Arizona Statewide Truck Parking Plan

Working Paper 1

Existing Conditions Analysis

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Arizona Department of Transportation

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Acronyms/Abbreviations

AADT	annual average daily traffic
AADTT	annual average daily truck traffic
ADOT	Arizona Department of Transportation
ATA	Arizona Trucking Association
ATRI	American Transportation Research Institute
BCA	Benefit-Cost Analysis
CMV	commercial motor vehicle
DMS	dynamic messaging sign
EB	eastbound
ELD	electronic logging device
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
GPS	global positioning system
HOS	Hours of Service
INDOT	Indiana Department of Transportation
NB	northbound
NDOT	Nebraska Department of Transportation
NHFP	National Highway Freight Program
NHS	National Highway System
O&M	operations and maintenance
ROW	right-of-way
SB	southbound
TI	Traffic Interchange
TAC	Technical Advisory Committee
TPA	Truck Parking Assessment
TPAS	Truck Parking Availability System
TPIMS	Truck Parking Information System
TxDOT	Texas Department of Transportation
VMT	Vehicle miles traveled
VHT	Vehicle hours of travel
WB	westbound
WIM	weigh-in-motion
WYDOT	Wyoming Department of Transportation

1 Introduction and Background

The Arizona Department of Transportation (ADOT) conducted a review and update of the truck parking supply and demand in the 2019 *Arizona Truck Parking Study*. The truck parking supply and demand also were discussed in the 2023 *Statewide Rest Area Study*, with additional truck parking identified since the 2019 Study. New regulations (Jason's Law, Hours of Service [HOS], and Electronic Logging Device [ELD] mandates), emerging truck traffic patterns, and the increased freight volume from the heightened demand for online purchasing, which accelerated during the COVID-19 pandemic, have exacerbated the shortage of available truck parking along interstate corridors. Consequently, there has been an increase in undesignated truck parking along on-/off-ramps, last-mile connectors, near rest areas, and at truck stops. Ensuring sufficient truck parking is crucial for reducing undesignated parking incidents and enhancing overall logistics efficiency.

This Arizona Statewide Truck Parking Study follows with a further inspection of the truck parking statewide in response to the increasing demand and subsequent need for safe and secure facilities for drivers to park. This update was conducted to identify locations for truck parking improvements and to plan for implementation based on need and best practices. Analyses were conducted to determine potential innovative technology and infrastructure solutions.

1.1 Relevant ADOT Studies

ADOT conducted several studies to identify and enhance freight parking in the state. Key studies are summarized as follows:

- *Arizona Truck Parking Study* (2019): This study followed the 2017 *Arizona State Freight Plan* and identified gaps between truck parking supply and demand. It used a data-driven approach to identify parking demand and a framework to advance policies and projects to improve truck parking in the state.
- *Arizona State Freight Plan* (2022): This plan built on the 2017 *Arizona State Freight Plan* to ensure the state's freight system remains strong by providing an action plan to guide decisions and investments. The plan served as the guiding document for freight-related decision-making by providing a review of historical conditions, forecasting existing and emerging trends, and outlining the state's priorities for the future.
- *Statewide Rest Area Study* (2023): This study, an update to the 2011 *Rest Area Study*, provided an updated rest area guide for ADOT's use over the next 20 years. The study recognized changing demand characteristics from new regulations and identified rest area parking expansion opportunities.
- Truck Parking Availability System (TPAS): ADOT partnered with the neighboring states of Texas, California, and New Mexico as part of the I-10 Corridor Coalition to develop a system for collecting and disseminating real-time truck parking availability. The TPAS system will disseminate parking availability and is expected to go live in 2024.

1.2 Study Goals and Objectives

This study's goals and objectives will reflect and expand upon the recommendations made in previous transportation planning studies and plans, including the *Arizona Truck Parking Study* (2019), *Arizona State Freight Plan* (2022), and the *Statewide Rest Area Study* (2023). (Table 1-1)

Table 1-1. Study Goals and Objectives

Goals & Objectives
1. Understand truck parking demand along the state highway system.
• Develop an inventory of existing truck parking facilities. • Identify existing truck parking deficiencies. • Determine truck parking demand peak.
2. Identify opportunities to increase truck parking.
• Identify areas of significant undesignated truck parking. • Determine utilization of existing parking facilities. • Identify opportunities to expand truck parking.
3. Develop a truck parking implementation plan for programming and construction.
• Identify near-term and long-term projects to expand truck parking.

1.3 Study Process

This study updates and supersedes the 2019 *Arizona Truck Parking Study*. The study reviewed the applicable rules and regulations that impact truck parking and conducted an analysis of current truck parking demand and use of existing parking facilities using American Transportation Research Institute (ATRI) data. Additionally, the study examined truck-related crashes over a 5-year period from 2017 to 2022 along the state highway system, with a particular focus on factors such as fatigued driving and parked trucks contributing to crashes.

Before identifying solutions specific to Arizona, the study explored truck parking solutions implemented by peer agencies. The identified Arizona-specific solutions were presented to the project's Technical Advisory Committee (TAC) and the stakeholder group. Following this, a prioritized list of projects for implementation was developed.

This document, Working Paper 1: *Existing Conditions Analysis*, provides a detailed inventory of existing conditions pertinent to Arizona truck parking facilities, reviews applicable laws and regulations associated with truck parking in the State, summarizes analysis of truck parking and utilization of existing truck parking facilities, and provides a high-level overview of peer state strategies to improve truck parking.

1.4 Project Stakeholders

The project team identified several stakeholders and included representatives from both public and private entities. Representatives from public agencies included personnel from ADOT, Federal Motor Carrier Safety Administration (FMCSA), Federal Highway Administration (FHWA), Metropolitan Planning Organizations (MPO), Councils of Government (COG), and municipal and tribal community representatives. Representatives for Arizona Trucking Association (ATA), National Association of Truck Stop Operators

(NATSO), and farming and mining concerns were included as private industry stakeholders. Three separate stakeholder meetings were conducted: the first one presented the study goals and obtained input for the study, the second one summarized data analysis findings, and the third one discussed the study recommendations and implementation framework.

2 Data Collection

The evaluation of truck parking demand and utilization of existing parking facilities considered data aligned with the study's objectives. These goals included addressing both existing and future truck parking needs, reducing instances of undesignated truck parking, and formulating an implementation plan for truck parking. The data needs identified for this study included:

- Truck parking laws and regulations
- Truck parking availability at public and private truck stops
- Truck traffic demand along the state highway system
- Undesignated and designated truck parking locations
- ATRI truck global positioning system (GPS) database
- Annual operation and maintenance costs
- Innovative technology solutions at truck parking facilities
- Peer state truck parking programs and initiatives

The following sections discuss findings based on the data collected for the study.

2.1 Applicable Laws and Regulations

The trucking industry is primarily regulated by federal laws based on the interstate commerce clause of the U.S. Constitution. Key federal agencies overseeing this industry include the U.S. Department of Transportation (USDOT), the FMCSA, and the National Highway Traffic Safety Administration. During the past 15 years, various federal initiatives aimed at enhancing safety on the national highway system (NHS) have been introduced. These include Jason's Law, HOS regulations, and ELD mandates.

2.1.1 Jason's Law

Jason's Law, established in 2012 following the tragic death of truck driver Jason Rivenburg, empowers individual states to identify and finance additional secure truck parking. The law mandates the USDOT to collaborate with state motor carrier representatives, assess a state's ability to provide adequate parking for commercial vehicles, evaluate traffic volume, and establish metrics to measure parking facility sufficiency. Since its inception, two surveys were conducted in 2015 and 2019. As of May 2023, the FHWA plans to conduct future surveys on truck parking capacity and demand at regular intervals.

2.1.2 Hours of Service

HOS regulations, as defined by the FMCSA, outline the maximum time drivers can be on duty, including driving and rest periods, to ensure driver alertness. HOS rules aim to enhance road safety by limiting work hours and ensuring rest but can lead to challenges and fatigue from limited truck parking. Commercial motor vehicle (CMV) carriers and drivers must adhere to HOS regulations detailed in 49 *Code of Federal Regulations* 395. These rules allow a 14-hour work period, preceded by 10 hours of rest. Within the 14-hour work period, 11 hours can be used for driving, leaving 3 hours for tasks such as loading. A mandatory 30-minute break is required within the first 8 hours of driving. Exceptions include the sleep-berth provision, adverse driving conditions, and exemptions for short-distance drivers. The ELD mandate, discussed next, enforces accurate activity tracking.

2.1.3 Electronic Logging Device

The ELD mandate, initiated in December 2017, has had a notable impact on the trucking sector. The mandate primarily affects CMV drivers, encompassing vehicles engaged in interstate commerce meeting specific weight or passenger capacity criteria. The ELD requirement's core objective, according to the FMCSA, is to aid the motor carrier industry in adhering to critical HOS regulations, thus enhancing road safety by ensuring drivers take necessary breaks. An April 2023 report from the FMCSA acknowledged challenges in evaluating ELDs' safety impact because of external factors post-implementation. The mandate aimed to bolster safety, HOS compliance, and technological advancement in trucking, leading to increased transparency, efficiency, and safety for drivers and road users. However, it also brought challenges such as heightened demand for truck parking, which prompted efforts to expand parking infrastructure and enforcement of parking regulations. In essence, the ELD mandate improved HOS compliance and safety while spurring challenges related to truck parking and prompting innovative solutions.

2.2 Parking Availability

The truck parking locations across the state can be broken down into three categories: public parking facilities, private parking facilities, and undesignated parking locations. These truck parking locations are located along state roads, interstates, and other roads in all seven ADOT Districts.

2.2.1 Public Parking

The public truck parking facilities managed by ADOT include 19 rest areas (33 sites), overflow lots at 3 rest areas, and 2 parking-only locations. The 2019 *Arizona Truck Parking Study* identified 523 truck parking spaces at these sites. The number of spaces has since been increased, as noted by the 2023 *Statewide Rest Area Study*, to 638 truck parking spaces. The existing truck parking inventory at the rest areas is shown on Figure 2-1 and summarized in Table 2-1.

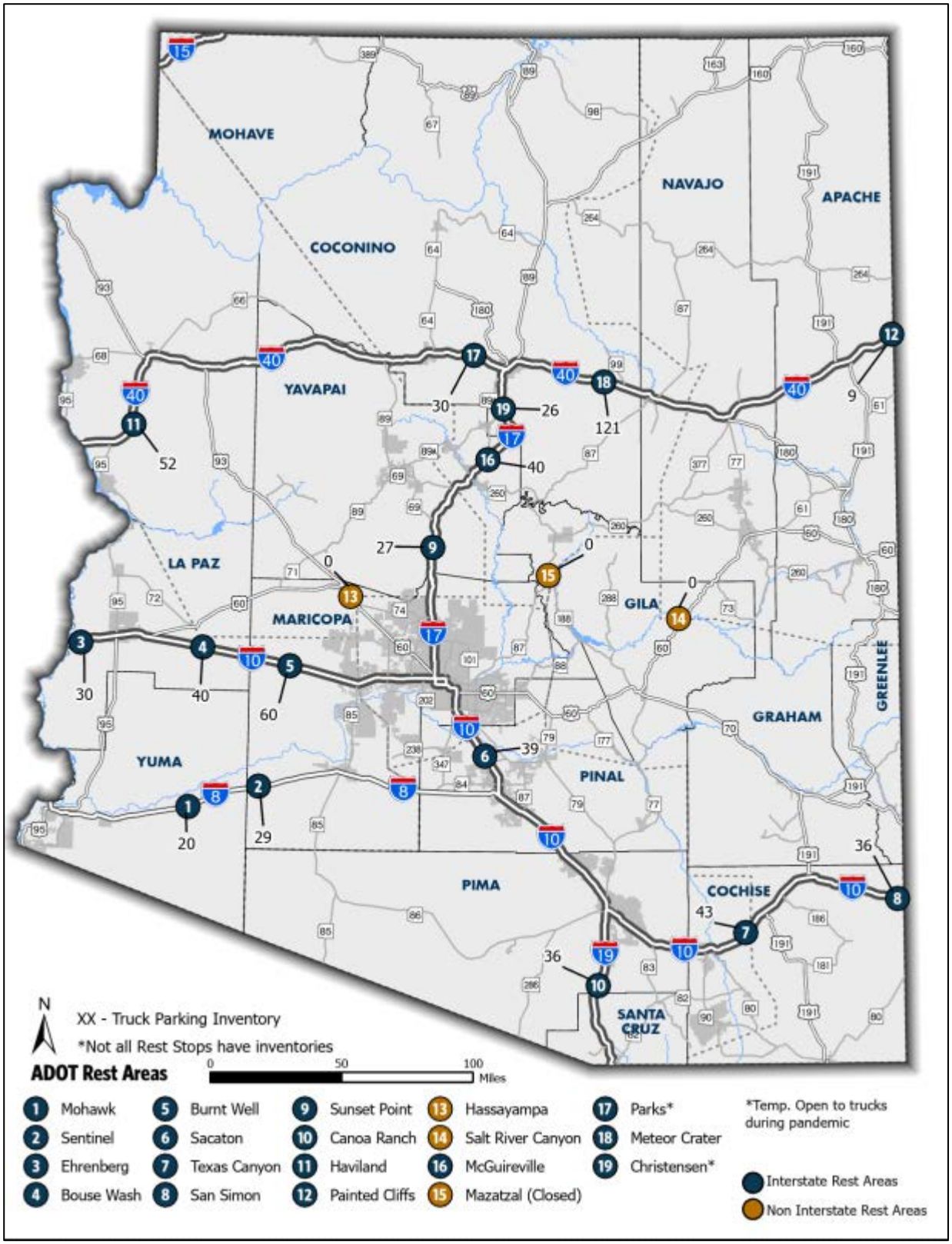


Figure 2-1. Public Rest Area Inventory

Table 2-1. Public Truck Parking Inventory

RA MAP No.[a]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	DISTRICT	PARKING SPACES	
					CARS	TRUCKS
1	Mohawk	I-8	EB	Southwest	25	10
1	Mohawk	I-8	WB	Southwest	28	10
2	Sentinel	I-8	EB	Southwest	28	14
2	Sentinel	I-8	WB	Southwest	28	15
3	Ehrenberg	I-10	EB	Southwest	26	15
3	Ehrenberg	I-10	WB	Southwest	25	15
4	Bouse Wash	I-10	EB	Southwest	42	20
4	Bouse Wash	I-10	WB	Southwest	32	20
5	Burnt Well	I-10	EB	Southwest	50	30
5	Burnt Well	I-10	WB	Southwest	45	30
6	Sacaton	I-10	EB	Southcentral	56	21
6	Sacaton	I-10	WB	Southcentral	44	18
7	Texas Canyon	I-10	EB	Southcentral	35	21
7	Texas Canyon	I-10	WB	Southcentral	35	22
8	San Simon	I-10	EB	Southeast	32	18
8	San Simon	I-10	WB	Southeast	42	18
9	Sunset Point	I-17	Both	Northwest	56	27
10	Canoa Ranch	I-19	NB	Southcentral	44	18
10	Canoa Ranch	I-19	SB	Southcentral	53	18
11	Haviland	I-40	EB	Northwest	28	29
11	Haviland	I-40	WB	Northwest	26	23
12	Painted Cliffs	I-40	Both	Northeast	34	9
13	Hassayampa	US 60	Both	Northwest	27	0
14	Salt River Canyon	US 60	Both	Southeast	19	0
15	Mazatzal[b]	SR 87	Both	Southeast	--	--
16	McGuireville	I-17	NB	Northcentral	45	20
16	McGuireville	I-17	SB	Northcentral	45	20
17	Parks[c]	I-40	EB	Northcentral	--	15
17	Parks[c]	I-40	WB	Northcentral	--	15
18	Meteor Crater	I-40	EB	Northcentral	32	57
18	Meteor Crater	I-40	WB	Northcentral	31	64
19	Christensen[c]	I-17	NB	Northcentral	--	11
19	Christensen[c]	I-17	SB	Northcentral	--	15
Total Number of Spaces					1,013	638

[a] = Rest area number corresponding to Figure 2-1.
[b] = No data available, rest area is closed or under construction
[c] = Rest area temporarily open to trucks only

Additional truck parking is available at the Meteor Crater, Canoa Ranch, and Sentinel rest areas at overflow parking lots. The truck parking overflow lots at I-40 eastbound (EB) and westbound (WB) Meteor Crater Rest Area were paved following the 2019 *Arizona Truck Parking Study* and turned into marked formal overflow parking areas. These overflow lots provide about 20 additional spaces (Figure 2-2). The I-19 northbound (NB) and southbound (SB) Canoa Ranch Rest Area overflow lots accommodate an additional 12 spaces (Figure 2-3). The I-8 EB Sentinel overflow lot provides 15 additional spaces (Figure 2-4).

