



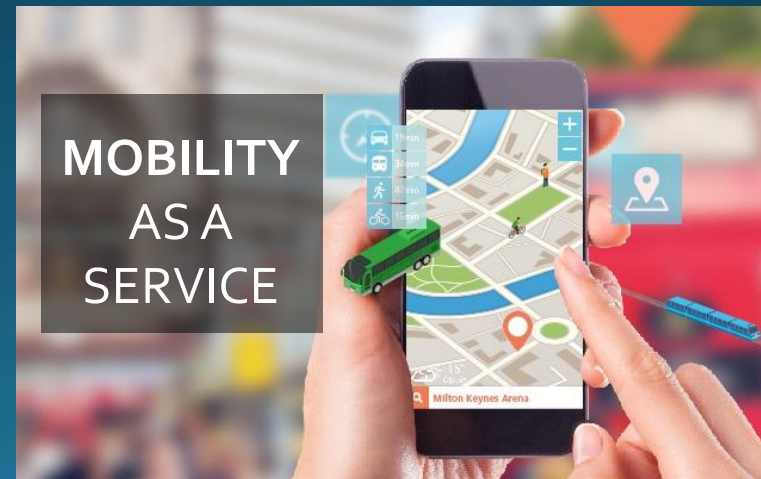
# Connected Automation: Vision, Planning and Initiatives at MDOT

Director Kirk Steudle  
Michigan Department of Transportation





# TOMORROW'S TRANSPORTATION BENEFITS



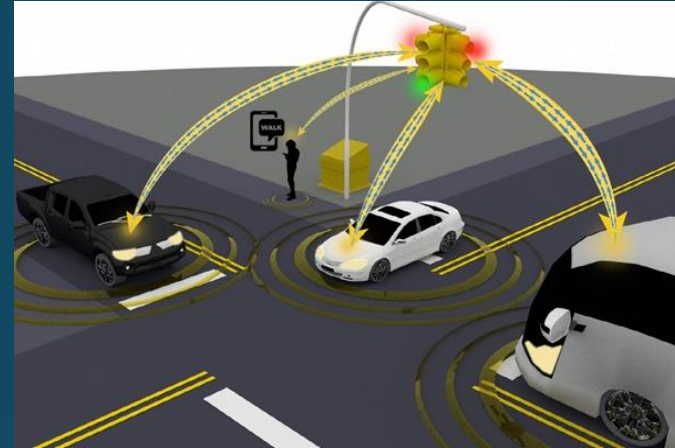




# CONNECTED, AUTOMATED & AUTONOMOUS VEHICLES



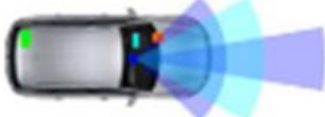
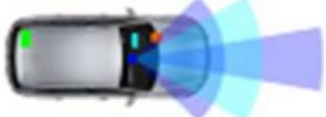
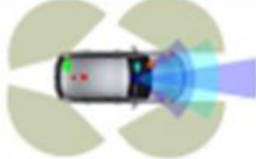
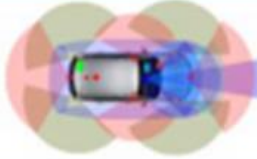
Connected



Automated



Autonomous

	Level 0	Level 1	Level 2	Level 3	Level 4
	Driver only	Assisted	Partial	Conditional	Full
Feature		Active high beam	Traffic jam assist	Collision avoidance	Valet self-parking
		Collision imminent braking	Adaptive cruise & lane keeping	Automated highway	Highway point-to-point
		Cruise control	Self-parking (with driver)	Automated urban	Urban point-to-point
					
Technology		Radar	Radar	LIDAR & 360° radar	LIDAR & 360° radar
		Forward sensors	Forward sensors	High accuracy GPS	High accuracy GPS
			Multi-domain controller	Multi-domain controller	Multi-domain controller
			Driver state sensor	Forward, HD & IR cameras	Forward, HD & IR cameras
		V2X	V2X	V2X	
			Internal moment unit	Internal moment unit	
Today		2020		2025+	

