Delaware Statewide Truck Parking Study

DRAFT Technical Memo 2: Strengths, Weaknesses, Opportunities, and Threats of Truck Parking

Prepared for:

WILMAPCO and DelDOT

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The objective of the Delaware Statewide Truck Parking Study is to address overnight parking hotspots as well as more localized, shorter-term truck parking and staging needs within the State of Delaware. An additional focus of this effort will include regular engagement with the local trucking community to help validate future strategies and recommendations.

Technical Memo

This Technical Memo is the second in a series of three that together inform the Study. This Technical Memo presents Delaware's truck parking inventory, analyzes truck parking demand, and identifies locations of undesignated truck parking to understand truck parking trends and identify strengths, weaknesses, opportunities, and threats for truck parking in the state.

Acknowledgements

The CPCS Team acknowledges and is thankful for the input of those consulted in the development of this Technical Memo, as well as the guidance and input of representatives from WILMAPCO, DelDOT and their study partners.

Opinions

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

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Acronyms / Abbreviations

AADT	Annual average daily traffic
ATRI	American Transportation Research Institute
CMV	Commercial Motor Vehicle
DelDOT	Delaware Department of Transportation
DOT	Department of Transportation
FHWA	U.S. Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
GPS	Global positioning system
HOS	Hours of service
MCMIS	Motor Carrier Management Information System
NIMBY	Not In My Backyard
PPP	Public-private partnership
SR	State Route
SWOT	Strengths, Weaknesses, Opportunities, and Threats
U.S.	United States
WILMAPCO	Wilmington Area Planning Council

1 Introduction

1.1 Background and Objectives

Truck parking is essential to the efficient movement of goods throughout the nation. In Delaware, truck parking is particularly critical to goods movement along the freight-heavy corridors of I-95, I-295, I-495, US 301, US 13, US 113, and SR 1. Truck parking remains a top issue for the trucking industry, with truck drivers in Delaware and nationwide facing truck parking shortages.

Delaware is home to 12 truck parking locations, providing a total of 333 spaces for truck drivers. Truck parking utilization provides insight into the balance of supply and demand of truck parking in Delaware. Truck parking utilization refers to the number of trucks parked at a given location, relative to the number of spaces at that location. It provides a snapshot of where truck parking is easy or difficult to find at any given time. In Delaware, truck parking utilization is highest in the early morning hours, as truck drivers take their overnight rest breaks, particularly in northern Delaware near I-95 and in urban areas.

Delaware also experiences undesignated truck parking, which refers to the issue of trucks parked at unmarked or unauthorized locations. In Delaware, observations of undesignated parking include trucks parked at unmarked areas within public rest areas, along on/off ramp and corridor shoulders, and along last-mile connectors. This has negative consequences for the state's economy, safety, infrastructure, and quality of life.

Understanding Delaware's truck parking utilization and undesignated truck parking helps identify trends and define opportunities to address truck parking needs. Building off data analysis and stakeholder input, this Technical Memo identifies the strengths, weaknesses, opportunities, and threats (SWOT) for truck parking in Delaware. This SWOT will inform the development of recommendations and implementation steps in the next stage of the study. Ultimately, the Delaware Statewide Truck Parking Study will provide the Delaware Department of Transportation (DelDOT), the Wilmington Area Planning Council (WILMAPCO), and other state and regional truck parking stakeholders with an analytical foundation to inform infrastructure investments and strategies to address the state's most pressing truck parking issues.

1.2 Overview of this Technical Memo

Purpose

The purpose of this Technical Memo is to understand the supply, demand, and impacts of truck parking in Delaware. Specifically, this memo provides an inventory of truck parking drawing on various data sources. This Technical Memo then presents the state's truck parking utilization using Trucker Path data, followed by an analysis of INRIX truck GPS data to identify locations of undesignated truck parking in the state. The data analysis, supplemented by stakeholder input, provides an understanding of statewide truck parking trends, which subsequently informs the SWOT identification for truck parking in Delaware. This will set the basis for developing a set of solutions and implementation recommendations to meet Delaware's truck parking needs.

Methodology

This Technical Memo was prepared using CPCS analysis of Trucker Path data; INRIX truck GPS data; DelDOT Class 5 (truck/trailer) crash data, Federal Motor Carrier Administration (FMCSA) Motor Carrier

Management Information System (MCMIS) data, and Delaware State Police commercial motor vehicle (CMV) parking violation data. This Technical Memo was also informed by stakeholder feedback, collected through a Truck Parking Focus Group meeting and Wikimap, an online interactive mapping tool.

Limitations

Some of the findings in this report are based on the analysis of third-party data. While CPCS makes efforts to validate data, CPCS cannot warrant the accuracy of third-party data.

2 Truck Parking Inventory

2.1 Introduction

The truck parking inventory presents the supply of truck parking facilities and spaces in Delaware. The consulting team developed the inventory by synthesizing publicly available data from FHWA's 2015 Jason's Law Report and data purchased from Trucker Path, validated with satellite imagery and online research.

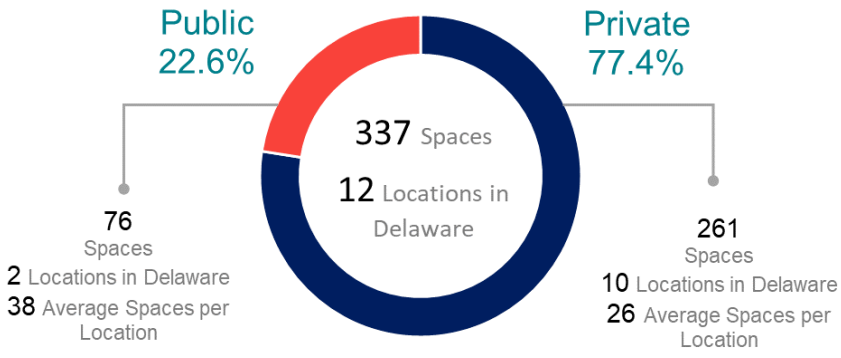
Trucker Path is a smartphone application that relies on crowdsourced data from almost one million drivers to visually identify and communicate truck parking availability to other drivers. Trucker Path collects and provides information including truck parking location, parking space availability, amenities, and directions, among other information.

Designated truck parking locations allow truck drivers to take federally required hours of service (HOS) breaks, wait for shipper or receiver appointments (known as staging), and use amenities such as restrooms or refueling stations. In addition to designated truck parking locations at public rest areas and private truck stop facilities, truck drivers park at other, less formal locations. These locations include restaurants (e.g. McDonald's), parking lots at retail businesses (e.g. Walmart), and other vacant lots (e.g. gravel lots). However, less formal truck parking locations are subject to change, given truck parking is not core to private restaurant and retail businesses. Therefore, for the purposes of this study, the Project Team focused on identifying formal rest areas and truck stops.

2.2 Delaware's Truck Parking Inventory

Delaware has 12 truck parking locations that offer a total of 337 truck parking spaces (Figure 1). Among these truck parking locations, there are 10 private locations and 2 public locations, representing 77.4 percent and 22.6 percent of truck parking spaces, respectively. Classified among the public locations are the Smyrna Rest Area and the Biden Welcome Center, the latter of which is a publicly-owned, but privately-operated facility.

Figure 1: Total, Public, and Private Truck Parking Locations in Delaware



The following pages show the location of truck parking facilities in Delaware, or within approximately 20 miles of the Delaware border, classified by public and private location (Figure 2) and by number of truck parking spaces (Figure 3). As illustrated, several truck parking facilities are located along US 13 running north-south and near I-95 extending across northern Delaware. A cluster of truck parking facilities is also located on I-295 in New Jersey, just across the Delaware Memorial Bridge. Figure 4 provides further detail on each truck parking location mapped, including the number of validated spaces[1] and whether overnight parking is permitted. As shown, truck parking spaces in Delaware are highly concentrated in the northern part of the state, with the largest facilities located along I-95 and in the Wilmington and New Castle urban areas.

[1] The Project Team validated the number of truck parking spaces at each facility using satellite imagery.

Figure 2: Public and Private Truck Parking Facilities in and Surrounding Delaware

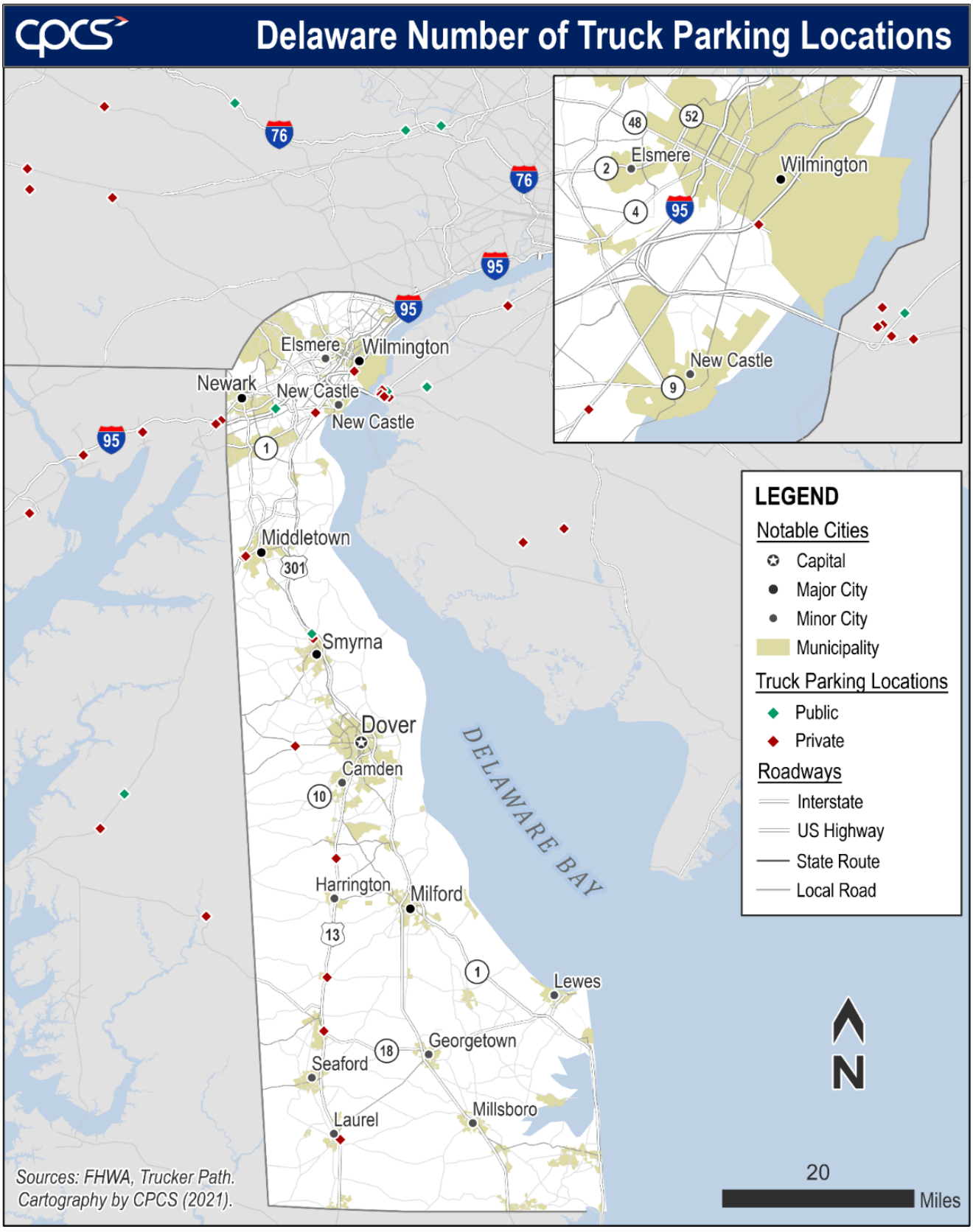


Figure 3: Truck Parking Facilities in and Surrounding Delaware by Number of Spaces

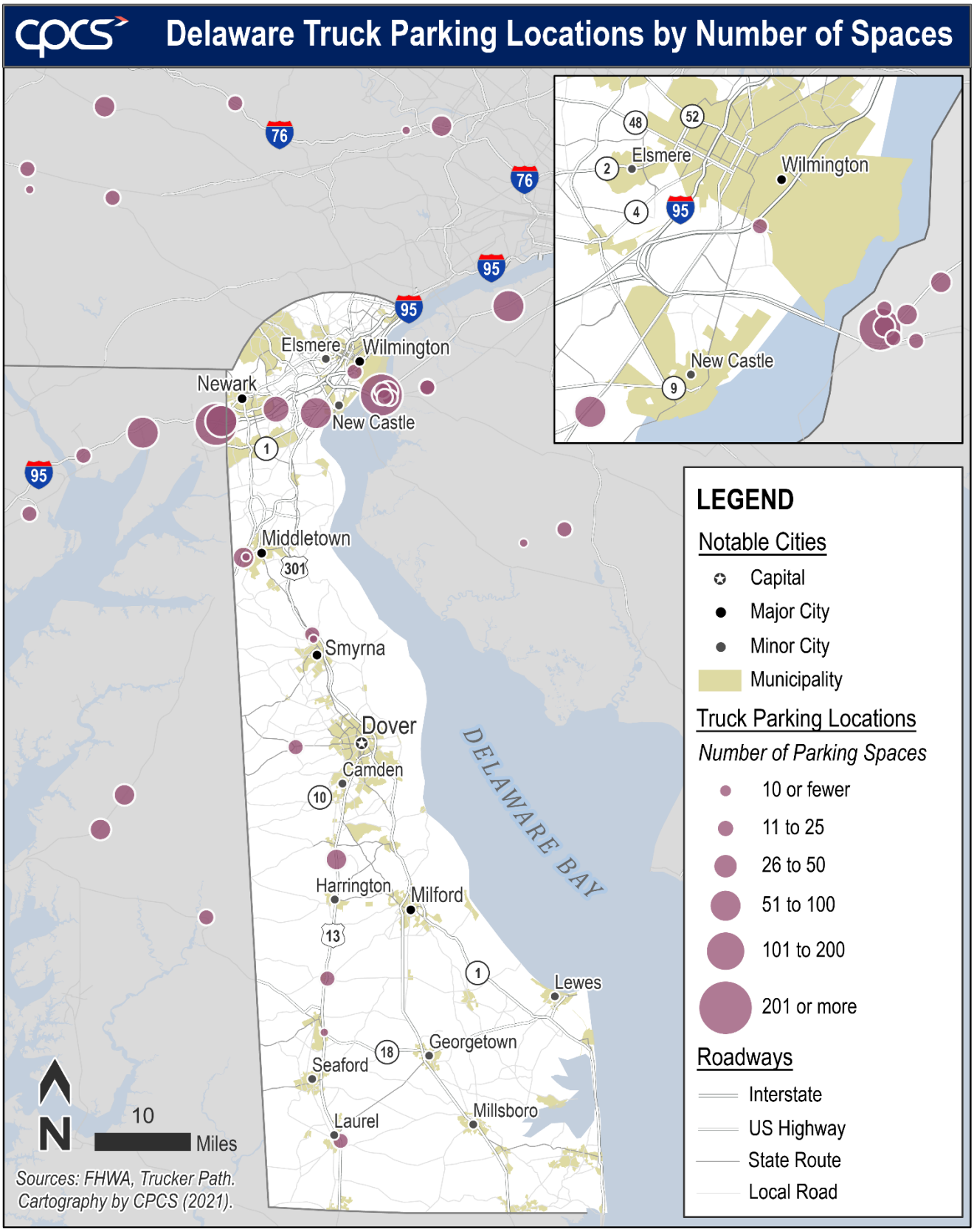


Figure 4: Truck Parking Facilities In and Surrounding Delaware

Title	Public/ Private	Validated Parking Spaces	State	Overnight Parking Authorized (DE Only)
Wawa	Private	3	DE	No
Smyrna Rest Area	Public	24	DE	Yes
Biden Welcome Center	Public	52	DE	Yes
Royal Farms	Private	5	DE	No
Royal Farms	Private	10	DE	No
Royal Farms	Private	15	DE	No
Royal Farms	Private	5	DE	No
Christiana Truck Stop	Private	24	DE	Yes
Oasis Travel Plaza	Private	20	DE	Yes
Shore Stop #288 - BP (paid parking)	Private	28	DE	Yes
301 Plaza	Private	42	DE	Yes
$ Parking Delaware Truck Plaza	Private	109	DE	Yes
Wawa	Private	9	MD	--
Perryville Weigh Station	Public	56	MD	--
US-301 Bay Country Rest Area	Public	32	MD	--
Exxon	Private	10	MD	--
Aberdeen Sunoco	Private	19	MD	--
Pilot Travel Center #290	Private	24	MD	--
Trailway Truck Terminal	Private	30	MD	--
Flying J Travel Center #784	Private	145	MD	--
TA Elkton #19	Private	152	MD	--
Flying J Travel Center #875	Private	222	MD	--
SB Warwick Weigh Station	Public	23	MD	--
Wawa	Private	5	NJ	--
Wawa	Private	7	NJ	--
Wawa	Private	6	NJ	--
Wawa	Private	6	NJ	--
Deepwater Welcome Center	Public	33	NJ	--
John Fenwick Service Area 7006	Public	10	NJ	--
Pilot Travel Center #253	Private	11	NJ	--
Clara Barton Service Area	Public	11	NJ	--
Major Auto Truck Plaza	Private	14	NJ	--
Deepwater Truck Center	Private	15	NJ	--
Lukoil Truck Stop	Private	16	NJ	--

Title	Public/ Private	Validated Parking Spaces	State	Overnight Parking Authorized (DE Only)
Sunoco Truck Stop Carneys Point	Private	40	NJ	--
TA Paulsboro #218	Private	150	NJ	--
Flying J Travel Center #688	Private	240	NJ	--
Valley Forge Travel Plaza	Public	8	PA	--
Rutter's #70	Private	8	PA	--
Lancaster Travel Plaza	Private	18	PA	--
Peter J. Camiel Service Plaza	Public	25	PA	--
Conoco	Private	25	PA	--
PA Turnpike King of Prussia Rest Area	Public	26	PA	--
Martins Trailside Express PacPrd	Private	30	PA	--
Pennsylvania Welcome Center Boothwyn	Public	8	PA	--

Source: CPCS analysis of FHWA, Trucker Path. Note: Whether overnight parking is authorized for locations within Delaware was determined through phone calls and/or email with each location, or a consultation with a designated location representative.

3 Truck Parking Utilization

3.1 Introduction

Truck parking utilization refers to the number of trucks parked at a truck parking location relative to the number of spaces at that location at a given time. The supply of and demand for spaces at a truck parking location impacts truck parking utilization. Truck parking utilization provides a snapshot of where truck parking is easy or difficult to find, and when combined with data on where undesignated parking is occurring, helps define the opportunities for addressing truck parking needs.

Several factors influence when and where drivers choose to park. A 2016 study by the American Transportation Research Institute (ATRI) asked truck drivers to select the five most important factors that influenced the location where they took their ten-hour HOS break. The top three factors selected were proximity to route and destination, access to restrooms and showers, and expected available parking (Figure 5).

