Arizona
Statewide Rest Area Study

ADOT

Final Draft Working Paper 1

Existing Conditions and Data Collection

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1 Introduction and Background

The 2011 Statewide Rest Area Study has provided a foundation for Arizona Department of Transportation's (ADOT) strategic plan to expand, preserve, and modernize rest areas for the last ten years. Although these facilities have served travelers well over the last few decades, recent changes in technology and the transportation industry require a thorough reassessment.

This update to the Statewide Rest Area Study (SWRAS) is being conducted by ADOT's Multimodal Planning Division (MPD). This update will develop a comprehensive list of improvements to all 19 of Arizona's state-owned, operated, and maintained rest area facilities. This study will identify, evaluate, and propose strategies to meet the rapidly growing need for the state to provide rest area services to the traveling public through study target year of 2041.

Relevant ADOT Studies

Recent efforts completed by ADOT were reviewed for information related to rest areas. The findings of those reviews are summarized as follows:

- ***What Moves You Arizona 2040*** is a long-range transportation plan that provides information to ADOT partners, such as metropolitan planning organizations and councils of government, about transportation needs and investment priorities to inform decisions on state highway funding. This plan identifies goals relevant to this study, such as increased investment in freight reliability and maintaining, preserving, and extending the service life of existing and future state transportation system infrastructure.
- **The *2017 Arizona State Freight Plan*** identifies short- and long-term transportation investment priorities and goals that are intended to promote economic growth within Arizona. More than 65 percent of freight tonnage moved within Arizona uses the highway system. Specifically, the Interstate highway system supports the greatest volume of freight (in terms of tonnage and value), particularly along the I-40 and I-10 corridors. The Arizona State Freight Plan identified a statewide shortage of safe truck parking as an issue ADOT should address to improve freight movement, especially on the I-17 corridor between Phoenix and Flagstaff and on I-10 between Tucson and Blythe, California.
- **The *2019 Arizona Truck Parking Study*** was developed in response to the *2017 Arizona State Freight Plan's* conclusion that inadequate truck parking affects the safety and efficiency of freight movement within the state. Inadequate truck parking causes truck drivers to park on highway shoulders, on/off ramps, vacant properties, or local surface streets. Increasing truck traffic volumes statewide has further exacerbated truck parking shortages in Arizona. Truck parking in these undesignated locations negatively affects highway safety, infrastructure condition, and quality of life. The *2019 Arizona Truck Parking Study* identified gaps between truck parking supply and demand, defined infrastructure and policy needs, and proposed potential capacity and technology solutions to improve truck parking in Arizona. The recommendations from the *2019 Arizona Truck Parking Study* included truck expansion projects at several ADOT rest

areas. Specifically, the study recommended that the number of existing truck parking spaces at the Haviland, Bouse Wash, and Sacaton Rest Areas be expanded and the Meteor Crater Rest Area formalize its overflow parking lots.

Study Process

This study updates and supersedes the *2011 Statewide Rest Area Study*. The same planning process is being followed: Inventory of Existing Conditions and Data Collection, Forecast Future Conditions and Deficiencies, and Develop Evaluation Criteria and Plan for Improvements.

A Working Paper will be written for each of these listed steps. This document, Working Paper 1: Inventory of Existing Facilities and Data Collection, provides a detailed inventory and assessment of existing conditions pertinent to Arizona rest areas.

Study Goals and Objectives

This study's goals and objectives will expand upon the transportation planning recommendations made by previous studies and plans, including the Arizona State Freight Plan (2017), What Moves You Arizona 2040 (2018), and the Arizona Truck Parking Study (2019). (**Table 1.1**)

Table 1-1. Study Goals and Objectives

GOALS OBJECTIVES
1 Assess current rest area facilities and identify deficiencies
• Inventory existing rest areas • Identify existing parking deficiencies • Determine traffic demand peak and capture rates • Develop benchmarking process to identify best practices
2 Evaluate future needs for preservation, expansion, modernization, and new facilities
• Forecast traffic for 5-, 10-, 20-year planning horizons • Evaluate future levels of service and parking • Identify rehabilitation and preservation projects for existing facilities • Identify the need for closing, adding, or expanding existing facilities • Identify public and/or private funding opportunities
3 Develop evaluation criteria and a plan for improvements
• Develop specific projects and implementation strategies addressing the following areas: motorist safety and security, traffic volumes, distance to alternative facilities, economic development, design features for each facility to operate in a safe and satisfactory conditions, required operating capacity for the planning horizons, and funding opportunities

Stakeholder Communication

Technical Advisory Committee

The Project Management Team (PMT) invited ADOT staff in roles relevant to the study to participate in the Technical Advisory Committee (TAC). The TAC's role will be to provide input on technical aspects of the study. Virtual meetings or email updates will be sent from the PMT to the TAC for their input.

A TAC kick-off meeting was held on February 2, 2022.The meeting was held to invite ADOT staff to participate as TAC members, introduce the project and background, and give participants a tentative milestone schedule. Several TAC meetings will be held throughout the study.

Tribal Consultation

As several rest areas are located on or adjacent to tribal lands, this study will also seek to obtain input throughout the process regarding available data and recommendations from tribal communities. This study will coordinate with ADOT's Tribal Liaison to ensure tribal communities have multiple opportunities to provide input and recommendations.

Data Collection

This study collected data to evaluate the existing conditions of Arizona's rest area facilities and their ability to meet traveler's existing and future needs, identify deficiencies, and implement emerging trends solutions that align with the goals and objectives of this study. Data needs were developed through careful consideration of this study's objectives and a review of the 2011 Arizona Statewide Rest Area Study.

The data needs identified for this study include, but are not limited to:

- Rest area locations (route, mileposts, direction, and nearest exit)
- Existing and Future Traffic (includes differentiation between passenger vehicles and trucks)
- Existing rest area usage
- Distance to alternative facilities (operating twenty-four hours a day and seven days a week)
- Rest area right-of way (ROW) and adjacent land ownership
- Existing amenities at rest areas
- Annual operation and maintenance costs
- Existing utilities at rest areas (location, condition, and required permits)
- Americans with Disabilities Act (ADA) compliant features at rest areas
- Completed improvements at rest areas (since the 2011 Study)
- Programmed improvements (as documented in ADOT's 2022-2026 5-Year Construction Program)

In addition, data from successful "peer" state rest area programs were collected for the purpose of updating the benchmarking process previously developed as part of the 2011 Study. This information was also used to determine contemporary best practices. Six peer states were selected based on their proximity and relation to Arizona, ongoing initiatives (e.g., I-10 Coalition), and input from the ADOT PMT. Although Florida is not a neighboring state to Arizona, The Florida Department of Transportation recently completed an update to their Statewide Rest Area Long-Range Plan (2020), which highlights emerging trends and recent changes in the transportation landscape. Therefore, Florida was also included as a peer state. The states selected for review include:

- Texas
- California
- Utah
- Nevada
- New Mexico
- Florida

California and New Mexico will be prioritized as they connect to Arizona through two major freight corridors in the state, Interstate-10 and Interstate-40.

Methodology

Data collection for this study was conducted between February and April 2022. Data was acquired though three major sources. The first method involved desktop research of available data acquired from publicly accessible and accredited online sources including Geographic Information System (GIS) data. Desktop data collection largely consisted of updates to sources used for the prior *2011 Arizona Statewide Rest Area Study*, as well as new ADOT initiatives and guidelines published since the previous study. Secondly, data not readily available to the public was acquired directly from the appropriate agency.

The third method of data collection involved field visits to each rest area for the purpose of verifying and documenting existing on-site conditions. Field visits were conducted in March 2022, over a three-week period. It should be noted that the Bouse Wash and Sentinel rest areas were under construction at the time of the field visits, and data could not be confirmed. In addition, the Mazatzal rest area is permanently closed, and data could not be collected. Finally, the Parks and Christensen rest areas are temporarily open to truck parking during the pandemic. Only data related to truck parking was collected at these two locations. The following data were obtained for each rest area where data was collected.

- **Truck counts** were obtained in the field between five in the afternoon and five in the morning to get accurate utilization for each rest area.
- **Site conditions** were examined including but not limited to building condition, utilities, roadway conditions, parking utilization, safety and security, signage, ADA compliant facilities, and all available services. This data was collected using the GIS based application software Survey123.
- **User behavior** observations were examined using a rest area evaluation checklist (**Appendix A**) which included but was not limited to, parking availability, observed lengths of stay, preferred parking locations, visitor tendencies, and other observational data on how the facility is being utilized.
- **Leading peer state** information was obtained during the desktop research portion of the data collection effort. For peer states that do not have publicly accessible data that is required for this study, a questionnaire was developed. Once approved by ADOT PMT, the peer state questionnaire was distributed to peer state rest area program and/or facility managers on April 6, 2022.

2 Existing Conditions

Rest Area Locations

Rest areas in Arizona are located along interstates, state roads, and other roads in all seven ADOT Districts. In total, there are 35 rest areas located in Arizona, as presented in **Figure 2-1**. Of the 35 rest areas in Arizona, 19 are owned and operated by ADOT, and one (Navajo Bridge Rest Area) is owned by ADOT and jointly maintained by ADOT and the National Park Service The remaining 15 rest areas are owned and operated by other agencies. For the purposes of this study, only those solely managed by ADOT will be evaluated. The 19 rest areas (33 sites) being evaluated by this study are summarized in **Table 2-1**.

Figure 2-1. Statewide Rest Areas

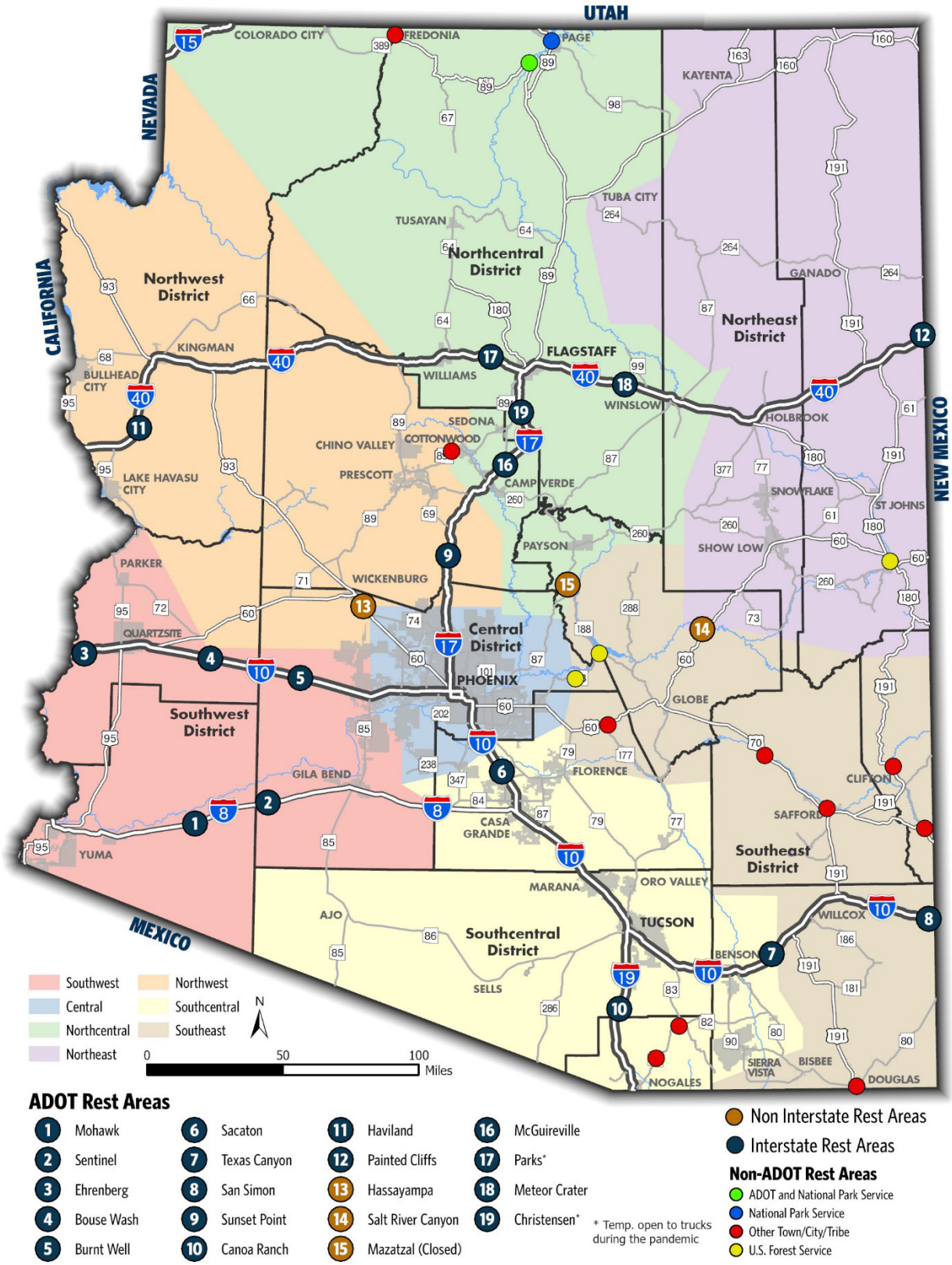


Table 2-1. ADOT Rest Area Locations

MAP No.[1]	Rest Area (RA)	ADOT District	Route	Milepost[2]
1	Mohawk	Southwest	I-8	55.8
1	Mohawk	Southwest	I-8	56.5
2	Sentinel	Southwest	I-8	83.6
2	Sentinel	Southwest	I-8	84.9
3	Ehrenberg	Southwest	I-10	4.4
3	Ehrenberg	Southwest	I-10	5.3
4	Bouse Wash	Southwest	I-10	52.2
4	Bouse Wash	Southwest	I-10	52.9
5	Burnt Well	Southwest	I-10	86.0
5	Burnt Well	Southwest	I-10	86.8
6	Sacaton	Southcentral	I-10	181.7
6	Sacaton	Southcentral	I-10	183.5
7	Texas Canyon	Southcentral	I-10	320.2
7	Texas Canyon	Southcentral	I-10	320.8
8	San Simon	Southeast	I-10	388.4
8	San Simon	Southeast	I-10	389.0
9	Sunset Point	Northwest	I-17	252.8
10	Canoa Ranch	Southcentral	I-19	32.7
10	Canoa Ranch	Southcentral	I-19	33.7
11	Haviland	Northwest	I-40	22.6
11	Haviland	Northwest	I-40	23.2
12	Painted Cliffs	Northeast	I-40	359.0
13	Hassayampa	Southwest	US 60	116.1
14	Salt River Canyon	Southwest	US 60	292.9
15	Mazatzal[a]	Southwest	SR 87	235.7
16	McGuireville	Northcentral	I-17	296.5
16	McGuireville	Northcentral	I-17	297.1
17	Parks[b]	Northcentral	I-40	181.6
17	Parks[b]	Northcentral	I-40	182.7
18	Meteor Crater	Northcentral	I-40	235.2
18	Meteor Crater	Northcentral	I-40	236.4
19	Christensen[b]	Northcentral	I-17	323.8
19	Christensen[b]	Northcentral	I-17	324.3

Notes:

[a] *Permanently Closed*

[b] *Permanently closed, but temporarily open to truck parking during the pandemic*

[1] *RA Map No. = Rest area number corresponding to Figure 2-1*

[2] *Milepost = Location of mainline off-ramp intersection for rest area*

Right-of-Way and Land Ownership

Right-of-Way

The existing right-of-way information around the rest areas was obtained from ADOT. It should be noted, that ADOT was in the process of updating the existing ROW data during the period this data was received (**Figure 2-2**).

Land ownership

The land ownership information for each of the rest areas was obtained from Arizona State Land Department (ASLD). The ownership of the land at and adjacent to the rest area varies per location. The land ownership of the rest areas and adjacent land is shown in **Figure 2-3**.

Figure 2-2. Existing Right-of-Way

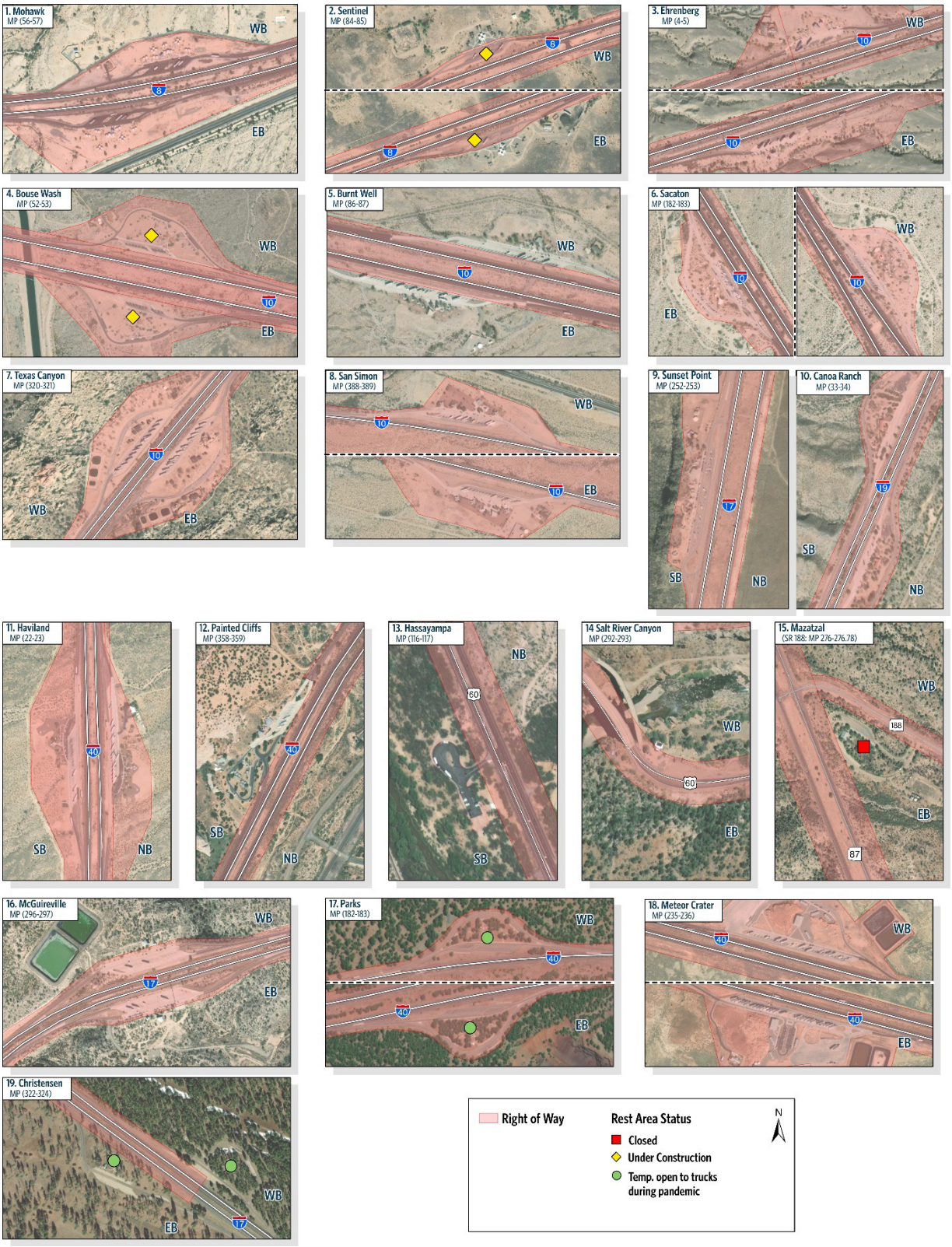
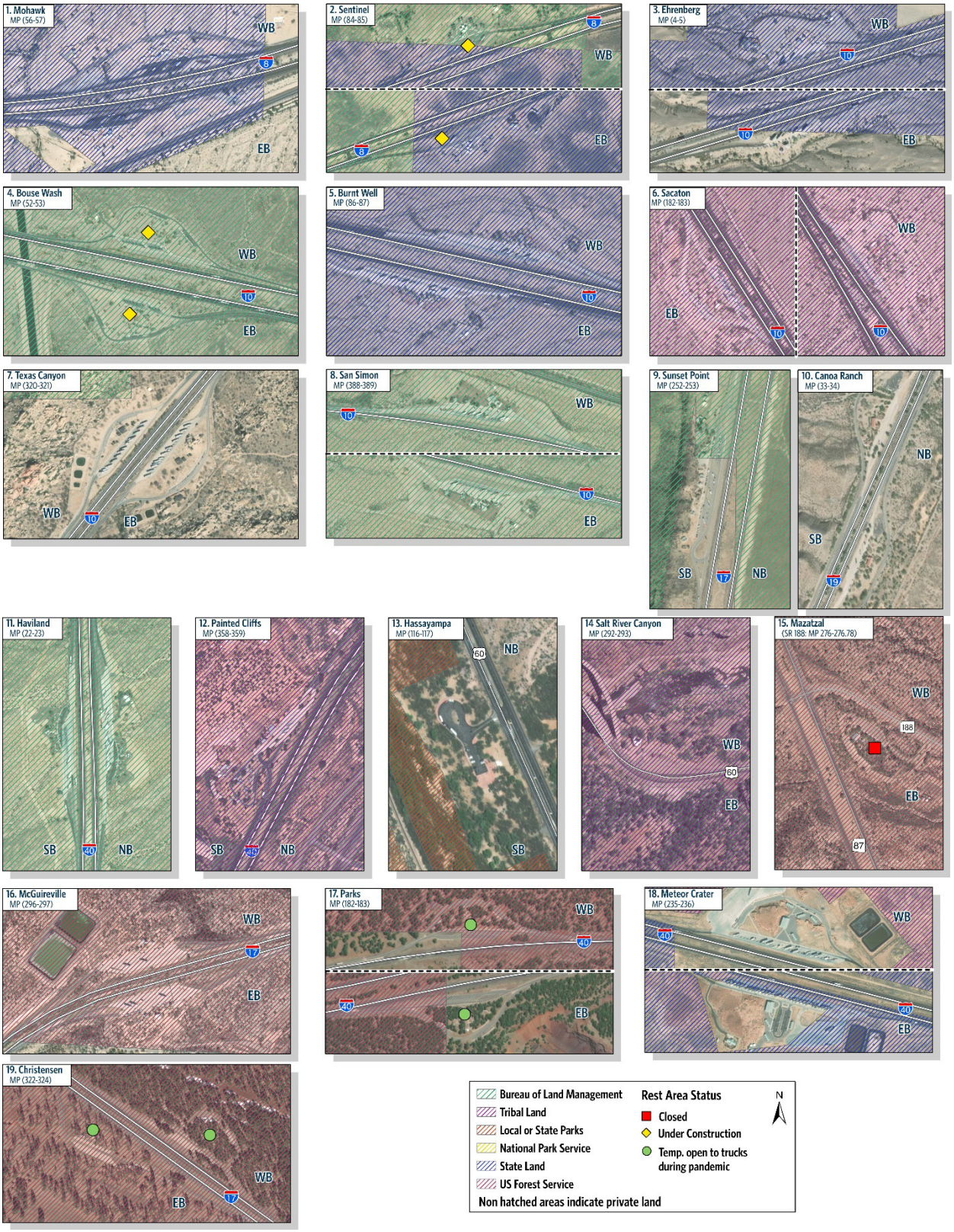


Figure 2-3. Existing Land Ownership



Environmental Overview

Preliminary information about the natural environment in the vicinity of each rest area was obtained from the Bureau of Land Management (BLM), the US Environmental Protection Agency (EPA), the Arizona Game and Fish Department (AGFD), the U.S. Fish and Wildlife Service (USFWS), the National Wetlands Inventory (NWI), and the Natural Resources Conservation Service (NRCS). **Figure 2-4** illustrates the biological and water resources and other environmental features adjacent to the rest areas.

