



Massachusetts Department of Transportation

Autonomous Vehicles Working Group

Regulatory and Legal Overview

March 30, 2017

Agenda

- Update on Current AV Testing in Massachusetts
- Roles and Responsibilities
 - Registry of Motor Vehicles
 - Executive Office of Public Safety and Security
- Legislative and Regulatory Review
 - Federal
 - Massachusetts
 - Executive Order No. 572
 - Massachusetts General Laws
 - Code of Massachusetts Regulations
- Proposed New Regulation
- Public Comment

Working Group Members

1. Stephanie Pollack, Secretary and CEO, MassDOT and MBTA
2. Kate Fichter, Assistant Secretary of Policy Coordination (Designee of Sec. Pollack)
3. Katie Stebbins, Assistant Secretary for Technology, Innovation and Entrepreneurship, EOHEd (Designee of Sec. Ash)
4. Hans Olson, Assistant Undersecretary for Homeland Security, Senior Advisor, Anti-Terrorism And Cyber Security, EOPSS (Designee of Sec. Bennett)
5. David Solet, General Counsel, EOPSS
6. Sarah Zaphiris, Chief Administrative Officer, RMV (Designee of Registrar Deveney)
7. Tom Tinlin, MassDOT Highway Administrator
8. Senator Thomas McGee, Senate Transportation Chair (Designee of Senate President Stan Rosenberg)
9. Representative William Straus, House Transportation Chair (Designee of House Speaker Robert DeLeo)
10. Lieutenant Colonel Edward Amodeo, Division Commander, Massachusetts State Police
11. Lieutenant Daniel Griffin, Traffic Programs Section, Massachusetts State Police
12. Joseph Sabella (Designee of Senate Minority Leader Bruce Tarr)
13. Matthew Mincieli (Designee of House Minority Leader Brad Jones)

Proposed Dates and Topics for Meetings

Date and Time	Topic(s)	Proposed Lead
March 30 th 10am-12pm	<ul style="list-style-type: none"> Review Existing Legislation and Regulations Presentation of Draft Regulation 	DOT, RMV, EOPSS
May 16 th , 1-3 pm	<ul style="list-style-type: none"> Review of Draft Testing Guidance Public Safety and Cybersecurity 	EOPSS
June - TBD	<ul style="list-style-type: none"> Economic Development Opportunities Current AV Legislation and Sponsors 	EOHED
August 16 th , 9-11 am	<ul style="list-style-type: none"> Land Use and Transportation Connected Vehicles (Direct Short Range Communication) 	
September – 9/26, 9/27 or 10/3 9am-12pm	<ul style="list-style-type: none"> Insurance and Liability ... 	
November 14 th , 9-11 am	<ul style="list-style-type: none"> ... 	
Additional Topics		

Stakeholder Engagement

- Proposed Working Group meeting for stakeholder engagement
- Invite public, municipalities, companies, other stakeholders to present or speak about issues pertaining to autonomous vehicles
- Invite legislators to speak about bills they have filed pertaining to autonomous vehicles

CURRENT AV TESTING



nuTonomy



November 19, 2016	MassDOT, the City of Boston, and nuTonomy execute MOU
December 23, 2016	MassDOT approves nuTonomy's Application to Test
January 29, 2017	nuTonomy completes Phase B1 of Test Plan* <ul style="list-style-type: none">• 100 miles in good weather during daylight hours
March 2, 2017	nuTonomy completes Phase B2 of Test Plan* <ul style="list-style-type: none">• 200 miles total, including 70 miles at night and some in rain

*Test Plan in Appendix

Other Entities Interested in Testing

- MassDOT has been approached by at least 5 auto manufacturers and other entities interested in testing highly automated vehicles on public roadways
- One company has submitted a draft MOU and application
- Several companies are focused on low-speed urban testing, others on highway
- Interest in both automation for “mobility as a service” and for private ownership

Intense Public Interest – Recent and Upcoming Local Events

- January 9th – TRB Intelligent Transportation Systems
- February 1st – WTS Boston New Years Reception
- March 2nd – Association of Unmanned Vehicle Systems International (AUVSI) New England Automated Vehicle Summit
- March 7th – GoBoston 2030 Vision and Action Plan
- March 8th – MassDOT Innovation & Tech Transfer Exchange: Opportunities and Challenges for Autonomous Transportation
- March 30th – Northeast Autonomous Vehicle Summit (Connecticut)
- April 27th – WTS Boston Luncheon: Autonomous Vehicles Panel
- May 31st – Museum of Science Self-Driving Car Forum



LEGISLATIVE AND REGULATORY REVIEW

Legislative and Regulatory Overview

- Federal Regulations and Guidance
- Relevant Massachusetts Legislation, Regulations and Executive Orders
 - Executive Order No. 572
 - Massachusetts General Laws (M.G.L.)
 - Chapter 89
 - Law of the Road
 - Chapter 90
 - Defines operators, licensing, seatbelts, operations, crash protocols, ...
 - Code of Massachusetts Regulations (C.M.R.)

