

**ARCHITECTURAL AND  
TRANSPORTATION BARRIERS  
COMPLIANCE BOARD**

**36 CFR Part 1192**

[Docket No. ATBCB 2010–0004]

RIN 3014–AA38

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

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

**ACTION:** Final rule.

**SUMMARY:** The Architectural and Transportation Barriers Compliance Board (Access Board or Board) is issuing a final rule that revises its existing accessibility guidelines for non-rail vehicles—namely, buses, over-the-road buses, and vans—acquired or remanufactured by entities covered by the Americans with Disabilities Act. The revised guidelines ensure that such vehicles are readily accessible to, and usable by, individuals with disabilities. The U.S. Department of Transportation (DOT) is required to revise its accessibility standards for transportation vehicles acquired or remanufactured by entities covered by the Americans with Disabilities Act (ADA) to be consistent with the final rule.

**DATES:** The final rule is effective January 13, 2017. Compliance with the final rule is not required until DOT revises its accessibility standards for buses, over-the-road buses, and vans acquired or remanufactured by entities covered by the ADA to be consistent with the final rule.

The incorporation by reference of one publication listed in the final rule was approved by the Director of the Federal Register as of January 13, 2017.

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**SUPPLEMENTARY INFORMATION:**

**I. Executive Summary**

*Purpose and Legal Authority*

The Americans with Disabilities Act (ADA) charges the Access Board with responsibility for the development of minimum guidelines aimed at ensuring the accessibility and usability of transportation vehicles, including buses, over-the-road buses (OTRBs), and vans.

See 29 U.S.C. 42 U.S.C. 12204, 12149(b); see also 792(b)(3)(B) & (b)(10) (authorizing Access Board to “establish and maintain” minimum guidelines for standards issued pursuant to titles II and III of the ADA). These guidelines, once adopted by DOT, become enforceable standards. In 1991, the Access Board issued accessibility guidelines for ADA-covered transportation vehicles (including buses, vans, and fixed guideway systems), and amended these guidelines in 1998 to include accessibility requirements for OTRBs.<sup>1</sup> Given the passage of nearly two decades, the existing guidelines are in need of a “refresh” for two primary reasons: To incorporate new accessibility-related technologies, such as automated announcement systems and level boarding bus systems, and to ensure that the agency’s transportation vehicle guidelines remain consistent with its other regulations that have been issued since 1998. See, e.g., Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADA and ABA Accessibility Guidelines), 36 CFR part 1191, apps. A–D. The final rule modifies only the existing guidelines for buses, vans, and OTRBs; the current guidelines for transportation vehicles operated in fixed guideway systems (e.g., rapid rail, light rail, commuter rail, and intercity rail) will be updated in a future rulemaking. Compliance with the final rule is not required until DOT adopts these revised guidelines as enforceable accessibility standards for ADA-covered buses, OTRBs, and vans.

In this preamble, the Access Board’s current accessibility requirements set forth in 36 CFR part 1192 for buses, OTRBs, and vans covered by the ADA are collectively referred to as the “existing guidelines.” The accessibility guidelines established in this final rule for ADA-covered buses, OTRBs, and vans are collectively referred to as the “2016 Non-Rail Vehicle Guidelines.” Unless otherwise noted, citations in this preamble to particular sections or subsections refer to provisions in the 2016 Non-Rail Vehicle Guidelines.

*Summary of Significant Changes*

The 2016 Non-Rail Vehicle Guidelines are intended to revise and update the Access Board’s existing guidelines that provide scoping and technical requirements to ensure that ADA-covered buses, OTRBs, and vans

are accessible to, and usable by, passengers with disabilities. Some of the key changes reflected in the final rule (relative to the existing guidelines) include:

- *New Organization and Format:* The 2016 Non-Rail Vehicle Guidelines use a new organizational approach that is modeled after the Access Board’s accessibility guidelines for buildings and facilities in 36 CFR part 1191. The new format organizes the revised scoping and technical guidelines for buses, OTRBs, and vans, into seven chapters, all of which are contained in a new appendix to 36 CFR part 1192. Most of the revisions in the final rule are editorial only, and restate current requirements in plain terms that are clear and easier to understand.
- *Consistent Application of Accessibility Requirements across Different Types of Non-Rail Vehicles:* Unlike the vehicle-by-vehicle approach used in the existing guidelines, the 2016 Non-Rail Vehicle Guidelines establish accessibility requirements that, with some exceptions, apply across all covered non-rail vehicles (i.e., buses, OTRBs, and vans), so that accessibility requirements between different types of vehicles are generally similar. The aim is to make these guidelines easier to understand and apply, particularly for regulated parties—such as public transit agencies—that frequently operate different types of non-rail vehicles.
- *New Requirement for Automated Announcement Systems on Large Fixed Route Buses Operated by Large Transit Entities:* Large transit entities are required under the 2016 Non-Rail Vehicle Guidelines to provide automated stop and route announcement systems on all large vehicles operating in fixed route bus service that stop at multiple designated stops. Automated announcement systems must have both audible and visible components. For purposes of this requirement, a “large transit entity” is defined as a provider of public transportation that operates 100 or more buses in annual maximum service for all fixed route bus modes collectively based on required annual data reported to the National Transportation Database, which is maintained by the Federal Transit Administration.
- *Revised Requirements for Maximum Running Slope of Ramps:* The 2016 Non-Rail Vehicle Guidelines revise and simplify the existing guidelines regarding running slope for ramps in non-rail vehicles. The existing guidelines specify a range of maximum running slopes for vehicle ramps depending on nature of deployment (e.g., deployment to sidewalk or

<sup>1</sup> Over-the-road buses are buses characterized by an elevated passenger deck located over a baggage compartment. 49 CFR 37.3. Outside the context of the ADA and this regulation, over-the-road buses are also commonly referred to as “motor coaches.”

roadway), with 1:4 being the steepest permitted maximum running slope for ramps deployed to the roadway. However, years of field experience and research studies have shown that 1:4 ramps are difficult to use and have resulted in safety concerns for many transit operators and passengers who use wheeled mobility devices. Newer vehicle and ramp designs now make deployment of ramps with lesser slopes feasible. Accordingly, the final rule specifies a maximum running slope of 1:6 for ramps deployed to roadways or curb-height bus stops, and 1:8 for ramps deployed to boarding platforms in level boarding bus systems.

• *New Accessibility Requirements for OTRBs:* Under the 2016 Non-Rail Vehicle Guidelines, OTRBs operating in fixed route service will be newly required to satisfy the following accessibility requirements: Signs for accessible seating and doorways; public

address systems; stop request systems; and provision of exterior destination or route signs on the front and boarding sides of vehicles, when exterior signage is provided. These requirements are new only as applied to OTRBs; buses and vans have been covered by similar requirements since 1991.

• *Other Revisions to Reflect Changes in Technologies and Standards:* The 2016 Non-Rail Vehicle Guidelines also reflect other changes, such as establishing accessibility requirements for level boarding bus systems and incorporating updated standards for wheelchair securement systems, which did not exist when the existing guidelines were issued.

Discussion of the bases for the key changes embodied in the 2016 Non-Rail Vehicle Guidelines, as well as proposed changes that were not carried forward to the final rule, is provided in this preamble.

*Costs and Benefits*

Consistent with Executive Orders 12866 and 13563, the Access Board prepared a final regulatory assessment (Final RA) to assess the likely costs and benefits of new or revised accessibility requirements in the 2016 Non-Rail Vehicle Guidelines that are expected have an incremental cost impact relative to its existing guidelines. The results of the Final RA show that, over the studied 12-year regulatory timeframe, annualized costs for the 2016 Non-Rail Vehicle Guidelines are expected to range from \$2.3 million to \$8.0 million, depending on the cost scenario and discount rate. Presented below are estimated annualized costs for the 2016 Non-Rail Vehicle Guidelines under each of the three cost scenarios (*i.e.*, low, primary, and high) studied in the Final RA, using 3% and 7% discount rates:

TABLE 1—ANNUALIZED COST OF NEW OR REVISED ACCESSIBILITY GUIDELINES IN THE 2016 NON-RAIL VEHICLE GUIDELINES FOR BUSES, OTRBs, AND VANS, ALL REGULATORY YEARS [3% and 7% discount rates]

Discount rate	Low scenario (\$millions)	Primary scenario (\$millions)	High scenario (\$millions)
3% .....	\$2.6	\$5.0	\$8.0
7% .....	2.3	4.5	7.2

The Final RA also assesses the economic impact of the 2016 Non-Rail Vehicle Guidelines from several other cost perspectives, including the cost to large transit entities of complying with the new automated announcement systems requirement, and the costs of the new accessibility requirements for OTRBs. In order to present a more refined evaluation of estimated costs to large transit entities of the automated announcement systems requirement, the Final RA models costs using three prototypical size-based categories—which are denominated Tiers I, II and III—that are intended to be representative of the range of fixed route bus fleets operated by such entities. Tier I models costs for a large transit entity that is on the “smaller” end of the size spectrum (*e.g.*, 130 buses operating in annual maximum fixed route service), while Tier III reflects a large transit entity on the “larger” end of the size spectrum (*e.g.*, 530 buses operating in annual maximum fixed route service). Based on these tiers, the Final RA estimates that per-agency annualized costs for the automated announcement system requirement will range from about \$44,000 (for a Tier I agency under the low scenario) to about \$430,000 (for a Tier III agency under the high

scenario). Under the primary scenario, which models what are considered to be the most likely set of cost assumptions, the Final RA estimates that per-agency costs for automated announcement systems will be as follows for each respective tier: Tier I—\$80,659; Tier II—\$154,985; and, Tier III—\$264,968.

Additionally, in terms of accessibility requirements that are newly applicable to OTRBs, the Final RA shows that the cost impact of these requirements is expected to be relatively modest. Annualized costs per vehicle are expected to range from \$631 (low scenario) to \$1,513 (high scenario) at a 7% discount rate. In light of this modest cost profile, the Final RA’s small business analysis finds that, while the 2016 Non-Rail Vehicle Guidelines will undoubtedly affect a substantial number of “small business”-sized OTRB firms (in light of small firms’ predominance in the relevant transportation, charter, and sightseeing industry sectors), its economic impact is not expected to be significant or disproportionate relative to other, larger OTRB firms.

Benefits of the 2016 Non-Rail Vehicle Guidelines, as discussed in the Final RA, are particularly challenging to quantify or monetize due to a variety of considerations, including insufficient

data, methodological constraints, and inherent difficulties in evaluating civil rights-based regulatory provisions that promote important societal values such as equity, fairness, and independence. Consequently, benefits attributable to new and revised requirements in the 2016 Non-Rail Vehicle Guidelines—which are expected to be significant—are described from a qualitative perspective.

The Final RA discusses how the new and revised provisions in the 2016 Non-Rail Vehicle Guidelines are expected to directly benefit a significant number of Americans with disabilities by ensuring that transit buses and OTRBs are accessible and usable. By addressing communication barriers (and, to a lesser extent, access barriers) encountered on such vehicles by persons with vision, hearing, mobility, and cognitive impairments, the 2016 Non-Rail Vehicle Guidelines will better enable persons with disabilities to use these modes of transportation to work, pursue an education, access health care, worship, shop, or participate in recreational activities. Other individuals and entities, such as transit agencies, are also expected to benefit from the 2016 Non-Rail Vehicle Guidelines through, for example, improved customer

satisfaction attributable to automated announcement systems.

## II. Rulemaking History

The Americans with Disabilities Act (ADA) requires the Access Board to issue guidelines for transportation vehicles—including buses, OTRBs, and vans—to ensure that new, used and remanufactured vehicles are readily accessible to and usable by individuals with disabilities. *See* 42 U.S.C. 12204. These guidelines serve as the baseline for enforceable accessibility standards issued by DOT for ADA-covered transportation vehicles. 42 U.S.C. 12204.

The Access Board first issued transportation vehicle accessibility guidelines in September 1991. *See* 56 FR 45530 (Sept. 6, 1991) (codified at 36 CFR pt. 1192, subpts. A–F). These guidelines establish accessibility requirements for new, used or remanufactured transportation vehicles—which included buses, vans, and rail vehicles operated in fixed guideway systems, but excluded OTRBs—covered by the ADA. These accessibility requirements relate to, among other things, ramps and lifts, onboard circulation, wheelchair spaces and securement devices, priority seats, stop request systems, and exterior route or destination signs. *Id.* With respect to announcement systems, these guidelines require large buses operating in fixed route service to be equipped with public address systems that permit announcement of stops or other passenger information. *See* 36 CFR 1192.35. The same day, DOT adopted the Access Board’s guidelines as enforceable accessibility standards for transportation vehicles covered by the ADA. *See* 56 FR 45584 (Sept. 6, 1991) (codified at 49 CFR pt. 37).

In 1998, the Access Board and DOT issued a joint final rule amending their respective existing transportation vehicle guidelines and standards to include accessibility requirements for OTRBs. *See* 63 FR 51694 (Sept. 28, 1998) (codified at 36 CFR pt. 1192, subpt. G & 49 CFR pt. 38, subpt. H). While many of the accessibility requirements for OTRBs in the 1998 amendments were the same as those applicable to buses and vans, they were not identical. OTRBs, for example, were not required to provide public address systems, stop request systems, or exterior signage identifying destinations or routes.

Other than these 1998 amendments, the Access Board’s vehicle guidelines have not been modified since their initial issuance in 1991. Since that time, new or updated technologies (such as

low floor buses, intelligent transportation systems, and automated announcement systems), transit system designs (such as bus rapid transit and level boarding bus systems), and accessibility standards have emerged. Such changes led the Access Board to begin informal efforts to update its existing transportation vehicle guidelines.

First, in April 2007, the Board published draft revisions to the existing guidelines that proposed changes to accessibility requirements for buses and vans. *See* Availability of Draft Revisions to Guidelines, 72 FR 18179 (April 11, 2007); U.S. Access Board, Draft Revisions to the ADA Accessibility Guidelines for Buses and Vans (2007) (available on the Access Board Web site) [hereafter, “2007 Draft Revised Guidelines”].<sup>2</sup> Among other things, the 2007 Draft Revised Guidelines proposed that large buses used in multiple-stop, fixed route service be required to have automated stop and route announcement systems. This proposed requirement applied to all transit agencies operating fixed route buses regardless of their location or size of bus fleet. The 2007 draft also proposed to decrease the maximum running slope of vehicle ramps to 1:8 (as compared to the existing guidelines, which specify a range of ramp slopes from 1:4 to 1:12, depending on deployment), require additional maneuvering clearance where a wheelchair space is confined on three sides, and require a 36-inch wide onboard circulation path from accessible doorways to wheelchair spaces (as compared to the existing guidelines, which require “sufficient clearance” for passengers who use wheelchairs).

The following year, in November 2008, the Board published a notice of availability for a second set of draft revised guidelines for public review and comment. *See* Availability of Draft Revisions to Guidelines, 73 FR 69592 (Nov. 19, 2008); U.S. Access Board, Revised Draft of Accessibility Guidelines for Buses and Vans (2008) (available on the Access Board Web site) [hereafter, “2008 Draft Revised

Guidelines”].<sup>3</sup> Among other things, the 2008 Draft Revised Guidelines reflected a significantly revamped format and organization more akin to the Board’s then-recent revisions to its revised ADA and ABA Accessibility Guidelines, rather than a “conventional” regulatory format. *Id.* at 69592. The 2008 Draft Revised Guidelines also incorporated changes in several proposed accessibility requirements in response to comments. Specifically, application of the automated announcement systems requirement was narrowed by proposing that only large transit agencies operating 100 or more buses in annual maximum service (referred to as “VOMS”) be required to deploy automated announcement systems on their large, fixed-route buses. This 100-bus VOMS threshold was added at the behest of commenters, including the American Public Transportation Association (APTA), who urged the Access Board to add a “small fleet exemption” to the automated announcement system requirement. Additional proposed changes in the 2008 Draft Revised Guidelines included: Increasing the maximum running slope for ramps and bridgeplates to 1:6 when deployed to the roadway; decreasing the proposed maneuvering clearances for wheelchair spaces; and, decreasing the proposed minimum clear width for circulation paths to 34 inches. Additionally, the 2008 Draft Revised Guidelines included proposed accessibility requirements for OTRBs and level boarding bus systems, which the 2007 draft revised guidelines had not addressed.

In July 2010, the Access Board formally commenced the rulemaking process by issuing a notice of proposed rulemaking to update the existing guidelines for buses, OTRBs, and vans. *See* Notice of Proposed Rulemaking—Americans with Disabilities Act Accessibility Guidelines for Transportation Vehicles, 75 FR 43748 (July 26, 2010) (hereafter, “2010 NPRM”). Aside from minor editorial changes, the proposed rule was substantively similar to the draft revised guidelines issued two years earlier. In particular, based on strong support from

<sup>2</sup> The 2007 Notice of Availability published in the *Federal Register* provided only notice that the Access Board’s draft revised guidelines had been made available for public review and comment. The actual text of the draft revised guidelines was posted on the Access Board’s Web site. *See* U.S. Access Board, [2007] Draft Revisions to the ADA Accessibility Guidelines for Buses and Vans, <https://www.access-board.gov/guidelines-and-standards/transportation/vehicles/update-of-the-guidelines-for-transportation-vehicles/draft-update/text-of-draft-revised-guidelines>.

<sup>3</sup> As with the draft revised guidelines issued one year earlier, the 2008 Notice of Availability published in the *Federal Register* provided notice only that the Access Board’s draft revised guidelines were available for public review and comment. The actual text of the draft revised guidelines was posted on the Access Board’s Web site. *See* U.S. Access Board, [2008] Revised Draft of Updated Guidelines for Buses and Vans, <https://www.access-board.gov/guidelines-and-standards/transportation/vehicles/update-of-the-guidelines-for-transportation-vehicles/updated-draft-of-updated-guidelines-for-buses-and-vans>.

commenters to the 2008 Draft Revised Guidelines, the automated announcement systems requirement (including a VOMS 100 threshold for large transit agencies) and the 1:6 maximum ramp slope requirement were carried forward to the proposed rule. To augment the written notice-and-comment process, the Board also held public hearings on the proposed rule in Chicago, IL and Washington, DC.

After the close of the comment period on the 2010 NPRM, the Access Board received reports from transit operators and a transportation consultant that some passengers who use wheelchairs were experiencing problems with new ramps that had been designed to meet the proposed 1:6 maximum running slope for ramps when deployed to the roadway. Accordingly, the Board reopened the comment period on the proposed rule and held two on-the-record public meetings to gather additional information on the feasibility and safety of the new ramp designs. See Notice of Public Information Meeting and Reopening of Comment Period, 77 FR 50068 (Aug. 20, 2012).

### III. Major Issues

#### *Automated Announcement Systems*

The Access Board's existing guidelines require large buses (*i.e.*, more than 22 feet in length) operating in fixed route service to be equipped with onboard public address systems to announce stops and other passenger information. See 36 CFR 1192.35. Current DOT regulations, in turn, specify the requisite characteristics of stop and route announcements; however, there is no requirement that such announcements be provided through automated messages, as opposed to vehicle operators. See 49 CFR 37.167(b) & (c). Transit agency announcement programs that primarily rely on operator-based announcements have proven to be problematic. Compliance reviews conducted by DOT, as well as multiple Federal lawsuits, have shown that, in vehicle-operator-based announcement programs, compliance with the existing regulatory standards is rarely above 50% of requisite stop or route announcements. See Final RA, Section 3.2 (summarizing results of DOT compliance reviews of transit agency announcement programs and Federal lawsuits raising ADA challenges to vehicle operator-based announcement programs). Consequently, despite the promulgation of the existing announcement requirement more than two decades ago, transit users with disabilities, along with transportation researchers,

continue to identify inadequate stop and route announcements as significant impediments to the use of public bus transportation by persons with disabilities.

Since the early 2000s, deployment of various advanced technologies in transportation—commonly referred to as “intelligent transportation systems” (ITS)—has grown substantially. For public transit systems, ITS deployments generally include a “core” set of applications for Automatic Vehicle Location (AVL) and Computer-Aided Dispatch (CAD) that facilitate management of fleet operations by providing real-time information on vehicle location. Additional functionalities, such as automated announcement systems, are also becoming increasingly common. Automated announcement systems help ensure that required stop and route announcements are made, and made consistently and clearly. Automated announcement systems also lessen the need to rely on operators of non-rail vehicles for compliance, and, thereby, allow operators to pay more focused attention on driving or other operational tasks.

Both ITS/AVL deployments generally, and deployments that include automated announcement systems, have exhibited tremendous growth in recent years. For example, as of 2013, DOT annual statistics tracking ITS deployments show that nearly 90% of fixed route buses are now equipped with AVL, which represents a 177% increase in AVL deployments since 2000.<sup>4</sup> Moreover, according to the annual *Public Transportation Vehicle Database* maintained by the American Public Transportation Association (APTA), the number of fixed route buses in the United States that provide automated announcements has increased from 10% in 2001 to 69% in 2015.<sup>5</sup>

The 2010 NPRM, as did the 2008 Draft Revised Guidelines, proposed that public entities operating 100 or more

<sup>4</sup> DOT, *Deployment of Intelligent Transportation Systems: A Summary of the 2013 National Survey Results* xiv, 26–27 (Aug. 2014).

