



DRAFT – NOT FOR DISTRIBUTION

Memorandum of Agreement to Operate Autonomous Test Vehicles on Public Ways in Massachusetts (v2.6)

This Memorandum of Agreement is entered into between the signatory parties and sets forth the terms and conditions between the signatory parties with respect to the operation of autonomous test vehicles (“AVs”) on roads and public ways and other public property in Massachusetts for testing purposes by _____.

Applicant Name

1) **Definitions:**

- a) **Applicant:** an individual, company, or organization that manufactures autonomous vehicles for testing on public roadways, or is involved with designing, supplying, testing, operating, or helping to manufacture autonomous vehicles.
- b) **Autonomous Mode:** the status of vehicle operation where technology that is a combination of hardware and software, remote and/or on-board, performs the dynamic driving task, with or without a natural person actively supervising the autonomous technology’s performance of the dynamic driving task. An autonomous test vehicle is operating or driving in autonomous mode when it is operated or driven with the autonomous technology engaged.
- c) **Autonomous Test Vehicle:** a vehicle that has been equipped with technology that is a combination of both hardware and software that, when engaged, performs the dynamic driving task, but requires a natural human test driver to continuously monitor the environment and supervise the vehicle’s performance of the dynamic driving task. An autonomous test vehicle does not include vehicles equipped with one or more systems that provide driver assistance and/or enhance safety benefits but are not capable of, singularly or in combination, performing the dynamic driving task on a sustained basis without the constant control or active monitoring of a natural person. For the purposes of this Application, an autonomous test vehicle is equipped with technology that makes it capable of operation that meets the definition of Levels 3, 4, or 5 of the SAE International *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, standard J3016*. The presence of a natural person who is an employee, contractor, or designee of the manufacturer or testing entity in the vehicle to monitor a vehicle’s autonomous mode performance shall not affect whether a vehicle meets the definition of autonomous test vehicle.
- d) **Autonomous Test Vehicle Driver (“Test Driver”):** an employee, contractor, or other designee of the Applicant who is approved by MassDOT to operate the Applicant’s Autonomous Test Vehicles.
- e) **Conventional Mode:** the status of the autonomous test vehicle when it is under the active physical control of a natural person sitting in the driver’s seat operating or driving the vehicle with the Autonomous Mode disengaged.

- f) Dynamic Driving Task: all of the real-time functions required to operate a vehicle on public ways, excluding selection of final and intermediate destinations, and including without limitation: object and event detection, recognition, and classification; object and event response; maneuver planning; steering, turning, lane keeping, and lane changing, including providing the appropriate signal for the lane change or turn maneuver; and acceleration and deceleration.
- g) Major Crash: Any collision involving the Applicant's autonomous test vehicle that features any of the following characteristics shall be considered a major crash: loss of life; any physical injury to the test driver, other drivers, or vehicle passengers; physical injury to any vulnerable road users, such as pedestrians, bicyclists, and other non-drivers; any damage to federal, state, or municipal government property, such as vehicles, infrastructure, or signage; any significant damage to private or commercial property, including, but not limited to, private or commercial vehicles, to be determined at the discretion of MassDOT.
- h) Minimal Risk Condition: a low-risk operating condition that an autonomous test vehicle automatically resorts to when either the automated driving system fails or when the human test driver fails to respond appropriately to a request to take over the Dynamic Driving Task.
- i) Minor Crash: Any collision involving the Applicant's autonomous test vehicle that does not qualify as a major crash shall be considered a minor crash.
- j) Operational Design Domain ("ODD"): the specific operating domain(s) in which an automated function or system is designed to properly operate, including but not limited to geographic area, roadway type, speed range, environmental conditions (weather, daytime/nighttime, etc.), and other domain constraints.
- k) Participant: a municipality, state agency, political subdivision, or a jurisdiction with publicly accessible roadways which has elected to participate in the process defined in this Application and allow autonomous test vehicles to operate in autonomous mode on designated roads as defined for each Testing Phase (see Testing Phase Schedule) without requiring individual Memoranda of Understanding for each Applicant. Participants may review each Application in the Initial Review phase, and may submit questions through MassDOT for the Applicant to respond to, as described below. Participants may be added periodically.
- l) Public Ways: includes but is not limited to any public highway, a private way laid out under authority of statute, a way dedicated to public use or where the general public has a right of access by motor vehicle or access as invitees or licensees, or a way under control of a park commissioner or body having similar powers.
- m) Testing: the operation of an autonomous test vehicle on public ways by a test driver for the purpose of assessing, demonstrating, and/or validating the autonomous mode performance.

