

# Lee County's Variable Pricing Project

**THE LEE COUNTY VARIABLE PRICING PROJECT IS A \$20 MILLION, FEDERALLY FUNDED, VALUE PRICING DEMONSTRATION PROJECT. DRIVERS, USING ETC, OBTAIN A 50-PERCENT TOLL DISCOUNT WHEN CROSSING EITHER THE MIDPOINT OR CAPE CORAL BRIDGES JUST PRIOR TO AND JUST AFTER THE MORNING AND EVENING PEAK PERIODS, GIVING DRIVERS INCENTIVE TO TRAVEL OUTSIDE OF PEAK PERIODS. THIS FEATURE PROVIDES AN OVERVIEW OF THE PROJECT, FROM CONCEPTION TO RESULTS.**

## PROJECT BACKGROUND

### *Project Location*

Lee County is located along Florida's southwest coast. The county's population is approximately 440,000 citizens, the majority of whom reside in or near the cities of Cape Coral and Fort Myers. These two cities are separated by the Caloosahatchee River (see Figure 1). The majority of employment is on the Fort Myers side, and the four bridges connecting Cape Coral to Fort Myers accommodate a great deal of the commuter traffic in the county. The Cape Coral and Midpoint Memorial Bridges are tolled, and variable pricing was implemented in August 1998 on these two bridges. The toll collection system allows payment via electronic toll collection (ETC) or by cash. With the ETC system, patrons have several payment options, making the entire tolling system somewhat complex (see Table 1).

Many people think of Lee County as a retirement area. Although there is a higher than average percentage of people over the age of 65 (24.3 percent in Lee County<sup>1</sup> vs. 12.7 percent nationwide<sup>2</sup>) in the county, bridge travelers are more often commuters (only 12.5 percent of bridge-user survey respondents were over 65 years of age<sup>3</sup>) with similar socioeconomic characteristics as those of drivers in other parts of the country. Additionally, bridge traffic is minimally impacted by seasonal variation in traffic demand. Of the 50 permanent count stations in the county, only one experiences less seasonal variation than the Cape Coral and Midpoint Memorial bridges.

### *Project History*

In 1994, the Lee County Board of County Commissioners increased the toll rate on the Cape Coral Bridge from 75 cents to \$1.00 to help fund design and early right-of-way acquisition for the Midpoint Memorial Bridge. As part of that action, the board

pledged that no further toll increases would be instituted in the foreseeable future. Therefore, political necessity led to the use of a discounted off-peak toll, instead of a higher toll during the peak hours. It is not surprising that this toll reduction has aided in political and public acceptance of the project.

The Midpoint Memorial Bridge was completed and opened to traffic in October 1997. Two months later, ETC began on both the Cape Coral and Midpoint Memorial bridges. Then, on Aug. 3, 1998, variable pricing began and has been offered ever since.

## PHASE I—PRE-PROJECT STUDY

Prior to implementation of variable tolls, a comprehensive pre-project study was conducted into the viability of the entire project. This pre-project study involved numerous public-outreach and opinion-gathering activities, including citizen advisory committees, focus groups, roadside interviews, commercial-user surveys and press releases to the local media. These efforts yielded valuable information regarding the development of both the variable pricing and ETC programs.

## PHASE II—IMPLEMENTATION OF ETC AND VARIABLE TOLLS

Prior to the introduction of ETC, bridge patrons could pay their tolls with cash or by using a bar-code sticker automatic vehicle identification (AVI) program. This program required each patron to renew membership each year. All stickers expired Oct. 31 of each year and renewal stickers could be obtained and applied to the vehicle anytime during the month of October. The initial transition plan involved replacing these bar-code stickers with ETC transponders during this traditional month-long renewal period in October 1997.

