Final Report
US Access Board
Rail Vehicles Access Advisory Committee
July 29, 2015

Chapter 1 – Introduction

I. Statutory Authority, Scope, and Objectives of the Committee

The Rail Vehicles Access Advisory Committee (RVAAC) of the Architectural and Transportation Barriers Compliance Board (Access Board) was established on May 23, 2013, in accordance with the Federal Advisory Committee Act (FACA). The committee was established in the public interest to support the Access Board in performing its duties and responsibilities under Section 504 of the Americans with Disabilities Act (ADA) which authorizes the Board to establish and maintain accessibility guidelines under titles ll and lll of the ADA.

The Access Board issued accessibility guidelines for transportation vehicles in 1991 (and amended the guidelines in 1998 to include additional requirements for over-the-road buses, i.e., buses characterized by an elevated passenger deck located over a baggage compartment). The Access Board's transportation vehicle guidelines are codified at 36 CFR part 1192. The guidelines apply to the acquisition of new, used, and remanufactured transportation vehicles, and the remanufacture of existing transportation vehicles to the extent required by regulations issued by the Department of Transportation (DOT). The guidelines were adopted by DOT as standards on September 6, 1991 (56 FR 45584) and are codified at 49 CFR 38. The portion of the guidelines addressing transportation vehicles using fixed guideway systems (e.g., rapid rail, light rail, commuter rail, and intercity rail) has not been revised or updated since 1991. The committee was established to advise the Access Board on matters related to the revision and update of the guidelines addressing transportation vehicles using fixed guideway systems subject to the ADA. The committee acted solely in an advisory capacity to the Access Board and did not exercise any program management responsibility nor make decisions directly affecting the matters on which it provides advice.

On February 14, 2013, the Access Board published in the Federal Register (78 FR 10581) a notice of intent to establish this advisory committee and seeking nominations from a variety of stakeholder organizations, including:

- Manufacturers of transportation vehicles that operate on fixed guideway systems;
- Transportation providers that operate fixed guideway systems;
- Organizations representing individuals with disabilities; and
- Other entities whose interests may be affected by the accessibility guidelines.

The February 2013 notice indicated that the number of committee members would be limited so that the committee's work can be accomplished effectively and that the committee would be balanced in terms of interests represented. The advisory committee members would not be considered special government employees and therefore would not need to file confidential financial disclosure reports. Each meeting would be open to the public and during subcommittee meetings anyone could participate as a subcommittee member.

Notices announcing each committee meeting were published in the Federal Register at least 15 days beforehand. All meetings and subcommittee meetings were also announced on the RVAAC website (www.access-board.gov/rvaac). Material used in committee meeting and subcommittee meeting can be found in the RVAAC electronic docket (http://www.regulations.gov/#!docketDetail;D=ATBCB-2013-0006) in the section titled Supporting Documents.

II. RVAAC Membership

In the May 23, 2013 Federal Register (78 FR 30828) the U.S. Access Board published the list of 24 organizations selected for representation on the committee. After the first meeting (November 13-14, 2013) in response to petitions for memberships, three organizations were added to the RVAAC membership: Hearing Loss Association of America, Metropolitan Transportation Authority of the State of New York, and New Jersey Transit.

Below are listed the 27 organizations comprising the committee membership. The Federal Railroad Administration served as an ex officio member.

1. Alstom Transportation
2. American Council of the Blind (ACB)
3. Association of Programs for Rural Independent Living (APRIL)
4. Bombardier Transportation
5. California Department of Transportation, Division of Rail
6. Center for Inclusive Design and Environmental Access
7. Community Transportation Association of America
8. Disability Rights Education & Defense Fund (DREDF)
9. Federal Railroad Administration
10. Hearing Access & Innovations (Hearing Access Program)
11. Hearing Loss Association of America
12. International Centre for Accessible Transportation
13. Maryland Transit Administration
14. Metra & Northeast Illinois Regional Commuter Railroad Corporation
15. Metropolitan Transportation Authority of the State of New York

16. National Association of the Deaf
17. National Association of Railroad Passengers
18. National Council on Independent Living
19. National Disability Rights Network (NDRN)
20. National Railroad Passenger Corporation (Amtrak)
21. New Jersey Transit
22. Parsons Brinckerhoff
23. RailPlan International
24. Ricon Corporation
25. South West Transit Association
26. Talgo, Inc.
27. United Spinal Association

The committee was chaired by Mr. Billy Altom (representing APRIL).

The advisory committee charter was renewed on March 18, 2015 and announced in the March 23, 2015 Federal Register (80 FR 15189).

III. Committee Process

The committee held the following seven meetings and presented its report to the Board on July 29, 2015. The committee's operating procedures were approved at the first meeting and can be found in the RVAAC electronic docket.

- 1st Meeting (November 13-14, 2013)
- 2nd Meeting (January 9-10, 2014)
- 3rd Meeting (April 10-11, 2014)
- 4th Meeting (September 11-12, 2014)
- 5th Meeting (February 26-27, 2015)
- 6th Meeting (April 23-24, 2015)
- 7th Meeting (June 4-5, 2015)

The committee intended to address access for new vehicles before addressing access when existing vehicles subject to the ADA are remanufactured. Although the committee desired to address access issues within stations, the committee's charter limited it to vehicle access issues that fall under the Access Board's jurisdiction. Because of time constraints, the committee was only able to address new vehicles. In addressing new vehicle access, the committee believed that all new vehicles must be designed and constructed so that persons with disabilities will be able to board and alight at all stations and stops used by a new vehicle. The committee recognized that not all stations and stops

are fully accessible, but it believed a new vehicle must at least provide the connection to the boarding and alighting area of a station or stop. Accessibility in transportation facilities is covered under the Access Board's Americans with Disabilities Act/Architectural Barriers Act Accessibility Guidelines (ADA/ABA Guidelines) and does not fall within the committee's purview.

The committee provides the following general guidance to the Access Board when addressing different vehicle types.

1. New vehicles, even if built to old/historic plans, must meet new construction requirements.

2. The top speed of a monorail in transit service will determine whether it is subject to light rail or rapid rail requirements.

3. Automated Light Rail Transit (ALRT), Automated Guideway Transit (AGT), Skytrains, etc. are subject to the same requirements as people movers.

4. Cog Railways are subject to the same minimum requirements as light rail systems.

5. Incline planes / funiculars with 16 or fewer passengers must have one accessible seating location; vehicles with more than 16 passengers are subject to the same minimum requirements as light rail systems.

6. Maglev (Magnetic levitation and propulsion) with a capacity of more than 16 passengers and operation exceeding 60 MPH will comply with the requirements of high speed rail. Vehicles on systems with a vehicle capacity of 16 passengers or less and /or operating less than 60 MPH must comply with the requirements for Automated Guideway Transit (AGT).

7. Personal Rapid Transit (PRT) cars must each be accessible with 32 inch entry doors and one accessible seating location; otherwise, PRT's will comply with light rail requirements.

8. Other Modes not defined here must be accessible, with the level of accessibility reviewed and established with the appropriate regulating body in a manner similar to the requirements for equivalent facilitation.

The committee recommends that where its report does not address a feature found in a vehicle but the feature is addressed in the ADA/ABA Guidelines; those requirements should be used to the maximum extent feasible.

Besides the seven meetings mentioned, the committee held numerous subcommittee conference calls. Information on those calls can be found in the RVAAC electronic docket (link provided above). The bulk of the committee's work was done by four subcommittees:

- Boarding and Alighting Subcommittee
  Chaired by Ms. Marilyn Golden (representing DREDF)
- Onboard Circulation and Seating Subcommittee
  Chaired by Mr. Joseph (Blair) Slaughter (representing Amtrak)
- Rooms and Spaces Subcommittee
  Chaired by Mr. Dennis Cannon (representing NDRN)
- Communications Subcommittee
  Chaired by Ms. Terry Pacheco (representing ACB)

IV. Guiding Principles the Committee Used

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. We must consider the growing demographics (the graying of America) when we establish scoping for accessible features.

V. Committee Approval of the Final Report

Twenty-one of the twenty-seven committee organizations approved submitting this report to the Access Board, thus the report is considered approved by the committee.

Two organizations (Federal Railroad Administration and Parsons Brinckerhoff) abstained from the vote to approve the report, and four organizations (California Department of Transportation Division of Rail, Metra & Northeast Illinois Regional Commuter Railroad Corporation, Metropolitan Transportation Authority of the State of New York, and Talgo, Inc.) voted against approving the report.

Two organizations supporting the report also submitted minority reports, and these can be found in Appendix C of this report. The Appendix also includes a third minority report which was submitted by the Metropolitan Transportation Authority of the State of New York. Alstom Transportation assisted in developing this third minority report but did approve sending the report to the Access Board.

Chapter 2 – Communications

I. General - Audible and Visible Communications

A. Where live or pre-recorded audible announcements are provided to passengers via public address systems, they shall also be provided visually. Where live or pre-recorded visible announcements are provided via variable message signage (VMS) systems, they shall also be provided audibly.

B. Audible announcements will be reproduced verbatim in a visual format. In an emergency situation, where verbatim text of an audible announcement cannot be produced and displayed, then an equivalent message shall be provided. Equivalent information shall mean: corresponding or virtually identical in meaning and impact. Until such time that accurate speech to text (or equivalent technology) is available, audio announcements made during life threatening emergency situations, which require immediate attention by crew members, are exempt from visual message display requirements.

C. The Access Board should examine what factors should be used to determine equivalency of audible and visible messages. Audible announcements need to have the same level of audible clarity as visual announcements. Pre-recorded announcements are generally preferred.

II. Variable Message Signs (VMS)

A. All cars must provide a sufficient number of variable message signs, but no less than two, such that every seat has a view of at least one sign. When car lights are dimmed for sleeping, the VMS should go dark and once an announcement is made, it shall immediately "come to life".

B. Where cars provide real time route map tracking, signs shall be provided in two locations so that every part of the car has a view of at least one sign. This requirement shall not apply when the same information is provided by the VMS**.** Where cars provide real time route map tracking, the audible information shall be available upon demand in at least two locations in the car.

Discussion: Though there was disagreement within the subcommittee, the group did agree that real time route maps should also be audibly available. One recommendation was to provide an earphone jack for individual usage similar to that used with ATMs. This does not imply a jack may be substituted for the induction loop.

C. Standards for visual aspects must be added.

D. Variable message signs legibility (e.g., font, case, style, and location) – Apply ANSI A117.1 technical requirements for VMS Displays to maximum extent feasible. Letter size shall not be required to exceed 3 inches at any viewing distance.

III. Audible Announcements

A. Audible announcements, including stop announcements, shall be pre-recorded, high quality messages when feasible.

B. Live human announcements should be kept to a minimum, except in the cases of emergency announcements. Pre-recorded, high quality messages are especially important for station stop announcements.

C. Standards for sound quality must be added. It is recommended the Access Board do research on speech intelligibility and acoustics in rail cars.

IV. Hearing Assistive Technology

A. Wherever audible announcements are provided, hearing assistive technology (e.g., hearing induction loops) that has the capability of coupling directly without an additional receiver, to hearing aids and cochlear implants, or other personal hearing devices (or future technologies benefiting deaf persons and persons with hearing loss) shall be provided.

B. Hearing assistive technology (e.g., hearing induction loops and future technologies benefiting deaf persons and persons with hearing loss) shall be provided in every car. Hearing assistive technology shall provide coverage to the entire car. Where it is not technically feasible to provide hearing assistive technology throughout the car, it shall be available to at least two seating areas of the car. The Access Board should evaluate the technical feasibility of induction loops on rail cars.

C. The induction loop signal should meet IEC Standard: IEC 60118-4:2014 (Electroacoustics - Hearing aids - Part 4: Induction-loop systems for hearing aid purposes - System performance requirements).

V. Lighting

A. The Access Board should do research on lighting as there are no requirements in the Vehicle Standard for general or task lighting other than at bus entry points. Research should look at:

1. Lighting in circulation areas, restrooms, sleeping compartments, step wells, and in any other areas. Step wells in particular raise issues:

i. Because they may or may not be level platforms;

ii. It may or may not be a paved surface one is stepping down on to;

iii. Distance to platform varies; and gaps may be difficult to identify especially at night.

2. Task lighting and on-demand passenger controls.

3. APTA's Standard for lighting for the Board's reference and research is included here: PR-E-RP-012-99 Recommended Practice for Normal Lighting System Design for Passenger Cars. http://www.apta.com/resources/standards/Documents/APTA-PR-E-RP-012-99.pdf

VI. Emergency Notification Announcements and Alarms

A. The VMS, when used for Emergency Notification Announcements, shall be connected to the car's back-up power system.

The following considerations and recommendations are made when alarm systems are provided. This is not a recommendation to require an alarm system.

B. Where emergency visual and audible signals (fire alarms etc.) are provided in rail cars (compartments, main area, restrooms, etc.), NFPA 72 requirements should be used throughout the car. Notification of an alarm should also be provided via the VMS. Alarms can cause disorientation and additional dangers to people who are blind or have cognitive disabilities so the maximum decibel level should be studied for car environments.

VII. Call Buttons Used to Communicate with Onboard Crew

A. Call buttons should give audible and visual feedback to assure they have been activated.
B. Tactile sign to identify the purpose ("emergency help", "onboard crew or car attendant", etc.) should be provided.

VIII. Door Announcements

A. An audible and visual notification shall be provided to indicate the door(s) that are to open. The notification should be made only once or twice, but not constant. This section shall not apply to manual doors operated only by a member of the train crew.
B. A second and different alarm shall be provided when a door is locked out and not going to open.
C. Route tracking for rapid and light rail only and add in flexibility for this requirement.
D. Include what doors will be opening in stop announcement prior to arrival in the station.

IX. Symbols

A. International Symbol of Accessibility (ISA).
The ISA shall be provided at required wheelchair spaces and at priority seating. The sign shall be located 48 inches to 60 inches above the floor or where most logical to the extent practicable.

B. Hearing Induction Loop Signs.
In cars with a hearing induction loop, at least two hearing induction loop signs shall be provided. These cars must provide a sufficient number of hearing induction loop signs such that every seat has a view of at least one sign. If the hearing induction loop does not cover every seat, signs shall be provided to indicate which seating areas are covered.

C. Other Signs for Hearing Assistive Technology.
In each car with hearing assistive technology, other than hearing induction loops, at least two signs that identify the specific type of technology used shall be provided. These cars

must provide a sufficient number of hearing assistive technology signs such that every seat has a view of at least one sign. If the technology used does not cover every seat, signs shall be provided to indicate which seating areas are covered.

