



# Using information to reduce delay and influence behavior

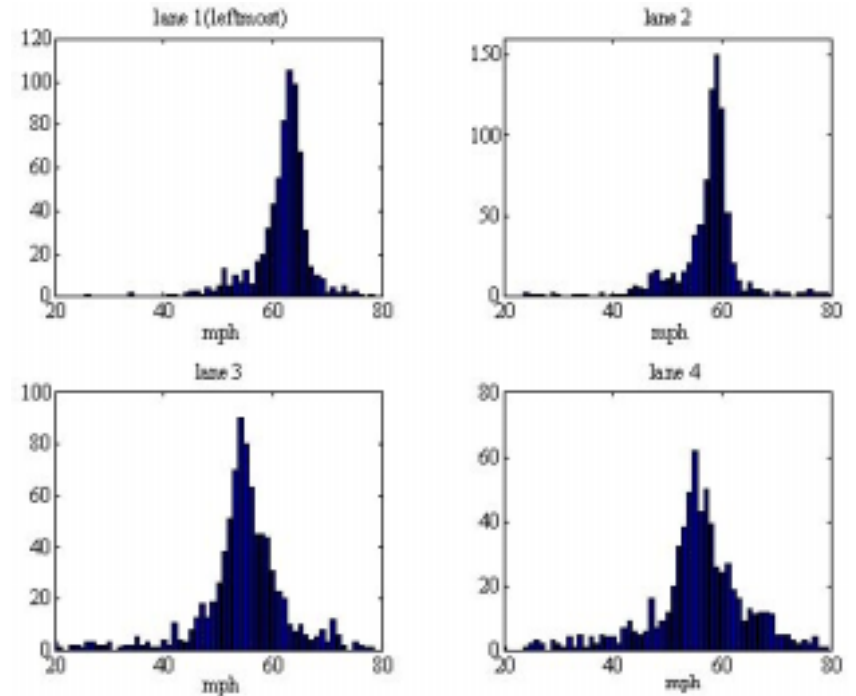
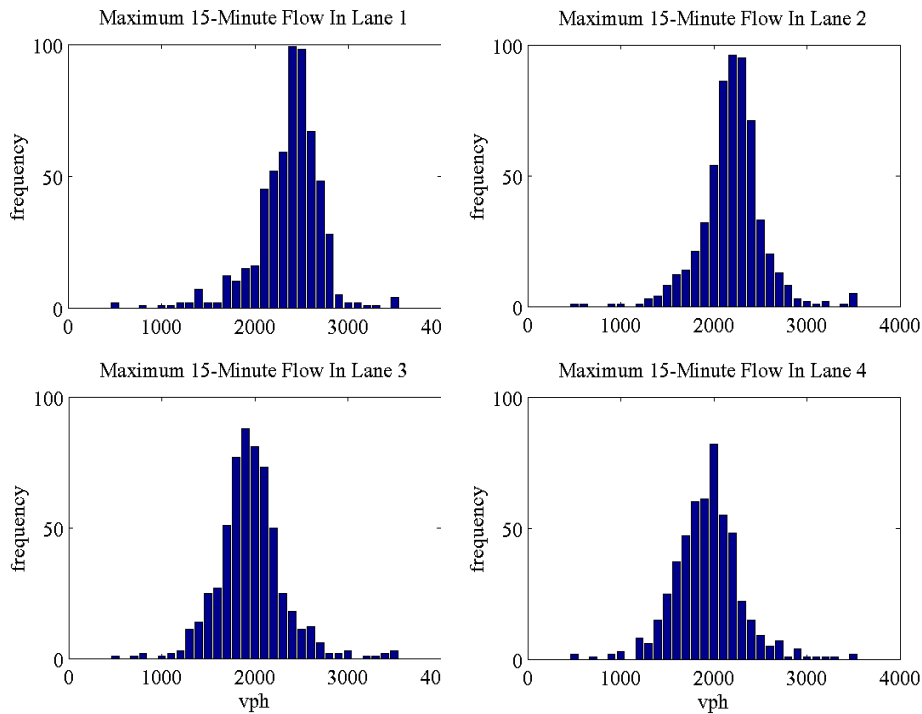
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# Production inefficiency

- ▶ maximum sustainable flow is 2000-2400 vph and occurs at 55-65 mph (LA data)