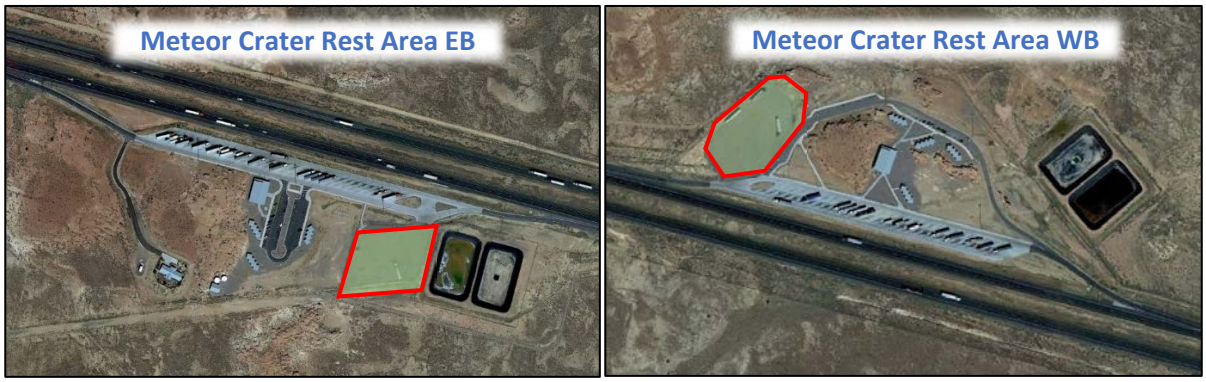


Figure 2-2. Meteor Crater Overflow Parking

Figure 2-3. Canoa Ranch Overflow Parking

Figure 2-4. Sentinel Overflow Parking

The two locations for truck-parking-only areas that ADOT owns, maintains, and manages include the Ligurta Parking Area and the Table Top Roadside Area on I-8. The Ligurta Parking Area does not appear on ADOT's rest area map and only includes garbage cans onsite alongside the 10 truck parking spaces (Figure 2-5). The Table Top site includes covered picnic table areas and garbage cans alongside the 12 truck parking spaces (Figure 2-6).

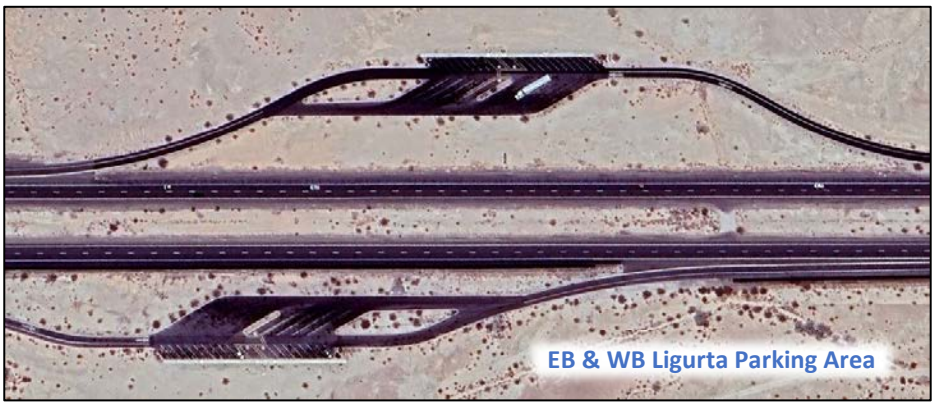


Figure 2-5. Ligurta Area Truck-Parking-Only Locations

Figure 2-6. Table Top Roadside Area Truck-Parking-Only Locations

The highest truck volume corridors, I-10 and I-40, include the greatest number of public truck spaces and make up nearly 68% of all public spaces (248 spaces and 232 spaces, respectively). The public truck parking inventory is summarized in Figure 2-7.

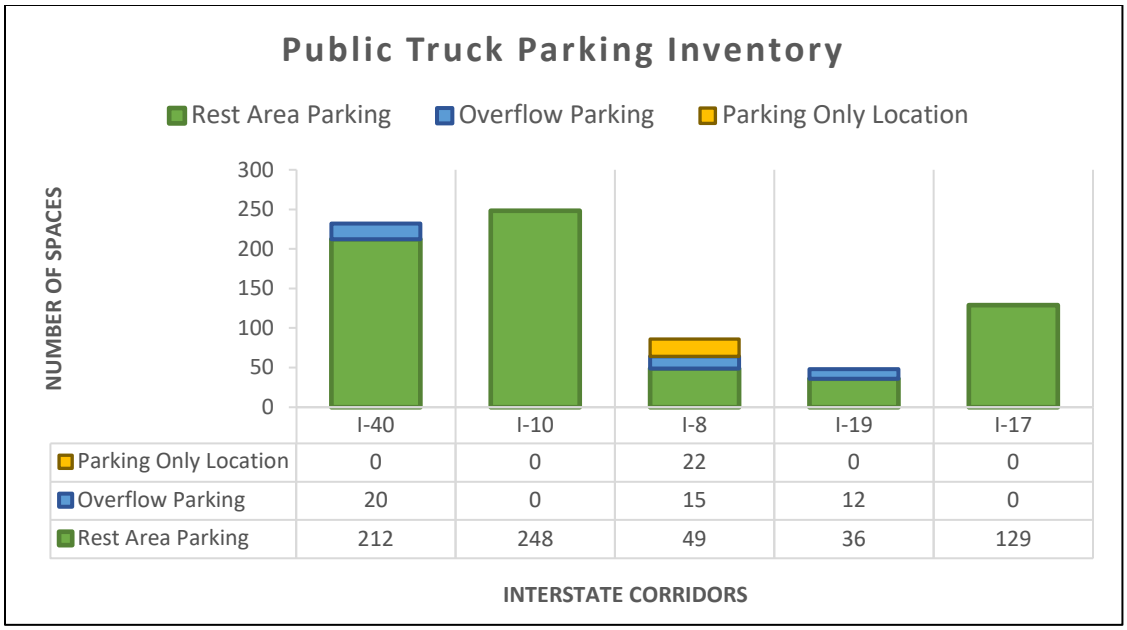


Figure 2-7. Public Truck Parking Inventory

2.2.2 Private Parking

Public parking statewide accounts for nearly 10% of overall designated parking while private parking accounts for the remaining majority. Private truck parking facilities were identified from GPS truck data and third-party parking availability apps such as Trucker Path. Private truck stops typically have more truck parking spaces as compared to public truck parking locations and some may offer reserved spots. The companies that provide the majority of private truck parking throughout Arizona are Pilot Flying J (1,940 spaces, 30%), TA & Petro (1,440 spaces, 22%), and Love's (880 spaces, 14%). Other parking providers include Shell, Pride, Roady's, Sun Mart, Conoco, Chevron, and others (2,230 spaces, 34%) (Figure 2-8).

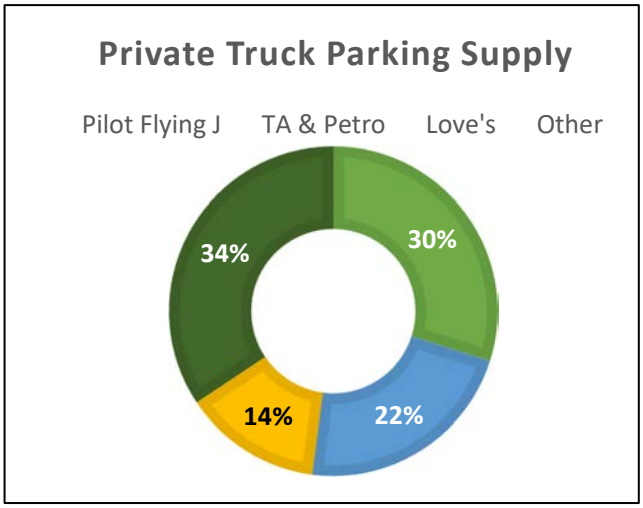


Figure 2-8. Private Truck Parking Supply

The geographic distribution of private parking facilities is shown in Figure 2-9.

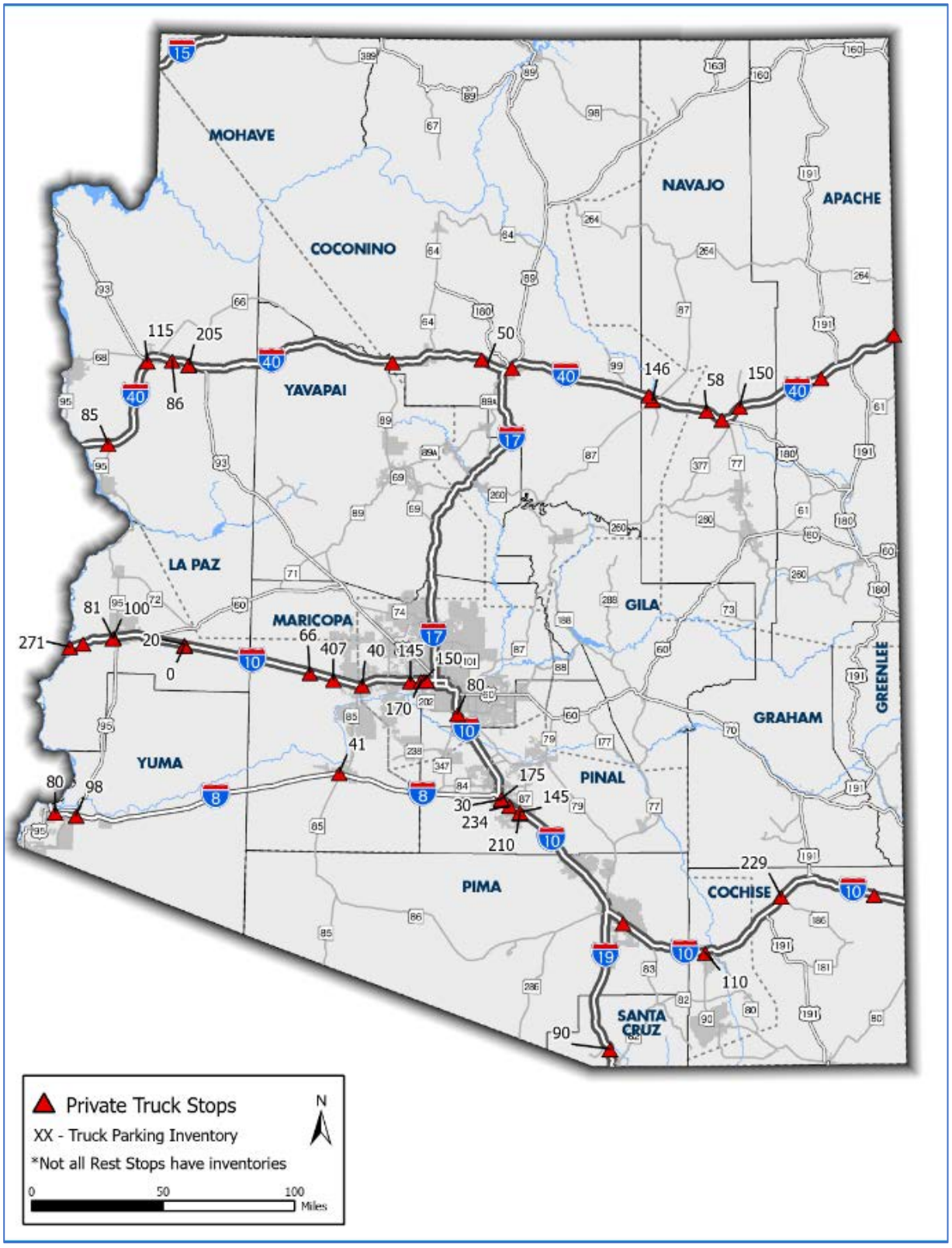


Figure 2-9. Private Truck Parking Inventory

The interstate system in Arizona accounts for more than 93% of all private parking spaces. The proportion of private truck parking among different corridors across the state varies. The corridor with the highest number of private truck parking spaces is I-10 (3,846 spaces, 59.1%). The corridor breakdown of private truck parking can be seen in Table 2-2.

Table 2-2. Private Truck Parking Supply by Corridor

	Corridor	Truck Parking Spaces	Proportion of Total Spaces	Total # Spaces	Total % Spaces
Interstates	I-10	3,846	59.1%	6,078	93.3%
	I-40	1,723	26.5%		
	I-8	329	5.1%		
	I-19	140	2.2%		
	I-17	40	0.6%		
U.S. Highways	US 89	37	0.6%	162	2.5%
	US 93	42	0.6%		
	US 160	30	0.5%		
	US 191	23	0.4%		
	US 60	10	0.2%		
	US 70	10	0.2%		
	US 95	10	0.2%		
State Routes	SR 89	5	0.1%	20	0.3%
	SR 95	15	0.2%		
Phoenix Metro	Phoenix	251	3.9%	251	3.9%
Total				6,511	100%

3 Truck Parking Analysis

The truck parking analysis included an overview of the traffic volume shift from 2019 to 2022 at each of the rest area locations. The undesignated parking analysis used truck GPS data from ATRI[1]. ATRI is a not-for-profit research organization that focuses on researching the congestion, mobility, and operations of the trucking industry by collecting commercial vehicle GPS data at millions of waypoints and thousands of stops. ATRI truck GPS data during two-week periods in February, May, August, and October of 2022 were used to conduct parking analysis at undesignated locations and utilization of designated parking locations. The top undesignated truck parking cluster locations were identified across the state. The designated parking utilization analysis then was conducted to identify the peak hours in which trucks were using parking for long periods of time.

3.1 Truck Volumes

There has been a consistent increase in freight volume in the state since the early 2000s. This trend took a steeper trajectory since 2020, with an increase in online shopping and related demand for delivery of goods. In addition to more truck traffic on the roadways, there also was an increase in the total annual average daily traffic (AADT) in Arizona from 2019 to 2022. These trends are illustrated on Figure 3-1 and in Table 3-1.

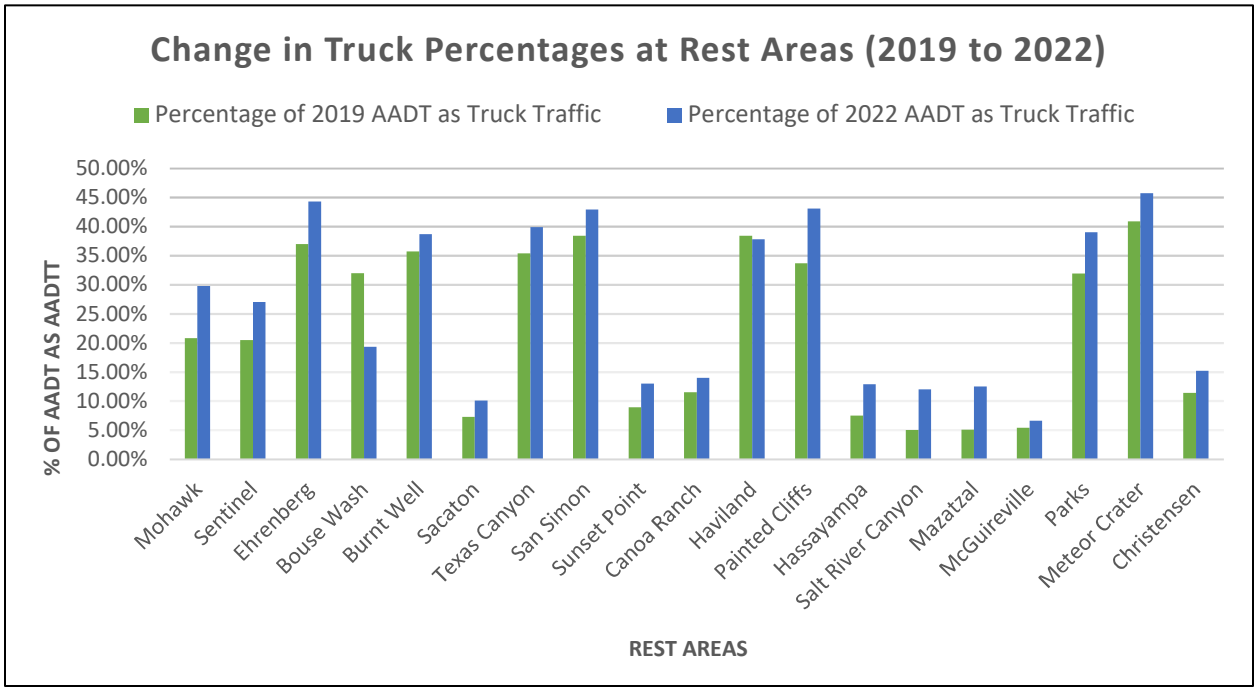


Figure 3-1. Change in Percentage of AADT as Truck Traffic, 2019 to 2022

[1] About ATRI – TruckingResearch.org

Table 3-1. Rest Area Traffic Demand Comparison, 2019 to 2022

RA No.[a]	Rest Area (RA)	Corridor	2019 AADT	2022 AADT	2019 AADTT[b]	2022 AADTT	2019 Proportion of Truck Traffic	2022 Proportion of Truck Traffic
1	Mohawk	I-8	10,620	9,590	2,209	2,855	20.8%	29.8%
2	Sentinel	I-8	10,500	13,859	2,152	3,751	20.5%	27.0%
3	Ehrenberg	I-10	27,286	27,198	10,097	12,056	37.0%	44.3%
4	Bouse Wash	I-10	26,339	27,354	8,421	5,282	32.0%	19.3%
5	Burnt Well	I-10	24,124	26,748	8,605	10,363	35.7%	38.7%
6	Sacaton	I-10	62,629	65,404	4,601	6,613	7.3%	10.1%
7	Texas Canyon	I-10	17,682	19,710	6,259	7,862	35.4%	39.9%
8	San Simon	I-10	14,118	15,737	5,421	6,748	38.4%	42.9%
9	Sunset Point	I-17	37,459	39,562	3,334	5,142	8.9%	13.0%
10	Canoa Ranch	I-19	17,314	22,443	1,999	3,153	11.5%	14.0%
11	Haviland	I-40	17,668	20,651	6,785	7,815	38.4%	37.8%
12	Painted Cliffs	I-40	23,129	22,251	7,806	9,588	33.7%	43.1%
13	Hassayampa	US 60	18,556	19,924	1,319	2,588	7.5%	12.9%
14	Salt River Canyon	US 60	2,788	3,569	139	429	5.0%	12.0%
15	Mazatzal[c]	SR 87	13,269	2,385	674	297	5.1%	12.5%
16	McGuireville	I-17	26,123	26,806	1,143	1,782	5.4%	6.6%
17	Parks[d]	I-40	20,316	21,738	6,481	8,480	31.9%	39.0%
18	Meteor Crater	I-40	19,820	21,929	8,100	10,018	40.9%	45.7%
19	Christensen[d]	I-17	23,237	24,542	2,649	3,729	11.4%	15.2%

Notes:
[a] = Rest Area number corresponding to Figure 2-1
[b] = Average Annual Daily Truck Traffic (FHWA C8-C13)
[c] = Permanently Closed
[d] = Permanently closed, temporarily open to truck parking

3.2 Undesignated Parking

Undesignated parking areas are locations that are not owned, operated, or maintained by either ADOT or private truck stops. Undesignated truck parking occurs most often along on-/off-ramps, at last-mile connectors, and near rest areas or truck stops. Areas of undesignated parking were identified based on ATRI truck GPS data collected in 2022. This process is detailed in the next section.