Figure 5: Factors Influencing Where Drivers Stop for 10-Hour Required HOS Breaks

Important Factor	Percent of Responses
Proximity to Route / Destination	96.5%
Restroom / Showers	79.8%
Expected Parking Availability	75.5%
Width of Parking Space / Ease of Access	31.9%
Restaurant	30.5%
Security	20.3%
Company Policy / Loyalty Program	18.1%
Internet	6.9%
Laundry	4.0%
Maintenance / Service Center	3.7%
Weather Conditions	3.6%

Source: ATRI, Managing Critical Truck Parking Case Study – Real World Insights from Truck Parking Diaries, December 2016

The following section provides more information on the top factors impacting truck parking utilization.

Proximity to Route and Destination

Proximity to route was the top factor that influenced where drivers stopped. HOS break requirements, trip length, routing, and trip time all affect when and where a truck driver needs to find truck parking. Truck parking facilities located along major freight corridors provide an efficient and convenient location for truck parking. Wider roads and high volumes of truck traffic also impact utilization, as the truck

volume on a roadway adjacent to a truck parking location has a direct relationship with the location's truck parking utilization.[2]

In addition to the route, proximity to the destination of a truck trip (major freight generators, e.g. warehousing and distribution centers, manufacturing facilities, freight terminals, intermodal connectors, ports, etc.) also affects where drivers choose to stop. Truck drivers often require truck parking while they wait for shipper or receiver appointments (staging), but many freight establishments do not allow drivers to park on-site outside of appointment times. Additionally, truck drivers typically prefer to stage close to their origin or designation, in order to meet their required appointment time and mitigate the impact of congestion, given the monetary impact of missing a pick-up or delivery appointment. Unpredictability due to congestion in urban areas and near freight generators further incentivizes drivers to stage near their origin or destination.

Amenities

Amenities at truck parking facilities – notably restrooms, showers, and restaurants/food – provide for the basic needs of truck drivers. While these amenities are especially important for long-haul drivers parking overnight and/or fulfilling longer HOS break requirements, they also attract drivers seeking specific facilities. Other amenities, such as security, internet, laundry, and maintenance/service center, were ranked by drivers as less important factors when determining where to park.

Expected Parking Availability

Trip planning refers to the process of estimating how far a truck driver can travel given their origin, destination, route, anticipated congestion, and HOS. During this trip planning process, truck drivers anticipate when and where they will need truck parking and draw on their experience and other sources to identify the expected parking availability of specific truck parking locations or areas.

Truck drivers use trip planning tools, such as traveler information websites, smartphone applications, GPS, experience, and maps to obtain information on truck parking locations and inform truck parking decisions.[3] Applications, such as Trucker Path and TruckMap, crowdsource data reported by nearby drivers to provide information about private and public truck parking availability. Public agencies may also disseminate information about public truck parking locations and availability through websites or dynamic roadside message signs.

Some private truck parking locations have a parking reservation system, which allows drivers to reserve a space for a fee. A reserved truck parking space mitigates the uncertainty associated with truck parking availability at a given time and location. However, motor carriers often do not reimburse fees associated with truck parking, and many drivers indicate that they are will not pay for parking. In a 2018 Trucker Path report, only 15 percent of fleet drivers reported their fleet would pay for

[2] Haque, et al., Truck Parking Utilization Analysis Using GPS Data, Journal of Transportation Engineering, September 2017, https://ascelibrary.org/doi/pdf/10.1061/JTEPBS.0000073
[3] ATRI, Managing Critical Truck Parking Case Study – Real World Insights from Truck Parking Diaries, December 2016. https://truckingresearch.org/wp-content/uploads/2016/12/ATRI-Truck-Parking-Case-Study-Insights-12-2016.pdf

reservations.[4] Meanwhile, about half of drivers indicate they would not pay any amount out of pocket for parking.[5]

Ease of Access / Width of Parking Space

Some truck parking facilities are located so they can be accessed by both directions of travel, while others cannot. Given potential differences in truck volumes on each side of a divided highway, a parking facility's access point can impact its utilization. Access is most likely to impact rest areas on divided highways, as these facilities are in the highway right-of-way and may require a driver on the other side of the roadway to backtrack for facility access. This leads to utilization differences, depending on which roadway direction the facility serves.

Similarly, ease of access to and the width of a parking space may impact utilization. When selecting a truck parking spot, truck drivers may consider the layout, width of the parking space, or the likelihood of getting blocked in by or hit by other drivers.[6]

3.2 Approach to Analyzing Truck Parking Utilization

Truck parking utilization analysis builds on the inventory of public and private truck parking locations. A year of Trucker Path data (2019) informed the truck parking utilization analysis to develop a statewide understanding of truck parking. The Trucker Path app uses the location of the phone to identify when a driver is located within one and a half miles of a truck parking facility and then prompts the user to categorize the truck parking location's availability as "lots," "some," or "full."

2019 data were selected to remove the potential for temporary shifts in the origin, destination, and/or volume of freight traveling in Delaware due to the COVID-19 pandemic. FMCSA also issued a series of HOS exemptions during COVID-19 to enable the movement of key commodities. Since HOS are a key factor in where and when a driver uses truck parking, these HOS exemptions during 2020 could present results that are not representative of typical truck parking utilization.

3.2.1 Statewide Truck Parking Utilization

The statewide utilization analysis produced hourly truck parking utilization for public and private truck parking facilities. Figure 6 shows the distribution of truck parking utilization among private and public truck parking facilities in Delaware by time of day. The calculation of hourly utilization for each parking location uses the responses submitted by truck drivers from Trucker Path and the detailed inventory to interpolate the data to form a continuous data set.

Figure 6 displays that the utilization of truck parking facilities in Delaware is lowest from late morning to early evening. As the evening progresses, truck drivers stop for their overnight rest breaks, filling up truck parking facilities. The peak utilization for truck parking is in the early morning, with the highest share of full facilities from 2 am to 3 am.

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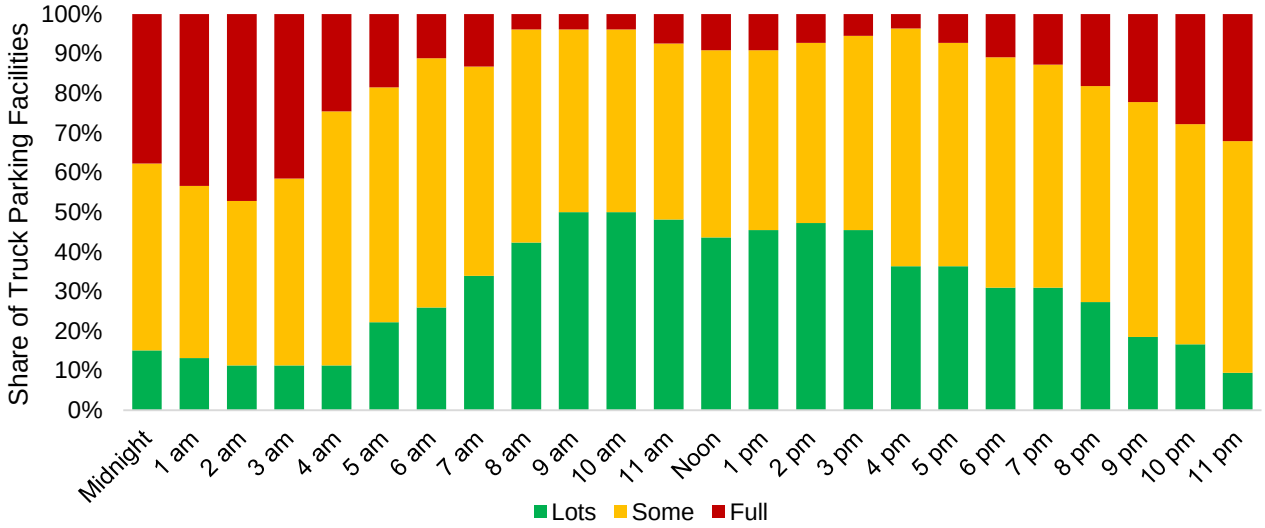
[4] Trucker Path, Truck Parking Report, July 2018, http://files.truckerpath.com/web/trucker-path-parking-white-paper-2018.pdf

[5] Trucker Path, Truck Parking Report, July 2018, http://files.truckerpath.com/web/trucker-path-parking-white-paper-2018.pdf; ATRI, Managing Critical Truck Parking Tech Memo #1: Commercial Driver Perspectives on Truck Parking, September 2015, https://truckingresearch.org/wp-content/uploads/2015/09/Managing-Critical-Truck-Parking-Tech-Memo-1-FINAL-09-2015.pdf

[6] ATRI, Managing Critical Truck Parking Case Study – Real World Insights from Truck Parking Diaries, December 2016

Figure 6: Statewide Truck Parking Utilization



Source: CPCS analysis and modeling of Trucker Path

The maps on the following pages illustrate the utilization of public and private truck parking facilities statewide from 8 am to 9 am (Figure 7), 2 pm to 3 pm (Figure 8), 8 pm to 9 pm (Figure 9), and 2 am to 3 am (Figure 10).[7] Areas are classified from low utilization (lots of spaces available) to high utilization (full, i.e. no spaces available), represented on a scale from green (low utilization) to yellow (medium utilization) to red (high utilization).

These figures illustrate how truck parking utilization in different areas of the state changes throughout the course of the day. From the morning through the early afternoon, truck parking utilization decreases as trucks leave their overnight spaces. As the evening progresses, utilization increases as truck drivers stop to park overnight. By the early morning hours, truck parking availability is at its most constrained with higher utilization levels statewide.

- **Morning (8 am to 9 am):** Low utilization throughout most of the state, with the exception of the New Castle area, which sees higher utilization.
- **Afternoon (2 pm to 3 pm):** Truck parking facilities statewide experience some of their lowest utilization levels of the day.
- **Evening (8 pm to 9 pm):** Higher utilization levels statewide, with truck parking particularly constrained near Seaford and west of Dover.
- **Early morning (2 am to 3 am):** Truck parking facilities statewide experience their highest utilization levels of the day, as truck parking availability is significantly constrained, especially in northern Delaware near I-95 and urban areas.

In Delaware, utilization is highest in the urban areas of Wilmington, New Castle, Smyrna, Dover, and Seaford. However, truck parking utilization is not at its full capacity at all facilities in Delaware, even during the peak early morning hours. Meanwhile, utilization remains low in many areas of the state during the non-peak hours of the late morning and afternoon.

[7] The utilization of each truck parking facility is represented through a heat map which depicts higher and lower utilization along Delaware's road network.

Figure 7: Truck Parking Utilization (8 am to 9 am)

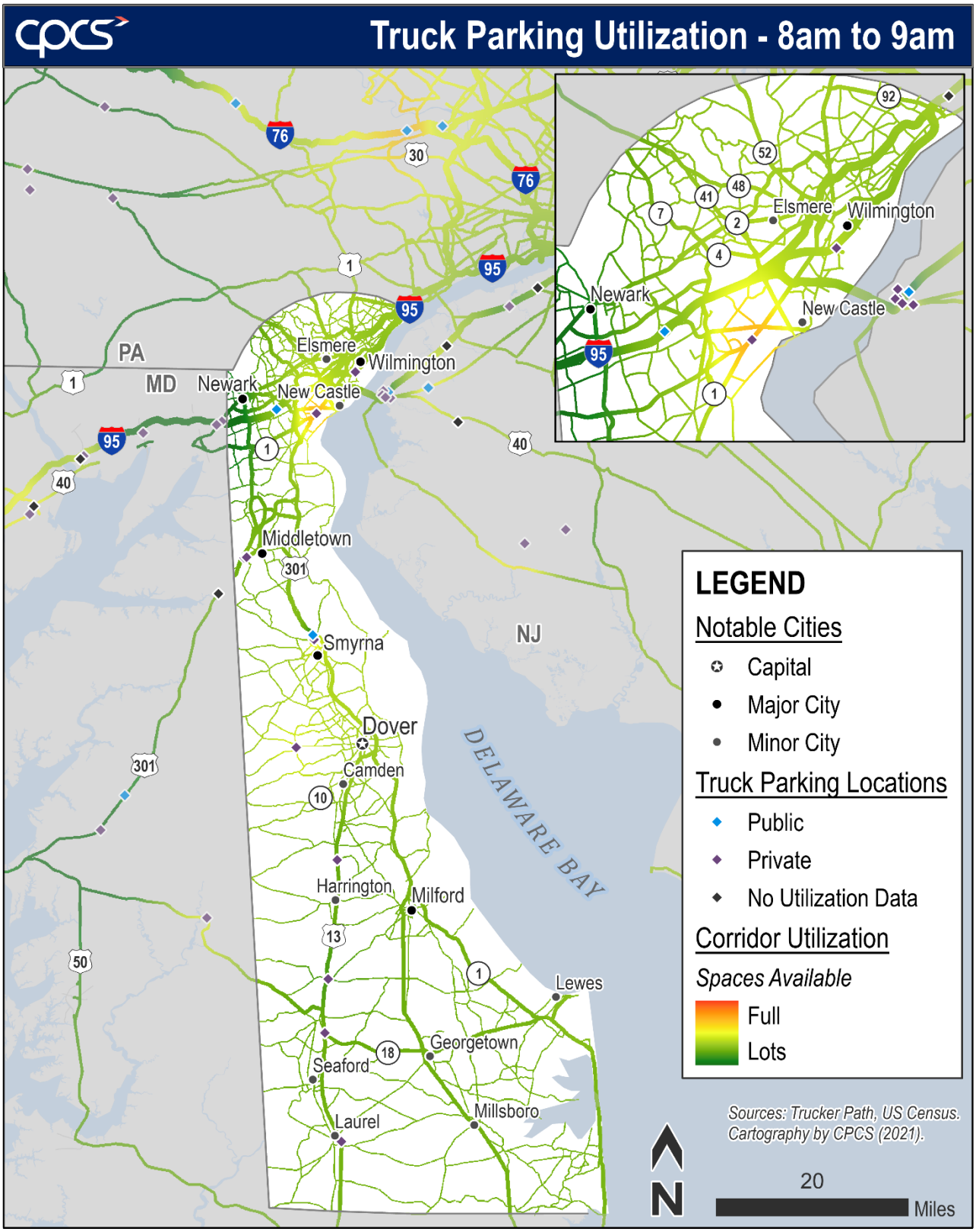


Figure 8: Truck Parking Utilization (2 pm to 3 pm)

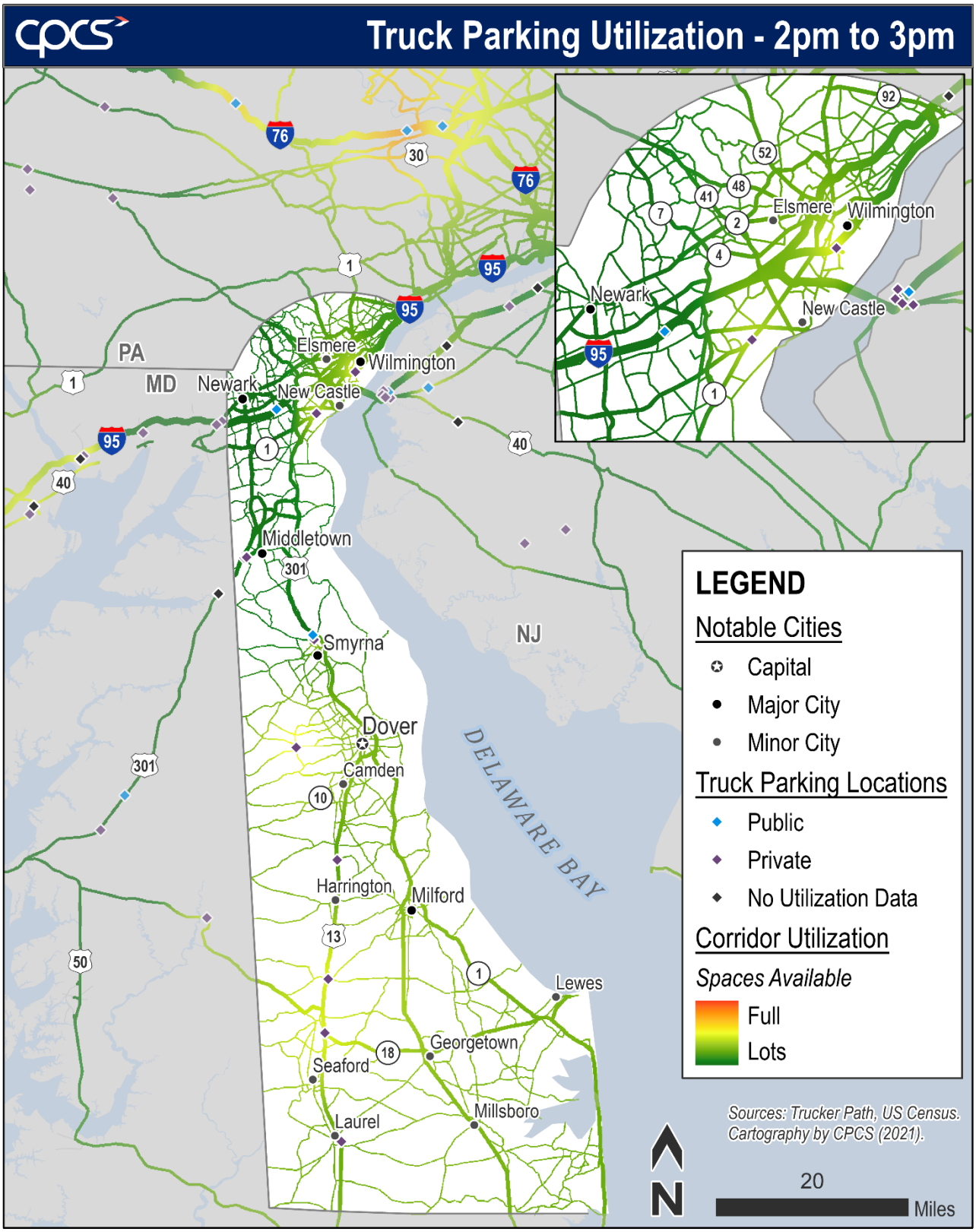


Figure 9: Truck Parking Utilization (8 pm to 9 pm)