<sup>5</sup> Historical data on automated stop announcement system deployments are based on the Appendix to APTA's 2015 *Public Transportation Fact Book*, which provides data on vehicle amenities by mode of travel from 2001 through 2014. See 2015 *Public Transportation Fact Book, Appendix A: Historical Tables*, Table 30 (June 2015), available at: <https://www.apta.com/resources/statistics/Documents/FactBook/2015-APTA-Fact-Book-Appendix-A.pdf>. Data on automated stop announcement system deployments in 2015 are derived from a sample of vehicle amenity data in the 2015 *APTA Public Transportation Database*, which is available for purchase from APTA.

buses in annual maximum fixed route service (as reported in the National Transit Database) must provide automated stop and route announcement systems on their large buses that operate in fixed route service and stop at multiple designated stops. Automated announcement systems, as proposed, must have both audible and visible components. For route announcements, the automated messages must be audible at boarding and alighting areas and the visible component must include signs on the front and boarding sides of buses. Stop announcements must be audible within vehicles, and the visible component must include signs that are viewable by passengers seated in wheelchair spaces and priority seats. The 2010 NPRM also posed several questions seeking public input on the proposed scoping for automated announcement systems, technical requirements, and costs. See 2010 NPRM, Question Nos. 16–20.

Overall, the vast majority of commenters to the 2010 NPRM were strongly supportive of the Board's proposal to require automated stop and route announcements. Supporters of the requirement, who represent a broad cross-section of commenters—including persons with disabilities, advocacy organizations, academia, and transit industry associations—expressed their firm belief that automated announcement systems would bring much-needed consistency to stop and route announcements on fixed route buses and, thereby, ensure that passengers with disabilities have access to critical information needed to use public transportation systems. Supporters also noted that, by requiring audible and visible components, the proposal would broadly benefit not only passengers with vision or hearing-related disabilities, but also persons with other types of disabilities, including cognitive impairments. Automated announcement systems would also, they believe, promote universal access by aiding passengers who are unfamiliar with particular bus routes (*e.g.*, out-of-town visitors or infrequent riders) and generally improving customer satisfaction.

Commenters in favor of the automated announcement systems requirement also expressed uniform support for the VOMS 100 threshold (*i.e.*, limiting scope of requirement to large transit agencies that operate 100 or more buses in annual maximum service in fixed route systems), viewing this limitation as striking a sensible balance between accessibility and economic considerations. For example, APTA—one of the nation's largest organizations

involved in the public transportation industry—praised the VOMS 100 threshold as a reasonable approach to limiting application of the automated announcement systems requirement. Other commenters voicing support for the VOMS 100 threshold included a statewide transit organization, a large disability-rights organization, and a national association of accessibility professionals. Several large transit agencies also noted that they have already equipped (or are in the process of equipping) their buses with automated announcement systems.

Transit entities, on the other hand, had mixed views on the general notion of an automated announcement systems requirement. APTA and a statewide association of transit managers noted their general approval for this proposal. A large transit agency also expressed support for the automated announcement systems requirement, but noted that the cost for such systems might impose hardships on small transit agencies. Another large transit agency observed that, while automated announcement systems are “a highly desired feature for improving customer information systems,” they can be costly and technically challenging to implement in some environments. Several other transit entities took no position on automated announcement systems, but offered suggestions for improving the proposed requirement, such as clarifying its application or adding technical specifications for audio quality. Lastly, three transit agencies opposed the automated announcement systems requirement outright, expressing concern about costs and the fact that the requirement mandates use of automated announcement systems, rather than allowing transit agencies to choose among competing priorities at the local level, particularly with respect to rural bus service.

After careful considerations of these comments, the Access Board has decided to retain the automated announcement system requirement in the final rule, albeit with several, small editorial changes that respond to commenters’ requests for clarification. (These editorial changes are discussed in Section IV.H below.) The Board strongly believes that automated announcement systems improve communication access for passengers with disabilities, which is a crucial factor in facilitating new or expanded use of fixed route bus transportation systems. Automated announcement systems have proven to be far superior to transit agency announcement programs that rely solely on vehicle

operator-provided announcement systems. See Final RA, Sections 3.2 & 3.3 (discussing comparative performance of vehicle operator-based announcement programs and automated announcement systems). Indeed, even though the existing guidelines requiring stop and route announcements have been in effect since 1991, significant problems persist, as evidenced by commenters’ anecdotes, DOT compliance reviews of transit agency announcement programs, and Federal ADA litigation.

Moreover, while the Access Board acknowledges that deployment of automated announcement systems by large transit agencies to comply with the final rule will necessarily impose costs (as well as lead to substantial benefits for bus passengers with disabilities), the cost impact of this requirement is tempered by several considerations. Foremost is that its application is limited to large transit entities that operate 100 or more fixed route buses in annual maximum service—a limitation that was added at the behest of APTA. See 2010 NPRM, 75 FR at 43753. By establishing a VOMS 100 threshold, the Board believes that the automated announcement systems requirement is appropriately and narrowly tailored to larger transit agencies that have the financial resources to deploy ITS with automated announcement system functionality and potentially serve the greatest number of passengers with disabilities.<sup>6</sup> Significantly, as discussed below in Section V.B (Regulatory Process Matters—Regulatory Flexibility Act), no small governmental entities (*i.e.*, public transit authorities with service or population areas under 50,000) are expected to incur compliance costs under the 2016 Non-Rail Vehicle Guidelines.

Additionally, extensive deployment of ITS in public transportation systems over the past decade means that, for most large transit agencies, the automated announcement systems requirement will not impose significant incremental costs. As noted above, transit industry statistics show that about 70% of fixed route buses nationally are already equipped with automated announcement systems, and nearly 90% are equipped with AVL. For large transit entities that have already

<sup>6</sup> For a detailed analysis of quantitative considerations that support promulgation of a VOMS 100 threshold (as opposed to other potential alternative VOMS thresholds for large transit agencies subject to the automated announcement systems requirement), see Final RA, Section 8 (Alternative Regulatory Approaches: Large Transit Agencies and the VOMS 100 Threshold & App. J (Key Characteristics of Transit Agencies Reporting Bus Modes of Service (2014 NTD Data)).

installed (or are planning to install) automated announcement systems as part of their ITS deployment, this new requirement will impose no additional costs. For large transit agencies that have already deployed ITS/AVL system-wide, but do not yet have automated announcement systems, the incremental cost of complying with the new requirement will, in all likelihood, only be the cost of adding automated announcement system functionality, rather than purchasing an entirely new ITS system. Thus, the Access Board expects that only a few large transit agencies will have to purchase and deploy entirely “new” ITS with automated announcement system functionality in order to comply with the final rule.

Finally, it bears emphasis that, while DOT has sole discretion to determine whether (or to what extent) the automated announcement system requirement will apply to new, remanufactured, and existing non-rail vehicles, the Department’s past practice in ADA rulemakings suggests that it is highly unlikely that existing transit buses would need to be retrofitted to comply with the automated announcement system requirement. Typically, DOT has imposed more stringent, “full” accessibility requirements on new or remanufactured vehicles, and exempted existing vehicles entirely. See, *e.g.*, 49 CFR 37.71, 37.75, 37.103, 37.183, 37.195 & 37.197. The only exception to this practice was the Department’s 1991 ADA rulemaking, which, in pertinent part, requires public entities acquiring used vehicles for operation in fixed-route service to ensure that such vehicles are readily accessible to and usable by individuals with disabilities. However, public entities are still permitted to purchase used vehicles that are not fully accessible so long as they document good faith efforts to obtain an accessible vehicle. See 49 CFR 37.73. Indeed, the Access Board is not aware of any instances of DOT adopting ADA transportation regulations that required current owners of existing buses to retrofit such buses to comply with newly promulgated standards. The Board appreciates that DOT will exercise its discretion concerning application of the automated announcement system requirement to existing vehicles based on its own assessment of costs and benefits, and will do so while bearing in mind past regulatory practices.

#### *Wheelchair Securement Systems*

The Access Board’s existing guidelines require buses, OTRBs, and

vans to provide wheelchair securement systems that comply with specified technical requirements at each wheelchair space. The 2010 NPRM proposed two changes to these technical specifications based on transportation research that post-dated the issuance of the existing guidelines. See 2010 NPRM, 75 FR at 43752. First, in large non-rail vehicles with a gross vehicle weight rating of 30,000 pounds or more, the proposed rule reduced from 4,000 pounds to 2,000 pounds the minimum force that wheelchair securement systems must be designed to restrain in the forward longitudinal direction. This proposed revision was made in light of research showing that a lower design force would be sufficient to accommodate force generated on wheelchairs and their occupants in large non-rail vehicles under common conditions (e.g., maximum braking, maximum acceleration, frontal collision). Second, the proposed rule modified the technical requirements for rear-facing wheelchair securement systems by adding a specification for forward excursion barrier to the current technical requirements. The forward excursion barrier is a padded structure designed to limit forward movement of a rear-facing wheelchair and its occupant relative to the vehicle. Additionally, the 2010 NPRM also asked two questions seeking commenters' views on potential cost savings from the proposed design force reduction and proposed technical requirements for forward excursion barriers. See 2010 NPRM, Question Nos. 13–14.

With respect to reducing the minimum design force for wheelchair securement systems, commenters to the 2010 NPRM expressed near universal support. Commenters who supported this proposal included several vehicle manufacturers, three public transit agencies, an individual with a disability, and an accessibility consultant. They applauded the proposed reduction in design force because it would, they believed, potentially foster more innovative designs that were lighter or easier to use than currently available securement systems. These commenters further opined that reducing the minimum design force would likely produce marginal (if any) cost savings. Only two commenters opposed the proposed reduction of the minimum design force, with one commenter (an equipment manufacturer) merely stating general opposition to the proposal and the other commenter (a public transit agency) expressing concern about safety in light

of larger mobility devices and rising obesity levels.

The Access Board has decided to retain the proposed reduction in minimum design force for wheelchair securement systems in the final rule. The revised design force would potentially spur greater innovation in wheelchair securement systems (which is an area in need of new approaches), but without sacrificing safety given that the 2,000-pound specification is based on findings from transportation studies.

With respect to the proposed addition of technical specifications for forward excursion barriers in rear-facing wheelchair securement systems, commenters expressed mixed views. Those who supported inclusion of specifications for forward excursion barriers (including individuals with disabilities and a transit agency), noted that, while rear-facing wheelchair spaces were not yet commonly used on fixed route buses in the United States, it was nonetheless important to specify a standard to keep pace with potential future changes in transit system designs. Other commenters (including a research center and a bus manufacturer), did not oppose inclusion of requirements for forward excursion barriers, but instead took issue with the Access Board's particular set of proposed specifications. They viewed the proposed requirements for forward excursion barriers as inadequate to protect wheelchair users. They suggested that, in the final rule, the Board should instead harmonize with international standards for rear-facing wheelchair securement systems, particularly since rear-facing wheelchair positions are much more common in Canadian and European public transportation systems. Finally, one transit agency objected outright to the inclusion of any requirement for forward excursion barriers.

In the final rule, the Access Board retains the requirement for forward excursion barriers for rear-facing wheelchair securement systems, but modifies the technical requirements for such barriers in response to commenters' expressed concerns about the specifications in the proposed rule. Specifically, T603.5 requires rear-facing wheelchair securement systems to provide forward excursion barriers complying with ISO 10865–1:2012(E), “Wheelchair containment and occupant retention systems for accessible transport vehicles designed for use by both sitting and standing passengers—Part 1: Systems for rearward facing wheelchair-seated passengers.” The ISO standard specifies design and performance requirements and associated test methods for forward

excursion barriers. The Board has determined that the added safety research used in the development of ISO 10865–1:2012(E), and its acceptance as a global standard, provide additional benefits to transit users and agencies that warrant its incorporation in the final rule.

#### *Running Slope of Ramps Deployed to Roadways or Curb-Height Bus Stops*

In the 2010 NPRM, the Access Board proposed to simplify and update the existing guidelines addressing the running slope of ramps in non-rail vehicles by establishing a single standard—1:6 maximum (17 percent)—for ramps deployed to roadways or to boarding and alighting areas without boarding platforms (i.e., curb-height bus stops). See 2010 NPRM, T303.8.1.<sup>7</sup> The Board proposed these changes for two primary reasons: To address concerns about the safety and usability of ramps when deployed at the steepest maximum slope permitted under the existing guidelines (1:4); and to update ramp slope requirements in light of the evolution of bus and ramp designs in the 25 years since the existing guidelines were promulgated. The Board's proposed 1:6 maximum ramp slope engendered the largest volume of comments of any of the proposed regulatory changes in the 2010 NPRM. Commenters overwhelmingly acknowledged the need to modernize the Board's existing guidelines for vehicle ramp slopes, but expressed differing views on the best approach for their revision. For the reasons discussed below, the final rule retains the proposed requirement that ramps in non-rail vehicles must have running slopes no steeper than 1:6 when deployed to roadways or boarding and alighting areas without boarding

<sup>7</sup> For ease of reference, this section discusses requirements for running slope in terms of ramps only; however, in the final rule, such requirements apply equally to ramps and bridgeplates. For ramps and bridgeplates deployed to boarding platforms in level boarding bus systems, the 2010 NPRM proposed a maximum slope of 1:8 (12.5 percent). See 2010 NPRM, T303.8.2. In level boarding bus systems, some or all designated stops have boarding platforms, and the design of the boarding platforms and the vehicles are coordinated to provide boarding having little or no change in level between the vehicle floor and the boarding platform. At present, there are only a handful of level boarding bus systems in the United States. The Access Board received no comments on this proposed 1:8 maximum ramp slope in the context of level boarding bus systems. This requirement has been retained in the final rule, albeit with a minor change in the wording of the rule text from “station platform” to “boarding platform.” See discussion *infra* Section IV.B (Summary of Comments and Responses on Other Aspects of the Proposed Rule—Chapter 1: Application and Administration—T103 Definitions) (discussing definition of “boarding platforms”).

platforms, such as curb-height bus stops. However, the text of the final rule has been revised to make clear that the requisite maximum running slope is a design standard to be measured to ground level with the bus on a flat surface; when deployed to roadways or curb-height bus stops, ramps must have the least running slope practicable under the given field conditions.

The existing guidelines specify a range of maximum running slopes for non-rail vehicle ramps depending on the nature of their deployment. While ramps must generally have the “least slope practicable,” the guidelines go on to specify several different maximum running slopes depending on whether the ramp is being deployed to the roadway or to a curb-height bus stop. See 36 CFR 1192.23(c)(5) (ramp slope requirements for buses and vans), 1192.159(c)(5) (OTRB-related ramp slope requirements). When a ramp is deployed to the roadway, the existing guidelines require its slope to be 1:4 maximum. For ramps deployed to bus stops with an adjacent 6-inch curb, the existing guidelines specify a range of maximum ramp running slopes depending on the differential in height between vehicle floor and curb. The existing slope requirements for vehicle ramps deployed to curb-height bus stops are shown in Table 2 below. Running slopes are expressed as the ratio of the vertical rise to the horizontal run.

TABLE 2—EXISTING GUIDELINES: MAXIMUM SLOPE OF VEHICLE RAMPS DEPLOYED TO CURB-HEIGHT BUS STOPS

Height of vehicle floor above 6-inch-high curb	Maximum running slope
3 inches or less .....	1:4
more than 3 inches and equal to or less than 6 inches .....	1:6
more than 6 inches and equal to or less than 9 inches .....	1:8
more than 9 inches .....	1:12

In 1991, when the Access Board issued the existing guidelines for ramp slopes, ramp and vehicle designs were not as advanced as they are today. Standard transit buses had high floors (usually 35 inches above the roadway) and steps at doorways. For this type of bus, lifts are the only means of providing accessible boarding and alighting. Yet, in public transit settings, lifts can sometimes be slow to deploy, costly to maintain, and have reliability issues. These and other factors spurred development and adoption of “low floor” transit buses in the early 1990s.

Low floor buses have a lower vehicle floor (typically 15 inches or less above the roadway) that permits a flat—rather than stepped—area at doorways. Most low floor buses also have a “kneeling” feature that hydraulically lowers the front end of the vehicle several inches closer to the curb to aid in boarding. Because of their lower floor and flat entry area, low floor buses can use ramps (instead of lifts) to provide access for passengers with disabilities. These features tend to make boarding and alighting easier and more user-friendly for all passengers and, consequently, reduce dwell times.<sup>8</sup> As of 1991, however, low floor bus technologies in the United States—as well as related vehicle ramp designs—were still in their infancy. Consequently, the maximum ramp slopes specified in the existing guidelines, while fairly steep for some types of deployments (such as 1:4 to the roadway), reflect what was feasible given then-existing technologies.

In the mid-2000s, when the Access Board initiated efforts to revise and update its non-rail vehicle guidelines, two related considerations prompted evaluation of ramp slopes. First, research studies demonstrated that steeper ramp slopes—particularly ramps with a 1:4 slope—are difficult to use for many individuals who use mobility devices, most notably manual wheelchairs users.<sup>9</sup> There were also documented incidents of wheelchairs and their occupants tipping over backwards going up bus ramps with 1:4 slopes. Second, low floor bus technologies had rapidly evolved and all major domestic bus manufacturers offered one or more models. Indeed, such buses had increasingly become public transit agencies’ vehicle of choice for fixed-route bus service.<sup>10</sup>

In the 2010 NPRM, the Access Board thus proposed to update the ramp slope requirements in the existing guidelines by establishing a 1:6 maximum slope for ramps deployed to roadways or curb-height bus stops. See 2010 NPRM, T303.8.1.<sup>11</sup> The intent of this proposal

was two-fold: To lessen the steepness of the maximum permitted ramp slope from 1:4 to 1:6, and to simplify application of the ramp slope requirements by replacing the existing deployment-based range of maximum ramp slopes with a single standard. On balance, commenters strongly supported this proposal.

The proposed ramp slope provision received broad support from a wide spectrum of commenters, including the disability community, APTA, transportation researchers, ramp manufacturers, and several transit operators. These commenters applauded the Board’s efforts to simplify the existing ramp slope requirements by specifying a single standard. They also agreed that the 1:4 maximum ramp slope in the existing guidelines was outdated and too steep. A 1:6 maximum for non-rail vehicle ramp slopes, in their view, was safer and more in line with current technology. Nonetheless, some supporters of the proposed ramp slope standard cautioned that, while a 1:6 standard for maximum ramp slope was preferable and generally feasible, certain local conditions (e.g., narrow urban sidewalk, roadside ditch, or excessive road crown) might make achieving a 1:6 ramp slope impractical or difficult in particular deployment situations. These commenters encouraged the Board to consider adding an exception that would permit steeper ramp slopes when necessary due to local conditions. Lastly, several ramp manufacturers observed that 1:6 ramps were commercially available, had about the same total cost of ownership (i.e., purchase price and maintenance costs) as older (1:4) ramp models, and were already in service on thousands of ramp-equipped low floor buses.

Only a handful of commenters expressed outright opposition to the proposed 1:6 maximum slope for ramps in non-rail vehicles. For two transit operators, this proposal proved problematic because, in their view, a single standard cannot adequately take into account the many variables affecting ramp slope under “real world” operating conditions. The third transit operator expressed concern that 1:6 ramps would increase capital and maintenance costs, could require longer ramps, and might not be compatible with some bus or van models. Additionally, two bus manufacturers, while not expressly opposing a 1:6 maximum slope standard, noted that certain models of smaller non-rail vehicles—such as vans or cutaway buses—might require redesign of suspension systems or other vehicle

<sup>8</sup> See, e.g., Transp. Research Board, *TCRP Synthesis 2—Low-Floor Transit Buses: A Synthesis of Transit Practices* (1994).

<sup>9</sup> See, e.g., K. Frost and G. Bertocci, *Retrospective Review of Adverse Incidents Involving Passengers Seated in Wheeled Mobility Devices While Traveling in Large Accessible Transit Vehicles*, 32 *Medical Engineering & Physics* 230–36 (2010).

<sup>10</sup> See, e.g., Transp. Research Board, *Federal Transit Admin., TCRP Report 41—New Designs and Operating Experiences with Low-Floor Buses* 1, 44–46 (1998).

<sup>11</sup> The Access Board also explored the feasibility of decreasing the maximum running slope for non-rail vehicle ramps in the 2007 and 2008 Draft Revised Guidelines. See *supra* Section II (Rulemaking History); see also 2010 NPRM, 75 FR at 43750.



parts in order to achieve the requisite ramp slope.

After the close of the comment period on the proposed rule, the Access Board received reports that a few transit agencies were experiencing problems with the usability of some 1:6 ramp models that had been recently installed on new transit buses. Accordingly, in August 2012, the Board issued a notice that it was reopening the comment period on the proposed rule and planned to hold public meetings in Washington, DC and Seattle, Washington to receive additional information on the new ramp designs. See Notice of Public Information Meeting and Reopening of Comment Period, 77 FR 50068 (Aug. 20, 2012).

Information developed during the reopened comment period painted a mixed picture of these 1:6 ramps. On the one hand, several transit agencies and individuals with disabilities confirmed that a few new 1:6 ramp models were indeed creating difficulties on some ramp-equipped low floor buses. They reported that, in order to avoid extending the ramps a longer distance outside the bus, some 1:6 ramps were designed with a fixed slope inside the bus and a variable slope outside the bus. The resulting grade break in the ramp run, along with its close proximity to the vestibule area flat floor, caused some passengers who used wheeled mobility devices to have difficulty negotiating the ramps or maneuvering in the bus vestibule (e.g., paying fare or turning into the aisle). Some of the affected transit agencies had taken these ramps out of service, while others were working with manufacturers to develop modifications for in-use ramps. Several commenters, while characterizing the existing 1:4 maximum ramp slope as “unsafe,” nonetheless urged the Access Board to delay issuance of a final rule until research or field testing documented the safety and usability of 1:6 ramps. They noted the complexity of the issue given the interplay of environmental conditions and in-vehicle space constraints.

