

**Report on the  
Value Pricing Pilot Program  
Through April 2016**

U.S. Department of Transportation  
Federal Highway Administration

## EXECUTIVE SUMMARY

Congestion pricing works by shifting some rush hour highway travel to other transportation modes or to off-peak periods. By removing a fraction (even as small as 5 percent) of the vehicles from a congested roadway, pricing enables the system to flow much more efficiently, allowing more vehicles to move through the same physical space.<sup>1</sup>

Although drivers unfamiliar with the concept initially have questions and concerns, drivers who are more experienced with congestion pricing usually support it because it offers them a reliable trip time. Transit and ridesharing advocates also appreciate the ability of congestion pricing projects to generate revenue and the financial incentives that make alternatives to driving more attractive.

The U.S. Congress established the Congestion Pricing Pilot Program in 1991. It was subsequently renamed the Value Pricing Pilot Program (VPPP) under Section 1216 (a) of the Transportation Equity Act for the 21<sup>st</sup> Century in 1998, and continued through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. While the program was continued there were no additional funds appropriated under the FAST Act for discretionary grants. The purpose of the VPPP is to demonstrate whether, and to what extent, roadway congestion may be reduced through the application of demand-based pricing strategies. The program seeks to measure the magnitude of the impact of such strategies on driver behavior, traffic volumes, transit ridership, air quality and availability of funds for transportation programs. After 2012, no additional funds were authorized for the discretionary grant component of the VPPP; however, the ability of the Federal Highway Administration (FHWA) to enter into cooperative agreements for projects that require tolling authority for their implementation under this program has continued.

***Congestion pricing encompasses tolling and non-tolling strategies that can reduce peak period congestion by charging motorists new or higher fees for use of roads and parking during peak times in order to encourage drivers to shift to other travel modes, routes or destinations; to travel at other times of the day; or to forgo making the trip altogether.***

While the program no longer actively solicits projects, FHWA was able to award funding to five new projects in 2015 using remaining Fiscal Year 2012 VPPP funds and re-purposed VPPP funds from completed projects. The FHWA staff continues to provide significant technical assistance to all project partners for project development, execution and evaluation, including implementation and pre-implementation activities. The FHWA staff also oversees the development and distribution of quarterly reports detailing how the objectives of the VPPP are being accomplished.

### Key Findings

Through a comprehensive Congestion Pricing Program that includes the VPPP, as well as follow-on initiatives such as the Congestion Reduction Demonstrations (CRD), Urban

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<sup>1</sup> *Congestion Pricing – A Primer: Overview*, U.S. Department of Transportation, Federal Highway Administration, October 2008, [http://ops.fhwa.dot.gov/publications/fhwahop08039/cp\\_prim1\\_00.htm](http://ops.fhwa.dot.gov/publications/fhwahop08039/cp_prim1_00.htm).

Partnership Agreements (UPA), and Express Lanes Demonstration programs, FHWA has now funded more than 135 congestion pricing projects and studies across 19 States and the District of Columbia. The projects supported by the VPPP demonstrate the technical feasibility of congestion pricing and, where implemented, have influenced user decisions to change their travel behavior. Projects and studies conducted as part of the VPPP have provided many valuable lessons. Furthermore, the UPA/CRD Programs included a very robust evaluation component, which allowed the U.S. Department of Transportation to assess impacts at a high level of detail. Many of the UPA/CRD findings were consistent with observed conditions and anecdotal evidence from many projects funded over the years by the Program. Several findings demonstrate the significant progress made in the past few years toward successful deployment of comprehensive congestion pricing strategies and programs, especially in congested urban areas:

- The VPPP helped to spark the rapid increase in priced managed lane deployments and the continued acceptance and deployment of this strategy in major metropolitan areas across the United States. In the late 1990s, there were only four priced managed lane facilities operating in the United States, and few transportation professionals had firsthand experience with implementing or operating these facilities. As of 2016, there are 33 operating managed lane facilities nationwide, more than double the number (14) that were in existence when the 2012 FHWA *Priced Managed Lanes Guide* was written.<sup>2</sup> There are currently an additional eight managed lane projects in construction, and approximately 14 others in planning. For all VPPP High Occupancy Toll lane projects, there has been a marked increase in new accounts/transponders, tolled trips, and gross revenues, indicative of a growing acceptance of pricing.
- Pricing also has a positive effect on transit ridership. Express buses using tolled lanes had faster speeds and shorter travel times. Bus ridership on priced managed lane corridors (e.g., the UPA/CRD) increased by a greater percentage than ridership on other parts of the respective local systems. On the SR 520 Bridge in Washington State, pricing succeeded in reducing traffic volumes by 34 percent in the first year, while transit ridership grew by 38 percent.
- The VPPP has created interest and enabled deployment opportunities within congested urban areas for other demand-based pricing strategies to further improve use of transportation alternatives on a broader scale. The deployment of non-toll congestion pricing strategies such as parking pricing, pay as you drive insurance, car sharing, bike sharing, and dynamic ridesharing have been growing and have experienced strong successes as well. For example, in King County, Washington, the Right Size Parking (RSP) project has attracted national attention. Several regions and cities around the country are currently working to replicate the RSP study and web calculator concept for their own planning purposes, including the San Francisco Bay Area, the District of Columbia, Boston, and Chicago. Overall, this study, through outreach and creation of a

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<sup>2</sup> Federal Highway Administration, *Priced Managed Lane Guide*, FHWA-HOP-13-007 (Washington, DC: FHWA, October 2012). Available at: <http://ops.fhwa.dot.gov/publications/fhwahop13007/index.htm>. Accessed 12/21/15.

web-based toolkit, has significantly advanced the industry's understanding of residential parking dynamics.

- Parking pricing efforts have led to increased usage of previously underutilized parking spaces. As part of the SFpark pilot project in San Francisco, California, pricing was effective in gradually reducing the prevalence of blocks with high occupancy and increasing occupancies on underutilized blocks. The LA Express Park project staff also observed a similar trend in occupancy due to price changes.
- Equity impacts have proven to be minimal, yet remain a concern to the public. The UPA/CRD projects did not generally have any negative equity impact and succeeded in expanding travel options through transit improvements and by expanding the range of parking price and convenience options available to drivers. Nevertheless, surveys at several sites indicate a persistent perception of unfairness in the pricing efforts.
- The VPPP has been a tremendous asset to partners in the transportation industry over the past two decades. Project partners often express their opinion that priced managed lanes would not be nearly as widespread without the program's influence. The program has supported the visibility of these projects through its consistent involvement with industry forums such as the Transportation Research Board, the American Association of State Highway and Transportation Officials, the International Bridge, Tunnel and Turnpike Association, and FHWA-sponsored regional workshops.

## **Moving Forward**

Congestion pricing remains an important congestion management strategy in the toolbox for FHWA. The FHWA anticipates that, in the future, synergies among demand-based pricing approaches will enhance significantly the effectiveness of comprehensive and coordinated regional programs. Second generation pricing approaches will combine regionwide pricing strategies, such as vehicle miles traveled fees, cordon pricing, and regional pricing along with non-toll strategies. The FHWA will continue to use proven outreach strategies to educate and inform State and local agencies about demand-based pricing strategies, including tolling and non-tolling efforts, with the ultimate goals of 1) mainstreaming demand-based pricing into the mindset of transportation professionals as a viable option, and 2) expanding public acceptance of demand-based pricing.

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## LIST OF ACRONYMS AND ABBREVIATIONS

4-T's – Tolling, transit, telecommuting, and technology  
AASHTO – American Association of State Highway and Transportation Officials  
ABAG – Association of Bay Area Governments  
ATDM – Active transportation and demand management  
BAAQMD – Bay Area Air Quality Management District  
BART – Bay Area Rapid Transit  
Caltrans – California Department of Transportation  
CAMPO – Capitol Area Metropolitan Planning Organization  
CCTV – Closed-circuit television  
CTRMA – Central Texas Regional Mobility Authority  
CDOT – Connecticut Department of Transportation  
ConOps – Concept of operations  
CMA – Congestion management agencies  
CRD – Congestion Reduction Demonstrations  
CV/AV – Connected vehicles/automated vehicles  
DDOT – District of Columbia Department of Transportation  
EA – Environmental assessment  
FAST – Fixing America's Surface Transportation Act  
FY – Fiscal year  
FDOT – Florida Department of Transportation  
FHWA – Federal Highway Administration  
GHG – Greenhouse gas  
HOT – High-occupancy toll  
HOV – High-occupancy vehicle  
IBTTA – International Bridge, Tunnel and Turnpike Association  
ICPP – Integrated Congestion Pricing Plan  
ITS JPO – Intelligent Transportation Systems Joint Program Office  
ITSA – Intelligent Transportation Society of America  
MIT – Massachusetts Institute of Technology  
Metro – Los Angeles County Metropolitan Transit Authority  
MAP-21 – Moving Ahead for Progress in the 21st Century Act  
MnDOT – Minnesota Department of Transportation  
MTC – Metropolitan Transportation Commission  
NYCDOT – New York City Department of Transportation  
NCTCOG – North Central Texas Council of Governments  
OBD – On-board diagnostics  
ODOT – Oregon Department of Transportation  
OTREC – Oregon Transportation Research and Education Consortium  
PAYD – Pay-as-you-drive  
P2P – Peer-to-peer  
PBOT – Portland Bureau of Transportation  
PSUS – Parking Supply and Utilization Study  
RTR – Real-time ridesharing  
RSP – Right Size Parking

SAFETEA-LU – Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy  
for Users  
SBCAG – Santa Barbara County Association of Governments  
SCAG – Southern California Association of Governments  
SFCTA – San Francisco County Transportation Authority  
SFMTA – San Francisco Municipal Transportation Agency  
SOV – Single-occupancy vehicle  
TDM – Travel demand management  
TEA-21 – Transportation Equity Act for the 21<sup>st</sup> Century  
TRAC – University of Washington State Transportation Research Center  
TRB – Transportation Research Board  
TXDOT – Texas Department of Transportation  
UBI – Usage-based insurance  
UC – University of California  
UPA – Urban Partnership Agreements  
DOT – United States Department of Transportation  
VHD – Vehicle hours of delay  
VHT – Vehicle hours of travel  
VMT – Vehicle miles traveled  
VTA – Valley Transportation Authority  
VPPP – Value Pricing Pilot Program  
WSDOT – Washington State Department of Transportation



# Chapter 1. Introduction

## Background

Congestion pricing works by shifting some rush hour highway travel to other transportation modes or to off-peak periods. By removing a fraction (even as small as 5 percent) of the vehicles from a congested roadway, pricing enables the system to flow much more efficiently, allowing more vehicles to move through the same physical space.<sup>3</sup>

Although drivers unfamiliar with the concept initially have questions and concerns, drivers who are more experienced with congestion pricing usually support it because it offers them a reliable trip time. Transit and ridesharing advocates also appreciate the ability of congestion pricing projects to generate revenue and the financial incentives that make alternatives to driving more attractive. The U. S. Department of Transportation (DOT) report, *Beyond Traffic 2045*, cites congestion pricing as a potential policy option to “manage demand and to reduce regulatory burdens on travelers and industry.”<sup>4</sup> The report also states that, “Expanding the use of tolling and congestion pricing could help to reduce congestion, while generating revenues that could be used to finance the construction of new roadways and bridges or maintain existing facilities.”<sup>5</sup>

*“Expanding the use of tolling and congestion pricing could help to reduce congestion, while generating revenues that could be used to finance the construction of new roadways and bridges or maintain existing facilities.”*  
**-Beyond Traffic 2045**

Through a comprehensive Congestion Pricing Program that includes the Value Pricing Pilot Program (VPPP) as well as follow-on initiatives such as the Congestion Reduction Demonstrations (CRD), Urban Partnership Agreements (UPA), and Express Lanes Demonstration programs, the Federal Highway Administration (FHWA) has now funded more than 135 congestion pricing projects and studies across 19 States and the District of Columbia.