Unfortunately, there was a shortage of transponders. The transponder manufac-

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turer warned the county of this delay, and the county was able to develop an alternative plan. Working with the media during this delay proved to be extremely important. LeeWay staff kept the media well informed regarding the problems, and the media ran news reports on the delay of the ETC transponders. These news reports helped to inform the public regarding the delays they were experiencing and, due to LeeWay's open and honest approach, the reports were neutral in tone and did not portray the program negatively due to the delays. Initial ETC transponder distribution was completed by January 1998 and since then the number of transponders in circulation has steadily increased to 72,500 as of January 2001.

### SYSTEM PRICING AND COSTS

Lee County Commissioners set the maximum toll at \$1.00 and, therefore, it was necessary to investigate off-peak discounts for this variable pricing program. An initial proposal was to reduce the toll rate during all but the peak traffic periods. This idea was abandoned due to high potential revenue losses and inefficiencies. The purpose of variable pricing was to encourage drivers to alter their time of travel to times outside the peak periods. Offering a toll discount at 3 a.m., for example, would not alter the trip of someone traveling at 7:15 a.m., and, therefore, was not an efficient use of the discount. However, a discount at 6:45 a.m. might cause some of those travelers to alter their trip. Using this approach, the traffic patterns on the bridges were examined (see Figure 2) to determine the appropriate discount periods (6:30 a.m. to 7:00 a.m., 9:00 a.m. to 11:00 a.m., 2:00 p.m. to 4:00 p.m. and 6:30 p.m. to 7:00 p.m.). The use of the off-peak discount as compared to a peak-hour surcharge also helped to overcome the social-equity issues that often arise with increasing peak-period tolls. As no toll was increased, no group suffered an additional financial burden to cross the toll bridge.

The toll discount was limited to drivers paying their toll electronically (termed "eligible" drivers). This limitation reduced the number of discounts given to drivers who use the facility during discount periods, ensured all those

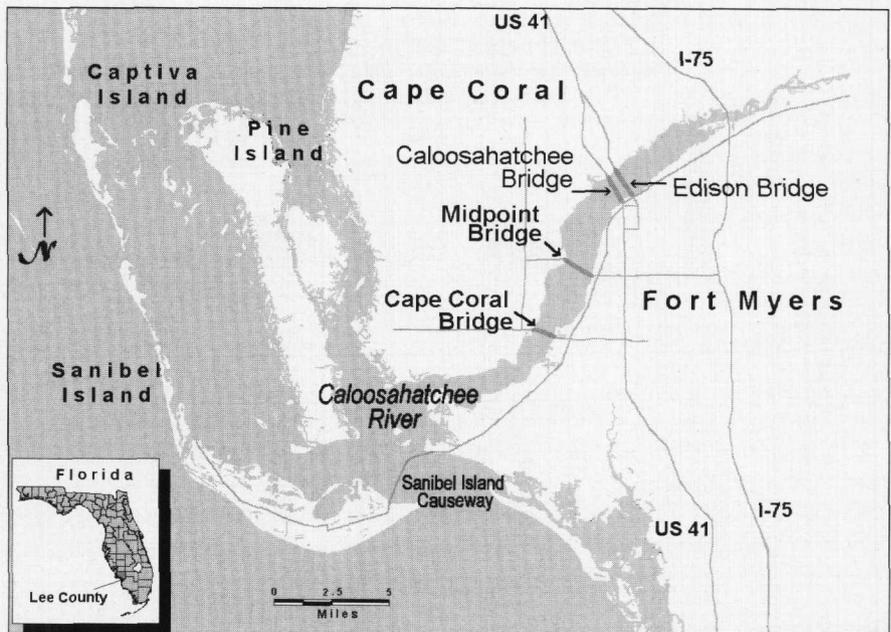


Figure 1. A map of Lee County, FL.

Table 1. Midpoint and Cape Coral Bridge toll rates.

