SMART GROWTH AND REGIONAL COLLABORATION

MAPC'S LEGISLATIVE AND POLICY CONSIDERATIONS FOR AUTONOMOUS VEHICLES

Adopted May 2017

MAPC supports transportation that provides sustainable, accessible, and affordable service to the 101 cities and towns in the MAPC region. We recognize the transformative benefits that autonomous vehicles[1] can have for Massachusetts' economy, environment, and quality of life – as well as the challenges that could result from disruption to existing forms of mobility. Autonomous vehicles will affect not only our transportation system, but also our economy, safety, workforce, environment, land use, and energy use.

The deployment of autonomous vehicles holds the potential to positively transform the transportation network. The positive transformational impacts include strengthening public transportation, reducing crashes and fatalities for drivers, pedestrians and bicyclists, as well as reducing traffic congestion and greenhouse gas emissions. Autonomous vehicles also have the capability to lessen the need for parking facilities and increase mobility for those who cannot drive.

However, without appropriate legislation and policies in place, the eventual widespread deployment of autonomous vehicles could increase safety risks for drivers, pedestrians, and cyclists in addition to increased traffic congestion, vehicle miles traveled (VMT), and greenhouse gas emissions. It is essential to establish legislation and policies that prioritize safety, advance equity, enhance mobility and accessibility, as well as protect the environment. Moreover, legislation and policies should be consistent with federal guidelines and strive for continuity across state lines.

The MAPC Executive Committee has adopted the following legislative and policy considerations to encourage the Commonwealth and our member municipalities to safely and equitably accommodate autonomous vehicles on the roadway network. These legislative and policy considerations aim to support regulations and planning that will ensure safe, accessible, and equitable mobility for the citizens in our region. We also want to optimize the physical, technical, legislative and policy frameworks on which autonomous driving will depend. Pursuing these legislative and policy considerations will allow us to advance the goals outlined in our regional plan, *MetroFuture: Making a Greater Boston Region*.

These legislative and policy considerations are intended to encourage the development of autonomous vehicles and support innovation and that would enable their deployment while ensuring public safety and equity for all users of the transportation system. As we seek to enable a smooth transition of autonomous vehicles in the region, MAPC's planning work and advocacy will be guided by both legislative and policy considerations. The legislative and policy considerations are outlined as follows:

[1] Autonomous vehicles possess various technologies that allow the vehicle to sense the surrounding environment and self-navigate without human intervention. These policies are primarily directed at Highly Automated Vehicles (HAVs) defined as vehicles by the Society of Automotive Engineers (SAE) at levels 3, 4, and 5 automation functions, meaning that the vehicle takes over all driving functions during at least some conditions. The levels range from SAE level 0 (full human control of the vehicle) to level 5 (the automated system performs all driving tasks under all driving conditions).

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Legislative Considerations

1. Data Collection and Data Sharing

Data collection, usage, and management are all essential elements of the operation of autonomous vehicles. MAPC encourages data-sharing requirements that foster open data platforms. With open data platforms, a wide array of organizations and individuals will be able to review and analyze performance, and public sector agencies will be in a better position to make informed planning, policy, operational, and infrastructure investment decisions. MAPC supports the following data collection and data sharing measures:

- A standardized data strategy which addresses collection, monitoring, storage, and sharing of autonomous vehicle information for planning purposes (e.g., travel speeds, congestion, distances traveled, on-demand services);
- Performance measures that address equity and environmental goals (e.g., mobility by subarea, vehicle occupancy, auto ownership, travel time, wait times for autonomous on-demand services, shared vs. non-shared service);
- Data privacy and security for drivers and passengers;
- Applications that provide unified platforms for users to access private and public transportation options;
- Coordination of schedules, trip planning, and payment for public and private transportation services; and
- Incentives for private companies to share their data with public sector agencies (e.g., tax incentives).

2. Potential Changes to Municipal and State Revenue

If autonomous vehicles become commonplace, local and state governments could experience funding reductions. Revenue from vehicle registration fees and excise taxes may decline if there is an increase in shared autonomous vehicles and revenue from the gas tax may decrease if a significant percentage of autonomous vehicles are electric. Widespread adoption of autonomous vehicles could also result in reduced fees related to human-related traffic fines, parking citations, and towing fees. Of course, balancing it out, there could also be significant declines in traffic accidents and congestion periods. In turn, this could reduce demands for repairing and maintaining the roadway network as well as the need for police, fire, and emergency medical services.

