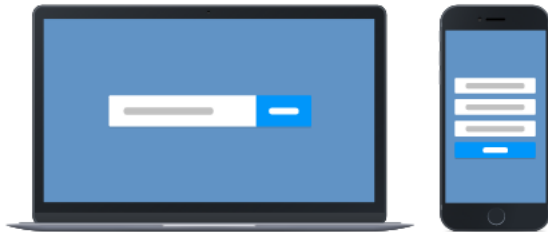


We will have a survey during the presentation using your cell phones or computers. Below are instructions on how to join the survey.

Web



Text



- 1 Go to **PolleEv.com**
- 2 Enter **HAPPYGARDEN061**
- 3 Respond to activity

- 1 Text **HAPPYGARDEN061** to **22333**
- 2 Text in your message

Past, Present, and Future of Priced Managed Lanes

2020 Purdue Road School

Ron Davis, P.E., PMP
Ganapathi Badireddi,
EIT

March 10, 2020



**CDM
Smith**

WATER + ENVIRONMENT + **TRANSPORTATION** + ENERGY + FACILITIES

Back in 2008



Feasibility of High Occupancy Toll (HOT) Lanes for Indiana

11-10-08

Ron Davis
Transportation Engineering
Advisor Dr. Kumares Sinha



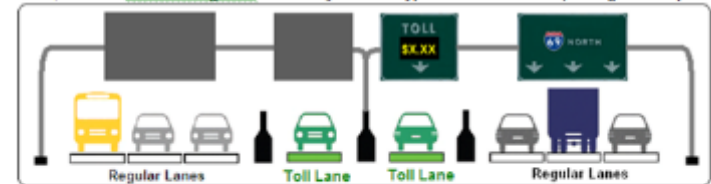
1

Survey for PURDUE UNIVERSITY Grad Student Ron Davis' Research Participants must be 18. You may skip any question you are uncomfortable with.

Figure 1: Map of North Indianapolis



Questions 9 - 14 Figure 2: Cut-away view of hypothetical toll lanes (Facing NORTH)



Questions 9 - 14 Figure 3: Top view with hypothetical toll lanes



Outline

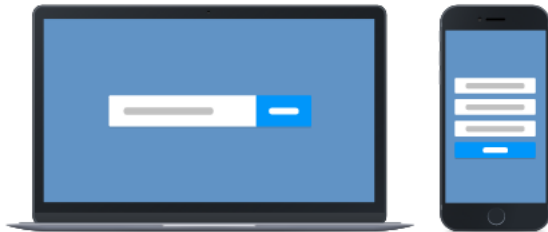
- Audience Polling
- Introduction and Benefits of Priced Managed Lanes
- Overall Sector Developments and Trends
- Facilities in Operation and Under Construction
- Historical and Future Growth
- Revenue



Audience Polling

We will have a survey during the presentation using your cell phones or computers. Below are instructions on how to join the survey.

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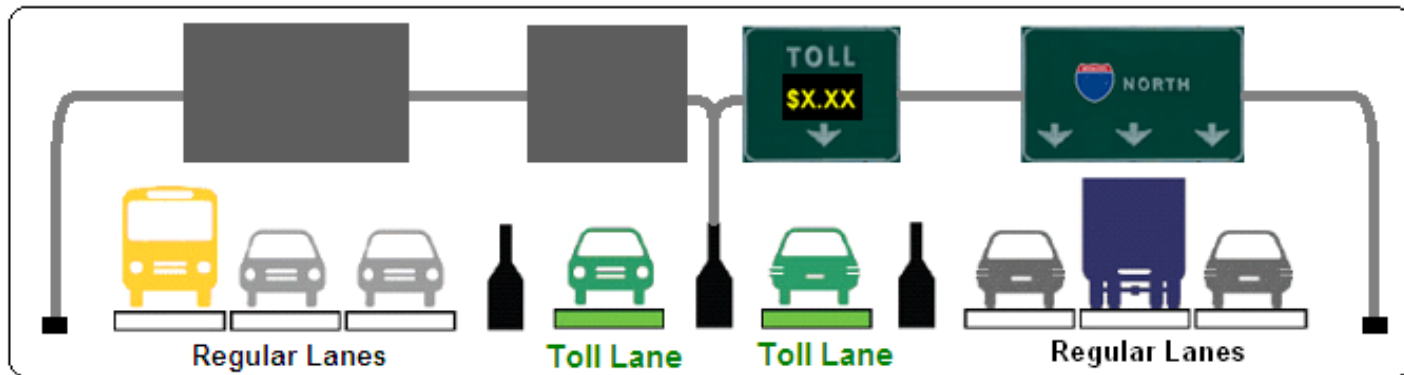
- 1 Text **HAPPYGARDEN061** to **22333**
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Introduction and Benefits

Priced Managed Lanes

- Priced Managed Lanes
 - HOT Lanes
 - Express Lanes
- Toll lanes set apart from “general purpose” highway lanes for congestion management



Why Priced Managed Lanes vs Traditional Highway Widening

- Ensure congestion benefit in the long term
- Encourage carpooling
- Allow buses to travel at high speeds
- All electronic tolling allows congestion pricing without congestion of traditional toll booth.

