

**On-board Circulation and Seating Sub-Committee  
to the U.S. Access Board's Rail Vehicles Access Advisory Committee**  
Summary Recommendations Report

**I. Doorway width, exterior (side doors)**

Minimum clear doorway opening: 32 inches

This requirement is for all rail vehicles and all side doors that are on the path to accessible areas of a car or on cars that may provide the only exterior access to an accessible car that does not have side doors as in a car that might be coupled to an intercity diner.

**II. Bi-parting doors**

Bi-parting doors with individual leaves that provide less than 32" clear opening were raised as an issue particularly on rapid rail systems where, should a single leaf not open, the passenger may not be able to exit the train and be forced to the next station and beyond. The Subcommittee offers the following:

Possible recommendations:

- a. Bi-parting doors should have at least one leaf that opens to a clear width of 32"
- b. Door leaves interlocked so that a functioning door always opens both leaves
- c. Both leaves must have an emergency release feature in case one leaf is obstructed or damaged so that it cannot open
- d. Communication method / device provided at the door area to alert the driver/operator to ensure passengers do not get stuck on the car because of inoperative doors. (Device location must comply with requirements for reachability of controls from a wheelchair.)

Discussion

1. The Subcommittee would like industry input from door and vehicle manufacturers to determine the most practical and reliable solution based on the issues listed below.
2. The key issue of this issue is that passengers can get stuck on trains and carried to distant stations and returning to the intended station can be difficult and/or dangerous. Regulating the size of door components may not solve the problem since any door opening system can and will fail in time. The key to avoiding the problem of getting trapped is to have immediate communication available between the passenger and operator so that the passenger can be let out of the car and the door locked out until it can be serviced. The Subcommittee would like to solicit comment from industry representatives in order to make final recommendations.

**III. Doorway width, between cars (end doors)**

Minimum clear doorway opening: 32 inches

This requirement is for all rail vehicles except for the operator's cab ends of transit cars such as subways, MU (Multiple-Unit) cars and commuter cars that have legitimate conditions that impact the end doorway. Those conditions are: system clearance, structural requirements, the operator having appropriate physical space and the operator's safe field of vision.

Proposed: The Cab ends of vehicles that may be used coupled within a train:

1. MU cars and Cab Cars, regardless of mode may have end doors of 30" if:
  - a. There is a legitimate issue for the vehicle operator having appropriate space and creating a wider path adversely impacts the operator's safe field of vision. Agencies must demonstrate that restrictive clearance, structural requirements and operator ergonomics justify the use of the 30" dimension as opposed to the 32" typical dimension.
  - b. Movement through this doorway shall not be necessary for an individual to get to accessible seating space.
  - c. The path to the door is less than 32" because of seating arrangements.

#### **IV. Overlap of clear path between cars.**

Safety devices or appliances required for the safe operation of the train may overlap the clear path as follows:

1. Protrusions into the clear aisle /doorway between cars must be at least 34" above the floor of the vehicle and may protrude no more than 4" (See 36CFR1191, appendix A, 404.2.3)
2. On cars where the doorway is 30" wide protrusions may overlap the path through the doorway by a maximum of 2" at or above 34" minimum from the floor.
3. Protrusions into the path may not continue for more than 12" longitudinally and may not occur simultaneously on the opposite side of the path.
4. Protrusions must be separated longitudinally by a minimum of 20". This assumes two coupled cars with the same end configuration

Discussion: Safety devices for use by railroad crews are often located at the ends of cars and in some cases such as lever type hand brakes, have geometric dimensions and locations that are critical to safe operation particularly during emergencies. One such device is the lever type hand-brake that has a maximum pivot height determined by other governing bodies. Agencies should be prepared to present legitimate reasons why such devices cannot or should not be located elsewhere. The dimensions of items 3 and 4 should be verified and revised if needed.

