Minnesota Statewide Truck Parking Study

October 2019

DEPARTMENT OF TRANSPORTATION

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Executive Summary

For many years, truck parking availability has been a national concern within the freight industry. However, recent industry trends and federal policy changes have increased the visibility and significance of truck parking challenges—and have prompted action by both the public and private sectors. Some of the factors driving these challenges include significant increases in the number of trucks on the road, changes to the hours of service drivers are required to follow, stricter enforcement of the hours of service rules after the implementation of the electronic logging device mandate, and rising expectations for productivity and efficiency.

This study is designed to build a better understanding of how truck parking issues impact Minnesota and what potential solutions could be undertaken by the Minnesota Department of Transportation (MnDOT) and its private sector partners.

The study includes a desk scan of relevant truck parking research and analysis undertaken in Minnesota and across the nation (Chapter 2). The purpose of the desk scan was to develop an overall framework for this study and to build upon past work.

The study also includes a summary of stakeholder engagement efforts completed throughout the study (Chapter 3), the development of a comprehensive Minnesota truck parking database identifying the locations and quantities of public and private truck parking throughout the state (Chapter 4), an assessment of truck parking demand using truck GPS data from the American Transportation Research Institute (ATRI) (Chapter 5), the results of an on-site field survey (Chapter 6), and a summary of oversize-overweight and superload vehicle parking needs (Chapter 7).

Finally, the report concludes with a summary of Minnesota truck parking opportunities and solutions (Chapter 8) and truck parking investment recommendations (Chapter 9).

Figure i. Private Truck Parking

Investment Case for Truck Parking

Based on past experience and feedback previously provided by the Minnesota Truck Association, MnDOT developed a series of risk and safety scenarios that could develop from underinvestment in truck parking by the public and private sectors. While these scenarios are extreme, they are based on real events across the nation and underline the importance of truck parking along Minnesota's roadways.

Figure ii. Investment Case for Truck Parking

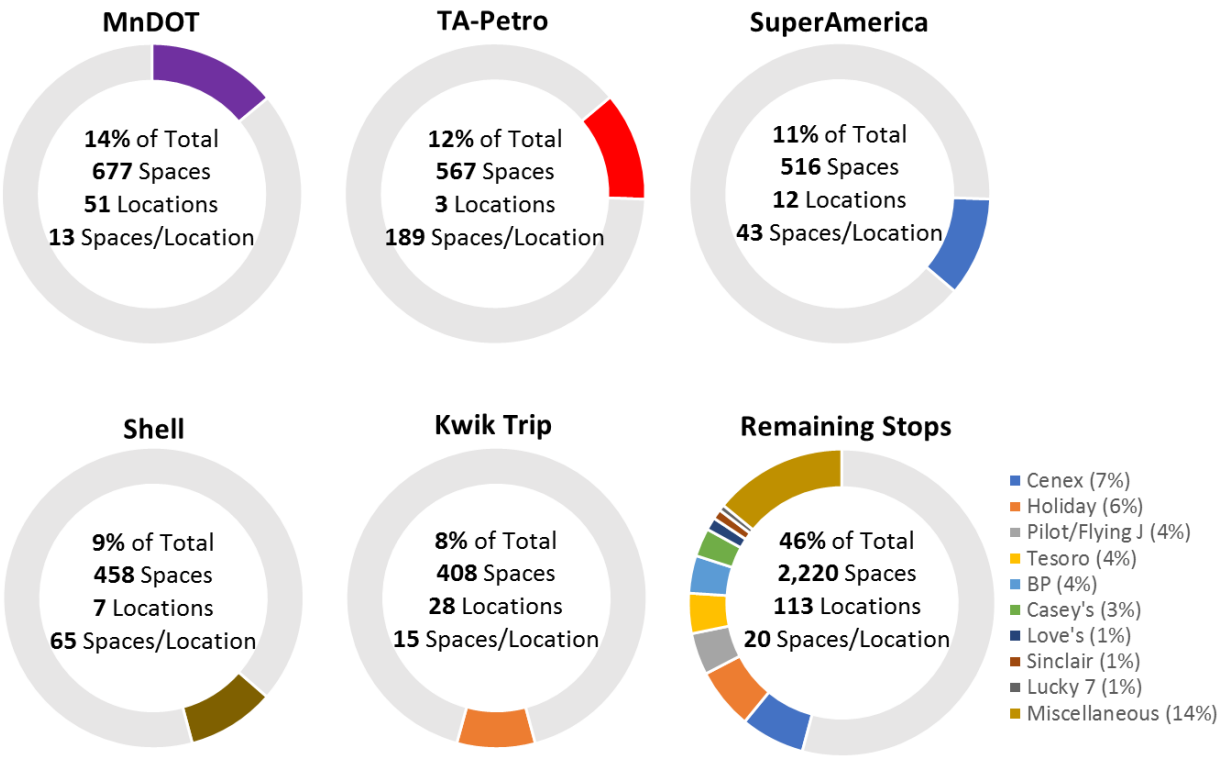
Truck Parking Locations and Capacity

To better understand the existing supply of truck parking throughout Minnesota, the study team developed a methodology that combined multiple sources of data to generate estimates of public and private truck parking capacity. The combination of data from these sources was used to estimate truck parking space counts for all truck stops (private and public) within the State of Minnesota. The results of this analysis will help project planners and policy makers gain a better understanding of the issues surrounding truck parking in Minnesota.

The data sources used in this analysis include:

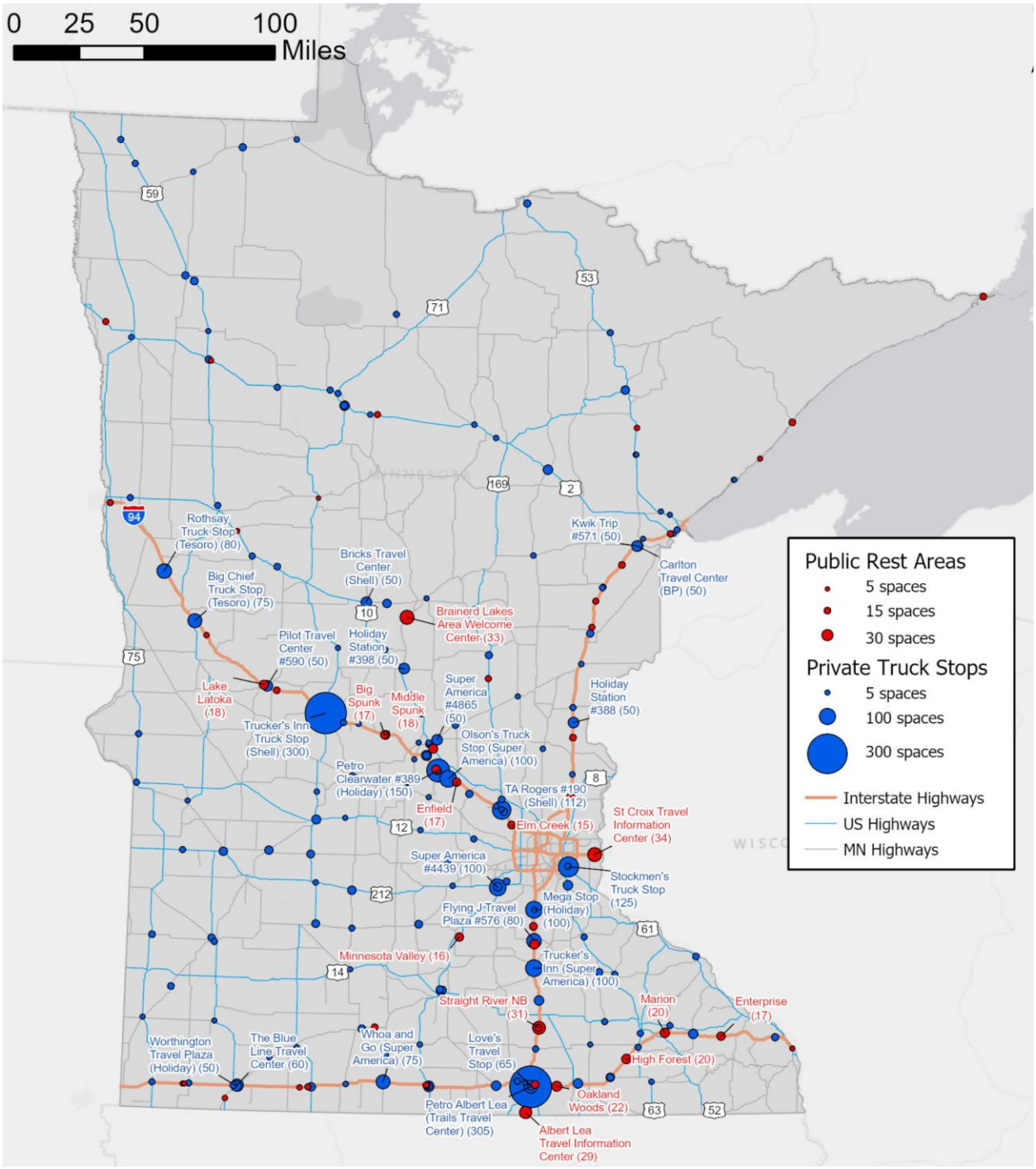
- Jason's Law Truck Parking Survey (2015)
- 2017 Trucker's Friend National Truck Stop Directory
- NATSO *Park My Truck* app
- TA-Petro's *TruckSmart* app
- Pilot-Flying J's *myPilot* app
- *Trucker Path* app

Figure iii. Minnesota Truck Parking Capacity by Provider



MnDOT is the largest singular provider of truck parking spaces in the state.

Figure iv. Minnesota Truck Parking Locations

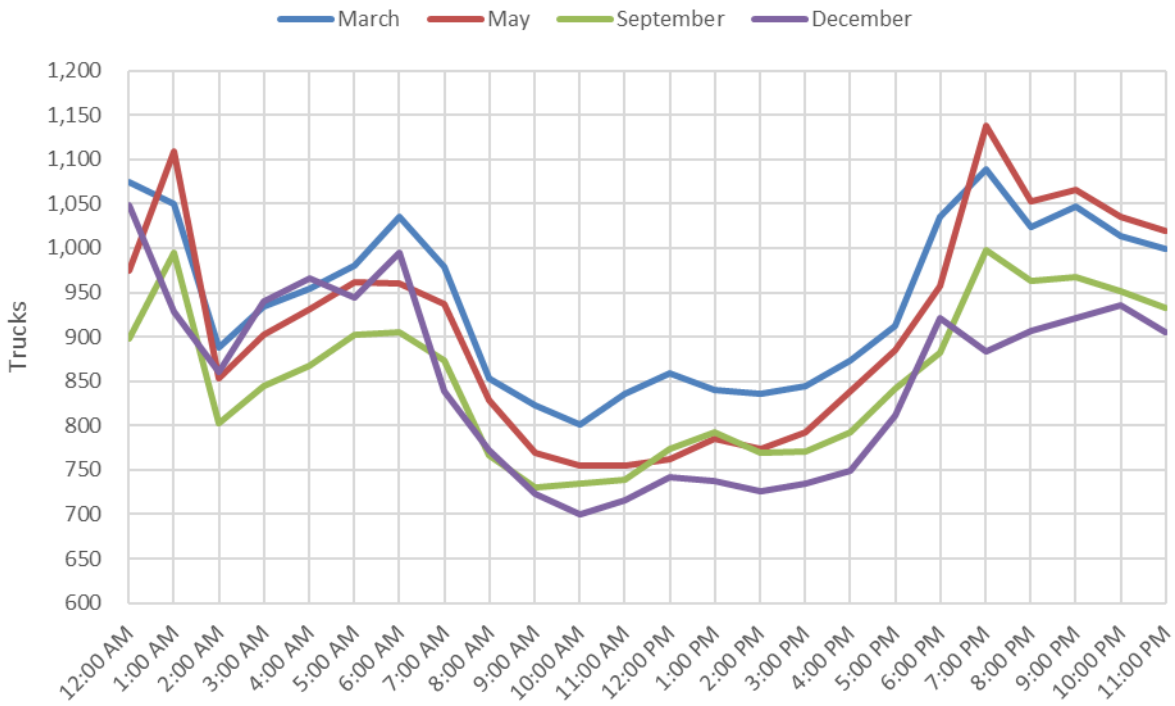


Source: SRF analysis of 2015 Jason's Law Survey, 2017 Trucker's Friend National Truck Stop Directory, NATSO Park My Truck app, TA-Petro TruckSmart app, Pilot-Flying J myPilot app and Trucker Path app data.

Truck Parking Demand

This study includes an assessment of truck parking demand by hour, by day, and by season. The primary data source used for this analysis is the American Transportation Research Institute's (ATRI) anonymized truck GPS dataset. This data was compared with the known truck parking capacity of a sample of 40 truck parking sites listed to identify instances where parking demand is near or exceeding capacity. This analysis helps to shed light on where truck parking demand is at its peak and will help to identify locations where additional truck parking capacity is needed.

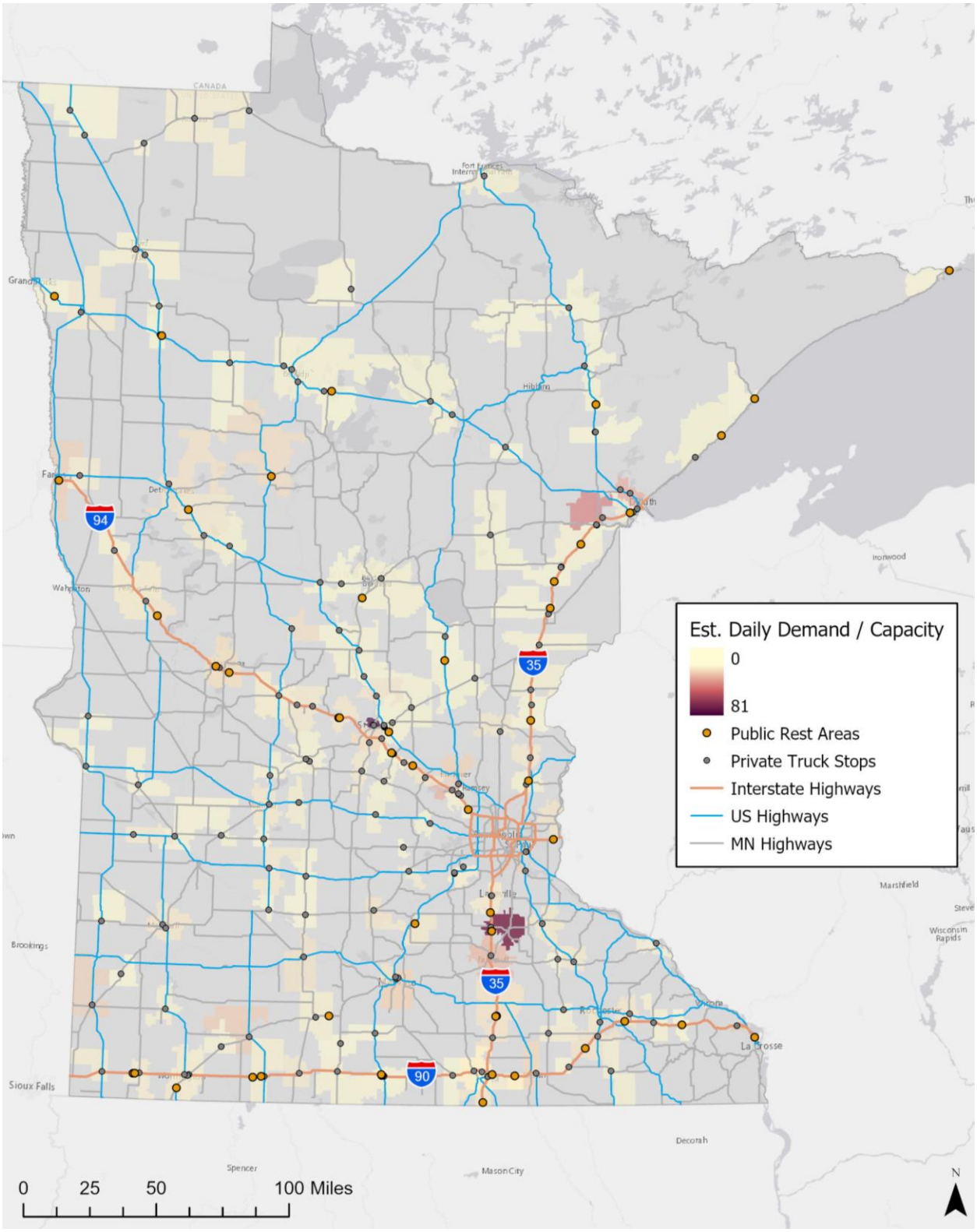
Figure v. Statewide Hourly Truck Parking Demand



Source: SRF Analysis of ATRI Data

This study also included an assessment of estimated zip-code level truck parking demand and utilization using StreetLight Insight data. This analysis compared the zip-code level truck parking demand to the existing zip-code level truck parking capacity throughout the state, based on the capacity calculated during the truck parking inventory development. The resulting ratio of demand to capacity identifies locations where truck parking demand greatly exceeds the available capacity and would benefit from capacity improvements.

Figure vi. Estimated Daily Truck Parking Demand vs. Capacity



Source: SRF analysis of Streetlight Insight data

Truck Parking Solutions and Opportunities

There is a clear public need and business case for increased truck parking in Minnesota. While previous efforts identified this challenge at a high-level, this study's more in-depth quantitative analysis—validated by stakeholder outreach and fieldwork—identified not only statewide demand figures, but location-specific parking needs.

This study directly addresses those needs with specific "solutions and opportunities" to help improve capacity and align existing truck parking supply with demand. These potential initiatives are grouped into three categories: Policy, Technology and Location-specific improvements. The study identifies potential solutions for urban truck parking challenges in the Twin Cities and develops two conceptual design/cost estimates for truck parking improvements at the Hansel Lake Rest Area and the Flying J outside of Northfield, MN.

Truck Parking Recommendations

The following recommendations provide an overarching roadmap designed to assist the public and private sectors (individually or collectively) solve Minnesota's truck parking challenges using the concepts developed in Chapter 4.

Figure vii. Truck Parking Recommendations

R

1. Introduction

For many years, truck parking availability has been a national concern within the freight industry. The issue is also faced by drivers in Minnesota. Recent industry trends and federal policy changes have increased the significance of truck parking challenges—and have prompted action by the public and private sectors. Among the driving factors:

- **More Trucks**: In the past ten years, overall tonnage carried by trucks increased 24 percent.
- **Hours of Service**: The Federal Motor Carrier Safety Administration (FMCSA) made significant changes to regulations limiting the number of consecutive hours a truck driver can drive. Although the changes have been modified somewhat, they still significantly impact the utilization of demand for truck parking facilities.
- **Electronic Logging Devices**: Moving Ahead for Progress in the 21st Century Act (MAP-21) mandated that trucking operations shift from a paper logbook to an electronic logbook that automatically logs a driver's activities based on the truck's operations. In general, the mandate has led to stricter enforcement of the hours of service (HOS) regulations.
- **Productivity Expectations**: Rising customer expectations for shorter delivery times and an increasingly cost competitive marketplace have placed pressure on truck drivers to push the limits of their HOS.

The combination of these factors often leaves truck drivers with a tough decision: Find a safe parking location before exhausting their HOS (and lose productivity) or to risk proceeding with uncertain parking expectations. If parking is unavailable when their hours elapse, drivers often park in unauthorized (and often unsafe) locations to maintain compliance.

However, this paradox does not just impact the trucking industry. These issues impact the safety of the general motoring public, local communities due to unauthorized parking, and the wasted productivity negatively impacts the economy.

Role of the Minnesota Statewide Truck Parking Study

This study is designed to build a better understanding of how truck parking issues impact Minnesota and what potential solutions could be undertaken by the Minnesota Department of Transportation (MnDOT) and its private sector partners. The study is a collaborative effort developed by the Office of Freight and Commercial Vehicle Operations with SRF and HDR, as well as guidance from an Advisory Committee which included input from the American Transportation Research Institute, the Minnesota Trucking Association, NATSO (representing travel plazas and truck stops), the FHWA, and other stakeholders. The overall approach to the study is data-driven and informed by freight stakeholder involvement. It provides a 10-year Minnesota truck parking vision and specific strategies that could be used to achieve that vision.

2. Leveraging Past Work

Desk Scan

The first step of the study was a desk scan of relevant truck parking research and analysis undertaken in Minnesota and across the nation. The purpose of the desk scan was to develop an overall framework for this study and to build upon past work. Through capturing best practices and lessons learned, the study developed an overall business case for truck parking investment, identified potential opportunities and solutions, and set the stage for data analysis undertaken in later chapters.

National/Regional Initiatives

Jason's Law Truck Parking Survey (2015)

In 2009, a truck driver named Jason Rivenburg parked in an abandoned gas station when his FMCSA Hours of Service had elapsed. While he was sleeping, Riverburg was robbed and subsequently murdered. Three years later, the Moving Ahead for Progress in the 21st Century Act (MAP-21) established Jason's Law (Section 1401). Jason's Law brought national attention to the issue of commercial vehicle operator safety and mandated USDOT to inventory existing truck parking locations and identify related industry trends and challenges.

The resulting study, *Jason's Law* Truck Parking Survey Results and Comparative Analysis was published in 2015. The study identified an inadequate supply of truck parking spaces relative to demand as a national safety concern. Specifically, that most truck parking locations are at full capacity during peak hours. Despite the clear demand, most truck parking locations are not able to expand due to economic constraints and public opposition.

Of the 50 states, the study ranked Minnesota 39th for overall truck parking space supply (spaces per 100 miles of the National Highway System). Similarly, the state also ranked 39th for the supply of spaces provided by the private sector. (Page 40). However, there was conflicting information from Owner-Operator Independent Drivers Association and the American Trucking Associations (OOIDA/ATA) surveys on the adequacy of the supply of truck parking in Minnesota. (Page 41).

American Transportation Research Institute Annual Survey (Ongoing)

The American Transportation Research Institute (ATRI), the independent research arm of the ATA conducts an annual survey to identify key industry issues. Over the past decade, truck parking has been amongst the top issues identified by the trucking industry. ATRI's 2015 report defines how the challenge impacts drivers:

> *The growing scarcity of available truck parking creates a dangerous situation for truck drivers who are often forced to drive beyond allowable HOS rules or park in undesignated and, in many cases, unsafe locations.*

Following the initial Jason's Law study, ATRI developed six truck parking-related studies. Most notably, Managing Critical Truck Parking Tech Memo #1: Commercial Driver Perspectives on Truck Parking identified that over half of survey respondents would be willing to pay a fee to reserve a parking space, particularly near metropolitan areas.

MAASTO TPIMS (2019)

The Mid American Association of State Transportation Officials (MAASTO) received a $25 million grant to deploy a regional Truck Parking Information Management System (TPIMS) across eight member states, including Minnesota. TPIMS provides real time truck parking information to drivers via dynamic message signs (DMS). It is estimated that the TPIMS could generate more than $403 million in economic benefits by reducing the time truck drivers spend looking for parking. Other benefits are more efficient movement of goods and less fuel consumption, which will result in reduced emissions (MAASTO 2019).

Minnesota Initiatives

MnDOT Interstate Truck Parking Study (2008)

MnDOT prepared a study to assess the supply and demand of truck parking along three interstate corridors (I-35, I-90, and I-94) in Minnesota. The report used new technology—which the FMCSA was developing and testing—to supply real-time parking information to truck drivers. This system used loop detectors and overhead sensors to record truck entries and exits from a facility in order to determine the number of available parking spaces.

MnDOT surveyed dispatchers to better understand their parking selection and needs. Most of the carriers (98 percent) reported that they do not provide parking location information to their drivers. One carrier explained that some drivers try to stop and rest as close as possible to their destination to avoid driving in rush hour in the morning. Therefore, they try to reach their destination the evening before and park at the shipper's dock overnight if allowed. Carriers also conveyed that most drivers share parking information with one another. Respondents also commented that more parking spaces are needed at peak hours and at all interstate highways, especially for overnight parking, and within 30 miles of major shippers and receivers (MnDOT 2008).

MnDOT (Interstate) Truck Parking Study: Phase II (2010)

The 2010 Phase II study identified the rest areas that were over capacity 15, 25, and 50 percent of the time, respectively. The study provided opportunities for expanding truck parking capacity in the state. The study focused on low-cost measures such as restriping existing facilities to better use space, expanding rest areas and allowing overnight use of weigh stations. Research focused on finding additional truck parking opportunities outside of urban areas due to the high cost of land in metropolitan areas. Specifically, truck parking facilities adjacent to interstates seemed to provide the greatest benefit by supplying needed parking for numerous trucking destinations (MnDOT 2010). The study specifically suggested truck parking remedies along interstate corridors (see Table 1) and provided estimated costs.

Table 1. 2010 Interstate Rest Area Suggested Remedies

Corridor	Recommendations
I-94 East	- Capacity enhancement of St. Croix facility - Improved information regarding parking availability - Coordination with WisDOT in providing parking information and spaces
I-94 West	- Capacity enhancement of Elm Creek, Burgan Lake, and Fuller Lake facilities - Improved information regarding parking availability
I-35 South	- Capacity enhancement of Albert Lea and Heath Creek facilities - Possible truck-only designation of Straight River northbound facility - Improved information regarding parking availability - Utilization of abandoned weigh station south of Straight River facilities - Possibly utilize wide median south of Heath Creek
I-90 East	- Capacity enhancement of High Forest and Oakland Woods facilities - Improved information regarding parking availability
I-90 West	- Capacity enhancement of Clear Lake facility - Improved information regarding parking availability
I-35 North	- None

Minnesota Highway Freight Program (2016)

MnDOT awarded $3.2 million from the National Highway Freight Program to expand truck parking capacity at two sites along I-90 at the Hayward and Oakland Woods Rest Areas. Future truck parking projects would also be eligible for the program. To understand where to target future investments, updated data from this study will be used.

CTS: A Comprehensive System for Assessing Truck Parking Availability (2017)

The University of Minnesota's Center for Transportation Studies conducted a user evaluation of the MnDOT's real-time Truck Parking Availability System (TPAS). The study found that truck drivers and carrier firms preferred to receive parking information via dynamic message signs followed by mobile applications. The least preferred method is the 511 traveler information system.

About half of the driver respondents and almost 60 percent of the carrier respondents preferred receiving parking availability information when they are 20 miles away from the truck stop or rest area. Also, more than one notification is desirable. The majority of drivers and carriers reported that the TPAS reliability would need to be at least 85 percent for them to use it. When asked about their willingness to pay for a parking spot, 37 percent of drivers and 48 percent of carrier firms responded affirmatively.

As part of the user evaluation, about 60 percent of drivers preferred computers as the parking information delivery method,

followed by dynamic message signs. When receiving advance notification of parking availability, half of truck drivers preferred a message such as "low availability" or the actual number of parking spaces available. Additionally, two thirds of truck drivers noted that the TPAS significantly helped them find parking and comply with HOS regulations. Drivers believed the TPAS would increase their efficiency and productivity if implemented across several states (MnDOT 2017).

Minnesota Statewide Freight System and Investment Plan (2018)

MnDOT developed an overarching Statewide Freight System and Investment Plan. This plan looked at many aspects of freight, including truck parking. MnDOT tested a video system capable of determining the number of available truck parking spaces in rest areas. The results of this work could be used to identify areas where more parking is needed. The study also recommended that advanced technologies such as dynamic message signs, global positioning systems, and intelligent truck parking could improve efficiency and safety by helping truck drivers better determine when and where to stop for mandated rest periods (MnDOT 2018).

Other State Level Initiatives

ADOT Truck Parking Working Papers (2018)

The Arizona Department of Transportation (ADOT) prepared a series of working papers to assess truck parking demand, issues, and needs and to propose potential solutions. The first Working Paper identified information- and capacity-related solutions from past nationwide studies. The paper identified various solutions that could be deployed in Arizona—and potentially elsewhere—including parking maps, static parking signs, websites and mobile applications, and dynamic signs. Additionally, the paper identified "new" capacity solutions like public-private and public-public partnerships, adapting existing parking facilities, re-opening closed rest areas, and construction of new rest areas (ADOT 2017).

The next two working papers identified truck parking demand and supply factors, respectively (ADOT 2018a and ADOT 2018b). These papers evaluated the parking availability throughout the day and concluded that availability is highest around noon and lowest at 4:00 a.m. Availability starts decreasing slowly until 5:00 p.m. and quickly from 5:00 p.m. to 2:00 a.m. (ADOT 2018b).

Colorado Truck Parking Information Management System (2019)

In 2019, the Colorado Department of Transportation (CDOT) is planning to deploy a TPIMS system to reduce unproductive time and miles travelled looking for parking. This system will provide real time truck parking information though dynamic road signs, CDOT website and mobile applications, and the 511 travel information system. Additionally, CDOT updates its Truck Parking Guide on a regular basis to ensure commercial drivers have access to the most up-to-date parking information (CDOT 2016).

Evaluation of the Michigan DOT's Truck Parking Information Management System (2016)

The Michigan Department of Transportation (MDOT) deployed a TPIMS

system along I-94 in 2015. MDOT's TPIMS system incorporates a variety of technologies to provide real-time information, including dynamic message signs, the Michigan traveler information platform, mobile applications, and in-cab displays.

In 2016, the University of Michigan studied the utility of the system's various aspects with truck drivers. The study found that in general, that most drivers did not know parking was available before deciding where to park or based their decision on past experience. However, drivers stated that they found the new parking information system useful and that this technology could reduce their driving time when searching for parking. Drivers preferred dynamic message signs as a method of communication for receiving parking information, with websites being the least preferred method, as no truck drivers reported using any websites to find parking. The participants noted that they believed the in-cab displays improved their safety or largely left it unaffected. Previous research showed that rest areas reduce the number of crashes and increase safety, although the effect is small. However, this pilot program did not find a material correlation between the use of TPIMS and safety (MDOT 2016).

FDOT District 5 Truck Parking Study (2018)

The Florida Department of Transportation (FDOT) District 5 Truck Parking Study identified truck parking needs and opportunities through targeted stakeholder engagement. The study uncovered that safety and proximity of the parking location are the two primary factors guiding a driver's parking decision.

The study found that truck parking needs are the highest between midnight and 5:00 a.m. on Sunday and Monday. Additionally, the study captured more subjective takeaways. For instance, one driver reported that while he preferred to park for free at a public facility, one advantage of private sector facilities is the ability to circulate for parking until space is available.

Recommendations of the study include public-private partnerships, ideal parking locations, and technology. In particular, the study called for the development of a TPIMS system to provide drivers with real time parking information along key corridors.

Low Cost Strategies to Increase Truck Parking in Wisconsin (2009)

This study's stakeholder outreach identified that while truck drivers were not using any specific system to find parking within Wisconsin, they were somewhat interested in using a WisDOT database/ navigation system as long as it is easy to use. Additionally, drivers do not park in closed weigh stations because of the possibility of having to move when the station opens, interrupting their rest. Drivers also prefer parking close to the entrance and exit ramps of highways to minimize the time spent driving to and from the truck parking spot and the highway. The study recommended the development of a TPIMS system and further exploration of privatizing public rest areas and creating public-private partnerships to assist with funding the maintenance of rest areas and increase the supply of truck parking.

Kansas State Freight Network Truck Parking Plan (2016)

The Kansas Department of Transportation (KDOT) and Kansas Turnpike Authority prepared a list of recommendations and tactics. These agencies recommended the use of electronic signage and online mechanisms to provide available truck parking information. KDOT and the Kansas Turnpike Authority also recommended adding or improving parking assets by expanding capacity in existing parking lots and using excess right-of-way. Another recommendation was to create partnerships with agencies to expand parking and create regional truck parking policies. The fourth recommendation was the development of pro-freight truck tax policies (KDOT and Kansas Turnpike Authority 2016).

North Jersey Rest Stop Studies (2008 & 2009)

The North Jersey Transportation Planning Authority's Rest Stop Study evaluated the need to accommodate fatigued drivers and increase safety. Among the study's recommendations: securing sites for parking as a necessary land use, pursuing alternative fuels, advancing complementary land use approaches, providing incentives for private sector development of truck parking, promoting public-private partnerships, and collaborating with other DOTs and local planning officials. (North Jersey Transportation Planning Authority 2008). A year later, the agency developed a Rest Stop Study Refinement and Action Plan. The plan emphasized outreach to educate and engage the public on the need for truck parking facilities, capacity expansion, and funding opportunities (North Jersey Transportation Planning Authority 2009).

Truck Parking in Pennsylvania (2007)

The Pennsylvania State Transportation Advisory Committee (TAC) study discussed the environmental and financial impacts associated with truck idling. While parked, drivers usually keep their engines running in order to provide electrical power inside the truck cab and maintain the cab interior at a comfortable temperature while the driver rests. The study evaluated stationary and mobile idle reduction strategies. Mobile units are generally auxiliary power units (APUs) and are also preferred over the stationary ones. The study revealed that some drivers prefer parking in unauthorized areas (road/ramp shoulders) to avoid solicitation for illegal activity and to prevent potential damage to their vehicle.

The TAC study also pointed out that no lead organization exists to solve the truck parking issues, and that several entities share a responsibility to solve the trucking industry problems. However, each entity's responsibility and legal authority are limited. The TAC prepared a 12-point strategy to pursue the study recommendations, including the creation of a public-private task force and the development of a truck parking policy with an emphasis on partnerships, finance, and funding program (Pennsylvania State Transportation Advisory Committee 2007).

Utah Interstate 15 Truck Parking Study (2012)

The Utah Department of Transportation (UDOT) conducted a survey to identify local truck parking issue and assess potential solutions suggested by truck drivers. The top two improvements that survey respondents identified for main corridors in Utah are to (1) build more parking spaces at truck stops,

and (2) build more parking spaces at rest areas.

To solve these challenges, UDOT identified the location, number of spaces and features at each existing truck parking facilities. UDOT's survey found that truck drivers preferred receiving information about availability of truck parking via a dynamic message sign, paper maps, and highway advisory radio. Based on this input and the inventory, a Utah Interstate Truck Parking map was developed. This map depicts public rest areas and truck stops along key corridors. Finally, UDOT recommended the organization of a Highway Rest Facility Committee to oversee the creation and implementation of a Highway Rest Facility System Program (UDOT 2012).

Virginia Truck Parking Study (2015)

The 2015 Virginia Truck Parking Study provided an overview of the truck parking conditions in the Commonwealth. The study included an extensive outreach effort, which concluded that there is a shortage of safe truck parking. More specifically, over 70 percent of truck drivers surveyed reported personal safety concerns associated with overnight truck parking.

The study recommended focusing on using public-private partnerships to increase truck parking capacity through special incentives like tax abatements and low-cost loans for new or expanded facilities. The plan made several other recommendations, including:

- Increasing on-site security at private truck stops and state-owned facilities;
- Collaborating with local officials, shippers, and receivers to provide staging areas for truck parking;
- Creating a multi-disciplinary task force to find truck parking solutions;
- Disseminating real-time information regarding truck parking availability;
- Using existing park-and-ride lots and weigh stations for overnight truck parking; and,
- Restriping truck parking spaces and drive aisles in rest areas to better accommodate trucks (VDOT 2015).

WSDOT Truck Parking Study (2016)

The Washington State Department of Transportation (WSDOT) undertook an extensive outreach effort to develop this study. Truck drivers indicated that they are most concerned about safety (crimes and solicitation). Communities are concerned about emissions and negative impacts on their neighborhoods. Noise from trucks and potential hazardous material spills were also identified as concerns by participants.

The study noted that policies and laws affecting truck parking differ among states and, sometimes, cities. As a result, truck drivers are often unsure what their legal parking options are as they cross city or state borders. The engagement effort also identified public education as a key component to increase public acceptance of trucks.

Outreach participants suggested a range of alternatives to truck parking: parking under power lines, at park-and ride lots, and at shopping centers. Other suggestions were to provide real-time parking information via dynamic message signs, websites, in-cab communication systems, and mobile device applications. The preferred method of communication was mobile applications.

Stakeholders also noted the need for public-private partnerships to provide parking and meet truck parking needs. The study suggested that surplus WSDOT property could be used for truck parking where available. (WSDOT 2016)

Data Gaps

To support the development of a comprehensive Survey of Existing Facilities in Chapter 2, the desk scan identified three major data gaps that impact the ability to plan for adequate truck parking.

- **Private Parking Spaces**: The Jason's Law survey provided comprehensive data on publicly provided truck parking spaces. However, private spaces were not fully captured. This is largely due to the varying data collection methods. For public spaces, state DOTs provided counts for each of their facilities. However, private spaces were identified by using "The Trucker's Friend" – a national truck stop directory. While, the directory is comprehensive, it does not include every private sector truck parking space. Likewise, it does not capture spaces constructed by freight companies to serve their own private fleets.
- **Defining a Truck Parking Space**: While some truck parking facilities have parking spaces that are clearly marked, others are just a concrete or stone pad with little to no markings. While assumptions can be made, the total capacity of unmarked facilities is largely determined by how drivers park their individual trucks.
- **Demand:** While site visits and TPIMS data allow state DOTs to get a conceptual idea of truck parking demand at facilities, it is often difficult to capture un-met demand (i.e. unauthorized parking). Similarly, how does one define demand—is it a normal day, during holiday season, or the demand placed on a facility when a key corridor closes for a major weather event or incident?

Identifying Opportunities and Solutions

The desk scan identified innovative high value/low cost solutions undertaken by other State DOTs and the private sector. These lessons learned (and others known to the project team) are organized in Table 2. These examples will be used to help match identified Minnesota truck parking needs with potential solutions later in the study.