Virginia I-495 Express Lanes

ML On-ramp

2 priced lanes

GP On-ramp

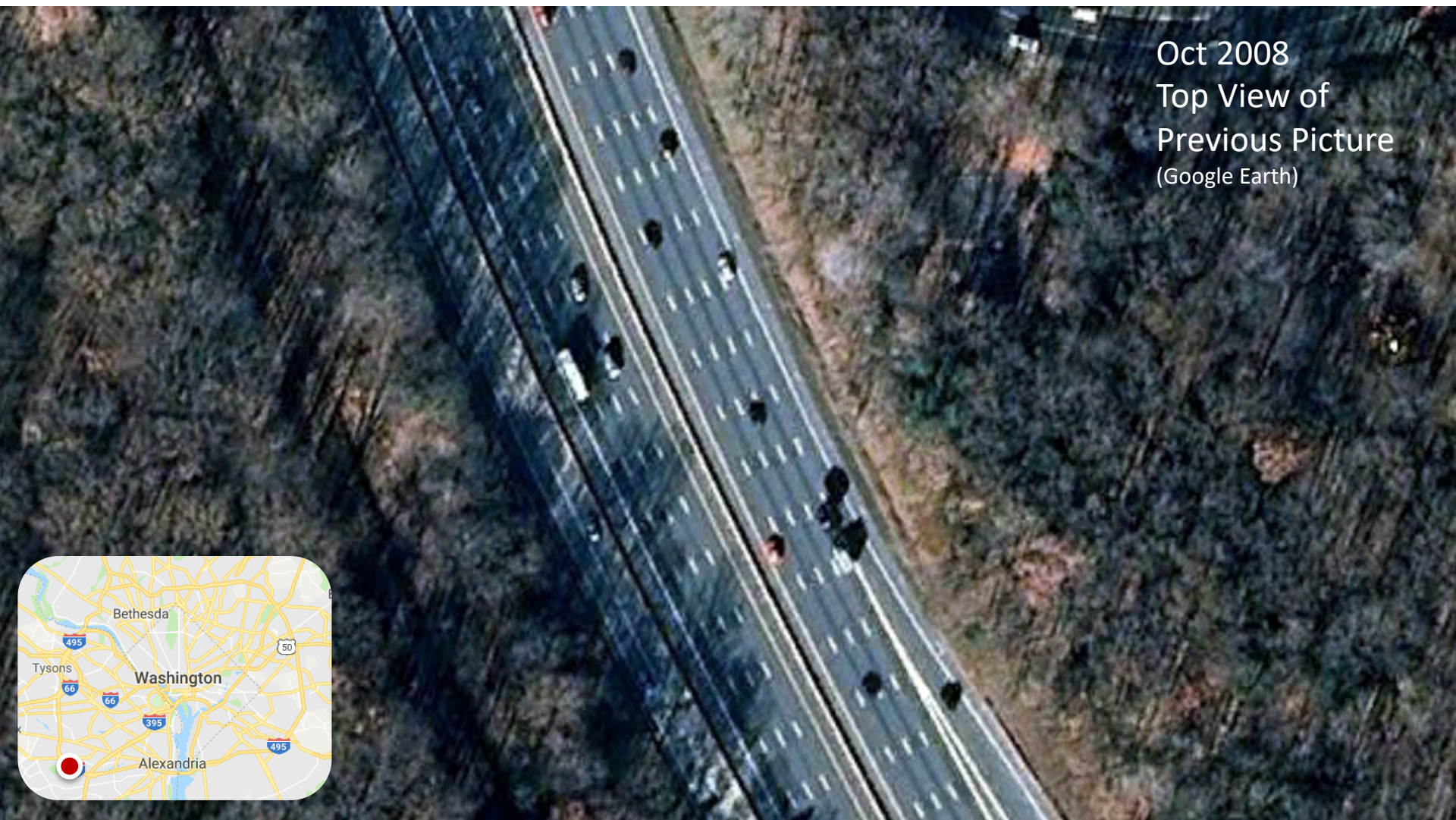


Plastic Pylon separation

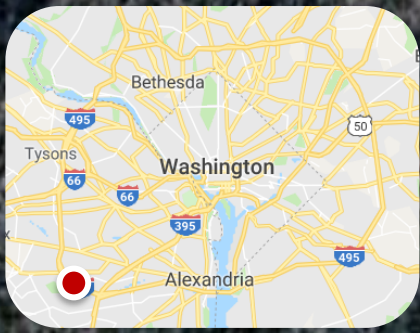
4 general purpose lanes



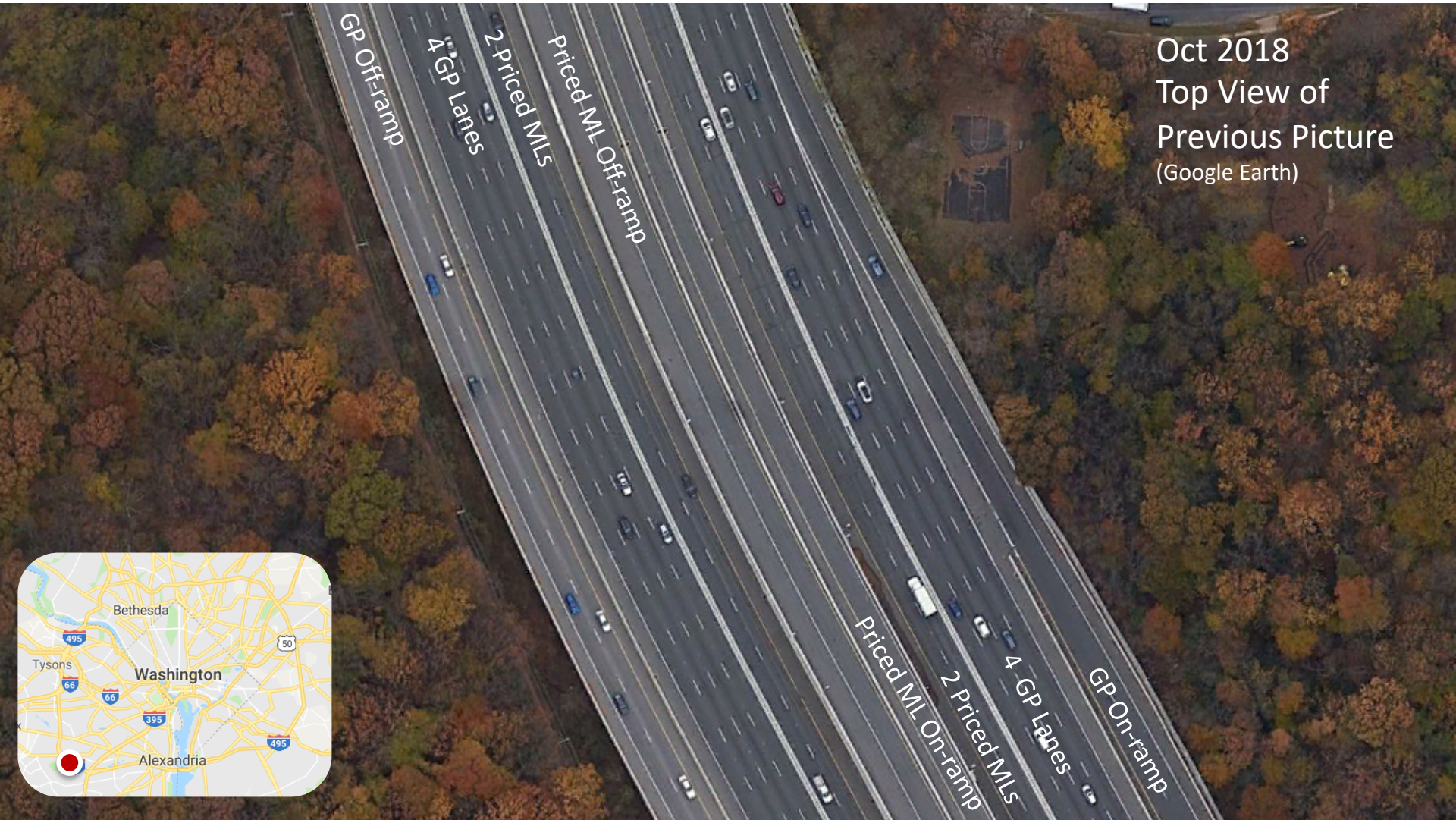
Virginia I-495 Express Lanes - 2



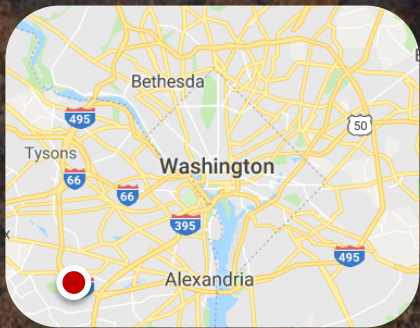
Oct 2008
Top View of
Previous Picture
(Google Earth)



