

INTERCITY RAIL CARS & SYSTEMS

Technical Assistance Manual

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Introduction

This technical assistance document is one of a series provided to help in understanding the background and underlying rationale of the Americans with Disabilities Act Accessibility Guidelines for Transportation Vehicles (Vehicle Guidelines) and how the guidelines may apply in a particular case. The documents in this series are:

- o Buses, Vans & Systems
- o Rapid Rail Vehicles & Systems
- o Light Rail Vehicles & Systems
- o Commuter Rail Cars & Systems
- o Intercity Rail Cars & Systems
- o Over-the-Road Buses & Systems
- o Automated Guideway Transit Vehicles & Systems
- o High-Speed Rail Cars, Monorails & Systems
- o Trams, Similar Vehicles & Systems

The information in this document is based on the preamble published with the Vehicle Guidelines, augmented with material developed in response to questions which have been posed to the Architectural and Transportation Barriers Compliance Board (Access Board) since publication of the guidelines. The Department of Transportation (DOT) has issued standards for vehicles based on the guidelines. The guidance in this document does not constitute a determination of compliance with the DOT standards or with your rights or responsibilities under the ADA and is not binding on DOT.

Background

The Americans with Disabilities Act (ADA) [P.L. 101-336, 42 U.S.C. 12101, *et seq*], signed into law by President Bush on July 26, 1990, is landmark legislation to extend civil rights protection to people with disabilities. The ADA prohibits discrimination on the basis of disability in employment, State and local government services, public transportation, public accommodations, commercial facilities, and telecommunications.

Title II of the ADA prohibits discrimination on the basis of disability in services, programs, and activities provided by public entities, including units of State and local government and the National Railroad Passenger Corporation (Amtrak). Title II addresses public transportation and contains provisions specifically addressing the following types of transit systems: fixed route bus, rapid rail, light rail, commuter rail, and intercity rail. Under title II, transit systems of these types which are owned or operated by public entities, and persons under contract with such entities, must be made readily accessible to and useable by individuals with disabilities, including individuals who use wheelchairs. With respect to public entities, title II requires that:

New Vehicles. New vehicles purchased or leased after August 25, 1990, must be accessible.

Used Vehicles. If used vehicles are purchased or leased after August 25, 1990, good faith efforts must be made to obtain accessible vehicles.

Remanufactured Vehicles. If vehicles are remanufactured after August 25, 1990, to extend their useful life for 5 years or more in the case of buses and rapid and light rail vehicles, or for 10 years in the case of commuter and intercity rail cars, then the vehicles must be made accessible to the maximum extent feasible.

"One-Car-Per-Train" Rule. At least one vehicle or car per in each train of two or more cars must be accessible as soon as practicable but in no event later than July 26, 1995, in the case of rapid, light, commuter, and intercity rail systems.

Demand Responsive Systems. New vehicles purchased or leased after August 25, 1990, for use in a demand responsive system operated by a public entity, or by a person under contract with such an entity, must be accessible unless the system, when viewed in its entirety, provides to individuals with disabilities a level of service equivalent to that provided to other members of the general public.

Title III of the ADA prohibits discrimination on the basis of disability in public accommodations and services provided by private entities. Under title III, public transportation services (other than by aircraft) provided by private entities must also be made readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs. Under title III, the following requirements apply to private entities that are primarily engaged in the business of transporting people and whose operations affect commerce:

New Vehicles. New vehicles purchased or leased after August 25, 1990, must be accessible unless the vehicle is to be used solely in a demand responsive system that, when viewed in its entirety, provides to individuals with disabilities a level of service equivalent to that provided to other members of the general public. This requirement does not apply to automobiles, vans with a seating capacity of less than 8 passengers, or over-the-road buses.

Vans. New vans with a seating capacity of less than 8 passengers purchased or leased after February 25, 1992, must be accessible, unless the system for which the van is being purchased

or leased, when viewed in its entirety, provides to individuals with disabilities a level of service equivalent to that provided to other members of the general public.

Rail Cars. New rail passenger cars purchased or leased after February 25, 1992, must be accessible. Rail passenger cars manufactured after February 25, 1992, to extend their useful life for 10 years or more must be made accessible to the maximum extent feasible.

For private entities not primarily engaged in the business of transporting people but whose operations affect commerce, such as hotels, shopping centers, and recreational facilities which operate shuttle service for customers or patrons, title III requires that:

New Vehicles for Fixed Route Systems. New vehicles with a seating capacity of more than 16 passengers purchased or leased after August 25, 1990, for use in fixed route systems must be accessible. This requirement does not apply to over-the-road buses. New vehicles with a seating capacity of 16 passengers or less purchased or leased after August 25, 1990, for use in a fixed route system must also be accessible unless the system, when viewed in its entirety, provides to individuals with disabilities a level of service equivalent to that provided to other members of the general public.

New Vehicles for Demand Responsive Systems. New vehicles with a seating capacity of more than 16 passengers, purchased or leased after August 25, 1990, for use in a demand responsive system must be accessible unless the system, when viewed in its entirety, provides to individuals with disabilities a level of service equivalent to that provided to other members of the general public.

Operation of Demand Responsive Systems. Demand responsive systems must be operated in such a manner that after July 26, 1990, the system, when viewed in its entirety, provides to individuals with disabilities a level of service equivalent to that provided to other members of the general public.

Over-the-Road Buses. Title III specifically addresses over-the-road buses operated by private entities. The Office of Technology Assessment (OTA) is responsible, under title III of the ADA, for studying the access needs of individuals with disabilities to over-the-road buses and the most cost-effective methods for providing such access. In view of this mandated study, over-the-road buses covered by title III are not required to be accessible to wheelchair or mobility aid users until July 26, 1997, for small providers and July 26, 1996, for other providers. Over-the-road buses purchased or leased after January 26, 1992, but before July 26, 1996 or 1997 may be

required to include accessibility features which do not involve structural changes or use of boarding devices.

Regulations

The Department of Transportation is responsible for issuing regulations to implement the transportation provisions of the ADA, including accessibility standards for transportation vehicles. The ADA required the Access Board to develop guidelines to provide guidance to DOT on establishing the accessibility standards for transportation vehicles. DOT published interim standards on October 4, 1990 (55 FR 40762). Those standards apply to vehicles purchased after August 26, 1990, but before October 7, 1991.

The Access Board published its minimum guidelines, known as the ADA Accessibility Guidelines for Transportation Vehicles on September 6, 1991, in the Federal Register (56 FR 45530). The provisions for lifts, ramps, and securement devices were drawn primarily from a series of guidelines developed as part of a project sponsored by the Federal Transit Administration (FTA), formerly the Urban Mass Transportation Administration (UMTA), in 1986: Guideline Specifications for Passive Wheelchair Lifts, Guideline Specifications for Active Wheelchair Lifts, Guideline Specifications for Wheelchair Ramps and Guideline Specifications for Wheelchair Securement Devices. Provisions from the Guideline Specifications were supplemented with additional material derived from common accessibility standards, such as the Uniform Federal Accessibility Standards (UFAS) and the American National Standards Institute (ANSI) A117.1-1980 specifications, research sponsored by the Access Board, and industry practice. Some provisions for Automated Guideway Transportation (AGT) "people movers" and rapid rail systems were derived from Los Angeles Downtown People Mover: Handbook on Accessibility for the Elderly and Handicapped (UMTA, November 1980). In addition, the guidelines incorporated provisions of 49 CFR Part 609 for buses, light rail and rapid rail systems published by UMTA in 1976.

These guidelines, codified at 36 CFR Part 1192, are not, in and of themselves, the standards for vehicles but rather form the minimum requirements for standards issued by DOT. DOT has adopted the substance of the guidelines (with minor editorial differences) as the accessibility standards for transportation vehicles. The final DOT regulation establishes effective dates for the accessibility standard and address when the standards are to be applied to vehicles for which a solicitation closes after October 6, 1991.¹ See 49 CFR 37.7. The manuals in this series will deal only with the requirements for vehicles procured after this date.

Vehicles Covered

The Board's Vehicle Guidelines primarily address new and remanufactured vehicles instead of existing vehicles since the ADA does not necessarily require vehicle retrofit. Existing

¹The requirements for the size of platform lifts and minimum door height for buses over 22 feet in length apply to solicitations closing on or after January 26, 1992. See 49 CFR 37.13 and the December 9, 1991, Federal Register (56 FR 64214).

buses, for example, are not required to be retrofitted to meet the standards of Part 38 of the DOT regulation. Even compliance with the "one-car-per-train rule" and the mobility aid seating requirements for intercity rail cars can be met by the purchase of new vehicles. However, some entities which do not plan to purchase a sufficient number of new vehicles before the compliance date for the "one-car-per-train" rule may choose to retrofit existing vehicles. For these entities, the Board has included provisions in the appropriate general sections concerning such retrofitted vehicles.

Operations

The Vehicle Guidelines cover the design, manufacture and alteration of vehicles, not their operation. Operational requirements are within the purview of DOT, not the Board, and are covered by Part 37 of the DOT rule, especially subparts B and G. Except for the possibility of operational procedures allowed under the equivalent facilitation provision, discussed below, the Board's statutory mandate is to ensure accessibility of the built environment, including instances in which operational procedures might fail. For example, the Board cannot assume that the strength, agility and attention of a driver will be sufficient to prevent a heavy wheelchair from rolling off a lift. Thus, the Board has included a requirement for lift platform barriers. Neither is it appropriate, as one transit operator suggested, to assume that fellow passengers will have the strength or skill to assist persons with disabilities to board vehicles. It is just as inappropriate to expect other passengers to lift a wheelchair user into a vehicle as it is to assume others should lift a wheelchair over a curb or carry someone up a flight of stairs to enter a building. Therefore, specific vertical and horizontal gaps for rail vehicles are specified.

Wheelchair and Mobility Aid Standards

Neither the ADA, nor any other statute, confers upon the Board the authority to set standards or minimum requirements for wheelchairs and mobility aids. The ADA does, however, provide a clear mandate to the Board to set the minimum requirements for vehicles. The Board has attempted to carry out this charge in the fairest, most cost effective manner possible consistent with the statute.

Minimum Requirements

It should be noted that these Vehicle Guidelines, and the DOT standards based on them, are minimum requirements. Standards or specifications which provide greater access are permitted. In addition, there are sections which expressly permit alternatives (e.g., rear-facing securement). The word "may" is used where alternatives are permitted and should not be construed as a requirement. Also, an appendix has been included in the guidelines which contains non-mandatory, advisory guidance to assist in applying the rule. The material from that appendix has been generally incorporated into the discussion material in this document.

Periodic Revisions

The Board intends to conduct periodic updates and revision of the Vehicle Guidelines so that future technologies and practices can be incorporated into them. As noted in the following discussions, the Board feels that additional data and study are needed regarding certain issues and it intends to further revise and modify these guidelines based on its review of collected data and study results. Also, some variations determined to provide equivalent facilitation may be explicitly incorporated in future updates.

In addition, the Board plans to revise and update these technical manuals as new information or technology surfaces or as the Vehicle Guidelines themselves are changed. In some places in these manuals, notation is made of drafting errors or sections where the regulation itself is unclear. Several non-substantive changes in the regulation may be made in the future and these changes will be reflected in revised editions of these manuals.

How These Manuals are Organized

Each of these manuals deals with a separate transportation mode or vehicle type, based on a particular subpart of the final regulation (e.g., subpart B - Buses, Vans and Systems; subpart C - Rapid Rail Vehicles and Systems; etc.). However, since subpart A applies to all vehicles, it is included at the beginning of each manual. Each manual is self-contained so that reference to other manuals is not necessary. Where the provisions of the Vehicle Guidelines refer to other modes, or where the DOT regulation requires one type of vehicle to comply with the requirements of another type, the relevant sections are repeated.

The portions of this document which appear in **bold** are the provisions as they appear in the final Vehicle Guidelines. The text immediately following is a discussion of the rationale. For purposes of this document, the section numbers correspond to the provisions as they appear in Title 36 of the Code of Federal Regulations. The numbering system of DOT's regulation follows the same format with the exception of the prefix number (i.e., §1192.23(b)(6) is substantively identical to §38.23(b)(6), etc.). Some of the provisions, particularly the requirements for horizontal gaps and vertical displacement between vehicles and platforms, must be read in conjunction with the station design requirements in 36 CFR Part 1191, which are included as Appendix A of the DOT regulation at 49 CFR Part 37.

Other Publications

The Access Board has also made available a checklist based on its ADA Accessibility Guidelines (ADAAG) for Buildings and Facilities. ADAAG contains requirements for transit facilities, including bus stops and terminals, fixed facilities and stations, and airports. The Board also publishes technical bulletins on certain sections in ADAAG. These publications are available from the Access Board.

