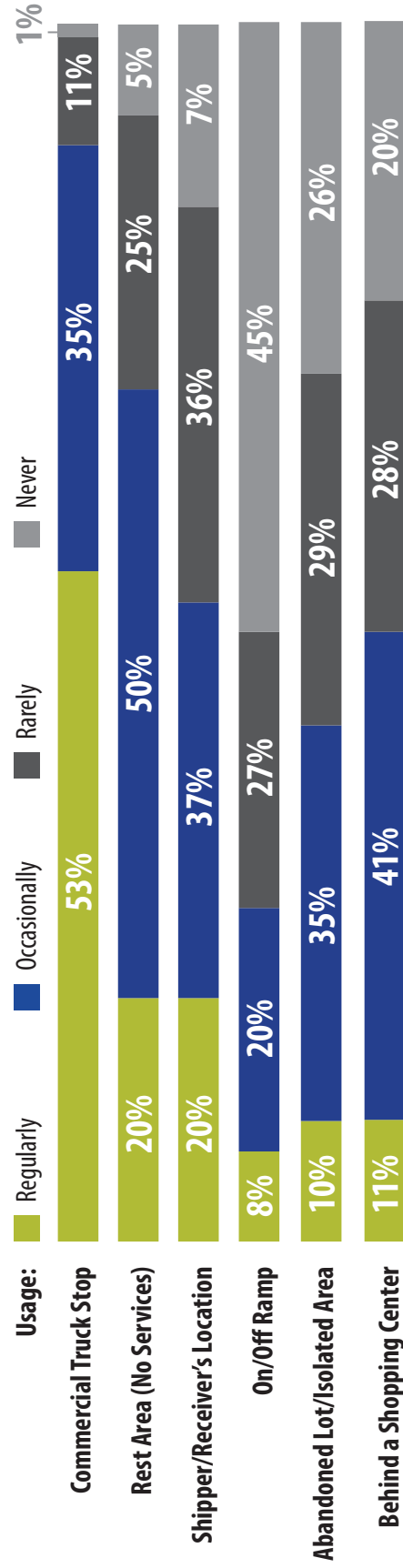
Figure 2 shows the survey results for locations where truck drivers generally park. A significant number of surveyed truckers park in areas that could be considered unsafe; including ramps, abandoned lots, and isolated locations like shopping center delivery areas.

Figure 1: Average Daily Long Haul Freight Truck Traffic on the National Highway System, 2011



Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.4, 2013.

Figure 2: Survey results for locations where truckers normally park



Courtesy of PowerPoint by Desiree Wood, Andrew Warcaba Associates and Hope Rivenburg

²2013 Safe Truck Parking PowerPoint by Desiree Wood, Hope Rivenburg, and Andrew Warcaba Associates

How Can TPIMS Address Regional Needs?

To improve safety and efficiency within the nation's truck transport network, drivers need real-time information regarding the location of available parking. In fact, recommendations in the first ever National Freight Advisory Committee report identify use of ITS as a solution for truck parking issues, while also citing fatigue prevention as a means to stem accidents in the transportation sector.³ This can be accomplished by launching a TPIMS. TPIMS is envisioned to be a network of safe, convenient parking areas with the ability to collect and broadcast real-time availability to drivers through a variety of media outlets. This will enable drivers to proactively plan their routes and make safer, smarter parking decisions. It will also enable parking facility owners (public and private) to understand the magnitude and timing of the demand on their facilities, thereby allowing for smart partnerships and investments to increase parking capacity in areas where demand exceeds supply. Commercial truck drivers will have new resources to use when looking for parking, increasing their overall productivity and efficiency. Therefore, instead of unsafely or illegally settling for parking at an overcrowded

parking facility, operators will have the ability to weigh the value of driving extra 5 to 20 miles to secure parking without fearing the unknown or lack of availability upon arrival.

Why the Midwest, and Why Now?

Three states in the MAASTO region are already implementing variations of TPIMS, paving the way for a progression to a regional system: Michigan, Wisconsin and Minnesota.

- TPIMS was deployed by the Michigan Department of Transportation (MDOT) in southwest Michigan, continuously operating since mid-2014. The I-94 international trade corridor often experiences overcrowding of rest areas, forcing drivers unfamiliar with the area to park along ramps, shoulders, and adjacent interchanges. The MDOT system helps truck drivers locate safe and convenient parking and plan their rest periods on a 130-mile stretch of I-94 from the Indiana state line to Parma, MI.



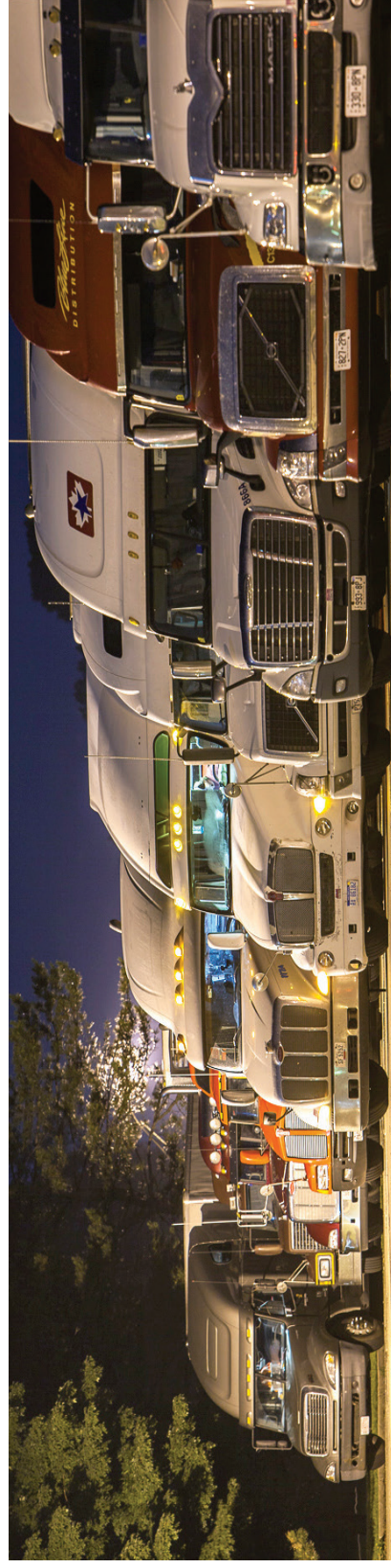
³ National Freight Advisory Committee, "Recommendations to U.S. Department of Transportation for the Development of the National Freight Strategic Plan", 2014.

- The Wisconsin Department of Transportation (WisDOT) is currently negotiating contracts to build a similar system along I-94 using a \$1 million grant from the Federal Highway Administration. This system will provide interstate truck parking continuity between Wisconsin and Minnesota. In Wisconsin, the system will provide dynamic message signs, integration with WI 511, and third party mobile applications to indicate availability of truck parking at four key rest areas.
- In Minnesota, truck parking availability at three rest areas is being calculated using an innovative stereoscopic camera system developed by the University of Minnesota. Information is provided via in-cab communications, the MN 511 website, and the University of Minnesota website.

The progress made in these three states has led to the initiation of this eight-state collaboration across the Midwest. This regional TPIMS approach is especially focused on the rest and parking needs of long-haul trucking operators who travel hundreds of miles, often across state lines, during a 14-hour shift. **With the Midwest serving as the Heartland of the U.S., this region offers a great opportunity to improve the national and global competitiveness of the nation's goods movement via truck, and sets the stage for the later expansion to both coasts and significant NAFTA corridors connecting to Canada and Mexico.**

Who Would Benefit from this System?

There are many benefactors of the MAASTO TPIMS Project. Commercial truck drivers will benefit from the system because, as shown through the success of MDOT's I-94 TPIMS Project, there will be better utilization of the parking assets along each corridor, reducing the illegal and informal parking at rest areas. As drivers will have the ability to use real-time truck parking availability information to find the next available parking location, their safety and the security of the goods that are being transported will also be increased. Maintaining agencies will benefit from the TPIMS investment because of the reduction in non-routine maintenance repairs on shoulders and ramps due to illegal or informal parking. Law enforcement agencies will be able to focus resources on higher value targets, rather than enforcing illegal parking. Manufacturers and shippers in the region will benefit from the more efficient movement of cargo, which enhances the global competitiveness of the Midwest economy. Residents of the partnership states will benefit from reduced emissions and a reduction in overall truck crashes, impacting fewer motorists safety and mobility. **The MAASTO TPIMS Project drives safety, economic benefits, and environmental benefits for the residents of the eight-state partnership at a very compelling benefit-cost ratio.**

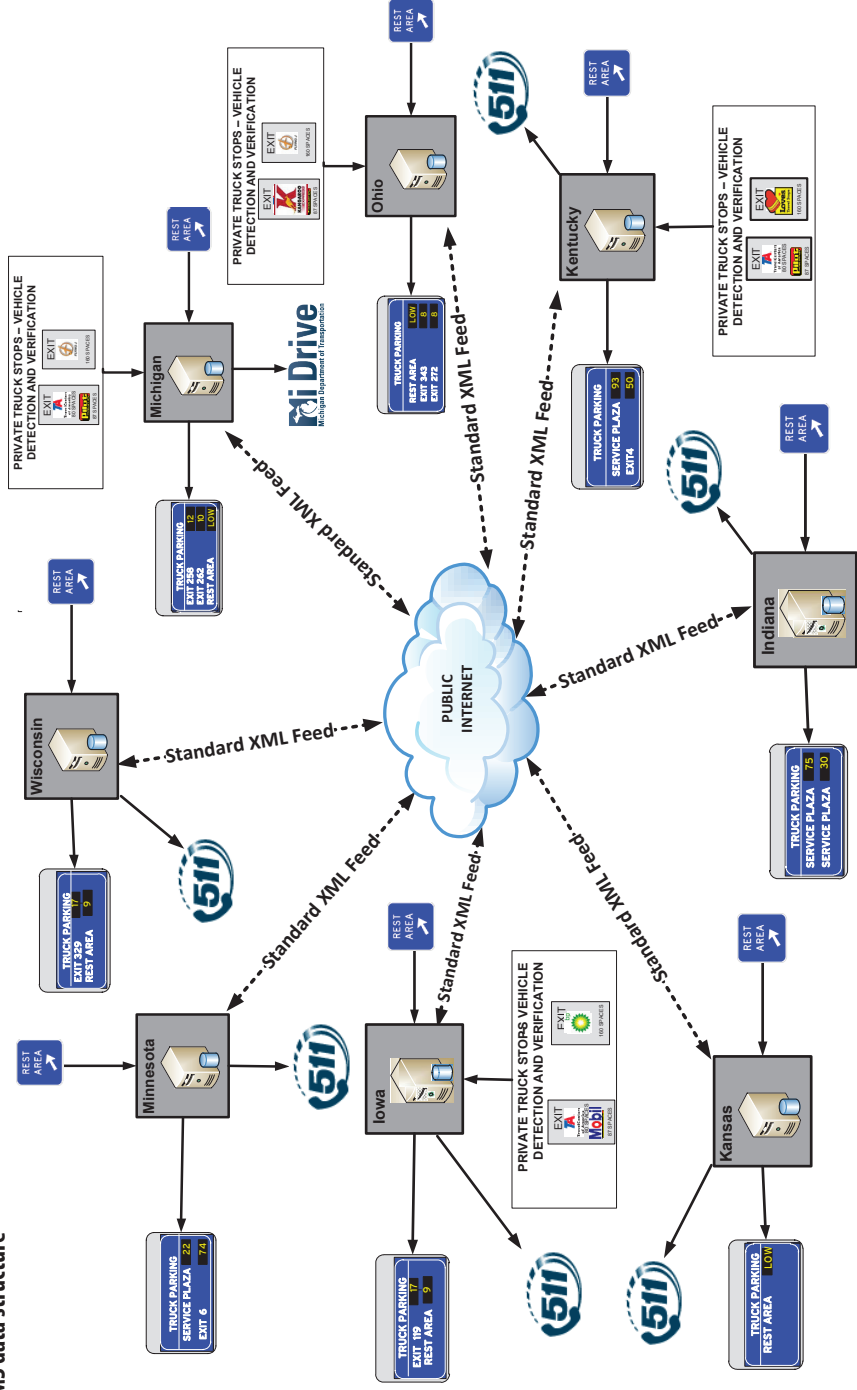


What is the Project Architecture?

The proposed architecture for TPIMS in the MAASTO region includes both the flexibility to allow each state to run their own parking system, and common standards to provide interoperability across state lines. This will allow for seamless integration while setting standards for future truck parking efforts nationwide. As shown in Figure 3, the technology deployed at parking facilities and roadside signs will integrate with each state's existing ITS network and software platform.

Additionally, a common Application Programming Interface (API) will be developed to exchange parking availability information between all parties, both public and private. This approach builds off of the successes in Michigan with data being seamlessly exchanged between MDOT and private project partners. This architecture will allow for quick project startup while being scalable to include additional sites, states, and data service platforms in the future.

Figure 3: TPIMS data structure



How will Availability Information be Shared?

The MAASTO TPIMS Partnership is proposing to deploy a TPIMS on critical freight corridors in the Midwest. The system will collect truck parking availability information and disseminate it to users over a variety of media, including dynamic truck parking signs upstream of rest areas, State DOT traveler information web-sites, and smart phone applications. Michigan is also currently disseminating truck parking info via Dedicated Short Range Communications (DSRC), and will continue in the future.

Dynamic Truck Parking Signage

The primary dissemination method for truck parking availability will be dynamic truck parking information signs upstream from project rest areas and weigh stations. Additionally, signs bring awareness to the system while showing alternate parking facilities near problem areas, and were ranked as the most preferred way to receive information in a 2012 survey of commercial operators in the Midwest. These signs will provide real-time information about the number of parking spaces available. **Figure 4** shows one of the five truck parking signs deployed in Michigan along I-94.

Smart Phones and In-Cab

Another potential approach for truck parking information dissemination is through the use of smart phone applications. In order to ensure safe operations, mobile applications will be FMCSA “one-touch” compliant by relying on hands-free voice interactive commands. Some of the State DOTs are considering the establishment of a mechanism to distribute data to drivers through existing subscription services such as third party dispatch platforms. Other DOTs may choose to limit information dissemination to dynamic truck parking information signs and/or traveler information web sites. The TPIMS allows flexibility for states to integrate new applications in the future as state budgets allow or new technologies become available.

Figure 4: Existing Truck Parking Sign in Michigan on I-94.

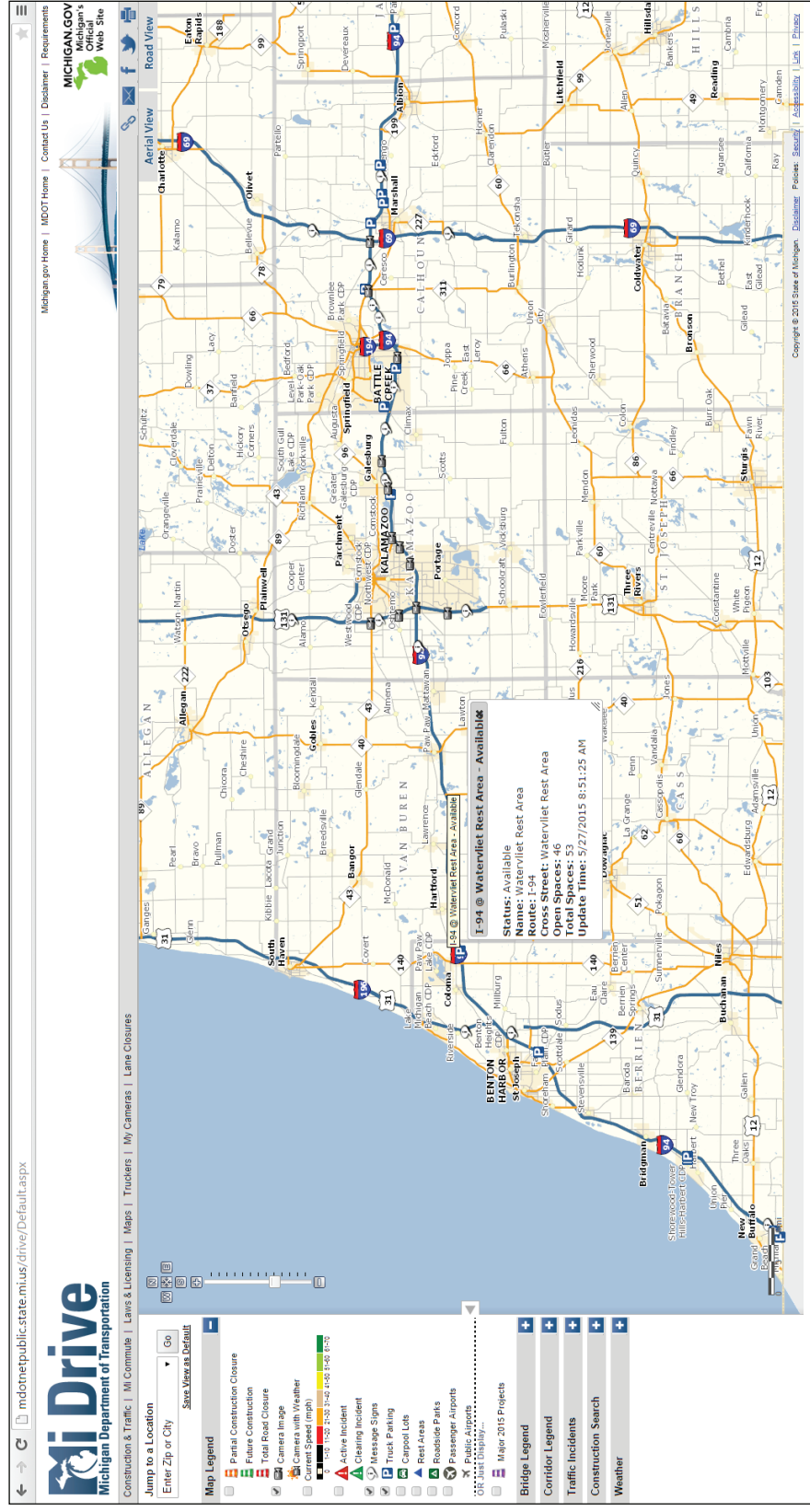


Traveler Information Web Sites

Parking availability information will be published on traveler information websites, such as KanDrive/511, Mi Drive, and MN 511 sites. Michigan, Minnesota, Wisconsin, Indiana, Iowa, and Kentucky will continue to maintain their respective websites while adding the new parking locations to their databases, while the

remaining states will determine if they will integrate data with their respective traveler information sites. These websites may include a page specifically for “Truckers”. Dispatchers can use this information to inform their drivers of parking availability in the corridor. As seen in **Figure 5** below, Mi Drive is already utilized to show parking information on existing TPIMS along I-94.