Since currently relied upon revenue may be substantially reduced, MAPC encourages local and state governments to develop an economic planning framework that identifies the impacts autonomous vehicles may have. The framework should also identify new approaches to transportation-related fees and taxes that could supplement possible lost revenue (e.g., autonomous vehicle specific registration fees, VMT fees).

3. Public Infrastructure

Autonomous vehicles are anticipated to affect the design and operation of roadways and will require new infrastructure as well as coordination among cities and towns, regional agencies, and various state departments, including the Massachusetts Department of Transportation (MassDOT) and the Executive Office of Energy and Environmental Affairs (EOEEA). Maintenance, upgrades, and investment in infrastructure should reflect the needs of autonomous vehicles (e.g., installing Vehicle-to-Infrastructure (V2I) equipment, sensors, uniform and standardized pavement markings and roadway signs, traffic signals, and improved pavement maintenance). MAPC supports public and private sector collaboration efforts that will invest in and install the new infrastructure requirements autonomous vehicles will bring.

MAPC encourages:

- Identifying strategic locations to install electric vehicle charging stations;
- Developing robust wireless communications networks; and
- Improving roadway maintenance programs that ensure the regular upkeep of signage, signals and lane markings, as well as the removal of debris that could potentially impede the operation of autonomous vehicles.

It is expected that existing lanes on roadways will be able to accommodate significantly more vehicles, especially if they are able to platoon. Consequently, adding physical capacity to roadways will most likely not be necessary. In fact, it may become viable to reduce the width of travel lanes on public roads and, as a result, additional space could be designated for pedestrians and bicyclists, public transit, and other land uses.

MAPC supports the following measures:

- Manage the balanced distribution of traffic, particularly adhering to the functional classification or character of services that roadways are intended to provide (e.g., arterials, collectors, and local roadways);
- Where appropriate, reduce travel lanes on public roads with the intent to make space available for pedestrians and bicyclists, public transit, and other land uses;
- Although there may be challenges in designating space both during the transition and over the long-term (e.g., similar to bicycle or BRT lanes), consider special lanes for autonomous vehicles, where appropriate; and
- Consider designating/certifying roads for driverless and/or manual operations.

4. Safety and Consistency

Testing and deployment of autonomous vehicles are in their early stages. To foster the continued development and rapid technological advancement of autonomous vehicles, MAPC encourages a flexible and a non-restrictive regulatory and legislative approach. However, we do support the following regulatory and legislative measures which advance safety and continuity:

- Enforce laws on speed limits, texting, drunk driving, and seatbelt use[2];
- Establish a regulatory framework to limit distracted driving for drivers of non-autonomous vehicles and for the SAE levels of automation that require human driving or circumstances when the driver is required to take back control of the vehicle;
- Promote uniform legislation, regulations, and operations of autonomous vehicles for all municipalities in the Commonwealth, and strive for consistently across state lines;
- Prevent cyber-attacks on autonomous vehicles that could either put human lives at immediate risk or theft of personal information; and
- Follow USDOT's Federal Automated Vehicles Policy for Model State Policy which calls for a consistent national framework for the deployment of autonomous vehicles.

5. Shared-Use Mobility Model

Primarily due to cost constraints, it is projected that autonomous vehicles may initially be shared and designed for commercial fleets (e.g., driverless taxis or shuttles) rather than individually owned. A trend toward shared rides could lead to an increase in on-demand services and away from individual ownership.

A shared-use mobility model for autonomous vehicles has the potential to reduce congestion and VMT, lessen the demand for parking and single occupancy vehicle ownership, as well as make space available for other modes of travel and even other land uses. MAPC strongly encourages the application of shared-use mobility models, supports incentives for shared rides or shared ownership of autonomous vehicles (e.g., shared vehicle zones, priority parking), and encourages integration with public transportation (e.g., first/last mile).

Shared-use mobility models should be developed to ensure regional benefits, complement public transportation, and to encourage zero-emissions vehicles (ZEVs). It is critical that low income and minority neighborhoods have access to these types of models. Shared-use mobility providers should find solutions to ensure that those without access to smartphones or who are unbanked are fully included in the implementation of new technology and services.

[2] This policy is primarily directed at Highly Automated Vehicles (HAVs) defined as vehicles by the Society of Automotive Engineers (SAE) at levels 0 (full human control of the vehicle), 1 (driver assistance), and 2 (partial automation), meaning that the human driver monitors the driving environment.