Federal Regulations and Guidance

- Federal Motor Vehicle Safety Standards (FMVSS)
- National Highway Traffic Safety Administration (NHTSA) published Federal Autonomous Vehicles Policy (Sept. 2016)
 - Levels of Automation
 - Federal vs State Roles
 - Vehicle Safety Assessment
 - Model State Policy
 - NHTSA Regulatory Tools
- Cybersecurity Best Practices for Modern Vehicles
- Other federal modal DOT agencies are reviewing their operating regulations

Federal Motor Vehicle Safety Standards (FMVSS)

- Introduced through the National Traffic and Motor Vehicle Safety Act of 1966
- To sell a motor vehicle in the U.S. market, a manufacturer must (self) certify that the vehicle meets performance requirements specified in the Federal Motor Vehicle Safety Standards, or FMVSS.
- 73 separate standards that generally focus on crash avoidance, crashworthiness, and post-crash survivability.
- Current Federal Motor Vehicle Safety Standards (FMVSS) do not explicitly address automated vehicle technology and often assume the presence of a human driver. As a result, existing language may create certification challenges for manufacturers of automated vehicles that choose to pursue certain vehicle concepts.

Federal Motor Vehicle Safety Standards (FMVSS)

Volpe conducted a preliminary review of the FMVSS:

- Driver references

- References in numerous standards to a driver (defined in §571.3 as “the occupant of the motor vehicle seated immediately behind the steering control system”), a driver’s seating position, or controls and displays that must be visible to or operable by a driver, or actuated by a driver’s hands or feet.

- Automated vehicle concepts

- Volpe developed 13 different automated vehicle concepts, ranging from limited levels of automation (and near-term applications) to highly automated, driverless concepts with innovative vehicle designs. The idea was to evaluate the FMVSS against these different automated vehicle concepts.

Federal Motor Vehicle Safety Standards (FMVSS)

- There are few barriers for automated vehicles to comply with FMVSS, as long as the vehicle does not significantly diverge from a conventional vehicle design.
- Automated vehicles that begin to push the boundaries of conventional design (e.g., alternative cabin layouts, omission of manual controls) would be constrained by the current FMVSS or may conflict with policy objectives of the FMVSS. Many standards pose challenges, particularly for ‘driverless’ concepts where human occupants have no way of driving the vehicle.
- In February 2016, NHTSA informed Google that a software guidance system would meet the definition of “driver” within the FMVSS.
- Exemption cap: NHTSA can only provide up to 2,500 vehicle exemptions from FMVSS for testing per year for a two-year period.

Massachusetts Legislation, Regulations, and Executive Orders

- Four general types of laws and regulations:
 - Definitions
 - Titles and Registration, Licensing, and Inspection
 - Operations
 - Enforcement

MASSACHUSETTS REGISTRY OF MOTOR VEHICLES

What year did the RMV issue the first license plate?

- A. 1899
- B. 1903
- C. 1912



Mission of the RMV

With a strong commitment to a personalized customer experience, we enable customer mobility and consumer safety across the Commonwealth. As a service organization, we credential and deliver driver, non-driver and vehicle services in multiple channels for our customers' convenience.

2017-19 Strategic Plan Goals

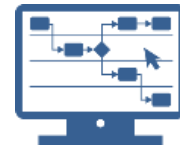
1. Be recognized as the industry leader in customer satisfaction



2. Build a Culture of Success



3. Deliver a flexible new business model and core system



4. Expand 3rd party channels /grow Out of Branch services



5. Increase capability to implement State and Federal mandates



Current State Laws and Regulations

Law or Reg	Definitions	Title, License, Inspection	Operations	Enforcement
MGL Ch 89: Law of the Road			X	X
MGL Ch 90 §1: Definitions	X			
MGL Ch 90 §7: Vehicle Standards		X		
MGL Ch 90 §8: Licensure		X	X	X
MGL Ch 90 §10: Right to Operate			X	
MGL Ch 90 §13: Operations			X	X
MGL Ch 90 §20: Violations				X
MGL Ch 90 §22: Violation/Suspension		X		X
MGL Ch 90 §24: OUI, Reckless Driving			X	X
MGL Ch 90 §31: Registrar's Authority		X	X	X
540 CMR 2.0: Definitions	X	X		X
540 CMR 4.0: Inspections	X	X		X
540 CMR 23.0: Licensing/Education	X	X		
540 CMR 24.0: Medical Qualification	X	X		

Definitions

- MGL Ch 90 §1
 - Operator, Manufacturer, Low-speed Vehicle, Livery,...
- 540 CMR 2.0
 - Personal Transportation Network Vehicle, Transportation Network Company,...
- 540 CMR 4.0
 - Class D License, Commercial Motor Vehicle, Inspector,...
- 540 CMR 23.0
 - Driver Education Program, Certification,...
- 540 CMR 24.0
 - Corrective Lens, Functional Impairment, Episode,...