A number of other commenters, however, expressed support for 1:6 ramps generally, as well as the particular ramp models at issue. Several bus and component manufacturers strongly supported the proposed 1:6 maximum slope requirement, stating that standard and cutaway bus models were already in production that came equipped with ramps capable of achieving a 1:6 maximum slope to roadways or curb-height bus stops. Additionally, a ramp manufacturer observed that, of the thousands of 1:6

ramps already in service on heavy-duty low floor transit buses across several hundreds of transit agencies, only about 2% of transit agencies had cited ramp grade break as a problem. This manufacturer also noted that, by 2013, it expected to have two new, redesigned 1:6 ramp models in commercial production that would address the cited problems by eliminating the grade break in the ramp run and minimizing the ramp’s impact on the available level floor space within the bus at the top of the ramp. Testing of field prototypes was underway, and initial feedback had been positive.

A third group of commenters—including a disability organization and a research institution—believed that the Access Board’s proposed 1:6 maximum ramp slope was still too steep. While preferable to steeper (1:4) ramps, a 1:6 ramp, they noted, was not “user-friendly” and could be difficult for passengers who use manual wheelchairs to use independently. These commenters urged the Board to instead adopt a 1:8 maximum ramp slope, which would make ramps usable for the vast majority of wheeled mobility device users.

Several years have passed since the comment period closed in late 2012. In the intervening years, 1:6 ramps have become well-established in the transit community. The ramp models at issue when the Access Board reopened the comment period have been replaced by a newer generation of 1:6 ramps; these ramps have been on the market—and in use—for several years without generating similar complaints. See Final RA, Section 3.4. Low floor non-rail vehicles equipped with 1:6 ramps are commercially available from a host of manufacturers, ranging from small cutaway buses to large, heavy-duty transit buses. *Id.* Moreover, the current version of APTA’s “Standard Bus Procurement Guidelines” (commonly referred to as the “APTA Whitebook”), which are widely used by transit agencies throughout the country for their bus procurements, lists 1:6 ramps as the default specification for large low floor buses. See APTA Standard Bus Procurement Guidelines, § TS 81.3 (May 2013). Indeed, 1:6 ramps have become so integrated into the transit marketplace that, at least for the heavy-duty low floor transit buses, these ramps are now the less expensive production models, whereas steeper (1:4) ramps are more costly special order items. See Final RA, Section 3.4.

After careful consideration, the Board has determined that a 1:6 maximum ramp slope—as proposed in the 2010 NPRM—strikes the appropriate balance

between usability and feasibility. We believe that establishing a 1:6 maximum running slope for non-rail vehicle ramps will make such ramps more usable for most passengers who use wheeled mobility devices, while also ensuring a workable standard that manufacturers and vehicle operators can meet without undue difficulty or expense. There is near uniform agreement that the 1:4 maximum ramp slope in the existing guideline is outdated and potentially unsafe. A ramp with a 1:6 maximum slope, while perhaps not independently usable by all individuals who use wheeled mobility devices, nonetheless presents a safer and more usable method of boarding and alighting for most mobility device users. Indeed, a recent peer-reviewed transportation study validated the efficacy of 1:6 ramps in reducing ramp-related incidents and accidents on non-rail transit vehicles.<sup>12</sup> This study found that the odds of a passenger using a wheeled mobility device having a ramp-related incident were 5.4 times greater when the ramp slope exceeded 1:6, and the odds of needing assistance were almost as great.

The 2016 Non-Rail Vehicle Guidelines thus require the running slope of ramps in non-rail vehicles used for deployment to roadways or curb-height bus stops to be no steeper than 1:6. However, the text of the provision has been modified to address commenters’ concerns about the difficulty of achieving 1:6 ramp slopes under all deployment conditions.

In the 2010 NPRM, the proposed rule simply established a 1:6 maximum slope for ramps deployed to roadways or curb-height bus stops; the provision did not, on its face, specify whether this maximum applied to a ramp’s designed capability (i.e., ramp must be capable of achieving a 1:6 maximum slope when deployed to the roadway or a curb-height bus stop) or to actual deployments in the field (i.e., ramp cannot be steeper than 1:6 regardless of local conditions under which it is being deployed). See 2010 NPRM, T303.8.1. Several commenters—including some who otherwise supported the proposed 1:6 ramp slope standard—expressed concern that local conditions sometimes make achieving a 1:6 ramp slope particularly challenging or even impossible. These commenters urged the Board to add an exception that would expressly permit steeper ramp slopes when necessary due to local conditions, such as a narrow sidewalk

<sup>12</sup> See Karen L. Frost, et al., *Ramp-Related Incidents Involving Wheeled Mobility Device Users During Transit Bus Boarding/Alighting*, 96 J. Physical Med. & Rehabilitation 928–33 (2015).



abutting a building in an urban setting, a roadside ditch in a rural area, or an excessive road crown.

To address these concerns, the provisions in the final rule specifying the maximum ramp running slopes for non-rail vehicles (*i.e.*, T402.8 and its two subsections) have been revised to clarify that the specified ramp slope requirements are design standards only. For example, T402.8.1 in the final rule states that, for ramps deployed to roadways or curb-height bus stops, the 1:6 maximum is a design standard that requires such ramps to be capable of achieving this requirement only when the vehicle is resting on a flat surface and the ramp is deployed to ground level. This revision aims to clarify that, although vehicle ramps may be deployed under various roadway and environmental conditions, measurement (and assessment) of compliance with the 1:6 maximum slope requirement is to be taken under one condition *i.e.*, when the bus is on a flat (level) surface, not on a crowned roadway or any other sloping surface. Typically, these ramp slope measurements will be made in the factory or testing laboratory prior to delivery to the field or, after a ramp is serviced, in the transit agency's maintenance facilities. We believe that these modifications to the final rule text address commenters' concerns that measurements would be affected by roadway conditions.

#### *Clear Width of Circulation Paths and Maneuvering Clearances at Wheelchair Spaces*

In the 2010 NPRM, the Access Board proposed specific minimum dimensions for the clear width of circulation paths within non-rail vehicles, as well as maneuvering clearances at wheelchair spaces. For the reasons discussed below, these proposals have not been retained in the final rule. Instead, pending further research, the 2016 Non-Rail Vehicle Guidelines retain the approach in the existing guidelines by requiring "sufficient clearances" for passengers who use wheelchairs to move between accessible doorways and wheelchair spaces, and to enter and exit wheelchair spaces. *See* T504.1; *see also* 36 CFR 1192.23(a), 1192.159(a)(1) (existing requirements for clearances for passengers who use wheelchairs).

Since the initial issuance of the existing guidelines in 1991, various parties—including individuals with disabilities, transit operators, and vehicle manufacturers—have requested guidance on the meaning of "sufficient clearances." Questions about clearances arose in the context of circulation paths that connect accessible doorways and

wheelchair spaces, as well as maneuvering spaces at wheelchair positions, which, on buses, OTRBs and vans, are typically confined on three sides by seats, side walls, or wheel wells.

Over the course of this rulemaking, the Access Board has attempted to clarify the meaning of "sufficient clearances" by proposing specific dimensions for the clear width of circulation paths and maneuvering clearances at wheelchair spaces, as well as more clearly specifying the obligation to ensure that features along circulation paths—particularly in the front vestibule of buses (where stanchions or fare collection devices tend to be located)—do not interfere with the maneuvering of wheelchairs or other mobility devices. For example, in the 2007 Draft Revised Guidelines, the Board proposed a fixed metric for the minimum clear width of circulation paths (36 inches), as well as maneuvering clearances of 6 inches (for front or rear entry wheelchair spaces) or 12 inches (for side entry wheelchair spaces) when wheelchair spaces are confined on three sides. *See* 2007 Draft Revised Guidelines, §§ 1192.23(a)(2), 1192.23(d)(2). These clearances were in addition to the requisite 30 inch by 48 inch minimum clear floor space for each wheelchair space. The 2007 draft also proposed guidelines for clearances at turns (such as the turn needed at the front of a bus) along circulation paths. *Id.* § 1192.23(a)(2).

Many commenters to the 2007 Draft Revised Guidelines were critical of these new proposals for maneuvering clearances at wheelchair spaces and the clear width of circulation paths.<sup>13</sup> Accordingly, in the 2008 Draft Revised Guidelines, the Access Board modified the proposed requirements for maneuvering clearances and clear width of circulation paths. The proposed additional clearances for maneuvering in or out of wheelchair spaces were trimmed by 1 inch (front or rear entry wheelchair spaces) and 6 inches (side entry wheelchair spaces) respectively. *See* 2008 Revised Draft Guidelines, Sections T402.4.1, T402.4.2. The proposed minimum clear width of circulation paths was also decreased to

34 inches. *Id.* at Section T502.2.

Additionally, the 2008 Draft Revised Guidelines did not retain the proposal for maneuvering clearances at turns; instead, the 2008 draft proposed a more general requirement that features on circulation paths should not interfere with the maneuvering of wheelchairs. *Id.* at T502.3.

In the 2010 NPRM, the proposed requirements for maneuvering clearances at wheelchair spaces and minimum clear width of circulation paths mirror the proposals in the 2008 Draft Revised Guidelines. *See* 2010 NPRM, Sections T402.4.1, T402.4.2 & 502.5. Additionally, the 2010 NPRM sought comment on a number of issues related to the proposed rule, including sufficiency of the proposals to meet the needs of persons with disabilities, feasibility of proposed clearances on different vehicle types and models, potential seat loss, and views on establishment of performance standards for passengers who use wheelchairs related to movement within vehicles and entry/exit from securement locations. *See* 2010 NPRM, 75 FR at 43751, Question Nos. 7–12.

Commenters' reactions to the proposed specifications in the 2010 NPRM for maneuvering clearances and clear width of circulation paths were decidedly mixed. The disability community, while generally applauding the Board's effort to replace the approach in the existing guidelines (*i.e.*, "sufficient clearances") with quantified minimum clearances, nonetheless expressed some skepticism that such clearances would be adequate to accommodate all types of mobility devices, particularly larger wheelchairs.

Reaction from the public transit community was, on the other hand, solidly opposed to the proposed specifications for minimum clear width of circulation paths and maneuvering clearances at wheelchair spaces. APTA and a large transit agency expressed support for the proposed clearance for side entry wheelchair spaces, but also noted that this clearance could result in some (unspecified) seat loss. Otherwise, the transit community uniformly opposed the clearances proposed in the 2010 NPRM. Several transit agencies submitted detailed drawings demonstrating that the proposed maneuvering clearances would, depending on various factors (*e.g.*, vehicle type, model, and seating layout), have significant consequences, such as: Elimination of some models of non-rail vehicles or costly redesign of others, seat loss, discontinuation of flip up seats at wheelchair spaces, or procurement of more expensive seating

<sup>13</sup> For example, several commenters stated that the proposed additional clearances would result in a significant reduction in seating capacity. *See* U.S. Access Board, Discussion of [2008] Revisions, <https://www.access-board.gov/guidelines-and-standards/transportation/vehicles/update-of-the-guidelines-for-transportation-vehicles/revised-draft-of-updated-guidelines-for-buses-and-vans/discussion-of-revisions>. Additionally, commenters submitted floor and seating plans showing that a 36-inch wide circulation path was not feasible for some vehicle models or seating layouts. *Id.*

equipment. Providers of paratransit services also urged the Board to exempt cutaway vehicles (minibuses) used for paratransit because their small size would make compliance difficult, result in loss of wheelchair spaces, or necessitate purchase of larger vehicles. There was broad support among the transit community for development of performance standards for onboard clearances for passengers who use wheelchairs.

Several bus manufacturers echoed the view that, for some bus models, compliance with the proposed requirements would require modification of designs and seating plans. One manufacturer noted some models of large buses might lose up to two seats for every side entry wheelchair space extended to meet the proposed 54-inch clearance. Another manufacturer submitted drawings showing that the proposed 34-inch minimum clear width for circulation paths would result in the loss of 10–14 seats per vehicle, depending on the model of bus. Manufacturers also noted concerns about design constraints due to current axle designs, noise level specifications, and wheel well strength requirements. There was strong support among bus and van manufacturers for establishment of performance standards.

Lastly, a university-based transportation research center stressed that development of suitable dimensions for maneuvering clearances and clear width of circulation paths on transit buses depended on multiple inter-related factors, including: Types of mobility devices, orientation of nearby seats, and relationship of wheelchair spaces to adjacent elements. Because of the complex relationship between these factors, the research center urged the Access Board to first undertake an in-depth study to better understand their interplay before promulgating criteria for clearances—criteria which, in their view, should be performance based, rather than prescriptive, to provide flexibility and foster innovation.

After careful consideration of commenters' views, the Access Board has determined that enumeration of dimensions for clearances is not advisable at this time. Ensuring that passengers who use wheelchairs and other mobility devices can safely and easily move from doorway to wheelchair space, as well as into and out of the securement system at that space, is a complex challenge that, as commenters rightly note, calls into play numerous variables and considerations. Throughout the course of this rulemaking, dating from the 2007 Revised Draft Guidelines through the

2010 NPRM, the Board has attempted to provide better guidance on the meaning of “sufficient clearances”—as provided in the existing guidelines—by proposing various minimum dimensions for maneuvering clearances at wheelchair spaces and clear width of circulation paths. Each iteration of these regulatory proposals, however, has been met with mixed reviews. Commenters made plain that a “one size fits all” approach—such as the establishment of specific minimum dimensions for clearances in the proposed rule—might provide modest benefits to some passengers who use wheelchairs or other mobility devices, but would also come at a steep cost in terms of vehicle redesign or seat loss. There was also uniform agreement that, given the complex interplay of factors, performance standards for onboard circulation of passengers who use wheelchairs would be useful and preferable.

However, while there are ongoing research studies aimed at improving the interiors of transportation vehicles for passengers who use mobility aids, the current state of information does not provide a sufficient basis for development of performance standards. The Board is hopeful that these ongoing research efforts will help to inform future rulemaking efforts. For example, the Rehabilitation Engineering Research Center on Accessible Public Transportation (RERC–APT) is conducting human factors research on boarding and disembarking vehicles by passengers with disabilities, as well as improved vehicle interiors, which may provide some of the evidentiary bases needed for the development of performance standards.<sup>14</sup>

In the meantime, however, the 2016 Non-Rail Vehicle Guidelines do not specify a minimum clear width for accessible circulation paths or maneuvering clearances at wheelchair spaces. Instead, the final rule retains the existing requirement that the clear width of accessible circulation paths must be sufficient to permit passengers using wheelchairs to move between accessible doorways and wheelchair spaces, and to enter and exit wheelchair spaces.

<sup>14</sup> RERC–APT is a partnership between the Robotics Institute at Carnegie Mellon University and the Center for Inclusive Design and Environmental Access (IDeA Center) at the School of Architecture and Planning, University at Buffalo, The State University of New York, and is funded by the National Institute on Disability, Independent Living, and Rehabilitation Research. Information on the RERC on Accessible Public Transportation is available at: <http://www.rercapt.org/>.

#### IV. Summary of Comments and Responses on Other Aspects of the Proposed Rule

Overall, the Access Board received about 100 written comments to the 2010 NPRM, including those received during the reopening of the comment period in the fall of 2012 to address issues related to ramp designs. In addition to comments received on the major issues discussed in the preceding section, commenters also expressed views on a variety of other matters related to the proposed rule. The Access Board's response to significant comments on these other matters are discussed below on a chapter-by-chapter basis following the organization of the final rule. Also addressed below are requirements in the final rule that have been substantively revised from the proposed rule. Provisions in the final rule that neither received significant comment nor materially changed from the proposed rule are not discussed in this preamble.

##### A. Format and Organization

As noted previously, the formatting and organization of the 2016 Non-Rail Vehicle Guidelines differs significantly from the existing guidelines. The new format organizes the revised scoping and technical guidelines for buses, OTRBs, and vans into seven chapters, all of which are contained in a new appendix to 36 CFR part 1192. This organization is consistent with the approach used by the Access Board since the issuance of its Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines in 2004. The 2016 Non-Rail Vehicle Guidelines use a modified decimal numbering system preceded by the letter “T” to distinguish them from other existing guidelines and standards. Main section headings are designated by three numbers (e.g., T101, T102, etc.). Under each main section heading, the text of the guidelines is organized by section levels. The first section level is designated by a two-part number consisting of the number used for the main section heading followed by a decimal point and a consecutive number (e.g., T101.1, T101.2, etc.). The second section level is designated by a three-part number consisting of the two-part number assigned to the first level section followed by a decimal point and a consecutive number (e.g., T101.1.1, T101.1.2, etc.).

Additionally, as part of its efforts to update its transportation vehicle guidelines, the Access Board has endeavored to write the 2016 Non-Rail Vehicle Guidelines in terms that make its requirements easier to understand.

As a consequence, most of the revisions in the final rule are editorial only, and merely restate existing guidelines in plainer language.

Commenters to the 2010 NPRM generally applauded the Access Board's efforts to revise the existing guidelines, including the format and organization of the proposed rule. Several commenters also praised the proposed rule as providing a much needed "refresh" of the existing guidelines, which were last amended in 1998. Some commenters did suggest that certain provisions would benefit from clarification or a retooled format. In response to such comments, many provisions in the 2016 Non-Rail Vehicle Guidelines have been consolidated, renumbered, or relocated. Even still, most of the scoping and technical requirements in the 2016 Non-Rail Vehicle Guidelines remain substantively the same as the existing guidelines, with changes in wording being editorial only. A side-by-side comparison of the 2016 Non-Rail Vehicle Guidelines and the existing guidelines is available on the Access Board's Web site ([www.access-board.gov](http://www.access-board.gov)). Unless otherwise noted, section numbers cited below refer to provisions in the 2016 Non-Rail Vehicle Guidelines.

#### *B. Chapter 1: Application and Administration*

Chapter 1 contains provisions on the application and administration of the 2016 Non-Rail Vehicle Guidelines. Only the definitions section in this chapter received comments.

##### T103 Definitions

In the 2010 NPRM, the Access Board proposed to remove several outdated or redundant definitions in the existing guidelines, including the definition of the term "common wheelchairs and mobility aids." Three transit agencies recommended that the Access Board retain this definition in the final rule, while another urged the Board to work with the Department of Transportation (DOT) to update the definition of "wheelchair" in DOT's own regulations for ADA-covered vehicles. One transit agency described the term as serving as a "reliable measure" for transit operators.

The Access Board believes that commenters' concerns about removal of this term from the transportation vehicle guidelines are misplaced. Deletion of the phrase "common wheelchair and mobility aids" will not leave transit agencies or others without guidance on what constitutes a "wheelchair" or other mobility aid. Rather, the practical effect of removing this definition means

that the 2016 Non-Rail Vehicle Guidelines will, instead, look to the definition of "wheelchair" in DOT's regulations for ADA-covered transportation vehicles. See T103.2 (providing that undefined terms, if expressly defined in DOT regulations, shall be interpreted according to those meanings). DOT's definition of "wheelchair," in turn, is similar to the definition of "common wheelchairs and mobility aids" in the existing guidelines, with the exception that its definition does not provide spatial and weight specifications for wheelchairs or mobility aids. Compare 49 CFR 37.3 (DOT definition of "wheelchair") with 36 CFR 1192.3 (definition of "common wheelchairs and mobility aids" in existing guidelines).<sup>15</sup>

The Board is aware that some transit agencies have, in the past, used the definition of "common wheelchairs and mobility aids" inappropriately to exclude certain wheelchairs and mobility devices from buses or vans, even when such devices could be accommodated within the vehicle. To the extent transit agencies are concerned that deletion of this definition in the Access Board's transportation vehicle guidelines will mean they can no longer determine what size wheelchairs or mobility devices are eligible for bus service, existing DOT regulation already address this issue: "The entity may not deny transportation to a wheelchair or its user on the ground that the device cannot be secured or restrained satisfactorily by the vehicle's securement system." 49 CFR 36.165(d). If DOT wishes to include a definition for "common wheelchair" in its regulations for other reasons, DOT can certainly do so. Comments on this subject should be directed to DOT when it commences a rulemaking to update its own regulations for ADA-covered transportation vehicles.

To provide clarity and consistency, several new terms have also been added to the definitions section (T103) in the 2016 Non-Rail Vehicle Guidelines. These terms are: Boarding platform, fixed route service (or fixed route), large transit entity, large non-rail vehicle, small non-rail vehicle, and non-rail vehicle. Generally speaking, these terms (or their related concepts) were present in the proposed rule, but appeared in

scattered scoping or technical provisions. For convenience and clarity, these terms are now centrally defined in T103. Each term is briefly discussed below.

"Boarding platform" is a new term for which definition was needed because the final rule, for the first time, addresses accessibility requirements for level boarding bus systems. A "boarding platform" is defined as a platform "raised above standard curb height in order to align vertically with the transit vehicle entry for level boarding and alighting." (Though not expressly defined, the 2010 NPRM used the term "station platform" in the context of requirements for level boarding bus systems.)

"Fixed route" is defined in the 2016 Non-Rail Vehicle Guidelines because the existing definition (which is incorporated from DOT regulations) references "fixed route systems," whereas the final rule refers to fixed route "services" or simply "fixed routes." In all other respects, the definition of "fixed route" has the same meaning as the existing guidelines.

The term "large transit entity" has been added in order to simplify the scoping and technical requirements for automated announcement systems, but it does not alter their meaning or application. As before, only public transportation providers that operate 100 or more buses in annual maximum service for all fixed route bus modes, as reported to the National Transit Database, are subject to the automated announcement system requirement.