6. Speed Limits

It is conceivable that on some roads, autonomous vehicles may travel at or below the speed limit. On other roads, they may travel faster than the speed limit, especially if there are designated lanes. MAPC supports monitoring vehicle speeds and traffic flow based on traffic conditions with the goal of managing traffic congestion, ensuring safety for all road users, and minimizing vehicle emissions and fuel usage. As autonomous vehicles are introduced into the roadway network, there should be strategic flexibility regarding the designation of speed limits.

7. Testing Activities

MAPC encourages testing activities and pilot projects by the public and private sectors, especially those that address longstanding transportation issues. MAPC supports the process MassDOT developed to facilitate the testing of highly automated vehicles (HAVs) in the Commonwealth, which follows the National Highway Traffic Safety Administration's (NHTSA) Federal Automated Vehicles Policy and Governor Baker's Executive Order No. 572. The approval to test can take place following the review and approval of a completed application and a Memorandum of Understanding (MOU) by the HAV Review Committee. Testing must ensure a high level of safety and demonstrate the performance of autonomous vehicles during normal operations.

8. Vehicle Miles Traveled (VMT)

There is general consensus that autonomous vehicles will encourage cumulative increases to the amount of travel, or vehicle miles travelled (VMT). Projected increases to VMT are attributed to two factors: travel convenience and upsurges in travel by people who previously did not drive, primarily those with disabilities and aging adults. According to a study by the University of Michigan's Transportation Research Institute, autonomous vehicles, under the most extreme scenario, have the potential to reduce car ownership by up to 43 percent, or from 2.1 to 1.2 vehicles per household[3]. This shift could result in a 75 percent increase in individual vehicle usage. It has been suggested that VMT could be offset by implementing effective road and parking pricing measures.

Having previously taken a formal position in support of VMT fees, MAPC continues to endorse the exploration of various types of VMT and dynamic road pricing plans designed to incentivize ride-sharing and discourage private car ownership as well as vehicles operating without drivers and passengers. The adoption of dynamic road pricing plans could discourage potential increases in VMT and mitigate congestion. Fees could also be based on the fuel efficiency of a vehicle to encourage reduced greenhouse gas emissions. Reduced or subsidized costs for first/last mile solutions may deter potential increases in VMT and encourage use of autonomous on-demand services. It is critical to consider the potential limitations of alternative revenue sources, how they may impact the adoption rate of autonomous vehicles, but also analyze opportunities that have the feasibility to address wider budgetary restructuring for all vehicle types (e.g., shift from a gas tax to VMT).

[3] *Driverless Vehicles: Fewer Cars, More Miles*, Transportation Research Institute, University of Michigan, February 11, 2015. This study is based on an analysis of the U.S. National Household Travel Survey (NHTS) data administered by the Federal Highway Administration (FHWA).

9. Zero Emissions Vehicles (ZEVs)

Two major innovations have emerged almost in parallel – autonomous vehicles and ZEVs, principally electric. It is anticipated that both technologies will continue to mature at around the same time. As transportation is the second largest source of greenhouse gas pollution, integrating the development of autonomous vehicles with ZEV technologies is a critical climate change solution. Policies that advance autonomous vehicle use must be in tandem with policies that promote ZEVs. MAPC strongly supports developing policies that maximize the number of autonomous vehicles that are ZEVs and supports incentivizing their use. It is MAPCs goal and expectation that the vast majority of autonomous vehicles will be ZEVs, and that public policy in the Commonwealth should incentivize or require through various mechanisms that this goal will be achieved.

Policy Considerations

1. Autonomous Delivery of Goods

In many locations, the rapid growth in e-commerce (e.g., Amazon, food deliveries, etc.) has caused a corresponding rise in the number of vehicles (e.g., trucks, vans, and cars) on the roadway network making deliveries, especially to residential dwellings.

MAPC supports the following measures regarding autonomous delivery of goods[4]:

- Ensure the adoption of autonomous delivery of goods is safe, efficient, and environmentally sustainable; put necessary safeguards in place before such delivery is allowed;
- Operation of autonomous delivery of goods cannot interfere with the operation of vehicles (autonomous or non-autonomous), public transportation (e.g., trains, buses, shuttles), bicyclists, or pedestrians;
- Implement e-commerce friendly street design concepts (e.g., require sidewalk and curb ramps, reevaluate the locations and times for parking in on-street delivery zones);
- Promote an integrated "complete streets" design approach, which takes into account automated delivery; and
- Implement residential building design concepts to make them more e-commerce friendly (e.g., modify zoning codes to require new buildings to allocate space for ground floor deliveries or install package lockers).

