



COLORADO

Department of Transportation

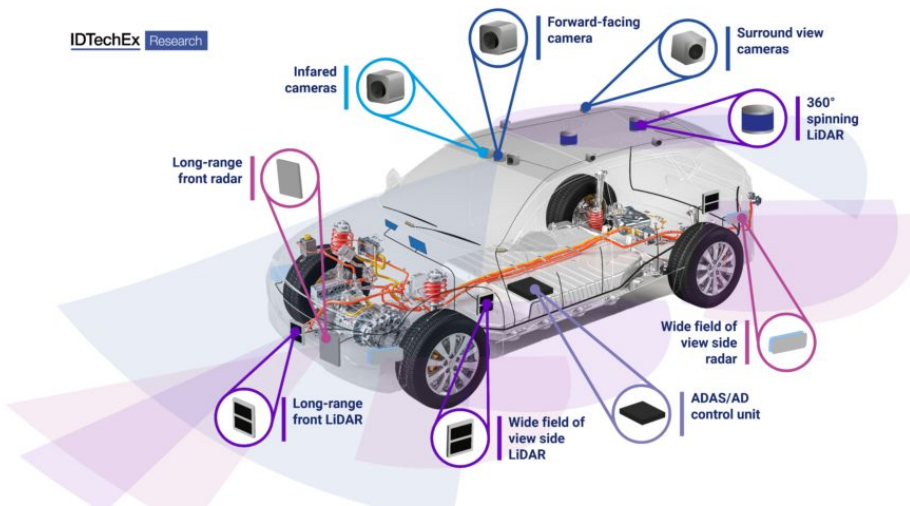
Autonomous Vehicle Update

10/21/2025 TLRC Meeting



What is an Autonomous Driving System?

CRS 42-1-102 (7.7) defines an automated driving system to mean “hardware and software that are collectively capable, without any intervention or supervision by a human operator, of performing all aspects of the dynamic driving task for a vehicle on a part-time or full-time basis, described as levels 4 and 5 automation in SAE International's standard J3016, as it existed in September 2016.”





SAE Levels of Driving Automation



SAE J3016™ LEVELS OF DRIVING AUTOMATION

	SAE LEVEL 0	SAE LEVEL 1	SAE LEVEL 2	SAE LEVEL 3	SAE LEVEL 4	SAE LEVEL 5
What does the human in the driver's seat have to do?	You are driving whenever these driver support features are engaged - even if your feet are off the pedals and you are not steering You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			You are not driving when these automated driving features are engaged - even if you are seated in "the driver's seat" When the feature requests you must drive These automated driving features will not require you to take over driving		
	THESE ARE DRIVER SUPPORT FEATURES			THESE ARE AUTOMATED DRIVING FEATURES		
What do these features do?	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/ acceleration support to the driver	These features provide steering AND brake/ acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met	This feature can drive the vehicle under all conditions	
Example Features	- Automatic emergency braking - Blind spot warning - Lane departure warning	- Lane centering OR - Adaptive cruise control	- Lane centering AND - Adaptive cruise control at the same time	Traffic jam chauffeur	- Local driverless taxi - Pedals/steering wheel may or may not be installed	Same as level 4, but feature can drive everywhere in all conditions.

Waymo & Zoox Deployments – September 2025

Waymo - ★ Deployments ★ Planned ☆ Testing Zoox - ⬠





Benefits and Challenges of Vehicle Automation

Anticipated Benefits:

- Reduction in human error and reduced driver workload
- Improved traffic flow and fewer traffic jams
- Enhanced predictability
- Mitigation of driver-related factors (e.g. fatigue, impairment)
- Improved accessibility
- Cost efficient

Anticipated Challenges:

- Cybersecurity
- Sensor limitations
- Transition period challenges
- Regulatory and legal uncertainties
- Data privacy concerns

Thus far, data from real world AV deployments has been encouraging



Waymo AVs Have Exceeded 100 Million Miles of Driving

- 1 Million Miles – January 2023
 - <https://electrek.co/2023/02/28/waymo-cruise-1-million-test-miles-will-begin-driverless-rides-los-angeles/>
- 2 Million Miles – May 2023 (@ 10,000 trips per week)
- **25 Million Miles – July 2024** (17M Phoenix, 7M San Francisco)
 - <https://www.benzinga.com/news/24/10/41541316/waymo-fleet-hits-25m-driverless-miles-autonomous-driving-company-says-its-fleet-is-safer-than-human>
- 1 Million Miles Weekly – Feb 2025
 - <https://techcrunch.com/2025/02/27/waymo-has-doubled-its-weekly-robotaxi-rides-in-less-than-a-year/>
 - 1 Million Miles weekly is equivalent to 3850 average drivers
 - At 200,000 trips per week, average trip distance is **5 miles**
- **100 Million Miles – July 2025**
 - <https://www.cbtnews.com/waymo-hits-100-million-driverless-miles-as-robotaxi-rollout-accelerates/>
- On average ...
 - An American drives about 13,500 miles per year (260 miles per week)
 - Over a lifetime (assuming a driving span of around 50 years), this totals roughly 675,000 miles. That's like circling the Earth at the equator about 27 times!