#### **V. Clear width from door to mobility aid seating location**

Minimum aisle width 32 inches

This requirement is for all rail vehicles

## **VI. Vestibule width**

44 inches minimum

This applies to vehicles with vestibules, wind screens, modesty panels or other partitions that establish an entrance or “vestibule” area separate from the occupied passenger space. Vehicles that have defined walls that establish a “vestibule” separate from passenger occupied space should be 44” wide over the most restrictive protrusion where 90 degree or similar turns are required immediately upon entering the vehicle. If the vestibule is arranged to allow a free-flowing path into the passenger area or aisle leading to that area, then the most restrictive width of the vestibule near the door may be less than 44” but in no case can the unobstructed path to the accessible seating area be less than 32”. (An example would be a space defined by angled or rounded walls that provide a progressively broader path)

## **VII. Entrance width for cars without vestibules**

44 inches minimum

Vehicles that do not have vestibules or otherwise physically defined separation between entrance areas and passenger occupied areas and require 90 degree or similar turn to reach the accessible seating space must have a clear path dimension across the vehicle free from panels or stanchions at least 44” wide. This path should be a straight line across the doorways on opposite sides of the vehicle.

Discussion: The intent of this definition is to insure that people in mobility devices can quickly move onto the vehicle but at the same time not over defining vertical stanchions to the point that ambulatory safety is compromised.

The opinion expressed generally by community members is very much in favor of recommending the clear projected space 44” wide across the vehicle, assuming that the doors are directly across from each other as is most common. The most expressed concern is that during heavy loadings it can be difficult or impractical for passengers using wheelchairs to move into designated spaces or move off of the train efficiently. Stanchions (poles) that accumulate standees make maneuvering into the car very difficult. Unfortunately the courtesy that might be afforded to passengers in certain regions or communities cannot be predicted or relied upon. Regulation is often an unfortunate necessity to insure that what should be basic courtesy in civilized society is guaranteed, particularly when some people may not be able to exercise the options available to the general public. We have seen during the course of the RVAAC’s work that while one provider has found that removing or rearranging stanchions improved overall circulation other systems are concerned that safety may be compromised. While it is most likely that the subcommittee and full committee would recommend the clear 44” dimension across the car, perhaps the Access Board could best serve the community and providers by considering studies, modifications and procurements that are underway before generating the proposed rule for this situation. Often changes that seem impractical or inefficient create unintended positive consequences such as those experienced by the Washington, DC Metro. Other providers and builders are seeing a shift to reducing vertical stanchions in door areas to improve general passenger flow on and off of the cars.)

Two particularly good comments during the 12-11-14 meeting were “Design can work against controversy” and “Defined positions encourage bad habits)

#### **VIII. Clear space for mobility aid seating location**

32” x 54”/32” x 59” minimum

32” x 54” minimum is required where the space is confined on no more than two sides.

32” x 59” is required when the space is confined on 3 sides to insure adequate maneuvering space. The rules for the overlap of space by fixed objects apply to this dimension.

Discussion: The increase from the original ADA definition is to accommodate larger and differently configured mobility aids and ensure that space for maneuvering is provided.

#### **IX. Overlap of seating clear space**

This applies to all rail vehicles. The required Clear space for mobility aid seating location may be overlapped by a maximum of 6 inches at or above height of 12 inches above the floor.

#### **X. Number of mobility aid seating positions**

Minimum of 2

Additional Accessible Seating:

Some quantity of seats should be easily removable or convertible to temporarily accommodate groups of individuals using wheelchairs.

Discussion: There should be some definition of the quantity of seats that should be removable per vehicle by mode. Removing or converting seats should not generate conflict with other requirements for accessibility and where conflict occurs the applicable requirement should be waived. Depending on the mode, convertible seats may have reduced functionality. This is especially true of more complex seats used in intercity trains where the added mechanical function interferes with other comfort features. The convertible seats will likely fall into the area where the seats need to be transfer seats. There should be language to address this possibility.

Operational practices are not part of the RVAAC responsibility, however by requiring removable or convertible seats there is an implied, if not defined, requirement for a provider to offer a seat removal plan and service. Depending on the mode or the nature of the operation, the impact to the provider could be substantial. In the absence of a policy for the provision of service, equipping vehicles is irrelevant. As an example, many but not all of Amtrak’s cars use a seat track system that allows for seats to be easily removed but the policy for removing seats for groups has not been consistent. In the case of Tier II trains the structural requirements for attaching seats makes removing seats especially difficult. In the case of transit systems where vehicle availability and seat volume is more time-of-day critical the logistical problems of managing a car with missing seats could dramatically impact the system’s ability to provide its service. Examples of what type of group movements should be reviewed and community and industry input solicited in order to craft more defined language for the NPRM.