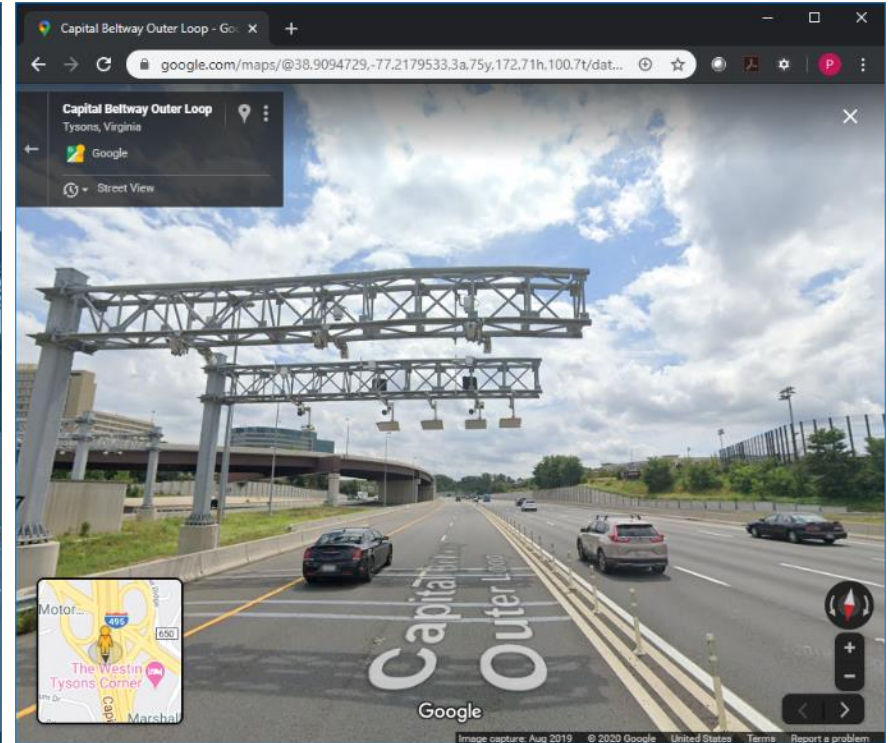
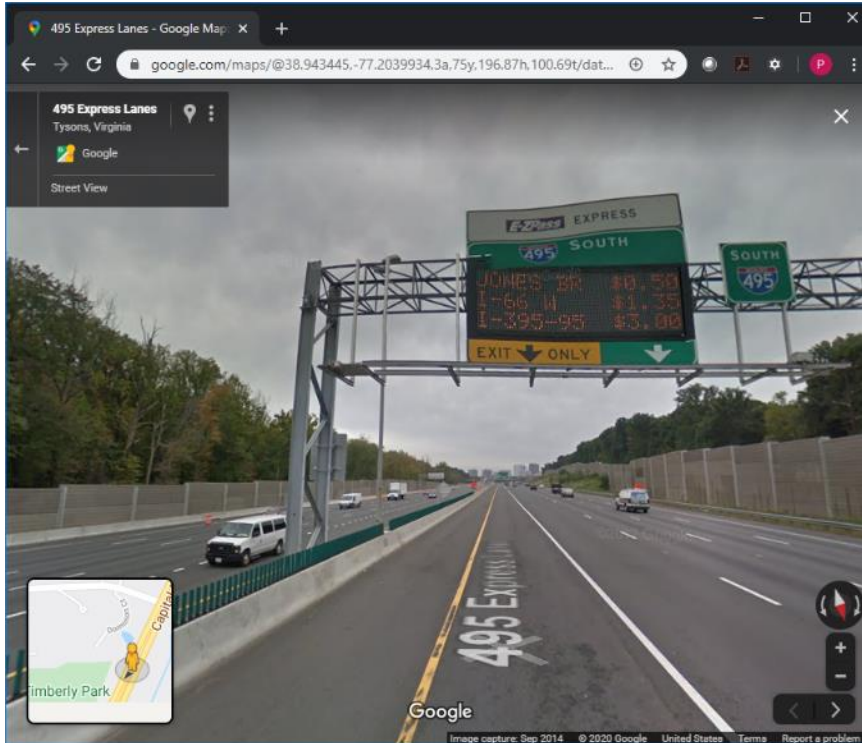
Virginia I-495 Express Lanes - 3



Oct 2018
Top View of
Previous Picture
(Google Earth)



All-Electronic/Cashless Tolling

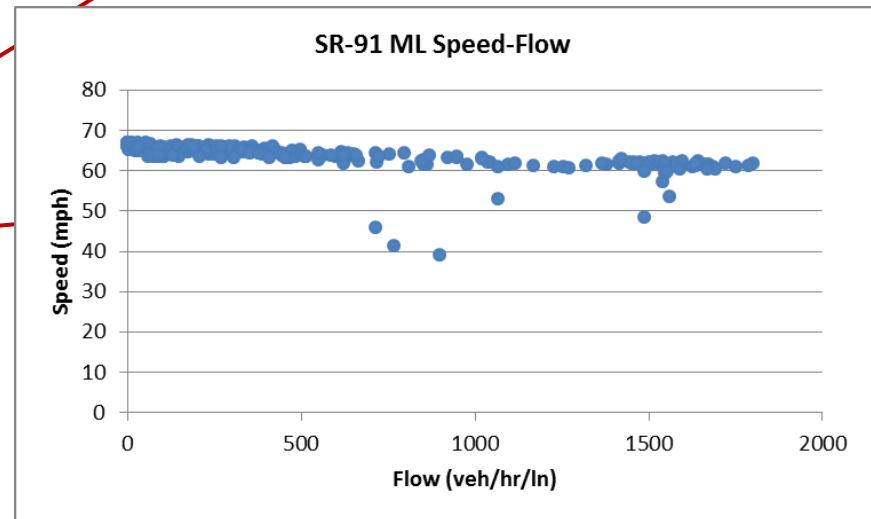
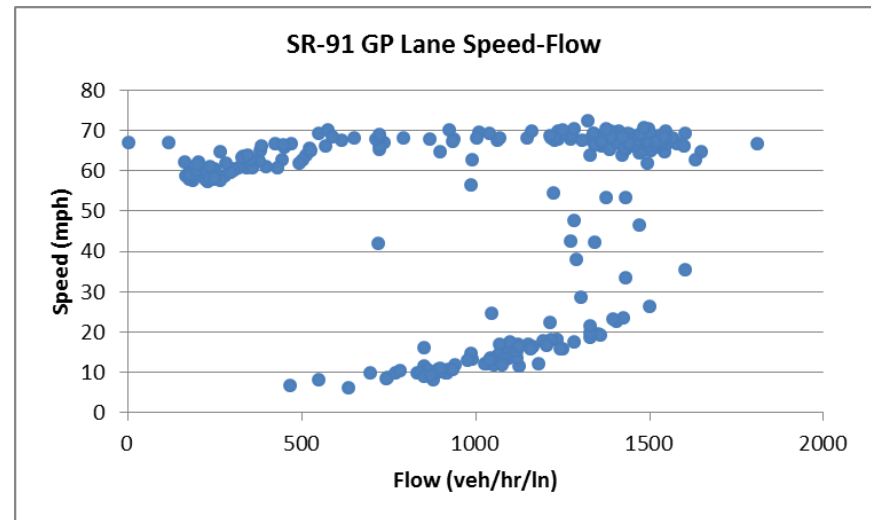


Theory in Practice

- Data from SR 91 Priced MLs (2 lanes) and GP Lanes (4 lanes) eastbound on Tuesday, April 6, 2010
- Facility near LA in CA
- In 5-minute intervals

5:00 to 5:05 pm
GP 636 vphpl, 6 mph
ML 1,644 vphpl, 62 mph

ML toll \$7.25 (about 10 mile segment)

