11.5 Facility-Based and Pay-as-You-Go Pricing Testing

Pricing corridors and a VMT user fee are strategies implemented to meet 2020 MTP/SCS key performance targets. Express lanes along major corridors are included to improve traffic management and reliability throughout the region. A mileage-based or Pay-As-You-Go (PAYGo) fee charge is implemented as a sustainable replacement to the gas tax and manage transportation network efficiently and equitably.

Both corridor pricing and user fee are a new feature to SACSIM19. Around the country, implementation of travel modeling software to capture express lanes is recognized as a very complex challenge, so testing of these features is critical. Testing of these new features included sensitivity testing and reasonableness checking, based on guidelines provided by state and federal agencies[26]. In addition to SACOG's testing, the beta-test group and early release of the draft SACSIM19 software and data files, described above in the "Public Access to the Model and Data" section, provided significant additional critical review of these new features. Testing focused on the high-occupancy/toll (HOT) and express lanes facility pricing, because those facilities are the major priced facilities included in the proposed MTP/SCS. HOT lanes, for purposes of this document, are conventional, one-lane HOV lanes, which allow priced access to drive alone vehicles or trucks. Express lanes, for purposes of this document, are generally multi-lane facilities that may allow HOV2 or HOV3+ vehicles access at reduced (or no) price, but allows priced access to drive alone vehicles and trucks. SACSIM19 has the capability to model "all-tolled" roadway facilities, however—given that no all-tolled facilities are included in the propose MTP/SCS, testing mainly focused around HOT and express lanes.

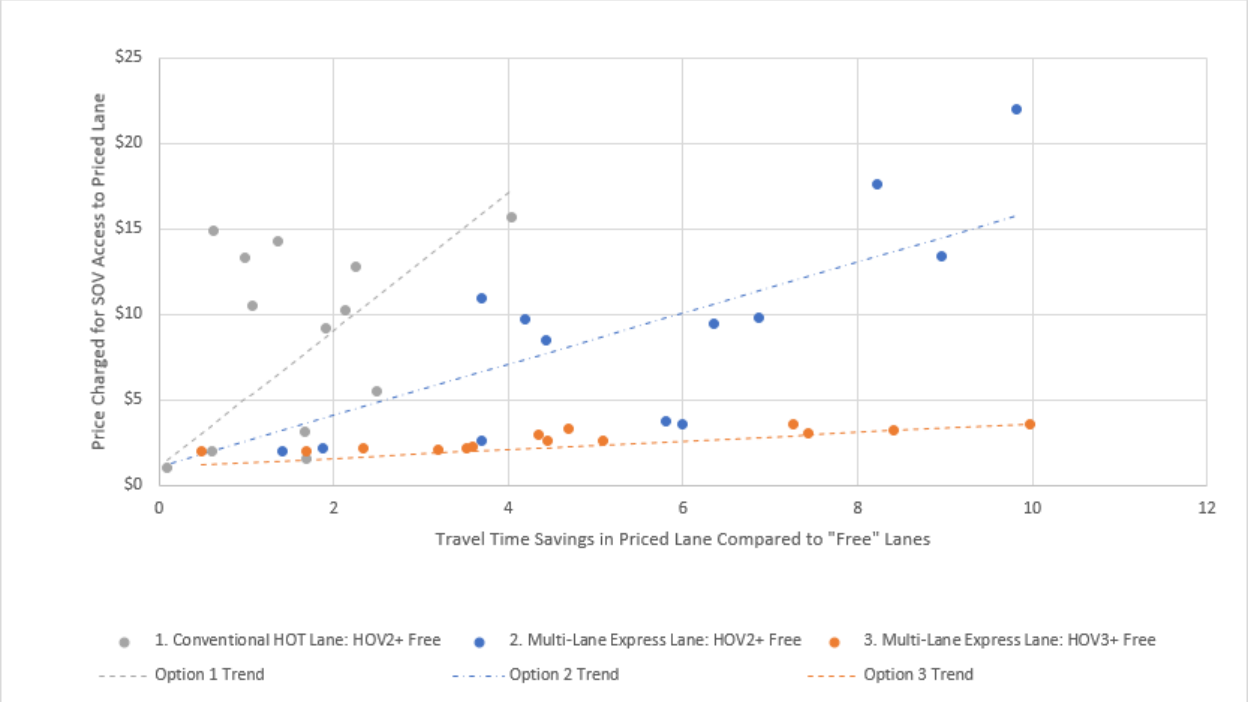
For HOT or express lanes facilities, SACSIM19 pricing software was developed to represent different rules on free versus paid access to HOT or express lanes. The general framework of the software is to iteratively identify a balance point between price of access, based on the rules for access for a given project, that ensures some level of travel time savings for the HOT or express lane, relative to the "free" parallel lanes. Testing focused on two dimensions: sensitivity of price-setting to time savings; and variations on the relationship between price and time savings, based on the rules governing access to the priced facility. Testing results summarized for three options:

- A conventional single-lane HOT lane, with HOV2 and HOV3+ vehicles allowed access for free, and drive alone vehicles and trucks accessing for a price. Available capacity for priced access to the HOT lane is the smallest for this option, because in the highest demand corridors, HOV2 and HOV3+ vehicle nearly fill up the lane. In order to limit the number of drive alone vehicles and trucks that can access the facility, the prices may have a drastic increase surge.
- A conventional 2-lane express facility, with HOV2 and HOV3+ vehicles accessing the facility free, and drive alone vehicles and trucks accessing the facility for a price. Because the facility has two lanes per direction, rather than one, there is generally more capacity to offer for priced access, and prices tend to be somewhat lower than the HOT lane option.
- An express lane option that allows free access to HOV3+ vehicles only, and priced access to HOV2 and drive alone vehicles, and trucks. This option prices off many HOV2s, so the

amount of capacity available for priced access is the highest of the three options, and the prices tend to be the lowest of the three.

