Appalachian Regional Truck Parking Study

Final Report

Prepared for:

Appalachian Regional Commission

Prepared by:

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The Appalachian Regional Truck Parking Study

The objective of the Appalachian Truck Parking Study is to 1) bring together the best available data and insights by combining completed state-level efforts and new research into an integrated regional assessment of truck parking supply, demand, and future needs and 2) to propose actionable recommendations for regional truck parking improvements.

Final Report

This final report for the Appalachian Truck Parking Study explains the purpose and background of the study, demonstrates the truck parking needs and issues identified from data analysis and stakeholder outreach in the Appalachian Region, and presents a variety of recommendations that Appalachian Regional Commission (ARC) and its regional partners may consider improving truck parking conditions in the state.

Acknowledgments

This project was commissioned and funded by the ARC. The project was envisioned and guided by Network Appalachia, a multimodal transportation stakeholder advisory group representing all 13 states of Appalachia. The research, analysis, and writing of this report were led by CPCS Transcom Inc. The CPCS Team acknowledges and is thankful for the input of those consulted in the development of this project, as well as the guidance and input of representatives from ARC and other individuals, including:

- Jim Sinnette and Tom Smith of the Appalachian Regional Commission
- Amber Reimnitz of the Federal Highway Administration
- Dan Hodge of Cambridge Econometrics

Opinions and limitations

Unless otherwise indicated, the opinions herein are those of the authors and do not necessarily reflect the views of ARC.

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Acronyms

ADHS	Appalachian Development Highway System
AID	Accelerated Innovation Deployment
ALDOT	Alabama Department of Transportation
ARC	Appalachian Regional Commission
ATRI	American Transportation Research Institute
ATTIMD	Advanced Transportation Technologies and Innovative Mobility Deployment
BAC	Blood Alcohol Content
BCA	Benefit-Cost Analysis
DOT	Department of Transportation
FAST	Fixing America's Surface Transportation
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
GDOT	Georgia Department of Transportation
GPS	Global Positioning System
HOS	Hour-of-Service
HP-ITD	High Priority Innovative Technology Deployment
INFRA	Nationally Significant Freight & Highway Projects
KYTC	Kentucky Transportation Cabinet
NAICS	North American Industry Classification System
NB	Northbound
NCDOT	North Carolina Department of Transportation
NOFO	Notice of Funding Opportunity
NYSDOT	New York State Department of Transportation
ODOT	Ohio Department of Transportation
PennDOT	Pennsylvania Department of Transportation
RAISE	Rebuilding American Infrastructure with Sustainability & Equity
RURAL	Rural Surface Transportation Grants
SB	Southbound
SCDOT	South Carolina Department of Transportation
TDOT	Tennessee Department of Transportation
TIDP	Technology and Innovation Deployment Program
TPIMS	Truck Parking Information Management Systems
TRIP	Thrive Regional Infrastructure Portal
US	United States

VDOT	Virginia Department of Transportation
WVDOT	West Virginia Department of Transportation

Executive Summary

The Appalachian Regional Truck Parking Study presents a comprehensive view of truck parking needs across the 423-county, 13-state area of the Appalachian Regional Commission (ARC). The study identifies strategies that ARC and regional partners should consider to improve truck parking in the region.

Impacts of Truck Parking

Supply chains rely on truck parking to provide truck drivers with safe and secure locations to take their federally required Hours of Service (HOS) breaks, access basic amenities, and stage for pick-up and delivery appointments. Yet, the national shortage of truck parking spaces is associated with negative safety outcomes, high driver attrition/turnover, economic losses, and many other impacts as summarized in Figure ES - 1. State-level truck parking studies in the Appalachian Region validate these impacts and highlight the need for coordinated action.

Figure ES - 1: Impacts of Inadequate Truck Parking

	Driver stops early for parking	Driver parks in undesignated locations	Driver exceeds HOS searching for parking
Safety		Safety risks for truck drivers and other roadway users; Drivers parking at undesignated locations are more susceptible to theft, robbery, and other illicit events.	Safety risks associated with fatigued driving for truck drivers and other roadway users
Economic	Lost drive time, with costs for drivers	Cargo exposed to theft;	
		Potential citation, resulting in financial loss to drivers and trucking companies	
Environmental		Noise and GHG emissions, as well as human and other waste produced from parking in incompatible areas.	Increased vehicle miles traveled causing additional noise and air pollution
Infrastructure		Infrastructure damage	Increased vehicle miles traveled causing extra wear and tear of roadway surface
Quality of Life		Drivers are unable to access amenities like bathrooms, showers, food, and recreational areas.	

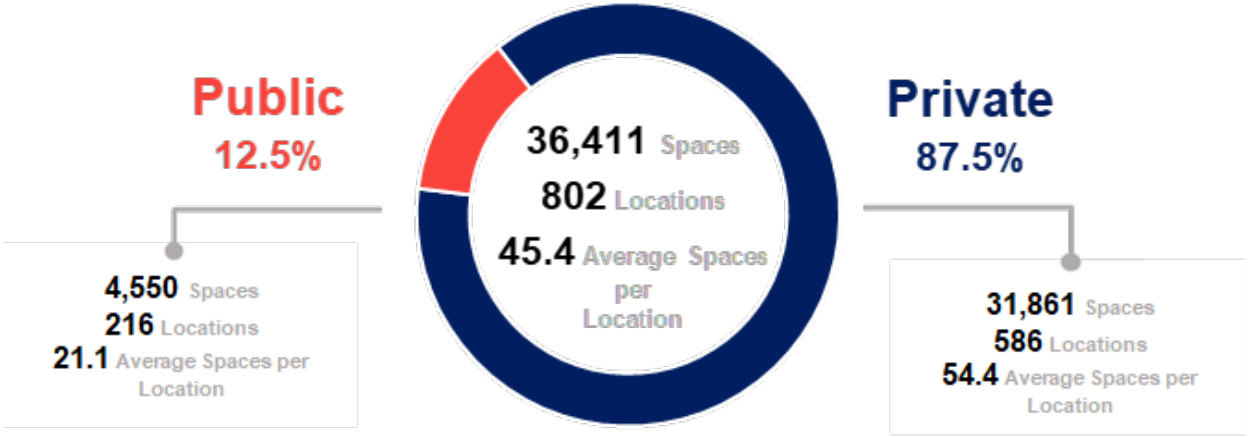
Source: CPCS.

Truck Parking in the Appalachian Region

There are more than 800 truck parking locations in the Appalachian Region, providing over 36,400 truck parking spaces (Figure ES - 2). Over 87 percent of the spaces are owned by private operators. Most of these parking locations are situated along corridors that are not part of the Appalachian Development Highway System (ADHS)—a network of designated roadways critical for boosting economic development in the Region. Truck parking spaces are concentrated around major

metropolitan areas, such as Atlanta, GA; Birmingham, AL; and Knoxville, TN; as well as in western Virginia and eastern Ohio (Figure ES - 3).

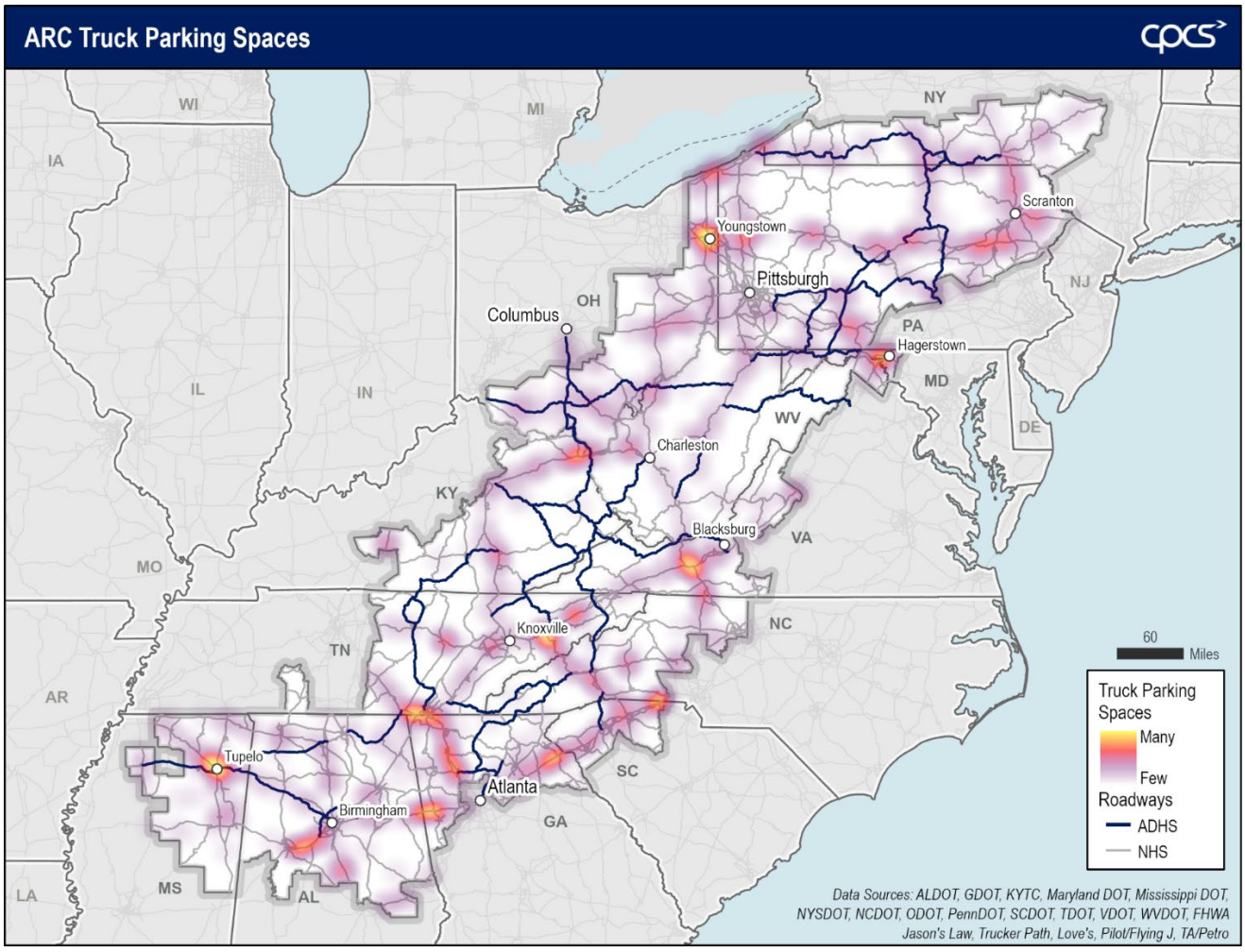
Figure ES - 2: Appalachian Region Truck Parking Spaces and Locations



Sources: FHWA Jason's Law, ALDOT, GDOT, KYTC, Maryland DOT, Mississippi DOT, NYSDOT, NCDOT, ODOT, PennDOT, SCDOT, TDOT, VDOT, WVDOT, Trucker Path, Love's, Pilot/Flying J, TA/Petro.

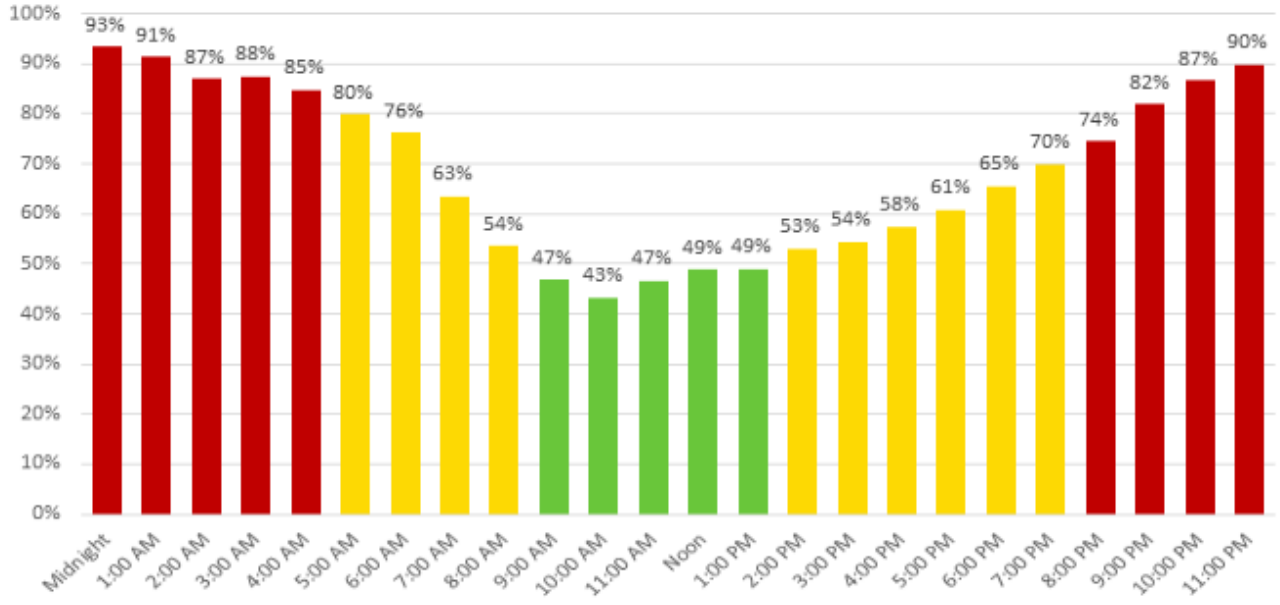
Truck Parking Issues in the Appalachian Region

Figure ES - 3: Appalachian Region Truck Parking Locations by Number of Spaces



The truck parking locations in the Region have the highest utilization rates during the overnight hours, peaking at midnight at 93 percent occupied. The utilization trend over the course of the average day is V-shaped, with the lowest utilization during the morning and early afternoon hours (9:00 AM – 1:00 PM) building to the highest levels of utilization in the evening and overnight. The utilization rates are higher during the evening and overnight hours because most truck drivers stop and rest at night after a long day of driving, and this is the most common time to take the longest required (8 hours) federal hours of service break.

Figure ES - 4: Appalachian Region Truck Parking Utilization



Source: CPCS analysis and modeling of ATRI, TPIMS, Trucker Path (2022)

All Interstates and ADHS corridors, except for US 119 south of Charleston, WV, are forecast to see an increase in truck parking demand based on the future truck volume. However, even though truck volume is a primary factor that induces demand for truck parking, what the truck growth forecast does not capture is a multitude of factors that can also impact truck volumes, such as freight-reliant businesses, intermodal hubs, and completion of ADHS corridors (all of which could lead to higher demand for truck parking).

Truck Parking Issues in the Appalachian Region

Undesignated truck parking is defined as when a truck parks in an area that is not otherwise intended for truck parking. It poses safety risks for drivers and other roadway users, additional infrastructure wear and tear, and quality of life for both truck drivers and people in the surrounding areas with conflicted interests. The concentrations of undesignated parking are highest in the southern portion of the Region, especially on Interstates surrounding Birmingham, AL; Atlanta, GA; Knoxville, TN; and Charleston, WV (Figure ES - 5 and Figure ES - 6).

Figure ES - 5: Appalachian Region Undesignated Truck Parking Density

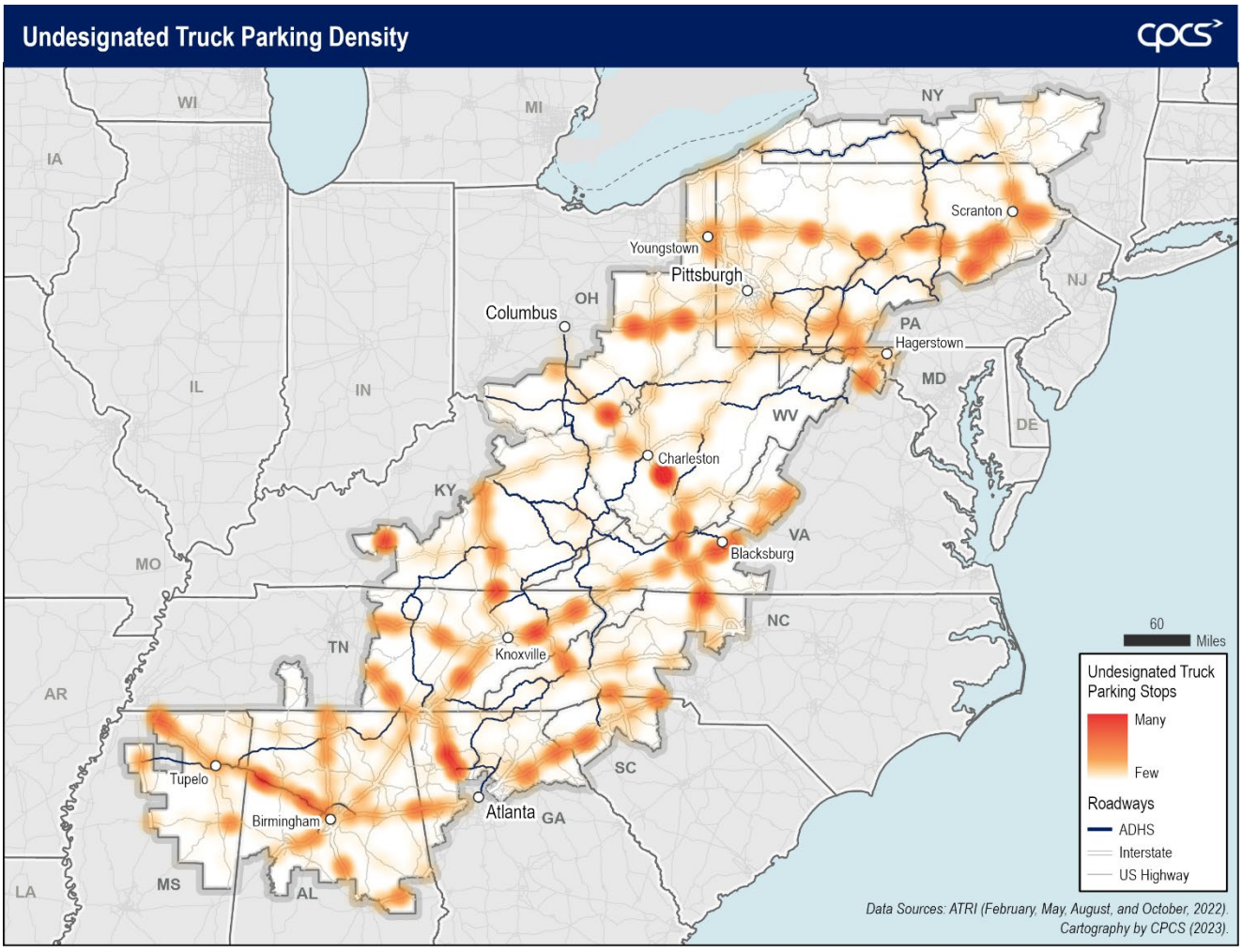


Figure ES - 6: Appalachian Region Undesignated Truck Parking Clusters – Large

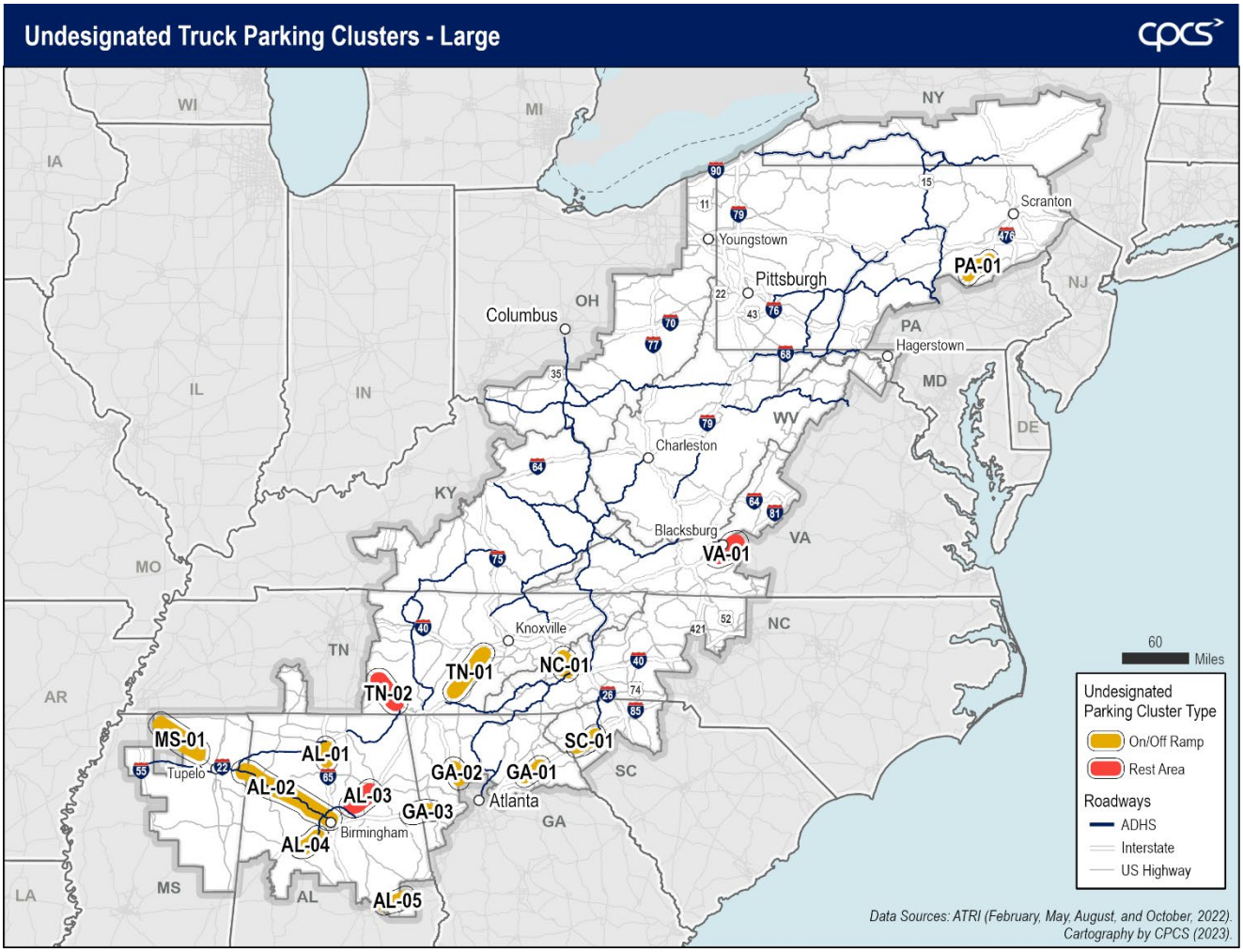
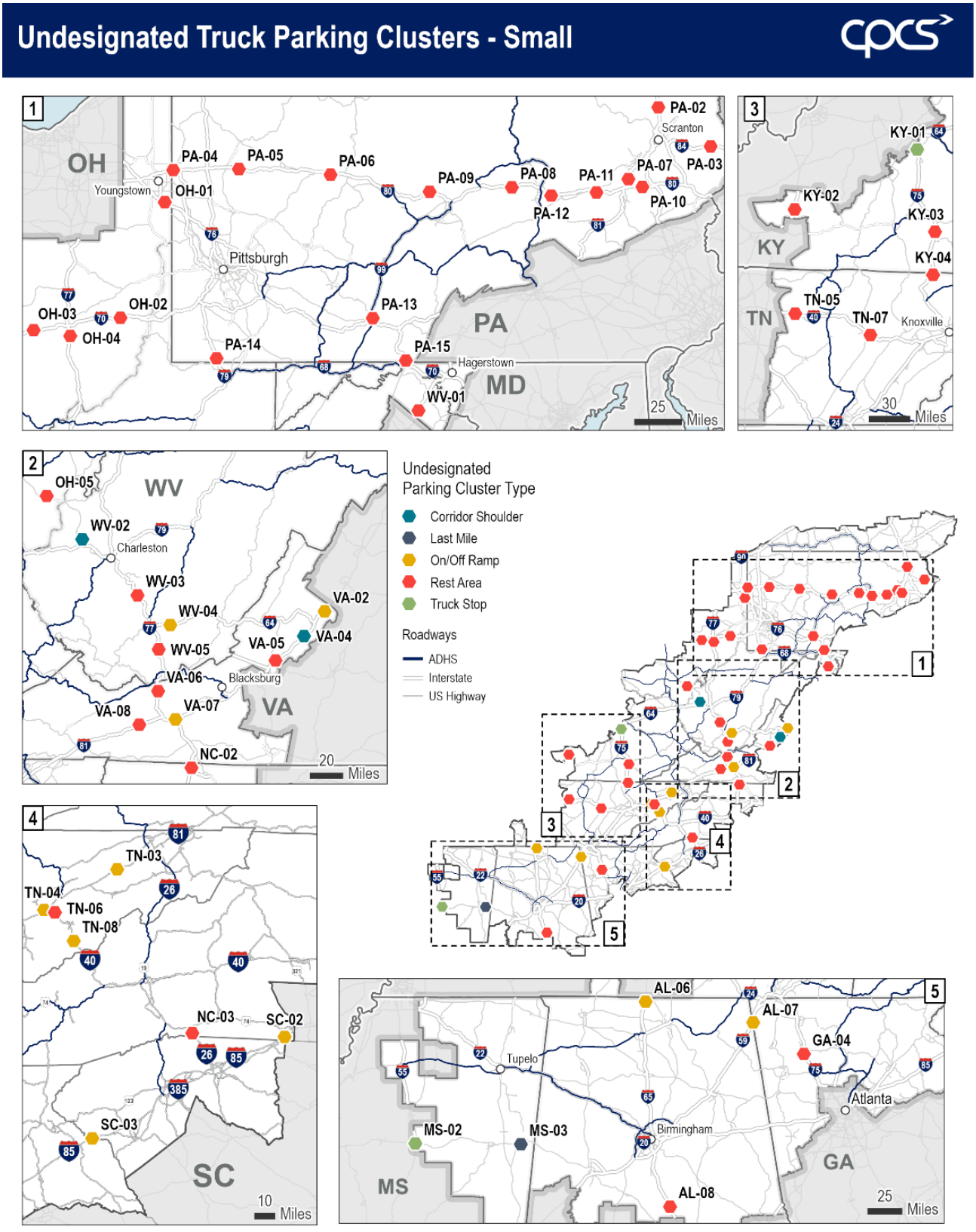


Figure ES - 7: Appalachian Region Undesignated Truck Parking Clusters – Small



Data Sources: ATRI (February, May, August, and October, 2022). Cartography by CPCS (2023).

Stakeholder feedback, obtained via focus group meetings and an online survey with regional representatives from state departments of transportation, regional planning agencies, truck industry, etc., validated the greatest truck parking demand locations identified by the data analysis. Additionally, the stakeholders also identified additional truck parking challenges, including restrictive zoning, community pushback on building truck parking spaces, competition for limited funds, technology limitations, right-sizing parking, and respect for facilities.

Truck parking needs from data analysis and stakeholder input helped prioritize two sets of corridors that could guide the decision-making on truck parking improvements in the region (Figure ES - 8 and Figure ES - 9)

Figure ES - 8: Truck Parking Priority Corridors on ADHS

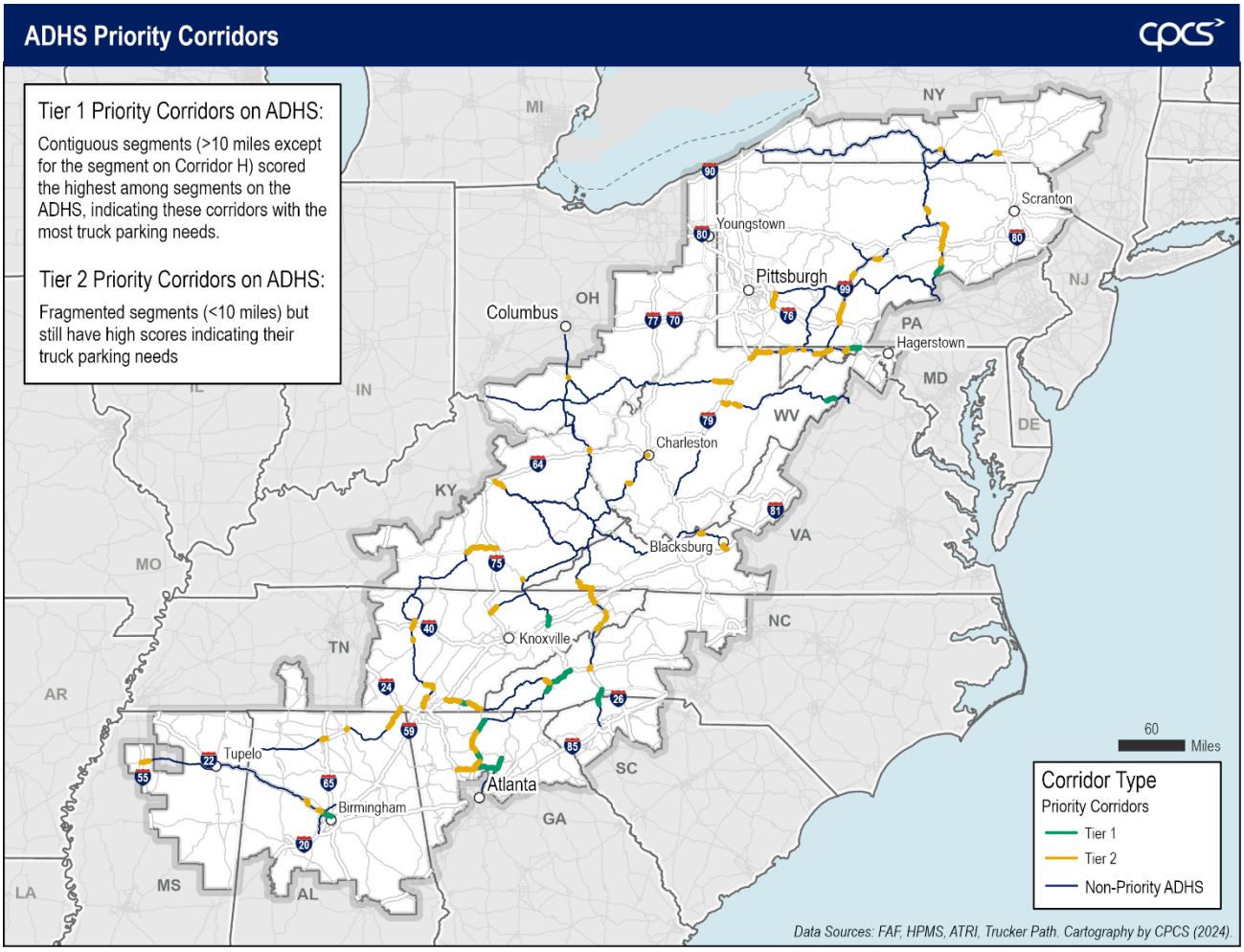
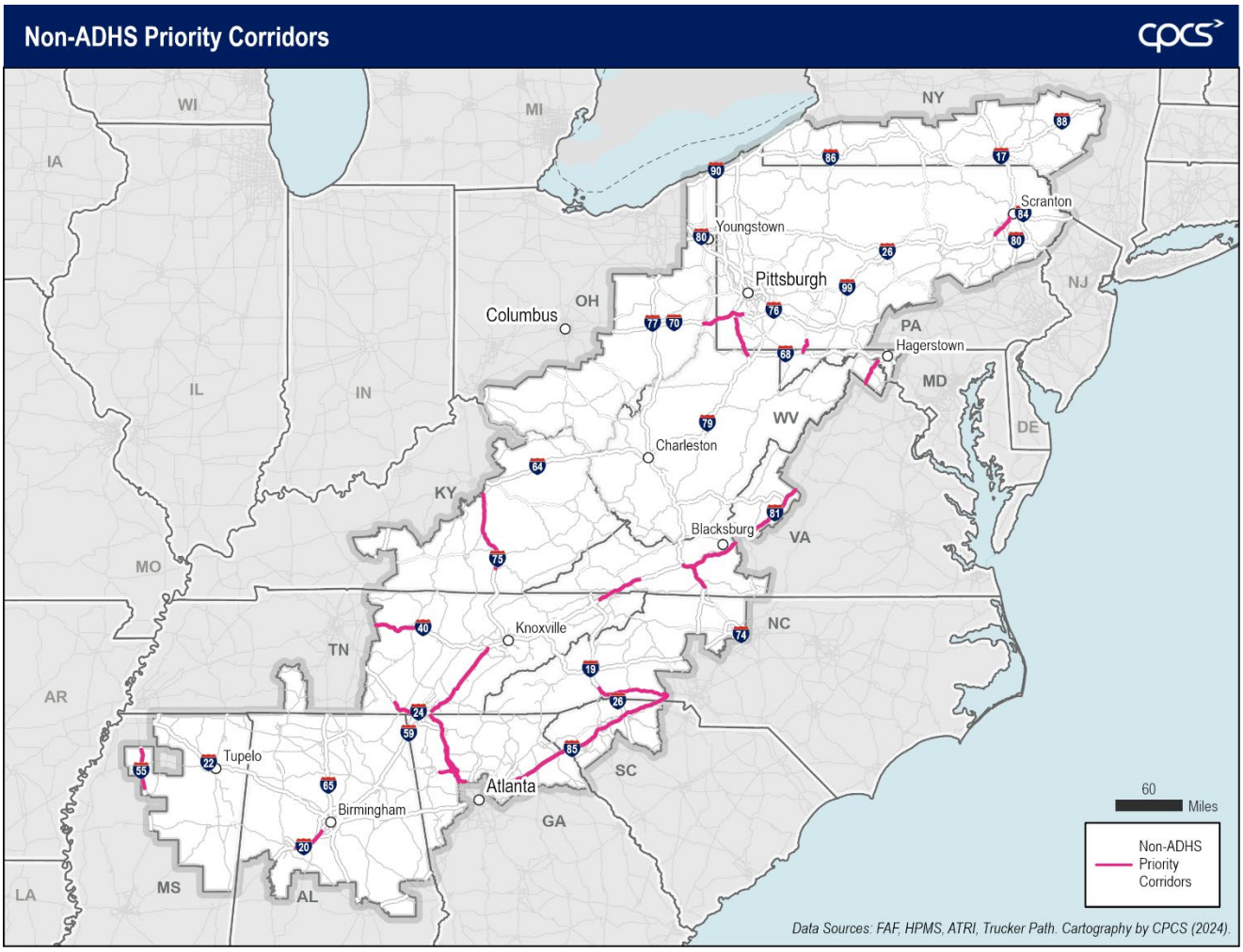
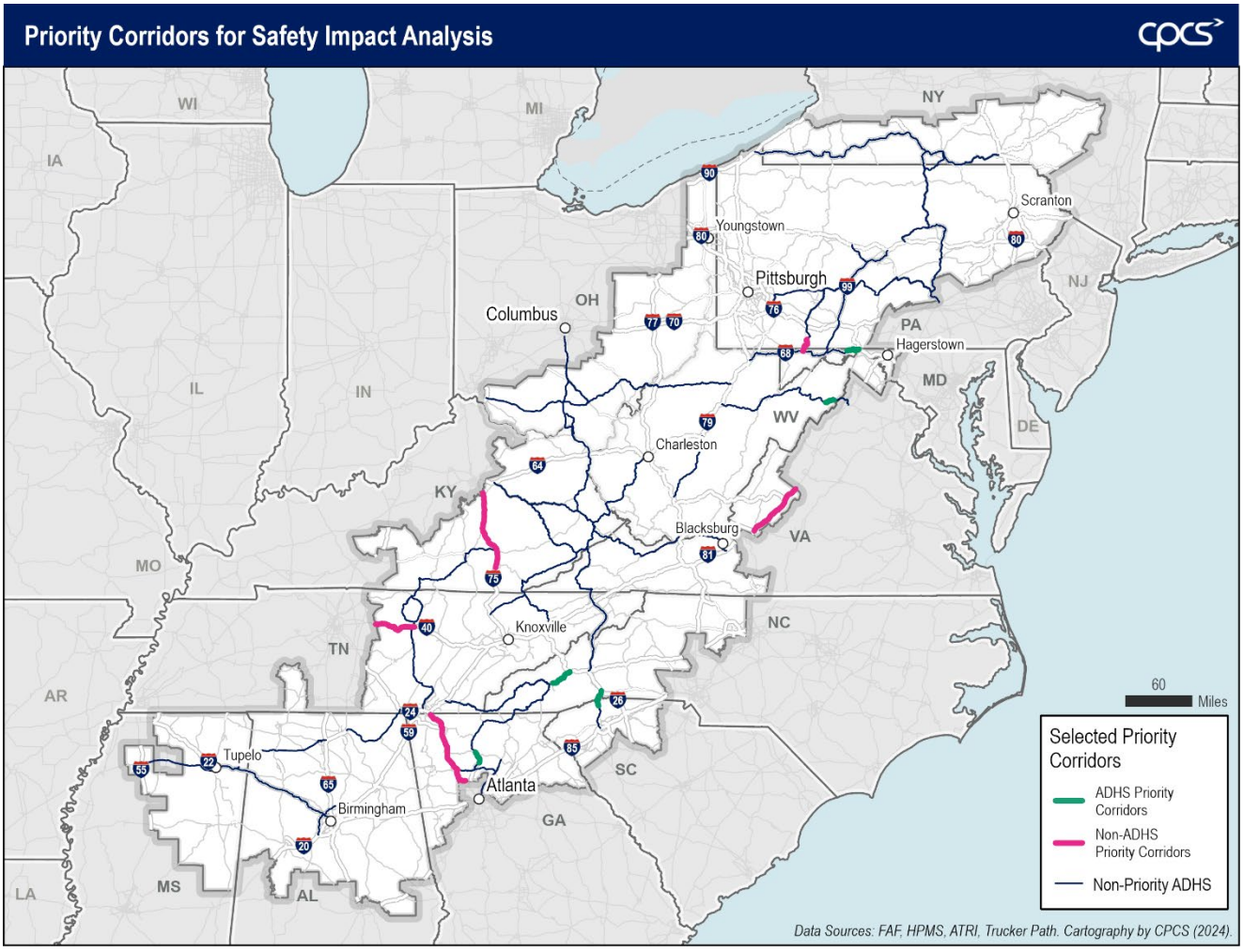


Figure ES - 9: Truck Parking Priority Corridors on Non-ADHS



Between 2018 and 2022, 406 truck-involved crashes happened due to fatigued driving and a total of 1,146 crashes happened due to undesignated parking along the priority corridors in the Appalachian Region. Along the ten selected corridors for the truck parking safety assessment (**Error! Reference source not found.**), about 37 percent of the crashes associated with inadequate truck parking led to property damage only while 57 percent led to minor injuries and 6 percent led to severe incapacitating injuries or fatalities. The most severe of these crashes occurred near the priority segment along US-25 in South Carolina, on US-219 in Pennsylvania, and along I-81 in Virginia.

Figure ES - 10: Select Truck Parking Priority Corridors for Safety Impact Assessment



Truck Parking Recommendations

Due to the many factors that contribute to the truck parking shortage, there is no single solution that will address the truck parking challenges facing the Appalachian Region; addressing this issue demands collaboration and coordination among various stakeholders, both public and private, to develop and deploy a portfolio of strategies. The following four recommendations are proposed to ARC considering its multistate scope:

Recommendation 1: *Utilize existing ADHS funding and ARC grant funding to support the improvement of truck parking in the Appalachian Region.*

Recommendation 2: *Organize peer exchanges among public stakeholders to foster multi-state and corridor collaborations in truck parking data sharing, planning, and solutions.*

Recommendation 3: *Convene public and private stakeholders to explore the possibility of partnerships to add more capacity for truck parking.*

Recommendation 4: *Assist communities in identifying and capitalizing on federal/state grant opportunities to fund truck parking projects.*

1 Introduction

Chapter Summary: Truck parking is a critical issue that affects the efficiency of supply chains, and the safety of truck drivers and other roadway users and can negatively impact the environment and roadway infrastructure. In the Appalachian Region, truck parking issues could also exacerbate and hinder the economic conditions in regions which are already economically distressed. The Appalachian Regional Truck Parking Study uses unified data sources, methodologies, and level of detail to better understand the truck parking needs on a regional level and to provide a starting point for the 13 states in the Region to convene, explore, and advance effective truck parking solutions.

1.1 The Purpose of the Study

Nationally, truck parking shortages negatively impact the economy, safety, infrastructure, and quality of life. ARC became interested in truck parking because its Network Appalachia Freight Transportation Advisory Group identified truck parking as a key issue. And while many ARC states developed state-level truck parking studies, the Appalachian Region lacked a region-wide study that could position ARC to address truck parking shortages. ARC was also prompted by the connection between truck parking and economic development. For example, truck parking shortages can hinder the economic development in some already economically distressed areas in the Region and the lack of truck parking in more rural areas or along ADHS corridors could limit the viability of a broader ecosystem of freight activities. On top of that, the region's multijurisdictional nature and unique topography added to the need for a comprehensive, region-wide truck parking study.