4X in one year



Waymo Data Indicates AV Safety Benefits

Safety data released by Waymo in September 2025 indicates the Waymo Driver is already making roads safer in the places where they currently operate.

Overall crash reduction



Crash reductions involving injuries to Vulnerable Road Users





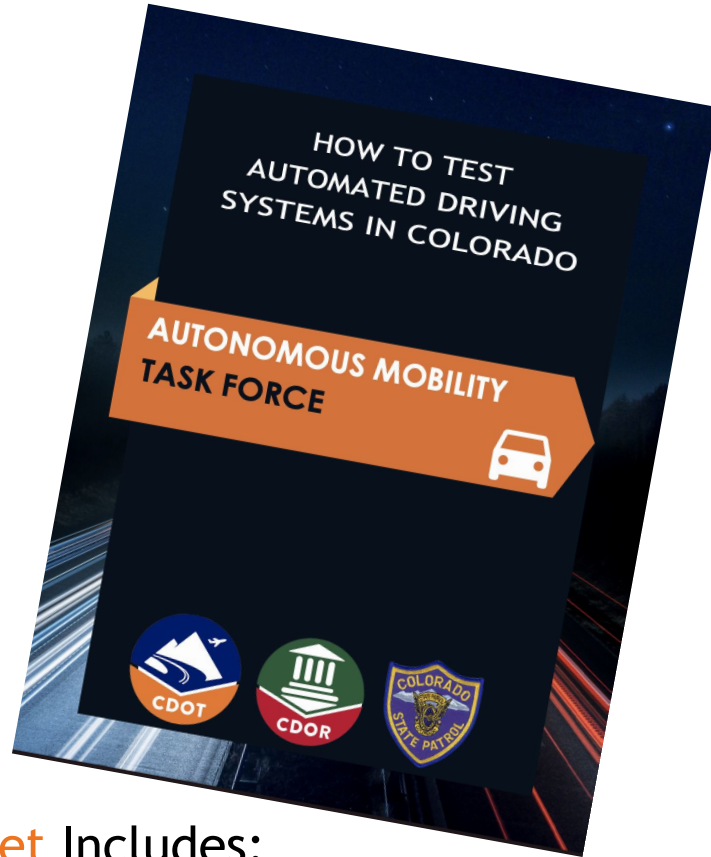
Autonomous Mobility Task Force Background

- [Senate Bill 17-213](#) provided a definition of automated driving systems (automated vehicles); affirmed that automated driving systems are authorized in Colorado if the system is capable of conforming to every state and federal law applying to driving; and enabled CDOT to establish a review process for vehicles that do not comply with this definition
- Collaboration between state agencies commenced in September 2017 to:
 - Establish Autonomous Mobility Task Force (AMTF)
 - Define roles and responsibilities
 - Enable clear checklist of expectations, required submittals, necessary templates, approval forms, etc.
- The AMTF meets on an ad hoc basis as applications are received and meetings are open to the public