Figure 5: The Mi Drive website is another mechanism for disseminating parking availability information

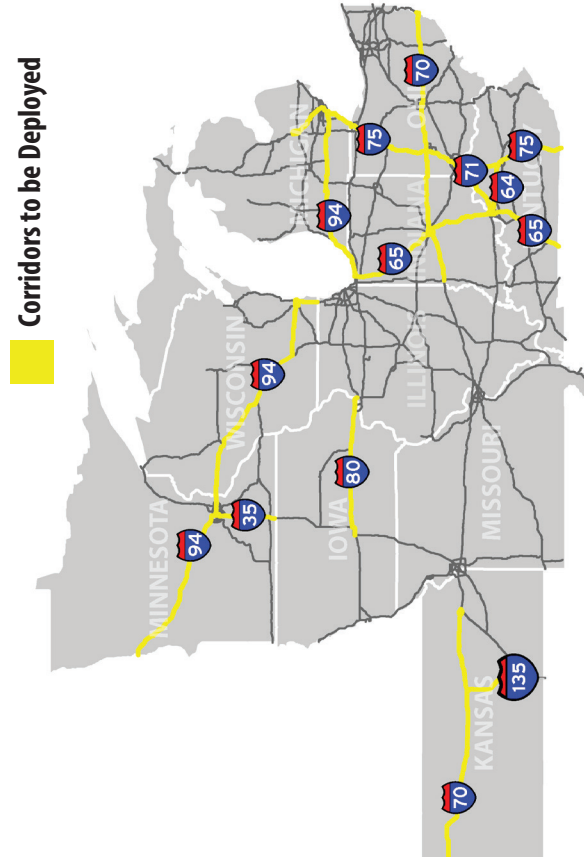


B. PROJECT LOCATION

The TPIMS project will be deployed across eight states which have each chosen specific corridors and locations to meet their particular needs. The Indiana, Kansas, Minnesota and Wisconsin DOTs will implement TPIMS at public facilities on their corridors. Michigan, Ohio, Kentucky and Iowa will implement at both public and private facilities to meet their truck parking availability needs. These facilities and corridors were selected for the following reasons:

- They carry high volumes of commercial vehicles, many of which are destined for large cities such as Kansas City, Des Moines, Indianapolis, Louisville, Chicago, Milwaukee, Detroit, Minneapolis, Cincinnati, Columbus, and Cleveland, among others. Commercial traffic uses the truck parking facilities along these corridors as staging and resting areas prior to delivering their loads to their destinations.
- State law enforcement agencies report that public rest areas and private truck parking facilities along these segments experience overcrowding that spills over onto rest area and interchange ramps and shoulders, creating safety and operational concerns. Enforcement of illegal parking is a growing challenge.
- Crash data compiled from the previous 10 years indicate that crashes involving trucks are common and many involve driver fatigue.

Figure 6: TPIMS Deployment Corridors



Corridor	State Deployed Across	Number of Deployed Rest Areas
I-35	Minnesota	3 DOT
I-64	Kentucky	2 DOT, 2 Private
I-65	Indiana, Kentucky	13 DOT, 5 Private
I-70	Ohio, Indiana, Kansas	32 DOT, 21 Private
I-71	Kentucky	1 DOT, 3 Private
I-75	Michigan, Ohio, Kentucky	14 DOT, 23 Private
I-80	Iowa	14 DOT, 10 Private
I-94	Michigan, Indiana, Wisconsin, Minnesota	16 DOT, 11 Private
I-135	Kansas	4 DOT

TPIMS Deployment Corridors

	<p>I-35 is a major north–south Interstate Highway in the central United States. I-35 stretches from Laredo, TX, on the American-Mexican border to Duluth, MN. I-35 serves as a main artery to the Midwest states by connecting Minneapolis, Des Moines, and Kansas City. The sections that will be covered by the TPIMS are from Minneapolis to Iowa.</p>		<p>In Kentucky, I-64 travels for 191 miles passing by Louisville, Frankfort, Lexington and Ashland. It has several major junctions within the state: I-65, I-71, I-264 and I-265 in Louisville, and I-75 in Lexington. TPIMS will cover the entire I-64 corridor in Kentucky.</p>
	<p>I-65 is a major Interstate Highway in the eastern United States. Its southern terminus is located in Mobile, AL, and its northern terminus is in Gary, IN, just southeast of Chicago. The TPIMS will be in place from Gary, IN south to the Kentucky/Tennessee border. I-65 serves as a main trucking route to Chicago, Indianapolis, and Louisville.</p>		<p>I-70 runs from Maryland to Utah, just over 2,150 miles, and is a major United States Interstate Highway running through many major cities including Denver, CO, Kansas City, KS, St. Louis, MO, Indianapolis, IN and Columbus, OH. TPIMS will be deployed on I-70 through Kansas, Indiana, and Ohio. The TPIMS deployment will cover over 800 miles of the highest truck volume sections of I-70.</p>
	<p>I-71 is an Interstate Highway in the Great Lakes/Midwestern and Southeastern region of the United States. Its southern terminus is in Louisville, KY and its northern terminus is in Cleveland, OH. While I-71 is designated a north–south highway, it is a major east–west route for cross-country traffic linking I-80 and I-90 to I-70 and ultimately (via I-65) to I-40. The section selected for TPIMS runs from Louisville, KY to Cincinnati, OH.</p>		<p>I-80 is a transcontinental limited-access highway in the United States that runs from downtown San Francisco, CA to Teaneck, NJ in the New York City Metropolitan Area. It is the second-longest Interstate Highway in the United States. I-80 runs through many major cities including Toledo, OH, Des Moines, IA, Omaha, NE, Salt Lake City, UT, Sacramento, CA and Oakland, CA, and passes within 10 miles of Chicago, IL and New York City, NY. TPIMS will be installed in Iowa along I-80 from the west side of Des Moines east to the Mississippi River.</p>
	<p>I-75 is a major north–south Interstate Highway in the Great Lakes and Southeastern regions of the United States and spans a total of 1,786 miles from Miami, FL to Sault Ste. Marie, MI. Due to high traffic levels on the interstate, much of the route is six lanes - even in rural areas. The areas that will be installed with the TPIMS are high truck volume areas from Flint, MI to the Kentucky/Tennessee border.</p>		<p>I-94 is a main artery for the northern states. I-94 is the northernmost east–west Interstate Highway connecting the Great Lakes and inter-mountain regions of the United States. I-94 is notable for being the only east–west Interstate Highway to form a direct connection into Canada connecting points from Seattle via I-90 to Toronto via Ontario Highway 401. TPIMS will be deployed from Moorhead, MN (the North Dakota/Minnesota border) to Port Huron, MI (the Canada/Michigan Border). I-94 is a main trucking route in which the TPIMS deployment will cover 928 miles of the most heavily trucked miles of the 1604 mile long corridor (57.9% of the total corridor).</p>
	<p>I-135 is a 95.7-mile-long Interstate Highway in central and south-central Kansas. I-135 runs between the cities of Salina and Wichita. The route also runs through the cities of McPherson, Newton, and Park City. The Interstate's northern terminus is at the junction of I-70 and its southern terminus is with I-35. TPIMS will cover the entire I-135 corridor in Kansas.</p>		



C. PROJECT PARTIES

The MAASTO TPIMS Project is proposed as a multi-state effort targeting major interstate and highway corridors to benefit the trucking community and safety of all motorists.

The Kansas Department of Transportation (KDOT) is the lead applicant for this project. KDOT will be coordinating and partnering with seven other State DOTs and MAASTO in order to construct, operate, and maintain this deployment. All participating parties in the proposed TPIMS Project are shown in the graphic on this page. All eight states committed matching funds and are ready to deploy TPIMS if selected for this grant.

The Michigan Department of Transportation (MDOT) has already deployed an initial TPIMS along the western half of the I-94 corridor from the Indiana border to Parma, MI. MDOT hopes to expand the project because of its ability to provide a safer, less congested I-94. In addition to deploying the system at public rest areas, MDOT has partnered and deployed the system with ten private truck stop locations to provide additional real time truck parking information to the truck drivers. The success of the project prompted MDOT to reach out to the MAASTO region to see if the system could be utilized along other corridors. MDOT has taken a lead role in organization and coordination of the project/application because of their positive experience with the TPIMS initial deployment.

The TIGER grant will also advance the efforts of several other states who have worked to provide information to their freight customers. Like MDOT, the Minnesota Department of Transportation (MnDOT) has deployed an information system related to truck parking. MnDOT recently completed a project with the University of Minnesota that developed and deployed video-based detection technologies at several rest areas along I-94 in the Twin Cities area. This information was then compiled and shared with truckers through portable-changeable message signs along I-94, and on a public website. In addition, the Kentucky Transportation Cabinet (KYTC) recently completed a study of truck parking.

Together, KDOT and the other partnering states are committed to deploying a consistent and innovative TPIMS as soon as the TIGER grant is successfully awarded.

Lead-Applicant	Partner
Partner	Partner
Partner	Partner
Partner	Partner

D. GRANT FUNDS

The TPIMS Project has a total estimated capital cost of \$36.6 million (in 2015 dollars).

Deployment costs include design, construction, and integration. Construction costs were estimated based on the 2013 bid tabulations for the I-94 TPIMS project. Planning and design cost was estimated as 25% of construction, integration was estimated at 10% of the construction cost, and Construction, Engineering & Inspection (CEI) was estimated to be 12% of construction costs.

Local Funding Source

The local funding source for the lead applicant and all project partners are state DOT funds. This project was determined to be a rural TIGER grant application as a majority of deployed sites are within rural areas as determined by the 2010 US Census. Even though there is no required match for a rural application, the eight-state MAASTO TPIMS Partnership has assembled a 10% state match and has all local matching funds committed and ready to deploy as soon as the grant is successfully awarded. As stated earlier in this application, **the TPIMS is a package of shovel-ready technology solutions to improve truck parking way-finding and efficiency for the trucking community.**



Project Budget

MAASTO Breakdown by State	Public Sites	Public Spaces	Private Sites	Private Spaces	Signs	Deployment Total (2015 \$)	90% TIGER Request (2015 \$)	10% State Match (2015 \$)	Annual State O&M (2015 \$)
Indiana	20	1,044	0	0	20	\$6,085,800	\$5,477,220	\$608,580	\$235,775
Iowa	14	263	10	2,060	14	\$4,980,864	\$4,482,778	\$498,086	\$423,336
Kansas	16	160	0	0	16	\$4,868,640	\$4,381,776	\$486,864	\$188,620
Kentucky	9	375	14	1,560	12	\$4,077,383	\$3,669,645	\$407,738	\$478,922
Michigan	8	194	22	942	8	\$4,020,089	\$3,618,080	\$402,009	\$662,556
Minnesota	5	130	0	0	8	\$1,775,000	\$1,597,500	\$177,500	\$68,289
Ohio	18	515	33	2,592	18	\$7,855,873	\$7,070,286	\$785,587	\$1,064,566
Wisconsin	7	241	0	0	14	\$3,000,000	\$2,700,000	\$300,000	\$82,521
Total	97	2,922	79	7,154	110	\$36,663,649	\$32,997,285	\$3,666,364	\$3,204,585

E. SELECTION CRITERIA

State of Good Repair

The MAASTO TPIMS Project will not add or replace existing truck parking facilities; rather, it will deploy an innovative package of ITS technology applications at existing facilities to optimize truck parking facility utilization and performance. TPIMS uses a system of sensors and cameras to convey traveler information to eliminate overcrowding and spread trucks across many available facilities. Overcrowding at facilities often causes trucks to park on the entrance/exit ramps or truck stop exits and the shoulders of roadways which leads to the degradation of the pavement in that area. Pavement on the shoulders and ramps was not designed to support parked vehicles for extended periods of time, especially at the loading requirements of commercial vehicles. The damage to the pavement has led to the need for expensive repairs over time.

In urban areas, truck drivers utilizing the TPIMS spend less time driving in urban settings looking for parking. Less time spent on urban streets decreases wear and tear on those roads. Reduced truck volume on urban streets also benefits motorists by decreasing congestion.

Economic Competitiveness

Truck parking improvements provide a number of strong economic benefits within the project corridors and helps strengthen the overall economic productivity and competitiveness of the entire Midwest.

- When deployed, a TPIMS is estimated to save the US economy billions of dollars each year, according to Traffic Technology International.⁴ It is estimated that the yearly cost of wasted fuel and lost working hours is \$7 billion and an average yearly cost of \$35 billion in damaged or stolen goods in transit in the US. The TPIMS Project would greatly decrease the time spent searching for parking and, in turn, decrease the amount of fuel used. Trucks would also no

longer be parking in low light locations such as the shoulders of freeways and exit/entrance ramps, which would deter theft. Assuming each driver saves 15 minutes while they seek parking, **annual driver time savings for the project corridors is estimated at over \$10 million.**

- A large-scale TPIMS will increase the ability of the U.S. to compete globally. The Midwest is known for its manufacturing industry and with explosive demand for just-in-time supply chains, an increase in efficient and reliable freight movement is needed to compete globally and increase both national and international trade. As shown in Figure 7 on the following page, truck traffic through the MAASTO TPIMS area is projected to greatly increase in the next 25 years. By proactively providing drivers with real-time parking information, the region will allow drivers to competitively move goods more efficiently, thereby supporting the region's manufacturing dominance and productivity.

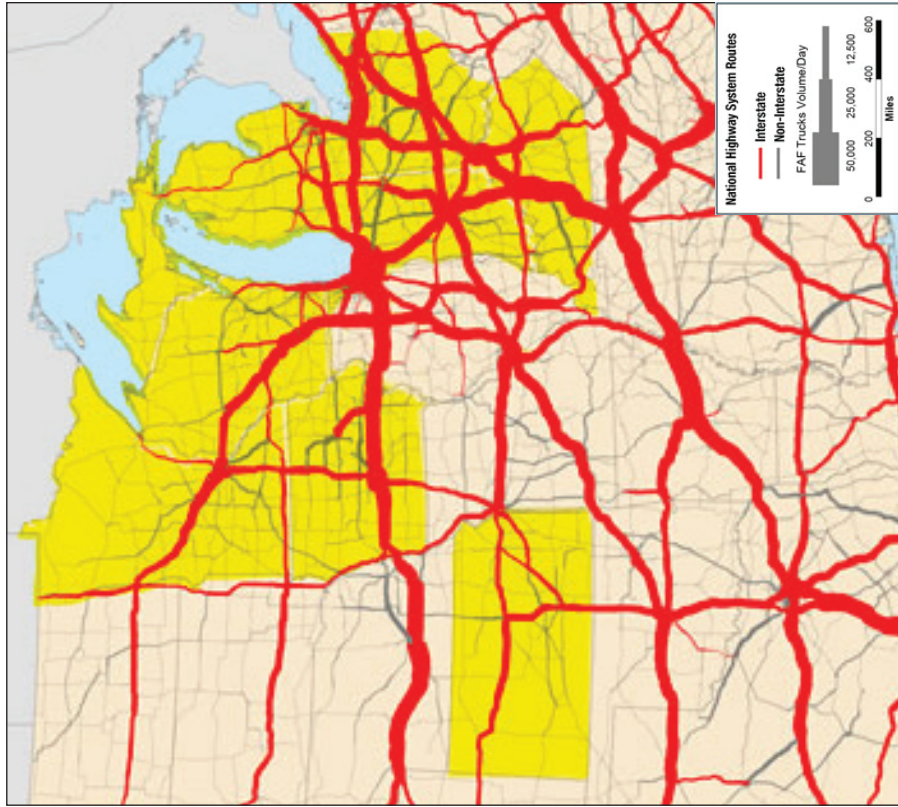
Quality of Life

This TPIMS project has the ability to improve the quality of life for all drivers on the roadway. Truck drivers utilizing the mobile traveler information web sites and dynamic truck parking signs will be able to locate a parking lot with available spaces instead of settling for an overcrowded lot or unsafe parking conditions. For those with sleeper cabs, a decrease in overcrowding and an increase in information about parking availability would allow for a much better night's sleep – essential for alert driving. Since commercial truck drivers have the greatest use for a TPIMS, their livability would be improved to the greatest extent, but the quality of life benefits extend to all highway users and nearby residents. Everyone benefits from fewer crashes caused by fatigued driving, adequate and appropriate rest area space for commercial vehicles, and reliable movement of goods.

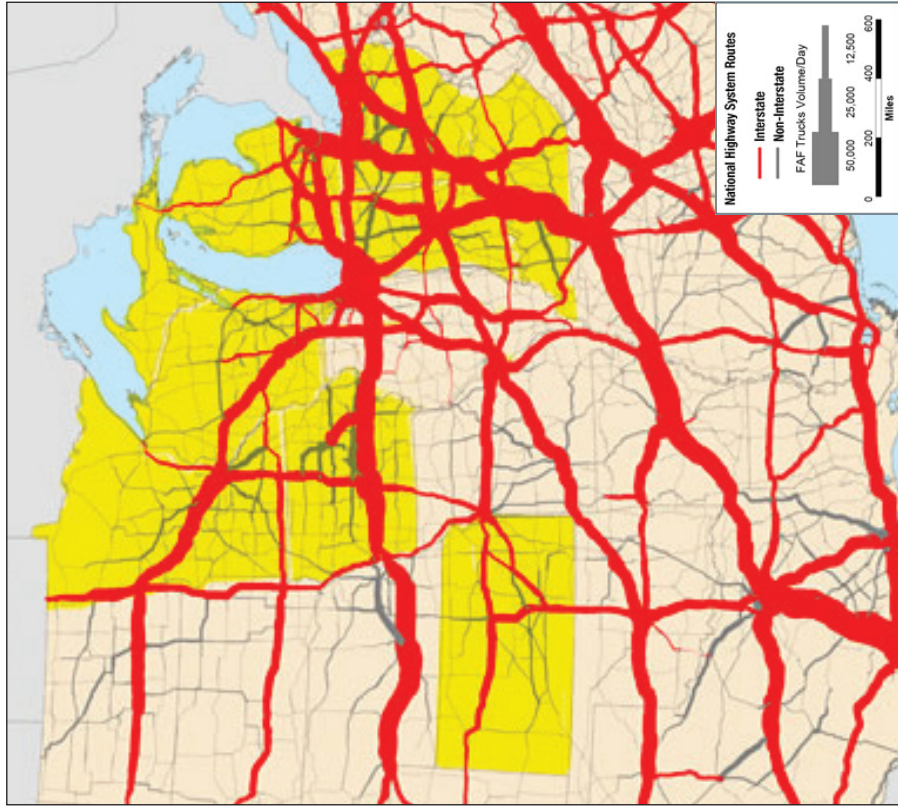
⁴“Smart Truck Parking System Set to Save the Economy Over US\$40bn.” Traffic Technology International n.d. Feb 2015. 64

Figure 7: Average Daily Long Haul Freight Truck Traffic on the National Highway System: 2011 and 2040

2011



2040



Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, *Freight Analysis Framework*, version 3.4, 2013.
Notes: Long-haul freight trucks typically serve locations at least 50 miles apart, excluding trucks that are used in movements by multiple modes and mail. NHS mileage as of 2011, prior to Map-21 System Expansion.

Environmental Sustainability

The longer it takes for a driver to locate parking, the more fuel is expended. TPIMS will make it easier for an operator to find a safe and convenient parking spot, which reduces the total amount of time a truck spends idling in traffic, consuming fuel, and creating emissions. Commercial vehicles are a large contributor to air pollution and TPIMS will greatly reduce the amount of unnecessary air pollution that is released into the environment from circling and seeking parking. **With an average two gallons of diesel fuel used in 15 minutes of searching for parking, over 176 metric tons of CO₂ emissions will be reduced every day on the MAASTO TPIMS corridors.**

In addition, directing trucks to a safe resting area keeps them off shoulders and ramp areas. Keeping trucks that haul environmentally harmful materials (such as hazardous materials, like oil and gas) off the shoulders of busy highways is especially important. A crash involving hazardous materials will potentially have irreversible effects on the quality of water, wetlands, and air. Providing short term solutions for locating truck parking efficiently, including for trucks hauling hazardous materials, is critical in promoting environmental sustainability.

Safety

As has been demonstrated successfully with the I-94 TPIMS deployment in Michigan, readily available information about safe truck parking reduces the overcrowding at rest areas and truck stops, decreasing the amount of incidents involving commercial vehicles parked on the shoulders of the highway and ramps. Additionally, several studies have linked parking shortages to increased crash rates. In Michigan, study results showed a positive relationship between rest area spacing and fatigue-related truck crashes with a significant increase in crashes, “when rest area spacing exceeded 50 mi.”⁵ A similar study in Minnesota showed that single truck crash densities increased at all times of the day with rest area distances greater than 30 miles.⁶ Both studies concluded that increased crash rates were related to overcrowded or insufficient available truck parking.