"Large non-rail vehicle" and "small non-rail vehicle" had previously been defined in Chapter 2's scoping provisions. For clarity, these "definitions" were moved to the definitions section in the final rule. In all respects, however, the terms have the same meaning as in the proposed rule. "Large non-rail vehicles" are vehicles more than 25 feet in length, as measured from standard bumper to standard bumper, and "small non-rail vehicles" are vehicles equal to or less than 25 feet in length. In the existing guidelines, 22 feet is the maximum length for small vehicles. A manufacturer noted, in response to the 2010 NPRM, that newer van designs have safety bumpers and frontal crash protection features that increase the vehicle length beyond 22 feet, but provide no additional passenger space. Consequently, while their currently available production models of vans and small buses qualify as large vehicles under the existing 22-foot threshold, compliance with certain accessibility requirements applicable to large vehicles (e.g., provision of two

<sup>15</sup> Specifically, "common wheelchairs and mobility aids" is defined as follows in the Access Board's existing guidelines: "[Any device] belonging to a class of three or four wheeled devices, usable indoors, designed for and used by persons with mobility impairments which do not exceed 30 inches in width and 48 inches in length, measured 2 inches above the ground, and do not weigh more than 600 pounds when occupied." 36 CFR 1192.3.

wheelchair spaces) is not practical due to limited interior space. This commenter recommended that the Access Board increase the threshold for distinguishing between small and large vehicles from 22 feet to 25 feet. The Access Board believes this commenters' concerns are well taken, and, accordingly, has increased the size threshold for large non-rail vehicles in the final rule. The Board does not expect this change to have a cost impact. Rather, this revision to the regulatory definition of "large non-rail vehicle" is only intended to address the problem of small vans or buses being inadvertently "reclassified" as large vehicles due to exterior safety features that increase a vehicle's bumper-to-bumper length without any accompanying expansion of interior passenger space.

Lastly, a definition of "non-rail vehicle" has been added to the final rule to clarify that this term, when used in the context of the 2016 Non-Rail Vehicle Guidelines, is intended to collectively refer only to those types of transportation vehicles that are addressed in these revised guidelines—namely, buses, OTRBs, and vans. By so defining "non-rail vehicle" in the final rule, potential confusion is avoided with the far broader definition of the term in DOT's existing regulations for ADA-covered transportation vehicles, which includes, among other things, public rail transportation. *See* 49 CFR 37.3.

### C. Chapter 2: Scoping Requirements

Chapter 2 in the 2016 Non-Rail Vehicle Guidelines has been substantially reorganized to present a more simplified approach. Whereas nearly all scoping provisions for buses, OTRBs, and vans in the 2010 NPRM were "nested" as subsections to a single section (former T203), in the final rule, each discrete feature or set of related requirements—such as, steps (T203), doorways (T204), illumination (T205), and handrails, stanchions, and handholds (T206)—has been assigned its own scoping section. Some scoping provisions have also been editorially revised for clarity. While the Access Board believes the modifications to the organization and text of provisions in Chapter 2 represent improvements, none of these changes were intended to alter the substantive scope of the final rule.

With the exception of the scoping requirements for automated announcement systems, relatively few commenters to the 2010 NPRM addressed the scoping provisions. Most matters raised by commenters related to

scoping for the automated announcement system requirement are discussed above in Section III (Major Issues), and will not be repeated here. However, there remain a few scoping-related matters raised by commenters that have not been previously addressed, and these matters are discussed below. Significant comments on other proposed scoping provisions are also discussed in this section.

#### T201 General

Buses, OTRBs, and vans acquired or remanufactured by entities covered by the ADA must comply with the scoping requirements in Chapter 2 to the extent required by DOT's implementing regulations for ADA-covered transportation vehicles, which, when revised, are required to use the 2016 Non-Rail Vehicle Guidelines as minimum accessibility standards. Two transit agencies and a bus manufacturer expressed concern about, or requested clarification of, the application of the requirements in the final rule to existing or remanufactured non-rail vehicles. Implementation and enforcement of the 2016 Non-Rail Vehicle Guidelines is within the sole authority of DOT, not the Access Board. The Access Board is statutorily tasked under the ADA with establishing minimum guidelines for the accessibility of ADA-covered transportation vehicles. Whether DOT ultimately elects to make its regulations applicable to then-existing ADA-covered vehicles, and, if so, to what extent, remains within the sole province of that agency. Consequently, compliance with the 2016 Non-Rail Vehicle Guidelines is not required until DOT adopts these guidelines as enforceable accessibility standards.

#### T202 Accessible Means of Boarding and Alighting

All buses, OTRBs, and vans covered under the 2016 Non-Rail Vehicle Guidelines must provide at least one means of accessible boarding and alighting that serves all designated stops on the assigned route to which the vehicle is assigned. These vehicles must also provide access to the roadway in the event passengers must be offloaded where there is no platform or curb. Provision of accessible boarding and alighting may be accomplished through the use of ramps and bridgeplates, lifts, or level boarding and alighting systems that meet the technical requirements in Chapter 4. Accessibility requirements for level boarding bus systems are new to the 2016 Non-Rail Vehicle Guidelines because the advent of such transit systems (e.g., bus rapid transit systems) post-dated the issuance of the existing

guidelines in 1991. Only two commenters expressed views on this scoping section, and both supported the Access Board's inclusion of requirements for level boarding bus systems.

#### T206 Handrails, Stanchions, and Handholds

The 2016 Non-Rail Vehicle Guidelines, as with the existing guidelines, require handrails, stanchions, or handholds to be provided at passenger doorways, fare collection devices (where such devices are otherwise provided), and along onboard circulation paths. Large non-rail vehicles must generally provide stanchions or handholds on forward- and rear-facing seat backs. Handrails, stanchions, and handholds must comply with the technical requirements in T303.

In response to three separate comments from a bus manufacturer, seating manufacturer, and transit agency, the text of T206 has been revised and an exception for high-back seats, such as those often found on OTRBs, has been added. The text revisions clarify that, where stanchions or handholds are provided on front- and rear-facing seat backs, they must be located adjacent to the aisle so that passengers may use them when moving between aisles and seats. The new exception provides that, for high-back seats, overhead handrails are permitted in lieu of stanchions or seat-back handholds.

#### T207 Circulation Paths

As a matter of clarification, the proposed rule specified that, where doorways are provided on one side of a non-rail vehicle, an accessible circulation path must connect each wheelchair space to at least one doorway with accessible boarding and alighting features. *See* 2010 NPRM, Section T203.4.2. Where doorways are provided on two sides of a vehicle, the proposed rule provided that an accessible circulation path must connect each wheelchair space to at least one doorway with accessible boarding and alighting features located on each side of the vehicle. *Id.* Additionally, the proposed rule provided that an accessible circulation path must connect each wheelchair space to at least one accessible doorway (*i.e.*, a doorway from which an accessible boarding and alighting feature can be deployed to the roadway). *Id.*

The Access Board received several comments from disability rights organizations and individuals with disabilities in support of this clarifying

language, and no commenters expressed disagreement with this approach. The 2016 Non-Rail Vehicle Guidelines retain this clarification on the scoping for circulation paths.

#### T210 Wheelchair Spaces

Under the 2016 Non-Rail Vehicle Guidelines, large non-rail vehicles must provide at least two wheelchair spaces, and small non-rail vehicles must provide at least one wheelchair space. Wheelchair spaces must also be located as near as practicable to doorways that provide accessible boarding and alighting features and comply with the technical requirements in T602. The requirements remain unchanged from the proposed rule.

A van manufacturer suggested, in response to the 2010 NPRM, that the Access Board add language in the final rule that would allow additional spaces, even if they do not meet the minimum required dimensions. The Board declines to add this requested text. Additional wheelchair spaces are already permitted under the existing guidelines, and the same language has been carried over into the 2016 Non-Rail Vehicle Guidelines. *See* T210.3. (“Small non-rail vehicles shall provide *at least one* wheelchair space complying with T602.”) (emphasis added). Neither the existing guidelines nor the revised guidelines in the final rule preclude additional wheelchair spaces beyond the minimum, but they do require each space—for safety reasons—to provide compliant securement systems, as well as seat and shoulder belts.

#### T211 Wheelchair Seurement Systems

Wheelchair securement systems complying with the technical requirements in T603 must be provided at each wheelchair space. The Access Board received several comments on the proposed technical provisions addressing wheelchair securement systems, and these comments are discussed under Chapter 6.

#### T213 Seats

The 2010 NPRM proposed that non-rail vehicles operating in fixed route systems be required to designate at least two seats as priority seats for passengers with disabilities. *See* 2010 NPRM, Section T203.10.1. The priority seats must be located as near as practicable to a doorway used for boarding and alighting. This is similar to the requirement that wheelchair spaces be located as near as practicable to a doorway used for boarding and alighting. Where aisle-facing seats and forward-facing seats are provided, at

least one of the priority seats must be forward facing.

Comments were received from a bus manufacturer and a transit operator seeking clarification whether flip up seats used in wheelchair spaces could also be designated as priority seats. There is nothing in the 2016 Non-Rail Vehicle Guidelines that prohibits such an approach. The same bus manufacturer also sought clarification concerning whether aisle-facing priority seats must be provided, even if none are near a doorway. When there is one or more aisle-facing seats on a fixed route non-rail vehicle, at least one of these seats must be designated as a priority seat. If there is only one aisle-facing seat on a fixed route non-rail vehicle, then that seat must be designated as a priority seat regardless of its location. If, however, a fixed route non-rail vehicle has more than one aisle-facing seat, then the transit operator has the discretion to designate as a priority seat whichever aisle seat it deems “as near as practicable” to a passenger doorway.

#### T215 Communication Features

The scoping provisions for communication features address a number of different areas, including: Signs or markers for priority seats, identification of wheelchair spaces and doorways that provide accessible means of boarding and alighting with the International Symbol of Accessibility, provision of exterior route or destination signs, and automated announcement systems on large non-rail vehicles that operate in fixed route service with multiple designated stops.

In the 2010 NPRM, the scoping requirements for communication features were scattered throughout Chapter 2. In the 2016 Non-Rail Vehicle Guidelines, all scoping requirements related to communication features have been reorganized and consolidated under a single section, T215. Other than this reorganization and some minor editorial changes to the text of certain provisions to improve clarity, the scoping provisions in the 2016 Non-Rail Vehicle Guidelines for communication features are the same as in the proposed rule.

With respect to signage for priority seats, the 2010 NPRM proposed that priority seats for passengers with disabilities be identified by signs informing other passengers to make such seats available for passengers with disabilities. These signs would be required to comply with the technical requirements in T702. (Section T702, in turn, addresses such matters as character style and height, line spacing, and contrast.) *See* 2010 NPRM, Sections

T203.10.2, T702. No commenters expressed disagreement with these scoping provisions. However, several persons with disabilities noted their frustration that priority seats on buses are often occupied by passengers who may not need them or filled with other passengers’ personal belongings (such as packages or strollers), and urged the Access Board to address this issue in the final rule.

While the Board acknowledges that ensuring the availability of priority seats for passengers with disabilities is a frequent problem, resolution lies beyond this final rule. This is a programmatic and service issue that falls outside the Access Board’s jurisdiction and, in any event, is a matter best left to DOT and transit operators. Disabilities are not always visible or apparent, and it can be difficult to discern whether a passenger has priority to use a designated seat. The requirement for signage at priority seats is aimed at helping to ensure that people with disabilities have priority use of these seats. However, there is nothing in the 2016 Non-Rail Vehicle Guidelines (or, for that matter, current DOT regulations) requiring other passengers to make the seats available, or mandating that vehicle operators make passengers move from priority seats when, in their view, such passengers do not need them. Nonetheless, transit operators are encouraged to make efforts, as appropriate for their systems and localities, to ensure that priority seats are available for passengers with disabilities when needed.

Section T215 in the 2016 Non-Rail Vehicle Guidelines also establishes several new communication-related scoping requirements for OTRBs. These new provisions, as applied to OTRBs, relate to: Identification of priority seats (with signs) and wheelchair spaces and accessible doorways (with the International Symbol of Accessibility) (T215.2.1, T215.2.2, and T215.2.3); exterior route or destination signs (T215.2.4); public address systems (T215.3.1); and stop request systems (T215.3.3). While these requirements are new to OTRBs, they have all been in effect for buses and vans since the existing guidelines were first promulgated in 1991. No comments were received on these scoping provisions as newly applied for OTRBs. The expected costs for these new OTRB requirements are discussed below in Section V.A (Regulatory Process Matters—Final Regulatory Assessment (E.O. 12866)).

Lastly, T215.3 in the 2016 Non-Rail Vehicle Guidelines sets forth scoping

requirements for announcement systems on large non-rail vehicles operating in fixed route service that stop at multiple designated stops. These requirements address: Public address systems, stop request systems, and automated route identification and stop announcement systems. The Access Board received a substantial number of comments relating to the issue of whether large transit agencies should be required to equip their large fixed route buses with automated announcement systems, and these comments are addressed above in Section III (Major Issues). Several other commenters sought clarification on how this requirement would apply in particular settings. These comments are discussed below.

First, a large transit agency, while noting that its fixed route bus fleet was already equipped with automated announcement systems, nonetheless expressed concern about the cost of complying with the automated announcement system requirement to the extent it would apply to its small fleet of large paratransit vehicles, which do not have such equipment installed. This commenter urged the Access Board to expressly exempt paratransit vehicles from the automated announcement system requirement. The Board declines to adopt this suggestion because no such exception is needed. By its terms, the automated announcement system requirement applies only to large non-rail vehicles operating in fixed route service with multiple designated stops. See T215.3, T215.3.2, and T215.4. Fixed route service, in turn, is defined as “[o]peration of a non-rail vehicle along a prescribed route according to a fixed schedule.” T103. Paratransit service, by nature, does not operate on either prescribed routes or fixed schedules. Accordingly, paratransit service does not qualify as “fixed route service,” and, therefore, is not subject to the automated announcement system requirement.

Second, a state-wide association of transit managers asked the Access Board to clarify how the VOMS 100 threshold applies to contractors that provide fixed route bus service for public transit agencies. “Large transit entity,” which is a newly defined term in T103, refers to providers of public transportation services that “operat[e] . . . 100 or more buses in annual maximum service for all fixed route service bus modes collectively, through either direct operation or purchased transportation.” Thus, for purposes of determining whether a transit operator is a “large transit entity” subject to the automated announcement system requirement, both directly operated and purchased

(*i.e.*, contracted) transportation services “count” towards the VOMS 100 threshold. This approach is consistent with DOT’s current accessibility standards for ADA-covered transportation vehicles, which specify that public entities entering into contractual arrangements with private entities for provision of fixed route service must ensure that the private entity satisfies the same accessibility requirements that would be applicable as if the public entity directly provided that same service. See 49 CFR 37.23; see also 49 CFR 37.3 (defining the term “operates” to include both directly operated and purchased transportation services).

Third, a number of commenters, including APTA and several transit agencies, sought clarification concerning application of the automated announcement system requirement to existing buses. APTA stressed that restricting the scope of this requirement to new (or newly acquired) buses was important to ensure that large transit agencies that do not yet have automated announcement systems would be able to acquire needed equipment through their regular procurement cycles, and smaller transit agencies nearing the VOMS 100 threshold were not inadvertently limited from expanding their fixed route service.

As discussed at the outset of this section (*see* T201 Scope), determining whether (or to what extent) the automated announcement system requirement will apply to existing buses falls within the purview of DOT, not the Access Board. The 2016 Non-Rail Vehicle Guidelines, as with our existing guidelines, establish minimum accessibility guidelines for buses, OTRBs, and vans acquired or remanufactured by entities covered by the ADA. See T101.1, T201.1. These revised guidelines, however, only become enforceable standards upon adoption by the Department of Transportation (DOT). Whether DOT elects to make its regulations applicable to then-existing ADA-covered transportation vehicles, and, if so, to what extent, remains within its sole discretionary authority. Consequently, views on the application of the automated announcement system requirement to existing buses are best directed to DOT, once it commences its own rulemaking to adopt the 2016 Non-Rail Vehicle Guidelines as enforceable accessibility standards. Regulated entities will not be required to comply with the 2016 Non-Rail Vehicle Guidelines until DOT completes its rulemaking efforts.

#### D. Chapter 3: Building Blocks

Chapter 3 in the 2016 Non-Rail Vehicle Guidelines has been significantly reorganized from the proposed rule. Chapter 3 in the 2016 Non-Rail Vehicle Guidelines contains the technical requirements related to three areas—walking surfaces (T302), handrails, stanchions, and handholds (T303), and operable parts (T304)—that formerly were located in a different chapter in the 2010 NPRM. See 2010 NPRM, Sections T802 (Surfaces), T804 (Additional Requirements for Handrails, Stanchions, and Handholds), and T805 (Operable Parts). While relatively few commenters addressed the proposed technical requirements in the 2010 NPRM relating to these three areas, some of these comments did lead the Board, as discussed below, to slightly revise the provisions in Chapter 3 of the final rule.

##### T302 Walking Surfaces

The technical requirements for walking surfaces include provisions on slip resistance, the maximum size of surface openings, and the maximum height of vertical surface discontinuities (*i.e.*, changes in level), with and without edge treatment. Exceptions are also provided for certain openings in wheelchair securement system components affixed to walking surfaces and for manual placement and removal of ramps and bridgeplates (as, for example, on small buses or vans in cases of emergency), as well as walking surfaces on steps that are not part of onboard passenger access routes.

With respect to slip resistance, a bus manufacturer urged the Access Board to incorporate specific measures for slip resistance (*i.e.*, maximum and minimum friction coefficients) in the final rule. The Board declines to adopt this recommendation. As with our other existing accessibility guidelines for the built environment and other areas, we do not specify in this rule any coefficients of friction because a consensus method for rating slip resistance still remains elusive. While different measurement devices and protocols have been developed over the years for use in the laboratory or the field, a widely accepted method has not yet emerged. Since rating systems are unique to the test method, specific levels of slip resistance can only be meaningfully specified according to a particular measurement protocol. Some flooring products are labeled with a slip resistance rating based on a laboratory test procedure.

Another commenter, a transportation research center, noted that the

wheelchair securement systems used in many non-rail vehicles—especially small buses and vans—are floor mounted and have openings that allow wheelchair tie downs to be attached using the openings. As a consequence, this commenter observed that most securement systems would not satisfy the proposed maximum opening in walking surfaces (*i.e.*, passage of a sphere no more than  $\frac{5}{8}$  inch or 16 mm in diameter). *See* 2010 NPRM, Section T802.3). To address this concern, an exception has been added to the final rule that allows a larger opening ( $\frac{7}{8}$  inch width maximum) for wheelchair securement system components affixed to walking surfaces, provided that, where such openings are greater than  $\frac{5}{8}$  inch in width, they visually contrast with the rest of the walking surface. *See* 2016 Non-Rail Vehicle Guidelines, T302.3, Exception 1. We do not, however, adopt this commenter's additional suggestion that wheelchair securement system components be exempted from the surface discontinuity requirements, which, in their view, was needed due to concerns about the commercial availability of products that meet this standard. We have identified several recessed or flush-mounted securement systems currently on the market that would comply with the requirements in the final rule. Accordingly, the final rule does not exempt wheelchair securement systems from compliance with the technical requirements for surface discontinuities in T302.4.

#### T303 Handrails, Stanchions, and Handholds

The technical requirements for handrails, stanchions, and handholds include specifications on edges, cross sections, and clearances (*i.e.*, space between gripping surface and adjacent surface). We received only one comment on the proposed technical requirements in the 2010 NPRM related to the cross section of seat-back handholds. In the 2010 NPRM, we proposed that gripping surfaces with circular cross sections (such as those used on seat-back handholds) have an outside diameter of  $1\frac{1}{4}$  inches minimum and 2 inches maximum. A seating manufacturer expressed concern that larger diameter handholds would result in significant industry-wide expense and lead to potential safety issues because greater rigidity would be less likely to absorb energy on impact. This commenter suggested that the Access Board instead harmonize with specifications for seat-back handholds in APTA's model bus procurement guidelines, which provide a  $\frac{7}{8}$  inch diameter (minimum) handhold

with quantification of minimum energy absorption for the seat back and handhold.<sup>16</sup> APTA's model bus procurement guidelines are well-established in the public transportation industry, and the Board is unaware of any concerns regarding the smaller seat-back handhold minimum specified in those guidelines. Accordingly, in the final rule, the Board has lowered the minimum dimension for seat-back handhold cross sections from  $1\frac{1}{4}$  inches (32 mm) to  $\frac{7}{8}$  inches (22 mm). *See* T303.3.1.

#### T304 Operable Parts

The technical requirements for operable parts in the 2016 Non-Rail Vehicle Guidelines remain the same as in the proposed rule; however, they have been slightly reorganized so that all requirements are consolidated into a single section, T304. The technical requirements for operable parts include provisions on height, location, and operation. Operable parts on fare collection devices serving passenger access routes, stop request systems, wheelchair spaces, and priority seats must comply with these technical requirements.

In the 2010 NPRM, the Access Board proposed to raise the minimum height of operable parts in non-rail vehicles from 15 inches to 24 inches. *See* 2010 NPRM, Section T805.2. A commenter to the 2008 Draft Revised Vehicle Guidelines noted that some operable parts—such as those on stop request devices—are small and difficult to reach for some transit users. To address the problem, the commenter suggested raising the specified minimum height for operable parts. No commenters objected to the revised minimum height (24 inches) for operable parts in the proposed rule. A transit agency did note that, based on a survey of its existing bus fleet, all operable parts on its buses were already mounted higher than 24 inches. Accordingly, the Access Board believes that compliance with this revised minimum height for operable parts—which has been retained in the final rule (*see* T304.2)—is unlikely to cause transit agencies to incur new costs or significantly alter existing practices.