## Congestion on I-210 (peak hours, Feb-April '02)

- ▶ For 60 mph reference, non-recurrent congestion is 13% of total congestion; and accidents account for 72% of non-recurrent congestion
- ▶ For 35 mph reference, non-recurrent congestion is 17% of total congestion
- ▶ Incidents limited to those reported by CHP

**TABLE 1. SUMMARY STATISTICS-- CONGESTION DELAY I-210**  
 A. Reference Speed = 60 mph

<i>l</i>	<i>P(l)</i>	<i>E{D/l}</i>	$\sigma$	<i>Error</i>	<i>Max D</i>	<i>Count</i>
Total	1.00	368.75	290.67	18.53	1457.75	246
<i>l</i> = 0	0.66	322.00	255.00	19.97	1098.50	163
<i>l</i> = inc	0.34	460.56	384.50	42.20	1457.75	83
<i>l</i> = non	0.15	410.58	304.67	50.09	1271.00	37
<i>l</i> = acc	0.19	500.75	352.75	52.01	1457.75	46

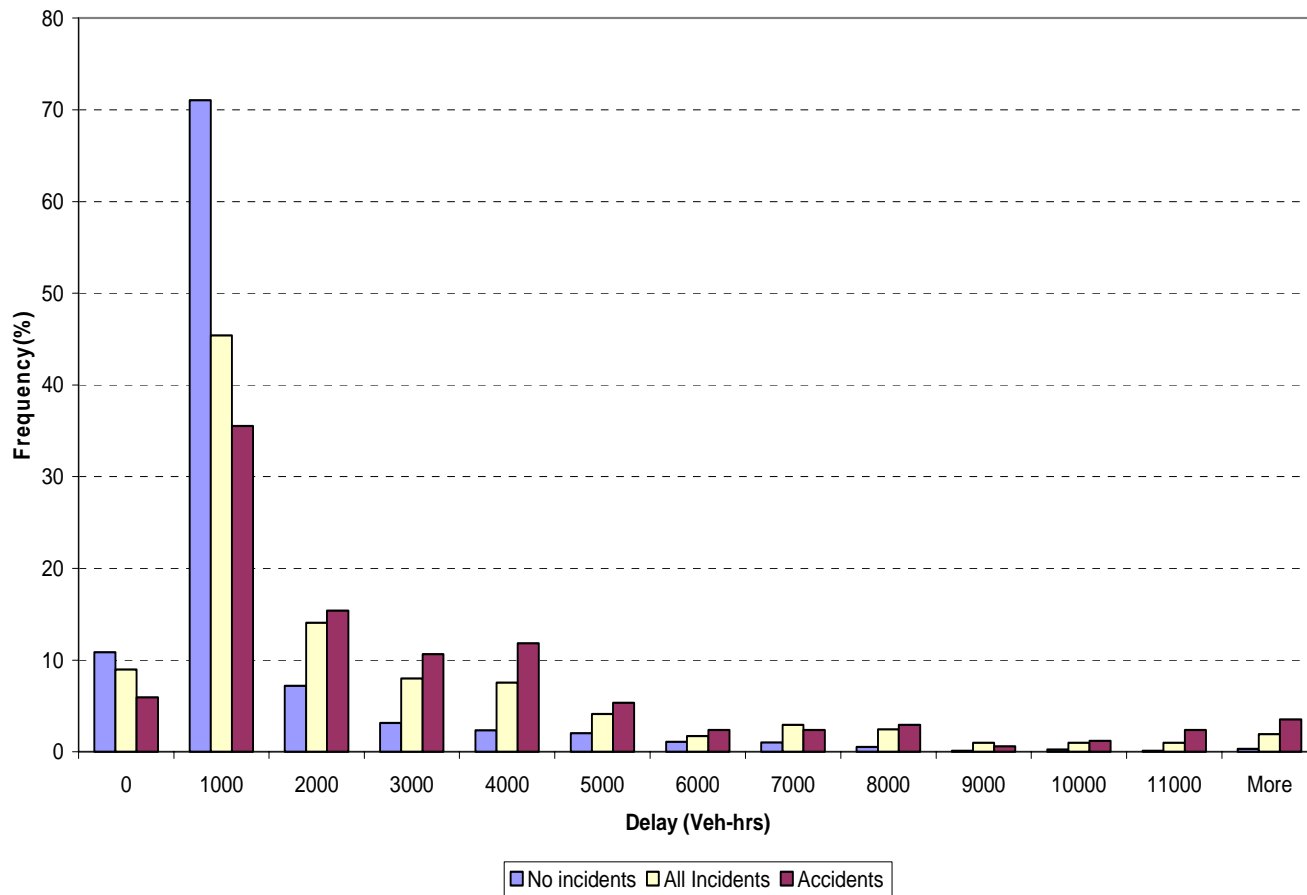
B. Reference Speed = 35 mph.

