

Lessons Learned from Regional Congestion Pricing Workshops (RCPWs)

Publication No. FHWA-HOP-18-015

November 2017



U.S. Department of Transportation
Federal Highway Administration

Notice

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in this document.

The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of the document.

Quality Assurance Statement

The Federal Highway Administration (FHWA) provides high quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. The FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

Technical Report Documentation Page

1. Report No. FHWA-HOP-18-015	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Lessons Learned from Regional Congestion Pricing Workshops (RCPWs)		5. Report Date November 2017	6. Performing Organization Code
		8. Performing Organization Report No.	
7. Author(s) Rama Boyapati		10. Work Unit No. (TRAIS)	
9. Performing Organization Name and Address Battelle 505 King Avenue Columbus, OH 43201		11. Contract or Grant No. DTFH61-12-D-00046	
		13. Type of Report and Period Covered Lessons Learned 9/2015 – 12/2017	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Highway Administration (FHWA) Office of Operations 1200 New Jersey Avenue, SE Washington, DC 20590		14. Sponsoring Agency Code HOP	
		15. Supplementary Notes	
16. Abstract The Federal Highway Administration (FHWA) supports efforts by State and local governments or other public authorities as they establish, maintain, monitor, and evaluate local congestion pricing programs. FHWA with support from the Battelle Team (Battelle and the Texas A&M Transportation Institute (TTI)) hosted a series of <i>Regional Congestion Pricing Workshops (RCPWs)</i> to further develop, advance, promote, and enhance tolling and pricing programs and initiatives in metropolitan areas. The workshops featured experts from operating projects who shared lessons learned from their experiences establishing congestion pricing programs. The information shared was designed to help workshop participants plan, implement, and advance a congestion pricing project in their region. The workshops were conducted through an interactive and knowledge sharing approach to encourage stakeholder engagement. This report focuses on the findings from three such workshops held between March 2016 and May 2017 in Schaumburg, Illinois; Pittsburgh, Pennsylvania; and Portland, Oregon. It details cross-cutting issues impacting participating stakeholders identified during the webinars, summarizes key developments achieved in the candidate regions since the webinars were hosted, and concludes with a summary of key takeaways and next steps based on stakeholder inputs and workshop experiences.			
17. Key Words Congestion Pricing; RCPW; Pricing Strategy; High-Occupancy Toll (HOT) lanes; High Occupancy Vehicle (HOV) lanes		18. Distribution Statement No Restrictions	
19. Security Classif.(of this report) Unclassified	20. Security Classif.(of this page) Unclassified	21. No. of Pages 34	22. Price N/A

SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS				
SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in²	square inches	645.2	square millimeters	mm ²
ft²	square feet	0.093	square meters	m ²
yd²	square yard	0.836	square meters	m ²
ac	acres	0.405	hectares	ha
mi²	square miles	2.59	square kilometers	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft³	cubic feet	0.028	cubic meters	m ³
yd³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in²	poundforce per square inch	6.89	kilopascals	kPa
APPROXIMATE CONVERSIONS FROM SI UNITS				
SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm²	square millimeters	0.0016	square inches	in ²
m²	square meters	10.764	square feet	ft ²
m²	square meters	1.195	square yards	yd ²
ha	hectares	2.47	acres	ac
km²	square kilometers	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m³	cubic meters	35.314	cubic feet	ft ³
m³	cubic meters	1.307	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
TEMPERATURE (exact degrees)				
°C	Celsius	1.8C+32	Fahrenheit	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m²	candela/m ²	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	1
CHAPTER 1. INTRODUCTION.....	3
CHAPTER 2. LESSONS LEARNED FROM THE WORKSHOPS	5
COMMUNICATE A BROAD UNDERSTANDING OF CONGESTION PRICING CAPABILITIES, LIMITATIONS, AND CHALLENGES.....	5
DEVELOP STAKEHOLDER UNDERSTANDING OF THE FEDERAL PROGRAMS RELATED TO CONGESTION PRICING	6
FINDINGS FROM IMPLEMENTED PRICING PROGRAMS.....	8
BENEFITS OF CONGESTION PRICING	10
CHAPTER 3. CROSS-CUTTING ISSUES IDENTIFIED ACROSS THE WORKSHOP REGIONS	13
CHAPTER 4. KEY DEVELOPMENTS IN THE CANDIDATE REGIONS FROM PRE- TO POST-WORKSHOP	15
ILLINOIS DOT (IDOT) (I-290 AND I-55 TOLL LANE PROJECTS).....	15
OREGON DOT (ODOT).....	16
PENNSYLVANIA DOT (PENNDOT)	17
CHAPTER 5. KEY TAKEAWAYS AND NEXT STEPS.....	19
KEY TAKEAWAYS FOR IDENTIFYING GOALS AND OBJECTIVES	19
KEY TAKEAWAYS FOR CHALLENGES AND POTENTIAL SOLUTIONS IMPLEMENTING CONGESTION PRICING.....	19
NEXT STEPS (PLANNED BY THE CANDIDATE REGIONS).....	19
CHAPTER 6. RESOURCES.....	21
MANUALS/PRIMERS.....	21
EVALUATION REPORTS	21
WEBSITES	22

LIST OF FIGURES

Figure 1. Map. I-55 and I-290 HOT Lane Study Area.	15
Figure 2. Map. ODOT I-205 and I-5 Study Corridor for Value Pricing.....	16
Figure 3. Map. PennDOT I-279 HOV Lane Study Area.	17

ABBREVIATIONS AND SYMBOLS

BRT	Bus Rapid Transit
CRD	Congestion Reduction Demonstration
DOT	Department of Transportation
EL	Express Lane
FAST	Fixing America’s Surface Transportation
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FTE	Florida Turnpike Enterprise
GP	General Purpose
HOT	High-Occupancy Toll
HOV	High Occupancy Vehicle
IDOT	Illinois Department of Transportation
ISRRPP	Interstate System Reconstruction and Rehabilitation Pilot Program
ISTEA	Intermodal Surface Transportation Efficiency Act
MDX	Miami-Dad Expressway Authority
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
OTC	Oregon Transportation Commission
MnDOT	Minnesota Department of Transportation
PBOT	Portland Bureau of Transportation
PennDOT	Pennsylvania Department of Transportation
ROD	Record of Decision
RCPW	Regional Congestion Pricing Workshops
SAFETEA-LU	Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users
SOV	Single Occupancy Vehicle
SPC	Southwestern Pennsylvania Commission
TAP	Transit Access Pass
TEA-21	Transportation Equity Act for the 21st Century
UPA	Urban Partnership Agreement
VMT	Vehicle Miles Traveled
VPPP	Value Pricing Pilot Program

