

*Expansion of Variable Pricing to
Heavy Vehicles
Final Report*



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EXECUTIVE SUMMARY

The use of intelligent transportation system tools such as Electronic Toll Collection (ETC), interoperability with other toll authorities and traffic demand management tools (TDM), such as variable pricing, now provide Lee County with the ability to handle higher hourly and daily traffic volumes on its toll bridges. The continued effort to manage congestion at all levels is important to the viability of the County, and value pricing has emerged as one of the County's most innovative tools for managing traffic congestion.

Lee County is located along Florida's southwest coast and the majority of its population resides in or near the cities of Cape Coral and Fort Myers. As shown in Figure 1: Lee County Map, these two cities are separated by the Caloosahatchee River. The majority of employment is in Fort Myers while Cape Coral remains largely residential. Therefore, the two tolled bridges, the Cape Coral and Midpoint Memorial Bridges, connecting Cape Coral to Fort Myers, carry a great deal of the commuter traffic in the County.

The vehicular toll paid to cross the Cape Coral and Midpoint Memorial Bridges is based on the number of axles and time of day the trip occurs. The nominal toll for a 2-axle vehicle is \$1.00, but there are several discount programs available for frequent users with 2-axles. Three-or-more axle vehicles pay a \$1.00 toll for the first 2-axles plus \$1.00 for each additional axle.

Electronic Toll Collection (ETC), known in Lee County as LeeWay, began in 1997 for 2-axle vehicles only. Prior to the implementation of the Heavy Vehicles Project in 1998, 3-or-more axle vehicles were not eligible for ETC. All 3-or-more axle vehicles had to use the attended lanes as shown in Figure 2: 3-or-more Axle Vehicle in an Attended Lane.

Figure 1: Lee County Map



Figure 2: 3-or-more Axle Vehicle in an Attended Lane



As stated above, tolls for 2-axle vehicles vary by time of day. This time of day tolling, called variable pricing, began August 3, 1998, on the Cape Coral and Midpoint Memorial Bridges.

Financing issues associated with the County’s newest bridge, the Midpoint Memorial Bridge, played a significant role in shaping the current Variable Pricing Program. The Midpoint Memorial Bridge opened in October 1997. Prior to the opening of the Midpoint Memorial Bridge, tolls were raised from \$0.75 to \$1.00 on the Cape Coral Bridge to help finance the construction of the Midpoint Memorial Bridge. At that time, the Lee County Commission promised citizens it would not raise bridge tolls for the foreseeable future.

Without the ability to increase tolls, the County faced unique issues in developing its original Variable Pricing Program, as most variable pricing programs raised tolls for travel during the peak hours. As an alternative, a discount during off-peak hours was proposed. To minimize the impact on the revenue stream the discount was confined to “shoulder hours” just before and just after peak hours. Lee County’s Variable Pricing Program discounts tolls 50 percent in the periods just before and just after the morning and evening peak 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.) for those patrons paying their toll electronically (see Figure 3: Patron Toll Display of a \$.25 Toll). This toll structure is designed to encourage drivers to leave the peak traffic periods and drive during off-peak/discount periods. Due to the project’s success, the variable pricing toll structure was continued after the expiration of the grant.

The Lee County Department of Transportation began offering ETC and variable pricing to trucks with 3-or-more axles as part of the Heavy Vehicles Project on December 1, 2003. This allows 3-or-more axle vehicles to pay half price tolls when they use the Cape Coral and Midpoint Memorial Bridges during variable pricing hours. The 3-or-more axle vehicles are still required to use the attended lanes on all bridges. However, axle counting and vehicle separation equipment is currently being installed at the Midpoint Memorial Toll Plaza. The Cape Coral and Sanibel Toll

Plazas are scheduled to be rebuilt in the near future at which point axle counting and vehicle separation equipment will be installed which will then allow 3-or-more axle vehicles in all lanes.

