

Bus driver's cab design

The inclusive and ergonomic bus cab of the future

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MAYOR OF LONDON



Contents

3



An inclusive, ergonomic and comfortable bus driver's cab

4



Reimagining the bus driver's cab as an inclusive and ergonomic workspace

10



Delivering the new inclusive and ergonomic bus driver's cab of the future

11



Developing the new bus driver's cab design

14



Call for innovation and collaboration from the bus industry

An inclusive, ergonomic and comfortable bus driver's cab

Our vision is for an inclusive and ergonomic driver's cab that is adjustable and designed for different body types

We want to reimagine the driver's cab to ensure it is designed holistically as a workplace that is safe, comfortable and secure for all bus drivers.

The new bus driver's cab design has seven key aims:

- Provide a comfortable, user-friendly and adjustable driver's cab that is designed for different body types to support a more inclusive workforce. With a shortage of bus drivers across the industry, an inclusive and ergonomic cab design is vital to attracting and retaining bus drivers, particularly more women
- Improve the safety of bus drivers by ensuring they are better protected in a collision
- Improve bus driver health and wellbeing through reducing health issues related to poor ergonomics and improve drivers' perception of the cab as a comfortable and inviting workspace. We want to elevate the driver's status and make drivers feel valued
- Reduce driver impairment, including fatigue from physical manoeuvring, and mental and cognitive overload from risks including illegal substances and distractions due to sounds and alerts in the cab
- Improve the safety of bus customers and road users outside the bus through new technology and measures implemented through the Bus Safety Standard, including enhanced driver assist systems and better integration of systems to mitigate safety risks by warning the driver or intervening on their behalf in emergency situations
- Support an improved bus customer experience, as well as customer safety, through better communication between the driver and customers, including wheelchair users
- Support improved bus driver security to ensure drivers feel secure and protected



Reimagining the bus driver's cab as an inclusive and ergonomic workspace

An ergonomic and user-friendly cab design is a critical part of delivering a safe and secure bus network; supporting safer driving as well as ensuring the safety of bus drivers

Our target, set out in our Vision Zero action plan, is for a safe bus network in London with no one killed on or by a bus by 2030, and no one killed or seriously injured on or by a bus by 2041. An ergonomic workplace that supports safer driving and improves safety for the bus driver is an important part of achieving this and supports our aims for a safe and secure bus network where everyone can travel by bus safely and with confidence.

The role of a bus driver involves managing a range of demands. Navigating London's

streets alone requires drivers to have a high level of skill, competency and concentration. Alongside this, bus drivers need to manage a range of attentional and cognitive demands in the vehicle. These include alerts and controls, route communications and real-time changes such as diversions, customer communication and sometimes abuse or assault by customers.

Through the new cab design, we want to support safer driving to reduce the risk of collisions and injuries to customers and

people outside the bus, as well as ensure the safety of bus drivers. This includes opportunities to reduce driver fatigue from physical manoeuvring, as well as mental and cognitive load through reducing alerts and sounds in the cab. Innovations in new technology, enhanced driver assist systems and improved integration of these systems in the driver's cab will contribute to improving safety and mitigating risks.

Our Vision Zero targets

2030

No one killed on or by a London bus

2041

No one killed or seriously injured on or by a London bus

**VISION
ZERO**
Travel Safe • Save Lives



'The right cab layout not only reduces the risk of fatigue to our people, it ensures that our teams have a safe environment while at work. Getting this right should help reduce any risk, not only to the people who use our services, but also other road users and pedestrians too. We're committed to working with all our business partners to ensure safety and comfort remain a top priority'



Mark Wallis
Engineering Director,
Stagecoach

'Go Ahead London are an inclusive employer and welcome the opportunity to work closely with TfL to enhance the bus driver's cab design to improve the ergonomics, and therefore the comfort and safety of London's bus drivers, paving the way to a more inclusive future'



Andrew Bury
Road Risk Manager,
Go Ahead London

A driver's cab that is comfortable, responsive and supports all drivers in their role will support improved recruitment and retention in the bus industry

There are shortages of bus drivers in London and across the UK, with challenges around the recruitment and retention of drivers. These challenges relate to a range of issues, not only the cab environment. However, we know from our engagement with bus drivers that poor ergonomics, comfort and adjustability are crucially important.

