

Pennsylvania Autonomous Vehicle Testing Policy: Final Draft Report of the Autonomous Vehicle Policy Task Force

November 2, 2016



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Contents

Acknowledgements.....	4
Foreword.....	7
Glossary of Terms.....	10
Introduction	12
Policy Topic #1: Minimum Approval for HAV Testers	15
Policy Topic #2: Who Is The Driver?.....	19
Policy Topic #3: Operation of HAVs	22
Policy Topic #4: Vehicle Characteristics, Capabilities, and Security	25
Policy Topic #5: Data Collection	29
Policy Topic #6: Testing Approval and Renewal	33
Appendix A: Draft Contract.....	35
Appendix B: Other Viewpoints.....	39
Appendix C: Meeting Summaries.....	60

Automated Vehicle Testing Policy

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Automated Vehicle Testing Policy

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Foreword

The world of transportation is undergoing a profound transformation, and is poised to change the world profoundly. The development of highly automated vehicles (HAVs) is progressing far more rapidly than anybody might have anticipated a few years, or even a few months ago.

The advance of HAV¹ technology promises tremendous benefits for society, including: vastly improved transportation safety; increased mobility options and flexibility; more efficient operation of our limited infrastructure capacity; reductions in green-house gas and emissions pollution, to name a few prospective effects. It also is likely to be a powerful force, creating new challenges and opportunities for business and labor, as well as raising hard questions regarding intellectual property, personal privacy, and cybersecurity.

Stretching back to the time of Benjamin Franklin, Pennsylvania has been a cradle of innovation and industry, so it comes as no surprise that today, the Keystone State is at the epicenter of the rise of HAV technology. Pittsburgh's Carnegie Mellon University can rightly be called a "birthplace of self-driving vehicles," and the University of Pennsylvania is home to a world-renowned robotics research program. Pennsylvania has emerged as a leading location for on-road testing of HAVs as they steadily advance toward eventual practical use.

The Pennsylvania Department of Transportation (PennDOT) has been engaged for a long while in support of these developments, including the work of our highway engineers, to promote the advanced signalization that will enable vehicles to connect to the roadway infrastructure. PennDOT has also been active in national efforts to develop uniform standards and practices for HAVs.

With the pace of HAV innovation accelerating, Transportation Secretary Leslie S. Richards challenged the Department to take action to sustain Pennsylvania's leadership in HAV research, while simultaneously ensuring that public safety remains the paramount priority as HAVs are tested on the roadways. In response to Secretary Richards' challenge, PennDOT has crafted a multi-level strategy:

- Under existing law, which never anticipated and therefore is silent on HAV technology, it is lawful to operate HAVs on the roadways, provided there is a licensed driver at the steering wheel ready to take control of the vehicle. However, this narrow scope for testing limits the progress of experimentation and innovation, which in the future, will probably include no driver at the wheel, or no manual steering apparatus at all. So PennDOT, in collaboration with the executive directors of the Transportation Committees of the General Assembly, proposed legislation to allow explicitly for on-road HAV testing under PennDOT's oversight.
- Recognizing that the conventional oversight mechanisms, such as the formal regulatory process, are too slow and inflexible to keep pace with the fast-changing technology, PennDOT proposed

¹ Illustrative of the pace of change is the very terminology that we use here. When this Task Force began its work in June 2016, the general term used for this technology was "autonomous vehicles." In September 2016, when US DOT issued its policy guidance, the term used was "highly automated vehicles," or HAVs. In this report, we have adopted the terminology preferred by the Federal government, though we did not change the name of the Task Force, which began and finished its work known as the Autonomous Vehicle Policy Task Force.

Automated Vehicle Testing Policy

that the legislation authorizes the Secretary to issue policies to oversee the procedures, conditions, and other requirements for safe on-road testing.

- In anticipation of these proposed law changes, PennDOT convened a Task Force of stakeholders, broadly representative of the various public- and private-sector organizations and interests that are involved or have a stake in the development of HAVs. This group, the Pennsylvania Autonomous Vehicle Policy Task Force, has been meeting regularly since spring 2016 to develop recommendations to the Secretary regarding policies to oversee on-road HAV testing. (Please see the Task Force Membership roster on page 4.)

This report, and the policy recommendations it contains, are the product of the Task Force's six months of work and deliberations. In reviewing the policies that follow, the reader is advised to bear in mind that it is a consensus report. No votes were taken. Instead, the Task Force membership worked collaboratively and iteratively to find common ground that will support the dual objectives of promoting the advancement of HAV technology, while ensuring public safety. As would be expected from any collaborative effort reflecting perspectives and interests that vary, and in some instances directly differ, unanimity among the membership was not sought or attained. However, it was remarkable throughout our proceedings how often the shared goal of safely advancing the technology encouraged the search — and largely succeeded in finding — that elusive common ground. In addition to the Task Force recommendations, this report's appendix includes comments submitted by individual members desiring to emphasize their particular perspectives.

We have also welcomed input from parties that are not participating directly on the Task Force, and, where appropriate, we have incorporated these perspectives into the policy recommendations. The Department plans to elicit further input by requesting public comment on these recommendations over the next 60 days, and we will be conducting an on-line forum in December 2016 to give the public an opportunity to ask questions and make their views known.

The reader should also bear in mind that nearly four months into the work of the Task Force, the US Secretary of Transportation released long-awaited policy guidance from the National Highway Traffic Safety Administration (NHTSA), entitled "Federal Automated Vehicle Policy: Accelerating the Next Revolution In Roadway Safety." This comprehensive policy document includes a "Model State Policy," with recommendations addressing areas of concern (notably including on-road testing) for which the states should take primary responsibility. The issuance of the NHTSA guidance in late September required us to carefully compare and contrast it with our work-in-progress. To a large extent, the Task Force's draft recommendations closely parallel the NHTSA guidance, and the differences fall well within the scope of variance the Federal guidance allows for when it states:

States may still wish to experiment with different policies and approaches to consistent standards, and in that way contribute to the development of the best approaches and policies to achieve consistent regulatory objectives. The goal of State policies in this realm need not be uniformity or identical laws and regulations across all States. Rather, the aim should be sufficient consistency of laws and policies to avoid a patchwork of inconsistent State laws that could impede

Automated Vehicle Testing Policy

innovation and the expeditious and widespread distribution of safety enhancing automated vehicle technologies.²

Moreover, the policy recommendations of the Task Force have been developed simultaneous with the introduction of the legislation that would give effect to the policies themselves. Both bills (SB 1268 and HB 2203 of the 2015-16 Session) are subject to the actions of the General Assembly, which may entail amendment or outright rejection. While the ultimate outcome cannot be known, if and when legislation is enacted that (as PennDOT recommends) authorizes the Department to issue policies to oversee on-road HAV testing, those policies may need to differ from the Task Force's recommendations in order to conform to the writ of the law. The Task Force undertook its work mindful of this caveat, in order to lay the foundation for the Secretary to issue the policies as soon as possible following their authorization by the enactment of the pending legislation.

If, at this early stage of the process of bringing HAV technology to life, much remains unknown, it underscores the importance of setting public policies that are flexible and responsive to circumstances that are changing rapidly and moving in directions no one can foresee with certainty. We must remember that we are currently only in the testing phase of HAV development. Testing, by its nature, entails trial and error that will ultimately advance HAV technology to the point where it can be safely and effectively deployed, so society can reap its enormous potential benefits.

PennDOT believes the best way to proceed down this exciting, but uncertain course is to engage collaboratively with the diverse stakeholders and the general public that will be most affected by the outcome. The work and the recommendations of this Task Force represent a down-payment on PennDOT's commitment to ongoing collaboration to bring the future of transportation to life in Pennsylvania and the world.

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² National Highway Traffic Safety Administration, Federal Automated Vehicles Policy: Accelerating the Next Revolution In Roadway Safety". Sept. 2016. P. 39.

Glossary of Terms³

"Automated Driving System (ADS)." The hardware and software that is collectively capable of performing all aspects of the dynamic driving task for a Highly Automated Vehicle (HAV).

"Crash." For purposes of required reporting for HAV testing, a crash involving either injury to or death of any person; or damage to any vehicle involved to the extent that it cannot be driven under its own power in its customary manner without further damage or hazard to the vehicle, other traffic elements, or the trafficway, and therefore requires towing.

"Deployment." The use of an HAV by members of the public who are not Operators or employees or agents of an HAV Tester.

"Driver." A natural person who drives or is in actual physical control of a vehicle.

"Driver Assist Features." An active safety system or combination of systems for driver assistance, including but not limited to, electronic blind spot detection, crash avoidance warning, emergency braking, parking assistance, adaptive cruise control, lane keeping assistance, lane departure warning, or traffic jam and queuing assistance, where one or more of those systems, alone or in combination with any other system, does not enable the vehicle to perform the dynamic driving task without the active control or monitoring by a human operator.

"Dynamic driving task." The operational (steering, braking, accelerating, monitoring the vehicle and trafficway) and tactical (responding to events, determining when to change lanes, turn, use signals, etc.) aspects of driving, but not the strategic (determining destinations and waypoints) aspect of the driving task.

"Full automation." Full-time performance by an automated driving system of all aspects of the dynamic driving task under all trafficway and environmental conditions that can be managed by a human driver.

"HAV Tester." A person who is contracted with PennDOT to conduct public testing of HAVs.

"High automation." The driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, and if a human driver does not respond appropriately to a request to intervene, the automated driving system is able to achieve a minimal risk condition upon that failure to intervene.

"Highly Automated Vehicle (HAV)." A motor vehicle or a mass transit vehicle with full or high automation that is equipped with an automated driving system.

"LiDAR." A device that is similar in operation to radar but emits pulsed laser light instead of microwaves.

"Minimal Risk Condition." A scenario where an automated driving system brings a vehicle to a safe stop

³ As they exist today; nomenclature is evolving as quickly as HAV technology itself.

Automated Vehicle Testing Policy

or safe running condition because of an ADS system malfunction, a failed request for operator intervention, or other occurrence that prohibits the automated driving system from fully and completely performing the dynamic driving task.

"Operation." The driving of an HAV on a test road for the purpose of testing an automated driving system.

"Operational Design Domain (ODD)." The HAV Tester's definition of the conditions in which the ADS, or the differing automated components thereof, is intended to operate with respect to roadway types, geographical location, speed range, lighting conditions for operation (day and/or night), weather conditions, and other operational domain constraints, including a description of how the ADS provides for object and event detection and response under of normal driving scenarios, expected hazards (e.g., other vehicles, pedestrians), and unspecified events (e.g., emergency vehicles, temporary construction zones) that could occur within the operational domain.

"Operator." An individual employed by or otherwise affiliated with an HAV Tester who is able to take immediate manual or remote control of the HAV.

"Person." A natural person, firm, co-partnership, association, or corporation.

"Platooning." Use of any equipment, device, or technology that allows a motor vehicle or series of motor vehicles to operate in an autonomous mode, while coupled or joined to a lead vehicle via a wireless connection in a caravan or motorcade.

"Request to intervene." A notification by the automated driving system to a human driver that s/he should promptly begin to resume performance of the dynamic driving task.

"Safety Override Control, ADS." A clearly marked and visible button, switch, or other manual input device in an HAV that allows the operator, passenger, or authorized law enforcement or first responder personnel to deactivate the ADS, either during testing operations, or as a result of an accident or in an emergency situation. This does not preclude the HAV Tester from providing multiple means, allowing the operator to override the automated driving system.

"Test road." Any of the following:

- (1) "Trafficway." The entire width between property lines or other boundary lines of every way or place of which any part is open to the public for purposes of vehicular travel as a matter of right or custom.
- (2) "The Pennsylvania Turnpike." As defined in 74 Pa. C.S. § 8102 (relating to definitions).

Introduction

Significant recent advances in automotive computing technology has resulted in the rapid advancement and deployment of various levels of vehicle automation. The publicly stated goal of numerous auto manufacturers, information technology companies, and related support industries is to ultimately design and deploy a vehicle that can operate on roads without the need for active, or even passive operation by a human driver. The safety and socioeconomic impacts of this technology are vast and not fully known today, but companies have been deploying graduating levels of automated features in recent model year vehicles. There is ample evidence that an HAV could be “real world,” road-ready by the year 2020.

To truly test the capabilities of these HAVs, they must encounter real-world situations. The HAV must learn to interact with other vehicles, trucks, bicyclists, and pedestrians. It must be able to safely handle unfamiliar and unanticipated obstacles, adverse weather, and poor road conditions; in short, all the many things a human driver might encounter on a given driving day. Thus, the ability for HAV developers to test on actual trafficways and encounter the real life situations human drivers do, is vital to the development and perfection of this emerging technology.

Pennsylvania is particularly well-suited to be a testing ground for HAVs, given its variety of classes and types of traffic ways, the cycle of all four seasons, and its geographic diversity. Educational entities, such as Carnegie Mellon University and the University of Pennsylvania, along with industry players, such as Google and UBER, have established testing programs in Pennsylvania. PennDOT sees the inherent value in this testing, welcomes the potential benefits of job creation and civic revitalization that HAVs promise, and encourages these entities in their efforts. But, PennDOT must balance this encouragement with its primary role as the steward of highway safety in the state.

To this end, PennDOT supports legislative efforts to set up parameters and policies for HAV testing programs. Additionally, PennDOT seeks to align, when appropriate, with model state policies issued as part of comprehensive federal guidance.⁴ In anticipation to legislative action, and to consider federal HAV guidance, PennDOT has convened an Autonomous Vehicle Policy Task Force (“Task Force”) comprised of industry leaders, academic experts, sister agencies and constituent representative groups to work as an advisory board to identify best practices for HAV testing policies.

I. Setting Minimum Approval Criteria

The Task Force considered what a HAV Tester has to demonstrate to provide ample assurance that it is capable of setting up, managing, and running a safe and successful testing operation on Pennsylvania’s highways. Many potential HAV Testers already have significant real-world and test-track experience with their technology and vehicles, while others may be “garage” operations, echoing the early days of Silicon Valley startups. Some parties bring vast technological knowledge and skills to the table, but not necessarily significant experience in navigating the regulatory field related to automobiles and their operation.

⁴ During the Task Force’s deliberations, the National Highway Traffic Safety Administration (NHTSA) issued [comprehensive guidance](#) – the Federal Automated Vehicles Policy – on HAV testing, which included a model state policy on September 20, 2016.

Automated Vehicle Testing Policy

Review of the different types of experience helped to identify a best practice for determining acceptable proof of the ability to safely test HAVs.

II. *Who is the Driver?*

Although the ultimate goal is for cars to drive themselves, existing law requires someone to be inside the vehicle, to be the driver, or at the least, a back-up to the technology that is operating the HAV. The Task Force grappled with how to best ensure that HAV Testers can run a truly driverless car in real-world situations, while simultaneously ensuring that someone, or something, is still able to take control of a vehicle if necessary, and also comply with existing statutory requirements placed on drivers in cases of accidents or emergencies. What does the testing environment look like when there is no human present in the vehicle?

III. *Vehicle Characteristics, Capabilities, and Security*

In addition to discussing the driver, the Task Force considered the vehicles themselves. Both the vehicle and Automated Driving Systems (ADS) must meet minimum criteria for safe operation. While it is not the intent or desire of PennDOT to dictate how HAVs are designed – an area traditionally reserved to federal regulators - some proof of concept should be required before testing is authorized by the Commonwealth. The Task Force deliberated over what an acceptable proof of concept should look like, and how it can vary from one HAV Tester to another.

Additionally, the Task Force addressed minimum requirements as to the technology deployed on HAVs, and researched national cybersecurity best practices that should be applied to these vehicles, both in general and before testing events. In a world where it may be impossible to fully eliminate attacks on a vehicle's IT infrastructure, the Task Force considered how the HAV Tester proposes to defend against such attacks, and whether they include cybersecurity as part of their testing plan. How does their security effort encompass all the technology deployed on the HAV: the CPU, the radar, the LiDAR, and more?

In conjunction with this, the Task Force acknowledged that while PennDOT is intimately familiar with Federal and Pennsylvania's state standards for vehicle safety, there may be a gap of knowledge regarding the underlying technology that makes HAVs function.

IV. *The "Where, When, and How" of Testing*

When, where, and how should testing occur? Companies have extolled Pennsylvania's virtues as an excellent real-world challenge, and it is no mystery why Google and UBER chose Pittsburgh as a test hub. With a widely varied infrastructure, challenging terrain, four distinct seasons of weather, urban density, and a robust pedestrian and cycling sector, the "Steel City" provides a perfect real-world test bed for HAVs.⁵ However, the Task Force asked whether full testing in all locations and conditions should be opened up immediately, or whether testing should be expanded on a gradual basis, based on past performance and/or proven advances in the particular HAV technology.

⁵ In addition to its physical challenges, Pittsburgh's emergence in recent years as a "vibrant ecosystem for high tech companies" provides necessary industry structure and skilled personnel to support testing efforts. Musthaler, Linda. "Pittsburgh Is a Vibrant Ecosystem for High Tech Companies." *Network World*. N.p., 25 Sept. 2014. Web. 20 May 2016.

Automated Vehicle Testing Policy

V. Data Collection

Another issue is the question of what to do with the data produced by testing. What data should be collected, and can be collected, under applicable federal and state laws, regulations or policies? What does the Commonwealth, and ultimately, the public, need to know to ensure that testing is proceeding properly? What data ultimately will prove that testing was a success?

VI. Testing Approval and Renewal

Finally, what does the approval process look like? The Task Force looked at how PennDOT should organize itself internally to deal with HAV testing in a way that promotes testing with swift yet thorough review and approval, while not unduly burdening the agency or the testers.

Policy Topic #1: Minimum Approval for HAV Testers

- I. Prior to the execution of the HAV Testing Contract (Contract)⁶ with the Pennsylvania Department of Transportation (PennDOT), and, if applicable, the Pennsylvania Turnpike Commission, the HAV Tester shall provide assurance that it is capable of setting up, managing, and running a safe and successful testing operation on Pennsylvania highways.
- II. The HAV Tester shall submit an HAV Testing Proposal (Testing Proposal) to PennDOT.
 - A. Content
 - i. The HAV Tester shall self-certify that they have met the requirements of enacted Pennsylvania legislation governing HAV testing.
 - ii. The HAV Tester shall self-certify that the HAV is in compliance with all Federal Motor Vehicle Safety Standards.
 - iii. The HAV Tester shall define a document the Operational Design Domain (ODD) for each HAV that will be tested on public trafficways. The ODD should describe the specific operating domain(s) in which the HAV is designed to properly operate. The defined ODD should include the following information to define the HAV's capabilities:
 - a. Trafficway types on which the HAV is intended to operate safely;
 - b. Geographic area;
 - c. Speed range;
 - d. Environmental conditions in which the HAV will operate (weather, daytime/nighttime, etc.); and
 - e. Other domain constraints.
 - B. Approval Process
 - i. Upon receipt of the Testing Proposal, PennDOT shall have ten (10) business days to approve, decline, or request clarification on the Testing Proposal.
 - a. If approved, the Department shall provide the HAV Tester with a temporary letter of authorization to test while the Contract execution process takes place.

⁶See Appendix for a conceptual draft approval contract. This draft policy recommends a testing approval process predicated on a contract that adopts policies as a way to allow for maximum flexibility in addressing the ever-shifting area of HAV testing, while ensuring compliance with final adopted policies. It is understood that legislative enactments may dictate different comparable approval and permitting mechanisms to which this policy is adaptable.

Automated Vehicle Testing Policy

- b. If declined, the Department shall provide a written explanation to the HAV Tester providing the reasons why the testing proposal was declined.
 - 1. The HAV Tester shall have thirty (30) days to appeal the decision.
 - 2. Upon appeal, the Pennsylvania Secretary of Transportation (Secretary) shall evaluate the proposal. If the HAV Tester wishes to appeal the Secretary's ruling, the appeal process shall adhere to all applicable laws and regulation of the Commonwealth of Pennsylvania, including, but not limited to, 67 Pa. Code Ch. 491.3.
- c. If clarification is needed, the Department shall outline where additional information is necessary. The HAV Tester shall have thirty (30) days to respond to the Department. Upon receipt of the additional information, the Department shall have five (5) business days to approve, decline, or request clarification on the updated Testing Proposal.

C. Existing Testers

- i. All HAV Testers who can provide evidence of having conducted HAV testing in Pennsylvania, prior to the enactment of Chapter 36 of Title 75, shall be allowed to continue testing their HAVs while executing a contract, unless otherwise bared by applicable law.
 - ii. Existing HAV Testers will have ninety (90) days to submit their Testing Proposal before the HAV Tester must discontinue testing.
- III. Prior to the testing of an HAV on Pennsylvania highways without an operator inside, the HAV Tester shall provide written notice to the Department. The Department reserves the right to require the HAV Tester to demonstrate the capabilities of its HAV. The Department shall have five (5) business days to request a demonstration upon receipt of the written notification or during testing in order to investigate a complaint or to otherwise ensure compliance with law.

Automated Vehicle Testing Policy

- A. Scheduling the Demonstration
 - i. It is the responsibility of the HAV Tester to arrange for a demonstration. The Department shall cooperate with the HAV Tester to schedule a demonstration within fifteen (15) business days.
 - ii. All demonstrations must occur in Pennsylvania on a facility or a trafficway agreed upon by both the Department and the HAV Tester.

