Guidelines for Safe Transport on Wheelchair-Accessible-Vehicles (WAVs)

aic
agency for integrated care

Forewords by the Co-Chairs

Mrs. Mina Lim & Ms. Judy Wee

After working in various positions in the community care sector for more than 10 years, I am honoured to co- chair with Ms Judy Wee (MDAS) to lead the 'Guidelines for Safe Transport on Wheelchair-Accessible Vehicles (WAVs) Workgroup'. This guide is the result of a dedicated team who care deeply about both the people providing transport and those who rely on it. Our shared goal is simple – to keep everyone safe.

In this first iteration, we've covered key areas like wheelchair securement, seat configurations, route planning, staff training, vehicle maintenance, and safe transfers for all users. We've also considered the wellbeing of drivers and transport assistants. We hope you'll use these guidelines with your teams across centres to improve safety and service for all. Let's work together to make a real difference.

Mrs. Mina Lim | ***Co-Chair,*** **Guidelines for Safe Transport on Wheelchair-Accessible Vehicles (WAVs) Workgroup**
Director, **St. Andrew's Senior Care (St. Andrew's Community Hospital)**

* * *

I am honoured to co-chair this workgroup, which has developed the Guideline on Safe Transport for Wheelchair-Accessible-Vehicles. As a wheelchair user and a passionate advocate for safe transport, I believe in ensuring the safety and dignity of both wheelchair users and transport staff. Our collective goal is to provide clear, actionable practices that safeguards everyone involved in the transport process.

With this guideline, we hope to foster a deeper understanding on the importance of safety and create a standard that benefits both users and providers.

Ms. Judy Wee | ***Co-Chair,*** **Guidelines for Safe Transport on Wheelchair-Accessible Vehicles (WAVs) Workgroup**
Executive Director, **Muscular Dystrophy Association (Singapore) (MDAS)**

Purpose of Guidelines

These Guidelines for Safe Transport on Wheelchair-Accessible-Vehicles (WAVs) are meant for:

- Transport service vendors who provide point-to-point transport to wheelchair users who use wheelchairs as in-vehicle seats on WAVs.
- Care centres providing and/or outsourcing such point-to-point transportation.

In these Guidelines, WAVs refer to minivans (e.g., Toyota Hi-ace, Hi-roof) with capacity for 1 front passenger and at least 8 rear passengers (excluding driver). Some operators may use larger vehicles such as the Mercedes Sprinter.

The Guidelines were co-drafted by the Agency for Integrated Care (AIC) and SG Enable, with inputs from a workgroup of industry stakeholders and wheelchair users. The Guidelines focus on safe practices, such as proper anchorage points for wheelchair securement, and risk minimisation strategies for WAV transport services. Although the endorsed Guidelines for Safe Transport on Wheelchair-Accessible-Vehicles (WAVs) can continue to be improved around existing limitations within the context of care sector WAVs, until then, all point-to-point transport service providers are strongly encouraged to work towards adopting the safe practices described in these Guidelines.

The resources in this publication serve as a reference and do not constitute regulatory requirements nor override manufacturer's recommendations. Operators are reminded to abide by prevailing safety regulations set out by relevant authorities and manufacturer's recommendations.

Version 1.0

Acknowledgement

We would like to express our heartfelt gratitude to all workgroup members for their invaluable contributions towards the Guidelines' development. Their time and expertise have given the document relevance and clarity, reflecting their commitment towards advancing safe practices in the field.

Workgroup for Guidelines for Safe Transport on Wheelchair-Accessible-Vehicles (WAVs)

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Mr. Leon Chan	Business Manager	Sunnybay Transport Pte Ltd	Member
Mr. Tan Chuan Hoh	Principal Occupational Therapist	SPD	Member
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Content

It is recommended for wheelchair users to be transferred to a vehicle seat and secured using the in-vehicle seatbelt system before commencing travel in a motor vehicle (University of Michigan Transportation Research Institute., 2018). The wheelchair should then be appropriately stored and secured in the vehicle.

Wheelchair users who cannot be transferred without compromising their medical or postural needs should have their wheelchairs secured to the vehicle floor using crash-tested seatbelts, while facing forward in the vehicle (Posture and Mobility Group., 2020; University of Michigan Transportation Research Institute., 2018).

01

Securement of Wheelchair and Passengers

1.1 Wheelchair Tie-down System (Four-point Strap Tie-downs)

The wheelchair tie-down system allows wheelchairs to be safely used as WAV in-vehicle seats. When deployed correctly, the system prevents the wheelchair from toppling or shifting during transit, thereby doubling its function as a stable passenger seat (Posture and Mobility Group., 2020). Wheelchair securement is therefore essential for both the wheelchair user and other passengers' safety.

Overseas standards and best practices recommend using the four-point strap system to secure the wheelchair to the vehicle floor (Posture and Mobility Group., 2020; Safe Transport Victoria., 2024; University of Michigan Transportation Research Institute., 2018). Using wheelchair tie-downs at four or more points can stabilise many wheelchair types when used according to manufacturer instructions.

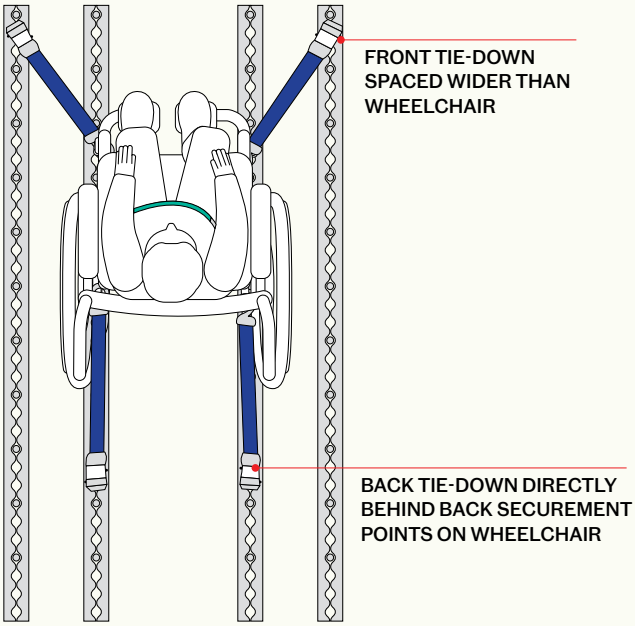


Fig 1: **Standard** 4-point wheelchair securement

1.2 Safe Practices for Wheelchair Securement in Singapore

1.2.1 Safe Practices for L-tracks Wheelchair Tie-down Method

L-tracks are metal rails installed in WAV floors for use with compatible automatic retractors, semi-automatic retractors (with tensioning knob) or manual tensioning buckles to secure wheelchairs.

Always strive for a **4-point tie-down**:

A. If four appropriately spaced L-tracks are available, use standard 4-point tie-downs (i.e. 2 tracks slightly wider than wheelchair width for front tie-downs and 2 tracks of equal width for back tie-downs).

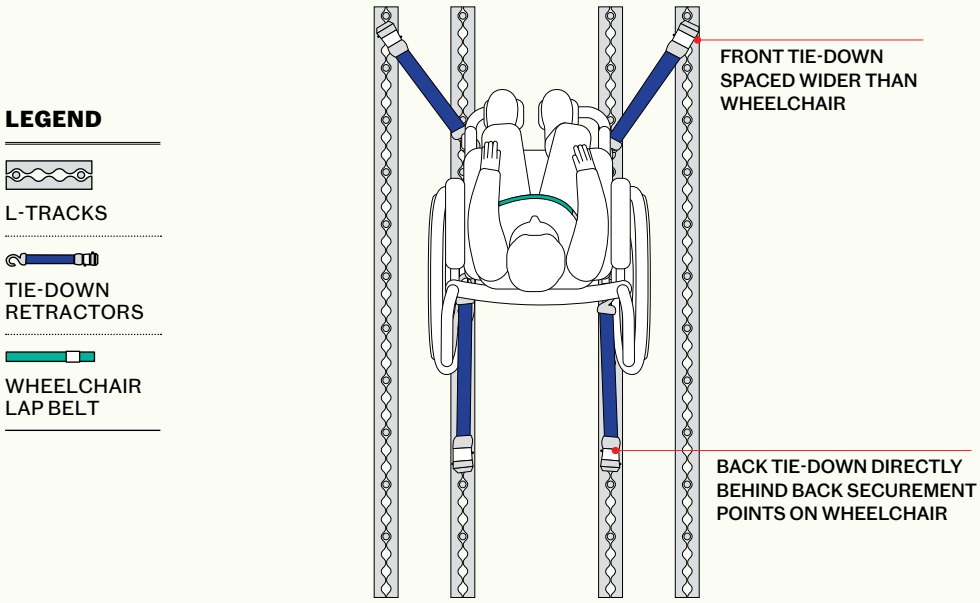
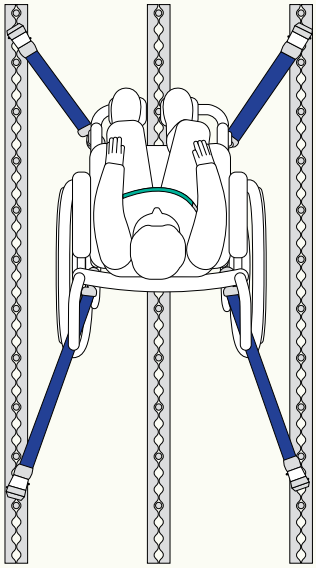


Fig 2: **Standard** 4-point wheelchair tie-down with 4 well-positioned L-tracks

B. If positions of four tracks are not suitable for the standard 4-point tie-down, or if only three or two L-tracks are available, use a modified 4-point tie-down.

If 3 L-tracks are present, use the 2 L-tracks at the extreme end for better stability



LEGEND

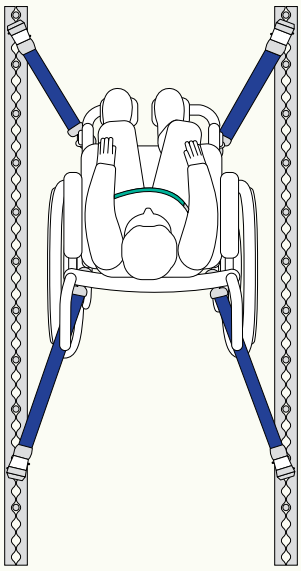
L-TRACKS

TIE-DOWN RETRACTORS

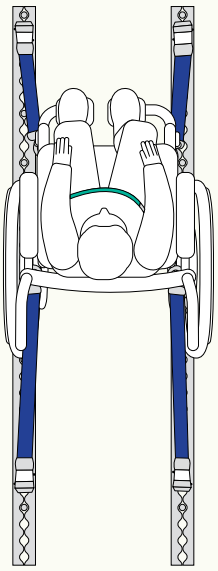
WHEELCHAIR LAP BELT

Fig 3: **Modified** 4-point wheelchair tie-down with 3 L-tracks

4 point tie-down with 2 L-tracks **spaced wider than wheelchair**



4 point tie-down with 2 L-tracks **spaced as wide as wheelchair**



LEGEND

L-TRACKS

TIE-DOWN RETRACTORS

WHEELCHAIR LAP BELT

Fig 4: **Modified** 4-point wheelchair tie-down with 2 L-tracks

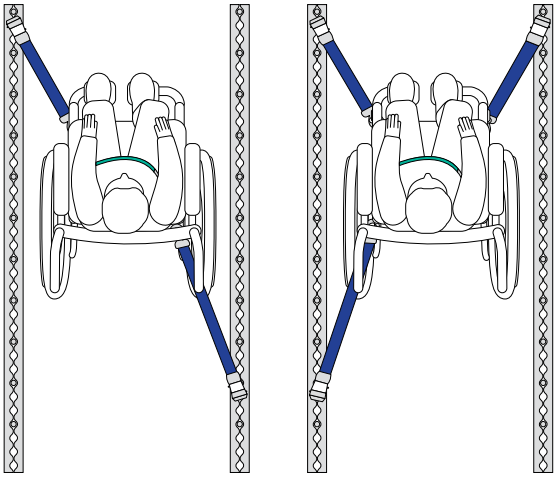
Automatic retractors, semi-automatic retractors and manual tensioning straps are compatible with L-tracks. Manual-tensioning straps may be more suitable for heavier wheelchairs as they offer greater tension compared to automatic retractors.

How to use

1. Push and slide the two front anchorage fittings into the L-tracks. Gently tug to ensure that the fitting is locked in place.
2. Position the wheelchair and apply all wheelchair brakes OR power off motorised wheelchairs.
3. Attach each hook end to a secure part of the wheelchair frame below seat height (refer to Section 1.5 on wheelchair securement points). Avoid wheels, footrests, armrests, or any movable parts.
4. a) For an automatic or semi-automatic retractor, pull the strap gently to engage the self-tensioning mechanism. This will automatically retract excess slack. Additional tension may be added to semi-automatic retractors by turning the knob clockwise.

   b) For a manual tensioning strap, pull and tighten the strap manually.
5. Check that the strap is flat and untwisted.
6. Repeat for the two rear anchorage straps.
7. Perform tilt-test (back, left and right) to ensure proper securement of wheelchair.

CAUTION – Proper execution also includes knowing what not to do.



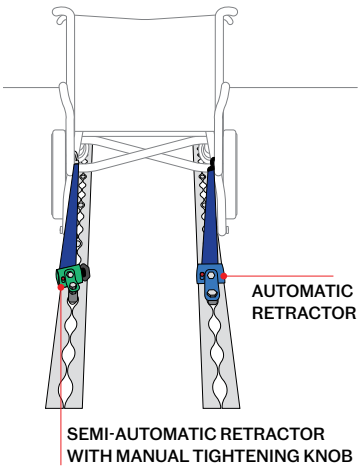
Do not use less than 4 tie-downs from wheelchair to vehicle floor; only consider alternatives as a last resort.

LEGEND

L-TRACKS

TIE-DOWN RETRACTORS

WHEELCHAIR LAP BELT



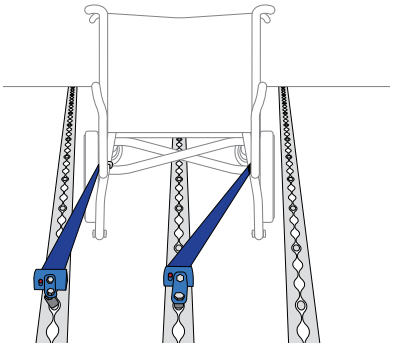
Do not use different types of straps on the same end (front or back) of the wheelchair.

- Always use two identical straps for the front tie-downs and two identical straps for the back tie-downs OR 4 identical straps for all 4 tie-downs.

LEGEND

L-TRACKS

TIE-DOWN RETRACTORS



Do not position the tie-downs such that the straps lean towards one side (left or right).

1.2.2 Safe Practices for D-rings Wheelchair Tie-down Method

D-rings usage for wheelchair securement has not been regulated at the time of these Guidelines' development. As D-rings are typically scattered throughout the vehicle interior, there is no "standard" 4-point wheelchair tie-down formation. Instead, a modified 4-point wheelchair tie-down with D-rings may appear as follows:

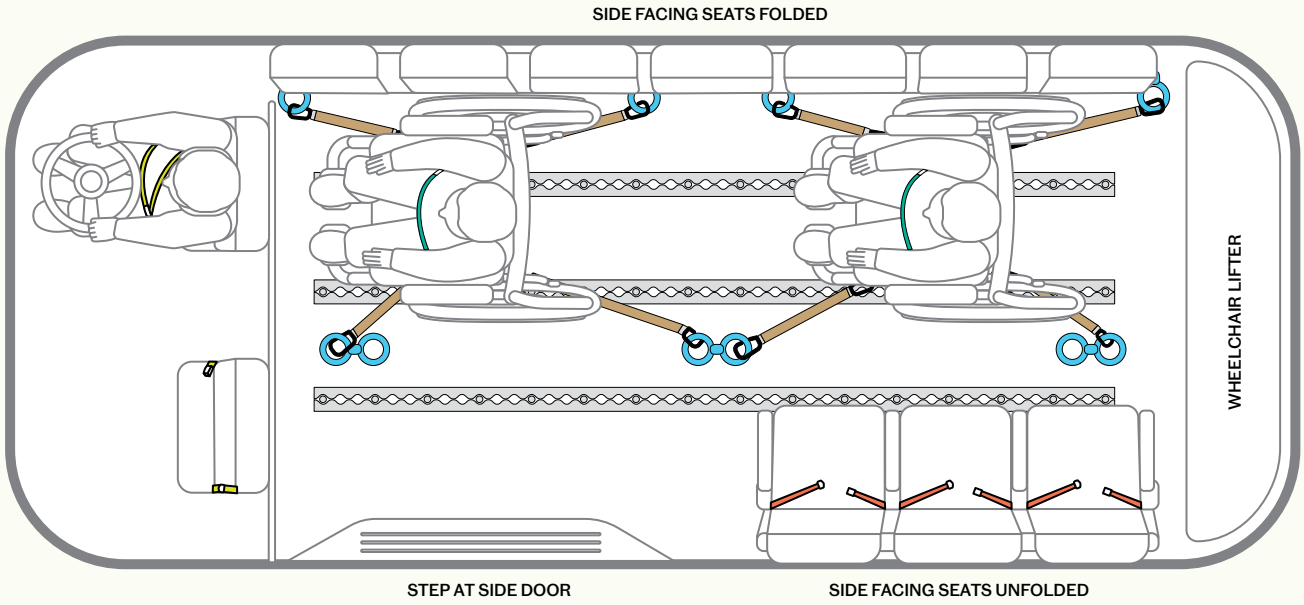


Fig 5: **Modified** 4-point wheelchair tie-down with D-rings

LEGEND

D-RINGS | L-TRACKS | TIE-DOWN RETRACTORS | D-RING TIE-DOWN STRAP | WHEELCHAIR LAP BELT | 2 POINT SEAT BELT | 3 POINT SEAT BELT

Only D-rings bolted to the vehicle subframe are secure and possibly strong enough to withstand the impact of a vehicular accident. However, it is not possible to visually assess and determine if a D-ring is indeed bolted to vehicles' sub-frames. Coupled with the fact that the rings are often scattered throughout a vehicle interior, it is safer to assume that most D-rings cannot support a good 4-point tie-down for multiple wheelchair securement.

Because wheelchair securement with L-tracks is standardisable and safer for wheelchair users, D-rings should be gradually phased out for wheelchair securement purposes.

As much as operations and finances allow, centres or transport operators are encouraged to retrofit vehicles with sufficient L-tracks *(refer to Section 1.3 on retrofitting L-tracks)* to support the standard or modified 4-point tie-downs.

In the interim, transport personnel are encouraged to take note of the following safety measures if they must use D-rings for wheelchair tie-downs:

1. Strive for 4-point tie-downs from appropriate securement points on the wheelchair *(refer to Section 1.5 on wheelchair securement points for more details)* to D-rings.
2. Only use D-rings on or near the vehicle floor (i.e., bolted to metal frame of seat legs if the seat frame itself is securely mounted to the vehicle floor and constructed of load-bearing material).

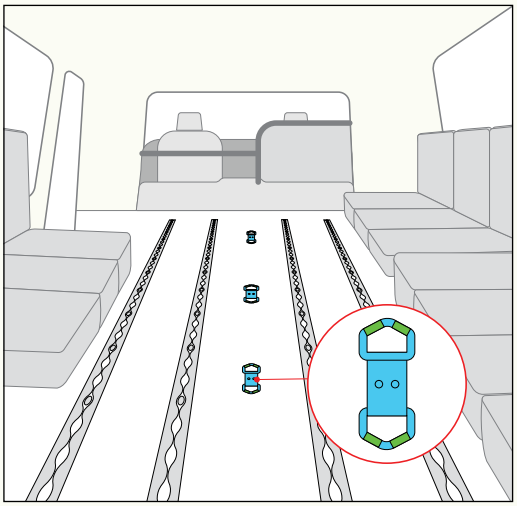


Fig 6: D-rings bolted to vehicle floor

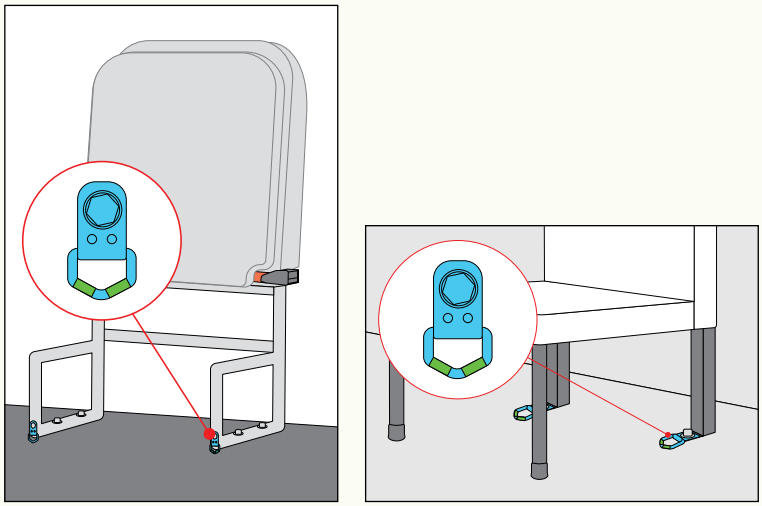


Fig 7: D-rings bolted to metal frame of seat legs

How to use

1. Locate two D-rings on the WAV floor that will be used for the two front anchorage straps. Check that chosen D-rings are not loose.
2. Attach each end of the strap to the floor-mounted D-ring.
3. Position the wheelchair and apply all wheelchair brakes OR power off motorised wheelchairs.
4. Attach the other end of the strap to a suitable securement point on the wheelchair frame *(refer to Section 1.5 on wheelchair securement points)*. **Do not** attach the tie-downs to any point above seat level (e.g., wheelchair handle). **Do not** hook onto wheels, footrests, or armrests.
5. Manually tighten the strap by using the strap's ratchet or buckle mechanism. Pull until the strap is taut but avoid over-tightening to prevent damaging the hook or strap.
6. Check that there is no slack or twisting within straps.
7. Repeat for the two rear anchorage straps.
8. Perform tilt-test (back, left and right) to ensure proper securement of wheelchair.

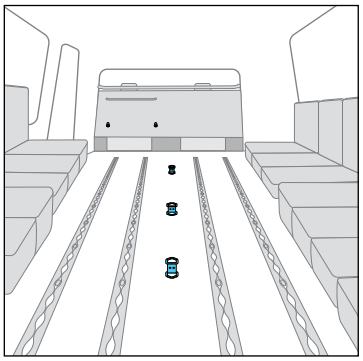
CAUTION – Proper execution also includes knowing what not to do.