# The 5 levels of driving automation

For on-road vehicles



Human driver



Automated system

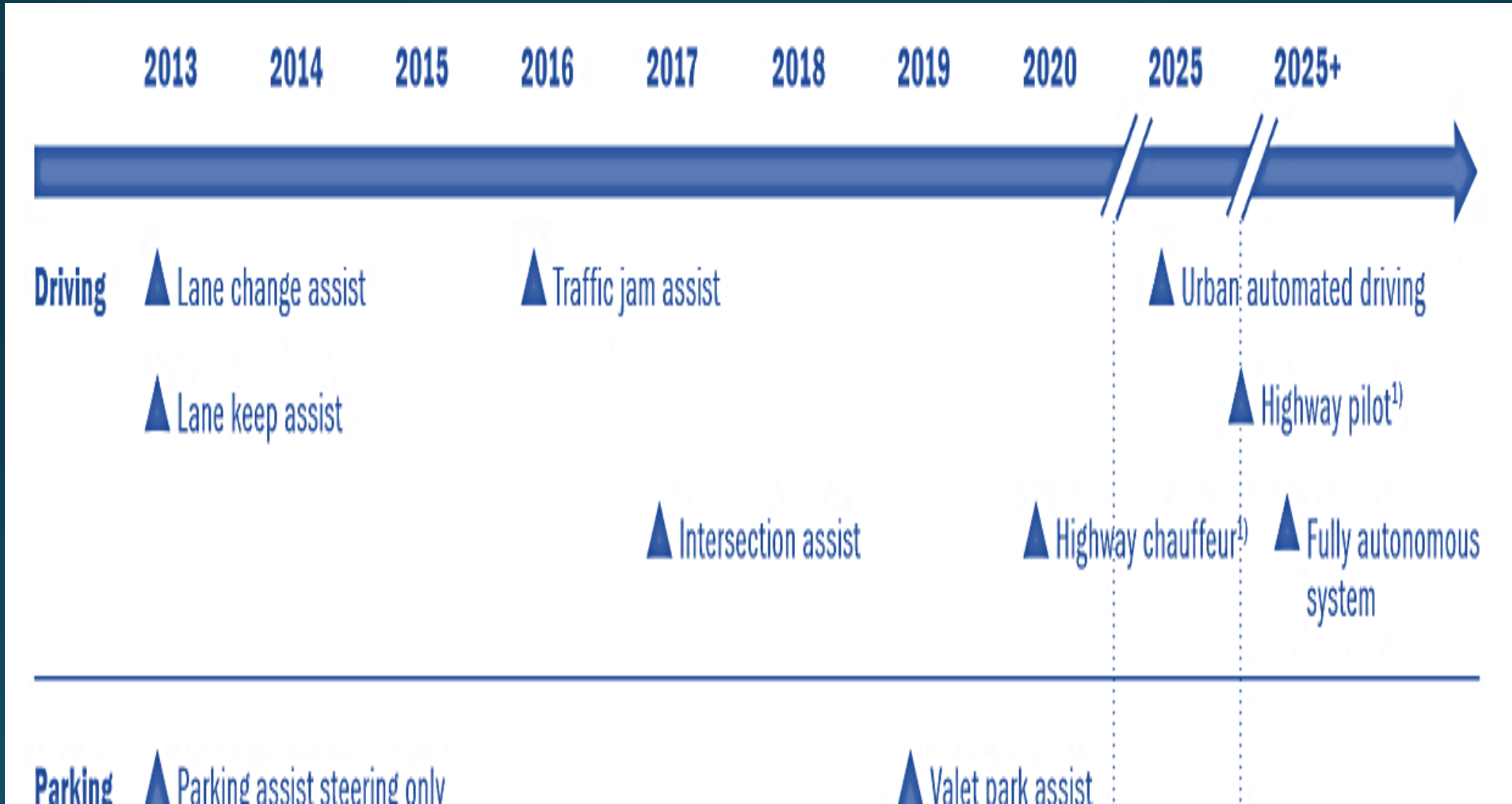
		Steering and acceleration/ deceleration	Monitoring of driving environment	Fallback when automation fails	Automated system is in control
Human driver monitors the road	<b>0</b> NO AUTOMATION				N/A
	<b>1</b> DRIVER ASSISTANCE				SOME DRIVING MODES
	<b>2</b> PARTIAL AUTOMATION				SOME DRIVING MODES
Automated driving system monitors the road	<b>3</b> CONDITIONAL AUTOMATION				SOME DRIVING MODES
	<b>4</b> HIGH AUTOMATION				SOME DRIVING MODES
	<b>5</b> FULL AUTOMATION				