Bus drivers sit for extended periods during their shifts, and incorrect posture and poor ergonomics can affect the back and joints. Bus drivers experience whole-body vibration and impact forces transmitted via the seat, and higher-frequency vibration from the steering wheel. Cognitive, visual and auditory stresses can impact bus drivers' health and wellbeing, as well as causing fatigue. We need to look at the driver's cab holistically, to ensure it is an inviting and comfortable workplace that supports drivers in their role and ensure they are valued.

Women in Bus and Coach (an organisation committed to improving diversity and inclusion within the bus sector) has highlighted the need to encourage more women to work in the industry at every

level and support them to remain. The Labour Force Survey reported that in 2020/21, only 16 per cent of bus and coach drivers were female. Across a sample of four London bus operators in 2020, between nine and 11 per cent of their total staff were female (based on gender pay reporting data from Transport UK, Go-Ahead, RATP Dev and Stagecoach). As this includes management, where women are especially under-represented, it is likely that the proportion of female drivers is comparable to national figures. In comparison, more than half of bus passengers are female.

Having a workforce that better reflects the diversity of our customers can help identify and address barriers to an inclusive bus service. Attracting more diverse candidates to the role can also help to address the chronic shortage of drivers in the industry.

To achieve this, we need to ensure the driver's cab suits all sizes and needs. Bus drivers have varied body sizes and shapes, but the cab is one set of fixed dimensions, unless items are adjustable. It is essential therefore to consider the full range of needs of all drivers in the cab design.

'Women make up a small minority of bus drivers. This is attributable, in part, to the work environment having historically been designed by men, for men. We want and need that to change. This isn't about taking anything away from male colleagues; it's about providing an inclusive workplace that empowers the employee and provides our customers with a safer, better service that more closely reflects the communities we serve'



Zoe Hands
Managing Director,
First Bus

'An ergonomic and inclusive cab design is important in encouraging more people to become bus drivers and to improving the working environment for all drivers'



Louise Cheeseman
Chair, [Women in Bus and Coach](#)



'We feel strongly that cab designs should offer the highest comfort and safety considerations available. We continue to partner with TfL in our shared objective of ensuring our drivers are both comfortable and safe within their everyday working environment'



Stephen Harris
Chief Operating Officer,
Metroline

'Our goal is to make cab design suitable for all drivers while focusing on what works well and identifying areas for improvement. By doing so, we can enhance drivers' welfare by reducing fatigue, improving posture and optimising ergonomics'



David Wecke
Head of Operational Safety,
Transport UK London



We have undertaken in-depth engagement with bus drivers across London and the rest of the UK to understand the challenges drivers experience with current bus cab designs

To understand the challenges bus drivers experience in detail, we have undertaken extensive engagement with bus drivers on the design of cabs, visiting bus garages across the UK and Ireland, including London, Edinburgh, Glasgow and Manchester, with further visits planned for Belfast and Dublin. This has provided comprehensive information on the safety and security of current cab designs, bus driver user experiences and what improvements drivers would like to see.

The engagement has provided a detailed view of the current issues and pain points for drivers in relation to the cab design and layout, as well as areas that are working well that can be built on.

One key issue highlighted by our engagement is poor lumbar support. This is a concern for all bus drivers but is a particular concern for female bus drivers.

'A softer seat cushion can be helpful for driving a long time'

'More adjustable lumbar support will help all drivers'

The importance of seat adjustment features, including tilt and height, was noted as important by all drivers and overall, there was strong satisfaction on adjustability. However, female bus drivers raised concerns around the adjustability of headrests. The thermal comfort of seats was raised as an issue, particularly in the summer with leather seats retaining heat and being uncomfortable.