1

Do not use D-rings mounted on the partition board

- Partition boards that separate the driver's cabin from the passenger area are not structural components of vehicles and therefore cannot bear wheelchair load.

Example of D-rings on partition board:



Close up view of D-rings on partition board:

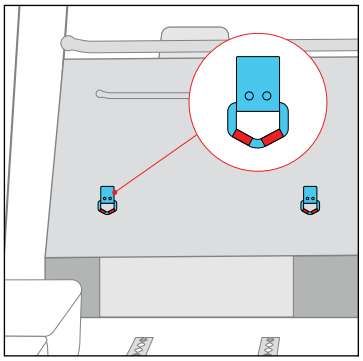
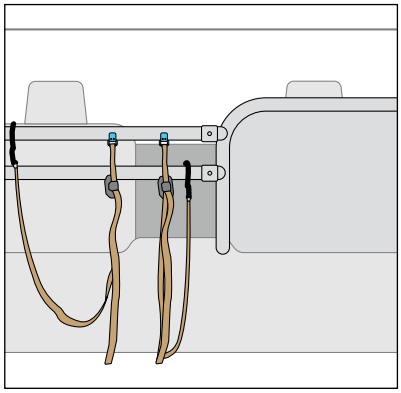


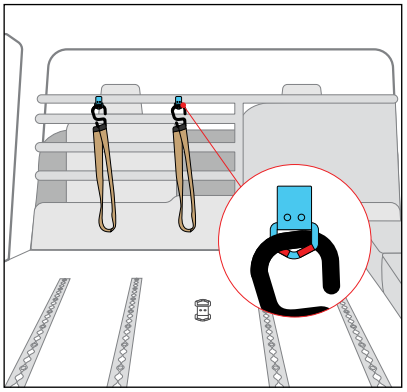
Fig 8: D-rings on partition board

2

Do not use D-rings screwed into safety bars behind the driver's seat

- Safety bars are designed to be used as grab supports or barriers, not wheelchair securement. Under pressure, screws may loosen or cause bars to tear out altogether.





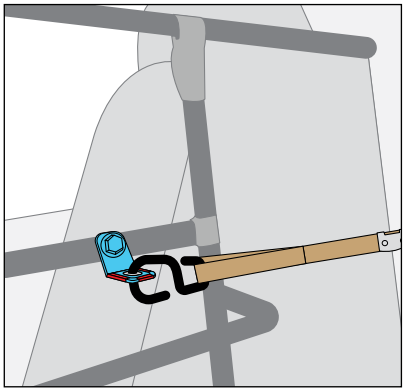


Fig 9: Examples of D-rings on safety bars behind driver seat

3

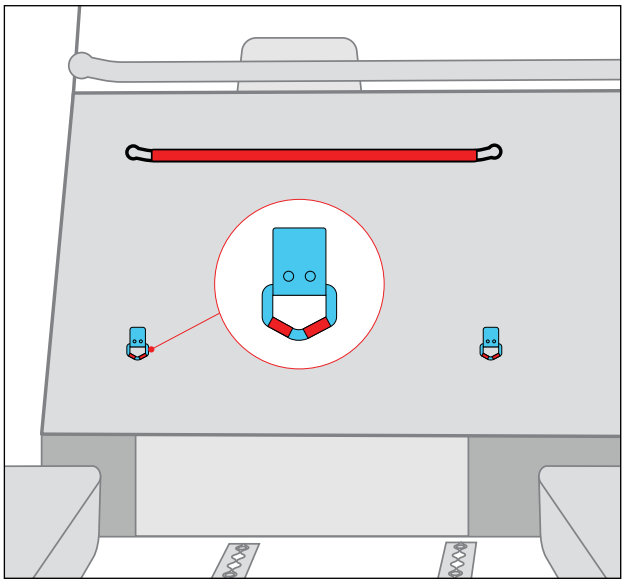
Do not use D-rings above wheelchair seat height

- D-rings above wheelchair seat level cannot form a secure 4-point tie-down even if secured to vehicle subframe. Wheelchairs secured in this manner will likely swing from front-to-back or side-to-side.

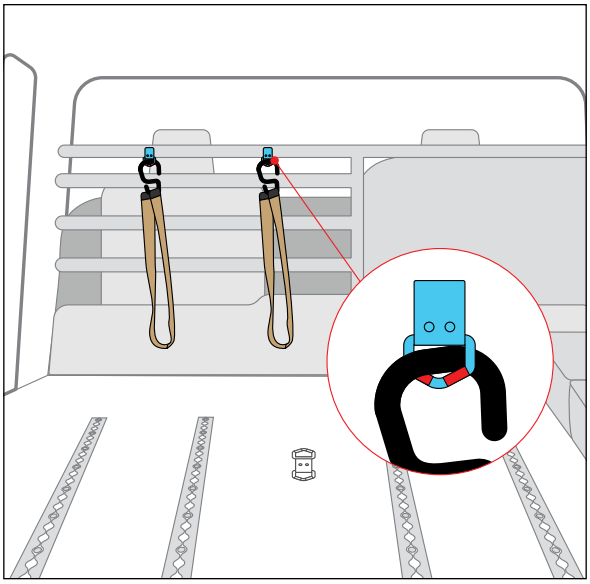
Centres and transport operators are strongly encouraged to assist transport personnel by labelling suitable D-rings using coloured tape. For example:

Red tape D-ring cannot be used for wheelchair securement.
These may be used for tying of cargo, e.g. folded wheelchairs.

D-rings on partition board:

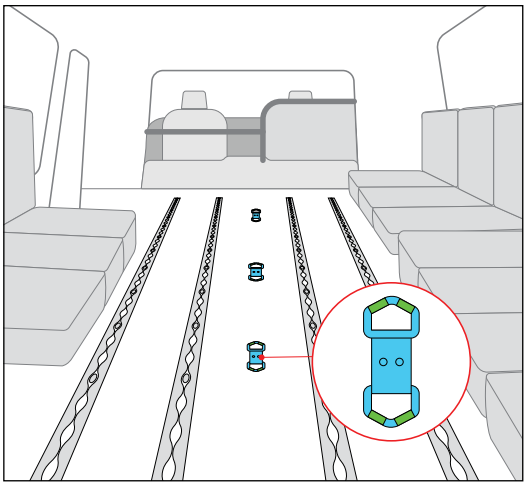


D-rings on safety bar behind driver seat:

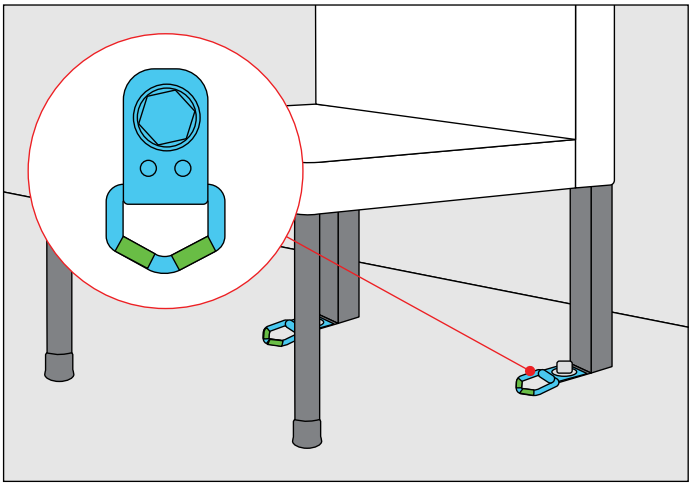


Green tape D-ring can be used for wheelchair securement

D-rings bolted to vehicle floor:



D-rings bolted to metal frame of seat legs:



1.2.3 Safe Practices for combination of L-tracks and D-rings Wheelchair Tie-down Method

When using a combination of L-tracks and D-rings, ensure that tie-down methods follow the same principles for safe L-track or D-ring tie-downs *(refer to Section 1.2.1 and Section 1.2.2)*.

Please refer to the diagram below for the possible combination tie-down methods.

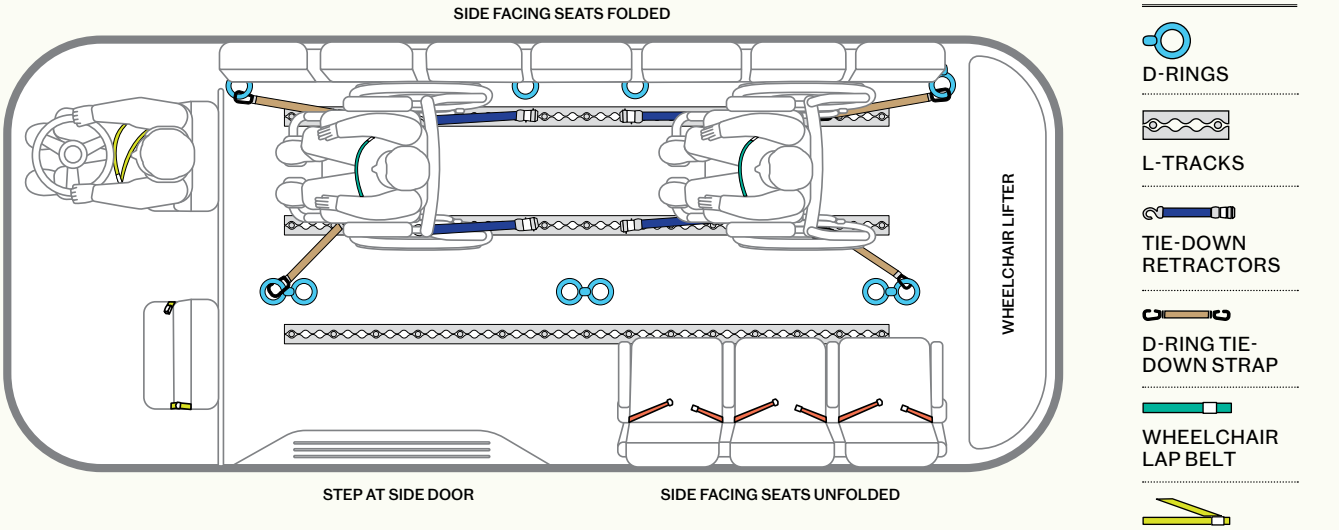


Fig 10: **Modified** 4-point tie-downs using L-tracks and D-rings

1.2.4 Summary of Do's and Don'ts

Do

1. Strive for 4-point floor tie-downs from appropriate securement points on the wheelchair to vehicle floor, regardless of wheelchair securement flooring system (i.e., L-tracks or D-rings).
2. Prepare front straps before positioning the wheelchair, to minimise chances of forgetting the front tie-downs.
   - If two transport personnel are present, delegate the task of securing front and back ties clearly to prevent either staff from assuming that their colleague has secured or will secure their assigned end.
3. Apply wheelchair brakes on both sides OR power off motorised wheelchairs.
4. Check that front tie-downs are secure before working on back tie-downs.
5. Perform a tilt-test (back, left and right) to ensure that the wheelchair will not topple backwards and/or sideways.
   - This task should also be delegated to a dedicated staff member.

Do not

1. Use non-standard tie-down methods such:
   a. Tying wheelchair to wheelchair.
   b. Tying wheelchair handlebars to metal bar behind driver seat.
   c. Tying wheelchair to window metal bars.
2. Strap or loop straps across the wheelchair user (if D-rings are used as main wheelchair securement or additional securement).

1.3 Retrofitting of L-tracks for appropriate wheelchair securement

→ **All L-tracks should be recessed to minimise trip hazards to all passengers.**

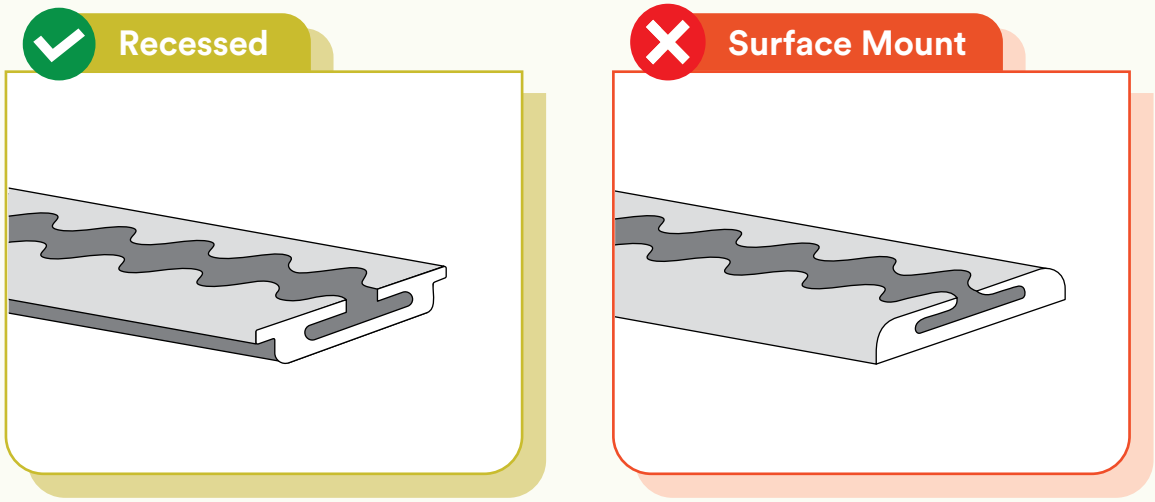


Fig 11: Recessed L tracks vs Protruding L-tracks

→ **To support 4-point tie-downs for multiple wheelchairs, it is best for WAVs to be retrofitted with at least 3 or 4 full-length recessed L-tracks.**

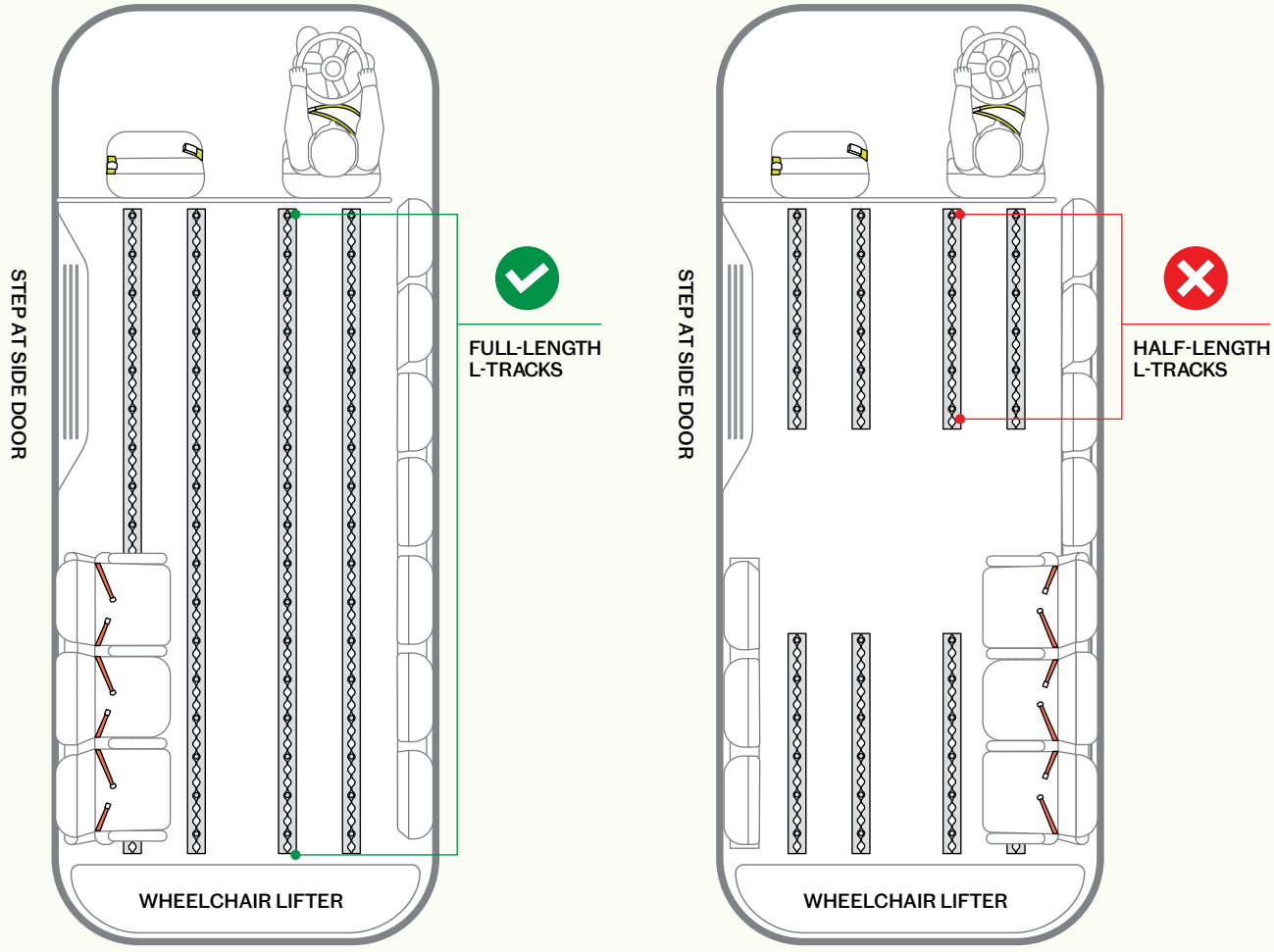


Fig 12: Full-length L-tracks vs Half-length L-tracks

→ **3 full-length L-tracks can support the modified 4-point securement of 2-3 wheelchairs in a single file.**

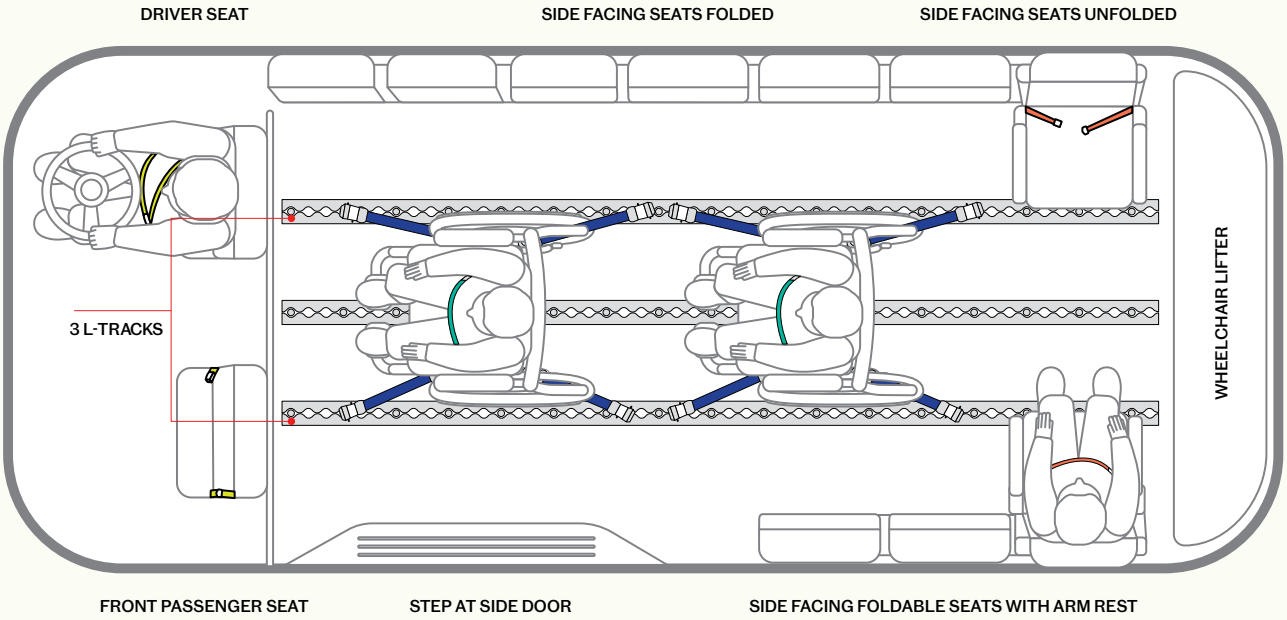


Fig 13: **Modified** 4-point tie-down with 3 full-length L-tracks

→ **4 full-length L-tracks can support 4-point standard tie-downs for 2 wheelchairs in a single file.**

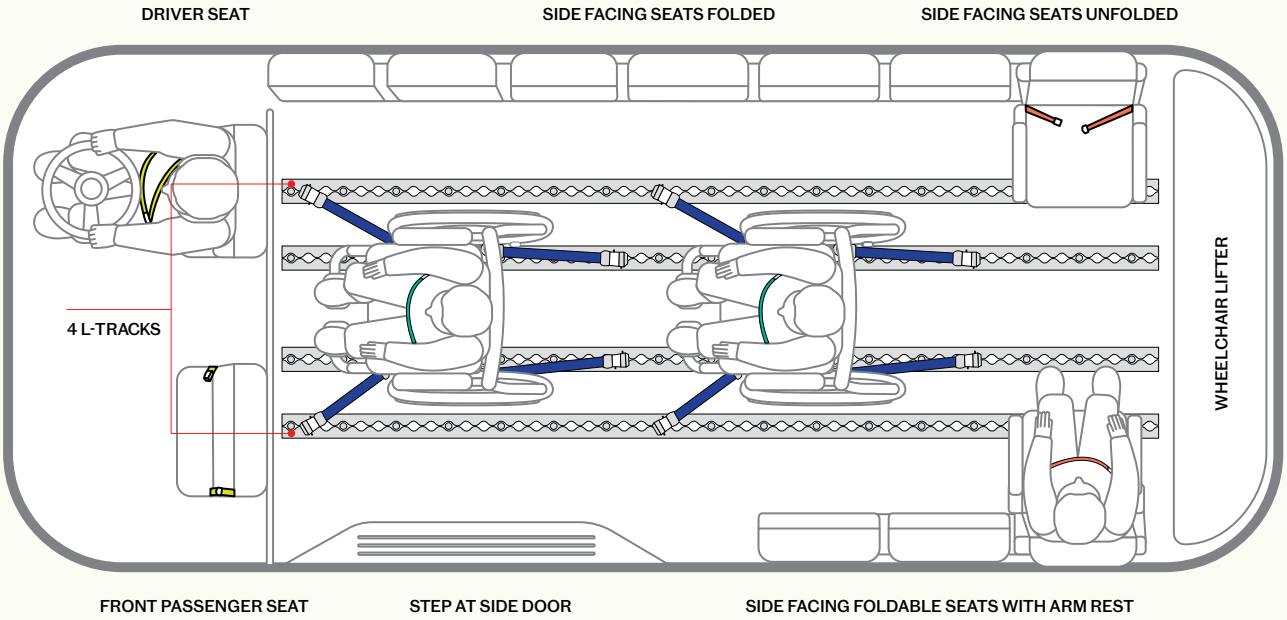


Fig 14: **Standard** 4-point tie-down with 4 full-length L-tracks

LEGEND

L-TRACKS	TIE-DOWN RETRACTORS	WHEELCHAIR LAP BELT
3 POINT SEAT BELT	2 POINT SEAT BELT	

→ **5 full-length L-tracks can support modified 4-point tie-downs for two small wheelchairs side-by-side. L-tracks should be flushed to either end as far as possible.**

