

the meeting will take place in room 442, Lafayette Building, 811 Vermont Avenue NW., Washington, DC 20420. The purpose of the meeting will be to discuss and finalize the committee recommendations.

The meeting will be open to the public up to the seating capacity of the conference rooms. Due to the limited seating capacity, it will be necessary for those wishing to attend to contact Mrs. Celia Dollarhide, Executive, Veterans' Advisory Committee on Education (phone 202-233-2152) prior to April 19, 1991. Interested persons may attend, appear before, or file statements with the Committee. Statements, if in written form, may be filed before or within 10 days after the meeting. Oral statements will be heard at 3 p.m. on April 29, 1991.

Dated: March 13, 1991.

By direction of the Secretary.

**Sylvia Chavez Long,**

*Committee Management Officer.*

[FR Doc. 91-6551 Filed 3-19-91; 8:45 am]

BILLING CODE 8320-01-M

#### Wage Committee; Meetings

The Department of Veterans Affairs (VA) in accordance with Public Law 92-463, gives notice that meetings of the VA Wage Committee will be held on:

Wednesday, April 3, 1991, at 2 p.m.  
 Wednesday, April 17, 1991, at 2 p.m.  
 Wednesday, May 1, 1991, at 2 p.m.  
 Wednesday, May 15, 1991, at 2 p.m.  
 Wednesday, May 29, 1991, at 2 p.m.  
 Wednesday, June 12, 1991, at 2 p.m.  
 Wednesday, June 26, 1991, at 2 p.m.

The meetings will be held in room 1161, Veterans Affairs Central Office, 810 Vermont Avenue NW., Washington, DC 20420.

The Committee's purpose is to advise the Chief Medical Director on the development and authorization of wage schedules for Federal Wage System (blue-collar) employees.

At these meetings the Committee will consider wage survey specifications, wage survey data, local committee reports and recommendations, statistical analyses, and proposed wage schedules.

All portions of the meetings will be closed to the public because the matters considered are related solely to the internal personnel rules and practices of the Department of Veterans Affairs and because the wage survey data considered by the Committee have been obtained from officials of private business establishments with a guarantee that the data will be held in confidence. Closure of the meetings is in accordance with subsection 10(d) of Public Law 92-463, as amended by Public Law 94-409, and as cited in 5 U.S.C. 552b(c) (2) and (4).

However, members of the public are invited to submit material in writing to the Chairperson for the Committee's attention.

Additional information concerning these meetings may be obtained from the Chairperson, VA Wage Committee, room 1175, 810 Vermont Avenue NW., Washington, DC 20420.

Dated: March 11, 1991.

By Direction of the Secretary.

**Laurence M. Christman,**

*Executive Assistant, Office of Program Coordination and Evaluation.*

[FR Doc. 91-6552 Filed 3-19-91; 8:45 am]

BILLING CODE 8320-01-M

#### Department of Veterans Affairs

##### Advisory Committee on Women Veterans; Meeting

The Department of Veterans Affairs gives notice under Public Law 92-463 that a meeting of the Advisory Committee on Women Veterans will be held April 10-11, 1991, Hotel Washington, 15th & Pennsylvania Avenue, Washington, DC. The purpose of the Advisory Committee on Women Veterans is to advise the Secretary regarding the needs of women veterans with respect to health care, rehabilitation, compensation, outreach and other programs administered by the Department of Veterans Affairs, and the activities of the Department of Veterans Affairs designed to meet such needs. The Committee will make recommendations to the Secretary regarding such activities.

The session will convene on April 10 from 9 a.m.-5 p.m. and April 11 from 9 a.m.-12 p.m. All sessions will be open to the public up to the seating capacity of the room. Because this capacity is limited, it will be necessary for those wishing to attend to contact Mrs. Barbara Brandau, Committee Coordinator, Department of Veterans Affairs (phone 202/535-7182) prior to April 1, 1991.

Dated: March 13, 1991.

By direction of the Secretary.

**Sylvia Chavez Long,**

*Committee Management Officer.*

[FR Doc. 91-6553 Filed 3-19-91; 8:45 am]

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# Federal Register

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Wednesday  
March 20, 1991

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## Part II

### Architectural and Transportation Barriers Compliance Board

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36 CFR Part 1192

Americans With Disabilities Act (ADA)  
Accessibility Guidelines for  
Transportation Vehicles; Proposed Rules

# ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD

## 36 CFR Part 1192

[Docket No. 90-3]

RIN 3014-AA09

## Americans With Disabilities Act (ADA) Accessibility Guidelines for Transportation Vehicles

**AGENCY:** Architectural and  
Transportation Barriers Compliance  
Board.

**ACTION:** Notice of proposed rulemaking.

**SUMMARY:** The Architectural and Transportation Barriers Compliance Board is issuing proposed guidelines to provide guidance to the Department of Transportation on establishing accessibility standards for transportation vehicles required to be accessible by the Americans with Disabilities Act (ADA) of 1990. The guidelines will ensure that transportation vehicles are readily accessible to and usable by individuals with disabilities in terms of architecture and design, transportation, and communication. The standards established by the Department of Transportation must be consistent with the guidelines.

**DATES:** Comments should be received by May 20, 1991. Comments received after this date will be considered to the extent practicable.

**ADDRESSES:** Comments should be sent to the Office of the General Counsel, Architectural and Transportation Barriers Compliance Board, 1111 18th Street, NW., suite 501, Washington, DC 20036. Comments will be available for inspection at this address from 9 a.m. to 5:30 p.m. on regular business days.

**FOR FURTHER INFORMATION CONTACT:** James Raggio, Office of the General Counsel, Architectural and Transportation Barriers Compliance Board, 1111 18th Street, NW., suite 501, Washington, DC 20036. Telephone (202) 653-7834 (Voice/TDD). This is not a toll-free number. This document is available in accessible formats (cassette tape, braille, large print, or computer disc) upon request.

## SUPPLEMENTARY INFORMATION:

### Background

The Americans with Disabilities Act (ADA) of 1990 extends to individuals with disabilities comprehensive civil rights protection similar to those provided to persons on the basis of race, sex, national origin, and religion under

the Civil Rights Act of 1964. 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 contains provisions for making fixed route bus, rapid rail, light rail, commuter rail, and intercity rail systems operated by public entities, and persons under contract with such entities, readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs. Title II specifically requires that:

- New vehicles purchased or leased after August 25, 1990 must be accessible. See 42 U.S.C. 12141 note, 12142(a), 12161 note, and 12162(a)(2) and (b)(2). See also 49 CFR 37.21, 37.51, and 37.81.<sup>1</sup>

- If used vehicles are purchased or leased after August 25, 1990, good faith efforts must be made to obtain accessible vehicles. See 42 U.S.C. 12141 note, 12142(b), 12161 note, and 12162(c). See also 49 CFR 37.23, 37.53, and 37.83.

- 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 rail and light rail vehicles, or for 10 years or more in the case of commuter rail and intercity rail passenger cars, then the vehicles must be made accessible to the maximum extent feasible. See 42 U.S.C. 12141 note, 12142(c), 12161 note, and 12162(d). See also 49 CFR 37.25, 37.55, and 37.85.

- At least one vehicle per train must be accessible as soon as practicable but in no event later than July 26, 1995 in the case of rapid rail, light rail (where 2 or more vehicles operate as a train), commuter rail, and intercity rail systems. See 42 U.S.C. 12141 note, 12148(b), 12161 note, and 12162(a)(1) and (b)(1).

Title II also requires that new vehicles purchased or leased after August 25, 1990 for use in a demand responsive system operated by a public entity, or 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 the general public. See 42 U.S.C. 12141 note, and 12144. See also 49 CFR 37.27. Title II further requires public entities that operate a fixed route bus, rapid rail, or light rail system (other than a system which provides solely commuter bus service) to provide paratransit and other special

transportation services to individuals with disabilities, beginning January 26, 1992, to the extent that providing such services would not impose an undue financial burden. See 42 U.S.C. 12141 note, and 12143.

Title III of the ADA prohibits discrimination on the basis of disability in public accommodations and services provided by private entities and contains provisions for making public transportation services (other than by aircraft) operated by such entities readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs. In the case of private entities that are not primarily engaged in the business of transporting people such as hotels, shopping centers and recreational facilities which operate shuttle service for their customers and patrons and whose operations affect commerce, title III specifically requires that:

- New vehicles with a seating capacity in excess of 16 passengers (other than an over-the-road bus) purchased or leased after August 25, 1990 for use in a fixed route system must be accessible.<sup>2</sup> See 42 U.S.C. 12181 note, and 12182(b)(2)(B)(i). See also 49 CFR 37.29(a)(1).

- 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 be accessible unless the system, when viewed in its entirety, ensures to individuals with disabilities a level of service equivalent to that provided to the general public. See 42 U.S.C. 12181 note, and 12182(b)(2)(B)(ii). See also 49 CFR 37.29(a)(2).

- A demand responsive system must be operated in such a manner after July 26, 1990 that, when viewed on its entirety, the system ensures to individuals with disabilities a level of service equivalent to that provided to the general public. See 42 U.S.C. 12181 note, and 12182(b)(2)(C)(i).

- New vehicles with a seating capacity in excess of 16 passengers (other than an over-the-road bus) 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, ensures to individuals with disabilities a level of service equivalent to that

<sup>2</sup> The ADA provides that the driver is to be included in determining the seating capacity of a vehicle. See 42 U.S.C. 12182(b)(2)(B) and (C), and 12184(b)(3) and (5). The Department of Transportation interprets seating capacity to mean the number of persons who can be seated in the vehicle without accessibility modifications. See 55 FR 40774 (October 4, 1990).

<sup>1</sup> The referenced regulations were published in the Federal Register on October 4, 1990 (55 FR 40764).

provided to the general public. See 42 U.S.C. 12181 note, and 12182(b)(2)(c)(ii). See also 49 CFR 37.29(a)(3).

In the case of private entities that are primarily engaged in the business of transporting people and whose operations affect commerce, title III specifically requires that:

- New vehicles (other than an automobile, a van with a seating capacity of less than 8 passengers, or an over-the-road bus) 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 the general public. See 42 U.S.C. 12181 note, and 12184(b)(3). See also 49 CFR 37.29(b)(1) and (2).

- 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 the general public. See 42 U.S.C. 12181 note, and 12184(b)(5). See also 49 CFR 37.29(c)(1) and (2).

- New rail passenger cars purchased or leased after February 25, 1992 must be accessible. See 42 U.S.C. 12181 note, and 12184(b)(6). See also 49 CFR 37.29(d).

- If rail passenger cars are remanufactured after February 25, 1992 to extend their useful life for 10 years or more, then the rail cars must be made accessible to the maximum extent feasible. See 42 U.S.C. 12181 note, and 12184(b)(7). See also 49 CFR 37.29(e).

Title III also contains provisions for providing access to over-the-road buses (i.e., buses characterized by an elevated passenger deck located over a baggage compartment) operated by private entities. Title III requires the Office of Technology Assessment to conduct a study of the access needs of individuals with disabilities to over-the-road buses and the most cost-effective methods for providing access to such buses. See 42 U.S.C. 12185. Structural changes to over-the-road buses or the purchase of boarding devices to provide access to individuals who use wheelchairs may not be required until after July 26, 1997 for small providers of transportation, and after July 26, 1996 for other providers. See 42 U.S.C. 12186(a)(2). The President may extend those dates by one year if the President determines that the requirements will result in a significant reduction in intercity over-the-road bus service. See 42 U.S.C. 12185(d). Over-the-road buses purchased

or leased after January 26, 1992 but before the above stated dates may be required to include accessibility features which do not involve structural changes or use of boarding devices. See 42 U.S.C. 12181 note, 12182(b)(2)(D), 12184(b)(4), and 12186(a)(2)(A)(i). See also H. Rept. 101-485, pt. 1, at 43.

The Department of Transportation (DOT) is generally responsible for issuing regulations to implement the transportation provisions of the ADA that include accessibility standards for transportation vehicles by July 26, 1991.<sup>3</sup> See 42 U.S.C. 12149, 12163, and 12186. The ADA requires that the Architectural and Transportation Barriers Compliance Board issue guidelines to provide guidance to DOT on establishing the accessibility standards for transportation vehicles.<sup>4</sup> See 42 U.S.C. 12204. The ADA states that the Board's guidelines are "to ensure that \* \* \* vehicles are accessible, in terms of architecture and design, transportation, and communication, to individuals with disabilities." <sup>5</sup> Id. The legislative history of the ADA provides further guidance regarding the level of accessibility to be provided. The House Committee Reports state that the ADA is intended to enable people with disabilities (including mobility, sensory, and cognitive impairments) to enter into and exit, and safely and effectively use transportation vehicles; and that, in addition to providing access to individuals who use wheelchairs, the design of new vehicles should include such features as non-slip floor surfaces, contrasting edges on steps, handrails and adequate illumination in boarding areas, contrasting characters on signage, public address systems for audible announcements, automatic door closing

alarms, and systems for providing information for persons with hearing impairments. See H. Rept. 101-485, pt. 1, at 27; H. Rept. 101-485, pt. 2, at 88-89; H. Rept. 101-485, pt. 4, at 44.

The proposed guidelines are organized into nine subparts according to types of transportation vehicles and systems as follows:

Subpart A—General  
Subpart B—Large Buses and Systems  
Subpart C—Rapid Rail Vehicles and Systems  
Subpart D—Light Rail Vehicles and Systems  
Subpart E—Commuter Rail Cars and Systems  
Subpart F—Intercity Rail Cars and Systems  
Subpart G—Vans and Small Buses  
Subpart H—Over-the-Road Buses and Systems  
Subpart I—Other Vehicles and Systems

Each subpart contains accessibility requirements for the various elements and features of the covered transportation vehicles and systems. As further discussed under the Section-by-Section Analysis, wherever possible the Board used existing guidelines, regulations, and industry practices in developing the proposed guidelines.

#### *Section-by-Section Analysis*

##### *Subpart A—General*

##### *Section 1192.1 Purpose*

These guidelines serve as the basis for accessibility standards to be issued by DOT for transportation vehicles required to be accessible by the ADA.

##### *Section 192.3 Definitions [Reserved]*

DOT is required to issue final regulations containing accessibility standards for transportation vehicles based on these guidelines by July 26, 1991. This section has been reserved pending publication of the final DOT ADA regulations so that the definitions included in the Board's guidelines will be consistent with the DOT ADA regulations. For purposes of commenting on these proposed guidelines, a set of interim definitions has been included as an appendix to this preamble. Unless otherwise noted, the definitions in the appendix are taken directly from the DOT ADA regulations published in the *Federal Register* on October 4, 1990 (55 FR 40764). Readers should look to that document for explanations of definitions which are not discussed below. Depending on comments submitted to DOT, it is possible that some of the definitions may be revised when DOT issues its final regulations in July 1991. Additional definitions are included to aid in understanding the guidelines or to further expand on a definition of a term contained in the DOT ADA regulations. Since these guidelines only cover design

<sup>3</sup> DOT issued regulations on October 4, 1990 containing interim accessibility standards for transportation vehicles. See 55 FR 40764.

<sup>4</sup> The Board is an independent Federal agency established pursuant to section 502 of the Rehabilitation Act of 1973 to ensure that the requirements of the Architectural Barriers Act of 1968 are met and to propose alternative solutions to architectural, transportation, communication, and attitudinal barriers faced by individuals with disabilities. The Board consists of 12 members appointed by the President from among the general public, at least six of whom are required to be individuals with disabilities, and the heads of 11 Federal agencies or their designees (Executive Level IV or above). The Federal agencies are: the Department of Health and Human Services, Education, Transportation, Housing and Urban Development, Labor, Interior, Defense, Justice, and Veterans Affairs; General Services Administration; and United States Postal Service.

<sup>5</sup> The ADA also requires the Board to issue accessibility guidelines for buildings and facilities. Proposed guidelines were published in the *Federal Register* on January 22, 1991 (56 FR 2299). Additional proposed guidelines for transportation facilities are published elsewhere in today's *Federal Register*.

of vehicles and systems, as opposed to operational issues which will be addressed by DOT, some definitions in the DOT ADA regulations, such as "commuter authority," "qualified individual with a disability," "private entity," "solicitation," have not been included in the appendix.

The term *accessible* is defined as meeting the minimum requirements of the guidelines.

An *automated guideway transit (AGT) system* means a fixed guideway transportation system which operates with small automated (driveless) individual vehicles or multi-car trains. These systems are often used to provide transportation between airport terminals or central business district circulation. Typical examples are Airtrans in the Dallas-Fort Worth Airport; the Downtown Component of Metro (DCM) in Miami; and the Fairlane People Mover in Dearborn, Michigan. Airtrans and the Miami DCM operate on a fixed schedule, while the Fairlane system responds to a call button, similar to an elevator. In fact, AGT systems have sometimes been called "horizontal elevators" because they usually operate behind a "platform screen" which separates the passenger waiting area from the guideway and which has doors that open only when a vehicle is properly positioned on the other side, just like an elevator.

The definition of *bus*, which does not include an over-the-road bus, is included to address two potential issues. Under earlier DOT regulations, there was a question as to whether a "trolley bus" was a bus or a fixed guideway vehicle, since it could not theoretically deviate from its "guideway" which is defined by overhead power lines. Since such vehicles are structurally buses for all practical purposes, they have been considered buses by DOT and this definition incorporates that understanding. Recently, several cities have instituted service, especially in historic districts, with new buses designed to look like historic trolleys. Title II of the ADA contains an exception for remanufactured vehicles of historic character. See 42 U.S.C. 12142(c)(2). See also 49 CFR 37.25 (d) and (e). Since these buses are not remanufactured vehicles, they do not qualify for the exception.

A definition of *common wheelchairs and mobility aids* has been included to clarify the types of wheelchairs and mobility aids which must be accommodated. The definition corresponds to the size and weight restrictions imposed by the lift (i.e., not more than 30 inches wide, 48 inches long, and 600 pounds when occupied).

See §§ 1192.23(b) (1) and (6). The term includes power wheelchairs and three wheeled "scooters" which are specifically mentioned in the legislative history. See H. Rept. 101-485, pt. 2, at 89. The phrase "usable indoors" is intended to preclude devices which are designed solely for recreational or outdoor use, including devices with internal combustion engines, but is not intended to exclude heavy-duty wheelchairs and mobility aids which can be used both indoors and outdoors, provided that they do not exceed the size and weight limits. The definition is also intended to exclude devices which might be used by a person with a disability but were not designed for that purpose, such as certain "all-terrain" vehicles. The definition is not intended to include walkers, crutches or other similar devices.

The definition of *demand responsive system* is taken from the DOT ADA regulations. As explained in the preamble to the DOT ADA regulations, a demand responsive system.

\* \* \* involves an interaction between the user and the system, beyond waiting at a stop for a bus. If, in order to receive service, a potential user must, or may, call in advance to request service, the system would be considered demand responsive rather than fixed route, even though there may be fixed starting and ending points \* \* \*. 55 FR 40766 (October 4, 1991).

For example, if a particular service must be arranged in advance by telephone or subscription, it would be considered a demand responsive system. Demand responsive systems are also referred to as "paratransit".

The definition of *high speed rail* has been added to address the type of system currently being planned for operation between Las Vegas and Anaheim; Orlando and Disney World/Epcot; and in the Fort Worth/Dallas/Houston triangle. Because the trains on these systems will travel at speeds which are incompatible with most existing railroads, they will not operate on existing freight lines. Instead, the systems will build their own dedicated track or special guideway and will not be affected by the station platform setback requirements that restrict high platform boarding on intercity rail and commuter rail systems which operate on existing freight lines.

The definition of *historical or antiquated rail passenger car* is taken directly from title III of the ADA which contains an exception for remanufactured historical or antiquated rail cars operated by private entities. See 42 U.S.C. 1284(c). Title II of the ADA also contains an exception for remanufactured buses and rapid rail and

light rail vehicles of historic character operated by public entities. See 42 U.S.C. 12142(c)(2). DOT is responsible for defining a vehicle of historic character for purposes of title II.

The definition of *light rail* is taken from DOT regulations at 49 CFR part 27 implementing section 504 of the Rehabilitation Act of 1973 (hereinafter referred to as the "DOT 504 regulations"). A sentence has been added to cover the light rail system operating in Los Angeles and the one being built in St. Paul which, although they use light rail vehicles, operate in a manner similar to rapid rail and provide level boarding.

The definition of *person with a disability* is taken from the DOT ADA regulations but does not include the further description of physical or mental impairment or major life activities.

The definition of *rapid rail* is derived from the DOT 504 regulations, with an additional sentence clarifying that rapid rail does not always operate in subways.

## Subpart B—Large Buses and Systems

### Section 1192.21 General

The guidelines have been divided into subparts for large buses (subpart B) and small buses (subpart C) based on gross vehicle weight rating (GVWR). The proposed GVWR division generally separates typical urban transit buses from vans and small buses. The GVWR division, however, may not be useful to private entities. For a private entity which purchases vehicles based on passenger carrying capacity, for example, the GVWR division may have no meaning. Moreover, vehicles used in intercity service, which may or may not be over-the-road buses, generally conform to categories defined by the Federal Highway Administration which may have little or no relationship to the proposed GVWR division.

Another potential way to categorize vehicles would be by type of lift (i.e., active or passive).<sup>6</sup> As discussed under § 1192.23, the documents which are used in as the basis for many of the provisions for mobility aid accessibility are divided by type of lift. Those documents contain relaxed provisions for active lifts since they are typically used in demand responsive service

<sup>6</sup> The term "active lift" refers to the type used primarily on vans and small buses which, when folded into its stowed position, normally blocks the door in which it is installed. Such a device must be deployed or activated each time the door is to be used. By contrast, "passive lifts" remain hidden, or passive, in the doorway until deployed and generally do not interfere with other passengers' use of the doorway.

where the driver can offer assistance in boarding and alighting. Unfortunately, driver assistance cannot always be assured and, as discussed below, the Board has not adopted some of those relaxed provisions for this reason.

Some provisions contained in this subpart are more relevant to one type of service than another. For example, a public address system or exterior destination and route signs may be appropriate for a multi-stop, fixed route service where passengers can board and alight at will. On the other hand, a demand responsive service takes passengers directly from origin to destination so announcement of "stops" is unnecessary; and the route and destination change at each pick-up point and do not need to be communicated to people outside the vehicle. The same generally holds true where fixed route vehicles operate solely between one or two points, such as between an airport and a hotel.

**Question 1.**<sup>7</sup> The Board requests comments on whether a division other than the one proposed would be more useful such as passenger capacity, type of lift (i.e., active or passive), or type of service (i.e., fixed route or demand responsive). If so, what division should be used? Since the majority of the provisions for both large and small buses are similar, should both types of vehicles be covered under a single subpart with "exceptions" to various provisions based on passenger capacity, type of lift, or type of service?

Paragraph (a) states that large buses required to be accessible by the DOT ADA regulations must comply with the applicable provisions of this subpart. This does not include over-the-road buses which are covered by subpart H.

Paragraph (b) provides that if an element or feature of a vehicle is replaced or modified, it must comply with the accessibility requirements for that element or feature, to the extent feasible. For example, if new flooring is installed, it would need to be slip resistant. See § 1192.25(a). If the step covering is replaced, a band of contrasting color would need to be applied. See § 1192.25(b). This provision is not intended to trigger additional accessibility of elements not altered and

does not require that an inaccessible bus be retrofitted with a lift.

However, if the lift of an accessible bus is replaced, the new lift would be required to comply with these guidelines, if it is structurally feasible.

#### *Section 1192.23 Mobility Aid Accessibility*

This section sets forth the requirements for mobility aid accessibility for large buses. Many of these provisions are restated under subparts D, E, F, and H for light rail, commuter rail, intercity rail, and vans and small buses. The discussion in this subpart should be referred to for information on the provisions for those modes. See §§ 1192.83, 1192.95, 1192.125, and 1192.133.

Currently, the most often used device to provide access to large buses is a lift, although some mid-sized buses use manual and automatic ramps. Ramps offer some advantages over lifts since they need to be deployed only once to board several people. Lifts have a fixed platform length which restricts the length of the wheelchair or mobility aid accommodated, while ramps do not. A low floor bus, a necessity for a usable ramp, also has advantages for people with semi-ambulatory disabilities because it permits shorter and fewer steps that would be more beneficial to such persons than either a ramp or lift.

**Question 2:** There have been attempts over the years to develop low floor buses suitable for typical public transportation systems. Low floor buses currently available have high front wheel housings which make them unsuitable for seats. The Board requests comments on how the production of low floor buses suitable for typical public transportation systems could be encouraged in the most cost-effective manner possible.

The provisions in this section are generally based on advisory guidelines developed in 1986 under the sponsorship of the Urban Mass Transportation Administration (UMTA). An Advisory Panel composed of lift and vehicle manufacturers, transit operators, state and local government officials, individuals with disabilities, wheelchair manufacturers, and federal government agencies developed four documents: *Guideline Specifications for Active Wheelchair Lifts*; *Guideline Specifications for Passive Wheelchair Lifts*; *Guideline Specifications for Wheelchair Ramps*; and *Guideline Specifications for Wheelchair Securement Devices*.<sup>8</sup> Since the

provisions of the various *Guideline Specifications* were developed through a consensus process that included lift and vehicle manufacturers, the recommendations have generally been accepted and incorporated in designs voluntarily by manufacturers. To the extent practical, taking into account the specific requirements of the ADA and the Board's responsibility to ensure that people with disabilities can safely and effectively use transportation vehicles, the Board has generally followed the *Guideline Specifications*. As further discussed below, if a provision in this section differs from the *Guideline Specifications* it is because of safety reasons or difficulty experienced by persons with disabilities in using the design. Some provisions of the *Guideline Specifications* have not been adopted because the concern operational issues or mechanical components like hydraulic hoses and fittings that do not directly affect accessibility.

Some of the provisions of this section are also based on existing or proposed specifications adopted by the State of California. See California Administrative Code, title 13, chapter 2, subchapter 4, article 15, Wheelchair Lifts (hereinafter referred to as the "California specifications"). California is one of four states which currently requires buses to be accessible by state statute and has adopted many of the substantive provisions of the *Guideline Specifications*. To compete in this large market, most lift and vehicle manufacturers have incorporated the California specifications directly into designs or offer an option complying with those specifications.

Paragraph (a) provides that at least one space must be provided on large buses for wheelchair and mobility aid users. The issue of how many spaces should be provided on vehicles has been much debated. The House Committee on Education and Labor addressed the issue as follows:

The requirement that a vehicle is to be readily accessible obviously entails that each vehicle is to have some spaces for individuals using wheelchairs or other mobility aids; how many spaces per vehicle are to be made available for wheelchairs is, however, a determination that depends upon various factors, including the number of vehicles in the fleet, the seat vacancy rates, and usage of people with disabilities.

The Committee intends, consistent with these factors, that the determination of how many spaces must be available for

<sup>7</sup> Throughout the preamble, the Board asks questions or seeks information on specific issues. To assist interested parties in responding to the questions and to facilitate analysis of responses to the questions, each question is numbered and commenters are encouraged to clearly identify or refer to the question number in their comments. Where applicable, commenters are also encouraged to provide empirical data or existing analyses that may shed light on costs related to the provisions.

<sup>8</sup> The documents referred to in the preamble are available for inspection at the Board's office. Unless

otherwise noted, copies of the documents may be obtained from the National Technical Information Service (NTIS) in Springfield, Virginia.

wheelchair use should be flexible and generally left up to the provider, provided that at least some seats on each vehicle are accessible. Technical specifications and guidance regarding lifts and ramps, wheelchair spaces, and securement devices are to be provided in the minimum guidelines and regulations to be promulgated under this legislation. These minimum guidelines should be consistent with the Committee's desire for flexibility and decisionmaking by the provider. H. Rept. 101-485, pt. 2, at 88.

**Question 3(a):** The number of spaces provided for wheelchair and mobility aid users may also be determined by configuration of the vehicle. For example, a 96 inch wide bus has a narrower aisle than a 102 inch wide vehicle, and space to maneuver a second wheelchair or mobility aid into place near the front door may be constrained. The same restrictions may not apply to a rear door location or an articulated (bend-in-the-middle) bus which generally has a wide aisle and more maneuvering room at the front because the aisle facing seats are higher. The Board seeks information on the maximum number of spaces for wheelchair and mobility aid users that can be accommodated on different configurations (e.g., front door lift, rear door lift) of various large buses (e.g., 96 inch wide bus, 102 inch wide bus, articulated bus).

**Question 3(b):** As indicated in the House Committee on Education and Labor Report, operational considerations will also affect the number of spaces provided for wheelchair and mobility aid users. The longer the headway (interval) is between accessible vehicles, the greater the need is for spaces for wheelchair and mobility aid users. For instance, if the headway between accessible buses on a fixed route system is 1 to 2 hours (which is common on some routes), once a person with a wheelchair or mobility aid boards the vehicle, the bus is "filled" to capacity as far as other wheelchair and mobility aid users are concerned. For a wheelchair or mobility aid user, being passed by a "filled" bus and having to wait several hours for another accessible bus which may also be "filled," will very likely discourage ridership. Since individual buses may be assigned to different routes each day and the number of spaces for wheelchair and mobility users cannot be readily changed, the Board requests comments on whether it is desirable that more than one space be provided on large buses for wheelchair and mobility aid users.

**Question 3(c):** The number of spaces provided for wheelchair and mobility aid users will also vary according to mode. A level boarding rapid rail

system, for example, can usually accommodate one wheelchair or mobility aid user at each door, if the handrail configuration is properly planned. Since rapid rail systems typically operate multi-car trains, the number of wheelchair and mobility aid users who can be accommodated on that mode is a function of the train length. In the case of light rail and commuter rail systems, all new vehicles must be accessible but some systems provide access to the vehicles with a mini-high platform or platform-mounted lift. (Platform-mounted lifts are also referred to as "wayside" lifts.) If two car trains are operated in such systems, the transit agency could: (1) Install a second mini-high platform or wayside lift to accommodate the second accessible vehicle; (2) double-stop (i.e., move the train to align the second vehicle door with the one mini-high platform or wayside lift to serve the second car); or (3) provide additional spaces for wheelchair and mobility aid users in the first car. Building a second mini-high platform or wayside lift is costly and double-stopping presents serious operational problems. Providing additional spaces in the first car may be more cost-effective. In the case of intercity rail, the ADA contains a formula for the number of spaces to be provided for wheelchair and mobility aid users which equates the number of spaces to the number of single-level rail passenger cars per train so that wheelchair and mobility aid access would only be required on half the total number of such cars. See 42 U.S.C. 12162(a)(3). The Board requests comments on whether a similar formula should be permitted for light rail and commuter rail as an alternative to building a second mini-high platform or wayside lift, or double-stopping and, if so, what should be the maximum number of spaces provided in any one car for wheelchair and mobility aid users.

**Question 3(d):** With the possible exception of vehicles with reserved seating arrangements, increasing the number of spaces provided for wheelchair and mobility aid users usually increases the overall passenger carrying capacity, including standees. The spaces can be equipped with a fold-down seat to accommodate other passengers when not occupied by a wheelchair or mobility aid user. Providing more than one space for wheelchair and mobility aid users would potentially increase the number of passengers that can be carried on vehicles during peak periods. While some passengers will presumably place a premium on the ability to find a seat,

others will place a premium on being able to board the vehicle and arrive at their destination earlier rather than wait for another vehicle. In fact, the Washington Metropolitan Area Transportation Authority recently ordered rapid rail cars with fewer seats so it could accommodate more passengers. The Board seeks information on whether there is a point at which a decrease in seats adversely affects ridership and, thus, operating revenues. The Board is particularly interested in any studies which attempt to quantify this cost impact for the various modes of transportation. The Board also seeks information on whether providing more than one space for wheelchair and mobility aid users has any detrimental effect on operations.

Paragraphs (b) (1) through (13) set forth the requirements for lifts to be used as boarding devices. Paragraph (b)(1) specifies design load and is based on sections 2.3.1, 2.3.2, and 2.4.1.1 of the *Guideline Specifications for Passive Wheelchair Lifts*.<sup>9</sup> The 600 pound design load is common practice and is generally agreed to by lift manufacturers. It is based on information from wheelchair manufacturers that heavier power wheelchairs weigh up to 250 pounds. The 99th percentile male weighs approximately 241 pounds for a combined weight of 491 pounds. A typical manual wheelchair weighs about 60 pounds, and with a 99th percentile male rider, the total is 301 pounds. If a 99th percentile male attendant accompanies the manual wheelchair user on the lift, the combined total is 542 pounds. Since it is unlikely that an attendant would accompany a power wheelchair user on the lift because the power wheelchair can be operated independently and would take up most of the lift platform, the proposed design load appears to accommodate the assumed population. The design load is not the maximum load that the lift can support but rather the load that it is designed to raise and lower. Components on which the lift depends for support must have a safety factor of six (i.e., 3,600 pounds) while non-working parts must have a safety factor of three (i.e., 1,800 pounds).

Paragraph (b)(2) concerns controls and interlock systems and is derived from sections 2.5.4.2, 2.5.4.3, and 2.5.8 of the *Guideline Specifications*. The

<sup>9</sup> Unless otherwise noted, the references to the *Guideline Specifications* in connection with paragraphs (b) (1) through (13) mean the *Guideline Specification for Passive Wheelchair Lifts*.

provision is less specific and more performance oriented than the designs incorporated in current lift models. Section 2.5.8.1 of the *Guideline Specifications for Active Wheelchair Lifts* permit the substitution of a warning light for the interlocks but the Board has not adopted this option because it introduces an element of possible human error into a safety factor. The requirement for the controls to allow raising or lowering is to permit the driver to reverse operation, if necessary. The requirement that such reversal not permit stowing when the platform is occupied responds to several reported accidents in which lifts apparently folded when occupied and caused serious injury to wheelchair users. At least one death is known to have occurred and there are conflicting reports as to whether the death resulted from the failure of the outer safety barrier or the inadvertent folding of the platform due to driver error.

Paragraph (b)(3) deals with emergency operation and is based on section 2.5.7 of the *Guideline Specifications*. The wording is taken from the California specifications. This requirement is simply for the design of a system which can be used in the event of a power failure and is consistent with current design of commercially available lifts.

Paragraph (b)(4) is adopted from section 2.4.2 of the *Guideline Specifications* and requires that the lift incorporate a "braking" or "damping" mechanism similar to elevators, which prevents the platform from falling more than twice the maximum operational speed. For active lifts which are stowed in a vertical position, the platform must not be permitted to fold down faster than this requirement. Such lifts are often unfolded or deployed manually and this provision guards against a possible hazard if the driver loses control of the platform while unfolding it.

Paragraph (b)(5) concerns safety barriers and incorporates a performance criterion based on sections 2.2.6.2 and 2.2.6.3 of the *Guideline Specifications*. The second sentence is based on section 2.2.6.4 of the *Guideline Specifications* and provides for "roll stops" on the inner edge of the platform to prevent a wheelchair or mobility aid from rolling off the edge of the lift adjacent to the vehicle until the lift is at floor height. Some lifts use part of the bus to perform this function while others have a flap which drops to form a transition from the lift to the vehicle floor. There is also a requirement that the sides of the lifts have barriers to prevent the wheels from rolling off. The side barriers need only

protect the part of the platform which extends beyond the vehicle. This is so the barriers do not extend into the bus at the top of the cycle and thus interfere with the maneuverability of a wheelchair or mobility aid into the vehicle.

*Question 4:* Paragraph (b)(5) also requires a barrier on the outer edge of the lift which must prevent a wheelchair or mobility aid from rolling off the platform, or riding over the barrier in case a power wheelchair user accidentally hits the chair control. Section 3.1.6 of the *Guideline Specifications* includes a test procedure involving specified power wheelchairs. Some transit agencies have specified that the front and rear barriers must slant in toward the platform under the assumption that this is necessary to prevent a power wheelchair from riding over the barrier. There is no evidence to support this contention. In fact, the power wheelchairs specified in the test procedure would be unable to ride over a vertical barrier if it were the appropriate height and slanting the barrier inward would reduce the platform length. Pending further tests, the Board proposes a performance requirement. Instead of specifying a height for the outer safety barrier when raised or closed, paragraph (b)(5) specifies that it withstand a static load of 1,600 pounds, applied at a height of 3 inches above and parallel to the platform, for 5 seconds without deflecting more than 5 degrees from the unstressed position. This performance requirement is taken from the California specifications and the Department of Veterans Affairs standard for wheelchair lifts. See *Veterans Administration Wheelchair Lift Systems: VA Standard Design and Test Criteria for Safety and Quality of Automatic Wheelchair Lift System for Passenger Motor Vehicles*, 49 FR 21390 (May 17, 1978). The Board requests comments on whether the proposed performance requirement for the outer safety barrier is adequate or whether a specific test procedure should be incorporated in paragraph (b)(5). The Board seeks information on any incremental costs associated with either the proposed performance requirement or a specific test procedure.

The last two sentences of paragraph (b)(5) provide alternative ways to ensure that the platform is not raised if the outer safety barrier is not locked or closed. These designs are currently incorporated in most commercially available lifts.