EXECUTIVE SUMMARY

The Federal Highway Administration (FHWA) supports efforts by State and local governments or other public authorities as they establish, maintain, monitor, and evaluate local congestion pricing programs. FHWA with support from the Battelle Team (Battelle and the Texas A&M Transportation Institute (TTI)) hosted a series of *Regional Congestion Pricing Workshops (RCPWs)* to further develop, advance, promote, and enhance tolling and pricing programs and initiatives in metropolitan areas. The workshops featured experts from operating projects who shared lessons learned from their experiences establishing congestion pricing programs. The information shared was designed to help workshop participants plan, implement, and advance a congestion pricing project in their region. The workshops were conducted through an interactive and knowledge sharing approach to encourage stakeholder engagement. This report focuses on the findings from three such workshops held between March 2016 and May 2017 in Schaumburg, Illinois; Pittsburgh, Pennsylvania; and Portland, Oregon. It details cross-cutting issues impacting participating stakeholders identified during the webinars, summarizes key developments achieved in the candidate regions since the webinars were hosted, and concludes with a summary of key takeaways and next steps based on stakeholder inputs and workshop experiences.

Through the RCPWs, the candidate regions were able to develop a critical understanding of the benefits and operational capabilities of congestion pricing in potentially enhancing corridor mobility performance. It also provided them with strategies to address equity concerns and how to present the benefits of congestion pricing in a way that could lead to critical political support. The RCPWs were successful in achieving awareness that subsequently led to stakeholders garnering the necessary political support permitting all three regions to make significant progress towards implementing their first congestion pricing project(s).

CHAPTER 1. INTRODUCTION

The Federal Highway Administration (FHWA), with the support of Battelle and the Texas A&M Transportation Institute (TTI), conducted three one-day Regional Congestion Pricing Workshops (RCPWs) in Schaumburg, Illinois; Pittsburgh, Pennsylvania; and Portland, Oregon.

The primary goal of the workshops was to provide technical support to State, regional, or local transportation agencies interested in deploying congestion pricing projects. These workshops involved stakeholders from the candidate regions and around the respective States. Workshop attendees included many representatives of various State Departments of Transportation (DOTs), regional and local transportation agencies, transit agencies, FHWA Division Offices, and support contractors.

The Illinois Department of Transportation (IDOT) hosted a one-day Congestion Pricing workshop on March 29, 2016 in Schaumburg, Illinois. The workshop involved stakeholders from the Chicago region and around the State. Participants included representatives of IDOT from both District 1 and State headquarters representing design, operations, programming, traffic, and executives, as well as FHWA's Illinois Division Office staff, PACE transit, and support contractors. IDOT is currently involved in the National Environmental Policy Act (NEPA) process and design for the deployment of high-occupancy toll (HOT) lanes on I-55. IDOT recently received a record of decision (ROD) for the I-290 project in the Chicago region. Local partners in the Chicago region expressed interest in hosting a workshop to discuss pricing implementation in the context of HOT lane development from an existing general purpose (GP) facility.

The Southwestern Pennsylvania Commission (SPC) hosted a one-day Congestion Pricing workshop on September 29, 2016 in Pittsburgh, Pennsylvania. The workshop included participation by stakeholders from the Pittsburgh region and around the State. This included numerous representatives of the Pennsylvania Department of Transportation (PennDOT) from both District 11 and headquarters, SPC, and support contractors with interest in investigating congestion pricing in the Pittsburgh region. One of the ideas under consideration is the conversion of the I-279 High Occupancy Vehicle (HOV) lanes to a HOT facility with congestion pricing.

The Oregon Department of Transportation (ODOT) hosted a one-day workshop on Congestion Pricing on May 5, 2017 in Portland, Oregon. The workshop engaged stakeholders from the Portland region and around the State. This included many representatives of ODOT, Portland Bureau of Transportation (PBOT), Oregon Metro, City of Portland, Federal Highway Administration, and support contractors. Members of the Oregon legislature expressed interest in conducting a workshop to understand the viability of tolling and congestion pricing options for generating revenue to support statewide and regional goals.

All three of these transportation agencies previously explored congestion pricing strategies. The workshop offered stakeholders an opportunity to meet with peers who have successfully

implemented congestion pricing projects to explore how to overcome potential challenges to implementing pricing in their region. Local partners in the three regions expressed interest in hosting workshops to explore available tolling options (e.g., pricing implementation in the context of HOT lane development from an existing HOV or GP facility). These workshops had a strong focus on exploration and discussion of a variety of pricing strategies. They additionally covered addressing implementation issues related to Federal, State, and local policies, effective public engagement, and integrating new advances in technology. The content addressed in each workshop varied, based on the objectives of the interested region.

Each workshop was designed to engage participants in discussions on:

- Congestion pricing concepts and strategies.
- Specific implementation issues, including:
 - Federal policy
 - Planning considerations
 - Design considerations
 - Operations & maintenance
- Peer operational and implementation case studies.
- Outreach and marketing.

This Lessons Learned report includes a summary of stakeholder understanding, key developments, cross-cutting issues, key takeaways and next steps. Key reference materials available for congestion pricing are provided at the end of this document.

CHAPTER 2. LESSONS LEARNED FROM THE WORKSHOPS

The following topics were discussed:

COMMUNICATE A BROAD UNDERSTANDING OF CONGESTION PRICING CAPABILITIES, LIMITATIONS, AND CHALLENGES

A. Capabilities:

- i. Congestion Pricing is a better alternative for traffic management, instead of adding capacity.
- ii. Through a traffic demand based dynamic congestion pricing approach, traffic demand could be diverted to alternate travel modes and off-peak periods.
- iii. As the congestion pricing encourages Heavy Occupancy Vehicles (HOV), an increased person throughput can be achieved for the selected transportation facility.
- iv. Existing funding to transportation facilities is limited. Congestion pricing can generate revenue to address some of the funding issues (pricing represents a fundamental shift in funding approach).
- v. Congestion pricing has the potential to demonstrate significant improvements in air quality.