Moving off the road provides improved safety for drivers and security for the goods they are transporting. Jason Rivenburg, as previously mentioned, was a commercial vehicle operator whose tragic circumstance left his family without a husband and father. **Providing easier access to safe parking can help prevent future tragedies while generating more than \$100 million in safety benefits.**

Secondary Selection Criteria

Innovation

KDOT and their partner State DOTs are building off the innovative projects deployed by Michigan and Minnesota for this regional TPIMS deployment.

The TPIMS Project represents the assembly of existing technologies – such as video and magnetometer detection – in an innovative way to drive safety and economic benefits for the region’s freight network. Each of the sensing technologies utilized by the project are proven, which provides a high degree of confidence. However, when marrying these individual technologies in new and innovative ways, the MAASTO TPIMS Partnership can drive new value for system users.

The application of these technologies for previous TPIMS in Minnesota and Michigan was a leap forward in the utilization of existing detection technologies to solve a unique problem. In Minnesota, the project partners utilized common video cameras with stereoscopic video analytics to create a presence based detection system. Michigan project team members noted that previous traffic detection efforts focused on advancing technologies and determining the most accurate

⁵Taylor, W.C., N. Sung, K. Kolody, A. Jawad. A study of Highway Rest Areas Characteristics and Fatigue Related Truck Crashes. Michigan state University, Lansing. July 1999.

⁶SRF Consulting, Inc. Interstate Highway Safety Study. Analysis of Vehicle Crashes Related to Related to Safety Rest Area Spacing. Minnesota Department of Transportation, Saint Paul, July 2007

technology systems. With the I-94 TPIMS, the Michigan team elected to develop a more holistic approach where overall system reliability – not accuracy – was paramount for driver adoption and project success. By supplementing off-the-shelf devices with human error correction, the project team was able to increase the reliability of the data without intense research and development expended by other projects.

These approaches will be repeated for the entire MAASTO TPIMS project. For example, typical traffic sensors (video, magnetometers, radar) are intended to be used on tangent sections of roadway at consistent speeds above 30 mph. However, these conditions rarely exist at rest areas or truck stops. The MAASTO TPIMS project will deploy simple video cameras combined with analytics for object tracking and vehicle classification; applications that have existed in the defense market for years. This innovative combination of existing technologies will enable the TPIMS project to achieve a high reliability for the drivers. **Drivers can count on the system to provide accurate information in order to make a smart, safe, efficient decision.**

Partnership

While the partnership demonstrated by the collaboration of eight State DOTs and MAASTO is impressive, this project represents a larger collaboration between public and private sector partners striving to improve parking conditions for the nation's truck drivers. The MAASTO TPIMS Partnership has received letters of support from both private truck stop operators and national trucking companies. Because at least 70% of the region's truck parking spaces are privately owned, relationships like these will be critical to the overall parking solution. By encouraging parking to take place at designated public and private facilities, instead of along the highway, state and private partners will come together to

battle a significant safety, economic and environmental issue. In addition to the partnership between public and private sectors, the collaboration between the MAASTO TPIMS partners presents opportunities to drive greater consistency in the national freight network. The partner states will develop standard design criteria and details to be used throughout the region, providing the uniformity that drivers demand. The project will also facilitate the adoption of a common software API, creating the ability to share availability data within the region, but also with private sector parties who may be able to integrate the information into existing truck traveler information services. The standardization of a truck parking API will also enable collaboration and partnership with other groups working on truck parking projects, such as the I-95 Coalition, Florida DOT, and Federal Motor Carrier Safety Administration. This initial deployment will set the stage for future expansion of TPIMS across the country bringing State DOTs, truck stop operators, fleets, and over-the-road drivers together to provide timely and reliable information to make smarter, safer and more efficient parking decisions.

F. RESULTS OF BENEFIT-COST ANALYSIS

The benefit-cost analysis for this proposal was completed using project performance data collected from the eight states that are participating in the region-wide TPIMS deployment. Inputs used to determine the benefits include:

- Benefit from reduction in crashes related to commercial driver fatigue;
- Benefit from travel time savings due to reduced number of crashes;
- Benefit from travel time savings for commercial drivers; and
- Benefit from reduced CO₂ and other emissions.

The analysis was conducted following the procedures set forth in the TIGER Benefit-Cost Analysis (BCA) Resource Guide from March 2015. **Safety, travel time, and environmental benefits total over \$403M in undiscounted dollars, leading to a Benefit-Cost ratio of 4.27.** With 3% and 7% discounts, the project Benefit-Cost ratio is 3.78 and 3.35, respectively. The full values and benefits are presented in the table on the right, and discussed in detail below.

Safety Benefits

To calculate the safety benefits of this proposal, safety data was collected from each of the eight participating states for the corridors involved in the deployment. A 10-year history of crashes involving commercial vehicles with driver fatigue as a contributing factor was available for analysis.

From the historical data, an annual average was derived for the number of crashes, injuries, fatalities, and incidents of property damage. Data on property damage was not available for all states, but based on those states where property damage data was provided, an average property damage cost was generated, then divided by the miles of deployment. That factor was then applied to the miles of deployment in the other states' corridors. The injury data was converted to the Abbreviated Injury Scale (AIS) according to the BCA guidance. Injuries, fatalities and property damage were then valued according to the BCA guidance.

Measure	Undiscounted (2013 \$)	NPV Discounted at 3%	NPV Discounted at 7%
Safety Benefit	\$107,139,265	\$72,734,574	\$45,677,214
Travel Time Benefits	\$206,344,580	\$140,082,959	\$86,550,788
Environmental Benefits	\$89,574,770	\$60,466,668	\$46,927,508
Total Benefits	\$403,058,614	\$273,264,201	\$179,155,509
Deployment Costs	\$36,663,649	\$33,063,805	\$28,949,491
Maintenance Costs	\$57,682,548	\$39,159,458	\$24,592,087
Total Cost	\$94,346,197	\$72,223,263	\$53,541,577
Benefit-Cost Ratio	4.27	3.78	3.35

Some of the key findings of the analysis include the following:

- In rest area proximity studies done in Michigan⁷ and Minnesota⁸, the data demonstrates that unavailable or inconvenient parking is linked to increased crash rates.
- Estimates of the percent of crashes related to commercial driver fatigue vary widely, from just under 2% when most narrowly defined in the California research to a number closer to 20% based on research done in Australia.⁹
- In the "The Large Truck Crash Causation Study - Analysis Brief Federal Motor Carrier Safety Administration Office of Research and Analysis Publication No. FMCSA-RRR-07-017 July 2007," approximately 12% of crashes were attributed to "driver non-performance," which includes fatigue, as well as other possible causes such as a heart attack or failure of other causes to explain the crash.¹⁰

To analyze potential safety benefits, a projection of future truck traffic and an estimate of the percent of commercial driver fatigue-related crashes that could be avoided by deployment of this system is necessary. While there is a wide variety of research into the connection between access and availability of truck parking on truck operator fatigue, and the relationship of fatigue to performance and crashes, there is no readily available projection regarding the number of crashes that might be eliminated if the problem were more effectively addressed.

The assumption for the purposes of this analysis is that region-wide implementation of the TPIMS has the potential to reduce the number of driver-fatigue-related crashes by 10% annually. If that is the case, implementation of TPIMS throughout the region would generate safety savings of \$4,877,993 annually. These savings, when projected to 2035, amount to \$107,139,265. When the 20-year safety savings are discounted at 3% the total comes to \$72,734,574; at 7%, those 20-year savings are \$45,677,214.

Economic Competitiveness: Travel Time Benefits

Travel time benefits have two components:

- Benefit to the general public from reduced crashes and subsequent lane closures, and
- Benefit to commercial truck drivers from increased productivity as a result of easier access to available truck parking.

To generate an estimated cost of travel time delay due to driver fatigue crashes, the percentage of urban and rural miles of corridor were calculated, and the number of crashes per state were distributed accordingly, and then aggregated. The total number of urban and rural crashes were then multiplied by the estimated delay time cost for rural and urban interstate miles, according to values cited in the Federal Motor Carrier Safety Administration's Report, Delay and Environmental Costs of Truck Crashes, released in March 2013.

The benefit to the public relies on the earlier estimate that deployment of TPIMS throughout the Midwest region has the potential to decrease the number of commercial driver fatigue-related crashes by 10%. Using that projection, the savings to be gained from reduced travel delay is an estimated \$649,219 per year. These savings, when projected to 2035, amount to \$11,685,933. When the 20-year savings are discounted at 3%, the total comes to \$7,993,332; at 7%, those 20-year savings are \$3,561,002. This represents significant travel time benefits and savings once the TPIMS Project is deployed.

⁷<http://www.tac.vic.gov.au/road-safety/statistics/summaries/fatigue-statistics>

⁸Taylor, W.C., N. Sung, K. Kolody, A. Jawad. A Study of Highway Rest Areas Characteristics and Fatigues Related Truck crashes. Michigan State University, Lansing. July 1999.

⁹<http://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts-2012>

¹⁰Crashes; SRF Consulting, Inc. Interstate Highway Safety Study. Analysis of Vehicle Crashes Related to Safety Rest Area Spacing. Minnesota Department of Transportation, Saint Paul, July 2007

	Number of Crashes per Year	Average Value of Delay by Road Type (2013 \$)	Average Annual Cost of Delay
Urban Crashes	92	\$58,888	\$5,669,369
Rural Crashes	223	\$3,694	\$822,816
Total	315	NA	\$6,492,185

The second component of travel time benefits relates to time saved for commercial drivers looking for a safe place to rest at the end of their hours of service. **A 2013 survey of 4,000 truck drivers suggests that 83% of drivers spend more than 30 minutes looking for parking; 39% stated that they take longer than an hour to find parking.**

To calculate the savings in driver time to locate parking, a conservative estimate of 15 minutes in driving time savings per driver was assumed, with 80% utilization of the parking spaces included in the deployment. The value of driver time savings was then calculated according to BCA guidance. **The result is an expected annual driver time savings of \$10,814,369 per year. These savings, when projected to 2035, amount to \$216,287,386.** When the 20-year savings are discounted at 3%, the total comes to \$151,654,734; at 7%, those 20-year savings are \$100,067,763. This represents significant driver time savings as a result of being able to more efficiently locate available parking.

There are other economic benefits that have not been quantified for this analysis. For example, shippers that use the corridors could see greater reliability in freight delivery. **There are 86 “Fortune 500” companies located in the eight Midwestern states participating in this proposal; even those that do not ship freight will benefit from safer, more reliable interstate travel.** Finally, many of these routes serve international freight shipments from border crossings into Canada or to deep-water international ports on the east coast and in the south. This helps improve the overall global competitiveness of goods movement as a result of the TPIMS project.

Environmental Sustainability Benefits

Reducing the number of miles that commercial vehicles drive during their search for safe parking also offers significant environmental benefits through reduced CO₂ and other diesel emissions. If a truck driver saves an estimated 15 minutes in drive time that would otherwise be spent looking for a safe place to rest, and instead use the time more effectively and productively by getting closer to his or her destination, that saves an estimated two gallons of diesel fuel. Using the number of parking spaces to be included in the deployment, and assuming 80% utilization of those spaces through the TPIMS, the reduction in CO₂ and other emissions was calculated using information from a 2008 Environmental Protection Agency Report “Emission Facts – Average In-Use Emissions for Heavy Duty Trucks” based on the reduction in use of diesel fuel. Those tons of emissions reductions were then valued according to BCA guidance. The result is annual savings from reduced emissions of \$4,464,701.

Reducing CO₂ emissions adds greater value in the future as compared to other pollutants or monetary savings, which are discounted due to inflation. **The anticipated 20 year savings from reduced CO₂ and other emissions, according to BCA guidance, will be \$89,574,770. The 3% and 7% discounted 20 year savings will be \$60,446,668 and \$46,927,508, respectively.**

G. PROJECT READINESS

Technical Feasibility

The TPIMS project includes deployment of new technologies at parking facilities and roadside locations. However, all project partners have experience with successfully deploying the same types of technology for different applications. From Dynamic Message Signs and traffic detectors used for Freeway Management to CCTV cameras and presence detection at arterial intersections, the proposed TPIMS can be integrated with most existing Advanced Transportation Management System (ATMS) software packages in place. **This means that TPIMS can be deployed rapidly and seamlessly across the eight-state region.**

While emerging technologies will continue to be considered for use in the future, the architecture that the MAASTO TPIMS Partnership has proposed allows flexibility for each state, and each site for that matter, to use a variety of vehicle detection technologies at the same time. This provides interoperability, and also allows for easy technology upgrades and replacements that do not depend on other partner agencies using the same equipment.

Some specific technologies that will be evaluated as part of the design process include path tracking and object recognition from Department of Defense appli-

cations. However, TPIMS is not reliant on any one specific technology and can use a number of previously deployed technologies for vehicle detection, including those already deployed by Michigan and Minnesota.

Financial Feasibility

The MAASTO TPIMS Partnership is fully prepared to commit the proposed local grant matching funds to make this project a reality. This match is a portion of the annual allocation the MAASTO TPIMS Partnership has made to ITS technologies, and an overall commitment to using technology to improve the safety and efficiency of the Midwest region’s transportation system. **Further, through past project work on I-94 in Michigan and Minnesota and on other ITS deployments, there is a high level of confidence in the early cost projections for this project, and that the requested funding level is sufficient to meet the needs of full implementation.**

Project Schedule

Planning and site identification for the MAASTO TPIMS Project is currently underway, with operations expected to commence in the first quarter of federal FY 2018. All funds will be obligated no later than January 31, 2016 to allow for the team to continue detailed design, well in advance of the statutory deadline of September 30, 2017. The MAASTO TPIMS Partnership expects to be able to immediately initiate development of Design/Build procurement documents through

Figure 8: TPIMS Project Schedule

Project Schedule	FFY 2016				FFY 2017				FFY 2018				
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	
Obligation of Tiger Grant Funds	★												
Planning and Stakeholder Coordination													
Design													
Construction													
System Launch										★			
Operational													↑

existing on-call contracts once project locations and requirements are finalized. Construction and integration of the system is anticipated to begin mid-2017, with the first sites coming online in October 2017. The project is anticipated to be completed and operational by the end of 1st quarter, federal FY 2018.

Assessment of Project Risks and Mitigation Strategies

The following section summarizes the most significant risk areas with the proposed TPIMS Project, and the project partnership's plan to address them:

Private Owner Engagement

- *Risk:* Some private truck stop owners are apprehensive about allowing the truck parking technology to be built on their lots for fear of government overreach, which may delay installation at some locations.
- *Mitigation:* Extra time has been built into the planning phase of the project to provide enough time for coordinating and scheduling for installation on private lots. Also, standardizing deployment agreements will allow all organizations to understand what has been agreed to in the past and what the requirements will be in the future, thus fostering cooperation instead of apprehension. Providing specifications and requirements in an easy to read format will allow owners to know what they are responsible for and what each state is responsible for within the deployment process. Finally, unified agreements with national truck stop operators will make it easier to install on independent truck stop chain operators, rather than approaching each operator as a separate entity. These mitigation measures are all best-practices from the successful I-94 TPIMS project in Michigan, where 10 private truck stops were integrated into the network.

Inter-State Communication and Data Sharing

- *Risk:* If each state acts as an independent entity, there is a risk of incompatible data and communication plans. This would not serve the purpose of acting as a regional cooperative to increase commercial vehicle safety and traveler information for truck drivers.



- *Mitigation:* Communication and cooperation are also keys to the success of the program. MAASTO will appoint a task force to develop compatible platforms across the MAASTO region. MAASTO's task force will use lessons learned from Michigan's I-94 project and Minnesota's University of Minnesota project to build standards for information dissemination (i.e. dynamic roadside signs) as well as data sharing (Application Programming Interface). MAASTO will also rely on the program management task force to set design criteria. This will allow the individual states to use preferred design and procurement methods in order to utilize processes that minimize risk profile while creating a unified regional deployment.

Technology Accuracy, Type and Integration

- *Risk:* The accuracy and reliability of the individual systems is dependent on the quality of the data collection. Accuracy and reliability are key to providing truck drivers with the best information available to plan their rest stops and parking needs.

- *Mitigation:* One way to increase accuracy is to perform manual counts and system resets during key time-frames for increased reliability. Additionally, path tracking and object recognition technologies could be used to track vehicles entering/exiting a parking facility and determine the classification of the vehicle (car v. truck). This simple, yet powerful, application could be economically deployed with a project the size of MAASTO TPIMS, leading to a more autonomous and robust system with less operational cost.

Ongoing Operations and Maintenance Budget

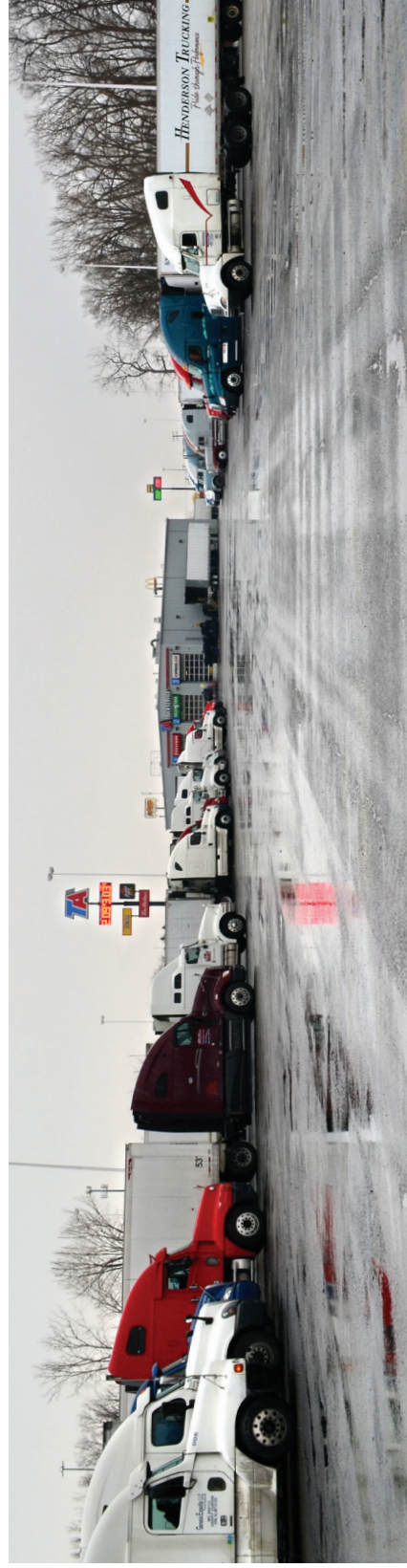
- **Risk:** MAASTO partners could become burdened with the ongoing operations and maintenance (O&M) costs associated with the truck parking systems. Therefore, system could become unsustainable in the long-term.
- **Mitigation:** MAASTO partners can enter into public-private ventures that result in O&M costs being mitigated as private companies operate the system for individual states. **The TPIMS Partnership will explore options with private entities that would reduce or eliminate the O&M burden from the states in the future.** Options include privatization of the traveler information services, sponsorships, and other arrangements.

Environmental Approvals

The proposed TPIMS Project will utilize existing state DOT ITS infrastructure as well as include the addition of new traffic sensors, cameras, and dynamic truck parking signs placed at or around the rest area locations and at interchanges. The placement and operation of the additional equipment is not expected to have any negative direct, indirect or cumulative environmental impacts. The project is fully expected to be environmentally classified as a Categorical Exclusion per each state's applicable environmental laws and regulations. The approximate locations of work will be determined and an environmental review will be completed prior to final design activities.

State and Local Planning

The Project is in conformance with state and local plans, including the statewide freight plans developed by Partnership states. The TPIMS Project also supports the charter adopted by the Mid-America Freight Coalition by "evaluating, implementing and operating technologies and other roadway appurtenances from a regional perspective and in a manner that supports the reliable, efficient and safe movement of freight."¹¹¹ If awarded funding, the project will be expeditiously included in each state's Transportation Improvement Program (TIP).



