

REPORT TO CONGRESS
Study of Adequacy
of Parking Facilities

June 2002

Prepared by the:

Federal Highway Administration
Washington, DC 20590

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	BACKGROUND	1
1.2	PROBLEM STATEMENT	2
1.3	RESEARCH APPROACH	2
1.4	ORGANIZATION OF REPORT	3
2.0	COMMERCIAL TRUCK PARKING DEMAND.....	4
2.1	INTRODUCTION	4
2.2	NATIONAL SURVEY OF DRIVER NEEDS AND PREFERENCES FOR PARKING.....	5
2.3	NATIONAL COMMERCIAL VEHICLE PARKING DEMAND MODEL	6
2.4	NATIONAL DEMAND FOR COMMERCIAL VEHICLE PARKING.....	7
2.5	SUMMARY AND CONCLUSIONS	10
3.0	COMMERCIAL TRUCK PARKING SUPPLY	11
3.1	INTRODUCTION	11
3.2	PUBLIC REST AREA PARKING FACILITIES.....	11
3.3	COMMERCIAL TRUCK STOP AND TRAVEL PLAZA PARKING FACILITIES	12
3.4	DRIVER'S ASSESSMENT OF PARKING FACILITY QUALITY	13
3.5	INTERCHANGEABILITY OF PUBLIC REST AREA AND COMMERCIAL TRUCK STOP AND TRAVEL PLAZA PARKING	17
3.6	SUMMARY AND CONCLUSIONS	20
4.0	ANALYSIS OF COMMERCIAL TRUCK PARKING SUPPLY AND DEMAND	21
4.1	INTRODUCTION	21
4.2	DETERMINING CURRENT LEVEL OF OVERCROWDING.....	21
4.3	NATIONAL SUMMARY OF OVERCROWDING	22
4.4	RESULTS FROM THE DRIVER SURVEY	24
4.5	SUMMARY AND CONCLUSIONS	25
5.0	ACTIONS TO REDUCE SHORTAGES	26
5.1	INTRODUCTION	26
5.2	REST AREA FORUM.....	26
5.3	STAKEHOLDER INTERVIEWS	27
5.4	ACTIONS RECOMMENDED BY STATE PARTNER GROUPS	28
5.5	ACTIONS TO EXPAND OR IMPROVE PUBLIC REST AREAS	28
5.6	ACTIONS TO EXPAND OR IMPROVE COMMERCIAL TRUCK STOPS.....	32
5.7	ACTIONS TO ENCOURAGE THE FORMATION OF PUBLIC-PRIVATE PARTNERSHIPS	32
5.8	ACTIONS TO EDUCATE OR INFORM DRIVERS ABOUT AVAILABLE SPACES	32
5.9	ACTIONS TO CHANGE PARKING ENFORCEMENT RULES	33
5.10	ACTIONS TO CONDUCT ADDITIONAL STUDIES	34
5.11	SUMMARY AND CONCLUSIONS	34
6.0	SUMMARY AND RECOMMENDATIONS.....	35
7.0	REFERENCES	39

TABLES

1 Peak hour demand for commercial vehicle parking along Interstate highways and other NHS routes carrying more than 1,000 trucks per day, 2000 9

2 Commercial truck parking inventory along Interstate and other NHS routes carrying more than 1,000 trucks per day 14

3 Driver-reported usability characteristics in truck parking..... 15

4 Driver-rated importance of features when parking 15

5 Drivers’ parking facility preferences by purpose of stop 16

6 Facility most recently used for sleep..... 17

7 Threshold values used to classify parking space utilization 21

8 Evaluation of parking shortages: State-by-State analysis 23

9 Evaluation of current parking shortages: National summary 24

10 Frequency with which drivers find available parking at public rest areas and commercial truck stops 25

11 Summary of recent or current actions pursued by State partners..... 30

12 Summary of future actions recommended by State partners..... 31

EXECUTIVE SUMMARY

This report documents the findings of a study undertaken to investigate the adequacy of commercial truck parking facilities serving the National Highway System (NHS) in response to Section 4027 of the Transportation Equity Act for the 21st Century (TEA-21). Section 4027 requires the following:

...a study to determine the location and quantity of parking facilities at commercial truck stops and travel plazas and public rest areas that could be used by motor carriers to comply with Federal hours-of-service rules. The study shall include an inventory of current facilities serving the National Highway System, analyze where shortages exist or are projected to exist, and propose a plan to reduce the shortages. The study may be carried out in cooperation with research entities representing motor carriers, the travel plaza industry, and commercial motor vehicle drivers.

To assist in the preparation of this report, the Federal Highway Administration (FHWA) encouraged the creation of partnerships of public and private sector stakeholders at the State level and provided a technical guidance document for their use in conducting an inventory of current facilities serving the NHS, analyzing current and projected shortages, and developing plans for action at the appropriate jurisdictional levels. The FHWA provided technical assistance to the partnerships to guide them in completing these activities. The FHWA division offices worked closely with the partners for approximately 1 year and provided guidance and advice on forming and structuring partnership membership, conducting partnership meetings to review inventory and analysis results, and preparing partnerships status reports that describe actions to mitigate any parking shortfalls identified. This report summarizes the results of this effort.

This study of parking facilities along the NHS is a follow-up to a previous study of the Interstate Highway System completed in 1996 and documented in Report No. FHWA-MC-96-0010 “Commercial Driver Rest and Parking Requirements: Making Space for Safety.” Subsequent to this 1996 report, a number of States also conducted studies of truck rest parking needs and availability within their jurisdictions.

The FHWA solicited input on the truck rest parking issue through a Rest Area Forum, which FHWA hosted in Atlanta, Georgia, on June 29-30, 1999. Forum participants included more than 70 State Department of Transportation and enforcement officials, representatives of the motor carrier industry, private truck stop operators, commercial drivers, safety advocates, and other interested parties.⁽¹⁾

In addition, on May 21, 1999, FHWA issued a Request for Information (RFI-ST-001) to obtain feedback on how best to design, focus, and conduct the Section 4027 study. Five individuals or organizations responded. The results from the 1996 report and individual States’ subsequent studies, the input from Rest Area Forum participants, and responses to the Request for Information can be summarized as follows:

- Many Rest Area Forum participants and respondents to the Request for Information voiced the sentiment that we now know the problem and, therefore, should focus on solutions rather than on more studies. One significant exception is a response to the Request for Information that recommends: “the TEA-21 study should count all private and public sector spaces to accurately assess the truck parking situation.”
- Parking shortages are concentrated and solutions thereto should be targeted at a corridor or regional level; therefore, the analysis of shortages and development of solutions should be performed at the corridor, State, or sub-state, rather than National level.
- Satisfying drivers’ rest parking needs in corridors or regions with either real or perceived shortages in parking supply is likely to require public, private, and public-private solutions. Identifying consensus solutions among parties with competing interests is likely to be easier and more successful at the corridor, State, or sub-state level.
- A major unknown and point of contention is whether, or, to what extent, public rest area and private truck stop parking are interchangeable. To supply parking where drivers need it, a better understanding of their parking-related needs and decision making is required.

In consideration of this input, FHWA undertook a two-pronged approach to the Section 4027 study. First, FHWA contracted research to clarify drivers’ parking-related needs and decision making. Second, FHWA encouraged the creation of partnerships of public and private sector stakeholders in 49 States (excluding Hawaii) and provided a guidance document for their use in inventorying current facilities serving the NHS, analyzing current and projected shortages, and developing plans for action at the appropriate jurisdictional levels. These partnerships provided a forum for interested parties, including State and local agencies as well as the private sector, to examine the problem and formulate strategies to mitigate any problems identified.

This report, which summarizes the work completed by these partnerships, involved the following process:

- Estimate parking demand using a modeling approach.
- Inventory public and private truck spaces.
- Identify deficiencies by comparing supply and demand.
- Develop recommendations for improvements to mitigate any existing or future problems identified.

Estimate Parking Demand Using a Modeling Approach

A nationwide estimate of the peak hour demand for commercial truck parking facilities resulting from the need to comply with Federal hours-of-services rules was conducted. The approach relied on the development of an engineering model to estimate the demand for commercial vehicle parking at public rest areas and commercial truck stops and travel plazas. The model predicts commercial truck parking demand for a highway segment based on total truck-hours of travel and the time and duration of the stops. The model considers the effect of current Federal hours-of-service regulations on parking demand by using these regulations as part of the basis for

estimating the average number of hours spent parking per hour spent driving. The study was restricted to current hours-of-service rules. If alternative rules are proposed, the model could be used to estimate their effect on parking demand.

A national survey of truck drivers' parking-related needs, preferences, and decision making was conducted as part of the modeling effort. Surveys were distributed to a national sample of more than 2,000 truck drivers through site visits and mailings to truck stops. Survey results were used to estimate the fraction of total parking demand that is for private and public parking spaces.

Following are highlights from these efforts:

- There is currently an estimated peak hour demand for approximately 287,000 truck parking spaces at commercial truck stops and travel plazas and public rest areas serving Interstate highways and other NHS routes carrying more than 1,000 trucks per day.
- The percentages of total demand for parking spaces at public rest areas and commercial truck stops based on drivers' stated preferences were estimated as 23 and 77 percent, respectively.
- The 20-year forecasted annual increase in parking demand is estimated to be 2.7 percent.
- Drivers' responses to the survey demonstrated definite preferences and priorities when it comes to choosing where they will park. For long-term rest (more than 2 hours), drivers overwhelmingly preferred commercial truck stops and travel plazas to public rest areas (79 percent to 6 percent, respectively). For short-term rest (less than 2 hours), drivers generally prefer public rest areas to commercial truck stops and travel plazas (45 percent to 19 percent, respectively). Short-haul driver preferences were the same as long-haul driver preferences, although short-haul drivers value parking facility features differently than long-haul drivers.

Additional details surrounding the national demand for commercial vehicle parking and the national survey of driver needs and preferences can be found in Section 2.0 of this report.

Inventory Public and Private Truck Spaces

An inventory of the number of public rest areas and commercial truck stops that could be used to comply with Federal hours-of-service rules was conducted as part of this study. The inventory included a survey of State Departments of Transportation (DOTs) to quantify the location and number of public rest areas. A proprietary database developed by Interstate America served as the primary basis for determining the number of spaces available at commercial truck stops and travel plazas. The driver survey also addressed features that truck drivers value at parking facilities. Highlights from the commercial truck parking supply inventory and driver survey include the following:

- An estimated 315,850 parking spaces at public rest areas and commercial truck stops and travel plazas serve Interstate highways and other NHS routes carrying more than 1,000 trucks per day.

- Approximately 10 percent of truck parking spaces were in public rest areas and 90 percent in commercial truck stops and travel plazas.
- Expected growth of truck parking spaces at public rest areas is expected to be smaller (5.1 percent over the next 5 years) than growth in the private sector (estimated at 6.5 percent annually).
- Truck drivers value public rest areas primarily for ease of access and convenience, and value commercial truck stops and travel plazas for their amenities.
- A significant percentage (21 percent) of the parking supply used by drivers to comply with Federal hours-of-service rules appears to occur at loading docks, company terminals or other facilities (e.g., fast food restaurants, shopping plazas, and motels).
- Results from the driver survey and observational field studies suggest some, but not complete, interchangeability between parking spaces at public rest areas and commercial truck stops and travel plazas.

Refer to Section 3.0 of this report for additional information pertaining to the supply of commercial truck parking spaces, including drivers' assessment of parking facility quality and the interchangeability of public rest areas and commercial truck stops and travel plazas.

Identify Deficiencies by Comparing Supply and Demand

A four-step process was used to determine where shortages in truck parking exist or are expected to exist. First, estimates of parking demand over roadway segments were developed using a modeling approach (Section 2.0). Second, estimates of parking supply were gathered for each segment using available data sources (Section 3.0). Third, a summary of the supply and demand for each roadway segment was provided to partners for review, verification, and comment. In many cases, subsequent analyses were conducted to account for the local knowledge of partners in order to improve the estimates. Fourth, a final calibration of the model was completed, and the calibrated model was used to evaluate shortages (Section 4.0). Highlights from these analyses follow:

- A shortage of total parking (public and commercial combined) may exist in 12 States. There are additional 8 States currently have sufficient total parking. These States may experience shortages in the near future due to growth in truck volumes.
- Shortages of parking at commercial truck stops and travel plazas are less common and, to the extent that these spaces are interchangeable, may offset shortages in parking at public rest areas (in 35 States).
- Although the driver survey indicates that 23 percent of the demand for truck parking spaces is at public rest areas, only 10 percent of the supply is at that type of facility.
- This imbalance in parking availability is underscored by the results of the driver survey where 50 percent of the respondents indicated that parking is rarely or almost never

available at public rest areas. Approximately 15 percent reported parking is rarely or almost never available at truck stops and travel plazas.