Figure 3: Patron Toll Display of a \$.25 Toll



The basic elements of *The Expansion of Variable Pricing to Heavy Vehicles Program* have been relatively easy to develop. However, the technology to implement the program proved to be exceptionally problematic. Automatic vehicle classification (AVC) was the most significant issue. To allow the program to be implemented within the grant, the County initiated variable pricing for 3-or-more axle vehicles in attended lanes only. This allowed vehicles to be classified manually. While this was not a technologically elegant solution, it was effective, and the project was able to proceed.

For vehicles with 3-or-more axles crossing the Cape Coral and Midpoint Memorial Bridges, the nominal toll charged in each direction is \$1.00 for the first 2-axles, plus \$1.00 for each additional axle. The 3-or-more axle vehicle variable pricing structure mirrors the variable pricing program for 2-axle vehicles by offering a 50% discount to the toll structure during same off-peak hours as two-axle vehicles.

It should be noted that even though the original variable pricing grant expired sometime ago, the success the County has had with pricing has resulted in the County maintaining the two-axle variable pricing program. Additionally, there are no plans to eliminate the 3-or-more axle vehicle discount program upon the grants expiration in February of 2005.

PUBLIC AWARENESS EFFORTS

The marketing efforts of *The Expansion of Variable Pricing to Heavy Vehicles Project* began prior to implementation of pricing discounts and ramped up to the actual date of implementation in December 2003. Following the establishment of the heavy vehicles toll discount program parameters, efforts focused on informing heavy vehicle owners/operators and fleet managers of the proposed heavy vehicle program. This public awareness campaign included the direct mail distribution of: customer letters, a newsletter, a self mailing brochure and application, the placement of posters in the lanes and distribution of press releases to the media.

Following the successful implementation of Variable Pricing for Heavy Vehicles, Lee County commenced their intrastate compatibility and interoperability program. This program enabled LeeWay customers with prepaid accounts to become interoperable with Florida's SunPass System and all other toll authorities/facilities across the state. This means any vehicle traveling in the state with an ETC tag and prepaid account established by any toll authority or facility across the state can travel through any toll facility in Florida and have the proper toll deducted from the account associated with that tag. As these payments meet the variable pricing discount requirement of electronic toll payment, these drivers receive the same variable pricing discount that LeeWay drivers receive. This interoperability program



also necessitated a public awareness program. This program included direct mail, newspaper advertising, posters and press releases

DATA ANALYSIS AND RESULTS

Analysis of results from *The Expansion of Variable Pricing to Heavy Vehicles* benefited greatly from the experience gained in the original Lee County Variable Pricing Project. This prior experience allowed the project team to focus on analysis of measurements that were most likely to reveal whether or not a variable pricing impact occurred.

Traffic Analysis

Quantitative traffic analysis involved two activities: measurement and analysis of traffic queues at the Cape Coral and Midpoint toll facilities and analysis of bridge traffic patterns.

Toll Facility Queuing

Traffic queuing is a significant issue for almost any toll facility. Queues can result from events that do not occur with predictability, such as an accident or equipment failure. Traffic queues can also occur from traffic demand exceeding facility capacity during predictable periods of the day. While queues from any occurrence are undesirable, it is the reoccurring, more predictable, queuing that a pricing program can address.

The original intent of the project was to allow access for 3-or-more axle vehicles to the automated lanes. The purpose of this was to allow the larger vehicles, which can be a substantial portion of the queue in the attended lanes, to access the more efficient automated lanes. The additional capacity available in the automated lanes would, theoretically, result in higher vehicle throughput and, therefore, shorter queues. As will be discussed, technology issues precluded this from happening during the study period. Therefore, the event that was most likely to bring about a reduction queue length did not occur during the study. It is therefore not surprising that a reduction in queue length that could reasonably be ascribed to this project could not be found. In fact, the overwhelming majority of changes in queuing were increases.



Overall traffic on the Cape Coral and Midpoint Memorial Bridge is increasing at a significant pace. Combined annual traffic on the two bridges increased from 31,500,000 to 33,150,000 from 2003 to 2004. This is of annual increase of 5.2%¹.