B. Limitations:

- i. Perception that if the entire facility is tolled, congestion pricing might be regressive on those who can least afford it.
- ii. Limited availability of Federal Highway Administration (FHWA) allotted slots for the pricing programs. Currently, 13 out of the 15 Value Pricing Pilot Program (VPPP) slots are granted for 11 State-led and 2 city-led programs. Similarly, 1 out of the 3 Interstate System Reconstruction and Rehabilitation Pilot Program (ISRRPP) slots are granted for Missouri State-led I-70 project.
- iii. All Federal-aid projects require National Environmental Policy Act (NEPA) based environmental review or alter previous commitments.

C. Challenges:

- i. Developing public acceptance and political support are two major challenges for the progression of Congestion Pricing, as there is limited awareness about the concept of managing congestion through pricing and its benefits. Identification of proper political champions outside the transportation department is an imperative characteristic in developing support for the congestion pricing program.
- ii. Location of access points is a key issue for design and operation of congestion pricing. Especially, in the areas that have high ramp density, the access points should be located at an appropriate distance from entry and exit ramps to mitigate quick maneuvers within short distances in general purpose (GP) lanes.

- iii. Interoperability of the candidate region tolling system with the neighboring tolling systems is a key issue. Lack of interoperability might lead to confusion among the travelers about the tolling operations and rules.

DEVELOP STAKEHOLDER UNDERSTANDING OF THE FEDERAL PROGRAMS RELATED TO CONGESTION PRICING

Four Federal programs provide authority to a region to implement congestion pricing when Federal-aid transportation funds are used to support a project. Presented below are the four Federal programs for congestion pricing. Detailed explanation of these programs can be found in the FHWA's Tolling Programs Website¹.

- 1) Section 166, HOV/High-Occupancy Toll (HOT) lanes: Under Section 166 of Title 23, existing HOV lanes may be converted to tolled operation provided that the local Metropolitan Planning Organization (MPO) endorses the use and number of tolls on the converted lanes. All tolls on new lanes must be variably priced and collected electronically to manage travel demand. To implement tolls on an existing HOV lane, project sponsors must demonstrate that the conditions on the facility are not already degraded and that the presence of paying vehicles will not cause conditions to become degraded. Ongoing annual reports documenting conditions on the converted lanes is also required, and if the HOV facility becomes degraded the sponsor must bring the facility into compliance either by increasing HOV occupancy requirements, increasing tolls, increasing capacity, or eliminating access to paying motorists.

The following certification provisions apply whenever an HOV lane is converted to HOT operations under Section 166:

- a. States must annually certify to FHWA that they meet the operational requirements stipulated in Section 166, including vehicle eligibility; enforcement; and operational performance monitoring, evaluation and reporting. The annual certifications must demonstrate that the presence of paying vehicles in the HOT lane has not cause traffic service to become degraded.
 - b. States must demonstrate that programs are in place to inform motorists how they may enroll and use the managed lane, either in a non-paying HOV vehicle or a paying HOT vehicle.
 - c. States must indicate that they have, or will have, an automated electronic toll collection system in place on the managed lanes.
- 2) Section 129, General Tolling Program: Section 129 provides authority for tolling Federal-aid highways in conjunction with new construction or other improvements to those highways. The passage of MAP-21 made significant changes to the Federal Section 129 Tolling Program including tolling eligibilities and agreement requirements. These changes have relaxed the prior, general prohibition on the imposition of tolls on Federal-aid highways and formalized provisions previously available through pilot programs. Public agencies may impose new tolls on Federal-aid highways in the following cases:

¹ https://www.fhwa.dot.gov/ipd/tolling_and_pricing/tolling_pricing/federal_tolling_programs.aspx

- a. Initial construction of a new highway, bridge, or tunnel.
 - b. Initial construction of new lanes on highways, bridges, and tunnels (including Interstates), provided the number of toll-free lanes is not reduced.
 - c. Reconstruction or replacement of a bridge or tunnel.
 - d. Reconstruction of a highway (other than an Interstate).
 - e. Reconstruction, restoration, or rehabilitation of an Interstate highway, if the number of toll-free lanes is not reduced.
- 3) Value Pricing Pilot Program (VPPP): The Value Pricing Pilot Program (VPPP) was initially authorized in Intermodal Surface Transportation Efficiency Act (ISTEA) as the Congestion Pricing Pilot Program and subsequently amended under other laws, most recently Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The program has encouraged implementation and evaluation of value pricing pilot projects to manage congestion on highways through tolling and other pricing mechanisms. The VPPP is limited to 15 slots.

MAP-21 made no changes to the program, and no additional funds have been authorized after Fiscal Year 2012. However, FHWA encourages use of the Section 129 General Tolling Program and Section 166 HOV/HOT Lanes program wherever possible, as opposed to the VPPP. Moving forward, requests for tolling authority under VPPP will be limited to situations that cannot be accommodated under the mainstream tolling programs, such as the pricing of existing toll-free facilities without substantial reconstruction of those facilities.

- 4) Interstate System Reconstruction and Rehabilitation Pilot Program (ISRRPP): The ISRRPP was authorized under Section 1216(b) of the Transportation Equity Act for the 21st Century (TEA-21) to permit up to three existing Interstate facilities to be tolled to fund needed reconstruction or rehabilitation on Interstate corridors that could not otherwise be adequately maintained or functionally improved without the collection of tolls. Each of the three facilities must be in different States. There is no special funding authorized for this program. To receive tolling authority under the program, project sponsors are required to have their program application approved by FHWA and to execute a tolling agreement.

The Fixing America's Surface Transportation (FAST) Act Section 1411 (c) amended the ISRRPP authorized under Section 1216(b) of TEA-21. First, the FAST Act adds the specific selection criterion that "a State has the authority required for the project to proceed." This acknowledges the key role that the State legislative authority has in implementing the ISRRPP. Second, the FAST Act specifies timeframes under which States with provisional approvals must complete the program's requirements. Any State receiving a provisional approval will have three years from the date of the approval to fully satisfy the program criteria, complete environmental review under NEPA, and execute a toll agreement with the FHWA. Lastly, the FAST Act allows for a one-year extension of the three-year provisional approval if the State demonstrates material progress toward implementation of its pilot project. The FAST Act gave the States

holding provisional approvals at the time the FAST Act was enacted one year to meet the program criteria or request an extension for an additional year. At this time, all three slots remain available. Upon approval of the program, selected States are required to execute an agreement with FHWA that toll collection must occur for at least 10 years.

