Department of Transportation
Federal Motor Carrier Safety Administration

SUPPORTING STATEMENT PART A
Safety Impacts of Human-Automated Driving System (ADS) Team Driving Applications
OMB Control Number: 2126-xxxx

SUMMARY

- This new information collection request (ICR), a driving simulator study with a series of questionnaires, will quantify the safety implications of team driving applications between humans and automated driving system (ADS)-equipped commercial motor vehicles (CMVs). This study will assess the safety benefits and disbenefits of human-ADS team driving applications and support the analysis of potential requests for relief from the Federal Motor Carrier Safety Administration's (FMCSA) hours of service regulations (HOS) under 49 U.S.C. § 31315 and 49 CFR part 381.
- The simulator study will consist of a 17-hour simulator study session completed at the Virginia Tech Transportation Institute (VTTI) with a simulated Level 4 (L4) ADS. L4 ADS-equipped CMVs are capable of all functions and controls necessary for driving without human assistance in limited conditions, and the human driver will not be asked to take over control of the vehicle. The L4 ADS will not operate outside of the conditions for which it was designed. Data collected will include quantitative and qualitive dependent variables, such as simulated driving performance, eye-glance patterns and duration, demographic characteristics, opinions and perceptions of situation awareness, risky driving, advanced technology, and effectiveness of driver training. The questionnaire data are needed to answer several research questions. Approximately 80 CMV drivers are expected to complete this study.

INTRODUCTION

This is to request the Office of Management and Budget's (OMB's) review and approval of a new Federal Motor Carrier Safety Administration (FMCSA) ICR titled Safety Impacts of Human-ADS Team Driving Applications.

Part A. Justification

1. CIRCUMSTANCES THAT MAKE THE COLLECTION OF INFORMATION NECESSARY

In 2020, there were 4,588 fatal crashes involving at least one large truck or bus, resulting in 5,125 fatalities.[1] Unfortunately, the rate of fatal crashes is rising. The fatality rate rose 8.5% to 0.177 per million total vehicle miles traveled from 2019 to 2020. Furthermore, in 2020, large trucks and buses were involved in crashes injuring 160,000 people. As part of its mission, FMCSA is charged by the United States Department of Transportation (USDOT) to engage in activities to reduce crashes and subsequent injuries and fatalities involving large trucks and buses. Furthermore, the USDOT's Research, Development, and Technology strategic plan calls for human factors research to better understand errors contributing to crashes, such as driver fatigue, inattention, and reduced operator performance.[2] One method that shows promise in preventing CMV-involved crashes is equipping CMVs with ADSs.

Over the past 15 years, ADS technology has advanced rapidly through innovation and U.S. initiatives encouraging university research and ADS competitions. Past efforts have largely focused on technical hardware and software challenges related to autonomous driving; less work has focused on understanding the human factors and limitations of CMV drivers in ADS-equipped CMVs and how remote assistants or drivers may be incorporated into ADS-equipped CMVs. As more manufacturers and technology companies move toward higher levels of automation (i.e., SAE International L4 and L5), additional human factors uncertainties arise with respect to how in-vehicle drivers and/or remote assistants/drivers will team with ADS-equipped CMVs. In fact, the USDOT acknowledges this need for research in their strategic plan: "In an era of rapidly evolving transportation technologies, human factors research also focuses on interactions with technology, and analyzes the potential for distraction or misunderstanding of the capabilities of new technologies" (p. 16).[2] Finally, the USDOT's *Automated Vehicles 4.0* reaffirms the need for human factors research on ADSs to prioritize safety, and specifically for FMCSA to investigate human factors associated with ADS-equipped CMVs.[3]

The rapid advancement of ADSs emphasizes the need for timely and objective research to not impede the progress of necessary policies to support the safe implementation of technology advancements.[4] These technologies will play an increasing role in improving roadway safety and in the ability of CMVs to operate as a team with human drivers and remote assistants. Although ADS-equipped trucks hold the promise of increased safety, productivity, and efficiency, it is not fully clear how human drivers and assistants will team with ADS-equipped trucks. Currently, there are at least four human-ADS teaming use cases:

1. In-vehicle driver teams with an ADS CMV;
2. In-vehicle driver teams with a following ADS-equipped CMV;
3. In-vehicle driver teams with a remote assistant ; and
4. Remote driver teams with an ADS CMV.