*“The VPPP has been of tremendous value to the congestion pricing industry over the past two decades.”*  
**-David Ungemah, Chair TRB Congestion Pricing Committee**

This represents direct project funding as well as extensive research on a variety of critical topics in congestion pricing. In the early development and application stages of the congestion pricing concept, multiple HOT lane projects encountered challenges and issues including equity, privacy, technology, and enforcement. Entities that are currently seeking to deploy congestion

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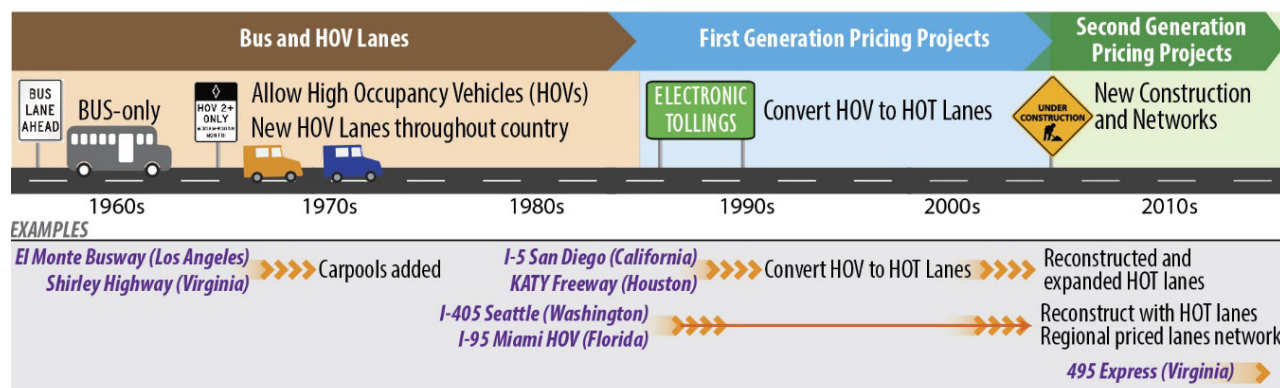
<sup>3</sup> Federal Highway Administration, *Congestion Pricing – A Primer: Overview*, FHWA-HOP-08-039 (Washington, DC: FHWA, October 2008). Available at: [http://ops.fhwa.dot.gov/publications/fhwahop08039/cp\\_prim1\\_00.htm](http://ops.fhwa.dot.gov/publications/fhwahop08039/cp_prim1_00.htm). Accessed 2/24/16.

<sup>4</sup> U.S. Department of Transportation, *Beyond Traffic 2045, Trends and Choices*, 2015. Available at: [https://www.transportation.gov/sites/dot.gov/files/docs/Draft\\_Beyond\\_Traffic\\_Framework.pdf](https://www.transportation.gov/sites/dot.gov/files/docs/Draft_Beyond_Traffic_Framework.pdf)

<sup>5</sup> Ibid.

pricing strategies have benefitted not only from the research the DOT has conducted on these topics, but also from sharing results across agencies and among industry partners. The FHWA provides key support to States to help them implement strategies to manage congestion problems. More importantly, findings from deployed projects continue to demonstrate that the application of innovative congestion pricing strategies can effectively manage demand on congested urban facilities.

As a result of successful deployments, there is growing consensus that congestion pricing is becoming a viable approach to reducing traffic congestion. Figure 1 depicts the evolution of managed lanes to priced managed lanes from the 1960s through today. In the early years of congestion pricing (1990s-early 2000s) in the United States, transportation agency staff that wished to explore such strategies were often met with skepticism or indifference within their own ranks. Many innovative concepts were incubated in the planning arena and took several years to develop into projects. Pilot program funding and support from the VPPP has helped significantly in the evolution from bus and high-occupancy vehicle (HOV) lanes to priced managed lanes, as shown in Figure 1. The VPPP has also helped significantly to accelerate concept development into implementation of actual congestion pricing projects. Often these projects were the first projects of their type in the region, catching the attention of decision makers and building desire for additional congestion pricing projects.



**Figure 1. Timeline Depicting the Evolution of Managed Lanes from the 1960s through today. Pilot program funding and support from the VPPP has helped significantly in the evolution from bus HOV lanes to priced managed lanes <sup>6</sup>**

Figure 2 depicts graphically the exponential growth of HOT lanes in the United States between the opening of the first projects in 1995 and 2015. (This figure summarizes the deployment of HOT lanes only; however, all priced managed lane types, including express toll lanes, full facility tolling, and HOT lanes, have experienced a similar rapid growth pattern.)

<sup>6</sup> Adapted from D. Ungemah, "HOT Lanes 2.0- An Entrepreneurial Approach to Highway Capacity," Presentation Slides for National Road Pricing Conference in Houston, TX, June 2010.

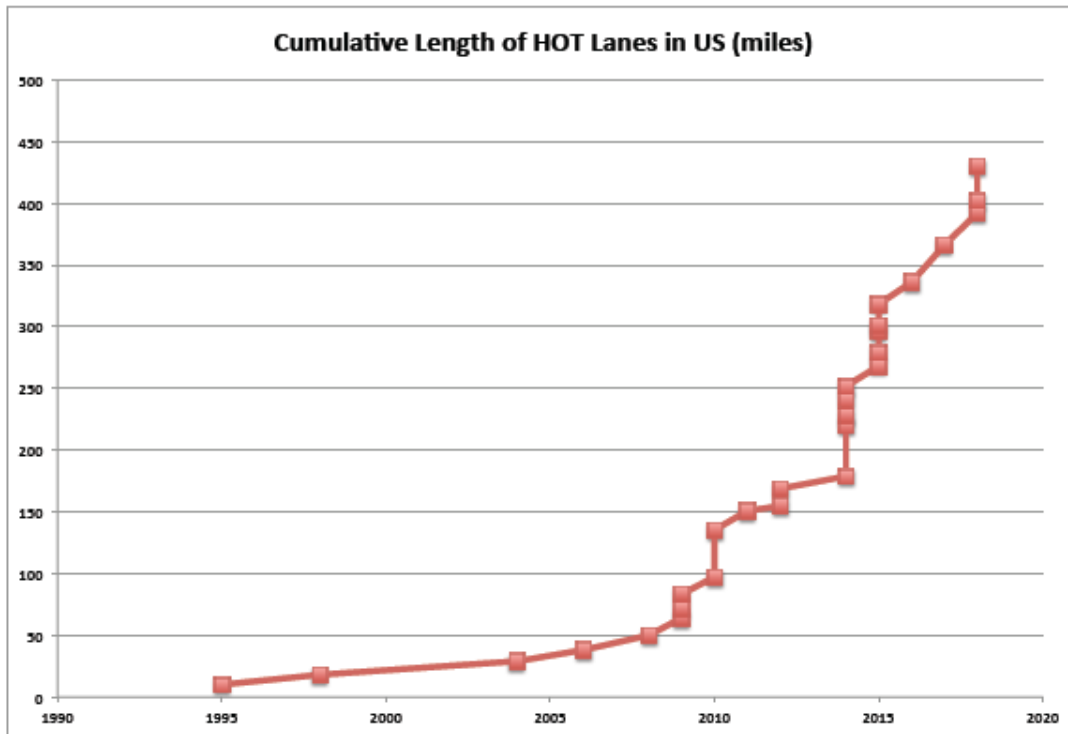


Figure 2: Growth in the cumulative length of HOT lanes in the United States.<sup>7</sup>

## Report Organization

This report provides an update on the various projects and studies that received funding through the VPPP and the UPA/CRD initiatives (described in detail in Chapter 3), especially those projects that were awarded since the last report in 2014. All projects described in this report received funding and assistance from the VPPP or the UPA/CRD initiatives. The level of assistance each project received under the VPPP is described in Appendix A. The report then discusses FHWA’s recent outreach and technical assistance efforts to advance congestion pricing beyond the VPPP and UPA/CRD project locations. Finally, the report provides an overview of emerging trends in congestion pricing and FHWA’s approach for helping to advance these trends and innovations across the country.

<sup>7</sup> D. Levinson and K. Krizek, *The End of Traffic and the Future of Transportation*, 2015. Available at: <http://davidlevinson.org/the-end-of-traffic-and-the-future-of-transport/>

## Chapter 2. The Value Pricing Pilot Program: Project Updates

The U.S. Congress established the Congestion Pricing Pilot Program in 1991. It was subsequently renamed the Value Pricing Pilot Program under Section 1216 (a) of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) in 1998, and continued into Section 1604(a) Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), P.L. 109-59. The Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America's Surface Transportation Act (FAST) did not make any additional funding available. However, FHWA's ability to enter into cooperative agreements for projects that require tolling authority for their implementation under this program remains.

Congress established the VPPP to demonstrate whether and to what extent roadway congestion could be reduced through the application of congestion pricing strategies and to estimate the magnitude of the impact of such strategies on driver behavior, traffic volumes, transit ridership, air quality, and availability of funds for transportation programs.<sup>8</sup> The program has provided tolling authority and discretionary grants to State or local governments to facilitate the demonstration of congestion pricing applications and report on their effects. According to the statutory requirements of VPPP, the FHWA may enter into cooperative agreements with up to 15 State or local governments or other public authorities to establish, maintain, and monitor value pricing pilot programs. Currently, there are 11 State-led programs and 2 city-led programs participating in the VPPP: California, Connecticut, Florida, Illinois, Maryland, Minnesota, Nevada, Oregon, Texas, Virginia, Washington State, New York City, and the District of Columbia. Many of these programs have multiple projects.

*For information on other VPPP projects, refer to the VPPP Quarterly Report at [http://www.ops.fhwa.dot.gov/congestionpricing/value\\_pricing/projects/index.htm](http://www.ops.fhwa.dot.gov/congestionpricing/value_pricing/projects/index.htm)*

*In 2015, FHWA awarded VPPP funding to five new projects using remaining FY 2012 VPPP funds and unspent VPPP funds from completed projects.*

The VPPP encourages the implementation and evaluation of value pricing pilot projects to manage congestion on highways through tolling and other pricing mechanisms. Although there is no longer a discretionary grant component, many States have gained experience with pricing strategies with the help of the VPPP, and States now have the capacity to implement larger scale value pricing projects. The FHWA continues to support

States' and regions' pricing initiatives by offering guidance and expertise in choosing the most promising and appropriate of the emerging strategies. Congestion mitigation, environmental concerns, and limited funding for highway construction have led to increased interest by State, regional and local transportation agencies in exploring the use of demand-based pricing as a strategy to manage congestion on oversubscribed roads.

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<sup>8</sup> Section 1012(b)(5) of the Intermodal Surface Transportation Efficiency Act of 1991, PL 102-240, as amended by section 1216(a) of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21), and section 1604(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), PL109-59 .

In 2015, FHWA used remaining Fiscal Year (FY) 2012 funds and unspent VPPP project funds to award \$3.4 million to an additional five projects. These projects are presented in Table 1.

**Table 1. VPPP Projects Awarded Funds in 2015.**

State	Locality/Recipient	Project	Grant Amount
California	Southern California Association of Governments	Analysis, public outreach and environmental assessment of cordon pricing in Westside Los Angeles	\$916,802
California	SFCTA for the San Francisco Bay Area Rapid Transit (BART) System.	Development of app for the Travel Smart Rewards Program to encourage travel/route shifts and reduce overcrowding at downtown BART stations during peak periods	\$508,000
California	City of Berkeley/Univ. of Calif. at Berkeley	Parking pricing project to reduce drive-alone trips to campus	\$169,185
Nevada	Lake Tahoe Transportation District	Parking pricing to minimize car travel through the most congested areas around Lake Tahoe	\$290,455
Texas	Texas A&M Transportation Institute	Pay-as-you-drive (PAYD) insurance study	\$1,491,000

In addition to the new projects identified in Table 1, numerous other projects have received funding since FY 2008. Appendix A includes a list of all previous awards. The following section provides updates on projects currently being studied. The projects are categorized by projects currently in progress and projects that were completed since 2014. The projects are further separated into projects involving tolls and projects not involving tolls. The VPPP has consistently awarded a portion of its funds to projects that did not involve highway tolls. The majority of the non-toll projects fall into one of three categories: parking pricing, priced vehicle sharing and dynamic ridesharing, or PAYD-pricing initiatives.