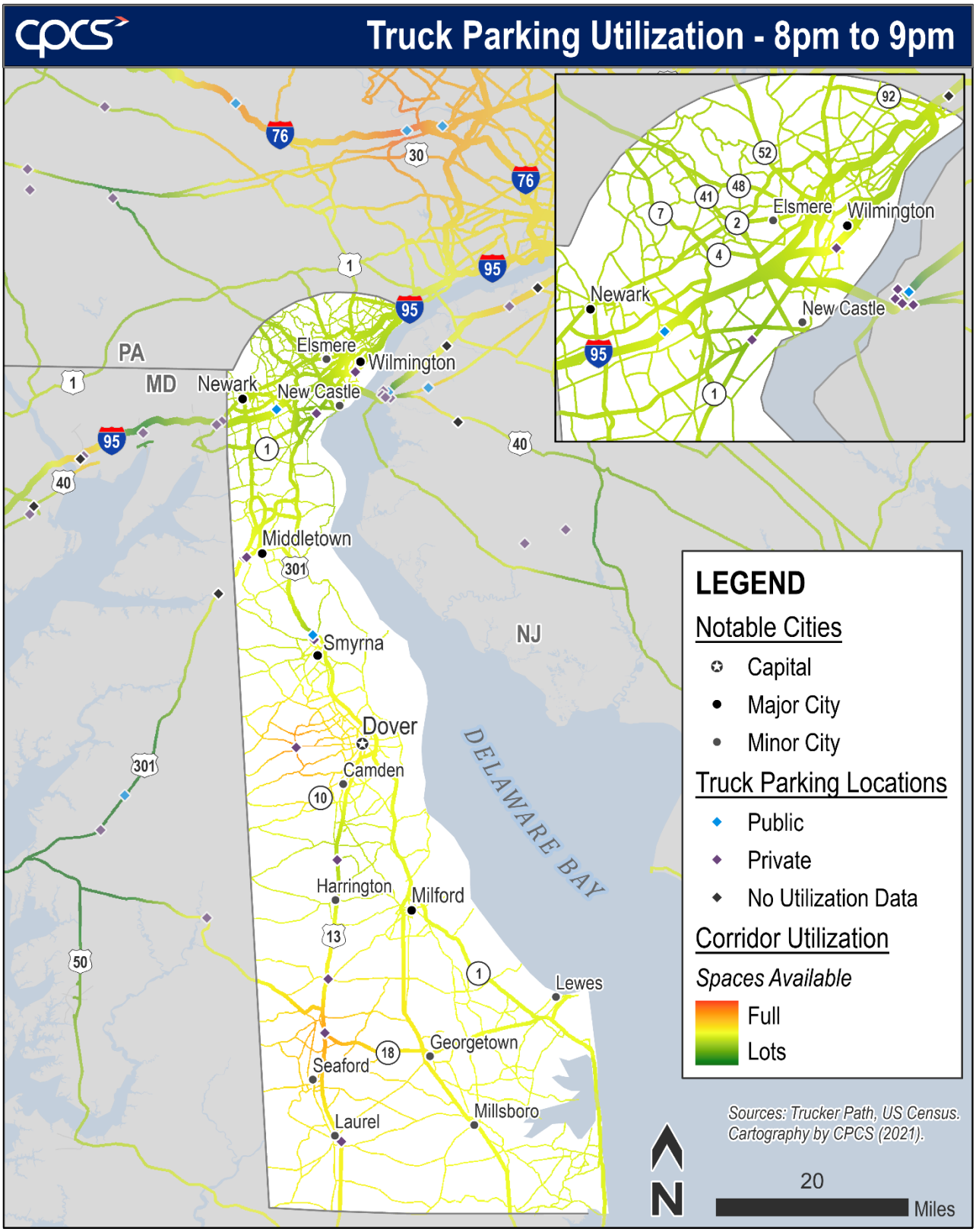
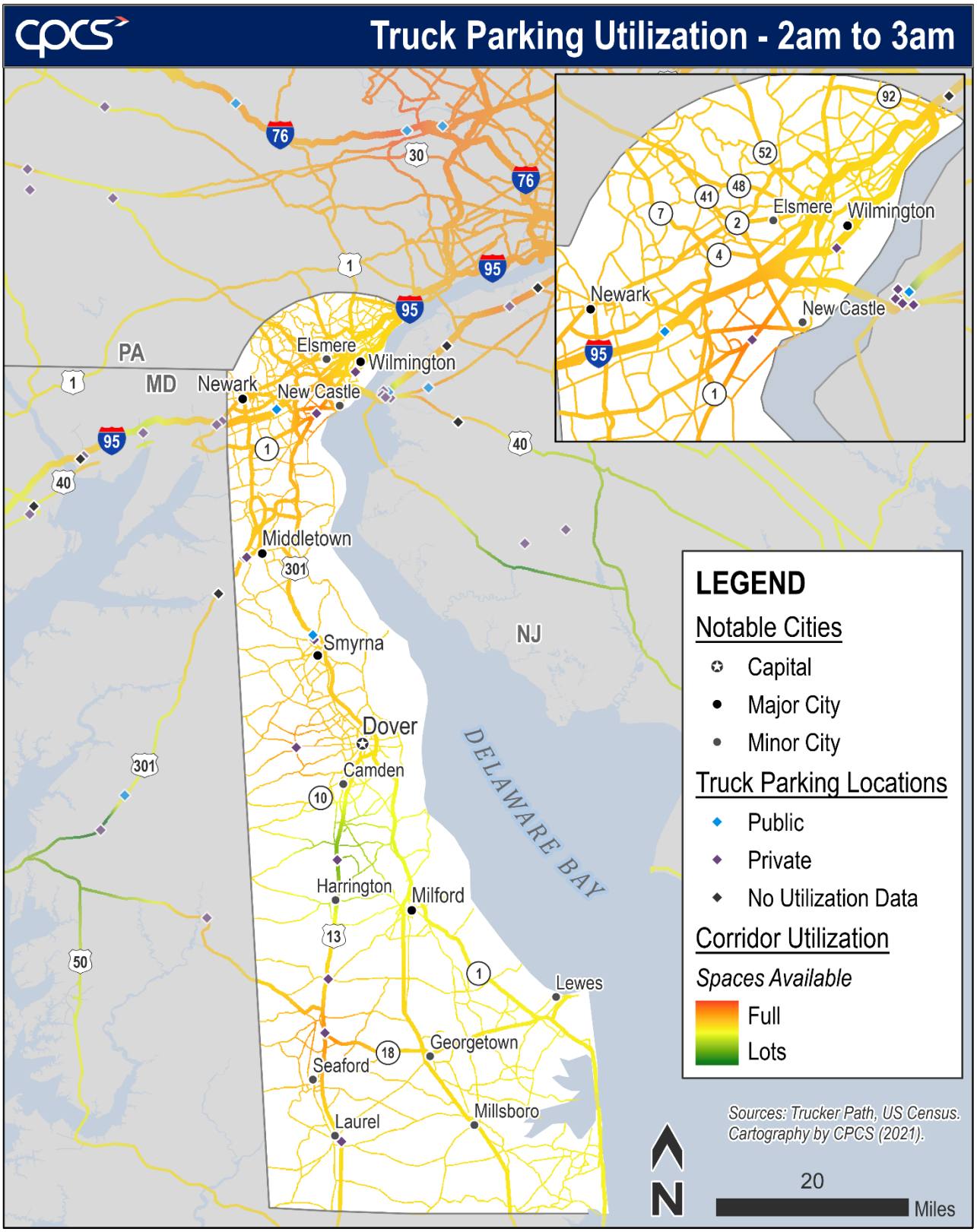


Figure 10: Truck Parking Utilization (2 am to 3 am)



4 Undesignated Truck Parking

4.1 Introduction

Undesignated truck parking refers to unmarked locations where trucks park. While truck parking utilization provides insight into where truck parking is available and where truck parking is difficult to find, understanding undesignated truck parking provides additional insight into the magnitude of unmet truck parking demand. Truck drivers may choose to park in undesignated locations if they have difficulty finding truck parking and they are nearing the end of their HOS. Undesignated truck parking serves as the most noticeable indication of a truck parking issue and has negative impacts on the economy, safety, infrastructure, and quality of life.

4.2 Classification of Undesignated Truck Parking

In total, the Project Team parsed through and analyzed over 17 million truck GPS waypoints during the 12 weeks of INRIX data analyzed (February 3-23, May 5-25, August 4-24, October 6-26). These waypoint data are, in essence, markers that trucks leave when traveling from their origin to their destination. Waypoints allow data users to calculate distance traveled, speed, route, location, and duration of time stopped, among other insights.

The process to identify undesignated truck parking began with using INRIX truck GPS data to identify when trucks stopped for more than 30 minutes. Approximately 119,700 stops were identified as truck stop events during the 12 weeks of data analyzed. Using the inventory of truck parking locations, approximately 8,200 stops were parked in designated truck parking areas (blue areas in Figure 11 and Figure 12) and 300 stops were parked in undesignated areas at Delaware's two public rest stops (red area in Figure 11). The remaining stops needed additional classification (e.g. trucks parked along roadways, at shippers/receivers, at truck terminals, etc.). Of these, 3,100 stops were identified as stops on the road network and investigated by the Project Team as locations of undesignated parking.

Figure 11: Public Truck Parking Location – Smyrna Rest Area

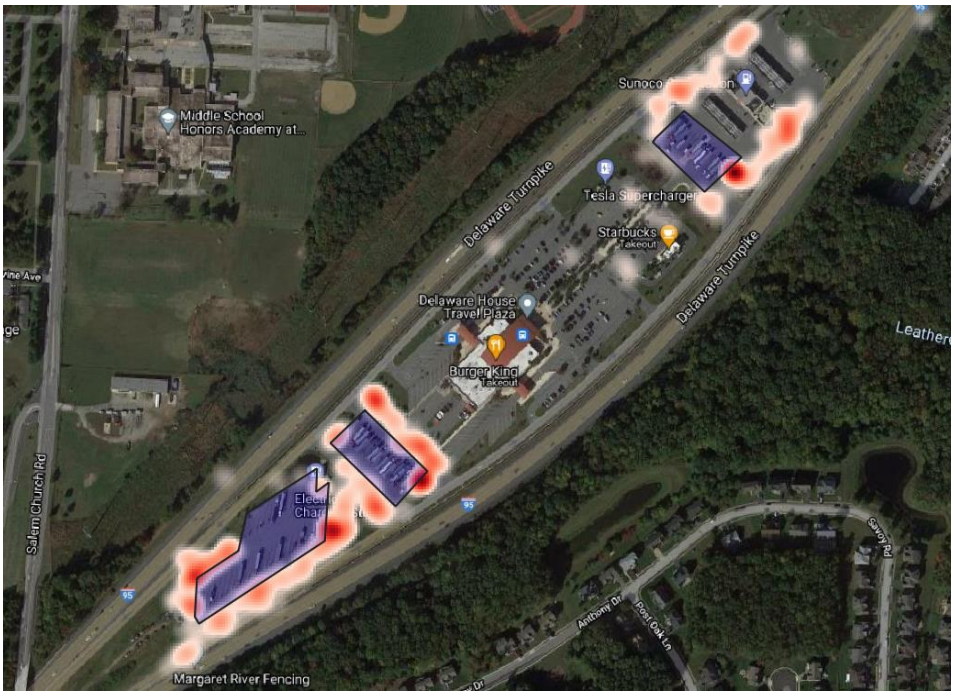
Figure 12: Private Truck Parking Location – 301 Travel Plaza

Source: Google Maps, Imagery ©2021 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2021, with CPCS polygons overlaid based on analysis of Trucker Path Data.

The Project Team identified undesignated truck parking occurring in areas outside of defined parking spaces at public rest areas, such as areas designated for passenger vehicles and on/off ramps near the public rest area. The Project Team also identified undesignated truck parking occurring at locations other than public rest areas. Additional non-rest area clusters are categorized into the six classifications presented below based on where the undesignated truck parking is occurring. The following section provides more detail on the different types of undesignated truck parking.

Rest Area: undesignated truck parking occurring in areas outside of defined parking spaces at public rest areas, such as unmarked areas, on/off ramps, and areas designated for passenger vehicles. Figure 13 displays undesignated truck parking at the Biden Welcome Center, with designated parking areas indicated in blue.

Figure 13: Undesignated Truck Parking Cluster Near Biden Welcome Center



Source: CPCS Analysis of INRIX data; Google Maps, ©2021 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data © 2021 Google, with CPCS polygons overlaid based on analysis of Trucker Path Data.

On/off ramp shoulders: undesignated truck parking occurring on interstate and other highway on/off ramp shoulders. This creates safety hazards for both truck drivers and other roadway users. Trucks parked in these undesignated areas are large fixed objects that block the sight distance for other roadway users and are susceptible to collision. Further, when trucks re-enter the traffic stream from the shoulder, they pose a safety risk due to a shorter distance to reach roadway speeds, resulting in a high speed differential. Figure 14 and Figure 15 display undesignated truck parking occurring at on/off ramps in Delaware.

Figure 14: Undesignated Truck Parking Cluster on SR 1/Puncheon Run Connector On/Off Ramps

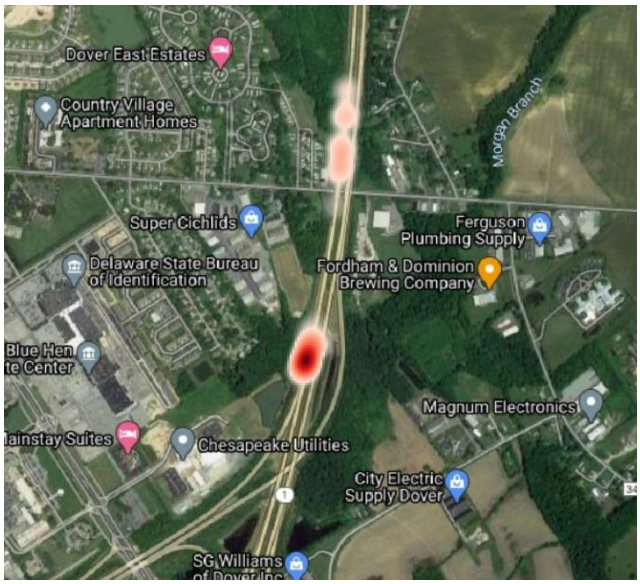
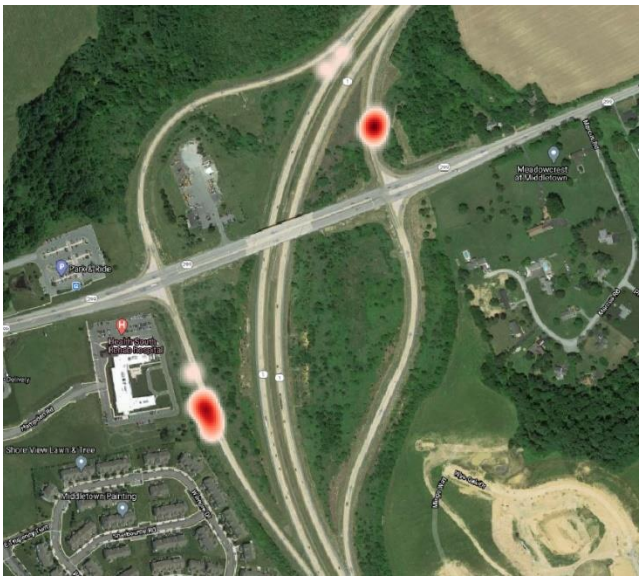


Figure 15: Undesignated Truck Parking Cluster on SR 1/SR 299 On/Off Ramps



Source: CPCS Analysis of INRIX data; Google Maps, ©2021 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data © 2021 Google

Corridor shoulders: undesignated truck parking occurring on interstate and other highway corridor shoulders. This creates safety hazards, for both truck drivers and other roadway users, similar to undesignated truck parking at on/off ramp shoulders. Trucks parked on corridor shoulders pose safety risks as large fixed objects susceptible to collision, as visual obstacles to sight distance, and when re-entering the traffic stream. However, compared to on/off ramp shoulders, trucks re-entering the traffic stream from corridor shoulders face a higher speed differential, particularly on interstate and other highway shoulders. Figure 16 shows undesignated truck parking occurring on highway shoulders. Figure 17 also illustrates undesignated parking on a corridor shoulder, from a street view.

Figure 16: Undesignated Truck Parking Cluster on SR 1 Shoulders

Source: CPCS Analysis of INRIX data; Google Maps, ©2021 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data © 2021 Google

Figure 17: Undesignated Truck Parking Street View on I-295 Corridor Shoulder

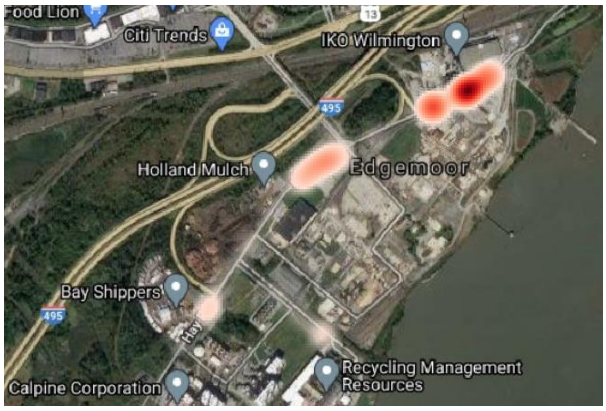
Source: Google Street View, ©2021 Google, Image Capture: Sept. 2019

Last-mile: undesignated truck parking occurs on local roadways in both industrial and non-industrial areas – particularly on last-mile connectors leading to freight generators. Undesignated truck parking on local roadways is less of a safety hazard, compared to heavy traffic corridors and on/off ramps, due to slower speeds and lower traffic volumes. However, undesignated truck parking on local roadways still poses safety and quality life issues by impeding traffic, blocking roadways, and spilling onto busier roads.

Undesignated truck parking at last-mile connectors leading to freight generators is typically associated with staging for pick-up and delivery. Figure 18 displays undesignated truck parking occurring on the roadway near a Mountainaire Farms facility. Meanwhile, Figure 19 shows undesignated truck parking occurring on roadways in Edgemoor near several freight-generating facilities, and Figure 20 provides a street view of undesignated parking at the same location.

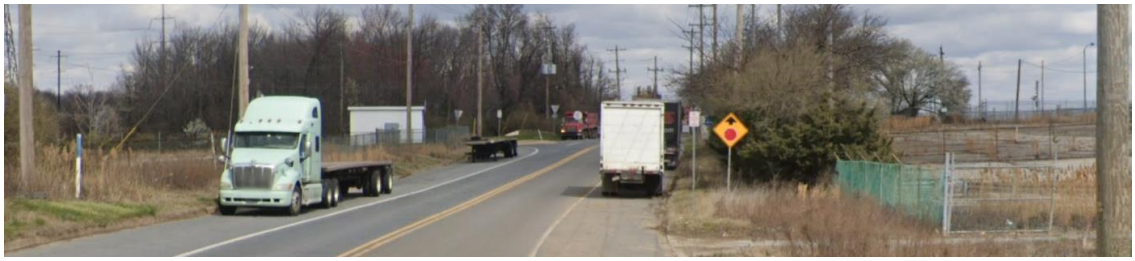
Figure 18: Undesignated Truck Parking Cluster Near Mountainaire Farms

Figure 19: Undesignated Truck Parking Cluster at Edgemoor



Source: CPCS Analysis of INRIX data; Google Maps, ©2021 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data © 2021 Google

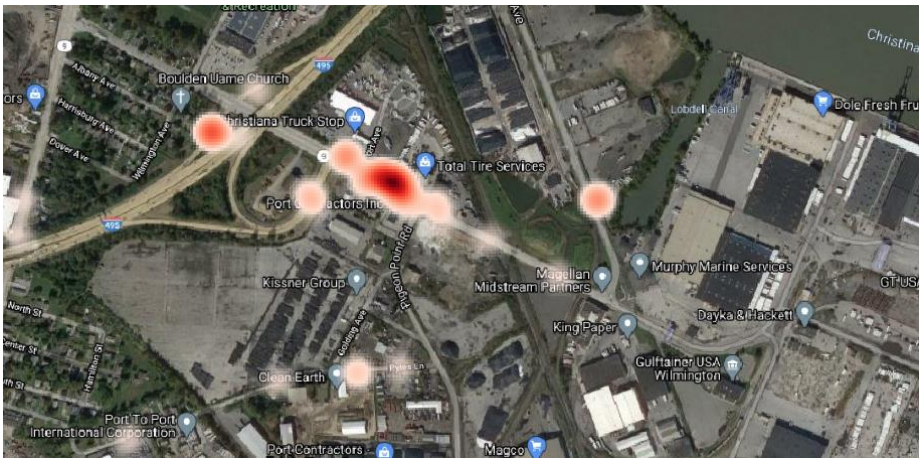
Figure 20: Undesignated Truck Parking Street View at Edgemoor



Source: Google Street View, ©2021 Google, Image Capture: Sept. 2019

Near truck stop: undesignated truck parking occurring near private truck stops, but not on-site, likely due to a lack of capacity at the given truck stop. The safety concerns of parking near truck stops are similar to undesignated truck parking on last-mile corridors, due to lower speeds and traffic volumes. Figure 21 shows undesignated parking near the Christiana truck stop.