Each of the teaming use cases above offers different potential human factors benefits and challenges. However, it is unclear how each human-ADS teaming use case will affect safety, productivity, and efficiency. Each teaming combination may positively or negatively affect a driver's cognitive workload and level of fatigue, alertness, or distraction compared to the case of a traditional driver in a truck without ADS. For example, the in-vehicle drivers and remote assistants/drivers in the above teaming use cases may experience varying workloads and differences in the development of fatigue. Thus, drivers and remote assistants/drivers may need different hours of service (HOS) regulations.

Previous research conducted by FMCSA[5] found a paucity of extant research related to ADS-equipped CMVs. To date, most commercial ADSs on U.S. roadways are in passenger vehicles, and CMV ADSs are only recently being implemented in real-world operations.[6] Therefore, FMCSA needs more data on ADS-equipped CMVs to understand the human factors surrounding team driving applications between humans and ADS-equipped CMVs. Data from this project will be used to provide insight into the following research questions.

Table 1. Research Questions to be Answered

No.	Research Question
1	Do drivers of ADS-equipped trucks experience different levels of fatigue compared to a non-ADS baseline?
2	How can the ADS interface be designed to improve safety, including for drivers that are deaf and hard of hearing?
3	Do drivers experience different levels of fatigue while actively driving and monitoring the ADS-equipped truck compared to remote assistants/drivers?
4	Compared to remote assistants/drivers, are drivers more or less likely to experience a lapse of attention and distraction?
5	Do drivers have different reaction times to unexpected events compared to remote assistants/drivers?
6	How do workload, fatigue, alertness, and distraction affect drivers' re-engagement with the driving task?
7	When, if ever, can a driver leave and/or return to the driver seat during a transition?
8	What is the likelihood of being involved in a safety-critical event (SCE) at the time of: 1) driver-to-ADS transition; 2) ADS-to-driver transition; 3) in-vehicle driver-to-remote assistant transition; 4) remote assistant-to-in-vehicle driver transition; 5) remote driver-to-ADS transition; and 6) ADS-to-remote driver transition?
9	How many trucks can a remote assistant safely monitor at one time?
10	What occurs when there is an emergency requiring the ADS to cease operation?
11	What HOS rules apply to the remote assistant/driver?
12	What is the ratio of time spent remote assisting to directly controlling the ADS truck?
13	What operational environment(s) are most likely to result in direct control vs. remote assisting?

The Secretary of Transportation's authority to conduct studies pertaining to CMV safety is in 49 U.S.C. 504, 31133, 31136, 31502, and is delegated to FMCSA at 49 CFR 1.87 (see Attachments A–E, respectively). Further, FMCSA is authorized to conduct research on CMVs under 49 U.S.C. 31108, "Motor Carrier Research and Technology Program."

This information collection supports the USDOT Strategic Goal of "Safety."

2. HOW, BY WHOM, AND FOR WHAT PURPOSE IS THE INFORMATION USED

2.1 Purpose of the Information Collection Effort

The objective of this project is to quantify the safety implications of the four human-ADS teaming use cases. Specifically, this project will support the following outcomes:

1. Provide data to support the analysis of potential requests for relief from FMCSA's HOS regulations under 49 C.F.R. part 381.
2. Provide an assessment of the safety benefits and disbenefits on human-ADS teaming scenarios:
   a) Driver use, workload, fatigue, alertness, and distraction when teaming with an ADS
   b) Remote assistant and remote driver use, workload, fatigue, alertness, and distraction while actively assisting and/or controlling an ADS-equipped truck

c) In-vehicle driver re-engagement to the driving task after ADS or remote driver control
d) Fleet acceptance and future integration possibilities

Answers to these research questions will provide insight into the potential safety implications associated with human-ADS team driving applications.

2.2 How Information Will Be Collected

Data will be collected from CMV drivers (hereafter referred to as "driver(s)") using VTTI's heavy vehicle driving simulator and a series of questionnaires. Drivers will be identified using VTTI's large database of truck drivers expressing interest in future studies as well as using fleets within a day's drive of Blacksburg, Virginia, as recruited via flyers, social media, or news outlets. Eligible drivers must hold a valid commercial driver's license with class A or B specification (CDL-A or CDL-B), currently drive a CMV, be 21 years of age or older, and pass the motion sickness history screening questionnaire (Attachment F). We anticipate 80 participants in total will complete the driving simulator study.