As presented in **Figure 2-4**, 13 rest areas are located adjacent to a habitat block and 11 are in a wildlife linkage zone. As defined by AGFD, a habitat block consists of important wildlife habitat that can reasonable expected to remain wild for at least 50 years, and a wildlife linkage zone is an area critical to wildlife movement. Coordination with AGFD is recommended during the rest area study and design processes.

At least 14 rest areas are located adjacent to washes, streams, or creeks, including the Hassayampa and Salt Rivers. Coordination with the US Army Corps of Engineers is recommended to determine the appropriate level of Clean Water Act investigation and permitting. In addition, the Canoa Ranch rest area is located within the Upper Santa Cruz and Avra Basin sole source aquifer; coordination with the EPA would be necessary prior to construction at this rest area. No prime or unique farmland is present at or immediately adjacent to any of the 19 rest areas (NRCS 2022)[1].

No suitable habitat for sensitive species is present at the rest stops due to the high level of disturbance at each rest stop and the continuously maintained landscape areas. However, the rest areas tend to be in the vicinity of undeveloped land that may provide potential habitat for sensitive species. The USFWS Information and Planning and Consultation system was used to identify threatened and endangered species within two miles of each rest area (**Table 2-2**). Ground surveys and further coordination with USFWS, AGFD, and BLM would be required to determine suitability of habitat, whether sensitive species are likely to occur in the project area, and potential impacts from construction on both habitat and species.

[1] U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2022. Online Soil Survey. Accessed March 7, 2022. https://websoilsurvey.sc.egov.usda.gov/app/HomePage.htm.

Table 2-2. Potential Threatened and Endangered Species Near Rest Areas

Common Name	Scientific Name	Status	Rest Areas Near Potential Habitat
Mammals			
Jaguar	*Panthera onca*	Endangered	Canoa Ranch, San Simon, Texas Canyon
Mexican Wolf	*Canis lupus baileyi*	Endangered	Salt River Canyon
Ocelot	*Leopardus (=Felis) pardalis*	Endangered	Canoa Ranch, Texas Canyon
Sonoran Pronghorn	*Antilocapra americana sonoriensis*	Endangered	Bouse Wash, Burnt Well, Canoa Ranch, Ehrenberg, Mohawk, Sacaton, Sentinel
Birds			
California Condor	*Gymnogyps californianus*	Endangered	Meteor Crater, Parks
California Least Tern	*Sterna antillarum browni*	Endangered	Burnt Well, Canoa Ranch, Hassayampa, Haviland, Sentinel
Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened	Canoa Ranch, Christensen, Mazatzal, McGuireville, Meteor Crater, Painted Cliffs, Parks, Salt River Canyon, Sunset Point
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Endangered	Canoa Ranch, Ehrenberg, Hassayampa, Mazatzal, McGuireville, Painted Cliffs
Yellow-billed Cuckoo	*Coccyzus americanus*	Threatened	Bouse Wash, Burnt Well, Canoa Ranch, Christensen, Ehrenberg, Hassayampa, Haviland, Mazatzal, McGuireville, Meteor Crater, Mohawk, Painted Cliffs, Parks, Sacaton, Salt River Canyon, San Simon, Sentinel, Sunset Point, Texas Canyon
Yuma Ridgway's Rail	*Rallus obsoletus yumanensis*	Endangered	Ehrenberg, Mohawk, Sentinel
Reptiles			
Northern Mexican gartersnake	*Thamnophis eques megalops*	Threatened	Bouse Wash, Canoa Ranch, Christensen, Ehrenberg, Haviland, Mazatzal, McGuireville, Meteor Crater, Painted Cliffs, Parks, Sacaton, Salt River Canyon, San Simon, Sunset Point, Texas Canyon
Sonoyta Mud Turtle	*Kinosternon sonoriense longifemorale*	Endangered	Canoa Ranch
Sonoran Desert Tortoise	*Gopherus morafkai*	Protected under a Candidate Conservation Agreement	Bouse Wash, Burnt Well, Canoa Ranch, Ehrenberg, Hassayampa, Haviland, Mazatzal, Mohawk, Sacaton, Sentinel, Sunset Point
Amphibians			
Chiricahua Leopard Frog	*Rana chiricahuensis*	Threatened	Canoa Ranch, Mazatzal, McGuireville, Texas Canyon
Fishes			
Bonytail	*Gila elegans*	Endangered	Ehrenberg

Common Name	Scientific Name	Status	Rest Areas Near Potential Habitat
Desert Pupfish	*Cyprinodon macularius*	Endangered	Sunset Point
Gila Chub	*Gila intermedia*	Endangered	Mazatzal, McGuireville, Sunset Point
Gila Topminnow (incl. Yaqui)	*Poeciliopsis occidentalis*	Endangered	Sunset Point
Loach Minnow	*Tiaroga cobitis*	Endangered	McGuireville
Razorback Sucker	*Xyrauchen texanus*	Endangered	Ehrenberg, Salt River Canyon
Spikedace	*Meda fulgida*	Endangered	Mazatzal, McGuireville
Zuni Bluehead Sucker	*Catostomus discobolus yarrowi*	Endangered	Painted Cliffs
Insects			
Monarch Butterfly	*Danaus plexippus*	Candidate	Bouse Wash, Burnt Well, Canoa Ranch, Christensen, Ehrenberg, Hassayampa, Haviland, Mazatzal, McGuireville, Meteor Crater, Mohawk, Painted Cliffs, Parks, Sacaton, Salt River Canyon, San Simon, Sentinel, Sunset Point, Texas Canyon
Plants			
Arizona Cliffrose	*Purshia (=Cowania) subintegra*	Endangered	McGuireville
Pima Pineapple Cactus	*Coryphantha scheeri var. robustispina*	Endangered	Canoa Ranch
Wright's Marsh Thistle	*Cirsium wrightii*	Proposed Threatened	Texas Canyon
Zuni Fleabane	*Erigeron rhizomatus*	Threatened	Painted Cliffs

Figure 2-4. Preliminary Environmental Features

Transportation System Overview

Roadway Functional Classification

Functional Classification is the categorization of streets and highways according to the character of travel service each roadway provides. The three major functional classification categories are defined by the Federal Highway Administration (FHWA) as Arterial, Collector, and Local. **Figure 2-5** presents the functional classification of roadways adjacent to rest areas.

Lanes and Posted Speed Limit

The posted speed limits and number of lanes adjacent to rest areas was verified through use of as-built plans, field visits, and GIS. **Figure 2-5** presents the number of lanes and posted speed limits on the mainline roadway adjacent to rest areas.

Bridge Conditions

The conditions of the existing bridges within the vicinity of rest areas were verified through coordination with the ADOT Bridge Group. The information obtained includes the latest sufficiency rating and condition of each bridge at or near rest areas. In **Figure 2-6** bridges with ratings only occur at or near five rest areas. In rest areas where rivers/washes are present but there is no bridge indicated, the water passes through a culvert.

Figure 2-5. Roadway Characteristics

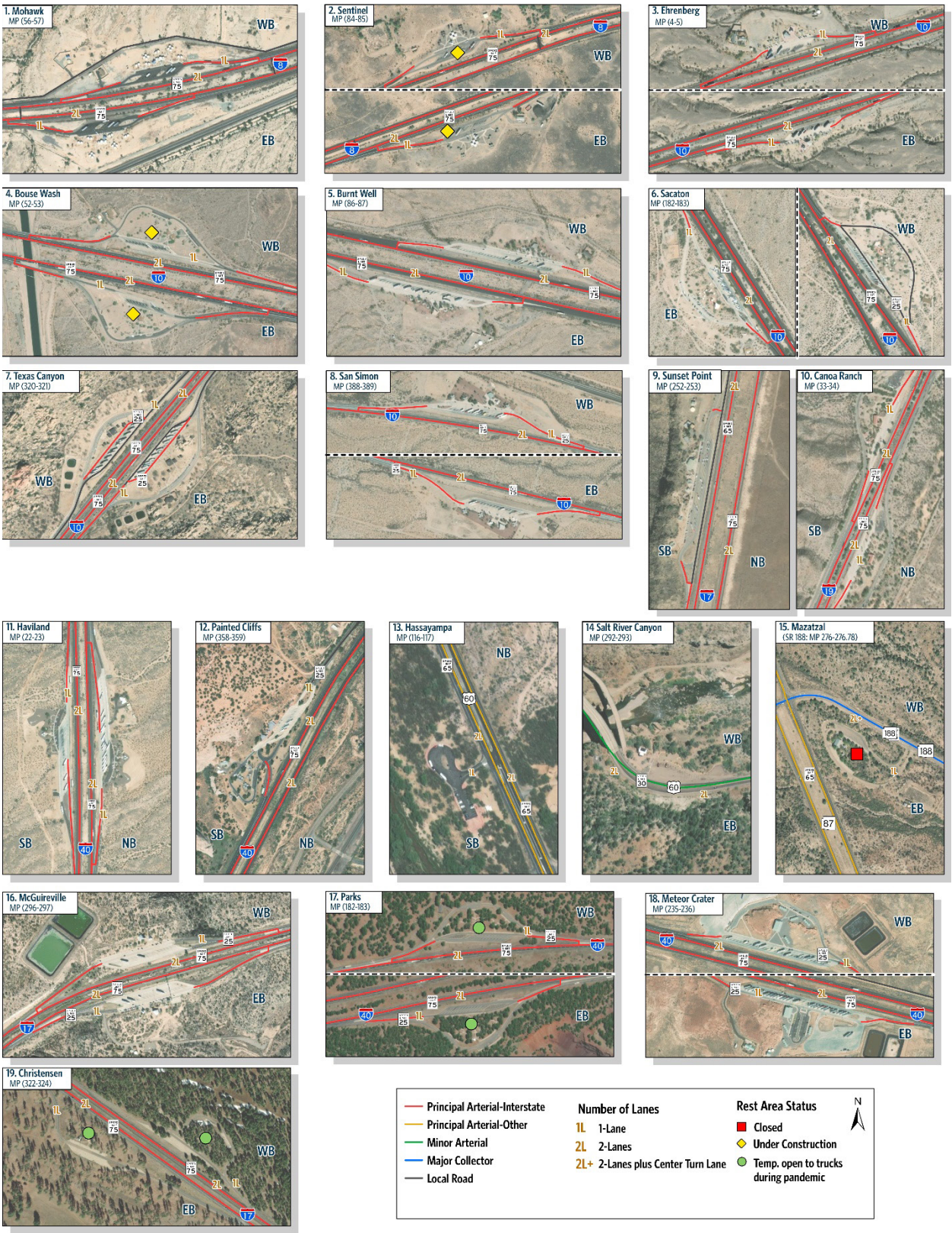


Figure 2-6. Bridge Conditions

3 Safety Overview

Crash Analysis

Data from ADOT's Accident Location Identification Surveillance System (ALISS) database were used to analyze crashes over a five-year period. Crashes were gathered for a one-mile radius on either side of the rest area measured from intersection and/or the mainline /on-off ramp intersections. The crashes included those on the on/off ramps to the rest areas, roads in the rest areas, on the mainline roadway, and one mile on either side of the mainline on/off ramp intersection.

All crashes occurring between January 1, 2017, and December 31, 2021, were included in the analysis. A total of 1,256 crashes occurred in the study area over the five-year period. Crash analysis was conducted for the rest areas in the study area to identify trends, patterns, and predominant crash reasons.

- Majority of the crashes occurred at or near the rest areas in Sacaton (22 percent), Sunset Point (18 percent), and McGuireville (8 percent)
- 96 percent of the total crashes occurred on the mainline, and 4 percent of the crashes occurred along the on/off ramps to the rest areas or in the parking lots.
- 97 percent of the total crashes at the 19 rest areas appear to have no relation to the rest areas.
- 51 percent of the total crashes involved a single vehicle, 26 percent were rear end crashes, and 16 percent were sideswipe crashes.
- 15 percent of the total crashes were the result of collision overturning/jackknife, 19 percent due to a collision with a fixed object, and 46 percent due to a collision with a motor vehicle.
- There were 22 fatal crashes (1.8 percent), 3 percent were suspected serious injury, 17 percent were suspected minor injury, and 9 percent were possible injury.

Figure 3-1 illustrates the crashes per location at each of the rest areas over the five-year analysis period. An analysis and brief discussion for each rest area including summaries of the various types of crash patterns is provided in **Appendix B.**

Figure 3-1. Crashes Near Rest Areas from 2017 to 2021

Emergency and Safety Management

Due to Arizona's size, geography, and changing environmental conditions, rest areas are key to supporting ADOT's emergency management efforts and serve several purposes.

- **Rest areas are used for staging during emergency situations**: Information provided by ADOT Facilities Management indicates that rest areas are used as staging areas during emergency situations and are sometimes used by the Arizona's Department of Public Safety (DPS) to support ongoing emergency efforts.
- **Rest areas provide safe harbor from weather events and dangerous driving conditions:** In addition, travelers along Arizona's highways sometimes must contend with rapidly changing weather conditions, and rest areas provide relief during such events. For instance, the ten-mile segment between mileposts 209 and 219 along interstate-10 experiences sudden dust storms which reduce driver visibility and create hazardous driving conditions. In response, ADOT has implemented a Dust Storm Detection System for this stretch of interstate-10. As events such as these occur in other portions of Arizona, rest areas provide drivers the ability to exit the interstates and highways safely to wait until driving conditions have improved.
- **Rest areas serve as "Safe Phone Zones" to reduce distracted driving:** Since the previous study, Geico and ADOT have partnered to provide branded signs prior to rest areas, which call attention to upcoming rest areas as places for drivers to stop and safely use their mobile devices.[2] In addition, the use of mobile devices has increased drastically since 2011, which has resulted in a national epidemic of distracted driving, particularly among teens and commercial drivers. The "Safe Phone Zones" partnership not only promotes rest areas as places for drivers to safely use their devices on trips, but it also provides new, non-toll and non-tax revenue to ADOT that can offset the operation and maintenance costs associated with rest areas.[3]
- **Rest areas add capacity during National emergencies (COVID-19):** Rest areas also provide opportunities to support indirect effects caused by national and state emergencies. For instance, two rest areas that have been permanently closed (Christensen and Parks) were temporarily reopened to allow for commercial vehicle parking to support the increased demand during the COVID-19 pandemic. It should be noted, that reopened rest areas do not provide amenities and only allow for truck parking.

[2] https://azdot.gov/adot-news/adot-and-geico-encourage-motorists-use-safe-phone-zones
[3] http://safephonezone.com/about.html

4 Rest Area Inventory

The following sections summarize the existing rest area inventory and associated data.

Age of Facilities

Many of ADOT's rest areas were first opened to the public in the 1970's, with the oldest (McGuireville) being opened in 1961. Although most rest areas have been renovated since first being built, the age of ADOT rest areas ranges from twenty-seven to sixty-one years, as summarized in **Table 4-1**.

Table 4-1. Rest Area Facility Age

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	MILE POST[3]	FIRST OPENED TO THE PUBLIC	AGE OF FACILITY (in years)
1	Mohawk	I-8	EB	55.8	1971	51
1	Mohawk	I-8	WB	56.5	1971	51
2	Sentinel	I-8	EB	83.6	1973	49
2	Sentinel	I-8	WB	84.9	1973	49
3	Ehrenberg	I-10	EB	4.4	1972	50
3	Ehrenberg	I-10	WB	5.3	1972	50
4	Bouse Wash	I-10	EB	52.2	1986	36
4	Bouse Wash	I-10	WB	52.9	1986	36
5	Burnt Well	I-10	EB	86.0	1975	47
5	Burnt Well	I-10	WB	86.8	1975	47
6	Sacaton	I-10	EB	181.7	1973	49
6	Sacaton	I-10	WB	183.5	1973	49
7	Texas Canyon	I-10	EB	320.2	1985	37
7	Texas Canyon	I-10	WB	320.8	1985	37
8	San Simon	I-10	EB	388.4	1972	50
8	San Simon	I-10	WB	389.0	1972	50
9	Sunset Point	I-17	Both	252.8	1970	52
10	Canoa Ranch	I-19	NB	32.7	1978	44
10	Canoa Ranch	I-19	SB	33.7	1978	44
11	Haviland	I-40	EB	22.6	1984	38
11	Haviland	I-40	WB	23.2	1984	38
12	Painted Cliffs	I-40	Both	359.0	1979	43
13	Hassayampa	US 60	Both	116.1	1982	40
14	Salt River Canyon	US 60	Both	292.9	1994	28
15	Mazatzal	SR 87	Both	235.7	1995	27
16	McGuireville	I-17	NB	296.5	1961	61
16	McGuireville	I-17	SB	297.1	1961	61
17	Parks	I-40	EB	181.6	1976	46
17	Parks	I-40	WB	182.7	1976	46

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	MILE POST[3]	FIRST OPENED TO THE PUBLIC	AGE OF FACILITY (in years)
18	Meteor Crater	I-40	EB	235.2	1973	49
18	Meteor Crater	I-40	WB	236.4	1973	49
19	Christensen	I-17	NB	323.8	N/A	(2)
19	Christensen	I-17	SB	324.3	N/A	(2)

Notes:

[1] RA Map No. = Rest area number corresponding to Figure 2-1;

[2] = No data available;

[3] Milepost = Location of mainline off-ramp intersection for rest area

Completed and Programmed Improvements

Fifteen of ADOT's managed rest areas have undergone improvements since the 2011 Study. Rest area improvements were prioritized based on recommendations from the 2011 Study, as well as needs identified by ADOT. Improvements to rest areas include but are not limited to water and wastewater system enhancements; structural, mechanical, and electrical rehabilitations; pavement rehabilitations; ADA improvements; restroom expansions and renovations; and truck parking expansions.

The list of improvements between 2011 and 2021 were provided by ADOT Facilities Management (**Table 4-2**)

Table 4-2. Completed Rest Area Improvements

Fiscal Year (FY)	Rest Area(s)	Description of Work	Funding Amount	Date Completed
FY 12 / FY 13	Sunset Point	Drill new well; water system communications; ramada structural rehabilitation	$3,495,000	October 2013
FY 12 / FY 13	Bouse Wash	Replace water/booster pumps (and related work); replace wastewater pond liners; ADA compliance; site paving; water system communication; structural, mechanical and electrical rehabilitation	$1,485,000	August 2013
FY 12 / FY 13	McGuireville Hassayampa	**McGuireville:** Drill new well; replace water/ booster pumps (and related work); paint water storage reservoir; ADA compliance; water system communication; and structural rehabilitation **Hassayampa**: Water system repair; parking lot rehabilitation	$1,400,000	**McGuireville:** November 2013 **Hassayampa:** June 2013
FY 13 / FY 14	Salt River Canyon	Replace water/booster pumps (and related work); paint water storage reservoir; replace composting toilets; ADA compliance; site paving; and structural rehabilitation	$1,290,000	October 2014
FY 13 / FY 14	Burnt Well Ehrenberg	**Burnt Well and Ehrenberg**: Replace water/booster pumps (and related work); replace septic tanks and leach fields; ADA compliance; site paving; paint water storage reservoir; water system communication; structural, mechanical, and electrical rehabilitation	$3,700,000	**Burnt Well:** October 2014 **Ehrenberg:** April 2015
FY 14 / FY 15	San Simon	Drill new well; replace water/booster pumps (and related work); replace septic tanks and leach field; paint water storage reservoir; site paving; ADA compliance; water system communications; structural, mechanical, and electrical rehabilitation	$3,000,000	May 2016
FY 14 / FY 15	Texas Canyon	Replace water/booster pumps (and related work); replace wastewater pond liners; replace septic tanks; replace water pipeline; paint water storage reservoir; ADA compliance; site paving; water system communication; structural, mechanical, and electrical rehabilitation	$4,795,000	June 2016

FY15 / FY16	Mohawk	Replace water/booster pumps (and related work); replace septic tanks; replace water pipeline; rehabilitate water pump building; replace water storage reservoir; ADA compliance; site paving; water system communication; structural, mechanical and electrical rehabilitation	$4,200,000	July 2017
FY 16 / FY 17	Sacaton Canoa Ranch	**Sacaton:** Replace water pipeline; replace septic tanks and leach fields; abandon old well; structural, mechanical, and electrical rehabilitation **Canoa Ranch**: Replace water pumps; install new water line; replace septic tanks and leach fields; replace water pipeline; paint water storage reservoir; water system communications; structural, mechanical, and electrical rehabilitation	$3,520,000	**Sacaton:** November 2018 **Canoa Ranch:** May 2019
FY 17 / FY 18	Haviland	Replace water/booster pumps (and related work); paint water storage reservoir; replace septic tanks; ADA compliance; truck parking expansion and site paving; structural, mechanical, and electrical rehabilitation	$2,250,000	July 2019
FY 18 / FY 19	Painted Cliffs Meteor Crater	**Painted Cliffs:** Replace water pumps, septic tanks and leach fields; water system communications; site work; structural, mechanical and electrical rehabilitation **Meteor Crater:** Replace water pumps; evaporation pond liners; paint water storage reservoir; water system communications; site work; truck parking expansion; structural, mechanical, and electrical rehabilitation	$3,775,000	**Painted Cliffs**: September 2020 **Meteor Crater:** October 2021

Four rest areas are either under construction or are programmed for improvements between fiscal years (FY) 2022-2023. Rest area improvements include but are not limited to rest area rehabilitation, water and wastewater improvements, truck parking expansion, ADA improvements, restroom and residence improvements, and structural, mechanical, and electrical improvements. The description of work and funding for rest area improvements (**Table 4-3**) were provided by the ADOT Facilities Management team and/or are documented in ADOT's Five-Year Transportation Facilities Construction Program (2022-2026), approved June 21, 2021. [4]

[4] https://apps.azdot.gov/ADOTLibrary/Multimodal_Planning_Division/FiveYrPlan/Five_Year_Program-FY2022-26.pdf

Table 4-3. Programmed Rest Area Improvements - Fiscal Years (FY) 2019-2023

Scheduled Year	Rest Area	Description of Work	Funding Amount	Expected Completion
FY 19 / 20	Bouse Wash	Relocate septic tanks (and related work); rehabilitate well for higher water production; paint water storage reservoir; truck parking expansion; ADA compliance restroom/residence renovation; structural, mechanical, and electrical rehabilitation	$4,375,000	April 2022
FY 20 / 21	Sentinel	Rehabilitate well, new pump house (and related work); replace septic tanks and leach fields; new water storage reservoir; truck parking expansion; ADA compliance; site work; structural, mechanical, and electrical rehabilitation	$7,125,000	September 2022
FY 21 / 22	Sunset Point	Rehabilitate old restroom building; residence renovation; replace aerators, power and related controls for the ponds; ADA compliance; demolition of old pump house interior (and related work); truck parking expansion; site work; structural, mechanical, and electrical rehabilitation	$6,400,000	February 2022
FY 22 / 23	McGuireville	Rehabilitate existing lift station and controls; install power and related controls for the evaporation ponds; residence renovation; ADA compliance; mechanical upgrade residence and restroom building; site painting and seal buildings; site work; truck parking expansion; structural, mechanical, and electrical rehabilitation	$6,500,000	2023

Operation and Maintenance

Operation and Maintenance Costs

The 2011 Study documented operational and maintenance costs for each rest area to be between $79,000 and $286,000, annually. The variation in costs were representative of the number of sites at each rest area, the size of facilities at each rest area, utility types, and overall usage. Since 2011, the costs to operate and maintain each rest area has risen slightly. According to ADOT Facilities Management, the cost to operate and maintain ADOT's rest areas, as of 2021, is approximately $300,000 annually (or $25,000 per month), which includes water and wastewater related costs.