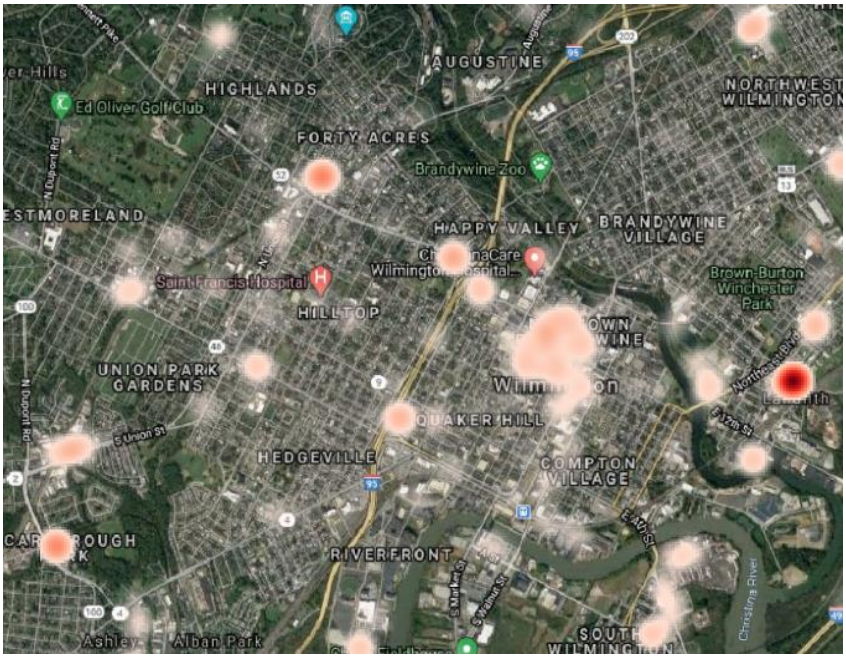
Figure 21: Undesignated Truck Parking Cluster Near Christiana Truck Stop



Source: CPCS Analysis of INRIX data; Google Maps, ©2021 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data © 2021 Google

Urban: undesignated truck parking occurring in urban areas. This is often sporadic, and it is difficult to differentiate deliveries from undesignated truck parking due to limited space for trucks to park in concentrated numbers in urban areas. This difficulty demonstrates the need for collaboration with local jurisdictions to address truck parking needs and issues in urban areas. Figure 22 shows undesignated parking in the Wilmington urban area.

Figure 22: Undesignated Truck Parking Cluster in Wilmington Urban Area



Source: CPCS Analysis of INRIX data; Google Maps, ©2021 Landsat / Copernicus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data © 2021 Google

4.3 Statewide Undesignated Truck Parking

The Project Team identified, validated, and classified 32 clusters of undesignated truck parking occurring in Delaware. First, we identified clusters of overnight undesignated truck parking, occurring between 12 am to 6 pm. Based on comments received from stakeholders, we then further examined undesignated truck parking occurring at all hours of the day to explore areas of undesignated truck parking related to staging.

Figure 23 below maps the 32 identified undesignated truck parking clusters in Delaware, classified by type. While undesignated parking on corridor shoulders and for last-mile are the most common cluster types, the largest single cluster of undesignated parking occurred at the Biden Welcome Center rest area. In 75 percent of Delaware's undesignated truck parking clusters, truck GPS data identified fewer than 50 counts of undesignated truck parking across 12 weeks. Though this GPS data represents a sample of total truck stops, the low total counts in the majority of the identified clusters indicate that Delaware’s undesignated parking issues are concentrated in a few select locations.

Figure 23: Undesignated Truck Parking Clusters (Map)

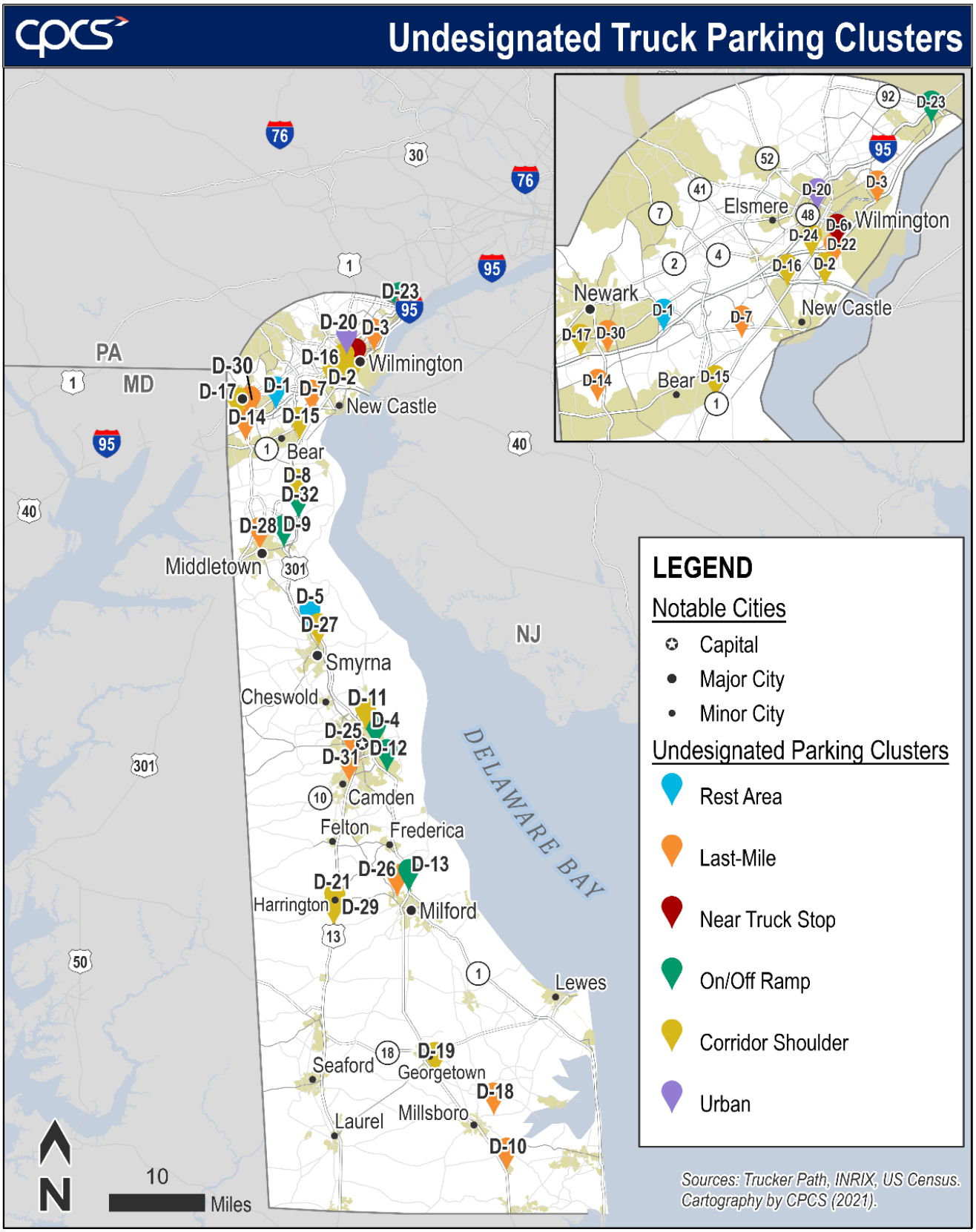


Figure 25 provides additional details for each cluster of undesignated parking corresponding to the marker shown in Figure 23 above. Additional information provided in the table below are as follows:

- **County:** County in which the cluster is located
- **Location Description:** Description of where the cluster is located
- **Type:** Type of undesignated truck parking, determined based on where undesignated truck parking occurs.
- **Total Count of Undesignated Stops:** Number of undesignated trucks stopped within the cluster during the 12 weeks of INRIX truck GPS data.
- **Total Duration of Undesignated Stops (Hours):** The total number of hours trucks were parked in an undesignated location.
- **Median Stop Duration (Hours):** Median number of hours that a truck parked in an undesignated location.
- **Average Stop Duration (Hours):** Average number of hours that a truck parked in an undesignated location.
- **Percent of Stops < 3 Hours:** Percentage of undesignated trucks stopped within the cluster for less than three hours.
- **Percent of Stops 3-8 Hours:** Percentage of undesignated trucks stopped within the cluster for three to eight hours.
- **Percent of Stops > 8 Hours:** Percentage of undesignated trucks stopped within the cluster for more than eight hours.
- **Period of Day with Highest Number of Undesignated Stops:** The period of day when the highest number of stops occur within the cluster, based on the hour of the day with the highest average number of stops during the 12 weeks of INRIX truck GPS data. Figure 24 illustrates the times of day that correspond to each period. In cases where the highest average number of stops occurred over several consecutive hours of the day, several periods were noted. In cases where there were several, non-consecutive hours of the day with the highest average number of stops, undesignated parking was classified as “recurring” in the cluster.

Figure 24: Corresponding Period and Times of Day

Period of Day	Time of Day
Overnight	12 am (Midnight) – 6 am
Morning	6 am – 12 pm (Noon)
Afternoon	12 pm (Noon) – 6 pm
Evening	6 pm – 12 am (Midnight)

Figure 25: Undesignated Truck Parking Clusters (Table)

Map Marker	County	Location Description	Type	Total Count of Undesignated Stops	Total Duration of Undesignated Stops (Hours)	Median Stop Duration (Hours)	Average Stop Duration (Hours)	% of Stops < 3 Hours	% of Stops 3 to 8 Hours	% of Stops > 8 Hours	Period of Day with Highest Number of Undesignated Stops
D-1	New Castle	Biden Welcome Center in Newark on I-95/ Delaware Turnpike	Rest Area	388	1,662	1.1	4.3	61%	8%	31%	Overnight
D-2	New Castle	I-295 in New Castle off the Delaware Memorial Bridge	Corridor Shoulder	48	91	1.2	1.9	90%	6%	4%	Overnight
D-3	New Castle	First/last-mile roads (Lighthouse Rd, Hay Rd) at Edgemoor	Last-mile	122	457	1.2	3.7	70%	7%	24%	Morning
D-4	Kent	SR 1 interchange with Puncheon Run Connector in Dover	On/Off Ramp	43	56	1.0	1.3	98%	0%	2%	Overnight, Morning
D-5	New Castle	Smyrna Rest Area in Smyrna on US-13/Dupont Pkwy and nearby US-13/SR 1 interchange on/off-ramps	Rest Area	98	282	1.0	2.9	76%	9%	15%	Morning
D-6	New Castle	Christiana Truck Stop at the Port of Wilmington on SR 9/Terminal Ave near I-495 on/off-ramps for Exit 2	Near truck stop	50	112	0.8	2.2	78%	12%	10%	Overnight, Morning
D-7	New Castle	US-13/Dupont Pkwy/S Dupont Hwy and US-40/Pulaski Hwy intersection, and near Wilton Blvd and US-40/Pulaski Hwy intersection in New Castle	Last-mile	75	304	1.9	4.0	57%	25%	17%	Recurring
D-8	New Castle	SR 1/Korean War Veterans Memorial Hwy (Toll Road) at Biddle's Corner Toll Plaza near SR 1/US-301 interchange near Middletown	Corridor Shoulder	19	47	1.9	2.5	84%	5%	11%	Evening, Overnight, Morning

Map Marker	County	Location Description	Type	Total Count of Undesignated Stops	Total Duration of Undesignated Stops (Hours)	Median Stop Duration (Hours)	Average Stop Duration (Hours)	% of Stops < 3 Hours	% of Stops 3 to 8 Hours	% of Stops > 8 Hours	Period of Day with Highest Number of Undesignated Stops
D-9	New Castle	SR 1 on/off ramps at Exit 136 to/from SR 299/Main St /Middletown Odessa Rd in Middletown	On/Off Ramp	27	53	1.1	2.0	78%	19%	4%	Overnight
D-10	Sussex	Daisey St between Dupont Blvd and Rte 401/Clayton Ave in Frankford	Last-mile	132	124	0.7	0.9	98%	0%	2%	Morning
D-11	Kent	SR 1/Korean War Veterans Memorial Hwy (Toll Road) at Dover Toll Plaza	Corridor Shoulder	32	76	1.3	2.4	75%	19%	6%	Evening, Overnight
D-12	Kent	SR 1 /Bay Rd near off-ramp at Exit 92 in Dover	On/Off Ramp	17	62	3.4	3.6	47%	41%	12%	Evening, Overnight
D-13	Kent	US 113/Dupont Blvd connection to SR 1/Bay Rd in Milford	On/Off Ramp	42	58	0.6	1.4	90%	7%	2%	Overnight
D-14	New Castle	First/last-mile roads (Executive Dr) in Newark	Last-mile	28	228	6.0	8.1	46%	11%	43%	Morning
D-15	New Castle	US-13/SR 1/S Dupont Hwy near on/off ramps to/from SR 1/Korean War Veterans Memorial Hwy near Bear	Corridor Shoulder	24	42	0.9	1.8	88%	8%	4%	Evening, Overnight
D-16	New Castle	US 13/N Dupont Hwy/N Dupont Pkwy interchange with I-295/Delaware Turnpike near New Castle	Corridor Shoulder	29	97	0.6	3.4	66%	10%	24%	Afternoon
D-17	New Castle	I-95/Delaware Turnpike (toll road) at Newark Toll Plaza	Corridor Shoulder	11	12	1.0	1.1	100%	0%	0%	Overnight
D-18	Sussex	SR 24/John J Williams Hwy near Rd 304 intersection in Millsboro	Last-mile	22	87	1.4	4.0	64%	14%	23%	Overnight, Morning

Map Marker	County	Location Description	Type	Total Count of Undesignated Stops	Total Duration of Undesignated Stops (Hours)	Median Stop Duration (Hours)	Average Stop Duration (Hours)	% of Stops < 3 Hours	% of Stops 3 to 8 Hours	% of Stops > 8 Hours	Period of Day with Highest Number of Undesignated Stops
D-19	Sussex	US-113/Dupont Blvd near S Bedford St/Shortly Rd near Georgetown	Corridor Shoulder	19	23	0.6	1.2	89%	11%	0%	Recurring
D-20	New Castle	Wilmington urban area	Urban	343	1,020	1.1	3.0	79%	10%	11%	Morning
D-21	Kent	US-13/S Dupont Hwy between Tower Hill Rd and Raceway Blvd near Harrington	Corridor Shoulder	14	39	1.4	2.8	64%	29%	7%	Overnight
D-22	New Castle	First/last-mile roads near (southwest of) the Port of Wilmington	Last-mile	42	136	1.7	3.2	69%	19%	12%	Morning, Afternoon
D-23	New Castle	I-495 near and at US-13/Philadelphia Pike interchange in Claymont	On/Off Ramp	58	82	0.7	1.4	93%	3%	3%	Morning
D-24	New Castle	US-13/N Dupont Hwy interchange with I-495, south of Wilmington and north of New Castle	Corridor Shoulder	38	56	0.6	1.5	92%	3%	5%	Morning, Afternoon
D-25	Kent	US-13/S Dupont Hwy near Puncheon Run Connector and Webbs Ln in Dover	Last-mile	37	81	0.8	2.2	84%	5%	11%	Overnight, Morning
D-26	Kent	First/last-mile roads (Vickers Dr) in Milford	Last-mile	25	103	2.7	4.1	60%	24%	16%	Morning
D-27	Kent	US-13/SR 6/N Dupont Blvd in Smyrna	Corridor Shoulder	20	66	0.8	3.3	75%	15%	10%	Evening, Overnight
D-28	New Castle	First/last-mile roads (Industrial Dr, Tower Ln, off N Cass St) in Middletown	Last-mile	18	61	1.0	3.4	61%	22%	17%	Morning, Afternoon

Map Marker	County	Location Description	Type	Total Count of Undesignated Stops	Total Duration of Undesignated Stops (Hours)	Median Stop Duration (Hours)	Average Stop Duration (Hours)	% of Stops < 3 Hours	% of Stops 3 to 8 Hours	% of Stops > 8 Hours	Period of Day with Highest Number of Undesignated Stops
D-29	Kent	US-13/S Dupont Hwy between Rd 435 and Hammondtown Rd/Williamsville Rd/Rd 116 near Harrington	Corridor Shoulder	16	12	0.6	0.8	100%	0%	0%	Morning, Afternoon
D-30	New Castle	I-95/Delaware Turnpike interchange with SR 896/S College Ave near Newark	Last-mile	14	43	1.7	3.1	64%	29%	7%	Recurring
D-31	Kent	US-13/S Dupont Hwy between Lochmeath Way and Voshells Mill Starr Hill Rd near Dover	Last-mile	14	49	1.4	3.5	71%	14%	14%	Recurring
D-32	New Castle	SR 1 interchange with Pole Bridge Rd at Exit 142 near Odessa	On/Off Ramp	12	28	0.7	2.3	83%	0%	17%	Recurring

Source: CPCS analysis of INRIX, Trucker Path.

4.3.1 Identifying Reasons for Undesignated Parking

Truck drivers may choose to park in undesignated locations if they have difficulty finding truck parking as they near the end of their HOS and/or as they stage for shipper or receiver appointments. Using the indicators in Figure 26 below, a comparison of information across clusters provides insight into why truck drivers are parking in these undesignated locations.

Figure 26: Indicators to Identify Reason for Truck Parking

	Long HOS Break	Staging
Stop Duration	Over 7 hours	Often no more than a few hours
Location	Any, may seek amenities	Near origin/destination
Period of Day	Overnight	Business day

Undesignated parking for periods over 7 hours is likely due to truck drivers taking all or a portion of the required 10 consecutive hours off-duty as required by HOS rules. HOS rules also allow drivers to split their long break into two periods, with the latest change to HOS regulations allowing drivers to meet the minimum 10 hours off-duty if they meet the following criteria: one off-duty period that is at least 2 hours, a second off-duty period spent in the sleeper berth that is at least 7 hours, and the total time off-duty is 10 hours. Parking for longer HOS break requirements often occurs during overnight hours. While drivers may park at any location, they may seek locations with amenities such as restrooms and food for their long HOS break. For instance, at cluster D-1, which is located at the Biden Welcome Center rest area, over 30 percent of undesignated stops have a duration of over 8 hours and the highest number of undesignated stops occur overnight. This indicates truck drivers parking in undesignated locations at cluster D-1 are doing so to fulfill their long HOS break requirements overnight. Undesignated parking for a shorter HOS break requirement (30-minute driving break or 2-3 hours off-duty as part of the split sleeper berth provision) is indicated by a shorter stop duration, ranging from 30 minutes to a few hours. Parking for a shorter HOS break may occur at any location, making it difficult to distinguish from staging.

