SUPPORTING BUS CAPTAINS FOR SAFER PUBLIC BUSES

Recommendations by the Bus Safety Tripartite Taskforce

Submitted to:

Minister for Transport Mr Chee Hong Tat

On 5 March 2025

Table of Contents

1. Executive Summary 3

2. Foreword by Taskforce Chairman, Mr Murali Pillai 5

3. Our Progress So Far 7

A. Safety as a Key Priority 7

B. Safety Initiatives Today 7

C. Bus Safety Outcomes 8

D. Formation of Taskforce and Terms of Reference 9

4. Findings from Public Engagement and Study of Overseas Practices 11

A. Key Findings from Engagements with the Public 11

B. Engagement with Bus Captains and Public Transport Workers 13

C. Learnings from Local and Overseas Safety Practitioners 15

5. Recommendations from the Bus Safety Tripartite Taskforce 19

A. Equipping Bus Captains with the Right Tools 20

B. Improving Internal Processes and Practices 24

C. Improving the Road Environment 29

6. Conclusion 32

7. Appendix 33

1. Executive Summary

1.1. In July 2024, the Bus Safety Tripartite Taskforce ("Taskforce") was formed to review how to enhance safety for commuters, bus captains and other road users. The Taskforce is chaired by Mr Murali Pillai, Minister of State, Ministry of Law and Ministry of Transport, and comprises representatives from the Government, the bus operators, as well as the National Transport Workers' Union (NTWU). A full composition of the Taskforce may be found in the Appendix.

1.2. The Taskforce engaged key stakeholders, through surveys with 2,300 members of the public, 3,400 bus captains, as well as in-person focus group discussions with over 200 bus captains, commuters and road users. The Taskforce also engaged local and international safety practitioners to learn from other fields and cities, to identify best practices for our public bus sector to adopt to enhance bus safety.

1.3. The Taskforce found that our public buses are generally safe. The annual number of serious collision accidents involving public buses remained stable in the past few years. Our public survey revealed that most respondents feel safe when travelling on public buses. The vast majority of bus captains are also confident that they could perform their jobs safely.

1.4. Nevertheless, our engagements identified several areas for improvement which will enable us to sustain and raise our safety standards. Members of the public shared feedback that some bus rides felt less safe due to harsh acceleration or braking by bus captains. They also suggested that more safety features, such as better cameras systems, be installed on buses to help bus captains drive more safely. Bus captains shared suggestions about adjusting the scheduled runtimes to make driving durations more manageable, and to afford them protected meal breaks times. Bus captains also shared their experience with road users who do not give way, and the dangers posed by jaywalking pedestrians who force bus captains to brake hard to avoid serious collisions.

1.5. Our bus captains have a demanding job, having to cope with and respond to unexpected scenarios while navigating busy traffic. Thus, the Taskforce's recommendations focus on ensuring that when bus captains are behind the wheel, they feel well-supported and confident, and ready to do their jobs well and provide safer public bus rides. We will do so by (i) equipping them with the right tools and (ii) providing them with supportive working conditions.

1.6. To complement existing safety features on our public buses, the Taskforce recommends implementing additional technological tools and systems to further improve bus captains' situational awareness and alert them to potential safety risks. This includes 360-degree collision warning systems, anti-fatigue systems, as well as camera mirror systems. The Taskforce also recommends introducing safety features such as better torque management, safety announcements

onboard buses and rear electronic display systems that provide advance alerts on bus captains' intentions to other road users.

1.7. The Taskforce affirmed existing processes for adjusting the scheduled runtime of bus routes. It also recognises ongoing tripartite efforts to improve the well-being of bus captains. It recommends that new bus routes do not exceed schedule runtimes of more than 2 hours. It further recommends that LTA work with bus operators to study the possibility of reducing the current scheduled runtime of services that exceed this threshold. It also recommends that bus operators work with LTA to optimise their operations to allow all bus captains to enjoy their full scheduled 25-minute meal break in practice, and work towards increasing the full meal break to 30 minutes, taking into consideration the impact on manpower and resource requirements.

1.8. On training, the Taskforce recommends introducing an industry-wide training point system to ensure that all bus captains receive a minimum level of training. Bus operators should also work with the Singapore Bus Academy (SGBA) to ensure that bus captains receive the appropriate training that is in accord with their experience and driving abilities. For example, the bus operators should facilitate more bus captains to attend SGBA's "BC Drive Safe" programme. For bus captains who need additional support, SGBA should introduce more targeted intervention programmes which will be customised for each bus captain's needs. The Taskforce also recommends that bus operators and LTA recognise and reward consistent safe driving by offering tiered safety incentives to bus captains.

1.9. Last but not least, to improve the road environment, the Taskforce recommends that LTA work with bus operators to implement more measures to facilitate bus movements, including more bus priority boxes at the exit of bus bays. LTA and bus operators should also work with relevant organisations to carry out larger-scale publicity efforts to improve road users' awareness of and compliance with such measures. It also specifically calls for the management of road works to be improved, recommending that the penalty for contractors who do not comply with road works regulations be raised. Furthermore, it recommends that LTA work with relevant agencies to upskill on-site Authorised Security Officers to safely perform more complex traffic regulation duties.

1.10. The Taskforce recommends that tripartite partners continue to work hand-in-hand to not only see through the implementation of the proposed measures but to ensure that safety processes are constantly reviewed as part of their commitment to ensure the safety of our public buses.

2. Foreword by Taskforce Chairman, Mr Murali Pillai

2.1 Every day, about 4 million trips are made on the public bus network. Public buses are an integral part of the daily lives of Singaporeans. They complement our MRT network by providing 'first and last mile' connectivity to transport nodes, and access to amenities in our neighbourhood and town centres.

2.2 While the number of serious accidents involving buses have remained stable over the years, we must make every effort to ensure that our standards are world-class and that we continue to take bus safety seriously. The Bus Safety Tripartite Taskforce was formed as part of this important mission.

2.3 The Taskforce consulted widely, with bus captains, members of the public, industry practitioners and safety experts, both local and abroad. Our visits and discussions also afforded opportunities for tripartite partners in the Taskforce, many of whom are leaders responsible for the day-to-day functioning of our bus network, to exchange ideas.

2.4 Our recommendations take bearing from a key insight from these meetings – the need to pay attention to the human element in issues of safety – in particular, the key role of the driver.

2.5 Bus captains have a demanding job – their shifts can start in the early hours of the morning, and at times, last into the evenings. Sometimes, the same bus captain who drove us to work in the morning would be the one driving us home in the evening, after they have had a break in between to rest.

2.6 In my first meeting with public transport union leaders, one said that driving a bus may be as challenging as piloting an aircraft. But there is no 'autopilot' for bus captains, who need to be on high alert all the time. There are difficult, split-second decisions to make – such as whether a bus captain should brake hard to avoid a collision with another vehicle that suddenly cuts in front of them, at the risk of commuters onboard the bus falling.

2.7 On the road, bus captains are constantly multitasking – driving safely, keeping the bus on schedule, while navigating their large vehicle through busy roads. Safety can seem like one among many priorities, even though every other consideration should bend at the knee.

2.8 Supporting our bus captains is therefore the key to enhancing bus safety. Our recommendations are aimed at ensuring that we provide the right tools and a conducive environment for bus captains to do their job well. At the same time, safety is a collective responsibility. We have also made recommendations that will involve commuters and road users too. We hope that these will be taken seriously and implemented by all relevant parties.