- B. Demonstration
 - i. It shall be the responsibility of the HAV Tester to provide appropriate safety measures to ensure the safety of the operator (if one is present in the HAV during the demonstration), Commonwealth representative(s), and any passengers.
 - ii. The HAV Tester shall demonstrate the HAV has the capability to control all “dynamic driving” tasks by the Automated Driving System (ADS) of all key aspects of the dynamic driving task under all trafficway and environmental conditions that can be managed by a human driver, where the dynamic driving task includes the operational (steering, braking, accelerating, monitoring the vehicle, and trafficway, etc.) and tactical (responding to events, determining when to change lanes, turn, use signals, etc.) aspects of the driving task, but not the strategic aspect of the driving task, such as determining destinations and waypoints.⁷
 - iii. Upon successful demonstration of the HAV without an in-vehicle operator, the Department shall begin the contract execution process as per section II.B, above. If the HAV Tester has an existing contract, the Department will issue a written approval of the change/addition to the HAV Tester’s approved testing Operational Design Domain (ODD) within five (5) business days to reflect the additional permissions.

- IV. Upon execution of the contract, it shall be the responsibility of the HAV Tester to ensure that the HAV only operates in conditions the HAV is capable of handling including, but not limited to, inclement weather, high speeds, and urban environments.

- V. The HAV Tester shall notify the Department when the HAV is capable of operating in new conditions, if there are material changes in the testing program, or if the HAV Tester otherwise modifies the ODD.

⁷ SAE International Standard J3016

Automated Vehicle Testing Policy

- A. The notification will be in writing and shall be accompanied by explanation of the new conditions or material modifications.
- B. Approval of modified testing shall be made in writing within five (5) days of receipt of the notification, or it will be deemed approved.
- C. Prior to approval that reflects changes to the Operational Design Domain (ODD), the Department may request a demonstration within ten (10) business days of notification. The demonstration shall follow the procedures established in Section III, Subsection B. The Department shall approve the ODD modification within five (5) business days of a successful demonstration or acceptance of the new capabilities.

Automated Vehicle Testing Policy

Policy Topic #2: Who Is The Driver?

- I. Under existing Pennsylvania law, the driver of any vehicle is a natural person who drives or is in actual physical control of a vehicle.
- II. In adding language to the Pennsylvania Vehicle Code (Title 75) and other laws governing driving to allow for HAV testing or deployment, a determinative definition of “driver” should be set by law, rather than be modified by policy, preferably following national standards that evidence an understanding of how an Automated Driving System (ADS) functions.
- III. During HAV testing, where an operator is either present in the vehicle or tasked with remote operation or oversight of the vehicle, there are two potential drivers – the operator and the ADS:
 - A. Unless otherwise prescribed by legislation, the ADS is the driver when the ADS is engaged and performing the dynamic driving task for the vehicle.
 - B. The operator is the driver when the ADS is not engaged.
 - C. The HAV Tester must certify that the operator is able to properly and safely engage, observe, monitor, and disengage the ADS consistent with their operator training.
 - D. Approval to test should require that the operator be able to intervene in situations where the ADS experiences a system interruption or other problem, rendering the ADS unable to safely perform the dynamic driving task, and the vehicle is unable to come to a minimal risk condition on its own.
- IV. The ADS is the driver during HAV testing, where there is no operator either present in the vehicle or tasked with remote operation or oversight of the vehicle.
 - A. Each HAV Tester must ensure that the ADS is able to achieve a minimal risk condition, in the event the ADS experiences a system interruption or other problem, rendering the ADS unable to continue to safely perform the dynamic driving task.
 - B. The HAV Tester must ensure that the HAV will provide immediate notification to the HAV Tester that it has entered a minimal risk condition.
- V. The HAV Tester must utilize a process established by law or otherwise approved by the Department to provide notification to law enforcement and to discharge the duties of a driver in the event of a traffic accident, breakdown, or in an instance where the vehicle cannot reach a minimal risk condition. This would be applicable in situations where there is a remote operator or when the HAV operates by ADS alone.

Automated Vehicle Testing Policy

End Notes:

National Highway Traffic Safety Administration Recognizes HAVs

When the ADS is engaged, for practical purposes, it is the driver. As noted during Task Force discussions, the National Highway Traffic Safety Administration (NHTSA) has recognized that the ADS in Google test vehicles, which specifically are vehicles without steering wheels, pedals, etc., can be considered the “driver” for certain purposes under the Federal Motor Vehicle Safety Standards, 49 U.S.C. § 301.¹ NHTSA also recommends that states deem the HAV to be the “driver” under state law when engaged in a full or high automation vehicle. This is a logical conclusion. The goal of HAV Testers is to create an ADS that can pilot the vehicle without human interaction.

Defining Liability

The Task Force is concerned with the allocation of criminal and civil liability in defining the driver. When the ADS is not engaged, then the human operator, if seated in an HAV with traditional vehicle controls – steering wheel, pedal, brake pedal, etc. – is no different from a driver of a standard vehicle. That person, who by law will be a licensed driver, will be subject to all applicable “rules of the road,” as if they were driving a non-HAV.

Commentators contend that when fully deployed, responsibility and liability for HAV faults and accidents may fall on the manufacturers of the vehicle or technology, as a products liability action or a body of law will develop expanding traditional tort liability for accidents. Determining who is responsible for traditional criminal and civil liability in an HAV accident situation will either be determined on a case-by-case basis or would need to be addressed with an explicit legislative directive, but cannot be established in a policy statement.

Operator Intervention

Another question revolves around operator intervention. For instance, when is an operator obligated to take control of the ADS if it is operating properly, but a situation presents itself where the operator, as an independent human driver, would choose an alternate vehicle maneuver as opposed to the driving decision that the ADS is processing during the dynamic driving task? The operator cannot be required to exhibit precognitive ability in regards to decision making of the ADS when it is operating normally. Instead, operators should exercise care and control of the HAV consistent with their training.

While full deployment of HAVs will require legislative changes to address the way in which the ADS interacts with law enforcement, emergency personnel and other drivers, this policy requires the tester to ensure that a human person discharges certain driver duties and responsibilities - e.g. 75 Pa. C.S. §§ 3743, 3744 (relating to duty of driver to stop and remain at the scene of an accident, and relating to the duty to give information and render aid).

The HAV testing proposal should identify minimum criteria for human operators. Some of these minimum criteria will be defined by statute, while others will need to be identified by each HAV Tester. The Task Force recommends that testers implement a self-training and certification process for human operators.

Automated Vehicle Testing Policy

Further, the reviewing agency (i.e., PennDOT) should require a summary explanation of the training program be included in the testing application response.

Policy Topic #3: Operation of HAVs

- I. Unless declared otherwise, HAVs may be tested on all trafficways in Pennsylvania. However, the Department reserves the right to prohibit testing or restrict testing to HAVs with in-vehicle operators.
 - A. Emergencies
 - i. The Department and, if applicable, the Pennsylvania Turnpike Commission, reserve the right to temporarily prohibit or restrict testing on select trafficways or statewide during extreme weather and declared emergencies.
 - ii. During extreme weather, HAVs should only be prohibited if there are active restrictions for other classes of vehicles.
 - iii. The Department or the Pennsylvania Turnpike Commission shall electronically notify the HAV Tester, with as much advance notice as practicable, about how, where, and when testing will be prohibited or restricted.
 - iv. To ensure safety, all ongoing testing shall be concluded safely within a reasonable time of the date and time specified in the notice.
 - B. Special Events
 - i. The Department and, if applicable, the Pennsylvania Turnpike Commission reserve the right to temporarily prohibit or restrict testing on specified trafficways during special events including, but not limited to dignitary visits, major conventions/summits, and superload movements. Only special events with potential dynamic closures and/or safety/security concerns should be considered for temporary prohibition or restricted testing.
 - ii. The Department or the Pennsylvania Turnpike Commission shall electronically notify the HAV Tester with as much advance notice as practicable, about how, where, and when testing is prohibited or restricted.
 - iii. The Department or the Pennsylvania Turnpike Commission shall provide at least one (1) day's notice to the HAV Tester. To the extent possible, the Department and the Pennsylvania Turnpike Commission shall attempt to provide three to five (3 to 5) days' notice.

Automated Vehicle Testing Policy

C. Safety Provision

- i. If a safety concern is identified, the Department and, if applicable, the Pennsylvania Turnpike Commission, reserve the right to temporarily prohibit or restrict testing on select trafficways. Prior to prohibiting or restricting testing, the Department will provide the HAV Tester with an explanation that details the safety concern.
- ii. The Department shall maintain a list of trafficways where testing is prohibited pursuant to subparagraph (B)(i), and notify HAV Testers three (3) business days in advance of the list changing.

D. Local Requests

- i. A local municipality, city, or operating agency may request a temporary prohibition or restriction on the testing of a HAV for any of the aforementioned provisions by contacting the Department. The Department shall consider the request, and if the Department determines that the requested prohibition or restriction is necessary and justified to address a safety concern, the agency will notify the HAV Tester within the allotted window of time.

II. When HAV Testing is no longer prohibited on a trafficway, the Department and/or Pennsylvania Turnpike Commission shall notify the HAV Testers within one (1) business day.

III. The Department recommends that the HAV Tester contacts the Department or Pennsylvania Turnpike Commission prior to testing to learn current trafficway conditions. The Department or the Pennsylvania Turnpike Commission can offer the HAV Tester a data feed of reported incidents and construction events.

IV. Platooning

- A. The Department and the Pennsylvania Turnpike Commission reserve the right to restrict platooning to select trafficways.
- B. The Department shall maintain a list of trafficways where platooning is permitted and notify HAV Testers within three (3) business days prior to the list changing.
- C. Platooning shall be restricted to two (2) commercial vehicles or three (3) passenger vehicles.
 - i. If an HAV Tester wishes to increase the number of vehicles permitted in a platoon, the HAV Tester shall:

Automated Vehicle Testing Policy

- a. Send written notification to the Department and/or Pennsylvania Turnpike Commission.
 - b. State the desired size of the platoon.
 - c. State the location and desired date/time of testing.
- ii. The Department and the Pennsylvania Turnpike Commission reserve the right to require a demonstration prior to the allowing of the additional vehicles in the platoon.
 - a. The Department shall have five (5) business days to request a demonstration upon receipt of the written notification.
 - b. Scheduling the Demonstration
 - a. It is the responsibility of the HAV Tester to arrange for a demonstration. The Department shall cooperate with the HAV Tester to schedule a demonstration within fifteen (15) business days.
 - b. All demonstrations must occur in Pennsylvania on a facility on a trafficway as designated by the Department.
 - c. Demonstration
 - a. It shall be the responsibility of the HAV Tester to provide appropriate safety measures are in place to protect the operator, Commonwealth representative(s), and any individual around the HAV.
 - b. Upon successful demonstration, the HAV Tester shall be permitted to increase the size of the platoon at the declared location.

Policy Topic #4: Vehicle Characteristics, Capabilities, and Security

- I. Highly Automated Vehicles (HAVs) used for testing purposes shall include the following characteristics:
 - A. The HAV and its Automated Driving System (ADS) technology shall comply with applicable federal law and all applicable safety standards and vehicle emission performance requirements set forth in state and federal law and regulations, unless HAV Testers hold specific, authorized exemptions.
 - B. The HAV shall have a safety override means or process to engage and disengage the ADS technology that is easily accessible to the operator, should manual intervention be required. The ADS shall also be able to be disengaged by law enforcement and other emergency responder personnel.
 - C. For vehicles that are not fully self-driving and that may require manual intervention or manual temporary control when an operator is physically located in the vehicle, the vehicle shall be equipped with a visual indicator inside the cabin to indicate when the ADS is engaged.
 - D. If an HAV is being used for testing purposes and the vehicle is a fully self-driving vehicle without an operator physically present in the vehicle, the vehicle shall be marked in a manner as determined by the Department in consultation with the Pennsylvania State Police (PSP) and the HAV Tester.
 - E. HAVs used for testing must be properly registered.
 - i. If the HAV being tested in Pennsylvania is registered in another state, the registration shall be recognized by Pennsylvania per current law.
 - ii. If the HAV is registered by the Commonwealth, a notation will be placed on the Pennsylvania registration credential.
 - F. HAVs must be properly titled.
 - i. If the HAV being tested in Pennsylvania and is titled in another state, the title shall be recognized by Pennsylvania.
 - ii. If the HAV is titled by the Commonwealth, a notation will be placed on the Pennsylvania Certificate of Title, and the vehicle will be branded as being a HAV test vehicle.
 - G. HAVs must have all lawfully required safety equipment installed, must meet safety requirements as defined by the Department in 67 Pa. Code 175.1 et. al., and must have a valid safety inspection, unless otherwise exempted by law, to ensure a safe operating

Automated Vehicle Testing Policy

experience and to prevent mechanical or electronic failure of the vehicle and operating system. Additionally, subject vehicles, as defined in 67 Pa. Code Chapter 175, must be emissions-inspected.

- II. Vehicles with ADS used for testing purposes shall be capable of performing certain tasks. Capabilities include:
 - A. The vehicle must safely alert the operator, when applicable, if ADS technology failure is detected, while the automated technology is engaged. When an alert is given, the vehicle must be able to transfer control back to the operator, when applicable, or the vehicle must obtain a minimal risk condition.
 - B. The vehicle shall be capable of operating in compliance with the Commonwealth's applicable traffic laws, motor vehicle laws, and must obey traffic control devices.
 - C. The vehicle should be equipped with a means to record data before a collision occurs. The information shall be made available to the Department on request.

- III. The HAV Testing Proposal must provide a self-certification specifying that processes and technologies are in place and aligned with cybersecurity best practices. These best practices include:
 - A. Governance – This includes, but is not limited to oversight, organizational alignment, communications, organizational commitment, and compliance.
 - B. Risk Assessment and Management – This would include, but not be limited to measurement of risks, documentation and communication to stakeholders, proactive monitoring, risk and compliance assessments on supply chains and critical suppliers, and documented risk assessments throughout the lifecycle of the testing phases.
 - C. Security by Design – This would include, but not be limited to identification of potential risks or threats before and during the design phase, layers of cybersecurity defenses, identification of trust boundaries, assurance of secure network connections, component testing for hardware and software, vulnerability testing, stress testing, and verification of software and hardware upgrades.
 - D. Threat Detection and Protection – This would include, but not be limited to processes to identify threats and vulnerabilities, proactive monitoring and communications, and reporting of threats and vulnerabilities to appropriate stakeholders and partners.
 - E. Incident Response and Recovery – This would include, but not be limited to a documented incident response lifecycle, development of an incident response team, periodic incident simulations, determination of enterprise impact, and appropriate notification protocols.

Automated Vehicle Testing Policy

- F. Training and Awareness – This would include, but not be limited to training programs across the motor vehicle environment, and ongoing cybersecurity awareness and training to all impacted stakeholders.
- G. Collaboration and Engagement with Appropriate Third Parties – This would include, but not be limited to information and data sharing forums with key stakeholders, engagement with governmental and educational institutions, and formation of strong partnerships with the cybersecurity community.

EXTERNAL REVIEW

1. Ensure vehicle is equipped with approved safety glass.
2. Ensure windshield wiper system operates properly, if so equipped.
3. Ensure proper operation of doors, including tailgate.
4. Ensure vehicle outside mirrors operate properly, if so equipped.
5. Ensure flooring and floor beds provide proper support.
6. Ensure there are no broken or covered lamps and lenses, malfunctioning turn signals, improperly operating fog lamps and auxiliary lamps.

INTERNAL REVIEW

1. Ensure steering guidance system is in safe operating condition.
2. Ensure indicator lights for high beam and turn signal lamps function properly.
3. Ensure horn or audible warning device operates properly.
4. Ensure brake pedal does not have excessive travel, fading or missing pedal pads, if so equipped.
5. Ensure braking system operates properly, to include parking brake.
6. Ensure seat adjustment mechanism and passive restraint system operate properly.
7. Ensure inside mirror holds adjustment and clear view is not blocked, if so equipped.

UNDER THE HOOD REVIEW

1. Ensure hood latch holds securely and latch release mechanism operates properly.
2. Ensure fuel system is not leaking.
3. Ensure exhaust system does not leak, if so equipped.
4. Ensure brake system does not leak.
5. Ensure battery is securely fastened.

ENSURE THE VEHICLE IS EQUIPPED WITH THE FOLLOWING EMISSION COMPONENTS, EXCEPT FOR FULLY ELECTRIC VEHICLES

1. Catalytic Converter
2. Exhaust gas recirculation valve
3. Positive crankcase ventilation valve
4. Fuel inlet restrictor
5. Air pump
6. Evaporative control system

BENEATH THE VEHICLE REVIEW

1. Ensure tires do not have excessive tread wear, repairs, bulges or separation, regrooved, oversized or undersized, improperly matched or studded tires. Ensure that the vehicle does not have missing wheel nuts or bolts, damaged or missing wheels and rims.
2. Ensure steering guidance system is not loose, does not have excessive tire movement, unsecured linkages, or tires rubbing on frame or chassis.
3. Ensure suspension system does not have excess ball joint movement, shock absorbers missing or severely leaking; mounting bolts, mounts, sway bar, stabilizing bar, or springs broken, missing, loose or worn.

4. Ensure floor bed or inner panels do not have openings that allow exhaust gas to penetrate passenger compartment and floor bed can support weight of occupants or cargo.
5. Ensure vehicle frame and body mounts do not have missing or broken parts or improper repairs.
6. Ensure the exhaust system does not have a missing muffler, holes or leaks, inadequate heat shield or protective system; or improper exhaust discharge.
7. Ensure the braking system does not have hydraulic hose leaks, restrictions or exposed cords; wheel cylinder or caliper leaks, missing or inoperative parts; broken, unsecured, contaminated or thin lining; mechanical damage other than wear.
8. Ensure the fuel system does not have leaks or improper fastening or routing.

ON ROAD REVIEW

1. Ensure parking brake exhibits normal resistance.
2. Ensure automatic transmission holds in "park".
3. Ensure vehicle stops in required distance and does not swerve out of a 12 ft lane.
4. Ensure braking and steering guidance systems do not malfunction.
5. Ensure speedometer operates.
6. Ensure odometer operates.
7. Ensure vehicle can be operated both forward and backward.

Policy Topic #5: Data Collection

I. General Data

- A. To document and measure the progress of HAV testing in Pennsylvania, PennDOT must collect fundamental data from all HAV Testers.
- B. In addition to the recommended data collection items identified below, specific data to be collected will either be identified by legislative enactments or should be in concert with a Tester's self-certifications and disclosures to NHTSA. See Federal Automated Vehicles Policy, pp. 13, 17-19.
- C. On a semi-annual basis, the HAV Tester shall provide the following information to PennDOT to report the following order of magnitude or approximate information to the Department:
 - i. Testing
 - a. Mandatory
 - 1. Total number of miles traveled by engaged HAVs in Pennsylvania.
 - 2. Total number of hours engaged HAVs operated on Pennsylvania trafficways.
 - 3. Size of HAV fleet testing in Pennsylvania.
 - b. Voluntary
 - 1. List of Pennsylvania counties where engaged HAVs were tested.
 - 2. Percentage of testing in Pennsylvania that occurred on limited access trafficways.
 - ii. Safety
 - a. Mandatory
 - 1. If applicable, the number of reportable crashes in Pennsylvania involving an HAV.
 - 2. If applicable, the number of reportable crashes where the HAV was deemed to be at fault.
 - b. Voluntary

Automated Vehicle Testing Policy

1. If applicable, the number of times the HAV reverted to a minimal risk condition, while testing on Pennsylvania trafficways.

- iii. Economic

- a. Voluntary

1. Number of employees in Pennsylvania involved with HAV testing.
2. If applicable, the number of new jobs created in Pennsylvania as a result of HAV testing.
3. If applicable, the number of new facilities constructed, purchased, or rented in Pennsylvania as a result of testing.

- II. Confidentiality

- A. To the extent that PennDOT may be furnished or given access to knowledge, information, data, compilations of data, customer-identifying information, reports, and documents that are confidential, trade secrets of, and proprietary to the Tester (i.e., information not in the public domain) including, but not limited to, information about and on the Tester's products, customers, and business operations and strategy ("Confidential Information"), PennDOT will not disclose the Confidential Information, except to employees, affiliates, agents, or professional advisors who need to know it and who have agreed in writing (or in the case of professional advisors are otherwise bound) to keep it confidential. PennDOT will ensure that those people and entities will use the Confidential Information only to exercise rights and fulfill obligations under this Agreement, and that they keep it confidential.
- B. PennDOT is required to comply with the Act of February 14, 2008 (P.L.6, No.3), as amended, known as the Right-to-Know Law, unless otherwise exempted.

- III. Crash Data

- A. The HAV Tester shall inform the Department of any reportable crash involving an HAV within 24 hours of occurrence. If the reportable crash occurred on any trafficway under the jurisdiction on the Pennsylvania Turnpike Commission, it shall be notified within 24 hours of the occurrence, as well.
 - i. In accordance with Section 3746 of Title 75, a reportable crash is any motor vehicle traffic crash occurring within Pennsylvania and involves:

Automated Vehicle Testing Policy

- a. Injury to or death of any person; or
 - b. Damage to any vehicle involved to the extent that it cannot be driven under its own power in its customary manner without further damage or hazard to the vehicle, other traffic elements, or the trafficway, and therefore, requires towing.
- ii. Notifications required under this section should be sent as follows, with “HAV Tester Crash” in the subject line:
- a. Department of Transportation: penndotcrashhelp@pa.gov
 - b. Pennsylvania Turnpike Commission: trafficalerts@paturnpike.com
- iii. The information that should be contained within the body of the notification shall include at minimum:
- a. County of crash
 - b. General location information such as municipality, state route, street name, intersecting street (if applicable)
 - c. Date of crash
 - d. Time of crash
 - e. The number of injuries, if applicable
 - f. The number of vehicles involved
 - g. Investigating police agency, if applicable
- B. In accordance with Section 3747(a) of Title 75, if a police officer does not investigate a crash required to be investigated by section 3746 (relating to immediate notice of crash to police department), the driver of a vehicle, who is in any manner involved in the crash shall, within five (5) days of the crash, forward a written report of the crash (AA-600, Commonwealth of Pennsylvania Driver’s form) to the Department.
- i. At the top of the AA-600, the HAV Tester shall write “HAV Report” above the form’s title.