Program	Time of day	Toll
No ETC tag (pay in cash)	All	\$1.00
ETC tag* with unlimited trips (\$330 per year)	All	\$0.00
ETC tag, not prepaid (pay in cash), 50-cent trips (\$40 per year)	All	\$0.50
ETC tag, prepaid (pay electronically), 50-cent trips (\$40 per year)	Discount periods All other times	\$0.25 \$0.50
ETC tag, prepaid (pay electronically), AVI only (no yearly fee)	Discount periods All other times	\$0.50 \$1.00

\*The ETC tag costs include an initial, refundable \$45 deposit. Prepaid tags users must also make an initial deposit of \$40 into their account for toll payments.

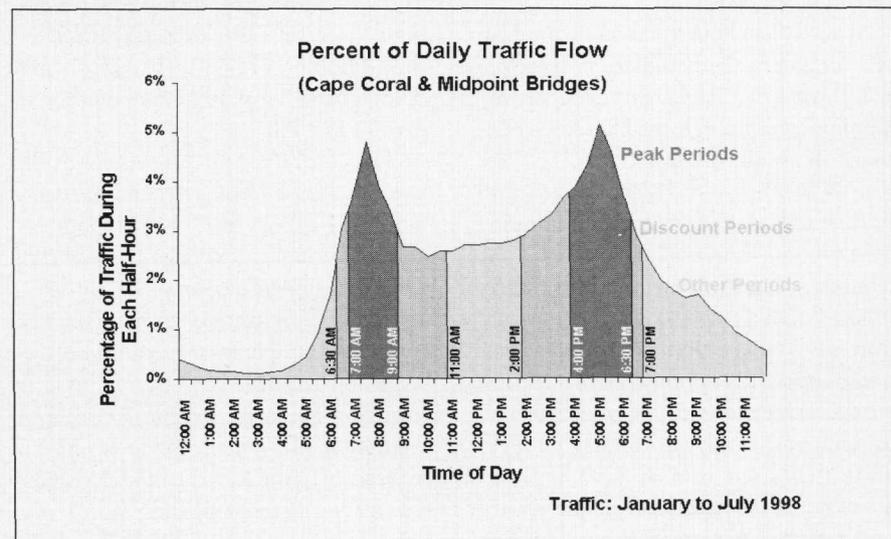


Figure 2. Daily traffic flow on the bridges.

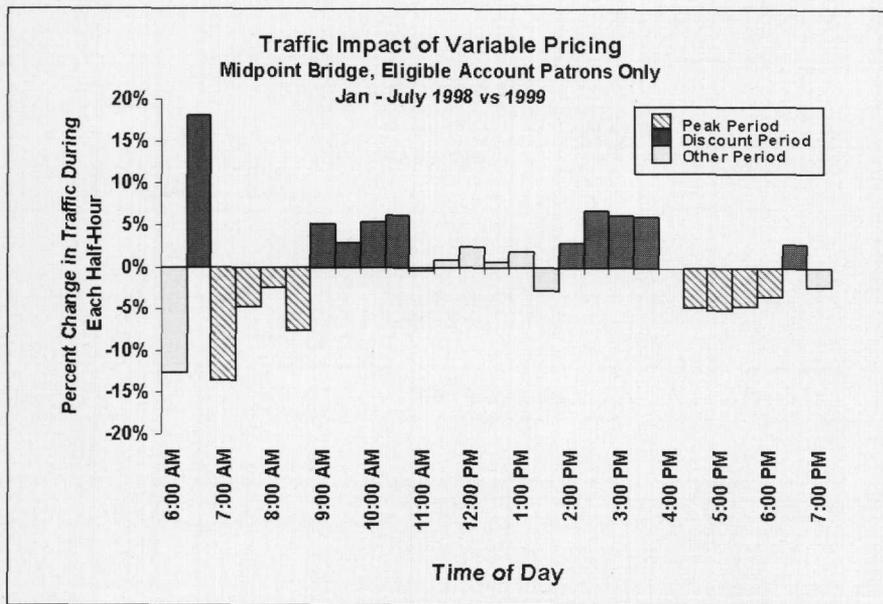


Figure 3. Change in time of travel for eligible users on the Midpoint Memorial Bridge.

eligible for the discount received information regarding the program and also provided important controls for data analysis. Changes in traffic patterns observed in eligible traffic but not observed among ineligible traffic from prior to the implementation of variable pricing as compared to once variable pricing began could be attributed to the discount toll. This provided excellent control (ineligible vehicles) and test (eligible vehicles) data for analysis. Of the eligible users, 94 percent saved 25 cents and 6 percent saved 50 cents (indicating 94 percent of eligible users purchased the 50-cent-trip frequent-driver discount program, see Table 1).

