Safety, Sustainability and Human Resources Panel

Date: **14 September 2021**

Item: **Bus Safety Programme and Driver Health and Wellbeing**

This paper will be considered in public

1 Summary

1.1 This paper provides an update on the progress of the Bus Safety Programme as well as the emerging work on Driver Health and Wellbeing in response to the longer-term recommendations made by University College London's (UCL) Institute of Healthy Equity report into driver deaths as a result of COVID-19.

2 Recommendation

2.1 **The Panel is asked to note the paper.**

3 Bus Safety Programme Delivery Update

3.1 The Mayor and TfL have adopted Vision Zero for London, with a target of zero deaths or serious injuries from road collisions by 2041.

3.2 Within Bus Operations, we have even more ambitious targets:

(a) 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 (against 2005-09 baseline); and

(b) No one killed in, or by, a bus by 2030.

3.3 The Bus Safety Programme was launched in February 2016, with the aim of reducing the number of people killed or seriously injured (KSI) on the bus network.

3.4 The number of people killed or seriously injured in or by a bus fell by 38 per cent to 132 people between 2019 and 2020, which is the lowest number on record. This is 78 per cent down on the 2005-09 baseline. While this reduction has exceeded the 2022 target highlighted above, there is still more to do to ensure we continue to see reductions in those killed and seriously injured as we move out of the pandemic.

3.5 The Bus Safety Programme is aligned with the Vision Zero 'safe systems' approach which aims to ensure safe speeds, safe streets, safe behaviours and safe vehicles. Progress against each area is detailed below.

4 Safe Speeds

Intelligent Speed Assistance (ISA)

4.1 Intelligent Speed Assistance (ISA) technology, which ensures compliance with speed limits, is a key part of the Bus Safety Standard (BSS). ISA uses GPS-linked speed

limit data to advise the driver of the current speed limit and automatically limits the speed of the vehicle as necessary. There are currently around 1,650 ISA enabled buses out of a total fleet of 9,000 in London, including 526 new vehicles that also meet the 2019 BSS.

ISA Retrofit

4.2 The retrofit roll out of ISA began in July 2021. The speed of roll out may be impacted by the world-wide shortage of microchips and we will be monitoring this situation closely over the next few months. Assuming there are no delays ,the programme will deliver 1200 buses in the first tranche. Future tranches will be subject to the next government funding settlement. The first buses that were retrofitted are based at Orpington bus garage, operated by Go Ahead London.

5 Safe Streets

Pedestrian behaviour and risk management

5.1 We appointed Integrated Transport Planning Limited (ITP) in 2019 to conduct research into pedestrian behaviour and risk management. The research aimed to help better understand pedestrian behaviour in relation to specific types of street infrastructure and the potential for light-touch engineering and technological solutions to help prompt people to reduce their exposure to road danger while walking in London. The final report was completed last year.

5.2 The research found that people largely behave appropriately for the level of risk except in situations where they fail to accurately judge risk due to distraction, such as from excessive noise or phone use, or when the environment suggests it is safer than it is. Contraflow bus lanes were identified as a key location where the actual risk exceeds the perceived risk, with pedestrian's attention found to be drawn to the dominant flow of traffic away from the contraflow directions causing them to look in the wrong direction.

5.4 A technical research group has been established to take forward the findings in the report. This group will further examine the report's findings for opportunities to improve processes and guidance and will aim to develop interventions to trial on street, including interventions to improve safety at contraflow bus lanes. Progress will be reported in future updates.

6 Safe Behaviour

Destination Zero Bus Driver Training

6.1 Delivery of 'Destination Zero', the safety training programme for London bus drivers, commenced in May 2019. The training course uses innovative virtual reality technology, which is designed to make the course engaging and impactful. Extensive filming took place in London so that participants on the training course can experience a wide range of scenarios that drivers in London may encounter. The training covers hazard perception, hazard prediction, judgement and driver wellbeing.

6.2 Training delivery has been severely impacted by COVID-19 with suspensions of all classroom-based training during all lockdowns and time taken to ensure COVID-safe delivery, including the procurement of surgical-grade cleaning equipment for the virtual reality headsets.