ADOT Rest Area Maintenance

Rest areas are maintained to ensure that each facility is safe, attractive, clean, sanitary, and operable 24 hours a day, 7 days a week. To maintain each facility, ADOT provides on-site caretaker residences for the contractor who maintains the rest areas. Caretaker's residences are provided at each rest area (one residence per pair of rest areas), except for the Hassayampa and Salt River Canyon rest areas, where no caretaker's residence is provided. **Table 4-7** in the following sections summarizes rest areas with caretaker's residences.

In 2019, ADOT entered a Public-Private Partnership with the Diamond Ridge Development Corporation to perform daily custodial services at rest areas. The contractor ensures the interior and exterior areas of rest areas are maintained and perform weekly and/or monthly services such as parking lot cleaning and HVAC maintenance. The contractor is also responsible for repairs, as feasible. It should be noted, the vending machines are maintained, stocked, and repaired by vending operators. In addition to regular maintenance and care of rest areas, ADOT has implemented hourly cleaning of contact surfaces to reduce the potential spread of viruses in response to the COVID-19 pandemic.

Existing Utilities

Water source and wastewater system utilities for each rest area was verified and documented using the most recent record drawings, and further verified during field visits. In addition, coordination with ADOT's utility engineers was conducted to obtain all documented and/or permitted power, gas, and telephone utilities at or adjacent to rest areas. **Table 4-4** presents all known utilities at or adjacent to each of the nineteen rest areas locations. Per ADOT's request, pump houses used to facilitate water usage at rest areas were geolocated during field visits and verified using GIS. It should be noted, since the Parks, Christensen, and Mazatzal rest areas are permanently closed, pump houses at these locations were not geolocated. In addition, a new pump house was being constructed for the Sentinel rest area during the period field visits were conducted. Therefore, the pump house location at the Sentinel rest area represents its location prior to construction. **Figure 4-1** presents the location of existing groundwater well pump houses for each rest area.

Table 4-4. Existing Utilities

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION	WATER SOURCE (EXISTING)	WASTEWATER SYSTEM (EXISTING)	HEATING OR AIR CONDITIONING (YES OR NO)	EXISTING PERMIITED UTILITIES (Location)
1	Mohawk	I-8	EB	Groundwater Well	Septic System	Yes	Telephone-Mountain States Telephone & Telegraph Co. (Underground)
1	Mohawk	I-8	WB	Groundwater Well	Septic System	Yes	
2	Sentinel	I-8	EB	Groundwater Well	Septic System	[2]	[2]
2	Sentinel	I-8	WB	Groundwater Well	Septic System	[2]	
3	Ehrenberg	I-10	EB	Groundwater Well	Septic System	Yes	Power-APS (Underground); Water-El Paso Natural Gas (Underground)
3	Ehrenberg	I-10	WB	Groundwater Well	Septic System	Yes	
4	Bouse Wash	I-10	EB	Groundwater Well	Septic System	[2]	[2]
4	Bouse Wash	I-10	WB	Groundwater Well	Septic System	[2]	
5	Burnt Well	I-10	EB	Groundwater Well	Septic System	Yes	Power-APS (Underground)
5	Burnt Well	I-10	WB	Groundwater Well	Septic System	Yes	
6	Sacaton	I-10	EB	American Water Company	Septic System	No	AE Power-Bureau of Indian Affairs
6	Sacaton	I-10	WB	American Water Company	Septic System	No	
7	Texas Canyon	I-10	EB	Groundwater Well	Septic System	No	Power-Sulphur Springs Valley Electric Cooperative, Inc. (Underground); Telephone-Mountain States Telephone & Telegraph Co. (Underground)
7	Texas Canyon	I-10	WB	Groundwater Well	Septic System	No	
8	San Simon	I-10	EB	Groundwater Well	Septic System	No	Power-Sulphur Springs Valley Electric Cooperative, Inc. (Underground)
8	San Simon	I-10	WB	Groundwater Well	Septic System	No	
9	Sunset Point	I-17	Both	Groundwater Well	Septic System	Yes	[2]
10	Canoa Ranch	I-19	NB	Groundwater Well	Septic System	No	Telephone-Mountain Bell (Underground); Telephone-Mountain States Telephone Co.

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION	WATER SOURCE (EXISTING)	WASTEWATER SYSTEM (EXISTING)	HEATING OR AIR CONDITIONING (YES OR NO)	EXISTING PERMIITED UTILITIES (Location)
10	Canoa Ranch	I-19	SB	Groundwater Well	Septic System	No	(Underground); AE Power-Tucson Gas & Electric
11	Haviland	I-40	EB	Groundwater Well	Septic System	Yes	Power-UNS Electric, Inc. (Underground)
11	Haviland	I-40	WB	Groundwater Well	Septic System	Yes	
12	Painted Cliffs	I-40	Both	Groundwater Well	Septic System	Yes	Water-Whiting Bros. Oil Co. (Underground)
13	Hassayampa	US 60	Both	Groundwater Well	Septic System	No	Power-APS (Underground)
14	Salt River Canyon	US 60	Both	Groundwater Well	Septic System	No	(2)
15	Mazatzal	SR 87	Both	(2)	(2)	(2)	(2)
16	McGuireville	I-17	NB	Groundwater Well	Septic System	Yes	Power-APS (Underground)
16	McGuireville	I-17	SB	Groundwater Well	Septic System	Yes	
17	Parks	I-40	EB	(2)	(2)	(2)	Power-APS (Underground); Telephone-Mountain Bell (Underground)
17	Parks	I-40	WB	(2)	(2)	(2)	
18	Meteor Crater	I-40	EB	Groundwater Well	Septic System	Yes	(2)
18	Meteor Crater	I-40	WB	Groundwater Well	Septic System	Yes	
19	Christensen	I-17	NB	(2)	(2)	(2)	Power-APS (Underground)
19	Christensen	I-17	SB	(2)	(2)	(2)	

Sources: ADOT, ADOT Repository of Online Archived Documents, Jacobs (March 2022)

Notes: [1] RA Map No. = Rest area number corresponding to Figure 2-1; [2] = No data available

Figure 4-1. Groundwater Well Pump Houses

As documented in the previous sections, fifteen rest areas have undergone improvements since 2011. Many of these included improvements to existing rest area utilities, such as well and well pump enhancements, electrical rehabilitation, and septic system improvements. In addition, ADOT has made water saving policy changes since the previous study to reduce water use at rest areas. The water and wastewater system enhancements listed in **Table 4-2** and **Table 4-3** are representative of ADOT's commitment to save 40,000 gallons of water per day at rest areas across Arizona. Water usage reduction efforts include the installation of low flow sinks and toilets, metered faucets, and replacing liquid soap dispensers with foam soap dispensers (requires less water to rinse). Other steps to reduce water usage include the new valve-exercise program, where valves are regularly inspected to reduce the chance of failure; similarly, daily water meter readings are taken to track potential spikes in water usage caused by leaks. [5]

Water Conservation Pump – Meteor Crater Rest Area (EB)

Technological improvements along ADOT's highway network and at rest areas have also occurred or are underway at the time of this study. To meet the growing demand and changes in the transportation technology landscape, ADOT is expanding its fiber optic cable network, with recent installation of fiber optic node buildings at the northbound McGuireville rest area and Sunset Point rest area.

Traffic Conditions

Mainline AADT

The COVID-19 pandemic resulted in dramatic changes to traffic patterns nationwide and throughout Arizona. Therefore, 2019 Annual Average Daily Traffic (AADT) was used to better represent traffic conditions prior to the pandemic. **Table 4-5** shows the combined total 2019 AADT for both travel directions for roadway segments adjacent to the rest areas.

Table 4-5. Mainline AADT Adjacent to Rest Areas

RA MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION	MILE POST[2]	2019 MAINLINE AADT
1	Mohawk (EB)	I-8	EB	55.8	10,620
1	Mohawk (WB)	I-8	WB	56.5	
2	Sentinel (EB)	I-8	EB	83.6	10,500
2	Sentinel (WB)	I-8	WB	84.9	

[5] https://aashtojournal.org/2019/05/31/arizona-dot-adopts-new-water-conservation-policies-for-rest-areas/

3	Ehrenberg (EB)	I-10	EB	4.4	27,286
3	Ehrenberg (WB)	I-10	WB	5.3	
4	Bouse Wash (EB)	I-10	EB	52.2	26,339
4	Bouse Wash (WB)	I-10	WB	52.9	
5	Burnt Well (EB)	I-10	EB	86.0	24,124
5	Burnt Well (WB)	I-10	WB	86.8	
6	Sacaton (EB)	I-10	EB	181.7	62,629
6	Sacaton (WB)	I-10	WB	183.5	
7	Texas Canyon (EB)	I-10	EB	320.2	17,682
7	Texas Canyon (WB)	I-10	WB	320.8	
8	San Simon (EB)	I-10	EB	388.4	14,118
8	San Simon (WB)	I-10	WB	389.0	
9	Sunset Point	I-17	Both	252.8	37,549
10	Canoa Ranch (NB)	I-19	NB	32.7	17,314
10	Canoa Ranch (SB)	I-19	SB	33.7	
11	Haviland (EB)	I-40	EB	22.6	17,668
11	Haviland (WB)	I-40	WB	23.2	
12	Painted Cliffs	I-40	Both	359.0	23,129
13	Hassayampa	US 60	Both	116.1	18,556
14	Salt River Canyon	US 60	Both	292.9	2,788
15	Mazatzal	SR 87	Both	235.7	13,269
16	McGuireville (NB)	I-17	NB	296.5	26,123
16	McGuireville (SB)	I-17	SB	297.1	
17	Parks (EB)	I-40	EB	181.6	20,316
17	Parks (WB)	I-40	WB	182.7	
18	Meteor Crater (EB)	I-40	EB	235.2	19,820
18	Meteor Crater (WB)	I-40	WB	236.4	
19	Christensen (NB)	I-17	NB	323.8	23,237
19	Christensen (SB)	I-17	SB	324.3	

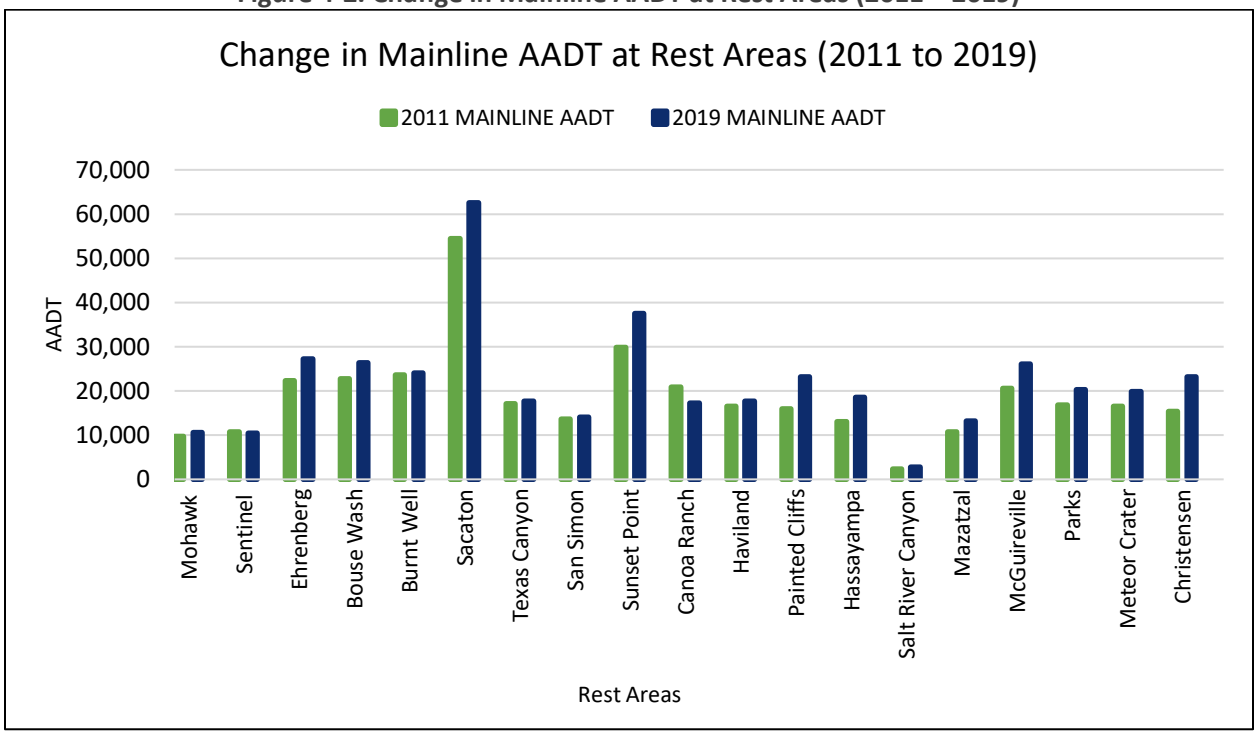
Notes:
[1] *RA Map No. = Rest area number corresponding to Figure 2-1*
[2] *Milepost = Location of mainline off-ramp intersection for rest area*

As population, tourism, and development grow throughout Arizona, traffic demand along Arizona's highway network does as well. The 2011 AADT volumes from the previous study were compared to 2019 AADT to determine changes in traffic demand at rest areas since the previous study. Because the 2019 AADT represents the combined traffic for both travel directions adjacent to rest areas, the 2011 AADT was also combined for both travel directions to allow for a more accurate comparison of change in AADT between 2011 and 2019. The Christensen, Painted Cliffs, and Hassayampa rest areas experienced the largest percentage increase (approximately 51 percent, 46 percent, and 43 percent, respectively) in adjacent mainline traffic since 2011.

The Canoa Ranch and Sentinel rest areas are the only rest areas that experienced a decrease in AADT since 2011 (16.8 percent and 2.8 percent, respectively). The Burnt Well, Texas Canyon, and San Simon

rest areas saw the smallest percentage increase (2.2 percent, 3.4 percent, and 3.8 percent, respectively) during this timeframe. **Figure 4-2** presents the changes in AADT volumes from 2011 to 2019 at each of ADOT's managed rest areas.

Figure 4-2. Change in Mainline AADT at Rest Areas (2011 – 2019)



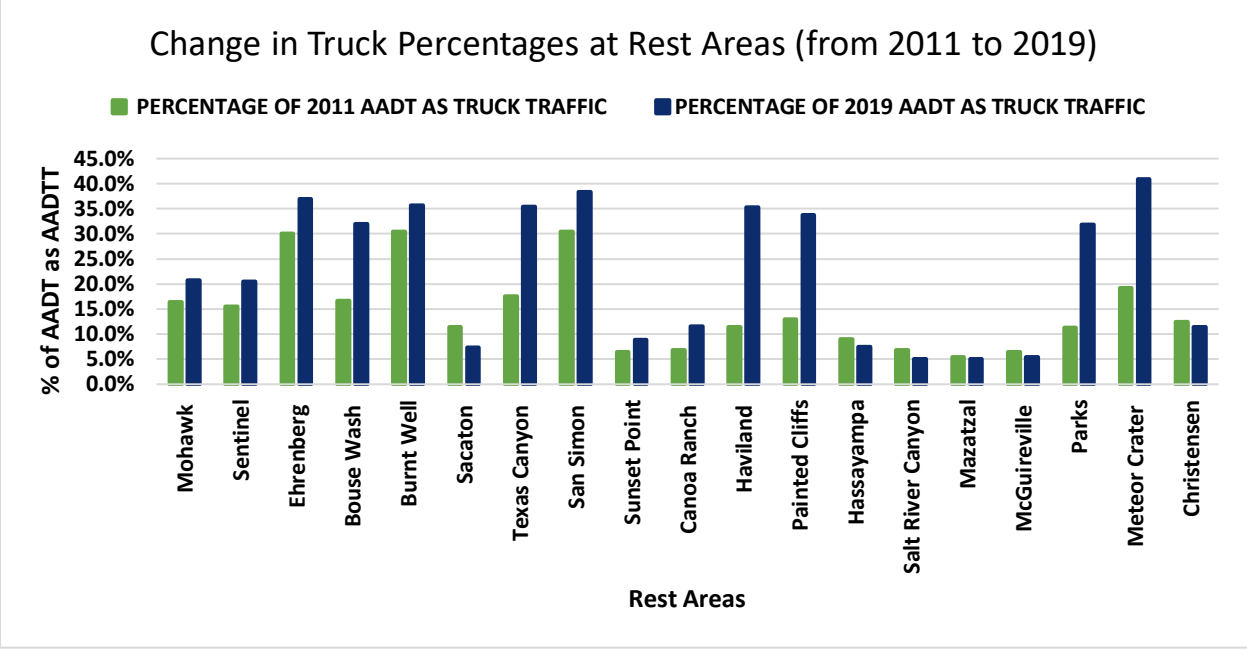
Source: ADOT MPD Data Analytics, 2011 Arizona Statewide Rest Area Study

Truck Traffic

According to the *2017 Arizona State Freight Plan*, Arizona's state highway network is the most utilized freight infrastructure in Arizona. Furthermore, most freight movement along the highway system is documented as being through-traffic (39 percent). This through-traffic is representative of traffic moving from major ports in Los Angeles and Long Beach to interior portions if the United States. [6] Rest areas provide key stopping and rest opportunities for these commercial vehicles.

On Arizona interstates and highways adjacent to ADOT rest areas, the 2019 Annual Average Daily Truck Traffic (AADTT) was highest at the Ehrenberg, Burnt Well, and Bouse Wash rest areas (10,097, 8,605, and 8,421 vehicles, respectively). This large amount of truck traffic adjacent to these rest areas aligns with findings documented in the *2017 Arizona State Freight Plan*, which noted I-10 as being Arizona's most utilized freight corridor. [7] In addition, the highest percentages of truck traffic (relative to total traffic) were located adjacent to the Meteor Crater, Haviland, and San Simon rest areas (40.9, 38.4, and 38.4 percent, respectively). The lowest AADTT was documented at the Mazatzal and Salt River Canyon rest areas (674 and 139 vehicles, respectively). Since the 2011 study, the Haviland and Painted Cliffs rest areas have seen dramatic increases in truck traffic (259 and 279 percent, respectively). Changes in truck traffic volumes adjacent to rest areas between 2011 and 2019 are summarized in **Table 4-6**, while the change in the percentage of truck traffic (relative to total traffic) adjacent to rest areas is presented as **Figure 4-3**. Additional data related truck traffic and rest area ramp traffic is being collected as part of this study and will be provided through an addendum once completed.

Figure 4-3. Change in Percentage of AADT as Truck Traffic (2011 to 2019)



[6] https://azdot.gov/sites/default/files/2019/08/arizona-state-freight-plan-110917.pdf
[7] https://azdot.gov/sites/default/files/2019/08/arizona-state-freight-plan-110917.pdf

Table 4-6. Truck Traffic Volumes

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION	2011 MAINLINE TRAFFIC VOLUME (AADT)	2019 MAINLINE TRAFFIC VOLUME (AADT)	2011 MAINLINE TRUCK TRAFFIC VOLUME (AADTT[2])	2019 MAINLINE TRUCK TRAFFIC VOLUME (AADTT[2])	PERCENTAGE OF 2011 AADT AS AADTT[2]	PERCENTAGE OF 2019 AADT AS AADTT[2]
1	Mohawk	I-8	EB	9,700	10,620	1,590	2,209	16.4%	20.8%
1	Mohawk	I-8	WB						
2	Sentinel	I-8	EB	10,800	10,500	1,670	2,152	15.5%	20.5%
2	Sentinel	I-8	WB						
3	Ehrenberg	I-10	EB	22,300	27,286	6,705	10,097	30.1%	37.0%
3	Ehrenberg	I-10	WB						
4	Bouse Wash	I-10	EB	22,800	26,339	3,799	8,421	16.7%	32.0%
4	Bouse Wash	I-10	WB						
5	Burnt Well	I-10	EB	23,600	24,124	7,181	8,605	30.4%	35.7%
5	Burnt Well	I-10	WB						
6	Sacaton	I-10	EB	54,500	62,629	6,195	4,601	11.4%	7.3%
6	Sacaton	I-10	WB						
7	Texas Canyon	I-10	EB	17,100	17,682	3,010	6,259	17.6%	35.4%
7	Texas Canyon	I-10	WB						
8	San Simon	I-10	EB	13,600	14,118	4,148	5,421	30.5%	38.4%
8	San Simon	I-10	WB						
9	Sunset Point	I-17	Both	29,800	37,549	1,923	3,334	6.5%	8.9%
10	Canoa Ranch	I-19	NB	20,800	17,314	1,423	1,999	6.8%	11.5%
10	Canoa Ranch	I-19	SB						
11	Haviland	I-40	EB	16,600	17,668	1,890	6,785	11.4%	38.4%
11	Haviland	I-40	WB						
12	Painted Cliffs	I-40	Both	15,900	23,129	2,062	7,806	13.0%	33.7%
13	Hassayampa	US 60	Both	13,000	18,556	1,170	1,391	9.0%	7.5%

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION	2011 MAINLINE TRAFFIC VOLUME (AADT)	2019 MAINLINE TRAFFIC VOLUME (AADT)	2011 MAINLINE TRUCK TRAFFIC VOLUME (AADTT[2])	2019 MAINLINE TRUCK TRAFFIC VOLUME (AADTT[2])	PERCENTAGE OF 2011 AADT AS AADTT[2]	PERCENTAGE OF 2019 AADT AS AADTT[2]
14	Salt River Canyon	US 60	Both	2,400	2,788	163	139	6.8%	5.0%
15	Mazatzal[a]	SR 87	Both	10,700	13,269	584	674	5.5%	5.1%
16	McGuireville	I-17	NB	20,600	26,123	1,333	1,413	6.5%	5.4%
16	McGuireville	I-17	SB						
17	Parks[b]	I-40	EB	16,800	20,316	2669	6,481	11.4%	31.9%
17	Parks[b]	I-40	WB						
18	Meteor Crater	I-40	EB	16,600	19,820	3,187	8,100	19.2%	40.9%
18	Meteor Crater	I-40	WB						
19	Christensen[b]	I-17	NB	15,356	23,237	1,907	2,649	12.4%	11.4%
19	Christensen[b]	I-17	SB						

Notes:
[a] *Permanently Closed*
[b] *Permanently closed, but temporarily open to truck parking during the pandemic*
[1] *RA Map No. = Rest area number corresponding to Figure 2-1*
[2] *AADTT = Annual Average Daily Truck Traffic (FHWA vehicles C8-C13)*

Amenities

The list of amenities provided at each rest area was updated from the previous 2011 Study based on recent improvements provided by ADOT and were confirmed through field visits conducted in March 2022. It should be noted that the Bouse Wash and Sentinel rest areas were under construction during the period when field visits were conducted; therefore, the list of amenities offered at these locations will be updated as part of the Final Draft Report.

As documented in previous sections, multiple rest areas have undergone improvements since 2011. These improvements include bathroom expansion at the Haviland rest areas, as well as electric, mechanical, and structural rehabilitation of ramadas, restroom, vending machine areas, and caretaker residences at multiple rest areas. The existing amenities offered at ADOT rest areas, and the amenities added or removed since 2011 are summarized in **Table 4-7**. **Table 4-8** provides the number of restroom stalls and/or urinals, ramadas, pet areas, and picnic areas available at each rest area.