Subpart A -- General

§1192.1 Purpose.

This part provides minimum guidelines and requirements for accessibility standards to be issued by the Department of Transportation in 49 CFR Part 37 for transportation vehicles required to be accessible by the Americans with Disabilities Act (ADA) of 1990, 42 U.S.C. 12101 et seq.

This section merely sets forth the purpose of the guidelines which is to establish the minimum requirements for standards issued by DOT. Section 504 of the ADA requires the Access Board to issue minimum guidelines and requirements for vehicles and facilities. In turn, DOT must issue standards which are consistent with these guidelines. The DOT standards could be more strict than the guidelines but could not provide a lesser degree of accessibility. This format is similar to that under the Architectural Barriers Act of 1968 in which the Board issued the Minimum Guidelines and Requirements for Accessible Design which sets the baseline for the Uniform Federal Accessibility Standards (UFAS). As discussed previously, the standards themselves have been issued by DOT and are codified at 49 CFR Part 38.

§1192.2 Equivalent facilitation.

Departures from particular technical and scoping requirements of these guidelines by use of other designs and technologies are permitted where the alternative designs and technologies used will provide substantially equivalent or greater access to and usability of the vehicle. Departures are to be considered on a case-by-case basis by the Department of Transportation under the procedure set forth in 49 CFR 37.7.

The Board and DOT agree that there is a need for some flexibility to address unique and special circumstances and to facilitate the application of new technologies. Therefore, an "equivalent facilitation" provision has been included that is similar to the provision in the buildings and facilities guidelines. DOT has established procedures under which an entity (e.g., transit agencies, providers, etc.) may pursue alternative means of providing accessibility with respect to specific requirements of the standard. The FTA or Federal Railroad Administration (FRA) Administrator will determine on a case-by-case basis whether equivalent facilitation is provided. See 49 CFR 37.7 for the detailed procedures which must be followed as part of an application to the Administrator for an equivalent facilitation determination. DOT intends to consult with the Board in making determinations of equivalency.

The Board wishes to point out that equivalent facilitation does not constitute a waiver from any accessibility requirement and is not a lesser standard of accessibility. Alternate

designs and technologies may be used only where they will provide substantially equivalent or greater access to, and usability of, a vehicle. The Board encourages that, when considering alternative designs and technologies, entities consult with individuals with disabilities and their organizations at the earliest possible stage of the process. The Board is available to provide technical assistance regarding equivalent facilitation.

In developing an equivalent facilitation proposal, an entity should consider the intent of the guideline or standard requirement. For example, large buses are required to have a doorway height of 5'8" from the raised lift platform. This height, although it accommodates only about 70% of the adult male population, is intended to provide some minimum head clearance for standees.

This clearance is especially important where a standee would be positioned outside the vehicle door when the lift is down but is moved up and through the door as the lift is raised. Other models of lifts do not move the standee through the door, but the individual would need to pass through the door after the lift is raised. While it is not practicable to provide clearance for the 90th percentile standee, it is desirable to provide as much head room as possible, since ducking to clear the doorway may be more difficult for persons with ambulatory disabilities than for other members of the general population. A greater height was not specified because information supplied by vehicle manufacturers indicated that this height was consistent with that needed to accommodate overhead door opening mechanisms and roof lines.

However, some lifts are designed such that the motion is entirely vertical ("elevator" type lifts) and a standee is positioned at the full inboard edge and is raised fully within the vehicle, clear of the door lintel. In this case, the FTA Administrator has determined that the intent of the doorway height requirement is being met by the particular lift configuration, provided the location of the handrails is such that the full inboard standing position is viable.

§1192.3 Definitions.

***Accessible* means, with respect to vehicles covered by this part, compliance with the provisions of this part.**

***Automated guideway transit (AGT) system* means a fixed-guideway transportation system which operates with automated (driverless) individual vehicles or multi-car trains. Service may be on a fixed schedule or in response to a passenger-activated call button. Such systems using small, slow moving vehicles, often operated in airports and amusement parks, are sometimes called "people movers".**

***Bus* means any of several types of self-propelled vehicles, other than an over-the-road bus, generally rubber tired, intended for use on city streets, highways, and busways,**

including but not limited to minibuses, forty- and thirty-foot transit buses, articulated buses, double-deck buses, and electric powered trolley buses, used to provide designated or specified public transportation services. Self-propelled, rubber tire vehicles designed to look like antique or vintage trolleys or street cars are considered buses.

Common wheelchairs and mobility aids means belonging to a class of three or four wheeled devices, usable indoors, designed for and used by persons with mobility impairments which do not exceed 30 inches in width and 48 inches in length, measured 2 inches above the ground, and do not weigh more than 600 pounds when occupied.

Commuter rail car means a rail passenger car obtained by a commuter authority (as defined by 49 CFR 37.3) for use in commuter rail transportation.

Commuter rail transportation means short-haul rail passenger service operating in metropolitan and suburban areas, operated by a commuter authority whether within or across the geographical boundaries of a State, usually characterized by reduced fare, multiple ride, and commutation tickets and by morning and evening peak period operations. This term does not include light or rapid rail transportation.

Demand responsive system means any system of transporting individuals, including the provision of designated public transportation service by public entities and the provision of transportation service by private entities, including but not limited to specified public transportation service, which is not a fixed route system.

Designated public transportation means transportation provided by a public entity (other than public school transportation) by bus, rail, or other conveyance (other than transportation by aircraft or intercity or commuter rail transportation) that provides the general public with general or special service, including charter service, on a regular and continuing basis.

Fixed route system means a system of transporting individuals (other than by aircraft), including the provision of designated public transportation service by public entities and the provision of transportation service by private entities, including but not limited to specified public transportation service, on which a vehicle is operated along a prescribed route according to a fixed schedule.

High speed rail means an intercity-type rail service which operates primarily on a dedicated guideway or track not used, for the most part, by freight, including, but not limited to, trains on welded rail, magnetically levitated (maglev) vehicles on a special guideway, or other advanced technology vehicles, designed to travel at speeds in excess of those possible on other types of railroads.

Intercity rail passenger car means a rail car intended for use by revenue passengers obtained by the National Railroad Passenger Corporation (Amtrak) for use in intercity rail transportation.

Intercity rail transportation means transportation provided by Amtrak.

Light rail means a streetcar-type vehicle railway operated on city streets, semi-private rights-of-way, or exclusive private rights-of-way. Service may be provided by step-entry vehicles or by level-boarding.

New vehicle means a vehicle which is offered for sale or lease after manufacture without any prior use.

Over-the-road bus means a vehicle characterized by an elevated passenger deck located over a baggage compartment.

Rapid rail means a subway-type transit vehicle railway operated on exclusive private rights-of-way with high-level platform stations. Rapid rail may also operate on elevated or at-grade level track separated from other traffic.

Remanufactured vehicle means a vehicle which has been structurally restored and has had new or rebuilt major components installed to extend its service life.

Specified public transportation means transportation by bus, rail, or any other conveyance (other than aircraft) provided by a private entity to the general public, with general or special service (including charter service) on a regular and continuing basis.

Tram means any of several types of motor vehicles consisting of a tractor unit, with or without passenger accommodations, and one or more passenger trailer units, including but not limited to vehicles providing shuttle service to remote parking areas, between hotels and

other public accommodations, and between and within amusement parks and other recreation areas.

Used vehicle means a vehicle with prior use.

The definitions in this section are consistent with the definitions included in the DOT final rule. This set of definitions, however, does not include some terms which are included in the DOT rule, primarily those which concern operational issues not addressed by the guidelines. Notice that the term "accessible" means compliance with the provisions of the guidelines (or the DOT standards in 49 CFR Part 38) which includes any determinations of equivalent facilitation.

§1192.4 Miscellaneous instructions.

(a) Dimensional conventions. Dimensions that are not noted as minimum or maximum are absolute.

(b) Dimensional tolerances. All dimensions are subject to conventional engineering tolerances for material properties and field conditions, including normal anticipated wear not exceeding accepted industry-wide standards and practices.

(c) Notes. The text of these guidelines does not contain notes or footnotes. Additional information, explanations, and advisory materials are located in the Appendix.

(d) General terminology. The terms used in this part shall have the following meanings:

(1) *Comply with* means meet one or more specification of these guidelines.

(2) *If, or if...then* denotes a specification that applies only when the conditions described are present.

(3) *May* denotes an option or alternative.

(4) *Shall* denotes a mandatory specification or requirement.

(5) *Should* denotes an advisory specification or recommendation and is used only in the appendix to this part.

This section contains several provisions designed to reduce some confusion which became evident in the responses to the original proposed regulation. It contains miscellaneous instructions, including dimensional conventions and tolerances, and general terminology. An appendix was also added to the final guidelines that contains additional information, explanations, and advisory materials. That material is summarized in the discussion sections of this document, where appropriate.

With respect to dimensional tolerances, certain materials expand or contract due to variations in temperature or during the process of "curing" or drying. As a result, even close tolerances during construction or manufacture cannot ensure continued conformance to a given standard. For example, a cable-driven historic inclined system has been modified to be generally accessible. However, the cable is subject to uncontrollable stretching during the day, especially in hot weather. The cars generally provide level entry in the morning, but may be significantly out of alignment by the end of the day. Such variation, even in a new system, resulting from material variations beyond the control of the operator would not be deemed in violation of the guidelines. Furthermore, unlike buildings and facilities which are essentially stationary objects, vehicles move and have dynamic as well as static "envelopes". Springs lose their elasticity, steel rails and wheels wear down, and supposedly "fixed" objects settle due to dynamic stress. The allowance for normal wear, however, is only to be applied in accordance with accepted industry standards and practices, not simply an agency policy. If the industry, including designers, engineers, manufacturers, operators, and recognized professional associations agree that a specific adherence can be achieved above that allowed by an agency policy or practice, it is the industry standard which is to be applied, not the agency policy.

Reliance on dimensional tolerances, however, is not an excuse for improper or deferred maintenance, or poor design or construction methods. For example, the claim of "dimensional tolerances" could not be made for a lift which fails to meet the vehicle floor within the limits specified in these guidelines, simply because an adjustment which could have been reasonably made to a control system or limit switch was not made. Neither could a rail operator be excused from compliance because it accepted vehicles from a manufacturer which did not meet the operator's bid specification. Nor could a group of manufacturers, operators or designers, for example, simply get together to adopt a lower "standard" solely for the purpose of relaxing compliance. Such a change would need to be acknowledged by a significant segment of the industry to constitute an "accepted industry standard or practice." Moreover, dimensional tolerances apply to the construction, manufacture or operation of a system, not to the design. An entity cannot issue vehicle specifications which are less stringent than those required by the guidelines; nor could it justify a wider horizontal gap as being within dimensional tolerances because it did not specify its vehicles to be within achievable limits for sway or stability.

Sub part F -- Intercity Rail Cars and Systems

§1192.111 General.

(a) New, used and remanufactured intercity rail cars, to be considered accessible by regulations issued by the Department of Transportation in 49 CFR Part 37, shall comply with this subpart to the extent required for each type of car as specified below.

The Americans with Disabilities Act (ADA) requires new or used rail cars that are purchased or leased after August 25, 1990, to be accessible. A public entity may purchase or lease a used intercity rail car for use on its system that is not readily accessible to and usable by individuals with disabilities, if after making demonstrated good faith efforts to obtain an accessible car, it is unable to do so. See 49 CFR §37.87(c) for a description of what constitutes good faith efforts. Cars that are remanufactured after this date to extend their usable life for 10 years or more are also required to be accessible, to the extent it does not compromise the structural integrity of the car. On October 4, 1990, the U.S. Department of Transportation (DOT) issued an interim set of requirements for such cars.

The guidelines discussed in this technical assistance document are substantively identical to standards issued by DOT on September 6, 1991, at 49 CFR Part 38 which replace the interim rules. The DOT rule at 49 CFR Part 37 further outlines the applicability and effective dates of these requirements. In general, these requirements became effective on October 7, 1991. Questions as to whether certain cars are subject to these standards and specific effective dates should be directed to DOT.

This section, as discussed below, contains scoping provisions based on the specific requirements of the ADA. A chart outlining these requirements in relation to each type of car is provided at the end of this section.

While there is no specific section on bi-level coach cars, which are more commonly used in commuter rail systems, the ADA requires all new rail cars to be able to be entered and used by persons with disabilities. Bi-level coach cars which can be entered directly from the station platform, as opposed to bi-level cars which can only be entered from an adjacent car, are subject to standards for single-level coaches pertaining to doors, passageways, steps and thresholds, etc. Accessible spaces should be provided on the level which can be directly accessed from the platform, usually the lower level. Such spaces may count toward the number of spaces required by 49 CFR 37.91.