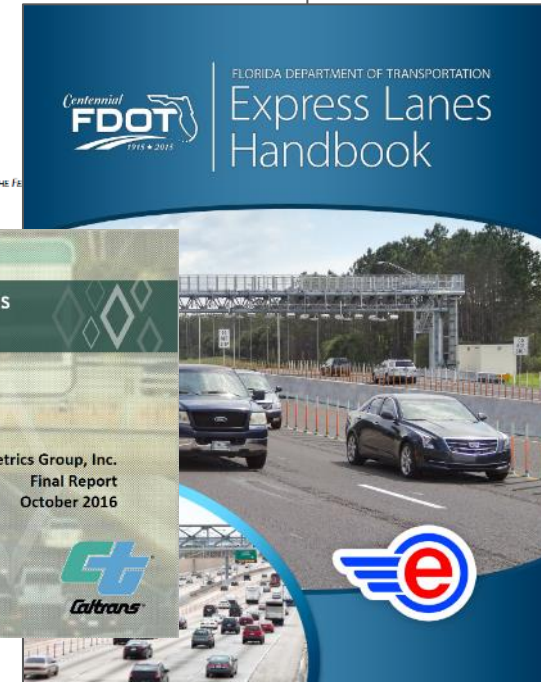
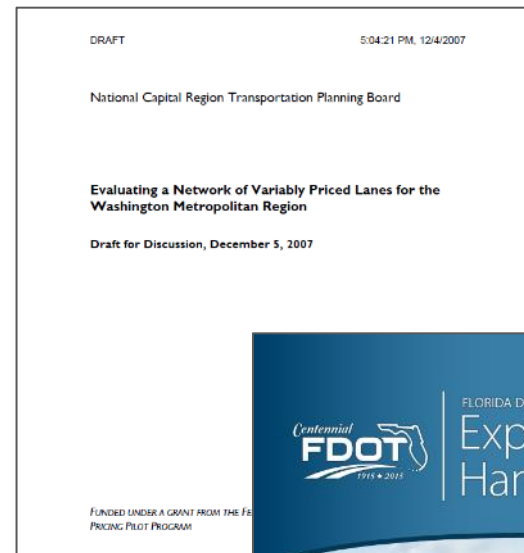




Overall Sector Developments and Trends

Sector Developments and Trends

- Managed lane networks taking shape in many metropolitan areas
 - CA - Los Angeles, San Francisco
 - CO - Denver
 - FL - Miami
 - GA - Atlanta
 - MN - Minneapolis
 - TX – Dallas, Houston
 - VA - Washington DC



Sector Developments and Trends - 2

- Several facilities have switched or are planning on switching from HOV2+ free to HOV3+ free
 - Challenges with HOV enforcement



<https://www.tollroadsinvirginia.com/Home/EZPass>



Trooper Guy Gill
@wspd1pio Follow

I don't always violate the HOV lane law...but when I do, I get a \$124 ticket! We'll give him an A for creativity! 🚔👍

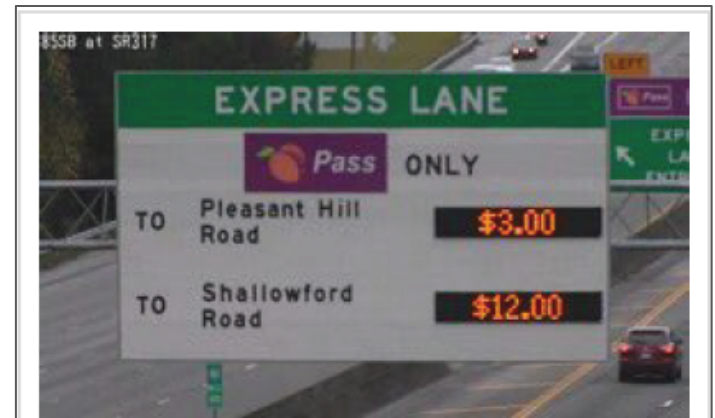
2:46 PM - 24 Mar 2015

2,640 RETWEETS 2,029 FAVORITES

USA Today 3/25/2015

Sector Developments and Trends - 3

- Revenue and toll rates have been increasing rapidly in recent years
 - There have been challenges with setting toll rate caps with several facilities
 - There has been industry discussion about the need for improving express bus service operating on priced managed lanes.



Just after 8 a.m. Tuesday, the cost to drive the 16-mile stretch of “HOT” express lane on I-85 southbound in Gwinnett and DeKalb counties hit a new record. (Credit: Channel 2 Action News)

AJC.com 11/23/2015

Sector Developments and Trends - 4

- Recent research shows most users travel on the lanes infrequently

<u>Group</u>	<u>Frequency</u>	<u>Fraction of Users</u>	<u>Daily Composition</u>
Single users	1 trip/year	48.4%	2.9%
Monthly users	2-40 trips/year	43.9%	20.6%
Weekly users	41-120 trips/year	4.7%	20.0%
Regular users	121-250 trips/year	2.1%	22.4%
Daily users	151-600 trips/year	1.0%	23.5%
High users	Over 600 trips/year	0.0%	10.6%

From Surface Transportation Innovations December 2019, Research done by University of Washington on I-405 Express Lanes in Seattle Metro Region using 2018 data

Facilities in Operation and Under Construction



Managed Lanes Statistics by State

State	Managed Lanes Mileage	Number of Facilities	Number of Public Agencies	Number of Private Agencies
California	111	9	7	
Colorado	41	4	1	1
Florida	73	7	2	
Georgia	67	3	1	
Maryland	8	1	1	
Minnesota	36	3	1	
North Carolina	26	1		1
Texas	226	17	4	2
Utah	72	1	1	
Virginia	71	5	1	1
Washington	31	2	1	
Grand Total	761	53	20	5