## **XI. Handrails and stanchions**

1. Size: 1.25 - 1.5 inches
2. Knuckle clearance: 1.5 inches minimum
3. Handrails, hand holds or similarly functional devices should be included on passenger seats. The purposes of such devices are:
  - a. Provide a discreet firm point for passengers to safely navigate to their seat or other amenities while the train is in motion.
  - b. Provide a safe condition for standees when other railings, loops or stanchions are unavailable.
  - c. Assist passengers in standing up from their seats.
4. Depending on the Mode, vertical stanchions should be included adjacent or as part of the seat at every other seat. Modes not subject to standee conditions as part of normal operation or where rotating or changeable seats are used are not required to include vertical stanchions.
5. Handholds, whether vertical or horizontal, provided adjacent to doors to aid boarding and alighting passengers whether in wheelchairs or ambulatory may be at the 32" minimum or 6" less than the clear door opening apart, whichever is greater.
6. Vertical handholds intended as boarding aids that project into the clear door opening should terminate no lower than 34" from the floor unless the device is intended as an aid to employees boarding from the ground or as an aid to passengers evacuating to the ground.

## **XII. Farebox guard**

Required for light rail systems only

## **XIII. Maneuverability near doors**

See items IV, VI and VII. The intent of the referenced items is to insure that the space near the doors is preserved for maneuverability.

## **XIV. Maneuvering space at wheelchair seating locations**

A 60" maneuvering circle must be provide at each Mobility Aid Seating Location.

This requirement is for all rail vehicles to ensure that the passenger can maneuver the wheelchair into the seating location. The circle may overlap the aisle, Mobility Aid Seating Location and other maneuvering locations. The purpose of the maneuvering circle is to ensure that a passenger can turn to face their desired direction of travel and exit the Mobility Aid Seating Location toward the door in which they entered the vehicle.

## **XV. Service animal spaces**

A minimum of two (2) spaces measuring 14"w x 38"l x 16"h must be provided for service animals.

This requirement is for all rail vehicles.

Service Animal space may be overlapped by fixed objects by 6" at 12"H and 12" at 16"H. Service Animal Space may overlap other defined floor space by a maximum 6" longitudinally and transversely.

Discussion: This should be reviewed physically to make sure that the measurements are appropriate. A short study involving live animals and their owners should be performed to make sure that the space is comfortable and safe for the animal and passengers. Likewise if the space is found to be oversized then the overlap dimensions might be increased.

#### **XVI. Transfer seat details**

1. For all vehicles, seats considered transfer seats must have a seating surface that is at least 17"- 19" above the finished floor. Bolsters or other cushion features must not extend above 19" to avoid hindering transfer.
2. For all vehicles, seats considered transfer seats with armrests must include armrest that rotate out of the way so as not to inhibit transfer. When rotated out of the way, the armrest must be at least ½ inch behind the surface of the seat back. Armrests must be designed to remain in the upright or down position during normal train motion.
3. For intercity rail vehicles only, seats in sleeping cars, food service cars and dining cars, or other seats intended for occupancy by persons who wish to transfer from a wheelchair, must be at least 17"-19" above the finished floor. No portion of the seat frame or shrouds may extend beyond the passenger surfaces of the seat bottom or back.

#### **XVII. Mode Details for Less Prevalent Rail Vehicles**

1. Historical or Heritage vehicles are included in light rail.
2. Replica and rehabilitated cars with a capacity of "x" or less are the same as light rail except for seating locations. Cars with a capacity of more than "x" are the same as light rail (Industry comment and recommendations are requested to generate a valid capacity and or vehicle size. This should include recommendation for loading definition such as normal, crush loading etc.)
3. Monorails in transit service are subject to the same requirements as light rail systems. Some exception may be needed for wheel intrusion on straddle beam vehicles.
4. Automated Light Rail Transit (ALRT), Automated Guideway Transit, (AGT), Skytrains, etc. are subject to the same requirements as light rail systems.
5. Cable Tramways services are subject to the same requirements as light rail systems.
6. Cog Railways are subject to the same minimum requirements as light rail systems
7. Incline planes / funiculars with 16 or fewer passenger must have one accessible seating location; vehicles with more than 16 passengers are subject to the same minimum requirements as light rail systems
8. Maglev (Magnetic levitation and propulsion) with capacity of more than 16 passengers and operation exceeding 60 MPH will comply with the requirements of intercity rail. Vehicles on systems with vehicle capacity of 16 passengers or less and /or operating less than 60MPH must comply with the requirements for Automated Guideway Transit (AGT).
9. Personal Rapid Transit (PRT). Each car must be accessible with 32" entry doors and one accessible seating location. Otherwise PRT's will comply with Light Rail requirements.