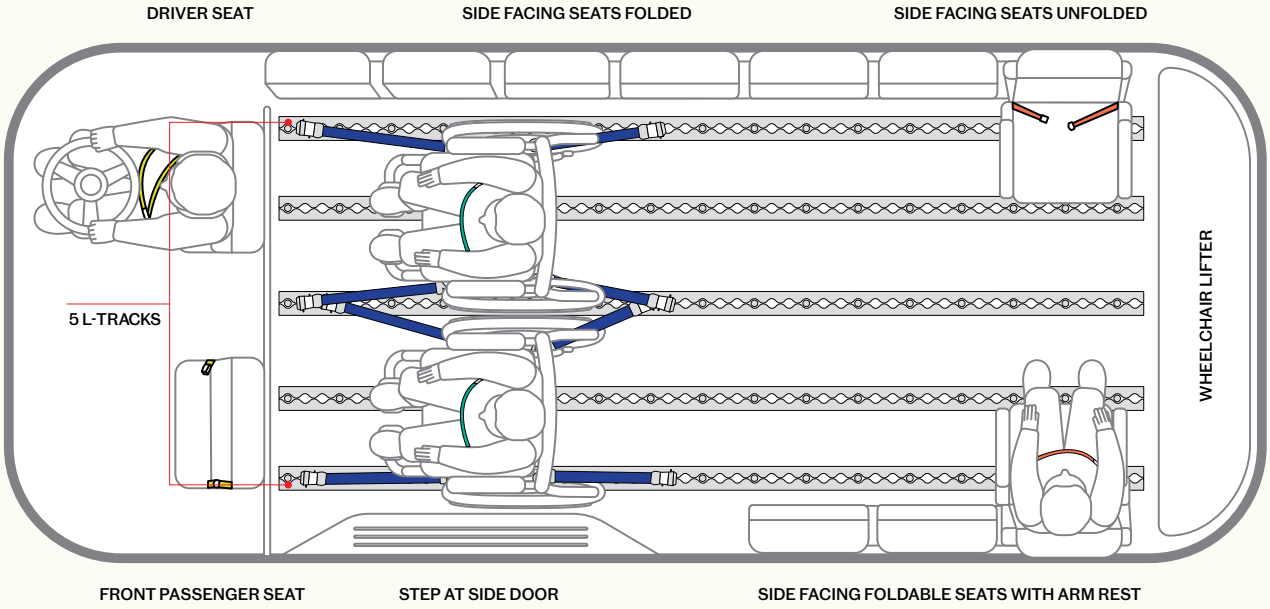


Fig 15: **Modified** 4-point tie-down with 5 full-length L-tracks
(2 wheelchairs secured side-by-side)

→ **Each L-track should be spaced between 11 to 13 inches of one another for optimal placement.**

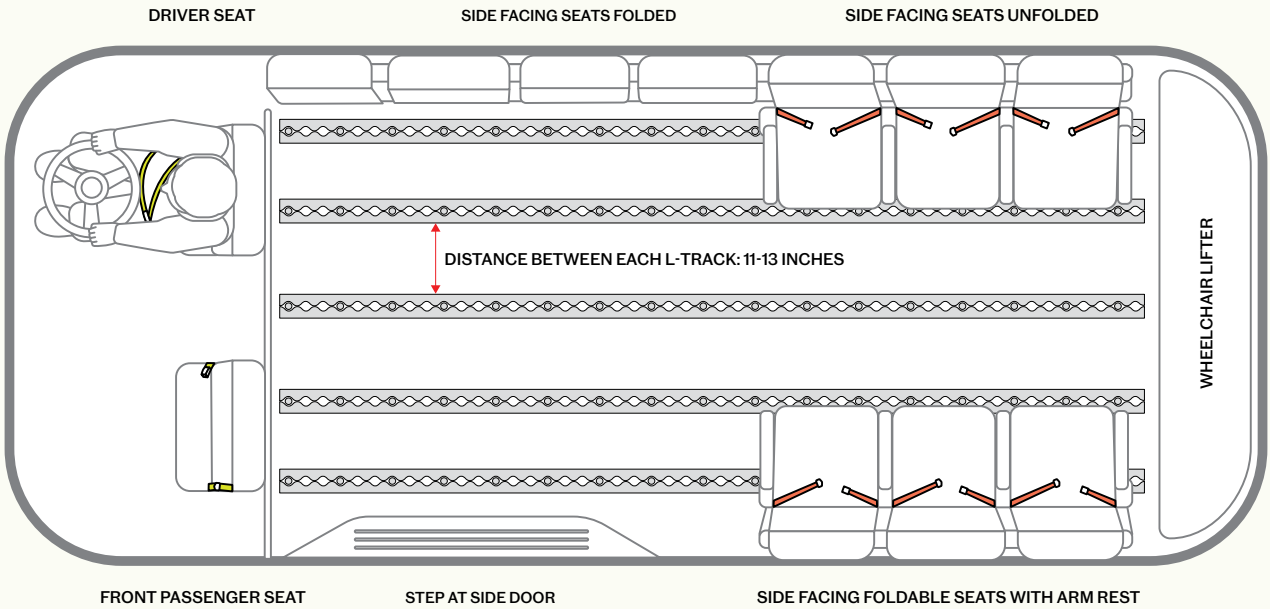


Fig 16: Appropriately spaced L-tracks

LEGEND

L-TRACKS	TIE-DOWN RETRACTORS	WHEELCHAIR LAP BELT
3 POINT SEAT BELT	2 POINT SEAT BELT	

1.4 Considerations for in-vehicle seat configurations

In-vehicle seat configurations include side-facing foldable seats only, front facing fixed seats only, and a combination of both. There is no single ideal layout that meets all operational needs.

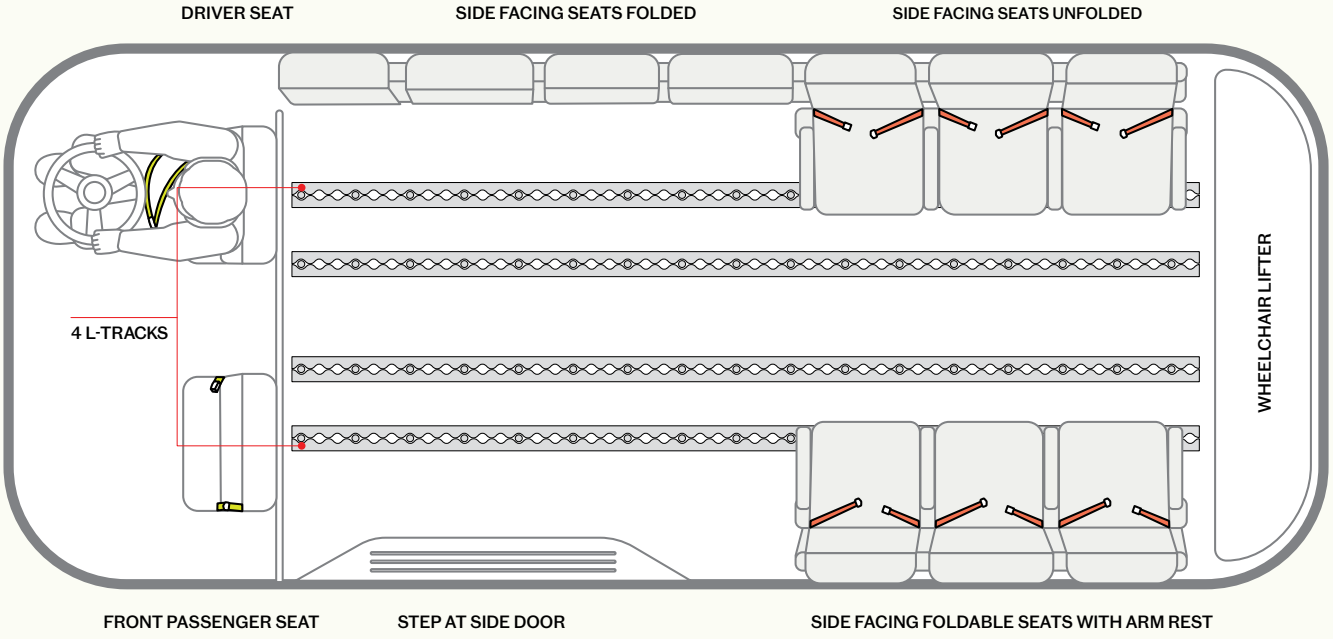


Fig 17: Side-facing seats only (also known as MRT style seats)

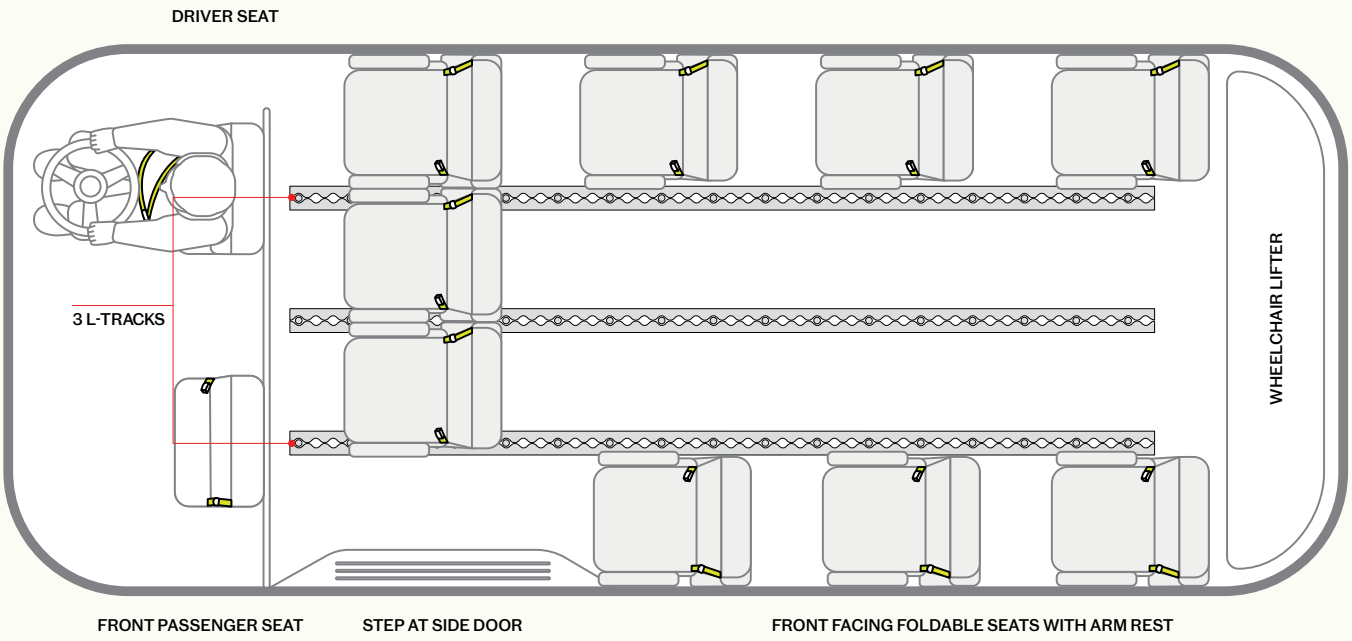


Fig 18: Front facing seats only (usually for larger vehicles e.g., Mercedes Benz Sprinter 519)

LEGEND

L-TRACKS
TIE-DOWN RETRACTORS
WHEELCHAIR LAP BELT
3 POINT SEAT BELT
2 POINT SEAT BELT

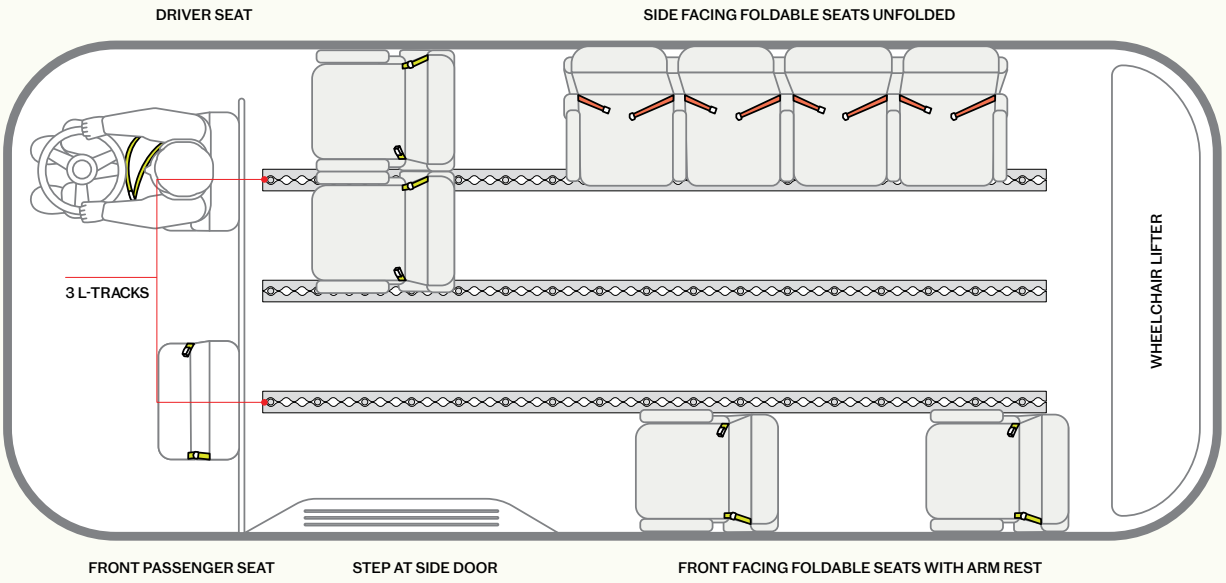


Fig 19: Mixed facing seats

LEGEND

L-TRACKS | TIE-DOWN RETRACTORS | WHEELCHAIR LAP BELT | 3 POINT SEAT BELT | 2 POINT SEAT BELT

Centres and/or transport operators may consider the following points when planning seat configurations to retrofit in new WAVs:

	Advantages	Disadvantages
Front facing seats with 3-point seatbelt	Enhanced passenger safety • 3-point seatbelt provides better securement. • Headrest on seats provides cushioning and reduces pressure on neck and head in the event of a crash	Fewer wheelchair users can be ferried.
Side facing foldable seats with 2-point lap belt	With sufficient L-tracks, vehicles can safely accommodate 3-4 wheelchair users.	Not as safe as front-facing passenger seats • Passengers may sway from side to side when vehicle turns. • Lack of neck and head cushioning as height of seats are below neck level.

Note:

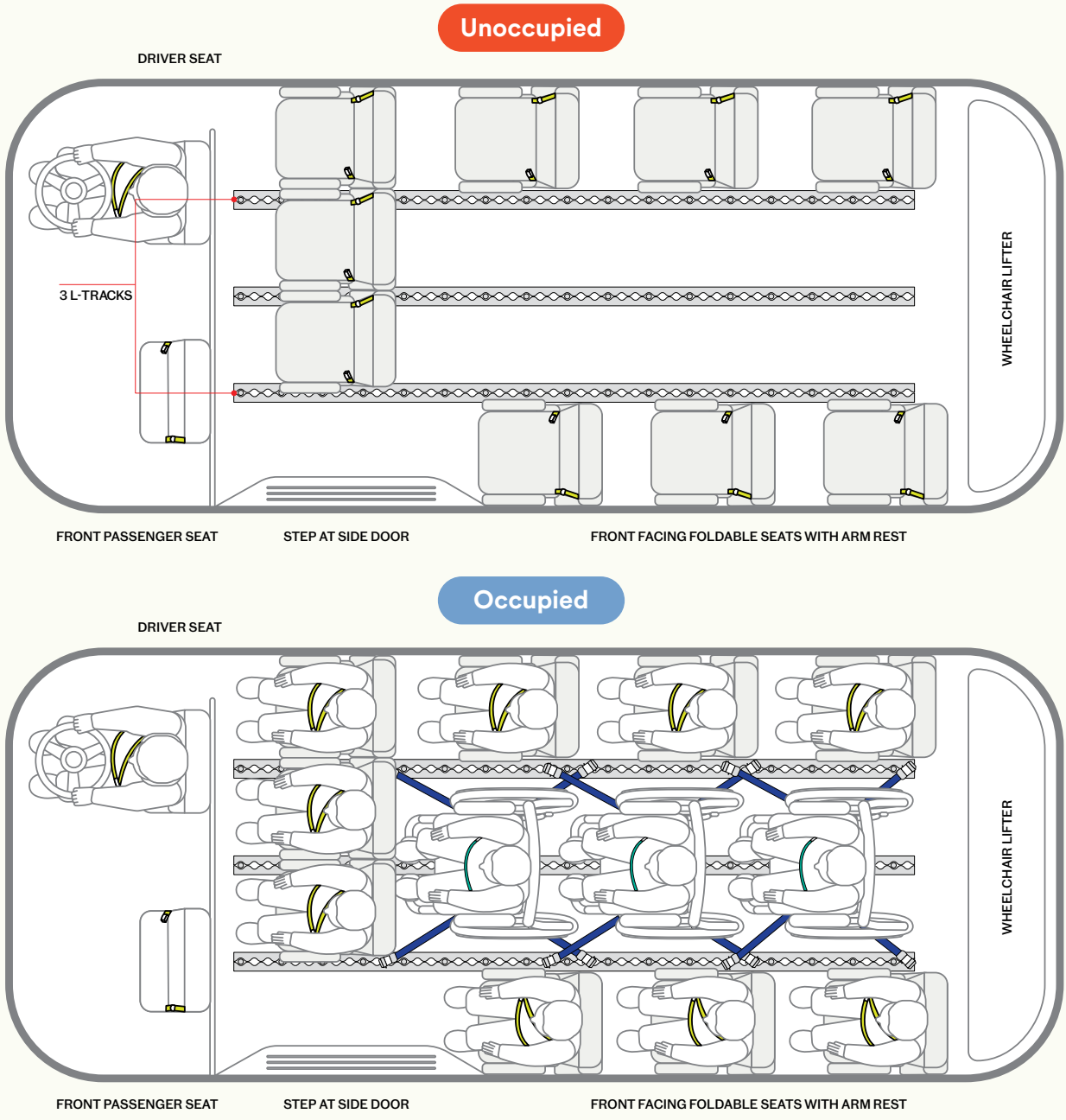
- 3-point seat belt cannot be installed on side facing seats.
- The speed limit is 70km/h for vehicles with all front facing seats.
- The speed limit is 60km/h for vehicles with all side-facing seats or a combination of side-facing and front facing seats.

When retrofitting side-facing foldable seats, individual flip-up armrests between seats are recommended to prevent passengers from sliding or falling sideways in domino-fashion. Note that larger passengers may require two seats.

Refer to the following seating configurations – for consideration – when retrofitting vehicles. Note: The illustrations below serve as reference examples and should not be considered definitive. The number of wheelchair users a vehicle can transport depends on the vehicle's size, seating configuration, the number of retrofitted L-tracks, and the size of the wheelchairs.