3.2.1 Undesignated Parking Identification

ATRI truck GPS data are collected from more than 1 million heavy-duty trucks and are translated into hundreds of thousands of stops. The undesignated truck parking data were collected in four separate two-week periods during February, May, August, and October of 2022. The undesignated parking analysis included the following steps:

1) Identifying trucks stopped for at least 30 minutes
2) Developing designated and undesignated parking polygons at rest area on-/off-ramps and buffers around roadways
3) Defining and validating clusters of undesignated truck parking
4) Combining and classifying undesignated truck parking clusters

Undesignated truck parking occurred across the state. Undesignated parking locations were grouped into clusters based on proximity. The total number of undesignated parking clusters was 39 (Table 3-2). The location of undesignated parking varied depending on the amount of truck parking available in the vicinity. The undesignated parking locations with the highest count of undesignated truck parking are identified in bold.

Table 3-2. Popular Undesignated Truck Parking Locations

ID	Corridor	Location Type	Location Description
1	I-10 (East of Tucson)	Rest Area	Texas Canyon Rest Area
2	Phoenix Metro Area	Last Mile	West Phoenix, south of I-10, east of SR 202, west of I-17
3	I-40 (West of Kingman)	Rest Area	Haviland Rest Area EB and WB
4	I-40 (East of Wilcox)	On-/Off-Ramp	At AZ/NM border, includes private stop, Painted Cliffs Rest Area, and ramps at Exit 357
5	I-40 (West of Flagstaff)	Rest Area	Parks Rest Area, Exit 185
6	I-10 (West of Phoenix)	On-/Off-Ramp	I-10 Exit 94, near Pilot
7	I-40 (East of Flagstaff)	On-/Off-Ramp	I-40 Exit 303, Exit 300
8	I-40 (West of Flagstaff)	On-/Off-Ramp	I-40 Exit 163, Exit 161, Near Love's
9	Phoenix Metro Area	Last Mile	Desert Cove Commercial Park
10	I-40 (East of Flagstaff)	On-/Off-Ramp	I-40 Exit 277, Near Love's
11	I-40 (East of Flagstaff)	On-/Off-Ramp	Exit 320
12	I-10 (East of Phoenix)	Rest Area	Sacaton Rest Area EB and WB
13	I-40 (West of Flagstaff)	On-/Off-Ramp	Exit 123 Near Johnsons Travel Center, Exit 121
14	I-40 (West of Flagstaff)	On-/Off-Ramp	Exit 146, Exit 144
15	I-40 (West of Flagstaff)	On-/Off-Ramp	Exit 9, Near 3 truck stops: CAT Scale, Love's, and Pilot
16	I-40 (East of Flagstaff)	On-/Off-Ramp	Exit 255, Near Flying J at Exit
17	I-40 (East of Flagstaff)	On-/Off-Ramp	Exit 292, Near Hopi Travel Plaza
18	I-10 (East of Phoenix)	Near Truck Stop	Mostly near Love's by Exit 302
19	I-10 (West of Phoenix)	On-/Off-Ramp	Exit 103, TA Travel Center nearby
20	I-40 (West of Flagstaff)	On-/Off-Ramp	Exit 109
21	Phoenix Metro Area	Last Mile	East of I-10, north of SR 202
22	I-40 (East of Flagstaff)	On-/Off-Ramp	Exit 283, TA Travel Center at Exit
23	I-40 (West of Flagstaff)	On-/Off-Ramp	Exit 103
24	I-40 (East of Flagstaff)	Rest Area	Meteor Crater Rest Area, Exit 233
25	I-17 (North of Phoenix)	Rest Area	Sunset Point Rest Area
26	I-10 (West of Phoenix)	Rest Area	Ehrenberg Rest Area
27	I-40 (East of Flagstaff)	On-/Off-Ramp	Exit 230, Exit 225
28	I-40 (East of Flagstaff)	On-/Off-Ramp	Exit 66, Petro at Exit
29	Phoenix Metro Area	Last Mile	West of SR 303
30	I-10 (East of Phoenix)	On-/Off-Ramp	Exit 219, Shell is at Exit
31	I-19 (North of Nogales)	Last Mile	Nogales Industrial Area
32	I-8 (West of Phoenix)	Rest Area	Ligurta Parking Area
33	I-10 (West of Phoenix)	Rest Area	Burnt Well Rest Area
34	I-40 (East of Flagstaff)	On-/Off-Ramp	Exit 269
35	I-10 (East of Phoenix)	On-/Off-Ramp	Exit 352, Exit 355
36	I-10 (East of Phoenix)	Rest Area	San Simon Rest Area, Exit 390
37	I-40 (West of Flagstaff)	On-/Off-Ramp	Exit 91, Exit 87
38	I-10 (West of Phoenix)	On-/Off-Ramp	West of Phoenix
39	Phoenix Metro Area	Last Mile	West Phoenix/Tolleson, south of I-10, west of SR 202L. Includes several private truck stops.

The 10 undesignated truck parking clusters with the highest number of undesignated trucks varied compared to the top clusters identified in the 2019 *Arizona Truck Parking Study*. Table 3-4 summarizes the current 2022 undesignated truck parking data as compared to Table 3-3, which details the previous ranking from data collected in 2017 and completed improvements since 2019.

Table 3-3. 2017 Undesignated Parking Clusters

Undesignated Parking Ranking	2017 Cluster Locations	Completed Improvements
1	East of Haviland Rest Area and I-40/US 95 Junction	July 2019—Truck parking expansion and site paving
2	West of Haviland Rest Area and I-40/US 95 Junction	July 2019—Truck parking expansion and site paving
3	West of Bouse Wash Rest Area off Exit 45 along I-10	April 2022—Truck parking expansion
4	Abandoned commercial parking lot in Winslow adjacent to I-40	2018—Landowner and Winslow Police barricaded entry to combat crime
5	I-8/I-10 junction near Casa Grande	No improvements
6	Quartz site near I-10 on-/off-ramp	No improvements
7	I-15 on-/off-ramp and adjacent vacant lot	No improvements
8	Roadside lot on the Shoulder of I-15	No improvements
9	I-17 Sunset Point Rest Area on-/off-ramps	February 2022—Truck parking expansion
10	I-10 Texas Canyon Rest Area on-/off-ramps	No improvements

Table 3-4. 2022 Undesignated Parking Top Clusters

Undesignated Parking Ranking	2022 Cluster Locations
1	West I-10 last mile in Phoenix
2	I-40 Parks Rest Area on-/off-ramps
3	I-10 Texas Canyon Rest Area on-/off-ramps
4	West I-10 last mile in Phoenix
5	Western I-40 near Winslow
6	Western I-40 near Painted Cliffs Rest Area
7	Haviland Rest Area on-/off-ramps
8	I-40 on/off-ramp near Flagstaff
9	Near Meteor Crater Rest Area along I-40
10	I-40 on-/off-ramp near Winslow

It can be observed from the table that the undesignated truck parking clusters have migrated slightly east across the state. Many of the 2017 clusters of high truck density were near the western corridors of I-10 and I-40 while the 2022 clusters of high undesignated parking density are more toward the center and east side of the state along I-10 and I-40.

The 2022 undesignated truck parking clusters occur primarily along on-/off-ramps (55%) for each corridor. Undesignated parking also was observed at rest areas (27%), last-mile connectors (17%), and near truck stops (2%) (Figure 3-2). These findings are consistent with the trends observed in the 2023 *Statewide Rest Area Study* and the 2019 *Arizona Truck Parking Study*.

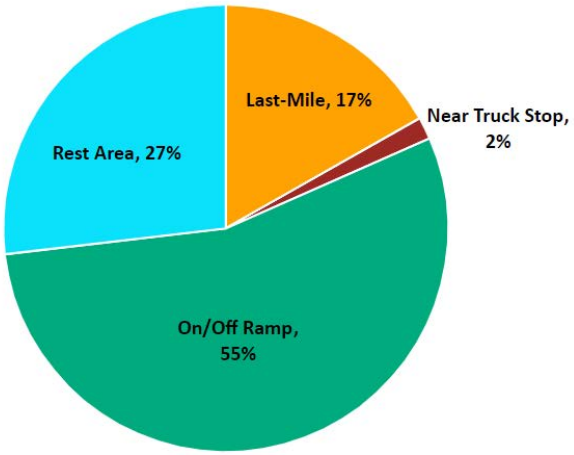


Figure 3-2. Undesignated Truck Parking Cluster by Type

The locations at which the undesignated parking is mostly taking place are along Arizona's highest truck volume corridors of I-10 and I-40 and in the Phoenix metro area (Figure 3-3). Undesignated truck parking along I-40 consists of 57% of the undesignated stops (27% along I-40 west of Flagstaff and 30% along I-40 east of Flagstaff). In addition, 15% of undesignated parking occurs in the Phoenix metro area as well as along I-10 east of Phoenix. The I-10 corridor, west of Phoenix, accounts for 9% of the undesignated parking incidents. Other undesignated parking was recorded along I-19 (2%), I-17 (1%), and I-8 (1%).

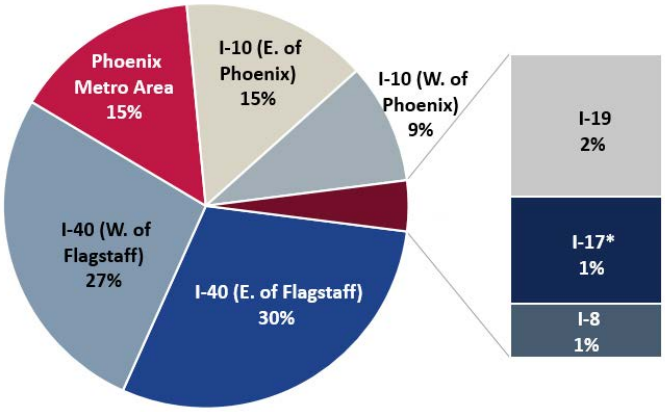


Figure 3-3. Undesignated Truck Parking Cluster by Location

More details and trends of the undesignated truck parking clusters can be seen on Figure 3-4, Figure 3-5, Figure 3-6, and Figure 3-7.