¹¹¹"MAFC Charter," Mid-America Freight Coalition RSS., 2015.

H. CONCLUSION

The MAASTO TPIMS Partnership Value

Kansas, Indiana, Iowa, Kentucky, Michigan, Minnesota, Ohio, Wisconsin and MAASTO are all committed to improving the quality and efficiency of the Midwest region's freight network. By collaborating with private truck stops and freight carriers, the Partnership will deploy the TPIMS Project on key freight corridors to provide truck drivers with real-time information related to truck parking availability. This system, comprised of innovative combinations of shovel-ready technology and applications, will facilitate smarter, safer and more efficient parking decisions. The safety, economic, and environmental improvements made possible by the system will generate a staggering \$403 million in benefits. This \$36.6 million TIGER grant request, coupled with the identified local matching funds for capital deployment as well as ongoing O&M, generate an impressive total benefit-cost ratio of greater than 4:1.

The MAASTO TPIMS Project is a model for regional collaboration and is scalable to the entire national freight network. On behalf of the entire MAASTO TPIMS Partnership, the Kansas Department of Transportation respectfully requests full funding of the Project.





I. FEDERAL WAGE RATE CERTIFICATION

Signed certifications are available at www.maasto.net/TIGERgrant.html.

APPENDICES

Appendix A: Benefit Cost Analysis

Benefit Cost Analysis is available at www.maasto.net/TIGERgrant.html.

Appendix B: Letters of Support

Letters of Support are available at www.maasto.net/TIGERgrant.html.



CHAPTER 4: APPENDIX

Appendix 4.A: *Truck Parking Strategy Summaries*

Description

Truck parking issues can be exacerbated by drivers not knowing where formal parking areas are located and the amenities they provide. This is easily remedied by providing drivers with a regularly updated truck parking guide that includes a truck parking map and information on the services provided at each parking location (public and private). The guide can be provided in paper and electronic forms (through social media, state websites and public- or private-sector apps). It can be promoted during the credentialing process, through an informational campaign and other marketing mechanisms.

This kind of information, once produced, can be provided to geolocation and mapping services (Google, Apple, Mapquest, Waze, etc.) as a truck parking information layer that includes locations and information on the services provided at each public or private parking location.

Target market

Truck drivers who infrequently travel the Kansas roadway network or who use multiple routes within the network will benefit from the information provided. While truck drivers that travel a corridor on a regular basis have knowledge of parking facility locations and the amenities provided at them, truck drivers that travel along a corridor less often can benefit from the information when planning a route through Kansas.

Key benefits

Truck drivers and trucking company dispatchers will have accurate information about the location of truck parking spaces and the type of amenities provided. KDOT and KTA can ensure that the information provided in the guides is accurate and private truck parking locations promoted provide at least a minimal amount of service.

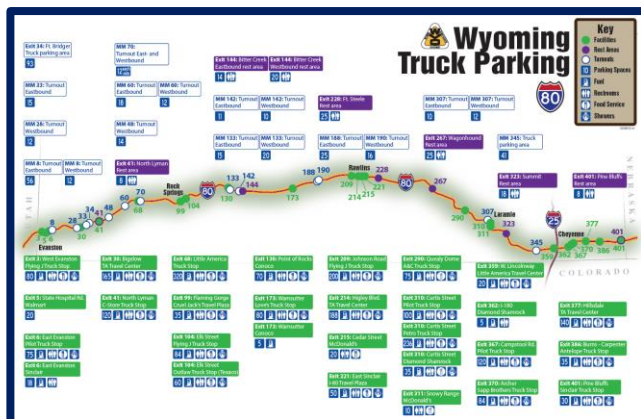
Implementation considerations

Adequate DOT or KTA staff must be available to periodically update the map. An on-line version of the map can be updated when the status of a truck parking area changes such as a private truck stop closing or a public parking area being closed for maintenance. To allow for these updates, truck parking availability must be monitored. Local KDOT and KTA staff will need to report changes impacting truck parking in their area.

Criteria will need to be developed for minimum service levels that a private truck parking facility must provide to be included in the guide. This could include a minimum number of truck parking spots or the type of security measures that are in place. Including a private facility in the guide will constitute a certain level of state endorsement. Private sector information providers currently provide some information on truck parking along key corridors in the Kansas. These on-line resources are focused on services provided along the corridor. Information about the number of truck parking spaces and availability is not currently provided.

Implementation examples

The Wyoming DOT publishes a truck parking map that provides information on public and private truck parking along I-80, I-90 and I-25. The number of total spaces at each parking location is provided along with the type of amenities available (fuel, restrooms, food and showers).



Strategy Implications

Cost: ●○○○○

Time: Short-term

Impact: State

Who: State

Hurdles: Development Time, Budget

Description

Parking decisions by truck drivers are made at various points during their journeys: hundreds of miles before their destinations; approaching exits to known facilities; or at parking lots when the lack of parking slots force a decision to move on to another location. At each of these points, adequate signage about parking options may cause truckers to avoid parking wherever possible regardless of safety or legality (such as at entrance and exit ramps, abandoned businesses or other locations that may be unsafe or lack security). Maximizing usage of designated parking areas through informed decision making requires informing truck drivers of options at multiple decision points in their travels by using various parking-related signage. This signage may be located in other states, along the public right of way, on ramps, and at the entrances and exits to public and private parking areas. For simplicity and cost effectiveness, these can be static signs providing the location, direction and distance of the nearest available alternative truck parking facilities.

Target market

Truck drivers looking for truck parking that are fatigued or nearing the maximum service hours are the target of this tactic; particularly, those who infrequently travel to or through Kansas, or who often use many different routes to make their pick-ups or deliveries.

Key benefits

Drivers will be able to make better parking choices using information provided by the static signs: where truck parking is available; the distance to the truck parking; and directional assistance in finding the parking. Reductions in ramp and other illegal/informal parking choices would improve safety for truckers and other members of the motoring public. Reduced truck parking on ramps will also benefit KDOT and KTA by decreasing ramp repairs and maintenance, since they were not designed to safely support parked vehicles for extended periods of time, especially commercial vehicles. Law enforcement agencies will be able to focus resources on higher value targets, rather than enforcing parking regulations.

Implementation considerations

This program would require development of standardized signage design, location and placement prioritization. Criteria for referring drivers to the next truck parking facility needs to be clear for drivers as well as for private facility operators who may question why they are or are not referenced in signage. Policy implications of referring drivers to private facilities will need to be considered, such as whether there is a need to indicate whether parking is public or private and the minimum service levels a private truck parking facility must provide to warrant installation of a sign (minimum number of truck parking spots, type of security measures in place, etc.). Legal issues related to sign placement in the right of way and the implied endorsement of a private facility stemming from signage references will need to be addressed.

Implementation examples

States such as Maryland, Connecticut and California have expanded their truck parking signage to better match demand with resources. The federal government opened the door to additional parking signage as part of the Interstate Oasis Program mandated in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation. An Interstate Oasis is a facility near an Interstate highway that provides products and services to the public, such as public restrooms, automobile parking and truck parking. These facilities must be open 24 hours per day, seven days a week. To provide or allow Interstate Oasis signing, a state must develop a statewide policy, program, procedures, and criteria for determining which private facilities are eligible. The DOTs in Vermont and Utah have designated Interstate Oasis facilities to supplement existing public rest area facilities and expanded signage directing truckers to these areas.



Strategy Implications

Cost: ●●○○○

Time: Short-term

Impact: Corridor

Who: State

Hurdles: Funding

Description

The availability of truck parking spots in Kansas parking areas changes constantly as truck drivers come and go from their resting periods. However, truck drivers typically have only their own experience as a guide for assessing whether a parking lot they are considering using will be full by the time they pull in for their break. Consequently, many drivers simply park wherever they can – legally or illegally – rather than run the risk of burning valuable hours of service driving to a parking facility that they may not be able to use once they arrive. Technology would enable KDOT, KTA and potential private industry partners to monitor and report in real time the number of available truck parking spaces at public rest areas and/or privately owned truck stops. The number of available spaces then can be communicated to truck drivers and trucking company dispatchers through roadside dynamic message signs, on-line traveler information sites and other smart phone applications. A combination of vehicle counting technology and video surveillance is required to accurately monitor truck parking availability. Roadside dynamic message signs can be hybrid static/dynamic signs that show both public and private availability.

Target market

Truck drivers and commercial operators planning their route, traveling a corridor when fatigued, or nearing the maximum service hours will benefit the most from this tactic. The real-time information will allow for more educated decisions to be made about what corridor to use and where to stop along the route. Trucking company dispatchers can use the on-line information or smart phone applications to assist their drivers in making decisions about where to park.

Key benefits

Proposed signs will notify drivers that truck parking is available, display the distance to the truck parking, and provide assistance in finding the parking. Truck drivers will know where parking spaces are available at public and private facilities and can make better decisions on how far they can drive given their service hour status and need for rest. This will allow underutilized parking facilities to be used more often and reduce illegal parking on ramps near the lots that typically reach capacity first. The number of available spaces can also be published as a data feed for sharing availability information in KDOT/KTA platforms, 511, third party driver-focused applications, and fleet management systems.

Implementation considerations

A combination of vehicle counting technology and video surveillance is required to accurately monitor truck parking availability. Determining truck parking availability at private truck stops can be challenging. Access points generally carry two-way traffic flow and the geometrics result in unique vehicle movement; also, parking spaces are often not formally delineated. To address these challenges, truck counting for parking space usage must be supplemented with manual resets, usually in late afternoon or early evening to improve accuracy during peak nighttime parking period. Video surveillance cameras are used by operations staff to reset the number of available spaces each day. To monitor truck parking availability at private truck stops, truck counting sensors and video surveillance equipment must be located on private property. Funding the construction and maintenance of the equipment on private property will likely require special consideration along with right-of-way agreements to install equipment. Given the effort required to monitor truck parking availability accurately, disseminating the information as widely as possible will make the system the most cost effective. Along with providing the truck parking availability information on roadside signs and DOT traveler information platforms, the information can be shared with the private sector for repackaging and distribution. Leveraging private sector information channels will help inform truck drivers where available parking spaces are located. A multi-state deployment of truck parking information systems will increase the usefulness for the system.

Implementation examples

The Michigan DOT has implemented a Truck Parking Information and Management System for the I-94 corridor. The system monitors truck parking availability at five public rest areas and ten private truck stops along the corridor. Truck parking availability is reported on dynamic message signs and through on-line and smart phone channels.

**Strategy Implications****Cost:** ●●●●○**Time:** Mid-term**Impact:** Corridor,
Region**Who:** State, Private**Hurdles:** Funding, Staffing, Accurate sharing of information by different technology applications

Description

Inventories of truck parking on the Kansas Statewide Freight Network reveal that part of the state's parking issues arise from inefficient use – or sub-optimal parking space configurations – of existing parking assets.

Addressing these issues first would reduce the required number of new parking areas to be constructed and highlight where the remaining greatest need is within the freight network. This could be accomplished by making parking layout and striping improvements to boost parking efficiency as a regular part of facility maintenance and rehabilitation planning at existing truck parking locations.

The same maintenance cycle could be used for identifying how many parking slots, and where, could be added to existing public facilities that are near or over their maximum utilization rates. Only once these steps were taken should new capacity construction be considered where existing public and private facilities are experiencing unmet parking demand or where there are a large number of trucks illegally parked nearby.

Target market

Truck drivers parking at rest areas, turnpike service plazas and private parking facilities, as well as truck drivers that are parking illegally on ramps or in other locations because there are no available parking spaces.

Key benefits

When truck parking spaces are not well delineated, truck drivers more often park in a manner that fails to maximize the efficient use of space in the available truck parking area. A well designed truck parking layout with pavement marking delineation will effectively increase a parking area's capacity.

Additional truck parking spaces strategically located in expanded existing public and private parking facilities can address excess demand for truck parking. When truck drivers cannot find an available space, they either park illegally or have to extend their trip while tired or exceeding their service hours. Illegal parking can be unsafe for the truck driver and other roadway users. Trucks parked on ramp shoulders represent obstacles in the normal clear zone. An illegal parking location may also be unsafe from a security standpoint. Optimizing Kansas truck parking before considering new capacity construction means KDOT and KTA can most efficiently invest their resources where needs cannot otherwise be met. Once these steps are taken, strategically locating new parking facilities where they are needed most to address unmet parking demand could provide the trucking industry greater productivity and reliability as they travel along their designated routes through Kansas, and encourage more truck traffic to utilize the Kansas Freight Network.

Implementation considerations

Improved truck parking layouts should accommodate efficient traffic flow, safe pedestrian movements and potential oversized/over height loads. Improved layouts or additional spaces in existing lots may be more cost effective since they leverage existing services and supporting utilities. Providing new parking spaces connected to an existing service interchange eliminates the need to add additional access to a freeway route. Property at these service interchanges can be very valuable, so the cost of additional right-of-way can be a challenge. In rural areas with longer distances between interchanges, truck parking turnouts can be constructed to minimize or eliminate the need for additional right-of-way. These truck parking turnouts would park vehicles parallel to a central circulation roadway that runs adjacent to the mainline.

Implementation examples

An example of this approach is represented by the 23 new truck parking spaces constructed on I-94 at Watervliet in Michigan. The project at I-94 and M-140 in southwest Michigan was built to improve safety and address parking shortages. Funding for this project included money from the Federal Truck Parking Facilities Program.

**Strategy Implications**

Cost: ●●●○○

Time: Mid-term

Impact: Spot

Who: State, Private

Hurdles: Funding, Cost and Need for Right-of-Way

Description

Kansas public and private parking lots do not generally have designated parking spaces or way-finding information on parking for longer-combination vehicles (LCVs). These doubles and triples are combinations of multiple trailers attached to one truck and, due to height and weight limits, typically have special parking needs. LCVs also require breakdown areas where they can drop off and pick up loads since some border states do not allow LCVs on their roadways. This strategy involves improving existing and future planned parking facilities and truck parking way-finding to better accommodate the needs of overweight and oversize vehicles. Making these changes at facilities close to state borders or major regional route intersections will position Kansas to better serve - and attract - LCV traffic using multi-state regional corridors that logically tie in to the Kansas Statewide Freight Network.

Target market

This strategy is aimed at truck drivers operating oversize or overweight vehicles and dispatchers assisting them with routing and parking decisions. Improved parking facilities and way-finding will benefit Kansas by motivating the target market to choose Kansas-favored routes to use.

Key benefits

Designated spaces in parking facilities at key locations such as state borders or major regional route intersections will be designed to accommodate the parking requirements of LCVs safely and efficiently. Truck drivers and trucking company dispatchers will have accurate information on Kansas freight network routes that accommodate LCVs and where along these routes there are designated LCV parking spaces and options for dropping off or picking up loads.

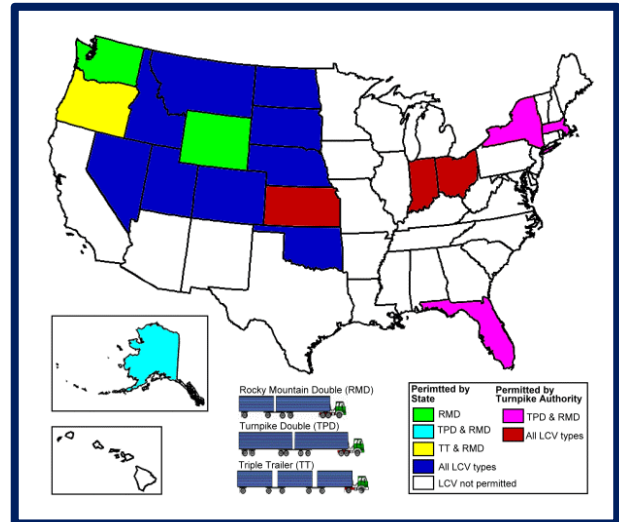
Implementation considerations

As shown on the map, aside from Oklahoma and the north and western states that connect to Kansas, many of the Midwestern states that provide multi-state routing through Kansas do not allow the use of LCVs without special permits. A multi-state deployment of LCV-designated parking facilities will increase the effectiveness of the parking and way-finding for the trucking community and better help with routing decisions for longer hauls. The opportunity to build an LCV parking network across state borders allows for better parking connectivity, standardization and route attraction.

There are also security concerns with dropping loads in parking facilities and leaving them unattended until the load is picked up at a later time. Ensuring that designated parking for LCVs is secure and well lighted would help address security concerns with loads. Additionally, geometric design for LCV parking spaces needs to accommodate larger vehicle configurations and turning radii. Spaces designated for LCVs would need to be monitored and enforced in order to ensure they are available for use by LCVs when needed.

Implementation examples

This strategy is being explored by a number of states, including Utah, Maryland, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Virginia and North Carolina. In 2011, as a result of the Utah Department of Transportation’s truck parking research for the Utah I-15 Truck Parking Project, a \$1.1 million grant was awarded to build 24 additional truck parking spaces for the Lunt Park Rest Area in southern Utah, which included parking for LCVs.



Strategy Implications

Cost: ●●○○○

Time: Short-term

Impact: Spot

Who: State, Private

Hurdles: Elimination of regional route LCV restrictions for greater productivity, security of loads, enforcement of designated parking

Description

The state of Kansas or the Kansas Turnpike Authority likely possesses excess right-of-way (ROW) areas along the Kansas Statewide Freight Network that can be converted into additional interim or long-term parking. These areas may include closed weigh stations, rest areas, toll plazas and service areas, old maintenance facilities and extra land purchased during construction of the original roadway. Identifying and repurposing excess ROW near where parking demand exceeds capacity (at the edge of urban areas, for example) could provide mid- or long-term resolution of localized parking issues. On such ROW, Kansas could make improvements, including pavement, striping, lighting and pit type toilets.

Target market

Truck drivers who are currently experiencing difficulties reliably finding overnight truck parking spots in congested parking areas would be served by this tactic. This may also have application where there is currently no parking provided or illegal parking is common.

Key benefits

The key benefit to this strategy is two-fold, a higher use for state owned tracts of land and additional safe and secure parking for drivers. This could also provide truck drivers with the easy on/easy off parking and restroom facilities, if desired. Areas like this may increase the desire of drivers to travel routes in Kansas thus increasing the amount of freight moving through the state.

Implementation considerations

There are limited locations where this tactic may be applied. The land available is required to be large enough to accommodate trucks and have easy access directly to the freeway or service interchange. In other words, the excess parcels will have to be ideally situated and sized to ensure good utilization and relief of parking demand at other locations. In addition, the elevation of the parcels and any changes in grade which are required will have to be reviewed for their practicality and impacts.

These lots, once built, would require ongoing maintenance and security checks. This should also be implemented in areas where it will not adversely impact truck related industries by relocating drivers from private facilities to public ones. However, this may be permissible where private facilities are already over-utilized.

Implementation examples

The Missouri Department of Transportation has closed a rest area near Mineola Hill, and closed and relocated a weigh station near Odessa along the I-70 corridor due to improved safety considerations (weigh station) and ongoing maintenance requirements (rest area). As a response to significant truck parking demands on the I-70 corridor, MoDOT has subsequently opened these facilities for use as truck parking.

