

Hard Shoulder Running in Ohio

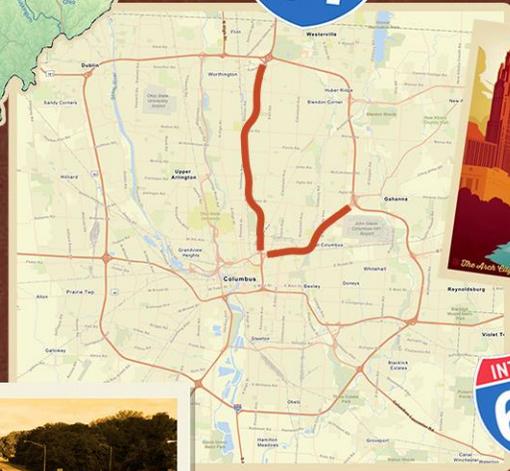
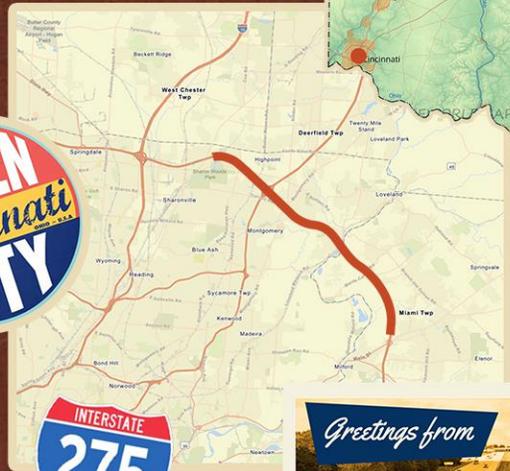
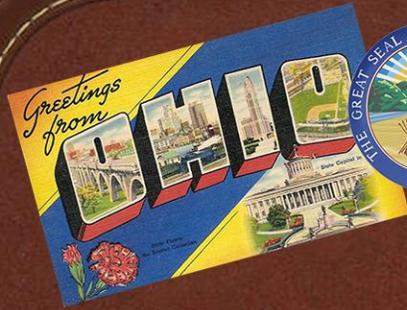
Welcome to SmartLane

Shane Campbell, PE
Senior Transportation Manager



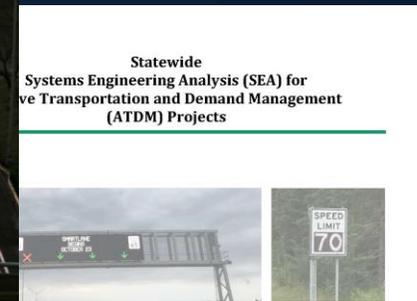
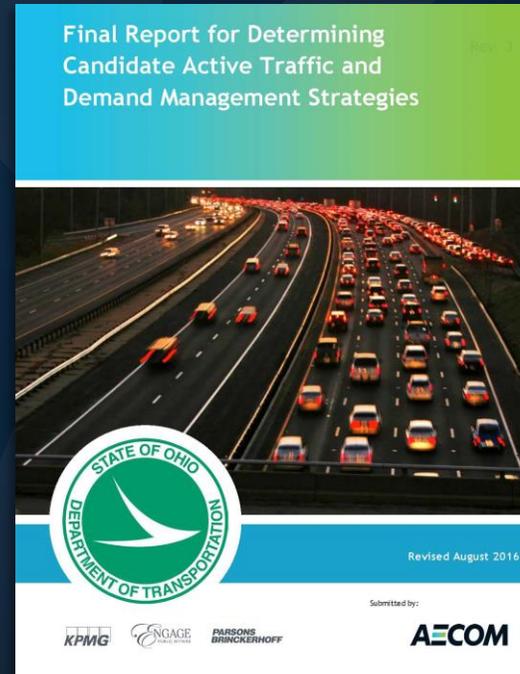
The Bobcat Way!





ODOT's HSR Story

- Statewide Active Transportation Demand Management (ATDM) Study
- Statewide Concept of Operations
- Statewide Systems Engineering Analysis (SEA)
- I-670 HSR Pilot (i.e. SmartLane)
- Advanced Traffic Management System (ATMS)



Takeaways

- Traffic Operations
- Shoulder Readiness
- Termination
- Constraints
- Safety
- ITS
- Costs
- Maintenance