2) Application and Approval:

- a) An Applicant who desires to operate autonomous test vehicles in Massachusetts shall review and understand the policy issued September 2017 by the National Highway Traffic Safety Administration (NHTSA) entitled Automated Driving Systems: A Vision for Safety and any policies or publications subsequently published by NHTSA or another recognized authority in the field of autonomous vehicles as required by MassDOT, in addition to Massachusetts Executive Order No. 572, the Executive Order on Autonomous Vehicles for the City of Boston, and the Regional MOU between MassDOT and Participants.
- b) For purposes of such testing on public ways in the Commonwealth per Executive Order No. 572, the Massachusetts Department of Transportation (MassDOT) is designated the lead agency. Only approval issued by MassDOT shall authorize operation of autonomous test vehicles on public ways.
- c) Applicants shall complete the Application in full, execute the Memorandum of Agreement (MOA), and email all documents comprising the Application to AVs@dot.state.ma.us.
- d) Initial Application Review: If an Application is deemed complete, MassDOT will review the Application in detail and provide approval, rejection, or a request for additional information within 30 business days. Within three business days of receiving an Application, MassDOT will transmit said application to any Participants.
 - i) If MassDOT or any Participant requires additional information to assess the Application, the Applicant will submit such information or provide to the satisfaction of MassDOT an explanation of any omission(s) from the Application within 15 business days of the request.
 - ii) MassDOT may review and respond – either with additional requests for clarification or with acknowledgement that all questions have been satisfactorily answered – within 15 business days of receipt of the additional information.
- e) Approval Review Meeting: Prior to issuing approval to test, MassDOT may request a meeting with the Applicant and any interested Participants to discuss the Application.
- f) Letter of Approval: MassDOT may issue a Letter of Approval (“Approval”) upon the successful completion of the Application process, which shall be carried in the test vehicles at all times. If MassDOT does not approve of the Application, a Letter of Denial may be issued along with instructions on how the Applicant may revise and resubmit the Application for a subsequent review.
- g) A Participant may elect to opt-out of approval of an Application.

- 3) **Testing Terms and Conditions:** The Applicant agrees to the following requirements when operating autonomous test vehicles on public ways.
- a) Approved autonomous test vehicles may operate in autonomous mode solely for the purpose of assessing, demonstrating, and validating the autonomous technology's capabilities.
 - b) The Applicant shall follow all applicable traffic laws and regulations, whether the vehicle is in Autonomous Mode or Conventional Mode, except when necessary for the safety of the vehicle's occupants and/or other road users.
 - c) In public ways testing, the Applicant may not artificially create a desired testing scenario, situation, or interaction with another vehicle or road user, unless the scenario, situation, or interaction does not violate any traffic laws or regulations and does not otherwise endanger public safety, impede traffic flow, or otherwise disrupt the regular usage of the public way.
 - d) Autonomous test vehicles shall be built from passenger vehicles that comply with federal regulations except for those parts, components, or vehicle systems that have been made inactive or modified in order to enable such passenger vehicles to be autonomous by modifying such vehicles to include certain sensors, computers, and other equipment. Each vehicle used for testing should follow the Voluntary Safety Self-Assessment set forth by NHTSA in September 2017, and meet applicable Federal Motor Vehicle Safety Standards, or provide evidence of an exemption that has been approved by NHTSA. The autonomous technology shall meet Federal Motor Vehicle Safety Standards, if any, for the vehicles' model year, and the Applicant's autonomous technology shall not make inoperative any Federal Motor Vehicle Safety Standards, Title 49 Code of Federal Regulations, Part 571.
 - e) The following vehicles will not be approved for testing as autonomous test vehicles on public roads: Trailers and Motorcycles as defined in M.G.L Chapter 90, and vehicles manufactured by a person or entity not recognized by NHTSA as a manufacturer of motor vehicles.
 - f) All vehicles used for such tests shall display a current inspection sticker, current registration plates, and signage on the sides and rear of the vehicle, sufficiently visible at a distance of approximately 25 feet to identify the vehicle as an "Autonomous Test Vehicle" or similar.
 - g) The Applicant shall make all reasonable efforts to participate in training workshops and public events as requested by MassDOT and Participants.
 - h) A copy of the MassDOT Letter of Approval and the First Responders Interaction Plan shall be carried in the approved test vehicle(s) at all times, in the glove box or another conspicuous location.