Drivers have highlighted concerns around the overall ergonomics of the cab in terms of limited space, poor visibility and the location of controls, causing drivers to hit their knees or strain their necks.





'Arriva welcomes this important opportunity to work with TfL on developing an inclusive and ergonomic new cab design to attract and retain more bus drivers, to support them in their role and improve safety'



Paula Tansley
Risk Manager, Arriva London

'UNO is committed to improving bus safety and supports this work to develop an inclusive and ergonomic cab design. This work will enhance drivers' health and wellbeing, reduce fatigue and support Vision Zero'



Simon Potts
Head of Health, Safety, Training and Environment, UNO

Delivering the new inclusive and ergonomic bus driver's cab of the future

We will deliver the new cab design through our world-leading Bus Safety Standard

The Bus Safety Standard contractually requires the use of safer vehicles by specifying safety requirements that new buses entering service in London must meet, both ahead of and in addition to regulation. The first suite of safety requirements for new buses was introduced through the Bus Safety Standard in 2019, with subsequent requirements in 2021 and 2024.

We are now developing phase 2 of the Bus Safety Standard to ensure we continue to innovate while delivering the safest buses to support our Vision Zero goals. The Bus

Safety Standard phase 2 will cover new safety requirements for 2027, 2030 and 2033. We will publish a roadmap in early 2026 which will set out the list of new measures required for new buses entering service in London in 2027, 2030 and 2033.

Our new design for the bus driver's cab will form a central part of the Bus Safety Standard phase 2. The design will be implemented in phases to allow sufficient time to research, develop and trial changes and new measures, and importantly to enable the bus industry to deliver the changes.



2027

2030

2033

Developing the new bus driver's cab design

The new inclusive cab design can only be achieved through partnership and engagement with the bus industry

The development of a new bus cab design requires innovation, collaboration with the bus industry and a holistic design approach. It is a complex area of work and links to multiple areas of research already under way and planned in the [Bus Safety Programme](#), as set out in our Bus safety strategy (2022). This includes our work to reduce and mitigate pedal application error, manage fatigue, improve driver health and wellbeing, and our work to reduce bus customer injuries, as well our wider priorities set out in the Bus action plan to improve bus customer experience.

We will continue to work with the bus industry and technical specialists to develop the new bus cab design and requirements for the Bus Safety Standard phase 2, including bus drivers, bus operators, unions, bus manufacturers, and suppliers.

We are working closely with bus operators in London, bus manufacturers and their tier one suppliers on a range of existing trials and research to inform the new bus driver cab design and on the overall development of the Bus Safety Standard phase 2.

Pedal application error

Pedal application error (PAE) is where drivers mistakenly press the accelerator in the honest belief that they are pressing the brake, resulting in unintended and uncontrolled acceleration, with a high collision risk. Currently, there is substantial variation across the bus fleet on the design, size and placement of pedals.

To help inform the development of a standardised specification for bus pedals, we have commissioned Apollo Vehicle Safety to deliver pedal position preference tests with over 100 drivers. This work provides insights on drivers' natural preferred foot placement and its impact on head and upper body movement. Further consultation, including with vehicle manufacturers, will be required as we continue to investigate the feasibility of a standardised specification for bus pedals.



'Alexander Dennis are delighted to support this work. The design of the driver's cab is fundamentally important in supporting the driver to control the vehicle safely and providing a comfortable workplace'



Jamie Wilson
Head of Concepts and Advanced Engineering, Alexander Dennis



‘Volvo is proud to support this initiative. We believe that enhancing the driver experience and support is not only crucial for the safety of the driver and customers, but also for the safety of other road users’



Thomas Forsberg
Head of Safety, Volvo Buses

‘At BYD, we are committed to collaborating with local transportation authorities, Women in Bus and Coach and operators to prioritise safety, comfort, and efficiency in driver’s cab designs’



Wilber He
Research and Development
Project Manager, BYD

We want to improve safety across the bus industry by informing regulations and standards

Through the Bus Safety Standard, we continue to deliver the safest vehicles with new safety features both ahead of and in addition to international regulation. The Bus Safety Standard measures are increasingly being adopted by other local authorities around the world, and it is leading the way across the bus industry to encourage safer vehicles.

