

The **PRICE** Is Right!

A simple demonstration of how peak hour traffic flow through variable pricing can make highways more efficient and saves money and aggravation for everyone.

The Doug MacDonald Challenge asked: How can we convey variable pricing's ability to improve highway efficiency as a simple matter of common sense?

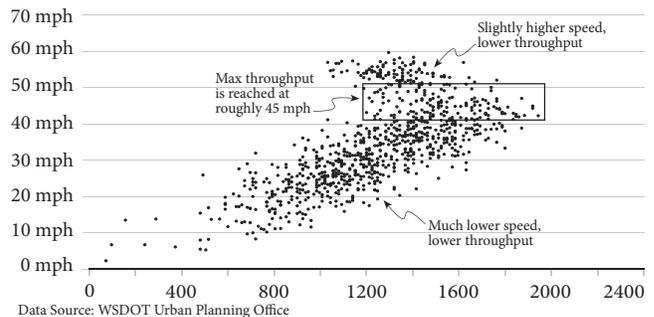
Why should we ask this question? Traffic professionals understand the story from the graphs at right. But if we want to promote efficiency solutions for highway congestion problems, we have to make the case to regular people too!

The winning approach to the challenge says "it's all about organizing the particle flow in contrast to letting the unorganized particles jam themselves up." Pouring the rice through the funnel shows this perfectly. Almost everybody knows from experience and intuition exactly what will happen even before they see it done. They can do it themselves in their own kitchen! And when they see the demonstration, they recognize a congested highway in the stuck rice!

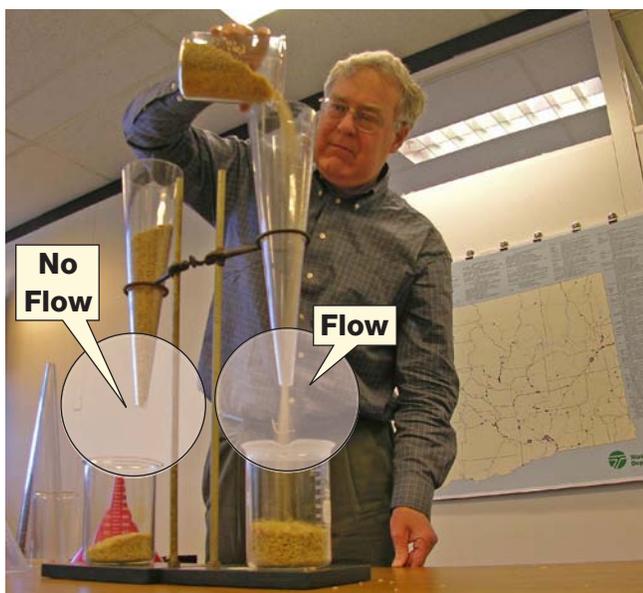
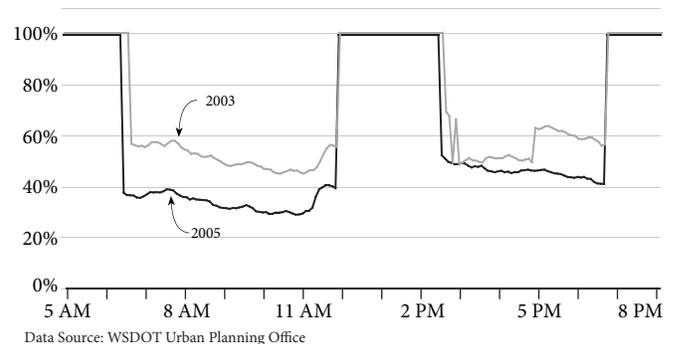


Relating Speed and Volume

I-405 Northbound at 24th NE, 6-11 AM Weekdays in May 2001
Hourly Volume/Lane

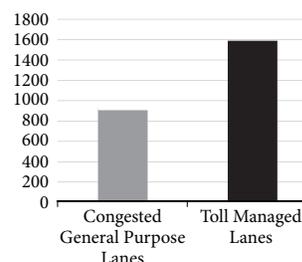


Lost Throughput Capacity on I-5 at I-90



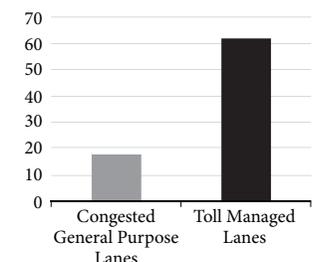
Traffic in Peak Hours on Eastbound SR 91 Friday Afternoons 2004

Vehicles Per Hour Lane Per Lane



Average Traffic Speed Peak Hours Eastbound SR 91 Friday Afternoons 2004

Miles Per Hour



Do the Demonstration Yourself!

Materials

- Two funnels
- Two liter-sized containers to place under the funnels
- One liter of rice
- One stop watch

Directions

Dump one liter of rice all at once into the funnel and time how long it takes for the rice to go completely through the funnel. Then, take the same liter of rice, the same funnel and the same stop watch, but this time pour the rice slowly and evenly into the funnel.

Based on previous experiments, we predict that you will shave off roughly 1/3 off the flow time through gradual, controlled pouring. Running both funnels at once allows for an interesting side-by-side comparison.



What does this tell us about how to fight congestion?

- **Pricing highways with variable tolls:** Paces demand through supply-price-demand algorithm to achieve steady, peak capacity conditions
- **Ramp meters:** Smooths highway merging to avoid flow breakdown, increase total flows.
- **Open- road tolling:** No stopping and bunching for toll booths
- **Variable speed limits:** Disciplines drivers to maintain best speed to avoid bunching, flow breakdown.
- **New project investments at bottlenecks:** recovers highway productivity for investments already made in the rest of the system.
- **Incident response:** clears blocking conditions, diminishes secondary accidents, restores flow conditions.
- **Information systems:** helps drivers anticipate conditions to better manage their own interactions with all the other rice.
- **Roundabouts:** dedicated to consistent flow, used in the right circumstances.
- **Access control:** a ancient application, well-understood
- **Traffic signal synchronization:** the rice demonstration is pretty basic!

The demonstration detailed in this handout is the brainchild of Paul Haase of Sammamish, Washington, the winner of the \$1,000 Doug MacDonald Challenge. The Doug MacDonald Challenge proposed a \$1,000 prize to the individual or group that proposed the most effective public communication tool explaining how to maximize traffic flow. The prize was funded by Secretary Doug MacDonald of the Washington State Department of Transportation, and the contest was sponsored by TRB's Congestion Pricing (ABE 25) Committee.



The rice proves efficiency works, when it comes to flow and funnels! We can take the same approach on our "we-don't-need-to-be-this-congested" highways.

Rice is not everyone's cup of tea!

Susan Gilmore, the Seattle Times reporter covering the Doug MacDonald Challenge (*Rice is Nice When Trying to Visualize Highway Traffic*, 12.29.06) forwarded the following reader e-mail:

Rice roads and paper sacks. How much more of the taxpayers' money will be squandered on this concept. Here is free advice . . . It's impossible to massage 10 pounds of rice into a 5 pound paper sack. . . . How is it that those appearing in the photo accompanying the article are so blind to the obvious solution to the problem depicted. **No fancy jargon or contest required, only a larger funnel.**

Who wants to take up Challenge Round II. We need a 100 word short reply, "We can't build our way out of congestion!"