# Tennessee Uses Crowdsource Data to Collaborate and Improve Travel During the I–40 Bridge Repair

U.S. Department of Transportation
**Federal Highway Administration**

Road Weather Management | Incident Management | Real Time Monitoring | Traveler Information | Traffic Signal Management

Source: Federal Highway Administration (FHWA).

## Introduction

The Tennessee Department of Transportation (TDOT) collaborates with Arkansas and Missouri Departments of Transportation (DOTs) to operate and maintain three Mississippi River crossings in west Tennessee—the I–155 Caruthersville Bridge, the I–40 Hernando DeSoto Bridge, and the I–55 Memphis-Arkansas Bridge. Constructed in the 1970s, the I–40 Bridge is crucial for local commutes and east-west freight movements.



*Figure 1. Map. West Tennessee road network. (Source: FHWA.)*

During a routine inspection in May 2021, transportation officials found significant cracks in the I–40 Bridge structure, requiring emergency repairs. Closing the bridge meant moving approximately 40,000 daily users, 30 percent of which were trucks, to an alternate route for more than 2 months.[1] In managing the emergency bridge closure, TDOT used multiple crowdsourced data to complement traditional intelligent transportation systems (ITS) technologies for better traveler information, multiagency collaboration, and operational enhancements that improved travel reliability and safety.

## Traffic Diversion Planning

TDOT reviewed travel time and congestion analytics through the Regional Integrated Transportation Information System Probe Data Analytics Suite by using crowdsourced vehicle probe data from INRIX®.[2] These crowdsourced and ITS data helped officials identify I–40 diversion routes.

TDOT sought to keep State route traffic on State routes and interstate traffic on interstates. The engineers developed two detour maps—one for interstate and one for local routing.[2] During the closures, the preferred I–40 interstate traffic alternative was the I–55 bridge, with a 12-mile (mi) detour. Other crossing options were 75 mi to the north or 60 mi to the south.

TDOT conducted daily meetings with FHWA, Arkansas DOT (ARDOT), the City of Memphis, and other agencies to review traffic flow, congestion, and event data through the duration of the I–40 closure. As a result of these meetings and supporting crowdsourced data, TDOT decided to close some access points into downtown Memphis and widen some sections of the I–55 detour.
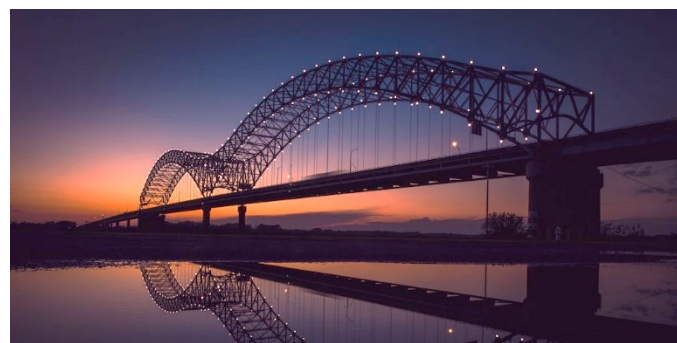


*Figure 2. Photo. I–40 Hernando DeSoto Bridge, Memphis, TN. (Source: Unsplash/Terrance Raper.)*

Officials were also able to make more accurate adjustments to lane configurations and collaborative signal timing plans with the City of Memphis. Crowdsourced data helped TDOT better collaborate with agencies to define, adjust, and improve diversion plans over the duration of the I–40 Bridge closure, improving traffic flow, travel times, and roadway safety. TDOT noted there was a 40-percent reduction in peak traffic delays within days after the solutions were implemented.

TDOT maximized data from existing ITS technology—such as cameras, dynamic message signs, and roadside sensors—to manage the I–40 diversion. Although beneficial, these ITS technologies left monitoring gaps and created data stovepipes across agency boundaries. TDOT leveraged the Waze® traffic viewer interface to more quickly detect the location of collisions, disabled vehicles, debris, congestion, and other events that impact traffic flow and traffic safety across the Tennessee–Arkansas border and within the City of Memphis. Monitoring these data helped TDOT implement a more tailored and timely response to incidents along the diversion route.

## Traveler Information

To help motorists better plan their commutes, TDOT provided estimated average travel delays by time of day and day of week, through a dedicated I–40 webpage on the TDOT website.[3] The agency also shared incident information through their 511 Twitter® feed.

A key traveler information element was promoting the preferred alternative through commonly used in-vehicle navigation systems, such as Waze. TDOT used Waze to communicate road closures with travelers, enhancing the reach of traveler and public information efforts. Traveler information helped road users better understand the I–40 closure and plan travel accordingly.

## Crowdsourced Data Beyond the I–40 Detour

According to TDOT Region 4 Director of Operations Michael Welch, P.E., "Everyone at the table was focused on making improvements that would reduce congestion and improve safety traveling through the Midsouth. Everyone stayed flexible and we relied on the data to make several small changes that led to large improvements." The all-hands approach to the I–40 bridge repair and diversion to I–55

helped TDOT look beyond traditional ITS data and opened the door to continued, wider use of crowdsourcing data. Crowdsourcing data are now an invaluable part of TDOT's traffic systems management and operations approach to managing regional networks.

*Figure 3. Map. I–40 Westbound detour and stylized version of the travel delay information shared with road users by TDOT. (Source: FHWA.)*

## References

1. Oman, N., and N. Earley. 2021 "I-40 Span has 'Significant' Break—No Vehicles Allowed On, No Barges Below." *Arkansas Democrat Gazette*, May 13, 2021. https://www.arkansasonline.com/news/2021/may/13/memphis-span-has-significant-break/, last accessed April 1, 2022.

2. TDOT. n.d. *Probe Data Information*. Nashville, TN: Tennessee Department of Transportation. https://www.tn.gov/content/dam/tn/tdot/traffic-engineering/Probe%20Data%20Information.pdf, last accessed March 1, 2022.

3. TDOT. n.d. "Interstate 40 Hernando DeSoto Bridge" (website). https://www.tn.gov/tdot/projects/region-4/i-40-hernando-desoto-bridge.html, last accessed March 30, 2022.