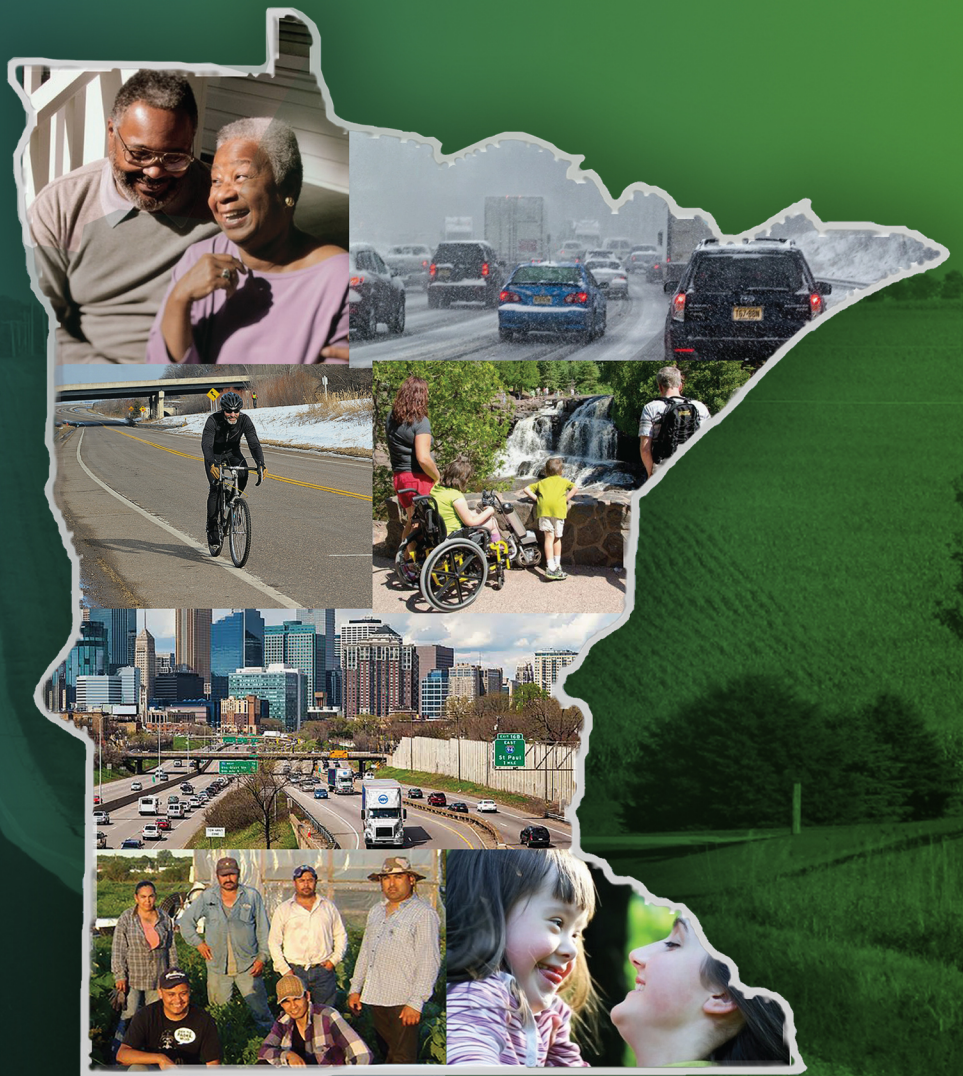


MINNESOTA GOVERNOR'S COUNCIL ON CONNECTED & AUTOMATED VEHICLES



ANNUAL REPORT
February 2021



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This report was prepared by the Minnesota Department of Transportation's Office of Connected and Automated Vehicles, known as CAV-X, with acknowledgment to the Advisory Council on Connected and Automated Vehicles, CAV Innovation Alliance, and Interagency CAV Team members with special thanks to the CAV partners and stakeholders.

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Prepared with support from:
AECOM

A NOTE FROM OUR CHAIRS

It is fair to say that the year 2020 was like nothing any transportation organization has faced. The disruptions, challenges and events of COVID-19, civil unrest after the killing of George Floyd and political uncertainty ask us to re-examine what it means to be stewards of the state's transportation system. The transformational events of 2020 have both given us an opportunity to reflect on how we recommit to social justice and racial equity, how we can use the state's transportation system to respond to COVID-19, and how we continue to look to the future.

As Minnesota re-examines its priorities and goals, the state continues to innovate as connected and automated vehicles and development of intelligent transportation systems technologies continue to evolve. The pandemic, racial injustice, political uncertainty and technology transformation are four trends that are shifting the way Minnesotans view the governor's Advisory Council on CAV's goal to build a transportation system that is safe, equitable, accessible, efficient healthy, and sustainable.

During the pandemic, the technology and auto industries continued to expand their innovations, using CAV technology to deploy food to food shelves and deliver medical supplies with autonomous shuttles. Connected commercial trucks platooned across the country to fill in gaps in the supply chain. By leveraging technology and innovation during pandemic response, the CAV industry grew over 3 percent in 2020, showing the importance of continuous innovation and looking to the future.

While many of Minnesota's public-facing CAV events were paused to avoid COVID-19 exposure risks in 2020, the Governor's Advisory Council remained active. In the past year the Council continued to convene, heard from national experts on workforce development, data and connectivity, and most importantly, launched the CAV Innovation Alliance. This Alliance fosters continued collaboration across the public, private and research sectors and allows communities to directly inform strategies to help Minnesota prepare for the deployment of CAVs.

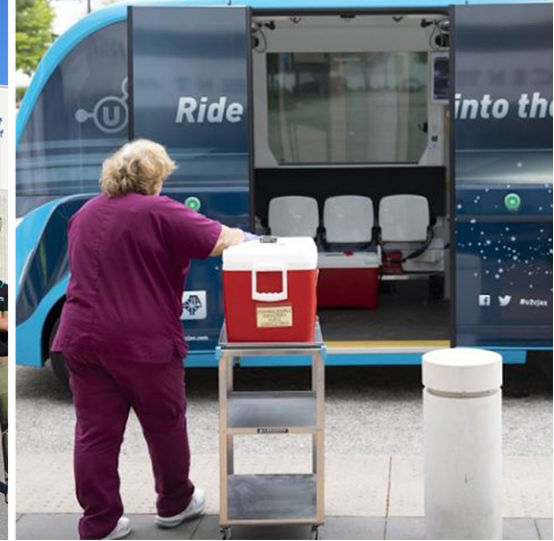
While the future level of CAV deployment in Minnesota remains uncertain, Minnesota has become a national leader in CAV largely because of our unique capacity to collaborate, innovate, and focus on how technology can benefit community transportation needs. Continued statewide leadership and a shared vision is critical to achieve our goals.