#### E. Chapter 4: Boarding and Alighting

Chapter 4 in the 2016 Non-Rail Vehicle Guidelines, which sets forth the technical requirements for ramps and bridgeplates, accessible means of level boarding and alighting, lifts, and steps, has been significantly reorganized and

revised from the proposed rule. All technical provisions related to boarding and alighting—including level boarding bus systems and steps (which formerly appeared in Chapters 2 and 5 respectively in the proposed rule)—are now consolidated in this chapter. Several provisions have also been revised at the behest of commenters. Responses to comments on the Board's proposal in the 2010 NPRM to revise the technical requirements for the slope of ramps in non-rail vehicles by specifying a single standard (1:6) for maximum running slope applicable to ramps deployed to roadways or curb-height bus stops are discussed in Section III (Major Issues). Discussed below are significant comments on other technical requirements for ramps, bridgeplates, and lifts, as well as other revisions to Chapter 4 in the final rule. (We received no comments on two provisions in Chapter 4—Level Boarding and Alighting (T404) and Steps (T405)—which are unchanged from the 2010 NPRM.)

#### T402 Ramps and Bridgeplates

The technical requirements for ramps and bridgeplates in the 2016 Non-Rail Vehicle Guidelines include provisions on design load, installation and operation, emergency operation, surfaces, clear width, edge guards, running slope, transitions, visual contrast, gaps, and stowage. These technical requirements are organized in similar fashion to the proposed rule; they also remain the same substantively as in the proposed rule, with the exception of the requirements for maximum ramp running slopes. Section T402 has been slightly revised to clarify that the ramps and bridgeplate barriers must be a minimum height of 2 inches, but allows them to be reduced to less than 2 inches when they are within 3 inches of the boarding end of the device. This accommodates wheelchair users' need to turn as they enter and exit the ramp and reduces the likelihood that passersby will trip on the barrier.

The Access Board received several comments relating to technical specifications for the design load of ramps. In the 2010 NPRM, the Board proposed to retain the existing requirement that ramps and bridgeplates longer than 30 inches (as well as lifts) be required to have design loads of 600 pounds (273kg) minimum. *See* 2010 NPRM, T303.2. These commenters—including a transit agency, an advocacy organization, and two transportation research centers—urged the Board to update (*i.e.*, increase) the specified design loads for lifts and ramps because, over time, occupied wheeled mobility

<sup>16</sup> *See, e.g., APTA, Standard Bus Procurement Guidelines RFP 2013* § TS 78–13 (May 2013) (available on APTA Web site).



devices have gotten heavier (e.g., larger or more complex devices, growing obesity rates).

While the Board acknowledges the trend towards heavier wheeled mobility devices and other factors having a tendency to increase the weight of various potential ramp-based boarding and alighting scenarios, we do not believe a revision in the existing minimum design load for ramps and bridgeplates is advisable at this time. Additional research directed at evaluating design loads for ramps in buses and vans, as well as potential effects of increase in minimum design load on vehicle design or operation is needed. Moreover, it is also important that any potential revision of requirements for minimum design loads for ramps be coordinated with design loads for public lifts specified in the Federal Motor Vehicle Safety Standards (FMVSS), which are incorporated by reference in the technical specifications for lifts in the final rule. *See* 2016 Non-Rail Vehicle Guidelines, T403.1. The Board also notes that the design load specified in T403.1 is a minimum requirement. Ramp manufacturers and transit operators are free to develop and use ramps with increased design loads as they deem appropriate. Indeed, there are several commercially available ramp models that have rated load capacities that exceed 600 pounds.

A bus manufacturer commented that the Federal Motor Vehicle Safety Standards (FMVSS) permit marking of the sides of the barriers to indicate the surface boundaries and warn passersby of a tripping hazard. Nothing in the final rule prevents this additional high contrast marking.

#### T403 Lifts

The technical requirements for lifts have been substantially revised in the 2016 Non-Rail Vehicle Guidelines. In the 2010 NPRM, the technical requirements for lifts were set forth in five enumerated provisions, with one section (T302.5) having eleven subsections. *See* 2010 NPRM, Sections T302.1–T302.5. These provisions addressed design load, controls, manual operation, platform characteristics, gaps, threshold ramps, contrast, deflection, movement, boarding direction, standees, and handrails. *Id.* Several commenters, including transit operators and a bus manufacturer, expressed concern with certain aspects of these proposed technical provisions, including specifications for interior and exterior manual releases in the event of a power failure. These commenters urged the Access Board to instead reference existing standards for public vehicular

lifts set forth in the FMVSS, which are issued by the National Highway Traffic Safety Administration. *See* 49 CFR 571.403, 571.404.

After considering this recommendation, the Board has determined that the public lift standards in the FMVSS provide a similar level of accessibility relative to the proposed rule, and, as well, provide measurable testing requirements that ensure both accessibility and safety for lift users. Section T403 of the 2016 Non-Rail Vehicle Guidelines has thus been revised to incorporate the technical requirements for public use lifts specified in Standards 403 and 404 of the FMVSS, which are codified at 49 CFR 571.403 and 571.404. We do, however, carry forward the requirement from the proposed rule that lift platforms be designed to permit passengers who use wheelchairs to board the platforms facing either toward or away from the vehicle. The public lift standards in the FMVSS are silent on boarding direction, so this requirement is set forth in a separate, stand-alone provision in the final rule. *See* 2016 Non-Rail Vehicle Guidelines, T403.2.

#### F. Chapter 5: Doorways, Circulation Paths, and Fare Collection Devices

Chapter 5 in the 2016 Non-Rail Vehicle Guidelines contains the technical requirements for doorways, illumination at doorways and boarding and alighting areas, passenger access routes, and, where provided, fare collection devices. Chapter 5 has been significantly reorganized since the proposed rule, with two sections being moved out of this chapter and located elsewhere in the final rule (*i.e.*, former T505 addressing handrails, stanchions, and handholds moved to scoping provisions in Chapter 2, and former T504 addressing steps moved to Chapter 4), and two other sections, which were formerly housed in other chapters of the proposed rule, now being located in this chapter (*i.e.*, T503 Illumination, T505 Fare Collection Devices). The Board believes that this reorganization makes for a more cohesive presentation of the technical requirements in this chapter. Additionally, in the final rule, the technical requirements for vertical clearances at doorways with lifts or ramps and for illumination at doorway areas have been restated using text in lieu of the tabular formats in the proposed rule. *Compare, e.g.*, 2010 NPRM, Table T503.1 (Vertical Clearance at Doorways with Lifts or Ramps) and Table T803 (Areas Illuminated and Illuminance Levels) with 2016 Non-Rail Vehicle Guidelines, Sections T502 (Doorways) and T503 (Illumination).

Other provisions in this chapter have also undergone modest editorial changes aimed at clarifying or simplifying the regulatory text. Despite the foregoing organizational changes and editorial revisions to Chapter 5, the substance of the underlying technical requirements remains largely the same as in the proposed rule, with the exception of the requirements for passenger access routes.

#### T503 Passenger Access Routes

In the 2016 Non-Rail Vehicle Guidelines, passenger access routes (which were referred to as “accessible circulation paths” in the proposed rule) must provide clearances sufficient to permit passengers using wheelchairs to move between doorways with accessible boarding and alighting features and wheelchair spaces, and to maneuver in and out of wheelchair spaces. This requirement essentially mirrors the current provisions in the existing guidelines applicable to buses, OTRBs, and vans. *See* 36 CFR 1192.23(a) (“All [covered] vehicles . . . shall provide . . . sufficient clearances to permit a wheelchair or other mobility aid user to reach a securement location.”), 1192.159(a)(1) (establishing same requirement for OTRBs). In the 2010 NPRM, the Access Board proposed prescribing a specific dimensional standard (34 inches) for the clear width of passenger access routes. *See* 2010 NPRM, Section T502.2. For the reasons discussed previously, *see* Section III (Major Issues), the Board decided not to move forward with this proposal in the final rule. It is hoped that, in the near future, ongoing research on interior circulation on public transportation vehicles will yield a performance standard that will serve the needs of transit operators, bus and equipment manufacturers, and persons with disabilities alike. At present, however, no such performance standard exists that can be referenced in the final rule.

#### T504 Fare Collection Devices

Section T504 in the 2016 Non-Rail Vehicle Guidelines establishes specifications for the location of fare collection devices (to ensure that such devices do not impede wheelchair movement along passenger access routes), as well as their operable parts (to ensure such devices are reachable and usable by passengers with disabilities). These technical requirements mirror those proposed in the 2010 NPRM. However, the Access Board did not retain a proposed specification—which also appears in the existing guidelines for buses and vans—requiring fare collection devices, where

provided, to be located “as close to the dashboard as practicable.” See 2010 NPRM, Section T502.3; see also 36 CFR 1192.33 (“Where provided, the farebox shall be located as far forward as possible[.]”). This change recognizes the possibility that some bus systems may also provide fare collection devices at center or rear doors. Wherever located, however, fare collection devices must not interfere with passenger circulation.

A transit agency expressed concern that application of the requirements in this section, in conjunction with the maximum mounting height for operable parts specified in T304 (*i.e.*, operable parts cannot be located higher than 48 inches above the vehicle floor), would require fare collection devices to be mounted higher than the industry norm of 45 inches. The Access Board believes such concerns are misplaced, and has not modified the specified height range for operable parts on fare collection devices (or any other devices). Forty-eight inches is the *maximum* height at which parts intended for use by passengers may be located; it is not the required height for operable parts. Under the 2016 Non-Rail Vehicle Guidelines, operable parts may be located at any point within the specified range of 24 inches minimum and 48 inches maximum. Transit operators may thus continue to follow industry norm and mount fare collection devices such that their operable parts are located 45 inches above the vehicle floor.

#### G. Chapter 6: Wheelchair Spaces and Securement Systems

Chapter 6 in the 2016 Non-Rail Vehicle Guidelines establishes technical requirements for wheelchair spaces, wheelchair securement systems, and seat belts and shoulder belts provided for passengers who use wheelchairs. (In the 2010 NPRM, these provisions appeared in Chapter 4 of the proposed rule.) With the exception of two areas, this chapter has been neither significantly reorganized nor substantively revised from the proposed rule. The two areas in which the requirements in this chapter differ substantially from the proposed rule—wheelchair space maneuvering clearances and forward excursion barriers for rear-facing wheelchair containments systems—are detailed in Section III (Major Issues) above. Comments related to proposed technical requirements in these two areas are also discussed in that section, and are not repeated here. Discussed below are significant comments on other aspects of the technical requirements for wheelchair spaces and securement systems.

#### T602 Wheelchair Spaces

The technical requirements for wheelchair spaces include provisions on surfaces, approach, and size. Under the final rule, as with the existing guidelines, one full unobstructed side of each wheelchair space must adjoin or overlap a passenger access route. See T602.3. Wheelchair spaces must also be 30 inches minimum in width and 48 inches minimum in length. See T602.4. Because mobility devices vary widely in their respective dimensions and maneuverability, we note that it may be beneficial for transit operators to consider providing wheelchair spaces larger than this minimum size to meet the needs of all transit users.

An exception has been added to T602.4 in the final rule that permits the space occupied by wheelchair footrests to be located under an adjacent seat, provided that the space under such seat meets specified size requirements. See T602.4 Exception. This exception is also found in the existing guidelines. See 36 CFR 1192.23(d)(2) (providing that “[n]ot more than 6 inches of the required clear floor space [for wheelchair spaces in buses and vans] may be accommodated for footrests under another seat”), 1192.159(d)(2) (setting forth same exception for wheelchair spaces in OTRBs). Because the 2010 NPRM proposed additional maneuvering clearances for wheelchair spaces, this exception was not germane and, therefore, did not appear in the proposed rule. See 2010 NPRM, Section T402. However, since these proposed maneuvering clearances have not been retained in the final rule, this exception is once again needed to permit an overlap between wheelchair spaces and the space under adjacent seats, provided such overlap satisfies certain conditions.

#### T603 Wheelchair Securement Systems

The technical requirements in the 2016 Non-Rail Vehicle Guidelines for wheelchair securement systems include provisions on orientation, design load, movement, and rear-facing wheelchair securement systems. In the 2010 NPRM, with respect to requirements for orientation of wheelchair spaces and their accompanying securement systems, the Access Board essentially restated requirements in the existing guidelines: Wheelchair securement systems must secure a wheelchair so that the occupant is facing the front or rear of the vehicle (*i.e.*, no “side facing” securement is permitted), and, on large non-rail vehicles, at least one securement system must be forward

facing. See 2010 NPRM, Section 403.2 & Advisory T403.2 Orientation.

A joint comment submitted by a consortium of transportation research centers urged the Access Board, for safety reasons, to restrict rear-facing wheelchair securement systems to large or slower-moving vehicles, such as large intra-city transit buses. Based on this comment, the orientation requirement for wheelchair securement systems has been revised in the final rule. Section T603.2 establishes a general requirement that wheelchair securement systems must be front facing. A new exception to T603.2 permits rear-facing securement systems “on large non-rail vehicles designed for use by both seated and standing passengers,” provided that at least one other wheelchair securement system is front facing.

Two commenters also suggested that the Access Board clarify (or define) what “normal operating conditions” means in the context of the requirement that wheelchair securement systems limit movement of occupied wheelchairs. See 2010 NPRM, T403.4 (providing that wheelchair securement systems must limit movement of occupied wheelchairs when, among other things, “the vehicle is operating in normal conditions”). In the 2010 NPRM, the text of this proposed section was accompanied by an advisory that states, in pertinent part: “Normal operating conditions are specific to the area where the vehicle operates. Vehicles that operate in hilly terrain or on winding roads will have more severe constraints than those operating in flat areas.” See 2010 NPRM, Advisory T403.4 Movement. These advisory materials are posted on the Access Board’s Web site.<sup>17</sup> A similar advisory will accompany the text of T603.4 in the final rule, and will also be available on the agency’s Web site.

Additionally, a few commenters responded to Question 15 in the 2010 NPRM, which sought input on whether the Access Board should address four safety-related matters in subsequent rulemakings. See 2010 NPRM, 75 FR at 43753–54, Question No. 15. These recommendations related to: Potential incorporation of forthcoming standards on wheelchair tiedown and occupant restraint systems used in motor vehicles

<sup>17</sup> The Office of the Federal Register does not permit advisory materials to be published in the Code of Federal Regulations. Consequently, only the version of the proposed rule posted on the Access Board’s Web site includes advisory text and figures. The online version of the proposed rule, as well as other materials related to this rulemaking, can be found here: <https://www.access-board.gov/guidelines-and-standards/transportation/vehicles/update-of-the-guidelines-for-transportation-vehicles>.

(SAE Recommended Practice J2249 (June 1999)), wheelchair securement systems in small non-rail vehicles, movement under emergency driving conditions, and rear-facing compartmentalization.<sup>18</sup> Several commenters, including a joint comment submitted by a consortium of two transportation research centers, recommended that the Access Board should adopt the standards in SAE Recommended Practice J2249 (June 1999) for front-facing wheelchair securement systems. Several other commenters expressed views on compartmentalization of rear-facing wheelchair positions. A large transit agency encouraged the Access Board to consider addressing specifications for rear-facing compartmentalization, which, it believes, offers the benefits of increasing independent access, reducing occupational hazards for vehicle operators, and reduces dwell times. Two other commenters, including a disability rights organization and a transportation research center, noted safety concerns and a need for further study.

The Access Board appreciates the input provided by these commenters on these areas, and will take their views under advisement in future rulemakings concerning transportation vehicles.

#### H. Chapter 7: Communication Features

Chapter 7 in the 2016 Non-Rail Vehicle Guidelines establishes technical requirements for characters on signs, the International Symbol of Accessibility, and vehicular announcement systems. With the exception of requirements addressing announcement systems in T704, this chapter has been neither reorganized nor substantively changed from the proposed rule. Section T704 in the final rule has been reorganized and editorially revised to improve clarity; these modifications, however, did not materially alter its terms. We received no comments on two of the three sections in Chapter 7—namely, Signs (T702) and International Symbol of Accessibility (T703)—and so these sections are not addressed below.

#### T704 Announcement Systems

The technical requirements for announcement systems include provisions on automated route identification announcement systems,

automated stop announcement systems, and stop request systems. These requirements are intended to ensure that passengers with disabilities have the critical information needed to make public bus transportation systems accessible, usable, and safe for independent use by persons with disabilities.

Stop request systems must provide audible and visible notification onboard the non-rail vehicle indicating that a passenger has requested to disembark at the next stop. *See* T704.3. Audible notifications may be verbal or non-verbal signals, while visible notifications must include either signs (complying with T702), lights, or other visually perceptible indicators. *Id.* There are also specifications addressing when stop request notifications must extinguish. *Id.* Parts on stop request systems intended for passenger use must comply with the technical requirements for operable parts (T304), including height, location, and ease of use. The technical requirement in the final rule for stop request systems on buses and vans are similar to the existing guidelines. *See* 36 CFR 1192.37. At the request of a transit agency, the final rule does clarify that a mechanism for requesting stops must be located within reach of each wheelchair and priority seat. *See* T704.3.2.

Automated announcement systems must also provide both audible and visible notifications. *See* T704.2, T704.4. Automated route identification systems must audibly and visibly identify the route on which the bus is operating. Automated stop announcement systems must provide audible and visible notification of upcoming stops on fixed routes. For both types of automated announcement systems, audible messages must be delivered using synthesized, recorded or digitized speech. For stop announcement systems, such messages must be audible within the bus, while, for route announcement systems, audible messages must be broadcasted externally at boarding and alighting areas. With respect to visible components, route identification systems are required to provide signs displaying route information on the front and boarding sides of the vehicle. For stop announcement systems, signs must be provided onboard and be viewable from all wheelchair spaces and priority seats. (Signs for each type of automated announcement system must also comply with T702.)

The vast majority of comments received in response to the Access Board's proposed requirements for automated announcement systems in

the 2010 NPRM related to the scoping for these requirements (*i.e.*, automated announcement systems must be provided by large transit agencies that operate 100 or more buses in annual maximum service in fixed route bus modes), rather than the technical specifications for such systems. Comments related to the scoping requirements for automated announcement systems are addressed at length in Section III (Major Issues) and IV (Summary of Comments and Responses on Other Aspects of the Proposed Rule—Chapter 2: Scoping Requirements).

Several commenters, including a public transportation organization, a transit agency, and individuals with disabilities, recommended that the Access Board include standards for the volume or quality (clarity) of audible components of automated announcement systems in the final rule. Other commenters, while not specifically opining on audibility standards, noted that the volume of announcements can sometimes be inconsistent or need adjustment in real-time to account for ambient noise.

While the Access Board shares these commenters' view that the audibility of stop and route information is a critical aspect of announcement systems, we are not aware of any national standards that would provide clear, objective, and consistent measures to assess compliance. Indeed, in the 2010 NPRM, the Board requested information on standards for audio quality that could be referenced in the final rule or, in the alternative, recommended in advisory materials. *See* 2010 NPRM, 75 FR at 43754 (Question 19). No commenters suggested or cited any referenceable standards for audio quality. Absent such standards, the Board declines at this time to include specifications for audio volume or quality in the technical requirements for automated announcement systems. However, should referenceable standards for audio quality of announcements in public transportation vehicles be developed, the Board will certainly consider referencing such standards in future rulemakings. Additionally, when DOT initiates its own rulemaking process to adopt these revised guidelines as enforceable standards for buses, OTRBs, and vans, it may find that inclusion of programmatic standards for announcement audibility (which are beyond the Board's jurisdiction) would be both appropriate and useful.

With respect to the requirement that automated stop announcement systems must have signage viewable onboard from all wheelchair spaces and priority

<sup>18</sup> SAE Recommended Practice J2249, Wheelchair Tiedown and Occupant Restraint Systems for Use in Motor Vehicles (June 9, 1999), as noted in the 2010 NPRM, was in the process of being updated and published as a voluntary consensus standard. *See* 75 FR at 43753 n. 18. In 2012, this recommended practice was indeed formally published as ANSI/RESNA WC-4: 2012, Section 18 "Wheelchair tiedown and occupant restraint systems for use in motor vehicles."

seats, APTA expressed concerns about the cost of providing signs for rear-facing wheelchair positions. For several reasons, we do not believe that, in practice, such signs will pose a significant expense. First, rear-facing wheelchair spaces are not required by the 2016 Non-Rail Vehicle Guidelines. Rather, the default orientation for wheelchair spaces is front facing, with the rear-facing position being an exception permitted only on certain large non-rail vehicles so long as at least one wheelchair securement system is front facing. See T603.2. Second, while rear-facing wheelchair spaces are prevalent throughout Europe and Canada, they are still relatively uncommon in the United States. Only a handful of transit agencies employ rear-facing wheelchair spaces for bus transit, and, when used, it is generally on bus rapid transit systems. Together, these considerations augur against significant costs for provision of stop announcements signs for rear-facing wheelchair spaces. Moreover, we believe it is beneficial for non-rail vehicles with any rear-facing passengers to provide this important communication feature.

## V. Regulatory Process Matters

### A. Final Regulatory Assessment (E.O. 12866)

Executive Orders 13563 and 12866 direct agencies to propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs; tailor the regulation to impose the least burden on society, consistent with obtaining the regulatory objectives; and, in choosing among alternative regulatory approaches, select those approaches that maximize net benefits. Important goals of regulatory analysis are to (1) establish whether Federal regulation is necessary and justified to achieve a market failure or other social goal and (2) demonstrate that a range of reasonably feasible regulatory alternatives have been considered and that the most efficient and effective alternative has been selected. Executive Order 13563 also recognizes that some benefits are difficult to quantify and provides that, where appropriate and permitted by law, agencies may consider and discuss qualitatively those values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts.