X. Signs

A. Menus & Directories.

At least one menu or directory shall comply with the building accessibility standards for visual signage (703.5) in each car where menus or directories are provided.

B. Service Animal Relief Area Signs.

1. Information should be made available on an inside wall nearest to the locations where the International Symbol of Accessibility (ISA) is required.

2. Recommend that this sign inform passengers to ask a crew member for the availability of this service. Service Animal relief area information should be available from train crew.

The following are recommendations for various types of static signs not specified above that may be located throughout rail vehicles. Recommend using the signage requirements from the building Standards. Tactile sign requirements in the ADA building Standard are found in section 703.2 and visual sign requirements are found in section 703.5.

C. Signs That Shall Meet the Tactile and Visual Requirements.

Signs Designating Rooms and Spaces, and Exit Signs, at doorways (located 48 inches to 60 inches above the floor at doors or doorways)

D. Signs That Shall Meet the Tactile and Visual Requirements for Size Where Practicable.

Non-Emergency Operational Signs

Specific requirements: where instructions for door latch/locks are provided, they shall be both visual and tactile, and be located next to the latch/lock, but not more than 10 inches from the latch/lock. Where a pictogram is provided for these instructions a tactile description shall be provided directly adjacent to it.

Non-Emergency Informational Signs

Caution and Safety Signs including icons and logos

E. Signs That Shall Meet the Visual Requirements.

Directional Signs including directional Exit Signs

Emergency Operational Signs: color alone shall not be used to designate emergency use elements

F. Signs Not Required to Meet Accessibility Standards.

Employee Only Signs

Designation Signs for Elements (such as phones)

XI. Videos

A. Where videos are provided, audio description and American Sign Language should also be incorporated.

Chapter 3 – Boarding and Alighting

I. Committee Priority

A. Full-length level or near-level boarding should be the highest priority and most preferred method of boarding on all fixed guideway (e.g., rail) modes. Level boarding is defined in DOT regulations.

B. When full-length level or near-level boarding is not required or possible, boarding should be, as often as possible, by ramp or bridge-plate as the primary means for boarding. Mechanical lifts should be a back-up alternative when necessary. Where mechanical lifts are needed, they should be car-borne, not station-based.

II. Scoping

A. General.

1. Rapid rail (e.g., subway) and high-speed rail cars purchased after the effective date of these requirements (to be determined by the Department of Transportation) shall be designed for full-length platform level or near-level boarding and meet the provisions of this section. In stations constructed on or after January 26, 1992, all car doors through which passengers board and alight shall meet the gap requirements set forth below. In stations constructed prior to January 26, 1992, at least one door serving each on-board seating area for wheelchairs and mobility aids shall meet these requirements.

Discussion: This is essentially required under the current regulations but is being restated to show the somewhat differing requirements for different modes. Rapid rail and high speed rail have the most stringent requirements for boarding all cars for the full length of the platform with minimal horizontal and vertical gaps.

2. All doors on light rail cars and commuter rail cars operating exclusively at level or near-level boarding station platforms shall comply with the gap requirements. At least one door through which passengers board and alight on each side serving each on-board seating area for wheelchairs and mobility aids of intercity rail cars, and commuter rail cars operating at mixed high and low platforms, shall meet these requirements.

Discussion: This requires all new light rail cars and commuter cars to be designed to meet gap requirements and have at least one accessible door which provides access to the on-board seating area for wheelchair and mobility aid users. The requirement recognizes that platforms on many existing light rail and commuter rail lines will have a mix of high and low platforms and mini-highs.

3. All doors on AGT (people mover) cars operating at speeds of 20 mph or slower shall meet the requirements for “people movers” set forth below.

B. Boarding and Alighting. All new rail and fixed guideway vehicles shall be compatible with level or near-level boarding. All steps shall incorporate a trap to cover the steps and bring the car floor level to the doorway. Doorways shall have a minimum vertical clearance of 74 inches from the closed trap.

Discussion: Some rail cars in current use have interior stairs that don't have traps. The only way they can achieve "level or near-level" boarding is with an intimidating long bridgeplate from a high platform to the car interior. A trap over the steps will bring the bridgeplate to a more reasonable length. However, the current door vertical clearance is measured from the first step. If a trap were closed, the vertical clearance would be significantly decreased. A minimum vertical clearance is needed. The suggested value is based on the Amtrak's Acela.

C. Gaps. Wherever either or both of the conditions in (1) and (2) are met, a car-borne ramp or bridgeplate or a car-borne lift shall be employed:

1. the horizontal gap between the boarding platform and the vehicle floor entry exceeds 2 inches; or

2. the vertical difference between the boarding platform height and the vehicle floor exceeds plus or minus 5/8 inch.

Discussion: This recognizes the reality that the gaps in the original accessibility regulations are difficult to achieve in intercity, commuter rail and some light rail systems and requires intercity, commuter, light, and high speed rail cars to provide a car-borne ramp or bridgeplate to mitigate the gap. A ramp or bridgeplate is only needed when the gaps exceed the specification. Therefore, any device or procedure which reduces the horizontal and vertical gap specified is encouraged.

D. People Movers. The horizontal gap between platform and car floor shall not exceed 1 inch. The vertical difference between platform and car floor shall not exceed plus or minus 5/8 inch.

Discussion: Because of the nature of people movers which operate on exclusive right of ways and travel at lower speeds, they should be able to be designed and constructed to meet these tolerances. This is the current requirement and is also included in the Automated Guideway Transit (AGT) specification from the American Society of Civil Engineers (ASCE).

III. Ramps and Bridgeplates

A. Fold or Telescope. Ramps and bridgeplates shall be permitted to fold or telescope if all the technical requirements are met.

Discussion: The committee considered gap mitigation devices (car-borne or station-based devices or materials that are used to reduce the horizontal and/or vertical gap

between the platform and the vehicle). Discussion revealed considerable concerns related to their maintenance as well as the possibility that certain kinds of devices could introduce hazards to riders and other individuals on the cars and on the platforms. The committee encourages further development on these devices to resolve these problems.

B. Design Load. The design load of ramps and bridgeplates 30 inches or more in length shall be 800 pounds minimum. The design load of ramps and bridgeplates less than 30 inches in length shall be 400 pounds minimum. Ramps and bridgeplates shall have a design safety factor of at least 3, based on the ultimate strength of the material.

Discussion: The design load is the weight the ramp or bridgeplate is designed to support without damage or permanent deformation. Some deflection may occur under load. The increase in design load from the current 600 pound and 300 pound minimums reflect research showing the combined weight of power wheelchairs and users is increasing and the industry is providing higher capacity bus lifts.

C. Handrails. Handrails shall be provided on ramps and bridgeplates where the horizontal gap between the platform and car floor exceeds 12 inches.

Discussion: This recognized that in some circumstances longer ramps and bridgeplates are necessary and thus handrails are needed in these situations (i.e., Amtrak set-back platforms in Maine have a considerable horizontal gap to provide clearance for freight trains using the same track).

D. Clear Width. The ramp and bridgeplate clear width shall be 32 inches minimum.

Discussion: The current minimum width of ramps and bridge plates is 30 inches. A wider ramp or bridgeplate is recommended because it is more usable by passengers who use wheelchairs, and accommodates a broader range of passengers with disabilities. The ramp or bridgeplate can be nearly as wide as the door.

E. Attachment. Ramps and bridge plates shall engage to the vehicle in such a manner that they shall not be subject to displacement from forces created when passengers are boarding and disembarking, including passengers using a wheeled mobility device, and can only be removed when actively disengaged by a member of the crew. Ramps and bridgeplates shall overlap the platform when deployed.

Discussion: There are examples of similar securement products, such as the latches on extension ladders, trailer hitches, etc. The Board should research language used in standards for these other products. This problem highlights the benefit of having a bridge plate or ramp permanently attached to the vehicle. An engineering analysis is needed to identify the forces that could be created during use. Wheeled mobility device users have

reported experiences when ramps and bridgeplates were not securely connected to the rail car.

F. Manual Operation. Power operated ramps and bridgeplates shall be capable of being operated manually and in a manner that is safe for the occupant and operator if the power fails.

G. Surfaces. Ramp and bridgeplate surfaces shall comply with the specifications for surfaces and shall be uninterrupted from edge to edge.

Discussion: Ramp and bridgeplate surfaces must be uninterrupted from edge to edge to accommodate three-wheel scooters. Expanded metal or perforated materials are permitted, as long as the openings comply with the surface requirements.

H. Edge Barriers. The edges of ramps and bridgeplates shall have barriers 2 inches high minimum extending from the vehicle doorway to 6 inches from the outer end, and shall taper down smoothly.

I. Slope. Ramps and bridgeplates shall have slopes not steeper than 1:8 (12.5 percent) when deployed to passenger boarding and alighting areas (e.g., station platforms and level of the street), measured at 50 percent passenger load. Meet the maximum slope or provide a mechanical lift.

Discussion: The Department of Transportation regulations at 49 CFR 37.165(f) require vehicle operators to assist passengers with disabilities with the use of boarding devices, even if the vehicle operators must leave their seats. Providing ramps and bridgeplates with the least possible slope accommodates a broader range of passengers with disabilities and minimizes the need for assistance.

In existing stations where meeting the 1:8 slope is difficult, operators may approach DOT to get an equivalent facilitation approval to possibly allow a steeper slope.

J. Transitions. Surface discontinuities at transitions from boarding and alighting areas to ramps and bridgeplates shall comply with surface requirements.

K. Visual Contrast. The perimeter of the ramp and bridgeplate surface shall be outlined. The outline shall be 1 inch wide minimum and shall contrast visually with the rest of the ramp and bridgeplate surface either light-on-dark or dark-on-light.

L. Gaps. When deployed for boarding and alighting, gaps between the ramp or bridgeplate surface and vehicle floor, and the ramp or bridgeplate surface and the station platform shall not permit passage of a sphere more than 5/8 inch in diameter.

M. Stowage. Where portable ramps or bridgeplates are permitted, a compartment, securement system, or other method shall be provided within the vehicle to stow the ramps and bridgeplates when not in use. When stowed in passenger areas, portable ramps and bridgeplates shall be protected from the elements, shall not pose a hazard to passengers, and shall not interfere with the maneuvering of wheelchairs.

N. Operation. Where car doors open automatically at platforms designed for level or near-level boarding, ramp and bridgeplate deployment shall be controlled by a push button that is accessible to both the train crew and the person who needs to utilize the device. Manually deployed ramps and bridgeplates shall be permitted where doors are opened by train personnel and where the horizontal gap exceeds 12 inches.

Discussion: The committee recognizes that any gap between a rail vehicle and a platform can be a safety hazard for all travelers. The committee viewed examples of automated devices being used in some European rail systems. Those devices appear to reduce or eliminate the horizontal gap. The committee also discussed several US systems. The San Francisco Municipal Railway (MUNI) light rail vehicles employ a similar device which folds out from beneath the step when the cars operate in the portion of the system with high platforms (subway tunnels). Electrically operated ramps or bridgeplates are used in the Portland, Boston, and Salt Lake City light rail vehicles. In Salt Lake City, the bridgeplate is deployed by a passenger-operated pushbutton. Since the technology for all of these systems is similar, the majority of the committee members feel that automated ramps or bridgeplates for new rail cars beginning in the third decade of the 21st century are not beyond reach. Committee members feel that based on information before the committee and on the committee members' respective experiences with and observations of automated gap fillers or mitigation devices on European equipment, and ramps and bridgeplates on US systems, provision of automated ramps or bridgeplates will increase safety for all passengers by mitigating the vertical and horizontal gaps. The committee further anticipates that this will speed boarding and alighting and therefore reduce dwell time.

Members of the committee, as well as members of the public, have expressed serious fears when crossing large gaps over significant heights (as much as 4 feet) on a narrow bridgeplate with only a 2 inch edge barrier. Therefore, this report recommends ramps and bridgeplates spanning a horizontal gap of 12 inches or more be equipped with handrails. Automatic deployment of a ramp or bridgeplate with handrails is probably not feasible. Manual deployment is permitted in those cases.

All bridgeplates to date in the US with automatic deployment have been on light rail which is different from intercity and commuter rail with respect to location of platform and density of passengers. It is recommended that the Board conducts research as to whether a different mode specific arrangement is needed.

Below are You Tube videos of automated gap mitigation devices (e.g., gap fillers) from some European Trains. The devices in use are visible at beginning of each of these videos:

Leipzig - https://www.youtube.com/watch?v=xSwPYrkzUyc#t=4m51s
Stuttgart - https://www.youtube.com/watch?v=dv_Dp6i8ev0
Vienna - https://www.youtube.com/watch?v=-yjbnkraBCQ#t=0m30s

IV. Lifts

A. Design Load. The lift design load shall be 800 pounds minimum. Load carrying components that are subject to wear shall have a design safety factor of at least six, based on the ultimate strength of the material. Other components that are not subject to wear shall have a design safety factor of at least three, based on the ultimate strength of the material.

Discussion: The design load is the weight the lift is designed to support without damage or permanent deformation. Some deflection may occur under load. The increase in design load from the current 600 pound minimum reflects research showing the combined weight of power wheelchairs and users is increasing and the industry is providing higher capacity lifts on buses.

Controls.

1. **Interlocks.** Lift controls shall be interlocked with the vehicle brakes, transmission, propulsion system, or door, or shall provide other systems to prevent the vehicle from moving when the lift is not stowed. Lift controls shall not be operable unless the interlocks are engaged.
2. **Sequence.** Lift controls shall be of a momentary contact type requiring continuous manual pressure. Lift controls shall permit the operator to change the operation sequence. Lift controls shall not permit the lift platform to be folded, retracted, or stowed when occupied, unless the platform is designed to be occupied when stowed in the passenger area of the vehicle.

Discussion: A rotary lift is an example of a lift platform that is designed to be occupied when the platform is rotated into a stowed position in the passenger area of the vehicle.

3. **Manual Operation.** Lifts shall be capable of being operated manually if the power to the lift fails. The manual operation shall be safe for the occupant and operator when operated according to the manufacturer's instructions. When operated manually, the lift platform shall deploy and lower to the boarding and alighting area or the roadway with an occupant; shall rise to the vehicle floor without an occupant; and shall stow. The lift platform shall not fold, retract, or stow when occupied, unless the platform is designed to be occupied when stowed in the passenger area of the vehicle. Doors that must be opened to allow the lift to operate shall have interior and exterior manual releases.

