

Commercial Vehicle Parking

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of Transportation**

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INTRODUCTION

The Iowa Department of Transportation was requested by the 1999 Iowa General Assembly to conduct a study of Iowa public policy regarding overnight truck parking. The legislature's request, contained in the Transportation Appropriation Bill, Senate File 424, required a "review of public policy issues related to the state provision of commercial truck parking."

Task Force

In the summer of 1999, the Iowa Department of Transportation formed a Task Force on Commercial Truck Parking. Members of the Task Force included stakeholders from corporate and independent trucking firms, representatives from highway user groups, academia, the enforcement community, the federal government, and the Iowa Department of Transportation. Task Force members include the following:

- Harold Andrews, Warren Transport
- Michael Crum, Department of Logistics, Operations, and Management, Iowa State University
- Kent Fleming, Office of Motor Carrier, Federal Highway Administration
- Lieutenant Tom Gabriel, Iowa State Highway Patrol
- Ron Marr, Petroleum Marketers of Iowa
- Delia Meier, Iowa 80 Truckstop
- Gary Michaelson, Michaelson Truck Line
- Dennis Tice, Division of Planning and Programming, Iowa Department of Transportation
- Daron Van Helden, AAA
- Paul Vandevenne, Paul's Enterprise
- Mike Winfrey, Office of Motor Vehicle Enforcement, Iowa Department of Transportation

The Task Force first met on August 17, 1999, to review the current status of Iowa public policy on commercial vehicle parking and to make recommendations regarding commercial vehicle parking. After lengthy discussions, the Task Force decided that before they could make any recommendations to the legislature, they needed additional information. The Task Force developed a substantial list of issues requiring research, listed below:

1. More information is needed on commercial truck parking space availability in Iowa, specifically:
 - An inventory of both public and private commercial vehicle parking spaces in Iowa.
 - Present and future demand for overnight parking.

- A distribution of supply and demand; a better understanding of where truck-parking shortages exist within the state.
 - Duration of parking; a better understanding of how parking spaces are used by trucks and what the space utilization rates are.
2. The safety benefits of additional truck parking space need to be quantified. The implicit benefit of additional parking spaces is safety. Additional spaces will both decrease the number of trucks parked along the shoulders and thus exposed to traffic and increase the opportunity for fatigued drivers to rest.
 3. The feasibility and potential benefits of alternative service delivery models must be determined. Alternative models include the following:
 - The Vermont model. The Vermont Department of Transportation has begun to work with private truck stops and other traveler service businesses to alleviate the shortage of rest area parking spaces. The state develops criteria for visitor or information centers. Criteria may include adequate overnight truck parking, 24-hour access to well-maintained restrooms, and pay telephones. In exchange for meeting the criteria, the service provider may receive signage on the interstate or be identified as a state visitor center on state maps. This would both encourage businesses to supplement the services offered at public rest areas and improve the amount of information available to the traveling public.
 - Use of weigh stations. The state of Iowa has plans to close outbound weigh stations. Following the example set by Kentucky, Iowa might explore the option of opening up both active and soon-to-be inactive weigh station parking spaces for overnight parking. The feasibility of this approach would depend on the level of service needed to accommodate overnight parking, the cost of additional facilities and maintenance, security, and the liability of the state.
 - Undeveloped sites. Some states have provided primitive truck parking spaces a safe distance from the flow of traffic. Primitive sites may be a low-cost, short-term solution, but they raise questions of sanitation, security, and liability.
 - Providing space availability information. In examining the seemingly acute shortage of truck parking spaces along Interstate 95 in the Baltimore Metropolitan area, the Baltimore Metropolitan Planning Organization found that, unbeknownst to truckers, parking spaces were available in local truck stops. One proposed solution is to provide “real time” space availability information to truck drivers to improve the utilization rate of existing private and public spaces.
 4. Cost of alternatives. To effectively compare approaches, a better understanding of costs and expected benefits for each alternative is needed.

Conducting research to address all of these issues within the time remaining to make recommendations to the 2000 Iowa General Assembly is not possible. Therefore, the Task Force agreed to limit the immediate research and data gathering to a study of national trends in public commercial truck parking and an investigation of how states around Iowa are dealing with this issue. Further, the Task Force asked for an estimate of the availability of and the demand for overnight truck parking at facilities along and adjacent to Iowa's interstate highways. To perform these tasks, the Task Force agreed to use the Center for Transportation Research and Education (CTRE) at Iowa State University. The analysis conducted by CTRE is described later in this report.

Recommendations

Following a review of CTRE's findings, the Task Force reached the following public policy recommendations. Given the short time frame for conducting the work of the Task Force and the limited scope of the research conducted in the time frame allotted, the recommendations are very general. The committee believes that more research is required to make more specific recommendations.

The following general recommendations consist of (1) overarching principles and (2) priorities for developing public parking spaces.

Overarching Principles

- The state needs to provide some overnight parking. The Task Force believed that the state cannot expect the private sector to meet all overnight parking demands. Presently, the proportion of available commercial truck parking spaces provided in public rest areas is about 13 percent of total available spaces. Therefore, the bulk of the available spaces are provided by the private sector. Whether 13 percent is a reasonable public share of the total spaces could not be determined by the Task Force given the limited research available. However, the Task Force felt that the State of Iowa should continue to be in the business of providing public spaces.
- The locations where unmet demand for overnight parking is greatest need to be prioritized as the locations for future public development of new overnight parking. Members of the committee pointed out that stretches of interstate highways in Iowa with few or no urban areas had fewer private truck stop operators. For example, I-35 north of Des Moines is part of the Iowa interstate highway network with unmet demand for overnight truck parking. Because of the few large cities on I-35 north of Des Moines, it is unlikely that many private truck stop operators will build facilities with substantial amenities.

Priorities for the Development of Future Development Public Parking Spaces

1. Evaluate existing public facilities to accommodate more truck parking (e.g., weigh stations, closed rest areas, and undeveloped sites).

2. Use intelligent transportation systems (ITS) solutions or other media to better inform truck operators of the availability of both public and private truck parking spaces.
3. As existing rest areas are upgraded, try to size parking to meet space demands for a 20-year planning horizon. This may involve re-engineering existing spaces as well as constructing new facilities.

Report Organization

The remainder of this report covers findings of the research. The following section is an environmental scan, which reviews current relevant federal laws, describes strategies in other states throughout the country and in our region for dealing with truck parking issues, briefly discusses recent and future research, and outlines a method of determining commercial rest area requirements.

The final section of the report covers the results of a survey conducted by CTRE during fall 1999 to determine the availability of and demand for overnight commercial truck parking in Iowa. In summary, results of the survey indicate that a substantial number of commercial trucks park overnight at Iowa public rest stops and commercial truck stops. The highest concentration of commercial truck stops is on I-80 east of Des Moines, followed by I-29 and the interstate highways surrounding Des Moines. Public rest areas are frequently filled or overflowing on most week nights, while most commercial truck stops are not completely full. However, some sections of Iowa's interstate system, such as those along I-80 east and I-380, appear to have a higher occupancy rates than others.

ENVIRONMENTAL SCAN

The purpose of the environmental scan was to develop an understanding of how overnight truck parking is being treated in other states and to put Iowa's truck parking issues in perspective with national trends. The lack of adequate overnight commercial truck parking is a national issue. Research indicates that overnight parking for commercial trucks is inadequate at present¹, and that truck traffic volume in the U.S. continues to grow.^{2,3}

This section includes a review of current federal law that affects truck parking space development, along with a review of the strategies being pursued by several states to address the growing demand. These states include California, Iowa, Kentucky, Maryland, New York, Ohio, Pennsylvania, and Vermont. This section also includes a discussion of a survey of transportation agencies in states bordering Iowa (Illinois,

1 *Commercial Driver Rest & Parking Requirements: Making Space for Safety*, U.S. Department of Transportation, Federal Highway Administration. Report No. FHWA-MC-96-0010. May 1996.

2 *U.S. Freight Transportation Forecast...to 2004*, Prepared by DRI/McGraw-Hill. Submitted to the American Trucking Associations Foundation. Second Annual Report. February, 1996. P. 15.