Automated Vehicle Testing Policy

- ii. When submitted, the AA-600 should be addressed “Attn: HAV Coordinator.”
 - iii. In the free text section of the form, the HAV Tester should answer the following questions, if known:
 - a. Was the car in automated mode at the time of the crash?
 - b. Were there any extenuating circumstances that caused the crash?
 - C. The Department and the Pennsylvania Turnpike Commission strongly encourages the HAV Tester to inform the applicable agency of any non-reportable crashes that occur on its trafficway.
- IV. Department Reporting
- A. Annually, the Department, in coordination with the Pennsylvania State Police, shall submit a report to the chairperson and minority chairperson of the Transportation Committee of the State Senate and the chairperson and minority chairperson of the Transportation Committee of the State House of Representatives that describes the status of HAV testing, including, but not limited to, economic impact, safety, technology deployment, technology advancement, public awareness, and recommendations to improve Chapter 36.

Policy Topic #6: Testing Approval and Renewal

- I. PennDOT shall serve as the Commonwealth's lead agency responsible for the testing of HAVs.
 - A. PennDOT will establish a multi-agency governing body to address, as needed, new technologies, issues, or safety concerns related to the testing of HAVs.
 - i. The governing body will have a chair and include various members from the Department, which may include representatives from Highway Administration, Driver and Vehicle Services, Multimodal Transportation, Information Systems and Technology Office, and others as designated by the Secretary.
 - ii. The governing body will also include representatives from the Governor's Office, the Pennsylvania State Police, Pennsylvania Turnpike Commission, the Pennsylvania Insurance Department, the Pennsylvania Department of Aging, the Pennsylvania Department of Community and Economic Development, the Pennsylvania Department of Labor & Industry, and the Pennsylvania Department of Human Services.
 - iii. The governing body shall consult with other key stakeholders as needs arise.
 - B. The Department will designate staff for the day-to-day operations related to the testing of HAVs. Operations will include administrative tasks associated with review and approval of Testing Proposals, general oversight of testing activities, interaction with approved testers and other stakeholders, and coordination of all internal and external communication activities.
 - C. All Testing Proposals shall be submitted to PennDOT to the designated contact(s) for review and approval. PennDOT will review the Testing Proposal in consultation with the Pennsylvania State Police, and as necessary, other Pennsylvania and federal government agency stakeholders.
- II. Entities wishing to test HAVs in Pennsylvania shall submit a Testing Proposal that includes information about the entity requesting testing authorization, which at minimum, shall include the name of the company, address and phone number for its headquarters; the name of the company's principal contact for the testing project, address, and phone number; name of each test in-vehicle or remote operator, and the jurisdiction in which the operator holds a current and valid license. Additionally, the Testing Proposal shall include information about the vehicles being tested, which at minimum, includes a list of vehicles that will be involved in the testing and their unique identifying information. Other information that shall be included in the testing proposal includes requirements as outlined in the "Minimum Approval for HAV Testers" and "Vehicle

Automated Vehicle Testing Policy

Characteristics, Capabilities, and Security” policy topics, as well as any other information the Department and, where applicable, the Pennsylvania Turnpike Commission may require.

- III. Once a Testing Proposal is reviewed and approved, PennDOT will issue a temporary letter of authorization to test pending contract approval. Once the contract is executed, PennDOT shall issue a Testing Permit for each test vehicle.
 - A. Testing Permits may be valid for an indefinite period of time. The Department may follow-up with approved Testers on a regular basis to ensure no material changes have occurred in a testing program.
 - B. The testing entity’s Test Permit shall be present in the vehicle at all times during operation.
 - C. The Department may choose to revoke Testing Permits as a result of imminent threats to public safety, breach of contract, or testing that occurs in a manner not previously approved by the Department.

Appendix A: Draft Contract

HIGHLY AUTOMATED VEHICLE TESTING CONTRACT

THIS AGREEMENT, made and entered into this _____ day of _____, 20__ by and between the Commonwealth of Pennsylvania, Department of Transportation, hereinafter called PENNDOT,

and

_____, _____, a _____, whose mailing address is _____, _____, hereinafter called the TESTER.

WITNESSETH:

WHEREAS, pursuant to the provisions of 75 Pa. C.S. § 3601 *et seq.*, the Commonwealth of Pennsylvania, Department of Transportation (PENNDOT) is responsible for establishing an approval system for entities desiring to test HAVs (HAV TESTER) on Pennsylvania trafficways [and the Pennsylvania Turnpike]; and,

WHEREAS, TESTER is willing to certify that the vehicle(s) it intends to deploy for testing meet the minimum criteria for the operations as set forth in the testing proposal (See Exhibit A, incorporated by reference and made a part of this Agreement);and,

WHEREAS, PENNDOT has previously reviewed the testing proposal and deemed that it is in conformance with the requirements of 75 Pa. C.S. § 36___ and has issued a temporary letter of authorization to test pending approval of this contract.

NOW, THEREFORE, for and in consideration of the foregoing premises and of the mutual promises set forth below, the parties agree, with the intention of being legally bound, to the following:

1. **CERTIFICATION** - TESTER represents and certifies as follows:
 - a. That it has the staff, facilities and expertise to perform the HAV testing program detailed in its application (Exhibit B) in a competent and professional manner.
 - b. that it has met all of the requirements in Chapter 36 of Title 75 of the Pennsylvania Consolidated Statutes, 75 Pa. C.S. § 3601 *et seq.*, and will continue to comply with these requirements for the duration of its testing program.
 - c. that it complies (adopted policy statement).
 - d. that it complies (adopted policy statement).
 - e. that it complies (adopted policy statement).
 - f. that it complies (adopted policy statement).
 - g. that it complies (adopted policy statement).

Automated Vehicle Testing Policy

2. **AUTHORIZATION** - TESTER is authorized to conduct testing on trafficways [and on the Pennsylvania Turnpike], as defined in 36 Pa. C.S. §. 36____, consistent with the scope of testing as outlined in the testing proposal (Exhibit B). Any and all future requests for material modifications to the testing program shall be made in writing to _____ and shall be accompanied by explanation of the material modification. Approval of modified testing shall be in accordance with [policy statement to be defined]. If the DEPARTMENT fails to act or approve any request for modification under this paragraph within 5 days of receipt of the written notification, such modification shall be deemed approved.
3. **TERM** - This agreement is valid for ____ years, unless sooner terminated by either party (see paragraph 7; below) or if sooner superseded by law.
4. **CONFIDENTIALITY & RIGHT TO KNOW LAW** -
 - a. In connection with performance of testing as set forth herein, to the extent that PENNDOT may be furnished or given access to knowledge, information, data, compilations of data, customer-identifying information, reports, and documents which are confidential, trade secrets of, and proprietary to TESTER (i.e., information not in the public domain) including, but not limited to, information about and on TESTER's products, customers, and business operations and strategy ("Confidential Information"), PennDOT will not disclose the Confidential Information, except to employees, affiliates, agents, or professional advisors who need to know it and who have agreed in writing (or in the case of professional advisors are otherwise bound) to keep it confidential. PennDOT will ensure that those people and entities will use the Confidential Information only to exercise rights and fulfill obligations under this Agreement, and that they keep it confidential.
 - b. PENNDOT's obligations hereunder for such Confidential Information shall not apply to information that:
 - i. is or becomes publicly available through no fault of DEPARTMENT;
 - ii. is disclosed to DEPARTMENT by a third party entitled to disclose such information;
 - iii. is already known to DEPARTMENT as shown by its prior written records;
 - iv. is independently developed by DEPARTMENT or its affiliates as evidenced by written records; or
 - v. is required by law or court order to be disclosed; provided, however, that in such a case, DEPARTMENT shall give TESTER prompt notice of such required disclosure so that TESTER may have an opportunity to contest such disclosure or obtain protective orders regarding such disclosure.
 - c. In no event shall this section be construed to limit Government Agency's obligations under the Pennsylvania Right-to-Know Law ("RTKL"), 65 P.S. § 67.101 *et seq.*, noting without limitation the applicability of Section 708(b) (11) of the RTKL... TESTER agrees that it will take such steps as may be reasonable to prevent the disclosure or use of any Confidential Information by any of TESTER's employees, agents, or subcontractors, except as expressly permitted hereby.
 - d. All Confidential Information is and shall remain the sole and exclusive property of TESTER. Neither this Agreement nor any disclosure hereunder shall be deemed, by implication, estoppel, or otherwise, to vest in PENNDOT any license, interest, or ownership rights of any kind to any Confidential Information, inventions, patents, "know-how", trade secrets, trademarks, or copyrights owned or controlled by TESTER or its affiliates.

Automated Vehicle Testing Policy

5. **INDEMNIFICATION** - TESTER agrees to indemnify and hold harmless PENNDOT and its officers, directors, and employees from and against any and all damages, liabilities, obligations, losses, deficiencies, actions, costs (including reasonable attorneys' fees and expenses), demands, suits, judgments, or assessments (hereafter "Claims") arising out of (a) TESTER's negligence in the performance of any testing; (b) any acts or omissions of TESTER, its employees, subcontractors, or agents in connection with the testing hereunder; or (c) any breach of this Agreement by TESTER, its employees, subcontractors, or agents. In the event of any Claim to which this indemnification applies, PENNDOT shall promptly notify TESTER of such Claim, provided, however, the failure to give such notice shall not relieve TESTER from its indemnification obligations. This obligation shall survive termination or expiration of this Agreement.

6. **NOTICES** - All notices of termination or breach must be in writing and addressed to

[PennDOT Contact]

[Tester Contact]

All other notices must be in writing and addressed to the other party's primary contact. Notice will be treated as given on receipt, as verified by written or automated receipt or by electronic log (as applicable).

7. **TERMINATION** –

a. TESTER may terminate this agreement, without prejudice to any other right or remedy it may have, immediately by written notice to PENNDOT.

b. PENNDOT may terminate this agreement, without prejudice to any other right or remedy it may have, with 30 days' notice to TESTER if TESTER materially breaches any provision of this Agreement and fails to cure such breach within ten (10) days of written notice of breach given by PENNDOT.

c. Upon termination or expiration of this Agreement, no right or liabilities shall arise out of this relationship other than those rights and liabilities otherwise specified in this Agreement, and the applicable approved Project Authorizations.

d. Any appeal of the termination of this contract shall be in accordance with [reference final policy statement on appeal right form termination of non-renewal and reference applicable Pa. Code sections, including, but not limited to, 67 Pa. Code Ch. 491.3].

8. **ASSIGNMENT** - This Agreement shall be binding upon and inure to the benefit of the parties and their affiliates, successors and assigns. PENNDOT may assign its rights and duties under this Agreement without TESTER's consent. TESTER may not assign its rights and obligations under this Agreement without the prior written consent of PENNDOT.

9. **GOVERNING LAW** - Except where preempted by federal law, this Agreement will be enforced, governed by, and construed in accordance with the laws of the Commonwealth of Pennsylvania.

10. **SEVERABILITY** - In the event any provision of this Agreement is found to be invalid, illegal, or unenforceable by a court of competent jurisdiction, the remaining provisions of this Agreement shall nevertheless be binding upon the parties with the same effect as though the void or unenforceable part had been severed and deleted.

Automated Vehicle Testing Policy

11. **ENTIRE AGREEMENT** - This Agreement constitutes the entire agreement between the parties with respect to this Agreement, and all prior agreements relating to the Services hereunder, express or implied, written or oral, are nullified and superseded hereby.

12. **AMENDMENTS** - This Agreement may not be modified, amended, assigned, supplemented, or rescinded, nor any provision hereof waived, except by an instrument in writing executed by a duly authorized representative of the parties hereto, or as provided for in paragraph 2, above

IN WITNESS WHEREOF, the parties have executed this Agreement the date first above written.

ATTEST:

Title: DATE

BY _____
Title: DATE

If a Corporation, the President or Vice-president must sign and the Secretary, Treasurer, Assistant Secretary or Assistant Treasurer must attest; if a sole proprietorship, only the owner must sign; if a partnership, only one partner need sign; if a limited partnership, only the general partner must sign. If a Municipality, Authority or other entity, please attach a resolution.

DO NOT WRITE BELOW THIS LINE--FOR COMMONWEALTH USE ONLY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BY _____

Deputy Secretary of Transportation

PRELIMINARILY APPROVED

APPROVED AS TO LEGALITY
AND FORM

BY _____
For Chief Counsel DATE

BY _____
Assistant Counsel DATE

BY _____
Deputy Attorney General DATE

RECORDED NO. _____
CERTIFIED FUNDS AVAILABLE UNDER
ACTIVITY PROGRAM _____
SYMBOL _____
AMOUNT _____

BY _____
Deputy General Counsel DATE

BY _____
for Comptroller DATE

Automated Vehicle Testing Policy

Appendix B: Other Viewpoints

Throughout its work, the Task Force has incorporated comments aired during its regularly scheduled meetings. What follows is a listing of comments that was submitted at the conclusion of the process. These statements are included within the report for future evaluation and discussion.

Name	Wayne Weikel
Organization	Alliance of Automobile Manufacturers

Section #	Page #	Comment
-	11	The definition of “Deployment” is drafted in a manner that could still include testing operations in their later stages, when regular drivers will be used to test real-world applications of technology. Recommend the following - The use of an HAV- <u>Selling or otherwise making available and HAV for operation outside a controlled test or development program operated by or for an HAV manufacturer</u> by members of the <u>general public who are not Operators, or employees, or agents of an HAV Tester, or members of a limited group of people that have requested to participate as passengers only in the HAV testing.</u>
-	11	The definition of “Driver” should be reconsidered in the context of the ADS and discussion of “Who is Driver” later in document. Seems appropriate to delineate within this definition the human and automated drivers.
-	12	The definition of “Operation” should be reconsidered to more clearly reflect that the operation in question is within the confines of a testing program. In common industry usage, “operation” can be a synonym for deployment. Without changes certain confusion will result.
-	12	The term “Safety Override Control, ADS” is not used in the document. It is also unclear if this is HAV testing or HAV deployment. With that said, the following definition presents significant concern, given that it wades deeply into NHTSA’s traditional jurisdictional domain of vehicle hardware. These decisions need to be made on a 50-state basis to avoid conflicting hardware requirements, which is seemingly referenced in the document’s introduction on page 14.
(I)	17	No other state is using a contract to permit in-state testing. The processes outlined will only serve to delay sophisticated testers from entering the state for such purposes. If the contract is based upon self-certification in section II, it seems that a notification process that includes a self-certification would accomplish the same goals, but without the unnecessary burden of a contract. The insistence on a involved contracting process will make Pennsylvania a less appealing venue for testing, when compared with neighboring states.
(II)(a)(ii)	17	The requirement to self-certify to compliance with <u>all</u> federal motor vehicle safety standards is too broad. In a testing environment there are often FMVSS

Automated Vehicle Testing Policy

Section #	Page #	Comment
		<p>that may not be applicable, or to which the testing/vehicle is exempt - a fact that NHTSA acknowledges on page 55 of its automated vehicle policy guideline.</p> <p>Recommend the following changes: “The HAV Tester shall self-certify that the HAV is in compliance with all <u>applicable</u> Federal Motor Vehicle Safety Standards <u>that are required under federal law.</u>”</p>
(II)(a)(iii)	17	<p>Defining the ODD in such a manner seems to raise a number of problems and we would recommend redrafting to identify expected testing parameters, not the ODD. As the ODD is defined it would limit testing to existing capabilities, not expansion of those limitations. Second, this section seems to require the disclosure of highly concealed business information. How and where the vehicle can operate and what the vehicle will be testing shows the sophistication of different testing programs. Similar value could be gained for the state by allowing for larger buckets of information – such as general roadway types or generally “testing for weather.”</p>
(II)(b)(i)	17	<p>While we appreciate the possibility of this emerging technology to bring new market entrants into the fold, auto manufacturers have a 100-year history to show responsible practices in bringing new technology to market. We would recommend revisiting this section to allow existing manufacturers to have access to an expedited process to ramp up testing in the state.</p>
(III)	18	<p>If the premise is that a demonstration is not required of all testers, then more guidance should be added to this section to indicate under what circumstances a demonstration can be requested. For example: <u>The Department shall present the HAV Tester with a detailed explanation of the basis for the request, including any specific deficiencies in the self-certification requirements.</u></p>
(III)(b)(ii)	19	<p>Understand the intent but it appears to overreach the realistic limits of a demonstration.</p> <p>Recommend the following: <u>“If a demonstration is requested, the HAV Tester shall demonstrate the HAVs automated driving system (ADS) has the capability to control the key aspects of the dynamic driving task including steering, braking, accelerating, and when appropriate responding to events.”</u></p>
(V)	19	<p>The process for updating testing requirements may prove to be a burden to testing. Hardware improvements or software updates that modify the ODD may be done continuously throughout the testing process. That is the very process of testing and improving technology; it is not a static process. Additionally, NHTSA, in its automated vehicle policy guidance, already requires a manufacturer to submit an amended Safety Assessment Letter for material changes. It is unclear what benefit is gained by duplicating requirements at the federal and state level.</p> <p>The state’s interests should be in what is tested not the vehicle’s capabilities. It should focus solely on changes to the testing plan:</p>

Automated Vehicle Testing Policy

Section #	Page #	Comment
		Recommend the following: ““The HAV Tester shall notify the Department when the HAV is capable of operating in new conditions, if there are material changes in the testing program plan or the HAV Tester otherwise modifies the ODD stated testing parameters in the testing plan proposal.”
V	21	While the state has every right to track incidents involving automated vehicle testing, it should focus upon incidents of instructive value. There is no obligation for non-automated vehicle drivers to notify law enforcement when there is a breakdown. Breakdown is not defined within the document and could lead to differing interpretations. Also, it is unclear what a report of failure to reach minimum risk condition would entail, which would not be captured under an accident report. This section should focus on the reporting of at-fault traffic accidents, to provide an illustrative picture to policymakers, as referenced in section III on page 32.
(I)(a-d)		Operational restrictions create a burden for the tester in terms of tracking and monitoring testing restrictions. No other state has adopted the types of restrictions envisioned in this section
(I)(a)(ii)	23	Section should be updated to reference HAV under the control of an ADS would be prohibited. An HAV not under ADS control is just like any other vehicle on roadway.
(IV)(a-c)	24	Platooning should not be addressed in the same policy as HAV. Platooning still has a driver in the lead vehicle making decisions, while following vehicles are wirelessly connected to the lead vehicle and simply track motion. HAV are decidedly different technology, which substitutes artificial decision making based on sensor-provided data. Given the size and weight of the vehicles involved, PennDOT should separately consider the unique challenges presented.
(I)(a)	27	Under 49 (U.S.C.) § 30112, established vehicle manufacturers may test vehicles that do not comply with all FMVSS requirements. It is not clear what is intended by the requirement to “hold specific authorized exemptions.” Exemptions may exist absent a specific authorization and not all regulations apply in all circumstances. Recommend the following: The HAV and its ADS technology shall comply with applicable federal law and state law all applicable safety standards and vehicle emission performance requirements set forth in state and federal law and regulations, unless the HAV Testers hold specific authorized are otherwise exemptions.
(I)(a)(b)	27	Despite perceived merit by some, this section needs to be reconsidered. It wades deeply into NHTSA’s traditional jurisdictional domain of vehicle hardware. These decisions need to be made on a 50-state basis to avoid conflicting hardware requirements, which is seemingly referenced in the document’s introduction on page 14. NHTSA should be allowed to make such determinations.
(I)(d)	27	NHTSA specifically states on page 44 of its automated vehicle policy guidance that “[r]egulations governing labeling and identification for HAVs should be

Automated Vehicle Testing Policy

Section #	Page #	Comment
		issued by NHTSA.” A 50-state solution is needed here. Such section should be held in reserve until NHTSA in coordination with AAMVA have a chance to agree to best approach. Additionally, the term “marked” implies a physical marking on the vehicle and limits possible higher tech alternatives to “identify/identification” the vehicle.
(I)(e-f)	27	Both of these sections fail to capture the full range of OEM practices with test vehicles. Especially with regard to non-domestic manufacturers, a vehicle may carry a manufacturer plate, but it is not registered or titled in the state providing the manufacturer plate. Given the expense of test equipment installed on test vehicles, foreign manufactures may bring into the country test vehicles from their country of origin to test the technology in the U.S. These vehicles never make it to the consumer and may not have a VIN number to allow it to be registered and titled. This section should be amended to also include vehicles carrying a manufacturer plate that are not registered or titled in a traditional sense. The absence of such allowance will essentially preclude testing in Pennsylvania by a number of major manufacturers.
(II)(c)	28	This section clearly crosses the line into areas under the jurisdiction of NHTSA, by requiring specific hardware to be added to vehicle. Just a standard for EDR data was regulated by NHTSA, so should expanded data in an HAV. Another area where state-to-state requirements could present a disincentive to test within the Commonwealth.
(III)	28	NHTSA addresses cybersecurity in the Vehicle Performance Guidance section of its automated vehicle policy. Redundant self-certification at the state level is unnecessary.
(I)(c)(i)(1)	31	The specific miles traveled or hours operated has proprietary value. As a mandatory data requirement these two items should be required to only be collected in one format (miles or hours) and in broader “buckets” (e.g. “0 to 100,000” “100,000 to 200,000” etc.)
(II)	35	The requirement to list/identify each vehicle test operator and every test vehicle as part of the Testing plan is an impediment to testing in PA. Both test operators and test vehicles are likely to change throughout testing. If this information is required as part of the testing plan, the HAV Tester would need to “modify” the plan each time a new test operator or vehicle were added or changed. This places the HAV Tester at risk of being in “breach” and subject to penalties and having testing shut down. Recommend striking these two requirements from this section, as they provide little illustrative value to the Commonwealth
(III)	36	No other state is currently pursuing a contracting process and the most current draft of PA SB 1268 specifically prohibits and contract requirement. The outlined contract process is cumbersome and a significant impediment to attracting HAV Testers to PA. Issuance of testing approval should be automatic upon submission of testing plan completed in good faith.