The Appalachian Regional Truck Parking Study presents a comprehensive view of truck parking needs across the 423-county, 13-state area of the Appalachian Regional Commission (ARC) to inform suitable strategies ARC and its partners should consider for improving truck parking in the Region.

This study seeks to bring together unified data sources and methodologies to pinpoint truck parking demand, supply, and gaps and to identify the resulting needs and issues that ARC and its partners may address in the future. The study relies on a robust stakeholder engagement approach that drew insights from hundreds of individuals representing the trucking industry and local, regional, and state governments. The findings will enable ARC and its partners to work from a common platform to identify and advance effective truck parking policies, initiatives, and investments to improve safety and facilitate regional commerce.

1.2 National and Regional Importance of Truck Parking

Having an adequate supply of safe truck parking spaces is critical to the economic health of the Appalachian Region. Providing truck drivers with safe and secure locations to take their federally required Hours of Service (HOS) breaks, access basic amenities, and stage for pick-up and delivery appointments is an increasingly important priority to keep freight moving safely and efficiently. Yet, truck drivers persistently face difficulties finding adequate truck parking due to a persistent shortage of safe and accessible spaces. Consequently, truck drivers consistently cite truck parking as a top issue and cause of stress at work, with some spending an hour or more looking for safe truck parking. This leads to negative safety outcomes, high driver attrition/turnover, and economic losses as summarized in Figure 1.

State-level truck parking studies conducted across the Region validate the importance of truck parking, and the impacts of inadequate truck parking cited in each study are summarized in Figure 2. These impacts confirm the importance of truck parking in the regional context. All studies reviewed cite the lack of truck parking as a cause of increasing safety concerns and reducing economic productivity. For example, North Carolina conducted a survey as part of their truck parking study and found that about 90 percent of respondents who identified as truck drivers cited that they spent more than 30 minutes on average searching for truck parking in North Carolina, leading to lost economic productivity. Beyond the negative safety and economic impacts, some states also examined the truck parking impacts from a quality-of-life perspective. For example, the Kentucky Truck Parking Assessment and Action Plan points out that truck drivers face daily stress in finding parking in time along their route to avoid potential traffic enforcement citations. West Virginia's truck parking analysis underscores that sufficient and well-maintained truck parking facilities can help with truck driver retention and attraction by improving the quality of work environments for drivers.

Figure 1: Impacts of Inadequate Truck Parking

	Driver stops early for parking	Driver parks in undesignated locations	Driver exceeds HOS searching for parking
Safety		Safety risks for truck drivers and other roadway users; Drivers parking at undesignated locations are more susceptible to theft, robbery, and other illicit events.	Safety risks associated with fatigued driving for truck drivers and other roadway users
Economic	Lost drive time, with costs for drivers	Cargo exposed to theft;	
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Environmental		Noise and GHG emissions, as well as human and other waste produced from parking in incompatible areas.	Increased vehicle miles traveled causing additional noise and air pollution
Infrastructure		Infrastructure damage	Increased vehicle miles traveled causing extra wear and tear of roadway surface
Quality of Life		Drivers are unable to access amenities like food, showers, and bathrooms.	

Source: CPCS.

Figure 2: Impacts of Inadequate Truck Parking Cited in State-Level Truck Parking Studies

State-Level Study	Safety	Economic	Environmental	Infrastructure	Quality of Life
2022 Alabama State Freight Plan	✓	✓			

2022 Kentucky Truck Parking Assessment & Action Plan	✓	✓			✓
2020 Maryland Truck Parking Study	✓	✓	✓		
2022 Mississippi State Freight Plan	✓	✓			✓
2020 North Carolina Truck Parking Study	✓	✓			
2024 New York State Freight Plan	✓	✓	✓	✓	✓
2021 Transport Ohio	✓	✓	✓	✓	✓
2045 Pennsylvania Freight Mobility Plan	✓	✓			
2022 South Carolina Statewide Truck Parking Assessment Study	✓	✓			✓
2015 Virginia Truck Parking Study	✓	✓		✓	✓
2023 West Virginia State Freight Plan	✓	✓			✓

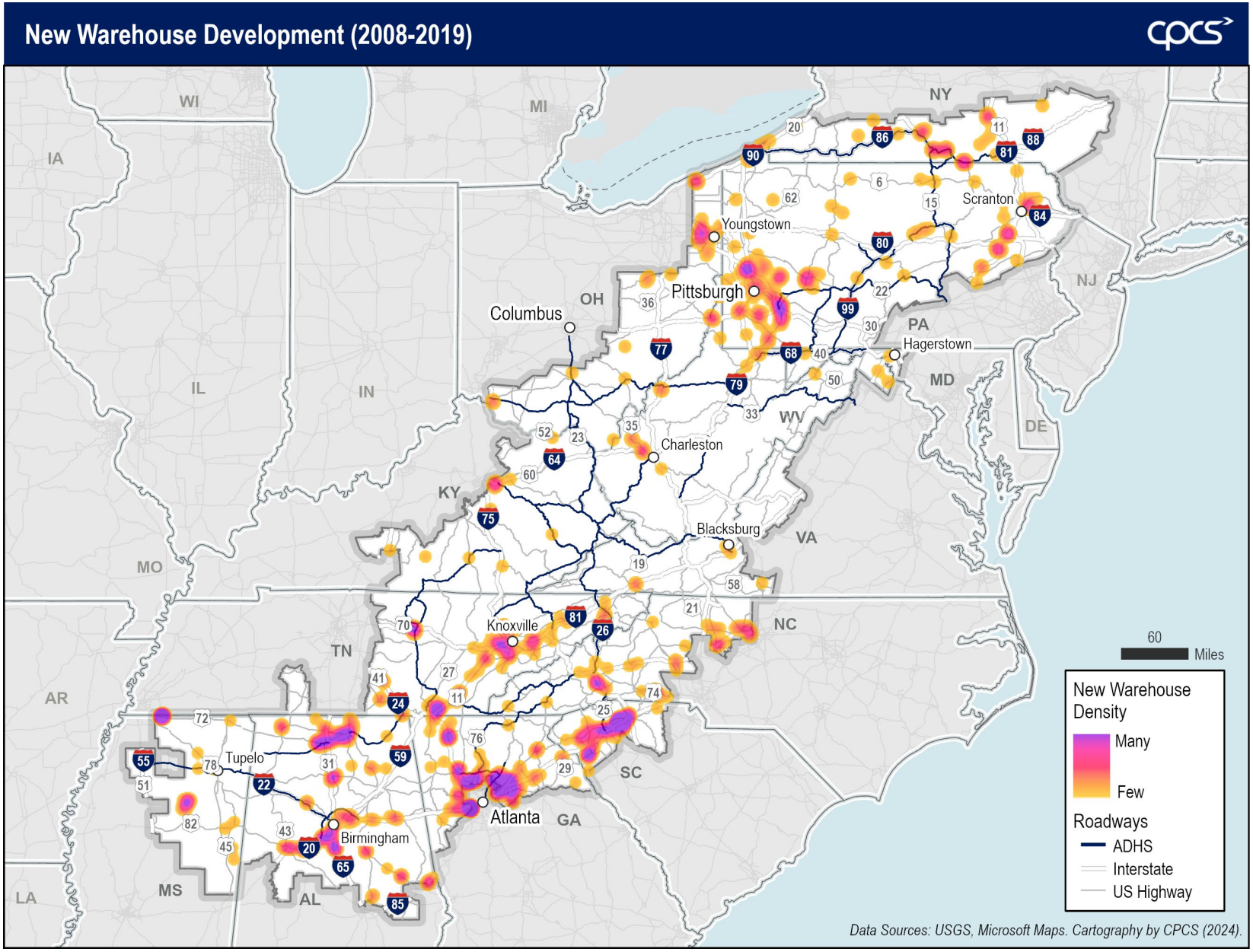
1.3 Truck Parking Trends in the Appalachian Region

The infrastructure development and unique geographical location of the Appalachian Region lead to some unique truck parking trends in the Region, especially in terms of understanding truck parking needs in the near future and proposing forward-looking strategies. These unique trends include:

- **Higher Truck Share with ADHS System Development.** As additional sections of the Appalachian Development Highway System (ADHS) are completed, it is anticipated that a greater share of trucks will utilize the Region's highways. Given the nature of long-haul trucking operations and HOS requirements, the demand for truck parking will grow at least as fast as truck volume. To ensure that the ADHS provides access to and freight mobility across regional and national markets, truck parking should be an integral part of the completion of the final stretch of the ADHS.

- **Growth in Warehouse and Distribution Facilities.** Additionally, the construction of new warehouses and distribution centers, spurred by the Region's strategic location and favorable economic conditions, will intensify the demand for truck parking facilities. Figure 3 shows the growth in the number of warehousing and distribution centers over the past decade in the Region. Most of the new developments are concentrated outside of Birmingham, AL; Huntsville, AL; Atlanta, GA; Knoxville, TN; Greenville, SC; and Pittsburgh, PA. These new developments serve as hubs for goods generation, distribution, and fulfillment, attracting a steady influx of trucks for loading, unloading, and storage purposes and increasing the need for truck parking. Sufficient truck parking infrastructure is necessary to continue attracting freight-reliant businesses and facilities to come into the region and facilitate the Region's economic development.

Figure 3: New Warehouse Development in the Appalachian Region (2008-2019)



1.4 About the Appalachian Regional Truck Parking Study

A series of key questions were used to guide the study, ensuring a holistic approach to identifying truck parking needs and issues and proposing effective and practical recommendations. Figure 4 displays the organization of the report by the key questions.

The methodology used for this study incorporates diverse data sources, including USDOT's Jason's Law, American Transportation Research Institute's (ATRI's) GPS data, Trucker Path crowdsourced truck parking usage data, and stakeholder input. This input was gathered from over 300 truck drivers, members of the public sector, and other key truck parking stakeholders in the Appalachian Region through an online survey and three virtual focus group meetings.

Figure 4: Key Questions and Report Organization

Key Question	Chapter/Section
What recent studies, data collection efforts, and fieldwork should be built upon to understand truck parking trends, challenges, and opportunities in the Appalachian region?	Section 1.2
What are the primary truck parking concerns among the trucking industry in the Appalachian region?	Chapter 3
How many public and private truck parking sites are located in the Appalachian region?	Section 2.1
What is the geographical arrangement of these facilities across the region?	
How many truck parking spaces are supplied among the truck parking facilities inventoried?	
How does this truck parking supply vary geographically in the region?	
What is the utilization of the region's truck parking supply, and how does this utilization vary geographically and by time of the day?	Section 2.2
Where does unmet truck parking demand currently lead to undesignated parking?	Section 3.1
Where will supply no longer be sufficient based on projected future (2045) demand?	Section 2.3
What areas would benefit from truck parking improvements?	Section 3.3
How do truck parking improvement/expansion costs compare to their expected benefits?	Section 4.2
What policies, initiatives, technology programs, and investment priorities can best address the identified truck parking issues?	Section 4.1
What are the roles and responsibilities of ARC and its partners and stakeholders in advancing truck parking?	
What are the recommended next steps to advance ARC's regional truck parking efforts?	

2 Truck Parking in the Appalachian Region

Chapter Summary: There are over 800 identified truck parking locations that provide more than 36,4000 truck parking spaces in the Appalachian Region, over 87 percent of which are owned by private operators. However, these existing truck parking spaces are usually fully utilized during overnight hours, falling short of meeting the actual truck parking demand in the Region. Moreover, the truck parking demand is forecast to grow based on the increasing truck volume in the future.

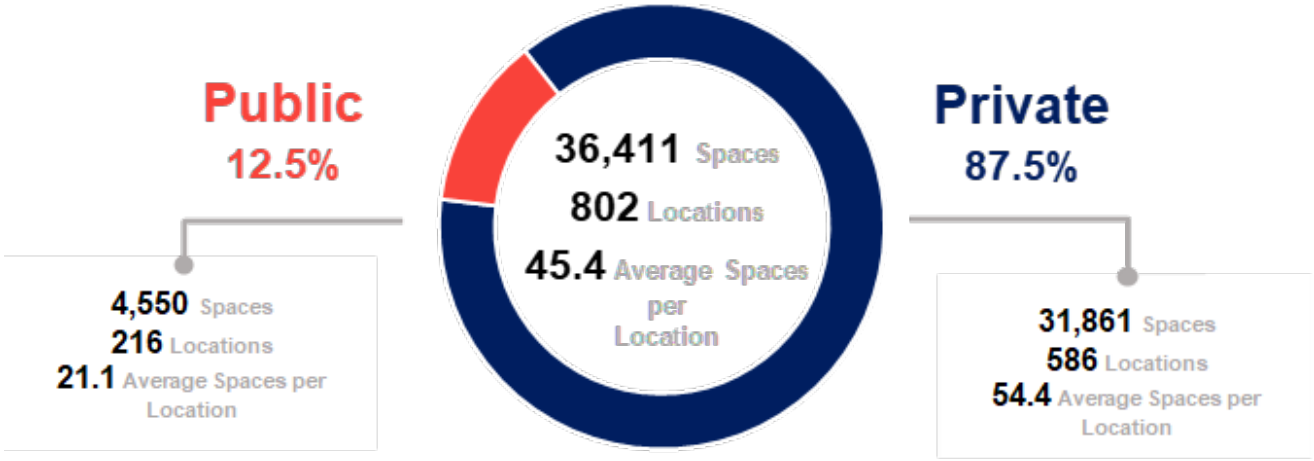
2.1 Truck Parking Inventory in the Region

As shown in Figure 5, the commercial truck stops typically have more parking spaces than public truck parking locations, with an average of 54.4 spaces at each commercial location, compared to an average of 21.1 spaces at each public location.

Public Locations: 216 (26.9 percent) of the Region's truck parking locations are public (including rest areas and weigh stations), providing 4,550 spaces (12.5 percent), which is lower than the national average of public market share for truck parking of 20 percent.

Private Locations: 586 locations (73.1 percent) are commercial truck stops, providing 31,861 spaces (87.5 percent). Three national truck parking companies – Pilot/Flying J, TA/Petro, and Love's – operate 121 (nearly 21 percent) of the Region's private truck parking locations, providing nearly 14,300 spaces, making up just under 45 percent of the Region's commercial truck parking spaces.

Figure 5: Appalachian Region Truck Parking Spaces and Locations



Sources: FHWA Jason's Law, ALDOT, GDOT, KYTC, Maryland DOT, Mississippi DOT, NYSDOT, NCDOT, ODOT, PennDOT, SCDOT, TDOT, VDOT, WVDOT, Trucker Path, Love's, Pilot/Flying J, TA/Petro.

Figure 6 and Figure 7 demonstrate the truck parking locations in the Appalachian Region by type of location (public or private) and number of truck parking spaces, respectively. The majority of the Region's truck parking locations are located along key freight the Interstates. Truck parking spaces are concentrated around major metropolitan areas, such as Atlanta, GA;, Birmingham, AL;, and Knoxville, TN,; as well as in western Virginia and eastern Ohio. Areas with particularly high amounts of truck parking spaces available include Youngstown, OH; Tupelo, MS; Hagerstown, MD; the interstate system surrounding Atlanta, GA; and near Wytheville, VA, where I-77 and I-81 meet. Urban areas that

appear to lack a high number of truck parking spaces include Pittsburgh, PA, Birmingham, AL, and Charleston, WV.

Most truck parking locations in the Appalachian Region are located along non-ADHS corridors.

Figure 8 and Figure 9 illustrate the truck parking locations on ADHS and non-ADHS highway corridors, respectively. Pennsylvania provides the greatest number of truck parking locations and spaces in the Region, followed by Ohio, Alabama, and Georgia. Additionally, West Virginia has the highest share of truck parking locations and spaces provided by the public sector (55 percent and 660 spaces). Likely due to its small share of the study area, Maryland provides the fewest truck parking locations and spaces within the Region.

A detailed breakdown of the truck parking inventory by state can be found in Appendix A.

Figure 6: Appalachian Region Truck Parking Locations by Type

Figure 7: Appalachian Region Truck Parking Locations by Number of Spaces

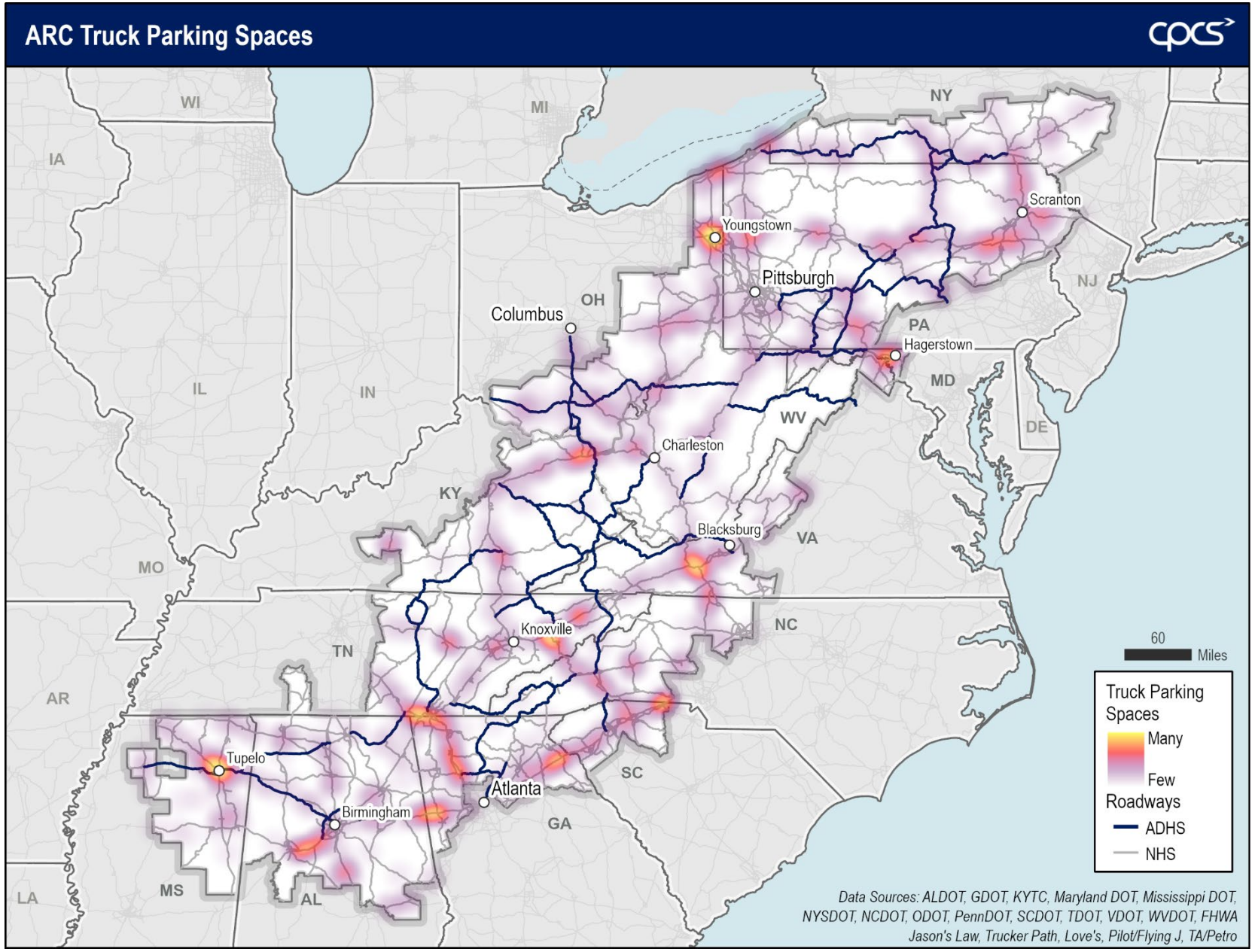


Figure 8: Appalachian Region Truck Parking Locations on ADHS by Type

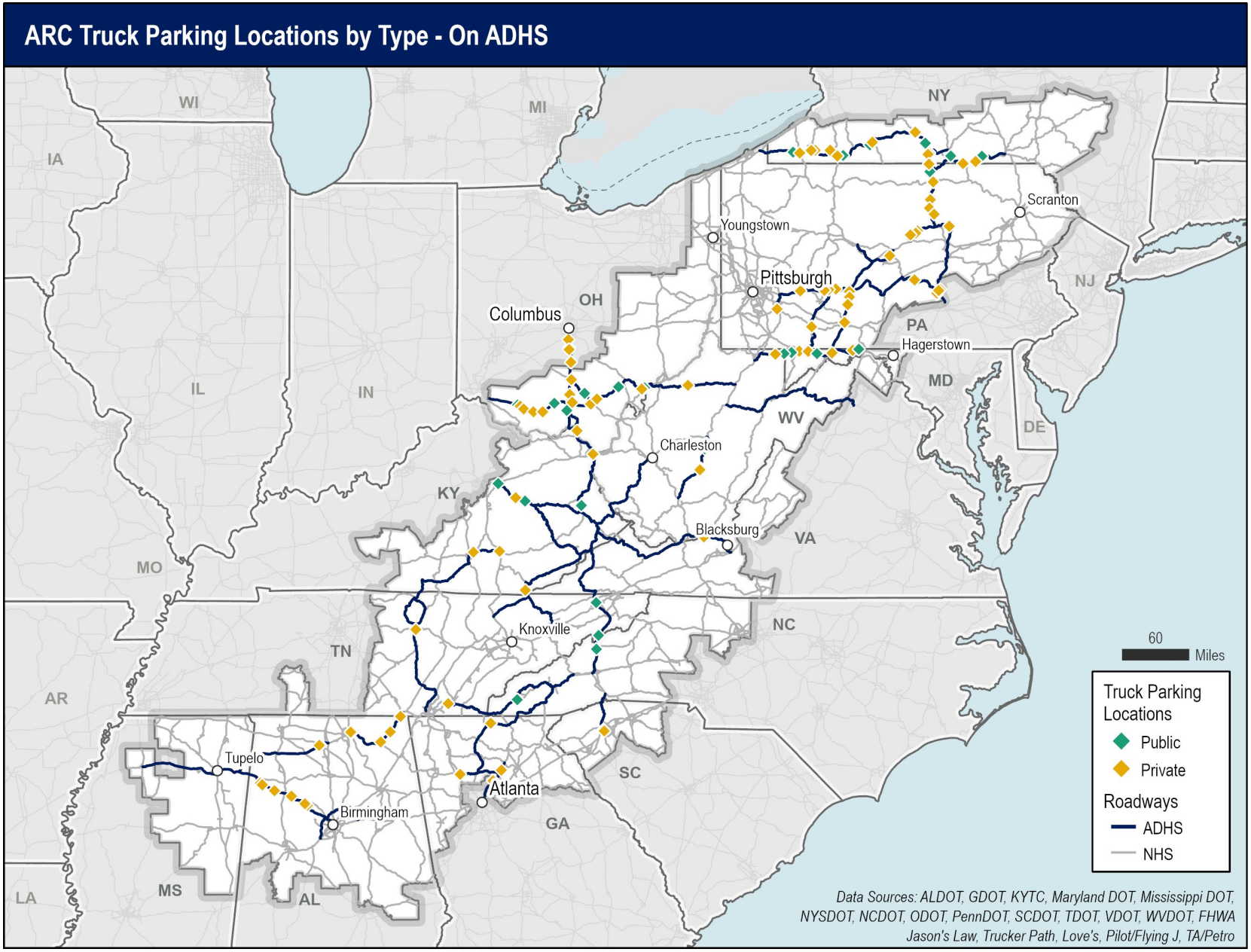


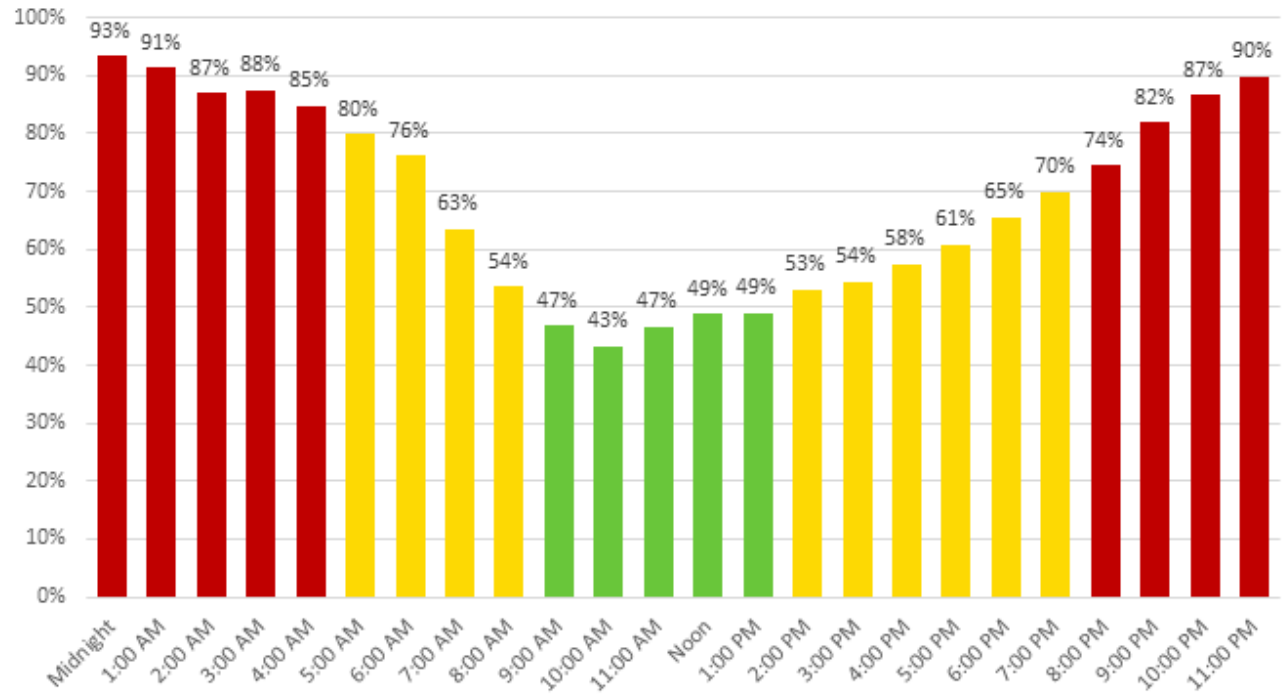
Figure 9: Appalachian Region Truck Parking Locations on Non-ADHS by Type

2.2 Truck Parking Utilization in the Region

The truck parking locations in the Region have the highest utilization rates during the overnight hours, peaking at midnight at 93 percent.

The truck parking locations in the Region have the highest utilization rates during the overnight hours, peaking at midnight at 93 percent occupied. The utilization trend over the course of the average day is V-shaped, with the lowest utilization during the morning and early afternoon hours (9:00 AM – 1:00 PM) building to the highest levels of utilization in the evening and overnight. The utilization rates are higher during the evening and overnight hours because most truck drivers stop and rest at night after a long day of driving, and this is the most common time to take the longest required (8 hours) federal hours of service break.

Figure 10: Appalachian Region Truck Parking Utilization



Source: CPCS analysis and modeling of ATRI, TPIMS, Trucker Path (2022)

Almost all truck parking spaces within the roadway catchment areas are fully utilized during the overnight hours in the Region.

Figures 11 through 13 illustrate truck parking utilization in the Region at midnight, 10 AM, and 7 PM, respectively. Green segments signify that the truck parking spaces within the catchment areas[1] of the segments are underutilized, while red segments indicate well-utilized truck parking, with most of them nearing full capacity at 100 percent utilization. Grey segments in West Virginia, Kentucky, and Tennessee reveal areas lacking any existing truck parking infrastructure within a

[1] For segment-level utilization, the evaluation involved comparing the total occupied spaces with the total available spaces within a catchment area surrounding each segment. In rural areas, this catchment area extended to a 1-hour drive, while in urban areas, it covered a 30-minute drive.

one-hour drive (circled in Figure 11). Appendix B includes the truck parking utilization maps showing the utilization in the Region for each hour of the day.

In general, the truck parking utilization is similar across the Region, with higher utilization rates occurring after 7:00 PM and before 5:00 AM, which aligns with the utilization trend demonstrated in Figure 10. The analysis also reveals dynamic patterns of truck parking utilization across different hours in the Region:

Midnight – 1 AM: This is the peak hour of truck parking utilization in the Region, with limited availability region-wide. Corridors in northwestern Georgia, western Kentucky, western Virginia, and eastern Pennsylvania have the highest utilization.

10 AM -11 AM: The truck parking utilization rate is the lowest in the Region between 10 AM and 11 AM.

7 PM – 8 PM: Truck parking utilization increases in the evening hours, especially in western KY, Central WV (around Charleston), eastern OH, and eastern PA areas.

Figure 11: Appalachian Region Truck Parking Utilization by Hour (Midnight – 1:00 AM)

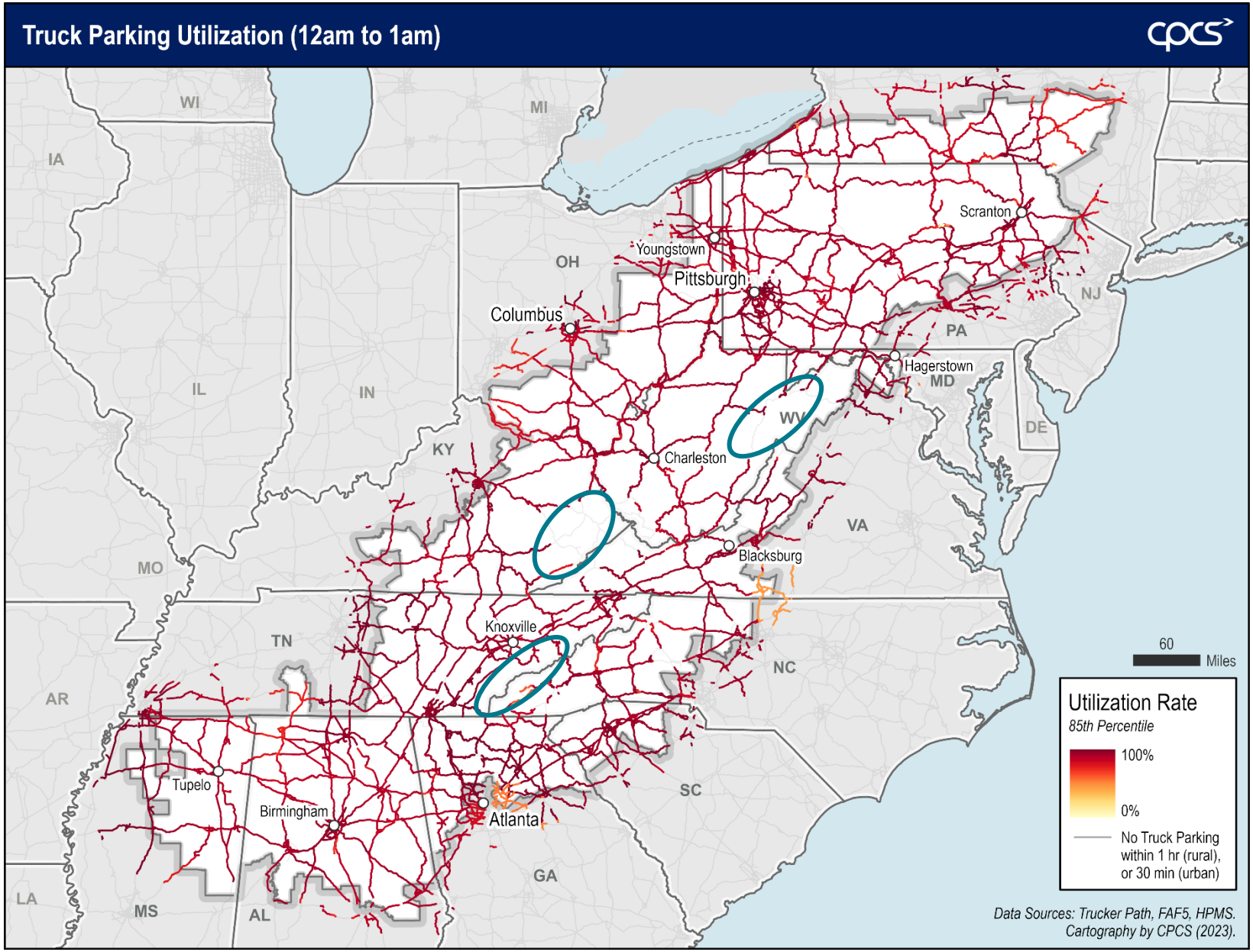


Figure 12: Appalachian Region Truck Parking Utilization by Hour (10:00 AM – 11:00 AM)

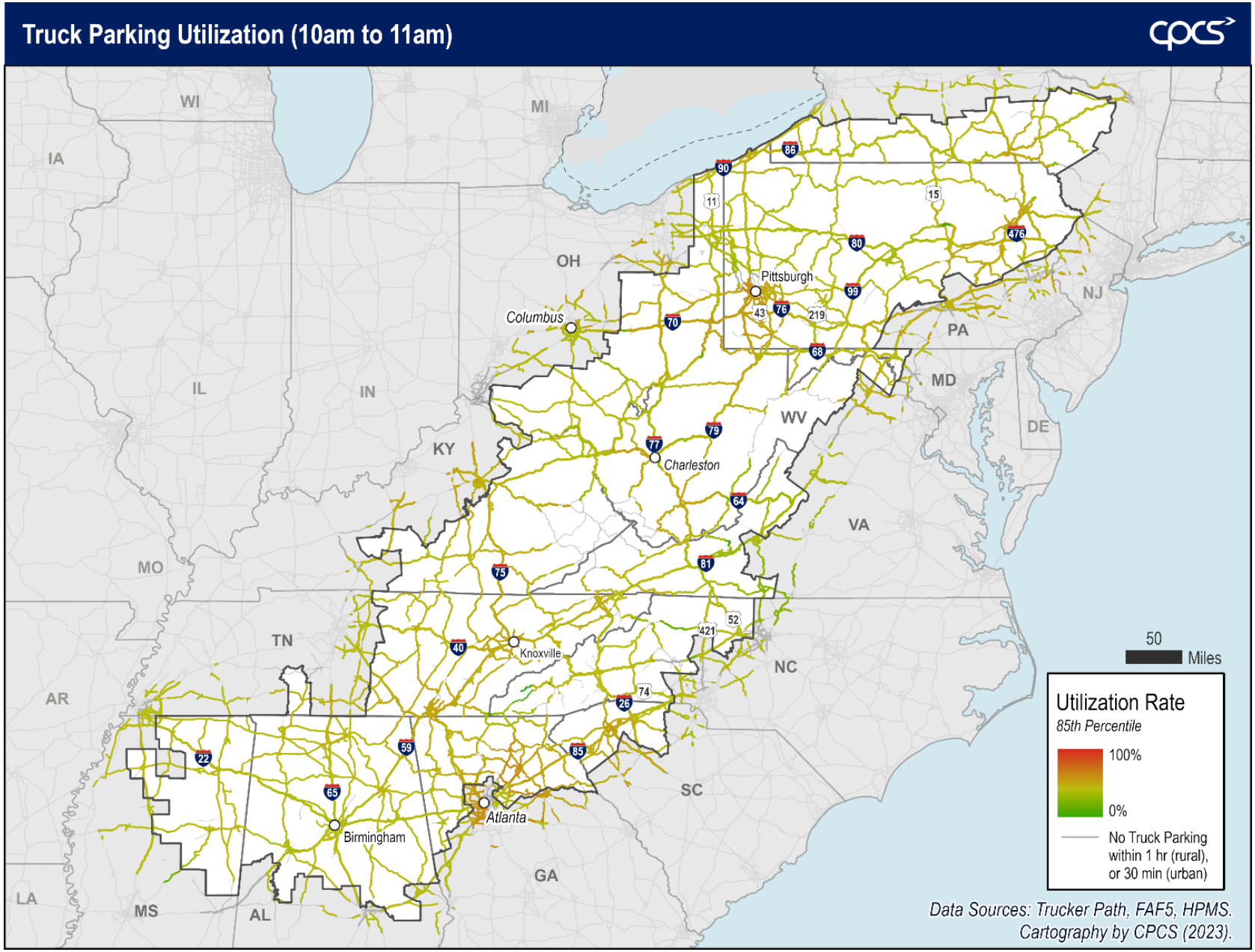
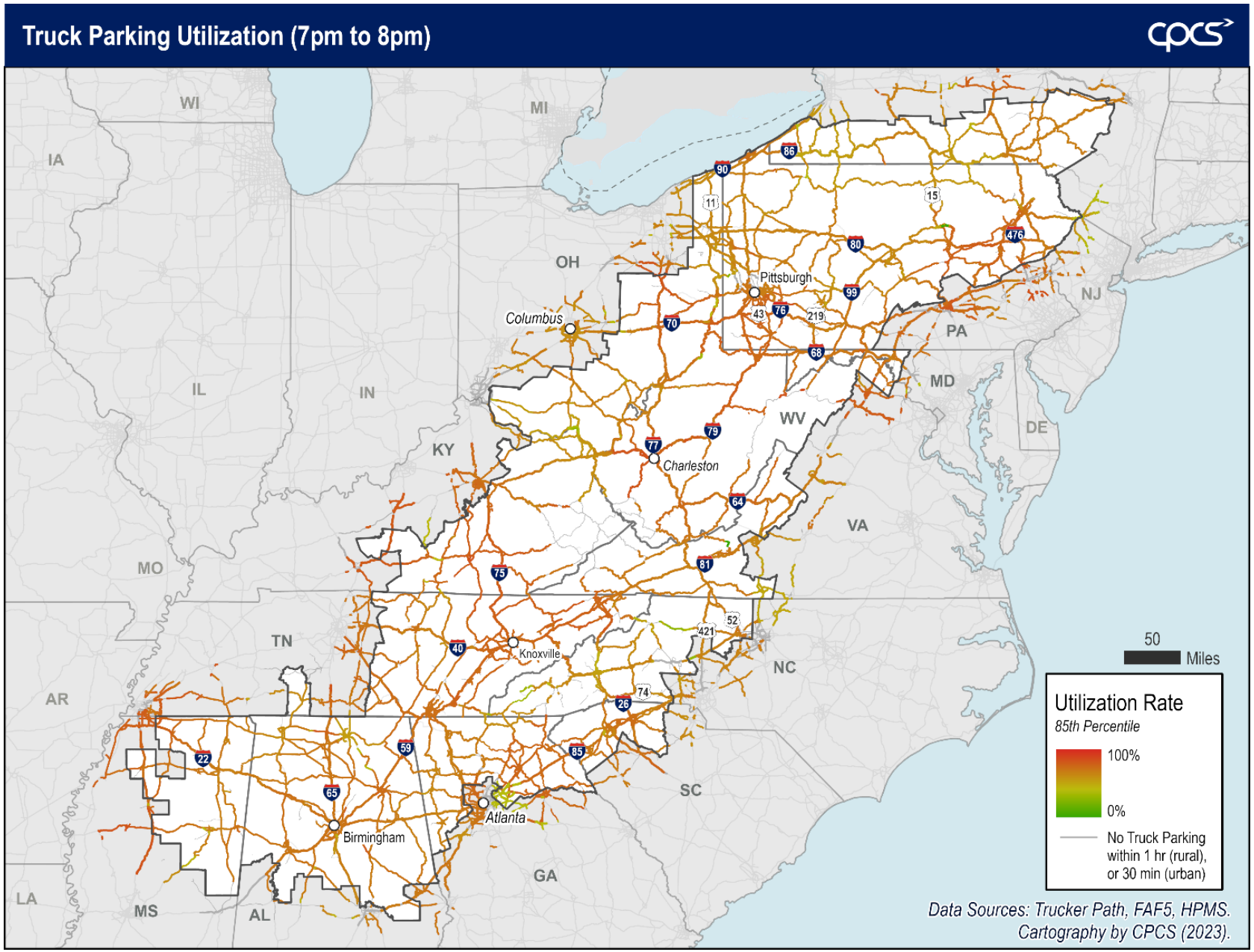


Figure 13: Appalachian Region Truck Parking Utilization by Hour (7:00 PM – 8:00 PM)



2.3 Future Truck Parking Demand

While the previous two sections focus on examining the current truck parking conditions in the Appalachian Region, this section takes a forward look at the future demand for truck parking quantitatively and qualitatively.