3 *U.S. Freight Transportation Forecast...to 2006*, Prepared by Standard & Poor's DRI with supplemental analysis by Martin Labbe Associates. Sponsored by ATA Foundation. Third Annual Report, Dec. 1997. P. 1.

Kansas, Minnesota, Missouri, and Nebraska) about their problems with and strategies for dealing with issues related to commercial truck parking.

Finally, current and future planned research into the issues of commercial truck parking is discussed, and a guideline for determining commercial driver rest areas requirements is described.

Federal Prohibitions on Commercialization of Rest Areas

Privately financed rest areas do not exist on the interstate system with the exception of toll roads that receive no federal aid but carry the interstate emblem and a few rare cases in which the private rest area was developed prior to the road being designated an interstate highway. Private or commercial use of interstate highway right of way is explicitly prohibited in US Code Title 23, Chapter 1, Section 111, paragraph a:

All agreements between the Secretary and State highway department for the construction of projects on the Interstate System shall contain a clause providing that the State will not add any points of access to, or exit from, the project in addition to those approved by the Secretary in the plans for such a project, without the prior approval of the Secretary. Such agreements shall also contain a clause providing that the state will not permit automotive service stations or other commercial establishments for serving motor vehicle users to be constructed or located on the right of way. Such agreements may, however, authorize a State or political subdivision to permit the use of airspace above and below the established grade line of the highway pavement for such purposes as will not impair the full use and safety of the highways, as will not require or permit vehicular access to such space directly from such established grade line of the highway, or otherwise interfere in any way with the free flow of traffic on the Interstate System. Nothing in this section, or in any agreement entered into under this section, shall require the discontinuance, obstruction, or removal of any establishment for serving motor vehicle users on any highway which has been, or is hereafter, designated as a highway or route on the Interstate System (1) if such establishment (A) was in existence before January 1, 1960, (B) is owned by a State, and (C) is operated through concessionaires or otherwise, and (2) if all access to, and exits from, such an establishment conform to the standards established for such a highway under this title.

In 1991, the Bush administration proposed allowing food and fuel “travel plazas” to locate at the 1,400 rest areas that flank the Interstate Highway System (HR 1351). The National Association of Truck Stop Operators (NATSO), the McDonald’s Corporation, and locally owned businesses fought the legislation on the grounds that privatization of rest areas would create unfair competition and ultimately devastate smaller communities that depend on the business at interchanges. This proposal did not make it into the final Intermodal Surface Transportation Equity Act.⁴

⁴ Mills, Mike, "Efforts to Commercialize Rest Areas Has Businesses Crying Highway Robbery." In *The Congressional Quarterly* (May 18, 1991), 1268-1269.

The American Trucking Association continues to lobby for expansion of parking whether through public or private funding. NATSO opposes expansion of rest area parking, suggesting that truck stops offer the most affordable solutions. According to NATSO, truck stops are currently expanding to meet the growing demand. NATSO contends that further private investment in overnight parking could be stimulated through targeted tax credits and low-interest loans.⁵

Federal legislation could potentially have an impact on funding decisions regarding state rest area programs. The 1995 National Highway System Designation Act (Section 310-Federal Share) allows for 100 percent federal funding for the modification and maintenance of non-commercial rest areas in areas “. . . where the secretary determines there is a shortage.”

State Efforts

Although rest areas are very popular with the traveling public, support for expansion or enhancement has not carried over to state budgeting processes. Increasingly, those responsible for rest area program management have been challenged by the scarcity of funds, a growing demand for facilities, particularly from the motor carrier industry, and the limitation of US Code Title 23. In the face of this challenge, states have been very creative. The following is a brief summary of the approaches adopted by states to meet these countervailing demands.

Iowa

The Iowa Department of Transportation, along with Worth County and the Iowa Department of Economic Development, entered into a public/private partnership to develop and maintain a “Welcome Center” at Interchange 214 along Interstate 35. The Welcome Center replaces both the northbound and southbound rest areas in the vicinity. The private developer is responsible for operations and maintenance of the center, with the Iowa Department of Transportation sharing in cost. Iowa contributed \$1.8 million of the \$2.5 million total project development and construction costs. The public/private partnership will save the State of Iowa an estimated \$3.43 million in maintenance costs over 30 years.⁶

New York

The New York State Department of Transportation (NYSDOT) is both investing in public rest area expansion and attempting to add capacity through public/private development. NYSDOT is proposing the development of a “Long Island Traveler and Information Center” (LITIC). The proposed LITIC would be located off the right of way. The State of New York would purchase land along the Long Island Expressway and lease it to a developer. The developer would agree to provide a combination of commercial and non-commercial services. Minimum service would include rest rooms, tourist/travel information, restaurant/food operation, and space for a police substation. The travel

⁵ Graham, Sandy, "Sorry No Vacancy: Truckers find parking spots hard to come by when they need sleep." *Traffic Safety* (January/February, 1998), 16-19.

⁶ Personal communication with William E. Zitterich and Steve McNenamin, Iowa Department of Transportation

centers would receive signage on the mainline and would be referenced on the state highway map and in publicly developed travel brochures.

The cost for development of three proposed traveler information centers, including access roads and parking lots, is estimated to be approximately 60 million dollars. The NYSDOT would contribute to the cost of construction. The size of the state's contribution will be determined through the proposal process.⁷

California

Since the 1970s, the California Department of Transportation (CALTRANS) has been attempting to add rest areas at interstate interchanges and along conventional highways through joint public/private development. Over the years, individual projects and programs either have been opposed successfully by local business concerns and local governments or have failed for economic reasons.⁸

CALTRANS has recently made progress in its attempt to raise the priority of rest areas within the agency. The 10-year State Highway Operations Protection Plan (SHOPP) proposes spending seventy million dollars to restore and renovate state rest areas. A Safety Roadside Rest Area System Improvement Team has been formed and given the mission of recommending improvements, rest area policies, guidelines, and practices.

A "request for proposals" is currently being prepared to assess potential opportunities for a public /private rest area at Chiriaco Summit on I-10. The proposal is for a public/private initiative similar to that of New York. The request for proposals, which will outline the responsibilities and ownership arrangement, was expected to be completed by November 16, 1999.

Pennsylvania

The Southwestern Pennsylvania Regional Planning Commission completed a Truck Rest Area Location Study in June of 1995.⁹ The study concludes that southwestern Pennsylvania, including the Pittsburgh metropolitan area, lacks conveniently located places for drivers to rest or to wait comfortably between pick-up and delivery appointments.

The study identified four basic designs for layover points. They are

1. The "truck stop" model. A privately operated, full service center, typically located near major interchanges of limited access highways.
2. The "service plaza" model. A large, publicly owned but typically privately operated service area located on the right of way of a toll highway.

⁷ Personal communication with Nancy Alexander, New York State Department of Transportation

⁸ Carhart, Ralph L. Safety Roadside Rest Areas, CALTRANS, October 6, 1998.

⁹ "Truck Rest Area Location Study". Southwestern Pennsylvania Regional Planning Commission, June 1995.

3. The “safety rest area” model. A public rest area located within the right of way of both interstates and limited access highways.
4. The “truck rest area” model. A simple parking space adequately removed from the flow of traffic.

The location of the parking shortage will dictate the approach taken.

Pennsylvania is unique in that it has experience with the low-cost “truck rest area” model. At regular intervals along the Pennsylvania Turnpike, the shoulder widens, permitting vehicles to pull over and park at a safe distance from the flow of traffic. The study considers developing such truck rest areas in close proximity to the industrial districts of Pittsburgh. The study suggests providing lighting and security to under-utilized, publicly held land, such as that directly underneath interstate bridges, the parking lot of a sports stadium, and parking lots adjacent to an old airport.

Kentucky

Kentucky has addressed the shortage of truck parking spaces more directly, constructing new rest areas and expanding parking at existing facilities. Some of the newer rest areas have been developed off the right of way, leaving open the possibility of adding commercial services in the future.