<i>l</i>	<i>P(l)</i>	<i>E{D/l}</i>	$\sigma$	<i>Error</i>	<i>Max D</i>	<i>Count</i>
Total	1.00	214.42	196.50	12.53	1104.25	246
<i>l</i> = 0	0.66	177.83	166.42	13.03	806.17	163
<i>l</i> = inc	0.34	286.19	234.20	25.71	1104.25	83
<i>l</i> = non	0.15	251.92	205.17	33.73	842.83	37
<i>l</i> = acc	0.19	313.75	246.58	36.36	1104.25	46



# Congestion measurement

- ▶ Probability distributions of congestion. Note importance of large tails



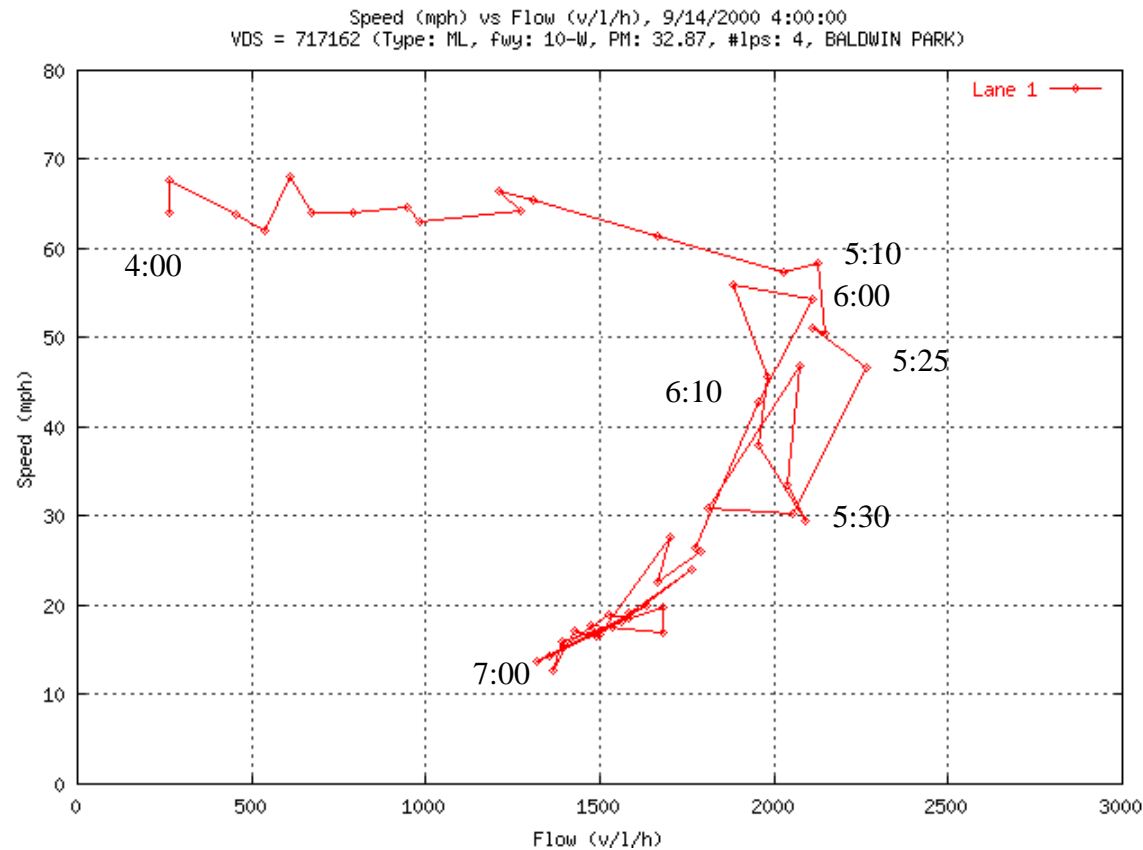


# Efficiency requires maintaining free flow conditions

- ▶ Efficiency of this segment is 100% until 5:00 am. At 7:00 am efficiency is

$$\eta = \frac{\text{Flow} \times \text{Speed}}{\text{MaxFlow} \times \text{SpeedAtMaxFlow}(60)} = 13\%$$