The \$20 million grant from the Federal Highway Administration (FHWA) that funded the Lee County program was administered through the Florida Department of Transportation (FDOT). The grant was 80 percent federal money with FDOT and Lee County each contributing 10 percent. Implementation of ETC required the largest expenditure of project funds. Funding was provided for installation of ETC equipment, purchase of transponders, development of the LeeWay service center as well as miscellaneous equipment and signage. Funding for ETC implementation totaled \$7.7 million. Costs for actual operation of the service center totaled \$2.9 million over the first 24 months of ETC operation.

Due to the unique nature of discounted tolls, the standard benefit-cost analysis is not readily applicable. In the Lee County variable pricing program, the primary cost is the reduction in the toll-revenue stream. This cost is approximately \$440,000 per year or 2.3 percent of toll revenue. From the implementation of variable tolls in August 1998 until August 2001, this revenue loss was recovered through the value pricing grant Lee County received from the FHWA. After August 2001, the discount program continued without FHWA funding due to public support for the program and the fact that revenue loss was small compared to the rapid increase in toll revenue and bridge ridership. For example, traffic on the Midpoint Bridge increased 17 percent from 1998 to 1999 and another 13 percent in 2000.

The cost of lost toll revenues provides an equivalent and direct economic benefit to the roadway user. Even without calculating capital cost savings or travel time savings, the benefit-cost ratio is, by definition, one. Any time or capital cost savings would simply increase this ratio.

As toll revenues can often be used to enhance a toll facility and its approaches, a question still remains as to whether a reduced toll results in the best use of revenues. One of the remaining tasks in the Lee County study is to take the experience gained and develop a rational proce-

cedure to address the benefit-cost issue so that such comparisons can be made.

A major public outreach/marketing program was performed through the life of the project. Efforts included traditional governmental outreach efforts as well as paid advertising and sponsorship of special events. The public involvement budget totaled \$800,000. Project development, monitoring and analysis were budgeted at \$2.2 million.

The final major component, a revenue reserve fund used to cover the lost revenue due to the toll discount, was originally funded at \$6.4 million. As the county developed the variable pricing program to offer toll discounts rather than charging a higher rate during the peak hours, a loss in overall toll revenue was anticipated. The establishment of the revenue reserve account allowed the county to proceed without violating its obligations to its bondholders. As the program has progressed, it was found that, due to targeting discounts only into those times when discounts were likely to attract drivers out of peak times, a significant savings was realized. Only \$1.2 million in toll revenue was lost over the three-year period funded by FHWA. Under agreement with FHWA, the county and FDOT are currently considering other Title 23 eligible uses for the remaining funds.

## FINDINGS AND OBSERVATIONS

### Traffic Data Collection

To begin, traffic patterns on the two toll bridges with variable pricing were examined. All Saturdays, Sundays and certain holidays (New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas) were excluded from the data, as variable pricing discounts were not offered on these days.

As discussed previously, not all traffic that crossed the toll bridges was eligible for the variable pricing discount. Only those patrons who used LeeWay PrePay (paying the toll electronically; approximately 25 percent of Midpoint and Cape Coral traffic) were eligible for variable pricing discounts. When data from eligible and ineligible traffic were examined separately, the impact of variable

pricing was apparent. Figures 3 and 4 display how the percentage of traffic during each half-hour period of the day changed from the year prior to variable tolling as compared to the year with variable tolling. The figures display these results for eligible users and ineligible users at the Midpoint Memorial Bridge. Results for the Cape Coral Bridge were similar. The traffic demand-toll price elasticities for various times of the day can be calculated by dividing the percentage shift in traffic found in Figures 3 and 4 by -50 percent.