Automated Vehicle Testing Policy

Section #	Page #	Comment
		<p>Recommend the following: “Once a Testing <u>Plan</u> is reviewed and approved <u>submitted</u>, PennDOT will issue a temporary letter of authorization to test permit testing to begin immediately pending contract final approval <u>and issuance of a testing permit</u>. <u>A temporary letter of authorization is not necessary for an automobile manufacturer that has manufactured and distributed motor vehicles in the United States that are certified to comply with all applicable federal motor vehicle safety standards and that has submitted appropriate manufacturer identification information to the National Highway Traffic Safety Administration.</u> Once the contract is executed, PennDOT shall issue a Testing Permit for each test vehicle. <u>Once issued, aA copy of the HAV Testing Permit shall be present in each HAV test vehicle at all times during HAV testing operation in the state.”</u></p>
Appendix A	37-40	<p>No other state has a adopted a contract process. The most recent draft of SB 1268 prohibits a contracting process. The contract process outlined will be a significant impediment and deterrent to HAV Testers. Doing so would put Pennsylvania at a competitive disadvantage with other states, dramatically undermining the very goal that brought the task force together: to grow the testing marketplace in Pennsylvania.</p>

Open-ended Comments:

Despite the considerable efforts made by the Task Force and legislative staff, the policy only speaks to automated vehicle testing; it does not contemplate deployment. With NHTSA’s recent guidelines as a model, the door to operational use by consumers has been opened. Pennsylvania will need to consider expanding this policy to prevent an obstacle to consumer acceptance.

Automated Vehicle Testing Policy

<i>Name</i>	Steve D’Ettorre
<i>Organization</i>	PA Department of Community & Economic Development (DCED)

Section #	Page #	Comment
Foreword	7	At the end of paragraph 2, should workforce/business retention concerns be included? This would show the group acknowledges there may be disruptions in certain industries due to HAVs.
Policy Topic #5	32	iii.1.a, Ask for # of e’ees involved w/ HAV testing in PA, re-write to read # of PA employees involved...In other words, we’d like to capture the work done by employees in the state. Hypothetically if a company was HQ somewhere else but testing in PA, they could technically claim those jobs as being involved in testing in PA.

Open-ended Comments:

I’m sure I missed it, but I’ve checked the doc a few times and do not see anything about a decal, identifier, etc. to let law enforcement know a vehicle is HAV. Is it in the report? I see it in the meeting minutes but not the actual policy report itself.

Automated Vehicle Testing Policy

Name	Jeffrey Perry
Organization	General Motors Company

Section #	Page #	Comment
Glossary	11	<p>“Deployment” – this definition as drafted is overly broad and could result in unintended restrictions and limitations on testing programs in Pennsylvania. Recommend the following changes:</p> <p>“Selling or otherwise making available an HAV for the operation use of an HAV, outside of a controlled test or development program operated by or for an HAV manufacturer, by member of the <u>general</u> public who are not Operators, or employees, or agents of an HAV Tester, <u>or members of a limited group of people that have requested to participate as passengers only in the HAV testing.</u>”</p>
Glossary	11	<p>“Driver” – Strike this definition from the glossary. The definition is inconsistent with sec II of policy topic #2 (Who is the Driver), inconsistent with NHTSA guidance, and inconsistent with industry development.</p>
Glossary	11	<p>Pg 11 “Driver Assist Features” – Technical changes are needed to this definition to ensure the language does not inadvertently ensnare driver and safety assist technologies already on the market. Recommend the following changes:</p> <p>“An active safety system or combination of systems for driver assistance, including but not limited to, electronic blind spot detection, crash avoidance warning, emergency braking, parking assistance, adaptive cruise control, lane keeping assistance, lane departure warning, or traffic jam and queuing assistance, where one of or more of those systems, alone or in combination with any other system, does not enable the vehicle to perform the dynamic driving task without the active any control and or monitoring of by a human operator.”</p>

Automated Vehicle Testing Policy

Section #	Page #	Comment
Glossary	11	Pg 11 “HAV Tester” - This definition should be modified. No other state is using a contract method and the reference to contracting is inconsistent with the most recent draft of SB 1268. Recommend the following changes: “A person who is employed by or contracted with the HAV manufacturer Department to conduct public testing of HAVs.”
Glossary	11	Pg 11 “Minimal Risk Condition” – Technical changes are need to this definition to avoid unintentional application to circumstances broader than automated vehicles. Recommend the following changes: “A scenario where an automated driving system brings a vehicle to stop or safe running condition because of an ADS a -system malfunction, a failed request for operator intervention or other occurrence which prohibits the automated driving system from fully and completely performing the dynamic driving task.”
Glossary	12	Pg 12 “Operation” – As drafted this definition is very restrictive and may result in conflicts throughout PA vehicle and traffic laws as it is inconsistent with the traditional meaning of the term. Recommend revise defined term as follows: “ Test Operation. The driving of an HAV on a test road for the purpose of testing an automated driving system”
Glossary	12	Pg 12 “Safety Override Control, ADS” – This term is never used throughout the policy document. The definition is also vague and confusing. The document does make a reference to a requiring a “means” for the operator to disengage the ADS and for law enforcement and first responders to disengage. This appears to suggest a specific design feature of the vehicle which the policy document acknowledges is an “area traditionally reserved to federal regulators” (PennDOT AV Policy Recommendation document, Introduction, section III) and as such should be eliminated from the document.
Topic 1: Minimum	17	Pg 17 - It is important to note that these policy recommendations only address “Testing” and do not provide a pathway for HAV developers to

Automated Vehicle Testing Policy

Section #	Page #	Comment
Approval for Testers		deploy HAVs in PA. This may be a substantial impediment to attracting HAV developers to PA as numerous other states are drafting legislation and policy that establishes a clear pathway for both testing and deployment (consistent with Federal guidance).
Topic 1 / Sec I	17	<p>Pg 17 Section I – No other state is using a contract method and the reference to contracting is inconsistent with the most recent draft of SB 1268. A formal contracting process will impose unnecessary delays and impede testing while adding little or nothing to make testing safer. Additionally the requirement that an HAV Tester provide assurance that it is capable of running a “successful” testing operation is a “subjective” requirement. What determines whether a testing operation is successful or a failure? Remove this reference to “successful”. Recommend combining this section into Section II opening sentence. Recommend the following:</p> <p>Combine Section I and Section II into:</p> <p><u>“The HAV Tester shall submit an HAV Testing Plan Proposal (Testing Plan Proposal) to the Department, and, if applicable, the Pennsylvania Turnpike Commission, including a statement of assurance that it is capable of setting up, managing, and running a safe testing operation on Pennsylvania test road.”</u></p>
Top 1 / Sec II (a) (ii)	17	<p>Pg 17 Section II (a) (ii) – The requirement to self-certify to compliance with ALL federal motor vehicle safety standards is too broad. In a testing environment there are often FMVSS that may not be applicable or to which the testing/vehicle is exempt. Recommend the following changes:</p> <p>“The HAV Tester shall self-certify that the HAV is in compliance with all <u>applicable</u> Federal Motor Vehicle Safety Standards <u>that are required under federal law.</u>”</p>
Top 1 / Sec II (a) (iii)	17	<p>Pg 17 Section II (a)(iii) – Requiring the HAV Tester to define the ODD and limit testing to those parameters would inherently constrain the testing process and stifle innovation since the ODD would represent the vehicles known limitations and testing would not be necessary. This requirement</p>

Automated Vehicle Testing Policy

Section #	Page #	Comment
		should instead be redrafted to specify identification of the expected testing parameters (not ODD).
Top 1 / Sec II (b) (i)	17	Pg 17 Section II (b)(i) – This section should be redrafted to identify a pre-authorization process that permits an HAV Tester <u>that is an established automobile manufacturer that has manufactured and distributed motor vehicles in the United States that are certified to comply with all applicable federal motor vehicle safety standards and that has submitted appropriate manufacturer identification information to the National Highway Traffic Safety Administration</u> to begin testing immediately upon a good faith submission of a complete testing <u>plan proposal</u> as identified in Section II (a). The Department would then have the opportunity to evaluate the testing <u>plan proposal</u> over the next 10 days and <u>order a stop to the testing if it does not comply with the requirements of Section II (a)</u> . Contracting is inconsistent with the most recent legislative drafts of SB 1268 and would be an unnecessary impediment to attract testers to PA.
Top 1 / Sec III	18	Pg 18 Section III – The opening paragraph on demonstrations is not clear. The intention of this section was to clarify that demonstrations are not “required” as part of the requirements to begin testing. Instead this section was meant to indicate that the Department could request a demonstration in order to validate an HAV Testers capabilities if there were any questions or concerns based on the testers financial or technical <u>competencies</u> . The second sentence should be redrafted as follows: “The Department reserves the right to <u>require request</u> an HAV Tester to demonstrate the capabilities of its HAV. <u>The Department shall present the HAV Tester with a detailed explanation of the basis for the request, including any specific deficiencies in the self-certification requirements.</u> ”
Top 1 / Sec III (b) (i)	19	Pg 19 Section III (b)(i) – Compliance with applicable FMVSS covers the “appropriate safety measures”. This paragraph should be reworded to focus on the “safe operation” of the HAV. Recommend the following: “It shall be the responsibility of the HAV Tester to ensure the safe operation of the HAV to <u>prevent</u> damage to property or injury to any person including

Automated Vehicle Testing Policy

Section #	Page #	Comment
		the Operator (if one is present in the HAV during the demonstration), Commonwealth representative(s), and any passengers or pedestrians.
Top 1 / Sec III (b) (ii)	19	Pg 19 Section III (b)(ii) – The requirement to demonstrate ALL key aspects of the dynamic driving task under ALL conditions is an impossible standard that cannot be satisfied. Additionally, this subsection is not clear that demonstrations are not required in order to test unless requested by the Department. Recommend the subsection be redrafted as follows: “If a demonstration is requested, the HAV Tester shall demonstrate the HAVs automated driving system (ADS) has the capability to control the key aspects of the dynamic driving task including steering, braking, accelerating, and when appropriate responding to events.”
Top 1 / Sec III (b) (iii)	19	Pg 19 Section III (b)(iii) – This subsection should be redrafted to direct the Department to issue a final testing permit upon successful completion of demonstration drive.
Top 1 / Sec V	19	Pg 19 Section V - Requiring the HAV Tester to notify the Department each time the HAV is determined to be capable of operating under new conditions would be an unnecessary impediment to testing. Additionally the reference to the ODD should be eliminated for the reasons previously stated (Section II (a)(iii)). The section should be limited to notification of material changes to the testing parameters included under the testing <u>plan proposal</u> . Recommend the following: “The HAV Tester shall notify the Department when the HAV is capable of operating in new conditions, if there are material changes in the testing <u>program plan</u> or the HAV Tester otherwise modifies the <u>ODD stated testing parameters in the testing plan proposal</u> .”
Top 1 / Sec V (b)	19	Pg 19 Section V (b) – Technical corrections are needed to correct grammatical errors. Recommend: “ Approval <u>Any objection to</u> of modified testing <u>conditions</u> shall be made in writing <u>with a detailed explanation for the objection</u> within five (5) business days of receipt of the notification or it will be deemed approved.”

Automated Vehicle Testing Policy

Section #	Page #	Comment
Top 1 / Sec V (c)	19	Pg 19 Section V (c) – There does not seem to be a reasonable need for continued demonstrations for modifications as the demonstration will only serve to demonstrate the basic capabilities of the HAV. The modifications by definition would represent parameters the HAV Tester intends to test.
Topic 2: Who’s the Driver Sec III (c)	21	Pg 21 Section III (c) – The requirement that an HAV Tester certify that the operator (test operator) is able to properly and safely engage, operate, and disengage the ADS should be clarified to specify “self-certification”.
Top 2 / Sec V	21	Pg 21 Section V – This section appears to impose additional obligations upon an HAV Tester that do not apply to any other vehicle operator in the state. While there is clear value in reporting traffic accidents/crashes, there is little or no value in requiring formal reporting of any and every breakdown, or “instance where the vehicle cannot reach a minimal risk condition” especially if such circumstances do not result in a crash. These are subjective circumstances that are likely to be reported inconsistently. Recommend the following: STRIKE “breakdown or an instance where the vehicle cannot reach a minimal risk condition”
Topic 3: Operation of HAVs Sec I (a)(ii)	23	Pg 23 Section I (a)(ii) – Technical corrections are needed to this section. The term “automated vehicle” is not defined in the policy recommendations. Recommend the following: “During extreme weather automated vehicle HAVs operated by an ADS should only be prohibited if there are active restrictions for other classes of vehicles.”
Top 3 / Sec I (c) (i)	24	Pg 24 Section I (c)(i) – This reference to “identifies a safety concern” is vague and overly broad. This issue was discussed at the Oct 5, 2016 Task Force meeting. Clarification is needed to establish parameters around who declares the safety concern and what defines a safety concern. Is this a

Automated Vehicle Testing Policy

Section #	Page #	Comment
		safety concern with the roadway, for weather, for pedestrians/general public?
Topic 4: Vehicle Characteristics Capabilities and Security Sec I (a)	27	Pg 27 Section I (a) – It is not clear what is intended by the requirement to “hold specific authorized exemptions.” Exemptions may exist absent a specific authorization and not all regulations apply in all circumstances. Recommend the following: “The HAV and its ADS technology shall comply with applicable federal law and state law all applicable safety standards and vehicle emission performance requirements set forth in state and federal law and regulations, unless the HAV Testers hold specific authorized are otherwise exemptions. ”
Top 4 / Sec I (b)	27	Pg 27 Section I (b) - This section is not clear under which circumstances law enforcement and emergency responder personnel need to be able to disengage the ADS. Since “disengagement” could result in stopping the vehicle unexpectedly or untimely, it seems this intention is that the means for these parties to disengage must apply to circumstances following a crash. Recommend adding the phrase “in the event of a crash” at the end of the paragraph.
Top 4 / Sec I (d)	27	Pg 27 Section I (d) – The reference under this section requiring an HAV to be “marked” is inconsistent with Federal guidance that vehicle markings and identification be determined by NHTSA to avoid a cumbersome 50 state approach. Additionally the term “marked” implies a physical marking on the vehicle and limits possible higher tech alternatives to “identify/identification” the vehicle. Recommend striking this provision in deference to NHTSA or replacing the term “marked” with “identified”.
Top 4 / Sec I (g)	27	Pg 27 Section I (g) – The reference to “lawfully required” safety equipment is vague and contrary to NHTSA guidance that vehicle design parameters be reserved for determination by federal regulators. Recommend replacing “lawfully required” with “applicable federally required”

Automated Vehicle Testing Policy

Section #	Page #	Comment
Top 4 / Sec III	28	<p>Pg 28 Section III – Cybersecurity best practices are an evolving field and may differ by industry. The nature of cybersecurity attacks means that policies and best practices are constantly developing and evolving. No company can assure that their cybersecurity processes are absolutely aligned with best practices because best practices are always changing. Self-certification that the HAV Tester has processes and technologies in place that take into consideration, to the best of its ability, industry cybersecurity best practices available at the time of vehicle development is the appropriate measure. Recommend the following:</p> <p>“The HAV Testing Plan proposal must provide a self-certification specifying that cybersecurity processes and technologies are in place to protect against unauthorized electronic control the safe operation of the HAV and to reasonable protect data in the HAV, using a risk-based approach and aligned with that takes into consideration, as appropriate under the circumstances, industry cybersecurity best practices available at the time of vehicle development. These Best practice considerations may include:”</p>
Topic 5: Data Collection Sec I (c)(i)(1)	31	<p>Pg 31 Section I (c)(i)(1) – the specific miles traveled or hours operated has proprietary value. As a mandatory data requirement these two items should be required in the alternative as an HAV Tester may only be collecting information in one format (miles or hours). Additionally, unless an HAV Tester willingly discloses precise miles or hours tested, any mandatory requirement should be limited to broader “buckets” (e.g. “0 to 100,000” “100,000 to 200,000” etc.)</p>
Topic 6: Testing Approval and Renewal Sec II	35	<p>Pg 35 Section II – The requirement to list/identify each vehicle test operator and every test vehicle as part of the Testing plan proposal is an impediment to testing in PA. Both test operators and test vehicles are likely to change throughout testing. If this information is required as part of the testing proposal, the HAV Tester would need to “modify” the plan proposal each time a new test operator or vehicle were added or changed. This places the HAV Tester at risk of being in “breach” and subject to penalties and having testing shut down. Recommend striking these two requirements from this section.</p>

Automated Vehicle Testing Policy

Section #	Page #	Comment
Top 6 / Sec III	36	<p>Pg 36 Section III – Issuance of testing approval should be automatic upon submission of testing plan proposal completed in good faith. The outlined contract process is cumbersome and a significant impediment to attracting HAV Testers to PA. Additionally, no other state is currently pursuing a contracting process and the most current draft of PA SB 1268 specifically prohibits and contract requirement. Recommend the following:</p> <p>“Once a Testing Plan Proposal is reviewed and approved submitted, PennDOT will issue a temporary letter of authorization to test permit <u>testing to begin immediately</u> pending contract final approval <u>and issuance of a testing permit. A temporary letter of authorization is not necessary for an automobile manufacturer that has manufactured and distributed motor vehicles in the United States that are certified to comply with all applicable federal motor vehicle safety standards and that has submitted appropriate manufacturer identification information to the National Highway Traffic Safety Administration. Once the contract is executed, PennDOT shall issue a Testing Permit for each test vehicle. Once issued, aA copy of the HAV Testing Permit shall be present in each HAV test vehicle at all times during HAV testing operation in the state.</u>”</p>
Appendix A	37-40	<p>Draft Contract – No other state has a contract process. The most recent draft of SB 1268 prohibits a contracting process. The contract process outlined will be a significant impediment and deterrent to HAV Testers.</p>

Open-ended Comments:

Automated Vehicle Testing Policy

<i>Name</i>	Erick Guerra
<i>Organization</i>	University of Pennsylvania

Section #	Page #	Comment
Forward	7	CMU is one of several birthplaces and not even the only one in PA. I might tone this down.
3.IV	24	I don't fully understand why the platooning regulations are so restrictive. It may be too late for this, but I feel these should be loosened or at least better explained. It's the part of the document that seems the most restrictive, which is surprising given that platooning is relatively safe and easy to do.
4.1.b	27	"The ADS shall also be able to be disengaged by law enforcement and other emergency responder personnel." This probably needs some elaboration. I assume this mean a physical intervention in the vehicle interior. Remote disengagement opens up a wide array of legal and cybersecurity issues.
General		The introduction would benefit from an explicit and clearly stated set of goals and objectives related to the policy testing framework (e.g., ensuring safety, promoting technological innovation, attracting industries to PA, reducing burden on police during transition).

Open-ended Comments:

Automated Vehicle Testing Policy

<i>Name</i>	Shari Shapiro
<i>Organization</i>	Uber Technologies, Inc.

Open-ended Comments:

We commend PennDOT staff for their thoughtful, inclusive, and deliberate approach to addressing these complex and ever-evolving issues. We appreciate the time and effort that all of the members of the Taskforce have contributed to the Report. We believe that all of this work has been worthwhile and will help expedite efforts to implement any later-adopted legislation. In the interim, however, we strongly recommend setting aside the current draft policy until there is legislative action and, in its place, adopting a simple and straight-forward policy encouraging the development and testing of HAVs in Pennsylvania.

As the Foreword of the Report explains, the policy recommendations of the Taskforce were initially developed in parallel with the legislation that would give effect to the policies themselves. Subsequently, NHTSA released guidelines for HAVs, and the drafters of the legislation made substantial revisions to the draft bill. It has become clear that a bill will not move forward until Spring 2017. As a result, the policy that was initially intended to implement a statutory directive no longer serves that purpose.

We also have several substantive concerns with the current draft policy. For instance, the policy attempts to define a “driver” as a “natural” person—even though this would not be required by existing statutory language, and the policy in fact recognizes that it would be logical to define the Automated Driving System as the driver under at least some circumstances (Policy Topic #2 at pages 21-22). The draft policy also includes several requirements relating to vehicle hardware, which are not well suited to state-by-state regulation (Policy Topic #4 at page 27). In addition, the policy anticipates an onerous contract process that would require a new demonstration and updates to the agreement whenever the HAVs are able to operate in new conditions (Policy Topic #1 at pages 17-19). Such hurdles would inhibit testers’ ability to continuously and seamlessly improve this advanced technology.

In light of these significant regulatory and legislative developments and our continuing substantive concerns with the current draft, we would strongly recommend a much simpler policy at this juncture. In the absence of legislation, the most effective policy to promote the continued development of HAVs in Pennsylvania would (1) state that PennDOT supports and encourages HAV testing in the Commonwealth, and (2) interpret the term “driver” in the Vehicle Code to include an Automated Driving System, as the current draft policy already implies (Policy Topic #2 at pages 21-22).

In sum, while legislation remains pending, we recommend setting aside the detailed policy recommendations contained in the Report. If PennDOT desires to adopt a policy at this time, we recommend a simple and streamlined approach as described above. With that larger context in mind, we offer some specific comments regarding particular sections of the draft policy below.