*Question 5:* Paragraph (b)(6)(i) concerns the lift platform surface. The first sentence requires slip resistant

surfaces and is derived from sections 2.2.2 and 2.2.3 of the *Guideline Specifications*. A Board sponsored research project on *Slip Resistant Surfaces* recommends that such surfaces, other than on ramps, have a static coefficient of friction of 0.6. The Board is considering including this value in its proposed guidelines for buildings and facilities. See 56 FR 2310 (January 22, 1991). The Board requests comments on whether this value should be included in paragraph (b)(6)(i) and analogous provisions for other vehicles where slip resistant surfaces are required. See §§ 1192.25(a), 1192.59, 1192.79(a), 1192.83(b)(6), 1192.95(b)(6), 1192.99(a), 1192.117(a), 1192.125(b)(6), 1192.133(b)(6), 1192.137(a), and 1192.153(a).

The platform size proposed in paragraph (b)(6)(i) differs from that recommended in section 2.2.1 of the *Guideline Specifications*. The *Guideline Specifications* specify a minimum clear length of 44 inches measured 2 inches above the surface of the platform based on data supplied by wheelchair manufacturers on percentages of wheelchairs with various lengths. The data indicate that 90% of wheelchairs sold are 44 inches or less and a platform with a minimum clear length of 44 inches measured 2 inches above the surface of the platform would accommodate the majority of wheelchairs since the inner and outer safety barriers generally slope upward and can be cleared by foot rests or the curve of the rear wheel.

In the Board's view, the 44 inch platform is not consistent with actual ridership data and a 48 inch platform is proposed. Information presented during Advisory Panel meetings on the *Guideline Specifications* from transit agencies such as the Southern California Rapid Transit District (SCRTD) and Seattle Metro, which currently provide accessible fixed-route service, is that 50% of mobility aid users who ride their systems, use larger power wheelchairs and three wheeled "scooters". Thus, the population of transit riders is skewed toward larger power mobility aids rather than distributed over the normal range of wheelchair types. This seems reasonable since the use of a power mobility aid is one way to reduce or eliminate the distance barrier from origin to bus stop. In addition to their larger size, many power mobility aids have small wheels or other physical characteristics which do not clear the inner and outer safety barriers. This is especially true for the newer lift designs which have very high barriers to prevent wheelchairs or mobility aids from riding

over them. Information supplied by SCRTD indicates that of the three types of lifts in its fleet, only one would be unable to meet a 48 inch requirement. Furthermore, even this lift manufacturer has reportedly redesigned its lift to create a longer platform in response to concerns raised by another large transit agency. The 30 inches by 48 inches requirement is also a commonly accepted standard for lift platforms in buildings and facilities. See UFAS § 4.11.2 and ANSI A117.1-1986, § 4.11.2.

The shaded area of Figure 1 shows the clear volume required for the lift platform. Inner and outer safety barriers on the lift may not intrude into this area when raised. This clearance is required to extend to 30 inches above the platform surface to ensure clearance to the top of the armrests. For clearance above this level, see *Question 21(c)* regarding doorway height. The anti-tip bars of some common wheelchairs and mobility aids are placed below the 2 inch height at which the minimum platform length is specified. Sometimes these anti-tip bars are so low they scrape the ground when the wheelchair or mobility aid user attempts to negotiate even a moderate ramp. The Board encourages wheelchair and mobility aid designers and manufacturers to consider whether anti-tip bars can be placed above the 2 inch height so they can clear the inner and outer safety barriers.

*Question 6(a):* The maximum lift platform length which can be accommodated on a bus is partly determined by the width of the bus; the location of the lift (front or rear door); and the presence of the steering column, drive train, or other equipment under the chassis. The choice of front or rear door lift location is a complex issue related to a variety of structural and operational factors and these guidelines do not propose to specify the location. The Board does not wish to inadvertently mandate one location over the other through a specification of a lift platform length which cannot be accommodated in the front or rear door. On the other hand, these guidelines need to take into consideration how the needs of persons who use various common wheelchairs and mobility aids can be accommodated. The Board seeks information on the maximum lift platform length which can be accommodated on various types of large buses with front and rear door lift locations and any incremental costs associated with longer lift platforms. If not all vehicle types can accommodate the same size lift platform, would specifying different sizes by type of

vehicle and lift location present a problem for wheelchair and mobility aid users who would not necessarily know in advance whether a particular bus could accommodate them? If a longer lift platform is required, should it be phased in on a specified timetable? If so, what should the timeline be?

*Question 6(b):* A potential impact of permitting a smaller lift platform is that the ADA requires public entities to provide paratransit to individuals with disabilities who cannot use fixed route services. See 42 U.S.C. 12143. Thus, a smaller lift platform can result in excluding potential riders who use larger mobility aids from fixed route service and making them eligible for paratransit. As noted above, some transit agencies which provide accessible fixed route service report that as many as 50% of riders who use mobility aids, use larger power wheelchairs and three wheeled "scooters". The Board seeks data from local areas on the potential number of wheelchair and mobility aid users would not be accommodated by: (a) A 44 inch lift platform and (b) a 48 inch lift platform. The Board also seeks data from local areas on the average cost per passenger for paratransit.

The exception in paragraph (b)(6)(ii) provides for some smaller buses in which the front door frame structural post would prevent the installation in the front door of a 30 inch wide lift without major modification, since the door post location is dictated by the front wheel position. The exception still makes it clear that the widest possible platform is to be achieved.

Paragraph (b)(7) deals with platform gaps and is derived from section 2.2.4 of the *Guideline Specifications*. A provision has been added based on the California specifications to address a safety issue with a particular lift design in which the outer safety barrier, when deployed, moves up and out leaving a substantial gap which wheelchair casters have reportedly fallen through.

*Question 7:* The minimum gap specified in the last sentence of paragraph (b)(7) refers to the forward edge of the platform where it meets the floor of the bus. Since bus doors, when open, take up space on both sides of the lift platform, the platform must be narrower than the step well. This often results in a gap along the side of the platform which cannot be protected by a side barrier because such a barrier would prevent the wheelchair or mobility aid from turning into the bus aisle from a front door lift. However, the problem which such a side gap poses appears to be minimal since the

wheelchair or mobility aid has only one wheel crossing the gap at an angle, and the chances of the wheel being caught is slight. The Board is not aware of any problems with current front door lift designs but seeks information, as well as any practical suggestions, on how the side gap might be eliminated or reduced without also interfering with maneuvering the wheelchair or mobility aid into the vehicle.

*Question 8:* Paragraph (b)(8) concerns the platform entrance ramp and is derived from section 2.2.3 of the *Guideline Specifications* and the California specifications with modifications. The California specifications prescribe a maximum slope of 1:6 with no limit on the rise. The 1:8 ratio is consistent with UFAS § 4.1.6(4)(a), Table 2 and ANSI A117.1-1986, § 4.8.2, Table 3. The Board is not convinced that a steeper slope is safe or can be negotiated by some three wheeled "scooters" which tend to "bottom out" on steep short slopes. The California specifications also permit a transition or lip on the ramp of 5/8 inch. The Board believes the ramp can be tapered to within ¼ inch or have a beveled edge of no more than ½ inch, which is consistent with common accessibility standards for buildings and facilities. See UFAS § 4.5.2 and ANSI A117.1-1986, § 4.5.2. The Board requests comments on whether the slope and threshold specifications can be achieved.

Paragraph (b)(9) specifies the maximum lift platform deflection and is derived from section 2.2.5 of the *Guideline Specifications* and the California specifications. When loading, a bus will be tipped slightly to the right due to road crown and, depending on the size of vehicle and suspension, the weight of a wheelchair or mobility aid will cause the vehicle to tip further. The provision is designed to limit additional "listing" due to the deflection of the platform itself and is not intended to include the tilting of the vehicle. For mechanical and structural reasons, this deflection cannot be completely eliminated but the 3 degree deflection is currently achievable and appears to be reasonable. While the *Guideline Specifications* require a load of 600 pounds, the California specifications specify 375 pounds. The 600 pound load is based on the same information as the lift design load. The 26 inch square test pallet is used because common wheelchairs and mobility aids are 26 inches wide and a 26 inch length is between a 36 inch wheel base for a common three wheeled "scooter" and

the 20 inch wheel base of a common power wheelchair.

**Question 9:** Paragraph (b)(10) concerns lift platform movement and is derived from section 2.5.11 of the *Guideline Specifications*. The California specifications permit lift platform motion up to 11.8 inches per second which was considered too fast by the Advisory Panel which developed the *Guideline Specifications*. The Advisory Panel reviewed a variety of transit agency bid documents and concluded a rate of 6 inches per second falls within the range of the majority. A UMTA sponsored report, *Safety Guidelines for Wheelchair Lifts on Public Transit Vehicles*, recommends a maximum acceleration rate of 0.3g but the Advisory Panel which developed the *Guideline Specifications* adopted a value of 0.2g as providing a more desirable condition, especially for standees. The report also recommends a maximum jerk rate of 0.3g/second (rate of change of acceleration) but little data are available on the suitability of this value. The Board requests comments on these specifications.

Paragraph (b)(11) deals with boarding direction and is derived from section 2.1.4 of the *Guideline Specifications*. Transit agencies often recommended that passengers using wheelchairs and mobility aids back on to the lift (facing outward from the bus) for easier movement to the securement location, especially for a front door lift. This orientation places the weight of the mobility aid close to the bus and provides a better mechanical advantage for the lift. However, it is difficult for some persons with disabilities to back a wheelchair or mobility aid with sufficient control. Control is particularly important when other passengers occupy the aisle-facing seats in a front door lift equipped bus. The lift should work properly when the weight of the chair is concentrated at points other than close to the bus. This is especially important when standees are accommodated at the outer edge of the platform.

Paragraph (b)(12) is based on the House Committee on Education and Labor Report which states that:

It is the Committee's intent that the obligation to provide lift service applies, not only to people who use wheelchairs, but also to other individuals who have difficulty in walking. For example, people who use crutches, walkers or three-wheeled mobility aids should be allowed to use a lift. H. Rept. 101-485, pt. 2, at 89.

Current lift designs have been used by standees in urban transit operations for many years. The Board is not aware of any problems with this use. Transit

agencies that have not permitted standees to use lifts have done so based on policy determinations rather than data. For example, several years ago, Milwaukee County and Washington Metropolitan Area Transportation Authority (WMATA) took delivery of the same type buses with identical lifts. Both agencies initially declared it "unsafe" for standees to ride the lift, citing head clearance problems. WMATA was eventually persuaded to test its assertion by permitting a group of persons with various semi-ambulatory disabilities to ride the lift but the problems anticipated did not materialize. WMATA changed its policy to permit use by standees while Milwaukee County continued to assert a safety problem. Similarly, Seattle Metro has allowed standees to use its lifts, simply having drivers remind passengers to "watch your head," with no report of problems. A pair of footprints has been painted on the platform of Seattle's lift to indicate the correct place to stand.

**Question 10(a):** One lift model raises standees fully within the vehicle where there is no head clearance problem and another lift model raises passengers completely outside the vehicle where, again, there is no clearance problem except for the cautionary statement from drivers when passengers move through the door. A third lift model starts with the passenger outside the door, moves up and in through an arc, and ends with the passenger inside the vehicle. It is this design which has raised the most concern for safety. However, the Board is not aware of any problems even with the latter design. The Board seeks information on any problems with accommodating standees on lifts. The Board also seeks data on any incremental costs related to accommodating standees on lifts.

**Question 10(b):** In addition to the indication of a preferred standing location, some lift specifications have required that the entire perimeter of the lift platform have a band of contrasting color. If such a provision is included in these guidelines, the contrast would be defined consistent with the requirement for step tread edges discussed under § 1192.25(b). The Board requests comments on whether such a provision should be included in paragraph (b)(12).

Paragraph (b)(13) concerns handrails and is derived from section 2.2.7 of the *Guideline Specifications*. Because individuals using mobility aids might need to use one hand rather than the other, and persons with hemiplegia have use of only one side and the side would be different while boarding and disembarking, handrails are required on

both sides. The configuration of one lift model could make the provision of handrails on both sides interfere with wheelchairs and mobility aids maneuvering into the bus while two lift models could meet the requirement.

**Question 11(a):** The *Guideline Specifications* recommend a handrail height between 25 and 34 inches. Common accessibility standards for buildings and facilities specify the height of handrails between 30 and 34 inches. See UFAS § 4.9.4(5) and ANSI A117.1-1986, § 4.9.4(6). The latter figure is proposed in paragraph (b)(13), especially since the lower handrail height recommended by the *Guideline Specifications* would be out of the range of a standee. A minimum length of 12 inches has been specified to provide a usable grasping surface without the handrail extending into the area needed for wheelchairs and mobility aids to maneuver into the bus. The 12 inch component may be either horizontal or diagonal, with the highest part at or below 34 inches and the lowest part at or above 30 inches. The diagonal configuration corresponds to the case in which the handrail also functions as the step handrail when the lift is stowed. The Board requests comments on these specifications.

**Question 11(b):** Common accessibility standards for buildings and facilities specify that the diameter of handrails shall be between 1¼ inches and 1½ inches or provide an equivalent gripping surface; and that the clear space between the handrails and the adjoining surface shall be 1½ inches. See UFAS § 4.26.2 and ANSI A117.1-1986, §§ 4.9.4 (3) and (5). The Board requests comments on whether it is feasible to include these specifications in paragraph (b)(13) and analogous provisions regarding handrails on other step entry vehicles without restricting the minimum 32 inch clear width required for open doorways. See §§ 1192.23(c)(8), 1192.29, 1192.77(d), 1192.83(b)(13) and (c)(8), 1192.95(b)(13) and (c)(8), 1192.97(d), 1192.115(d), 1192.125(b)(13) and (c)(8), 1192.133(b)(12) and (c)(8), 1192.135(d), and 1192.155(c).

**Question 11(c):** The requirement that the handrails withstand 100 pounds force is based on the *Guideline Specifications* which are, in turn, derived from a Canadian lift standard. The Board requests comments on whether this specification is sufficient to ensure stable and safe handrails. The Board also seeks information on whether it is feasible to design handrails to withstand a greater force and the incremental cost of such a design.

Paragraphs (c)(1) through (8) set forth the requirements for ramps to be used as boarding devices. Paragraph (c)(1) includes a ramp design load requirement that is based on the same assumptions as for lifts discussed under paragraph (b)(1). Unlike lifts, however, which are loaded while resting on the ground or at floor height and are essentially uniformly loaded during raising and lowering, ramps are subject to loading in a complex way as the mobility aid moves along the surface. Section 2.2.1 of the *Guideline Specifications for Wheelchair Ramps* specifies a 400 pound load based on the capacity of existing ramps and the fact that the ramp market is small and does not support competition.<sup>10</sup> The Board does not believe that this justifies a reduced capacity. If ramps are used in fixed route service, they should accommodate the same mobility aids that lifts accommodate. The potential load requirements appear to be just as important for ramps as for lifts, especially if assistance is needed on a steep ramp, since this would necessitate another person on the ramp at the same time as the wheelchair and occupant.

The *Guideline Specifications* also require that the load be distributed evenly over a length of 48 inches and the full width of the ramp. In reality, even a 48 inch long mobility aid would not have its weight distributed over the full 48 inches but would instead be concentrated on four or three wheels. The 26 inch square test pallet specified in paragraph (c)(1) is the same as that specified in paragraph (b)(9) for lifts. Allowing the weight to be uniformly distributed over a 26 inch square pallet represents a load significantly less strenuous than would actually occur.

**Question 12:** Paragraph (c)(2) is analogous to the surface requirements for lifts and is derived from section 2.1.9 of the *Guideline Specifications*. A Board sponsored research project on *Slip Resistant Surfaces* recommends that ramp surfaces have a static coefficient of friction of 0.8. The Board is considering including this value in its proposed guidelines for buildings and facilities. See 56 FR 2310 (January 22, 1991). The Board requests comments on whether this value should be included in paragraph (c)(2) and analogous provisions for other vehicles. See §§ 1192.83(c)(2), 1192.95(c)(2), 1192.125(c)(2), and 1192.133(c)(2).

The requirement for a 30 inch minimum clear width is derived from

common accessibility standards for buildings and facilities. See UFAS § 4.2.4.1 and ANSI A117.1-1986, § 4.2.4.1. The provision is also consistent with the requirements for lifts in paragraph (b)(6). The provision for the ramp to accommodate both four wheeled and three wheeled mobility aids is a performance requirement designed to ensure that the surface is a solid platform. Common portable devices consisting of two separate tracks cannot accommodate three wheeled "scooters".

**Question 13:** Paragraph (c)(3) specifies that the ramp edge be tapered to within ¼ inch or have a beveled edge of no more than ½ inch to be consistent with common accessibility standards for buildings and facilities. See UFAS § 4.5.2 and ANSI A117.1-1986, § 4.5.2. Section 2.1.10 of the *Guideline Specifications* specifies a maximum threshold of ⅝ inch. The Board requests comments on whether the proposed specifications can be achieved.

Paragraph (c)(4) concerns ramp barriers and is derived from section 2.1.11 of the *Guideline Specifications*. The *Guideline Specifications* specify a barrier of 1½ inches but recommend a 2 inch barrier as desirable. The 2 inch requirement is also consistent with common accessibility standards for buildings and facilities. See UFAS § 4.8.7 and ANSI A117.1-1986, § 4.8.7. Unlike lifts, a mobility aid on a ramp is moving and has a higher potential of encountering the barrier so that the 2 inch height is a critical safety factor.

**Question 14:** Paragraph (c)(5) includes slope requirements derived from common accessibility standards for buildings and facilities. See UFAS § 4.1.6(4)(a), Table 2 and ANSI A117.1-1986, § 4.8.2, Table 3. The slopes must be attained when the ramp is deployed to typical stops in the operating environment. Vehicles operated in rural areas may not have curbs available. In such cases, the ramp may need to be telescoping or folding to attain the proper slopes. The *Guideline Specifications* permit a slope of 1:3 where assistance is provided. Bus ramp tests show that on a ramp with a 1:4 slope the following percentage of subjects needed assistance: 74% of wheelchair and mobility aid users; 73% of individuals with semi-ambulatory disabilities; and 79% of elderly people. A *Study of Public Bus Entry/Exit Systems for Handicapped and Elderly*, Metropolitan Detroit Market Research (August 1978).

This report is not available from NTIS.) Wheelchairs have also been reported to overturn on ramps with a 1:4 slope. *Ramp Design Parameters for Low*

*Floor Transit Buses*, Booz-Allen & Hamilton (April 1980). (This report is not available from NTIS.) The Board requests comments on whether steeper slopes should be permitted if the DOT ADA regulations require drivers to provide assistance to passengers when using a ramp. The Board also seeks information on the incremental costs of providing ramps with the following slopes: (a) 1:4; (b) 1:6; (c) 1:8; and (d) 1:10.

Paragraph (c)(6) is intended to prevent the use of portable ramps which are simply rested against the vehicle floor when being used. Portable ramps are not precluded but they would need to be attached to the vehicle in some fashion while being used. Several designs include quick-release brackets or drop-in pins for temporarily anchoring the ramp to the vehicle during use.

Paragraph (c)(7) ensures that portable ramps are properly stowed in the passenger compartment.

**Question 15:** Paragraph (c)(8) is analogous to the requirements for lift handrails in paragraph (b)(13), except that ramp handrails are not mandatory. See *Questions 11(b) and (c)* regarding handrail dimensions and force requirements. The handrails must be graspable as the individual begins to board the vehicle and be usable throughout the process. For this purpose, handrails attached to the vehicle may be more appropriate than those attached to the ramp, especially for short ramps. In most vehicles suited for ramp access, the ramp is used only to board wheelchair or mobility aid users because the floor is low enough that persons with semi-ambulatory disabilities, as well as elderly people, find it more convenient to board by using the steps and handrails provided in the entrance. The Board requests comments on whether ramp handrails should be mandatory.

Paragraphs (d)(1) through (6) set forth requirements for securement systems. Paragraph (d)(1) concerns restraint forces and is derived from sections 2.3.1 and 2.3.2 of the *Guideline Specifications for Wheelchair Securement Devices*.<sup>11</sup> The difference between forces required for small and large vehicles recognizes the results of crash tests which show that smaller vehicles experience higher peak deceleration (e.g., 21-25g for small buses versus 8-10g for large buses). The requirement specifies that both the securement device itself and the

<sup>10</sup> Unless otherwise noted, the references to the *Guideline Specifications* in connection with paragraphs (c)(1) through (8) mean the *Guideline Specifications for Wheelchair Ramps*.

<sup>11</sup> Unless otherwise noted, the references to the *Guideline Specifications* in connection with paragraphs (d)(1) through (6) mean the *Guideline Specifications for Wheelchair Securement Devices*.

attachment to the vehicle must be capable of withstanding the specified force. These guidelines are intended to provide a base line for restraint requirements. The Board understands that the National Highway Traffic Safety Administration is considering proposing additional regulations in this area.

Securement systems which utilize cargo straps may have little difficulty meeting these requirements. More problematic are the various clamp devices used in some transit systems. The Board, in cooperation with the UMTA-funded Project ACTION, recently published a technical assistance brochure on *Securement of Wheelchairs and Other Mobility Aids on Transit Vehicles* which describes the successful systems used by some transit agencies. The brochure, available free from the Board, is part of the Board's ongoing program of technical assistance to help covered entities provide accessible services.

Paragraph (d)(2) concerns location and size of the securement area and is derived from the California specifications. The provision incorporates wheelchair and mobility aid space requirements from common accessibility standards for buildings and facilities. See UFAS § 4.2.4.1 and ANSI A117.1-1986, § 4.2.4.1. A fixed or fold-up seat may overlap a portion of this clear floor space at the front only if a minimum of 9 inches is provided for foot rests to swing under it. See Figure 2. The provision also allows for fold-down seats in the securement area.

*Question 18:* Paragraph (d)(3) states that the securement system must accommodate common wheelchairs and mobility aids. For the definition of this term, see the appendix to the preamble. This includes power wheelchairs and three wheeled "scooters". As noted above, transit agencies which currently provide fixed route accessible service report that more than 50% of the mobility aid users who ride their systems, use power wheelchairs and three wheeled "scooters". Securement systems which accommodate the range of common wheelchairs and mobility aids exist (e.g., Los Angeles, Seattle, Boston). The Board's technical assistance brochure mentioned above describes these systems. These systems are not "automatic" and may at times require assistance from drivers. Manufacturers are currently designing new securement systems which may better suit the needs of fixed route operators. The Board seeks information regarding such systems and their costs compared to securement systems currently in use.

Paragraph (d)(4) concerns seating orientation of securement systems and is derived from § 2.1.3 of the *Guideline Specifications*. The *Guideline Specifications* do not specify an orientation but the Advisory Panel which developed the document agreed that forward facing seating was safer than side facing. This is supported by all crash test data to date in which even some power wheelchairs secured sideways tend to fold and disintegrate. The occupants of side facing wheelchairs are also subjected to impact with the chair armrests which could cause severe injury. On the other hand, the safest orientation is rear facing, but only if a padded barrier is provided behind the passenger's head and upper torso to prevent whiplash. The barrier would need to be slightly above the wheelchair backrest (approximately 36 inches above the floor); extend to a sufficient height to accommodate a 99th percentile male wheelchair user (approximately 56 inches above the floor); and would need to be at least as wide as the wheelchair backrest (approximately 18 inches wide). This design could present a problem if the padded barrier interfered with driver vision which may occur in some vehicles at particular locations.

*Question 17(a):* Most large buses provide forward facing securement systems. At least one manufacturer of large transit buses which offers a rear door lift normally provides one forward facing and one rear facing securement system. This configuration permits the individual to choose his or her preferred orientation when both systems are empty and also allows two people traveling together to face each other and carry on a conversation. The Board requests comments on whether this configuration should be permitted. Are there other configurations of one forward facing and one rear facing securement system that are feasible and desirable? (If only one securement system is provided, it would be required to face forward.) If a rear facing securement system is permitted, should a padded barrier be required, and are the specifications discussed above (the padded barrier must be at least 18 inches wide and extend from 36 inches to 56 inches above the floor) adequate? The Board also seeks information on the cost of providing such a padded barrier. For seating orientation of securement systems on vans and small buses, see the discussion under § 1192.133(d).

*Question 17(b):* Some individuals with disabilities who have poor upper body stability may have difficulty with a forward facing orientation unless an additional restraint system is provided,

such as a shoulder harness. The guidelines do not specify seat belts or shoulder harnesses since other passengers are not provided with, or required to use, such devices. In fact, standees, people with large packages or grocery carts, and infants in strollers may be at greater risk in an accident or panic stop situation than persons seated in wheelchairs or mobility aids. Securement systems are required to prevent the wheelchair or mobility aid from becoming a missile in the event of a crash or sudden stop. In such cases, the wheelchair or mobility aid can cause injury to others, as well as the person with a disability. The Board requests comments on whether a seat belt or shoulder harness should be provided for wheelchair and mobility aid users. The use of such devices is an operational issue to be addressed by DOT in its ADA regulations.

*Question 18:* Paragraph (d)(5) is based on a proposed taxi regulation developed by Montgomery County, Maryland, and specifies that the securement system shall limit the movement of an occupied wheelchair or mobility aid to no more than 2 inches in any direction. Section 4.1.2 of the *Guideline Specifications* specifies a maximum 4 inch movement but that figure was considered excessive by some members of the Advisory Panel which developed the document. From the standpoint of "crashworthiness," a zero movement requirement may be necessary. The National Highway Traffic Safety Administration is considering proposing additional regulations in this area. The Board requests comments on whether the maximum 2 inch movement is appropriate.

Paragraph (d)(6) deals with stowage and is derived from § 2.1.4 of the *Guideline Specifications*. It simply specifies that the securement system shall not cause a tripping hazard and that the securement area should be available for standees when needed.

#### *Section 1192.25 Doors, Steps and Thresholds*

This section is based on DOT regulations implementing accessibility requirements of the Urban Mass Transportation Act of 1964, Federal-Aid Highway Act of 1973, and section 504 of the Rehabilitation Act of 1973 (hereinafter referred to as the "UMTA regulations"). See 49 CFR 609.15(f).

Paragraph (a) requires slip resistant surfaces on floors and steps. See *Question 5* regarding whether a static coefficient of friction of 0.6 should be specified for slip resistant surfaces.

*Question 19:* Paragraph (b) specifies a contrast ratio to quantify the requirement in the UMTA regulations for a "contrasting" step edge. The same ratio is specified in analogous provisions for other step entry vehicles. See §§ 1192.79(b), 1192.99(b), 1192.117(b), 1192.137(b), and 1192.153(b). The ratio is derived from a Board sponsored research project on *Information Systems for Low Vision Persons*. The ratio is also proposed to be included in the accessibility guidelines for buildings and facilities. See 56 FR 2375 (January 22, 1991). The Board requests comments on whether the ratio is suitable for step edges and, if not, seeks data supporting a different ratio. The Board also seeks information on any costs related to the provision.

*Question 20:* Paragraph (c) contains height requirements for the first front door step and rear door step that are consistent with current transit bus designs to ensure necessary undercarriage clearance on typical urban streets. Common accessibility standards for buildings and facilities specify a maximum 7 inch step riser height and 11 inch tread depth. See ANSI A117.1-1986, § 4.9.2. Steps inside current buses do not conform to these specifications but it is not clear whether this is due to design constraints or simply lack of awareness of the specifications. Riser height and tread depth are not independent variables. There is a limited space for steps in buses, since the steps cannot intrude into the bus vestibule and the maximum bus width is constrained by the roadway. To fit in this limited space, deeper treads require higher risers while shorter risers require shallower treads. Riser height and tread depth are also influenced by the overall floor height. Achieving a lower floor will make it easier to meet the specifications. The Board requests comments on whether a maximum 8 inch riser height and 11 inch tread depth are achievable and any potential costs involved.

*Question 21(a):* Paragraph (d) requires doors to have a clear width of 32 inches when open to accommodate persons with semi-ambulatory disabilities, as well as lifts or ramps. (The 32 inch door opening accommodates the crutch-tip to crutch-tip stance of a 95th percentile male crutch user.) An exception has been included for buses where a structural member prevents compliance, similar to the provision for lift platform width. The Board requests comments on this specification and whether it should apply to all doors.

*Question 21(b):* Paragraph (d) also specifies a maximum 15 lbf (66 N) door

closing force based on the ANSI standard for power operated doors. See ANSI A156.10-1985, §§ 9.8 and 9.9. The same requirement is included in analogous provisions for other vehicles. See §§ 1192.53(a), 1192.73(a), 1192.93(c), 1192.113(c), and 1192.153(d). Doors that close with too much force or speed can cause persons with semi-ambulatory disabilities to lose their balance. The Board requests comments on whether this specification is appropriate for vehicles and any potential costs involved.

*Question 21(c):* The guidelines do not specify the height of the doorway in large buses because unlike vans and some small vehicles they are generally designed for standing passengers. Nevertheless, the clearance between the lift in its raised position and the doorway may be restricted for standees boarding with the lift. The height of the opening is constrained by the door opening mechanism which is usually located above the door. The Board seeks information on the maximum doorway height which can be achieved and any potential costs involved.

#### *Section 1192.27 Priority Seating Signs*

This section is based on the UMTA regulations. See 49 CFR 609.15(d). A provision has been added to paragraph (a) to respond to complaints that the usually designated aisle-facing seats are not always suitable for some people with semi-ambulatory disabilities. Paragraph (b) requires that securement locations be identified and paragraph (c) contains specifications for the requirement in the UMTA regulations that signs be "clearly legible." The specifications for character height are derived from common accessibility standards used in buildings and facilities for persons with low vision. See UFAS § 4.30.2 and ANSI A117.1-1986, § 4.28.2. The spacing and contrast specifications are derived from a Board sponsored research project on *Information Systems for Low Vision Persons*. A similar provision is proposed for inclusion in the accessibility guidelines for buildings and facilities. See 56 FR 2376-77 (January 22, 1991).

#### *Section 1192.29 Interior Circulation, Handrails and Stanchions*

This section is based on the UMTA regulations. See 49 CFR 609.15(e). Some of the wording is derived from the "White Book" Baseline Specification for Advance Design Buses. See *Question 11(b)* regarding whether it is feasible to include handrail dimensions in this section without restricting the minimum 32 inch clear width required for open doorways.

*Question 22(a):* Paragraphs (a) and (b) state that handrails and stanchions shall be placed to permit ample turning and maneuvering space for wheelchairs and other mobility aids to enter the bus and reach a securement location from a lift or ramp and not restrict the vestibule space. The Board requests comments on whether further design specifications are needed with respect to maneuvering space and placement of handrails and stanchions and, if so, what the specifications should be.

*Question 22(b):* Paragraph (b) states that handrails and stanchions used for boarding assistance in the entrance shall have "sufficient clearance" to prevent inadvertent wedging of a passenger's arm. Common accessibility standards for buildings and facilities specify that the clear space between the handrails and the adjoining surface shall be 1½ inches. See UFAS § 4.26.2 and ANSI A117.1-1986, § 4.9.4(5). The Board requests comments on whether this specification should be included in paragraph (b) or whether another specification may be more appropriate.

Paragraph (e) adds a provision to respond to a common problem in which stanchions block the footrest of a wheelchair or mobility aid as the user turns into the aisle from a front door lift. This is usually caused by the vertical stanchion immediately behind the driver position which could be terminated at the aisle-facing seat or directed back out of the path. This would not involve a significant design change but is simply often overlooked by specification writers.

#### *Section 1192.3 Lighting*

This section is based on the UMTA regulations. See 49 CFR 609.15(g). Paragraph (a) specifies a level of lighting in the front stepwell when the door is opened for boarding or alighting but permits a lower level at other times so as not to cause window reflection which could inhibit the driver's visibility. Paragraph (b) specifies a level of lighting for other stepwells at all times. Doorways in which lifts or ramps are installed would be required to have the same level of lighting on the lift or ramp surface, but only at the top, adjacent to the vehicle floor.

*Question 23(a):* Paragraph (c) concerns outside lights which illuminate the boarding area beyond the step, lift or ramp edge. The UMTA regulations require an area 3 feet beyond the lower step edge to be illuminated and generally the lighted area extends further. The Board requests comments on whether the specified lighting level

can be achieved 3 feet beyond the outer edge of the lift or ramp.

*Question 23(b):* As indicated above, the lighting levels specified in this section are derived from the UMTA regulations. The Board seek information on whether these levels are adequate for persons with vision impairments. If the levels are not adequate, the Board requests data on any studies which might support different levels.

#### *Section 1192.33 Fare Box*

*Question 24(a):* This section is based on the UMTA regulations. See 49 CFR 609.15(h). It responds to a common problem where fare boxes are often placed so as to restrict entry by wheelchairs and mobility aids. Based on experience and requests for technical assistance, it appears that the statement that the fare box "not obstruct traffic in the vestibule" is not well understood. The Board requests comments on whether further design specifications are needed with respect to maneuvering space in the vestibule area and fare box placement.

*Question 24(b):* A transit bus design introduced in the late 1970's had a notch in the dashboard for a recessed fare box but was not used because fare boxes are normally emptied through a side port and recessing the fare box would have interfered with that function. The Board requests comments on the feasibility of requiring the fare box to be flush with or recessed in the dashboard and any incremental costs involved.

#### *Section 1192.35 Public Information System*

The ADA requires that the guidelines address communication accessibility for individuals with hearing, speech and visual impairments. See 42 U.S.C. 12204. The legislative history identifies public address systems as a particular area to be addressed. See H. Rept. No. 101-485, pt. 4, at 44.

*Question 25(a):* Paragraph (a) provides for a public address system to respond to the most common complaint from persons with visual impairments that drivers fail to announce stops in multi-stop service where passengers are free to board and alight at any stop. Providing a speaker outside the door would also permit drivers to announce the line or destination of fixed route vehicles so passengers did not need to block the door to obtain this information. This is especially valuable where several bus lines use the same stop and it may be difficult to see the destination sign. DOT has recognized that "[t]here is substantial merit in routinely announcing all stops (buses in some systems have automatic recording

systems that do so)" and has indicated that it is considering "whether these or similar steps should be required as part of the final ADA rule to be published in 1991." 55 FR 40767 (October 4, 1990). The Board intends to coordinate its guidelines with the DOT ADA regulations and requests comments on whether the guidelines should require buses to be equipped with public address systems in conjunction with the DOT ADA regulations requiring that such systems be used. The Board also requests comments on whether the requirement for public address systems should apply only to buses used in fixed route systems since buses used in demanded responsive systems take passengers directly from their origin to destination and typically do not need to announce information about routes and stops.

*Question 25(b):* Paragraph (b) also permits automated information systems provided they use recorded or digitized human speech. Digitized human speech, in which spoken sounds and words are recorded digitally and rearranged for customized messages, is specified as opposed to synthetic speech which is generated electronically. A Board sponsored research project on *Information Systems for Low Vision Persons* tested visually impaired subjects with recorded, digitized and synthetic speech and concluded that synthetic speech was not yet at the stage of development where it can be recognized easily. The Board requests comments on whether synthetic speech capabilities have improved significantly since 1987 when the research project was conducted and is particularly interested in data on persons with visual and hearing impairments since reduced hearing and vision often accompany one another in older persons. The Board also seeks information on the costs of producing digitized and synthetic speech.

*Question 26:* Paragraph (b) is intended to address the need for providing information to persons with hearing impairments. A performance requirement is proposed to provide the same or equivalent information in a form usable by persons with hearing impairments. The provision lists assistive listening systems, similar to those required in auditoriums and assembly areas, as a means of meeting the requirement. The most practical assistive listening device for this application would be a magnetic induction loop installed in the bus. At least one tour company has equipped some of its tour buses with such a system which allows persons with hearing aids having a "T-switch" to pick

up the magnetic induction directly, eliminating the background noise. These systems are relatively inexpensive and technologically simple. However, such systems do not assist persons with severe hearing impairments or who are deaf. The Board seeks information on other technology which could satisfy the performance requirement, as well as any costs involved. Pending the receipt of this information, the Board has reserved analogous provisions for other modes. See §§ 1192.61(b), 1192.103(b), and 1192.121(b).

#### *Section 1192.37 Stop Request*

Typical fixed route transit buses provide pull-cords or tape switches for requesting the driver to stop. These devices may not be assessable to wheelchair and mobility aid users in securement locations. Even when the devices can be reached and activated, the driver may not realize that a wheelchair or mobility aid user is the one who wants to exit, especially from rear door securement locations. This section specifies that the stop request system must be accessible and that the driver be alerted to the need to assist the wheelchair or mobility aid user. Paragraph (a) contains a requirement for audible and visual signals that is designed to accommodate persons with vision or hearing impairments. Currently devices are being installed in buses which ring and cause a "Stop Requested" sign to light in front. The sign is extinguished when the door is opened and the bell is reset. Such devices may benefit everyone. The provision applies to buses used in fixed route, multi-stop service where passengers board and alight at will. The requirement is unnecessary for a demand responsive service, or tour or charter service where the vehicle stops for all passengers at a limited number of points. Paragraph (b) specifies that the activating device (i.e., button, cord, or tape switch) must fall within commonly accepted reach ranges for persons with disabilities. See UFAS § 4.2.5 and ANSI A1171.1 1986, § 4.2.5.

#### *Section 1192.39 Destination and Route Signs*

Paragraph (a) is based on the UMTA regulations. See 49 CFR 609.15(i). It permits individuals to see destination and route information from the boarding side, as well as the front of the vehicle. Again, this provision is intended for buses used in fixed route service.