Table 4-7. Rest Area Amenities and ADA Compliance

Table Key:
✓ = *Amenity or ADA available;* ✓ = *Amenity added between 2011 and 2022;* ✘ = *Amenity not available;* ✘ = *Amenity removed between 2011 and 2022;*

RA MAP No. [1]	REST AREA	ROUTE	TRAFFIC DIRECTION SERVED	DISTRICT	CARETAKER'S RESIDENCE	ADA COMPLIANCE			AMENITIES							
						PARKING	RAMPS	RESTROOMS	RESTROOMS	TRAVELER INFO	VENDING MACHINES	DRINKING FOUNTAINS	RAMADAS	PICNIC AREAS[3]	PET AREAS	PUBLIC TELEPHONES
1	Mohawk	I-8	EB	Southwest	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
1	Mohawk	I-8	WB	Southwest	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
2	Sentinel	I-8	EB	Southwest	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
2	Sentinel	I-8	WB	Southwest	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
3	Ehrenberg	I-10	EB	Southwest	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
3	Ehrenberg	I-10	WB	Southwest	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
4	Bouse Wash	I-10	EB	Southwest	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
4	Bouse Wash	I-10	WB	Southwest	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
5	Burnt Well	I-10	EB	Southwest	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
5	Burnt Well	I-10	WB	Southwest	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
6	Sacaton	I-10	EB	Southcentral	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
6	Sacaton	I-10	WB	Southcentral	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
7	Texas Canyon	I-10	EB	Southcentral	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘

Table Key:

✓ = *Amenity or ADA available;* ✓ = *Amenity added between 2011 and 2022;* ✘ = *Amenity not available;* ✘ = *Amenity removed between 2011 and 2022;*

RA MAP No. [1]	REST AREA	ROUTE	TRAFFIC DIRECTION SERVED	DISTRICT	CARETAKER'S RESIDENCE	ADA COMPLIANCE			AMENITIES							
						PARKING	RAMPS	RESTROOMS	RESTROOMS	TRAVELER INFO	VENDING MACHINES	DRINKING FOUNTAINS	RAMADAS	PICNIC AREAS [3]	PET AREAS	PUBLIC TELEPHONES
7	Texas Canyon	I-10	WB	Southcentral	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
8	San Simon	I-10	EB	Southeast	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
8	San Simon	I-10	WB	Southeast	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Sunset Point	I-17	Both	Northwest	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
10	Canoa Ranch	I-19	NB	Southcentral	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
10	Canoa Ranch	I-19	SB	Southcentral	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
11	Haviland	I-40	EB	Northwest	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
11	Haviland	I-40	WB	Northwest	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
12	Painted Cliffs	I-40	Both	Northeast	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
13	Hassayampa	US 60	Both	Northwest	No	✓	✓	✓	✓	✓	✘	✘	✘	✓	✓	✘
14	Salt River Canyon	US 60	Both	Southeast	No	✓	✓	✓	✓	✓	✘	✓	✘	✓	✓	✘
15	Mazatzal	SR 87	Both	Southeast	No	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
16	McGuireville	I-17	NB	Northcentral	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
16	McGuireville	I-17	SB	Northcentral	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘

Table Key:

✓ *= Amenity or ADA available;* ✓ *= Amenity added between 2011 and 2022;* ✘ *= Amenity not available;* ✘ *= Amenity removed between 2011 and 2022;*

RA MAP No. [1]	REST AREA	ROUTE	TRAFFIC DIRECTION SERVED	DISTRICT	CARETAKER'S RESIDENCE	ADA COMPLIANCE			AMENITIES							
						PARKING	RAMPS	RESTROOMS	RESTROOMS	TRAVELER INFO	VENDING MACHINES	DRINKING FOUNTAINS	RAMADAS	PICNIC AREAS[3]	PET AREAS	PUBLIC TELEPHONES
17	Parks	I-40	EB	Northcentral	No	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
17	Parks	I-40	WB	Northcentral	No	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
18	Meteor Crater	I-40	EB	Northcentral	Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
18	Meteor Crater	I-40	WB	Northcentral	No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✘
19	Christensen	I-17	NB	Northcentral	No	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
19	Christensen	I-17	SB	Northcentral	No	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)

Notes:

[1]RA Map No. = Rest area number corresponding to Figure 2-1

[2] = No data available, rest area is closed

[3]Picnic Areas = Tables with attached benches for seating

Table 4-8. Number of Select Amenities at ADOT Rest Areas

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	RESTROOMS/STALLS				RAMADAS	PET AREAS	PICNIC AREAS
				Men	Women	Family	*Total*			
1	Mohawk	I-8	EB	7	7	0	14	6	2	2
1	Mohawk	I-8	WB	7	7	0	14	6	2	2
2	Sentinel	I-8	EB	6	6	2	14	6	3	7
2	Sentinel	I-8	WB	6	6	2	14	6	3	7
3	Ehrenberg	I-10	EB	6	7	0	13	6	2	0
3	Ehrenberg	I-10	WB	6	7	0	13	6	2	0
4	Bouse Wash	I-10	EB	4	4	0	8	5	3	8
4	Bouse Wash	I-10	WB	4	4	0	8	5	3	8
5	Burnt Well	I-10	EB	6	7	0	13	6	2	6
5	Burnt Well	I-10	WB	6	7	0	13	4	2	4
6	Sacaton	I-10	EB	6	6	0	12	7	1	10
6	Sacaton	I-10	WB	6	6	0	12	7	2	11
7	Texas Canyon	I-10	EB	6	6	0	12	3	2	12
7	Texas Canyon	I-10	WB	6	6	0	12	3	2	12
8	San Simon	I-10	EB	6	7	0	13	3	2	12
8	San Simon	I-10	WB	6	7	0	13	3	2	12
9	Sunset Point	I-17	Both	8	8	1	17	6	3	9
10	Canoa Ranch	I-19	NB	8	8	1	17	3	1	7
10	Canoa Ranch	I-19	SB	8	8	1	17	3	1	8
11	Haviland	I-40	EB	8	6	0	14	4	2	12
11	Haviland	I-40	WB	8	6	0	14	4	2	12
12	Painted Cliffs	I-40	Both	6	6	0	12	5	2	16

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	RESTROOMS/STALLS				RAMADAS	PET AREAS	PICNIC AREAS
				Men	Women	Family	*Total*			
13	Hassayampa	US 60	Both	2	2	0	4	0	1	7
14	Salt River Canyon	US 60	Both	5	5	0	10	0	1	2
15	Mazatzal	SR 87	Both	(2)	(2)	(2)	(2)	(2)	(2)	(2)
16	McGuireville	I-17	NB	6	6	0	12	4	3	7
16	McGuireville	I-17	SB	6	6	0	12	5	2	9
17	Parks	I-40	EB	(2)	(2)	(2)	(2)	(2)	(2)	(2)
17	Parks	I-40	WB	(2)	(2)	(2)	(2)	(2)	(2)	(2)
18	Meteor Crater	I-40	EB	8	8	1	17	3	2	12
18	Meteor Crater	I-40	WB	8	8	1	17	4	4	16
19	Christensen	I-17	NB	(2)	(2)	(2)	(2)	(2)	(2)	(2)
19	Christensen	I-17	SB	(2)	(2)	(2)	(2)	(2)	(2)	(2)

Notes:

[1]RA Map No. = Rest area number corresponding to Figure 2-1

[2] = No data available, rest area is closed

Parking

As part of this study's goals and objectives, and considering the importance of assessing existing traveler's needs, data for designated parking at rest areas were compiled and documented during field reviews. While most rest areas have designated parking for both cars and commercial vehicles, the Salt River Canyon and Hassayampa rest areas do not have designated truck parking. The following sections summarizes the existing parking conditions at rest areas (**Table 4-9**), as well as private truck parking locations and utilization.

Table 4-9. Existing Parking

RA MAP No. [1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	DISTRICT	EXISTING PARKING	
					CARS	TRUCKS
1	Mohawk	I-8	EB	Southwest	25	10
1	Mohawk	I-8	WB	Southwest	28	10
2	Sentinel[4]	I-8	EB	Southwest	28	14
2	Sentinel[4]	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[4]	I-10	EB	Southwest	42	20
4	Bouse Wash[4]	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	SR 87	Both	Southeast	[2]	[2]
16	McGuireville	I-17	NB	Northcentral	45	20
16	McGuireville	I-17	SB	Northcentral	45	20

RA MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	DISTRICT	EXISTING PARKING	
					CARS	TRUCKS
17	Parks	I-40	EB	Northcentral	(3)	15
17	Parks	I-40	WB	Northcentral	(3)	15
18	Meteor Crater	I-40	EB	Northcentral	32	57
18	Meteor Crater	I-40	WB	Northcentral	31	64
19	Christensen	I-17	NB	Northcentral	(3)	11
19	Christensen	I-17	SB	Northcentral	(3)	15
				Totals	**1013**	**638**

Notes:

[1] *RA Map No. = Rest area number corresponding to Figure 2-1*

[2] *= No data available, rest area is closed or under construction*

[3] *= Rest area temporarily open to trucks only*

[4] *= Represents the number of parking spaces available following construction*

Car Parking at Rest Areas

Rest areas provide designated parking for cars at each of the 19 rest area locations. While visitors are encouraged to stay at the rest areas to reduce driving fatigue, no overnight camping is permitted.

- The Parks, Christensen, and Mazatzal rest areas are permanently closed to car parking.
- Designated car parking spaces at rest areas vary among all facilities, with the number of car parking spaces ranging between 19 and 56 spaces.

Table 4-9 summarizes the number of car parking spaces available at each rest area.

Truck Parking at Rest Areas

Since the previous rest area study in 2011, key legislation changes have been implemented, such as the amendment to the Federal Motor Carrier Safety Regulations (FMCSRs) requiring that electronic logging devices for commercial drivers do not exceed their allowable hours-of service (consecutive driving time-limit) and that drivers take mandatory rest periods.[8] In addition, Jason's Law was implemented to bring attention to the lack of available truck parking nationwide. As a result of these new legislations, truck parking has become a major concern both nationally and within Arizona.

Trucks Parked at the Ehrenberg Rest Area (WB)

[8] https://www.govinfo.gov/content/pkg/FR-2015-12-16/pdf/2015-31336.pdf

The *2019 Arizona Truck Parking Study* was initiated by ADOT following the findings of the *2017 Arizona State Freight Plan*, which concluded that the inadequate truck parking was a major issue affecting freight movement throughout Arizona.[9] The *2019 Arizona Truck Parking Study* found that that the growing truck parking demand in areas close to the Arizona/California border, and major cities such as Phoenix and Flagstaff, resulted in 5 rest areas sites (Bouse Wash EB and WB, Painted Cliffs, Haviland EB and WB) being among the top fifteen most utilized truck parking locations at night. As documented in the study, and as noted by ADOT Facilities Management, most truck parking spaces at rest areas are full by 3am. This high utilization results in commercial drivers parking in undesignated locations at or adjacent to the rest areas, thereby creating unsafe conditions and increased infrastructure damage. Undesignated truck parking is further detailed in the following sections.

Since those documents were published, ADOT has focused on improving and expanding public truck parking at rest areas. To address deficiencies in truck parking throughout Arizona, ADOT has begun implementing multiple projects which aim to not only provide more public truck parking, but also to efficiently disseminate real-time parking information for commercial drivers.

The most recent initiatives include the newly established I-10 Corridor Coalition, which is a joint effort among departments of transportation for California, Arizona, New Mexico, and Texas. This coalition was awarded a grant by the U.S. Department of Transportation to implement a Truck Parking Availability System (TPAS) along the I-10 corridor between California and Texas. The TPAS project is being designed to detect truck parking availability at rest areas and to disseminate this information in real-time to commercial drivers. One goal of this project is to reduce the amount of time drivers spend looking for available parking, thereby reducing driver fatigue, as well as reducing the chance that drivers will park in undesignated locations. Therefore, the result of this project is expected to provide benefits such as improved mobility and safety, reduction of infrastructure damage and emissions, and reducing lost earnings for commercial drivers through increased efficiency and productivity.[10] The TPAS system is being implemented at 4 ADOT rest areas (8 sites) along the I-10 corridor in Arizona, which include the Ehrenberg, Bouse Wash, Texas Canyon, and San Simon rest areas. Once completed, truck parking availability at those rest areas will be disseminated to drivers through use of dynamic messaging signs located before each rest area exit, as well as on the ADOT 511 website. According to ADOT, construction of TPAS at these 4 rest areas is expected to begin in the fall of 2022. In addition, ADOT plans to evaluate the potential for standardizing the TPAS system at the remaining rest areas following a period of operation and evaluation.

Source: I-10 Connects Website

[9] https://azdot.gov/sites/default/files/2019/08/final-report-arizona-truck-parking-study.pdf
[10] https://i10connects.com/node/4656

As mentioned in previous sections, ADOT has made numerous improvements to rest areas since the 2011 rest area study. These improvements have included:

- Truck parking expansion at the Haviland and Meteor Crater rest areas, where over 100 additional truck parking spaces have been added between the two locations.
- The Sentinel and Bouse Wash rest areas are currently under construction, with truck parking expansions included as part of those projects.
- Truck expansion projects are also programmed for the McGuireville and Sunset Point rest areas.

The existing total number of truck parking spaces at all ADOT's 19 rest areas is approximately 638, which has increased from the 454 designated spaces documented as part of the *2019 Arizona Truck Parking Study*.[11] **Table 4-9** summarizes the number of truck parking spaces at each rest area.

As part of the field visit data collection, the number of truck parking spaces being utilized during the time of each field was collected. The number of spaces used, as well as the calculated utilization rates are provided in **Table 4-10**. Although the amount truck parking spaces being used during the field visits is not a reliable indicator of each rest area's overall truck parking utilization, it does provide some insight for truck parking at ADOT rest areas. It should be noted that the truck parking utilization was collected during peak truck parking hours (5:00pm to 5:00am), as suggested by ADOT. Among the rest areas studied, only the eastbound Texas Canyon and eastbound Ehrenberg rest areas were observed as having a truck parking utilization above 75 percent. Also, the Hassayampa rest area does not have designated truck parking spaces, which is why the utilization is above 100 percent.

Truck Parking at Ehrenberg Rest Area (EB)

Table 4-10. Observed Truck Parking Utilization

Rest Area	Route	Date of Visit	Available Truck Parking Spaces	Occupied Truck Parking Spaces	Utilization Rate
Sacaton EB	I-10	3/1/2022	21	10	47.6%
Sacaton WB	I-10	3/1/2022	18	8	44.4%
Salt River Canyon	US 60	3/3/2022	0	0	0.0%
San Simon EB	I-10	3/7/2022	18	7	38.9%
San Simon WB	I-10	3/8/2022	18	11	61.1%
Texas Canyon EB	I-10	3/8/2022	21	19	90.5%
Texas Canyon WB	I-10	3/8/2022	22	6	27.3%

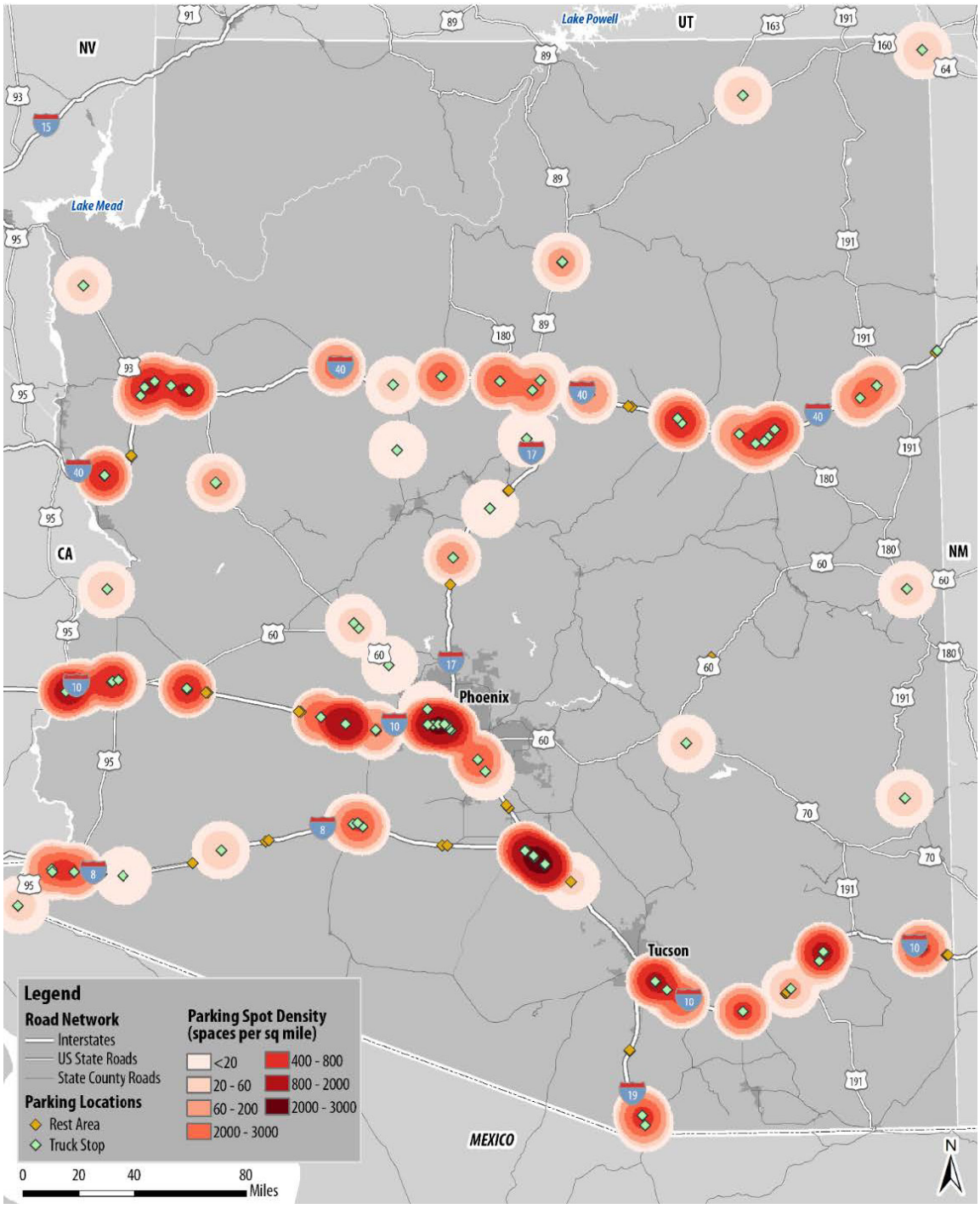
[11] https://azdot.gov/sites/default/files/2019/08/wp3-truck-parking-supply-demand-and-gaps.pdf

Rest Area	Route	Date of Visit	Available Truck Parking Spaces	Occupied Truck Parking Spaces	Utilization Rate
Burnt Well EB	I-10	3/8/2022	30	(1)	(1)
Burnt Well WB	I-10	3/8/2022	30	(1)	(1)
Ehrenberg EB	I-10	3/8/2022	15	12	80.0%
Ehrenberg WB	I-10	3/8/2022	15	8	53.3%
Canoa Ranch NB	I-19	3/8/2022	18	8	44.4%
Canoa Ranch SB	I-19	3/8/2022	18	10	55.6%
Hassayampa	US 60	3/9/2022	0	5	500.0%
Haviland EB	I-40	3/9/2022	29	12	41.4%
Haviland WB	I-40	3/9/2022	23	3	13.0%
Sentinel EB	I-8	3/9/2022	10	5	50.0%
Sentinel WB	I-8	3/9/2022	10	2	20.0%
Mohawk EB	I-8	3/10/2022	10	1	10.0%

Private Truck Parking Locations

The *2019 Arizona truck Parking Study* found that a majority of the available truck parking spaces in Arizona is comprised of private truck parking locations. In fact, that study found that private truck parking locations provide over 12 spaces for every one truck parking space provided by ADOT. In total, private truck parking spaces in Arizona equaled approximately 6,511, with over 93 percent of those located adjacent to the interstate highways. These private truck parking locations, such as a Pilot Flying J or TA-Petro offer truck parking availability and reservations systems allowing for commercial drivers to plan. In addition, these private locations provide expanded amenities not available at ADOT rest areas. These expanded amenities include such items as fueling station, showers, laundry facilities, and more. **Figure 4-4** is an excerpt from the *2019 Arizona Truck Parking Study* and presents the density of private truck parking locations throughout Arizona.

Figure 4-4. Private Truck Parking Density (2019)



Source: 2019 Arizona Truck Parking Study

Undesignated Truck Parking

Undesignated truck parking is defined as trucks parking at on/off ramps, roadway shoulders, and vacant lots. As documented in the *2019 Arizona Truck Parking Study*, over 50 percent of commercial drivers spend 15 minutes or more searching for available parking, and over 63 percent begin searching for parking 30 minutes before their required stop time. This time spent looking for parking results in

reduced productivity and earnings. As a result, drivers often fail to find parking before they reach their hours-of-service limit and are forced to park in undesignated locations. Survey results from the *2019 Arizona Truck Parking Study* found that approximately 50 percent of surveyed drivers park in undesignated location in Arizona at least once per week. Trucks parking in undesignated locations create unsafe conditions for other motorists and causes increased infrastructure damage to roadways.

The *2019 Arizona Truck Parking Study* found that five ADOT rest areas were among the top 15 locations where undesignated truck parking occurs. The five rest areas referenced in the study include the Haviland, Sunset Point, Texas Canyon, Ehrenberg, and Meteor Crater rest areas. It also noted that the exits near the Bouse Wash rest area, were also among the top 15 locations for undesignated truck parking.

Following the truck parking study, the ADOT Facilities Management began keeping track of the number of trucks parked in undesignated locations for the Painted Cliffs, Meteor Crater, Haviland, McGuireville, and Sunset Point rest areas. That data was provided for this study and an analysis of the most recent 6 months (August 2021 to January 2022) was conducted. According to the data provided by ADOT, the Haviland (eastbound/westbound) and Sunset Point rest areas experienced the highest total of undesignated truck parking (1985/974 and 881, respectively), as well as the highest average number of trucks parked in undesignated locations per day (10.8/5.3 and 4.8, respectively). It should be noted that undesignated parking at or near the Painted Cliffs may be partially due to a vertical clearance constraint for large trucks exiting from the eastbound direction. Specifically, vehicles exiting I-40 from the eastbound direction at exit 359 must travel under the existing bridge to reach the Painted Cliffs rest area. The vertical clearance for this bridge is 13 feet and 11 inches, which results in some large trucks not being able to access the rest area from this route. **Table 4-11** summarizes the analysis of undesignated truck parking at the 5 rest areas for the 6-month period.

Table 4-11. Analysis of Undesignated Truck Parking at Select Rest Areas

Rest Area	Route	Total # of Trucks Parked in Undesignated Locations	Average # of Trucks Parked in Undesignated Locations per Day
Painted Cliffs	I-40	782	4.3
Meteor Crater (EB)	I-40	308	1.7
Meteor Crater (WB)	I-40	110	0.6
Haviland (EB)	I-40	1985	10.8
Haviland (WB)	I-40	974	5.3
McGuireville (NB)	I-17	113	0.6
McGuireville (SB)	I-17	625	3.4
Sunset Point	I-17	881	4.8

Rest Area Spacing

The distance between ADOT rest areas was determined by measuring the distance in miles between each ADOT rest area along the same corridor or highway within Arizona. Some rest areas do not have another rest area, for several miles, in the same travel direction, as summarized in **Table 4-12**. Although, some rest areas are spaced beyond the American Association of State Highway and Transportation Officials (AASHTO) recommended 60 miles or one-hour drive time, all rest areas have Alternative Stopping Opportunities (ASOs) within the recommended distance.