FINDINGS FROM IMPLEMENTED PRICING PROGRAMS

While pricing of managed lanes has been in place for over 20 years, most of the projects have been conversions of existing HOV lanes into HOT lanes. These are the first-generation projects. For transportation agencies that have not implemented congestion pricing before, HOV to HOT conversion is a safe first step.

Many of the experts who participated in the workshops shared their experiences in addressing the evolution from first-generation pricing strategies into more complex express toll lanes using new or expanded capacity. These types of projects are referred to in the tolling and pricing community as “second-generation pricing projects.” Second-generation projects typically include strategies to apply variably priced lanes and variable tolls on entire roadways. Pricing changes throughout the day, either on a variable daily schedule or dynamically based on the level of congestion and demand for the managed lanes. The second-generation movement also includes the implementation of integrated networks of priced roadways within urban regions.

While the first-generation HOT lanes were relatively simple facilities with limited points of access and egress, many newer priced managed lane projects include multiple access points that integrate them with multiple activity centers.

Minneapolis/St. Paul Region

The greater Minneapolis-St. Paul region implemented three managed lane projects: on I-394, I-35W and I-35 E. Each facility started as HOV lanes and was subsequently converted to HOT lanes under the MnPASS program. The I-394 conversion resulted when the under-utilized HOV lane came under increased political and public scrutiny. The first MnPASS managed lanes were opened along the 11-mile corridor on I-394 in 2005 and featured dynamic pricing. These were the first HOT lanes to use double-striped lines rather than physical barriers.

The I-35W MnPASS lanes, supported under the Urban Partnership Agreement (UPA) program, were opened in 2009 and included 8 miles of an HOV to HOT conversion, plus a 3-mile priced dynamic shoulder lane. The dynamic shoulder lane is used as a price-managed lane during peak periods, and then returned to a shoulder during off-peak periods. The priced dynamic shoulder lanes were an outgrowth of the region's system of bus-only shoulders and were considered a better way of utilizing existing infrastructure as an interim solution.

Both the I-394 and I-35W MnPASS lanes are considered first generation priced facilities in that they converted existing HOV lanes into HOT lanes, with the I-35W project having additionally converted an existing shoulder into a peak period HOT lane. The move into second generation priced facilities occurred in 2016, when MnPASS added new lanes to a 4-mile section of I-35E, north of St. Paul through a combination of lane additions and an innovative time-period-based approach through the I-35E/I-694 commons area. Because there was no need to add lanes

through the recently reconstructed commons area, Minnesota DOT (MnDOT) decided to convert the inside southbound general-purpose lane to a HOT lane during the morning peak period. In the northbound direction through the commons, there is no HOT lane designation. This novel approach is being evaluated for one to two years, and modifications may be made depending on the evaluation results.

Southeast Florida

In Miami, single HOV lanes in I-95 (95 Express) were expanded to two HOV lanes in each direction. This project was planned in two phases to expand a 20-mile corridor. The first phase was deployed in 2009. The initial 7-mile I-95 express facility converted a single HOV lane each way into two HOT lanes in each direction. The extra lane was created by narrowing the travel lanes from 12 feet to 11 feet, and narrowing the shoulders. Additionally, the existing HOV lane buffer was reduced to 1 foot of separation between the general use lanes and the proposed managed lanes. Construction also included some bridge and interchange improvements to maintain continuity of the dual managed lane facility. The design included pylon separation rather than concrete barriers, because of limited right of way. Innovative operational aspects of the project included shifting from HOV-2 to HOV-3 eligibility and requiring eligible carpools to register with the local ride-sharing agency. These characteristics differentiate I-95 from a conventional HOV to HOT conversion project.

The I-95 project was the first step in creating a two-county network of express toll lanes. Phase 1-A of the project, the southern half of northbound lanes, opened in 2008. Phase 1-B opened in 2010. The 2nd Phase began in 2015, extending the lanes 14 miles northward. The complete 95 Express facility was made operational in 2016. Since opening, the 95 Express has had a positive effect on travel in South Florida. The tolling, transit, travel demand management, and technology strategies have increased travel speeds by 200 percent in the general-purpose lanes and by 300 percent in the express lanes, while increasing transit usage by 360 percent since launch, due to the introduction of new express routes and additional buses.

Given the success of the 95 Express project, Florida DOT (FDOT) and its partners developed a plan to construct multiple Express Lane (EL) corridors across the Southeast Florida region to create an EL network. Four entities – FDOT District 4, FDOT District 6, FDOT Florida's Turnpike Enterprise (FTE), and the Miami-Dade Expressway Authority (MDX) – will be involved in the EL network deployment.

Los Angeles

In November 2012 and February 2013, respectively, Metro in Los Angeles converted the car pool lanes on I-110 and I-10 into HOT lanes. These HOT lanes are freely accessible for HOV 2+, transit vehicles, and clean air vehicles. However, single occupancy vehicles pay tolls at all times. An LA metro survey found that a major share of the residents in the tolling corridor are represented by low income groups. To enhance and encourage the low-income group usage of express lanes, LA metro implemented programs like carpool loyalty, Transit Access Pass (TAP) rewards, and low-income assistance plans. These programs offered regular incentives to commuters using carpools and transit services.

San Diego

Using a VPPP grant from FHWA, San Diego was the first conversion of HOV lanes into a HOT facility in 1988. Renamed FasTrak, the purpose of the original I-15 HOT lane was to better utilize the HOV lane and ensure fast, reliable transit service. The managed lane operation was simple in that there was only one entry and exit point. Revenues from the HOT lane were allocated to new corridor transit service, providing an additional travel choice to users.