It is our ambition to see the safety measures in the Bus Safety Standard adopted in regulations and standards for buses. This will improve safety across the industry and reduce the investment costs for manufacturers in the development and delivery of new safety measures.

We are engaging with regulators and standard setters, including the Department for Transport and the International Standards Organisation (ISO) on the new bus cab design. We understand that a new cab design is a significant undertaking for each bus manufacturer individually, and it will be easier to adopt if they can see the potential of a wider market for design changes being provided by changes in regulations and/or standards.

'It's TfL that has become both the de facto national research and development centre and leader on bus safety'

Urban Transport Group

Research into driver impairment

We have commissioned independent, in-depth research into driver impairment to look at all forms of impairment including drugs and alcohol, fatigue, distraction, and stress to understand the key issues and gaps, best practice and mitigation to reduce impairment. This will include issues and opportunities to change the driver's cab to reduce the risk of impairment.

'The Bus Centre of Excellence fully supports the development of an inclusive and ergonomic driver's cab as part of the Bus Safety Standard. Reimagining the driver's cab as a safe, comfortable and adaptable workplace is a vital step toward creating an increasingly inclusive and diverse workforce, and improving safety and wellbeing for drivers, customers and all road users'



Stelios Rodoulis
Head of Bus Centre
of Excellence



Dr Robert Best
Director of Engineering,
Wrightbus

'Wrightbus is committed to making its buses as safe and inclusive as possible. The TfL approach to making positive change is viewed as an extremely effective balance of being industry-led alongside research and trials that make truly fact-based decision-making. We look forward to continuing to work with TfL on their Bus Safety Standard'

Call for innovation and collaboration from the bus industry

We will work with bus operators, including bus drivers, trade unions, bus manufacturers and their supply chain, technical specialists and other stakeholders to develop the new cab design

The development of the new bus driver's cab design will be informed by independent research and trials to examine the improvements needed and the possible solutions. Stakeholder engagement will be central to the development, trialling and implementation of new design standards.

Engagement with the bus industry

Our Bus Driver Cab of the Future Working Group will work with bus manufacturers and operators to integrate and modernise our automatic vehicle location system and electronic ticket machine interfaces, improving ease of use and enabling new functionalities while considering the need to reduce alerts and sounds in the cab to reduce fatigue. We will engage bus drivers to develop new design ideas that consider the full range of needs of all drivers to ensure the cab is an inviting and comfortable workplace for all.

A collaborative and innovative approach

We are working with the Royal College of Art's Intelligent Mobility Design Centre (IMDC) to develop innovative and visionary new design ideas for the bus driver's cab. The IMDC, including the Intelligent Mobility Masters students, will be working with TfL, bus manufacturers and bus operators, including bus drivers, to develop new design ideas that inspire and provide a fresh approach to designing the cab holistically as the driver's workplace.

We are keen to look at innovative ideas and approaches to cab design and call upon the bus industry, including bus manufacturers and the supply chain to contribute their input and ideas. We are particularly keen to consider what has been successful in other relevant transport modes, such as HGVs and trams, and what can be transferred to buses. Alongside this we will review existing designs and work by other cities.

We also call upon bus operators and drivers to give their input into what is needed to make cabs more adjustable and inclusive, via the trials we will be running as the design programme progresses.

Driver collision restraint systems

To enhance the safety of bus drivers, we commissioned TRL to undertake in-depth research into driver collision restraint systems (DCRS) to understand the key opportunities and challenges for implementing DCRS, including a review of collision data to understand the safety benefits.

