



WEATHER-RESPONSIVE MANAGEMENT STRATEGIES

FACTSHEET

Source: Federal Highway Administration.

Preparing for a Solar Eclipse

Background

The Weather-Responsive Management Strategies initiative under the Federal Highway Administration (FHWA) Every Day Counts – Round 5 program promotes the use of road weather data from mobile and connected vehicle technologies to support traffic and maintenance management strategies during inclement weather. The goal is to improve safety and reliability, as well as reduce impacts on the transportation system resulting from adverse weather.

In anticipation of upcoming solar eclipse events in 2023 and 2024, this factsheet describes what a transportation agency may experience as part of a solar eclipse and how to prepare for anticipated traffic impacts.

WHAT IS A SOLAR ECLIPSE?

The National Weather Service (NWS) describes a solar eclipse as a relatively rare phenomena that occurs when "the Moon passes between the Sun and Earth, casting the Moon's shadow on Earth."¹ The path of an eclipse is narrow and short-lived. Types of solar eclipse are described as follows:

Total Solar Eclipse: When the Moon's elliptical orbit is towards its minimum distance from Earth, the Moon appears larger than the Sun. When an eclipse occurs during this time, it is a total eclipse because the Moon is completely (or totally) obscuring the Sun, as shown in figure 1. The resulting shadow visible at the narrow "path of totality," appears with a ring of light.

The next total solar eclipse is scheduled to cross the United States on April 8, 2024, with a path shown in figure 2 across the following States:

- Arkansas
- Illinois
- Indiana
- Maine
- Missouri
- New Hampshire
- New York
- Ohio
- Oklahoma
- Pennsylvania
- Texas
- Vermont



Figure 1. Image of a total solar eclipse.
(Source: USDOT/Getty.)

¹ National Weather Service. n.d. "Solar and Lunar Eclipses"
<https://www.weather.gov/fsd/suneclipse>, last accessed August 12, 2022.

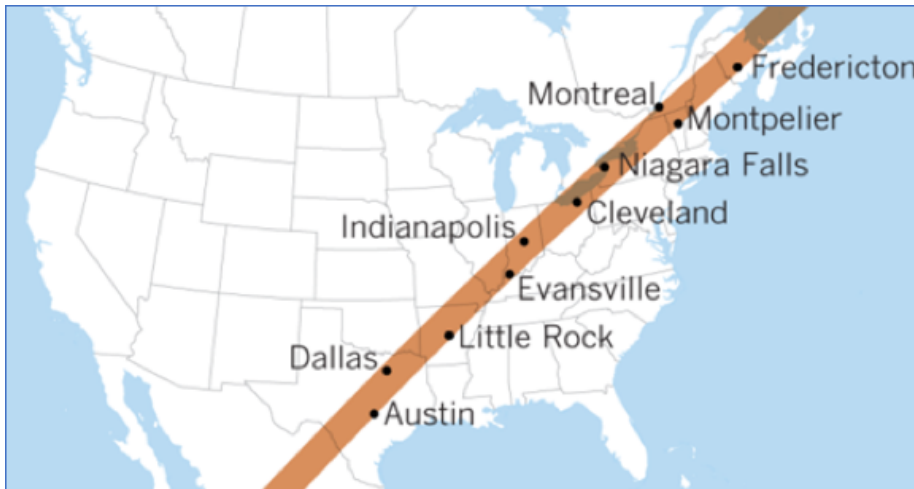


Figure 2. A total solar eclipse will cross the eastern United States on April 8, 2024. (Source: National Weather Service.)

Annular Solar Eclipse: Conversely, when the Moon's elliptical orbit is toward its maximum distance from Earth, the Moon will appear visually smaller than the Sun. Because the Moon is not completely obscuring the Sun's light during the eclipse, the antumbral (or negative) shadow appears with a thin ring of bright sunlight surrounding the Moon, as depicted in figure 3.

The next annular solar eclipse is scheduled to cross the United States on October 14, 2023, with a path across the following States:

- Arizona
- California
- Colorado
- Nevada
- New Mexico
- Oregon
- Texas
- Utah



Figure 3. Image of an annular solar eclipse. (Source: USDOT/Getty.)

Hybrid Solar Eclipse: The rarest type of eclipse is when a total eclipse changes to an annular eclipse, or vice versa, along the eclipse path.

WHAT ARE POTENTIAL TRANSPORTATION IMPACTS OF A SOLAR ECLIPSE?

Because a solar eclipse is a relatively rare type of planned special event, it can generate large volumes of traffic for which State and local departments of transportation (DOTs) will need to prepare. A solar eclipse is unique in how its path crosses many locations across the Nation. Many people are interested in experiencing a solar eclipse firsthand, even if they do not live near its path. Thus, in addition to increased traffic and potential safety impacts caused by people traveling to experience the solar eclipse, a variety of additional associated local activities, festivals, and events may also be scheduled to coincide with the eclipse that cause additional impacts.

A total solar eclipse occurred in the United States on August 21, 2017, and created delays and queuing on rural interstates and highways across the Nation, as shown in figure 4 from Wyoming. During the days before and after the 2017 event, people traveled into rural areas near the path of totality. In the days leading up to the eclipse, some State DOTs worked with the NWS using a Pathfinder approach. This coordination helped DOTs understand whether cloud cover might impact visibility of the eclipse in certain areas, causing increased congestion as visitors moved to locations with better weather conditions and visibility. Additionally, increased traffic to remote areas could cause other safety impacts, such as the presence of illegally parked vehicles in unsafe areas (e.g., shoulders or medians), or the increased potential of igniting wildfires in dry areas.