Figure 11-7 graphically illustrates the results of the of the three test options, across 14 test corridors. Shown in the figure is the comparison of corridor time savings (defined as the number minutes saved in the priced lane, compared to the parallel free lane) and average price charged to access the priced lane (or lanes). For all three options, the expected relationship showing price increasing with time savings offered by the priced facility is evident. The three options differed very widely, and in expected ways, on the magnitude of price and its volatility across the corridors within each option. Option 1, the conventional HOT lane, showed the highest prices (average just under $10) relative to time saved, largely because in the highest priced corridors, very little-to-no capacity was available to priced access, and virtually all potential users had to be priced off. Table 11-11 Managed Lane / Pricing Tests provides option-level tallies, and shows that of users of the HOT lane, only 2 percent paid their way into the lane—98 percent had access for free. At the other end of the spectrum is option 3, the express lane, which allowed free access only to HOV3+ vehicles. This option offered priced access to the largest number of users, and the prices charged were the lowest at under $3 average, and 50 percent of the users paying. Option 2 (express lane with free access to HOV2 and HOV3+ vehicles) splits the difference between Options 1 and 3.

Figure 11-7 Price Versus Time Savings for Three Managed Lane Options



Source: SACOG 2020.

Table 11-11 Managed Lane / Pricing Tests

	Facility Pricing Scenario	Drivers Accessing Time Savings for Free	Drivers Accessing Time Savings with Toll	Travel Time Savings in Priced Lane (minutes)	Average Toll Rate per Mile	Average SOV Toll Facility Price	VMT Accessing Travel Time Savings (thousands)	Percent VMT Accessing Travel Time Savings	Percent VMT Accessing Travel Time Savings and Paying Toll
1	Conventional HOT Lane	HOV2+	SOV, Truck	-1.5	$0.89	$9.71	974	21%	2%
2	Multi-Lane Express Lane	HOV2+	SOV, Truck	-5.1	$0.58	$9.68	1,170	27%	11%
3	Multi-Lane Express Lane	**HOV3+**	**HOV2, SOV, Truck**	-4.7	$0.36	$2.89	877	21%	50%

Source: SACOG 2020.

Suggested by one of the beta-testers of the new SACSIM19 pricing features was testing around extreme pricing values. The specific suggestion was to test a range of pricing for access to a facility up to $100, which is recognized as an unreasonably high price for an actual project. Testing around extreme values is informative for software testing, and not as a potential actual project proposal. A test of this nature was conducted based on change in travel decisions comparing a range in pricing, time of day, and demand of a particular route. Table 11-12 shows testing along Interstate 80 over the Causeway between Davis and Sacramento. Three scenarios of an all-lane tolled facility are compared at different pricing rates: $5, $25, and $100 dollars. It is important to note that ALL of these pricing rates were set purely for testing purposes, and that actual rates for a proposed express lane project will be the subject of extensive project development work, public input, and policy debate. It is also important to note that the test scenario was based on all-lanes tolling, as opposed to express lanes, where a "free" option always exists. The $5 rate shows a shift of 31 percent of vehicles use alternative routes. At $25, almost 90 percent of traffic avoided the facility. At $100 dollars, the price is so extreme the facility is effectively closed down, and all traffic avoids it. This test shows SACSIM19 highway assignment is sensitive to the level of pricing added to a facility as different persons have a range of valuation of time with respect to their preferred routing choices.

Table 11-12 All Lane Pricing Sensitivity to Extreme Value Test

SACSIM19	DAILY					
	Causeway EB			Causeway WB		
2035	**Quantity**	**Change**	**% Change**	**Quantity**	**Change**	**% Change**
2035 Base	95,242	0	0.00%	95,974	0	0.00%
$5 Toll, All Time Periods, Mainline & HOV	64,162	-31,080	-32.60%	65,496	-30,478	-31.80%
$25 Toll, All Time Periods, Mainline & HOV	10,334	-84,908	-89.10%	11,825	-84,149	-87.70%
$100 Toll, All Time Periods, Mainline & HOV	19	-95,223	-100.00%	16	-95,958	-100.00%

Source: SACOG 2020.

In addition to corridor pricing, a mileage-based user fee was also tested. Table 11-13 shows sensitivity testing on different mileage based user fee rates based on time of day and location. A discounted fee was applied for rural areas and off peak hours with less congestion. When the user fee increase, the household VMT and Congested VMT decrease. The orders of magnitude of decrease changes based on the rate showing the model is sensitive to different user fee rates.

Table 11-13 User Fee Sensitivity Testing

Scenario	HH VMT % Change from Base	HH Congested VMT % Change from Base
No user fee – Baseline	0.0%	0.0%
1/2 cent peak/off peak rural/urban user fee	-0.3%	-1.9%
2/4 cent peak/off peak rural/urban user fee	-1.5%	-8.2%

Source: SACOG 2020.
NOTE – These scenarios were run for sensitivity testing only and do not reflect the 2020 MTP/SCS preferred scenario.