Automated Vehicle Testing Policy

Section #	Page #	Comment
Foreword	7	The reference to the legality of testing with a licensed driver at the steering wheel might suggest that current law would not allow testing without a licensed driver behind the wheel. We believe the relevant laws have flexibility and that there are reasonable interpretations that the law does not require a driver in every vehicle, and would not require any such driver to be a natural person. See the below comments re: Policy Topic #2 at pp. 21-22.
Glossary	11-12	<p>Definition of “deployment” - By categorizing HAV operations into “testing” and “deployment,” the policy creates a false distinction for fleet operators, who will always control vehicles on roads.</p> <p>Definition of “driver” - Vehicle Code Section 102 defines "driver" as follows: "'Driver.' A person who drives or is in actual physical control of a vehicle." A “natural” person is not required, and the reference to a “natural” person should be removed.</p> <p>We recommend removing the definitions of “full” and “high” automation, and replacing the definition of “highly automated vehicle” with the following: <i>A vehicle that contains systems referred to as conditional (Level 3), high (Level 4), and full (Level 5) in the Society of Automotive Engineers’ Standard J3016, January 2014. These are systems that rely on the highly automated vehicle system, not on a human, to monitor the driving environment.</i></p> <p>Definition of “person” - We recommend adding a clause to the end of this definition, specifying that “for purposes of this policy, a ‘person’ includes an automated driving system.”</p> <p>We recommend removing the defined term “Safety Override Control, ADS,” as states are not best-situated to address or mandate hardware requirements for HAVs.</p>
Intro- duction	14	The subsection “Who is the Driver” should clarify that there is flexibility in the existing law, particularly if PennDOT interprets “driver” to include an automated driving system. See the below comments re: Policy Topic #2 at pp. 21-22.
Policy Topic #1	17	<p>The latest draft of the HAV testing bill does not include the "contract" concept. It anticipates an application + permit process.</p> <p>In addition, the content of the permit application is spelled out in detail in the latest draft of the HAV testing bill. The proposal/application content listed in the draft policy is inconsistent and would need to be updated to align with the final version of the bill.</p> <p>Ideally this policy topic #1 re: the approval process should be set aside until final bill language is adopted.</p>

Automated Vehicle Testing Policy

Section #	Page #	Comment
	18-19	A demonstration whenever the HAV is able to operate in new conditions would be quite burdensome (see Section III.b.iii and Section V). In addition, we recommend removing the demonstration requirement as a prerequisite to testing (see Section III). (See also platooning demonstration provisions in Policy Topic #3, p. 25.) The Nevada DMV, for example, has decided not to require a demonstration prior to approval for testing, even though it initially adopted rules that would have required such a demonstration. http://dmvnev.com/autonomous.htm . PennDOT's ability to request a demonstration during testing in order to investigate a complaint or to otherwise ensure compliance with law would be sufficient to protect public safety.
Policy Topic #2	21-22	The law does not require a "driver" to be a "natural" person. Vehicle Code Section 102 defines "driver" and "person" as follows: "Driver." A person who drives or is in actual physical control of a vehicle. "Person." A natural person, firm, copartnership, association or corporation. First, the definition of "driver" does not explicitly require a driver in every vehicle. Second, even if this were read to require a driver, the automated driving system could be considered the "driver" of the vehicle (i.e., a "person" or entity - since a "natural" person is not required). On page 22, this draft policy recognizes that it is logical to conclude that the HAV is the "driver" under state law. Therefore, we recommend removing the statement on page 21 that would indicate a "natural" person is required.
Policy Topic #3	23	Restricting testing to testing conducted with in-vehicle operators would be inconsistent with policy topic #2 above re: testing without a human operator. In addition, our preference would be to omit the reference to prohibiting or restricting HAV testing during special events. If a special event exception is essential, we would recommend limiting it to situations where vehicles operated by natural persons are also restricted, similar to the emergency / inclement weather language contained in this draft policy.
	24-25	We do not see a need to restrict platooning to 2-3 vehicles. This issue is also under consideration by the legislature; ultimately, the policy will need to be adjusted according to the final bill language. We also note that any language regarding demonstrating platoons' capabilities should parallel the final legislative determinations regarding demonstrations in general.
Policy Topic #4	27	We believe that it is not necessary and not advisable for states to address hardware / equipment issues. (See, e.g., Sections I.b-d, II.a, II.c.)
Policy Topic #5	31-32	We recommend against requesting the total number of miles and hours (see Section I.c.i.1), as these do not provide any relevant data regarding the safety issues that PennDOT would be overseeing and could reveal commercially

Automated Vehicle Testing Policy

Section #	Page #	Comment
		<p>sensitive information. Moreover, given the current state of the reporting that would be required under the current draft HAV testing bill, reporting of these items should be voluntary, not mandatory, if included at all.</p> <p>We also recommend against requesting the voluntary economic items listed in Section I.c.iii, as they are not relevant to the testing mission and would impose an administrative burden unrelated to safety or testing (ultimately distracting resources from those efforts).</p>
Policy Topic #6	35	<p>Having multiple agencies review every testing application / proposal seems unnecessary. (See Section I.c.) If the law (or policy) outlines the requirements that must be met, and an applicant meets them, it would only be necessary for one agency to review and approve. Bringing in multiple agencies risks causing unnecessary delay in the process.</p> <p>The application/proposal should not be required to include a list of operators and vehicles' unique identifying information. (See Section II.) Testers will likely need flexibility regarding which vehicles and which test operators will conduct tests in Pennsylvania.</p>
Appendix A: Draft Contract	37-40	<p>As noted above, the contract is no longer an aspect of the application + permit process envisioned in the latest draft of the HAV testing bill. We recommend that the draft contract should be set aside unless/until it is addressed via state law.</p> <p>Regarding Section 3, Authorization, on p.38: Requiring modification of a contract prior to deployment of more advanced technology could be unduly burdensome and inhibit prompt deployment and further development of advanced HAV technologies.</p> <p>Regarding Section 6, Indemnification, on p.39: We recommend the below, more balanced indemnification language:</p> <p>INDEMNIFICATION - <i>TESTER agrees to indemnify and hold harmless PENNDOT and its officers, directors, and employees from and against any and all damages, liabilities, obligations, losses, deficiencies, actions, costs paid or payable to a third party (including reasonable attorneys' fees and expenses), demands, suits, judgments, or assessments with respect to any third party claim (hereafter "Claims") arising out of (a) TESTER's negligence in the performance of any testing under this Agreement; (b) any intentional or negligent acts or omissions of TESTER, its employees, subcontractors, or agents in connection with the testing under this Agreement; or (c) any breach of this Agreement by TESTER, its employees, subcontractors, or agents. Notwithstanding the foregoing, TESTER shall have no obligation under this Section for claims arising out of or related to (x) any intentional or negligent act or omission of PENNDOT or its employees, subcontractors, or agents, or (y) any allegation related to PENNDOT's authority to enter into this Agreement or PENNDOT's enforcement</i></p>

Automated Vehicle Testing Policy

Section #	Page #	Comment
		<p><i>of this Agreement. The foregoing indemnification obligation is contingent upon PENNDOT providing TESTER with (i) prompt written notice of any potential claim subject to indemnification under this Agreement, (ii) sole control over the defense and settlement of each such claim (provided that TESTER will not settle or compromise any claim without written consent of PENNDOT, which consent shall not be unreasonably withheld, conditioned, or delayed), and (iii) reasonable cooperation, at TESTER's expense, in the defense and settlement of a claim. This obligation shall survive termination or expiration of this Agreement.</i></p> <p>Regarding Section 9, Assignment, on p.39: We recommend adding an additional phrase clarifying that <i>TESTER retains the right to transfer the Agreement or any right under the Agreement to an affiliate without the prior written consent of PENNDOT.</i></p> <p>Lastly, the language preceding the signature line should clarify that for a limited liability company (LLC), only one managing member need sign.</p>

Appendix C: Meeting Summaries

<i>Client / Agreement / #</i>	PennDOT Program Center / Planning Open End / E03449	
<i>Project / MBI #</i>	WO#2 - Autonomous Vehicle Task Force / 152937	
<i>Date / Time / Location</i>	01-Jun-2016 / 11:00 AM – 1:00 PM / PennDOT Central Office, Conference Room 8N1 and CMU CIC, 4720 Forbes Ave., Room 2101	
<i>Attendees/ Representing</i>	PennDOT: Leslie Richards (LR); Andrew Blum (AB); Corey Brown (CB); Cindy Cashman (CC); Emma Lowe (EM); Eric Nelson (EN); Feevan Megersa (FM); Jim Foringer (JF); Jason Sharp (JS); Kara Templeton (KT); Kurt Myers (KM); Leo Bagley (LB); Mark Kopko (MK); Phil Tomassini (PT); Roger Cohen (RC)	
	PA DCED: Steve D’Ettorre (SD)	
	PA State Police: Brian Ianuzzi (BI); Major Edward Hoke (EH)	
	PA Dept. of Ins.: Glenda Ebersole (GE)	
	PA Turnpike Commission: Stacia Ritter (SR)	
	PA Leg. EDs: David Kozak (DK); Josh Myers (JM); Meredith Biggica (MB); Nolan Ritchie (NR)	
	AAA: Ted Leonard (TL)	PMTA: Jim Runk (JR)
	ATA: Bob Pitcher (BP)	SAE: Bill Gouse (BG)
	CMU: Dr. Raj Rajkumar (RR), Stan Caldwell (SC)	Uber Technologies: Ashwini Chhabra (AC)
	FHWA: Phil Bobitz (PB)	Univ. of Penn.: Erick Guerra (EG)
	Local Gov’t: Erika Strassburger (ES)	
	Michael Baker: Jeff Bergsten (JB); Larry Bankert (LaB)	

Meeting Purpose: Discuss plan for developing policy that encourages the safe testing of Autonomous Vehicles in PA.

Notes:	Action Items:
1. Secretary’s Greeting (LR) <ul style="list-style-type: none"> a. Task Force Goal: Support the development of testing autonomous vehicles in a safe way. b. PA is seen as a hub for this type of innovation. c. Wants PA to be known as a good forward-looking partner for this technology. d. Noted that she is encouraged by local, regional, and statewide stakeholders at the table and wants us to bring up any relevant topics as we move forward. e. Safety can never be compromised, safety first. 	➤ N/A
2. Introductions (RC, KM, All) <ul style="list-style-type: none"> a. The above listed attendees introduced themselves. 	➤ N/A
3. Task Force Mission and Meeting Schedule (RC, KM) <ul style="list-style-type: none"> a. RC: Mission: Develop Policy recommendations within a 6-month timeframe for encouraging industry to safely test automated vehicles 	➤ N/A

<p>in PA. While the Task Force policy recommendations cannot be too prescriptive (we need to make industry want to test vehicles in PA), we need to make sure safety is not compromised. This is the delicate balance that we are challenged with and why this group was selected to take on this challenge.</p> <ul style="list-style-type: none"> b. KM: Note: Automated vehicles with a driver at the wheel are legal on PA public roads today. Automated vehicles without a driver at the wheel are legal on PA private roads today. The Task Force’s mission is to focus on policy recommendations for automated vehicle testing. c. The Task Force will focus on multiple areas, but two key areas of focus should be noted: <ul style="list-style-type: none"> i. Remote Operation Testing. ii. Platooning. d. Schedule: Meetings will be held in the mornings of the dates indicated and the exact meeting times will be finalized soon. 	
<p>4. Other States’ Policy (MK)</p> <ul style="list-style-type: none"> a. Caltrans: No policy passed to date by DMV. Working on operating policy now. Draft policy is elaborate and very rigid. b. FDOT: Both testing (2012) and operating (2016) policy passed. Vehicle does need to be branded (similar to “Student Driver”) but in general the policy is considered more open. Some argue it is too flexible and not safe enough. c. MDOT: Testing policy already passed. Working on operating/regulatory policy now. Vehicles required to have specialty plates, definition of “manufacturer” broadened (so as not to limit to only the big auto makers). d. UDOT: No policy in place, but currently looking at best practices from other states. Expected to have testing policy adopted by 01-Dec-2016, so they are a little behind us/PennDOT. e. Nevada DOT: MK did not investigate thoroughly, but no policy in place. Nevada thinks Caltrans is too rigid, and wants to be more similar to MDOT. f. NHTSA: Coming out with Policy guidance in June/July 2016. NR indicated the Task Force should move forward as planned, but should be consistent with the forthcoming guidance. g. For PennDOT, we should aim to be safe but open, somewhere between CA and FL in terms of rigidity. Comprehensive policy that is adaptable to technology changes is key. 	<ul style="list-style-type: none"> ➤ MK: Due 6/15: Compile a 1-page matrix that summarizes and compares the testing policies for the studied DOTs. ➤ MK: Due every call/meeting: Keep Task Force informed of any changes to other DOTs policy.
<p>5. Overview of Senate Bill 1268 (CC)</p> <ul style="list-style-type: none"> a. Testing can only occur after a contract is signed. b. Allows for truck platooning (only FL has this). c. Requires \$5M in insurance. d. Allows for remote operation. 	<ul style="list-style-type: none"> ➤ CC: Due every call/meeting: Provide updates to the Task Force regarding legislation. ➤ DK: Due 6/15: Determine if additional/modified language is needed to allow for more flexibility in 3616.a.2.

<ul style="list-style-type: none"> e. In Senate Transportation Committee now. Would like to see it move forward in parallel with the Task Force work. No time to wait, must be done concurrently in order to move quickly. f. The Legislative Executive Directors participation in the Task Force is critical to the success of these parallel efforts. g. CC wanted to point out that there are 2 types of reporting: Tester to PennDOT and PennDOT to the General Assembly. Task Force policy recommendations need to make this distinction. h. Paragraph 3616.a.2: "Any instance, on a biannual basis, where the operator was required to disengage the vehicle from autonomous mode as a result of a failure of the autonomous technology." This paragraph should be clarified to confirm that the reporting is only required for a true failure of the automation, and not routine disengagement as a part of the normal testing process. General Assembly will want to know what the failures are, how they occurred, and what is being done to fix them. i. RR brought up that the Task Force policy recommendations should define limitations on a remote operator. For example if the remote operator was physically located in Japan, even at the speed of light, an electronic command could be delayed by a full second, and could impact safety. Options for remote operator's distance from the vehicle include a minimum of line of sight to a maximum of 1000 miles or the country's borders (whichever is less), to ensure safety. 	
<p>6. Policy White Paper (JS)</p> <ul style="list-style-type: none"> a. ODOT is very interested in advancing autonomous operations for truck platooning. b. Whatever policy recommendations the Task Force puts forth, we need to make sure the PTC is addressed as well. c. Legislation calls for testing on different classifications of roads (high volume vs. low volume), and policy recommendations need to do the same. d. Driver hierarchy: <ul style="list-style-type: none"> i. Behind the wheel ii. Within eyesight iii. Remote with a passenger that could take over iv. Fully remote e. AC is ok with establishing parameters as long as there is room to grow. AC feels the MDOT approach seems the most reasonable. f. KM: Need to balance safety with encouraging growth and innovation. g. RC: Need to safely control failure, but allow for failures to happen (the only way to truly learn). h. EG: Requested the Task Force establish metrics for determining a testing "success". 	<ul style="list-style-type: none"> ➤ AB: Due 6/15: work with EG to establish testing success metrics. ➤ JS: Add testing success metrics to white paper.
<p>7. Task Force Deliverables (RC, KM)</p>	<ul style="list-style-type: none"> ➤ All: Due 6/10: Identify what questions need to be answered

<ul style="list-style-type: none"> a. Ultimate: Full report of Policy Recommendations submitted to Secretary Richards. b. Interim: Identify and draft “chapters” of the report on the conference calls, finalize the chapters at the meetings. 	<p>in the policy guidance from each person’s local perspective, and e-mail them to JB (jbergsten@mbakerintl.com).</p>
<p>8. Task Force Organizational Structure and Sharepoint (KM, JB)</p> <ul style="list-style-type: none"> a. Org Structure: <ul style="list-style-type: none"> i. Group agreed that rather than organizing into subcommittees, it makes sense as outlined in the Meeting schedule to focus each meeting on a sub set of topics. ii. However, maintaining the Legislative Subcommittee makes sense, and they will provide an update report at each call/meeting. iii. In addition, a Testing Success Metrics Subcommittee consisting of AB and EG was established. b. Sharepoint: <ul style="list-style-type: none"> i. JB distributed a 1-pager on setting up an account on Sharepoint. ii. This sharepoint site will serve as the hub for information sharing. iii. Use Internet Explorer as your browser when accessing Sharepoint. 	<ul style="list-style-type: none"> ➤ All: Due 6/15: Task Force members to establish a Sharepoint Account using the 1-pager as a guide. ➤ JB: Add standing agenda items for Legislative and Testing Success Metrics updates.
<p>9. Future Meetings</p> <ul style="list-style-type: none"> a. W 15-Jun 10am: Call -Tester & Operating Draft Policy b. W 13-Jul 10am: In Person - Finalize Tester & Operating Policy c. W 20-Jul: AM Call - Operator & Vehicle Draft Policy d. W 03-Aug: AM In Person – Finalize Operator & Vehicle Policy e. W 17-Aug: AM Call – Data & Contract Draft Policy f. W 14-Sep: AM In Person – Finalize Data & Contract Policy g. W 21-Sep: AM Call – Full Draft Policy h. W 05-Oct: AM In Person – Final Policy Recommendations i. W 19-Oct: AM Call – If Necessary j. W 02-Nov: AM In Person – Adopt Policy Recommendations 	<ul style="list-style-type: none"> ➤ All: Due 6/10: Block out the mornings of the meeting dates now (morning meeting times will be finalized soon).

<i>Client / Agreement / #</i>	PennDOT Program Center / Planning Open End / E03449	
<i>Project / MBI #</i>	WO#2 - Autonomous Vehicle Task Force / 152937	
<i>Date / Time / Location</i>	15-Jun-2016 / 10:00 AM – 12:00 PM / PennDOT Central Office, Conference Room 8N1	
<i>Attendees/ Representing</i>	PennDOT: Roger Cohen (RC); Kurt Myers (KM); Andrew Blum (AB); Corey Brown (CB); Cindy Cashman (CC); Michael DeMatt (MD); Emma Lowe (EL); Feevan Megersa (FM); Jim Foringer (JF); Brian Hare (BH); Jason Sharp (JS); Kara Templeton (KT); Mark Kopko (MK); Kevin Breck (KB)	
	PA DCED: Paul Opiyo (PO)	
	PA State Police: Captain Bruce Williams (BW)	
	PA Dept. of Ins.: Glenda Ebersole (GE)	
	PA Turnpike Commission: Stacia Ritter (SR)	
	PA Leg. EDs: David Kozak (DK); Josh Myers (JM); Nolan Ritchie (NR)	
	AAA: Ted Leonard (TL)	PMTA: Jim Runk (JR)
	American Trucking Assn.: Ted Scott	SAE: n/a
	CMU: n/a	Uber Technologies: Ashwini Chhabra (AC)
	FHWA: Phil Bobitz (PB)	Univ. of Penn.: Erick Guerra (EG)
	Local Gov't: n/a	
	Michael Baker: Jeff Bergsten (JB); Brian Funkhouser (BF)	

Meeting Purpose: Document draft policy recommendations for the first two White Paper topics: tester, and driver/operator.

Notes:	Action Items:
1. Welcome (RC) <ul style="list-style-type: none"> a. Co-Chair Roger Cohen opened the meeting by thanking everyone in attendance. 	➤ N/A
2. Roll Call (JB) <ul style="list-style-type: none"> a. Attendees introduced themselves. 	➤ N/A
3. Review of June 1 Meeting Summary (RC) <ul style="list-style-type: none"> a. PennDOT is aware of sound quality problems during kick-off meeting and will work to address. b. Today's primary objectives are to use the materials prepared by MK and JS as discussion points to inform preparations of a draft for future review (on July 13) and come to consensus. c. Comments made will become part of the project's written record. 	➤ AB: Address sound quality problems.
4. Legislative Update (CC) <ul style="list-style-type: none"> a. SB1268 has not changed since the last meeting. b. No interest in holding any hearings at this time. c. SR is putting together a matrix and will circulate to the group via SharePoint. 	➤ All: Submit thoughts on the bill provisions being considered.

Notes:	Action Items:
<ul style="list-style-type: none"> d. House version of the bill has been drafted and includes a few additions such as: <ul style="list-style-type: none"> i. Operator must be within 1,000 miles of the vehicle ii. Vehicle does not need to be marked iii. Elected to remove recording when testers disengage the vehicle from autonomous mode e. KM: advised avoiding a license plate approach as a means of identifying AVs f. Tester may want the flexibility of having the vehicle marked or unmarked g. BW: we have a curious public, and AVs will generate 911 calls h. Needs to be more deliberation as to why the 1,000-mile limit is appropriate/relevant. 	
<ul style="list-style-type: none"> 5. Metrics Update (AB) <ul style="list-style-type: none"> a. Attempts to address the question of how to measure what a successful AV program looks like. Draft measures include: <ul style="list-style-type: none"> i. Attraction of technology firms to the state ii. Advancing technology through the testing of AVs iii. Improving safety b. Could be measured by number of jobs created, companies attracted, or others, such as number of collisions and incidents per VMT. 	<ul style="list-style-type: none"> ➤ AB: Will upload a final draft to SharePoint for additional comments from the Task Force and for review at the July 13 meeting.
<ul style="list-style-type: none"> 6. Policy Discussion: Minimum Approval for Testers (MK) <ul style="list-style-type: none"> a. We're looking for a comfort level...what protections will the State have in permitting AV testers? b. \$5M in insurance was chosen as a barrier to entry by a smaller operator; it is consistent with what others have done to cover liability exposure. This advantages incumbents however, and may be a concern. PA Dept. of Insurance is comfortable with the number. c. EL: Should the weather be a consideration in proof of testing? d. Should conditional approvals be allowed? There could be two tracks toward certification which could be defined by higher levels of liability acceptance. e. Task Force seems to be leaning toward some combination of Scenarios 1 and 3: "Potential AV tester submits an AV testing proposal," and "Potential AV tester provides a demonstration of an AV vehicle." 	<ul style="list-style-type: none"> ➤ MK: Will develop a written draft paper by 01-Jul-2016 that captures today's discussions to put in front of the Task Force for further review.
<ul style="list-style-type: none"> 7. Policy Discussion: "Who is the 'Driver'?" (JS) <ul style="list-style-type: none"> a. Do we blend the "operator" versus the "driver"? b. There is a question over who is responsible for a Vehicle Code violation if a vehicle gets pulled over. Who gets cited, etc.? c. EH: We would consider the operator to be responsive to the Vehicle Code. This needs to cover areas related to gross negligence or criminal intent. d. From a liability standpoint, in the case of an accident or civil suit, it is preferable that the responsibility lie with the tester. In the case of criminal negligence, then the operator would be the one held responsible. e. NR: PennDOT originally had a different proposal: did not want to limit it to violations of Title 18 or Title 75. f. What information would the operators be apprised of that they would be at fault? 	<ul style="list-style-type: none"> ➤ JS: Will develop a written draft paper by 01-Jul-2016 that captures today's discussions to put in front of the Task Force for further review.