Table 2. Innovative Truck Parking Solutions

Area	Approach
Policy	Include truck parking opportunities within the state's project selection process (FDOT)
	Potential truck parking locations must be compatible with surrounding land use (FDOT)
	Tax incentives and public investment could leverage private sector investment (NCTP)
	Parking requirements (zoning) at/near major freight generators (MnDOT)
Technology	Truck Parking Information Systems (TPIMS) are widely cited as a high priority solution
	TPIMS technology advancements – moving from maintenance-intensive magnetometer pucks sensors to video recognition (MnDOT)
	Vehicle to infrastructure (V2I) investment to provide real time parking information to drivers (MnDOT)
	Beyond standard TPIMS dynamic message sign (DMS), inclusion of parking info on larger overhead devices
	Including private parking facility information on TPIMS system (when available)
	Reservation systems near port/intermodal facilities (Virginia Port Authority)
	Next generation TPIMS: Predictive Parking Availability (California Air Resources Board)
Expanding Facilities	Leverage public land near private facilities to build expanded parking (FDOT)
	Allow parking at closed public facilities (i.e. weight stations, park and rides) (WSDOT)
	Repurpose underutilized rest areas for truck only parking (MoDOT)
	Inventory locations - like big box stores – which allow truck parking on their property. Ensure this inventory is added to the various truck parking apps.
New Facilities	Use unused/underused right of way to build new parking facilities. This could be undertaken directly by the DOT or property could be sold to developers (off the interstate system). (WSDOT) Examples: - Between Divided Highway Lanes – MnDOT - Brainerd Lakes Welcome Center (TH 371) - Interchanges – Nebraska DOT – Basic parking facilities within the ramp's turning radii - Adjacent Property – Wyoming DOT – Turnouts along I-80
Partnership	Develop partnerships – between state DOTs, trucking and truck stop associations, public safety agencies, local governments and companies – to develop policies and ultimately solutions for truck parking issues. (MnDOT)

Investment Case for Truck Parking

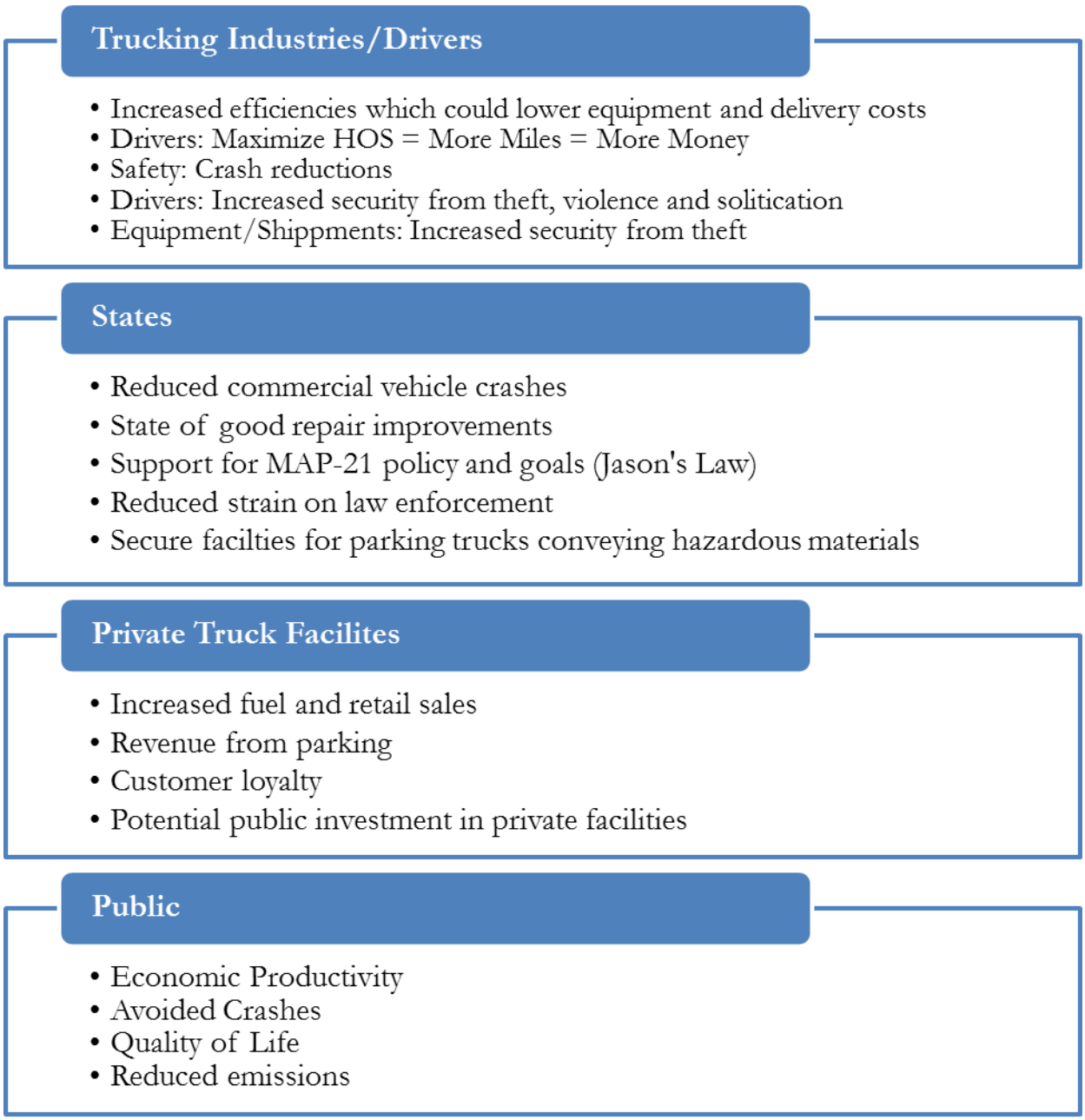
Based on past experience and feedback previously provided by the Minnesota Truck Association, MnDOT developed a series of "worst-case" scenarios that could develop from underinvestment in truck parking by the public and private sectors. While these scenarios are extreme, they are based on real events across the nation and underline the importance of truck parking along Minnesota's roadways.

Figure 1. Investment Case for Truck Parking

Benefits of Truck Parking

The desk scan identified several methods states, agencies and private enterprises use to qualify and quantify investment decisions for increased truck parking (Figure 2). At a high level, these factors define benefits to various parties and overall society for enhanced truck parking. These key lessons learned will factor into work to integrate truck parking within the Minnesota Highway Freight Program's selection process.

Figure 2. Benefits of Truck Parking



3. Stakeholder Coordination and Outreach

Multiple stakeholder groups were engaged during the course of this project to gather information and feedback on the study approach, methodology, results, and recommendations. Stakeholder groups were selected in an effort to represent multiple perspectives on truck parking issues. This included truck drivers, truck stop operators, shippers, carriers, and various trade associations.

Study Advisory Committee

The Study Advisory Committee (SAC) consisted of multi-disciplinary, high-level policy makers and stakeholders selected to help guide the study throughout its duration. This committee met routinely throughout the project to advise and guide the study deliverables for truck parking solutions throughout the state. Members of the SAC included:

- John Hausladen, President, Minnesota Trucking Association (MTA)
- Tiffany Wlazlowski Neuman, Vice President of Public Affairs, NATSO
- Terrence Beltz, Program Analyst, FHWA Minnesota and Wisconsin Divisions
- Capt. Jonathan Olsen, Commercial Vehicle Enforcement Office Leader, Minnesota State Patrol
- Robert H. Williams, Rest Area Program Manager, MnDOT - Office of Project Management and Technical Services
- Timothy Wilcox, Rest Area Project Manager, MnDOT - Office of Project Management and Technical Services
- Chris Moates, Building Services Planning Director, MnDOT - Office of Maintenance - Building Services
- Ted Coulianos, Assistant Office Director, MnDOT - Office of Commercial Vehicle Operations
- Shaker Rabban, Statewide Investment Planner MnDOT - Office of Transportation System Management
- Skip Foster, Manager, Freedom Lines, LLC
- Dan Murray, American Transportation Research Institute
- Caroline Boris, American Transportation Research Institute
- Frank Loetterle, Supervisor, MnDOT – Office of Freight and Commercial Vehicle Operations
- Gregg Moyer, Safety Director CDS, California Overland

SWOT Analysis

During the first meeting of the SAC, the group conducted a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis to identify and clarify the main trends and issues affecting truck parking in Minnesota now and in the future. A summary of the items discussed in each category during the meeting are summarized in Table 3.

Table 3. Minnesota Truck Parking SWOT Analysis

Strengths	- Large group of truck stops/rest areas representing 90 percent of current capacity - Wide distribution of facilities (geographic coverage) - Truck stops are excellent, but many, rest stops could be improved
Weaknesses	- No scale facilities are open 24/7 and truck parking access is limited at these locations - When private truck stops go out of business or eliminate truck parking, this has detrimental impacts to supply chain efficiency and creates more capacity issues for nearby truck parking locations
Opportunities	- Some currently closed rest stops could be reopened to increase capacity - Some public rest areas have time limits of no more than eight hours; This does not always align with truck driver scheduling needs - Truck/trailer and passenger vehicle sides of rest areas complement each other, but can each side be repurposed to meet demand as needed? - Working with private companies to coordinate truck parking/staging areas has led to some successful implementations - Working with local governments on land use and zoning policy decisions to improve truck parking capacity and conditions - Strong need for access to truck parking in urban areas, but must balance residential concerns with truck parking externalities (e.g., noise) and private business liability concerns - Potential to fund truck parking elements such as dynamic message boards through Highway Safety Improvement Program (HSIP)? Can the safety aspects of truck parking improvement be highlighted to widen the net for funding opportunities? - Can abandoned facilities be repurposed for truck parking (without services)?
Threats	- Growing number of RVs and boats that use truck parking spaces - Limited transportation funding; No funding dedicated to truck parking - Maintenance of existing facilities remains a funding burden/obligation - Availability of truck parking affects society, not just trucking industry

Truck Drivers

Truck drivers experience parking first-hand and are therefore the best source for gathering feedback on existing issues and the most effective solutions. For this study, feedback from truck drivers was generated from multiple sources including an online survey distributed by ATRI to multiple truck driving organizations via mailing lists, as well as a presentation and discussion held at the Minnesota Trucking Association's (MTA) Truck Driving Championships.

MTA Truck Driving Championship

This focus group at the 2019 Minnesota Truck Driving Championships was organized by the Minnesota Trucking Association. This event is a regional competition for drivers, challenging them through a variety of events including a written test, obstacle courses, and safety inspection challenges. Winners are eligible to participate in the National Truck Driving Championship, sometimes referred to as the "Superbowl of Safety."

This outreach included a presentation to the 5-axle, flatbed, and sleeper driver classifications who were sequestered prior to their driving events. The study team provided an overview of the purpose and goals of the study, a summary of analysis and feedback gathered to date, and held a guided discussion with the drivers to identify common issues they experience while driving and parking. A summary of the items discussed during the meeting is provided below.

- The **Electronic Logging Device (ELD) mandate and a general lack of parking availability** are the two biggest issues drivers face while driving. The need to find safe and reliable parking locations along their routes has become even more important following the roll-out of the ELD systems. The need to avoid hours of service violations often results in drivers parking earlier to ensure parking availability (and losing productive time) or choosing to park in unauthorized locations when parking is not available. It is anticipated that this situation will continue to grow more challenging as the ELD mandate goes into full effect in December 2019.
- **Truck drivers are resourceful and rely on multiple tools** to find parking locations. These tools include traditional sources such as paper truck stop directories but also new truck parking apps such as TruckerPath. Drivers also rely on MnDOT resources such as the 511 Travel Information and the TPIMS display board.
- Many drivers noted that the **MnDOT website and 511 web pages are difficult or impossible to use via mobile phones** while on the road. The webpages in their current form are not mobile friendly. They will also become more difficult to use when Minnesota's hands-free driving regulations go into place in August 2019. MnDOT has recently released a truck-focused mobile app version of its 511 system. This app was release in March 2019.

- **Increased RV overnight parking** during the summer months further limits parking availability at rest areas. Drivers suggested additional signage and/or enforcement of parking restrictions to help this issue.
- **Many cities and receiver locations are banning truck parking**, causing additional issues.
- Truck drivers desire the state government to be more **flexible on parking regulations and enforcement** to allow parking on rest area shoulders and ramps.

Figure 3. MTA Truck Driving Championship Presentation

Online Survey

An online survey was developed for this study for distribution to truck drivers and other stakeholders. The survey included 16 questions related to truck parking behavior, locations of truck parking needs, additional issues related to truck parking, driver knowledge of newer technology such as the TPIMS system and driver demographics.

Distribution of the survey was facilitated by ATRI through their database of Midwest carriers. ATRI also facilitated distribution to five Midwest state trucking associations, and through the Owner-Operator Independent Drivers Association (OOIDA). In total, 150 responses were received for the online survey. An additional 32 responses were completed by drivers and collected during the MTA Truck Driving Championships outreach event.

The detailed results of the survey are provided in Appendix C. The results of the survey were largely in line with recent survey efforts by ATRI and others nationwide. Lack of truck parking availability has continued to grow as a major concern for truck drivers as the volume of truck traffic increases and demands and expectations of the supply chain continue to pressure drivers to move as efficiently as possible. These issues are further inflated by the demands of the ELD mandate and hours of service regulations. Highlights from the survey are detailed below:

- More than half of survey respondents require parking in Minnesota at least once per week.
- On average, finding parking in Minnesota takes approximately 30 to 60 minutes. 22 percent of respondents stated that finding truck parking in Minnesota take one hour or more.

- Shipper/Receiver locations rarely permit parking on-site and delays related to loading and unloading at shipper/receiver locations frequently exceeds one hour.
- Regarding questions of whether it was easier to find parking in Minnesota compared to other nearby states, the majority of respondents were neutral or disagreed. In conversations during the Truck Driving Championships, many drivers noted that parking in Minnesota was not better or worse than other states, but that parking issues are becoming more common nationwide.
- More than half of respondents noted that the recently installed TPIMS signs on I-94 make it easier to find truck parking in Minnesota.
- Survey respondents were predominantly male (94 percent), aged 45-64 (67 percent), and operate in the for-hire trucking industry segment (80 percent).
- In an open-ended response asking about locations of frequent truck parking difficulty, respondents noted multiple locations in and around the Minneapolis-St. Paul metropolitan area as well as Saint Cloud, Albert Lea, Rogers, and Interstates 94, 35, and 90. A word cloud highlighting many of these responses is shown in 0.

Figure 4. Word Cloud of Locations of Frequent Truck Parking Capacity Issues

Shippers and Carriers

A focus group meeting with shippers and carriers was hosted by the MTA. Participants included representatives from Bay & Bay, Brenny Transportation, Dart Transit, Dean Foods, Cargill, Walmart, and Manning Transfer. Shippers and carriers provide differing and complementary perspectives on truck parking issues. While carriers are responsible for managing fleets of vehicles, shippers may or may not be involved in the actual delivery of goods. A summary of the items discussed during the focus group is provided below:

- Participants that operate trucking fleets had varying degrees of involvement with truck drivers. While some are very involved in truck routing and identification of truck parking locations, others are more hands-off and leave those decisions to the drivers.
- Parking at receiver locations has become more difficult. Some ideas that were discussed include charging customers a surcharge if drivers are unable to find overnight parking.
- In many cases, parking at receiver locations is prohibited by local noise ordinances or zoning policy. Liability to receivers for allowing truck parking is also becoming a concern and is leading many receivers to ban truck parking at their facilities.
- Participants suggested the possibility of incentivizing receiver parking through tax breaks, revolving loans, or other incentives.
- Participants noted that the ELD mandate is making trip planning and meeting hours of service requirements more difficult.
- Uncertainty over parking availability at the final destination often leads to parking earlier to avoid hours of service violations, but this also reduces overall route efficiency.
- Truck spot reservation is becoming a more common feature at truck stops, but while this can improve certainty on truck parking availability, it can also be costly.
- Finding truck staging locations in Minnesota is most difficult within the Minneapolis-St. Paul metropolitan area.
- Participants also discussed the potential impacts of autonomous truck operations on truck parking issues. While the group agreed that autonomous trucking would eventually reduce truck parking demand, it is anticipated that this will not be an important element in the short- to medium-term.

Truck Stop Operators

Two focus group meetings were held with truck stop operators. The first meeting was with TA-Petro which is the largest private provider of truck parking in Minnesota. Their three facilities combined provide 567 parking spaces representing 12 percent of Minnesota's total truck parking capacity. The second meeting was with KwikTrip, the fourth largest provider of truck parking in Minnesota. KwikTrip also boasts the highest number of facilities throughout the state at 28 sites. These two operators provided an excellent cross-section of truck parking providers in the state. A summary and comparison of the feedback gathered during these meetings is provided in Table 4.

Table 4. Truck Stop Operator Comparison

	TA-Petro	KwikTrip
Characteristics	- 3 locations - 12 percent of MN truck parking - 189 spaces/site	- 28 locations - 8 percent of MN truck parking - 15 spaces/site
Site requirements for new site development	- Minimum 24-acre site needed - All sites are one-stop-shop, providing amenities such as food and showers.	- Four different site footprints based on needs and site suitability: Basic C-Store; + side diesel, + truck parking, Full truck stop with amenities - 58 locations within Minnesota (roughly half have truck parking)
Truck Parking Limitations	- Local communities often adversarial to new sites. Concerns of impacts of truck traffic	- Local zoning and noise ordinances are biggest barrier to new site development, particularly in the Minneapolis-St. Paul metro

Additional items that were discussed with both providers include:

- Providers are interested in potential opportunities such as public-private partnerships as well as programs to encourage truck parking where it is needed through tax incentives, grant funding, and liability insurance pools.
- Truck reservation systems have been experimented with at some locations, but most providers have the mindset of wanting to avoid charging customers a parking fee. However, this might be feasible in locations with very high truck parking demand.
- While the majority of truck parking providers do not charge a fee for parking, some that do charge also waive this fee if truck drivers or carriers purchase sufficient amounts fuel or negotiate for parking through other agreements.
- Truck stop operators are increasingly tuned in to the feedback they receive on mobile apps such as TruckerPath or Google Reviews. Ensuring that their locations are listed on these apps and monitoring reviews for feedback is seen as an important element.

- Regarding strategies that MnDOT can employ to assist with new site developments, actions discussed included:
    - Working with local governments and land use authorities to highlight the importance of truck parking to the local and regional economies.
    - Assisting with the development of a public campaign to draw attention to the needs of truck drivers and the benefits that trucking has on local economies, similar to the recent efforts by railroad companies such as CSX with their *How Tomorrow Moves* campaign boasting the ability to haul one ton of freight 423 miles on one gallon of fuel.

4. Truck Parking Database

To better understand the existing supply of truck parking throughout Minnesota, the study team developed a methodology that combines multiple sources of data to generate estimates of public and private truck parking capacity. The data sources used in this analysis include the following:

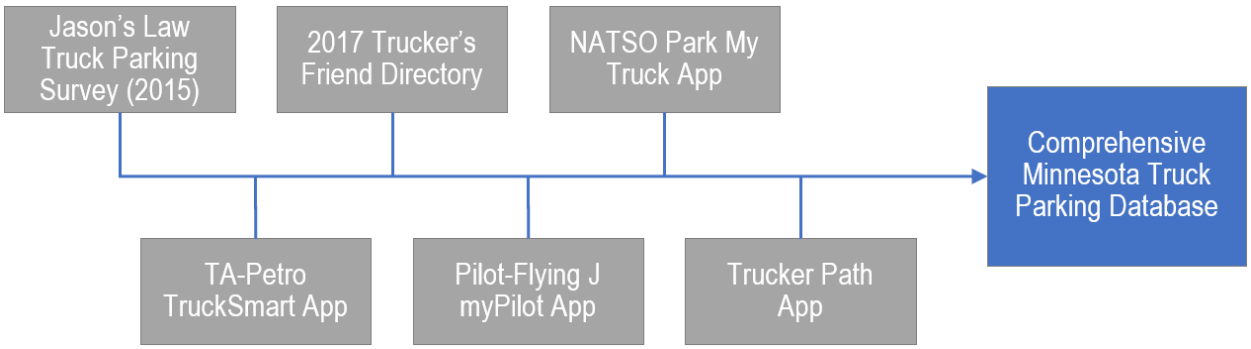
- Jason's Law Truck Parking Survey (2015)
- 2017 Trucker's Friend National Truck Stop Directory
- NATSO *Park My Truck* app
- TA-Petro's *TruckSmart* app
- Pilot-Flying J's *myPilot* app
- *Trucker Path* app

The combination of data from these sources was used to estimate truck parking locations and capacity for all truck stops (private and public) within the State of Minnesota. This data has been compiled into a database for all truck parking facilities in Minnesota. The results of this analysis will help project planners and policy makers gain a better understanding of the issues surrounding truck parking in Minnesota and will function as an outreach tool to educate other stakeholders about the existing conditions and future needs regarding truck parking capacity.

Data Sources

The analysis of truck parking on statewide roadway networks is often hampered by the limited availability of data, particularly regarding the capacity of private truck stops. The following section describes each of the six truck parking data sources in more detail and discusses the relative advantages and disadvantages of each. While each data source individually provides only a portion of the truck parking picture, the goal of this analysis is to combine the sources in such a way that the data they provide balances their inherent limitations and results in a comprehensive and complete picture of truck parking available in the state.

Figure 5. Truck Parking Database Creation Process Chart



Jason's Law Truck Parking Survey

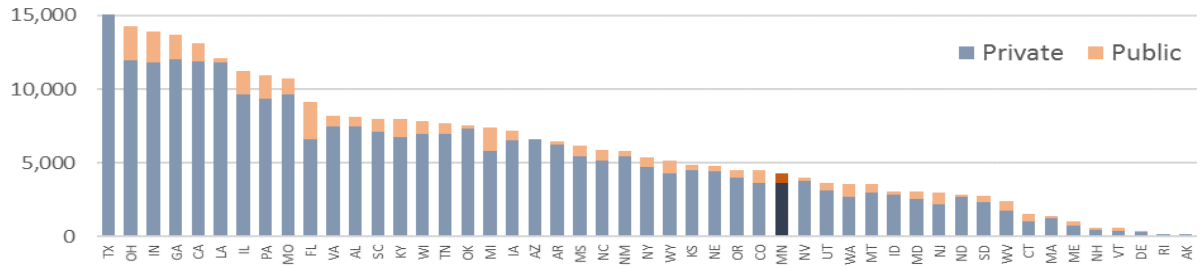
Originally conducted in 2015, the Jason's Law Truck Parking Survey was a national survey of truck parking capacity and conditions. The legislation passed to create the survey was established to provide a "national priority on addressing the shortage of long-term parking for commercial motor vehicles on the National Highway System (NHS) to improve the safety of motorized and non-motorized users and for commercial motor vehicle operators." Specifically, Jason's Law requires the Minnesota. Department of Transportation (MnDOT) to conduct a survey and comparative assessment in consultation with relevant State motor carrier representatives to:

1. Evaluate the capability of Minnesota to provide adequate parking and rest facilities for commercial motor vehicles engaged in interstate transportation;
2. Assess the volume of commercial motor vehicle traffic in Minnesota; and
3. Develop a system of metrics to measure the adequacy of commercial motor vehicle parking facilities in Minnesota

Data for public facilities was requested from State DOT's during this survey. Data for private facilities was based on information provided in the 2015 version of the Trucker's Friend National Truck Stop Directory, discussed in more detail below. A complete data set of the Jason's Law Survey results is currently available through the Bureau of Transportation Statistics (BTS) National Transportation Atlas Database.[1]

The Jason's Law Survey identified 196 (147 private, 49 public) individual sites with a total truck parking capacity of 4,266 spaces in Minnesota. Of this total, 625 spaces (14.7 percent) are provided by public parking facilities. The data from this survey served as a baseline from which to build upon for this study. Note that as of the date of this report, the Jason's Law Survey is in the process of being updated to reflect 2019 parking conditions. The output of this analysis was used to provide updated MnDOT truck parking space counts for the State.

Figure 6. Truck Parking Spaces by State (Jason's Law Survey, 2015)



Source: Jason's Law Survey, 2015. Note: Texas count extends beyond figure frame.

[1] BTS National Transportation Database, Truck Parking: https://data-usdot.opendata.arcgis.com/datasets/truck-stop-parking?geometry=-255.587%2C24.822%2C36.737%2C65.356

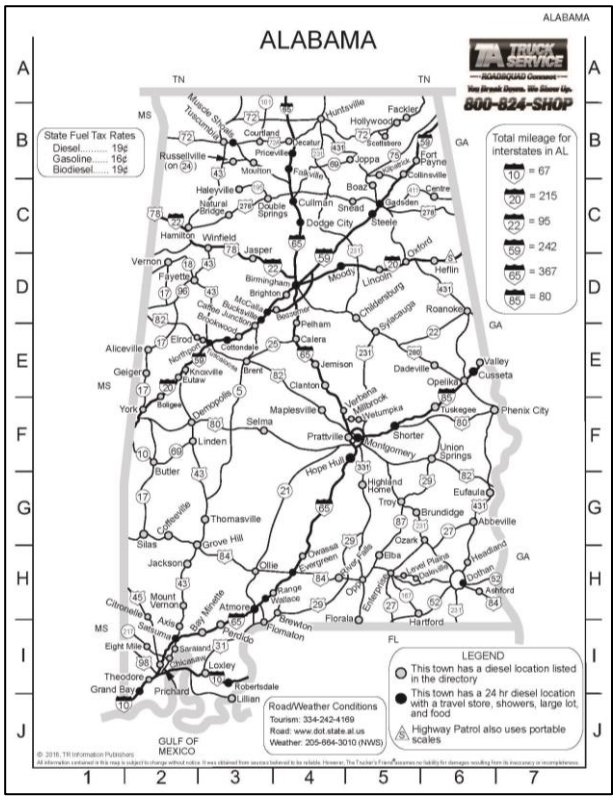
2017 Trucker's Friend

For nearly 30 years, the Trucker's Friend National Truck Stop Directory[2] has been a primary source of information related to truck and fuel stops across the United States and Canada. The goal of the directory is help drivers stay productive on the road by providing location and contact information for many private truck stops throughout the respective countries, as well as providing detailed information related to the amenities available at each location including fuel type, food and lodging options, shower and bathroom facilities, on-site financial services, and emergency and weather information.

The directory is updated annually and continues to be the most widespread and comprehensive source of truck stop information available to truck drivers. The 2017 version of the directory is the most recently available print version. Note that the Trucker's Friend Directory will no longer be provided in print form but will continue to provide information via the website mapping tool.

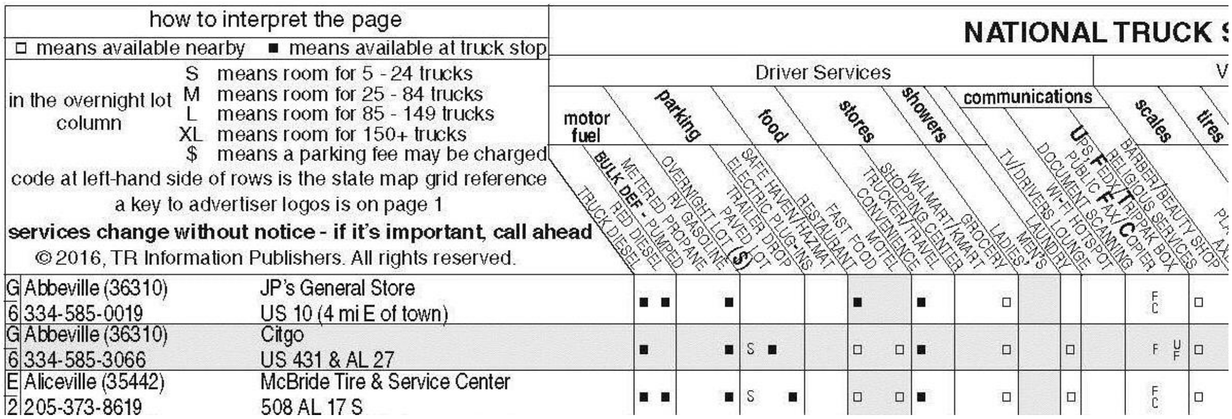
Although the Trucker's Friend provides extremely comprehensive information on amenities available at each site, it does not provide a precise count of truck parking spaces. Instead, it categorizes parking by general lot size (small, medium, large, and extra-large) and provides a numerical range for each. This limits the accuracy of the parking capacity listings for each stop. The Trucker's Friend directory includes information for 160 truck stops throughout the state of Minnesota. Of these, 99 stops are noted as providing overnight truck parking.

Figure 7. Example Trucker's Path State Map



[2] Trucker's Friend National Truck Stop Directory: https://www.truckstops.com/

Figure 8. Example Trucker's Path Directory Page with Parking Size and Site Amenities


how to interpret the page
□ means available nearby ■ means available at truck stop
in the overnight lot column S means room for 5 - 24 trucks; M means room for 25 - 84 trucks; L means room for 85 - 149 trucks; XL means room for 150+ trucks; $ means a parking fee may be charged
code at left-hand side of rows is the state map grid reference
a key to advertiser logos is on page 1
services change without notice - if it's important, call ahead
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NATIONAL TRUCK
Driver Services
motor fuel: TRUCK DIESEL, RED DIESEL, BULK DEF, METERED DEF - PUMPED
parking: RV GASOLINE, PROPANE, OVERNIGHT LOT (S), PAVED LOT, TRAILER DROP, ELECTRIC PLUG-INS, SAFE HAVEN/HAZMAT
food: RESTAURANT, FAST FOOD
stores: MOTEL, CONVENIENCE, TRUCKER/TRAVEL, SHOPPING CENTER, WALMART/KMART, GROCERY
showers: LADIES', MEN'S
communications: LAUNDRY, TV/DRIVERS LOUNGE, WI-FI HOTSPOT, DOCUMENT SCANNING, PUBLIC FAX/COPIER, UPS/FEDEX
scales: RELIGIOUS SERVICES, BARBER/BEAUTY SHOP
tires

G6	Abbeville (36310) 334-585-0019	JP's General Store US 10 (4 mi E of town)
G6	Abbeville (36310) 334-585-3066	Citgo US 431 & AL 27
E2	Aliceville (35442) 205-373-8619	McBride Tire & Service Center 508 AL 17 S

Park My Truck App (NATSO)

Developed by the Truck Parking Leadership Initiative, a collaboration comprised of the NATSO Inc., the NATSO Foundation, the American Trucking Associations, and the American Transportation Research Institute (ATRI), the *Park My Truck* mobile app provides drivers with truck stop parking information at locations across the United States on a user-friendly platform. The app allows drivers to view nearby stops along their routes. Stops can be filtered by search radius, or by state, to allow for a streamlined search process. The application provides drivers with stop information such as number of truck-specific parking spaces available at each location, nearby amenities, and stop contact information. The app is available on both Apple and Android platforms.

The *Park My Truck* app provides information on nearly 95 truck stops throughout Minnesota and has substantial overlap with the truck stops listed in the Trucker's Friend directory. The *Park My Truck* App includes two additional truck stops that are not included in the Trucker's Friend directory. Likewise, the Trucker's Friend directory includes eight truck stops with overnight parking that are not included in the *Park My Truck* app.

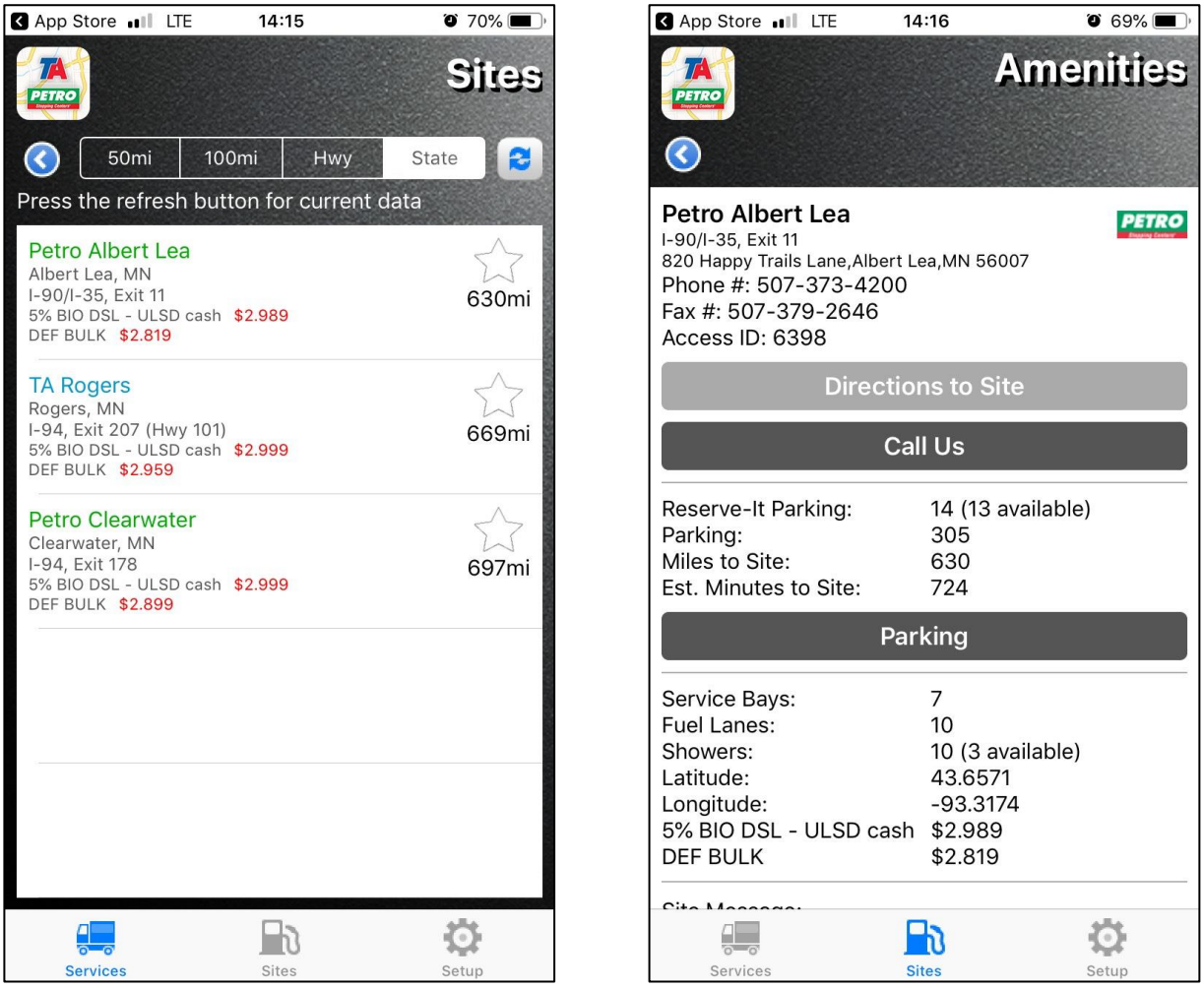
Figure 9. Park My Truck Interface

TruckSmart (TA-Petro)

Developed by TravelCenters of America LLC (TA), the *TruckSmart* mobile app provides truck parking information for all TA-Petro truck stops nationwide. TA-Petro stops provide some of the largest number of truck parking spaces per location in Minnesota. This app platform provides drivers with information such as the number of truck parking spaces available, location amenities, fuel choices, and contact information along with in-app abilities such as parking spot reservation, shower reservation, in-bay service request, and many others.

Since this app displays only TA-Petro truck stops, its coverage in Minnesota is minimal. Only three TA-Petro stops are listed in Minnesota (Albert Lee, Clearwater, and Rogers). However, these three truck stops are among the largest in the state, providing 567 total truck parking spaces and representing more than 12 percent of the total truck parking capacity in Minnesota. The space counts provided also align with values reported for the same stops on other platforms. The app is available on both Apple and Android platforms.

Figure 10. TruckSmart Interface: Stop Listing and Stop Details

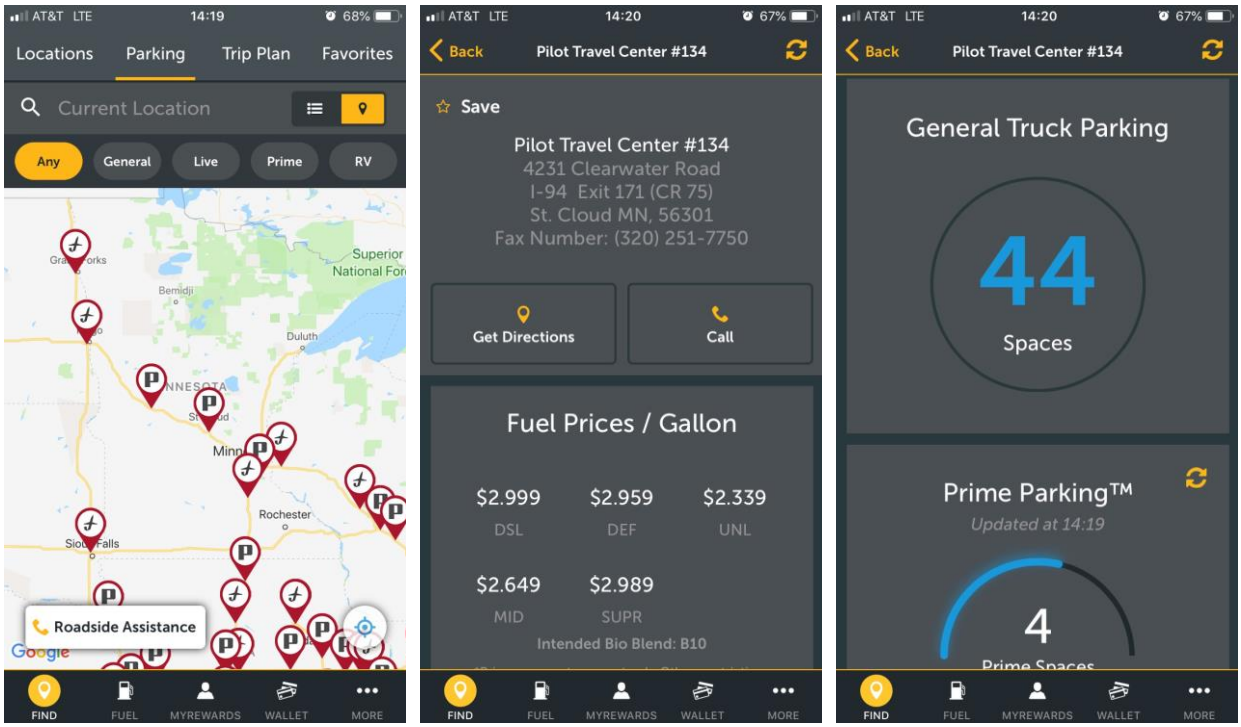


MyPilot (Pilot-Flying J)

Developed by Pilot Travel Centers, LLC, the *myPilot* mobile app provides truck parking information for all Pilot and Flying J truck stops nationwide. Along with TA-Petro, Pilot-Flying J stops provide some of the largest number of parking spaces per location in Minnesota. Like other apps, the *myPilot* app provides drivers with stop information such as number of parking spots at each location, fuel prices, fuel lane availability, nearby amenities and food options, as well as standard contact information. This app also provides drivers with real-time parking availability information, as well as the ability to reserve parking spots ahead of time.