Fig 20: Seating configuration:

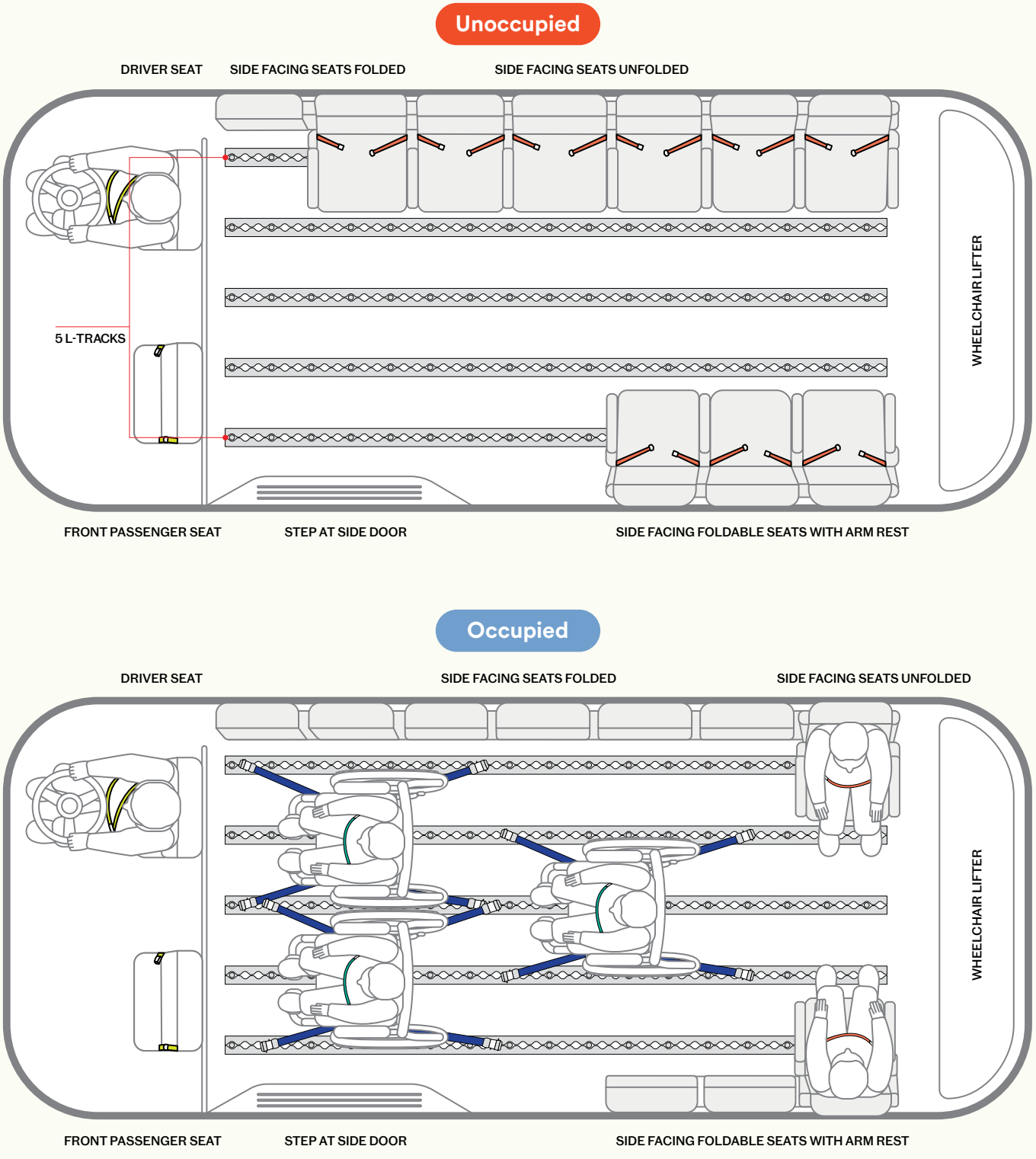
Front facing seats only (usually for larger vehicles e.g., Mercedes Benz Sprinter 519)



LEGEND

L-TRACKS | TIE-DOWN RETRACTORS | WHEELCHAIR LAP BELT | 3 POINT SEAT BELT | 2 POINT SEAT BELT

Fig 21: Seating configuration:
Side facing seats only



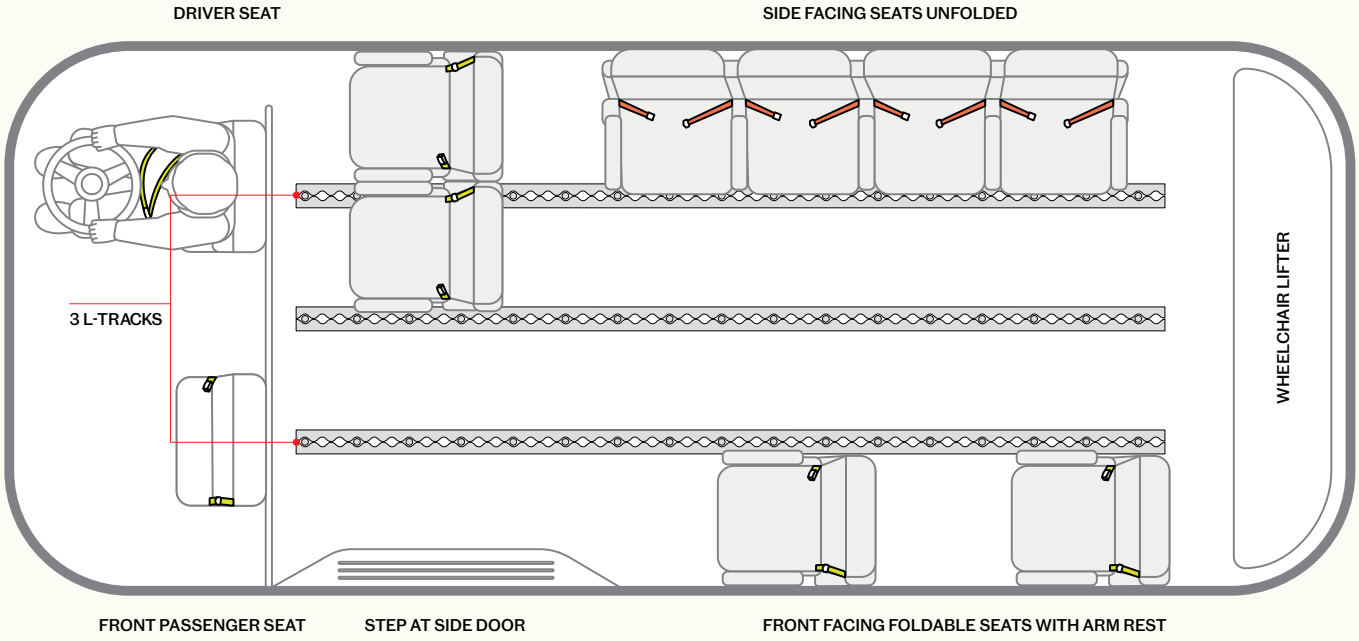
LEGEND

L-TRACKS | TIE-DOWN RETRACTORS | WHEELCHAIR LAP BELT | 3 POINT SEAT BELT | 2 POINT SEAT BELT

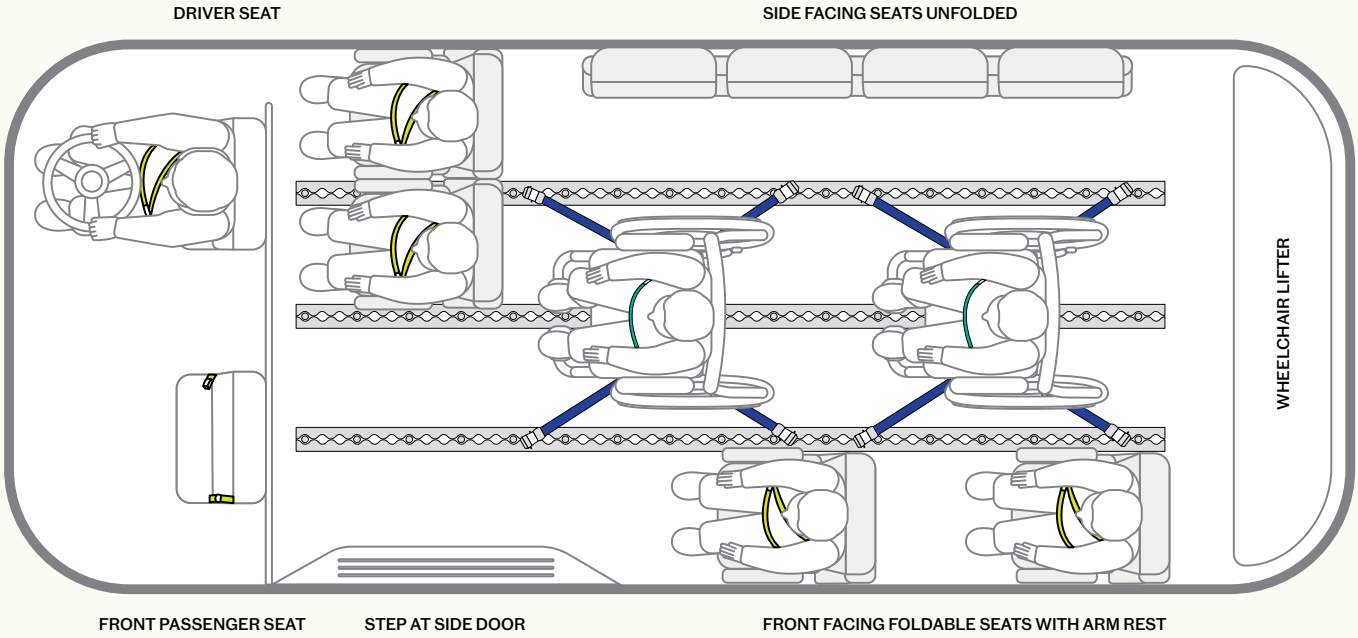
Fig 22.1: Seating configuration:

Mixed seating (options are not exhaustive)

Unoccupied



Occupied

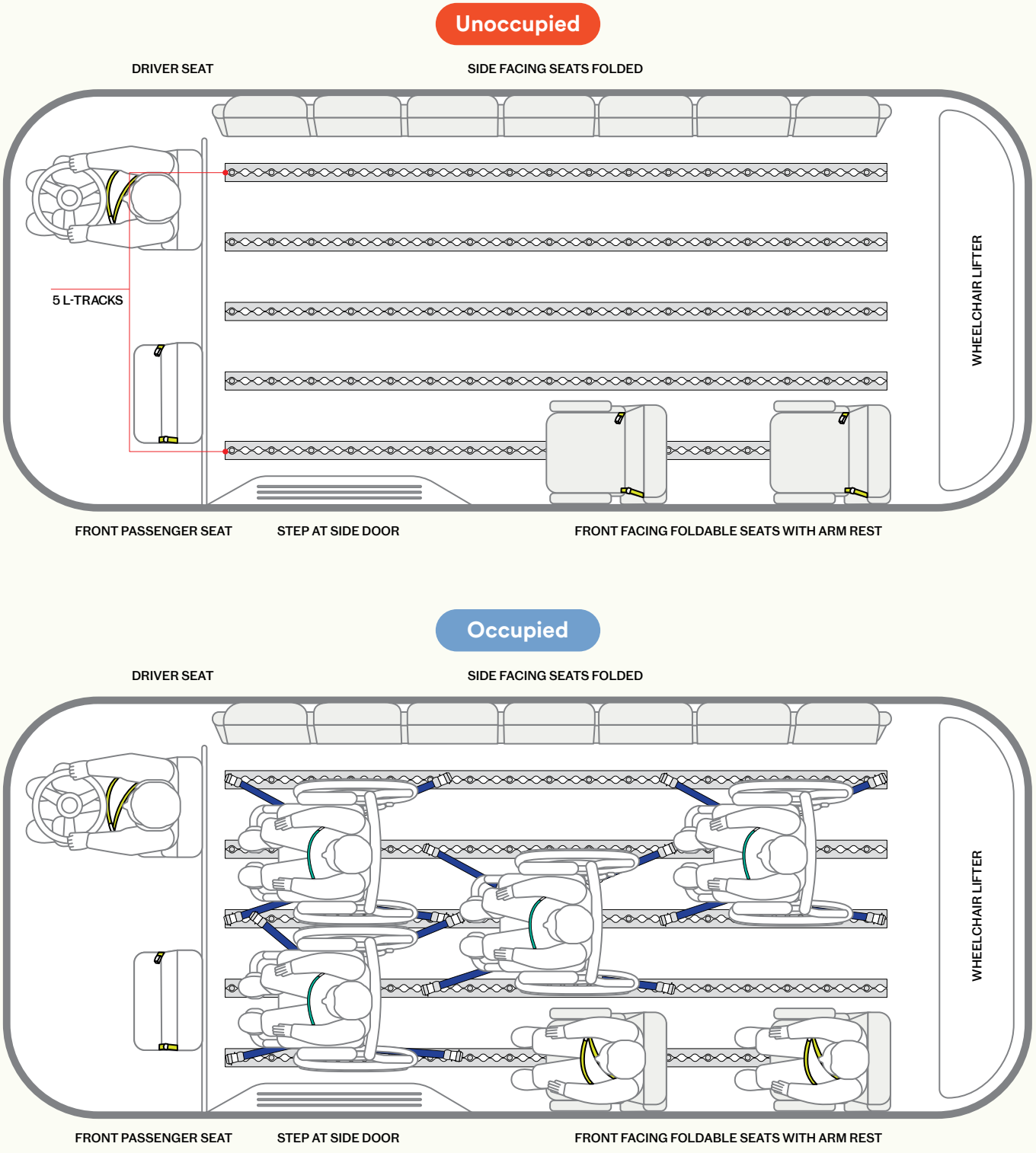


LEGEND

L-TRACKS | TIE-DOWN RETRACTORS | WHEELCHAIR LAP BELT | 3 POINT SEAT BELT | 2 POINT SEAT BELT

Fig 22.2: Seating configuration:

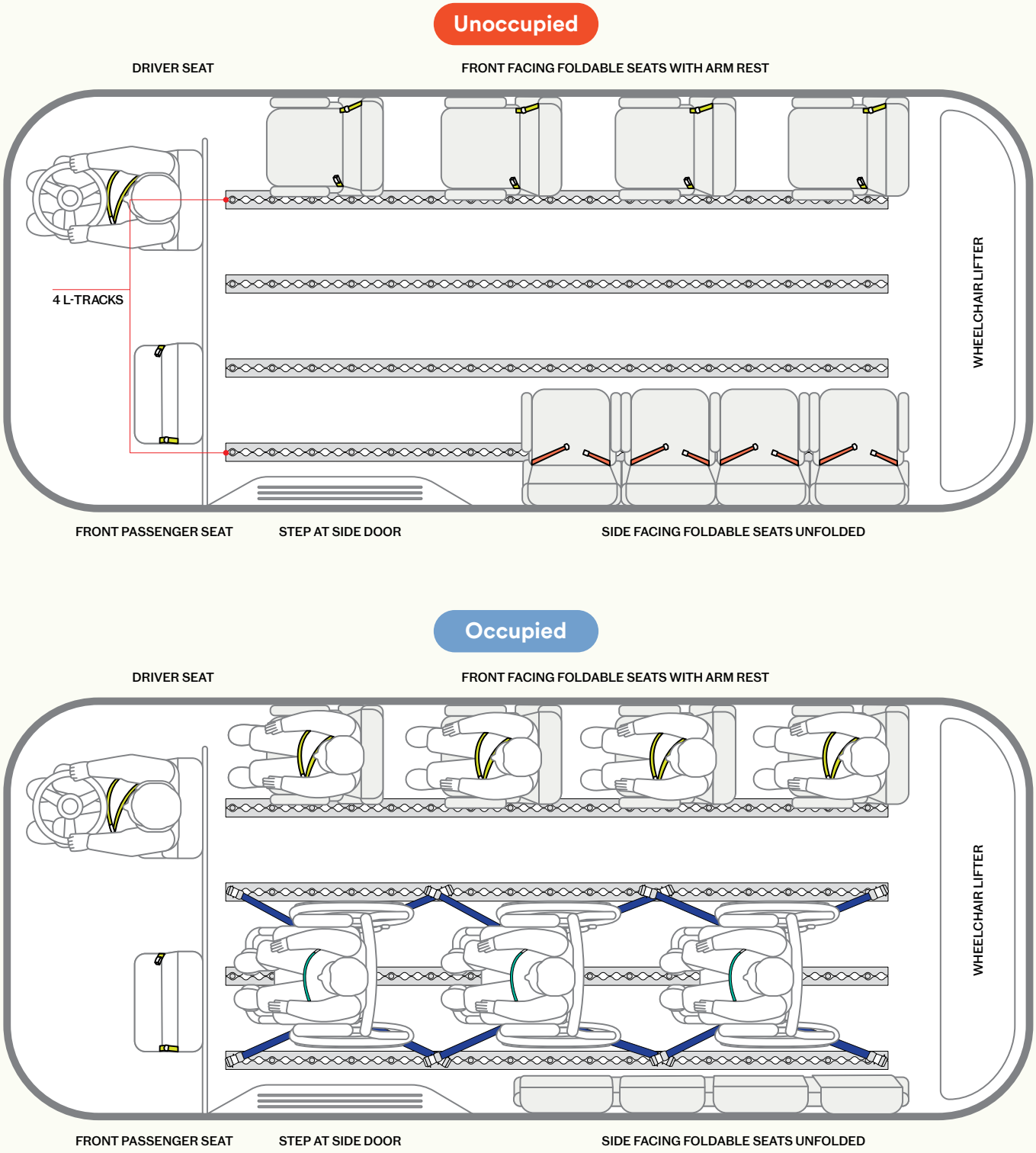
Mixed seating (options are not exhaustive)



LEGEND

L-TRACKS | TIE-DOWN RETRACTORS | WHEELCHAIR LAP BELT | 3 POINT SEAT BELT | 2 POINT SEAT BELT

Fig 22.3: Seating configuration:
Mixed seating (options are not exhaustive)



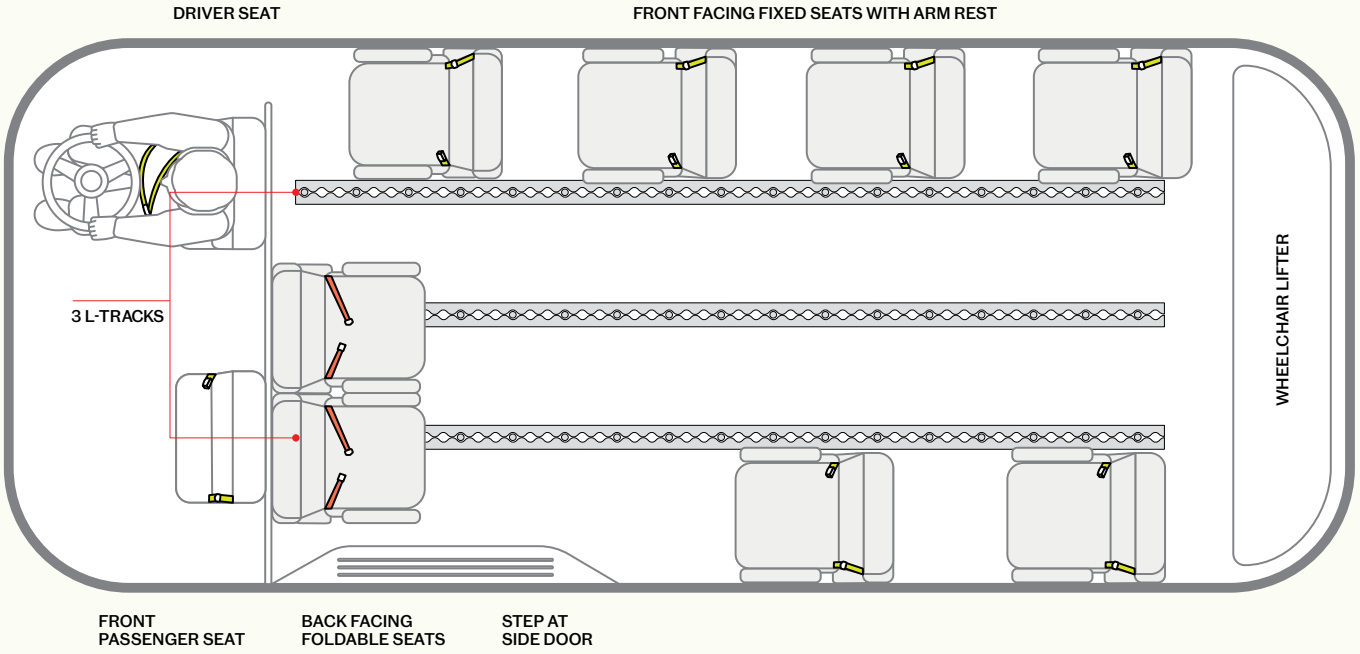
LEGEND

L-TRACKS | TIE-DOWN RETRACTORS | WHEELCHAIR LAP BELT | 3 POINT SEAT BELT | 2 POINT SEAT BELT

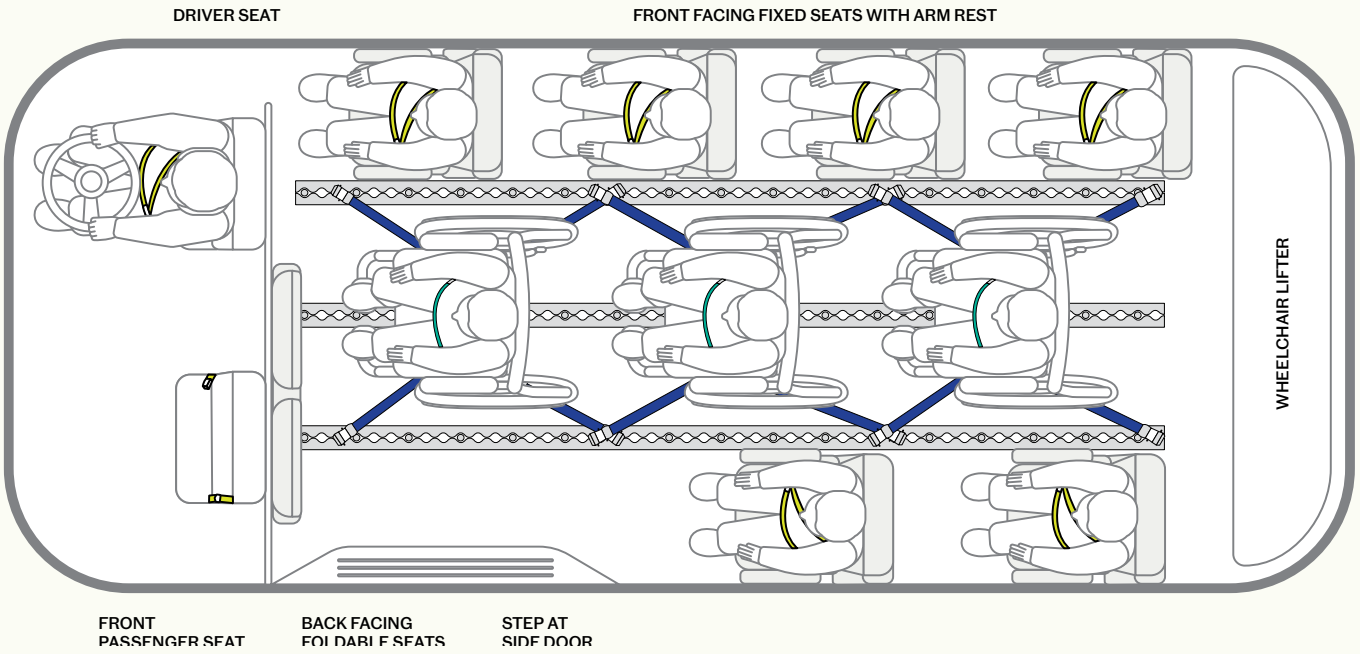
Fig 22.4: Seating configuration:

Mixed seating (options are not exhaustive)

Unoccupied



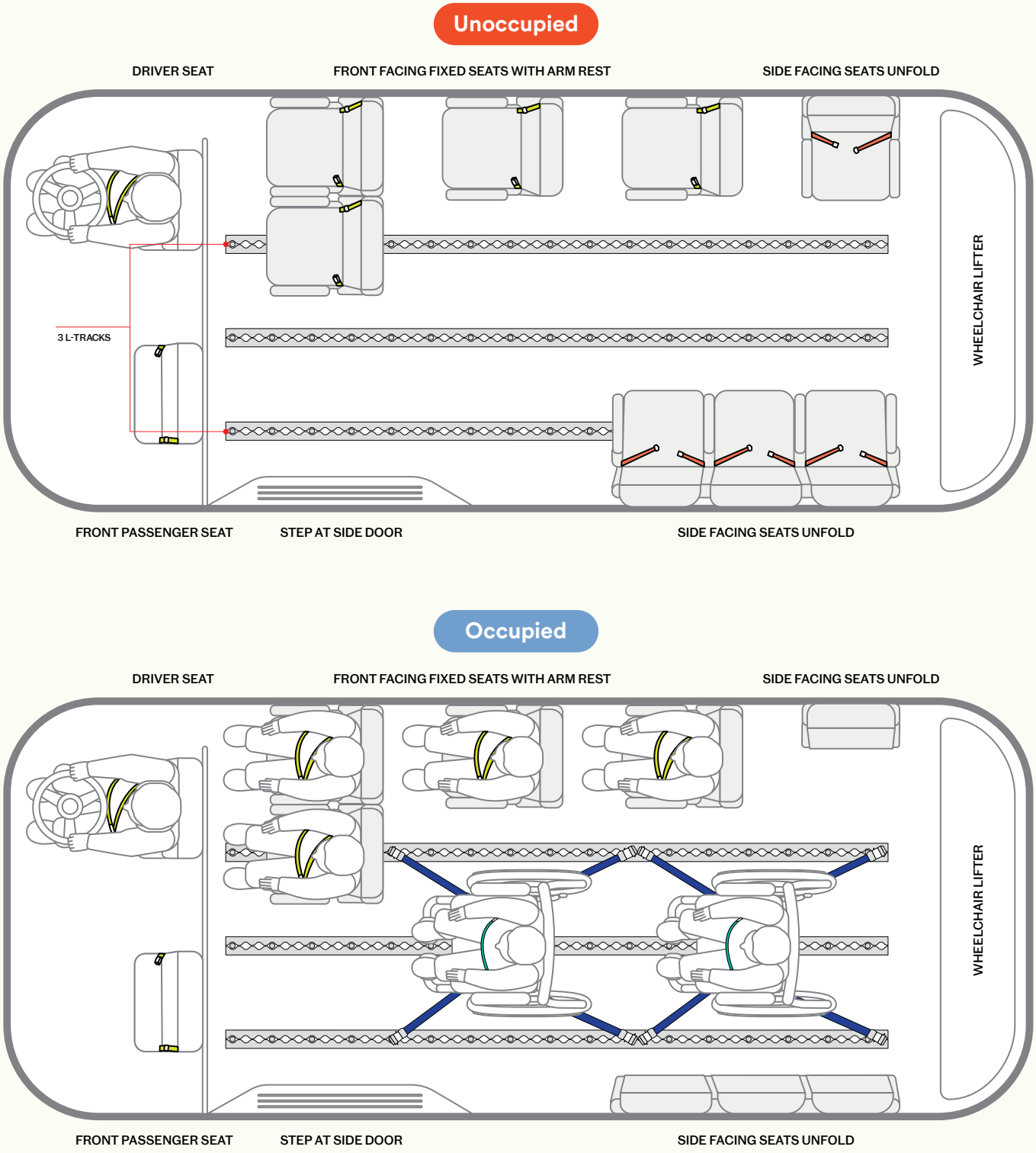
Occupied



LEGEND

L-TRACKS | TIE-DOWN RETRACTORS | WHEELCHAIR LAP BELT | 3 POINT SEAT BELT | 2 POINT SEAT BELT

Fig 22.5: Seating configuration:
Mixed seating (options are not exhaustive)



LEGEND

L-TRACKS | TIE-DOWN RETRACTORS | WHEELCHAIR LAP BELT | 3 POINT SEAT BELT | 2 POINT SEAT BELT

1.5 Safe Practices for Wheelchair Securement Points

Safe wheelchair securement includes attaching straps from appropriate points from the wheelchair to the vehicle floor.