USE OF FREEWAY SHOULDERS FOR TRAVEL

Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy

February 2016



U.S. Department of Transportation
Federal Highway Administration

I-670

Columbus



I-71

Columbus



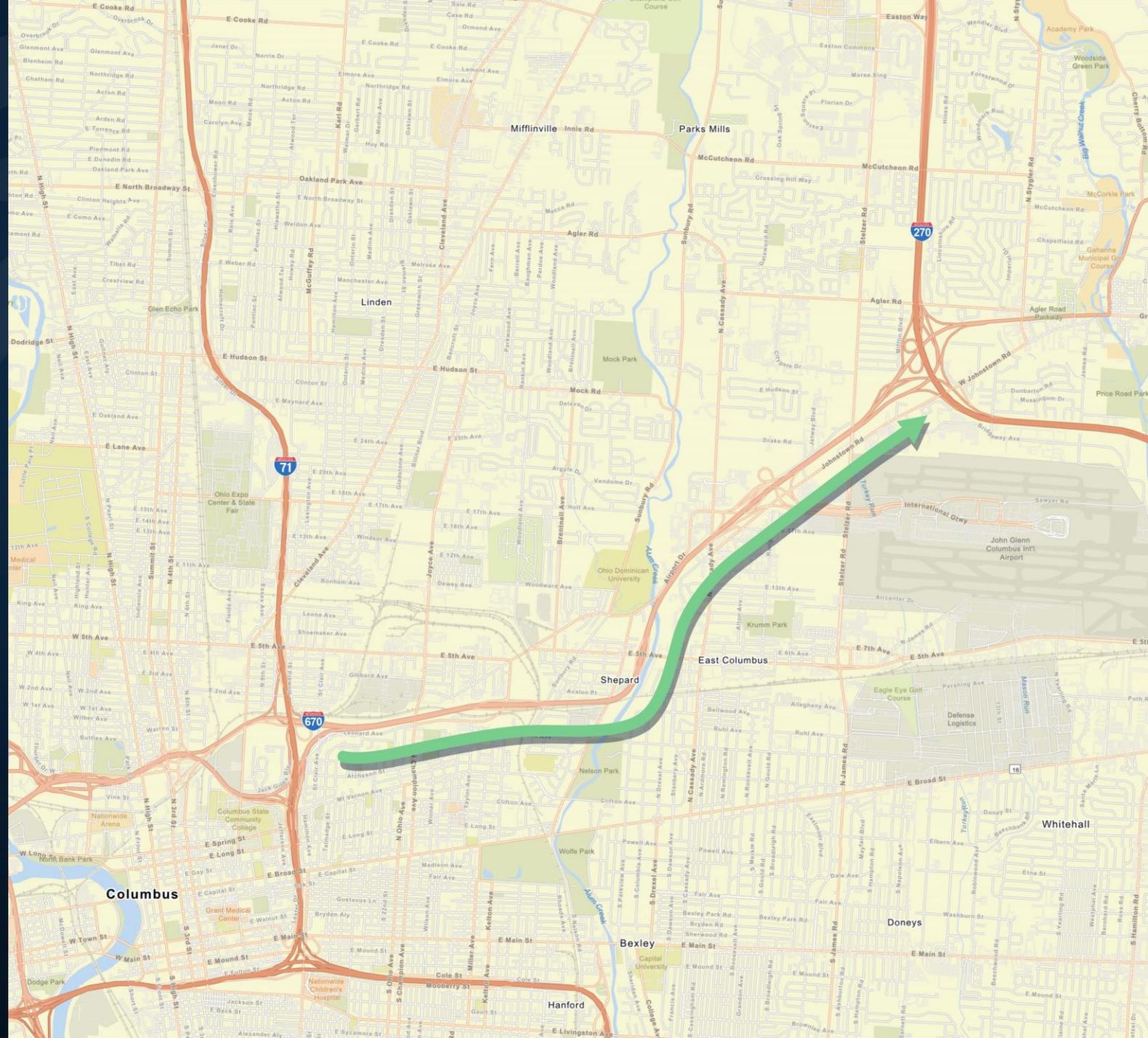
I-275

Cincinnati



I-670

Columbus



Traffic Operations and Shoulder Readiness



Segment	3.97 - 4.66	4.66 - 5.1	5.1 - 5.51	5.51 - 6.07	6.07 - 6.73	6.73 - 7.25	7.25 - 7.69	7.69 - 8.17	8.17 - 8.97	8.97 - 9.31	9.31 - 10.1	10.1 - Ramp	Ramp to 270
3:00 PM	56.2	61.1	63.5	64.2	66.2	64.0	64.9	63.4	66.2	65.5	63.7	61.4	61.7
3:05 PM	56.3	61.0	63.1	64.0	66.1	63.6	64.4	62.8	66.0	65.3	63.7	61.5	61.8
3:10 PM	56.2	61.4	62.5	63.6	65.7	63.0	63.7	62.5	65.6	64.9	63.5	61.5	61.4
3:15 PM	56.2	61.3	62.2	63.3	65.3	62.4	63.2	61.8	64.9	64.4	62.9	60.6	60.6
3:20 PM	55.7	61.1	61.5	62.5	64.2	61.5	62.2	61.1	64.1	63.6	62.0	59.8	58.9
3:25 PM	55.8	61.0	61.3	61.9	63.7	61.4	61.9	61.1	64.0	63.0	61.3	59.0	57.3
3:30 PM	55.7	60.9	61.0	61.5	63.7	61.2	61.8	60.7	63.5	62.1	60.9	58.3	56.4
3:35 PM	55.9	60.6	60.5	61.5	63.6	61.0	61.2	60.3	62.3	60.7	60.3	58.2	56.2
3:40 PM	56.0	60.5	59.5	60.1	61.7	59.3	59.6	58.8	61.1	59.7	59.6	57.7	55.6
3:45 PM	55.9	60.1	57.2	55.9	56.4	55.2	56.7	56.5	59.2	57.9	57.9	55.8	52.1
3:50 PM	55.9	60.2	51.9	49.1	50.3	51.1	53.4	54.3	57.2	55.7	56.5	54.5	49.1
3:55 PM	55.7	60.2	49.6	45.4	49.9	48.8	51.9	52.9	55.2	53.7	55.1	53.0	47.3
4:00 PM	55.8	60.1	48.6	44.0	45.6	48.7	51.7	52.5	54.2	52.9	54.5	52.7	46.8
4:05 PM	55.6	59.5	48.2	43.6	45.2	48.3	51.5	52.7	54.2	52.2	54.0	53.4	47.9
4:10 PM	55.1	58.6	44.2	41.8	43.9	47.3	51.5	52.3	53.6	51.3	53.7	52.5	46.0
4:15 PM	54.9	57.2	39.0	38.3	41.9	45.9	49.7	51.0	52.2	49.6	51.6	50.1	40.7
4:20 PM	54.4	56.1	34.9	35.1	38.4	42.6	46.6	48.6	48.2	45.1	47.9	46.7	35.5
4:25 PM	54.1	54.8	32.4	33.1	35.4	39.6	42.7	45.0	43.3	40.6	44.6	45.1	32.4
4:30 PM	53.1	53.8	30.6	30.8	33.1	37.6	40.2	42.4	39.6	36.2	42.3	45.1	30.7
4:35 PM	51.8	53.2	31.9	30.2	31.5	36.0	38.3	40.0	37.5	34.1	41.6	44.8	31.6
4:40 PM	51.2	52.9	31.6	30.3	30.3	34.2	36.5	38.3	35.6	32.8	40.3	44.2	31.2
4:45 PM	51.0	52.9	29.6	28.8	28.2	32.4	34.5	36.5	32.6	30.1	38.0	43.6	30.3
4:50 PM	50.8	53.6	27.7	27.5	27.1	31.3	32.8	34.7	30.4	29.3	37.8	42.5	28.1
4:55 PM	50.9	53.5	27.2	27.4	27.3	30.5	31.2	32.8	29.9	29.0	36.4	43.3	27.6
