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To: Department of Infrastructure, Transport,
Regional Development and Communications
(DisabilityTransport@infrastructure.gov.au)

Submission on the "Reform of the Disability Standards for Accessible Public Transport: Consultation Regulation Impact Statement" February 2021

Thank you for the opportunity to provide feedback on the DSAPT reform document. As a researcher and occupational therapist with over 30 years of experience, I promote transport mobility for people with disabilities and age-related health problems, focussing on the use of mobility devices (manual wheelchairs, motorised wheelchairs and motorised mobility scooters), also referred to as mobility aids. The information provided in this submission is based on research I have led over the past eight years on public transport accessibility for people with disabilities, focussing on access for people using mobility devices/ aids. This has led to several industry reports and peer-reviewed publications as noted below. Joining me in in this submission is occupational therapy clinical colleague with expertise in the disability sector and research higher degree student, Bonnie Watt and engineering colleagues with expertise in transport access, Dr. Julian Chua and Dr. Gayan Kahandawa.
I have drawn evidence from nine research projects in this field (were permissible) to support the information provided in this document:

1. **2021 Improving safety for bus passengers using wheelchairs and mobility scooters: Effectiveness of restraint systems**

$307,000. Funded by: Department of Transport Victoria

Description: This project is currently underway and will provide evidence concerning the effectiveness of both passive and active restraint systems to prevent slide and tip of people using mobility devices on public route buses. The resulting data can be used to inform decisions on suitability of implementing passive or active restraint systems on route buses nationally.

2. 2020 – Increasing accessibility for passengers with disabilities using Brisbane Metro Vehicles.

$26,000. Funded by: Brisbane City Council.

Description: Research to support access and travel space for people using mobility devices on Brisbane Metro Vehicles. Consulted across the development and prototype testing phase with Brisbane City Council team and HESS. Research and report are commercial in confidence.

3. 2020 - 2023– Driving Change: Improving bus driver attitudes, communication and behaviour in encounters with passengers with a disability

PhD student project- Bonnie Watt (supported by Department of Transport Victoria and BusVic- Bus Association of Victoria).

Description: People with a disability report that some bus drivers can demonstrate a negative attitude, discourteous behaviour, and inappropriate communication. This 'transport disadvantage' is an environmental barrier experienced by people with a disability, which prevents them from equitable public transport access and as a result impacts their occupational participation and engagement. Both passengers with a disability and bus drivers report a need for more extensive training of bus drivers to improve their encounters with passengers with a disability. This project seeks to improve bus driver attitudes, communication methods and behaviour in encounters with passengers with a disability through developing and testing an evidence based, co-designed training program; the Bus Driver Educational Training on Transport Inclusivity for all Passengers (BETR TRIP) package.

4. 2019-20– Innovations for people with a disability.

$92,302. Funded by: Australasian Centre for Rail Innovation (ACRI).

Following an international horizon scan including hospitality and tourism, retail, healthcare and education sectors, this project identified a wide range of low and high-tech innovations that assist people with disabilities to manage everyday life. Workshops with consumers and transport experts prioritized implementation of these technologies. These findings were leveraged to improve the rail transport experience for Australians with a wide range of disabilities.

Technical report 1: *International Innovations that promote passenger rail accessibility. Horizon scan*.

Technical report 2: *International Innovations that promote passenger rail accessibility. National Workshop findings*

5. 2019– Wheelchair tiedown and occupant restraint systems (WTORS) for mobility devices on public route buses: National and international literature audit and survey

$56,093. Funded by: Public Transport Victoria (now Department of Transport Victoria).

Description: Identified 8 main types of WTORS in use internationally and the advantages and disadvantages of each approach. Surveyed 448 mobility device users and ambulant bus

passengers in Australia and the USA regarding the use of WTORS with mobility devices on public route buses. The finding from this review were inconclusive in terms of making recommendations on the best restraint or containment system to implement on route buses. Therefore, the Department of Transport have commissioned a new piece of work to collect research evidence on the effectiveness of active and passive-style WTORS to prevent tip and slide, as documented above as Project 1.

Technical report 1: *Wheelchair tiedown and occupant restraint systems (WTORS) for mobility devices on public route buses. National and international literature audit and survey.*

6. 2017- 2018 Situational factors contributing to musculoskeletal injuries in tram drivers on the G:Link.

$67,000 Funded by Keolis Downer Gold Coast.

Description: Investigation into tram driver behaviour and upper limb occupational injuries experienced by tram drivers.