**NOTICE OF PUBLIC
LAND AUCTION**


3.02 Acres, +/- Butler County

The Secretary of Transportation of the State of Kansas will offer for sale at public auction the following parcel:

Tract 2122 – 6u, Project 96-8(37) K -3292-01

11:00 a.m. Tues., August 11, 2015

INSPECTION TO TAKE PLACE ONE HOUR PRIOR TO SALE



Tract 6u
(Approx. boundaries)

Minimum Bid \$1,140.00

Strategy Implications

Cost: ●●○○○

Time: Short-term

Impact: Spot

Who: State,

Turnpike

Hurdles: Funding to improve facilities,
Ongoing maintenance

Description

Drivers may be dissuaded from seeking out legal or formal parking areas because geometric limitations involving a local access interchange make access for trucks difficult or time consuming. Simple or more extensive changes to the interchange may increase the likelihood of trucks utilizing the services at the local access interchange. Changes could include improving turning radii, widening short sections of streets or adding turn lanes to improve access to public or private truck parking facilities. This approach would involve inventorying and prioritizing such improvements so that they may be addressed through future special-purpose federal programs (e.g. TIGER grants, Jason's Law) or future Kansas transportation planning efforts.

Target market

Truck drivers for whom access determines informal parking behaviors; DOT and state legislative decision makers involved in developing and implementing future transportation improvement plans and standards; and federal officials involved with reviewing and approving federal parking grant applications.

Key benefits

By implementing these low-cost improvements, existing truck parking spots will be "unlocked" throughout the state to maximize parking capacity. Trucks will be able to easily access parking spaces they previously may have bypassed due to inconvenient movements to and from freight corridors. This tactic also opens up low-cost opportunities for local communities or businesses to fund or seek funding for making these comparatively inexpensive improvements in order to generate additional economic development opportunities. As a statewide initiative, this approach may be appealing to federal TIGER grant application reviewers given that freight improvements are increasingly receiving more extensive federal support.

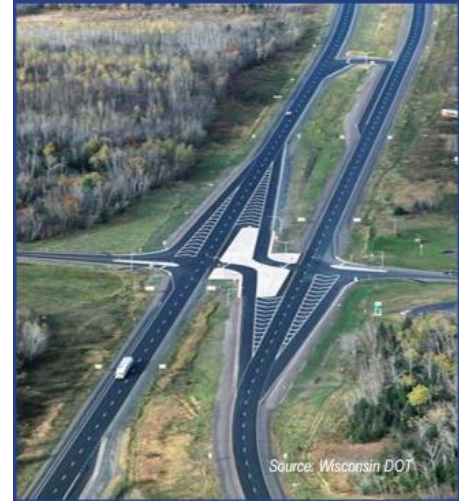
Implementation considerations

There are moderate to higher costs associated with the improvements depending on the level of interchange or parking access geometric improvements needed. There is a concern that the improvements may be seen as benefiting a certain single business or communities so great consideration to equity should be given in considering different areas for improvement. This improvement would only help address parking needs at locations with existing lots or service stations where the interchange geometry is constraining truck traffic. This is a long term solution, as once these geometric improvements are made the interchange will be configured for truck traffic for at least the remainder of its life cycle.

Implementation examples

This approach is consistent with FHWA guidance given for prioritizing projects that improve freight movements and has been implemented in a number of states at the policy level, including California, Oregon, Minnesota and others.

Restricted Crossing U-Turn (RCUT) (aka J-turn, Superstreet)



Strategy Implications

Cost: ●●●○○

Time: Long-term

Impact: Spot

Who: State, Private

Hurdles: Funding, Perceptions of Favoritism

Description

In some circumstances, truck parking issues arise out of driver confusion or lack of understanding about how potential law enforcement activities may affect their work. For example, truckers may avoid parking at closed weigh stations for concern that they may find themselves subject to equipment or permitting enforcement. As a result, they may choose to park on highway ramps when they have no other viable alternative due to hours of service requirements – and do so at unsafe locations or in an unsafe manner.

To this end, development of a Highway Patrol/Freight Trucking Collaboration Program would create a framework in which the trucking community could have an open and collaborative dialogue with the Kansas State Highway Patrol regarding trucking issues, particularly those revolving around parking. The goal of this consultation program is for both Highway Patrol and the trucking community to reach concurrence and consistency in truck parking enforcement throughout the state. This program may handle such issues as how ramp parking is allowed and in what locations, and how overnight parking at weigh stations and other facilities with an enforcement presence may be encouraged.

Target market

Highway Patrol and truck drivers willing to collaborate in developing consensus and consistent enforcement of appropriate “pro-parking” enforcement policies consistent with law enforcement goals.

Key benefits

Truck drivers better understand where and how they can and cannot park in Kansas, increasing traveler safety and making them more comfortable traveling throughout the state (thus encouraging more drivers to choose Kansas routes). Troopers benefit from the combination of clear parking guidelines and an informed, educated enforcement population.

Implementation considerations

This is a strategy that can be implemented fairly quickly. However, the success of this strategy is highly dependent on the development of safe and convenient truck parking options. As seen in states with a focus on enforcement understanding of truckers needs, it is important to truly address the root of the problem – lack of convenient truck parking. Today, parking options may be limited forcing truckers to use the shoulders of ramps, especially in situations where they are out of service hours.

Implementation examples

In North Carolina, the State Highway Patrol issued a statement that it is stepping up its enforcement on illegally stopped trucks along Interstate ramps in an effort to save lives and increase safety for the motoring public. In response, trucking companies pointed out the hours of service requirements and lack of options. The Highway Patrol retracted the memo and developed friendlier language that included trucks and cars.



Strategy Implications

Cost: ●○○○○

Time: Short-term

Impact: Corridor

Who: State

Hurdles: Enforcement Consensus, Risk and Liability Assessments, Potential Legislative Action

Description

Kansas state agencies such as the Department of Commerce's Travel & Tourism Division build and operate parking areas, often at locations near the Kansas Statewide Freight Network. These parking assets and their rules of operations may, in some instances, be easily modified to allow for or increase the amount of freight truck parking that occurs there.

To test the concept, KDOT would partner with Travel & Tourism to incorporate truck parking areas in existing and new tourist information sites where deemed appropriate. Travel and Tourism currently maintains two travel information centers: one in Goodland on I-70 East Milepost 7, and one along the I-35 Turnpike 10 miles south of Wichita in Belle Plaine. Future travel information centers and other tourist sites should include designated truck parking areas where appropriate.

Target market

Truck drivers using traveler information centers as a resource for parking, amenities and general traveler information.

Key benefits

Providing truck parking at new tourist sites will aid both truckers and the general traveling public. Often, the most visible parking areas for truckers and motorists are tourist sites. Providing truck parking at these sites will provide safe alternatives for truckers. This parking information will also provide viable alternatives to

parking on ramps which can be a hazard for truckers and motorists. Additionally, cost sharing between local and state agencies could provide more opportunities to develop future traveler information and tourism sites.

Implementation considerations

Implementation of this strategy is dependent upon sharing land and resources with new tourist sites. Therefore, this strategy is contingent on coordination with the Travel & Tourism Division and other state and local agencies to acquire land and develop these facilities. With only two dedicated traveler information centers in the state there is the need to develop new facilities. As these new facilities are planned accommodations should be made for dedicated truck parking.

The state may also consider partnering with local city, county and regional tourist organizations throughout the state. There may be the opportunity to jointly develop facilities near interstate interchanges with a set aside for truck parking. For the truck parking component KDOT could develop cost sharing agreements with local and state agencies for construction and maintenance of the parking lots as shared facilities.

Implementation examples

In Indiana, accommodations for truck parking are provided at tourist welcome centers and rest areas. INDOT welcome centers and rest areas currently provide 1,444 semi-truck parking spaces across the state – an average of 48 parking spaces at each facility.



Strategy Implications

Cost: ●●○○○

Time: Long-term

Impact: Corridor

Who: State

Hurdles: Funding

Description

States are closing rest areas or seeking sustainable, marketing-based revenue to support them in the face of budget pressures and greatly increased options for traveler rest and relief. Federal funds available for rest area improvements including provisions under *Jason's Law* enacted under MAP-21) are insufficient for state needs. Additionally, federal law prohibits states from allowing private entities to sell goods in interstate public rest areas for profit. This federal law was enacted to prevent unfair advantages for private companies that are directly accessible from the interstate over those companies that operate at an exit off the interstate. Some exceptions exist for toll roads such as the Kansas Turnpike, New York State Thruway and the Pennsylvania Turnpike. This is because these roads were built before being designated interstates, which today makes it allowable to have service areas on the Kansas Turnpike that advertise and make revenues.

In order to provide more options for public parking facilities to have amenities similar to private truck stops, there is an opportunity for current policies and federal/state law to be modified to permit public transportation agencies to advertise, market and sell the branding rights to their public parking facilities in order to better fund needed parking capacity and amenity improvements.

Target market

Federal and state lawmakers; departments of transportation; private entities, such as petroleum marketing and convenience store owners and operators, retail stores, data providers and others interested in leasing public rest area facilities.

Key benefits

Commercialized rest areas reduce public costs for capital and maintenance improvements, increase user services and amenities; and benefit states' taxpayers through private-sector concessionaires' lease payments to states. Value-added services could also be provided such as a truck parking reservation system.

Implementation considerations

Concerns about privatization on the interstate include the lack of control by the government and opposition from trade groups, such as associations representing convenience stores. These trade groups are often opposed to rest area privatization due to increased competition from businesses that are perceived to have unfair advantages. Nearby economies at interchanges may be impacted, but strong public support for privatization exists.

Implementation examples

Several states have explored the commercialization of rest areas and other public parking facilities. Vermont partnered with a private truck stop to provide better service to the driving public. The private truck stop welcomes all drivers (those who purchase goods and those who do not); in return, the state has placed a sign on the interstate and at the private truck stop directing drivers to the facility. Vermont has saved hundreds of thousands of dollars from privatized capital improvements and savings in maintenance costs annually. In Iowa, the state entered into a public-private partnership in 1994 to develop and maintain a welcome center on Interstate-35. The developer is responsible for operating and maintaining the center; the Iowa Department of Transportation shares the cost. The State will save about \$3.43 million in maintenance costs over 30 years. Legislation has since been passed to prevent future partnerships because of the unfair competitive advantage that exists for commercial entities operating directly on the interstate.



Strategy Implications

Cost: ●○○○○

Time: Mid-term

Impact: Spot or Corridor

Who: Federal/State

Hurdles: Legislation or policies restricting privatization or commercialization. Trade groups that oppose expanded commercialization due to unfair advantages and impacts to local interchange economies.

Description

Currently, there are federal truck freight policies and regulations that provide a level of consistency for the nation's trucking industry operations; however, each state also has the ability to develop and mandate their own trucking policies and regulations, making it challenging to provide regional cohesiveness beyond state borders. This can be addressed if neighboring states collaborate regionally to form coalitions to develop corridor-specific truck freight and truck parking policies and regulations to increase truck routing through Kansas and its bordering states. In the instance of truck parking, the regional coalition of states would collaborate to identify new and revised truck policies and regulations that, together, would improve truck parking availability, amenities and way-finding. This could include collaborating regionally to place Kansas freight parking signage in other states (and vice versa) where initial truck routing and parking decisions are made, coordinating on providing consistent, designated longer-combination vehicle (LCV) parking strategies and developing regional parking maps for use on websites, smart phones, informational kiosks and other applications.

Target market

Target markets are Kansas and neighboring state agencies and legislators who can integrate government action to develop cohesive truck freight policies and regulations to better serve the regional parking needs of the trucking industry on specific heavy freight corridors. The Mid America Association of State Transportation Officials (MAASTO), which is comprised of 10 Midwestern states, would also be a market for developing multi-state collaborative efforts on truck parking policies and regulations.

Key benefits

The trucking industry will have consistent operating policies and regulations along regional freight corridors of significance, which will allow for greater efficiencies in truck routing and parking decisions. Consistent policies and regulations may also grow awareness of the MAASTO region as a trucking freight hub through the Midwest, which will help attract and retain truck traffic and related businesses to Kansas and its partnering states.

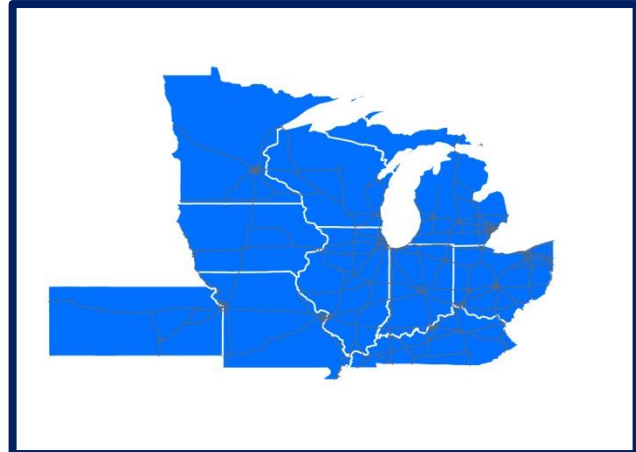
Implementation considerations

Within each partnering state, a champion and supporters for the cohesive package of trucking operational policies and regulations will have to be identified to introduce and shepherd the policies through the legislative and State DOT approval processes. In the legislature, political consensus will have to be developed and maintained during consideration and passage of the cohesive policies and regulations.

Multi-state agreement on consistent truck parking policies and standardization for ease of use and way-finding will be critical. Integrating both public and private parking facilities into the regional coalition will be necessary to provide the greatest benefits to the trucking industry and its supporting services.

Implementation examples

To improve the efficiency, economic competitiveness and safety of the regional freight network, the State of Kansas in partnership with Indiana, Iowa, Kentucky, Michigan, Minnesota, Ohio, Wisconsin and MAASTO, developed a Federal TIGER Grant proposal for a multi-state Truck Parking Information and Management System (TPIMS). This project, sponsored by the eight-state MAASTO TPIMS Partnership, provides an opportunity to create a new and collaborative way for the Midwest region to address truck parking information and availability needs along its busiest freight corridors. When deployed, this system will provide truck drivers with reliable, real-time information to make smarter, more efficient truck parking decisions. At this time, decisions on the grant award have not yet been made, but this partnership would lay the groundwork for a multi-state, regional truck parking system using a consistent, collaborative approach.



Strategy Implications

Cost: ●●○○○

Time: Mid-term

Impact: State, Regional

Who: Regional States

Hurdles: Political Consensus, Agreement on consistent parking standardization strategies.

Description

Public parking facilities typically include rest areas, service areas, weigh stations and other available public right-of-way along a state's freight network. Available right-of-way to expand these lots is limited, and most public facilities are unable to provide amenities such as restaurants, fuel and showers that private parking facilities offer. This stems from a lack of ongoing operations and maintenance funding, as well as federal law prohibiting states from allowing private entities to sell goods for profit in public rest areas. However, partnering with private industry gives transportation agencies an opportunity to offer these amenities and increase truck parking capacity. They can do so by delivering new or improved parking facilities on property owned and operated by private industry by combining public and private funding, maintenance and risk sharing. There are additional opportunities to develop public-private partnerships to share and disseminate real-time information on parking availability through smart phone applications, public and private websites, and way-finding signage.

Target market

State DOT agencies, private petroleum marketing and convenience store owners and operators, the warehousing industry and other large retail stores/areas with excess parking (e.g., Big Box stores, malls).

Key benefits

Partnerships between transportation agencies and private industry can provide new or improved parking capacity and way-finding information in a faster and more cost-effective timeframe. Public partners can provide additional parking pavement cost effectively and efficiently. Private industry can provide additional amenities and ongoing facility operation and maintenance. Both partners can then share their real-time parking data in order to effectively direct truck drivers to available public and private parking capacity.

Implementation considerations

Some commercial truck stop owners and other private entities are reluctant to add new parking capacity or use excess parking capacity for truck parking. Providing funding or other types of incentives to encourage implementation partnerships for delivering new or improved parking capacity would be beneficial. Jason's Law, passed under MAP-21, enables federal funding to be used to provide truckers better access to safe parking areas by building and updating parking facilities. Within the law, there are provisions for developing public-private partnerships to fund the needed parking improvements. Today, public-private partnerships are most applicable to commercial parking facilities owned and operated by private industry. Until federal law changes to allow privatization, rest areas, service areas and parking areas along interstates and other roads do not fall under the public-private partnership category because they are funded by the government.

Implementation examples

The Michigan DOT has partnered with private commercial truck stops to build new truck parking availability monitoring system equipment within existing truck stop facilities as a part of their Truck Parking Information and Management System for the I-94 corridor. Both partners now track and share their real-time parking data through smart phone applications, websites and dynamic message sign (DMS) in order to effectively direct truck drivers to available public and private parking capacity.



Strategy Implications

Cost: ●●○○○

Time: Mid-term

Impact: Spot

Who: State, Private

Hurdles: State legislation or policies that restrict public-private partnership opportunities, joint sharing of risks and accurate parking information.

Description

Kansas currently has no cohesive set of tax policies that, together, would sustain or grow state freight truck volumes or help adequately provide those trucks with an appropriate level of parking or other support. This can be addressed by creating a Freight Truck Tax Incentive Working Group to develop an integrated tax incentive package that increases private-sector investments in business operations that generate significantly higher Kansas freight truck volumes as well as parking and other services that would be required to adequately service the volumes.

The Working Group could consist of representatives from the Kansas Departments of Transportation, Commerce and Revenue; the Kansas Turnpike Authority; the Kansas Division of the Budget; Kansas House and Senate tax committees and key freight truck stakeholder groups. They would collaborate to identify new and revised tax policies that, together, would incentivize the private sector to locate distribution centers and other generators of large volumes of freight truck movement in Kansas while also providing new or expanded parking and other services to the freight truck industry.

Target market

Target markets are: (1) private-sector companies and investors who can create new truck-trip generating and parking facilities and related services; and (2) Kansas agencies and legislators who can integrate government action to increase freight truck volumes and support in ways that improve freight truck volumes' impact on the state's economy and quality of life.

Key benefits

This approach focuses new private-sector funding and planning resources on increasing usage of the Kansas Freight Network and providing adequate parking and other support services. Doing so will increase jobs and economic activity in the state and help the trucking industry be more productive and efficient. This also positions the state to attract businesses and services in advance of potential freight movement changes that may be produced by the Panama Canal expansion project completion in 2016, the Nicaragua Canal in the early 2020s and other future freight truck developments.

Implementation considerations

This tactic will require developing multi-stakeholder consensus regarding the best ways to attract and support larger volumes of freight truck traffic to the Kansas Freight Network. State tax revenue implications will have to be accurately developed and communicated to build support for adoption of the tax incentive package that is ultimately developed. A champion and supporters for the incentive package will have to be identified to introduce and shepherd the incentives through the legislative approval process. In the legislature, political consensus will have to be developed and maintained during consideration and passage of the tax incentive package.

Implementation examples

This approach as outlined has not been used in other states. However, many states, including Kansas, typically target industries to grow and support through tax incentives. Kansas has had a long and successful history of attracting business and investments through programs such as Promoting Employment across Kansas (PEAK), the Partnership Fund, the Kansas Bioscience Authority, High Performance Incentive Program (HPIP), and Rural Opportunity Zones.



Strategy Implications

Cost: ●●○○○

Time: Mid-term

Impact: Statewide

Who: State, Private

Hurdles: State revenues, Cost, Political Consensus

Description

Many of the problematic truck parking areas in Kansas are at the edge of major urban areas. Given their locations, and that some parking solutions may need to be created or built in multiple political jurisdictions, one strategic approach is to provide affected cities and counties with help in developing locally and regionally integrated approaches to creating more freight truck parking.

This would be accomplished by creating a Freight Truck Parking Working Group to address practical issues that may serve as barriers to parking solutions. The goal would be to assist city and county governments in building or expanding freight truck parking assets on or near the Kansas Statewide Freight Network. The Working Group would be comprised of selected representatives from the Kansas Departments of Transportation, Commerce and Revenue; the Kansas Turnpike Authority; the Kansas Division of the Budget; Kansas House and Senate Local Government committees and key city and county stakeholder groups. The Working Group would collaborate to create model ordinances for promoting secure parking at new and existing industrial/warehouse developments, state legislation that would empower local government land banks to more easily aggregate blighted land for added urban truck parking and new state and/or federal loan program(s) to help local governments build secure parking areas for resident truck owners/operators. As part of this effort, KDOT would contribute the assistance of its staff “parking liaison” (see *related freight parking strategy/tactic package*) to assist local governments in finding the necessary partners, resources and solutions to address their freight truck parking issues.