## **Projects in Progress**

### ***Projects Involving Tolls***

#### ***Cordon/Area Charging in Los Angeles and Build-Out of Express Lanes in Southern California***

The Express Travel Choices (Phase II) study examines the potential of implementing a cordon/areawide pricing pilot in major activity centers within the Los Angeles area in conjunction with build-out of the planned managed network of express/HOT lanes across Southern California. Through collaboration of the Southern California Association of Governments (SCAG), the California Department of Transportation (Caltrans) and the Los Angeles County Metropolitan Transportation Authority (Metro), this study aims to integrate pricing into a comprehensive approach to congestion management, developing a concept of operations (ConOps) for the Southern California region.

The study team for the express lane network component of the project completed traffic and revenue forecasts and developed phasing/tiering recommendations for the network under consideration. With continued guidance provided by county agencies and Caltrans in reviewing recent analyses, a “financially constrained” express lane network has been recommended for inclusion in SCAG's Draft 2016 Regional Transportation Plan. The study team is finalizing operational policies for the ConOps.

The study team also continues to analyze financial, economic, and environmental justice/equity components of the cordon project. Continued stakeholder engagement is underway with civic organizations, elected leadership, and partner agencies.

Following the successful Phase II project, this SCAG Phase III pre-implementation project will bring cordon pricing closer to fruition in Westside Los Angeles through an enhanced equity analysis, aggressive public outreach, and the pursuit of needed institutional arrangements, additional transit agency coordination, and preparation of an environmental assessment.

The project’s primary goals include promoting a balanced transportation system by encouraging travelers to consider mobility options, increasing the use of transit and active transportation modes, improving quality of life by reducing congestion levels, and reducing vehicle miles traveled/vehicle hours traveled VMT/VHT and greenhouse gas (GHG) emissions.

Pre-implementation study efforts are being conducted by the SCAG in coordination with affected jurisdictions—the city of Los Angeles and the city of Santa Monica.

The Phase III pre-implementation study is funded through the end of 2016. Results are expected through FY 2017.

#### *Treasure Island Mobility Management Study in San Francisco, CA*

The Treasure Island Mobility Management Agency (TIMMA) staff has developed toll policy recommendations and has prepared a toll system ConOps. The toll policy recommendations, developed as the Treasure Island Mobility Management Study, pay particular attention to transportation affordability for current and future residents in below-market-rate housing on the Island. This affordability focus responded to the Board and community input heard through three major rounds of outreach.

The toll system ConOps describes the components of the toll system and how it will operate. Issues of particular importance include how the Island toll system will relate to the San Francisco-Oakland Bay Bridge toll system; and the “trip building” aspect of the system, which will ensure that only Bridge-bound trips, and not local trips, will be tolled.

The TIMMA has drafted agreements with its partner agencies (such as ferry and East Bay bus transit operators) in anticipation of a program launch in 2019 to correspond to the first phase of development on the Island.

#### *Feasibility of Pricing on I-84 in Hartford, CT*

The Connecticut Department of Transportation (CDOT) received VPPP funds to examine the feasibility of a variety of pricing strategies to address the deteriorating conditions on I-84 in the city of Hartford, one of the most highly traveled and congested highway segments in the region. A portion of the segment traverses an elevated structure, which is nearing its end of useful life. Replacement costs will be high, and this study will examine the potential of congestion pricing both to finance part of the replacement and to manage congestion.

Data collection and evaluation activities were conducted in 2013. A stated preference survey was also conducted to generate insights into the public's willingness to pay tolls in return for a more reliable trip. A travel demand model was prepared and a draft of model development and calibration was completed in March 2014. The study is in progress and expected to be complete soon. Thus far, the study has been very valuable in providing information regarding tolling options and the ability to provide congestion relief through time-of-day tolling. It has also provided insight into the net revenue stream resulting from the variable pricing scenarios. The State of Connecticut will have to pass enabling legislation to allow for tolling and to keep all the revenue received through pricing in a Special Transportation Fund in order for the recommendations of this study to be implemented. The results of this study will be important in making the case for enabling legislation at the State level.

#### *Variable Pricing in I-95 Corridor from New York to New Haven, CT*

The ConnDOT is also currently evaluating the potential of congestion pricing strategies on the heavily congested I-95 corridor from New York to New Haven to better manage traffic and improve the efficiency of existing facilities. As with the I-84 study discussed above, this study will also explore the ability of congestion pricing to generate revenues to finance transit improvements. Data collection was conducted to understand existing traffic patterns on the corridor, including truck surveys, origin-destination surveys, and license plate surveys. This data served as inputs to a travel demand model, which is being used to assess the likely impacts of various pricing strategies. The project team completed the draft existing conditions report in early 2014. Since September 2015, the project consultant has been concentrating on completing the final study document, which is on schedule. Thus far, the study has provided valuable information regarding the potential of congestion relief through tolling, particularly time-of-day variable tolling. The study will also assess the net revenue stream resulting from the variable pricing scenarios. As noted above, the State of Connecticut will have to pass enabling legislation to allow for tolling and to keep all the revenue received through pricing in a Special Transportation Fund in order for the recommendations of this study to be implemented. The results of this study will be important in making the case for enabling legislation at the State level.

#### *Influencing Travel Behavior, Sensitivity to Environmental Justice, and Use of Innovative Technology in Texas*

The Texas Department of Transportation (TxDOT) and North Central Texas Council of Governments (NCTCOG) are conducting a study to determine which types of congestion pricing incentives and programs on IH-30/Tom Landry Highway will most encourage drivers to seek alternatives to driving alone or driving during peak periods. Smart card technology will be used to track subscribers' managed lane use, and users will be awarded incentives based on how they

choose to use the managed lanes. The study also includes an equity component to explore the potential impacts managed lanes have on low-income travelers.

Texas A&M Transportation Institute has finalized its draft of the “Traffic Thermostat” tool for Dallas-Fort Worth area partners to review. The Traffic Thermostat was built to help guide the user through a logical, step-wise process of examining potential changes to a managed lane/toll facility. The tool was built to be generic, allowing for its application to any managed lane facility. The Traffic Thermostat will help plan what managed lane policies and incentives are needed so that the managed lanes meet their goals and performance measures. Work has continued with partner agencies to provide transit service along the corridor and to the park-and-ride facilities once the managed lane opens.

Local drivers have been recruited to participate in the study, and their actual travel patterns will be monitored to determine how priced facilities impact all users, including low-income populations. Examples of targeted travel behaviors include, but are not limited to, peak-period pricing, transit, park-and-ride lots, ridesharing, telecommuting, bicycling, and varied work schedules.

At this time, the following activities have been completed:

- A real-time casual carpooling mobile application for was created for the region in February 2014. The NCTCOG staff continues to work with partner agencies to determine if they can integrate the accounting system in order to track usage and provide incentives as well as allow the subscribers to monitor transportation costs.
- The NCTCOG in partnership with Texas A&M Transportation Institute finalized a baseline analysis that includes the identification of goals, objectives, and performance measures for the implementation of the Traffic Thermostat. The region has identified value pricing program incentives for travelers and completed a survey of interest in the possible incentives. Based on the survey results, the Traffic Thermostat tool for the IH 30 Managed Lanes has been updated to incorporate the results of the survey. The next step is to run the updated Traffic Thermostat tool to ensure it meets expectations.

The NCTCOG has begun defining incentives and plans to implement them once the IH-30 Managed Lane project opens in April 2016. It is anticipated that the project will be completed in March 2017.

#### *SR 167 Express Toll Lanes Continuous Access Demonstration in Seattle, WA*

The Washington State Department of Transportation (WSDOT) has developed a 230 lane-mile system of freeway HOV lanes in the Puget Sound region that has been a popular and well-used enhancement to the freeway system. In the past decade, most Puget Sound HOV lanes have become so well used that they have lost some of their speed and reliability advantage and fail to meet State and Federal performance goals. To remedy this, WSDOT is testing HOT lanes on a pilot basis in the SR 167 corridor and is developing a dual-lane express toll lane facility on I-405. This project involves conducting a before-and-after evaluation for re-stripping the SR 167 HOT



lane system to allow near-continuous access, providing information and outreach to customers and the public, and performing a before-and-after evaluation of the system.

The physical changes to the roadway to achieve continuous access were completed in late summer of 2014, and the system has been operating smoothly since. The WSDOT collaborated with the Washington State University Transportation Research Center (TRAC) program to perform the before-and-after evaluation of this project. A first draft of the evaluation was based on 6 months of data prior to the access change and 6 months of data after the access change. After a review of the draft findings, both WSDOT and TRAC agreed that it would be prudent to include a larger set of “after” data before publishing the evaluation. The additional data required for this evaluation has been collected and the draft final report is currently in production by TRAC.

### ***Projects Not Involving Tolls***

#### ***BART Perks in San Francisco, CA***

The San Francisco Travel Smart Rewards Pilot Program is anticipated to mitigate severe BART system overcrowding by deploying a mobile enabled Web site and cash incentives to encourage riders to shift their travel to the shoulders of the peak period.

The main goal of the project is for BART to provide a quality customer experience by reducing crowding in the East Bay to downtown San Francisco travel market. The objective is to reduce crowding by approximately 5 percent in this market during the peak period.

The San Francisco Travel Smart Rewards Pilot Program will mitigate severe BART system overcrowding by deploying an app coupled with incentives (such as Clipper transit cards, monetary rewards, or other) for regular peak-period users of the downtown Embarcadero and Montgomery stations to voluntarily shift their travel to peak shoulders or other stations or routes.

Program participants will sign up on the mobile-enabled Perks Web site with their Clipper transit card identification number and will accrue points by riding BART. Program participants will also earn points just by signing up and referring friends. Higher levels of points will be provided for travel outside the most congested peak travel periods. Riders will be able to choose to cash out their points for low-value cash rewards (via PayPal) or use points to play a game to win higher levels of rewards.

#### ***Residential Parking Management Project in San Francisco, CA***

Through this project, the San Francisco Municipal Transportation Agency (SFMTA) will explore how it could evolve or change existing parking practices in San Francisco. The study will explore how pricing could be used to manage parking in residential and mixed-use areas.

As part of this study, occupancy and license plate surveys have been conducted over 42 2-mile routes in the study area and the results were analyzed. In addition, an online household survey was conducted to obtain residents’ travel patterns, commute modes, parking access, and use from November 21 through December 13, 2015.

The project team has initiated the implementation of a public outreach strategy that includes community open houses to share some of the findings of the project and to solicit input from community members on key on-street parking issues. As a part of this work, the project team reached out to neighborhood and business leaders in a select few San Francisco neighborhoods to discuss the possibility of conducting a pilot parking management program. The project team worked with Arup (the prime contractor) to evaluate several alternative scenarios for pricing 1-day flex permits and motorcycle permits.

The final recommended parking policy reform proposals will be submitted to the SFMTA board for approval. The intention of the project is to inform similar policy development in other cities, especially those in California.

#### *One-Way Electric Vehicle Carsharing in San Diego, CA*

“Pricing Your Way to Operational Efficiency: One-Way Electric Vehicle Carsharing in San Diego” is a partnership of University of California (UC) Berkeley, car2go carsharing company in San Diego, Caltrans, and the FHWA. This project is exploring the impact of a one-way, electric vehicle carsharing system on travel behavior and the effect of pricing experiments to help incentivize consumers to redistribute the vehicles in ways that lower operational costs to car2go.

The project is designed to conduct three rounds of surveys to evaluate the impacts of the system on user behavior and the effect of pricing experiments on travel patterns. The project is also evaluating activity data to ascertain whether the experiments resulted in notable changes in vehicle distribution. Two pricing experiments are involved in the study: one designed to incentivize members to bring car2go vehicles to a downtown location to improve vehicle charging, the other designed to incentivize members to remove vehicles from areas with low demand. Thus far, the project has implemented two of the three surveys of system users and analyzed activity data collected before the pricing experiment implementation.

Some key preliminary results indicate that the presence of car2go reduces the need for car ownership. Approximately 33 percent of car2go members in San Diego have either gotten rid of vehicles that they owned or opted not to purchase a vehicle because of the presence of car2go. The balance of this impact is weighted toward avoided vehicle purchases or vehicle ownership suppression. Survey data indicate that ongoing pricing experiments are having some impact on travel decisionmaking. After completion of both experiments, a joint analysis of the surveys will be conducted and the findings published in a report.