### **XVIII. Intercity, High speed and Articulated Vehicle Restrooms**

This applies to all vehicles that are required to or otherwise have accessible restrooms. Vehicles that are semi-permanently coupled or otherwise provide coupled diaphragm passageways that provide continuous floor surfaces and that create no vertical or lateral shearing conditions found in conventional cars with individual diaphragms may be arranged so that only one of the vehicles contains an accessible restroom. Each car must have the required number of accessible seats. Further, only one of the cars must have a vestibule and side doors. In all conditions, the pathways between accessible spaces, vestibules and restrooms must meet the minimum requirements set forth for accessibility. (According to 42 USC 12162(a) (3) Intercity (Amtrak) coaches must have accessible seating spaces AND an accessible restroom. This does not eliminate the possibility of a car builder or Amtrak from applying for equivalent facilitation.)

### **XIX. Vertical Movement on Intercity Long-Distance Bi-Level Cars**

Following are draft recommendation for vertical movement of passengers with disabilities between the levels of new intercity (Amtrak) passenger cars.

#### **APPLICABILITY:**

This applies to new bi-level intercity lounge cars built for Amtrak and any bi-level equipment used by successors to an Amtrak route acquired by another operating entity or company as sanctioned under PRIAA. FURTHER, cars operated by private companies in scheduled intercity long distance service shall comply. Lounge means any car with a primary function that is to enhance the passenger experience beyond the purchased coach or sleeper accommodation and is so designed to enhance viewing from the second level. This requirement extends to any bi-level car, with or without food service, except diners, that has non-revenue seating available to all passengers on the train on a first come basis.

Open platform observation areas that are accessible to passengers at no extra charge and those provided for an extra fare must be made accessible to passengers using mobility devices. Full service Diners with a lower level kitchen that is not designed for passenger use are not required to have built-in vertical access.

While not considered true bi-level cars, single level cars traditionally known as “dome cars” that offer an elevated area designed for viewing scenery, with or without food service must have a number of accessible seating spaces and vertical access to reach the viewing level. Accessible spaces in the dome car may be convertible for use by other passengers when passengers using wheelchairs are not present.

#### **Possible Additional Applicability:**

1. All bi-level Intercity Long Distance bi-level coaches.
2. All bi-level Intercity Long Distance sleepers. (Key points are the number of rooms accessible per car, the type of room, upstairs and downstairs etc.)

3. All bi-level Intercity Long Distance Diner cars. Accessible from the adjacent car or dining tables are provided in the Lounge car. (The entire lower level of the diners is consumed by the kitchen.)

## GUIDING PRINCIPALS

1. Features providing access for people with disabilities must be equivalent to those provided others in terms of functionality and aesthetics, and must not segregate individuals with disabilities.
2. Accessible features should be the norm for everyone.
3. There may not be restrictions on using any facilities or features until the train is stopped.
4. Safety concerns must be balanced with the underlying civil rights principles of the ADA.
5. Establishing policy mandates will drive the development of improved generations of technology.
6. All train cars should be accessible.
7. Access Board guidelines should promote the development of technology, and not freeze current technology in place.
8. Every circulation path used by the public needs an accessible route.
9. We must consider the growing demographics (the graying of America) when we establish scoping for accessible features.

## REQUIREMENTS

New intercity bi-level passenger trains have some means of transferring passengers using mobility aids, or who otherwise cannot negotiate stairs, between the levels. The goal is to expand the full rail travel experience for passengers who might otherwise miss out on key features of train travel. The following features and requirements apply:

1. All vertical load bearing features designed with a safety factor of three
2. Accessible path from the vehicle entrance to the lift device
3. Accessible path from the lower level accessible spaces, restrooms etc. to the lift device
4. Accessible path from the lift device to upper level accessible spaces.
5. Lift device shall not require backing in or backing out.
6. Lift must function with or without Head End Power and include a manual function in the case of total power loss.
7. Appropriate electrical and or mechanical safety devices to insure that the lift cannot operate unless the user is safely aboard the lift.
8. Gates, doors, guards, etc. must include interlocks to insure safe operation yet have sufficient tolerance and latitude to prevent system faults due to train motion and normal wear of components.
9. Lift platform shall be the same size as required for wayside and car borne lifts
10. The lift may be a vertical style or an inclined platform lift but the lift may not impede the stairway use.