This annual report informs the Legislature and Governor on the work of the Council in 2020, fostering collaboration and continued innovation to advance a safe, equitable and sustainable Minnesota.

*Margaret Anderson Kelliher and Phil Magney
Governor's Council on Connected and Automated
Vehicles co-chairs*



Governor's Advisory Council on Connected and Automated Vehicles Members



From left: Pennsylvania's connected vehicle truck platoon; autonomous food shelf deliveries in Westminster, Colo.; COVID-19 medical supply delivery in Florida.

1. 2020 TRENDS IN CAV

COVID-19

As automated vehicle technology continued to rapidly advance in 2020 with improved sensors, increased venture capital funding, and more deployments across the world, the global pandemic placed a noticeable pause on vehicle manufacturing and the auto industry as a whole.

In March 2020 Minnesota – and states around the country – issued stay-at-home orders aimed to reduce the spread of COVID-19, resulting in many employees working from home, limiting travel, and implementing social and physical distancing. Many retail and service businesses suffered the impact of the pandemic. Working from home reduced the need for travel, gas consumption decreased, and auto sales decreased 15 percent.

Despite these impacts, the CAV industry expanded, immediately pivoting to find unique and creative ways to use the technology to respond to global health needs. Autonomous shuttles were used to deliver medical supplies in Florida. Autonomous vehicles delivered supplies to food shelves in Colorado. The autonomous truck industry moved up its deployment timelines to expand autonomous operations in the South. Truck platoons delivered food supplies across the East Coast.

Due to this rapid expansion the CAV industry grew over 3 percent in 2020. Curbside services and home package delivery expanded by 40-50 percent in 2020. With the increased focus on driverless delivery – including driverless package delivery – states like

Pennsylvania and Washington enacted legislation authorizing organizations like Amazon to operate on sidewalks to autonomously deliver packages.

Equity and Racial Justice

In May, the killing of George Floyd by Minneapolis police officers sparked protests around the world that reignited calls for racial equity and social justice.

Organizations across the country and in Minnesota reflected on what they are doing to advance racial justice, social justice and equity. Many organizations developed equity statements, recommitting their work to advance the goals of Black Lives Matter and organizations that advocate for social justice. The State of Minnesota enterprise, including the Department of Transportation, examined their strategic priorities and goals, hosted town halls, and renewed focus on more strategic approaches to dismantling systemic racism.

MnDOT and the Governor's Advisory Council on CAV are advancing transportation equity goals to bring more inclusive leaders into this discussion and using an equity lens framework to examine policies and programs to understand where gaps lie and who has historically been missing from these conversations.



U.S. Secretary of Transportation Pete Buttigieg

Federal Administration Transition

With the change in administrations in January 2021, newly elected President Biden named Pete Buttigieg as the Secretary of Transportation. While the Administration is still in its early planning phases, the U.S. Department of Transportation and the administration plan to renew its focus on equity and sustainability efforts. Initiatives may include expanding federal funding for broadband along the highway system, advancing electric vehicle and sustainable transportation goals, and supporting continued innovation in CAV programs.

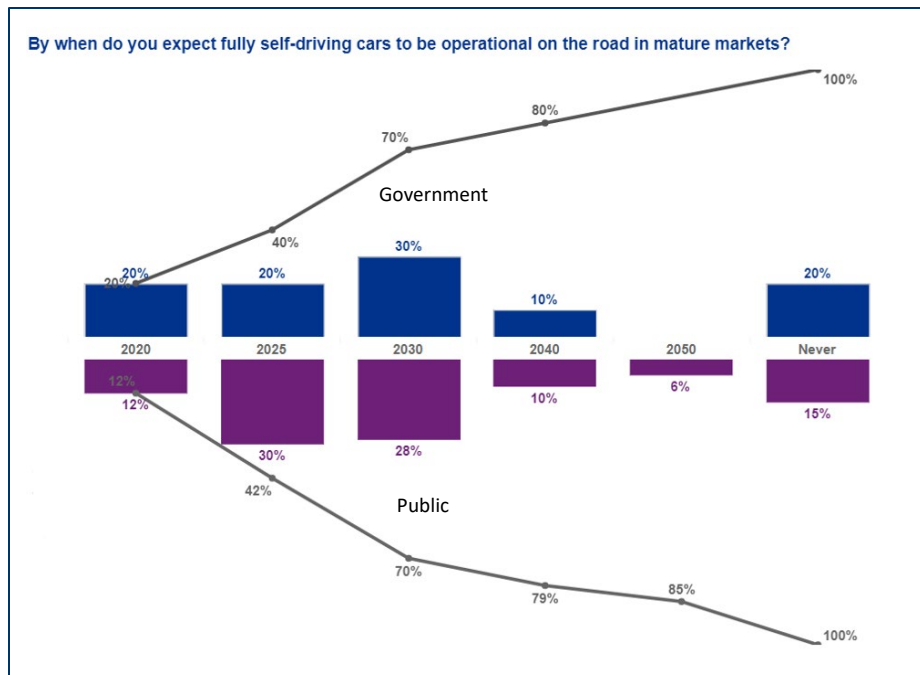
Deployment Timelines

The past year also saw changes in estimated timelines for deployment for CAVs. Waymo launched driverless rideshare services in Chandler, Ariz., and California authorized five companies to conduct driverless testing on public roads – Waymo, Cruise, Nuro, Zoox and AutoX. In November, California created a program to authorize driverless ridesharing services.

Despite this progress in 2020, the rest of the industry is more reserved on its previously optimistic timelines. Recent surveys show that the auto industry believes it will be closer to 2050 when self-driving cars will be

operational on roads in mature markets, with 15 percent of the public and 20 percent of governments believing CAVs will never be fully deployed.

Despite the transformational changes in 2020, the CAV industry and global trends reflect a renewed focus on equity, sustainability and continuous innovation through public-private partnerships that focus on the safe advancement of CAV.



Deloitte Automotive Consumer Study Survey



2. COUNCIL'S VISION AND GOALS

Background

Executive Order 19-18 established the Governor's Advisory Council to understand how emerging technologies will impact Minnesota's transportation system and how to use CAV technologies to advance safer, more equitable, accessible, and sustainable transportation.