Undesignated parking for staging is often indicated by location, as truck drivers stage near their origin/destination on last-mile corridors and in urban areas near freight generators. Staging can take place at any time and the total duration varies, but often is no more than a few hours. Parking for staging occurs throughout the business day, beginning in the morning hours, as shipper/receiver appointments occur. For example, at cluster D-22, almost 70 percent of undesignated stops have a duration of less than 3 hours and the highest number of undesignated stops occur in the morning and afternoon.

There may be a mix of undesignated parking for both HOS break requirements and for staging within a cluster as well. In some cases, truck drivers simultaneously stage overnight for early morning appointments and fulfill a longer HOS stop requirement. For instance, at cluster D-18, over 20 percent of undesignated stops have a duration of over 8 hours, with the highest number of truck stops occurring during both the overnight and morning periods. Another cluster representing a mix is cluster D-7, with truck stop durations ranging from less than 3 hours, 3 to 8 hours, and over 8 hours and undesignated truck parking recurring at several hours of the day and night.

The locations, magnitude, and drivers of undesignated parking provide insight into Delaware's truck parking issues, and they form the basis of the subsequent SWOT identification for truck parking in the state.

5 Safety Impacts

5.1 Introduction

An imbalance in the supply of and demand for truck parking spaces can lead to safety issues for truck drivers, as well as for other drivers and the public. If fatigued drivers cannot find safe parking for rest, they are faced with a difficult choice: continue driving while fatigued and/or beyond their HOS, or park at an undesignated location, which may be along a highway or ramp shoulder or at another unsafe or unsecure area. These situations all pose serious safety and security hazards to both truck drivers and other road users. The risks associated with fatigued drivers and undesignated truck parking affect safety in the following ways:

- **Crashes with trucks parked at undesignated locations:** Trucks parked in undesignated areas are a safety hazard to both truck drivers and other highway users. Among Delaware's severe truck-involved crashes, trucks parked on Delaware corridor shoulders have been involved in at least two fatal crashes in the last decade – one in 2014 and one in 2020.[8] These fatal crashes demonstrate the risk of undesignated truck parking, particularly on high traffic corridors.

- **Crashes that occur due to fatigued driving:** As truck drivers drive beyond their HOS, truck drivers may become be fatigued, losing the ability to stay vigilant and appropriately time their psychomotor and cognitive responses. Breaks at certain intervals can reduce task monotony and increase driver alertness.[9]

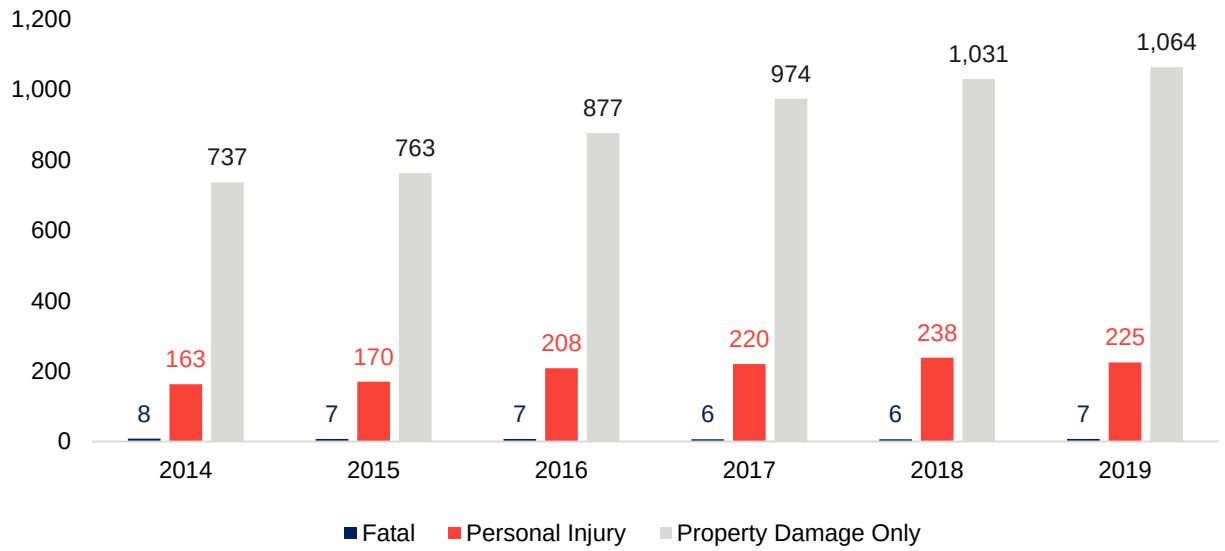
5.2 Truck/Trailer Crashes

Between 2014 and 2019, over 6,700 crashes in Delaware involved trucks/trailers. Of these crashes, 41 resulted in fatality (0.6 percent), 1,224 resulted in personal injury (18.2 percent), and 5,446 in property damage only (81.1 percent). During this time, truck/trailer-involved crashes increased by 42.7 percent in Delaware, from 908 crashes in 2014 to 1,296 crashes in 2019. Meanwhile, the number of fatality crashes has remained steady. These trends are illustrated in Figure 27 below.

[8] NBC Philadelphia, Man Injured in Accident With Tractor-Trailer Dies, January 9, 2014, https://www.nbcphiladelphia.com/news/local/delaware-man-injured-in-accident-with-tractor-trailer-dies/74928/; NBC Philadelphia, Deadly Wreck Slows I-95 in Delaware for Hours, December 7, 2020, https://www.nbcphiladelphia.com/news/transportation-and-transit/wreck-slows-i-95-in-delaware/2623391/; News Break, Woman killed after car hits tractor-trailer on Interstate 95 in Delaware, December 12, 2020, https://www.newsbreak.com/delaware/new-castle/news/2120177714665/woman-killed-after-car-hits-tractor-trailer-on-interstate-95-in-delaware.

[9] Commercial Motor Vehicle Driver Fatigue, Long-Term Health, and Highway Safety, The National Academies Press, 2016, ISBN 978-0-309-39252-5 | DOI 10.17226/21921.

Figure 27: Crashes Involving a Truck-Trailer (2014-2019)



Source: Delaware DOT (2014-2019). Note: One record from 2017 did not receive a classification for fatal, personal injury, or property damage only.

Among truck/trailer-involved crashes between 2014 and 2019, 27.3 percent were classified as "driver inattention; distraction; or fatigue." Meanwhile, in 0.3 percent of all truck/trailer-involved crashes, the harmful event was related to an "illegally parked motor vehicle." However, the cause of the crash identified in the data could be attributed to any vehicle involved in the crash, not necessarily the truck/trailer. A review of individual crash reports would need to be conducted in order to identify the number and severity of crashes directly related to truck parking.

Figure 28 below displays truck/trailer-involved crashes between 2014 and 2019 in Delaware, and Figure 29 compares these truck/trailer-involved crashes to truck volume in the state. As illustrated, crashes and fatalities are most concentrated in northern Delaware – in Wilmington and along I-95, I-295, and I-495 – which is also where truck volume, as measured by annual average daily traffic (AADT), is highest in the state. Similarly, additional crashes and fatalities are also concentrated along other high AADT corridors – US 301, US 13, and US 113, and SR 1.

Figure 28: Truck/Trailer Crashes (2014-2019)

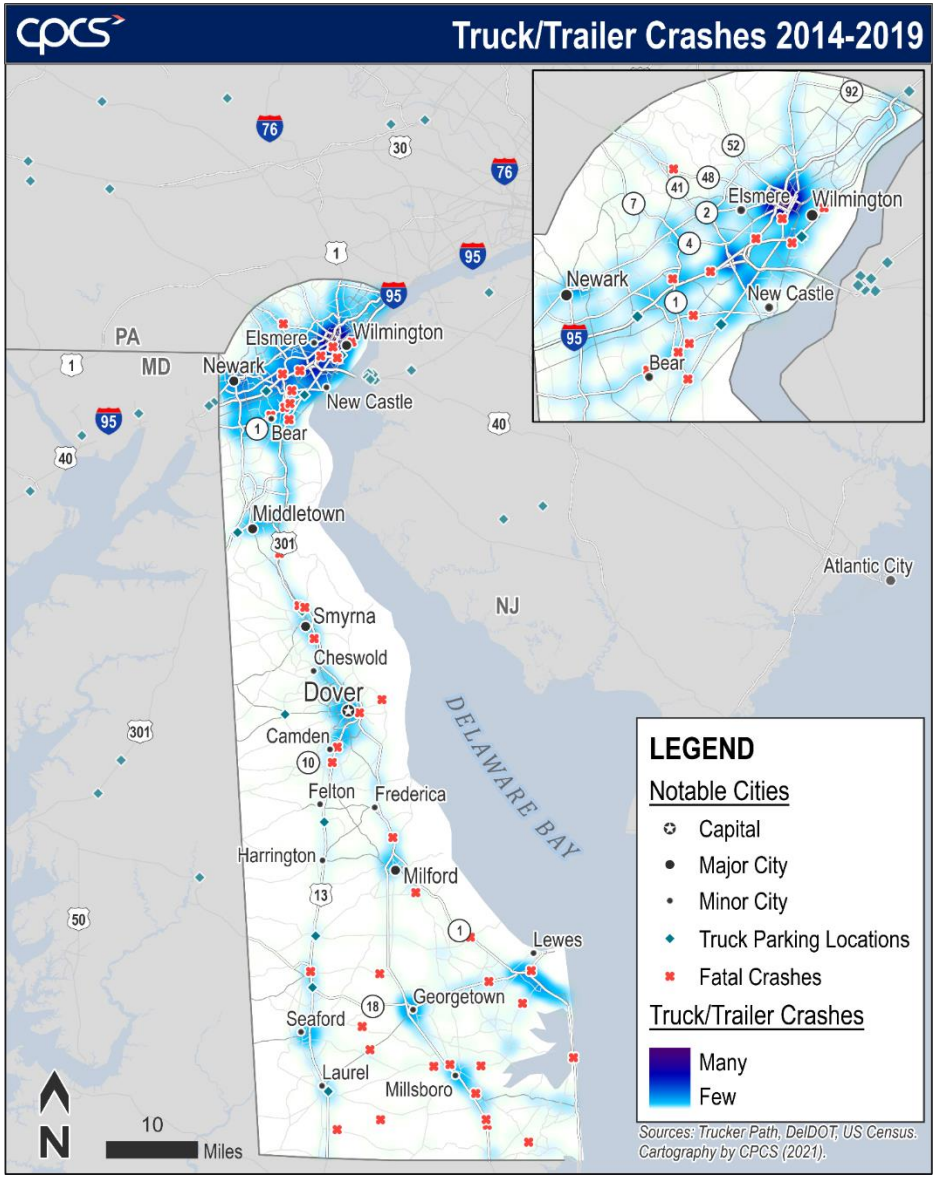
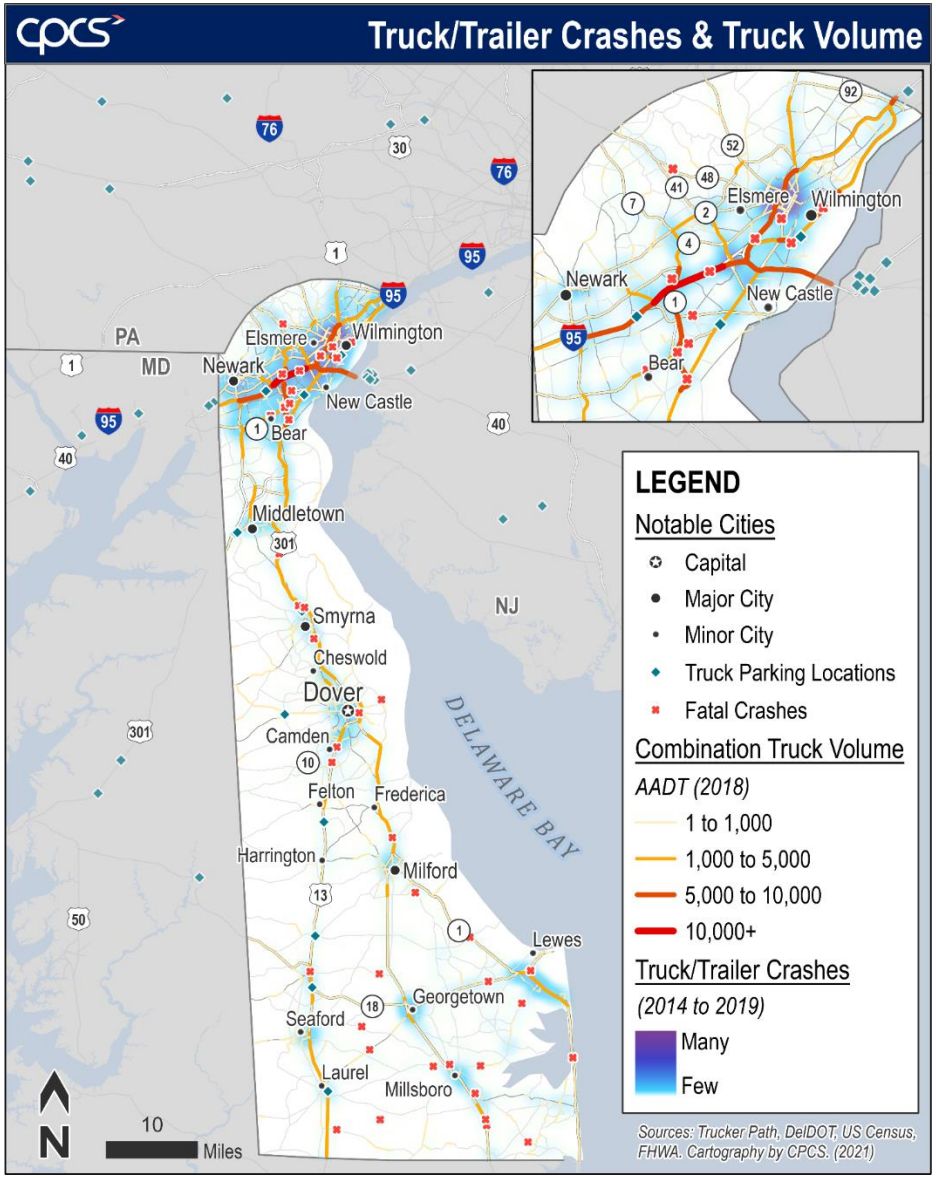


Figure 29: Truck/Trailer Crashes (2014-2019) and Truck Volume (2018)



5.3 Truck Driver Violations

The FMCSA's HOS regulations place specific limits on the number of hours that truck drivers are allowed to be on-duty and drive, and require drivers to have time off-duty, in order to improve safety for truck drivers and other road users. If truck drivers violate HOS regulations, they are subject to a range of penalties, including written warnings, fines, and putting a driver out of service.

FMCSA collects roadside inspection and vehicle violation data at the national and state levels. Between 2017 and 2020, 12,500 roadside violations were recorded for trucks in Delaware, with just over 2 percent of these violations related to HOS regulations. As detailed in Figure 30, the majority of HOS violations relate to driving beyond the 14-hour on-duty period. This is followed by violations for driving beyond the 11-hour driving limit. These violations indicate the presence of safety hazards and the potential for crashes in Delaware due to fatigued drivers.

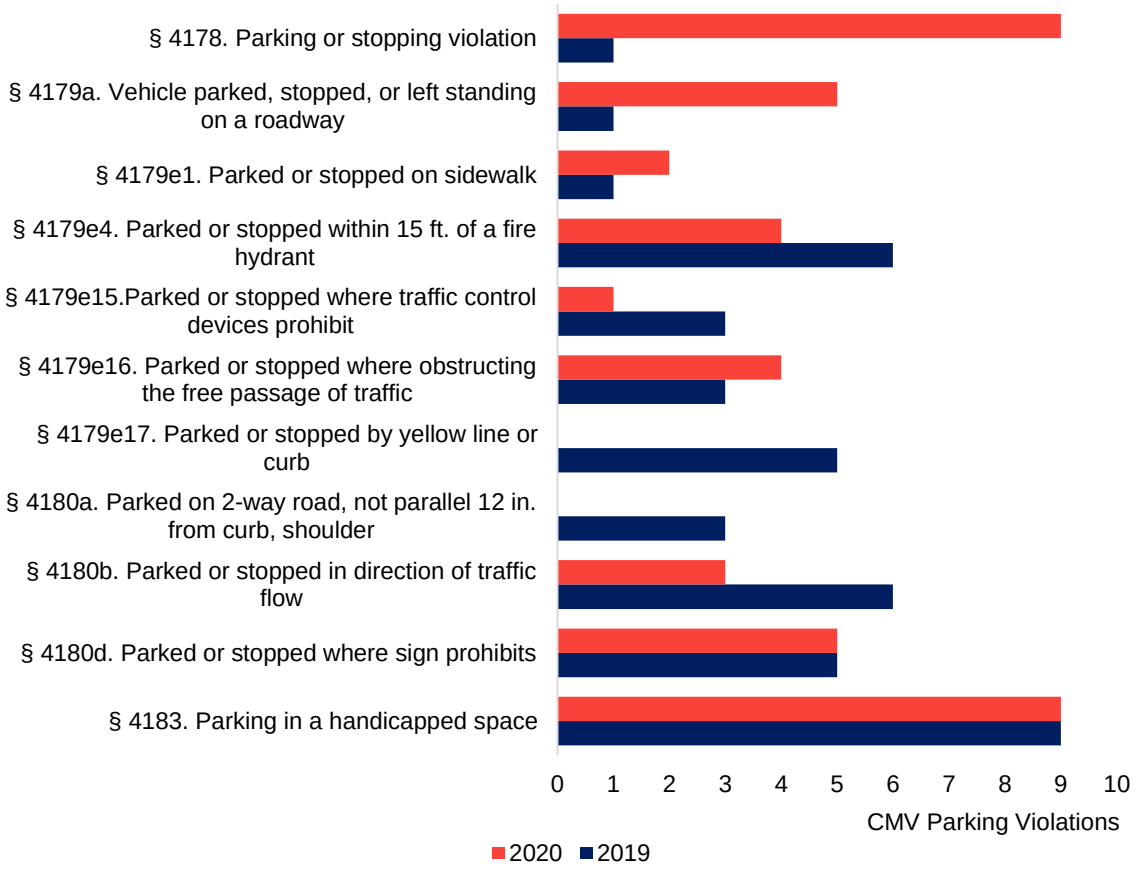
Figure 30: FMCSA Records of HOS Violations in Delaware (2017-2020)

Violation	No. of Violations	Percent of Total Violations
Driving beyond 14-hour duty period	116	0.93%
Driving beyond 11-hour driving limit	59	0.47%
Driving beyond 14-hour duty period – Nominal Violation	45	0.36%
Driving beyond 11-hour driving limit in a 14-hour period – Nominal Violation	14	0.11%
Driving beyond 8-hour driving limit since the end of the last on duty, off-duty, or sleeper period of at least 30 minutes	14	0.11%
Driving after 70 hours on duty in an 8-day period	6	0.05%
Driving after being declared out-of-service for HOS violation(s)	2	0.02%
Driving after 70 hours on duty in an 8-day period – Nominal Violation	0	0.00%
Driving after 60 hours on duty in a 7-day period	0	0.00%
Total	**256**	**2.05%**

Source: FMCSA Motor Carrier Management Information System (MCMIS) as of 1/29/2021, 2017-2020

Figure 31 details the number of CMV parking violations in Delaware for 2019 and 2020 by statute. Appendix A provides further detail on the select statutes by which these violations are classified. Note that while the CMV parking violations data identifies about 40 annual parking violations for 2019 and 2020, the Project Team identified hundreds of undesignated truck stops during the 12-week period of truck GPS data analyzed, suggesting that CMV parking violations do not represent the full range of undesignated parking occurring in Delaware.