Like the *TruckSmart* app by TA-Petro, this app displays only Pilot and Flying J truck stops. This includes one Flying J Travel Plaza in Northfield and three Pilot Travel Centers in Inver Grove Heights, St. Cloud, and Alexandria. These four stops provide 214 truck parking spaces, accounting for nearly five percent of Minnesota's truck parking capacity. The truck parking capacity values provided for these stops largely align with values reported for the same stops on other platforms. The app is available on both Apple and Android platforms.

Figure 11. myPilot: Map Interface, Stop Information, Parking Capacity

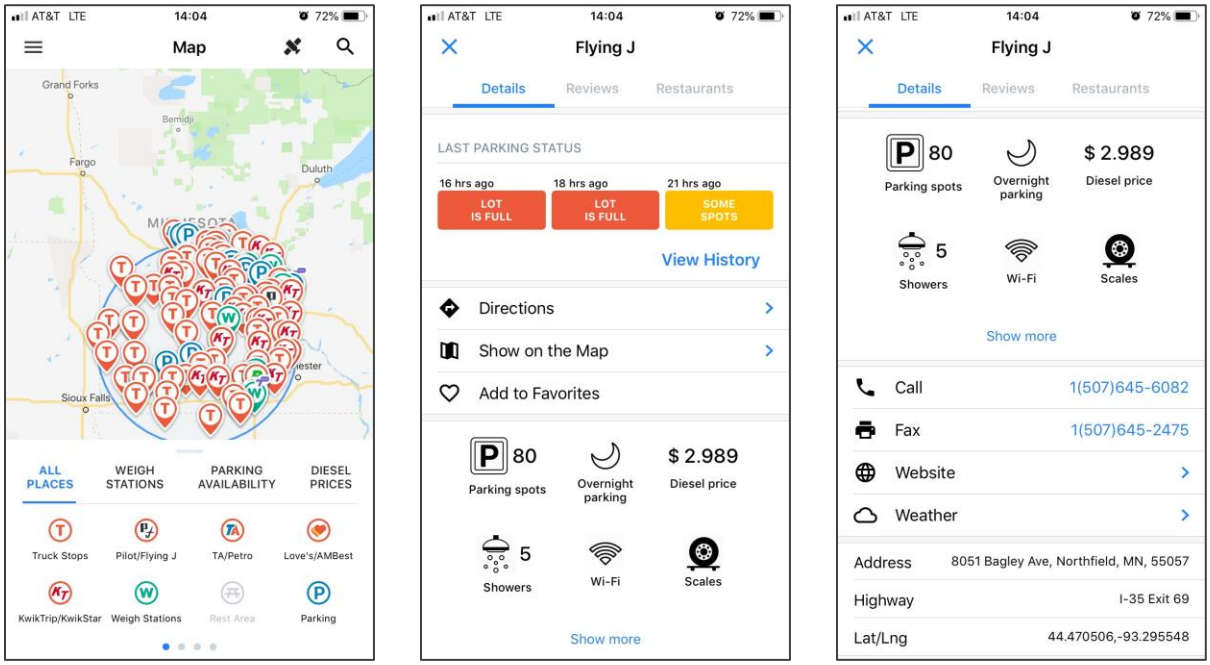


Trucker Path

In recent years, the *Trucker Path* app has become one of the most popular and widely used applications for truckers looking to locate parking nationwide. Launched in 2013, by 2016 the app had achieved over 450,000 active monthly users. At the time, this represented 30 percent of all Class 8 truckers in the United States.[3] The application contains basic information for over 4,000 truck stops. The information presented for each location is displayed in an easy-to-use format giving drivers information to locate a safe place to park for several hours or overnight. The information provided for each stop includes, but is not limited to: contact information, parking capacity, fuel availability, and nearby food and lodging.

The principal advantage of *Trucker Path* is the breadth of information and stop typologies that it provides, as well as its wide coverage throughout Minnesota. All of the truck stops with overnight parking included in the previously discussed data sources are also included in the *Trucker Path* data. Additionally, the *Trucker Path* app includes data for an additional 106 truck stops not included in any other data source. One potential downside of the *Trucker Path* app for the purposes of this study is that the accuracy of the truck parking capacity information is not easily verifiable at a large scale. In many instances, the *Trucker Path* capacity estimates are substantially different from the capacities listed in other data sources. However, in many cases this app provides the only available information on truck parking.

Figure 12. Trucker Path - Map Interface, Stop Information, and Parking Capacity



[3] http://fortune.com/2015/07/09/trucker-path-app/

Final Truck Parking Capacity Estimates

Each of the six data sources provides important information about specific aspects of truck parking infrastructure, but do not individually provide the complete picture of truck parking in Minnesota Developing parking capacity estimates throughout the state required additional and analysis of the data sources, comparison between data sources, and verification of some individual locations.

Database Development

The starting point of the analysis was to collect data for each truck stop listed on all six of the sources. Data collected included the stop name, latitude, longitude, company identification (ID) number, address, town/city, zip code, and phone number. Unique ID numbers were assigned to every individual stop. These unique ID numbers were used to track stops that appeared on multiple apps and allowed for the truck parking capacity values to be compared between sources.

Collection methodology varied depending on the app/source type. For directory or list-type sources (Trucker's Friend and *Park My Truck*), data was collected in the order that the stops were listed in the source. For example, the Trucker's Path manual has a list of over 200 truck stops. Starting with stop "A", data for every stop was collected in the order that it appeared. For map-based phone application sources (*TruckSmart, myPilot, Trucker Path*), collection was more challenging. Stops were not presented in a list format and could not be collected on-by-one. Instead, data was collected on a roadway-by-roadway basis. Starting at one end of a major roadway (I-90 in Southern Minnesota, for example), parking capacity data was collected for every stop along the roadway until the segment of the roadway within Minnesota ended. This ensured that every stop was collected throughout the state. In total, data for 214 truck stops was collected, including 51 public and 163 private sites. An additional 84 private truck stops were identified during the review which did not provide overnight truck parking.

Final Truck Parking Capacity Determination

Although some of the truck stop locations featured similar or identical parking capacity numbers across all sources, in many cases the number of spaces varied substantially from source to source. The following section details the steps taken to determine the most accurate capacity count.

Figure 13. Elm Creek Rest Area Aerial

Public Stops

Space counts for public rest areas were provided by both the published Jason's Law Survey data as well as from counts collected by MnDOT in 2018. Further examination and comparison between these two sources revealed that in several instances the count values did not match. Therefore, to ensure that accurate space counts were processed as part of the analysis, the space counts needed to be verified and validated.

This process was carried out by counting the number of spaces at each public stop using Google Earth aerial imagery. The publication year of the aerial imagery ranged between 2015 and 2018. For the purposes of determining the final capacity counts, if the aerial imagery of each public site was from 2017 or newer, the aerial space counts were used. Otherwise, the capacity counts provided by MnDOT were used. These capacity estimates were further confirmed for multiple sites during the field survey discussed in a later section.

Private Stops

Figure 14 below highlights the differences in the capacity counts between Park My Truck (NATSO) and Trucker Path, the two data sources with the highest number of recorded sites. While there is an overall correlation between the sources, in some cases the capacity counts for one source were more than three times higher than the other source. Part of this discrepancy stems from the difficulty of quantifying an exact number of parking spaces, particularly in parking areas that are gravel or unmarked. Figure 15 highlights an example of this situation for Olson's Truck Stop in Clearwater. Overnight truck parking is provided in the gravel lot to the west of the gas station. The actual capacity of the site is influenced by many factors such as how closely trucks are parked, the presence of materials or other vehicles stored on the site, and condition of the lot during adverse weather conditions such as heavy snow or rain. As an example of the discrepancy between data sources, the records for the Olson's Truck stop show a capacity of 100 in the NATSO Park My Truck app and a capacity of 40 in the Trucker Path App. The Trucker's Friend directory provides a range of 85-149 for this site.

This study identified approximately 20 truck stops with significant disparities for further review. An assessment of site aerials was conducted to estimate actual truck parking capacity based on a quantification of parking areas within each site and using a minimum parking stall area of 1,400 square feet per space (based on stall dimensions of 15 feet wide by 90 feet long). Using this method, it was found that in general, the NATSO parking capacity estimates were closer to the actual estimates found during the aerial review.

Figure 14. *Truck Stop Capacity Estimates*

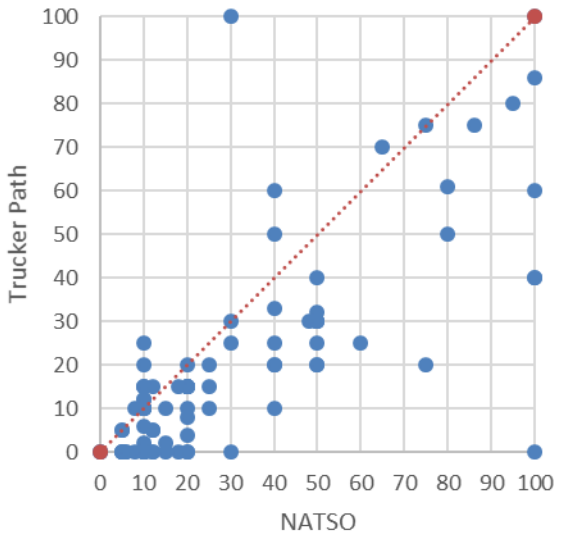


Figure 15. Olsen's Truck Stop Aerial

Based on the findings of the analysis, the final truck parking capacity estimates for the 163 private truck stops providing overnight parking were assigned using the following prioritization methods. An example of this methodology applied to four example sites is provided in Table 5 below.

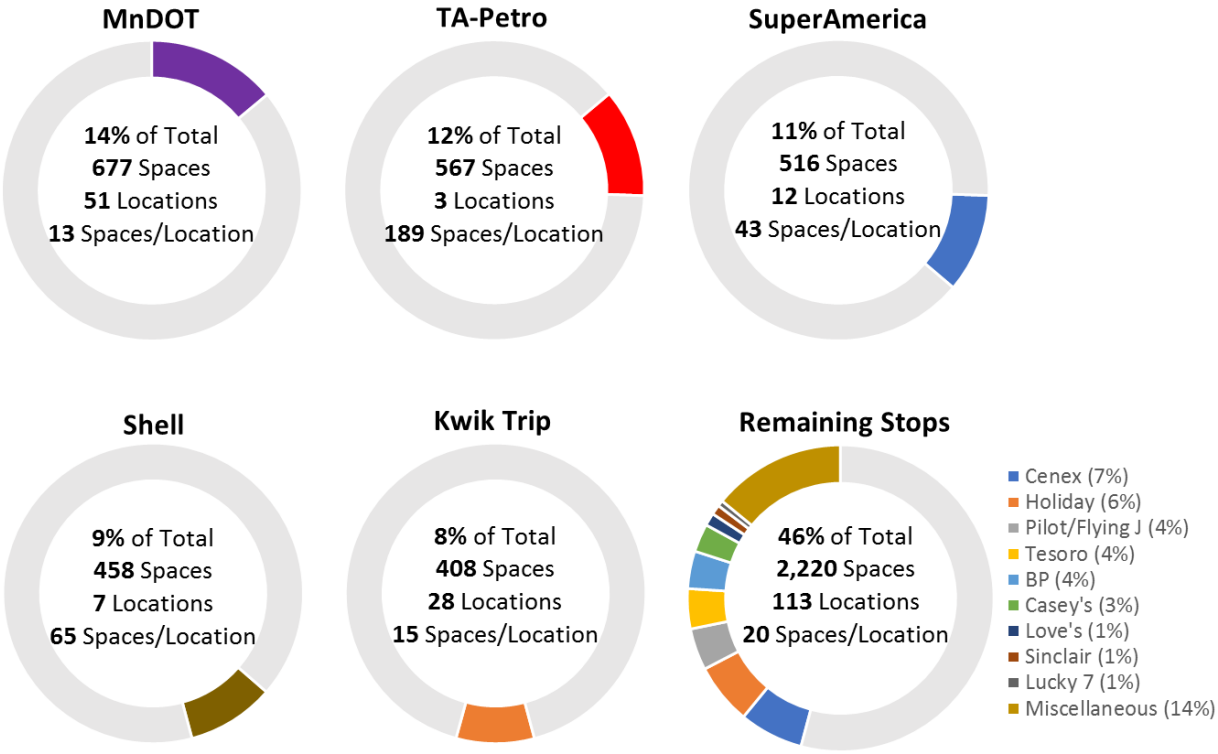
1. **TruckSmart (TA-Petro) or Pilot-Flying J:** Capacity estimates for these sites were gathered from the proprietary apps developed by TA-Petro and Pilot-Flying J. A total of seven sites were assigned capacity values using this method.
2. **Park My Truck (NATSO):** For all other stops, capacity estimates were gathered from the NATSO Park My Truck app (where available), given the higher accuracy found during the parking count verification step discussed above. A total of 87 sites were assigned capacity values using this method.
3. **Trucker Path:** The remaining truck stops not covered by either the TA-Petro, Pilot-Flying J proprietary apps or the Park My Truck app were assigned capacity values based on data in the Trucker Path app. A total of 69 sites were assigned capacity values using this method.

Table 5. Final Capacity Determination Examples: Private Stops

Truck Stop	Town	TA-Petro	Pilot/Flying J	NATSO	Trucker Path	Final Capacity
TA Rogers #190 (Shell)	Rogers	**112**	N/A	80	61	**112**
Pilot Travel Center #134	St. Cloud	N/A	**44**	50	40	**44**
Big Chief Truck Stop (Tesoro)	Fergus Falls	N/A	N/A	**75**	75	**75**
Kwik Trip #104	Clearwater	N/A	N/A	N/A	**20**	**20**

The final estimation of truck parking capacity within the state of Minnesota is 4,846 spaces. Of these spaces, 677 (14 percent) are provided by MnDOT at wayside rest areas. The remaining truck parking capacity is provided by a mix of private truck stop operators. A breakdown of the major truck parking providers is provided in Figure 16. The figure highlights the total estimated number of parking spaces, the number of facilities within the state, the percent of Minnesota truck parking capacity, and the average number of parking spaces per location provided by each provider. Out of the private truck stop providers, TA-Petro has the highest proportion of statewide truck parking capacity at 12 percent. This capacity is provided at only three locations, resulting in the highest number of spaces per location at 189. Statewide, the average number of truck parking spaces per location is 16.

Figure 16. Minnesota Truck Parking Capacity by Provider

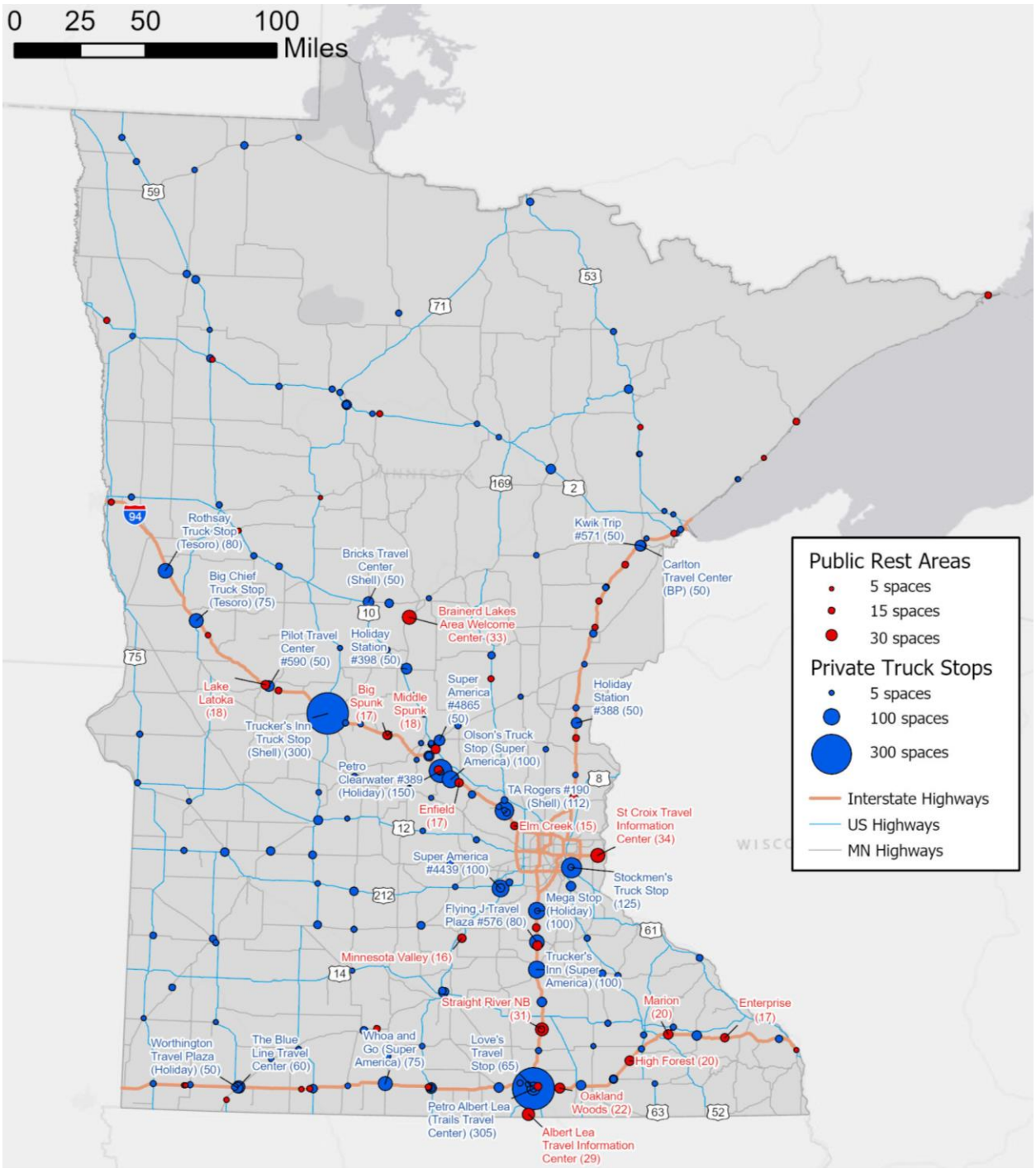


The distribution of truck parking capacity throughout the state is shown in Figure 17. The name and capacity of facilities are labeled for private locations with 50 or more truck parking spaces and public locations with 15 or more truck parking spaces. The size of the symbols representing each facility are scaled in relation to their truck parking capacity.

The majority of truck parking facilities are clustered in close proximity to either the Interstate or US Highway systems. The three highest capacity facilities in the state are the Petro Albert Lea (305 spaces) located at the intersection of I-35 and I-90, the Trucker's Inn Truck Stop (300 spaces) located on I-94 near Sauk Centre, and the Petro Clearwater (150 spaces) located on I-94. Many of the

larger capacity truck parking locations are located on I-94 between Minneapolis-St. Paul and Fargo and on I-35 between Minneapolis-St. Paul and the Iowa border. Many smaller capacity truck parking locations are located throughout the state, typically adjacent to US or State highways.

Figure 17. Minnesota Truck Parking Locations



Source: SRF analysis of 2015 Jason's Law Survey, 2017 Trucker's Friend National Truck Stop Directory, NATSO Park My Truck app, TA-Petro TruckSmart app, Pilot-Flying J myPilot app and Trucker Path app data.

5. Parking Demand Analysis

The previous section highlighted the location of truck parking throughout Minnesota. This section includes an assessment of truck parking demand by hour, by day, and by season. The primary data source used for this analysis is the American Transportation Research Institute's (ATRI) anonymized truck GPS dataset. This data was compared with the known truck parking capacity of a sample of 40 truck parking sites listed to identify instances where parking demand is near or exceeding capacity. This analysis helps to shed light on where truck parking demand is at its highest and identifies locations where additional truck parking capacity is needed.

ATRI Truck GPS Data

The ATRI Truck GPS dataset comprises a continuous stream of truck position data reported for more than 800,000 trucks. The data included in this stream contains the latitude and longitude of each vehicle, date and time stamps, speed of the vehicle, and other similar information. This data is recorded for each vehicle every few minutes to help paint a comprehensive picture of truck driving and parking behavior throughout the country.

In the past few years, ATRI has developed a methodology for using this truck GPS dataset to assess truck parking demand at specific site locations. This approach is well documented in a March 2017 technical memorandum for a Minnesota truck parking case study.[4] For this analysis, ATRI was provided with geofenced locations of 40 truck parking locations in the state. An example of this geofencing approach is shown in Figure 18. To account for potential seasonal variations data was collected for four two-week time periods throughout the year in 2018:

- March 5-18
- May 7-10
- September 10-23
- December 3-16

Figure 18. Geofence Boundary and HCAADT Site

For each site, this analysis identified and gathered data for all trucks inside the site boundary with a speed of zero mph as stopped or parked. Duplicate unique truck IDs were removed within each individual

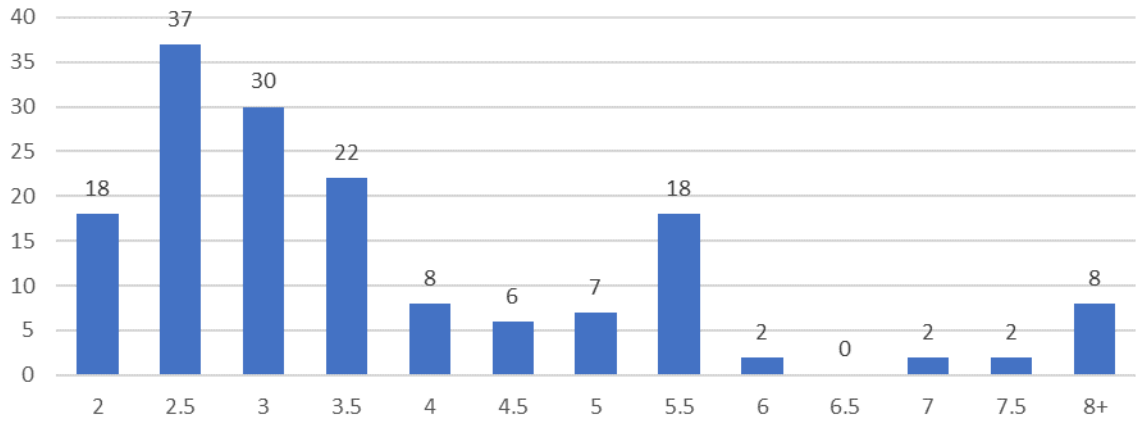
[44] *Managing Critical Truck Parking Tech Memo #2: Minnesota Case Study – Utilizing Truck parking GPS Data to Assess Parking Supply and Demand:* https://atri-online.org/wp-content/uploads/2017/02/Managing-Critical-Truck-Parking-Tech-Memo-2-02-2017-1.pdf

time frame (hourly and daily) to avoid counting the same truck multiple times.

The ATRI data represents only a sample of all truck activity on the roadway network. Therefore, in order to estimate total truck activity at each site it was necessary to develop expansion factors. These expansion factors were developed by comparing ATRI data to daily truck counts on nearby roadways where MnDOT Heavy Commercial Annualized Average Daily Traffic (HCAADT) values are known. An example of such a location is shown in Figure 18. In this example, the MnDOT HCAADT location recorded a value of 2,950 heavy commercial vehicles per day. Comparing this to the ATRI dataset along this same segment of roadway showed values between approximately 540 to 590 heavy commercial vehicles per day. To expand this value to approximate the actual daily truck counts in this area, expansion factors between 5.0 and 5.45 were used depending on the date of the data.

The distribution of ATRI expansion factors used in this analysis are summarized in Figure 19. The expansion factors ranged between a minimum of 2.13 at the Adrian Westbound public rest area, to a maximum of 17.11 at an I-94 frontage road in North Minneapolis. The median expansion factor used in the analysis was 3.44, representing a data saturation rate of 29 percent (i.e. on average, 29 percent of trucks parking at each facility were represented in ATRI's dataset).

Figure 19. Histogram of Analysis Inflation Factors



Analysis Locations

The demand analysis was completed for 40 locations throughout the state, including 24 public rest areas, 10 private trucks stops, three locations representing highway on and off ramps near major truck parking facilities, and three locations representing frontage road locations in the Minneapolis-St. Paul metropolitan area.

Public Rest Areas

The following 24 public rest areas were included in the demand analysis. These rest areas represent locations with high truck parking capacity and/or known recurring truck parking demand issues. A total of 416 truck parking spaces are located at these locations, representing 63 percent of public truck parking capacity within Minnesota.

- Hansel Lake
- Lake Latoka
- Burgen Lake
- Big Spunk
- Fuller Lake
- Elm Creek
- New Market
- Heath Creek
- Straight River SB
- Straight River NB
- Marion
- High Forest
- Oakland Woods
- Hayward
- Albert Lea Travel Information Center
- Blue Earth EB
- Blue Earth WB
- Clear Lake
- Adrian WB
- St Croix Travel Information Center
- Brainerd Lakes Area Welcome Center
- Tettegouche Visitor Center
- Enterprise
- Minnesota Valley

Private Truck Stops

The following private truck stops were included in the demand analysis. These facilities include the top ten highest capacity sites and represent 35 percent of the private truck parking capacity within Minnesota.

- Trucker's Inn Truck Stop (Shell), Sauk Center
- Petro Clearwater #389 (Holiday), Clearwater
- Stockmen's Truck Stop, South St. Paul
- TA Rogers #190 (Shell), Rogers
- Trucker's Inn (Super America), Faribault
- Mega Stop (Holiday), Lakeville
- Super America #4439, Shakopee
- Flying J Travel Plaza #576, Northfield
- Olson's Truck Stop (Super America), Hasty
- Petro Albert Lea (Trails Travel Center), Albert Lea

Select On/Off Ramp Locations

In addition to designated public and private parking locations, this study was also interested in quantifying the impact of parking in unauthorized parking locations such as highway on and off ramps. While parking at these locations is not authorized, many drivers use these sites as a last resort when parking in nearby authorized locations is unavailable and driving further to find available parking would violate their hours of service regulations. In a driver survey completed as part of this study, 70 percent of respondents said their frequency of only being able to find parking on ramps or shoulders was "occasionally," "often," or "always."

Three locations were selected for this analysis representing ramps near truck parking locations with known recurring capacity and overflow issues. These include the highway ramps near the St. Croix Travel Information Center on I-94 adjacent to the Wisconsin border (Figure 20), the ramps near the Elm Creek public rest area on I-94 in the northwestern Minneapolis-St. Paul metropolitan area (Figure 21), and the ramps near the Super America private truck stop on US Highway 169 in Shakopee (Figure 22).

Figure 20. Ramps Adjacent to St. Croix Travel Information Center

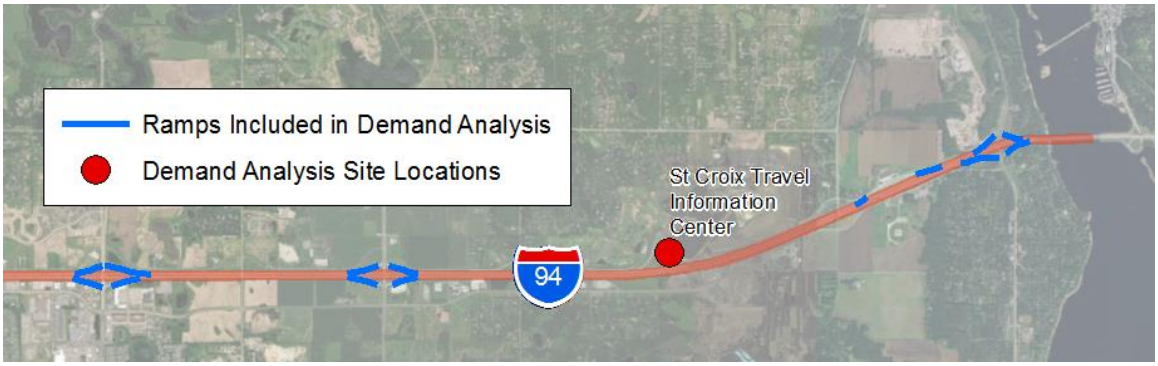


Figure 21. Ramps Adjacent to Elm Creek Rest Area

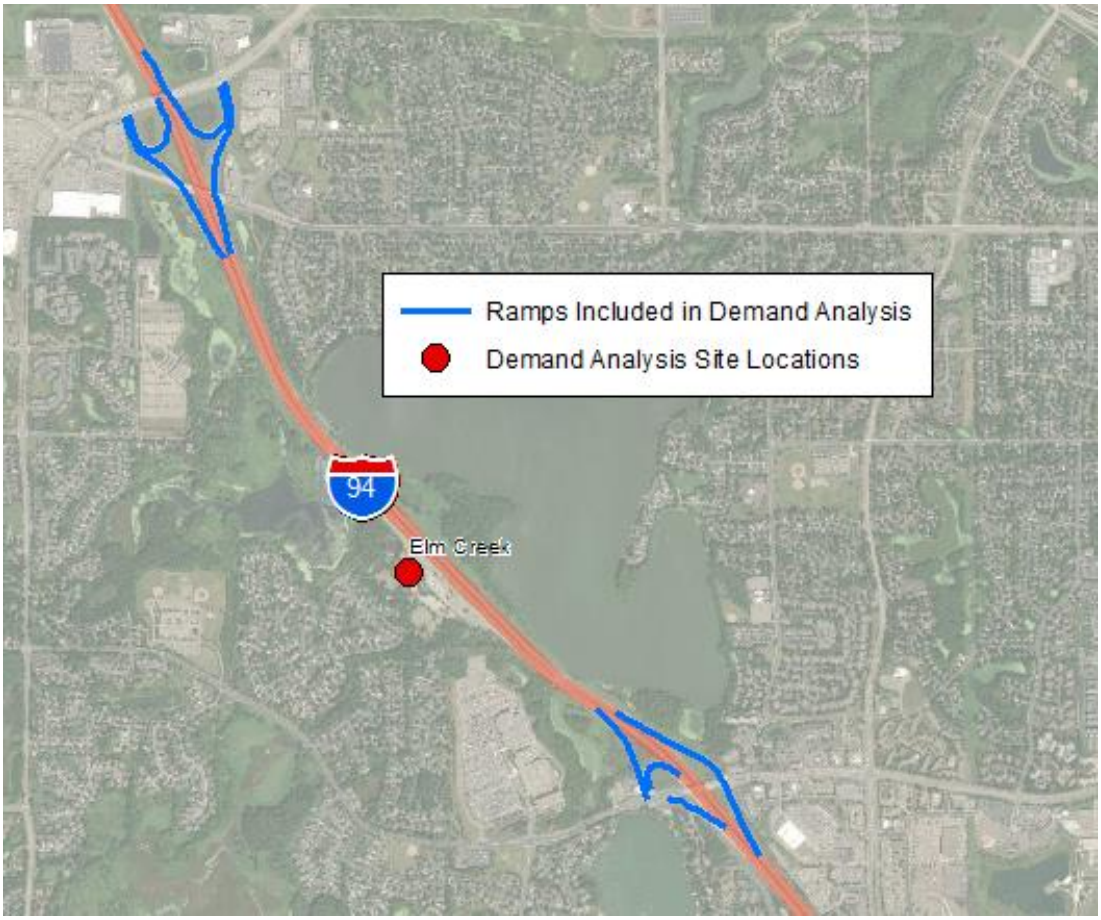
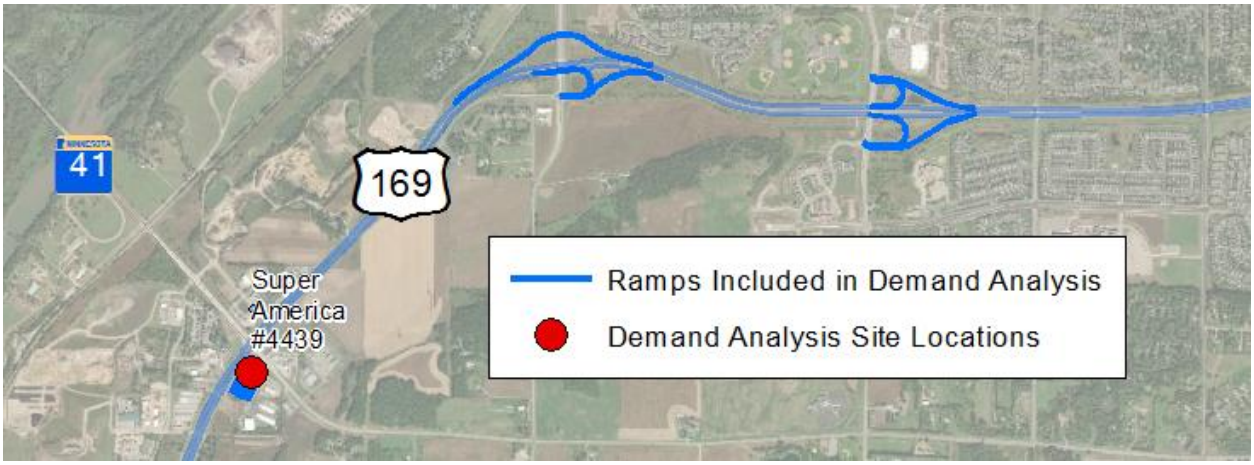


Figure 22. Ramps Adjacent to Shakopee Super America



Select Frontage Road Locations

In addition to designated public rest areas and private truck stop locations, in some instances many drivers also choose to park on local roadways. This parking may be related to the need to find overnight rest locations when the maximum hours of service is being reached, or it may be utilized for truck staging prior to making a final delivery. This analysis included three locations where high truck parking activity has been noted through field observation. These include Gateway Drive NW in Coon Ramps, I-94 frontage roads in North Minneapolis, and I-94 frontage roads located near Saint Paul College. The locations of these areas are shown in Figure 23.

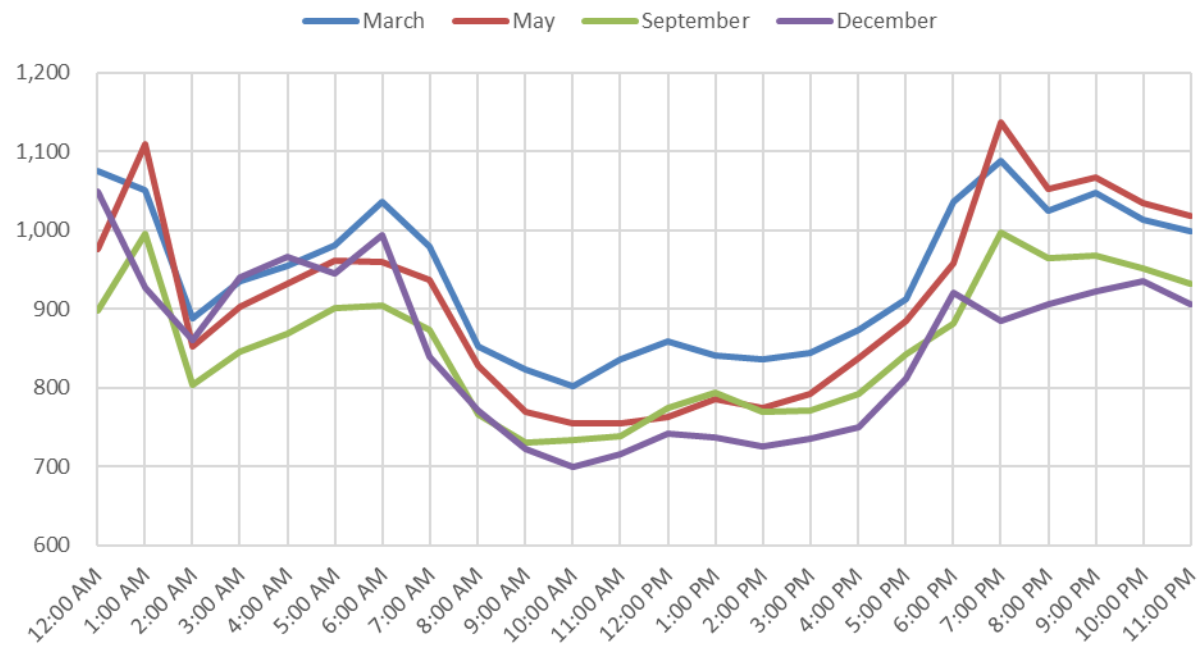
Figure 23. Local Roadways Included in Demand Analysis

Analysis Results

The distribution of truck parking demand by hour of the day is shown in Figure 24. This data includes all trucks within the 40 designated analysis sites that are fully stopped for any amount of time. Therefore, this analysis includes both long-term parking activity for drivers stopping in order to meet their hours of service requirements, and short-term truck parking activity for short rests. The data also includes truck parking related to temporary staging as part of the shipping and delivery process. Since the 40 analysis sites combined represent 39 percent of the estimated truck parking capacity in Minnesota, it is assumed that the data provides an accurate representation of truck parking activity statewide. However, it should be noted that the magnitude of truck parking demand in terms of trucks per hour or per day should not be interpreted to represent an actual count of statewide truck parking demand. Efforts to estimate total truck parking demand are discussed later in this document.

The lowest levels of truck parking activity occur approximately between the hours of 8:00 AM and 4:00 PM. From 5:00 PM to 7:00 PM truck parking activity increases substantially, reaching a peak level at 7:00 PM, and remains high until 2:00 AM. After this point truck parking activity drops before steadily rising again to another peak at 6:00 AM. The overall trend in truck parking activity changes very little between the March, May, September, and December data. The highest levels of truck parking activity are reached during the May time period at 7:00 PM.

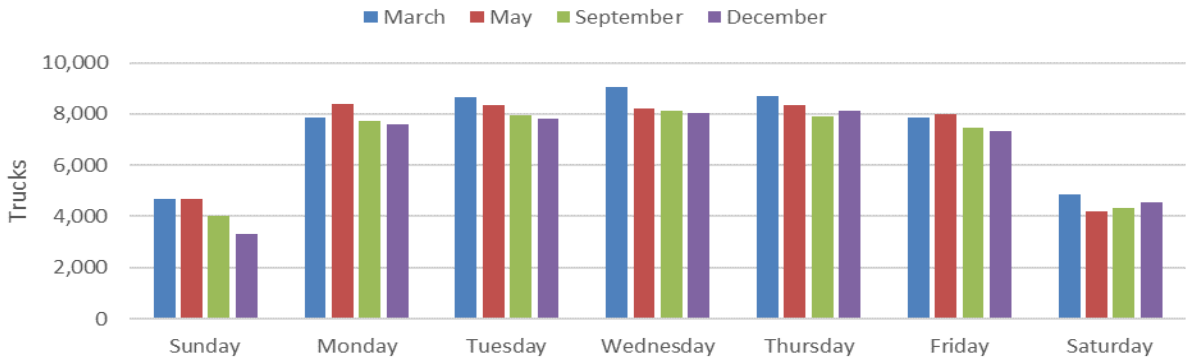
Figure 24. Statewide Hourly Truck Parking Demand



Source: SRF analysis of ATRI data.