The travel-pattern changes of eligible patrons were examined to see if traditional peak-period travelers were moving their time of travel to outside of the peaks (one of the goals of the project.) From Figure 3, it is clear that variable pricing has caused a significant positive impact on traffic patterns of eligible patrons on Midpoint Memorial Bridge. All 10 half-hour time periods during discount hours experienced a significant increase in eligible user traffic. Additionally, eligible user traffic decreased significantly during eight of the nine half-hour time periods during peak traffic hours. With these data, differences in the mean percentage change greater than approximately three percent were found to be statistically significant ( $p < 0.05$ ).<sup>4</sup> If this change were simply caused by peak spreading then similar changes would be present in the ineligible traffic patterns. In contrast, for the traffic patterns of ineligible users (Figure 4), traffic changed significantly in only six of the 19 half-hour time periods encompassing the discount and peak hours. The percentage change in the traffic patterns of ineligible drivers was also smaller than that of eligible drivers. This indicates variable tolls have influenced travel behavior as expected.

#### Bridge-User Survey

A postage-paid mailback survey, handed to drivers on the bridges, was developed to determine the sociodemographic and commute characteristics of those drivers who chose their time of travel to obtain the variable toll discount, how often drivers did this and why others did not use variable pricing. Driver

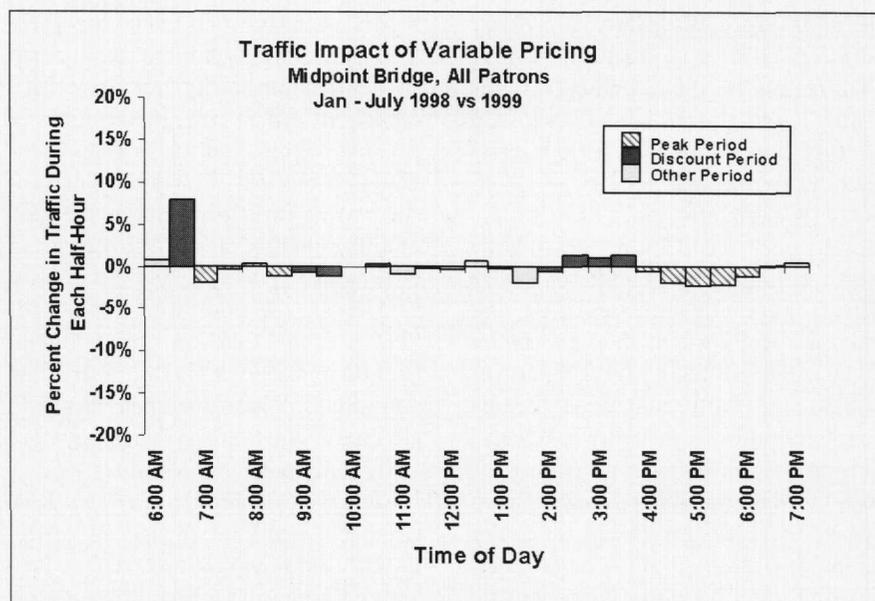


Figure 4. Change in time of travel for ineligible users on the Midpoint Memorial Bridge.

participation in this survey was entirely voluntary. To obtain a high and rapid response rate, a cash prize of \$1,000 was offered to one randomly drawn survey that was postmarked on or before May 30, 1999. The surveys were handed out on May 18, 19 and 20, 1999.

Approximately 8,200 surveys were distributed and 3,428 surveys were returned on time, for an overall response rate of 42 percent.<sup>5</sup> Surveys with critical inconsistencies or critical missing data were removed, leaving 3,110 surveys for analysis. Over 82 percent of respondents had heard of variable pricing. This would indicate that the project's public-awareness campaign (including radio, billboard and newspaper advertisements) has been largely successful.