The Access Board prepared a final regulatory impact analysis (Final RA) that assesses the likely benefits and costs of the 2016 Non-Rail Vehicle Guidelines. Expected benefits are

discussed and likely incremental. Compliance costs for new requirements are monetized for the projected 12-year regulatory timeframe, including potential costs to small businesses offering OTRB-provided transportation, charter, and sightseeing services. The Final RA also incorporates several “stress tests” to assess the relative impact of hypothetical adjustments to selected cost-related assumptions on overall results. A complete copy of this final regulatory assessment is available on the Access Board’s Web site ([www.access-board.gov](http://www.access-board.gov)), as well the Federal Government’s online rulemaking portal ([www.regulations.gov](http://www.regulations.gov)).

### 1. Costs: Summary of Methodology and Results

On the cost side, the Final RA estimates the economic impact of new or revised requirements in the 2016 Non-Rail Vehicle Guidelines that are expected to have an incremental impact relative to the existing guidelines or current transit industry practices. As with the proposed rule, most of the changes in the 2016 Non-Rail Vehicle Guidelines are stylistic or editorial only, and thus not expected to have an incremental cost impact. There are, however, five requirements (or related sets of requirements) in the 2016 Non-Rail Vehicle Guidelines for which regulated entities are expected to incur incremental compliance costs. One of these requirements (*i.e.*, automated stop and route announcement systems) applies only to certain large transit agencies. The other four requirements—signage for accessible seating and doorways, exterior destination or route signs, public address systems, and stop request systems—while applicable to non-rail vehicles, are only “new” for OTRBs. (Such requirements have been in effect for buses and vans since 1991.)

For purposes of assessing the likely cost impact of these five requirements over the 12-year regulatory time horizon, the Final RA uses a unit cost approach that reflects both initial costs (*e.g.*, equipment, installation, and training) and ongoing costs (*e.g.*, operation and maintenance), as applicable for each respective requirement. While the cost methodology used in the Final RA builds on the cost methodology used in the regulatory assessment that accompanied the proposed rule, *see* U.S. Access Board, *Cost Estimates for Automated Stop and Route Announcements* (July 2010) (copy available on agency Web site), it also incorporates revisions to certain estimates, assumptions and modelling

approaches. These changes were made to, among other things, address comments, reflect changes in the 2016 Non-Rail Vehicle Guidelines, and incorporate updated research or data. Revisions and updates reflected in the Final RA’s cost methodology include: Use of three (rather than two) sets of cost assumptions—low, medium, and high—when estimating incremental costs of the 2016 Non-Rail Vehicle Guidelines; incorporation of the four new accessibility requirements for OTRBs into the cost model; evaluation of the cost impact of the automated announcement systems requirement using three size-based “tiers” (Tiers I, II and III) for large transit entities; and, addition of a small business analysis.

In sum, the Final RA estimates annual costs of the five new or revised accessibility requirements in the 2016 Non-Rail Vehicle Guidelines with incremental impacts for each of the twelve “regulatory years” and, within each of these years, separately for each of three (*i.e.*, “high,” “medium/primary,” and “low”) cost scenarios. (Annual costs estimates under each cost scenario are generated by respectively indulging all applicable “high” cost assumptions, all “medium” cost assumptions, and all “low” cost assumptions.) Generally speaking, the “medium” cost estimates collectively serve as the primary scenario in the Final RA when calculating incremental costs because it models the most likely set of cost assumptions, while the “low” and “high” cost estimates respectively provide the lower- and upper-bound cost projections.

In terms of results, the Final RA evaluates the cost impact of the new accessibility requirements in the 2016 Non-Rail Vehicle Guidelines from three main perspectives: Total costs; annualized costs to large transit entities for automated announcement systems; and annualized costs for the four accessibility requirements that are newly applicable to OTRBs. The results for each of these three cost perspectives are summarized below.

### Annualized Cost of New or Revised Accessibility Requirements in the 2016 Non-Rail Vehicle Guidelines

Table 3 below provides the annualized cost, under each of the Final RA’s three cost scenarios, for the five new or revised accessibility requirements in the 2016 Non-Rail Vehicle Guidelines that are expected to have an incremental cost impact. All monetized costs were estimated over a 12-year time horizon using discount rates of 3% and 7%.

TABLE 3—ANNUALIZED COST OF NEW ACCESSIBILITY GUIDELINES IN THE 2016 NON-RAIL VEHICLE GUIDELINES FOR BUSES, VANS, AND OTRBS, ALL REGULATORY YEARS [3% and 7% discount rates]

Discount rate	Low scenario (\$millions)	Primary scenario (\$millions)	High scenario (\$millions)
3% .....	\$2.6	\$5.0	\$8.0
7% .....	2.3	4.5	7.2

These results show that annualized costs of the 2016 Non-Rail Vehicle Guidelines will, most likely range from \$4.5 million to \$ 5.0 million, depending on the discount rate. Notably, even under the high scenario, annualized costs are not expected to exceed \$8 million. Results from the Final RA thus demonstrate that the expected cost impact of the 2016 Non-Rail Vehicle Guidelines falls far below the threshold for economic (monetary) significance of regulatory actions provided in E.O. 12866. See E.O. 12866, § 3(f)(1) (defining “significant regulatory action” as, among other things, a rule that would likely have an “annual effect on the economy of \$100 million or more”).

Annualized Costs to Large Transit Entities for Automated Announcement Systems

Second, the Final RA also examines likely annualized costs related to the requirement that large transit entities provide automated announcement systems for stop and route identification on their large vehicles operating in fixed route bus service. Large transit agencies, in turn, are defined in the 2016 Non-Rail Vehicle Guidelines as public transportation providers operating 100 or more buses in annual maximum service in fixed route bus modes, through either direct operation or contract, based on annual data required to be reported to the National Transportation Database [hereafter, “VOMS 100 threshold”]. See T104.4 (defining “large transit entity”); see also 49 CFR pt. 37 (regulations governing the

DOT-administered National Transportation Database). While the scope of the automated announcement systems requirement is thus necessarily limited to larger transit entities, there are still—relatively speaking—a wide range of “sizes” within the community of covered transit agencies, which can range in fleet size from just over 100 buses operating in fixed route bus service to hundreds.

Accordingly, to provide a more refined picture of estimated costs to large transit entities for automated announcement systems, the Final RA separately models costs for this requirement based on three prototypical size-based “tiers”—Tiers I, II & III—with Tier I being on the smaller end of the size spectrum and Tier III on the larger end. These three size-based tiers are intended to represent the typical range of “sizes” of large transit agencies covered by the automated announcement system requirement. Assumptions about relevant cost-modeling characteristics for each of these three tiers of large transit agencies—namely, the number of large buses in annual maximum service in fixed route bus modes, fixed routes, garages, vehicle operators, and mechanics—along with estimates concerning the status and nature of current ITS deployments (if any) by these transit entities, serve as the framework for modeling costs.<sup>19</sup> As detailed in the Final RA, assumptions about the number of transit agencies per tier, as well as their respective fixed

route bus fleets and current state of ITS deployments, were developed from research by Access Board staff and data reported in the 2014 National Transportation Database. See Final RA, Section 5.1.1.

It also bears noting that the Final RA’s cost model for the automated announcement systems requirement accounts for potential growth by public transit agencies over time. That is, it is assumed that, every third year during the 12-year regulatory timeframe, one transit agency will “cross” the VOMS 100 threshold, and, thereby, become newly subject to the requirement for automated announcement systems. These “new” large transit agencies are assumed to have characteristics similar to—though slightly smaller than—large transit agencies in “Tier I,” based on the assumption that transit entities crossing the VOMS threshold will do so in an incremental fashion. See Final RA, Section 5.1.1.

Presented in Table 4 below are per-agency annualized costs for the automated announcement systems requirement under each of the Final RA’s three cost scenarios. These annualized costs range from about \$44,000 (for a Tier I agency under the low scenario) to about \$430,000 (for a Tier III agency under the high scenario). Under the primary scenario, which models the most likely set of cost assumptions, per-agency costs for announcement systems are estimated to be as follows: Tier I—\$80,659; Tier II—\$154,985; and, Tier III: \$264,968.

TABLE 4—ANNUALIZED PER AGENCY COSTS OF AUTOMATED ANNOUNCEMENT SYSTEMS REQUIREMENT FOR LARGE TRANSIT AGENCIES [Tiers I, II & III]

	Low scenario	Primary scenario	High scenario
Large Transit Agency—Tier I .....	\$44,208	\$80,659	\$129,305
Large Transit Agency—Tier II .....	76,678	154,985	248,313
Large Transit Agency—Tier III .....	129,444	264,968	429,715

<sup>19</sup> For example, under Tier I, it is assumed that the transit agency operates a fleet of 130 buses in fixed route service, while Tier III assumes a fleet of

530 vehicles in fixed route bus service. For a detailed discussion of the assumed characteristics

for each of the three tiers, see Final RA, Section 5.1.1 & Appendix B.

These annualized cost figures underscore the logical cost corollary that per-agency costs directly relate to agency size, with the “smallest” large transit agencies (Tier I) experiencing the lowest annualized costs under all scenarios, and, conversely, the “largest” large transit agencies (Tier III) having the highest annualized costs. Nonetheless, even for Tier III agencies, costs are not estimated to exceed \$450,000 annually under even the high scenario.

**Annualized Costs of New Accessibility Requirements for OTRBs**

The third set of cost results presented in the Final RA relates to the four new OTRB-related accessibility requirements in the 2016 Non-Rail Vehicle Guidelines. Because various transportation-related industry sectors use OTRBs for scheduled transportation services, charter services, sightseeing,

and other services, these accessibility requirements (unlike the automated announcement systems requirement) do not affect a discrete set of regulated entities. Consequently, reliable estimates of per-firm costs related to the new OTRB accessibility requirements cannot be made. Instead, the Final RA examines costs for these four requirements on a per-vehicle and per-requirement basis.

With respect to per-requirement costs, the Final RA evaluates the respective costs of each of the four new OTRB accessibility requirements under the three cost scenarios over the projected 12-year term of the 2016 Non-Rail Vehicle Guidelines. For each cost scenario, results are broken down separately (in nominal dollars) by requirement for each year, and then presented as rolled-up annualized values for all requirements at 3% and

7% discount rates. In sum, the annualized cost for these four new requirements collectively across all OTRBs is estimated to be \$0.9 million under the primary scenario at a 7% discount rate, while the low and high scenarios respectively project \$0.5 million and \$1.4 million in annualized costs using the same discount rate. For a complete presentation of cost-per-requirement results, see Final RA, Section 7.1.3 & Appendices F–1 to F–3.

Second, in terms of per-vehicle costs, the Final RA examines likely costs related to the four new OTRB accessibility requirements. Annualized costs of these new requirements are examined under each of the three cost scenarios, with results presented on a per-vehicle basis using 3% and 7% discount rates. The results from these per-vehicle annualized cost analyses are presented below in Table 5.

**TABLE 5—PER-VEHICLE ANNUALIZED COSTS OF NEW ACCESSIBILITY REQUIREMENTS FOR OTRBs**

	Low scenario	Primary scenario	High scenario
3% Discount Rate .....	\$631	\$1,124	\$1,754
7% Discount Rate .....	549	971	1,513

As this table demonstrates, the cost of the new OTRB accessibility requirements are expected to be quite modest, when viewed from a per-vehicle perspective, under all three cost scenarios. Indeed, annualized costs per vehicle are only expected to be about \$1,100 or less (depending on the discount rate) under the primary scenario.

**2. Benefits: Qualitative Summary of Benefits**

Benefits of the revised accessibility requirements in the 2016 Non-Rail Vehicle Guidelines to persons with disabilities (and others)—while significant—are not quantified or monetized in the Final RA, but instead described from a qualitative perspective. Such benefits are particularly challenging to quantify or monetize due to a variety of considerations. These challenges include: (a) A lack of current, reliable statistics on ridership by persons with specific disabilities on transit buses and OTRBs; (b) the fact that persons with disabilities will experience benefits differently, depending on the nature of their respective disabilities, and the current level of accessibility provided by the transit system or OTRB they wish to use; (c) the unknown extent to which improved accessibility of transit buses and OTRBs may either spur new

demand among persons with disabilities who do not currently use such vehicles due to accessibility barriers that are addressed by the 2016 Non-Rail Vehicle Guidelines, or increase demand among current passengers with disabilities; (d) the extent to which persons with disabilities have reliable access to transportation, since, even when accessible, vehicles cannot be used if a potential passenger cannot reach them; (e) personal transportation preferences of persons with disabilities, who, like all individuals, make transit decisions for multiple reasons, some of which are unrelated to accessibility; and (f) the inherent challenges posed by monetization of key benefits of the 2016 Non-Rail Vehicle Guidelines, such as equity, fairness, independence, and better integration into society.

While the foregoing factors make formal quantification or monetization of the 2016 Non-Rail Vehicle Guidelines’ benefits inherently difficult, their significant benefits can still be amply described. The most significant benefits from the 2016 Non-Rail Vehicle Guidelines are expected to flow from the automated stop and route announcement systems requirement. The failure to announce stops and other identifying route information has been a recurring problem under the existing regulatory regime. See Final RA, Section 3.2. By requiring audible and visible

notification of upcoming stops and identifying route information through automated announcements, the new requirement is expected to deliver significant benefits to passengers with vision- or hearing-related disabilities who use fixed route buses and OTRBs, or who would use such services absent communications barriers. *Id.* at Section 6.

Consistent and intelligible stop and route announcements, for example, may enable passengers who are blind or have low vision—for the first time—to use fixed route service independently, or permit them to do so more reliably and with greater frequency. Automated announcements are also expected to generate time savings by lessening (if not preventing) situations in which passengers with vision- or hearing-related disabilities disembark at the wrong stop, and then must wait for another bus (or other means of transportation) to transport them to their desired destination. In sum, the automated announcement systems requirement will not only deliver direct and substantial benefits to fixed route passengers with vision- or hearing-related disabilities, but will also promote fairness by ensuring a more consistent approach to announcements on fixed route buses across the country.

Individuals with other types of disabilities may also experience benefits

from the automated announcement system requirement. Studies have shown that individuals with cognitive or intellectual disabilities also frequently face communications barriers when using fixed route transit, and, thus will benefit from consistent, reliable stop and route announcements, such as those provided by automated announcement systems.<sup>20</sup> Additionally, for individuals with significant mobility impairments, automated stop announcements may mean the difference between getting off at the correct stop and getting off at the wrong stop—due to unintelligible (or non-existent) stop or route announcements—to face a physically arduous or hazardous journey to his or her intended destination (or other location that gets the trip back on track). See Final RA, Section 6 (summarizing findings from transportation research studies on the importance of consistent and intelligible stop and route announcements to passengers with disabilities).

For the new OTRB-related requirements, benefits are expected to be similar to, though perhaps more incremental than, the benefits accruing from automated announcement systems. These four new accessibility requirements—identification of wheelchair spaces and accessible doorways (with the International Symbol of Accessibility) and priority seats (with signs), exterior destination or route signage, public address systems, and stop request systems—are all aimed at addressing communication barriers to use of, or use of accessible features on, OTRBs. Signage of wheelchair spaces and priority seats is expected to enable passengers with disabilities to more readily locate these accessibility features. Signage for accessible seating may also aid in deterring passengers without disabilities from using priority seating or setting packages or strollers in wheelchair spaces (when such spaces are not otherwise occupied by flip-down seating), thereby keeping them available for passengers with disabilities. Similarly, having accessible stop request mechanisms within reach of passengers seated in accessible seating on fixed-route OTRBs ensures that passengers

with disabilities who use such seating can independently indicate their desire to disembark at the next designated stop. Public address systems, in turn, enable passengers with hearing-related disabilities (as well as other passengers) to better understand information conveyed by the vehicle operator, which, in the event of an emergency, could be of urgent significance. Lastly, having exterior route or destination signage on the front and boarding sides of OTRBs aids passengers with disabilities by making it easier to ascertain a given vehicle's route, destination, or identity. Having such signage in both locations is particularly important, for example, at transit hubs, bus terminals, areas where multiple vehicles are parked simultaneously, or other locations where traffic or terrain make circling to the front of the vehicle difficult or hazardous.

Additionally, it bears noting that other individuals and entities, including transit agencies, may benefit indirectly from new accessibility requirements in the 2016 Non-Rail Vehicle Guidelines. Several research studies on ITS deployments and automated announcement systems have shown that such systems often have the beneficial effect of increasing both customer satisfaction and ridership.<sup>21</sup> For large transit agencies that do not yet have automated announcement systems, compliance costs incurred in deploying such systems might thus be offset in part by increases in fixed route ridership and fare revenue. Additionally, bus passengers who are unfamiliar with a particular route, or

who are visiting from outside the area, may find the wayfinding assistance provided by automated stop and route announcements to be helpful.

### 3. Alternative Regulatory Approaches: Automated Announcement Systems

In promulgating a 100-bus VOMS threshold for large transit agencies subject to the automated announcement systems requirement, the Access Board considered other potential regulatory alternatives. Ideally, when determining the most appropriate numeric VOMS threshold for large transit agencies subject to the automated announcement system requirement, the Access Board would have evaluated the net (monetized) benefits of potential alternate thresholds as part of the regulatory calculus were such data available. See, e.g., OMB, Circular A-4, *Regulatory Analysis* 2-3, 7-9, 16-17 (Sept. 17, 2003). However, as noted above, data constraints, along with the inherent challenges posed by formal assessment of key benefits of the final rule for persons with disabilities (e.g., equity, fairness, independence, and better integration into society) precluded monetization of benefits attributable to the automated announcement systems requirement, or, more generally, the final rule. Accordingly, it was not possible to determine, from the perspective of economic efficiency, which VOMS threshold would be the most beneficial to society. The Access Board thus used other available information and considerations—such as analyzing NTD annual data—to tailor a VOMS threshold that reduces the burden of the automated announcement systems requirement on small entities, while, at the same time, ensuring that automated announcement system-equipped transit buses will be available to greatest number of persons with disabilities who use these vehicles.

As originally proposed, automated announcement systems requirement would have applied to all transit agencies regardless of the size of their large, fixed-route bus fleets. See Sections II (Regulatory History) & III (Major Issues—Automated Stop Announcements). The VOMS 100 threshold was initially added to the 2008 Draft Revised Guidelines at the behest of commenters who sought an exemption for smaller transit agencies. *Id.* Specification of this particular threshold was intended as a means of tailoring coverage of the automated systems requirement to larger, urbanized transit entities that were most likely to serve a significant population of persons with disabilities, as well as

<sup>21</sup> See, e.g., Transportation Research Board, *TCRP Synthesis 73—AVL System for Bus Transit: Update* 3, 3, 13-43, 64-66 (2008) (noting that, among other benefits, automated stop announcements enable vehicle operators to focus on safe vehicle operation, reduce customer complaints, and ensure better compliance with ADA regulations and other legal requirements); Delaware Center for Transportation, University of Delaware, *Costs and Benefits of Advanced Public Transportation Systems at Dart First State* 23-32 & App. A (July 2004) (general benefits of ITS deployments include: increased transit ridership and revenues from passenger fares; improved transit service; increased customer satisfaction; and, enhanced compliance with ADA requirements); DOT, ITS Joint Program Office, *Evaluation of Acadia National Park ITS Field Operational Test: Final Report* 4-13-4-17 (2003) (strong majority of visitors surveyed about automated on-board stop announcements on buses in Acadia National Park indicated that these announcements made it easier for them to get around, reduced uncertainty about bus stops, helped save them time, and played an influential role in their decision to use bus transit); see also National Council on Disability, *Transportation Update: Where We've Gone and What We've Learned* 39 (2015) (discussing the importance of effective stop announcements to persons with disabilities, and noting that "lack of an effective stop announcement and route identification program can force riders onto ADA paratransit").

<sup>20</sup> Arizona State Univ., Morrison Institute for Public Policy, *Stuck at Home: By-Passing Transportation Roadblocks to Community Mobility and Independence* 3 (2013), available at: <https://morrisoninstitute.asu.edu/products/stuck-home-passing-transportation-roadblocks-community-mobility-and-independence>; National Council on Disability, *Current State of Transportation for People with Disabilities in the United States* 13-14 (June 13, 2005), available at: <http://www.ncd.gov/policy/current-state-transportation-people-disabilities-united-states>.



have the financial and technological resources to deploy automated announcement system functionality. *Id.* In this way, the Access Board views the VOMS 100 threshold as striking a reasonable balance between competing interests (e.g., improved communication accessibility versus not overburdening smaller transit agencies) while also remaining consistent with the ADA's goals of reducing transportation barriers, and, more generally, ensuring consistent accessibility standards nationwide. *See, e.g.*, 42 U.S.C. 12101.

Establishment of a VOMS 100 threshold for automated announcement systems in the final rule—as opposed to specification of a different numeric threshold—was based on not only these policy and legal considerations, but also quantitative analysis of data from the National Transportation Database (NTD). As detailed in the Final RA, the Access Board downloaded pertinent information from the 2014 NTD annual data to assess how drawing different numeric lines for the VOMS threshold might impact transit agencies of various sizes. *See* Final RA, Section 8. In sum, the resulting dataset encompassed nearly 700 urban transit entities of all sizes that reported operating one or more fixed-route bus modes. *Id.* Based on this data, the Access Board conducted comparative analyses of potential alternate VOMS thresholds (i.e., VOMS 50 and VOMS 250 thresholds) from several perspectives, including projected population of persons with disabilities in transit agencies' respective service areas, estimated bus ridership by disabled passengers, and potential availability of Federal funds for ADA-related capital expenditures (such as deployment of automated announcement systems). *Id.* These comparative analyses of potential alternate VOMS thresholds showed, from a quantitative perspective, that the VOMS 100 threshold struck a reasonable, middle-ground metric in terms of the scope of covered large, urban transit agencies.