Data as of 01/07/2020

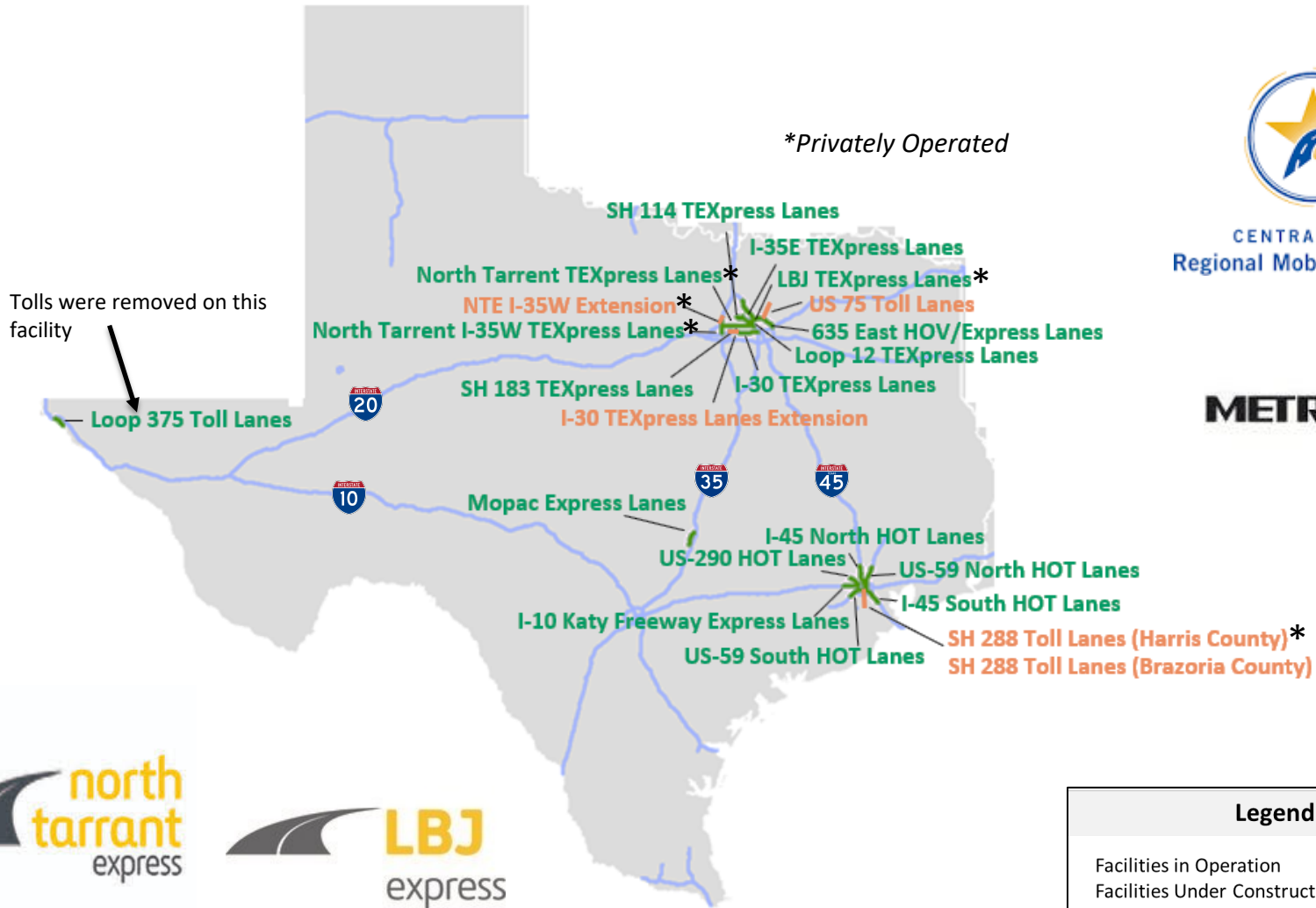
Texas Summary



CENTRAL TEXAS
Regional Mobility Authority



**Privately Operated*



Tolls were removed on this facility



Legend	
Facilities in Operation	
Facilities Under Construction	
U.S. Primary Roads*	

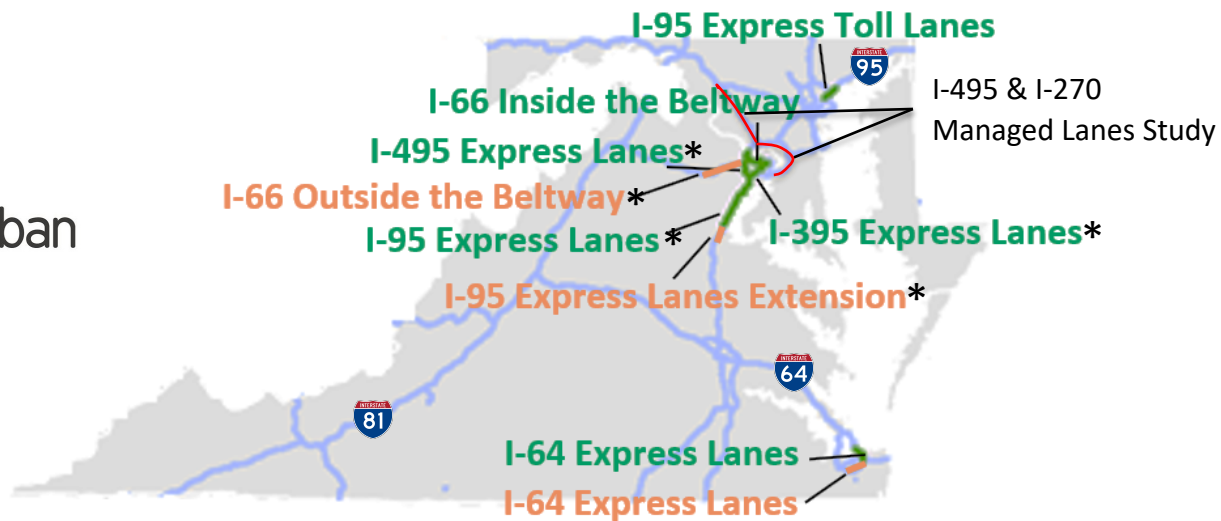
Data as of 01/07/2020

Virginia/Maryland Summary



Maryland
Transportation
Authority

Transurban

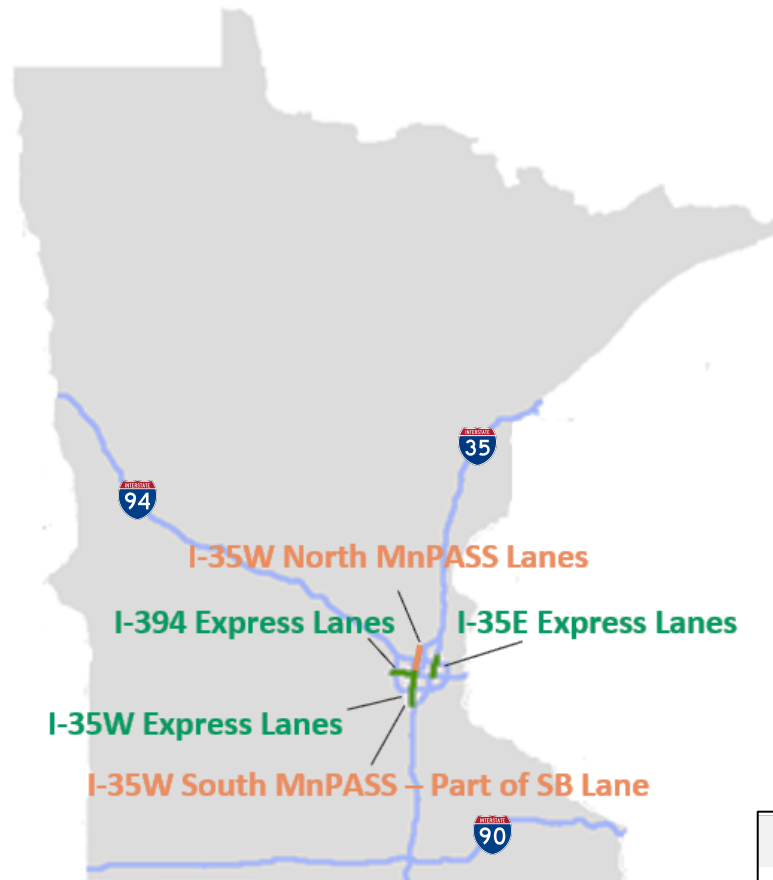


**Privately Operated*

Legend	
Facilities in Operation	—
Facilities Under Construction	—
U.S. Primary Roads	—