The distribution of truck parking demand by day of week is shown in Figure 25. As expected, based on previous studies, truck parking activity is highest Monday through Friday. The level of truck parking activity on Saturday and Sunday drops nearly 50 percent from average weekday levels. Peak truck parking activity typically occurs on Wednesday or Thursday for the time period reviewed in this analysis.

Figure 25. Statewide Daily Truck Parking Demand



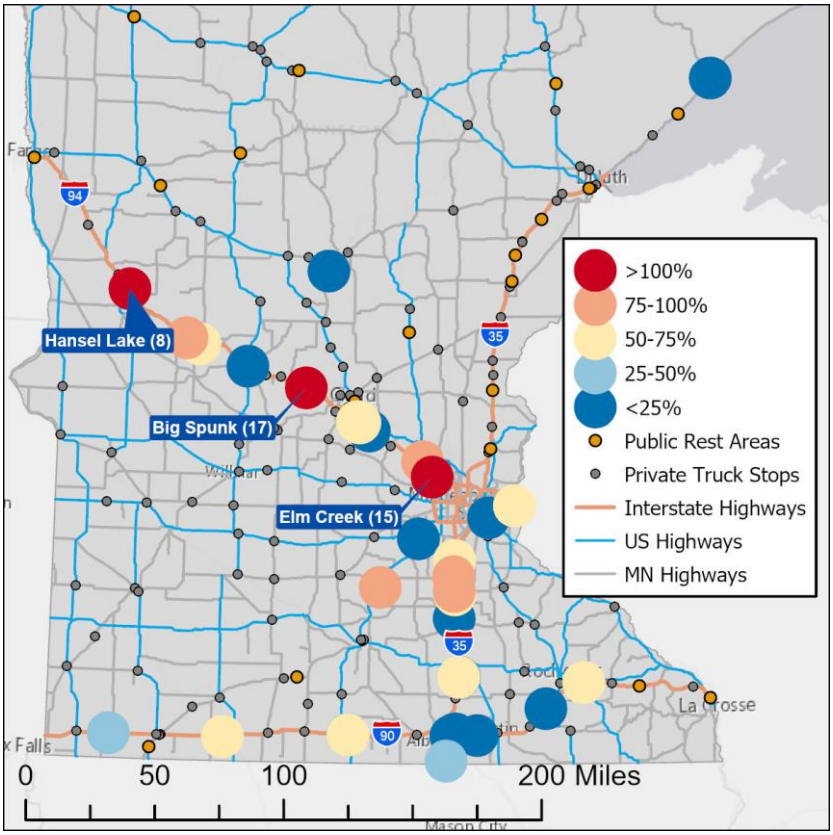
Source: SRF analysis of ATRI data.

Site-Level Utilization

Utilization of facilities throughout the state was measured by comparing the ATRI hourly truck parking activity to the truck capacity of each site. The ratio of demand to capacity at each site results in an estimation of percent utilization. As an example, if, over the course of a given hour, the ATRI data showed 20 trucks stopping at a site and the truck parking capacity of that site was 30 spaces, this would result in an estimated utilization of 67 percent. Utilization in excess of 100 percent indicates that a site is over capacity, with trucks likely parked in unauthorized locations (e.g., on and off ramps in the case of a public rest area). However, it is important to note that since the ATRI data includes all trucks that stop for any amount of time, a site showing a percent utilization of over 100 percent may also be the result of multiple trucks stopping for less than one hour.

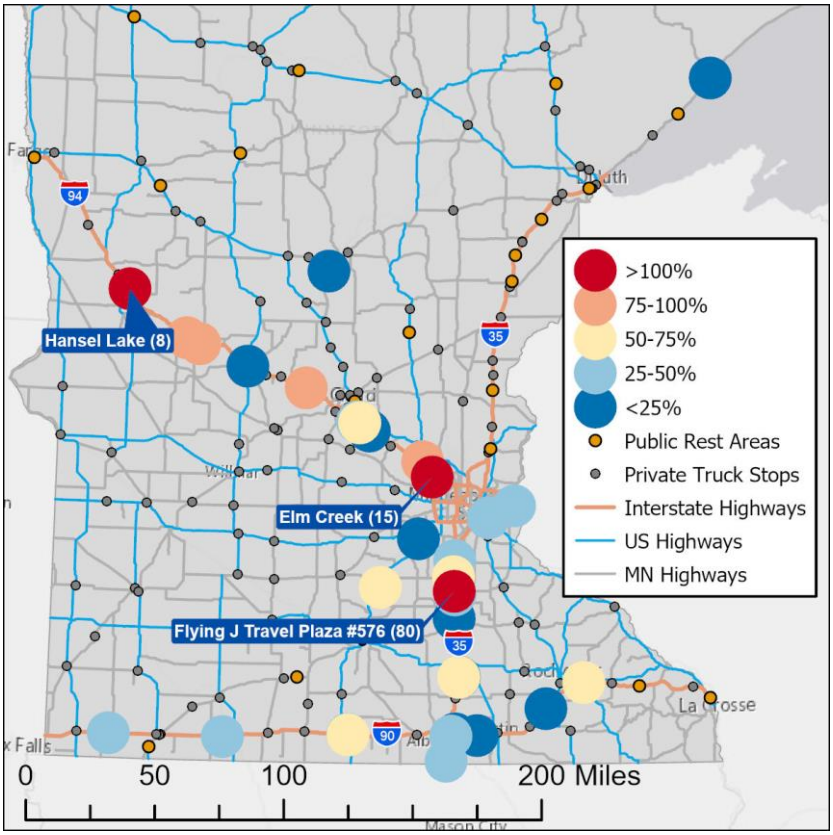
The following figures highlight truck parking utilization at the locations included in the demand analysis at various time throughout the day. Labels are provided for each location where truck parking utilization exceeds 100 percent. In general, truck parking utilization at these locations follows the hourly demand pattern shown in Figure 24, with demand lowest between the hours of 9:00 AM and 3:00 PM and peaks in activity between the hours of 6:00 PM and 6:00 AM. However, the utilization at individual facilities often deviates from this pattern. For example, truck parking utilization at the Hansel Lake and Big Spunk public rest areas exceeds capacity at 9:00 AM but is under capacity at 6:00 PM and 9:00 PM.

Many locations are also consistently over capacity throughout the day. The locations where demand exceeds capacity for more than 12 hours per day include the Elm Creek, Hansel Lake, Big Spunk, and Marion rest areas, the TA in Rogers, and the Flying J Travel Plaza in Northfield.



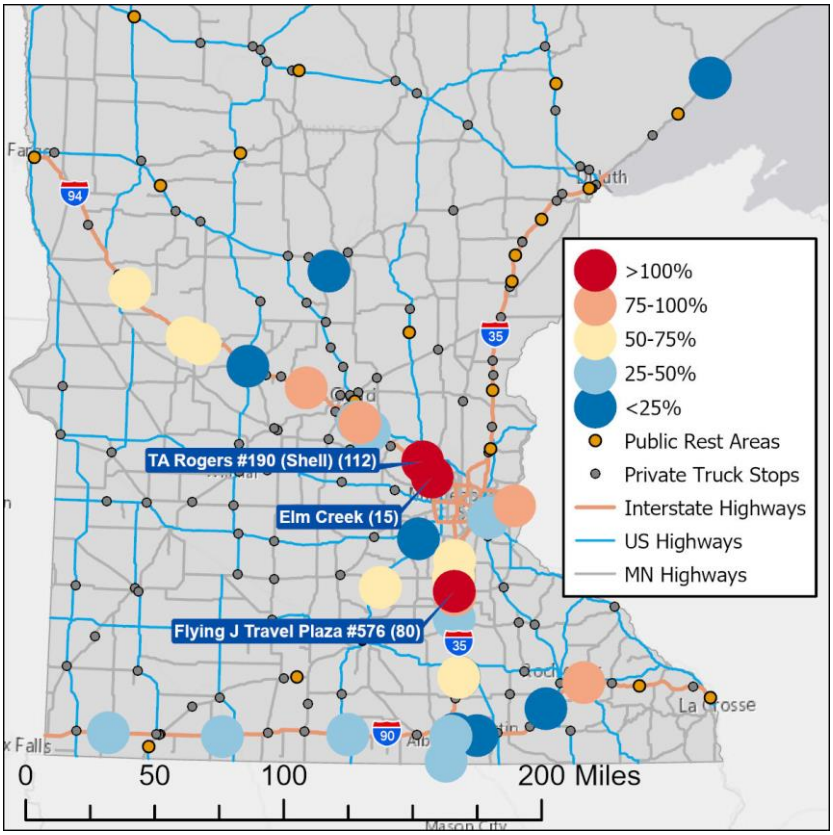
12:00 PM

This hour falls within the time period of lower truck parking demand. However, three sites (Hansel Lake, Big Spunk, and Elm Creek rest areas) exceed their capacity at this hour. Many locations along the I-94 and I-35 corridors also experience utilization in the 75-100 percent range. A portion of the utilization during this hour is likely due to truck drivers breaking for lunch.



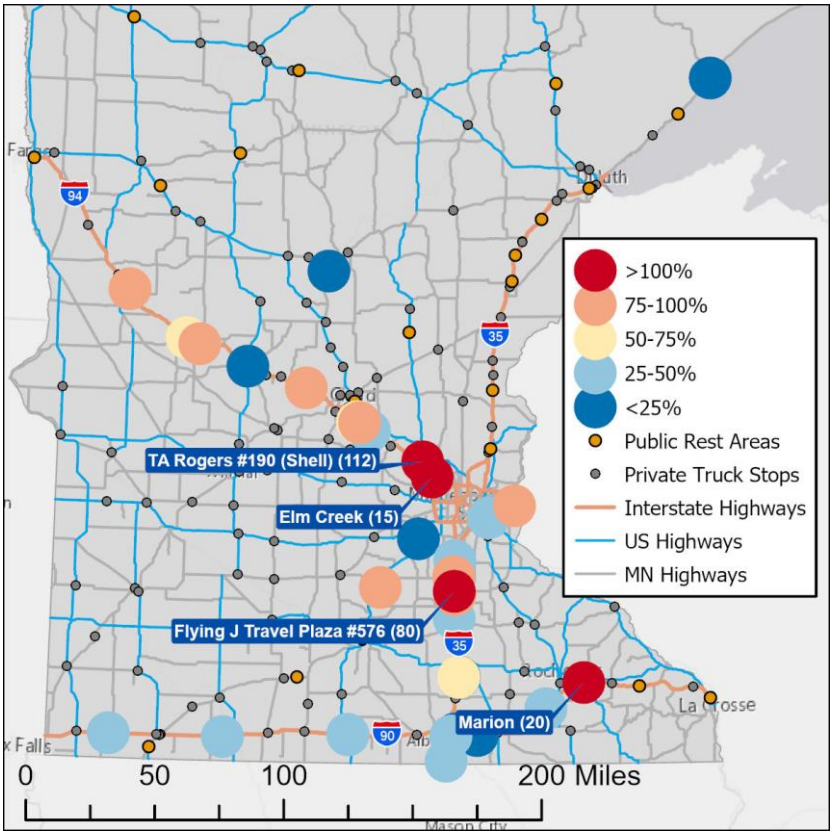
3:00 PM

Demand during this hour generally remains low at most locations. At this time, the Hansel Lake rest area exceeds capacity as well as the Flying J Travel Plaza. The Flying J will remain over capacity until 12:00 AM. However, many of the parking location surrounding the Flying J are substantially under capacity during this time.



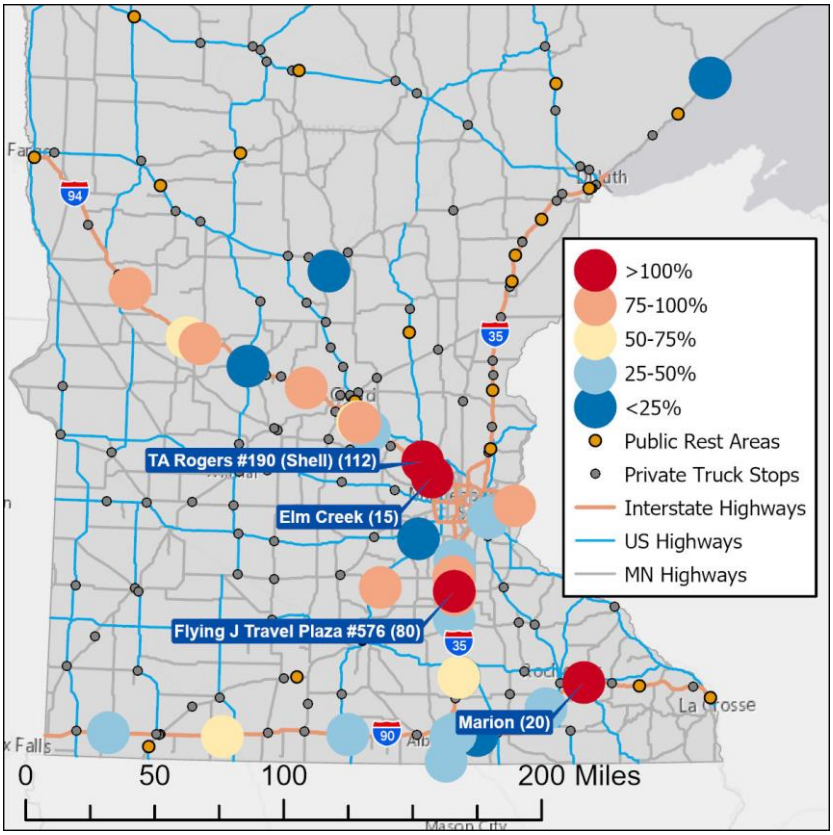
6:00 PM

This hour marks the start of the peak truck parking utilization time period. Many of the truck parking locations in and near the Minneapolis-St. Paul metropolitan area begin to exceed capacity, including the Elm Creek rest area, the TA in Rogers, and the Flying J in Northfield. Location outside of the metro generally remain under capacity.



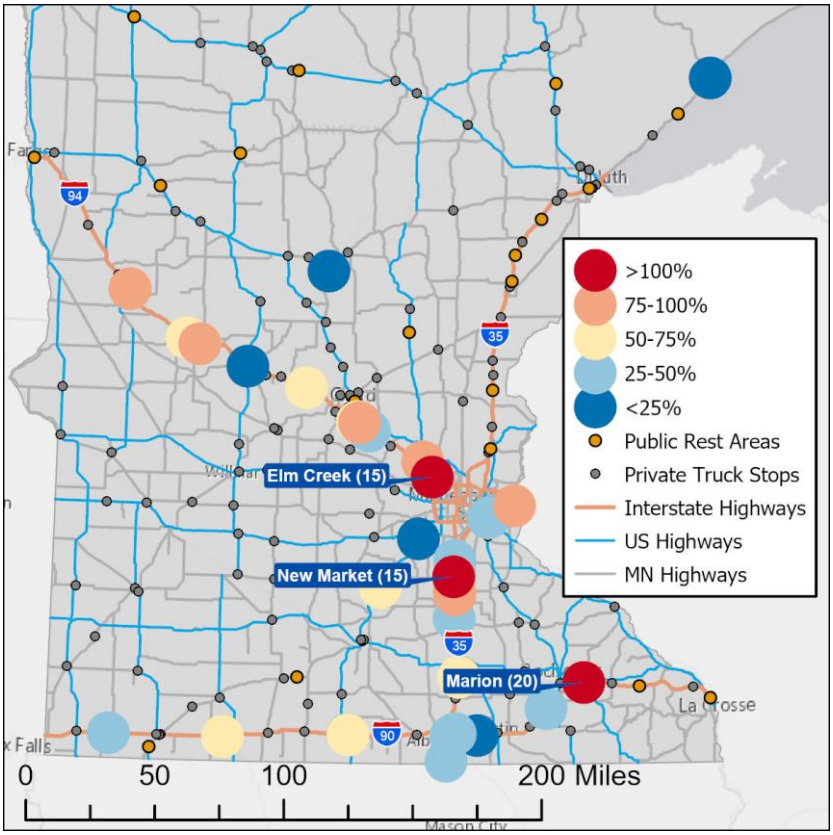
9:00 PM

Truck parking utilization continues to increase during this hour. The Elm Creek rest area, TA Rogers, and Flying J remain over capacity. Utilization at the Marion rest area also begins to exceed its capacity. Many other rest areas begin to reach their full capacity, specifically at sites along the I-94 corridor between Minneapolis-St. Paul and Fargo.



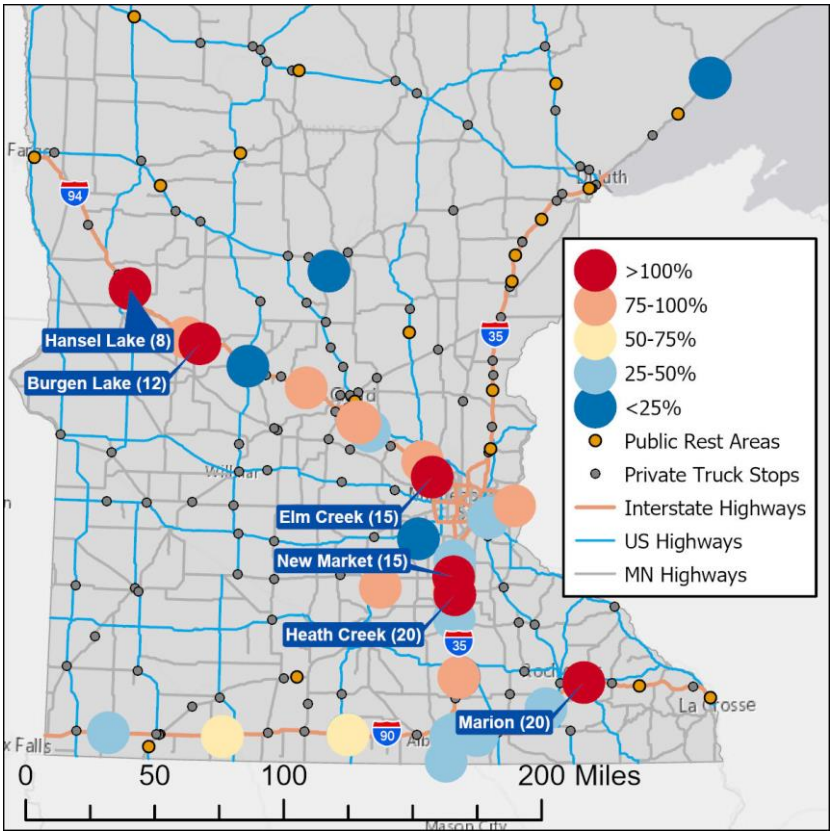
12:00 AM

Truck parking utilization during this hour remains nearly identical to the 9:00 AM hour. The Elm Creek and Marion rest areas, TA Rogers, and Flying J remain over capacity.



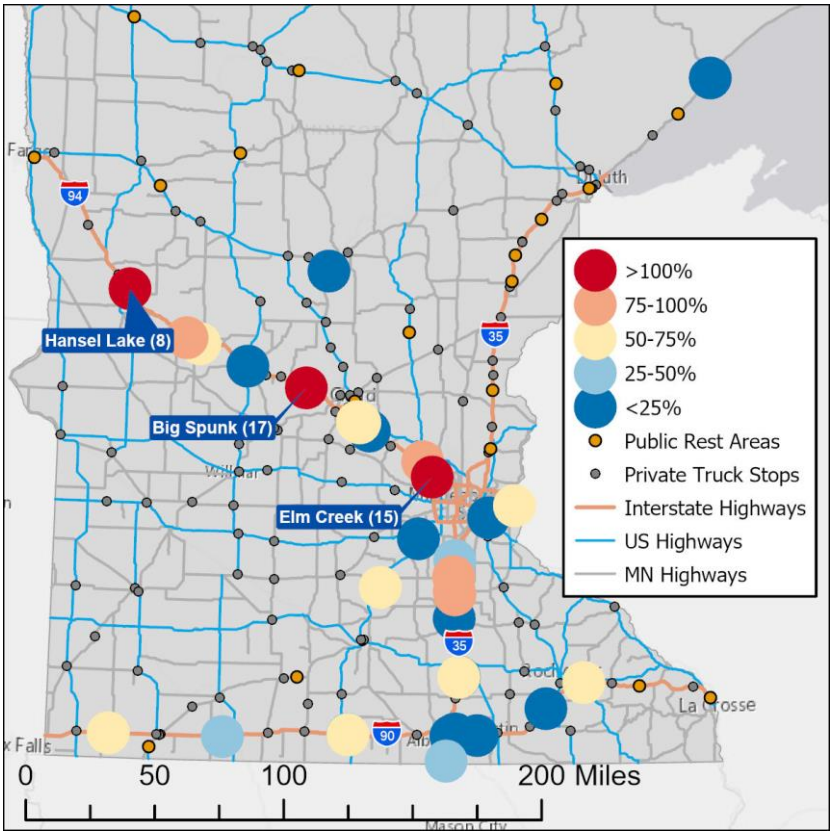
3:00 AM

Truck parking utilization during this hour remains over capacity at the Elm Creek and Marion rest areas. Utilization at the TA Rogers and Flying J falls into the 75-100 percent range, while the utilization at the New Market rest area begins to exceed capacity.



6:00 AM

This hour results in the highest number of locations exceeding capacity, including the Hansel Lake, Burgen Lake, Elm Creek, New Market, Heath Creek, and Marion rest areas. Interestingly the utilization during this hour is highest at public rest areas and relatively lower at many of the private truck stops.



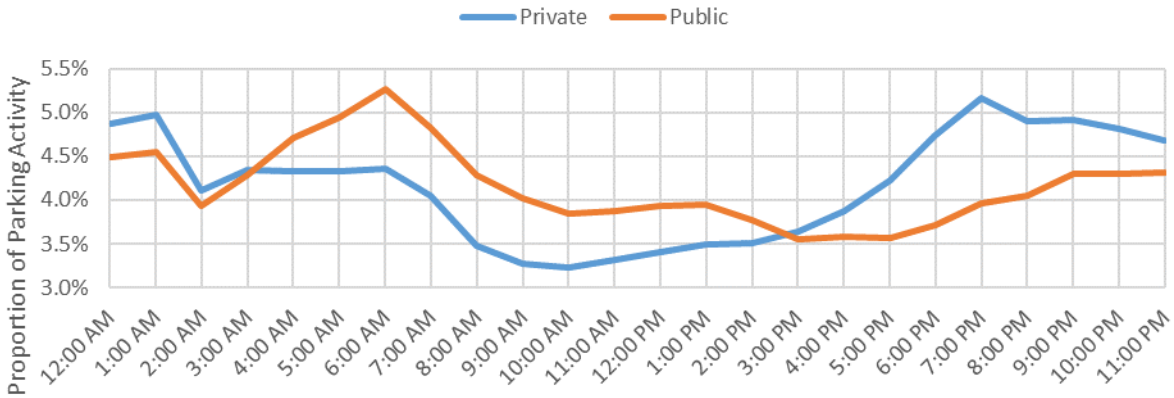
9:00 AM

During this hour, statewide truck parking utilization begins to fall. However, individual hot spots of truck parking activity still occur in some areas, specifically along the I-94 corridor where utilization at the Hansel Lake, Big Spunk, and Elm Creek rest areas exceeds capacity.

Public vs. Private Utilization

A review of the differences in truck parking utilization between public rest areas and private truck stops offers some interesting findings. Figure 26 displays the proportion of truck parking demand between the 24 public rest areas and 10 private truck stops included in this analysis. The figure shows that truck parking utilization at public rest areas is highest in the morning, specifically during at 6:00 AM, while utilization at private truck stops is highest at 7:00 PM. This higher evening utilization at private truck stops is likely attributable to truck drivers stopping for dinner. The high early morning utilization at public rest areas may be the result of truck drivers staging (e.g., parking and waiting until their final delivery destination opens for business).

Figure 26. Public and Private Truck Parking Utilization



Source: SRF analysis of ATRI data

Major Corridors and Directionality

One aspect that warranted additional review was the potential impact of the direction of travel on truck parking demand and utilization. To assess the impacts of this characteristic on truck parking behavior, this review isolated directional public rest areas on the three major corridors of I-94, I-35, and I-90. Private truck stops along these corridors all provide bidirectional access and were therefore excluded from this review. The proportion of truck parking activity by direction is shown in Figure 27 (I-94), Figure 28 (I-35), and Figure 29 (I-90) below.

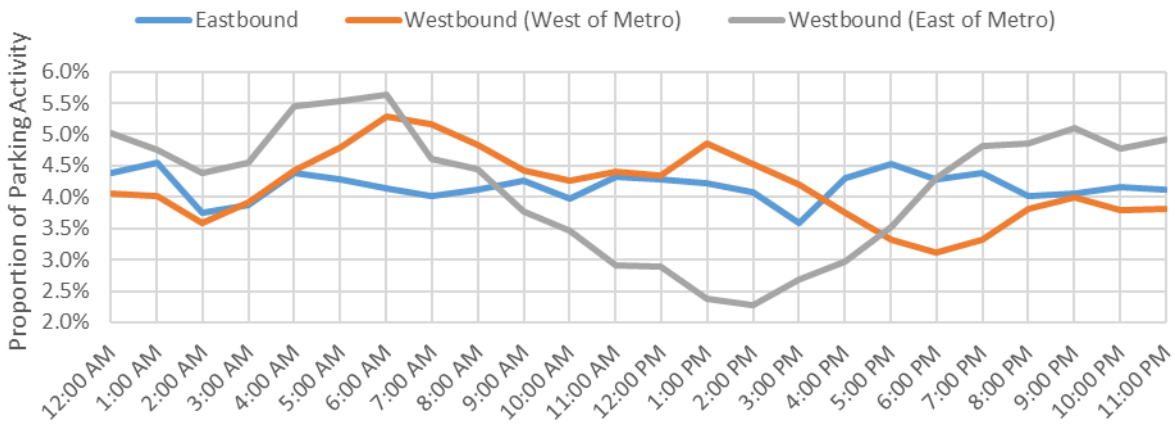
The overall distribution of parking activity along these corridors largely follows the trend for all public rest areas shown in Figure 26 above. However, there are some key differences in direction for certain corridors:

- In the I-94 corridor it is important to distinguish the St. Croix Travel Information Center (TIC)—which lies east of the Minneapolis-St. Paul metro—from the remaining rest areas west of the metro. The St. Croix TIC experiences a substantial peak in activity between 4:00 AM and 6:00 AM, following by a fall in

activity between 8:00 AM and 7:00 PM. This is most likely related to truck drivers using the St. Croix TIC as a staging location prior to entering the metro area. While the westbound activity west of the metro follows a somewhat similar pattern, its peak in activity occurs over a longer duration (6:00 AM to 1:00 PM) and the difference between peak and non-peak activity levels are not as severe. Meanwhile, the eastbound truck parking activity remains relatively flat throughout the day.

- The I-35 and I-90 corridors experience very little differentiation in parking activity levels between the northbound/southbound and eastbound/westbound directions. In both corridors, there is a slight increase in activity between the hours of 12:00 PM and 3:00 PM for the southbound direction on I-35 and the eastbound direction of I-90. This may be related to the drivers hitting their hours of service limits after leaving the Minneapolis-St. Paul metro and south on I-35 and east on I-90.

Figure 27. I-94 Rest Area Demand by Direction



Source: SRF analysis of ATRI data

Eastbound Rest Areas:

- Big Spunk
- Elm Creek

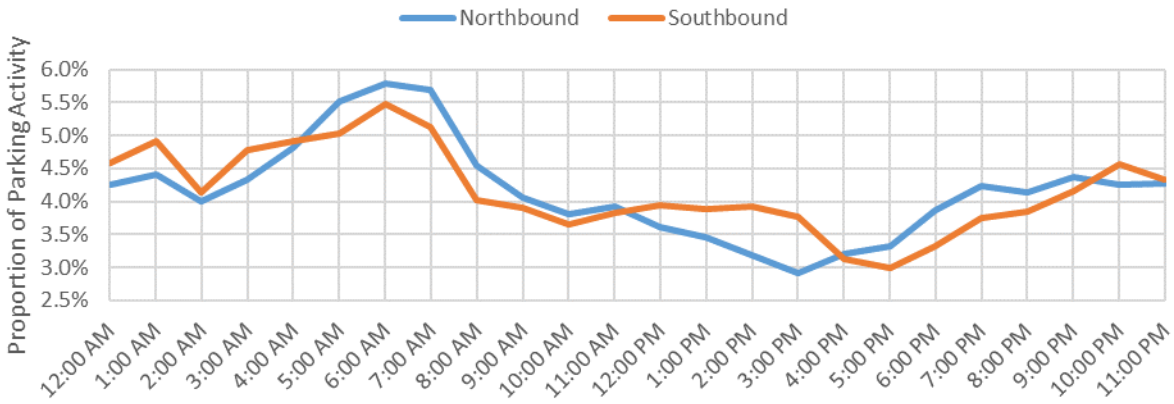
Westbound Rest Areas (East of Metro):

- St. Croix Travel Information Center

Westbound Rest Areas (West of Metro):

- Burgen Lake
- Fuller Lake
- Hansel Lake
- Lake Latoka

Figure 28. I-35 Rest Area Demand by Direction



Source: SRF analysis of ATRI data

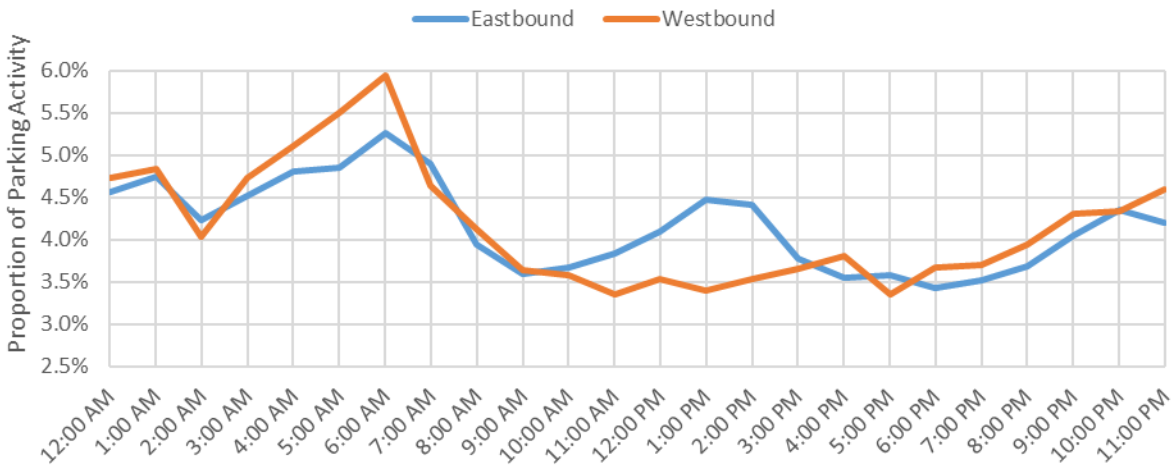
Northbound Rest Areas:

- Albert Lea Travel Information Center
- Heath Creed
- Straight River

Southbound Rest Areas:

- New Market
- Straight River

Figure 29. I-90 Rest Area Demand by Direction



Source: SRF analysis of ATRI data

Eastbound Rest Areas:

- Blue Earth
- Clear Lake
- Enterprise
- Hayward
- High Forest

Westbound Rest Areas:

- Adrian
- Blue Earth
- Marion
- Oakland Wood

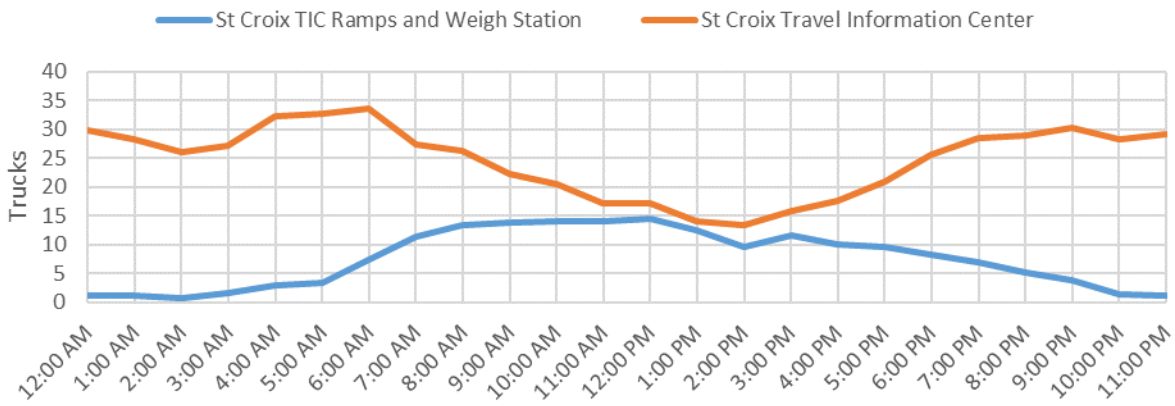
Select Highway Ramps

Another aspect of truck parking that was reviewed during this analysis was the impact of overcapacity parking conditions on adjacent highway ramps. Truck drivers seeking parking at a facility may find it over capacity, but still must find a place to park in order to avoid violating their hours of service requirements. Based on anecdotal evidence and findings from stakeholder outreach efforts, many drivers under these conditions choose to park at highway on and off ramps. While parking at these locations is not legally authorized, many drivers find this option preferable to violating their hours of service.

Three locations were chosen where highway on and off ramp parking has been observed by State Patrol and others. These include the ramps and weigh station adjacent to the St. Croix TIC, the ramps adjacent to the Elm Creek rest area, and the ramps adjacent to the Super America private truck stop located in Shakopee. This analysis compared the overall truck parking demand at each site with the respective nearby ramps to identify potential trends in ramp parking usage.

The demand analysis results for the St. Croix TIC are shown in Figure 30. The overall truck parking demand for the TIC correlates with the general trends at public rest areas of higher demand in the evening and early morning hours, with lower demand in the midday period. The demand at the associated ramps and weigh station shows an opposing trend with the highest demand during the midday period between 7:00 AM and 5:00 PM. Much of this activity is associated with trucks stopping at the weigh station. The expected result of higher truck parking activity at the ramps immediately following the evening peak activity at the TIC does not show through in this data. On average, the data show one truck in total parked at the ramps and weigh station during the hours of 9:00 PM to 3:00 AM. Given the first-hand accounts of trucks parking overnight at these locations, this finding could be a result of those trucks not being represented as well in the ATRI dataset. This finding may also indicate that parking at these ramps and weigh station are not a recurring issue but are rather conditions that occur only during occasional truck parking peaks not captured within the timeframe of the ATRI dataset.

Figure 30. St. Croix Travel Information Center and Adjacent Ramps and Weigh Station

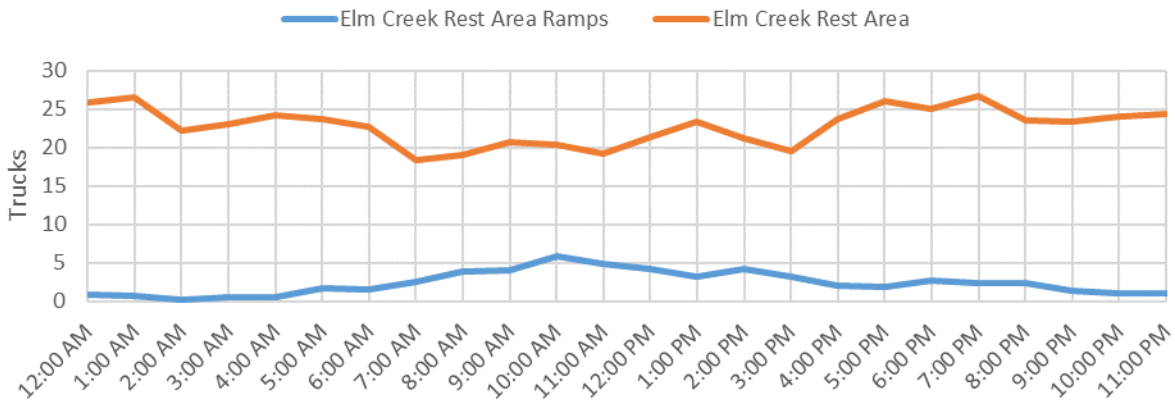


Source: SRF analysis of ATRI data

The demand analysis results for the Elm Creek rest area and adjacent ramps are shown in Figure 31. Truck parking demand at the Elm Creek rest area loosely follows the statewide truck parking activity trends. Parking activity remains high throughout the day with only a very slight dip in activity during the midday hours. Similar to the result at the St. Croix TIC ramps, parking activity at the ramps adjacent to Elm Creek also appears minimal. Parking activity between the hours of 9:00 PM and 3:00 AM averages one truck parked. There is a slight increase in truck parking activity on the ramps during the midday, but it is also possible that this data is including truck backing up onto the ramps due to traffic signal delays.

No data was recorded in the ATRI dataset for the ramps adjacent to the Shakopee Super America location.