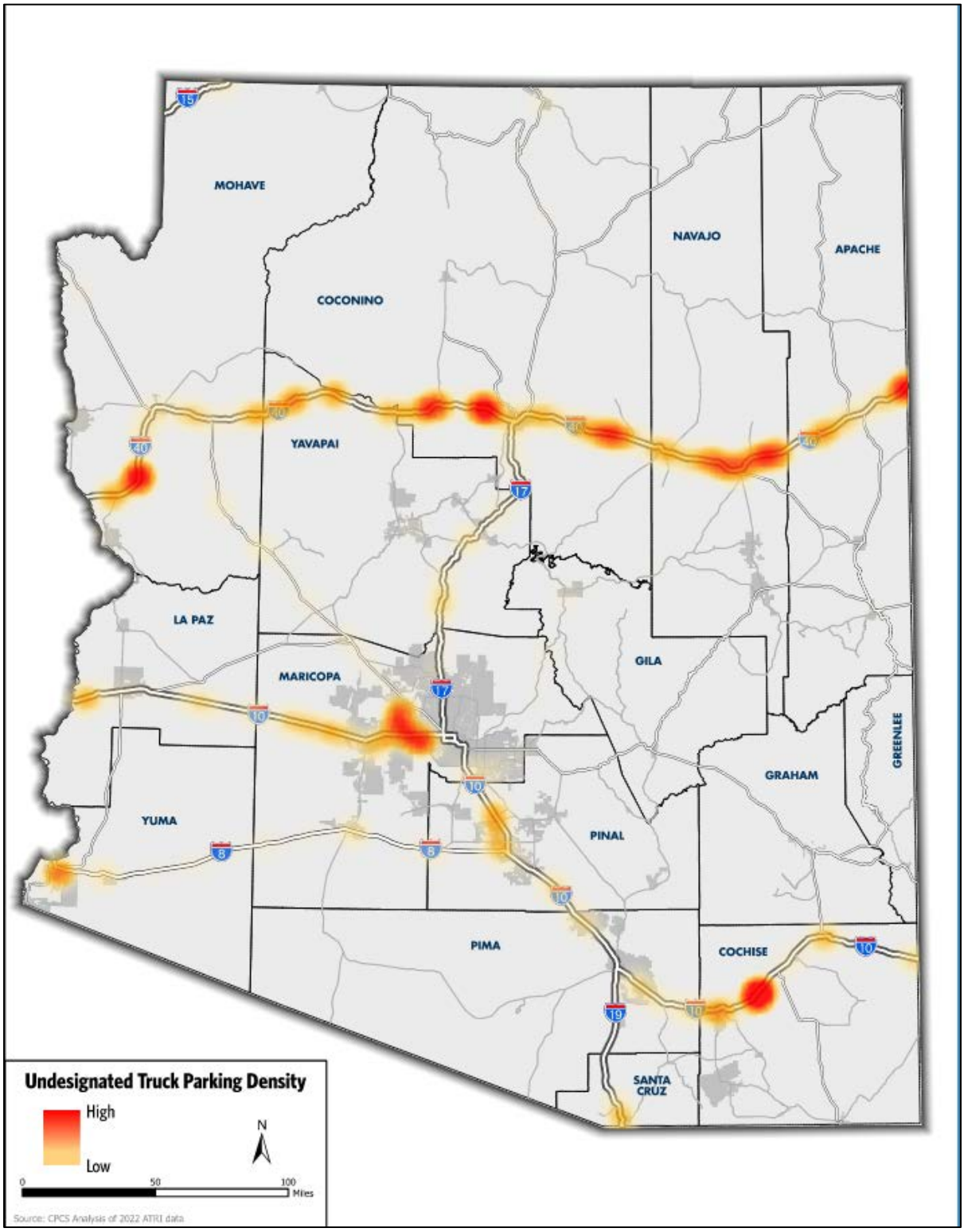


Figure 3-4. Undesignated Parking Density Heat Map

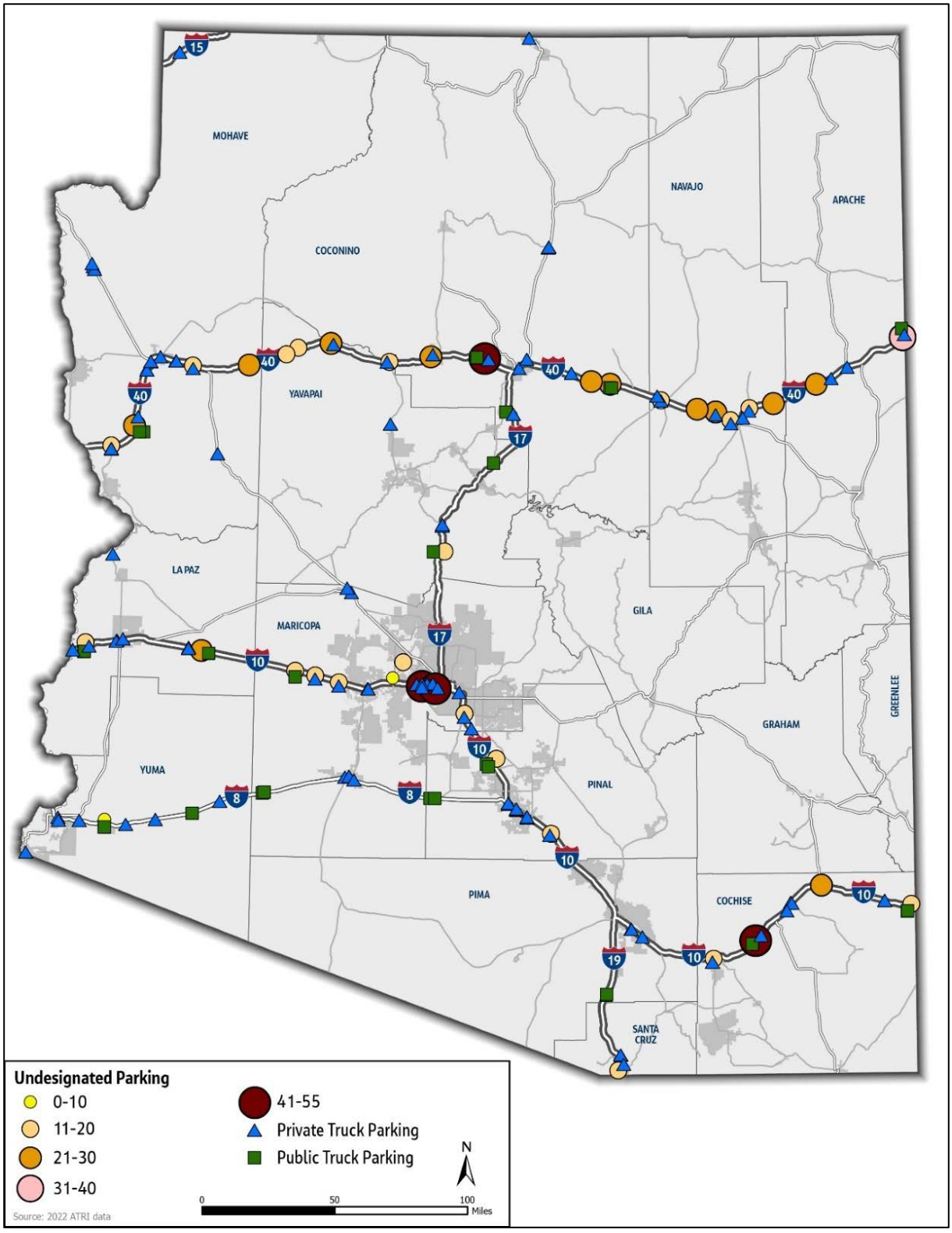


Figure 3-5. Undesignated Parking Activity Cluster Intervals

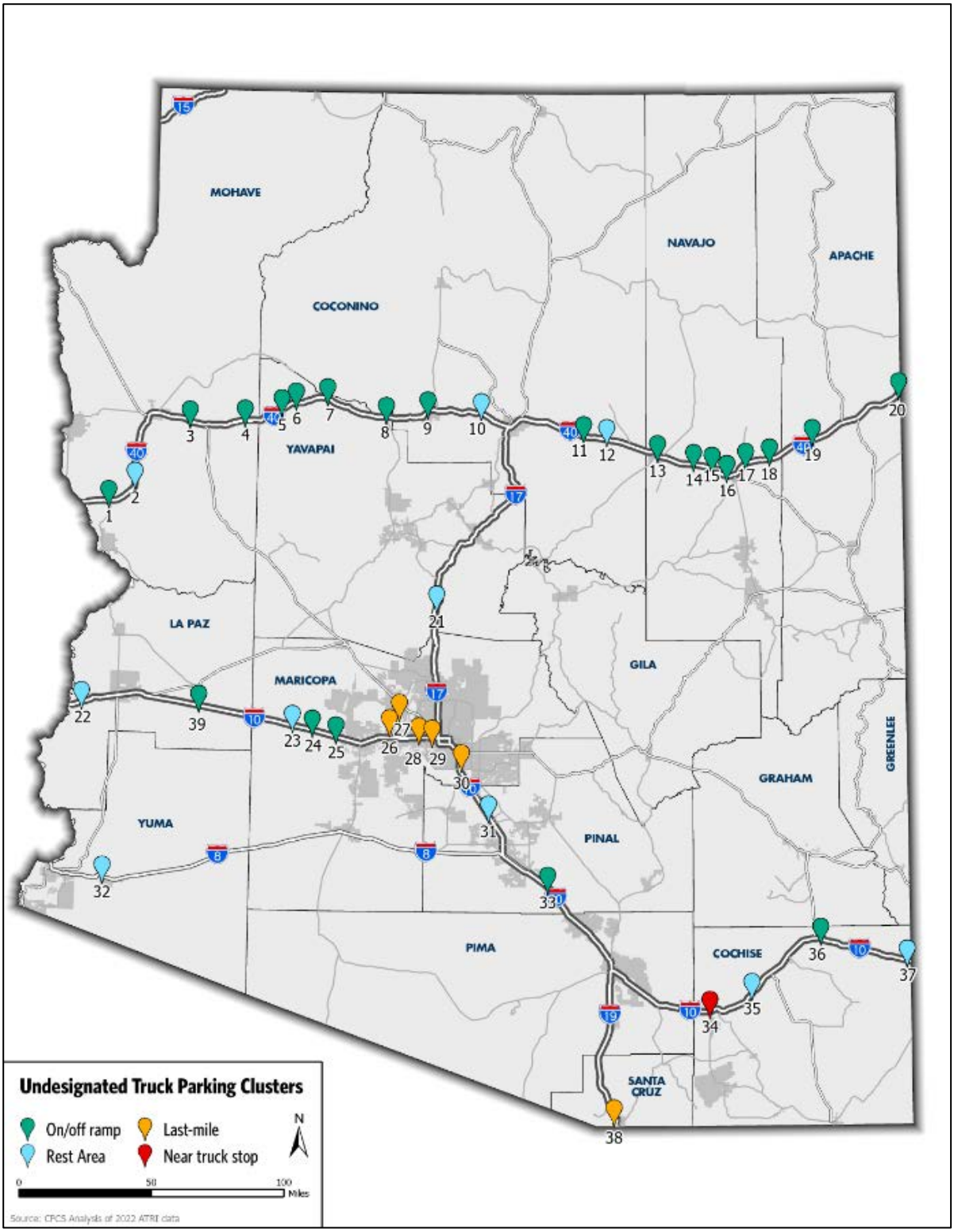


Figure 3-6. Undesignated Truck Parking Clusters

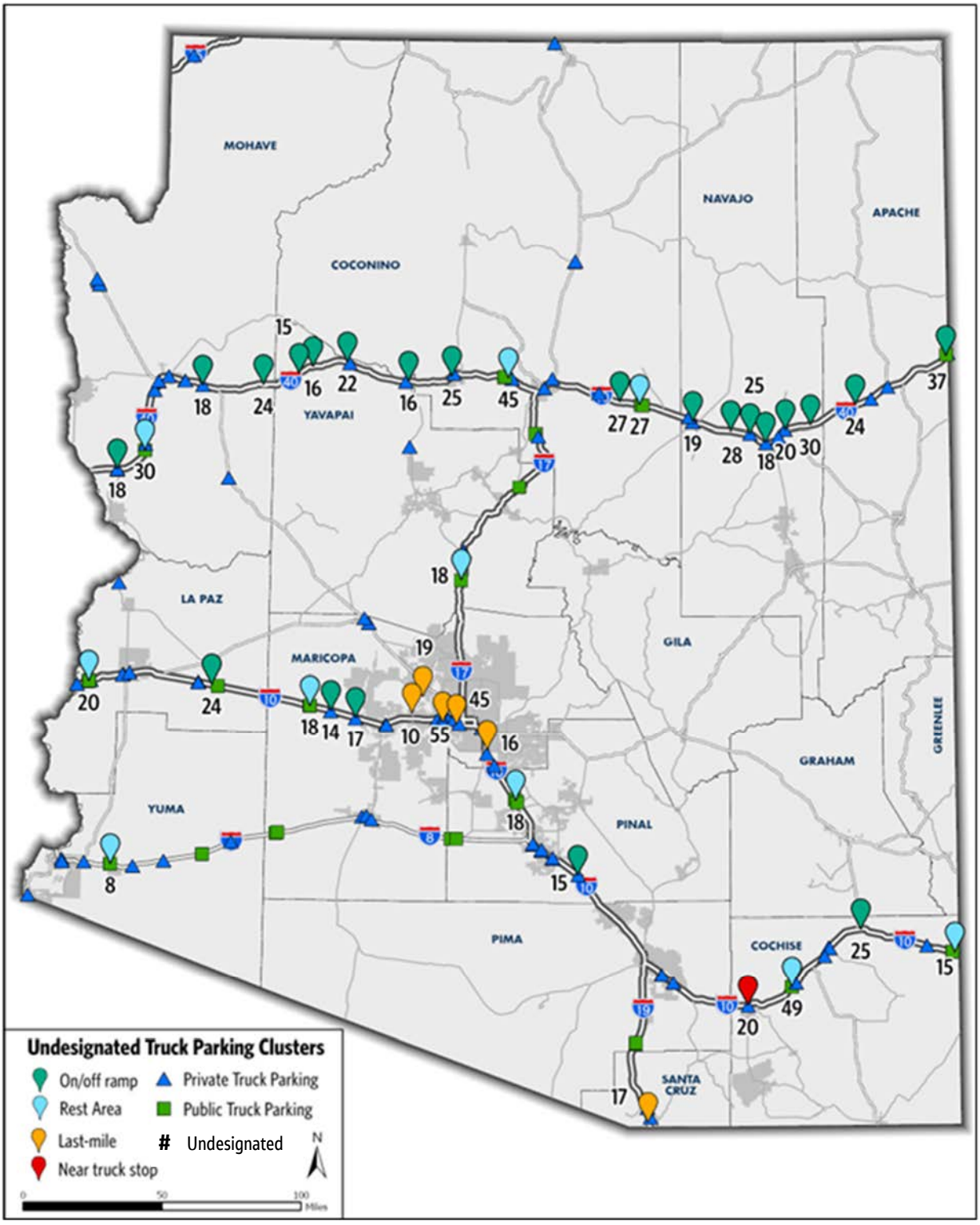


Figure 3-7. Undesignated Parking Intensity at Each Cluster

Table 3-5. Directional Undesignated Parking Intensity at Each Cluster

Map ID*	Total Undesignated	Eastbound	Westbound	Northbound	Southbound
1	18	10	8	-	-
2	30	20	10	-	-
3	18	9	9	-	-
4	24	12	12	-	-
5	15	7	8	-	-
6	16	7	8	-	-
7	22	10	12	-	-
8	16	9	7	-	-
9	25	14	11	-	-
10	45	25	20	-	-
11	27	14	13	-	-
12	27	16	11	-	-
13	19			-	-
14	28	15	13	-	-
15	25	12	13	-	-
16	18	9	9	-	-
17	20	8	12	-	-
18	30	16	14	-	-
19	24	11	13	-	-
20	37	16	21	-	-
21	18	-	-	2	16
22	20	11	9	-	-
23	18	10	8	-	-
24	14	7	7	-	-
25	17	10	7	-	-
26	10	8	2	-	-
27	19	14	5	-	-
28	55	38	17	-	-
29	45	20	25	-	-
30	16	10	6	-	-
31	18	10	8	-	-
32	8	2	6	-	-
33	15	8	7	-	-
34	20	11	9	-	-
35	49	25	24	-	-
36	25	12	13	-	-
37	15	6	9	-	-
38	17	-	-	14	3
39	24	10	14	-	-

*Map IDs correspond to those shown in Figure 3-6.

3.2.2 Proximity to Designated Truck Parking Locations

It is higher risk for truck drivers to park in undesignated parking areas, but they may have done so out of driver fatigue, as a last resort when their daily HOS came to a close, or because of a lack of available designated parking. The intensity of undesignated truck parking is shown on Figure 3-8. The top 10 undesignated parking clusters and their proximity to designated public rest area truck parking and private truck parking are examined in the following discussion.

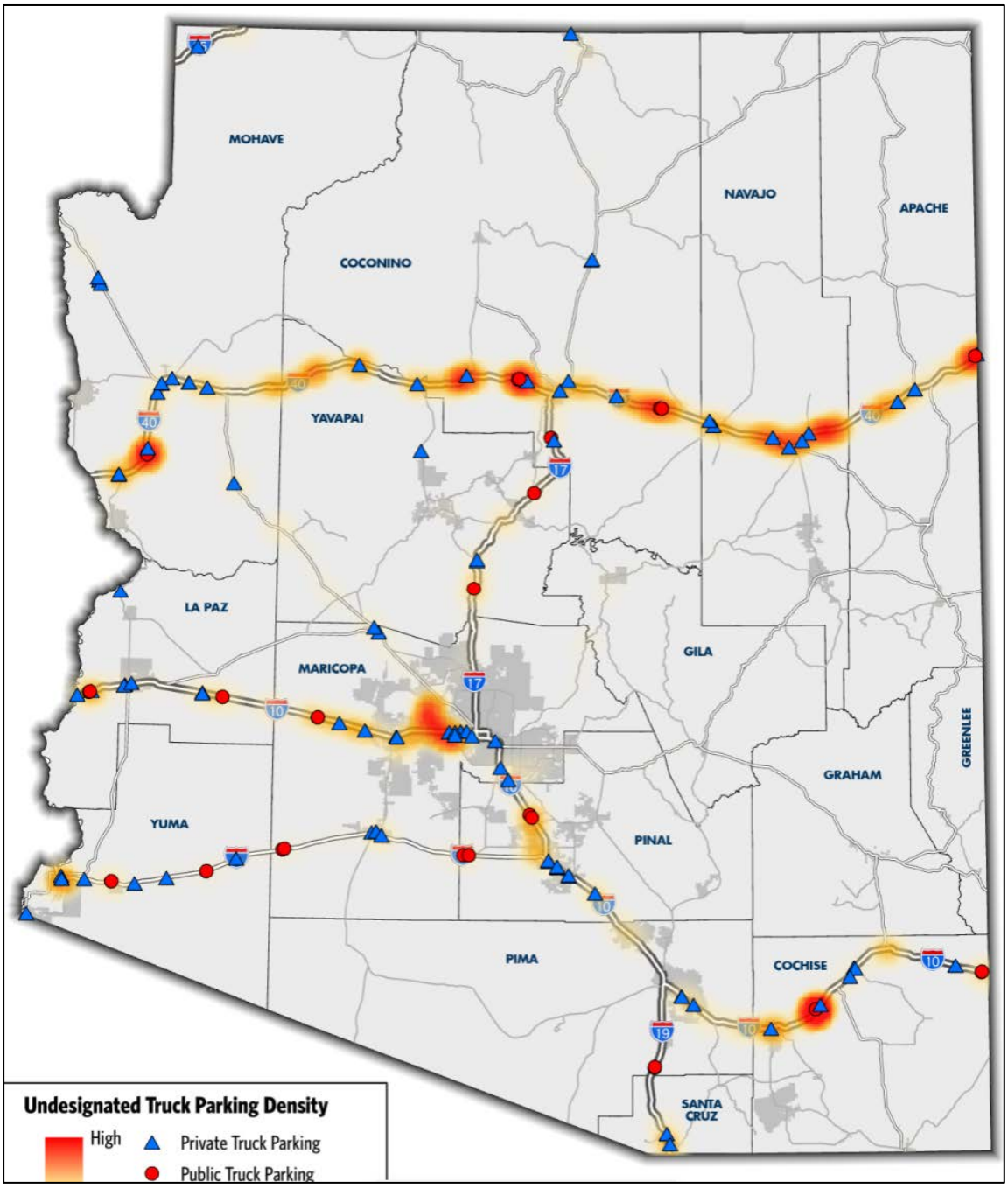
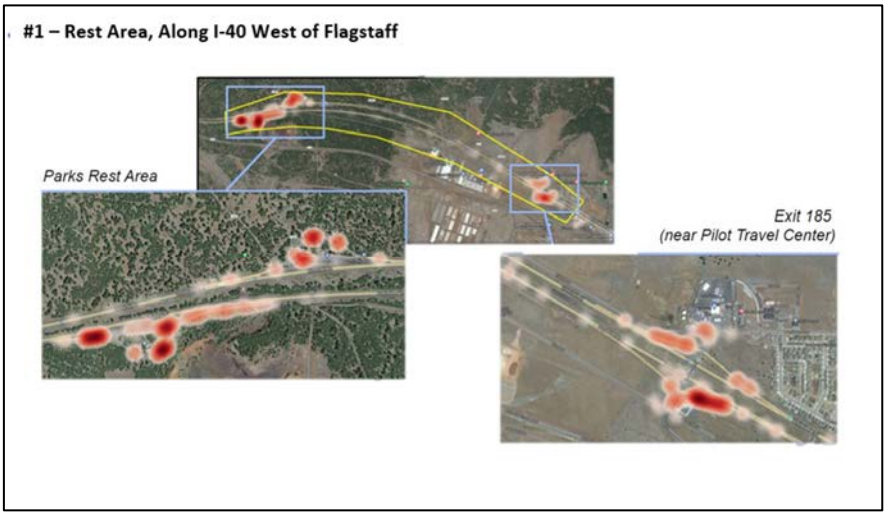
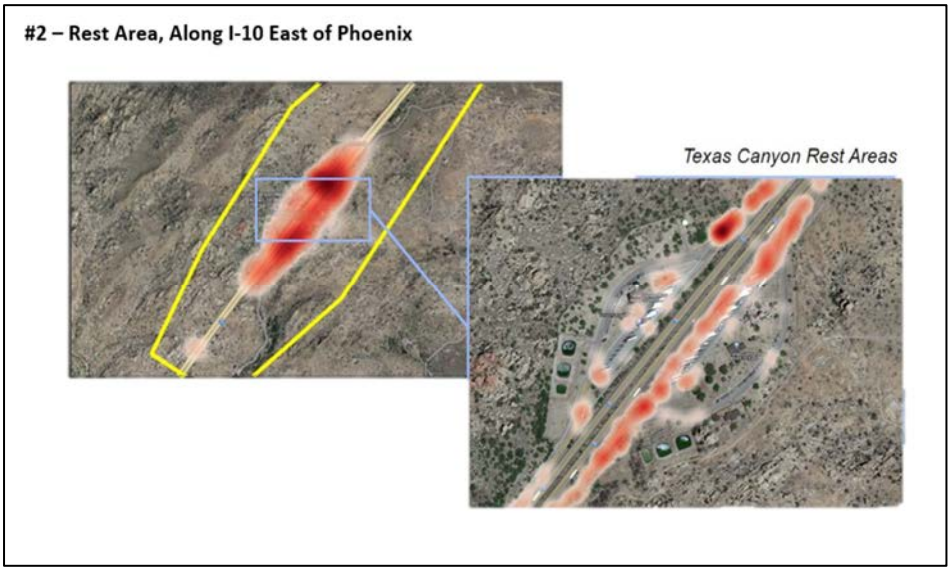


Figure 3-8. Undesignated Parking Areas and Nearby Public & Private Parking

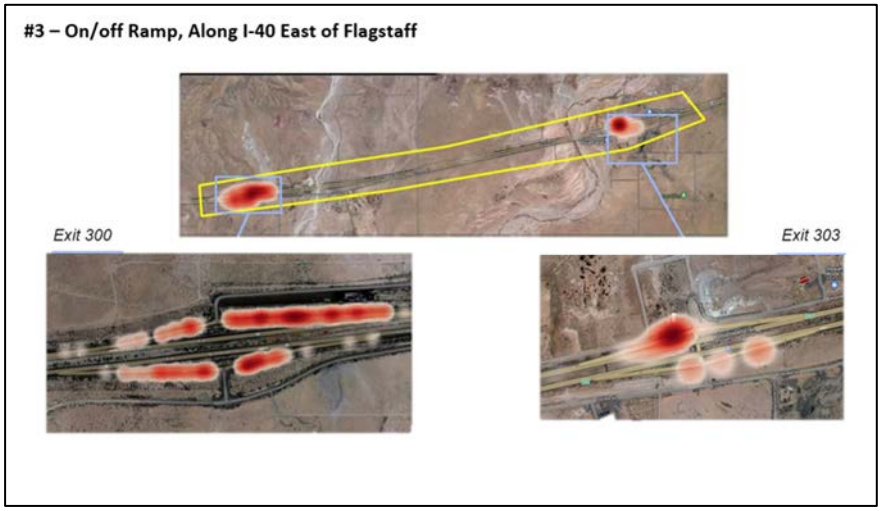
1. Rest area, along I-40 west of Flagstaff—This cluster is near two parking options: Pilot Travel Center off Exit 185 to the east, and the Parks Rest Area to the west. Undesignated parking is occurring on the on-/off-ramps to each of the locations and is occurring in the EB and WB directions.