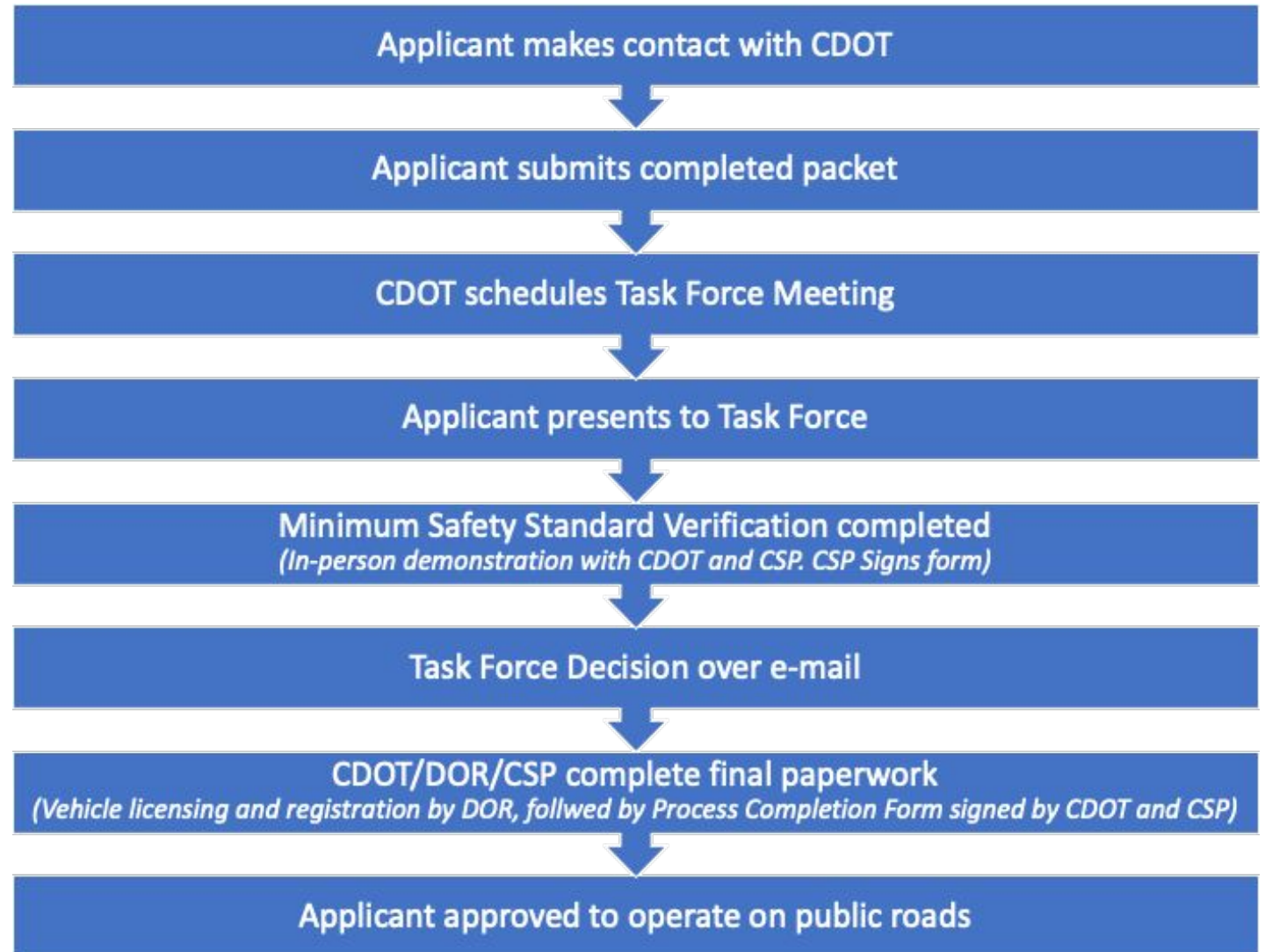


General AMTF Application Process



Packet Includes:

- Operational Design Domain (ODD)
- Safety Information
- Driver Certification
- Vehicle Certification
- Insurance Certification





Example Applications Approved by AMTF

- EasyMile Shuttles

- Denver Office Grand Opening Demo - December 2017
- 61 AV Route Service - January 2019
- City of Westminster Food Bank - May 2020
- City of Golden and Colorado School of Mines - July 2021



- CDOT Autonomous Attenuators

- Region 4 Deployment - May 2018
- Region 5 Deployment - January 2020
- Region 3 Deployment - June 2025