*Question 27:* Paragraph (b) includes specifications for character height, spacing and contrast based on a Board sponsored research project on

*Information Systems for Low Vision Persons* which conducted tests primarily indoors with stationary signs. A similar provision has been proposed for inclusion in the accessibility guidelines for buildings and facilities. See 56 FR 2376-77 (January 22, 1991). Persons with low vision have complained about the visibility of bus headsigns, especially when they are used to convey messages other than route and destination information. The Board seeks information on any studies which have been conducted on the illumination and character requirements for persons with low vision with respect to signs on moving vehicles in outdoor lighting.

#### Subpart C—Rapid Rail Vehicles and Systems

##### Section 1192.51 General

Paragraph (a) states that rapid rail vehicles required to be accessible by the DOT ADA regulations must comply with the applicable provisions of this subpart. Paragraph (b) provides that if an element or feature of a vehicle is replaced or modified, it must comply with the accessibility requirements for that feature, to the extent feasible.

##### Section 1192.53 Doorways

This section is based on the UMTA regulations. See 49 CFR 609.17(b). Paragraph (a) specifies the clear width, and closing force and speed for doors. See *Question 21(b)* regarding closing force and speed.

*Question 28:* A provision has been added to paragraph (a) for end doors between cars to have a 30 inch minimum clearance. In an emergency, passengers are often requested to evacuate one car by passing into another. Passage through the end door may also be necessary when the doors on one car fail to open. This provision is intended to ensure that wheelchair and mobility aid users can also be evacuated in an emergency. It does not necessitate that end doors between cars be usable during normal operation. The Board seeks information on any incremental costs related to this provision.

*Question 29:* A provision has been added to paragraph (b) stating that, if all vehicles are accessible, then the international symbol of accessibility shall not be displayed on the vehicles. A similar provision is included in analogous sections for other vehicles used in multi-car trains. See §§ 1192.73(b) and 1192.93(e). The Board believes that the international symbol of accessibility should be used only where needed to direct persons with disabilities to an accessible vehicle rather than an inaccessible one. If the

symbol is required on all new vehicles, systems which are already accessible and do not have symbols, such as the Washington, DC Metro, would begin to acquire new vehicles with symbols. The presence of a symbol on new vehicles could lead to an assumption that the older vehicles are not accessible. On the other hand, if the symbol is optional for a system with all vehicles currently accessible, it might still acquire new vehicles with the symbol if the manufacturer includes it or if the transit agency neglects to specify "no symbol". This provision attempts to deal with this potential problem by prohibiting the symbol in those cases. The prohibition does not, however, solve the problem of an inaccessible system that purchases new accessible cars which should be identified. As the system eventually replaces its entire fleet, all its vehicles would be accessible and marked by the symbol. The Board requests comments on whether such a system should be required to remove the symbols when all its vehicles are accessible. The Board also seeks information on any potential costs related to such a requirement.

The UMTA regulations require audible warning signals to alert passengers of closing doors. Paragraph (c) adds a requirement for visual signals, such as a flashing light wired to the audible alarm, to alert slower moving passengers that the doors are about to close, especially in high noise operations.

The UMTA regulations require that the gap between the platform and vehicle be minimized. In some instances, a vertical gap of as much as 4 or 5 inches has been allowed. This represents a serious tripping hazard as well as a barrier to wheelchair or mobility aid users. Paragraph (d)(1) specifies that the horizontal gap between a vehicle door at rest and the platform shall be no greater than 3 inches and the height of the vehicle floor shall be plus or minus  $\frac{5}{8}$  inch of the platform under normal passenger loading conditions. The same specifications are included in analogous provisions for other rail systems. See §§ 1192.73(d), 1192.93(d), 1192.113(d), and 1192.175(a).

Some horizontal gap is necessary between platforms and vehicles to allow for sway as the trains move through stations. This is particularly true in rapid rail with relatively fast and heavy vehicles. The maximum 3 inch horizontal gap is recommended because it is common in new systems, easily achievable, and has not posed significant problems for persons with disabilities during the hundreds of thousands of gap crossings in modern

rapid rail systems such as the Washington DC Metro. The absolute value of the gap will change due to vehicle sway (roll) as passengers enter and leave the vehicle so the requirement is for the vehicle at rest.

*Question 30(a):* Some older rapid rail systems have smaller horizontal gaps. From an accessibility standpoint, smaller gaps are desirable. Construction tolerances may make it difficult to easily attain smaller gaps when building platforms. Some automated guideway transit systems have attached a wooden plank to the face of the platform. Since the wood is relatively soft, as compared to the concrete platform, the plank achieves a closer spacing without the risk of damaging cars as they move through the station. A hard rubber extrusion might serve the same purpose. A vehicle manufacturer once suggested attaching a "fire hose" to the edge of the platform which would be pumped with air when the train stopped for boarding. When the train doors closed, the air stream would be directed by a solenoid controlled valve at right angles to the hose mouth, collapsing the hose. It is not the intent of these guidelines to require such devices, but the Board seeks information on devices or construction techniques which could reduce the horizontal gap in new construction and existing stations in the most cost-effective manner possible. The Board also seeks data on accidents associated with the gap between platforms and vehicles.

*Question 30(b):* The allowable vertical gap and horizontal gap are closely interrelated. Since the vertical gap can cause the front casters of a wheelchair to turn sideways and drop into the horizontal gap, the larger the vertical gap, the smaller the horizontal gap which can be safely negotiated. Conversely, small vertical gaps permit larger horizontal gaps. The spring suspension of old rapid rail cars often placed an empty car significantly above the platform so that it would be approximately level with the platform under full passenger load. Modern rapid rail cars, however, typically use pneumatic suspension which adjusts the car height to some nominal value with variations in passenger load. The plus or minus  $\frac{5}{8}$  inch tolerance specified in paragraph (d)(1) ensures that the set value corresponds to the platform height but recognizes that the suspension "give" would allow fluctuation in the value. According to an informal survey conducted by Board staff, rapid rail car manufacturers stated that they can meet a plus or minus  $\frac{1}{4}$  tolerance and that a plus or minus 1 inch tolerance was

"normal" for rapid rail vehicles. The Bay Area Rapid Transit (BART) system in San Francisco reportedly specifies a tolerance of plus or minus  $\frac{1}{2}$  inch. There is no information as to how closely that specification is met. The Washington DC Metro system has specified a tolerance of plus or minus  $\frac{3}{8}$  inch but accepted vehicles considerably out of compliance. The proposed plus or minus  $\frac{5}{8}$  inch specified here is a compromise between the  $\frac{1}{4}$  inch tolerance manufacturers claimed and variations which may occur in platform construction. The Board requests comments on whether a tolerance of plus or minus  $\frac{5}{8}$  inch can be achieved. The Board also seeks information on any incremental costs involved in achieving a plus or minus  $\frac{5}{8}$  inch tolerance as compared to a plus or minus 1 inch tolerance.

The exception in paragraph (d)(2) recognizes that in older systems, platform height uniformity may not have been specified or settling may have occurred. New vehicles used in such older systems are given more latitude in matching platform height. However, it is assumed that such older systems will have a smaller horizontal gap, or some device could be used to achieve the same effect.

#### Section 1192.55 Priority Seating Signs

This section is based on UMTA regulations. See 49 CFR 609.17(c). The provisions are similar to those for large buses which are discussed under § 1192.27(b).

#### Section 1192.57 Interior Circulation, Handrails, and Stanchions

This section is based on the UMTA regulations. See 49 CFR 609.17(d). Paragraph (a) requires that handrails and stanchions be provided to assist safe boarding, on-board circulation, seating and standing assistance, and alighting by persons with disabilities. Since vertical stanchions can be reached by seated by short people, they are desirable, especially those which connect to seat backs rather than continuing to the floor, provided that they do not limit necessary floor space.

Paragraph (b) adds space requirements for wheelchairs and mobility aids consistent with common accessibility standards for buildings and facilities. See UFAS § 4.2.4.1 and ANSI A117.1-1986, § 4.2.4.1. The space requirements only specify a clear floor space, not necessarily a designated area. Many modern rapid rail vehicles can easily accommodate a wheelchair or mobility aid in the space normally permitted for standees. This can be immediately inside a door if the doorway width, stanchion placement,

and aisle width are properly planned. A stanchion or handrail should be adjacent to the area for grasping since securement systems are not required. Most rapid rail vehicles can accommodate at least one wheelchair or mobility aid at each door.

*Question 31:* Paragraph (b) also includes a performance requirement which alerts designers to consider the placement of stanchions immediately inside doors to ensure maximum maneuvering space for wheelchair and mobility aid users. The Board requests comments on whether further design specifications are needed with respect to maneuvering space and placement of handrails and stanchions and if so, what the specifications should be.

*Question 32:* The guidelines do not require securement systems to be provided on rapid rail, commuter rail, and intercity rail vehicles based on a DOT study which concluded that such devices were not needed on rail vehicles where acceleration, deceleration and jerk are minimal. *Elements of the R&D Plan for Improving Transit Accessibility for the Elderly and Handicapped: The Need for Wheelchair Fastening Equipment in Rail Rapid Transit Vehicles*, Alan J. Warshawer Associates (October 1980). (This document is not available through NTIS). Securement systems that have been provided in some rapid rail systems have not been used. There is no "universal" securement system. Most systems require some assistance. In rapid rail, commuter rail, and intercity rail vehicles, however, the driver is not available to provide assistance, even in the front car. The need to exit the vehicle relatively quickly also makes it unlikely that any system could be effectively used. In intercity rail cars, an individual whose wheelchair or mobility aid was secured would be unable to use the accessible restroom if he or she could not independently operate the securement system. The Board requests comments on whether securement systems should be required and, if so, what the system should be to address the practical problems identified. The Board also requests comments on whether a handrail or stanchion should be required immediately adjacent to the wheelchair or mobility aid space.

#### Section 1192.59 Floor Surfaces

This section is based on the UMTA regulations. See 49 CFR 609.17(e). All floors are required to have slip resistant surfaces. See *Question 5* regarding whether a static coefficient of friction of 0.6 should be specified for slip resistant floor surfaces.

#### Section 1192.61 Public Information System

Paragraph (a)(1) requires that each vehicle be equipped with a public address system for announcing stations to ensure that such information is available to those who cannot read a platform sign because of position or visual impairment. At least one car in each train is also required to have an external speaker to announce information on arriving trains for persons who have difficulty seeing or reading external signs on vehicles as they enter stations. The Washington DC Metro system has recently begun experimenting with external train speakers. Automated information systems using recorded or digitized human speech and alternative technology that provides equivalent access to information are permitted. See *Question 25(b)* regarding synthetic speech.

*Question 33:* Paragraph (a)(2) contains an exception to the requirement for external train speakers in the case of systems that provide information on arriving trains through a station-based announcement system. For example, the BART system has light emitting diode (LED) signs which announce arriving trains and their destinations. Intercity train stations often have audible and visual announcement systems. The Board requests comments on whether paragraph (a)(2) should permit an exception only if the station-based announcement system provides information in both audible and visual forms.

Paragraph (b) is reserved to address the need for providing information to persons with hearing impairments. The Board has requested information on this issue under subpart B. See *Question 26*. Pending the receipt of this information, the Board has reserved analogous provisions for other modes. With respect to external train speakers, since the vehicle is not connected to the station, assistive listening technology cannot be used. Assistive listening technology can be used if a station-based announcement system is provided.

#### Section 1192.63 Between-Car Barriers

Several accidents have occurred in which persons with visual impairments fell from platforms into the space between rapid rail cars. While mobility training, correct cane technique, or properly trained guide dogs should prevent these accidents, the built environment should provide sufficient cues. The majority of persons with visual impairments have some light

vision and often can detect the difference in light from an open doorway and the side of a car. Coupled with the sound of the door opening and use of a cane, or guide dog, to detect the floor of the vehicle, a person with a visual impairment should be able to determine the difference between the door and the space between cars. Under crowded, rush hour conditions, however, when there may be a high noise level, confusion may occur. Also, most new rapid rail cars have windows at the ends which shed light into the space between cars making the gap appear lighter than the car body. Thus, in the rush to board, a cane user may not register the absence of the car floor in time to catch his or her balance. This scenario appears to have been the case in some of the accidents.

*Question 34:* Several devices could be utilized to provide cues and prevent accidents. Chains or pantograph gates would provide a simple cue which might be detected before stepping far enough forward to lose balance. Many older rapid rail systems provided such barriers between cars. The use of chains was apparently abandoned because they had to be manually disconnected before cars could be separated. Spring loaded pantograph gates on the ends of each car can maintain contact during normal train movement and be designed so that automatic car separation is possible. The Board requests comments regarding the feasibility of using chains, pantograph gates, or other devices such as motion detectors as between-car barriers. The Board also seeks information regarding any costs related to such devices.

An exception is provided for systems which provide platform screens to block the platform edge.

#### Subpart D—Light Rail Vehicles and Systems

##### *Section 1192.71 General*

Paragraph (a) states that light rail vehicles required to be accessible by the DOT ADA regulations must comply with the applicable provisions of this subpart.

Paragraph (b)(i) requires that newly designed and constructed light rail systems operating on dedicated rights-of-way must provide level boarding. The light rail system in Los Angeles operates on a dedicated right-of-way and provides level boarding. New light rail systems planned in St. Paul and Silver Spring/Bethesda (Maryland) will also operate on dedicated right-of-ways and can provide level boarding.

*Question 35:* Level boarding is the best means of providing accessibility and benefits all passengers. It can

significantly reduce station dwell times required for passenger boarding and alighting. In new construction, level boarding can be achieved in some cases when grading the site by piling the dirt fill next to the track and placing a concrete slab on top to coordinate with the level of the train floor. In other cases, it may be necessary to construct a high-level platform. Light rail usually consists of 1 or 2 car trains and the platform length required is shorter than for other types of rail. Mini-high platforms, on the other hand, require extensive ramping systems that could extend more than 1 car length. Mini-high platforms also present operational problems, including having to align the car door with the smaller platform and double stopping if more than one wheelchair or mobility aid user boards or alights from the vehicle at the same stop. Mini-high platforms typically accommodate only 3 or 4 standing passengers and 1 or 2 wheelchair or mobility aid users at a time, and can restrict the normal flow of passengers boarding and alighting from the train thereby increasing station dwell times. The Board requests comments on cost-effective design and construction techniques for providing level boarding for light rail. The Board also seeks information on any existing analyses of costs of constructing high-level platforms and mini-high platforms, and grading sites to provide level boarding. The Board is especially interested in data from systems which provide level boarding.

Paragraph (b)(ii) contains an exception for vehicles designed for, and operated on, pedestrian malls, city streets, or other areas where level boarding is not feasible. The exception permits mini-high platforms, or platform-mounted or car-borne boarding devices (i.e., lifts, ramps or bridge plates). Vehicles are available which have a convertible step which raises for level boarding and lowers for boarding from the street.

Paragraph (c) provides that if an element or feature of a vehicle is replaced or modified, it must comply with the accessibility requirements for that feature, to the extent feasible.

##### *Section 1192.73 Doorways*

This section is based on the UMTA regulations. See 49 CFR 609.19(b)(1). Except as noted below, the provisions are similar to those for rapid rail which are discussed under § 1192.53. See the following questions:

- *Question 21(b)* regarding closing force and speed for automatic doors.
- *Question 28* regarding 30 inch minimum clearance for end doors

between vehicles in multi-car trains to permit wheelchair and mobility aid users to be evacuated in an emergency.

- *Question 29* regarding prohibiting the display of the international symbol of accessibility if all vehicles are not accessible.

- *Question 30(a)* regarding the horizontal gap between the boarding platform and level entry vehicles.

- *Question 30(b)* regarding the vertical gap between the boarding platform and level entry vehicles.

With respect to coordination of level entry vehicles with the boarding platform, some light rail systems have a substantially larger horizontal gap due to the use of traditional plug-type doors which move outward for a short distance before moving to the side. The use of pocket doors, which slide into pockets in the side of the vehicle and do not need the additional clearance, allows the gap to be the same as for rapid rail. Plug doors could still be used under this provision so long as they clear the platform so that a larger horizontal gap is not produced.

Paragraph (d)(2) permits the use of platform-mounted or car-borne boarding devices (i.e., lifts, ramps or bridge plates) where it is not operationally or structurally possible to meet the horizontal or vertical gap requirements.

##### *Section 1192.75 Priority Seating Signs*

This section is based on the UMTA regulations. See 49 CFR 609.19(c). The provisions are similar to those for large buses which are discussed under § 1192.27.

##### *Section 1192.77 Interior Circulation, Handrails and Stanchions*

This section is based on the UMTA regulations. See 49 CFR 609.19(d). The provisions in paragraph (b) for step entry vehicles are similar to those for large buses discussed under § 1192.29(b). The provisions in paragraph (c) for level entry vehicles and entrances accessible by lifts, ramps or bridge plates are similar to those for rapid rail discussed under § 1192.57(b). See the following questions:

- *Question 11(b)* regarding whether it is feasible to include handrail dimensions in this section without restricting the minimum 32 inch clear width required for open doorways.

- *Question 22(b)* regarding whether a 1-½ inch clearance between handrails and stanchions used for boarding assistance in the entrance and the driver's barrier is sufficient to prevent inadvertent wedging of a passenger's arm.

- *Question 32* regarding whether securement systems should be required on light rail cars and whether a handrail or stanchion should be required immediately adjacent to the wheelchair or mobility aid seating locations.

- *Question 36:* For vehicles which provide accessibility by means of lifts or ramps, the area for wheelchairs and mobility aids should be as close as possible to the accessible door. For vehicles which have a lift at the front door adjacent to the driver and fare box, care must be taken to ensure that the fare box, driver seat platform, and any vertical stanchions in the vicinity of the door do not restrict maneuvering space for wheelchair and mobility aid users. Paragraph (c) includes a performance requirement which alerts designers to consider the placement of stanchions near doors to ensure maximum maneuvering space. The Board requests comments on whether further design specifications are needed with respect to maneuvering space and placement of handrails and stanchions and, if so, what the specifications should be.

#### *Section 1192.79 Floors, Steps and Thresholds*

This section is based on the UMTA regulations. See 49 CFR 609.19(e). Except as noted below, the provisions are similar to those for large buses which are discussed under § 1192.25. See the following questions:

- *Question 5* regarding whether a static coefficient of friction of 0.6 should be specified for slip resistant floor surfaces.

- *Question 19* regarding whether the contrast ratio specified for step edges is suitable.

- *Question 37:* As discussed under § 1192.25(c), common accessibility standards for buildings and facilities specify a maximum 7 inch step riser height and 11 inch tread depth. See ANSI A117.1-1986, § 4.9.2. The 14 inch standard for the first bus front step is consistent with current bus design to ensure necessary undercarriage clearance on typical urban streets. Light rail vehicles, however, do not operate under the same conditions as buses even when tracks are laid on city streets. For this reason, it may actually be possible to achieve a lower first step than for buses. On the other hand, the floor height for light rail vehicles is determined by the wheel trucks and undercarriage which is higher than that for buses, further restricting the choices for steps and risers. The Board requests comments on whether the following specifications are achievable on light rail vehicles and any potential costs involved:

- (a) The height from the ground to the first step shall not exceed 14 or 16 inches.

- (b) Stair risers shall not exceed 7, 8, or 9 inches.

- (c) Stair treads shall be no less than 10 or 11 inches wide.

#### *Section 1192.81 Lighting*

This section is based on the UMTA regulations. See 49 CFR 609.19(f). The provisions are similar to those for large buses discussed under § 1192.31. See the following questions:

- *Question 23(a)* regarding whether the specified lighting level can be achieved 3 feet beyond the outer edge of the lift or ramp.

- *Question 23(b)* regarding whether the specified lighting levels are adequate for persons with vision impairments.

#### *Section 1192.83 Mobility aid accessibility.*

This section requires new vehicles that do not provide for level boarding to provide access by means of a car-borne or platform-mounted boarding device (i.e., lift, ramp or bridge plate). Except as noted below, the provisions are similar to those for large buses discussed under § 1192.23. See the following questions:

- *Question 3(d)* regarding whether a formula similar to the one used for intercity rail for wheelchair and mobility aid spaces should be permitted for light rail and, if so, what should be the maximum number of spaces provided in any one car.

- *Question 4* regarding whether the proposed performance requirement for the outer safety barrier on the lift platform is adequate or whether a specific test procedure should be incorporated in paragraph (b)(5) and any incremental costs associated with either approach.

- *Question 5* regarding whether a static coefficient of friction of 0.6 should be specified for the platform lift surface.

- *Question 6(a)* regarding the maximum lift platform length which can be accommodated on various models of light rail vehicles and incremental costs associated with longer lift platforms.

- *Question 6(b)* regarding data from local areas on the potential number of wheelchair and mobility aid users who could not be accommodated by: (a) A 44 inch lift platform and (b) a 48 inch lift platform; and the average cost per passenger for paratransit.

- *Question 7* regarding how the side gap between the lift platform and vehicle floor might be eliminated or reduced without also interfering with maneuvering the wheelchair or mobility aid into the vehicle.

- *Question 8* regarding whether the lift platform entrance ramp and threshold specifications in paragraph (b)(8) can be achieved.

- *Question 9* regarding the platform movement specifications in paragraph (b)(10).

- *Question 10(a)* regarding any problems with accommodating standees on lifts and any incremental costs relating to accommodating standees.

- *Question 10(b)* regarding whether a band of contrasting color should be required around the perimeter of the lift platform.

- *Questions 11(a) through (c)* regarding lift handrail dimensions and force requirements.

- *Question 12* regarding whether a static coefficient of friction of 0.8 should be specified for ramp surfaces.

- *Question 13* regarding specifications for the ramp edge.

- *Question 14* regarding whether steeper ramp slopes should be permitted.

- *Question 15* regarding whether ramp handrails should be mandatory.

Paragraphs (b)(2)(ii) and (iii) contain two exceptions from the requirements for controls and interlock systems between the lift and the vehicle. The first exception is intended to accommodate a rotary lift. The typical bus lift is deployed with its long dimension perpendicular to the long axis of the bus. A rotary lift pivots into or out of the vehicle and deploys with the long dimension of the platform parallel to the long axis of the vehicle. The advantage of this design is that it requires very little space along side the vehicle and the mobility aid user exits parallel to, and close by, the vehicle. A rotary lift is not practical in typical urban bus operations because the bus cannot always align itself parallel to the curb. Light rail vehicles, on the other hand, operate on a fixed guideway and often load or unload passengers into narrow "islands" between automobile traffic lanes where it may not be feasible to deploy a typical bus lift. A rotary lift could be deployed in such situations. In the boarding process, the mobility aid user boards the lift platform, and the rotary lift rises and pivots while occupied into the passenger compartment to a stowed position. In some cases, the mobility aid user remains on the lift platform for the trip. An exception is provided for this situation from the requirement that lift not be stowed while occupied. The second exception covers platform-mounted lifts, ramps or bridge plates. Those devices are exempted from the requirement that the controls be

interlocked with the car brakes or propulsion system provided that there is some other system to ensure that the vehicle cannot move when the boarding device is being used. For example, if the boarding device can only be operated when the vehicle door is open, and the door has an interlock, this may satisfy the requirement.

Paragraph (c)(6) contains an exception from the requirement that ramps or bridge plates be firmly attached to the vehicle for platform-mounted devices. Such boarding devices are permitted if they are as firmly attached to the platform.

*Question 38:* Ramp handrails are not mandatory for large buses. See § 1192.239(c)(8). Paragraph (c)(8) also does not require handrails on ramps or bridge plates used with light rail vehicles. Bridge plates, however, may span a larger distance and be higher off the ground than ramps on buses. The Board requests comments on whether handrails should be required on bridge plates. See *Questions 11(b) and (c)* regarding handrail dimensions and force requirements.

As discussed under § 1192.57, the guidelines do not require securement systems to be provided on rapid rail, light rail, commuter rail, or intercity rail vehicles. See *Question 32* regarding whether securement systems should be required on such vehicles; and whether a handrail or stanchion should be required immediately adjacent to the wheelchair or mobility aid space.

#### *Section 1192.85 Between-Car Barriers*

This section is similar to the requirement for rapid rail vehicles discussed under § 1192.63 except that step entry light rail vehicles which operate at-grade do not need between-car barriers. See *Question 34* regarding the feasibility of using chains, pantograph gates, or other devices such as motion detectors as between-car barriers.

*Question 39:* The Board requests comments on whether provisions for public information systems should be specified for light rail vehicles similar to those specified for large buses and rapid rail in §§ 1192.35 and 1192.61. See the following questions:

- *Question 25(a)* regarding whether the guidelines should require vehicles to be equipped with public address systems in conjunction with the DOT ADA regulations requiring that such systems be used.
- *Question 25(b)* regarding use of synthetic speech.
- *Question 33* regarding whether an exception should be permitted for station-based announcement systems

only if it provides information in both audible and visual forms.

#### *Subpart E—Commuter Rail Cards and Systems*

##### *Section 1192.91 General*

Paragraph (a) states that commuter rail cars required to be accessible by the DOT ADA regulations must comply with the applicable provisions of this subpart.

Paragraph (b) provides that if an element or feature of a vehicle is replaced or modified, it must comply with the accessibility requirements for that feature, to the extent feasible.

Paragraph (c) recognizes that level boarding is the best means of providing accessibility and benefits all passengers. However, it may not be feasible to provide high-level platforms on systems where commuter rail trains use the same tracks as freight trains. Freight trains are typically wider than commuter rail trains which means that high-level platforms would need to be set back to allow the passage of the wider trains. For the reasons discussed under § 1192.71(c) with respect to light rail, level boarding has significant advantages over mini-high platforms and car-borne, platform-mounted, or portable lifts. Where a platform set-back is required, it is still preferable to provide level boarding from a platform approximately at the same height as the car floor by means of a car-borne or platform-mounted bridge plate. The actual platform set-back required may be less than expected. The typical center-to-center spacing between parallel tracks, one for each direction, or between main track and side track is 13 feet. This means that the maximum clearance from the center of the track to the side is 6.5 feet. For a typical 10 foot wide passenger car (5 feet from center of track), the set-back clearance is 18 inches or less, a distance which can easily be crossed by a bridge plate. On rare occasions, a freight train may need to transport a load wider than this clearance would permit but, because such a wide load would preclude passing other trains traveling in the opposite direction or on side tracks, advance planning is required to clear all adjacent tracks. Amtrak engineers reported, during discussions with the House Energy and Commerce Committee, that the problem had been solved in some stations by providing a detachable platform over-hang which could be removed if such a wider load needed to be transported. Reportedly, in the several years in which such stations have been in operation, the over-hang has never had to be removed.

#### *Section 1192.93 Doorways*

Except as noted below, the provisions in this section are similar to those for rapid rail which are discussed under § 1192.53. See the following questions:

- *Question 21(b)* regarding closing force and speed for automatic doors.
- *Question 28* regarding 30 inch minimum clearance for connecting doors between cars to permit wheelchair and mobility aid users to be evacuated in an emergency.
- *Question 29* regarding prohibiting the display of the international symbol of accessibility if all vehicles are accessible.

The requirement in paragraph (a) that the connecting doors between single level cars have a minimum clear opening of 30 inches for emergency passage does not imply Board endorsement or acceptance of persons with disabilities moving between cars under normal circumstances, especially when the train is moving. As further discussed in connection with intercity rail under § 1192.113, as a general rule movement between cars is an unsafe practice and is permitted under the ADA only for the purposes of providing access to a single level dining car. The provision does not apply to bi-level cars because the connecting doors are always on the upper level and the ADA does not require access to the upper level for wheelchair and mobility aid users.

Paragraph (b) does not require that all doors be accessible to wheelchair and mobility aid users, unless level boarding is provided. Rather, it requires at least one door on each side of the car from which passengers normally board to provide access to wheelchair and mobility aid users. The use of a designated door rather than the door through which other passengers board is permitted. A 32 inch passageway is required only from the accessible door to the seating spaces provided for wheelchair and mobility aid users. The ADA does not require all aisles or passageways to be accessible to wheelchair or mobility aid users. See H. Rept. 101-485, pt. 4, at 46.

*Question 40:* Sometimes intercity rail cars are used for commuter rail service. Those cars generally have side doors which open onto a vestibule which is 31 inches wide. The passenger compartment is usually separated from the vestibule by a power operated sliding door with a clear opening of 30 or 31 inches. A wheelchair or mobility aid user entering the side door must make a right-angle turn in the vestibule to pass through the sliding door and into the

passenger compartment. This turn is extremely difficult for a manual wheelchair user to negotiate, and virtually impossible for a power wheelchair or mobility aid user. The minimum 42 inch width specified for the vestibule in paragraph (b) is consistent with common accessibility standards for buildings and facilities. See UFAS § 4.13.6, Figures 25 (e) and (f), and ANSI A117.1—1986, § 4.13.6, Figures 25 (e) and (f). Amtrak has indicated that the bulkhead which separates the vestibule from the passenger compartment could be set back further in new cars to provide a wider vestibule. If the spacing between seat rows is reduced by a fraction of an inch, it may be possible to widen the vestibule without any loss of seats. The Board requests comments on the feasibility of widening the vestibule to 42 inches without reducing seating capacity. The Board also requests comments on the feasibility of widening the sliding door between the vestibule and the passenger compartment to 32 inches and any incremental costs involved.

*Question 41:* Paragraph (c) requires audible and visual warning signals on automatic doors to alert passengers to closing doors, just as required for rapid rail and light rail vehicles. The legislative history of the ADA specifically includes automatic door closing alarms as a feature to be required on accessible rail cars. See H. Rept. 101-485, pt. 4, at 44. The use of such systems may not be a common practice for commuter rail. The Board requests comments whether this requirement presents any special problems for commuter rail vehicles and any costs involved.

Paragraph (d)(2) provides that where platform set-backs do not allow the specified horizontal and vertical gaps to be achieved, a car-borne, platform-mounted, or portable boarding device (i.e., lift, ramp or bridge plate) must be provided.

#### *Section 1192.95 Mobility Aid Accessibility*

This section requires new vehicles that do not provide for level boarding to provide access by means of a car-borne, platform-mounted, or portable boarding device (i.e., lift, ramp or bridge plate). Except as noted below, the provisions are similar to those for buses discussed under § 1192.23. See the following questions:

- *Question 3(d)* regarding whether a formula similar to the one used for intercity rail for wheelchair and mobility aid spaces should be permitted for commuter rail and, if so, what should be

the maximum number of spaces provided in any one car.

- *Question 4* regarding whether the proposed performance requirement for the outer safety barrier on the lift platform is adequate or whether a specific test procedure should be incorporated in paragraph (b)(5) and any incremental costs associated with either approach.

- *Question 5* regarding whether a static coefficient of friction of 0.6 should be specified for the platform lift surface.

- *Question 8* regarding whether the lift platform entrance ramp and threshold specifications in paragraph (b)(8) can be achieved.

- *Question 9* regarding the platform movement specifications in paragraph (b)(10).

- *Question 10(a)* regarding any problems with accommodating standees on lifts and any incremental costs relating to accommodating standees.

- *Question 10(b)* regarding whether a band of contrasting color should be required around the perimeter of the lift platform.

- *Questions 11 (a) through (c)* regarding lift handrail dimensions and force requirements.

- *Question 12* regarding whether a static coefficient friction of 0.8 should be specified for ramp surfaces.

- *Question 13* regarding specifications for the ramp edge.

- *Question 14* regarding whether steeper ramp slopes should be permitted.

- *Question 15* regarding whether ramp handrails should be mandatory.

Hand-operated portable lifts are sometimes used for commuter rail. Paragraph (a)(2) requires such lifts to meet applicable requirements of this section. The requirements for a manual back-up for power failure, brake or propulsion system interlocks, and other requirements related to power operated boarding devices clearly do not apply to hand-operated portable lifts. The design load requirement does apply to such lifts.

*Question 42:* Paragraph (b)(2) exempts platform-mounted and portable lifts from the requirement that the controls be interlocked with the car brakes or propulsion system provided that there is some other system to ensure that the train cannot move when the lift is in use. A similar provision is included in light rail. See § 1192.83(b)(2)(iii). The need for some type of system to prevent the train from moving may be more critical for commuter rail in which doors often do not have any type of interlock and are physically closed by personnel. There have been instances where trains began

moving before passengers had completed boarding. Sometimes a whistle or bell announces preparation to move but this may not be heard by persons with hearing impairments. Presumably, the portable lift will be operated by train personnel who will be aware that the train is about to move this may not be sufficiently fail-safe. The Board requests comments on types of systems that could be used and any costs involved.

*Question 43:* The ADA does not require commuter rail and intercity rail operators to provide paratransit for wheelchair and mobility aid users who cannot be accommodated by the lift platform length. This raises the question whether the lift length specified for commuter rail and intercity rail should be longer than for other transit modes. The Board requests comments on the maximum platform length which can be accommodated on vehicles with car-borne lifts and the incremental cost of requiring a longer lift platform. The Board also seeks information on the platform length of platform-mounted and portable lifts currently in use.

With respect to handrails on bridge plates, the Board has the same concerns as with light rail vehicles whether handrails should be required. See *Question 39* regarding handrails on bridge plates.

As for seating locations, sufficient clearances must be provided to permit wheelchair and mobility aid users to reach the location. See *Question 32* regarding whether securement systems should be required on rapid rail, light rail, commuter rail, or intercity rail vehicles; and whether a handrail or stanchion should be required immediately adjacent to the wheelchair or mobility aid space.

#### *Section 1192.97 Interior Circulation, Handrails and Stanchions*

Handrails and stanchions are not required in commuter rail cars to the same extent as in other types of vehicles. Commuter rail cars often start slower than rapid rail or light rail vehicles and have longer dwell times in stations to permit people to find a seat. Handrails and stanchions are required in the entrances to step entry vehicles since this is the area where most accidents occur. See *Question 11(b)* regarding whether it is feasible to include handrail dimensions in this section without restricting the minimum 32 inch clear width required for open doorways.

Where handrails or stanchions are provided at other places, they must be sufficient to permit safe on-board

circulation and seating and standing assistance. In commuter rail systems, where standees are likely to be present, a sufficient number of handrails and stanchions is critical. Seating and standing assistance may be provided by the armrests on traditional coach seats rather than special or extra handrails.

**Question 44:** Paragraph (a) states that where handrails and stanchions are provided, they shall be placed to permit ample turning and maneuvering space for wheelchairs and other mobility aids to enter the vehicle and reach a seating location. The Board requests comments regarding whether further design specifications are needed with respect to maneuvering space and placement of handrails and stanchions and, if so, what the specifications should be.

#### *Section 1192.99 Floors, Steps and Thresholds*

Except as noted below, this section is similar to that for large buses which is discussed under § 1192.25. See the following questions:

- **Question 5** regarding whether a static coefficient of friction of 0.6 should be specified for slip resistant floor surfaces.

- **Question 19** regarding whether the contrast specified for step edges is suitable.

**Question 45:** As discussed under § 1192.25(c), common accessibility standards for buildings and facilities specify a maximum 7 inch step riser height and 11 inch tread depth. See ANSI A117.1-1986, § 4.9.2. The floor height of commuter rail cars is determined by the wheel trucks and undercarriage which is higher than that for buses. The Board requests comments on whether the following specifications are achievable on commuter rail cars and any potential costs involved:

(a) The height from the ground to the first step shall not exceed 14 or 16 inches.

(b) Stair risers shall not exceed 7, 8, or 9, inches.

(c) Stair treads shall be no less than 10 or 11 inches wide.

The Board also requests comments on whether the use of an auxilliary step, often put into place by train personnel, is adequate.

#### *Section 1192.101 Lighting.*

This section is similar to that for large buses discussed under § 1192.31. See the following questions:

- **Question 23(a)** regarding whether the specified lighting level can be achieved 3 feet beyond the outer edge of the lift, ramp or bridge plate.

- **Question 23(b)** regarding whether the specified lighting levels are

sufficient for persons with vision impairments.

#### *Section 1192.103 Public Information System*

This section is similar to that for rail vehicles discussed under § 1192.61, except that external speakers are not required. Paragraph (b) is intended to address the need for providing information to persons with hearing impairments. The Board has requested information on this issue under subpart B. Pending the receipt of this information, the Board has reserved analogous provisions for other modes.

#### *Section 1192.105 Priority Seating Signs*

This section is similar to that for large buses discussed under § 1192.27.

#### *Section 1192.107 Restrooms*

The ADA does not require a commuter rail car to provide an accessible restroom if a restroom is not provided for other passengers. See 42 U.S.C. 12162(b)(2)(B)(i). The specifications for the water closet, grab bars, and faucets and flush controls are based on common accessibility standards for buildings and facilities. See UFAS §§ 4.16.3, 4.16.5, 4.17.6, and 4.27.4; and ANSI A117.1-1986, §§ 4.16.3, 4.16.5, 4.17.6, and 4.25.4.

**Question 46:** The specifications for clear floor space and door width are derived from the current Amtrak restroom design which is constrained by the layout of the car. For a discussion of the Amtrak restroom, see § 1192.123. The specifications assume that the restroom is placed at the end of the car, near the entrance stepwell, and across from an inaccessible restroom, as is common in intercity rail cars. However, if the restroom is placed elsewhere, there may be more room to provide better accessibility. The specifications are the absolute minima and many wheelchair and mobility aid users, especially those with power devices, will experience difficulty using it. The Board requests comments on whether other restroom configurations are feasible and, if so, whether any loss of seats would result from such designs.