5:00 PM	50.1	52.4	28.2	27.9	27.0	29.5	30.1	32.0	28.5	28.5	35.4	43.2	26.9
5:05 PM	50.2	51.7	29.2	28.7	26.7	29.4	29.8	32.1	28.3	27.3	35.8	43.4	27.3
5:10 PM	50.4	53.2	30.9	30.3	27.0	29.7	30.5	31.6	27.1	26.1	34.8	42.1	26.6
5:15 PM	50.3	52.4	31.7	29.9	26.7	29.8	29.9	30.6	25.3	24.7	33.2	41.2	24.9
5:20 PM	49.7	52.6	29.4	29.3	26.3	29.3	29.3	22.6	22.6	31.3	39.6	25.3	23.3
5:25 PM	49.7	52.2	29.9	29.7	25.8	27.6	26.4	26.5	21.3	21.1	29.6	39.2	22.5
5:30 PM	49.3	53.4	31.7	29.9	25.5	26.6	24.8	25.7	21.3	20.8	29.4	39.4	22.6
5:35 PM	48.4	53.5	34.1	30.8	25.8	27.2	25.6	21.4	21.1	21.1	30.0	39.3	23.7
5:40 PM	49.6	53.7	33.5	27.7	26.7	29.7	26.7	22.4	22.2	31.4	40.5	24.8	24.8
5:45 PM	50.7	53.9	40.4	37.8	31.0	30.6	28.8	28.7	24.8	24.4	33.4	41.6	25.9
5:50 PM	51.5	54.9	43.6	42.5	35.4	33.9	31.7	32.1	28.4	27.9	36.1	43.1	28.0
5:55 PM	52.4	55.4	46.5	47.0	40.8	38.8	36.8	36.7	32.8	32.0	39.9	44.6	30.6
6:00 PM	52.6	55.4	49.5	51.1	48.3	44.0	41.5	37.3	36.3	34.7	44.9	43.7	33.1
6:05 PM	53.0	55.0	51.2	54.4	51.6	49.0	47.4	46.8	43.3	41.8	47.6	46.3	38.1
6:10 PM	53.4	56.7	53.5	57.4	56.1	54.0	52.6	51.0	49.7	47.4	52.0	49.8	42.7
6:15 PM	54.3	58.4	56.3	59.2	59.0	56.7	56.0	55.0	54.3	52.6	55.1	52.4	46.6
6:20 PM	55.0	59.0	55.2	59.6	60.2	58.4	58.4	57.1	57.0	55.9	57.1	54.8	49.8
6:25 PM	54.7	57.9	52.9	60.7	61.6	59.9	60.0	58.7	58.9	58.4	58.7	56.3	52.1
6:30 PM	55.7	58.9	58.4	62.1	63.6	61.0	61.3	59.7	60.6	60.2	60.0	57.7	54.8
6:35 PM	55.9	59.3	59.7	63.1	64.5	61.8	62.5	60.6	62.1	61.8	58.7	56.6	56.6
6:40 PM	56.0	59.0	59.5	63.2	64.9	62.4	63.1	61.6	63.5	62.8	61.6	59.4	56.0
6:45 PM	56.1	60.5	61.3	64.2	66.3	63.5	64.4	62.9	64.4	63.5	62.6	60.2	59.1
6:50 PM	55.6	59.7	61.9	64.2	66.5	63.5	64.4	63.1	64.8	64.0	62.5	60.1	59.1
6:55 PM	55.8	59.7	62.6	64.7	66.6	64.0	65.2	63.7	65.5	64.8	63.3	60.5	59.9
7:00 PM	55.9	60.0	63.6	65.9	67.1	64.7	65.0	63.9	65.4	65.0	63.8	61.3	61.2
7:05 PM	55.3	60.1	63.2	66.2	67.4	64.9	65.3	64.1	65.7	64.0	61.7	61.8	61.7
7:10 PM	55.0	59.9	62.9	66.0	67.4	65.1	65.5	64.3	66.7	66.0	64.3	62.0	62.1
7:15 PM	55.0	60.2	62.6	66.1	67.7	65.4	65.5	64.3	66.6	65.6	64.4	62.1	62.5
7:20 PM	54.9	60.3	62.4	66.5	67.8	65.5	65.5	64.8	66.9	66.2	64.5	61.9	62.5
7:25 PM	54.7	60.4	62.5	66.6	67.8	65.5	65.5	64.9	66.9	66.4	64.5	62.0	62.5
7:30 PM	54.2	60.1	62.9	66.1	67.5	65.3	65.6	64.7	66.6	66.5	64.9	62.5	62.7