Data will be collected during one extended study session. Questionnaire data will be collected prior to the simulator study, during the simulator study, and after the simulator study (Attachment G). Driver participation in the study is voluntary; therefore, there is no obligation to answer an undesired question in any part of the questionnaires nor to continue to participate.

2.2.1 Pre-Study Data Collection

When participants arrive at VTTI on their scheduled study date, they will read and sign a paper copy of the study consent form describing participation in the study session (Attachment H). The participant will be given as much time as needed to review and ask questions. If the driver consents to participate in the study, they will complete the W-9 form for compensation purposes (Attachment I). Then the participant will be asked to complete three QuestionPro electronic questionnaires using a tablet provided by VTTI. These questionnaires cover demographics, driving experience and health, and perceptions of technology (Attachment G).

Next the participant will be asked to complete a 3-minute Psychomotor Vigilance Test (PVT) via an app on the VTTI tablet. Then the Simulator Sickness questionnaire will be reviewed with the participant so they are familiar with the questions and symptoms they should make the researcher aware of should they start to experience them.

2.2.2 Simulator Data Collection

Drivers will be randomly assigned to one of the four team use cases described in Section 1. Drivers will transition to being in-control of the simulated vehicle and allowing the ADS to be in control of the simulated vehicle. These transitions will occur in a systematic order every few hours for a total of 16 hours.

Once the driver begins driving the heavy vehicle driving simulator, the driving simulator will collect continuous data such as steering input, brake input, acceleration/deceleration, speed, stop sign/traffic light violations, major and minor crashes, curb strikes, near-crashes, and lane excursions. A video monitoring system called FlexDas will collect continuous video and simulator data during the driving scenarios. While active, FlexDas will be integrated to record data from the forward roadway simulation, the left-side and right-side simulations, a driver-

facing camera, and an over-the-shoulder camera (when appropriate). The encrypted data are stored on a removable solid-state drive within the FlexDas that can only be retrieved by select VTTI staff. Role-based access controls are utilized to ensure appropriate data use, as described in NIST 800-53, AC-3(7). Levels of access are based on the least-privilege model. Furthermore, participants will receive an anonymous Driver ID (e.g., Participant 001, 002, etc.) at the beginning of participation. The key linking the Driver ID to the driver and the key linking the driver to the data will not leave VTTI. Keys will be stored in a limited access project folder. All data collection methods (e.g., questionnaires, camera views, etc.) and the process for protecting data are included in the informed consent (Attachment H).

Eye-tracking data will be collected by an eye-tracking system and will be used in all simulation testing. This will collect objective measures of the driver's attention, gaze direction, reaction time, and drowsiness to inform conclusions on engagement in the driving/assisting tasks, distraction from a task, and fatigue. The data will be collected through the eye-tracking system, but only project team members at VTTI will have access to the data and the ability to analyze results. All study staff have received extensive training in best practices for the protection of human subjects and are acutely aware of the importance of prioritizing the protection of participant privacy in the execution of all study-related procedures. As mentioned above, all data will be linked only to an anonymous ID (e.g., Driver 001) and will be stored on a secure server within password protected, limited access folders.

Between driving tasks, drivers will be asked to complete the same 3-minute PVT via an app on the VTTI tablet. The PVT will be administered immediately after drivers complete a driving task and immediately before drivers start a driving task.

2.2.3 Post-Study Data Collection

After participating in the simulator portion of the study, participants will be given an electronic post-study questionnaire (Attachment G). This electronic assessment will be delivered in the same format as the pre-study questions (via tablet). These questions will determine attitudes and experiences with ADS technology after driving the ADS simulated CMV.

2.3 Who Will Collect the Information

FMCSA has contracted with VTTI at the Virginia Polytechnic Institute and State University (VT) to administer this study and analyze its results. The investigators currently performing this study are Matthew Camden, Richard Hanowski, Andrew Krum, Susan Soccolich, Scott Tidwell, Christiana Ridgeway, Brian Pugliese, and Xiaojian Jin.

In accordance with USDOT’s policy on research involving human subjects, this study was reviewed and approved by Virginia Tech’s Institutional Review Board (IRB) prior to beginning data collection (see Attachment J).

