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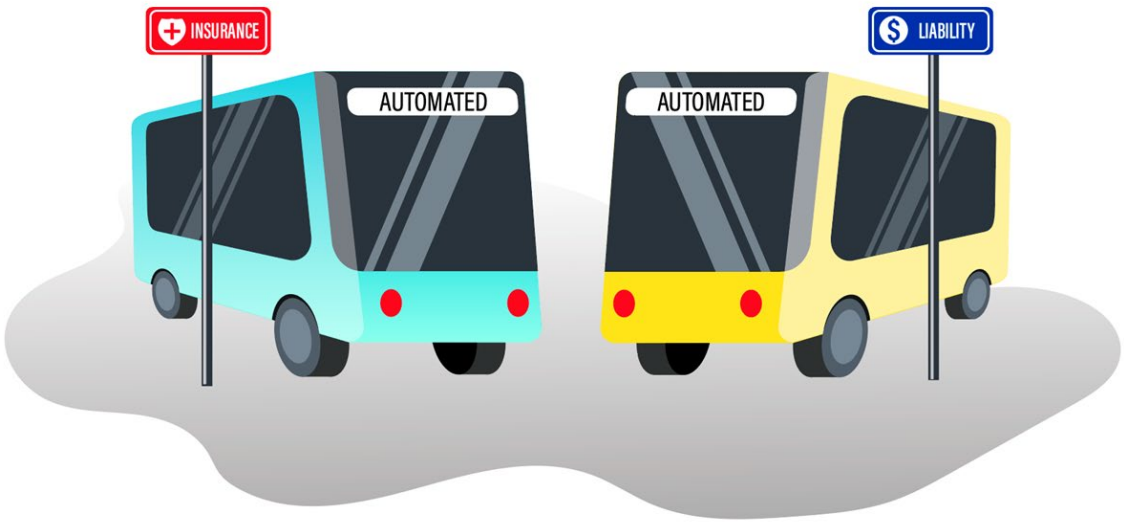
Insurance and Liability for Automated Transit Buses: State of the Practice Review

APRIL 2021

FTA Report No. 0192

PREPARED BY
John A. Volpe National Transportation Systems Center



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Metric Conversion Table

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: volumes greater than 1000 L shall be shown in m^3				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC

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14. ABSTRACT

Testing, demonstration, and adoption of new technologies in public transportation require transit agencies to address technological, operational, and institutional issues. Insurance and liability for automated transit buses is one such topic for which stakeholders may not always be aware of the options available or the process to secure a policy, given the early stage of technological development. This report provides an overview of the state of the practice, as informed by insurance industry representatives and stakeholders with recent experience regarding automated transit bus pilots and demonstration projects. The scan finds that insurance for these projects is available but not routine and provides some considerations.

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TABLE OF CONTENTS

Abstract

Testing, demonstration, and adoption of new technologies in public transportation require transit agencies to address technological, operational, and institutional issues. Insurance and liability for automated transit buses is one such topic for which stakeholders may not always be aware of the options available or the process to secure a policy, given the early stage of technological development. This report provides an overview of the state of the practice, as informed by insurance industry representatives and stakeholders with recent experience regarding automated transit bus pilots and demonstration projects. The scan finds that insurance for these projects is available but not routine and provides some considerations.

SECTION

1

Introduction

Testing, demonstration, and adoption of new technologies in public transportation require transit agencies to address technological, operational, and institutional issues. Insurance and liability for automated transit buses is one such topic where stakeholders may not always be aware of the options available or the process to secure a policy, given the early stage of technological development. This report provides an overview of the state of the practice, as informed by insurance industry representatives and stakeholders with recent experience regarding automated transit bus pilots and demonstration projects.

Purpose

To support the development and deployment of automated bus transit services, the United States Department of Transportation (USDOT) Federal Transit Administration (FTA) has developed a five-year Strategic Transit Automation Research (STAR) Plan that outlines the agency's research agenda on driving automation systems.[1] This paper supports the goals of the STAR Plan, which include identifying and resolving barriers to deployment. Questions related to insurance have been raised by agencies interested in hosting a pilot project. During stakeholder outreach, both in the preparation of the STAR Plan and following its publication, some transit agency representatives have identified the uncertainty around insurance as creating a potential barrier to their progress in this field. This report documents the current state of the practice and is not intended to be viewed as official guidance or recommendations.