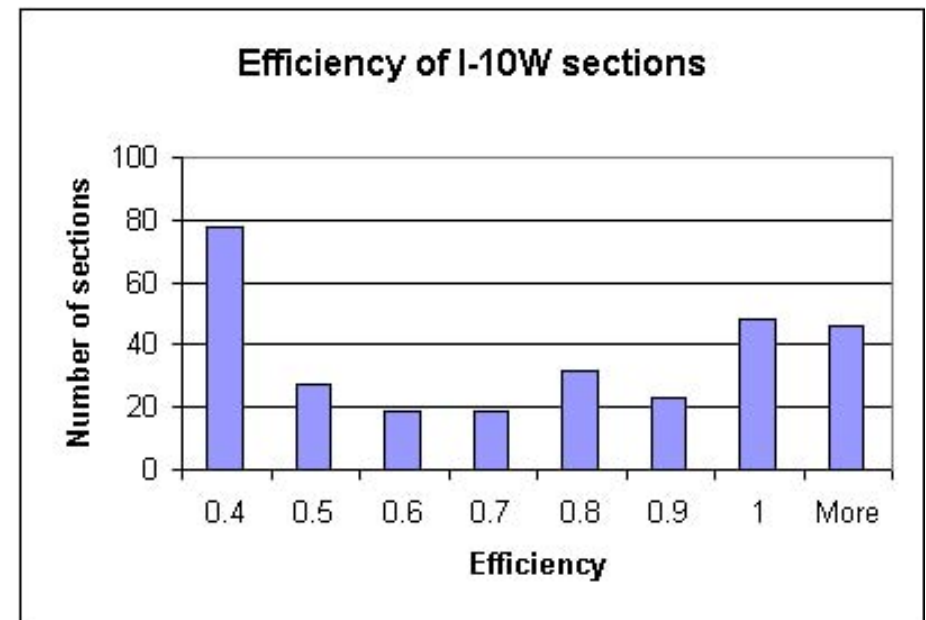
- ▶ Ramp-metering will be effective only if it maintains free flow





## Inefficiency of I-10W in AM peak

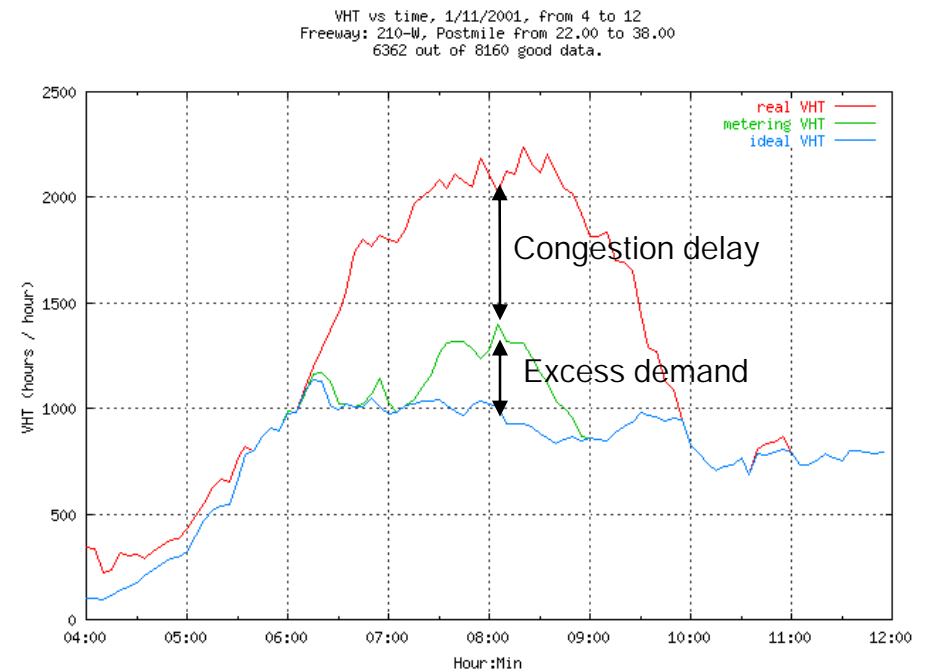
- ▶ Efficiency of all 291 segments of I-10W at time of worst congestion on Oct 1, 2000, midnight to noon
- ▶ 78 segments have efficiency under 40%, 65 between 40 and 80%, 46 have efficiency larger than 100 (speed at max flow larger than 60 mph)