11. The lift must include a fold down seat and horizontal and vertical hand rails on at least one side of the lift "car"
12. If the lift does not allow for direct entrance then the dimensions for boarding the lift must be at least equal to the requirements for maneuvering a wheelchair into an alcove.
13. The lift must operate normally at the maximum track superelevation with the train stopped (approximately 7 degrees.
14. Lift must operate in emergency mode to within x degrees of the car's rollover angle. (This must be studied to see how the movement within the car affects the vehicle's center of gravity in extreme cases.) (The concept of this performance requirement is so that as long as a car is not on its side or in eminent danger of falling over that the lift can provide safe movement to the lower level)
15. The lift frame must be of sufficient strength or otherwise so designed and installed as to function when the car is at its maximum designed diagonal misalignment (end-to-end twist)
16. Gates, doors, guards, hand rails etc. must be designed to contain the maximum load required for the lift when subject to the FRA required loading of 4g vertical, 4g lateral and 8g longitudinal and remain functional after the event. (For FRA does this mean when the device is loaded to its maximum capacity?)
17. Emergency stop devices must be available on-board the device and on both levels.
18. The maximum travel time between levels is X seconds
19. The lift system should have soft starts and stops.
20. The lift system should have obstruction detection
21. The lift must work reliably whether the train is in motion or not.

#### ANCILLARY REQUIREMENTS:

1. Cars with upper level restrooms must have an accessible restroom if the car includes vertical access or is available by design from a car with vertical access.
2. Cars with vertical access with restrooms on the lower level are not required to have upper level restrooms. (This is stated because PRIIA bi-level cars have non-ADA restrooms on the second level and a reduced number of restrooms on the lower level. The net number of toilets remains the same and seating is expanded on the lower level and reduced on the upper level. The reason for restrooms on the second level is that negotiating the stairs is a growing problem for ambulatory passengers primarily due to age. If the upper level and lower level must have the accessible restrooms then the primary function of the car as an enhancement to travel is greatly reduced because the number of passengers that can use the car is reduced.)
3. The quantity of accessible spaces should be on one level or divided between levels but the final quantity should not be greater than cars without vertical access. Convertible seating should be used to maximize the available seating space when persons using wheelchairs are not present.

#### ECONOMIC RISKS:

1. Applying vertical access to non-revenue cars has limited economic impact and may in fact encourage passengers who cannot use stairs to choose the train for travel. The primary costs are any extra cost for the equipment and maintenance over time.
2. Applying vertical access to revenue cars, i.e. coaches and sleepers will have a direct affect in lost revenue capacity. The physical impact and corresponding fiscal impact must be reviewed prior to NPRM.
3. There is a very real possibility that the economics will no longer justify building new bi-level Intercity Long Distance cars. The advent of bi-level cars on intercity long distance trains is driven by multiple economic goals. The enhancement of viewing due to the extra height was nice but the bi-level intercity car came about just before the number of airline passengers surpassed train passengers and railroad were trying to maintain service. Bi-level cars allowed the railroad to increase the number of passengers per car. The capital and operating investment per passenger on a higher capacity car is lower and thus the profit (or loss reduction) is greater. There is a huge risk that the economic efficiencies of bi-level intercity cars will be lost to accessible features. This comment does not apply to Lounge cars as defined at the front of this document. A proper study should be made.
4. The details governing the construction of lifts should be done with guidance from requirements in the built environment with full consideration that weight and space are big concerns for rail cars. This does not mean that safety or utility is compromised but following requirements for the built environment could unduly consume space or otherwise threaten the viability of the device in a rail car.

#### PHYSICAL RISK:

1. Dynamic factors during normal train operation will affect the operational reliability of the system. Unlike the built environment, railcars experience lateral, vertical, longitudinal and torsional movement. These movements can occur suddenly with no planning or warning.
2. The effects of train operation today at 90mph and at PRIAA specified speeds of 125mph on the integrity and safety of a lift system are not known.
3. The compact environment of a passenger car coupled with the dynamic effects may present challenges for independent operation that need to be resolved.