- i) Prior to conducting each test, autonomous test vehicles shall undergo a thorough safety check by qualified personnel as designated by the Applicant.
- j) Each test driver shall be at least 21 years of age, possess a valid driver's license issued by a state or territory of the United States and have a driving record free of any pending cases or convictions for serious motor vehicle violations including but not limited to operation of a motor vehicle while under the influence of alcohol or drugs, which shall include any cases that were disposed of under Chapter 90, Section 24D; operating to endanger the safety of the public; leaving the scene after personal injury or property damage and motor vehicle homicide. MassDOT may deny approval for any test driver at its sole discretion.
- k) When autonomous test vehicles are operated in autonomous mode, a test driver who is trained and experienced in the operation and control of autonomous test vehicles shall be in the driver's seat or other location in the vehicle from which they can monitor the environment and take immediate control of the dynamic driving task if necessary.
- l) Test drivers shall not use a mobile telephone, hands-free mobile telephone or mobile electronic device, or otherwise engage in a distracting activity while an autonomous test vehicle is operating in Autonomous Mode on any public way.
- m) A test driver shall not conduct Testing activities for more than 8 hours in any consecutive 24-hour period.
- n) The Applicant shall enroll in the Commonwealth's [Driver Verification System](#) to track any changes to the test drivers' license status.
- o) In designated phases of the Testing Phase Schedule, a member of the public may ride in an autonomous test vehicle provided there are no fees charged to the passenger. The Applicant shall accommodate passengers including senior citizens and people with mobility impairments, vision impairments, or other sensory impairments. The Applicant must consult with MassDOT and Participants to explore potential use cases.
- p) The Applicant shall disclose to any passenger in the vehicle that is not a test driver, employee, contractor, or designee of the Applicant the nature of personal information, if any, that may be collected about the passenger and how it may be used.
- q) The Applicant may submit to MassDOT and any Participant(s) a proposal for a new testing phase, or changes to an existing phase(s), to be considered by MassDOT and any Participant(s).
- r) Videos of testing shall be taken on at least two occasions annually and such videos, including videos taken from within the test vehicle, shall be shown to MassDOT and Participants upon request and without cost.

- s) The Applicant shall certify in the application that the autonomous test vehicle is equipped with an autonomous technology data recorder that captures and stores autonomous technology sensor data for all vehicle functions that are controlled by the autonomous technology for at least 30 seconds before a collision with another vehicle, person, or other object while the test vehicle is operating in autonomous mode. The data captured and stored by the autonomous technology data recorder, in a read-only format, must be capable of being accessed and retrieved by a commercially-available tool or means.
- t) In the event of a crash, the Applicant shall follow the requirements set forth in the Crash Protocol.