Title, License, and Inspection

- MGL Ch 90 §7
 - Vehicle Standards
- MGL Ch 90 §8
 - Application for License, Qualifications
- MGL Ch 90 §22
 - Violations and Suspensions of License or Registration
- MGL Ch 90 §31
 - Rules and Regulations for Licenses and Permits
- 540 CMR 2.0
 - Registration Plates, Driving and Knowledge Tests, Restrictions
- 540 CMR 4.0
 - Inspection Requirements
- 540 CMR 23.0
 - Drivers Education and Training
- 540 CMR 24.0
 - Medical Qualifications for Licensure

Operations

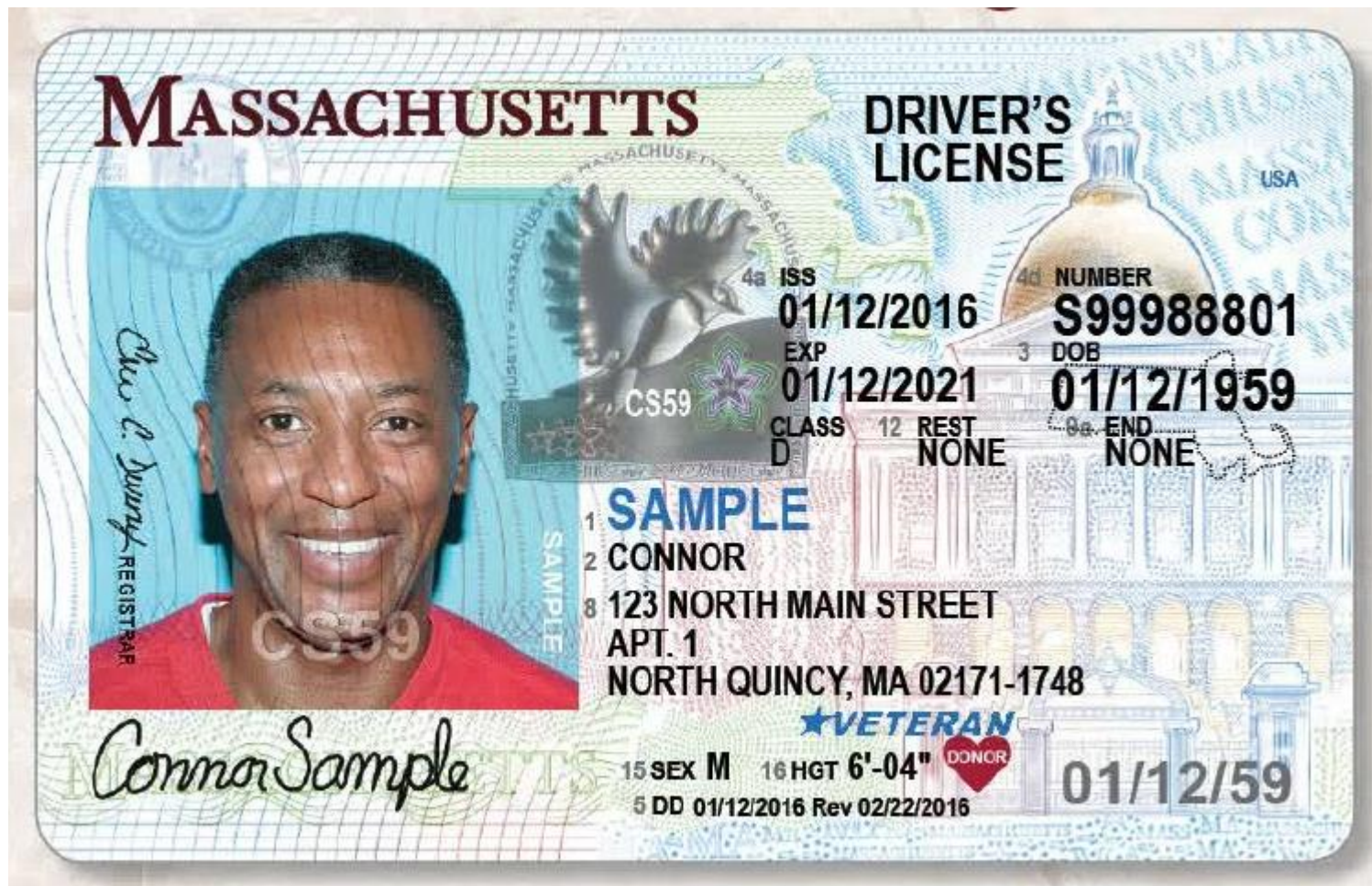
- MGL Ch 90 §8
 - Operational Restrictions and Requirements by License
- MGL Ch 90 §10
 - Minimum Age (16), Licensure Requirement
- MGL Ch 90 §13
 - Interfering with Operation, TV Broadcasts/Screens, Headphones, Seatbelts, Mobile Phones
- MGL Ch 90 §24
 - Operating Under the Influence, Reckless Driving, Leaving the Scene, Providing Information
- MGL Ch 90 §31
 - Registrar's Rulemaking

M.G.L. Chapter 90 § 1 - Definitions

- Operator: any person who operates a motor vehicle or trackless trolley
- Question: Who is the operator of an AV in SAE Level 3-5?

M.G.L. Chapter 90 §8 – Licensure

- “Application for a license to operate motor vehicles may be made by any person...Before a license is granted pursuant to this section, the applicant shall pass such examination as to his qualifications as the registrar...shall require... A person to whom a license has been issued under this section shall not operate motor vehicles other than those for which such license has been made valid by the registrar... An applicant for a license or renewal thereof appearing in person at a registry branch shall take and pass a vision test administered by the registry”
- Question: Will I need a special license to operate an autonomous vehicle?
- Question: What examination/qualifications should a driver need to pass to operate an autonomous vehicle?