2. Education

MAPC supports public education about autonomous vehicles which will address what they are, how they operate, and how to interact with them. To ensure successful adoption of autonomous vehicles, public education should be extensive and target specific ages and constituencies. With enhanced understanding, the Commonwealth will be well positioned to understand and plan for this emerging technology.

[4] Autonomous delivery of goods refers to ground delivery unmanned robots, not unmanned aerial vehicles (UAVs).

3. Equity

The deployment of autonomous vehicles should be designed to incorporate, enhance, and support the mobility needs of all demographics. Autonomous vehicles have the potential to advance a more equitable transportation system and make mobility possible for those who are limited by current transportation options. We need to ensure that the benefits of autonomous vehicles reach all demographics, including those least well-served by public transportation, minorities, and people of low-income backgrounds. Furthermore, autonomous vehicles offer an unprecedented opportunity to promote increased independence, mobility, and improve the quality of life for both aging adults and individuals with disabilities.

4. Land Use

Autonomous vehicles have the potential to significantly alter land use patterns. The potential impacts of autonomous vehicles on land use could be two-fold. On one hand, individuals may elect to live in more remote locations and commute further distances, yet on the other hand, autonomous vehicles could promote dense urban development patterns. MAPC supports land use policies that promote sustainable development and discourage sprawl.

Decreased individual vehicle ownership, use of autonomous on-demand services, and more efficient use of on- and off- street parking spaces, could all contribute to making new land available in urban areas. MAPC supports the concept of managing the influence of autonomous vehicles to shape land use changes that include repurposing of off-street parking and lanes on public roads.

Since it is too early to determine the impacts of autonomous vehicles on land use, a range of land use policies should continue to be explored and implemented which discourage sprawl and encourage high-density, walkable communities. Examples of these policies include:

- Planning for autonomous vehicles should enhance the integral connection between land use and transportation;
- Accommodating autonomous on-demand services (e.g., establish hubs for autonomous vehicle pick-up/drop-off);
- Facilitating pedestrian access to destinations (housing, schools, retail) by reducing space allocated for parking lots and garages; and
- Promoting infill development.

5. Long Range Goals

Autonomous vehicles present an opportunity for public sector agencies and municipalities to accomplish many of their long range goals. These goals include Vision Zero initiatives, greenhouse gas reduction goals, and improved congestion management (e.g., adding exclusive lanes for autonomous vehicles, promoting high occupancy vehicle (HOV) use). Public sector agencies and municipalities should evaluate how autonomous vehicles could directly impact long range goals such as these.

6. Long Range Planning and Modeling

MAPC agrees with the assumption that existing travel patterns will not continue indefinitely. The future impacts of autonomous vehicles should be evaluated by developing multiple planning scenarios, modeling travel behaviors, and considering changes to investment priorities. We support efforts that will identify and evaluate how autonomous vehicles may influence future travel behaviors and how these findings can best be incorporated into travel demand and land use modeling as well as long range plans (e.g., changes in roadway design, VMT, parking). Models should be updated as more concrete information about autonomous vehicles' impacts on capacity, traffic safety, land use, and travel behaviors becomes available.

The potential impacts of autonomous vehicles should be incorporated into the Metropolitan Planning Organization's (MPO) regional long range planning process and desired scenarios advanced in the MPO's Long Range Transportation Plan. Long range planning decisions that are made today will affect future infrastructure, land use, and transportation options and investments. With this analysis, the MPO will be in an informed position to implement policies and propose investments.

7. Parking

In the future, autonomous vehicles may create less need for parking, especially in areas that are land constrained, because of their ability to park themselves. Additionally, there may be need to designate public parking spaces for shared autonomous vehicles. Since parking has a tremendous impact on both land use and transportation, MAPC is hopeful that autonomous vehicles can support policies that minimize the amount of land dedicated to parking, manage where parking spaces are sited, and repurpose on- and off- street parking for other land uses (e.g., residential, hotel, office, retail), open space, and bicycle lanes). Specific parking policies MAPC encourages include:

- Advancing reduced parking through the implementation of shared-use mobility models for autonomous vehicles;
- Dedicating parking spaces (on and off street) for shared autonomous vehicles;
- Implementing variable-priced parking to manage the usage of parking spaces;
- Removing minimum parking requirements from zoning by-laws;
- Requiring all new parking facilities constructed to be adaptable to other uses in the future (e.g., flat floors, sufficient floor-to-ceiling heights, and adequate loading capacity);
- Decreasing the need for parking spaces and parking facilities at transit stations which could potentially create new opportunities for transit-oriented development; and
- Applying these parking policies as part of development review.