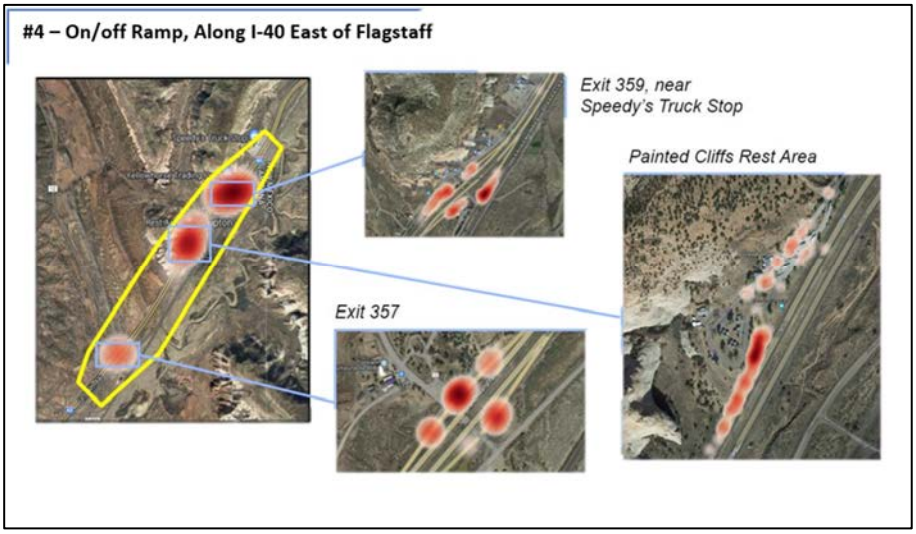
2. Rest area, along I-10 east of Phoenix—This cluster is centered at the Texas Canyon Rest Area with undesignated parking occurring along the on-/off-ramps to the rest area in both the WB and EB directions. The undesignated parking is slightly more prevalent in the EB direction.



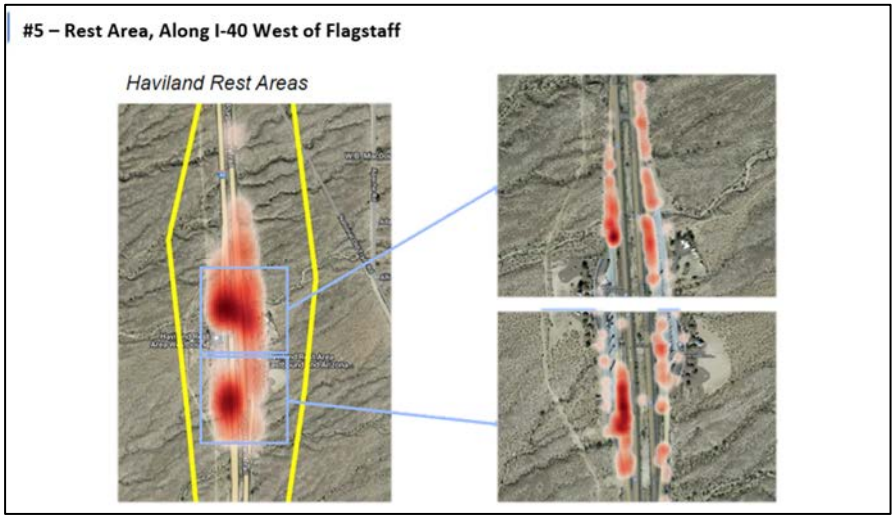
3. On-/off-ramp, along I-40 east of Flagstaff—This cluster includes Exit 300 to the west and Exit 303 to the east. The on-/off-ramps at Exit 300 have undesignated parking in the EB and WB directions. The undesignated parking at Exit 303 is most evident on the WB on-ramp to I-40. The nearest parking area to the east is 22 miles away at the Navajo Travel Center and the nearest parking area to the west is One9 Truck Stop 11 miles away.



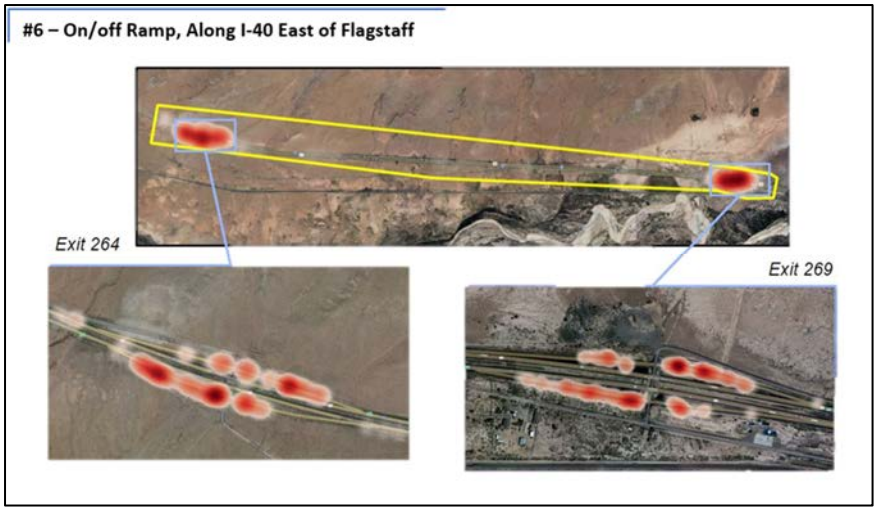
4. On-/off-ramp, along I-40 east of Flagstaff—This cluster includes three parking locations nearby: Exit 357 to the west, Exit 359 near Speedy's Truck Stop, and the Painted Cliffs Rest Area in between the two. Exit 357 experiences the most undesignated parking along the EB on-ramp and the WB off-ramp. The Painted Cliffs Rest Area primarily has undesignated parking occurring on the I-40 on-ramp. At Exit 359, undesignated parking occurs at the on-/off-ramps in both the EB and WB directions.



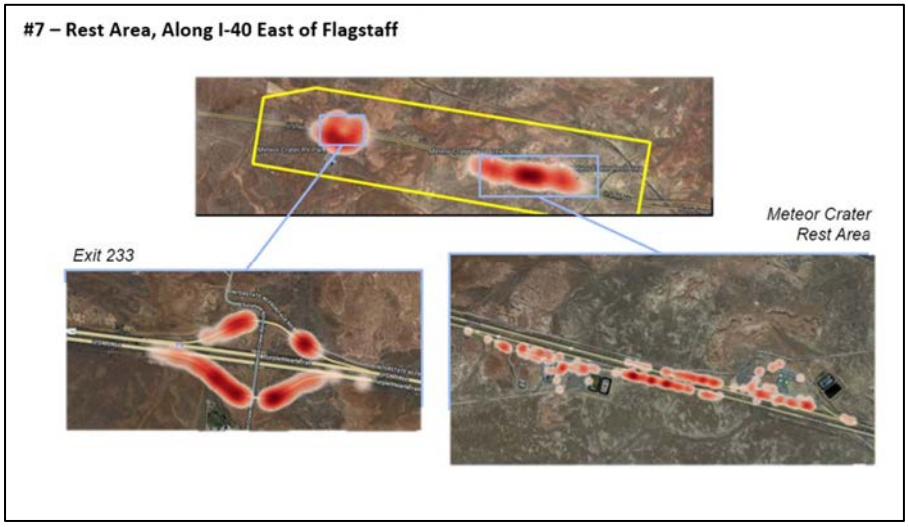
5. Rest area, along I-40 west of Flagstaff—This cluster is centered at the Haviland Rest Area. Undesignated parking occurs at the on-/off-ramps along the EB and WB directions. The WB direction experiences slightly more undesignated parking.



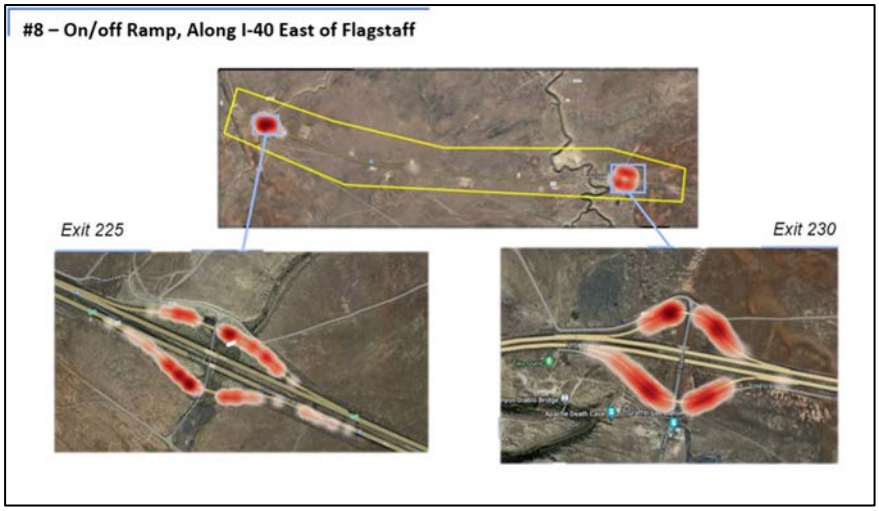
6. On-/off-ramp, along I-40 east of Flagstaff—This cluster features two locations of undesignated parking: Exit 264 to the west and Exit 269 to the east. At Exit 264, undesignated parking occurs at the on-/off-ramps in the EB and WB directions. The EB off-ramp experiences slightly more undesignated parking. Exit 269 experiences undesignated parking along the on-/off-ramps in the WB and EB directions. The off-ramps in either direction experience the most undesignated parking. The nearest parking facilities are Flying J Travel Center 8.5 miles to the west and Love's Truck Stop 6.5 miles to the east.



7. Rest area, along I-40 east of Flagstaff—This cluster includes two areas of undesignated parking: Exit 233 to the west and the Meteor Crater Rest Area to the east. The undesignated parking at Exit 233 occurs at the on-/off-ramps along the EB and WB directions, with greater instances along the EB direction. The Meteor Crater Rest Area experiences undesignated parking along the EB and WB on-/off-ramps, with the most instances occurring at the EB on-ramp and WB on-ramp locations.

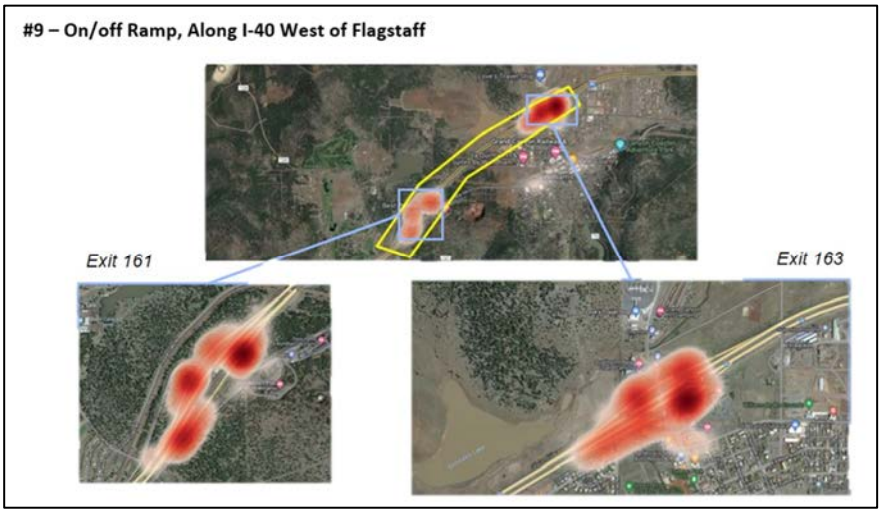


8. On-/off-ramp, along I-40 east of Flagstaff—This cluster includes two areas of undesignated parking: Exit 225 to the west and Exit 230 to the east. Undesignated parking is prevalent on the on-/off-ramps along the EB and WB directions at both exits. The nearest parking facility to the west is Navajo Blue Travel Plaza 5.5 miles away and to the east is Meteor Crater Rest Area 10.5 miles away.

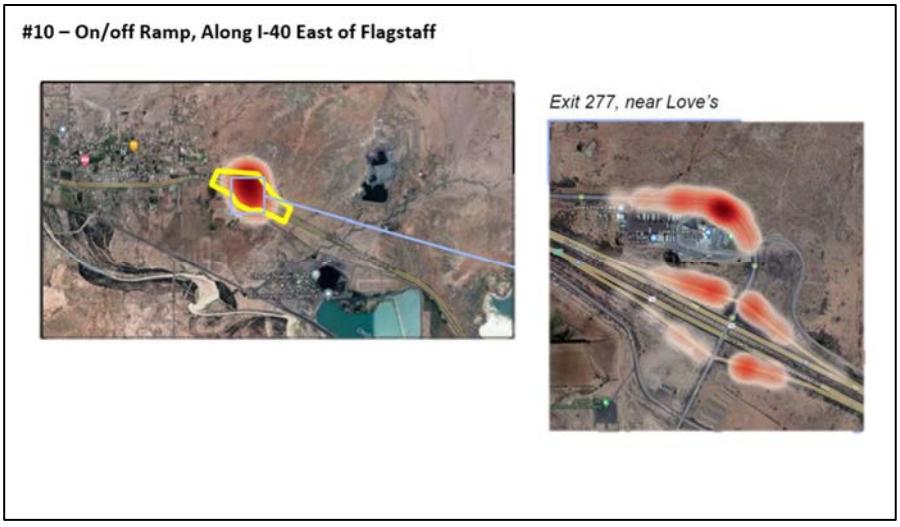


9. On-/off-ramp, along I-40 west of Flagstaff—This cluster includes two areas of undesignated parking: Exit 161 to the west and Exit 163 to the east. Undesignated parking is prevalent on the on-/off-ramps along the

EB and WB directions at both exits. The nearest parking facility to the west is 14.8 miles away at ONE9 Travel Center and to the east is Love's Travel Stop 2.5 miles away.



10. On-/off-ramp, along I-40 east of Flagstaff—This cluster is centered around Exit 277 near Love's Travel Stop. Undesignated parking occurs at the EB and WB on-/off-ramps, with more incidents along the EB direction. The highest undesignated parking occurs along the arterial next to the Love's Travel Stop.



3.3 Parking Utilization Analysis

The designated parking utilization analysis was conducted by comparing the ATRI truck GPS data with Arizona weigh-in-motion (WIM) stations to develop expansion factors. The trucks parked in designated parking spaces at public and private truck stops then were identified so that the expansion factor could be applied. The expansion factors were applied to each truck using the following prioritized rules:

1) The last WIM station a truck passed over within the last 11 hours
2) The expansion factor at WIM stations within 20 miles of where the truck stopped
3) According to the statewide average weighted by truck counts

The expanded truck counts during the 8-week data collection period were compared to the total number of designated spaces at each truck parking location. The truck parking demand was assessed by the time of day that trucks were parking at facilities, the locations at which they were parking, and the duration of time when the trucks were parked.