#### *Subpart F—Intercity Rail Cars and Systems*

##### *Section 1192.111 General*

This section contains scoping provisions based on the specific requirements of the ADA. See 42 U.S.C. 12162(a) (2) through (4). See also 49 CFR 37-87.

Paragraphs (a) (1) and (d) concern single-level passenger coaches and food service cars. 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. See 42 U.S.C. 12162(a)(3). Not more than two of each type of spaces may be located in any coach or food service car. Id. Each coach or food service car on which wheelchair spaces are provided must have a wheelchair accessible restroom. Id. 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 spaces in each of the 10 coaches, two of each type of spaces 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. Although all new coaches do not necessarily have to be wheelchair accessible, as explained in the legislative history of the ADA, they must incorporate accessibility features such as adequate doorway clearances, lighting, slip-resistant floors and public information systems for individuals with semi-ambulatory disabilities and individuals with hearing or vision impairments. See H. Rept. 101-485, pt. 4, at 46.

Paragraph (a)(2) concerns single-level dining cars and lounge cars. These 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 could enter the coach car and go through the vestibule to the dining car. See 42 U.S.C. 12162(a)(4)(A). The issue of safe passage between cars was the subject of considerable discussion at a series of meetings among staff of the House Energy and Commerce Committee, Amtrak officials, and disability representatives, at which Board staff provided technical assistance. Amtrak

officials had previously testified at the hearing before the Committee that movement between cars presented serious problems, especially when trains were moving through switches. Nevertheless, the discussions concluded that passage into dining cars was necessary since they do not have doors opening to platforms. As the House Energy and Commerce Committee Report explains:

\* \* \* this provision represents the *only* instance in the legislation in which the right of a passenger who uses a wheelchair to pass between cars is recognized. During consideration of the bill, considerable attention was devoted to the question of whether the movement of a passenger who uses a wheelchair through the vestibule connecting adjacent cars should be permitted. In the Committee's judgment, such movement as a general rule constitutes an unsafe practice that can seriously endanger the passenger and in turn subject Amtrak or other passenger railroads to major lawsuits. Thus, it is not the intention of the bill to require any railroad or commuter authority to provide access between cars on a train for passengers using wheelchairs, except in the single instance described in this paragraph. In that single instance, the right of a disabled passenger to have an opportunity to eat in an integrated setting appeared to the Committee, on balance, to outweigh the safety concerns, particularly because the movement between cars is likely to occur when the train is stopped. H. Rept. 101-485, pt. 4, at 48-49 (emphasis in original).

The ADA 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. See 42 U.S.C. 12162(a)(4)(A).

Paragraph (a)(3) concerns bi-level dining cars. These 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. 42 U.S.C. 12162(a)(2)(D). However, as explained in the legislative history, they must incorporate accessibility features such as adequate doorway clearances, slip-resistant floor surfaces, and public information systems for individuals with semi-ambulatory disabilities and individuals with hearing and vision impairments. See H. Rept. No. 101-485, pt. 4, at 46.

Paragraph (a)(4) concerns bi-level lounge cars which are often placed in trains which 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 essentially equivalent to

that which other passengers could obtain in the dining car be provided to persons with disabilities in the lower level lounge car. See 42 U.S.C. 12162(a)(4)(B).

Paragraph (a)(5) concerns restrooms. The ADA requires that single-level passenger coaches and food service cars with wheelchair spaces provide a wheelchair accessible restroom. See 42 U.S.C. 12162(a)(3)(D). 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. See U.S.C. 12162(a)(2)(C).

Paragraph (a)(6) concerns sleeper cars and is consistent with Amtrak's practice of providing a wheelchair accessible sleeping compartment in each new sleeping car.

Paragraph (b) is similar to the provisions for light rail and commuter rail and recognizes that level boarding is the best means for providing accessibility and benefits all passengers. For the reasons discussed under § 1192.91(c) with respect to commuter rail, it may not be feasible to provide high level platforms where intercity rail trains share tracks with freight trains in which case a car-borne, platform-mounted, or portable boarding device (i.e., lift, ramp or bridge plate) must be provided.

Paragraph (c) provides that if an element or feature of a car is replaced or modified, it must comply with the accessibility requirements for that feature, to the extent feasible.

#### *Section 1192.113 Doorways*

Except as noted below, the provisions in this section are similar to those for rapid rail and commuter rail which are discussed under §§ 1192.53 and 1192.93. See the following questions:

- *Question 21(b)* regarding closing force and speed for automatic doors.
- *Question 29* regarding prohibiting the display of the international symbol of accessibility if all cars are accessible.
- *Question 40* regarding the feasibility of widening the vestibule to 42 inches without reducing seating capacity and widening the sliding door between the vestibule and the passenger compartment to 32 inches.

• *Question 47:* As discussed under § 1192.111(a)(2), the ADA permits passage between cars by wheelchair users to provide access from a single-level passenger coach into a single-level dining car. Board staff have discussed the design of end doors with Amtrak designers and it appears that a 30 inch clear opening is attainable. The Board requests comments if a 32 inch opening

can be achieved and any incremental costs involved.

Paragraph (b) does not require that all doors be accessible to wheelchair users, unless level boarding is provided. Rather, with respect to cars required to be accessible by § 1192.111(a) where wheelchair seating locations are provided, at least one door on each side of the car from which passengers normally board must be accessible. The 32 inch passage specified in paragraph (b) is required only from the accessible door to accessible spaces in the car, such as wheelchair seating locations, accessible restroom, accessible table, and accessible sleeping compartment. The ADA does not require all aisles or passageways to be accessible to wheelchair users. See H. Rept. 101-485, pt. 4, at 46.

Paragraph (d)(2) provides that where platform set-backs do not allow the specified horizontal and vertical gaps to be achieved, a car-borne, platform-mounted, or portable boarding device (i.e., lift, ramp or bridge plate) must be provided.

Paragraph (e) contains a provision that appropriate signage indicate which accessible doors are adjacent to an accessible restroom, if applicable.

#### *Section 1192.115 Interior Circulation, Handrails and Stanchions*

This section is the same as that for commuter rail which is discussed under § 1192.97. See *Question 11(b)* regarding whether it is feasible to include handrail dimensions in this section without restricting the minimum 32 inch clear door width required for open doorways.

*Question 48:* Paragraph (a) states that where handrails and stanchions are provided, they shall be placed to permit ample turning and maneuvering space for wheelchairs and other mobility aids to enter the car and reach a seating location. The Board requests comments regarding whether further design specifications are needed with respect to maneuvering space and placement of handrails and stanchions and, if so, what the specifications should be.

#### *Section 1192.117 Floors, Steps and Thresholds*

Except as noted below, this section is similar to that for large buses which is discussed under § 1192.25. See the following questions:

- *Question 5* regarding whether a static coefficient of friction of 0.6 should be specified for slip resistant floor surfaces.
- *Question 19* regarding whether the contrast specified for step edges is suitable.

**Question 49:** As discussed under § 1192.25(c), common accessibility standards for buildings and facilities specify a maximum 7 inch step riser height and 11 inch tread depth. See ANSI A117.1—1986, § 4.9.2. The floor height for intercity rail cars is determined by the wheel trucks and undercarriage which is higher than that for buses. The Board requests comments on whether the following specifications are achievable on intercity rail cars and any potential costs involved:

(a) The height from the ground to the first step shall not exceed 14 to 16 inches.

(b) Stair risers shall not exceed 7, 8, or 9 inches.

(c) Stair treads shall be no less than 10 or 11 inches wide.

The Board also requests comments on whether the use of an auxiliary step, often put into place by train personnel, is adequate.

#### *Section 1192.119 Lighting*

This section is similar to that for large buses discussed under § 1192.31. See the following questions:

- Question 23(a) regarding whether the specified lighting level can be achieved 3 feet beyond the outer edge of the lift, ramp or bridge plate.

- Question 23(b) regarding whether the specified lighting levels are sufficient for persons with vision impairments.

#### *Section 1192.121 Public Information System*

This section is similar to that for rapid rail vehicles discussed under § 1192.61, except that external speakers are not required. Amtrak normally provides public address systems on its cars.

**Question 50:** Paragraph (b) is intended to address the need for providing information to persons with hearing impairments. The Board has requested information on available technology. See *Question 26*. Pending receipt of this information, the Board has reserved analogous provisions for other modes. The Board requests comments on whether an assistive listening system would operate in a train where power is provided by under-car electric traction motors, as in some portions of the Northeast corridor, which might cause significant interference with a magnetic induction system.

#### *Section 1192.123 Restrooms*

This section is the same as that for restrooms in commuter rail cars discussed under § 1192.107. See *Question 46* regarding whether other restroom configurations are feasible and, if so, whether any loss of seats

would result from such designs. The current Amtrak restroom has been engineered to fit within the car and provide a passageway between the restrooms of 33 inches to the passenger seats. Since the minimum passable aisle width is 32 inches, a wider restroom may not be feasible without some creative design. Common accessibility standards for buildings and facilities specify a minimum 36 inch width for an accessible route. See UFAS § 4.3.3 and ANSI A117.1—1986, § 4.3.3. The 39 inch clear opening on the side wall doorway is to allow the maximum turning clearance considering the limited interior space. To provide more space, the restroom itself would probably need to be lengthened which would displace more seats, one of the most critical concerns expressed by the House Energy and Commerce Committee during the many meetings on this issue. The compromise to permit wheelchair seating locations to be grouped so that not all cars would have an accessible restroom was an effort to minimize the loss of seats. Amtrak has introduced fold-up seats which can be used in the wheelchair seating location so the loss of seats is not as severe as anticipated.

#### *Section 1192.125 Mobility Aid Accessibility*

Except as noted below, the provisions are similar to those for large buses which are discussed under § 1192.23 and includes some provisions for commuter rail which are discussed under § 1192.95. See the following questions:

- Question 4 regarding whether the proposed performance requirement for the outer safety barrier on the lift platform is adequate or whether a specific test procedure should be incorporated in paragraph (b)(5) and any incremental costs associated with either approach.

- Question 5 regarding whether a static coefficient of friction of 0.6 should be specified for the platform lift surface.

- Question 8 regarding whether the lift platform entrance ramp and threshold specifications in paragraph (b)(8) can be achieved.

- Question 9 regarding the platform movement specifications in paragraph (b)(10).

- Question 10(a) regarding any problems with accommodating standees on lifts and any incremental costs relating to accommodating standees.

- Question 10(b) regarding whether a band of contrasting color should be required around the perimeter of the lift platform.

- Question 11(a) through (c) regarding lift handrail dimensions and force requirements.

- Question 12 regarding whether a static coefficient of friction of 0.8 should be specified for ramp surfaces.

- Question 13 regarding specifications for the ramp edge.

- Question 14 regarding whether steeper ramp slopes should be permitted.

- Question 15 regarding whether ramp handrails should be mandatory.

- Question 42 regarding types of systems that could be used to prevent the train from moving when the lift is in use.

- Question 43 regarding the maximum platform length which can be accommodated on cars with car-borne lifts, and the length of platform-mounted and portable lifts currently in use.

With respect to handrails on bridge plates, the Board has the same concerns as with light rail vehicles whether handrails should be required. See *Question 39* regarding handrails on bridge plates.

The seating requirement in paragraph (d) apply to the extent required by § 1192.111 (a) and (d). An accessible route with a minimum clear width of 32 inches must be provided from doorways to the seating locations. See *Question 32* regarding whether securement systems should be required on rapid rail, light rail, commuter rail, and intercity rail vehicles; and whether a handrail or stanchion should be required immediately adjacent to the wheelchair or mobility aid space.

#### *Section 1192.127 Sleeping Compartments*

**Question 51:** Amtrak currently provides one accessible sleeping compartment on all new sleeping cars. This provision preserves that practice. Paragraph (a) requires that the sleeping compartment be designed so that a wheelchair or mobility aid user can enter the and use the compartment. See Figure 4. Paragraph (b) requires that the sleeping compartment have an accessible restroom complying with § 1192.123(a). Paragraph (c) requires that controls and operating mechanisms be accessible consistent with common accessibility standards for buildings and facilities. See UFAS § 4.27.3 and 4.27.4, and ANSI A 117.1—1986 §§ 4.25.3 and 4.25.4. The Board requests comments on whether other requirements such as interior space and layout should be specified consistent with the design constraints imposed by the sleeping car and, if so, what the requirements should be. The Board also requests comments on what requirements should be specified for persons who are deaf or hearing impaired and whether an

additional sleeping compartment should be equipped for such persons.

#### Subpart G—Vans and Small Buses

##### Section 1192.131 General

Paragraph (a) states that vehicles with a gross vehicle weight rating (GVWR) less than 19,500 pounds which are required to be accessible by the DOT ADA regulations must comply with the applicable provisions of this subpart. As discussed under § 1192.21, the proposed GVWR division generally separates typical urban transit buses from vans and small buses. See *Question 1* regarding whether another division would be more useful such as passenger capacity, type of lift (i.e., active or passive), or type of service (i.e., fixed route or demand responsive). Vans and small buses are frequently used for demand responsive service but are also used for fixed-route service, especially in rural and small urban areas. This subpart does not include requirements for public address or stop request systems because the small size of the vehicles makes such requirements unnecessary. Such requirements are also not applicable if the vehicles are operated in demand responsive service.

*Question 52:* The Board requests comments on whether trams, motorized carts and powered vehicles pulling one or more trailer units used for shuttle service at such places as malls, airports, or amusement parks should be covered by subpart G or subpart I. If the vehicle consists of several units as in the case of a powered unit pulling one or more trailer units, would the GVWR be determined based on each unit or the vehicle as a whole. Should these vehicles be covered as a separate category under subpart I?

Paragraph (b) provides that if an element or feature of a vehicle is replaced or modified, it must comply with the accessibility requirements for that element or feature, to the extent feasible.

##### Section 1192.133 Mobility Aid Accessibility

This section sets forth the requirements for mobility aid accessibility for vans and small buses.

*Question 53:* Paragraph (a) provides that at least one space must be provided on vans and small buses for wheelchair and mobility aid users. For a discussion of the ADA legislative history regarding spaces for wheelchair and mobility aid users, see 1192.23(a).

The Board requests comments on the factors that affect the number of spaces provided on vans and small buses for wheelchair and mobility aid users, and

under what circumstances it would be desirable to provide more than one space. The Board also seeks information on the impact of providing additional spaces for wheelchair and mobility aid users on overall seating capacity for various types of vehicles.

Paragraphs (b) (1) through (12) set forth the requirements for lifts to be used as boarding devices. Paragraph (b)(1) specifies design load and is derived from 2.3.1, 2.3.2, and 2.4.1.1 of the *Guideline Specifications for Active Wheelchair Lifts*.<sup>12</sup> The provision is the same as that for large buses which is discussed under § 1192.23(b)(1).

*Question 54:* Paragraph (b)(2) concerns controls and interlock systems, and is derived from sections 2.5.4.3, 2.5.4.4, 2.5.8.3, and 2.5.8.4 of the *Guideline Specifications*. The *Guideline Specifications* permit the substitution of a warning light for an interlock system since active lifts are typically used in demand responsive systems where the driver can offer assistance in boarding and alighting and because vans rarely have the type of interlock systems as large buses. The Board has not adopted this option because it introduces an element of possible human error into a safety factor. It is not the intent of these guidelines to require vans and small buses to have the same type of interlock systems as large buses. Other types of interlock systems may be appropriate. Many vans have a switch in the steering column which prevent certain electrical systems from being operated unless the transmission is engaged in "park" and the lift electrical system could be tied into that switch. The ignition key usually cannot be removed unless the transmission is engaged in "park". If the ignition key is used to operate the lift, the vehicle could not be moved while the lift is operated. Some vans have lights which flash when the emergency brake is engaged. A solenoid could be wired to the lights and the lift so that lift could not be operated unless the emergency brake is engaged. The Board requests comments on whether these or other systems could be incorporated in vans and small buses at reasonable cost.

The phrase "where provided" has been added when describing controls in paragraph (b)(2) because many active lifts have manually operated portions of the cycle. An exception has also been included to allow the use of rotary lifts which are designed to be stowed while

the platform is occupied. Rotary lifts are further discussed under § 1192.83(b)(2).

Paragraph (b)(3) deals with emergency operation and is derived from section 2.5.7 of the *Guideline Specifications*. This provision is the same as that required for large buses which is discussed under § 1192.23(b)(3).

Paragraph (b)(4) deals with power or equipment failure and is derived from section 2.4.2 of the *Guideline Specifications*. This provision is identical to that for large buses which is discussed under § 1192.23(b)(4).

Paragraph (b)(5) concerns safety barriers and is derived from sections 2.2.6.1 through 2.2.6.5 of Option A of the *Guideline Specifications*. This provision is identical to that for large buses which is discussed under § 1192.23(b)(5). See *Question 5* regarding whether the performance requirement for the outer safety barrier is adequate or whether a specific test procedure should be incorporated in paragraph (b)(5). Option B of the *Guideline Specifications* provides a lesser requirement for safety barriers together with a set of operating procedures designed to reduce the potential for accidents. The Board has not adopted Option B for several reasons. First, these guidelines cannot specify operating procedures. Second, Option B assumes that the driver can offer assistance in boarding and alighting. Unfortunately, driver assistance cannot always be assured. Even if operational procedures could be required, there is no way to ensure that they will be followed. If a heavy power wheelchair slipped off the platform, it would require a very strong and coordinated individual to restrain the wheelchair and occupant. In addition, the suggested procedure of disengaging the power drive on power wheelchairs is not possible on some models. Many new power wheelchairs have electric brakes controlled by the power drive which are automatically released when the power drive is disengaged.

*Question 55:* Active lift manufacturers participating on the Advisory Panel which developed the *Guideline Specifications* expressed concern that the safety barrier specified in Option A would significantly increase the weight and cost of the lift. The Board requests comments on any weight increase related to the requirements in paragraph (b)(5) and any incremental costs involved.

Paragraph (b)(6) concerns the lift platform surface and is derived from sections 2.2.1.1 and 2.2.1.2 of the *Guideline Specifications*. The provision is identical to that for large buses which is discussed under § 1192.23(b)(6). See

<sup>12</sup> Unless otherwise noted, the references to the *Guideline Specifications* in connection with paragraph (b)(1) through (12) mean the *Guideline Specifications for Active Wheelchair Lifts*.

*Question 5* regarding whether a static coefficient of friction of 0.8 should be specified for slip resistant surfaces.

*Question 56(a):* The *Guideline Specifications* recommend a 48 inch lift platform length as preferable. As discussed under § 1192.23(b)(6), a shorter lift platform would not accommodate individuals who use larger power wheelchairs and three wheeled "scooters". The ADA requires that public entities provide paratransit to individuals with disabilities who cannot use fixed route service. See 42 U.S.C. 12143. If a shorter lift platform is specified for larger buses, a longer lift platform would have to be specified for vans and small buses used to provide paratransit. The Board seeks information on the maximum lift platform length which can be accommodated on various types of vans and small buses and any incremental costs associated with longer lift platforms.

*Question 56(b):* Vans and small buses are sometimes used to provide fixed route service, especially in rural and small urban areas. The Board requests comments on whether vans and small buses used to provide fixed route service should be required to have the same lift platform length as large buses used in fixed services.

*Question 56(c):* The *Guideline Specifications* also recommend a 32 inch lift platform width as preferable. The doorways of many vans and small buses are not as width-constrained as large buses and may be able to accommodate a wider lift. The Board seeks information on the types of vans and small buses which: (1) Can accommodate a 32 inch wide lift platform, and (2) cannot accommodate a 32 inch wide lift platform.

Paragraph (b)(7) deals with platform gaps and is derived from section 2.2.3.2 of the *Guideline Specifications* and the California specifications. Except as noted below, the provision is similar to that for large buses discussed under § 1192.23(b)(7). See *Question 7* regarding the side gap on lifts in which the doors open into the vestibule. A second provision has been added to allow for a hand hold on semi-automatic lifts. The hand hold may not exceed 1½ inches by 4½ inches so as not to catch the wheelchair or mobility aid wheels.

Paragraph (b)(8) concerns the platform entrance ramps and is derived from section 2.2.3 of the *Guideline Specifications*. The provision is identical to that for large buses which is discussed under § 1192.23(b)(8). See *Question 8* regarding whether the slope and threshold specifications can be achieved.

*Question 57:* Paragraph (b)(9) specifies the maximum lift platform deflection and is derived from section 3.1.3 of *Guideline Specifications*. The provision is similar to that for large buses discussed under § 1192.23(b)(9), except that the *Guideline Specifications* specify a 400 pound test instead of the 600 pound load the lift is designed to raise. The provision is intended to limit only the deflection of the lift platform and not the tilting of the vehicle caused by the weight of a wheelchair or mobility aid. As discussed above, depending on the lift platform length specified for large buses, vans and small buses may need to accommodate heavier wheelchairs and mobility aids. Obviously there is some limit. The Board requests comments on whether the lift platform deflection requirement should be 600 pounds and any incremental costs involved.

Paragraph (b)(10) concerns lift platform movement and is derived from section 2.5.10.1 of the *Guideline Specifications*. The provision is similar to that for large buses which is discussed under § 1192.23(b)(10).

Paragraph (b)(11) deals with boarding direction and is derived from section 2.1.4 of the *Guideline Specifications*. The provision is identical to that for large buses which is discussed under § 1192.23(b)(11).

*Question 58:* Paragraph (b)(12) concerns handrails and is derived from section 2.2.7 of the *Guideline Specifications* with a change in handrail height based on common accessibility standards for buildings and facilities. Except as noted below, the provision is similar to that for large buses discussed under § 1192.23(b)(13). See *Questions 11 (a) through (c)* regarding handrail specifications and force requirements. Paragraph (b)(12) requires a handrail on only one side of the lift. This is due to the design of active lifts which fold into the passenger compartment. The handrails need to fold or retract and having handrails on both sides may pose a design problem. The Board requests comments on whether it is feasible to provide handrails on both sides of an active lift.

*Question 59:* The guidelines for vans and small buses do not require lifts to accommodate standees as in the case of large buses. See § 1192.23(b)(12). Vans and small buses usually have lower floors and shorter and fewer steps than large buses which are easier to use by individuals with semi-ambulatory disabilities. The Board requests comments on whether lifts on vans and small buses should be required to accommodate standees. Should any requirements for lifts to accommodate

standees apply to vehicles only above a certain floor height and, if so, what should the floor height be. Are there other constraints which may make lifts on some vans and small buses unsuitable for standees such as doorway height or the single handrail requirement?

Paragraphs (c) (1) through (8) set forth the requirements for ramps to be used as boarding devices. The provisions are the same as those for large buses which are discussed under § 1192.23(c) (1) through (8).

Paragraphs (d) (1) through (6) set forth requirements for securement systems. Paragraph (d)(1) concerns restraint forces and is derived from section 2.3.2 of the *Guideline Specifications for Wheelchair Securement Devices*.<sup>13</sup> Crash tests show that smaller vehicles experience higher peak deceleration (e.g., 21–25g for small buses versus 8–10g for large buses). The requirement specifies that both the securement device itself and the attachment to the vehicle must be capable of withstanding the specified force. These guidelines are intended to provide a base line for restraint requirements. The Board understands that the National Highway Traffic Safety Administration is considering proposing additional regulations in this area. Securement systems which utilize cargo straps of one type or another may have little difficulty meeting these requirements. More problematic are the various clamp devices used in some transit systems. The Board, in cooperation with the UMTA-funded Project ACTION, recently published a technical assistance brochure on Securement of Wheelchairs and Other Mobility Aids on Transit Vehicles which describes the successful systems used by some transit agencies. The brochure, available free from the Board, is part of the Board's ongoing program of technical assistance to help covered entities provide accessible services.

Paragraph (d)(2) concerns location and size of the securement area and is identical to the provision for large buses which is discussed under § 1192.23(d)(2).

Paragraph (d)(3) states that the securement system must accommodate common wheelchairs and mobility aids. (For the definition of this term, see the appendix to the preamble.) This includes power wheelchairs and three wheeled "scooters." See *Question 16* seeking

<sup>13</sup> Unless otherwise noted, the references to the *Guideline Specifications* in connection with paragraphs (d) (1) through (6) mean the *Guideline Specifications for Wheelchair Securement Devices*.

information on new securement systems under development.

*Question 60:* Paragraph (d)(4) concerns seating orientation of securement systems and is derived from section 2.1.3 of the *Guideline Specifications*. The *Guideline Specifications* do not specify an orientation but the Advisory Panel which developed the document agreed that forward facing seating was safer than side facing seating. This is supported by all crash test data to date in which even some power wheelchairs secured sideways tend to fold and disintegrate. The occupants of side facing wheelchairs are also subjected to impact with the chair armrests which could cause severe injury. On the other hand, the safest orientation is rear facing, but only if a padded barrier is provided behind the passenger's head and upper torso to prevent whiplash. For the discussion of the specifications for the padded barrier, see § 1192.23(d)(4). During the Advisory Panel meetings on the *Guideline Specifications*, demand responsive operators favored side facing seating because it provided greater capacity. However, the need for more than two spaces, which can be accommodated forward facing even in some of the smallest mini-vans, is not justified in most cases due to the common low "load factors" of 1.5 persons per vehicle hour. Furthermore, a side facing orientation in many, if not all, vans and small buses causes the wheelchair or mobility aid foot rests to intrude into the aisle needed for other passengers. The deceleration or "g" forces are generally higher for small vehicles, which is reflected in the greater restraint force requirements and the rear facing orientation may be more appropriate for vans and small buses. Some vans use securement straps which are attached to the floor in tracks and can be easily moved and rearranged to fit different chair configurations, making it possible for passengers to choose the orientation they prefer. The Board requests comments on whether a rear facing orientation should be permitted for vans and small buses. If a rear facing orientation is permitted, should a padded barrier be required and are the specifications discussed under § 1192.23(d)(4) appropriate for padded barriers? The Board also seeks information on the cost of providing such a padded barrier.

The guidelines do not require seat belts or shoulder harnesses. See *Question 17(b)* regarding whether seat belts or shoulder harnesses should be provided for wheelchair and mobility aid users.

Paragraph (d)(5) specifies that the securement system shall limit the movement of an occupied wheelchair or mobility aid to no more than 2 inches in any direction. The provision is identical to that proposed for large buses which is discussed under § 1192.(d)(5). See *Question 18* regarding whether the maximum 2 inch movement is appropriate.

Paragraph (d)(6) deals with stowage and is derived from section 2.1.4 of the *Guideline Specifications*. It simply provides that the securement system shall not cause a tripping hazard and that the securement area should be available for standees when needed.

#### *Section 1192.135 Interior Circulation, Handrails and Stanchions*

Except as noted below, this section is similar to that for large buses which is discussed under § 1192.29. See *Question 11(b)* regarding whether it is feasible to include handrail dimensions in this provision without restricting the minimum 32 inch clearance for open doorways.

*Question 61:* Paragraph (a) states that handrails and stanchions shall be placed to permit ample turning and maneuvering space for wheelchairs and other mobility aids to enter the bus and reach a securement location from a lift or ramp. The Board requests comments on whether further design specifications are needed with respect to maneuvering space and the placement of handrails and stanchions and, if so, what the specifications should be.

Paragraph (e) is derived from § 2.2.1.3 of the *Guideline Specifications for Active Wheelchair Lifts* which specifies only door opening height. This paragraph adds the requirement that the height clearance continue to the securement location. For many persons with disabilities, especially high-level spinal cord injury, ducking to enter a low door is difficult or impossible. Similarly, riding with insufficient headroom is uncomfortable and possibly dangerous. The height is derived from anthropometric data for a 95th percentile male seated in a wheelchair and is consistent with information contained in the appendix to UFAS § A4.2.4.

#### *Section 1192.137 Floors, Steps and Thresholds*

This section is similar to that for large buses which is discussed under § 1192.25. See the following questions:

- *Question 5* regarding whether a static coefficient of friction of 0.6 should be specified for slip resistant floor surfaces.

- *Question 19* regarding whether the contrast specified for step edges is suitable.

*Question 62:* As discussed under § 1192.25(c), common accessibility standards for buildings and facilities specify a maximum 7 inch step riser height and 11 inch tread depth. See ANSI A117.1—1986, § 4.9.2. The Board requests comments on whether the following specifications are achievable on vans and small buses, and any potential cost involved:

(a) The height from the ground to the first step shall not exceed 14 inches.

(b) Stair risers shall not exceed 7, 8, or 9 inches.

(c) Stair treads shall be no less than 10 or 11 inches wide.

#### *Section 1192.139 Lighting*

This section is similar to that for large buses which is discussed under § 1192.31. See the following questions:

- *Question 23(a)* regarding whether the specified lighting level can be achieved 3 feet beyond the outer edge of the lift, ramp or bridge plate.

- *Question 23(b)* regarding whether the specified lighting levels are sufficient for persons with vision impairments.

#### *Subpart H—Over-the-Road Buses and Systems*

#### *Section 1192.151 General*

Over-the-road buses operated by private entities are not required to be wheelchair accessible until July 26, 1997 for small providers, and July 26, 1996 for other providers. See 42 U.S.C. 12186(a)(2). The definition of "small provider" will be addressed in the DOT ADA regulations. The Office of Technology Assessment (OTA) is required to conduct a study of the access needs of individuals with disabilities to over-the-road buses and the most cost-effective methods for providing access to such buses. See 42 U.S.C. 12185. A draft of the OTA report is to be provided to the Board for comment and the Board's comments are to be included in the final report which is due to Congress by July 26, 1993. Id. In the interim, DOT is required to issue standards for over-the-road buses which do not involve structural changes or the use of boarding devices. See 42 U.S.C. 12186(a)(2)(A). The guidelines in this subpart cover only those matters which do not involve structural changes and are similar to the provisions for large buses with exception of mobility aid accessibility. The provisions for mobility aid accessibility are reserved pending the completion of the OTA study.

If a public entity contracts with a over-the-road bus operator to provide designated public transportation covered by title II of the ADA, the requirements of title II, including the provision of wheelchair accessibility, apply. See 42 U.S.C. §§ 12141 (definition of "operators") and 12142. See also 49 CFR 37.3(b).

#### *Section 1192.153 Doors, Steps and Thresholds*

This section is similar to that for large buses which is discussed under § 1192.25. See the following questions:

- *Question 5* regarding whether a static coefficient of friction of 0.6 should be specified for slip resistant floor surfaces.
- *Question 19* regarding whether the contrast specified for step edges is suitable.
- *Question 21(b)* regarding door closing force and speed.

*Question 63:* As discussed under § 1192.25(c), common accessibility standards for buildings and facilities specify a maximum 7 inch step riser height and 11 inch tread depth. See ANSI A117.1-1986, § 4.9.2. The Board requests comments on whether the following specifications can be achieved within the confines of the stepwell on over-the-road buses.

(a) The height from the ground to the first step shall not exceed 14 inches.

(b) Stair risers shall not exceed 7, 8, or 9 inches.

(c) Stair treads shall be no less than 10 or 11 inches wide.

Paragraph (d) specifies that the clear width of the door shall be 32 inches when open to accommodate individuals with semi-ambulatory disabilities. (The 32 inch door opening accommodates the crutch-tip to crutch-tip stance of a 95% percentile male crutch user.)

#### *Section 1192.155 Interior circulation, Handrails and Stanchions*

Over-the-road buses rarely have handrails and stanchions to the same extent as urban transit buses and this provision does not require handrails or stanchions to be installed except in the entrance to assist persons with disabilities to board and alight safely. See the following questions:

- *Question 11(b)* regarding whether it is feasible to include handrail dimensions in this section without restricting the 32 inch clear width required for open doorways.
- *Question 22(b)* regarding whether a 1½ inch clearance between handrails and stanchions used for boarding assistance in the entrance and the driver's barrier is sufficient to prevent

inadvertent wedging of a passenger's arm.

#### *Section 1192.157 Lighting*

*Question 64:* This section is similar to that for large buses which is discussed under § 1192.31. See *Question 23(b)* regarding whether the specified lighting levels are sufficient for persons with vision impairments. The Board requests comment on the applicability of these provisions to over-the-road buses.

#### *Section 1192.159 Mobility Aid Accessibility. [Reserved]*

This section is reserved pending the completion of the OTA study.

### Subpart 1—Other Vehicles and Systems

#### *Section 1192.17 General*

*Question 65:* Paragraph (a) states that vehicles and conveyances which are not covered by the other subparts and which are required to be accessible by the DOT ADA regulations must comply with the applicable provisions of this subpart. Some of the vehicles and conveyances addressed by this subpart may be more commonly associated with recreation than with designated or specified public transportation. See *Question 52* regarding whether trams, motorized carts and powered vehicles pulling one or more trailer units used for shuttle service at such places as malls, airports, or amusement parks should be covered by subpart G or subpart 1. The Board requests comment on what other types of vehicles or conveyances are not clearly covered by another subpart and should be included under subpart 1.

Paragraph (b) provides that if an element or feature of a vehicle or conveyance is replaced or modified, it must comply with the accessibility requirements for that feature, to the extent feasible.

#### *Section 1192.173 Automated Guideway Transit Vehicles and Systems*

This section contains requirements for automated guideway transit (AGT) systems which normally operate with small vehicles boarded from platforms level with the vehicle floor. These systems operate similar to rapid rail and this section specifies compliance with most of the parts of subpart C. However, since AGT systems use small, lightweight vehicles moving at relatively slow speed, the vehicles are generally able to attain much smaller horizontal and vertical gaps from the platform than rapid rail. Therefore, paragraph (b) contains stricter requirements for coordination with the boarding platform.

Paragraph (c) requires that barriers be provided to prevent persons from stepping off platforms between cars.

Since AGT systems usually operate behind platform screens which have doors that open only when a vehicle door is correctly aligned, most systems will not need to provide barriers on the vehicles.

#### *Section 1192.175 High-Speed Rail Cars and Systems*

High speed rail systems have not yet been constructed in this country but several systems are in various stages of planning. The systems planned will generally be designed to operate only on dedicated track or special guideway and are, therefore, more like rapid rail than commuter rail or intercity rail. Except in very few cases, tracks used by freight trains are not suitable for high speed rail. Since the systems envisioned will not be affected by station platform set-back requirements needed for freight trains, this section requires high speed rail cars to provide level boarding from high-platforms.

High speed rail cars will probably be closer in design to intercity rail cars than to rapid rail vehicles so paragraph (b) requires compliance with subpart F.

#### *Section 1192.177 Ferries, Excursion Boats and Other Vessels*

This section covers conveyances which operate on water and provide designated or specified public transportation or are used for recreation. The Board will coordinate these guidelines with the United States Coast Guard.

Paragraph (a) specifies a minimum clear door width and permits a maximum ¾ inch threshold to accommodate gaskets and water seals provided they are beveled on both sides.

Paragraph (b) requires that at least one seating area be provided adjacent to other passenger seats which can accommodate a wheelchair or mobility aid user. The provision is the same as that for vehicles.

*Question 66:* Paragraph (c) is reserved for securement systems. It seems reasonable, under some conditions, for a wheelchair or mobility aid to be secured, especially in rough weather. On the other hand, there may be some operations, such as slow moving canal boats, where it would not be necessary. One means of dealing with this issue would be to include specifications for securement systems "where provided." The Board seeks comment on whether securement systems should be provided on vessels and any costs involved.

*Question 67(a):* Paragraph (d) specifies that gangplanks and other boarding devices shall comply with the provisions for ramps and bridge plates

contained in § 1192.125(c). A critical issue in developing guidelines for vessels is the effect tidal changes will have on gangplanks and boarding ramps. The slope of a gangplank or boarding ramp may vary with tidal changes. Furthermore, movement of the vessel with respect to the boarding platform is not controllable as it is with other modes. For this reason, the accessibility of the vessel is closely related to the accessibility of the loading platform or dock. Even where floating docks are used, the slope of any ramp connection to land may change with the tide. At least one ferry system has built a facility on land housing an elevator with a multi-level pier extending out over the water. The ferry docks at the appropriate pier level and the person with a disability uses the elevator to reach the corresponding pier. This arrangement solves some of the problem of salt-water corrosion of the elevator that would occur if it were over the water. Even with such an arrangement, however, there may still be extreme variations in gangplank slope. Especially with choppy water, the variations between boat floor level and dock may undergo extreme variations. The Board requests comments on whether the slope of the gangplank should be specified only under "normal" conditions, and, if so, what constitutes "normal." While it is tempting to permit steeper slopes than would otherwise be permitted, the presence of water on the gangplank may make the steep slope more unusable than in dry situations. How should these potential problems be addressed and what are the costs involved?

*Question 67(b):* Sometimes a gangplank may otherwise be accessible except that it rests on the vessel's gunwale with a step down to the deck. This barrier could be eliminated by the use of a raised platform on the deck, with a ramp leading off, possibly at right angles to the gangplank. Such a platform and ramp could be portable as long as it were put in place at each docking so that would be available to be used with some degree of independence. The Board requests comments on this or other solutions to barriers presented by gunwales and any costs involved.

Paragraph (d) specifies the general design of an accessible restroom based on the provisions for commuter rail and intercity rail. An accessible restroom is only required if a restroom is provided for other passengers.