In addition to building and expanding rest area parking, the Kentucky Transportation Cabinet has made a total of 225 spaces available for overnight parking at five weigh stations. The weigh station parking areas are open 24 hours a day and are patrolled by the Kentucky Motor Vehicle Enforcement Officers. This approach has met with limited success partially because facilities at the weigh station are not designed to rest area standards. Kentucky has added facilities to existing weigh stations and will include additional parking as well as better facilities to newly constructed weigh stations.¹⁰

Ohio

Ohio is experiencing truck parking shortages in isolated areas. The Ohio Department of Transportation is attempting to address the shortage with little or no impact on the state’s transportation budget. To accomplish this, the Ohio Department of Transportation will begin with the simplest solutions and look for opportunities to partner with private industry.

Approaches include the following:

1. Supporting the preservation of existing rest areas.
2. Using signs, perhaps variable message signs and real-time data, to provide drivers with more information on available truck spaces at both rest areas and truck stops.

¹⁰ Personal communication with John Sacksteder, Kentucky Department of Transportation.

3. Adding capacity to existing rest areas by replacing pull-in parallel parking design with the pull-through design.
4. Working with the private sector to more precisely identify location of shortage and available parking spaces.

Vermont

Concerned with escalating operating costs, the State of Vermont recently closed one of its rest areas and designated a nearby truck stop as a “Vermont Information Center.” In exchange for state designation as an information center, corresponding signage, and mention in Vermont travel guides, the rest area agreed to meet criteria set by the state. Criteria included 24-hour access to a pay telephone and restrooms and prominent display of tourism information.

NATSO has embraced this approach. NATSO suggests that a state establish criteria for designation as an information center. All truck stops and travel plazas that meet the criteria would then be granted information center status and would benefit from signage and mention in travel guides. Such an approach would preserve competition.¹¹

Maryland

In its 1996 study, “No Room at the Inn,” the American Trucking Association identified the I-95 corridor as the one with the greatest truck parking shortage. The Laurel, Maryland, rest area was deemed one of the nation’s busiest. Trucks were frequently parking illegally on the shoulder of the road.

The Baltimore Metropolitan Council’s Freight Movement Task Force formed a Truck Rest Area Subcommittee to address the issue. The subcommittee observed the parking situation during nighttime hours. They were surprised to learn that, while trucks were parked illegally along the shoulders of the interstate, a sufficient number of parking spaces were available at nearby private truck stops. The subcommittee concluded that the illegal parking could be, in part, attributed to a lack of information on the availability of truck parking spaces. Also, one private truck stop had gained a bad reputation and was deemed by some drivers to be a less attractive option than parking on the shoulder illegally.

Maryland transportation agencies have agreed to increase signage along the interstate to inform drivers of available truck parking spaces.¹²

States Bordering Iowa

State transportation agencies in Illinois, Kansas, Minnesota, Missouri, and Nebraska) were contacted to determine if they have experienced problems with commercial truck parking issues and the agencies’ strategies for addressing the issues. The people most often contacted for their opinions were professionals and administrators

11 Personal communication with Lisa Mullings, National Association of Truck Stop Operators

12 "Regional Committee Addresses Truck Parking Issues", Jocelyn Jones, Baltimore Metropolitan Council, November 1998.

within each state's department of transportation (DOT). The following questions were asked:

- Within your state, do you have problems with adequate overnight parking for commercial trucks along interstate highways?
- Where do you have the most trouble with adequate overnight commercial truck parking? For example, are the problems most pronounced in
 - rural, remote areas along interstates?
 - a particular region of the state (north, south, east, west)?
 - at your state borders?
 - near major metropolitan areas?
- What policies, if any, are you developing to mitigate the perceived commercial truck parking supply shortage?
- Do you see this as a federal, state, regional, or private sector problem? In other words, who do you think has the responsibility to try to solve it?
- How do you plan to fund your efforts to relieve truck parking shortages?

Comments from state officials are summarized below.

Illinois

In Illinois, the commercial sector supplies the necessary spaces for truck drivers to park and rest, according to Joe Hill, Engineer of Operations for the Illinois Department of Transportation, Division of Highways. The most recent study of truck parking issues at public rest stops in Illinois was completed 12 or 13 years ago. The state subsequently decided to provide a total of 45 truck parking places (15 feet wide by 75 feet long) at each public rest stop (currently totaling 47 statewide) as they made improvements to these facilities. Some rest areas have more but no new ones have less.

The rule in Illinois is a limit of three hours parking at a rest stop; the police do not enforce this rule strictly unless it is obvious that people are camping. Only three public rest stops are located around the Chicago metropolitan area, and one of these (near South Beloit on the north side) prohibits trucks altogether. Despite the fact that the private sector is filling most of the demand for overnight commercial truck parking, drivers still park on interchange ramps in both urban and rural areas. Apparently the main reason for this is to avoid a variety of disturbances to drivers' resting at commercial truck stops, including prostitutes (often called "lot lizards") and drug dealers. In contrast, Illinois' public rest areas have fewer security problems. They are normally operated by attendants from 6:00 a.m. to 10:00 p.m. and are patrolled at least once a night by police, and their entrance and exit ramps are nearly always full at nights with commercial trucks.

The Illinois DOT gets few requests to increase the amount of public rest area truck parking. Those who do advocate for more spaces are usually private safety advocate groups. The trucking industry is not lobbying the state for more spaces, and commercial truck stops say that the state should refrain from expanding its parking since it infringes on their business.

Mr. Hill predicts more growth in truck traffic through Illinois and has noted a 5 to 10 percent increase in vehicle miles traveled per year (both car and truck) for the last 9 years. On average, 20 to 30 percent of the traffic going through Chicago consists of commercial trucks. Much of this growth, he believes, is due to the introduction of just-in-time manufacturing systems and the rise in the number of semis owned by farmers who are transporting their crops to market.

Kansas

Overnight parking for commercial trucks is currently not an issue of concern in Kansas, according to Mr. Ken Gudenkauf, Assistant Bureau Chief of the Bureau of Traffic Engineering, Kansas DOT. He has noted some parked commercial trucks on entrance and exit ramps on Kansas's interstates but believes that truckers park in these areas more for convenience than for lack of parking spaces in public rest areas and truck stops. He says that the frequent demands of clients with just-in-time manufacturing schedules influence drivers to park on available ramps a convenient distance from their plants so that they can time their arrivals more accurately. No data have been gathered on the adequacy of truck parking in Kansas, and there are no plans to expand on the current inventory of spaces available.

Minnesota

The Minnesota Department of Transportation (Mn/DOT) has conducted annual Motorist Usage Surveys at safety rest areas (currently totaling 55 full-service facilities) throughout the state since 1969. Minnesota has estimated models with which to calculate daytime vehicular parking capacity needs for all vehicle types (including commercial vehicles), but these models are not applicable to overnight truck parking. Mn/DOT recently conducted a two-phase study to measure actual nighttime parking conditions for commercial trucks in Minnesota's public rest areas.

In Phase I (1995 to 1997), on-site rest area custodial staff provided two counts of oversized vehicles per night for up to 759 days at 50 full-service Mn/DOT rest stops. A preliminary analysis of Phase I data indicated that 26 of the 50 sites had potential truck parking capacity problems, and 15 of the 26 rest areas with potential problems had regular nighttime parking capacity problems. Phase II data collection recorded the number of trucks parked at these 15 sites at each site 4 times between 10:00 p.m. and 8 a.m. between May and September 1998.

The results of analysis from Phase II indicated that the highest truck occupancy rates occurred at the 15 locations with the most critical capacity problems between 2:00 and 4:00 a.m. On a daily basis, the highest demand occurred on Tuesday, followed closely by Wednesday, Thursday, and Monday. The demand on Fridays was about 75 percent of the average of the other weekdays, and the demand on Saturdays and Sundays

was significantly below the other levels. Year-long trends seen in Phase I indicated that the highest-use month was August, while the lowest-use month was December.

At 6 of the 15 sites studied in Phase II, truck parking capacity was met or exceeded more than 50 percent of the time (based on 2:00 a.m. counts). Truck parking capacity was met or exceeded between 10 and 50 percent of the time at all 15 sites in the Phase II study. Truck parking capacity was met or exceeded less than 10 percent of the time at five of the sites studied¹³.