With the increase in traffic comes increase in congestion and queues. Currently total queuing (total for all lanes in one direction) eastbound on the Cape Coral Bridge between 7:30 a.m. and 8:30 a.m. is over 100 vehicles. Total queuing between 7:00 a.m. and 7:30 a.m. increased from 55.5 to 96.8 for two-axle vehicles between 2003 and 2004.

The increases in queuing noted during the peak hours tend to indicate that the toll facilities are operating at or near capacity. For this reason future increases in queuing are not likely to be linear in relationship to traffic increases as all additional traffic will effectively be added directly to the queue.

Bridge Traffic Patterns

Analysis of bridge traffic patterns for this study is very similar to the successful techniques used in the County's first variable pricing study and implementation. The methodology relies upon data collection activities that are already being undertaken as part of the toll collection process. Because of this, it is not necessary to rely upon a sample of the trip population to analyze travel behavior. Instead, all trips undertaken in the year prior to and in the year after the implementation of variable pricing for heavy vehicles were included in the analysis. As the entire population was included in the analysis of travel patterns, any change that occurred in travel patterns can be said to be truly a change.

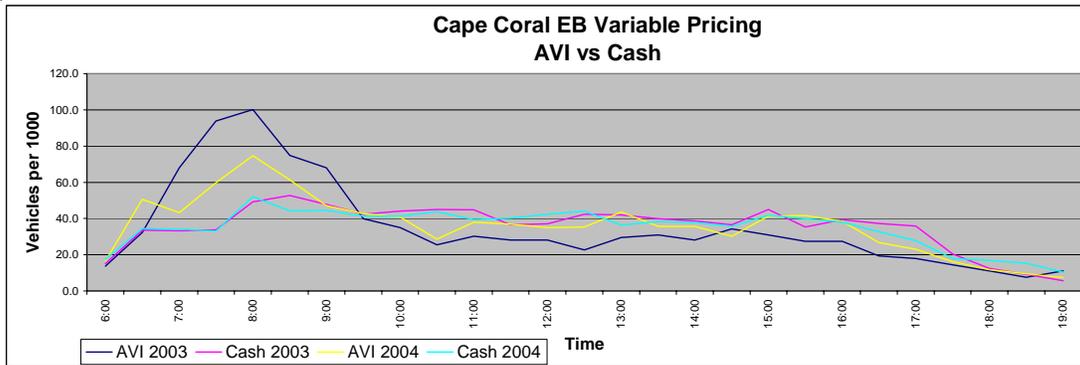
When any level of change is, in fact, a definitive change, it is necessary to determine what level of change likely represents an affect on the traffic stream from an outside source. In examining the data, it appears that a change of 10 or more vehicles-per-thousand in a 30 minute increment represents more of a change than the normal clustering of data around zero change.

In examining whether variable pricing might have had a positive effect on traffic patterns on the Cape Coral and Midpoint Memorial Bridges comparison was made between travel patterns, both Automatic Vehicle Identification (AVI) and cash, for the two years during the study. This comparison is shown in Figure 4: Cape Coral Bridge Eastbound Traffic in March (Variable Pricing). Other months showed similar patterns.

¹ ibid.



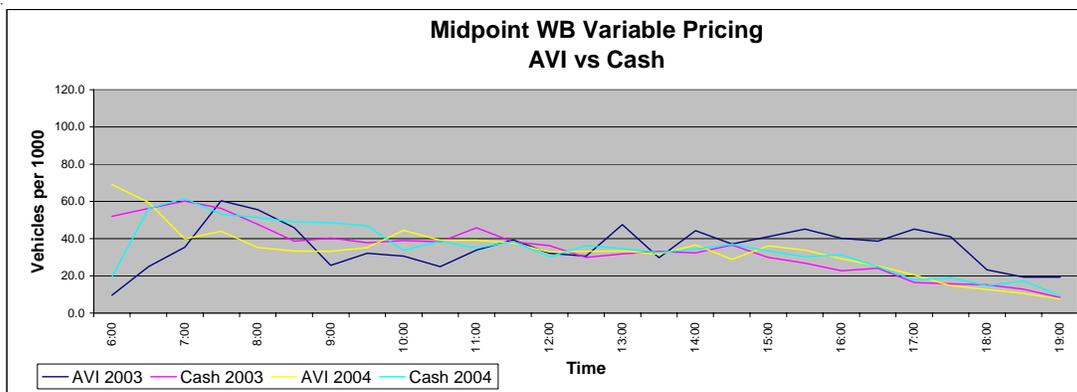
Figure 4: Cape Coral Bridge Eastbound Traffic in March (Variable Pricing)