#### *Parking Pricing and Transportation Demand Management in the city of Berkeley and UC Berkeley, CA*

The VPPP provided funding to the city of Berkeley for the go-Berkeley pilot program. This program is now complete. Additional funding was provided to UC Berkeley to help reduce drive-alone trips to campus through a parking scheme for monthly patrons and a program to incentivize employees to reduce parking without changing parking prices. The UC Berkeley efforts are ongoing.

***The Berkeley City Council  
Information Report can be found at:  
<http://www.goberkeley.info/results>***

The goBerkeley Pilot Program was launched in Downtown Berkeley, the Elmwood, and Southside/Telegraph on July 2013 with three overarching goals: to support economic vitality, to reduce congestion and emissions, and to assess the feasibility of expanding the program beyond the 2-year pilot period. Coordinating between transportation demand management (TDM) and parking management, the goBerkeley Pilot Program conducted visitor, resident, and employee surveys and collected transit usage and parking data before and during the pilot period. The program also tested automated parking data collection methods to ascertain the most accurate and cost-effective program design going forward.

The goBerkeley TDM Program aimed to decrease single-occupancy vehicle (SOV) use and increase the use of travel alternatives. To attain that, the following financial incentives were offered in the pilot areas:

- 1,000 free 6-month AC Transit “TravelChoice Berkeley” passes for residents,
- 1,000 free 1-year AC Transit Easy Passes for employees, and
- Deeply discounted City CarShare fees (up to 90% off) for businesses and their employees.

The goBerkeley TDM Program survey results showed an overall 3.1 percent reduction in automobile use, with 94 percent of participants reporting that they were walking more, 90 percent reporting using transit more, and 19 percent reporting biking more. Among almost 500 Easy Pass program participants, 82 percent said they used AC Transit more because they had the pass and almost half said they used their pass at least twice a week. The carshare program included 15 businesses and over 60 participants. Results indicated that more than 10 percent of participants used carsharing as a new travel alternative.

The goBerkeley Parking pilot assessed the long-term feasibility of demand-responsive parking management through adjusted parking rates and time limits at parking meters, parking lots, and parking garages. Analysis of the observed parking availability, meter transaction data, and community surveys indicated an overall improvement on parking availability and customer satisfaction. Results also showed a change in driver behavior and shift in parking demand to metered areas with available parking. The analysis also indicated that vehicle-mounted cameras could be used to reduce parking data collection costs and improve parking enforcement. Considering environmental sustainability, the goBerkeley Pilot Program achieved its goal of reducing emissions resulting from SOV use and by managing parking. The preliminary analysis found that the goBerkeley program has reduced VMT by 1,649 miles per day.

As mentioned above, the VPPP program has provided additional funding to an existing city of Berkeley/UC Berkeley project designed in part to use priced daily parking to reduce drive-alone trips to campus. The project will enable a randomized controlled trial of a second-price-reverse auction for monthly parking patrons to give up their parking privileges on specific days when parking is in highest demand.

Another study conducted as part of the UC Berkley effort to reduce parking demand explores a new kind of employee parking permit, the FlexPass, which incentivizes employees to reduce parking without significantly changing parking prices, thus avoiding employee discontent. Most employees of the UC Berkeley buy a monthly parking permit with pre-tax dollars. The FlexPass is also a monthly pass that refunds money to the employee in proportion to the number of working days not parked each month. The study finds that unbundling a monthly employee-parking permit reduces parking by making employees mindful of daily parking usage.

#### *Multimodal Dynamic Parking Pricing in the District of Columbia*

This project is evaluating the state-of-the-art and cost-effective parking management strategies deploying a mix of technologies and data analytics. The pilot program is being implemented at the Chinatown/Penn Quarter area. Lessons learned from the pilot will help to shape eventual deployment throughout the District of Columbia (District). The goal of this pilot project is to increase on-street parking availability by deploying various pricing strategies and reducing the time drivers spend searching for a parking space by providing parking availability information in real-time. The parking management strategies will also be applied to delivery vehicles and inter-city buses in the Chinatown/Penn Quarter.

This project has launched the pay-by-space initiative from “pay-and-display” for multispace meter blocks. To facilitate that transition, the District Department of Transportation (DDOT) demarcated all study area parking spaces using space number posts, developed outreach material, and updated the system infrastructure. A robust public outreach and education program was also deployed. The stakeholder outreach included a coordinated effort among D.C. agencies to engage the public and discuss the changes with study area businesses and community groups. The DDOT also collected data on existing conditions in November 2015. This included data on average time to find an open parking spot, placard usage, double parking/illegal parking activity, and a customer survey. In addition, DDOT continued with the development of a blended “asset-lite” approach to predicting real-time occupancy by incorporating sampled parking occupancy data from the portable closed circuit television (CCTV) cameras deployed in the field along with limited sensor data, payment data, and citation data. The DDOT also started engaging app developers who could take the real-time parking availability information from a published application program interface and provide it to customers.

#### *Parking Pricing to Minimize Car Travel through the Most Congested Areas Around Lake Tahoe, NV*

The Tahoe Transportation District will deploy peak-season pricing at a rural tourist destination parking facility. This will be combined with enforcement of road-shoulder parking prohibitions and better user information. Outside of the VPPP project, an improved shuttle service linking tourist destinations with remote parking and better bicycle access (including an off-road trail and bicycle rental) will be provided.

#### *Drive Smart Mobile Technology Pilot Program in New York, NY*

Drive Smart is a New York City Department of Transportation (NYCDOT) consumer technology project that uses data drawn from a car's on-board diagnostics port (OBD-II) to help

New York City drivers save money, save time, and drive more safely. Drive Smart provides a suite of services and mobile applications to drivers—provided by private sector partners—that incentivize safe driving and environmentally efficient travel choices. Participants are also encouraged to enroll in a usage-based insurance (UBI) program offered by a leading national insurer to receive incentives for avoiding driving and for driving during less congested times or on less congested routes. Enrollees will also get feedback on their driving and their actual cost of car ownership and use. The NYCDOT will use Drive Smart data to learn more about accidents in order to support the implementation of Vision Zero, New York City's street safety initiative.

In July 2015, NYCDOT launched a 1-year Drive Smart pilot program with 400 volunteer drivers to evaluate the effectiveness of Drive Smart in helping drivers make smarter choices. For that purpose, NYCDOT procured 450 Drive Smart OBD-II devices to be installed in the vehicles of pilot participants, launched the program Web site, and conducted a full beta test with 25 test devices and drivers. The OBD-II devices are transmitting second-by-second driving data to the Drive Smart server in order to power the range of driver feedback applications and the UBI product offered by the Drive Smart Technology Partners. Preliminary analysis of anonymized driving data is under way in order to support the city's Vision Zero initiative and contribute to the understanding of how its road network is being utilized. Participant outreach and recruitment is ongoing and further evaluation and analysis will continue until the demonstration project ends in August 2016.

#### *PARK Smart in New York, NY*

The NYCDOT PARK Smart 2.0 program enables community stakeholders to work with NYCDOT to address local curb management issues such as parking availability, cruising, double-parking, and truck deliveries on busy retail corridors. The NYCDOT works together with local merchants and residents to develop a PARK Smart plan that typically includes parking pricing strategies curb regulation changes, and parking technology. The program has been successful in increasing curbside access for shoppers, residents, and commercial vehicles. NYCDOT began by conducting an analysis of PARK Smart in the Boerum Hill/Cobble Hill section of Brooklyn. Data showed that the program reduced parking occupancy while increasing turnover. The agency then began working with the Myrtle Avenue Brooklyn Partnership and Brooklyn Community Board 2 on a PARK Smart on the Myrtle Avenue corridor in Brooklyn's Fort Greene and Clinton Hill neighborhoods. The agency also reached out to an array of local community and business groups in Brooklyn, Manhattan, and Queens to discuss PARK Smart and identify additional future PARK Smart areas.

The NYCDOT began the development and implementation of a comprehensive data collection effort in over 40 neighborhood retail corridors to collect parking metrics and performance data to influence the “reprogramming of the curb” and to develop both pricing and regulatory structures that will improve the overall operability of the curb. The agency then began developing a larger framework for the development of a citywide parking management toolbox or “blueprint” that will be used to influence larger parking management

***The Drive Smart Mobile  
Technology Pilot Program  
can be found at:  
<https://www.drivesmartnyc.com/#about>***

policies and approaches. This program will build upon the previous experiences in each of the previous PARK Smart pilot areas, as well similar programs in peer cities.

PARK Smart is an innovative pilot program to develop a pricing and regulatory mechanism to allocate curb space for mixed vehicle classes by time of day and location on block. These “multi-function meters” and the associated curb regulations use a combination of pricing and regulations to influence driver behavior and meet parking demand. The meter rates are tailored based on observed travel demand patterns. In addition, the department is experimenting with new time bands and rate structures on these pilot blockfaces to determine their applicability at other locations across the city. The NYCDOT has also developed new geospatial datasets and refined data collection techniques to improve its ability to measure blockface performance and activity.

The NYCDOT has continued to talk to an array of local community and business groups in Brooklyn, Manhattan, Staten Island, and Queens to discuss innovative curb management strategies as well as approaches to improving curb operations.

#### *Peer-to-Peer Car Sharing in the City of Portland, OR*

This project is a collaborative effort between FHWA, Getaround Inc., the Oregon Department of Transportation (ODOT), the Portland Bureau of Transportation (PBOT), and the Oregon Transportation Research and Education Consortium (OTREC) to evaluate the effects of peer-to-peer (P2P) car sharing and other incentives on people’s travel behavior in the city of Portland, Oregon. In addition, this project evaluates other factors such as usage-based insurance and peak usage pricing. To attain these goals, the project recruited about 300 car owners into the study and installed a Getaround's Carkit™ device in their vehicles to track VMT.

The project also aims to assess whether P2P car sharing reduces overall VMT by making the cost of driving for both car owners and renters variable while creating a revenue stream for car owners and increasing access to jobs and activities for those without cars. The OTREC monitored the rental activity of owner and renter participants in the study, and Getaround monitored rental income activity for owners. The OTREC has also surveyed renters regarding their rental experiences with Getaround. The OTREC is analyzing the survey data and the rental activity of owner and renter participants and is preparing the final report.

#### *Texas A&M Transportation Institute Pay as you Drive Insurance Study*

The Texas A&M Transportation Institute is leading a PAYD insurance project, to be conducted with Allstate Insurance Company. The project is intended to convert participant insurance premiums from fixed-rate to at least 50 percent mileage based. Various sources of data would be used to discern resulting driving reductions.

Subsequent to the funds being awarded, Allstate Insurance Company decided to withdraw from the project. The Texas A&M Transportation Institute is revising the scope of the project to accomplish the intended goals in a new way. They will be considering various options to move

forward before submitting the re-scoped project to the FHWA, Office of Operations for review and approval.

*Park and Ride Pricing in Multifamily Developments in King County, WA*

The intent of this study is to explore opportunities for priced park-and-ride spaces in multifamily developments located near high capacity transit services and to develop a business model for this innovative source of park-and-ride parking that could be tested in future pilot programs.

Synthesis of the analysis and project objectives led to the proposal of a “hybrid” business model in which the program would be operated by a private parking management or parking technology company, and King County Metro would provide assistance with regulatory issues and with marketing the program to both multifamily property owners and park-and-ride users. If successfully implemented as envisioned, the business model will benefit:

- Transit riders by providing them with additional parking options,
- Multi-family building owners by making it possible for them to generate income from underutilized parking, and
- King County Metro by enabling the agency to bring additional park-and-ride spaces online for less than the cost of constructing new parking.

The long-term vision for this concept is a self-sustaining program that no longer needs financial support from King County Metro and provides real-time park-and-ride availability at a large number of diverse sites distributed throughout the county. The study identifies a critical piece in achieving that vision; namely, a conservative, near-term, pilot-project approach that proves the market and sets the stage for the concept to grow over time until financial viability is established. The study will also identify a potential opportunity for the program to become integrated with other regional public transit parking programs.