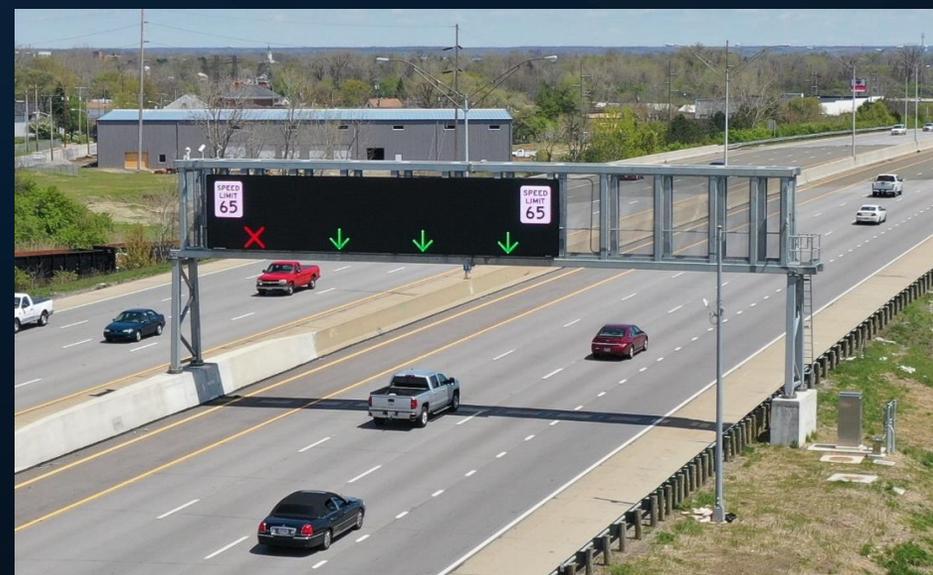
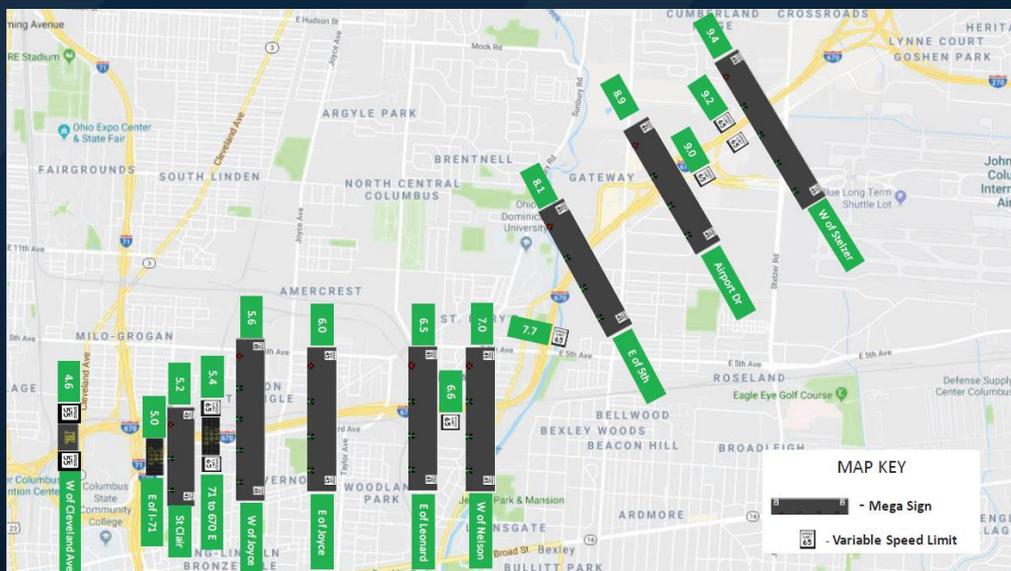


Termination



Intelligent Transportation System

- 9 - large DMS signs
- 3 - smaller DMS signs
- 39 - new CCTV cameras
- 9 - variable speed limit signs
- New radar speed detectors
- Temporary communication plan
- 17 new power service locations
- \$12M



Mega is Cool but Costly



Budget Friendly

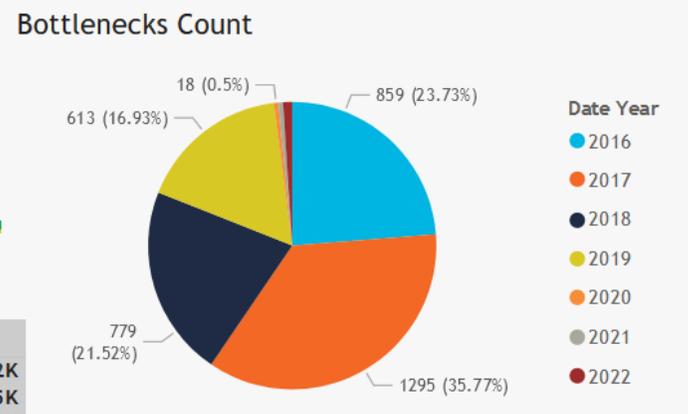
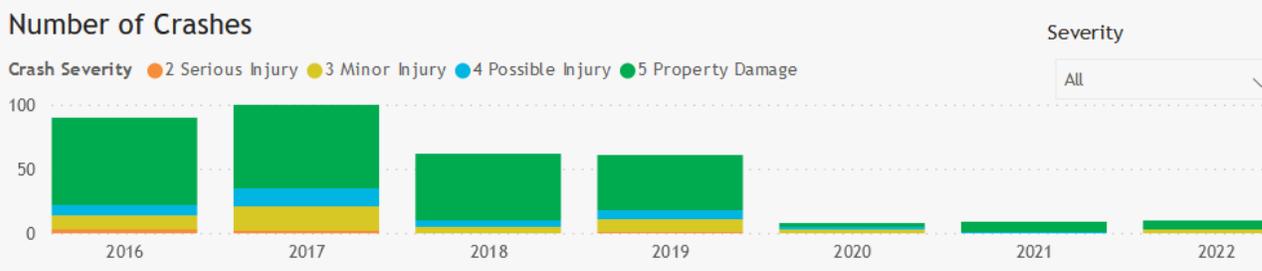
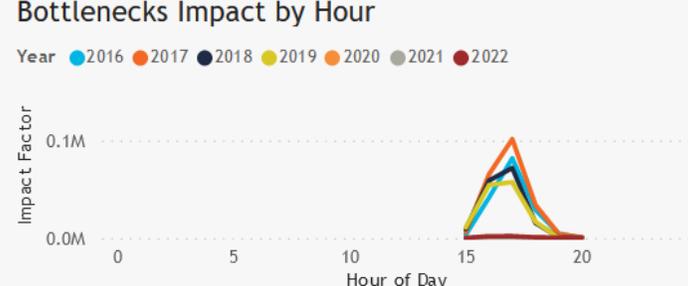
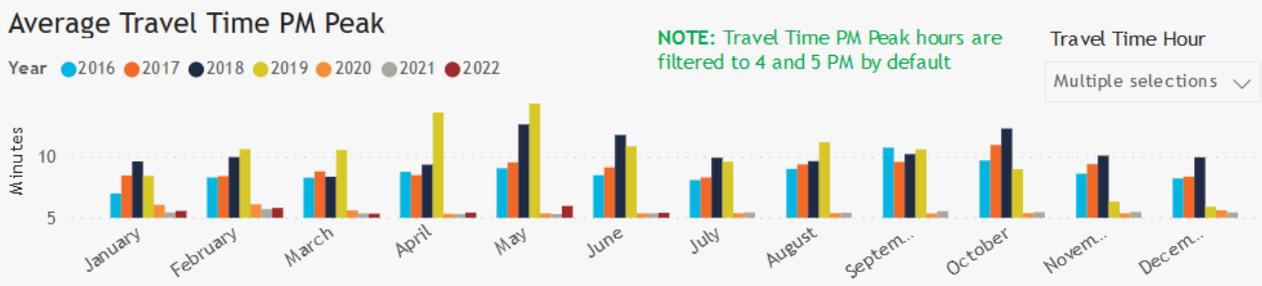