Methodology

Project staff reviewed publicly-available materials, such as requests for proposals (RFPs), case studies, and company websites, to determine insurance requirements and practices relevant to automated transit buses (including smaller-form transit vehicles such as automated shuttles, cutaway vans, and similar vehicles used to provide transit service). From the available literature, staff identified gaps in knowledge to inform interviews with industry representatives. These interviews occurred between September and December 2020 and included discussions with representatives from insurance companies, transit agencies, private transit service operators, and technology developers, as described below:

[1] For more information on this work and access to a draft of the Strategic Transit Automation Research Plan document, visit https://www.transit.dot.gov/research-innovation/strategic-transitautomation-research-plan.

- **Insurance companies** – The insurance market comprises insurance companies, reinsurance companies, and insurance brokers, each serving a unique function in the overall insurance market. Transit agencies securing insurance for automated transit buses are likely to deal with one or more of these companies during this process.
- **Transit agencies** – Each transit agency included in the outreach effort has hosted an automated transit bus pilot project or has gone through the planning process to prepare for a project.
- **Private transit service operators** – Transit agencies may contract with an operator to provide a transportation service. Operators may procure vehicles (through purchase or lease), provide on-board attendants, or conduct operations and maintenance activities.
- **Technology developers** – Technology developers may design or manufacture automated transit buses or the systems used in automated transit buses.

SECTION 2

Background

Automation

Automation in vehicles covers a wide range of technology levels and capabilities. SAE International provides a scaling system of automation from Level 0 (no automation) to Level 5 (full automation):[2]

- **Level 0 features** do not include automation of foundational systems (e.g., steering, braking, or propulsion) on a sustained basis but may include momentary automation of foundational systems (e.g., automatic emergency braking to prevent or mitigate collisions).
- **Level 1 features** automate either lateral (steering) or longitudinal (propulsion and braking) systems and require an engaged human driver to constantly monitor the driving environment.
- **Level 2 features** automate both lateral and longitudinal systems and require an engaged human driver to constantly monitor the driving environment.
- **Level 3 features** do not require an engaged human driver to constantly monitor the driving environment but do require a human driver to be present and respond appropriately to a request to intervene.
- **Level 4 features** do not require a human driver to be present but may have a limited operational design domain (ODD), meaning that the feature will be able to operate only under certain roadway or environmental conditions.
- **Level 5 features** do not require a human driver to be present and can operate under all ODDs that can be managed by a human driver.

Level 0–2 features are often referred to as advanced driver-assistance systems (ADAS), and Level 3–5 features are often referred to as automated driving systems (ADS).

ADAS with automated actuation (e.g., adaptive cruise control, automatic emergency braking, and lane keeping assistance) is available in many light-duty vehicles and some heavy duty trucks but is generally not commercially-available in transit buses.[3] Some ADAS features for transit buses are being tested in pilots (e.g., the Pierce Transit project funded through a Safety Research and Demonstration Program grant from FTA).[4] ADS are in the prototype testing

[2] https://www.sae.org/standards/content/j3016_201806/.

[3] See the FTA "Transit Bus Automation Market Assessment" report at https://www.transit.dot.gov/sites/fta.dot.gov/files/2020-07/FTA_Report_No._0144_Update.pdf.

[4] https://www.piercetransit.org/news/?id=252.

stage for all vehicle types, including transit vehicles (e.g., low-speed automated shuttles, cutaway buses, and larger city transit buses).

Pilot Organization

Pilot projects often involve the partnership of several different organizations and stakeholders. Although the participation may vary between projects, there are some typical roles. The host organization, such as a public transit agency or university, typically plans the pilot, contracts with other organizations, and manages the coordination of various stakeholders. The host organization will likely put out an RFP in search of an operator that is willing to comply with the specifications outlined in the request. The operator may purchase or lease vehicles, provide on-board attendants, and perform operations and maintenance activities. Technology developers produce the ADS and may also be involved in vehicle design and manufacture. These companies do not always play an active role in the day-to-day operation of a pilot project but do remain responsible for supporting and updating their products. There is significant variation between projects, and the roles are not necessarily mutually exclusive; for example, a technology developer may directly operate and maintain vehicles during the course of a pilot.