3. EXTENT OF AUTOMATED INFORMATION COLLECTION

All questionnaires will be loaded onto VTTI-owned computers or tablets. All responses will be automatically uploaded to an online secure database once the participants submit their answers. Simulated driving performance and eye-tracking data will be stored on an encrypted hard drive and manually uploaded by VTTI onto a secure server. Using electronic entry for data collection also reduces data entry error later needed for analysis.

4. EFFORTS TO IDENTIFY DUPLICATION

FMCSA and the VTTI research team are unaware of other research conducted, currently or in the past, that could be used to fulfill the goals of this study. A recently completed gap analysis by FMCSA on research involving ADSs in CMVs found a paucity of existing research related to ADS-equipped CMVs.[7] Much of the work relating to ADS technology involved passenger vehicles. However, the CMV environment is unique considering the physical vehicle differences, opposing use cases, and varying driver characteristics when compared to passenger vehicles. In general, the authors indicated that existing research lacks an understanding of safe and effective use of ADS-equipped CMVs on U.S. roadways and of specific research needs.

5. EFFORTS TO MINIMIZE THE BURDEN ON SMALL BUSINESSES

This study will involve a convenience sample of drivers with no efforts to target drivers from specific types or sizes or carriers. Participation in the study is voluntary, so no small business will have an imposed burden that it is not willing to bear.

6. IMPACT OF LESS FREQUENT COLLECTION OF INFORMATION

This is a new data collection effort. FMCSA has determined that this collection of information is necessary for conducting the study; currently, there is no existing data set that can be used for this project. Data will be collected from participants over a 16-month period. The study session will last approximately 17 hours. Each driver's participation is limited to the time spent at VTTI.

During each 17-hour study session, drivers will be asked to complete the data collection requirements described in Section 2.2. Less frequent collection of information would result in a lack of data needed to answer some of the research questions, which would in turn limit the data analysis.

7. SPECIAL CIRCUMSTANCES

There are no special circumstances related to this information collection.

8. COMPLIANCE WITH 5 CFR 1320.8 (b):

FMCSA published a notice in the Federal Register with a 60-day public comment period to announce this proposed information collection on June 8, 2023, and the comment period closed on August 7, 2023 (88 FR 37597; Attachment K). A total of three comments were received from the public. The first comment was submitted by the American Property Casualty Insurance Association (APCIA). APCIA provided support for the study, indicating that the study will provide important data on how human-ADS teaming may affect driver workload, fatigue, and alertness. Additionally, APCIA's comment discussed the challenges associated with developing insurance policies for ADS-equipped commercial motor vehicles (CMVs), which will be dependent on access to information to identify vehicles with ADS and their functions. FMCSA agrees that results from this study will provide important data on how human-ADS teaming applications affect drivers' workload and attention; however, it is not within the scope of this study to examine how the public and insurers can access information on a CMV's ADS and their functions.

The second comment was submitted by an individual. This comment expressed concerns for the safety of ADS-equipped CMVs and how ADS-equipped trucks will be compliant during a roadside inspection. FMCSA is actively engaged in many research and administrative activities to help improve the safety of CMV drivers and the general public, including research on ADS-equipped CMVs. There are many research questions that need to be answered before ADS-equipped CMVs are deployed at scale. Some of these research questions are focused on the ADS technology itself to ensure that the ADS technology functions as intended and incorporates the appropriate redundant failsafe systems. Other research questions focus on the human factors associated with how drivers will interact and team with ADS and how law enforcement will ensure the safe operation of ADS-equipped CMVs. Results from this study, and other studies focused on ADS-equipped CMVs, will help to ensure the safety of ADS and drivers on the road.

The final comment was submitted by the Autonomous Vehicle Industry Association (AVIA). AVIA provided support for the study to gather additional information that could be used, in part, to inform decisions in response to potential requests for relief from FMCSA's hours of service regulations under 49 U.S.C. § 31315 and 49 CFR part 381. Additionally, AVIA requested amending the language in the study to align with terminology used in SAE J3016. Specifically, AVIA recommended replacing the term "remote monitor" with "remote assistant" and "remote operator" with "remote driver." FMCSA agrees that the use of consistent communication is important when describing ADSs. FMCSA revised the terminology to align with SAE J3016.