B. Lift Platforms.

1. **Surfaces.** Lift platform surfaces shall comply with general provisions for surfaces.
2. **Size.** The lift platform clear width shall be 32 inches minimum measured from the platform surface to 40 inches minimum above the platform surface. The lift platform clear length shall be 54 inches minimum measured from the platform surface to 40 inches (1015 mm) above the platform surface.

Discussion: The current lift platform size is a minimum clear width of 28 1⁄2 inches at the platform, a minimum clear width of 30 inches measured from 2 inches above the lift platform surface to 30 inches above the surface, and a minimum clear length of 48 inches measured from 2 inches above the surface of the platform to 30 inches above the surface. The recommended change reflects research showing the size of wheelchairs and users is increasing.

3. **Edge Barriers.** Lift platforms shall have edge barriers complying with the latest specifications for lift edge barriers to prevent the wheels of wheelchairs from rolling off the platforms. Openings between lift platform surfaces and raised barriers shall not permit passage of a sphere 5/8 inch in diameter. Edge barriers shall not interfere with the maneuvering of wheelchairs.
4. **Gaps.** When the lift platform is at the vehicle floor level and any edge barrier is lowered, the gap between the platform surface and the vehicle floor shall not permit passage of a sphere 5/8 inch in diameter.
5. **Threshold Ramps.** Threshold ramps from boarding and alighting areas to lift platforms and edge barriers used as threshold ramps shall have slopes not steeper than 1:8 (12.5 percent) for a rise of 3 inches maximum. The slope shall be measured when the lift platform is level. Surface discontinuities at transitions from boarding and alighting areas to threshold ramps shall comply with the surface requirements.
6. **Visual Contrast.** The perimeter of the lift platform surface shall be outlined. The outline shall be 1 inch wide minimum and shall contrast visually with the rest of the platform surface either light-on-dark or dark-on-light.
7. **Deflection.** When occupied, lift platforms shall be permitted to deflect 3 degrees in any direction with respect to the platform's unloaded position, exclusive of vehicle roll or pitch.
8. **Movement.** Lift platform movement shall comply with the following:
    i. **Normal Operating Conditions.** When occupied, lift platforms shall move at a rate of 6 inches/second maximum, and the horizontal and vertical acceleration shall be 0.3g maximum under normal operating conditions. When folding, retracting, or stowing, lift platforms shall move at a rate of 12 inches/second maximum under normal operating conditions, unless the platform is folded and stowed manually.
    ii. **Power or Equipment Failure.** In the event of a power failure or single failure of any load carrying component, lift platforms that are occupied or are stowed in a vertical position shall move at rate of 12 inches/second maximum.
9. **Boarding Direction.** Lift platforms shall permit passengers who use wheelchairs to board the platforms facing either toward or away from the vehicle.
10. **Standees.** Lift platforms shall be usable by passengers who use walkers, crutches, canes, or braces or who otherwise have difficulty using steps. Lift platforms shall be permitted to be marked to indicate a preferred standing position.

11. **Handrails.** Lift platforms shall have handrails complying with general provisions for handrails on two sides of the platform that move in tandem with the platform to provide support for passengers in a standing position. Handrails shall have a usable gripping surface 8 inches long minimum. The gripping surface shall be 30 inches minimum and 38 inches maximum above the lift platform surface. Handrails shall not interfere with the maneuvering of wheelchairs.

V. Between Car Barriers

A. Current regulations require between-car barriers in light and rapid rail systems. The committee recommends that between-car barriers be required in intercity and high-speed rail systems.

Chapter 4 – Onboard Circulation and Seating

I. Doors and Doorways

Recommendations for doors and doorways are as follows:

A. Doorway Width, Exterior (Side Doors). Minimum clear doorway opening: 32 inches.

Discussion: Applies to all rail vehicles and all side doors that lead to the accessible on-board circulation path. In the case of vehicles that do not have side doors but are required to be accessible, such as intercity diners, cars that will be coupled to them must have accessible side doors leading to the accessible on-board circulation path.

B. Bi-parting Side Doors. To ensure that passengers can readily board and alight from vehicles, particularly during high capacity periods and when alternative doorways are not available, the following recommendations are made:

1. At least one leaf of the door pair should provide a minimum 32 inch clear opening.

Discussion: "Should" instead of "must" is used here because larger panels can create unintended conditions. An absolute requirement for the 32 inch leaf may inhibit more efficient, reliable and safe designs.

2. Door leaves should be interlocked with a single drive to ensure that the maximum clear opening is achieved.

Discussion: "Should" versus "must" is used here because individual leaves with their own motors may operate more reliably than one motor driving two doors.

3. When door leaves are interlocked, each door must have an independent emergency release actuator separate from the door mechanism to allow manual operation. Placement of release actuators must be within the defined reach range of someone using a wheelchair.

4. Automated Door System Indicators.

a. Rail vehicles that routinely open multiple power doors, whether fully automated or manually activated by the train operator must provide the following door visual and audible condition indicators on the exterior and interior of the vehicle:

i. For exterior indicators, indication that the door on the platform side is not available for normal use and/or door on the opposite side of the vehicle is not available for normal use.

ii. For interior indicators, the annunciation shall be door specific.

b. Indicators must be discrete from other door system indicators so that passengers and crew are not confused. Indicators may be activated:

i. Automatically as part of the door operating system feedback and/or;

ii. Manually when the door is physically locked out by the train operator.

c. Manual doors that are opened only by a railroad employee, as with intercity long distance trains, and intercity or high speed trainsets with an alternative onboard accessible circulation path to another set of doors are not require to comply with this section.

Discussion: When door systems include the ability to notify the operator via the door operating system of a door's failure to open, then the door condition indicators should activate. Depending on the nature of the operation, this could relieve the operator from physically having to lock the door out immediately. Standardization of the indications, particularly for the audible indicator, is very important and should be established nationally through APTA, the Access Board or jointly. The audible indicator does not need to be spoken voice, and its duration should be limited to avoid annoying passengers on the train and causing confusion.

A major concern 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 committee would like the Board to solicit comments from industry representatives.

Comments received by at least one transit operator and one car builder were that the imbalance of different sized doors could make the opening process less reliable and having the door of a certain size did nothing to address the core problem of not being able to get past a failed door.

C. Doorway Width, Between Cars (End Doors). Minimum clear doorway opening: 32 inches.

This requirement is for all rail vehicles except for the ends of transit cars such as rapid rail, Multiple-Unit (MU), 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 Exceptions: The cab ends of vehicles that may be used coupled within a train such as MU cars, trailer cars and cab cars, regardless of mode, may have end doors of 30 inches if:

1. 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 inch dimension as opposed to the 32 inch typical dimension.
2. Movement through this doorway shall not be necessary for an individual to get to accessible seating space.
3. The path to the door is less than 32 inches because of seating arrangements.
4. Intercity and full-width commuter cars may only apply this exception to the cab-end of cars.

D. Overlap of Clear Path between Cars. Safety devices or appliances required for the safe operation of the train such as the handbrake, railings or latches may overlap the clear path as follows:

1. Protrusions into the clear aisle /doorway between cars must be at least 34 inches above the floor of the vehicle and may protrude no more than 4 inches (See 36 CFR 1191, appendix A, 404.2.3).
2. On cars where the doorway is 30 inches wide protrusions may overlap the path through the doorway by a maximum of 2 inches at or above 34 inches minimum from the floor.
3. Protrusions into the path may not continue for more than 12 inches longitudinally and may not occur simultaneously on the opposite sides of the path.
4. Protrusions must be separated longitudinally by a minimum of 20 inches. 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.

II. Entrance Width

A. Entrance Width for Cars with Vestibules. Minimum vestibule width 44 inches.

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 inches 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 inches but in no case, can the accessible on-board circulation path be less than 32 inches. An example would be a space defined by angled or rounded walls that provide a progressively broader path. Protrusions such as handrails and other devices shall follow the requirements for the Overlap of Clear Path between Cars.

B. Entrance Width for Cars without Vestibules. Minimum width 44 inches.

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 on to the Accessible On-board Circulation Path must have a clear path dimension across the vehicle free from panels or stanchions at least 44 inches wide. This path should be a straight line across the doorways on opposite sides of the vehicle.

Exception: Entrances that are not on the Accessible On-board Circulation Path or do not lead to a wheelchair space are not bound by this requirement.

Discussion: The intent of this definition is to ensure 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 committee members is very much in favor of recommending the clear projected space 44 inches 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 accommodate 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 ensure 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 inch 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”.

III. Clear Width of the Accessible On-board Circulation Path (AOCP)

Minimum clear width is 32 inches.

The AOCP connecting accessible features, such as rest rooms, accessible seating and other features as required to be accessible by mode, is 32 inches for all rail vehicles. This does not intend nor require that a vehicle must have an AOCP throughout. As an example, a vehicle with two or more doors on each side only need have an AOCP from one door on each side of the vehicle to and between the features required to be accessible. If there are multiple accessible seating areas in the vehicle, they may be separated by aisles of less than 32 inches so long as each accessible seating area has an AOCP to the accessible features.

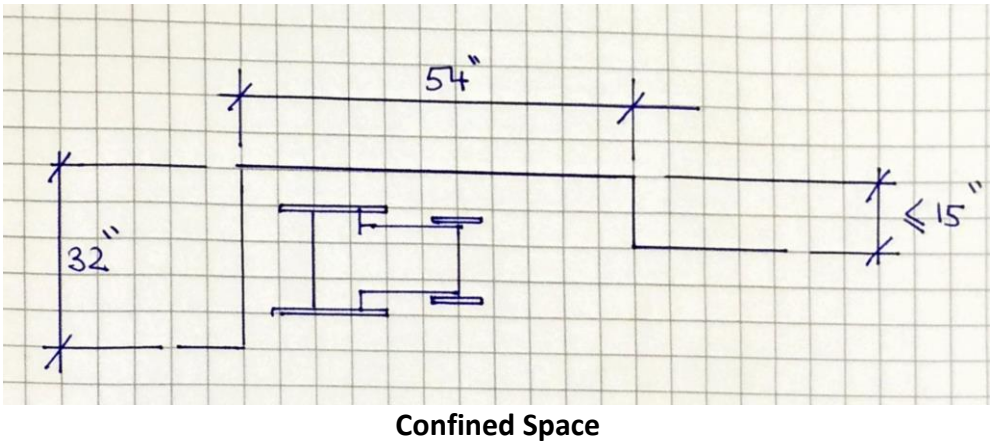
Note: The intent of Sections II and III is to ensure that the space near the doors is preserved for maneuverability.

IV. Mobility Aid Seating Locations

A. Clear Floor Space.

1. The minimum clear floor space for mobility aid seating locations is 32 inches x 54 inches where the space is confined on no more than two sides.
2. The minimum clear floor space is 32 inches x 59 inches when the space is confined on 3 sides to ensure adequate maneuvering space. A mobility aid seating location confined by transverse walls or other restrictive elements will require the 59 inch dimension when the length of both of the transverse walls or confining elements exceeds 15 inches.

   Exception: If one of the elements or walls is equal to, or less than, 15 inches then the 54 inch dimension may be used. The rules for the overlap of seating clear space by fixed objects apply to this dimension.



Confined Space

(*Sketch provided by André Gagné, Bombardier Transportation, and there are no restrictions on its use.)

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.

B. Overlap of Clear Floor 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 a minimum height of 12 inches above the floor.

C. Maneuvering Space at Mobility Aid Seating Locations. A 60 inch maneuvering circle must be provided 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. The turning circle, or other maneuvering space, should not require a person occupying another location to vacate that location. Research suggests that a 60 inch circle may not be sufficient for some common wheeled mobility devices. Unfortunately, additional space may not be possible in the limited confines of a vehicle. Other maneuvering configurations (e.g., "T" and "L" turns) may provide usable maneuvering spaces. The Board should request specific comment from wheeled mobility device users.

Discussion: While the 60 inch circle is thought appropriate, questions were raised about requiring a 67 inch circle or using dimensions for "T" or "L" turns. An illustration explaining the overlap relation of maneuvering space to seating space and path of travel is needed.

D. Securement of Mobility Devices. Mobility device securement is not required on rail vehicles and if provided, it shall be the rider's decision as to whether or not to use the securement devices. Mobility device users cannot be required to use a tie down.

Exception: Free rolling devices, such as a Segway, must be secured.

E. Number of Mobility Aid Seating Positions.

1. A minimum of 2 mobility aid seating locations shall be provided in each coach or car.

Discussion: The Board should evaluate this requirement in light of smaller capacity coaches/cars, and other types of coaches/cars and mode types. Consider using a length requirement to determine the number needed. Need to establish measuring point for determining length.

Mobility aid seating positions may either be permanently arranged or created by manipulating seats. If seating positions are established by converting seats, the seating position must not overlap the regular travel path of the vehicle.

When a vehicle contains seating that allows passengers to choose their direction of travel, then one half of the accessible seating locations must allow for travel facing the direction of travel.

2. Additional Accessible Seating:
For Intercity and High Speed Rail Systems: The railroad must have a quantity of coaches available (10% of car type fleet) that has seats that are removable as defined below:

- **a.** In each coach exceeding 70 feet in length, at least 6 pairs of seats or a quantity that will allow up to a total of 6 persons using wheelchairs to remain in their wheelchairs shall be removable with advance notice that is commensurate with the agencies' charter move policy.
- **b.** Coaches at or under 70 feet long shall have 3 removable seat pairs or a quantity that will allow up to a total of 3 persons using wheelchairs to remain in their wheelchairs.
- **c.** Fixed consist trains composed of cars over 70 feet long must have at least one coach with removable seats
- **d.** Fixed consist trains composed of cars at or under 70 feet long must have at least two coaches with removable seats.
- **e.** If the removal of seats removes the designated transfer seats, then the next available coach seat will be deemed a transfer seat with no further modification. Those seats then must have at a minimum, folding armrests to facilitate transfer.
- **f.** This requirement is not intended to prevent an agency having more seats removable but rather to establish a minimum quantity per single level coach.
- **g.** The requirement for wall mounted tables will not extend into the spaces made available by removing seats.

Discussion: There should be some definition of the quantity of seats that should be removable or convertible 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. The quantity of convertible and/or removable seats should be a percentage of the vehicle or train set.