The following provisions address the minimum requirements for various types of intercity rail cars. These requirements are summarized in a chart on page 25.

(1) Single-level rail passenger coaches and food service cars (other than single-level dining cars) shall comply with §§1192.113 through 1192.123. Compliance with §1192.125 shall be required only to the extent necessary to meet the requirements of paragraph (d) of this section.

Single-level passenger coaches and food service cars must comply with all the requirements of this subpart except those of section 1192.127, which apply to sleeping compartments.

For the purposes of these guidelines and the provision of a minimum number of accessible seating and wheelchair storage locations, it should be noted that the term "food service car," defined as any car in which food or drink is served, includes dining and lounge cars. Such cars, as discussed below, are required to provide at least one table for accessible seating and one storage space which would count as part of the total number of such spaces required for each train.

(2) Single-level dining and lounge cars shall have at least one connecting doorway complying with §1192.113(a)(2), connected to a car accessible to persons using wheelchairs or mobility aids, and at least one space complying with §1192.125(d)(2) and (3), to provide table service to a person who wishes to remain in his or her wheelchair, and space to fold and store a wheelchair for a person who wishes to transfer to an existing seat.

This paragraph concerns single-level dining and lounge cars. These types of cars are not entered directly from the platform but rather through the vestibule of an adjoining car. The ADA requires that, unless not practical, an accessible coach car must be placed adjacent to the end of the dining car so that individuals with disabilities can enter the coach car and go through the vestibule to the dining car. Passage into dining cars is necessary since they do not have doors opening to platforms. Thus, this provision applies the requirement in the section on doorways (1192.113) pertaining to end doors. These doors must have a minimum clear opening width of 32 inches to the extent allowed by regulations issued under the Federal Railroad Safety Act of 1970. This provision also requires that space be available to park a wheelchair at a table and to store a folded wheelchair if the person wishes to transfer to a seat.

Based on the legislative history of the ADA, the Board strongly recommends that single-level dining and lounge cars comply with those sections that apply to single-level passenger coaches and food service cars except those requirements pertaining to doorways entered directly from the platform. These requirements include interior circulation and handrails (1192.115(a) and (b)), floor surfaces (1192.117(a)), and public information systems (1192.121). Since these cars do not have direct entrances, as noted above, the requirements for handrails

and color contrast at entrance steps (1192.115(c) and 1192.117(b), respectively), and lighting at entrances (1192.119) would not apply.

(3) Bi-level dining cars shall comply with §§1192.113(a)(2), 1192.115(b), 1192.117(a), and 1192.121.

This provision addresses bi-level dining cars. These types of cars can only be entered from the upper level of an adjacent bi-level car. (The lower level is occupied by food preparation equipment). The ADA does not require bi-level dining cars to be wheelchair accessible. However, as explained in the legislative history, they must incorporate accessibility features such as adequate doorway clearances (1192.113(a)(2)) and slip-resistant floor surfaces (1192.117(a)) for individuals with semi-ambulatory disabilities, and public information systems (1192.121) for individuals with hearing and vision impairments. It is also required that, where handrails and stanchions are provided, they "permit safe boarding, on-board circulation, seating and standing assistance, and alighting by persons with disabilities" (1192.115(b)). The Board strongly recommends that such handrails and stanchions meet the specifications for diameter and clearance (1192.115(a)).

(4) Bi-level lounge cars shall have doors on the lower level, on each side of the car from which passengers board, complying with §1192.113, a restroom complying with §1192.123, and at least one space complying with §1192.125(d)(2) and (3) to provide table service to a person who wishes to remain in his or her wheelchair and space to fold and store a wheelchair for a person who wishes to transfer to an existing seat.

This section pertains to bi-level lounge cars which are often placed in trains that also have bi-level dining cars. The lower level of a bi-level lounge car can be entered directly from the platform and normally has a restroom and an area where drinks are served. The ADA requires that, whenever a new bi-level lounge car is operated in conjunction with a bi-level dining car, table service be provided to persons with disabilities in the lower level of the lounge car essentially equivalent to that which other passengers could obtain in the dining car.

Consequently, the lower doors of these cars must conform to the requirements for entrances and passageways (1192.113), accessible restrooms, if restrooms are provided for other members of the general public (1192.123), and wheelchair seating and storage requirements (1192.125(d)). Further, paragraph (b) of this section requires that boarding devices such as lifts (1192.125(b)) or ramps (1192.125(c)) be provided where level boarding is not provided.

In view of the legislative history of the ADA, it is also strongly recommended that bi-level lounge cars comply with the requirements for interior circulation (1192.115), floors, steps and thresholds (1192.117), lighting (1192.119), and public information systems (1192.121).

(5) Restrooms complying with §1192.123 shall be provided in single-level rail passenger coaches and food service cars adjacent to the accessible seating locations required by paragraph (d) of this section. Accessible restrooms are required in dining and lounge cars only if restrooms are provided for other passengers.

The ADA requires that single-level passenger coaches and food service cars with wheelchair spaces provide a wheelchair accessible restroom. This restroom must be located adjacent to spaces where wheelchairs may be positioned or stored. Single-level dining cars, single-level lounge cars, and the lower level of bi-level lounge cars are required to provide wheelchair accessible restrooms only if restrooms are provided for all passengers.

(6) Sleeper cars shall comply with §§1192.113(b) through (d), 1192.115 through 1192.121, and 1192.125, and have at least one compartment which can be entered and used by a person using a wheelchair or mobility aid and complying with §1192.127.

Sleeper cars are fully subject to all sections except portions of those pertaining to doorways (1192.113) and wheelchair seating and storage spaces (1192.125(d)). Although the section on restrooms is not referenced by this provision, the section on sleeping compartments (1192.127) requires that accessible compartments contain a restroom complying with 1192.123 which can be entered from the compartment. Section 1192.113(a) is not referenced because it relates directly to entrance doors adjacent to the spaces required by 1192.111(d) which are not included on sleeper cars. Nevertheless, the ADA makes it clear that sleeper cars must be able to be entered and used. Therefore, the platform entrance doors located closest to the accessible sleeping compartment should comply with 1192.113(a).

(b)(1) If physically and operationally practicable, intercity rail cars shall comply with §1192.113(d) for level boarding.

This provision recognizes that level boarding is the best means of providing accessibility and benefits all passengers. It is operationally superior to deploying boarding devices such as lifts, ramps, or bridge plates and can significantly reduce station dwell times required for passenger boarding and alighting. The term "level-boarding," as used by these guidelines, means direct access between the platform and any car of the train without any change in level. For intercity rail, this would in most cases involve access from a high level platform. Boarding devices, such as lifts, ramps, or bridge plates, are not included in this term. For level boarding, full length high platforms are recommended over mini-high platforms, which can only accommodate a limited number of passengers and may restrict normal passenger flow. Also, mini-high platforms provide a smaller area where car entrances must be aligned and, in some

cases, may require double-stopping of the train, especially when there are more wheelchair or mobility aid users than can be accommodated on a single car.

This requirement applies only where it is "structurally and operationally feasible" to provide level boarding. The feasibility of level boarding depends primarily on the boarding platforms of the system. It is recognized that level boarding is most feasible in new systems where station platforms can be built so as to be level with the floor height of cars. The requirements for transit facilities in subpart C of the DOT rule require that intercity rail stations have platforms so that level boarding can be provided unless, again, it is not "operationally or structurally feasible" to do so. In the case of new stations, the question of feasibility will depend primarily on whether high platforms can be provided. In the case of existing stations, it would not be considered "structurally" feasible to provide level-boarding at stations with low-level platforms. Level boarding may not be "operationally" feasible along track which is also shared by freight lines since greater platform setbacks are often required.

Under this provision, cars of level boarding systems must be coordinated with the boarding platform as specified by these guidelines. This provision pertains only to those types of cars where access from the platform directly into the car is required (single-level passenger and food service cars, bi-level lounge cars, and sleeper cars).

(2) Where level boarding is not structurally or operationally practicable, intercity rail cars shall comply with §1192.125.

This provision requires that boarding devices such as car-borne, platform-mounted, or portable lifts, ramps or bridge plates be provided where level boarding is not achievable. In new and key stations, the use of such devices is allowed where it would not be feasible to construct high-level platforms. Boarding devices must meet the applicable specifications of these guidelines for mobility aid accessibility.

(c) If portions of the car are modified in a way that affects or could affect accessibility, each such portion shall comply, to the extent practicable, with the applicable provisions of this subpart. This provision does not require that inaccessible cars be retrofitted with lifts, ramps or other boarding devices.

This provision is similar to existing requirements of all common accessibility codes and should be viewed as an "opportunity" clause. That is, when modifications are made for any reason, the opportunity should be explored to provide the maximum access feasible. When a car is modified, each element that is part of the modification should be brought in to compliance with the applicable sections of these requirements. For example, if a car's floor is resurfaced and its electrical system rewired, the new floor surface should be slip resistant at aisles and

areas used by standees and mobility aid users. If existing audible signals are replaced or rewired, the installation of audible and visual door signals would also be required as part of the modification project. The intent of this provision is to ensure that elements of a car will be made accessible when the opportunity to do so exists in the regular course of modifying or upgrading cars. However, those elements of the car not affected by the modification plan would not have to be brought into conformance with these requirements. Under any modification plan, the installation of a lift, ramp, bridge plate or other boarding device is not required, even if the entrance of a car is modified.

(d) Passenger coaches or food service cars shall have the number of spaces complying with §1192.125(d)(2) and the number of spaces complying with §1192.125(d)(3), as required by 49 CFR 37.91.

The ADA requires that intercity rail trains provide a number of spaces for parking wheelchairs (for individuals who wish to remain in their wheelchairs) and a number of spaces for folding and storing wheelchairs (for individuals who wish to transfer to a seat) in single-level passenger coaches and food service cars equal to: (a) one half the number of coaches in the train by July 26, 1995; and (b) the total number of coaches in the train by July 26, 2000. Not more than two of each type of space may be located in any coach or food service car. Each coach or food service car on which wheelchair spaces are provided must have a wheelchair accessible restroom if restrooms are provided for the general public. These requirements are intended to minimize the loss of seats. For instance, in a train with 10 single-level passenger coaches, a total of 10 wheelchair seating locations and 10 spaces for storing folded wheelchairs would have to be provided by July 2000. Instead of placing one of each type of space in each of the 10 coaches, two of each type of space could be placed in 5 coaches for the same total number of spaces and only those 5 coaches would be required to have wheelchair accessible restrooms. If a longer train will divide into two shorter trains along a route, a sufficient number of such wheelchair accessible coaches would have to be included on the longer train to ensure that the appropriate number of wheelchair accessible coaches are on each of the shorter trains when they divide.

(e) Existing cars retrofitted to meet the seating requirements of 49 CFR 37.91 shall comply with §§1192.113(e), 1192.123, 1192.125(d) and shall have at least one door on each side from which passengers board complying with §1192.113(d). Existing cars designed and manufactured to be accessible in accordance with Department of Transportation regulations implementing section 504 of the Rehabilitation Act of 1973 that were in effect before October 7, 1991, shall comply with §1192.125(a).

The ADA requires that at least one car in each train of two or more cars be accessible by 1995. Some operators will choose to make existing cars accessible in order to meet this requirement. In such situations, this provision requires only that cars conform to the following:

REQUIREMENTS FOR RETROFITTED CARS
<p>One accessible door on each side from which passengers board that:</p> <ul style="list-style-type: none"> - is designated by the International Symbol of Accessibility; and - is coordinated with the platform where level entry is provided so that the horizontal gap does not exceed 4 inches and the car floor is within plus or minus 2 inches of the platform height when the vehicle is loaded to 50% of its capacity
Boarding devices (lift, ramp or bridge plate) where level entry is not provided
Accessible seating locations and storage spaces (at least one, but no more than two that are on an accessible route from accessible entrances)
An accessible restroom (if restrooms are provided for all passengers) and signage at adjacent entrance to car indicating the availability of an accessible restroom

Existing cars that meet previous accessibility standards can also be used to meet the "one-car-per-train" rule as long as they meet the requirements for boarding devices where level entry is not provided. Where they do not, existing cars can be used to satisfy the rule only if modified to meet the requirements for boarding devices. Thus, cars manufactured in accordance with earlier standards issued under section 504 of the Rehabilitation Act must conform with the requirements under "Mobility Aid Accessibility" (1192.125) so that such cars, if originally acquired for use on a level-entry system, will be equipped with appropriate boarding devices for use where level entry is not provided (e.g., at low-level platforms).