Figure 31. Elm Creek Rest Area and Adjacent Ramps



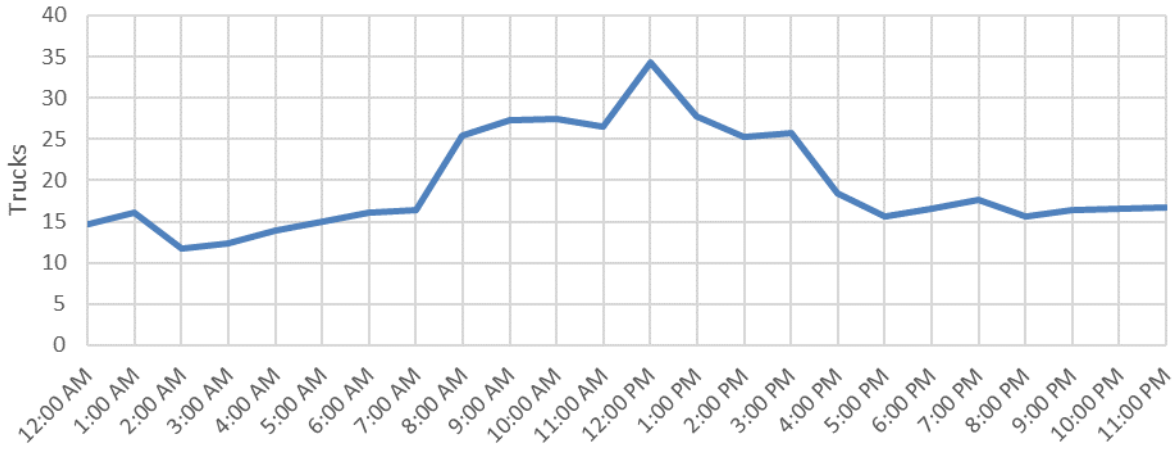
Source: SRF analysis of ATRI data

Frontage Roads

The final analysis completed with the ATRI data was an assessment of truck parking activity on three local roadways adjacent to major highway corridors. These included Gateway Drive NW near US Highway 10 in Coon Rapids, Washington Avenue N near I-94 in North Minneapolis, and portions of St. Anthony Avenue and Concordia Avenue near I-94 in Saint Paul. While the data did not record any truck parking activity on the Gateway Drive NW or the St. Anthony Avenue/Concordia Avenue locations, it did record data for the Washington Avenue N location, as displayed in Figure 32.

The figure highlights a high level of truck parking activity throughout the day with higher levels of activity in the midday period and a peak in activity during the noon hour. On average, the data estimates that approximately 15 trucks park along this roadway segment overnight. The data indicate that the road is used for both long-term overnight parking as well as truck staging and temporary rests. Since the data for frontage road locations was relatively limited and inconclusive, the truck parking issues identified by project partners in these areas will need to be evaluated and addressed using alternative techniques.

Figure 32. Parking Activity on Washington Avenue North



Source: SRF analysis of ATRI data

StreetLight Insight

Since 2017, MnDOT has contracted with StreetLight Data to provide multimodal transportation data for both statewide and small-scale analyses. The StreetLight InSight software tool allows MnDOT to collect trip counts and origin-destination information for passenger vehicle traffic, bicycles, pedestrians, and—most importantly for this study—commercial vehicles. StreetLight's commercial vehicle data is provided by INRIX, which collects its data from more than 400,000 commercial vehicles across the country. While the saturation rate for INRIX and StreetLight data is not as high as it is for the ATRI data, given MnDOT's current

vendor agreement, it provides easy-to-access commercial vehicle data at a statewide level.

For the purposes of this analysis, the ATRI data is assumed to be the more accurate and representative data source as applied to the 40 individual analysis sites. The role of the StreetLight data is to provide a high-level overview of truck parking activity throughout the state as a means of assessing approximate truck parking demand and utilization at the zip-code level.

Data Selection

In order to limit StreetLight's heavy commercial data to only those trucks which are the focus of this study, the following data queries were used:

- Include only trucks classified as "heavy commercial." This category includes vehicles with a gross vehicle weight of 26,000 pounds or more.
- Include only truck trips with a duration of more than 150 minutes. The purpose of this query is to limit the amount of short-haul truck trips from the data. Short-haul trips generally occur within a local area and typically do not require the use of long-term parking or staging locations. Trips with a duration over 150 minutes (the longest trip duration categorized within the StreetLight data) focus the analysis on the trucks most likely to require the truck parking facilities reviewed in this study.

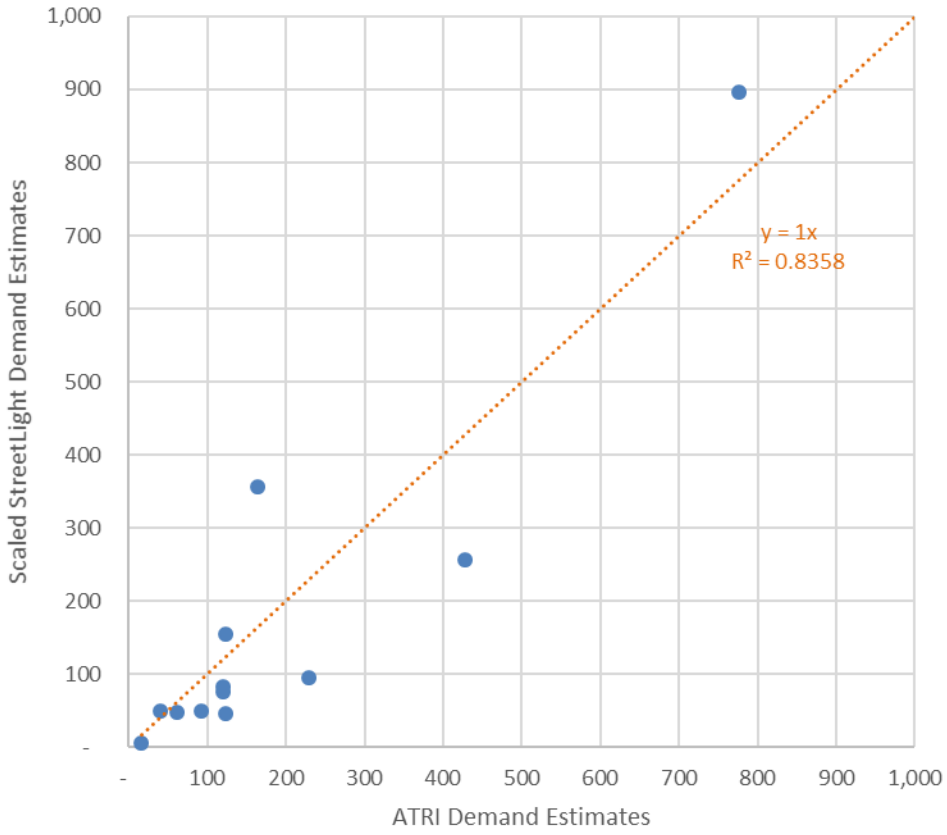
Once these queries were applied, the resulting trips were analyzed to identify the destination point locations ending within each zip code in the state. As provided, the StreetLight data can be used to assess order of magnitude differences within the data but cannot be used to estimate hourly or daily trip counts. In order to generate this level of detail, the StreetLight data must be scaled to known values such as Heavy Commercial Annualized Average Daily Traffic (HCAADT) counts. For this analysis, the scaling process was completed by first identifying zip codes in which all of the known truck parking locations were included in the ATRI demand analysis. Within the twelve zip codes meeting these criteria, it is assumed that the truck parking demand measured in the ATRI analysis will be approximately equal to the truck parking demand measured in the StreetLight data. Using these twelve zip codes, a simple linear scaling factor was developed to apply to the StreetLight data. The resulting correlation between the scaled StreetLight and ATRI data is shown in Figure 33.

This scaling factor was then applied to the remaining StreetLight zip-code level truck parking values to develop an estimate of average daily truck parking demand within the state of Minnesota. Using this methodology results in the following estimates:

- Average daily long-haul truck trips in Minnesota: **26,206**
- Average truck trips ending during peak parking timeframe (6:00 PM – 3:00 AM) = **5,800**

The estimated overnight parking demand for long-haul truck trips of 5,800 is higher than the total estimated Minnesota truck parking capacity of 4,846 spaces. This element of demand exceeding capacity is reflected in the demand analysis discussed in the previous section.

Figure 33. Scaled StreetLight vs. ATRI Demand Estimates



Source: SRF analysis of ATRI and Streetlight Insight data

Zip-Code Level Truck Parking Demand

The StreetLight truck parking data was used to develop zip code level estimates of truck parking demand. The average daily truck parking demand in each zip code is shown in Figure 34. The figure highlights the strong correlation between truck parking demand and proximity to the Interstate Highway System. Demand is particularly high along the I-94 corridor between Minneapolis-St. Paul and Fargo-Moorhead and the I-35 corridor between Minneapolis-St. Paul and I-90. The highest levels of demand in the state occur near the intersection of I-35 and I-90 near Albert Lea. Notable levels of demand also occur along US 169 near Mankato.

Zip-Code Level Truck Parking Utilization

One method used in this study to help determine locations where additional truck parking capacity is needed was to compare the zip-code level demand to the existing zip-code level truck parking capacity throughout the state. The capacity for each site included in the truck parking inventory developed as part of this study was tallied by zip code. The ratio of demand to capacity within each zip code is displayed in Figure 35.

Many areas that appear prominently in the demand map do not show as strongly in the demand vs. capacity map. For example, the high-demand area near the intersection of I-

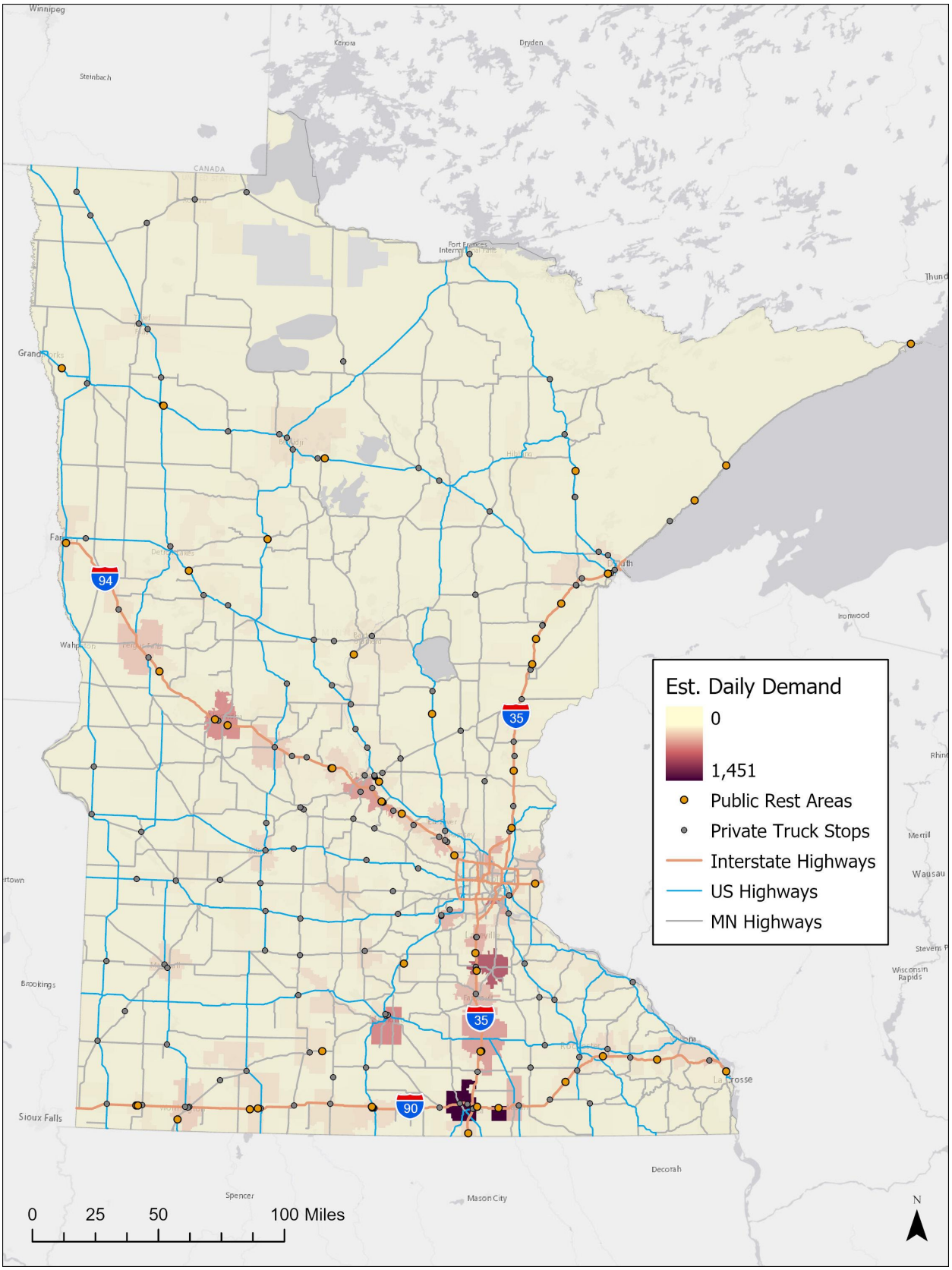
35 and I-90 does not appear in the demand vs. capacity map. Despite having the highest demand in the state, there is also a large amount of truck parking capacity in place to accommodate this need. The area with the highest ratio of demand to capacity is located on I-35 near Northfield. Other locations with relatively higher demand to capacity ratios include areas on I-35 near Duluth, the I-94 corridor between Minneapolis-St. Paul and St. Cloud and the I-35 corridor between Minneapolis-St. Paul and the Iowa border.

Table 6 below summarizes the 15 zip codes in Minnesota with the highest ratio between average daily demand and total parking capacity. Larger versions of Figure 34 and Figure 35 are included in Appendix D.

Table 6. Top 15 Zip Codes by Demand/Capacity

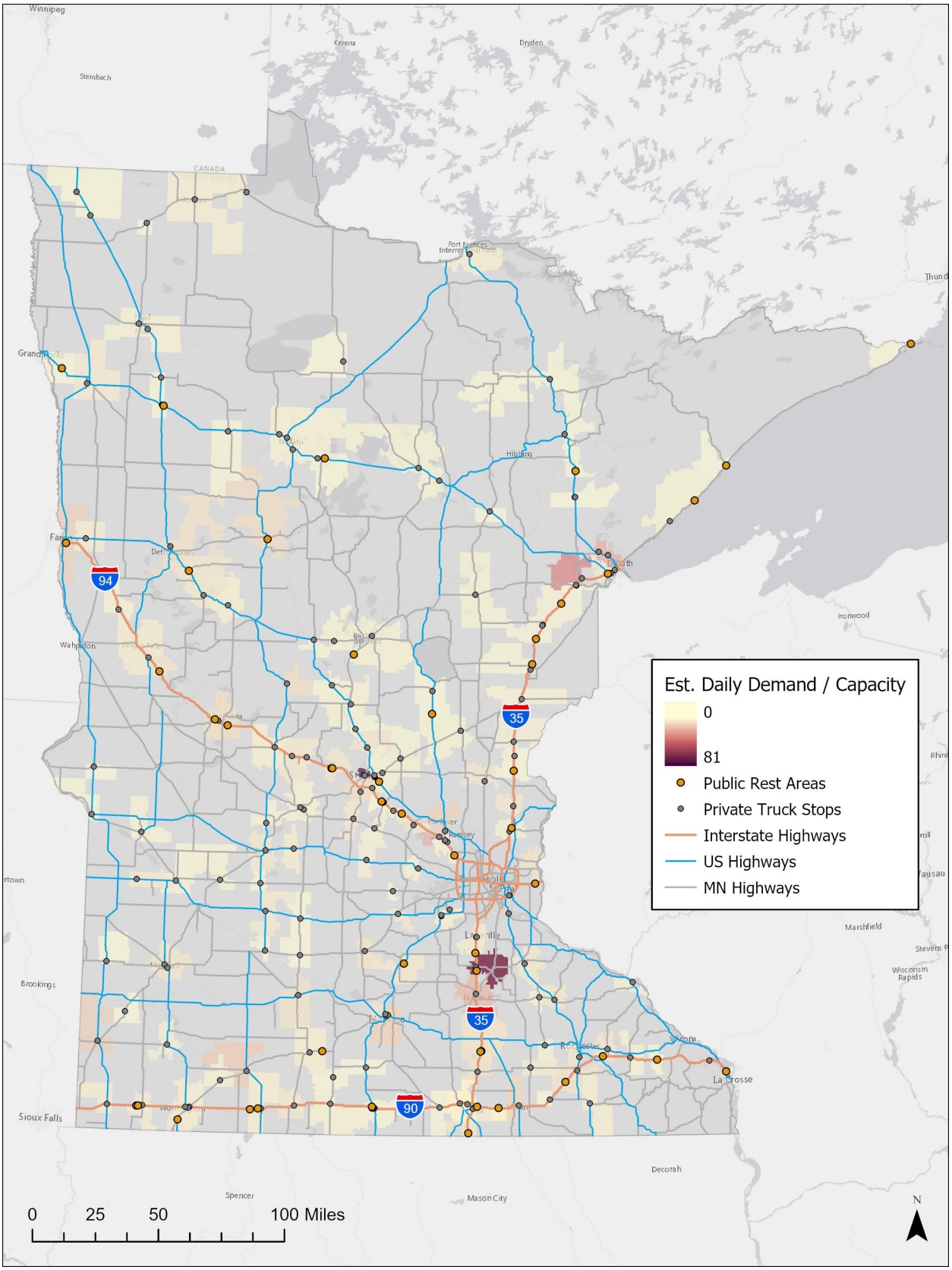
Rank	Zip Code	Daily Demand/Capacity Ratio	Primary City
1	56303	81.0	St. Cloud
2	55057	64.0	Northfield
3	55720	33.3	Cloquet
4	55811	20.8	Duluth
5	55376	20.4	St. Michael
6	55021	17.9	Faribault
7	55925	14.2	Dakota
8	56101	13.2	Wilder
9	55330	11.7	Elk River
10	56164	11.5	Pipestone
11	55077	11.5	Inver Grove
12	56560	11.3	Moorhead
13	56001	10.8	Mankato
14	55912	9.7	Austin
15	56470	8.4	Park Rapids

Figure 34. Estimated Daily Truck Parking Demand



Source: SRF analysis of Streetlight Insight data

Figure 35. Estimated Daily Truck Parking Demand vs. Capacity



Source: SRF analysis of Streetlight Insight data

6. On-Site Field Survey

Field surveys of 20 public rest areas were completed as part of this study to identify site-specific issues and to field verify data collected during the development of the statewide truck parking inventory. The field surveys were completed between Monday, February 11 and Thursday, February 14, 2019. The surveys were completed between the hours of 10:00 PM and 6:00 AM to coincide with the timeframe for peak truck parking utilization. In addition to measuring truck parking utilization, the field surveys also assessed site characteristics such as lighting conditions, pavement quality, and site circulation issues. The field survey also identified instances of trucks parking on highway on and off ramps adjacent to each rest area to identify potential capacity and parking overflow issues. An example of the survey form used during the field reviews is provided in Appendix B. The following rest areas were included in the field review:

- Adrian WB
- Albert Lea TIC
- Big Spunk Lake
- Blue Earth EB
- Blue Earth WB
- Burgen Lake
- Clear Lake
- Elm Creek
- Fuller Lake
- Hansel Lake
- Hayward
- Heath Creek
- High Forest
- Lake Latoka
- Marion
- New Market
- Oakland Woods
- St Croix TIC
- Straight River NB
- Straight River SB

Winter Weather Conditions

February 2019 proved to be the snowiest February in recorded history in Minnesota with a record 30.4 inches of snowfall. Many of the rest areas were surveyed during or immediately after major snowfall events. These conditions impacted both the conditions of the rest areas (e.g., snowdrifts blocking parking areas) and simultaneously increased the demand on the facilities with many drivers choosing to park at a rest area rather than continue to travel. Some photos of the site conditions during the field survey are shown in Figure 1 and **Error! Reference s ource not found.**.

The site conditions emphasized the multi-purpose nature of the rest areas as both sites for routine rest breaks as well as safe refuges during extreme storm events. The significant over-capacity issues at many locations also highlighted the importance of planning and designing the rest area network in preparation for similar storm events in the future.

Figure 36. Big Spunk Lake Rest Area

Figure 37. Hansel Lake Rest Area

Summary of Results

A summary of the field survey findings is shown in Table 7. The table includes a summary of pavement condition, weather conditions during the review, rest area capacity and utilization, and the presence of parking on nearby highway on and off ramps.

- **Pavement condition** was measured on a subjective scale ranging from good (smooth pavement with minimal cracks and potholes), to fair (some potholes or rough surfaces), to poor (notable pavement defects and rough driving surface). The majority of pavement conditions were recorded as good. Two locations (Burgen Lake and Heath Creek) were recorded at poor, while four location (Adrian WB, Blue Earth WB, Elm Creek, and Oakland Woods) were recorded at fair. In some instances, snow

cover made it difficult to determine pavement quality.

- **Weather conditions** were predominantly snowy or clear, but snow covered. All but one instance of a rest areas being utilized beyond capacity occurred during these two weather conditions.
- **Utilization** was measured by dividing the number of trucks recorded at each site by the parking capacity expressed by the truck stall count. Eight of the 20 sites were recorded at or near capacity during the field survey. These instances largely correlate with severe weather. Both the Albert Lea and St. Croix Travel Information Centers (TIC) were at more than 200 percent capacity during this review. These TICs are the first rest areas travelers arrive at when entering the state from Wisconsin along I-90 and from Iowa along I-35.
- **Unauthorized parking at nearby ramps** was recorded by the surveyors as they travelled from one rest areas to the next. Where available, notes are also provided describing the location of this parking. While parking on nearby ramps often occurred near rest areas that were over capacity (Albert Lea TIC, Marion, and St. Croix TIC), there were many other instances of unauthorized ramp parking recorded near rest areas that were not at capacity including Clear Lake, Fuller Lake, Hayward, and High Forest.

The table also includes the average truck parking utilization as calculated during the ATRI demand analysis. In all but two cases (Elm Creek and Heath Creek) demand was higher during the field survey as expected based on the adverse weather conditions. The utilization was most significantly increased at the Albert Lea and St. Croix TICs. The median increase in utilization across all 20 sites was 28 percent.

Table 7. Field Review Summary

Rest Area	Pavement Condition	Weather Condition	Capacity	Truck Count	Field Review Utilization	Average Utilization (9 PM)	Unauthorized Parking on Nearby Ramps	Notes
Adrian WB	Fair	Clear, Snow Covered	6	4	67%	38%	No	
Albert Lea Travel Information Center	Good	Heavy Snow	29	61	210%	27%	Yes	Exits 11, 26, weigh station north of Albert Lea
Big Spunk Lake	N/A	Heavy Snow	17	16	94%	78%	No	
Blue Earth EB	Good	Clear	11	8	73%	47%	No	
Blue Earth WB	Fair	Clear, Snow Covered	10	7	70%	34%	No	
Burgen Lake	Poor	Clear, Snow Covered	12	11	92%	86%	No	
Clear Lake	Good	Clear, Snow Covered	7	4	57%	47%	Yes	Weigh station near Worthington
Elm Creek	Fair	Clear, Snow Covered	15	21	140%	156%	No	
Fuller Lake	Good	Clear	17	16	94%	54%	Yes	Hasty exit WB
Hansel Lake	Good	Heavy Snow	8	8	100%	92%	No	Brandon exit EB
Hayward	Good	Clear	14	8	57%	24%	Yes	Blue Earth exit WB
Heath Creek	Poor	Clear, Snow Covered	20	14	70%	94%	No	
High Forest	Good	Clear, Snow Covered	20	9	45%	29%	Yes	Austin exit
Lake Latoka	Good	Heavy Snow	18	18	100%	72%	No	
Marion	Good	Clear, Snow Covered	20	32	160%	101%	Yes	Chatfield (Highway 52) exit
New Market	N/A	Heavy Snow	15	19	127%	84%	No	
Oakland Woods	Fair	Clear, Snow Covered	22	4	18%	14%	No	
St Croix Travel Information Center	Good	Clear, Snow Covered	34	72	212%	89%	Yes	
Straight River NB	Good	Clear	31	19	61%	10%	No	
Straight River SB	Good	Clear	12	17	142%	65%	No	

7. Oversize-Overweight and Superload Truck Parking

MnDOT allows the free movement of commercial vehicles on Minnesota highways so long as they are within the permitted size and weight limits of 13'6" high, 8'6" wide, 75' long[5] and no more than 80,000 pounds gross vehicle weight (GVW). Vehicles or cargo exceeding one or more of these limits are classified as oversize-overweight (OSOW) and are allowed to travel on Minnesota highways only after obtaining a permit from MnDOT Office of Freight and Commercial Vehicle Operations. An additional classification of superload is generally reserved for vehicles that exceed 16' high, 16' wide, 150' long, or more than 250,000 GVW. However, this designation is reviewed and applied on a case-by-case basis.

The study team met with MnDOT's OSOW Permitting office to discuss trends and existing issues with the movement of OSOW and superload vehicles on Minnesota's highways, specifically as they relate to the need for parking for these vehicles.

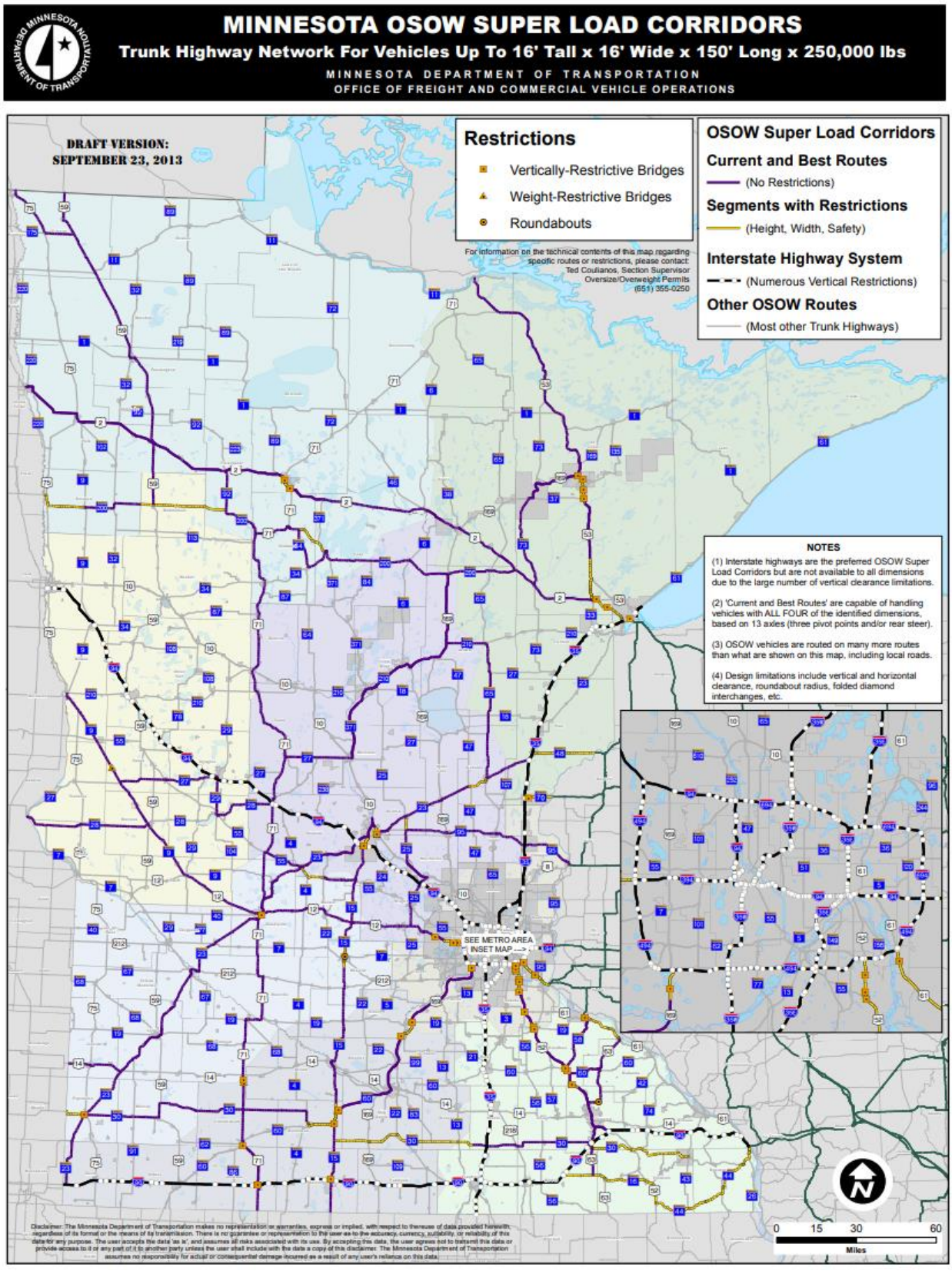
OSOW Shipments in Minnesota

The OSOW permitting office processes approximately 2,500 permits per year, although this can vary substantially from year to year and from season to season. Identification of parking and staging locations is not a part of the permitting process and it is left to the carriers to determine appropriate locations. The permitting office noted that the St. Croix weigh station is often used as a staging location since it is designed to accommodate heavier loads and is located near the Minnesota-Wisconsin border, making it an ideal location for trucks staging prior to entering the Minneapolis-St. Paul metro. A map of designated OSOW and superload corridors as well as locations of height and width restrictions in Minnesota is shown in Figure 39.

Figure 38. Oversize-Overweight Vehicle

[5] Length limits depend on the type of vehicle being operated. For more information, see: https://www.dot.state.mn.us/cvo/oversize/OSOWBrochure-Colorv.pdf

Figure 39. MnDOT OSOW and Superload Corridor Map



Currently, the need for superload permits is largely driven by the wind energy industry. The hauling of equipment such as windmill masts and blades commonly originates from the Port of Duluth with deliveries throughout Minnesota and adjacent states. Other major superload manufacturers included tanks and vessels for natural gas, single and double-wide manufactured homes, and mining equipment. The locations of major superload generators in Minnesota are shown in Figure 40.

This figure was generated as part of a study conducted for MnDOT by the National Center for Freight and Infrastructure Research and Education (CFIRE) to identify locations suitable for OSOW and superload truck parking and staging. The study found that very few sites exist in Minnesota that can accommodate parking and staging needs of superload vehicles. These vehicles often need to park near the state border for inspection, load adjustment, to obtain additional permits, or to wait for an escort vehicle. The locations of common border crossings identified during the study are also shown in Figure 40.

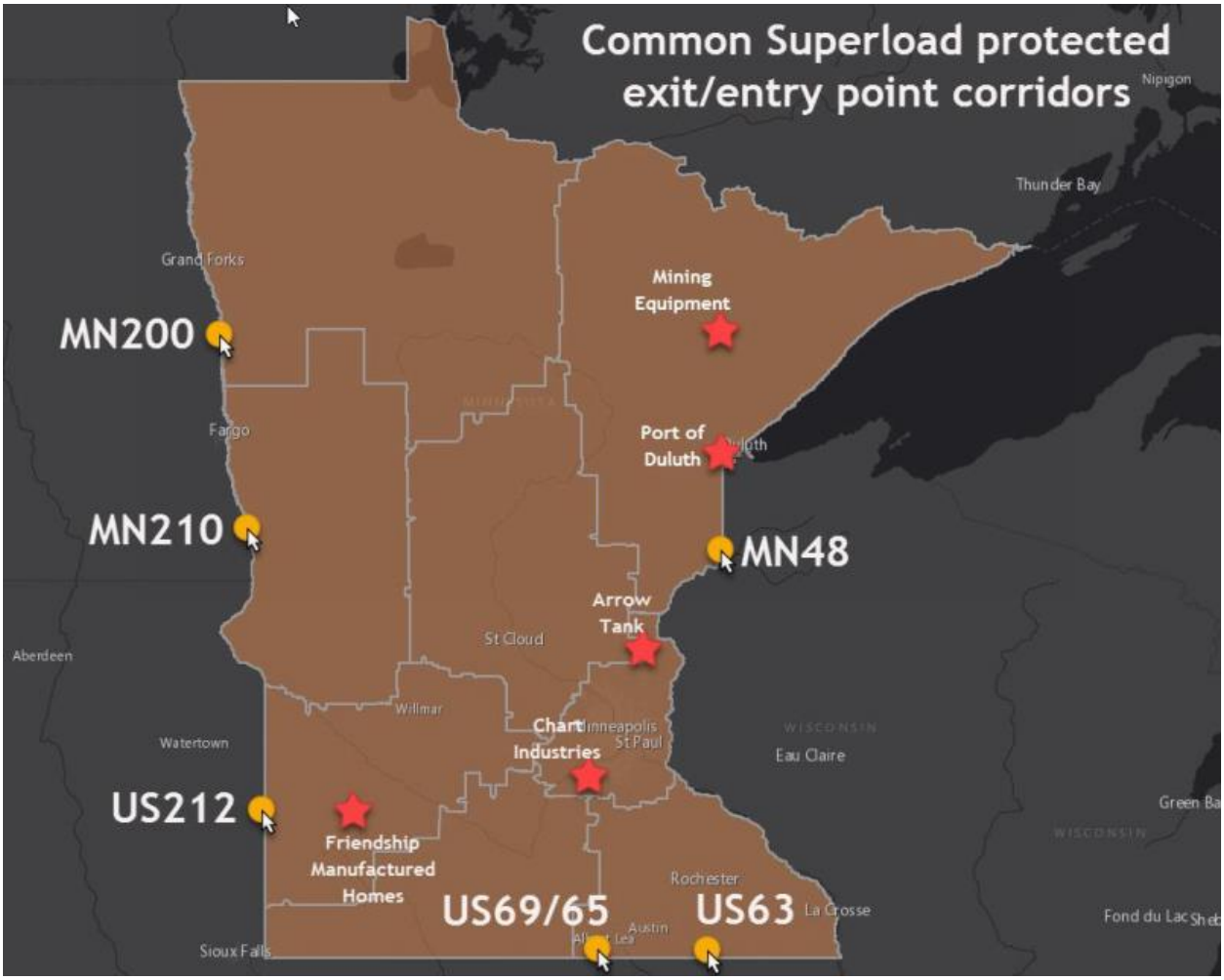
Potential OSOW/Superload Truck Parking Improvements

The MnDOT permitting office noted that parking-related issue are not a common issue. However, when they do hear complaints, it is typically related to OSOW and superload vehicles parking on the side of the road. Drivers may park in these locations due to hours of service requirements, to check loads, or for staging. However, due to limited shoulder widths on many roads, this can lead to the vehicle becoming a collision hazard for other vehicles on the road.

Recommendations discussed with the permitting office to help improve parking conditions for OSOW and superload vehicles include the following:

- Modification of rest areas and other facilities near the Minnesota state line to better accommodate OSOW and superload vehicles.
- Implementation of periodic truck parking turnoffs (wider and stronger shoulders) on OSOW and superload routes.
- Continue to update and revise OSOW and superload corridor maps and permit systems to ensure that drivers have information to plan their movements.

Figure 40. Major Superload Generators and Common Entry/Exit Points



Source: National Center for Freight and Infrastructure Research and Education

- **MN 48:** A common crossing point for size and weight which works well for both Minnesota and Wisconsin. There are more superloads that come out of Wisconsin into Minnesota at this location.
- **MN 200:** An alternative crossing point that works well for size and weight for both Minnesota and North Dakota. This is a common route for superloads from the Port of Duluth.
- **MN 210:** An alternative crossing point that works well for size and weight for both Minnesota and North Dakota
- **US 212:** A high volume corridor for Friendship Homes; Montevideo MN.
- **US 69/65:** Alternative crossing points due to vertical clearance constraints on I-35 at the Minnesota/Iowa border
- **US 63:** Alternative crossing point due to vertical clearance challenges on I-90 in southeast Minnesota. Other important alternative corridors include portions of MN 16, MN 44, and MN 56.

8. Truck Parking Solutions and Opportunities

There is a clear public need and business case for increased truck parking in Minnesota. While previous efforts identified this challenge at a high-level, this study's more in-depth quantitative analysis—validated by stakeholder outreach and fieldwork—identified not only statewide demand figures, but location-specific parking needs.

This chapter directly addresses those needs with specific "solutions and opportunities" to help improve capacity and align existing truck parking supply with demand. These potential initiatives are grouped into three categories: Policy, Technology and Location-specific improvements.

Policy-Level Solutions

Integration with other MnDOT Planning Efforts

The Minnesota Statewide Truck Parking Study's recommendations and analytical results provide a unique opportunity to enhance future key MnDOT planning documents—such as the Statewide Freight System and Investment Plan and the Strategic Highway Safety Plan—with clear recommendations to improve truck parking.

Statewide Freight System and Investment Plan

The 2016 - 2019 Statewide Freight System and Investment Plan (SFSIP) analyzed Minnesota's freight needs—including truck parking. In fact, one of the plan's strategies—"conduct an assessment of truck parking and plan for expansion, as warranted"—resulted in this truck parking study. As such, the upcoming SFSIP update should integrate key takeaways from this study, specifically the study's recommendations regarding truck parking.

Strategic Highway Safety Plan

Commercial vehicles (CMVs) account for 10 percent of total crashes statewide. As such, the Minnesota Strategic Highway Safety Plan (SHSP) identified the reduction of CMV crashes as a key priority on their vision towards zero crashes. The SHSP featured a four-page summary which details CMV crash trends.

The Truck Parking Study's stakeholder outreach and analysis identified safe and adequate truck parking as a major factor in reducing truck crashes and improving safety for commercial drivers. Key recommendations from this study should be integrated within the next SHSP update.

Leveraging Public and Private Sector Investment

While policy and technological solutions can mitigate truck parking challenges, current demand levels require new and expanded capacity. Overcoming this challenge will require increased and sustained investment by the public and private sectors. Within the public sector, there are limited options to fund truck parking improvements. Based on the state's needs and stakeholder outreach, the following funding opportunities could be leveraged by MnDOT and their partners to create new truck parking capacity.

- **Legislative Opportunities:** Seek funding for a truck parking investment program or individual improvements from the Minnesota State Legislature and U.S. Congress
- **Safety Funding:** Evaluate the feasibility of including truck parking in future iterations of MnDOT's Highway Safety Improvement Program.
- **Local and Regional Governments:** Consider funding local truck parking, particularly in urbanized areas with truck parking capacity needs.
- **Minnesota Highway Freight Program:** The FAST Act created a new program that provided funding to Minnesota to create freight-related highway improvements. If this program is renewed by the up-coming surface transportation reauthorization, MnDOT should integrate truck parking needs into their project selection process.
- **Discretionary Grant Programs:** Federal programs like BUILD (formally TIGER), INFRA (formerly FASTLANE) and the National Economic Partnership have funded multi-state truck parking projects. For example, the Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Ohio and Wisconsin DOTs received a joint $25 million TIGER grant to create a Regional Truck Parking Information and Management System (TPIMS).