*Question 68:* Paragraph (f) is reserved for elevators in multi-deck vessels. Common accessibility standards for buildings and facilities permit smaller

elevators in the case of alterations to existing buildings where structural constraints prohibit use of a full-size elevator. See UFAS § 4.1.6(4)(c)(ii) which permits an elevator as small as 48 inches by 48 inches. The Board requests comments on whether a smaller elevator should be permitted in multi-deck vessels and any costs involved. Should elevators be required? Should a cruise ship be considered as a hotel and meet the requirements for accessible lodging? Should accessibility requirements be based on size of the vessel and, if so, what should be the dividing line?

#### Regulatory Process Matters

These guidelines are issued to provide guidance to DOT in establishing accessibility standards for transportation vehicles required to be accessible by the ADA. The standards established by DOT must be consistent with and may incorporate these guidelines. These guidelines, when considered together with regulations issued by DOT, meet the criteria for a major rule under Executive Order 12291. The Board has prepared a Preliminary Regulatory Impact Analysis (PRIA) which has been placed in the docket and is available for public inspection at the Board's office. The PRIA includes a comparison of the Board's guidelines with existing voluntary guidelines and industry practice; a qualitative and quantitative discussion of the benefits of accessibility; a cost impact analysis for certain accessibility elements; and a discussion of the regulatory alternatives considered.

These guidelines when issued in final form, will not directly effect any transportation vehicle. The DOT ADA regulations will include accessibility standards, based on these guidelines, and will determine the applicability of those standards to specific vehicles. Therefore, the actual number of vehicles affected, and the overall cost of all transportation systems, is a function of the DOT ADA regulations. For this reason, the PRIA prepared by the Board for these guidelines has been confined to an assessment of the incremental costs for each vehicle type which would be incurred in the absence of the guidelines (the "base case").

The DOT ADA regulations issued on October 4, 1990 require vehicles purchased after August 26, 1990 to be accessible in accordance with the requirements of the ADA. The "base case" is assumed to be the existing voluntary guidelines and industry practice which would be incorporated in vehicle design to meet the requirements of the DOT ADA regulations in the absence of the Board's guidelines. For

public entities covered by title II of the ADA, this assumption is reasonable since many public transit agencies had begun to purchase accessible vehicles prior to the ADA. For example, all buses purchased in California have been required by state statute to be accessible and meet the California specifications since 1978. Other transit agencies have made commitments to accessibility as early as 1974. For those transit agencies which have only recently begun to purchase accessible vehicles, there are ample information resources available, including the voluntary guidelines sponsored by the Urban Mass Transportation Administration (UMTA), to ensure that the "base case" will be relatively uniform from agency to agency.

For private entities, the situation is more complicated. Many private entities covered by title III of the ADA do not have a history of providing accessibility. As a result, the shared information base among similar entities will be much smaller. Nevertheless, it can be assumed that the "base case" for private entities will be similar to that for public entities for two reasons. First, many of the vehicles are provided by the same manufacturers which supply public entities. A private entity requesting an "accessible vehicle" is likely to get one similar to that which would be supplied to a public transit agency. Second, a private entity seeking to avoid litigation is likely to specify a vehicle which it has reason to believe is generally considered to be accessible, and would likely look to public transit agencies as a model.

To the extent feasible, in accordance with the specific requirements of the ADA and its legislative history, the proposed guidelines closely follow existing voluntary guidelines and industry practice. The PRIA focuses on analyzing the incremental cost impact of each specific provision of the guidelines insofar as it differs from the "base case".

Generally, there are two broad approaches which can be taken in developing guidelines: (1) Design specifications and (2) performance specifications. The advantage of a design specification is that it sets forth specific quantifiable values which must be met (such as platform size or handrail height) and which can be readily determined at the outset. Checking for compliance is relatively easy and consists of taking simple measurements. The major disadvantage is that it limits innovation and may not result in the best or most cost-effective solution. Also, such designs are slow to respond

to technological changes, in this case, changes in wheelchair and mobility aid design.

On the other hand, a performance specification defines a function which the design must meet and allows a variety of solutions. A performance specification for vehicles would permit on-going design changes to meet changing wheelchair and mobility aid designs. The primary disadvantage is that a performance specification must frequently include one or more tests which must be performed to check for compliance. Verification of compliance, therefore, is not as easy on the part of the purchaser. Moreover, compliance cannot always be determined until after the fact, that is after a failure to meet the performance specifications which could lead to claims of discrimination and litigation. For example, a performance specification which required a lift to accommodate "common wheelchairs and mobility aids" could lead to disputes over which specific type of wheelchairs or mobility aids are included. It would also require manufacturers and transit providers to respond to a "moving target" of changing wheelchair and mobility aid design.

The proposed guidelines have taken the "hybrid" approach of providing design specifications in some cases (such as lift platform length) and performance specifications in others (such as information systems for persons with hearing impairments). In some cases, both types of specifications are considered and specific comments requested from the public on which approach is best.

As a result, the estimate of the direct costs for the proposed guidelines is much less straightforward than for buildings and facilities where a specific design solution exists. Where the proposed guidelines have attempted to codify existing voluntary guidelines or industry practice, or where the requirements can easily be satisfied within a competitive bidding process involving major suppliers, then insignificant or no direct costs are assigned to the implementation of the guidelines. However, direct capital and operating costs are incurred when the guidelines attempt to significantly

extend existing voluntary guidelines or industry practice. Moreover, since there are a variety of possible solutions to meet a performance specification, each with its own associated development and product costs, a specific cost estimate is not possible. In such cases, the approach taken in estimating costs is to perform an engineering analysis of the contribution a particular component or part thereof makes to the whole, and how a change in that component would affect the cost of the whole. For instance, in the case of a typical lift for a large bus, according to a survey of lift manufacturers such lifts cost between \$12,000 and \$15,000, which is 7% to 10% of the bus cost. Depending on the chosen design solution, the proposed requirements for a bus lift have the potential to cause a 1-5% increase in the unit bus capital cost as a result of the following changes:

- The requirement for controls interlocked with the drive or propulsion system. Based on estimates from manufacturers offering this feature for current systems, such controls typically cost less than 1% of the bus unit cost.
- The static load, deflection and height requirements for the outer safety barrier. These may require design modification to increase the strength of the loading edge with new or additional material. Since the loading edge constitutes less than 10% of the lift by weight, and the material cost is proportional to weight, the potential additional costs would be less than 10% of the lift cost and less than 1% of the bus unit cost.
- The increased platform surface area which may require design modification and additional platform material. The difference in platform area between the base case and the requirement represents an increase of approximately 9%. Since the platform is less than 25% of the total lift weight, the increase in platform area is proportional to increase in platform weight, and material cost is proportional to weight, the potential additional costs would be less than 2.5% of the lift cost and less than 1% of the bus unit cost.
- The requirements that the platform accommodate standees which may require modification of handrails and

the platform surface. The additional handrails and platform markings would impose a less than 1% incremental cost to the bus unit cost.

It is expected that the increased static load, deflection and larger platform requirements may incur a weight related cost of less than 1% of the vehicle. Some changes such as meeting the contrast ratio on step edges is expected to have a negligible effect. Existing UMTA regulations require the step edge to "contrast" but without any quantitative value. It is anticipated that some markings may meet the requirement now while others would need to make marginal changes in the brightness of the lighter color, since most floor material is often black. The incremental unit vehicle cost is expected to be somewhat higher for vans and small vehicles since the incremental cost to a lift, for example, will be approximately the same as for a large bus but the unit cost of the vehicle is lower and, thus, the percentage change will be higher.

In addition to direct costs, six categories of indirect costs were analyzed:

- (1) Research and development costs (costs incurred by the vehicle and equipment manufacturers in meeting the new requirements);
- (2) Organizational costs (costs arising from potential organizational and staff difficulties in adopting new vehicles and equipment types);
- (3) Technical risk (costs associated with the unknown capacity of the operator to support the new equipment);
- (4) Financial risk (costs of capital outlays and associated financial burden assumed for new equipment);
- (5) Cost of non-compliance (enforcement costs including administrative, legal and court costs); and
- (6) Cost of inhibiting innovation (implementation of any purely design-based specification could be associated with a cost in terms of inhibition of technical and other innovation).

The PRIA applies the foregoing analysis to the specific requirements for the various types of vehicles. The cumulative effect on a particular vehicle type results in the following estimates of cost:

| Vehicle type     | Incremental unit capital cost | Incremental unit operating and maintenance cost | Seat decrease <sup>1</sup> | Weight increment |
|------------------|-------------------------------|-------------------------------------------------|----------------------------|------------------|
| Large buses..... | <4.5%<br>\$6,975              | <0.5%<br>\$128                                  | <3%                        | <2.5%            |
| Rapid rail.....  | <2.5%<br>\$37,500             | <1.5%<br>\$837                                  | <3%                        | None             |
| Light rail:      |                               |                                                 |                            |                  |
| Level entry..... | <0.5%                         | None                                            | <3%                        | None             |

| Vehicle type               | Incremental unit capital cost | Incremental unit operating and maintenance cost | Seat decrease <sup>1</sup> | Weight increment |
|----------------------------|-------------------------------|-------------------------------------------------|----------------------------|------------------|
| Non-level entry .....      | \$12,500                      |                                                 |                            |                  |
|                            | <1.5%                         | <1%                                             | <6%                        | <1%              |
| Commuter rail:             | \$37,500                      | \$516                                           |                            |                  |
| Level entry .....          | <1.5%                         | <1%                                             | <4%                        | None             |
|                            | \$22,500                      | \$785                                           |                            |                  |
| Non-level entry .....      | <1.5%                         | <1%                                             | <4%                        | None             |
|                            | \$22,500                      | \$785                                           |                            |                  |
| Intercity rail:            |                               |                                                 |                            |                  |
| Level entry .....          | <0.5%                         | None                                            | <8%                        | None             |
|                            | \$5,500                       |                                                 |                            |                  |
| Non-level entry .....      | <3%                           | <2%                                             | <8%                        | None             |
|                            | \$33,000                      | \$1,648                                         |                            |                  |
| Vans and small buses ..... | <6%                           | None                                            | <14%                       | <1.5%            |
|                            | \$2,700                       |                                                 |                            |                  |
| Over-the-road buses .....  | <1%                           | None                                            | None                       | None             |
|                            | \$2,000                       |                                                 |                            |                  |
| AGT systems .....          | <1%                           | None                                            | <5%                        | None             |
|                            | \$15,000                      |                                                 |                            |                  |
| Boats .....                | None                          | None                                            | <2%                        | None             |

<sup>1</sup> Fewer seats and heavier vehicles may lead to indirect operating costs.

The above chart summarizes the total estimated incremental costs derived from a series of charts in the PRIA which address the specific requirements for each vehicle or system type. Columns two and three present the estimated percentage changes in capital and operating and maintenance costs, along with the dollar value computed from the vehicle unit cost. For example, the estimated increase in capital cost for large buses is less than 4.5% of the bus unit cost of \$155,000, or approximately \$6,975. The estimated operating and maintenance cost increase is less than 0.5% of an estimated annual per-vehicle operating cost of \$19,500 and maintenance cost of \$6,100. The vehicle unit capital, operating, and maintenance costs are derived from information supplied by vehicle manufacturers, operators, trade associations, and government reports.

Columns four and five present the estimates of potential decreases in seats and weight increment per vehicle, respectively. These represent indirect costs. For example, the increase in weight may represent an increase in operating cost for buses and vans depending on fuel cost. A small increase in weight of rail vehicles, on the other hand, may have a negligible effect on operating cost. Also, the estimated potential for a decrease in seating for intercity rail and some commuter rail cars, for example, assumes that the provision of a wider vestibule would result in seat loss. However, if the spacing between rows of seats in a typical coach car is decreased by a fraction of an inch, the vestibule can be widened with no loss of seats.

Estimating the cost impact of seat decrease for other modes is far more

difficult because relevant data are lacking. For example, for large buses the potential is for the loss of one seat, out of 35 or 40, for a potential decrease of 3%. Vehicles operating in fixed-route service have very different constraints during peak and non-peak periods. During non-peak periods, for instance, typical large buses operate with empty seats so the loss of one seat will have a negligible effect. During peak periods, on the other hand, when buses often have standees, the absence of a seat actually translates to an increase in capacity for standees. See *Question 3(d)*. The missing seat represents 2 to 4 additional passengers who are able to board instead of waiting for another bus. While some passengers may place a premium on a seat, others will place a premium on being able to board a "full" bus and arriving at their destination a few minutes earlier than otherwise. In any event, the increase in capacity provides more rides and generates more revenue. Most likely, there is some point at which the seat decrease adversely affects ridership and, thus, operating revenues. The fact that the Washington Metropolitan Area Transportation Authority in a recent order for rapid rail cars specified fewer seats to increase ridership suggests that 1 or 2 seats is not significant for large vehicles.

For small buses and vans, the seat loss is proportionately higher because there are fewer total seats. However, many demand responsive systems typically operate with load factors of 1.5 passengers per vehicle hour so that the loss of one seat may have little or no effect. This may not be true for small buses and vans operating in fixed-route service or rural areas where seats have a higher value.

*Question 69:* The Board seeks any data which would quantify the cost impact of fewer seats on various modes, especially any surveys of passengers which have attempted to determine the relative importance of seats versus rides. The American Public Transit Association has provided the Board with survey data on base fares for different modes. However, the actual cost of a ride, and the overall effect of decreased seating, is dependent on the time of day, zone charges, discount fares, and a variety of other factors. The Board seeks any data which would help develop a profile of a "typical" fare or cost ranges for rides.

*Question 70:* Considerable data exists on publicly operated transportation vehicles as a result of the reporting requirements of section 15 of the Urban Mass Transportation Assistance Act. The Board seeks data for privately operated transportation vehicles which would assist the Board in developing a final Regulatory Impact Analysis.

With respect to benefits, the PRIA concludes that all persons with disabilities able to use public transportation would experience a decrease in the difficulty and cost of traveling as a result of the guidelines. In addition, an estimated 175,000 users of power wheelchairs and 120,000 users of three-wheeled "scooters," currently excluded from many transit systems because of small lifts and inappropriate securement systems, would be able to use transportation systems nationwide. Moreover, several requirements of the guidelines, such as better signage, better illumination, public address systems, wide doorways, stop request systems, and more readable route and

destination signs would benefit the general public.

With respect to regulatory alternatives the ADA specifically requires that the guidelines "shall establish additional requirements, consistent with this Act, to ensure that \* \* \* rail passenger cars, and vehicles are accessible, in terms of architecture and design, transportation and communication, to individuals with disabilities." See 42 U.S.C. 12204(b). The ADA further provides that nothing in the Act shall be construed to apply a lesser standard than the standards applied under title V of the Rehabilitation Act of 1973 or the regulations issued by Federal agencies pursuant to such title. See 42 U.S.C. 12201(a). To this end, the proposed guidelines have relied on existing regulatory requirements, such as 49 CFR parts 27 and 609, issued under title V of the Rehabilitation Act of 1973.

These guidelines considered together with the DOT ADA regulations may have a significant impact on a substantial number of small entities. This impact is required by the statute, however, and the Board does not have the discretion under the ADA to lessen the requirements.

A Federalism assessment will be prepared by DOT. The Board will cooperate with DOT in the preparation of the assessment.

Finally, the guidelines do not have any significant impact on the environment.

#### Appendix to the Preamble—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 small 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 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, and do not weigh more than 600 pounds when occupied.

*Commuter rail transportation* means short-haul rail passenger service operating in metropolitan and suburban areas, 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.

*Commuter rail car* means a rail passenger car obtained by a commuter authority for use in commuter rail transportation.

*Demand responsive system* means any system of transporting individuals, including but not limited to providing designated public transportation service or specified public transportation service by vehicle at the request of the user, 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 but not limited to providing designated or specified public transportation services, on which a vehicle (including a bus, van, rail vehicle, or other vehicle) is operated along a prescribed route according to a fixed schedule and which does not involve an advance request by a passenger to ensure that service is provided.

*High speed rail* means an intercity rail service which operates on a dedicated guideway or track not used 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 existing railroads.

*Historical or antiquated rail passenger car* means a rail passenger car

(a) Which is not less than 30 years old at the time of its use for transporting individuals;

(b) The manufacturer of which is no longer in the business of manufacturing rail passenger cars; and

(c) Which—

(1) Has a consequential association with events or persons significant to the past; or

(2) Embodies, or is being restored to embody, the distinctive characteristics of a type of rail passenger car used in the past, or to represent a time period which has passed.

*Intercity rail transportation* means transportation provided by the National Rail Passenger Corporation (Amtrak).

*Intercity rail passenger car* means a rail passenger car obtained by Amtrak for use in intercity rail transportation.

*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.

*Operates* includes, with respect to a fixed route or demand responsive system, the provision of transportation service by the public entity itself or by a person under a contractual or other arrangement or relationship with a public entity.

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

*Person with a disability* means an individual having a permanent or temporary physical or mental impairment that substantially limits one or more of the major life functions of such individual.

*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 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.

*Used vehicle* means a vehicle with prior use that was originally purchased before June 26, 1990.

#### List of Subjects in 36 CFR Part 1192

Civil rights, Handicapped, Individuals with disabilities, Transportation.

Authorized by vote of the Board on December 13, 1990, and January 2, 1991.

**William H. McCabe,**  
*Chairman, Architectural and Transportation Barriers Compliance Board.*

For the reasons set forth in the preamble, it is proposed to add part 1192 to title 36 of the Code of Federal Regulations to read as follows:

**PART 1192—AMERICANS WITH DISABILITIES ACT (ADA) ACCESSIBILITY GUIDELINES FOR TRANSPORTATION VEHICLES**

**Subpart A—General**

Sec.

1192.1 Purpose.

1192.3 Definitions. [Reserved]

**Subpart B—Large Buses and Systems**

- 1192.21 General.
- 1192.23 Mobility aid accessibility.
- 1192.25 Doors, steps and thresholds.
- 1192.27 Priority seating signs.
- 1192.29 Interior circulation, handrails and stanchions.
- 1192.31 Lighting.
- 1192.33 Fare box.
- 1192.35 Public information system.
- 1192.37 Stop request.
- 1192.39 Destination and route signs.

**Subpart C—Rapid Rail Vehicles and Systems**

- 1192.51 General.
- 1192.53 Doorways.
- 1192.55 Priority seating signs.
- 1192.57 Interior circulation, handrails and stanchions.
- 1192.59 Floor surfaces.
- 1192.61 Public information system.
- 1192.63 Between-car barriers.

**Subpart D—Light Rail Vehicles and Systems**

- 1192.71 General.
- 1192.73 Doorways.
- 1192.75 Priority seating signs.
- 1192.77 Interior circulation, handrails and stanchions.
- 1192.79 Floors, steps and thresholds.
- 1192.81 Lighting.
- 1192.83 Mobility aid accessibility.
- 1192.85 Between-car barriers.

**Subpart E—Commuter Rail Cars and Systems**

- 1192.91 General.
- 1192.93 Doorways.
- 1192.95 Mobility aid accessibility.
- 1192.97 Interior circulation, handrails and stanchions.
- 1192.99 Floors, steps and thresholds.
- 1192.101 Lighting.
- 1192.103 Public information system.
- 1192.105 Priority seating signs.
- 1192.107 Restrooms.

**Subpart F—Intercity Rail Cars and Systems**

- 1192.111 General.
- 1192.113 Doorways.
- 1192.115 Interior circulation, handrails and stanchions.
- 1192.117 Floors, steps and thresholds.

- 1192.119 Lighting.
- 1192.121 Public information system.
- 1192.123 Restrooms.
- 1192.125—Mobility aid accessibility.
- 1192.127 Sleeping compartments.

**SUBPART G—Vans and Small Buses**

- 1192.131 General.
- 1192.133 Mobility aid accessibility.
- 1192.135 Interior circulation, handrails and stanchions.
- 1192.137 Floors, steps and thresholds.
- 1192.139 Lighting.

**Subpart H—Over-the-Road Buses and Systems**

- 1192.151 General.
- 1192.153 Doors, steps and thresholds.
- 1192.155 Interior circulation, handrails and stanchions.
- 1192.157 Lighting.
- 1192.159 Mobility aid accessibility.
- [Reserved]

**Subpart I—Other Vehicles and Systems**

- 1192.171 General.
- 1192.173 Automatic guideway transit vehicles and systems.
- 1192.175 High-speed rail cars and systems.
- 1192.177 Ferries, excursion boats and other vessels.

**Figures in Part 1192**

Authority: Americans With Disabilities Act of 1990, Public Law 101-336, 42 U.S.C. 12204.

**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.

**§ 1192.3 Definitions. [Reserved]**

**Subpart B—Large Buses and Systems**

**§ 1192.21 General.**

(a) New, used or remanufactured buses having a Gross Vehicle Weight Rating (GVWR) of 19,500 pounds or above (except over-the-road buses covered by subpart H of this part), to be considered accessible by regulations issued by the Department of Transportation in 49 CFR part 37, shall comply with the applicable provisions of this subpart.

(b) If portions of the vehicle are modified in such a way that it 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 buses be retrofitted with lifts, ramps or other boarding devices.

**§ 1192.23 Mobility aid accessibility.**

(a) *General.* All vehicles covered by this subpart shall provide a level-change mechanism or boarding device (e.g., lift or ramp) complying with paragraph (b) or (c) of this section; sufficient clearances to permit a wheelchair or other mobility aid user to reach a securement location; and at least one securement device complying with paragraph (d) of this section.

(b) *Vehicle 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.

(2) *Controls.* The controls shall be interlocked with the vehicle brakes or transmission, or shall provide other appropriate fail-safe mechanisms or systems, so that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks are engaged. Each control for deploying, lowering, raising, or 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.

(3) *Emergency operation.* The lift shall incorporate an emergency method of deploying, lowering to ground 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.

(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 a occupant in the event of a failure of power, chain, cable or hydraulic hose.

(5) *Platform barriers.* The platform shall be equipped with barriers to prevent any of the wheels of a wheelchair or mobility aid from rolling off the platform 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 vehicle until the platform is in its fully raised position. Each side of the lift platform which extends beyond the vehicle shall have a barrier a minimum 1-½ inches high. Such barriers shall not interfere with entering the vehicle. The loading-edge barrier (roll-off barrier) which functions as a loading ramp when the lift is at ground level, shall be sufficiently high when raised or closed to prevent a power wheelchair or mobility aid from riding over it and shall withstand a static load of 1,600 pounds, applied at a height of 3 inches above and parallel to the platform, for 5 seconds without deflecting more than 5 degrees from the unstressed position. The barrier on the outboard or loading edge of the lift shall automatically raise or close, and remain raised or closed, at all times that the platform is more than 3 inches above the roadway or sidewalk and the platform is occupied. Alternatively, a barrier may be raised, lowered, opened or closed by the lift operator provided an interlock or inherent design feature prevents the lift from raising unless the barrier is raised or closed.

(6) *Platform surface*—(i)

*Requirements.* The platform surface shall be free of any protrusions over ¼ inch high and shall be slip resistant. The platform shall have a minimum clear width of 30 inches measured from the platform surface to 30 inches above the platform and a minimum clear length of 48 inches measured from 2 inches above the surface of the platform to 30 inches above the surface of the platform. (See Fig. 1.)

(ii) *Exception.* Where a bus body structural member would preclude a lift platform with a minimum 30 inch clear width, the minimum clear width shall be as close to 30 inches as possible but in no case less than 28½ inches.

(7) *Platform gaps.* Any openings between the platform surface and the raised barriers shall not exceed ⅝ inch wide. When the platform is at vehicle floor height with the inner barrier down or retracted, gaps between the forward lift platform edge and the vehicle floor shall not exceed ½ inch horizontally and ⅝ inch vertically.

(8) *Platform entrance ramp.* The entrance ramp, or loading-edge barrier used as a ramp, shall not exceed a slope of 1:8, for a maximum rise of 3 inches, and the transition from roadway or sidewalk to ramp may be vertical without edge treatment up to ¼ inch. Thresholds between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

(9) *Platform deflection.* The lift platform (not including the entrance ramp) shall not deflect more than 3 degrees 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 platform.

(10) *Platform movement.* No part of the platform shall move at a rate exceeding 6 inches/second during deployment, lowering, lifting, 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 shall be 0.2g.

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

(12) *Use by standees.* Lifts shall accommodate persons using walkers, crutches, canes or braces or who otherwise cannot use steps. The platform may be marked to indicate a preferred standing position.

(13) *Handrails.* Platforms on lifts shall be equipped with handrails which move in tandem with the lift on both sides which shall be graspable throughout the entire lift operation. Handrails shall have a horizontal or diagonal component at least 12 inches long with the top between 30 inches and 34 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 1¼ inches and 1½ inches or shall provide an equivalent grasping surface, and have corner radii of not less than ⅝ inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

(c) *Vehicle ramp*—(1) *Design load.* Ramps shall support a load of 600 pounds, placed at the centroid of the ramp 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.

(2) *Ramp surface.* The ramp surface shall be continuous and slip resistant; shall not have protrusions from the surface greater than ¼ inch; shall have a clear width of 30 inches; and shall accommodate both four-wheel and three-wheel mobility aids.

(3) *Ramp threshold.* The transition from roadway or sidewalk and the transition from vehicle floor to the ramp may be vertical without edge treatment up to ¼ inch. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

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

(5) *Slope.* Where a 1:12 slope is not feasible, ramps shall have a slope no steeper than 1:8 for a maximum 3 inch rise, or no steeper than 1:10 for a maximum 6 inch rise. The slope shall be measured when the ramp is deployed to typical stops in the operating environment. Folding or telescoping ramps are permitted provided they meet all structural requirements of this section.

(6) *Attachment.* When in use for boarding or alighting, the ramp shall be firmly attached to the vehicle so that it is not subject to displacement when loading or unloading a heavy power mobility aid and that any gaps between vehicle and ramp shall not exceed ⅝ inch.

(7) *Stowage.* Ramps, including portable ramps stowed in the passenger area, shall be stowed in such a way that they do not pose any hazard to passengers.

(8) *Handrails.* If provided, handrails shall allow persons with disabilities to grasp them from outside the vehicle while starting to board, and to continue to use them throughout the boarding process, and shall have the top between 30 inches and 34 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 1¼ inches and 1½ inches or shall provide an equivalent grasping surface, and have corner radii of not less than ⅝ inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

(d) *Securement devices*—(1) *Design load.* Securement systems on vehicles with GVWRs of 30,000 pounds or above, and their attachments to such vehicles, shall restrain a force in the forward longitudinal direction of up to 2,000 pounds per securement leg or clamping mechanism and a minimum of 4,000 pounds for each mobility aid. Securement systems on vehicles with GVWRs of up to 30,000 pounds, and their attachments to such vehicles, shall restrain a force in the forward longitudinal direction of up to 2,500 pounds per securement leg or clamping mechanism and a minimum of 5,000 pounds for each mobility aid.

(2) *Location and size.* The securement system shall be placed as near to the

accessible entrance as practicable and shall have a clear floor area of 30 inches by 48 inches. Not more than 6 inches of the required clear floor space may be accommodated for footrests under another seat provided there is a minimum of 9 inches from the floor to the lowest part of the seat overhanging the space. Securement areas may have fold-down seats to accommodate other passengers when a wheelchair or mobility aid is not occupying the area, provided the seats, when folded up, do not obstruct the clear floor space required. (See Fig. 2)

(3) *Mobility aids accommodated.* The securement system shall secure common wheelchairs and mobility aids and shall either be automatic or easily attached by a person familiar with the system and mobility aid and having average dexterity.

(4) *Orientation.* The securement device or system shall secure the wheelchair or mobility aid facing toward the front of the vehicle.

(5) *Movement.* When the wheelchair or mobility aid is secured in accordance with manufacturer's instructions, the securement system shall limit the movement of an occupied wheelchair or mobility aid to no more than 2 inches in any direction.

(6) *Stowage.* When not being used for securement, or when the securement area can be used by standees, the securement system shall not interfere with passenger movement, shall not present any hazardous condition, shall be reasonably protected from vandalism, and shall be readily accessed when needed for use.

#### § 1192.25 Doors, steps and thresholds.

(a) *Slip resistance.* All floors and steps shall have slip-resistant surfaces.

(b) *Contrast.* All step edges and thresholds shall have a band of color(s) running the full width of the step which contrasts from the step tread and riser by 70%, as determined by the formula:

$$\text{Contrast} = [(B1 - B2)/B1] \times 100$$

where:

B1 = light reflectance value (LRV) of brighter area, and

B2 = light reflectance value (LRV) of darker area.

(c) *Step height and risers.* The height from the ground to the first step shall not exceed 14 inches at the front door and 16 inches at the rear side door. All stair risers shall not exceed 8 inches and the tread depth shall not be less than 11 inches.

(d) *Clear width and closing force—(1) Requirements.* All doors shall have a minimum clear width when open of 32 inches. A door shall not require more

than 15 lbf (66 N) to prevent it from closing at any point in the closing cycle.

(2) *Exception.* Where a bus body structural member would preclude a door with a minimum 32 inch clear width, the minimum clear width shall be as close to 32 inches as possible but in no case less than 30 inches.

#### § 1192.27 Priority seating signs.

(a) Each vehicle shall contain sign(s) which indicate that seats in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them. At least one set of forward-facing seats shall be so designated.

(b) Each securement location shall have a sign designating it as such.

(c) Characters on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10, with a minimum character height (using an upper case "X") of  $\frac{1}{8}$  inch, with "wide" spacing (generally, the space between letters shall be  $\frac{1}{16}$  the height of upper case letters), and shall contrast with the background by 70%, as determined by the formula in § 1192.25(b).

#### § 1192.29 Interior circulation, handrails and stanchions.

(a) Interior handrails and stanchions shall permit ample turning and maneuvering space for wheelchairs and other mobility aids to reach a securement location from the lift or ramp.

(b) Handrails and stanchions shall be provided in the entrance to the vehicle in a configuration which allows persons with disabilities to grasp such assists from outside the vehicle while starting to board, and to continue using such assists throughout the boarding and fare collection process. These assists shall have sufficient clearance from the driver's barrier to prevent inadvertent wedging of a passenger's arm. Where on-board fare boxes are provided, a horizontal passenger assist shall be located across the front of the vehicle and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the front door through the boarding procedure. Passengers shall be able to lean against the assist for security while paying fares.

(c) Overhead handrail(s) shall be provided which shall be continuous except for a gap at the rear doorway.

(d) Handrails and stanchions shall be sufficient to permit safe boarding, on-

board circulation, seating and standing assistance, and alighting by persons with disabilities.

(e) For vehicles with front-door lifts or ramps, vertical stanchions immediately behind the driver shall either terminate at the lower edge of the aisle-facing seats, if applicable, or be "dog-legged" so that the floor attachment does not impede or interfere with wheelchair footrests. The driver seat platform, to the maximum extent feasible, shall not extend into the aisle or vestibule beyond the wheel housing.

#### § 1192.31 Lighting.

(a) Any stepwell or doorway immediately adjacent to the driver shall have, when the door is open, at least 2 foot-candles of illumination measured on the step tread or lift platform.

(b) Other stepwells and doorways, including doorways in which lifts or ramps are installed, shall have, at all times, at least 2 foot-candles of illumination measured on the step tread, or lift or ramp, when deployed at the vehicle floor level.

(c) The vehicle doorways shall have outside light(s) which provide at least 1 foot-candle of illumination on the street surface for a distance of 3 feet from all points on the bottom step tread or lift or ramp outboard edge. Such light(s) shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

#### § 1192.33 Fare box.

Where provided, the farebox shall be located as far forward as practicable and shall not obstruct traffic in the vestibule, especially wheelchairs or mobility aids.

#### § 1192.35 Public information system.

(a) Each vehicle shall be equipped with a public address system permitting the driver, or recorded or digitized human speech messages, to announce stops and provide other passenger information within the vehicle and outside the front door.

(b) An information system shall be provided which is capable of providing the same or equivalent information to hearing impaired persons using an assistive listening system (e.g., magnetic inductive loops) or other appropriate technology or service.

#### § 1192.37 Stop request.

(a) Where passengers may board or alight at multiple stops at their option, each vehicle shall provide controls adjacent to the securement location for requesting stops and which alerts the driver that a mobility aid user wishes to disembark. Such a system shall provide

auditory and visual indications that the request has been made.

(b) Controls shall be mounted no higher than 48 inches and no lower than 15 inches above the floor, 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).

#### § 1192.39 Destination and route signs.

(a) Where destination or route information is displayed on the exterior of a vehicle, each vehicle shall have illuminated signs on the front and boarding side of the vehicle.

(b) Characters on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10, with a minimum character height (using an upper case "X") of 1 inch for signs on the boarding side and a minimum character height of 2 inches for front "headsigns", with "wide" spacing (generally, the space between letters shall be 1/16 the height of upper case letters), and shall contrast with the background by 70%, as determined by the formula in § 1192.25(b).

### Subpart C—Rapid Rail Vehicles and Systems.

#### § 1192.51 General.

(a) New, used and remanufactured rapid rail vehicles, to be considered accessible by regulations issued by the Department of Transportation in 49 CFR part 37, shall comply with this subpart.

(b) If portions of the vehicle are modified in such a way that it 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 vehicles be retrofitted with lifts, ramps or other boarding devices.

#### § 1192.53 Doorways.

(a) *Clear width and closing force.* Passenger doorways on vehicle sides shall have clear openings at least 32 inches wide when open. Doorways at ends of vehicles shall have clear openings of 30 inches to permit wheelchair and mobility aid users to be evacuated to an adjoining vehicle in an emergency. Automatic doors shall not require more than 15 lbf (66 N) to prevent closing at any point in the closing cycle. The closing speed shall be one foot per second maximum.

(b) *Signage.* The international symbol of accessibility shall be displayed on the exterior of accessible vehicles operating on an accessible rapid rail system

unless all vehicles are accessible, in which case no symbol shall be displayed.

(c) *Signals.* Auditory and visual warning signals shall be provided to alert passengers of closing doors.

(d) *Coordination with boarding platform—(1) Requirements.* Where the vehicle will operate in an accessible station, the design of vehicles shall be coordinated with the boarding platform design such that the horizontal gap between a vehicle door at rest and the platform shall be no greater than 3 inches and the height of the vehicle floor shall be plus or minus 5/8 inch of the platform height under all normal passenger load conditions. Vertical alignment may be accomplished by vehicle air suspension or other suitable means of meeting the requirement.

(2) *Exception.* New vehicles operating in existing stations may have a floor height plus or minus 1½ inches of the platform height provided the horizontal gap is no greater than 2½ inches.

#### § 1192.55 Priority seating signs.

(a) Each vehicle shall contain sign(s) which indicate that certain seats are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.

(b) Characters on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10, with a minimum character height (using an upper case "X") of ½ inch, with "wide" spacing (generally, the space between letters shall be ¼ the height of upper case letters), and shall contrast with the background by 70%, as determined by the formula:

$$\text{Contrast} = [(B1 - B2)/B1] \times 100$$

where:

B1 = light reflectance value (LRV) of brighter area, and

B2 = light reflectance value (LRV) of darker area.

#### § 1192.57 Interior circulation, handrails and stanchions.

(a) Handrails and stanchions shall be provided to assist safe boarding, on-board circulation, seating and standing assistance, and alighting by persons with disabilities.

(b) Handrails, stanchions, and seats shall allow a wheelchair or mobility aid user to enter the vehicle and position the wheelchair or mobility aid in an area, having a minimum clear space of 48 inches by 30 inches, which does not prevent movement of other passengers. Particular attention shall be given to ensuring maximum maneuverability immediately inside doors. Ample

vertical stanchions from ceiling to seat-back rails shall be provided. Vertical stanchions from ceiling to floor shall not interfere with wheelchair or mobility aid circulation and shall be kept to a minimum in the vicinity of doors.

(c) The diameter or width of the gripping surface of handrails and stanchions shall be 1¼ inches to 1½ inches or provide an equivalent gripping surface.

#### § 1192.59 Floor surfaces.

All floors shall have slip-resistant surfaces.

#### § 1192.61 Public information system.

(a)(1) *Requirements.* Each vehicle 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. At least one vehicle in each train shall have an external public address system to permit transportation system personnel, or recorded or digitized human speech messages, to announce train, route, or line identification information.

(2) *Exception.* Where station announcement systems provide information on arriving trains, an external train speaker is not required.

(b) [Reserved]

#### § 1192.63 Between-car barriers.

(a) *Requirement.* Suitable devices or systems shall be provided to prevent individuals from inadvertently stepping off the platform between cars. Acceptable solutions include, but are not limited to, pantograph gates, chains, motion detectors or similar devices.

(b) *Exception.* Between-car barriers are not required where platform screens are provided which close off the platform edge and only open when trains are correctly aligned with the doors.

### Subpart D—Light Rail Vehicles and Systems

#### § 1192.71 General.

(a) New, used and remanufactured light rail vehicles, to be considered accessible by regulations issued by the Department of Transportation in 49 CFR part 37, shall comply with this subpart.

(b)(1) Vehicles intended to be operated solely in light rail systems confined to a dedicated right-of-way, and for which all stations or stops are designed and constructed for revenue service after January 26, 1993, shall

provide level boarding and shall comply with §§ 1192.73(d)(1) and 1192.85.

(2) Vehicles designed for, and operated on, pedestrian malls, city streets, or other areas where level boarding is not feasible shall provide wayside or car-borne lifts, mini-high platforms, or other means of access in compliance with § 1192.83 (b) or (c).