The success of the HOT lane conversion on I-15 led to a major freeway reconstruction / expansion effort in 2012 between SR 163 and SR 78. This project added two HOT lanes in the existing section to create a bi-directional four-lane facility and extended the project north by 12 miles, completing a 20-mile barrier-separated HOT facility. The managed lanes have a movable barrier that can allow various combinations of operations for the four combined HOT lanes and multiple access points to the general-purpose highway lanes. In addition, direct access ramps, park-and-ride lots, and transit stations were added along the HOT lane section.

The HOT lanes allow HOV 2+ and transit to travel free of charge, while single-occupancy vehicles (SOV) can buy into the lanes using dynamic pricing. This operation allows demand to be fully managed throughout the HOT lane facility. The initial HOT Lane project included a new express bus service. Further expanded as part of the second-generation project, a 35-mile all-day Bus Rapid Transit (BRT) line was implemented in 2014 connecting Escondido to downtown San Diego via the I-15 Express Lanes - branded as "Rapid". Five direct connector ramps allow BRT vehicles (and carpools/ vanpools/SOV toll users) access to off-line BRT stations and park-and-ride facilities. These connector ramps and stations are spaced roughly every four miles.

I-15 FasTrak currently generates toll revenues of nearly \$1 million per year for BRT service in the I-15 corridor. After covering operating expenses, the remaining revenues are earmarked to be spent on improving corridor transit service, an arrangement that helped to gain political and public acceptability of the project.

BENEFITS OF CONGESTION PRICING

The core values of congestion pricing are to reduce the existing traffic congestion through implementation of pricing programs and improve the transportation facilities through the revenue generated. In locations where existing or anticipated excess HOV lane capacity is available, conversion to a HOT lane facility is encouraged as a way to increase throughput and to provide additional travel options for drivers. As part of an overall approach to respond to increased travel demand and address traffic congestion, HOV and HOT lanes can be a practical alternative to adding more general-purpose travel lanes. The FHWA encourages the implementation of HOV or HOT lanes as an important part of an area-wide approach to help metropolitan areas address their requirements for improved mobility, safety, and productivity, while also being sensitive to environmental and quality of life issues. The following system level benefits could be identified by the implementation of congestion pricing:

- 1) Reduced congestion through managed corridor traffic.
- 2) Improvement in usage of public transportation modes.
- 3) Increased funding for transportation facilities.

- 4) Improved usage of alternate routes.
- 5) Reliable trip travel time.

CHAPTER 3. CROSS-CUTTING ISSUES IDENTIFIED ACROSS THE WORKSHOP REGIONS

Across the workshops, the following issues were raised commonly by the stakeholders and representatives.

How do agencies address the critique, “Is tolling (i.e., congestion pricing) just double taxation?”

- Agencies commonly provide alternatives other than tolled, or priced options, such as carpooling or taking transit. Agencies also describe scenarios with limited revenue used for transportation (e.g., no gas tax increase over a number of years) and increased congestion. One common example is the need for a traveler to pick up a child at daycare. The traveler would rather pay the cost of the toll than to arrive later and pay more for daycare.

How do agencies develop public acceptance and political support for Congestion Pricing Programs?

- To gain public acceptance for the program, in addition to holding public meetings, agencies conduct comprehensive public education about the benefits of reduced congestion through implementation of pricing programs.
- To gain political support, agencies commonly cultivate project champions that foster the Congestion Pricing Initiative. A champion may be an elected official, community leader, or individual from private sector. It is beneficial to have champion outside transportation sector.

Did you have to get Federal Highway Administration (FHWA) permission to convert the existing general purpose (GP) lane to a High Occupancy Vehicle (HOV)/High-Occupancy Toll (HOT) lane?

- Taking MnPass as an example, the conversion was a recommendation of a Value Pricing Pilot Program (VPPP) study, and the performance of the remaining GP lanes are not expected to be affected given the available capacity. MnDOT has a memorandum of understanding with FHWA under Section 166 authority.

What criteria helps define the process to select a pricing strategy?

- Based on existing practice, the selection process relies on an assessment of various feasibility considerations, driven by the program goals and overall regional and statewide planning efforts. These feasibility considerations are part of a conceptual planning process that identifies and addresses different elements of an initial comprehensive implementation plan. Commonly, the plan details an examination of issues related to institutional capability (e.g., tolling authority, legal, staff), design (e.g., possibility of

physical construction), operations (e.g., daily functional practicality), implementation (e.g., project phasing, opening), financial, and public and political support.

What are some high-level goals and objectives to consider when thinking about deploying congestion pricing?

- Typically, agencies that implemented congestion pricing have either prioritized congestion management or revenue generation. Other objectives include improving travel time reliability; increasing transit serviceability and ridership; movement of commercial goods and services; supporting community land use and development goals; or improving air quality. Prioritization of goals should be undertaken because not all objectives align.

How does an operating agency decide to increase capacity in HOV-HOT conversion lanes?

- Agencies make operational and tolling decisions by regularly monitoring performance to assess the aspects that are operating poorly. Agencies also estimate the impact of various operational changes (e.g., increasing the occupancy requirement or changing the toll rate) by using engineering judgement and microsimulation modeling.

What should we do to start the conversation and build the narrative?

- Successful project sponsors have typically justified congestion pricing by tying overall program goals to specific measures, and showing how implementation can improve performance. For example, if improving congestion is a goal, showing how pricing would reduce trip times and offer a route without degraded delay. Depending upon the strategy, transit services, carpools, and single occupant vehicles can all use the priced facility without encountering delay — an option that did not previously exist. Sponsors need to articulate benefits and clearly stipulate the type and amount of investment needed. Public engagement and education is critical and needs to occur early during the project development process.

Could you do congestion pricing if you have ramp metering involved?