## Projects Completed Since 2014

### *Projects Involving Tolls*

#### *SR 237 Express Lanes Extension with Continuous Access in Santa Clara, CA*

The SR 237 Express Lanes (Phase 2) project was an extension of the existing first phase of the SR 237 Express Lanes project called SR 237/I-880 Express Connectors. The SR 237 Express Lanes (Phase 2) project involved the conversion of the remaining 4 miles of HOV lanes on SR 237 to Express Lane operations. It provided solo drivers the option of paying a toll to use the Express Lanes during commute hours. Carpools with two or more occupants, motorcycles, transit buses and eligible hybrids continue to use the Express Connectors free of charge. Tolls are collected electronically using the proven FasTrak transponder technology already in use throughout California. Tolls for solo drivers vary based on the level of congestion and are adjusted to maintain a free-flowing ride on the Express Lanes.

The SR 237 Express Lanes project has now been in successful operation since March 2012. The existing operating segment was developed using VPPP funds among other sources. Since the start of operations, this express lane has resulted in over 200,000 hours of total travel time savings in both the express lanes and adjacent general purpose lanes. Over 10 million customers have used the express lanes, about 20 percent of which were toll-paying. These customers have been the beneficiaries of a more reliable and faster commute with travel time savings of up to 14 minutes per trip, even with the recent increase in traffic resulting from a stronger economy.

The Santa Clara Valley Transportation Authority (VTA) was awarded VPPP funds in 2012 to evaluate the potential of using different access approaches, such as continuous access with no painted buffer between the Express Lanes and general-purpose lanes. As part of this project, 1 mile of existing striped buffer was removed on a pilot basis. After 6 months of data collection to assess the impact of this change, this change was made permanent. This conversion would extend the reach of express lanes on SR 237 about 4 miles to the west into the city of Sunnyvale. As part of this deployment, both more open access and more restricted access arrangements for the buffer striping between express lanes and general purpose lanes was studied. The analysis resulted in the selection of the more open access for the striping separating express lanes and general purpose lanes. The extension of express lanes on SR 237 is underway with the project in the final design phase. The opening of the SR 237 express lanes extension is scheduled for 2018.

#### *Integrated Congestion Pricing Plan in Florida*

The Florida Turnpike Enterprise of the Florida Department of Transportation (FDOT) received funding under the VPPP for evaluating the potential for implementing congestion pricing along the Turnpike System. The Integrated Congestion Pricing Plan (ICPP) included three primary phases developed over several years to determine where, when, and how congestion pricing might be used on the turnpike to improve

***Florida Integrated  
Congestion Pricing Plan  
reports are available at:  
[http://floridasturnpike.com/  
icpp/reports.html](http://floridasturnpike.com/icpp/reports.html)***



mobility. The study also explored the opportunity to incorporate carpooling and transit services into the overall congestion pricing solution. Much of this effort focused on the large urban areas of the State that experience extended periods of congestion, including Southeast Florida, Tampa, and Orlando.

All phases of the project have been completed. Phase I of the ICPP was initiated in February 2011 and completed in December 2011. Activities in Phase I included the development of study goals and objectives, identification of various policy questions, evaluation of future roadway widening needs, and assessment of tolling plans for potential projects. In addition, some preliminary engineering evaluation was completed to help make recommendations regarding preferred design criteria. Several operational issues were also evaluated, including tolling considerations and traffic management needs.

In September 2011, FDOT received a VPPP grant to help fund Phase II of this study. Phase II was the Evaluation and Coordination portion of the study that solicited customer input regarding pricing options through market research and focus groups. This Phase was initiated in February 2012 and completed in March 2014. In this Phase, FDOT developed a public outreach and education program to obtain feedback from stakeholders on the project and completed a traffic and revenue study of two express lane projects on the Turnpike. Finally, in September 2012, FDOT received a VPPP grant to help fund Phase III of this study. During Phase III, FDOT prepared a Master Plan to guide future implementation efforts. The Phase III report evaluated FTE's congestion pricing program to determine the economic impacts that the ICPP would have on Florida's statewide economy. To this end, the IMPLAN economic impact modeling system was used to quantify both direct and indirect impacts, which ripple throughout the economy of the entire state of Florida. The study also calculated future economic benefits recognized from operating revenues.

The FDOT plans to use the study recommendations to:

- Implement an express lanes network throughout the State;
- Use performance measures identified in the study to evaluate the performance of express lane projects; and
- Survey the public to receive feedback on the express lanes projects as they open to traffic.

As part of the immediate next steps, FDOT plans to prioritize the construction of the three express lane projects recommended under this study.

#### *Interstate 35E MnPASS Managed Lanes Extension in Minneapolis, MN*

The I-35E MnPASS Extension Study was a pre-implementation planning study aimed at developing and evaluating conceptual alternatives for extending MnPASS Express Lanes between Little Canada Road and CR 96 on I-35E. The study was completed in the third quarter of 2015. The study resulted in the I-35E MnPASS Extension project moving forward into the pre-design and environmental assessment (EA) process. The EA was approved in December 2015, and project letting is planned for early 2016. The MnPASS HOT lanes in this segment are anticipated to open by December 2016. Funding from the VPPP was instrumental in the

Minnesota Department of Transportation's decision to evaluate this HOT lane extension. The MnPASS lanes through the I-35E/I-694 commons area will feature two of the innovative recommendations to come out of the study:

***The I-35 MnPASS Extension Study can be found at:  
<http://www.dot.state.mn.us/metro/projects/i35emnpassextension/index.html>***

- Southbound – the existing inside general purpose lane will be converted to a MnPASS lane during the morning peak period.
- Northbound – there will be no MnPASS lane designation through this area, creating a gap in the northbound MnPASS lane in the corridor

This innovative approach will be monitored and evaluated for a 2-year period following opening. The Land Use and Transit Enhancement component of the study also developed recommendations for increasing transit and carpool use in the I-35E corridor, such as informal park-and-ride sites called “Gather and Go’s.” Many of these ideas and recommendations will be further evaluated and potentially implemented by local governments, transit providers, and others as community and transit planning and development move forward in the corridor.

*Real-Time-Ridesharing Technology to Support Differential Tolling by Occupancy, Central Texas*

This real-time ridesharing (RTR) pilot project based in central Texas linked dynamic ridesharing and tolling systems, providing participants shared rides with a toll discount. The project demonstrates an operational concept of using RTR technology with an existing tolling system for express lane occupancy verification. The project was the result of collaboration between FHWA and Central Texas Regional Mobility Authority (CTRMA) along with key project partners including Carma (formerly Avego, Ltd.), the Capital Area Metropolitan Planning Organization (CAMPO), and TxDOT. The ridesharing system was centered on a smartphone application called Carma that facilitated carpool arrangements by listing drivers and riders with similar trips and providing an estimate of the cost of a trip for riders based on a preset per-mile rate.

The pilot was publicly launched on CTRMA's 183A expressway connecting Austin and Leander, Texas, on February 27, 2014, and then added service on the full length of the Manor Expressway connecting Austin to Manor, Texas. The project was expanded to include tollways in TxDOT's Central Texas system. A key feature of this pilot was vehicle occupancy verification and tolling using RTR technology.

Data on trip patterns collected through this pilot program was analyzed and reported. The study found several advantages of RTR for both system users and toll operators. The primary benefit to users was an average of \$1.08 in savings per trip on tolls alone. For toll operators the primary benefit was the ability to verify occupancy and protect against occupancy fraud using RTR technology.

## ***Projects Not Involving Tolls***

### ***Dynamic Ridesharing Pilot (SmartRide) with Pricing Incentives in Santa Barbara, CA***

The Santa Barbara County Association of Governments (SBCAG) Traffic Solutions and the Community Environmental Council were awarded a VPPP grant to implement dynamic ridesharing in Santa Barbara County. The project, launched in 2012, included a smartphone application that enabled real-time rideshare matching, micro incentives from the riders to the drivers, incentives for participating in the program, and extensive travel behavior data collection. The 18-month long project was implemented in two major travel corridors: Hwy 101 from Ventura to Santa Barbara's South Coast and Isla Vista (near UC Santa Barbara) to Santa Barbara City College. The project was branded as “SmartRide.”

***The SmartRide program final report is available at [http://www.ops.fhwa.dot.gov/congestionpricing/value\\_pricing/pubs\\_reports/projectreports/sb\\_sride\\_dynshare/index.htm](http://www.ops.fhwa.dot.gov/congestionpricing/value_pricing/pubs_reports/projectreports/sb_sride_dynshare/index.htm)***

Two markets were targeted for this pilot: college students traveling Hwy 101 from Isla Vista to Santa Barbara City College and adult commuters traveling the highly congested Hwy 101 corridor from Ventura and Ojai to Santa Barbara and Goleta.

The pilot realized only minimal success in creating one-time carpools. This can be attributed to several factors, including the lengthy app development process, the steep learning curve for the app, as well as cultural barriers with real-time ridesharing.

Over the 3-year pilot program, 755 individuals downloaded the app; 418 users created a schedule in the app and 367 added a profile photo. Only 31 of the 755 users logged more than one trip. In total, 274 trips were made which resulted in 3,325 miles of ridesharing.

While the pilot failed to launch a viable, real-time ridesharing community, it was successful in helping develop the Avego Carma app. It was also valuable in contributing to the evolution of the concept of real-time ridesharing. Key lessons for communities interested in launching a real-time ridesharing program include the following:

- Conduct internal testing of the technology before introducing it to the general public, and only introduce a technology that is stable and user-friendly.
- Target markets that have natural conditions that lend themselves to a real-time rideshare solution, such as toll lanes, HOV lanes, expensive parking, and a concentration of travel between select origins and destinations.
- Consider that simply offering an app does not create demand for real-time ridesharing.
- Do not underestimate the level of effort needed to build a critical mass of app users.
- Consider testing smaller real-time rideshare groups composed of 15 to 25 individuals that have similar commutes as an incremental approach to building a larger real-time rideshare community. Each group should have a champion to conduct outreach and marketing.

Real-time ridesharing has tremendous potential to reshape the way people move. However, it may be a significant leap for many communities that have inherent cultural barriers to carpooling. A concept worth further testing is real-time rideshare groups comprised of 15 to 25 individuals rather than a single large ridesharing community of hundreds or thousands. These commuters may only have small variations in their commute and potentially belong to the same community or neighborhood. If each carpooler has a network of 15 to 25 people they know they can carpool with, they will likely benefit from the flexibility of a real-time ridesharing system while experiencing the comfort and familiarity that is needed to normalize this mode of travel. This incremental or phased approach would potentially have a better chance at immediate success than ridesharing implementation on a larger scale.

#### *Parking Supply and Utilization Study in San Francisco, CA*

The San Francisco Parking Supply and Utilization Study (PSUS) evaluated the effectiveness and feasibility of several parking-related strategies to manage congestion and incentivize alternatives to driving. The study focused on off-street, nonresidential parking comprising garages and lots used for commercial, industrial, and other nonresidential purposes. The study evaluated strategies that could complement the existing on-street parking regulatory setting, including SFpark demand-based pricing. The study concentrated on the northeastern portion of San Francisco, which includes the downtown area.

The study evaluated the VMT and vehicle hours of delay (VHD) reduction attributable to several examined parking strategies. The study also examined the effects of strategies on parking-related revenue and considered the feasibility of implementing the best-performing strategies. A key finding of the study was that some of the most effective parking pricing strategies, such as bulk discount elimination, resulted in a 5.7 percent reduction in VHD.

#### *LA Express Park's Performance Parking System Implementation in Westwood, CA*

The implementation of a performance parking system in Westwood Village is an extension of the intelligent parking system developed for downtown Los Angeles. The downtown project, LA Express Park, began operations in May 2012. The project used demand-based pricing for on-street parking and real-time parking availability to improve the utilization of parking spaces. In areas of high demand for on-street parking, the price was increased, and in areas of low demand, the price was lowered. The public was informed of parking availability and current pricing through the parking guidance system.

The goals of the program were to increase the availability of on-street parking, reduce traffic congestion and associated pollution, encourage a shift in travel choices, and improve the customer experience.

Smart parking meters and sensors were installed in all of the 460 on-street parking spaces. By linking the sensor data with the meter policies, the meters will not accept payment beyond the posted time limit until a new vehicle parks in the space.