# Potential efficiency gains from ramp metering

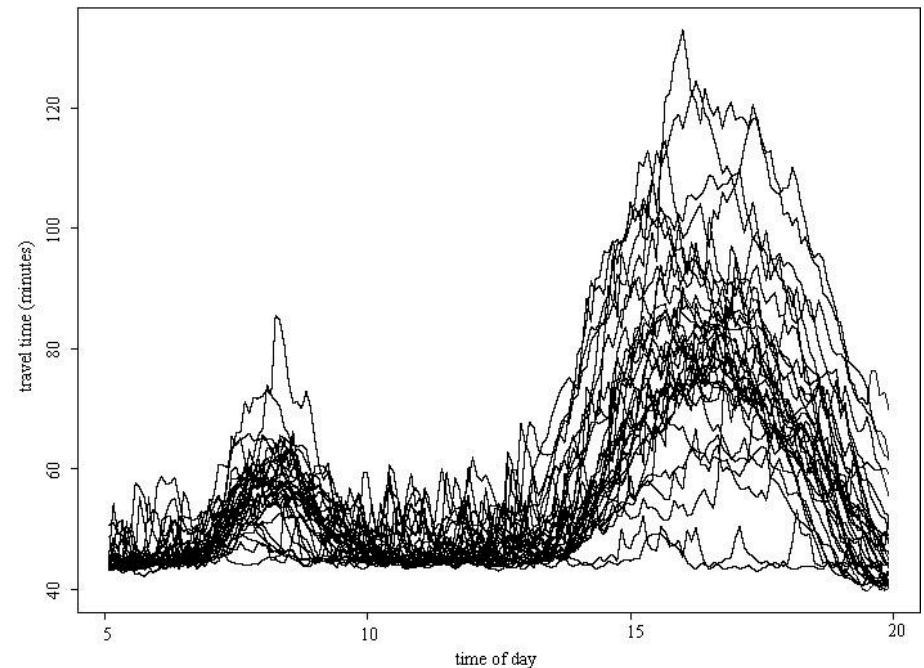
- ▶ Select freeway section I-210W, pm 22 to 38, Jan 11, 2001, 4.00 am to noon
- ▶ Hypothesis: if flow is maintained below max observed flow (less 3%), then speed will be 60 mph
- ▶ For LA, annual congestion delay estimated at 75 million vehicle-hours of which 50 million is eliminated by this policy