(c) If portions of the vehicle are modified in such a way that it 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 vehicles be retrofitted with lifts, ramps or other boarding devices.

#### § 1192.73 Doorways.

(a) *Clear width and closing force.* All passenger doorways on vehicle sides shall have minimum clear openings of 32 inches when open. Where multi-vehicle trains are operated with doors between vehicles, doorways at ends of vehicles shall have minimum clear openings of 30 inches to permit wheelchair and mobility aid users to be evacuated to an adjoining vehicle in an emergency. Automatic doors shall not require more than 15 lbf (66 N) to prevent closing at any point in the closing cycle. The closing speed shall be one foot per second maximum.

(b) *Signage.* The international symbol of accessibility shall be displayed on the exterior of each vehicle operating on an accessible light rail system unless all vehicles are accessible, in which case no symbol shall be displayed.

(c) *Signals.* Auditory and visual warning signals shall be provided to alert passengers of closing doors.

(d) *Coordination with boarding platform (1) Requirements.* The design of level-entry vehicles shall be coordinated with the boarding platform design so that the horizontal gap between a vehicle at rest and the platform shall be no greater than 3 inches and the height of the vehicle floor shall be plus or minus  $\frac{1}{2}$  inch of the platform height. Vertical alignment may be accomplished by vehicle air suspension, automatic ramps or lifts, or any combination.

(2) *Exception.* New vehicles operating in existing stations may have a floor height plus or minus  $\frac{1}{2}$  inches of the platform height provided the horizontal gap is no greater than  $2\frac{1}{2}$  inches.

(3) *Exception.* Where it is not operationally or structurally feasible to meet the horizontal or vertical requirements, platform or vehicle devices complying with § 1192.83(b) or platform or vehicle mounted ramps or

bridge plates complying with § 1192.83(c) shall be provided.

#### § 1192.75 Priority seating signs.

(a) Each vehicle shall contain sign(s) which indicate that certain seats are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.

(b) Where designated wheelchair or mobility aid seating locations are provided, signs shall indicate the location and advise other passengers of the need to permit wheelchair and mobility aid users to occupy them.

(c) Characters on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10, with a minimum character height (using an upper case "X") of  $\frac{5}{8}$  inch, with "wide" spacing (generally, the space between letters shall be  $\frac{1}{16}$  the height of upper case letters), and shall contrast with the background by 70%, as determined by the formula of § 1192.79(b).

#### § 1192.77 Interior circulation, handrails and stanchions.

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

(b) At entrances equipped with steps, handrails and stanchions shall be provided in the entrance to the vehicle in a configuration which allows passengers to grasp such assists from outside the vehicle while starting to board, and to continue using such assists throughout the boarding process. These assists shall have sufficient clearance from the driver's barrier to prevent inadvertent wedging of a passenger's arm. Where on-board fare collection devices are used, a horizontal passenger assist shall be located between boarding passengers and the fare collection device and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the door through the boarding procedure. Passengers shall be able to lean against the assist for security while paying fares.

(c) At all doors on level-entry vehicles, and at each entrance accessible by lift, ramp or other suitable means, handrails, stanchions, passenger seats, vehicle driver seat platforms, and fare boxes, if applicable, shall be located so as to allow a wheelchair or mobility aid user to enter the vehicle

and position the wheelchair or mobility aid in an area having a minimum clear area of 48 inches by 30 inches, which does not prevent the movement of other passengers. Particular attention shall be given to ensuring maximum maneuverability immediately inside doors. Ample vertical stanchions from ceiling to seat-back rails shall be provided. Vertical stanchions from ceiling to floor shall not interfere with wheelchair or mobility aid circulation and shall be kept to a minimum in the vicinity of accessible doors.

(d) The diameter or width of the gripping surface of handrails and stanchions shall be  $1\frac{1}{4}$  inches to 1 $\frac{3}{4}$  inches or shall provide an equivalent gripping surface.

#### § 1192.79 Floors, steps and thresholds.

(a) All floors and steps shall have slip-resistant surfaces.

(b) All thresholds and step edges 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 by 70%, as determined by the formula:

$$\text{Contrast} = [(B1 - B2)/B1] \times 100$$

where:

B1 = light reflectance value (LRV) of brighter area, and

B2 = light reflectance value (LRV) of darker area.

(c) The height from the ground to the first step shall not exceed [ ] inches. All stair risers shall not exceed [ ] inches and the tread depth shall not be less than [ ] inches. [See preamble Question 37 for options.]

#### § 1192.81 Lighting.

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

(b) Other stepwells and doorways with lifts, ramps or bridge plates shall have, at all times, at least 2 footcandles of illumination measured on the step tread or lift or ramp, when deployed at the vehicle floor level.

(c) The doorways of vehicles not operating at lighted station platforms shall have outside lights which provide at least 1 footcandle of illumination on the station platform or street surface for a distance of 3 feet from all points on the bottom step tread, lift platform, ramp or bridge plate edge. Such lights shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

### § 1192.83 Mobility aid accessibility.

(a)(1) *General.* All new light rail vehicles, other than level entry vehicles, covered by 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 location, with a minimum clear floor area of 48 inches by 30 inches, which does not prevent passenger flow.

(2) *Exception.* If lifts, ramps or bridge plates meeting the requirements of this section are provided on station platforms or other stops, the vehicle is not required to be equipped with a car-borne device.

(b) *Vehicle 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.

(2) *Controls*—(i) *Requirements.* The controls shall be interlocked with the vehicle brakes or propulsion system so that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks are engaged. 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.

(ii) *Exception.* Where physical or safety constraints prevent the deployment at some stops of a lift having its long dimension perpendicular to the vehicle axis, the transportation identity may specify a lift which is designed to deploy with its long dimension parallel to the vehicle axis and which pivots into or out of the vehicle 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 in which the stowed position is within the

passenger compartment and which is intended to be stowed while occupied.

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

(3) *Emergency operation.* The lift shall incorporate an emergency method of deploying, lowering to ground 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.

(4) *Power or equipment failure.* Lift 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 failure of power, chain, cable or hydraulic hose.

(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 vehicle until the lift is in its fully raised position. Each side of the lift platform which extends beyond the vehicle shall have a barrier a minimum 1½ inches high. Such barriers shall not interfere with entering the vehicle. The loading-edge barrier (roll-off barrier) which functions as a loading ramp when the lift is at ground level, shall be sufficiently high when raised or closed to prevent a power wheelchair or mobility aid from riding over it and shall withstand a static load of 1,600 pounds, applied at a height of 3 inches above and parallel to the platform, for 5 seconds without deflecting more than 5 degrees from the unstressed position. The barrier on the outboard or loading edge of the lift shall automatically rise or close, and remain raised or closed, at all times that the lift is more than 3 inches above the station platform or roadway and the lift is occupied. Alternatively, a barrier may be raised, lowered, opened or closed by the lift operator provided an interlock or inherent design feature prevents the lift from rising unless the barrier is raised or closed.

(6) *Platform surface.* The lift platform surface shall be free of any protrusions over ¼ inch high and shall be slip resistant. The lift platform shall have a minimum clear width of 30 inches

measured from 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)

(7) *Platform gaps.* Any openings between the lift surface and the raised barriers shall not exceed ⅝ inch wide. When the lift is at vehicle floor height with the inner barrier down or retracted, gaps between the forward lift platform edge and vehicle floor shall not exceed ½ inch horizontally and ⅝ inch vertically.

(8) *Platform entrance ramp.* The entrance ramp, or loading-edge barrier used as a ramp, shall not exceed a slope of 1:8, for a maximum rise of 3 inches, and the transition from the station platform or roadway to ramp may be vertical without edge treatment up to ¼ inch. Thresholds between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

(9) *Platform deflection.* The lift platform (not including the entrance ramp) shall not deflect more than 3 degrees 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.

(10) *Platform movement.* No part of the lift platform shall move at a rate exceeding 6 inches/second during deployment, lowering, lifting, or stowing. This requirement does not apply to the deployment or stowage cycles of lifts that are manually deployed or stowed. The maximum lift horizontal and vertical acceleration shall be 0.2g.

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

(12) *Use by standees.* Lifts shall accommodate persons using walkers, crutches, canes or braces or who otherwise cannot use steps. The lift may be marked to indicate a preferred standing position.

(13) *Handrails.* Platforms on lifts shall be equipped with handrails, which move in tandem with the lift on both sides which shall be graspable throughout the entire lift operation. Handrails shall have a horizontal or diagonal component at least 12 inches long with the top between 30 inches and 34 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 1¼ inches and 1½ inches or shall provide an equivalent grasping surface, and

have corner radii of not less than  $\frac{1}{8}$  inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

(c) *Vehicle ramp or bridge plate*—(1) *Design load.* Ramps or bridge plates shall support a load of 600 pounds, placed at the centroid of the ramp 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.

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

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

(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.

(5) *Slope.* Where a 1:12 slope or less is not feasible, ramps or bridge plates shall have slopes no steeper than 1:8 for no more than a 3 inch rise, or no steeper than 1:10 for a 6 inch rise. The slope shall be measured when the ramp or bridge plate is deployed to its normal operating point such as the roadway or station platform. Folding or telescoping ramps or bridge plates are permitted provided they meet all structural requirements of this section.

(6) *Attachment.*—(i) *Requirement.* When in use for boarding or alighting, the ramp or bridge plate shall be firmly attached to the vehicle so that it is not subject to displacement when loading or unloading a heavy power mobility aid and that any gaps between vehicle and ramp shall not exceed  $\frac{1}{8}$  inch.

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

(7) *Stowage.* Ramps or bridge plates, including portable devices stowed in the passenger area, shall be stowed in such a way that they do not pose any hazard to passengers.

(8) *Handrails.* If provided, handrails shall allow persons with disabilities to grasp them from outside the vehicle while starting to board, and to continue to use them throughout the boarding process, and shall have the top between

30 inches and 34 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  $1\frac{1}{4}$  inches and  $1\frac{1}{2}$  inches or shall provide an equivalent grasping surface, and have corner radii of not less than  $\frac{1}{8}$  inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

#### § 1192.85 Between-car barriers.

Devices or systems shall be provided where vehicles operate in a high-platform, level-boarding mode to prevent individuals from inadvertently stepping off the platform between cars. Appropriate devices include, but are not limited to, pantograph grates, chains, motion detectors or other suitable devices.

### Subpart E—Commuter Rail Cars and Systems

#### § 1192.91 General.

(a) New, used and remanufactured commuter rail cars, to be considered accessible by regulations issued by the Department of Transportation in 49 CFR part 37, shall comply with this subpart.

(b) If portions of the car are modified in such a way that it 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.

(c)(i) Commuter rail cars shall comply with § 1192.93(d) for level boarding wherever structurally and operationally feasible.

(ii) Where level boarding is not structurally or operationally feasible, commuter rail cars shall comply with § 1192.95.

#### § 1192.93 Doorways.

(a) *Clear width.* All doors opening onto station platforms and all doorways into passenger coach compartments shall have a minimum clear opening of 32 inches. Doorways at ends of cars connecting two adjacent single level cars shall have a minimum clear opening of 30 inches.

(b) *Passageways.* At least one doorway on each side from which passengers board the car shall permit access by persons using mobility aids and shall have an accessible route at least 32 inches wide leading to a seating location complying with § 1192.95(a)(3). In cars where such doorways require

passage through a vestibule, such vestibule shall have a minimum width of 42 inches. (see Fig. 3)

(c) *Signals and closing force.* 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. Automatic doors shall not require more than 15 lbf (66 N) to prevent closing at any point in the closing cycle. The closing speed shall be one foot per second maximum.

(d) *Coordination with boarding platform*—(1) *Requirements.* Cars operating in stations with high platforms shall be coordinated with the boarding 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 plus or minus  $\frac{1}{8}$  inch of the platform height. Vertical alignment may be accomplished by car air suspension, platform lifts or other devices, or any combination.

(2) *Exception.* New vehicles operating in existing stations may have a floor height plus or minus  $1\frac{1}{2}$  inches of the platform height provided the horizontal gap is no greater than  $2\frac{1}{2}$  inches.

(3) *Exception.* Where platform setbacks do not allow the specified horizontal gap or vertical alignment, car, platform or portable lifts complying with § 1192.95(b), or car or platform ramps or bridge plates, complying with § 1192.95(c), shall be provided.

(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, in which case no symbol shall be displayed. Appropriate signage shall also indicate which accessible doors are adjacent to an accessible restroom, if applicable.

#### § 1192.95 Mobility aid accessibility.

(a)(1) *General.* All new commuter rail cars, other than level entry cars, covered by 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; sufficient clearances to permit a wheelchair or other mobility aid user to reach a seating location; and at least one mobility aid seating location complying with paragraph (d) of this section.

(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, the car is not required to be equipped with a car-borne device.

(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.

(2) *Controls*—(i) *Requirements*. The controls shall be interlocked with the car brakes or propulsion system so that the car cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks are engaged. 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.

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

(3) *Emergency operation*. The lift shall incorporate an emergency method of deploying, lowering to ground 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.

(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 failure of power, chain, cable or hydraulic hose.

(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 platform 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 extends beyond the car

shall have a barrier a minimum 1½ inches high. Such barriers shall not interfere with entering the car. The loading-edge barrier (roll-off barrier) which functions as a loading ramp when the lift is at ground level, shall be sufficiently high when raised or closed to prevent a power wheelchair or mobility aid from riding over it and shall withstand a static load of 1,600 pounds, applied at a height of 3 inches above and parallel to the lift platform, for 5 seconds without deflecting more than 5 degrees from the unstressed position. The barrier on the outboard or loading edge of the lift shall automatically rise or close, and remain raised or closed, at all times that the lift platform is more than 3 inches above the station platform and the lift is occupied. Alternatively, a barrier may be raised, lowered, opened or closed by the lift operator provided an interlock or inherent design feature prevents the lift from rising unless the barrier is raised or closed.

(6) *Platform surface*. The lift platform surface shall be free of any protrusions over ¼ inch high and shall be slip resistant. The lift platform shall have a minimum clear width of 30 inches measured from 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)

(7) *Platform gaps*. Any openings between the lift platform surface and the raised barriers shall not exceed ⅝ inch wide. When the lift is at car floor height with the inner barrier down or retracted, gaps between the forward lift platform edge and car floor shall not exceed ½ inch horizontally and ⅝ inch vertically.

(8) *Platform entrance ramp*. The entrance ramp, or loading-edge barrier used as a ramp, shall not exceed a slope of 1:8, for a maximum rise of 3 inches, and the transition from station platform to ramp may be vertical without edge treatment up to ¼ inch. Thresholds between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

(9) *Platform deflection*. The lift platform (not including the entrance ramp) shall not deflect more than 3 degrees 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.

(10) *Platform movement*. No part of the lift platform shall move at a rate exceeding 6 inches/second during deployment, lowering, lifting, or stowing. This requirement does not apply to the deployment or stowage cycles of lifts that are manually deployed or stowed.

The maximum lift horizontal and vertical acceleration shall be 0.2g.

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

(12) *Use by standees*. Lifts shall accommodate persons using walkers, crutches, canes or braces or who otherwise cannot use steps. The lift may be marked to indicate a preferred standing position.

(13) *Handrails*. Platforms on lifts shall be equipped with handrails, which move in tandem with the lift, on both sides which shall be graspable throughout the entire lift operation. Handrails shall have a horizontal or diagonal component at least 12 inches long with the top between 30 inches and 34 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 1¼ inches and 1½ inches or shall provide an equivalent grasping surface, and have corner radii of not less than ⅝ inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the car.

(c) *Car ramp or bridge plate*—(1) *Design load*. Ramps or bridge plates shall support a load of 600 pounds, placed at the centroid of the ramp 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.

(2) *Ramp surface*. The ramp or bridge plate surface shall be continuous and slip resistant, shall not have protrusions from the surface greater than ¼ inch, shall have a clear width of 30 inches and shall accommodate both four-wheel and three-wheel mobility aids.

(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 ¼ inch. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

(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.

(5) *Slope*. Where a 1:12 slope or less is not feasible, ramps or bridge plates shall have slopes no steeper than 1:8 for no more than a 3 inch rise, or no steeper than 1:10 for a 6 inch rise. The slope shall be measured when the ramp or bridge plate is deployed to its normal operating point such as the station

platform Folding or telescoping ramps or bridge plates are permitted provided they meet all structural requirements of this part.

(6) *Attachment*—(i) *Requirement*. When in use for boarding or alighting, the ramp or bridge plate shall be firmly attached to the car so that it is not subject to displacement when loading or unloading a heavy power mobility aid and that any gaps between car and ramp shall not exceed  $\frac{3}{8}$  inch.

(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.

(7) *Stowage*. Ramps or bridge plates, including portable devices stowed in the passenger area, shall be stowed in such a way that they do not pose any hazard to passengers.

(8) *Handrails*. If provided, handrails shall allow persons with disabilities to grasp them from outside the vehicle while starting to board, and to continue to use them throughout the boarding process, and shall have the top between 30 inches and 34 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  $1\frac{1}{4}$  inches and  $1\frac{1}{2}$  inches or shall provide an equivalent grasping surface, and have corner radii of not less than  $\frac{1}{8}$  inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

(d) *Mobility aid seating location*. 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 spaces shall adjoin or overlap an accessible route. Such space may have fold-down or removable seats for use when not occupied by a wheelchair or mobility aid user. (See Fig. 2)

#### § 1192.97 Interior circulation, handrails and stanchions.

(a) Where provided, interior handrails or stanchions shall be placed to permit ample turning and maneuvering space for wheelchairs and other mobility aids to reach a seating location, complying with § 1192.95(d), from an accessible entrance.

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

(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.

(d) The diameter or width of the gripping surface of handrails and stanchions shall be  $1\frac{1}{4}$  inches to  $1\frac{1}{2}$  inches or shall provide an equivalent gripping surface.

#### § 1192.99 Floors, steps and thresholds.

(a) All floors and steps shall have slip-resistant surfaces.

(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 by 70%, as determined by the formula:

$$\text{Contrast} = [(B1-B2)/B1] \times 100$$

where:

B1 = light reflectance value (LRV) of brighter area, and

B2 = light reflectance value (LRV) of darker area.

(c) The height from the platform to the first step shall not exceed [ ] inches. All stair risers shall not exceed [ ] inches and the tread depth shall not be less than [ ] inches. [See preamble Question 45 for options.]

#### § 1192.101 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.

(b) The doorways of cars not operating at lighted station platforms shall have outside lights which provide at least 1 footcandle of illumination on the station platform surface for a distance of 3 feet from all points on the bottom step tread, ramp, bridge plate or lift platform edge. Such lights shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

#### § 1192.103 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.

(b) [Reserved]

#### § 1192.105 Priority seating signs.

(a) Each car shall contain sign(s) which indicate that certain seats are priority seats for persons with disabilities and that other passengers

should make such seats available to those who wish to use them.

(b) Characters on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10, with a minimum character height (using an upper case "X") of  $\frac{5}{16}$  inch, with "wide" spacing (generally, the space between letters shall be  $\frac{1}{16}$  the height of upper case letters), and shall contrast with the background by 70%, as determined by the formula of § 1192.99(b).

#### § 1192.107 Restrooms.

(a) If a restroom is provided for the general public, it shall be designed so as to allow a person using a wheelchair or mobility aid to enter and use such restroom as specified below.

(1) The minimum clear floor area shall be 35 inches by 60 inches. Permanently installed fixtures may overlap this area a maximum of 6 inches, if the lowest portion of the fixture is a minimum of 9 inches above the floor, and a maximum of 19 inches, if the lowest portion of the fixture is a minimum of 29 inches above the floor, provided such fixtures do not interfere with access to the water closet. Fold-down or retractable seats or shelves may overlap the clear floor space at a lower height provided they can be easily folded up or moved out of the way.

(2) The height of the water closet shall be 17 inches to 19 inches measured to the top of the toilet seat. Seats shall not be sprung to return to a lifted position.

(3) A grab bar at least 24 inches long shall be mounted behind the water closet, and a grab bar at least 40 inches long shall be mounted on at least one side wall, 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 of 32 inches. Doorways on the side wall shall have a minimum clear opening 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.

(b) Restrooms designed to be accessible shall be in close proximity to at least one seating location for persons using mobility aids and shall be connected to such a space by an

unobstructed path having a minimum width of 32 inches.

## Subpart 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.

(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.

(2) Single-level dining and lounge cars shall have at least one connecting doorway complying with § 1192.113, connected to a car accessible to wheelchairs and mobility aids, and at least one space complying with § 1192.125(d)(2), 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.

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

(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) 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.

(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.

(6) Sleeper cars shall comply with §§ 1192.113 (b) through (d), 1192.115 (b) through (c), 1192.117 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.

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

(2) Where level boarding is not structurally or operationally feasible,

intercity rail cars shall comply with § 1192.125.

(c) If portions of the car are modified in such a way that it 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 lift, ramps or other boarding devices.

(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 37.87.

### § 1192.113 Doorways.

(a) *Clear width.* All doors opening onto station platforms and all doorways into coach passenger compartments shall have a minimum clear opening of 32 inches. Doorways at ends of cars connecting two adjacent cars shall have a minimum clear opening of 32 inches to permit wheelchair and mobility aid users to enter into a single-level dining car, if available, and to be evacuated to an adjoining single-level coach or food service car in an emergency.

(b) *Passageway.* 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, 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)

(c) *Signals and closing force.* 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. Automatic doors shall not require more than 15 lbf (66 N) to prevent closing at any point in the closing cycle. The closing speed shall be one foot per second maximum.

(d) *Coordination with boarding platforms—(1) Requirements.* Cars which provide levelboarding in stations with high platforms shall be coordinated with the boarding 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 plus or minus  $\frac{1}{8}$  inch of the platform height. Vertical alignment may be accomplished by car air

suspension platform lifts or other devices, or any combination.

(2) *Exception.* New vehicles operating in existing stations may have a floor height plus or minus  $1\frac{1}{2}$  inches of the platform height provided the horizontal gap is no greater than  $2\frac{1}{2}$  inches.

(3) *Exception.* Where platform setbacks do not allow the specified horizontal gap or vertical alignment, platform or portable lifts complying with § 1192.125(b), or car or platform bridge plates, complying with § 1192.125(c), may be provided.

(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, in which case no symbol shall be displayed. Appropriate signage shall also indicate which accessible doors are adjacent to an accessible restroom, if applicable.

### § 1192.115 Interior circulation, handrails and stanchions.

(a) Where provided, interior handrails or stanchions shall be designed and placed to permit ample turning and maneuvering space for wheelchairs and other mobility aids to reach a seating location, complying with § 1192.125(d), from an accessible entrance.

(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.

(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.

(d) The diameter or width of the gripping surface of handrails and stanchions shall be  $1\frac{1}{4}$  inches to  $1\frac{1}{2}$  inches or shall provide an equivalent gripping surface.

### § 1192.117 Floors, steps and thresholds.

(a) All floors and steps shall have slip-resistant surfaces.

(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 by 70%, as determined by the formula:

$$\text{Contrast} = [(B1 - B2) / B1] \times 100$$

where:

B1 = light reflectance value (LRV) of brighter area, and

B2 = light reflectance value (LRV) of darker area.

(c) The height from the platform to the first step shall not exceed [ ] inches. All stair risers shall not exceed [ ] inches and the tread depth shall not be less than [ ] inches. [See preamble Question 49 for options.]

**§ 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.

(b) The doorways of cars not operating at lighted station platforms shall have outside lights which provide at least 1 footcandle of illumination on the station platform surface for a distance of 3 feet from all points on the bottom step tread, ramp bridge plate or lift platform edge. Such lights shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

**§ 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.

(b) [Reserved]

**§ 1192.123 Restrooms.**

(a) If a restroom is provided for the general public, and an accessible restroom is required by § 1192.111 (a) and (d), it shall be designed so as to allow a person using a wheelchair or mobility aid to enter and use such restroom as specified below.

(1) The minimum clear floor area shall be 35 inches by 60 inches. Permanently installed fixtures may overlap this area a maximum of 6 inches, if the lowest portion of the fixture is a minimum of 9 inches above the floor, and may overlap a maximum of 19 inches, if the lowest portion of the fixture is a minimum of 29 inches above the floor. Fixtures shall not interfere with access to and use of the water closet. Fold-down or retractable seats or shelves may overlap the clear floor space at a lower height provided they can be easily folded up or moved out of the way.

(2) The height of the water closet shall be 17 inches to 19 inches measured to the top of the toilet seat. Seats shall not be sprung to return to a lifted position.

(3) A grab bar at least 24 inches long shall be mounted behind the water closet, and a grab bar at least 40 inches long shall be mounted on at least one side wall, 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 of 32 inches. Doorways on the side wall shall have a minimum clear opening 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.

(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.

**§ 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 (d) 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.

(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, the car is not required to be equipped with a car-borne device.

(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.

(2) *Controls—(i) Requirements.* The controls shall be interlocked with the car brakes or propulsion system so that the car cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks are engaged. 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.

(ii) *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 cannot move when the lift is in use.

(3) *Emergency operation.* The lift shall incorporate an emergency method of deploying, lowering to ground 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.

(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 failure of power, chain, cable or hydraulic hose.

(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 platform 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 extends beyond the car shall have a barrier a minimum of 1½ inches high. Such barriers shall not interfere with entering the car. The loading-edge barrier (roll-off barrier) which functions as a loading ramp when the lift is at ground level, shall be sufficiently high when raised or closed to prevent a power wheelchair or mobility aid from riding over it and shall withstand a static load of 1,600 pounds, applied at a height of 3 inches above and parallel to the lift platform, for 5 seconds without deflecting more than 5 degrees from the unstressed position. The barrier on the outboard or loading edge of the lift shall automatically rise or close, and remain raised or closed, at all times that the lift platform is more than 3 inches above the station platform and the lift is occupied. Alternatively, an outboard barrier may be raised, lowered, opened or closed manually provided an interlock or inherent design feature prevents the lift from rising unless the barrier is raised or closed.

(6) *Platform surface.* The lift platform surface shall be free of any protrusions over ¼ inch high and shall be slip resistant. The lift platform shall have a minimum clear width of 30 inches measured from 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)

(7) *Platform Gaps.* Any openings between the lift platform surface and the raised barriers shall not exceed ⅝ inch wide. When the lift is at car floor height with the inner barrier down or retracted, gaps between the forward lift platform edge and car floor shall not exceed ½ inch horizontally and ⅝ inch vertically.

(8) *Platform entrance ramp.* The entrance ramp, or loading-edge barrier used as a ramp, shall not exceed a slope of 1:8, for a maximum rise of 3 inches, and the transition from station platform to ramp may be vertical without edge treatment up to ¼ inch. Thresholds between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

(9) *Platform Deflection.* The lift platform (not including the entrance ramp) shall not deflect more than 3 degrees 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.

(10) *Platform movement.* No part of the lift platform shall move at a rate exceeding 6 inches/second during deployment, lowering, lifting, or stowing. This requirement does not apply to the deployment or stowage cycles of lifts that are manually deployed or stowed. The maximum lift horizontal and vertical acceleration shall be 0.2g.

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

(12) *Use by standees.* Lifts shall accommodate persons using walkers, crutches, canes or braces or who otherwise cannot use steps. The lift may be marked to indicate a preferred standing position.

(13) *Handrails.* Platforms on lifts shall be equipped with handrails, which move in tandem with the lift, on both sides which shall be graspable throughout the entire lift operation. Handrails shall have a horizontal or diagonal component at least 12 inches long with the top between 30 inches and 34 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 1¼

inches and 1½ inches or shall provide an equivalent grasping surface, and have corner radii of not less than ⅝ inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the car.

(c) *Car ramp or bridge plate—(1) Design load.* Ramps or bridge plates shall support a load of 600 pounds, placed at the centroid of the ramp 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.

(2) *Ramp surface.* The ramp or bridge plate surface shall be continuous and slip resistant, shall not have protrusions from the surface greater than ¼ inch, shall have a clear width of 30 inches and shall accommodate both four-wheel and three-wheel mobility aids.

(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 ¼ inch. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

(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.

(5) *Slope.* Where a 1:12 slope or less is infeasible, ramps or bridge plates shall have slopes no steeper than 1:8 for no more than a 3-inch rise, or no steeper than 1:10 for a 6-inch rise. The slope shall be measured when the ramp or bridge plate is deployed to its normal operating point such as the station platform. Folding or telescoping ramps or bridge plates are permitted provided they meet all structural requirements of this section.

(6) *Attachment—(i) Requirement.* When in use for boarding or alighting, the ramp or bridge plate shall be firmly attached to the car so that it is not subject to displacement when loading or unloading a heavy power mobility aid and that any gaps between car and ramp shall not exceed ⅝ inch.

(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.

(7) *Stowage.* Ramps or bridge plates, including portable devices stowed in the passenger area, shall be stowed in such a way that they do not pose any hazard to passengers.

(8) *Handrails.* If provided, handrails shall allow persons with disabilities to grasp them from outside the vehicle while starting to board, and to continue

to use them throughout the boarding process, and shall have the top between 30 inches and 34 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 1¼ inches and 1½ inches or shall provide an equivalent grasping surface, and have corner radii of not less than ⅝ inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

(d) *Seating—(1) Requirements.* All intercity rail cars required to be accessible by § 1192.111 (a) and (d) 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 locations complying with paragraph (d)(3) of this section which adjoin or overlap an accessible route with a minimum clear width of 32 inches.

(2) *Wheelchair 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.

#### § 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 and use 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.

(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.

**Subpart G—Vans and Small Buses****§ 1192.131 General.**

(a) New and used vehicles of GVWR less than 19,500 pounds, to be considered accessible by regulations issued by the Department of Transportation in 49 CFR part 37, shall comply with this subpart.

(b) If portions of the vehicle are modified in such a way that it 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 vehicles be retrofitted with lifts, ramps or other boarding devices.

**§ 1192.133 Mobility aid accessibility.**

(a) *General.* Vehicles covered by this section shall provide a level-change mechanism (e.g., lift or ramp) complying with paragraph (b) or (c) of this section; sufficient clearances to permit a wheelchair or other mobility aid user to reach a securement location; and at least one securement device complying with paragraph (d) of this section.

(b) *Vehicle 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.

(2) *Controls—(i) Requirements.* The controls shall be interlocked with the vehicle brakes or transmission, or shall provide other appropriate fail-safe mechanisms or systems, to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged. 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.

(ii) *Exception.* Where the lift is designed to deploy with its long dimension parallel to the vehicle axis and which pivots into or out of the

vehicle while occupied (i.e., "rotary lift"), the requirements of this paragraph prohibiting the lift from being stowed while occupied shall not apply since, in this design the stowed position is within the passenger compartment and the lift is intended to be stowed while occupied.

(3) *Emergency operation.* The lift shall incorporate an emergency method of deploying, lowering to ground 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.

(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 failure of power, chain, cable or hydraulic hose.

(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 platform 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 vehicle until the platform is in its fully raised position. Each side of the lift platform which extends beyond the vehicle shall have a barrier a minimum 1½ inches high. Such barriers shall not interfere with entering the vehicle. The loading-edge barrier (roll-off barrier) which functions as a loading ramp when the lift is at ground level, shall be sufficiently high when raised or closed to prevent a power wheelchair or mobility aid from riding over it and shall withstand a static load of 1,600 pounds, applied at a height of 3 inches above and parallel to the platform, for 5 seconds without deflecting more than 5 degrees from the unstressed position. The barrier on the outboard or loading edge of the lift shall automatically raise or close, and remain raised or closed, at all times that the platform is more than 3 inches above the roadway or sidewalk and the lift platform is occupied. Alternatively, a barrier may be raised, lowered, opened or closed manually provided an interlock or inherent design feature prevents the lift from rising unless the barrier is raised or closed.

(6) *Platform surface.* The platform surface shall be free of any protrusions over ¼ inch high and shall be slip resistant. The platform shall have a minimum clear width of 30 inches measured from the platform surface to 30 inches above the platform and a

minimum clear length of 48 inches measured from 2 inches above the surface of the platform to 30 inches above the surface of the platform. (See Fig. 1)

(7) *Platform gaps.* Any openings between the platform surface and the raised barriers shall not exceed ⅝ inch wide. When the platform is at vehicle floor height with the inner barrier (if applicable) down or retracted, gaps between the forward edge of the lift platform and vehicle floor shall not exceed ½ inch horizontally and ⅝ inch vertically. Platforms on semi-automatic lifts may have a hand hold not exceeding 1½ inches by 4½ inches located midway between the edge barriers.

(8) *Platform entrance ramp.* The entrance ramp, or loading-edge barrier used as a ramp, shall not exceed a slope of 1:8, for a maximum rise of 3 inches, and the transition from roadway or sidewalk to ramp may be vertical without edge treatment up to ¼ inch. Thresholds between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

(9) *Platform deflection.* The lift platform (not including the entrance ramp) shall not deflect more than 3 degrees in any direction between its unloaded position and its position when loaded with 400 pounds distributed over an area of 26 inches by 26 inches located at the centroid of the lift platform.

(10) *Platform movement.* No part of the platform shall move at a rate exceeding 6 inches/second during deployment, lowering, lifting, or stowing. This requirement does not apply to the deployment or stowage cycles of lifts that are manually deployed or stowed.

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

(12) *Handrails.* Platforms on lifts shall be equipped with handrail(s), which move(s) in tandem with the lift, on at least one side which shall be graspable throughout the entire lift operation. Handrails shall have a horizontal component at least 12 inches long with the top between 30 inches and 34 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 1¼ inches and 1½ inches or shall provide an equivalent grasping surface, and have corner radii of not less than ⅝ inch. Handrails shall not interfere with wheelchair or mobility aid

maneuverability when entering or leaving the vehicle.

(c) *Vehicle ramp*—(1) *Design load*. Ramps shall support a load of 600 pounds, placed halfway up the ramp 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.

(2) *Ramp surface*. The ramp surface shall be continuous and slip resistant, shall not have protrusions from the surface greater than ¼ inch, shall have a clear width of 30 inches and shall accommodate both four-wheel and three-wheel mobility aids.

(3) *Ramp threshold*. The transition from roadway or sidewalk and the transition from vehicle floor to the ramp may be vertical without edge treatment up to ¼ inch. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2.

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

(5) *Slope*. Where and a slope of 1:12 is not feasible, ramps shall have slopes no steeper than 1:8 for no more than a 3 inch rise, or no steeper than 1:10 for a 6 inch rise. The slope shall be measured when the ramp is deployed to its normal operating point. Folding or telescoping ramps are permitted provided they meet all structural requirements of this section.

(6) *Attachment*. When in use for boarding or alighting, the ramp shall be firmly attached to the vehicle so that it is not subject to displacement when loading or unloading a heavy power mobility aid and that any gaps between vehicle and ramp shall not exceed ⅝-inch.

(7) *Stowage*. Ramps, including portable ramps stowed in the passenger area, shall be stowed in such a way that they do not pose any hazard to passengers.

(8) *Handrails*. If provided, handrails shall be provided in the entrance to the vehicle in a configuration which allows passengers to grasp such assists from outside the vehicle while starting to board, and to continue using such assists throughout the boarding process. Handrails shall have the top between 30 inches and 34 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 1¼ inches and 1½ inches or shall provide an equivalent grasping surface, and have corner radii of not less than ⅞ inch.

Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

(d) *Securement devices*—(1) *Design load*. Securement systems, and their attachments to such vehicles, shall withstand a force in a forward longitudinal direction of 2,500 pounds per securement leg or clamping mechanism and a minimum of 5,000 pounds for each mobility aid.

(2) *Location and size*. The securement system shall be placed as near to the accessible entrance as practicable and shall have a clear floor area of 30 inches by 48 inches. Not more than 6 inches of the required clear floor space may be accommodated for footrests under another seat provided there is a minimum of 9 inches from the floor to the lowest part of the seat overhanging the space. Securement areas may have fold-down seats to accommodate other passengers when a wheelchair or mobility aid is not occupying the area provided the seats, when folded up, do not obstruct the clear floor space required. (See Fig. 2)

(3) *Mobility aids accommodated*. The securement system shall secure common wheelchairs and mobility aids and shall be either automatic or easily attached by a person familiar with the system and mobility aid and having average dexterity.

(4) *Orientation*. The securement shall be installed so that the secured wheelchair or mobility aid is facing toward the front of the vehicle.

(5) *Movement*. When the wheelchair or mobility aid is secured in accordance with manufacturer's instructions, the securement system shall limit the movement of an occupied wheelchair or mobility aid to no more than 2 inches in any direction.

(6) *Stowage*. When not being used for securement, the securement system shall not interfere with passenger movement, shall not present any hazardous condition, and shall be reasonably protected from vandalism.

#### § 1192.135 Interior circulation, handrails and stanchions.

(a) Interior handrails and stanchions shall be designed and placed to permit ample turning and maneuvering space for wheelchairs and other mobility aids to reach a securement location from the lift or ramp.

(b) Handrails and stanchions shall be provided in the entrance to the vehicle in a configuration which allows persons with disabilities to grasp such assists from outside the vehicle while starting to board, and to continue using such assists throughout the boarding process.

These assists shall have sufficient clearance from the driver's barrier to prevent inadvertent wedging of a passenger's arm. Where on-board fare collection devices are used, a horizontal passenger assist shall be located between boarding passengers and the fare collection device and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the door through the boarding procedure. Passengers shall be able to lean against the assist for security while paying fares.