- The estimated growth rate of truck parking spaces at commercial truck stops and travel plazas (6.5 percent) will accommodate the expected growth in demand for these spaces (2.7 percent).
- The estimated growth rate of truck parking spaces at public rest areas (5.1 percent over the next 5 years, or 1.0 percent annually) is below the 20-year forecasted estimated growth in demand for these spaces (2.7 percent annually). The increased demand for public parking will exacerbate the supply shortages already apparent for public parking unless either additional public spaces are made available or steps are taken to encourage drivers to better utilize the existing supply of private spaces.

Additional findings stemming from the analysis of commercial truck parking supply and demand, including a national summary of overcrowding and a State-by-State analysis of parking shortages can be found in Section 4.0 of this report.

Recommendations for Improvements to Solve Parking

Plans for addressing parking shortages should match the geographic scale of the shortage, i.e., area-specific, Statewide, or regional. The commercial truck stop and travel plaza industry, State highway agencies, and turnpike authorities, should and will continue to be principal suppliers of parking facilities. Public rest areas along the NHS were never intended and will never be sufficient to accommodate truck-parking demand. The major responsibility for providing parking for commercial vehicles should remain with private industry. States should continue to provide public rest areas to address short-term rest needs. The recommendations which follow are categorized into four groups: Recommendations for States, Recommendations for the Federal Government, Technology Recommendations, and Recommendations for Federal Surface Transportation Reauthorization.

Recommendations for States

Individual State action plans are the core strategy for reducing shortages. During the course of this study, individual States drafted plans for addressing truck parking shortages. As detailed in Chapter 5 of this report, States' proposed actions fall into six broad categories:

- Expand or improve public rest areas.
- Expand or improve commercial truck stops and travel plazas.
- Encourage the formation of public-private partnerships.
- Educate or inform drivers about available spaces.
- Change parking enforcement rules.
- Conduct additional studies.

The FHWA, in cooperation with the Federal Motor Carrier Safety Administration (FMCSA), will work with their State partners to maintain, and refine where necessary, the State action plans, at a level appropriate to the current adequacy of available parking in the State, i.e.:

- In States where a surplus of parking is currently available at both public rest areas and commercial truck stops and travel plazas, FHWA and FMCSA will continue to work with the State to review and update as needed their Statewide Rest-Area Plan, consistent with AASHTO's 2001 *Guide for Development of Rest Areas on Major Arterials and Freeways* and corresponding sections of FHWA's *Federal-Aid Program Guide*.
- In States where a shortage of parking at public rest areas and/or commercial truck stops and travel plazas is currently estimated, FHWA and FMCSA will work with these States' partners to refine (where necessary), periodically update, and monitor implementation of the plan the State drafted as part of their Final Status Report under the Section 4027 study.

Recommendations for the Federal Government

Within current legislative authority, the appropriate role for the USDOT (FHWA and FMCSA) is to facilitate a continuing dialogue among and actions by parking suppliers, commercial vehicle drivers and the motor carrier industry, and other concerned stakeholders (States, local governments, and others), the goal of which is to foster appropriate cross-jurisdictional strategies and actions to reduce shortages.

The FHWA, in cooperation with FMCSA, will facilitate continuing a dialogue among parking stakeholders to address the adequacy of parking. In addition to the reports produced under this study, resource materials to stimulate the dialogue will include the synthesis on "Dealing with Truck Parking Demands" being prepared under NCHRP Project 20-5, Topic 32-01.

The FHWA, in cooperation with FMCSA, will hold regional meetings to discuss:

- The NHS corridors where regional (i.e., multi-State) strategies would be most effective.
- Development of multi-stakeholder strategies to make most effective use of existing parking supply and future investment in additional supply. Multi-stakeholder strategies may involve a wide range of possible public-private, public-public, and private-private relationships along with possible innovative financing.

The FMCSA should facilitate discussions with shipper/receiver facilities, and port and railroad terminals regarding their role in providing parking to meet the needs of truck drivers serving their facilities.

To facilitate State programs/projects that encourage drivers' use of private truck parking facilities serving the NHS, FHWA should issue guidance on, and as necessary change policy/program guidelines to permit/encourage Federal funding for projects that improve the

operational and safety aspects of interchanges and cross roads and enhance access to private truck facilities.

Technology Recommendations

The FHWA and FMCSA should initiate actions to facilitate private-sector provision and truck-driver use of truck parking spaces at commercial truck stops and travel plazas serving the NHS, including improved information systems that facilitate truck drivers use of private truck stops for their long-term parking requirements.

On a national level, the FHWA and FMCSA should investigate the feasibility of using Intelligent Transportation System (ITS) technology in the development and promotion of technology-based solutions to provide traveler information to truck drivers on available parking and other relevant matters (location of truck stops, weather, and congestion and delays).

Consistent with the new Administration's National Energy Policy, FHWA and FMCSA should work with the EPA to promote the use of technology to provide more energy-efficient alternatives for truck parking.

Recommendations for Federal Surface Transportation Reauthorization

In developing its Federal Surface Transportation Reauthorization proposal, FHWA and FMCSA should consider a range of legislative and administrative policy/procedural changes including: permitting innovative financing (low-interest loans and grants); permitting commercialization/privatization of public rest areas on Interstate right of way and allowing States to use Federal-aid funds to operate and improve safety and security at public rest areas; allowing the development of an "oasis" signing standard for businesses along the NHS meeting appropriate criteria to be developed by FHWA, States and relevant stakeholders; permitting Federal-aid funds to be used for projects to build auxiliary public truck parking lots at private truck stops off the right of way; and prohibiting States from enacting or enforcing time restrictions on parking at public rest areas on Interstate/NHS right of way in the event drivers need to comply with Federal hours-of-service rules.

1.0 INTRODUCTION

1.1 BACKGROUND

The deregulation of the trucking industry in the early 1980s led to significant changes in the way goods and products are moved throughout the United States. Prior to deregulation, approximately 20,000 motor carriers operated in an environment where operating authority was issued by the Interstate Commerce Commission and entry into the industry was difficult. As of 2000, approximately 500,000 Interstate motor carriers operated in the United States, and projections over the next 20 years estimate continuing growth. As truck traffic on America's highways increased, the demand for services and facilities for the trucking industry, including the demand for truck parking spaces, increased as well.

Another significant change in the movements in goods and services was the advent of “just-in-time” delivery. Manufacturers now operate in an environment where large warehouse inventories of parts and supplies are no longer maintained, but instead are delivered by trucks in tightly scheduled deliveries so that these inputs arrive “just-in-time” to be used in the manufacturing process. “Just-in-time” delivery places new demands on truck parking facilities as trucks use these facilities as staging areas in order to better meet their delivery requirements. The combination of increased truck traffic and tighter delivery schedules are two of the primary reasons for the increased demand for truck parking, and this increased demand has resulted in perceived shortages of truck parking space in some parts of America.

This report documents the findings of a study to investigate the adequacy of commercial truck parking facilities throughout the Nation in response to Section 4027 of the Transportation Equity Act for the 21st Century (TEA-21). Section 4027 requires FHWA to prepare the following:

...a study to determine the location and quantity of parking facilities at commercial truck stops and travel plazas and public rest areas that could be used by motor carriers to comply with Federal hours-of-service rules. The study shall include an inventory of current facilities serving the National Highway System, analyze where shortages exist or are projected to exist, and propose a plan to reduce the shortages. The study may be carried out in cooperation with research entities representing motor carriers, the travel plaza industry, and commercial motor vehicle drivers.

To assist in the preparation of this report, FHWA encouraged the creation of partnerships of public and private sector stakeholders at the State level and provided a technical guidance document for their use in conducting an inventory of current facilities serving the NHS, analyzing current and projected shortages, and developing plans for action at the appropriate jurisdictional levels. The FHWA provided technical assistance to the partnerships to guide them in the completing these activities. The FHWA division offices worked closely with the partners for approximately 1 year and provided guidance and advice on forming and structuring partnership membership, conducting partnership meetings to review inventory and analysis results, and preparing partnerships status reports that describe actions to mitigate any parking shortfalls identified. This report summarizes the results of this effort. A more thorough discussion can be found in the Technical Report.⁽²⁾

1.2 PROBLEM STATEMENT

The Federal Motor Carrier Safety Administration has tentatively estimated that driver fatigue is a primary factor in 4.5 percent of truck-involved fatal crashes and is a secondary factor in an additional 10.5 percent of such crashes.⁽³⁾ A 1995 study conducted by the National Transportation Safety Board asserts that the most important factors in predicting a fatigue-related accident are the duration of the last sleep period, the time slept in the past 24 hours, and interruptions in sleep periods.⁽⁴⁾ The availability of parking for commercial vehicles can affect all of these factors.

In 1996, the FHWA funded a study entitled *Commercial Driver Rest and Parking Requirements: Making Space for Safety*.⁽⁵⁾ This study of parking along the Interstate Highway System was conducted in response to a Senate recommendation to evaluate the adequacy of places for truck drivers to stop and rest. This study estimated a shortfall of 28,400 public truck parking spaces nationwide. While a detailed survey of public rest areas was conducted, the survey of private truck stops was more cursory and relied on a statistical weighting of the 17 percent of private truck stops and travel plazas that completed and returned the survey.

In 2000, the National Transportation Safety Board published a Special Investigation Report that summarized the results from four public hearings pertaining to relevant safety issues regarding trucks and how to address them.⁽⁶⁾ The major issue addressed in the Safety Board investigation was the lack of safe available commercial vehicle parking on or near Interstates. The report also addressed the lack of information about parking available to truck drivers and the State-enforced parking time limits.

This report summarizes the inventory, analysis, and planning methodologies employed by partnerships; documents the compiled National inventory of parking facilities serving the NHS; describes the nature of truck parking shortages nationwide; outlines plans to address those shortages; and highlights progress toward implementing these plans. In addition, this report incorporates results from the research conducted to clarify drivers' parking-related needs and decision making.

1.3 RESEARCH APPROACH

The research presented in this report is focused on 49 States, and excludes Hawaii, the District of Columbia, and Puerto Rico. The FHWA organized "Partners for Adequate Parking Facilities" in each State. Discussions among these partners formed the basis for understanding truck parking demand and supply and helped develop a plan of action to address any problems that were identified. These partners typically included membership representing motor carriers, the travel plaza industry, and commercial vehicle drivers.

To assist partners in providing the necessary input to the Section 4027 Study, FHWA prepared a Technical Guidance Document that described an approach to determining commercial vehicle driver rest parking requirements.⁽⁷⁾ Each partnership was encouraged to consider using the methodology contained in the guidance document for identifying parking needs and developing a plan of action to mitigate any problems identified.

A nationwide survey of parking spaces at public rest areas was conducted during the summer of 2000 to ascertain the number and characteristics of publicly owned and operated spaces for heavy trucks. An inventory of commercial truck stop and travel plaza spaces was created using a proprietary database developed and maintained by Interstate America. The information from the survey and the inventory comprised the basis to determine the location and quantity of both public and commercial parking facilities that could be used by motor carriers to comply with Federal hours-of-service rules as required in the TEA-21 Section 4027 study.

Demand for parking on a highway segment was estimated through a modeling approach that considered the daily volume of trucks traveling across the segment and duration of stops anticipated to comply with hours-of-service rules. The parking demand and parking supply values over the full length of a highway segment were compared to determine the magnitude of parking shortfall. Partners examined these model estimates in light of actual observational studies or experience to provide a basis for determining validity of the results. Where appropriate, model parameters were adjusted to better replicate observed parking demand values against modeling results.

Finally, partners discussed the supply and demand analysis results to identify roadway segments with a parking shortage. In cases where either current or future shortfalls were identified, partners worked together to develop strategies to mitigate these shortages. As discussed later in this report, these strategies fell into six broad categories:

- Expand or improve public rest areas.
- Expand or improve commercial truck stops and travel plazas.
- Encourage the formation of public-private partnerships.
- Educate or inform drivers about available spaces.
- Change parking enforcement rules.
- Conduct additional studies.

1.4 ORGANIZATION OF REPORT

This report is divided into six parts. Following this introductory section, Section 2.0 contains an overview of factors affecting commercial vehicle parking demand and the modeling approach used in this study. Section 3.0 describes the commercial vehicle parking supply, and Section 4.0 compares parking supply and demand. Section 5.0 outlines the recommended actions proposed by partners to reduce any shortages that were identified. Finally, Section 6.0 contains a summary and recommendations for States and the Federal Government, including recommendations for Federal surface transportation reauthorization and technology recommendations.