Insurance

Transit agencies may use a mix of strategies, including self-insuring, forming insurance pools, and purchasing insurance. Transit agency size can influence insurance strategies, with larger agencies often self-insuring and smaller agencies often purchasing insurance.[5]

To identify relevant types of insurance for transit bus automation, the project team directly consulted subject matter experts and performed a scan of publicly-available RFPs, which generally include minimum coverage requirements. The scan of RFPs for automated transit bus projects revealed trends and similarities between insurance requirements for various projects. The high degree of similarity among various RFPs is not surprising, as it is relatively common for agencies to consult documents from previous projects and adapt the wording to suit their needs. Additionally, one interviewee supplied documentation on types of insurance frequently required for automated vehicles.[6] Common types of insurance for automated transit bus pilots are described as follows:

- **Workers' Compensation and Employer's Liability** – Employer liability is a type of workers' compensation. Generally, workers' compensation is

[5] The most recent publication on this topic found by the research team was in 1995, suggesting that this may be a field ripe for research. However, anecdotal evidence from stakeholder discussion suggests that this pattern holds today. See http://onlinepubs.trb.org/onlinepubs/tcrp/tsyn13.pdf.

[6] https://ioaautonomy.com/coverage-guide.

subject to state law requirements (that may vary per industry) with minimum thresholds of coverage to which the company must comply.

- **Commercial General Liability Insurance** – A commercial general liability policy provides coverage for bodily and personal injury, and property damage caused by a company's products or operation.
- **Automobile (Vehicle) Liability** – Commonly referred to as "auto liability," this is similar to a policy held by individuals for their personal vehicles. It covers the cost of damages in the form of bodily injury and property damage inflicted on another party while driving.
- **Professional (Business) Liability** – This policy is also often called "technology errors and omissions" and covers losses to a third party for damages as a result of technology failure. This policy is necessary only when a product is being used by a third party.
- **Equipment Stack (Inland Marine)** – This insurance typically covers high-value tools and products and may be used to insure products while they are being shipped or stored. In the case of automated vehicles, it can be used to cover the equipment stack (e.g., sensors and cameras), which is likely not covered by an auto liability policy.

Insurance requirements and their coverage limits by state for the RFPs reviewed can be found in Appendix A. In addition to the common types of insurance required as identified above, reviewed RFPs included other, less frequently-requested types of insurance. Interviewees also identified additional types of insurance that may be required, depending on the specific details of a pilot. These less-common types of insurance include valuable papers and records insurance, umbrella coverage, indemnity, excess liability coverage, director and officer liability, and cyber liability insurance.

SECTION 3

Findings & Conclusion

As described by one interviewee, insurance is a "backwards-looking industry." Historical data about experience with a technology or product are key factors in an insurer's decision of whether or not to provide insurance and at what cost. For an emerging technology such as ADS, for which historical data are not available in general, particularly for applications such as public transportation, this lack of historical data can reduce the pool of potential insurers. With regard to ADS, the insurance industry is at an early stage, and several insurers are actively pursuing research opportunities or participating in industry forums and working groups to learn more about the technology.

Insurance is available but not routine. In general, insurance coverage is widely available for ADAS-equipped vehicles. However, although multiple insurance firms do provide coverage for ADS-equipped vehicles, including some in automated transit bus pilot applications, not all insurers are in this market. Transit agencies may need to invest effort to find a firm willing to insure their project.

Interviewees had different perceptions of how this very small market has evolved in recent years, which may be explained, in part, by the large variation in how implementations are conducted and the range of interest in new technologies from insurers. For example, one interviewee characterized the market as increasingly open to and willing to insure ADS projects, expanding from a single insurance provider to five insurance providers over the past few years. On the other hand, another interviewee noted that in the wake of high-profile crashes involving driving automation, insurance companies have asked for increasingly extensive documentation on technologies and implementation, even requiring third-party technical experts to evaluate automated technologies and their readiness levels prior to offering insurance.