Data as of 01/07/2020

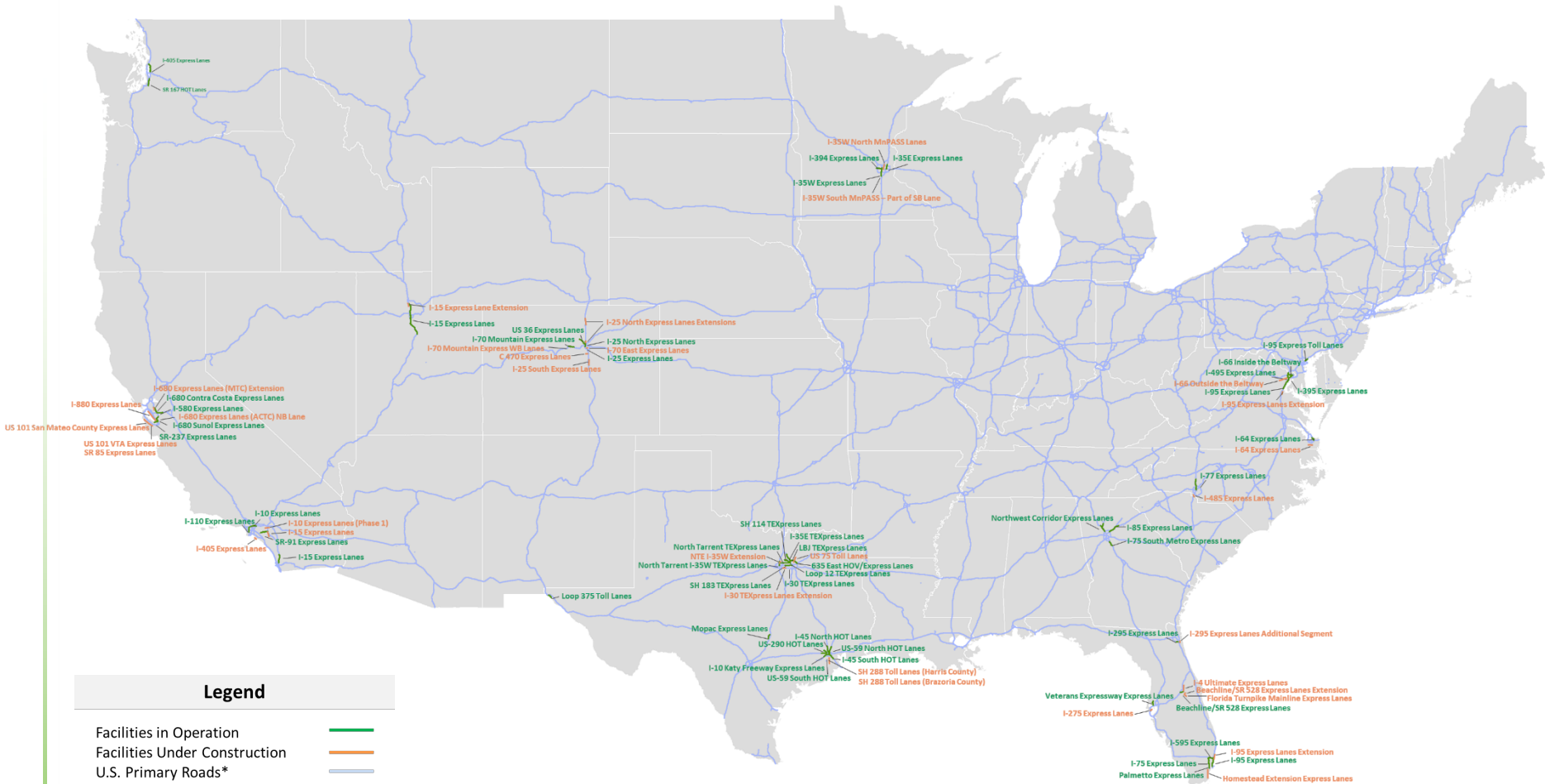
Minnesota Summary



Legend	
Facilities in Operation	
Facilities Under Construction	
U.S. Primary Roads	

Data as of 01/07/2020

National Map



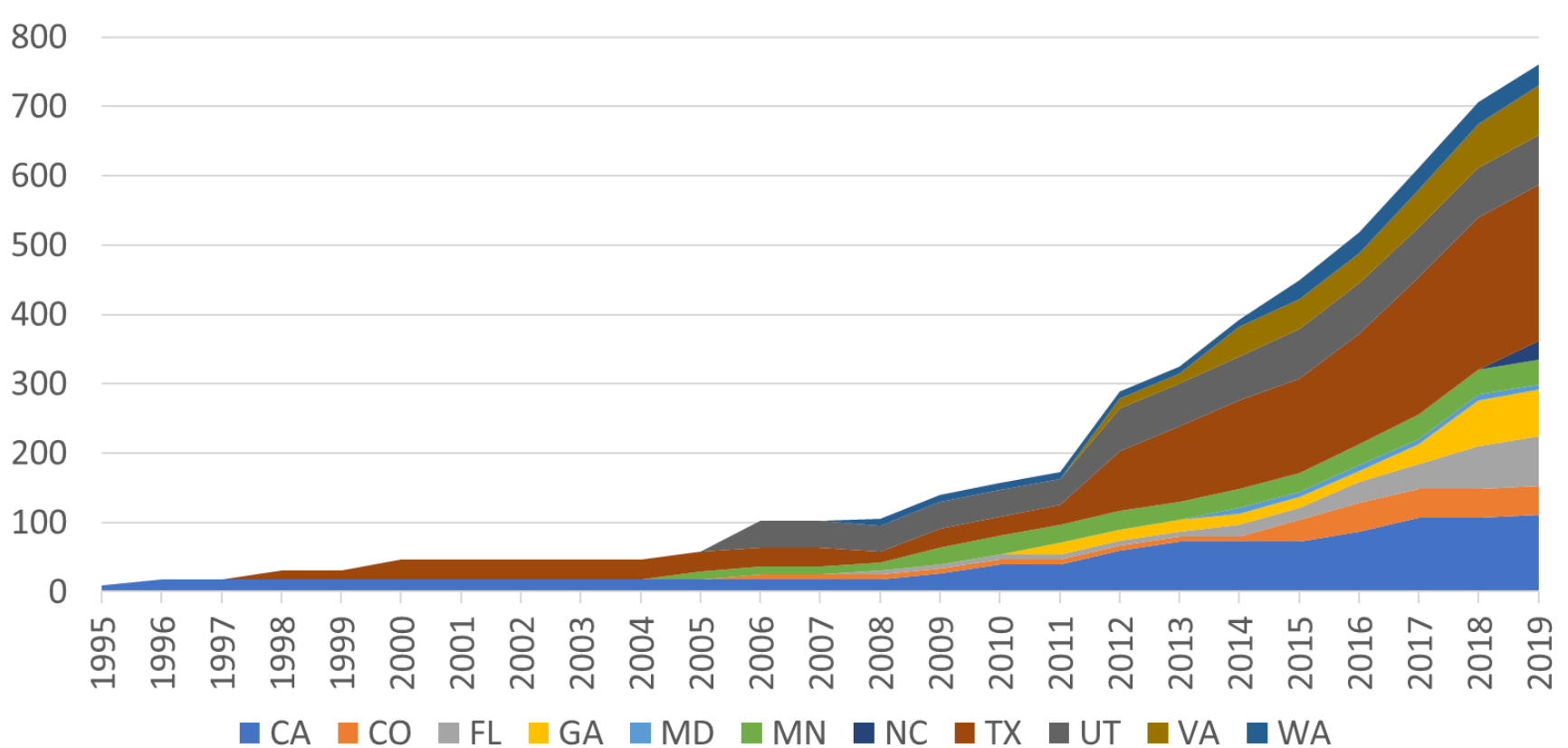
*Primary roads are generally divided, limited-access highways within the interstate highway system or under State management, and are distinguished by the presence of interchanges.