2.0 COMMERCIAL TRUCK PARKING DEMAND

2.1 INTRODUCTION

This section summarizes an analysis that was conducted to develop a nationwide estimate of the peak hour demand for commercial truck parking facilities resulting from the need to comply with Federal hours-of-service rules. Federal hours-of-service rules have been in effect in their current form since 1962 (49 *CFR* 395). The rules allow for commercial motor vehicle drivers in interstate commerce to be on duty up to 15 hours and drive up to 10 hours after 8 consecutive hours off duty. Weekly limits provide that if a motor carrier operates commercial motor vehicles every day, its drivers may not drive after being on duty 70 hours in 8 consecutive days. These rules, therefore, typically require drivers of commercial motor vehicles to complete a period of rest while en route to a destination if the driver is unable to return home for the required rest.

While drivers are required to obtain extended rest, there is no single agency, organization, or group that is responsible for providing drivers extended rest locations. Essentially, drivers find such locations themselves and typically rely upon two primary options: commercial truck stops and travel plazas or public rest areas. (Drivers also use other facilities such as loading areas or terminals, shopping centers or plazas, and other similar facilities. This study concentrates on the supply of public rest area parking and parking provided at commercial truck stops and travel plazas as required by Section 4027.) Driver preferences for a particular type of facility to park for rest are influenced by a number of factors, including the anticipated length of the rest period and whether the facility provides for non-rest related activities, such as refueling and maintenance or eating a meal.⁽⁸⁾ Commercial truck stops and travel plazas are designed to provide drivers an opportunity to fulfill many non-rest related activities while public rest areas provide the driver with only minimal services.

A questionnaire concerning truck drivers needs and preferences was developed for this study to help derive travel demand estimates. A survey of commercial truck drivers was administered to more than 2,000 truck drivers in selected regions across the United States. Survey responses were used to determine truck drivers' needs, preferences, and travel patterns (e.g., why, when, and where they park). This information was used to calibrate several of the parameters in the model so that they would more accurately represent drivers' behaviors and travel patterns. Driver survey results were used to develop default values for the following parameters: average hours spent loading/unloading per week, average hours spent at home per week, average hours spent parking for rest at shipper/receiver per week, and the portion of demand for public rest area and commercial truck stop and travel plaza spaces.

The importance of determining the values of the loading/unloading time, at-home time, and time spent resting at shipper/receiver was to calculate the amount of time a driver requires parking along the highway in a typical week. Similarly, values of total parking demand for public rest areas and commercial truck stop and travel plaza spaces were derived based on responses to questions in the driver survey (from both short- and long-haul drivers) regarding where they prefer to stop for different purposes (e.g., long-term rest, restroom, meal, etc.). For a thorough discussion of the driver needs and preferences survey and how questions from the survey were used to develop travel demand estimates, refer to references 8 and 9.

2.2 NATIONAL SURVEY OF DRIVER NEEDS AND PREFERENCES FOR PARKING

A clear understanding of truck drivers' parking-related needs, preferences, and decision making is necessary to accurately assess truck parking supply and demand.

To measure truck driver parking needs and preferences, the *Commercial Vehicle Driver Survey: Assessment of Parking Needs and Preferences*⁽⁸⁾ study employed a nationwide survey of truck drivers. The survey sought to determine the following:

- How truck drivers plan for and address their parking needs.
- How truck drivers select when, where, and at which facilities they park.
- What truck drivers think of the adequacy of current parking facilities.

Surveys were distributed to a national sample of truck drivers both directly, through site visits to truck stops, and indirectly, through mailings to truck stops. A total of 2,046 completed surveys were collected. During site visits, survey teams collected 1,042 completed surveys. Surveyors experienced overwhelmingly high response rates (above 80 percent) after briefly explaining the purpose of the survey to drivers. An additional 4,400 surveys were mailed out to 22 truck stops across the country. Close to 1,100 surveys were returned, yielding a response rate of 24 percent for the mail-out distribution.

Locations for the site visits and mail-out distributions were chosen in order to reach a nationally representative sample of drivers. Before embarking on the major data collection task, the survey team tested distribution methods by visiting both public and commercial truck parking facilities on the east coast. During this pilot test, drivers made it clear that when at public rest areas they do not have time to participate in the study. However, at commercial truck stops and travel plazas, drivers generally agreed to fill out the survey during their stay. To determine whether omitting public rest areas from the list of distribution locations would limit the sample of short-haul drivers, the survey team asked short-haul drivers if they use commercial truck stops and travel plazas as often as they use public rest areas. Short-haul drivers consistently indicated that they use both types of facilities equally. Therefore, to maximize response rate and minimize negative impact on drivers' time, commercial truck stops and travel plazas were used exclusively for the survey distribution.

To ensure that the sample would be representative of a national sample of drivers, survey distribution sites were located in 27 States along major trucking corridors on the NHS. All regions of the United States were included.

Data from the national sample were analyzed to examine driver opinions with respect to parking patterns and preferences. Drivers' responses to the survey demonstrated definite preferences and priorities when it comes to choosing where they will park. When drivers park their trucks, most expect to satisfy only their basic needs. Drivers prefer parking facilities that provide food, fuel, restrooms, telephones, and showers. They also consider safety and convenience important when they park their trucks. When it comes to safety, drivers appear to value well-lighted parking lots even more than they value security presence. Drivers do not consider entertainment and other "luxuries" to be necessary characteristics of a parking facility. As one driver urged, "I just want to find a place to park that is safe and available." Because truck stops typically provide showers,

restaurants, and repair facilities, it is not surprising that drivers generally prefer commercial truck stops and travel plazas to public rest areas. When drivers park for quick naps, they prefer to park in public rest areas.

2.3 NATIONAL COMMERCIAL VEHICLE PARKING DEMAND MODEL

A modeling approach was used to develop an estimate of the demand for commercial vehicle parking at commercial truck stops and public rest areas. The details of this model can be found elsewhere, but the general concepts underpinning the model are described in the following paragraphs.⁽⁹⁾

The model predicts commercial truck parking demand for a highway segment based on total truck-hours of travel and the time and duration of stops. The model considers the effect of Federal hours-of-service regulations on parking demand as part of the basis for estimating the average number of hours spent parking per hour spent driving. The model also considers the observation from the driver survey that drivers use public and private parking spaces for different parking purposes by using the survey results to estimate the fraction of total parking demand that is for private and public parking spaces. Although the corridor model limits the conclusions that can be drawn about a specific commercial truck stop and travel plaza or public rest area (e.g., the need for lighting, additional parking, etc.), it was considered more appropriate to reflect a roadway segment's or corridor's supply and demand characteristics.

The model develops corridor-level estimates of demand rather than estimates of demand for individual public rest areas or commercial truck stops and travel plazas along a route. This approach is based on the theory that demand for parking is explained by hours of driving rather than the attributes of an individual truck stop or rest area. Building the modeling framework around this system-level approach provided a basis to examine the influences of HOS regulations as well as driving time and distance on parking demand.

The modeling framework begins by estimating the truck-hours of travel for each highway segment using the annual average daily traffic, the percent of trucks, the length of the roadway segment being analyzed, and the speed limit or average truck speed. A key parameter in the model is the number of hours of parking required by drivers given the number of hours they traveled. Thus, Federal hours-of-service regulations have an indirect, but very real, effect on parking demand: the more hours of parking required for a given period of time on the road (i.e., the higher the ratio of parking time to driving time), the higher the estimated parking demand. Using these factors for a particular highway segment, the model produces a peak-hour, segment-wide estimate of parking spaces demanded at public rest areas and commercial truck stops and travel plazas.

The calibration of model parameters involved an iterative, trial-and-error effort that sought to produce parameter values that successfully replicated the results of field observations for selected corridors within an acceptable degree of error. Calibration of the model was accomplished by varying parameters' values in the model until an acceptable level of error was achieved. The resulting parameters were then applied to estimate demand.

Field data collection studies were completed to assist in the calibration of model parameters. Model parameters were calibrated using overnight field observations of parked trucks in eight

States: Arkansas, Georgia, Idaho, Mississippi, Missouri, Pennsylvania, Tennessee, and Virginia. Observational studies were performed on 29 segments of highway in these eight States representing four regions and nine corridors. The parking demand estimates produced by the model are highly variable at the segment level. For example, the model estimates are within ± 10 percent of the observed parked trucks for only 4 of the 29 segments (14 percent), ± 20 percent for 11 of the 29 segments (38 percent), and ± 30 percent for 20 of the 29 segments (69 percent). At the corridor level, on the other hand, the model is much more accurate. Model estimates are within ± 10 percent of the observed parked trucks for six of the nine corridors (67 percent), ± 15 percent for seven of the nine corridors (78 percent), and ± 20 percent for eight of the nine corridors (89 percent).

This variance can be attributed to several factors. First, the model does not take into account the spatial distribution of available truck parking spaces. Although the amount of available parking does not affect the amount demanded, the spatial distribution of the supply will affect where, geographically, the demand is met. In other words, if a segment has no available supply, drivers who need or want to park will seek parking on adjacent segments. In addition, the model does not take into account typical freight movement (e.g., north to south, east to west, region to region). Typical travel patterns may result in locations experiencing a high demand for parking on a particular day(s) of the week. These peaking characteristics, which may have been captured in the field counts, are not reflected in the model estimates. Thus, it might be necessary to adjust the default value for the peak parking factor to meet the demand. Finally, the use of only two short-haul to long-haul ratios (i.e., 0.36/0.64 for urban and 0.07/0.93 for rural segments) may not adequately reflect the variations across regions and corridors. To better understand the variability in the short-haul to long-haul ratio, origin-destination surveys should be conducted in a variety of different locations that represent a range of distances from metropolitan areas with different populations.

Overall, the model produces acceptable estimates of parking space demand, with an error of only -2 percent for the 29 segments combined, an estimate within 269 spaces of the observed parked trucks. However, the model is not microscopic enough to accurately predict segment-specific demand. Because the model is driven by the number of long-haul trucks on a segment, the accuracy of the estimates is highly sensitive to input values such as annual average daily traffic and percent trucks. If these input values are not accurate, the model estimates cannot be expected to reflect actual conditions. Also, at the time the observational studies were conducted, the observed parked trucks exceeded the supply along half of the 29 segments, and therefore, may not be an accurate representation of the total demand for parking. Because the model was calibrated to the observed parked trucks, the use of this model will result in a conservative estimate of truck parking demand. Additional details concerning the calibration effort can be found elsewhere.⁽⁹⁾

2.4 NATIONAL DEMAND FOR COMMERCIAL VEHICLE PARKING

The modeling approach was applied to appropriate NHS roadway segments throughout 49 States (excluding Hawaii). For analysis purposes, only segments carrying more than 1,000 commercial motor vehicles per day were considered. Segments falling below this threshold are less likely to generate sufficient demand to warrant either commercial truck stop or public rest area facilities to comply with Federal hours-of-service rules.

Partners in each State reviewed these estimates and provided comments and suggestions that were used to improve the estimates. In many cases, adjustments were made to better reflect the volume of truck traffic on a segment, the speed limit, and other model factors.

Table 1 contains a summary of the modeling results for each State. The values presented in this table do not include any time that a driver may park for long-term rest at a loading or unloading facility. Demand estimates are provided for both public rest areas and commercial trucks stops and travel plazas. It is estimated that there is currently a peak hour demand for approximately 287,316 truck parking spaces at commercial truck stops and travel plazas and public rest areas nationally.^a Demand on Interstate highways was for 245,389 truck parking spaces (56,424 spaces at public and 188,965 at commercial facilities), and demand on non-Interstate highways was for 41,927 spaces (9,643 at public and 32,284 at commercial facilities). States with the highest daily demand include Texas and California as well as the mid-western States of Indiana, Illinois, and Ohio.

The estimate of public and private parking demand reflects the preferences for public versus private parking, as determined by the national driver survey. During this survey, drivers were asked for each of seven activities whether they preferred to stop at a public rest area or at a commercial truck stop for that activity. The relative preference for each type of parking space was estimated by taking an average of the preferences for each activity, rating each preference by the relative frequency of that type of activity and the duration of that activity. The proportions of total parking demand for rest area and truck stop spaces were estimated as 0.23 and 0.77, respectively.

Projections of the annual increase in parking demand over a 20-year period were also prepared and are presented in Table 1. The demand for parking in the year 2020 was estimated using the parking demand model. Most model parameters remained the same as when estimating the current parking demand. New input values to the model were obtained and derived from the following sources for the purpose of making a year 2020 forecast:

^a Because travel demand is variable, traffic engineering analyses generally focus on the peak periods of travel (e.g., peak hour of the day, peak month of the year). Peak demand for long-term truck parking typically occurs in the overnight hours between 10:00 p.m. and 6:00 a.m. As part of this study, commercial vehicle parking field surveys were conducted to record trucks parked during the peak hour in public rest areas, private truck stops, pull-out areas, interchange ramps, mainline and cross street shoulders, fueling stations, fast food restaurants, hotels, etc. These field counts were compared to the parking demand estimates from the model during the model calibration process.