#### *Regional Parking Analysis in the San Francisco Bay Area, CA*

This study explored potential regional parking policies, particularly in the realm of pricing and management. The effort resulted in the development of a regional parking database for use by local jurisdictions to inform policy. It used case studies, academic research, policy analysis, and data analysis to address the relationship between parking pricing, policies, parking supply, and parking demand in cities around the Bay Area.

Among the key findings of this study was the identification of excess parking supply, lack of an effective parking policy to balance demand and supply, misalignment of the parking requirements with demands of the local communities, and lack of analysis of alternative modes of access to transit. The study also found that employee programs that charge for parking are the most effective in reducing the number of people who drive to work.

The study also recommended strategies ranging from bold, innovative steps to small, incremental activities to reform parking policies in the Bay Area. The report recommended that Metropolitan Transportation Commission (MTC) work closely with cities, transit agencies, the Association of Bay Area Governments (ABAG), congestion management agencies (CMA), the Bay Area Air Quality Management District (BAAQMD), development and business interests, and advocacy groups in this process of reforming parking policies.

#### *Employer Benefit Design to Reduce Single-Occupant Vehicle Commuting in Kendall Square, MA*

The goal of this research is to examine and recommend changes to the design of employer-sponsored commuter benefit programs in Kendall Square in Cambridge, MA, to reduce single-occupancy vehicle commuting. The research provided an analysis of both current commuting behaviors for large employers in Cambridge as well as current incentives used in both local and national organizations to promote behavior change. The report presented the design for a tool to track the impacts of commuter benefit changes at the individual and employer level as well as a series of potential commuter incentives and their expected effects on mode share.

The report also made recommendations for the next phase of experimental trials, including strategies such as offering incentives to Kendall Square employers. The study provides a focused discussion of potential strategies that Massachusetts Institute of Technology (MIT) could employ as a large employer in the study area to promote alternatives to single-occupant vehicle commuting.

The findings of this research suggest that by changing the costs of commuting and providing both monetary and social incentives to employees, single-occupant vehicle commuting mode share can be reduced, even in high-transit, urban areas like Kendall Square. Introducing a combination of universal transit passes, parking cash-out schemes, daily parking rates, and commuter dashboards can improve transit, walking, and bicycling mode share for employers in Cambridge, Massachusetts.

#### *Incentives to Reduce Off-Street Parking Supply and Car Use in King County, WA*

King County Metro's Right Size Parking (RSP) project sought to promote livability by reducing the supply and demand for parking in new developments and by providing new residents with a range of transportation choices that are less costly than car ownership. This, in turn, is intended

to facilitate the building of more compact, transit-oriented communities. The project included a dynamic Web site where users could calculate parking use at developments in order to guide decisions on building and managing parking. Incentives were offered to jurisdictions and developers to test pricing and right-sizing of parking supply, and engagement activities were conducted with the development community to encourage use of parking demand information and implementation of parking pricing strategies. The surrounding jurisdictions established a local competitive grant program for localities and developers to take aggressive actions to reduce parking supply and to promote alternatives to car ownership and use.

In December 2013, King County Metro published *Right Size Parking Model Code*, aimed at municipalities looking to right-size their residential parking supply. The document provides a menu of options and explanation of each policy choice. Pilots to test parking pricing, parking management, and transportation demand management strategies were awarded to four partner King County cities: Seattle, Kent, Kirkland, and Tukwila and began in 2014. The intent of the pilot projects was to apply the findings from the RSP research to better align jurisdictional parking regulations with regional goals, like increased transit ridership and affordable housing. Policy changes under consideration by the municipalities range from reductions in parking minimums to management strategies including shared parking and a residential parking program update.

***The final report on Right Size Parking is available at:***  
**<http://metro.kingcounty.gov/programs-projects/right-size-parking/pdf/rsp-final-report-8-2015.pdf>**

The final report was completed in August 2015. The key outcomes of the RSP Project in King County include research on multifamily parking utilization, a web-based calculator to estimate parking needs, and guidance on developing parking policy and management techniques to support right sizing. The following groups have adopted study recommendations: professionals throughout King County, including local jurisdictions that have adopted new parking code; developers who now use the tool to plan new projects; and property managers who have implemented parking management and transportation demand management techniques. One important outcome from the project is the development of a multifamily transit pass program developed by King County Metro. Due to high usage of the web-based calculator tool, King County will be updating the data and underlying statistical model in 2016. In addition, King County used the findings from this study to develop a new grant project funded by VPPP, the Park-and-Ride Pricing in Multifamily Developments project. This project will test opportunities to price park-and-ride spaces at multifamily developments near high capacity transit services. The RSP project has attracted national attention. Several regions and cities around the country, including the San Francisco Bay Area, Washington, D.C., Boston, and Chicago, are currently working to replicate the RSP study and web calculator concept for their own planning purposes. Overall, RSP has significantly advanced the industry's understanding of residential parking dynamics.

## Chapter 3. The Urban Partnership Agreements and the Congestion Reduction Demonstration Programs

### Background

In May 2006, the DOT announced the National Strategy to Reduce Congestion on America's Transportation Network, also known as the "Congestion Initiative." The intent of the initiative was to demonstrate a variety of innovative but proven strategies that could provide relief to traffic gridlock if more widely practiced. The Urban Partnership Agreements and the Congestion Reduction Demonstration (UPA/CRD) programs encouraged more aggressive, broad-scale pricing approaches. In each program, multiple sites around the United States were awarded funding to implement congestion reduction strategies. For these two competitive programs, DOT awarded over three-quarters of a billion dollars in grants to six sites: Miami, Minneapolis/St. Paul, San Francisco, Seattle, Atlanta, and Los Angeles. Projects were deployed between 2008 and 2013.

The UPA/CRD programs focused on using four complementary and synergistic strategies to relieve urban congestion, known as the "4-Ts": tolling, transit, telecommuting, and technology. For example, one of the strategies deployed by the Minnesota I-35 W project combined congestion pricing and active travel demand management to implement priced dynamic shoulders.<sup>9</sup> As a result of strategies that combined modes, the UPA/CRD program also represents the successful collaboration between offices of several DOT agencies, including the FHWA Offices of Operations and Innovative Program Delivery, Federal Transit Administration, and the Office of the Secretary Intelligent Transportation Systems Joint Program Office (ITS JPO). The States also collaborated as highway, transit, regional, and local transportation entities worked together to implement the projects.

Table 2 shows the projects deployed at each of the six sites, organized by how the projects fit into each 4-T category.

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<sup>9</sup> Priced dynamic shoulders on I-35 west allow transit and carpools to use the shoulder for free, and MnPASS customers can use the shoulder for a fee. The left shoulder is open to traffic, with overhead sign gantries indicating its operational status. When the general purpose lanes become congested, the shoulder is opened and the speed limit on the general purpose lanes is reduced.

**Table 2. 4-T Congestion Reduction Strategies Deployed at Six UPA/CRD Sites and Start Date for Congestion Pricing**

Atlanta	Los Angeles	Miami	Minneapolis	San Francisco	Seattle
<b>Project Location and Implementation Dates</b>					
Suburban NE Atlanta, I-85 Oct 2011	Los Angeles County I-110 in Nov. 2012; I-10 in Feb. 2013; Express Park in May 2012.	Miami-Ft Lauderdale, I-95 Dec. 2008 northbound. Jan. 2010 southbound.	Minneapolis I-35 W, suburbs to downtown Phase 1 in Sept. 2009; Phase 2 in Nov. 2010.	San Francisco, CBD Sept. 2011	Seattle SR-520, Floating Bridge, Btwn I-5 and I-405, Dec. 2011
<b>Pricing Strategy</b>					
HOV to HOT lane conversion on I-85 (Express Lanes).	HOV to HOT lane conversion on I-10 and I- 110 (Express Lanes). Also, demand-based parking pricing (LA Express Park™).	HOV to HOT lane conversion on I-95 (95 Express).	HOV to HOT lane conversion and addition of new HOT lanes on I- 35 W (Mn- Pass). Also added priced dynamic shoulder lane.	Demand-based pricing of city- owned on- street and off-street parking spaces in 7 pilot areas (SFpark).	Variable tolling on SR 520 Bridge.
Increased HOV require- ment from 2+ to 3+.	Maintained existing HOV requirements, 2+ on I- 110 and 3+ during peak periods on I-10.	Increased vehicle occupancy requirement from 2+ to 3+.	Maintained 2+ carpool occupancy requirement.		Registered van- pools and buses ride for free.
Carpools required to register and use toll tag.	Carpools required to register and use switchable transponder.	3+ carpools required to register and display special decal but no transponder.	Carpools do not need to register or use trans- ponder.		Registered van- pools and buses required to use transponder.
<b>Transit</b>					
12 new commuter buses in the corridor.	59 new clean-fuel buses to 4 service providers.	23 new buses	27 new buses.		44 new buses.
3 new Xpress bus routes in the corridor.	More frequent bus rapid transit service and municipal feeder service.	3 new transit routes.			Addition of 90 one- way peak period bus trips.
4 new or expanded park- and-ride lots.	Expanded parking capacity at transit stations.	500 park-and-ride spaces added.	6 new or expanded park- and-ride lots.		Enhancements to two park-and-ride lots.
	Transit signal priority on two streets in downtown LA.	Bus rapid transit in HOT lanes.	Bus bypass lane at Highway 77/Highway 62 interchange.		
	Other enhancements, e.g., new transit operating and main- tenance facility.		Double contraflow lanes in downtown Minneapolis (MARQ2).		



**Table 2. 4-T Congestion Reduction Strategies Deployed at Six UPA/CRD Sites and Start Date for Congestion Pricing (cont'd)**

Atlanta	Los Angeles	Miami	Minneapolis	San Francisco	Seattle
<b>Telecommuting /TDM</b>					
Outreach to encourage formation of 3-person carpools.	Promotion to increase registered vanpools and employer-based ride-sharing.	Outreach to encourage 3-person carpool formation as well as other employer-based programs for ridesharing, telecommuting and flex-time.	eWorkPlace telework program.	Use of existing alternate commute outreach to distribute brochures on SFpark and 511 parking information.	Continued programs already in use by agencies and other employers that aim to reduce trips in the region.
<b>Technology</b>					
Automated toll enforcement systems.	Dissemination of parking information on-line and on variable message signs.	Introduction of ramp metering at 22 locations.	Active traffic management.	Real-time information on parking price and availability disseminated by websites, telephone, and mobile apps.	Active traffic management system on SR 520 and I-90 corridors.
	Transit signal priority on selected streets in downtown Los Angeles.	Transit signal priority on selected routes leading to I-95.	Real-time transit and traffic signs.		New travel time signs near key interchanges for SR 520.
			Driver assist system for shoulder running buses.		

## National Evaluation Summary

Because they were innovative, had the ability to significantly influence travel behavior, and involved the application of a high degree of advanced technology, the DOT undertook a national evaluation of the six UPA/CRD project sites after all the projects were deployed. The ITS JPO funded the national evaluation and it was jointly managed with the FHWA. The National Evaluation Report was released in August 2015.

***Contemporary Approaches in Congestion Pricing: Lessons Learned from the National Evaluation of Congestion Pricing Strategies at Six Sites is available at [http://ntl.bts.gov/lib/55000/55600/55668/UPA\\_2015\\_Final\\_9-17-15.pdf](http://ntl.bts.gov/lib/55000/55600/55668/UPA_2015_Final_9-17-15.pdf).***

Below is a listing of some of the key findings and lessons learned from the national evaluation of the six sites. More information can be found in the National Evaluation Report (accessible via the link noted in the callout box).

### ***Growth and Change in Usage***

- HOT lanes grew in terms of new accounts/transponders, tolled trips, and gross revenues at all four sites, which is indicative of a growing acceptance of tolling.
- On the SR 520 Bridge, tolling succeeded in reducing traffic volumes by 34 percent in the first year, while transit ridership grew by 38 percent. Monthly toll transactions remained steady.
- As part of the SFpark pilot, pricing was effective in gradually reducing the prevalence of blocks with high occupancy and increasing occupancies on under-utilized blocks. A similar trend in occupancy as a result of price changes was seen for LA Express Park.