According to Carol Braun, Senior Landscape Architect for Mn/DOT, Minnesota continues to collect data on the truck parking issue. They are following a data collection pattern similar to the Phase II study (counting trucks four times a night) and are adding more sites to the analysis. Also, in August 1999, Mn/DOT conducted a nighttime length-of-stay commercial truck parking study at three Interstate-94, Mn/DOT rest areas. This study was conducted from 11:00 p.m. to 7:00 a.m. Monday night through Saturday morning simultaneously at three consecutive I-94 eastbound rest areas located between Moorhead and St. Cloud, Minnesota. The primary data collected were dwell times for each vehicle. Data collection included classifying and recording the hourly volume of mainline traffic and the vehicles entering the rest area to determine the percent of each vehicle type stopping at the rest area. The results of this study may be available late in 1999. Other studies Mn/DOT is undertaking include determining the types of vehicles and their numbers that stop at public rest areas.

Ms. Braun is specifically interested in characterizing rest stop use in the I-94 corridor. She wants to determine whether nighttime truck parking demand is a corridor issue or an individual rest area issue, and whether both commercial truck stops and public rest areas are full. Ms. Braun believes that different solutions will be appropriate if the entire corridor is saturated than will be appropriate if just individual rest areas are saturated. If truck drivers simply do not know what facilities are available off the interstate, then it is a driver education issue. If all the facilities along the corridor are full, then the state may have a corridor safety issue.

The reason Mn/DOT conducted the original study, she said, was to share the data with business groups, who she thought might use the information to justify further investment in truck stops to fill the demand revealed. The Federal Highway Administration's 1996 study on commercial driver rest and parking requirements stated that for long-term or overnight parking, the majority of drivers prefer private truck stops to public rest areas.¹⁴ Ms. Braun believes that private truck stop owners should listen to their customers and respond to their preference.

In two-hour focus group sessions facilitated by Mn/DOT, some commercial drivers preferred commercial truck stops because of the services provided and for safety

¹³ "Commercial Truck Usage Nighttime Parking Demand Analysis February 1995- October 1998" Minnesota Department of Transportation, Office of Technical Support, Site Development Unit, December, 1998.

¹⁴ *Commercial Driver Rest & Parking Requirements: Making Space for Safety*, U.S. Department of Transportation, Federal Highway Administration. Report No. FHWA-MC-96-0010. May 1996.

reasons. Others liked public rest stops because they are quieter. Truckers tend to learn which stops have the facilities they prefer.

Many of Minnesota's rest areas are 20 to 30 years old and in need of reconstruction. Six-hour rest area stays are allowed, but patrol officers do not strictly enforce this limit for commercial truck drivers.

Minnesota makes funding decisions for its highway system based on the needs of each state transportation district. As an example, the South-East state transportation district currently is in the midst of a \$35 million transportation improvement program for 1999. Some of this money will be devoted to replacing and refurbishing its public rest stops. Ms. Braun stated that rest areas compete with other transportation projects, but they are also eligible for safety, enhancement, and scenic by-ways funding. Some financial support comes from the Transportation Equity Act for the 21st Century (TEA-21, passed in June 1998). All projects must go through a ranking process, which is why Mn/DOT is carefully trying to characterize its truck parking issues in order to make a case for the proper government funding.

Missouri

Commercial truck parking demand at state-owned and operated facilities exceeds capacity, according to Bill Wilson, administrator of the Missouri Department of Transportation's (MoDOT) Motor Carrier Services Unit. In August 1999, MoDOT completed a rest area survey. Initial review of survey data indicates most public rest stops are filled at night by commercial trucks whose drivers are resting overnight. Missouri's interstate rest areas were initially built for passenger cars and commercial trucks for short safety breaks. Today, trucks park on interstate exit/entrance ramps and roadsides within 5 to 10 miles of these rest areas. The survey did not address how many additional parking spaces are needed.

Mr. Wilson said truckers prefer public rest areas because of security and convenience. Truckers say they are less likely to be blocked in by other vehicles. While they feel public rest areas are generally safe, they would like increased security at both public and private rest areas.

Regulations requiring truckers to stop for extended periods to sleep raise the question of who is responsible for providing rest facilities. Should taxpayers, commercial truck companies, or truck-stop owners pay for extended-use parking facilities for commercial truckers? Missouri and other states continue to consider these questions and evaluate solutions.

Nebraska

Demand at public rest stops for overnight truck parking spaces exceeds the current supply in Nebraska, according to Art Thompson, Highway Landscape Architect at the Nebraska Department of Roads (NDOR). He could not give estimates for the need, if any, for more commercial truck stops, although he is aware that more have been built in recent years. Nebraska has public rest areas located only along interstate highways. From North Platte east along I- 80, Nebraska has experienced periodic problems with

having enough public sector parking places for trucks stopping overnight. Consequently, trucks tend to fill the entrance and exit ramps to public rest areas. Nebraska law caps the stopping time at public rest areas at 5 hours, but this limit is not strictly enforced. When troupers do enforce it, they answer driver protests by arguing that better planning is required on the part of the trucker. That is, drivers should not plan to sleep in public rest areas.

The NDOR hosted a rest area summit in fall 1999, similar to the one held in Atlanta in June 1999. Attendees included a variety of stakeholders, including trucking associations, independent operators, truck stop operators, economic development personnel, and members of the state patrol. The intent of the summit was to brainstorm solutions to the truck parking issue. Mr. Wayne Teten, Deputy of Operations for the NDOR, was in charge of organizing the summit. He states that the Federal Highway Administration advocates state expenditures to expand the number of public truck parking spaces. Some truckers feel that the government owes them places to park, since it is creating new regulations that restrict the number of hours they can drive before being required to rest. In turn, NDOR officials feel that, faced with limited financial resources, they may be forced to choose between upgrading roads or expanding truck parking.

Mr. Teten feels that the parking problem must be handled jointly by all players involved (state and federal agencies, trucking companies, and commercial truck stop operators). He states that some participants in the Atlanta forum held some misconceptions about how the problem could be solved. For example, one independent operator had read in *USA Today* that the government was enjoying a \$1 billion tax surplus. "Why not pay for extra parking from these funds?" he asked. In the long run, suggested Mr. Teten, truckers may have to pay for extra parking by a tax on diesel fuel. As a result of this, freight rates may go up, thereby laying the real cost on the customers of carriers.

Regarding the problem of prostitutes and drug dealers that often frequent commercial truck stops, Mr. Teten believes that these people would not ply their trades if there were not a market for them. Truckers need to be willing to call the police about such violations but historically are shy of taking such action.

Nebraska officials speak of the problem of the government moving into sectors that may be considered the bailiwick of private industry. However, they are uncertain whether commercial truck stops can meet the demand for overnight truck parking and wonder whether the problem will be solved only via private/public sector cooperation.

Mr. Teten offered solutions that included the provision of government grants to private truck stops to expand their facilities. Another idea might include a surtax on diesel that can be dedicated to expanding truck parking.

Currently Nebraska is rebuilding several of its rest areas. Most of those were not purchased with the idea that they would be expanded, potentially requiring actions under eminent domain clauses. Such tactics would not be popular with landowners who would be forced to give up property. At the same time, the truck traffic volumes on interstate

highways appears to be growing. Mr. Teten mentioned research predicting that over-the-road freight will increase 30 percent by 2006. Also, the number of trucks on interstate highways is likely to increase in coming years due to proposed federal regulations designed to reduce the number of consecutive hours driven by truckers, thus exacerbating the parking problem.

Recent Research

Dr. J. L. Gattis and Dr. Melissa S. Tooley “Rural Rest Area Privatization Conditions” (Arkansas Department of Transportation and the Federal Highway Administration. December 1997):

While acknowledging that federal law prohibits private operations on the interstate, this report explores the attributes and conditions that would make a rest area site attractive or even feasible for commercial development. Researchers interviewed toll authorities, representatives of fast food and petroleum companies that have a presence along the interstate system, utility companies, states transportation agencies, and state and federal environmental agencies.

For states that are exploring the option of a public/private rest area or are actually in the process of selecting a site, this report would be of great value as it draws from the experiences of those in the business of providing traveler services.