Table 1. Peak hour demand for commercial vehicle parking along Interstate highways and other NHS routes carrying more than 1,000 trucks per day, 2000

State	Public rest area demand	Commercial truck stop demand	Total demand	20-Year forecasted annual increase in parking demand
Alabama	1,634	5,473	7,107	4.4%
Alaska	25	88	113	1.0%
Arizona	1,052	3,523	4,575	3.2%
Arkansas	1,783	5,968	7,751	2.9%
California	4,539	15,183	19,722	1.9%
Colorado	760	2,546	3,306	3.0%
Connecticut	616	2,060	2,676	1.7%
Delaware	206	694	900	2.4%
Florida	1,694	5,665	7,359	2.8%
Georgia	2,188	7,324	9,512	3.0%
Idaho	734	2,462	3,196	3.0%
Illinois	3,338	11,172	14,510	1.1%
Indiana	4,299	14,400	18,699	3.0%
Iowa	688	2,302	2,990	3.6%
Kansas	566	1,907	2,473	2.7%
Kentucky	2,206	7,380	9,586	2.7%
Louisiana	2,060	6,910	8,970	3.0%
Maine	205	691	896	0.5%
Maryland	592	1,983	2,575	2.0%
Massachusetts	863	2,894	3,757	1.3%
Michigan	1,275	4,262	5,537	2.2%
Minnesota	872	2,925	3,797	2.0%
Mississippi	1,254	4,194	5,448	2.7%
Missouri	2,643	8,841	11,484	2.7%
Montana	462	1,550	2,012	2.6%
Nebraska	251	837	1,088	3.6%
Nevada	682	2,285	2,967	2.0%
New Hampshire	72	243	315	2.2%
New Jersey	457	1,528	1,985	0.6%
New Mexico	1,218	4,083	5,301	2.5%
New York	1,801	6,034	7,835	3.0%
North Carolina	1,270	4,262	5,532	3.0%
North Dakota	188	635	823	3.0%
Ohio	3,301	11,059	14,360	2.9%
Oklahoma	1,078	3,610	4,688	1.8%
Oregon	1,139	3,819	4,958	1.8%
Pennsylvania	2,360	7,903	10,263	3.0%
Rhode Island	167	566	733	1.4%
South Carolina	1,265	4,236	5,501	3.8%
South Dakota	199	666	865	1.7%
Tennessee	1,214	4,073	5,287	4.0%
Texas	8,305	27,797	36,102	2.7%
Utah	391	1,307	1,698	4.3%
Vermont	27	91	118	1.2%
Virginia	1,772	5,932	7,704	1.4%
Washington	815	2,724	3,539	2.1%
West Virginia	468	1,572	2,040	3.0%
Wisconsin	633	2,115	2,748	4.2%
Wyoming	440	1,475	1,915	3.6%
Grand total	66,067	221,249	287,316	2.7%

- Estimates for speed limit were based on the Highway Performance Monitoring System (HPMS) and comments provided by State Departments of Transportation (DOTs).
- Projected annual average daily traffic was derived from the HPMS, public rest area survey responses, and comments provided by State DOTs. If projections for the annual average daily traffic were not provided or obtained from HPMS then a growth rate for the annual average daily traffic of 3 percent per year was assumed.
- The percent trucks were derived from HPMS and data provided by the State DOTs.
- The demand was derived from the methodology contained in the Technical Guidance document. The demand shown in the table represents the number of spaces demanded for the peak hour along a corridor.

2.5 SUMMARY AND CONCLUSIONS

The primary purpose of this section was to develop an estimate of the demand for truck parking spaces at public rest areas and commercial truck stops and travel plazas that will serve in Section 4.0 as part of the basis for identifying parking space shortages on the NHS. A model for truck parking demand was developed based on the results of a national driver survey, and this model was calibrated by comparing observed parking volume against estimated volume. Development of the demand estimates did indicate the following:

- Driver surveys indicated that 23 percent of the demand is for parking at public rest areas and 77 percent of the demand is for parking at commercial truck stops and travel plazas.
- The 20-year forecasted growth rate of demand for truck parking at both public rest areas and commercial truck stops and travel plazas is estimated to be 2.7 percent annually.

3.0 COMMERCIAL TRUCK PARKING SUPPLY

3.1 INTRODUCTION

This section contains an inventory of the number of public rest areas and commercial truck stops that could be used to comply with Federal hours-of-service rules. A survey of public rest areas was completed to develop an inventory of public rest area spaces. A proprietary database developed by Interstate America served as the primary basis for determining the number of spaces available at commercial truck stops and travel plazas. The inventory includes Interstate highways and the non-Interstate portions of the NHS with daily truck volumes greater than or equal to 1,000.^a A total of 39,963 Interstate and 21,702 non-Interstate miles were included in the inventory.

3.2 PUBLIC REST AREA PARKING FACILITIES

A survey that included 49 States (excluding Hawaii) was conducted to gather information on truck parking capacity at public rest areas and other public facilities.^b The following list describes the key findings from this analysis:

- The survey identified 31,249 spaces at 1,771 public facilities.
- Nationwide, about 10 percent of the total available parking spaces are at public facilities, with a low of 1 percent and a high of 39 percent within individual States. In 35 of the 49 States, parking spaces at public facilities amount to between 5 percent and 15 percent of the total.
- Some States restrict parking at public rest areas. For example, 27 States limit the length of time that a truck can park at some public rest areas.
- Some States augment the parking available for commercial vehicles at public rest areas by allowing parking at other facilities. For example, 11 States permit trucks to park for extended rest at some weigh stations.
- A total of 288,995 parking spaces (7.2 spaces per road-mile) were identified on Interstate highways, and 10 percent of these parking spaces were at public facilities. A total of 26,855 parking spaces (1.2 spaces per road-mile) were identified on non-Interstate highways, and 10 percent of these parking spaces were at public facilities.
- A 1996 survey of parking spaces at public rest areas documented a complete inventory for 33 States for a total of 16,334 spaces at 907 facilities.⁽⁵⁾ In the inventory completed for this study, 16,101 spaces were noted at 1,090 facilities for the same 33 States. This indicates a slight decrease of about 1 percent in the supply of parking spaces at public rest areas during this period.

^a Some States provided data for highway segments with daily truck volumes less than 1,000, in which case these highway segments are included in the analysis. For example, no highways with daily truck volumes greater than 1,000 exist in Alaska, and Alaska provided data for those highway segments that had a high daily truck volume relative to other highways in Alaska.

^b These public facilities includes public rest areas, welcome centers, turnpike travel plazas, weigh stations, and truck-only parking lots.

- Eleven States reported plans to expand truck parking at public facilities by 1,609 spaces over the next 5 years, which implies an estimated growth of 5.1 percent over a 5-year period.

Detailed results on the number of public parking facilities and spaces for each State are listed in the first three columns of Table 2.

3.3 COMMERCIAL TRUCK STOP AND TRAVEL PLAZA PARKING FACILITIES

Commercial truck stops and travel plazas are designed to provide drivers an opportunity to fulfill many non-rest related activities while public rest areas provide the driver with only minimal services. Commercial truck stop operators provide a number of services to trucks and typically provide extended parking to encourage drivers to use these services. In other words, commercial truck stop and travel plaza operators do not provide extended-stay parking as a primary service but only to encourage purchases of fuel, food, and other services. Truck stop operators do not generally charge for parking and provide parking only to attract business.

The primary data source for the inventory of parking spaces at commercial truck stops and travel plazas was the Truck Stops Database developed by Interstate America. The Federal Highway Administration, for purposes of this study, obtained a license for the use of the 1999 database, which includes every known facility in the United States and Canada. The Truck Stops Database, which is updated annually, contains information describing the number of commercial vehicle parking spaces available at each facility as well as information about the amenities available (e.g., type of fuel available, type of food available). The following list describes the key findings from this analysis:

- The analysis identified 284,601 spaces at 3,382 commercial facilities.
- Nationwide, about 90 percent of the total available parking spaces are at commercial facilities, with a low of 61 percent and a high of 99 percent within individual States. In 35 of the 49 States, parking spaces at commercial facilities amount to between 85 percent and 95 percent of the total.
- A total of 288,995 parking spaces (7.2 spaces per road-mile) were identified on Interstate highways, and 90 percent of these parking spaces were at commercial facilities. A total of 26,855 parking spaces (1.2 spaces per road-mile) were identified on non-Interstate highways, and 89 percent of these parking spaces were at commercial facilities.
- The National Association of Truck Stop Operators (NATSO) Foundation reports an estimated annual growth rate of 6.5 percent for the number of parking spaces available at commercial truck stops and travel plazas.^c

Detailed results on the number of commercial truck stop and travel plaza parking facilities and spaces for each State are listed in Table 2.

^c An evaluation of the Truck Stops Database for the years 1997 to 2000 indicated an average growth rate of 6.5 percent for these years. The NATSO Foundation expects this rate of growth to continue.

3.4 DRIVER'S ASSESSMENT OF PARKING FACILITY QUALITY

Because the number of available parking spaces is only part of the parking picture, respondents were asked to report how frequently truck parking spaces have certain usability characteristics. Drivers rated how frequently available parking is convenient to the highway, has the features they need, has time limits that allow enough time for their needs, has enough room for them to maneuver their trucks in and out, and is used only by trucks. Respondents gave mixed ratings for all these usability characteristics (Table 3). For each of these usability characteristics, *sometimes* [encountered] was the most frequently reported driver response. The usability characteristic that was most often encountered by respondents (i.e., most often given ratings of frequently or almost always) was *available parking has the features I need*, marked by 51 percent of respondents. Thirty-nine percent of respondents indicated that available parking is *frequently* or *almost always* convenient to the highway.

Table 2. Commercial truck parking inventory along Interstate and other NHS routes carrying more than 1,000 trucks per day

State	Public rest areas			Truck stops and travel plazas			Total
	Number of facilities	Number of spaces	Percent of total	Number of facilities	Number of spaces	Percent of total	Number of spaces
Alabama	27	712	9%	99	6,902	91%	7,614
Alaska ¹	N/A	457	100%	N/A	N/A	N/A	457
Arizona	38	559	6%	58	8,140	94%	8,699
Arkansas	21	343	4%	108	7,519	96%	7,862
California	88	1,106	13%	122	7,496	87%	8,602
Colorado	31	167	6%	57	2,710	94%	2,877
Connecticut	20	361	23%	12	1,243	77%	1,604
Delaware	1	70	18%	8	324	82%	394
Florida	69	1,709	19%	85	7,339	81%	9,048
Georgia	31	1,162	9%	122	11,475	91%	12,637
Idaho	30	245	11%	25	1,967	89%	2,212
Illinois	54	1,267	12%	122	9,602	88%	10,869
Indiana	52	2,430	14%	119	14,529	86%	16,959
Iowa	38	804	13%	65	5,209	87%	6,013
Kansas	29	455	9%	55	4,383	91%	4,838
Kentucky	44	991	12%	76	7,186	88%	8,177
Louisiana	15	221	2%	115	9,159	98%	9,380
Maine	11	113	8%	16	1,248	92%	1,361
Maryland	11	295	11%	14	2,290	89%	2,585
Massachusetts	17	140	7%	20	1,916	93%	2,056
Michigan	75	1,570	20%	90	6,147	80%	7,717
Minnesota	40	536	11%	58	4,503	89%	5,039
Mississippi	43	428	6%	98	7,003	94%	7,431
Missouri	35	618	5%	140	12,272	95%	12,890
Montana	43	392	11%	39	3,085	89%	3,477
Nebraska	22	263	8%	46	2,835	92%	3,098
Nevada	36	260	5%	31	4,979	95%	5,239
New Hampshire	6	86	11%	13	697	89%	783
New Jersey	19	667	15%	34	3,730	85%	4,397
New Mexico	11	78	1%	49	6,322	99%	6,400
New York	36	1,257	15%	97	6,970	85%	8,227
North Carolina	37	642	8%	102	7,323	92%	7,965
North Dakota	30	260	11%	25	2,039	89%	2,299
Ohio	98	1,402	11%	135	11,474	89%	12,876
Oklahoma	63	767	7%	129	9,632	93%	10,399
Oregon	40	602	10%	52	5,702	90%	6,304
Pennsylvania	65	1,298	8%	134	14,502	92%	15,800
Rhode Island	5	267	39%	3	420	61%	687
South Carolina	49	816	9%	96	8,515	91%	9,331
South Dakota	21	371	22%	30	1,331	78%	1,702
Tennessee	30	767	11%	89	6,419	89%	7,186
Texas	105	654	3%	284	23,525	97%	24,179
Utah	24	238	9%	43	2,488	91%	2,726
Vermont	41	178	28%	63	449	72%	627
Virginia	39	820	10%	13	7,445	90%	8,265
Washington	29	455	15%	39	2,663	85%	3,118
West Virginia	21	506	23%	21	1,717	77%	2,223
Wisconsin	23	652	10%	80	5,971	90%	6,623
Wyoming	58	792	17%	51	3,806	83%	4,598
Total	1,771	31,249	10%	3,382	284,601	90%	315,850

¹ An inventory of private parking spaces was not performed for Alaska.