Performance



TSMO
TRANSPORTATION SYSTEMS
MANAGEMENT & OPERATIONS
Making Our System Work Better

Date: 1/1/2016 - 6/30/2022
Year: All
Month: All
Weekday: All
Hour: Multipl...



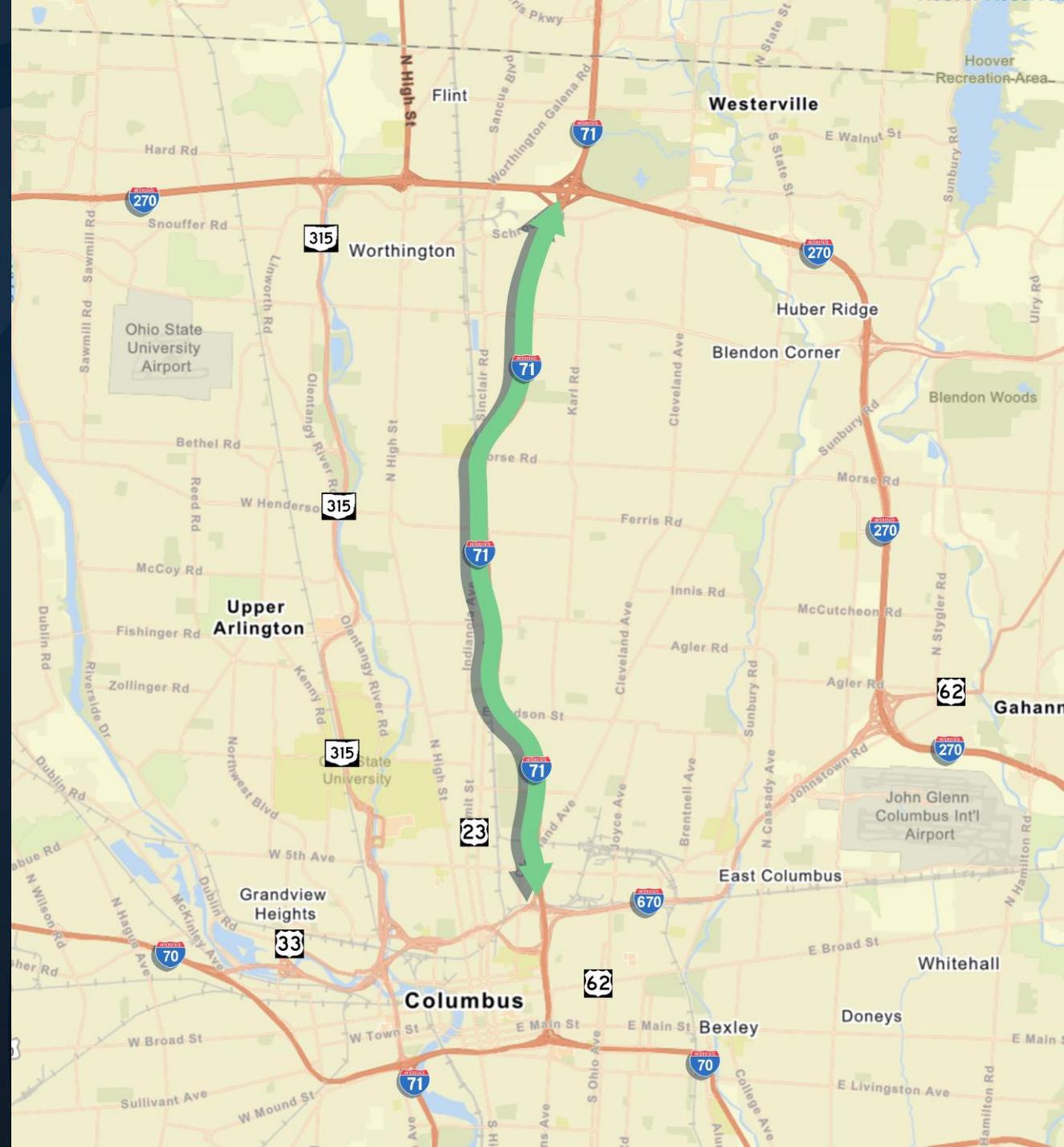
Vehicle Delay Hours

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
2016	4.42K	6.16K	6.67K	7.42K	7.92K	6.98K	6.53K	7.77K	10.39K	8.97K	7.79K	6.89K	87.92K
2017	7.27K	5.66K	7.19K	6.86K	9.38K	7.92K	7.20K	9.07K	8.77K	11.39K	8.98K	7.37K	97.05K
2018	9.34K	8.52K	7.16K	8.08K	12.22K	10.76K	8.46K	7.81K	8.28K	11.62K	9.13K	7.02K	108.40K
2019	4.79K	7.53K	8.85K	13.65K	13.63K	7.76K	6.57K	8.90K	7.39K	5.66K	0.44K	0.04K	85.22K
2020	0.20K	0.44K	0.00K	0.00K	0.03K	0.01K	0.02K	0.01K	0.05K	0.00K	0.00K	0.65K	1.41K
2021	0.06K	1.18K	0.02K	0.04K	0.00K	0.02K	0.14K	0.11K	0.36K	0.09K	0.05K	0.00K	2.08K
2022	0.49K	1.05K	0.08K	0.09K	0.78K	0.16K							2.66K
Total	26.57K	30.54K	29.98K	36.14K	43.97K	33.61K	28.92K	33.68K	35.24K	37.73K	26.39K	21.97K	384.75K