### ***Congestion***

- Congestion impacts were assessed with several measures— travel time, speed, and reliability. High-occupancy vehicle to high-occupancy toll (HOV-to-HOT) lane conversions, along with transit and other improvements, led to reductions in some congestion metrics and increased throughput in some, but not all, sites. Particular combinations of added capacity, HOV restrictions, and registration and toll tag requirements appear to affect the differences observed among the sites.
- Tolling on SR 520 resulted in improved congestion on the bridge, but led to slightly more traffic on the alternate I-90 route.
- SFpark variable pricing significantly reduced cruising for parking in the pilot areas compared to the control areas. Less cruising for parking would have reduced congestion, but congestion reduction was difficult to detect with the available data. Higher traffic volumes associated with an improving economy may have obscured the congestion impact as well.

### ***Transit***

- In five of the six sites, express buses using tolled lanes had faster speeds and shorter travel times. Bus ridership on the UPA/CRD corridors increased by a greater percentage than ridership on other parts of the respective local systems.

### ***Telecommuting/TDM***

- Typically only a modest amount of funding, if any, was allocated for telecommuting and travel demand management (TDM component of the 4T strategies) at the six sites. This was most notably reflected in the results of ridesharing impacts where there was a decline in HOV 2+ and 3+ carpools. Minneapolis successfully demonstrated telecommuting as a congestion management tool, and Los Angeles and Seattle dramatically increased vanpool operations related to their projects.

### ***Environmental Impacts***

- Emissions changed as a direct, but not exclusive, effect of reduced VMT. Emissions declined at three of the five evaluated sites and increased at two sites. Lower emissions associated with congestion pricing could not offset higher emissions when VMT increased at the two sites where this occurred.

### ***Benefit-Cost Analysis***

- The results were modest, or in some cases negative, perhaps reflecting the experimental nature of some of the investments. In addition, limitations in the data available to measure some benefits at certain sites may have influenced the findings.

### ***Equity***

- The UPA/CRD projects did not generally have any negative equity impact and succeeded in expanding travel options through transit improvements and by expanding the range of parking price and convenience options available to drivers. Nevertheless, surveys at several sites indicate a persistent perception of unfairness in the tolling efforts.

### ***Technology***

- Intelligent transportation technology permeated the congestion pricing and several of the other 4-T strategies. Interviews with agency personnel indicated that, by and large, the technologies added operational value and provided benefits to travelers. At the same time, technology sometimes presented technical challenges that had to be surmounted by the local partners.

### ***The Deployment Experience***

- Stakeholders concluded that several key factors contributed to the success of the UPA/CRD projects, including staff competencies, working “outside” of their usual domains, building upon existing partnerships, working with new partners, and having shared goals and a common vision.

- Through purposeful and extensive marketing and outreach conducted by the UPA/CRD partners, sites were generally quite successful in communicating plans about their projects over time and effectively managing customer relations.

### ***Public Acceptance***

- Based on surveys and media coverage, the projects were seen as beneficial for the transportation system in the various region, and users of the new projects perceived direct benefits to themselves. One HOT lane site, Atlanta, was the exception in sustaining considerable negative reactions for many months, perhaps an indication of the numerous simultaneous changes—more than at other sites—that the public was being asked to absorb.

### ***Operational Impacts***

- New technologies imposed new responsibilities on agency staff that required additional training, staff members, and new ways of thinking about operations.
- The fairness and sustainability of congestion pricing strategies requires successful enforcement, and the UPA/CRD sites used various combinations of technology and manual enforcement processes to detect and process violations. Owing to differences in metrics among the sites, no general conclusions about enforcement trends were drawn.

### **Long-Term Effects of the UPA/CRD Projects**

Since the demonstration period ended, each of the six sites has continued to build on its UPA/CRD experience in various ways:

- Regional expansion of tolling is underway or planned in Atlanta, Miami, Minnesota, and Seattle, and further expansion is being studied in Los Angeles and other sites. The public appears to have accepted tolling based on the growth in toll accounts, transponders, and tolled trips at the sites.
- Transit continues to make significant gains in ridership on routes initiated with UPA/CRD funds. Bus ridership on the UPA/CRD corridors increased by a greater percentage than ridership on other parts of the respective local systems.
- San Francisco has deployed smart meters throughout the city, which will be the platform for expanding demand-responsive SFpark pricing citywide. LA Express Park is expanding, as well.

## Chapter 4. Advancing Congestion Pricing: Components of Outreach and Technical Assistance Initiatives

Transportation professionals representing the Congestion Pricing and Managed Lanes Committees of the Transportation Research Board (TRB) as well as others who have been involved with the FHWA Congestion Pricing Program in the past have been quite vocal in their support of the agency's congestion pricing initiatives. The following list summarizes some of the common components and themes of existing products and services offered by the program.

**Project Support and Technical Assistance** To enable effective and successful implementation of each VPPP project awarded, the FHWA Congestion Pricing Program staff provide significant levels of support and technical assistance to VPPP awardees on an ongoing basis. This often time-consuming effort includes meeting with awardees via phone and in person, coordinating with project partners, reviewing project materials, and collecting and posting quarterly reports. This is a large-scale effort that requires constant support and dedication from FHWA staff to ensure that VPPP successes and lessons learned are understood and available to be shared with other agencies.

**Program Involvement with Professional Forums** FHWA involvement in transportation professional forums (such as the TRB Annual Meeting) has been a crucial link between public and private transportation professionals and DOT programs. With such a large cross-section of transportation experts in attendance, it is an efficient means of getting the word out on current programs and accurately sharing recent industry developments. The TRB committees are very effective at sharing common experiences, identifying research needs, and helping to plot the course for the congestion pricing industry into the future. Throughout the past two decades, "FHWA Updates" have been a key agenda item at TRB Managed Lanes and Congestion Pricing Committee meetings. Many respondents expressed that hearing first-hand from FHWA program managers in these forums was the most effective way of raising awareness of pricing success stories as well as the most recently published pricing-related outreach materials.

**Written Materials (Primers, White Papers, Guidance, and Flyers)** The VPPP and other related FHWA programs have delivered numerous valuable documents for industry use. During the discussions at the National Congestion Pricing Conference in 2013, two research topics were identified that have led directly to primers. These newest primer in the Congestion Pricing Primer series are *Evolution of Second Generation Pricing Projects*, was published in 2016 and *Effective Approaches to Streamlining Back Office Operations* is currently under development.

**Facilitated Peer Exchanges** Many agencies have benefited from FHWA-sponsored peer exchanges that include participation by congestion pricing experts. There is a great benefit in bringing together a broad array of technical specialists and key decision makers from the host agency for the opportunity to interact directly with the out-of-State expert. The local

**Primers and other resources are available on the FHWA Congestion Pricing Web site:**  
[http://ops.fhwa.dot.gov/congestion\\_pricing/resources.htm](http://ops.fhwa.dot.gov/congestion_pricing/resources.htm) and  
[http://ops.fhwa.dot.gov/congestion\\_pricing/value\\_pricing/](http://ops.fhwa.dot.gov/congestion_pricing/value_pricing/)

congestion pricing expert may already have certain specific knowledge; however, it lends additional credibility to have the project manager from another State deliver the message. It also creates a focus and urgency to bringing many decision makers together to meet with the out-of-State expert.

**Workshops** The VPPP continues to sponsor workshop series such as the one on Contemporary Tools and Approaches for Parking Pricing and Management. The initial round of workshops concluded in March 2015, including workshops in the District of Columbia, Denver, Houston, Boston, Minneapolis, and Atlanta. These events were designed primarily for parking program managers and transportation policy leaders from local governments to exchange ideas with national leaders and among themselves. The overall feedback has been positive, and an additional round of workshops began in September 2015 in Chicago; Durham, NC; and San Diego, with two more planned in Portland and Fort Lauderdale. A new series of workshops designed to support entities that desire to implement pricing will begin in March 2016. Chicago and Pittsburgh will host the first two workshops.

**Webinars** FHWA sponsors a continuing series of webinars that explore challenges in implementing congestion pricing. Webinars have proven to be one of the most effective and efficient means of delivering project results, research findings, and lessons learned to industry, with the Congestion Pricing webinar series consistently attracting 200 to 300 participants per event. The FHWA often partners with TRB committees in identifying congestion pricing topics that are timely and of interest to practitioners. Webinars in 2015 included: *Synergies Among Congestion Pricing, Active Transportation and Demand Management (ATDM), and Other Market-Based Strategies* and *Evaluation Procedures for Converting from HOV Lanes to Priced Managed Lanes*, and *Environmental Justice Mitigation, Equity, and Public Transit on Priced Managed Lane Facilities*. Recordings and presentations from these webinars can be accessed via the link in the callout box.

**Web Site Updates.** FHWA unveiled a new Congestion Pricing Web site in late 2014 that combined the four previously disparate sites on VPPP, UPA, CRD, and the Express Lanes Demonstration Program into one comprehensive congestion pricing Web site. The site provides links to publications, tools, and other resources to help agencies implement congestion pricing. In addition, the VPPP quarterly reports continue to be posted to the Web site, providing updates on each VPPP project.

***Recordings and presentations from past Congestion Pricing Webinars are available at <http://www.ops.fhwa.dot.gov/congestionpricing/webinars/index.htm>.***

## **Chapter 5. Key Goals for Advancing Congestion Pricing Over the Next 3-5 Years**

Program results clearly demonstrate that the application of congestion pricing strategies across the country has successfully relieved localized congestion problems in major metropolitan areas. That is why it remains an important congestion management strategy for the FHWA. Efforts and initiatives to effectively support and mainstream congestion pricing will remain a focal point for FHWA programs to reduce traffic congestion and improve the reliability of the transportation system.

With the completion of many of the VPPP projects and the national evaluation of the UPA and CRD programs, FHWA is now focusing on delivering a comprehensive congestion pricing program that uses the cumulative lessons learned and successes of all three programs rather than focusing on the individual findings of each. This comprehensive approach ensures that outreach efforts take into account the wide variety of stakeholders, strategies, and approaches that have been used or are being used across all FHWA congestion pricing programs.

In the past few years, the rapid increase in priced managed lane deployments indicates that acceptance of this strategy has continued to spread in major metropolitan areas of the United States. It is anticipated that eventually managed lanes will also be considered a “mainstream” strategy for regions in which they have been deployed, as HOT lane conversions became during the 2005-2010 period.

However, FHWA also desires to advance the use of all demand-based pricing strategies, not just priced managed lanes. Non-toll congestion pricing strategies such as parking pricing, PAYD insurance, car sharing, bike sharing, dynamic ridesharing, and other strategies that turn the fixed costs of driving into variable costs have experienced strong successes as well. There is a significant opportunity for regions that have installed priced managed lanes to expand into other demand-based pricing strategies to further increase utilization of transportation alternatives such as transit, carpools, and vanpools on a broader scale.

In order to change the conversation about priced facilities, it is appropriate for us to change the way we talk about priced facilities. One way to do this is to begin using the more comprehensive term “demand-based pricing” in reference to the many strategies that FHWA supports through its congestion pricing program. This change in terminology may also work to broaden the appeal of priced facility strategies in terms of public acceptance, as history has shown that the public’s first reaction to “tolled lanes” is typically outright rejection.

The FHWA anticipates that, in the future, synergies among demand-based pricing approaches will enhance significantly the effectiveness of comprehensive and coordinated regional programs. Second-generation pricing approaches will combine regionwide pricing strategies, such as VMT fees, cordon pricing, and regional pricing, with non-toll strategies. Table 2 provides an overview of the FHWA Congestion Pricing program’s goals, objectives, and strategies over the next 3-5 years.