REQUIREMENTS FOR NEW CARS

	1192.113 Doorways	1192.115 Interior Circulation	1192.117 Floors, Steps & Thresholds	1192.119 Lighting	1192.121 Public Info. Systems	1192.123 Restrooms	1192.125 Mobility Aid Accessibility	1192.127 Sleeping Compartments
Passenger & Food Service (single level)	full compliance	full compliance	full compliance	full compliance	full compliance	full compliance if restroom provided for general public; req'd location near access. seating	boarding devices for non-level entry cars; wheelchair & storage spaces as required by DOT rule	N/A
Dining & Lounge (single level)	at least one 32" end door leading to an accessible car	(recommend compliance of interior hand rails (a) & (b))	(recommend compliance of floors (a))	N/A	(recommend full compliance)	full compliance if restroom is provided for general public	at least 1 wheelchair space and 1 storage space	N/A
Dining (bi-level)	at least one 32" end door leading to an accessible car	compliance with (b) for on- board cir. req'd; (recommend compliance with (a))	slip resistant floor surfaces as required by (a)	N/A	full compliance	full compliance if restroom is provided for general public	N/A	N/A
Lounge (bi-level)	full compliance (lower level doors only)	(recommend full compliance)	(recommend full compliance)	(recommend full compliance)	(recommend full compliance)	full compliance if restroom is provided for general public	boarding devices for non-level entry cars; at least 1 wheelchair space and 1 storage space	N/A
Sleeper	compliance with (b)-(d) req'd; (recommend full compliance)	full compliance	full compliance	full compliance	full compliance	full compliance for restroom serving compartment	boarding devices for non-level entry cars	at least one compartment in full compliance

REQUIREMENTS FOR EXISTING CARS RETROFITTED UNDER "ONE CAR PER TRAIN" RULE

Existing Cars	at least 1 door on each side coordinated with platform & marked as accessible	N/A	N/A	N/A	N/A	full compliance if restroom provided for general public	boarding devices for non- level entry cars; at least 1 wheelchair space and 1 storage space	N/A
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§1192.113 Doorways.

(a) Clear width. (1) At least one doorway, on each side of the car from which passengers board, of each car required to be accessible by §1192.111(a) and where the spaces required by §1192.111(d) are located, and at least one adjacent doorway into coach passenger compartments shall have a minimum clear opening width of 32 inches.

Only one entrance on each side of the car from which passengers board is required to provide a minimum clear opening of 32 inches. If boarding only occurs from one side, only that side is required to have an accessible door. Many intercity rail cars have an interior doorway into passenger compartments. This doorway must also provide 32 inches of clear width. Accessible seating locations should be located as close as possible to this compartment doorway, as shown in Figure 4. This will ensure that an accessible route is provided from the entrances on both sides of a car at one end to accessible seating locations, which are to be placed near the accessible entrances.

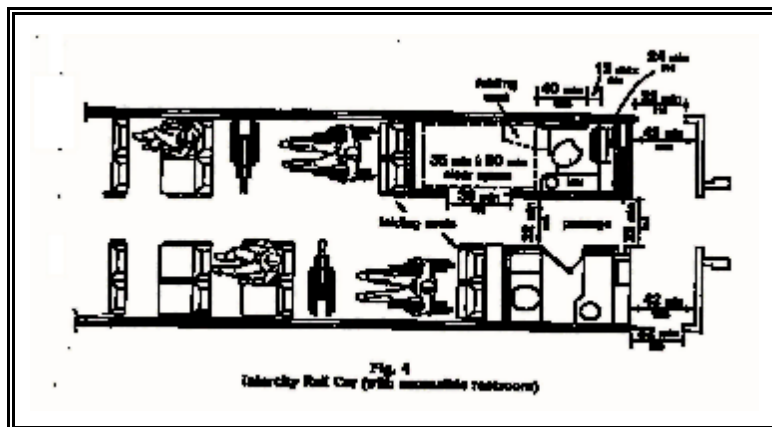
The 32 inch door width does not pertain solely to wheelchair or wheeled mobility aid users. Rather, the dimension is designed to accommodate the crutch-tip-to-crutch-tip distance for a typical crutch user. Also, the requirement is for a "clear opening." Providing a wide doorway with a vertical stanchion in the center does not meet this requirement. Obviously, accessible doorways and passageways are also needed in accessible sleeper cars.

(2) Doorways at ends of cars connecting two adjacent cars, to the maximum extent practicable in accordance with regulations issued under the Federal Railroad Safety Act of 1970 (49 CFR Parts 229 and 231), shall have a clear opening width of 32 inches to permit wheelchair and mobility aid users to enter into a single-level dining car, if available.

The 32-inch clear width is specified for end doors to ensure access between single-level coaches, food service cars, and dining cars. Under the ADA, bi-level cars are required to be accessible, although not necessarily for wheelchair users. However, as noted above, the 32-inch clear width specification is based on the minimum space needed for crutch users and other persons who are semi-ambulatory. This provision recognizes that the necessary structural modification in providing 32-inch end doors on new cars may conflict with safety requirements issued under the Railroad Safety Act of 1970. Consequently, this provision applies only where there is no conflict with these safety regulations. Where there is conflict, the end doors must provide the maximum clear width allowed.

(b) Passageway. Doorways required to be accessible by paragraph (a) of this section shall permit access by persons using mobility aids and shall have an unobstructed passageway at least 32 inches wide leading to an accessible sleeping compartment complying with §1192.127 or seating locations complying with §1192.125(d). In cars where such doorways require passage through a vestibule, such vestibule shall have a minimum width of 42 inches. (See Fig. 4)

This section, in conjunction with paragraph (a)(1), ensures that an accessible route is provided to accessible seating locations. Paragraph (a)(1) addresses entrances and doors that are located on such routes, while this provision covers passageways. Intercity rail cars with entrance vestibules typically have routes that require a right-angle turn into the compartment door. Due to the maneuvering involved, this provision requires that such vestibules be at least 42 inches wide so that enough clear space is provided for wheelchair and mobility aid users to negotiate such turns. The 42-inch dimension is based on existing accessibility standards for buildings and facilities and is considered the absolute minimum amount of space necessary for turns at doorways. This requirement would only apply to one vestibule for each car located at the same end where accessible entrances and compartment doors are located. The figure below illustrates these requirements.



During the development of these guidelines, many commenters pointed out that existing cars could not be easily modified to provide 42-inch wide vestibules. However, it should be noted that this requirement pertains only to new cars and that existing cars or cars that are retrofitted under the "one-car-per-train" rule would not be subject to this provision.

(c) Signals. If doors to the platform close automatically or from a remote location, auditory and visual warning signals shall be provided to alert passengers of closing doors.

Audible signals usually activate before the doors begin to close and thus provide advance warning that the doors are about to close. Without visual signals, persons with hearing impairments are not afforded any equivalent advance warning and can only detect closings as the doors actually begin to close. According to information received during the development of these guidelines, the addition of audible and visual warning signals for automatically-operated doors of new cars is feasible and represents only a modest cost increase for a chime, light and associated electrical controls at each doorway. These signals are not required to be provided on existing cars or those that are retrofitted. Since proposed

requirements for door closing force and speed have been removed, the Board considers the provision of audible and visual indicators to be of even greater importance.

The term "passengers" means persons within the transit system including those who are on the train and those waiting to board. Therefore, warning signals must be visible from both inside and outside the car. This can be achieved by equipping the entrances of new cars with both an interior and exterior light indicator. Also, it is conceivable that a single light indicator, by either its illumination level, design, or placement may be specified so that it is visible both inside and outside the car. Either method of addressing this requirement is acceptable so long as it provides a visual warning that doors are about to close. Further, visual indicators should be synchronized with audible signals so that equivalent advance notification of door closure is provided to all persons, including those with hearing or visual impairments.

Notice that the requirement for audible and visual warning signals applies only to doors which close automatically or are closed from a remote location.

(d) Coordination with boarding platforms. - (1) Requirements. Cars which provide level-boarding in stations with high platforms shall be coordinated with the boarding platform or mini-high platform design such that the horizontal gap between a car at rest and the platform shall be no greater than 3 inches and the height of the car floor shall be within plus or minus 5/8 inch of the platform height. Vertical alignment may be accomplished by car air suspension, platform lifts or other devices, or any combination.

This requirement pertains to new cars operating at new stations with high-level platforms (level boarding) or mini-high platforms. These specifications and the exceptions that follow outline the maximum horizontal gap and vertical tolerance allowed. However, cars should be specified to be level with the platform edge and as close to it horizontally as possible, so that under normal passenger conditions these maximum levels are not exceeded. These tolerances, even when specified in the acquisition of new cars, may not be achieved under all conditions. The requirements are based on normal passenger conditions. It is incumbent on the operator not only to specify the correct floor height when ordering cars (and to accept them only if they meet the specification) but also to correctly specify the rail-to-platform height when constructing new stations. Thus, it is important to keep in mind that the horizontal gap and vertical tolerance are dependent not only on the car specifications but also the design and construction of station platforms. Those requirements, including gap requirements, are provided at 49 CFR Part 37, Appendix A.

In those instances where none of these requirements could be met, including those allowed by the exceptions, operators would be able to pursue alternative means of reducing gaps under the procedure for equivalent facilitation contained in DOT's rule (see 49 CFR 37.7).

Also, the Board recognizes that close tolerances during construction or manufacture cannot insure continued conformance to a given standard. Variations, such as those resulting from normal wear or material variations would not be deemed violations of the guidelines. However, only those variations within the limits of accepted industry practices or tolerances are allowed. (See Subpart A at the beginning of this manual for further discussion of dimensional tolerances.) When the variation exceeds these limits, adjustments would be required to bring the car back into alignment. The Board recognizes the need for flexibility where feasibility and cost significantly affect the ability to meet the standards for new cars and new stations. The exceptions below take into account circumstances that would make compliance with the gap tolerances for new systems difficult, if not impossible, to meet.

The intent of the above specifications is to define an "accessible interface" which would not necessitate additional gap-closing methods or devices. If it cannot be achieved, additional devices or equipment must be provided.

(2) Exception. New cars operating in existing stations may have a floor height within plus or minus 1-1/2 inches of the platform height.

The ability to closely align new cars with existing station platforms is limited by the rail-to-platform height and the vertical distance between the track and the platform. Consequently, this provision allows new cars serving existing stations a greater vertical tolerance since the variability in existing platform height may make the 5/8 inch tolerance infeasible. However, the 3-inch maximum for the horizontal gap must be met unless prohibited by platform setbacks (addressed below).

(3) Exception. Where platform set-backs do not allow the horizontal gap or vertical alignment specified in paragraph (d)(1) or (2), platform or portable lifts complying with §1192.125(b), or car or platform bridge plates, complying with §1192.125(c), may be provided.

Since many intercity rail lines share track with freight lines, high platforms may not be operationally feasible. Freight lines often require greater platform set-backs from the track. Therefore, it is anticipated that most intercity rail systems will provide access from low platforms with car-borne, platform-mounted, or portable lifts. Other options include bridging the gap between cars and platforms with ramps or bridge plates or providing mini-high platforms. One commuter rail operator has developed a car-borne bridge plate mounted in a car vestibule compartment which can be easily and quickly deployed where needed.

NOTE: The exception in section 1192.93(d)(3) is also intended to apply to retrofitted vehicles addressed by section 1192.93(d)(4) (below). However, as currently written in the final rule, this is not apparent. A technical correction will be made to clarify that the alternatives

allowed in (d)(3) for lifts, ramps, or bridge plates where platform set-backs prohibit coordination of the vehicle with the platform as required in (d)(1) or d(2) would also apply to retrofitted vehicles operating in new and key stations addressed by d(4).

(4) Exception. Retrofitted vehicles shall be coordinated with the platform in existing stations such that the horizontal gap shall be no greater than 4 inches and the height of the vehicle floor, under 50% passenger load, shall be within plus or minus 2 inches of the platform height.

This exception pertains to existing cars that are made accessible to comply with the "one-car-per-train" rule. Generally, existing cars cannot be coordinated with the platform to the degree that new cars can. Even if feasible, retrofitting existing cars to meet the requirements for new cars could be very expensive. Consequently, this exception allows a greater and more easily achievable horizontal gap and vertical tolerance. These cars need to be aligned with the platform at new stations or key stations so that the horizontal gap does not exceed 4 inches and the vertical tolerance is less than 2 inches. While the Board does not consider such a gap to be desirable, such cars will eventually be phased out as new cars are added to the system.