9. PAYMENTS OR GIFTS TO RESPONDENTS

Participants will be compensated for their time in the study. Drivers will receive up to $850 per session (i.e., $50 per hour) for participating in the 17-hour study session. This hourly compensation aligns with the 90th percentile loaded wage for heavy vehicle operators (see Section 12 below).[8,9] Compensation aligning with the 90th percentile was selected as it could also reimburse for travel expenses (i.e., mileage, gas) and account for a higher value placed on a driver's limited free time each week. As the participants are heavy vehicle operators, they work up to 70 hours each week, and are often only home for 2 days each week to be with family and to complete errands and chores. Because this free time is so limited, it is more valuable than the average hourly wage. Thus, compensation needs to be higher than the mean wage; compensation needs to adequately reflect asking participants to use part of the only 34 to 48 hours they are home each week. Compensation will be prorated to the nearest hour if participants choose to leave the study early. Participants will be paid via Clincard. A bonus of $100 will be provided to participants who complete the entire 17-hour session. Due to the length of the study session, participants will also be compensated $25 for food. Thus, drivers that participate in the entire study session may receive up to $975 (up to $850 for the study session, $100 bonus, and $25 food reimbursement). Additionally, the study will arrange a ride to Blacksburg, VA, at no cost to the participant if they live within 30 miles. If participants live more than 30 miles away from Blacksburg, VA, the study will pay for a one-night stay at a local hotel. Reducing the hourly compensation or the bonus will have significant negative effects on the data collection effort.

10. ASSURANCE OF CONFIDENTIALITY

Drivers will receive a unique anonymous Driver ID (e.g., Participant 001) at the beginning of participation. The key linking the Driver ID to the driver and the key linking the driver to the

data will not leave VTTI. Keys will be stored in a limited-access project folder. The study's principal investigator (PI), Matthew Camden, and limited members of the research team assigned by the PI will have access to the folder. The key will be destroyed no later than 12 months after the end of the study contract. After being assigned a Driver ID, all questionnaires and other sensitive data will use this ID to avoid a breach of confidentiality. The electronic questionnaire data will be collected via a VTTI tablet, so no identifiable IP addresses will be collected. Information collected to compensate the participant will be obtained but will never be stored with study data.

Respondents may refrain from answering any questions that they do not feel comfortable answering. Respondents may also choose to leave the study at any time if they change their mind about participating.

Video and audio data will be collected using the VTTI FlexDas. The storage drive will be swapped after each participant and uploaded to the VTTI server. Once on the secure VTTI server, the data will have limited access granted only to the research team working on the project; access will be controlled by the study PI. The continuous eye-tracking data belong solely to VTTI and will not be shared with the eye-tracking company. The eye-tracking data will be stored on the secure VTTI server and will be handled in the same manner as video and audio data. The heavy vehicle driving simulator does not collect any personally identifiable information (PII), but a Driver ID will be assigned to the data. Therefore, all data will be stored on the VTTI limited-access secure server.

All study staff have received extensive training in best practices for the protection of human subjects and are acutely aware of the importance of prioritizing the protection of participant privacy in the execution of all study-related procedures. The consent form will explain to the participants what they can do to protect their privacy. The research team will go through all necessary steps to ensure the confidentiality of participant data whenever possible.

11. JUSTIFICATION FOR COLLECTION OF SENSITIVE INFORMATION

No questions of a sensitive nature will be asked for this data collection.

12. ESTIMATE OF BURDEN HOURS FOR INFORMATION REQUESTED

It is estimated that the driver sample will be drawn from CMV drivers who have previously participated in research at VTTI and drivers located within a day's drive of Blacksburg, Virginia. The objective is to recruit 80 participants from this accessible population. As discussed in detail in Part B, 88 participants account for potential participant drop out. The only eligible participants are CMV drivers with a CDL-A or CDL-B who are 21 years old or above and who currently drive a CMV.

Respondent burden is associated with completing the study questionnaires and "driving" in the heavy vehicle simulator for extended periods of time during the study session. All 88 participants respondents (including the 80 respondents that we anticipate completing the entire study) will spend approximately 1 hour completing pre- and post-simulator-study materials consisting of the following: Consent Form (Attachment H), W-9 Compensation Form (Attachment I), Demographics & Previous Experiences questionnaire (Attachment G), Perceptions of

Technology & Vehicle ADS questionnaire (Attachment G), 3-minute PVT, Driver Behavior questionnaire (Attachment G), and Simulator Sickness questionnaire (Attachment F). Researchers pilot tested the length of each questionnaire to estimate the burden minutes per response. During primary data collection, the participants will spend approximately 16 hours in the driving simulator while transiting being responsible for the control of the CMV. Between transitions, participants will complete a PVT. After participating in the study, participants will complete the Post-Study ADS Experiences & Perceptions questionnaire (Attachment G). The estimates of burden hours resulting from the participating respondents are presented below in Table 2.