2.9 We acknowledge, however, that the work of ensuring bus safety is never complete. Emerging safety risks will continue to surface. Hence, even though the Taskforce's work may have ended, the tripartite partners must continue to work closely to ensure safety of our public buses.

2.10 I would like to take this opportunity to acknowledge the hard work and strong commitment of all Taskforce members over the last few months, including partners from NTWU, public bus operators, Traffic Police, Singapore Road Safety Council and MOM, as well as my colleagues from MOT and LTA.

3. Our Progress So Far

A. Safety as a Key Priority

3.1 With a fleet of approximately 5,800 buses and over 350 bus services, the public bus network serves about 4 million trips daily. Under our Bus Contracting Model (BCM), four operators provide services across 14 different bus packages, with a combined workforce of over 12,000, including approximately 9,500 bus captains.

3.2 With millions of trips each day being served across a vast network, ensuring the safety of commuters and other road users is a core responsibility for the tripartite partners – the public bus operators, public transport workers and NTWU, and the Government.

B. Safety Initiatives Today

3.3 Undergirding this shared commitment to safety is a set of regulations, systems and initiatives that reflect the role and responsibilities for each of the tripartite partners:

a. Regulatory requirements. Under the BCM, bus operators bid for the right to operate specific bus packages and are paid fixed service fees, with the Government bearing the revenue risk. Instead of having to worry about how ridership affects their revenues, a fixed service fee model allows the bus operators to focus on improving operational efficiency and excellence, including maintaining high safety standards. All bus operators are required to meet a set of Quality of Service (QOS) standards for every bus package; this includes maintaining the number of bus accidents at less than 0.5 per 100,000 bus-km every month. Operators that fail to meet this requirement are liable to face financial penalties. LTA also conducts regular safety audits on the bus operations, such as onboard buses and at interchanges. Any safety lapses identified have to be rectified promptly by operators.

b. Training programmes. Besides providing training to operate their vehicles and serve commuters, our bus operators seek to instil in our bus captains a strong safety consciousness. Safety is a key focus in the training and on-boarding of new bus captains. They are required to undergo both classroom and practical safety-focused training before they are allowed to operate buses on roads. In addition, all bus captains undergo regular safety refresher sessions to reinforce their commitment to safety, enhance their knowledge on safety issues and learn the latest safety best practices.

c. Assistive technologies. Under the BCM, LTA procures and owns the buses, while bus operators maintain these buses. LTA and the bus operators also work closely to trial new technology and update our buses with new safety equipment. Safety equipment on our buses have been improved over the

years. Public buses are now equipped with various systems to support bus captains, including collision warning systems, and telematic systems which monitor and provide feedback to bus captains on their driving behaviour.

d. Safety culture. With four bus operators that have different operating practices and processes, there is a need to ensure a common commitment and shared understanding of what it takes to keep our public buses safe. We therefore need to build a strong sense of shared responsibility across the entire sector, and by tripartite partners. LTA does this by organising frequent safety meetings with all bus operators and NTWU, ensuring that operators share learning points from accidents and near misses, as well as their best practices, with each other. LTA also consolidates and shares learning points across operators through quarterly safety bulletins.

3.4 Community engagement. Relying on tripartite partners is necessary but insufficient, as we also need the cooperation of commuters, motorists and other road users. For example, we encourage commuters to find a seat on the bus if available, hold on to the handrails at all times especially when standing, and avoid using the stairs in double-decker buses when the bus is moving. This will minimise the risk of falls and injury due to sudden bus movement. We also encourage motorists to give way to buses, and not to cut into the lanes of buses especially when buses are leaving their bus stops. To build a greater sense of shared responsibility and awareness of good practices, LTA and bus operators regularly conduct safety campaigns and roadshows to engage and educate the public. In addition, LTA has also implemented measures to support the safe and smooth operation of buses on the road, including bus lanes and bus priority boxes at the exit of bus bays.

C. Bus Safety Outcomes

3.5 Through the effort of tripartite partners and with the support of commuters and road users, the annual number of serious collision accidents involving public buses in Singapore has remained stable in the past few years. There were 185 accidents in 2024, compared to 200 in the whole of 2023 and 191 in the whole of 2022. This is comparable to the trend for road traffic accidents involving all vehicle types, with overall accidents resulting in injuries increasing from 6,779 in 2022 to 6,944 in 2023 and 7,049 in 2024.

3.6 Among the accidents involving public buses include collision accidents that occurred due to factors beyond a bus captain’s control, such as cases where another motorist rear-ends a bus. The accidents where bus captains were found to be at-fault have also remained stable in the past few years. There were 93 such accidents in 2024, compared to 99 in the whole of 2023 and 85 in the whole of 2022.

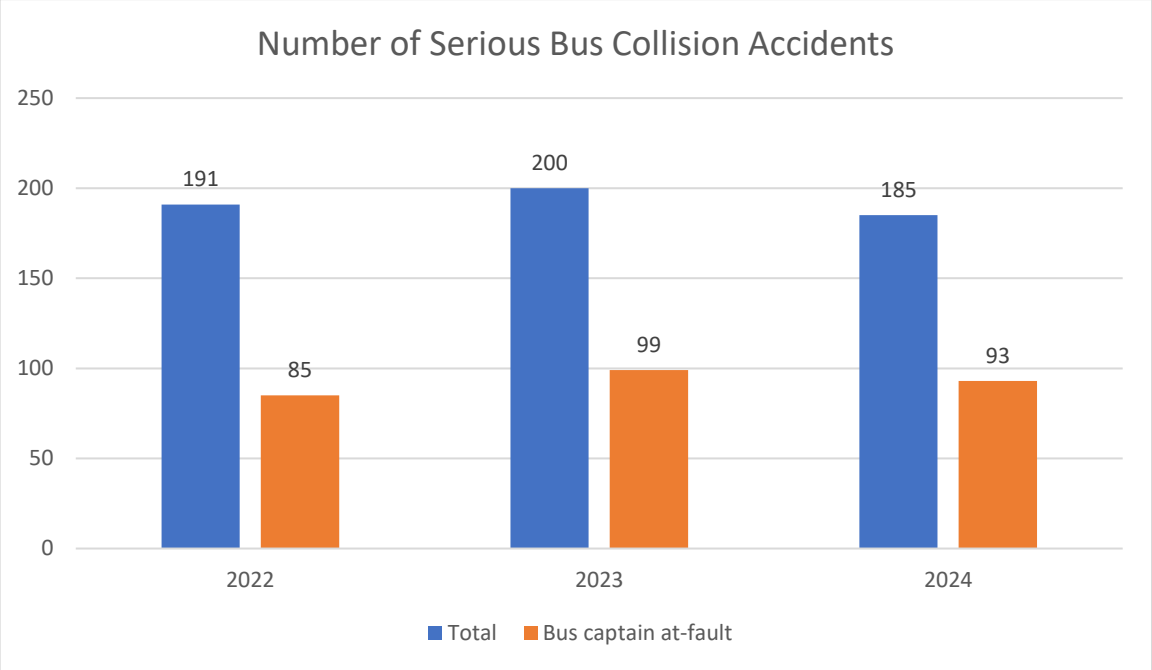


Chart of serious bus collision accident statistics for 2022-2024

D. Formation of Taskforce and Terms of Reference

3.7 Against this context, the Bus Safety Tripartite Taskforce was formed in July 2024. While bus safety outcomes have remained strong, our bus captains face a more challenging operating environment today. With traffic, especially during peak periods, returning to pre-Covid levels, and more diverse needs among our bus commuters, the Taskforce aimed to comprehensively review how to enhance bus safety across all operations aspects, and improve the well-being of bus captains.