3.3.1 Parking Utilization by Time of Day

The weekday utilization for the statewide analysis peaks in the early morning hours with a high at 93% at midnight and 1:00 a.m. High truck parking utilization was recorded from 8:00 p.m. to 4:00 a.m. Medium utilization ranged from 56% to 75% and included the hours of 5:00 a.m., 6:00 a.m., 5:00 p.m., 6:00 p.m., and 7:00 p.m. The lowest utilization was recorded at 11:00 a.m. at 28%. The weekday truck parking time-of-day utilization is shown on Figure 3-9.

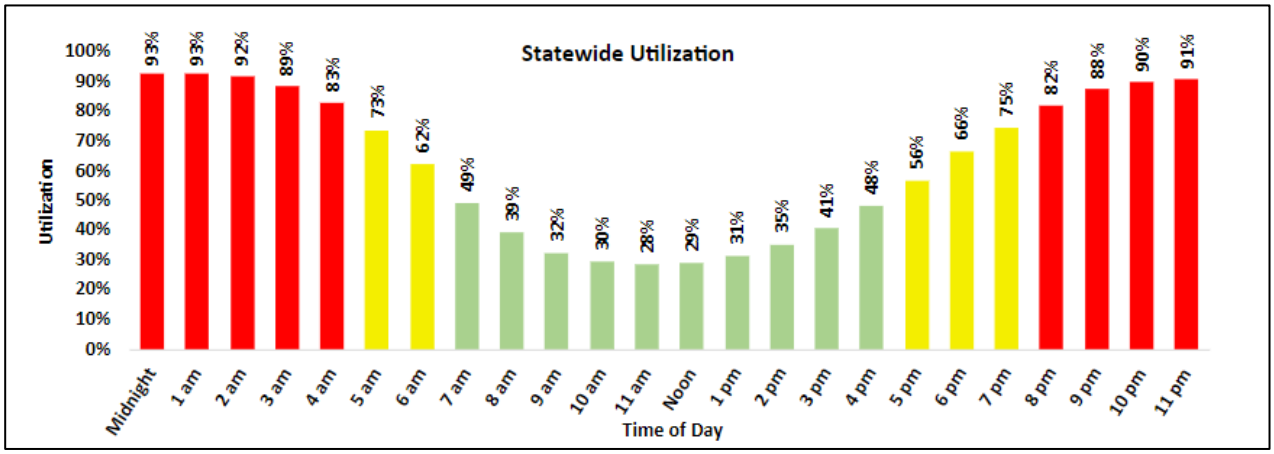


Figure 3-9. Weekday Truck Parking Utilization

3.3.2 Parking Utilization by Location

The truck parking utilization by location was conducted by connecting truck parking utilization to NHS roadway segments. The utilization was calculated for each segment according to public and private truck parking location within either (1) a 30-minute drive time from an urban segment, or (2) a 1-hour drive time from a rural segment. This analysis displays the utilization of all nearby truck parking spaces. For example, a truck driver operating in a rural area that is shown in red in the following maps would encounter little to no available truck parking spaces at all locations within an hour drive. Roadway segments shown in black have

zero truck parking locations within a 30-minute (urban segment) or 1-hour drive (rural segment). Roadway segments shown in black denote the equivalent of a truck parking desert, highlighting that there are no truck parking spaces nearby. The segment-based utilization for various times of the day can be seen in Figure 3-10, Figure 3-11, and Figure 3-12.

It was found that locations of regional and independent truck stops had a relatively lower truck parking utilization as compared to the larger private truck stops. As for locations of undesignated parking throughout varying times of day, the highest utilization is during the nighttime hours of 12:00 a.m. to 1:00 a.m. This peak period had few parking spaces available along all of I-40 and I-17, and the eastern portion of I-10 east of Tucson. Last-mile connectors near metro Phoenix and Tucson had medium to low parking availabilities and I-8 had medium parking availability. The medium availability of truck parking inside Phoenix is likely because of the presence of truck terminals in Phoenix providing a location to stop for trucks associated with large fleets. ATRI data tend to represent larger trucking fleets, which affects the number of trucks parked at truck stops versus truck terminals inside Phoenix. As shown in the statewide utilization, truck parking generally is available from 8:00 a.m. to 4:00 p.m. The evening and overnight peak utilization of truck parking stands in contrast to a.m. and p.m. peak volumes on roadways.

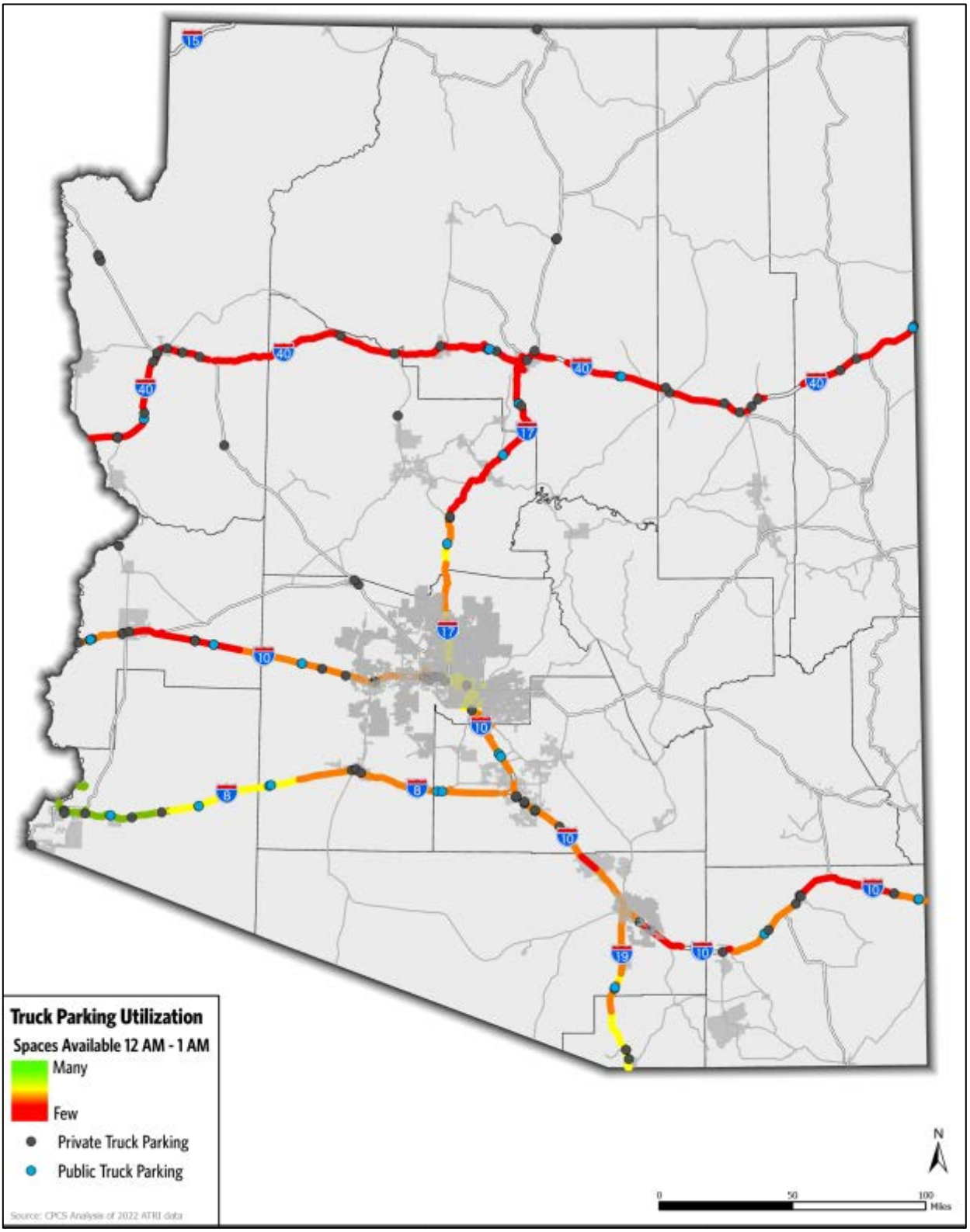


Figure 3-10. Truck Parking Utilization from 12:00 a.m. to 1:00 a.m.

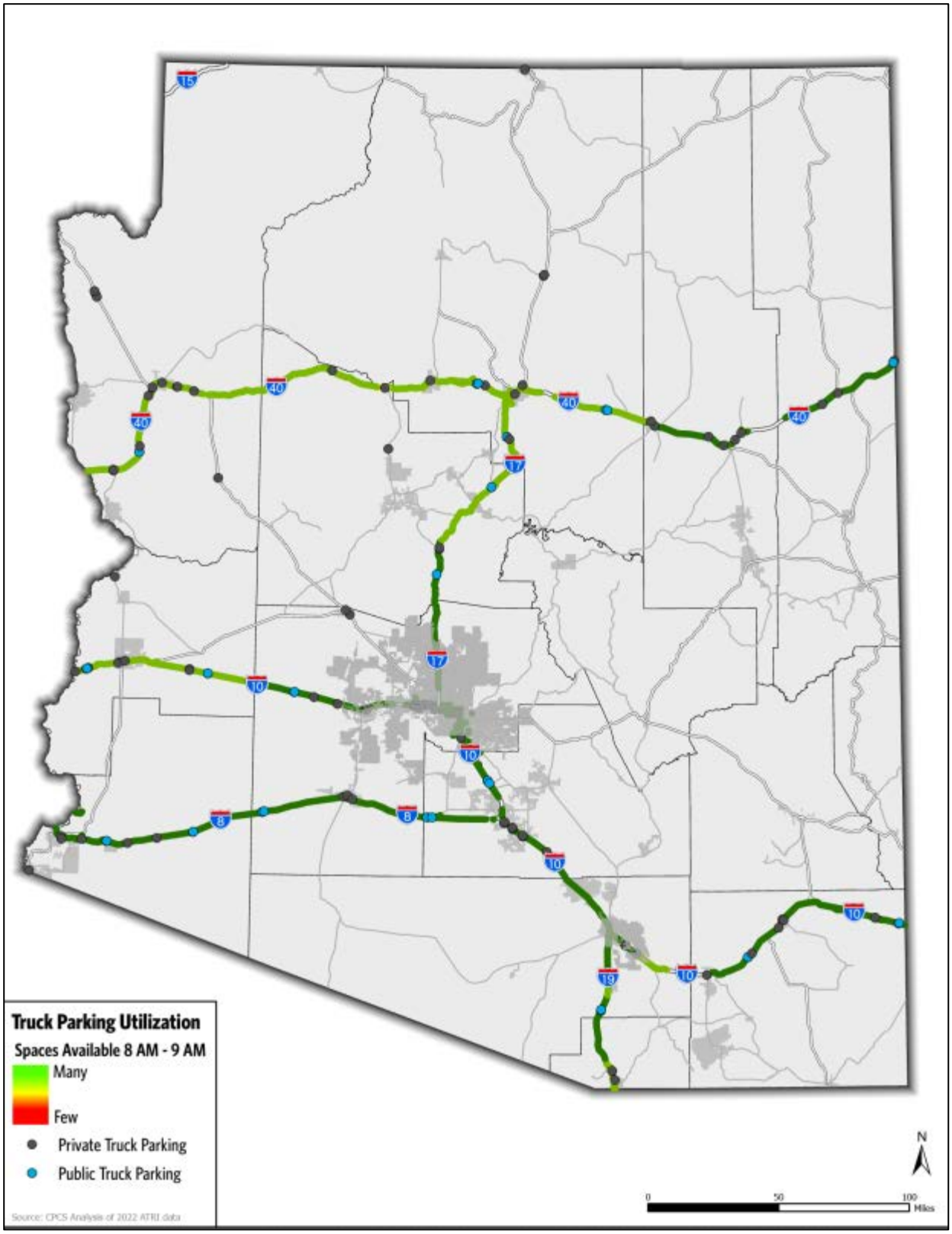


Figure 3-11. Truck Parking Utilization from 8:00 a.m. to 9:00 a.m.

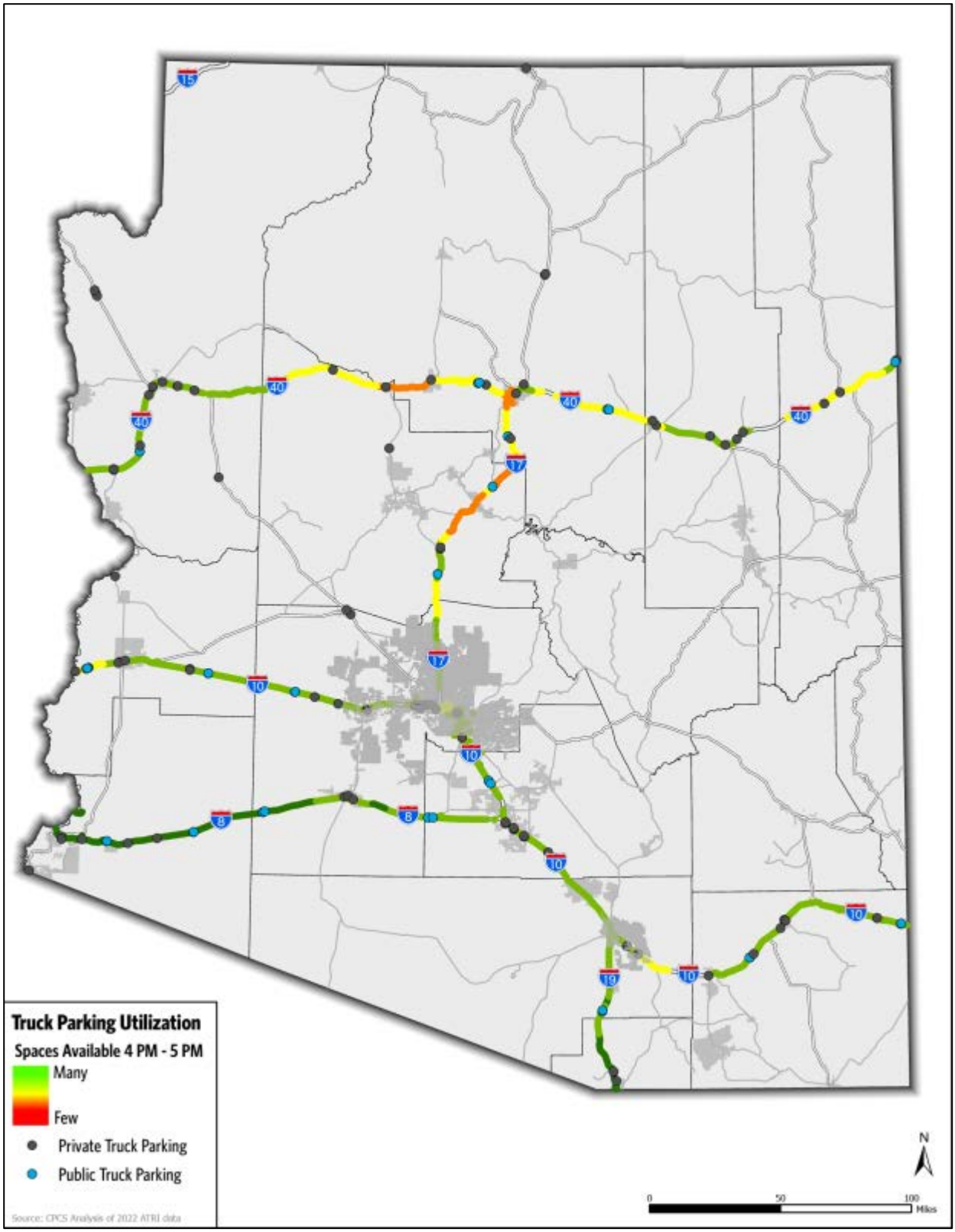


Figure 3-12. Truck Parking Utilization from 4:00 p.m. to 5:00 p.m.

4 Safety Overview

The lack of safe and secure public and private truck parking has led truck drivers to park in undesignated parking areas and at higher-risk locations, including on-/off-ramps, shoulders of highways, access roads, and along first-/last-mile connector roads. The shortage of parking spaces leads truck operators to drive beyond the permitted HOS as they search for parking, resulting in operating their vehicles while fatigued.

Roadway shoulders and interchange on- and off-ramps were identified as areas of high undesignated truck parking, which causes major safety concerns for both the parked truck drivers and the travelers along the roadways. The following section details further inspection of the past five years' truck crashes along the NHS throughout Arizona using the Accident Location Identification Surveillance System database. Truck-related crash incident reports were reviewed to identify crashes where driver fatigue, parking in undesignated areas, and lack of parking were listed as crash-contributing factors.

4.1 Crash Analysis

The truck crashes used in this analysis occurred between July 17, 2018, and July 17, 2023. During this period, a total of 11,541 truck-related crashes occurred. Figure 4-1 illustrates a crash map identifying injury severity.

It is important for this study to identify crashes that can be attributed to lack of parking along the state highway system. To identify these crashes, the crashes during the analysis period were filtered using attributes that identified the condition of the truck driver (whether fatigued) and the position of the truck (whether parked in an undesignated area) at the time of the crash. The fatigued-related and parked truck crashes along major corridors are summarized in Table 4-1 and mapped on Figure 4-2.