6.3 As of July 2021, 9,845 drivers had been trained. Of this number, 95 per cent of delegates have rated the course as good or excellent, with 98 per cent of drivers rating it as ‘useful’ or ‘extremely useful’ in their day-to-day role. In addition, 97% per cent would recommend ‘Destination Zero’ to a colleague.

6.4 The number of drivers being trained dropped significantly between April and December 2020 and was suspended again in January 2021. Due to this and continued social distancing in classrooms, the numbers of drivers being trained remain low. We are working with operators to establish a revised end date for the training with an intended target of all drivers receiving training by March 2022.

6.5 Transport Research Laboratory Limited is in place to independently evaluate its long-term impact.

Fatigue Management Awareness Training for Managers

6.6 A fatigue management awareness training course for managers and supervisors at bus operators has been developed in conjunction with bus operators. This half-day course began rolling out to eligible staff from late October 2020, following a successful piloting period during September and early October.

6.7 The training course focuses on what fatigue is, how fatigue can be recognised and how managers can support their staff in managing the effects or root causes of fatigue. The course also gives managers tools to empower them to act and create a more open culture to manage fatigue.

6.8 Training was delivered initially by our consultants, J.A. Ward Consulting Limited, and then by the bus operators’ own trainers from February 2021. The last bus operator managers and supervisors received their training in June 2021 and this training is now completed for existing staff. Training materials will remain available for all operators to train new staff in the future. The final number of bus operating staff trained was 1,750 (down from an original rough estimate of 2,200) which reflected refinement of operator training lists and changes within the bus operator structures during this period. The period of training was extended from an anticipated completion date of April 2021 due to the reduced availability of staff as a result of the pandemic. Feedback from the training showed that 92 per cent of delegates agreed or strongly agreed that their understanding of fatigue and alertness management improved through attending the training and 88 per cent agreed or strongly agreed the training was relevant to their needs. The longer-term evaluation has shown that more people agree or strongly agree that they have awareness and knowledge of fatigue and the ability to manage fatigue after completing the training.

6.9 This training was so well-received that it was extended to operational managers in our Bus Operations department which included staff from Bus Services Delivery, Victoria Coach Station and Dial-a-Ride. The course is now being used to inform the development of similar training for use across our other operational departments.

Fatigue Key Performance Indicators

6.10 We have provisionally suggested three fatigue Key Performance Indicators (KPIs) which will apply across all areas of TfL and this extends to bus operators. These are:

(a) fatigue will be considered as standard in any collision/accident investigation;

(b) high levels of overtime will be monitored and mitigations put in place; and

(c) all employees will receive fatigue management awareness training.

6.11 We are currently working with bus operators to enable consistent reporting against these KPIs.

6.12 In addition, we have been working with bus operators to understand what local measures we may want to use to help measure our progress in managing fatigue. Given the immaturity of the fatigue programme, it is difficult to set challenging and meaningful KPIs beyond those outlined above, so rather a series of measures, checks and data-gathering processes are being put in place to enable the setting of additional KPIs once there has been sufficient progress.

Fatigue Detection Technology

6.13 To support the bus operators in understanding the nature and scale of fatigue within their own operations, and to develop their company culture and processes further to successfully manage bus driver fatigue, we will be working with the 10 bus operating companies, and via them their drivers and local union reps to deliver a minimum of one bus route per operator to have the latest fatigue detection technology fitted. Once fitted, there will be a 12-month period of data collection and analysis which will further inform the wider bus driver fatigue management programme and any further roll out of fatigue detection technology. It is anticipated that the technology will be fitted and the trial will begin in late 2021 (as with ISA subject to availability of materials).

7 Safe Vehicles

Bus Safety Standard

7.1 The Bus Safety Standard is being rolled out against the published Roadmap. Phase 2 has begun, looking ahead at changes from 2024 onwards, either adding to the existing roadmap or stretching the roadmap to encompass 2027 and 2030. Any changes or additions to the roadmap will be evidence-based, take account of the projected benefits from the existing measures (Phase 1), and will also include issues arising among bus occupants resulting in slight injuries.