What is Pathfinder?

Pathfinder is a collaborative strategy for proactive transportation system management ahead of and during adverse weather events, which encourages State DOTs, NWS, and weather service contractors to share and translate weather forecasts and road conditions into consistent transportation impact messages for the public. More information is available at <https://ops.fhwa.dot.gov/publications/fhwahop18034/index.htm>.

Similarly, the path of the 2024 total solar eclipse will cross rural areas, although in close proximity to major population centers, such as Houston, TX, New York City, NY, and Boston, MA. For optimal viewing, many people from these large cities will travel to nearby rural areas to view the 2024 solar eclipse. Major cities like Dallas, TX and Cleveland, OH are also in the path of the 2024 total solar eclipse, and these areas may be more capable of handling an influx of travelers wishing to view the eclipse.



Figure 4. The 2017 total solar eclipse caused significant traffic delays on rural interstates in Wyoming. (Source: Wyoming Department of Transportation.)

HOW CAN A DOT PREPARE FOR A SOLAR ECLIPSE?

Transportation agencies can prepare for a solar eclipse and associated increased traffic volumes by taking several proactive steps:

- **Be a primary source for public information:** Transportation agencies may create dedicated web pages for the solar eclipse event, or otherwise have special links to solar eclipse events and information available on the DOT traveler information website, 511, and/or social media channels. Traffic delays are likely to occur as a result of travelers driving to the path of the solar eclipse; however, DOTs can manage the message and help travelers anticipate traffic conditions by providing information weeks or months prior to the event. DOTs may also consider working with third-party traveler information providers to coordinate messages.
- **Coordinate with the NWS:** Transportation agencies in the path of the solar eclipse may consider a Pathfinder approach to coordinate with the NWS in the days leading up to the solar eclipse. Forecasted precipitation and cloud cover could impact visibility conditions for the solar eclipse, causing last minute shifts in travel to different viewing locations. The NWS can support DOTs in developing accurate, actionable messaging for social media, traveler information websites, or dynamic message signs (DMS) to help manage traffic and provide weather-related updates for the traveling public.
- **Coordinate with law enforcement, first responders, and local agencies:** State DOTs may consider being part of conversations with law enforcement and local agencies to understand how everyone can work together to coordinate and share resources to most efficiently respond to incidents, manage traffic, and improve safety and mobility. Specifically, these agencies may coordinate with the DOT to develop traffic control or management plans for specific locations to reduce congestion and prevent illegal parking or turns. First responders representing fire departments and emergency medical services may also be involved in these conversations, given long-lasting queues and potential medical emergencies that could be experienced by eclipse viewers.
- **Coordinate with construction and maintenance staff and contractors:** DOTs should consider working with construction and maintenance staff and contractors to minimize lane or road closures around the solar eclipse event that would exacerbate adverse traffic impacts on key corridors. If feasible, planned maintenance activities may be halted or delayed in areas that will be impacted by the event. Additionally, pre-positioning of tow operators and courtesy patrols may be considered for areas that are anticipated to experience long-standing queues and delays.
- **Manage traveler expectations:** In the days leading up to the solar eclipse and the day of the event, DOTs may consider issuing public service announcements on radio stations or DMS to help travelers anticipate heavy traffic conditions. DOTs may encourage travelers to consider modifying travel plans and routes to avoid anticipated congestion. Generally, arrivals to the solar eclipse are more likely to be paced over a longer period of time, while most people will be departing the area at about the same time, once the solar eclipse has passed.

During and after the solar eclipse, DOTs should continue to coordinate with State and local law enforcement to help resolve traffic issues, incidents, and congestion that occur as travelers depart the area. Additionally, DOTs should continue to provide up-to-date traveler information via traditional media sources, 511, and traveler information websites, and on social media to support travelers on their return trip after the solar eclipse. The information provided to travelers may encourage travelers to consider delaying their return trip to avoid traffic congestion.

Conclusions

A solar eclipse can create major traffic issues, and DOTs have a role in helping to manage the impact. Specifically, DOTs should consider coordination with NWS, law enforcement, first responders, local agencies, construction contractors, and maintenance staff to anticipate and prepare for impacts caused by increased traffic due to public interest in the solar eclipse. DOTs may also consider providing additional information about the eclipse on existing traveler information websites, social media pages, and DMS, or even consider developing a webpage dedicated to the event. In this way, DOTs can help to proactively manage impacts caused by the traveling public for a solar eclipse event.

Available Resources

FHWA Road Weather Management Program:

<https://ops.fhwa.dot.gov/weather>

National Weather Service Solar and Lunar Eclipses:

<https://www.weather.gov/fsd/suneclipse>

National Operations Center of Excellence – Solar Eclipse Resources:

<https://transportationops.org/eclipse>

FHWA Factsheet – Wyoming Department of Transportation Total Solar Eclipse:

<https://ops.fhwa.dot.gov/Publications/fhwahop18033/index.htm>

<https://highways.dot.gov/>

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