HORIZONTAL AND VERTICAL TOLERANCES

	NEW STATIONS	EXISTING STATIONS
NEW CARS	3" horizontal gap 5/ 8" vertical tolerance	3" horizontal gap 1-1/ 2" vertical tolerance
RETROFITTED CARS	4" horizontal gap 2" vertical tolerance	4" horizontal gap 2" vertical tolerance

(e) Signage. The International Symbol of Accessibility shall be displayed on the exterior of all doors complying with this section unless all cars and doors are accessible and are not marked by the access symbol. (See Fig. 6) Appropriate signage shall also indicate which accessible doors are adjacent to an accessible restroom, if applicable.

The accessible entrances of new and retrofitted cars are required to be designated as accessible using the International Symbol of Accessibility (access symbol) shown in the figure below. However, new cars acquired for an intercity rail system in which all cars are accessible do not have to be designated by the symbol. In fully accessible systems, consistency is important, so that if existing accessible cars are designated, new cars should be designated as

well. Still, the Board considers the access symbol to be at times subject to over-use and thus recommends that transit operators remove symbols when all cars are accessible. Since cars are usually designated by decals, which eventually wear and must be replaced, operators may opt to simply not replace them.

Signage for accessible restrooms is also required. Since restrooms are not necessarily provided on all intercity rail cars, signage must be placed at the entrance so that persons may determine before boarding which car offers an accessible restroom. This signage should be located at the accessible entrances closest to such restrooms or those accessible entrances one would be expected to use to reach the restrooms. Currently, there is no standard symbol or sign for indicating that an accessible restroom is provided at a certain location. The content of such signs are left to the discretion of operators. Such signs might include written information, such as "Accessible Restroom Available," and any appropriate or assistive symbols.



NOTE: The DOT regulation at 49 CFR 38.113 contains a typographical error in which this section is designated as "3" rather than "e."

§1192.115 Interior circulation, hand rails and stanchions.

(a) Where provided, hand rails or stanchions within the passenger compartment shall be placed to permit sufficient turning and maneuvering space for wheelchairs and other mobility aids to reach a seating location, complying with §1192.125(d), from an accessible entrance. The diameter or width of the gripping surface of interior handrails and stanchions shall be 1-1/4 inches to 1-1/2 inches or shall provide an equivalent gripping surface. Hand rails shall be placed to provide a minimum 1-1/2 inches knuckle clearance from the nearest adjacent surface.

This provision does not require hand rails or stanchions but stipulates that where they are provided, they must not obstruct the accessible route connecting accessible entrances to accessible seating locations. Handrails or stanchions cannot encroach upon the 32 inches of clear width for accessible routes or the 42 inches of clear width necessary for right-angle turns at vestibule doorways.

Most car handrails are made of pipe. In the building industry, pipe size typically specifies inside diameter so that a 1-1/2 inch pipe handrail actually has a larger outside

diameter, sometimes up to 2 inches. Such handrails have not posed any known problem. Thus, the 1-1/2 inch diameter requirement can result in a handrail of approximately 2 inches under current building industry practices.

(b) Where provided, handrails and stanchions shall be sufficient to permit safe boarding, on-board circulation, seating and standing assistance, and alighting by persons with disabilities.

This provision is a general performance requirement in order to allow as many options as possible in the design of accessible cars.

(c) At entrances equipped with steps, handrails or stanchions shall be provided in the entrance to the car in a configuration which allows passengers to grasp such assists from outside the car while starting to board, and to continue using such assists throughout the boarding process, to the extent permitted by 49 CFR Part 231.

Stepped entrances are required to be equipped with handrails and stanchions that can be reached by the passenger from the outside before actually stepping into the car. Such handrails and stanchions must be placed so that passengers can use them at all stages of the boarding process. The diameter and spacing specifications of paragraph (a) do not apply to such handrails since they may conflict with regulations issued by the Federal Railroad Administration. However, it is recommended that where possible, entrance handrails be provided according to those specifications.

§1192.117 Floors, steps and thresholds.

(a) Floor surfaces on aisles, step treads and areas where wheelchair and mobility aid users are to be accommodated shall be slip-resistant.

A specific measure, or static coefficient of friction, has not been specified for slip-resistance. Slip resistance is based on the frictional force necessary to keep a shoe heel or crutch tip from slipping on a walking surface under conditions likely to be found on the surface. While the dynamic coefficient of friction during walking varies in a complex and non-uniform way, the static coefficient of friction, which can be measured in several ways, provides a close approximation of the slip resistance of a surface. Contrary to popular belief, some slippage is necessary for walking, especially for persons with restricted gaits. A truly "non-slip" surface could not be negotiated.

The Occupational Safety and Health Administration recommends that walking surfaces have a static coefficient of friction of 0.5. A research project sponsored by the Board conducted tests with persons with disabilities and concluded that a higher coefficient of friction was needed by such persons. A static coefficient of friction of 0.6 is recommended for steps, floors, and lift platforms and 0.8 for ramps.

The coefficient of friction varies considerably due to the presence of contaminants, water, floor finishes, and other factors not under the control of transit providers and may be difficult to measure. Nevertheless, many common materials suitable for flooring are now labeled with information on the static coefficient of friction. While it may not be possible to compare one product directly with another, or to guarantee a constant measure, transit operators or car designers and manufacturers are encouraged to specify materials with appropriate values. As more products include information on slip resistance, improved uniformity in measurement and specification is likely to develop. The Board has published a brochure, "Slip Resistant Surfaces," available at no cost, which provides additional information and advisory guidelines on slip resistant surfaces.

A variety of common materials used on transit vehicle floors can provide adequate slip resistance. Common rubberized matting may be slip resistant depending on the orientation of the grooves. Carpet is more variable depending on pile and weave and should probably be tested before it is specified.

(b) All step edges and thresholds shall have a band of color(s) running the full width of the step or threshold which contrasts from the step tread and riser or adjacent floor, either light-on-dark or dark-on-light.

The band of contrasting color required by this provision must span the full length of the threshold and steps along the nosing. However, a minimum width for the band itself is not specified. The Board recommends a minimum of three inches, although the actual size is left to the discretion of operators. While a minimum level of contrast for this band is not specified, it is recommended that the following formula be used in determining the contrast level:

$$\text{Contrast} = [(B_1 - B_2) / B_1] \times 100$$

where B_1 = light reflectance value (LRV) of the lighter area
and B_2 = light reflectance value (LRV) of the darker area.

Note that in any application both white and black are never absolute; thus, B_1 never equals 100 and B_2 is always greater than 0.

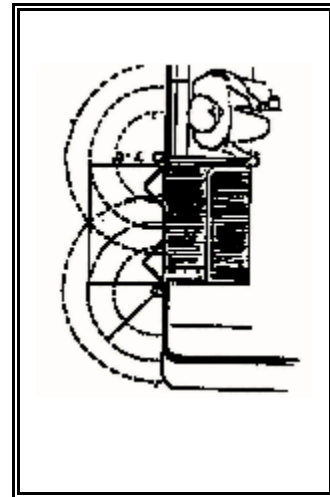
§1192.119 Lighting.

(a) Any stepwell, or doorway with a lift, ramp or bridge plate, shall have, when the door is open, at least 2 footcandles of illumination measured on the step tread, ramp, bridge plate or lift platform.

This requirement is based on existing FTA requirements for other transit modes and pertains only to the interior lighting provided at entrances equipped with boarding devices. The measurement pertains to all step treads of the entrance or the lift platform at floor level. While a maximum lighting level is not specified, it should be noted that high levels may increase the time necessary for the vision of exiting passengers to adjust to a darker, nighttime environment.

(b) The doorways of cars not operating at lighted station platforms shall have outside lights which, when the door is open, provide at least 1 footcandle of illumination on the station platform surface for a distance of 3 feet perpendicular to all points on the bottom step tread edge. Such lights shall be shielded to protect the eyes of entering and exiting passengers.

This provision, is also based on an existing FTA requirement for other transit modes and specifies that the 3 foot distance is to be measured perpendicularly from the step tread, as shown in the figure. The meaning of "3 feet perpendicular to all points on the bottom step tread outer edge" is to define a rectangle on the ground outside the car door which is three feet deep and as wide as the door lower step. In most cases, the actual area illuminated will be a semi-circular pattern. Such a pattern would meet the above requirement as long as the specified rectangle were illuminated.



This requirement pertains only to cars that serve unlighted stations. While these guidelines pertain only to vehicles, not stations, it is recommended that stations be lighted to serve both those passengers waiting at stations and those passengers entering or exiting cars. If stations are lighted, car doorways do not have to be illuminated.

§1192.121 Public information system.

(a) Each car shall be equipped with a public address system permitting transportation system personnel, or recorded or digitized human speech messages, to announce stations

and provide other passenger information. Alternative systems or devices which provide equivalent access are also permitted.

This provision requires cars to be equipped with a public address system that provides either recorded or digitized human speech messages or announcements made by drivers or other transit personnel. Digitized human speech uses spoken sounds and words arranged digitally and rearranged for customized messages. While other systems that provide equivalent access to information are permitted, the use of synthetic speech is not recommended. According to Board-sponsored research, synthetic speech, which is generated electronically, has not yet been proven to be as easily recognized or understood as recorded or digitized human speech. Information received by the Board during the development of these guidelines did not contradict this assessment.

(b) [Reserved]

These guidelines do not currently contain requirements or specifications for the provision of public information in a format that is accessible to persons with hearing impairments. Such a requirement has been reserved pending further study of the options that are available in making such information fully accessible; the Board expects to include some requirements in the future. However, general prohibitions of discrimination in the DOT rule require, in essence, that information necessary for the operation or use of a transit system be made available to persons with hearing impairments. Thus, it is recommended that the information for passengers contained in audible announcements also be made available to persons with hearing loss or who are deaf. Of course, announcements intended only for system personnel are not part of the information needed by passengers. DOT is assessing available and soon-to-be available technology during a study to be conducted during Fiscal Year 1992. Entities are encouraged to employ whatever services, signage or alternative systems or devices that provide equivalent access and are available.

Information can be provided in different ways, some of which are relatively simple and inexpensive. For example, one transit system has a policy of flashing interior train lights to indicate to passengers who are deaf that the train is malfunctioning and that all passengers must exit the train at the next station. Of course, the meaning of this signal must be conveyed in advance to potentially affected passengers for it to be useful and may not be useful to persons unfamiliar with the system, such as tourists. A prominent sign in the vehicle also would be useful. In general, such information should be included in the brochures and guides available to the public rather than only in a "special services" brochure intended for persons with disabilities. Access to some information may also be conveyed by a system of signage providing information routinely provided in announcements (e.g., no smoking, fares, hours of

operation) while information provided in special announcements (e.g., changes in schedule, elevators not in service) could be posted in strategic areas, such as at entrances to the station or at information kiosks.

More sophisticated solutions could include visual display systems and electronic message boards. Visual display systems provide information through electronic message boards or video monitors and can accommodate persons who are deaf as well as those with hearing loss. Electronic message boards using a light emitting diode (LED) or "flip-dot" display are currently provided in some transit stations and terminals and may be usable in cars. One transit system is testing the feasibility of on-board visual displays for next-station announcements and even points of interest, news headlines and weather reports. Paid advertisements may be used to support the system. Such visual displays can supplement audio announcements. These devices may be used to provide real time or pre-programmed messages. However, real time message displays require the availability of an employee for keyboard entry of the information to be announced.

Video monitor systems, such as visual paging systems provided in some airports (e.g., Baltimore-Washington International Airport), are another alternative. The Board can provide technical assistance and information on these systems, including a free pamphlet, "Airport TDD Access: Two Case Studies."

Assistive listening systems (ALS) may possibly provide another alternative although they benefit a narrower population of people with hearing loss. These types of systems are intended to augment standard public address and audio systems by providing signals which can be received directly by persons with special receivers or their own hearing aids and which eliminate or filter background noise. Magnetic induction loops, infra-red and radio frequency systems are types of listening systems which are appropriate for various applications. These systems, however, are not usable by persons who are deaf. Further, the feasibility and cost of installing such devices on cars remain uncertain. The Board has published a pamphlet, "Assistive Listening Systems," available at no cost, which lists demonstration centers across the country where technical assistance can be obtained in selecting and installing appropriate systems. The state of New York has also adopted a detailed technical specification which may be useful.

§1192.123 Restrooms.

(a) If a restroom is provided for the general public, and an accessible restroom is required by §1192.111(a) and (e), it shall be designed so as to allow a person using a wheelchair or mobility aid to enter and use such restroom as specified in paragraphs (a)(1) through (5) of this section.