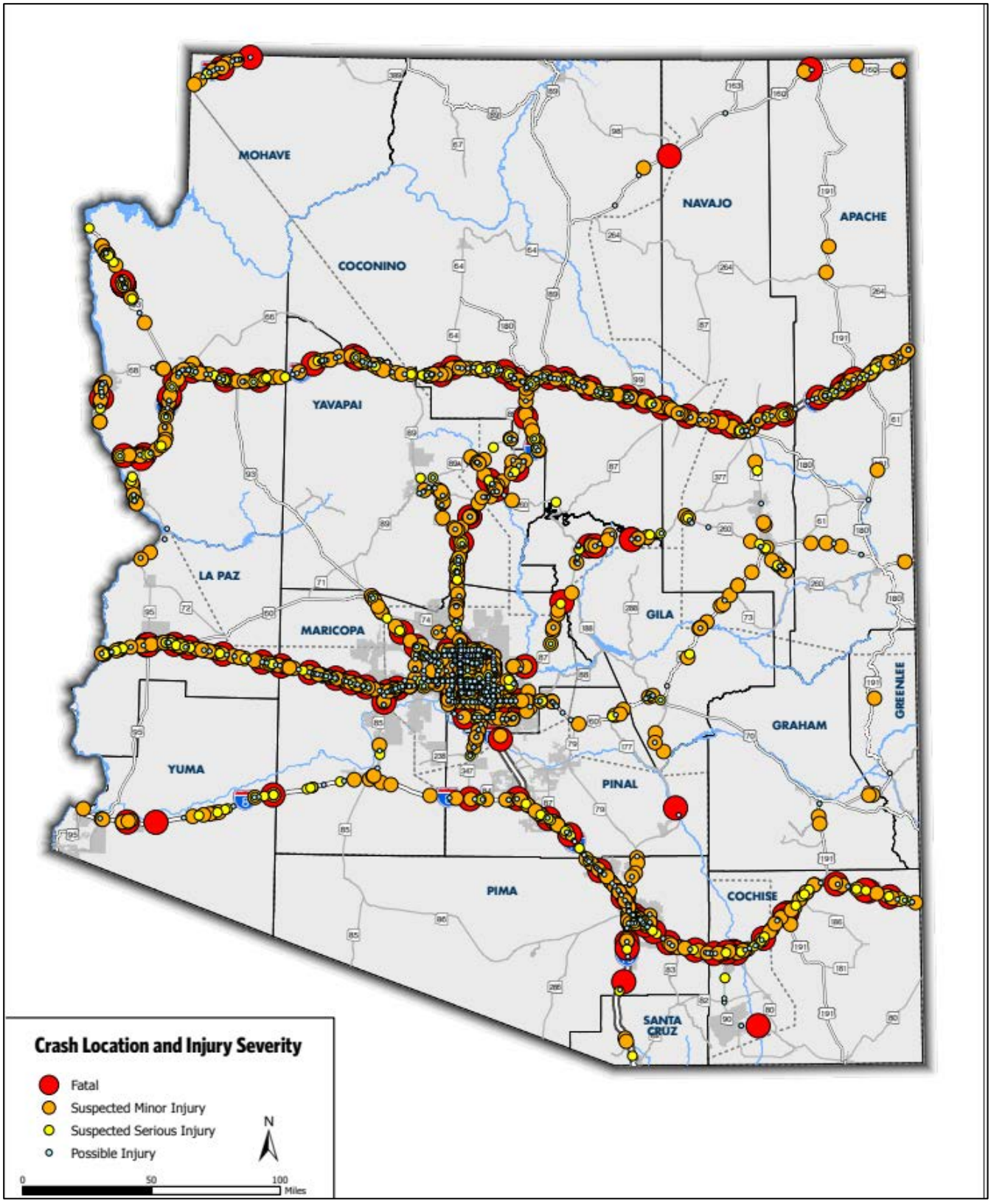


Figure 4-1. Crash Injury Severity

c

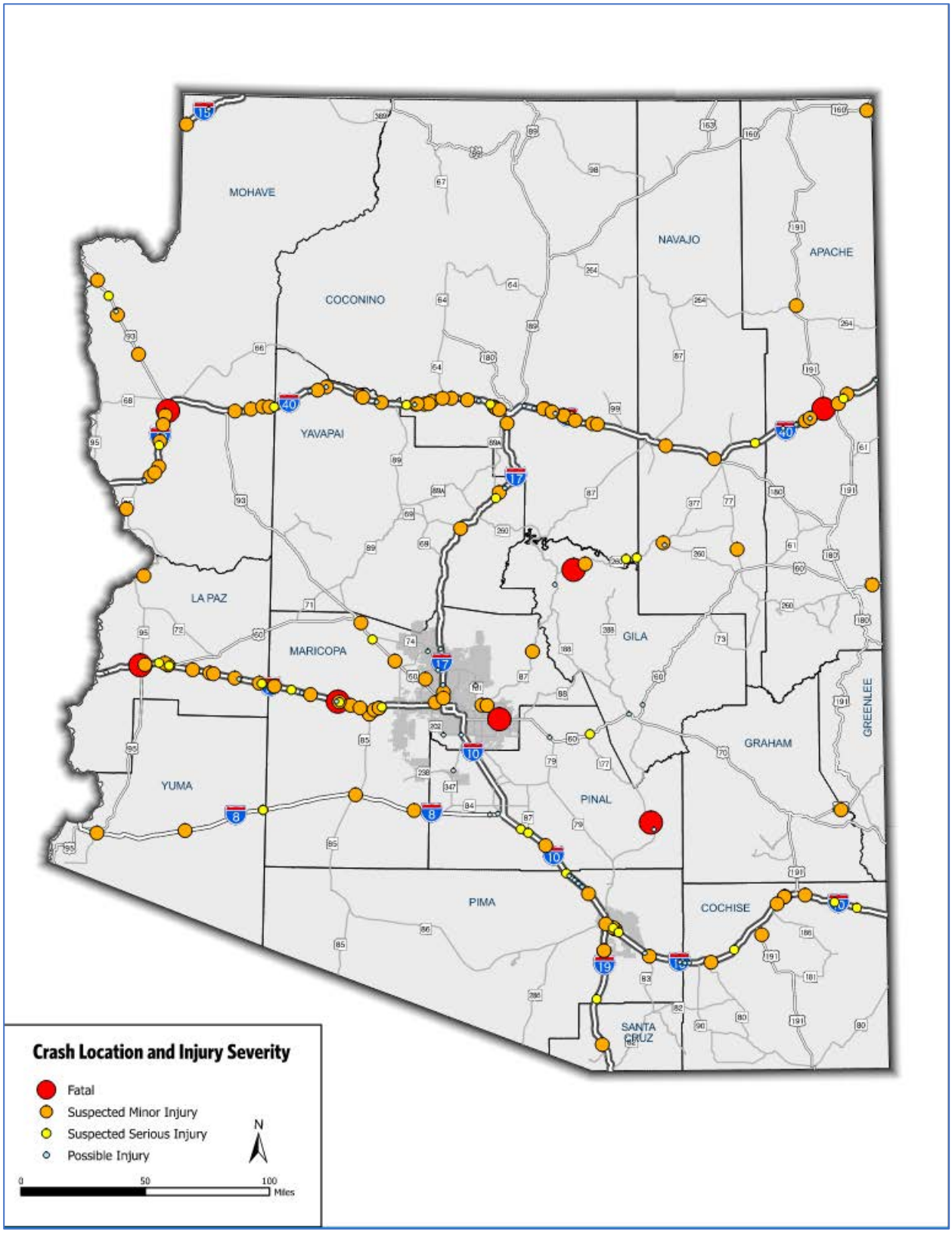


Figure 4-2: Driver Fatigue and Parked Truck Crashes

Table 4-1. Driver Fatigue and Parked Truck Crashes

Corridor	Crash Contributing Factors		Total Crashes
	Parked Vehicles	Driver Fatigue	
I-10	48	99	147
I-40	73	85	158
I-8	7	22	29
I-17	19	21	40
I-19	3	5	8
All Other Roads	48	79	127
Total	198	311	509

From Table 4-1, most of the driver fatigue and parked vehicle crashes occurred along I-40 (158 crashes, 32%). The I-10 corridor was a close second (147 crashes, 29%). Both corridors had high traffic volume and experienced parking deficiencies. The serious injury and fatal crashes with contributing factors of driver fatigue and parked vehicles were reviewed further to gather information from the crash incident reports. The detailed law enforcement narrative in the reports was examined to see if any additional factors were the primary reason for the incidents. After ensuring that no additional factors were the primary reason, the filtered crash data and undesignated parking densities were used in conjunction to identify potential locations for parking expansion.

5 Peer State Review

In addition, data were sourced from peer state truck parking programs to update the benchmarking process similar to the 2023 *Statewide Rest Area Study*, with the application to truck parking. The best practices and innovative technology trends for truck parking were determined from this process. Ten states were chosen based on their proximity to Arizona, ongoing truck parking initiatives, and input from the ADOT Project Management Team. The states selected for review are identified in Figure 5-1.

Figure 5-1. Peer States Reviewed for Truck Parking Best Practices

5.1 Peer States

New Mexico, California, and Texas were chosen based on their shared major freight corridors with Arizona of I-10 and I-40, as well as the I-10 Corridor Coalition agreement among the states. Nebraska was included because of its truck parking best practices in recognition of the FHWA Office of Freight Management and Operations' National Coalition on Truck Parking. Florida was chosen for its in-depth inspection of freight parking solutions from the recent Florida Department of Transportation (FDOT) *Statewide Truck Parking Study*. Nevada, Colorado, Missouri, and Indiana proved to have valuable case studies for truck parking availability by retrofitting and converting existing rest areas. Wyoming was chosen for its cost-effective solutions for providing buffered truck parking turnouts along major freight corridors.

Some general strategies for states' actions to increase truck parking availability include collaboration and partnerships, data collection and analysis, expansion and enhancement of rest areas, public-private partnerships, innovative funding mechanisms, technology solutions, and flexible zoning and regulations. These can be seen in the following examples for six states across the western U.S., two of which (New Mexico and California) are members of the I-10 Corridor Coalition. The truck parking initiatives in place for the

states of Wyoming, Nebraska, Colorado, New Mexico, California, and Washington are discussed in detail in the following section.

5.1.1 Wyoming

Wyoming hosts three major interstate highways (I-90, I-80, and I-25) crucial for transporting goods daily. Harsh weather conditions often heighten the need for truck parking, particularly on I-80. Wyoming employs technology to mitigate the parking shortage by offering advance weather notifications and dependable parking information during extreme conditions. The state recently released an updated truck parking map[2], listing various options such as truck stops, businesses, turnouts, and rest areas, detailing available amenities and space quantities. I-80 has approximately 3,000 parking spots, while I-25 and I-90 offer 1,300 spots combined.

5.1.2 Nebraska

Nebraska's freight plan[3] focuses on improving truck parking, especially along the I-80 corridor. Strategies include using Intelligent Transportation Systems, expanding existing spaces, and building designated spots along I-80. Currently, there are 116 truck parking facilities in Nebraska, with 330 spaces across 21 locations on I-80. A new parking lot near the I-80/US 138 interchange offers more than 100 additional parking spots, providing safe and accessible parking for truckers to meet HOS regulations. This initiative benefits both drivers and local economies. The state's approach aligns with Jason's Law, recognizing truck parking as a managed asset. These efforts have gained recognition as best practices and are contributing to national efforts to increase truck parking supply.

5.1.3 Colorado

Colorado's *Truck Parking Assessment* (TPA)[4] employs a thorough and forward-looking strategy to tackle truck parking challenges within the state. The process involves creating truck parking maps by updating existing Colorado Department of Transportation inventory through aerial photos, stakeholder input, and coordination. A truck travel pattern database is established using GPS-equipped trucks' location data. By merging the parking maps with this database, the utilization of parking facilities along TPA corridors is quantified. The TPA evaluates current and future truck parking requirements along these corridors, devising solutions based on parking availability. For private/public spots with adequate availability, the Truck Parking Information Management Systems is suggested. In areas with limited parking, possible solutions include constructing rest areas and turnouts near travel plazas and repurposing existing facilities, including weigh stations and park 'n ride lots along the NHS.

5.1.4 New Mexico

The New Mexico freight plan[5] provides a view of the current state of freight movement and offers a forecast for the next 25 years. The 2040 study plan includes evaluating truck parking issues and addressing capacity

[2] WYDOT TruckParking (state.wy.us)
[3] Nebraska State Freight Plan
[4] TPA 2019_Report_FINAL_reduced (1).pdf (colorado.gov)
[5] Technical and Freight Planning | NMDOT

concerns on key freight corridors. One proposed solution is enhancing truck parking facilities, which involves constructing additional rest areas with parking for trucks. Additionally, to alleviate congestion and counter limitations on parking, the plan suggests building bridges on major corridors.

5.1.5 California

California's statewide truck parking study[6] analyzes the state's truck parking needs and proposes effective solutions. The study begins by identifying truck parking supply through truck GPS data for both commercial and publicly owned spaces. Afterward, considering safety, stakeholder input, and demand data, specific truck parking needs are determined and quantified. This includes demand patterns in different locations, peak hours, 24-hour periods, and based on ownership.

The study suggests various strategies to address these needs. To enhance capacity, California plans to expand roadside rest areas, establish dedicated truck parking facilities near shippers and receivers, and incorporate parking spaces at new or existing commercial vehicle enforcement facilities. Additionally, maximizing existing infrastructure involves implementing smart curbside management tactics, promoting truck parking in unused industrial zones, allowing truck parking in certain auto-designated lots during off-hours, permitting emergency parking in underutilized lots, creating TPAS, and installing connected signage indicating nearby parking spaces for trucks.

5.1.6 Washington

In Washington, the state's Joint Transportation Committee released a *Truck Parking Action Plan*[7] in 2021. The plan recommends identifying the most feasible site for truck parking facilities, building smaller parking lots for short-term staging only, and building a new truck parking facility to accommodate roughly 50 trucks on/near I-5 near Seattle-Tacoma International Airport. Innovatively, the plan promotes "Airbnb" truck parking, stating, "mobile applications have been developed to allow property owners to market their available space, and truck drivers and companies to identify, reserve, and pay for parking at available locations, expanding the pool of inventory and providing a financial incentive for participating property owners. Truckers are directed to parking in existing lots which are already zoned for commercial or industrial use and permitted for truck activity. To date, these apps have primarily attracted local owner-operators or trucking companies who lease space for their fleet by the month." Additionally, the plan proposes tax incentives for shippers and receivers to provide truck parking onsite.

Key highlights from peer agency strategies discussed previously are described in the following sections.

5.2 Parking Expansion and Reconfiguration

5.2.1 Creative Use of Existing Right-of-Way

One agency that has been cited for best practices on the topic is the Nebraska Department of Transportation (NDOT) for using state right-of-way (ROW) to provide nearly 200 truck parking spaces along I-80 at the

[6] dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/freight-planning/plan-accordion/catrkpkgstdy-finalreport-a11y.pdf

[7] Joint Transportation Committee truckparking (wa.gov)

junction with US 138[8] (Figure 5-2). The lot was surfaced with leftover asphalt millings from prior projects and includes garbage dumpsters and lighting.

Figure 5-2. NDOT I-80/US 138 Interchange Parking Expansion

[8] NDOT's Innovation Brings Truck Parking to Big Springs – Benefits of Transportation

5.2.2 Upgrading Existing Rest Areas

Several states have included retrofitting rest area facilities to accommodate additional truck parking. The Indiana Department of Transportation (INDOT) published its *Rest Area & Welcome Center Improvement Plan* in 2020[9]. The plan aims to address truck parking deficiencies across the state's rest areas by modernizing and constructing new rest area facilities and improving truck parking by converting some existing car parking to commercial truck parking. INDOT's 10-year plan calls for adding more than 1,100 semitrailer parking spaces across the state by the end of fiscal year 2032 (Figure 5-3).