As shown, there is clearly a reduction in the AVI trips in the a.m. peak when 2003 AVI travel is compared with 2004 AVI travel. While this could possibly be ascribed to cash drivers switching to AVI, a change in cash travel would also be anticipated. As shown, cash travel patterns remained similar throughout the day, and are practically identical for 2003 compared to 2004 from 6:00 a.m. until the peak at 8:00 a.m. Based on this analysis of the travel pattern it is likely that variable pricing is impacting 3-or-more axle vehicle traffic during the a.m. peak on the Cape Coral Bridge.

The 2003 and 2004 cash to AVI comparisons are shown in Figure 5: Midpoint Memorial Bridge Eastbound Traffic in March (Variable Pricing). Other months showed similar patterns.

Figure 5: Midpoint Memorial Bridge Westbound Traffic in March (Variable Pricing)



As shown, there does appear to be a significant difference between eastbound AVI traffic in 2003 and AVI traffic in 2004. While not as definitive as the Cape Coral Bridge, there is a possibility that variable pricing for 3-or-more axle vehicles is impacting traffic on the Midpoint Memorial Bridge.



Comparison of westbound traffic for the Cape Coral and Midpoint Memorial Bridges was also performed. While it could be argued that variable pricing has had an impact on traffic in the westbound direction, particularly on the Midpoint Memorial Bridge, the changes in travel patterns are felt to be too weak to suggest any type of definitive change.

SURVEYS

Data collected without direct interaction with the driver, such as that collected for this study on travel patterns and queuing, provides insight into *what* occurred during the study period. To determine *why* changes occurred, or may have occurred, it is necessary to solicit information from the drivers using the facility. For this reason a series of surveys and telephone interviews is included as part of the study.

The most influential survey in determining whether or not there was a variable pricing impact was the post-implementation mail back survey. This survey was developed to capture opinions and actions taken by companies who owned or operated heavy vehicles. The survey examined if these companies planned their routes to avoid peak traffic periods, if they knowingly participate in the variable pricing program, why they choose to, or not to, participate in the variable pricing program, the size and composition of their fleet, the number of trips rescheduled due to variable pricing, and other pertinent factors.

As expected, based on demographics of Lee County’s economy, the industry types of the fleets who responded were primarily: construction, service and transportation related. The response shows the trips are spread fairly evenly across all the bridges. Of these trips across the bridges, 40% are made during the peak travel times with 20% occurring between 7:00 a.m. and 9:00 a.m. and 20% occurring between 4:00 p.m. and 6:30 p.m. The fleet routing and timing is based predominately on the job location, and customer appointments. When asked if they adjust the time of travel or routes because of changing traffic or other roadway conditions 48% said yes. The routes are adjusted most frequently due to congestion and traffic accidents or other unusual traffic congestion.

81% of respondents stated they are familiar with the LeeWay ETC system, though only 24% said they use this on their 3-or-more axle vehicles. When asked about variable pricing, 49% were familiar with the concept. This low awareness is probably due in part to the fact that 76% of respondents did not use ETC, a requirement for variable pricing. Because they were not using ETC they were not in the LeeWay database, therefore, they would not have been directly notified of variable pricing. When asked if they adjusted the routes or timing of trips due to variable pricing, 50% indicated they did not use ETC therefore they were “not applicable”. Of the remaining 50% of respondents for whom the question was



applicable, 4% stated they frequently adjust the routes and 15% stated occasionally. It should be noted that the modest response to variable pricing indicated on the survey is consistent with observed changes in travel patterns. In fact, they tend to confirm that a modest response to variable pricing has occurred among 3-or-more axle vehicles.