#### B. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) requires Federal agencies to analyze the impact of regulatory actions on small entities, unless an agency certifies that the rule will not have a significant impact on a substantial number of small entities. *See* 5 U.S.C. 604, 605 (b). Based on the results from the Final RA, the Access Board does not believe that the 2016 Non-Rail Vehicle Guidelines will have a significant impact on a substantial number of small entities. Nonetheless, to promote better understanding of the 2016 Non-Rail

Vehicle Guidelines as applied to small entities operating in transportation-related business sectors, the Access Board provides below a final regulatory flexibility analysis consistent with section 604 of the RFA.

*Summary of the need for, and objectives of, the 2016 Non-Rail Vehicle Guidelines.* The Americans with Disabilities Act (ADA) mandates that the Access Board establish accessibility guidelines for transportation vehicles that are acquired or remanufactured by entities covered by the ADA. *See* 42 U.S.C. 12204, 12149(b). The Access Board's guidelines for transportation vehicles were initially promulgated in 1991, and thereafter amended in 1998 to include accessibility requirements for OTRBs. Given the passage of nearly two decades, these existing guidelines are in need of a "refresh" for two primary reasons: to incorporate new accessibility-related technologies, such as automated announcement systems and level boarding bus systems, and ensure that the transportation vehicle guidelines are consistent with the agency's other guidelines and standards issued since 1998.

Most of the revisions in the 2016 Non-Rail Vehicle Guidelines are editorial only. These revised guidelines use a new organizational format that is modelled after the Access Board's current guidelines for buildings and facilities that were issued in 2004. Additionally, as part of its efforts to update the existing guidelines, the Board has also endeavored to write the final rule in terms that make its requirements simpler and easier to understand. There are, however, five areas in which technical requirements in the 2016 Non-Rail Vehicle Guidelines have substantively changed relative to the existing guidelines. One of these requirements (i.e., automated stop and route announcement systems) only applies to large transit entities and, therefore, does not impact any small entities. The other four requirements—identification of wheelchair spaces and accessible doorways (with the International Symbol of Accessibility) and priority seats (with signs), exterior destination or route signage, public address systems, and stop request systems—while applicable to all non-rail vehicles, are only "new" for OTRBs. (Such requirements have been in effect for buses and vans since 1991.) The revisions in the 2016 Non-Rail Vehicle Guidelines will help ensure that buses, vans, and OTRBs are readily accessible to, and usable by, individuals with disabilities. Compliance with the 2016 Non-Rail Vehicle Guidelines is not required until the Department of

Transportation (DOT) adopts these revised guidelines as enforceable accessibility standards for ADA-covered buses, OTRBs, and vans.

*Summaries of significant issues raised by public comments in response to the initial regulatory flexibility analysis and discussion of regulatory revisions made as a result of such comments.* Commenters did not raise any issues related to the initial regulatory flexibility analysis presented in the 2010 NPRM.

*Estimates of the number and type of small entities to which the 2016 Non-Rail Vehicle Guidelines will apply.* Small governmental jurisdictions (i.e., state or local government units with a population of less than 50,000) and small businesses (i.e., small private entities that meet the size standards established by the Small Business Administration (SBA)) will be affected by the 2016 Non-Rail Vehicle Guidelines only to the extent they are subject to DOT's ADA regulations covering transportation services for individuals with disabilities (49 CFR part 37), which, in turn, must be "consistent with" the Access Board's accessibility guidelines.

The Final RA also provides a small business analysis that evaluates the number of small entities potentially affected by the 2016 Non-Rail Vehicle Guidelines, and the likely economic impact on such entities. *See* Final RA, Sections 4.3 & 8. In sum, the Final RA's small business analysis finds as follows. First, the 2016 Non-Rail Vehicle Guidelines are only expected to have an economic impact on small (private) firms that operate OTRBs in fixed route service. No small governmental jurisdictions are expected to incur compliance costs under the 2016 Non-Rail Vehicle Guidelines given that the automated announcement systems requirement only applies to large transit entities (i.e., transit agencies operating 100 or more buses in annual maximum service in fixed route bus modes). According to the current (2014) National Transit Database, none of transit entities that report operating 100 or more buses in annual maximum service in fixed route bus modes have service areas or urbanized area (UZA) populations under 50,000.<sup>22</sup>

Second, the Final RA's small business analysis evaluates the number of small businesses that potentially may be affected by the 2016 Non-Rail Vehicle Guidelines. Small firms operate OTRBs

<sup>22</sup> *See* Federal Transit Administration, 2014 National Transportation Database—Agency Information, [http://www.ntdprogram.gov/ntdprogram/database/2013\\_database/NTDdatabase.htm](http://www.ntdprogram.gov/ntdprogram/database/2013_database/NTDdatabase.htm) (last visited Jan. 11, 2016).

for a variety of purposes, but predominant uses include: provision of fixed route passenger service within or among cities, passenger charter services, airport shuttle services, sightseeing tours, and packaged tours. While these services do not squarely align with any single business sector the under the 2012 North American Industry Classification System (NAICS), they best

“map” to the following four 6-digit NAICS codes: 485113 (Bus and Other Motor Transit Systems); 485210 (Interurban and Rural Bus Transportation); 485510 (Charter Bus Industry); and 487110 (Scenic and Sightseeing Transportation, Land).<sup>23</sup> Data were compiled from the 2012 U.S. Economic Census (released in June 2015) to determine the number of small

OTRB firms within each of these four transportation-related NAICS codes. The Economic Census data show that firms within these four transit/transportation/charter/sightseeing industry sectors are, based on SBA-defined size standards, overwhelmingly small businesses. The number and percentage of small businesses in each of the four NAICS codes are provided below in Table 6.

TABLE 6—NUMBER AND PERCENTAGE OF SMALL BUSINESSES IN FOUR OTRB-RELATED BUSINESS SECTORS

2012 NAICS code	NAICS description	Total firms	Small business firms	Small business firms (% of total firms)
485113 .....	Bus and Other Motor Vehicle Transit Systems .....	625	584	93.4
485210 .....	Interurban and Rural Bus Transportation .....	397	369	92.9
485510 .....	Charter Bus Industry .....	1,265	1,211	95.7
487110 .....	Scenic and Sightseeing Transportation, Land .....	543	517	95.2

It bears noting, however, that firm data in Table 6 above likely overestimates the number of small firms affected by the 2016 Non-Rail Vehicle Guidelines. This is due to the fact that the four listed NAICS codes encompass transportation, charter, and sightseeing services provided by vehicles other than OTRBs, such as trolley buses, transit buses, or historic rail cars. In other words, these NAICS codes are not restricted to transportation services provided exclusively by OTRBs. There are no NAICS codes, however, directed solely to OTRB-provided transportation or other services. Accordingly, despite their limitations, these four NAICS codes nonetheless provide the best available framework (given current data limitations) for estimating the number of small firms that may operate OTRBs and, thereby, potentially incur compliance costs under the 2016 Non-Rail Vehicle Guidelines.

*Description of the projected reporting, recordkeeping and other compliance requirements of the 2016 Non-Rail Vehicle Guidelines.* As noted below in Section V.E., discussing the Paperwork Reduction Act, the 2016 Non-Rail Vehicle Guidelines impose no reporting or record-keeping requirements on any entities, regardless of size. The Access Board acknowledges that there may be other minor, indirect administrative costs incurred by regulated entities—including small businesses—as a result of the 2016 Non-Rail Vehicle Guidelines, including such tasks as becoming familiar with the 2016 Non-Rail Vehicle Guidelines, or keeping track of the operational status of onboard equipment for automated

announcement systems. However, such compliance costs are expected to be neither significant nor disproportionately borne by small entities.

*Description of the steps taken by the Access Board to minimize the economic impact on small entities consistent with the stated objectives of the ADA.* In the 2007 Draft Revised Guidelines, the Access Board considered requiring all public transit agencies to provide automated announcement systems on large fixed route buses, regardless of the size of the agency. Several commenters, including the American Public Transit Association, expressed concern that the cost of providing such announcement systems would be prohibitive for small transit agencies. Consequently, in the NPRM, the Access Board proposed to limit application of the automated announcement system requirement to large transit agencies. This limitation, as noted above, has the practical effect of excluding all small public transit agencies from the automated announcement systems requirement.

**C. Executive Order 13132: Federalism**

The final rule adheres to the fundamental federalism principles and policy making criteria in Executive Order 13132. The 2016 Non-Rail Vehicle Guidelines are issued pursuant to the Americans with Disabilities Act (ADA). The ADA is civil rights legislation that was enacted by Congress pursuant to its authority to enforce the Fourteenth Amendment to the U.S. Constitution and to regulate commerce. The ADA prohibits discrimination on the basis of disability in the provision of transportation services. See 42 U.S.C.

12101 *et seq.* The ADA requires transportation vehicles acquired or remanufactured by covered entities to be readily accessible to, and usable by, individuals with disabilities. The ADA recognizes the authority of state and local governments to enact and enforce laws that provide for greater or equal protection for the rights of individuals with disabilities.

**D. Unfunded Mandates Reform Act**

The Unfunded Mandates Reform Act does not apply to proposed or final rules that enforce constitutional rights of individuals or enforce statutory rights that prohibit discrimination on the basis of race, color, sex, national origin, age, handicap, or disability. Since the 2016 Non-Rail Vehicle Guidelines are issued pursuant to the ADA, which prohibits discrimination on the basis of disability, an assessment of the rule’s effect on state, local, and tribal governments, and the private sector is not required.

**E. Paperwork Reduction Act**

Under the Paperwork Reduction Act (PRA), Federal agencies are generally prohibited from conducting or sponsoring a “collection of information” as defined by the PRA, absent OMB approval. See 44 U.S.C. 3507 *et seq.* The 2016 Non-Rail Vehicle Guidelines do not impose any new or revised collections of information within the meaning of the PRA.

**F. Availability of Materials Incorporated by Reference**

Regulations issued by the Office of the Federal Register (OFR) require Federal agencies to describe in their regulatory preambles the steps taken to ensure that

<sup>23</sup> See U.S. Census Bureau, 2012 NAICS Definitions (undated), available at: [http://www.census.gov/eos/www/naics/2012NAICS/2012\\_Definition\\_File.pdf](http://www.census.gov/eos/www/naics/2012NAICS/2012_Definition_File.pdf) (last visited: Jan. 11, 2016).

incorporated materials are reasonably available to interested parties, as well as summarize the contents of referenced standards. See 1 CFR part 51.

The final rule incorporates by reference one voluntary consensus standard in T603.5, a standard from the International Organization for Standardization (ISO) concerning securement systems for rear-facing wheelchair positions in transportation vehicles. In keeping with OFR regulations, the Access Board provides below the requisite information on the availability of this standard and a summary of its contents. ISO 10865–1:2012(E), Wheelchair containment and occupant retention systems for accessible transport vehicles designed for use by both sitting and standing passengers—Part 1: Systems for rearward facing wheelchair-seated passengers, First Edition, June 5, 2012 [ISO Standard 10865–1:2012(E)]. The primary purpose of this standard is to limit movements of rear-facing wheelchairs and other mobility devices that could result in hazardous contact with vehicle interiors or injury to other passengers. The standard is applicable to vehicular securement systems used mainly in fixed route service when operated under normal and emergency driving conditions, where passengers are permitted to travel both sitting and standing. Specifications include design and performance requirements and associated test methods. Availability: This standard is available for inspection at either the U.S. Access Board, 1331 F Street NW., Suite 1000, Washington, DC 20004–1111, (202) 272–0080 (voice), (202) 272–0082 (TTY), or the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741–6030, or go to [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html). Additionally, the American National Standards Institute (ANSI) has agreed to make an online read-only version of this standard available to the public without charge. This standard is also available for purchase from the International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH–1211, Geneva 20, Switzerland (<http://www.iso.org/iso/home/store.htm>).

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

Civil rights, Incorporation by reference, Individuals with disabilities, Transportation.

Approved by vote of the Access Board on May 23, 2016.

**David M. Capozzi,**  
*Executive Director.*

For reasons stated in the preamble, 36 CFR part 1192 is amended as follows:

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

■ 1. The authority citation for part 1192 is revised to read as follows:

**Authority:** 29 U.S.C. 792 (b) (3); 42 U.S.C. 12204.

**Subpart A—General**

**§ 1192.3 [Amended]**

- 2. Amend § 1192.3 as follows:
  - a. In the definition of “Bus,” remove the phrase “other than an over-the-road bus,”; and
  - b. Remove the definitions of “Common wheelchairs and mobility aids,” “Demand responsive system,” “Designated public transportation,” “Fixed route system,” “New vehicle,” “Remanufactured vehicle,” “Specified public transportation,” and “Used vehicle.”

■ 3. In § 1192.4, revise paragraph (b), remove paragraph (c), and redesignate paragraph (d) as paragraph (c).

The revision reads as follows:

**§ 1192.4 General.**

\* \* \* \* \*

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

\* \* \* \* \*

**Subpart B—Buses, Over-the-Road Buses, and Vans**

- 4. Revise the heading for subpart B to this part to read as set forth above.
- 5. Revise § 1192.21 to read as follows:

**§ 1192.21 General.**

The accessibility guidelines for buses, over-the-road buses, and vans are set forth in Appendix A to this part.

**§§ 1192.23, 1192.25, 1192.27, 1192.29, 1192.31, 1192.33, 1192.35, 1192.37, NS 1192.39 [Removed]**

■ 6. Remove 1192.23, 1192.25, 1192.27, 1192.29, 1192.31, 1192.33, 1192.35, 1192.37, NS 1192.39.

**Subpart G—[Removed and Reserved]**

- 7. Remove and reserve subpart G, consisting of §§ 1192.151 through 1192.161.
- 8. Redesignate the appendix to part 1192 as appendix A to part 1192 and revise it to read as follows:

**Appendix A to Part 1192—Accessibility Guidelines for Buses, Over-the-Road Buses, and Vans**

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**Chapter 1: Application and Administration****T101 Purpose**

T101.1 Purpose. These Non-Rail Vehicle Guidelines, which consist of Chapters 1 through 7, contain scoping and technical requirements for new, used or remanufactured non-rail vehicles to ensure their accessibility to, and usability by, individuals with disabilities. The Non-Rail Vehicle Guidelines apply to the extent required by regulations issued by the Department of Transportation under the Americans with Disabilities Act, as amended (42 U.S.C. 12101 *et seq.*).

**T102 Conventions**

T102.1 Calculation of Percentages. Where the determination of the required size or dimension of an element involves ratios or percentages, rounding down for values less than one half shall be permitted.

**T102.2 Units of Measurement.**

Measurements are stated in U.S. and metric customary units. The values stated in each system (U.S. and metric customary units) may not be exact equivalents, and each system shall be used independently of the other.

T102.3 Vehicle Length. The length of non-rail vehicles shall be measured from standard bumper to standard bumper.

**T103 Definitions**

T103.1 Terms Defined in Referenced Standards. Terms defined in referenced standards and not defined in T103.4 shall have the meaning as defined in the referenced standards.

T103.2 Undefined Terms. Terms not specifically defined in T103.4 or in regulations issued by the Department of Transportation (49 CFR part 37) shall be given their ordinarily accepted meaning in the sense that the context implies.

T103.3 Interchangeability. Words, terms, and phrases used in the singular include the plural; and words, terms, and phrases used in the plural include the singular.

T103.4 Defined Terms. For the purpose of the Non-Rail Vehicle Guidelines, the following terms have the indicated meaning.

**Boarding platform.** A platform in a level boarding bus system raised above standard curb height in order to align vertically with the transit vehicle entry for level boarding and alighting.

**Fixed route service (or fixed route).**

Operation of a non-rail vehicle along a prescribed route according to a fixed schedule.

**Large transit entity.** A provider of public transportation that is required to report to the National Transportation Database (49 U.S.C. 5335), and that, for any given calendar year, reports to such database the operation of 100 or more buses in annual maximum service for all fixed-route service bus modes collectively, through either direct operation or purchased transportation.

**Large non-rail vehicle.** Non-rail vehicles that are more than 25 feet (7.6 m) in length.

**Level boarding bus system.** A system in which buses operate where some or all of the designated stops have boarding platforms and the design of boarding platforms and non-rail vehicles are coordinated to provide

boarding having little or no change in level between the vehicle floor and the boarding platform.

**Non-rail vehicle.** A self-propelled, rubber-tired vehicle used to provide transportation services and intended for use on city streets, highways, or busways that constitutes either a bus, over-the-road bus, or van.

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

**Small non-rail vehicle.** Non-rail vehicles that are equal to or less than 25 feet (7.6 m) in length.

**Surface discontinuities.** Differences in level between two adjacent surfaces. Elevation changes due to ramps or stairs do not, themselves, constitute surface discontinuities. However, abrupt changes in level on the walking surface of ramps or stairs are surface discontinuities.

**Chapter 2: Scoping Requirements****T201 Scope**

T201.1 General. Non-rail vehicles purchased, leased or remanufactured by entities covered by the Americans with Disabilities Act (ADA) shall comply with the requirements in the Non-Rail Vehicle Guidelines to the extent required by regulations issued by the Department of Transportation in 49 CFR Part 37.

T201.2 Reduction in Access Prohibited. No modifications to a non-rail vehicle shall be taken that decrease, or have the effect of decreasing, the net accessibility or usability of the vehicle below the requirements of the Non-Rail Vehicle Guidelines.

**T202 Accessible Means of Boarding and Alighting**

T202.1 General. Non-rail vehicles shall provide at least one means of accessible boarding and alighting that serves each designated stop on the fixed route to which the vehicle is assigned. Non-rail vehicles shall also provide at least one means of accessible boarding and alighting that can be deployed to the roadway. Provision of accessible boarding and alighting shall be made through one or more of the following methods: ramps or bridgeplates complying with T402, lifts complying with T403, or a means of level boarding and alighting complying with T404.

**T203 Steps**

T203.1 General. Steps on non-rail vehicles shall comply with T405.

**T204 Doorways**

T204.1 General. Doorways on non-rail vehicles shall comply with T204.

T204.2 Doorways with Lifts, Ramps or Bridgeplates. Doorways with lifts or ramps shall comply with T502.2.

T204.3 Doorways with Level Boarding and Alighting. Doorways with level boarding and alighting shall comply with T502.3.

T204.4 Doorways with Steps on Over-the-Road Buses. On over-the-road-buses,

doorways with steps shall comply with T502.4.

**T205 Illumination**

T205.1 General. Non-rail vehicles shall provide illumination complying with T503 at ramps, bridgeplates, doorways, and boarding and alighting areas.

**T206 Circulation Paths**

T206.1 General. Circulation paths in non-rail vehicles shall comply with T302.

**T207 Handrails, Stanchions, and Handholds**

T207.1 General. Non-rail vehicles shall provide handrails, stanchions, and handholds in accordance with T207. Handrails, stanchions, and handholds shall comply with T303.

T207.2 Passenger Doorways. Handrails or stanchions shall be provided at passenger doorways in a configuration that permits grasping and use from outside the non-rail vehicle and throughout the boarding and alighting process.

T207.3 Fare Collection Devices. Handrails shall be provided at fare collection devices and shall be configured so that they can be used for support when at the fare collection device.

T207.4 Circulation Paths. Handrails, stanchions, and handholds shall be provided along circulation paths in accordance with T207.4.

T207.4.1. Small vehicles. Handrails, stanchions, or handholds shall be provided within small non-rail vehicles in a configuration that permits onboard circulation and assistance with seating and standing.

T207.4.2. Large vehicles. Handholds or stanchions shall be provided within large non-rail vehicles on all forward- and rear-facing seat backs located directly adjacent to the aisle.

**Exception:** Where high-back seats are provided, handrails located overhead or on overhead luggage racks shall be permitted instead of stanchions or handholds.

**T208 Passenger Access Routes**

T208.1 General. Non-rail vehicles shall provide passenger access routes that permit boarding and alighting, onboard circulation, and seating by passengers with disabilities. A passenger access route shall consist of a route complying with T208.2 between wheelchair spaces and doorways, walking surfaces complying with T302, and clearances complying with T504.

T208.2 Connection to Doorways. A passenger access route shall connect each wheelchair space to doorways that provide a means of accessible boarding and alighting in accordance with T208.2.

T208.2.1 Doorways on One Side of vehicle. Where non-rail vehicles have doorways on one side, a passenger access route shall connect each wheelchair space to a doorway that provides a means of accessible boarding and alighting in accordance with T202.

T208.2.2 Doorways on Two Sides of vehicle. Where non-rail vehicles have doorways on two sides, a passenger access route shall connect each wheelchair space to

doorways on both sides of the vehicle that provide a means of accessible boarding and alighting in accordance with T202.

T208.2.3 Deployment to Roadway. A passenger access route shall connect each wheelchair space to a doorway providing a means of accessible boarding and alighting that can be deployed to the roadway in accordance with T202.

#### T209 Fare Collection Devices

T209.1 General. Where non-rail vehicles provide onboard fare collection devices, at least one fare collection device shall serve a passenger access route and comply with T505.

#### T210 Wheelchair Spaces

T210.1 General. Non-rail vehicles shall provide wheelchair spaces in accordance with T210.

T210.2 Large non-rail vehicles. Large non-rail vehicles shall provide at least two wheelchair spaces complying with T602.

T210.3 Small non-rail vehicles. Small non-rail vehicles shall provide at least one wheelchair space complying with T602.

T210.4 Location. Wheelchair spaces shall be located as near as practicable to doorways that provide a means of accessible boarding and alighting.

#### T211 Wheelchair Securement Systems

T211.1 General. Non-rail vehicles shall provide wheelchair securement systems complying with T603 at each wheelchair space.

#### T212 Seat Belts and Shoulder Belts

T212.1 General. Non-rail vehicles shall provide seat belts and shoulder belts complying with T605 at each wheelchair space.

#### T213 Seats

T213.1 General. Seats on non-rail vehicles shall comply with T213.