(c) Handrails and stanchions shall be sufficient to permit safe on-board circulation, seating and standing assistance, and alighting by persons with disabilities.

(d) The diameter or width of the gripping surface of handrails and stanchions shall be 1¼ inches to 1½ inches or shall provide an equivalent gripping surface.

(e) The minimum height of the door opening at the lift and the interior height from lift to securement location shall be 56 inches.

#### § 1192.137 Floors, steps and thresholds.

(a) All floors and steps shall have slip-resistant surfaces.

(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 material by 70%, as determined by the formula:

$$\text{Contrast} = [(B1-B2)/B1] \times 100\%$$

where:

B1 = light reflectance value (LRV) of brighter area, and

B2 = light reflectance value (LRV) of darker area.

(c) The height from the ground to the first step shall not exceed 14 inches. All stair risers shall not exceed [ ] inches and the tread depth shall not be less than [ ] inches. [See preamble Question 62 for options.]

#### § 1192.139 Lighting.

(a) Any stepwell, or doorway in which a lift or ramp is installed or used, shall have, when the door is open, at least 2 foot-candles of illumination measured on the step tread, lift platform or ramp surface.

(b) The vehicle doorways shall have outside light(s) which provide at least 1 foot-candle of illumination on the street surface for a distance of 3 feet from all points on the bottom step tread, lift platform or ramp edge. Such light(s)

shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

#### Subpart H—Over-the-Road Buses and Systems.

##### § 1192.151 General.

New, used and remanufactured over-the-road buses, to be considered accessible by regulations issued by the Department of Transportation in 49 CFR part 37, shall comply with this subpart.

##### § 1192.152 Doors, steps and thresholds.

(a) All floors and steps shall have slip-resistant surfaces.

(b) All step edges shall have a band of color(s) running the full width of the step which contrasts from the step tread and riser by 70%, as determined by the formula:

$$\text{Contrast} = [(B1 - B2) / B1] \times 100$$

where:

B1 = light reflectance value (LRV) of brighter area, and

B2 = light reflectance value (LRV) of darker area.

(c) The height from the ground to the first step shall not exceed [ ] inches. All stair risers shall not exceed [ ] inches and the tread depth shall not be less than [ ] inches. [See preamble Question 63 for options.]

(d) Doors shall have a minimum clear width when open of 32 inches. A door shall not require more than 15 lbf (66N) to prevent it from closing at any point in the closing cycle.

##### § 1192.155 Interior circulation, handrails and stanchions.

(a) Handrails or stanchions shall be provided in the entrance to the vehicle in a configuration which allows persons with disabilities to grasp such assists from outside the vehicle while starting to board, and to continue using such assists throughout the boarding process. These assists shall have sufficient clearance from the driver's barrier to prevent inadvertent wedging of a passenger's arm.

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

(c) The diameter or width of the gripping surface of handrails and stanchions shall be 1¼ inches to 1½ inches or shall provide an equivalent gripping surface.

##### § 1192.157 Lighting.

(a) Any stepwell or doorway immediately adjacent to the driver shall have when the door is open, at least 2

foot-candles of illumination measured on the step tread.

(b) The vehicle doorway shall have outside light(s) which provide at least 1 foot-candle of illumination on the street surface for a distance of 3 feet from all points on the bottom step tread edge. Such light(s) shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

##### § 1192.159 Mobility aid accessibility. [Reserved]

#### Subpart I—Other Vehicles and Systems

##### § 1192.171 General.

(a) New, used and remanufactured vehicles and conveyances for systems not covered by other subparts of this part, to be considered accessible by regulations issued by the Department of Transportation in 49 CFR part 37, shall comply with this subpart.

(b) If portions of the vehicle or conveyance are modified in such a way that it 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 vehicles be retrofitted with lifts, ramps or other boarding devices.

##### § 1192.173 Automated guideway transit vehicles and systems.

(a) Automated Guideway Transit (AGT) vehicles and systems, sometimes called "people movers", shall comply with the provisions of §§ 1192.53 (a) through (c), and 1192.55 through 1192.61 for rapid rail vehicles and systems.

(b) Where the vehicle will operate in an accessible station, the design of vehicles shall be coordinated with the boarding platform design such that the horizontal gap between a vehicle door at rest and the platform shall be no greater than 1 inch and the height of the vehicle floor shall be plus or minus ½ inch of the platform height under all normal passenger load conditions. Vertical alignment may be accomplished by vehicle air suspension or other suitable means of meeting the requirement.

(c) In stations where open platforms are not protected by platform screens, a suitable device or system shall be provided to prevent individuals from stepping off the platform between cars. Acceptable devices include, but are not limited to, pantograph gates, chains, motion detectors or other appropriate devices.

##### § 1192.175 High-speed rail cars and systems.

(a) All cars for high-speed rail systems, including but not limited to those using "maglev" or "TCV" technology, operating on exclusive, dedicated rail (i.e., not used by freight trains) or guideway, in which stations are constructed for revenue service after January 26, 1993, shall be designed for high-platform level boarding and shall comply with § 1192.111(a) for each type of car which is similar to intercity rail, §§ 1192.111(d), 1192.113 (a) through (c) and (e), 1192.115 (a) and (b), 1192.117 (a) and (b), 1192.121 through 1192.123, 1192.125(d), and 1192.127 (if applicable). The design of cars shall be coordinated with the boarding platform design such that the horizontal gap between a car door at rest and the platform shall be no greater than 3 inches and the height of the car floor shall be plus or minus ⅝ inch of the platform height under all normal passenger load conditions. Vertical alignment may be accomplished by car air suspension or other suitable means of meeting the requirement. All doorways shall have, when the door is open, at least 2 foot-candles of illumination measured on the door threshold.

(b) All other high-speed rail cars shall comply with the similar provisions of subpart F of this part.

##### § 1192.177 Ferries, excursion boats and other vessels.

(a) *Doorways.* Doorways to all passenger areas shall have a minimum clear opening of 32 inches. Thresholds may be a maximum ¾ inch to accommodate gaskets and water seals provided they are beveled on both sides.

(b) *Seating areas.* At least one area for passengers using wheelchairs or mobility aids shall be provided as close as practicable to an accessible entrance, and adjacent to seating of other passengers, with a clear floor area 30 inches by 48 inches. Not more than 6 inches of the required clear floor space may be accommodated for footrests under another seat provided there is a minimum of 9 inches from the floor to the lowest part of the seat overhanging the space. Such areas may have fold-down seats to accommodate other passengers when a wheelchair or mobility aid is not occupying the area provided the seats, when folded up, do not obstruct the clear floor space required. (See Fig. 2.)

(c) *Securement.* [Reserved]

(d) *Gangplanks.* Gangplanks and other boarding devices shall comply with § 1192.125(c).

(e) *Restrooms.* If restrooms are provided for the general public they shall comply with § 1192.123(a) (1) through (5), and shall be connected to

the seating area(s) required by paragraph (b) of this section by an unobstructed route at least 32 inches wide.

(f) *Elevators.* [Reserved]

BILLING CODE 8150-01-M

## Figures in Part 1192

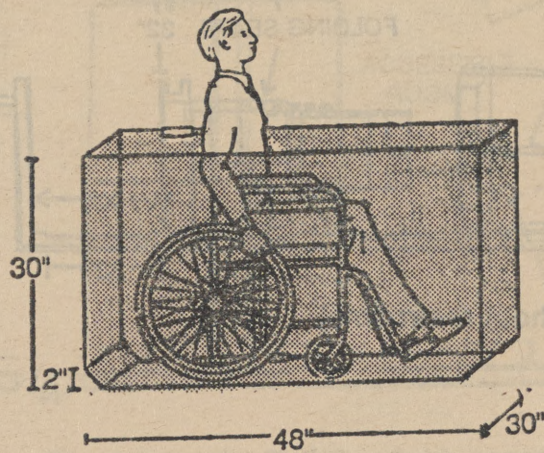


Fig. 1

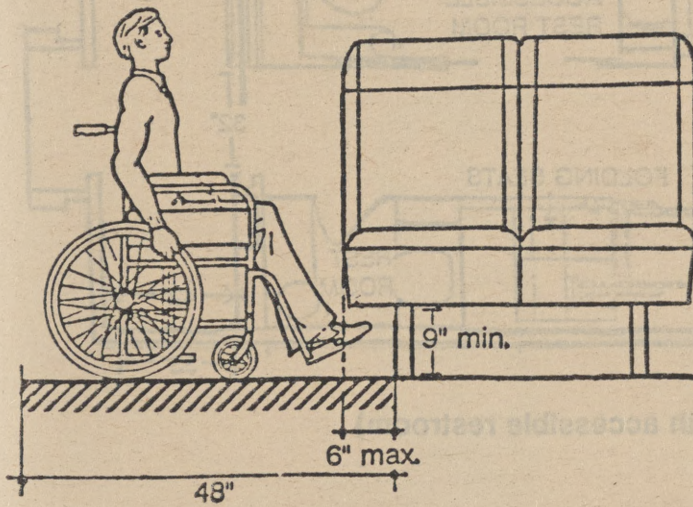


Fig. 2

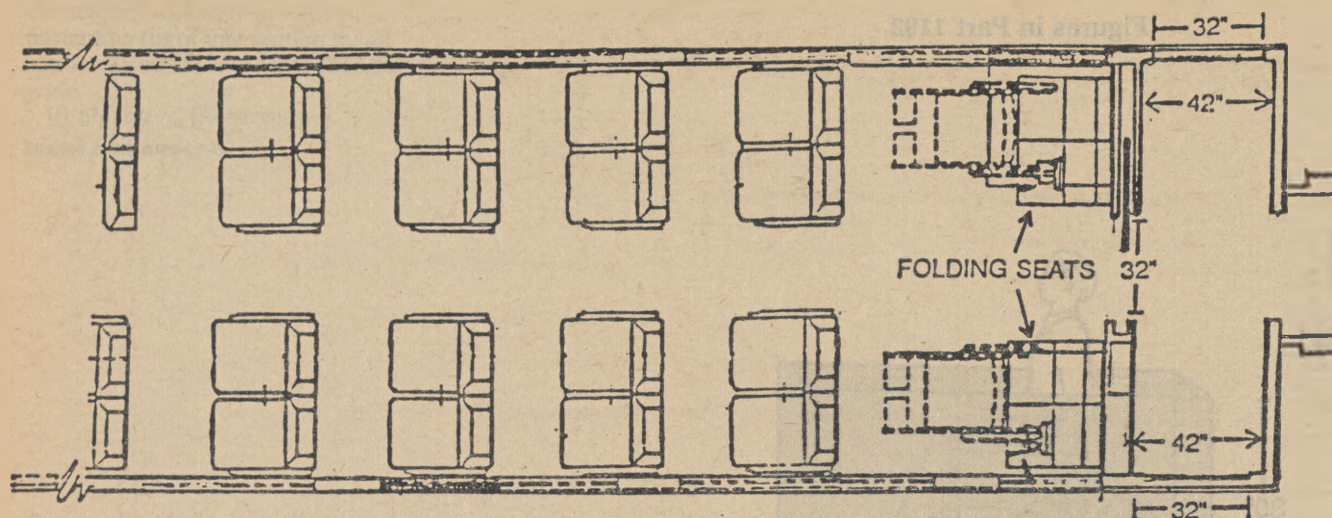


Fig. 3 Commuter Rail Car (without restrooms)

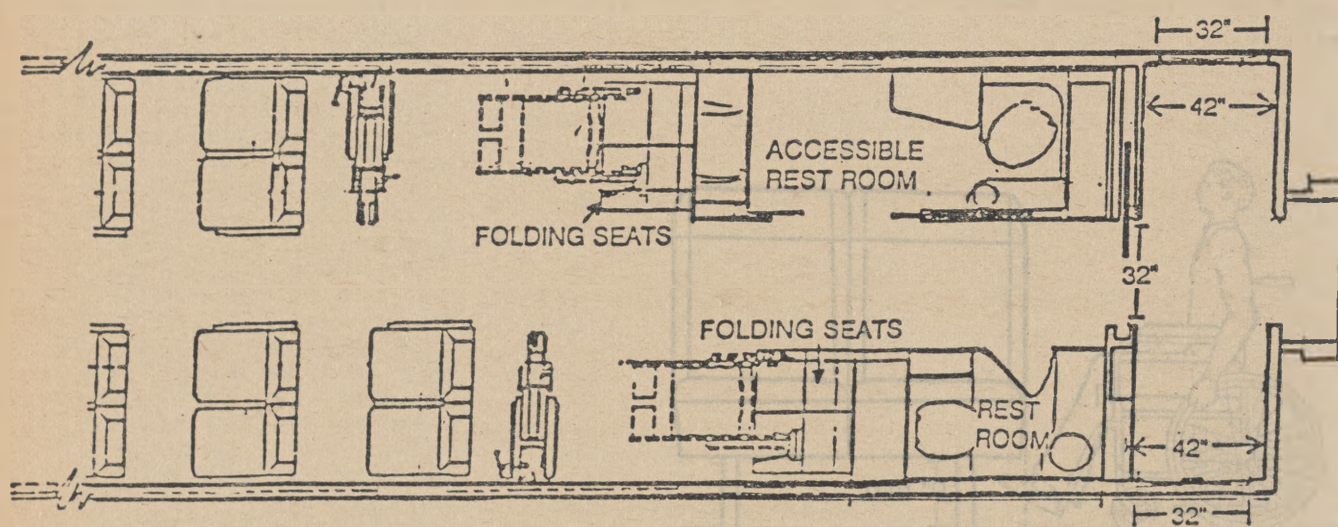


Fig. 4 Intercity Rail Car (with accessible restroom)

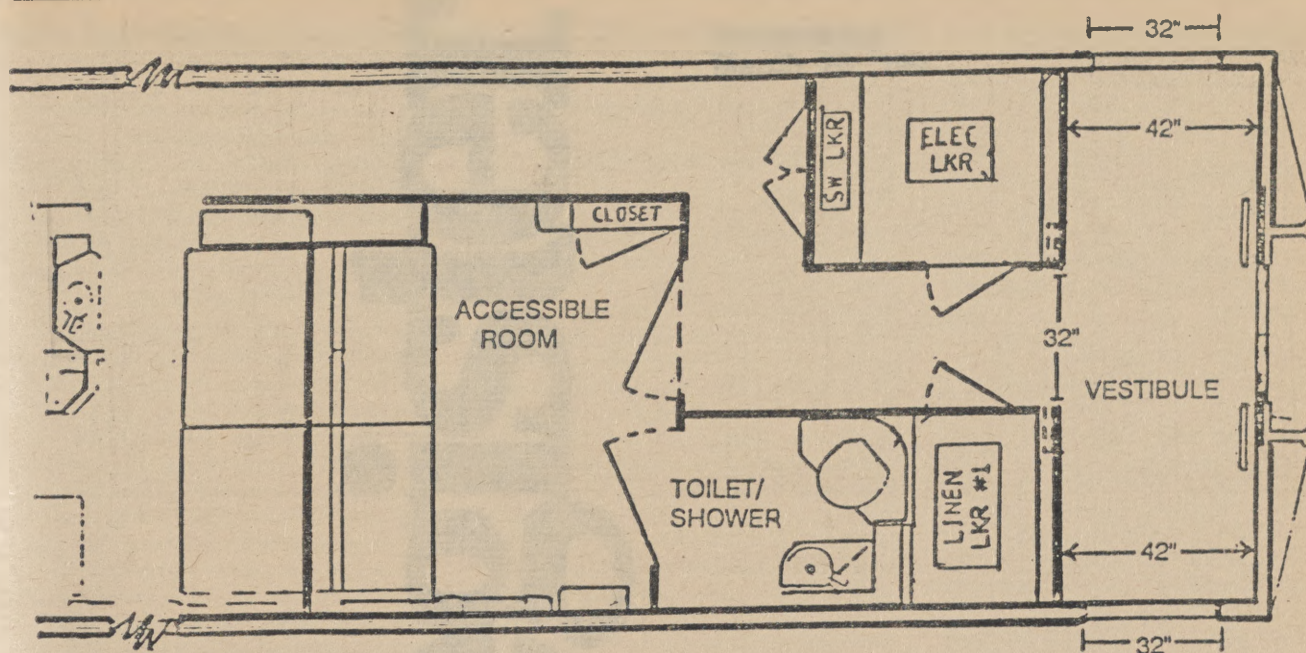


Fig. 5 Intercity Rail Car (with accessible sleeping compartment)

[FR Doc. 91-6347 Filed 3-19-91; 8:45 am]

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**Wednesday  
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## **Part III**

# **Architectural and Transportation Barriers Compliance Board**

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**36 CFR Part 1191**

**Americans with Disabilities Act (ADA)  
Accessibility Guidelines for Buildings and  
Facilities; Supplemental Notice; Proposed  
Rules**

**ARCHITECTURAL AND  
TRANSPORTATION BARRIERS  
COMPLIANCE BOARD****36 CFR Part 1191**

[Docket No. 90-4]

RIN 3014-AA09

**Americans with Disabilities Act (ADA)  
Accessibility Guidelines for Buildings  
and Facilities****AGENCY:** Architectural and  
Transportation Barriers Compliance  
Board.**ACTION:** Supplemental Notice of  
proposes rulemaking.

**SUMMARY:** On January 22, 1991, the Architectural and Transportation Barriers Compliance Board published proposed guidelines to provide guidance to the Department of Justice on establishing accessibility standards for new construction and alterations in places of public accommodation and commercial facilities, as required by title III of the Americans with Disabilities Act (ADA) of 1990. The proposed guidelines reserved a section for additional requirements for transportation facilities. This supplemental notice of proposed rulemaking (SNPRM) proposes additional requirements for transportation facilities and will ensure that such facilities are readily accessible to and usable by individuals with disabilities in terms of architecture and design, transportation, and communication. The SNPRM also proposes to make the guidelines applicable to publicly operated transportation facilities covered by title II of the ADA in order to provide guidance to the Department of Transportation on establishing accessibility standards for those facilities.

**DATES:** Comments should be received by May 20, 1991. Comments received after this date will be considered to the extent practicable.

**ADDRESSES:** Comments should be sent to the Office of the General Counsel, Architectural and Transportation Barriers Compliance Board, 1111-18th Street, NW, Suite 501, Washington, DC 20036. Comments will be available for inspection at this address from 9 a.m. to 5:30 p.m. on regular business days.

**FOR FURTHER INFORMATION CONTACT:** James Raggio, Office of the General Counsel, Architectural and Transportation Barriers Compliance Board, 1111-18th Street, NW., Suite 501, Washington, DC 20036. Telephone (202)

653-7834 (Voice/TDD). This is not a toll-free number. This document is available in accessible formats (cassette tape, braille, large print, or computer disc) upon request.

**SUPPLEMENTARY INFORMATION:****Background**

On January 22, 1991, the Architectural and Transportation Barriers Compliance Board published a notice of proposed rulemaking (NPRM) in the *Federal Register* that set forth proposed guidelines to provide guidance to the Department of Justice on establishing accessibility standards for new construction and alterations in places of public accommodation and commercial facilities, as required by title III of the Americans with Disabilities Act (ADA) of 1990. See 56 FR 2296. The proposed guidelines contained scoping provisions and technical specifications generally applicable to all types of buildings and facilities covered by title III of the ADA (sections 4.1 through 4.34) and additional requirements specifically applicable to restaurants and cafeterias (section 5); medical care facilities (section 6); mercantile and business facilities (section 7); libraries (section 8); and transient lodging (section 9).

Title III of the ADA specifically covers privately operated terminals, depots, or other stations used for public transportation. The scoping provisions and technical specifications contained in section 4.1 through 4.34 of the proposed guidelines are applicable to those transportation facilities. Because transportation facilities have unique characteristics, some of which involve coordination with transportation vehicles, the Board reserved a section of the proposed guidelines for additional requirements that would specifically apply to transportation facilities pending the development of accessibility guidelines for transportation vehicles. The Board has published a separate NPRM elsewhere in today's *Federal Register* containing proposed accessibility guidelines for transportation vehicles and is publishing this supplemental notice of proposed rulemaking (SNPRM) to amend the accessibility guidelines for building and facilities to include additional requirements specifically applicable to transportation facilities. The proposed additional requirements will ensure that transportation facilities are readily accessible to and usable by individuals with disabilities in terms of architecture and design, transportation, and communication.

Title III of the ADA becomes effective on January 26, 1992. See 42 U.S.C. 12181 note. The requirements of title III

relating to new construction apply to places of public accommodation and commercial facilities designed or constructed for first occupancy after January 26, 1993. See 42 U.S.C. 12183(a)(1). The Department of Justice published proposed regulations to implement title III in the *Federal Register* on February 22, 1991 (56 FR 4452) which further address these dates. See 28 CFR 36.401 and 36.402.

The Board also proposes to make its accessibility guidelines for buildings and facilities applicable to publicly operated transportation facilities covered by title II of the ADA. Title II establishes accessibility requirements for both new and existing transportation facilities operated by units of State and local government and the National Railroad Passenger Corporation (Amtrak). Title III of the ADA also becomes effective on January 26, 1992. See 42 U.S.C. 12131 note, 12141 note, and 12161 note. In the case of rapid rail, light rail, and commuter rail title III requires with respect to existing facilities that "key stations" (as determined under criteria established by the Department of Transportation) be made accessible by July 26, 1993. See 42 U.S.C. 12147(b) and 12162(e)(2)(A). The Department of Transportation may extend this period for stations that need extraordinarily expensive structural changes to, or replacement of, existing facilities up to 20 years for commuter rail and 30 years for rapid rail and light rail provided certain conditions are met. *Id.* Title III also establishes "program accessibility" requirements with respect to all other existing stations on rapid rail and light rail systems for persons with disabilities other than wheelchair users. See 42 U.S.C. 12147. The Department of Transportation will address which station features must be made accessible under this provision. In the case of intercity rail, all existing stations must be made accessible by July 26, 2010. See 42 U.S.C. 12162(e)(2)(A). In addition title III establishes accessibility requirements for alterations to existing facilities. See 42 U.S.C. 12147(a) and 12162(e)(2)(B). The Department of Transportation is responsible for issuing regulations that include accessibility standards for these publicly operated transportation facilities. The Department of Transportation's standards must be consistent with the Board's guidelines.

## Section-by-Section Analysis

### 10. Transportation Facilities

#### 10.1 General

This section is a scoping provision which applies all the other provisions for buildings and facilities published in the *Federal Register* on January 22, 1991 (56 FR 2296) to transportation facilities, in addition to the applicable requirements of this section.

Title III of the ADA does not require elevators in newly constructed or altered places of public accommodation and commercial facilities that are less than three stories or have less than 3000 square feet per story, unless the facility is a type specified in the statute or designated by the Department of Justice. See 42 U.S.C. 12183(b). This exemption is contained in section 4.1.3(5) of the guidelines. However, there is no elevator exemption in title II of the ADA for publicly operated transportation facilities. In addition, the Department of Justice has proposed to designate privately operated terminals, depots, or other stations used for public transportation, or an airport passenger terminal, as not eligible for the elevator exemption under title III of the ADA. See 56 FR 7452 (February 22, 1991) (28 CFR 36.401)(d)). Therefore, section 4.1.3(5) of the guidelines does not apply to transportation facilities covered by title II of the ADA and will not apply to privately operated transportation facilities covered by title III of the ADA under the Department of Justice's proposed regulations.

**Question 1:**<sup>1</sup> The guidelines have been separated according to transportation mode (e.g., bus stops and terminals, fixed facilities and stations, airports, and boat and ferry docks). The Board requests comments on whether this division is appropriate or whether a different one should be used. The Board also seeks comments on whether the terms "station" and "terminal" should be defined.

#### 10.2 Bus Stops and Terminals

##### 10.2.1 New Construction

**Question 2:** Paragraph (1) covers the construction of a new bus loading "passenger pad" at a stop or the construction of a boarding and alighting area in a bus terminal. It does not

address the siting of a bus stop on an existing public way which is addressed in section 10.2.2(1). The provision specifies a minimum clear level area outside the bus door where a lift would be deployed (72 inches length and 42 inches width). The space must be clear of utility poles, fire hydrants, street furniture and other similar obstacles. The location of the clear space would be different for front or rear door lifts. A typical lift extends 3 or 4 feet beyond the doorway. The minimum space required at the forward edge of the lift for a wheelchair or mobility aid to exit is 3 feet, as determined by preliminary results of a Board sponsored project on accessible parking and loading zones. The 6 feet (72 inches) length required by this provision is barely adequate if the bus stops slightly back from the curb or roadway edge to allow more room to exit. The width requirement allows 12 inches of leeway to allow some positioning of the bus. The Board requests comments on whether these minimum dimensions are too restrictive; whether more room should be required; and how much.

**Question 3:** The Board is also considering adding a provision that the area be "level" in some sense. Unfortunately, specifying a strict requirement would preclude the construction of pads in hilly areas. For example, the general requirement for accessible loading zones is that the surface be level with a slope no greater than 1:50 in all directions. Meeting a 1:50 slope may be possible toward or away from the roadway because such a slope is typically provided for drainage, but a pad built on a street which exceeded this slope could not meet the requirement without being at an angle with respect to the lift platform. That is, the slope of the roadway determines the slope of the pad. One possible way to address this problem would be to set a maximum slope perpendicular to the roadway for drainage, and require the slope parallel to the roadway to be the same as the roadway. Some current stops on existing, steep roadways might be inaccessible. The Board requests comments on how to provide the maximum acceptable slope without precluding the construction of pads in hilly areas.

Paragraph (1) also requires the passenger pad or boarding and alighting area to be connected to the public way by an accessible route. If a passenger pad is constructed in an unimproved area, there must be some way provided to exit the area, possibly a curb ramp or an accessible transition to a sidewalk. The provision does not necessarily

mean that the public way itself will be accessible. For example, if a concrete passenger pad is constructed in a rural area which has no sidewalks but only a dirt or gravel road shouldn't the pad must have a ramp or accessible transition to the shoulder but there is no requirement to construct sidewalks. If sidewalks are constructed in the future, however, they must provide an accessible transition to the passenger pad.

Paragraph (2) concerns bus shelters on public streets. Bus shelters are often provided by a private company which sells advertising in or on the shelter. They are normally governed by city or local ordinance and usually involve some approval by the transportation entity. This provision requires that bus shelters be sited at the bus stop so as to permit a wheelchair or mobility aid user to enter and use it. The shelter must be placed sufficiently back from the curb to allow an accessible route into it, at least 36 inches wide. The space under or inside the shelter must also be configured in such a way that it provides a clear area to accommodate at least one wheelchair or mobility aid user. The loading area required by paragraph (1) must also be accessible from the shelter.

Paragraph (3) would require, where route identification is normally provided for the general public, at least one sign that identifies the route or routes serving the stop or bay, to meet the character height and spacing requirements of section 4.30 (signage). This information could be on the bus stop sign itself, provided it met the character height requirements for signs mounted above 66 inches. Permanent signage for use of the system must also meet the same requirements. This provision is not intended to limit the provision of detailed timetables or route maps, such as on display units which are often attached to sign poles. As long as such pole-mounted signs do not extend beyond the pole by more than 4 inches, they would meet the "protruding objects" requirements of section 4.4. Because of length, detailed timetables or route maps could not be provided if the characters were required to be no less than 5/8 inches high. Since this information changes frequently, it is not intended to be considered "permanent" as used in this provision.

**Question 4:** The Board seeks comments on how route and schedule or timetable information could be made accessible to persons with vision impairments.

**Question 5:** Paragraph (3) does not impose the requirements for illumination contained in section 4.30 since signage is

<sup>1</sup> Throughout the preamble, the Board asks questions or seeks information on specific issues. To assist interested parties in responding to the questions and to facilitate analysis of responses to the questions, each question is numbered and commenters are encouraged to clearly identify or refer to the question number in their comments. Where applicable, commenters are also encouraged to provide empirical data or existing analyses that may shed light on costs related to the provisions.

usually outdoors where lighting is not controllable. The Board requests comments on whether a separate requirement for illumination should be included for signage within terminals.

### 10.2.2 Bus Stop Positioning

Paragraph (1) requires the transportation entity to ensure that the required clear space is available at stops on existing streets, to the maximum extent feasible. Primarily, this means that stops must be chosen which most closely meet the requirements of section 10.2.1.

In a typical urban area, specific bus routes are chosen according to some set of criteria. After the streets are known, and the intersections or other areas for desirable stops have been selected, agency personnel are sent to survey likely bus stop locations. The staff measures the area to ensure sufficient space for the length of the bus expected to be operated, checks for storm drains which might interfere with the bus' front wheel, and generally selects the most desirable spot for passengers to board. The selected spot is marked, and a sign is placed. Paragraph (1) may require a slight adjustment in the position of the stop that would have been chosen in the absence of a lift, or the removal of street furniture. The entity must pay particular attention to the area where the lift is to be deployed, which will be different for front and rear door lifts. At least one large transit agency delayed putting into service over 900 rear-door lift buses for a year and a half because it had not planned in advance the interface of lifts and existing stops and necessary changes to those stops.

*Question 6:* Paragraph (2) would require that new route identification signs to comply with the appropriate character height and spacing requirements of section 4.30 (signage). The Board requests comments on the effect of this provision and whether it is adequate to address the needs of persons with visual impairments to use the bus system.

### 10.3 Fixed Facilities and Stations

#### 10.3.1 New Construction

This section is based on existing Department of Transportation (DOT) regulations in 49 CFR 609.13 for federally funded fixed-guideway stations. Intercity bus terminals have been added.

*Question 7:* Paragraph (1) requires designers to lay out stations in a straightforward manner, both to reduce the distance a person with a disability would need to travel and to encourage consistency in design to assist all

persons, but especially persons with cognitive, visual, or stamina-limiting disabilities to locate various elements expeditiously. The requirement is a performance criterion which seeks to encourage good efficient design but it lacks objective criteria which could be applied to judge whether a specific design was in compliance with the provision. The Board requests information on what other general or specific design guidance could be provided in this paragraph.

Paragraph (2) provides that the circulation path for a person with a disability shall coincide, to the maximum extent feasible, with the circulation path for other passengers. This is partly a matter of convenience and partly a safety and security issue. Planners should avoid placing elevators and other accessible entrances away from the areas where other passengers would be available to provide assistance if necessary. This requirement is tempered with the phrase "to the maximum extent feasible" in recognition that absolute adherence is not always possible, especially in deep subway stations where an elevator's vertical path must necessarily be removed from one end of an escalator's path. Sections 4.1.2(1) and 4.1.3(1) of the proposed guidelines published in the *Federal Register* on January 22, 1991 (56 FR 2296) provide that an accessible route complying with section 4.3 connect an accessible entrance with public transportation stops, accessible parking spaces, and public streets within the site and that an accessible route also connect accessible elements and spaces within the building or facility. In the January 22, 1991 *Federal Register*, the Board has requested comments on whether the requirements proposed here in paragraph (2) should be included as part of the general requirement for an accessible route in section 4.3. See 56 FR 2309. If such a provision is included in section 4.3, this paragraph will be revised accordingly.

*Question 8:* The Board seeks comment on whether the provision that the circulation path for persons with disabilities coincide with the path for other passengers in transportation facilities should be retained in section 10.3.1(3) even if it is not included in section 4.3.

Paragraph (2) also requires signage to indicate the location of the accessible entrance, and an accessible route to it, if it is different from the circulation path for the general public. A similar provision has been proposed in section 4.1.2(7)(c) of the proposed guidelines to require inaccessible entrances to have signage indicating the route to the

nearest accessible entrance. See 56 FR 2332. This paragraph also requires that the accessible route not bypass fare collection.

Paragraph (3) proposes to set some criteria for deciding whether more than one entrance to a fixed-guideway station should be accessible. Especially for subway stations, which frequently have entrances which are blocks apart on the surface, having only one entrance accessible can pose a severe hardship for some persons with disabilities, particularly those with reduced stamina. Some subway stations, which are technically a single facility, have platforms, mezzanines and other portions which are not internally connected by any direct route. A person with a disability who can only use one entrance may need to travel a very long and circuitous route internally to reach a boarding platform which the general public can directly reach from an inaccessible entrance. Moreover, such a route may require the use of several elevators, any one of which if out of service renders the path inaccessible. The options suggested attempt to address this problem. The cost of each option could be drastically different due primarily to additional elevators required. In general, option 3 is the most costly and option 4 is the least. For further discussion of the cost considerations, see the Preliminary Regulatory Impact Analysis (PRIA).

Option 1 is actually a restatement of the existing, though misunderstood, requirement of section 4.1.2(8) of the Uniform Federal Accessibility Standards (UFAS). This section requires that, where entrances serve different functions, including transportation facilities, an entrance serving each such function must be accessible. Some transit agencies have interpreted this provision to mean that an entrance serving each type of facility must be accessible and have provided access to one set of bus bays, for example, but not another set serving different routes. In one particular instance, a person with a disability can access one set of routes at the accessible entrance, but to get a bus serving the inaccessible entrance must travel several blocks to a highway which crosses the tracks, go over a steep overpass, and return several blocks to the other set of bays which are only a few feet away from the starting point. Section 4.1.2(1) of the proposed guidelines would clarify the requirement by specifically stating that public transportation stops must be connected by an accessible route to an accessible entrance. See 56 FR 2331. Of course, a transit agency could choose to route all

bus lines serving a particular station to a single accessible entrance.

Option 2 attempts to establish a distance criterion between entrances for requiring more than one entrance to be accessible. The difficulty in this approach is establishing the specific distance which would be appropriate. For example, there is no such thing as a "standard block" from one city to the next, or even within a city. One way to avoid the problem of block variability would be to set a specific distance. Some accessibility standards set a limit of 200 feet for the maximum distance between certain elements, such as the distance between accessible parking spaces and an accessible entrance. Assuming that a person with a disability should not be required to travel more than 200 feet in either of two opposite directions to reach an accessible entrance would require the entrances to be no more than 400 feet apart.

Option 3 would require all entrances to be accessible. Neither UFAS nor section 4.1 of these guidelines include retail and commercial facilities among facilities which must be served by an accessible entrance to a building, but Option 3 would serve this purpose.

Option 4 proposes that, notwithstanding section 4.1 of these guidelines, only one entrance would be required to be accessible. This option recognizes the special difficulty of providing accessible entrances to subway stations, for example, which often must move and relocate utility lines and sewers to provide a vertical elevator shaft. Some of this extra cost could be avoided by the use of inclined elevators along existing stair or escalator paths. Inclined elevators currently cost two to three times more than standard elevators but this differential could decrease if inclined elevators became more common.

**Question 9:** The Board requests comments on each of the proposed options, including benefits and costs. In particular, the Board seeks information on: (a) whether the 400 foot distance in option 2, or some other distance, is reasonable and whether there is data to support any specific distance criterion; and (b) the benefits and costs to retailers, transit providers, and persons with disabilities if option 3 were adopted. The Board also seeks information on the cost of inclined elevators.

**Question 10:** Paragraph (4) addresses direct connections between other buildings and facilities and transportation facilities which are increasingly common, especially in new systems. Direct connections offer a distinct advantage to both the

transportation entity and the connecting building, especially in cold climates, and may even generate revenue for both owners. In several stations in some relatively new subway systems, the general public can move directly from transit stations to office buildings or shopping malls while persons with disabilities must travel to the surface and sometimes travel a block or more on the surface to reach the same point. This provision requires designers to plan the location of "knock-out panels" for potential connections so that they are on accessible routes. The Board requests comments on whether this provision is adequate to ensure that persons with disabilities have access to connecting facilities with the same ease and independence as the general public.

**Question 11:** Paragraph (5) clarifies that station identification signs are to be treated as "permanent identification of . . . spaces" and each entrance to a station must have at least one sign which can be read by touch, mounted at a consistent height. For example, if a pylon is used at a station entrance, such as Washington DC's Metro, Atlanta's MARTA, and Baltimore's MTA, the tactile signage could be incorporated in the signage for all passengers. Where stations serve different routes or destinations, that information would also need to be tactile. This provision would not necessarily be applicable to some intercity bus terminals. The Board requests comments on whether a standard location for such tactile signage should be prescribed.

Paragraph (6) addresses the need for passengers in a train to be able to identify the station quickly and easily from inside the vehicle. This is especially important for persons with mobility impairments who may need extra time to get ready to disembark. This is also important for those who cannot hear (or understand) any public address announcement which may be provided. Since passengers with disabilities cannot always ensure that they will be on the side of the train where they can see platform-mounted signs (in a typical rail transit system, the "platform side" of the train varies from stop to stop), this provision requires signs to be mounted where they can be seen from inside the vehicle through the windows on both sides of the vehicle.

Paragraph (7) ensures that signage necessary for use of the system, including routes served by a particular station, are accessible to persons with low vision. It also requires signs on the platform or in the boarding area identifying the station be available in tactile format.

**Question 12:** The Board seeks comments on how information regarding routes and destinations can be made available to individuals who are blind.