Approximately 20 percent of respondents were eligible for the variable pricing discount tolls. From the survey, 6 percent of all respondents (28 percent of eligible respondents) had altered their time of travel at least once due to the variable pricing toll discounts during the first nine months of the program. Typical usage of variable pricing (defined here as purposefully altering travel behavior in order to obtain the toll discount) was also obtained from the survey. Only 7.2 percent of variable pricing participants used the program more than five times per week, but over 71 percent participated at least once per week.

Reasons for not participating in variable pricing were also examined. The main reason respondents did not participate in variable pricing was the inability to change their time of travel. Only 6 percent of all respondents indicated that the main reason for not using variable pricing was that the toll discount was too small. This was surprisingly low since the majority (94 percent) of variable pricing users saved only 25 cents per trip.

It should also be noted that the toll savings was the primary reason for participation in the program. Driving during the discount periods offered little to no travel-time savings as compared to the peak period. Traffic on the bridges flows near free-flow speed during all hours of the day and queues at the toll booths are only slightly longer during peak periods. For example, in March 2000 the average queue length on the Midpoint Memorial Bridge in the peak direction from 7 a.m. to 9 a.m. was 3.9 vehicles, and, from 9 a.m. to 11 a.m., the average queue length was 1.3 vehicles. This difference of 2.6 vehicles equates to less than 20 seconds of extra delay on average. Therefore, changes in traffic due to this variable pricing program are primarily due to economic considerations and not travel-time savings.

This helps to substantiate these authors' claim that a significant number of drivers would alter their travel

behavior if they were offered a concrete reason to change, no matter how small that reason may be. Before variable tolling began, drivers, who did not need to drive during the peak periods, traveled during the peak for lack of a concrete reason not to. The traffic congestion in Lee County was slightly worse during those periods, but these drivers were not time sensitive. For example, people might choose to gather for morning coffee at a local restaurant at 8:30 a.m. Traffic congestion added a couple minutes to their drive, but this did not prevent them from making the trip. Once the variable pricing program began, these drivers had a monetary reason for altering the time of their meeting to 9:15 a.m. Nonscientific interviews with county residents, as well as the results from this survey, indicate that this particular phenomenon (a change in discretionary peak-period drivers) occurred.

Travelers' flexibility in choosing their time of travel was also investigated in this survey. Results indicated that almost 25 percent of drivers could have altered their time of travel by an hour or more. Not surprisingly, variable pricing participants claimed to have more flexible travel schedules.

Finally, the differences between those respondents who did and did not use variable pricing were examined. Respondents participating in variable pricing had more flexibility with regard to the timing of their trips. As a group, participants were significantly older, less likely to be employed full time (53.8 percent of participants were employed full time vs. 72.7 percent of nonparticipants), those that were employed were significantly more likely to participate in a flextime program, they had a higher average education level and they included a greater proportion of females (66.4 percent vs. 51.9 percent).

Despite these significant differences, the data did not indicate a "typical" variable pricing user. Variable pricing participants' characteristics were well distributed between all sociodemographic and commute categories. Logit modeling results also indicated no strong tendency for variable pricing participants to be of any specific characteristics, but

several characteristics (including those listed above) were significant in the models. This homogeneity may have been caused, at least in part, by the times of day that the discount was offered. Commuters comprised the majority of variable pricing participants during the early morning (6:30 a.m. to 7:00 a.m.) and evening (6:30 p.m. to 7:00 p.m.) periods. Conversely, the other discount periods (9:00 a.m. to 11:00 a.m. and 2:00 p.m. to 4:00 p.m.) were used primarily by nonworkers. When combined, these two groups exhibited similar characteristics to all survey respondents as a whole.