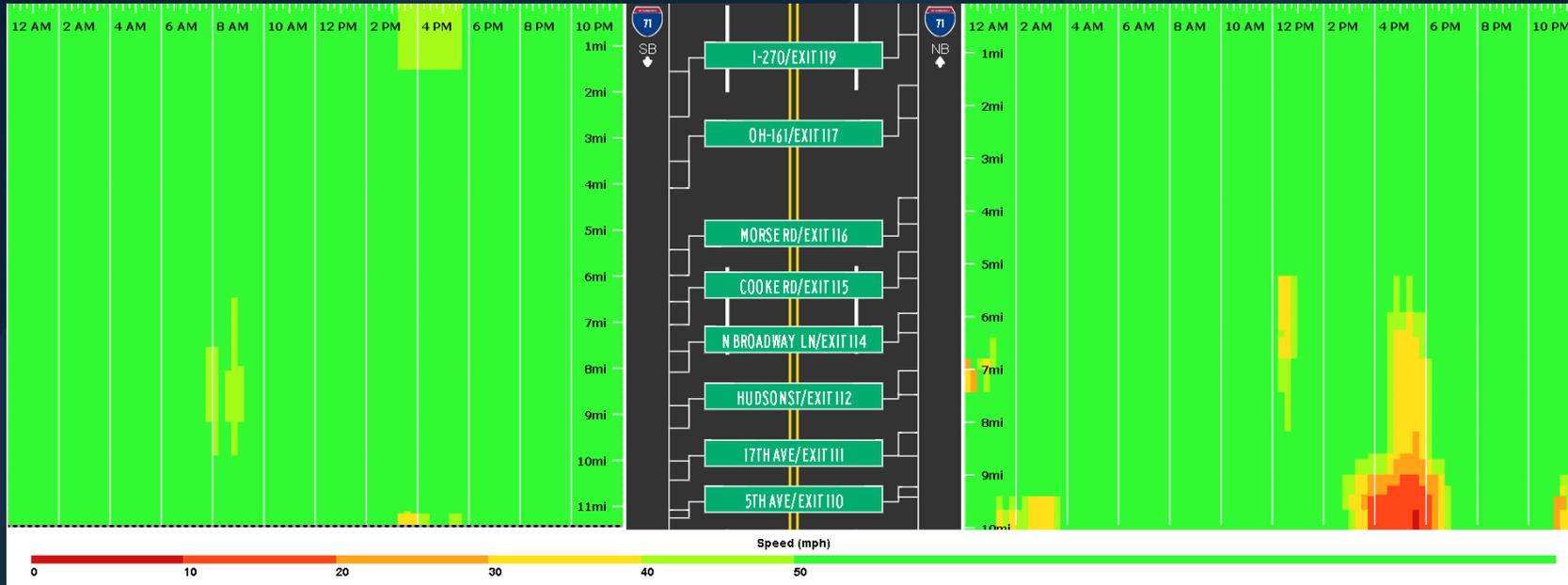
Opening Date: 10/23/19

I-71

Columbus



Traffic Operations and Shoulder Readiness



Alternatives Analysis



EXISTING



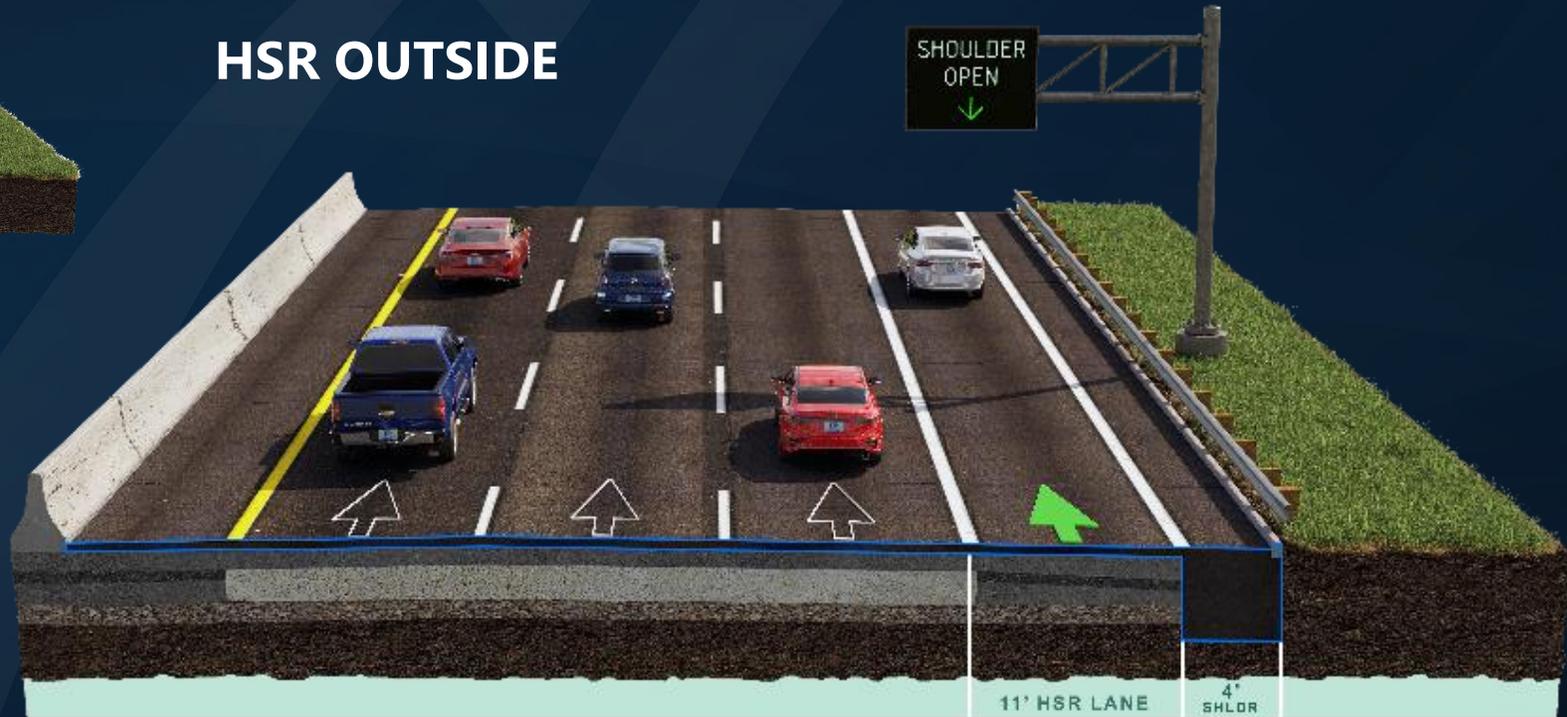
Alternatives Analysis



EXISTING



HSR OUTSIDE



Alternatives Analysis



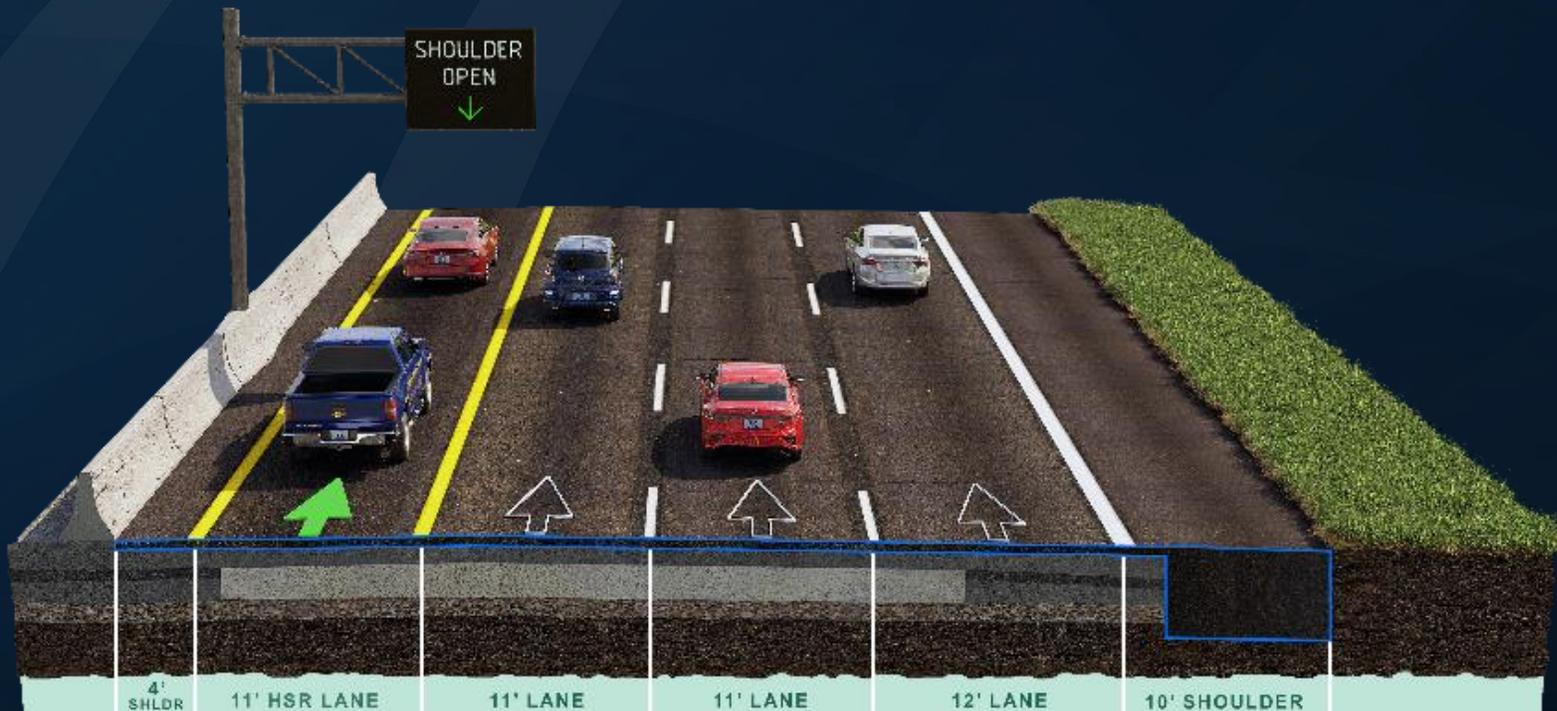
EXISTING