Table 3. Driver-reported usability characteristics in truck parking

Usability characteristic	Percent of respondents reporting*				
	Almost always	Frequently	Sometimes	Rarely	Almost never
Parking is convenient to highway	9%	30%	41%	12%	7%
Facility has features needed	15%	36%	38%	7%	3%
Parking time limits allow enough time	15%	22%	30%	18%	15%
Parking allows enough room to drive in and out	8%	24%	48%	15%	6%
Truck spaces used only by trucks	9%	25%	34%	20%	12%

Note: The bold-faced percentages highlight the most frequently reported response for each usability characteristic.

*Due to rounding, percentages may not sum to 100.

To help clarify drivers' parking preferences, the survey asked drivers to identify how important various parking facility features are to them when they park their trucks. Drivers rated various features on a scale from 1 to 5 (*almost always important* to *almost never important*). Table 4 shows the features evaluated, along with the mean, median and modal ratings they received. Features rated as most important were generally the ones that address basic needs. Food, fuel, restrooms, telephones, showers, convenience to highway, and well-lighted parking lots all received modal ratings of *almost always important*. In fact, between 70 percent and 85 percent of the sample rated these features as *frequently* or *almost always important*. Interestingly, drivers appear to value well-lighted parking lots more than they value security presence. Seventy-five percent of respondents rated "well-lighted parking lots" as *frequently* or *almost always important*, while only 60 percent gave the same ratings to "security presence." The majority of drivers rated features such as entertainment facilities, Internet connections, and availability of travel information as less important.

Table 4. Driver-rated importance of features when parking

Important features	Mean	Median	Mode
Restrooms	1.4	1.0	1
Convenient to highway	1.6	1.0	1
Showers	1.7	1.0	1
Well-lighted parking lot	1.9	1.0	1
Public phones	1.9	1.0	1
Restaurant	1.9	1.0	1
Fuel	2.0	1.0	1
Security presence	2.3	2.0	1
Repair facilities	2.6	3.0	1
Prepaid fuel cards accepted	2.9	3.0	1
Vending machines	3.4	3.0	5
Entertainment facilities	3.4	3.0	5
Travel information available	3.6	4.0	5
Internet connections	4.0	5.0	5

Note: Respondents rated the features on a scale from 1 to 5 ("almost always important" to "almost never important").

Almost 400 respondents provided written comments on the parking facility features they consider important. The single most frequently mentioned feature was *big parking spaces that allow trucks to maneuver in and out* (written by 45 drivers). Drivers indicated that they look for quiet parking facilities where they are not likely to be disturbed by police officers or solicitors. They value clean facilities where the personnel are friendly. Drivers also commented that they prefer parking

facilities that allow access to shopping areas with grocery or department stores. Finally, drivers commented that laundry facilities add to the appeal of a parking facility.

Ratings given by short-haul drivers reflected the fact that they value parking facility features differently than long-haul drivers. Specifically, long-haul drivers most often rated features such as showers, fuel, and well-lighted parking lots as *almost always important*, while short-haul drivers most often rated these same features as only *frequently important*. Female respondents provided different ratings than their male counterparts on some features. Eighty percent of women rated security presence as *frequently* or *almost always important*, while just under 60 percent of men gave the same ratings to security presence. Additionally, 92 percent of women rated “well-lighted parking lots” as *frequently* or *almost always important*, while about three-quarters of men did the same.

In addition to inquiring about the features that are important to drivers, the survey also asked which type of parking facilities (public versus commercial) they prefer for parking. Because parking facility preference likely depends on the purpose of the stop, various common “reasons for parking” were identified to give context to their facility preferences. Generally when drivers showed a preference, they indicated a preference for commercial truck stops over public rest areas (Table 5). Public rest areas were preferred to commercial truck stops only when drivers stop for a quick (less than 2-hour) nap. For extended rest (more than 2 hours), performing minor truck maintenance, and eating a meal, drivers overwhelmingly preferred truck stops to rest areas, with between 79 percent and 91 percent of drivers indicating a preference for truck stops and less than 6 percent indicating a preference for rest areas. Most respondents marked *no preference* for stops made to use vending machines, get travel information, use public telephones, and use the restroom. However, among those drivers who did show a facility preference when making these types of stops, more drivers indicated a preference for truck stops. For all the parking reasons listed, short-haul driver preferences were the same as long-haul driver preferences.

Table 5. Drivers’ parking facility preferences by purpose of stop

Reason for parking	Percent of respondents reporting*		
	Rest area	No preference	Truck stop
Take a quick nap (≤ 2 hours)	45%	36%	19%
Take an extended rest (> 2 hours)	6%	16%	79%
Use vending machines	28%	58%	14%
Get travel information	9%	51%	40%
Use public phones	14%	49%	37%
Perform minor maintenance on truck	2%	19%	79%
Use the restroom	25%	45%	30%
Eat a meal	1%	8%	91%

Note: The bold-faced percentages highlight the most frequently reported response for each parking reason.

*Due to rounding, percentages may not sum to 100.

In the same survey, drivers were asked where they parked their trucks to sleep during their most recent trips. The results are summarized in Table 6.

Table 6. Facility most recently used for sleep

Facility	Respondents reporting (%)*
Home	9%
Truck stop	54%
Public rest area	8%
Ramp	4%
Loading dock	10%
Other	11%
No response	4%

*Because of rounding, percentages do not sum to 100.

A significant proportion (54 percent) reported using a commercial truck stop or travel plaza. Interestingly, 10 percent reported parking at a loading dock, company terminal, or other facility to sleep. In addition, 11 percent reported parking at other facilities, such as shopping plazas and hotels or motels. These facilities, therefore, appear to represent a significant proportion of the parking supply used by drivers to comply with Federal hours-of-service rules. The results of this survey support the idea that drivers prefer to use commercial truck stops and travel plazas for extended rest. Clearly, however, a proportion of drivers also use public rest areas for this purpose.

3.5 INTERCHANGEABILITY OF PUBLIC REST AREA AND COMMERCIAL TRUCK STOP AND TRAVEL PLAZA PARKING

An important factor in determining whether there is a sufficient supply of truck parking spaces involves the concept of interchangeability of spaces at public rest areas and commercial truck stops and travel plazas. That is to say, can a surplus of parking spaces at commercial truck stops and travel plazas compensate for a shortfall in available public rest area parking? Since most truck drivers utilize public rest areas and commercial truck stops and travel plazas for resting, it is logical to conclude that a driver can rest equally well while parked at a public rest area or at a commercial truck stop or travel plaza and, therefore, these spaces are interchangeable. This view is challenged, however, by the results of the national survey of driver needs and preferences, by the findings of field observational studies, and by the imbalance identified within the supply and demand ratios between public and commercial parking spaces.

National Truck Parking Needs and Preferences Survey

Drivers' responses to the Truck Parking Needs and Preferences Survey conducted as part of this study demonstrated definite preferences and priorities when it comes to choosing where they will park. These preferences are offered as evidence of the limited interchangeability or substitutability between public rest areas and commercial truck stops or travel plazas.

- When drivers park for quick naps (less than 2 hours), they prefer to park in public rest areas (45 percent of the drivers preferred a public rest area, 19 percent preferred commercial truck stops, and 36 percent expressed no preference between public rest areas and commercial truck stops). For more lengthy activities (greater than 2 hours), such as eating a meal, resting for the night, or repairing a truck, drivers would choose truck stops where possible (79 percent of the drivers preferred a truck stop, 6 percent preferred rest areas, and 16 percent expressed no preference between rest areas and truck stops).

- To help clarify drivers' parking preferences, the survey asked drivers to identify how important various parking facility features are to them when they park their trucks. Restrooms, convenience to a highway, showers, well-lighted parking lots, and public telephones were the top features selected from a list of 14 features that drivers rated as most important. Three of the five features address drivers' basic needs, while the other two clearly address drivers' preferences. Drivers were also given the opportunity to write comments on the parking features they considered most important. The single most frequently mentioned feature was big parking spaces that allow trucks to maneuver in and out.
- The survey also provided the respondents with the opportunity to speculate about why truck drivers sometimes park on entrance or exit ramps and highway shoulders. The most commonly reported reasons were that no nearby parking facility was available, no empty spaces were available at nearby truck stops or rest areas, nearby parking spaces have time limits that are too short, empty parking spaces nearby were blocked by others vehicles, the ramp/shoulder is convenient for getting back on the road, interruptions by strangers (e.g., drug dealers, prostitutes) was less likely, it is hard to drive around congested parking lots, and better lighting exists on ramp(s)/shoulder(s) than in lot(s).

Field Observational Studies

In addition to the driver self-report data cited above, more objective evidence to support the notion of limited interchangeability between public rest areas and commercial truck stops and travel plazas can be found from the results of observational field surveys conducted both for this study and by a number of other States.

- Commercial vehicle parking field surveys were conducted as part of the demand model development effort for this study. The purpose of these observational studies was to record trucks parked during the peak hour in public rest areas, commercial truck stops, pull-out areas, interchange ramps, mainline and cross street shoulders, fueling stations, fast food restaurants, hotels, etc. The studies were conducted along two segments of I-81 in Virginia, on seven segments of Georgia interstate highways and six segments of Pennsylvania interstate highways. These segments were selected as representing the typical range, from low to high, of truck parking supply and demand. Although all of the rest areas were full or overflowing, some of the commercial truck stops had spaces available, as did most of the fast-food restaurants, fueling stations, and shopping centers along the segments, suggesting that drivers do differentiate between parking at public rest areas and other commercial parking areas.
- The University of Tennessee conducted nighttime observational studies at all public rest areas in Tennessee for each day of the week.⁽¹⁰⁾ Availability of space in commercial truck stops and travel plazas near interchanges was also examined. The results of the occupancy studies showed that the rest areas were overflowing with trucks at night, as evidenced by trucks parked along the shoulders of highway exit and entrance ramps as well as on interchange ramps. While the rest areas were overflowing, approximately 30 percent of the private truck parking spaces were not occupied, and the unoccupied private parking spaces outnumbered the trucks parked along the highways by nearly three times. To understand why

some truck drivers park along the highway when there are available private parking spaces, in-depth interviews were held with drivers. Opinions of the drivers interviewed were quite consistent. The findings were that commercial truck stops and public rest areas are not substitutes for each other because they meet different needs.

- The State of Iowa completed field observations of truck parking on Interstate highways in 1999.⁽¹¹⁾ This study divided the Interstates in Iowa into six segments. Parking at public rest areas was observed to be above capacity for almost every segment and almost every day during the observation period, and trucks were observed parking on the shoulder at exit and entrance ramps. On the other hand, parking at commercial truck stops and travel plazas was observed to be above capacity for only a single segment, and then for only two of the 7 days during the observation period. This suggests that drivers do differentiate between parking at public rest areas and other commercial parking areas.
- In 1999, the Baltimore Metropolitan Council sponsored a study of truck parking in the Baltimore area that concluded that, even though there was a sufficient supply of parking spaces available to truck drivers, trucks were often parked illegally along the highways at night.⁽¹²⁾ These observations suggest that truck drivers do differentiate between parking spaces by choosing to park at illegal spaces along the highway rather than legally at other locations.
- The FHWA supported a study in 1996⁽⁵⁾ that included observations of truck parking along a stretch of I-81 between Radford, Virginia, and Knoxville, Tennessee. These observations indicated that public rest areas tended to reach capacity before commercial truck stops, and that large numbers of trucks parked on shoulders and ramps of rest areas, even when parking was available at a public rest area. These findings suggest that truck drivers differentiate between parking at public rest areas and other commercial parking facilities.

Public-Private Supply/Demand Imbalance

As stated earlier in this report, the national driver survey was also used to develop an estimate of public and private parking demand to reflect preferences for public versus private parking. As part of the survey, drivers were asked for each of seven activities whether they preferred to stop at a public rest area or at a commercial truck stop for that activity. The relative preference for each type of parking space was estimated by taking an average of the preferences for each activity, rating each preference by the relative frequency of that type of activity and the duration of that activity. The proportions of total parking demand for public rest area and commercial truck stop spaces were estimated as 0.23 and 0.77, respectively. However, when looking at the supply of available parking, on average, approximately 90 percent of the total available parking spaces are at commercial facilities, and 10 percent of the available parking spaces are at public facilities. This imbalance in supply (90/10) and demand (77/23) between the commercial and public sectors, respectively, is further evidence on the limits of interchangeability in the drivers' eyes.