3.8 The Taskforce is chaired by Minister of State for Transport Murali Pillai, and includes representatives from various Government agencies, the four bus operators (Go-Ahead Singapore, SBS Transit, SMRT Buses, and Tower Transit Singapore), as well as NTWU (see Appendix for the Taskforce members).

3.9 The Terms of Reference for the Taskforce are to:

a. Review existing safety protocols and procedures in the public bus industry, identify residual safety hazards and risks, and recommend strategies to mitigate them;

b. Review staffing level and working conditions of bus workforce, such as working hours and fatigue levels, to identify and recommend improvements to training, procedures and practices to improve well-being and safety consciousness among the bus workforce;

c. Review the adequacy of existing road infrastructure, and enforcement of bus lanes and other measures to facilitate bus operations, to recommend improvements aimed at enhancing bus safety;

d. Identify, review, and recommend existing and emerging technologies and hardware improvements aimed at enhancing public bus safety and improving the well-being of the bus workforce; and

e. Engage other relevant stakeholders and experts (e.g. bus operators, regulatory bodies, health and safety experts) to gather insights and best practices to further enhance public bus safety and improve the well-being of the bus workforce.

4. Findings from Public Engagement and Study of Overseas Practices

4.1 To identify possible initiatives to further improve our bus safety outcomes, the Taskforce sought ideas from key stakeholders, industry practitioners and safety experts locally and from abroad, as well as members of the public. Consultations were carried out through surveys, focus group discussions and study visits both locally and abroad. The findings of these engagements are summarised below.

A. Key Findings from Engagements with the Public

Public Survey

4.2 The Taskforce conducted a public survey from 23 August 2024 to 24 September 2024, to gather feedback from members of public regarding their perceptions of public bus safety. About 2,300 responses were received, and 60% of respondents gave a score of at least 8 out of 10 when asked whether they feel safe travelling on public buses (with 1 being extremely unsafe and 10 being extremely safe). This was an affirmation of the safety practices currently in place.

4.3 The Taskforce reviewed the qualitative suggestions provided by respondents, across several areas, when asked how bus safety could be improved:

a. Driving behaviour. Respondents suggested that bus safety could be improved if bus captains (i) avoided accelerating or braking too harshly; (ii) ensured commuters are seated before driving off; and (iii) practised defensive driving techniques such as keeping a better look out when driving and signalling early before exiting bus bays.

b. Safety features. Roughly a quarter of respondents gave feedback on the safety features of our buses. Some felt that certain bus models were more prone to jerky acceleration or braking. Others suggested deploying more assistive technology to aid bus captains in driving (e.g. blind-spot detection or collision warning systems), or adding more grab poles or handgrips to improve commuter safety.

c. Bus scheduling. Around 15% of respondents gave feedback on the scheduling of bus services, and suggested that the runtime of bus services be reviewed to ensure that bus captains have adequate time to complete their journeys, and have sufficient rest time between journeys.

Focus Group Discussions with Commuters and Other Road Users

4.4 To supplement the findings from the survey, the Taskforce conducted four focus group discussions (“FGDs”) between 27 September 2024 and 8 October 2024 to

gather feedback from bus commuters and road users on their experiences with safety on and around public buses in Singapore. A total of 87 commuters, including students, adults, seniors, and persons with disabilities, as well as 70 road users, comprising both motorists and cyclists, participated in these FGDs.

FGD participants engaging in discussions on public bus safety

4.5 The key issues raised during the FGDs were:

a. Driving behaviour of bus captains. Many participants acknowledged the challenges faced by bus captains, including having to maintain a consistent schedule so that commuters do not face excessive wait times. However, some felt that safe driving behaviour should be reinforced. Participants cited examples of harsh acceleration and braking, not slowing sufficiently when approaching a bend, and not checking blind spots as some of the negative driving behaviour they had observed from some bus captains. They suggested that more safety training be provided for bus captains, and for more safety equipment be deployed to help bus captains to drive more safely.

b. The role of other road users. Participants also recognised that many accidents involving our public buses are not due to the fault of bus captains. For example, poor behaviour of other road users, such as not slowing down near bus stops and illegally using or stopping along bus lanes can also contribute to accidents. Participants suggested that more public education could be carried out, to complement stricter enforcement against bus lane and bus priority box violations, and improvements to road infrastructure such as speed regulating strips near bus stops.

c. The role of commuters. Participants shared that the impact of accidents could be exacerbated when commuters fail to take note of safety practices, such as crowding at bus entrances or not holding on to grab poles when the bus is moving. Besides awareness campaigns, participants suggested using the PA system onboard buses to remind commuters of safe travel practices.

B. Engagement with Bus Captains and Public Transport Workers

Survey of Bus Captains

4.6 The Taskforce conducted an online survey to gather feedback from bus captains, who are well-placed to suggest how bus safety can be improved. Over 3,400 bus captains provided feedback. While the vast majority of bus captains [1] felt confident of carrying out their duties safely, they provided qualitative feedback on a range of issues including scheduling and rostering, training, safety features on buses, and the behaviour of other road users.

a. Scheduling and rostering. Some bus captains suggested reviews to bus service runtimes to reduce time pressure on them, and allow them to drive more safely. This includes accounting for the additional time needed to complete their routes with the removal of more discretionary right turn junctions.[2] The majority felt that the optimal runtime for a bus trip should be within two hours. Another area of concern among bus captains is the sufficiency of meal break times, as their scheduled meal break times can often be taken up by a delayed end to their previous trip, or waiting for parking lots at the bus interchange.

b. Training. While over 90% of bus captains felt that the training they received was adequate for them to perform their duties safely, there was some unevenness in the provision of continuing training, with some bus captains feeling that they had not received sufficient refresher training on safety skills and best practices.

c. Safety features. Bus captains generally found the safety features onboard buses helpful, such as 360-degree cameras as well as external proximity alerts to pedestrians and vehicles. They also gave suggestions for additional safety features, such as enhancements to the side mirrors to improve visibility during wet weather.

d. Behaviour of other road users. Bus captains also shared their experience with other motorists not giving way to buses, and encroaching into bus priority boxes, yellow boxes or bus lanes. They suggested that stronger