Alternative Stopping Opportunities

Alternative Stopping Opportunities are defined as private facilities that offer similar amenities as those at ADOT rest areas (restrooms, parking, etc.), and are open 24 hours a day and 7 days a week. The distance between the nearest existing ASOs and ADOT rest areas was updated from the previous study and is summarized in **Table 4-12**.

Table 4-12. Rest Area Spacing and Distance to Alternative Shopping Opportunities

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	DISTRICT	MILE POST[2]	DISTANCE TO NEAREST RA (mi)		DISTANCE TO NEAREST ASO[3] (mi)	
						N or E	S or W	N or E	S or W
1	Mohawk	I-8	EB	Southwest	55.8	28	None	11	14
1	Mohawk	I-8	WB	Southwest	56.5	28	None	11	14
2	Sentinel	I-8	EB	Southwest	83.6	None	28	32	17
2	Sentinel	I-8	WB	Southwest	84.9	None	28	32	17
3	Ehrenberg	I-10	EB	Southwest	4.4	48	None	1	4
3	Ehrenberg	I-10	WB	Southwest	5.3	48	None	1	4
4	Bouse Wash	I-10	EB	Southwest	52.2	34	48	42	7
4	Bouse Wash	I-10	WB	Southwest	52.9	34	48	42	7
5	Burnt Well	I-10	EB	Southwest	86.0	97	34	8	41
5	Burnt Well	I-10	WB	Southwest	86.8	97	34	8	41
6	Sacaton	I-10	EB	Southcentral	181.7	138	97	7	8
6	Sacaton	I-10	WB	Southcentral	183.5	138	97	7	8
7	Texas Canyon	I-10	EB	Southcentral	320.2	68	138	2	13
7	Texas Canyon	I-10	WB	Southcentral	320.8	68	138	2	13
8	San Simon	I-10	EB	Southeast	388.4	None	68	7	10
8	San Simon	I-10	WB	Southeast	389.0	None	68	7	10
9	Sunset Point	I-17	Both	Northwest	253	45	None	11	21
10	Canoa Ranch	I-19	NB	Southcentral	32.7	None	None	30	20
10	Canoa Ranch	I-19	SB	Southcentral	33.7	None	None	30	20
11	Haviland	I-40	EB	Northwest	22.6	159	None	22	13
11	Haviland	I-40	WB	Northwest	23.2	159	None	22	13
12	Painted Cliffs	I-40	Both	Northeast	359.0	None	123	<1	20
13	Hassayampa	US 60	Both	Northwest	116.1	175	None	4	14
14	Salt River Canyon	US 60	Both	Southeast	292.9	None	175	47	38
15	Mazatzal[a]	SR 87	Both	Southeast	235.7	None	None	15	47
16	McGuireville	I-17	NB	Northcentral	297	27	45	40	10
16	McGuireville	I-17	SB	Northcentral	297	27	45	40	10
17	Parks[b]	I-40	EB	Northcentral	181.6	54	159	3	19
17	Parks[b]	I-40	WB	Northcentral	182.7	54	159	3	19
18	Meteor Crater	I-40	EB	Northcentral	235.2	123	54	19	35

MAP No.[1]	REST AREA (RA)	ROUTE	TRAFFIC DIRECTION SERVED	DISTRICT	MILE POST[2]	DISTANCE TO NEAREST RA (mi)		DISTANCE TO NEAREST ASO[3] (mi)	
						N or E	S or W	N or E	S or W
18	Meteor Crater	I-40	WB	Northcentral	236.4	123	54	19	35
19	Christensen[b]	I-17	NB	Northcentral	324	None	27	13	37
19	Christensen[b]	I-17	SB	Northcentral	324	None	27	13	37

Notes:

[a] *Permanently Closed*

[b] *Permanently closed, but temporarily open to truck parking during the pandemic*

[1] *RA Map No. = Rest area number corresponding to Figure 2-1*

[2] *Milepost = Location of mainline off-ramp intersection for rest area*

5 Benchmarking and Peer States

AASHTO provides the leading guidance and recommendations on the best practice standards for planning, designing, and operating/maintaining rest areas. The AASHTO Guide provides general guidelines for best practice standards for the following benchmarking factors considered in this report:

- Parking layout and capacity
- Building and restroom facilities
- ADA compliance
- Operations and maintenance
- Green/environmentally friendly technologies and practices
- Signing
- Telecommunications
- Landscaping and Lighting

This report also references rest area design and operating standards from other states leading in the implementation and development of best practice standards, including the California Department of Transportation (Caltrans), Texas Department of Transportation (TxDOT), Minnesota Department of Transportation (MnDOT), and other state Departments of Transportation.

Parking Layout and Capacity

The AASHTO Guide provides the following recommendations regarding the development of rest area parking:

Parking Lot Scale

Parking lots should be only as large as required by design calculations while also providing a logical circulation pattern. Oversized lots can confuse motorists and appear harsh and uninviting as drivers approach buildings. Where scale of a lot is very large or linear, landscaped parking bays and islands should be considered to soften the expanse of pavement and reduce its visual impact.

Auto/Truck Parking Separation

Separate lots should be provided for trucks, with appropriate access and circulation patterns. Three examples of different site layouts are depicted in **Figure 5-1**, **Figure 5-2**, and **Figure 5-3**.

Use of Curbs

Curbs along entrance roadways and around parking lots provide excellent traffic delineation. When ramps approaching parking lots are constructed with shoulders but no curbs, the ramp edges often are rutted by truck traffic, becoming unsightly and creating a continual maintenance problem. If curbs are substituted for shoulders, this problem can be avoided. Although concrete or stone curbs increase construction costs and sometimes maintenance costs, many states accept that cost for the visual and aesthetic benefits. Barrier curbs should not be used on high-speed portions of the ramps. Curbs are recommended around all parking lots, on approach ramps, and for islands separating car and truck lots.

Parking-Space Dimensions

States developing rest areas should review AASHTO's guidelines and their own experience elsewhere in modifying [parking space] dimensions.

Surface Consistency

Pavements for entrance/exit ramps, roadways, and parking areas should be designed to provide consistent surface types and structural strengths throughout the entire facility.

Parking-Area Grade

Parking areas typically should be designed with a 2 percent cross slope. The maximum grade is 5 percent, and the minimum is 0.5 percent (to allow for adequate drainage). If practical, pavement slope of parking spaces reserved for persons with disabilities should not exceed a 1 percent grade.

Other Layout Considerations

Layout of paved areas should include consideration of parking-lot dimensions, types of drainage systems required, paving material used, and locations of curbs and islands. These visual effects should be as carefully considered as the durability of various paving materials or potential maintenance problems.

Other Paving Considerations

Other paving plan elements that should be considered include sidewalk scoring patterns, surface textures, and locations of curb ramps and crosswalks. The most current Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Transportation Vehicles (U.S. Architectural and Transportation Barriers Compliance Board) must be used. These features should be adapted so that they match the site-development concept. Paving plans and site-development plans must be coordinated. [12]

Amount of Auto and Truck Parking

AASHTO provides specific calculations to estimate the amounts of auto and truck parking required at a given rest area location. Critical inputs to these calculations include: *Current mainline AADT, 20-year AADT growth factors, Peak-hour AADT, Capture rate – i.e. the proportion of the mainline traffic stopping at the rest area, Average vehicle length of stay for different vehicle types, and Mainline traffic composition – proportions of autos and trucks.*

An important consideration for designing parking layouts is the separation between auto and truck parking. Providing this separation minimizes the risk of collisions between autos and trucks by improving vehicular circulation/maneuvering and creates a sense of smaller scale parking lots that are quieter and create a more inviting environment for rest area users.

[12] "Guide for Development of Rest Areas on Major Arterials and Freeways, 3rd Edition," AASHTO, 2001; pages 62-70.

Figure 5-1. Parking Layout A (AASHTO 2001)

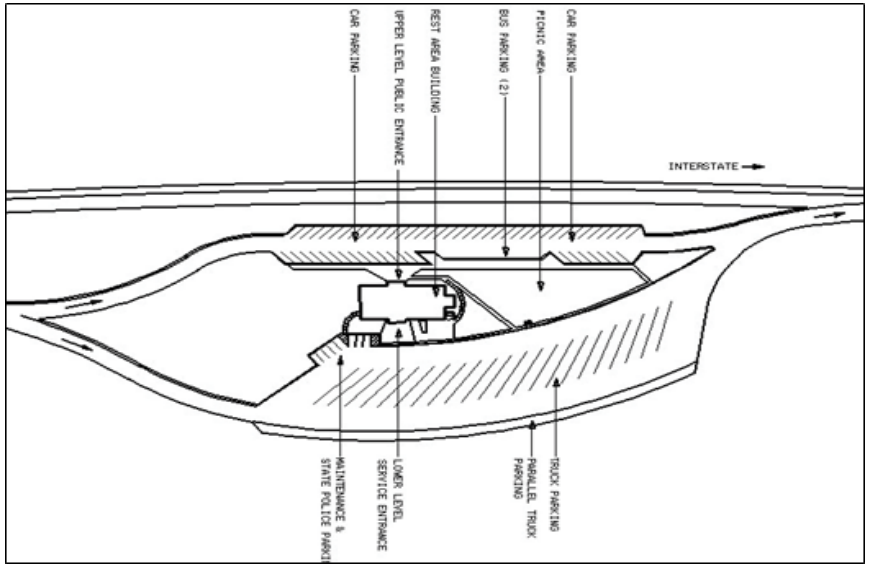


Figure 5-2. Parking Layout B (AASHTO 2001)

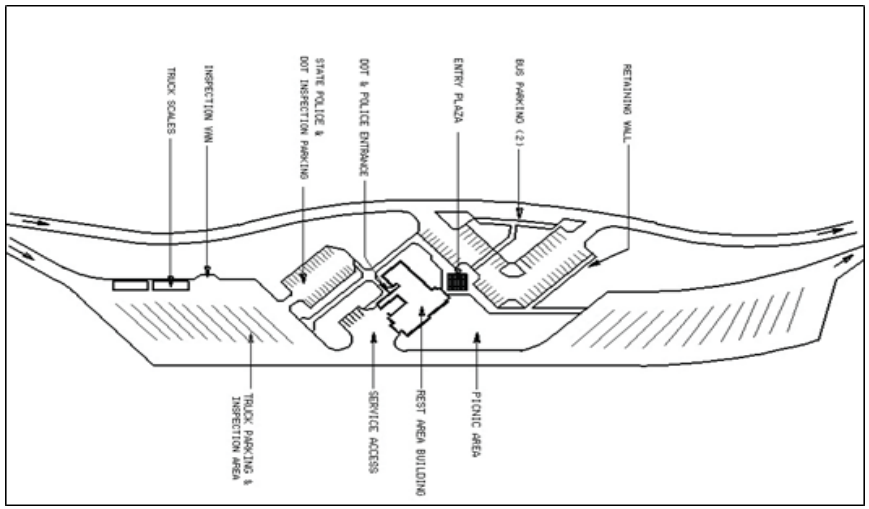
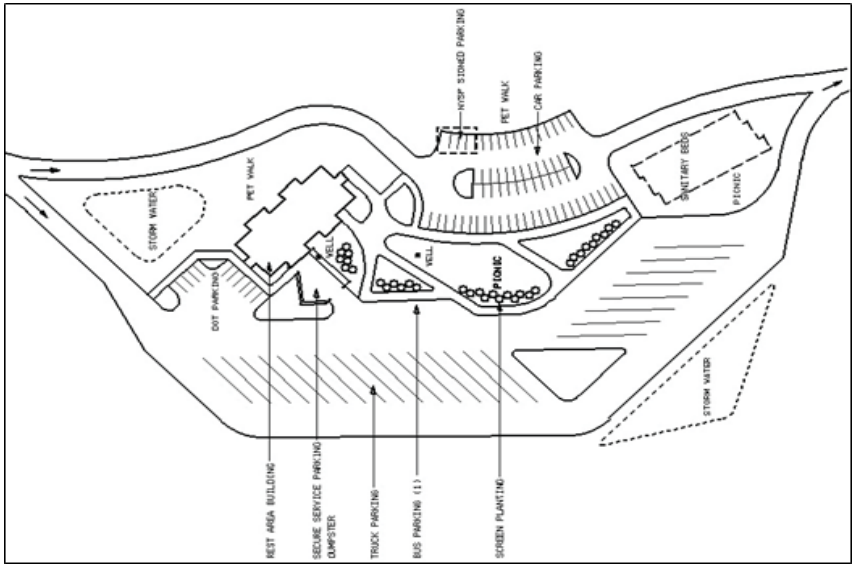


Figure 5-3. Parking Layout C (AASHTO 2001)



ADOT Design Standards Parking Layout and Parking Need

ADOT has indicated that the Department follows AASHTO's design guidelines and methodologies when calculating the number of auto and truck/bus parking spaces required at a particular rest area location. Therefore, in estimating the amount and mix of parking at a given rest area over its design life, ADOT is judged to be applying the best practice standards recommended by AASHTO. In terms of rest area parking area layout design standards, the ADOT Roadway Design Guidelines simply state that "Rest Area Parking Areas and irregular features may be computed by hand-plotted cross sections, or with differential surface modeling techniques." ADOT staff has commented that parking area layout design is very site specific and therefore applying a single parking area layout design standard can be ineffective. [13]

However, although parking area layouts will be site specific, the AASHTO recommendations for parking area design are general in nature and can be applied to a range of different designs. It is recommended that ADOT consider the AASHTO parking layout recommendations when developing new or improving existing rest area parking areas.

Based on a review of satellite images of the 19 ADOT-owned rest areas included in this analysis, rest area parking area layouts appear to be designed in conformance with the general layouts specified in **Figure 5-1**, **Figure 5-2**, and **Figure 5-3**. However, at a number of rest areas in Arizona, auto and truck parking areas are located directly adjacent to each other instead of being separated by landscaping and building features/structures as recommended by AASHTO. Greater separation between auto and truck/bus parking areas would tend to improve traffic/pedestrian circulation, reduce noise pollution associated with concentrated vehicle parking, and create a sense of smaller scale parking that is both more inviting and more visually appealing to motorists.

Building and Restroom Facilities

Building Design Considerations

Recognizing the diversity and uniqueness of rest area site conditions, the AASHTO Guide does not recommend specific rest area building designs. Instead, the AASHTO Guide provides more general guidance regarding the design factors and objectives that should be considered when developing rest area facilities. Common rest area building elements include:

- Restrooms
- Lobby/Information areas
- Picnic shelters
- Custodial offices
- Storage structures

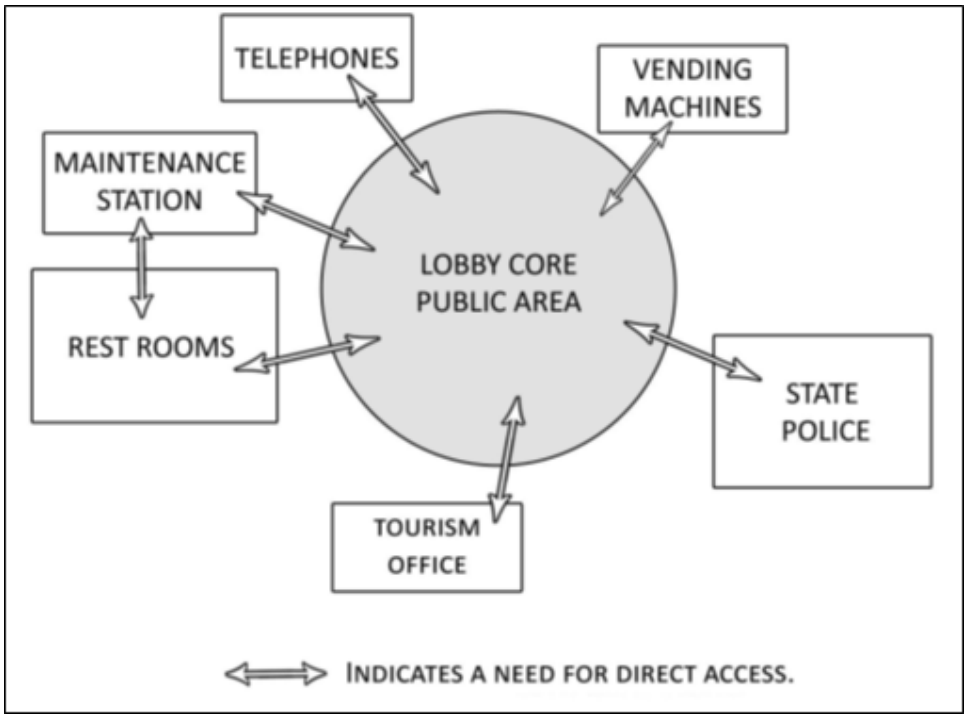
The AASHTO Guide states that "a major requirement for a well-designed building is that it functions smoothly with minimal maintenance. Floor plans must permit easy access to restrooms, adequate

[13] Input provided by Mark Hoffman, ADOT Multimodal Planning Division and LeRoy Brady, ADOT Intermodal Transportation Division (Roadside Development group), during a project conference call on May 13, 2011.

circulation space within the entry and inner lobby and sufficient space for mechanical equipment and maintenance operations. Other program requirements, such as information centers, interpretive facilities, and vending machines, should be considered in preliminary architectural design." [14]

Figure 5-4 presents appropriate access requirements for the core lobby area of the main rest area building.

Figure 5-4. Rest Area Main Building: Features to be Accessed Through Lobby (NYDOT)



In Figure 1.15, the "Tourism Office" cell might also be substituted with areas with information displays and computer kiosks or Wi-Fi internet access points.

The AASHTO Guide highlights the fact that the main or principal building is "the most important element of the rest area, serving as the focal point and as a tool for disseminating information to travelers." The main rest area building is also the largest and most noticeable structure within the rest area and, as such, the AASHTO Guide highlights the fact that "designing an attractive and interesting building fosters a good impression of site development and the state responsible for it." Considering this fact, the AASHTO Guide indicates that "exterior treatments and architectural forms should be explored that may be distinctive, interesting, and appropriate" and that typically "a stripped-down building will not save much money but may leave a negative impression on visitors." Regarding the relative cost of designing an architecturally unique rest area building compared to a more utilitarian, stripped-down facility, the AASHTO Guide points out that "a common misconception is that a more attractive building having a distinctive architectural style is expensive." Instead, the AASHTO Guide suggests that an architecturally distinct facility is not necessarily more expensive, stating that "a building's exterior treatment seldom

[14] "Guide for Development of Rest Areas on Major Arterials and Freeways, 3rd Edition," AASHTO, 2001; page 77.

represents a major part of its cost. Mechanical and plumbing elements normally consume a greater portion of that cost."[15]

Therefore, a clear objective in designing the central rest area building should be to design/construct facilities that are architecturally interesting and attractive, particularly considering that according to AASHTO, doing so does not necessarily represent significant increases in overall project costs.

The AASHTO Guide recommends that state DOTs develop a "written building and site design program" that will provide rest area designers with guidance regarding the optional building designs and considerations. According to the AASHTO Guide, the building/site design program should:

- "Identify all specific requirements of the building and site, as well as use of equipment and materials."
- "Budget constraints for all structures and the entire project should also be stated early in the program document."
- "Identify any requirements for buildings that are energy-efficient or meet pertinent national, state, and local building codes."

As a way to reduce maintenance costs, the AASHTO Guide recommends the use of "low-maintenance and vandal-resistant materials." For interior building features these include "quarry-tile floors, tile walls, epoxy paints, and sturdy, well-built restroom fixtures." Exterior building features should also be constructed from materials that require a minimum amount of maintenance. ADOT has indicated that rest areas in Arizona typically employ steel and masonry materials which are favored over wood, as these materials tend to better withstand the arid desert conditions in Arizona.

Restrooms

The AASHTO Guide does not provide specific guidelines regarding optimal restroom design or configurations. However, the guide does specify the calculations that should be followed when estimating the need for the number of toilets and urinals for both men and women's restrooms. The calculations consider the following variables:

- Mainline design-year AADT
- Number of restroom users per vehicle
- Peak-hour usage
- Capture rate – proportion of the mainline traffic stopping at the rest area
- Restroom users per hour per fixture
- The default AASHTO formula for estimating the total number of toilets/urinals is:
- (Design year AADT) x (Capture rate) x (0.0117)

The constant of 0.0117 is based on applying standard default values for the numbers of restroom users per vehicle, peak-hour use factors, and restroom users per hour per fixture based on a 2-minute cycle. Location specific factors, such as peak-hour usage factors, should be used when available as they provide more accuracy compared to default factors. The AASHTO Guide specifies that 60% of the total number of toilets/urinals required should be devoted to the women's restroom, while the remaining 40% should be located in the men's restroom. Regarding the split between urinals and flush toilets in

[15] Ibid, page 78.

the men's restroom, the AASHTO Guide is silent. However, the California Highway Design Manual recommends that the number of fixtures in the men's restrooms should be divided evenly between urinals and flush toilets.

Regarding the layout/design of restrooms, the AASHTO Guide states that designers should "consider providing dual restrooms at each area to allow at least one for each sex to remain open during cleaning. Individual unisex units also permit continued use during cleaning."[16] Several state DOTs provide specific and useful design guidance for the development of restrooms. For example, the Caltrans Highway Design Manual recommends that:[17]

- Entrances to restrooms should be visible from the parking area. They should be well lighted and clearly identified with signs and/or graphics.
- Restroom entrances should not be located in areas of dead-end circulation.
- Facilities intended for general public use should not be located near restroom entrances.
- Privacy screens at restroom entrances should allow visibility from the ground to a height of 12 inches to 18 inches above the ground.
- Lockable steel doors should be provided for entrances to rest rooms
- Two [additional] restrooms should be provided for each gender to allow for uninterrupted public access to facilities during janitorial cleaning operations.

ADOT Design Standards for Buildings & Restrooms:

Existing ADOT design publications do not provide specific standards or guidance for designing and developing rest area buildings and restrooms. Considering the importance of these facilities, it is recommended that the general guidelines specified by AASHTO be considered by ADOT in developing rest area building and restroom design standards.

ADOT currently uses the AASHTO formulas to estimate the quantity of restroom fixtures required to meet demand in both in men's and women's restrooms. Therefore, ADOT is considered to currently be applying the best practice standards for estimating restroom capacities at rest areas in Arizona.

In general, rest areas in Arizona are judged to conform to the general building layout and access standards specified by AASHTO, with rest area buildings reflecting unique and interesting designs, and with central buildings and restrooms providing convenient and functional access to motorists.

ADA Compliance

All design considerations relating to access of rest area facilities by persons with disabilities should conform to the latest version of the Americans with Disabilities Act Accessibility Guidelines ([ADAAG] 2006 Standards or later), which provides extensive guidelines/construction requirements for developing a range of rest area features including pedestrian routes, ramps, doors and windows, restroom facilities, vending machines, signs, and telephones. The FHWA has ruled that when "Federal-aid highway program funds are used for parking facilities, or buildings such as transit facilities, rest areas, information centers, transportation museums, historic preservation projects, or other projects where pedestrians are

[16] Ibid, page 21.