In summary, while it may be argued that, since truck drivers could rest equally well at public rest areas and commercial truck stops and travel plazas, parking spaces at these two different types of rest stops are interchangeable. In other words, truck stop parking can be substituted for rest area parking, even if the private parking is not as convenient. On the other hand, empirical evidence provided through both driver surveys and observations of parking behavior indicate that parking at these locations is not interchangeable; more likely, the evidence suggests that there is some interchangeability and this interchangeability is limited due to preferences expressed by drivers for one type of space over another. In reality, a system of parking exists in this country that consists of public rest areas, commercial truck stops and travel plazas, weigh stations, and various commercial establishments (motels, fast food restaurants, etc.). As a system, a certain synergy applies such that substitution occurs among the available types of spaces. However, it is not a complete substitutability. The interchangeability of one type of parking space for another is limited or governed by an array of drivers' preferences (e.g., purpose of the stop, amenities available, parking convenience, etc.), and it is these preferences that influence a driver's decision as to where to park.

3.6 SUMMARY AND CONCLUSIONS

The primary purpose of this section was to describe the inventory of truck parking spaces at public rest areas and at commercial truck stops and travel plazas that will serve in Section 4.0 as part of the basis for identifying shortages in truck parking spaces on the NHS. Evaluation of this inventory did indicate the following:

- Public rest areas account for 10 percent of truck parking spaces, and commercial truck stops and travel plazas account for 90 percent. Consequently, changes that result in greater use of existing private parking spaces may be a cost-effective way to address shortages in supply.
- Expected growth of truck parking spaces at public rest areas is expected to be small (5.1 percent over the next 5 years), while growth in the private sector is estimated at 6.5 percent annually.

In addition to the inventory of parking spaces, this section also described survey results indicating the features that truck drivers value at a parking facility and, in this context, described interchangeability of parking spaces at public rest areas and commercial truck stops and travel plazas for meeting parking demand. The evidence indicated that truck drivers valued public rest areas primarily for ease of access and convenience and valued truck stops for their amenities. This differentiation suggested that, although the two types of parking spaces considered in this study are interchangeable in theory, in practice, some drivers preferentially choose one type of parking space over another.

4.0 ANALYSIS OF COMMERCIAL TRUCK PARKING SUPPLY AND DEMAND

4.1 INTRODUCTION

The methodology used to analyze where shortages exist or are expected to exist involved a four-step process. First, estimates of parking demand over roadway segments were developed using the demand modeling approach described earlier. Second, estimates of parking supply were gathered for each segment using the data sources discussed previously. Third, a summary of the supply and demand for each roadway segment was provided to partners for review, verification, and comment. The partners provided important feedback to account for the knowledge and experience of the local traffic parameters used to estimate parking supply and demand, and this feedback was used to further refine the demand model. Fourth, final calibration of the demand model was completed, and the results of analyses based on this final calibration were used in this report.

Note that the results of these analyses were meant to assist in developing strategies and plans to reduce or better manage any shortages. The information provided was not intended to provide a sufficient level of detail to define the specific location and quantity of truck parking spaces required at any particular location. Design level detail required to complete this type of needs assessment was not practical within the time frame and resources of this study. However, the supply and demand information provided at the corridor level did fulfill the goal of identifying system-level problems and needs that can serve as the basis for the formulation of policy alternatives and the conduct of more detailed study at a later time. In fact, many of the partners used the supply and demand results described above for exactly this purpose.

4.2 DETERMINING CURRENT LEVEL OF OVERCROWDING

The analysis for overcrowding compared the demand and supply results described in the previous sections by examining the ratio of estimated parking space demand (from the demand model) and parking space supply (from the supply survey). This ratio was labeled the Demand/Supply Ratio. A value significantly less than 1 indicates that the demand for spaces is less than the supply (i.e., there is a surplus of spaces). A value significantly greater than 1 indicates that the demand for spaces is greater than the supply (i.e., there is a shortage of spaces), and a value near to 1 indicates that demand nearly equals supply (i.e., there are sufficient, but not a surplus of, spaces). Table 7 lists the values used to classify parking space utilization in this analysis.

Table 7. Threshold values used to classify parking space utilization

Demand/supply ratio	Parking space utilization
Less than 0.9	Surplus spaces
0.9 to 1.1	Sufficient spaces
Greater than 1.1	Shortage of spaces

4.3 NATIONAL SUMMARY OF OVERCROWDING

The Demand/Supply Ratio and the classification method described above were used to evaluate the overall degree of truck parking space utilization for each State by comparing the total demand and total supply for the State. The results of the State-by-State analysis are listed in Table 8.

Table 8. Evaluation of parking shortages: State-by-State analysis

State	Public Spaces		Commercial Spaces		Total Spaces	
	Ratio	Category	Ratio	Category	Ratio	Category
Alabama	2.29	Shortage	0.79	Surplus	0.93	Sufficient
Alaska ¹	0.05	Surplus	N/A	N/A	N/A	N/A
Arizona	1.88	Shortage	0.43	Surplus	0.53	Surplus
Arkansas	5.20	Shortage	0.79	Surplus	0.99	Sufficient
California	4.10	Shortage	2.03	Shortage	2.29	Shortage
Colorado	4.55	Shortage	0.94	Sufficient	1.15	Shortage
Connecticut	1.71	Shortage	1.66	Shortage	1.67	Shortage
Delaware	2.94	Shortage	2.14	Shortage	2.28	Shortage
Florida	0.99	Sufficient	0.77	Surplus	0.81	Surplus
Georgia	1.88	Shortage	0.64	Surplus	0.75	Surplus
Idaho	3.00	Shortage	1.25	Shortage	1.44	Shortage
Illinois	2.63	Shortage	1.16	Shortage	1.33	Shortage
Indiana	1.77	Shortage	0.99	Sufficient	1.10	Shortage
Iowa	0.86	Surplus	0.44	Surplus	0.50	Surplus
Kansas	1.24	Shortage	0.44	Surplus	0.51	Surplus
Kentucky	2.23	Shortage	1.03	Sufficient	1.17	Shortage
Louisiana	9.32	Shortage	0.75	Surplus	0.96	Sufficient
Maine	1.81	Shortage	0.55	Surplus	0.66	Surplus
Maryland	2.01	Shortage	0.87	Surplus	1.00	Sufficient
Massachusetts	6.16	Shortage	1.51	Shortage	1.83	Shortage
Michigan	0.81	Surplus	0.69	Surplus	0.72	Surplus
Minnesota	1.63	Shortage	0.65	Surplus	0.75	Surplus
Mississippi	2.93	Shortage	0.60	Surplus	0.73	Surplus
Missouri	4.28	Shortage	0.72	Surplus	0.89	Surplus
Montana	1.18	Shortage	0.50	Surplus	0.58	Surplus
Nebraska	0.95	Sufficient	0.30	Surplus	0.35	Surplus
Nevada	2.62	Shortage	0.46	Surplus	0.57	Surplus
New Hampshire	0.84	Surplus	0.35	Surplus	0.40	Surplus
New Jersey	0.69	Surplus	0.41	Surplus	0.45	Surplus
New Mexico	15.62	Shortage	0.65	Surplus	0.83	Surplus
New York	1.43	Shortage	0.87	Surplus	0.95	Sufficient
North Carolina	1.98	Shortage	0.58	Surplus	0.69	Surplus
North Dakota	0.72	Surplus	0.31	Surplus	0.36	Surplus
Ohio	2.35	Shortage	0.96	Sufficient	1.12	Shortage
Oklahoma	1.41	Shortage	0.37	Surplus	0.45	Surplus
Oregon	1.89	Shortage	0.67	Surplus	0.79	Surplus
Pennsylvania	1.82	Shortage	0.54	Surplus	0.65	Surplus
Rhode Island	0.63	Surplus	1.35	Shortage	1.07	Sufficient
South Carolina	1.55	Shortage	0.50	Surplus	0.59	Surplus
South Dakota	0.54	Surplus	0.50	Surplus	0.51	Surplus
Tennessee	1.58	Shortage	0.63	Surplus	0.74	Surplus
Texas	12.70	Shortage	1.18	Shortage	1.49	Shortage
Utah	1.64	Shortage	0.53	Surplus	0.62	Surplus
Vermont	0.15	Surplus	0.20	Surplus	0.19	Surplus
Virginia	2.16	Shortage	0.80	Surplus	0.93	Sufficient
Washington	1.79	Shortage	1.02	Sufficient	1.14	Shortage
West Virginia	0.92	Sufficient	0.92	Sufficient	0.92	Sufficient
Wisconsin	0.97	Sufficient	0.35	Surplus	0.41	Surplus
Wyoming	0.56	Surplus	0.39	Surplus	0.42	Surplus

¹The supply of parking spaces at commercial truck stops and travel plazas was not determined for Alaska.

The results of this State-by-State analysis are summarized in Table 9. A total of 35 States were classified as having a shortage of parking spaces in public rest areas, while only 8 States had this classification for commercial truck stops and travel plazas. When considering total parking space demand and supply, which is appropriate if one assumes interchangeability in the use of public and private parking spaces, 12 States were classified as having a shortage of parking spaces.

Table 9. Evaluation of current parking shortages: National summary

Parking utilization	Number of states		
	Public parking	Commercial parking	Total parking
Surplus of spaces	10	34	29
Sufficient spaces	4	6	8
Shortage of spaces	35	8	12
Total	49	48 ¹	49

¹ Alaska did not report on the number of parking spaces available at commercial truck stops and travel plazas.

Nationally, the greatest shortages appear to be in the Northeast and the Midwest. Shortages also appear to be greater on non-Interstate highways, where the estimated National demand of 9,643 for public spaces far outstrips the estimated supply of 2,853 spaces, the estimated demand of 32,284 for private spaces also outstrips the estimated supply of 24,002 spaces.^d

The demand model was also used to estimate demand for commercial vehicle parking 20 years into the future based on State estimates for the increase in truck volume during that period, and the resulting estimates were used to calculate an estimated annual growth rate in the demand for truck parking. These estimates project an average growth rate of 2.7 percent, with rates for individual States varying from 0.5 to 4.4 percent. For comparison, the annual growth in supply of parking spaces at public rest areas is estimated at 1 percent, and the growth at commercial truck stops and travel plazas is estimated at 6.5 percent.

4.4 RESULTS FROM THE DRIVER SURVEY

Several hundred drivers provided written and verbal comments, both solicited and unsolicited, regarding the availability of truck parking. Overwhelmingly, drivers remarked that there are not enough parking spaces at public rest areas or commercial truck stops and travel plazas. Drivers complained of a lack of parking availability particularly in the overnight hours. Drivers also reported that more parking is needed near metropolitan areas and in certain regions of the country (e.g., Northeast, Southern California, Northwest).

Drivers were asked how frequently they encounter available parking at public and private truck parking facilities (Table 10). Among the overall sample, only 11 percent of respondents indicated that they frequently or almost always find available parking at public rest areas and only about one-third of respondents reported that they frequently or almost always find available parking at commercial truck stops. Nearly 90 percent of respondents indicated that they only sometimes, rarely, or almost never find available parking at public rest areas. While two-thirds

^d In the case of non-Interstate highways, greater access to other sources of public and private parking spaces may help offset some of the apparent shortage.

reported that they only sometimes, rarely, or almost never find available parking at commercial truck stops.

Table 10. Frequency with which drivers find available parking at public rest areas and commercial truck stops

Type of Facility	Percent of Respondents				
	Almost Never	Rarely	Sometimes	Frequently	Almost Always
Public Rest Areas	14%	34%	41%	9%	2%
Commercial Truck Stops	4%	12%	51%	25%	9%

Drivers also had the opportunity to rate how often their next stop (e.g., shipper or receiver) has available parking. The most frequently reported response (by 40 percent of sample) was that sometimes their next stop has available parking. Thirty-seven percent of drivers reported that their next stop has available parking rarely or almost never. Twenty-three percent indicated that their next stop has available parking frequently or almost always.

4.5 SUMMARY AND CONCLUSIONS

This section has presented the results of a National comparison of parking supply and demand, which indicates that a shortage of parking at public rest areas may exist in up to 35 States and a shortage of total parking may exist in up to 12 States. Shortages of parking at commercial truck stops and travel plazas are less common and, to the extent they are interchangeable, may offset shortages in parking at public rest areas.

This imbalance in parking availability is underscored by the results of the driver survey. Drivers were asked how frequently they encounter problems in obtaining parking spaces at public and commercial truck parking facilities. Nearly 50 percent of the respondents indicated that parking is rarely or almost never available at public rest areas. Approximately 15 percent reported parking is rarely or almost never available at commercial truck stops and travel plazas.

It is estimated that the demand for truck parking spaces will continue to grow at an average rate of 2.7 percent nationally, creating new demand for parking at both public rest areas and commercial truck stops and travel plazas. While estimates of the growth rate of parking spaces at commercial truck stops and travel plazas will accommodate the increased demand for private parking, the increased demand for public parking will exacerbate the supply shortages already apparent for public parking unless either (a) additional public spaces are made available or (b) steps are taken to encourage drivers to better utilize the existing supply of private spaces. The following section contains recommendations developed by various State partners to address these current and future shortages.