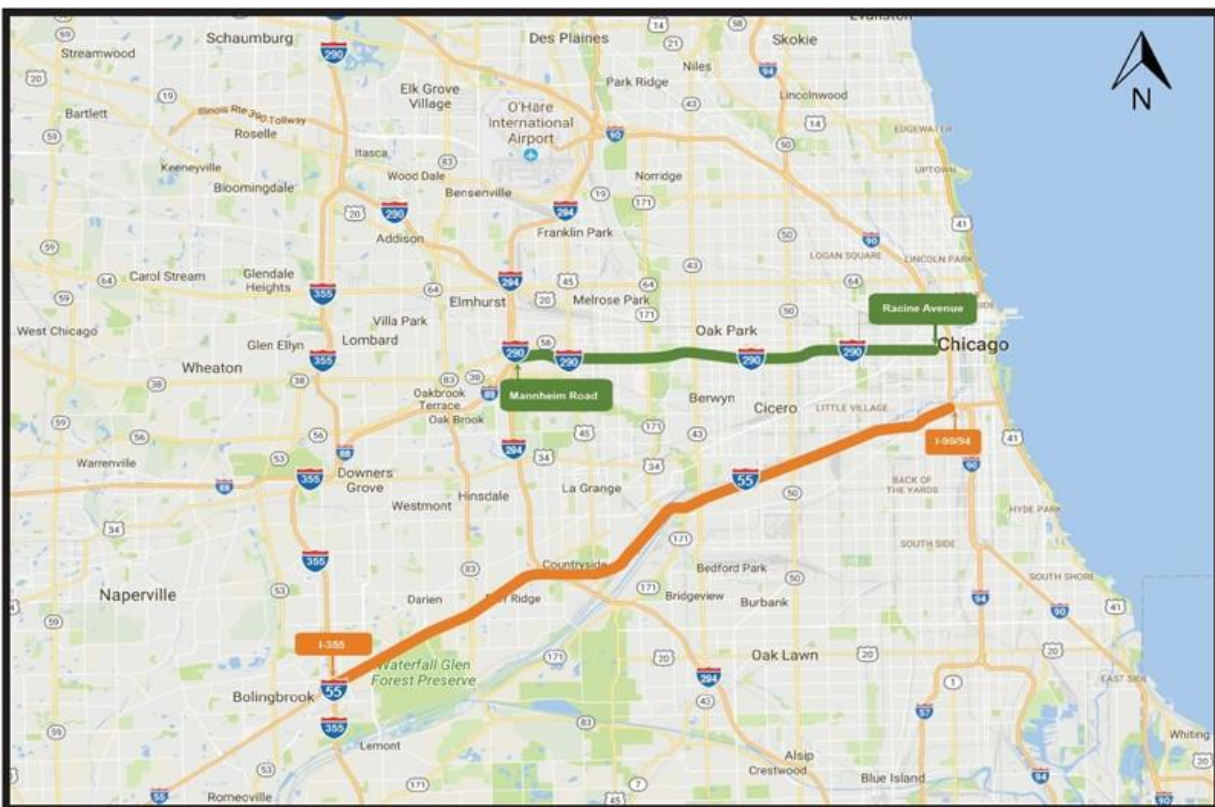
- Yes, agencies can implement ramp metering in concert with congestion pricing and other active traffic management strategies. California and Minnesota are examples of States that operate ramp metering for corridors with priced managed lanes facilities. For those corridors, it would be best to house the operation of the managed lane in the same traffic management center as the ramp metering operation.

CHAPTER 4. KEY DEVELOPMENTS IN THE CANDIDATE REGIONS FROM PRE-TO POST-WORKSHOP

After the workshops were held, most candidate regions were successful in making progress in planning, development, and implementation of congestion pricing project activities. Importantly, agencies strengthened the political and technical support for implementation of pricing programs in their respective areas, and enhanced stakeholder awareness on the role of value pricing programs to improve the efficiency in corridor traffic management. Key developments by Chicago and Portland observed following their respective workshops are presented below.

ILLINOIS DOT (IDOT) (I-290 AND I-55 TOLL LANE PROJECTS)

In 2016, IDOT identified I-290 as the potential first congestion priced project. Currently, the State is exploring which of Federal Highway Administration's (FHWA's) two pilot tolling programs might provide the type of tolling authority sought. The two programs under consideration are the Interstate System Reconstruction and Rehabilitation Pilot Program (ISRRPP) and the Value Pricing Pilot Program (VPPP). IDOT has completed the Record of Decision for I-290. In the case of I-55 HOT lane deployment on a 25-mile stretch, the State indicated that it is still in the process and design stage. IDOT is also investigating public private partnership funding methods to enhance the progress of I-55 toll lane project. A complete overview of I-55 and I-290 High-Occupancy Toll (HOT) lane corridor is presented in Figure 1.