The 15-member council represents various sectors, including freight, transit, mobility, accessibility, research, business, industry, research, tech start-ups, labor, local government, cybersecurity, and insurance. State agencies, tribal governments, counties, and cities are also represented. The Council is tasked with:

- Reviewing developments in CAV and emerging technologies
- Exploring partnership opportunities for the State to be prepared for the widespread adoption of new technologies
- Proposing policies to safely test and deploy CAVs
- Implementing recommendations from the 2018 Council
- Preparing an annual report to the Governor
- Engaging communities experiencing transportation barriers
- Advising the departments of Transportation and Public Safety on the safe testing and deployment of CAV

Vision, Mission and Values

The Council's vision is to build a future transportation system that is safe, equitable, accessible, efficient, healthy and sustainable.

The Council's mission is to collaborate with stakeholders, partner with academic institutions and private industry, and engage communities to prepare for a future with emerging transportation technologies.

DESTINATION CAV COUNCIL VALUES

- SAFETY
- EQUITY
- INNOVATION
- RELIABILITY
- LIVABILITY

Minnesota's CAV Goals



Equity, Access and Equity: CAVs may reduce transportation barriers for people with disabilities, aging communities, low-income families, and could provide better access to jobs and health care and other transportation modes.



Jobs and Workforce Development: CAVs present opportunities to reskill and upskill workers, attract new talent to the STEM field, and develop jobs of the future while protecting the jobs of today.



Safety and Efficiency: Technology can eliminate some aspects of human error that contribute to the nearly 400 lives that are lost on Minnesota highways each year. CAVs could also reduce crashes and congestion.



Economic Development and Small Business: Minnesota competes in a global market and is a leader in key sectors. Advancing CAV policy could grow Minnesota businesses, attract new ones, and expand opportunity for small businesses.



Public Health and Sustainability: CAVs could help rethink the way we plan communities to maximize health and sustainable multimodal transportation. Since many CAVs are electric, they could reduce emissions to advance sustainability goals.

Council Priorities and Strategies

The Council developed 10 priorities to accomplish by 2024.

- Equity, mobility, accessibility, public health and environment:** Through all its work, the Council committed to an ongoing priority to use an equity lens to review how CAV can reduce barriers, expand access for communities and ensure these efforts support the state's environmental sustainability goals.
- Industry and research partnerships:** Review how the state's CAV goals align with industry and researchers to advance strategic partnerships with the CAV industry and Minnesota academic institutions.
- Education, outreach, engagement, demonstrations, and pilots:** Develop workshops and events to help communities understand the technology and listen to their ideas on how CAV can solve their transportation needs. Demonstrate CAV technology across the state and host annual conferences and summits to collaborate.
- Invest in infrastructure:** Strategically invest to support CAVs through fiber, pavement markings, signals, and other infrastructure.
- Law for safe testing and deployment:** Pass a law that authorizes the use of driverless vehicles on public roads without human operators. Make recommendations on related insurance, reporting, data privacy, and autonomous delivery to support the testing of CAVs.
- Economic and workforce development:** Convene employers and workforce experts to develop data on CAV occupations. Grow awareness of CAV jobs and apply for grants to pilot CAV skills development.
- Data privacy and cyber security:** Review state policy on data privacy and cybersecurity and make recommendations to update Minnesota data practices laws to address CAV technology.
- Insurance and liability:** Review national efforts and determine minimum insurance standards.
- Regional and federal coordination:** Align Minnesota with other states and federal government initiatives and share best practices. Represent and attend national committees.
- Human factors research on the impacts of CAV on users:** Expand research on the social, technological, and other impacts CAV will have on our society.

3. WHAT ARE OTHER STATES DOING?

How does Minnesota’s CAV program compare to other states? Over 41 states have considered CAV legislation. In 2020 the Council heard from national experts across the country and hosted peer exchanges with a dozen states to share information and best practices. Below is a summary of what leading states are advancing.

Arizona

Arizona remains one of the most laissez-faire regulatory regimes in the U.S. with no laws that address CAVs. In 2020 the state reviewed its laws and deemed it had the regulatory structure it needed to oversee CAVs.



Arizona authorizes fully driverless vehicles through an online testing form. To oversee the state’s activities, the state created the Institute for Automated Mobility (AIM) – a public-private partnership to advance testing and evaluation. AIM’s goals are to create metrics to evaluate the safe performance of CAVs and use video analytics to monitor its current driverless rideshare program.

California

California’s AV regulatory program remains the strictest in the country, overseen by its Public Utilities Commission and Department of Motor Vehicles. California approved five companies for autonomous testing on public roads, and in late 2020 approved a new permitting program that allows permittees to sell driverless ridesharing services. Cities are prohibited from developing their own AV operating policies.

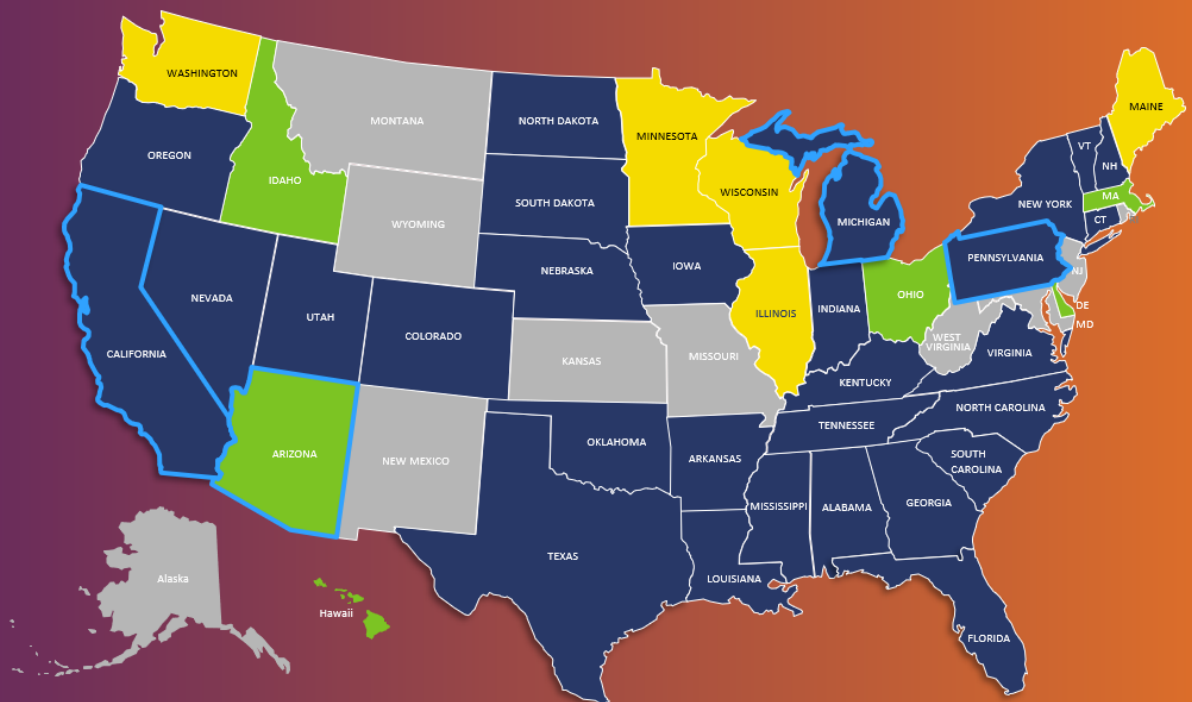


Minnesota entered into a new partnership with the Contra Costa Transportation Authority (CCTA), which owns the nation’s largest testing facility. The partnership allows Minnesota and California to share their testing facilities and exchange information, including best practices on California’s data privacy systems, leading industry partnerships, and how CCTA is advancing