Strategy Implications

Cost: ●●○○○

Time: Mid-term

Impact: Spot, Corridor

Who: State, Local

Hurdles: Budget, State and local stakeholder consensus

Target market

This tactic’s audience is comprised of local government decision makers who may need new policy tools or funding to respond to local truck parking needs that also impact the Kansas Statewide Freight Network. Additionally, selected representatives from the Kansas Departments of Transportation, Commerce and Revenue; the Kansas Turnpike Authority; the Kansas Division of the Budget; Kansas House and Senate Local Government committees.

Key benefits

This approach enlists local governments to help solve freight truck parking issues that affect them as well as the usage of the Kansas Statewide Freight Network. It provides them with resources that they might not otherwise have access to when dealing with localized truck parking issues. In the process, it creates more efficient use of existing parking resources, lessening the overall cost of improving the freight truck parking system. For rural and small town areas, it provides a means of attracting and retaining owner-operators, small trucking operations, and the residents, jobs and tax revenues they offer.

Implementation considerations

This tactic will require developing policies that fully and flexibly address local jurisdictions’ freight truck parking needs and preferences while also positively affecting the Kansas Statewide Freight Network. A champion and supporters for the regulatory models and loan program package will have to be identified to advance interest and action at the local level. In the legislature, political consensus will have to be developed and maintained during consideration and passage of the loan and land bank legislative elements.

Implementation examples

Freight truck parking is usually taken up as a subset issue of regional freight mobility councils or committees such as the Mid-America Regional Council’s Goods Movement Committee or the Puget Sound Regional Freight Mobility Roundtable. This approach differs in that this approach elevates the subject matter to a higher, broader level of emphasis.

Description

Truck parking issues may be exacerbated by the unanticipated consequences of truck delivery schedules and policies used by large-volume generators, such as warehousing and distribution centers, coupled with land-use, noise or other local regulations that may further limit truck parking access and capacity at final destinations. Truck drivers may go the maximum window in terms of their hours of service to get as close to their final destination as possible. However, if there are limits on when they can arrive or park at their final destinations, they are forced to park wherever they can. This can mean existing lots operate above capacity, truck drivers park illegally, or they are forced to drive around on the local street or highway networks because they can find no place to park. Consequently, better public- and private-sector coordination regarding such policies, or the formation of incentive programs for additional truck parking, may effectively reduce or redistribute demand on state truck parking facilities in ways that lower costs to taxpayers, improve driver safety and make Kansas a more appealing routing option.

Target market

Truck drivers prohibited or dis-incentivized from driving directly to their final destinations; local communities bearing the brunt of impacts from the combination of over-used lots and significant warehousing, distribution center and light industrial business operations.

Key benefits

Local requirements of sufficient truck parking and broad parking area lessens demand and expense on state facilities, reduces local congestion and safety concerns from drivers searching for parking and appropriately shares social and economic impacts with the businesses that, as final destinations, generate the impacts. Truck drivers will spend less time driving in urban settings looking for parking, which decreases wear and tear on those roads. Reduced truck volume on urban streets also benefits motorists by decreasing congestion.

Implementation considerations

Truck parking needs should be carefully considered as local communities and KDOT review traffic impact studies. Local communities should consider requirements for additional truck parking and staging as part of the plan review for new distribution facilities and major commercial centers. Increases in truck parking at distribution/light industrial facilities may necessitate increased safety and security measures and enforcement. Because this is a local land use issue, there is little the state can do directly to implement this strategy. However, the state can work with local communities who have expressed an interest in addressing the truck parking problem and provide technical expertise and best practice examples from other communities around the country. Additionally, Kansas may want to consider requiring such parking practices when state transportation funding or assistance is provided to advance public or private development.

Implementation examples

Many jurisdictions have considered this approach, including: Baltimore, Maryland; Morris County, New Jersey; and the North Jersey Transportation Planning Authority. However, independent assessments of the effectiveness of these efforts have not been conducted. Thirty new truck parking spaces were constructed in a new lot at the I-15/SR-76 Interchange to reduce emissions and increase safety by providing trucks a safe place to park while waiting to access the Port of San Diego. Funding for this project included money from the Federal Truck Parking Facilities Program.



Strategy Implications

Cost: ●●●○○

Time: Short-term

Impact: Spot

Who: State, Local,
Private Industry

Hurdles: Regulatory, Funding, Consensus,
Enforcement

Description

Barriers to solving truck parking issues often arise because no one is empowered to bring together the multiple entities whose cooperation would be needed to solve the underlying issue. A localized truck parking shortage, for example, might be rectified if a developer could identify a potentially profitable location for a new truck stop that also solves a parking capacity issue; the same could be true if there was a knowledgeable resource that could work with a community to create a secure parking area for local owner-operators.

In such an environment, a simple fix is to create a liaison role from which a knowledgeable expert can bring together multiple parties and resources to create opportunities and clear hurdles. This is a model often used throughout local and state governments in the form of film commissions or business incubators. In the case of truck parking, this could be a KDOT position and person tasked with working with local and state public- and private-sector interests to improve freight truck parking and related issues across the state.

Target market

The truck parking liaison role would serve local communities, private industry and truck drivers seeking to provide and expand safe, secure freight truck parking in ways that would contribute to local and statewide economic vitality and quality of life.

Key benefits

The KDOT liaison allows for official channels to be created for discussing and promoting safe and efficient truck operations in the state of Kansas.

Implementation considerations

This tactic carries staff and service marketing costs. If duties are added to those of an existing staff member, there may be impacts to both sets of responsibilities. There may be a lag time between when the position is created and when the first benefits are accrued. Working to solve the parking problems of a community or a developer, for example, may lead some to perceive the role as picking winners and losers or that those receiving assistance are getting special or favored treatment.

Implementation examples

The liaison role is an inherent function of government, and it's one that KDOT and other departments are familiar with performing. Additionally, the liaison position has been successfully used for a broad range of activities, including the Kansas Film Commission, the Kansas Bioethics Authority and the Kansas Business Center. It is less common to use this model to address freight parking issues. In this use, implementation examples typically revolve around municipal or port agencies working with the private sector to solve parking issues on a temporary or permanent basis in order to lessen enforcement burdens and impacts on neighboring residences and businesses.



Strategy Implications

Cost: ●○○○○

Time: Short-term

Impact: Statewide

Who: State

Hurdles: Funding, Hiring, Marketing

Description

Truck routing and parking decisions can be made hundreds of miles before a truck ever enters Kansas. As a result, the freight truck policies, regulations and permitting of other states can negatively impact the number of freight trucks that are routed to and through Kansas. By reviewing and eliminating legislative and regulatory barriers to regional consistency, or “harmonization” along freight corridors (e.g., signage, truck parking restrictions, weight limits, etc.) Kansas can position itself to better attract and maintain higher levels of freight truck traffic. This can translate into greater - but more predictable - freight truck parking demands.

Accomplishing this would require Kansas to coordinate regulatory changes with states bisected by highway corridors connecting to the Kansas Freight Network. This effort would be most effective if the focus was on harmonizing with partner states those areas of regulation and permitting that offer enough value to cause drivers, dispatchers and others to route increased volumes of truck traffic through and within Kansas. KDOT and KTA could engage Kansas Congressional Delegation in identifying and eliminating potential federal barriers to the kind of regional regulatory compacts contemplated here.

Target market

State government decision makers along freight corridors connecting to the Kansas Statewide Freight Network are the focus of this tactic. Partnering states, primarily states benefitting most from partnering with Kansas in harmonizing truck regulations and permitting in ways that create cost and regulatory advantages over other states and routes (e.g., I-35 connecting states, I-70 connecting states, etc.).

Key benefits

Regional harmonization of freight truck regulations and permitting creates time and cost savings for the trucking industry, resulting in more freight trucks being generated within or routed through Kansas. Added truck volumes, if significant, would help generate additional jobs, economic activity and investment in the state. This, in turn, would increase support for additional parking and other resources to support higher truck volumes and the economic activity they generate.

Implementation considerations

This tactic requires analyzing freight movements to and through Kansas to identify and prioritize corridors by: current and future truck volumes; opportunities for growth based on potential harmonization; and likelihood for success in developing regulatory partnerships with states bisected by those corridors.

Working with other states will mean reconciling potentially radically different freight truck and economic development agendas. Regulatory harmonization would have to happen quickly, as the likely competitive advantages it would create will most benefit the region(s) making the first moves in this area. Existing federal trucking regulations and oversight may introduce unanticipated obstacles that will have to be worked through in tandem with other states as they arise or are identified.

Most importantly, harmonization efforts will have to be focused on those regulatory and permitting issues that, if addressed, will be sufficiently important to the trucking industry as to change current routing and dispatching decision making.

Implementation examples

Regional harmonization of freight truck regulations is seldom, if ever, used in the U.S. It is a common tool in international trade agreements such as NAFTA. In these instances, harmonization has helped produce higher freight and truck volumes, faster transit times, less costly permitting and regulation, and greater political and financial support for truck infrastructure investments.



Strategy Implications

Cost: ●●●○○

Time: Mid-term

Impact: State/Region

Who: State

Hurdles: Political and state agency consensus



CHAPTER 5: APPENDIX

Appendix 5.A: *Benefits and Cost Analysis*

Sign Group 1 - Colby/Oakley

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 9,766,848		
Environmental Benefits	\$ 3,873,149		
Total Benefits	\$ 13,639,997	\$ 10,146,436	\$ 7,225,116
Deployment Costs	\$ 1,756,800		
Maintenance Costs	\$ 1,581,120		
Total Cost	\$ 3,337,920	\$ 2,932,954	\$ 2,594,320
Benefit-Cost Ratio	4.09	3.46	2.78

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
Levant Rest Area EB	49	10	3	30.0%	Public
Levant Rest Area WB	49	10	0	0.0%	Public
Petro	53	100	60	60.0%	Private
Pilot	54	120	80	66.7%	Private
Phillips 66	70	80	40	50.0%	Private
Travel America	76	115	80	69.6%	Private
Grainfield Rest Area EB	97	10	6	60.0%	Public
Grainfield Rest Area WB	97	10	5	50.0%	Public

Number of Signs	4	Public Spaces	40
Number of Sites	8	Private Spaces	415
Number of Parking Spaces	455		

Benefits:			
2018 (Opening)	\$ 681,999.87	Annually	
Net Present Value of 20 years	\$13,639,997.44	Undiscounted	
Net Present Value of 20 years	\$10,146,435.95	3% Discount	
Net Present Value of 20 years	\$ 7,225,116.36	7% Discount	

Crash Benefits

Travel Time Benefits			
80% of Available Spaces	364		
Hours of Parking Search	91		
Annual Savings	\$ 488,342.40		

Environmental Benefits			
80% of Available Spaces	364		
Gallons Saved Daily	728		
Miles Saved Daily	4,368		
Annual Savings	\$ 193,657.47		

Conversion Factors

Emissions Savings	Savings (Metric)			Conversion Factors	
	Tons/Year	Value/Ton	Total	Value	Units
CO2	1,536.90	\$ 43.00	\$ 66,086.79	2205	lbs/metric tons
VOC	0.40	\$ 1,999.00	\$ 805.39	0.035	grams/oz
Nox	7.76	\$ 7,877.00	\$ 61,150.60	0.0625	oz/lbs
PM	0.18	\$ 360,383.00	\$ 65,614.69		

Costs:			
Sites	\$ 1,000,000.00	\$ 125,000.00	Per Site
Signs	\$ 220,000.00	\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 244,000.00		20% Engineering & CM
Contingency	\$ 292,800.00		20% Contingency
Total	\$ 1,756,800.00		

Annual O&M			
Annual O&M	\$ 79,056.00		
Net Present Value of 20 years	\$1,581,120.00	Undiscounted	
Net Present Value of 20 years	\$1,176,153.65	3% Discount	
Net Present Value of 20 years	\$837,520.39	7% Discount	

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 2 - Wakeeney

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 1,931,904		
Environmental Benefits	\$ 766,117		
Total Benefits	\$ 2,698,021	\$ 2,006,987	\$ 1,429,144
Deployment Costs	\$ 698,400		
Maintenance Costs	\$ 628,560		
Total Cost	\$ 1,326,960	\$ 1,165,969	\$ 1,031,349
Benefit-Cost Ratio	2.03	1.72	1.39

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
24/7	127	70	55	78.6%	Private
Ogallah Rest Area EB	132	10	7	70.0%	Public
Ogallah Rest Area WB	132	10	9	90.0%	Public

Number of Signs	2	Public Spaces	20
Number of Sites	3	Private Spaces	70
Number of Parking Spaces	90		

Benefits:			
2018 (Opening)	\$ 134,901.07	Annually	
Net Present Value of 20 years	\$2,698,021.47	Undiscounted	
Net Present Value of 20 years	\$2,006,987.33	3% Discount	
Net Present Value of 20 years	\$1,429,143.90	7% Discount	

Crash Benefits

Travel Time Benefits

80% of Available Spaces	72
Hours of Parking Search	18
Annual Savings	\$ 96,595.20

Environmental Benefits

80% of Available Spaces	72
Gallons Saved Daily	144
Miles Saved Daily	864
Annual Savings	\$ 38,305.87

Emissions Savings	Savings (Metric Tons/Year)			Conversion Factors	
	Tons/Year	Value/Ton	Total	Value	Units
CO2	304.00	\$ 43.00	\$ 13,072.11	2205	lbs/metric tons
VOC	0.08	\$ 1,999.00	\$ 159.31	0.035	grams/oz
Nox	1.54	\$ 7,877.00	\$ 12,095.72	0.0625	oz/lbs
PM	0.04	\$ 360,383.00	\$ 12,978.73		

Costs:				
Sites	\$ 375,000.00		\$ 125,000.00	Per Site
Signs	\$ 110,000.00		\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 97,000.00		20% Engineering & CM	
Contingency	\$ 116,400.00		20% Contingency	
Total	\$ 698,400.00			

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 3 - Salina

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 7,083,648		
Environmental Benefits	\$ 2,809,097		
Total Benefits	\$ 9,892,745	\$ 7,358,954	\$ 5,240,194
Deployment Costs	\$ 1,936,800		
Maintenance Costs	\$ 1,743,120		
Total Cost	\$ 3,679,920	\$ 3,233,461	\$ 2,860,132
Benefit-Cost Ratio	2.69	2.28	1.83

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
24/7	252	40	25	62.5%	Private
Pilot	252	150	110	73.3%	Private
Petro	252	80	85	106.3%	Private
EB Solomon Rest Area	267	10	6	60.0%	Public
WB Solomon Rest Area	267	10	12	120.0%	Public
NB 81 Rest Area		5	7	140.0%	Public
SB 81 Rest Area		5	12	240.0%	Public
I-335 24/7	92	30	27	90.0%	Private
I-335 Rod's #8	92	30	14	46.7%	Private
Number of Signs	4			Public Spaces	30
Number of Sites	9			Private Spaces	330
Number of Parking Spaces	360				

Benefits:

2018 (Opening)	\$ 494,637.27	Annually
Net Present Value of 20 years	\$ 9,892,745.40	Undiscounted
Net Present Value of 20 years	\$7,358,953.55	3% Discount
Net Present Value of 20 years	\$ 5,240,194.28	7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces	264
Hours of Parking Search	66
Annual Savings	\$ 354,182.40

Environmental Benefits

80% of Available Spaces	264
Gallons Saved Daily	528
Miles Saved Daily	3,168
Annual Savings	\$ 140,454.87

Conversion Factors

Emissions Savings	Savings (Metric)			Conversion Factors	
	Tons/Year	Value/Ton	Total	Value	Units
CO2	1,114.68	\$ 43.00	\$ 47,931.08	2205	lbs/metric tons
VOC	0.29	\$ 1,999.00	\$ 584.13	0.035	grams/oz
Nox	5.63	\$ 7,877.00	\$ 44,350.98	0.0625	oz/lbs
PM	0.13	\$ 360,383.00	\$ 47,588.68		

Costs:

Sites	\$ 1,125,000.00	\$ 125,000.00	Per Site
Signs	\$ 220,000.00	\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 269,000.00	20%	Engineering & CM
Contingency	\$ 322,800.00	20%	Contingency
Total	\$ 1,936,800.00		

Annual O&M

Annual O&M	\$ 87,156.00	
Net Present Value of 20 years	\$1,743,120.00	Undiscounted
Net Present Value of 20 years	\$1,296,661.20	3% Discount
Net Present Value of 20 years	\$923,331.91	7% Discount

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 4 - Junction City

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 2,253,888		
Environmental Benefits	\$ 893,804		
Total Benefits	\$ 3,147,692	\$ 2,341,485	\$ 1,667,335
Deployment Costs	\$ 878,400		
Maintenance Costs	\$ 790,560		
Total Cost	\$ 1,668,960	\$ 1,466,477	\$ 1,297,160
Benefit-Cost Ratio	1.89	1.60	1.29

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
Sapp Brother's	295	45	39	86.7%	Private
Shell	298	35	22	62.9%	Private
EB Grandview Plaza Rest Area	309	15	3	20.0%	Public
WB Grandview Plaza Rest Area	309	10	10	100.0%	Public

Number of Signs	2	Public Spaces	25
Number of Sites	4	Private Spaces	80
Number of Parking Spaces	105		

Benefits:			
2018 (Opening)	\$ 157,384.59	Annually	
Net Present Value of 20 years	\$ 3,147,691.72	Undiscounted	
Net Present Value of 20 years	\$2,341,485.22	3% Discount	
Net Present Value of 20 years	\$ 1,667,334.54	7% Discount	

Crash Benefits

Travel Time Benefits

80% of Available Spaces	84
Hours of Parking Search	21
Annual Savings	\$ 112,694.40

Environmental Benefits

80% of Available Spaces	84
Gallons Saved Daily	168
Miles Saved Daily	1,008
Annual Savings	\$ 44,690.19

Savings (Metric

Emissions Savings	Tons/Year	Value/Ton	Total
CO2	354.67	\$ 43.00	\$ 15,250.80
VOC	0.09	\$ 1,999.00	\$ 185.86
Nox	1.79	\$ 7,877.00	\$ 14,111.68
PM	0.04	\$ 360,383.00	\$ 15,141.85

Conversion Factors

Value	Units
2205	lbs/metric tons
0.035	grams/oz
0.0625	oz/lbs

Costs:

Sites	\$ 500,000.00	\$ 125,000.00	Per Site
Signs	\$ 110,000.00	\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 122,000.00	20%	Engineering & CM
Contingency	\$ 146,400.00	20%	Contingency
Total	\$ 878,400.00		

Annual O&M

Annual O&M	\$ 39,528.00		
Net Present Value of 20 years	\$790,560.00	Undiscounted	
Net Present Value of 20 years	\$588,076.83	3% Discount	
Net Present Value of 20 years	\$418,760.20	7% Discount	

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 5 - Paxico

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 1,674,317		
Environmental Benefits	\$ 663,968		
Total Benefits	\$ 2,338,285	\$ 1,739,389	\$ 1,238,591
Deployment Costs	\$ 698,400		
Maintenance Costs	\$ 628,560		
Total Cost	\$ 1,326,960	\$ 1,165,969	\$ 1,031,349
Benefit-Cost Ratio	1.76	1.49	1.20

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
EB Grandview Plaza Rest Area	336	15	3	20.0%	Public
WB Grandview Plaza Rest Area	336	15	?		Public
24/7	341	48	31	64.6%	Private

Number of Signs	2	Public Spaces	30
Number of Sites	3	Private Spaces	48
Number of Parking Spaces	78		