Private Sector Investment and Participation

Truck parking has a clear public benefit. However, private enterprises clearly benefit as well. Because of this, the truck parking paradox can only be solved through a true partnership between the public and private sectors. This section outlines potential initiatives which could be undertaken to align these two sectors' unique strengths to enable increased private sector investment and participation.

Indemnification/Insurance Pool

Big box stores and shopping centers have large parking lots which are typically underutilized or vacant at night. These lots are often identified as a potential opportunity to provide truck parking within an urban area. Similarly, large parking lots at many freight developments have been identified as potential parking opportunities for trucks serving these facilities.

While these ideas have significant potential, there are clear impediments to their implementation. Chief among them, the real and/or perceived liability created by property owners allowing truck parking at their businesses.

To overcome this challenge, the freight community could explore various options to identify the best way to limit companies' exposure from allowing trucks to park in

their lots. Based on stakeholder input, potential options could include a change in state law to indemnify the liability created or to establish an insurance pool to spread the risk.

Tax Incentives/Revolving Loan Fund

The Minnesota Rail Service Improvement loan program provides no-interest loans to improve rail service in the state. The program focuses on supporting capital improvements, rail rehabilitation and acquisition of new rail lines. While this program is not designed to fund an entire project, it can help bridge the financial gap for projects that might not happen otherwise.

A similar program could be developed to provide financial assistance to truck stops and freight generators to provide new truck parking capacity on-site. This program could feature other financial tools such as tax incentives as well—all focused on making the business case for new truck parking.

Local Planning and Zoning Initiatives

The desk scan and stakeholders' feedback identified several land-use-planning-related challenges which can complicate truck parking expansion, especially in urban areas. The root of these issues is the (real or perceived) impact of truck parking on surrounding areas—particularly noise, crime and safety. These issues are important to understand, because they complicate the land use approval process for new or expanded facilities. To overcome these challenges, the following strategies could be employed:

Education/Awareness Program	The public is largely unaware of the importance of truck parking to obtaining their day-to-day necessities and the role truck parking plays in highway safety. A coordinated marketing campaign could help educate the public and key stakeholders.
Minimum Parking Requirements	Most zoning ordinances have minimum parking requirements which must be met to develop large commercial parcels. Similar truck parking requirements could be developed for freight-related land use developments.
By-Right Truck Parking Zones	Areas near existing public and private truck parking facilities could be zoned to provide "by-right" zoning approval for new/expanded parking. Essentially, zones that allow certain uses "by-right" allow projects that conform to the zoning standards to receive project approvals without a discretionary review process.
Technology Enhancements	Existing or proposed truck parking facilities should explore new ways to mitigate the real or perceived impacts on surrounding areas. For example, integrate emissions control technologies to reduce the PM 2.5-point source impacts at parking locations due to idling.

NATIONAL EXAMPLES – LOCAL INITIATIVES

The National Coalition for Truck Parking – State, Regional and Local Government Coordination Group's 2018 Report identified several real-world examples of how local governments have made provisions for truck parking in their communities. While MnDOT does not have any control over local decision-making, the following examples could provide useful examples for tackling challenges associated with urban truck parking:

Overnight Parking - Weed, California

The City of Weed, CA, located on Interstate 5 at the base of Mount Shasta, created municipal truck parking for about 30 trucks on two pieces of city owned land zoned for industrial use. The city was motivated to use its land to create truck parking because it recognized the important role that trucks play in the city's economy. Weed's City Manager noted that they have not received pushback or complaints from residents in the community. Trucks are permitted to park for up to 72 hours.

Street Parking - Moreno Valley, California

Moreno Valley allows commercial truck parking on certain roadways in the city. Some areas are designated solely for overnight truck parking and others allow for truck parking at all times. Vehicles can park for up to 72 hours in a designated area.

Street Parking - Carson, California

The city of Carson, California designated specific areas of the city where trucks can park for up to 72 hours and where trucks can load and unload goods. The city also designated specific truck routes to provide a means to carry vehicles between the State highways and commercial zones in the city.

Long-Term Parking - Elmira, New York

The City of Elmira created a municipal truck parking area from an existing industrial-zoned lot adjacent to a carpool parking lot. This facility is located off of Interstate 86. It provides about 25 truck parking spaces, for which the city charges $5 per day and trucks can stay for up to thirty days. Once the facility was created, complaints from residents about trucks parking in the community decreased.

MAFC Urban Truck Parking Locations

While this project focused on statewide truck parking needs, the Mid-America Freight Coalition (MAFC) recently completed a 10-state study that focused on the "Identification of Urban Truck Parking Locations in the MAASTO Region."[6]

[6] Identification of Urban Truck Parking Locations in the MAASTO Region: http://midamericafreight.org/wp-content/uploads/2019/05/Identification-of-Urban-Truck-Parking-Locations-in-the-MAASTO-Region-FINAL.pdf

(MAASTO is the Mid-American Association of State Transportation Officials (MAASTO), which includes Minnesota) The study used a methodology that employed GIS to identify locations that had a high-level potential for future truck parking locations. However, it did not look at the individual suitability of proposed sites.

Within Minnesota, the MAFC study identified 11 urban locations in Anoka, Dakota, Hennepin, Ramsey, and Washington counties. Most identified locations were abandoned industrial sites with varying pavement conditions and semi-developed parcels with unused capacity.

Technological Opportunities

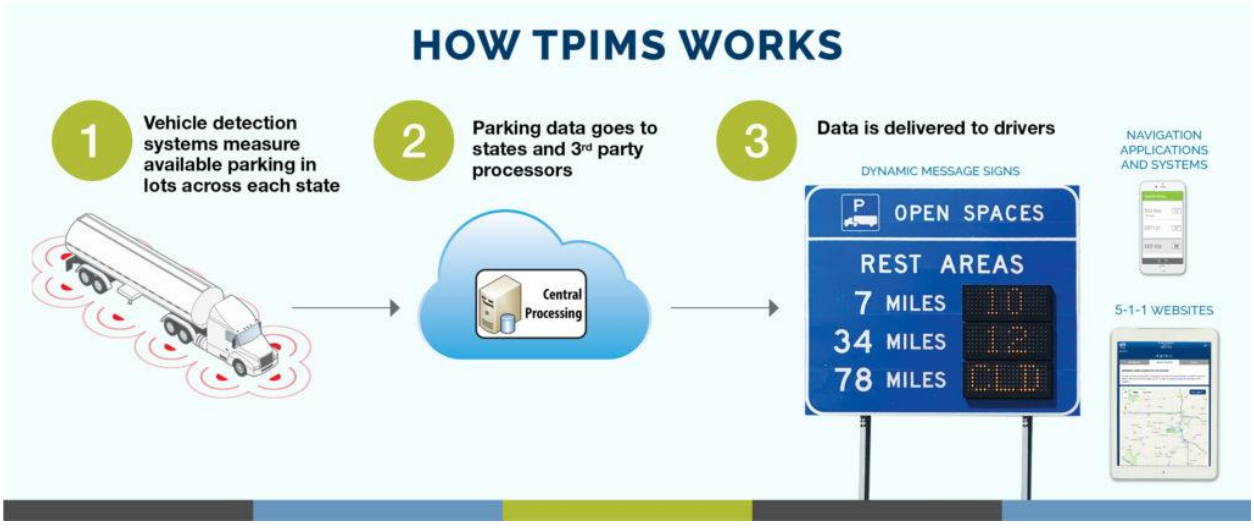
Technological strategies can provide relatively low cost, high value opportunities to address Minnesota's truck parking challenges. Innovations—like Truck Parking Information Management Systems (TPIMS)—have allowed truck drivers to use existing parking facilities more efficiently and effectively. By managing information on demand and availability, technology solutions can help mitigate need for expanded capacity. Additionally, noise and emissions associated with truck parking could be mitigated with electric hook-ups for reefers and in-cab air conditioning.

Truck Parking and Management System (TPIMS)

One key takeaway from this study has been the importance and potential impact of enhanced Truck Parking and Management Systems (TPIMS) to the Minnesota freight community. TPIMS systems provide real-time truck parking availability information to drivers. By doing this, information flows to drivers more quickly and accurately in real time to better match available truck parking supply with demand. Generally speaking, information is provided directly to drivers via changeable message signs, navigation systems/dispatchers and 511 systems (See Figure 41).

Real time parking utilization information is gathered at rest areas and truck stops using magnetometers or camera systems to effectively county in/out truck movements in parking areas—and in the case of cameras, the spaces themselves.

Figure 41. TPIMS Overview



Source: Courtesy of MAASTO

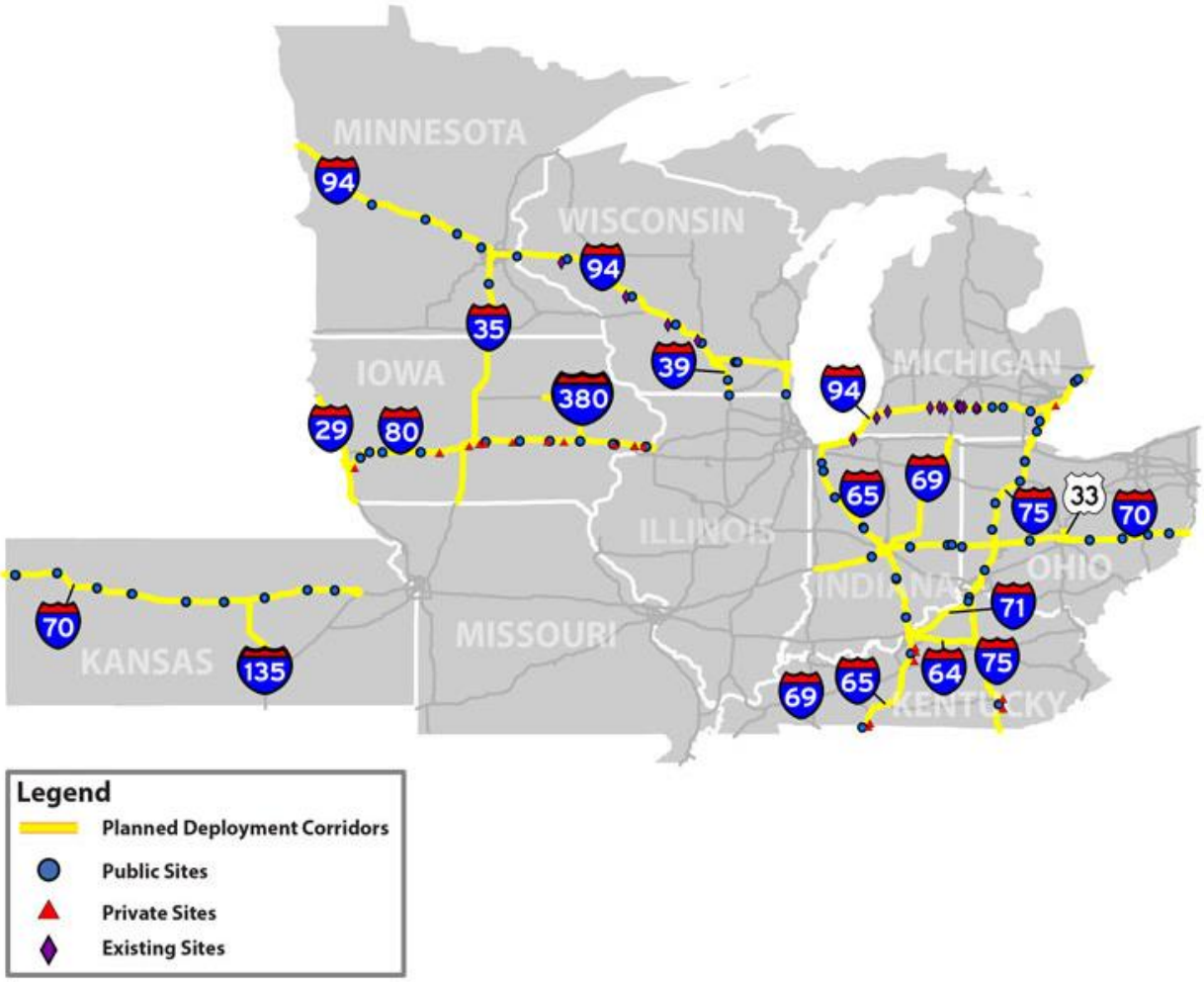
Minnesota TPIMS

The project's desktop scan, advisory committee and stakeholders all identified TPIMS as a critical part of the truck parking solution.

MnDOT is currently participating in an 8 state, multijurisdictional effort through MAASTO to implement a regional truck parking information and management system with existing Intelligent Transportation Systems (ITS) technology on major freight routes in eight Midwestern states.

The current MnDOT TPIMS system is employed on I-94 and I-35 south of the Twin Cities and into Iowa. This system uses changeable messaging signage that provides drivers real-time truck parking information, online 511 maps (with real time camera views) and text updates directly to drivers' phones.

Figure 42. MAASTO Regional TPIMS System



Source: Courtesy of MAASTO

Future TPIMS Opportunities

A key recommendation of this study is that MnDOT should continue its commitment to the multi-state TPIMS project and maintain existing sites. MnDOT should look at future targeted expansion based on further evaluation of the system performance.

If the system is expanded, the following specific recommendations identified by this study's analysis—and validated by public and private stakeholders—suggests that MnDOT focus this expansion in the following areas:

I-90 Corridor: New TPIMS Corridor

I-90 was identified as a heavy truck corridor with limited parking opportunities. Because of the corridor's rural nature, opportunities to share available parking would be exceptionally valuable to truck drivers.

I-94 Corridor: Expand Coverage to Private Truck Stops

There is significant truck parking demand in the Northwest quadrant of the Twin Cities metro area. Freight stakeholders identified this area as a key pre-positioning area not only for Minneapolis, but for advanced manufacturing facilities in Plymouth, Maple Grove, and the Brooklyn Park area.

While building new capacity in this area may be difficult because of current development patterns, the existing TPIMS system on I-94 in Metro District and District 3 could be expanded to include private sector truck parking facilities. By doing so, truck drivers will be better equipped to make parking related decisions.

Predictive Parking Availability

TPIMS systems currently provide data on real-time truck parking space availability and are extremely useful if a driver is close to the facility. However, if a driver is farther way and there are a limited number of spots available—the drivers often still must make a calculated decision: Do they park in a nearby available spot and stop early or continue driving and risk not finding a spot before their duty/drive time runs out? As TPIMS systems continue to advance and data is collected, MnDOT could explore the use of predicative analytics to help mitigate this challenge.

Integration with Electronic Logging/Dispatch Systems

While changeable messaging signs are the most visible part of a TPIMS system, stakeholders identified the need for a mobile solution—beyond the current MnDOT 511 website. Given the safety concerns related to distracted driving, future iterations of the program should explore the potential inclusion of parking data to Electronic Logging Devices and dispatching systems. This would provide trucking companies and their drivers with integrated truck parking data where they need it the most.

Location Specific Opportunities

Twin Cities Area (Urban) Parking Challenges

Local government and private sector stakeholders identified urban truck parking as a major challenge in the Twin Cities area.

Often overlooked, trucks play an important role in developing livable communities. After all, "what good is a walkable neighborhood if the corner store you walk to is out of milk?" Urban delivery vehicles provide life's daily necessities—food, beverages, medical supplies, clothing, and ultimately refuse removal—that create a livable neighborhood. While communities must support freight movement, it is important to find the right balance between needed deliveries and potential impacts (real or perceived) from freight movement—including truck parking.

The process for defining potential solutions for urban truck parking challenges can be complex. In general, there are three types of urban truck parking challenges:

- **Prepositioning:** Most truck trips begin and end in urban areas. Drivers strategically locate their overnight rest location near or within an urban area to maximize their available hours of service while positioning themselves to meet delivery timeframes.
- **Delivery:** In areas where there are not adequate truck loading/unloading zones, ramps or shipping docks, trucks drivers are often forced to park their vehicles in travel lanes, bicycle facilities, shoulders or turning lanes to make their deliveries.
- **Long-term Parking:** Zoning regulations and home owners' associations often restrict semi-truck parking in residential areas. Owner/Operators who do not have a separate business address, often locate long-term truck parking elsewhere in the city. At times, parking on city streets in areas with reduce traffic enforcement.

Deeper Dive: City of Minneapolis

The City of Minneapolis has identified several areas where unauthorized parking is negatively impacting their neighborhoods. Presented in Table 8, each situation presents a different set of challenges and implications.

Solving these challenges can be complex. For example, Washington Avenue parallels I-94 just north of downtown Minneapolis. Based on feedback from the city, trucking community, and project team site visits and experience, the following is likely occurring along the corridor:

1. Drivers are prepositioning to make downtown deliveries;
2. Long-term parking for truck owners and other commercial vehicles (party buses, etc.) who live in a different part of the Twin Cities
3. Life/health/safety issues—Indicators of larger issues like grilling and lawn chairs.

Table 8. City of Minneapolis Truck Parking Challenges

Location	Specific Issues	Impacts
Steward (Neighborhood)	Extended truck parking on: - 26th Street East - 25th Street East - 23rd Avenue South - 24th Avenue South - 25th Avenue South - 26th Avenue South - 27th Avenue South	- Intersection sight lines are often impacted - Streets narrow (at times becoming impassable), especially during winter weather - Visitor and local business parking reduced - Trucks are frequently worked on in the street.
Nicollet Avenue	Lake Street East to 33rd Street East	- Intersection sight lines are often impacted - Idling trucks impacting nearby buildings fresh air intakes
Washington Avenue North	Along I-94 between Plymouth Avenue North and 36th Avenue North	- Over 60 trucks parking for multiple days - RVs and event-related buses are parked as well - Grilling and lawn chairs present
Northeast (Neighborhood)	- Hoover Street Northeast - Spring Street Northeast - Godward Street Northeast	- Sight lines (intersections and driveways) - Narrowing of streets - Business impacts (due to lack of parking)
South Minneapolis (Neighborhood)	- 60th Street West - 61st Street West at Lyndale Avenue South	- No specific impacts identified
2nd Avenue North	- Colfax Avenue North to Lyndale	- No specific impacts identified

Potential Solutions

While banning truck parking might seem like the obvious solution, this may not resolve the root problem. Simply stated, trucks will find somewhere else to park. Often these bans result in roaming truck parking issues, often just moving the trucks to areas where their impacts could be more significant than the current location. Similarly, the trucks that "have to" be there for deliveries will simply factor parking tickets into their cost of delivering to the neighborhood. So, what are potential solutions given the strategies outlined in this chapter for a situation like the Washington Avenue example?

Leveraging the case studies from California, one potential solution may lie in creating an on-street parking strategy for trucks, such as marking large metered truck parking spots that are limited to 48 or 72 hours along the corridor. The key to this strategy is to calculate an appropriate fee to ration the spaces. This will ensure that there is a turnover of users and that only functioning trucks use the spaces. Secondly, a coordinated law enforcement and zoning enforcement effort must be made to remove loitering behavior (i.e., the grilling and lawn chairs identified in Table 8). Over the long-term, adaptive reuse of industrial areas could provide opportunities to create city owned

truck parking lots, similar to the Weed, California case study.

Figure 43. Unauthorized parking challenges are often not limited to traditional semi-trailers.

Capacity Enhancements

From this analysis and stakeholder feedback, MnDOT identified two high-priority areas for further analysis. For each area, a range of potential truck parking solutions were ranked by their relative effectiveness, cost, time to implementation, and responsible party (public vs. private sector vs. public-private partnership or P3).

When evaluating potential solutions for each location, MnDOT evaluated not just the feasibility of each location, but specifically how the facility would be used.

Flying J Travel Center #576

The Flying J Travel Center #576 is located off I-35 at Exit 65 on County Road 46/Bagley Avenue, just outside of Northfield (Figure 44). Using the methodology described in Chapter 2, peak truck parking demand for this location exceeds its capacity (102 percent). The facility is primarily used by drivers to rest overnight, while prepositioning one-hour outside of the Twin Cities. There are several potential options to expand parking options at/near this truck stop.

Directly across State Highway 19 (Lonsdale Boulevard West) from the Flying J is a MnDOT park-and-pool lot. According to MnDOT's records, the facility has 30 commuter spots and is frequently at or near capacity. While retrofitting park-and-pool lots to accommodate trucks during commuting off-hours has worked in other areas, the distance between the facility and the Twin Cities could result in overlapping usage and conflict between commuters and trucks. However, there is an undeveloped 10-acre parcel directly adjacent to the park-and-ride facility that could be acquired to expand both truck and commuter parking (Parcel ID# 02.25.3.75.001). This facility could be developed as a P3, where the Flying J could help the state secure the property and/or build the necessary pedestrian infrastructure for truck drivers to safely cross State Highway 19 to access the Flying J.

There are two undeveloped parcels to the south of the Flying J that could be used for future truck parking expansion. The lot directly to the south of the Flying J is owned by a trust (Parcel ID# 02.36.2.00.002) and the lot directly south of the trust-owned parcel is actually owned by the Flying J/Pilot Travel Centers (Parcel ID#02.36.2.000.004). Additionally, there is a flag lot present just to the south of the Flying J that is owned by a cement company (Parcel ID# 02.36.2.00.003). Based on this information, there appears to be an opportunity for the state to incentivize this development to occur sooner. This could be a potential Public-Private Partnership where the truck stop operator could request grant money for

it to acquire the parcel and develop additional truck parking.

Conceptual designs and cost estimates for this facility are available in Appendix E. Note that these estimates are preliminary and do not include right-of-way acquisition costs.

Figure 44. Northfield Flying J Travel Center and Surrounding Parcels

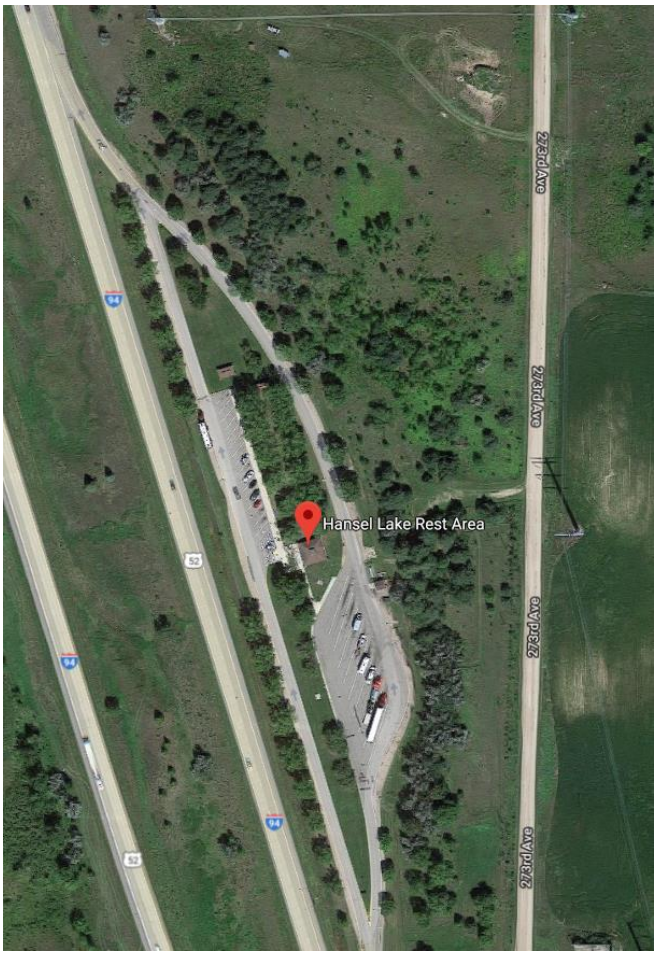
Hansel Lake Rest Area

The Hansel Lake Rest Area is located along I-94 (Westbound) just east of Fergus Falls at Milepost 69. Using the methodology described in Chapter 2, truck parking demand for this facility is at 99 percent of its capacity. While there is passenger vehicle parking available, stakeholders identified that long-haul trucks are the primary user of this facility. Because of this, the study's project advisory committee suggested that this facility be expanded and transition into a truck haven.

Otter Tail County records indicate that the current rest area is part of a larger parcel owned by the State of Minnesota. This parcel reaches from I-94 to 273rd Avenue and includes a utility easement to the north (see Figure 45). Under this solution, the existing facility would be reworked as part of a larger effort to use the entire parcel for truck parking and supporting facilities.

Conceptual designs and cost estimates for this facility are available in Appendix E.

Figure 45. The Hansel Lake Rest Area Right of Way is bounded by 273rd Avenue and the utility lines to the north.



Case Study: Repurposed Rest Areas for Truck Parking

The Missouri and South Dakota DOTs have repurposed existing rest areas into truck-only facilities. According to the Federal Highway Administration's Parking Capacity Working Group Report, Missouri has converted ten rest areas and seven former weight stations into truck parking facilities. These facilities were converted to help meet the needs of both commercial vehicles but to also decrease the renovation and maintenance costs associated with traditional rest areas. Similarly, South Dakota DOT has retrofitted two facilities along I-29 and I-90.

The most notable example is along I-70 in Danville, Missouri where Missouri DOT converted a traditional rest area into a 48-space truck only parking facility, as seen in Figure 46 and Figure 47.

Figure 46. I-70 Rest Area in Danville, Missouri (Before)

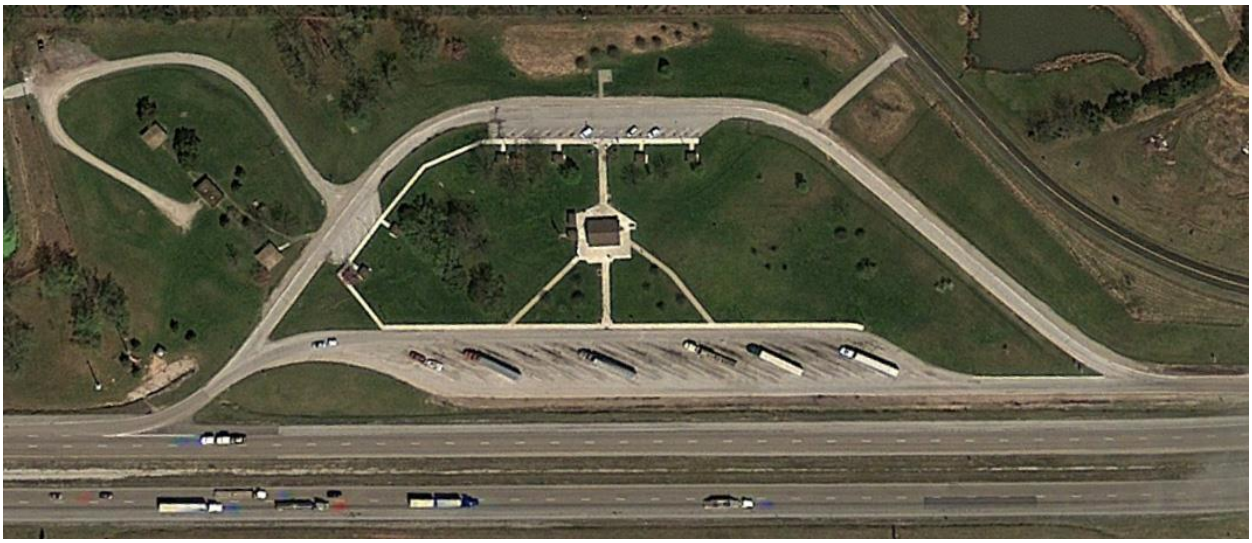


Figure 47. I-70 Truck Only Rest Area in Danville, Missouri (After)

9. Truck Parking Recommendations

The Minnesota Statewide Truck Parking Study was built upon the lessons learned from previous studies and designed to support the policy and investment goals of the Minnesota Statewide Freight System and Investment Plan. While this comprehensive assessment was data-driven, it was informed and validated by stakeholder outreach and site visits. Based on those results, Chapter 4 outlined several specific potential solutions and opportunities to address Minnesota's truck parking needs.

The following recommendations provide an overarching roadmap designed to assist the public and private sectors (individually or collectively) solve Minnesota's truck parking challenges using the concepts developed in Chapter 4.

- MnDOT should consider new ways to fund truck parking internally such as setting aside internal state road construction funds specifically for truck parking improvements and actively seek external opportunities – like federal discretionary grant programs
- The Minnesota freight and safety communities should actively seek policy changes to support truck parking improvements
- MnDOT should continue to maintain existing TPIMS sites as part of the commitment to the project and should look at future targeted expansion based on further evaluation of the system performance.
- Strategically build new truck parking capacity
- This study's results should be integrated in future MnDOT freight and safety planning efforts
- MnDOT should partner with aligned organizations to develop a freight land use planning training program
- Develop a program to provide technical assistance to local communities dealing with truck parking challenges
- Integrate fiber conduit in future rest areas and construction projects

Recommendations

1. Explore Public Sector Funding Sources

MnDOT should consider new ways to fund truck parking internally and actively seek external opportunities – like federal discretionary grant programs.

The study found that there are limited public and private sector resources currently dedicated to increasing truck parking capacity in Minnesota. MnDOT should consider the designation of state funding outside of the Minnesota Highway Freight Program to develop new/expanded rest

areas, or to provide seed money to induce private sector investment. Additionally, MnDOT should actively pursue discretionary grant programs like BUILD or INFRA to develop multiple facilities, or enhancements to the TPIMS program. In addition to these programs, MnDOT and their public sector partners should consider the following programs to support expanded truck parking facilities and technologies:

- Surface Transportation Block Grant Program
- Advanced Transportation and Congestion Management Technologies Deployment Initiative
- Congestion Mitigation and Air Quality Improvement (CMAQ) Program
- National Highway Performance Program (NHPP)
- Innovative Technology Deployment Program (formerly CVISN)
- Motor Carrier Safety Assistance Program - High Priority Grant Program

2. Engage the Minnesota Legislature

The Minnesota freight and safety communities should actively seek policy changes to support truck parking improvements.

The larger Minnesota freight and safety community should engage with the Minnesota Legislature to make changes to Minnesota Statute to enable expanded truck parking opportunities. While the obvious appeal would be to create dedicated truck parking funding, there are several other issues that could be addressed. Among them, addressing the liability issues keeping private parking lot owners (warehouses, big box stores, malls, etc.) from allowing trucks to part in otherwise empty parking spots.

3. TPIMS Program

MnDOT should continue to maintain the existing sites as part of the commitment to the TPIMS project and should look at future targeted expansion based on further evaluation of the system performance.

TPIMS systems provide real-time truck parking availability information to drivers via changeable message signs, navigation systems/dispatchers and 511 systems. The current MnDOT TPIMS system is on I-94 and I-35W south of the Twin Cities and into Iowa. Expanding the TPIMS system on I-90 and I-94 including private truck stops could potentially help respond to truck parking needs both in rural areas and in pre-positioning areas near the Twin Cities. TPIMS could also be improved to provide predictive parking information and integrating with dispatching systems already used by the industry.

4. Build New Truck Parking Capacity

Strategically build new truck parking capacity.

MnDOT and the private sector should build new truck parking capacity. Chapter 4 identified two specific expansion opportunities. The public and private sectors should work together to develop these two facilities and continually expand parking statewide.

5. Integration with Future Planning and Safety Planning

This study's results should be integrated in future MnDOT freight and safety planning efforts.

Future updates of the Statewide Freight System and Investment Plan and the Strategic Highway Safety Plan are key opportunities to incorporate the results of this study to improve traffic safety for the general motoring public and safety/security for truck drivers.

6. Technical Assistance

MnDOT should partner with aligned organizations to develop a freight land use planning training program.

MnDOT should partner with the Minnesota Chapter of the American Planning Association to develop a freight related training program focused on educating public sector land use planners on the complexities of truck parking. With freight anticipated grow significantly in the coming years and the predominance of e-commerce, public education about freight as a necessity is important to mitigate community issues regarding the negative impacts of freight.

7. Technical Assistance to Local Communities

Develop a program to provide technical assistance to local communities dealing with truck parking challenges.

MnDOT should partner with aligned groups – like the Minnesota Chapter of the American Planning Association or the FHWA/National Highway Institute - to develop a freight related training program focused on educating public sector land use planners on the complexities of truck parking.

Groups like the National Coalition in Truck Parking and the NCHRP program have identified integrating freight into land use decision-making as a major hindrance to successful freight planning – the same is true with truck parking.

With freight anticipated grow significantly in the coming years and the predominance of e-commerce, public education about freight as a necessity is important to mitigate community issues regarding the negative impacts of freight.

8. Integrate Fiber Conduit on Future Projects

Integrate fiber conduit in future rest areas and construction projects

Integration of fiber conduit for future Trunk and Interstate Highway projects will support the growing technological advancements in intelligent transportation systems, communications for drivers, and driver amenities.

9. Collaborate with National Partners

Work closely with national partners and experts to address the needs identified in this plan with industry best practices.

To ensure the needs identified in this study are fully addressed and new industry trends, research, and/or best practices are accounted for, MnDOT should continue to participate in working groups hosted by the National Coalition on Truck Parking, as well as seek collaboration with other partner organizations.