Truck volume is a primary factor that induces demand for truck parking.

According to the truck volume forecast from the Bureau of Transportation Statistics' Freight Analysis Framework, As shown in Figure 14, except for a segment on Corridor G south of Charleston, WV, all other ADHS corridors are forecast to see an increase in truck volume, indicating a growing demand for truck parking on the network. In particular, the truck volumes on Corridor P and Corridor N in Pennsylvania, Corridor H in West Virginia, Corridor S in Tennessee, Corridor W in South Carolina, Corridor A in Georgia, and Corridor X in Alabama are expected to grow the most, suggesting the need for more truck parking ion these areas. In terms of non-ADHS corridors in the Region, all Interstates will need to accommodate higher truck parking demand as the truck volume increases in the next three decades (Figure 15).

Figure 14: Truck Volume Change on the ADHS in the Appalachian Region (2022-2050)

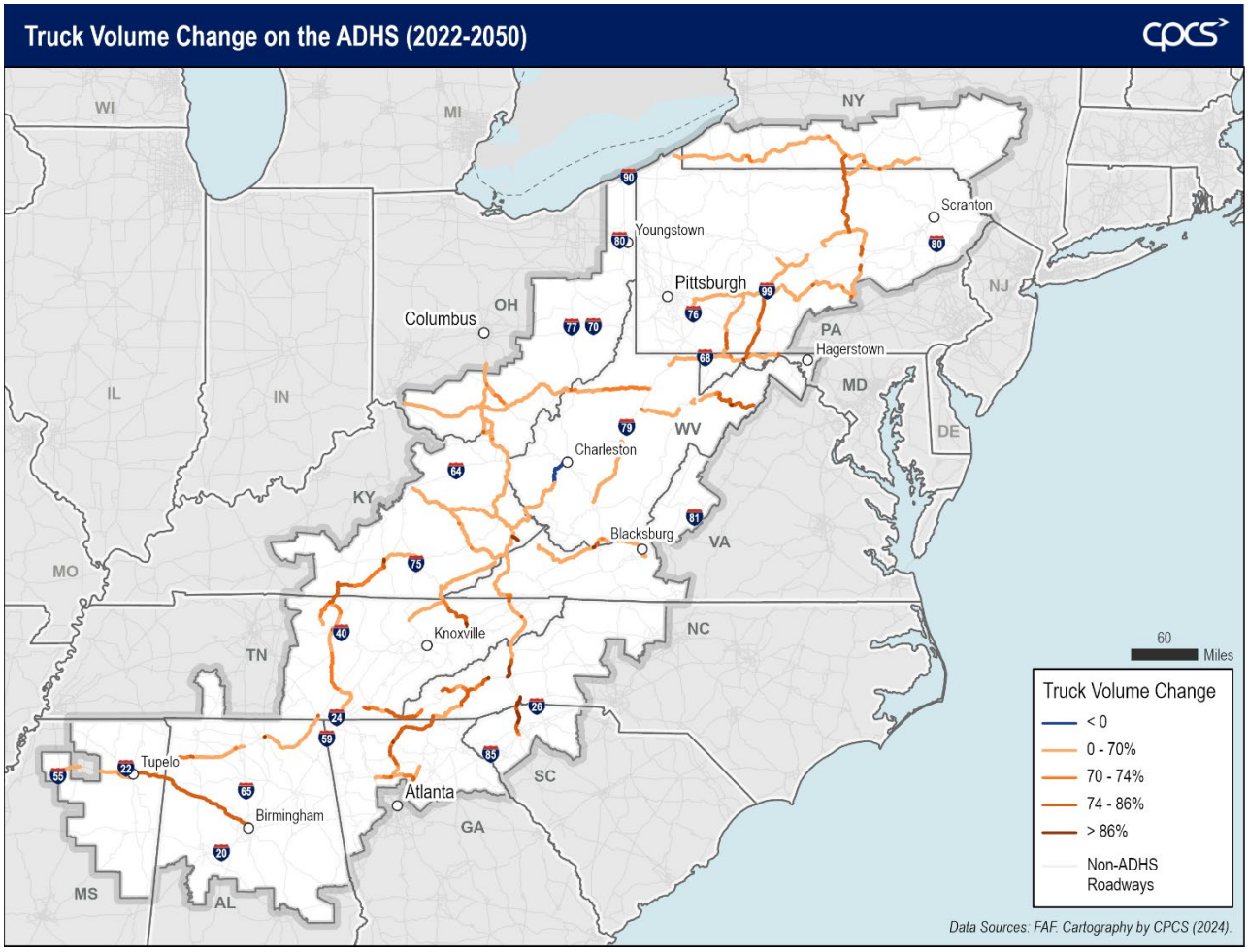
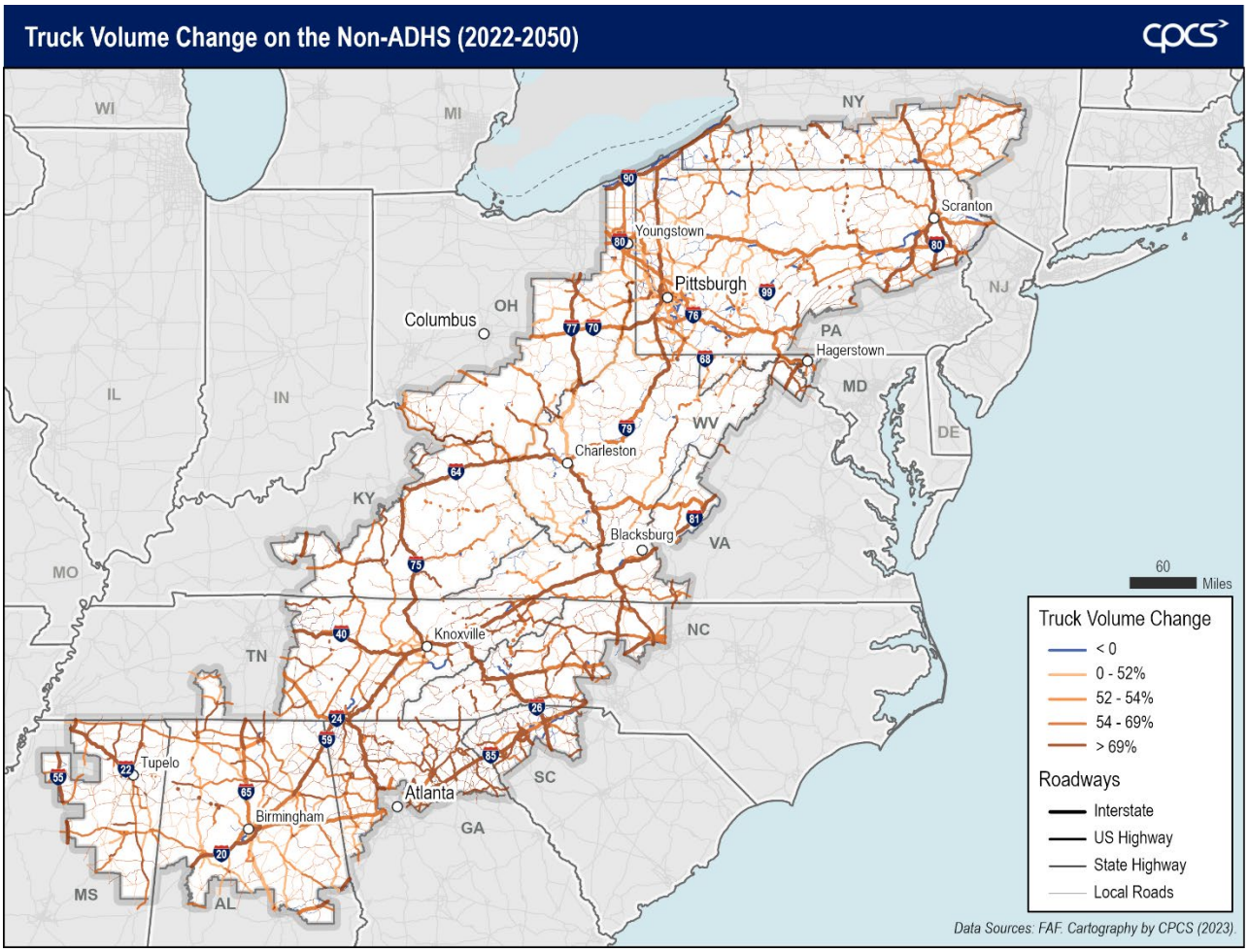


Figure 15: Truck Volume Change on the Non-ADHS in the Appalachian Region (2022-2050)



While the forecast shows regional-level potential truck growth, it does not capture the many factors that can also impact truck volumes and truck parking demand, such as the development of freight-reliant businesses and intermodal hubs.[3] The distinct nature of these local elements means that communities will experience varying degrees of change in truck parking demand. Given that the Region encompasses a diverse range of communities in terms of their levels of industrial activities, population density, multimodal freight infrastructure, and many other factors, this section discusses three primary generators of truck parking demand and their planning implications for ARC to consider.

- **Freight-Reliant Industries**: Clusters of freight-reliant industries[4] that depend on freight transportation infrastructure for goods movements are located across the Region. These industries usually utilize trucks for transporting commodities over short distances (<250 miles) and completing first-/last-mile trips for multimodal freight movements.[5] In other words, freight-reliant businesses tend to generate truck traffic, increasing truck parking demand near establishments for deliveries and pick-ups. The following questions can help ARC estimate future demand for truck parking around new facilities serving freight-reliant industries and understand the characteristics of the required truck parking spaces:
    - Where are the new freight-dependent businesses located?
    - How many trucks are expected to be handled by these facilities?
    - What periods of time do the deliveries/pick-ups occur?
    - What types of trucks (e.g., oversized/overweight trucks) are utilized by the businesses?

Additionally, FHWA's Truck Parking Development Handbook includes a tool designed to offer high-level estimates of truck parking demand for areas with freight-intensive land uses and developments.[6] This estimation tool enables local planners and practitioners to evaluate the necessary number of truck parking spaces for new industrial developments based on NAICS codes (i.e., industry types) and distance to the existing truck parking facilities.

- **Intermodal Hubs**: Inland intermodal terminals can generate significant truck traffic associated with the movement of containers to and from local and regional shippers. Truck drivers prefer parking closer to the intermodal facilities as they wait for their turn to drop off or receive goods. The following questions can help inform ARC of the truck parking demand induced by existing or new intermodal hubs:
    - Where are the new intermodal hubs?
    - What is the key highway access serving the intermodal facilities?
    - What is the volume of freight to/from the new intermodal hub by truck?
    - If an existing intermodal facility is undergoing expansion, what is the anticipated increase in truck volume?
    - What are the delivery/pick-up windows?

- **Through-Traffic**: Truck traffic passing through the communities in the Region can also generate significant truck parking demand. While the previous two factors primarily induce truck parking demand at the origins or destinations of a trip, the through truck traffic induces truck parking demand along highways. This factor is especially relevant considering the near completion of the remaining ADHS corridors (e.g., Corridor H in West Virginia). Understanding the implications of ADHS corridor completion on truck volumes and patterns will help ARC have a better grasp of the forthcoming demand for truck parking along or near the newly constructed corridors:
    - How likely will truck traffic be diverted to the newly constructed ADHS corridors?
    - What is the expected increase in truck traffic along the new and existing ADHS?

3 Truck Parking Issues in the Appalachian Region

Chapter Summary: Truck parking issues in the Region include the deficit between demand and supply, as well as policy, funding, and social challenges to expand existing truck parking sites or construct new ones. The truck parking deficit manifests itself in the way of undesignated truck parking. The undesignated truck parking is along key corridors, most of which are on non-ADHS, specifically Interstate Highways. The lack of truck parking also leads to safety concerns. The undesignated truck parking, along with fatigue driving due to the lack of parking, caused crashes in the Region, some of which led to injuries and fatalities. Stakeholders cited restrictive zoning, community pushback, limited funds, and other challenges facing the Region regarding the implementation of truck parking improvements, providing insights for the future.

3.1 Undesignated Truck Parking

Overview of the Undesignated Truck Parking in the Region

Undesignated truck parking is defined as when a truck parks in an area that is not otherwise intended for truck parking. The most frequent locations of undesignated truck parking are on/off ramps at highway exits and rest areas.

Parking in undesignated or unmarked areas can be attributed to various factors, including the scarcity of designated truck parking spaces, the inability to locate parking before reaching HOS limits, a lack of knowledge of nearby truck parking, and the need for staging before or after loading/unloading. The occurrence of undesignated truck parking has adverse effects on road safety, infrastructure, quality of life, and the economy. Undesignated truck parking is one of the most noticeable indicators of truck parking challenges. Together with truck parking utilization rates, it assists in evaluating the magnitude of unmet truck parking demand.

Types of Undesignated Truck Parking

Undesignated truck parking in the Appalachian Region occurs primarily at public rest areas and along on/off ramps, and less frequently on corridor shoulders or last-mile roads. The section below provides descriptions of each type of undesignated parking, including examples from the Region.

Rest Areas

At rest areas, undesignated truck parking occurs when trucks park outside of a designated marked parking space. This type of parking may include trucks parked in the passenger vehicle lot, as well as the on and off-ramps leading to and from the rest area. This is illustrated in Figure and Figure . There are many safety risks associated with this type of undesignated truck parking, for both truck drivers and other roadway users. For example, trucks parked along the sightlines could contribute to collision potential. Additionally, parking on the shoulder in these areas damages pavement that is not meant to withstand the ongoing weight of heavy trucks.

Figure 16: Undesignated Truck Parking at Morton Travel Plaza (NB), WV

Source: Google Street View, © Google, Image Capture: October 2015.

Source: CPCS analysis of ATRI (2022).

Figure 17: Undesignated Truck Parking at Horse Cave Rest Area (NB/SB), KY

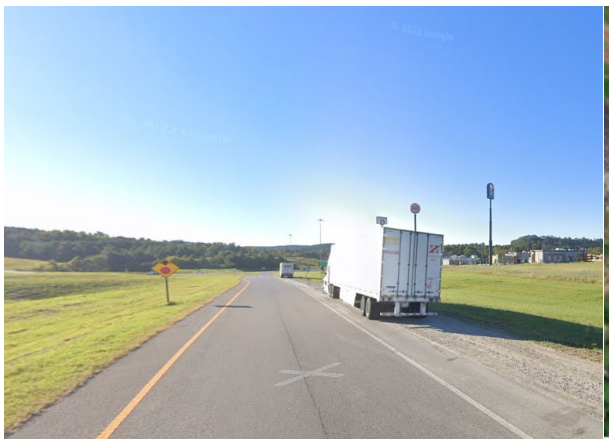
Source: Google Street View, © Google, Image Capture: July 2019.

Source: CPCS analysis of ATRI (2022).

On/Off Ramp

The on/off ramp category of undesignated truck parking refers to trucks parked on the shoulders of highway on and off ramps and interchanges, as seen in Figure . Like the undesignated truck parking at on/off ramps at rest stops, trucks parked on the shoulders of highway on, and off ramps bear the same threat to other vehicles and roadway infrastructure.

Figure 18: On/Off Ramp Truck Parking at I-22 Exit 65 in Jasper, AL



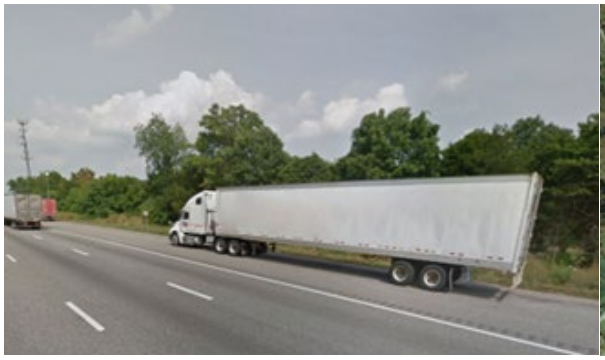
Source: Google Street View, © Google, Image Capture: September 2022.

Source: CPCS analysis of ATRI (2022).

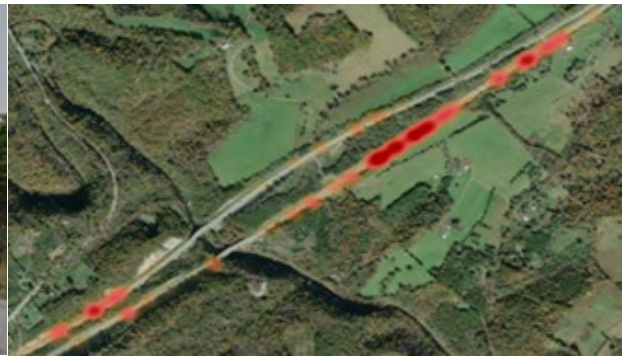
Corridor Shoulder

This classification refers to trucks parking along the shoulders of a roadway (as exemplified in Figure 19. The safety risks associated with corridor shoulder truck parking are similar to the ones caused by truck parking along on/off ramps. In the Appalachian Region, corridor shoulder truck parking occurs near toll plazas and high-traffic areas where the interstate shoulder is particularly wide.

Figure 19: Corridor Shoulder Truck Parking along I-81 in VA



Source: Google Street View, © Google, Image Capture: July 2011.



Source: CPCS analysis of ATRI (2022).

Last-Mile

As truck drivers wait for appointments near shipping and receiving facilities, they may park along nearby last-mile roads (Figure 20). While this type of parking is less dangerous than parking on the shoulder of a high-volume or high-speed corridor, it has the potential to create obstacles for local traffic, noise pollution, and contribute to higher emissions.

Figure 20: Last-Mile Truck Parking in Cartersville, GA

Source: CPCS analysis of ATRI (2022).

Truck Stop

Undesignated truck stop parking refers to trucks stopped just outside of a private truck parking facility, as seen in Figure 21. One reason for this may be a real or perceived lack of available parking spaces at the facility. This type of undesignated parking typically occurs on local roads surrounding a truck stop. Undesignated truck parking may also occur on the on/off ramp near a truck stop, which poses a greater safety risk due to higher speeds and heavier traffic than parking on local roads.

Figure 21: Undesignated Truck Parking in Winona, MS

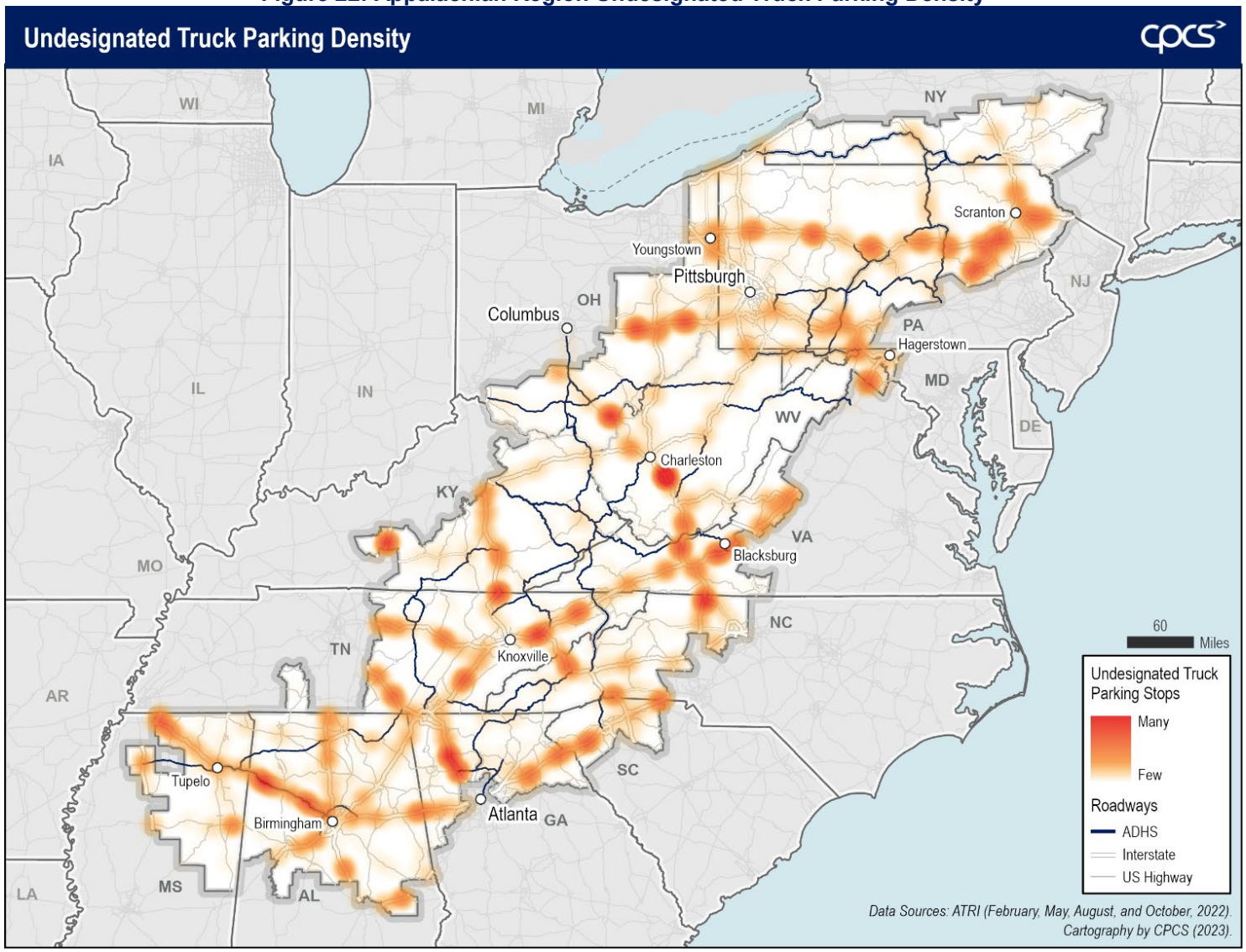
Source: Google Street View, © Google, Image Capture: August 2023.

Source: CPCS analysis of ATRI (2022).

Undesignated Truck Parking Clusters

The results of the undesignated truck parking analysis can be viewed in the heat map, as seen in , with the highest amounts of undesignated parking depicted in bright red. The concentrations of undesignated parking are highest in the southern portion of the Region, especially on Interstates surrounding Birmingham, AL, Atlanta, GA, Knoxville, TN, and Charleston, WV.

Figure 22: Appalachian Region Undesignated Truck Parking Density



A total of 65 undesignated truck parking clusters were identified in the Appalachian Region – 15 large clusters and 50 small clusters.

Undesignated truck parking clusters were identified using a two-step process. Firstly, clusters were generated as density-based hotspots using validated undesignated truck parking stop points. The resulting clusters were then reviewed and grouped based on proximity and cluster types. The large and small clusters in the Region are displayed in Figure 23 and Figure 24, respectively. The large clusters refer to areas where an entire corridor section is a hot spot for undesignated parking. This is especially true for interstate highway corridors, such as the sections of I-20, I-22, I-65, and I-59 that surround Birmingham, AL, where on/off ramp parking is the primary type of undesignated truck parking. Large clusters also occur on corridors surrounding other southern cities in the Region. The small clusters are primarily driven by undesignated truck parking at rest areas, which accounts for over half of the identified clusters. Fewer clusters are attributed to on/off ramp parking, with more sparse cases of truck stop, last-mile, and corridor shoulder parking. Additional details about each of the clusters, including the total undesignated truck parking counts, total parking duration, and the hour of the day with the most undesignated stops, are identified in .

Figure 23: Appalachian Region Undesignated Truck Parking Clusters – Large

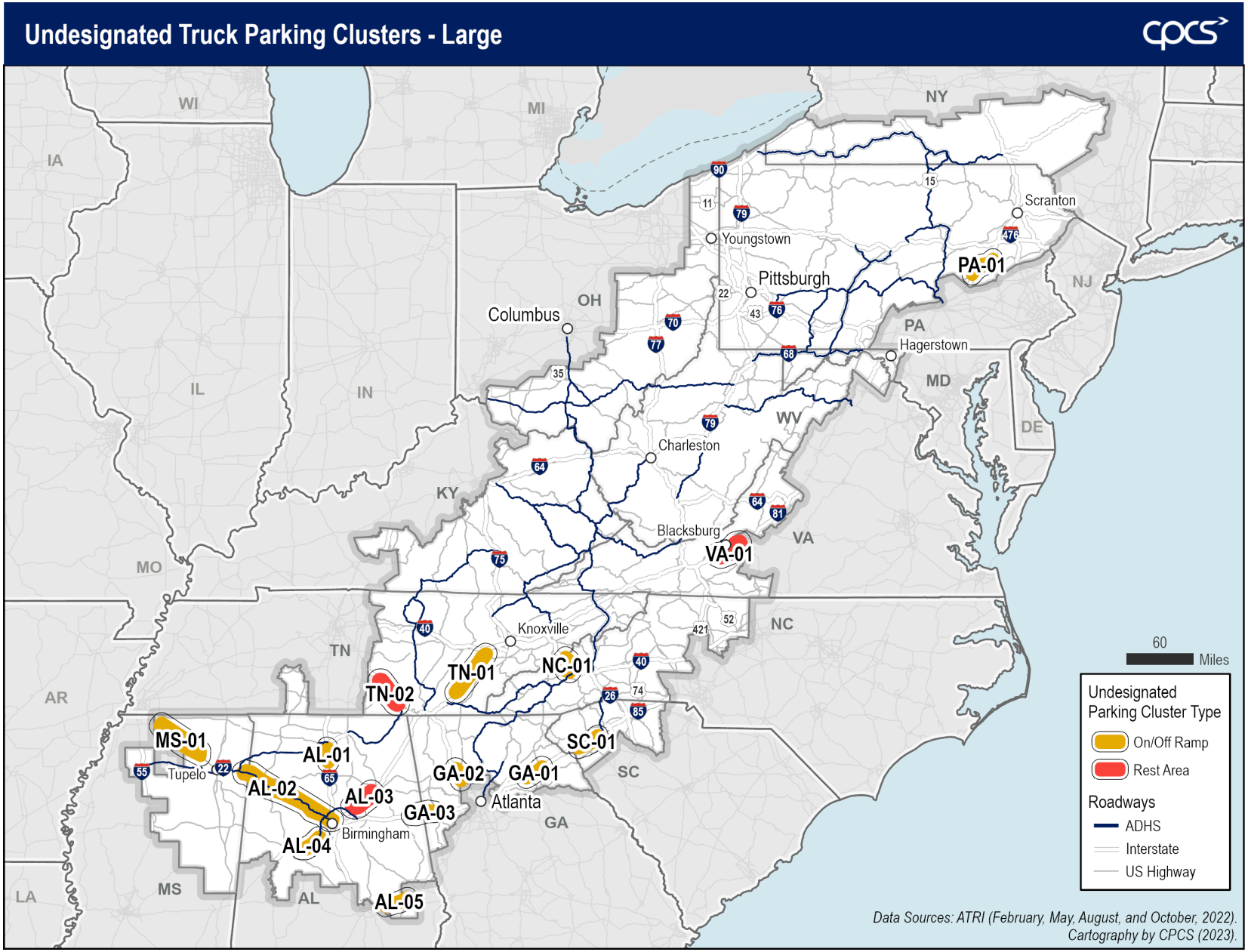
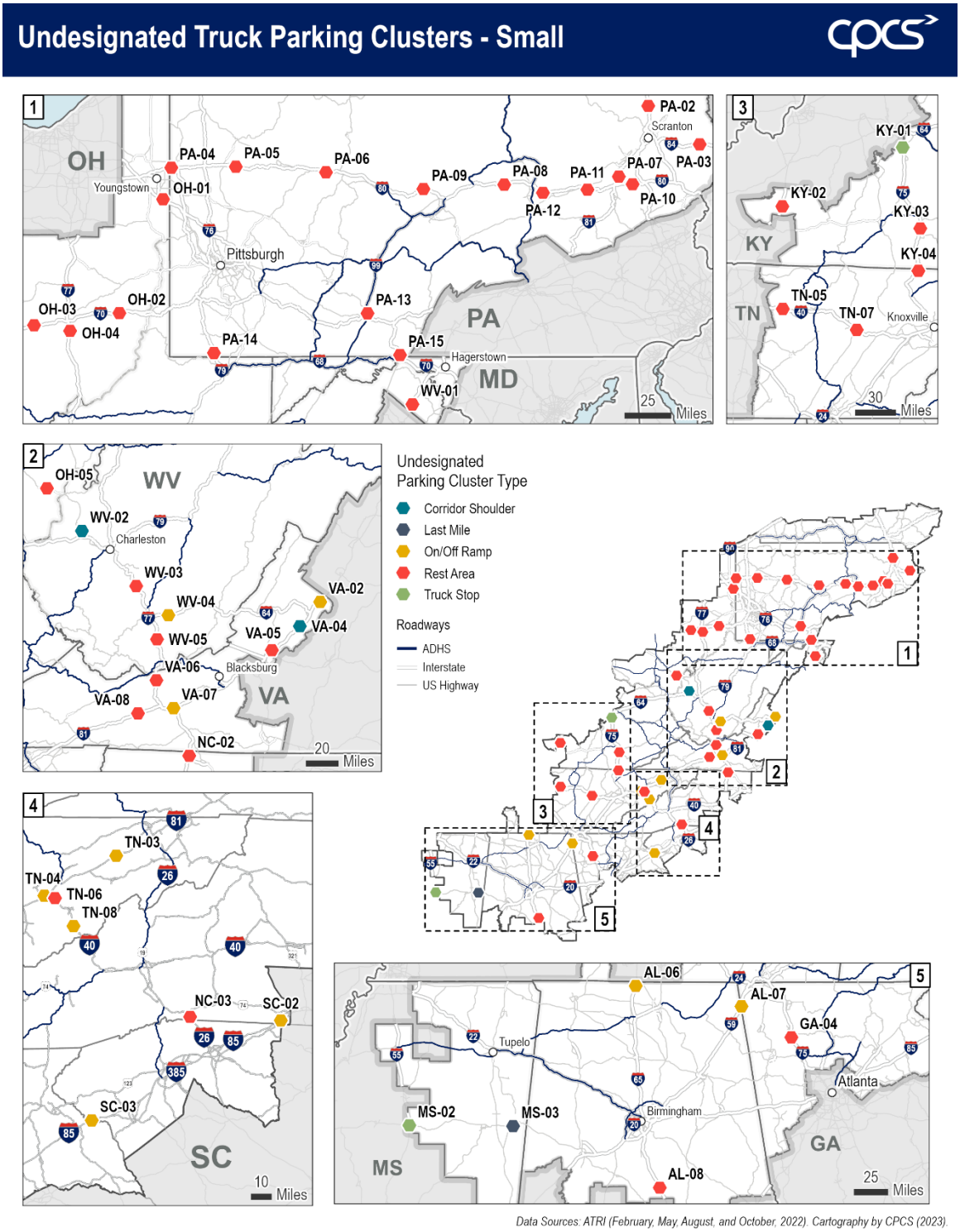


Figure 24: Appalachian Region Undesignated Truck Parking Clusters – Small



Data Sources: ATRI (February, May, August, and October, 2022). Cartography by CPCS (2023).

3.2 Stakeholder-identified Truck Parking Needs

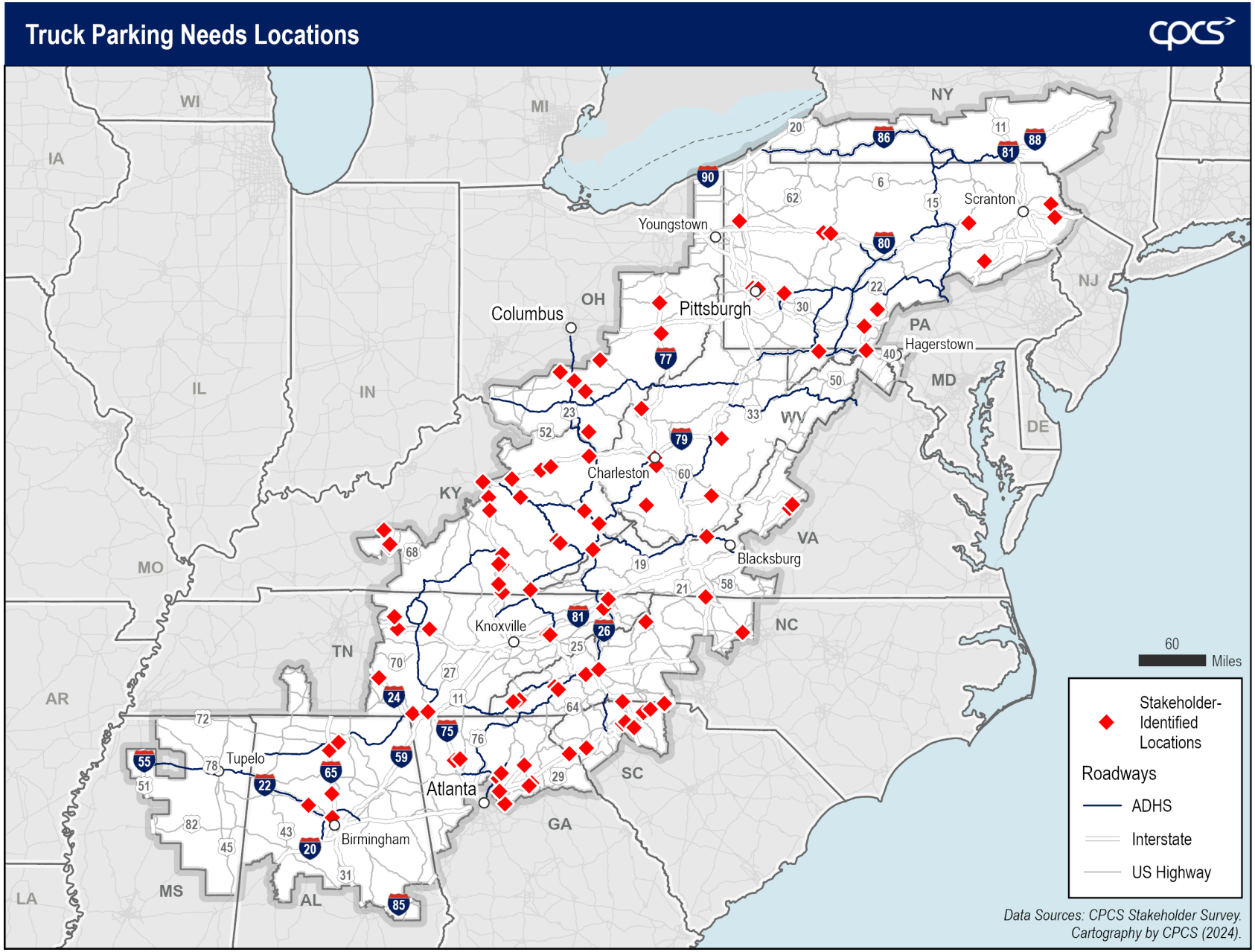
The locations of stakeholder-identified truck parking needs largely align with the ones identified by data analysis.

Through the process of stakeholder engagement, respondents from both the private and public sectors provided their input on truck parking needs locations via a survey. In the survey, respondents were asked to drop "pins" onto a map, identifying locations where they have noticed a need for additional truck parking (Figure 25). This could be due to observations of high rates of undesignated truck parking, personal experience of needing truck parking in an area and being unable to find it, or another reason. Responses to the map identified areas in need of additional or new truck parking, many of which aligned with the locations identified by data analysis. This alignment helps validate the results of data analysis. Many responses to the survey, particularly from the private industry, noted a greater concern for the Region is a lack of truck parking spaces, more so than a lack of locations.

Building on input received through surveys, the conversations with stakeholders via focus groups further enriched the list of truck parking challenges in the Region by providing qualitative context to the identified pins. These identified issues include:

- **Restrictive Zoning**: It is difficult to build truck parking in high-demand areas, such as near urban centers, when restrictive zoning prevents it.
- **Community Pushback**: Many communities push back against the installation of truck parking in their communities due to the stigma around truck parking. Improving awareness of the importance of truck parking and the benefits to the local economy brought by such improvements are needed.
- **Competition for Limited Funds**: States have limited funds and many needs to which to allocate funds. Truck parking has not received the awareness it deserves, so can be overlooked during the allocation process.
- **Technology Limitations**: A lack of cell service in mountainous regions presents safety risks for drivers and contributes to quality-of-life issues. Drivers must be able to get in touch with emergency responders when necessary for safety reasons. Being unable to reach family or friends due to a lack of cell service when parked contributes negatively to the quality of life of drivers on the road.
- **Right-Sizing Parking**: There is a need to "right-size" truck parking. Some areas have limited land available but there is still demand for truck parking. Taking advantage of what is available and utilizing it for truck parking is better than not building any parking because there is not a large tract of land available.
- **Respect of Facilities**: Respecting facilities is required from all parties involved. Operators must ensure a clean, usable, facility for truck drivers. This includes providing the amenities necessary to maintain a usable environment. Similarly, drivers must show respect for the space by disposing of trash in designated receptacles and cleaning up after themselves.

Figure 25: Truck Parking Needs Locations Identified by the Stakeholders via Survey



3.3 Truck Parking Priority Corridors

Identified truck parking needs help prioritize a list of corridors that could guide the decision-making on truck parking improvements in the Region.

Through a weighted, multi-criteria evaluation process (detailed in Appendix E), two sets of priority corridors were identified on ADHS (Figure 26) and non-ADHS (Figure 27), respectively. The priority corridors on the ADHS are further categorized into Tier 1 and Tier 2:

- **Tier 1 ADHS Corridors**: These corridors consist of high truck parking segments that stretch more than 10 miles.[2]
- **Tier 2 ADHS Corridors**: These corridors are made up of a series of segments less than 10 miles that present moderate to high truck parking needs.

The identified priority corridors provide a basis for the truck parking safety impact analysis demonstrated in Section 3.4, and the prioritization methodology can be used to update the priority corridors as the locations with high truck parking needs change in the future.

[2] The Study chooses 10 miles as the cutoff threshold to avoid identifying fragmented segments.