Other data-collection activities have found no significant changes in vehicle speeds, average vehicle occupancies, Lee-Tran ridership, travel-time runs, or accidents that could be attributed to the discount toll. Therefore, it can be concluded that a significant portion of eligible drivers altered their time of travel to obtain the toll discount but did not alter other travel behaviors or significantly impact overall traffic away from the toll bridges. (For details of all of these analyses, please visit [www.cutr.eng.usf.edu/its/varprice.htm](http://www.cutr.eng.usf.edu/its/varprice.htm).)

## CONCLUSIONS

ETC in Lee County is being used to charge tolls that vary by time of day. Variable tolling/pricing has been operational since August 1998 and successfully shifted a significant percentage of eligible peak-period drivers to off-peak times. Traffic eligible for toll discounts has increased by over 10 percent during some discount periods while decreasing over 10 percent during some peak periods.

Since this is a pilot project, emphasis was placed not only on the number of drivers altering their travel behavior but also on the characteristics of those drivers and their primary motivation for participating in variable pricing. These data were obtained in a bridge-user survey conducted in May 1999. It was found that 28 percent of all drivers eligible for the toll discount used it at least once during the first nine months of the project. Most of these variable pricing participants, 71 percent, used it at least once per week. The reason most often cited for not using variable pricing was that time of travel was

inflexible. Very few respondents felt the toll savings were too small to cause them to change their time of travel.

## FUTURE OF THE PROJECT

The variable pricing program in Lee County has answered the question "Can pricing effect travel demand?" There is now no doubt that it can. Significant changes in travel patterns have been brought about with toll changes averaging just over 25 cents.

In the future, Lee County is pursuing plans to expand the pricing program in two ways. The first is to examine the feasibility and potential effectiveness of pricing on point congestion in a study of priced queue jumps. These queue jumps could take the form of preferred toll lanes at congested intersections or an overpass for toll-paying vehicles. The second is an expansion of the pricing program to heavy (three-plus axle) vehicles.

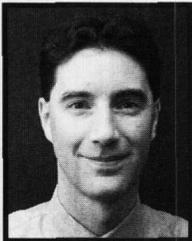
The experience in Lee County is a validation of the long-espoused theory that pricing can play a significant role in managing the growing problem of traffic-congestion management. The goal now is to find creative, publicly acceptable methods to introduce pricing into the mainstream of planning and engineering efforts in congestion management. ■

## References

1. U.S. Census Bureau. *Population Estimates for Counties by Age and Sex*. Obtained from [www.census.gov/population/estimates/county/cas/cas1.txt](http://www.census.gov/population/estimates/county/cas/cas1.txt). Washington, DC, USA, August 2000.
2. U.S. Census Bureau. *Resident Population Estimates of the United States by Age and Sex*. Obtained from [www.census.gov/population/estimates/nation/intfile2-1.txt](http://www.census.gov/population/estimates/nation/intfile2-1.txt). Washington, DC, USA, January 2001.
3. Burris, M. *Lee County Variable Pricing Interim Report*. Tampa, FL, USA: Center for Urban Transportation Research, University of South Florida, April 2000.
4. To determine if changes in traffic volumes during each half-hour period were statistically significant, a t-test was performed. This test compared the percent of daily traffic during a specific half-hour period prior to the implementation of variable pricing (January to June 1998) to the percent of daily traffic in that same half-hour period with variable pricing (January to

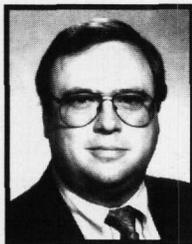
June 1999). There were 127 days of data in both assessment periods.

5. Typical response rates are in the range of 25 percent to 35 percent, with 30 percent considered excellent, according to the Institute of Transportation Engineers' *Manual of Traffic Engineering Studies*, 1994, p. 114.