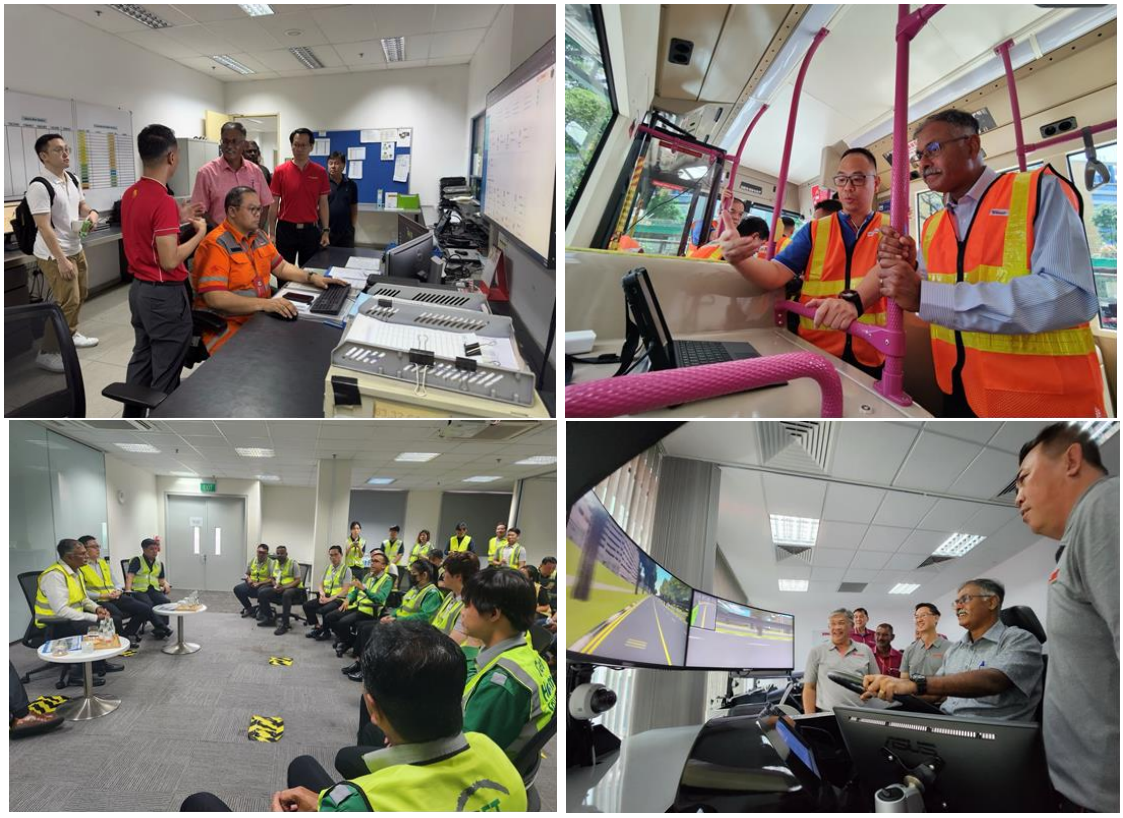
[1] When asked about whether they were confident of carrying out their duties safely, around 85% of Bus Captains gave a score of between 8 and 10, on a scale of 1 to 10 (with 1 being extremely unconfident and 10 being extremely confident).

[2] Discretionary right turn junctions are being progressively replaced by Red-Amber-Green right turn arrows by the LTA, where motorists are only allowed to turn right when the green arrow appears. This makes it safer, especially for crossing pedestrians, but may result in longer waiting times for right-turning vehicles to clear the junction.

enforcement action be taken against offenders, and to step up public education for other road users.

Discussions with Public Transport Workers

4.7 In September and October 2024, Taskforce members visited the four bus operators to better understand their safety processes, technology and training. During the visits, Taskforce members engaged bus captains and other operations staff across the bus operators in roundtable-style engagement sessions to gather their feedback on bus safety.



Photos of engagements held with bus captains and operations staff from (clockwise from top left) Go-Ahead Singapore, SBS Transit, SMRT Buses and Tower Transit Singapore

4.8 The key concerns and suggestions raised at these sessions include:

a. Bus scheduling. Bus captains shared that they were experiencing more difficulty completing their trips on time. Reasons cited include:
   i. more congested roads post-Covid;
   ii. increased dwell times at bus stops to assist wheelchair users and other commuters requiring help; and
   iii. more time needed to clear junctions where discretionary right turns have been converted to Red-Amber-Green right turn arrows.

b. Meal breaks and layovers. Given congested roads and tight bus schedules, bus captains also raised concerns about meal breaks and layovers being cut short if bus captains ended their previous trip later than scheduled.

c. Road environment. Bus captains shared the challenges they faced when travelling along areas undergoing construction or road works, especially when traffic marshals were inexperienced or insufficient lane width was left, which made it difficult for larger vehicles such as buses to navigate through safely. Bus captains also suggested having more bus priority measures, such as more bus priority boxes to allow buses to exit bus bays more easily.

d. Safety features. Bus captains acknowledged that assistive technology has supported them to detect hazards and to drive more safely. Bus captains endorsed some of the safety features that have been trialled by bus operators on a limited basis, such as more advanced 360-degree collision warning systems, and suggested that they be installed fleetwide. Bus captains also suggested that more specific training be provided on the safe operation of electric buses, which may have different handling characteristics, as they become a larger proportion of our fleet.

e. Behaviour of commuters and other road users. While bus captains acknowledged that they were primarily responsible for the safety of their vehicles and commuters, they shared that the behaviour of commuters and other road users could make it more challenging for them to carry out their role safely. Examples shared by bus captains include commuters signalling their intention to board or alight the bus late, jaywalking pedestrians, and motorists who fail to give way to buses exiting the bus bay despite bus priority boxes; these behaviours could result in bus captains having to brake abruptly.

C. Learnings from Local and Overseas Safety Practitioners

4.9 The Taskforce also embarked on a series of external engagements to learn from experts from other fields or cities. These included (i) a visit to the Singapore Armed Forces (SAF) Transport Command at Sembawang Camp, (ii) a closed-door roundtable discussion with international bus industry experts from South Korea, Australia and the United Kingdom at the Singapore International Transport Congress & Exhibition 2024, as well as (iii) a study visit to London to engage with practitioners and experts from Go-Ahead London, Metroline, Transport for London (TfL), the Chartered Institution of Highways and Transportation and Bus Centre of Excellence (BCoE), and Imperial College London.


Taskforce members during the visit to Sembawang Camp


Taskforce members at (a) engagement with Transport for London and (b) engagement with Imperial College London

4.10 The key learning points from these external engagements are as follows:

a. Strong Support for Drivers:

- Personalised support and training. Targeted training is an important factor in building good driving habits. Our engagements affirmed the current practice among local bus operators to use onboard telematics system to identify bus captains who may need additional training. The Taskforce noted that this practice can be made more effective with a stronger focus on customising training to address the specific competency gaps of individual bus captains. The Taskforce noted the SAF's practice of customising training to address the weaknesses or bad habits of individual transport operators. TfL and the London bus operators also shared their personalised approach in supporting individual drivers, using telematics and open engagements to identify individual training needs, and supporting drivers to manage their personal commitments.

- Fostering peer learning and support. The Taskforce noted the more extensive use of peer learning and support at the driver level by foreign operators and in other local settings. For example, the SAF shared its practice of conducting quarterly refresher sessions, where driving habits observed among transport operators would be shared across the community. The Taskforce also noted the strong networks of public transport practitioners and workers in London. For example, the BCoE has a Bus Knowledge Sharing and Incident Network to bring together bus and road safety experts and facilitate cross-sharing of safety incidents, emerging trends, and best practices; TfL also established a "Women in Bus and Coach" network to provide support for female bus drivers, and to encourage more women to join the bus industry. While the SGBA encourages peer learning as part of its "BC Drive Safe" refresher course, the Taskforce noted the potential for more effective learning through stronger peer support – both between drivers, and through stronger networks between operators to share best practices.

- Providing safety incentives. Incentives can help to reinforce and recognise positive driving behaviours. While local bus operators do provide safe driving incentives for bus captains, the Taskforce noted that more can be done to show recognition for bus captains across the entire industry. For example, the SAF provides a safety performance incentive to transport operators for every 3,000km of accident-free driving; by setting a stringent target that can be met by most Full-Time National Servicemen, the safety performance incentive is able to encourage safer driving among transport operators.

b. Use of Technology and Data:

- Adopting technological tools. The Taskforce noted the potential for more widespread use of technological tools, including some that are being trialled in Singapore today. In our various visits, bus operators and experts shared their real-world experience with various technological tools, including the practical trade-offs and feedback from drivers. These include: (i) 360-degree Collision Warning Systems which improves situational awareness of bus captains, (ii) Anti-Fatigue Systems which provides visual and audio alerts to bus captains when fatigue or distraction is detected, and (iii) Camera Mirror Systems which replace traditional side mirrors and can provide clearer visibility to bus captains in adverse weather conditions.