(3) A grab bar at least 24 inches long shall be mounted behind the water closet, and a horizontal grab bar at least 40 inches long shall be mounted on at least one side wall, with one end not more than 12 inches from the back wall, at a height between 33 inches and 36 inches above the floor.

(4) Faucets and flush controls shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 lbf (22.2 N). Controls for flush valves shall be mounted no more than 44 inches above the floor.

(5) Doorways on the end of the enclosure, opposite the water closet, shall have a minimum clear opening width of 32 inches. Doorways on the side wall shall have a minimum clear opening width of 39 inches. Door latches and hardware shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.

A larger clear width is required at side doors to accommodate the greater maneuvering space required for turns through doorways. A clear width of 42 inches is preferable, and generally considered essential at such doors, but in view of the confined space involved in a rail car, a clear width of 39 inches is allowed.

(b) Restrooms required to be accessible shall be in close proximity to at least one seating location for persons using mobility aids complying with §1192.125(d) and shall be connected to such a space by an unobstructed path having a minimum width of 32 inches.

Restrooms are usually located at the ends of cars. Accessible seating locations should be provided at the same end. Under typical design configurations, the 32-inch wide route that must be provided to accessible seating locations would serve as the same route serving accessible restrooms.

§1192.125 Mobility aid accessibility.

(a)(1) General. All intercity rail cars, other than level entry cars, required to be

accessible by §1192.111(a) and (e) of this subpart shall provide a level-change mechanism or boarding device (e.g., lift, ramp or bridge plate) complying with either paragraph (b) or (c) of this section and sufficient clearances to permit a wheelchair or other mobility aid user to reach a seating location complying with paragraph (d) of this section.

The requirement for boarding devices applies only to intercity rail systems that do not provide level boarding. This would also apply to the cars of new systems where level boarding is provided at some but not all stops. The clearances required for access to seating locations includes those required at doorways and passageways (section 1192.113) and those required for interior circulation (section 1192.117).

(2) Exception. If portable or platform lifts, ramps or bridge plates meeting the applicable requirements of this section are provided on station platforms or other stops, or mini-high platforms complying with §1192.113(d) are provided, at stations or stops required to be accessible by 49 CFR Part 37, the car is not required to be equipped with a car-borne device.

New, non-level entry cars are not required to be equipped with boarding devices if such devices are provided at station platforms or mini-high platforms are provided. To meet this exception, boarding devices or mini-high platforms would have to be provided at all stations and stops required to be accessible. However, transit operators should consider which option (boarding devices on cars or at stations) offers the most accessibility in determining their course of action. Where platform-mounted devices are provided, new cars need not be equipped with boarding devices as long as each new car is compatible with those located on platforms.

The Board received some comments from operators of light rail systems who currently use platform-mounted (wayside) lifts or mini-high platforms with which the operator aligns one door of the vehicle. The operators suggested that the second vehicle should not be required to be accessible so that a second lift or mini-high platform would not be needed to serve the second vehicle in the train. The current requirement does not require the provision of additional lifts or platforms at a station if other vehicles of the train which are required to be accessible are compatible with, and can be served by, the lift or platform if positioned properly.

In practical terms, the driver would align the door of the first car with the lift or mini-high platform and allow all passengers using wheelchairs or mobility aids to board. If all the waiting passengers who need the lift or platform can be accommodated on the first car, the train would not need to move to allow boarding of the second car. A transit operator should, therefore, carefully assess the interior layout of its cars to ensure that sufficient clear floor area is provided to accommodate all the anticipated wheelchair and mobility aid users for a trip. If a larger number of such passengers presented themselves at a stop, and a second car were not full, it may be discriminatory under the DOT rule not to move the train to allow those passengers to board the second car. This potential situation is one of the reasons why the Board strongly urges planners and designers to provide level boarding from full length high platforms wherever possible.

(b) Car Lift. - (1) Design load. The design load of the lift shall be at least 600 pounds. Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware which would not be expected to wear, shall have a safety factor of at least three, based on the ultimate strength of the material.

The specified design load is consistent with the definition of a "common wheelchair or mobility aid" which weighs 600 pounds or less when occupied. However, the design load does not represent the maximum load the lift is capable of supporting. The safety factors for the support components mean the lift cables, pulleys and shaft will support 3600 pounds and the platform, frame and attachment hardware must support 1800 pounds.

Previous FTA-sponsored guidelines for lifts and some state codes specify a detailed test and certification procedure to help ensure reliability, maintainability and durability. The Board does not view these issues as directly related to accessibility design but rather operational considerations. The DOT rule requires accessibility equipment to be maintained and those factors which could affect maintainability should generally be included in bid specifications. Furthermore, the National Highway Traffic Safety Administration (NHTSA) may issue a regulation on several safety aspects of accessibility equipment on buses which may include

some specific testing requirements, and which may be applicable to rail car lifts. The Board views NHTSA as the more appropriate agency to deal with these issues and has not dealt with them in the guidelines.

(2) Controls. - (i) Requirements. The controls shall be interlocked with the car brakes, propulsion system, or door, or shall provide other appropriate mechanisms or systems, to ensure that the car cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged. The lift shall deploy to all platform levels normally encountered in the operating environment. Where provided, each control for deploying, lowering, raising, and stowing the lift and lowering the roll-off barrier shall be of a momentary contact type requiring continuous manual pressure by the operator and shall not allow improper lift sequencing when the lift platform is occupied. The controls shall allow reversal of the lift operation sequence, such as raising or lowering a platform that is part way down, without allowing an occupied platform to fold or retract into the stowed position.

Most large vehicles are specified with door interlocks which prevent movement when the door is open. Since the door must be open to operate the lift, this provision would be satisfied. If an auxiliary door is provided exclusively for a lift or ramp, that door would also need to be interlocked. Alternatively, the lift or ramp itself could be provided with its own interlock system. In some cases, meeting this requirement may involve other solutions, especially for rail cars where door interlocks are not normally provided or where a portable lift may have no direct connection to the car. The "appropriate mechanisms or systems" might include some relatively simple electrical interlocks. However, the system or mechanism cannot work only as a warning to the driver, such as a flashing light or buzzer, which can be inadvertently overlooked. The key operational criterion is that the car cannot be moved while the lift or ramp is in use. Furthermore, the lift must be designed to deploy to all levels expected to be encountered in the operating environment.

Finally, if the lift is electrically operated, the controls must be of the momentary contact type, requiring continuous pressure to activate and must be interlocked in such a way as to preclude the possibility of folding or stowing the lift when the platform is occupied (except as

provided below). Some lifts currently in service can be folded or stowed simply because the operator presses the wrong button at the wrong time. This regulatory provision is intended to preclude this possibility. Some lifts accomplish this function by incorporating a pressure sensitive switch in the platform to sense when it is occupied. Others incorporate a slip-clutch mechanism on the folding motor such that it is not capable of folding anything heavier than an empty platform. Photocells or proximity switches might also be employed to detect the presence of a lift user on the platform. Whatever system is used, it should be designed so that, if the pressure switch, photocell or proximity switch is not operating, the lift will not operate.

The lift must be capable of reversal, but without folding or stowing. For example, if the platform is raised to the car floor but the inner barrier fails to retract to allow the user to board, then the controls must allow the lift to be returned to platform level for deboarding. In this case, the fold or stow function must still be precluded until the platform is empty.

(ii) Exception. Where physical or safety constraints prevent the deployment at some stops of a lift having its long dimension perpendicular to the car axis, the transportation entity may specify a lift which is designed to deploy with its long dimension parallel to the car axis and which pivots into or out of the car while occupied (i.e., 'rotary lift'). The requirements of paragraph (b)(2)(i) of this section prohibiting the lift from being stowed while occupied shall not apply to a lift design of this type if the stowed position is within the passenger compartment and the lift is intended to be stowed while occupied.

This provision simply permits the use of a certain type of lift which would be precluded by the previous requirement that the lift cannot be stowed when occupied. The particular type of device, a rotary lift, intended to be covered by this exception is one in which the platform rotates into the car and this is the stowed position. In this case, the lift is intended to be stowed while occupied, which would otherwise be prohibited by strict application of the previous paragraph. It should be noted, however, that another type of rotary lift in which the platform is intended to be raised to a vertical position for stowage, is not covered by this exception. Such a design is not precluded, since the rotation of the platform while occupied is not prohibited, but the actual raising of the platform into the vertical stowed position must still be prevented when the platform is occupied.

(iii) Exception. The brake or propulsion system interlocks requirement does not apply to platform mounted or portable lifts provided that a mechanical, electrical or other system operates to ensure that cars do not move when the lift is in use.

This exception for platform-mounted or portable lifts allows use of a "mechanical, electrical, or other system" in lieu of an interlock system, to ensure that the car does not move while the lift is in use. Under this exception, devices may be installed that do not function as an interlock but, at a minimum, as a warning that a lift is in use or that a door is open. Some mechanical or electrical device must be provided in addition to any operational methods in order to limit the possibility of human error. This provision is written as a performance requirement so that transit operators and manufacturers have as much flexibility as possible in providing such a system. If this requirement cannot be met, operators can develop and propose alternative methods under the procedures for equivalent facilitation.

(3) Emergency operation. The lift shall incorporate an emergency method of deploying, lowering to ground or station platform level with a lift occupant, and raising and stowing the empty lift if the power to the lift fails. No emergency method, manual or otherwise, shall be capable of being operated in a manner that could be hazardous to the lift occupant or to the operator when operated according to manufacturer's instructions, and shall not permit the platform to be stowed or folded when occupied, unless the lift is a rotary lift and is intended to be stowed while occupied.

This provision is intended to allow persons who need the lift to disembark if the lift power fails. Typically, this operation is performed by a hand operated crank or pump, although some devices incorporate a back-up power system. The emergency system is only intended to allow the lift to be deployed and lowered to platform level with an occupant, not to allow the passenger to board. Whatever method is used for emergency operation, it must continue to operate safely, when operated according to manufacturer's instructions. Notwithstanding the cautionary note about manufacturer's instructions, the emergency system must not permit the lift to be stowed or folded when occupied.

(4) Power or equipment failure. Platforms stowed in a vertical position, and deployed platforms when occupied, shall have provisions to prevent their deploying, falling, or folding any faster than 12 inches/second or their dropping of an occupant in the event of a single failure of any load carrying component.

This provision requires some sort of "braking" or "damping" mechanism, similar to those provided on elevators, to prevent "free fall" of an occupied platform in the event of a power failure or single failure of any load carrying component. The fall rate also applies to the deployment cycle in order to protect any persons waiting close to the car for the lift to deploy when the power fails. This is not a "planned" event which can be anticipated and the slow rate might provide enough time to move out of the way. This provision applies only to those lifts which are stowed in a vertical position, generally the so-called "active" lifts, which could fall outward (i.e., unfold) when someone is waiting outside the car. Most such lifts with a powered deploy cycle simply stop when the power fails. Preventing rapid deployment in the event of a single failure of a load carrying component, such as a chain or cable breakage, will likely require more ingenuity.

(5) Platform barriers. The lift platform shall be equipped with barriers to prevent any of the wheels of a wheelchair or mobility aid from rolling off the lift during its operation. A movable barrier or inherent design feature shall prevent a wheelchair or mobility aid from rolling off the edge closest to the car until the lift is in its fully raised position. Each side of the lift platform which, in its raised position, extends beyond the car shall have a barrier a minimum 1-1/2 inches high. Such barriers shall not interfere with maneuvering into or out of the car. The loading-edge barrier (outer barrier) which functions as a loading ramp when the lift is at ground or station platform level, shall be sufficient when raised or closed, or a supplementary system shall be provided, to prevent a power wheelchair or mobility aid from riding over or defeating it. The outer barrier of the lift shall automatically rise or close, or a supplementary system shall automatically engage, and remain raised, closed, or engaged at all times that the lift platform is more than 3 inches above the station platform and the lift is occupied. Alternatively, a barrier or system may be

raised, lowered, opened, closed, engaged or disengaged by the lift operator provided an interlock or inherent design feature prevents the lift from rising unless the barrier is raised or closed or the supplementary system is engaged.

The first part of this provision covers the barrier (often called a "roll stop") which is intended to prevent the lift user from rolling or stepping off the platform edge closest to the car. Some lifts have a flap which rises when the lift is deployed and lowers when the platform reaches the car floor level. Other designs depend on the structure of the car itself or a "close-out panel" to prevent falling off the inner edge.