We have commissioned further research to ensure the design of DCRS are inclusive by considering the needs of all drivers. As part of this research, TRL have engaged with bus drivers, seat suppliers and bus and coach operators on the implementation of seatbelts. This work will help to inform new measures to improve the safety of bus drivers.

'Accessibility and inclusivity are at the heart of everything we do at Lothian, and we are delighted to support the work by Women in Bus and Coach and TfL to set out a clear vision for a more inclusive, ergonomic bus cab design. Drivers spend most of their working day in the cab; it is vital that we make this environment as comfortable and accessible as possible to ensure greater inclusivity within the bus sector'



Sarah Boyd
Managing Director,
Lothian Buses

We will continue to work with the bus industry, stakeholders and our research partners to develop the new bus cab design of the future. An ergonomic cab that is designed holistically as the driver's workplace is an important part of delivering our Vision Zero targets by supporting safer driving and ensuring drivers are better protected in a collision. An inclusive cab that is comfortable and designed for different body types will help to attract and retain bus drivers and aims to ensure drivers feel valued and supported.



About us

Part of the Greater London Authority family led by Mayor of London Sadiq Khan, we are the integrated transport authority responsible for delivering the Mayor's aims for transport. We have a key role in shaping what life is like in London, helping to realise the Mayor's vision for a 'City for All Londoners' and helping to create a safer, fairer, greener, healthier and more prosperous city. The Mayor's Transport Strategy sets a target for 80 per cent of all journeys to be made by walking, cycling or using public transport by 2041. To make this a reality, we prioritise safety, sustainability, health and the quality of people's experience in everything we do.

We run most of London's public transport services, including the London Underground, London Buses, the DLR, London Overground, Elizabeth line, London Trams, London River Services, London Dial-a-Ride, Victoria Coach Station, Santander Cycles and the IFS Cloud Cable Car.

We manage the city's red route strategic roads and are responsible for the maintenance, management and operation of more than 6,000 sets of traffic lights across the capital. The London boroughs are responsible for all the remaining roads within their boundaries. The experience, reliability and accessibility of our services are fundamental to Londoners' quality of life. Safety remains our number one priority and we continue to work tirelessly to improve safety across the network for both colleagues and customers.

Our vision is to be a strong, green heartbeat for London. We are investing in green infrastructure, improving walking and cycling, reducing carbon emissions, and making the city's air cleaner. The Ultra Low Emission Zone, and fleets of increasingly environmentally friendly and zero-emission buses, are helping to tackle London's toxic air. We are also improving public transport options, particularly in outer London, to ensure that more people can choose public transport or active travel over using their vehicles. That is why we are introducing

the outer London Superloop bus network, providing express bus routes circling the entire capital, connecting outer London town centres, railway stations, hospitals and transport hubs.

We have constructed many of London's most significant infrastructure projects in recent years, using transport to unlock economic growth and improve connectivity. This includes major projects like the extension of the Northern line to Battersea Power Station and Nine Elms in south London, as well as the completion of the London Overground extension to Barking Riverside and the Bank station upgrade.

The Elizabeth line, which opened in 2022, has quickly become one of the country's most popular railways, adding 10 per cent to central London's rail capacity and supporting new jobs, homes and economic growth. We also use our own land to provide thousands of new affordable homes and our own supply chain creates tens of thousands of jobs and apprenticeships across the country.

We are committed to being an employer that is fully representative of the community we serve, where everyone can realise their potential. Our aim is to be a fully inclusive employer, valuing and celebrating the diversity of our workforce to improve services for all Londoners.

We are constantly working to improve the city for everyone. This means using information, data and technology to make services intuitive and easy to use and doing all we can to make streets and transport services accessible and safe to all. We reinvest every penny of our income to continually improve transport networks for the people who use them every day. None of this would be possible without the support of boroughs, communities and other partners who we work with to improve our services. By working together, we are creating brighter journeys and a better city.