Figure 26: Priority Corridors on ADHS

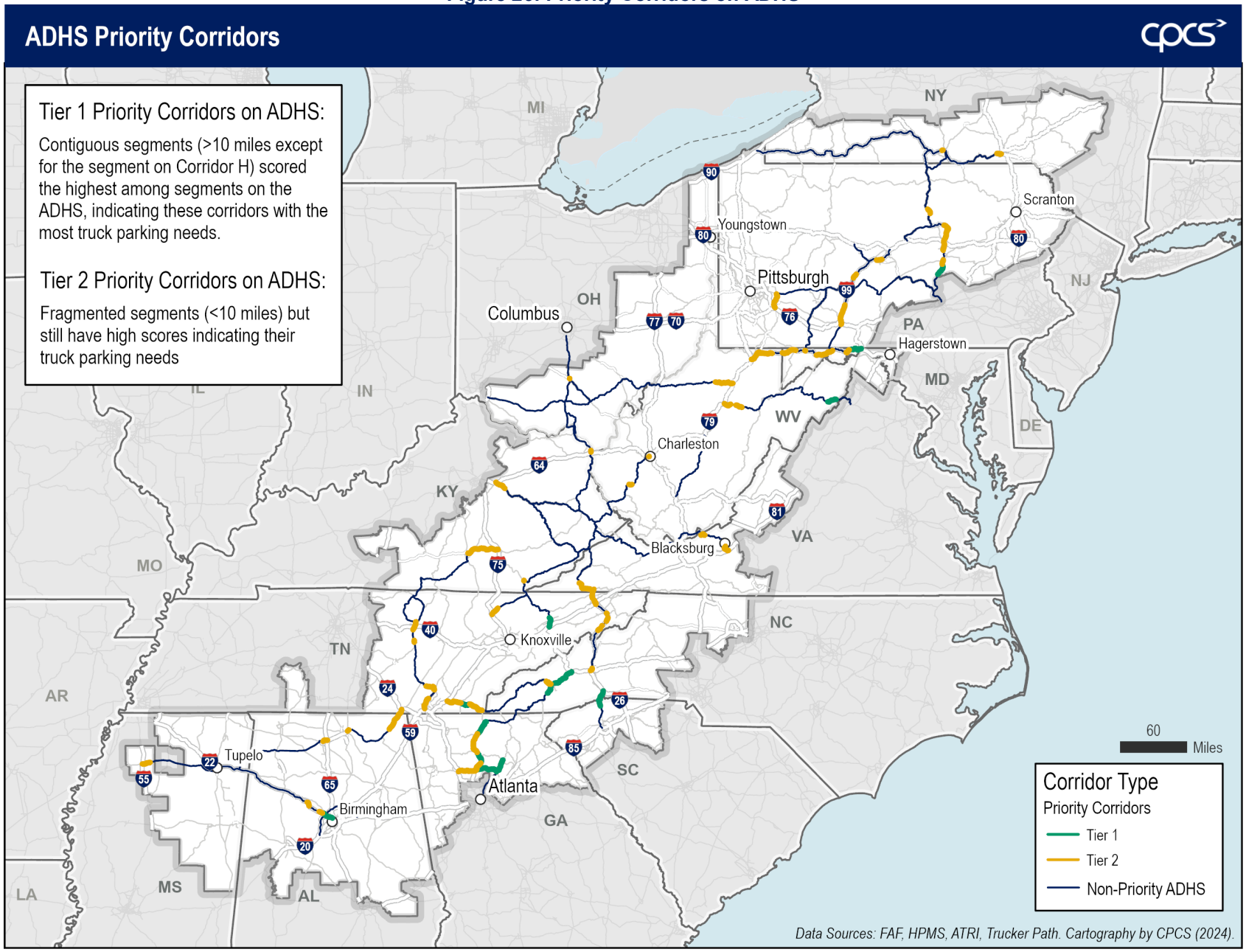
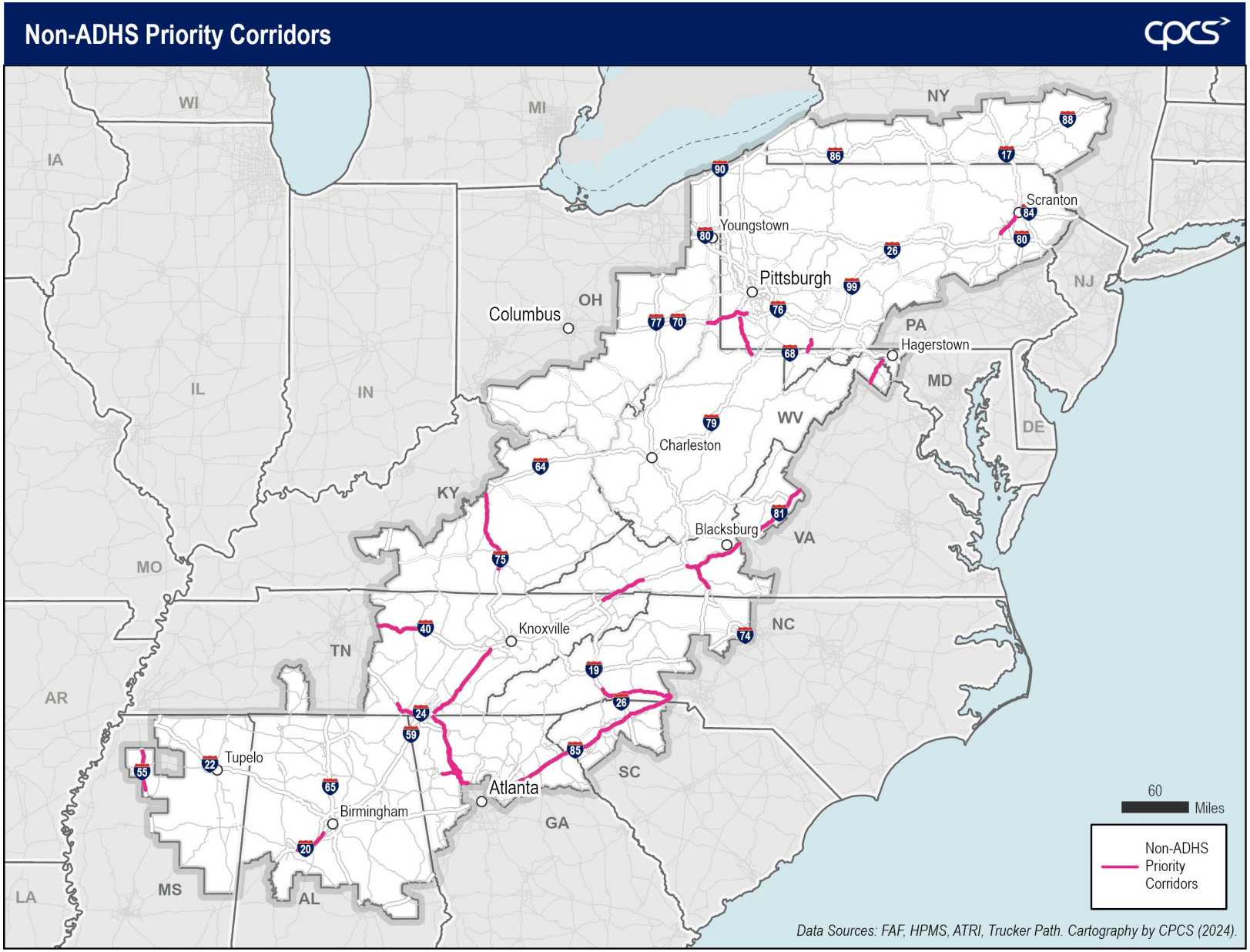


Figure 27: Priority Corridors on Non-ADHS



3.4 Truck Parking Safety Impacts

Truck parking facilities offer a secure location for drivers to park their trucks when not on duty, allowing them to rest, access services, and adhere to federal HOS regulations, which ensure minimum rest periods to combat the dangers of tired driving among long-haul truckers.

Fatigued driving contributes to around 100,000 crashes annually nationwide, with over 72 percent resulting in casualties.[3] Fatigue impairs drivers' cognitive function and awareness to a level comparable to being legally intoxicated; 21 hours without sleep is akin to a 0.08 percent blood alcohol content (BAC), and 24 hours without sleep equates to 0.1 percent BAC.[4] Studies have shown that fatigue can specifically negatively impact drivers' deviation of lane position, steering rate, driving speed variability, and reaction time leading to overall vehicle control and lateral control issues.[5]

Insufficient parking options may force fatigued drivers to continue driving while tired or to park in unsafe locations such as highway shoulders or ramps, thereby endangering themselves and other road users. Parking in these undesignated areas also deprives drivers of restful sleep and access to basic amenities like food, restrooms, and showers, making it challenging for the drivers to maintain a healthy work-life balance and resulting in increased drowsiness and impaired driving performance during subsequent driving shifts.

To account for the safety impacts of inadequate truck parking in the Appalachian Region, this section examines the key contributing factors and driver conditions in truck-involved crashes that occurred along priority corridors (Figure 28) between 2018 and 2022. The police-recorded crash datasets provided by the Appalachian Region member state DOTs encompass various commercial vehicle types such as tour buses, work vans, and both single and multiple-unit trucks. Specifically for this analysis, truck-involved crashes are identified based on involvement of the following vehicle types:

- Single Unit Truck (3 or more axles)
- Truck Tractor
- Truck/Trailer
- Other Heavy Trucks

Additionally, two distinct types of crashes associated with truck parking shortages can be identified from typical crash reports:

1. **Crashes due to Fatigued or Drowsy Driving:** Police-recorded crash reports highlight specific attributes indicating fatigue, drowsiness, or sleepiness as the primary cause of the crash. These conditions are noted if drivers involved in a crash exhibit signs of loss of consciousness or reduced physical or mental capacity due to fatigue.

2. **Crashes Resulting from Trucks Parking in Undesignated Locations:** Crash reports also often detail the parties involved, crash type (e.g., rear-end collision), and the positions or conditions of vehicles just prior to the crash occurrence (e.g., parked). These attributes are used to identify truck-involved crashes associated with undesignated parking.

[3] USDOT, NHTSA Traffic Safety Facts Annual Report Tables, accessed February 2023. https://cdan.nhtsa.gov/tsftables/tsfar.htm

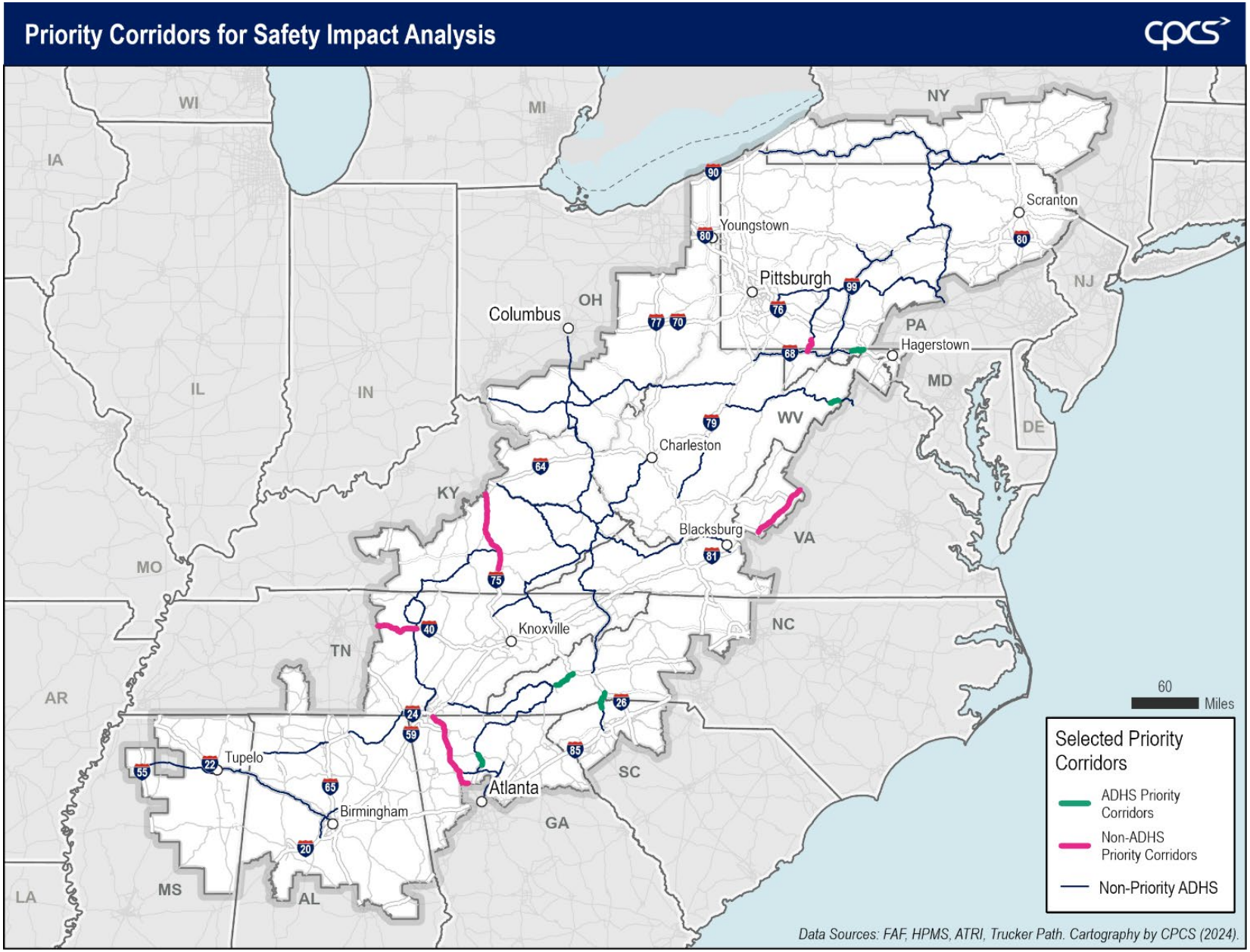
[4] The legal limit for driving in the United States is 0.08% BAC. For more information, see: The National Institute for Occupational Safety and Health (NIOSH) Training for Shift Work and Long Work Hours, accessed 2023.

[5] Lowrie, J., et al., The impact of sleep deprivation and alcohol on driving: a comparative study, 2020, BMC Public Health volume 20, Article number 980; and Yao, Y., et al., Classification of Fatigued and Drunk Driving Based on Decision Tree Methods: A Simulator Study, 2019, International Journal of Environmental Research and Public Health, 16 (11).

Between 2018 and 2022, 406 truck-involved crashes happened due to fatigued driving and a total of 1,146 crashes happened due to undesignated parking along the priority corridors in the Appalachian Region.

Figure 28 shows the locations and alignment of the corridors selected for the truck parking safety assessment. These corridors were selected based on their truck parking needs and geographical locations. The select corridors include I-68/US-40 in Maryland, US-219 in Pennsylvania near the Maryland border, US-48/WV-55/WV-259 in West Virginia, US-23/US-54/US-64 in North Carolina, a portion of US-25 traversing the North Carolina-South Carolina border, sections of I-75 and I-575 in Georgia, I-81 in Virginia, I-75 in Kentucky, and I-40 in Tennessee. Appendix F contains segment-level maps pinpointing safety hotspots along and within a 30-mile buffer of each priority corridor.

Figure 28: Select Priority Corridors for Safety Impact Assessment



In terms of severity, about 37 percent of the crashes associated with inadequate truck parking along the priority corridors led to property damage only while 57 percent led to minor injuries and 6 percent led to severe incapacitating injuries or fatalities. The most severe of these crashes occurred near the priority segments along US-25 in South Carolina, on US-219 in Pennsylvania, and along I-81 in Virginia.

These findings highlight the safety implications of insufficient truck parking along specific corridors in the Appalachian Region. However, the focus on select routes means that many more crashes could occur along lower-volume routes, particularly in rural areas where average travel speeds are higher, increasing the risk of more severe and deadly crashes due to fatigue or undesignated parking.

It is also essential to recognize that inadequate truck parking has broader safety implications beyond the specific crash types discussed in this section. For instance, due to a lack of available parking, truck drivers often have to drive longer hours to find available designated parking or have limited access to healthy food options and other amenities, leading to increased stress and fatigue over time, adding to several other challenges that truckers face due to the nature of their occupation, such as time away from home.

4 Truck Parking Recommendations

Chapter Summary: A range of recommendations are proposed for ARC to consider to address truck parking needs in the Appalachian Region. ARC's multistate nature allows it to approach truck parking needs and potentially fund truck parking improvement projects on a regional level. ARC can also use its existing platform to host peer exchanges and data sharing among public stakeholders to initiate conversations on corridor-level truck parking solutions. Besides fostering collaborative relationships among member states, ARC can also partner with other existing multi-jurisdictional organizations to strengthen regional discourse on truck parking. Moreover, ARC can also act as a convener between the public and private sectors to facilitate the process of exploring the landscape of public-private partnerships (P3) truck parking solutions. Finally, ARC can also provide grant advising and support to state and local communities.

There is no single solution to the truck parking challenges facing the Appalachian Region; addressing this issue demands collaboration and coordination among various stakeholders, both public and private, to develop and deploy a portfolio of strategies. Given its multi-state scope, ARC holds a unique position to facilitate this collaborative effort. This chapter outlines actionable recommendations that ARC can adopt to tackle the Region's truck parking needs and challenges. Additionally, it presents a tailored project benefit-cost analysis tool for ARC's future use in funding applications for truck parking projects in the Region.

4.1 Truck Parking Strategies

Appalachian-State Truck Parking Initiatives

Partner with State Truck Parking Initiatives

With the important role that truck parking plays in the Region, many ARC member-states have undertaken initiatives and strategies to address the truck parking shortage. State DOTs throughout the Region are partnering with their state trucking associations to understand where truck parking expansion or additions are needed in their state. Engaging with the state trucking associations allows DOTs to gain the drivers' perspectives on truck parking needs in their states.

Public-Private InitiativesMany of the states have also expressed an interest in exploring the opportunities presented by public-private partnerships to advance truck parking. However, there has been an emphasis on the research and knowledge-gathering process more than the implementation of a P3 truck parking project. Due to these initiatives being led by the respective state DOTs, initiatives are almost exclusively focused on singular states and lack emphasis on regional or system-wide truck parking needs.

Multi-State Truck Parking Projects

Additionally, ARC member-states have participated in regional truck parking improvement projects. Eight members of the Mid America Association of State Transportation Officials (MAASTO) – including Kentucky and Ohio – worked with the Federal Highway Administration (FHWA) to develop a Regional Truck Parking Information Management System (TPIMS), which went live in 2019. The project allows for monitoring of truck parking availability at authorized public and private truck parking sites and the sharing of that information seamlessly with truck drivers. The power of this project is that the truck

parking information does not stop at a state boundary. Rather, drivers can seamlessly access truck parking availability information as they move throughout the Region.

The recommendations in this report build and look to expand on these initiatives.

Appalachian Regional Truck Parking Initiatives

Recommendation 1: *Explore utilizing existing ADHS funding and ARC grant funding to support the improvement of truck parking in the Appalachian Region.*

To determine the conditions under which ADHS funds could be used for truck parking, ARC can explore available funding to perform a feasibility study or administer a truck parking pilot project on ADHS construction projects. Such a study or pilot project could demonstrate how existing funding available to ARC could be effectively invested in improving the truck parking in the Region, thereby serving as a model for the potential allocation of additional funding toward addressing truck parking needs.

Recommendation 2: *Organize peer exchanges among public stakeholders to foster multi-state collaborations in truck parking data sharing, planning, and solutions.*

To encourage the development of truck parking throughout the Appalachian Region, ARC can utilize its existing Network Appalachia multimodal transportation advisory group as a platform for the sharing of best practices for truck parking solutions. Peer exchanges among member states have several benefits. Within the 13-state Region, stakeholder perspectives can vary. Hosting a peer exchange can allow for the identification of common interests among stakeholders and provide an opportunity for people who may not usually have the chance to share their perspectives to come together and discuss their perspectives. This, in turn, allows for increased collaboration between diverse stakeholders at the regional level. Such peer exchange may spark interest and conversations on corridor-level truck parking solutions, which can not be done on the state level of planning. Additionally, ARC can use the peer exchanges as an opportunity to update member states on ARC funding for truck parking solutions, once the funding is available in the future.

Throughout ARC's geographic area, there are other multistate or multijurisdictional groups that have vested interests in improving the Region's truck parking capacity and access. By working with these groups, ARC can use its position to foster multi-state collaboration on truck-parking- projects. Other multi-jurisdictional groups have successfully fostered collaboration in the Region on freight-related projects. For example, Thrive Regional Partnership has fostered multi-state data sharing through its geospatial data portal. The visualizations and data analysis results from this regional truck parking study could also be shared in a similar manner, integrated into a data-sharing portal along with other transportation, economic, and demographic data, serving as a one-stop-shop for the Appalachian Region's data sources. Besides a data portal, an online story map is another visually engaging way to communicate and share truck parking information to all groups of stakeholders.

Thrive Regional Infrastructure Portal (TRIP)

TRIP, a geospatial data portal, integrates information from across three states: Georgia, Alabama, and Tennessee. Research results from TRIP are intended to support long-range transportation plans by MPOs, optimize state and federal funding, and develop a curriculum to train the next generation of talent in freight-depending industries.

The portal is part of a collaboration with the Georgia Institute of Technology.

Recommendation 3: *Convene public and private stakeholders to explore partnerships to enhance truck parking.*

Public and private sector groups have distinct interests and needs. Given ARC's members include the 13 states in the Appalachian Region, they are well-positioned to facilitate the interaction between groups. ARC can first identify which type of P3 truck parking solutions may be most applicable to member-states' unique truck parking needs and processes for undertaking public-private partnership projects. Then, ARC can convene a session with private stakeholders and interested State DOTs to explore existing options for collaboration between the two groups.

The facilitation of a P3 requires collaboration from multiple levels of the public sector, as well as private industry. Successful truck parking P3s have engaged with all jurisdictions involved, and some have experienced the support of a "project champion" at the local level. ARC could fill a similar role, offering support and knowledge to planners in the Region who may not have the resources to fully support a project such as this, but whose communities would benefit from it.

Additionally, if ARC understands the P3 process in each state, it could help streamline the P3 process when an opportunity presents itself. As each state has different P3 regulations and processes, ARC could play an important role by maintaining a perspective that helps fit the puzzle pieces of the Region's P3 regulations together.

Public-Private Partnership Truck Parking General Key Considerations

1. Orient truck parking **to the areas and regions that really need them** based on truck parking needs analysis and stakeholder feedback.
   - When working with an existing facility, consider if **the facility is well connected to on/off ramps** and if it has **safe, accessible, entrances and exits** for trucks. If not, estimate the amount of investment needed.
   - When partnering with an existing parking facility, **assess the facility's existing condition**. The facility's current maintenance standards are likely to continue.
2. **Buy-in from Local Government** is key. A "project champion" in the local region can be instrumental in getting a project over the finish line.
3. **Assess expected demands on other resources**, such as additional police presence in the area.

Examples of Public-Private Truck Parking Models

1. **DOT buys land adjacent to existing private truck parking site:** If vacant land is available adjacent to an existing truck parking site, the DOT can buy the land and develop truck parking on the land, which gives drivers access to the amenities provided by the private operator next door. Alternatively, the DOT can lease or give the land to the private truck stop operator and establish which party will be responsible for maintenance and upkeep. The operator then expands truck parking at the site.
2. **Asset-lite business utilizes existing lot and DOT helps offset costs for drivers:** Asset-lite businesses can utilize existing lots and set up secure parking facilities that drivers pay to access. To help drivers access these sites, DOTs can partner with the asset-lite business to help offset the costs of a driver parking their overnight or for staging purposes.
3. **Partner with businesses to utilize existing large parking lots after hours:** DOTs can partner with businesses in their regions, such as Walmart, to use their large parking lots for overnight truck parking. Some DOTs have begun conversations on this model, where the DOT will build the facilities and infrastructure necessary to support truck parking, in return for the business allowing access to the lot or land.

Public-Private Partnerships for Truck Parking Case Study: Town of Bennett, Colorado

There are several examples of the successful application of public-private partnerships to develop new truck parking in the United States. In Colorado, the Town of Bennett was struggling with undesignated truck parking due to overflow from a nearby national private truck stop provider site. The area was further complicated by an outdated bridge on a key travel route. The Town of Bennett made an agreement with the national private truck stop provider, where the Town would enhance the intersection in front of the facility to allow trucks to navigate it more easily, which included rebuilding an aging bridge that was used by trucks to access the parking site. In return, the national private truck stop provider would expand their truck parking facilities by over 100 spots, utilizing a ten-acre parcel of land adjacent to their existing parking lot. Colorado DOT then formed an Intergovernmental Agreement with the Town of Bennett for the Colorado DOT to address the concerns about the aging bridge. This was beneficial to the Colorado DOT, as they were able to make a one-time improvement to the area, rather than entering into a long-term contract, while fulfilling the needs of the private sector to make it possible for the private truck stop operator to expand their truck parking at the site. The Colorado DOT was responsible for the design of the bridge; when the design was completed, the Town was able to actively pursue federal grants to advance bridge construction faster than the Colorado DOT would have been able to construct. Following the infrastructure improvements to the bridge and intersection, the truck parking site was expanded by the national private truck stop provider, who added 114 parking spots to the location.

Private Truck Parking Solution Example - Outpost

Outpost is a company providing a network of managed truck parking facilities, primarily in the Southwest and Midwest of the U.S. The company uses a unique model, where it controls all variables of the truck parking service – such as real estate, operations, and technology – which allows the company to best serve its customers' needs. Cameras used to monitor trucks entering and exiting the lot allow operators to track and manage their fleet virtually. Additionally, the company has introduced technology allowing trucking companies to make online reservations for spaces, manage driver access to Outpost's facilities, monitor equipment usage, and improve the efficiency of their parking and equipment storage. While the company primarily serves monthly or long-term truck storage, they are expanding their daily and overnight truck parking operations. As each ARC member-state has different P3 rules, ARC can act as a facilitator to assist Outpost with finding locations to open new sites in Appalachia's greatest-need areas, and assist them with navigating the unique local and state regulations that affect the opening of a new site.

An Outpost Truck Parking Facility

Source: Outpost

Recommendation 4: *Assist communities in identifying and capitalizing on federal/state grant opportunities to fund truck parking projects.*

There are several funding opportunities available through federal grants for transportation or truck-parking projects. ARC could assist communities in the Region in identifying federal grant opportunities that could be used for developing additional truck parking. For grants or programs where multiple states or jurisdictions are eligible, ARC could play a crucial role of coordinating representatives from the jurisdictions, to put forward the strongest application possible. This could include identifying and bringing the right people to the table, managing check-ins to keep the process on track, or providing granting writing advice. Figure 29 lists the available federal funding programs that support truck parking projects for ARC to explore.

Figure 29: Federal Funding Programs for Truck Parking

Program Name	Issuing Agency	Description	Eligible Uses	Timeline
Advanced Transportation Technologies and Innovative Mobility Deployment (ATTIMD)	FHWA	Projects to deploy, install, and operate advanced transportation technologies.	Grants should improve safety, mobility, efficiency, system performance, intermodal connectivity, and infrastructure return on investment.	Applications closed in February 2024. Funding will be provided through fiscal year 2026.
High Priority Innovative Technology Deployment (HP-ITD)	FMCSA	Advance the technological capability and promote the deployment of intelligent transportation system applications for truck operations, including truck, commercial driver, and carrier-specific information systems and networks, and to support/maintain truck information systems /networks.	Deployment and development of new and innovative advanced technology solutions that support truck information systems and networks, for planning activities, including the development or updating of program or top-level design plans in order to become eligible or maintain eligibility for the HP-ITD awards; and for the operation and maintenance costs associated with innovative technology.	NOFO closed in April 2024, awards expected in August 2024
Accelerated Innovation Deployment (AID)	FHWA	The AID Demonstration program provides funding as an incentive to accelerate the use of innovation in highway transportation projects. The Federal Highway Administration (FHWA) expects funding for AID Demonstration grants to be made available from amounts authorized within the Technology and Innovation Deployment Program (TIDP) under the Fixing America's Surface Transportation (FAST) Act. The grants are administered through the FHWA Center for Accelerating Innovation	Projects must: • Be eligible under Title 23, United States Code. • Be ready to initiate within 12 months of applying for AID Demonstration funding. • Involve any phase of a highway transportation project between project planning and project delivery including planning, financing, operation, structures, materials, pavements, environment, and construction. • Include an innovation proven in real-world highway transportation applications,* though not routinely used by the applicant or the subrecipient. Address TIDP goals.	Completed applications are evaluated and award determinations are made on an open, rolling basis until the program ends or funding is no longer available.

Program Name	Issuing Agency	Description	Eligible Uses	Timeline
Local and Regional Project Assistance, also referred to as Rebuilding American Infrastructure with Sustainability & Equity (RAISE)	FHWA	Projects that will have significant local or regional impact, and improve transportation infrastructure.	Highway or bridge projects eligible for assistance under Title 23, United States Code are among eligible projects.	NOFO closed in February 2024.
Nationally Significant Freight & Highway Projects (INFRA)	FHWA	Multimodal freight and highway projects of national or regional significance to improve the safety, efficiency, and reliability of the movement of freight and people in and across rural and urban areas.	Projects that improve safety, generate economic benefits, reduce congestion, enhance resiliency, and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements.	The most recent awards were announced in early 2024.
Rural Surface Transportation Grants (RURAL)	FHWA	Projects to improve and expand the surface transportation infrastructure in rural areas to increase connectivity, improve the safety and reliability of the movement of people and freight, and generate regional economic growth, and improve quality of life.	Highway, bridge, or tunnel projects eligible under the National Highway Performance Program, Surface Transportation Block Grant Program, or the Tribal Transportation Program; highway freight project eligible under the National Highway Performance Program; highway safety improvement project; project on a publicly-owned highway or bridge improving access to certain facilities that support the economy of a rural area; integrated mobility management system, transportation demand management system, or on-demand mobility services.	NOFO will close in May 2024.

Source: FHWA; FMCSA.

5 Truck Parking Project Benefit-Cost Analysis Tool

The ARC Truck Parking Benefit-Cost Analysis (BCA) Spreadsheet Tool is a specialized resource developed as part of the Appalachian Region Truck Parking Study. This tool provides ARC partners with a tailored template for conducting benefit-cost analyses of truck parking-related projects. It incorporates truck parking-specific parameters derived from industry research and features a systematic approach for calculating benefits in line with the 2024 Update of the USDOT Benefit-Cost Analysis Guidance.[6]

5.1 The Purpose and Future Use Cases

ARC partners can use this tool to perform benefit-cost analyses on truck parking-related capital improvement projects. It can be included in applications for federal competitive grant programs such as the Nationally Significant Multimodal Freight & Highway Projects program (INFRA)[7] or the Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD)[8] grants.[9]

5.2 Inputs and Outputs

By providing project-specific inputs, such as project scope, project cost estimates, truck parking spaces, and traffic crash data, users can derive a range of economic output metrics, such as Net Present Value (NPV) and Benefit-Cost Ratio (BCR), for the project under analysis.

Comparison with USDOT's BCA Template
The USDOT offers a generic Benefit-Cost Analysis Spreadsheet Template for Discretionary Grant Programs,[10] which shares foundational principles with the ARC Truck Parking Benefit-Cost Analysis Spreadsheet Tool, such as the treatment of baselines, alternatives, inflation adjustments, discounting, and analysis periods, and incorporates parameters from Appendix A of the USDOT BCA guidance document. The ARC tool builds on USDOT BCA guidance and parameters while focusing specifically on truck parking projects and the calculation of their benefits. It integrates benefit estimation steps directly into the spreadsheet formulas, streamlining the process of applying the project and deriving benefit-cost analysis results.

5.3 General Assumptions

The general assumptions used in the ARC Truck Parking BCA Spreadsheet Tool across all benefit categories were developed based on USDOT BCA Guidance released on December 5, 2023,[11] including:

6 USDOT, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, December 5, 2023. https://www.transportation.gov/mission/office-secretary/office-policy/transportation-policy/benefit-cost-analysis-guidance, accessed May 2024.
7 USDOT, The INFRA Grant Program, March 4, 2024. https://www.transportation.gov/grants/infra-grant-program, accessed May 2024.
8 USDOT, Grant Programs, February 21, 2023. https://highways.dot.gov/research/technology-innovation-deployment/grant-programs, accessed May 2024.
9 As USDOT updates the BCA guidance annually to reflect the latest federal grant application requirements, users should ensure that the most current parameters from the USDOT guidance are incorporated into the template.
10 USDOT, Benefit-Cost Analysis Spreadsheet Template for Discretionary Grant Programs, January 31, 2024. https://www.transportation.gov/mission/office-secretary/office-policy/transportation-policy/benefit-cost-analysis-spreadsheet-template, accessed May 2024.
11 USDOT, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, December 5, 2023. https://www.transportation.gov/mission/office-secretary/office-policy/transportation-policy/benefit-cost-analysis-guidance, accessed May 2024.

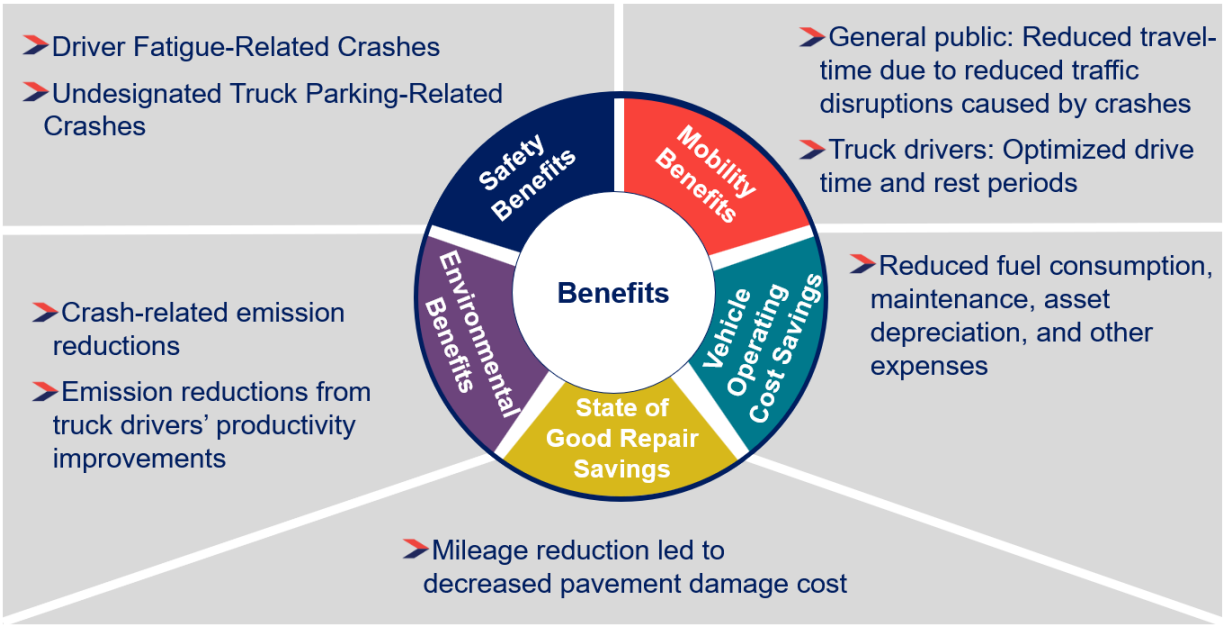
- Measuring benefits in dollar terms, whenever possible, and expressing benefits and costs in a common unit of measurement (2022 Real Dollars);
- Discounting future benefits and costs with the real discount rates recommended by USDOT of 3.1 percent generally and 2 percent for benefits related to carbon dioxide emissions; and
- Using USDOT guidance for the valuation of travel time savings, vehicle operating costs, safety benefits, and reductions in air emissions, while relying on industry best practices for the valuation of other effects.

5.4 Key Benefit Categories

The ARC Truck Parking BCA Spreadsheet Tool has the following project benefit categories built in (Figure 30):

- **Safety benefits**: crash reduction from reducing the time spent searching for truck parking while fatigued and/or beyond truck drivers' hours of service as well as crash reduction from few instances of truck drivers parking in undesignated locations.
- **Mobility benefits**: reduced travel-time due to reduced traffic disruptions caused by crashes for the general public and reduced travel-time due to optimized drive time and rest periods for truck drivers.
- **Environmental benefits**: emission reductions from reduced crashes and truck drivers' productivity improvements.
- **Vehicle operating cost savings**: savings for truck operators due to reduced fuel consumption, maintenance, and other expenses.
- **State of good repair savings**: reduced cost of maintaining a state of good repair on public roadways.

Figure 30: ARC Truck Parking BCA Spreadsheet Tool Benefit Categories



Source: CPCS, 2024

Project impacts not included in the BCA
The ARC Truck Parking BCA Spreadsheet Tool quantifies the project benefits based on USDOT guidance for federal grant opportunities and does not include other types of project

impacts, such as indirect economic and financial impacts. Indirect economic impacts encompass jobs generated through facility operations and those involved in the supply chain for products purchased during project deployment and operation. Additionally, many truck parking projects enhance regional economic competitiveness by lowering transportation costs, improving reliability, and offering various benefits to the private sector. The construction phase itself also generates numerous jobs, both directly in construction and indirectly in related industries. These types of benefits are not quantified in the analysis.

Financial impacts, such as revenue generated through facility charges or other sources, primarily affect the facility sponsor or operator and are not included in the overall project benefit calculation. It's important to note that economic and financial impacts could be very relevant at the local or regional level (e.g., number of new jobs associated with a project or potential to attract businesses). But these impacts are not considered by USDOT for federal benefit-cost calculations, and thus not included in this BCA tool.

5.5 Key Parameters

The ARC Truck Parking BCA Spreadsheet Tool includes several parameter categories that allow users to adjust project assumptions:

- **General Economic Parameters**: Users can modify assumptions related to the model's current dollar year (default is 2022) and discount rates based on the latest USDOT guidance. Additionally, users can update parameters such as the project construction start year (default is 2025), construction period duration (default is 3 years), and project operation period duration (default is 10 years) to better reflect the project's specifics. The default project operation period in the tool is set at 10 years, which is suitable for the demonstration example of a truck parking information management system (see section Demonstration Using the I-68 Corridor below for more detail) along the I-68 built in the tool. Other truck parking projects, such as parking capacity expansion or new parking facility construction projects may require a longer operation period (e.g., 20 years). The tool contains additional instructions on accommodating more analysis years.
- **Facility Characteristics**: Users can adjust assumptions related to truck parking facilities, including the number of truck parking spaces to be constructed or improved in urban or rural areas, as well as utilization levels.
- **Cost Estimates**: Users can update assumptions regarding project deployment and operation cost estimates.
- **Facility Performance**: Users can modify assumptions about the performance of truck parking facilities, such as the average time or travel distance saved for truck drivers searching for parking. The tool provides default values based on extensive industry research.
- **Benefit Calculation Parameters:** Users can adjust assumptions related to the calculation of benefits, customizing them based on the project's location, such as whether it is in an urban or rural area.

5.6 Sensitivity Analysis

To allow users to test the robustness of a project's benefits and economic viability, a sensitivity analysis can be performed using the ARC Truck Parking Benefit-Cost Analysis Spreadsheet Tool. This analysis can be used to assess the project's attractiveness under more or less favorable conditions (e.g., lower or higher project implementation costs).

Modeling inputs, such as economic monetization factors for travel time savings, emissions, and state-of-good-repair, are well-established and documented by the USDOT BCA guidelines and have been used in similar projects' BCAs. Figure 31 identifies the input parameters and assumptions that can be

used in the sensitivity analysis. These parameters were chosen for two main reasons: they are not as thoroughly documented or frequently utilized in the USDOT guidelines, allowing for nuanced judgments and interpretations; and they have the potential to influence a wide range of project benefits.

Figure 31: Sensitivity Parameters and Their Relation to Benefit Categories

Sensitivity Parameter	Benefit Categories Impacted
Travel time savings per parking space (hours)	• Travel time savings (for truck drivers, due to knowledge of parking availability) • Environmental benefits (due to truck driver efficiency improvements)
Miles saved per parking space (miles)	• Vehicle operating cost savings • State of good repair (highway pavement)
Crash reduction rate (%)	• Safety benefits for public motorists • Travel time savings for public motorists (due to a reduction in crashes and traffic congestion) • Environmental benefits (due to reduced traffic congestion from crashes)

Source: CPCS

Users can adjust the parameters and compare the resulting BCR to assess the robustness of projects' benefits and economic viability.

5.7 Demonstrations

For illustrative purposes, the ARC Truck Parking Benefit-Cost Analysis Spreadsheet tool demonstrates the process of calculating the benefit-costs for two hypothetical projects in two separate Microsoft Excel spreadsheets:

1) A hypothetical Truck Parking Information Management System (TPIMS) project: This hypothetical project assumes instrumenting TPIMS technology for five spaces at an existing truck parking facility. The location of the hypothetical project was chosen in consultation with the steering committee of the Appalachian Region Truck Parking Study and is used solely for demonstration.
2) A hypothetical truck parking capacity project: This hypothetical project assumes the construction of a truck parking facility with 20 spaces.

These spreadsheets differ in two main aspects: analysis period and crash reduction assumptions.

- Firstly, the analysis period varies between the two project types. TPIMS projects typically use a 10-year analysis period, reflecting their shorter-term impact and technological nature. In contrast, capacity expansion projects, which include new truck parking facilities or expansions of existing ones, employ a 20-year analysis period. This longer timeframe accounts for the more permanent and infrastructural nature of these projects.
- Secondly, the spreadsheets incorporate different assumptions about crash reduction rates. TPIMS projects generally use a 10% crash reduction rate, as they primarily focus on improving information dissemination to drivers. Capacity projects, however, warrant a higher crash reduction rate. This is because they physically remove more trucks from roadside parking, providing safer alternatives and thus having a more significant impact on reducing truck-related accidents.

Sample TPIMS Project BCA Results

A hypothetical implementation of TPIMS at an existing truck parking facility is projected to generate significant value, with an estimated $126,000 in benefits over a 10-year service period (discounted to 2022 dollars), against a cost of approximately $42,000 (also discounted to 2022 dollars) spread over three years. This results in a benefit-cost ratio of 3. Sensitivity analysis further confirms the hypothetical project's robustness, with a viable benefit-cost ratio ranging between 1.8 and 4 under various assumption adjustments.

The benefits of this hypothetical TPIMS are estimated by quantifying the safety and travel time savings the project could generate and the other derivative benefits from vehicle operation cost savings, reduced emissions, and less wear-and-tear for the roads. For demonstration purposes, it is assumed that TPIMS technology will be instrumented to the five parking spaces available at the location. The following section explains the reasoning for the safety and travel time-saving benefits.