Appendix A: Statewide Truck Parking Database

Stop Name	Town/City	Final Capacity
Public Stops		
Albert Lea Travel Information Center	Twin Lakes	29
Worthington Travel Information Center	Worthington	8
Clear Lake Rest Area	Jackson	7
Adrian EB Rest Area	Adrian	6
Adrian WB Rest Area	Adrian	6
Des Moines River Rest Area	Jackson	9
Blue Earth EB Rest Area	Blue Earth	11
Oakland Woods Rest Area	Albert Lea	22
Blue Earth WB Rest Area	Blue Earth	10
Hayward Rest Area	Albert Lea	14
High Forest Rest Area	Racine	20
Dresbach Travel Information Center	La Crescent	6
Enterprise Rest Area	Lewiston	17
Marion Rest Area	Eyota	20
Watonwan River Rest Area	St. James	11
Straight River SB Rest Area	Owatonna	12
Straight River NB Rest Area	Owatonna	31
Heath Creek Rest Area	Northfield	20
Minnesota Valley Rest Area	Le Sueur	16
New Market Rest Area	Elko New Market	15
St Croix Travel Information Center	Afton	34
Elm Creek Rest Area	Maple Grove	15
Daytonport Rest Area	Ramsey	0
Forest Lake Rest Area	Forest Lake	14
Enfield Rest Area	Clearwater	17
Central Minnesota Travel Information Center	Saint Cloud	18
Goose Creek Rest Area	Harris	12
Big Spunk Rest Area	Avon	17
Fuller Lake Rest Area	Clearwater	17
Burgen Lake Rest Area	Alexandria	12
Lake Latoka Rest Area	Alexandria	18
Rum River Rest Area	Onamia	9

Stop Name	Town/City	Final Capacity
Hansel Lake Rest Area	Dalton	8
Kettle River Rest Area	Finlayson	10
Brainerd Lakes Area Welcome Center	Brainerd	33
General Andrews Rest Area	Sturgeon Lake	10
Culkin Rest Area	Mahtowa	11
Frazee Rest Area	Frazee	6
Thompson Hill Travel Information Center	Duluth	10
Moorhead Travel Information Center	Moorhead	10
Park Rapids Visitor Center	Park Rapids	5
Gooseberry Falls Visitor Center	Two Harbors	6
Anchor Lake Rest Area	Melrude	8
Tettegouche Visitor Center	Silver Bay	12
Cass Lake Area Welcome Center	Cass Lake	10
Oak Lake Rest Area	Erskine	7
Fisher's Landing Travel Information Center	Davidson	10
Grand Portage Visitor Center	Grand Portage	12
Middle Spunk Rest Area	Avon	18
Floodwood Rest Area	Floodwood	0
Lake Pepin Rest Area	Lake City	6
Private Stops		
Worthington Travel Plaza (Holiday)	Worthington	50
Cenex Fuel Stop	Worthington	0
Kwik Trip #646	Blue Earth	0
The Blue Line Travel Center	Worthington	60
Expressway BP (BP)	Luverne	12
Kum and Go	Adrian	10
Vet's Whoa and Go (SuperAmerica)	Jackson	30
Kwik Trip #424	Fairmont	0
Blue Earth Auto and Truck Stop (Sinclair)	Blue Earth	20
Shell Food Mart (Shell)	Blue Earth	48
Petro Albert Lea (Trails Travel Center)	Albert Lea	305
Love's Travel Stop	Albert Lea	65
Kum and Go	Sherburn	8
Expressway (Cenex)	Alden	40
Whoa and Go (SuperAmerica)	Fairmont	75
Kwik Trip #250	Austin	40
Vet's Whoa and Go (SuperAmerica)	Albert Lea	10
Expressway	Heron Lake	6
Casey's #3064	Truman	8
Vet's Whoa and Go (SuperAmerica)	Windom	0

Stop Name	Town/City	Final Capacity
Kwik Trip #414	Stewartville	10
Kwik Trip #497	Nodine	19
Amish Market Square AQ/T Plaza (BP)	St. Charles	40
Casey's #2996	Butterfield	0
Kwik Trip #464	Rochester	12
Casey's #3002	St. James	25
Kwik Trip #753	Eyota	10
Kwik Trip #619	Kasson	12
Severson's Sinclair (Sinclair)	Winona	0
Kwik Trip #623	Minnesota City	0
Kwik Trip #403	Owatonna	40
Zip Trip (Cenex)	Brookings SD.	0
Kwik Trip #334	Mankato	40
Shell on 3rd Ave	Mankato	20
Expressway (BP)	Mankato	20
Kwik Trip #463	Zumbrota	12
Trucker's Inn (SuperAmerica)	Faribault	100
Kwik Trip #843	Wabasha	0
Prairie Pride Cenex	Marshall	10
Cattoor's Sinclair	Marshall	20
Kwik Trip #385	Northfield	0
Flying J Travel Plaza #576	Northfield	80
SuperAmerica #4771	Cannon Falls	10
Smart Mart (Shell)	Fairfax	10
Morton BP (BP)	Morton	25
Kwik Trip #481	Red Wing	0
Cenex C-Store	Arlington	0
Mega Stop (Holiday)	Lakeville	100
SuperAmerica #4439	Shakopee	100
Holiday Station #246 (Holiday)	Shakopee	30
SuperAmerica #4785 (SuperAmerica)	Glenco	0
Smith Oil (Sinclair)	Norwood Young America	0
Chatterbox Cafe	Olivia	0
Pilot Travel Center #581	Inver Grove Heights	40
Speedway (former SuperAmerica #4180)	Bloomington	0
Kwik Trip #662	Eagan	0
Holiday Station	Eagan	0
Stockmen's Truck Stop	South St. Paul	125
United Express	Hollywood	10
Mel's 7-71	Blomkest	25

Stop Name	Town/City	Final Capacity
CT Sales	Dawson	10
Cenex C-Store	Montevideo	0
Donner's Crossroads (BP)	Clara City	30
Pro Stop Service Centers, Inc.	St. Paul	0
Flippin Bill's (BP)	Delano	10
Lake Region Co-Op (Cenex)	Cokato	5
Willmar Auto Plaza (BP)	Willmar	0
Kwik Trip #937	Willmar	34
Litchfield Holiday	Litchfield	0
SuperAmerica	Blaine	0
TA Rogers #190 (Shell)	Rogers	112
Casey's General Store #3268	Appleton	2
SuperAmerica #4554	St. Michael	0
Kwik Trip #681	St. Michael	5
Holiday Station #408	Forest Lake	5
Ascheman Oil and Tire	Danvers	0
S and D One Stop (Cenex)	Ortonville	10
Wyoming Sinclair Food Shop	Wyoming	0
Wyoming Shell	Wyoming	0
Hilltop Stop (Tesoro)	Paynesville	10
Olson's Truck Stop (SuperAmerica)	Hasty	100
Petro Clearwater #389 (Holiday)	Clearwater	150
Casey's General Store	Belgrade	0
Casey's General Store	St. Augusta	2
Schmidty's BK (Shell)	St. Augusta	20
Pilot Travel Center #134	St. Cloud	44
SuperAmerica on Hwy 75 #4875	Waite Park	0
Circle 9 Marathon	Princeton	0
SuperAmerica #4256 (SuperAmerica)	St. Cloud	10
Tri County Co-Op (Cenex)	Graceville	10
SuperAmerica #4865	Sauk Rapids	50
Morris Co-Op Association	Morris	0
SuperAmerica #4861	Foley	10
Holiday Station #388	Rush City	50
Trucker's Inn Truck Stop (Shell)	Sauk Center	300
Holiday Stationstores	Sauk Center	0
Pine's Edge Grocery and Liquor (Marathon)	Rice	10
Holiday Station #463	Royalton	12
Holiday Station #345	Alexandria	0
SuperAmerica #4500	Pine City	0

Stop Name	Town/City	Final Capacity
Pilot Travel Center #590	Alexandria	50
Holiday Station #398	Little Falls	50
Zarns Oil	Little Falls	0
Gateway Cafe and Station	Onamia	20
Big Chief Truck Stop (Tesoro)	Fergus Falls	75
Petro Plus #106 (Victory)	Pillager	0
Bricks Travel Center (Shell)	Motley	50
SuperAmerica #4076	Brainerd	0
Pine Square (BP)	Brainerd	0
Minit Mart #562 (Mobil)	Moose Lake	10
Rothsay Truck Stop (Tesoro)	Rothsay	80
Cenex C-Store	New York Mills	15
Oasis Travel Plaza (Cenex)	Perham	10
Carlton Travel Center (BP)	Carlton	50
Kwik Trip #571	Carlton	50
Holiday Station #422	Duluth	12
Kwik Trip #220	Hermantown	4
Holiday Station #409	Pike Lake	2
Orton's (Tesoro)	Audubon	0
Petro Serve USA #054 (Tesoro)	Glyndon	10
Lucky 7 One Stop (BP)	Swan River	40
SuperAmerica #4778	Cotton	3
Inter City Oil	Cotton	5
Davis Oil	Grand Rapids	0
63 Fuel Stop (Clark)	Grand Rapids	0
Beaver Bay Mobil Mart	Beaver Bay	0
Casey's	Cohasset	8
Express Mart (Sinclair)	Nashwauk	0
Palace Junction C-Store (Cenex)	Cass Lake	5
Cenex C-Store	Bemidji	40
Pete's Place South	Bemidji	20
Petro Serve USA #057 (Tesoro)	Bemidji	10
Pete's Place West (Shell)	Bemidji	10
Lucky 7 General Store	Virginia	30
Win-E-Mac Travel Center (Tesoro)	Erskine	20
Ampride Convenience Mart (Cenex)	Crookston	8
Country Store (Clark)	Cook	10
Lucky 7 C Store	Cook	0
Northdale Oil (Tesoro)	East Grand Forks	0
Village One Stop	Kelliher	10

Stop Name	Town/City	Final Capacity
Petrol Pumper	Thief River Falls	20
Rainy Lake Oil	International Falls	20
The Fisherman (Cenex)	International Falls	0
Holiday Station #380	International Falls	0
Cenex C-Store	Roseau	20
Bernstrom Oil (Clark)	Lancaster	10
Farmer Union Oil Cenex	Warroad	5
Kwik Trip #875	Albert Lea	2
Kwik Trip #330	Belle Plaine	0
Petro Plus (Victory)/Casey's General Store	Brainerd	0
Cambridge Fuel (BP)	Cambridge	5
Kwik Trip #608	Chatfield	0
Kwik Trip #874	Chisago City	0
Kwik Trip #234	Cloquet	4
Kwik Trip #224	Duluth	0
Casey's	Ellendale	10
Kwik Trip #316	Hutchinson	0
Kwik Trip #844	Lake City	0
Kwik Trip #166	Moose Lake	10
Kwik Trip #854	Norwood	6
Gateway Cafe and Station (Cenex)	Onamia	0
Kwik Trip #162	Otsego	15
Kwik Trip #659	Rochester	0
Buffalo Ridge Express	Ruthton	15
Kwik Trip #149	St. Cloud	18
Kwik Trip #158	St. Cloud	5
Kwik Trip #178	St. Paul (South)	10
SuperAmerica #4035	Shakopee	18
Casey's #3263	Worthington	15
Wabasha Public Truck Parking	Wabasha	15
Comforts of the Past Street Parking	Spring Valley	6
Parking /Restaurant	Dexter	30
IdleAir/ TA Truck Service	Albert Lea	17
Burger King	Jackson	0
Gas Station/Country Pride Services Co-Op	Windom	10
McDonalds	Lakeville	7
Cenex	Belle Plaine	0
McDonalds	Norwood Young America	0
Cabela's Store Parking	Rodgers	20
McDonalds	Monticello	0

Stop Name	Town/City	Final Capacity
Parking Area	Monticello	20
Charlie's Cafe	Freeport	5
Sinclair	Melrose	10
Holiday Station	Duluth	0
McDonalds	Two Harbors	3
Restaurant	Detroit Lakes	10
Shooting Star Casino	Mahnomen	0
Lookout Mountain Parking Lot	Virginia	0
Rivers Edge Convenience	Greenbush	5
Lake Geo Travel Plaza	Dexter	20
Rock Creek Motor Shop	Pine City	10
Cenex	Finlayson	20
Holiday Stationstores	Rogers	8
Kwik Trip #733	Caledonia	0
Kwik Trip #622	Byron	0
Kwik Trip #590	Rochester	0
Kwik Trip #279	Rochester	0
Kwik Trip #245	Plainview	0
Kwik Trip #111	Oak Park heights	0
Kwik Trip #926	New Prague	0
Kwik Trip #458	Buffalo	0
Kwik Trip #104	Clearwater	20
Kwik Trip #154	Sauk Rapids	0
Kwik Trip #120	St. Cloud	2
Kwik Trip #575	St. Joseph	0
Kwik Trip #147	St. Joseph	0
Kwik Trip #598	Paynesville	9
Kwik Trip #928	Princeton	0
Kwik Trip #213	Stacy	5
Kwik Trip #592	Rush City	0
Kwik Trip #186	Hinckley	7
Kwik Trip #273	Duluth	5
Kwik Trip #117	Duluth	0
Kwik Trip #141	Two Harbors	2
Circle 9 Marathon	Princeton	0
Sunny's	Hill City	0
Casey's General Store	Kimball	2
Casey's General Store	Annandale	2
Hwy 19 Scale and Fuel	Gaylord	25
Casey's General Store	Ogilvie	2

Stop Name	Town/City	Final Capacity
Holiday Stationstores	McGregor	5
Casey's General Store	Pillager	30
Casey's General Store	Brainerd	2
Roseau County Co-Op Association	Badger	0
Java Moose Espresso Cafe	Grand Marais	0
Cenex	Wanamingo	20
Roady's Cenex Zip Trip	Fergus Falls	0
Roady's Cenex Zip Trip	Hawley	0
Casey's General Store	Randall	10
Cenex	Hector	30
Casey's General Store	Olivia	5
Cenex Travel Plaza	Montevideo	30
Cenex	Deer River	5
Cenex	Bagley	10
19 and 75 Filling Station	Ivanhole	15
Casey's General Store	Pipestone	2
Casey's General Store	Slayton	4
Community Co-op Cenex	Detroit Lakes	0
Brooks Travel Plaza	Brooks	1
Cenex	Thief River Falls	25
Cenex	Lake Bronson	10
Casey's General Store	Browerville	2
Hillcrest Truck Stop	New London	5
Casey's General Store	Sleepy Eye	4
Casey's General Store	Hayfield	2
Casey's General Store	Atwater	2
Casey's General Store	Amboy	5

Appendix B: Field Survey Review Form

DEPARTMENT OF TRANSPORTATION

SRF

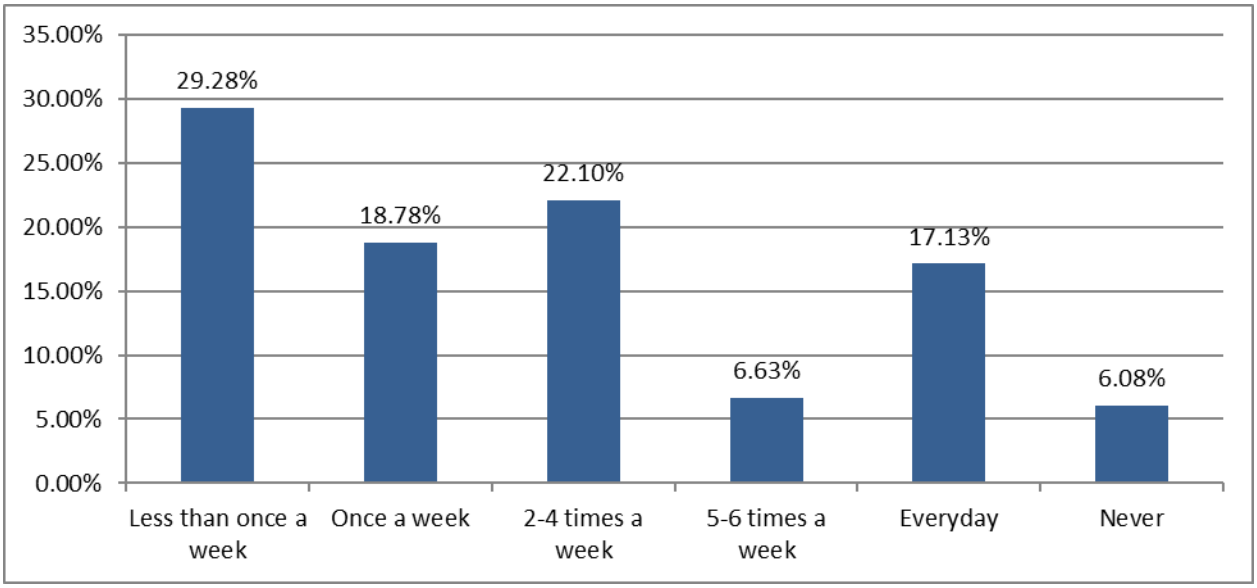
MnDOT Truck Parking Study - Field Site Reviews - February 2019		
Date		
Time		
Stop Name	A - Adrian	
Location/Town	Adrian	
Highway	I-90	
Direction	Westbound	
Lat/Long	43.63804	-95.966716
Surveyors		

1	**Parking Capacity**		
	Number of Truck Stalls		
2	**Parking Utilization**		
	Number of Occupied Truck Stalls		
3	**Unauthorized Truck Parking** *Trucks parked on on/off ramps, on periphery of parking lot, or other locations outside of marked stalls		
	Yes	No	
4	**If "Yes", how many?**		
5	**If "Yes", please note the locations of unauthorized truck parking on map on the other side of this form.**		
6	**Truck Parking Stall Dimensions**		
	Width (feet)		
	Length (feet)		
7	**Pavement Condition** *Select From List Below. Note Any Specific Pavement Issues On Map		
	Poor Fair Good	Comments:	
8	**Adequate Lighting**		
	Yes	No	Comments:
9	**Unauthorized Truck Parking on Highway Exits Adjacent to Site**		
	Yes	No	Comments:
10	**Any Other Truck Parking Problems or Barriers?**		

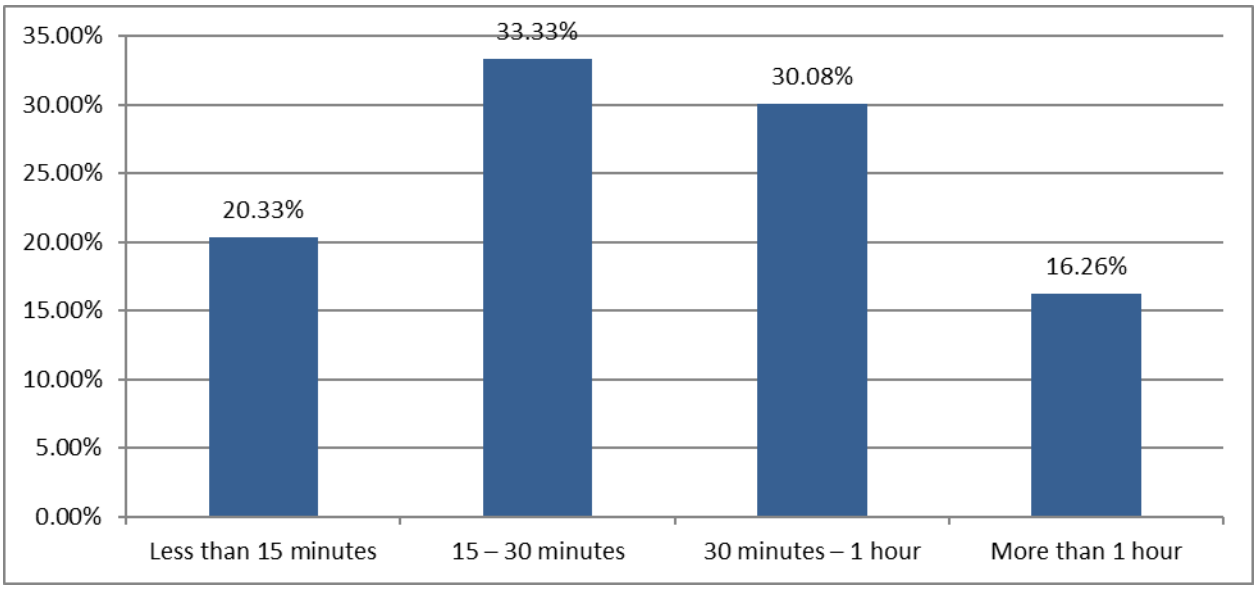
Notes

Appendix C: Online Driver Survey Responses

Question 1: How often do you need truck parking in Minnesota?



Question 2: On average, how long does it take for you to find truck parking in Minnesota?



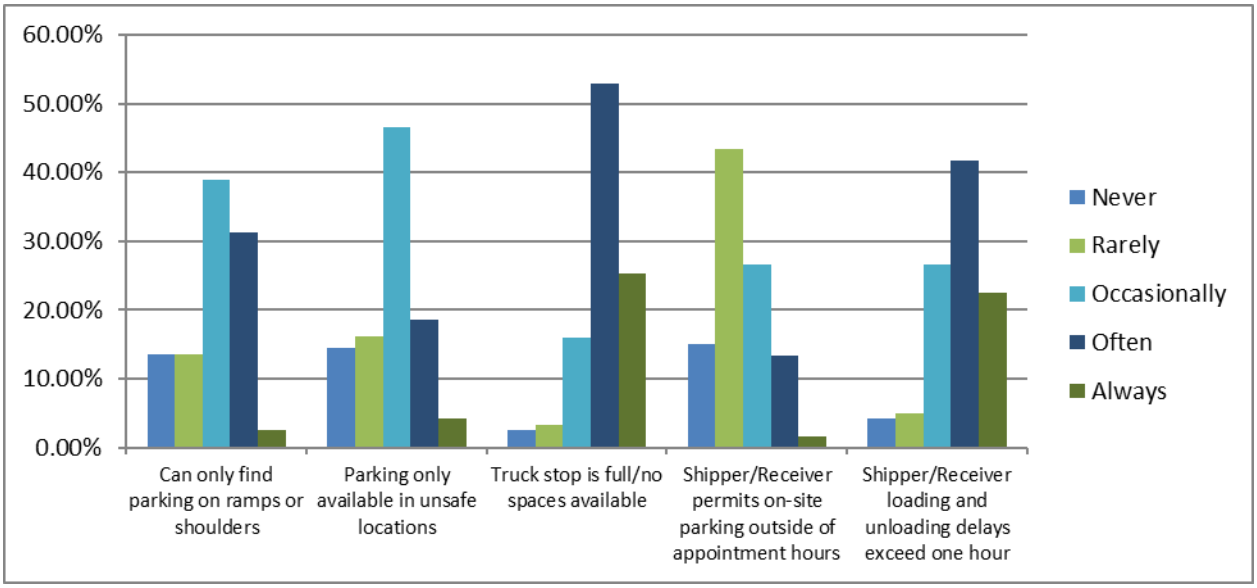
Question 3: Where in Minnesota is finding safe available parking most difficult? Please see example responses, below, to help answer this question.

Top Survey Responses

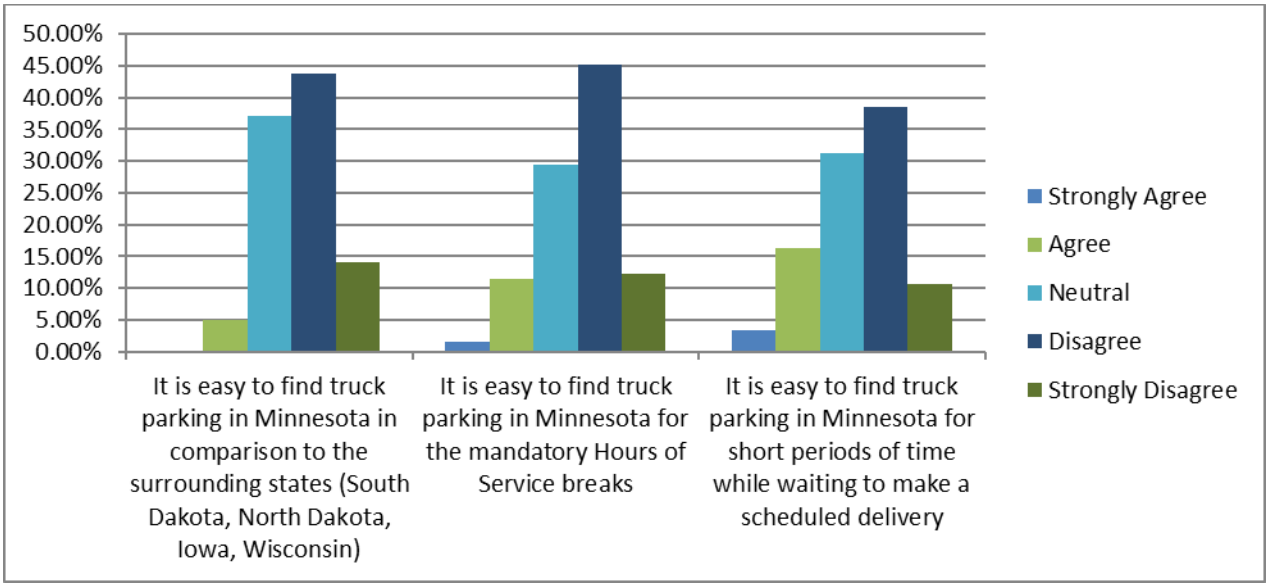
Corridor/ Mile Post/Town/City	Frequency
I-94	39
Twin Cities	32
I-35	19
Minneapolis	18
St. Paul	12
St. Cloud	9
Rogers	8
I-90	8
Albert Lea	7
I-35 and I-90	6

Word Cloud of Top Question 3 Responses

Question 4: How often do you personally experience the following in Minnesota? (check one response for each row).

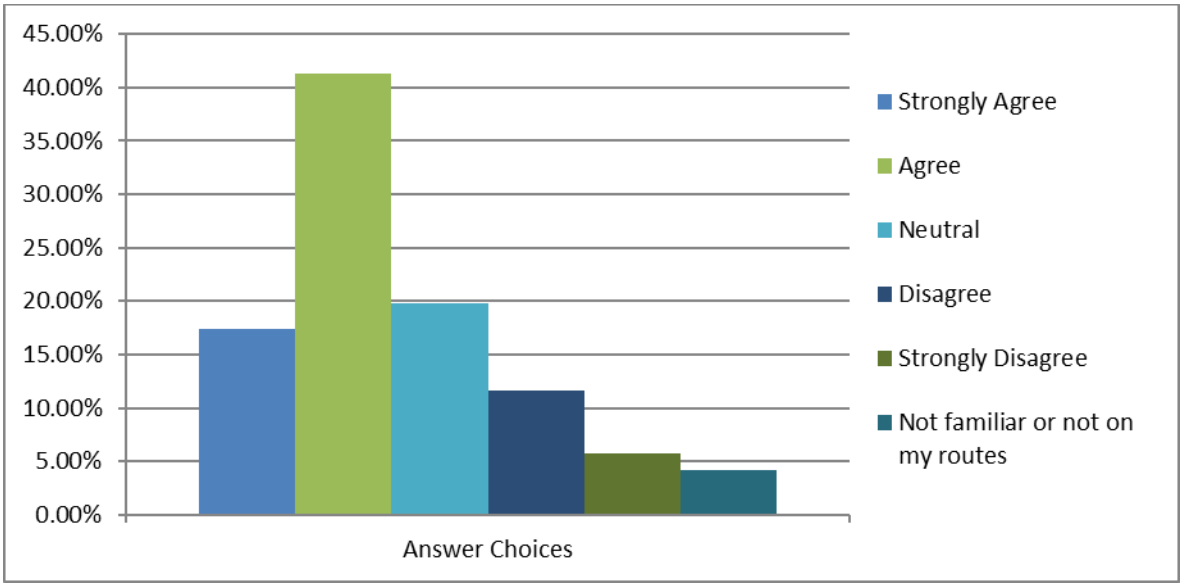


Question 5: Please indicate how easy it is to find truck parking in Minnesota with the following scenarios. (check one for each row)



Question 6: MnDOT has recently installed message boards that show public rest areas with truck parking and space availability to make it easier to find truck parking in Minnesota. Signs look like those shown below. If you are not familiar with these signs, more information is available at: https://trucksparkhere.com/

The recently installed variable message boards make it easier for me to find truck parking in Minnesota.



Question 7: Please provide any additional comments or feedback on the parking availability message boards.

Number	Comment
1	Mn needs more
2	The signs are nice but not always accurate
3	There is so very little places to park around metro all the truck stops are to small to handle the volume if trucks delivering or passing through the area
4	There a nice tool.
5	By the time you arrive, so has anyone else in front of you searching for parking and no one has vacated a spot.
6	There is no parking to speak of up Hwy 52. I can count less than 25 spots from the Iowa border to the twin cities. Rochester has no parking and it use to have a truck stop until mayo and the democrat mayor put a kibosh on any truck stop with parking in the city.
7	None
8	Most issues are around the city's
9	Often is the available parking spot just taken if I arrive, so if there was a kind of prediction how many Trucks are just hitting for the area where the open spots are would help with the decision if or if not to use the last left driving time to the farther away lot or not. Because every mile counts on the end of the day.
10	they are eazy to see on the side of the road
11	Useless for planning night time shut down locations
12	i love them
13	The new signs are helpful
14	Distance between signs and actual parking makes planning useless.
15	We need an app
16	Might work if they were actually updated regularly. And furthermore, they dont really do much good. How do i know the info is accurate? Its a nice thought, but really isnt helping anything and i see it as a waste of tax dollars. Dont tell me how many spaces are left, make more parking instead.
17	N/A
18	They seem to fill up to quick when there is a spot
19	I would like o see more of them
20	Sign inaccurate, worse than no sign at all.
21	When you have a sign board telling you that there are spaces available 80 miles away, it don't mean they will be available in an hour and a half. This is useless information. It would be nice to have signage directing you to business' or other parking off the interstate. It is hard to drive through Minneapolis if you are at the end of your day, because if you get held up in traffic, there is nowhere to park, unless you park on a ramp since you could be in violation on your ELD.

Number	Comment
22	The message boards are not updated very often.
23	Better than what we have now.
24	In general, more parking is needed
25	Accuracy is questionable
26	Haven't seen any in Minnesota as of yet
27	Simply put we need more parking more areas to park, no restrictions in towns and cities especially in industrial area!!
28	Message Boards do not help with parking spend the money on more spaces
29	Apps
30	It would be nice if parking signs would include all the rest areas and miles to on that road (i.e. all rest areas on I-94 or I-90). That way a driver could check his hours and see if he could make some of those rest areas in his time left.
31	Truck parking should be allowed in all individual areas. Wal mart and food warehouse. This is the biggest PROBLEM
32	Message boards only work when approaching the rest area. Don't really allow you to plan ahead. We more or less know from time of day if parking is available not. It can give you hope a spot is available and if says 0 prevents you from driving through if you want. I'm not convinced from others that have them they are accurate at any given time
33	I think overall mn. Has sufficient parking available. it's harder to find a place around the cities tho. anytime after 3 it's also harder... oversize loads usually have a harder time finding spots to park...
34	Need more spaces closer to metro area.
35	Need focus on building more truck stops for us , loves or pilot /flying j. Kwik Trip stops need more parking
36	The only reason I don't say they make it easier is that they just tell you how many spots are available a few miles in advance
37	By the time I get the "34" miles down the road those "12" spots are already gone.
38	Parking remains an issue, especially to park, get required 10 hour rest and drive to delivery in high traffic periods.
39	I no longer drive truck.
40	It is a good start
41	no truck stop or parking in mpls or st,paul west bound rest area coming into mn from wi always full. rest area south bound 35 no trucks
42	The system doesn't update properly. Will say available space but when you pull in it's full.
43	The are great idea.
44	Need more places in metro area to park with the fee truck stops there isn't enough places to park
45	The Twin Cities need more truck stops !!
46	1. Many drivers dont know how to park. So you may not be able to leave when your break is over.
47	Good idea. Sometimes find them not updated quickly enough.
48	Overall, not too bad.

Number	Comment
49	Does not offer more spaces...just tells what's available. Just saves time pulling in when full.
50	Parking oversized loads is hard in minn. Rest areas need more room,
51	Some rest areas have limited room for adequate exit from parking spaces, so I avoid them at night. The 14 hour window is a menace to public safety and needs to be eliminated.
52	a separate sign for private truck stops to display spots left would be great
53	BIG HELP
54	Does improve probability of space available
55	good idea for drivers to plan ahead. I suggest that thru apps that drivers can have updates on available parking
56	I almost never need to park in Mn
57	I think they are a great idea
58	keep numbers more accurate. Need more capacity
59	need to be updating more often for accuracy
60	wide shoulder area on ramps would help

Question 8: Do you have any additional thoughts on finding convenient, safe and legal truck parking in Minnesota?

Number	Comment
1	We need more truck stops to rest eat etc it is especially bad around the metro look at current truck stops on any given day during the evening such as pilot Inver Grove heights stockman's south st Paul ta Rogers mn holiday Lakeville
2	Mpls is Terrible to find parking
3	Encourage companies like Love's and Kwik Trip to build. Educate the citizens that we are not a bunch of sex seeking drug addicts and we help your communities.
4	The ELD has made my job miserable to work with. My understanding cities and town and the states had to provide parking to make this to happen. Now if don't find a spot before 6:30 you are screwed. Fact
5	None
6	Every Community with a Business area needs to be mandated to provide a parking lot based on the Truck traffic the Businesses create, so that as a example a little Town has a day 20 Trucks coming, then have them to have a lot for 10 Trucks for overnight parking and mandatory Sanitary installation.
7	wider off ramps on ramps
8	Ask a law enforcement officer.
9	no
10	just need more
11	No
12	Too many municipality have banned truck parking for where you actually deliver.
13	There are simply not enough places to park. The new ELD's mandates makes it impossible to

Number	Comment
	drive into a spot without running out of hours. Costumers do not allow on location parking. The state needs to Tax incentive privet property owners who provide for truck parking.
14	Update your tiny rest areas.
15	Extend size of rest areas and build more. Especially on the I-90 corridor
16	TO add more parking even if only for CMV's with limited facilities.(port-a-potties and trash bins) but well lit
17	More full service rest areas
18	More parking needed at all rest areas on 94 and north on 35
19	In rural areas, it would be nice to be able to park on ramps and have those ramp shoulders maybe widened to make sure there is plenty of room to do so. Maybe even put garbage cans in these areas so that there is no excuse for dumping. If this parking were amply available it would increase the safety of not only truck drivers, but the motoring public as a whole.
20	It is very hard to find adequate,safe parking in the MSP Metro area. I used to be able to park at the McDonald's in Jordan. That spot went away when another fast food joint was put in. Then, the Superamerica closed at the junction of MN41 and US 169 in order for a complete overhaul of that junction to take place. You could find a spot to park at the Superamerica if you got there early enough in the evening. The Holiday at that junction is full all hours of the day and night with mostly local trucks.The other truckstops in the region, Inver Grive Heights,St Paul and Rogers are usually full by early afternoon at best. I always cringe when faced with a load to the MSP area because of the lack of parking. Occasionally, I'm able to park on site at the job site I'm delivering to, but, that doesn't happen very often. The I-90 corridor seems to have adequate parking as does I-35 in my experience....
21	Rural areas have very little parking
22	We could park at State weigh stations, but drivers fear being woke up and inspected. MSP doesn't have a good reputation with drivers.
23	Expand rest areas and/or make ON ramp shoulders wider and permissible to park on
24	Would be nice if there was any
25	Read previous
26	Truck stops are usually full by 8:00 pm additional rest havens would be nice
27	No
28	It would be nice if when the lot is full. That the sign says FULL or 0 instead of LOW.
29	Need more safe places north of I-94
30	No
31	We either need more truck stops, more rest areas or some truck only parking areas, or make all shippers/receivers provide space if there's any delays or if you arrive early, like at Aldi distribution center
32	Shipper/Receiver locations need to help by having space for trucks.
33	As the Safety Director at Transport Designs, I hear quite a bit of complaining from our drivers regarding the parking situation from Albert Lea north to Minneapolis, from Hudson to Minneapolis and Alexandria to Minneapolis. No truck parking in the metro area and truck stops fill up pretty early as do rest areas. It is a hit or miss situation with drivers at times having to use on-ramps or store parking lots to park.

Number	Comment
	Not a good or safe situation.
34	Small should have more parking available
35	Any roadway that is subject to closure (gated) should have state-provided parking available near the gate site.
36	Let us just park on the on ramps like Wisconsin.
37	Have bigger or more of truck stops. Even have truck only rest areas like Wyoming.
38	Spend that tax money once on truck drivers instead of welfare bumbs
39	No
40	Need 4 times parking now.
41	Campers and cars using our parking spots.
42	Problems are high population areas where land is expensive. No cheap easy fix.
43	Keep them simple, straight shots in and out
44	Adopting the Canadian HOS rules would be a step in the right direction.
45	No
46	a separate sign for private truck stops to display spots left would be great
47	Designated short term parking (30 - 60 min) for breaks
48	double trailers, 30 rest brake, temp parking, switching team drivers
49	have 30 min space parking for breaks
50	I almost never need to park in Mn
51	I try to find parking at night, some plants let you park without a permit
52	More parking spaces in safe areas. More urban parking capacity
53	NEED MORE MARKED 30 MIN PARKING
54	there needs to be parking closer to the cities
55	usually ramps are what I use
56	We need ramp shoulders for DOT required tire checks and load securement short term
57	when I was an OTR driver, I made great use of truck stops atlases I believe parking phone apps would be great tool. Now that I'm LTL, I don't really need this type of info anymore. Ive noticed along Hwy 10 in Coon Rapids, at Hanson, trucks used to park where the new dealership was built. They are no longer able to park here. There used to be a good 10 trucks that would park there. Maybe more parking in that area?

Question 9: What is your gender?

Gender	Responses	Percent
Male	109	95%
Female	5	4%
No Response	1	1%
Total	115	100%

Question 10: What is your age?

Age	Responses	Percent
Younger than 25	1	1%
25 to 44	25	21%
45 to 64	80	67%
Over 65	14	12%
Total	120	100%

Question 11: In what segment of the trucking industry do you primarily operate? (check one)

Industry	Responses	Percent
For-hire	91	75%
Private	28	23%
Don't know	3	2%
Total	122	100%

Question 12: If for-hire, which sector best describes your operation? (check one)

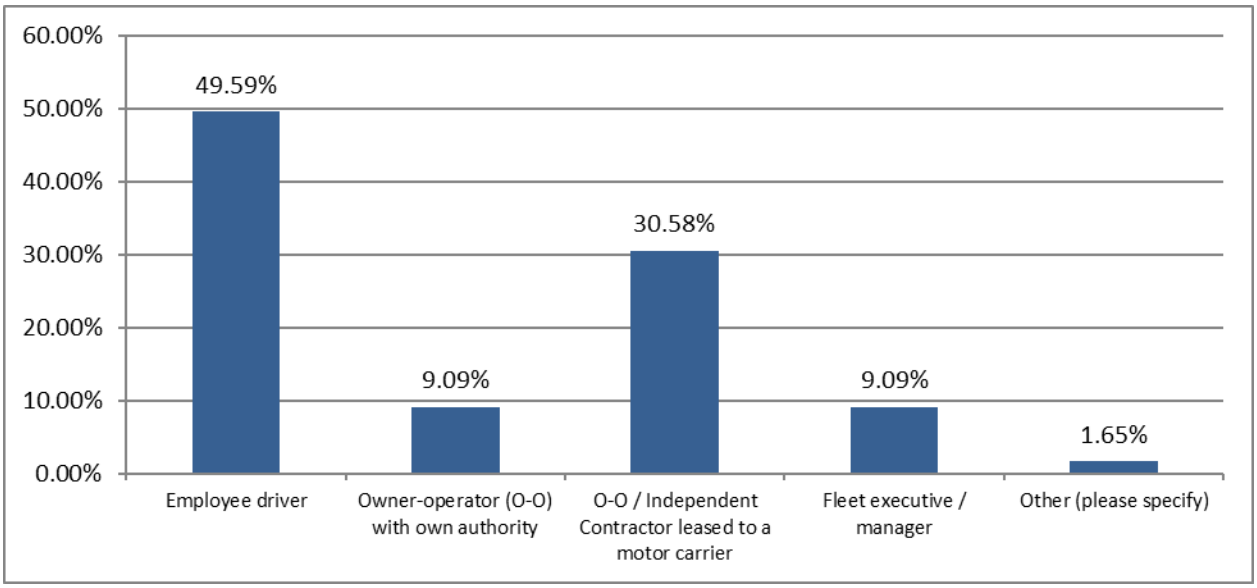
Sector	Responses	Percent
Truckload	65	55%
Less-than-truckload	9	8%
Flatbed	23	19%
Tanker	3	3%
Express/Parcel Service	4	3%
Intermodal Drayage	3	3%
Don't know	2	2%
Other (please specify)	9	8%
Total	118	100%

"Other" Responses

Response	Comment

1	Route driving multiple drops
2	Private carrier Vans, Flatbeds
3	Specialized open deck
4	Oversized
5	Oversize
6	tow truck
7	Over the road
8	livestock
9	Package, fedex ground, tractor trailers

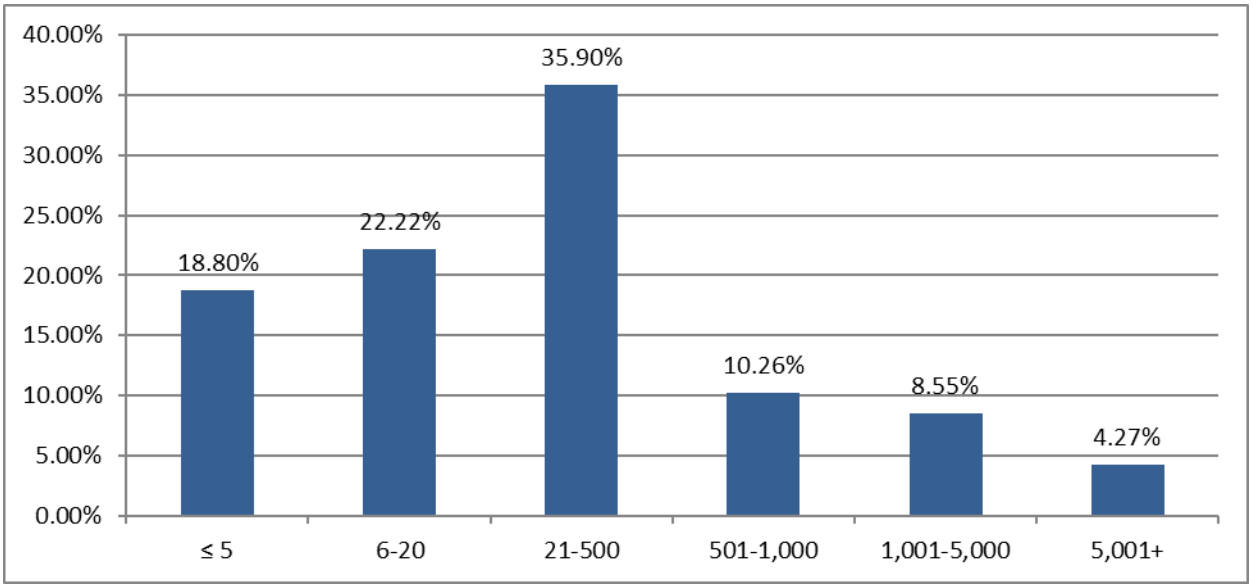
Question 13: Which of the following best describes your employment? (check one)