Do

1. Locate and attach straps to wheelchair transit hooks.
   - Transit hooks are crash tested.
   - Intended for use as securement points for wheelchair tie-downs.
   - Usually indicated by a hook symbol.

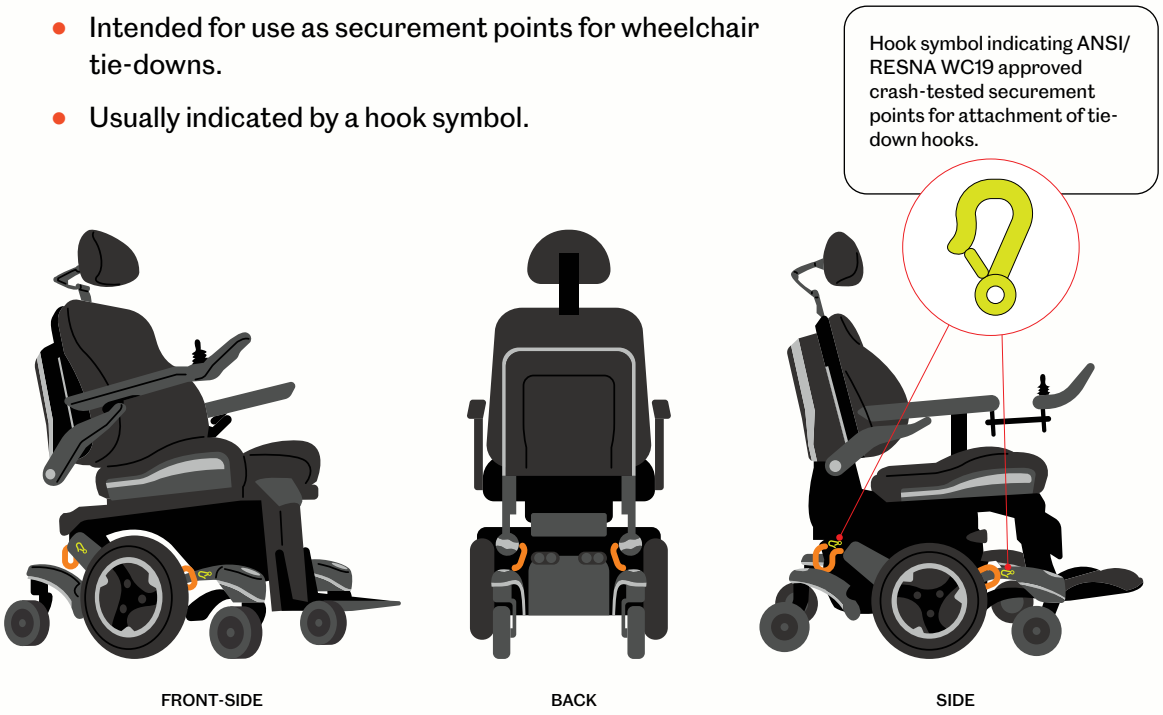


Fig 23: Example of motorised wheelchair with transit hooks

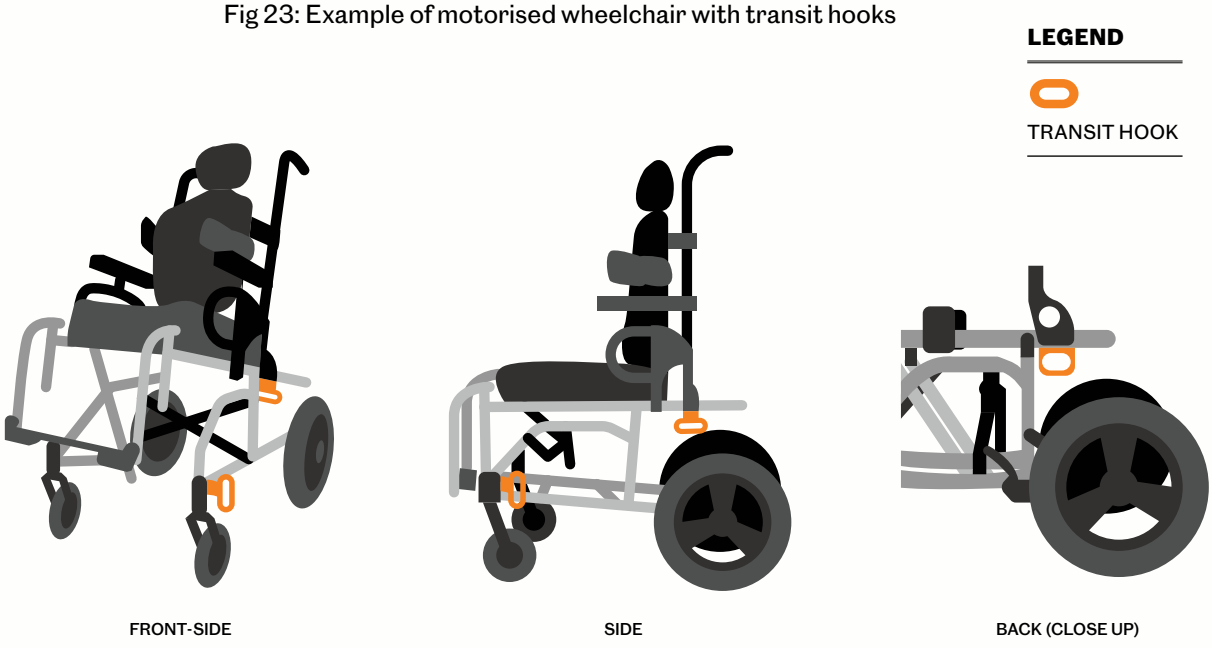


Fig 24: Example of reclining wheelchair with transit hooks

2 If there are no transit hooks, attach the straps to:

a. Welded junctions of the wheelchair frame or;

b. Structural areas where the wheelchair frame is fastened together with hardened steel bolts

LEGEND

SUITABLE UNSUITABLE

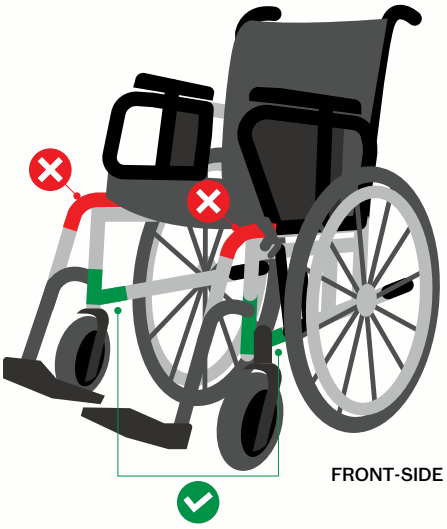


Fig 25: Examples of welded junctions on wheelchair to hook tie-downs

3 Ensure straps are attached to 4 different points of the wheelchair (2 front, left and right; 2 back, left and right).

a. Rear securement points should be high enough to create angles of 30 to 45 degrees with vehicle floor

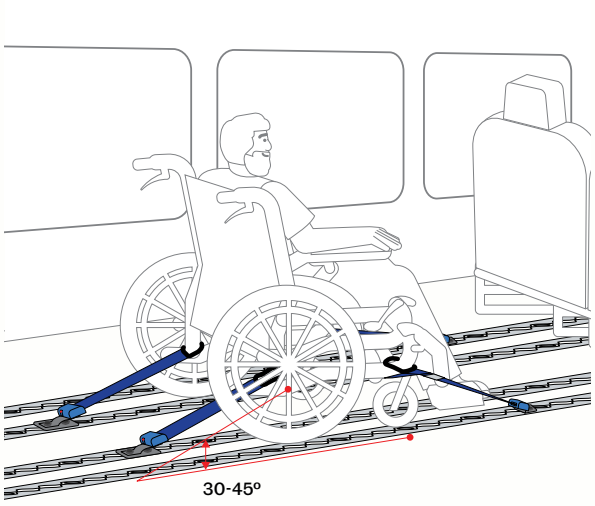


Fig 26: Rear straps secured at an angle of 30-45 degrees to vehicle floor

b. Floor anchor points of the rear straps should be positioned directly behind the wheelchair or welded junctions of the wheelchair frame.

c. If possible, front straps should be anchored to the floor at points that are spaced wider than the wheelchair for greater stability during transit.

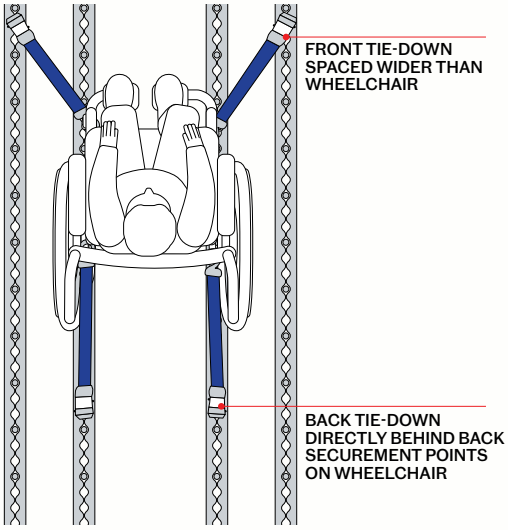


Fig 27: **Standard** 4-point tie-down with front tie-down straps spaced wider than wheelchair

Do not

1. Attach straps to adjustable, moving or removable parts of the wheelchair such as the armrest, footrest, lower legs support, or wheels. (Posture and Mobility Group., 2020; University of Michigan Transportation Research Institute., 2018)

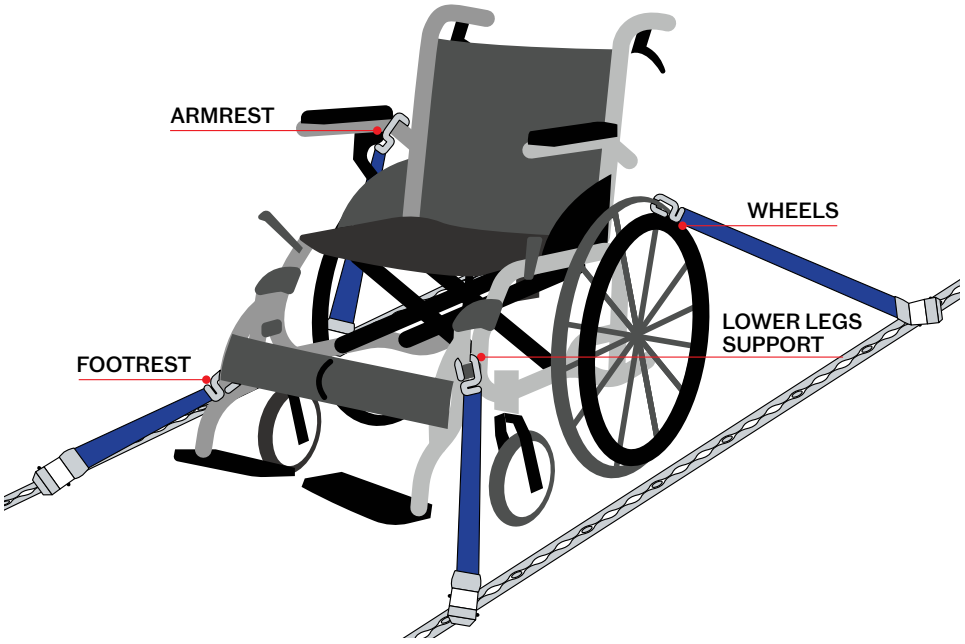


Fig 28: **Do not** attach tie-down straps to removable parts of wheelchair

2. Attach straps to any point above seat level (e.g., wheelchair handle).

3. Attach any strap to the cross axis of the wheelchair, which is collapsible and therefore not secure.

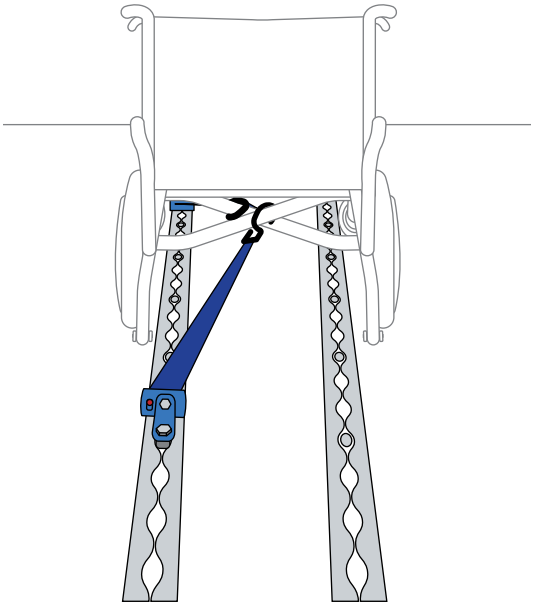


Fig 29: **Do not** attach tie-down strap to wheelchair's cross axis

Please refer to the images below for suitable and unsuitable securement points for wheelchairs commonly used in Singapore.