Data as of 01/07/2020



Historical and Future Growth

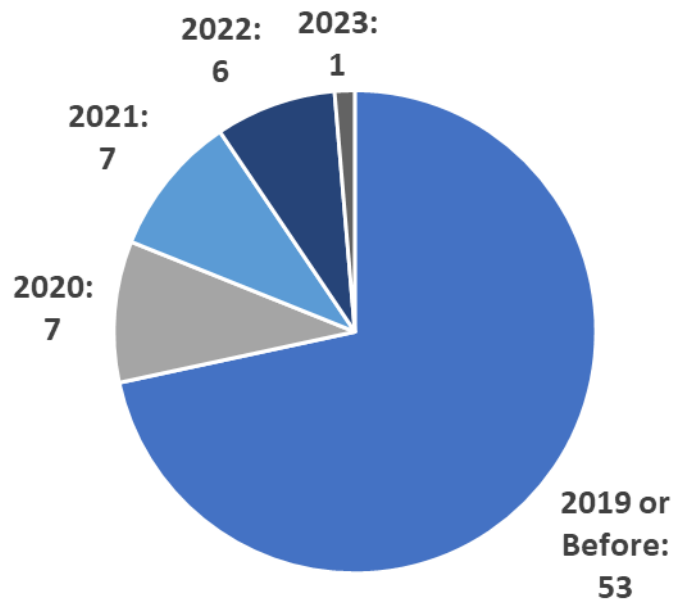
Historical Centerline Mileage Growth



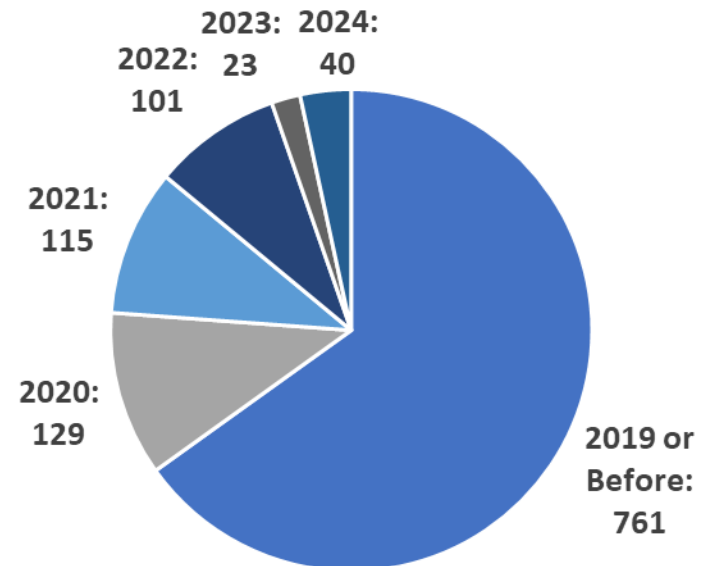
Data as of 01/07/2020

Future Growth

Facilities by Year¹



Centerline Mileage by Year¹



¹2020 to 2024 Estimated Based on Facilities Under Construction as of December 2019

Data as of 01/07/2020

Future Centerline Mileage Growth

Years	CA	CO	FL	GA	MD	MN	NC	TX	UT	VA	WA	Total
1995 to 2019	111	41	73	67	8	36	26	226	72	71	31	761
2020 to 2024	137	60	92	0	0	12	9	42	10	47	0	408
Total	248	101	165	67	8	48	35	267	82	118	31	1,169
Growth 2019 to 2024	123%	145%	127%	0%	0%	33%	35%	18%	14%	66%	0%	54%

¹2020 to 2024 Estimated Based on Facilities Under Construction as of December 2019

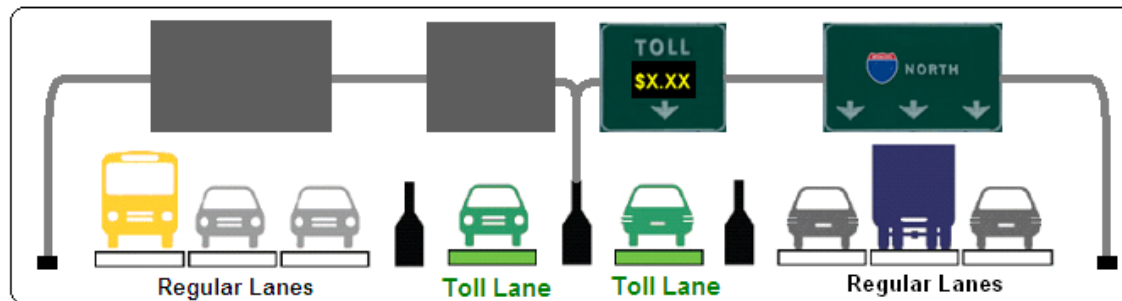
Data as of 01/07/2020



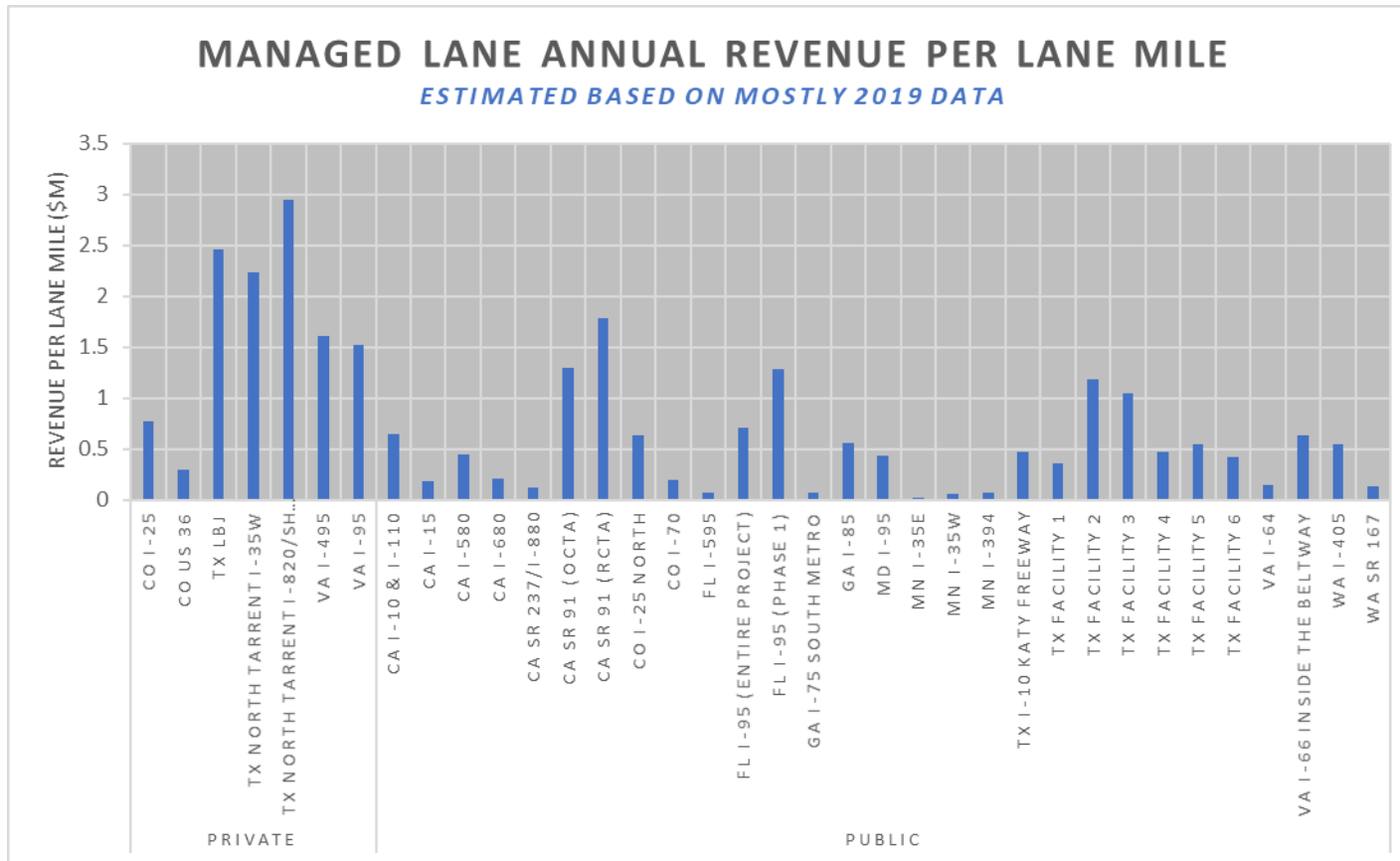
Revenue

Priced Managed Lane Revenue

- Revenue generation can be impacted by many factors including:
 - General purpose lane traffic and congestion levels
 - HOV and video tolling policies
 - HOV2+ free, HOV3+ free, no HOV free?
 - Toll setting policies (revenue maximization vs. throughput maximization and toll rate caps)
 - Commercial truck policies and other vehicle eligibility policies
 - Physical configuration including number of lanes and lane separation