In addition to 3-or-more axle vehicles, two-axle vehicles, the overwhelming majority of bridge users, are potentially impacted by *The Expansion of Variable Pricing Program to Heavy Vehicles*. To this end a telephone survey was conducted in February 2005 to determine two-axle vehicle bridge users' response to the expansion of the program. The survey also provided an opportunity for follow-up of stated two-axle vehicle participation in variable pricing.

The survey, in general, contained good news for the LeeWay program. Participation in variable pricing was no exception. Prior to any discussion of LeeWay or variable pricing, drivers that indicated that they usually travel outside rush hours were asked the reason they usually travel outside of rush hours. Just over 10% of respondents indicated that they changed due to variable pricing. Later in the survey, after discussion of the variable pricing program, approximately 18% of drivers indicated that they do, at least occasionally, change their trip time to obtain variable pricing discounts. It is likely that the actual response to variable pricing is somewhere between the 10% response and the 18% response. This would indicate a modest continuing response to variable pricing, which is consistent with data from other sources.

Just over 10% of drivers surveyed were aware that variable pricing had been extended to 3-or-more axle vehicles. Most of the response, therefore, to the opinion of program expansion was an immediate response to new information. Still, almost 40% of respondents had a very favorable opinion of the expansion, another 24% had a somewhat favorable opinion, and approximately 4% of respondents had a somewhat or very unfavorable opinion of the expansion with about 30% of respondents being either neutral or undecided.

Not surprisingly, the LeeWay variable pricing program enjoys a very high recognition among LeeWay customers. Almost 95% had heard of variable pricing. Perhaps more importantly, over 83% have a very favorable opinion of variable pricing, 9% have a somewhat favorable opinion of variable pricing leading to 92% of LeeWay customers having an overall favorable opinion of variable pricing. Less than 1% of LeeWay customers have a somewhat or very unfavorable opinion of variable pricing.

The survey also asked drivers' opinions about the responsiveness and friendliness of LeeWay Service Center personnel and toll collectors. Over 85% of customers surveyed have a somewhat or very



favorable opinion of service center personnel, and over 80% of LeeWay customers have a very or somewhat favorable opinion of the toll collectors. Neutral opinions made up the vast majority of the remaining responses. Unfavorable opinions were only one half of 1% for service center personnel, and less than 3% for toll personnel. Particularly as tolls do not normally enjoy extreme popularity, these results indicate that LeeWay is doing an outstanding job of customer service.

Finally, the survey solicited opinions regarding LeeWay becoming interoperable with the state's electronic toll collection system. Over 85% of respondents were aware of interoperability prior to the survey, and over 86% had a very favorable opinion of interoperability with over 93% having a somewhat or very favorable opinion of interoperability. Less than one half of 1% have a somewhat or very unfavorable opinion of interoperability.

CONCLUSION

The use of intelligent transportation system tools now provide Lee County with the ability to handle higher hourly and daily traffic volumes on its toll bridges. *The Expansion of Variable Pricing to Heavy Vehicles Program* has likely had a modest impact on travel patterns during the morning peak on the bridges in the eastbound direction. Further, variable pricing for two-axle vehicles likely continues to enjoy a modest level of success.

The County, however, is experiencing and will continue to experience explosive growth. Observation of traffic conditions at the toll facilities and surrounding roadways indicates that congestion is increasing. Traffic volume reports, and the queuing analysis performed as part of this study, confirm this.

Variable pricing has a proven record of success in Lee County. Based on the results obtained in the study and documented in this report, consideration should likely be given to modifying the variable pricing program for two-axle vehicles to determine its potential viability in addressing the County's traffic issues. While this can sometimes be a difficult issue to address, the level of support that LeeWay and variable pricing enjoy in Lee County would likely translate into a high level of credibility and potential support from the County's citizens in examining a variable pricing toll structure that can effectively address some of the County's more pressing congestion problems.



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