[17] "California Highway Design Manual", Chapter 910, page 910-6; Available online at: https://dot.ca.gov/-/media/dot-media/programs/design/documents/chp0910-a11y.pdf

expected, the project must meet the current applicable accessibility standards, whether or not the project is within the public right-of-way." [18] In this case, FHWA considers "current applicable accessibility standards" for all new or altered rest area facilities including buildings, parking areas, curbs, ramps, and walkways to be those standards specified by ADAAG. Therefore, in cases where ADOT constructs new or alters existing rest areas, the accessibility designs must meet and reflect those specified by ADAAG.

Operation and Maintenance

Regarding rest area maintenance standards, the AASHTO Guide recommends developing "a one- to five-year maintenance and site-management plan, identifying tasks that must be completed and also relative timing and coordination of each activity." [19] The AASHTO Guide indicates that the primary tasks that might be addressed in this plan would include:

- Building maintenance and management
- Mowing and turf management
- Fertilization
- Vegetation maintenance and pruning
- Site irrigation
- Snow removal
- Road pavement care
- Wetland and wildlife habitat
- Equipment maintenance and management

The AASHTO Guide recommends that "a maintenance and operation plan should be developed for each rest area to ensure that critical maintenance activities are appropriately considered as part of ongoing rest-area operations." AASHTO further recommends that "maintenance and operation requirements should be identified in the maintenance and operations plan, including frequency for each activity." [20]

As part of the operation manual for new or renovated rest areas, the AASHTO Guide recommends that "During construction, the equipment installed, wiring diagrams, water lines, sewerage, pumps, septic-drainage fields, water coolers, faucets, lighting fixtures, etc., all should be documented as to locations, types, model numbers, parts, etc. This information should be collected and included in an operations manual, so that persons maintaining the facility have a ready reference concerning equipment information and maintenance schedules." The AASHTO Guide indicates that other items that should be included in the operations manual include "a list of emergency contacts (with telephone numbers and addresses), copies of all permits (such as sewer outlets), fire emergency plans, any agreement for facility operation and/or maintenance, and all equipment maintenance books or manuals." [21]

Maintenance activities and schedules will vary depending on a range of factors including: level of average daily use, age/condition of facilities, types of landscaping provided, level of amenities/facilities onsite, type of water/wastewater and other utility systems, and environmental/climatic conditions. Rest area building/restroom maintenance standards should be clearly defined with frequency of

[18] Federal Highway Administration website: http://www.fhwa.dot.gov/programadmin/pedestrians.cfm

[19] "Guide for Development of Rest Areas on Major Arterials and Freeways, 3rd Edition," AASHTO, 2001; Page 70.

[20] Ibid, page 71.

[21] Ibid, page 105.

maintenance activities dependent primarily on the level of use. The lack of scheduled building maintenance can cause the facility to deteriorate more rapidly and result in higher costs to repair and remediate deficiencies due to delayed preventative maintenance.

MnDOT is considered a leader in rest area maintenance standards and provides useful guidelines for the maintenance of rest area buildings and restrooms. For example, MnDOT recommends the following building maintenance activities for an hourly, daily, weekly, monthly and annual basis for rest areas open to the public 24 hours per day, year-round: [22]

Several times daily (frequency to depend on traffic/usage at rest area):

- Remove wastepaper from floor
- Mop problem areas in restrooms, lobby, and entry areas
- Clean smudges and smears on windows, doors, walls and partitions
- Clean sinks and mirrors
- Clean water closets, urinals and drinking fountains
- Check toilet tissue dispensers
- Clean sanitary napkin containers
- Empty waste receptacles, if required

Once Daily:

- Clean windowsills, ledges, grills, soap dispensers, shelves and mirrors
- Clean light fixtures and lenses
- Clean walls, floors and partitions
- Clean and empty exterior ash trays
- Check operation of utilities such as heating and cooling systems, sewage systems, water systems and electrical systems
- Record nighttime truck usage at select rest areas.
- Store lost and found items and document in log.
- Raise and lower flags honoring half-staff declarations.

Weekly:

- Check and clean floor drains
- Add water to low use floor drains
- Wash all interior and exterior windows (except during winter periods)
- Make sewage treatment pond observations, if applicable

Monthly:

- Wipe off electric motors to keep free of dust
- Check filters installed in air, fuel and water systems
- Check fire extinguishers

[22] Mn/DOT "Maintenance Manual," Chapter 12; Available online at: https://www.dot.state.mn.us/maintenance/pdf/manual/chapter-10-maintenance-of-rest-areas.pdf

- Replenish water treatment chemical feeders
- Inspect drain field monitoring pipes
- Clean all air vent grills

Annually:

- Clean all light fixtures
- Wash walls and ceilings
- Strip, clean and refinish floors
- Install display case graphics at MnDOT request, typically every other year.

As Needed:

- Paint, stain, varnish or seal all trim, doors, partitions and exposed wood surfaces as required with colors that match existing finishes
- Make minor building and site repairs
- Pump septic tanks once per year or as use requires

ADOT Rest Area Maintenance Standards

ADOT issues and awards contracts for the maintenance of rest areas in Arizona that provide specific and detailed recommendations regarding the type of maintenance, standards, and frequency for which maintenance activities are to be performed. Prior to 2013, had several separate and independent contracts overseeing rest areas. In 2013, the P3 Office successfully bundled rest area maintenance into one statewide contract (with the exception of water source and wastewater system utilities).[23] In 2019, ADOT entered a Public-Private Partnership with Diamond Ridge Development Corporation, which took over maintenance and operations of 14 rest areas throughout Arizona.[24] ADOT maintenance contracts reflect and largely conform to the AASHTO maintenance recommendations and are similar to standards recommended by states considered to be leaders in rest area maintenance. The ADOT maintenance contracts specify detailed maintenance requirements for all rest area facility components including restrooms, reception areas, information and vending kiosks, ramadas, picnic tables/areas, all landscaped areas, walkways, and parking areas. Several rest areas in Arizona provide onsite housing within the rest area for contract maintenance staff and therefore provide 24-hour presence in case of maintenance emergencies.

Green Technologies and Practices

Regarding the use of "green" or environmentally friendly practices, the AASHTO Guide only provides basic guidance, stating that State DOTs "are encouraged to explore alternative-energy sources for building heating and cooling systems. Not only will these reduce operating costs, but because rest areas are very visible, alternative-energy technology can be presented effectively to the public in informational displays, etc." [25]

[23] https://azdot.gov/adot-blog/public-private-partnership-manage-states-highway-rest-areas
[24] Information provided by ADOT's P3 Office on May 4, 2022.
[25] "Guide for Development of Rest Areas on Major Arterials and Freeways, 3rd Edition," AASHTO, 2001; Page 77.

Arizona Executive Order 2005-05 "Implementing Renewable Energy and Energy Efficiency in New State Buildings" established in February 2005 by Governor Napolitano sets objectives and standards for state agencies, including ADOT, in implementing renewable and efficient energy measures in newly constructed state buildings. Specifically, the Executive Order states that:

- "All new state-funded buildings constructed after the date of this Executive Order shall be designed and constructed to derive at least 10 percent (10%) of their energy from a renewable resource."
- "All state-funded buildings constructed after the date of this Executive Order shall meet at least the 'silver' LEED standard." [26]

ADOT is one of several state agencies named in the Order as being required to submit an annual report to the Governor summarizing actions taken to achieve the goals set forth in the Executive Order and indicating the degree to which the goals of the Executive Order have been achieved.

Since rest areas buildings are typically state-funded buildings, new and possibly reconstructed rest areas in Arizona would likely need to meet the energy requirements specified in the Executive Order. Regarding the requirement that state buildings utilize 10% of their energy from a renewable resource, the Order states that "A renewable resource may include: solar, wind, or the use of thermal energy from biomass fuels for heating and or cooling. This goal may also be met through the purchase of renewable energy credits (as defined by the Department of Commerce Energy Office) from an energy producer." [27]

One of the best potential renewable energy sources for rest areas might come from solar power, particularly considering the amount of clear, sunny weather in many regions of Arizona. Considering the improvements in solar cell technology during the last decade which have translated into more efficient and lower cost systems, the use of solar power may be a cost effective and appropriate source of renewable energy to meet the minimum 10% goal specified in the Executive Order.

The U.S. Green Building Council LEED standards are one of the best sources of green building standards available. The Executive Order sets the objective that new state buildings should strive to meet at least the Silver LEED standard. Currently, there are four levels of LEED certifications with Silver being a mid-level certification earning between 50 and 59 points out of a total of 100 possible points (note that the higher the point score the more the building conforms to LEED green building standards). The objective of the LEED performance standards leading to certification is "…to promote healthful, durable, affordable, and environmentally sound practices in building design and construction." The LEED performance standards for certification focus on seven different topic areas, where points are earned in each topic area corresponding to the extent to which the design/construction of a facility meets the LEED standards.

The seven topic areas include:

- Sustainable Sites
- Water Efficiency

[26] Arizona "Executive Order 2005-05: Implementing Renewable Energy and Energy Efficiency in New State Buildings," February 11, 2005.
[27] Ibid.

- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation in Design
- Regional Priority

The LEED standards for each of these topic areas are too numerous and detailed to be summarized here; therefore, it is recommended that ADOT review these standards available at the U.S. Green Building Council's LEED website. [28]

Although the LEED standards represent one of the best sources of green building practices, building/designing rest areas to LEED specifications and utilizing green technologies (e.g. solar cells) has the potential to increase project costs and constrain project development in some cases. Considering the budgetary challenges facing Arizona, it is important to carefully weigh the tradeoffs between environmental benefits associated with conforming to LEED standards and utilizing green technologies and the higher project costs that might be incurred as a result. It is recommended that ADOT strive to meet LEED standards and utilize green technologies where practical and possible and in cases where doing so would not result in significant additional costs that would make the development of new rest areas financially infeasible.

ADOT Green Technologies and Practice Standards

According to ADOT, the Department does not have a set of specific standards or policies relating to the use of green technologies/practices in designing and constructing rest areas in Arizona. ADOT indicated that the Department last investigated the use of solar power at rest areas in the 1980's when the cost of solar technology was considerably higher than it is now. Another green technology that ADOT investigated in the past was the use of cool towers which is an evaporative system using gravity developed by the University of Arizona Environmental Research Lab. However, a trial use of cool towers was found to be ineffective in providing sufficient air conditioning at rest areas in Arizona, and the concept was abandoned. ADOT has indicated that rest areas in Arizona utilize infrared heating rather than forced air heating, where insulation is used to maintain heat, reduce energy consumption, and minimize utility expenses.

Recognizing the reality of budgetary constraints in Arizona, a primary issue and objective is how to develop rest areas that are efficient and cost effective. In some cases, implementing green building practices and utilizing green technologies could prove to be cost prohibitive considering budgetary realities. Therefore, it is recommended that in considering the use of green practices and technologies for specific projects, similar to those discussed above, that ADOT seek to analyze the comparative costs between green and non-green practices/technologies to fully understand what, if any, additional costs green building practices/technologies entail.

Signing

The FHWA publishes the "Manual on Uniform Traffic Control Devices" or MUTCD (2003 and 2009 versions), which represents the definitive collection of national standards for all traffic control devices,

[28] U.S. Green Building Council's LEED webpage is available at: http://www.usgbc.org/DisplayPage.aspx?CategoryID=19

including road markings, highway signs, and traffic signals located on all public roads and highways. The MUTCD provides specific recommendations and examples for advance guide and entrance signing for rest areas. The MUTCD does not provide guidance for signing within rest areas, however. The AASHTO Guide provides guidelines for providing signing within the rest area facility. Specifically, the AASHTO Guide recommends that:

- "Signing within the site should be limited to avoid confusing drivers. An overall sign system should be developed during site design for their most effective use. Signing along ramps and parking lots should identify intended directional flow of traffic."
- "Pedestrian signs should provide concise directions, orientation, and other information, while respecting the site environment and being consistent in style with overall site design. They should be sized and placed with pedestrian sight lines in mind, as well as being visually pleasing and well-designed. Effects of sign placement, materials, and ADAAG should be considered when creating a complete signing plan."
- "Sign placement depends on site circulation and special features. They can be situated throughout the site or clustered neatly with other design elements. A common sign material is wood, with a routed message, but metal, plastic, or fiberglass can also be used. Effects of site signing and messages presented must be carefully considered. Negative messages should be avoided."
- "Metal signs mounted at heights meeting Interstate standards will be ineffective for pedestrians. Signs intended for pedestrian use in parking areas or along walkways may be at other heights than interpretive signs and may be governed by special requirements for character height and proportion. ADAAG gives guidelines for all aspects of sign placement and construction, including character size, proportion, finish, height, and location." [29]

ADOT Signing Standards

ADOT has adopted the 2003 MUTCD and has not yet updated to the revised 2009 MUTCD standards. ADOT uses the MUTCD signing standards for rest areas and is therefore judged to be utilizing the best practice design standards with respect to advance guide signing for rest areas. Based on a review of ADOT design publications, the Department does not appear to have a set of specific design standards for signage within the rest area facility. Therefore, it is recommended that ADOT consider the general guidance provided by AASHTO in developing design standards for signage within rest areas in Arizona.

Telecommunications

Traditionally, public payphones have been considered a universal and necessary amenity at most rest areas. At a minimum, public payphones provide an important security feature in that they offer travelers a way to telephone in emergencies to reach outside assistance. The AASHTO Guide provides the following recommendations in providing public payphones: [30]

- Wall-mounted telephone units are preferable to outdoor phone booths.
- Phones should be in areas protected from weather, lighted, and visible from major-use areas, such as building lobbies.

[29] "Guide for Development of Rest Areas on Major Arterials and Freeways, 3rd Edition," AASHTO, 2001; Pages 78-79.
[30] Ibid, page 87.

- Emergency numbers should be posted on or near the phones.
- In compliance with ADAAG, the number of volume-controlled and TDD units in public facilities is based on required service level.
- Rest area planners may want to consider the installation of phones with credit-card slots and fax/computer jacks, adding to convenience and profitability of phone service.
- In large rest areas, a secondary phone may be located away from the building or in the truck-parking lot. When secondary phone service is provided for commercial truck drivers, these may be mounted at heights convenient for use from a truck cab.

In recent years a number of states developed additional telecommunications at rest areas, including most notably Wi-Fi internet. Texas and Iowa have led in the development of Wi-Fi at rest areas, and many if not all rest areas in these states have either Wi-Fi or direct internet access. These states have contracted with private companies, such as Zoom Information Systems or Coach Connect, to provide the software and information management systems. The Governor's Office, the Arizona Commerce Authority and ADOT are partnering to bring broadband to much more of Arizona. Within this partnership, and as such, the implementation of Wi-Fi access has been considered and may be coming to rest areas throughout the state.[31]

ADOT Telecommunication Standards

There is some question regarding whether public payphones are still needed at rest areas in Arizona, considering the rise of cell phone usage and the continuing expansion of cell phone coverage. A check of amenities at Arizona rest areas showed public payphones either did not previously exist or were removed before 2022, except for the westbound San Simon Rest Area, where a public payphone has been added since 2011.

In 2013, ADOT entered a Public-Private Partnership with Infrastructure Cooperation of America to take over the maintenance and operations of 14 rest areas. Within this partnership, the implementation of Wi-Fi access has been considered and may be coming to rest areas throughout the state.

Landscaping and Lighting

Landscaping

The AASHTO Guide provides general guidance regarding rest area landscape development. It is important to recognize that landscaping design is very site specific and that in Arizona the availability of water is a critical issue which impacts landscaping options and decisions.

The AASHTO Guide provides the following general guidelines regarding landscape development:

- General Considerations. "Landscape design should consider site layout, public safety, native plantings, erosion control, wind and sun protection, sustainable landscape, and minimal use of water, labor, and chemicals in long-term maintenance of landscape."
- Layout. "Landscape design should begin near the beginning of the deceleration ramp, continue throughout the rest area, and extend back to the highway. Landscape design elements include plant materials, hardscape materials, gradients, and alignments. These

[31] Information provided by ADOT's P3 Office on May 4, 2022.

elements should flow from the highway into and from the rest area. Abrupt change detracts from unified design."

- Plant Use. "Use of plant materials should be considered an essential part of rest-area design. They offer opportunities to define spaces, provide shade, accent and direct views, and create focal points Trees and shrubs can become architectural elements affecting climate, providing aesthetic stimulation, and creating wildlife habitat."
- Plant Selection. "Select hardy plants suitable to the site's soils and growing conditions, and adaptable to roadside locations. When possible, native plants, forbs, and ground covers should be established in construction areas. This maximizes their survival over the life of the project and minimizes maintenance costs. Native grasses can be used in areas where mowing will be infrequent and herbicide/fertilizer use minimal. In arid regions, use of xeric plant material should be considered to avoid extensive irrigation. In forested settings, consider locating rest areas where areas of significant forest canopy can be preserved. Occasionally, selective cutting may improve scenic views or reveal other scenic features."
- Maintenance. "Maintenance problems should be anticipated. Landscape design objectives should include establishing and maintaining low-maintenance lawn and landscape, using low-impact horticultural practices and minimal amounts of chemicals. Use of fertilizers, herbicides, and other pesticides in high-use pedestrian areas should be limited. Maintenance practices should be integrated to combine mechanical, cultural, biological, and selective chemical techniques." [32]

ADOT Landscape Standards

ADOT has reported that there is no single set of defined standards applied or utilized regarding rest area landscape development. ADOT has indicated that in all cases the Department seeks to utilize indigenous and native plant species and materials. ADOT has also indicated that the Department seeks to implement landscape designs that minimize maintenance and water usage, particularly considering the extremely limited water supply at many rest areas in Arizona. These basic landscape objectives specified by ADOT generally conform to the AASHTO standards discussed above. It is recommended that ADOT consider adopting the general landscape guidelines recommended by AASHTO when and where appropriate. Since landscape design is very site specific, only general guidelines and recommendations are useful.

Lighting

The AASHTO Guide indicates that there are four primary types of lighting for exterior uses, each of which have different characteristics. The lighting types and their associated qualities include:

- Mercury vapor. "Fair color characteristics, gives off blue-green light. Lighting cost and efficiency is poor."
- Metal halide. "Good color characteristics. Light color is white, and accurately brings out colors. Efficiency is moderate."
- High-pressure sodium. "Poor color characteristics. Light is yellow. Efficiency is good."

[32] Ibid, pages 99-102.

- Low-pressure sodium. “Very poor color characteristics. Light is yellow. Efficiency is very good.”

The AASHTO Guide provides the following recommendations and considerations regarding rest area lighting design:

- Lighting-type Selection. “When selecting among lighting types, consideration should be given to light color in addition to cost. In general, white light (i.e. metal halide lighting) is preferable to yellow light (i.e. high-low pressure sodium lighting) due the harshness of yellow lighting.”
- Illumination Levels. “At night, physical safety is a major issue—illumination levels must be high enough to provide well-lit paths from parking areas to building entryways. Peripheral lighting must give enough illumination to discourage loitering or criminal activity. If light levels are inadequate, travelers will feel unsafe and uncomfortable when stopping.”
- Lighting Areas. “Lighting should reflect the scale of the area to be lit. Two levels are important in rest area design: (1) area lighting and (2) pedestrian lighting. These require different intensity of light and luminaire mounting heights. Area lighting includes entrance and exit ramps, roadways, parking lots, and entry areas. Pedestrian lighting illuminates walkways, building approaches, terraces, and other significant site features.”
- Lighting Fixture Heights. “Walkway and other site lighting should be at lower, more intimate heights for pedestrians, such as 3.6 m (10 ft) post-type lights or 1 m (3 ft) ground-mounted lights. Roadway and parking lighting should have taller poles, often up to 15 m (50 ft).”
- Lighting Fixture Design. “Colors and styles of luminaires and poles establish strong visual patterns and should be carefully considered. Roadway and pedestrian lighting should be easily differentiated, both in physical structure and intensity. Where possible, one luminaire style should be used for all mounting heights and locations to provide continuity. Lights should be attractive and styled to match materials used elsewhere on the site.”
- High-mast Lighting. High-mast lighting is sometimes used in parking areas because it requires fewer poles to provide adequate illumination but should be used with caution. Mounting heights of 24 m (80 ft) and higher can present a massive visual presence within the site that may seem imposing and uncomfortable. Also, if rest areas are located near residential neighborhoods or other areas where these structures might be intrusive, significant community resistance may be encountered.”

Table 5-1 summarizes the rest area lighting levels recommended by the AASHTO Guide.

Table 5-1. AASHTO Recommended Lighting Levels (AASHTO 2001)

Level of Activity	General Parking and Pedestrian Area			Vehicle Use Area (only)		
	Lux (minimum on pavement)	Footcandles (minimum on pavement)	Uniformity Ratio (average/ minimum)	Lux (average on pavement)	Footcandles (average on pavement)	Uniformity Ratio (average/ minimum)
High	10	0.9	1:1	22	2	3:1
Medium	6	0.8	4:1	11	1	3:1
Low	2	0.2	4:1	6	0.5	4:1

Notes:

The term "Lux" and "Footcandle" are different measures of illuminance or the intensity of light per unit area.

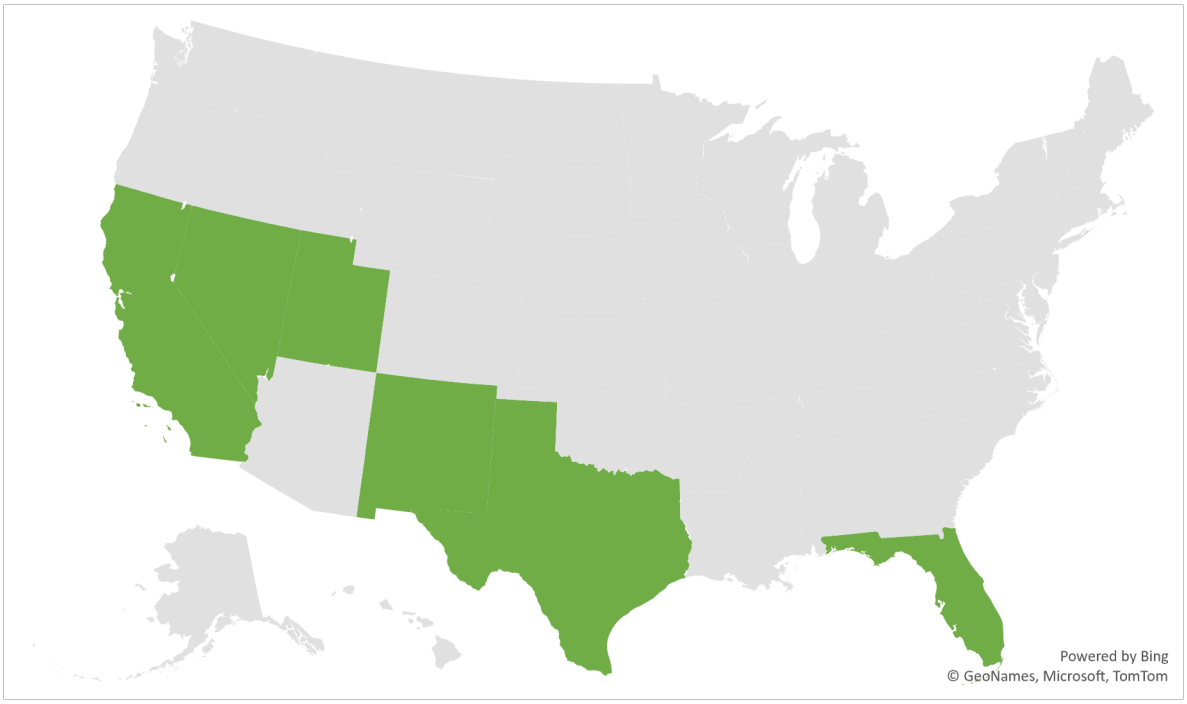
ADOT Rest Area Lighting Standards

The ADOT staff reported that the Department does have a set of established lighting standards or policies for rest area lighting. ADOT staff indicated that high-mast lighting is used at several rest areas in Arizona and is the preferred form of lighting as it is more efficient than other types of lighting.[33] The "mast" of this form of lighting consists of a 50-foot tower with multiple light fixtures at the top. It is recommended that ADOT consider the lighting standards recommended by AASHTO in designing new or redeveloped rest areas. Although ADOT does use high-mast lighting at several rest areas, something AASHTO appears to discourage, the masts are lower than those specified by AASHTO and are in regions that are typically remote and outside residential areas and therefore do not create the problem of intrusive lighting for residents.