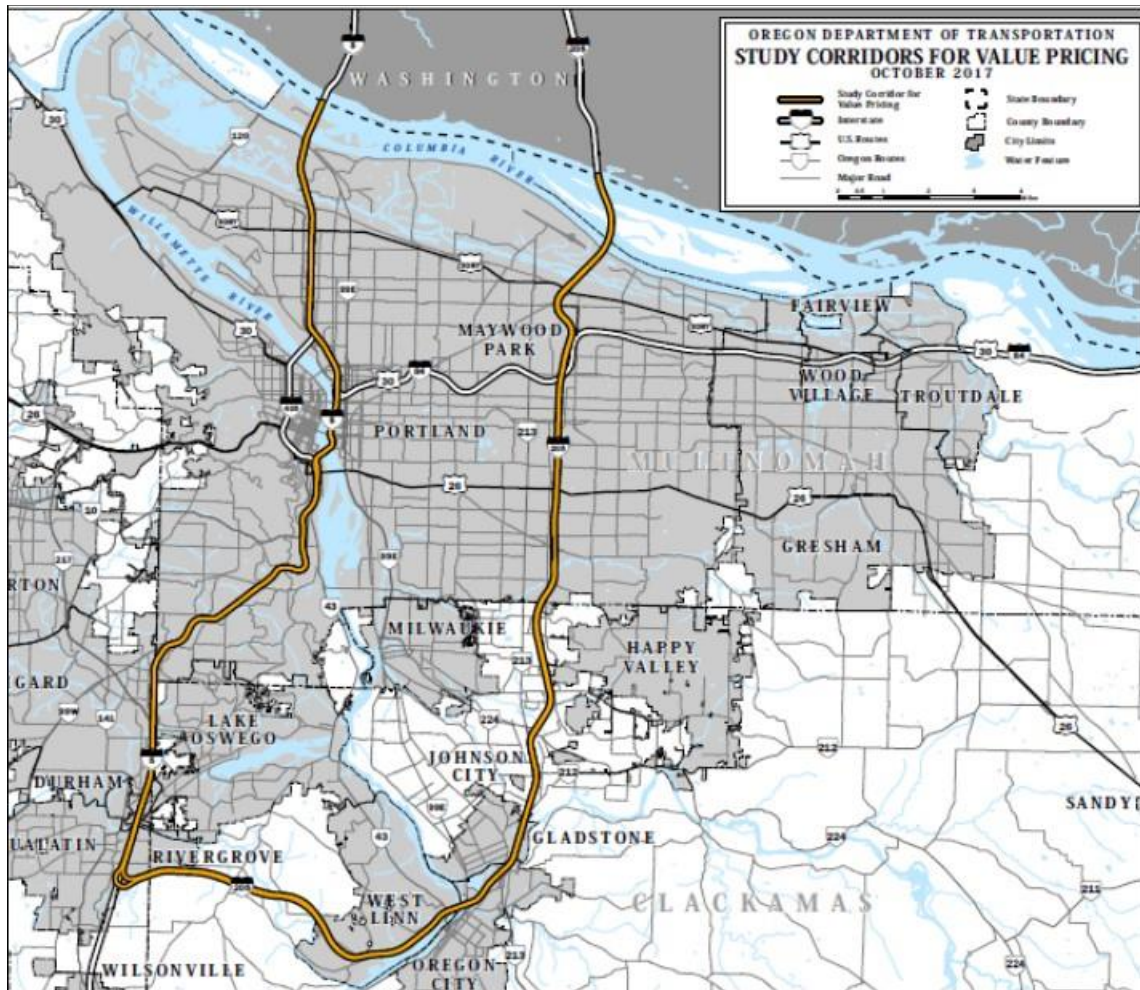


Source: IDOT

Figure 1. Map. I-55 and I-290 HOT Lane Study Area.

OREGON DOT (ODOT)

The Governor signed a Bill on August 18, 2017 effective October 6, 2017 that directs the Oregon Transportation Commission (OTC) to establish a traffic congestion relief program. This includes, but is not limited to, implementing variable time-of-day pricing based on traffic congestion. The OTC is directed to seek necessary approval from FHWA to implement value pricing. It requires that value pricing be implemented, upon receipt of FHWA approval, on Interstate 205 and on Interstate 5 between the interchange with Interstate 205 and the Washington border; authorizes OTC to implement congestion pricing in other areas of the State; and creates a Congestion Relief Fund specifying that revenues from value pricing are to be deposited into the fund. Figure 2 below presents a depiction of the I-205 and I-5 value pricing study corridor). ODOT is planning to engage in dialogue with all regional stakeholders to discuss the alternatives and establish the best pricing plan for the selected corridor. ODOT is also planning to evaluate the Federal government's tolerance limits for tolling prices and request for waivers, if required.

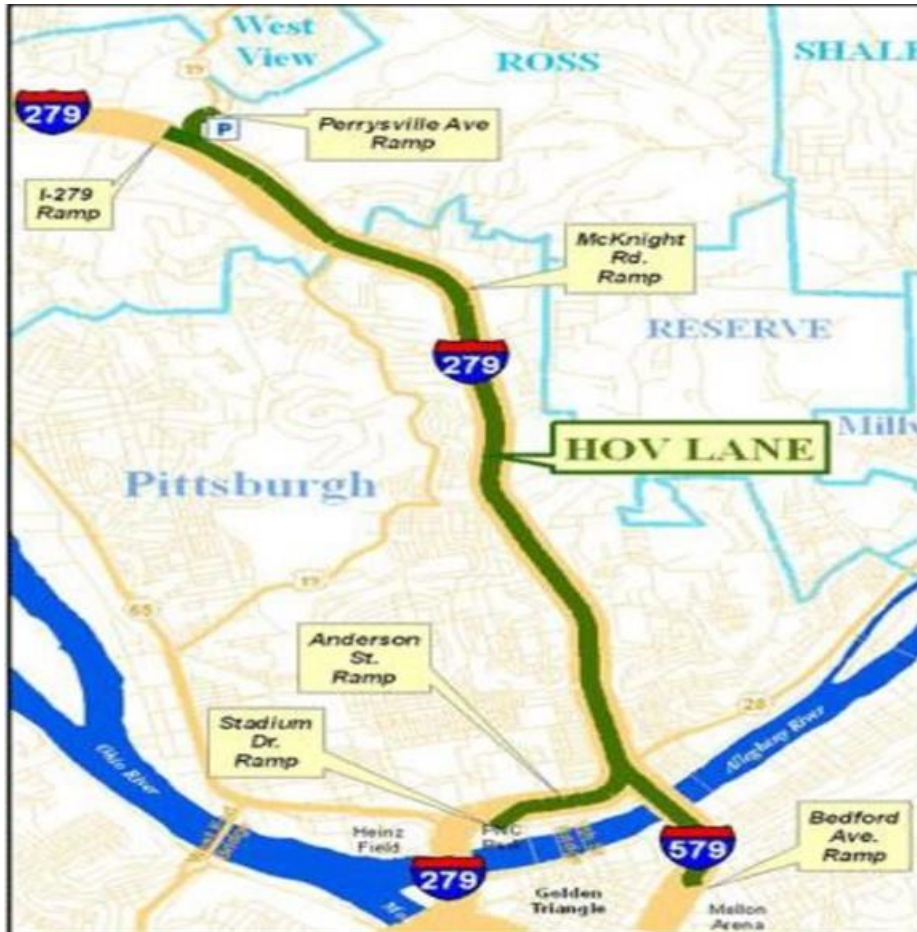


Source: ODOT

Figure 2. Map. ODOT I-205 and I-5 Study Corridor for Value Pricing.

PENNSYLVANIA DOT (PENNDOT)

Following the workshop, SPC desires to study the conversion from HOV to HOT lane facility. Figure 3 below depicts the area of interest for possible consideration of congestion pricing. Currently, PennDOT has a reversible two-lane HOV facility on I-279.



Source: PennDOT

Figure 3. Map. PennDOT I-279 HOV Lane Study Area.

CHAPTER 5. KEY TAKEAWAYS AND NEXT STEPS

Based on workshop experiences and stakeholder inputs, the following key takeaways and planned next steps were identified from the workshop regions.