5.0 ACTIONS TO REDUCE SHORTAGES

5.1 INTRODUCTION

This section begins with a summary of the results of the Rest Area Forum that FHWA hosted to identify issues and find solutions to provide adequate safe parking for commercial drivers and their vehicles. Next, the section outlines recommendations suggested by a number of stakeholder groups to capture specific positions that will help form an implementation agenda. In addition, the section describes actions proposed by partners to reduce commercial truck parking shortages identified by the preliminary demand/supply analysis results in their States. This information will serve as the basis for continuing dialog among the stakeholder community to address this problem. It is expected that the information provided from this study, as well as from previous efforts, will provide a sufficient level of detail to identify specific forward-moving actions.

5.2 REST AREA FORUM

On June 29-30, 1999, FHWA hosted a 2-day Rest Area Forum in Atlanta, Georgia. More than 70 representatives from State DOTs and enforcement agencies, the motor carrier industry, commercial drivers, private truck stop operators, safety advocates, and other interested stakeholders participated in the Forum, which was intended to address the following objectives:

- Review issues surrounding the provision of parking for commercial drivers by both States and commercial truck stop operators.
- Describe and document success stories and best practices.
- Consider means to provide real-time information on the availability of parking spaces and information on driver fatigue.
- Identify actions and initiatives, including legislative and funding, that could be undertaken to address parking shortages.

A number of issues were identified by Forum participants, and recommendations were developed for the seven highest ranked issues (not presented in any ranked order):

- Improve safety and security at public rest areas and commercial truck stops.
- Provide low-interest loans, tax incentives, and public-private partnerships to support commercial truck stops (i.e., meet parking space demand through the private sector).
- Use alternative parking sites such as weigh stations and park-and-ride lots.
- Improve the provision and location of public rest areas and commercial truck stops (e.g., spacing standards between parking areas).
- Improve financial support for improving and expanding public rest areas, and make this a safety-related issue.

- Eliminate time limits on parking at public rest areas. Alternatively, enforce time limits to increase the availability of spaces at public rest areas.
- Increase driver education and information on causes of fatigue and on the availability and location of available parking spaces.

These recommendations served as a resource for identifying a number of questions that were included in the survey.⁽¹⁾ It is interesting to note that the findings of the current study, which draws upon a significantly larger (and different) population than that included in the Rest Area Forum, are consistent with and support these recommendations. The Rest Area Forum report also noted that the recommendations developed were not necessarily consensus recommendations, and that various stakeholders disagreed on approaches to addressing shortages of commercial vehicle parking spaces. The results of the current study support this lack of consensus, in particular on the issue of whether parking space shortages should be addressed by expanding public rest areas or relying on the private sector to meet demand.

5.3 STAKEHOLDER INTERVIEWS

Thirteen National stakeholder groups representing the enforcement community, the motor carrier industry, truck rest stop operators, shippers and receivers, and the safety community were contacted to provide specific recommendations on how to reduce commercial truck parking shortages. Each of these groups shares a common desire to solve the truck-parking problem, but provides a different viewpoint on the best approach to solve this problem. These viewpoints and the corresponding recommendations can be summarized as follows:

- The trucking industry should have the primary responsibility for ensuring that adequate parking is available for commercial vehicles. The truck-stop industry provides adequate parking to meet the needs of most professional drivers. Where those needs are not being met, the trucking industry should look for alternative parking options by setting schedules to use existing parking more efficiently, developing consortia to locate available parking in areas where existing parking is deemed inadequate, and working with shippers and receivers to allow parking at those facilities. This position is supported most strongly by stakeholders representing truck rest stop operators.
- The government should have a significant responsibility to provide parking spaces for commercial vehicles. Funding for parking spaces at public rest areas should be increased. Improved access to parking at public facilities should be provided by (a) removing parking restrictions at existing public rest areas, (b) designating more spaces for truck parking only, (c) opening other facilities (e.g., inspection and weigh stations, park-and-ride facilities) to truck parking during off-hours or non-peak periods of demand, and (d) communicating information about space availability and locations to drivers (e.g., through the use of variable message signs, brochures, telephone messages, and the Internet). This position is supported most strongly by stakeholders representing the motor carrier industry and the safety community.
- Both the trucking industry and the government should participate to ensure adequate parking for commercial vehicles is available. In addition to the ideas listed in the previous two

paragraphs, the Federal Government should mandate the use of highway funds to construct public rest area facilities where a need for such facilities is demonstrated. In addition, public-private partnerships could be used to build new parking spaces either by providing low-interest loans or State-owned land for construction of new parking spaces. This position is supported most strongly by stakeholders representing shippers and receivers and, to a lesser degree, the safety community.

5.4 ACTIONS RECOMMENDED BY STATE PARTNER GROUPS

Partners provided a set of recommended actions to solve any parking shortfalls that have been identified either through this study or as a result of other similar studies conducted in recent years for their States. These actions fall into six broad categories, as listed below:

- Expand or improve public rest areas.
- Expand or improve commercial truck stops.
- Encourage the formation of public-private partnerships.
- Educate or inform drivers about available spaces.
- Change parking enforcement rules.
- Conduct additional studies.

Table 11 summarizes the actions that have either recently been completed or are currently being implemented in each State. Table 12 summarizes the actions by each State partnership for future implementation. The most frequently mentioned action was to improve or expand public rest areas. The next most frequently mentioned action was to improve or expand commercial truck stops.

5.5 ACTIONS TO EXPAND OR IMPROVE PUBLIC REST AREAS

A number of States expressed a desire to expand or improve the public rest area facilities as a strategy to increase the availability of parking for trucks. For example, 37 States have expressed a desire to expand their facilities at some point in the future. A total of 15 States stated that they have firm plans to provide additional parking spaces, while 11 of these States provided a specific number of spaces for a total increase of 1,609 spaces at public facilities over the next 5 years, which is 5.1 percent of the 31,249 current spaces. Additional recommendations follow:

- Construct new public rest area facilities with additional truck parking spaces. Consider developing truck-only parking facilities. Raise the priority of public rest area construction by making it a safety-related issue.
- Add new truck spaces to existing public rest areas as part of scheduled rest area reconstruction or rehabilitation. Redesign and reconfigure rest areas to increase parking and improve commercial vehicle circulation through the lot. Also, convert parallel parking to pull-through parking for added driver convenience.
- Convert closed public rest areas into parking facilities, and consider designating these facilities for truck-parking only.

- Investigate the use of Federal funds for maintaining public rest areas. Explore alternative financing of public rest area construction. Develop pilot projects for generating revenue to keep public rest areas open.
- Partner with other State agencies such as the Department of Tourism to incorporate truck parking needs in the development of new tourist information sites.
- Review and expand security at public rest areas by providing call boxes, cameras, increased law enforcement, etc.
- Identify locations where commercial vehicle parking can be combined with Ports-of-Entry, weigh stations, or police substations. Consider exempting trucks from enforcement actions to encourage the use of these sites for parking by fatigued drivers.

Table 11. Summary of recent or current actions pursued by State partners

State	Expand public facilities	Expand private facilities	Foster partnerships	Improve information	Enforcement changes	Additional studies	Rely on private sector
Alabama							
Alaska							
Arizona	✓	✓					
Arkansas	✓	✓	✓	✓			
California	✓	✓		✓			
Colorado	✓	✓					
Connecticut	✓						
Delaware							✓
Florida	✓	✓					
Georgia	✓	✓		✓			
Idaho	✓	✓	✓	✓			
Illinois	✓	✓		✓			
Indiana			✓	✓			
Iowa	✓	✓					
Kansas							
Kentucky	✓						
Louisiana	✓	✓		✓			
Maine						✓	
Maryland	✓			✓			
Massachusetts						✓	
Michigan						✓	
Minnesota							
Mississippi	✓						
Missouri	✓	✓	✓	✓			
Montana	✓		✓				
Nebraska	✓						
Nevada	✓	✓		✓			
New Hampshire							
New Jersey						✓	
New Mexico	✓						
New York						✓	
North Carolina	✓			✓	✓	✓	✓
North Dakota							
Ohio	✓	✓			✓		
Oklahoma							
Oregon	✓			✓			✓
Pennsylvania	✓			✓			
Rhode Island	✓	✓		✓			
South Carolina	✓						✓
South Dakota							
Tennessee	✓	✓					
Texas	✓						✓
Utah							
Vermont	✓						
Virginia	✓	✓		✓			
Washington	✓						
West Virginia						✓	
Wisconsin	✓	✓	✓	✓		✓	
Wyoming	✓			✓	✓		✓

Table 12. Summary of future actions recommended by State partners

State	Expand public facilities	Expand private facilities	Foster partnerships	Improve information	Enforcement changes	Additional studies
Alabama						
Alaska						
Arizona	✓	✓				
Arkansas	✓	✓	✓	✓		
California	✓	✓		✓		
Colorado	✓	✓				
Connecticut	✓					
Delaware	✓				✓	
Florida	✓	✓				
Georgia	✓	✓		✓		
Idaho	✓	✓	✓	✓		
Illinois	✓	✓				
Indiana	✓		✓	✓		
Iowa	✓					
Kansas						
Kentucky	✓					
Louisiana	✓	✓		✓		
Maine						✓
Maryland	✓			✓		
Massachusetts	✓					
Michigan						
Minnesota						
Mississippi	✓					
Missouri	✓	✓	✓	✓		
Montana	✓					
Nebraska	✓					
Nevada	✓	✓		✓		
New Hampshire						
New Jersey						✓
New Mexico	✓					
New York						✓
North Carolina	✓			✓	✓	
North Dakota	✓					
Ohio	✓	✓				
Oklahoma						
Oregon	✓			✓		
Pennsylvania	✓			✓		
Rhode Island	✓			✓		
South Carolina	✓					
South Dakota	✓					
Tennessee	✓	✓				
Texas	✓					
Utah						
Vermont	✓					
Virginia	✓	✓		✓		
Washington	✓					
West Virginia						✓
Wisconsin	✓	✓	✓	✓		✓
Wyoming	✓			✓	✓	

- Construct turnouts in rural sections of Interstate for highway parallel parking by commercial trucks.
- Upgrade facilities currently closed during off-season to be open year round.
- Improve geometric design at interchanges to increase convenience to drivers choosing to exit. For example, increase turning radii, widen narrow bridges, place traffic signals where warranted, and add turning lanes to ease access to and egress from commercial truck stops.

5.6 ACTIONS TO EXPAND OR IMPROVE COMMERCIAL TRUCK STOPS

A number of States believe the best solution to providing additional commercial truck parking along overcrowded corridors is to let the commercial truck stop industry continue to construct the required spaces. Growth estimates provided by the NATSO Foundation point out that the number of private spaces has increased by an average of 6.5 percent per year over the last 2 years. If this rate continues, much of the private demand can be accommodated by the anticipated growth in private spaces.

5.7 ACTIONS TO ENCOURAGE THE FORMATION OF PUBLIC-PRIVATE PARTNERSHIPS

Several States recommended the formation or promotion of public-private partnerships to expand the number of parking spaces available for use by commercial trucks. These suggestions included the following:

- Create working groups between the public and private sectors to develop new parking and explore options to overcome barriers to cooperation.
- Work with the private sector to redevelop or construct new public rest areas with direct access to the interstate.
- 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 to lease or maintain lot.
- 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).

5.8 ACTIONS TO EDUCATE OR INFORM DRIVERS ABOUT AVAILABLE SPACES

A number of States recommended developing information sources or infrastructure that will better inform or educate drivers about the availability of parking. States suggest that the Intelligent Transportation System infrastructure may provide real-time information on the availability of parking to drivers. In addition, States suggested that drivers be informed of the importance of complying with hours-of-service rules to encourage fatigued drivers to pull off the road. Specific recommendations offered by the States include the following:

- Educate drivers on the safety benefits of rest and encourage them to use available spaces. For example, provide safety information (e.g., through brochures and public service announcements) to both drivers and trucking companies about the relationship between driver fatigue and accidents to encourage fatigued drivers to get off the road.
- Develop Intelligent Transportation System deployments that provide drivers with real-time information on the location and availability of parking spaces. For example, investigate using cell telephones and radio frequencies to broadcast parking locations and their availability to drivers.
- Investigate using mailings related to credentials administration for the International Registration Plan and the International Fuel Tax Agreement as a means to distribute information on the location and type of parking spaces within the base State to participating motor carriers.
- Publish and distribute a “truckers map” that pinpoints parking facilities for drivers.
- Initiate a program that informs drivers of State-approved parking facilities. Such facilities may have security, lighting, and other services that will encourage drivers to use existing spaces.
- Use both static and real-time signage to provide drivers with information about availability and location of public and private parking spaces.