Technical Report: Naweed, A., Unsworth, C.A. & Bowditch, L. (2018). *A Person-Environment-Occupation Study of Situational Factors Contributing to LRV Driver Injuries in the Gold Coast.* (Tech. Rep 1). Keolis Downer.

Publications:

Naweed, A., Unsworth, Bowditch, L., & Trigg, J. (2020). Out on a limb: Applying the Person-Environment-Occupation Performance model to examine injury-linked factors among light rail drivers. *Safety Science*, 127, 1-18 https://doi.org/10.1016/j.ssci.2020.104696

7. 2016- 2018 Ticket to ride: promoting accessible bus journeys for mobility device users.

$145,000 Funded by Public Transport Victoria.

Description: This research provided a detailed engineering and 3D analysis of accessibility for mobility device users on buses. The research examined the DSAPT standards with respect to buses and we were able to demonstrate using 3D evidence that many mobility device users are successfully able to access a range of buses that are not DSAPT compliant. The research also reviewed and challenged the accuracy of the draft technical standard for powered wheelchairs and mobility scooters (DR TS 3695.3:2017 CP). This research highlights our understanding of the complexities of the DSAPT and related standards, and that these Standards do not necessarily ensure accessibility for people with disabilities.

As shown in Figure 1, we designed, built and tested the mobility device access on buses

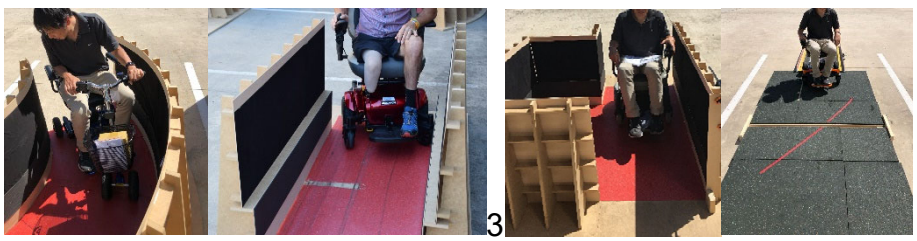

Figure 1: Left to right – Swept Path Test, Narrow Access Path Test, Allocated Space Test, Pavement Gap Test

As shown in Figure 2, we also undertook 3D scans of rolling stock using state-of-the-art scanning technology to determine DSAPT compliance, and mobility device access. This work is the first of its kind in this area.

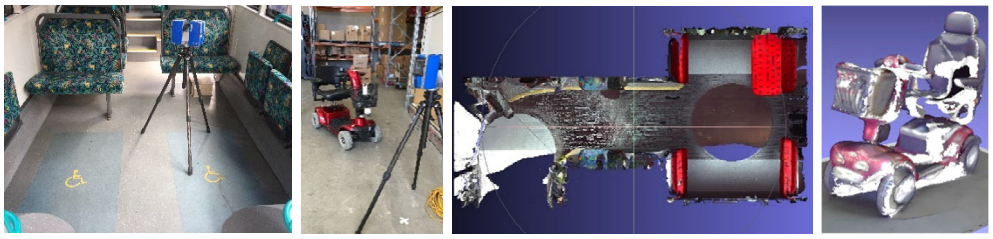

Figure 2: Left to right – 3D scanning a bus, 3D scanning a powered mobility device, Plan view of a scanned bus 3D model, Scanned scooter 3D model

Technical report 1: The accuracy of the four tests (Swept Access, Allocated Space and Narrow Access Path, and Pavement Gap tests) to correctly identify powered mobility devices that will pass and fail Blue Label tests
Technical report 2: Which buses in use that do and don't comply with the DSAPT standards, will enable boarding for customers using powered mobility aids with dimensions that do, and don't comply with proposed Blue Label criteria.
Technical report 3: Accessibility features to improve bus design.
Publications:

Unsworth, C.A., Chua, J., Naweed, A., Gudimetla, P., Nguyen, T.D., Barnes, D.G. (2018). Use of 3D scanning technology to determine bus access for people using powered mobility aids. *Journal of Transport and Health*, 10, 350-360. doi.org/10.1016/j.jth.2018.07.002

Unsworth, C.A., Chua, J., & Gudimetla, P. (2020). A 3D Measurement and Computerized Meshing Study to Promote Bus Ridership Among People Using Powered Mobility Aids. *Frontiers in Built Environment, Transportation and Transit Systems, 6 (90),* 1- 12 doi: 10.3389/fbuil.2020.00090

8. 2015 The influence of public transport accessibility on consumer's choice and use of mobility aids.

$25,000 Funded by Public Transport Victoria.

Description: Telephone interview with detailed survey of 65 people with a wide range of disabilities on their experiences on all conveyances of using mobility devices, and the opportunities they see for improvements.