## Traveler welfare loss

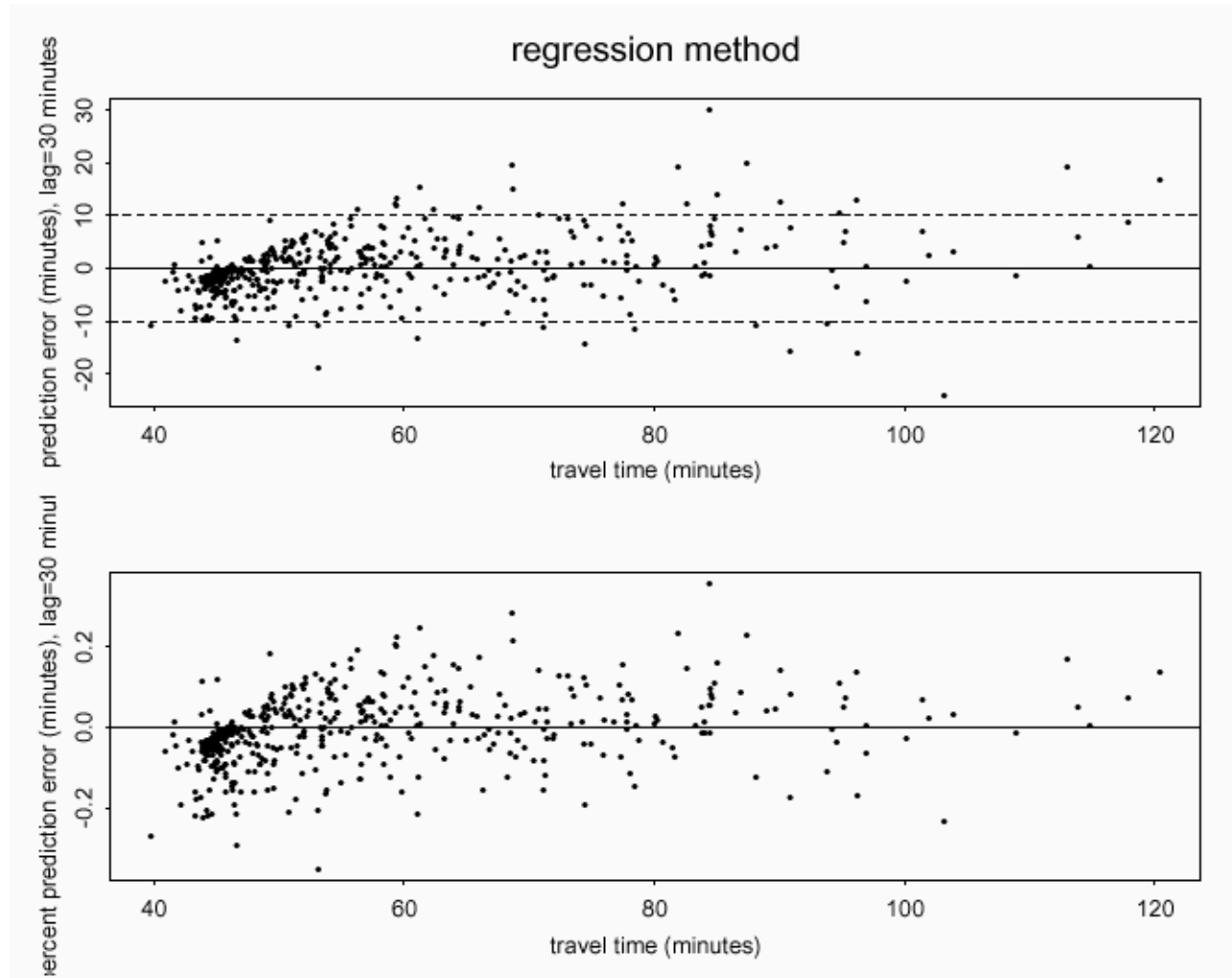
- ▶ Travel times for 20 days in October, 2000, on I-10E, between pm 1.3 and 48.5, starting every 5-min, between 5 am and 8 pm
- ▶ Unconditional distribution shows large variation
- ▶ 90% confidence interval for trip starting at 5 pm is between 55 and 110 min
- ▶ Travel time distribution, conditioned on current and past values, shows much smaller variation—permits prediction of travel time







# Travel time prediction—30 min forecast





# Traveler information scenario

The image displays several mobile phone screens with navigation and arrival information:

- Directions screen:** Shows instructions: "Directions", "N on I-880 for 18 mi", "Merge onto SR24", "E on SR24 for 1.8mi", "Exit at MLK Jr. Blvd", "more...".
- Route map screen:** Shows a map with labels: "Route", "Broadway", "Harbor", "Mission", "Elm", "Claremont".
- Est. Arrival Time screen:** Shows: "Est. Arrival Time", "Current: 2:48pm", "Arrive: 3:25pm", "At: UC Berkeley".
- \*\*AOT UPDATE\*\* screen:** Shows: "\*\*AOT UPDATE\*\*", "To: UC Berkeley", "Arrive: 3:35pm", "Current: 3:02pm".
- Central speech bubble:** A yellow speech bubble with the text "Am I going to be late?".



## Appendix 1: How to Access PeMS

- ▶ Go to the following URL:

<http://transacct.eecs.Berkeley.edu>

- ▶ You need a username and password
- ▶ You can get these at the PeMS web site
  - Select “Login” and then “Apply for an Account”
  - Fill out the online form and select “Apply”

Freeway Performance Measurement Project - Microsoft Internet Explorer

File Edit View Favorites Tools Help

← Back → Search Favorites History

Address <http://transacct.eecs.berkeley.edu/login.php?l>

**Freeway Performance Measurement Project**

PATH Partners for Advanced Transit and Highways Caltrans

Welcome to the Freeway Performance Measurement Project Web Site. This is an experimental project conducted by the EECS Department at the University of California, at Berkeley, with the cooperation of California Department of Transportation. The intent of this project is to collect historical and real-time freeway data from freeways in the State of California in order to compute freeway performance measures. We also provide a wide variety of tools for transportation researchers to examine historical loop detector data. Finally, we also provide tools to compare the real-time freeway performance with historical trends.

In order to use the Freeway Performance Measurement Site, you must [apply](#) for an account. Registering is easy and only requires some information and a valid email account. Your account can usually be approved within one or two working days.

**I'm an Existing User**

Username: Password:

[Forget your password?](#)

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