- Data-driven approach. A data-driven approach is necessary to effectively identify and address hazards, and make continual improvements to bus safety. For example, driver telematics data is used by TfL and London bus operators to identify accident hotspots and design mitigation measures. While this is something that bus operators

already perform today, the Taskforce noted the potential for such data to be used to improve collaboration across the industry, and with academia and external experts.

c. Community Engagement:

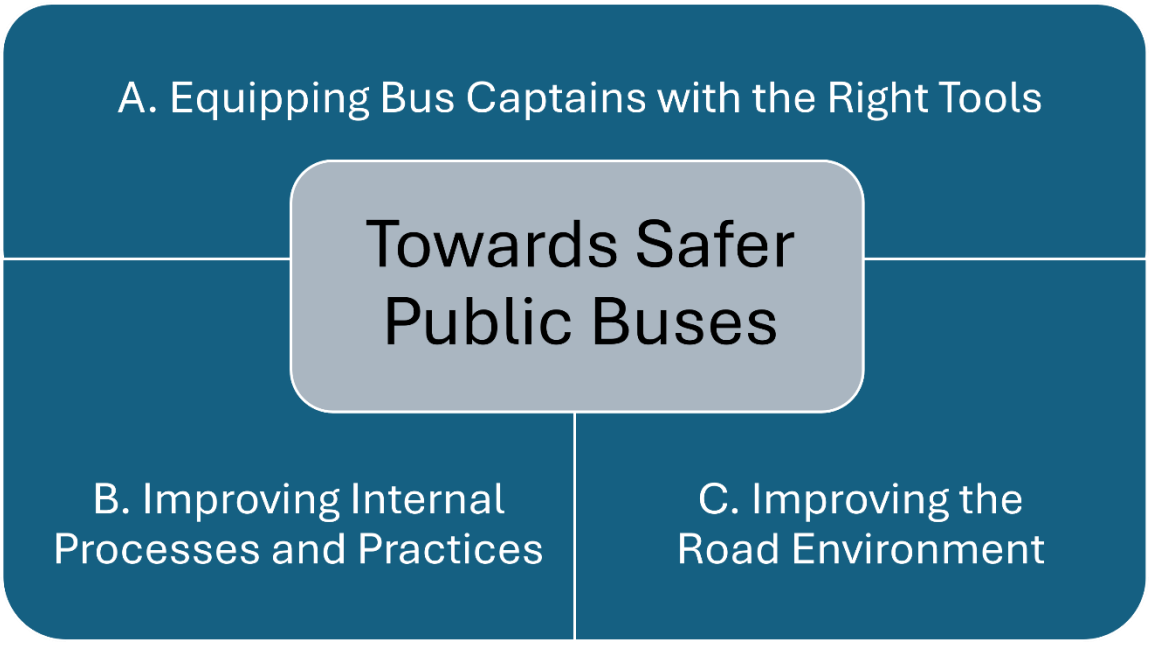
- Engaging the public. Given the impact that commuters and other road users can have on the safe operation of buses, public engagement is an important contributor to better safety outcomes. While LTA, bus operators, Traffic Police, and the Singapore Road Safety Council already carry out various public engagements today, the Taskforce noted the potential for closer collaboration between stakeholders to engage the public on road safety issues. For example, the representatives from the London Road Safety Council shared how they work closely with the police, health and safety inspectorate and bus operators to actively engage the public and increase road safety consciousness, including through public campaigns to spotlight specific issues such as the risk posed by pedestrians who are distracted by their mobile phones.

5. Recommendations from the Bus Safety Tripartite Taskforce

5.1 The Taskforce affirmed that our public bus system has a good track record for safety, and that our stakeholders are confident about using and sharing the road with our public buses. At the same time, the Taskforce received and studied a range of ideas to allow us to maintain and improve safety standards amidst a more challenging environment.

5.2 Across its engagements, the Taskforce recognised a clear theme – safety is a collective responsibility, and bus captains are the vanguards. Given the demands placed on bus captains, how we support them will make a critical difference to safety outcomes. Bus captains balance multiple demands such as staying on schedule while operating large vehicles on roads that have become busier post-Covid, while continuing to keep themselves and commuters safe. On the road, bus captains with the right skills and experience, and a familiarity with safety equipment, will be best prepared to deal with emerging or unexpected scenarios. giving more support to bus captains will make a difference in avoiding and mitigating the impact of accidents, and enhance safety on and around buses.

5.3 To make our public buses safer, the Taskforce's recommendations are focused on supporting bus captains by: (A) equipping them with the right tools, and providing them with supportive working conditions, which comprise recommendations on (B) improving internal processes and practices, as well as (C) improving the road environment.



Summary of focus of the Taskforce's recommendations

A. Equipping Bus Captains with the Right Tools

Safety features currently deployed in our public bus fleet

Today, public buses are equipped with a range of safety features to help bus captains drive safely and avoid accidents. The safety features available differ across bus operators and bus models.

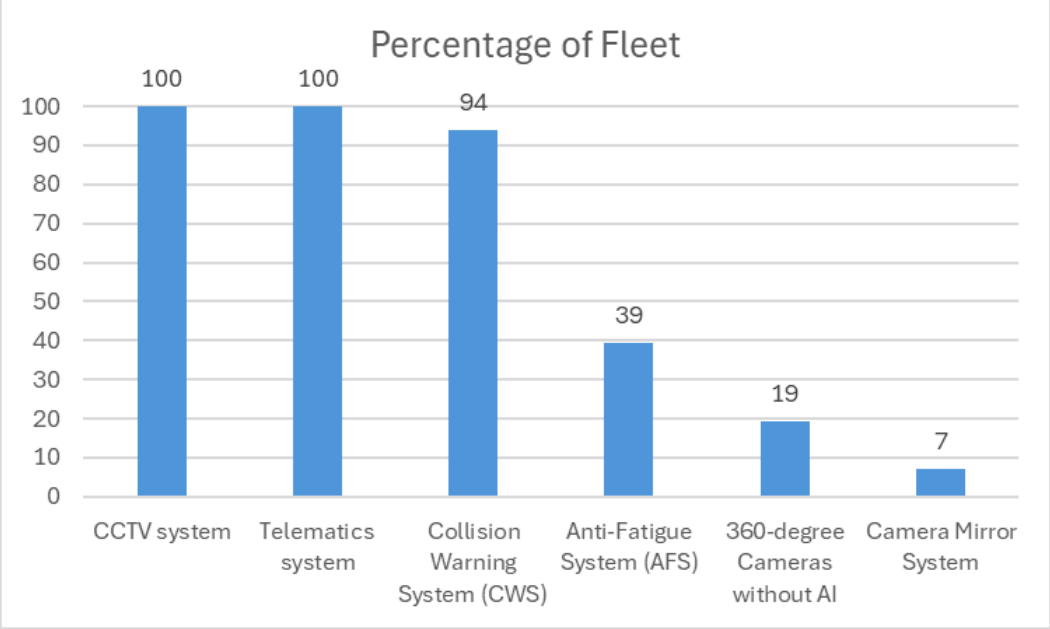
a. **Integrated collision warning and onboard surveillance system.** This provides real-time coverage of external and internal environments and issues alerts when potential collisions are detected.

b. **Telematics System**. This monitors a bus captain's driving patterns like lane changes, acceleration, and braking, and will alert the bus captain and bus operators of behaviours such as harsh braking.

c. **Anti-fatigue system.** This provides audio-visual alerts when it detects that the bus captain may be fatigued or distracted.

d. **360-degree cameras:** This provides a comprehensive view of the vehicle's surroundings for bus captains.

e. **Camera mirror system.** This offers a wider field of view and reduced blind spots for bus captains, and improves side visibility during adverse weather conditions.