Table 2. Respondent Tasks

Type of Respondent	Task Name	No. Of Respondents	No. Of Responses per Respondent	No. Of Responses	Burden per Response (minutes)	Total Burden Hours
Eligible CMV Drivers	Recruitment	160	1	160	10 minutes	26.7
	Consent form	88	1	88	15 minutes	22
	W-9 form	88	1	88	2.5 minutes	3.7
	Pre-study Demographics & Previous Experiences questionnaire	88	1	88	4.5 minutes	6.6
	Perceptions of Technology & Vehicle ADS questionnaire	88	1	88	6.25 minutes	9.2
	PVT	88	8 (at each transition point within the Human-ADS Team Driving task)	704	3 minutes	35.2
	Pre-Study Driver Behavior questionnaire	88	1	88	3.6 minutes	5.3
	Post-Study ADS Experiences & Perceptions questionnaire	88	1	88	6.1 minutes	8.9
	Human-ADS Team Driving	88	1	88	960 minutes	1,408
	Study Total	**–**	**–**	**1,480 Responses**	**–**	**1,525.6 hours**

The data collection process will progress across a period of 16 months. The total number of study responses is 1,480. Burden hours for the study total 1,525.6 hours, or an average annual burden of 508.5 hours across the three years of Office of Management and Budget approval. The previous burden hours estimation is a conservative calculation with a hypothetical zero participant dropout rate. It is likely that approximately 8 drivers will drop out on average halfway through the simulator portion of the study, resulting in 80 participants completing the entire 16 hours of simulation (as well as the post study questionnaire), and 8 participants completing only 8 hours of simulation (with no post study questionnaire). The 80 drivers who participate in the full study are expected to see a burden of 17 hours.

Only CMV drivers will undertake the study tasks. We assume that the impacted CMV driver occupation corresponding to the Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES) is Heavy and Tractor-Trailer Truck Drivers, which has a median hourly wage of $14.77, $23.23, and $34.97, for the 10th, 50th, and 90th percentiles, respectively, for the Truck Transportation industry (Occupation code 53-3032), from the BLS May 2021 National Industry-Specific Occupational Employment and Wage Estimates.[8] To arrive at a loaded wage, we first estimated a load factor of 1.40 by dividing the total cost of compensation for private industry workers of the trade, transportation, and utilities industry ($32.07) by the average cost of hourly wages and salaries ($22.91) as reported by the BLS in its Employer Costs for Employee Compensation for December 2021 ($32.07 ÷ $22.91 = 1.40).[9] Multiplying the mean hourly wage by the load factor results in a loaded hourly wage range of $20.68 to $48.96 ($14.77 x 1.40 = $20.68; $23.23 × 1.40 = $32.52; $34.97 x 1.40 = $48.96). Table 3 shows the calculated wage for the truck driving population.

Table 3. Respondent Occupation and Wage

BLS OES Occupation Code	BLS OES Occupation Description	10th Percentile Hourly Wage	Median Hourly Wage	90th Percentile Hourly Wage	Load Factor	Loaded Hourly Wage
53-3032	Heavy and Tractor-Trailer Truck Drivers	$14.77	$23.23	$34.97	1.40	$20.68–$48.96

The loaded hourly wage for each respondent task was multiplied by the total burden hours per task to arrive at the total cost per task. In all, these tasks involve 1,480 responses and cost $31,549.41–$74,693.38, which are annualized at 493 responses and $10,516.47– $24,897.79. The breakdown is illustrated in Table 4.