What is a Coach? Traditional definitions of coaches have changed with innovative designs across multiple modes. As an example, throughout much of the 20th century, coach cars in intercity and commuter service ranged from 40 to 90 feet in length. At the creation of the ADA virtually all intercity and commuter coaches exceeded 80 feet long. Contemporary developments have individual cars in train sets at 40 plus feet and trainsets that may be produced from foreign designs for use in the U.S. could have coaches that are well under 85 feet in length. Regulations based solely on "per vehicle" requirements will yield more mobility aid seating space than is needed while simultaneously reducing overall seating capacity. A thorough study should be made that can allow establishment of a percentage of accessible seating spaces relative to the passenger capacity of the train set, individual vehicle, and mode.

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 make 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 types of group movements should be reviewed and community and industry input solicited in order to craft more defined language for the Notice of Proposed Rulemaking (NPRM).

V. Transfer Seat Details

A. For all vehicles, seats considered transfer seats regardless of mode or car type must have all portions of seating surfaces 17 inches minimum and 19 inches maximum above the finished floor. No portion of the seat frame or shrouds may extend beyond the passenger surfaces of the seat bottom or back.

B. For all vehicles, seats considered transfer seats with armrests must include armrests 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.

Discussion: This should be reconciled with building research to make sure that the dimensions are correct.

VI. Handrails and Stanchions

A. Dimensions.

1. Size: 1.25 - 1.5 inches.

2. Knuckle clearance: 1.5 inches minimum.

B. Location and Purpose.

1. **Handrails and handholds.** Handrails, hand holds or similarly functional devices should be included on transverse 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.
   - **d.** Allow passengers in aisles to use seats for support without invading seated passenger personal space.
2. **Vertical Stanchions.** Light and rapid rail, vertical stanchions should be included adjacent, or as part of the seat, at every other seat row, alternating from one side of the aisle to the other. These stanchions are intended to provide handholds for navigating the aisle on a moving vehicle, especially for people with disabilities which limits their ability to reach overhead handholds. Other designs which perform this function should be carefully evaluated. Modes not subject to standee conditions as part of normal operation or where rotating, reclining or changeable seats are used are not required to include vertical stanchions.
3. **Handholds adjacent to Doors.** 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 inches minimum or 6 inches less than the clear door opening apart, whichever is greater.
4. **Vertical Handholds used as Boarding Aids.** Vertical handholds intended as boarding aids that project into the clear door opening should terminate no lower than 34 inches 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.

VII. Fareboxes

Farebox guards are required only when fareboxes are available for use. Where provided, fareboxes shall be located at accessible entrances.

VIII. Restrooms in Intercity, High Speed Rail and Articulated Vehicles

This applies to all vehicles that are required to have, or otherwise have, accessible restrooms**.**

A. 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.

B. 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.)

C. Further guidance should be solicited from industry.

IX. Vertical Movement on Intercity Long-Distance Bi-Level Cars

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

A. Applicability.

This applies to new bi-level intercity lounge cars built for Amtrak and any bi-level lounge car used by successors to an Amtrak route acquired by another operating entity or company as sanctioned under the Passenger Rail Investment and Improvement Act of 2008 (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, and in interstate service that does not include revenue seating and is 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.)

B. 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, but shall allow pass-through.
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 ensure that the lift cannot operate unless the user is safely aboard the lift.
8. Gates, doors, guards, etc. must include interlocks to ensure 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 super-elevation 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. Bi-level cars with vertical access are not required to have any restrooms on the upper level but the car must have at least one accessible restroom either on the upper or the lower level.
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.

C. 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 effect in lost revenue capacity. The physical impact and corresponding fiscal impact must be reviewed prior to a 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 railroads 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 done.
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.

D. Physical Risks.

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.

Chapter 5 – Rooms and Spaces

I. Restrooms

A. Scoping. Each new Amtrak car shall have a restroom meeting the technical requirements, except dining and lounge cars where no restroom is provided for the general public. Where restrooms for the public are provided in a car, a restroom meeting the requirements in **I.B.** below shall be provided. Cars, other than those provided by Amtrak, with no public restroom shall not be required to have an accessible restroom. Accessible restrooms shall be in close proximity to seating spaces for persons using wheelchairs and mobility aids and shall be connected to those spaces by an accessible on-board circulation path. In fixed-consist trains, not provided by Amtrak, where a restroom for the public is not provided in a specific car, an accessible restroom shall be permitted to be provided in an adjacent car provided that:

1. required wheelchair spaces in the car without a restroom are located in the end of the car closest to the connection with the car that has an accessible restroom;
2. the accessible restroom is as close as practicable to the connection between cars;
3. doors along the path are automatic; and
4. the width and floor surface through the transition complies with the requirements for an accessible on-board circulation path (see Surfaces) while the train is traveling along its normal route at its normal operating speed.

Discussion: The ADA defines "intercity rail" as service provided by the National Railroad Passenger Corporation (Amtrak) and sets specific requirements for an accessible car. [See **Appendix A**.] In particular, each car must have space for a person to remain in a wheelchair or mobility device, transfer seat, space to store a folding wheelchair, and an accessible restroom (see section (a) of **Appendix A**). On the other hand, the section on Commuter Rail explicitly states that an accessible restroom is not required in a car which does not have a restroom for the general public.

When the guidelines were originally written, the only intercity and commuter systems in operation were composed of traditional rail cars, coupled together, pulled or pushed by locomotives. Cars can be uncoupled and arranged in various configurations and the coupled connection has significant horizontal and vertical freedom of motion. The result can be a dangerous shearing motion between the openings of adjacent coupled cars when trains are moving. During discussions while crafting subpart B of title II, members of Congress were concerned about allowing persons with disabilities, especially wheelchair users, to move between cars unless the train was stopped in a station.

Since the original guidelines were issued, some "fixed consist" trains, similar to ones operated in Europe or Japan, have been introduced or proposed in the USA. In these

trains, the cars are semi-permanently connected to each other and can only be re-arranged in a maintenance facility. The connection between cars allows them to pivot, but there is little or no horizontal or vertical movement between cars and no dangerous shearing, even in turns or moving through switches. In addition, many of these cars are Electric Multiple Units (EMU) which have motors in each. With a variety of motors and other electrical components underneath, there is little extra space for water and waste tanks needed for a restroom. As a result, restrooms for the general public may only be provided in every other car. The committee believes that providing an accessible restroom in every other car in a fixed consist train provides accessibility equivalent to a restroom in every car under the conditions set above: the path between cars must comply with the requirements for an on-board accessible path, including width and surface characteristics, doors must be automatic, and the spaces for wheelchairs must be at the ends closest to the restroom.

Acela Restroom

(*Kenneth Shiotani, National Disability Rights Network, took this photo and there are no restrictions on the use of this photo.)

Talgo Restroom

(*Kenneth Shiotani, National Disability Rights Network, took this photo and there are no restrictions on the use of this photo.)

B. Technical Requirements.

1. Provide a 60 inch turning circle or a demonstrable equivalent that provides for side transfer and the ability to enter and exit in a forward direction.

Discussion: Since some people will need to turn around while not fully dressed, the maneuvering space needs to be entirely inside the room with the door closed. Given that the committee is requiring a larger wheelchair "footprint" than the current regulation, a larger turning circle may be needed. The physical constraints of a rail car may make that impractical. The Board should solicit comments from car designers and manufacturers as to the feasibility of providing larger maneuvering space. The Board should also solicit comments from wheelchair and mobility aid users as to whether there are configurations without a turning circle which are nevertheless usable. For example, some wheelchair users find the restroom on the Acela trains to be usable even though it does not have a 60 inch turning circle. It does permit a forward approach to the lavatory and a side transfer to the toilet. In effect, this results in an "L-shaped" space. Some wheelchair users also report that the restrooms in the Talgo trains operating on the

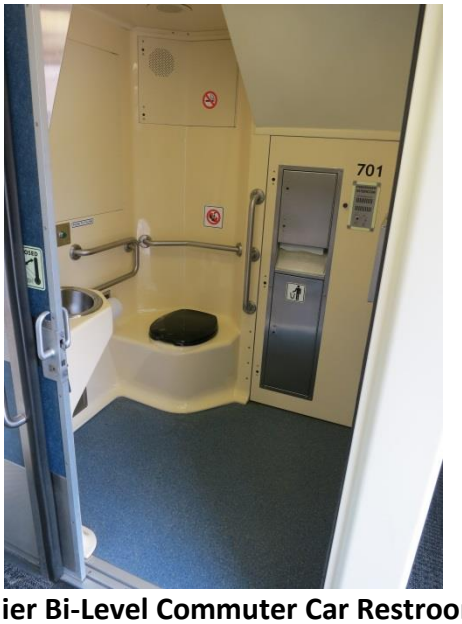
Cascade line in the Northwest are usable. Suggest that the Board develop a performance test to determine toilet room usability.

2. Allow side approach to toilet/water closet (WC).

Provide a clear floor space of 32 inches by 54 inches. Thirty-two inches to be measured from the outer edge of toilet bowl rim; 54 inches to be measured from the back wall of the toilet, extending parallel to the center line of the toilet.

Discussion: The restroom specified in the current guidelines is unusable by many as it requires a 180-degree transfer. A side transfer is the most common maneuver, as has been recognized for years by the accessible toilet stall requirements for buildings and facilities. Facilitating the correct transfer method is even more critical in a moving vehicle.

The spacial requirements set forth incorporate the new recommended wheelchair or mobility aid size. Many rail car toilet designs have a shroud that projects beyond the toilet rim. Some also have a wall or bulkhead that protrudes from the back wall beside the toilet. These prevent a person from positioning a wheelchair for a direct side transfer. All maneuvers can be complicated by the motion of the vehicle.



Bombardier Bi-Level Commuter Car Restroom

(*Kenneth Shiotani, National Disability Rights Network, took this photo and there are no restrictions on the use of this photo.)

The above photo, taken from the open door, shows a restroom layout that does provide a side transfer with the toilet in the upper left corner, facing outward. However, the wall

behind the transfer space, against which the wheelchair would back up, appears to be 4-6 inches further out than the wall behind the toilet itself due to a trash receptacle in that wall. The position of that wall prevents the wheelchair user from positioning the wheelchair far enough back for a direct side transfer. In addition, the shroud surrounding the toilet extends out from the side, making it difficult for someone to get close enough for a direct side transfer to the toilet seat.

3. Provide a power door
   a. Controls shall comply with Controls and Operating Mechanisms.
   b. Controls shall be located 12 inches minimum from inside corner. This does not apply to the manual handle/latch for use when power fails.

Discussion: Power doors are common in rail cars between seating areas and vestibules. Rocking and swaying cars make manually opening sliding doors difficult. Opening and closing such doors is especially difficult for a wheelchair user in a moving rail car. It is even harder to securely latch and unlatch a sliding door when the latch mechanism is in a corner. Wheelchair footrests often preclude a close approach.

4. Provide grab bars on side and behind water closet using buildings and facilities requirements.

Discussion: Grab bar placement is especially important in a moving rail car. In general, more is better. The provisions for toilet rooms in buildings and facilities should be the starting point with a request for comment on additional requirements. The committee was made aware that ANSI provides specifications for vertical grab bars. The Board should investigate whether adding those specifications is appropriate.

5. Provide a grab bar along the front of the lavatory. This bar may serve as the toilet (WC) side grab bar.

Discussion: This grab bar is needed to provide stability in a moving car.

6. Fold-down grab bar permitted on open side of WC, provided it meets force requirements for folding/deploying and does not intrude into required clear floor space when not deployed.

Discussion: Folding grab bars have been controversial because many of them have been difficult to deploy and fold. While they must be easy to deploy, they must not deploy or fall because of rail car movement. Some have also been difficult to lock in place for use and may require significant dexterity to lock and unlock. The connection to wall or floor may require significant extra bracing and may have a high maintenance requirement.

Nevertheless, if properly designed, they offer significant advantages where space is constrained.

7. Lavatory faucet controls (and soap dispenser, if provided) shall be proximity (e.g., infra-red) activated.

Discussion: Water on a train is limited. Therefore, it is not practical to have faucets that can be left on. The solution has usually been spring-loaded levers or buttons that must be continually pressed. This may be difficult or impossible for some persons with disabilities, especially if he or she needs to hold on to a grab bar because of train motion.

8. Where feasible, lavatory should be within reach of person seated on WC.

Discussion: Some persons with disabilities find it convenient to be able to reach and use the lavatory while sitting on the toilet. On the other hand, placing the lavatory too close to the toilet may make it difficult to approach the lavatory from a wheelchair.

II. Single–Level Dining Car Technical Requirements

A. Provide table space for two wheelchairs and transfer seats with two storage areas. Spaces can be convertible.

Discussion: The current guidelines specify "at least one, but no more than two" from the statutory language. Most cars provide only one space of each type. This means that two wheelchair users who wish to remain in their chairs cannot ride together in the same car or eat together in the dining car. The committee is proposing that the scope specify two in all cases.

B. Table top 34 inches maximum

1. 29 inches minimum under table, extending 17 inches minimum back from seating position edge.

2. 32 inches minimum width.

Discussion: Most of these numbers are taken from the requirements for buildings and facilities.

III. Sleeping Compartments:

A. Scoping. At least one compartment in each sleeping car shall meet the technical requirements in **B** below.

Discussion: This is the current requirement. In single level sleeping cars, the compartment must be configured longitudinally to allow a passageway for other passengers to reach the non-accessible compartments. A sketch of an example

configuration is shown below. In a bi-level sleeping car, an accessible compartment can be placed on the lower level across the entire car. This may allow some more spacious designs.

B. Technical requirements.

1. Side transfer to toilet, shower chair; meet requirements for restrooms in **IB2** above.

Discussion: An accessible restroom must be included within the compartment. The restroom shown in the current guidelines is not usable by many persons with a disability. It requires a 180-degree transfer to the WC. The technical requirements for the restroom presented here are the same as the restroom in a coach car. An accessible restroom in a single level sleeper is constrained by the need for an aisle for other passengers. This probably means that a turning circle larger than 60 inches is not feasible.

2. 60 inch turning circle in sleeping area with bed deployed.

Discussion: The diagram included in the current guidelines does not allow a wheelchair user to turn around or maneuver when the bed is deployed. This often means the occupant can't access the restroom or reach some controls and operating mechanisms.

3. Controls for all lights, HVAC, call button, power outlet, etc. shall be within reach ranges (permit duplicate controls and tethered remotes).

