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Bumper to Bumper: Predicting Traffic Flow

by Eric Weiner

Cars cross the San Francisco-Oakland Bay Bridge shortly after it opened in 1936. In its first year, the bridge served 9 million vehicles. Determining how many vehicles, and what kind of vehicles, will cross a bridge on a daily basis is not merely academic. It affects the stress — or load — on the bridge, and therefore, its lifespan and maintenance schedule. Keystone/Getty Images

NPR.org, August 7, 2007 · The late Danish physicist Niels Bohr once wryly observed, "Prediction is very difficult, especially about the future." That nugget of wisdom is especially true when it comes to predicting how many people will use a particular bridge or road or airport—or any other piece of infrastructure.

Yet that is exactly what traffic engineers are asked to do all the time. Determining how many vehicles, and what kind of vehicles, will cross a bridge on a daily basis is not merely academic. It affects the stress — or load — on the bridge, and therefore, its lifespan and maintenance schedule.

Investigators have not yet determined what caused the I-35W bridge to collapse in Minneapolis last week. But it was carrying more than double the number of vehicles originally forecast when it was built in 1967, according to the Minnesota Department of Transportation.

In the past, unexpectedly high traffic volume has contributed to the collapse of bridges. In 1967, the Silver Bridge collapsed in West Virginia, killing 46 people. The Federal Highway Administration concluded that the main cause was a crack that grew undetected in one of the bridge's huge chain links, but that the high volume of traffic was also a factor.

Most of the nation's highways and bridges were built in the 1950s and '60s. Since then, the number of vehicles (cars and trucks) nationwide has increased more than four-fold, from 74 million to more than 300 million. Today, there are more vehicles than people in the United States.

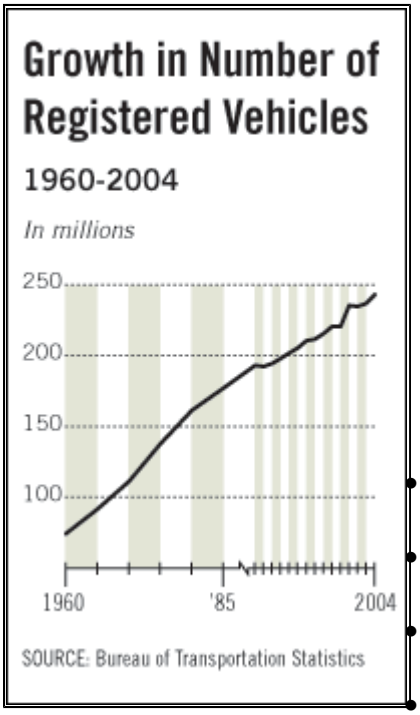
Predicting traffic volume might sound like a narrow specialty, but in fact it is a broad, interdisciplinary field that relies on urban planning, economics, and many other disciplines. Predicting traffic volume for a given bridge or road means also predicting population and economic growth, and that is never easy.

In some ways, the field of traffic forecasting has advanced by leaps and bounds since the 1960s. There are now sophisticated computer models and standardized procedures employed nationwide. Yet the forecasts still rely on the quirks of human behavior, and the forecasts can often be wildly off the mark. Some of the variables that affect traffic volume are zoning laws, construction of new shopping malls, and the availability of public transportation.

"Yes, computers are bigger, and the field of traffic forecasting has advanced considerably as a discipline. But engineers are using the same basic methods, the same paradigms that they used the 1960s," says Hani Mahmassanic, a professor of traffic management at the University of Maryland.

"Traffic forecasting is not an exact science," agrees Michael Demetsky, head of the Center for Transportation Studies in Charlottesville, Va. Forecasters, he says, still rely on past usage patterns to predict future ones, and that can lead to faulty forecasts.

Then there is a phenomenon called "induced traffic." Basically, it means that if you build it, they will drive. A new



Lindsay Mangum, NPR

Government statistics through 2004 show the number of cars has grown more than four-fold since the 1960s. Today, the U.S. is estimated to have more than 300 million vehicles — that's more cars than people.

bridge or interstate highway not only eases congestion for the cars and trucks already on the road, it also acts as a traffic magnet, attracting new vehicles and, in some cases, compounding the very congestion it was supposed to relieve.

Traffic forecasts are like weather forecasts, says Brian Smith, a professor of civil engineering at the University of Virginia.

"We're pretty good at predicting the weather a couple of days in advance," Smith says. "But the 10-day forecast isn't as good, and the seasonal forecasts are even worse."

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