- **Safety Benefits:** Without access to reliable information about parking locations and availability, truck drivers may continue searching for parking from location to location. If they are unable to find a spot before reaching their hours-of-service limit, truck drivers may be forced to park at undesignated locations, such as along highway on/off-ramps or on shoulders next to overwhelmed rest areas or truck stops. Both driving while fatigued and parking at undesignated locations create serious safety risks to truck drivers and other road users. A TPIMS project could help prevent accidents by providing truck drivers with information on parking availability. Prior research on the effect of rest areas shows that providing information about the availability of truck parking leads to a decrease in the number of crashes.[12] A 10% reduction applied for the demonstration project is consistent with the rate used in FHWA's TOPS-BC tool.[13]
- **Travel Time Savings - Truck Driver Productivity Improvements**: Recent studies have found that the uncertainty of truck parking availability often leads truck drivers to end their day early, ranging from 30 minutes to an hour, to avoid running out of drive time under hours-of-service regulations.[14] Rather than risk being unable to find truck parking towards the end of their drive time, truck drivers often opt to finish driving earlier, if they are able to access available truck parking spaces along their route. The TPIMS project provides substantial travel time savings to truck drivers by broadcasting the availability of truck parking spaces. It enhances truck drivers' productivity and efficiency by allowing them to better manage their schedules, optimize their drive time and rest periods, and reduce unnecessary drive time searching for parking, thereby saving significant travel time in the process. This analysis conservatively assumes that 15 minutes of time that truck drivers spend searching for parking could be saved by the improved truck parking information made available to truck drivers through the TPIMS.

Other benefits, including vehicle operation cost savings, reduced emissions, and less wear-and-tear for the roads are derived from the safety and travel time saving benefits discussed above.

5.8 Limitations

In addition to the indirect economic or financial impacts that are not included per USDOT BCA guidance, the tool currently does not consider benefits to active transportation mode users, or benefits that are less straightforward to calculate. One example is the potential health benefits for truck drivers

[12] Michigan Department of Transportation. Evaluation of MDOT Truck Parking Information and Management System. May 2016. https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Programs/TSMO/ITS/Truck-Parking-Project-Report.pdf?rev=3aa0e02d44c34b4597ceada5380e7c9f&hash=6B1F5176BE457F3506F6A61A0D982610. Accessed June 2023.

[13] FHWA, Tool for Operations Benefit Cost Analysis (TOPS-BC, V 4.0). https://ops.fhwa.dot.gov/plan4ops/topsbctool/index.htm. Accessed June 2023.

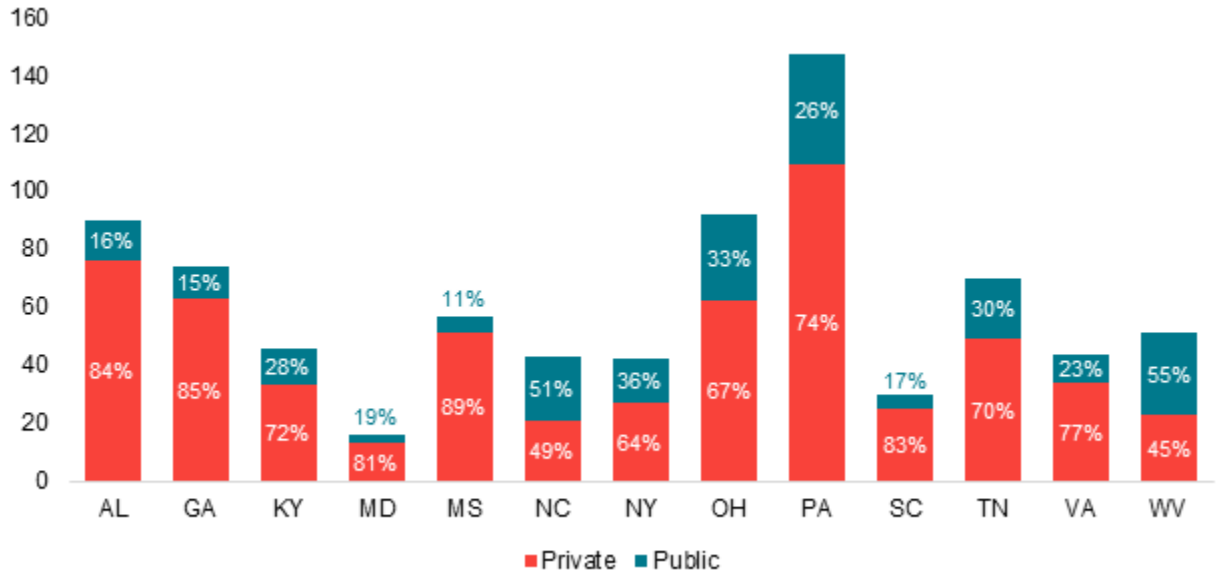
[14] American Transportation Research Institute. An Analysis of the Operational Costs of Trucking: 2020 Update. November 2020. https://truckingresearch.org/wp-content/uploads/2020/11/ATRI-Operational-Costs-of-Trucking-2020.pdf. Accessed June 2023.

from improved access to truck parking facilities or from better amenities (such as showers, Wi-Fi, security, food, etc.) provided at the facilities. In addition, the tool contains default values for benefit calculation parameters based on industry research. However, these parameters may not be directly applicable to every project due to various factors. Nevertheless, the tool is designed to allow users to easily update the assumptions, and the results will adjust accordingly to reflect these updates.

Appendix A Truck Parking Inventory

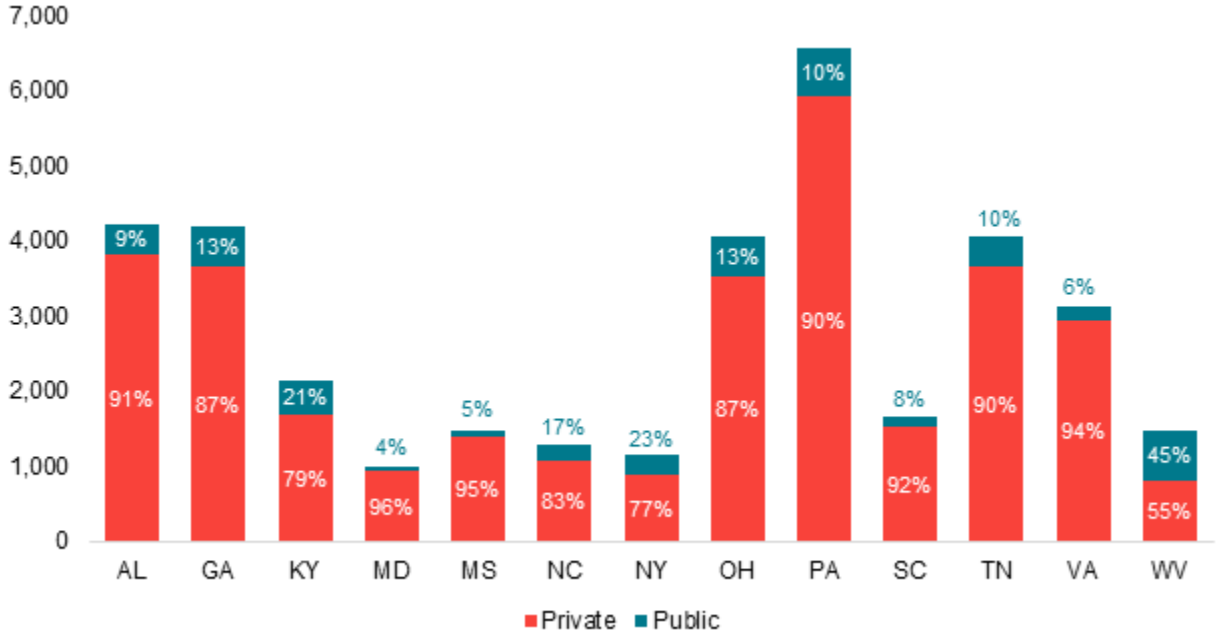
The average number of truck parking spaces at each facility in the Appalachian Region is 45.4 spaces per location, with private truck stops typically providing a higher number of spaces at each facility, compared to public truck parking facilities. A-1 compares the typical size of truck parking facilities in the Region. As demonstrated, Virginia's truck parking facilities provide the highest number of spaces on average, due to the large size of private truck stops in the state's counties that fall within the Appalachian Region. Georgia and Kentucky's public truck parking facilities, however, provide more spaces compared to public truck parking facilities in other states in the Region. Although Pennsylvania provides the greatest number of truck parking locations, these locations contribute fewer spaces compared to the regional average.

Figure A-1: Appalachian Region Truck Parking Locations by State and Type



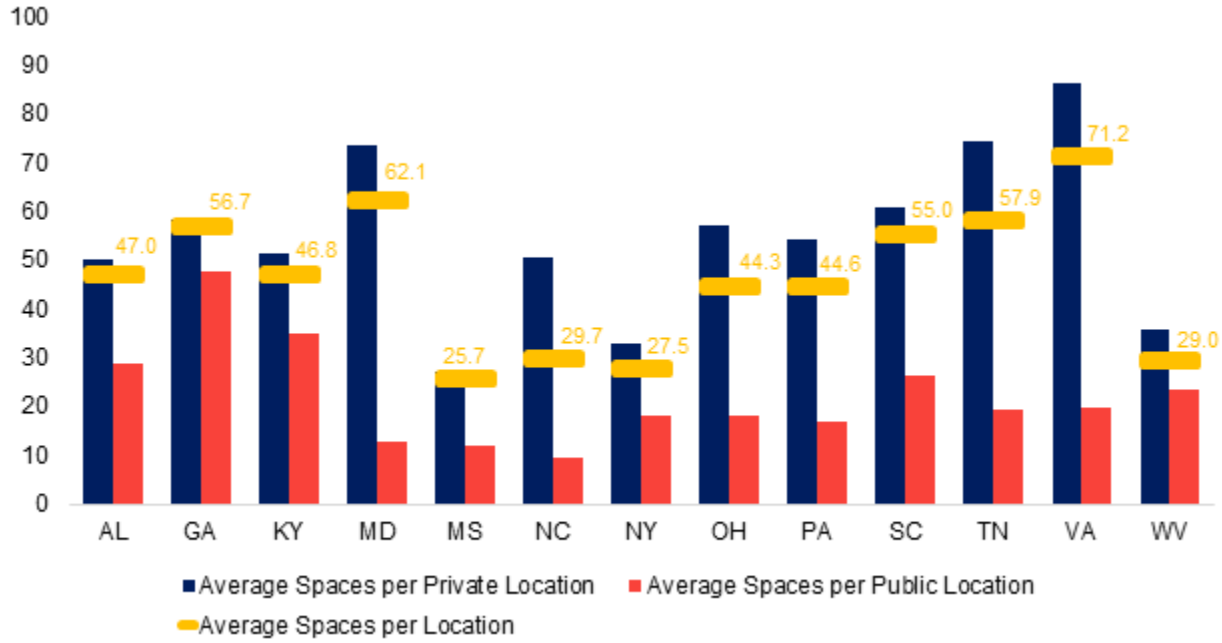
Sources: FHWA Jason's Law, ALDOT, GDOT, KYTC, Maryland DOT, Mississippi DOT, NYSDOT, NCDOT, ODOT, PennDOT, SCDOT, TDOT, VDOT, WVDOT, Trucker Path, Love's, Pilot/Flying J, TA/Petro.

Figure A-2: Appalachian Region Truck Parking Spaces by State



Sources: FHWA Jason's Law, ALDOT, GDOT, KYTC, Maryland DOT, Mississippi DOT, NYSDOT, NCDOT, ODOT, PennDOT, SCDOT, TDOT, VDOT, WVDOT, Trucker Path, Love's, Pilot/Flying J, TA/Petro.

Figure A-3: Appalachian Region Average Number of Truck Parking Spaces per Private and Public Location by State



Sources: FHWA Jason's Law, ALDOT, GDOT, KYTC, Maryland DOT, Mississippi DOT, NYSDOT, NCDOT, ODOT, PennDOT, SCDOT, TDOT, VDOT, WVDOT, Trucker Path, Love's, Pilot/Flying J, TA/Petro.

Appendix B Truck Parking Utilization by Time of Day

Figure B- 1 to Figure B- 24 shows the truck parking utilization in the Appalachian Region by time of day.

Figure B- 132: Truck Parking Utilization (12 AM to 1 AM)

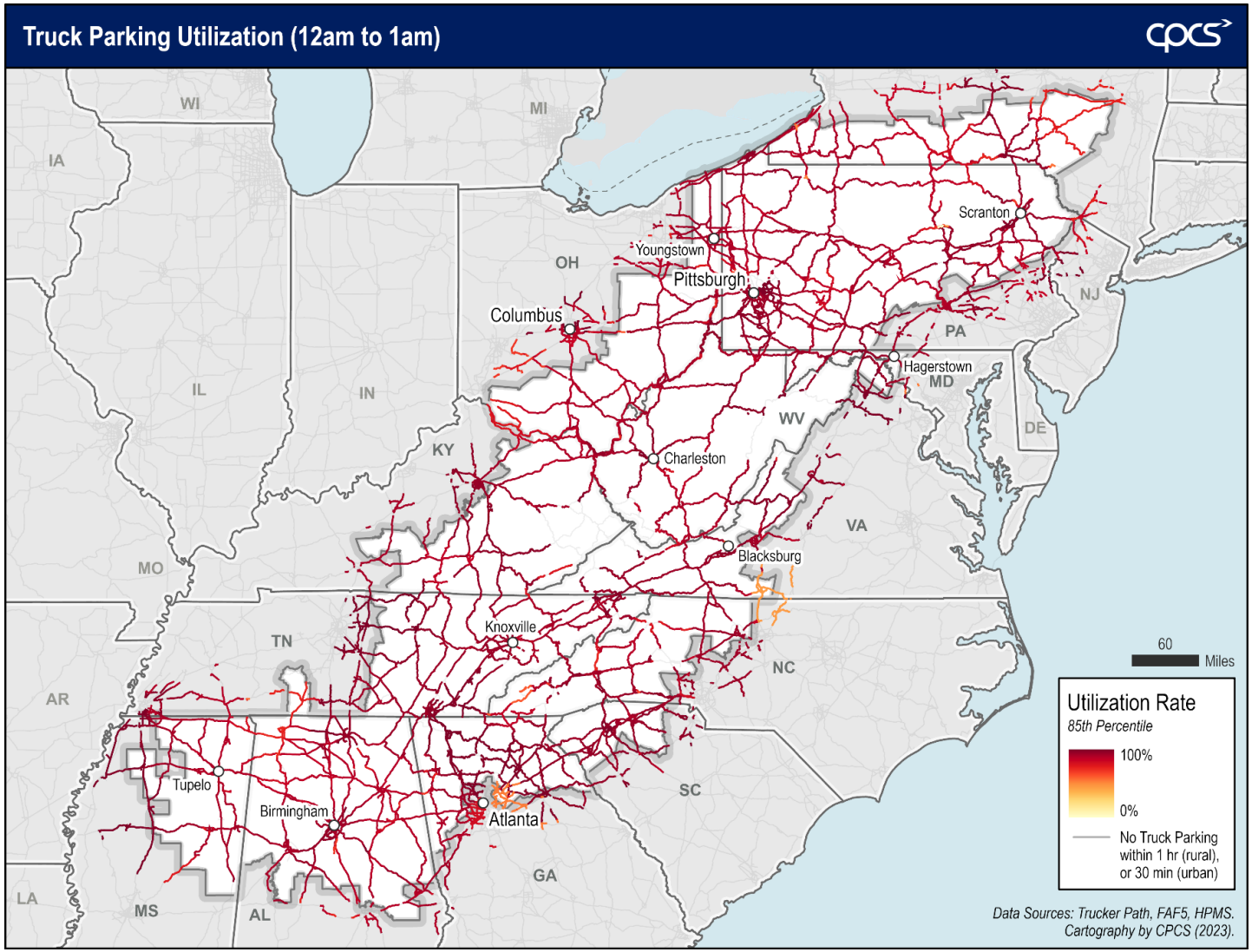


Figure B- 233: Truck Parking Utilization (1 AM – 2 AM)

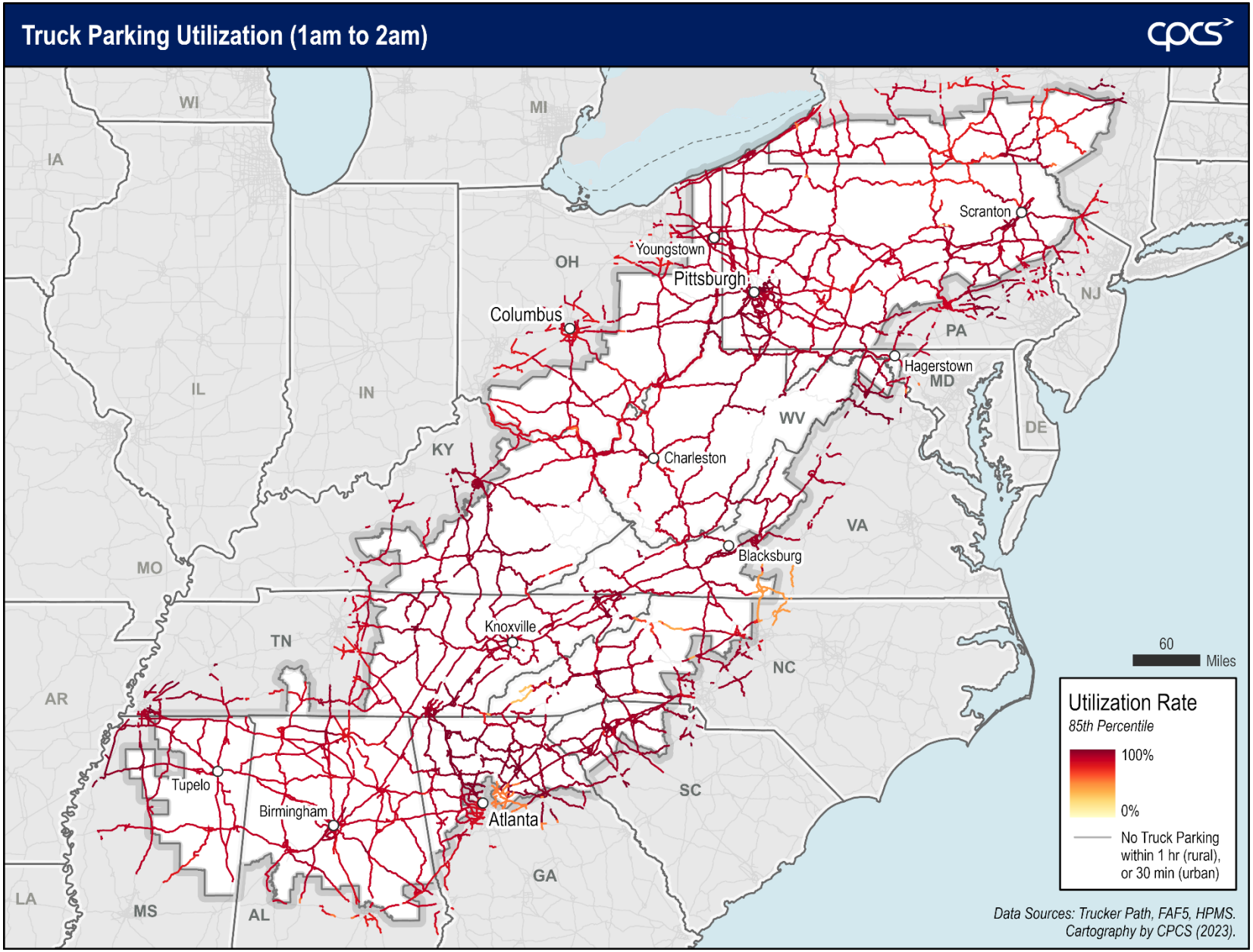


Figure B- 334: Truck Parking Utilization (2 AM – 3 AM)

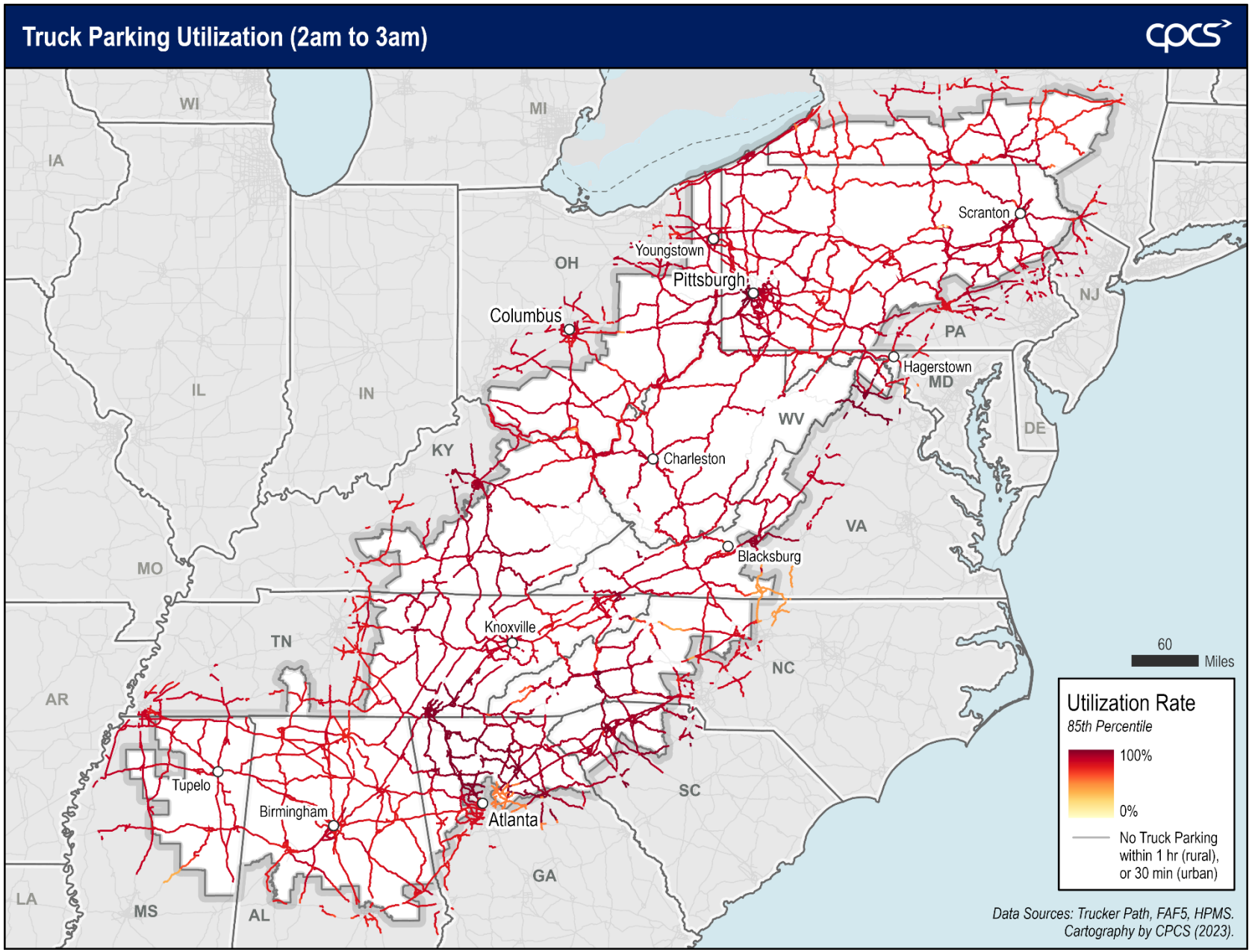


Figure B- 4: Truck Parking Utilization (3 AM – 4 AM)

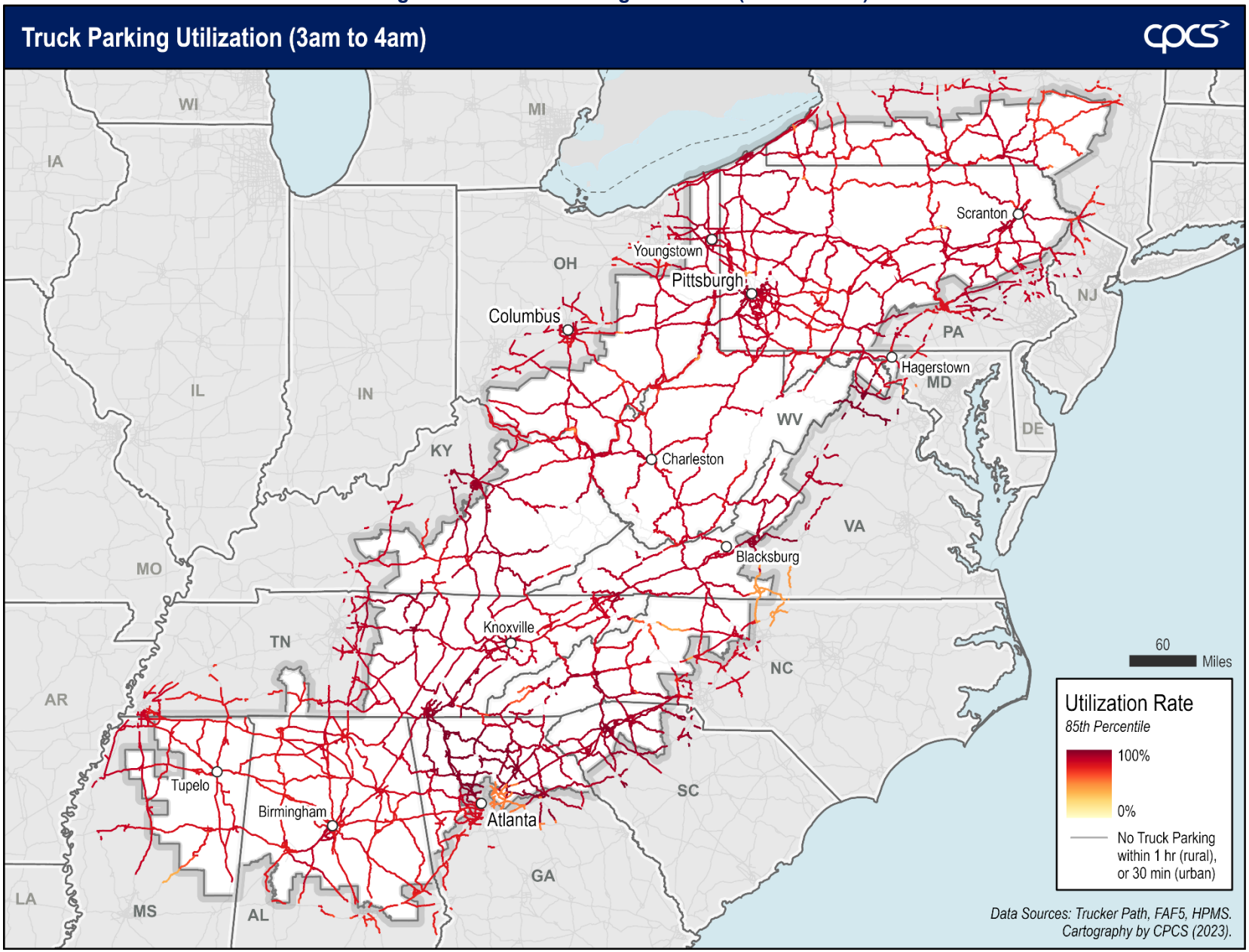


Figure B- 5: Truck Parking Utilization (4 AM – 5 AM)

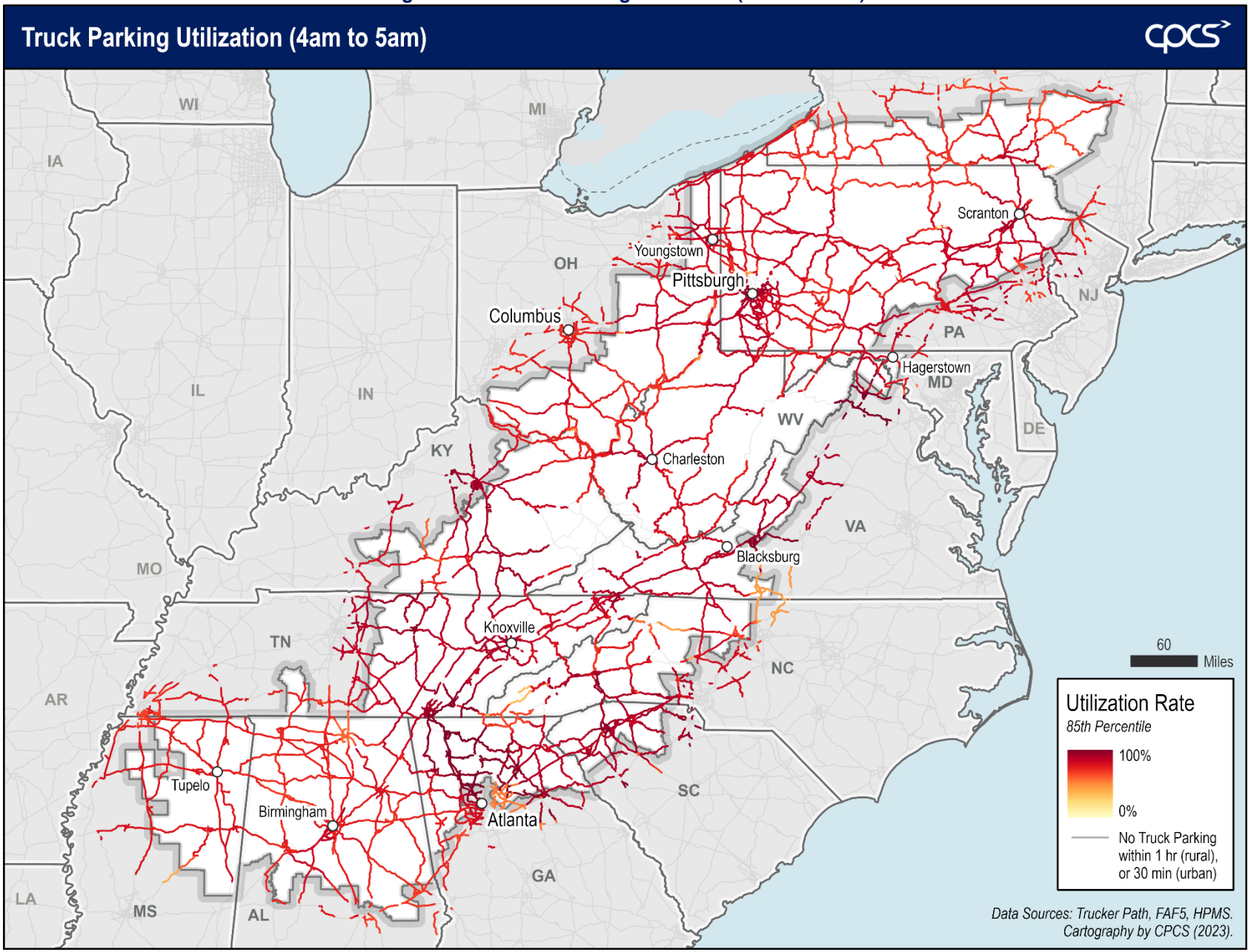


Figure B- 6: Truck Parking Utilization (5 AM – 6 AM)

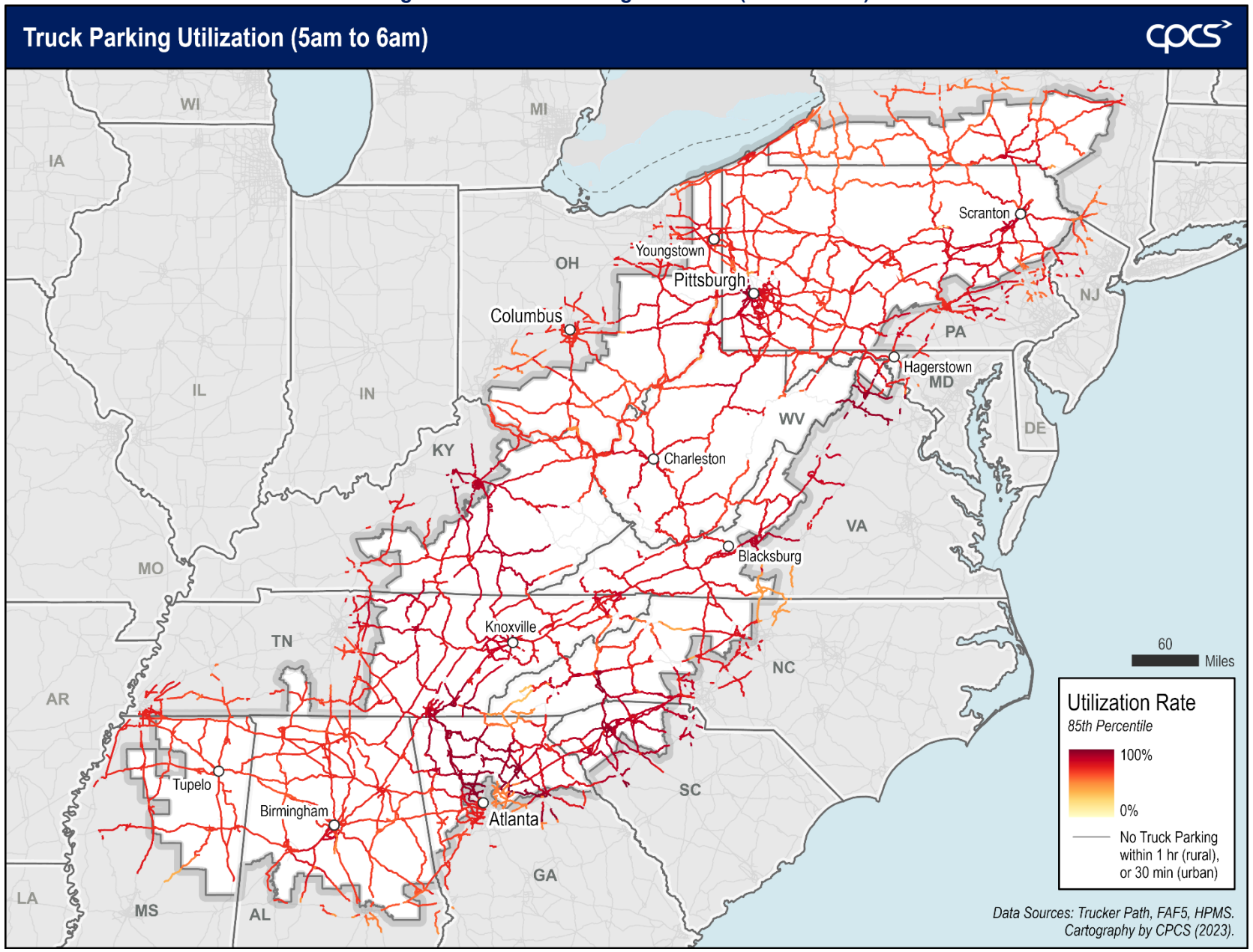


Figure B- 7: Truck Parking Utilization (6 AM – 7 AM)

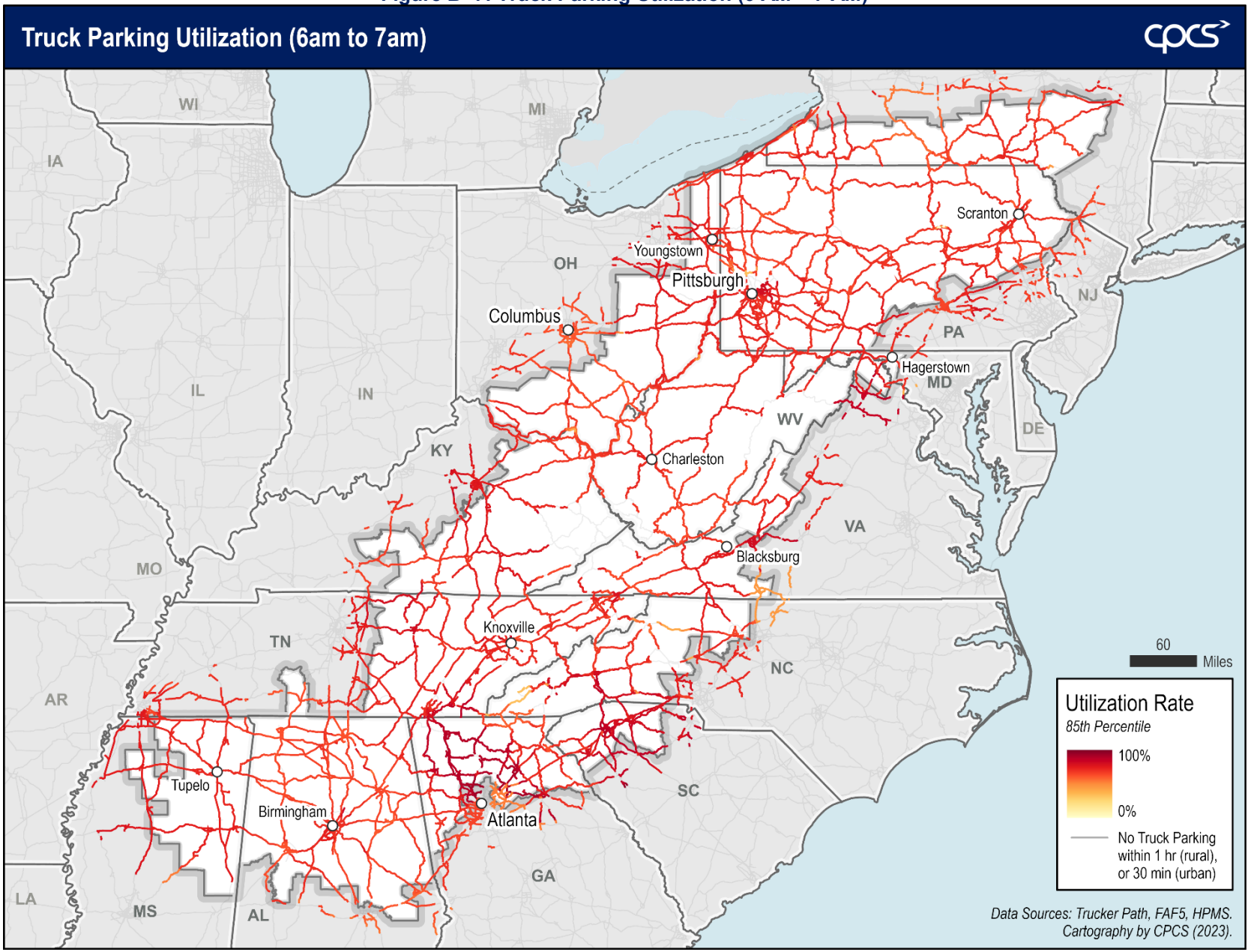


Figure B- 8: Truck Parking Utilization (7 AM – 8 AM)

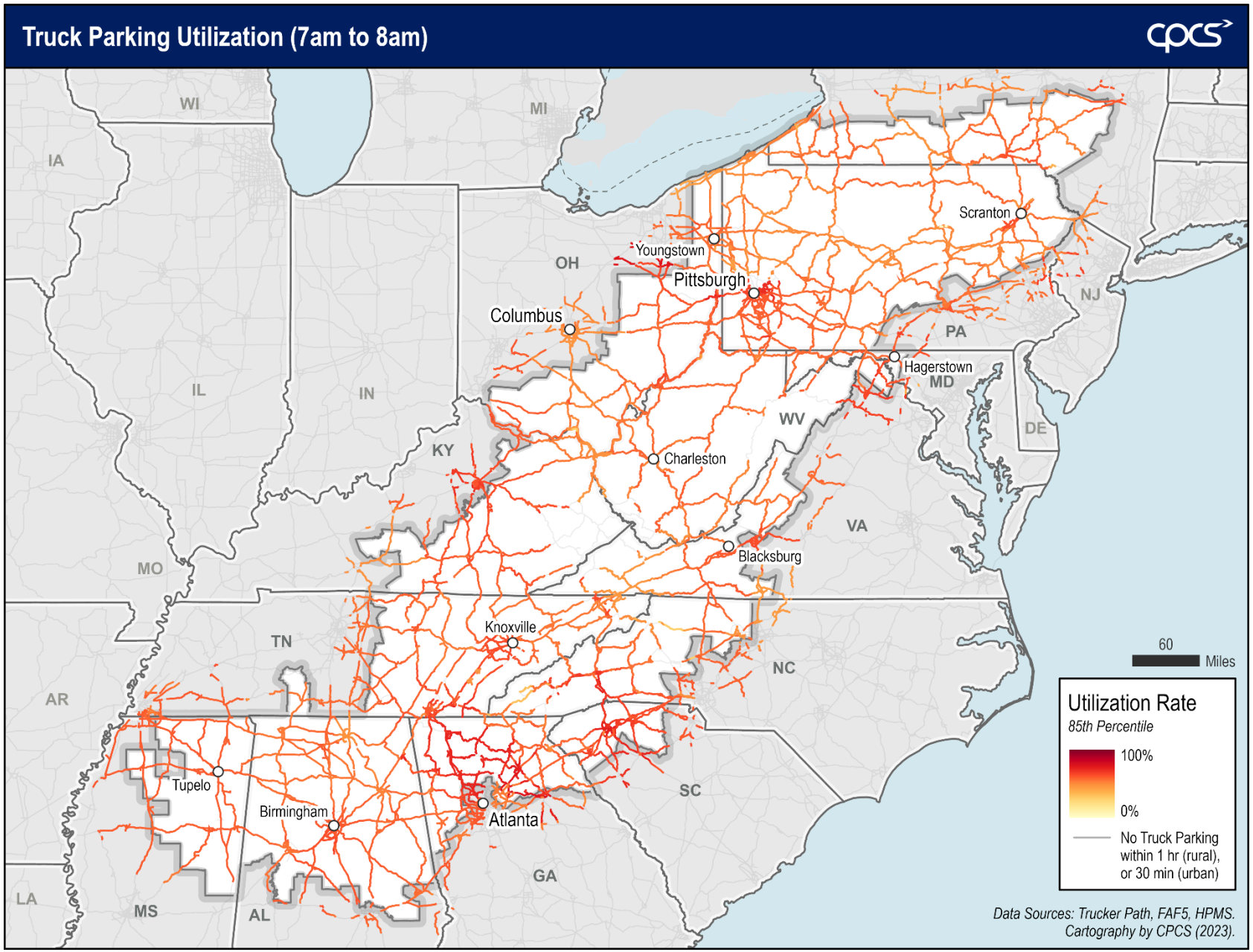


Figure B- 9: Truck Parking Utilization (8 AM – 9 AM)