Multiple aspects of the implementation will affect insurability. The details of the implementation and the ODD will inform insurance requirements and costs as well as the complexity of insuring the project. Factors that interviewees identified as relevant are noted below. As a general principle, factors that reduce risk are preferred by insurers. For example, one interviewee noted that higher speeds, larger vehicle masses, and more expensive base vehicles can increase insurance costs for full-size buses as much as five times over low-speed shuttles, which use smaller, lighter, and less-expensive platforms. Because insurance is a complex topic for which multiple factors are considered in context, it was not possible for the project team to identify clear best practices universally applicable to all implementations. Interviewees suggested that key

variables that may influence insurability and cost include characteristics related to the following:

- **Duration** – length of pilot or demonstration activity.
- **Operators** – presence or absence of an onboard operator, affiliation of the onboard operator (e.g., technology developer employee, transit agency employee, or other affiliation), and operational role of onboard operator (if present).
- **Vehicle** – vehicle mass, value, and passenger capacity.
- **ADS** – ISO 26262 compliance, maturity of the system, and level of automation.
- **Operations** – vehicle speed, presence or absence of other vehicles and other road users, operational environment (e.g., test track, dedicated guideway, or public roadway), speed limit, use case, and whether the vehicle is operating as part of a demonstration or in revenue service.
- **Passengers** – presence or absence of passengers, number of passengers, whether passengers have signed a waiver, and who the passengers are (e.g., children, passengers with disabilities).

Vehicle ownership and operation arrangements inform which parties are insured, and how. Transit agencies may purchase or lease vehicles, or an operator or technology developer may provide vehicles as part of a contract. These arrangements will influence which parties are insured for what. For example, in many pilots to date, transit agencies have not purchased vehicles outright, and vehicle operations have been handled by the technology developer or a third-party operator. In these cases, the technology developer or operator will likely carry a majority of the necessary insurance rather than the transit agency. However, in cases where the transit agency purchases a vehicle, that agency becomes responsible for a majority of the insurance (i.e., excluding Errors and Omissions coverage, which would remain the responsibility of the vehicle/equipment producer).

State and local laws and regulations will influence insurance needs. Workers' compensation requirements vary from state to state. Some agencies may have local requirements to work with a firm based in their state. One interviewee noted the relative advantage of working in Florida, which has sovereign immunity, as described below:

> "Neither the state nor its agencies or subdivisions shall be liable to pay a claim or a judgment by any one person which exceeds the sum of $200,000 or any claim or judgment, or portions thereof, which, when totaled with all other claims or judgments paid by the state or its agencies or subdivisions

> arising out of the same incident or occurrence, exceeds the sum of $300,000." Florida Statutes § 786.28(25) (2018)

Sovereign immunity provides the benefit of limited exposure per incident, which would tend to reduce the risk for the insurer.

Advice from Interviewees

Interviewees provided the following advice to transit agencies or other organizations planning to host an automated transit bus pilot:

- Consider working with a knowledgeable broker to help determine and find the right coverage.
- Invite insurance brokers and providers to visit the site and experience the technologies in person.
- Include insurance requirements clearly in RFPs or other procurement documents.
- Control the ODD to reduce insurance costs. This includes limiting the project to fixed routes, using dedicated lanes, and keeping automated vehicles separate from mixed traffic and pedestrians. In general, the less exposure a project has, the lower the insurance costs will be.
- Research vehicle capabilities and limitations before selecting a vehicle.

Conclusion

Insurance is available for automated transit buses, but it may require significant up-front investment of time to determine insurance requirements and identify a broker, and ultimately an insurance provider, which are a good fit for the project. Interviewees generally suggested that insurance should not be a barrier to the deployment of automated transit bus projects and were optimistic that it will be increasingly mainstreamed over time.

APPENDIX

A

Selected Requests for Proposals

The research team reviewed publicly-available RFPs and documented their insurance requirements. (Note: This is not a comprehensive list of RFPs for automated bus transit projects.)

