

Wall Street Journal...

Slowing Down Will Get You Through a Traffic Jam Faster *Measures to Minimize Bottlenecks Emphasize the Importance of Cutting Your Speed*

By Jo Craven McGinty

The next time you spend an hour in stop-and-go traffic, go ahead—blame the drivers. Chances are, it's their fault. And maybe yours, too.

When traffic thickens on freeways, drivers often make decisions that worsen conditions. They speed up when they should slow down. They change lanes when they should stay put. They squeeze together when they should spread out.

In effect, they leave no room to react. When something unexpected occurs, it leads to sudden braking, and what might have been a manageable slowdown becomes a miserable crawl or, worse, traffic grinds to a standstill.

Once the flow of traffic is disrupted, the shock wave ripples backward, with driver after driver braking. Instead of progressing smoothly, traffic rapidly queues.

"Everyone is selfish and wants maximal travel time versus optimal time for everyone," said Hesham Rakha, a professor of civil and environmental engineering at Virginia Tech. "By being selfish, you make the system worse."

The Federal Highway Administration estimates that 40% of all congestion nationwide can be attributed to recurring bottlenecks. The problem cost the country \$78 billion last year in wasted time and fuel, according to INRIX, a company that studies the economic and environmental costs of congestion.

Bottlenecks can't be entirely eliminated, but they can be minimized. Solutions include variable speed limits that change in response to congestion, metered on-ramps that use traffic signals to gradually feed drivers onto freeways, and zipper merges which, when a lane is about to end, instruct drivers to use all lanes until a designated point then take turns merging.

Essentially, the approaches direct drivers to go slower in order to go faster.

"The intuition is if you are more aggressive, you will get to your destination faster," Mr. Rakha said. "Studies have shown that if you are less aggressive, you'll get there faster."

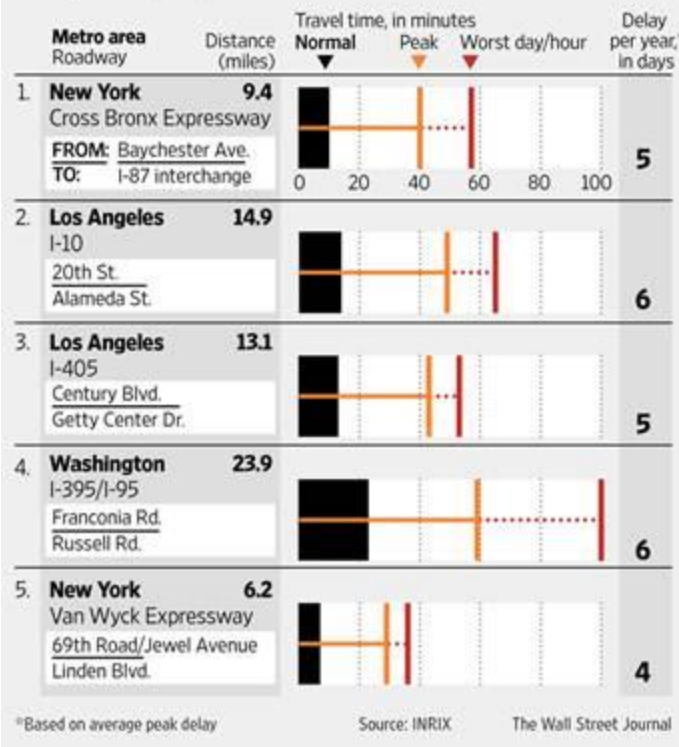
Traffic engineers measure the capacity of a freeway by the number of vehicles per lane per hour. Under normal conditions, with traffic flowing freely, capacity is about 2,000 vehicles per lane per hour, according to Bernard J. Arseneau, director of traffic management systems for Omaha, Neb.-based HDR Inc.

When traffic begins to slow, capacity initially increases because the density makes up for the reduced speed, and more of the tightly packed vehicles pass through. The benefit peaks at around 45 mph with about 2,200 vehicles per lane per hour. But at maximum volume, the system is vulnerable.

"When you get to that level, it doesn't take much to mess things up," Mr. Arseneau said. "Any disruption is likely to break down traffic."

Jammed

A look at the five worst bottlenecks in the country, by how long it takes to drive through them normally compared with how much longer it takes, on average, during daily peak traffic and at their worst day and hour.



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Ideally, drivers should maintain a steady slower speed, avoid unnecessary lane changes, which induce braking, and lengthen the gaps between vehicles to allow for adjustments. But left to their own devices, drivers are more likely to jockey for position. Some change lanes or race forward to cut in line. Others counter by tailgating or straddling lanes.

Mr. Rakha compares it to pouring sand through a funnel. “If you pour sand suddenly, not as much goes through as if you pour exactly the amount the funnel needs,” Mr. Rakha said. “There is more throughput by pouring less into the funnel.”

Once freeway traffic drops below 45 mph, vehicles begin to queue, and capacity drops to about 1,600 vehicles per lane per hour. The reduction of 400 to 600 cars per lane per hour is significant.

“You end up with stop-and-go congestion,” Mr. Arseneau said.

To help drivers make better choices, state departments of transportation employ various techniques.

Minnesota uses the [zipper merge](#), often in work zones when a lane is dropped, and the technique is taught in the state’s [drivers education manual](#). Zippering doesn’t hasten traffic, but it makes merging more orderly, and it significantly reduces queue lengths.

“The length of the backup gets reduced by up to 40%,” said Ken E. Johnson, a traffic engineer with the Minnesota Transportation Department.

Variable speed limits slow vehicles before they begin to queue. Georgia, for example, recently [implemented variable speeds](#) on I-285 in Atlanta to reduce congestion. There, depending on road conditions, the speed, posted on electronic signs, may vary from 35 mph to 65 mph.

Ramp meters keep freeway traffic moving by controlling the volume of merging traffic. In 2001, Minnesota turned off 430 ramp meters for six weeks and [studied the effect](#). Among other things, the researchers found that freeway volume decreased by 9% and travel times increased by 22%.

“We know if we can delay congestion from occurring and slow traffic down, that will prolong the free flow and get more vehicles through,” Mr. Arseneau said. “You want to make sure you keep that traffic flowing as long you as can.”

It is a tall order that the engineers acknowledge is counterintuitive.

“We’re telling them to slow down to reach their destination faster,” Mr. Rakha said. “It’ll be hard for the driver to recognize that.”