540 C.M.R. 2.0:

Classes of License and License Restrictions

- **Class C:** Any single vehicle or combination of vehicles that does not meet the definition of Class A or Class B, but is either designed to transport 16 or more passengers including the driver, or is required to be placarded for hazardous materials
- **Class D:** Any single vehicle or combination of vehicles that does not meet the definition of Class A, Class B, Class C, or Class M.

Some License Restrictions Include:

- Corrective lenses (B)
- Mechanical aid (adaptive devices) (C)
- Prosthetic aid (D)
- Automatic transmission (E)
- Limit to daylight only (G)
- Hardship - restricted hours of operation (hours appear on license) (H)
- Limited – Other (Jr. Operator not valid under age 18 between 1:00 AM and 4:00 AM unless accompanied by a parent or guardian) (I)
- Restriction card must be carried (J)
- CDL - except class A and B bus (N)
- Medical waiver must be carried (Q)
- Bi-optic telescopic lens (R)
- Proof of current blood sugar level (S)
- Restrict to 14 passenger capacity (Y)
- Ignition interlock (Z)

540 CMR 4.0 – Safety and Emissions Inspections

- Initial and Subsequent Annual Inspections
- Procedures for Inspection of Non-Commercial Vehicles
 - Brakes: operate the vehicle to test the parking and service brake
 - Steering: check for free steering by turning the steering wheel through a full right and left turn
 - Mirrors: at least one mirror so placed and adjusted as to afford the operator a clear, reflected view of the highway to the rear and left
- Question: what changes, if any, would be needed to inspect autonomous vehicles?

MGL Ch 90 §31 – Rules and Regulations

- The registrar may make rules and regulations governing the use and operation of motor vehicles or trailers ...and may establish regulations to govern operators' licenses, permits and identification cards and any other products the registrar is authorized to issue or which are provided by general or special law.

EXECUTIVE OFFICE OF PUBLIC SAFETY AND SECURITY

Enforcement

- Massachusetts State Police
 - Unlicensed Operation – Chapter 90, §10
 - Operating to Endanger – Chapter 90, § 24(2)(a)
- RMV Enforcement Authority
 - Chapter 90, §22

POSSIBLE REGULATION FOR CHAPTER 28 OF 540 CMR

Application Process for Autonomous Vehicle Testing

- Enter into MOU with applicable jurisdiction(s)
- Submit Application to MassDOT
 - Appropriately document engineering, prior testing, and safety of autonomous vehicle



Enforcement Available

- The issue: what enforcement is available if the operator of an autonomous vehicle fails to follow the MOU and Application process?
 - Issue has been publicly raised several times
 - AV manufacturers have failed to follow rules in other jurisdictions

540 C.M.R. Chapter 28

Possible Regulation

- 540 C.M.R. Chapter 28 - Regulation of Motor Vehicles Operated by Autonomous Technology
 - 28.01: Scope and Applicability
 - Temporary regulation for autonomous vehicles on public ways during initial development, testing and demonstration
 - Enforceable by State and local police pursuant to authority of Ch. 15A §22

540 C.M.R. Chapter 28

Possible Regulation (Cont.)

○ 28.02: Definitions

- **Active Control:** the human operator is physically manipulating the systems which control the motor vehicle.
- **Application to Test:** the MassDOT/RMV application for permission to test or demonstrate Autonomous Vehicles on public ways in the Commonwealth
- **Autonomous Technology:** technology installed on a motor vehicle that has the capability to drive the vehicle without the active control or monitoring by a human operator
- **Autonomous Vehicle:** a motor vehicle equipped with Autonomous Technology, whether the technology directing movement of the vehicle is mechanical, electrical or computer generated and that allows the vehicle to operate without monitoring and control by an active operator. It includes Highly Automated Vehicles, defined by the Society of Automotive Engineers (SAE) as meeting SAE Levels 3, 4, or 5.
- **Highly Automated Vehicle:** see Autonomous Vehicle
- **MOU:** the Memorandum of Understanding containing the terms and conditions governing the operation and testing of Autonomous Vehicles on public ways
- **Written Permission:** the document issued by the MassDOT/RMV containing the terms and conditions that authorize a person or organization to test or demonstrate an Autonomous Vehicle on public ways.

540 C.M.R. Chapter 28

Possible Regulation (Cont.)