Paragraph (8) requires automatic fare collection and adjustment systems to be accessible to and usable by persons with disabilities according to the specifications for automated teller machines. In addition, at least one fare collection device or system must be accessible. Such devices are available on the market. Every station in Atlanta's MARTA system has one. Accessible turnstiles are also available. The accessible device or system need not be of the same type or design as the system for other passengers as long as it is as easily, conveniently and independently as usable as the system used by the general public. For example, one rapid transit system has installed a modified bus fare box adjacent to the station attendant's kiosk next to an accessible gate. Such a system may suffice, provided it meets the specifications for controls and operating mechanisms and is usable even when the station attendant is absent. To the maximum extent feasible, however, the accessible fare collection system should be integrated into the system used by the general public. Fare collection systems which require assistance from a station attendant do not afford equal access, especially when the station attendant is absent or busy. Paragraph (8) also requires that gates which must be pushed open by a wheelchair or mobility aid be designed with a smooth continuous surface so as not to catch on parts of wheelchairs or mobility aids.

Paragraph (9) requires the edge of platforms bordering a drop-off to have a detectable warning complying with section 4.29 (detectable warnings) running the entire length of the drop-off. The detectable warning need be only  $\frac{1}{4}$  the width of the platform under some circumstances. For example, there are some existing rapid transit platforms which are only 36 inches wide. In such a case, the detectable warning could cover the entire platform and there would be no detectable "safe" area. Under this provision, a 36 inch platform would have a 12 inch warning surface. If it were a center platform, with a drop-off on both sides, it would have a 12 inch unmarked area down the center with a 12 inch warning on each side. The reference to "platform screens" in this provision recognizes that some automated guideway transit systems, sometimes called "people movers", provide a barrier at the platform edge with doors which open only when a vehicle is lined up on the other side. Such systems

operate like elevators and, since there is no drop-off, do not require detectable warnings.

**Question 13:** The requirement for detectable warnings would also be applicable to the bus bay area where passengers board intercity buses. The typical intercity bus terminal bay has a "standard" curb as opposed to the normal rail platform edge. The Board seeks comments on whether bus bay areas with a "standard" curb should be required to have a detectable warning or should such warnings only be applied adjacent to a "substantial" drop-off? If the latter provision is adopted, how should a "substantial" drop-off be defined? One proposal being considered for inclusion in a private sector standard is to apply detectable warnings only at drop-offs which exceed a "nominal" curb. Should such a criterion be applied here?

**Question 14:** Research sponsored by the Board and others has demonstrated that changes in resiliency or sound-on-cane-contact to be the most universally detectable under a broad range of circumstances. See 56 FR 2311-12 for a discussion of the research. Paragraph (9) would require interior platform detectable warnings to incorporate such a difference. The restriction to interior applications recognizes the problems with such materials when subjected to outdoor weather changes. The Board requests data on exterior applications of detectable warnings, particularly with respect to resilience.

Paragraph (10) is derived from existing DOT regulations in 49 CFR 609.13 for federally funded fixed-guideway systems which requires that platforms be coordinated with the vehicle floor to minimize the vertical and horizontal gap. This paragraph adds quantitative specifications for the gap allowed. Section 321(a) of the Surface Transportation Assistance Act of 1978 required DOT to prepare a cost and benefit analysis of making existing rail systems accessible. Part of that study involved an investigation of existing barriers, including the gap between rapid rail cars and platforms. For example, according to reports prepared for the so-called "321 Study", the horizontal gap in rapid rail systems varies from 2½ inches to 3 inches. Three inches seems to be an obtainable maximum, which allows for the sway of relatively high speed vehicles and is common in new systems. Light rail vehicles should have no trouble achieving the same standard. The 3 inch gap has apparently caused little trouble in the hundreds of thousands of crossings each year by persons using mobility aids in the Washington DC

Metro. For lighter weight, slower moving automated guideway systems, a survey conducted in 1980 for the development of accessibility design guidelines for such systems found the maximum gap to be 1 inch or less. See *Los Angeles People Mover: Handbook on Accessibility for the Elderly and Handicapped*, UMTA (1980). The report is available for inspection at the Board's office. Copies may be obtained from the National Technical Information Service (NTIS) in Springfield, Virginia.

**Question 15:** The fact that some older rapid systems operate with smaller horizontal gaps demonstrate that closer tolerances can be achieved. From an accessibility standpoint, smaller gaps are desirable. Construction tolerances may make it difficult to easily achieve the smaller gaps when building platforms. However, some automated guideway systems have mounted wooden planks to the outer edge of the platform to reduce the gap. A hard rubber extrusion could serve a similar function in rapid rail without causing damage to the vehicles in case they rubbed it passing the station. A vehicle manufacturer suggested some years ago that a hose could be mounted to the edge of a platform which would be pumped with air when the train stopped, filling the gap. When the train prepared to leave the station, the air stream would be directed by a solenoid-controlled valve at right angles to the hose opening, aspirating the air and collapsing the hose. Reportedly, a light rail system operating in Spain provides a gap closing device at one door of one car. The device must be activated by the passenger prior to boarding but the controls may not be usable by persons with disabilities. It is not the intent of these guidelines to require such devices, but the Board seeks information on any devices or construction techniques which could reduce the horizontal gap in new construction and existing stations in the most cost-effective manner possible. The Board also seeks data on accidents associated with the gap between platforms and vehicles.

**Question 16:** With respect to the vertical gap, modern rapid and light rail vehicles and people movers usually have air suspension systems capable of being set for consistent heights. The Board understands that the Bay Area Rapid Transit District specifies a height of plus or minus ½ inch. The Washington DC Metro included a requirement for a height of plus or minus ¾ inch in a recent specification but accepted vehicles considerably out of compliance. According to an informal survey conducted by Board staff, rapid

rail car manufacturers claim to be able to set a specific car floor height within plus or minus ¼ inch and that maintaining that height is a matter of "routine maintenance". The Board seeks information verifying manufacturer's claims. In particular, the Board requests comments on how the specifications would be maintained over time, especially as wheels wear.

Where the specified tolerances cannot be achieved, an exception is provided for systems with vehicles having lifts or bridge plates complying with the proposed guidelines for vehicles published elsewhere in today's *Federal Register*. In effect, the tolerances define an "accessible interface" which is negotiable independently. If the coordination is achieved, the transit entity need do nothing else to provide accessibility to the vehicles. If the tolerances cannot be met, some other suitable means must be provided to permit access to the vehicles.

Paragraph (11) requires boarding areas of new stations to be provided in an integrated setting rather than segregated. Systems designed for "double stopping" in which the vehicle stops in one location to board the general public, then moves to another location to board persons with disabilities, do not provide equal access. Not only does such a program promote separation, it introduces operational problems in the system which may lead to service degradation and a "backlash" against providing quality service to persons with disabilities. Double stopping, where it occurs, is usually the result of adding lifts or mini-high platforms as an afterthought rather than planning the system to be accessible. This provision seeks to promote adequate planning in new construction.

Paragraph (12) concerns illumination. Good general illumination on accessible routes and in accessible spaces is critical to the use of transportation systems by persons with disabilities, especially persons with low vision. Many forms of visual impairment cause a person's vision to respond slowly to changes in lighting level, especially in moving from bright daylight to dim transit stations. Relatively uniform lighting levels, as well as brightness are important. Fluorescent ceiling lights with proper diffuser panels provide even illumination and are longer lasting and cheaper to operate than incandescent lights. Other types of illumination, such as Halogen, "daylight" spectrum, and some systems tested by the military, are also more appropriate for persons with visual impairments. On the other hand, recessed ceiling lights mounted in cans,

or downlights, are example of inappropriate lighting. They create pools of light and shadow which are disconcerting to many persons with low vision. Conditions such as glaucoma and cataracts cause particular susceptibility to glare and reflection which is aggravated as a person moves under succeeding downlights. Such lights also reflect off the interior surfaces of eyeglasses which may be particularly disconcerting to persons with vision impairments. Downlights are not prohibited by this paragraph but cannot be the only source of illumination on an accessible route or space.

*Question 17:* The Board requests comments on whether the guidelines should specify illumination levels for other than signage, including variance and uniformity, for use of transportation facilities by persons with disabilities.

Paragraph (13), as was discussed under paragraph (3), takes into account that different entrances to the same transportation station may be physically separated from one another so that there is no accessible route connecting the entrances internally. This is especially true if there are a limited number of elevators connecting levels. For this reason, unlike the typical office or assembly area, a public telecommunication display device or telecommunication device for deaf persons (TDD) is needed at each entrance. One rapid transit system which has all of its stations staffed, provides a portable TDD in several station attendant kiosks which can be obtained upon request. Public TDDs which can be installed as a part of a public telephone are also commercially available.

It is recommended that telephones be provided on the boarding platform if provided on the mezzanine. It is sometimes necessary to place calls from inside transit stations, especially if there has been a delay which affects a pick-up time at the destination, such as a paratransit connection. For persons with mobility impairments who may need to use elevators, getting to the mezzanine to make a necessary call and returning to the platform to board a train may be a difficult and time consuming task in the typical transit station. Getting to a phone quickly and easily may mean the difference between making or not making a connection. For paratransit systems which often require scheduling hours in advance, the ability to make a call may be especially critical. However, because the provision of a telephone in the platform is only incidental to accessibility and usability of the system,

the Board is not considering making it a requirement of these guidelines.

*Question 18:* Paragraph (14) simply requires that the minimum space necessary for wheel flanges be provided in areas such as pedestrian malls or where the opposite boarding platform can only be reached by crossing tracks. Devices designed to close the flange gap are available, and have been used for years in freight yards, but the reliability of their continual use in daily operation is not known. The Board seeks information on the minimum width of the space needed for wheel-flange clearance as well as any feasible gap-closing devices which could be specified, and any potential costs involved.

*Question 19:* Paragraph (15) concerns public address systems. Most transportation facilities provide a variety of information to passengers by public address systems, some of it, such as elevator operation, specifically related to service for persons with disabilities. Persons with hearing impairments need this information as well. The proposed provision is a general performance requirement which could include assistive listening devices, video monitor paging systems used at the Baltimore Washington International Airport, light emitting diode (LED) or "flip dot" visual displays used in the Bay Area Rapid Transit District and some stations in New York, or other means. Such systems are beneficial to the general public as well, especially in noisy environments. Although the provision is stated in terms of a performance criterion, the Board requests comments on whether more specific design guidance is needed for alternative systems which could meet the criterion (e.g., color of LED display, height of letters on visual paging systems).

Paragraph (16) addresses clocks. Transportation systems usually have time-related service or fare changes. In some cases, particularly with respect to "reduced fare" programs for persons with disabilities, knowing the correct time may be critical. This regulatory provision would require clocks, when provided, to be visible to persons with low vision as well as others.

Paragraph (17) addresses escalators. While escalators are not permitted as part of an accessible route, and cannot be safely used by some persons with disabilities, they are a common means of providing entrance and exit to stations. In many new subway systems, they are the only means of exit when elevators fail. This proposal does not envision the provision of wheelchair

accessible escalators which are reportedly in service in the Japan National Railway system. The requirements in this section are designed to allow escalators to be available in situations when the elevators are out of service and there is a need to evacuate the station, but only with assistance by system personnel. As a general rule, the Board does not endorse the use of escalators by persons with mobility impairments. However, escalators should not impose unnecessary barriers for emergency use if needed. The operational aspects of emergency evacuation are the purview of the DOT regulations.

*Question 20:* The requirement for a 32 inch clear width is to permit a person using a wheelchair or mobility aid to be assisted up the escalator. The requirement for at least two treads to be level beyond the comb plate before risers begin to form, is to provide sufficient space to position a wheelchair before steps begin to form. More than two level treads is desirable. Many new escalators are already installed with this feature including all of the escalators in the Washington, DC Metro system. Such a design is also generally safer since it provides time for riders to establish sound footing before steps form. This is especially important for elderly persons and those who walk with some difficulty. The Board seeks information on any incremental costs and benefits associated with wide versus narrow escalators, especially with respect to passenger carrying capacity at the same speed.

*Question 21:* The requirements for a step-edge contrasting band is designed to assist persons with low vision who do not need the elevator and is consistent with the proposed guidelines in section 4.30 regarding signage for persons with low vision. See 56 FR 2376-77. The Board requests comments on whether the 70% contrast ratio specified in section 4.30 is an appropriate application in this context.

*Question 22:* Paragraph (18) concerns elevators and is derived from earlier DOT regulations implementing Section 504 of the Rehabilitation Act of 1973. A reference to section 4.10 of these guidelines has been added. The exception is designed to clarify requirements of section 4.10 which appear to prohibit an elevator designed to accommodate a stretcher. At least one subway system currently under design plans to install elevators which are 60 inches wide by 84 inches long, to accommodate a stretcher if necessary during emergency evacuation. Such a cab would provide a 60 inch diameter

turning circle but has a dimension less than the minima prescribed in section 4.10. The Board requests comments on whether this exception should be incorporated in section 4.10, rather than having it only apply to transportation facilities.

Paragraph (19) requires the ticketing area, where provided, to be usable by persons with disabilities to the maximum extent feasible. Primarily, this section is intended to apply to intercity and commuter rail service. The space in front of ticket counters must provide sufficient maneuvering space for wheelchairs and other mobility aids and must be reachable by an accessible route. Counters must comply with the requirements applicable generally to mercantile facilities. See 56 FR 2382-83.

*Question 23:* Paragraph (20) requires the baggage claim area, if provided, to be on an accessible route and the equipment to be approachable. It does not impose specific requirements on the equipment itself. This provision is primarily applicable to intercity rail. The requirements for gates to have a solid surface is so that they will not catch on parts of the wheelchair or mobility aids as the gate is pushed open. The Board requests comments on whether other design specifications are needed for baggage claim areas.

### 10.3.2 Existing Facilities: Key Stations

As discussed above, the ADA requires key stations on rapid rail, light rail, and commuter rail systems to be made accessible and all existing intercity rail stations to be made accessible. This section addresses these provisions of the ADA and is modeled on the proposed DOT regulations for making existing airport facilities accessible. See 55 FR 8081 (March 6, 1990).

*Question 24:* The Board requests comments on whether the accessible entrance should be required to be no more than some specified distance from a primary entrance used by the general public. See section 10.3.1(3) for further discussion of this issue. For example, the entrance which can be most easily or cheaply modified may be one which is infrequently used by the general public. For security and safety reasons, persons with disabilities should not have to use out-of-the-way places to gain access. This means that the place which is most convenient for the transit system operator is not necessarily the best place from the standpoint of persons with disabilities. However, a requirement to locate the accessible entrance close to a primary entrance may have significant cost implications. If a specific distance is specified, what should the figure be?

Specific requirements for alterations are contained in 4.1.6 of the proposed guidelines. See 56 FR 2335-37.

Paragraph (2) specifies that at least one accessible route include many of the features which would be required to be accessible in new construction. Some provisions for new construction have been omitted from this paragraph. For example, section 10.3.1(3) deals with multiple accessible entrances which are not anticipated for key stations. Section 10.3.1(4), which deals with direct connections, is not included because a provision has been included in paragraph (4) to cover only newly constructed direct connections. Section 10.3.1(10) specifies coordination of platform and vehicle floor height which may not be possible in some existing stations. Section 10.3.1(11) generally prohibits "double stopping" in new construction but may be required in some existing stations. Section 10.3.1(17) specifies requirements for escalators but the design required may not be adaptable to existing facilities.

*Question 25:* The Board requests comments on whether there are any suitable means for narrowing the horizontal gap at platforms in existing stations which could be included in these guidelines, particularly where the platform is curved and cannot attain a uniform horizontal gap. Although escalators are not part of an accessible route as discussed under section 10.3.1(17), in many stations escalators are the only means of exit when elevators fail. The Board requests comments on whether the requirements for escalators in section 10.3.1(17) should be included here and the costs and feasibility of such a requirement. Paragraph (3) simply requires that the accessible route not by-pass the fare collection system.

*Question 26:* Paragraph (4) requires new direct connections opened in existing stations, even if they are into existing buildings or facilities, meet the requirements of new facilities, insofar as the portion in the station is concerned. If it is economically advantageous to the transit entity or the building owner to create a new entrance into an inaccessible portion of the station, the parties will need to decide whether the advantage warrants making additional changes in the station and negotiate how the costs are to be shared. In general, the transit entity could simply pass the extra cost on to the building or facility wanting the connection to decide if it were worth the cost. This provision does not require the expenditure of any additional funds but only that, if the modification or addition is undertaken, that it be done in conformance with

accessibility requirements. The transit entity or building owner can always choose not to perform the modification. The Board requests comments on any special circumstances, difficulties or costs related to providing accessible new direct connections in existing transit facilities.

### 10.3.3 Existing Facilities: Alterations [Reserved]

This section pertains to alterations of an area containing a "primary function" and requires certain modifications to the "path of travel" and other elements, provided the cost is not "disproportionate" to the overall cost. The responsibility for defining a primary function and other aspects of this requirement fall to the Department of Justice. Therefore, the Board is reserving this section pending rulemaking activities by the Department of Justice and will include conforming requirements in the final guidelines. See 56 FR 7452 (February 22, 1991) for the Department of Justice's proposed regulations.

## 10.4 Airports

### 10.4.1 New Construction

Most of the provisions of this section are derived from proposed DOT regulations for airports. See 55 FR 8081 (March 6, 1990).

Paragraphs (1) and (2) are similar to the requirements for transit stations regarding designing the layout and circulation paths to minimize the distances which persons with disabilities must travel compared to the general public. Paragraph (3) requires the ticketing area to be usable by persons with disabilities to the maximum extent feasible. Paragraph (4) concerns public telephones. Most airports provide many public telephones and will be required to provide TDDs in accordance with section 4.1.3(17)(c). See 56 FR 2335. This provision deals with small airports which may not have phones in sufficient number to trigger those requirements. TDDs in airports are critical for deaf persons who may need to contact persons when planes are delayed. Paragraph (5) requires the baggage claim area to be on an accessible route and the equipment to be approachable. Paragraph (6) concerns public address systems and is a general performance requirement. The Board has a technical paper, "Airport TDD Access: Two Case Studies", which describes the visual paging system used in the Baltimore Washington, International Airport.

*Question 27:* Paragraph (7) is reserved for airport security systems. The Board

seeks information on specific requirements for airport security systems. In particular, what aspects of the security are part of the facility and appropriately addressed in these guidelines, and which are more correctly regarded as equipment subject to operational requirements in the DOT regulations? Since most airport security is performed by air carrier personnel, regulated under the Air Carrier Access Act not the ADA, additional information is requested on which facilities are covered.

#### 10.4.2 Existing Airports

Paragraph (1) is derived from proposed DOT regulations for airports. See 55 FR 8081 (March 6, 1990). A provision has been added for at least one accessible restroom.

#### 10.5 Boat and Ferry Dockets [Reserved]

**Question 28:** Ferry and boat docks and other similar facilities must be accessible. There are unique problems with docks, however, primarily due to variations in tide level. The horizontal and vertical gap between boats and boarding areas cannot be maintained with the same degree of compliance as for fixed facilities, especially under rough water conditions. Even floating docks will not remain in a constant relationship with the vessel. The requirements for docks may need to specify a range of options for compliance. There are some examples of "accessible" facilities in Seattle and Delaware but the Board needs more information to set specific requirements. The Board is particularly interested in examples of accessible facilities and how they are operated. For example, what slope of a gangplank can be reasonably assured under varying tide conditions? If elevators are used on a dock to reach different pier levels for boarding at different tide levels, how can they be protected from salt water corrosion? Since gangplanks may be wet, should a higher value of slip resistance be required than for ramps and if so, what should it be?

#### Regulatory Process Matters

These guidelines supplement the proposed ADA accessibility guidelines for buildings and facilities published in the Federal Register on January 22, 1991 (56 FR 2296) and contain additional provisions for publicly and privately operated transportation facilities that are required to be accessible by titles II and III of the ADA. The guidelines

provide guidance to the Department of Justice and Department of Transportation which are responsible for establishing the accessibility standards for covered transportation facilities. The standards established by those agencies must be consistent with these guidelines. These guidelines, when considered together with the regulations to be issued by the Department of Justice and Department of Transportation, meet the criteria for a major rule under Executive Order 12291.

The Board completed a Preliminary Regulatory Impact Analysis (PRIA) in connection with the proposed ADA accessibility guidelines for buildings and facilities and has prepared an addendum to the PRIA for this supplemental notice of proposed rulemaking. The PRIA and the addendum have been placed in the docket and are available for public inspection at the Board's office.

The majority of transportation facilities are designed and constructed by public entities which are currently covered by Section 504 of the Rehabilitation Act of 1973. That statute prohibits discrimination on the basis of disability by recipients of federal financial assistance and implementing regulations generally require that covered entities comply with the Uniform Federal Accessibility Standards (UFAS) when constructing or altering buildings and facilities. In addition, most transportation facilities are covered by State accessibility codes and standards. Therefore, the addendum to the PRIA addresses those proposed accessibility elements which are in addition to existing requirements or practice and which are different or marginally more costly. Included in the analysis were: accessible fare gates; accessible boarding (mini-high platforms, portable lifts); public information system (visual paging system, moving light emitting diode (LED) display); direct connections (elevators); detectable warnings at boarding platforms; and telecommunication display devices or telecommunication devices for the deaf (TDDs). Costs were also analyzed for accessibility elements under section 4 of the proposed guidelines published in the Federal Register on January 22, 1991 which had the potential of adding to the cost of transportation facilities.

The direct costs of the accessibility elements for fixed transportation facilities and stations are estimated as follows:

| Element                                  | Guideline paragraph | New construction |
|------------------------------------------|---------------------|------------------|
| Areas of Refuge.....                     | 4.3.11              | \$1,248          |
| Curb Ramp                                |                     |                  |
| Detectable                               |                     |                  |
| Warnings.....                            | 4.7.7               | 24               |
| Elevators—Braille hoistway markings..... | 4.10                | 102              |
| Alarms—visual alarms.....                | 4.28.3              | 1,568            |
| Detectable                               |                     |                  |
| Warnings—stairs.....                     | 4.29                | 960              |
| Signage—Braille.....                     | 4.30                | 87               |
| Direct Connections (elevator).....       | 10.3.1(4)           | 50,000           |
| Accessible Fare Gates.....               | 10.3.1(8)           | 6,000–8,000      |
| Detectable                               |                     |                  |
| Warnings.....                            | 10.3.1(9)           | 1,200–3,600      |
| TDDs.....                                | 10.3.1(13)          | 424              |
| Public Information System.....           | 10.3.1(15)          | 18,400           |

Level boarding is assumed in all rapid rail and some light rail stations, for which there is no additional cost for an accessible interface with the vehicle. Commuter and intercity rail systems are assumed to use mini-high platforms or portable lifts, as is current practice. The direct costs for a mini-high platform based on a modular kit developed by New Jersey Transit is \$70,000 per platform or \$140,000 per station based on two platforms needed per station. The direct costs for a portable lift, including storage facility, based on the model used by Amtrak is \$3,000.

The direct costs of the accessibility elements for airports are estimated as follows:

| Element                                  | Guideline paragraph | New construction |
|------------------------------------------|---------------------|------------------|
| Areas of Refuge.....                     | 4.3.11              | \$7,488          |
| Curb Ramp                                |                     |                  |
| Detectable                               |                     |                  |
| Warnings.....                            | 4.7.7               | 24               |
| Elevators—Braille hoistway markings..... | 4.10                | 207              |
| Alarms—visual alarms.....                | 4.28.3              | 19,604–20,280    |
| Detectable                               |                     |                  |
| Warnings—vehicular path.....             | 4.29.5              | 12,474           |
| Signage—Braille.....                     | 4.30                | 734              |
| TDDs.....                                | 10.4.1(4)           | 848              |
| Public Information System.....           | 10.4.1(6)           | 11,200           |

Based on the above, the direct costs by type of transportation facility for the accessibility elements are estimated as follows:

| Facility type                                            | Cost            | Cost/square feet | Percent of new construction cost |
|----------------------------------------------------------|-----------------|------------------|----------------------------------|
| Fixed Transportation Facilities—                         |                 |                  |                                  |
| Underground.....                                         | \$80,013–84,413 | 3.16–3.24        | 0.18–0.19                        |
| At-grade.....                                            | 80,013–84,413   | 2.21–2.33        | 0.88–0.93                        |
| Elevated.....                                            | 80,013–84,413   | 2.19–2.31        | 0.55–0.58                        |
| Additional cost for stations without level boarding..... | 3,000–140,000   |                  |                                  |
| Airports.....                                            | 52,579–53,255   | .04              | 0.03                             |

**Question 29:** The Board seeks comments on the approaches and data used to estimate the potential costs of the guidelines for transportation facilities. The Board is interested in any empirical data or existing analysis which may shed light on these matters and particularly is interested in information on the cost of additional elevators, if any, needed to ensure that direct connections are accessible. The Board is also interested in information on: (1) the number of visual alarms needed for subway stations and (2) the costs of various configurations of a moving light emitting diode (LED) display, visual paging, or other similar systems for making public information systems accessible to individuals with hearing impairments. Any such information, where relevant, will be incorporated into the Final Regulatory Impact Analysis.

The additional guidelines contained in this supplemental notice of proposed rulemaking will not have a significant impact on a substantial number of small entities. A Federalism assessment will be prepared by the Department of Transportation. The Board will cooperate with that agency in the preparation of the assessment. Finally, the guidelines do not have any significant impact on the environment.

#### List of Subjects in 36 CFR Part 1191

Buildings, Civil rights, Handicapped, Individuals with disabilities.

Authorized by vote of the Board on December 13, 1990, and January 2, 1991.

William H. McCabe,

Chairman, Architectural and Transportation Barriers Compliance Board.

For the reasons set forth in the preamble, the proposed guidelines published in the **Federal Register** on January 22, 1991 (56 FR 2296) adding part 1191 to title 36 of the Code of Federal Regulations are proposed to be amended as follows:

#### PART 1191—AMERICANS WITH DISABILITIES ACT (ADA) ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES

1. The authority citation for 36 CFR part 1191 continues to read as follows:

**Authority:** Americans with Disabilities Act of 1990, Pub. L. 101-336, 42 U.S.C. 12204.

2. Section 1191.1 is revised to read as follows:

##### § 1191.1 Accessibility guidelines.

The accessibility guidelines for buildings and facilities for purposes of the Americans with Disabilities Act are found the appendix to this part. The guidelines are issued to provide guidance to the Department of Justice and Department of Transportation on establishing accessibility standards to implement the legislation.

3. The appendix to part 1191 is amended by revising section 1, and adding a new section 10 to read as follows:

#### Appendix to Part 1191—Americans With Disabilities Act (ADA) Guidelines for Buildings and Facilities

\* \* \* \* \*

##### 1. Purpose

This document sets guidelines for accessibility to buildings and facilities by individuals with disabilities under the Americans with Disabilities Act (ADA) of 1990. These guidelines are to be applied during the design, construction, and alteration of places of public accommodation and commercial facilities covered by title III of the ADA and publicly operated transportation facilities covered by title II of the ADA to the extent required by regulations implementing those titles.

\* \* \* \* \*

##### 10. Transportation Facilities

###### 10.1 General

Every station, bus stop, bus stop pad, terminal, building or other fixed transportation facility, shall comply with the applicable provisions of 4.1 through 4.34, and the applicable provisions of this section.

**Exception:** The elevator exception in 4.1.3(5) does not apply to transportation facilities covered by title II of the ADA.

###### 10.2 Bus Stops and Terminals

###### 10.2.1 New Construction

(1) Bus stops, bays and other areas where a lift or ramp is to be deployed

shall have a pad with a firm, stable surface; a minimum clear length of 72 inches, measured from the curb or vehicle roadway edge; and a minimum clear width 42 inches, measured parallel to the vehicle roadway; and shall be connected to the public way by an accessible route complying with 4.3 and 4.4.

(2) Where provided, bus shelters shall be installed or positioned so as to permit a wheelchair or mobility aid user to enter from the public way and to reach a location, having a minimum clear floor area of 30 inches by 48 inches, entirely within the perimeter of the shelter. Such shelter shall be connected by an accessible route to the boarding area required by paragraph (1) of this section.

(3) Where provided, at least one route identification sign and permanent information for the use of the transportation system shall comply with 4.30.2, 4.30.3, and 4.30.5.

##### 10.2.2 Bus Stop Positioning

(1) Bus stop sites shall be chosen such that, to the maximum extent feasible, the area where lifts or ramps are to be deployed comply with section 10.2.1.

(2) If new route identification signs are provided, at least one shall comply with 4.30.2, 4.30.3, and 4.30.5.

##### 10.3 Fixed Facilities and Stations

###### 10.3.1 New Construction

New rapid rail, light rail, commuter rail, intercity bus, intercity rail, and automated guideway transit stations shall comply with the following provisions, as applicable:

(1) Elements such as ramps, elevators or other vertical circulation devices, fare vending or ticketing areas, and fare collection areas shall be placed to minimize the distance which wheelchair users and other persons who cannot negotiate steps may have to travel compared to the general public.

(2) The circulation path, including an accessible entrance and an accessible route, for persons with disabilities shall, to the maximum extent feasible, coincide with the circulation path for the general public. Where the circulation path is different, signage shall be provided to show the accessible

entrance and accessible route. Fare collection systems shall be on an accessible route.

(3) **Option 1:** Entrances to a station serving different transportation fixed routes or groups of fixed-routes shall also be accessible.

**Option 2:** Each entrance to a station which is more than 400 feet from an accessible entrance shall also be accessible.

**Option 3:** All entrances to stations shall be accessible.

**Option 4:** In lieu of compliance with 4.1, at least one entrance to each station shall be accessible.

(4) When direct connections to commercial, retail, or residential facilities are provided, the transportation entity shall provide an accessible entrance complying with 4.14 to each such direct connection and an accessible route complying with 4.3 to and from boarding platforms and each such direct connection, including all transportation system elements used by the public.

(5) Each entrance to a station shall have at least one sign identifying the station and the route or routes served, if applicable, complying with 4.30.4 and 4.30.6.

(6) Rapid rail, light rail, commuter rail, intercity rail and automated guideway transit stations shall have identification signs, complying with 4.30.2, 4.30.3, 4.30.5, and 4.30.8, at frequent intervals and clearly visible from within the vehicle on both sides. Station identification signs placed close to vehicle windows (i.e., on the side opposite from boarding) shall have the top of the highest letter or symbol below the top of the vehicle window and the bottom of the lowest letter or symbol above the horizontal mid-line of the vehicle window.

(7) Lists of stations, routes, or destinations served by the station and located on boarding areas and platforms or mezzanines shall comply with 4.30.2, 4.30.3, 4.30.5, and 4.30.8. Signs on platforms or boarding areas identifying the specific station shall comply with 4.30.4.

(8) Automatic fare vending, collection and adjustment (e.g., add-fare) systems shall permit utilization of the transportation system by persons with disabilities; shall comply with 4.34; and shall have control identification signage complying with 4.30.4. If self-service fare collection devices are provided for the general public, at least one such device for entering, and at least one such device for exiting, unless one device serves both functions, at each accessible entrance shall have a minimum clear opening of 32 inches wide; shall permit

passage of a wheelchair; and shall have coin or card slots, and controls necessary for its operation complying with 4.27. Gates which must be pushed open by wheelchair or mobility aid users shall have a smooth continuous surface extending from 2 inches above the floor to 27 inches above the floor.

(9) Boarding area and platform edges bordering a drop-off, not protected by platform screens, shall have a detectable warning, complying with 4.29, at least 36 inches wide, or  $\frac{1}{2}$  the width of the platform, whichever is less, running the full length of the platform drop-off. In interior stations, the detectable warning shall differ in resiliency or sound-on-cane-contact from the adjacent platform material.

(10) For rapid rail, light rail, commuter rail, intercity rail and automated guideway transit systems, the rail-to-platform height shall be coordinated with the vehicle floor height so that the vertical difference, measured when the vehicle is at rest, is within plus or minus  $\frac{1}{2}$  inch under all normal passenger load conditions. For rapid rail, light rail, commuter rail and intercity rail systems, the horizontal gap, measured when the vehicle is at rest, shall be no greater than 3 inches. For automated guideway transit systems, the horizontal gap shall be no greater than 1 inch.

**Exception:** In light rail systems operating on streets or pedestrian malls, and in commuter rail and intercity rail systems where it is not operationally or structurally feasible to meet the horizontal gap or vertical difference requirements, mini-high platforms, car-borne or platform-mounted lifts, ramps or bridge plates, or similar manually deployed devices, meeting the applicable requirements of 34 CFR 1192.83, 1192.95 or 1192.125 (proposed elsewhere in this issue of the *Federal Register*) shall suffice.

(11) Stations shall not be designed or constructed so as to require persons with disabilities to board and alight a vehicle at a location other than the one used by the general public.

(12) Illumination levels in the areas where signage is located shall comply with 4.30.8. Lighting along accessible routes in accessible spaces shall be of a type and configuration to provide uniform illumination.

(13) Where public telephones are provided, in addition to the requirements of 4.31, a public telecommunications display device or telecommunications device for the deaf (TDD) shall be provided at each entrance. Where mezzanines and boarding platforms are on different levels, it is recommended that at least

one accessible public telephone be provided on each.

(14) Where crossing tracks is necessary to reach boarding platforms, the route surface shall be level and flush with the rail top at the outer edge and shall have only the minimum feasible gap on the inner edge of each rail to permit passage of wheel flanges. Where this is not feasible, an above-grade or below-grade accessible route shall be provided.

(15) Where public address systems are provided to convey information to persons in terminals, stations, or fixed facilities, a means of conveying the same or equivalent information to persons who are deaf or hearing impaired shall be provided.

(16) Where clocks are provided they shall comply with 4.30.1, 4.30.2, 4.30.3, 4.30.5, and 4.30.8.

(17) Where provided in subways, escalators shall have a minimum clear width of 32 inches. At the top and bottom of each escalator run, at least two contiguous treads shall be level beyond the comb plate, before risers begin to form. Each tread shall have a visually contrasting band defining the edge of the tread. The edge of the tread shall be apparent from both ascending and descending directions.

(18) Where provided, elevators shall be glazed or have transparent panels to allow an unobstructed view both in to and out of the car. Elevators shall comply with 4.10.

**Exception:** Elevator cars with a clear floor area in which a 60 inch diameter circle can be inscribed may be substituted for the minimum car dimensions of 4.10, Fig. 22.

(19) Where provided, ticketing areas shall permit persons with disabilities to obtain a ticket and check baggage. Space in front of counters shall comply with 4.2 and 4.3 and counters shall comply with 7.2.

(20) Where provided, baggage check-in and retrieval systems shall be on an accessible route complying with 4.3, and shall have space immediately adjacent complying with 4.2. If unattended security barriers are provided, at least one gate shall comply with 4.13. Gates which must be pushed open by wheelchair or mobility aid users shall have a smooth continuous surface extending from 2 inches above the floor to 27 inches above the floor.

### 10.3.2 Existing Facilities: Key Stations

(1) Rapid, light and commuter rail key stations, as defined under criteria established by the Department of Transportation in 49 CFR part 37, and intercity rail stations shall provide at

least one accessible route from an accessible entrance to those areas necessary for use of the transportation system.

(2) The accessible route required by 10.3.2(1) shall include the features specified in 10.3.1 (1)-(2), (5)-(9), (12)-(16), and (18)-(20).

(3) Where technical infeasibility in existing stations requires the accessible route to lead from the public way to a paid area of the transit system, an accessible fare collection system, complying with 10.3.1(8), shall be provided along such accessible route.

(4) New direct connections to commercial or retail facilities shall comply with 10.3.1(4).

### 10.3.3 Existing Facilities: Alternations. [Reserved]

## 10.4. Airports

### 10.4.1 New Construction

(1) Elements such as ramps, elevators or other vertical circulation devices, ticketing areas, security checkpoints, or passenger waiting areas shall be placed to minimize the distance which wheelchair users and other persons who cannot negotiate steps may have to travel compared to the general public.

(2) The circulation path, including an accessible entrance and an accessible route, for persons with disabilities shall, to the maximum extent feasible, coincide with the circulation path for the general public. Where the circulation path is different, signage shall be provided to show the accessible entrance and accessible route.

(3) Ticketing areas shall permit persons with disabilities to obtain a ticket and check baggage. Space in front of counters shall comply with 4.2 and 4.3 and counters shall comply with 7.2.

(4) Where public telephones are provided, TDDs shall be provided in compliance with 4.1.3(17)(c) or one per concourse, whichever is greater.

(5) Baggage check-in and retrieval systems shall be on an accessible route complying with 4.3, and shall have space immediately adjacent complying with 4.2. If unattended security barriers are provided, at least one gate shall comply with 4.13. Gates which must be pushed open by wheelchair or mobility aid users shall have a smooth continuous surface extending from 2 inches above the floor to 27 inches above the floor.

(6) Terminal information systems which broadcast information to the general public through a public address

system shall provide a means to provide the same or equivalent information to persons who are deaf or hearing impaired. Such methods may include, but are not limited to, an assistive listening device complying with 4.33 and visual paging systems using video monitors and computer technology.

(7) Security Systems. [Reserved]

### 10.4.2 Existing Airports

(1) When required by regulations issued by the Department of Transportation, existing airports shall provide at least one accessible route from an accessible entrance to those areas in which each carrier conducts activities related to the provision of air transportation.

(2) The accessible route required by 10.4.2(1) shall include the features specified in 10.4.1 and at least one accessible restroom for each sex, or one unisex restroom, complying with 4.22 and 4.23.

### 10.5 Boat and Ferry Docks. [Reserved]

\* \* \* \* \*

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