Discussion: A typical compartment has many light controls, some intended for use by a person in the upper bunk. This is obviously desirable, but if those lights are turned on by someone who is not immediately available, the wheelchair user can't turn them off. Duplicate controls must be available in an accessible location. One way would be to provide a tethered control "wand" or panel. Bluetooth controls could also be provided. Power wheelchair users will need a conveniently located power outlet to plug in their chairs.

4. Positive door latch, operable from outside by train personnel.

Discussion: A positive door latch is necessary to prevent the compartment door from opening due to rail car movement. Train personnel must be able to unlatch the door from the outside, both to provide service and in case of emergency.

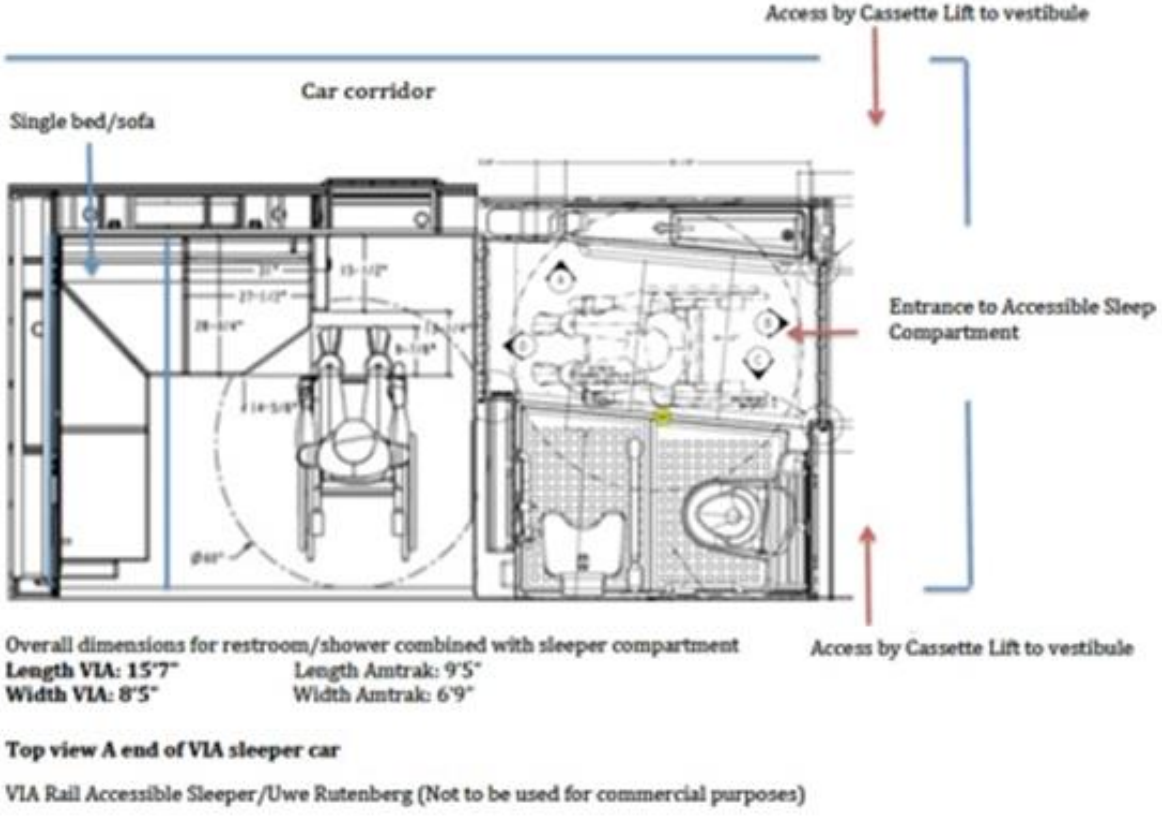
5. Bed at wheelchair seat height of 17 inches to 18 inches.

Discussion: Beds which are too high or too low present problems for transferring. Cushions should not compress below 17 inches.

6. Table usable by wheelchair user: 34 inches maximum top height; 29 inches minimum under clearance to 17 inches from approach edge; 32 inches minimum width under approach edge.

Discussion: The current guidelines do not provide requirements for tables in sleeping compartments. The tables provided in current sleepers are too low to allow knee clearance. A wheelchair user must lean very far forward and the table surface is very low. The sway and roll of a moving rail car makes its use virtually impossible. The specifications here are the same as dining cars.

7. Doors are not allowed to swing through any defined accessible clearance.



Top View A End of VIA Sleeper Car

(*Figure owned by VIA Rail Sleeper/Uwe Rutenberg and is not to be used for commercial purposes.)

IV. Lounge Car

A. Scoping. Single-level lounge cars shall comply with the technical requirements in **IVB**. Bi-level lounge cars shall comply on the lower level. Bi-level lounge cars shall have direct access to station platforms on the lower level. Where vertical access is provided, accessible seating

spaces shall also be provided on the upper level. Where a bi-level dining car is provided, an accessible bi-level lounge car shall be directly coupled to it.

Discussion: The ADA exempts bi-level dining cars from any accessibility requirements. The statute, and the DOT regulations, does address providing dining service in a lounge car. If a bi-level lounge car is provided, it must be placed adjacent to a bi-level dining car so that dining service can be provided in the lounge car. The current requirement for a lounge car is that it has a wheelchair space, a transfer seat, and an accessible restroom on the lower level. If vertical access is provided, accessible service must also be provided on the upper level.

B. Technical requirements.

1. Table space for 2, same as dining car.

Discussion: Current guidelines do not include specifications for tables. The specifications for dining cars presented earlier are used here.

2. Accessible restroom.

Discussion: An accessible restroom is required by the current guidelines. The technical requirements presented in this report are applied here.

3. Self-serve area meets ADA/ABA Guidelines for cafeteria.

Discussion: There are currently no specifications for self-service food areas in rail cars. This provision would apply the requirements for cafeterias and similar spaces of the buildings and facilities guidelines.

4. Vending machines must meet ADA/ABA guidelines.

Discussion: There are currently no specifications for vending machines in rail cars. Due to car movement, vending and similar machines in rail cars are fixed.

V. Controls and Operating Mechanisms

A. Definition.

Operable Part. A component of a device or system used to insert or withdraw objects, or to activate, deactivate, adjust, or connect to the device or system. Operable parts include, but are not limited to, buttons, levers, knobs, smart card targets, coin and card slots, pull-cords, jacks, data ports, electrical outlets, and touch screens.

Discussion: This definition is adapted from the ADA/ABA Guidelines and is intended to include all the kinds of controls that might be found in a new rail car.

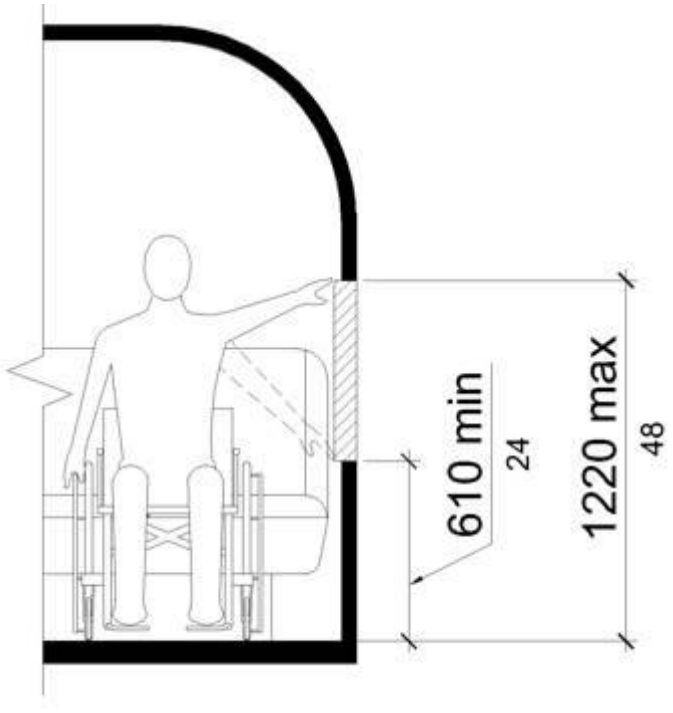
B. Scoping. The technical requirements apply to operable parts at wheelchair and transfer seating locations, restrooms, sleeping compartments, and dining and lounge car seating locations. If operable parts are provided for the public at any seating location, equivalent operable parts shall be provided at wheelchair and transfer seating locations. On intercity (Amtrak) train cars, call buttons to summon train personnel shall be provided at wheelchair and transfer seating locations, within sleeping compartments and within restrooms. In sleeping compartments, controls for all lights and HVAC shall meet the technical requirements.

Discussion: The locations are intended to cover all the places where a person with a disability might ride a rail car. It is also intended to ensure that persons with disabilities have access to all the amenities provided to the general public. For example, if electrical outlets and USB ports are available to general passengers, they must be available at accessible locations.

C. Technical requirements.

1. Location.

a. The height of operable parts shall be 24 inches minimum and 48 inches maximum above the vehicle floor (see figure below).



Side Reach Range

(*The above side reach range figure is owned by the Access Board and there are no restrictions on its use.)

Discussion: These reach ranges are derived from research from SUNY Buffalo

b. The lateral position shall be a maximum of 6 inches in front of, or behind, the centerline of the wheelchair seating space and clear floor space in sleeping compartments.

Discussion: The placement of controls and operating mechanisms is at the approximate longitudinal center of wheelchair seating areas. This is because a wheelchair user may wish to face in either direction. He or she may wish to sit facing away from other seating if that is the direction the train is traveling. On the other hand, if he or she is traveling with someone occupying the transfer seat, he or she will probably want to face that seat, regardless of the travel direction.

c. Operable parts shall be 10 inches maximum from the vertical plane adjacent to the side of the wheelchair or mobility aid closest to the operable part.

Discussion: This provision is the "reach distance" from the side of a wheelchair or mobility device to the control, probably mounted on the rail car wall. It is consistent with requirements for buildings and facilities.

d. Controls 12 inches minimum from inside corner (does not apply to manual door handle/latch for use when power fails).

Discussion: Wheelchair footrests extend forward and often prevent a user from reaching controls mounted close to an inside corner. This is especially true for persons with limited arm strength and dexterity. Manual door latches may need to be located near an inside corner, so they are not required to comply.

2. Redundant controls are permitted (e.g., on a tethered or wireless remote).

Discussion: Where it makes sense to locate controls in an inaccessible location, such as light controls for an upper bunk, a duplicate control can be placed in an accessible location.

3. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 lb. maximum.

Discussion: This provision is taken from the ADA/ABA Guidelines. In particular, manual door hardware must be a lever type.

4. Power door buttons shall be ¾ inch across minimum.

Discussion: Small buttons are especially problematic for persons with limited dexterity. Buttons to open and close power doors in restrooms and compartments must be easy to activate, especially in an emergency.

5. Controls shall be tactilely discernable without activation (e.g., raised buttons or have surrounding border raised 1/32 inch minimum).

Discussion: A person with limited vision should be able to locate a button by touch without inadvertently activating it. This will also help someone who may need to locate a call button in a dark compartment.

6. Two-state controls (e.g., on/off, hi/low, etc.) shall provide visual and tactilely discernable indication of their state (e.g., toggle, slide, pushbutton which remains depressed when activated).

Discussion: Similar to the above requirement, a person with limited vision should be able to determine the state of a control by touch.

7. Call buttons shall comply with **Chapter 2, VII**.

Note: Some buttons light up and buzz when activated, then flash and have intermittent tone or voice message when personnel answer, and help is on the way.

Discussion: This provision is similar to systems provided in elevators under the ADA/ABA Guidelines for buildings and facilities.

VI. Floor Surfaces

A. Scoping. The technical requirements for surfaces in **VI B** apply to circulation paths (including accessible on-board circulation paths), lift platforms, ramps and bridgeplates, wheelchair and mobility aid seating spaces, and step treads.

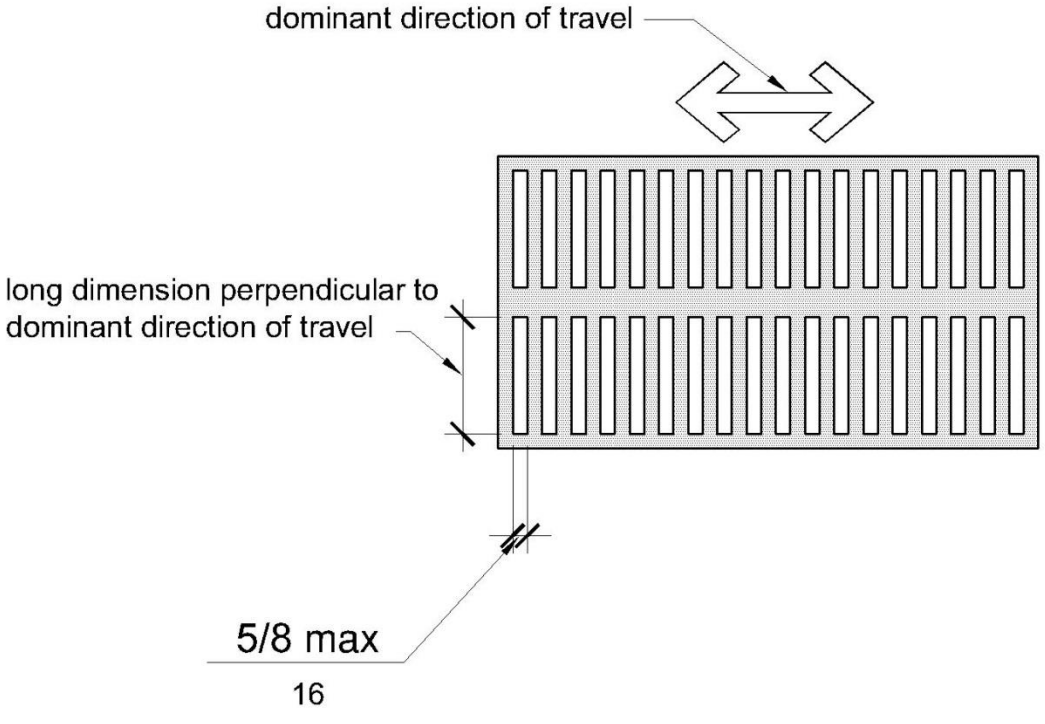
Discussion: These requirements apply to all the areas that are part of an accessible on-board circulation, as well as step treads. In particular, these requirements apply to the path between cars of a fixed consist train. The technical requirements in **VI B** below are taken from the ADA/ABA Accessibility Guidelines.