- Vehicles must be under active control of operator unless part of a test or demonstration of autonomous technology, in which case it must abide by the MOU and Application.
- No motor vehicle may be operated on a public way unless the vehicle is under the active control of a licensed operator who is seated in the driver's seat unless paragraph number (2) applies.
- Failure to follow the terms of the MOU and Application is presumed to constitute “operating to endanger” and “unlicensed operation” and can result in:
 - Termination of permission to test an autonomous vehicle
 - Fine and/or license suspension
 - Securing and towing of vehicle

CALIFORNIA'S AUTONOMOUS VEHICLES REGULATIONS

California's Regulations: Overview

- September 2014 – California's Department of Motor Vehicles (DMV) permitted autonomous vehicles *testing*, with a driver inside (Article 3.7)
- December 16, 2015 – DMV released draft *deployment* regulations for review
- March 10, 2017 – Published proposed regulations to establish a path for the testing and deployment of fully autonomous (driverless) vehicles (Article 3.8)
 - 45 day public comment period
 - Public hearing in Sacramento on April 25, 2017

California's Regulations:

Highlights of Proposed Regulations

- Includes testing of vehicles that do not require presence of a driver inside (Article 3.7)
- Includes deployment of autonomous vehicles, including those without a driver (Article 3.8)
- Testing without a driver and deployment require a copy of NHTSA's 15-point safety assessment
- Considered requiring independent third-party assessment of vehicles' capabilities
- Proposed self-certification process

California's Regulations: Testing Application and Reporting

- Testing Application and Acknowledgements
 - Testing only with trained employees and designees
 - Driver in immediate physical control or monitoring
 - Tested under controlled and simulated conditions,...
- Evidence of Insurance
- Incorporation Documents
- Training Program Outline
- Vehicle Registration (Certificate or Title, Statement of Facts Certification, Brake and Light Adjustment Certificate, and Smog Certificate)
- Reporting of Collisions and Disengagements
- Requirements for Vehicles Without a Driver

California's Regulations: Testing Application

- Application for Testing of Autonomous Vehicles
 - Manufacturer Information (Name, Address, etc)
 - Vehicles (Make and Model)
 - Acknowledgements
 - Incapable of operating outside of the disclosed ODD or other restricted conditions
 - Data capture and storage for 30 seconds before and 5 seconds after a crash
 - Complies with FMVSS or has appropriate waiver
 - Driverless vehicles have two-way communications link
 - Attachments
 - Description of the ODD, common and restricted conditions
 - Consumer and end-user education plan, including ODD
 - Law enforcement interaction plan
 - Certification

California's Regulations: Deployment Application and Reporting

- Deployment Application and Acknowledgements
 - Additional requirements for driverless vehicles
- Evidence of Insurance
- Consumer Education Plan
- Autonomous Technology Failure Protocol
- Law Enforcement Interaction Plan
- NHTSA Safety Assessment Letter
- Reporting Safety Defects
- Information Privacy
- Driver and Manufacturer Responsibilities
- “Truth in Advertising”

California's Regulations:

Definitions

○ Autonomous Mode¹

- An autonomous vehicle that is operated or driven without active physical control by a natural person sitting in the vehicle's driver's seat. is the status of vehicle operation where technology that is a combination of hardware and software, both remote and on-board, performs the dynamic driving task, with or without a natural person actively monitoring the driving environment. An autonomous vehicle is operating or driving in autonomous mode when it is operated or driven with the autonomous technology engaged.

Removed | Added | Maintained

¹Proposed California Code of Regulations Title 13, Div. 1, Ch. 1, Article 3.7

California's Regulations: Definitions

- Autonomous Test Vehicle¹
 - ~~Any vehicle equipped with technology that has the capability of operating or driving the vehicle without the active physical control or monitoring of a natural person whether or not the technology is engaged, excluding vehicles equipped with one or more systems that enhance safety or provide driver assistance but are not capable of driving or operating the vehicle without the active physical control or monitoring of a natural person.~~ a vehicle equipped with technology that is a combination of both hardware and software that performs the dynamic driving task, with or without a natural person continuously controlling the vehicle or continuously monitoring the vehicle's performance in the driving environment. Excluding vehicles with one or more driver assistance systems which are not capable of performing sustained dynamic driving task without control or monitoring of a natural person. SAE levels 3-5. Includes presence of monitoring employee or designee of manufacturer.

¹Proposed California Code of Regulations Title 13, Div. 1, Ch. 1, Article 3.7

California's Regulations: Definitions

- Dynamic Driving Task¹
 - All of the real-time functions required to operate a vehicle in on-road traffic, excluding selection of final and intermediate destinations, and including without limitation: object and event detection, recognition, and classifications; 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.

¹Proposed California Code of Regulations Title 13, Div. 1, Ch. 1, Article 3.7

California's Regulations: Definitions

- Driver¹
 - The natural person who is operating an autonomous vehicle when it is not operating in the autonomous mode.
- Operator²
 - Of an autonomous vehicle is the person who is seated in the driver's seat, or if there is no person in the driver's seat, causes the autonomous technology to engage.

¹Proposed California Code of Regulations Title 13, Div. 1, Ch. 1, Article 3.7

²California Vehicle Code Section 38750

California's Regulations: Definitions

- Manufacturer^{1,2}
 - Of autonomous technology is the person as defined in Section 470 that originally manufactures a vehicle and equips autonomous technology on the originally completed vehicle or, in the case of a vehicle not originally equipped with autonomous technology by the vehicle manufacturer, the person that modifies the vehicle by installing autonomous technology to convert it to an autonomous vehicle after the vehicle was originally manufactured.