Table 4. IC2: Respondent Task Costs

Respondent Task	Hourly Wage Range	Total Burden Hours	Cost per Task
Recruitment	$20.68–$48.96	26.7	$552.16–$1,307.23
Consent form	$20.68–$48.96	22	$454.96–$1,077.12

Respondent Task	Hourly Wage Range	Total Burden Hours	Cost per Task
W-9 form	$20.68–$48.96	3.7	$76.52–$181.15
Pre-study Demographics & Previous Experiences questionnaire	$20.68–$48.96	6.6	$136.49–$323.14
Perceptions of Technology & Vehicle ADS questionnaire	$20.68–$48.96	9.2	$190.26–$450.43
PVT	$20.68–$48.96	35.2	$727.94 – $1,723.39
Pre-Study Driver Behavior questionnaire	$20.68–$48.96	5.3	$109.60–$259.49
Post-Study ADS Experiences & Perceptions questionnaire	$20.68–$48.96	8.9	$184.05–$435.74
Human-ADS Team Driving	$20.68–$48.96	1,408	$29,117.44–$68,935.68
Study Total	**–**	**–**	**$31,549.41–$74,693.38**

Totals for this ICR:

- **Estimated Total Burden Hours:** 1,525.6 hours
- **Estimated Total Responses:** 1,480 responses
- **Estimated Total Respondents:** 80 respondents
- **Estimated Total Annual Burden Costs:** $10,516.47–$24,897.79

13. ESTIMATE OF TOTAL ANNUAL COSTS TO RESPONDENTS

There are no additional costs to respondents beyond those associated with the hourly burden presented above.

14. ESTIMATE OF COST TO THE FEDERAL GOVERNMENT

The research design, protocol development, and implementation of the research methods will be completed between Fiscal Year (FY) 2022 and FY 2025. The total cost for the contract is $1,794,859. This includes the development of the research protocol, information gathering from select carriers and ADS providers, programing the driving simulator, participant recruitment, executing the study procedures, paying participants, analyzing the data, and writing the final report. Additionally, FMCSA's COR cost for the contract is $32,820 between FY 2022 and FY 2025. Thus, the total cost to the Federal Government is $1,827,679.

15. EXPLANATION OF PROGRAM CHANGES OR ADJUSTMENTS

This is a new information collection.

16. PUBLICATION OF RESULTS OF DATA COLLECTION

The results of this information collection will be documented in a technical report to be delivered to and maintained by FMCSA. The report will summarize the data relied upon, analyses, results, and conclusions, which will help inform policy on ADS regulation in the trucking industry and the situations impacting human factors in ADS-equipped CMVs. All data collected in this effort will be reported in an aggregated format in which any specific individual participant cannot be identified such as "Only 27% of drivers indicated a positive attitude towards ADS technology prior to participating versus 87% after the study."

Only authorized project personnel and authorized employees of the research sponsors will have access to study data that personally identifies participants or that could be used to personally identify participants while the participant is enrolled in the study. The research team or project sponsor may also show specific clips of deidentified video at research conferences and project meetings. Participants' names or other identifying information will never be associated with the showing of such video clips at conferences. The data from this study will be included in the FMCSA Data Repository (IRB #20-539). A de-identified public-use data set will be posted online, and identifiable data will be available to qualified researchers with privacy and security protections in place.

17. APPROVAL FOR NOT DISPLAYING THE EXPIRATION DATE OF OMB APPROVAL

No such approval is being requested.

18. EXCEPTIONS TO CERTIFICATION STATEMENT

None.

ATTACHMENTS:
The attachments F, G, H, and I are information collection instruments.

A. Title 49 U.S.C. § 504 titled, *"Reports and records."*
B. Title 49 U.S.C. § 31133 titled, *"General powers of the Secretary of Transportation."*
C. Title 49 U.S.C. § 31136 titled, *"United States Government regulations."*
D. Title 49 U.S.C. § 31502 titled, *"Requirements for qualification, hours of service, safety, and equipment standards."*
E. Title 49 CFR § 1.87 titled, *"Delegation to the Federal Motor Carrier Safety Administrator."*
F. Recruitment Materials
G. Data Collection Materials
H. Informed Consent Form
I. W9 Form
J. Virginia Tech IRB approval letter.
K. Federal Register 60-day notice (88 FR 37597), June 8, 2023.

[1] FMCSA. (2022). *Large Truck and Bus Crash Facts 2020*. Federal Motor Carrier Safety Administration, USDOT. Retrieved from https://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts-2020#A4

[2] USDOT. (2020). *Research, development, & technology strategic plan FY 2018-2022.* Retrieved from https://www.transportation.gov/sites/dot.gov/files/2020-11/DOT%20RDT%20Strat%20Plan%20-%20112320%20-%20Final.pdf

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