Benefits:			
2018 (Opening)	\$ 116,914.26	Annually	
Net Present Value of 20 years	\$ 2,338,285.28	Undiscounted	
Net Present Value of 20 years	\$1,739,389.02	3% Discount	
Net Present Value of 20 years	\$ 1,238,591.38	7% Discount	

Crash Benefits

Travel Time Benefits

80% of Available Spaces	62
Hours of Parking Search	16
Annual Savings	\$ 83,715.84

Environmental Benefits

80% of Available Spaces	62
Gallons Saved Daily	125
Miles Saved Daily	749
Annual Savings	\$ 33,198.42

Emissions Savings	Savings (Metric Tons/Year)			Conversion Factors	
	Tons/Year	Value/Ton	Total	Value	Units
CO2	263.47	\$ 43.00	\$ 11,329.16	2205	lbs/metric tons
VOC	0.07	\$ 1,999.00	\$ 138.07	0.035	grams/oz
Nox	1.33	\$ 7,877.00	\$ 10,482.96	0.0625	oz/lbs
PM	0.03	\$ 360,383.00	\$ 11,248.23		

Costs:

Sites	\$ 375,000.00	\$ 125,000.00	Per Site
Signs	\$ 110,000.00	\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 97,000.00	20% Engineering & CM	
Contingency	\$ 116,400.00	20% Contingency	
Total	\$ 698,400.00		

Annual O&M

Annual O&M	\$ 31,428.00		
Net Present Value of 20 years	\$628,560.00	Undiscounted	
Net Present Value of 20 years	\$467,569.28	3% Discount	
Net Present Value of 20 years	\$332,948.68	7% Discount	

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 6 - Topeka/Lawrence

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 5,581,056		
Environmental Benefits	\$ 2,213,228		
Total Benefits	\$ 7,794,284	\$ 5,797,963	\$ 4,128,638
Deployment Costs	\$ 878,400		
Maintenance Costs	\$ 790,560		
Total Cost	\$ 1,668,960	\$ 1,466,477	\$ 1,297,160
Benefit-Cost Ratio	4.67	3.95	3.18

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
Topeka Service Area	188	100	100	100.0%	Public
Lawrence Service Area	209	80	72	90.0%	Public
EB I-70 Staging Area	414	50	10	20.0%	Public
WB I-70 Staging Area	414	30	20	66.7%	Public

Number of Signs	2	Public Spaces	260
Number of Sites	4	Private Spaces	0
Number of Parking Spaces	260		

Benefits:

2018 (Opening)	\$ 389,714.21	Annually
Net Present Value of 20 years	\$ 7,794,284.25	Undiscounted
Net Present Value of 20 years	\$5,797,963.40	3% Discount
Net Present Value of 20 years	\$ 4,128,637.92	7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces	208
Hours of Parking Search	52
Annual Savings	\$ 279,052.80

Environmental Benefits

80% of Available Spaces	208
Gallons Saved Daily	416
Miles Saved Daily	2,496
Annual Savings	\$ 110,661.41

Conversion Factors

Emissions Savings	Savings (Metric Tons/Year)	Value/Ton	Total	Value	Units
CO2	878.23	\$ 43.00	\$ 37,763.88	2205	lbs/metric tons
VOC	0.23	\$ 1,999.00	\$ 460.22	0.035	grams/oz
Nox	4.44	\$ 7,877.00	\$ 34,943.20	0.0625	oz/lbs
PM	0.10	\$ 360,383.00	\$ 37,494.11		

Costs:

Sites	\$ 500,000.00	\$ 125,000.00	Per Site
Signs	\$ 110,000.00	\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 122,000.00	20%	Engineering & CM
Contingency	\$ 146,400.00	20%	Contingency
Total	\$ 878,400.00		

Annual O&M

Annual O&M	\$ 39,528.00	
Net Present Value of 20 years	\$790,560.00	Undiscounted
Net Present Value of 20 years	\$588,076.83	3% Discount
Net Present Value of 20 years	\$418,760.20	7% Discount

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 7 - Beto Junction

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 4,765,363		
Environmental Benefits	\$ 1,889,756		
Total Benefits	\$ 6,655,120	\$ 4,950,569	\$ 3,525,222
Deployment Costs	\$ 878,400		
Maintenance Costs	\$ 790,560		
Total Cost	\$ 1,668,960	\$ 1,466,477	\$ 1,297,160
Benefit-Cost Ratio	3.99	3.38	2.72

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
NB Homewood Rest Area		13	11	84.6%	Public
SB Homewood Rest Area		14	16	114.3%	Public
Travel America Beto Junction	155	135	130	96.3%	Private
BP	155	60	32	53.3%	Private

Number of Signs	2	Public Spaces	27
Number of Sites	4	Private Spaces	195
Number of Parking Spaces	222		

Benefits:			
2018 (Opening)	\$ 332,755.98	Annually	
Net Present Value of 20 years	\$ 6,655,119.63	Undiscounted	
Net Present Value of 20 years	\$4,950,568.75	3% Discount	
Net Present Value of 20 years	\$ 3,525,221.61	7% Discount	

Crash Benefits

Travel Time Benefits

80% of Available Spaces	178
Hours of Parking Search	44
Annual Savings	\$ 238,268.16

Environmental Benefits

80% of Available Spaces	178
Gallons Saved Daily	355
Miles Saved Daily	2,131
Annual Savings	\$ 94,487.82

Savings (Metric

Emissions Savings	Tons/Year	Value/Ton	Total	Value	Units
CO2	749.87	\$ 43.00	\$ 32,244.54	2205	lbs/metric tons
VOC	0.20	\$ 1,999.00	\$ 392.96	0.035	grams/oz
Nox	3.79	\$ 7,877.00	\$ 29,836.12	0.0625	oz/lbs
PM	0.09	\$ 360,383.00	\$ 32,014.20		

Conversion Factors

Base Costs

Sites	\$ 500,000.00	\$ 125,000.00	Per Site
Signs	\$ 110,000.00	\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 122,000.00	20%	Engineering & CM
Contingency	\$ 146,400.00	20%	Contingency
Total	\$ 878,400.00		

Annual O&M

Annual O&M	\$ 39,528.00		
Net Present Value of 20 years	\$790,560.00	Undiscounted	
Net Present Value of 20 years	\$588,076.83	3% Discount	
Net Present Value of 20 years	\$418,760.20	7% Discount	

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 8 - Emporia

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 2,361,216		
Environmental Benefits	\$ 936,366		
Total Benefits	\$ 3,297,582	\$ 2,452,985	\$ 1,746,731
Deployment Costs	\$ 676,800		
Maintenance Costs	\$ 609,120		
Total Cost	\$ 1,285,920	\$ 1,129,908	\$ 999,451
Benefit-Cost Ratio	2.56	2.17	1.75

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
Emporia Service Area		20	44	220.0%	Public
Flying J	127	90	87	96.7%	Private

Number of Signs	4	Public Spaces	20
Number of Sites	2	Private Spaces	90
Number of Parking Spaces	110		

Benefits:			
2018 (Opening)	\$ 164,879.09	Annually	
Net Present Value of 20 years	\$ 3,297,581.80	Undiscounted	
Net Present Value of 20 years	\$2,452,984.52	3% Discount	
Net Present Value of 20 years	\$ 1,746,731.43	7% Discount	

Crash Benefits

Travel Time Benefits

80% of Available Spaces	88
Hours of Parking Search	22
Annual Savings	\$ 118,060.80

Environmental Benefits

80% of Available Spaces	88
Gallons Saved Daily	176
Miles Saved Daily	1,056
Annual Savings	\$ 46,818.29

Savings (Metric

Emissions Savings	Tons/Year	Value/Ton	Total
CO2	371.56	\$ 43.00	\$ 15,977.03
VOC	0.10	\$ 1,999.00	\$ 194.71
Nox	1.88	\$ 7,877.00	\$ 14,783.66
PM	0.04	\$ 360,383.00	\$ 15,862.89

Conversion Factors

Value	Units
2205	lbs/metric tons
0.035	grams/oz
0.0625	oz/lbs

Costs:

Sites	\$ 250,000.00	\$ 125,000.00	Per Site
Signs	\$ 220,000.00	\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 94,000.00		20% Engineering & CM
Contingency	\$ 112,800.00		20% Contingency
Total	\$ 676,800.00		

Annual O&M

Annual O&M	\$ 30,456.00		
Net Present Value of 20 years	\$609,120.00	Undiscounted	
Net Present Value of 20 years	\$453,108.37	3% Discount	
Net Present Value of 20 years	\$322,651.30	7% Discount	

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 9 - Newton

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 3,863,808		
Environmental Benefits	\$ 1,532,235		
Total Benefits	\$ 5,396,043	\$ 4,013,975	\$ 2,858,288
Deployment Costs	\$ 1,036,800		
Maintenance Costs	\$ 933,120		
Total Cost	\$ 1,969,920	\$ 1,730,923	\$ 1,531,074
Benefit-Cost Ratio	2.74	2.32	1.87

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
NB Rest Area		10	7	70.0%	Public
SB Rest Area		10	14	140.0%	Public
Newell Truck Plaza	31	110	106	96.4%	Private
Casey's Truck Stop	40	50	45	90.0%	Private

Number of Signs	4	Public Spaces	20
Number of Sites	4	Private Spaces	160
Number of Parking Spaces	180		

Benefits:			
2018 (Opening)	\$ 269,802.15	Annually	
Net Present Value of 20 years	\$ 5,396,042.94	Undiscounted	
Net Present Value of 20 years	\$4,013,974.66	3% Discount	
Net Present Value of 20 years	\$ 2,858,287.79	7% Discount	

Crash Benefits

Travel Time Benefits

80% of Available Spaces	144
Hours of Parking Search	36
Annual Savings	\$ 193,190.40

Environmental Benefits

80% of Available Spaces	144
Gallons Saved Daily	288
Miles Saved Daily	1,728
Annual Savings	\$ 76,611.75

Conversion Factors

Emissions Savings	Savings (Metric Tons/Year)			Conversion Factors	
	Tons/Year	Value/Ton	Total	Value	Units
CO2	608.01	\$ 43.00	\$ 26,144.22	2205	lbs/metric tons
VOC	0.16	\$ 1,999.00	\$ 318.62	0.035	grams/oz
Nox	3.07	\$ 7,877.00	\$ 24,191.45	0.0625	oz/lbs
PM	0.07	\$ 360,383.00	\$ 25,957.46		

Costs:

Sites	\$ 500,000.00	\$ 125,000.00	Per Site
Signs	\$ 220,000.00	\$ 55,000.00	Per Sign (Dynamic)
Engineering & CM	\$ 144,000.00		20% Engineering & CM
Contingency	\$ 172,800.00		20% Contingency
Total	\$ 1,036,800.00		

Annual O&M

Annual O&M	\$ 46,656.00		
Net Present Value of 20 years	\$933,120.00	Undiscounted	
Net Present Value of 20 years	\$694,123.47	3% Discount	
Net Present Value of 20 years	\$494,274.33	7% Discount	

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 10 - Dodge City

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 832,686		
Environmental Benefits	\$ 330,211		
Total Benefits	\$ 1,162,897	\$ 865,049	\$ 615,987
Deployment Costs	\$ 43,200		
Maintenance Costs	\$ 38,880		
Total Cost	\$ 82,080	\$ 72,122	\$ 63,795
Benefit-Cost Ratio	14.17	11.99	9.66

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
Love's		65	60	92.3%	Private
Flying J		68	69	101.5%	Private

Number of Signs	3	Public Spaces	0
Number of Sites	2	Private Spaces	133
Number of Parking Spaces	133		

Benefits:			
2018 (Opening)	\$ 58,144.86	Annually	
Net Present Value of 20 years	\$ 1,162,897.22	Undiscounted	
Net Present Value of 20 years	\$865,048.71	3% Discount	
Net Present Value of 20 years	\$ 615,987.48	7% Discount	

Crash Benefits

Travel Time Benefits

80% of Available Spaces	93
Hours of Parking Search	8
Annual Savings	\$ 41,634.32

Environmental Benefits

80% of Available Spaces	93
Gallons Saved Daily	62
Miles Saved Daily	372
Annual Savings	\$ 16,510.54

Emissions Savings	Savings (Metric Tons/Year)			Conversion Factors	
	Tons/Year	Value/Ton	Total	Value	Units
CO2	131.03	\$ 43.00	\$ 5,634.32	2205	lbs/metric tons
VOC	0.03	\$ 1,999.00	\$ 68.66	0.035	grams/oz
Nox	0.66	\$ 7,877.00	\$ 5,213.48	0.0625	oz/lbs
PM	0.02	\$ 360,383.00	\$ 5,594.07		

Costs:

Sites	\$ -	\$ -	Per Site
Signs	\$ 30,000.00	\$ 10,000.00	Per Sign (Static)
Engineering & CM	\$ 6,000.00		20% Engineering & CM
Contingency	\$ 7,200.00		20% Contingency
Total	\$ 43,200.00		

Annual O&M

Annual O&M	\$ 1,944.00		
Net Present Value of 20 years	\$38,880.00	Undiscounted	
Net Present Value of 20 years	\$28,921.81	3% Discount	
Net Present Value of 20 years	\$20,594.76	7% Discount	

Data Table

- 10% Annual Truck Crash Diversion
- 70% Parking Lot Utilization Percentage
- 5 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 0.67 Gallons of gas used in parking search
- 4 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 11 - Garden City

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 1,158,248		
Environmental Benefits	\$ 459,316		
Total Benefits	\$ 1,617,564	\$ 1,203,263	\$ 856,825
Deployment Costs	\$ 57,600		
Maintenance Costs	\$ 51,840		
Total Cost	\$ 109,440	\$ 96,162	\$ 85,060
Benefit-Cost Ratio	14.78	12.51	10.07

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
Cenex	Business 50 & 83 S	65	42	64.6%	Private
Garden City Travel Plaza	50 & 83	120	95	79.2%	Private

Number of Signs	4	Public Spaces	0
Number of Sites	2	Private Spaces	185
Number of Parking Spaces	185		

Benefits:			
2018 (Opening)	\$ 80,878.19	Annually	
Net Present Value of 20 years	\$ 1,617,563.80	Undiscounted	
Net Present Value of 20 years	\$1,203,263.24	3% Discount	
Net Present Value of 20 years	\$ 856,824.70	7% Discount	

Crash Benefits

Travel Time Benefits

80% of Available Spaces	130
Hours of Parking Search	11
Annual Savings	\$ 57,912.40

Environmental Benefits

80% of Available Spaces	130
Gallons Saved Daily	86
Miles Saved Daily	518
Annual Savings	\$ 22,965.79

Conversion Factors

Emissions Savings	Savings (Metric Tons/Year)		Total	Conversion Factors	
	Tons/Year	Value/Ton		Value	Units
CO2	182.26	\$ 43.00	\$ 7,837.22	2205	lbs/metric tons
VOC	0.05	\$ 1,999.00	\$ 95.51	0.035	grams/oz
Nox	0.92	\$ 7,877.00	\$ 7,251.83	0.0625	oz/lbs
PM	0.02	\$ 360,383.00	\$ 7,781.23		

Costs:

Sites	\$ -	\$ -	Per Site
Signs	\$ 40,000.00	\$ 10,000.00	Per Sign (Static)
Engineering & CM	\$ 8,000.00		20% Engineering & CM
Contingency	\$ 9,600.00		20% Contingency
Total	\$ 57,600.00		

Annual O&M

Annual O&M	\$ 2,592.00		
Net Present Value of 20 years	\$51,840.00	Undiscounted	
Net Present Value of 20 years	\$38,562.41	3% Discount	
Net Present Value of 20 years	\$27,459.68	7% Discount	

Data Table

- 10% Annual Truck Crash Diversion
- 70% Parking Lot Utilization Percentage
- 5 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 0.67 Gallons of gas used in parking search
- 4 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Sign Group 12 - Liberal

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 388,170		
Environmental Benefits	\$ 153,933		
Total Benefits	\$ 542,102	\$ 403,256	\$ 287,152
Deployment Costs	\$ 57,600		
Maintenance Costs	\$ 51,840		
Total Cost	\$ 109,440	\$ 96,162	\$ 85,060
Benefit-Cost Ratio	4.95	4.19	3.38

Locations	Exit #	Spaces	Inv. Count	Utilization Rate	Type
Shell		35	30	85.7%	Private
Sinclair		10	7	70.0%	Private
54 Rest Area		5	1	20.0%	Public
Kismet Rest Area		12	8	66.7%	Public

Number of Signs	4	Public Spaces	17
Number of Sites	4	Private Spaces	45
Number of Parking Spaces	62		

Benefits:

2018 (Opening)	\$ 27,105.12	Annually
Net Present Value of 20 years	\$ 542,102.46	Undiscounted
Net Present Value of 20 years	\$403,255.79	3% Discount
Net Present Value of 20 years	\$ 287,152.06	7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces	43
Hours of Parking Search	4
Annual Savings	\$ 19,408.48

Environmental Benefits

80% of Available Spaces	43
Gallons Saved Daily	29
Miles Saved Daily	174
Annual Savings	\$ 7,696.64

Conversion Factors

Emissions Savings	Savings (Metric Tons/Year)	Value/Ton	Total	Value	Units
CO2	61.08	\$ 43.00	\$ 2,626.53		2205 lbs/metric tons
VOC	0.02	\$ 1,999.00	\$ 32.01		0.035 grams/oz
Nox	0.31	\$ 7,877.00	\$ 2,430.34		0.0625 oz/lbs
PM	0.01	\$ 360,383.00	\$ 2,607.76		

Costs:

Sites	\$ -	\$ -	Per Site
Signs	\$ 40,000.00	\$ 10,000.00	Per Sign (Static)
Engineering & CM	\$ 8,000.00		20% Engineering & CM
Contingency	\$ 9,600.00		20% Contingency
Total	\$ 57,600.00		

Annual O&M

Net Present Value of 20 years	\$ 2,592.00	
Net Present Value of 20 years	\$51,840.00	Undiscounted
Net Present Value of 20 years	\$38,562.41	3% Discount
Net Present Value of 20 years	\$27,459.68	7% Discount

Data Table

- 10% Annual Truck Crash Diversion
- 70% Parking Lot Utilization Percentage
- 5 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 0.67 Gallons of gas used in parking search
- 4 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Capacity Improvement 1 - Ruleton Rest Areas

	Undiscounted	3% NPV (2017S)	7% NPV (2017S)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 536,640		
Environmental Benefits	\$ 212,810		
Total Benefits	\$ 749,450	\$ 557,496	\$ 396,984
Deployment Costs	\$ 120,000		
Maintenance Costs	\$ 108,000		
Total Cost	\$ 228,000	\$ 200,338	\$ 177,208
Benefit-Cost Ratio	3.29	2.78	2.24

Locations	Existing Parking	Additional Spaces	Suggested Improvement
WB Ruleton Rest Area	10	15	Change signing and striping to allow parking in loop area
EB Ruleton Rest Area	10	10	Change signing and striping to allow parking in car area

Existing Parking 20
 Number of Parking Spaces 25

Benefits:
 2018 (Opening) \$ 37,472.52 Annually
 Net Present Value of 20 years \$ 749,450.41 Undiscounted
 Net Present Value of 20 years \$557,496.48 3% Discount
 Net Present Value of 20 years \$ 396,984.42 7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces 20
 Hours of Parking Search 5
 Annual Savings \$ 26,832.00

Environmental Benefits

80% of Available Spaces 20
 Gallons Saved Daily 40
 Miles Saved Daily 240
 Annual Savings \$ 10,640.52

Emissions Savings	Savings (Metric)		
	Tons/Year	Value/Ton	Total
CO2	84.45	\$ 43.00	\$ 3,631.14
VOC	0.02	\$ 1,999.00	\$ 44.25
Nox	0.43	\$ 7,877.00	\$ 3,359.92
PM	0.01	\$ 360,383.00	\$ 3,605.20