Traffic level, proximity to other services, and traffic types are all variables that must be considered in combination when determining the feasibility of a proposed site for travel service centers. Of the toll authorities surveyed, the lowest reported vpd (vehicles per day) count for a service oasis along a toll highway was 5,800. This was described as a “marginal operation.” The distance between the selected site and similar services should be a minimum of 20 miles and, preferably, 30 to 40 miles. If considering a remote site, utility (sewer, water, telephone, and electricity) development costs must be factored into any feasibility study. It is also worth noting that toll authorities expressed regret that they had not originally obtained larger sites. One agency had sites of 60 acres but would now opt for sites of at least 100 acres.

“No Room at the Inn” (American Trucking Associations Foundation, Inc. Copyright 1996):

In 1992, the U.S. Senate recommended further research into the causes of driver fatigue and directed the Federal Highway Administration to evaluate the adequacy of parking space for commercial vehicles. Funded by the Federal Highway Administration, this study was conducted by the Truck Research Institute, the research arm of the American Trucking Associations. The study identified a shortfall of 28,400 truck parking spaces nationwide. The shortfall is more acute on the East Coast and most acute in the Northeast. The cost of providing the additional 28,400 truck parking spaces was estimated to range from \$489 million to \$629 million. The study recommends a combination of approaches to meet the shortage. Options include the following:

1. Enforce parking time limits more stringently.

2. Modify parking policy. Allow trucks to use a portion of the car parking area for overnight parking.
3. Maximize efficiency of existing facilities through design modification. An example would be to replace pull-in parking with diagonal pull-through parking.
4. Expand existing facilities. Add truck parking spaces.
5. New construction. In addition to new rest areas, states might consider construction of less expensive truck pull-off areas.

To meet the shortfall, the study concludes that truck parking needs must be given higher priority by states:

A clear public policy approach should be developed to analyze current spending practices and integrate truck parking requirements into state DOT planning. After defining a need or demand, solutions must be developed through an orderly planning process and stated in terms of a program. To ensure commitments to such a rest area development program, objectives should be established, priorities set, and funding levels defined as part of an overall state program.

Future Research

The Transportation Equity Act for the 21st Century (TEA-21, passed in June 1998) calls for a second study on the truck parking shortage. The objective is to determine the location and quantity of parking facilities at commercial truck stops and travel plazas and public rest areas and propose a plan to reduce the shortages. The scope has been widened from the first study to include the entire National Highway System.

TEA-21 also includes a Welcome Center Pilot Project. The project provides for a demonstration safety rest area and information center along I- 75 in Cobb County, Georgia. The center may provide goods and information that are of interest to the travelling public, including commercial advertising and media displays. This pilot project might be a foray into commercialized rest areas.

Method for Determining Commercial Rest Area Requirements

In 1996 the Federal Highway Administration published a guideline entitled, “Commercial Driver Rest Area Requirements: Making Space for Safety.” Designed to help planners collect the information needed to assess how effectively the public rest area program is serving commercial drivers, it provides ways to outline parking requirements and compare them against existing conditions. It provides instructions for collecting baseline information and establishing guidelines for the design of future rest areas.

As outlined in this document, determining commercial driver rest area requirements involves the following tasks:

- Perform an inventory of all state highway rest area facilities.
- Identify important trucking corridors and conduct a direct observation survey.
- Survey commercial drivers to identify their driving habits, attitudes, and preferences.
- Apply appropriate truck parking demand models to determine shortages, surpluses, or misallocation of rest area parking facilities.
- Analyze and interpret the results to understand the demand/capacity issues.
- Report and utilize the results of this process to address the issues raised.

The rest area inventory includes elements such as rest area identification, site location, physical characteristics, amenities, usage patterns, and traffic statistics. After identifying the traffic corridors of interest, direct observation of rest areas is required, including collecting data on capacity and demand for short- and long-term truck parking and identifying shortfalls in capacity.

Demand is determined by posting observer teams working in pairs at public rest stops of interest over a five-day period. Observations should be made every half-hour from 10 p.m. to 6 a.m. at each site from Sunday through Thursday. Friday and Saturday are excluded because research shows that nighttime demand decreases predictably and significantly. More in-depth observations include monitoring parking activities for every space and noting times of arrival and departure. This provides an important variable, Vehicles per Hour per Space (VHS), for use in the final analysis using a parking demand model. Data collection at private truck stops is somewhat different in that observer teams count the total number of trucks parked at each facility at the top and bottom of each hour, marking their totals on site maps. In order to link demand for truck parking on the corridor with average daily traffic data, observer teams are required to count the number of trucks passing their sites for 15 minutes every hour.

Analysis takes place by converting collected data into machine-readable elements by coding the observations to distinguish between types of trucks, long- and short-term parking, and legal/illegal parking. Using descriptive statistics and graphics, inferences can be made about the following:

- supply, as shown by percent utilization
- demand, as shown by the number of vehicles entering the rest areas
- repressed demand for longer stays, as evidenced by stays beyond legal limits
- types of facilities that are used most

Two quantitative models have been developed to analyze public rest area usage by trucks and the need for additional truck parking spaces at rest areas. A Capacity

Utilization model identifies the factors that influence the use of public rest area parking spaces by trucks. The second model, Truck Parking Demand, was developed to estimate the need for additional truck parking spaces at public rest areas.

One factor that is still needed in this guideline is a way to factor in the anticipated future growth of demand. Published data and personal observations of officials closely linked to transportation indicate that the volume of truck traffic on major U.S. highways will continue to grow for the foreseeable future. Further, the shortfall of parking capacity revealed by such studies cannot necessarily be made up by simply adding or expanding rest areas. Limited government funds may not be adequate to meet the need, which continues to grow and change, resulting in the need to address the lack of parking capacity in innovative ways.

STUDY OF AVAILABILITY OF AND DEMAND FOR PARKING IN IOWA

During the fall 1999, CTRE conducted a survey to determine the availability of and demand for truck parking in Iowa. In summary, the results of the survey indicate that a substantial number of commercial trucks park overnight at Iowa public rest stops and commercial truck stops. The highest concentration of commercial truck stops is on I-80 east of Des Moines, followed by I-29 and the interstate highways surrounding Des Moines. Public rest areas are frequently filled or overflowing on most week nights, while most commercial truck stops are not completely full. However, some sections of Iowa's interstate system, such as those along I-80 east and I-380, appear to have higher occupancy rates than others.

The survey asked commercial facility operators to voluntarily collect data for the survey. Considering the somewhat low participation rate for commercial facilities (41 percent), and considering that data were collected for only one three-week period at commercial facilities and for only one week at public rest areas, the data are too sparse to make definitive estimates of observed supply and demand for overnight parking. The results do, however, provide a meaningful indication of the relative supply and demand for overnight parking.

The survey of available truck parking spaces along Iowa interstates was divided into two categories: public rest areas and private commercial truck stops. Appendix A contains two charts: Figure 1 contains an inventory of the number of truck parking spaces in Iowa public rest areas, divided up by sections of interstate (I-80 east, I-80 west, I-35 north, I-35 south, I-380, I-29, I-680). Figure 2 contains an inventory of the number of Iowa commercial truck stop parking spaces, again divided up by sections of interstates. Within Iowa, 584 public rest area truck parking places and 4,052 truck stop truck parking spaces are adjacent to interstate highways, for a total of 4,636 truck parking spaces near Iowa's interstate highways.

Public Rest Areas

There are 39 public rest areas in Iowa, totaling 584 truck parking spaces. Three of these rest areas did not have parking allocated to trucks, leaving a total of 36 in the survey. The number of available commercial truck parking places averages approximately 16 spaces per rest area, ranging between 5 and 24 truck parking spaces per rest area.

The Iowa State Patrol agreed to develop an approximate inventory of the number of commercial trucks parked at the majority of these sights. The Iowa State Patrol surveyed 514 parking spaces, or 88 percent of those available. They accomplished this by counting the number of commercial trucks parked at each rest area between 10:00 p.m. and 5:30 a.m. for week between October 17 and 24, 1999. The survey form used for public rest areas is shown in Appendix B.