Source: SAE International





# THE TIMELINE: DRIVERLESS VEHICLE FEATURES





# Open Invitation: Michigan's Legislation



## SENATE BILL No. 995

LL No. 995

May 25, 2016. Introduced by Senators KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTEL, COLBECK, SCHMIDT, MARLEAU, HORN and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1949 PA 300, entitled "Michigan vehicle code," by amending sections 2b, 602b, 643, 643a, and 665 (MCL 257.2b, 257.602b, 257.643, 257.643a, and 257.665), sections 2b and 665 as added and section 602b as amended by 2013 PA 231, and by adding sections 40c, 606b, and 645a; and to repeal acts and parts of acts.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

1 Sec. 2b. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND  
2 SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF  
3 THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME  
4 BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS  
5 SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT  
6 DOES NOT INCLUDE STRATEGIC ASPECTS OF A DRIVING TASK, INCLUDING,

03186'15 KED

## SENATE BILL No. 996

LL No. 996

May 25, 2016. Introduced by Senators KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTEL, COLBECK, SCHMIDT, MARLEAU, HORN and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1949 PA 300, entitled "Michigan vehicle code," (MCL 257.1 to 257.923) by adding section 665b.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

1 SEC. 665b. (1) A MOTOR VEHICLE MANUFACTURER MAY PARTICIPATE IN  
2 A SAVE PROJECT IF IT SELF-CERTIFIES TO ALL OF THE FOLLOWING:  
3 (A) THAT IT IS A MOTOR VEHICLE MANUFACTURER, A PERSON THAT IS  
4 NOT A MOTOR VEHICLE MANUFACTURER MAY NOT PARTICIPATE IN A SAVE  
5 PROJECT.  
6 (B) THAT EACH VEHICLE IN THE PARTICIPATING FLEET IS OWNED OR  
7 CONTROLLED BY THE MOTOR VEHICLE MANUFACTURER AND IS EQUIPPED WITH  
8 ALL OF THE FOLLOWING:  
9 (i) AN AUTOMATED DRIVING SYSTEM.

06007'16 KED

## SENATE BILL No. 997

LL No. 997

May 25, 2016. Introduced by Senators WARREN, KOWALL, JONES, STAMAS, BRANDENBURG, HERTEL, COLBECK, SCHMIDT, MARLEAU, HORN and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1949 PA 300, entitled "Michigan vehicle code," by amending sections 2b and 601a (MCL 257.2b and 257.601a), section 2b as added by 2013 PA 231 and section 601a as amended by 2011 PA 119, and by adding section 665a.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

1 Sec. 2b. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND  
2 SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF  
3 THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME  
4 BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS  
5 SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT  
6 DOES NOT INCLUDE STRATEGIC ASPECTS OF A DRIVING TASK, INCLUDING,  
7 BUT NOT LIMITED TO, DETERMINING DESTINATIONS OR WAYPOINTS;  
8 (A) OPERATIONAL ASPECTS, INCLUDING, BUT NOT LIMITED TO,

05463'16 KED

## SENATE BILL No. 998

LL No. 998

May 25, 2016. Introduced by Senators HORN, KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTEL, SCHMIDT, MARLEAU and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1961 PA 236, entitled "Revised judicature act of 1961," by amending section 2949b (MCL 600.2949b), as added by 2013 PA 251.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

1 Sec. 2949b. (1) The manufacturer of a vehicle is not liable  
2 and ~~shall~~**MUST** be dismissed from any action for alleged damages  
3 resulting from any of the following unless the defect from which  
4 the damages resulted was present in the vehicle when it was  
5 manufactured:  
6 (a) The conversion or attempted conversion of the vehicle into  
7 an automated motor vehicle by another person.  
8 (b) The installation of equipment in the vehicle by another

03484'15 TDR



U.S. Department of Transportation

# FEDERAL TESTING GROUNDS



1. City of Pittsburgh and the Thomas D. Larson Pennsylvania Transportation Institute
2. Texas AV Proving Grounds Partnership
3. U.S. Army Aberdeen Test Center
4. **American Center for Mobility (ACM) at Willow Run**
5. Contra Costa Transportation Authority (CCTA) & GoMentum Station
6. San Diego Association of Governments
7. Iowa City Area Development Group
8. University of Wisconsin-Madison
9. Central Florida Automated Vehicle Partners
10. North Carolina Turnpike Authority



# U.S. Army TARDEC







NB State St

Liberty St

SPEED  
LIMIT  
25

Liberty St











# American Center for Mobility

CONNECTED. AUTOMATED. VALIDATED.