[33] Input provided by Mark Hoffman, ADOT Multimodal Planning Division and LeRoy Brady, ADOT Intermodal Transportation Division (Roadside Development group), during a project conference call on May 13, 2011.

Peer States and Emerging Trends

Peer state rest area programs were reviewed to identify additional benchmarks and emerging trends for use in this study. Peer states identified include California, Texas, Nevada, Utah, New Mexico, and Florida.



Although, peer states do have some rest area related information available on their respective DOT websites, some information was not publicly accessible. Therefore, a peer state questionnaire was developed and distributed to each state's rest area program or facilities manager. Completed questionnaires were returned by TxDOT, Caltrans, Nevada Department of Transportation (NDOT), and two of New Mexico Department of Transportation (NMDOT) districts. In 2020, the Florida Department of Transportation (FDOT) completed an update to their statewide rest area long-range plan, which provided sufficient information as to not require a questionnaire being completed. Peer state information received as part of the questionnaire are categorized in the subsequent sections as follows:

- Existing Rest Area Systems
- Safety and Security
- Existing Amenities
- Long-Range Plan
- Parking Availability and Demand
- Funding
- Emerging Trends

Existing Peer State Rest Area Systems

Based on input provided by each peer state's Department of Transportation (DOT) and available online data, a list of each peer state's overall rest area systems was compiled. Among the states reviewed,

Texas, Florida, and California have the largest total number of rest areas and welcome centers (88, 85, and 86, respectively). These totals are representative of their larger size and population as compared to other peer states. The number of rest areas and welcome centers for each peer state is summarized in **Table 5-2.**

Table 5-2. Existing Peer State Rest Area Systems

	Peer States					
Facility Type	**Florida**	**New Mexico**	**Utah**	**California**	**Nevada**	**Texas**
Rest Area - Interstate Facilities	50	24	14	50	7	46
Rest Area - Off-system Facilities (State Roads and Highways)	1	6	11	35	20	30
Rest Area - Tolled Facilities	8	0	0	0	0	0
Welcome Centers	4	0	4	1	4	12
Truck Comfort/Weigh Stations (with rest area facilities)	20	0	(1)	(1)	0	0
Truck Only Rest Area	2	1	(1)	0	0	0
Total Facilities	**85**	**31**	**29**	**86**	**31**	**88**
Notes: ***[1] = Data Unavailable***						

The overall needs and objectives for each peer state's transportation network may vary, but the vision or goal for their rest area system tend to be aligned. In fact, FDOT, TxDOT, Caltrans, NDOT, and Utah Department of Transportation (UDOT) all envision these facilities as safety rest areas that aim to reduce driver fatigue by providing drivers with opportunities to rest, use restrooms, check vehicles, and discover information related to surrounding areas.

Although peer state rest area programs generally follow the AASHTO and FHWA recommended rest area spacing of 60 miles or one-hour drive, specific spacing requirements vary among peer states. For instance, California has implemented policy that recommends a maximum of 30 miles between rest areas. A study completed by Caltrans found that fatigue-related collisions tended to increase beginning 30 miles from rest areas, suggesting that 30 miles might represent the optimum spacing. Similar to ADOT, NDOTs spacing requirements meet FHWA requirements, but rest area locations are also based on analysis of safety data, existing alternative service locations, and economic value.

Safety, Security, and Emergency Management

Safety and Security

All TxDOT managed rest areas contain security cameras for facility monitoring and maintain footage for up to 30-days. Although security cameras are not currently present at NDOT rest areas, cameras are expected to be included as part of future rest area reconstruction efforts. California rest areas provide cameras at only a few select rest areas, while New Mexico and Florida rest areas do not have cameras.

Security staff is provided 24-hours a day at all TxDOT rest areas, while FDOT provides nighttime security at each rest area. The NMDOT provides security staff 2 rest areas located within NMDOT District 5. Caltrans noted that janitorial staff are present at rest areas during business hours and provide a base level for alerting law enforcement of criminal activity. Similarly, ADOT provides on-site caretaker residences at most rest areas, which also provide a base level for alerting law enforcement. Some Caltrans, TxDOT, and ADOT rest areas also provide designated parking spaces and offices for law enforcement, which provides an increased level of Highway Patrol presence.

Emergency Management

Because the geography, topography, weather conditions, and demographics vary among peer states, each state has different emergency management roles that their rest areas serve. For instance, Caltrans stated that their rest areas are used by first responders on an as needed basis and can act as staging and operation centers during wildfire events. Rest areas managed by FDOT provide additional capacity and act as staging areas during regional and statewide evacuation efforts, while TxDOT provides tornado shelters at 25 rest areas within high-risk areas. Certain Nevada rest areas provide overflow parking when certain roadways become unnavigable or closed due to weather conditions. As stated in a previous section, ADOT rest areas are used as staging areas during emergencies and provide safe harbor for drivers during dangerous weather events.

Existing Amenities

Basic Amenities

Existing amenities offered at peer state's rest areas were compiled and compared to determine benchmarks for rest area amenities. A comparison of existing amenities reveals that most per states provide similar amenities to those offered at ADOT rest areas. Specifically, most peer states provide designated parking for both cars and trucks, restrooms, picnic areas, running water, pet exercise areas, and vending machines. It should be noted that completed peer state questionnaires were not received from the Utah Department of Transportation (UDOT), or from 4 of the 6 NMDOT Districts. **Table 5-3** summarizes the existing amenities at peer state rest areas.

Table 5-3. Existing Peer State Amenities

Peer State	Florida	Utah	New Mexico	California	Texas	Nevada
Number of Facilities	**65**	**29**	**31**	**86**	**88**	**31**
Basic Amenities						
Restrooms	85	(1)	30	86	88	24
Running Water	85	(1)	29	86	88	13
Picnic Area	65	(1)	30	85	88	30
Vending Machines	85	(1)	6	31	48	0

Peer State	Florida	Utah	New Mexico	California	Texas	Nevada
Telephone	65	(1)	(1)	82	0	3
Pet Exercise Area	65	(1)	(1)	85	88	0
Designated Truck Parking	85	(1)	21	84	51	28
Expanded Amenities						
Wi-Fi	12 (WC & TF)	(1)	(1)	0	47	1
Digital/Interpretive Displays	8 (TF)	(1)	(1)	86	36	31
Electric Vehicle Charging Stations	8 (TF)	(1)	(1)	28	0	4
Cultural/Historic/Tourism Exhibits	0	(1)	19	86	36	Yes (# Unknown)
Recreational Trails	1	(1)	(1)	2	10	0
Children Play Areas	0	(1)	(1)	0	35	0
Recreational Vehicle Dump Stations	0	(1)	(1)	10	6	6
Security Staff	65	(1)	(1)	0	66	0
Law Enforcement/Security Office Space	0	(1)	(1)	Yes (# Unknown)	30	0

Notes:
TF = tolled facilities; WC = welcome center
[1] = Data Unavailable

Expanded Amenities

To identify potential benchmarks for future consideration and implementation at ADOT rest areas, expanded amenities offer a view into peer state's practices and the potential evolving expectations or needs of Arizona travelers. Among the expanded amenities identified within peer state rest area programs, the most prevalent amenities include Wi-Fi, cultural, historical, or tourism exhibits, recreational trails, electric-vehicle charging, and digital displays. The expanded amenities offered at peer state rest areas are summarized in **Table 5-3**.

Long-Range Plans

Based on responses received and available online resources, NDOT, TxDOT, Caltrans, and FDOT have developed or are currently developing long-range plans for their rest areas. In partnership with Michigan

State University, NDOT is currently working to produce a long-range plan for the maintenance, reconstruction, rehabilitation, and new development of rest areas. The long-range plan is expected to be available in May 2022. As mentioned previously, FDOT recently completed an update to their rest area long-range plan, which provides recommendations through 2045. Caltrans is actively working to update their 2011 rest area master plan, while TxDOT has developed a 10-year plan to replace or build new rest areas and provide additional truck parking.

Rest Area Rehabilitation, Replacement, and Closures

Most TxDOT rest areas have been constructed or modernized beginning in 2000, with 10 to 12 rest areas still expected to be updated. TxDOT noted that although they have not closed any rest areas, they have replaced outdated facilities. The main factors for reconstructing or replacing TxDOT rest areas were based on AADT and parking availability, with those same factors also determining the type of facility constructed (full-service facilities versus limited facilities with expanded parking). In addition, each reconstructed or newly built TxDOT rest areas is uniquely designed to be context-sensitive to the area and relies on local community involvement for design. The unique designs results in visitors being more engaged with the facilities and lengths of stays extended.

According to the completed questionnaire, NDOT has constructed new rest areas, replaced old facilities, repurposed, or conducted major renovations of older facilities in the last 5 years. These improvements were completed to address ADA compliance, water system issues, and general operating needs. In addition, NDOT rest areas are being designed or rehabilitated to be architecturally appropriate for their respective areas and to ensure they align with Nevada's Department of Tourism and Cultural Affairs branding.

Similarly, Caltrans has replaced or rehabilitated several rest areas in the last 5 years. Currently, 14 existing rest areas are either being designed for rehabilitation or are under construction. These facility improvements were identified due to aging facilities and capacity issues. In addition, traffic studies are conducted at the time of renovation to determine the building, parking, and wastewater treatment capacity needs. Caltrans also noted that while no rest areas have been permanently closed in the last 5 years, temporary rest area closures do happen on a semi-regular basis during emergency maintenance work, planned construction, or seasonal weather events.

Several FDOT rest areas have also undergone rehabilitation or renovation within the last 5 years. At the time when their long-range plan was being updated, 5 rest areas were closed for renovations, while 2 new rest areas were being evaluated for potential construction. On average, 2 FDOT rest areas are renovated per year. Rest area improvements are identified through use of a uniform inspection criteria that occurs annually for each rest area. Rest areas maintenance needs are also identified based on feedback from visitors, which can be provided through use of posted quick response codes (commonly called a QR code) that are located at each rest area.

Per the completed questionnaire provided by NMDOT's District 2, a long-range plan for NMDOT's rest areas is currently being developed. In addition, NMDOT District 2 noted that rest areas that were replaced or renovated were due to capacity, as traffic growth and usage rates outgrew the existing rest

area capacity. As part of those improvements, NMDOT District 2 rest areas were upgraded to include ADA compliant features, baby changing stations, and drinking water.

Parking Availability and Demand

Truck parking shortages and undesignated truck parking is a major issue among all peer states, including Arizona. For example, Caltrans noted that throughout California there is a truck parking shortage of approximately 2,000 spaces. In addition, Caltrans and TxDOT noted that trucks parking in undesignated areas (e.g., exit ramps and shoulders) creates unsafe conditions and have contributed to crashes. Because of these truck parking issues, many peer states have recently studied and published truck parking and freight studies. In fact, UDOT, FDOT, TxDOT, ADOT, Caltrans, and NDOT have already developed or are conducting truck parking studies to identify potential solutions.

One solution being adopted by peer states is the implementation of TPAS at rest areas. As mentioned in previous sections, the newly established I-10 Corridor Coalition is developing and deploying TPAS along the I-10 corridor between California and Texas. The TPAS project is used to detect truck parking availability at rest areas and disseminate this information in real-time to commercial drivers. Similarly, FDOT has implemented TPAS statewide at rest areas throughout Florida, while NDOT has plans to implement a truck parking management system in future years.

Funding

According to the completed questionnaire, funding sources for rest area maintenance and improvements vary among each DOT. The funding source for Caltrans rest areas is derived from California's State Highway Operation and Protection Program (SHOPP), which is used to protect and preserve assets within the state's highway system, including rest areas. Different assets within SHOPP are funded based on inventory condition ratings and desired state of repair for each facility. The SHOPP allocation for rest areas is approximately $35 million per year.

Similar to ADOT, FDOT rest area improvements are funded through the DOT's 5-year work program. The average funding per year for FDOT rest area improvements is similar Caltrans, with an average of approximately $35 million.

The funding for NDOT rest area improvements varies greatly dependent on needs and project approval. Capital maintenance projects are completed by NDOT's Architectural group, while each rest area facility is maintained through separate contracts by the NDOT Districts in which they reside. According to NDOT, the completion of the long-range plan is expected to result in a rest area construction or reconstruction budget of approximately $25 million over 5 years.

Although specific amounts were not provided, TxDOT did note that the TxDOT Roadside Facilities is provided an annual budget to support 10-year projection plans.

Public-Private Partnerships

Public-Private Partnerships (P3s) for rest areas among peer state DOTs have been relatively non-existent, mostly due to existing state and federal restrictions. However, some P3s have been possible, such as ADOT's statewide rest area maintenance contract and the Geico sponsored Safe Phone Zones.

These P3s provide opportunity to reduce operational and maintenance costs at rest areas, while also promoting statewide goals.

Despite existing restrictions, opportunities for additional P3s do exist. Notably, the FHWA established guidelines in 2006 to designate oasis (off-system) facilities throughout the nation. The FHWA's Interstate Oasis Program states that oasis facilities are private facilities located no more than 3 miles outside of the interstate ROW that offer additional goods and services for travelers (24 hours per day, 365 days a year), including free public restrooms and free car and commercial-truck parking for no less than 10 hours for travelers. These facilities should be located close to exits and geometrically designed to allow vehicles easy access, thereby allowing travelers the ability to quickly return to the highway.[34] The recommendation for locating these facilities outside of the interstate right-of-way was based on federal regulations that prohibit private or commercial development at rest area facilities.

Although UDOT did not provide a completed questionnaire, and information related UDOT rest areas was limited at the time of this study, other state rest area studies have documented some of UDOT's rest area program details. According to New Hampshire's *2016 Statewide Rest Area and Welcome Center Study*, UDOT has developed several rest areas through a public-private rest stop program. The minimum requirements and goals for public-private rest areas align closely to those developed by FHWA for the Interstate Oasis Program. [35]

Emerging Trends

Emerging trends related to peer state's rest areas were evaluated to ensure that ADOT rest areas meet existing and future travelers needs. Emerging trends identified among peer states include electric-vehicle (EV) charging stations, TPAS, and wireless internet (Wi-Fi).

EV Charging

Since the previous study, the use of electric vehicles has increased drastically, resulting in the need for access to EV charging stations. In 2022, the federal government provided funding and guidance for implementing EV charging stations nationwide.[36] Specifically, the guidance states that the EV charging stations should be provided every 50 miles and within 1 mile of the interstate exits. However, federal restrictions still exist that limit the placement of EV charging stations within interstate ROW.

While not within interstate ROW, FDOT and NDOT have implemented EV charging at various locations throughout their respective states. Specifically, FDOT now has EV charging stations at each toll road service plaza, while NDOT has implemented EV charging stations along non-interstate highways. Caltrans has implemented EV charging stations at various rest areas throughout California, including rest areas along interstate 5. As part of this study, further evaluation of existing EV charging policies, federal restrictions, and EV charging locations will be documented in future working papers.

[34] https://www.federalregister.gov/documents/2006/02/27/E6-2682/interstate-oasis-program
[35] https://www.nh.gov/dot/projects/documents/statewide-rest-area-study-9-2-2016.pdf, pgs. 243-245
[36] https://www.govinfo.gov/content/pkg/FR-2021-11-29/pdf/2021-25868.pdf

TPAS

A common issue among all peer states, and nationwide, is the shortage of available truck parking. Furthermore, the lack of information related truck parking availability results in increased safety concerns, reduced productivity and earnings, and infrastructure damage. As a result, all peer states have either developed or are developing TPAS at rest areas. These systems use sensors to determine truck parking availability at rest areas. This information is then disseminated through various platforms, including dynamic messaging signs, mobile applications, and websites. These systems were developed to help balance the demand for truck parking at rest areas by providing commercial vehicles the necessary information to plan routes and stops accordingly.

As mentioned previously, ADOT, Caltrans, NMDOT, and TxDOT have formed the I-10 Coalition to develop and deploy TPAS at several rest areas along I-10 between Texas and California. If successful, ADOT plans to evaluate the potential for standardizing the TPAS system at the remaining rest areas following a period of operation and evaluation.

Wi-Fi

Another emerging trend observed among the peer states was the use and availability of Wi-Fi at rest areas. As travelers continue to use and rely on mobile devices, wireless connectivity at rest areas provides travelers the ability to access needed information such as weather updates, traffic conditions, and directions. States such as Texas and Florida have made Wi-Fi available at many of their facilities. TxDOT uses sponsorships to provide Wi-Fi service at rest areas, which minimized operational and installation costs. These Wi-Fi services also can be used to provide real-time information updates for the digital displays. However, connectivity and service at remote rest area locations are dependent on existing utilities. The Governor's Office, the Arizona Commerce Authority and ADOT are partnering to bring broadband to much more of Arizona. Within this partnership, and as such, the implementation of Wi-Fi access has been considered and may be coming to rest areas throughout Arizona.[37]

[37] Information provided by ADOT's P3 Office on May 4, 2022.

Appendix A
Rest Area Field Review Checklist

Field Report Checklist

ADOT Contract No: **MPD0015-22**

Highway:		Inspection Date:	
Mile Post:		Inspection By:	
Traffic Direction:			
Nearest Down Stream Exit:			
Name:		Milepost/Distance:	

Travel Way Geometry:

Rest Area Entering Speed	
Post Speed:	
Rest Area Exiting Ramp	
Posted Speed:	
Onsite Condition	
Pavement Type and Condition:	
Additional Comments:	

Parking:

Trucks		**ADA**
Total Stalls:		
Occupied:		
Autos		
Total Stalls:		
Occupied:		
Oversized (Trailers, RV's)		
Total Stalls:		
Occupied:		
Trucks and Autos Separated:		
Unauthorized Overflow		
Locations:		
Potential Hazards:		
Additional Comments:		

Amenities:

Picnic Areas:	
Ramadas:	
Seating Areas:	
Pet Areas:	
Traveler Information:	

Field Report Checklist

ADOT Contract No: **MPD0015-22**

Vending:			
Telephone:		Functional (Y/N):	
Other:			
Additional Comments:			

Utilities:

Water:		Water Provider:	
		Well:	
		Storage:	
Pump house/Well house		Geolocated (Y/N):	
Sewer:			
Electric:		Service Size:	
Gas:		Uses:	
Communications:			
Site Lighting			
Parking:			
Use Areas:			
Building Exterior:			
Additional Comments:			

Security Features:

Lighting:	
Cameras:	
Call Boxes:	
DPS Facilities:	
MVD / ACE Facilities:	
Additional Comments:	

Accessibility:

ADA Ramps:	
ADA Parking:	
Van Accessibility:	
Additional Comments:	

Buildings:

Number of Buildings:	
Type of Structure:	
Building Uses:	
Heating or Air Conditioning:	
Running Water:	

Field Report Checklist

ADOT Contract No: **MPD0015-22**

Sewer Type:	
ADA Compliance:	
Building Conditions:	
Additional Comments:	

Additional Comments:

_____
_____
_____
_____

ADOT Contract No: **MPD0015-22**

Observational Checklist for Rest Area Facilities

The following document will guide additional observations for rest areas in their existing condition during the field visits. The evaluator should fill out the below criteria as accurately as possible.

Site Conditions – the following section relates to the conditions surrounding the site and access to the site

Time of visit: _____ Duration: _____

What were the weather conditions at the time of the site visit? (circle the applicable conditions)

Daytime Nighttime

Sunny Light Rain Heavy Rain Fog

What were the adjacent mainline traffic conditions at the time of the site visit? (Circle one)

Free-Flowing Light Traffic Heavy Traffic Not moving

Is there any standing water (flooding) over impervious surfaces such as sidewalk/roadway at the time of the visit? Y / N If so, provide a brief description.

_____

Are there obstacles at the rest area that could prevent all users from entering the site?

Are there any observable gaps in lighting? Y / N

If so, provide a brief description.

_____

Parking Conditions – the following section relates to parking availability and utilization as seen during the site visit.

How close is the car parking to the building? Circle One: Very Close Somewhat Close Somewhat Far Very Far

Do you see any RV's parked at the site? Y / N If so, how many? _____

If so, where are they parked? _____

Are there any trucks parked in unauthorized locations at the site? Y / N

If so, how many? _____

If so, where are they parked? _____

How many electric/hybrid vehicles appear to be parked at the rest area? _____

Field Report Checklist

ADOT Contract No: **MPD0015-22**

How many motorcycles are parked at the rest area? _____

Traveler Demographics – the following section relates to people/travelers using the rest area site itself.

Are there any law enforcement officials at the rest area? Y / N If yes, how many? _____

Is there private security at the rest area? Y / N If yes, how many? _____

How many children are at the rest area? (Best approximation) _____

What percentage of those at the rest area appear to be senior citizens (65+)?

Circle One: 0-25 % 26 – 50 % 51 – 75 % 76- 100 %

Amenities/Services Utilization – the following section relates to the activities/amenities being utilized at the rest area.

During the time of your site visit, how many people used the vending machines? _____

How many people are using the picnic areas? _____

During the time of your site visit, how many people are viewing the information kiosks? _____

How many people appear to be eating? _____

How many pets are using the pet exercise area? _____

During the time of your site visit, how many people are utilizing the family restrooms (if available)? _____

During the time of your site visit, how many people are utilizing the site provided telephones? _____

Are there any travelers that appear to be performing some sort of vehicle maintenance or repair such as inflating or changing a tire, and if so what type and how many? Y / N If yes, Type _____, Amount_____

Are there any persons collecting donations or selling goods? If so, lease describe the activity_____
_____

Appendix B
Crash Analysis by Rest Area

CRASH ANALYSIS BY REST AREA

1. *MOHAWK*

The crash analysis statistics at the Mohawk Rest Area include the following:

- Total number of crashes: 36
- Year 2019 and 2020 had the highest occurrence of crashes with 8 each (22%)
- More than half of the crashes occur on the Westbound (WB) Mainline
- Majority are single vehicle crashes
- Motor Vehicle in Transport accounts for majority of collision type
- Predominant violations for the crashes are Speed too Fast for Conditions

Fatal Crash
1 crash: WB Mainline between the on and off-ramps for the WB Rest Area.
Violation: Failed to Keep in Proper Lane

Parking Area Crashes
None

Ramp Crashes
1 crash: Eastbound (EB) Rest Area on-ramp
Violation: Unsafe Lane Change

2. *SENTINEL*

The crash analysis statistics at the Sentinel Rest Area include the following:

- Total number of crashes: 32
- Year 2020 had the highest occurrence of crashes at 12 (38%)
- More than half of the crashes occur on the EB Mainline
- Majority are single vehicle
- Collision types include Motor Vehicle in Transport (25%) and Overturning (31%)
- Predominant violations for the crashes are Speed Too Fast for Conditions and No Improper Action.

Fatal Crashes
1 crash: EB mainline approximately one mile after the EB Rest Area on ramp
Violation: unknown.