4) **Crash Protocol**

- a) In the event of a crash during testing of an autonomous test vehicle in Massachusetts:
 - i) The Applicant will comply with the laws of the Commonwealth in regard to notifying police, if necessary, assisting at the crash scene if it can be done safely, and exchanging vehicle ownership and insurance information with other vehicle and property owners that may be involved.
 - ii) The Applicant will notify MassDOT, and the Participant on whose road the crash occurred, of a crash as soon as possible, or within at most 12 hours after a crash occurs.
 - iii) Regardless of the severity of the crash, a “Crash Report” shall be filed with the RMV pursuant to Chapter 90, Section 26 within 5 days of the crash, providing specific details of the crash and containing information as to the possible cause or causes.
 - iv) If a major crash occurs on Massachusetts public ways involving the Applicant’s autonomous test vehicle, MassDOT and Participants will temporarily suspend testing by the Applicant until the initial cause of the crash can be determined and any necessary corrections made, per the Crash Response Form, following submission of the Crash Report. The involved Applicant shall participate in an in-person meeting with MassDOT and Participants following submission of the Crash Report and Crash Response Form. MassDOT may require changes to the Applicant’s Testing Plan, and the Applicant may not resume testing on public ways unless and until a Letter of Approval is re-issued by MassDOT.
 - (1) MassDOT or any Participant may require that all other Applicants temporarily suspend testing activities for up to 72 hours as necessary.
 - v) If a minor crash occurs on Massachusetts public ways involving the Applicant’s autonomous test vehicle, MassDOT or any Participant may request that the

Applicant involved in the crash temporarily suspend testing activities for up to 72 hours as necessary if it appears the Applicant's autonomous test vehicle may be at fault for the crash, as determined by MassDOT. In the event of such a determination, the Applicant may be required to complete a Crash Response Form following submission of the Crash Report.

- b) In the event of a crash during testing of an autonomous test vehicle outside of Massachusetts:
 - i) If a major crash occurs outside of Massachusetts involving an Applicant's autonomous test vehicle, the Applicant shall notify MassDOT within at most 24 hours, and all further testing by the Applicant within Massachusetts will be temporarily suspended by MassDOT and Participants. The Applicant shall participate in an in-person meeting with MassDOT and any Participant following submission of a Crash Report or similar documentation and a Crash Response Form. MassDOT may require changes to the Applicant's Testing Plan, and the Applicant may not resume testing on public ways unless and until a Letter of Approval is re-issued by MassDOT.
 - (1) MassDOT or any Participant may request that all Applicants temporarily suspend testing activities for up to 72 hours as necessary, and review any crash report or investigation documents that may become available.
- c) In the event of a major crash during conventional operation of an autonomous test vehicle on Massachusetts public ways, MassDOT or any Participant may request that the Applicant complete a Crash Response Form.
- d) In the event of a crash during conventional operation of an autonomous test vehicle on Massachusetts public ways which was immediately preceded by autonomous mode operation and the vehicle never came to rest following such operation, the Applicant shall for purposes of the Crash Protocol consider such a crash to have occurred in autonomous mode.
- e) MassDOT or investigating law enforcement agencies may request that the Applicant provide crash data as described in part (3)(s).

5) Monthly Conference Calls:

- a) The Applicant shall participate in a conference call at least monthly with MassDOT and any interested Participant.

6) Quarterly Progress Reports:

a) The Applicant shall submit a Progress Report at least quarterly to MassDOT and the Participants. Progress Reports will be shared with Participants and discussed during the Monthly Conference Calls. The Progress Reports should comprise the following reporting requirements for the prior quarter, depending on the Applicant's current testing phase and activities:

i) All Phases – Reporting Requirements

- (1) Amount of testing conducted
- (2) Locations tested in
- (3) Traffic conditions tested in
- (4) Weather conditions tested in
- (5) Operational design domain(s) tested in
- (6) A description of takeover procedures used during testing, including the conditions for planned or expected disengagements of autonomous mode
- (7) Observations and lessons learned
- (8) Progression within the Testing Plan
- (9) Goals for current and future testing, and/or proposals for changes to Testing Plan
- (10) Feedback for municipal and state transportation engineers, planners, and policymakers
- (11) A description of all crashes, near-misses, unplanned or unexpected disengagements (failures of the autonomous system), and violations of traffic laws which occurred during testing, including:
 - (a) Time
 - (b) Location
 - (c) Type of roadway
 - (d) Weather conditions
 - (e) Vehicle speed
 - (f) Other parties involved
 - (g) A general description of the incident and relevant findings