Figure 31: CMV Parking Violations by Statute (2019-2020)



Source: CPCS analysis of CMV Parking Violation Data (2019-2020), Delaware State Police

Figure 32 below maps these CMV parking violations, and Figure 33 further compares the location of violations to first/last-mile connectors[10] in the state, which indicate the presence of a freight-generating facility.

[10] First/last-mile connectors identified as part of the WILMAPCO Delaware Statewide First/Final Mile Network Study.

Figure 32: Commercial Vehicle Parking Violations Identified by Delaware Safety Enforcement (2019-2020)

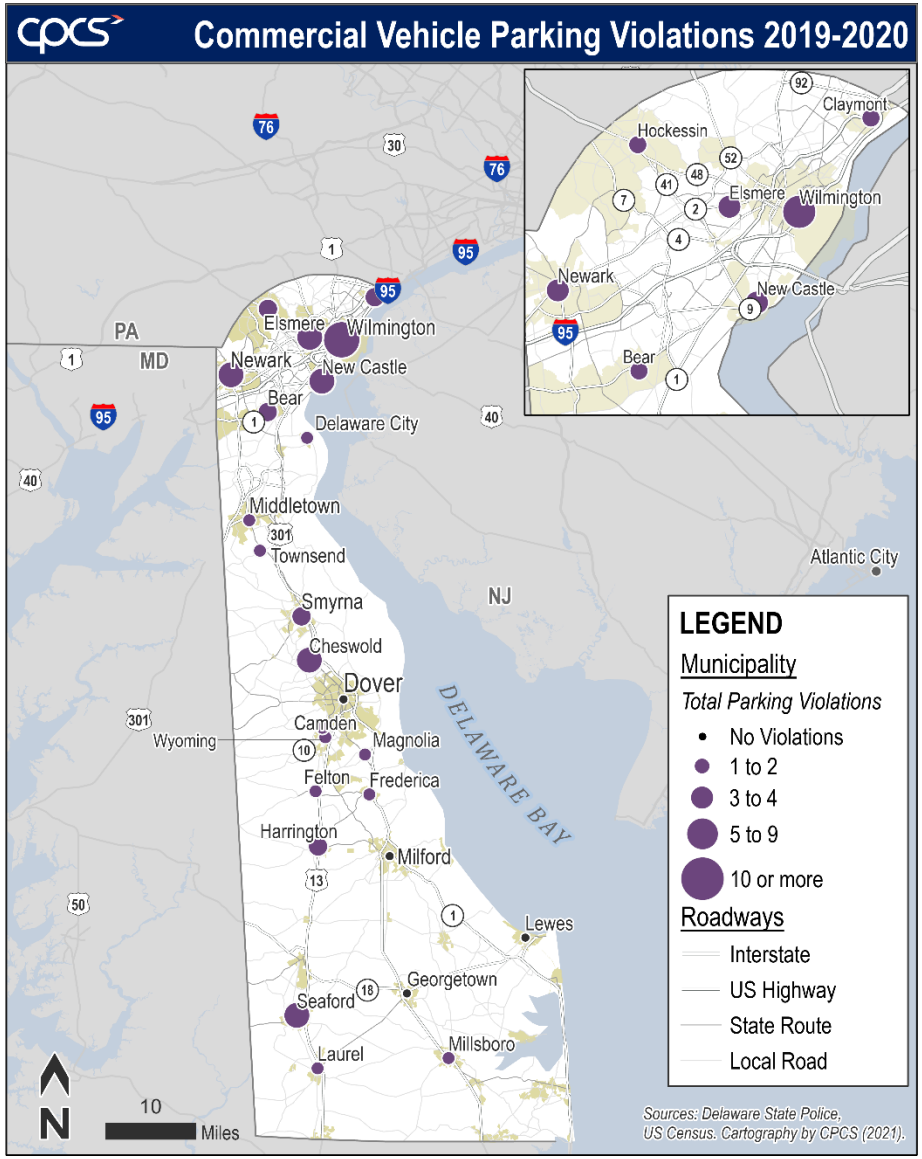
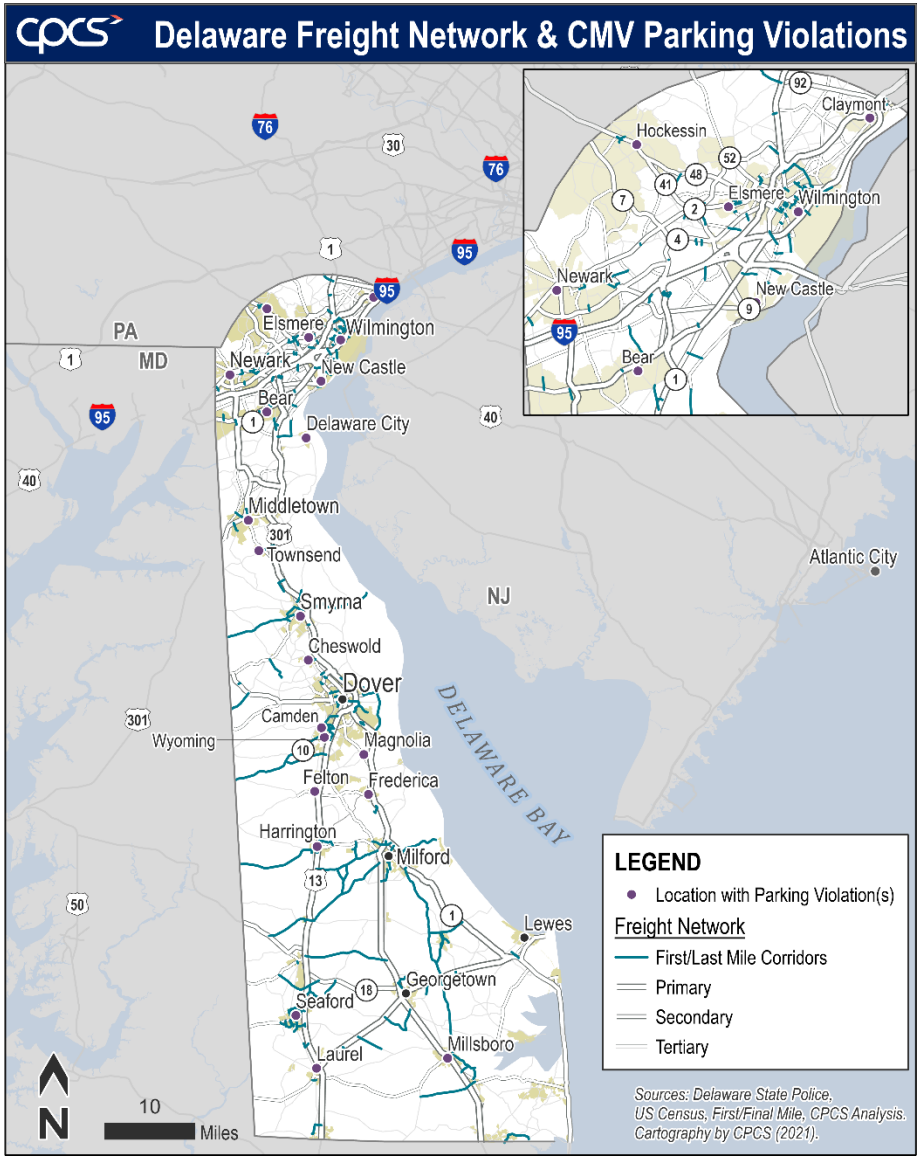


Figure 33: Commercial Vehicle Parking Violations Identified by Delaware Safety Enforcement (2019-2020) and Freight Network (2020)



6 Statewide Truck Parking Trends

6.1 Introduction

The analysis of truck parking supply (inventory) and demand (utilization) provides insight into the current state of truck parking in Delaware. The identification of undesignated truck parking in the state serves as the most noticeable indication of a truck parking issue. This imbalance between truck parking supply and demand in Delaware has negative impacts on the economy, safety, infrastructure, and quality of life.

After initial data analysis, the Project Team engaged in two forms of stakeholder outreach to validate and obtain additional feedback regarding truck parking and associated issues in Delaware.

- **Truck Parking Focus Group:** On March 11, 2021, DelDOT and WILMAPCO, in coordination with the Project Team, hosted a Truck Parking Focus Group Meeting to present initial findings on Delaware's truck parking inventory, utilization, and locations of undesignated parking. During the focus group, 15 stakeholders, representing public agencies (at the state, MPO, and county level), private industry (trucking and other), and educational institutions, had the opportunity to provide feedback and ask questions on these results. Stakeholders also provided input regarding Delaware's most pressing truck parking issues, needs, and potential opportunities. Appendix B provides stakeholder responses collected through polling questions during the meeting.

- **Wikimap:** From March 11 to April 1, 2021, state, local, and industry stakeholders had the opportunity to provide feedback on truck parking issues in Delaware through an online mapping tool (Wikimap). This interactive map allowed stakeholders to "drop a pin" on the map in order to identify locations of undesignated parking in the state. The Wikimap received eight total responses during this time. Appendix C provides a list of these responses.

The top truck parking trends in Delaware, informed by data analysis and stakeholder input, are presented in the following section. Building off the data analysis, stakeholder feedback, and top trends, the Project Team identified the strengths, weaknesses, opportunities, and threats for truck parking in Delaware.

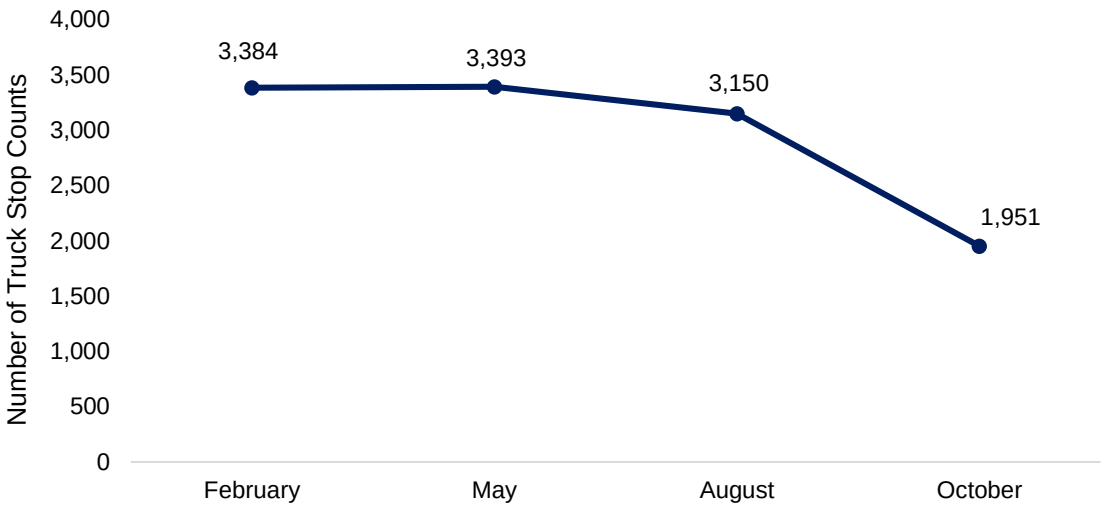
6.2 Statewide Truck Parking Trends

6.2.1 Seasonality Impacts on Truck Parking Demand

Seasonal trends, driven by tourism, agriculture, and weather events, impact truck traffic moving through Delaware. As a result, these trends also influence truck parking demand in the region.

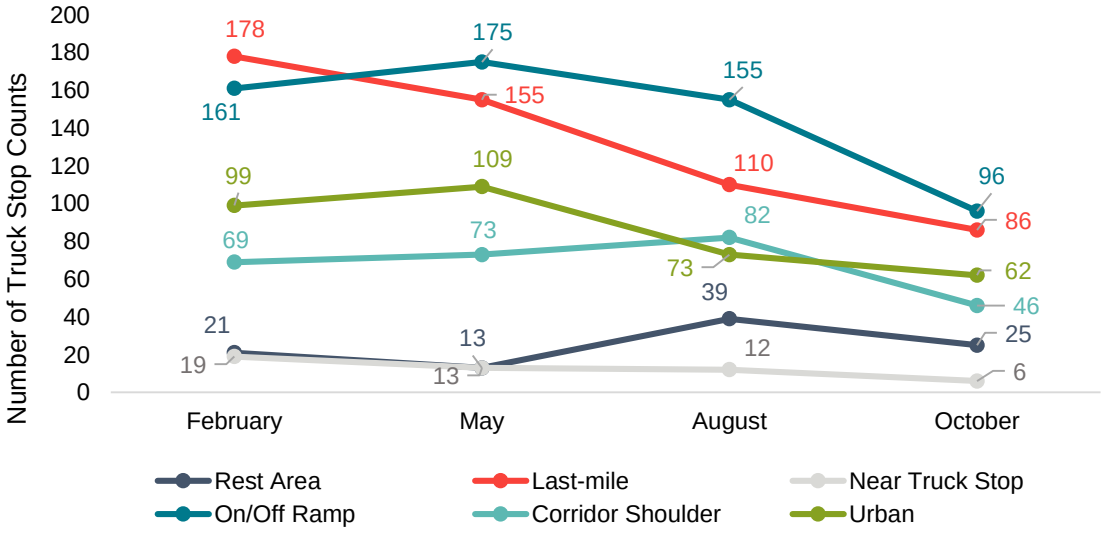
The following figures illustrate seasonal differences in truck parking in Delaware at both designated truck parking locations and undesignated truck parking clusters. This analysis is based on variation in INRIX truck stops data collected across four months in 2019 – February, May, August, and October. Figure 34 displays the number of truck parking counts at designated truck parking locations, and Figure 35 displays the number of undesignated truck parking counts at identified undesignated clusters. At both designated parking locations and undesignated clusters statewide, the number of truck stops in October is typically lower than in February, May, and August. Appendix D further provides truck stop counts by month for each designated truck parking location and undesignated truck parking cluster.

Figure 34: Designated Parking Truck Stop Counts by Month



Source: CPCS analysis of FHWA, Trucker Path.

Figure 35: Undesignated Parking Truck Stop Counts by Type and Month



Source: CPCS analysis of INRIX, Trucker Path.

6.2.2 Urban Utilization

Truck parking utilization in Delaware is highest in urban areas, particularly in Wilmington, New Castle, Smyrna, Dover, and Seaford. Although utilization is yet to reach full capacity in Delaware, truck parking capacity in these areas are the most strained in the state, nearing full utilization in the peak early morning hours of 2 - 3 am. Among urban areas, New Castle County experiences the highest density of strained capacity, with almost full utilization occurring along I-95.

6.2.3 Insufficient and/or Lack of Capacity

Insufficient and/or a lack of truck parking capacity was a top issue cited by stakeholders during the focus group. High truck parking utilization at Delaware's two public rest areas – the Smyrna Rest Area

on US 13 and the Biden Welcome Center on I-95 – coupled with a high density of nearby undesignated parking, further indicates insufficient truck parking along Delaware's key freight corridors.

Truck parking is particularly limited in central and southern Delaware, with five private truck parking facilities located along US 13 within the two counties. In Kent and Sussex counties, several of these identified truck parking locations do not permit overnight parking. Further, there are no truck parking locations on SR 1 south of Smyrna. The private locations in central and southern Delaware that do allow overnight parking require fees for parking at these locations. As truck parking fees are often not covered by motor carriers, truck drivers typically will avoid paying out of pocket for overnight truck parking.[11]

6.2.4 Barriers to Facility Access

Barriers to facility access may include physical barriers, such as difficulty accessing a facility, and information barriers, such as lack of knowledge about a facility and its truck parking availability. At Smyrna Rest Area, stakeholders noted trucks often park in the undesignated shoulders of the southbound SR 1 on-ramp to US 13, which is only a few minutes' drive from the Smyrna Rest Area. Truck GPS data further demonstrates a density of undesignated truck parking at this specific location. Physical factors – Smyrna Rest Area's location off of SR 1 – as well as information factors – lack of knowledge about truck parking availability at the rest area – may be further explored to determine the role of these factors in undesignated parking at that location.

Stakeholders also noted that although trip planning tools, such as Trucker Path, may provide information about truck parking locations and availability, not all truck drivers may be familiar with using these applications and technologies for trip planning.

6.2.5 Undesignated Truck Parking

The Project Team identified 32 clusters of high undesignated truck parking density in Delaware. An analysis of these clusters indicates undesignated truck parking occurs in Delaware when truck drivers are unable to find truck parking for HOS break requirements and for staging. Truck drivers are more likely to park in undesignated areas near public rest areas for longer, overnight HOS breaks, while they are more likely to park in undesignated areas near freight generators, on last-mile corridors, and in urban areas, for staging. At some locations, truck drivers also park overnight in undesignated locations on last-mile corridors. Undesignated parking at different times of the day and for varied durations occurred on corridor and on/off ramp shoulders as well, with several clusters located along I-95, I-295, I-495, US 13, US 113, and SR 1.

Stakeholders also noted that parking for HOS break requirements is often needed near I-95, a key freight corridor for long-haul trips. Meanwhile, parking for staging is needed along first/final-mile connections statewide. These patterns of undesignated truck parking in Delaware have negative impacts on the state's economy, safety, infrastructure, and quality of life.

[11] Trucker Path, Truck Parking Report, July 2018, http://files.truckerpath.com/web/trucker-path-parking-white-paper-2018.pdf; ATRI, "Managing Critical Truck Parking Tech Memo #1: Commercial Driver Perspectives on Truck Parking," September 2015, https://truckingresearch.org/wp-content/uploads/2015/09/Managing-Critical-Truck-Parking-Tech-Memo-1-FINAL-09-2015.pdf.

6.2.6 Increasing Goods Movement

The growth of freight is outpacing the addition of truck parking capacity in Delaware. Expected future increases of goods movement in Delaware are driven by general increased demand for freight, as well as growth in the state's freight-reliant industries and the proposed Edgemoor port in Wilmington.

The proposed port expansion is located in Wilmington, where truck parking utilization is the highest in the state. This increased volume and demand will also increase the need for staging locations in an area where truck paring capacity is already strained. Without additional truck parking capacity, the Wilmington area is likely to experience an increase in truck drivers parking in undesignated locations and idling without sufficient parking. Additionally, stakeholders note increasing manufacturing and warehousing development statewide will increase truck traffic in central and southern Delaware, areas with already limited options for truck parking.

6.3 Strengths, Weaknesses, Opportunities, and Threats (SWOT)

The analysis presented in this Technical Memo, in addition to stakeholder input obtained through the Truck Parking Focus Group and online Wikimap, forms the basis of the SWOT identification for truck parking in Delaware, as presented in Figure 36 below. The SWOT will inform the future identification of recommendations and implementation steps to address truck parking issues and needs in the state.

Figure 36: Delaware's Truck Parking SWOT Analysis

Strengths

- Truck parking utilization is not at its full capacity at all facilities in the state, even during peak hours. Utilization remains low in many areas during non-peak hours.
- Limited undesignated parking observations, with relatively low counts of undesignated stops at several clusters.
- Biden Welcome Center rest area is the result of a public-private partnership.