Graph showing prevalence of safety features currently deployed on our existing operational bus fleet

In addition, buses are equipped with features that mitigate the impact of incidents that may occur on the road.

a. **Automatic fire suppression system**. This detects and suppresses fire in the engine and battery compartments.

b. **Grab poles and hand grips**. Accessible handrails and hand straps for commuters, including wheelchair users, improve commuter safety by reducing the risk of injury from falls when the bus is moving.

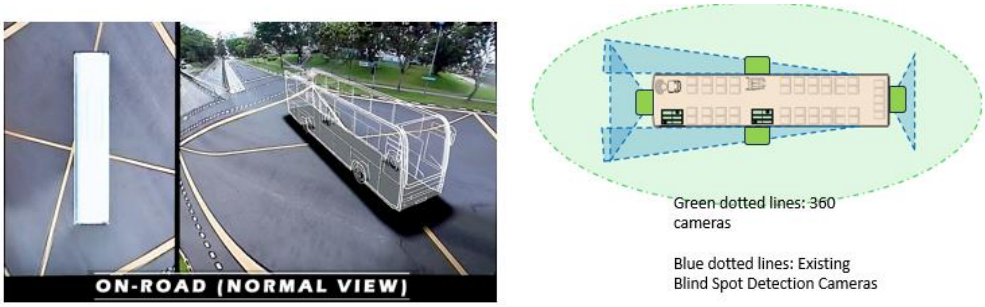
c. **Emergency exits**. Our buses are designed with multiple exit points to allow for rapid evacuation during emergencies. In the event that the exit points are inaccessible, break glass hammers are placed in strategic locations to allow commuters to break the tempered glass windows and create additional exits.

5.4 Over the years, our public buses have been upgraded with a range of safety features. These include safety features that have been trialled by bus operators on a limited basis, and features that have been incorporated in newly-acquired buses. The Taskforce noted that safety technology has continued to improve, while existing technologies have matured and can be deployed fleet wide. The Taskforce identified two areas where more widespread deployment of technological tools and systems can further improve safety.

New Safety Systems to be Installed Fleetwide

5.5 First, more mature technology to improve bus captains' situational awareness and alert them to potential safety risks have become available. These systems may potentially avert serious accidents. While some of these systems are being introduced on a trial basis or as part of new bus purchases, **the Taskforce recommends equipping our entire existing bus fleet with these systems**:

a. **360-degree collision warning system with AI.** A system which eliminates blind spots of existing camera systems should be installed on all buses. Based on current AI image processing technology, such systems should be able to provide real-time audio-visual alerts when it detects potential collisions with pedestrians or other motorists from all directions. Footage from these cameras can also be used to carry out enforcement of bus lane violations, as well as to detect potholes to facilitate prompt fixing of roads.



Images showing how the 360-degree collision warning system would enhance safety (for illustration purposes only)

b. **Anti-fatigue system (AFS).** A system which provides audio-visual alerts when it detects that a bus captain may be fatigued or distracted (e.g. using eye-tracking technology) should be installed on all buses, to ensure that bus captains remain alert on the road.

Image showing the anti-fatigue system installed on a bus (for illustration purposes only)

c. **Camera mirror system (CMS).** Existing side mirrors on all buses should be augmented or replaced with high-definition cameras and interior displays, to reduce blind spots and improve side visibility during adverse weather conditions.

Images showing the camera mirror system being trialled on a bus (for illustration purposes only)

New Safety Systems to be Installed Where Feasible

5.6 Second, the Taskforce identified a number of other technological features to support safer driving and commuter habits, so that bus captains can better

concentrate on driving safely. The Taskforce recommends implementing or retrofitting the following safety features where feasible:

a. **Improved torque management.** As bus captains operate different vehicle models with different handling characteristics, there could be some unevenness in their handling of bus acceleration depending on the vehicle they are driving. The transmission output, engine output and accelerator pedal feedback of our buses can be adjusted to reduce "jerkiness" of bus movement during acceleration. This improves passenger comfort and safety, and could prevent accidents when buses are moving off. Torque management software should be implemented on existing buses where possible, and incorporated as a new requirement for future bus purchases.

b. **Safety announcement onboard buses.** Safe commuting habits, such as holding on firmly to handrails or grab poles when buses are moving, can help to reduce the impact of accidents, including if buses have to brake abruptly to avoid a collision. Pre-recorded safety announcements can remind commuters of these good practices, and relieve bus captains from having to make such reminders before moving off. This should be implemented on buses where speakers are available, and on new buses which are equipped with speakers.

c. **Rear electronic display system.** To automatically alert other road users, a new rear display to indicate bus movements should be implemented for new buses. The display will take in the bus captain's inputs, such as turn signals, to alert other road users when the bus is about to stop, move off or reverse. With this, other road users will be more aware of the intention of bus captains and can react accordingly.

Images showing an enlarged rear electronic display on a bus, and a mock-up of the enhanced new display (for illustration purposes only)

Streamlining of Display Units for Bus Captains

5.7 Several bus captains provided feedback that the installation of multiple onboard systems could create distractions, especially when each system has its own display. The Taskforce acknowledges the importance of ensuring our bus captains are able to focus on driving safely, and not be overwhelmed by multiple display units. In tandem with recommendations to retrofit more safety systems

on our buses, the Taskforce recommends that LTA explore how the number of display units in the driving cabin can be reduced, such as using an integrated display system that synthesises information from different systems to display and alert bus captains of the most critical information needed to driving safely.

B. Improving Internal Processes and Practices

5.8 Beyond providing bus captains with the right technological tools, the Taskforce also recognises the demanding nature of the bus captain role. We should provide bus captains with supportive working conditions, by improving both their skills and well-being, and ensure that they can be fully focused on their core task of conveying commuters to their destinations. The Taskforce proposes the following recommendations to creating a more conducive environment for bus captains to perform their roles effectively.

Continual Refinements of Bus Runtime

5.9 The schedules for bus captains' duties are based on the scheduled runtime for completing their bus route. Scheduled runtimes account for the average travel time, considering factors such as typical travel conditions, number of passengers, weather patterns, and the dwell time at bus stops for commuters to board and alight. However, actual runtimes can still vary due to day-to-day fluctuations of these factors. Bus operators take these factors into consideration when scheduling buses, while also ensuring that they meet service reliability and bus punctuality standards set out under the BCM. Bus runtimes are also calibrated for different day types (e.g. weekdays, weekends, school holidays), as well as periods (e.g. peak, off-peak), to account for variations in traffic conditions and commuter travel patterns.

a. It is important that our bus captains have sufficient runtime to complete the route within the scheduled time. This is so that bus captains do not come under time pressure, which may compromise safety. Currently, bus operators conduct regular reviews by comparing actual runtimes to scheduled runtimes, and incorporating feedback from bus captains. Where necessary, bus operators will seek LTA's approval to vary runtimes. When making any adjustments to runtime, LTA and bus operators will also need to consider the impact to service standards, as excessive runtime can also lead to unnecessarily slow bus speeds and negatively affect the passenger experience.

b. **The Taskforce affirms the existing process for adjusting the scheduled runtime of bus routes.** Since August 2024, the runtimes of 111 bus routes have been reviewed, with runtime being increased to account for time taken to make right turns (due to the removal of more discretionary right turn junctions), clear heavier traffic, and longer boarding and alighting times due to higher ridership.