ii) Passenger Pilots

- (1) Total number of passenger trips
- (2) Average number of passengers per trip
- (3) Qualitative feedback on the user experience
- (4) Qualitative feedback on curbside operations
- (5) Aggregated and anonymized origin and destination coordinates of each trip (blockface level specificity) with distance and time information (miles and minutes)
- (6) City or town where each ride originated
- (7) City or town where each ride ended

- (8) Miles (or percent of miles) travelled while occupied and unoccupied by passengers
- (9) *Optional: passenger home zip code*
- (10) *Optional: email contact information for passengers who opt-in*

7) Testing Phase Change:

- a) To advance to the next phase in the Testing Phase Schedule, the Applicant shall submit a request in writing to MassDOT and the Participants, including an updated Progress Report, and shall participate in a conference call with MassDOT and any interested Participants. MassDOT will respond with approval, a request for additional information, or a denial within 15 business days of receipt of the Progress Report and request to change phases.

8) Suspension or Revocation of Approval:

- a) MassDOT or any Participant may revoke the Applicant's Approval for any of the following reasons:
 - i) The Applicant has failed to maintain evidence of the insurance requirements.
 - ii) The Applicant has violated this MOA.
 - iii) Any act or omission of the Applicant or one of its test drivers, employees, contractors, or designees which MassDOT finds makes the operation of autonomous test vehicles on public ways by the Applicant an unreasonable risk to the public.
- b) MassDOT will provide a 15-day written notice to the Applicant before revoking the Applicant's Approval. However, MassDOT shall immediately revoke the Applicant's Approval if the Applicant is engaging in testing in such a manner that immediate revocation is required for the safety of persons on a public way.
- c) Upon the revocation of Approval, the Applicant shall cease all testing of autonomous test vehicles on public ways until MassDOT has verified that the Applicant has taken appropriate action to correct the deficiencies that caused the revocation and MassDOT has lifted the revocation.
- d) MassDOT and Participants reserve the right to temporarily suspend testing for public safety reasons at any time.

9) Term of Approval:

- a) An approved Application shall be valid for a period of two years from midnight of the last day of the month of issuance unless sooner revoked or surrendered.

Renewal of approval for the ensuing two year period may be obtained by the Applicant to whom the approval was issued upon submission of a revised Application to MassDOT.

- b) The Applicant shall submit a revised Application prior to implementing changes which would:
 - i) Make the vehicle capable of operation at an SAE International level that is different than and/or in addition to the level in the Approval; or
 - ii) Make the vehicle capable of operation on a roadway type that is different than and/or in addition to those in the Approval; or
 - iii) Increase the maximum speed of the vehicle by more than 15 miles per hour; or
 - iv) Make the vehicle capable of operation in geographic areas different than and/or in addition to those in the Approval.
- c) MassDOT will review any revised Application within 15 business days and may issue an updated Approval for the ensuing two-year period. If MassDOT does not approve of the Application, a Letter of Denial may be issued along with instructions on how the Applicant may revise and resubmit the Application for a subsequent review.

10) Insurance Requirements:

- a) The Applicant shall purchase and maintain during the term of this agreement, at their sole expense, all insurance required by the applicable laws of the Commonwealth of Massachusetts and other insurance specified in this section. Insurance must be issued by insurance companies licensed to write such insurance in the Commonwealth of Massachusetts, and will have a current rating provided by “Best’s Insurance Reports” of A- VII or above.
- b) Insurance Certificates including statements evidencing all requirements listed below shall be delivered to MassDOT prior to approval of the Application, and renewal certificates will be delivered no later than 30 days prior to expiration of the preceding policy. Failure of the Applicant to provide and continue to enforce such insurance shall be deemed a violation of this agreement. These requirements are minimum limits and coverages and shall not be construed to limit the liability of the Applicant or its insurers.
- c) Commercial General Liability for bodily injury and property damage, on an occurrence form, no less broad than ISO Form CG 2010 10 01. Coverage must include premises/operation, products/completed operations liability, contractual liability, and personal/advertising injury subject to a minimum limit of one million (\$1,000,000) per occurrence and two million (\$2,000,000) annual aggregate. The

limit must be apply on a per location or per project basis. A separate stand- alone products policy is acceptable.