Organization and Project	Workers' Compensation and Employer's Liability	Commercial General Liability Insurance	Vehicle Liability and Automobile Liability	Business (Professional) Automobile Liability	Other
Ohio Department of Transportation RFP #505-19, Automated Shuttle Service Public-Private Partnership Issued: July 2, 2018 Reference: p. 24-25	Coverage in compliance with State laws	$1,000,000 – Per occurrence, $2,000,000 – General aggregate	$1,000,000 – Combined single limit for bodily injury and property damage	$5,000,000 – Combined single limit each accident bodily injury and property damage	Valuable papers and records insurance; umbrella coverage in excess of underlying liability policies in amount not less than $1,000,000 per occurrence / $1,000,000 aggregate
State of Rhode Island Department of Administration RFP – Bid #7592714, RI Transportation Innovation Partnership Autonomous Vehicle Mobility Challenge Issued: April 2018 Reference: p. 26-31	$1,000,000 – Bodily injury by accident, each accident $1,000,000 – Bodily injury by disease, each employee $1,000,000 – Bodily injury by disease, policy limit	N/A	$2,000,000 – Per occurrence combined single limit for bodily injury and property damage (vehicles carrying up to 10 passengers) $5,000,000 – Per occurrence combined single limit for bodily injury and property damage (vehicles carrying greater than 10 passengers)	$1,000,000 – Per claim $5,000,000 – Aggregate	Insurance of personal property, equipment, machinery and facilities; indemnification clause included
US Ignite[7] RFP, Autonomous Vehicle Research Testbed: On Base Shuttle Issued: June 2020 Reference: p. 22-23	Coverage in compliance with State laws	$1,000,000 – Per occurrence $2,000,000 – General aggregate	$1,000,000 – Combined single limit for bodily injury and property damage	$2,000,000 – Per claim $2,000,000 – Annual aggregate; any deductible will be sole responsibility of successful proposer and may not exceed $50,000 with written approval of US Ignite	Valuable Papers and Records Insurance: Insurance covering valuable papers and records shall be included only if specifically required in the Agreement. Umbrella coverage in excess of the underlying liability policies in an amount not less than $5,000,000 per occurrence Indemnification clause is included

[7] US Ignite is a private company that released an RFP on behalf of the U.S. Army Installation Fort Carson in Colorado.

Organization and Project	Workers' Compensation and Employer's Liability	Commercial General Liability Insurance	Vehicle Liability and Automobile Liability	Business (Professional) Automobile Liability	Other
Minnesota Department of Transportation RFP, Minnesota Autonomous Bus Pilot Issued: Mid 2017 Reference: p. 15-16	$100,000 – Bodily injury by disease per employee $500,000 – Bodily injury by disease aggregate $100,000 – Bodily injury by accident	$2,000,000 – Per occurrence $2,000,000 – Annual aggregate $2,000,000 – Annual aggregate Products/ completed operations	$5,000,000 – Per occurrence combined single limit for bodily injury and property damage (for vehicles carrying 20 or less passengers) $10,000,000 – Per occurrence combined single limit for bodily injury and property Damage (for vehicles carrying 21 or more passengers)	$2,000,000 – Per claim $2,000,000 – Annual aggregate	N/A
Michigan Department of Transportation Checklist to Designate Areas of Evaluation for Proposal and Scope of Service for Specialty Services, NAIAS 2020 Michigan Mobility Challenge Issued: July 2019 Reference: p. 4	Workers' Compensation: Coverage in compliance with state laws Employer's Liability: $500,000 – Each accident $500,000 – Each Employee by disease $500,000 – Aggregate disease	$1,000,000 – Each occurrence $1,000,000 – Personal & advertising injury $2,000,000 – General aggregate $2,000,000 – Products/ completed operations	$1,000,000 – Per occurrence	$1,000,000 – Per claim	N/A
State of Florida Department of Transportation RFP-DOT-18-19-5010-UCF, District 5 Autonomous Shuttle Service for University of Central Florida Campus Issued: April 12, 2019 Reference: p. 7, 45, 64-65	Coverage in compliance with State laws	$2,000,000 minimum each occurrence	$2,000,000	$5,000,000	Excess liability insurance of at least $10,000,000 minimum each occurrence; cyber liability insurance of at least $5,000,000

APPENDIX

B

Interviewees

The team conducted interviews with representatives from the following companies:

Company	Industry
First Transit	Operator
Insurance Office of America (IOA)	Insurance Broker
Jacksonville Transit Authority (JTA)	Transit Agency
Liberty Mutual	Insurance Agency
Marsh	Insurance Broker
May Mobility	Developer
Munich Re	Reinsurance Company
Robotic Research	Developer
State Farm	Insurance Agency
Transdev	Operator
Valley Transit Authority (VTA)	Transit Agency

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