KETTERING UNIVERSITY

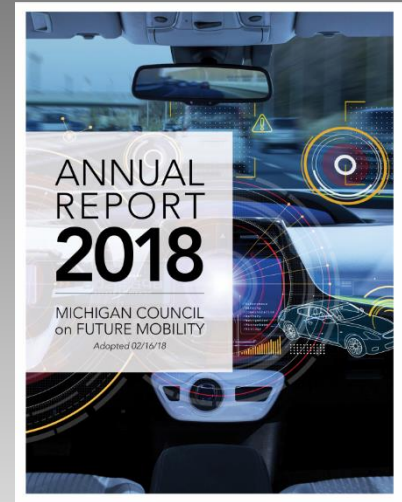


MICHIGAN STATE UNIVERSITY





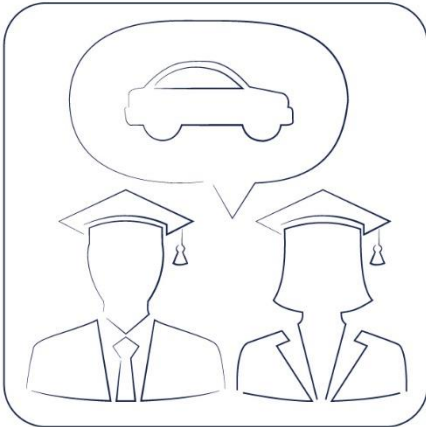
# Michigan Council on Future Mobility



[https://www.michigan.gov/documents/snyder/MCF\\_Mobility\\_report\\_3\\_619285\\_7.pdf](https://www.michigan.gov/documents/snyder/MCF_Mobility_report_3_619285_7.pdf)



# MICHIGAN'S FOCUS



**Talent**



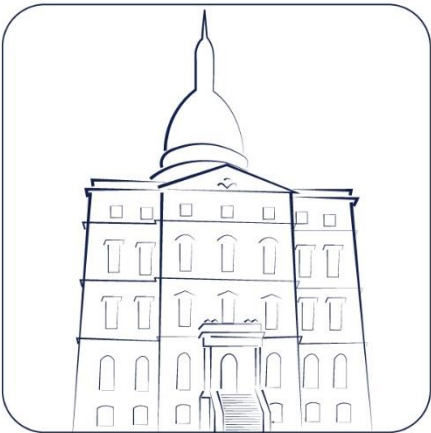
**Mobility**



**Industry Awareness**



**Retention  
& Attraction**



**Advocacy**

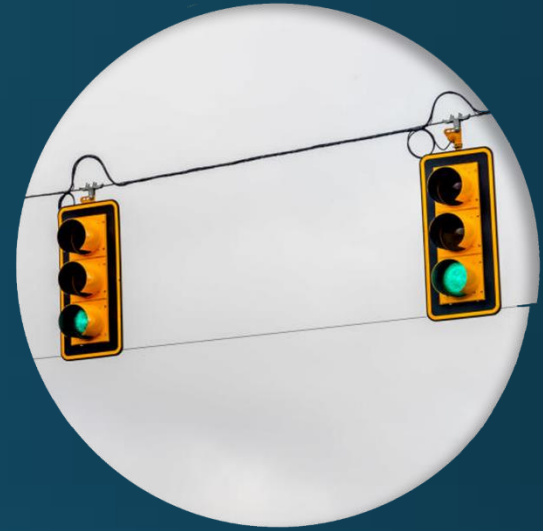


## TRANSIT



MDOT values its ability to assist local agency partners in promoting safety and mobility.