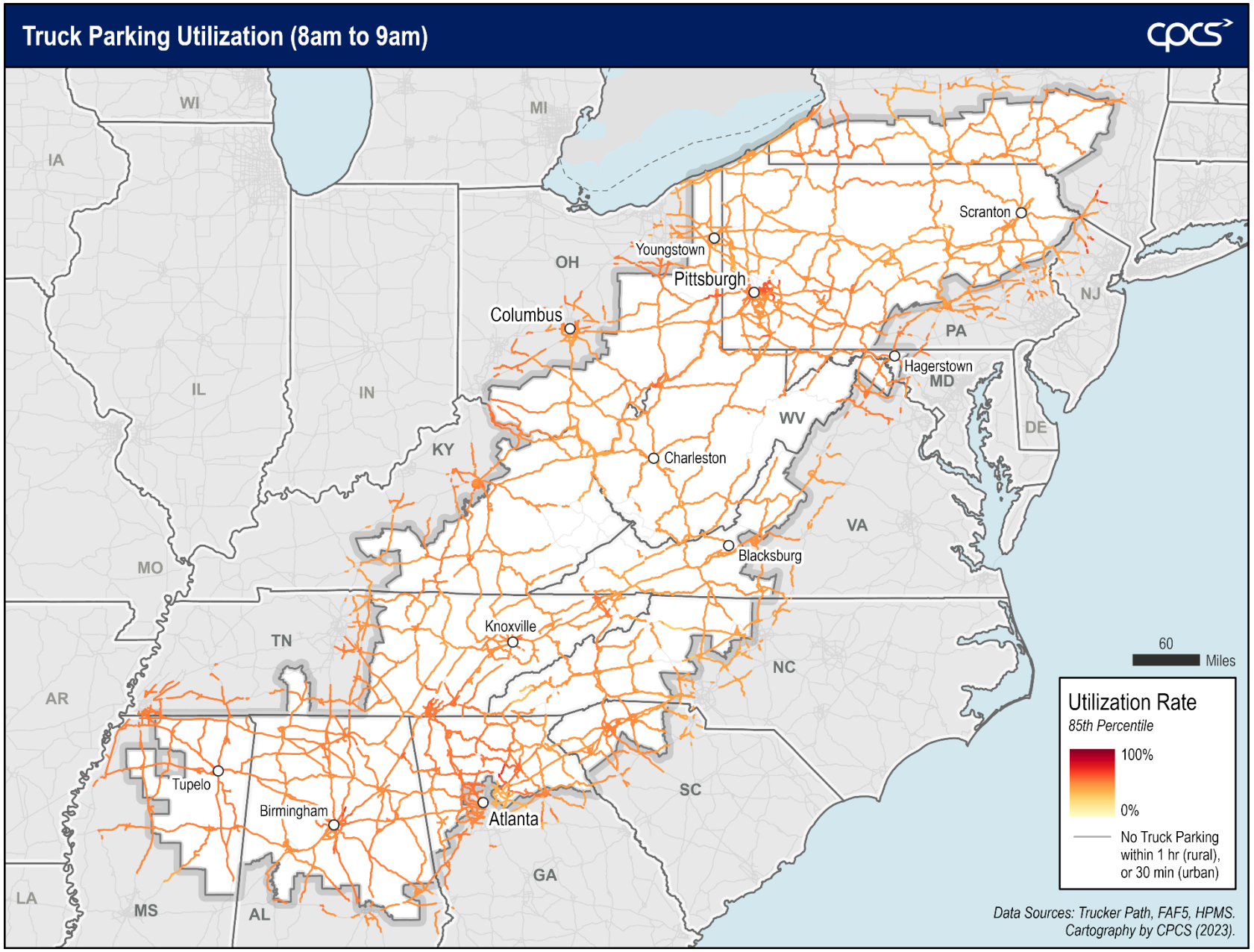


Figure B- 10: Truck Parking Utilization (9 AM – 10 AM)

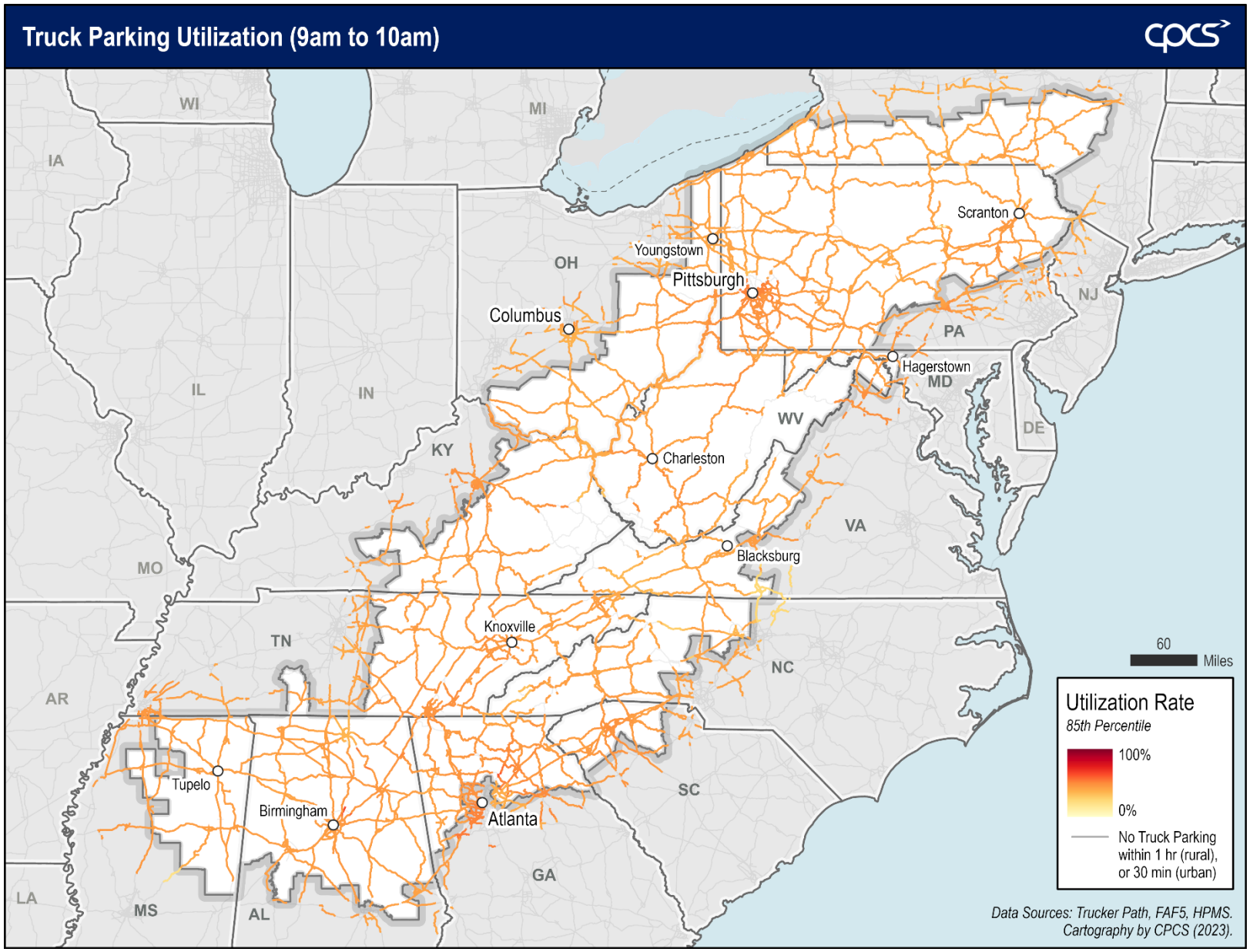


Figure B- 11: **Truck Parking Utilization (10 AM – 11 AM)**

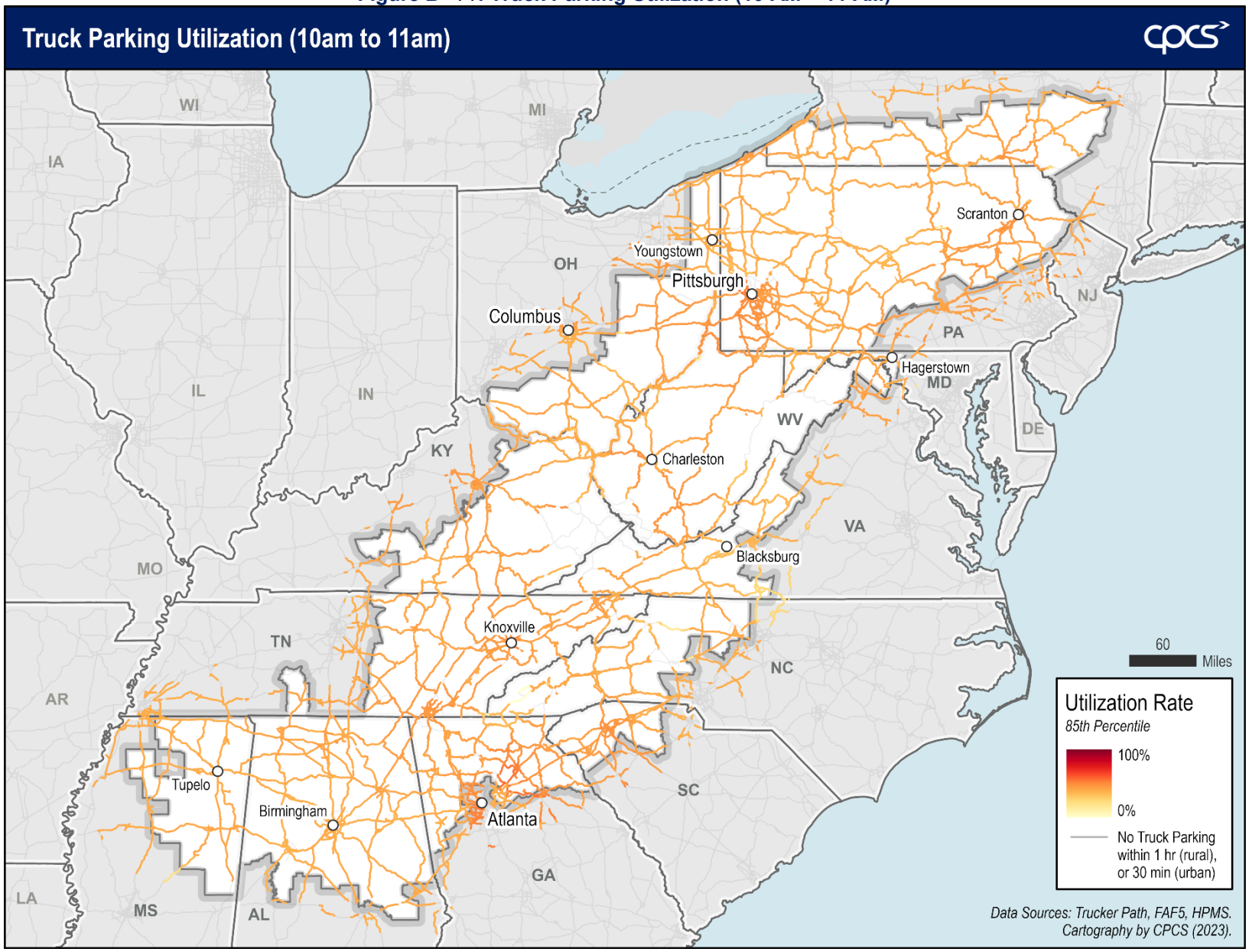


Figure B- 12: Truck Parking Utilization (11 AM – 12 PM)

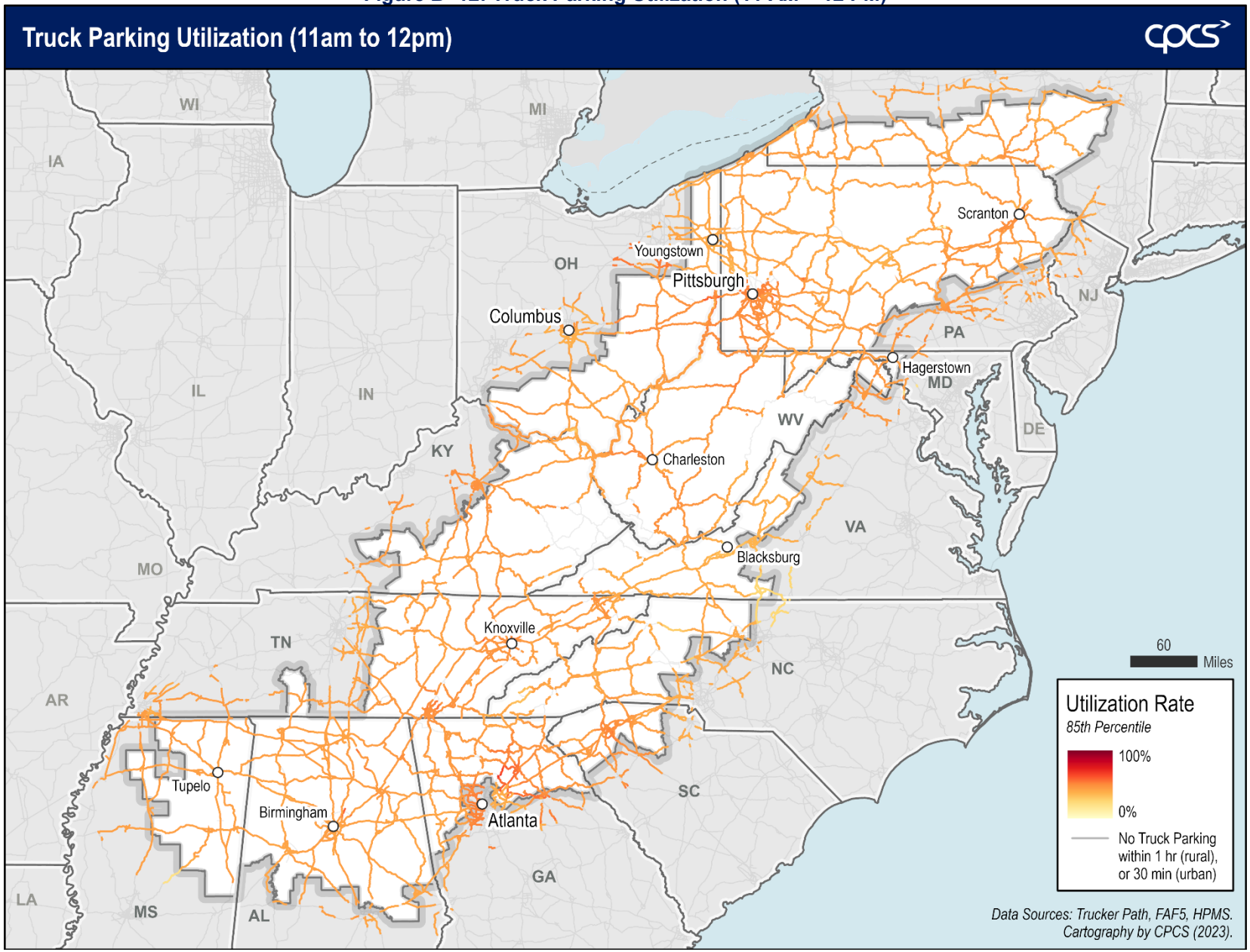


Figure B- 13: Truck Parking Utilization (12 PM – 1 PM)

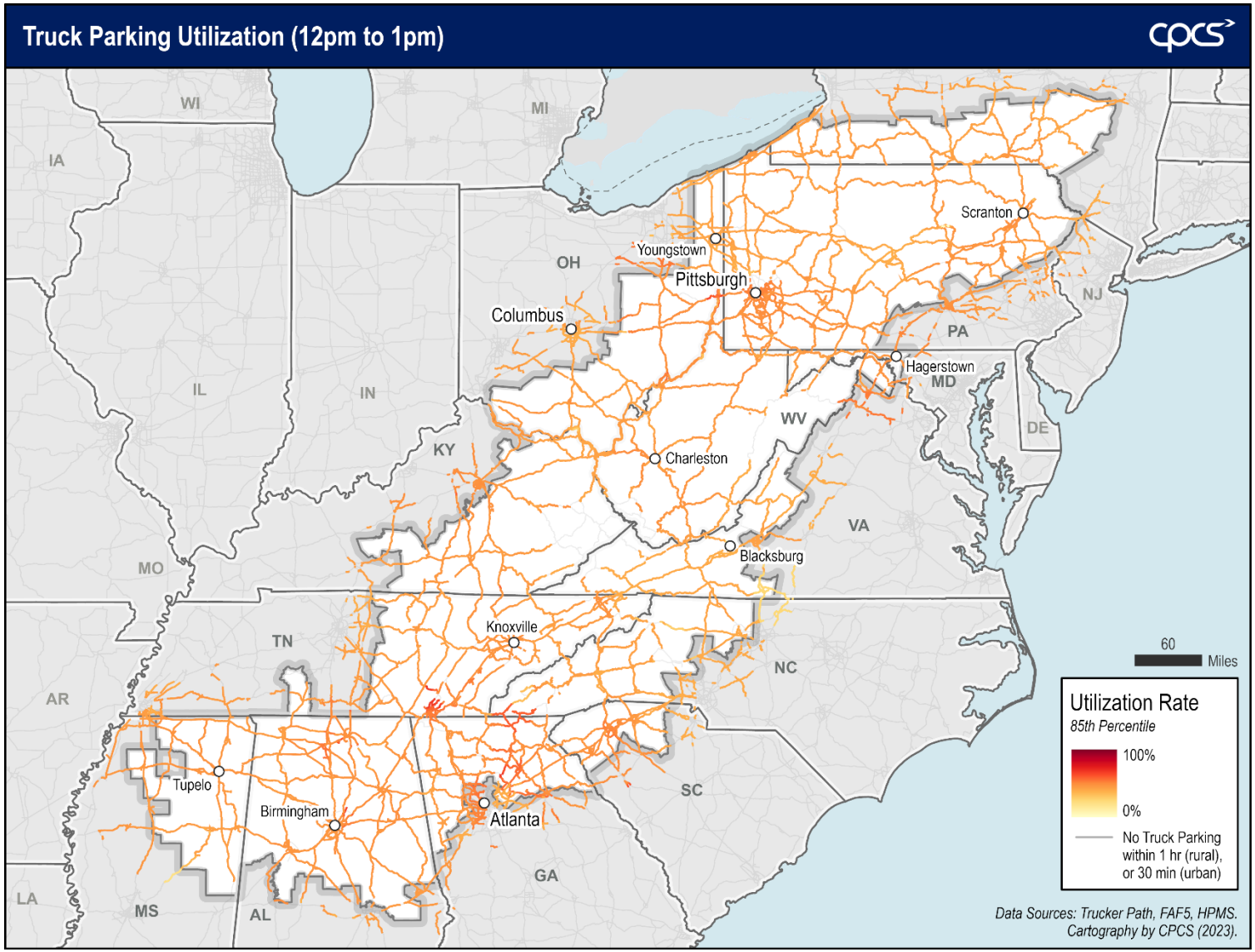


Figure B- 14: Truck Parking Utilization (1 PM – 2 PM)

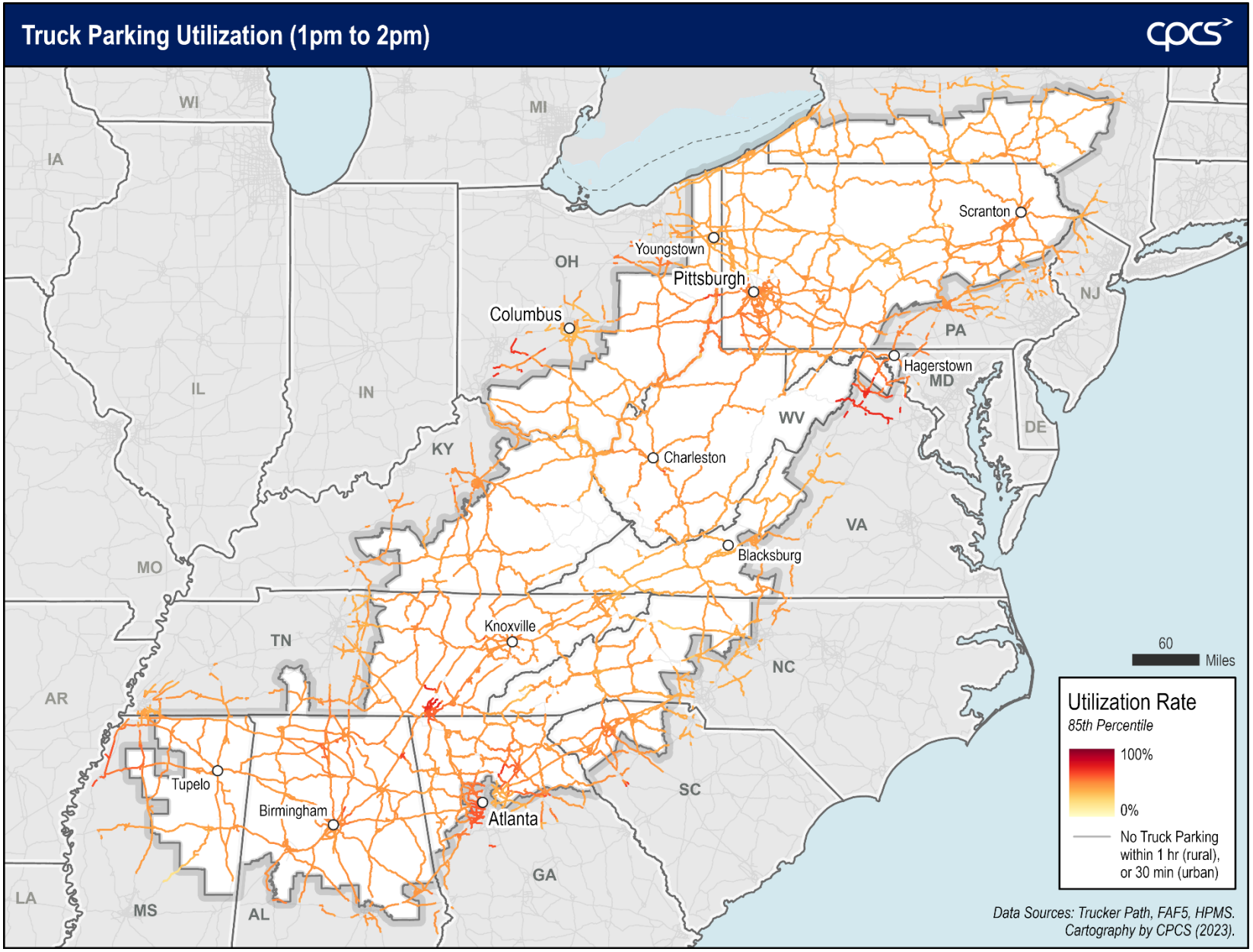


Figure B- 15: Truck Parking Utilization (2 PM – 3 PM)

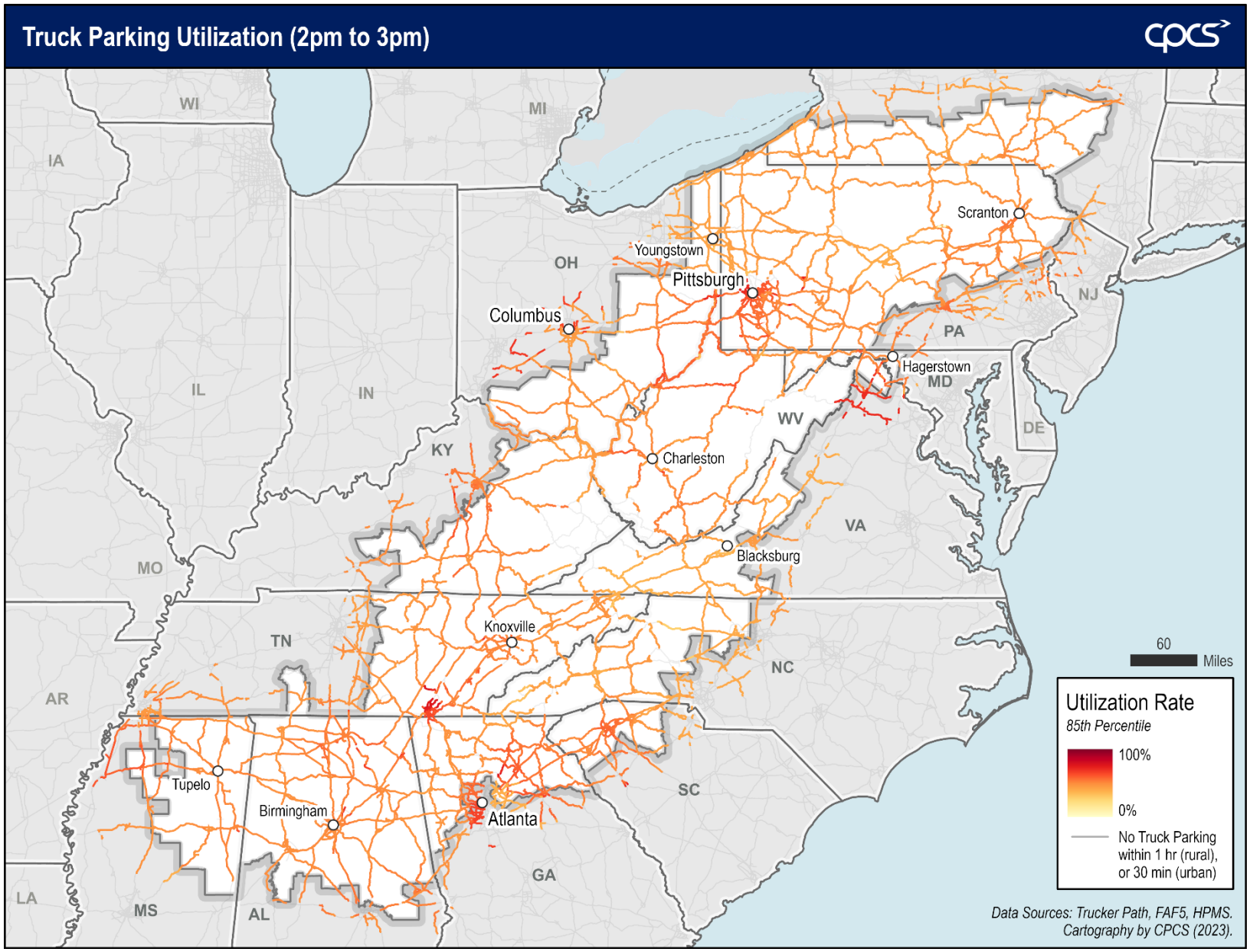


Figure B- 16: Truck Parking Utilization (3 PM – 4 PM)

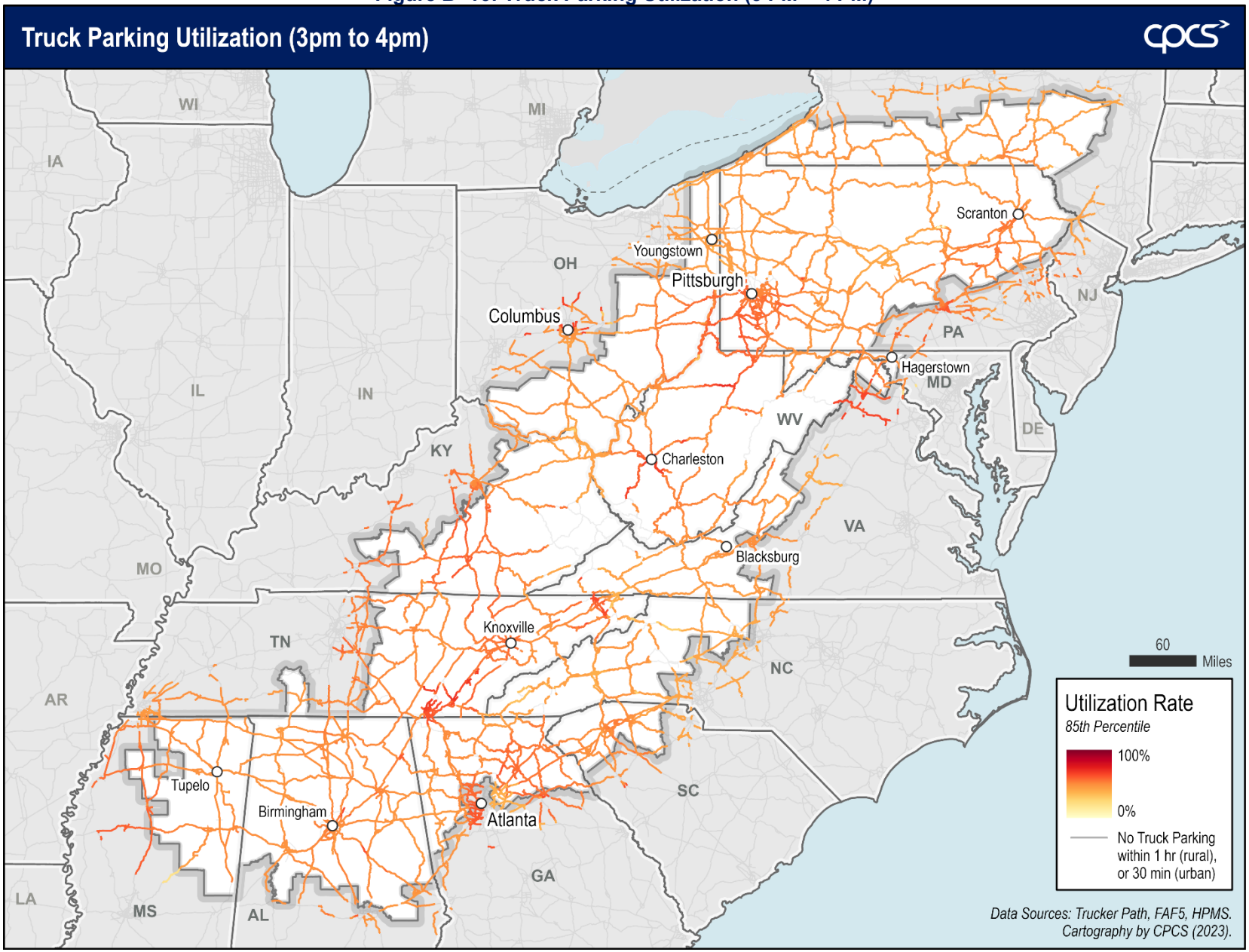


Figure B- 17: Truck Parking Utilization (4 PM – 5 PM)

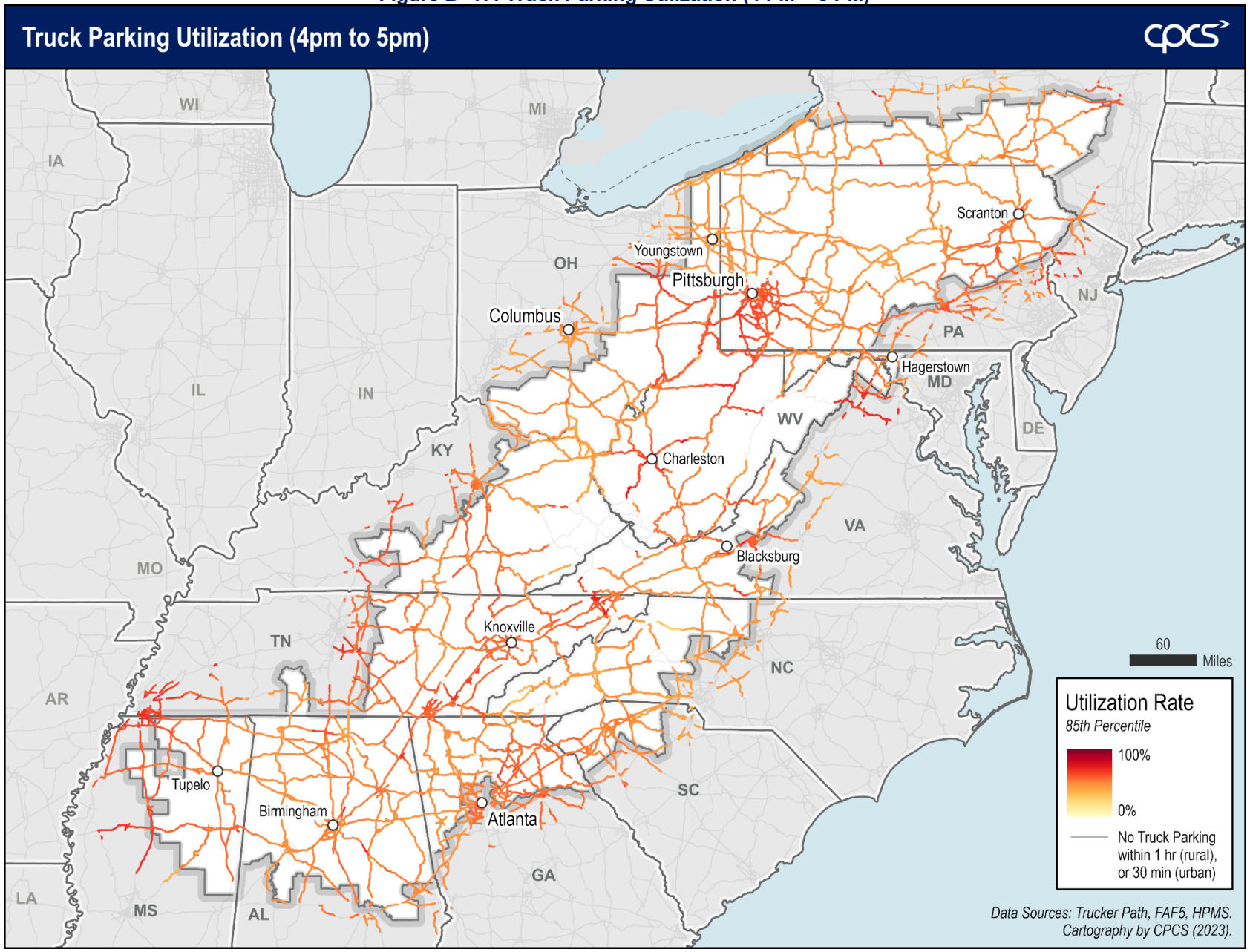


Figure B- 18: Truck Parking Utilization (5 PM – 6 PM)

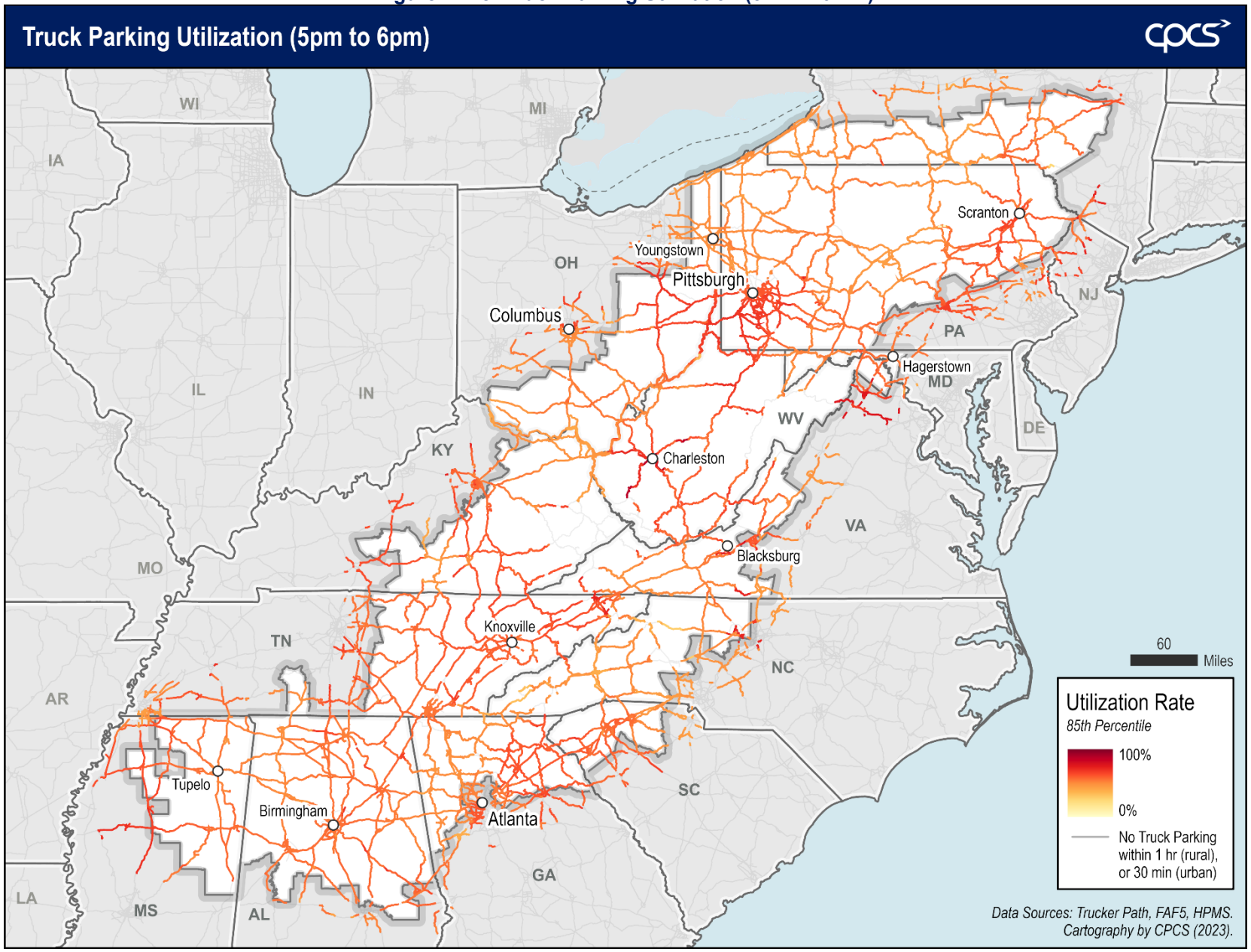


Figure B- 19: Truck Parking Utilization (6 PM – 7 PM)