Notes:	Action Items:
<p>g. No clear consensus on this as of today.</p>	
<p>8. SharePoint Demonstration (BF)</p> <ul style="list-style-type: none"> a. Point browser to register and sign in: https://www.login.state.pa.us/login/ b. Use Internet Explorer to log onto project SharePoint site: https://spportal.dot.pa.gov/Planning/ProgramCenter/AVTF/Pages/default.aspx c. Save in your favorites for future reference. d. Contact Andrew Blum with any problems: ablum@pa.gov; (717) 772-4450 	<ul style="list-style-type: none"> ➤ All: Task Force members should register to use the project's SharePoint site.
<p>9. Review of Action Items (RC)</p> <ul style="list-style-type: none"> a. In addition to the action items noted in the previous agenda items: 	<ul style="list-style-type: none"> ➤ JB will upload to SharePoint: "Guidelines for the Safe On-Road Testing of SAE Level 3, 4, and 5 Prototype Automated Driving Systems (ADS)." ➤ AB will expand on his draft matrix and post on Sharepoint to allow for responses and additional follow-up questions when sharing comments with the Task Force.
<p>10. Adjournment (RC)</p> <ul style="list-style-type: none"> a. Roger thanked everyone for attending and declared the meeting adjourned at 11:50. 	<ul style="list-style-type: none"> ➤ N/A
<p>11. Future Meetings</p> <ul style="list-style-type: none"> a. W 13-Jul 10am: In Person - Finalize Tester & Operating Policy b. W 20-Jul: AM Call - Operator & Vehicle Draft Policy c. W 03-Aug: AM In Person – Finalize Operator & Vehicle Policy d. W 17-Aug: AM Call – Data & Contract Draft Policy e. W 14-Sep: AM In Person – Finalize Data & Contract Policy f. W 21-Sep: AM Call – Full Draft Policy g. W 05-Oct: AM In Person – Final Policy Recommendations h. W 19-Oct: AM Call – If Necessary i. W 02-Nov: AM In Person – Adopt Policy Recommendations 	<ul style="list-style-type: none"> ➤ All: Block out the mornings of the meeting dates now (meeting times will be finalized soon).

<i>Client / Agreement / #</i>	PennDOT Program Center / Planning Open End / E03449	
<i>Project / MBI #</i>	WO#2 - Autonomous Vehicle Task Force / 152937	
<i>Date / Time / Location</i>	13-Jul-2016 / 10:00 AM – 1:00 PM / PennDOT Riverfront Office Center (ROC), Conference Room 4A	
<i>Attendees/ Representing</i>	PennDOT: Roger Cohen (RC); Kurt Myers (KM); Andrew Blum (AB); Emma Lowe (EL); Dan Cessna (DC); Jason Sharp (JS); Kara Templeton (KT); Mark Kopko (MK); Philip Tomassini (PT)	
	PA DCED: Steve D'Ettore (SD)	
	PA State Police: Major Edward Hoke (EH); Captain Bruce Williams (BW); Brian Ianuzzi (BI); Beth Readler (BR)	
	PA Dept. of Ins.: Glenda Ebersole (GE)	
	PA Turnpike Commission: Stacia Ritter (SR)	
	PA Leg. EDs: David Kozak (DK); Josh Myers (JM); Nolan Ritchie (NR); Meredith Biggica (MB); Eric Nelson (EN)	
	AAA: Ted Leonard (TL)	PMTA: n/a
	American Trucking Assn.: Robert Pitcher (RP)	SAE: Bill Gouse (WG)
	CMU: Raj Rajkumar (RR)	Uber Technologies: Ashwini Chhabra (AC)
	FHWA: Phil Bobitz (PB)	Univ. of Penn.: Erick Guerra (EG)
	Local Gov't: Erika Strassburger (ES)	GM: Jeffrey Perry (JP)
	Michael Baker: Jeff Bergsten (JB); Brian Funkhouser (BF)	

Meeting Purpose: Document draft policy recommendations for the first two White Paper topics: tester, and driver/operator.

Notes:	Action Items:
1. Welcome (RC) a. Co-Chair Roger Cohen opened the meeting by thanking everyone in attendance.	➤ N/A
2. Roll Call (JB) a. Attendees introduced themselves. b. JC acknowledged Jeffrey Perry, GM's regional director of state government relations	➤ N/A
3. Review of June 15 Meeting Summary (RC) a. Draft policy documents will be reviewed in further today (7/13). b. SharePoint site will continue to be enriched, including June 1 images from Pittsburgh.	➤ AB to add appropriate images to project SharePoint site
4. Legislative Update (CC) a. HB2203 went out of committee on June 28. There were 3 negative votes, primarily over concerns related to PennDOT's rulemaking authority. Legislative meetings will be held on this throughout the summer. Some	➤ N/A

Notes:	Action Items:
<p>movement on legislation is anticipated by the fall on one of the two versions of the bill.</p> <p>b. NR: Regarding SB1268, there have been discussions with uber and Google to refine the language. A co-sponsorship team is meeting tomorrow. A draft amendment to SB 1268 is being circulated and will move to have the transportation committee consider it when it convenes in the fall.</p> <p>c. JP offered several observations</p> <ol style="list-style-type: none"> i. There was no mention of auto manufacturers as a stakeholder in the development of the bill. This is critical, as many manufacturers are teaming up with companies such as Lyft and Google, etc. ii. Definitions in bills for AV need to be reviewed with more scrutiny. Self-driving definitions need to be brought up to where the industry is. Current definition of autonomous technology is currently slightly contradictory: it allows for no human interaction or monitor. iii. Manufacturers are primarily interested in level 4 or 5. Definitions need to be discussed more and a point for the TF to make to legislators. iv. Outside technology can bring interesting innovation to this topic. There should be language added as to who the manufacturers are and the exemptions for liability, etc. as many testers are developing their own technology and modifying vehicles without the manufacturer's permission. We wouldn't want to be responsible for this. v. PA is the only state where GM has seen a mileage restriction. There is no evidence to suggest it makes a quantitative difference. <p>d. NR: we have been in connection with the PA Auto Alliance as a proxy to the automakers. A second point about self-driving is missing. Strengthening of that language is welcomed.</p> <p>e. WG: Wants the Task Force to refer to SAE terminology.</p>	
<p>5. Metrics Update (AB, EG, and PB)</p> <ol style="list-style-type: none"> a. Attempts to address the question of how to measure a successful AV testing program. b. EG reviewed a one-pager of 5 draft performance measures related to AV testing. Is there a way to measure a multimodal benefit? Industry would be collecting most of the data; we do not want to add additional reporting burdens that other states may not be requiring. c. TL: Measures may want to consider testing during inclement weather. d. JP: Some data may be proprietary information as it directly helps private industry improve development of its system over someone else's. This is captured to some extent in Michigan's legislation. What are some high-level data we can agree on without getting into proprietary issues or implicating proprietary interests? e. EL: Cyber security more of a Federal concern. It is a topic for discussion at a future meeting. There is an expectation for federal guidance on metrics. f. Manufacturers will likely resist regular reporting cycles. 	<ul style="list-style-type: none"> ➤ KM: Requested uber and GM specifically to react to draft performance measures. ➤ AB, EG, PB: Follow up with Task Force members who expressed points of view.

Notes:	Action Items:
<p>6. Policy Discussion: Minimum Approval for Testers (MK)</p> <ul style="list-style-type: none"> a. A contract is a way of addressing extreme change in the industry. It can be streamlined even more for pre-approval. b. JP: some concern with how easy a contract will be to achieve and continue testing as opposed to self-certification/notification. The state would hold some veto authority over some conditions. What makes a state attractive is a manufacturer's ability to go in freely and begin testing. c. We are presently not recommending an AV endorsement. d. JP: Marked AV will attract unwanted attention. Current policy recommends a marked vehicle if it is unoccupied, or operated remotely. They need to be identifiable to authorities for law enforcement purposes. e. Approvals should be centrally managed (as opposed to the Districts). Change "may" to "shall" so the appeal process can be followed. f. Any action by the Department would be able to be appealed. This is important to protect due process rights. Current uncertainty over what an appeal process would look like for a vehicle operating on the PA Turnpike. g. JP: self-certification and notification option is appealing to the manufacturers. Too much specificity may be a deterrent to manufacturers. A demo may be a deterrent to manufacturers if it is not optional. h. In Section 2.a.i. there is concern over documenting meeting every requirement of Chapter 36 of Title 75. The state needs to secure the same level of assurance from smaller start-ups as from larger companies (e.g., GM, Google, etc.). i. SR and JP: Definitions need to be made clearer in the draft policy. j. Draft policy will ultimately be presented to the Transportation Secretary for her sign-off. 	<ul style="list-style-type: none"> ➤ JC and SR: Create a workable methodology for both institutions that would not institute additional delay on test applicants. ➤ MK: Will add hard dates ➤ MK: Add a subheading that addresses AV definitions. ➤ MK: Will put the draft on SharePoint for additional comment from the Task Force. ➤ Task Force members are encouraged to contact Mark with any additional comments.
<p>7. Policy Discussion: "Who is the 'Driver'?" (JS)</p> <ul style="list-style-type: none"> a. TRB recently published a tome on the current legal landscape on AV b. NR: NHSTA has not yet recommended a final policy but will be a guide as to how we would update the language. c. Michigan refers to it as ADS. Manufacturers need an exemption from liability if someone has modified a vehicle without its consent. Vehicle could accrue points for infractions. d. Policy should include some consideration as to the provision of contact information being immediately available in the event of a crash (for injured party(ies)). e. Have access available through ACN in lieu of the 1,000-mile limit. f. KM: We will look at a potential system solution about information being captured by the vehicle that would include contact information so it is available electronically. 	<ul style="list-style-type: none"> ➤ JS: refine draft based on today's discussion.
<p>8. Review of Action Items (RC)</p> <ul style="list-style-type: none"> a. In addition to the action items noted in the previous agenda items: 	<ul style="list-style-type: none"> ➤ KT take first cut on development of a draft Vehicle policy; MK will do the same for

Notes:	Action Items:
	<p>Operating Policy in coordination with JS.</p> <ul style="list-style-type: none"> ➤ BF: Send revised invitation for the scheduled 20-Jul-2016, which will now be held on 27-Jul-2016.
<p>9. Public Comments</p> <ul style="list-style-type: none"> a. The state's crash forms should be revised to account for AV b. Is requiring \$5 M in insurance cost prohibitive? c. Draft policy papers can be shared with non-Task Force members as long as they are presented as "drafts". 	<ul style="list-style-type: none"> ➤ MK: raise crash form issue with PennDOT's Darrell St. Clair ➤ GE to investigate impacts of insurance costs ➤ KM: Work with TL to determine how best to communicate to the public
<p>10. Adjournment (RC)</p> <ul style="list-style-type: none"> a. Roger thanked everyone for attending and declared the meeting adjourned at 12:45. 	<ul style="list-style-type: none"> ➤ N/A
<p>11. Future Meetings</p> <ul style="list-style-type: none"> a. W 27-Jul: AM Call - Operator & Vehicle Draft Policy b. W 03-Aug: AM In Person – Finalize Operator & Vehicle Policy c. W 17-Aug: AM Call – Data & Contract Draft Policy d. W 14-Sep: AM In Person – Finalize Data & Contract Policy e. W 21-Sep: AM Call – Full Draft Policy f. W 05-Oct: AM In Person – Final Policy Recommendations g. W 19-Oct: AM Call – If Necessary h. W 02-Nov: AM In Person – Adopt Policy Recommendations 	<ul style="list-style-type: none"> ➤ All: Block out the mornings of the meeting dates now (meeting times will be finalized soon).

<i>Client / Agreement / #</i>	PennDOT Program Center / Planning Open End / E03449	
<i>Project / MBI #</i>	WO#2 - Autonomous Vehicle Task Force / 152937	
<i>Date / Time / Location</i>	27-Jul-2016 / 10:00 AM – 12:00 PM / PennDOT Central Office, Conference Room 8N3	
<i>Attendees/ Representing</i>	PennDOT: Roger Cohen (RC); Kurt Myers (KM); Leo Bagley (LB); Corey Brown (CB); Rich Kirkpatrick (RK); Mark Kopko (MK); Emma Lowe (EL); Eric Nelson (EN); Jason Sharp (JS); Kara Templeton (KT); Phil Tomassini (PT); Anita Wasko (AW)	
	PA DCED: Steve D'Ettorre (SD)	
	PA State Police: Major Hoke (EH); Captain Williams (BW); Lieutenant Ianuzzi (BI)	
	PA Dept. of Ins.: Bojan Zankic (BZ)	
	PA Turnpike Commission: Stacia Ritter (SR)	
	PA Leg. EDs: David Kozak (DK); Nolan Ritchie (NR); Meredith Biggica (MB); Eric Bugaile (EB)	
	AAA: Ted Leonard (TL)	PMTA: Kevin Stewart (KS)
	American Trucking Assn.: Ted Scott (TS)	SAE: Bill Gouse (BG)
	CMU: not represented	Uber Technologies: Ashwini Chhabra (AC)
	FHWA: Phil Bobitz (PB)	Univ. of Penn.: not represented
	Local Gov't: Erika Strassburger (ES)	GM: Jeffrey Perry (JP)
	Michael Baker: Jeff Bergsten (JB); Brian Funkhouser (BF)	

Meeting Purpose: Document draft policy recommendations for the second set of White Paper topics: Operating Parameters and Vehicle Characteristics.

Notes:	Action Items:
1. Welcome (RC) a. Co-Chair Roger Cohen opened the meeting by thanking everyone in attendance.	➤ N/A
2. Roll Call (JB) a. Attendees introduced themselves.	➤ N/A
3. Review of July 13 Meeting Summary (RC) a. All written comments received will be posted onto the project SharePoint site.	➤ Task Force members encouraged to submit comments to BF at brian.funkhouser@mbakerintl.com and review posted comments on SharePoint site.
4. Legislative Update (EN) a. EN provided a summary. SB 1268 has been amended and is currently before the Senate transportation committee. b. Revisions define: full vs. self-driving automation; changes the definition of platooning by limiting it to 3 motor vehicles; establishes inspection criteria for AV; exemption for pre-existing condition;	➤ Task Force members are encouraged to send comments to NR at nritchier@pasen.gov . by M 08-Aug-2016.

Notes:	Action Items:
<p>allows public to comment on PennDOT's policies; specifies liability; requires PennDOT to evaluate financial needs for testing purposes; identifies options for how PennDOT should proceed once testing has concluded.</p> <ul style="list-style-type: none"> i. MK: May not be a need for a platooning threshold. Passenger vehicles could be done more than three at a time, etc. c. There are options for the effective dates and operations certifications. d. SR questioned language in the inspection paragraph. Some vehicles may be modified, while others (e.g., Google vehicle) may never be operated by a human. PennDOT will not fail a vehicle if it was never equipped a certain way. Regulations as they exist today require parts (mirrors, windshield wipers, etc.) that may not be needed if the vehicle is an AV. e. JP: Current definitions in draft legislation are too broad if the goal is to make Pennsylvania an attractive environment for the deployment and testing of AV. Current definitions appear to go broader than the Level 4 and 5 SAE standards previously discussed. NR: Draft definitions mirror NHTSA's definitions for autonomy. The Commonwealth will rely more on guidance from NHTSA than SAE. f. BG: NHTSA is dropping their separate levels of automation. g. "Limited" requires an operator, but "full autonomy" allows no driver present. h. SAE definitions are posted on SharePoint. i. JP: Guidance from NHTSA on Level 4 and 5 have not been released yet, but are expected within the next two weeks. RC: NHTSA's guidance will be incorporated into our work. j. MK: Asked why we're defining platooning to only three vehicles, as the market for passenger vehicles will be more than three. <ul style="list-style-type: none"> i. NR: This was as requested from law enforcement. k. RC: The AVTF is responsible for providing guidance as the legislative chairs work on development of legislation. 	
<p>5. Metrics Update (AB)</p> <ul style="list-style-type: none"> a. No update. 	<p>➤ N/A</p>
<p>6. Policy Discussion: Operating Parameters (MK)</p> <ul style="list-style-type: none"> a. Draft policy allows for testing on all roadways, with clauses outlining temporary suspension during natural or declared emergencies, or during movement of superloads. However, platoon testing will be constrained to specific roadway segments as approved by PennDOT. b. Draft strongly encourages the AV tester to reach out to PennDOT prior to testing for roadway conditions (e.g., weather, construction, etc.) 	<ul style="list-style-type: none"> ➤ <u>MK</u>: will address Task Force comments ➤ <u>AC</u>: will send MK some draft language to use in classifying emergencies.

Notes:	Action Items:
<ul style="list-style-type: none"> c. NR voiced concerns with the local exemption as drafted in Section I.a. d. JP: Having only 1-day notice for Special Events may not be enough time for a tester to conclude the test and arrange to get the AV back to a secure location. Perhaps 3-5 days are needed. MK and JS indicated that unfortunately in some instances PennDOT is not informed with more than 24 hours' notice, so PennDOT will provide good faith communications to alert the tester as early as possible (as soon as they are aware). e. JP: The policy should mention restart timing to indicate when it is acceptable to begin testing again. f. Restrictions would be imposed only during extreme inclement weather. There are classifications of emergencies and the language should be narrowed to indicate as such. 	
<p>7. Policy Discussion: Vehicle Characteristics (KT and KM)</p> <ul style="list-style-type: none"> a. KT raised awareness that the Department has developed an "acceptable vehicle safety characteristics proof of concept for an AV." b. PT notes proposed security measures are broad enough to encourage testers to come to Pennsylvania. c. JP: in paragraph I.A.: AV technology shall meet APPLICABLE federal motor vehicle safety standards. d. In paragraph I.B., change "mechanism" to "means". e. In paragraph I.D.: JP has a concern with advertising AVs with placards for safety reasons. A decal in the window may be appropriate for law enforcement to be able to identify it. PSP not looking for anything "over-the-top" for vehicle identification. PSP in favor of including information on the plate which could in turn be checked out from the dispatch center. f. Can first responders deactivate a vehicle completely during an extrication process? Draft policy needs language for a "kill switch" for first responders to disable the AV and not jeopardize safety. There needs to be a means to engage and disengage the AV. g. What will an AV brand on an AV title have on the resale of that vehicle? KM: Brand stays with a vehicle; impacts on resale are unknown. Vehicles that are branded include taxis, police cruisers, flooded vehicles, etc. Branding ensures consumers know what they are buying. h. What safety requirements are required? Refers to Vehicle Code sections. i. Consistency is needed with the definitions (fully vs. limited self-driving automation, etc.). JS is preparing a glossary of definitions. j. JP: Add "if so equipped" for emergency brakes, since some do not exhibit resistance. 	<ul style="list-style-type: none"> ➤ KT: will address changes offered by the Task Force. ➤ AW: will provide Vehicle Code provisions for safety equipment (I.g.) to Jeff Perry and upload to the SharePoint site. ➤ JS: will develop a draft glossary of definitions by 29-Jul-2016. ➤ MK: will examine other states on the questions of security. (PT has already reached out to other states: VA, CA, UT, MI.) ➤ PT: will revise opening paragraph to Section III of the draft policy.