- d) Automobile Liability covering all owned, non-owned, hired, leased, rented vehicles and autonomous vehicles with limits no less than one million (\$1,000,000) combined single limit.
- e) Workmen’s Compensation and Employers Liability Insurance: The Applicant shall also maintain, continuously throughout the Term of this agreement (i) workers compensation insurance providing statutory coverage as required by the Commonwealth of Massachusetts, and (ii) Employers Liability coverage with limits of not less than five hundred thousand (\$500,000) per accident.
- f) Umbrella Liability: Providing excess coverage over the general liability, products liability if not included in the general liability, automobile liability and employer’s liability coverages. Such coverage shall be written on an occurrence basis and be no less broad than the underlying coverages. The policy shall be subject to a minimum limit of \$ twenty five million dollars (\$25,000,000) per occurrence and in the aggregate.
- g) General Conditions
 - i) MassDOT must be named as Additional Insured on the commercial general liability, automobile liability and the umbrella liability policies. Endorsements evidencing the same must be attached to the certificate. These same coverages must be primary and non-contributory over any insurance available to MassDOT.
 - ii) Waiver of Subrogation in favor of MassDOT will be included as respects all coverages listed above. The workers compensation policy must be specifically endorsed to reflect the required waiver and such endorsement should be attached to the required certificate.
 - iii) All policies will be endorsed to provide thirty days written notice to the certificate holder, MassDOT, in the event of cancellation, non-renewal or material changes in coverage. Such endorsements must be attached to the Certificate. The Applicant must provide updated insurance information to the Department within 30 business days by emailing AVs@dot.state.ma.us.
 - iv) The following address shall be used for filing a Certificate of Insurance:
MassDOT
10 Park Plaza Suite 4160
Boston, MA. 02116

11) Laws Governing: This Memorandum of Agreement shall be construed under and governed by the laws of the Commonwealth of Massachusetts.

12) Indemnification: The Applicant agrees to defend, hold harmless and indemnify the Mass Registry of Motor Vehicles, the Massachusetts Department of Transportation, the Commonwealth of Massachusetts, the Massachusetts Port Authority, the Department of Conservation and Recreation, and the Participants and each of their respective employees and authorized agents from any and all claims, actions, damages, losses or expense of every nature and kind in law or equity, arising out of or in connection with the Applicant's operation of autonomous test vehicles on public or private ways or other public property in the Commonwealth of Massachusetts, including in any Participant. The obligations under this section shall survive the termination of this agreement.

This MOA constitutes the entire agreement, and supersedes all prior negotiations, understandings and agreements (oral or written), between the parties concerning the subject matter hereof. This MOA may be executed in one or more counterparts, each of which is an original, but taken together constituting one and the same instrument. Execution of a facsimile copy (including PDF) shall have the same force and effect as execution of an original, and a facsimile signature shall be deemed an original and valid signature. No change, consent or waiver to this MOA will be effective unless in writing and signed by the party against which enforcement is sought. In the event that any provision of this MOA shall be determined to be illegal or unenforceable, that provision will be limited or eliminated to the minimum extent necessary so that the MOA shall otherwise remain in full force and effect and enforceable.

In Witness Whereof, the parties acknowledge their agreement to the foregoing upon the date the last party signs below.

Applicant Name

Signature of Applicant's Representative **Printed Name** **Date of Signing**

Massachusetts Department of Transportation

Participant # **Participant #** **Participant #**

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