¹California Vehicle Code Section 38750

²California Code of Regulations Title 13, Div. 1, Ch. 1, Article 3.7



PUBLIC COMMENT

APPENDIX



nuTonomy Testing Plan

Phase A - Off-Road or Off-Site Testing

Place	Milestone
Testing must not occur on a City street.	<p>A partner must document or demonstrate the following before moving to Phase B1:</p> <ul style="list-style-type: none"> • Ease of manual takeover from AV • Emergency braking and emergency stop functionality • Safety alert system for the driver to take over control • Automatic braking upon detection of an obstacle • Basic driving capabilities, such as staying within a lane.

Phase B1 - The Raymond L. Flynn Marine Park

Time	Place	Manner	Milestone
Testing must occur in daylight hours only during weather without precipitation.	Testing can only occur within the Marine Industrial Park.	Vehicle must have a safety driver behind the wheel.	After documenting 100 miles logged in Phase B1, the partner may request to move to Phase B2.

Phase B2 - The Raymond L. Flynn Marine Park

Time	Place	Manner	Milestone
<p>Testing must occur in both during daytime and nighttime hours.</p> <p>Testing must include periods during precipitation.</p>	Testing can only occur within the Marine Industrial Park, an area defined in attachment	Vehicle must have a safety driver behind the wheel.	After documenting 100 miles logged in Phase B2, the partner may request to move to Phase C1.

Phase C1 - A Second, Mutually-Agreed Upon Geography			
Time	Place	Manner	Milestone
Testing must occur in daylight hours only during weather without precipitation.	Testing can only occur within the South Boston Waterfront, an area defined in attachment (<i>TBD</i>)	Vehicle must have a safety driver behind the wheel.	After documenting 200 miles logged in Phase C1, the partner may request to move to Phase C2.
Phase C2 - A Second, Mutually-Agreed Upon Geography			
Time	Place	Manner	Milestone
Testing must occur in both during daytime and nighttime hours. Testing must include periods during precipitation.	Testing can only occur within the South Boston Waterfront, an area defined in attachment (<i>TBD</i>)	Vehicle must have a safety driver behind the wheel.	After documenting 200 miles logged in Phase C2, the partner may request to move to Phase D1.
Phase D1 - City of Boston			
Time	Place	Manner	Milestone
Testing must occur in daylight hours only during weather without precipitation.	Testing can only occur within the City of Boston, an area defined in attachment (<i>TBD</i>) Vehicle can only operate on roads with a speed limit at 30 mph or less.	Vehicle must have a safety driver behind the wheel.	After documenting 400 miles logged in Phase D1, the partner may request to move to Phase D2.
Phase D2 - City of Boston			
Time	Place	Manner	Milestone
Testing must occur in both during daytime and nighttime hours. Testing must include periods during precipitation.	Testing can only occur within the City of Boston, an area defined in attachment (<i>TBD</i>) Vehicle can only operate on roads with a speed limit at 30 mph or less.	Vehicle must have a safety driver behind the wheel.	N/A

SAE Levels of Automation

- At SAE Level 0, the human driver does everything
- At SAE Level 1, an automated system on the vehicle can sometimes assist the human driver conduct some parts of the driving task
- At SAE Level 2, an automated system on the vehicle can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task
- At SAE Level 3, an automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests
- At SAE Level 4, an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions
- At SAE Level 5, the automated system can perform all driving tasks, under all conditions that a human driver could perform them

National Automated Vehicles Research

- BMW Group, Intel and Mobileye are set to test a fleet of 40 autonomous vehicles later this year [2017] as part of a joint partnership between the three companies. “**BMW** is on its way to delivering a car capable of Level 3, Level 4 and Level 5 autonomy in the next four years.” - [Elmar Frickenstein, SVP for Autonomous Driving](#)
- “**Audi**’s next generation A8 [~2018] will feature Traffic Jam Pilot...this system will give drivers the option to turn over steering, throttle, and braking functionality to the vehicle at speeds of up to 35 mph when certain conditions are met.” – [January 2017 Press Release](#)

National Automated Vehicles Research (2)

- **Tesla** vehicles, beginning in October 2016, will ship with the “Hardware 2” package - eight cameras and 12 ultrasonic sensors – capable of level 4 or 5 driving in the future after wireless software updates. Current Tesla vehicles can use “Autopilot mode”, SAE level two.
- **Ford** announced its “...intent to have a high-volume, fully autonomous SAE level 4-capable vehicle in commercial operation in 2021 in a ride-hailing or ride-sharing service.” – [August 2016 Press Release](#)

National Automated Vehicles Market (3)

- **Toyota Research Institute** is pursuing two paths to autonomy: Guardian and Chauffeur
 - Guardian: autonomous vehicle technology operates in the background and is constantly monitoring the environment, stepping in when it perceives a collision is imminent.
 - Chauffeur: autonomous technology takes over the driving task from the human driver.
- “We are currently testing and refining both Guardian and Chauffeur. To date, most of our testing of Chauffeur has been done on closed courses in a number of states. We are testing on public roads in Michigan, and have plans to test after we receive regulatory approval from [Massachusetts and California] to do so. Because these systems can save lives, our hope is to deploy our systems as soon as possible, but we will only do so when we know that they can be deployed safely and responsibly.” – [Gill Pratt, February 2017 Congressional Testimony](#)