Weaknesses

- Limited geographic coverage of truck parking facilities, with a notable absence of truck parking locations in southeast Delaware.
- Limited overnight truck parking locations in central and southern Delaware (Kent and Sussex Counties), as select private facilities do not allow overnight truck parking.
- Insufficient space for staging near Port of Wilmington and Edgemoor.
- High utilization of truck parking facilities during peak hours in urban areas (Wilmington, New Castle, Smyrna, Dover, and Seaford).
- Undesignated parking clusters at and near public rest areas (Biden Welcome Center and Smyrna Rest Area), in urban areas (Wilmington, New Castle, Smyrna, and Dover), and along key freight corridors (I-95, I-295, I-495, US 13, US 113, SR 1).
- Crash data reporting limitations, with limited insight on truck parking-related crashes from statewide truck/trailer-involved crash data.

Opportunities

- Continue to monitor, discuss, and conduct outreach on truck parking in the state and region (e.g. through Standing Committee, champion, outreach and education, etc.), in order to identify changes in truck parking needs and issues.
- Integrate truck parking into statewide and local planning to actively prepare for and mitigate against increasing freight development, truck traffic, and associated demand for parking.
- Explore truck parking capacity expansion near undesignated parking clusters, particularly where vacant lots and/or state-owned land have been identified nearby.
- Explore truck parking capacity expansion near existing truck parking facilities, such as through a public-private partnership.
- In areas with limited existing overnight parking (in Kent and Sussex Counties), explore new locations for truck parking facility development, such as through a public-private partnership.
- Disseminate information about truck parking locations and/or parking availability to truck drivers through static and/or dynamic signs, particularly at existing truck parking locations with low utilization.
- Collaborate with local agencies to identify and address truck parking issues, particularly in urban areas.
- Collaborate with local agencies and freight-reliant industries (e.g. manufacturing, warehousing) to promote the availability of designated truck parking near new freight-generating developments.
- Coordinate truck parking planning and signage at state borders with neighboring state DOTs.
- Collaborate with the trucking industry to provide truck parking facility updates, promote the use of underutilized facilities, and gather information on truck parking needs and issues in Delaware and the surrounding region.

Threats

- Increasing goods movement, driven by the growth of freight-reliant industries and potential port expansion.
- Need for expanded access to truck parking and staging in urban areas, where capacity is most strained but land is difficult and expensive to acquire.
- “Not In My Backyard” (NIMBY) community concerns about idling, noise and air emissions, and real and perceived safety hazards pose a challenge to the expansion of truck parking.
- Lack of truck parking-dedicated funding.
- Lack of clear public and private roles to address truck parking issues.

7 Conclusion and Next Steps

This Technical Memo presents Delaware's truck parking inventory, analyzes truck parking demand, and identifies locations of undesignated truck parking to understand truck parking trends and identify strengths, weaknesses, opportunities, and threats for truck parking in the state.

The next phase of this study will include the development of strategies and solutions that best address locations with the greatest truck parking needs in Delaware. Solutions will include truck parking projects, policies, and partnerships. The focus group will convene a second time in May 2021 to help guide the development of these recommendations. Implementation recommendations will be identified, as well as guidance for each, including implementing agency, appropriate locations for application, best practices, and potential challenges and constraints. High-level costs will be provided for select recommended solutions. These steps, in combination with this technical memo and subsequent technical memos, will form the basis of the Study's strategies and recommendations to meet Delaware's truck parking needs.

Appendix A Delaware Parking Violation Statutes

Appendix A details the select statutes by which Delaware's statewide records of CMV parking violations between 2019 and 2020 are classified.

Delaware's statewide records of CMV parking violations classify violations by the following civil penalty statutes:[12]

§ 4178. Violations of offenses prohibiting stopping, standing or parking.
Any violation of this subchapter or any municipal or county ordinance, code or regulation prohibiting stopping, standing or parking shall be subject to a civil penalty only…

§ 4179. Stopping, standing or parking.

(a) Upon any highway outside of a business or residential district, no person shall stop, park or leave standing any vehicle, whether attended or unattended, upon the roadway, except when necessary to avoid conflict with other traffic or where it is necessary for public utility vehicles to temporarily stop along the highway to make alterations in or repairs to utility facilities, so long as proper traffic-control devices are posted or where it is in compliance with the directions of a police officer or traffic-control device.

…

(e) No person shall stop, stand or park a vehicle, except when necessary to avoid conflict with other traffic or in compliance with the directions of a police officer or traffic-control device, including all state-owned and/or state leased property; in any of the following places: (1) On a sidewalk; … (4) Within 14 feet of a fire hydrant; … (15) At any place where official traffic-control devices prohibit stopping, standing or parking; (16) At any place where such parking, standing or stopping obstructs the free passage of other traffic; (17) Wherever a curb is marked yellow or a yellow line is placed at the edge of a roadway or shoulder; …

§ 4180. Additional parking regulations; penalty

(a) Except as otherwise provided in this section, every vehicle stopped or parked upon a 2-way roadway shall be so stopped or parked with the right-hand wheels parallel to and within 12 inches of the right-hand curb or outside edge of the shoulder.

(b) Except when otherwise provided by local ordinance, every vehicle stopped or parked upon a one-way roadway shall be so stopped or parked parallel to the curb or edge of the roadway, in the direction of authorized traffic movement, with its right-hand wheels within 12 inches of the right-hand curb or outside edge of the shoulder, or its left wheels within 12 inches of the left-hand curb or outside edge of the shoulder.

…

(d) The Department of Transportation may place signs prohibiting or restricting the stopping, standing or parking of vehicles on any highway where, in its opinion, such stopping, standing or parking is dangerous to those using the highways or where the stopping, standing or parking of vehicles would unduly interfere with the free movement of traffic thereon. Such prohibitions or restrictions may be declared to be effective either part or all of the time, and differing limits may be established for different times of the day, for different types of vehicles, for different weather conditions and when other significant factors differ.

…

[12] 21 Del. C. §§ 4178-4180.

Delaware's statewide records of CMV parking violations also classify violations by the following violation statute:[13]

§ 4183. Parking areas for vehicles being used by persons with disabilities.

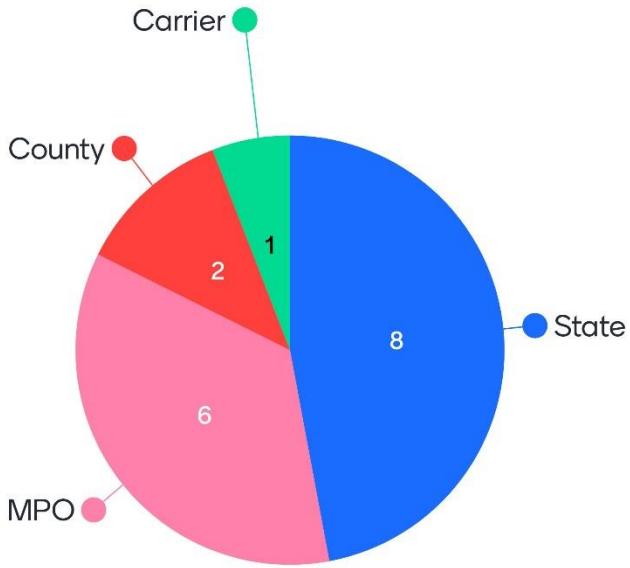
[13] 21 Del. C. §§ 4178-4183.

Appendix B Truck Parking Focus Group

Appendix B provides the stakeholder feedback collected through polling during the March 11, 2021 Truck Parking Focus Group meeting hosted by DelDOT and WILMAPCO, in coordination with the Project Team. Stakeholder responses were collected through Mentimeter, a live-polling platform.

What best describes your industry?

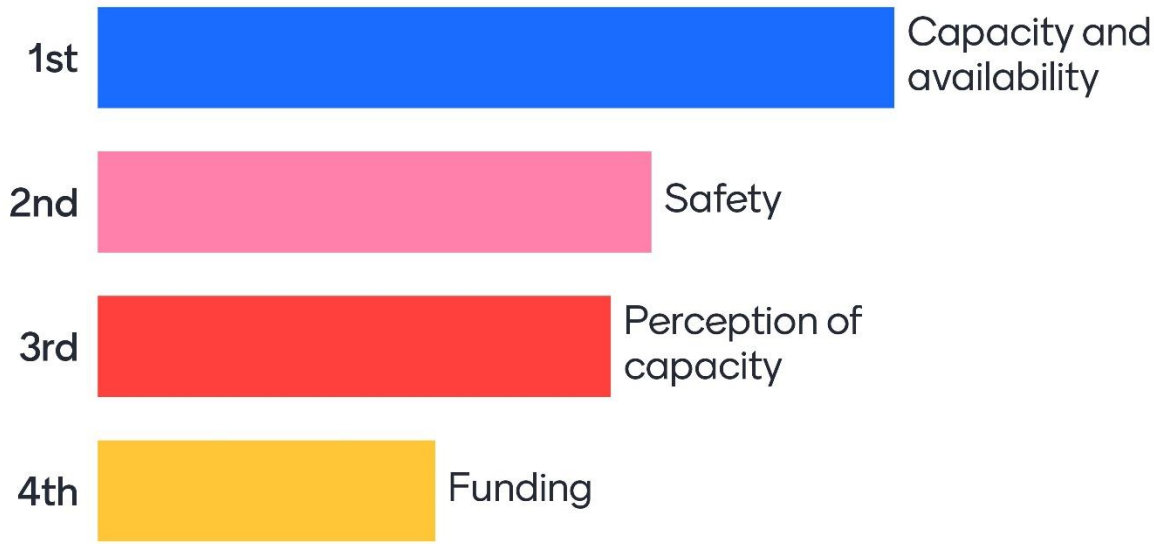
Mentimeter



17

Rank the following truck parking issues:

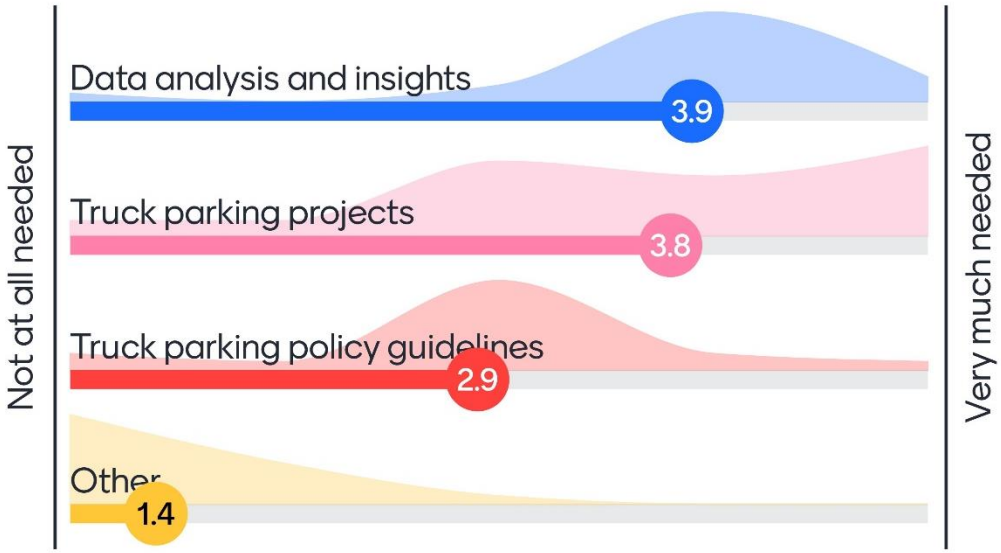
Mentimeter



17

What is most needed to address truck parking challenges?

Mentimeter



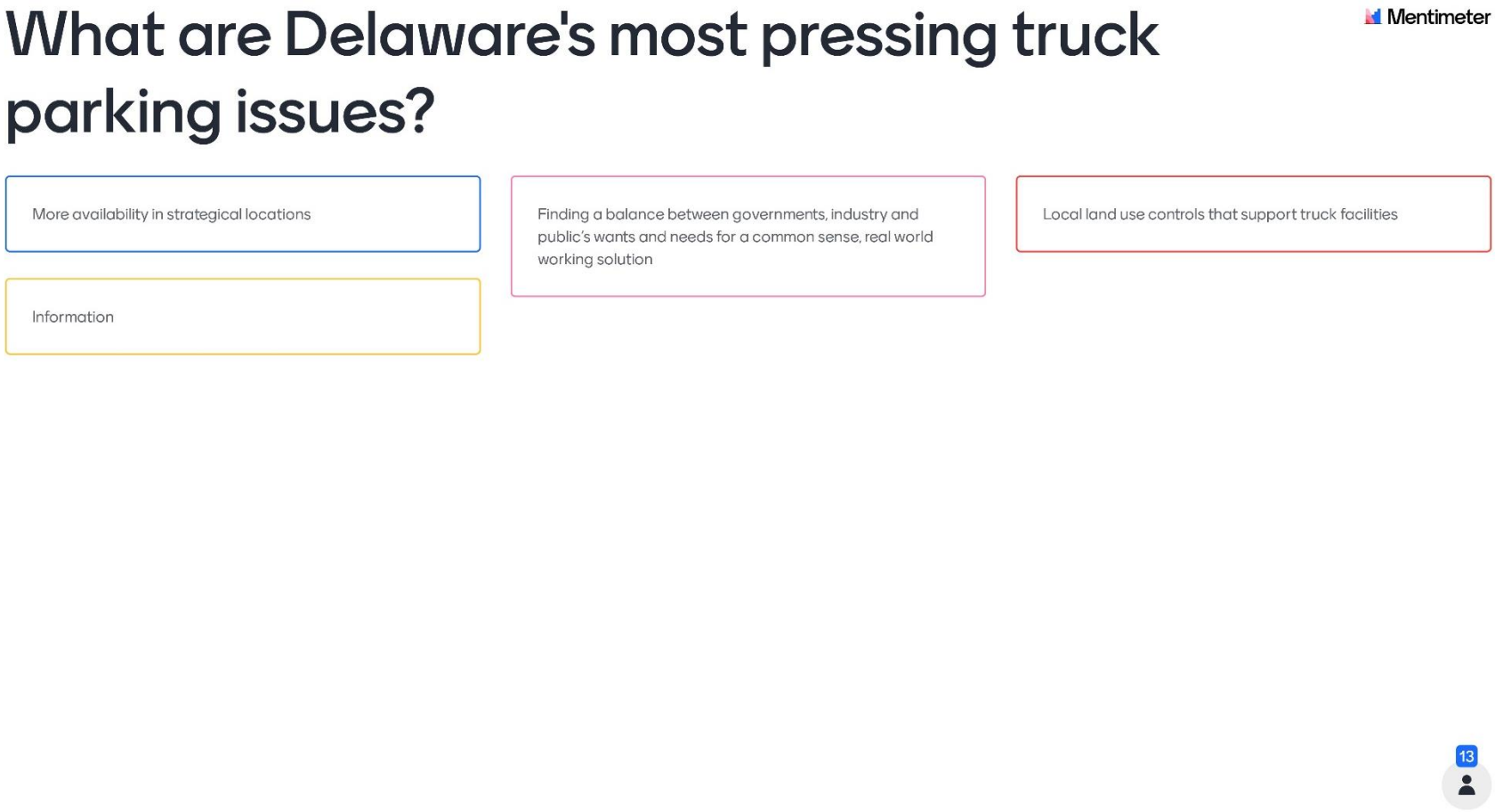
17

What are Delaware's most pressing truck parking issues?

Mentimeter

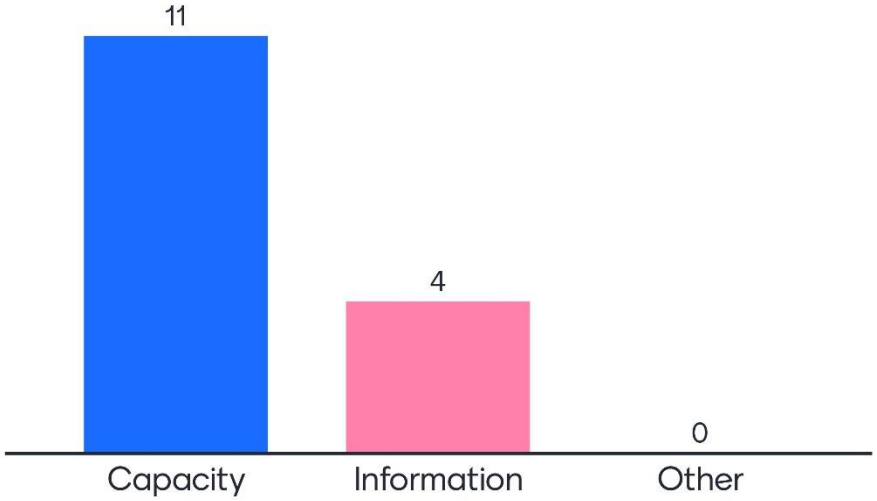
- Central Delaware needs a designated truck parking area
- Lack of parking in general
- Ability to communicate/identify available parking
- Who pays? public or private?
- Having adequate parking spaces and/or methods of letting truckers know where parking is so that they don't have to get caught at the end of their HoS.
- COOPERATION BETWEEN PRIVATE PARKING SUPPLIERS AND DELDOT.
- Lack of parking in Sussex County.
- Safety issues related to trucks parking on ramps and shoulders. In addition to the reasons you mentioned earlier, blocking bike lanes (shoulders) is another safety aspect of this issue.
- Adequate availability in Central Delaware, along Delaware's backbone Rt1. Kent County has attracted multiple manufacturing companies, with an increase in the trucking industry for more opportunity, leading to more local residents needing temp parkin

13


What are Delaware's most pressing truck parking issues?
Mentimeter
More availability in strategical locations
Finding a balance between governments, industry and public's wants and needs for a common sense, real world working solution
Local land use controls that support truck facilities
Information
13

In your opinion, are DE's truck parking issues due to a lack of truck parking spaces (capacity) or info about parking availability (information)?

Mentimeter



15

What do you see as the root causes of truck parking issues in Delaware?

Mentimeter

Increase in Logistic and Distribution and lack of planning for the increase in the past

locally unwanted land use (LULU)

Land value in the north east corridor is not conducive to truck parking. Truck parking doesn't generate the revenue to ultimately justify its existence

Based on some of the discussion so far, lack of training/education on this topic for at least some drivers may be part of the issue.