Costs:

Sites \$ 80,000.00 \$20k per Rest Area for signing and striping + 40k for lighting
 Engineering & CM \$ 16,000.00
 Contingency \$ 24,000.00
 Total \$ 120,000.00

Annual O&M

\$ 5,400.00
 Net Present Value of 20 years \$108,000.00 Undiscounted
 Net Present Value of 20 years \$80,338.36 3% Discount
 Net Present Value of 20 years \$57,207.68 7% Discount

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Conversion Factors

Value Units
 2205 lbs/metric tons
 0.035 grams/oz
 0.0625 oz/lbs

Capacity Improvement 2 - Ogallah Rest Areas

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 321,984		
Environmental Benefits	\$ 127,686		
Total Benefits	\$ 449,670	\$ 334,498	\$ 238,191
Deployment Costs	\$ 120,000		
Maintenance Costs	\$ 108,000		
Total Cost	\$ 228,000	\$ 200,338	\$ 177,208
Benefit-Cost Ratio	1.97	1.67	1.34

Locations	Existing Parking	Additional Spaces	Suggested Improvement
WB Ogallah Rest Area	10	7	Change signing and striping to allow parking in loop and
EB Ogallah Rest Area	10	8	Change signing and striping to allow parking in loop and

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA'S TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Existing Parking	20
Number of Parking Spaces	15
Benefits:	
2018 (Opening)	\$ 22,483.51 Annually
Net Present Value of 20 years	\$ 449,670.25 Undiscounted
Net Present Value of 20 years	\$334,497.89 3% Discount
Net Present Value of 20 years	\$ 238,190.65 7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces	12
Hours of Parking Search	3
Annual Savings	\$ 16,099.20

Environmental Benefits

80% of Available Spaces	12
Gallons Saved Daily	24
Miles Saved Daily	144
Annual Savings	\$ 6,384.31

Emissions Savings	Savings (Metric)		
	Tons/Year	Value/Ton	Total
CO2	50.67	\$ 43.00	\$ 2,178.69
VOC	0.01	\$ 1,999.00	\$ 26.55
Nox	0.26	\$ 7,877.00	\$ 2,015.95
PM	0.01	\$ 360,383.00	\$ 2,163.12

Conversion Factors

Value	Units
2205 lbs/metric tons	
0.035 grams/oz	
0.0625 oz/lbs	

Costs:

Sites	\$ 80,000.00	\$20k per Rest Area for signing and striping + 40k for lighting
Engineering & CM	\$ 16,000.00	
Contingency	\$ 24,000.00	
Total	\$ 120,000.00	

Annual O&M

	\$ 5,400.00
Net Present Value of 20 years	\$108,000.00 Undiscounted
Net Present Value of 20 years	\$80,338.36 3% Discount
Net Present Value of 20 years	\$57,207.68 7% Discount

Capacity Improvement 3 - Russell Rest Areas

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 386,381		
Environmental Benefits	\$ 153,223		
Total Benefits	\$ 539,604	\$ 401,397	\$ 285,829
Deployment Costs	\$ 120,000		
Maintenance Costs	\$ 108,000		
Total Cost	\$ 228,000	\$ 200,338	\$ 177,208
Benefit-Cost Ratio	2.37	2.00	1.61

Locations	Existing Parking	Additional Spaces	Suggested Improvement
WB Russell Rest Area	8	9	Change signing and striping to allow parking in
EB Russell Rest Area	8	9	Change signing and striping to allow parking in

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Existing Parking	16
Number of Parking Spaces	18

Benefits:

2018 (Opening)	\$ 26,980.21	Annually
Net Present Value of 20 years	\$ 539,604.29	Undiscounted
Net Present Value of 20 years	\$401,397.47	3% Discount
Net Present Value of 20 years	\$ 285,828.78	7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces	14
Hours of Parking Search	4
Annual Savings	\$ 19,319.04

Environmental Benefits

80% of Available Spaces	14
Gallons Saved Daily	29
Miles Saved Daily	173
Annual Savings	\$ 7,661.17

Emissions Savings	Savings (Metric)		
	Tons/Year	Value/Ton	Total
CO2	60.80	\$ 43.00	\$ 2,614.42
VOC	0.02	\$ 1,999.00	\$ 31.86
Nox	0.31	\$ 7,877.00	\$ 2,419.14
PM	0.01	\$ 360,383.00	\$ 2,595.75

Costs:

Sites	\$ 80,000.00	\$20k per Rest Area for signing and striping + 40k for lighting
Engineering & CM	\$ 16,000.00	
Contingency	\$ 24,000.00	
Total	\$ 120,000.00	

Annual O&M

Annual O&M	\$ 5,400.00	
Net Present Value of 20 years	\$108,000.00	Undiscounted
Net Present Value of 20 years	\$80,338.36	3% Discount
Net Present Value of 20 years	\$57,207.68	7% Discount

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Conversion Factors

Value	Units
2205	lbs/metric tons
0.035	grams/oz
0.0625	oz/lbs

Capacity Improvement 4 - 81 Rest Areas

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 300,518		
Environmental Benefits	\$ 119,174		
Total Benefits	\$ 419,692	\$ 312,198	\$ 222,311
Deployment Costs	\$ 120,000		
Maintenance Costs	\$ 108,000		
Total Cost	\$ 228,000	\$ 200,338	\$ 177,208
Benefit-Cost Ratio	1.84	1.56	1.25

Locations	Existing Parking	Additional Spaces	Suggested Improvement
NB 81 Rest Area	5	2	Change signing and striping to allow parking in ca
SB 81 Rest Area	5	12	Change signing and striping to allow parking in ca

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Existing Parking	10
Number of Parking Spaces	14
Benefits:	
2018 (Opening)	\$ 20,984.61 Annually
Net Present Value of 20 years	\$ 419,692.23 Undiscounted
Net Present Value of 20 years	\$312,198.03 3% Discount
Net Present Value of 20 years	\$ 222,311.27 7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces	11
Hours of Parking Search	3
Annual Savings	\$ 15,025.92

Environmental Benefits

80% of Available Spaces	11
Gallons Saved Daily	22
Miles Saved Daily	134
Annual Savings	\$ 5,958.69

Emissions Savings	Savings (Metric		
	Tons/Year	Value/Ton	Total
CO2	47.29	\$ 43.00	\$ 2,033.44
VOC	0.01	\$ 1,999.00	\$ 24.78
Nox	0.24	\$ 7,877.00	\$ 1,881.56
PM	0.01	\$ 360,383.00	\$ 2,018.91

Conversion Factors

Value	Units
2205	lbs/metric tons
0.035	grams/oz
0.0625	oz/lbs

Costs:

Sites	\$ 80,000.00	\$20k per Rest Area for signing and striping + 40k for lighting
Engineering & CM	\$ 16,000.00	
Contingency	\$ 24,000.00	
Total	\$ 120,000.00	

Annual O&M

Annual O&M	\$ 5,400.00
Net Present Value of 20 years	\$108,000.00 Undiscounted
Net Present Value of 20 years	\$80,338.36 3% Discount
Net Present Value of 20 years	\$57,207.68 7% Discount

Capacity Improvement 5 - Abandoned Topeka Service Area

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 1,717,248		
Environmental Benefits	\$ 680,993		
Total Benefits	\$ 2,398,241	\$ 1,783,989	\$ 1,270,350
Deployment Costs	\$ 1,187,091		
Maintenance Costs	\$ 1,068,382		
Total Cost	\$ 2,255,472	\$ 1,981,832	\$ 1,753,013
Benefit-Cost Ratio	1.06	0.90	0.72

Locations	Existing Parking	Additional Spaces	Suggested Improvement
Closed Topeka Service Area	0	80	Place gravel over existing concrete and open to truck parking

Existing Parking	0
Number of Parking Spaces	80
Benefits:	
2018 (Opening)	\$ 119,912.07 Annually
Net Present Value of 20 years	\$ 2,398,241.31 Undiscounted
Net Present Value of 20 years	\$1,783,988.74 3% Discount
Net Present Value of 20 years	\$ 1,270,350.13 7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces	64
Hours of Parking Search	16
Annual Savings	\$ 85,862.40

Environmental Benefits

80% of Available Spaces	64
Gallons Saved Daily	128
Miles Saved Daily	768
Annual Savings	\$ 34,049.67

Emissions Savings	Savings (Metric Tons/Year)		
	Value/Ton		Total
CO2	270.22 \$	43.00 \$	11,619.66
VOC	0.07 \$	1,999.00 \$	141.61
Nox	1.36 \$	7,877.00 \$	10,751.75
PM	0.03 \$	360,383.00 \$	11,536.65

Costs:

Sites	\$ 791,393.75	+ \$100k in lighting	Area	47000 SY
Engineering & CM	\$ 158,278.75		HMA Tons	6198.75
Contingency	\$ 237,418.13		HMA \$	526,894
Total	\$ 1,187,090.63			

Annual O&M

Annual O&M	\$ 53,419.08
Net Present Value of 20 years	\$1,068,381.56 Undiscounted
Net Present Value of 20 years	\$794,740.99 3% Discount
Net Present Value of 20 years	\$565,922.47 7% Discount

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Conversion Factors

Value	Units
2205	lbs/metric tons
0.035	grams/oz
0.0625	oz/lbs

Capacity Improvement 6 - Homewood Rest Areas

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 300,518		
Environmental Benefits	\$ 119,174		
Total Benefits	\$ 419,692	\$ 312,198	\$ 222,311
Deployment Costs	\$ 120,000		
Maintenance Costs	\$ 108,000		
Total Cost	\$ 228,000	\$ 200,338	\$ 177,208
Benefit-Cost Ratio	1.84	1.56	1.25

Locations	Existing Parking	Additional Spaces	Suggested Improvement
WB Homewood Rest Area	14	7	Change signing and striping to allow parking in
EB Homewood Rest Area	13	7	Change signing and striping to allow parking in

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Existing Parking 27
 Number of Parking Spaces 14

Benefits:
 2018 (Opening) \$ 20,984.61 Annually
 Net Present Value of 20 years \$ 419,692.23 Undiscounted
 Net Present Value of 20 years \$312,198.03 3% Discount
 Net Present Value of 20 years \$ 222,311.27 7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces 11
 Hours of Parking Search 3
 Annual Savings \$ 15,025.92

Environmental Benefits

80% of Available Spaces 11
 Gallons Saved Daily 22
 Miles Saved Daily 134
 Annual Savings \$ 5,958.69

Emissions Savings	Savings (Metric)		
	Tons/Year	Value/Ton	Total
CO2	47.29	\$ 43.00	\$ 2,033.44
VOC	0.01	\$ 1,999.00	\$ 24.78
Nox	0.24	\$ 7,877.00	\$ 1,881.56
PM	0.01	\$ 360,383.00	\$ 2,018.91

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Conversion Factors

Value Units
 2205 lbs/metric tons
 0.035 grams/oz
 0.0625 oz/lbs

Costs:

Sites \$ 80,000.00 \$20k per Rest Area for signing and striping + 40k for lighting
 Engineering & CM \$ 16,000.00
 Contingency \$ 24,000.00
 Total \$ 120,000.00

Capacity Improvement 7 - Towanda Service Area

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 1,073,280		
Environmental Benefits	\$ 425,621		
Total Benefits	\$ 1,498,901	\$ 1,114,993	\$ 793,969
Deployment Costs	\$ 412,500		
Maintenance Costs	\$ 371,250		
Total Cost	\$ 783,750	\$ 688,663	\$ 609,151
Benefit-Cost Ratio	1.91	1.62	1.30

Locations	Existing Parking	Additional Spaces	Suggested Improvement
Towanda Service Area	27	50	Place Gravel Lot in area of water tower at service area

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Existing Parking	27
Number of Parking Spaces	50
Benefits:	
2018 (Opening)	\$ 74,945.04 Annually
Net Present Value of 20 years	\$ 1,498,900.82 Undiscounted
Net Present Value of 20 years	\$1,114,992.96 3% Discount
Net Present Value of 20 years	\$ 793,968.83 7% Discount

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	#####	MAASTO Tiger Grant
NOX	8.61	grams/mile	#####	MAASTO Tiger Grant
PM	0.20	grams/mile	#####	MAASTO Tiger Grant

Crash Benefits

Travel Time Benefits

80% of Available Spaces	40
Hours of Parking Search	10
Annual Savings	\$ 53,664.00

Environmental Benefits

80% of Available Spaces	40
Gallons Saved Daily	80
Miles Saved Daily	480
Annual Savings	\$ 21,281.04

Emissions Savings	Savings (Metric)		
	Tons/Year	Value/Ton	Total
CO2	168.89	\$ 43.00	\$ 7,262.28
VOC	0.04	\$ 1,999.00	\$ 88.50
Nox	0.85	\$ 7,877.00	\$ 6,719.85
PM	0.02	\$ 360,383.00	\$ 7,210.41

Conversion Factors

Value	Units
2205 lbs/metric tons	
0.035 grams/oz	
0.0625 oz/lbs	

Costs:

Sites	\$ 275,000.00	20k SY Gravel + \$75k in lighting		
Engineering & CM	\$ 55,000.00		Area	20000 SY
Contingency	\$ 82,500.00		HMA Tons	10875
Total	\$ 412,500.00		HMA \$	\$ 1,024,375
			Total \$	\$ 1,536,563
Annual O&M	\$ 18,562.50			\$ 69,145.31
Net Present Value of 20 years	\$371,250.00	Undiscounted		\$1,382,906.25 Undiscounted
Net Present Value of 20 years	\$276,163.13	3% Discount		\$1,028,707.65 3% Discount
Net Present Value of 20 years	\$196,651.39	7% Discount		\$732,526.43 7% Discount

Capacity Improvement 8 - Bloom Rest Area

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 429,312		
Environmental Benefits	\$ 170,248		
Total Benefits	\$ 599,560	\$ 445,997	\$ 317,588
Deployment Costs	\$ 225,000		
Maintenance Costs	\$ 202,500		
Total Cost	\$ 427,500	\$ 375,634	\$ 332,264
Benefit-Cost Ratio	1.40	1.19	0.96

Locations	Existing Parking	Additional Spaces	Suggested Improvement
Bloom Rest Area	15	20	Place Gravel Lot in green space to allow parking.

Existing Parking	15
Number of Parking Spaces	20
Benefits:	
2018 (Opening)	\$ 29,978.02 Annually
Net Present Value of 20 years	\$ 599,560.33 Undiscounted
Net Present Value of 20 years	\$445,997.18 3% Discount
Net Present Value of 20 years	\$ 317,587.53 7% Discount

Crash Benefits

Travel Time Benefits

80% of Available Spaces	16
Hours of Parking Search	4
Annual Savings	\$ 21,465.60

Environmental Benefits

80% of Available Spaces	16
Gallons Saved Daily	32
Miles Saved Daily	192
Annual Savings	\$ 8,512.42

Emissions Savings	Savings (Metric Tons/Year)		
	Tons/Year	Value/Ton	Total
CO2	67.56	\$ 43.00	\$ 2,904.91
VOC	0.02	\$ 1,999.00	\$ 35.40
Nox	0.34	\$ 7,877.00	\$ 2,687.94
PM	0.01	\$ 360,383.00	\$ 2,884.16

Costs:

Sites	\$ 150,000.00	10k SY Gravel + \$50k in lighting
Engineering & CM	\$ 30,000.00	
Contingency	\$ 45,000.00	
Total	\$ 225,000.00	

Annual O&M

Annual O&M	\$ 10,125.00
Net Present Value of 20 years	\$202,500.00 Undiscounted
Net Present Value of 20 years	\$150,634.43 3% Discount
Net Present Value of 20 years	\$107,264.39 7% Discount

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Conversion Factors

Value	Units
2205	lbs/metric tons
0.035	grams/oz
0.0625	oz/lbs

Capacity Improvement 5 - Topeka Service Area

	Undiscounted	3% NPV (2017\$)	7% NPV (2017\$)
Safety Benefit	\$ -		
Travel Time Benefits	\$ 1,073,280		
Environmental Benefits	\$ 425,621		
Total Benefits	\$ 1,498,901	\$ 1,114,993	\$ 793,969
Deployment Costs	\$ 450,000		
Maintenance Costs	\$ 405,000		
Total Cost	\$ 855,000	\$ 751,269	\$ 664,529
Benefit-Cost Ratio	1.75	1.48	1.19

Locations	Existing Parking	Additional Spaces	Suggested Improvement
Topeka Service Area	61	50	Place gravel over existing concrete and open to truck parking

Data Table

- 10% Annual Truck Crash Diversion
- 80% Parking Lot Utilization Percentage
- 15 Reduced Parking Search Time in Minutes/Space
- 208 Heavy Shipping Days per Year
- \$ 25.80 Hourly Rate from FHWA's TIGER Benefit-Cost Analysis Resource Guide
- 2.00 Gallons of gas used in parking search
- 12 Miles saved per parking space
- 4.50% Annual Maintenance Factor

Existing Parking	61
Number of Parking Spaces	50
Benefits:	
2018 (Opening)	\$ 74,945.04 Annually
Net Present Value of 20 years	\$ 1,498,900.82 Undiscounted
Net Present Value of 20 years	\$1,114,992.96 3% Discount
Net Present Value of 20 years	\$ 793,968.83 7% Discount

Emission	Conversion	Units	\$/Ton	Source
CO2	22.38	lbs/gallon	\$ 43.00	MAASTO Tiger Grant
VOC	0.45	grams/mile	\$ 1,999.00	MAASTO Tiger Grant
NOX	8.61	grams/mile	\$ 7,877.00	MAASTO Tiger Grant
PM	0.20	grams/mile	\$ 360,383.00	MAASTO Tiger Grant

Crash Benefits

Travel Time Benefits

80% of Available Spaces	40
Hours of Parking Search	10
Annual Savings	\$ 53,664.00

Environmental Benefits

80% of Available Spaces	40
Gallons Saved Daily	80
Miles Saved Daily	480
Annual Savings	\$ 21,281.04

Emissions Savings	Savings (Metric)		
	Tons/Year	Value/Ton	Total
CO2	168.89	\$ 43.00	\$ 7,262.28
VOC	0.04	\$ 1,999.00	\$ 88.50
Nox	0.85	\$ 7,877.00	\$ 6,719.85
PM	0.02	\$ 360,383.00	\$ 7,210.41

Conversion Factors

Value	Units
2205	lbs/metric tons
0.035	grams/oz
0.0625	oz/lbs

Costs:

Sites	\$ 300,000.00	20k SY Gravel + \$100k in lighting.		
Engineering & CM	\$ 60,000.00		Area	25000 SY
Contingency	\$ 90,000.00		HMA Tons	13593.75
Total	\$ 450,000.00		HMA \$	1,255,469
			Total \$	1,883,203
				84,744.14
Annual O&M	\$ 20,250.00			\$
Net Present Value of 20 years	\$405,000.00	Undiscounted	\$1,694,882.81	Undiscounted
Net Present Value of 20 years	\$301,268.87	3% Discount	\$1,260,778.82	3% Discount
Net Present Value of 20 years	\$214,528.79	7% Discount	\$897,780.63	7% Discount

Notes:

GHG Emission Factor: <http://www.epa.gov/otaq/consumer/420f08027.pdf>

Estimate of 6 miles per gallon

1gm = .035oz 1oz=.0625lbs

Assuming 208 days of use per year or 4 days a week

One Time Software Costs: These numbers do not include the one-time costs of central software updates. That will be highly variable for each state.

Costs	Price	Units
AB-3	\$ 10.00	SY
Asphalt	\$ 85.00	Ton
Concrete	\$ 48.00	8" PCCP SY
Milling	\$ 3.50	SY