Bus Safety Standard 2019

7.2 Since summer 2019, new buses entering the fleet have had to meet the requirements of the Bus Safety Standard (2019). So far, around a total of 530 buses meet it and this number is increasing all the time. Safety measures include Intelligent Speed Assistance (ISA) technology to limit the buses speed to the posted speed limit, Acoustic Vehicle Alerting Systems (AVAS) for quiet-running buses only (around 385 buses) to alert vulnerable road users to the bus, blind spot wing mirrors to improve visibility in known blind spots, and non-slip flooring of a higher resistance than is usually required to reflect the additional risk of being on a moving vehicle.

Bus Safety Standard 2021

7.3 From summer 2021, all new buses have also been required to meet the requirements of the Bus Safety Standard (BSS) 2021 roadmap (which are additional to those required in 2019). Safety measures include camera monitoring systems (CMS) replacing wing mirrors, improvements to the internal design of buses to reduce risk factors for passengers, changes to the braking system to prevent buses from rolling away without drivers in the cab, and ‘brake toggling’ to reassert good driver position and pedal awareness to reduce incidents of pedal confusion.

BSS 2024 – future requirements

7.4 From 2024, in addition to meeting the requirements under BSS 2019 and BSS 2021, all new buses entering the London bus fleet must also comply with the BSS 2024. Safety measures include Advanced Emergency Braking (AEB), front and nearside Vulnerable Road User (VRU) detection systems (such as Mobileye) and energy absorption of the front of the bus to mitigate the severity of injury should pedestrians or cyclists be in a collision with the bus.

7.5 Work is currently underway to help bus manufacturers achieve the ambitious safety measures required for 2024, AEB is the most challenging safety measure to introduce on buses and has dedicated resource to focus on getting it right.

Acoustic Vehicle Alerting Systems (AVAS)

7.6 The AVAS project has suffered delays due to the COVID-19 pandemic. This project requires cooperation and extensive visits with bus operators at bus garages, specialist consultant and manufacturer support from companies not based in London and direct driver engagement as well as in-person public engagement with our most vulnerable customers. Additionally, changes to travel patterns means that we are seeing atypical roadside noise levels which makes for a challenging real-world testing environment.

7.7 Despite these challenges the project has made significant progress. Bus route 100 was upgraded to responsive AVAS, which means that the sound level of the Urban Bus Sound changes through five volume settings to reflect the ambient noise conditions of the location and time of day that the bus is passing through. Together with the lifting of lockdown this meant that the on-street stakeholder engagement could take place and one-to-one interviews with our key accessibility stakeholder groups has been concluded. Interviews with drivers have also taken place and final technical checks are being carried out to upgrade buses from three further bus manufacturers. Work to reduce ingress of noise into the bus cabin for drivers has been very positive. Reports on this final stage of the project are due in the autumn and it is anticipated that we will be able to decide on whether to roll-out responsive AVAS across the eligible buses in the fleet, and for new buses, by October 2021.

Pedal Application Error

7.8 The Bus Safety Standard roadmap included requirements for solutions in relation to Pedal Application Error, including brake toggling, pedal standardisation and pedal acoustic feedback from 2021. As the evidence and research gathered on Pedal Application Error was not strong enough to show that changing the pedals would be most effective, the decision was made to put pedal standardisation on hold until further research could be undertaken.

7.9 We are working with consultants AECOM and the bus operators to understand the extent of pedal confusion incidents occurring amongst London bus drivers and explore the root causes. The research will include surveys at bus depots (predominately bus drivers but open to other operational staff) and workshops for bus drivers to discuss their experience and potential solutions to avoid pedal confusion in more depth. Stakeholders from across the bus industry will also be asked to provide input on the viability of solutions currently required as part of the Bus Safety Standard for Pedal Application Error. The final report is expected at the end of the year.

Bus Safety Standard Retrofit Projects

7.10 The roll out of the Bus Safety Standard through new buses is limited to the bus renewal cycle. While the push for electrification of the bus fleet may escalate this renewal, there is more we can do to improve safety now and in the shorter-term. Retrofitting selected safety measures will bring quicker benefit realisation and means that it is possible to target safety measures more quickly to those buses or routes that need them.