Capping Total Runtime for Bus Routes

5.10 The Taskforce noted feedback from bus captains that the optimal runtime for a single journey should not exceed two hours. The Taskforce also noted that the longest bus route in overseas jurisdictions like London has a runtime of around one hour. Longer journeys can result in lapses in concentration and cause stress to bus captains, such as when they feel the urge to use the toilet. This could increase the risk of accidents occurring.

a. **The Taskforce recommends not introducing bus routes with a scheduled runtime of more than two hours**.

b. In addition, there is a minority of existing bus routes with scheduled runtimes exceeding two hours. Most of these are older trunk routes that were introduced when the rail network was sparser and there was a greater need for bus services to connect distant locations across the island. **The Taskforce recommends that LTA and bus operators study existing bus services with long runtimes, to reduce the runtime of services where feasible.** When reviewing such routes, priority should be accorded to bus services with more challenging routes or longer runtimes of above three hours.

Ensuring Adequate Meal Break Duration

5.11 While the minimum scheduled meal break for bus captains is 25 minutes, the Taskforce noted that on any given day, over 20% of bus captains do not enjoy their full scheduled meal break. This could be due to longer runtimes caused by traffic conditions, or parking issues at congested bus interchanges delaying the start of their scheduled breaks.

a. **The Taskforce recommends that bus operators work with LTA to optimise their operations, to allow all bus captains to enjoy their full scheduled meal break in practice**. This can be achieved in part by adjusting layover practices at more congested bus interchanges and making improvements to infrastructure at bus interchanges.[3]

b. Building on the above, **the Taskforce also recommends that LTA, bus operators and NTWU work towards increasing the full meal break**

[3] One option is to increase the use of "Crew Layover Without Bus" arrangements. This is a scheduling arrangement where bus captains switch between vehicles during their shifts. This allows bus captains to take a break without requiring their bus to be parked, reducing the parking space required at each interchange while also increasing the likelihood of bus captains being able to enjoy their scheduled meal break in full.

progressively to 30 minutes, taking into consideration the impact on manpower and resource requirements.

Improve Training Programmes for Bus Captains

5.12 The Taskforce affirms that the current training regimes effectively equip our bus captains with the skills to operate their vehicles safely. However, the Taskforce noted feedback from bus captains that the practice of providing refresher training was less consistent, and not all bus captains were confident about the level of continual training they received.

Existing safety training for bus captains

On-boarding new Bus Captains

Since November 2016, all new bus captains must undergo a 5-day Enhanced Vocational Licence Training Programme ("EVLTP"), conducted by the SGBA, before they can obtain their Omnibus Drivers' Vocational Licence. The EVLTP comprises six modules to provide comprehensive foundational core skills training for new bus captains.

S/N	Modules
1.	Overview of Public Transport Industry
2.	Omnibus Driver's Vocational Licence Rules and Regulations
3.	Sectoral Tripartism
4.	Overview of New On-Board Bus Equipment and Common Fleet Management System
5.	Service Literacy
6.	Safe Driving Techniques a. Hazard Awareness Training and Test b. Scenario-based Simulator Training

The module on safe driving techniques includes two components, which are regularly updated based on emerging situations that bus captains may encounter on roads:

a. Hazard Awareness Training and Test, which equips new bus captains with knowledge on the types of hazards that they may encounter while driving, how to spot such hazards early, and the necessary actions to take in such scenarios.

b. Scenario-based Simulator Training, which utilises a simulator training and behaviour analytics system to identify and correct unsafe driving behaviours.

New bus captains then undergo an additional five to six weeks of on-the-road training with bus operators before they are deployed for service. During this

period, bus captains will be familiarised with the company's service culture and operations, and go through practical on-the-road training. Some bus operators also produce pre-recorded videos of bus service routes for their bus captains to familiarise themselves with their designated routes and locations where potential hazards might be encountered.

Continuing training and engagement

Bus operators conduct regular briefings for and engagements with their bus captains at least once every quarter. During these sessions, bus operators will share various road safety matters, including lessons learnt from past incidents.

Road safety circular and notices are also shared with bus captains on a regular basis, through safety leaflets and bus operators' in-house mobile applications. In addition, short ad-hoc briefings are conducted to address safety issues or disseminate urgent safety messages.

Bus operators also provide refresher training for bus captains to continually improve their safety awareness and driving skills. Such training is regularly updated to take into account prevailing safety trends, high profile accident cases, as well as any changes in bus operating instructions or traffic rules.

In August 2022, the SGBA launched a one-day "BC Drive Safe" programme for existing bus captains. This refresher course aims to reinforce safe driving culture and equip bus captains with the correct attitude to deal with other road users and potentially hazardous traffic situations. The programme includes peer learning through discussions of case studies and scenario-based simulator training.

5.13 To ensure that best practices are widely shared, and reduce the number of accidents caused by a lapse in driving skill, the **Taskforce recommends the following enhancements to the continuing training programmes for bus captains**:

a. **Introduce an industry-wide training point system.** Currently, the training progress of individual bus captains is not tracked evenly across bus operators, which may lead to bus captains undergoing different levels of training. A points-based training system should be implemented across operators, where bus captains receive points for completing different training modules. SGBA should track the training points received by each bus captain, to ensure that all bus captains receive a minimum amount of training per year.

b. **Improve take up of "BC Drive Safe" programme.** The Taskforce affirms the value of the BCDS refresher training programme conducted by SGBA, which utilises peer learning to reinforce safety principles. However, due to

scheduling exigencies, not all bus captains have been able to benefit from this programme, with only about 40% of bus captains completing BCDS since it was launched in 2022. Bus operators should work with SGBA to schedule and register their bus captains for this refresher programme in a timely manner. SGBA should offer more runs of the programme so that more bus captains can attend the programme.

c. **Introduce a targeted intervention programme.** Bus operators are already using onboard telematics system to identify bus captains who may need additional training. **The Taskforce recommends that the SGBA augment these existing interventions, by introducing a more robust and personalised coaching programme** to help bus captains that may require more support. The programme should identify and address the specific competency gaps of these bus captains through the use of various training tools such as learning needs analysis, workplace learning and coaching techniques.

Safe Driving Incentives

5.14 To encourage good driving behaviour and recognise the important role played by bus captains in ensuring the safety of commuters and other road users, **the Taskforce recommends that bus operators and LTA recognise consistent safe driving by offering tiered safety incentives to bus captains.** These incentives can be based on achieving various accident-free mileage milestones. In addition to the monetary incentives, safety badges that can be worn on uniforms or plaques can also be presented to bus captains during industry-level events to recognise bus captains with exceptional accident-free driving records, and instil a sense of pride among bus captains for being safe drivers.