Appendix C contains a series of charts that illustrate the percent fill rate of public rest areas within Iowa, divided by sections of Iowa's interstate highways. The averages for each group of public rest areas on a section of Iowa's interstate highway were calculated for each day of the week. The results of the survey are shown in the following table:

Interstate	# rest areas	total # spaces	% Full (M-Th)	% Full (F-Su)
I-80 East	10	126	73-108	45-87
I-80 West	8	126	35-238	39-272
I-35 North	5	76	64-230	28-240
I-35 South	3	41	173-181	100-153
I-380	1	32	106	148
I-29	8	113	79-228	92-233

These results indicate that Iowa public rest areas are frequently full to overflowing.

Some patrol officers gathered extra information. For example, in addition to counting trucks at rest stops on I-35, patrol officer Lt. Ketchum kept counts at locations outside of public rest areas between mileposts 176 and 214. He noted that trucks were parking at Iowa DOT weigh stations, two on October 19 (Tuesday) and up to six on October 20 (Wednesday). At milemarkers 188, 176, 194, 197, and 208, he noted that trucks were parked on what may be assumed to be exit ramps off of I-35:

Milemarker #	Direction	# trucks
197	south	1
188	north	1
176	south	1
194	north	1
193	north	1
208	north	1

Commercial Rest Stops

According to the commercial publication “Trucker’s Friend”¹⁵, there are a total of 120 commercial truck stops in Iowa. Fifty-eight of these are located in close proximity to Iowa’s interstate highways.

All 58 commercial truck stops near interstate highways were contacted by telephone to solicit their participation in a three-week survey. They were asked to count the number of commercial trucks that parked at their premises once a night between 10:00 p.m. and 5:30 a.m. every day for three weeks. A total of 39 agreed to participate at this stage, while the rest declined for various reasons, which included being too busy or understaffed to undertake the survey or having no overnight truck parking. Some declined without explanation. The final number of participating truck stops who completed and returned the surveys was 24. The survey used for the commercial truck stops is shown in Appendix B.

Each commercial truck stop was mailed a survey, then called approximately one week later to check on progress on the survey and to answer any questions. A reminder to continue filling out the surveys was also mailed to participants. Participating businesses were called toward the end of their survey periods to remind them to finish the study and return it to the CTRE as early as conveniently possible. The total period covered by the study was between October 4 and November 29, 1999. A table illustrating the participation rate of commercial truck stops in this survey is shown in Appendix D.

Based on the final survey results, calculations were made to determine how full a truck stop’s lot was on each night of the week. For example, the number of trucks was counted on three consecutive Mondays. Each count was divided by the number of parking places available at the truck stop. If the truck stop had 100 places for trucks to park, and three consecutive Mondays yielded counts of 30, 40, and 50 trucks, then the percentage full rate for that truck stop on Monday nights would be 30 percent, 40 percent, and 50 percent. These percentages were averaged to get a final percent fill rate for that night of the week, which in this case would be $(30+40+50)/3$ or a 40 percent fill rate on average for Monday nights at that location during the survey period.

15 Published by TR Information Publishers, © 1999, P.O. Box 476, Clearwater, FL 33757, pp. 81-5

Appendix E contains a series of charts that illustrate how full commercial truck stops became between the hours of 10:00 p.m. and 5:30 a.m. over the surveyed period. Each chart illustrates these conditions in a different section of an Iowa interstate.

The ranges for each group of participating truck stops on a section of Iowa interstate were tabulated for each day of the week. The results of the survey are shown in the following table:

Interstate	% Full Monday – Thursday	% Full Friday – Sunday
I-80 East	75 – 91	73 – 91
I-80 West	61 – 73	59 – 75
I-35 North	56 – 61	40 – 56
I-35 South	57 – 63	54 – 60
I-380	83 – 111	72 – 86
I-29	68 – 82	60 – 66

Based on these results, it appears that commercial truck stops are not normally completely full a high percentage of the time. However, some sections of Iowa interstate appear to have a higher occupancy rate than others, such as truck stops along I-80 east and I-380.

During the survey, commercial truck stop operators reported that they experience more crowded conditions in the winter months. This usually occurs due to the piling of snow, which takes up more room in their lots. Several truck stops reported that they do not have paved or marked parking lots. As a result, trucks often park in an unorganized fashion, creating collision hazards and problems with blocking each other in.

Additional Research Needed

Future phases of study should include data collection in other seasons of the year and interviews with truck drivers to ascertain their views on availability of overnight parking in Iowa and the reasons they choose to park at the locations they selected. For example, it was not necessarily clear to the researchers why public facilities were jammed with trucks parking overnight when clean, well maintained, and free private facilities were nearby.

Further analysis is also required to determine the safety benefits of providing public overnight parking facilities in comparison to the costs of such facilities and in comparison to the safety benefits that may be achieved from alternative safety investments.

Final Note

Although public rest areas and commercial truck stops were the focus of this study, it should be noted that these are not the only sources of overnight truck parking places. For example, Walcott commercial truck stop operators who participated in this

survey collected additional revealing information by counting the number of trucks that parked overnight at businesses near their establishments (specifically, restaurants and motels). In one week of the survey, between 17 and 37 trucks parked at these nearby establishments nightly.

An officer who participated in this survey noted trucks parking in Iowa DOT weigh stations and on exit/entrance ramps, as has been discussed earlier. Occasionally, commercial trucks are seen parking overnight in mall or grocery store parking lots. These cases, plus the strategies being followed by other states as described in this report, illustrate that public rest areas and commercial truck stops are not the sole source of overnight parking places for commercial truck drivers.

APPENDIX A: INVENTORY OF TRUCK PARKING SPACES

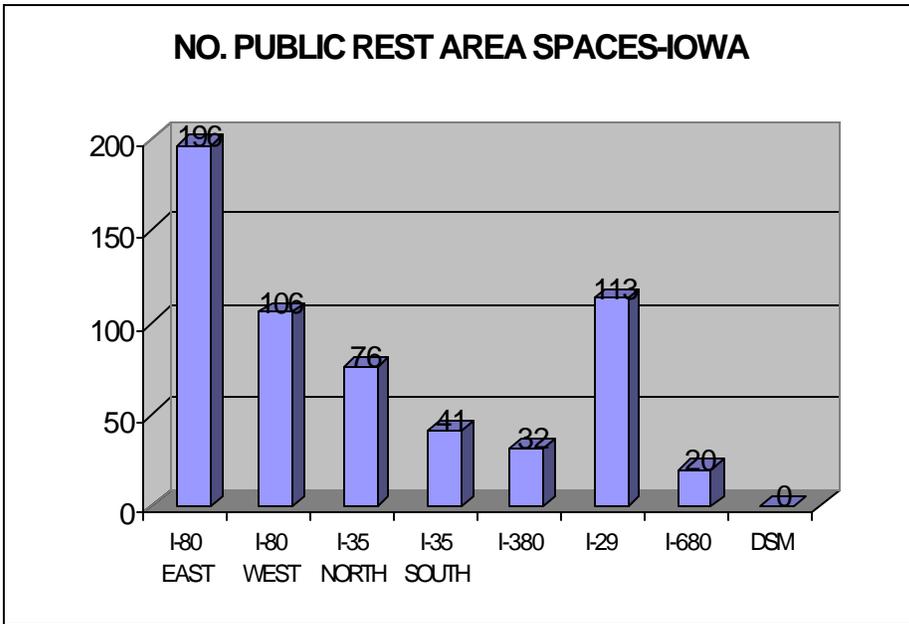


Figure 1. Inventory of truck parking spaces in Iowa’s public rest areas by section of interstate