Notes:	Action Items:
<ul style="list-style-type: none"> k. JP: Section II.C. suggested removing the parenthetical "30 seconds in advance" and the "6 months following" language from this section and save that language for the "Data" white paper. Also...add the PSP as a potential receiver of the data, along with PennDOT. l. The language addressing the "Black Box" should be revised to provide more flexibility. m. Other states are leaving security determinations up to the tester (self-certifying) and deferring to guidance from the federal government. It may put less liability on the State. The opening paragraph to Section III needs to be clarified. 	
<ul style="list-style-type: none"> 8. Review of Action Items (RC) <ul style="list-style-type: none"> a. Comments expressed today will be incorporated into a revised meeting package for discussion during the 03-Aug-2016 meeting. b. MK: Noted that crash reports are being revised to include AVs and will be issued in 2018 as a part of their regularly scheduled updates. c. BF: Post previous meeting summaries to the project SharePoint site. d. RC noted that there will be no call-in for the August 3 meeting. The meeting will be conducted from the ROC in Harrisburg, with a bridge line being used at a satellite location at PennDOT District 11-0 in Bridgeville. 	<ul style="list-style-type: none"> ➤ BF: Post previous meeting summaries to SharePoint.
<ul style="list-style-type: none"> 9. Adjournment (RC) <ul style="list-style-type: none"> a. Roger thanked everyone for attending and declared the meeting adjourned promptly at 12:00. 	<ul style="list-style-type: none"> ➤ N/A
<ul style="list-style-type: none"> 10. Future Meetings <ul style="list-style-type: none"> a. W 03-Aug: AM In Person – Finalize Operating Parameters & Vehicle Characteristics b. W 17-Aug: AM Call – Data & Contract Draft Policy c. W 14-Sep: AM In Person – Finalize Data & Contract Policy d. W 21-Sep: AM Call – Full Draft Policy e. W 05-Oct: AM In Person – Final Policy Recommendations f. W 19-Oct: AM Call – If Necessary g. W 02-Nov: AM In Person – Adopt Policy Recommendations 	<ul style="list-style-type: none"> ➤ N/A

<i>Client / Agreement / #</i>	PennDOT Program Center / Planning Open End / E03449	
<i>Project / MBI #</i>	WO#2 - Autonomous Vehicle Task Force / 152937	
<i>Date / Time / Location</i>	03-Aug-2016 / 10:00 AM – 1:00 PM / PennDOT Riverfront Office Center (ROC), Conference Room 4A	
<i>Attendees/ Representing</i>	PennDOT: Roger Cohen (RC); Kurt Myers (KM); Andrew Blum (AB); Cindy Cashman (CC); Dan Cessna (DC); Mark Kopko (MK); Eric Nelson (EN); Don Smith (DS); Philip Tomassini (PT); Anita Wasko (AW)	
	PA DCED: Steve D'Ettore (SD)	
	PA State Police: Major Edward Hoke (EH); Captain Bruce Williams (BW)	
	PA Dept. of Ins.: Glenda Ebersole (GE)	
	PA Turnpike Commission: Stacia Ritter (SR)	
	PA Leg. EDs: Meredith Biggica (MB); Eric Bugaile (EB); David Kozak (DK); Josh Myers (JM); Nolan Ritchie (NR)	
	AAA: Ted Leonard (TL)	PMTA: n/a
	American Trucking Assn.: n/a	SAE: n/a
	CMU: n/a	Uber Technologies: Ashwini Chhabra (AC)
	FHWA: Phil Bobitz (PB)	Univ. of Penn.: Erick Guerra (EG)
	Local Gov't: Erika Strassburger (ES)	GM: Jeffrey Perry (JP)
	Michael Baker: Brian Funkhouser (BF); Jeff Kupko (JK)	

Meeting Purpose: Finalize recommendations for the second set of White Paper topics: Vehicle Characteristics, and Operating Parameters.

Notes:	Action Items:
1. Welcome (RC) a. Co-Chair Roger Cohen opened the meeting by thanking everyone in attendance.	➤ N/A
2. Roll Call (BF) a. Attendees introduced themselves.	➤ N/A
3. Review of July 27 Conference Call (RC) a. RC noted the good discussion from last week's pre-meeting conference call in shaping drafts of today's two policy papers.	➤ N/A
4. Legislative Update (CC) a. CC: we continue to meet with the executive directors to refine SB1268. b. NR is seeking comments embedded into the Word version of the file. c. RC: We are working to ensure the language between policy and legislation is aligned.	➤ Task Force members encouraged to provide comments to Nolan on SB1268.

Notes:	Action Items:
<p>5. Metrics Update (AB)</p> <ul style="list-style-type: none"> a. AB met with AC and incorporated comments. b. Task Force members were invited to review what is currently available on SharePoint, and to contact AB (717) 772-4450 to discuss further. c. EG will share on data reporting and needs at a future meeting. 	<ul style="list-style-type: none"> ➤ All: Review draft on SharePoint and contact AB, as needed.
<p>6. Policy Discussion: Operating Parameters (MK)</p> <ul style="list-style-type: none"> a. Local exemptions were revised to allow restrictions during certain times. Restrictions are expected to be temporary and not commonplace. b. A clause was added as to how the Commonwealth will alert when testing is available again. c. More narrow language was added to address severe weather and declared emergencies. d. Language was also revised to allow for stoppage in a reasonable amount of time, as opposed to an immediate stop. e. Language concerning special events was refined to include the type of events involving the FBI or secret service, etc. f. It was noted that sometimes the Commonwealth is not able to provide more than one day's notice, but that every attempt will be made to provide 3-5 days' notice. Sometimes it is beyond the control of the Department. g. AC: Current draft does not distinguish between full AV and remotely-operated or system-controlled vehicles. Should they be exempted? h. Local officials can impose temporary restrictions on local roads only for extreme weather or special events. i. SR: Under local requests (Section III) the draft policy should note that if testing will occur on both PennDOT and PTC roadways, that both agencies should be contacted. j. If a municipality needs to close a road for safety reasons, this would be addressed separately, apart from AV policy. KM: there is a need to ensure that communication between locals, the Commonwealth, and testers is open and inclusive. RC: the Task Force will need to spend time discussing how to effectively communicate with all stakeholders: locals, PennDOT, and testers. k. AC: From the tester's vantage point, they will want to know where vehicles can go or not go to plot out that day's testing. l. SR: Draft legislation says no more than 3 vehicles can platoon, but proposed recommendations say we're restricted to 2 commercial or 3 personal, with provisions for increasing in number. If the bill is changed, the policy will need to be revised. The statute should be broad enough so that management has flexibility. m. TL: Public does not realize how close to the horizon AV vehicles are. RC: this needs to be rolled out in a way that the public can understand and accept. 	<ul style="list-style-type: none"> ➤ MK: Revise wording in Section III. ➤ BF: Upload JP's comments on this topic to SharePoint for review by the Task Force.
<p>7. Policy Discussion: Vehicle Characteristics (KM and PT)</p> <ul style="list-style-type: none"> a. KM: Under Section I.B. we now use the term "means" instead of "mechanism". b. KM: Under Section II.C., the reference to a "black box" has been removed, but we're still requiring the capture of information. 	<ul style="list-style-type: none"> ➤ KM: will clarify use of the term "performance" in Section I.A.

Notes:	Action Items:
<ul style="list-style-type: none"> c. PT: Under Section III, revised draft speaks of aligning with ISAC as a good starting point. The opening paragraph now includes mention of self-certification. The 7 subordinate processes/best practices remain the same, but we are asking the industry to self-certify against the 7 processes. d. Within Section I.C., a visual indicator would alert an operator or a first responder that the system is engaged. This should be for vehicles that are not fully self-driving. This may not apply to Level 4 or 5 vehicles. AW: more comfortable with visual indication vs. visual indicator, as we currently do for things like adaptive cruise control and rear parking, etc. e. JP: unsure of the value of such an indicator for Level 4 and 5 vehicles if no one is in it. This is also added cost and weight to a manufacturer. EH: First responders and law enforcement personnel need to know they can work a crash scene safely. We would be supportive of any language that would accomplish that. f. RC: NHTSA may be able to create some uniformity on this topic. There needs to be a protocol so there's no second-guessing in an emergency situation. g. JP: Within Section I.D., manufacturer would discourage large and conspicuous vehicle markings as being too distracting to other drivers. A sticker or decal in the windshield might suffice. KM: Nevada requires a specific license plate, but it became an issue in crossing state boundaries. PennDOT wishes to avoid an approach that would be an inhibitor to interstate travel. NHTSA will hopefully be addressing issues related to vehicle markings and interstate travel in its forthcoming guidance. h. EH: Quick identification in the event of a crash is needed, as officers and first responders may spend time looking for bodies that do not exist. Incorporating the information into a VIN could be examined as part of an after-action review, but not readily available to a first responder at the scene if the system is down. Again, NHTSA needs to take the lead on this issue. i. JP: Within Section I.F, current branding of an AV within the title is viewed unfavorably. KM: This is a consumer knowledge and protection issue. The buyer has a right to know. j. AC: In California, we have done 3-year leases so consumers are not saddled with the AV "brand" if they don't want it. k. JP: Within Section 1.G.: a manufacturer may not want to search the code section to find out everything the Commonwealth needs, but it may be in the legislation. l. KM: Within Section I.A., "performance" standards are a reference to emissions. The first part of the subsection addresses safety, the second half, emissions. This will be clarified. m. JP: Within Section III, we need to ensure we're using appropriate terminology: "testing proposal" versus "testing notice" etc. Centralized editing is needed. KM: We clearly recognize we need to develop a glossary of terms and ensure that terms are being used consistently and in alignment with the legislation. n. RC: Development of a glossary and model contract are underway. 	<ul style="list-style-type: none"> ➤ AC: will e-mail suggested language to RC and KM for use in Section II.A. ➤ JS: Developing the draft model contract. ➤ JS: Developing a glossary of terms. ➤ BF: Upload JP's comments on this topic to SharePoint for review by the Task Force.

Notes:	Action Items:
<ul style="list-style-type: none"> o. JP: Section II.A. currently states that control should not be transferred to a human operator, but does not clarify the type of technology. Level 4 or 5 may not have a human operator to transfer to. AC: if there is a driver in the vehicle, some concerns don't apply. AC will e-mail suggested language to RC and KM for use in updating the draft. p. BW: Encouraged using a sticker on the windshield. KM: NHTSA may need to take the lead on this issue for something that is nationally recognized. q. SD: Is there a way to protect against criminal intent in tampering with AV functions? RC: Cyber security is an enormous challenge. 	
<ul style="list-style-type: none"> 8. Review of Action Items (RC) <ul style="list-style-type: none"> a. Next Task Force meeting (pre-meeting call) will be in two weeks on 17-Aug-16. Topics to be discussed include a draft Contract, and Data Retention and Sharing. Mark Kopko, Jeff Perry, Glenda Ebersole, and representatives from the PSP should discuss what they would like to see. Some key points: <ul style="list-style-type: none"> i. What is of value to keeping and having data? ii. What data is valuable? iii. Manufacturer's capabilities to capture the data? b. JP: Currently EDRs are not required on vehicles. He referenced NPRM Rule 563 dating back to last year; previously FMVSS 405 (2012). This could be used as a lead for the discussion. 	<ul style="list-style-type: none"> ➤ <u>MK, GE, JP, and EH</u> to work together on ideas for a draft that will be presented and discussed.
<ul style="list-style-type: none"> 9. Public Comments <ul style="list-style-type: none"> a. None 	<ul style="list-style-type: none"> ➤ N/A
<ul style="list-style-type: none"> 10. Adjournment (RC) <ul style="list-style-type: none"> a. Roger thanked everyone for attending and declared the meeting adjourned at 11:50 a.m. 	<ul style="list-style-type: none"> ➤ N/A
<ul style="list-style-type: none"> 11. Future Meetings <ul style="list-style-type: none"> a. W 17-Aug: AM Call – Data & Contract Draft Policy b. W 14-Sep: AM In Person – Finalize Data & Contract Policy c. W 21-Sep: AM Call – Full Draft Policy d. W 05-Oct: AM In Person – Final Policy Recommendations e. W 19-Oct: AM Call – If Necessary f. W 02-Nov: AM In Person – Adopt Policy Recommendations 	<ul style="list-style-type: none"> ➤ N/A

<i>Client / Agreement / #</i>	PennDOT Program Center / Planning Open End / E03449	
<i>Project / MBI #</i>	WO#2 - Autonomous Vehicle Task Force / 152937	
<i>Date / Time / Location</i>	17-Aug-2016 / 10:00 AM – 12:00 PM / PennDOT Room 8N3	
<i>Attendees/ Representing</i>	PennDOT: Roger Cohen (RC); Kurt Myers (KM); Andrew Blum (AB); Cindy Cashman (CC); Emma Lowe (EL); Dan Cessna (DC); Rich Kirkpatrick (RK); Don Smith (DS); Kara Templeton (KT); Mark Kopko (MK)	
	PA DCED: Steve D'Ettore (SD)	
	PA State Police: Captain Bruce Williams (BW); Lt. Mike Triponey (MT); Cpl. Tracey Flynn	
	PA Dept. of Ins.: Glenda Ebersole (GE)	
	PA Turnpike Commission: Stacia Ritter (SR)	
	PA Leg. EDs: David Kozak (DK); Josh Myers (JM); Nolan Ritchie (NR); Meredith Biggica (MB)	
	AAA: Ted Leonard (TL)	PMTA: Kevin Stewart (KS)
	American Trucking Assn.: n/a	SAE: Bill Gouse (WG)
	CMU: Raj Rajkumar (RR)	Uber Technologies: Ashwini Chhabra (AC)
	FHWA: Phil Bobitz (PB)	Univ. of Penn.: Erick Guerra (EG)
	Local Gov't: Erika Strassburger (ES)	GM: Jeffrey Stefan (JS)
	Michael Baker: Brian Funkhouser (BF); Jeff Kupko (JK)	

Meeting Purpose: Document draft policy recommendations for the third set of White Papers: Data Collection, and Testing Approval/Renewal.

Notes:	Action Items:
1. Welcome (RC) a. Co-Chair Roger Cohen opened the meeting by thanking everyone for their attendance and ongoing contributions.	➤ N/A
2. Roll Call (BF) a. Attendees introduced themselves.	➤ N/A
3. Review of August 3 Meeting Summary (RC) a. Meeting summaries were included in today's meeting package and are also available on the project SharePoint site.	➤ N/A
4. Legislative Update (CC) a. NR yesterday had distributed revised versions of SB1268. (This version does not include any redlining to ease review.) NR requested feedback on this by Friday, 09-Sept-2016. This will be the last round of solicitation. b. If previous comments were not addressed, include them again. c. Readers will see significant changes to the proposed legislation. We still maintain the diversity between the full and limited self-driving automation that are consistent with NHTSA level 4 and SAE level 5. We will wait for federal	➤ Task Force member comments on the latest version of the legislation should go to NR, with optional copy to RC, KM, CC, and/or BF by 09-Sept-2016.

Notes:	Action Items:
<p>guidance in understanding when AVs can be purchased and operated by consumers.</p> <p>d. NR: Many do not want to see platooning in the legislation.</p> <p>e. RC noted that, since our last meeting, Secretary Richards had a press conference on AV technology that received good media coverage: "Pennsylvania pulls ahead of the pack on self-driving vehicles."</p>	
<p>5. Policy Discussion: Data Collection (MK)</p> <p>a. The draft policy paper is organized into two sections: General Data, and Crash Data.</p> <p>b. A future glossary (to be developed by Jason Sharp) needs to define certain terms such as "kill switch" and "crash", etc.</p> <p>c. SR: Will provide contact information for the PTC under Section II.a.ii.</p> <p>d. Information on non-reportable crashes is requested, but not required.</p> <p>e. JS: Some reporting requirements may be overly burdensome. RC encouraged task force members to identify any areas in the draft that may appear to be particularly troublesome.</p> <p>f. Everything currently defined within Section II. of the draft paper is parallel to existing law, whether it be a standard vehicle, or an AV.</p> <p>g. Under Section II.b.iii.3., cyber-security entails a malicious intrusion into the operating system. Other issues include mapping best practices as they evolve. There are vast unknowns involved in cyber security.</p> <p>h. AC: Data reporting should be focused on safety. "Fully AV testing" could include an operator behind the wheel. Definitions will be key and the Task Force needs to be wary of overly-broad categorizations.</p> <p>i. AB can work with MK on some of the measurements.</p> <p>j. EG: Once we settle on the metrics, it should be easy to align the two documents. Terms such as "kill switch" may be more difficult to define and measure, but others are more straightforward.</p> <p>k. Reporting "new jobs" could be more of a state responsibility than a tester responsibility. This approach should be considered. It might be helpful to include required reporting, and another tier for safety and other data that may be more likely to be proprietary in nature.</p> <p>l. AC: The Commonwealth should collect numbers that it "needs to have" and adds value vis a vis public safety versus "nice to have". There is uncertainty if forthcoming NHTSA guidance will speak to this issue.</p> <p>m. SD: If DCED's programs are used, we can access that information (job creation and other economic data) especially if tax credits have been used.</p> <p>n. NR: As connected vehicles become more prevalent, PennDOT should know if there are any cyber-security issues as they will impact other drivers on the roadway. Other testers need to be aware of potential harm. There was uncertainty as to whether confidentiality needs to be referenced in the draft policy guidance.</p> <p>o. MK: Data collection may be extensive, but to some degree it could also be helpful to the industry, i.e., the technology needs to be validated and supporting safety data can help play a role.</p>	<ul style="list-style-type: none"> ➤ JS: Develop glossary. ➤ MK: Address Task Force comments highlighted in this summary. ➤ MK: Change references from "accidents" to "crashes." ➤ All: send thoughts on draft paper prior to next meeting on 14-Sept-2016. ➤ NR and CC to continue to discuss this issue as it relates to draft legislation. ➤ SR: Send MK contact information for PTC. ➤ AB: follow-up with MK on the measurements.

Notes:	Action Items:
<p>p. JK: Maintaining general data is important should something happen during testing. PennDOT and/or PTC can then say “here is the reason we are still doing this” to be able to document safety, lives saved, etc. The public may question why we continue to test; we need the data to reinforce why.</p> <p>q. SR: Should limited access roadways read “highways”? Cross reference this with Title 75.</p>	
<p>6. Policy Discussion: “Testing Approval and Renewal” (KT)</p> <p>a. KT: The draft policy ensures we have a governing body composed of various members who are stakeholders within this process to address any issues that may arise as we move forward.</p> <p>b. SR: requested that the PTC be added as an agency of note under Section II.</p> <p>c. JS: Not having self-certification may be a deterrent. KM: encouraged review comments - the policy as proposed is relatively straight-forward and not intended to be an inhibitor.</p> <p>d. JM: rather than a contract, would there be openness to a permit instead?</p> <p>e. “Other stakeholders” as documented in Section I.c. may be too general, and should be bounded with names of specific agencies, such as PTC, manufacturers, Uber, etc.</p> <p>f. AC: In Section III.a. there should be more specificity for the contract period. Two years would be preferable.</p> <p>g. AB: Be careful when we state “operator” to specify the in-car operator. The language needs to align with what was used in the previous policy paper: Who is the Driver. “Operator” could include potential remote operators and as such needs to be clarified.</p> <p>h. NR: In Section II., we assume PennDOT will have an online proposal submission process, but details still need to be worked out. The newest version of the legislation has a new definition of test passenger. In Section III., it is assumed the testing permit would be the autonomous technology, or the AV. If the latter, what if there are technical changes made to the vehicle, would the permit then still be valid? Having the permit on board would need to be included in the draft legislation.</p> <p>i. EL: In section I.a.i., change “governance body” to “governing body”.</p> <p>j. AB: “What’s being permitted” may require its own section.</p>	<p>➤ KT: Add the PTC in Section II. and other editorial changes, as highlighted in this summary.</p> <p>➤ All Task Force members are encouraged to provide any additional comments prior to the next meeting, on 14-Sept-2016.</p>
<p>7. Review of Action Items (RC)</p> <p>a. We will continue to make progress on a glossary.</p> <p>b. At the end of this process, everyone will have an opportunity to review a completed document in draft and be able to make comments, changes, and articulate any concerns. There will be no vote at the end of the process, as we are a consensus-seeking body. The Task Force will ultimately recommend this to Secretary Richards.</p> <p>c. The first four policy documents will be uploaded onto the project SharePoint site.</p>	<p>➤ JS: A draft contract will be prepared and presented to task force members by next week.</p> <p>➤ BF: Put current iterations of the first four policy papers onto SharePoint.</p>

Notes:	Action Items:
8. Adjournment (RC) <ul style="list-style-type: none"> a. There being no further business, Roger thanked everyone for attending and declared the meeting adjourned at 11:35. 	➤ N/A
9. Future Meetings <ul style="list-style-type: none"> a. W 14-Sep: AM In Person – Finalize Data & Contract Policy b. W 21-Sep: AM Call – Full Draft Policy c. W 05-Oct: AM In Person – Final Policy Recommendations d. W 19-Oct: AM Call – If Necessary e. W 02-Nov: AM In Person – Adopt Policy Recommendations 	➤ N/A

<i>Client / Agreement / #</i>	PennDOT Program Center / Planning Open End / E03449	
<i>Project / MBI #</i>	WO#2 - Autonomous Vehicle Task Force / 152937	
<i>Date / Time / Location</i>	14-Aug-2016 / 10:00 AM – 1:00 PM / Riverfront Office Center (ROC) Room 4A	
<i>Attendees/ Representing</i>	PennDOT: Roger Cohen (RC); Kurt Myers (KM); Andrew Blum (AB); Cindy Cashman (CC); Michael DeMatt (MD); Emma Lowe (EL); Mark Kopko (MK); Jason Sharp (JS)	
	PA DCED: Steve D'Ettore (SD)	
	PA State Police: Major Edward Hoke (EH); Captain Bruce Williams (BW); Sergeant Brent Zechman (BZ); Sergeant Tracy Flynn (TF)	
	PA Dept. of Ins.: Glenda Ebersole (GE)	
	PA Turnpike Commission: Stacia Ritter (SR)	
	PA Leg. EDs: David Kozak (DK); Nolan Ritchie (NR); Meredith Biggica (MB)	
	AAA: n/a	PMTA: n/a
	American Trucking Assn.: n/a	SAE: Bill Gouse (WG)
	CMU: Dr. Raj Rajkumar (RR)	Uber Technologies: n/a
	FHWA: Phil Bobitz (PB)	Univ. of Penn.: Erick Guerra (EG)
	Local Gov't: Erika Strassburger (ES)	GM: Jeffrey Perry (JP)
	Public Utilities Commission: Joseph Cardinale, Jr. (JC); Joe Hardenelli (JHa); John Herzog (JHe)	
	Michael Baker: Jeff Bergsten (JB); Brian Funkhouser (BF)	

Meeting Purpose: Document recommendations for the draft Contract and the third set of White Papers: Data Collection, and Testing Approval/Renewal.