Technical Report 1: *The influence of public transport accessibility on consumer's choice and use of mobility aids* (Tech. Rep 1). Public Transport.

Publications:

Unsworth, C.A., Rawat, V., Sullivan, J., Tay, R., Naweed, A., & Gudimetla, P. (2019). 'I'm very visible but seldom seen." Consumer choice and use of mobility aids on public transport. *Disability and Rehabilitation- Assistive Technology, 14 (2), 122- 132* DOI: 10.1080/17483107.2017.1407829

9. 2011 An exploration of the community mobility difficulties experienced by people with arthritis and related musculoskeletal conditions.

$10,000 Funded by Arthritis Victoria.

Description: The overall aim of the project was to gather evidence concerning the nature and extent of the difficulties experienced by Australian people with arthritis and related musculoskeletal conditions (such as rheumatoid arthritis, psoariatic arthritis and osteoarthritis) when driving and using public transport. Arthritis is the major cause of chronic pain and disability in Australia, and of all the National Health Priority Areas, is the most prevalent condition affecting some 3.85 million Australians. We conducted rural and metropolitan focus groups in Victoria (n= 21 respondents), each of approximately 2 hours duration. Data were also collected through a national on-line survey (n=46 respondents). Respondents reported that having an "invisible illness" presented a problem when using public transport. They felt that they did not receive the amount of assistance and consideration they required from drivers of public transport vehicles, nor access to seats and rails from fellow travellers.

I would be very happy to provide any further assistance, and look forward to hearing the outcomes of the Consultation,
Sincerely,

Professor Carolyn Unsworth
PhD, BAppSci(OccTher), GCTE, OTR, MRCOT, FOTARA

Feedback across the 16 areas of reform.

Chapter 4: Staff training and communication

4.5 Consultation questions: Preferred option- Regulatory

PhD student and expert occupational therapist, Bonnie Watt (Research project No.3 described above) is working with our team to develop and test an education package specifically designed to promote better communication patterns for bus drivers. This research uses a co-design approach. The research commences with understanding the issues from both the perspectives of people with lived experience and bus drivers. This will provide data related to the experiences people with a disability have when interacting with frontline staff as well as the experience of bus drivers. A co-designed education package (input from lived experience experts, bus drivers and research team) will be developed. The education package will be co-led by educators with bus/health backgrounds and persons with lived experience expertise. The education package is called the Bus Driver Educational Training on Transport Inclusivity for all Passengers (BETR TRIP) package. The effectiveness of the package to improve bus driver interactions will be tested against current status quo video education used. Program due for completion by early 2023. This education package will be made available for use in the bus industry nationally.

Chapter 5: Mobility aid safety

5.5 Consultation questions: Preferred option- Non regulatory

My research team has previously investigated various types of wheelchair restraint/containment methods on buses both domestically and internationally, as well as passenger opinions (people using mobility devices and ambulant passengers). The advantages and limitations of different options were explored.

We have also worked with a domestic operator/provider to design, test and implement a passive rearward facing mobility aid containment system for bus-type vehicles.

Our research currently underway will provide evidence on the effectiveness of different passive and active restraint/ containment systems (see Figure 3) to prevent slide and tip of people in their mobility aids when used in rearward and forward-facing positions.

Figure 3.

	
Example active restraint system (Australia)	Example passive restraint system (Germany)

Chapter 6: Priority seating

6.6 Consultation questions: Preferred option- Regulatory

Number of priority seats: Option 1.

Identification of priority seats. Priority seats identified by colour alone is a problem as many people do not notice this difference and what it signifies. Signage on windows or walls (in multiple formats, and of tested size) is helpful, but the best option we have seen is where the seat itself has the priority woven as part of the fabric. For example CDC Melbourne have red fabric with repeated logos, or Transport for London has messaging on the seatbacks as shown in Figure 4a,b,c.

Figure 4:

	
a. CDC Bus Victoria, Australia	b. Transport for London, UK, example fabric 1

	
c. Transport for London, UK example fabric 2	d. Example that some passengers carry card to show other passengers that they need a priority seat

Priority seats should be (i) fixed and (ii) should not be co-located in mobility aid allocated spaces. Priority seats that need to be flipped down are very difficult for many people with a range of disabilities to activate and sit on safely. Furthermore, people using flip down priority seats in allocated spaces for mobility aids may have to move if a person using a mobility aid enters the bus, necessitating a search for another suitable seat nearby.