In addition, side barriers must be provided along those portions of the platform that remain outside the car when the lift is in the raised position. The portion which is inside the car envelope does not need side barriers as such barriers could restrict the ability of a wheelchair or mobility aid user in turning into the aisle. In addition, a specific prohibition makes it clear that the side barriers cannot interfere with maneuvering. Care must be taken in this design because there is often a gap between the side of the lift platform and the car floor when the lift is fully raised. In regard to bus lifts, several lift manufacturers and transit operators have indicated that they use various "close-out" gaskets and devices to eliminate or reduce such gaps so that the wheel of a wheelchair or mobility aid will not be trapped when it turns into the aisle. The height requirement for side barriers has been chosen to accommodate some rims on the cambered wheels of sport wheelchairs which may need space to clear the barriers. Higher barriers might interfere with such chairs unless the platform is wider.

Previous FTA-sponsored guidelines for lifts specified a safety test for the loading edge (outer) barrier. The Board has not required such a test in these guidelines because NHTSA is planning to issue proposed safety standards for bus lifts which may be suitable for application here. The Board feels that NHTSA is the appropriate agency to define safety tests. In the meantime, this provision includes only a performance requirement and permits a supplementary system as an alternative to a high barrier.

Finally, whatever barrier or supplemental system is used, it must either rise or engage automatically when the lift is raised more than three inches off the platform or ground, or there must be an interlock which prevents the lift from rising more than three inches off the platform or ground unless the barrier or supplementary system is engaged. Thus, the barrier or system

could be engaged manually, provided the lift could not rise unless it were properly engaged. Systems could, for example, employ an electrical switch which interrupts power to the lift unless the barrier is engaged or might use a mechanical slip-clutch or gear and sprocket arrangement which is engaged only when the barrier is raised or the supplemental system is engaged.

(6) Platform surface. The lift platform surface shall be free of any protrusions over 1/4 inch high and shall be slip resistant. The lift platform shall have 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. (See Fig. 1)

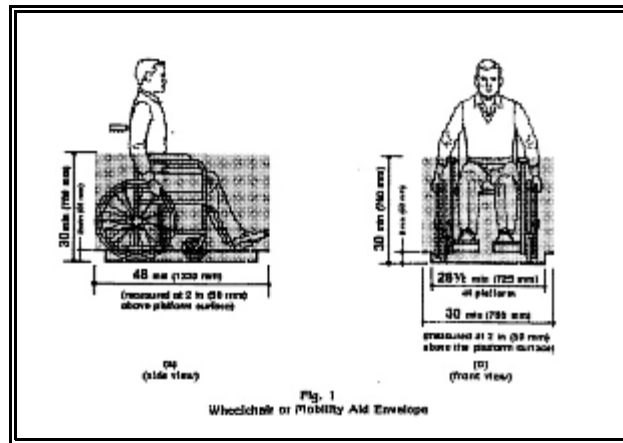
The requirement for the 1/4-inch maximum protrusion is consistent with common accessibility standards and is intended to reduce tripping hazards for standees.

The requirement for slip resistance is a general performance requirement. As discussed under floor surfaces, there are difficulties in defining an appropriate test procedure for determining the level of slip resistance or the static coefficient of friction. However, a static coefficient of friction of 0.6 is recommended for platform surfaces.

The specified platform surface dimensions are consistent with the definition of "common wheelchairs and mobility aids" in requiring a 30 inch width and 48 inch length measured 2 inches above the platform. The reason for the length measurement to be taken at the 2-inch height is to allow for certain elements such as barrier hinges or control rods to impinge on the 48-inch envelope only if they do not interfere with anti-tip bars and other parts of the wheelchair or mobility aid. While a minimum length at the platform surface is not specified (unlike the width requirement) obviously the platform surface cannot be less than the wheelbase of the mobility aid.

The width measurement position acknowledges that the door structure of some cars may not permit a 30 inch wide platform unless the door frame is modified. The width is to be measured 2 inches above the platform to allow a narrower platform at the bottom only, thus permitting wider lifts to be incorporated without modifying the door frame.

Also, the lift handrails are often attached to the platform at the bottom and the structural material takes up some portion of the usable surface. To have a platform with a clear width of 30 inches at the surface would require a lift with a much wider overall width. Measuring the width above the handrail anchor points allows a lift which does not affect door structure but still allows a clear 30 inches between handrails. The clear space is measured to the height of 30 inches to clear the arm rests of most wheelchairs and mobility aids. The clear space required is shown as the shaded portion of Figure 1. In effect, a box of the indicated dimensions must be accommodated on the platform.



The barriers must not intrude into this area when raised. Thus, the inner rollstop and outer barriers must be vertical or, preferably slant outward, to provide the clear area. Under no circumstances may the barriers slant inward into the required clear space.

(7) Platform gaps. Any openings between the lift platform surface and the raised barriers shall not exceed 5/8 inch wide. When the lift is at car floor height with the inner barrier (if applicable) down or retracted, gaps between the forward lift platform edge and car floor shall not exceed 1/2 inch horizontally and 5/8 inch vertically. Platforms on semi-automatic lifts may have a hand hold not exceeding 1-1/2 inches by 4-1/2 inches located between the edge barriers.

This section is intended to prevent the front caster of a wheelchair from turning sideways and dropping through the gap between the raised barrier and the platform. It applies

only to the gap between the platform and the raised barrier and does not preclude the use of expanded metal platforms. A handhold hole is permitted in the platform for lifts which are manually folded or unfolded.

(8) Platform entrance ramp. The entrance ramp, or loading-edge barrier used as a ramp, shall not exceed a slope of 1:8, when measured on level ground, for a maximum rise of 3 inches, and the transition from station platform to ramp may be vertical without edge treatment up to 1/4 inch. Thresholds between 1/4 inch and 1/2 inch high shall be beveled with a slope no greater than 1:2.

This required slope is based on common accessibility standards which allow steeper slopes for short distances where a slope of 1:12 cannot be provided due to existing constraints. A slope of 1:8 is permitted for a maximum rise of 3 inches. If the rise is greater, the slope must be less. In general, the leading edge of the ramp must be tapered. A maximum vertical edge of 1/4 inch is permitted but, if the lip is 1/4 inch to 1/2 inch, the edge must be beveled to a slope of 1:2. In no case may the lip be greater than 1/2 inch high.

(9) Platform deflection. The lift platform (not including the entrance ramp) shall not deflect more than 3 degrees (exclusive of car roll) in any direction between its unloaded position and its position when loaded with 600 pounds applied through a 26 inch by 26 inch test pallet at the centroid of the lift platform.

The provision has been clarified so that the platform deflection is exclusive of car roll. In practice, however, the Board expects that the deflection would not be measured on the car but would be measured by the manufacturer on a "test rig" in the factory. The manufacturer would then certify the lift as meeting the standard. The same is also anticipated for other measures, such as acceleration and barrier resistance.

Since the car will normally tilt when the lift is loaded, due to the weight of the wheelchair or mobility aid and the user, there will be a slope away from the car toward the barrier. The reason for limiting the deflection of the lift platform is to minimize the contribution to this slope by the platform itself. The deflection load is based on the term

"common wheelchair or mobility aid" which is defined as weighing as much as 600 pounds when occupied. To increase the angle would allow the platform to slope more with a heavy wheelchair. This situation is potentially the most dangerous and the most likely to result in a wheelchair or mobility aid overriding or defeating the outer barrier.

(10) Platform movement. No part of the platform shall move at a rate exceeding 6 inches/second during lowering and lifting an occupant, and shall not exceed 12 inches/second during deploying or stowing. This requirement does not apply to the deployment or stowage cycles of lifts that are manually deployed or stowed. The maximum platform horizontal and vertical acceleration when occupied shall be 0.3g.

The specified maximum speeds are provided not only for the safety of persons, including standees, occupying the lift, but also of any persons waiting near the lift. The deployment and stowage rate, although allowed a greater speed, may also affect passenger safety. A potential user waiting outside the car might not be able to get out of the way of a rapidly deploying lift. Similarly, some lifts which fold up into the passenger compartment, particularly active lifts, could pose a hazard to a person inside the car near the lift if the platform stowed too quickly. Accordingly, the final rule specifies the 6 inch per second speed only for the raising and lowering of an occupied lift and a 12 inch per second speed for the deploy and stow portion of the cycle.

The Board considered a requirement for the maximum rate of change of acceleration (jerk) but did not do so because it is difficult to measure and can be easily affected by other variables not directly related to the rate of change of acceleration of the lift platform itself. Also, there is no research which identifies acceptable rates for persons with disabilities.

(11) Boarding direction. The lift shall permit both inboard and outboard facing of wheelchairs and mobility aids.

While some operators advise wheelchair or mobility aid users to back onto the lift, it is difficult for some people to do so. Therefore, the lift must permit persons to board and alight facing either in toward the car or out toward the platform or boarding area. This requirement

should be considered in conjunction with the barrier or supplemental system designed to retain the wheelchair or mobility aid on the platform. For example, some barriers have been designed to rise under the curve of the rear wheel or under the front footrests of a wheelchair. Some designs may be usable only if the occupant is facing a particular direction. This is not permitted. Similarly, at least one supplementary lift restraint system used in Canada involves a belt connected between handrails. This belt must be long enough to go around the back of the wheelchair or mobility aid if the person is facing inward, not just across the armrests for a person facing outward.

(12) Use by standees. Lifts shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The lift may be marked to indicate a preferred standing position.

The DOT rule requires that operators accommodate standees on lifts which meet the design requirements of Part 38. Some current lifts already meet these standards with respect to standees while others do not. According to DOT, it is not the intent of the DOT rule to require that standees be accommodated on lifts which do not meet those standards. See 49 CFR 37.165(g).

(13) Handrails. Platforms on lifts shall be equipped with handrails, on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation. Handrails shall have a usable component at least 8 inches long with the lowest portion a minimum 30 inches above the platform and the highest portion a maximum 38 inches above the platform. The handrails shall be capable of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. The handrail shall have a cross-sectional diameter between 1-1/4 inches and 1-1/2 inches or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than 1/8 inch. Handrails shall be placed to provide a minimum 1-1/2 inches knuckle clearance from the nearest adjacent surface. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the car.

Considerable research has been conducted in the past on the height of a handrail which can be used by persons with disabilities. Until recently, the accepted height has been a minimum 30 inches and a maximum 34 inches above the platform. More recent research on handrail height has suggested that a height from 34 inches to 38 inches is better and these dimensions have been accepted by the model building codes and incorporated in the Board's final guidelines for buildings and facilities. Because of design constraints imposed by a vehicle, the Board is not inclined to fully impose these new dimensions on hand rails.

With respect to the force requirements, handrails in buildings and facilities are required to withstand much higher forces because they are intended to provide support for rising from a sitting position, maneuvering into and out of a wheelchair or mobility aid, or walking up or down stairs or ramps. The handrails on a lift are intended only to provide stability as opposed to major support. Lift handrails meeting the 100 pound force requirement have been in service for many years with no known problem. Moreover, handrails mounted on walls, are subject to torques which are very different from those on lift handrails attached only to the platform. To withstand equivalent forces would require substantial reinforcement of the lift hand rail attachment points, with corresponding increases in weight, and a potential decrease in the platform width. In the absence of information that the 100 pound force requirement is inadequate, it has not been changed. In regard to handrail shape or configuration, the Board is not aware of any problems with either curved or vertical handrails, provided they move in tandem with the platform.

As for handrail diameter, the requirements in this section are consistent with the Board sponsored hand anthropometrics research project which tested gripping by persons with various hand disabilities and confirmed the appropriateness of the specified dimensions. A 1-inch diameter handrail would not be usable. Most car handrails are made of pipe. In the building industry, pipe size typically specifies inside diameter so that a 1-1/2 inch pipe handrail actually has a larger outside diameter, sometimes up to 2 inches. Such hand rails have not posed any known problem. Thus, the 1-1/2 inch diameter requirement can result in a hand rail of approximately 2 inches under current building industry practices. The 1-1/2 inch clearance also received general support and has been included.

It is critical that more than one handrail be provided if standees are to be able to use the

lift. The presence of two handrails is also critical for rotary lifts. However, because of the design of rotary lifts, it may be that a suitable configuration can be achieved with hand rails that are not necessarily on opposite sides of the platform, but might be on two adjacent sides. Accordingly, this section specifies handrails on "two sides" rather than "both sides" of the platform.

(c) Car ramp or bridge plate. - (1) Design load. Ramps or bridge plates 30 inches or longer shall support a load of 600 pounds, placed at the centroid of the ramp or bridge plate distributed over an area of 26 inches by 26 inches, with a safety factor of at least 3 based on the ultimate strength of the material. Ramps or bridge plates shorter than 30 inches shall support a load of 300 pounds.