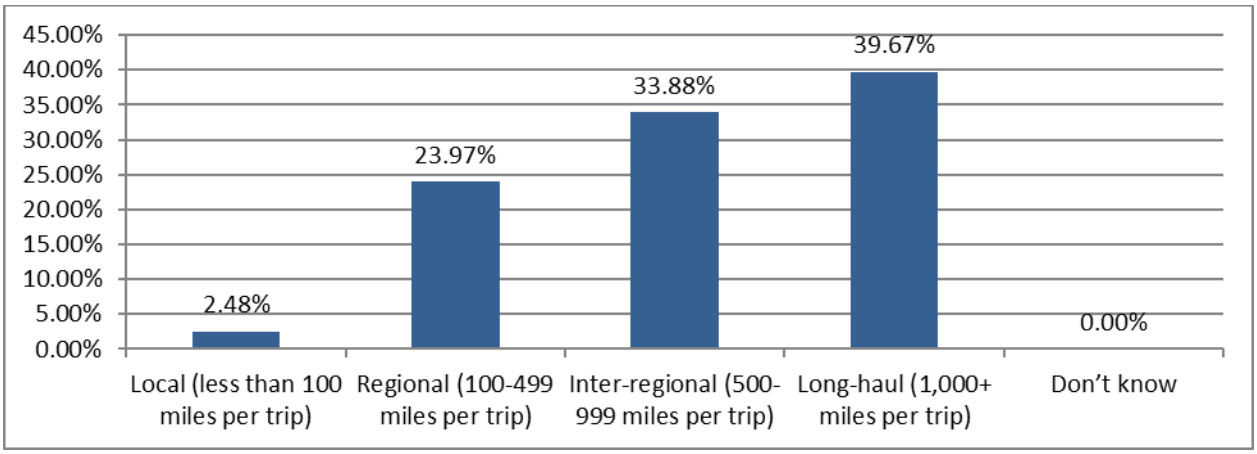
"Other" Responses

Response	Comment
1	Dispatcher
2	6 axle's

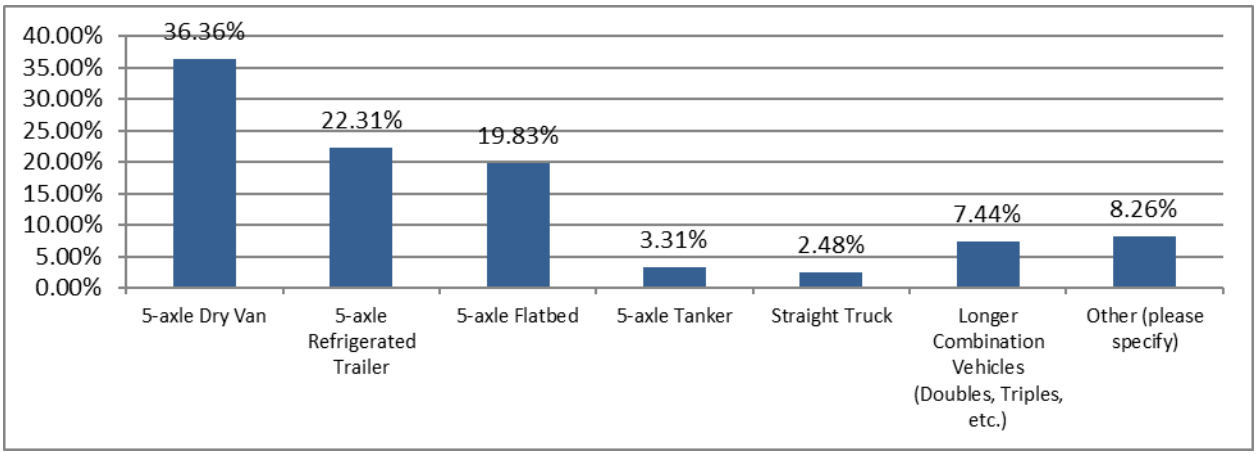
Question 14: If you are an employee or leased driver, how many total tractors does your fleet operate? (check one)



Question 15: In general, what is your overall average length of haul? (check one)



Question 16: What is the primary vehicle configuration that you typically operate? (check one)

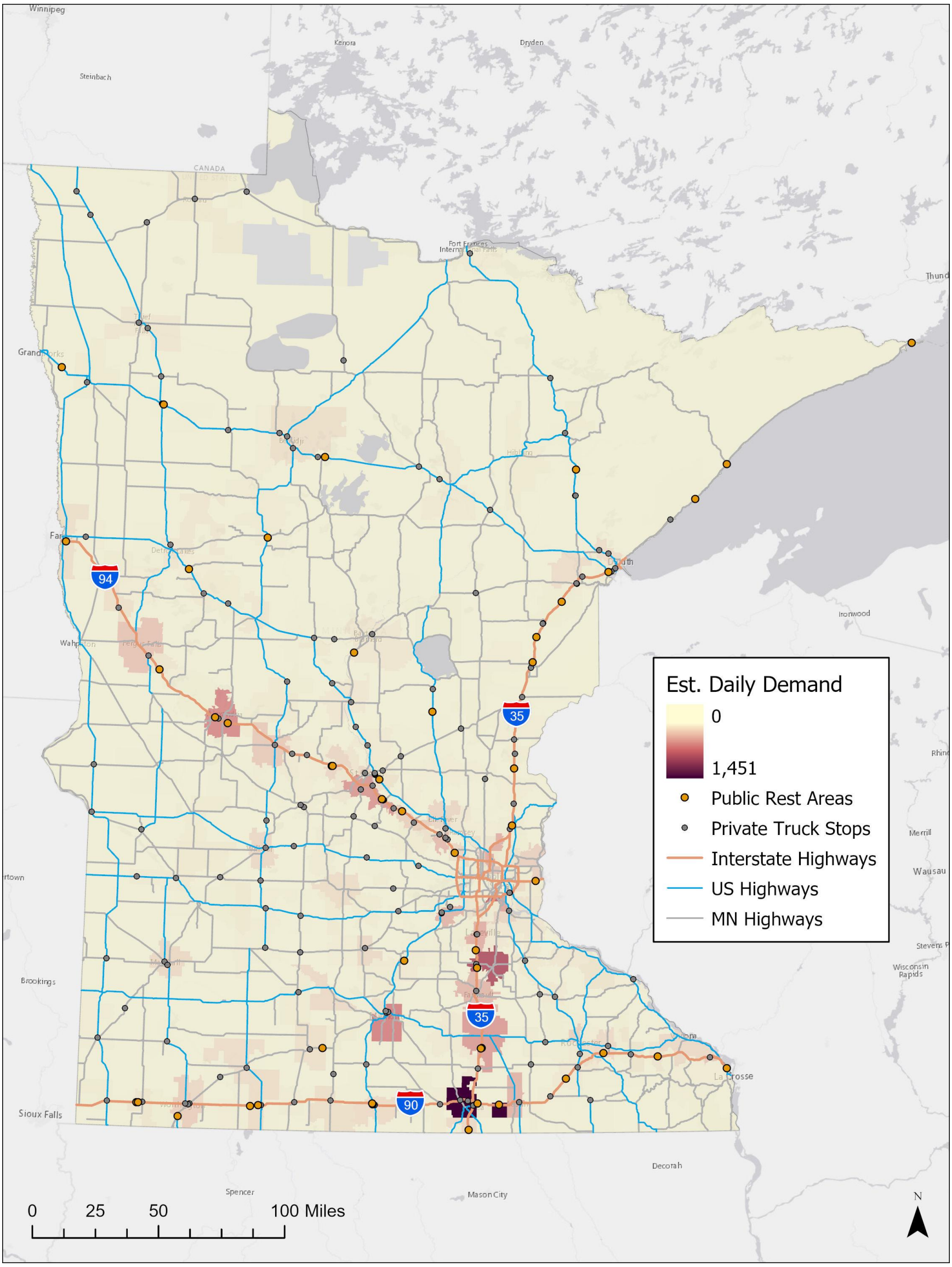


"Other" Responses

Response	Comment
1	RGN
2	5 Axle vans and flatbeds
3	Specialized double drop oversized
4	5 AXLE RGN
5	5 axle and 6 axle RGM
6	6 axle's
7	6-Axle RGN for OVERSIZE LOADS. That's a whole new can of worms to open once you do find a truck stop!
8	5 Axelrod hopper
9	5 axle livestock trailers
10	80 ft stretch trls. Flat bed

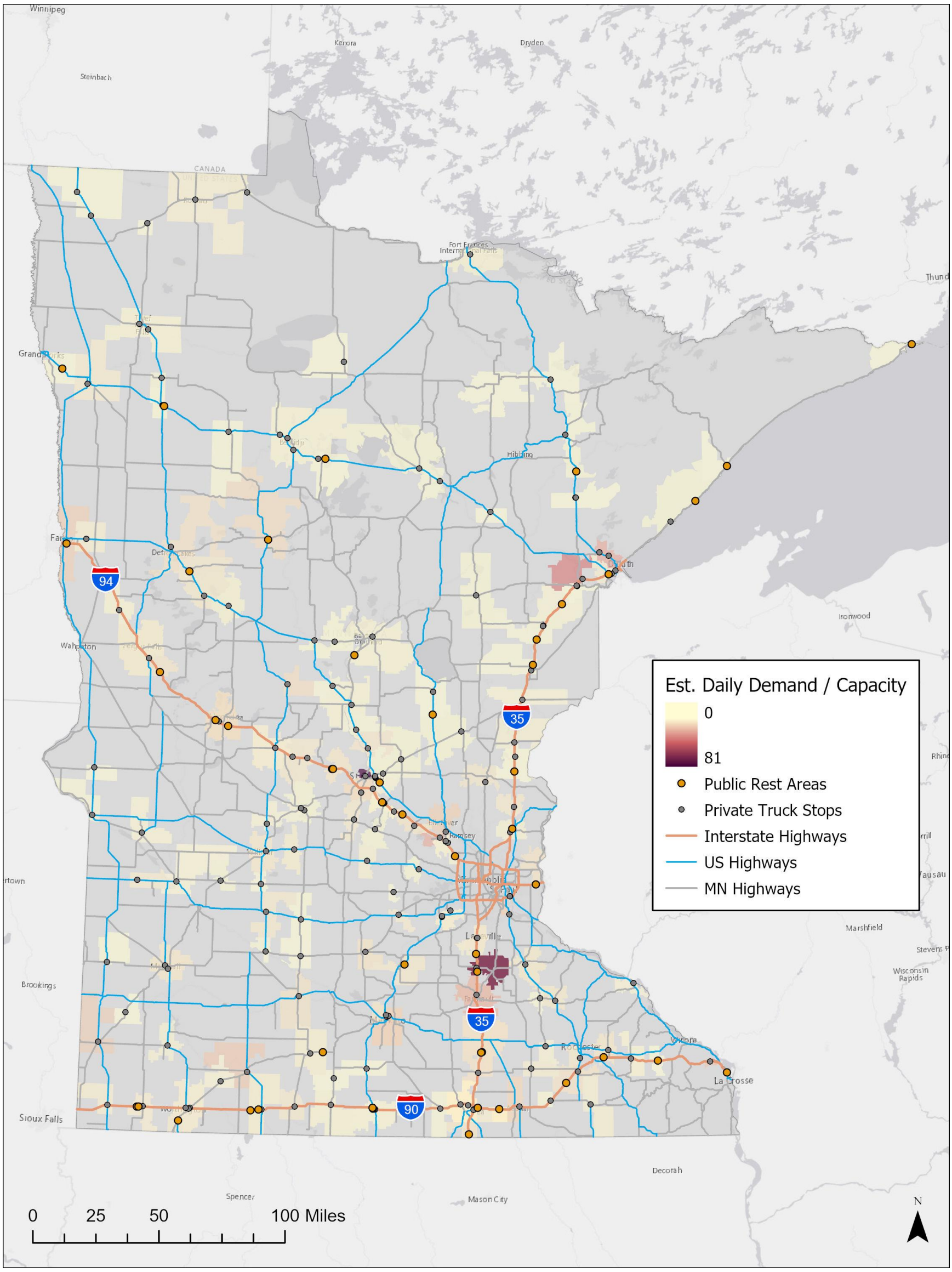
Appendix D: Parking Demand and Utilization by Zip Code

Figure 48. Estimated Daily Truck Parking Demand



Source: SRF analysis of Streetlight Insight data

Figure 49. Estimated Daily Truck Parking Demand vs. Capacity



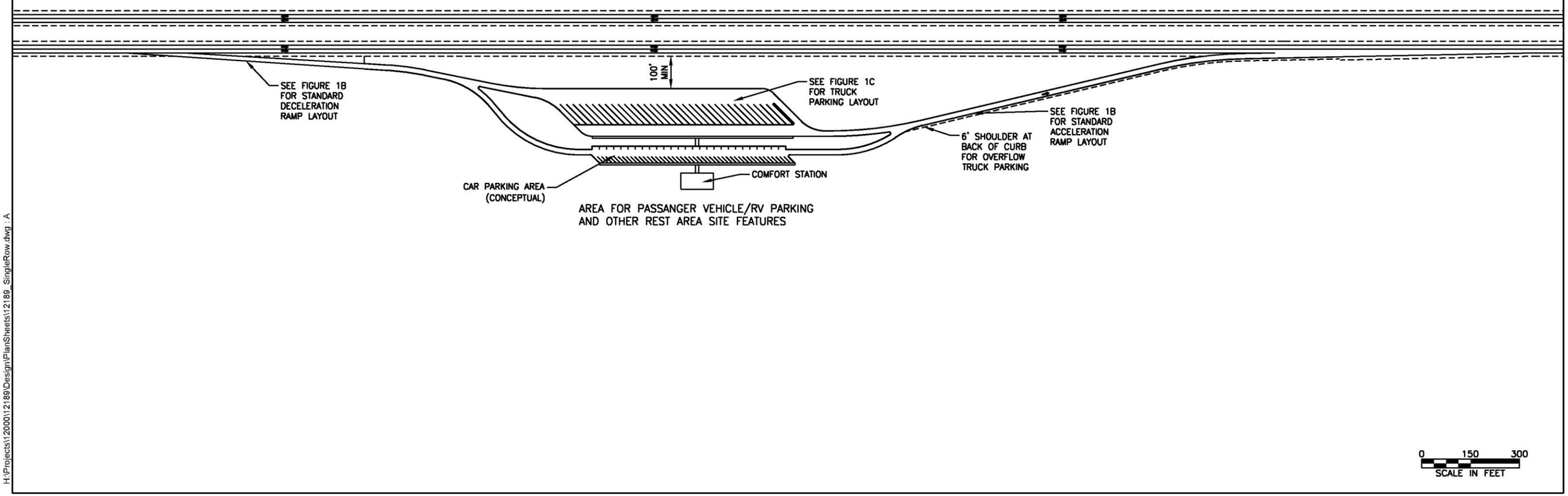
Appendix E: Conceptual Layouts and Cost Estimates

The following pages include planning-level conceptual layouts and cost estimates for two examples of new facilities and three examples of retrofitting existing facilities. These include:

- New public facility (single row) [Figures 1A, 1B, 1C]: This example shows the conceptual layout for a new public rest area with a single row of parking. The layout includes 34 parking spaces and is estimated to cost approximately $2.1 Million.
- New public facility (double row) [Figures 2A, 2B, 2C]: This example shows the conceptual layout for a new public rest area with a double row of parking in a butterfly configuration. The layout includes 34 parking spaces and is estimated to cost approximately $3.1 Million.
- Retrofit of Hansel Lake Rest Area [Figure 3A]: This example shows the conceptual installation of additional truck parking at the Hansel Lake Rest area. The layout adds 14 spaces to the existing 8 at an estimated cost of approximately $1.1 Million
- Retrofit of Flying J Northfield truck stop [Figure 3B]: This example shows the conceptual installation of additional truck parking in the adjacent parcel south of the existing truck stop. The layout adds 76 additional parking spaces at an estimated cost of approximately $2.7 Million.

GENERAL NOTES:

- THROUGH HIGHWAY SHOWN WITH 12' LANES AND 10' PAVED SHOULDER
- RAMP LENGTHS SHOWN ARE DRAWN BASED ON 70MPH HIGHWAY DESIGN SPEED
- PASSENGER CAR AND RV PARKING AREAS NOT SHOWN
- OTHER POSSIBLE SITE FEATURES NOT SHOWN
- TRUCK PARKING LOT SHOWN 100' FROM EDGE OF TRAVELED LANE
- CURB CLOSEST TO THROUGH HIGHWAY TO BE B624
- CURB FURTHEST FROM THROUGH HIGHWAY TO BE DR4-9



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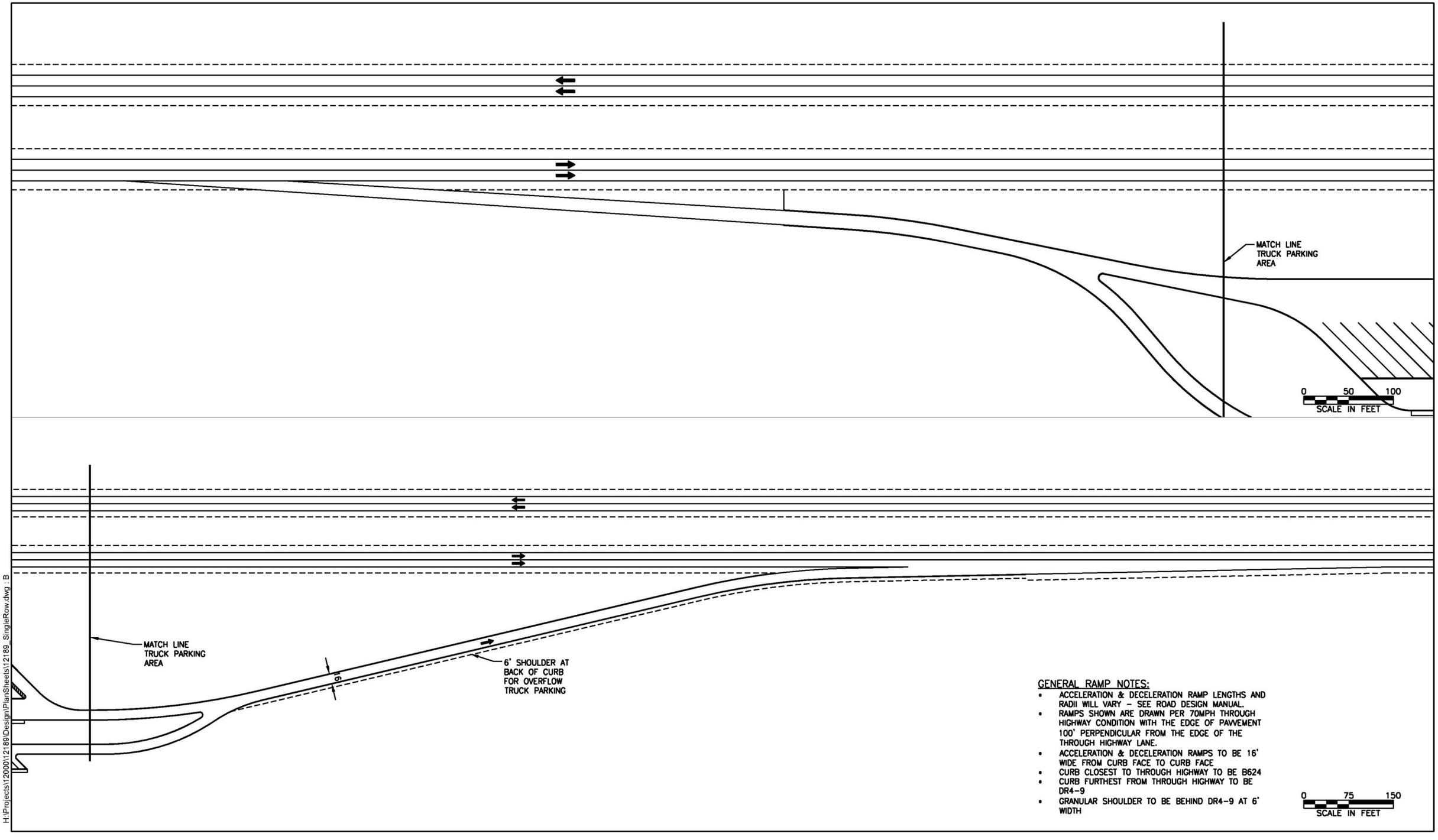
TRUCK PARKING GUIDELINES - SINGLE ROW - OVERVIEW

MINNESOTA STATEWIDE TRUCK PARKING STUDY
MINNESOTA DEPARTMENT OF TRANSPORTATION

Figure 1A

Job #12189.00
7/31/2019 - 10:50AM



TRUCK PARKING GUIDELINES - SINGLE ROW - DECEL/ACCEL LANES

MINNESOTA STATEWIDE TRUCK PARKING STUDY
MINNESOTA DEPARTMENT OF TRANSPORTATION

Figure 1B

Job #12189.00
7/31/2019 - 10:51AM

MATCH LINE DECELERATION LANE
SEE SHEET FIGURE 1B

100' MINIMUM TO SHOULDER OF HIGHWAY LANES

TRUCK PARKING AREA

R50'

34 TRUCK PARKING SPACES

48'

14'

75'

89'

14'

45'

20'

5'

R100'

MATCH LINE ACCELERATION LANE
SEE SHEET FIGURE 1B

1' WIDE PARKING STRIPE

35'

16'

R25'

6' SIDEWALK

CAR PARKING AREA (CONCEPTUAL)

COMFORT STATION (CONCEPTUAL)

0 30 60
SCALE IN FEET

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SRF

TRUCK PARKING GUIDELINES - SINGLE ROW - PARKING AREA

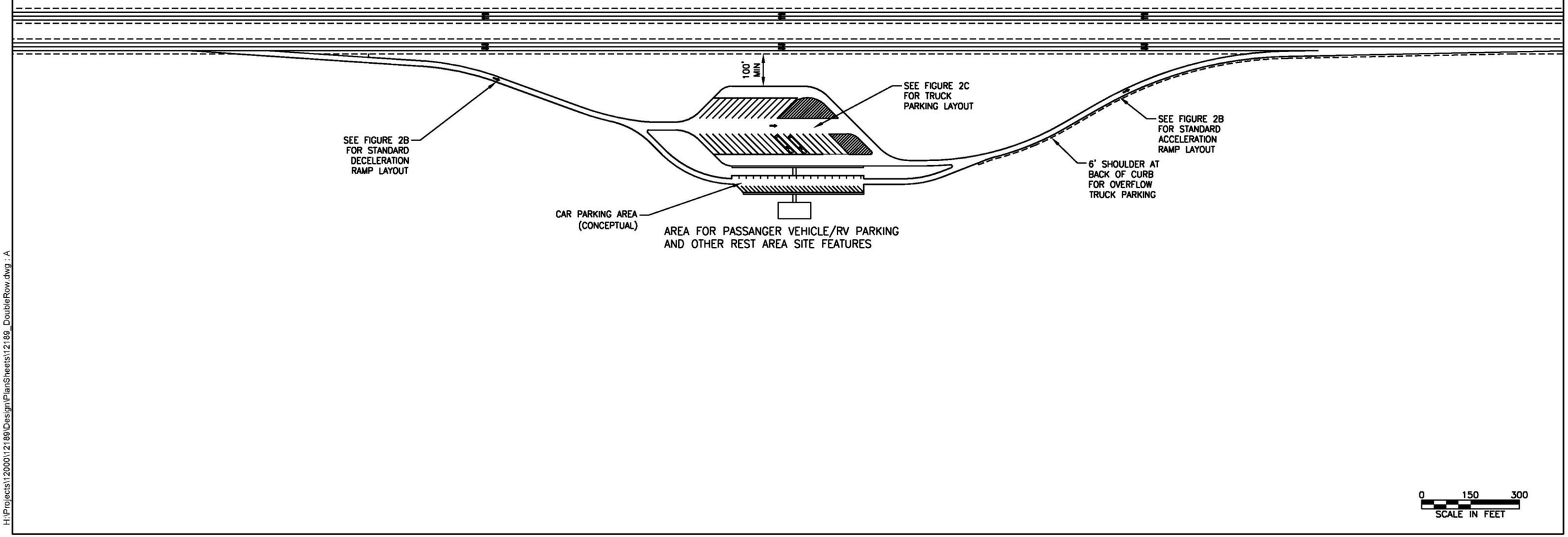
MINNESOTA STATEWIDE TRUCK PARKING STUDY
MINNESOTA DEPARTMENT OF TRANSPORTATION

Figure 1C

Job #12189.00
7/31/2019 - 10:52AM

GENERAL NOTES:

- THROUGH HIGHWAY SHOWN WITH 12' LANES AND 10' PAVED SHOULDER
- RAMP LENGTHS SHOWN ARE DRAWN BASED ON 70MPH HIGHWAY DESIGN SPEED
- PASSENGER CAR AND RV PARKING AREAS NOT SHOWN
- OTHER POSSIBLE SITE FEATURES NOT SHOWN
- TRUCK PARKING LOT SHOWN 100' FROM EDGE OF TRAVELED LANE
- CURB CLOSEST TO THROUGH HIGHWAY TO BE B624
- CURB FURTHEST FROM THROUGH HIGHWAY TO BE DR4-9



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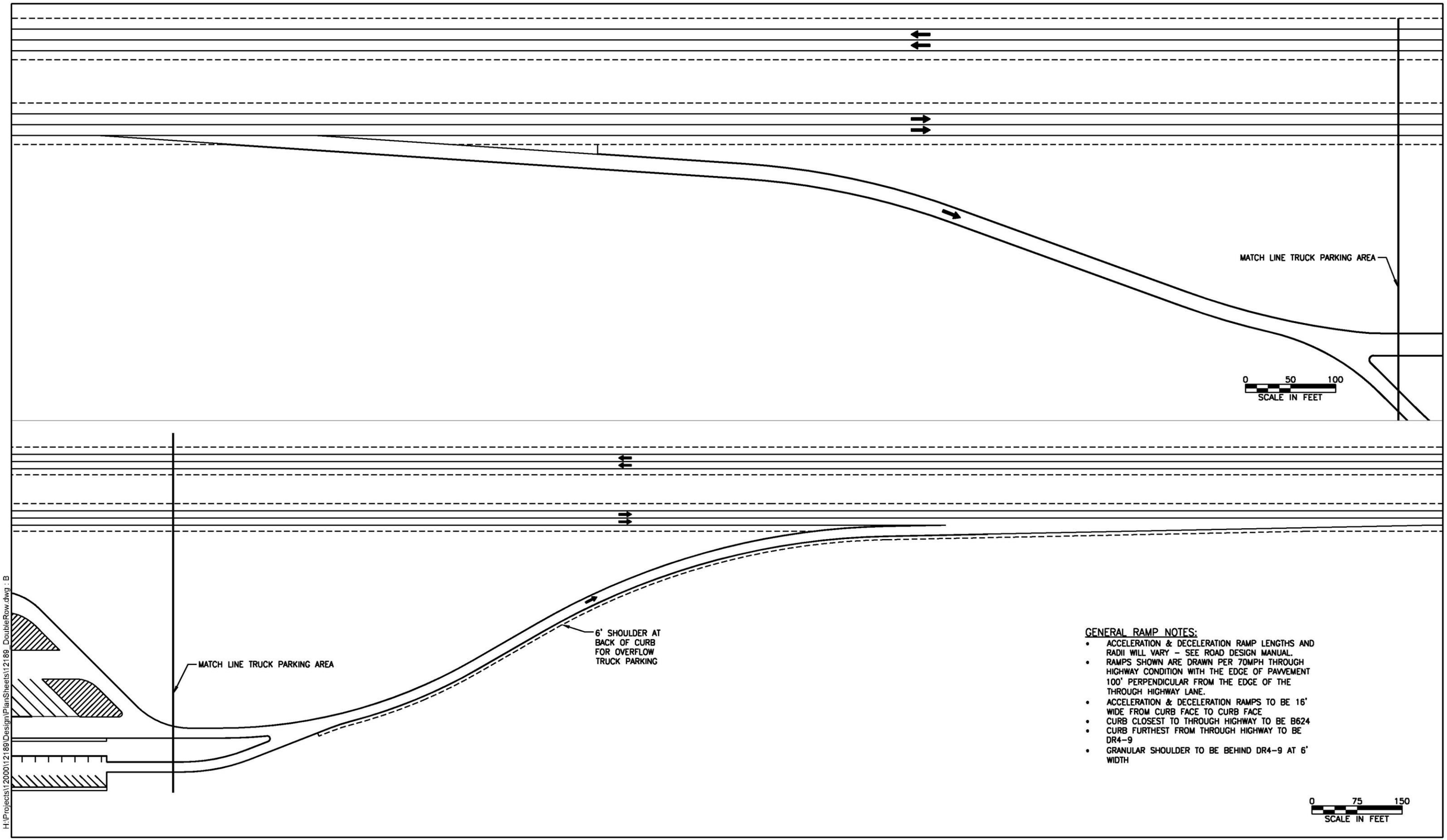
TRUCK PARKING GUIDELINES - DOUBLE ROW - OVERVIEW

MINNESOTA STATEWIDE TRUCK PARKING STUDY
MINNESOTA DEPARTMENT OF TRANSPORTATION

Figure 2A

Job #12189.00
7/31/2019 - 10:54AM



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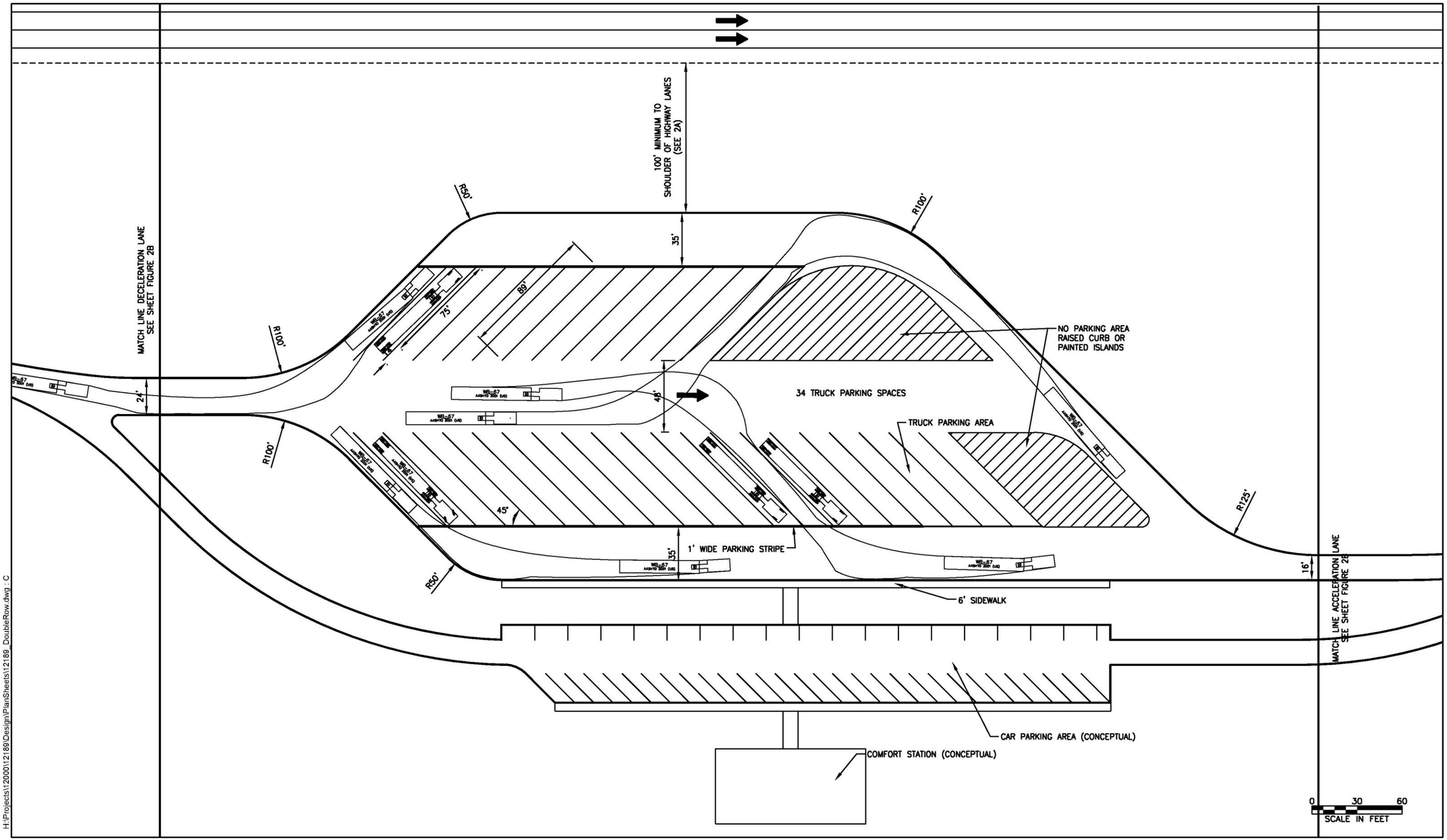
TRUCK PARKING GUIDELINES - DOUBLE ROW - DECEL/ACCEL LANES

MINNESOTA STATEWIDE TRUCK PARKING STUDY
MINNESOTA DEPARTMENT OF TRANSPORTATION

Figure 2B

Job #12189.00
7/31/2019 - 10:54AM



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TRUCK PARKING GUIDELINES - DOUBLE ROW - PARKING AREA

MINNESOTA STATEWIDE TRUCK PARKING STUDY
MINNESOTA DEPARTMENT OF TRANSPORTATION

Figure 2C

Job #12189.00
8/1/2019 - 9:02AM

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TRUCK PARKING GUIDELINES - RETROFIT - HANSEL LAKE REST AREA (DALTON, MN)

MINNESOTA STATEWIDE TRUCK PARKING STUDY
MINNESOTA DEPARTMENT OF TRANSPORTATION

Figure 3A

Job #12189.00
7/31/2019 - 10:26AM

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TRUCK PARKING GUIDELINES - RETROFIT - PRIVATE LOT PARKING (FLYING J - NORTHFIELD, MN) - SOUTH PARCEL

Figure 3B

MINNESOTA STATEWIDE TRUCK PARKING STUDY
MINNESOTA DEPARTMENT OF TRANSPORTATION

Job #12189.00
8/1/2019 - 9:45AM

SRF Consulting Group, Inc. | Engineers Planners Designers

MINNESOTA STATEWIDE TRUCK PARKING STUDY

Concept Construction Cost Estimate (based upon 2018 bid price information)

Prepared By: SRF Consulting Group, Inc., August 1, 2019

					NEW SINGLE ROW		NEW DOUBLE ROW		HANSEL LAKE RETROFIT		FLYING J SOUTH RETROFIT	
	ITEM DESCRIPTION		UNIT	UNIT PRICE	EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT	EST. QUANTITY	EST. AMOUNT
PAVING AND GRADING COSTS												
GrP 1	2106 Excavation - common & subgrade		cu. yd.	$8.00	6,312	$50,493	19,100	$152,800	6,500	$52,000	15,800	$126,400
GrP 2	2106 Common Embankment (CV)		cu. yd.	$5.00	640	$3,200	725	$3,625	115	$575	320	$1,600
GrP 3	Parking Lot Pavement	(1)	sq. yd.	$52.00	16,230	$843,960	19,050	$990,600	6,420	$333,840	15,783	$820,716
GrP 4	Concrete Walk	(2)	sq. yd.	$50.00	39	$1,972	228	$11,389	27	$1,333	908	$45,417
GrP 5	ADA Pedestrian Curb Ramp		each	$1750.00								
	SUBTOTAL PAVING AND GRADING COSTS:					**$899,626**		**$1,348,914**		**$452,248**		**$1,153,133**
DRAINAGE, UTILITIES AND EROSION CONTROL												
Dr 1	Drainage - urban		10%			$90,000		$135,000		$46,000		$116,000
Dr 2	Turf Establishment & Erosion Control		10%			$90,000		$135,000		$46,000		$116,000
	SUBTOTAL DRAINAGE, UTILITIES AND EROSION CONTROL					**$198,000**		**$297,000**		**$102,000**		**$256,000**
SIGNAL AND LIGHTING COSTS												
SGL 1	Parking Lot Lighting		each	$2,500	16	$40,000	20	$50,000	10	$25,000	20	$50,000
	SUBTOTAL SIGNAL AND LIGHTING COSTS:					**$40,000**		**$50,000**		**$25,000**		**$50,000**
SIGNING & STRIPING COSTS												
SGN 1	Signing (C&D)		1%			$8,996.26		$13,489.14		$4,522.48		$11,531.33
SGN 2	Striping		lin. ft.	$1	5300.0	$5,300	6367.0	$6,367	2077.0	$2,077	1480.0	$1,480
	SUBTOTAL SIGNING & STRIPING COSTS:					**$14,296**		**$19,856**		**$6,599**		**$13,011**
	SUBTOTAL CONSTRUCTION COSTS:					**$1,151,922**		**$1,715,770**		**$585,848**		**$1,472,144**
MISCELLANEOUS COSTS												
M 1	Mobilization		5%			$58,000		$86,000		$30,000		$74,000
M 2	Non Quantified Minor Items		5%			$58,000		$86,000		$30,000		$74,000
M 3	Traffic Control		1%			$12,000		$18,000		$6,000		$15,000
	SUBTOTAL MISCELLANEOUS COSTS:					**$186,000**		**$276,000**		**$96,000**		**$237,000**
ESTIMATED TOTAL CONSTRUCTION COSTS without Contingency:						**$1,337,922**		**$1,991,770**		**$681,848**		**$1,709,144**
1	Contingency or "risk"		20%			$268,000		$399,000		$137,000		$342,000
ESTIMATED TOTAL CONSTRUCTION COSTS PLUS CONTINGENCY:						**$1,605,922**		**$2,390,770**		**$818,848**		**$2,051,144**
	OTHER PROJECT COSTS:											
	DESIGN ENG. & CONSTRUCTION ADMIN.		Lump Sum	20%		$322,000		$479,000		$164,000		$411,000
	SUBTOTAL OTHER PROJECT COSTS					**$322,000**		**$479,000**		**$164,000**		**$411,000**
	TOTAL PROJECT CONSTRUCTION COST					**$1,927,922**		**$2,869,770**		**$982,848**		**$2,462,144**
	INFLATION COST (CURRENT YR. TO YR. 2021)		Years	3%	2	$200,000	2	$200,000	2	$100,000	2	$200,000
	TOTAL PROJECT CONSTRUCTION COST (OPENING YEAR DOLLARS)					**$2,127,922**		**$3,069,770**		**$1,082,848**		**$2,662,144**

NOTE: (1) Includes aggregate base class 5 and PASB or OGAB, as appropriate.
(2) Includes aggregate base class 5.

Note that these estimates are preliminary and do not include right-of-way acquisition costs. All costs are based on truck parking and walk areas only.

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