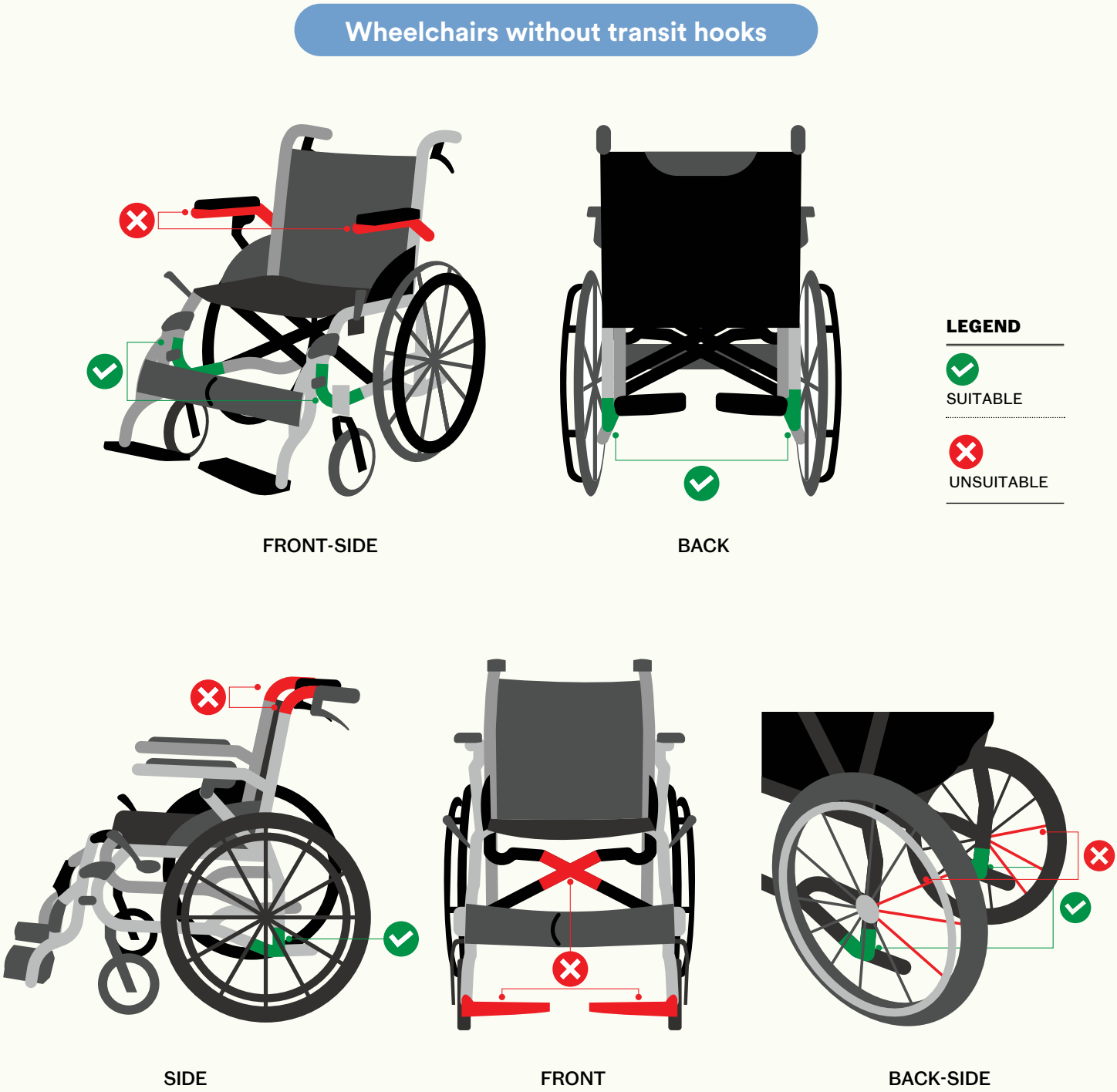


Fig 30: Suitable and unsuitable securement points on manual wheelchair

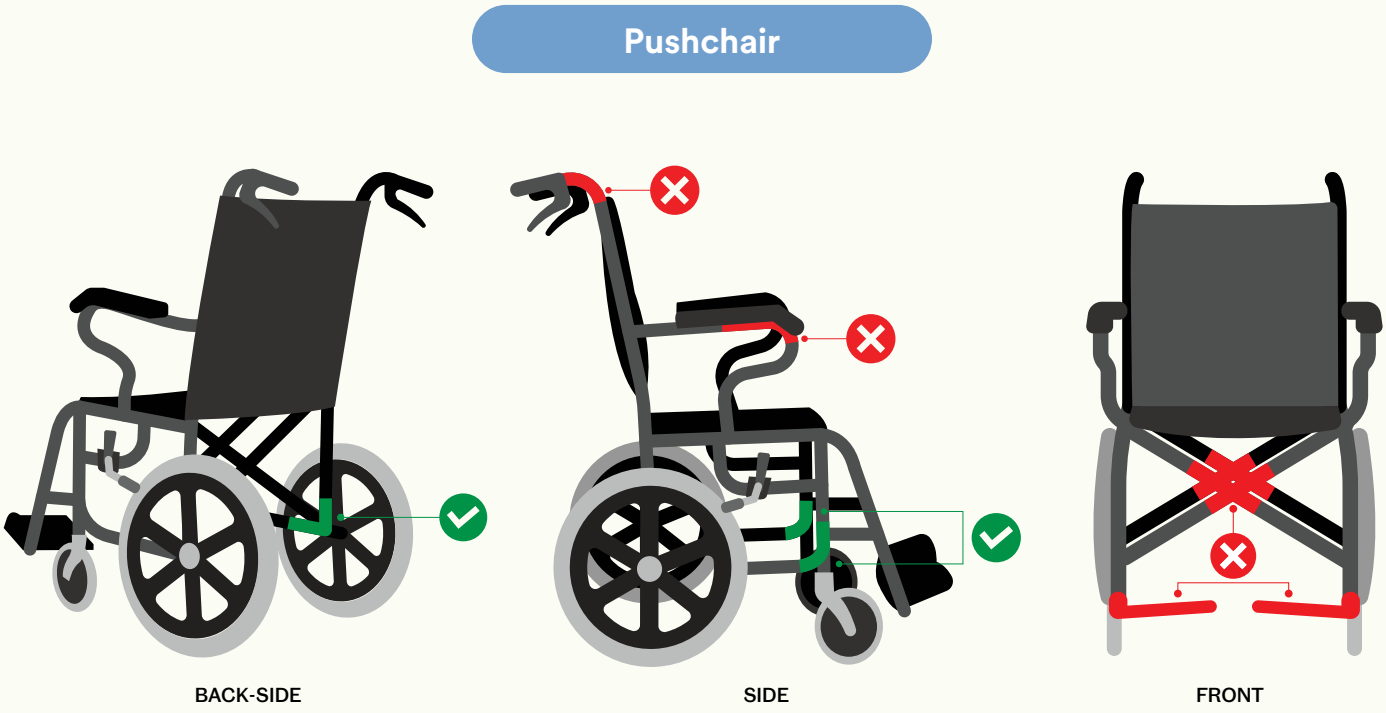


Fig 31: Suitable and unsuitable securement points on pushchair

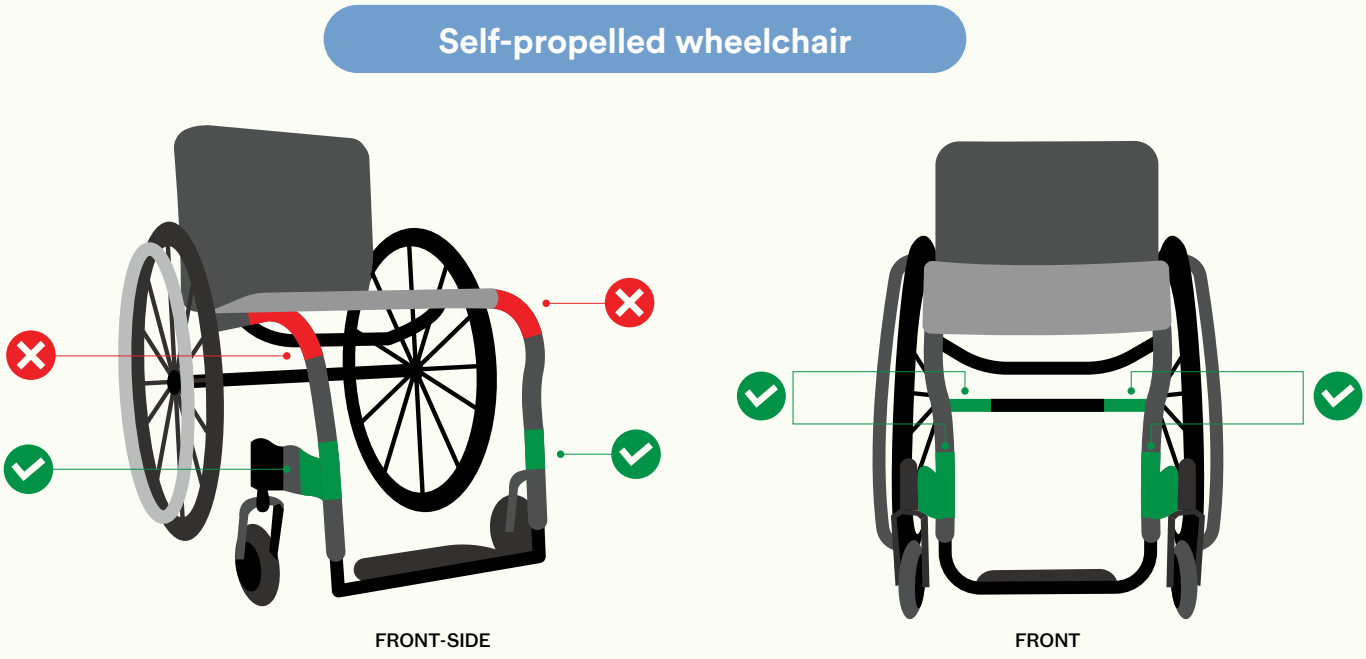
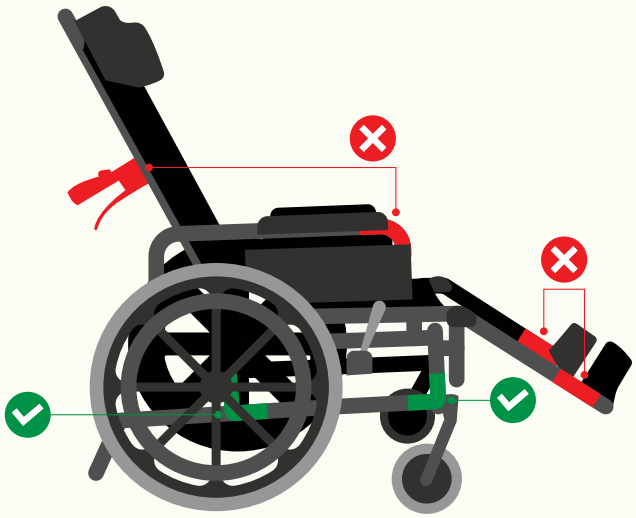


Fig 32: Suitable and unsuitable securement points on self-propelled wheelchair

Reclining wheelchair (without transit hooks)



SIDE

LEGEND

SUITABLE

UNSUITABLE

Fig 33 : Suitable and unsuitable securement points on reclining wheelchair

Note: These examples are non-exhaustive. When in doubt, please consult an occupational therapist with the relevant experience.

Operators interacting with regular clients are strongly encouraged to mark appropriate securement points on wheelchairs with coloured and contrasting tape (e.g., green duct tape).

- Seek the client's and/or caregiver's consent before making any markings.
- Encourage transport staff to use the four marked points for wheelchair securement (i.e. do not use other points).
- Encourage client and/or caregiver to instruct transport personnel to use marked points for wheelchair securement (especially if they encounter transport staff who are unfamiliar with wheelchair securement).

FRONT-SIDE BACK-SIDE BACK-SIDE

Fig 34: Wheelchair with appropriate securement points marked out with coloured and contrasting tape

Centres and transport vendors should remind transport personnel to seek clarification with supervisors or care centre staff whenever they are unsure of suitable securement points on unfamiliar wheelchairs.

LEGEND

Mark out appropriate securement points with coloured and contrasting tape

1.6 Occupant Restraint System

The occupant restraint system refers to seatbelts that are designed to minimise injuries to passenger(s) during a crash. Correct use of seatbelts reduces the risk of contact with the vehicle interior, decreasing the severity of injuries (FIA Foundation., 2023). A three-point seatbelt distributes crash force over the strongest parts of the human body (hips and shoulders), reducing passenger trauma and preventing passenger ejection (FIA Foundation., 2023).

Three-point lap and diagonal seatbelts are the safest due to the pelvic or lap portions being anchored to structural regions of the vehicle or to wheelchair tie-down straps. Upper anchor points of shoulder belts are attached to the structural points installed on WAV sidewalls with lower ends connecting to the pelvic or lap belts near the hip (Posture and Mobility Group., 2020; University of Michigan Transportation Research Institute., 2018).

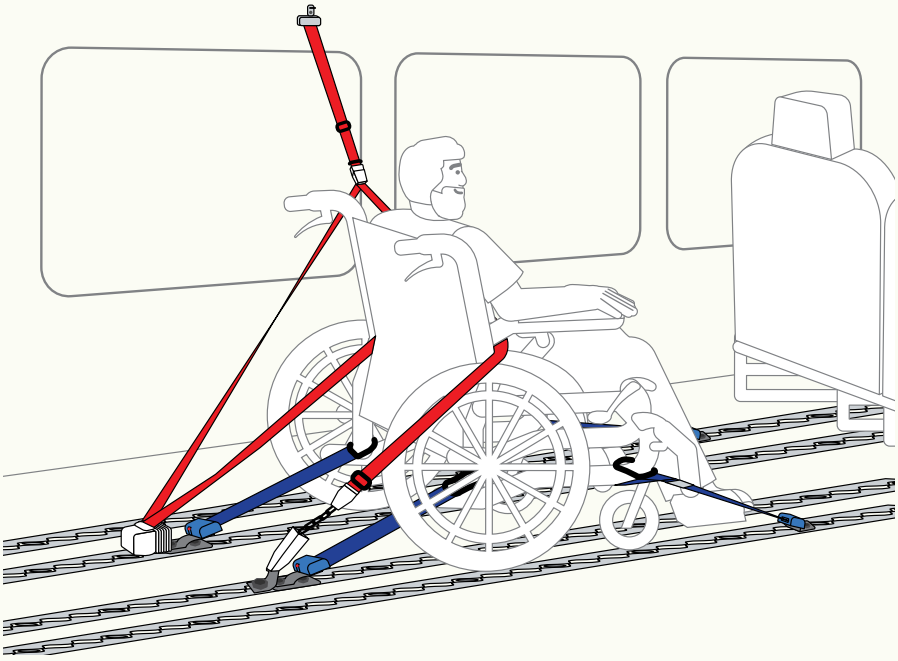


Fig 35: Wheelchair with 4-point tie-down and 3-point occupant restraints

1.6.1 Safe Practices for Occupant Restraint for Wheelchair Users

As use of 3-point belts is not feasible for wheelchair users within the local context, care centres and transport vendors should minimally inform clients and caregivers that wheelchair lap belt use is mandatory. This should be stated in the terms and conditions of the service provision.

Ensure that the wheelchair user is properly secured with a wheelchair lap belt before the start of each trip. If necessary, secure the lap belt with a buckle behind the wheelchair to prevent wheelchair users from unbuckling it.

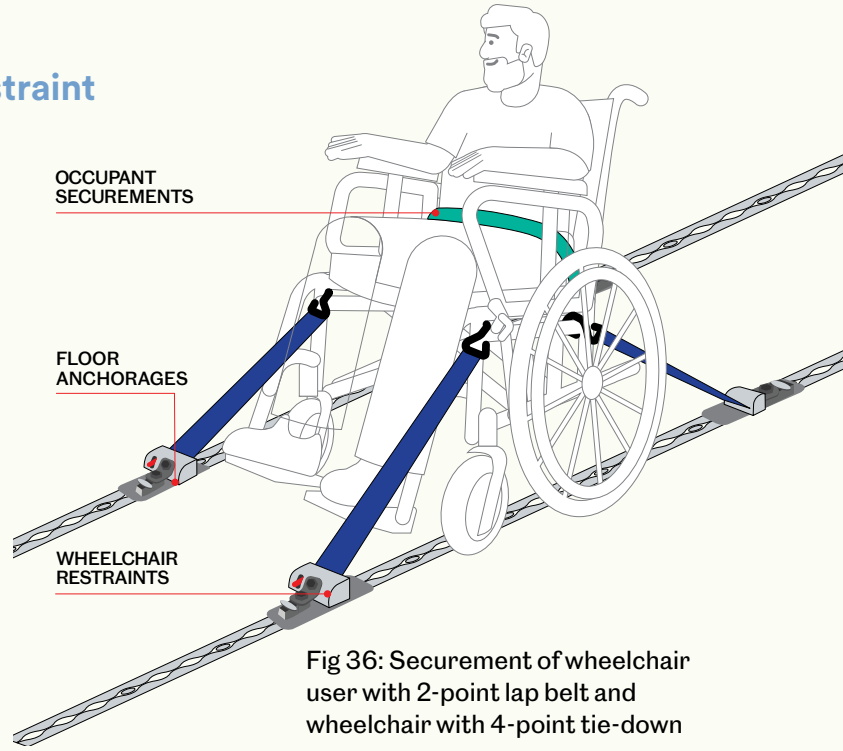


Fig 36: Securement of wheelchair user with 2-point lap belt and wheelchair with 4-point tie-down

It is recommended to keep a few spare lap belts in WAVs for wheelchair users who might not have their own lap belts.

When handling clients who refuse to use lap belts, operators are encouraged to work with caregivers and/or care staff to manage their behaviour and devise workable solutions to ensure clients' safety during trips.

1.6.2 Safe Practices for Occupant Restraints for Ambulant Passengers

All ambulant passengers, including the Transport Attendant (TA), should use their 2-point seat belt (side-facing foldable seats) or 3-point seat belt (front facing seats) correctly when on board the vehicle. Passengers found guilty of not wearing a seatbelt or lap belt when available may be subject to fines.

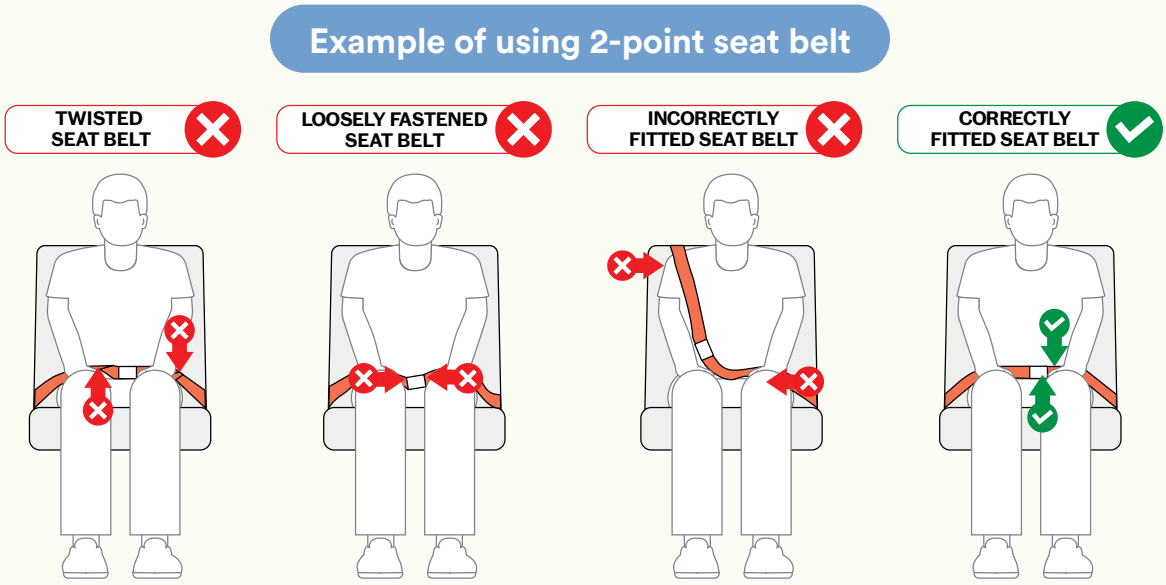


Fig 37: Dos and Don'ts of using 2-point seat belt

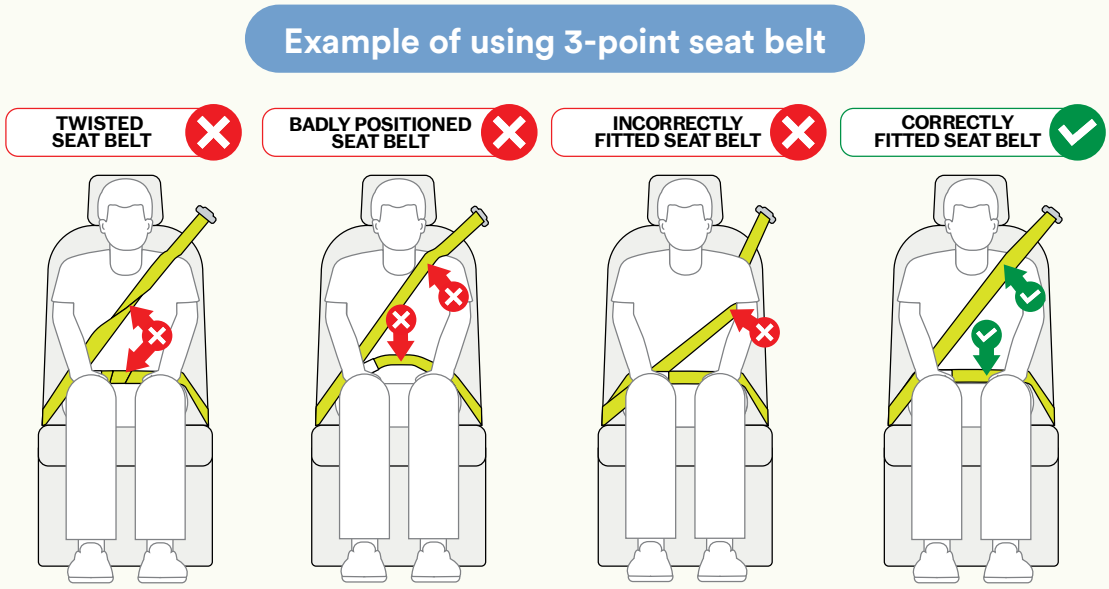


Fig 38: Dos and Don'ts of using 3-point seat belt

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02

On and Off Boarding WAVs

2.1 Hydraulic Wheelchair Lift

Due to the height difference between the ground level and vehicle floor, wheelchair users require vehicle boarding aids such as a passenger lift platform (i.e., hydraulic lift) to onboard and offboard the WAV. The lift should be purchased from an Original Equipment Manufacturer (OEM) compliant with applicable ISO standards.

As falls can be fatal, operators must comply with the manufacturer's instructions and safety precautions during lift use. Operators should also verify the lift's intended use(s) –whether it supports one wheelchair user, one wheelchair user with one standee*, one standee or two standees – and ensure that the total weight does not exceed the lift's maximum capacity as stated in the user manual. The lift should only be operated by staff who have undergone relevant training.

**Standee refers to a standing passenger*

2.2 Safe Practices When Purchasing Hydraulic Wheelchair Lift

There are various types of hydraulic wheelchair lift designs available in the market serving different purposes. Care centres and transport vendors should therefore purchase suitable lifts with user instructions that align with the organisation's operating needs. This helps to minimise liability in the event of any incident.

When deciding which type of hydraulic wheelchair lift to purchase, consider the following factors:

1 Boarding direction

- Some lift manuals specify that wheelchair users should board the vehicle while facing inward.
- Others specify that users must board facing outward.

2 Lift usage by attending staff together with wheelchair user

- Some lifts are not designed to accommodate both a wheelchair user and an additional person.
- If the attending staff and wheelchair user must board the lift together, use lifts specifically designed for this purpose, which are longer in length and equipped with higher handlebars.
- Always check the user manual to confirm that this is allowed.

3 Lift usage by ambulant client

- Some lifts do not support use by standing passengers.
- If the ambulant must use the lift, confirm that:
  i. The user manual explicitly allows this.
  ii. The handlebars are of appropriate height and length for the standee to hold without needing to slouch.

It is the operator's responsibility to ensure the operating instructions for your chosen lift aligns with your organisation's operational needs and safety protocols.

2.2.1 Dimensions of Various Hydraulic Wheelchair Lift

Dimensions of hydraulic wheelchair lifter

	Platform Length (mm)	Platform Width (mm)
Short Lifter	1066	762
Long Lifter (Recommended)	1219 - 1350	762 - 820

Note: Dimensions above are examples. Do check with your retrofitting workshop whether a long lift can be retrofitted into your vehicle.

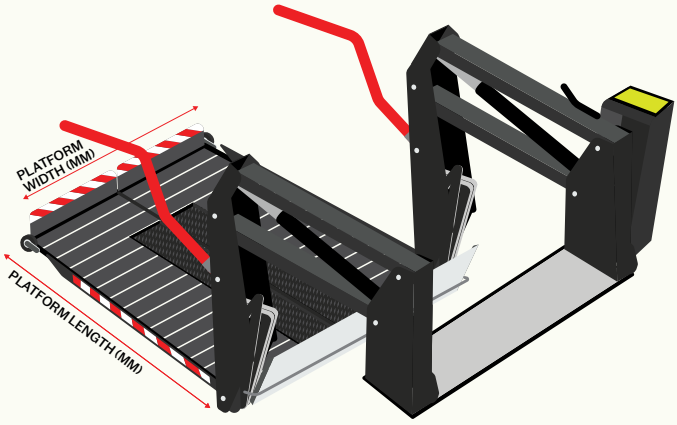

Fig39: Dimensions of hydraulic wheelchair lift

2.3 Safe Practices for On and Off-boarding Wheelchair User on Hydraulic Wheelchair Lift

Safe practices to note for on and off-boarding wheelchair users using hydraulic wheelchair lift **that permit wheelchair users to face inward when boarding**:

- Wheelchairs should be positioned in the middle of the lift, away from the back flap of the hydraulic wheelchair lift.

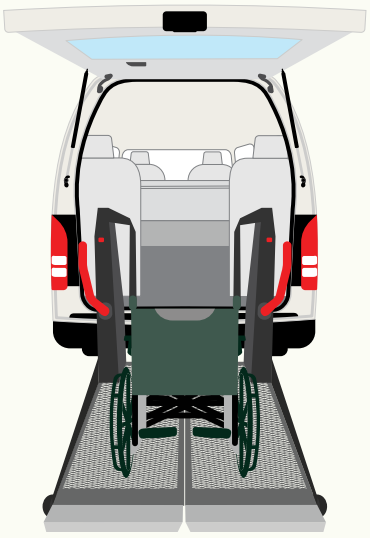

Fig 40: Wheelchair facing inwards and positioned in the middle of lift away from lift's back flaps

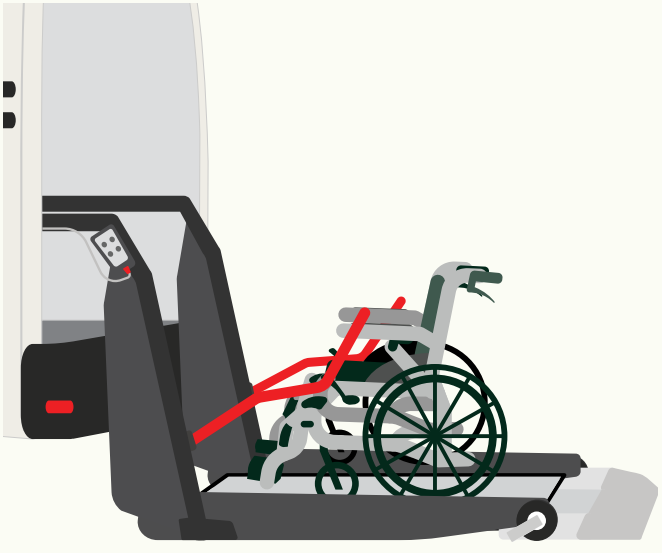

Fig 41: (Side view) wheelchair facing inwards and positioned in the middle of lift away from lift's back flaps

- Inform wheelchair user to keep their arms within the armrests or as close to their body as possible when on the lift.
- Apply wheelchair brakes on both sides OR power off motorised wheelchairs.
  - → If two or more staff are assisting with on or off-boarding, designate accountability of locking wheelchair brakes to one person.

2.3.1 One-Staff Operation: Onboarding a Wheelchair User onto WAV and Securing Wheelchair with 4-point tie-down

This section outlines the step-by-step process for a staff to safely onboard a wheelchair user onto a WAV using a hydraulic wheelchair lift and secure the wheelchair in the WAV by themselves.