5.9 ACTIONS TO CHANGE PARKING ENFORCEMENT RULES

Changes in parking regulations and other development-related regulations were recommended by several States. These included the following:

- 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 facilities in or near their community industrial and business parks (i.e., zoning). The “Not in My Back Yard” syndrome has made it difficult to gain this local support. This issue has become a major problem for developing new commercial truck stops and public rest area facilities near the boundaries of larger cities.
- Encourage better recognition or credit and tax incentives for companies and terminal operators who provide “truck staging area” facilities for pick-up and delivery activities with 24-hour access, parking, sanitation, and security. This could be promoted at both the State and National level.
- Promote building requirements for future warehouse and delivery facilities to incorporate truck parking and staging facilities as part of their development/building permit process. Encourage public/private partnerships to fund or offset these increased costs. This could be promoted at both the State and local level.

5.10 ACTIONS TO CONDUCT ADDITIONAL STUDIES

Several States recommended more detailed follow-up studies to refine the results emerging from this effort and to develop more detailed strategies targeted at specific locations.

One State will be pursuing more detailed truck parking supply and demand studies at the State and regional levels on specific heavily traveled truck corridor highways. The methodology used for the national study will be modified. Field interviews with truckers could be added to make the results of these studies more useful as planning tools for developing measures to address identified parking problems.

Another State suggested that a multi-State committee be established to evaluate alternatives and recommend solutions that would address “on-time deliveries.” Many States noted that truck parking demand at certain locations is a reflection of trucks “staging” to provide “just-in-time” delivery.

5.11 SUMMARY AND CONCLUSIONS

State partners recommend the implementation of several types of strategies to expand or better manage parking for vehicles to comply with Federal hours-of-service rules. These actions include expanding or improving public rest areas, expanding or improving commercial truck stops, encouraging the formation of public-private partnerships, educating or informing drivers about available spaces, changing enforcement rules, and conducting additional studies.

6.0 SUMMARY AND RECOMMENDATIONS

Each year there are over 41,000 highway fatalities in the United States and over 5,000 of these fatalities occur in crashes involving commercial motor carriers. The FMCSA has estimated that driver fatigue is a primary factor in 4.5 percent of large truck-involved crashes and a secondary factor in an additional 10.5 percent of large truck-involved crashes. Currently, the US DOT has a safety goal of reducing highway-related fatalities and injuries by 20 percent over 10-year period ending in 2008. The FMCSA has an additional goal of reducing the number of large truck involved fatalities by 50 percent over a 10-year period ending in 2009. If we are to meet these ambitious goals, aggressive steps must be taken to eliminate significant crash causation factors. Clearly, inadequate rest by truck drivers is one such factor and the availability of safe places to obtain needed rest must be addressed as part of a comprehensive safety agenda.

Current Federal hours-of-service rules are very specific about the number of hours that truck drivers may operate a vehicle before they must rest. Most truck drivers depend on parking facilities, at both commercial truck stops and travel plazas and public rest areas, to obtain needed rest. However, it is not clear that an adequate number of parking spaces exist in all States or along certain high truck volume corridors.

Section 4027 of the Transportation Equity Act for the 21st Century (TEA-21) requires:

...a study to determine the location and quantity of parking facilities at commercial truck stops and travel plazas and public rest areas that could be used by motor carriers to comply with Federal hours-of-service rules. The study shall include an inventory of current facilities serving the NHS, analyze where shortages exist or are projected to exist, and propose a plan to reduce the shortages.

This report, which has been prepared in cooperation with research entities representing motor carriers, the travel plaza industry, and commercial motor vehicle drivers, presents the findings of the Section 4027 study. The results of the analyses, described in Sections 2.0 through 5.0 of this report, have been abstracted in the Executive Summary.

Recognizing the wide range of concerned stakeholders on the issue of parking facilities that could be used by motor carriers to comply with Federal hours-of-service rules, the significant role of commercial truck stops and travel plazas in supplying the vast majority of parking spaces (approximately 90 percent nationwide), and the 23 U.S.C. delegation of decision making on public rest areas to the State level, FHWA worked through its division offices in each State to engage public and private-sector stakeholders (Partners for Adequate Parking Facilities) as they deemed appropriate to address Section 4027 study requirements. Each State, excepting Hawaii and the District of Columbia (exempted), developed and/or reviewed parking demand and supply estimates and, where warranted, developed action items for addressing identified parking shortages. The results indicate truck-parking shortages are non-existent or corridor specific in some States, but more severe and pervasive in other States and regions.

Plans for addressing shortages should match the geographic scale of the shortage, i.e., corridor-specific, Statewide, or regional. The commercial truck stop and travel plaza industry, State

highway agencies, and turnpike authorities, should and will continue to be principal suppliers of parking facilities. Within current legislative authority, the appropriate role for the US DOT (FHWA and FMCSA) is to facilitate continuing dialogue among and actions by parking suppliers, commercial vehicle drivers and the motor carrier industry, and other concerned stakeholders, the goal of which is to foster appropriate cross-jurisdictional strategies and actions to reduce shortages. Looking toward reauthorization, it is also appropriate to consider recommending changes in authority whereby the USDOT could expand its role in ways recommended by stakeholders.

In May 2001, the National Energy Policy, a Report of the National Energy Policy Development Group, recommended:

“The NEPD [National Energy Policy Development] group recommends that the President direct the EPA and DOT to develop ways to reduce demand for petroleum transportation fuels by working with the trucking industry to establish a program to reduce emissions and fuel consumption from long-haul trucks at truck stops by implementing alternatives to idling, such as electrification and auxiliary power units at truck stops along interstate highways, EPA and DOT will develop partnership agreements with trucking fleets, truck stops, and manufactures of idle-reducing technologies (e.g., portable auxiliary packs, electrification) to install and use low-emission-idling technologies.”

The National Energy Policy puts a new and national emphasis on addressing energy-efficient solutions to truck parking, though specific recommendations in that area were beyond the scope of this effort.

Recommendations

Plans for addressing parking shortages should match the geographic scale of the shortage, i.e., area-specific, Statewide, or regional. The commercial truck stop and travel plaza industry, State highway agencies, and turnpike authorities, should and will continue to be principal suppliers of parking facilities. Public rest areas along the NHS were never intended and will never be sufficient to accommodate truck-parking demand. The major responsibility for providing parking for commercial vehicles should remain with private industry. States should continue to provide public rest areas to address short-term rest needs. The recommendations which follow are categorized into four groups: Recommendations for States, Recommendations for the Federal Government, Technology Recommendations and Recommendations for Federal Surface Transportation Reauthorization.

Recommendations for States

During the course of this study, individual States drafted plans for addressing truck parking shortages. These individual State action plans are the core strategy for reducing parking shortages. As detailed in Chapter 5 of this report, States’ proposed actions fall into six broad categories:

- Expand or improve public rest areas.

- Expand or improve commercial truck stops and travel plazas.
- Encourage the formation of public-private partnerships.
- Educate or inform drivers about available spaces.
- Change parking enforcement rules.
- Conduct additional studies.

The FHWA, in cooperation with FMCSA, will work with their State partners to maintain, and refine where necessary, the States' plans, at a level appropriate to the current adequacy of available parking in the State, i.e.:

- In States where a surplus of parking is currently available at both public rest areas and commercial truck stops and travel plazas, FHWA and FMCSA will continue to work with them to review and update as needed their Statewide Rest-Area Plan, consistent with AASHTO's 2001 *Guide for Development of Rest Areas on Major Arterials and Freeways* and corresponding sections of FHWA's *Federal-Aid Program Guide*.
- In States where a shortage of parking at public rest areas and/or commercial truck stops and travel plazas is currently estimated, FHWA and FMCSA will work with them to refine (where necessary), periodically update, and monitor implementation of the plan each State drafted as part of the Final Status Report under the Section 4027 study.

Recommendations for the Federal Government

Within current legislative authority, the appropriate role for the US DOT (FHWA and FMCSA) is to facilitate a continuing dialogue among and actions by parking suppliers, commercial vehicle drivers and the motor carrier industry, and other concerned stakeholders (States, local governments, and others), the goal of which is to foster appropriate cross-jurisdictional strategies and actions to reduce shortages.

The FHWA, in cooperation with FMCSA, will facilitate continuing a dialogue among parking stakeholders to address the adequacy of parking. In addition to the reports produced under this study, resource materials to stimulate the dialogue will include the synthesis on "Dealing with Truck Parking Demands" being prepared under NCHRP Project 20-5, Topic 32-01.

The FHWA, in cooperation with FMCSA, will hold regional meetings to:

- Identify NHS corridors where regional (i.e., multi-State) strategies would be most effective.
- Develop multi-stakeholder strategies to make most effective use of existing parking supply and future investment in additional supply. Multi-stakeholder strategies may involve a wide range of possible public-private, public-public, and private-private relationships along with possible innovative financing.

The FMCSA should facilitate discussions with shipper/receiver facilities, and port and railroad terminals regarding their role in providing parking to meet the needs of truck drivers serving their facilities.

To facilitate State programs/projects that encourage drivers' use of private truck parking facilities serving the NHS, FHWA should issue guidance, and as necessary change policy/program guidelines, to permit/encourage Federal funding for projects that improve the operational and safety aspects of interchanges and cross roads and enhance access to private truck facilities.

Technology Recommendations:

FHWA and FMCSA should consider initiatives to facilitate private-sector provision and truck-driver use of truck parking spaces at commercial truck stops and travel plazas serving the National Highway System, including improved information systems that facilitate truck drivers' use of private truck stops for their long-term parking requirements.

On a national level, the FHWA and FMCSA should investigate the feasibility of using Intelligent Transportation System (ITS) technology in the development and promotion of technology-based solutions to provide traveler information to truck drivers on available parking and other relevant matters (location of truck stops, weather, and congestion and delays).

Consistent with President Bush's National Energy Policy, FHWA and FMCSA should work with the EPA to promote the use of technology to provide more energy-efficient alternatives for truck parking.

Recommendations for Federal Surface Transportation Reauthorization:

In developing the Administrator's Federal Surface Transportation Reauthorization proposal, FHWA and FMCSA should consider a range of legislative and administrative policy/procedural changes including: permitting innovative financing (low-interest loans and grants); permitting commercialization/privatization of public rest areas on Interstate right of way and allowing States to use Federal-aid funds to operate and improve safety and security at public rest areas; allowing the development of an "oasis" signing standard for businesses along the NHS meeting appropriate criteria to be developed by FHWA, States and relevant stakeholders; permitting Federal-aid funds to be used for projects to build auxiliary public truck parking lots at private truck stops off the right of way; and prohibiting States from enacting or enforcing time restrictions on parking at public rest areas on Interstate/NHS right of way in the event drivers need to comply with Federal hours-of-service rules.

7.0 REFERENCES

- ¹ Rest Area Forum: Summary of Proceedings. FHWA-RD-00-034, December 1999.
- ² Science Applications International Corporation. *Study of Adequacy of Commercial Truck Parking Facilities*. Technical Report prepared for FHWA, FHWA-RD-01-158, February 2002.
- ³ Department of Transportation, Federal Motor Carrier Safety Administration. *49 CFR Parts 350, et al. Hours of Service of Drivers; Driver Rest and Sleep for Safe Operations; Proposed Rule*. Federal Register, May 2, 2000.
- ⁴ National Transportation Safety Board. *Factors that Affect Fatigue in Heavy Truck Accidents*. Safety Study NTSB/SS-95/01, 1995.
- ⁵ Trucking Research Institute, Apogee Research, Inc., and Wilbur Smith Associates. *Commercial Driver Rest & Parking Requirements: Making Space for Safety*. Washington, D.C.: FHWA Report Number FHWA-MC-96-0010, May 1996.
- ⁶ National Transportation Safety Board. *Truck Parking Areas*. Highway Special Investigation Report NTSB/SIR-00/01, May 2000.
- ⁷ Science Applications International Corporation and George Mason University. *Technical Guidance – TEA-21 Section 4027 Study of the Adequacy of Commercial Truck Parking Facilities Serving the National Highway System*. Report prepared for FHWA, Revised June 2000.
- ⁸ Science Applications International Corporation. *Commercial Vehicle Driver Survey: Assessment of Parking Needs and Preferences*. Technical Report prepared for the FHWA, April 2001.
- ⁹ Science Applications International Corporation. *Model Development for National Assessment of Commercial Vehicle Parking*. Technical Report prepared for FHWA, April 2001.
- ¹⁰ Wegmann, F. J., A. Chatterjee, and D. B. Clarke. *Truck Parking at Night Along Interstate Highways – Tennessee Experience*. Second International Truck and Bus Safety Symposium, Knoxville, Tennessee, October 1999.
- ¹¹ Iowa Department of Transportation. *Commercial Vehicle Parking*. Center for Transportation Research & Education Management Project 99-56, 1999.
- ¹² Metropolitan Planning Organization for the Baltimore Region Transportation Steering Committee, Baltimore, Maryland. Press release, “TSC’s Baltimore Region Freight Movement Task Unveils Sign to Help Truckers Find Overnight Truck Stops,” June 1999.