Executive Order No. 572

- Signed on October 20, 2016 by Governor Baker
- Created the AV Working Group
- Established a process to develop Guidance for testing highly automated vehicles and their safe deployment in the Commonwealth
 - MassDOT, with input from the Working Group and technical experts, will develop a process for companies to obtain approval to test highly automated vehicles (Currently Underway)
 - Develop an application process for companies (Currently Underway)

M.G.L. Chapter 90

Section	Scope
§1	Definitions
§1A	Registration of motor vehicles; liability insurance
§8	Operator's licenses; applications; examinations
§10	Operation of motor vehicle without license
§13	Safety precautions for proper operation and parking of vehicles
§13A	Seat belt use required; exemptions; penalty
§20	Penalties and punishments
§22	Suspension or revocation of certificate of registration or license; notice
§24	Driving while under influence; reckless and unauthorized driving; failure to stop after collision
§31	Use and operation of motor vehicles or trailers; conduct of operators and chauffeurs; rules and regulations

M.G.L. Chapter 90 § 1 - Definitions

Other key definitions:

- Automobile/Motor Vehicle
- Livery Vehicle
- Low-speed vehicle
- Owner
- Owner-Contractor
- Incompetent Persons
- Way
- ...

M.G.L. Chapter 90 §7 – Vehicle Standards

- Every automobile shall be provided with **at least two braking systems**...service brake system, and ...parking brake system...with a **separate means of application**...operating directly or indirectly on at least two wheels...which shall suffice alone to stop said automobile within a proper distance as defined...
- Every motor vehicle...shall be provided **with...a suitable bell, horn or other means of signalling**, with suitable lamps, and with a lock, key or other device to prevent such vehicle from being set in motion by unauthorized persons, or otherwise contrary to the will of the owner or person in charge thereof
- Every motor vehicle registered in the Commonwealth which is privately owned and operated and designed for the carriage of passengers and which is used primarily for pleasure or for pleasure and business, including every such vehicle furnished for hire by a rental car agency but excluding every such vehicle used for public or commercial purposes, shall be equipped with **two seat safety belts** for the use of occupants of the front seats.

M.G.L. Chapter 90 §7 – Vehicle Standards (2)

- Every motor vehicle registered in the Commonwealth shall be equipped with **a device to permit the front and rear directional signals to flash simultaneously**, said device to be operated only when the vehicle is disabled or stopped in the event of emergency on or at the side of any way.
- **No person shall sell, offer for sale or install** on, or in, any motor vehicle or trailer, **any component, device or substance...which does not comply with the federal motor vehicle safety standard**, if any... Nothing in this act shall prevent the registrar from prescribing minimum standards for any component, device, or substance for which no federal motor vehicle safety standard is or has been established...
- The **registrar shall adopt standards and specifications for...a distinctive slow moving vehicle emblem**. Every...vehicle designed to operate at twenty-five miles an hour or less...including...every low-speed motor vehicle, traveling on a public way during day or night shall display on the rear of the vehicle such emblem...

MGL Ch 90 §10 – Right to Operate

- No person under sixteen years of age shall operate a motor vehicle upon any way. No other person shall so operate unless licensed by the registrar...
- Notwithstanding the foregoing provisions, no person shall operate on the ways of the commonwealth any motor vehicle, whether registered in this commonwealth or elsewhere, if the registrar shall have suspended or revoked any license to operate motor vehicles issued to him under this chapter, or shall have suspended his right to operate such vehicles, and such license or right has not been restored or a new license to operate motor vehicles has not been issued to him. Operation of a motor vehicle in violation of this paragraph shall be subject to the same penalties as provided in section twenty-three for operation after suspension or revocation and before restoration or issuance of a new license or the restoration of the right to operate.

MGL Ch 90 §13 – Operations

- **No person**, when operating a motor vehicle, **shall permit to be on or in the vehicle or on or about his person anything which may interfere with or impede the proper operation of the vehicle or any equipment by which the vehicle is operator or controlled**, except that a person may operate a motor vehicle while using a federally licensed 2-way radio or mobile telephone, except as provided in sections 8M, 12A and 13B, as long as 1 hand remains on the steering wheel at all times.
- **No person shall drive any motor vehicle equipped with any television viewer, screen or other means of visually receiving a television broadcast** which is located in the motor vehicle at any point forward of the back of the driver's seat, or which is visible to the driver while operating such motor vehicle.
- **No person shall operate a motor vehicle while wearing headphones, unless said headphones are used for communication in connection with controlling the course or movement of said vehicle.**

MGL Ch 90 §13A – Seatbelts

- No person shall operate a private passenger motor vehicle or ride in a private passenger motor vehicle, a vanpool vehicle or truck under eighteen thousand pounds on any way unless such person is wearing a safety belt which is properly adjusted and fastened; provided, however, that this provision shall not apply to:...(e) anyone involved in the operation of taxis, liveries, tractors, trucks with gross weight of eighteen thousand pounds or over, buses, and passengers of authorized emergency vehicles.
- The provisions of this section shall be enforced by law enforcement agencies only when an operator of a motor vehicle has been stopped for a violation of the motor vehicle laws or some other offense.