Parking Area Crashes
None

Ramp Crashes
None

3. *EHRENBURG*

The crash analysis statistics at the Ehrenberg Rest Area include the following:

- Total number of crashes: 41

- Year 2019 had the highest occurrence of crashes at 13 (32%)
- More than half of the crashes occurred on the EB Mainline
- Majority were sideswipe (32%) and single vehicle (39%)
- More than half of the crashes were Motor Vehicle in Transport (51%)
- Predominant violations for the crashes were No Improper Action (41%).

Fatal Crashes
None

Parking Area Crashes
None

Ramp Crashes
1 crash: EB Rest Area on-ramp
Violations: Failed to Yield Right of way

1 crash: WB Rest Area off-ramp
Violation: Unknown

1 crash: WB Rest Area on-ramp
Violation: No improper Action

4. *BOUSE WASH*

The crash analysis statistics at the Bouse Wash Rest Area include the following:

- Total number of crashes: 53
- Year 2019 had the highest occurrence of crashes at 12 (27%).
- More than half of the crashes occur on the WB Mainline
- 40% of the crashes were single vehicle
- 25 of the crashes were Motor Vehicle in Transport (56%)
- Predominant violations for the crashes were Speed Too Fast for Conditions (38%) and No Improper Action (31%).

Fatal Crashes
None

Parking Area Crashes
None

Ramp Crashes
1 crash: EB Rest Area off-ramp
Violations: Other

1 crash: WB Rest Area off-ramp
Violation: Speed Too Fast for Conditions

5. *BURNT WELL*

The crash analysis statistics at the Burnt Well Rest Area include the following:

- Total number of crashes: 72
- The highest occurrences of crashes occurred in the Year 2021 at 20 (28%) and in Year 2018, when 17 (24%) crashes occurred
- More than half of the crashes occurred on the EB Mainline
- 50% of the crashes were single vehicle
- 30 of the crashes were Motor Vehicle in Transport (42%)
- Predominant violations for the crashes were Speed Too Fast for Conditions (26%) and No Improper Action (32%)

Fatal Crashes

1 crash: WB Mainline approximately half a mile after the WB Rest Area on ramp
Violation: Unknown

1 crash: EB Mainline roughly one mile prior to the EB Rest Area off-ramp
Violation: Unknown

Parking Area Crashes

None

Ramp Crashes

1 crash: EB Rest Area off-ramp
Violation: Failed to Keep in Proper Lane

6. *SACATON*

The crash analysis statistics at the Sacaton Rest Area include the following:

- Total number of crashes: 282
- The highest occurrences of crashes occurred in Year 2021 at 76 (27%)
- More then half of the crashes occurred on the WB Mainline
- Approximately 56% of the crashes were rear end crashes.
- 202 crashes were classified as Motor Vehicle in Transport (72%)
- Predominant violations for the crashes were Speed Too Fast for Conditions (50%)

Fatal Crashes

1 crash: EB Mainline roughly 0.5 miles east of EB Rest Area off-ramp
Violation: Speed too Fast for Conditions

1 crash: WB Mainline roughly 0.5 miles west of WB Rest Area off-ramp
Violation: Failed to Keep in Proper Lane

1 crash: WB Mainline roughly a mile west of WB Rest Area off-ramp
Violation: Failed to Keep in Proper Lane

1 crash: WB Mainline between the Rest Areas
Violation: Speed too Fast for Conditions

Parking Area Crashes

1 crash: EB Rest Area
Violation: No Improper Action

Ramp Crashes
None

7. *TEXAS CANYON*

The crash analysis statistics at the Texas Canyon Rest Area include the following:

- Total number of crashes: 56
- The highest occurrences of crashes occurred in Year 2019 at 17 (30%)
- Roughly 39 (70%) of the total crashes occur on the EB Mainline
- Approximately 70% of the crashes were single vehicle
- About 18% of the crashes were classified as Overturn Rollover and 25% were classified as Motor Vehicle in Transport.
- Predominant violations for the crashes were Speed Too Fast for Conditions (41%) and No Improper Action (43%).

Fatal Crashes
1 crash: WB Mainline roughly a mile west of WB Rest Area on-ramp
Violation: No Improper Action

Parking Area Crashes
None

Ramp Crashes
1 crash: EB Rest Area off-ramp
Violation: Unsafe Lane Change

8. *SAN SIMON*

The crash analysis statistics at the San Simon Rest Area include the following:

- Total number of crashes: 29
- Years 2020 to 2021 had the highest amount of crashes at 8 each (28%)
- Roughly 18 (62%) of the total crashes occurred on the EB Mainline
- 69% of the crashes were single vehicle
- The collision type for about 24% of the crashes was classified as Motor Vehicle in Transport
- Predominant violations for the crashes were No Improper Action (24%)

Fatal crashes
1 crash: EB Mainline roughly near the EB Rest Area on-ramp

Violation: Other

Parking Area Crashes
None

Ramp Crashes
2 crashes: WB Rest Area on-ramp
Violation: Speed Too Fast for Conditions and Other

9. *SUNSET POINT*

The crash analysis statistics at the Sunset Point Rest Area include the following:

- Total number of crashes: 96
- Years 2020 to 2021 had the highest amount of crashes at 52 each (23%)
- Half of the total crashes occurred on the Northbound (NB) Mainline (54%)
- 48% of the crashes were single vehicle, however rear end collisions accounted for at least 35% of the crashes
- The collision type for about 47% of the crashes was classified as Motor Vehicle in Transport
- Predominant violations for the crashes were Speed Too Fast for Conditions (41%) and No Improper Action (29%)

Fatal Crashes
1 crash: NB Mainline near the NB off-ramp for the Rest Area
Violation: Exceeded Lawful Speed.

1 crash: NB Mainline near the NB on-ramp for the Rest Area
Violation: Unknown.

1 crash: Southbound (SB) Mainline approximately a mile south of the SB on-ramp for the Rest Area
Violation: Speed too Fast for Conditions.

1 crash: SB Mainline 0.5 mile south of the SB on-ramp for the Rest Area
Violation: Failed to Keep in Proper Lane.

1 crash: SB Mainline near the SB on-ramp for the Rest Area
Violation: Failed to Keep in Proper Lane.

Parking Area Crashes
None

Ramp Crashes
1 crash: NB Rest Area off-ramp
Violations: Speed Too Fast for Conditions

1 crash: SB Rest Area on-ramp
Violation: No Improper Action

10. *CANOA RANCH*

The crash analysis statistics at the Canoa Ranch Rest Area include the following:

- Total number of crashes: 40
- The highest occurrence of crashes was in Year 2019 at 15 (38%)
- More than half of the crashes were on the SB Mainline

- 60% of the crashes were Single Vehicle
- The collision type for 25% of the crashes was classified as Collision with an Animal and another 25% was Motor Vehicle in Transport.
- Predominant violations for the crashes were Speed Too Fast for Conditions (33%) and No Improper Action (43%).

Fatal Crashes
None

Parking Area Crashes
None

Ramp Crashes
None

11. HAVILAND

The crash analysis statistics at the Haviland Rest Area include the following:

- Total number of crashes: 18
- The highest occurrence of crashes was in Year 2018 at 7 (39%)
- 83% of the crashes were on the EB Mainline
- Roughly 72% of the crashes were single vehicle
- The collision type for about 22% of the crashes was classified as Overturning and another 28% were classified as Motor Vehicle in Transport.
- The predominant violation for the crashes was No Improper Action (44%).

Fatal Crashes
1 crash: EB Mainline near the EB off-ramp for the Rest Area
Violation: Speed too Fast for Conditions.

Parking Area Crashes
None

Ramp Crashes
None

12. PAINTED CLIFFS

The crash analysis statistics at the Painted Cliffs Rest Area include the following:

- Total number of crashes: 14
- The highest occurrence of crashes was in Year 2021 at 7 (50%)
- More than half of the crashes were on the EB Mainline (64%)
- Roughly 64% of the crashes were Single Vehicle
- The collision type for about 29% of the crashes were Motor Vehicle in Transport
- Predominant violations for the crashes were Speed Too Fast for Conditions (29%) and Unknown (36%)

Fatal Crashes
None

Parking Area Crashes
None

Ramp Crashes
2 crashes: EB Rest Area off-ramp
Violation: Unknown and Other

13. HASSAYAMPA

The crash analysis statistics at the Hassayampa Rest Area include the following:

- Total number of crashes: 43
- The highest occurrence of crashes occurred in Year 2009 at 14 (33%)
- 51% of the crashes were on the EB Mainline
- Roughly 75% of the crashes were single vehicle
- The collision type for about 30% of the crashes were Collision with Animals and another 30% as Collision with Fixed Object
- Predominant violations for the crashes are Inattention/Distraction and Failed to Yield Right of Way

Fatal Crashes
1 crash: EB Mainline approximately a quarter of a mile west of the Rest Area entrance
Violation: Speed too Fast for Conditions.

1 crash: WB Mainline approximately 0.1 mile west of the Rest Area entrance
Violation: Speed too Fast for Conditions.

Parking Area Crashes
6 crashes: Rest Area
Violation: Speed Too Fast for Conditions, Failed to Yield Right of Way, and No Improper Action

Intersection Crashes
10 crashes: Rest Area Intersection
Violation: Unsafe Lane Changes, Speed Too Fast for Conditions, Ran Stop Sign, Failed to Keep in Proper Lane, Failed to Yield Right of Way, and No Improper Action

14. SALT RIVER CANYON

The crash analysis statistics at the Salt River Canyon Rest Area include the following:

- Total number of crashes: 16
- The highest occurrence of crashes occurred in Year 2018 at 10 (63%)

- Half of the crashes were on the SB Mainline
- Nearly all of the crashes were single vehicle (88%)
- The collision type for about 31% of the crashes was Overturn Rollover
- The predominant violation for the crashes was Speed Too Fast for Conditions (69%)

Fatal Crashes
None

Parking Area Crashes
None

Ramp Crashes
None

15. MAZATZAL

The crash analysis statistics at the Mazatzal Rest Area include the following:

- Total number of crashes: 33
- The highest occurrence of crashes occurred in Year 2020 at 10 (30%)
- Majority (67%) all of the crashes were on the WB Mainline
- Nearly all of the crashes were single vehicle (61%)
- The collision type for about 39% of the crashes was Motor Vehicle in Transit
- Predominant violations for the crashes were No Improper Action (36%) and Speed Too Fast for Conditions (7%)

Fatal Crash
1 crash: WB SR 188 Mainline, at the Rest Area entrance intersection
Violation: Failed to Yield Right of way

Parking Area Crashes
None

Intersection Crashes
7 crashes: Rest Area Intersection
Violation: Speed Too Fast for Conditions, Failed to Yield Right of Way, and No Improper Action

16. MCGUIREVILLE

The crash analysis statistics at the McGuireville Rest Area include the following:

- Total number of crashes: 104
- The highest occurrences of crashes occurred in the Year 2019 at 27 (26%) and in Years 2017 and 2021, when 25 (24%) crashes occurred
- More than half of the total crashes occur on the SB Mainline (73%)
- Nearly 73% of the crashes were single vehicle

- The collision type for about 26% of the crashes was classified as Motor Vehicle in Transport and another 23% were classified as Overturn Rollover
- The predominant violation for the crashes was Speed Too Fast for Conditions

Fatal Crashes
1 crash: SB Mainline near SB Rest Area on-ramp
Violation: Crossed Median

Parking Area Crashes
None

Ramp Crashes
1 crash: NB Rest Area on-ramp
Violations: Speed Too Fast for Conditions

2 crashes: SB Rest Area on-ramp
Violation: Disregarded Traffic Signal and No Improper Action

17. PARKS

The crash analysis statistics at the Parks Rest Area include the following:

- Total number of crashes: 54
- The highest occurrence of crashes occurred in Year 2017 at 20 (37%)
- Just about half of all of the crashes were on the WB Mainline
- 67% of the crashes were single vehicle
- The collision type for about 30% of the crashes was Motor Vehicle in Transport
- The predominant violation for the crashes was No Improper Action

Fatal Crash
None

Parking Area Crashes
None

Ramp Crashes
None

18. METEOR CRATER

The crash analysis statistics at the Meteor Crater Rest Area include the following:

- Total number of crashes: 38
- The highest occurrence of crashes occurred in Year 2020 at 12 (32%)
- 71% of the crashes were on the EB Mainline
- 53% of the crashes were single vehicle

- The collision type for about 45% of the crashes was classified as Motor Vehicle in Transport and 24% as Overturn Rollover
- Predominant violations for the crashes were No Improper Action (29%) and Speed Too Fast for Conditions (32%)

Fatal Crashes
1 crash: EB Mainline approximately a quarter mile east of the EB Rest Area on-ramp
Violation: Failed to Keep in Proper Lane

Parking Area Crashes
None

Ramp Crashes
1 crash: WB Rest Area off-ramp
Violation: Speed Too Fast for Conditions
1 crash: EB Rest Area on-ramp
Violation: No Improper Action

19. CHRISTENSEN

The crash analysis statistics at the Meteor Crater Rest Area include the following:

- Total number of crashes: 69
- The highest occurrence of crashes occurred in Year 2018 at 19 (28%) and in Year 2017 at 16 (23%)
- 59% of the crashes were on the NB Mainline
- 86% of the crashes were single vehicle
- The collision type for about 39% of the crashes was classified as Collision with an Animal and 23% as Overturn Rollover
- Predominant violations for the crashes were No Improper Action (52%) and Speed Too Fast for Conditions (30%)

Fatal Crashes
1 crash: NB Mainline approximately a quarter mile south of the NB Rest Area off-ramp
Violation: Failed to Keep in Proper Lane

Parking Area Crashes
None

Ramp Crashes
None

FIGURE B-1: SEVERITY OF INJURY
(JANUARY 2017-DECEMBER 2021)

RA No	Rest Area	Fatal	Injury				Rest Area Total
			No	Possible	Suspected Minor	Suspected Serious	
1	Mohawk	1	25		7	3	36
2	Sentinel	1	20	2	9		32
3	Ehrenberg		32	5	2	2	41
4	Bouse Wash		31	7	7		45
5	Burnt Well	2	49	3	15	3	72
6	Sacaton	4	203	25	46	4	282
7	Texas Canyon	1	42	4	8	1	56
8	San Simon	1	17	5	5	1	29
9	Sunset Point	5	154	18	39	6	222
10	Canoa Ranch		30	6	4		40
11	Haviland	1	11	1	5		18
12	Painted Cliffs		10	2	1	1	14
13	Hassayampa	2	30	10	11	2	55
14	Salt River Canyon		8	2	4	2	16
15	Mazatzal	1	22	1	5	4	33
16	McGuireville	1	69	9	19	6	104
17	Parks		45	3	5	1	54
18	Meteor Crater	1	23	6	7	1	38
19	Christensen	1	51	2	13	2	69
Grand Total		22	872	111	212	39	1256

FIGURE B-2: TYPES OF COLLISIONS
(JANUARY 2017-DECEMBER 2021)

RA No.	Rest Area	Collision with Animal	Collision with Vehicle	Collision with Pedestrian	Overturning or Jackknife	Collision with Fixed Object	Other	Rest Area Total
1	Mohawk	2	10	0	4	16	4	36
2	Sentinel	1	8	0	10	8	5	32
3	Ehrenberg	0	24	0	3	5	9	41
4	Bouse Wash	0	25	0	4	4	12	45
5	Burnt Well	1	34	1	10	15	11	72
6	Sacaton	3	207	0	25	28	19	282
7	Texas Canyon	2	15	0	10	18	11	56
8	San Simon	4	9	0	0	13	3	29
9	Sunset Point	4	108	0	34	42	34	222
10	Canoa Ranch	10	11	0	5	8	6	40
11	Haviland	2	5	0	4	4	3	18
12	Painted Cliffs	1	5	0	1	7	0	14
13	Hassayampa	9	26	0	6	11	3	55
14	Salt River Canyon	0	2	0	5	4	5	16
15	Mazatzal	8	13	0	5	5	2	33
16	McGuireville	5	27	0	24	31	17	104
17	Parks	16	17	0	8	7	6	54
18	Meteor Crater	0	18	0	10	5	5	38
19	Christensen	27	8	0	16	8	10	69
Grand Total		95	572	1	184	239	165	1256

FIGURE B-3: MANNER OF COLLISION
(JANUARY 2017-DECEMBER 2021)

RA No.	Rest Area	Angle (Front To Side) (Other Than Left Turn)	Head On	Left Turn	Rear End	Rear To Side	Sideswipe	Single Vehicle	U Turn	Other/Unknown	Rest Area Total
1	Mohawk		1		4		4	25		2	36
2	Sentinel				2		6	19		5	32
3	Ehrenberg				9		13	16		3	41
4	Bouse Wash				12	1	12	18		2	45
5	Burnt Well				14		19	36		3	72
6	Sacaton				158		43	66		15	282
7	Texas Canyon				7		8	39		2	56
8	San Simon				3		6	20			29
9	Sunset Point		1		77		30	106		8	222
10	Canoa Ranch				6		4	24		6	40
11	Haviland				3		1	13		1	18
12	Painted Cliffs						4	9		1	14
13	Hassayampa	6		7	4		6	26	1	5	55
14	Salt River Canyon						2	14			16
15	Mazatzal	3		2	4		4	20			33
16	McGuireville	1	2		10		11	75	1	4	104
17	Parks		1		2		12	36		3	54
18	Meteor Crater		1		7		9	20		1	38
19	Christensen				6		1	59		3	69
Grand Total		10	6	9	328	1	195	641	2	64	1256

FIGURE B-4: JUNCTION RELATED CRASHES
(JANUARY 2017-DECEMBER 2021)

RA No.	Rest Area	No Relationship	Driveway Or Alley	Entrance/ Exit Ramp	Entrance/Exit Ramp Interchange	Intersection	Intersection Related Non Interchange	Intersection Related Non Interchange	Other/ Unknown	Rest Area Total
1	Mohawk	35		1						36
2	Sentinel	32								32
3	Ehrenberg	37		3					1	41
4	Bouse Wash	42		2					1	45
5	Burnt Well	71		1						72
6	Sacaton	281				1				282
7	Texas Canyon	55		1						56
8	San Simon	26		2					1	29
9	Sunset Point	218		1	1				2	222
10	Canoa Ranch	40								40
11	Haviland	18								18
12	Painted Cliffs	12		2						14
13	Hassayampa	38	5			9	1	1	1	55
14	Salt River Canyon	16								16
15	Mazatzal	25				7			1	33
16	McGuireville	101		2	1					104
17	Parks	54								54
18	Meteor Crater	36		2						38
19	Christensen	69								69
Grand Total		1206	5	17	2	17	1	1	7	1256

FIGURE B-5: CRASHES BY LOCATION
(JANUARY 2017-DECEMBER 2021)

RA No	Rest Area	Mainline				Off-Ramp				On-Ramp				Unknown	Rest Area Entrance/ Exit Intersection	Parking Area	Rest Area Total
		EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB				
1	Mohawk	13	21							1				1			36
2	Sentinel	20	11											1			32
3	Ehrenberg	23	15				1			1	1						41
4	Bouse Wash	18	23			1	1							2			45
5	Burnt Well	43	28			1											72
6	Sacaton	118	145	11	5									2		1	282
7	Texas Canyon	38	17			1											56
8	San Simon	18	9								2						29
9	Sunset Point			118	99			1					1	3			222
10	Canoa Ranch			18	21									1			40
11	Haviland	15	2											1			18
12	Painted Cliffs	7	4			2								1			14
13	Hassayampa	21	16											2	10	6	55
14	Salt River Canyon	8	8														16
15	Mazatzal			18	7									1	7		33
16	McGuireville			27	75							1	1				104
17	Parks	25	27											2			54
18	Meteor Crater	26	10				1			1							38
19	Christensen			41	28												69
Grand Total		393	336	233	235	5	3	1	0	3	3	1	2	17	17	7	1256

FIGURE B-6: CRASHES BY YEAR
(JANUARY 2017-DECEMBER 2021)

RA No	Rest Area	Year					Rest Area Total
		2017	2018	2019	2020	2021	
1	Mohawk	6	7	8	8	7	36
2	Sentinel	1	9	7	12	3	32
3	Ehrenberg	8	7	13	4	9	41
4	Bouse Wash	8	8	12	8	9	45
5	Burnt Well	10	17	11	14	20	72
6	Sacaton	51	53	54	48	76	282
7	Texas Canyon	10	10	17	9	10	56
8	San Simon	6	1	6	8	8	29
9	Sunset Point	43	38	37	52	52	222
10	Canoa Ranch		7	7	2	2	18
11	Haviland	6	7	2	3		18
12	Painted Cliffs	2	2	2	1	7	14
13	Hassayampa	11	11	14	9	10	55
14	Salt River Canyon	2	10	1	2	1	16
15	Mazatzal	3	5	6	10	9	33
16	McGuireville	25	14	27	13	25	104
17	Parks	20	9	12	7	6	54
18	Meteor Crater	4	6	6	12	10	38
19	Christensen	16	19	13	8	13	69
Grand Total		232	240	255	230	277	1234

FIGURE B-7: LIGHTING CONDITIONS
(JANUARY 2017-DECEMBER 2021)

RA No.	Rest Area	Dark Lighted	Dark Not Lighted	Dark Unknown Lighting	Dawn	Daylight	Dusk	Unknown	Rest Area Total
1	Mohawk	1	7		1	25	2		36
2	Sentinel		4		1	27			32
3	Ehrenberg	5	10		2	24			41
4	Bouse Wash	3	13		5	24			45
5	Burnt Well	2	24		4	39	3		72
6	Sacaton	13	62		6	192	9		282
7	Texas Canyon	1	15		2	35	3		56
8	San Simon	4	6		2	15	2		29
9	Sunset Point	7	57		6	139	12	1	222
10	Canoa Ranch		13	1	1	22	2	1	40
11	Haviland		9			9			18
12	Painted Cliffs	2	3			7	2		14
13	Hassayampa	2	12		3	37	1		55
14	Salt River Canyon		7			9			16
15	Mazatzal	1	16			15	1		33
16	McGuireville	5	16		1	77	5		104
17	Parks		19		3	32			54
18	Meteor Crater	8	10		3	15	2		38
19	Christensen	1	34		1	33			69
Grand Total		55	337	1	41	776	44	2	1256

FIGURE B-8: WEATHER CONDITIONS
(JANUARY 2017-DECEMBER 2021)

RA No.	Rest Area	Blowing Sand Soil Dirt	Clear	Cloudy	Fog Smog Smoke	Rain	Sleet Hail Freezing Rain Or Drizzle	Snow	Snow Or Blowing Snow	Other/ Unknown	Rest Area Total
1	Mohawk		31	2		3					36
2	Sentinel		28			4					32
3	Ehrenberg	1	30	7		3					41
4	Bouse Wash		39	5		1					45
5	Burnt Well		64	5	1	1				1	72
6	Sacaton	1	259	16		6					282
7	Texas Canyon		27	9		18	1		1		56
8	San Simon		25	3		1					29
9	Sunset Point		188	20		11	1		1	1	222
10	Canoa Ranch		34	6							40
11	Haviland		16	1						1	18
12	Painted Cliffs		10	4							14
13	Hassayampa		43	9		3					55
14	Salt River Canyon		11	4					1		16
15	Mazatzal		22	8		2			1		33
16	McGuireville		45	15		43	1				104
17	Parks		37	11			2		3	1	54
18	Meteor Crater		34	3					1		38
19	Christensen		48	6	1	1	2	3	8		69
Grand Total		2	991	134	2	97	7	3	16	4	1256