People who need priority seats may not 'look' disabled and may also feel it is difficult to ask other passengers to move from these seats. To assist with this, people who need priority seats should be provided with the option of carrying a card (the size of a credit card), or wearing a lanyard if they wish, provided by the transport operator/ provider, to show other passengers who are in the priority space that they need to sit.

Evidence supporting these issues has been gathered in Projects 4 and 9 listed above.

Chapter 7: Allocated spaces in transit

7.5 Consultation questions: Preferred option- Regulatory

Items that can intrude into the space: Option 1.

Access paths:

Access paths that lead to allocated spaces need to be 850mm wide and clear of obstructions and protruding objects. Relaxing the swept path to 750mm between the wheel arches should only be permissible if the bus also has mid door boarding, directly into an allocated space, for people using a mobility device. Our research on buses (see Project 7) revealed that the swept path entrance is the 'pinch' point that denies many people access to buses in the mobility devices.

Accessible spaces:

Our research (particularly project 7 listed above) has demonstrated the importance of ensuring the DSAPT works in three- dimensional (3D) space rather than 2D length and breadth

alone. It is vital that seating, wheel arches, lateral stanchions and other service ducting (heating/cooling) do not reduce the available space for the allocated space.

While it is imperative that two allocated spaces are provided, where possible, it is very important for there to be more than two allocated spaces co-located so that people using mobility devices can travel together. The accessible spaces need to be provided at boarding access points. This is particularly important on trains where allocated spaces may be available in carriages that people using mobility devices cannot board, and they cannot move through the train to reach them for fear of not being able to get back to an exit door in time to disembark. Often, train boarding is only through a limited number of carriages (eg. first and last, or mid carriage only) to enable ramp access. When anticipating future demand, it is vital to consider the ageing of our population and the likelihood that increasing numbers of older people will want to board conveyances in their mobility devices (particularly larger mobility scooters designed specifically for outdoor use including public transport access).

The allocated spaces (buses, trains, trams, light rail, ferries) need to be clearly prioritised for people using mobility devices. This is not consistently the case. There is confusion that these spaces are equally prioritised for people with prams (pushers/ strollers) used by children. Clear signage needs to convey the priority order. This is particularly important when a person in a mobility aid attempts to board a space already occupied by a person with child in a pram. A five-year court battle in the UK referred to as ‘‘the Doug Paulley case” or the ‘‘wheelchair v buggy case” illustrates this point. Doug Paulley is a wheelchair user in Yorkshire who was denied access to a bus in February 2012 because a mother with a pram was already in the allocated space. She refused to move, despite the bus driver requesting her to make space for Mr. Paulley. Mr. Paulley successfully sued the bus operator, in 2013. The bus operator then appealed and won in the Court of Appeals in 2014. In 2016, Mr. Paulley was granted the right to appeal the decision and the Equality and Human Rights Commission took his case to the Supreme Court of the United Kingdom. The final judgement (Coleman, 2016), which found mostly in Mr. Paulley’s favour, technically ruled against the first come, first served priority to uphold Mr. Paulley’s right to travel in the allocated space. The court noted it is the responsibility of drivers to ‘‘pressurize the non-wheelchair user to vacate the space, depending on the circumstances”. The reformed DSAPT needs to ensure Australian public transport users are clear concerning priority access for allocated spaces. This is already underway in many jurisdictions with the removal of pram signage in wheelchair allocated spaces. *Reference: Coleman, C., 2016. Supreme Court to hear ’wheelchair vs buggy’ bus case. BBC. Retrieved from: http://www.bbc.co.uk/news/uk-36534907.*

The minimum size for the allocated space is currently specified in DSAPT as 800mm by 1300mm (AS1428.2 (1992).

We support the addition of a vertical spaces to be unobstructed to 1500mm, particularly as our research has shown that seat cushioning from fold -down seats can reduce the useable width of the allocated floor space by 150mm (i.e. reducing from 800mm to 650mm). We strongly recommend the removal of flip down seats from allocated spaces for this reason.

Research can be conducted to examine the dimensions of an allocated space required to fit most mobility aids, or the dimensions of mobility aids that will fit within the current DSAPT dimensions for the allocated space. Our research (see project 7) focussed on the latter. We

tested 35 mobility aids on 21 buses and found 15 could access at least 16 of the buses. However, we noted that while several of the smaller mobility scooters we tested are marketed for outdoor use and easy access on public transport, these were not very stable devices and are completely unsuitable for use by larger people. However, several of these mobility aids were included in the 15 that could access most buses. We found that due to difficulty in travelling through the swept path, and being able to manoeuvre into the allocated space, the dimensions of mobility aids that are best placed to access route buses are:

- diagonal length (D) is less that than 1250mm.
- overall length (L) is less than 1100mm
- measured turn radius is less than 750mm

Assuming that the revised DSAPT promotes access for people using mobility aids on buses by entering through a mid-door directly into an allocated space (thus avoiding the swept path pinch point), we also advocate that the allocated space footprint be increased in length, anticipating future demand on allocated spaces by an ageing population using larger mobility devices such as motorised scooters.