For **one-staff** operation, ensure the following conditions are met:

1. Hydraulic wheelchair lift's user manuals* allow one wheelchair user with one standee (i.e., person assisting the wheelchair user) on the lift
2. Total weight does not exceed lift's maximum load capacity
3. There is sufficient space for staff to stand with the wheelchair on the lift.
4. Staff can hold on to the wheelchair with one hand, and
5. Hold onto the lift handle with the other hand, and
6. Comfortably operate the lift via remote or controls incorporated into the handlebar.

If the above conditions cannot be met, it is recommended for on and off-boarding to be carried out by at least **two staff**.

**If not stated clearly in the hydraulic wheelchair lift's user manual, it is recommended to write in to the manufacturer to clarify whether the lift can safely accommodate a wheelchair user with one standee, provided the combined weight is below maximum load.*

Fig 42: One-Staff Operation: Onboarding a Wheelchair User onto WAV

Step 1 **Prepare and lock front anchorage straps**

- Prepare front anchorage straps by locking them on the L-tracks OR D-rings in the vehicle before onboarding the wheelchair user.

Step 2 **Check wheelchair user's lap belt**

- Check that wheelchair user's lap belt is fastened.

Step 3 **Position wheelchair on lift platform and lock wheelchair brakes on both sides (Switch power off for motorised wheelchairs)**

- Guide the wheelchair user onto the middle of the lift platform.
  - → Note: The lift's user manual must permit wheelchair users to board facing inwards (towards vehicle).
- Once in place, lock both brakes for manual wheelchairs OR switch off the power of motorised wheelchairs to prevent any accidental movement.

Step 4 **Staff assists wheelchair user on lift and guide wheelchair user into vehicle**

- Staff boards lift with wheelchair user (only if permitted by lift's user instructions and within weight limit).
- Hold onto the wheelchair while gripping the lift's handlebar or safety rail at the same time.
- Raise lift platform. Once lift and vehicle floor level are aligned, release wheelchair brakes or reactivate power of motorised wheelchair, then push wheelchair user into vehicle.

Step 5 **Position wheelchair in vehicle and lock wheelchair brakes on both sides (Switch power off for motorised wheelchairs)**

- Position the wheelchair for securement.
- Apply the brakes of manual wheelchairs OR power off motorised wheelchairs.

Step 6 **Secure front tie-downs before rear tie-downs**

- Attach front anchorage straps to appropriate points on the wheelchair frame, followed by the rear anchorage straps.
- All straps should be tensioned evenly and checked that they are not twisted and firmly fastened.

Step 7 **Perform a tilt test**

- Perform a tilt test by rocking the wheelchair backward, then side-to-side to confirm it is properly secured.

Note: Motorised wheelchair users should move their own wheelchair onto wheelchair lift, into WAV and position wheelchair for securement with guidance from staff.

2.3.2 One-Staff Operation: Releasing Tie-Downs and Offboarding Wheelchair User from WAV

This section outlines the step-by-step process for a staff member to safely release the wheelchair in the vehicle and offboard a wheelchair user when operating the hydraulic wheelchair lift and WAV alone.

For **one-staff** operation, ensure the following conditions are met:

1. Hydraulic wheelchair lift's user manuals* allow one wheelchair user with one standee (i.e., person assisting the wheelchair user) on the lift
2. Total weight does not exceed lift's maximum load capacity
3. There is sufficient space for staff to stand with the wheelchair on the lift.
4. Staff can hold on to the wheelchair with one hand, and
5. hold onto the lift handle with the other hand, and
6. comfortably operate the lift via remote or controls incorporated into the handlebar.

If the above conditions cannot be met, it is recommended for on and off-boarding to be carried out by at least **two staff**.

**If not stated clearly in the hydraulic wheelchair lift's user manual, it is recommended to write in to the manufacturer to clarify whether the lift can safely accommodate a wheelchair user with one standee, provided the combined weight is below maximum load.*

Fig 43: One-Staff Operation: Offboarding a Wheelchair User from WAV

Step 1

Release 4-point wheelchair tie-down

- Release 4-point anchorage straps, starting with the rear straps followed by the front.
- Return straps to their holders or retract them fully to avoid tripping.
- Unlock both brakes of manual wheelchairs OR switch on the power of motorised wheelchairs.

Step 2

Guide wheelchair user onto lift

- Position the wheelchair user in the middle of the lift.
  - → Note: The lift's user manual must permit wheelchair users to off-board facing inwards (towards vehicle). The lift must also permit a staff to stand behind the wheelchair user during the process.

Step 3

Lock wheelchair in place

- Lock both brakes for manual wheelchairs OR switch off the power of motorised wheelchairs to prevent any accidental movement.

Step 4

Guide wheelchair user to ground level

- Hold onto the wheelchair while gripping the lift's handlebar or safety rail at the same time.
- Lower lift platform steadily. Once lift and ground level are aligned, release wheelchair brakes or reactivate power of motorised wheelchair.
- Guide wheelchair user off the lift.

Note: Motorised wheelchair users are to move their own wheelchair onto wheelchair lift and out of WAV with staff guidance

2.3.3 Two-Staff Operation: Onboarding a Wheelchair User onto WAV and Securing Wheelchair with 4-point tie-down

This section outlines the step-by-step process for two staff to safely onboard a wheelchair user onto a WAV using a hydraulic wheelchair lift and secure the wheelchair in the vehicle. For two-staff operation, Staff A will remain outside WAV and Staff B will enter WAV to receive the wheelchair user. *(Note: organisations are encouraged to adapt roles shown within these Guidelines to best fit their staffing arrangements.)*

Fig 44: Two-Staff Operation: Onboarding a Wheelchair User onto WAV

Step 1 **Prepare and lock front anchorage straps**

- [Staff B] Prepare front anchorage straps by locking them on the L-tracks OR D-rings in the vehicle.

Step 2 **Check wheelchair user's lap belt**

- [Staff B] Check that wheelchair user's lap belt is fastened.

Step 3 **Position wheelchair on lift platform and lock wheelchair brakes on both sides (Switch power off for motorised wheelchairs)**

- [Staff A or B] Guide wheelchair user onto the middle of the lift platform.
  - → Note: The lift's user manual must permit wheelchair users to board facing inwards (towards vehicle).
- [Staff A] Once in place, lock both brakes for manual wheelchairs OR switch off the power of motorised wheelchairs to prevent any accidental movement.

Step 4 **Both staff stand on ground level to support the wheelchair**

- [Staff A and B together] Stand on either side of the wheelchair (one staff for each side) and grip it firmly from your own side to ensure that the wheelchair remains steady throughout the lifting process.
- [Trained staff, either A or B] Raise the lift platform.

Step 5 **Receive and guide wheelchair user into vehicle**

- [Staff B] Enter the WAV via the side door and position yourself near the bridge plate (front flap) to receive the wheelchair.
- [Staff B] Pull the wheelchair forward into the vehicle in a smooth, controlled manner. Ensure that the wheelchair is rolled, not lifted, and that front castor wheels always remain in contact with the platform.
- [Staff A] Stabilise the wheelchair from behind from outside the vehicle.

Fig 45: Two-Staff Operation: Onboarding a Wheelchair User onto WAV

Step 6 **Position wheelchair in vehicle and lock wheelchair brakes on both sides (Switch power off for motorised wheelchairs)**

- [Staff B] Positions the wheelchair for securement.
- [Staff A or B] Apply the brakes of manual wheelchairs OR power off motorised wheelchairs to prevent unnecessary movement during the securement process.

Step 7 **Secure front tie-downs before rear tie-downs**

- [Staff B] Attach front anchorage straps to appropriate points on the wheelchair frame, followed by the rear anchorage straps.
- All straps should be tensioned evenly and checked that they are untwisted and firmly fastened.

Step 8 **Perform a tilt test**

- [Designated staff, either A or B] Once all four tie-downs are in place, perform a tilt test by rocking the wheelchair backward, then side-to-side to confirm it is properly secured, reducing the risk of toppling during transport.

Note: Motorised wheelchair users are to move their own wheelchair onto wheelchair lift, into WAV and position wheelchair for securement with guidance from staff.


2.3.4 Two-Staff Operation: Releasing Tie-Downs and Offboarding a Wheelchair User from WAV

This section outlines the step-by-step process for two staff to safely release the wheelchair in the vehicle and offboard a wheelchair user from a WAV using a hydraulic wheelchair lift. For two-staff operation, Staff A will exit WAV and Staff B will remain in WAV to position the wheelchair user onto lift. *(Note: organisations are encouraged to adapt roles shown within these Guidelines to best fit their staffing arrangements.)*

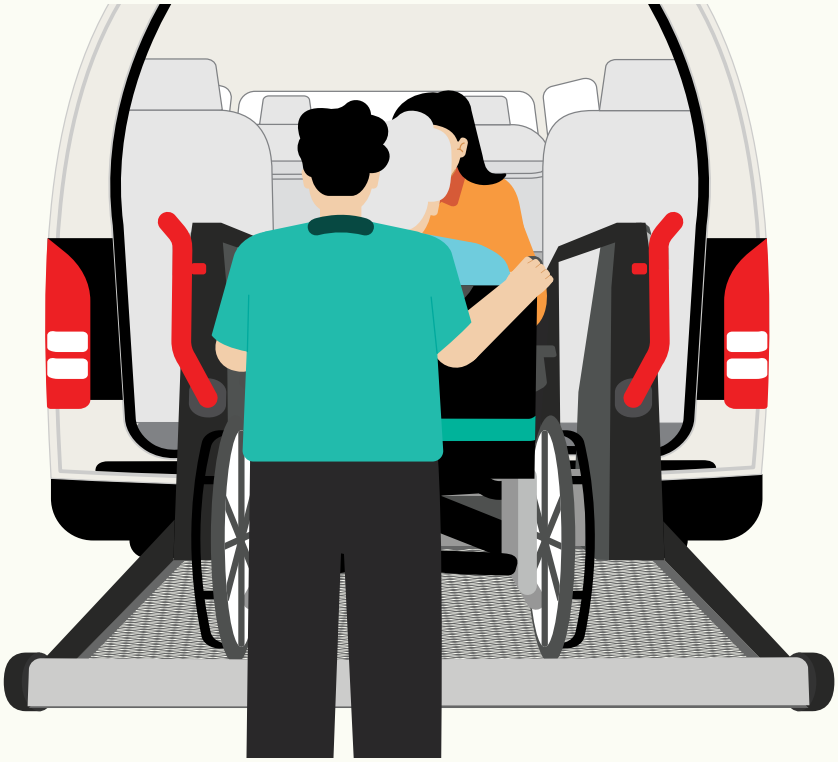

Fig 46: Two-Staff Operation: Offboarding a Wheelchair User from WAV

Step 1

Release 4-point wheelchair tie-down

- [Staff A or B] Release 4-point anchorage straps, starting with the rear straps followed by the front.
- Return straps to their holders or retract them fully to avoid tripping.
- Unlock both brakes of manual wheelchairs OR switch on the power of motorised wheelchairs.

Step 2

One staff guides wheelchair onto lift and another staff supports the back of the wheelchair

- [Staff B] (in-vehicle staff) Move the wheelchair backward toward the rear door of the vehicle.
- [Staff A] (outside vehicle) Support the wheelchair from behind at the same time.
- [Staff A and B together] Position the wheelchair user in the middle of the lift.
  - → Note: The lift's user manual must permit wheelchair users to off-board facing inwards (towards vehicle).

Step 3

Lock wheelchair in place

- [Staff A or B] Lock both brakes for manual wheelchairs OR switch off the power of motorised wheelchairs to prevent any accidental movement.

Step 4

Both staff stand on ground level to support the wheelchair, lower lift and guide wheelchair user to ground level

- [Staff B] Exits vehicle via the side door.
- [Staff A and B together] Stand on either side of the wheelchair (one staff for each side) and grip it firmly from your own side to ensure that the wheelchair remains steady throughout the process.
- [Trained staff, either A or B] Lower the lift.
- [Staff A or B] Once the lift reaches ground level and the rear roll-out flaps land on the ground, proceed to guide the wheelchair user off the lift safely.

Fig 47: Two-Staff Operation: Offboarding a Wheelchair User from WAV

Note: Motorised wheelchair users are to move their own wheelchair onto wheelchair lift and out of WAV with staff guidance.

Note: On and off board one client at a time. Ensure that side-doors are closed to prevent ambulant clients from getting off the vehicle unsupervised during hydraulic wheelchair lift.

2.4 On and Off-boarding Ambulant Clients

Ambulant clients may on and off board the vehicle using the side-door entry or hydraulic wheelchair lift, depending on the centre or transport vendors' protocol.

2.4.1 Safe Practices for On and Off-boarding Ambulant Clients via Side-door

1. Ensure WAV has appropriate stepping aids installed.
2. Staff should be available to assist passenger with on/off-boarding.
3. Direct client to on or off-board with stepping aids while holding on to available grab bars.
4. Only trained staff should assist clients with on/off-boarding.

In cases where care centres or transport operators are unsure about a client's ability to navigate the steps safely (e.g. client was recently discharged from hospital), consider on and off boarding the client on a wheelchair via the hydraulic wheelchair lift before transferring the client to an in-vehicle seat.

2.4.2 Safe Practices for On and Off-boarding Ambulant Clients via Hydraulic Wheelchair Lift

1. Staff should be available to assist ambulant client on and off the lift.
2. Instruct client to hold onto lift handles (not staff) when standing on the lift.
3. Staff must be able to hold onto the lift handle with one hand and client with the other, while operating the lift comfortably via remote or controls incorporated into the lift handle.
   - If client refuses to be held, staff should hover their hand behind client and be ready to support in case client loses balance.
4. Lift handlebars should be of appropriate height and length for the standee to hold without the need to adjust their standing posture in an uncomfortable and/or unstable manner.

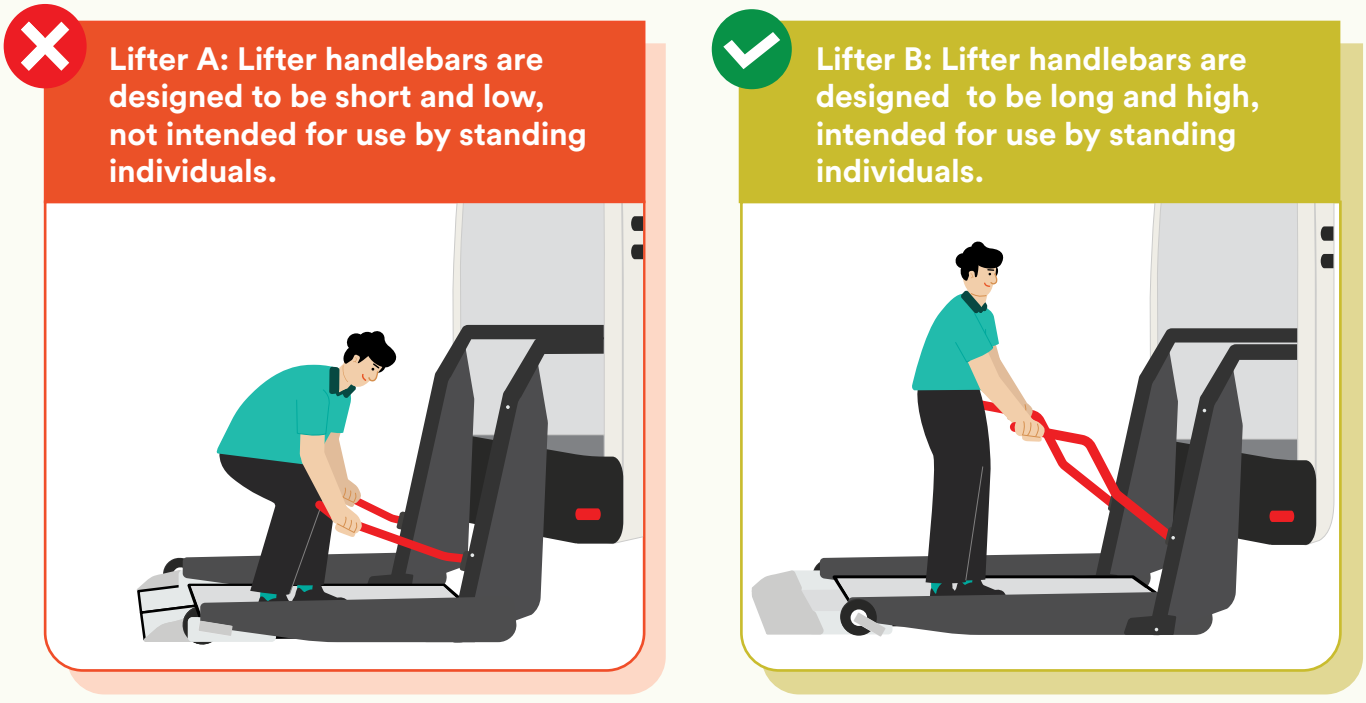

Fig 48: Appropriate lifts for ambulant clients to use

5. If the hydraulic wheelchair lift manual permits standee(s) to stand on lift, ensure that only 1 staff and 1 ambulant client is on the lift platform (Do not allow 2 ambulant clients to stand on the hydraulic lift at the same time).

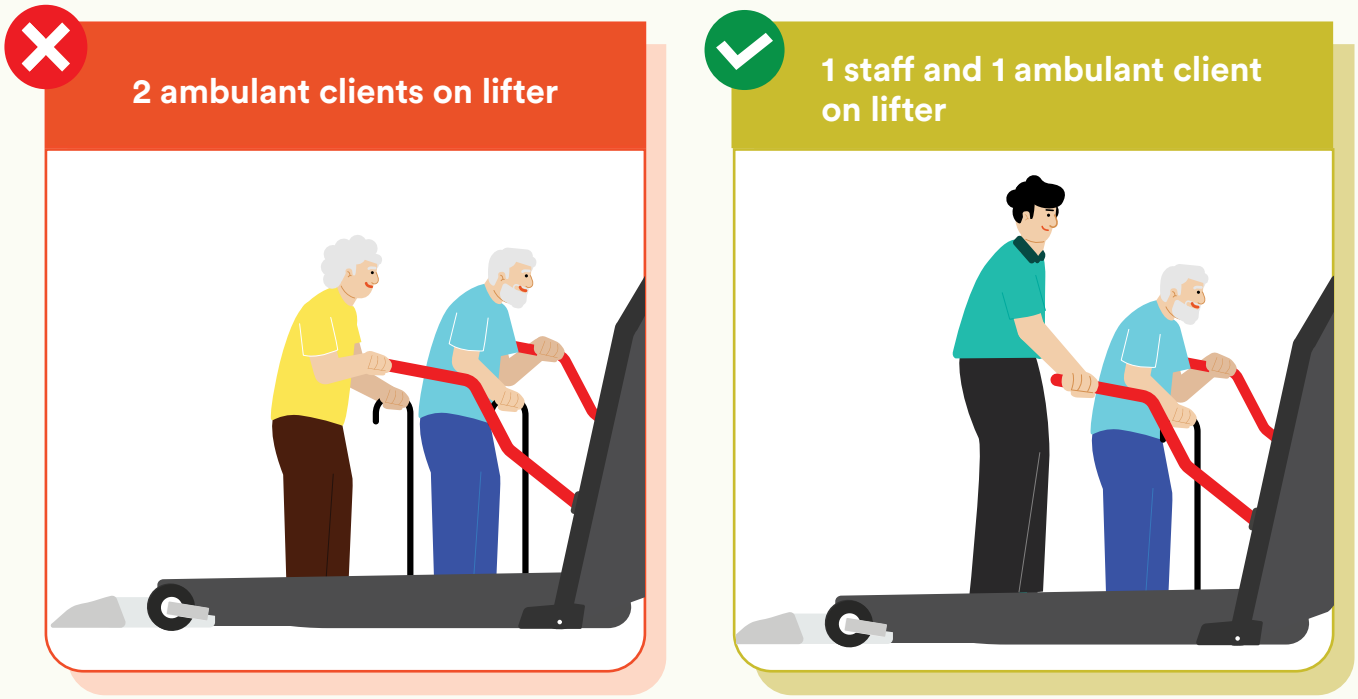

Fig 49: Only 1 staff and 1 ambulant client is allowed on hydraulic wheelchair lift

2 ambulant clients on lifter

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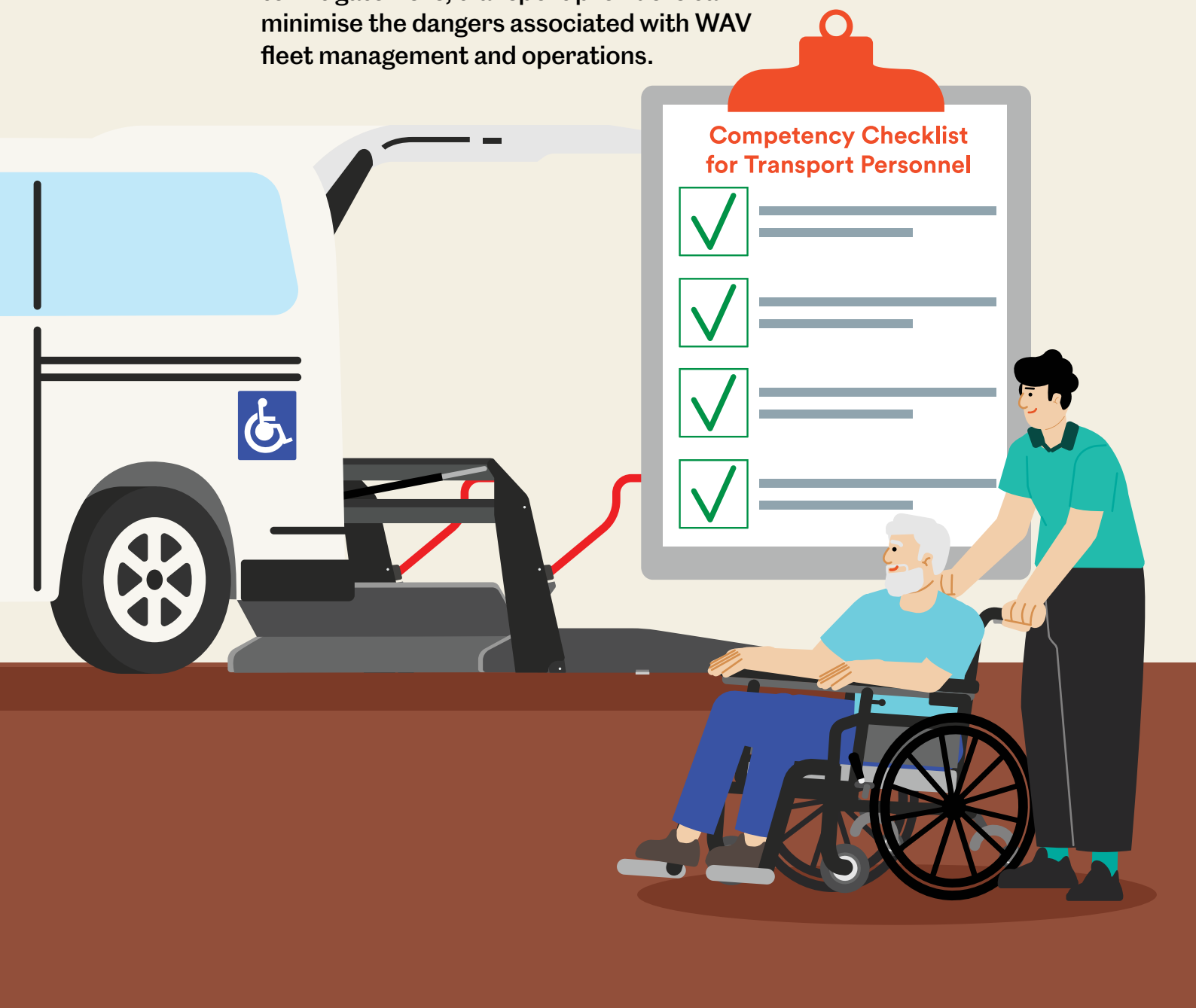
03

Planning and Minimising Risks

By identifying and evaluating potential sources of harm and taking proactive measures to mitigate risks, transport providers can minimise the dangers associated with WAV fleet management and operations.