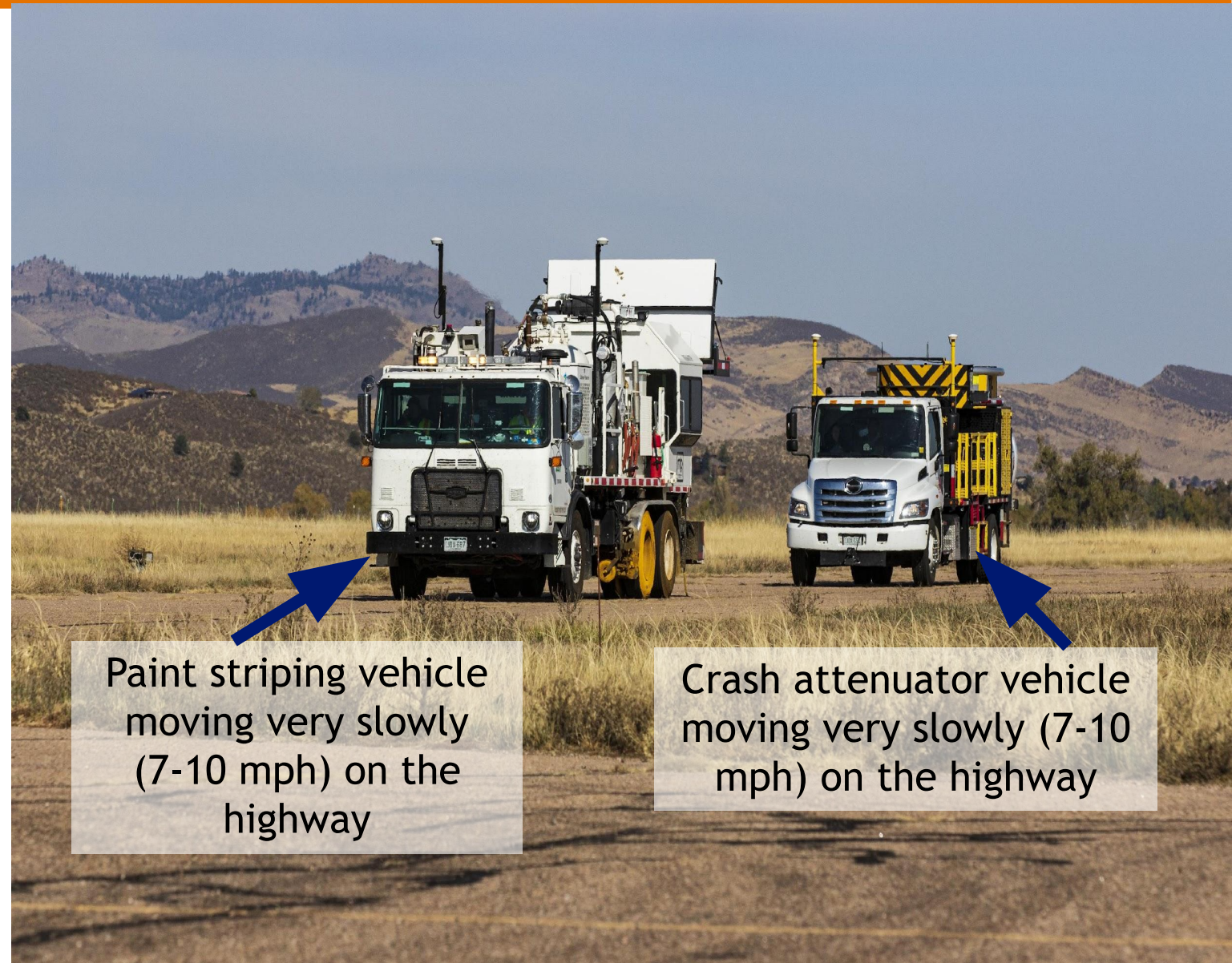




CDOT Autonomous Truck Mounted Attenuator Program

ATMA Program Goals:

- Remove human driver from the follower truck
- Decrease risk of operations
- Increase efficiency of operations
- Pursue cutting-edge technology to improve highway management





ATMA Phased Deployment

Phase 1 (2018 - Early 2020)

- Purchase of ATMA
- Testing and Validation of first ATMA in Northern Colorado
- Completion of the Colorado Autonomous Mobility Task Force Process
- Operational Deployment of ATMA in daily operations
- Approval on CDOT Roads less than 2,500 AADT

Phase 2 (Early 2020 - Late 2024)

- Request for expansion on CDOT roads less than 5,000 AADT
- Addition, testing and validation of CDOT's second ATMA in southwestern Colorado
- Completion of the Colorado Autonomous Mobility Task Force process
- Operational deployment of second ATMA

Phase 3 (Late 2024 - Present)

- Addition of a third ATMA
- Testing and Validation in the Pueblo area
- Completion of the Colorado Autonomous Mobility Task Force process
- Operational deployment
- Testing with multiple leader trucks but keeping same Operational Design



USDOT SMART Grant Progress

- USDOT Phase 1 SMART Grant awarded in Spring 2023 and completed in Summer 2025
- Multi-state project led by CDOT with partners - Wisconsin DOT, Minnesota DOT, Oklahoma DOT
- Project Goals
 - Expand ATMA deployments
 - Verify the versatility of the leader trucks
 - Create a toolkit for future deployments
 - Expand use cases of ATMA to crack sealing and sweeping operations (to be pursued in Phase 2 SMART Grant application)





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Q&A