STATE AUTOMATED VEHICLE LAWS

Since 2012, at least 41 states and D.C. have considered legislation related to autonomous vehicles

- Enacted legislation
- Executive Order
- Both
- None





European Union Truck Platooning

autonomous transit and mobility on demand applications.

California’s Consumer Protection Act (CCPA) was enacted to protect individuals’ private data that may be collected within CAVs. In 2020 the public overwhelmingly approved a referendum to amend the law to improve privacy protections.

Pennsylvania



Pennsylvania continues to lead the East Coast in CAV policy through the Pennsylvania Department of Transportation and the

state’s Advisory Council. In 2020 the state authorized automated delivery devices on sidewalks. PennDOT is looking at how it can align its CAV programs with unmanned aerial systems, smart mobility, electric vehicle and related technologies.

In October PennDOT coordinated with other states to the nation’s longest connected vehicle platoon with Locomation from Pittsburgh to Detroit.

Michigan



Michigan continues to lead the nation in developing public-private partnerships with the Detroit-based CAV auto and tech industry. Michigan law allows platoons and CAVs on all public roads.

Michigan’s activities are now coordinated through the state’s new Office for Future Mobility out of the Governor’s Office. Michigan created a CAV Strategic Plan, based on Minnesota’s. The state updated its investment policies for pavement marking to upgrade infrastructure to accommodate CAVs and improve visibility for human drivers.

Michigan announced the creation of a CAV corridor from Detroit to Ann Arbor with private and public funding. The University of Michigan also published a *Middle Skills Report* highlighting the six key skills the CAV industry will need into the future.

AV TEST Initiative



National Highway Traffic Safety Administration AV TEST Initiative

5. STATE, REGIONAL AND FEDERAL POLICY

Minnesota Implements Platooning Law

The 2019 Legislature authorized truck platooning by permit, requiring commercial vehicles to submit a plan to the departments of Public Safety and Transportation. Platooning is a connected vehicle technology that allows vehicles to travel closely in a convoy. Platooning is only allowed on specific state highways. The new program was launched in June 2020. To date, no permit requests have been received.

Federal Communications Commission Connected Vehicle Regulatory Changes

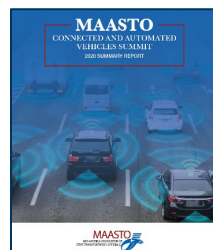
For nearly two decades states were advancing connected vehicle technologies through 'dedicated short-range communications,' which use F.C.C.-approved radio bandwidth to communicate to other vehicles. The 5G cellular technology industry pushed the F.C.C. to enact a new rule, which went into effect in late 2020, essentially eliminating the ability for DSRC to advance. This significantly impacts highway safety because cell signal can face delays or dropped service. Minnesota is coordinating with other states, researchers and safety advocates, including the Intelligent Transportation Society of America, to oppose the regulatory change.

Minnesota has already started these newly approved technologies in St. Paul and Roseville to understand the benefits and limitations of cellular technologies.

NHTSA AV TEST Public Trust Initiative

In June, the National Highway Traffic Safety Administration launched the Automated Vehicle

Transparency and Engagement for Safe Testing (AV TEST) Initiative. This is a new online GPS tool that allows the public to see where CAV testing is happening across the country. States like Minnesota and private companies like Nuro enter real-time information and data to build trust and transparency with the public and lawmakers.



MAASTO CAV 10-Year Strategy

In May 2020 Mid-America State Transportation Officials kicked-off a new committee of 10 states to collaborate and advance CAV planning and preparedness.

Minnesota chairs this committee, which hosted its inaugural summit in October, finalizing a 10-year regional strategy for CAV. The states signed a memorandum of understanding committing the region to this continuous effort, now the first region in the nation to develop coordinated, inter-jurisdictional CAV strategies.

FHWA Broadband Rulemaking and Strategy

The Federal Highway Administration continues to coordinate with states on research and testing. Minnesota continued to engage in the Automated Vehicle Concept of Operations, a high-level strategy to help states prepare their road systems for CAVs. FHWA also issued rules for more coordinated broadband installation on interstates and issues several rounds of grants to states, including Minnesota's successful application to test connected vehicle data in work zones.

6. HOW MINNESOTA IS PREPARING FOR CAV

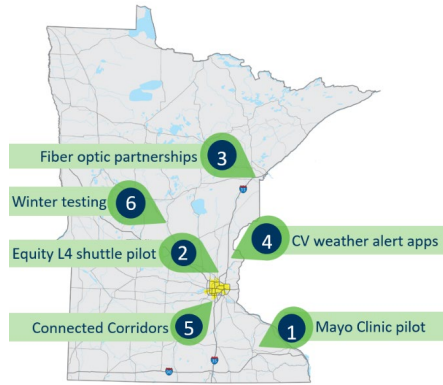
Minnesota Department of Transportation

The MnDOT Office of Connected and Automated Vehicles (CAV-X) was launched in April 2018 to support the

