For release: October 18, 2022
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New study rates traffic signal workings in 101 cities

Urban travelers in the United States are almost twice as likely to arrive at a traffic signal on green than on red, according to a new study by researchers at the Texas A&M Transportation Institute (TTI).

“American drivers share a common experience – and sometimes a common frustration – with traffic signals every day,” says Luke Albert, an associate research engineer at TTI. “We’ve developed a way to compare those experiences from one city to another.”

More than half of the urban traffic delay that travelers experience occurs on city streets rather than freeways, the study notes, and a major share of that hindrance occurs at traffic signals. But measuring the extent of that traffic delay has been difficult without expensive equipment. Instead, researchers can now gauge signal workings using data collected from cars moving through controlled intersections.

Findings from the study are based on analysis of about 210,000 traffic lights, coast to coast, for one week in October 2020. Data for the analysis was collected anonymously and provided by INRIX, which also provides traffic condition data for TTI’s Urban Mobility Report (UMR). The new traffic signal research, funded by the National Institute for Congestion Reduction, builds upon the 2021 UMR.

Examining signal performance in the same 101 urban areas reviewed by the UMR, experts assigned a Traffic Signal Efficiency Index for each city.

The national average for that measurement is 1.7 – meaning that a driver is 1.7 times more likely to arrive at a traffic light that’s green rather than red. The lowest-performing signals can be found in Fresno, California (just above 1.1, meaning a roughly equal likelihood of green and red on arrival), while drivers in Boulder, Colorado enjoy the best-performing signals (a 2.6 score, meaning a driver is almost three times more likely to arrive on green).

Generally, urban areas with a higher signal density scored better than better than cities where signals were less prevalent.

A wide range of temporary conditions can also affect signal operations, according to the researchers. In the case of October 2020, for instance, areas of Louisiana saw more signal-related delay in the wake of a hurricane. Conversely, drivers experienced less signal-related delay in university-centric cities where virtual classes were the norm during a pandemic.

Findings from the new study can help local transportation agency officials improve their street operations.

“Crowdsourced data, like this information from INRIX on how traffic signals are working, gives people making travel decisions much more detailed information and more quickly than in the past when engineers had to go stand on the side of the road to watch traffic or install expensive equipment,” Albert says. “This evolving data allows TTI to evaluate the 101 most congested urban areas in this way for the first time.”

Study findings support TTI’s conclusions in nearly three decades of UMR installments – that ever-worsening traffic gridlock calls for a mix of solutions. Efforts to make the most of existing roadway capacity by improving signal performance, for instance, can be more cost-effective than adding new traffic lanes or interchanges to reduce congestion.

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