KEY TAKEAWAYS FOR IDENTIFYING GOALS AND OBJECTIVES

- Managing congestion should be a primary motivation and generating revenue second.
- Public acceptance is critical – utilize advisory groups, outreach meetings, political champions. Public engagement is critical and needs to occur early during the project development process.
- Clean air and emissions reduction; vehicle miles traveled (VMT) reduction are important.
- System reliability; mode shift is an essential component.
- Safe and efficient travel for the public is important.
- Consider social equity — concerns about ability to pay tolls, elderly, lower income.

KEY TAKEAWAYS FOR CHALLENGES AND POTENTIAL SOLUTIONS IMPLEMENTING CONGESTION PRICING

- Impacts (costs to local roads; community impacts) on diversion should be considered.
- Travelers may make trip decisions based on long versus short trip cost implications.
- Tolling can impact discretionary trips.
- Collection of pre- and post-deployment traffic data will be critical to show the potential impact of the congestion pricing approach.

NEXT STEPS (PLANNED BY THE CANDIDATE REGIONS)

- Consider doing a Memorandum of Understanding (MOU); get all of the right people at the table.
- Continue dialogue to define goals, objectives, and outcomes.
- Get more information on cordon pricing.
- Get more information on when and how you pick a third-party concessionaire.

CHAPTER 6. RESOURCES

Many key resources are available to support the development and implementation of Congestion Pricing. These include:

MANUALS/PRIMERS

- FHWA Priced Managed Lane Guide
 - <http://www.ops.fhwa.dot.gov/publications/fhwahop13013/index.htm>
- NCHRP Report 686: Road Pricing – Public Perceptions and Program Development
 - http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_686.pdf
- FHWA Guidebook for State, Regional, and Local Governments on Addressing Potential Equity Impacts of Road Pricing
 - <http://ops.fhwa.dot.gov/publications/fhwahop13033/index.htm>
- FHWA Roles of Transportation Management Centers in Incident Management on Managed Lanes
 - <http://www.ops.fhwa.dot.gov/publications/fhwahop14022/index.htm>
- NCHRP Report 777: A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events
 - http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_777.pdf
- Federal-Aid Highway Program Guidance on High Occupancy Vehicles (HOV) Lanes
 - <http://www.ops.fhwa.dot.gov/freewaymgmt/hovguidance/>
- Effective Approaches for Advancing Congestion Pricing in a Metropolitan Region
 - <http://www.ops.fhwa.dot.gov/publications/fhwahop12030/index.htm>
- Advancing Congestion Pricing in the Metropolitan Transportation Planning Process: Four Case Studies
 - <http://www.ops.fhwa.dot.gov/publications/fhwahop11002/index.htm>
- FHWA Congestion Pricing Primer Series
 - http://www.ops.fhwa.dot.gov/congestionpricing/resources/primers_briefs.htm

EVALUATION REPORTS

- Urban Partnership Agreement/Congestion Reduction Demonstration (UPA/CRD) National Evaluation Reports, Travel Behavior Studies, and Updates
 - Contemporary Approaches in Congestion Pricing: Lessons Learned from the National Evaluation of Congestion Pricing Strategies at Six Sites
 - http://ntl.bts.gov/lib/55000/55600/55668/UPA_2015_Final_9-17-15.pdf
 - Lessons Learned on Congestion Pricing from the Seattle and Atlanta Household Travel Behavior Surveys
 - http://ntl.bts.gov/lib/54000/54000/54065/UPA-CRD_Panel_Survey_Lessons_Learned_Final_Report_Volpe.pdf
 - Minnesota (I-35W HOT Lanes)
 - Report: http://www.dot.state.mn.us/rtmc/reports/hov/20130419MnUPA_Evaluation_Final_Rpt.pdf

- Seattle (SR 520 Bridge)
 - Report: http://ntl.bts.gov/lib/54000/54400/54470/120214_seattle_upa_final_report.pdf0.pdf
 - Panel Study: http://ntl.bts.gov/lib/54000/54000/54063/UPA_Panel_Survey_Seattle_Final_Report_Volpe.pdf
- Atlanta (I-85 Express Lanes)
 - Report: <http://ntl.bts.gov/lib/54000/54000/54072/14-152.pdf>
 - Panel Study: http://ntl.bts.gov/lib/54000/54000/54062/CRD_Panel_Survey_Atlanta_Final_Report_Volpe.pdf
 - Equity Impacts noted in Panel Study: http://ntl.bts.gov/lib/54000/54000/54064/UPA-CRD_Panel_Survey_Equity_Final_Report_Volpe.pdf
- Los Angeles (I-10 and I-110 Express Lanes & LA Express Park™)
 - Report: <http://ntl.bts.gov/lib/55000/55600/55669/FHWA-JPO-14-126-1.pdf>
 - Website: <https://www.metroexpresslanes.net/en/home/index.shtml>
- San Francisco (SFpark)
 - Report: http://ntl.bts.gov/lib/54000/54900/54928/032515_rev_san_fran_508_final_FHWA-JPO-14-128.pdf
- Miami (95 Express Lanes)
 - Website: <http://www.95express.com>

WEBSITES

- FHWA's Congestion Pricing Website
 - <http://www.ops.fhwa.dot.gov/congestionpricing>
- FHWA's Congestion Pricing Webinar Series
 - <http://www.ops.fhwa.dot.gov/congestionpricing/webinars/index.htm>
- FHWA's Urban Partnership Agreement (UPA) Website
 - http://www.ops.fhwa.dot.gov/congestionpricing/urb_partner_agree.htm
- FHWA's Congestion Reduction Demonstration (CRD) Website
 - http://www.ops.fhwa.dot.gov/congestionpricing/cong_reduc_demo.htm
- FHWA's Value Pricing Pilot Program (VPPP) Website
 - http://www.ops.fhwa.dot.gov/congestionpricing/value_pricing/index.htm
- High-Occupancy Vehicle/Managed Use Lane Pooled Fund Study (HOV/MUL PFS) Website:
 - <https://ops.fhwa.dot.gov/freewaymgmt/hov.htm>



U.S. Department of Transportation
Federal Highway Administration

U.S. Department of Transportation
Federal Highway Administration
Office of Operations (HOP)
1200 New Jersey Avenue, SE
Washington, DC 20590

<https://ops.fhwa.dot.gov>

FHWA-HOP-18-015
November 2017