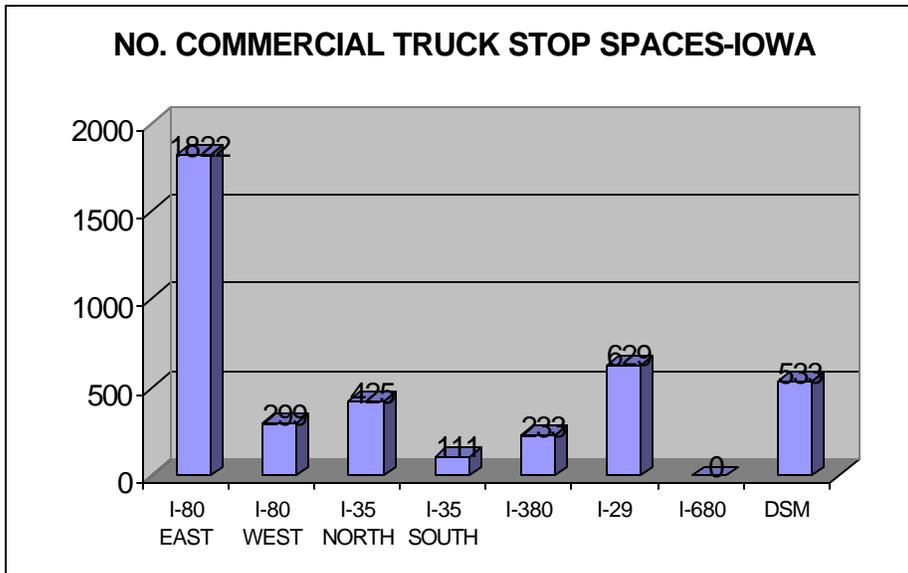


Figure 2. Inventory of truck parking spaces in Iowa’s commercial truck stops by section of interstate

APPENDIX B: SURVEY FORMS

Research Project on Commercial Vehicle Parking

Instructions for surveying public rest stops

Thank you for participating in this study. We are trying to find how commercial truck drivers use Iowa public rest stops when they stop to rest at night. Your participation is very important to this research, which is being done at the request of the Iowa State legislature. The information gathered here will help Iowa lawmakers develop policies with regards to overnight truck parking facilities. We want to find out how many commercial trucks park at public rest stops on interstates each night for three weeks.

Following this page there is an example form and four blank forms. Fill out the top of each form. Please use one form per public rest area. For example, you would use one complete form for the east-bound (EB) Adair rest stop, and one complete form for the west-bound (WB) Adair rest stop. If you need additional forms, please photocopy enough for your use.

In the left-hand column, fill out the day of the week and the time for which you are recording truck counts. For example, for October 1, you might write in "Fri/1a.m.". (See the next page for an example.)

Count the number of commercial trucks at each rest stop in your area once between the hours of 10:00 p.m. and 5:30 a.m. On the form there are 3 columns for your counts: entrance, parking lot, and exit. The entrance and exit are the ramps entering and leaving the rest stop, respectively. Please count the number of trucks parked in each of these areas and write the number in the appropriate column on the line that contains your current date and the time you counted them. If you want to make comments, use the "NOTES" column on the right-hand side.

Please collect this information beginning the evening of October 17 and continuing up to and including the evening of October 24. As soon as possible after October 24, please return your completed forms to me at the address shown below.

If you have any questions about the study, you can reach me at 515-294-3230 or contact me by email at btaylor@iastate.edu. Thanks again for your participation!

Sincerely,

Beth Taylor
Center for Transportation Research and Education
ISU Research Park
2901 South Loop Drive, Suite 3100
Ames, IA 50010-8632

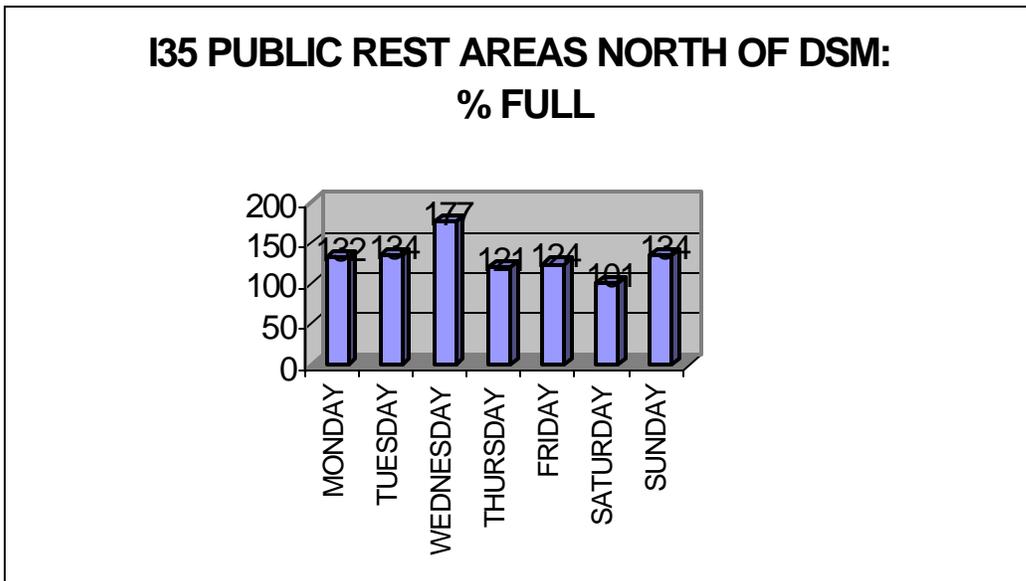
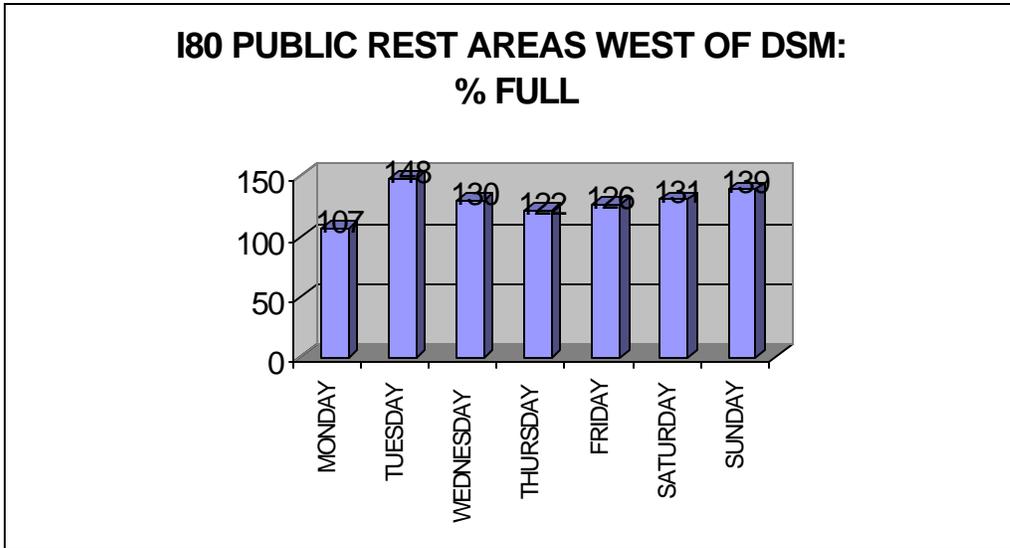
IOWA DEPARTMENT OF TRANSPORTATION SAFETY REST AREASTRUCK
 PARKING DATA COLLECTION FORM 1999

REST AREA NAME: _____ LOCATION: _____

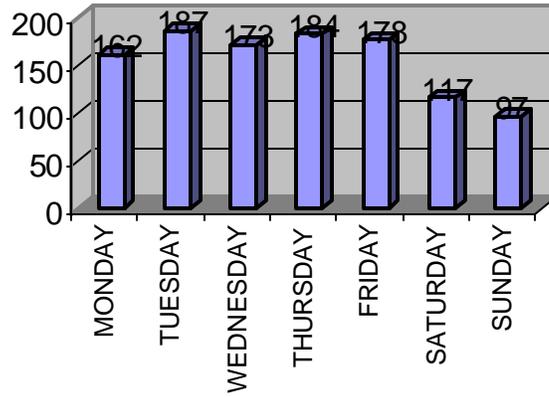
MONTH: _____ Patrol Officer: _____

<i>Date/Day/Time</i>	<i>Initial</i>	<i>Entrance Ramp</i>	<i>Parking Lot</i>	<i>Exit Ramp</i>	<i>Notes</i>
1/Fri/					
2/Sat/					
3/Sun/					
4/Mon/					
5/Tue/					
6/Wed/					
7/Thur/					
8/Fri/					
9Sat/					
10Sun/					
11/Mon/					
12/Tue/					
13/Wed/					
14Thur/					
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31/Sun/					