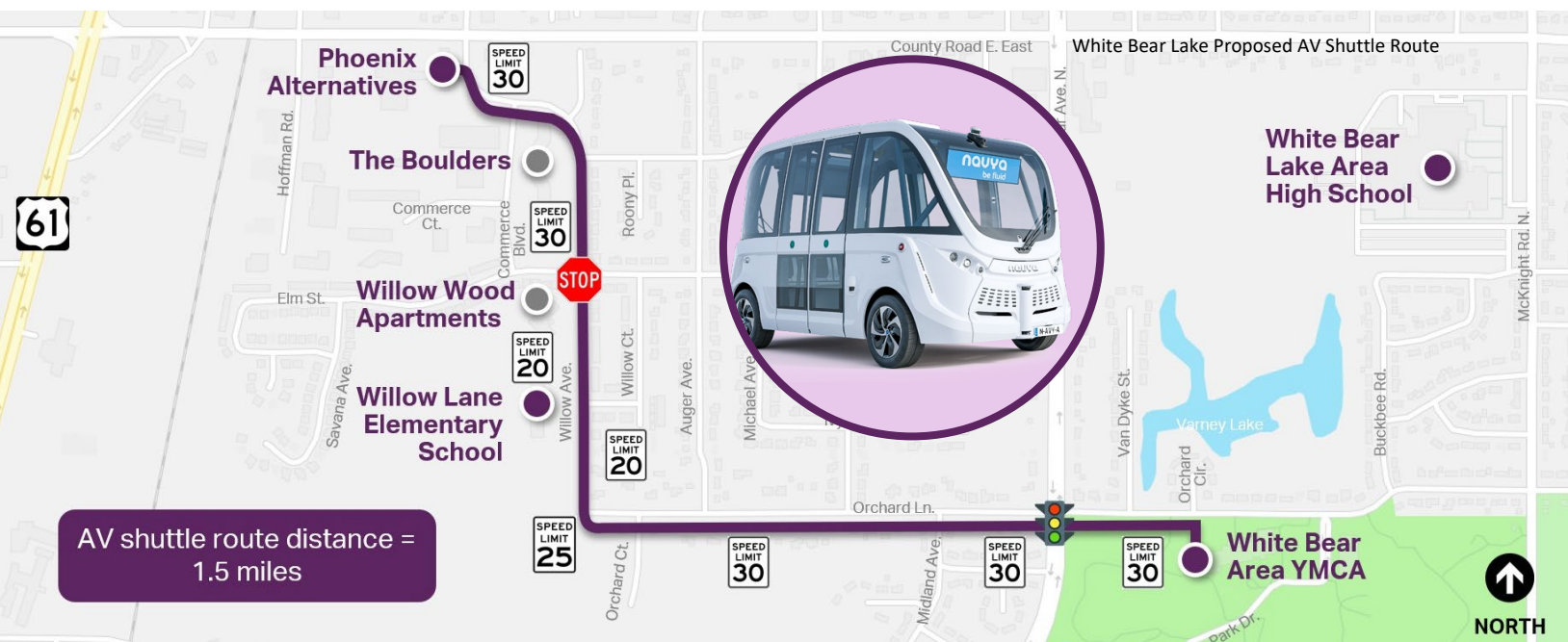
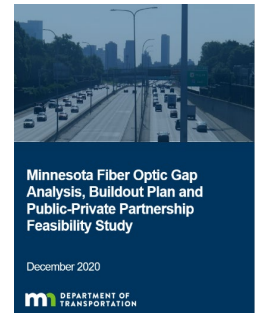
Governor’s Advisory Council and dedicate an interdisciplinary team to advance policy, planning, research, testing and engineering prepare the state for CAV.

After two years of dedicated collaboration and research, CAV-X is now one of the country’s leading institutions on CAV. In 2020 the office focused on several important initiatives, including:

- CAV Challenge:** MnDOT won top regional and national *Transportation Innovation* and *America’s Transportation Awards* for the Minnesota CAV Challenge, an innovative procurement where industry, researchers and communities can propose unique ideas to use CAV technology to solve Minnesota’s transportation challenges. Over 83 unique ideas have been proposed with 14 active projects being planned.



- COVID-19 risk assessments:** MnDOT re-evaluated anticipated public launch dates for CAV pilots to address COVID-19 risks. MnDOT paused public pilots until 2021 when COVID-19 risks may lift, allowing research pilots to integrate new CAV technologies.
- Autonomous shuttle pilots:** 2021 will see the launch of autonomous shuttle pilots near the Mayo Clinic in Rochester, MN, and in White Bear Lake, MN.
- Connected vehicle technology corridors:** The state and partners are testing new cellular vehicle communications technologies that connect snowplows and prevent red-light running to help avoid collisions.
- Fiber and broadband:** MnDOT, MniT and Department of Employment and Economic Development are completing a 10-year investment plan for fiber optic that supports CAVs and broadband. The state also met with the private telecommunications industry to understand their broadband expansion goals and learn how to partner in future pilots.
- Public survey:** MnDOT conducted the nation’s largest CAV survey to understand Minnesotans’ attitudes on CAV, as part of the state’s planning



efforts for the *Minnesota Strategic CAV Messaging and Engagement Plan*, to be completed in 2021.

- **Corridor planning:** Partners kicked off the state’s first CAV corridor planning effort with communities along Highway 52 from Rochester to St. Paul.
- **CAV traveler information:** The state and researchers integrated CAV technology into snowplows to alert drivers when they’re coming up on a plow to help drivers avoid crashes and “see” in snowy conditions.
- **National committees and working groups:** MnDOT represents Minnesota on key regional and national committees and conferences to advance CAV research and policy.

Counties

The Minnesota County Engineers Association has a CAV committee, comprised of members from each MnDOT District, which meets regularly to coordinate on CAV topics. This year the CAV committee began holding meetings with the MnDOT CAV-X Office and MnDOT State Aid for Local Transportation Division to share CAV information and coordinate activities.

Recognizing the need for an integrated approach to implementing CAV across the transportation system, county representatives are participating on the Advisory Council’s Safety and Law Enforcement, Infrastructure Investment, and Outreach and Education Committees. Two county representatives also participate on the Minnesota Guidestar Board of Directors.

These activities have led to county involvement in various implementation activities, including: (1) Hennepin County’s CAV strategic plan; and (2) the Highway 52 CAV corridor study pilot where Olmsted, Goodhue and Dakota counties are partnering with MnDOT and other stakeholders to understand which CAV technologies could benefit the highway users and communities between St. Paul and Rochester.

Sharing information about CAV technologies is an important element of moving toward implementation at the county level. Recently, MnDOT State Aid for Local Transportation provided an extensive overview of CAV in its “State Aid E-Scene,” which is shared with all counties across the state. Counties are also participating in locally focused research, including “How Locals Need To Prepare for the Future of V2V/V2I Connected Vehicles” and “Preparing Local Agencies for the Future of CAV,” to assist local agencies with preparing CAVs and related

technologies. The Local Road Research Board also includes county representation to research emerging CAV issues.

Interagency CAV Team (I-CAV)



I-CAV represents all public agencies and research institutions to help governments prepare for CAV. Representatives from state agencies, the University of Minnesota, MnSCU, Met Council, the Federal Highway Administration and others collaborate and develop cross-agency policies and support the Advisory Council. I-CAV’s mission is to advance CAV education and outreach, research, AV policy and standards for infrastructure and data. In 2020 I-CAV kicked off a working group to assess automated delivery device policy and prepare Minnesota for deployment of these delivery robots in the future.