7.11 In addition to ISA, there are three further safety measures that are being explored for potential retrofit programmes – AVAS, Camera Monitoring Systems (CMS) and fatigue detection technology.

7.12 Currently, there are around 385 buses with AVAS but we also have many electric and hybrid vehicles in the existing bus fleet which could also have the benefit of AVAS. Buses in London are expected to remain in the fleet for approximately 14 years meaning that, without action to retrofit AVAS to all pre-BSS 2019 buses, it could take to 2034 for buses without AVAS to be replaced. Outcome definition work looking at the different options for retrofitting AVAS to London buses, including the high-level costs and benefits is complete. The next stage is progressing option selection / feasibility to be complete by the end of the year.

7.13 CMS improve direct and indirect vision for the driver by reducing blind spots and improving hazard perception. All new buses entering our contracts from now are required to have CMS. Some manufacturers are already able to offer this as an option to bus operators and currently around 430 new buses already have CMS fitted. Outcome definition work on retrofitting CMS on vehicles in the existing bus fleet has been completed and work on developing the full scope of the project as well as procurement options is underway and set to complete by October 2021.

7.14 Fatigue detection technology is the last opportunity for intervention before a fatigue-induced collision may occur. On its own it does not solve bus driver fatigue, or negate need to mitigate bus driver fatigue, but it forms a key part of TfL's and bus operator's fatigue management programme. Any further roll out of this technology will be informed by the year-long cross-operator project.

8 Driver Health and Wellbeing

8.1 We commissioned UCL's Institute of Health Equity to look at driver deaths as a result of COVID-19 and the Phase 1 report was published in July 2020 and Phase 2 was published in March 2021. The research highlighted a need to focus on driver health and wellbeing in the longer term, in addition to the short-term actions required as a result of the pandemic; with an emphasis on being more proactive in understanding existing health conditions of bus drivers, supporting better health and identifying those most at risk. The UCL research showed that many of the bus drivers who sadly died had underlying health conditions which may have put them at increased risk when they contracted COVID-19. Although the rates of underlying health conditions amongst the surveyed bus drivers were no higher than the general population, there was some evidence of earlier onset of these conditions and of obesity.

8.2 The Bus Safety Development team, in collaboration with Bus Operators are introducing more frequent voluntary health assessments for drivers in the form of self-assessment kiosks to help detect health conditions such as hypertension, diabetes, and heart disease at an earlier stage. These kiosks will signpost drivers to additional

support available from their operator Employee Assistance Programmes and other external resources. This will enable bus operators to assist drivers in getting the help they need, building on the open culture work of the fatigue management programme.

8.3 The Bus Safety Development team successfully bid for the Design Council Employee Health Innovation Fund and will receive a grant to research and pilot the best way to deliver bus driver health and wellbeing assessments in the longer term. This research will include benchmarking the use of health assessments across other industries and in local bus operators in other comparable countries. The project will help identify solutions to improving bus drivers' health and wellbeing and increase understanding of their needs and what their employers can do to support them. The project aims to raise awareness of the ways in which drivers can take responsibility for their own health by suitable lifestyle adjustments, and to provide early detection of potential health problems. The study will begin in September 2021 and will also analyse the effectiveness of various interventions in health and wellbeing checks and the key parameters of driver health and well-being engagement and participation at work.

Fatigue and Health and Wellbeing Innovation Fund

8.4 We have committed to targeting the next round of Bus Safety Innovation Funding at measures that will help to reduce fatigue and in light of the findings of the UCL report, the fund was broadened to include innovation that could also improve health and wellbeing of bus drivers. The Fatigue and Wellbeing Innovation Challenge was launched in March 2021. There were over 50 responses from companies with solutions and the shortlisted companies were able to work with the Bus Operators to submit joint bids. Funding awards will be announced shortly with trials due to start in the autumn.

9 Slips, Trips and Falls

9.1 We continue to focus on measures to understand and try to reduce customer slips, trips, and falls on buses. Slips, trips and falls are the most common incident across the transport network, and on buses we have continued to see an increase in the frequency of these incidents since the beginning of the pandemic, relative to the number of people travelling.