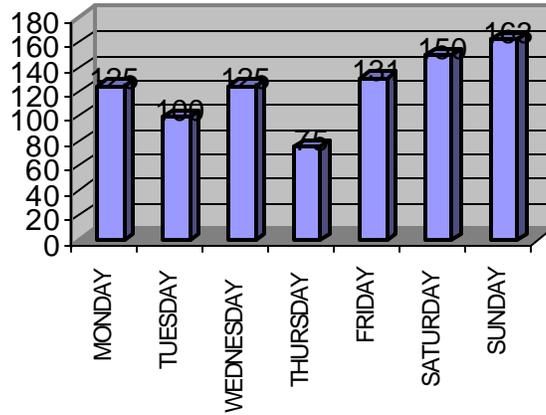
APPENDIX C: CHARTS ILLUSTRATING SURVEY RESULTS FOR PUBLIC REST AREAS



**I35 PUBLIC REST AREAS SOUTH OF DSM:
% FULL**

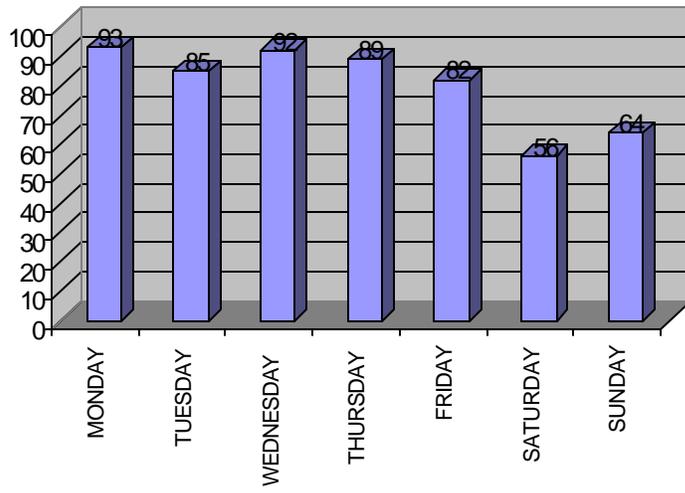


I380 PUBLIC REST AREAS: % FULL



Note: 1 rest area reported

129 PUBLIC REST AREAS: % FULL



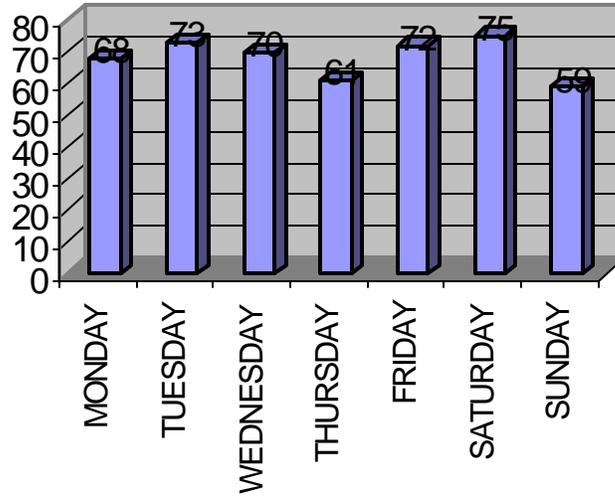
APPENDIX D: PARTICIPATION RATE OF INTERSTATE-SIDE COMMERCIAL TRUCK STOPS

Interstate Section	Total No. Truck Stops	No. Truck Stops in Survey	Participation Rate (%)	Total No. Parking Spaces	No. Spaces Involved in Survey	% Parking Spaces in Survey
I80 East of DSM	19	7	37	1822	1177	65
I80 West of DSM	9	2	22	299	192	64
I35 North of DSM	10	7	62	425	250	59
I35 South of DSM	4	2	50	111	61	55
I380	4	3	75	233	218	94
I29	8	4	50	629	556	88
Des Moines	4	1	25	533	21	6
	58	26		4052	2475	

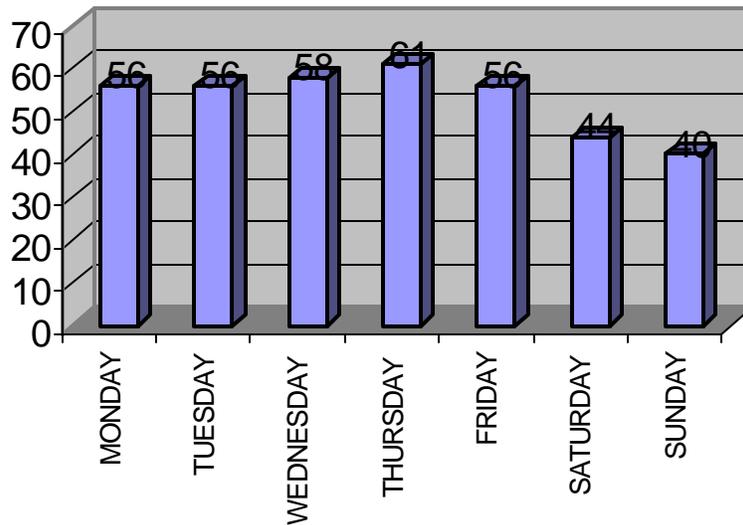
61% of commercial truck parking spaces were involved in survey.
45% of truck stops participated in the survey.

**APPENDIX E: CHARTS ILLUSTRATING SURVEY RESULTS FOR
COMMERCIAL TRUCK STOPS**

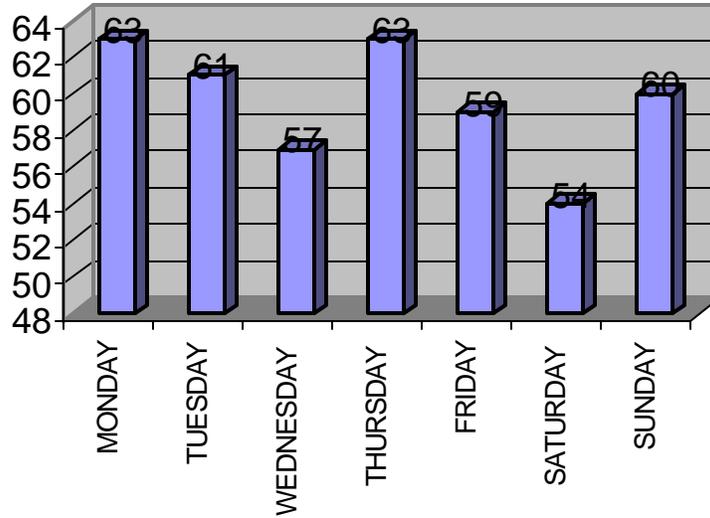
I80 TRUCK STOPS WEST OF DSM: % FULL



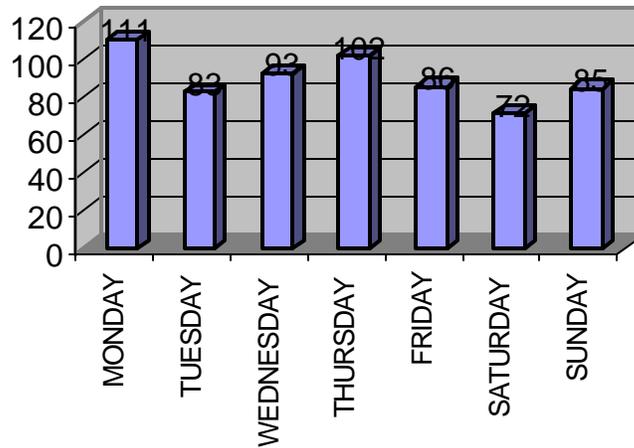
I35 TRUCK STOPS NORTH OF DSM: % FULL



I35 TRUCK STOPS SOUTH OF DSM: % FULL



I380 TRUCK STOPS: % FULL



I29 TRUCK STOPS: % FULL