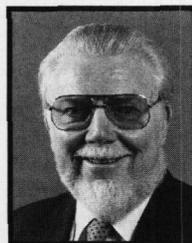
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*County Variable Pricing Project while at the University of South Florida's Center for Urban Transportation Research. Burris is a Member of ITE.*



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**GEORGE L. CRAWFORD,**  
*P.E., passed away on June 9, 2001, several months after this feature was submitted for publication in ITE Journal. Before his death, he*

*served as Principal-in-Charge of the Lee County Variable Pricing Pilot Project and as the Director of the Lee County Department of Transportation; he also founded several private consulting firms. Crawford's affiliations included the National Society of Professional Engineers, the Transportation Research Board and the American Public Works Association. On May 5, shortly before his death, he graduated from Florida Gulf Coast University with a master's in Business Administration. Crawford was a Fellow Life Member of ITE.*

Up-to-Date *Continued from page 22*

- Fostering the development and deployment of technology to promote intelligent transportation systems;
- Focusing on the performance of the entire transportation system, through better planning, management, construction, operations, asset management, maintenance and construction; and
- Increasing the accessibility of the transportation system.

The full text of the administrators' joint testimony can be viewed at [www.house.gov/transportation/highway/02-07-02/dot.html](http://www.house.gov/transportation/highway/02-07-02/dot.html).

### **FHWA RELEASES NEW HIGHWAY STATISTICS REPORT**

The 2000 edition of the Highway Statistics report is available. The annual publication contains information on U.S. roads and highway users, including statistical data on motor fuel, motor vehicles, driver licensing, highway-user taxation, state and local highway finance, highway mileage, federal-aid for highways, tables and charts from the 1995 Nationwide Personal Transportation Survey, and international data. The report can be obtained by sending a written request to the Office of High-

way Policy Information, FHWA, Room 3306, 400 7th St., SW, Washington, DC 20590 USA. In addition, the report can be viewed at [www.fhwa.dot.gov/ohim/hs00/index.htm](http://www.fhwa.dot.gov/ohim/hs00/index.htm).

### **NHTSA—MULTICULTURAL SAFETY OUTREACH WEB SITE**

NHTSA recently unveiled its new multicultural outreach Web site, which makes traffic-safety materials and other information available to persons in and those serving minority communities. It is an effort to assist communities that are disproportionately affected by traffic-safety problems. According to NHTSA, "motor vehicle crashes are the leading cause of death in the given age ranges: Hispanic (ages 1–44), African-American (ages 1–14), Asian American (ages 1–24) and American Indian (ages 1–44)." The site provides a variety of safety and education materials in separate sections for the ethnic groups listed above. Publications and other materials can be viewed and ordered at [www.nhtsa.dot.gov/multicultural](http://www.nhtsa.dot.gov/multicultural). ■

*For more information or to submit Up-to-Date news items, contact Aliyah N. Horton ([ahorton@ite.org](mailto:ahorton@ite.org)) at ITE Headquarters. Additional international transportation legislation and regulatory information is available on ITE's Web site at [www.ite.org](http://www.ite.org).*

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### *Undam that traffic jam*

For millions of Americans, girding for gridlock is a teeth-grinding daily ritual. And with more cars on the road every day, engineers and other professionals trained to reduce traffic congestion are finding plenty of job opportunities. One enticement: Transportation engineers can quickly produce results, on city streets and interstate freeways. "I wanted to find a way I could physically make the world better," says 24-year-old rookie traffic engineer Britt Thesen. Her work in San Francisco—planning bus lanes, putting speed humps on residential streets, and timing traffic signals—sounds disarmingly simple, but to harried commuters

and concerned civic leaders it can provide overdue relief. As the population density of cities and suburbs increases, traffic gridlock is likely to generate new jobs for sociology and political science graduates, too. They will work with engineers on behalf of neighborhood groups seeking solutions to sprawl and congestion.

**PAY AND PERKS:** \$45,000 to \$150,000. Producing tangible change is a source of job satisfaction for many.

**TRAINING:** Most traffic engineers have a B.S. in civil or electrical engineering or computer science. A master's degree and state certification are often helpful.—*Andrew Curry*

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