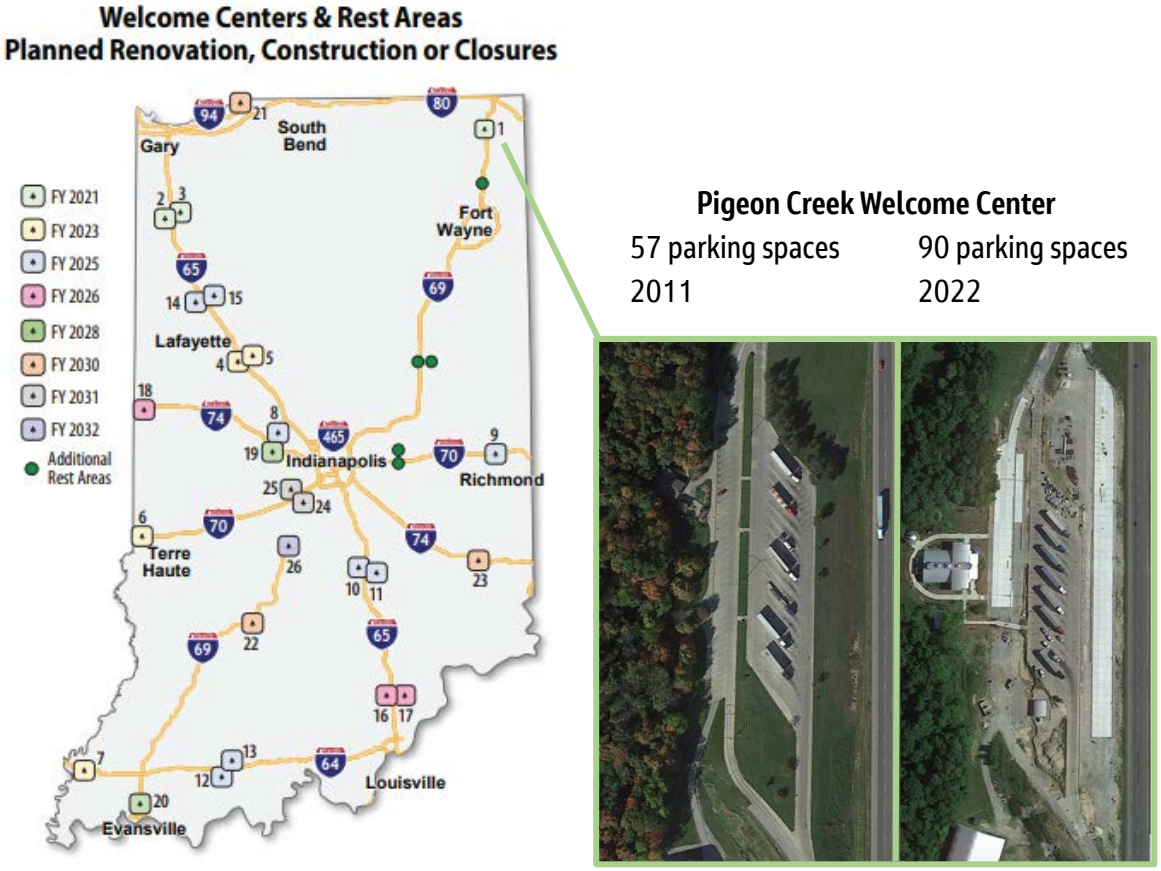


Figure 5-3. INDOT Welcome Centers and Rest Area Conversions

[9] https://www.in.gov/indot/files/Rest-Area-and-Welcome-Center-Improvement-Plan.pdf

The Missouri Department of Transportation (MoDOT)[10] has taken steps to retrofit its existing rest areas and has continued to convert unused rest areas into commercial truck parking facilities. Additional parking at existing rest areas is provided by expanding truck parking within existing ROW (Figure 5-4).

Figure 5-4. MoDOT Rest Area Conversions to Truck Parking Only

[10] https://www.modot.org/northwest-missouri-rest-area-modifications

5.2.3 Truck-Parking-Only Areas

The Wyoming Department of Transportation (WYDOT)[11] has added areas of "truck parking only" along major freight corridors to increase truck parking. These "turnouts" are a low-cost option that may help create a safe barrier between the parked semitrailers and the interstate, and offset incidents of undesignated parking along on- and off-ramps at various stopping points (Figure 5-5).

Figure 5-5. WYDOT Truck Parking Turnout Location along I-80

5.3 Commercial Parking Partnerships

Some states are exploring partnerships with private entities to supplement public truck parking with private facilities. The *FHWA Truck Parking Development Handbook* (2022)[12] details the public-private partnership (P3) opportunities and identities the benefits and challenges for implementing commercial parking through such partnerships (Table 5-1).

Table 5-1. FHWA Truck Parking P3 Benefits and Potential Barriers

Benefits	Potential Barriers to Implementation
Reduces public cost of development and maintenance of parking locations.	Identifying mutually beneficial terms to meet public and private needs can be challenging.
Distributes risk across multiple parties.	State law may prohibit or limit local authority to enter into P3s.
May provide additional amenities not typically present at public rest areas.	-

[11] https://www.dot.state.wy.us/news/new-truck-parking-map-available
[12] Truck Parking Development Handbook (dot.gov)

5.3.1 Private Partnership Use Cases

Washington's Joint Transportation Committee released a *Truck Parking Action Plan*[13] in 2021 that recommends that a partnership program be developed to provide commercial truck parking in underused infrastructure locations such as large retail or industrial parking lots. The plan also promotes "Airbnb" truck parking solutions in which property owners may rent their available lots to local owner-operators in areas permitted for commercial and industrial use. These sites may be less at risk than other undesignated parking areas, such as along interstate on- and off-ramps.

The Trucker Path app[14] is widely used by truck drivers across the country, and the app features Walmart as a host for commercial truck parking across Arizona and other states. The app features more than 76 Walmart locations that have truck parking availability in the state, with most of the stores in last-mile locations along major corridors (Figure 5-6). These agreements with commercial establishments are determined by local jurisdiction and are at the discretion of each property owner.

Figure 5-6. Walmart Commercial Truck Parking Opportunity

5.4 Emerging Technology Trends

Recognizing the need to optimize existing truck parking space utilization, several states are exploring technology solutions. Some solutions include the implementation of a detection technology, a communications system, and an information dissemination system. The following sections identify some of these emerging technology themes.

5.4.1 Truck Parking Availability System

In the previous 2019 *Arizona Truck Parking Study*, the Arizona Truck Parking Advisory Group ranked Truck Parking Information Management System (TPIMS) as a priority project. TPIMS operates by installing sensors and using radar camera detection for ingress and egress counts, with closed-circuit television (CCTV) cameras used in conjunction with third-party analytics for parking space updates on dynamic messaging signs (DMS).

[13] Final_TruckParkingActionPlan_2021.pdf (wa.gov)
[14] https://truckerpath.com/trucker-path-app/walmart-with-truck-parking/

The prioritization by the advisory group led to the three-phase implementation plan for TPIMS. Phase I included the TPIMS proof of concept, which compared the available technologies to use for the TPIMS; phase II continued to build on the work from phase I and additional funding resources for the TPIMS were identified for a corridor or statewide basis; and phase III considered branching out the TPIMS to additional locations.

Figure 5-7. I-10 Corridor Coalition Project Limits

The I-10 Corridor Coalition [15] built off of this proposed solution and started a pilot project with TPAS that spanned along I-10 with a partnership between the states of California, Arizona, New Mexico, and Texas (Figure 5-7). This pilot study integrated real-time truck parking availability data collected via CCTV cameras and radar sensors with connected DMS at 37 public truck parking locations, with 8 locations in Arizona along the eastbound and westbound directions at the rest areas of Ehrenberg, Bouse Wash, Texas Canyon, and San Simon (Figure 5-8). The project is expected to be fully operational by 2024.

[15] https://i10connects.com/sites/default/files/media/I-10_TPAS_ConOps.01.2022.pdf

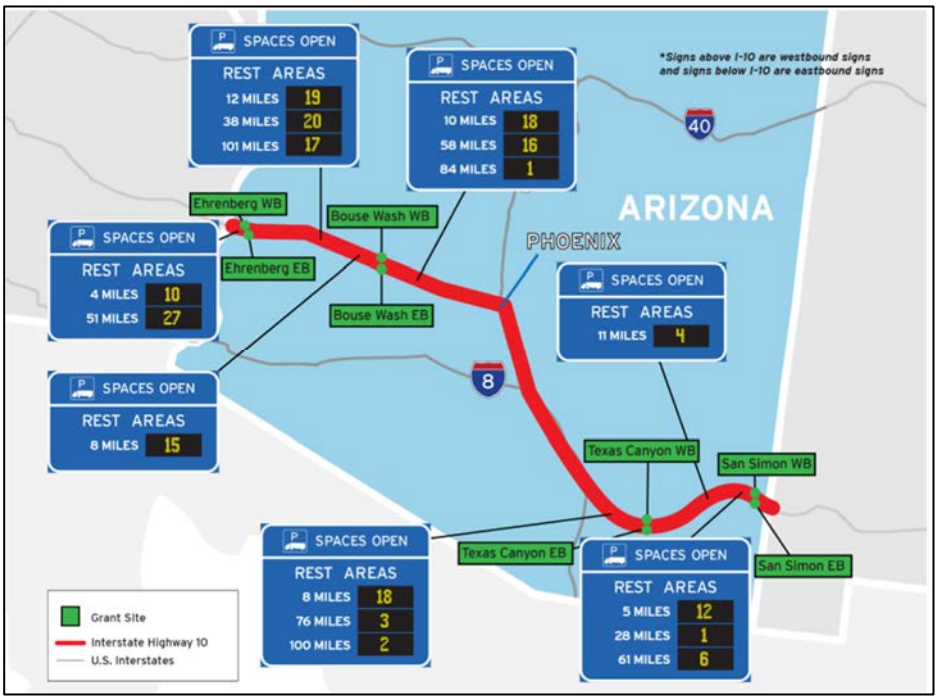


Figure 5-8. Arizona TPAS Implementation Sites

Additional truck parking solutions at a corridor-wide basis were developed by the Texas Department of Transportation (TxDOT) as a part of the 2020 *Texas Freight Network Technology and Operations Plan*[16]. Three potential strategies include the following:

- Freight Integrated Corridor Management: This strategy has high-level benefits of safety, mobility, and reduced emissions to improve freight flow through areas of high crash potential by rerouting trucks along parallel routes (Figure 5-9).
- High-resolution Advanced Freight Traveler Information System: This strategy provides benefits of reducing vehicle operating costs and increasing safety to provide real-time traffic updates using web and mobile apps for truck drivers to make informed decisions pre-trip and on-the-road for overall

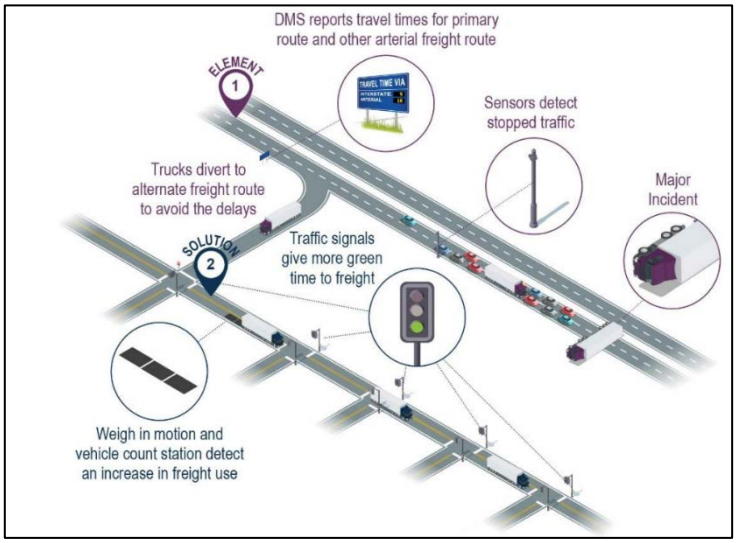


Figure 5-9. TxDOT Freight Integrated Corridor Management

[16] https://ftp.txdot.gov/pub/txdot/tpp/freight-planning/fntop/freight-network-technology-and-operations-plan.pdf

efficiency and reduced congestion (Figure 5-10).

- Automated Vehicle Infrastructure with Connected Signing and Data: The integration of automated vehicle infrastructure, connected signing, and data has high-level benefits for improving safety, mobility, and reducing emissions to help navigate atypical road geometries and construction zones for improved freight mobility with electronic connected signage (Figure 5-11).

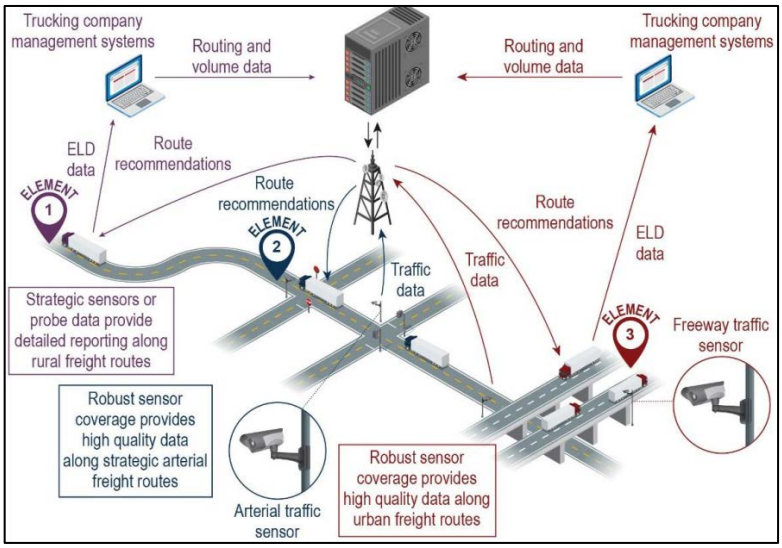


Figure 5-10. TxDOT High-Resolution Freight Traveler Information System

5.4.2 Detection Solutions

A Truck Parking Technology Assessment Survey was conducted in May 2023 by the Maryland Department of Transportation that obtained responses from various state and city departments of transportation across the country to determine the benefits and challenges of several truck parking data collection devices and their efficiency for improving parking availability. The survey found that in addition to the CCTV cameras and radar detection (Figure 5-12), pavement-embedded pucks used for measuring space occupancy and dual camera spectroscopy also were in use. The most effective solution was the combination of the radar detection systems with the CCTV cameras. The pucks were noted as ineffective, with one survey responding that they experienced a 70% failure rate within 2 years of deployment. All the survey respondents emphasized the importance of system design, construction, integration, and testing of the truck parking availability devices and systems.

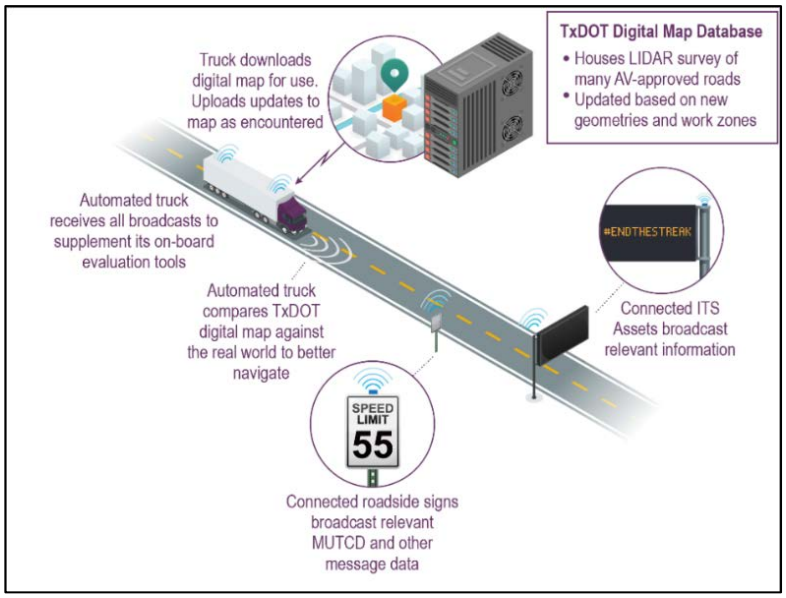


Figure 5-11. TxDOT AV Infrastructure, Connected Signage and Data

Figure 5-12. CCTV Camera and Radar Detection for TPAS

5.4.3 Information Dissemination

To inform drivers about truck parking availability, several departments of transportation updated their 511 websites for real-time traveler information. An example of the real-time truck parking availability website is the FDOT 511 Traffic Information Website[17]. The interactive site allows users to input their routes and see potential traffic speeds, alerts, and areas with truck parking availability (Figure 5-13). FDOT's 511 website with truck parking availability first became available following the release of FDOT's 2020 *Statewide Truck Parking Study*.

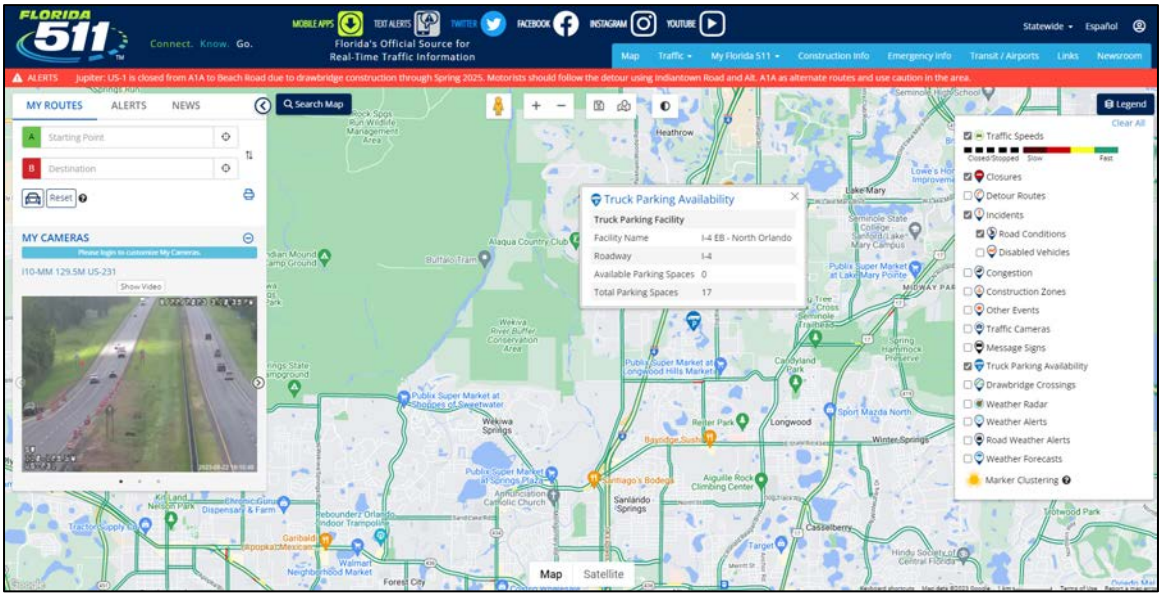


Figure 5-13. FDOT 511 Website Real-Time Truck Parking Availability

[17] https://www.fdot.gov/rail/studies/truck-parking