Revenue per Lane Mile



Private Managed Lane Average: \$1.7M

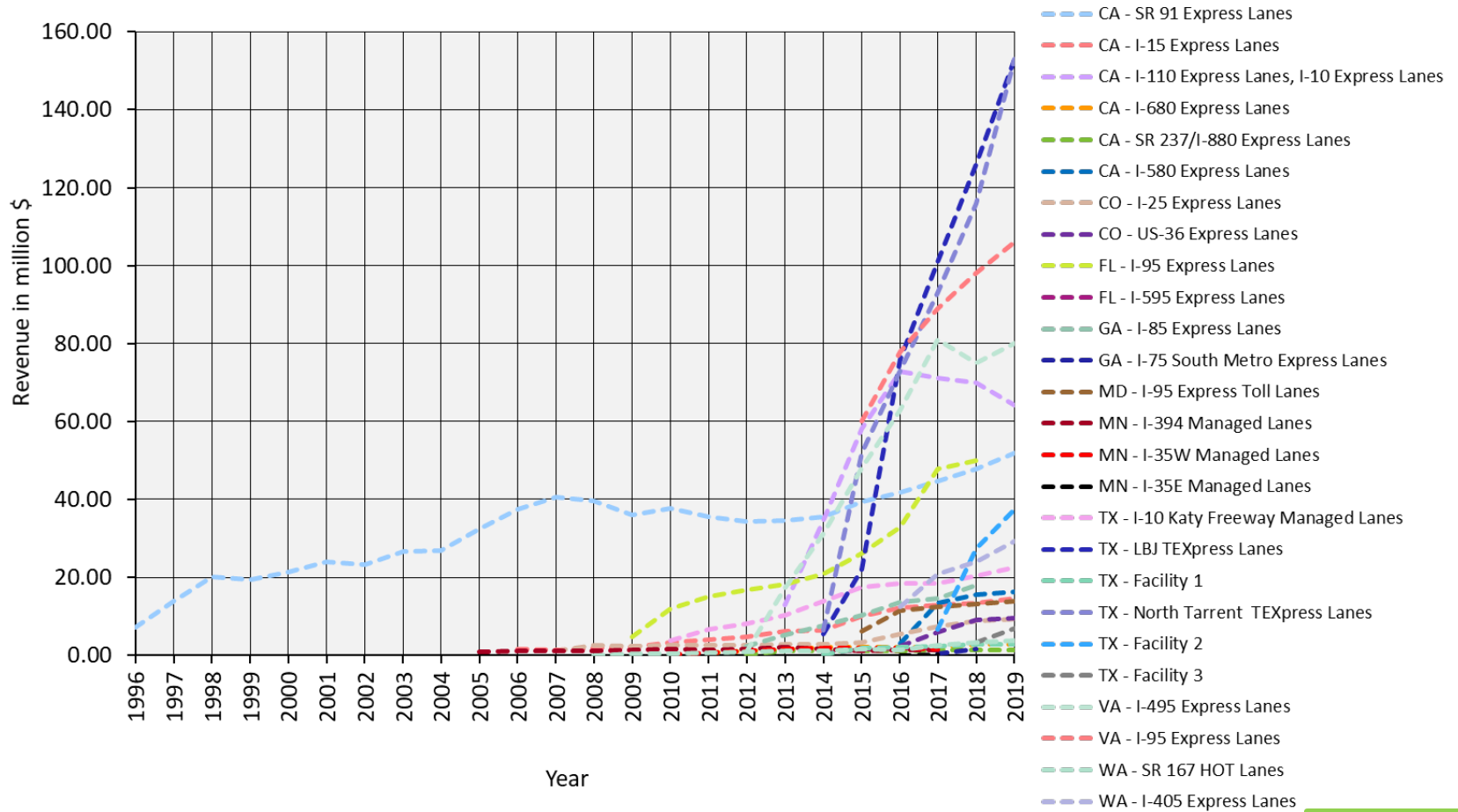
Public Managed Lane Average: \$0.5M

IN Toll Road (2019 Est.): About \$0.5M

IL Tollway (2018 Est.):
 I-355: \$1.2M
 Tri-State: \$0.9M
 I-90: \$0.5
 I-88: \$0.4



Historical Revenue



Closing Remark

- Nearly all new toll facilities since 2010 in U.S. have opened with All-Electronic Tolling (no toll booths or cash collection)



Closing Remark - 2

“Stop and go traffic at toll booths cause congestion and pollution issues so tolling is not a good idea.”

Closing Remark - 3

“Stop and go traffic at toll booths cause congestion and pollution issues so tolling is not a good idea.”

WRONG!

Tolling is not a silver bullet, but congestion and pollution issues at toll booths are no longer a challenge on new toll facilities since around 2010

Thank You

- Ron Davis, CDM Smith
 - Phone: 517-740-3059
 - Email: davisrw@cdmsmith.com
- Ganapathi Badireddi, CDM Smith
 - Phone: 517-318-3676
 - Email: badireddig@cdmsmith.com



TARIFF OF TOLL RATES	
EACH FOOT PASSENGER	2¢
BICYCLES, EACH RIDER	2¢
HORSE AND RIDER	5¢
HORSE, JACK, MULE, NEAT BEAST, SHEEP OR SWINE, EACH	2¢
ANY VEHICLE DRAWN BY ONE HORSE OR BEAST	10¢
ANY VEHICLE DRAWN BY TWO HORSES OR BEASTS	15¢
ANY VEHICLE DRAWN BY THREE HORSES OR BEASTS	20¢
ANY VEHICLE DRAWN BY FOUR HORSES OR BEASTS	25¢
ANY VEHICLE DRAWN BY MORE THAN FOUR HORSES OR BEASTS, FOR EACH ADDITIONAL HORSE OR BEAST	5¢
AUTOMOBILES, PASSENGER (SEVEN PASSENGERS OR LESS)	15¢
AUTOMOBILES, PASSENGER (MORE THAN SEVEN PASSENGERS)	25¢
AUTOMOBILE TRUCKS, LESS THAN 1 TON	15¢
AUTOMOBILE TRUCKS, 1 TON OR MORE	25¢
MOTORCYCLES, ONE PASSENGER	5¢
MOTORCYCLES, WITH SIDE CAR, (TWO PASSENGERS)	10¢
MOTORCYCLES, WITH SIDE CAR, (MORE THAN TWO PASSENGERS)	15¢

Priced Managed Lane Revenue – AV's

- Autonomous Vehicles (from Feb 2020 “The Effect of Automated Vehicles on Toll Roads” from Fitch Ratings
 - “Unlike conventional toll roads, managed lane projects are more vulnerable to revenue loss since AVs are expected to reduce congestion.”
 - Critical question: How much will AVs reduce congestion?
 - “Alternatively, managed lanes could promote the use of AVs by becoming dedicated AV lanes.”