B. Technical requirements.

1. Surfaces shall be firm, stable and slip resistant.

2. Openings in surfaces shall not allow the passage of a sphere more than 5/8 inch diameter. Elongated openings shall be placed so that the long dimension is perpendicular to dominant direction of travel. Lift platforms that are folded and

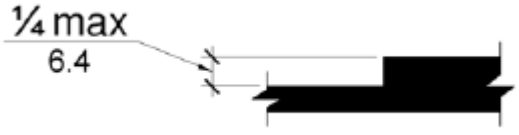
stowed manually, and ramps and bridgeplates that are deployed manually shall be permitted to have a cut-out in the surface 1½ inch maximum by 4½ inch maximum for the operator to grasp the surface.



Openings

(*The above Openings figure is owned by the Access Board and there are no restrictions on its use.)

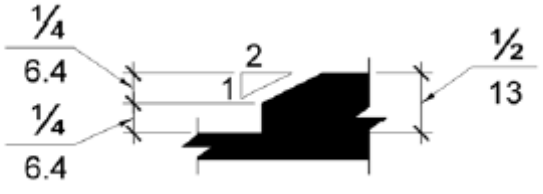
3. Carpet or carpet tile shall be securely attached and shall have a firm cushion, pad, or backing or no cushion or pad. Carpet or carpet tile shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be ½ inch maximum. Exposed edges of carpet shall be fastened to floor surfaces and shall have trim on the entire length of the exposed edge.
4. Surface discontinuities:
   a. Changes in level of ¼ inch high maximum shall be permitted to be vertical.



¼ Inch Change in Level

(*The above ¼ inch change in level figure is owned by the Access Board and there are no restrictions on its use.)

b. Changes in level between ¼ inch high minimum and ½ inch high maximum shall be beveled with a slope not steeper than 1:2.



½ Inch Change in Level

(The above ½ inch change in level figure is owned by the Access Board and there are no restrictions on its use.)

c. Changes in level greater than ½ inch high shall be ramped and shall have a slope of 1:12 maximum.

Appendix A – Americans with Disabilities Act Statutory Language

Note: The “less than symbol” and “greater than symbol” <> are used to bracket certain sections and words highlighted in yellow in this Appendix which were originally underlined to draw attention to these parts of the statutory language.

SUBPART II - PUBLIC TRANSPORTATION BY INTERCITY AND COMMUTER RAIL

Sec. 12161. Definitions

As used in this subpart:
(1) Commuter authority
The term "commuter authority" has the meaning given such term in section 24102(4) (FN1) of title 49.

(2) Commuter rail transportation
The term "commuter rail transportation" has the meaning given the term "commuter rail passenger transportation" in section 24102(5) (FN1) of title 49.

(3) <Intercity rail transportation>
The term "intercity rail transportation" means transportation <provided> by the <National Railroad Passenger Corporation>.

(a) <Intercity rail transportation>
(1) One car per train rule
It shall be considered discrimination for purposes of section 12132 of this title and section 794 of title 29 for a person who provides intercity rail transportation to fail to have at least one passenger car per train that is readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, in accordance with regulations issued under section 12164 of this title, as soon as practicable, but in no event later than 5 years after July 26, 1990.
(2) New intercity cars
(A) General rule
Except as otherwise provided in this subsection with respect to individuals who use wheelchairs, it shall be considered discrimination for purposes of section 12132 of this title and section 794 of title 29 for a person to purchase or lease any new rail passenger cars for use in intercity rail transportation, and for which a solicitation is made later than 30 days after July 26, 1990, unless all such rail cars are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, as prescribed by the Secretary of Transportation in regulations issued under section 12164 of this title.
(B) <Special rule for single-level passenger coaches> for individuals who use wheelchairs
Single-level passenger coaches shall be required to -
(i) be able to be entered by an individual who uses a wheelchair;

(ii) have space to park and secure a wheelchair;

(iii) have a seat to which a passenger in a wheelchair can transfer, and a space to fold and store such passenger's wheelchair; and

(iv) <have a restroom usable by an individual who uses a wheelchair>, only to the extent provided in paragraph (3).

(C) Special rule for single-level dining cars for individuals who use wheelchairs

Single-level dining cars shall not be required to -

(i) be able to be entered from the station platform by an individual who uses a wheelchair; or

(ii) have a restroom usable by an individual who uses a wheelchair if no restroom is provided in such car for any passenger.

(D) <Special rule for bi-level dining cars for individuals who use wheelchairs

Bi-level dining cars shall not be required to -

(i) be able to be entered by an individual who uses a wheelchair;

(ii) have space to park and secure a wheelchair;

(iii) have a seat to which a passenger in a wheelchair can transfer, or a space to fold and store such passenger's wheelchair; or

(iv) have a restroom usable by an individual who uses a wheelchair.>

(3) Accessibility of single-level coaches

(A) General rule

It shall be considered discrimination for purposes of section 12132 of this title and section 794 of title 29 for a person who provides intercity rail transportation to fail to have on each train which includes one or more single-level rail passenger coaches -

(i) a number of spaces -

(I) to park and secure wheelchairs (to accommodate individuals who wish to remain in their wheelchairs) equal to not less than one-half of the number of single-level rail passenger coaches in such train; and

(II) to fold and store wheelchairs (to accommodate individuals who wish to transfer to coach seats) equal to not less than one-half of the number of single-level rail passenger coaches in such train, as soon as practicable, but in no event later than 5 years after July 26, 1990; and

(ii) a number of spaces -

(I) to park and secure wheelchairs (to accommodate individuals who wish to remain in their wheelchairs) equal to not less than the total number of single-level rail passenger coaches in such train; and

(II) to fold and store wheelchairs (to accommodate individuals who wish to transfer to coach seats) equal to not less than the total number of single-level rail passenger coaches in such train, as soon as practicable, but in no event later than 10 years after July 26, 1990.

(B) Location

Spaces required by subparagraph (A) shall be located in single-level rail passenger coaches or food service cars.

(C) Limitation

Of the number of spaces required on a train by subparagraph (A), not more than two spaces to park and secure wheelchairs nor more than two spaces to fold and store wheelchairs shall be located in any one coach or food service car.

(D) Other accessibility features

Single-level rail passenger coaches and food service cars on which the spaces required by subparagraph (A) are located shall have a restroom usable by an individual who uses a wheelchair and shall be able to be entered from the station platform by an individual who uses a wheelchair.

(4) Food service

(A) Single-level dining cars

On any train in which a single-level dining car is used to provide food service -

(i) if such single-level dining car was purchased after July 26, 1990, table service in such car shall be provided to a passenger who uses a wheelchair if -

(I) the car adjacent to the end of the dining car through which a wheelchair may enter is itself accessible to a wheelchair;

(II) such passenger can exit to the platform from the car such passenger occupies, move down the platform, and enter the adjacent accessible car described in subclause (I) without the necessity of the train being moved within the station; and

(III) space to park and secure a wheelchair is available in the dining car at the time such passenger wishes to eat (if such passenger wishes to remain in a wheelchair), or space to store and fold a wheelchair is available in the dining car at the time such passenger wishes to eat (if such passenger wishes to transfer to a dining car seat); and

(ii) appropriate auxiliary aids and services, including a hard surface on which to eat, shall be provided to ensure that other equivalent food service is available to individuals with disabilities, including individuals who use wheelchairs, and to passengers traveling with such individuals.

Unless not practicable, a person providing intercity rail transportation shall place an accessible car adjacent to the end of a dining car described in clause (i) through which an individual who uses a wheelchair may enter.

(B) Bi-level dining cars

On any train in which a bi-level dining car is used to provide food service -

(i) if such train includes a bi-level lounge car purchased after July 26, 1990, table service in such lounge car shall be provided to individuals who use wheelchairs and to other passengers; and

(ii) appropriate auxiliary aids and services, including a hard surface on which to eat, shall be provided to ensure that other equivalent food service is available to individuals with disabilities, including individuals who use wheelchairs, and to passengers traveling with such individuals.

(b) <Commuter rail transportation>

(1) One car per train rule

It shall be considered discrimination for purposes of section 12132 of this title and section 794 of title 29 for a person who provides commuter rail transportation to fail to have at least one passenger car per train that is readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, in accordance with regulations issued under section 12164 of this title, as soon as practicable, but in no event later than 5 years after July 26, 1990.

(2) New commuter rail cars

(A) General rule

<It shall be considered discrimination for purposes of section 12132 of this title and section 794 of title 29 for a person to purchase or lease any new rail passenger cars for use in commuter rail transportation>, and for which a solicitation is made later than 30 days after July 26, 1990, <unless all such rail cars are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs>, as prescribed by the Secretary of Transportation in regulations issued under section 12164 of this title.

(B) Accessibility

For purposes of section 12132 of this title and section 794 of title 29, <a requirement that a rail passenger car used in commuter rail transportation be accessible to or readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, shall not be construed to require -

(i) a restroom usable by an individual who uses a wheelchair if no restroom is provided in such car for any passenger>;

(ii) space to fold and store a wheelchair; or

(iii) a seat to which a passenger who uses a wheelchair can transfer.

Appendix B – List of Considerations for DOT

This is a list of operational issues that came up in the deliberations of the Access Board's Rail Vehicles Access Advisory Committee (RVAAC) on future accessible rail cars. The RVAAC hopes that the Access Board will convey this list to the Department of Transportation (DOT) for potential rulemaking on rail operations.

1. Accessible Announcements.

When announcements are made, in the station, on the platform, and in the train, dual-mode communications should be utilized so that the announcements are accessible to all passengers. This means the placement of the visual announcements and all audible announcements should be clear and hearing aid compatible.

Regardless of the mode of transportation, people who are deaf and who have hearing loss, and people who are blind and have vision impairments, have the right under the Americans with Disabilities Act to equal access to the same information as everyone else.

Once tri-mode communication becomes available, DOT should promptly require rail and fixed guideway providers' crew to restrict public address system announcements to emergencies. Otherwise, the crews will need to run prepared or canned messages. Variable message sign announcements will benefit all passengers.

Recommend that DOT work on pocket signs, apps, web sites, etc., for emergency informational signs if there is no space to meet the signage requirements.

2. Removable Seats.

When seats are temporarily removed or reconfigured on intercity and high-speed rail cars to allow a group of people with disabilities to sit together, any group rate surcharges should be modest. This is consistent with existing ADA rules against surcharges, as well as the DOT ADA requirement to modify policies, practices, and procedures when necessary to avoid discrimination. This is a civil rights issue, as ordinarily, small groups of non-disabled passengers can much more easily ride Amtrak together.

Reconfigurable or removable seats may be considered to maximize revenue. Any cost associated with removing and handling seats is more than offset by the revenue when those seats are in place.

3. Securements (Tie-Downs).

Mobility device securements are not required on rail vehicles. If provided, it shall be the rider's decision as to whether to use them. If wheelchair securements are provided on rail cars, the rail provider may not impose a requirement that passengers using wheelchairs must allow their wheelchairs to be secured. (Consider possible exception for non-wheelchair power-driven mobility devices without brakes.)

4. Service Animal spaces.

If service animal spaces are provided at certain seating spaces on rail cars, the rail provider may not impose a requirement that passengers who have service animals are restricted to using those seats.

At stations, there need to be sufficient animal relief areas that are easily accessible. DOT should include training requirements that personnel know where service animal relief areas are. There should be signage at stations about these relief areas, where they exist.

5. Intercity-like Rail Service.

When entities other than Amtrak operate very similar service, a situation not contemplated by the ADA of 1990, DOT should consider how it can require such entities to comply with the same non-discrimination rules that the ADA requires of Amtrak. This issue arises regarding removing or reconfiguring seats as well as other operational non-discrimination rules. Services that are substantially equivalent to Amtrak should be subject to the same ADA requirements as Amtrak.

Appendix C – Minority Reports

Minority Report - Amtrak

Submitted by J. Blair Slaughter, representative of the National Railroad Passenger Corporation (Amtrak).

The following report is offered for consideration by the Board. The report contains no radical opposition to the Committee Report but is presented with the hope that Amtrak's often unique service offering is considered appropriately. Many American's only frame of reference for train travel is commuter trains and compact high frequency corridor operations. Amtrak's operations are vastly different from commuter operations over most of its route miles and stations. We ask simply that the Board consider the diversity and uniqueness of intercity operations as the proposed rule is crafted.

1. Chapter 2, II. B.

Where cars provide real time route map tracking, signs shall be provided in two locations so that every part of the car has a view of at least one sign.

Comment: This may be appropriate for a commuter situation but on intercity trains the potential exist for an information point that is fully accessible but remote from the coach seating area. Unlike commuter service a route map on an intercity long-distance train may be purely informative and entertaining but not critical to the transportation process. As written the recommendation would not allow for such an application.

2. Chapter 3, V. A

The committee recommends that between-car barriers be required in intercity and high-speed rail systems.

Comment: This feature is appropriate for high platform level boarding which is most often found on single level equipment that are uncoupled infrequently. Bi-level long intercity trains will see no benefit from adding the barriers, will add cost and may in fact create a safety hazard to railroad employees responsible for coupling and uncoupling cars. This should be carefully reviewed before there is a blanket application.

3. Chapter 4, IV. E

Number of Mobility Aid Seating Positions.
A minimum of 2 mobility aid seating locations shall be provided in each coach or car.

Comment: The requirement for intercity (Amtrak) trains is currently one but no more than two positions in each car. The intent of that language was to prevent operators from creating "cattle cars" for passengers using wheelchairs in order to comply with the ADA. The unintended consequence it that two people using wheelchairs cannot sit in the same car. This can be very problematic for companions and families attempting to travel together. Doubling the number of accessible spaces for intercity trains will have a massive revenue impact. Lost revenue space affects the economics of vehicles over their entire useful life. The Committee recommendation is but a patch that seeks to correct the statutory mistakes in the original ADA. Amtrak agrees that the problem exists and should be corrected but ultimately the number of accessible seating spaces should reflect demand and not unduly burden intercity services that are continually threatened with abolishment by legislative demands. Third party audits should be conducted to measure actual demand and projected demand for service to be used in developing the proposed rule. Quality of access should be our goal going forward and that is not always achieved by simply increasing the quantity of access.

4. Chapter 4, V.B

For all vehicles, seats considered transfer seats with armrests must include armrests 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.