**Table 3. Overview of the FHWA Congestion Pricing Program’s goals, objectives, and strategies over the next 3-5 years.**

Goals		Objectives	Strategies (or Program Components)
Mainstream demand-based pricing into the mindset of transportation decision makers and managers as a viable option.	Mainstream demand-based pricing among those regions that have implemented projects already.	<ul style="list-style-type: none"> <li>• Increase significantly the number of major metropolitan areas that include language promoting the expanded use of demand-based pricing strategies in their long-range transportation plans.</li> <li>• Increase significantly the number of metropolitan areas (that are currently using at least one demand-based pricing strategy) that undertake studies on implementing additional, complementary demand-based pricing strategies within the region.</li> </ul>	<ul style="list-style-type: none"> <li>• Study incentive-based pricing to manage demand.</li> <li>• Create and enhance analytic decision-making tools that will help state, local and regional entities determine the most effective demand-based pricing strategies.</li> <li>• Study the potential early deployment of connected vehicles/automated vehicles (CV/AV) in priced managed lane corridors.</li> <li>• Assist industry in achieving national interoperability of toll transaction technologies.</li> <li>• Develop the types of outreach products to decision makers that the public and transportation experts have identified as being most useful in deploying congestion pricing projects.</li> </ul>
	Mainstream demand-based pricing among those localities that have not yet implemented such projects.	<ul style="list-style-type: none"> <li>• Identify the metropolitan areas (top 30 metro areas in annual congestion) that have no demand-based pricing projects and target them for outreach from FHWA Division Offices to find out who is considering but has not implemented so they can be offered marketing assistance.</li> </ul>	
Expand public acceptance of demand-based pricing.		<ul style="list-style-type: none"> <li>• Host deliberative forums in all regions interested in congestion pricing strategies.</li> </ul> <p>(Note: The Metropolitan Washington COG VPPP study on public acceptance of road pricing offers an effective future outreach effort. For more information, see: <a href="http://www.mwcog.org/store/item.asp?PUBLICATION_ID=470">http://www.mwcog.org/store/item.asp?PUBLICATION_ID=470</a>)</p>	<ul style="list-style-type: none"> <li>• Develop a tool for local agencies to use to help them identify areas of specific concern among the public so that those concerns can be targeted for response.</li> <li>• Develop a media kit for use by local and regional agencies considering a demand-pricing project.</li> </ul>

## **Chapter 6. Closing**

The VPPP has been of tremendous value to advancing congestion pricing over the past two decades. In the view of many project partners over that period, priced managed lanes would not be nearly as widespread without the Program's influence.

The VPPP fostered a friendly environment for project partner agencies where each benefited from the other's experiences as well as VPPP-funded research conducted by other agencies. A competitive spirit grew among project partners to be the first to implement innovative strategies. This was particularly evident among the agencies implementing congestion pricing projects through the Urban Partnership Agreement and Congestion Reduction Demonstration programs.

The FHWA will continue its efforts to ensure widespread awareness of pricing as a strategy to manage roadway congestion. Through these efforts, FHWA will continue to equip State and local agencies with resources and guidance to help them understand and implement congestion pricing strategies. These real-world examples enable target audiences to understand that congestion pricing strategies can be successfully implemented in all different types of regions.

## Appendix A. VPPP Projects Funded Since 2008

VPPP Projects Funded Since 2008				
FISCAL YEAR	FUNDING RECIPIENTS	STATE	PROJECT	AMOUNT
2008	Caltrans/San Francisco Municipal Transportation Agency	CA	SFpark Urban Partnership	\$10,000,000
2008	MNDOT	MN	MN Innovative Choices for Congestion Relief UPA	\$5,000,000
2008	WSDOT/King county/Puget Sound	WA	Seattle/Lake Washington corridor Tolling and Transit UPA	\$10,000,000
2009	Caltrans/Valley Transportation Authority	CA	Implement roadway pricing on SR 237 Express Connectors	\$3,200,000
2009	Twin Cities Area	MN	Feasibility study on pricing innovative lane additions on Trunk Highway 77	\$540,000
2009	Twin Cities Area	MN	Pre-implementation study of priced managed lane on I-94	\$400,000
2009	Greater Buffalo Niagara Regional Authority	NY	Pre-implementation of study of GPS-based truck pricing system	\$717,000
2009	Puget Sound/Seattle Area	WA	Express Lanes system concept study	\$1,280,000
2010	Caltrans / Santa Clara County	CA	Strategies to manage traffic and parking.	\$2,358,000
2010	Caltrans / City of Berkeley	CA	Strategies to manage on-street parking and reduce congestion from circling vehicles.	\$1,800,000
2010	Caltrans / Santa Barbara County	CA	Testing of carpooling system that uses participation incentives.	\$158,400
2010	Florida DOT	FL	Initiative for a regional priced managed lane network that can serve as a model for other regions.	\$900,000
2010	Tampa-Hillsboro Expressway Authority	FL	Advancement of first regional network of bus toll lanes in the Tampa area.	\$800,000
2010	NCDOT and Charlotte MPO	NC	Advancement of first regional network of priced lanes in the Charlotte area.	\$400,000
2010	MnDOT	MN	Expansion of project to test incentive alternatives to monthly parking passes and discourage daily driving.	\$24,800
2010	Texas DOT	TX	Usage-based insurance pricing and additional incentives for efficient travel choices.	\$1,948,000
2010	Virginia DOT and Washington Council Of Governments	VA	Public Acceptability of Road Use Pricing	\$320,000
2010	Washington DOT and King County	WA	Implementation of incentives as alternatives to parking.	\$1,024,000
2011	Caltrans/SCAG	CA	Express Travel Choices	\$1,080,000
2011	Caltrans/MTC	CA	Priced Electric-assist Bicycle Sharing in San Francisco	\$1,054,221
2011	Caltrans/SFCTA	CA	Parking Pricing and Regulations Study in San Francisco	\$480,000
2011	Connecticut DOT	CT	I-84 Viaduct, Hartford, CT	\$644,000

<b>VPPP Projects Funded Since 2008</b>				
<b>FISCAL YEAR</b>	<b>FUNDING RECIPIENTS</b>	<b>STATE</b>	<b>PROJECT</b>	<b>AMOUNT</b>
2011	Connecticut DOT	CT	I-95 Corridor Full Facility Pricing: New York to New Haven CT	\$1,120,000
2011	Florida DOT/Florida Transportation Enterprise	FL	Integrated Congestion Pricing Plan	\$600,000
2011	Illinois State Toll Highway Authority	IL	Integrate and Finance Transit w/ Priced Managed Lanes	\$528,840
2011	Massachusetts	MA	Pay-As-You-Drive Insurance in Massachusetts	\$2,144,000
2011	Oregon	OR	Peer-to-Peer Ridesharing in Portland, Oregon	\$1,725,000
2011	Texas	TX	Integrating Transit Related Pricing Incentives in Support of Managed Lanes	\$160,000
2011	Texas/NCTCOG	TX	Influencing Travel Behavior and Considering Environmental Justice	\$588,301
2011	Texas/CTRMA	TX	183A Turnpike Pilot Downstream Impacts	\$1,220,424
2011	Virginia	VA	Dynamic Ridesharing with Financial Incentives in Northern VA	\$447,200
2011	Washington	WA	Parking Pricing for Delivery trucks in Seattle	\$446,000
2012	Caltrans/SFCTA	CA	Treasure Island Mobility Management study	\$480,000
2012	Caltrans/Contra Costa Transportation Authority	CA	Contra Costa I-80 tolled-corridor real-time ridesharing	\$322,400
2012	Caltrans/San Diego Association of Governments	CA	San Diego pricing incentives for one-way electric car sharing	\$440,653
2012	Caltrans/SFMTC	CA	San Francisco Metropolitan Transportation Commission Regional Parking Pricing Analysis Tool	\$560,000
2012	Caltrans/SFMTA	CA	Parking Pricing Enhancement Study in San Francisco	\$420,000
2012	Caltrans/VTA	CA	SR 237 Express Lanes Extension in San Jose	\$1,600,000
2012	Caltrans/LADOT	CA	Performance parking system implementation in Los Angeles	\$600,272
2012	DDOT	DC	Multimodal, dynamic parking pricing in downtown Washington, DC	\$1,090,000
2012	FDOT/FTE	FL	Integrated Congestion Pricing Planning--Phase Three	\$400,000
2012	FDOT/MetroPlan Orlando	FL	Regional Congestion Pricing Study in Orlando	\$350,000
2012	IDOT	IL	Peer-to-Peer Car Sharing Pilot Project	\$715,118
2012	MassDOT	MA	Kendall Square Employer Transportation Benefit Pricing Trail	\$743,872
2012	MNDOT	MN	I-35E MnPass Managed Lane Extension Study	\$605,000
2012	NYDOT	NY	DriveSmart New York City	\$1,000,000
2012	NYDOT	NY	ParkSmart New York City	\$950,000
2012	TXDOT/CTRMA	TX	Austin-area real-time carpooling automated toll discounts	\$764,008

VPPP Projects Funded Since 2008				
FISCAL YEAR	FUNDING RECIPIENTS	STATE	PROJECT	AMOUNT
2012	WSDOT/King County	WA	King County Park-and-Ride Pricing in Multi-Family Developments	\$543,900
2012	WSDOT	WA	Express Toll lanes Continuous Access Demonstration	\$520,000
2015*	Southern California Association of Governments	CA	Analysis, public outreach and environmental assessment of cordon pricing in Westside Los Angeles	\$916,802
2015*	SFCTA for the San Francisco Bart Area Rapid Transit (BART) System	CA	Development of app for the Travel Smart Rewards Program to encourage travel/route shifts and reduce overcrowding at downtown BART stations during peak periods	\$508,000
2015*	City of Berkeley/Univ. of Calif. At Berkeley	CA	Parking pricing project to reduce drive-alone trips to campus	\$169,185
2015*	Lake Tahoe Transportation District	NV	Parking pricing to minimize car travel through the most congested areas around Lake Tahoe	\$290,455
2015*	Texas Transportation Institute	TX	Pay-as-you-drive (PAYD) insurance study	\$1,491,000

\*These projects were awarded in 2015 but were funded with FY2012 funds and excess funds recovered from completed projects.

## Appendix B. Annotated List of Technical Resources

- Federal Highway Administration, *Congestion Pricing – A Primer Overview*, FHWA-HOP-08-039 (Washington, DC: FHWA, 2008). Available at:  
[http://ops.fhwa.dot.gov/publications/fhwahop08039/cp\\_prim1\\_00.htm](http://ops.fhwa.dot.gov/publications/fhwahop08039/cp_prim1_00.htm).
- Federal Highway Administration Congestion Pricing Web Site -  
<http://www.ops.fhwa.dot.gov/congestionpricing/>
- Federal Highway Administration, *Priced Managed Lane Guide*, FHWA-HOP-13-007 (Washington, DC: FHWA, 2012). Available at:  
<http://ops.fhwa.dot.gov/publications/fhwahop13007/index.htm>. Accessed 12/21/15.
- Federal Highway Administration Value Pricing Pilot Program Quarterly Reports -  
[http://www.ops.fhwa.dot.gov/congestionpricing/value\\_pricing/projects/index.htm](http://www.ops.fhwa.dot.gov/congestionpricing/value_pricing/projects/index.htm)
- D. Levinson and K. Krizek, *The End of Traffic and the Future of Transportation*, 2015.  
Available at: <http://davidlevinson.org/the-end-of-traffic-and-the-future-of-transport/>
- D. Ungemah, “HOT Lanes 2.0- An Entrepreneurial Approach to Highway Capacity,”  
Presentation Slides for National Road Pricing Conference in Houston, TX, June 2010.
- U.S. Department of Transportation, *Beyond Traffic 2045, Trends and Choices*, 2015.  
Available at:  
[https://www.transportation.gov/sites/dot.gov/files/docs/Draft\\_Beyond\\_Traffic\\_Framework.pdf](https://www.transportation.gov/sites/dot.gov/files/docs/Draft_Beyond_Traffic_Framework.pdf)
- U.S. Department of Transportation, *Contemporary Approaches in Congestion Pricing: Lessons Learned from the National Evaluation of Congestion Pricing Strategies at Six Sites*, FHWA-JPO-2015-217 (Washington, DC: ITS JPO, 2015). Available at:  
[http://ntl.bts.gov/lib/55000/55600/55668/UPA\\_2015\\_Final\\_9-17-15.pdf](http://ntl.bts.gov/lib/55000/55600/55668/UPA_2015_Final_9-17-15.pdf)
- Section 1012(b)(5) of the Intermodal Surface Transportation Efficiency Act of 1991, PL 102-240, as amended by section 1216(a) of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21), and section 1604(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), PL109-59 (August 10, 2005).