Cities

The League of Minnesota Cities has representation from local elected officials and League staff on the Governor’s Advisory Council and is involved with the Minnesota CAV Innovation Alliance. These representatives sit on various Innovation Alliance committees to assist in moving forward CAV goals. Mayor Gadd of Hopkins participates in the Connectivity and Data Committee, which is key to involving local city perspective as the state examines the impact of potential data collection and accompanying public policies. Councilmember Tina Folch of Hastings sits on the Outreach and Education Committee to ensure communities are engaged, and to help identify key messaging and information-sharing opportunities.

Examples of activity at the city level include MnDOT and the city of Hastings discussing fiber planning efforts when major highway reconstruction is taking place. Hastings provided support to MnDOT to understand how cities want to be engaged in CAV planning and ensuring the state coordinates with local government on potential opportunities to lay fiber along highways.

In 2020, the city of Minneapolis focused on developing policies and building the necessary digital infrastructure

to support CAV. In November, its [Transportation Action Plan](#) was adopted, including a [strategy](#) to harness technological advancements for citywide benefits that support safe street operations and focus on human-centered design. Minneapolis was also one of three cities chosen to participate in the Transportation For America [Smart Cities Collaborative](#).

The city of Rochester is partnering on several efforts to advance CAV and smart city technology. Rochester is a member of the Automated Bus Consortium, a group of 12 transit providers across the country working to bring automated technology to full-size transit buses. The city is partnering with First Transit, Easy Mile, MnDOT's CAV-X office, Destination Medical Center and Mayo Clinic to launch a six-passenger autonomous shuttle in spring 2021 in downtown Rochester. The project was placed on hold during the COVID-19 pandemic, which allowed the project to test newer technologies, identify infrastructure improvements needed for safe testing on public roadways, evaluate operations in mixed traffic, understand how new technology works in winter weather, and engage with the public.

The City Engineers Association in 2020 convened the CAV subcommittee with leadership from the city of Eden Prairie to help city officials plan for CAVs. The League of Minnesota Cities continues to seek opportunities for city officials to learn more about CAV and what it will take to prepare for more widespread use of CAV technologies.

Universities and Colleges

The University of Minnesota made great strides in 2020 to advance its work in CAV, led by the Center for Transportation Studies. CTS completed a strategic plan that identifies five strategic initiatives and research focus areas where the University has existing expertise and capabilities. Implementation is underway. This new "MnCAV Ecosystem" brand embodies the interdependence of infrastructure, people and data; cross-cutting issues; and multi-sector partnerships.

In early 2020, CTS also launched a project to help explore internal university needs for CAV infrastructure to support research, education and engagement activities. That exploration led to a successful proposal for funding to: (1) purchase a CAV; (2) lease a second vehicle for work on vehicle connectivity; and (3) lease an autonomous transit shuttle. Funding was provided by internal university resources led by the Office of the Vice President for Research. Dataspeed is building a highway speed CAV for research in spring 2021. The university is

partnering with VSI Labs for ongoing software and technical assistance support and training. Research with these technologies is being conducted jointly with MnDOT and the Local Road Research Board.

CTS entered into a partnership agreement with the city of White Bear Lake, Newtrax, and AECOM to launch an autonomous shuttle pilot as part of MnDOT's *CAV Challenge* program. The university will use the CAV shuttle for research during the project, which launches in late 2021. CTS secured a federal grant to host a *CAV Career Pathways Summer Camp* for White Bear Lake high school students in summer 2021. During the camp, students will learn about CAV technologies, participate in CAV demonstrations, and meet with professionals and academics to learn about CAV career opportunities.

University personnel are actively engaged with the CAV Innovation Alliance and Governor's Advisory Council. Frank Douma co-chairs the Data Connectivity Committee, Gina Baas serves as one of the chairs of the Outreach and Education Committee, and several other faculty are participating as committee members.

The [Minnesota State Transportation Center of Excellence](#) includes 33 campuses across the state to develop a high-tech CAV workforce. MnSCU is training mechanics to be prepared to service CAVs and is developing training and outreach programs to make the workforce aware of these coming CAV workforce trends.

Private industry

Many Minnesota companies are advancing CAV innovation. Local tech start-up VSI Labs, founded by Council co-chair Phil Magney, completed its first automated cross-country road trip to both coasts to learn about how the technology adapts.

Council members Polaris Industries and 3M Corporation are working on connected vehicle innovations. Polaris is advancing partnerships with DEED and other state workforce partners to develop CAV career skills. 3M is developing innovative CAV infrastructure solutions in partnership with MnDOT along Interstate 94 in St. Cloud to test some of these new technologies.

ITS Minnesota continues to advance the state's CAV and ITS goals with private industry by developing unique partnerships to host CAV trainings, such as a cybersecurity training and ITS systems engineering to help technicians advance CAV readiness in their own fields.

**CAV
ADVISORY
COUNCIL**

**STATEWIDE
INNOVATION
ALLIANCE**

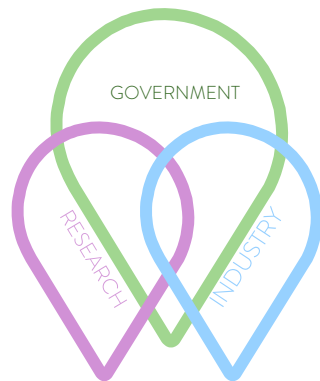
COMMITTEES



7. LAUNCHING THE STATE'S CAV INNOVATION ALLIANCE

Building a Statewide Coalition

One of the Council's key goals in 2020 was launching the *CAV Innovation Alliance* in May 2020 - a statewide coalition for emerging transportation technologies, based off the 2018 Advisory Council Executive Report



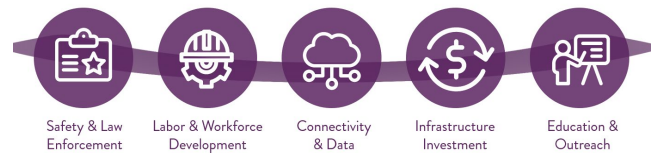
recommendations. The Alliance is intended to be a broad statewide network to coordinate CAV work across Minnesota and serves as a "one stop shop" for CAV in the state.