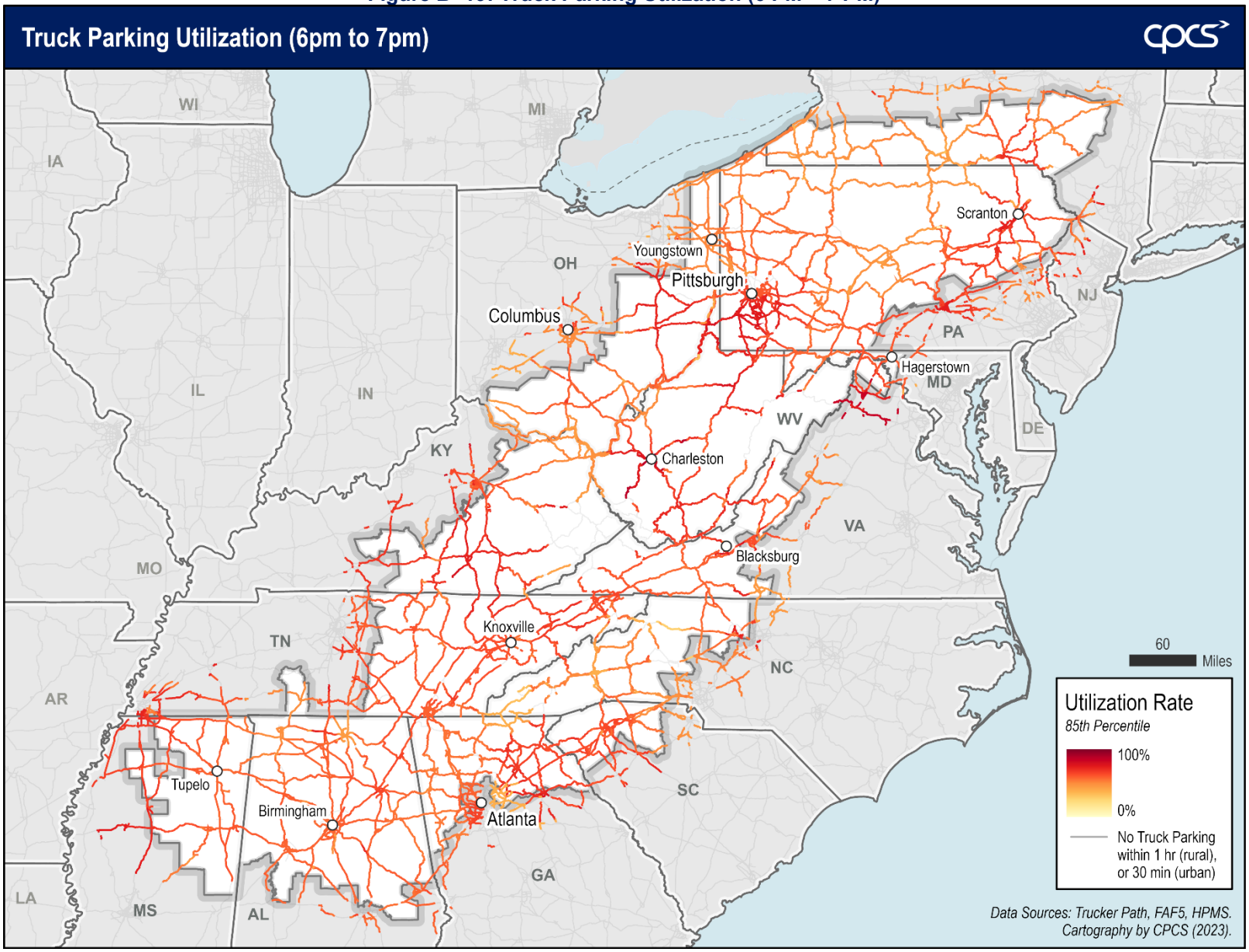


Figure B- 20: Truck Parking Utilization (7 PM – 8 PM)

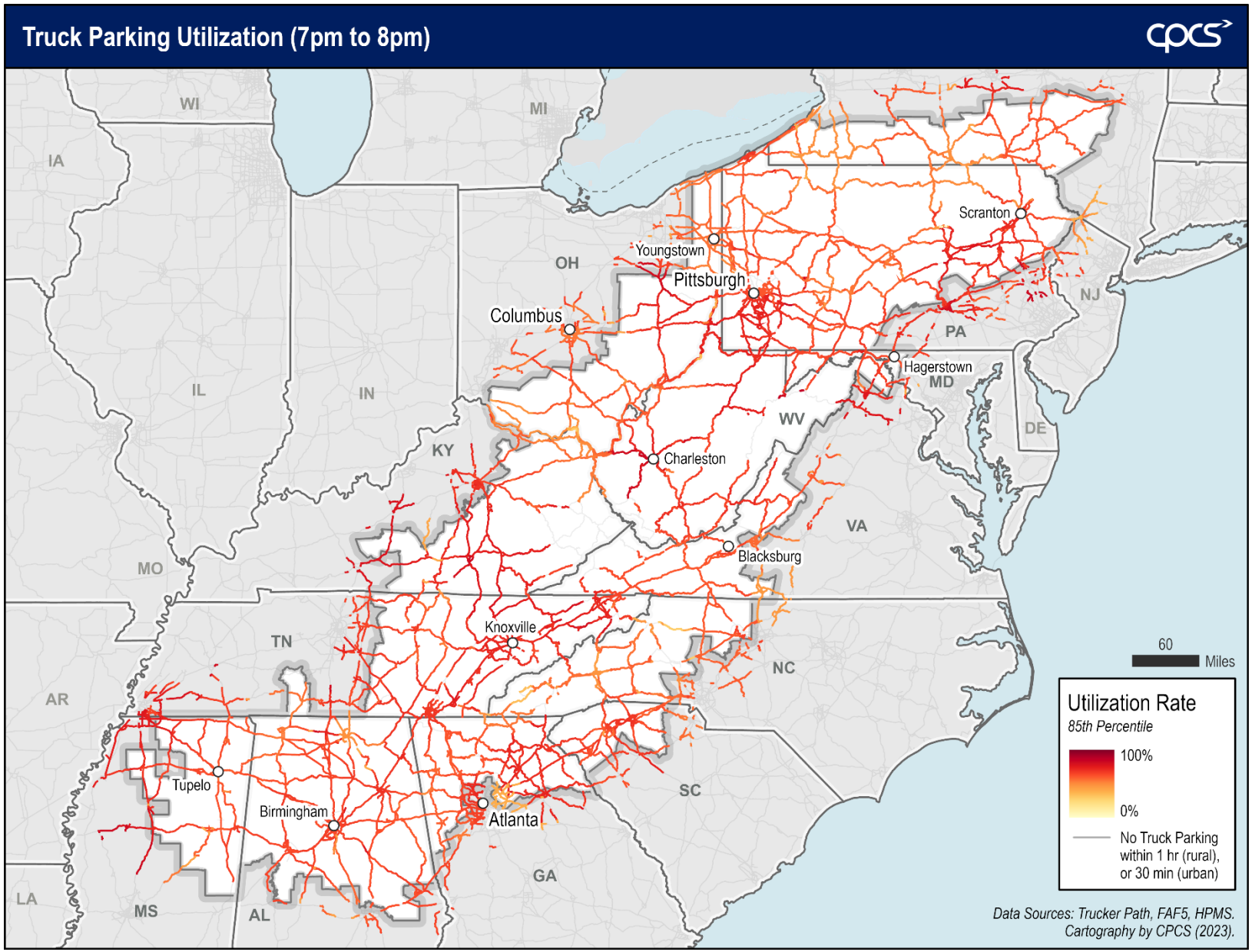


Figure B- 21: Truck Parking Utilization (8 PM - 9 PM)

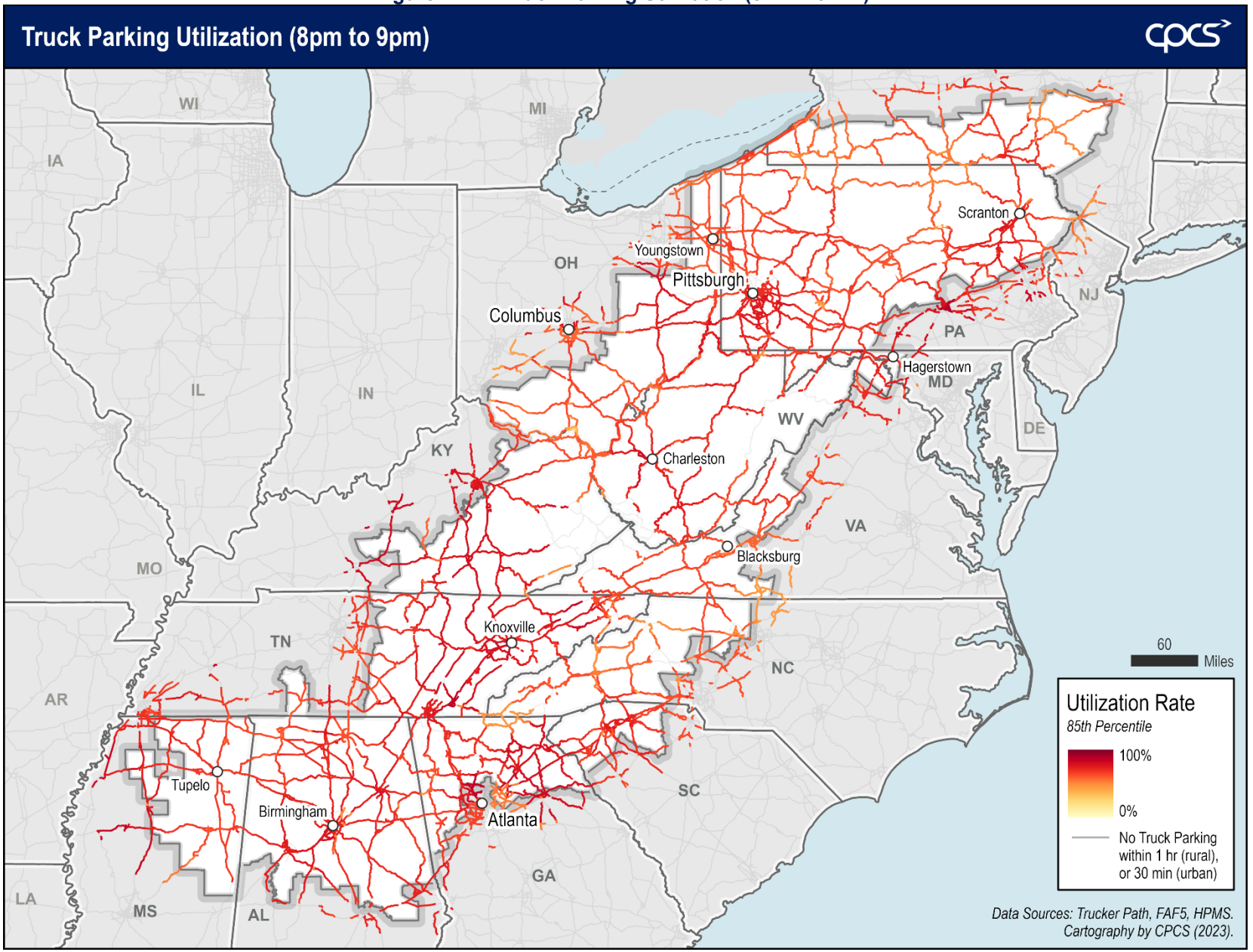


Figure B- 22: Truck Parking Utilization (9 PM – 10 PM)

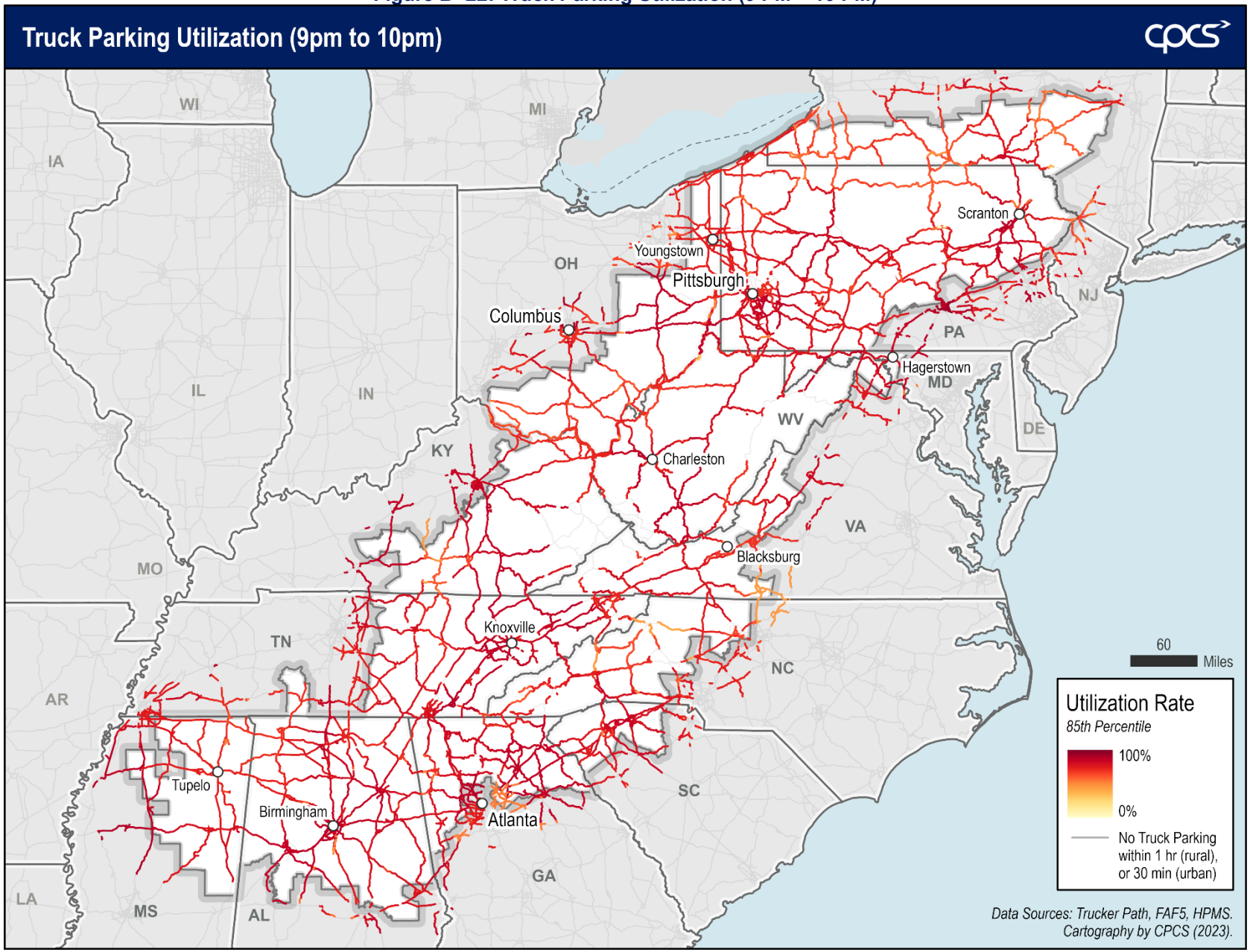


Figure B- 23: Truck Parking Utilization (10 PM – 11 PM)

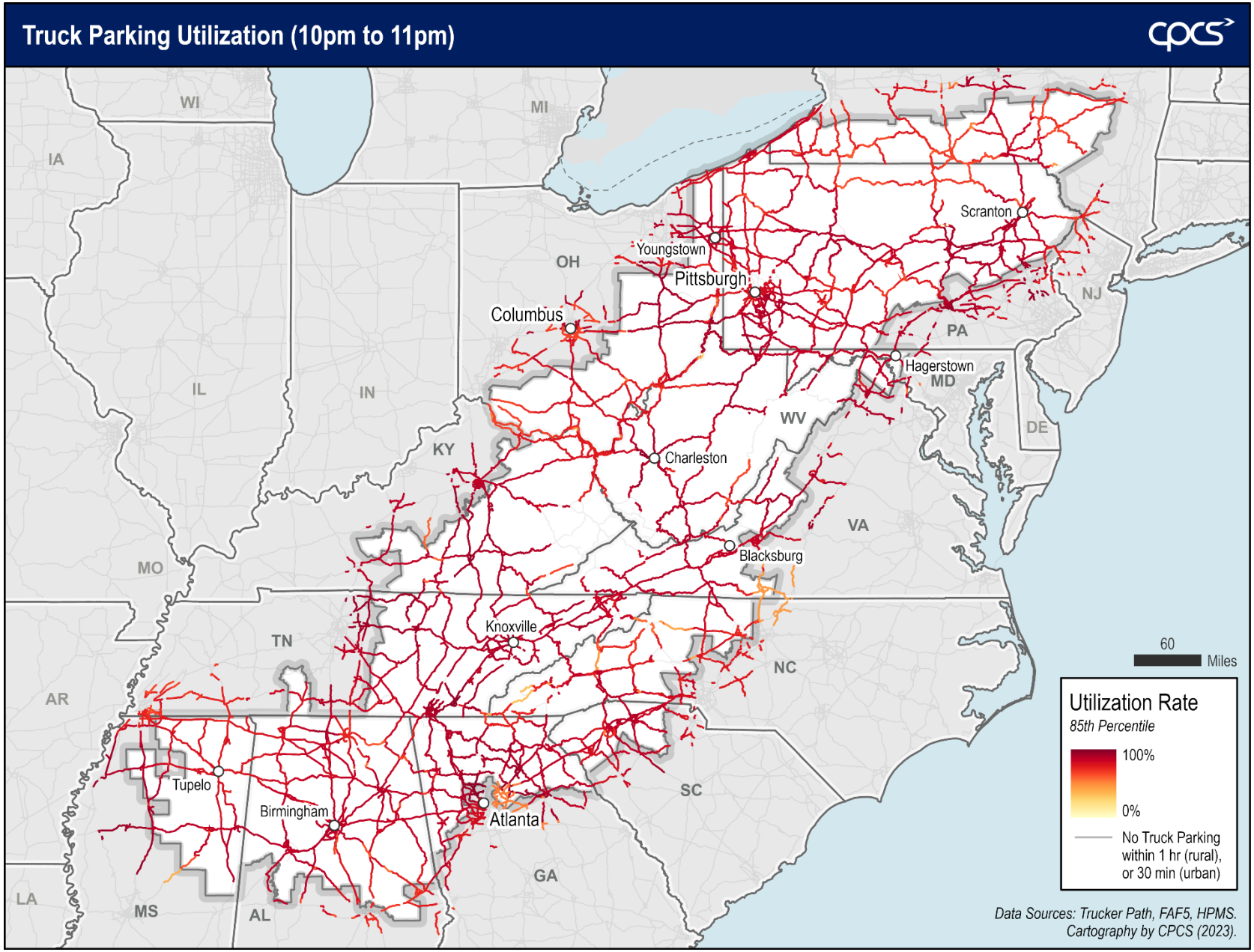
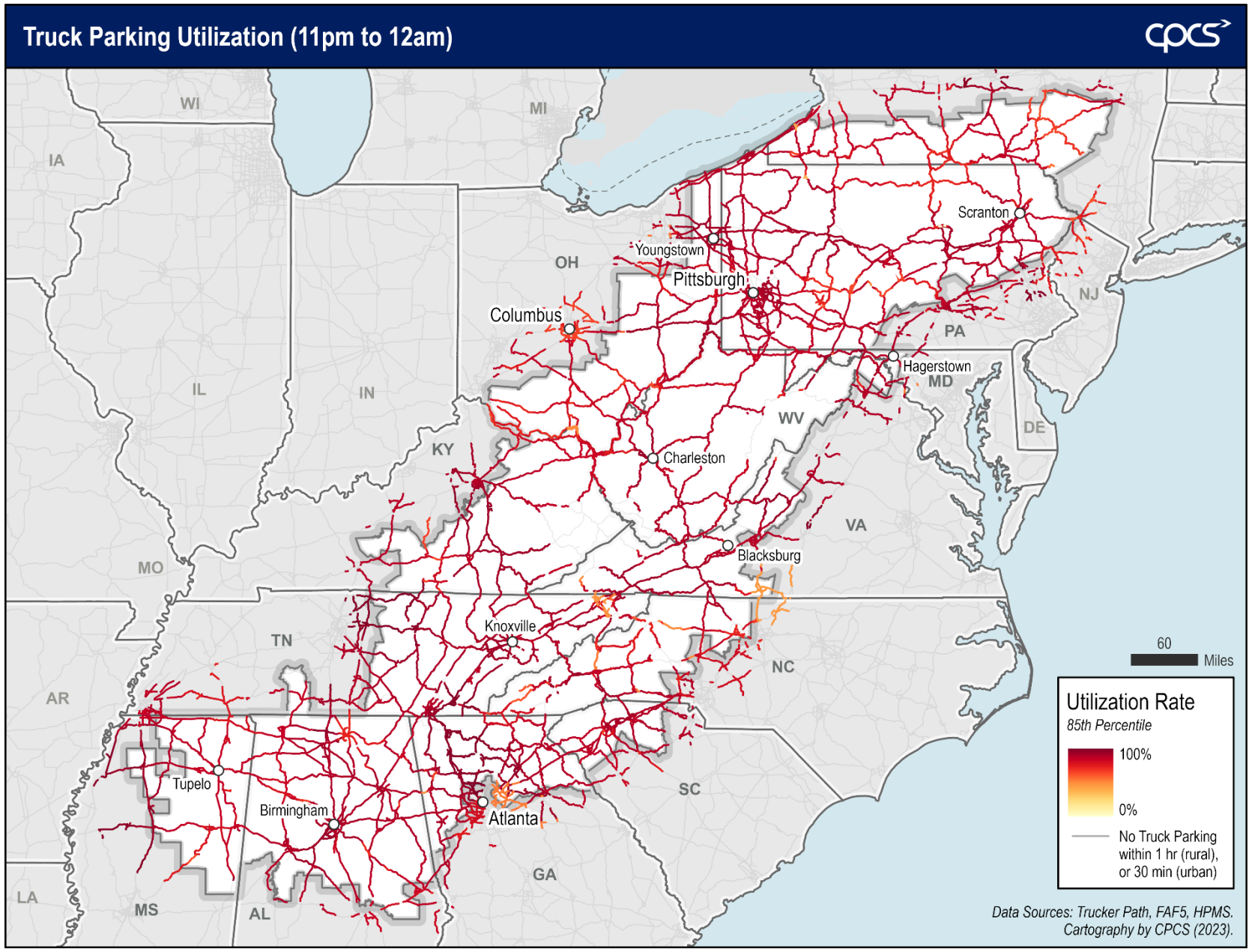


Figure B- 24: Truck Parking Utilization (11 PM – 12 AM)



Appendix C FHWA Truck Parking Demand Forecast Model Overview

FHWA Truck Parking Demand Forecast

Truck parking forecasting methods are not as advanced as the analytics used to identify current truck parking demand. Still, depending on the quality of data and tools available, forecasting truck parking demand can provide some insight into future conditions by anticipating changes in demand. The FHWA Truck Parking Demand Forecast Model (hereinafter referred to as "the Model") was explored for consideration in the Region.

The following analysis begins with an overview of the Model and details the considerations and reasoning behind the initial selection of and ultimate decision against using the Model. Subsequently, the section shifts to offer a qualitative discussion on future truck parking demand in the Appalachian Region. This discussion aims to provide guidance for ARC in proactively planning for the Region's future truck parking needs. This analysis also explains why the application process and inherent limitations of the Model ultimately led to the decision against its usage for this study. Finally, a discussion of some of the future truck parking demand factors that may impact the region, including freight facilities, intermodal hubs, and through traffic is included.

Overview of the FHWA Truck Parking Demand Forecast Model

The Model, originally developed in 2002, estimates segment-based truck parking demand by incorporating traffic engineering, truck driver behaviors, and Federal HOS regulations. About half of the parameters were derived from a survey of over 2,000 drivers conducted across the US in May 2000. The forecast model requires four key data inputs included in the FHWA's Highway Performance Monitoring System (HPMS):

- Length of highway segment
- Annual average daily traffic (AADT)
- Percent of daily traffic consisting of commercial trucks
- Speed limit of highway or average truck speed

In addition to the four key data inputs, Figure 16 displays the list of parameters used in the formula and explains the source of each value.

Figure 16: FHWA Segment-Based Forecast Model – Parameters

	Model Variable	Default Value	Method Used to Determine the Value
1	Seasonal peaking factor	1.15	Domain knowledge
2	Short-term parking duration per hour traveled (min/hour)	5	Domain knowledge
3	Maximum hours driven per week	70	HOS Regulation
4	Average hours spent loading/unloading per week	15	Survey

5	Average hours spent at home per week	42	Survey
6	Average hours spent parking for rest at shipper/receiver per week	16	Survey
7	Proportion of demand for rest area spaces	0.23	Survey
8	Proportion of demand for truck stop spaces	0.77	Survey
9	Proportion of total trucks that are short-haul	0.36 or 0.07*	Field observation; model calibration
10	Proportion of total trucks that are long-haul	0.64 or 0.93*	
11	Peak-parking factor for short-haul trucks	0.02	Domain knowledge; field observation; model calibration
12	Peak-parking factor for long-haul trucks	0.09	

Source: Model Development for National Assessment of Commercial Vehicle Parking.

Note: Values depend on proximity of analysis segment to a metropolitan area: 0.36/0.64 for segments within 200 miles of a city of 200,000 or more, 0.07/0.93 otherwise.

Strengths and Shortcomings of the Model

This section outlines the strengths of the Model while delving into the shortcomings and data challenges that led to the decision against using the Model for truck parking demand forecast in the Appalachian Region.

Strengths of the Model

The strengths that initially led to the consideration of this Model as the guiding framework for truck parking demand forecasting in the Region include:

Reliable Source: The Model, funded by FHWA, is one of the first forecast frameworks designed specifically for truck parking demand predictions. Documentation about the Model is comprehensive, providing the process of key parameter collection and a list of major assumptions. These details help us understand the model methodology. Additionally, the step-by-step model instructions enable ARC to replicate the forecast in the future, if needed.

Publicly Accessible Input Dataset: All required data inputs are part of HPMS, a dataset maintained by FHWA and available to the public. The dataset is updated annually by FHWA using the highway extent, condition, performance, and use and operating characteristics reported by each state department of transportation. Despite a two-year lag in dataset publication, HPMS remains one of the most comprehensive highway datasets available, providing valuable information for public use.

Shortcomings of the Model

Despite its strengths, the Model has drawbacks that prompted exploring alternative approaches for discussing future truck parking demand. The weaknesses include:

Dated Model: Developed over two decades ago, the Model's parameters were collected through surveys at truck parking stops in 2000. Given the evolving goods movement patterns, especially

impacted by the recent pandemic, re-examining and updating these parameters with newer information from the trucking industry is essential to the accuracy of the model outputs.

Limited Consideration of Freight-Generators: The Model relies solely on truck volume input for a given segment, overlooking important factors such as freight-generating facilities' characteristics. This limitation may result in higher error rates on segments close to warehouses, distribution centers, and other freight-generating facilities, hindering accurate predictions of truck parking demand.

Assumed Fixed Traffic Patterns: While the future AADT in HPMS is frequently used in transportation planning and engineering, it doesn't factor in changes induced by new roadways. The underlying assumption of fixed traffic patterns by the Model does not reflect the future after the ADHS completion, impacting its accuracy in predicting the truck parking demand in the Region.

Challenges with the Input Dataset

Acknowledging the strengths and shortcomings of the Model, applying the forecasting framework with the intention of examining the applicability of the Model thoroughly and generating any lessons learned for similar exercises in the future was attempted. However, during the forecast analysis, missing data and data quality issues in the HPMS dataset was discovered, which were fundamental to running the Model:

- **Missing Base-Year Data**: Key attributes including AADT (0.03% segments missing), truck AADT (0.6% of segments missing), and speed limits have different levels of missing data, with the speed limits having a substantial percentage of missing segments (35.5 percent of segments missing). Although the percentages of the missing AADT and truck AADT are minimal, the missing speed limits alone will still inevitably lead to inaccurate model results and missing predictions on corresponding segments.
- **Truck AADT Share Anomaly:** Some major roadways in GA, like US Highway 278 near the Alabama-Georgia border, showed a truck AADT share exceeding 100 percent.
- **Missing Future AADT**: Future AADT data was missing on 50.0% of segments.

To address these data issues, the missing values were interpolated using various methodologies, including replacing empty values with neighboring or similar segments' or referring to statistically sound data from the 2018 HMPS dataset.[2] However, due to the large number of segments with problematic or missing values, there is low confidence that the forecast results based on so many assumptions can provide insightful information on truck parking future demand in the Region. Instead, the next section introduces a few key factors that can qualitatively impact the future demand for truck parking in the Region and can offer ARC questions to guide the estimation of future demand.

Appendix D Undesignated Truck Parking Clusters in the Appalachian Region

Figure D- 1 demonstrates the detailed characteristics of large and small undesignated truck parking clusters, respectively.

Figure D- 1: Undesignated Truck Parking Clusters Summary – Large Clusters

Cluster ID	Type and Description	Total count	Total duration (hours)	Median stop duration (hours)	Average stop duration (hours)	% stops < 3 hours	% stops 3-7 hours	% stops 7+ hours	Peak Undesignated Stop Hour	On ADHS?
AL-01	*On/Off Ramp* I-65, AL • On/off ramps at Exits 322, 325, 328, 334	884	3,975	2	4	57	11	32	4 AM	No
AL-02	*On/Off Ramp, Rest Area* I-22, MS-AL • 27 on/off ramps between MS-AL Border and I-22 & I-65 Junction • MS Welcome Center (WB)	7290	30,720	2	4	62	8	30	9 PM	Yes, Completely
AL-03	*Rest Area, On/Off Ramp* I-59, AL • St. Clair County Rest Areas (NB/SB) • On/off ramps at Exits 174, 156, 154	762	2,547	1	3	72	6	22	3 AM	No
AL-04	*On/Off Ramp, Rest Area, Last Mile* I-20, AL • Tuscaloosa County Rest Areas (WB/EB)	1723	7,500	2	4	59	11	31	11 PM	Yes, Partially

	• On/off ramps at Exits 86, 89, 97, 100, 104 • Near last-mile facilities at Mercedes Benz Campus in Vance, AL, and off of McAshan Dr in McCalla, AL									
AL-05	*On/Off Ramp, Rest Area* I-85, AL • On/off ramps at Exits 42, 38, 32, 26, 22 • Macon County Rest Areas (NB/SB)	1731	8,409	2	5	55	8	37	11 PM	No
GA-01	*On/Off Ramp, Last Mile* I-85, GA • On/off ramps at Exits 137, 140, 147, 154 • Near last-mile facilities in Pendergrass, GA off of US-129 and GA-82	1685	7,428	2	4	60	10	30	11 PM	No
GA-02	*On/Off Ramp, Last Mile, Truck Stop* I-75, GA • On/off ramps at Exits 296, 293, 290, 288, 285, 283 • Near last mile facilities in Cartersville, GA	2027	9,671	2	5	53	13	34	7 PM	No
GA-03	*On/Off Ramp, Rest Area* I-20, AL-GA • On/off ramps at Exits 205, and 210 in AL; Exits 5, 9, and 11 in GA	1953	8,309	2	4	61	8	31	9 PM	No

	• Georgia Visitor Information Center (EB) • Cleburne Welcome Center (WB)									
MS-01	*On/Off Ramp, Last Mile* I-22, MS • On/off ramps at Exits 18, 21, 26, 30, 37, 41, 48, 55, 60, 64 • Last-mile roads off of MS-7 in Holly Springs, MS • Near last mile facilities on MS-30	3064	13,282	2	4	60	8	31	9 PM	No
NC-01	*On/Off Ramp, Rest Area, Corridor Shoulder* I-40, NC • On/off ramps at Exits 24, 20, 15, 7 • North Carolina Welcome Center (EB) • Haywood Rest Area (SB) • Corridor shoulder parking before Exit 7 (SB)	1622	8,866	3	5	50	6	44	8 PM	No
PA-01	*On/Off Ramp, Rest Area* I-81, PA • On/off ramps at Exits 112, 116, 119, 124, 134 • Last mile roads near facilities south of I-81 in Pottsville, PA	2228	8,243	1	4	64	13	23	11 PM	No

	• Weigh Stations (NB/SB) in Barnesville, PA									
SC-01	*On/Off Ramp, Rest Area, Last Mile* I-85, SC • On/off ramps at Exits 14, 19, 21, 27, 35 • Anderson Rest Areas (NB/SB) • Near last mile facilities in Anderson, SC off of SC-81	1887	8,331	2	4	61	8	31	9 PM	No
TN-01	*On/Off Ramp, Rest Area, Truck Stop* I-75, TN • 10 on/off ramps between Exits 76 and 33 • Athens Rest Areas (NB/SB)	2967	15,479	3	5	50	8	48	9 PM	No
TN-02	*Rest Area, On/Off Ramp* I-24, TN • Grundy County Rest Area (WB/EB) • On/off ramps at Exits 117, 127, 134, 135, 143 • Truck Inspection Site (EB) in Monteagle, TN • Weigh Station (EB) in Manchester, TN	2218	10,881	2	5	54	9	37	10 PM	No

	• Truck Parking Area (EB) in Hillsboro, TN									
VA-01	*Rest Area, On/Off Ramp* I-81, VA • Radford Rest Areas (NB/SB) • Ironto Rest Area (NB) • On/off ramps at Exits 109, I-81 & US-460 Junction, 128	3297	12,727	1	4	65	7	27	9 PM	Yes, Partially

Figure D- 235: Undesignated Truck Parking Clusters Summary – Small Clusters

Cluster ID	Type and Description	Total count	Total duration (hours)	Median stop duration (hours)	Average stop duration (hours)	% stops < 3 hours	% stops 3-7 hours	% stops 7+ hours	HOD most undesignated stops	On ADHS?
AL-06	*On/Off Ramp, Rest Area* I-65, AL • On/Off Ramps at Exits 365, 361 • Alabama Welcome Center (SB)	727	3,452	2	5	55	8	37	11 PM	No
AL-07	*On/Off Ramp, Rest Area* I-59, GA-AL • On/off ramps at Exit 239 (AL), Exit 4 (GA) • Alabama Welcome Center (WB)	544	2,580	2	5	55	9	36	5 AM	No
AL-08	*Rest Area, On/Off Ramp* I-65, AL	1,307	6,470	2	5	56	8	36	9 PM	No

	• Chilton County Rest Areas (NB/SB) • On/off ramps at Exits 212, 208, 205, 200 • Last mile in Clanton, AL									
GA-04	*Rest Area, On/Off Ramp, Last Mile/Truck Stop* I-75, GA • Adairsville Travel Plaza (NB) • On/off ramps at Exits 310, 306 • Parking along last mile roads in Calhoun, GA, and in Adairsville, GA	2,230	14,370	8	6	41	8	51	7 PM	No
KY-01	*Truck Stop, On/Off Ramp* I-75, KY • Truck stops in Lexington, KY and Richmond, KY • On/off ramps at Exits 95, 97, 99	895	6,158	9	7	36	8	56	9 PM	No
KY-02	*Rest Area, On/Off Ramp, Truck Stop* I-65, KY • On/off ramps at Exits 58, 65	2,112	12,556	6	6	44	8	48	8 PM	No
KY-03	*Rest Area, On/Off Ramp* I-75, KY • London Weigh Stations (NB/SB) • On/off ramp at Exit 29	876	4,781	4	5	49	5	46	9 PM	No
KY-04	*Rest Area, On/Off Ramp* I-75, KY-TN • KY Welcome Center (NB) • TN Welcome Center (SB) • On/off ramps at Exits 160, 156	2,097	10,787	2	5	54	6	40	8 PM	No
MS-02	*Truck Stop, On/Off Ramp*	384	2,392	5	6	46	7	47	8 PM	No

	US-82, MS • Parking in Winona, MS • On/off ramps at US-82 & I-55 Junction									
MS-03	*Last Mile* MS-182, MS • Last mile parking in Columbus, MS	758	879	1	1	99	1	0	5 AM	No
NC-02	Rest Area, On/Off Ramp I-77, NC-VA • North Carolina Welcome Center (SB) • Lambsburg Rest Area (NB) • On/off ramps at Exit 1 (VA) and Exit 100 (NC) • Weigh Stations (NB/SB) in Mt Airy	1,806	10,417	4	6	46	6	47	8 PM	No
NC-03	*Rest Area, On/Off Ramp, Corridor Shoulder, Last Mile* I-26 NC-SC • South Carolina Welcome Center (SB) • North Carolina Welcome Center (NB) • On/off ramps at Exits 1 (SC), 163 (NC) • Corridor Shoulder (EB) on US-74 after I-26 Junction • Last mile roads at Exit 163 off of NC-108	1,032	5,449	2	5	52	7	41	7 PM	No
OH-01	*Rest Area* I-76, OH • Mahoning Valley Service Plaza (WB) • Glacier Hills Service Plaza (EB)	733	1,740	1	2	83	2	14	8 PM	No
OH-02	*Rest Area, On/Off Ramp* I-70, OH	1,554	9,759	8	6	43	5	52	8 PM	No

	• Belmont Rest Areas (WB/EB) • On/off ramp at Exit 208									
OH-03	*Rest Area, On/Off Ramp* I-70, OH • I-70 Rest Area (WB) • On/off ramps at Exits 164, 160, 157	1,758	9,986	3	6	50	5	44	8 PM	No
OH-04	*Rest Area* I-77, OH • Senecaville Rest Areas (NB/SB)	846	4,802	3	6	50	3	47	8 PM	No
OH-05	*Rest Area* US-35, OH • I-35 Rest Areas (WB/EB) • On/off ramps at Exits 165, 160	2,217	13,941	8	6	43	5	52	8 PM	No
PA-02	*Rest Area, Last Mile* I-81, PA • Greenfield Rest Area (NB) • Nicholson Rest Area (SB) • Last-mile parking on PA-92 in Kingsley, PA, and Clifford, PA	888	3,389	1	4	68	7	25	9 PM	No
PA-03	*Rest Area, On/Off Ramp* I-84, PA • Greentown Rest Areas (WB/EB) • On/off ramps at Exits 26, 30, 34	1,465	6,206	1	4	64	5	31	4 AM	No
PA-04	*Rest Area* I-80, PA • East Pennsylvania Welcome Center (EB)	611	2,264	1	4	68	7	25	8 PM	No
PA-05	*Rest Area, On/Off Ramp* I-80, PA	1,269	5,874	2	5	58	8	35	10 PM	No

	• Harrisville Rest Areas (WB/EB) • On/off ramps at Exit 29, 35, 42									
PA-06	*Rest Area, On/Off Ramp* I-80, PA • Brookville Rest Areas (WB/EB) • On/off ramps at Exits 86, 90	1,414	6,926	2	5	56	7	37	9 PM	No
PA-07	*Rest Area, On/Off Ramp* I-81, PA • Mountain Top Rest Areas (NB/SB) • On/off ramps at Exits 159, 155	1,070	5,297	2	5	55	7	38	8 PM	No
PA-08	*Rest Area, On/off Ramp* I-80, PA • Loganton Rest Areas (WB/EB) • On/off ramps at Exits 192, 199	1,129	4,838	1	4	63	6	31	4 AM	No
PA-09	*Rest Area, On/Off Ramp* I-80, PA • Snow Shoe Rest Areas (NB/SB) • On/off ramp at Exit 147	1,331	5,931	1	4	60	7	33	9 PM	No
PA-10	*Rest Area* I-80, PA • White Haven Rest Area (EB)	620	3,340	2	5	54	5	41	7 PM	No
PA-11	*Rest Area, On/Off Ramp* I-80, PA • Columbia County Rest Areas (WB/EB) • On/off ramp at Exit 242	1,062	5,676	3	5	52	7	41	9 PM	No
PA-12	*Rest Area* I-80, PA	805	3,570	1	4	61	6	33	9 PM	No

	• Danville Rest Areas (WB/EB)									
PA-13	*Rest Area, Last Mile, On/Off Ramp* I-99, PA • Last Mile Roads off of US-220 BUS • On/off ramps at Exits 1, 3	882	4,591	2	5	53	10	37	10 PM	Yes
PA-14	*Rest Area, On/Off Ramp, Truck Stop* I-79, PA-WV • Pennsylvania Welcome Center (NB) • West Virginia Welcome Center (SB) • On/Off Ramps at Exits 1, 7 (PA) • Parking on roads near Mt Morris Truck Stop at Exit 1	783	4,589	7	6	47	.	50	8 PM	No
PA-15	*Rest Area* I-70, PA • Pennsylvania Welcome Center (NB)	665	4,041	6	6	44	7	49	8 PM	No
SC-02	*On/Off Ramp, Rest Area* I-85, NC-SC • On/off ramps at Exits 2, 5, 8 • South Carolina Welcome Center – Blacksburg (SB) • North Carolina Welcome Center (NB) • Last-mile roads in Grover, NC	1,298	5,303	1	4	64	6	30	8 PM	No
SC-03	*On/Off Ramp, Rest Area* I-85 SC-GA • Georgia Welcome Center (SB) • South Carolina Welcome Center (NB) • On/off ramps at Exits 177 (GA), 1, 2, 4 (SC)	1,097	4,716	1	4	63	5	32	11 PM	No

TN-03	*On/Off Ramp, Rest Area* I-81, TN • Greene County Rest Areas (NB/SB) • On/off ramps at Exits 30, 36, 44	1,929	9,353	2	5	55	7	38	10 PM	No
TN-04	*On/Off Ramp, Rest Area, Truck Stop* I-40/I-81, TN • On/off ramps at Exits 4 (I-81); Exits 415, 412 (I-40) • White Pine Rest Area (SB) • Jefferson County Rest Area (NB)	2,002	9,738	2	5	54	8	38	11 PM	No
TN-05	*Rest Area, On/Off Ramp* I-40, TN • Gordonsville Parking Area (EB) • Tennessee Welcome Center (WB) • On/off ramps at Exits 254, 258, 268	1,596	7,859	2	5	55	7	38	10 PM	No
TN-06	*Rest Area, On/Off Ramp* I-40, TN • Jefferson County Rest Area (WB) • On/off ramp at Exit 424	405	2,583	8	6	40	8	53	9 PM	No
TN-07	*Rest Area* I-40, TN • Cumberland County Rest Areas (WB/EB) • On/off Ramps at Exits 329, 322, 320	1,250	5,550	2	4	58	8	33	8 PM	No
TN-08	*On/Off Ramp, Rest Area* I-40, TN • On/off ramps at Exit 440, 447 • Tennessee Welcome Center (WB)	552	2,400	2	4	59	7	34	10 PM	No
VA-02	*On/Off Ramp, Rest Area*	1,136	3,920	1	3	68	9	23	9 PM	No

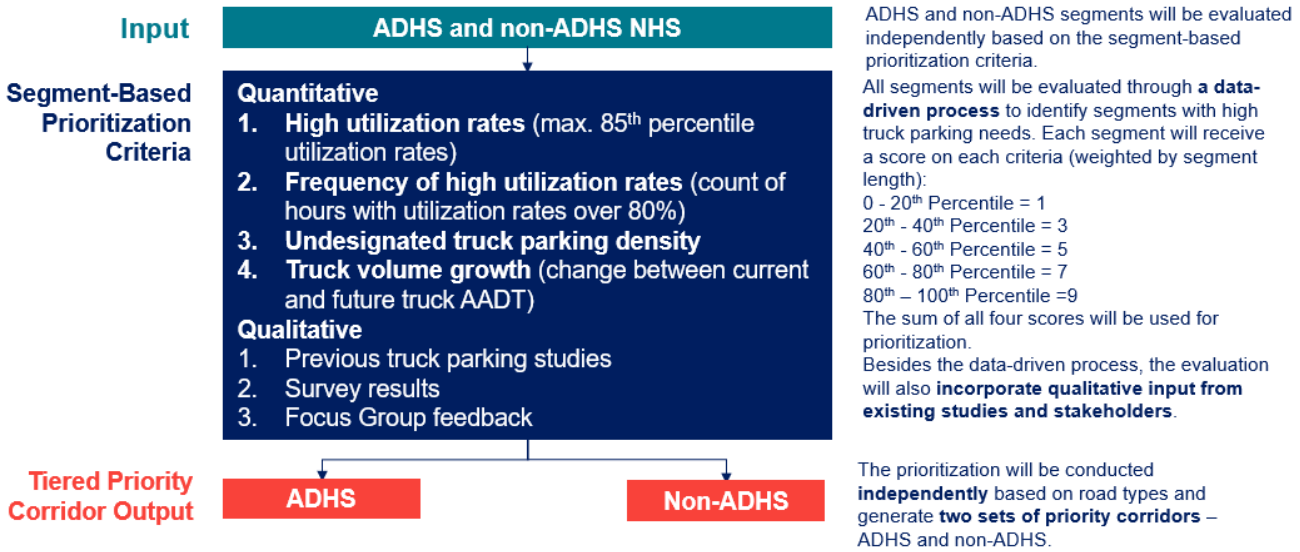
	I-81/I-64, VA • On/Off ramps at Exits 195, 200, 205 • Fairfield Rest Area (SB)									
VA-04	*Corridor Shoulder, On/Off Ramp* I-81, VA • Corridor shoulder parking WB/EB near MM 184 • On/off ramps at Exits 175, 180	737	1,841	1	2	77	9	13	3 AM	No
VA-05	*Rest Area, On/Off Ramp* I-81, VA • Troutville Rest Area (EB) • On/off ramp at Exit 156	568	2,165	1	4	65	10	25	8 PM	No
VA-06	*Rest Area, On/off Ramp, Truck Stop* I-77, VA • Rocky Gap VA Welcome Center (SB) • Rocky Gap Rest Area (NB) • On/off ramps at Exits 62, 58	1,618	11,942	10	7	30	6	64	9 PM	No
VA-07	*On/Off Ramp* I-81, VA • On/off ramps at Exits 86, 84, 80, 77; I-81 & I-77 Junction	787	2,108	1	3	77	7	16	11 PM	No
VA-08	*Rest Area, On/Off Ramp, Corridor Shoulder* I-81, VA • Smyth Rest Area (WB) • On/Off Ramps at Exits 54, 60 • Corridor Shoulder (EB) near Crockett Car-only Rest Area	1,025	3,371	1	3	71	7	21	9 PM	No
WV-01	*Rest Area, Truck Stop, On/Off Ramp, Last Mile*	1,692	9,454	3	6	50	8	42	8 PM	No

	I-81, WV-VA • West Virginia Welcome Center (WB) • On/off ramps at Exit 323 (VA), Exit 8 (WV) • Along last mile roads in Martinsburg, WV									
WV-02	*On/Off Ramp* US-35, WV • On/Off Ramps at WV-869 Junction, MM 3, I-64 Junction	697	3,142	1	5	59	5	36	9 PM	No
WV-03	*Rest Area, On/Off Ramp, Corridor Shoulder* I-64, WV • On/off Ramps at Exits 74, 66, 60	3,868	17,097	1	4	62	5	34	8 PM	No
WV-04	*On/Off Ramp* I-64, WV • On/off ramp at Exit 133	470	1,735	2	4	64	12	24	12 AM	No
WV-05	*Rest Area, On/Off Ramp* I-77, WV • Camp Creek Rest Area (SB) • On/off ramps at Exits 20, 28	1,521	7,454	2	5	56	5	39	9 PM	No

Appendix E Priority Corridor Approach

Figure E- 1 illustrates the priority corridor evaluation approach. The approach incorporates both quantitative and qualitative input to ensure the final output reflects the truck parking needs from the data analysis and stakeholder feedback. ADHS and non-ADHS roadways were assessed separately due to their different nature in traffic patterns. With higher truck volume, non-ADHS roadways may be favored in the scoring process if being considered together with the ADHS.