## SIGNALS



## DATA ACCESS



**TOGETHER,**



**WE LEAD**

## FLEET



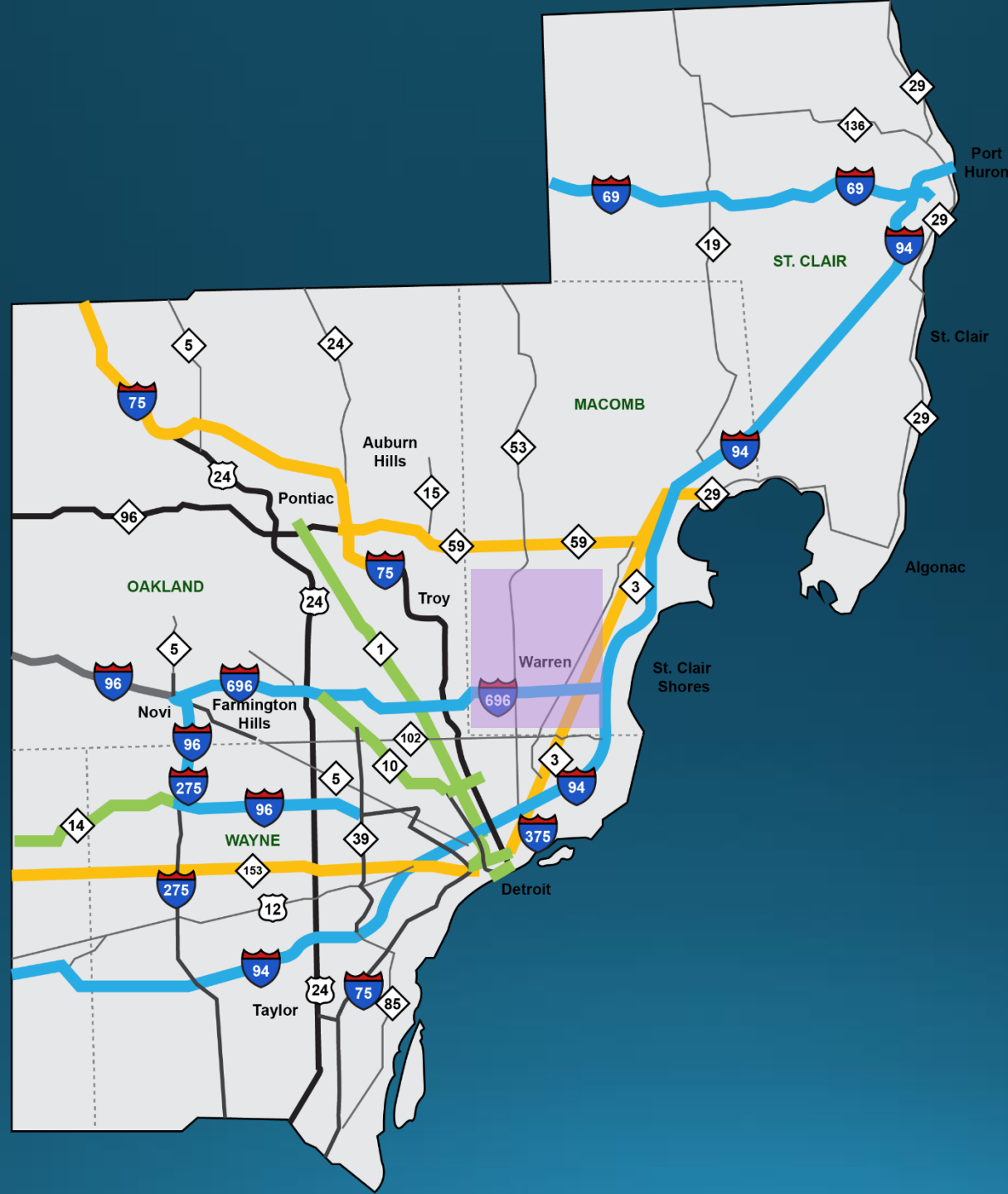
This is achieved by sharing best practices and standards developed in the CV and AV environments



Deployments in  
Ann Arbor:  
**CAV Miles  
Equipped:  
55**

Deployments in  
Lansing:  
**CAV Miles  
Equipped:  
10**

**CAV Miles  
Equipped  
by 2019:  
500+**



**MDOT & MCDR  
CAV  
Infrastructure  
Deployments**

- Existing & 2017
- 2018
- 2019
- Macomb Co. Dept. of Roads  
RSU Deployment



# MDOT ITS SIGNALS CV INITIATIVE

- **CV Enabled Signals Policy**
- **Signal Controller Spec Update**
- **All new or upgraded traffic signals on the MDOT system will be CV-enabled going forward**