3.1 Selection of Wheelchair Models

Wheelchair models that lack designated securement points (i.e., transit hooks) or with frames that lack sufficient structural points for proper 4-point tie-down securement are not suitable for use as in-vehicle seats on WAVs (refer to *Section 1.5* for information on appropriate wheelchair securement points). Ensuring that both the wheelchair and user can be safely secured should be the top priority when selecting wheelchairs for use as in-vehicle seats in WAVs.

Centres and transport operators should assess their clients' wheelchairs and advise on their compatibility with WAVs. If necessary, teams should consult an occupational therapist (OT) with relevant experience. Wheelchair users without WAV-compatible wheelchairs should be transferred to built-in vehicle seats and have their wheelchairs secured separately. If transfer is not possible or the wheelchair user is uncooperative, WAV operators may deny service on the grounds of safety.

3.1.1 Suitable Wheelchair Models for Use as Seats on WAVs

WAV-suitable wheelchairs should be equipped with transit hooks or have adequate structural points on the wheelchair frame to support a 4-point tie-down. These are typically manual wheelchairs, pushchairs, reclining wheelchairs, self-propelled wheelchairs, and selected models of motorised wheelchairs. Centres should encourage clients and caregivers to purchase suitable wheelchairs that have built-in lap belts for safety reasons.

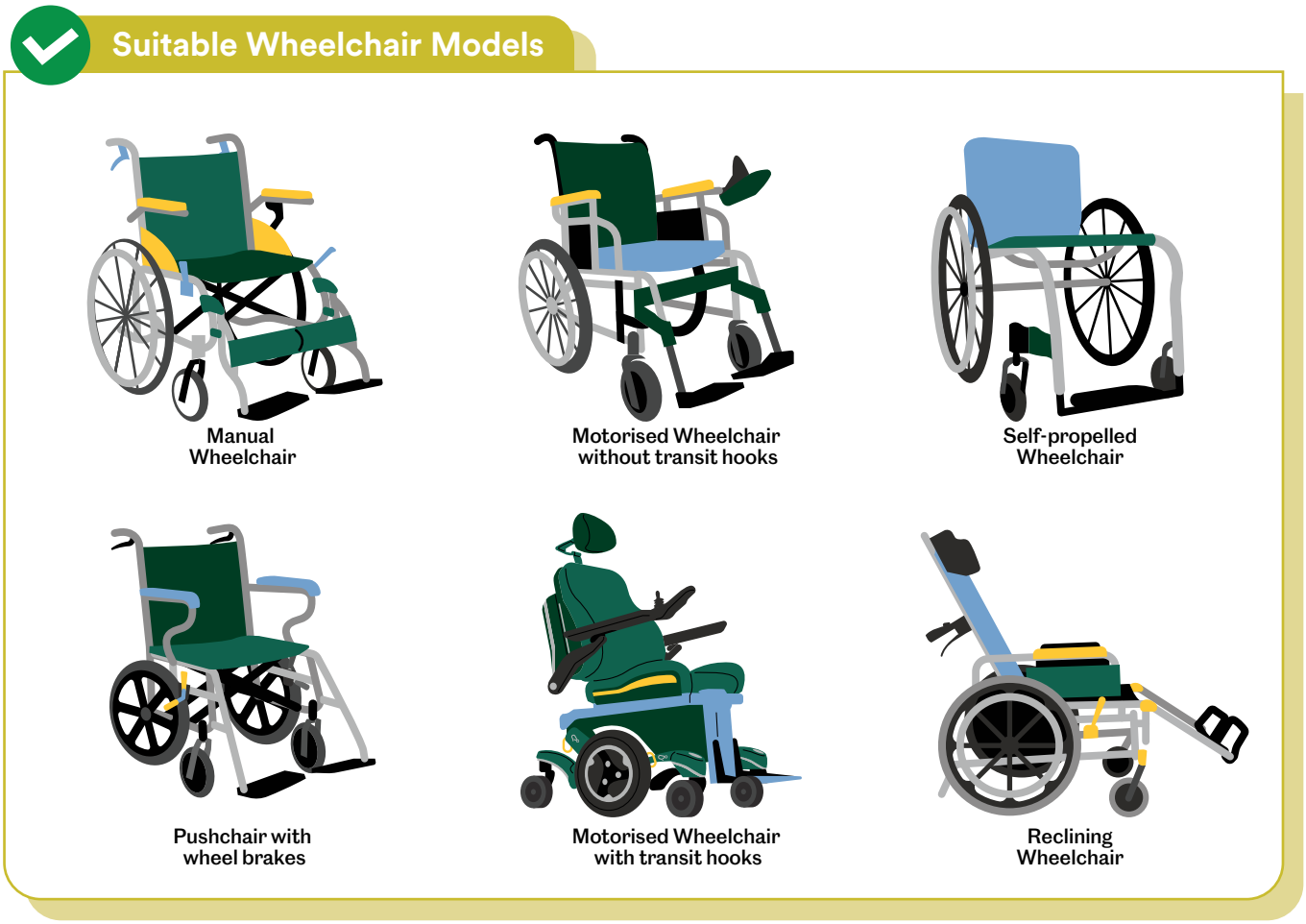


Fig 50: Suitable wheelchair models for use as seats on WAVs

3.1.2 Unsuitable Wheelchair Models for Use as Seats on WAVs

Examples of wheelchairs and mobility devices that lack appropriate structural points for securement and are unsuitable for use as in-vehicle seats include geriatric chairs, travel wheelchairs, personal mobility aid scooters

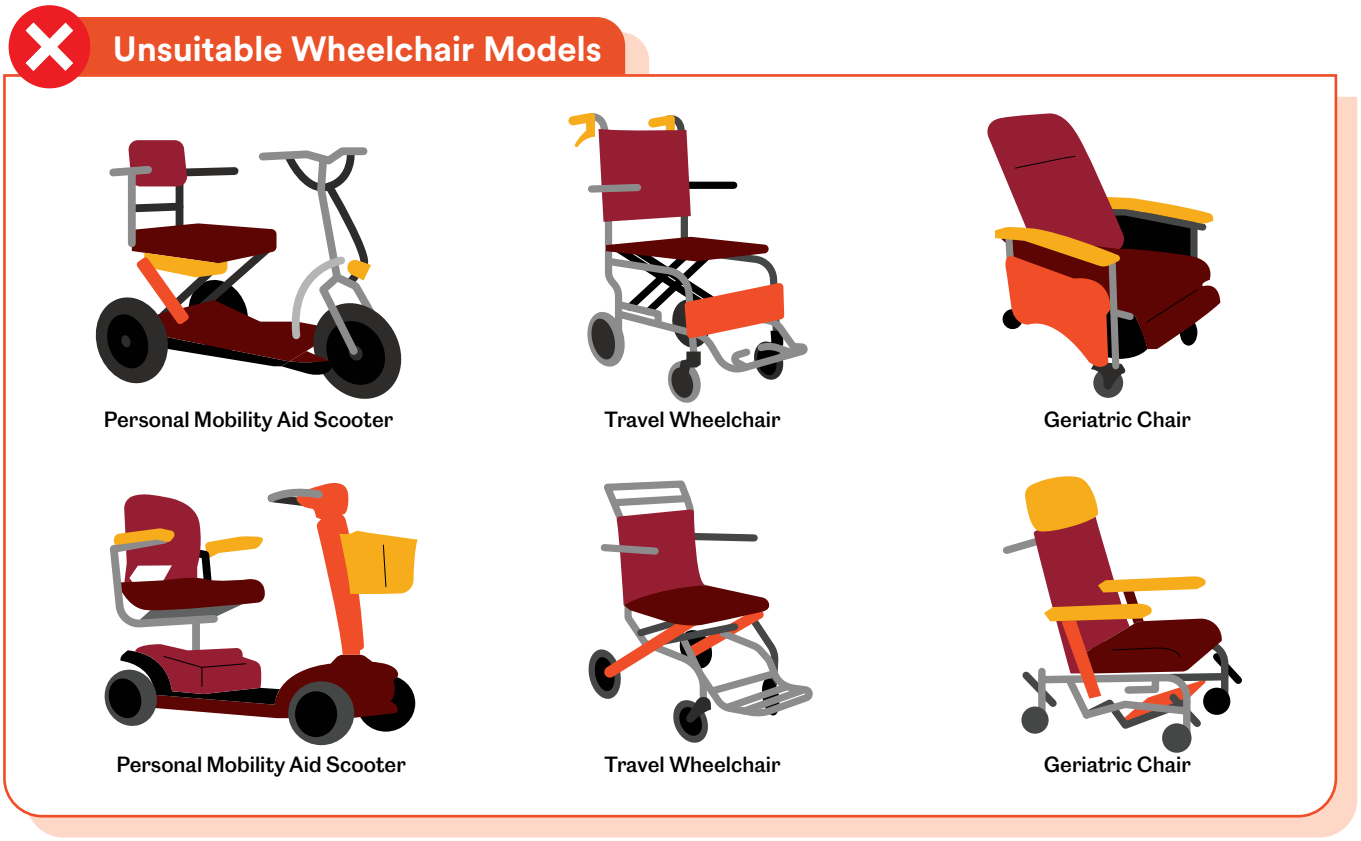


Fig 51: Unsuitable wheelchair models for use as seats on WAVs

3.2 Route Planning

Effective route planning ensures the safety and comfort of wheelchair users, ambulant clients, and transport personnel. While it is the transport personnels' responsibility to secure the wheelchair and its user properly, the route planning team (in-house or outsourced) is responsible for ensuring that WAV space capacity is not exceeded. Should certain wheelchair users require more space (e.g., those using reclining or larger manual wheelchairs), the centre should arrange additional trips or vehicles from the transport provider.

A supportive environment should be fostered to encourage transport personnel to raise safety concerns. Drivers should be empowered to provide feedback if they believe that passenger safety has been compromised e.g., when space constraints prevent proper securing of wheelchairs with a 4-point tie-down.

Additionally, wet weather contingency planning should be part of route planning, particularly at unsheltered pick-ups and drop-off points.

3.3 Provision of a Transport Attendant (TA)

Having a TA on board can help manage clients with special needs or cognitive impairments. This allows the driver to focus on driving safely without being disrupted by passengers. In addition, the TA can provide immediate assistance during emergencies. Their presence is therefore strongly recommended to enhance overall passenger safety.

3.4 Training and Competency for Transport Personnel

Transport personnel must be trained to ensure the safety and comfort of passengers with mobility challenges. Such training includes:

- Operations of hydraulic wheelchair lift.
- Wheelchair securement and occupant restraint.
- Basic understanding of clients condition(s) and needs (e.g., dementia, autism, intellectual disability etc).
- Life-saving procedures (e.g., CPR/AED, first aid etc.)
- Familiarity with emergency protocols (e.g. client suddenly feeling unwell, transport accidents with/ without injuries, wet weather affecting client pick up/drop off).

Note: Consider keeping a hardcopy of the organisation's Transport Emergency Protocol in the vehicle for reference in the event of an emergency.

While it may not be feasible for all personnel to attain CPR certification, it is still beneficial for staff members to attend courses such as CPR/AED and First Aid so that they can assist first responders at the scene.

The following checklist provides guidance on competencies that the transport personnel should achieve prior to rendering services independently.

Training/Competency Checklist for Transport Personnel

**Centre/Organisation may decide on the responsibilities of the respective Transport Personnel (Driver and Transport Attendant) and use the checklists accordingly*

Training/Competency Ensure transport personnel are trained in tasks listed below before providing transport service.	**Tick if done/ competent**	**N/A**
1. Attended and/or completed CPR/AED and First Aid course		
2. Completed relevant training to understand the condition, behaviour, concerns and needs of clients e.g. with dementia, autism, intellect disability, and communication strategies		
Competencies with wheelchair lift operations		
3. Able to operate hydraulic wheelchair lift safely: a. Deploy/descend/ascend/stow b. Familiar with the operations of the handrail switch (if any) c. Able to perform safety check for wheelchair lift (Refer to *Annex* for a sample of wheelchair lift checklist.)		
4. Understands the importance of applying wheelchair brakes when user is on hydraulic wheelchair lift		
5. Familiar with placement of brakes on various wheelchairs; able to apply brakes for both manual and motorised wheelchairs		

Competencies with wheelchair securement		
6. Able to perform standard or modified 4-point tie-down from wheelchair to floor (L-tracks and/or D-rings)		
7. Able to identify suitable points for securement on wheelchairs (i.e. use transit hooks if available, alternatively use unmovable points on wheelchairs such as fixed/welded junctions)		
8. Understands that the following should **not be done** when performing wheelchair tie-downs: a. Use of removable wheelchair parts such as footrests or armrests b. Tying wheelchair to wheelchair c. Tying wheelchair to bars or any point higher than the wheelchair seat		
Competencies with occupant restraint		
9. Understands importance of using a wheelchair lap belt for wheelchair users and seatbelts for ambulant clients, at minimum		
10. Able to educate clients and/or caregivers on lap belt and seat belt securement requirements		
Competencies with emergency protocols and drills		
11. Familiar with emergency protocols and drills (i.e. knows what to do within the shortest possible time, such as bringing vehicle to a safe stop, attending to client and calling 995 for ambulance and paramedics OR call centre if client is still conscious and responsive). • Minor traffic accident (no/minimal injuries, does not require emergency medical service) • Major traffic accident (e.g. major accident, requires emergency medical services) • Client onboard suddenly feels unwell		
General competencies		
12. Able to communicate effectively with clients, including persons with dementia, autism and intellectual disability		
13. Understands the importance of getting adequate sleep and/or rest between shifts to remain alert while providing transport services		
14. Understands the importance of informing in-charge personnel to arrange for replacement driver/attendant if feeling unwell, due to risks of driving or performing attendant duties when unwell		

3.5 Pre-shift and Post-shift Vehicle Checks

Regular vehicle checks help to identify issues as early as possible, allowing transport operators to arrange for necessary maintenance works and/or deploy "reserve" vehicles to avoid unnecessary mishaps. Pre-shift checks should be conducted before the day's first trip and post-shift checks after the last trip. The following is a sample vehicle checklist:

Pre-shift/ post-shift Checklist for Vehicle

Check	Tick if done	Tick if not applicable
1. Perform general operational and safety checks on vehicle interior and exterior, including under the hood. (E.g. air-con, engine, horn, lights, in-vehicle camera, cashcard has sufficient value, etc.)		
2. Check that the wheelchair lift mechanism is functioning well, including the lift flaps. (Refer to *Annex* for a sample of wheelchair lift checklist.)		
3. Check that all safety belts and wheelchair securement points, tiedown straps/hooks and harnessing are strong, secured and in operating condition		
4. Check that vehicle has the following: a. First aid kit b. Fire extinguisher c. Spare lap belts d. Cutter for emergencies		
5. Report to person-in-charge to arrange for a replacement driver or transport attendant **if feeling unwell**.		

3.6 Internal Audit

Internal audits are essential for safety compliance. These may include regular (e.g. bi-monthly) on-the-ground inspections and/or reviews of in-vehicle camera recordings. Unannounced audits may also be conducted to understand challenges on the ground. If necessary, the centre or transport operator may arrange relevant refresher training to keep staff up to date with the latest skills and knowledge.
The following is a checklist that may be adapted for both regular and unannounced audits:

Internal Audit Checklist

Observations	Tick if done
Prior to WAV on and off boarding	
1. Driver parks vehicle away from traffic on level surface with no obstacles beneath lift platform	
2. Driver puts the vehicle brake on 'Park' (not 'Neutral')	
3. [onboarding only] Staff positions wheelchair user at a safe distance from the vehicle to prepare for boarding. (If raining, staff chooses a suitable pick-up point with shelter where possible)	
4. Staff opens the rear door of the securely parked vehicle only after closing the side doors of the vehicle.	
5. Staff operates hydraulic wheelchair lift at areas with sufficient clearance when lift is unfolded (Note: Only trained personnel are allowed to operate the hydraulic wheelchair lift)	
6. [onboarding only] Staff secures and checks that wheelchair users are properly secured with a wheelchair lap belt. Wheelchair users without a lap belt should be provided with one.	
During WAV on and off boarding	
7. Staff assists one client at a time during on and off boarding E.g. Close side-door to prevent ambulant clients from getting on or off vehicle without supervision while hydraulic wheelchair lift is in operation	
8. Staff applies wheelchair brakes OR powers off motorised wheelchairs before operating the wheelchair lift	
Securement of wheelchair and ambulant clients	
9. Staff positions wheelchair in WAV and locks wheelchair brakes OR powers off motorised wheelchairs	
10. Driver and/or transport attendant performs standard or modified 4-point tie-down for each wheelchair	
11. Staff does not secure any wheelchair via the following methods: a. Tying wheelchair to wheelchair b. Using armrests or footrests as wheelchair securement points c. Tying wheelchair to bars or any point higher than wheelchair seats	
12. Staff performs tilt test (back, left and right) to ensure wheelchair is properly secured	
13. Staff secures ambulant clients with seat belt or lap belt properly	
During transport journey	
14. Driver practices safe and defensive driving, avoids sudden braking or abrupt stops at traffic lights	
15. Driver abides by speed limit	
16. Transport attendant remains seated with seat belt fastened, even at traffic lights, unless client assistance is absolutely necessary	
17. Transport attendant (if available) looks out for clients asleep or awake with their head tilted backwards and readjusts their position carefully when safe to do so	

3.7 Cyclical Maintenance of Vehicle and Accessibility Equipment

Good cyclical maintenance minimises downtime and likelihood of vehicular and/or equipment breakdown during service. Inspection and maintenance records of each vehicle and its accessibility equipment should be kept by the transport provider and centre.

Any damage or suspicion of damage found with the vehicle or its accessibility equipment should be reported immediately.

3.7.1 Maintenance of Vehicle

General vehicle maintenance should be carried out **every 6 months or 10,000km travelled, whichever comes first**.

3.7.2 Maintenance of Hydraulic Lift

Hydraulic lifts are required to undergo scheduled maintenance and inspection at the vehicle workshop **every 6 months or whenever signs of damage appear, whichever comes first**. A record of the maintenance should be kept by the transport provider.

3.7.3 Maintenance of Wheelchair Tie-downs and Occupant Restraint

Wheelchair tie-down straps, seat belts and lap belts should be maintained in fully functional state and **inspected every 3 months**. Tie-down straps that are worn out or damaged (e.g., fraying straps, faulty retractor lock) must be replaced without delay.

After arriving at a destination, all retractors and belts should be kept (e.g., in a designated storage place) to avoid any damage caused by wheelchairs rolling over during onboarding and offboarding.

Floor tracks for anchoring the wheelchair tie-downs should be kept clean of debris.

In case of a crash or accident, all equipment should undergo thorough inspection at a vehicle workshop that specialises in retrofitting works for WAVs and replaced, if needed.

3.8 Regular Health Check-ups for Transport Personnel

Regular health check-ups and good management of chronic disease(s) are vital to ensure that transport personnel remain fit for duty for as long as possible. Centres and transport operators are encouraged to enrol all staff in HealthierSG, the national health programme covering recommended health screenings and chronic disease management. Drivers above the age of 65 should also undergo regular assessment to confirm that they are physically and mentally fit to drive.

04
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05
Annex

Daily Inspection Checklist for Hydraulic Wheelchair Lift

Name of Driver: _____ Date: _____

Lift Model: _____

Lift Serial No.: _____

Vehicle No.: _____

Vehicle Chassis No.: _____

Vehicle Model: _____

Item	Tick if done	Remark
1. Before opening doors, ensure that the lift has not lost its hydraulic pressure and is not leaning against the doors. *When opening doors and deploying lift, ALWAYS stand clear of the platform's range of motion		
2. Visually check for any leaks or damage		
3. Check for obvious signs of damage and notify manager/person-in-charge if necessary		
4. Check that the Operation Instruction is visible		
5. Check that the hand pump handle is present		
6. Check that handset control is working correctly with no signs of damage		
7. Check that the platform is clean and dry		
8. Check that handrails are clean, working correctly, rust free and undamaged		
9. Check that the arm guards are present and undamaged		
10. Check that movements occur smoothly without jerking or unusual noises		
11. Check that the bridge plate operates correctly and lands on the vehicle floor smoothly		
12. Check that the Roll-off-ramp operates correctly and lands on the ground smoothly		
13. Check that the warning lights are operating correctly before using the lift (if fitted)		

Contact Details

Manager/Team fleet In-charge: _____

If in doubt, please contact the authorised dealer/retrofitter

AIC would like to sincerely thank SG Enable for accepting our invitation to co-develop the Guidelines for Safe Transport on Wheelchair-Accessible-Vehicles (WAVs). Your contribution of time, knowledge and practical insights has been instrumental in ensuring the relevance of this document (Version 1.0).

This collaboration reflects our shared commitment to improving accessibility and ensuring safe, dignified transport for all wheelchair users. We deeply value your partnership.

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