Since ramps are permitted in some cases instead of lifts, it is essential that they be designed to accommodate the same range of common wheelchairs and mobility aids. Consequently, the design load specified for lifts is also required for ramps or bridge plates 30 inches or longer. Ramps or bridge plates under 30 inches must have a design load of 300 pounds; such ramps or bridge plates are approximately the length of a test pallet and placement of a loaded pallet on the ramp would not test the strength of the ramp but would instead merely rest on the car and platform or curb. Furthermore, ramps shorter than 30 inches need support only about half the weight of a wheelchair or other mobility aid at a given point: when the front wheels are on the ramp, the rear wheels are still on the boarding area, and when the rear wheels move onto the ramp, the front wheels will be inside the car. The provision does not specify a test pallet for making this measurement, but manufacturers should use a method which approximates the loading that would be expected from either the front or rear wheels of a wheelchair or mobility aid, applied at enough points along the ramp length to ensure that it will support a common wheelchair or mobility aid user without significant deflection.

(2) Ramp surface. The ramp or bridge plate surface shall be continuous and slip resistant, shall not have protrusions from the surface greater than 1/4 inch high, shall have a clear width of 30 inches and shall accommodate both four-wheel and three-wheel mobility aids.

The term "continuous surface" means a single, uninterrupted surface from edge to edge as opposed to a platform with a gap in the middle that may incorporate steps. It is also intended to preclude the use of two separate ramps placed some distance apart. Those configurations can accommodate four wheeled devices but cannot accommodate three wheeled scooters. Ramps having two parts are permitted, provided they are designed to be deployed together to provide a uniform, uninterrupted surface. The term was not intended to preclude expanded metal ramps which are often much lighter than solid platforms of the same strength.

While lift platforms are permitted to be 28-1/2 inches wide, ramps must have a clear width at the surface of 30 inches. This is because ramps are designed to be traversed, while a wheelchair or mobility aid user essentially remains stationary on a lift platform while it is in operation. For this reason, a wheelchair or mobility aid user needs more clearance on a ramp for maneuvering than on a lift platform. The restriction on 1/4-inch high protrusions is taken from common accessibility standards for accessible surfaces.

A minimum value of coefficient of friction is not specified for slip resistance due to practical difficulties in measuring such a value. However, the Board has conducted research on slip resistance and recommends a static coefficient of friction of 0.8 for ramp surfaces.

(3) Ramp threshold. The transition from station platform to the ramp or bridge plate and the transition from car floor to the ramp or bridge plate may be vertical without edge treatment up to 1/4 inch. Changes in level between 1/4 inch and 1/2 inch shall be beveled with a slope no greater than 1:2.

This provision is drawn from common accessibility requirements for accessible paths. The ends of the ramp, both where it meets the platform, and the transition to car floor, must be tapered to 1/4 inch vertical lip or up to 1/2 inch, beveled to a slope of 1:2. In no case may the lip exceed 1/2 inch.

(4) Ramp barriers. Each side of the ramp or bridge plate shall have barriers at least 2 inches high to prevent mobility aid wheels from slipping off.

The height requirement for side barriers on ramps is derived from common accessibility requirements for ramps. The height differs from that for lift platform side barriers because wheelchairs and mobility aids move along the ramp during boarding and alighting and there is substantially more opportunity for wheels to ride over barriers on ramps than for lift platforms.

Although short ramps or bridge plates that are placed between door posts limit the likelihood of a wheelchair or mobility aid rolling off, the Board believes there is still sufficient danger in many situations to require edge barriers.

(5) Slope. Ramps or bridge plates shall have the least slope practicable. If the height of the vehicle floor, under 50% passenger load, from which the ramp is deployed is 3 inches or less above the station platform a maximum slope of 1:4 is permitted; if the height of the vehicle floor, under 50% passenger load, from which the ramp is deployed is 6 inches or less, but more than 3 inches, above the station platform a maximum slope of 1:6 is permitted; if the height of the vehicle floor, under 50% passenger load, from which the ramp is deployed is 9 inches or less, but more than 6 inches, above the station platform a maximum slope of 1:8 is permitted; if the height of the vehicle floor, under 50% passenger load, from which the ramp is deployed is greater than 9 inches above the station platform a slope of 1:12 shall be achieved. Folding or telescoping ramps are permitted provided they meet all structural requirements of this section.

Previous tests of ramps on buses have shown that a slope of 1:6 is generally the maximum slope which could be negotiated but that short ramps of 1:4 slope could be used by some persons under some circumstances. The Board recognizes that there are practical difficulties in meeting common accessibility standards in vehicles which are constrained by other factors, such as maximum width. In view of these factors, this section requires that, in general, the least slope practicable be obtained. A slope of 1:4 is permitted if the vertical floor height is 3 inches or less above the station platform. This would require a ramp approximately 1 foot long and would be short enough to be negotiable by many people. If the floor height does not exceed 6 inches above the platform, a slope of 1:6 would be permitted. A slope of 1:8 would

be permitted if the floor height does not exceed 9 inches above the platform. A slope of 1:12 would be required for greater rises.

Height of Vehicle Floor Above Platform	Maximum Ramp Slope
3 in. or less	1:4
6 in. or less but more than 3 in.	1:6
9 in. or less but more than 6 in.	1:8
more than 9 in.	1:12

(6) Attachment. - (i) Requirement. When in use for boarding or alighting, the ramp or bridge plate shall be attached to the vehicle, or otherwise prevented from moving such that it is not subject to displacement when loading or unloading a heavy power mobility aid and that any gaps between vehicle and ramp or bridge plate, and station platform and ramp or bridge plate, shall not exceed 5/8 inch.

The 5/8 inch gap specified is based on the width of a wheelchair front caster.

(ii) Exception. Ramps or bridge plates which are attached to, and deployed from, station platforms are permitted in lieu of car devices provided they meet the displacement requirements of paragraph (c)(6)(i) of this section.

With respect to portable ramps, the ADA legislative history specifically mentions portable ramps as a viable option for some vehicles. The principal complaint about portable ramps has usually been the possibility of slipping which the Board believes is adequately addressed by the requirement that the ramp be firmly attached to the car or platform when in use for boarding and alighting. Several commercially available portable ramps have brackets which are attached to the car and which permit quick connect and disconnect. Others have a hole-and-pin arrangement which allows for firm attachment while in use. The definition of "firmly attached" in this case means that the ramp does not move enough to allow a gap

between car and ramp greater than 5/8 inch under any conditions, not necessarily that the ramp be rigidly attached.

(7) Stowage. A compartment, securement system, or other appropriate method shall be provided to ensure that stowed ramps or bridge plates, including portable ramps or bridge plates stowed in the passenger area, do not impinge on a passenger's wheelchair or mobility aid or pose any hazard to passengers in the event of a sudden stop.

This section of the final guidelines addresses the provision of a stowage compartment, securement system, or other means of ensuring that the ramp does not pose a hazard. In many situations where portable ramps are currently used, the ramp is simply set inside the passenger compartment, sometimes leaning against the passenger's mobility aid, where it could cause injury in a sudden stop. Some ramps automatically stow in a pocket under the floor or are folded back over the step. At least one manufacturer provides a storage area immediately inside the door as part of the hand rail configuration.

(8) Handrails. If provided, hand rails shall allow persons with disabilities to grasp them from outside the car while starting to board, and to continue to use them throughout the boarding process, and shall have the top between 30 inches and 38 inches above the ramp surface. The handrails shall be capable of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. The handrail shall have a cross-sectional diameter between 1-1/4 inches and 1-1/2 inches or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than 1/8 inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the car.

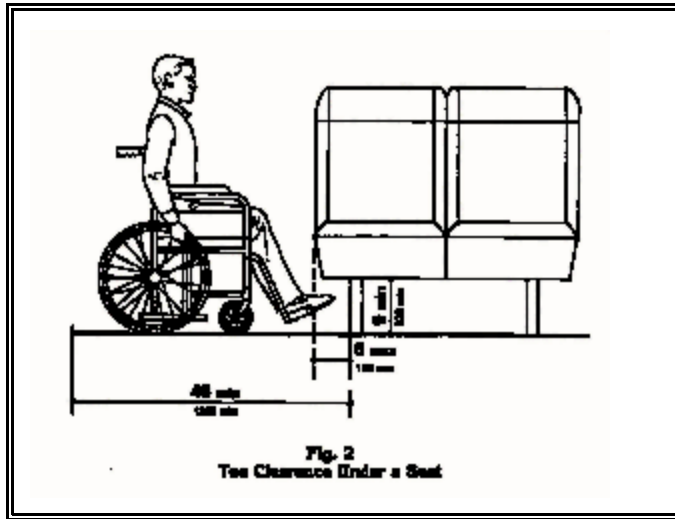
These handrail specifications are similar to those required on lifts (see previous discussion). The Board generally recognizes that "short" ramps and bridge plates do not need hand rails while "long" ones may. Unfortunately, there is no general agreement on the definition of "short" or "long." Since most ramps and bridge plates will probably be "short" in some sense, the Board has not made the provision of hand rails on ramps or bridge plates

mandatory. The Board will further review this issue when the guidelines are revised and updated.

(d) Seating. - (1) Requirements. All intercity rail cars required to be accessible by §1192.111(a) and (e) of this subpart shall provide at least one, but not more than two, mobility aid seating location(s) complying with paragraph (d)(2) of this section; and at least one, but not more than two, seating location(s) complying with paragraph (d)(3) of this section which adjoin or overlap an accessible route with a minimum clear width of 32 inches.

This requirement and its statutory basis are discussed under section 1192.111.

(2) Wheelchair or mobility aid spaces. Spaces for persons who wish to remain in their wheelchairs or mobility aids shall have a minimum clear floor area 48 inches by 30 inches. Such space may have fold-down or removable seats for use when not occupied by a wheelchair or mobility aid user. (See Fig. 2)

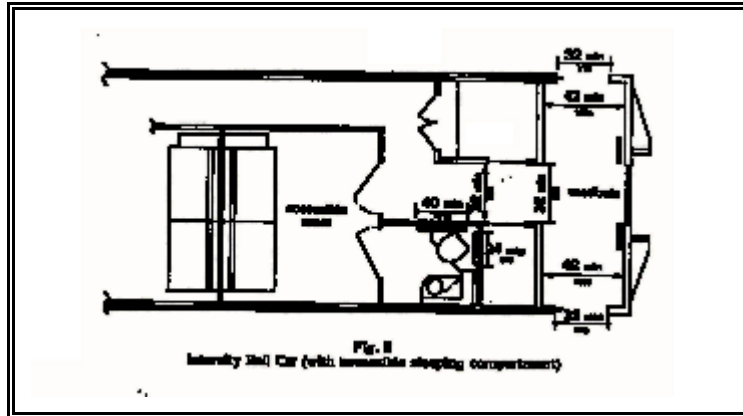


(3) Other spaces. Spaces for individuals who wish to transfer shall include a regular coach seat or dining car booth or table seat and space to fold and store the passenger's wheelchair.

This provision is based on specific requirements of the ADA. Minimum dimensions for wheelchair storage spaces are not provided in part because of the various types of wheelchairs that must be accommodated. It is recommended that storage spaces be sized according to the typical dimensions of a standard folding wheelchair. Note that wheelchair or mobility aid securement devices are not required.

§1192.127 Sleeping compartments.

(a) Sleeping compartments required to be accessible shall be designed so as to allow a person using a wheelchair or mobility aid to enter, maneuver within and approach and use each element within such compartment. (See Fig. 5)



(b) Each accessible compartment shall contain a restroom complying with §1192.123(a) which can be entered directly from such compartment.

This restroom is not required to have the full 35 by 60 inch maneuvering space so long as this amount of clear space is provided in the adjoining sleeping compartment and a straight approach from the compartment to the water closet is provided. Under this configuration, a wheelchair user may exit the restroom by backing out through the door and into the maneuvering space provided in the sleeping compartment.

(c) Controls and operating mechanisms (e.g., heating and air conditioning controls, lighting controls, call buttons, electrical outlets, etc.) shall be mounted no more than 48 inches, and no less than 15 inches, above the floor and shall have a clear floor area directly in front a minimum of 30 inches by 48 inches. Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.

The 15 to 48 inch mounting height range is derived from existing accessibility standards for building and facilities; these measurements are based on the lowest and highest frontal reaches determined for persons using wheelchairs.

This provision applies to permanently installed mechanisms and not to portable devices or accommodations, which are addressed by the DOT rule. Assistive equipment and

accommodations, such as visual alarms, are considered "auxiliary aids," which are covered by DOT's rule, not these guidelines. Operators should be aware that even though such devices are not required when acquiring new cars, they may need to be provided under certain provisions contained in the DOT rule.