To support as many mobility aids as possible to be able to manoeuvre into the allocated space (particularly onto buses), we advocate that the minimum size for the allocated space be increased to:

800mm wide by 1450mm long by 1500mm high (unobstructed).

We advocate the additional 150mm length for two reasons: Firstly, if a forward excursion barrier (FEB)/ ironing board is used in the future as part of a passive wheelchair restraint / containment system, these barriers intrude into and thus reduce the available 3D allocated space length by 100mm. This means the current DSAPT-compliant allocated space length of 1300 is effectively reduced to 1200mm in the 3D space. We therefore recommend an additional 100mm for length account for this. Secondly, we recommend an additional 50mm to aid manoeuvrability of larger mobility aids. Of the 35 commonly used mobility aids we tested, 83% were themselves 950mm or over in length, and 52% had turn radii greater than the ideal 750mm. An additional 50mm of length would increase access for many additional mobility aids using the reverse S move preferred to access the allocated space as per AS TS 3695.3:2018.

Chapter 8: Digital information screens

8.5 Consultation questions: Preferred option- Regulatory

Our research (see Project 4) strongly supports improved signage, particularly the provision of digital displays on bus, tram/ light rail and rail. Participants in our research described the numerous benefits of digital displays with audio outputs in train carriages that provided up-to-date information on approaching a station, and any details of lift problems at an upcoming station to allow passengers to make alternate plans in advance (also discussed under Chapter 9 Lifts).

Chapter 9: Lifts

9.5 Consultation questions: Preferred option- Regulatory

As noted above, passengers require information in real time that is made available on personal journey planners accessed through mobile apps, or conveyances through visual and auditory displays to alert passengers of lift problems in advance so that alternative plans can be made.

Signage should be provided to support priority lift access for people using mobility aids.

Chapter 10: Website accessibility

10.6 Consultation questions: Preferred option- Regulatory

Website prescriptive requirements: Sub-option 1.

Chapter 11: Communication during service disruption

11.5 Consultation questions: Preferred option- Regulatory

As noted above under Chapter 8, information on planned and unplanned disruptions need to be conveyed in a timely manner to assist people with disabilities to plan ahead to minimise stress and fatigue and ensure successful completion of journeys.

Chapter 12: Gangways

12.5 Consultation questions: Preferred option- Regulatory

Chapter 13: Assistance animal toileting facilities

13.5 Consultation questions: Preferred option- Regulatory

Chapter 14: Emergency egress

We support the development of emergency egress provisions. Such provisions might be informed by research in modelling emergency evacuations in build environments:

Manley, M., et al., (2011). Modeling Emergency Evacuation of Individuals with Disabilities in a Densely Populated Airport. Transportation Research Record: Journal of the Transportation Research Board,No. 2206,Transportation Research Board of the National Academies, Washington,D.C., 2011, pp. 32–38.DOI: 10.3141/2206

Hashemi, M. (2018). Emergency evacuation of people with disabilities: A survey of drills, simulations, and accessibility. Cogent Engineering, 5: https://doi.org/10.1080/23311916.2018.1506304

Chapter 15: Fit for purpose accessways

15.5 Consultation questions: Preferred option- Regulatory

Access paths to be the principle pedestrian path of travel: Option 2 (Ramps and walkways must be the principal path of travel and have primacy in pedestrian capacity over stairs).

Access paths to be kept clear at all times: Option 1 (at all times)

Chapter 16: Wayfinding

16.5 Consultation questions: Preferred option- Regulatory

Chapter 17: Tactile ground surface indicators

16.5 Consultation questions: Preferred option- Regulatory

Chapter 18: Passenger loading areas

18.5 Consultation questions: Preferred option- Regulatory

Number of taxi rank spaces: Option 2

Chapter 19: Provision of information in multiple formats

19.5 Consultation questions: Preferred option- Regulatory

Chapter 20: Amendments to references to Australian Standards

We support the changes to the references to Australian Standards.

Information from other Australian Standards (e.g AS/NZS 1428; AS/NZS10542) required to read and implement the DSAPT should be provided as an Appendix in the DSAPT with appropriate permissions sought and granted from the copyright holders for these inclusions if possible.