Figure E- 136: Priority Corridor Evaluation Approach



Source: CPCS

Appendix F Priority Corridor Safety Hotspots

Figure F- 1 to Figure F- 10 illustrate the truck-parking-related crashes on the ten selected priority corridors.

Figure F- 1: Truck Parking Safety Hotspot: MD I-68/US-40

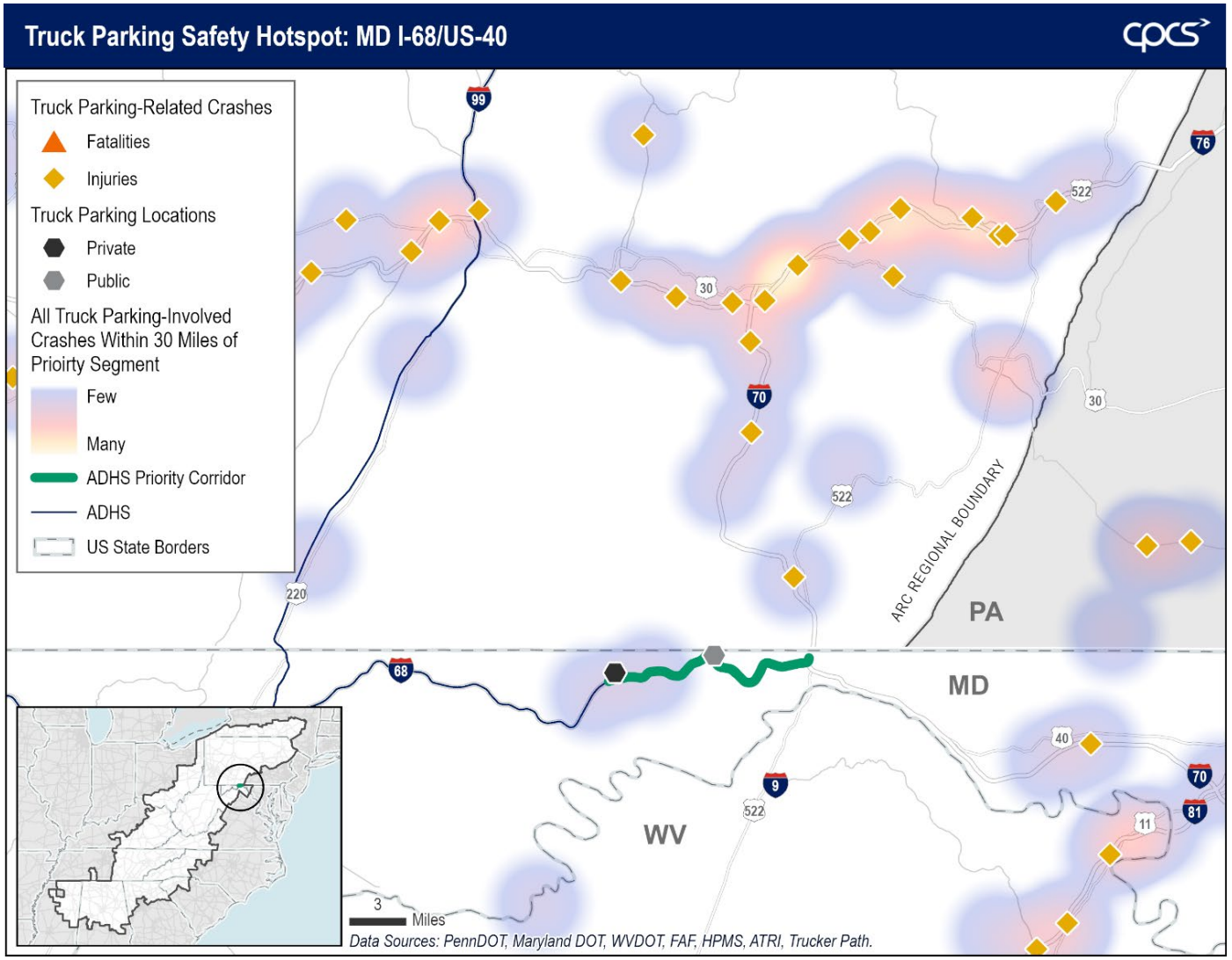


Figure F- 237: Truck Parking Safety Hotspot: WV US-48/WV-55/WV-259

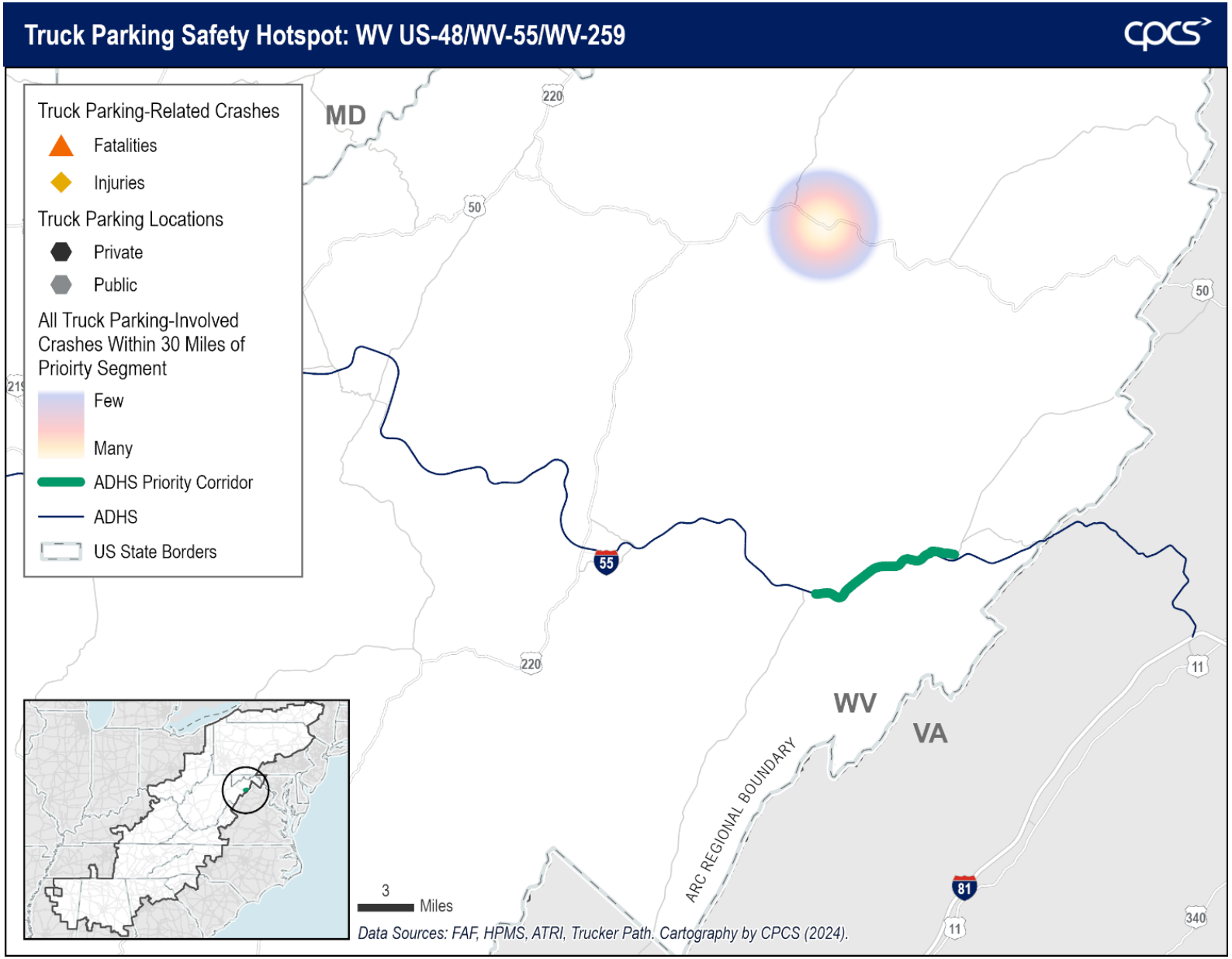


Figure F- 3: Truck Parking Safety Hotspot: NC US-23/US-54/US-64

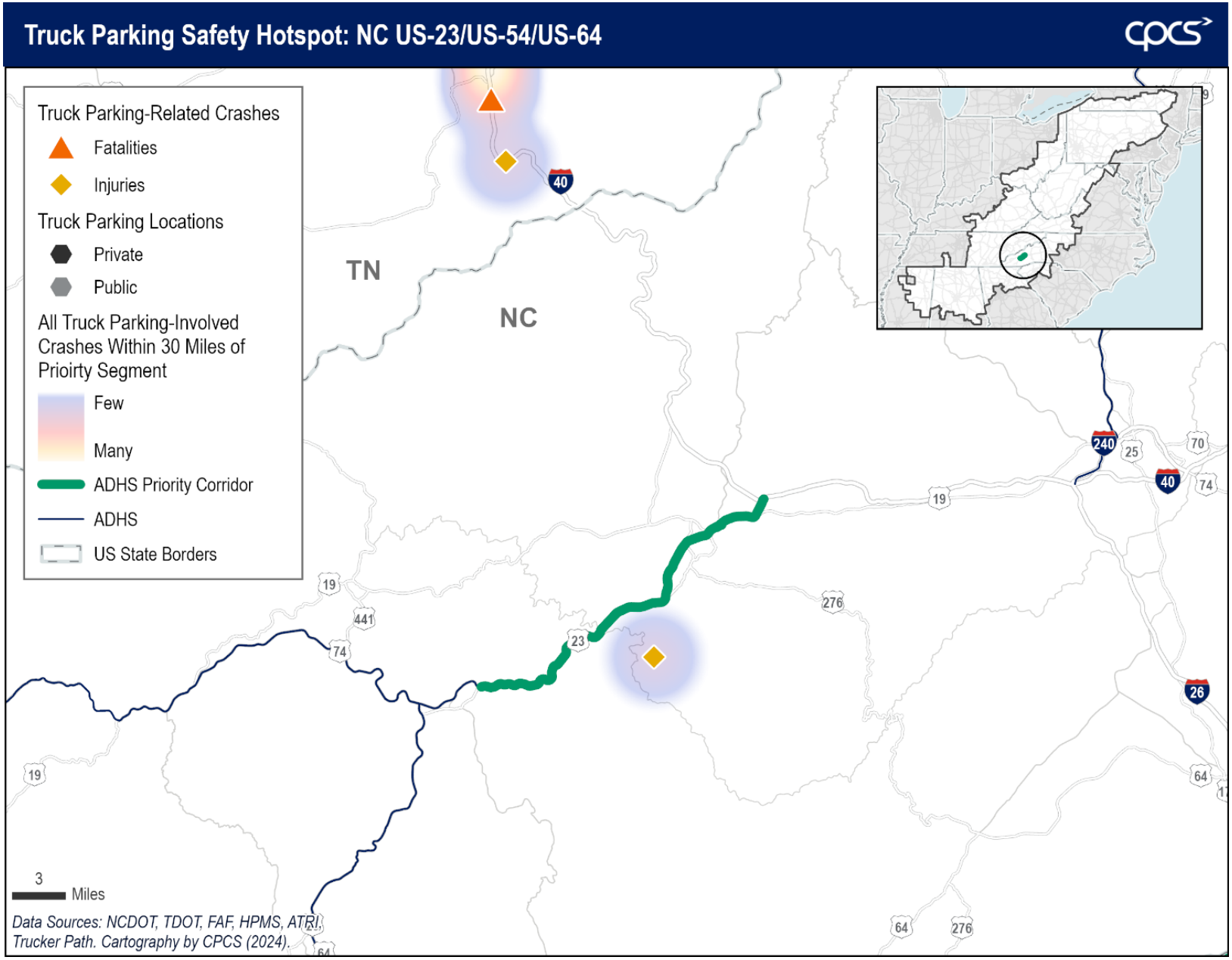


Figure F- 4: Truck Parking Safety Hotspot: SC-NC US-25

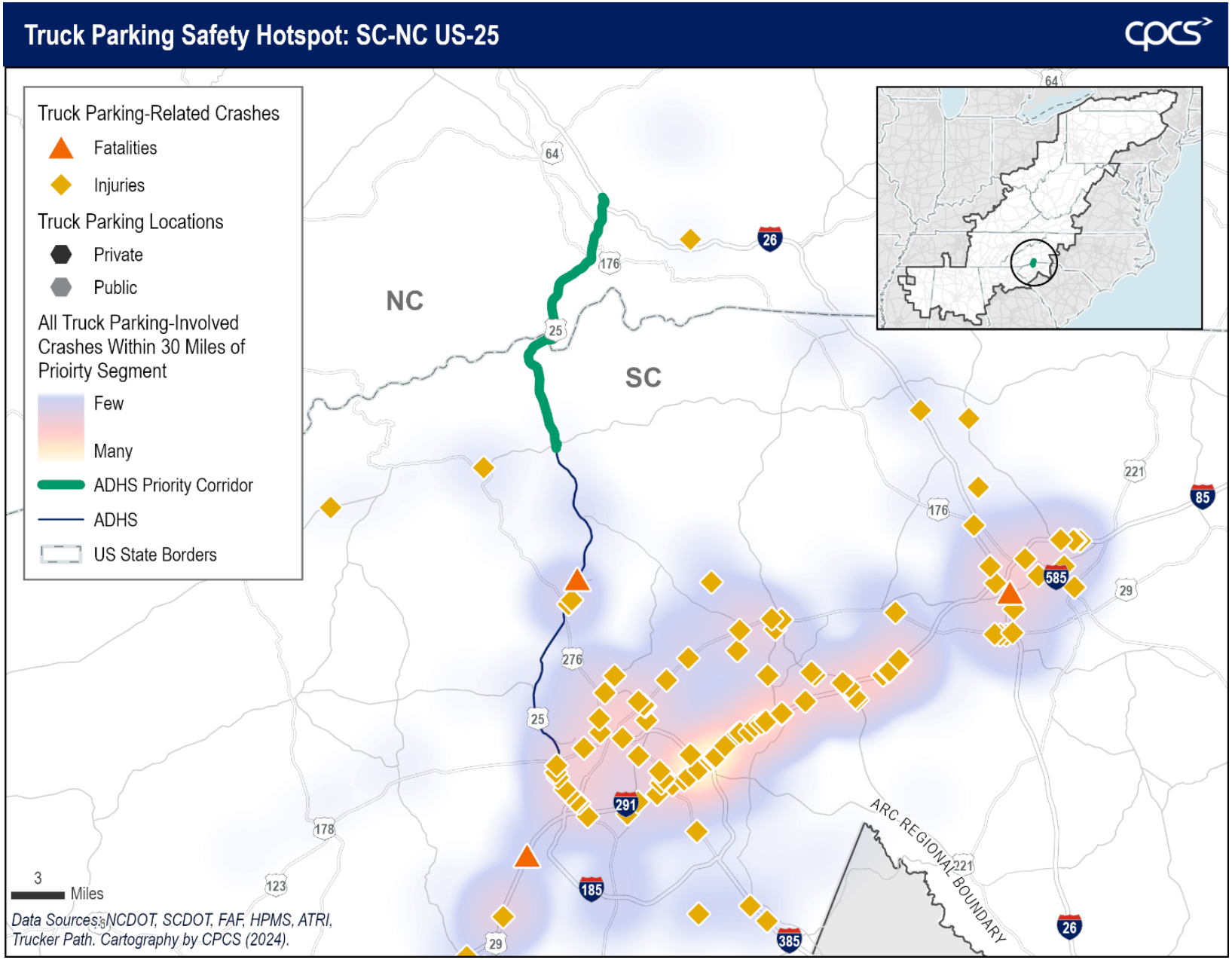


Figure F- 5: Truck Parking Safety Hotspot: GA I-575/GA-5

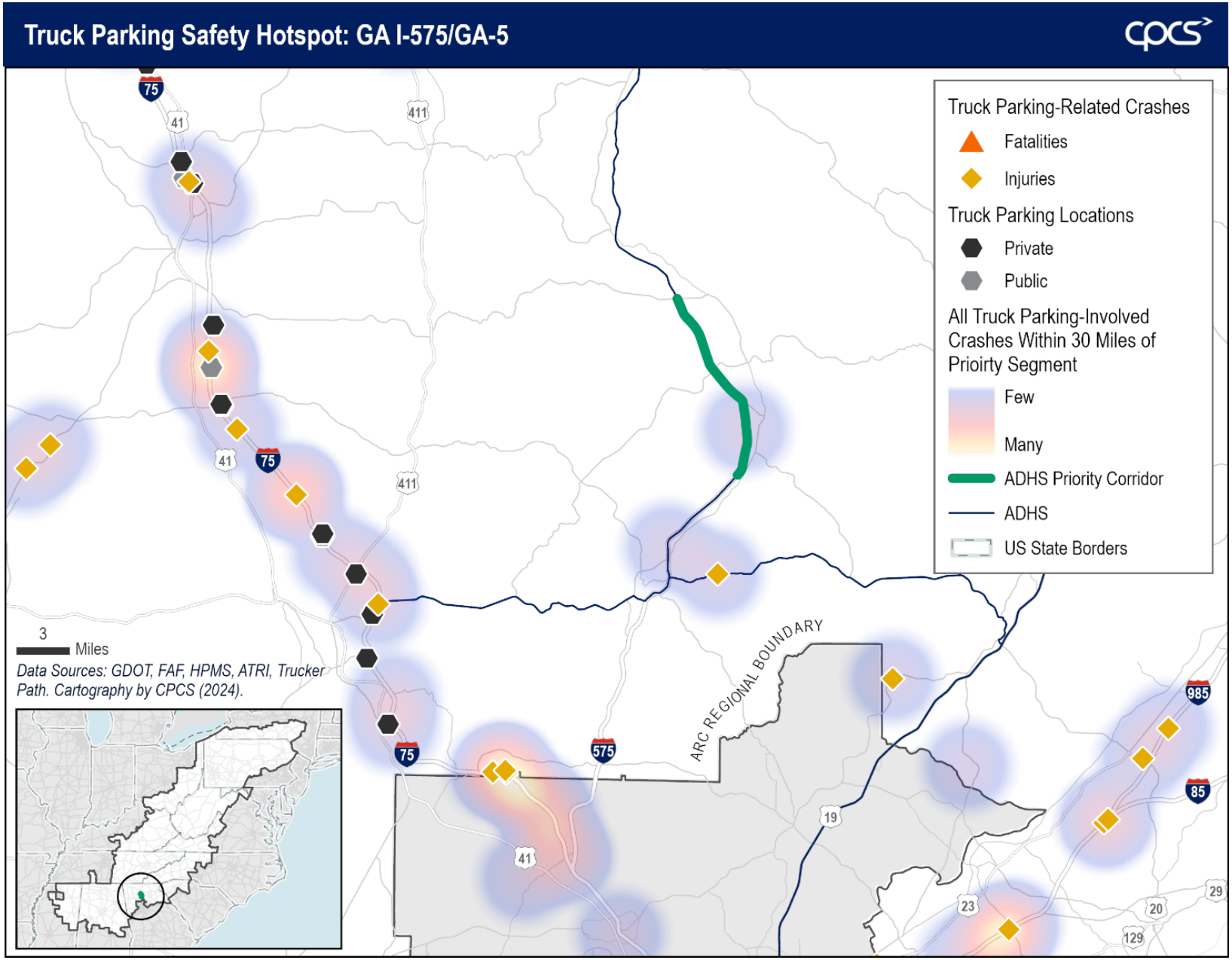


Figure F- 6: Truck Parking Safety Hotspot: PA-MD US-219

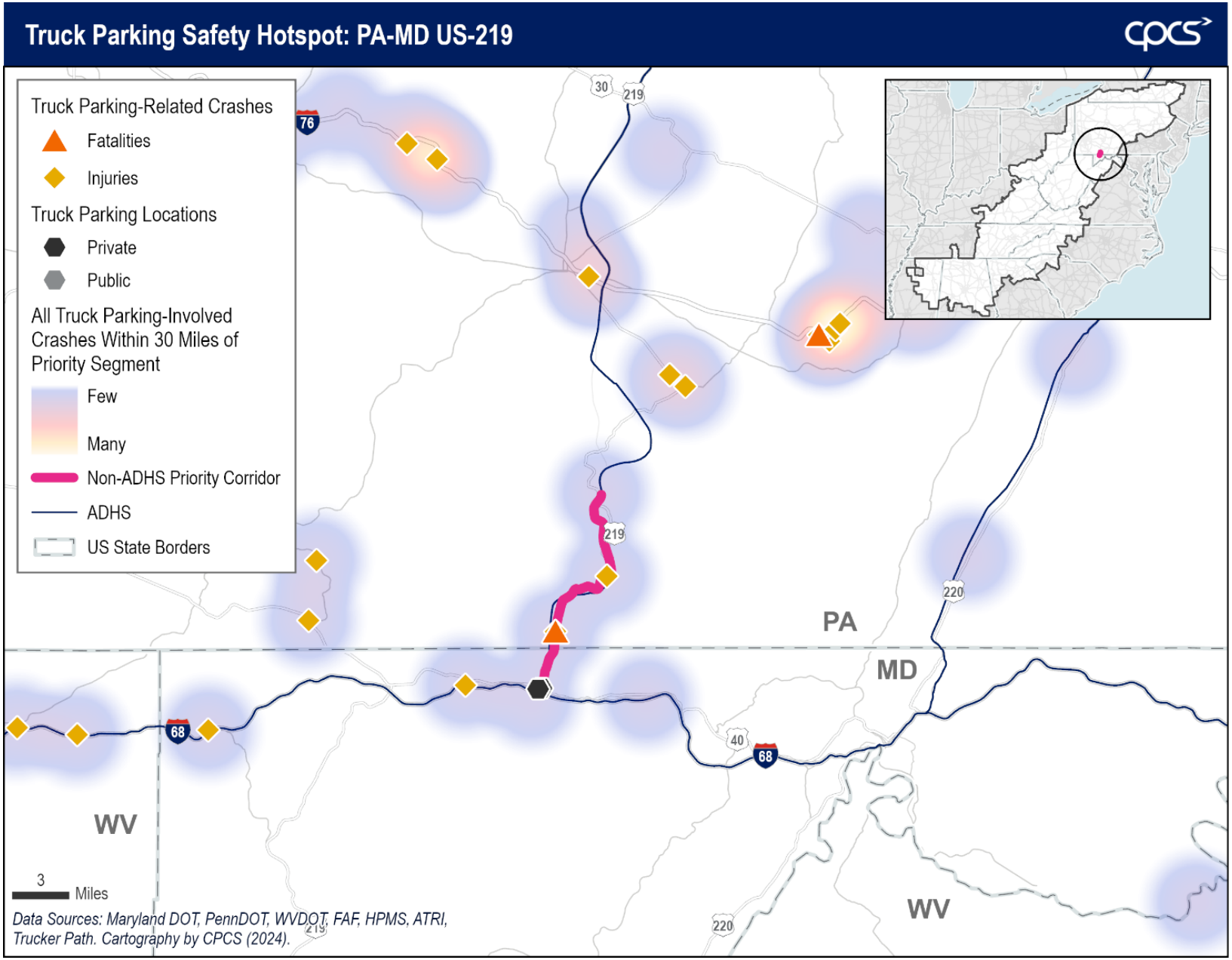


Figure F- 7: Truck Parking Safety Hotspot: VA I-81

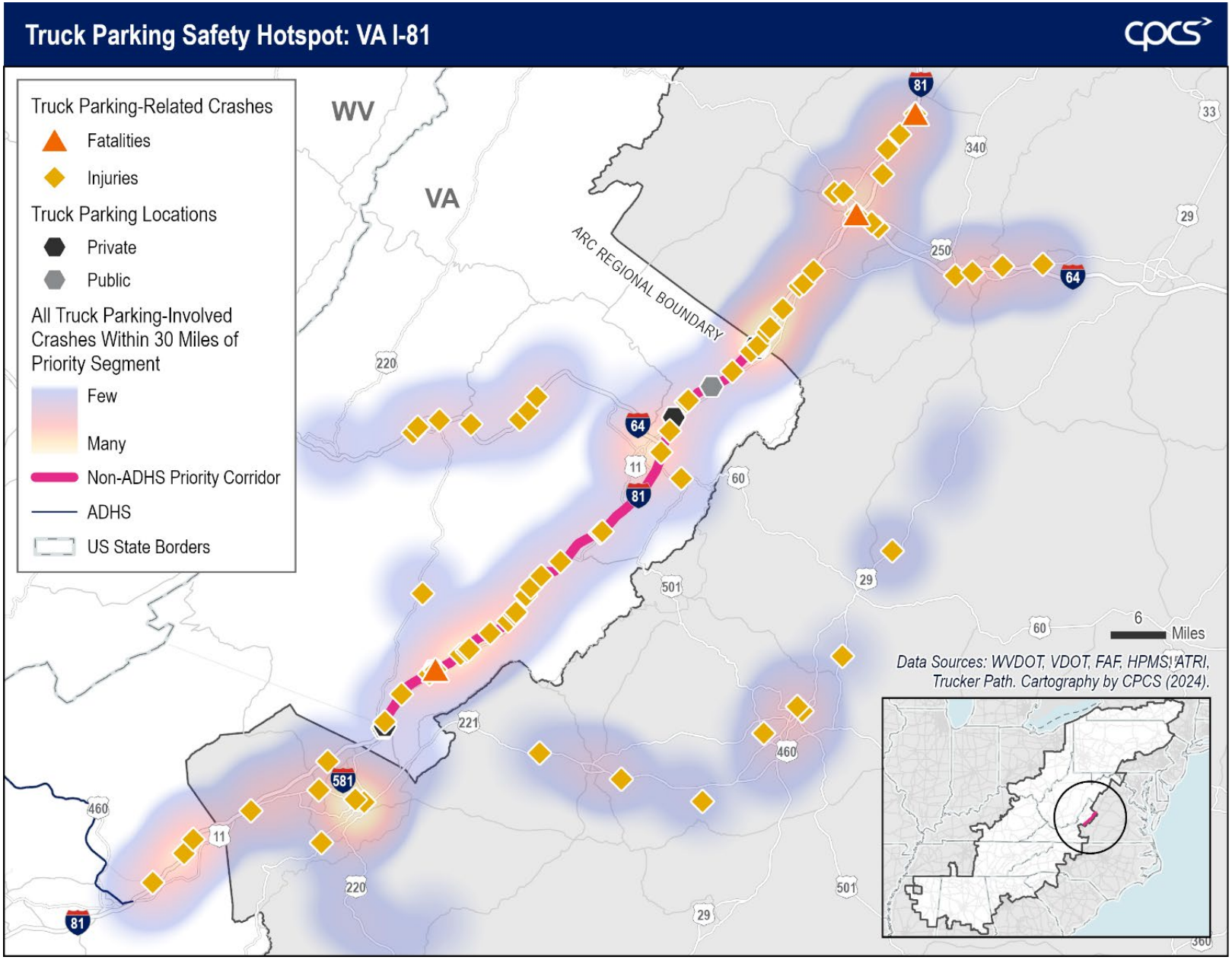


Figure F- 8: Truck Parking Safety Hotspot: KY I-75

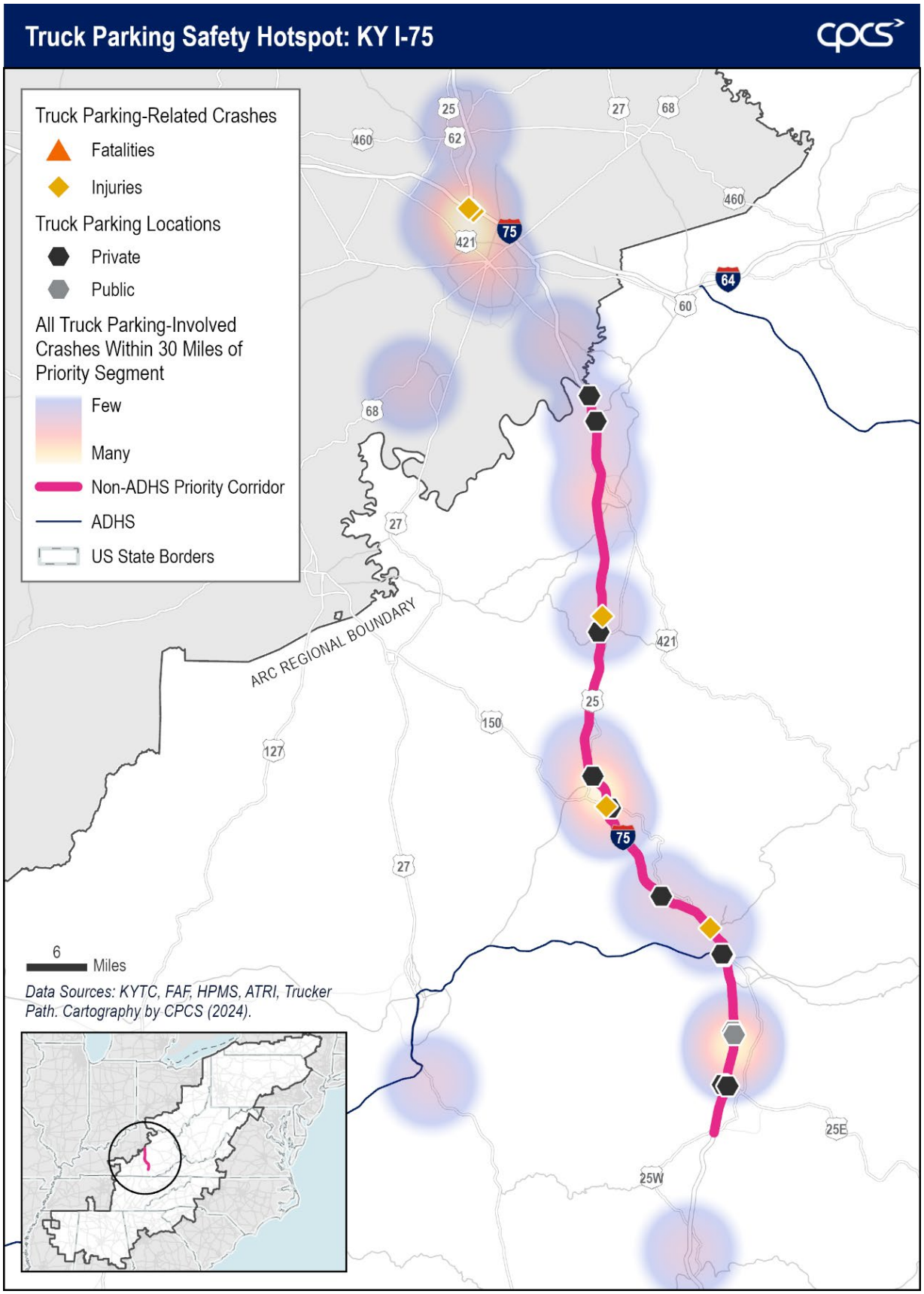


Figure F- 9: Truck Parking Safety Hotspot: TN I-40

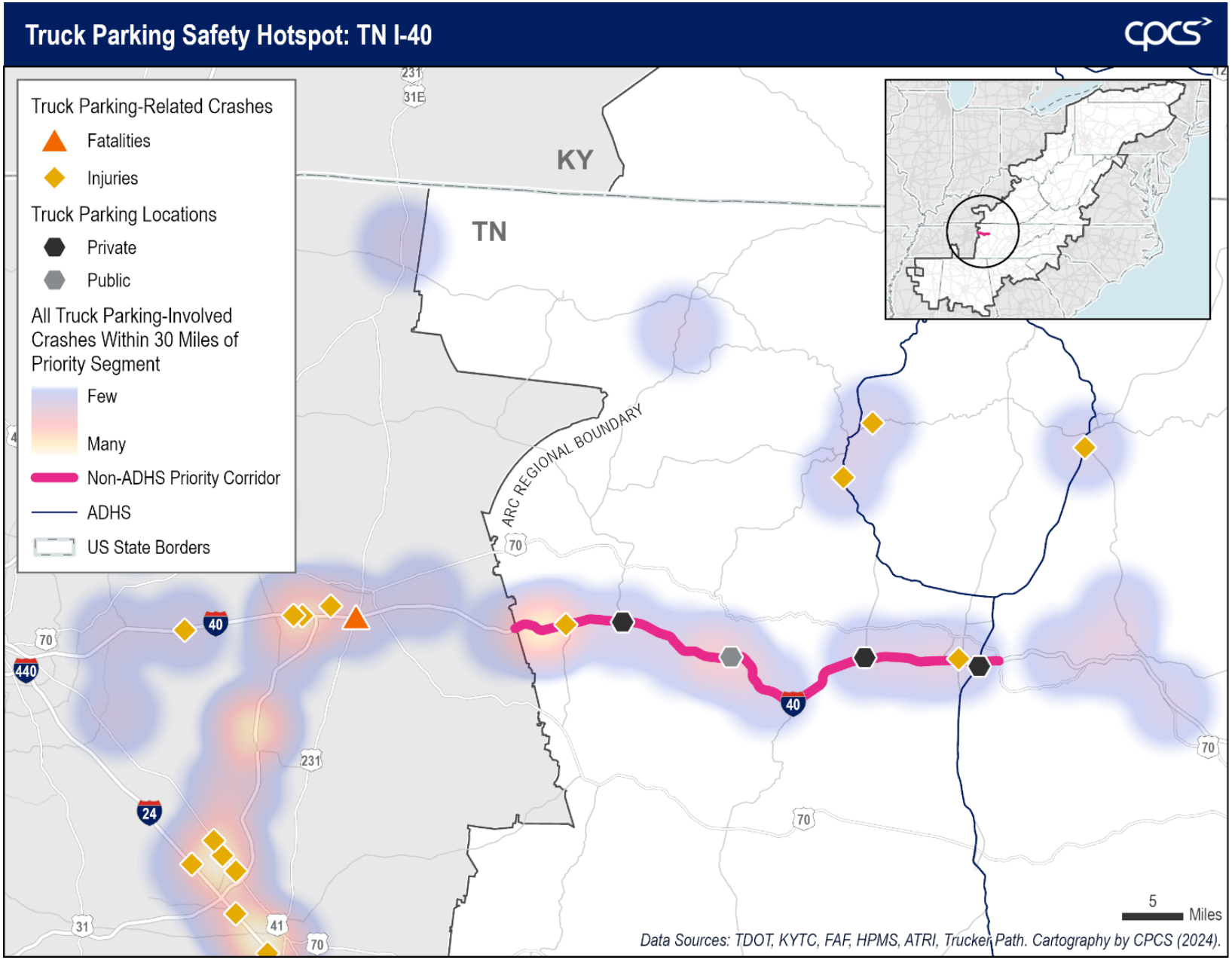


Figure F- 10: Truck Parking Safety Hotspot: GA I-75