The goals of the CAV Innovation Alliance are to:

1. Create a network of local, regional, and state organizations who share a commitment to planning and preparing for CAV and emerging technologies
2. Coordinate CAV activities across the state to develop a unified program and avoid redundant research
3. Implement Governor's Advisory Council recommendations to advance the Council's priorities

4. Develop priorities for public-private research, pilots, and projects
5. Meet regularly to discuss CAV project and research updates, share lessons learned, and best practices
6. Convene an annual conference to share lessons learned and develop priorities for the Alliance

Committees



The Alliance ultimately reports to the Governor's Advisory Council. Recognizing the need to be more strategic in focusing Minnesota's efforts, the Alliance created five committees that focus on developing immediate solutions to help the state prepare for CAV. The committees are staffed and administratively supported by MnDOT. Each committee has two co-chairs, from both the public and private sectors, with deep technical expertise in each respective committee topic. Each quarter, the committees report to the Council on their activities, hosting educational panels, and showcasing key deliverables to the state's CAV leaders to advance Council goals.

| Safety Committee | Labor & Workforce Development | Connectivity & Data Committee | Infrastructure Investment Committee | Education and Outreach Committee |
|---------------------------------------|---|--------------------------------------|-------------------------------------|----------------------------------|
| CHAIRS | | | | |
| Department of Public Safety and MnDOT | MnSCU Technology Center of Excellence and Polaris | University of Minnesota and Fastcase | MnDOT and WSB | University of Minnesota and HDR |

Each Committee identified several key goals and top priorities.

| GOALS | | | | |
|---|--|--|--|--|
| <ul style="list-style-type: none"> Define 'CAV safety' Develop CAV safety principles Advance multi-modal safety research focused on human-centered design Educate CAV safety benefits | <ul style="list-style-type: none"> Develop CAV STEM curriculum Create baseline CAV workforce occupational data Apply for grants to pilot a CAV workforce upskilling program | <ul style="list-style-type: none"> Define CAV data privacy principles Create a CAV data privacy policy framework Identify the CAV data the state needs Develop a public-private CAV data pilot | <ul style="list-style-type: none"> Provide expertise on infrastructure standards Advise on what CAV investments to make Develop partnerships to fund CAV infrastructure | <ul style="list-style-type: none"> Increase awareness of CAV in the state Convene stakeholders in conferences and events Develop messaging and outreach materials Host technology demonstrations |



Safety Committee

The Safety Committee is chaired by the Minnesota Department of Public Safety's Office of Traffic Safety and MnDOT's Bicycle and Pedestrian Coordinator.

Kicking off in early 2021, the committee will focus on how CAV technology can advance the state's goals to eliminate deaths and injuries on roads (known as *Toward Zero Deaths*). Priorities include ensuring the state promotes walking and biking and providing transportation for all communities. The transportation system must be designed for all road users, not just CAV technologies, so this committee uses a human-centered design and multi-modal approach to help the state identify its CAV safety principles and promote the goals in the *Strategic Highway Safety Plan*.

Committee leadership advocates that safety comes down to equity, where everyone should feel safe, regardless of mode. CAV is a tool that can help achieve the vision of transportation safety and equity.



Labor & Workforce Development Committee

This committee is co-chaired by the Minnesota State Colleges and Universities' Technology Center of Excellence and Polaris, with strong support from the state's Department of Employment and Economic Development, workforce advocates, CAV technical consultants, and leaders from the state's Auto Dealers and Trucking Associations.

The committee is focusing on evaluating the state's STEM programs to create CAV educational materials to help individuals learn about CAV careers, working with DEED to develop data to track CAV occupations in Minnesota, looking into upskilling and reskilling workers in CAV skills, and developing a CAV skills pilot program. In November 2020, the committee supported DEED and MnDOT in applying for a federal Department of Labor grant to pilot some of these applications across Minnesota.

Members are committed to intentional job creation by supporting employers and employees to prepare understand and prepare for CAV technology impacts jobs of today, while planning for jobs of the future.



Connectivity & Data Committee

This committee is co-chaired by Fastcase and the Humphrey School of Public Affairs State and Local Policy Program, with Vice Chair support from Maslon LLP.

This committee helps the state understand what to do with CAV data and how Minnesota can responsibly manage CAV data. The committee reviewed over a dozen state and international data policies to develop the *Minnesota CAV Data Privacy Principles*, a framework to understand how the state should address the challenges of managing complex information and responsibly sharing information with the appropriate entities.

The committee, with leadership from MnIT, is also developing the state's *Security by Design Framework* to identify how systems can be developed to prevent cyberattacks and other security concerns.

The committee is leading the Alliance in using an equity lens framework when creating these new policies, asking how CAV policies may unintentionally impact Minnesota communities and ensuring the state engages all communities.



Infrastructure Investment Committee

This committee is chaired by MnDOT's Assistant Commissioner of Operations and WSB and is convened jointly with Minnesota's well-established *Guidestar Board of Directors*. Committee priorities include advising cities, counties and the state on what strategic investments should be made to support CAV.

The committee is assessing opportunities to invest in fiber, traffic signals, pavement marking and signing and how to manage CAV assets. Cities are looking into digital curbside mapping and curb management. This and other data – like work zone, signal timing and traffic data – is critical for CAVs and traditional vehicles to operate safely. Members are also looking into policies that support testing on public road, winter weather testing and autonomous freight research.



Education and Outreach Committee

With education and outreach being one of the state's number one priorities, this committee supports the Council and all Alliance committees to develop a collaborative approach to CAV education, outreach and awareness.

Co-chaired by the University of Minnesota Center for Transportation Studies and HDR, this committee focuses on increasing awareness of CAV technology, sharing regular updates on Minnesota's CAV program and activities, and convening stakeholders and communities to learn about CAV, collaborate on policy and share best practices.

The committee includes a diverse group of stakeholders with backgrounds in accessibility and mobility advocacy, planning, community engagement, public outreach, communications, and other fields.

Committee priorities include:

1. Developing CAV presentation materials and talking points
2. Creating a regular CAV newsletter
3. Developing a statewide CAV website
4. Hosting technology demonstrations
5. Convening an annual CAV conference
6. Surveys to gauge public awareness of CAV

This committee supports the implementation of the MnDOT CAV Strategic Plan, the state's *Strategic CAV Communications and Engagement Plan*, and the outreach and education work of all Alliance and Council priorities. Surveys show that when the public has an opportunity to see the technology in person, ask questions, and participate in demos, two-thirds of Americans support investments and planning for CAV. Without engaging communities, however, Americans are hesitating to adopt CAV technology.

The Alliance will help Minnesotans understand what a future with CAV looks like. The pandemic and renewed demands for racial justice have sparked conversations in how we build trust, develop meaningful relationships, and collaborate across Minnesota.

CAV Innovation Alliance Membership

The Innovation Alliance is intended to be a broad partnership that includes representatives from universities and technical colleges, private industry, nonprofits, government, and communities. In its first six months the Alliance has grown significantly, but still seeks opportunities to include diverse voices from across the state. As the state seeks more members, current members are listed below.