Data Trends

9.2 Prior to the pandemic, around 2.3 slips, trips and falls on buses were being recorded for every million passenger journeys. Between April 2020 and July 2021, this rate has continued to fluctuate around 3.15 incidents per million passenger journeys on average.

9.3 The most common places on the bus where slips, trips and falls are occurring continues to be when boarding and alighting (13 per cent and 11 per cent respectively), when using the stairs (23 per cent), along with incidents which happen on the same level (41 per cent). We also know that sudden braking is a common cause leading to these slips, trips and falls, and can be compounded if passengers are not holding on. These proportions are broadly consistent with the incidents reported prior to the pandemic.

9.4 Passengers seem particularly exposed to risk when the bus is setting off from stationary or approaching their stop. We are continuing to promote the importance for

drivers allowing time for passengers to settle before moving off, and encouraging passengers to hold poles and handrails when travelling or moving around the bus.

Current Interventions

9.5 As outlined previously, due to the coronavirus pandemic, we suspect there may be a general reduction in passengers' tendency to hold on to poles and railings inside the buses. This is something which has been observed on other modes and identified by other transport operators during our benchmarking work too (see 9.7 below).

9.6 To combat the increased rate of incidents, we have:

(a) reviewed the guidance in the Big Red Book relating to taking extra care and being patient before departing to make sure all customers who boarded (particularly those who are older or have disabilities) are sitting down or holding on safely;

(b) continued to participate in independent coronavirus testing on regularly touched surfaces on vehicles, and publicise the cleaning regime and test results so that passengers can be confident that our vehicles and stations are clean;

(c) reviewed the modules that make up the current bus driver awareness campaign to ensure they are aligned with the needs of customers coming back to public transport as we continue to emerge from lockdown. Focused modules include *serving the stop*, and *assisting our older and disabled customers*. These provide an opportunity to renew key safety messages to allow sufficient time for passengers to be seated or holding on; and

(d) extended a trial to evaluate posters in the stairs area on double deck vehicles encouraging passengers to hold the handrail while ascending / descending. These posters are now in place on around a third of the double deck buses.

9.7 Other measures being taken include:

(a) through the International Bus Benchmarking Group, we have asked other bus operators in other cities about their experiences of slip, trip, falls and relevant interventions they have implemented to prevent them. In addition to comparing interventions, this benchmarking has revealed that an increased rate of incidents during the pandemic is an issue shared amongst other bus organisations;

(b) ensuring slip, trip and fall mitigation is included in future iterations of the Bus Safety Standard and considered for future vehicle refurbishments;

(c) evaluating how predictive technology being trialled, which warns a driver of hazards like close following of the vehicle in front, can help to allow enough time to brake smoothly;

(d) reviewing contrast/lighting at the bus stop/door threshold to minimise the likelihood of passengers tripping;

(e) exploring ways to ensure drivers best anticipate changes in their environment beyond the work of Destination Zero; and

(f) improving the quality of data reported/collated about root causes of slip, trip and fall incidents.

Developing a longer-term strategy

9.8 Work is also underway to develop a longer-term data-led strategy which will explore further action needed to prevent slips, trips and falls. Initially, this work has focused on buses and has included a review of existing insight, analysis and research to better understand the system of causal factors contributing to these incidents on buses.

9.9 Next steps for the strategy include a review of our existing interventions, to evaluate the impact of measures on safety performance across Surface modes and set out and trial a template methodology. In the first stage, the project will focus on the effectiveness of (a) falls on stairs posters; and (b) collision avoidance technology as primary 'proof of concept' case studies, with an ambition to quantify their impact or identify recommendations for improved data gathering that will enable better understanding in future.

List of appendices:

None

List of Background Papers:

Bus Safety Programme and Driver Health and Wellbeing, Safety, Sustainability and Human Resource Panel, 10 February 2021

Bus Safety Programme papers to the Safety, Sustainability and Human Resource Panel on:

- 10 March 2016
- 30 June 2016
- 23 January 2017
- 27 September 2018
- 4 September 2019
- 12 February 2020

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