HSR OUTSIDE



HSR INSIDE



Alternatives Analysis



EXISTING



PBPD



HSR OUTSIDE



HSR INSIDE



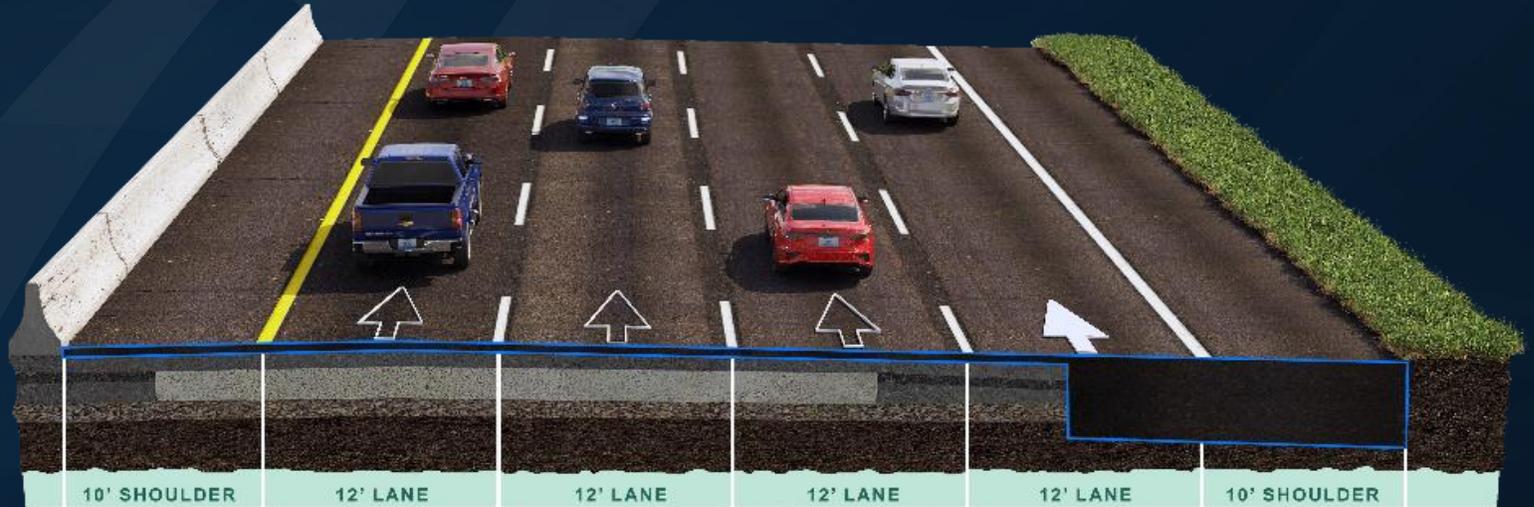
Alternatives Analysis



EXISTING



STANDARD DESIGN



HSR OUTSIDE



HSR INSIDE



PBPD



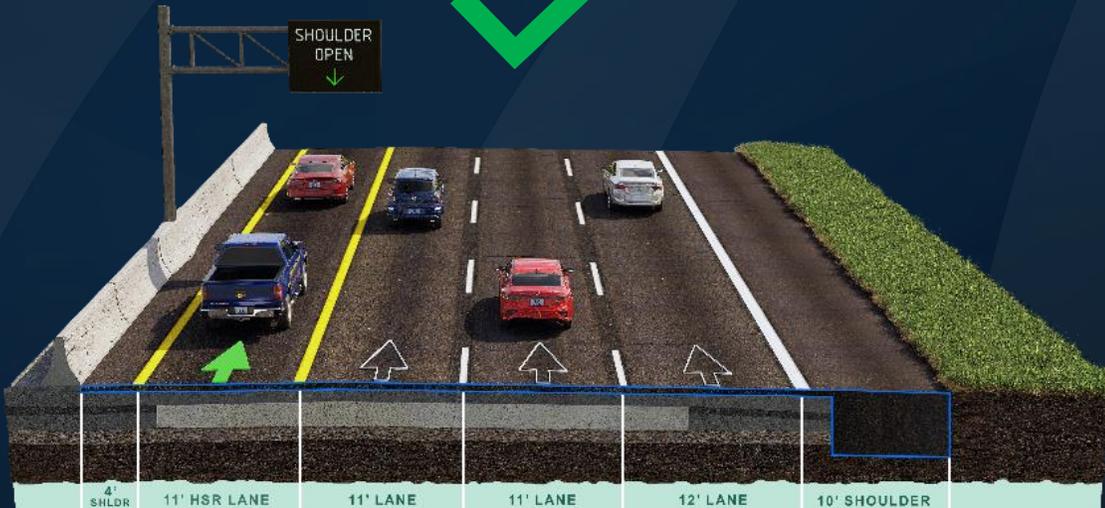
Costs relatively equal...winner is?



- Safety
- Phased Implementation
- Maintenance



HSR Inside



PBPD



I-275

Cincinnati





Constraints and Constructability



Constraints and Constructability



Constraints and Constructability



Constraints and Constructability



ODOT's SmartLane

Questions

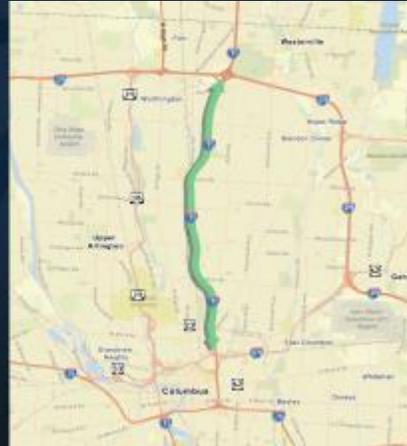
I-670

Columbus



I-71

Columbus



I-275

Cincinnati