- 3M
- AECOM
- American Family Insurance
- American Trucking Research Institute
- Association of Minnesota Counties
- Blue Cross/Blue Shield
- Bolton & Menk
- Cam Creek Consulting
- City of Apple Valley
- City of Eden Prairie
- City of Hopkins
- City of Hastings
- City of Richfield
- City of Roseville
- Dakota County
- Fastcase
- Federal Highway Administration
- Freedom Lines
- Governor's Advisory Council on CAV
- Guidestar Board of Directors
- HDR
- House of Representatives
- Ideate Consulting
- Intelligent Transportation Society (ITS) Minnesota
- Interagency CAV Team
- League of Minnesota Cities
- Maslon LLP
- Met Council
- Minnesota Automobile Dealers Association
- Minnesota 360
- Minnesota Council on Disability
- Minnesota Department of Administration
- Minnesota Department of Employment and Economic Development
- Minnesota Department of Human Services
- Minnesota Department of Public Safety
- Minnesota Department of Transportation
- Minnesota Trucking Association
- Mobility Mania
- NewPublica
- County Engineers Association
- State Colleges and Universities
- Minnesota Transportation Alliance
- Minnesota Safety council
- MnIT
- Polaris Industries
- Rochester Public Schools
- State Patrol
- Split Rock Partners
- SRF
- Stantec
- The Plum Catalyst
- Twin Cities Shared Mobility Collaborative
- University of Minnesota
- VSI Labs
- Washington County
- WSB

8. 2021 LOOK AHEAD

WHAT CAV EVENTS ARE TAKING PLACE IN MINNESOTA IN 2021?



Public engagement, outreach and demonstrations: Once COVID-19 risks lift later in the year, CAV demonstrations will be held at the Capitol, St. Cloud and in the Twin Cities. CAV workshops are being hosted at the *Transportation Conference* in March, *International Automated Vehicle Symposium*, and the *Toward Zero Death Conference* in October. The CAV newsletter and websites will be re-imagined to deliver news and updates on the state's activities, showcasing opportunities to get involved.



Autonomous shuttle pilots: Minnesota will continue collaborative public-private partnerships to understand how the state should prepare for CAV. The Rochester and White Bear Lake autonomous pilots will launch in summer and fall 2021, with other Greater Minnesota pilots currently being planned.



Connectivity & Work Zone Safety: The FHWA granted Minnesota funding to test connected vehicle work zone safety applications. With the FCC ruling, the state is also looking into new cellular connected vehicle technologies, including those being piloted in Ramsey County in Roseville. DEED, MnIT and MnDOT are also partnering to deploy fiber and

broadband in key areas of the state to advance CAV and rural connectivity goals.



Data privacy and cybersecurity: Minnesota became the first state in the country to develop CAV privacy principles, which will be tested in 2021 CAV applications. The state has also developed a framework to make these systems secure which MnDOT and MnIT are looking into testing in 2021.



Research: The state is researching automated delivery devices like sidewalk robots, connected vehicle efficiency, and understanding the social justice impacts of CAV deployment. In 2020 the state launched the Gender Equity in Transportation Collaborative, or *G.E.T. Collaborative*, to research how emerging technologies impact gender and racial disparities.



Equity, Mobility and Access: The state's CAV program is now the first program in the nation to make equity one of its key priorities. In 2021, CAV projects and programs will use an equity lens framework to ensure the state's decisions do not unintentionally or negatively impact Minnesota communities. The state is recommitting its focus on equity to ensure the future of transportation is accessible for all.



CAV ADVISORY COUNCIL MEMBERSHIP AND LEADERSHIP

| ADVISORY COUNCIL MEMBERS | ORGANIZATION |
|---|---|
| COMMISSIONER MARGARET ANDERSON KELLIHER, CO-CHAIR | Minnesota Department of Transportation |
| AMBER BACKHAUS | Automobile Dealers Association |
| DAN CHEN | 3M |
| RYAN DANIEL | St. Cloud Metropolitan Transit |
| JACOB FREY (REPRESENTED BY ROBIN HUTCHINSON) | City of Minneapolis |
| MICHAEL GORMAN | Split Rock Partners |
| JOHN HAUSLAUDEN | Minnesota Trucking Association |
| PHIL MAGNEY, CO-CHAIR | VSI Labs |
| LAURIE MCGINNIS | University of Minnesota Center for Transportation Studies |
| MYRNA PETERSON | Mobility Mania |
| EDWARD REYNOSO | Teamsters Joint Council |
| DAMIEN RIEHL | Fastcase Legal Research Platform |
| VICKY RIZZOLO | American Family Insurance |
| PATRICK WELDON | Polaris |

| EX-OFFICIO MEMBERS | ORGANIZATION |
|--|---|
| MAYOR JASON GADD | League of Minnesota Cities |
| COUNCIL MEMBER TINA FOLCH | City of Hastings, League of Minnesota Cities Representative |
| COMMISSIONER ALICE ROBERTS-DAVIS | Department of Administration |
| COMMISSIONER THOM PETERSON | Department of Agriculture |
| DEPUTY COMMISSIONER ANNE O'CONNOR | Department of Commerce |
| COMMISSIONER STEVE GROVE | Department of Employment and Economic Development |
| COMMISSIONER JAN MALCOLM (REPRESENTED BY EMILY SMOAK) | Department of Health |
| COMMISSIONER JODI HARPSTEAD (REPRESENTED BY COURTNEY WHITED) | Department of Human Services |
| COMMISSIONER MARK PHILLIPS | Iron Range Resources and Rehabilitation Department |
| COMMISSIONER JOHN HARRINGTON | Department of Public Safety |
| COMMISSIONER ROBERT DOTY | Department of Revenue |
| COMMISSIONER TAREK TOMES | Minnesota IT Services |
| COMMISSIONER LAURA BISHOP (REPRESENTED BY TODD BIEWEN) | Minnesota Pollution Control Agency |
| WAYNE SANDBERG | County Representative, Association of Minnesota Counties |
| DAVID DIVELY | Interim Executive Director, Minnesota Council on Disability |
| REP. CONNIE BERNARDY | Majority Party Representative, Minnesota House of Representatives |
| REP. STEVE ELKINS | Representative, Minnesota House of Representatives |
| SEN. SCOTT NEWMAN | Majority Party Representative, Minnesota Senate |
| SEN. SCOTT DIBBLE | Minority Party Representative for Minnesota Senate |
| CHAIRWOMAN CATHY CHAVERS | Boise Fort Tribe, Minnesota Indian Affairs Council |
| CHARLIE ZELLE | Chair, Met Council |