8. Public Transportation

Autonomous vehicles have the potential to significantly transform public transportation, including bus, transit, and rail. While there is considerable opportunity for public transit agencies to become more efficient and financially stable by incorporating autonomous vehicle technologies and collaborating with Transportation Network Companies (TNCs) such as Uber and Lyft, exactly how they will be utilized remains uncertain. It is also possible that autonomous vehicles could enhance first mile/last mile services, if public policies are adjusted to enable them to assist in this arena.

Future decisions must keep passenger safety a priority and maximize the cost effectiveness of their service, while ensuring equitable access and fairly priced mobility options for all riders. Autonomous vehicles and autonomous mobility on-demand services (e.g., TNCs), which may be public, private, or a combination of both, should serve to complement, not substitute or reduce, public transportation services.

MAPC supports the following measures:

- Services that complement and supplement public transportation (e.g., off-peak and late night access);
- Leverage private mobility companies to fill-in transit gaps, especially first/last mile, and support improved access to public transportation;
- Support cost-effective, on-demand transit in lieu of low-performing fixed routes;
- Ensure that public transit service is competitively priced, reliable, and convenient; and
- Transition transit fleets (subway, trolley, rail, and bus) to leverage autonomous technologies, to advance better performance times, higher frequencies, and faster average speeds.

9. Track and Monitor Federal and State Developments

In addition to staying continually informed of existing and developing policies, legislation, and programs taking place on a federal level and with other states nationwide, MAPC should stay apprised of ongoing and future developments in the Commonwealth. MAPC recognizes that municipalities are where this new technology will be deployed. As such, it is critical to maximize the benefits of autonomous vehicle technologies for the Commonwealth's residents. Where appropriate, these legislative and policy considerations and the principles of *MetroFuture* should be conveyed during any future comment periods and hearings around this transformative issue.

10. Transition Period

It is estimated that it could take at least a decade before significant numbers of autonomous vehicles appear on roadways. There will be a period of time when autonomous vehicles and conventional vehicles will be sharing the road. Creating and managing an environment that will balance a mix of autonomous and conventional vehicles will be a challenge.

MAPC supports initially limiting autonomous vehicles to areas restricted for low-speed vehicles, restricted travel lanes, or operating only in designated areas. Initial adoption of autonomous vehicles may first take place in areas that are more congested, have public support, and are more affluent. Uneven initial usage should be anticipated. The Commonwealth and municipalities should be mindful that the designation of areas or lanes for autonomous vehicles could raise concerns about equity.

When autonomous vehicles are permitted on roadways, they will need to follow state and municipal regulations designated for conventional vehicles. A different set of regulations for autonomous vehicles would only generate confusion and unsafe conditions. Eventually, if autonomous vehicles were to become the principal form of vehicular transportation, regulations (e.g., traffic control, signage, speed limits, and parking requirements) should change incrementally to accommodate autonomous vehicles.

11. Truck Freight and Delivery Systems

Autonomous truck freight movement and delivery has the potential to improve fuel efficiency and reduce crashes. MAPC supports safer, more efficient, and environmentally sustainable freight and delivery systems that promote consolidation of shipments, non-peak hour deliveries, and designation of autonomous truck routes.

12. Workforce Impacts

The adoption of autonomous vehicles is anticipated to disrupt existing industries and labor markets. In particular, there could be substantial job losses in the trucking and delivery industries followed by job reductions in the auto-repair and law enforcement sectors. While it is too soon to tell exactly how, the onset of autonomous vehicles may lead to the creation of new industries and employment opportunities. The development of policies and adoption of regulations should recognize the potential economic impacts of autonomous technologies, both positive and negative. These policies and regulations should support career paths and transitions, with a focus on the needs of those who will be adversely affected by automated driving technology.

MAPC encourages proactive evaluation of workforce impacts as well as examination of workforce education and training needs (e.g., autonomous vehicle repair and maintenance) the autonomous vehicle industry will necessitate. We support the formation of new employment and training opportunities, especially for those sectors most likely to be displaced by automated driving. New career opportunities created by the autonomous vehicle industry should be accessible to all, especially for populations historically underrepresented in the transportation and technology industries.

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