Ongoing Efforts to Improve Well-being of Bus Captains and Enhance Job Attractiveness

5.15 Besides scheduling and training, providing supportive working conditions for bus captains also involves improving the well-being of bus captains, and ensuring that there are sufficient bus captains to manage the workload in a growing bus network. **The Taskforce affirmed the work of other ongoing tripartite platforms and efforts to improve the health of our bus captain population**, **as well as to increase the job attractiveness of the bus captain role** to attract a new generation to join and stay in this industry. These include:

a. The Healthier SG and Mental Wellness Committee for Public Transport Workers, which was set up in May 2024 and chaired by NTWU, aims to enhance, advocate for and increase awareness of physical health and mental wellness issues among public transport workers, including bus captains. For example, the Committee supported the rollout out of Healthier SG Health Screening for all public transport workers, and is exploring further initiatives to encourage workers, especially those aged 40 and above, to go

for follow-up consultations, and to provide other preventive screening for public transport workers.

b. To improve recruitment and retention, bus operators are offering higher sign-on bonuses of up to $20,000, higher referral bonus and introduced 5-day and 4-day work week, as well as part-time schemes, to provide more employment options. The bus operators have also worked with LTA and NTWU on a series of public campaigns to profile and encourage jobseekers to consider the public transport sector, including joining as a bus captain. Tripartite partners have collaborated on road shows, participated in career fairs and launched social media campaigns. The bus operators have set out career progression roadmaps, provide retention incentives and re-employment bonuses, and also offer benefits such as mental health workshops. There are also ongoing efforts to look into measures and initiatives to make the bus captain job more attractive.

C. Improving the Road Environment

5.16 Bus captains have to contend with busier roads while still providing reliable travel times, especially as traffic returns to pre-Covid norms. Improving the road environment encountered by our bus captains will help them to continue providing safe journeys. The Taskforce's third set of recommendations pertain to better management of the road environment to help bus captains continue providing safe journeys.

Existing Road Measures

Every year, LTA implements approximately 1,000 localised road enhancements to improve road safety and traffic flow. These enhancements include kerb realignments to improve bus movements, and the installation of railings to direct pedestrians to safer crossing points.

To support bus movements, about 230km of bus lanes, 340 bus priority boxes, as well as 40 B-signals (bus priority at traffic lights) have also been implemented. LTA also calibrates traffic light timing at signalised junctions where possible, to favour smoother bus movement.

Images showing existing road measures to facilitate bus movements, such as bus priority boxes and B-signals

LTA also conducts regular reviews with bus operators to enhance bus movement on the roads. Since 2015, over 140 road corridors have been reviewed, resulting in more than 90 improvement measures.

Improve Facilitation of Bus Movements

5.17 Currently, about seven in 10 bus stops already feature measures like bus lanes and bus priority boxes that help facilitate buses moving off from the bus stop. This includes bus stops where buses stop along the road without entering a bus bay, as buses there are generally able to move off more easily. However, bus captains may still face issues at certain locations, such as navigating multiple lane changes after departing from bus stops.

a. **The Taskforce recommends that LTA work with bus operators to review the remaining three in 10 (around 1,600) bus stops**. Unless the impact on traffic and other road users is exceptionally severe, LTA should provide features to facilitate bus movement at these remaining bus stops.

b. **The Taskforce also recommends that LTA and bus operators continue to work with relevant organisations, such as the Singapore Road Safety Council and Traffic Police, to carry out larger-scale publicity efforts to improve other road users' awareness of and compliance with measures to facilitate bus movement**. An example of this is an existing collaboration between bus operators, Traffic Police and the Singapore Road Safety Council to raise awareness of bus blind spots to cyclists and other road users.

Enhance Management of Road Works

5.18 Currently, contractors involved in road works are required to adhere to the Code of Practice for Traffic Control at Work Zones, which provides a comprehensive set of guidelines on traffic control arrangement. These include provisions for appropriate signage, barriers, and traffic management plans to protect workers and road users. Contractors found to have violated the Code of Practice and any other requirements will be fined and/or issued demerit points.

5.19 Nonetheless, the Taskforce noted feedback from bus captains that they continue to face difficulties when navigating through roads undergoing road works, due to inexperienced road marshals not providing proper instructions, or improper barrier placements resulting in difficulty in manoeuvring buses through affected stretches.

a. **The Taskforce recommends raising the penalty for contractors who do not comply with road works regulations.**

b. To ensure that contractors are able to comply with regulations, especially when more complex traffic regulation is required, **the Taskforce recommends that LTA work with relevant agencies to upskill Authorised Security Officers to safely perform more complex traffic regulation duties around worksites,** to decrease the reliance on auxiliary police officers.

6. Conclusion

6.1 The various recommendations proposed by the Taskforce seek to equip our bus captains with the right tools and provide them with supportive working conditions, both through improved internal processes and procedures as well as an improved road environment.

6.2 To ensure that our bus captains are well-supported and able to do their job well, these recommendations complement other ongoing efforts to improve their well-being, such as efforts to improve recruitment and retention.

6.3 Safety is a collective responsibility, not just that of the bus captains. The awareness, understanding and cooperation from commuters, motorists and other road users are equally critical to avoid safety incidents.

6.4 Tripartite partners will continue to work hand-in-hand to not only see through the implementation of the proposed measures but to ensure that we do not waver from our commitment to ensure the safety of our public buses.

6.5 The Taskforce would like to thank our public bus operators Go-Ahead Singapore, SBS Transit, SMRT Buses, and Tower Transit Singapore for hosting Taskforce members during our respective visits, as well as the SAF for accommodating our visit to 1st Transport HQ at Sembawang Camp. We would also like to thank NTWU for helping us to gather feedback from bus captains.

6.6 In addition, we would also like to express our gratitude to Transport for London, Go-Ahead London, Metroline, Imperial College London, and the Chartered Institution of Highways and Transportation as well as the Bus Centre of Excellence for hosting Taskforce members during our study trip to London, and sharing their insights on safety practices within their unique operating environment.

6.7 Finally, the Taskforce would also like to thank all members of the public and bus captains who responded to surveys and participated in focus group discussions. Your feedback has greatly assisted the Taskforce in its deliberations.

7. Appendix

Composition of the Bus Safety Tripartite Taskforce

S/N	Name	Designation
1.	Mr Murali Pillai	Minister of State, Ministry of Law & Ministry of Transport
2.	Mr Melvin Yong ***(from July 2024 until December 2024)***	Executive Secretary, National Transport Workers' Union
3.	Ms Yeo Wan Ling ***(from January 2025)***	
4.	Mr Jeremy Yap	Deputy Chief Executive (Policy, Planning & Public Transport), Land Transport Authority
5.	Mr Yeo Teck Guan	Senior Group Director (Public Transport), Land Transport Authority
6.	Mr Alvin Chia	Senior Group Director (Traffic & Road Operations), Land Transport Authority
7.	Mr Leonard Lee	Managing Director, Go-Ahead Singapore
8.	Mr Lim Tien Hock	Chief Executive Officer (Bus Business), SBS Transit
9.	Mr Tan Peng Kuan	President (STRIDES Holdings), SMRT
10.	Mr Winston Toh	Managing Director, Tower Transit Singapore
11.	Mr Mak Mun Whai	General Secretary, National Transport Workers' Union
12.	Mr Peh Chee Kang	Vice President, National Transport Workers' Union
13.	Mr Anthony Raj George	Assistant General Secretary, National Transport Workers' Union
14.	Mr Abdul Rahman Mohamad	Executive Committee Member, National Transport Workers' Union
15.	Mr Lionel Bok	Deputy Commander, Traffic Police
16.	Mr Louis Loke	Executive Director, Singapore Road Safety Council
17.	Mr Sebastian Tan	Director (Occupational Safety and Heath Inspectorate Department), Ministry of Manpower