MGL Ch 90 §13B – Mobile Phones

- No operator of a motor vehicle shall use a mobile telephone, or any handheld device capable of accessing the internet, to manually compose, send or read an electronic message while operating a motor vehicle. For the purposes of this section, an operator shall not be considered to be operating a motor vehicle if the vehicle is stationary and not located in a part of the public way intended for travel.

MGL Ch 90 §20 – Violations

- Any person who operates and any person who owns or permits to be operated a motor vehicle or trailer that fails to meet the safety standards established by the registrar pursuant to section 7A shall be punished by a fine of \$25. Any person who owns and fails to have inspected a motor vehicle owned by him, as required pursuant to section 7A or 7V of this chapter or sections 142J and 142M of chapter 111 or any person who operates or permits a motor vehicle owned by him to be operated without a certificate of inspection or a certificate of rejection displayed in accordance with the provisions of said section 7A or 7V or said sections 142J or 142M and the rules and regulations promulgated thereunder shall be punished by a fine of \$50. Any motor vehicle which is required to be inspected pursuant to the provisions of said section 7A and said section 142J or 142M and fails to meet the requirements of such inspection and has not been issued a certificate of waiver under the provisions of clause (b) of the first paragraph of said section 7V or said section 142M shall be subject to suspension or revocation of the certificate of registration as may be prescribed by the registrar under section 22.

MGL Ch 90 §22 – Violations and Suspensions

- The registrar may suspend or revoke without a hearing any certificate of registration or any license issued under this chapter whenever the holder thereof has committed a violation of the motor vehicle laws of a nature which would give the registrar reason to believe that continuing operation by such holder is and will be so seriously improper as to constitute an immediate threat to the public safety... The registrar may order the license of such operator or the registration certificate and number plates to be delivered to him; and neither the certificate of registration nor the license shall be reissued unless, upon examination or investigation, or after a hearing, the registrar determines that the operator shall again be permitted to operate... The registrar, under the same conditions and for the same cause, may also suspend the right of any person to operate motor vehicles in the commonwealth under section ten until he shall have received a license from the registrar or until his right to operate has been restored by the registrar.

MGL Ch 90 §22 – Violations and Suspensions

- The registrar may, after due hearing, suspend or revoke any certificate of registration or any license issued under this chapter, when he has reason to believe the holder thereof is an incompetent person to operate motor vehicles, or is operating a motor vehicle improperly.
- If the registrar receives official notice...that a resident of the commonwealth or any person licensed to operate a motor vehicle under the provisions of this chapter has been convicted in another state, country or jurisdiction of a motor vehicle violation, the registrar shall give the same effect to said conviction for the purposes of suspension, revocation, limitation or reinstatement of the right to operate a motor vehicle, as if said violation had occurred in the commonwealth.
- If the registrar receives official notice...that a resident of the commonwealth, or any person licensed to operate a motor vehicle ...has had a license or right to operate suspended or revoked in another state, country or jurisdiction, the registrar shall not issue a license to said person, and if a license has already been issued the registrar shall immediately revoke said license, without a prior hearing...

MGL Ch 90 §24 – Driving Under Influence; Reckless/Unauthorized Driving; Failure to Stop

- (1) (a) (1) Whoever, upon any way or in any place to which the public has a right of access, or upon any way or in any place to which members of the public have access as invitees or licensees, operates a motor vehicle with a percentage, by weight, of alcohol in their blood of eight one-hundredths or greater, or while under the influence of intoxicating liquor, or of marijuana, narcotic drugs, depressants or stimulant substances, all as defined in section one of chapter ninety-four C, or the vapors of glue shall be punished by a fine of not less than five hundred nor more than five thousand dollars or by imprisonment for not more than two and one-half years, or both such fine and imprisonment.

540 C.M.R.

Section	Scope
2.0	Vehicle Registrations, Operator Licensing, Commercial Vehicle Markings
4.0	Safety and Emissions Inspections
23.0	Licensing, Certification and Operating Requirements for Professional Driving Schools, Instructors, and Education Programs
24.0	Medical Qualifications for Operators of Motor Vehicles

540 CMR 2.0 – Definitions, Registration Plates, Remedies, Applications and Tests

- Definitions
 - Livery Vehicle
 - Personal Transportation Network Vehicle
 - Private Passenger Motor Vehicle
 - Transportation Network Company
- Vehicle Registration Plates
 - Private Passenger
 - Commercial
 - Livery
- Remedies
 - Immediate Threat to Public Safety
 - Incorrect Vehicle Registration Plate
- Applications and Tests
 - Driving Knowledge Tests
 - Licenses
 - Restrictions

540 CMR 24.0 – Medical Qualifications

- Provides minimum physical and mental qualification standards determined to be necessary for the safe operation of a motor vehicle.
- Apply to all applicants and licensees for learner's permits or licenses to operate motor vehicles in the Commonwealth
- Any licensee or applicant who is unable to meet the medical qualification standards described in 540 CMR 24.00 is not eligible to obtain or hold a learner's permit or license.
- Types of Impairments, Standards, and Procedures
 - Driving Relevant Functional Impairment
 - Visual Standards and Procedures
 - Seizure and Loss of Consciousness Standard and Procedures
 - Cardiovascular and Respiratory Disease Standards and Procedures
 - Arthritis Disease Standard and Procedures