Comment: Amtrak recommends that perhaps as many as fifty percent of seats be equipped with flip-up armrest.

5. Chapter 5, II. A Single–Level Dining Car Technical Requirements

Provide table space for two wheelchairs and transfer seats with two storage areas. Spaces can be convertible.

Comment: Single-level dining cars have limited seating capacity due to half the car being taken up by the galley. During the development of its new dining cars, Amtrak struggled to strike a balance between maintain capacity and providing accessible seating space and wheelchair storage. Convertible spaces were criticized as "making a spectacle" of the arrival of someone using a wheelchair. The solution eliminated an entire table and five seats but the result is a very easy to use space. Increasing the table space for wheelchairs and storage space without convertible spaces adversely affects the operation of the diner and will increase the number of seating's needed for each meal period. Convertible space is critical. Since the dining car service is typically operated using reservations it is possible for the operator to prepare the seating area to accommodate persons using wheelchairs and thus eliminate any unwarranted attention when they arrive in the car. The Committee can only make recommendations for the vehicle and not operation and so Amtrak recommends that as a prerequisite for using convertible space the railroad or diner operator must produce an acceptable plan of operation that addresses the concerns of patrons using wheelchairs.

6. Appendix B

3. Securements (Tie-Downs).
Mobility device securements are not required on rail vehicles. If provided, it shall be the rider's decision as to whether to use them. If wheelchair securements are provided on rail cars, the rail provider may not impose a requirement that passengers using wheelchairs must allow their wheelchairs to be secured. (Consider possible exception for non-wheelchair power-driven mobility devices without brakes.)

Comment: Amtrak recommends that the DOT review the agreement between Amtrak and the FRA concerning "Segway" or similar devices which have no brake when powered off. These devices will wander about during normal train motion and present a continual hazard if unrestrained. Amtrak does allow such devices and has equipped its fleet with easy to use restraints for them.

Minority Report - National Association of the Deaf

Submitted by Debra Patkin, representative of the National Association of the Deaf.

The National Association of the Deaf (NAD) supports the Final Report of the Rail Vehicles Access Advisory Committee of July 8, 2015 being submitted to the United States Access Board, but wishes to submit this minority report to address concerns about specific portions of the Final Report that are contrary to visual accessibility for deaf and hard of hearing travelers.

CHAPTER 2, SECTION 1(B):

The NAD supports the general premise of Chapter 2, which focuses on communications on rail vehicles, but takes exception to Section 1(B) of this chapter. The language of this subsection is as follows:

> Audible announcements will be reproduced verbatim in a visual format. In an emergency situation, where verbatim text of an audible announcement cannot be produced and displayed, then an equivalent message shall be provided. Equivalent information shall mean: corresponding or virtually identical in meaning and impact. Until such time that accurate speech to text (or equivalent technology) is available, audio announcements made during life threatening emergency situations, which require immediate attention by crew members, are exempt from visual message display requirements.

This subsection is contradictory in that it requires different standards for three levels of announcements:

1) audible announcements in regular settings are to have visual access to verbatim information,

2) audible announcements in emergency settings are to have visual access to "equivalent information", and

3) audible announcements in life threatening emergency settings are to have no visual access of any kind.

In other words, when the level of emergency increases, the amount of visually accessible information decreases, and worse, there is to be absolutely no visual information in life threatening emergency settings. This regulatory recommendation is counterproductive.

RECOMMENDATION: The NAD asks that some form of equivalent information be provided even in life threatening emergency settings, rather than leave deaf and hard of hearing passengers to fend for themselves in such dire circumstances.

CHAPTER 5:

This chapter focuses on rooms and spaces, but does not mention Visual Messaging Signs (VMS) in such rooms and spaces. While Chapter 2 addresses VMS in general, there is no clear requirement in either Chapter 2 or Chapter 5 that some form of visual alert be provided in every form of room and space. For example, Chapter 2, Section 2(A) indicates that "all cars must provide a sufficient number of variable message signs" without any further information or detail. Chapter 5 discusses the physical requirements (but not communication requirements) for dining cars, sleeping compartments, and restrooms.

RECOMMENDATION: The NAD asks that Chapter 2, Section 2(A) be clarified to say "all cars must provide a sufficient number of variable message signs, and some form of visual notification must be provided in all rooms and spaces such as restrooms, sleeping compartments, and dining cars." Further, the NAD asks that Chapter 5 references this language throughout that chapter.

Minority Report - Metropolitan Transportation Authority of the State of New York

Submitted by Frank Maldari, representative of the Metropolitan Transportation Authority of the State of New York.

Minority report to the Final Report (3rd Draft) dated July 08, 2015 to the US Access Board from Rail Vehicles Access Advisory Committee.

This report has been prepared by New York MTA with input from other members of the committee, see below, and is being provided to the Access Board for consideration.

- Metropolitan Transportation Authority of the State of New York - Frank Maldari
- California Department of Transportation, Division of Rail - Momoko Tamaoki
- Talgo Inc. - Joshua Coran
- Parsons Brinckerhoff - Frank Banko
- METRA - David Martinez
- Alstom Transportation - Jon Holbrook

We are in agreement with the majority of the recommendations provided in the report, and believe that in addition to providing improved accessibility to rail transportation systems, they will provide significant benefits to all passengers. However we feel that there must be balance between new accessibility initiatives and what is operationally feasible and fiscally responsible. We believe that some of the recommendations are out of balance with these objectives and suggest several changes as outlined below:

Chapter 2- Communications

A. Audible and Visible Communications

The report recommends that all new cars have audible and visual components for all messaging systems used to communicate with passengers, including live announcements.

Concerns about the current recommendation:

*** Customer Impact**. Currently there is no accurate, real time speech-to-text conversion technology on the market. Therefore, this recommendation may have the unintended consequence of limiting the amount of information provided to passengers via the public address system.

Recommendations to address above concerns:

Consider limiting verbatim audio and visual announcements to pre-recorded announcements of station stops, and provide allowances for live audio announcements to provide similar, but not verbatim information. For example, if there is a delay, the sign could identify the delay, and the audio message could provide the same information but also include supplemental information, such as the cause of the delay.

B. Variable Message Signs

The report recommends that every seat must have a view of one of the two VMS screens.

Concerns about the current recommendation:

*** Cost**. Depending on the seating layout, a few seating locations may not have clear sightlines to a VMS. Consider that it may not be reasonable to require a complete VMS for one or two seat locations. In some cases one screen may be visible from all revenue seats in the car, making the cost of the second unit completely unnecessary.

*** Car Design.** Depending on the seating layout, there are times where a few seat locations will not have clear sight to VMS, and there may be no reasonable alternative to provide a VMS for certain seating positions.

Recommendations to address above concerns:

Consider revising the recommendation that every seat is to have a view of the VMS sign and instead identify a minimum percentage of the passenger seats that must have a view of the sign. Our recommendation is that the minimum percentage of the car seat with a view of a VMS be 90%. Persons who desire to view the VMS will have the opportunity to sit in a seat with a view of a VMS.

C. Door Announcements

The report recommends that audio and visual notification indicate which doors will open at each station.

The report recommends that audio and visual alarm be provided to indicate when a door is locked out and will not open.

Concerns about the current recommendation:

For some operating authorities, the platform used for a given train may vary at certain stations, and doors may open on either side of the car, or both. Oftentimes, the boarding platform is not known until the train is entering the station. Therefore, this information would need to be provided in real

time by the crew, resulting in a complicated, and potentially distracting, crew interface with the communication system.

In addition, this recommendation may result in a substantial increase in audio alarms and announcements on trains and would impact the passenger environment. Consider that an audio announcement may not effectively communicate which door is locked out.

Recommendations to address above concerns:

1. For operations that do not have guaranteed station berthing patterns, consider not identifying which doors will open in the station stop announcement.
2. Allow the door locked out audio announcement to be intermittent and only active when a door open command is provided by the train crew or by other means so that the alarm is not a constant annoyance to passengers on the train.

D. Hearing Assistive Technology

The report recommends hearing assistive technology (e.g., hearing induction loops) to be installed on all new cars. The coverage area is identified as the entire car unless not technically feasible.

Concerns about the current recommendation:

*** Car Design and Technology.** Consider that hearing induction loops have never been tested in a subway system and present a number of technical challenges. There are known challenges in making hearing induction loops effective within steel framed buildings or structures. Metallic interior paneling, including aluminum, interferes with the hearing loop signals, and areas near propulsion equipment provide electro-magnetic interference. The frequencies at which the hearing assistive technologies operate at would need to be carefully reviewed to prevent interference to/from communications based train control equipment, train radios, and other critical equipment.

*** Cost.** As part of one recent car procurement, the estimated cost to install hearing inductive loops was approximately $39,000 per car. Considering the technical limitations to the systems effectiveness, this cost is significant, especially for large car orders. Since there are currently no domestic projects and very few international projects that have successfully implemented hearing inductive loops, the cost at this time is not certain. Please also consider the additional maintenance costs associated with these systems.

*** Coverage**. The report recommends coverage in all areas of the car that are feasible, but in no less than two areas. Since there are known technical issues with achieving 100% coverage as outlined above, each new procurement would need to justify the coverage area if they do not achieve 100% coverage. Trying to provide coverage in areas near propulsion equipment will require significant effort and drive up the cost of the system. Consider eliminating the recommendation that coverage

be provided in the entire car. This will allow the risks and cost to be managed while providing the benefit to areas of the car where these types of systems can be successfully implemented.

Recommendations to address above concerns:

Considering that hearing assistive technology is new to the domestic rail equipment, it is premature to recommend its use until the technical issues identified above have been resolved. Consider that the recommendation for hearing induction loops be withheld until successful implementation of the technology on domestic rail projects is achieved. There are domestic rail projects that are implementing this technology that could be monitored by the Access Board. In addition, the federal government could sponsor pilot programs at a number of authorities to assess the issues associated with its use on different types of rail equipment. Once this experience is achieved, the Access Board will be in a better position to recommend its use and the authorities will be in a better position to meet the new recommendations. The coverage area should be defined as a minimum percentage of the car so that areas difficult to cover, such as areas near propulsion equipment, are not required to have coverage. This will limit the risk and cost associated with implementation of new technology.

Consider that until the technology is vetted on domestic projects, the increased use of visual displays, as recommended by this report, will provide a means for train crews to communicate with persons with hearing impairment.

E. Signage

The report recommends most signage on rail cars to be compliant with ADA building standards, relative to size and font, and that certain signs include braille. These combined elements will significantly increase the size of the signage currently in use.

Concerns about the current recommendation:

*** Car Design.** The larger size may not be achievable for certain signs due to limited available space in a rail car. An example demonstrated during one of the committee meetings was the emergency window removal instructions, which are required for commuter rail cars. When the signs were updated to meet the tactile and visual recommendations the signs covered the entire side window, limiting the passengers' view out of the car.

*** Safety.** Since the location of the signs is not specified, people with vision impairments may not be able to locate the signage in order to read the braille. Searching for signs would pose a hazard to both the person trying to locate the signs and to other passengers.

Recommendations to address above concerns:

Suggest allowing alternate means of communicating the information on signs in the train, such as special handouts, seat-pocket cards, apps, and web sites.

Chapter 3- Boarding and Alighting

A. Gap Standard

The report recommends a new maximum gap standard of +/- 5/8 inches vertical and 2 inches horizontal for all equipment. If the gap is exceeded, ramps, bridge plates, or mechanical lifts are required. The current standard although challenging, is typically achievable while the new gap recommendations will be extremely difficult to meet, consequently bridge plates will be required. Although a smaller gap, both vertical and horizontal is better than a larger one, there was no analysis available to justify the new gap recommendations, and the current standard appears to be practical for most wheeled mobility devices.

For stations built before January 26, 1992, the report recommends, at least one door of all cars meet the recommended gap at all stations. For stations built after January 26, 1992, the report recommends, all doors of all cars meet the recommended gap at all stations.

Due to recognized challenges associated with making old stations accessible, the key station provisions, outlined in 49 CFR part 37, require only key existing stations to be compliant. Additionally in 49 CFR part 38, there are different gap requirements depending on age of station and cars.

Concerns about the current recommendations:

*** Safety**. Currently at many subway stations there is no need for bridge plates. The new regulations will require bridge plates on new rail cars. Safe deployment of these devices in a crowded subway environment during rush hours will be difficult.

Currently most curved platform stations on rapid rail are not ADA designated stations and do not have bridge plate provisions. The new gap recommendations will require that the bridge plates be installed on the cars be capable of traversing the largest vertical and horizontal gap at any station. The station with the largest gap will dictate the bridge plate design for all new cars. Consequently, the bridge plates carried on the cars may be very long to accommodate the largest gaps. These long bridge plates may create a safety hazard when deployed in confined areas at a station. The new recommendation for bridge plates design would be further complicated at certain stations due to existing gap mitigation devices. At some current MTA curved platform subway stations with gaps above 12 inches that currently use gap fillers (e.g., Union Square, South Ferry, and Times Square) there will need to be two devices in use; the current gap fillers and bridge plates. These devices would need to be designed to interface with each other.

Changing the gap standard (both size and applicability) as proposed may result in unintended consequences that may actually create more gap hazards. In some instances, station improvements have been implemented to meet the existing gap standard with existing equipment. At some existing MTA subway stations (approximately 50 % of NYCT stations), a slightly elevated "hump" (which can vary from 0 to 6 inches) has been installed at the platform edge at the boarding area for persons with mobility devices (defined as a 35 feet to 40 feet long landing near the conductor's position in the middle of the train). The existing cars currently ride at a height that ensures the cars that platform at the Boarding Area provide level boarding (per current standards). At all other doors of the train, the train floor is higher than the platform (sometimes more than 6 inches). Bridge plate designs that mitigate the gap in one direction (e.g., stepping down from the car to the platform) are much simpler than bridge plates that need to adjust to platforms that could either be above or below the car's floor height. Consequently, to simplify bridge plate designs, car builders may elect to raise the car floors, if possible, so that the new car floors are always higher than the raised boarding areas at some stations. If the new car floors are raised then there will be greater vertical gaps at many stations and very large vertical gaps at stations which have an elevated hump (in areas that are not raised). This larger vertical gap will be a hazard to all passengers. In addition, since the bridge plate needs to be designed to handle the largest gap on the system, it will need to be large enough to handle the increased vertical gap that has resulted from the proposed new gap standard. In this particular instance, the proposed rule would be creating a larger vertical gap and a hazard to most passengers.