Notes:	Action Items:
<p>1. Welcome and Review of Media Coverage (RC)</p> <ul style="list-style-type: none"> a. Co-Chair Roger Cohen opened the meeting by thanking everyone for their attendance and ongoing contributions. He extended appreciation to PennDOT staff and all stakeholders for their participation. b. There has been a deluge of media coverage nationally over the past few weeks surrounding Uber's testing in Pittsburgh. The Policy Office has been fielding many media requests to explain Pennsylvania's existing law and proposed new framework on AV policy in support of public safety. c. Regarding AV, there is skepticism and concern in public opinion which is reflected in the media. It underscores the importance of our work in that testing is promoted and safety is protected. 	<p>➤ N/A</p>
<p>2. Roll Call (JB)</p> <ul style="list-style-type: none"> a. Attendees introduced themselves. Other guests included Sergeant Brent Zechman and Sergeant Tracy Flynn from the PSP. Other guests were from the PA PUC and included: John Herzog, Deputy Chief Counsel, and Joe 	<p>➤ N/A</p>

Notes:	Action Items:
<p>Hardenelli. A new working member to the Task Force is Larry Coben, a trial lawyer who could not attend today.</p>	
<p>3. Review of August 17 Conference Call (RC)</p> <ul style="list-style-type: none"> a. A draft was included in the meeting package for Task Force members' review. A copy is also available on the project SharePoint site. 	<p>➤ N/A</p>
<p>4. Review of Policy Paper: Testing Approval (KM)</p> <ul style="list-style-type: none"> a. KM: hopeful to have guidance from NHTSA soon. b. Some minor wording changes were made throughout the draft policy, including the addition of PA DCED to the list of stakeholders in I.a.2. c. In I.a.2., it was recommended to add L&I to the list of industry partners. d. JP: The AV bill that Michigan has already advanced through the Senate is designed to not slow the process of innovation, which is more palatable to a manufacturer. It still puts some boundaries however as to what is appropriate. e. JP: Expressed concerns regarding Pennsylvania's right-to-know law, where anyone could demand possession of the data. As currently written, this is a framework for safety, but not to attract new business. There's no "safety reason" to require a contract in order to indemnify the Commonwealth. f. Uber's current activities in Pittsburgh reflects the lack of a restrictive law and the ability to get started on testing in a non-restrictive testing environment. g. KM: NYS is currently the only state that restricts the use of AV. We seek a balanced playing field for the public and the testers. Safety is of paramount importance to us in drafting the policy. 	<p>➤ Task Force: provide any additional comments to Kara Templeton at ktempleton@pa.gov.</p>
<p>5. Review of Draft Contract and Glossary (JS)</p> <ul style="list-style-type: none"> a. JS: In crafting a draft contract, we have tried to have minimal terms and conditions that would still be acceptable to the Commonwealth. b. JP: Other states are saying they would like data, however, we have never said no to providing crash data and the value it offers. c. EG: in order for crash data to be useful we need a measure of exposure, as numbers in a vacuum will not mean much...certain types of data would require some supporting operational background information. d. KM: Michigan and Florida do not require information to be supplied, but California has a number of requirements, and posts online for all to see. So there is no one set approach that represents the right answer. e. JP: there may be instances where a manufacturer isn't even capturing different pieces of data, if it's required. f. JP: The policy needs to use a different term than "kill switch." g. In Section 2 (Authorization), "updated application" needs to be addressed. h. BG: SAE document J3018 is a 12-page AV manual and the procedures that should be followed. It is a good benchmark. i. MB: The draft Contract states 5 years, while the draft policy has 2 years. JS: "Five" should be a placeholder until the legislation is released. The numbers will ultimately align. j. DK: "and shall be accompanied by an updated testing application" plays into the manufacturers' argument. 	<p>➤ Task Force: Provide any additional comments to JS...particularly BG and JP as to what represents "material changes" in creating those standards now for the program and more certainty in the documents and in the legislation. jsharp@pa.gov</p>

Notes:	Action Items:
<ul style="list-style-type: none"> k. JP: We would consider “material changes” to be the geography, as the AVs require detailed mapping that they operate inside of. Another example would include going from employees to allowing the public in the AV on any basis. l. KM: Purpose is to have a one-pager (e.g., permit, etc.) in the vehicle available to law enforcement. m. MB: what is the purpose of the governing body in the policy? What does it govern? RC: One of our final issues to discuss involves the successor group to this Task Force. We can serve as a public liaison, as advisors to the Secretary and the Commonwealth, and recommend new policy as needs arise. There is a need for a body that remains active after our work is done, as public interest in this is high and growing. A successor, governance body would be productive, and such a concept should be provided for in our work. 	
<p>6. Glossary of Definitions:</p> <ul style="list-style-type: none"> a. JS: The SAE documents have been of great use in creating a first draft. He encouraged the Task Force to look for missing terms. Approved language within the glossary will eventually be reflected in revised policy statements. b. BG: SAE has gone from using vague phrases to explaining what “minimal risk” is in a full page of text. SAE’s document will also be completely copyright-free so it can be included in the final regulation. NHTSA will be adopting this as well. The SAE version will be universally adopted. 	<ul style="list-style-type: none"> ➤ Task Force: provide comments to JS at jsharp@pa.gov.
<p>7. Review of Policy Paper: Data Collection (MK)</p> <ul style="list-style-type: none"> a. MK: Minor comments have been made to the draft since the last meeting. b. “Kill switch” will be replaced with new language. c. There is a new Section II on confidentiality and a new Section IV on Department reporting. d. JP: We would expect much of the economic data to be optional, and we might not even track certain information. e. JP: California’s experience on this is that it is creating busy-work since there is no way to verify what is being reported. For example, Google reported 1,300 incidents where it had to take over the system, while Tesla reported zero. RC: This illustrates the conundrum that the governing parties face in establishing mandatory versus voluntary standards for any of this, since some actors may act in good faith or otherwise. f. JP: The vehicle needs to be able to get to a minimal risk condition...we would never shut the vehicle off, etc. g. RC: Since our last meeting, Uber has shared concerns with us on data collection. We would like to gain information on what the high level economic impacts of AV testing are...nothing fine-grained. EG: It makes sense to align the contract with the metrics. What can we obtain that would not be a burden on testers, yet would still be useful about making judgments on the success of the testing program? It would be helpful to get a clearer idea from the testers as to what data/metrics is easy, and what is difficult to obtain. 	<ul style="list-style-type: none"> ➤ Task Force: Provide any additional comments to MK at markopko@pa.gov ➤ JP and AC: provide MK with a list of data types that are readily attainable. ➤ BF: Compile the 6 Chapters including the Contract and Glossary into one Draft document.

Notes:	Action Items:
8. Metrics Update (AB)	➤ <u>Task Force:</u> let AB or EG know of any comments on metrics at ablum@pa.gov .
9. Legislative Update (NR) <ul style="list-style-type: none"> a. NR: There have been significant advancements made on the draft legislation. There is still feedback that has not been received or reviewed yet. Another meeting on Monday with manufacturers will further help refine the draft. A theme has been in finding the right balance between safety and encouraging innovation/creativity of the AV testers. b. There are some concerns from PennDOT as to how platooning is being recognized. There is a new section in the draft legislation on this concept. c. MB: There is a companion bill in the House which will mirror what the Senate is doing. PennDOT has promoted cross-chamber comity and collaboration. 	➤ <u>Task Force:</u> encouraged to provide comments to NR at nritchie@pasen.gov
10. Upcoming Meetings: Schedule and Location (RC) <ul style="list-style-type: none"> a. We're scheduled to meet on October 5 to discuss all the policy recommendations, which will reflect today's updates. Policy recommendations we are making will be subject to alignment based on the SB and any additional guidance from the Federal government. b. KM: There will not be a vote on the policy being put forward, as that has never been the intent for the Task Force. The Task Force is making recommendations to the Secretary and trying to reach consensus on the policies. Opportunity will be given to put any dissent in writing for the Secretary's review. 	➤ N/A
11. Public Comments (RC) <ul style="list-style-type: none"> a. JHe:The PUC has a history with Uber in bringing this technology to Pennsylvania. He commended the Task Force for its work on AV policy. b. JB: CMU will be demonstrating an AV around the capitol complex on September 28 as part of a safety symposium. CMU is donating the vehicle; PennDOT CO funded DSRC to communicate with the AV; District 8-0 paid for installation costs of the equipment; and the City purchased new compatible signal controllers for 8 intersections. The objective is to expose as many legislators as possible to see AV technology at work. The signals will be permanent, and Harrisburg will have a permanent AV test bed with I2V communications. c. NR: The theme of the upcoming Northeast Conference on Public Administration on November 11-13 will be "Public Administration in an Era of Collaboration." It represents a great opportunity to spotlight our efforts on AV policy. 	➤ N/A
12. Adjournment (RC) <ul style="list-style-type: none"> a. There being no further business, Roger thanked everyone for attending and declared the meeting adjourned at 12:10. 	➤ N/A
13. Future Meetings <ul style="list-style-type: none"> a. W 05-Oct: AM In Person – Final Policy Recommendations 	➤ N/A

Notes:	Action Items:
b. W 19-Oct: AM Call – If Necessary c. W 02-Nov: AM In Person – Adopt Policy Recommendations	

<i>Client / Agreement / #</i>	PennDOT Program Center / Planning Open End / E03449	
<i>Project / MBI #</i>	WO#2 - Autonomous Vehicle Task Force / 152937	
<i>Date / Time / Location</i>	05-Oct-2016 / 10:00 AM – 1:00 PM / Riverfront Office Center (ROC) Room 4A	
<i>Attendees/ Representing</i>	PennDOT: Roger Cohen (RC); Kurt Myers (KM); Andrew Blum (AB); Cindy Cashman (CC); Dan Cessna (DC); Emma Lowe (EL); Mark Kopko (MK); Eric Nelson (EN); Jason Sharp (JS); Kara Templeton (KT); Phil Tomassini (PT)	
	PA DCED: Steve D'Ettore (SD)	
	PA State Police: Major Edward Hoke (EH); Captain Bruce Williams (BW)	
	PA Dept. of Ins.: Glenda Ebersole (GE)	
	PA Turnpike Commission: Stacia Ritter (SR)	
	PA Leg. EDs: Eric Bugaile (EB); David Kozak (DK); Josh Myers (JM); Nolan Ritchie (NR); Meredith Biggica (MB)	
	AAA: Ted Leonard (TL)	PMTA: n/a
	American Trucking Assn.: n/a	SAE: n/a
	CMU: Dr. Raj Rajkumar (RR)	Uber Technologies: Shari Shapiro (SS); Patty Robbins (PR)
	FHWA: Phil Bobitz (PB)	Univ. of Penn.: n/a
	Local Gov't: Erika Strassburger (ES)	GM: Jeffrey Perry (JP)
	Michael Baker: Jeff Bergsten (JB); Brian Funkhouser (BF)	

Meeting Purpose: Document recommendations for the draft policies.

Notes:	Action Items:
<p>1. Welcome and Call to Order (RC)</p> <ul style="list-style-type: none"> a. Co-Chair Roger Cohen opened the meeting by thanking everyone for their attendance and ongoing contributions. This will be the Task Force's last working meeting, as the next will be to formalize the recommended policies. He noted it has been a busy and momentous month both here in nationally with the release of NHTSA guidance. b. He noted the NHTSA guidance gives scope to the states to make variations as deemed appropriate. c. RC noted the Department has received multiple invitations to speak on this topic, including the recent demonstration by CMU at the Safety Symposium here in Harrisburg. During this event, Governor Wolf rode an HAV and met with CMU grad students working on the project. 	<p>➤ N/A</p>

Notes:	Action Items:
<p>d. EL: The Secretary is going to the ITS World Conference in Australia next week to represent the AVTF's efforts on policy formulation, as well as status of PA legislation.</p>	
<p>2. Roll Call (JB)</p> <p>a. Attendees introduced themselves. Shari Shapiro is now representing Uber in place of Ashwini. Patty Robbins of Uber also joined by phone. RC thanked all for their consistent attendance and participation.</p>	<p>➤ N/A</p>
<p>3. Review of September 14 Meeting (RC)</p> <p>a. A draft was included in the meeting package for Task Force members' review. A copy is also available on the project SharePoint site.</p>	<p>➤ N/A</p>
<p>4. Review of Contract (KM)</p> <p>a. RC: The drafting troika of JS, MK, and KT have been diligently inputting and working seamlessly on AVTF comments with our working group. Comments on the working draft continue to be welcomed. We will document differing opinions as part of the record.</p> <p>b. RC: A contract is not included in the draft legislation. Our internal work group believes a contract is necessary and is something we will recommend to the Secretary. The contract is the one way the policies can have any teeth, or enforcement value.</p> <p>c. JS: As a regulatory agency, we need to question how we approach this both to encourage testing and exercise public oversight. PennDOT needs to be nimble and reactive to constant changes in the technology. We do not want regulations that will someday need to be re-promulgated, but rather, a flexible policy. NHTSA recommends the states should have a process that includes a letter of authorization and a permit in every vehicle.</p> <p>d. JP: Manufacturers believe any contract would need to be flexible without imposing delays on the contracting process – it needs to appear more like a notification, etc. The industry needs to be able to come in and get started, with the documentation process occurring “in the background” as opposed to up front. Other states allow the testing to get started up front.</p> <p>e. KM: Is there a way though legislation to address these concerns? JS: Yes, if we add exemptions and rollbacks of things in the legislation.</p> <p>f. ODD needs to be defined in the glossary.</p> <p>g. NR: The Feds are not requiring any contracts, nor are states requiring contracts. How can we extend control to the AG's office that this process will be executed in a timely fashion? Can PennDOT still create policy with the current version?</p> <p>h. KM: we don't have to have a contract. JS has said we could issue a permit, but a letter of authorization simply means we as the</p>	<p>➤ Task Force: Provide comments to Brian Funkhouser at brian.funkhouser@mbakerintl.com</p>

Notes:	Action Items:
<p>Commonwealth would have no way to enforce the policies, other than the good faith of testers to follows them...there would be no enforcement. We prefer a simplified contract so that we remove barriers. If the law can be written to allow for a streamlined contract that becomes an affirmation of the ability of a company to do the testing, we're fine with that.</p> <ul style="list-style-type: none"> i. KM: With permits, there would be no foundational support to be able to enforce. We have moved away from regulations in favor of contracts because they are more efficient. j. KM: If there is a disagreement, it will end up in the courts, and they will ask where our authority is to enforce it. Regulations are not nimble enough. RC: How should the Commonwealth exercise its oversight and have enough flexibility to respond to changes in the technology? k. JP: Safety Assessment Letter is in the bill, but yet not a requirement under the NHTSA Guidance. Any requirement for the ODD can be problematic since it is defining a production vehicle you would deploy, or turn loose to the public. If we tell you up front what the ODD is, we end up limiting ourselves on our R&D. Say instead what range you will be testing in. l. KM: We clearly accept the fact that what NHTSA put out is that this is an initial step and not set in stone...it is just guidance. But our mantra is that we want to maintain flexibility for companies that want to test in Pennsylvania. m. MB: Could an application take the place of a contract, and then issue a permit? JS: We want to make the application the "guts" of what is approved. n. KM: if there is some way we can write the language in the legislation to address the issues that JS has noted while ensuring streamlining, we're happy to do that. Let's main flexibility while maintaining public safety. o. NR: Why aren't other states issuing contracts? p. JS: The proposal under review is consistent with NHTSA guidance. q. RC: NHTSA encourages the states to aim for "sufficient consistency." r. NR: We are competing with other states on this. I'll be seeking other legal counsel on these differences. s. EH: The goal of the contract is to ensure compliance with the policy. Why couldn't registration be suspended if a tester is in violation of the policy? KM: It would apply only to PA-registered vehicles. t. RC: Would be great if this could be cleared up by statute. We want to be responsible stewards of public safety. 	

Notes:	Action Items:
<p>5. Review of Draft Policies (JS)</p> <ul style="list-style-type: none"> a. RC: Communicate any changes to us today or in writing. b. JP: Are we clear whether a demonstration is formally required or not? The draft should probably remove the term CLOSED facility. Streamline the demonstration language under policy 1, Section III.b. on page 10 of the draft. In Section III.b.ii., the draft should read KEY versus ALL aspects of the dynamic driving task. c. EL: There are inconsistencies in the draft recommendation. "Self-driving" is referred to throughout the document. We're better to define more terms rather than less. Write this for those who are not policy experts or engineers. JS: It's a nomenclature issue...we had settled on ADS, then NHTSA came out. d. JP: They're both correct, in that an HAV operates by an ADS. In the glossary, ADS still has some old terms in it. e. JP: Under Policy #3: Operation of HAVs, under I.a.iii., the policy as written may not provide enough time. KM: Add the word "reasonable" f. JS: Regarding Policy #3, Section I.a., the word "emergency" is not defined in the Vehicle Code. g. MK: Regarding Policy #3, Section I.a., we don't know how HAVs will respond to our snow plows; it is an environment we are not comfortable with in allowing testing. CC: We will need to test in extreme weather in order for the technology to progress. KM: There needs to be some definition as to what an "emergency" is. SR: We may need to send an HAV attenuator truck out to a particular site during an emergency. Also, the governor can issue a proclamation, but so can counties and municipalities. Counties inform PennDOT when this happens. h. JP: We suggest removing the 15-point safety assessment as it is not determinative. It implies there is a minimum and it is out of place as it appears in the draft. There is no basis for compliance, as it is guidance. It is not precise. KT: Are there concerns with this? i. JP: "Marking" on a vehicle has a physical connotation to it. Perhaps change MARKINGS to IDENTIFICATION. Most of the manufacturers are going to get close to doing it the same way...the industry tends to follow itself. BW: We're looking for some consistency on this. KT: We will consult with the PSP and PennDOT on marking requirements. j. JP: Under Cybersecurity in 4.III, we may in the future see unauthorized access. The solution to this is always moving ahead of us. Not everyone is a member of AUTO-ISAC or has access to their information. PT: We need to be aware and responsive to cybersecurity issues with this policy. k. EL: Legislators and others may assume that HAVs are connected to infrastructure. JB: Eventually we will see the two technologies 	<ul style="list-style-type: none"> ➤ Task Force: Provide comments to Brian Funkhouser at brian.funkhouser@mbakerintl.com ➤ MK, JS, and KT: Fine-tune the policy language in advance of our next meeting.

Notes:	Action Items:
<p>converge. Should the policy address vehicles connected to infrastructure? SS: Be careful what is included as “infrastructure”. What is the scope of infrastructure? RC asked PT to help define transportation infrastructure.</p> <ul style="list-style-type: none"> i. JP: Policy #5 - Data Collection: There are still concerns over reporting total miles traveled. Perhaps this could be an either/or. Would be helpful from a proprietary standpoint if we’re able to report perhaps in ranges, e.g., 0-100 etc. m. JP: Policy #5 – Data Collection: Asking for fleet size in l.c.i.c. is not totally objectionable. In l.c.ii, Safety sub-bullets do not indicate if they are mandatory or voluntary. SS: will provide further comment to PennDOT on this. n. JP: Policy #5 – Data Collection: Regarding Confidentiality in Section II: is it possible that the RTK law doesn’t apply? JS: It must be through legislation. We built it into the contract too to the extent it is possible. We must protect CI and PI. This should be part of any legislative enactment to protect the industry. SS: we are supportive of the confidentiality language. o. JP: It makes more sense for the permit to be an indefinite permit unless it is revoked or cancelled to save the state time and resources (as opposed to having a permit deadline). Testing and deployment will begin to blend quickly. Perhaps contact the tester two or three years down the road and ask if everything originally stated still complies. p. JP: The definition of “deployment” is not used in the policy; I would recommend deleting it. 	
<p>6. Glossary of Definitions:</p> <ul style="list-style-type: none"> a. JB: ODD has been added but currently without definition. b. JS: We took a mix of NHTSA definitions in developing the glossary. c. JP: The ADS definition: “full or limited self-driving automation” could be removed. JS agreed. d. ES: Perhaps move the Glossary from the Appendix to a point after the Introduction to make the subsequent content more understandable. 	<ul style="list-style-type: none"> ➤ PennDOT: will move the placement of the glossary and continue fine-tuning of the definitions.
<p>7. Legislative Update (NR)</p> <ul style="list-style-type: none"> a. NR: It should be apparent that the latest version of the legislation from 9/29 reflects NHTSA guidance. The text shown in yellow includes additional provisions from the state. Some questions remain for the industry. Most significant is the effectiveness of this type of legislation. NHTSA is guidance, and not rule-making. They are collecting additional feedback on the guidance. b. NR: House would need at least 7 days for a bill coming from the Senate. 	<ul style="list-style-type: none"> ➤ N/A

Notes:	Action Items:
8. Upcoming Meetings: Schedule and Location (RC) <ul style="list-style-type: none"> a. W 19-Oct: AM Call – to review revised final draft report 	<ul style="list-style-type: none"> ➤ N/A
9. Adjournment (RC) <ul style="list-style-type: none"> a. There being no further business, Roger thanked everyone for attending and declared the meeting adjourned at 12:30. 	<ul style="list-style-type: none"> ➤ N/A
10. Future Meetings <ul style="list-style-type: none"> a. W 02-Nov: AM In Person – Adopt Policy Recommendations b. This will be held either at the Commonwealth Keystone Building, or at the Riverfront Office Center, depending upon Secretary Richard's availability. 	<ul style="list-style-type: none"> ➤ <u>EL</u>: will let RC know of Secretary Richards' availability