# YOUR CONNECTED WORK ZONE

INJURE/  
KILL A  
WORKER  
\$ 7500 +  
15 YEARS



INJURE/  
KILL A  
WORKER  
\$ 7500 +  
15 YEARS

ROAD  
WORK  
AHEAD



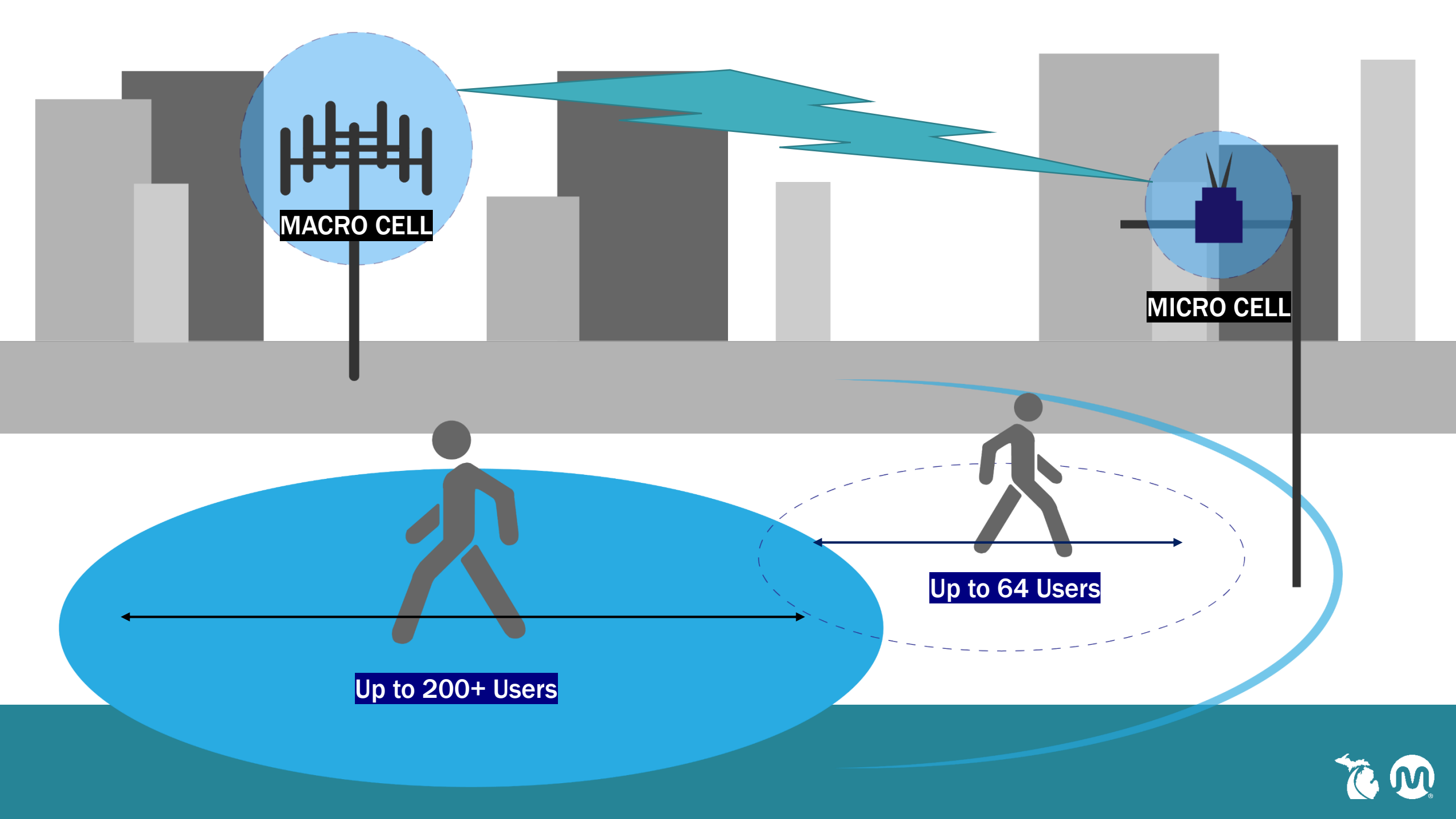
ROAD  
WORK  
AHEAD



# CAV + FIRST RESPONDERS

- Location Information
- Damage/Injury Information
- Signal Priority & Preemption
- Vehicle Detection/Collision Avoidance
- Road Weather Information
- Vehicle Shutdown





**MACRO CELL**

**MICRO CELL**

**Up to 200+ Users**

**Up to 64 Users**

Transforming Mobility for the 21st Century

# DETROIT 2018

**27th Annual Meeting & Expo**

ITS America | June 4-7

[www.itsdetroit2018.org](http://www.itsdetroit2018.org)