*** Customer impact**. Deployment of bridge plates would increase dwell times, reducing throughput, resulting in increased crowding conditions both on the trains and on platforms.

*** Cost.** The estimated cost associated with adding manual bridge plates to subway cars is on the order of $500 per plate. These costs will increase if handholds are required due to a single station needing such a device. However if powered bridge plates are required the associated cost will be significantly higher, refer to "bridge plates" issue below.

B. Bridge Plates

The report recommends automatic deploying bridge plates that are activated on demand by a push button that is accessible to both the train crew and passengers. The current standard allows a manually-deployed bridge plate. The report also recommends that the maximum slope of the bridge plate be reduced from 1:4 to 1:8. This recommendation will effectively double the length of the bridge plate for a given vertical gap.

Concerns about the current recommendations:

*** Safety**. Bridge plates installed on every car would need to be designed to work with the worst case offset of any car at any station. In order to address **all gaps**, devices may need to be at least 32

inches long, assuming a four-inch vertical offset between car and platform. The longer bridge plate would reduce the amount of space the wheelchair has to maneuver as it exits the bridge plate, and could interfere with columns or other features on the platform when deployed, particularly since many subway platforms have columns that are 8 inches from the edge of the platform.

The longer bridge plates may present a hazard to customers on the platform and in the car vestibules during deployment and retraction. If the car floor is higher than the platform, the 32 inch long exposed ramp would be a tripping hazard to passengers on the platform. If the car floor is lower than the platform, the ramp would need to extend into the passenger compartment, creating a tripping hazard to passengers on the car. If the car floor is higher or lower than the platform depending on the station, the device would need to be significantly more complex to meet the slope recommendations and to also automatically fold out of the way when not in use.

While the goal discussed during the RVAAC proceedings was to allow wheelchair customers to board trains without assistance, the customer activation recommendation may be problematic since a customer could activate the bridge plate while other riders are attempting to board the train, and when passengers are in the vestibule or on the platform in the path of a deploying or retracting bridge plate. Another concern would be clearing the bridge plate area to allow retraction on a crowded train. In addition the extended platform would be a tripping hazard to those walking on and off the train, who are not expecting a bridge plate. Another concern would be tampering with the push button device by children and others which would pose a hazard to people in the area of the device. One way to mitigate these and other safety issues would be having a member of the train crew or a station-based carrier representative activate the bridge plate. In this case the passenger accessible push-button activation would be unnecessary since someone would already be at the doorway. The continued use of manually-deployed plates would allow for increased options for storing the bridge plates and will also improve reliability, discussed below.

In the longer term, automatic deploying mechanisms may preclude future installations of platform screen doors.

*** Reliability.** Automatically deploying bridge plates operating upon demand would be complex electromechanical devices requiring new safety-critical indication systems for the crew, and would introduce a new mechanism that could impact service. For example, if the device does not retract, when commanded, the train would not be able to leave the station. A single failed bridge plate would cause major service disruptions during rush hour service on a busy commuter or rapid rail system.

Transit systems operating in an environment with snow and ice such as New York MTA would require provisions to address the accumulation of snow and ice on the bridge plate and station platforms.

*** Car design and weight.** The bridge plate system would add weight to the car, significantly impact the vehicle structure, and require additional strengthening especially around door openings. It is

also possible that adding recommended exterior equipment to the standard car profile may violate the wayside clearances.

Although it may not be an obvious concern for rail cars, weight is a very important concern and weight management is an important part of new vehicle procurements. Infrastructure limits the weight of passenger equipment in certain areas and there are new safety mandates such as crashworthiness and Positive Train Control (PTC), which add new components and weight to passenger cars. The estimated weight associated with the addition of a powered bridge plate is 400 lbs. per bridge plate.

*** Technology.** Currently there is no "off the shelf" device which meets all of the recommendations for this new bridge plate for all transit systems. In fact, the only bridge plate type device that was shown during the meetings was for light rail vehicles, which is a significantly different operating environment than heavy traffic rapid and commuter rail operations, which require high reliability to prevent back-up and delays. In addition, the structural design of light rail equipment is significantly different from FRA compliant commuter rail equipment. Commuter rail equipment must meet federal crashworthiness requirements that do not apply to light rail equipment. Commuter rail equipment will typically have a structural side sill running below the side entrance doors which will prevent the placement of bridge plate device in the area under the side door threshold. Consequently this would be a newly designed device specifically for commuter rail applications and there will likely be reliability issues typically associated with new designs.

*** Cost.** Since there is no "off the shelf device" which meets all of the recommendations for this new bridge plate for all transit systems, there will be significant development costs associated with the addition of these new devices on rail cars. An estimate of the design cost of this device for a new subway car application is $1,000,000. The estimated per-unit cost for a bridge plate device is $10,000. An estimate of the per-unit cost to integrate this device into a vehicle and provide the necessary safety interlocks, controls and performance testing is $10,000 per car for a four door car. For a four door rail car, the estimated recurring per car cost is $50,000. Costs for cars with additional doors and bridge plates will be proportionally higher.

For a thousand car procurement the added capital cost for a four door car would be $51 million.

In addition to the capital costs, there will also be added recurring maintenance costs that are estimated to be $5,000 per year per car for a four door, four bridge plate car.

In addition to the above costs there will also be expenses incurred due to extra energy consumption estimated to be $700 per four door car per year, based on a weight estimate of 400 lbs. per door or 1,600 lbs. per car.

Consequently the costs associated with adding this type of device to rail cars are substantial.

*** Customer impact**. Deployment would increase dwell times, reducing throughput and lead to increased crowding on trains and platforms. Equipment-related delays also could occur. As noted above, if the device fails, a train would be prevented from leaving the station and require being removed from service for repairs.

*** Car interior space**. The need to have automatic deploying bridge plates would require a device at each door. This will require more space than the current single manual bridge plate that can be used for all doors on a car. The increased bridge plate storage space would lead to decreased seating and/or vestibule space.

*** Floor heights.** In order to reduce the complexity of the bridge plate device, the floor of rail cars could be raised to permit the bridge plate to always drop down onto the platform. However increasing the height of rail cars may not be possible due to wayside clearance requirements. Since car capacity is always being optimized, car sizes are typically already at their limit, therefore increasing their height is typically not an option. Raising the floor height and not the car height will reduce interior head room and may obsolete service proven car designs. In order to achieve a car floor height above the highest platform on an entire system, increasing the floor height on new cars will likely result in larger vertical gaps at certain existing stations.

Recommendations to address above concerns:

1. Mitigation of the gap should not be limited to one methodology of bridge plate deployment. Each operating environment is different and each authority should be allowed to handle bridge plate deployment in a manner that is safe and appropriate for that particular operating environment. Consequently, consider removing the recommendation for powered bridge plates and allow for manual bridge plates, as per the current regulation.

2. Consider removing the new slope recommendations, or identify it as a goal, and maintain the existing slope requirements.

C. On board lifts

The report recommends that new cars have on board lifts for stations that do not have high platforms. As a result, station-based lift platforms could no longer be used for new equipment.

Concerns about the current recommendations include:

*** Cost.** This would be a significant cost and capacity issue for new cars that serve a few stations without high platforms.

*** Car design and weight**. The on board lifts will also have a negative impact on car structural design and crashworthiness and will lead to increased car weight and will lead to the modification of service-proven vehicle designs.

*** Car interior space**. The need to have on board lifts would require a device at each door. This will require a significant amount of space for storage and deployment. Depending on the car design, the loss of interior space will vary. An estimate on the amount of space lost to an on-board lift is 2 seats per device. This results in a loss of 8 seats per car for a car with four doors, which is a significant impact to car capacity.

*** Reliability.** On board lifts are complex electromechanical devices requiring new safety-critical indication systems for the crew, and would introduce a new mechanism that could impact service. For example, if the device does not retract, the train would not be able to leave the station. Repair of such a device would require removal of the train from service. Alternatively a mobile station based lift could be repaired on site or at a shop, without affecting car availability or on-time performance of the system.

Recommendations to address above concerns:

Consider removing the recommendation for all mechanical lifts to be car-borne and allow station based lifts, in accordance with the current requirements.

Chapter 4 – On Board Circulation and Seating

A. Doorway Width, Between Cars (End Doors)

The report recommends 32 inch wide end door openings on all passenger cars, except cab cars in cases where it can be proven that the smaller cab size results in operational issues.

Concerns about the current recommendations:

*** Safety.** Since most commuter rail equipment has end door openings approximately 24 inches wide between the collision posts, this recommendation would locate the collision posts (on non-cab ends) approximately 8 inches further apart, affecting the car body structure and design and possibly impact anti-telescoping performance should there be a collision between existing cars and cars with the new collision post design.

*** Car design and weight.** The change would also lead to increased weight due to the wider space between collision posts and the need to maintain the same collision post performance requirements.

Recommendations to address above concerns:

Maintain the existing FRA regulations (49 CFR part 38.93) which exempt commuter cars with aisles less than 30 inches that lead to the end doors, from the requirement for 32 inch end doors.

B. Maneuvering Space at Mobility Aid Seating Locations

The report includes recommendations for larger wheelchair parking areas in each car. The existing requirement of 30 inches X 48 inches is recommended to be replaced with 32 inches X 54 inches or 32 inches X 59 inches, and a 60 inch turning circle for maneuvering into the parking area. This standard would require more space and would likely reduce seating capacity.

Concerns about the current recommendations:

*** Car interior space.** Currently many commuter cars have the wheelchair parking areas located adjacent to one another across the aisle. This allows for people with wheelchairs who are traveling together to sit near each other. In addition, this allows for efficient layout of the spaces for wheelchair parking. Depending on the layout of the car, this new recommendation for a 32 inches X 54 inches parking space combined with a 60 inches turning circle will likely require displacement of more passenger seats.

*** Cost.** The cost associated with the removal of three more passenger seats is based on additional equipment that is needed to make up for the loss of seating capacity in a train (if other system constraints will even allow for longer trains or more trains). The additional costs would include capital, maintenance and operating costs. Since a typical single level commuter car has approximately 100 seats, the incremental cost associated with the loss of one seat would be about 1%. Based on a recent MU car procurement, an estimate of the capital cost is approximately $25,000 per seat. The estimated maintenance and operating cost would also be increased by this same percentage. Consequently the capital cost associated with three passenger seats on a commuter car would be $75,000.

Recommendations to address above concerns:

Consider removing the recommendation for a 60 inch turning circle for maneuvering space and allow alternative arrangements such as “L” and “T” maneuvers into the space as outlined in the discussion section of the report.

C. Vertical Movement Requirements

The report recommends the lift device shall not require backing in or backing out only, but shall allow pass through.

Concerns about the current recommendations:

*** Car interior space.** This recommendation eliminated use of the car's aisle for access to the lift effectively at least doubling the space it requires on each level. For example, on a sleeper it will eliminate eight berths (about 20% of the revenue capacity of the car).

Recommendations to address above concerns:

Consider removing the suggested requirement that the lift device shall not require backing in or backing out only.

D. Vertical Movement Requirements

A fold down seat is recommended on wheelchair lifts.

Concerns about the current recommendations:

*** Car Design and Weight.** This recommendation increases the size and complexity of the lift and appears to be an unnecessary. There is no seat required on wheel chair lifts so its need in this case is not obvious.

Recommendations to address above concerns:

Consider removing the suggested requirement for fold down seat on wheelchair lift.

E. Vertical Movement Ancillary Requirements

The report suggests that an accessible toilet be provided on the upper level if one is provided for ambulatory passengers.

Concerns about the current recommendations:

*** Car Interior Space.** This additional space requirement for an accessible toilet is substantial. This recommendation will essentially eliminate all upper level toilets.

Recommendations to address above concerns:

Consider removing the suggested requirement upper lever toilets.

Chapter 5 – Rooms and Spaces

A. Restrooms

The report recommends a 60 inch turning circle (within the closed compartment) or demonstrable equivalent that provides for side transfer and the ability to enter and exit in a forward direction. In addition, the report recommends a clear floor space of 32 inches by 54 inches. The 32 inches is measured from the outer edge of the rim and the 54 inches is measured from the back wall, extending parallel to the centerline of the toilet.

Concerns about the current recommendations:

*** Car interior space.** While the new side-transfer recommendation appears to address issues with some of the current restroom designs that were discussed during the meeting, the need for turning space requires further discussion. The impact on seating space will be significant, and will encourage removal of toilets from commuter equipment.

On typical commuter cars the restroom provisions take up approximately 9 seats, but allow for a clear aisle so that train crew members can see down a train. The proposed design could take up an additional 3 seats, and will block the aisle, preventing train crew members from seeing through the cars. This is a security and safety concern.

*** Cost.** The cost associated with the removal of three more passenger seats is based on additional equipment that is needed to make up for the loss of seating capacity in a train. The additional costs would include capital, maintenance and operating costs. Since a typical commuter car has approximately 100 seats, the incremental cost associated with the loss of one seat would be about 1%. Based on a recent MU car procurement, an estimate of the capital cost is approximately $25,000 per seat. The estimated maintenance and operating cost would also be increased by this same percentage. Consequently the capital cost associated with 3 passenger seats on a commuter car would be $75,000.

*** Capacity.** Many commuter trains are crowded during rush hour and there is limited train capacity due to infrastructure. Consequently, for areas like Penn Station, New York, adding additional trains may not be an option, and the loss of seats will lead to increased crowding on rush hour trains. The cost associated with creating more train capacity to key stations, like Penn Station is significant.

Recommendations to address above concerns:

1. Consider removing recommendation for the 60 inch turning circle within the toilet compartment, or alternatively allow the aisle space adjacent to the restroom to be considered part of the 60 inch turning circle.

2. Consider removing the new clear floor space recommendation.

3. Consider having different recommendations for commuter rail and intercity equipment. Intercity cars would have the proposed recommendations and commuter rail would have the above suggested modifications to the recommendations.

The above changes will provide significant flexibility to the designer, which may allow meeting the new side transfer recommendation without significantly increasing the size of the toilet compartment.

B. Sleeping Compartments Technical Requirements

The report suggests that the bed be no higher than 18 inches and compress to no lower than 17 inches.

Concerns about the current recommendations:

*** Passenger Comfort.** A bed that only compresses 1 inch under load will not be very comfortable.

Recommendations to address above concerns:

Consider reducing the suggested bed height under load requirement to allow for more a more comfortable bed cushion.