Lack of commercial influence on public policy to create adequate parking. Public knowledge of landowners around Rt1 of potential for development

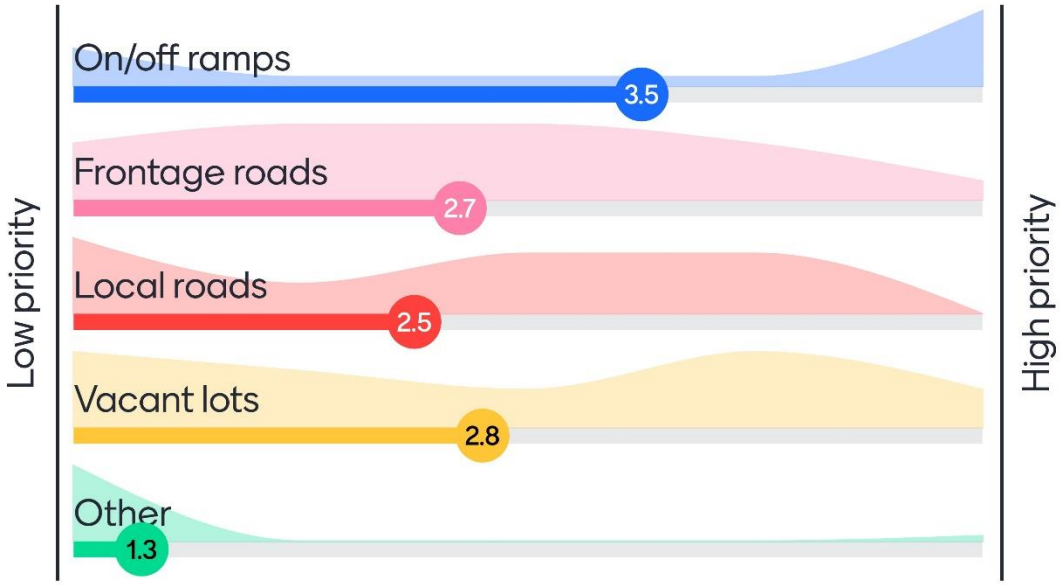
Distribution centers (Walmart, Amazon etc) outpacing additional parking availability. Electronic Hours of Service forcing drivers to rest when hours expire so looking for parking is not an option.

Public disconnect between the need for trucks on the road/parking for them and packages destined for their household/businesses

7

What level of priority should be given to different types of undesignated parking?

Mentimeter



15

What are Delaware's most important truck parking opportunities?

Mentimeter

In attracting Distribution companies - having designated truck parking would be a selling point.

Keeping truck parking in step with changing industries

Coordinating with the private sector to share info and data as to where private facilities may be profitable.

Potential redevelopment of underutilized commercial spaces for truck parking/staging uses

STATE/PUBLIC WORK WITH POTENTIAL/ACTUAL PRIVATE TRUCK PARKING FACILITIES TO CREATE MORE, SAFE PARKING

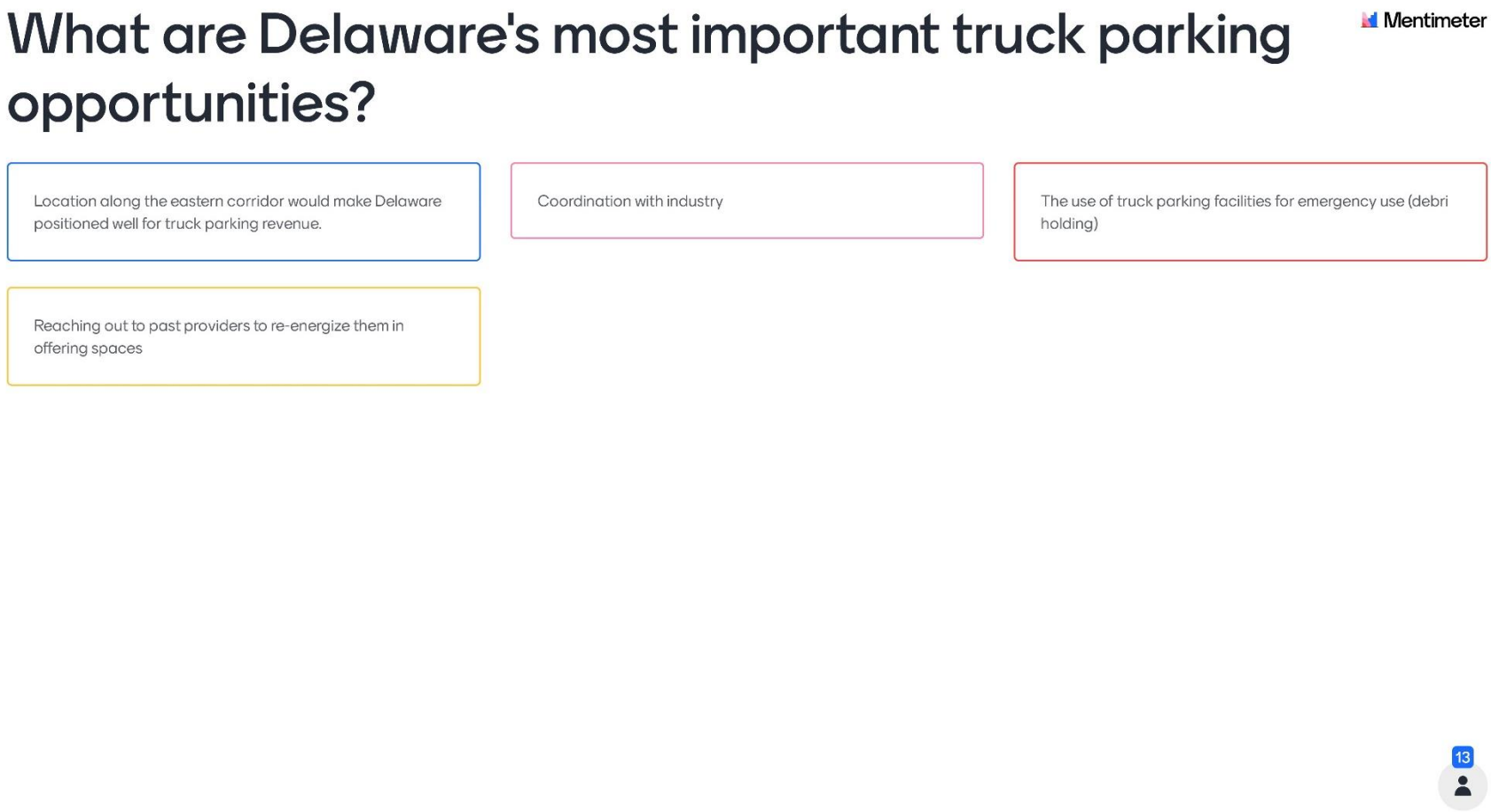
Re purposing vacant lots for designated truck parking

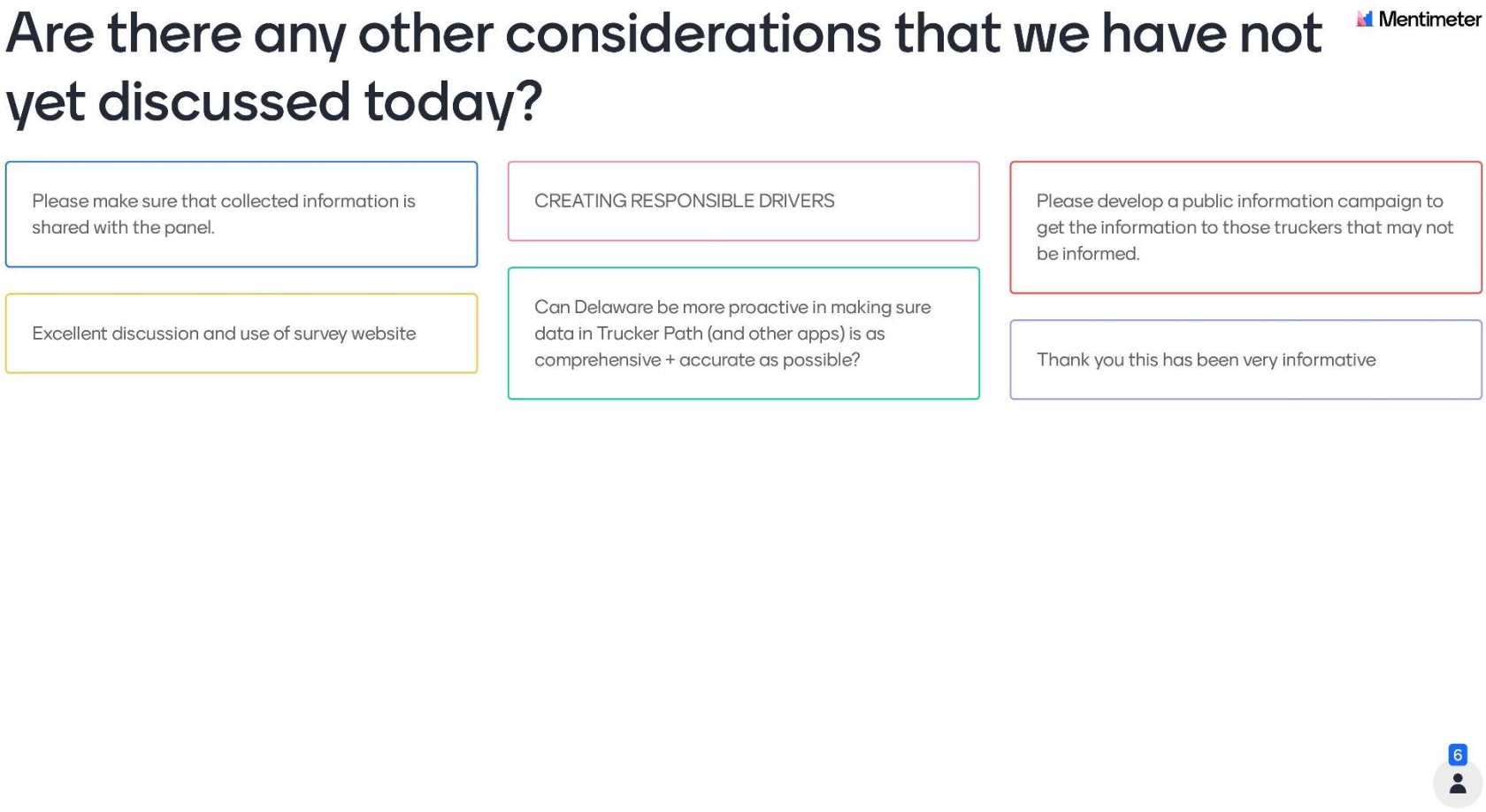
Expansion of open space along undeveloped parcels in northern and southern part of Kent County. Possibly focusing on a single new parking facility in the Dover area along Rt 1

Identifying and dissemination of truck parking to drivers and carriers in the corridor

Considerations with capital projects

13


What are Delaware's most important truck parking opportunities?
Mentimeter
Location along the eastern corridor would make Delaware positioned well for truck parking revenue.
Coordination with industry
The use of truck parking facilities for emergency use (debri holding)
Reaching out to past providers to re-energize them in offering spaces
13


Are there any other considerations that we have not yet discussed today?
Mentimeter
Please make sure that collected information is shared with the panel.
CREATING RESPONSIBLE DRIVERS
Please develop a public information campaign to get the information to those truckers that may not be informed.
Excellent discussion and use of survey website
Can Delaware be more proactive in making sure data in Trucker Path (and other apps) is as comprehensive + accurate as possible?
Thank you this has been very informative
6

Appendix C Truck Parking Study Outreach Wikimap

Appendix C details the stakeholder comments provided on the Wikimap interactive map, open for comment from March 11 to April 1, 2021. Figure 37 illustrates the Wikimap tool and the locations of stakeholder comments, indicated by the dropped pin icons. Figure 38 further details the comments provided, as well as Project Team responses for incorporation of comments into the Delaware Truck Parking Study.

Figure 37: Wikimap Tool

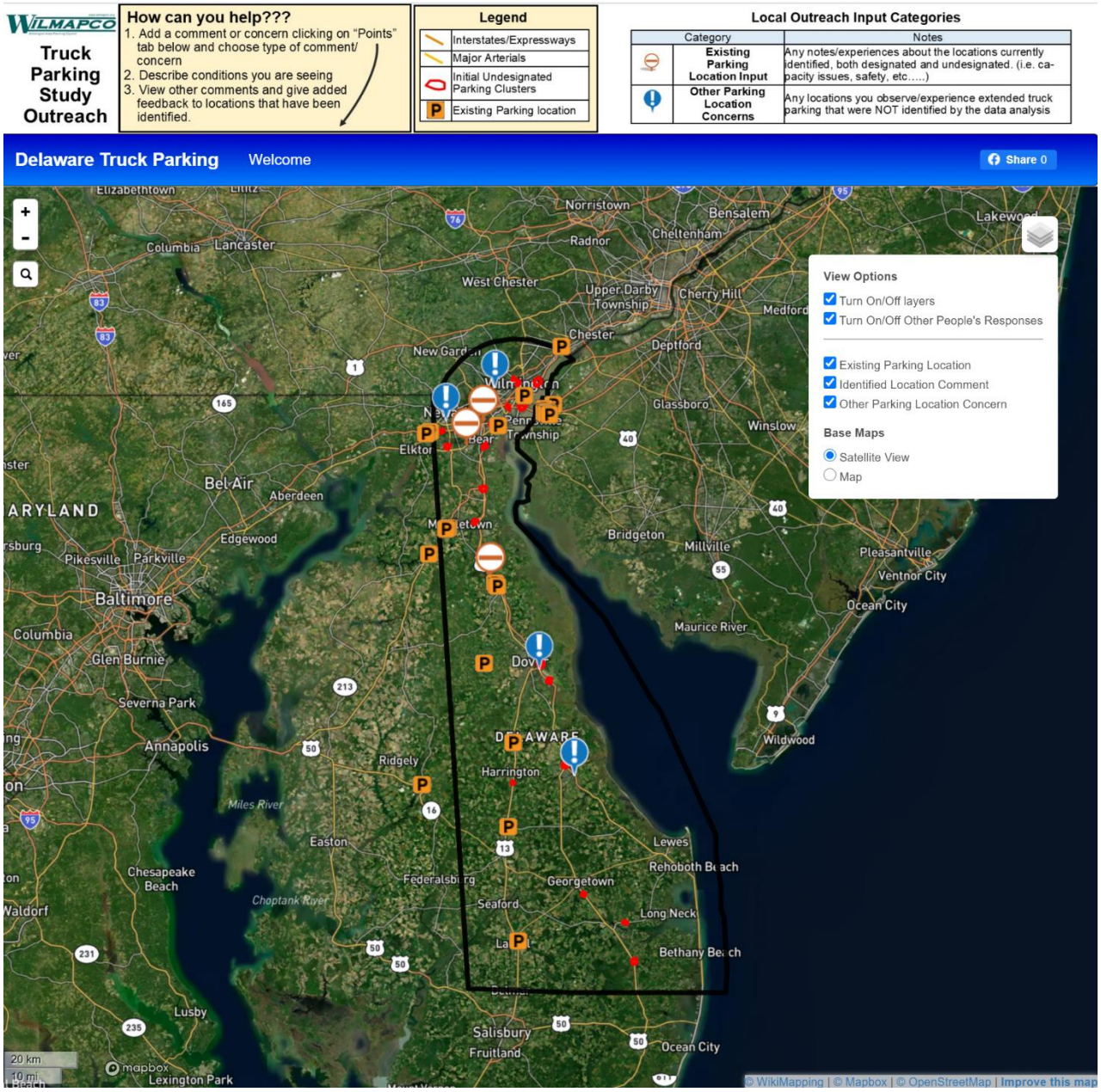


Figure 38: Wikimap Tool Stakeholder Comments and Responses

Location	Comment	Response
SR 141 interchange with SR 41/SR 2 (Kirkwood Hwy.)	N/A	No concern identified
Newark Station	Commercial service vehicles have been parked in train and DART lot overnight especially when the company has a long term project in the area and does not want employees taking the vehicles home	The Delaware Truck Parking Study is focused on addressing long-term truck parking needs for both overnight parking for truck drivers to rest, as well as more localized, shorter-term truck parking and staging needs. This comment is specific to storing commercial service vehicles related to short-term construction, maintenance, or other projects in the area.
SR 273 (Christiana Rd.) just east of SR 1 on/off ramps (Exit 162)	DelDOT has received complaints in the past regarding trucks parking overnight on the shoulder here, where it is posted Emergency Parking Only	Adjacent to undesignated parking cluster D-7.
Porter Rd. just south of US 40	DelDOT recently implemented NO PARKING signs in this area due to complaints about trucks parked here blocking the shoulder, particularly for use of bikes. Trucks have continued to be observed here and police enforcement has occurred.	Truck GPS data does not show a density of undesignated truck parking at this location. However, this location has been noted as an issue area and will be considered when developing recommendations for the Delaware Truck Parking Study.
SB SR 1 ramp to US 13	Trucks often park on the SB SR 1 ramp to SB US 13 at this location	Truck GPS data shows a density of undesignated truck parking at this location. Located within undesignated parking cluster D-5.
NB SR 1 just south of Exit 95	Truck parking occurs nightly on wide shoulder of SR 1	Adjacent to undesignated parking cluster on D-4.
NB SR 1 on-ramp from SR 36 (Cedar Beach Rd.)	Truck parking occurs nightly on this ramp	Adjacent to undesignated parking cluster D-13.
SB SR 1 on-ramp from SR 36 (Cedar Beach Rd.)	Truck parking occurs nightly on this ramp	Adjacent to undesignated parking cluster D-13.

Appendix D Truck Stop Counts by Month

Appendix D provides truck stop counts by month at designated truck parking locations (Figure 39) and at undesignated truck parking clusters (Figure 40). This illustrates seasonal differences in truck parking in Delaware.

Figure 39: Designated Truck Parking Locations – Truck Stop Counts by Month

Public/ Private	February	May	August	October	Trend
Private	363	420	355	289	
Private	123	148	184	93	
Private	342	313	293	179	
Private	120	141	123	71	
Private	74	52	61	45	
Public	999	1,133	959	552	
Public	472	398	378	232	
Private	45	33	66	34	
Private	131	96	64	37	
Private	112	126	104	50	
Private	85	71	67	55	
Private	156	138	124	71	
Private	216	192	212	141	

Private	146	132	160	102	
All	**3,384**	**3,393**	**3,150**	**1,951**	

Source: CPCS analysis for FHWA, Trucker Path.

Figure 40: Undesignated Truck Parking Clusters – Truck Stop Counts by Month

Map Marker	Type	February	May	August	October	Trend
D-1	Rest Area	103	115	107	63	
D-2	Corridor Shoulder	9	13	18	8	
D-3	Last-mile	60	38	11	13	
D-4	On/Off Ramp	13	9	12	9	
D-5	Rest Area	21	13	39	25	
D-6	Near truck stop	19	13	12	6	
D-7	Last-mile	21	31	10	13	
D-8	Corridor Shoulder	3	5	6	5	
D-9	On/Off Ramp	9	8	7	3	
D-10	Last-mile	47	33	29	23	
D-11	Corridor Shoulder	6	10	8	8	
D-12	On/Off Ramp	5	7	2	3	

D-13	On/Off Ramp	15	13	7	7	
D-14	Last-mile	8	8	8	4	
D-15	Corridor Shoulder	7	8	7	2	
D-16	Corridor Shoulder	5	7	11	6	
D-17	Corridor Shoulder	1	5	1	4	
D-18	Last-mile	7	8	5	2	
D-19	Corridor Shoulder	8	5	5	1	
D-20	Urban	99	109	73	62	
D-21	Corridor Shoulder	4	0	8	2	
D-22	Last-mile	13	11	8	10	
D-23	On/Off Ramp	11	21	15	11	
D-24	Corridor Shoulder	13	14	8	3	
D-25	Last-mile	4	11	20	2	
D-26	Last-mile	4	7	8	6	
D-27	Corridor Shoulder	8	3	7	2	
D-28	Last-mile	7	2	4	5	

D-29	Corridor Shoulder	5	3	3	5	
D-30	Last-mile	5	3	3	3	
D-31	Last-mile	2	3	4	5	
D-32	On/Off Ramp	5	2	5	0	
All		**547**	**538**	**471**	**321**	

Source: CPCS analysis of INRIX, Trucker Path.