T213.2 Priority Seats. Non-rail vehicles operated in fixed-route service shall designate at least two seats as priority seats for passengers with disabilities. Priority seats shall be located as near as practicable to a doorway used for boarding and alighting. Where non-rail vehicles provide both aisle-facing and forward-facing seats, at least one of the priority seats shall be a forward-facing seat.

T213.3 Armrests at Aisle Seats on Over-the-Road Buses. Where armrests are provided on the aisle side of seats on over-the-road buses, folding or removable armrests shall be provided on the aisle side of at least 50 percent of aisle seats. Priority seats and moveable or removable seats permitted by T602.4.1 at wheelchair spaces shall be included among the fifty percent of seats with folding or removable armrests.

#### T214 Operable Parts

T214.1 General. Where provided for passenger use, operable parts at wheelchair spaces and priority seats, stop request systems, and fare collection devices serving passenger access routes shall comply with T304.

#### T215 Communication Features

T215.1 General. Communication features on non-rail vehicles shall comply with T215.

T215.2 Signs. Signs shall comply with 215.2.

T215.2.1 Priority Seats. Priority seats shall be identified by signs informing other passengers to make the seats available for persons with disabilities. Signs at priority seats shall comply with T702.

T215.2.2 Wheelchair Spaces. Wheelchair spaces shall be identified by the International Symbol of Accessibility complying with T703.

T215.2.3 Doorways. Doorways that provide a means of accessible boarding and alighting shall be identified on the exterior of the non-rail vehicle by the International Symbol of Accessibility complying with T703.

T215.2.4 Destination and Route Signs. Where destination or route signs are provided on the exterior of non-rail vehicles, such signs shall be located at a minimum on the front and boarding sides of the vehicle. The signs shall be illuminated and comply with T702.

T215.3. Public Address and Stop Request Systems. Large non-rail vehicles that operate in fixed route service with multiple designated stops shall provide public address and stop request systems in accordance with T215.3.

T215.3.1 Public Address Systems. Public address systems shall be provided within non-rail vehicles to announce stops and other passenger information.

T215.3.2 Stop Request Systems. Where non-rail vehicles stop on passenger request, stop request systems complying with T704.3 shall be provided.

T215.4 Automated Announcement Systems. Large non-rail vehicles operated in fixed route service with multiple designated stops by large transit entities shall provide automated stop announcement systems and automated route identification systems in accordance with T215.4.

T215.4.1 Automated Stop Announcement Systems. Automated stop announcement systems shall comply with T704.3.1.

T215.4.2 Automated Route Identification Systems. Automated route identification systems shall comply with T704.3.2.

### Chapter 3: Building Blocks

#### T301 General

T301.1 Scope. The requirements in Chapter 3 shall apply where required by Chapter 2 or where otherwise referenced in any other chapter of the Non-Rail Vehicle Guidelines.

#### T302 Walking Surfaces

T302.1 General. Walking surfaces in non-rail vehicles shall comply with T302.

*Exception:* Walking surfaces on lifts shall not be required to comply with T302.

T302.2 Slip Resistant. Walking surfaces shall be slip resistant.

T302.3 Openings. Openings in walking surfaces shall not allow the passage of a sphere more than  $\frac{5}{8}$  inch (16 mm) in diameter. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

*Exceptions:* 1. Wheelchair securement system components affixed to walking surfaces shall be permitted to have openings  $\frac{7}{8}$  inch (22 mm) maximum in width provided that, where such openings are more than  $\frac{5}{8}$  inch (16 mm) in width, they contrast visually with the rest of the walking surface either light-on-dark or dark-on-light.

2. Ramp and bridgeplate surfaces shall be permitted to have one opening  $1\frac{1}{2}$  inches (38 mm) maximum in width and  $4\frac{1}{2}$  inches (115 mm) maximum in length to allow the operator to grasp the ramp or bridgeplate for manual operation.

T302.4 Surface Discontinuities. Surface discontinuities shall be  $\frac{1}{2}$  inch (13 mm) high maximum and shall be beveled with a slope not steeper than 1:2.

*Exceptions:* 1. Surface discontinuities  $\frac{1}{4}$  inch (6.4 mm) high maximum shall not be required to be beveled.

2. Steps complying with T405 shall be permitted on walking surfaces that are not part of a passenger access route.

#### T303 Handrails, Stanchions, and Handholds

T303.1 General. Handrails, stanchions, and handholds in non-rail vehicles shall comply with T303.

T303.2 Edges. Edges shall be rounded or eased.

T303.3 Cross Section. Gripping surfaces shall have a cross section complying with T303.3.

T303.3.1 Seat-Back Handhold Cross Section. The cross section of seat-back handholds shall have an outside diameter of  $\frac{7}{8}$  inches (22 mm) minimum and 2 inches (50 mm) maximum.

T303.3.2 Handrail and Stanchion Circular Cross Section. Handrails and stanchions with a circular cross section shall have an outside diameter of  $1\frac{1}{4}$  inches (32 mm) minimum and 2 inches (50 mm) maximum.

T303.3.3 Handrail and Stanchion Non-Circular Cross Section. Handrails and stanchions with a non-circular cross section shall have a perimeter dimension of 4 inches (100 mm) minimum and  $6\frac{1}{4}$  inches (160 mm) maximum, and a cross section dimension of  $2\frac{1}{4}$  inches (57 mm) maximum.

T303.4 Clearance. Clearance between gripping surfaces and adjacent surfaces shall be  $1\frac{1}{2}$  inches (38 mm) minimum.

#### T304 Operable Parts

T304.1 General. Operable parts in non-rail vehicles shall comply with T304.

T304.2 Height. Operable parts shall be located 24 inches (610 mm) minimum and 48 inches (1220 mm) maximum above the floor of non-rail vehicles.

T304.3 Location. Operable parts provided at a wheelchair space shall be located adjacent to the wheelchair space 24 inches (610 mm) minimum and 36 inches (915 mm) maximum from the rear of the wheelchair space measured horizontally.

T304.4 Operation. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 lbf (22.2 N) maximum.

**Chapter 4: Boarding and Alighting****T401 General**

T401.1 Scope. The requirements in Chapter 4 shall apply where required by Chapter 2 or where otherwise referenced in any other chapter of the Non-Rail Vehicle Guidelines.

**T402 Ramps and Bridgeplates**

T402.1 General. Ramps and bridgeplates shall comply with T402. Ramps and bridgeplates shall be permitted to fold or telescope.

T402.2 Design Load. Ramps and bridgeplates 30 inches (760 mm) or more in length shall be designed to support a load of 600 pounds (273 kg) minimum, placed at the centroid of the ramp distributed over an area of 26 inches by 26 inches. The design load of ramps and bridgeplates less than 30 inches (760 mm) in length shall be 300 pounds (136 kg) minimum. The factor of safety for ramps and bridgeplates shall be 3 or more, based on the ultimate strength of the material.

T402.3 Installation and Operation. When used for boarding and alighting, ramps and bridgeplates shall be firmly attached to the non-rail vehicle to prevent displacement. Ramps and bridgeplates provided on large non-rail vehicles shall be permanently installed and power operated.

*Exception:* Ramps and bridgeplates on large non-rail vehicles that serve only designated stops with boarding platforms providing level boarding and alighting shall not be required to be permanently attached and power operated provided that portable ramps or bridgeplates capable of deployment to the roadway are carried onboard.

T402.4 Emergency Operation. Power-operated ramps and bridgeplates shall be capable of manual operation in the event of a power failure.

T402.5 Surfaces. Ramp and bridgeplate surface material shall comply with T302 and extend across the full width and length of the ramp or bridgeplate.

T402.6 Clear Width. The clear width of ramps and bridgeplates shall be 30 inches (760 mm) minimum.

T402.7 Edge Guards. Ramps and bridgeplates shall provide edge guards continuously along each side of the ramp or bridgeplate to within 3 inches (75 mm) of the end of the ramp or bridgeplate that is deployed furthest from the non-rail vehicle. Edge guards shall be 2 inches (51 mm) high minimum above the ramp or bridgeplate surface.

T402.8 Running Slope. The maximum running slope of ramps and bridgeplates shall comply with T402.8.1 or T402.8.2.

T402.8.1 Deployment to Roadways or to Curb Height Boarding and Alighting Areas. The running slope of ramps and bridgeplates used for deployment to the roadway or to curb-height boarding and alighting areas shall be 1:6 maximum, as measured to ground level with the non-rail vehicle resting on a flat surface.

T402.8.2 Deployment to Boarding Platforms. The running slope of ramps and bridgeplates used for deployment to platforms shall be 1:8 maximum, as measured to the boarding platform with the non-rail vehicle resting on a flat surface.

T402.9 Transitions. Vertical surface discontinuities at transitions from boarding and alighting areas to ramps and bridgeplates shall comply with T302.4.

T402.10 Visual Contrast. The perimeter of the walking surface on ramps and bridgeplates shall be marked by a stripe. The stripe shall be 1 inch (25 mm) wide minimum and shall contrast visually with the rest of the walking surface either light-on-dark or dark-on-light.

T402.11 Gaps. When ramps or bridgeplates are deployed for boarding and alighting, gaps between the ramp or bridgeplate surface and floor of non-rail vehicles shall not permit passage of a sphere more than 5/8 inch (16 mm) in diameter.

T402.12 Stowage. Where portable ramps and bridgeplates are permitted, a compartment, securement system, or other storage method shall be provided within the non-rail vehicle to stow such ramps and bridgeplates when not in use.

**T403 Lifts**

T403.1 General. Lifts shall comply with T403 and the National Highway Traffic Safety Administration's Federal Motor Vehicle Safety Standards (FMVSS) for public use lifts at 49 CFR 571.403 and 571.404.

T403.2 Boarding Direction. Lift platforms shall be designed to permit passengers who use wheelchairs the option to board the platforms facing either toward or away from the non-rail vehicle.

**T404 Level Boarding and Alighting**

T404.1 General. Boarding and alighting at boarding platforms in level boarding bus systems shall comply with T404.

T404.2 Vehicle Floor and Boarding Platform Coordination. The design of non-rail vehicles shall be coordinated with the boarding platforms to minimize the gap between the vehicle floor and the boarding platforms.

T404.3 Ramps and Bridgeplates. Where the space between the floor of non-rail vehicles and a boarding platform is greater than 2 inches (51 mm) horizontally or 5/8 inch (16 mm) vertically when measured at 50 percent passenger load with the vehicle at rest, non-rail vehicles shall provide ramps or bridgeplates complying with T402.

**T405 Steps**

T405.1 General. Steps shall comply with T405.

T405.2 Surfaces. Step tread surfaces shall comply with T302.

T405.3 Visual Contrast. The outer edge of step treads shall be marked by a stripe. The stripe shall be 1 inch (25 mm) wide minimum and shall contrast visually with the rest of the step tread or circulation path surface either light-on-dark or dark-on-light.

**Chapter 5: Doorways, Circulation Paths and Fare Collection Devices****T501 General**

T501.1 Scope. The requirements in Chapter 5 shall apply where required by Chapter 2 or where otherwise referenced in any other chapter of the Non-Rail Vehicle Guidelines.

**T502 Doorways**

T502.1 General. Doorways in non-rail vehicles shall comply with T502.

T502.2 Doorways with Lifts, Ramps or Bridgeplates. The vertical clearance at doorways with lifts, ramps or bridgeplates shall comply with T502.2. Vertical clearance shall be measured from the inside finished edge of the door opening to the highest point of the deployed lift, ramp or bridgeplate below.

T502.2.1 Over-the-Road Buses. For over-the-road buses, the vertical clearance at doorways shall be 65 inches (1650 mm) minimum.

T502.2.2 Other Vehicles. For other non-rail vehicles, the vertical clearance at doorways shall be 56 inches (1420 mm) minimum on small non-rail vehicles and 68 inches (1725 mm) on large non-rail vehicles.

T502.3 Doorways with Level Boarding. Doorways on non-rail vehicles designed for level boarding bus systems shall comply with T502.3.

T502.3.1 Clear Width. Doorways shall provide a clear opening of 32 inches (810 mm) minimum.

T502.3.2 Thresholds. Thresholds at doorways shall be marked by a stripe. The stripe shall be 1 inch (25 mm) wide minimum and contrast with the rest of the walking surface either light-on-dark or dark-on-light.

T502.4 Doorways with Steps on Over-the-Road Buses. On over-the-road buses, doorways with steps shall provide an opening with a clear width of 30 inches (760 mm) minimum.

*Exceptions:* 1. The door opening clear width above a height of 48 inches (1220 mm) measured from the lowest step tread shall be permitted to taper so as to reduce in width to 18 inches (457 mm) minimum.

2. Where compliance with T502.4 is not structurally feasible, the door opening clear width shall be permitted to be 27 in (685 mm) minimum.

3. Hinges and other door mechanisms shall be permitted to protrude 4 inches (100 mm) maximum into the door opening clear width at or below 48 inches (1220 mm) in height measured from the lowest step tread.

**T503 Illumination**

T503.1 General. Illumination shall be provided at ramps, bridgeplates, doorways, and boarding and alighting areas in accordance with T503. Lights shall be shielded so as not to project directly into the eyes of entering and exiting passengers.

T503.2 Ramps and Bridgeplates. When ramps or bridgeplates are deployed, the walking surface shall be lighted with 2 foot-candles (22 lux) minimum of illumination.

T503.3 Steps at Front Doorways. The walking surface on steps serving the front doorway of non-rail vehicles shall be lighted with 2 foot-candles (22 lux) minimum of illumination when the vehicle doors are open.

T503.4 Steps at Other Doorways. The walking surface on steps serving all other non-rail vehicle doorways shall be lighted at all times with 2 foot-candles (22 lux) minimum of illumination.

T503.5 Exterior Illumination for Boarding and Alighting Areas. Exterior lighting shall

be provided to illuminate walking surfaces of boarding and alighting areas when the doors of non-rail vehicles are open. Where doorways have steps, the illumination shall be 1 foot-candle (11 lux) minimum for a distance of 3 feet (915 mm) measured beyond the outside edge of the doorway or bottom step tread. Where doorways have ramps, bridgeplates or lifts, the illumination shall be 1 foot-candle (11 lux) minimum for a distance of 3 feet (915 mm) measured beyond the edge of the ramp, bridgeplate or lift farthest from the non-rail vehicle.

**T504 Passenger Access Routes**

**T504.1 General.** Passenger access routes shall provide clearances that are sufficient to permit passengers using wheelchairs to move between wheelchair spaces and doorways that provide accessible boarding and alighting, and to enter and exit wheelchair spaces.

**T505 Fare Collection Devices**

**T505.1 General.** Fare collection devices in non-rail vehicles shall comply with T505.  
**T505.2 Location.** Fare collection devices shall be located so as not to interfere with wheelchair movement along passenger access routes.  
**T505.3 Location of Operable Parts.** Operable parts shall be located so that they are reachable by passengers using wheelchair when parked in a clear space 30 inches (760 mm) wide minimum and 48 inches (1220 mm) long minimum. Operable parts shall be located adjacent to the toe end of the clear space or shall be located no more than 10 inches (255 mm) measured from the centerline of the long dimension of the clear space.

**Chapter 6: Wheelchair Spaces and Securement Systems**

**T601 General**

**T601.1 Scope.** The requirements in Chapter 6 shall apply where required by Chapter 2 or where otherwise referenced in any other chapter of the Non-Rail Vehicle Guidelines.

**T602 Wheelchair Spaces**

**T602.1 General.** Wheelchair spaces in non-rail vehicles shall comply with T602.  
**T602.2 Surfaces.** Wheelchair space surfaces shall comply with T302.  
**T602.3 Approach.** One full unobstructed side of each wheelchair space shall adjoin or overlap a passenger access route.  
**T602.4 Size.** Wheelchair spaces shall be 30 inches (760 mm) minimum in width and 48 inches (1220 mm) minimum in length.  
*Exception:* The portion of the wheelchair space occupied by wheelchair footrests shall be permitted to be located beneath another seat provided that space beneath the seat is

30 inches (760 mm) wide minimum, 9 inches (230 mm) high minimum, and 6 inches (150 mm) deep minimum.

**T602.5 Fold-Down or Removable Seats.** Fold-down or removable seats shall be permitted in wheelchair spaces, provided that, when folded up or stowed, they do not obstruct the minimum size of the wheelchair space specified in T602.4.

**T603 Wheelchair Securement Systems**

**T603.1 General.** Wheelchair securement systems in non-rail vehicles, including attachments, shall comply with T603.  
**T603.2 Orientation.** Wheelchair securement systems shall secure the wheelchair so that the occupant faces the front of the non-rail vehicle.

*Exception:* On large non-rail vehicles designed for use by both seated and standing passengers, rear-facing wheelchair securement systems shall be permitted provided that at least one wheelchair securement system is front facing.

**T603.3 Design Load.** Wheelchair securement systems shall comply with the design loads specified in T603.3.1 or T603.3.2, as applicable.

**T603.3.1 Non-Rail Vehicles with Gross Vehicle Weight Rating Equal to or Greater than 30,000 lbs.** On non-rail vehicles with a gross vehicle weight rating equal to or greater than 30,000 pounds (13,608 kg), wheelchair securement systems shall restrain a force in the forward longitudinal direction of 2,000 lbf (8,800 N) minimum for each wheelchair.

**T603.3.2 Non-Rail Vehicles with Gross Vehicle Weight Rating Less than 30,000 lbs.** On non-rail vehicles with a gross vehicle weight rating less than 30,000 pounds (13,608 kg), wheelchair securement systems shall restrain a force in the forward longitudinal direction of 5,000 lbf (22,000 N) minimum for each wheelchair.

**T603.4 Movement.** Wheelchair securement systems shall limit the movement of an occupied wheelchair to 2 inches (51 mm) maximum in any direction when secured in accordance with the manufacturer's instructions and when the non-rail vehicle is operating in normal conditions.

**T603.5 Securement Systems for Rear-Facing Wheelchair Positions.** Rear-facing wheelchair securement systems shall provide forward excursion barriers and padded head rests that comply with ISO 10865-1:2012(E), Wheelchair containment and occupant retention systems for accessible transport vehicles designed for use by both sitting and standing passengers—Part 1: Systems for rearward facing wheelchair-seated passengers, First Edition, June 5, 2012 [ISO Standard 10865-1:2012(E)]. ISO Standard 10865-1:2012(E) is incorporated by reference into this section with the approval of the Director of the Federal Register under 5

U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, a notice of change must be published in the **Federal Register** and the material must be made available to the public. All approved material is available for inspection at the U.S. Access Board, 1331 F Street NW., Suite 1000, Washington, DC 20004-1111, (202) 272-0080 (voice), (202) 272-0082 (TTY) and is available from the International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211, Geneva 20, Switzerland (<http://www.iso.org/iso/home/store.htm>). It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030, or go to [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).

**T604 Stowage**

**T604.1 General.** When wheelchair securement systems are not in use, the systems shall not protrude into the wheelchair space except as provided in T603.5, and shall not interfere with passenger movement or pose a hazard. Wheelchair securement systems shall be reasonably protected from vandalism, and shall be readily accessed then needed for use.

**T605 Seat Belts and Shoulder Belts**

**T605.1 General.** Seat belts and shoulder belts provided for passengers who use wheelchairs shall comply with 49 CFR 571.209. Seat belts and shoulder belts shall not be used in place of wheelchair securement systems complying with T603.

**Chapter 7: Communication Features**

**T701 General**

**T701.1 Scope.** The requirements in Chapter 7 shall apply where required by Chapter 2 or where otherwise referenced in any other chapter of the Non-Rail Vehicle Guidelines.

**T702 Signs**

**T702.1 General.** Signs on non-rail vehicles shall comply with T702.  
**T702.2 Character Style.** Characters shall be displayed in sans serif fonts and shall not use italic, oblique, script, highly decorative, or other unusual forms.  
**T702.3 Character Proportions.** Characters shall use fonts where the width of the uppercase letter "O" is 55 percent minimum and 110 percent maximum of the height of the uppercase letter "I".  
**T702.4 Character Height.** Character height shall comply with Table T702.4. Character height shall be based on the uppercase letter "I".

TABLE T702.4—CHARACTER HEIGHT

Sign location	Minimum character height
Exterior route or destination signs on boarding side of non-rail vehicle .....	2 inches (51 mm).
Exterior route or destination signs on front of non-rail vehicle .....	4 inches (100 mm).



TABLE T702.4—CHARACTER HEIGHT—Continued

Sign location	Minimum character height
Interior signs designating wheelchair spaces or priority seats, where baseline of character is equal to or less than 70 inches (1780 mm) above the non-rail vehicle floor.	5/8 inch (16 mm).
Interior signs designating wheelchair spaces, priority seats, stop announcements, or stop requests where baseline of character is more than 70 inches (1780 mm) above the non-rail vehicle floor.	2 inches (51 mm).

T702.5 Stroke Thickness. Stroke thickness of the uppercase letter “T” shall be 10 percent minimum and 30 percent maximum of the height of the character.

T702.6 Character Spacing. Character spacing shall be measured between the two closest points of adjacent characters, excluding word spaces. Spacing between individual characters shall be 10 percent minimum and 35 percent maximum of character height.

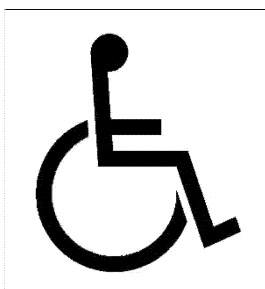
T702.7 Line Spacing. Spacing between the baselines of separate lines of characters within a message shall be 135 percent minimum and 170 percent maximum of the character height.

T702.8 Contrast. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background. Where provided, protective surfaces over signs shall have a non-glare finish.

*T703 International Symbol of Accessibility*

T703.1 General. The International Symbol of Accessibility shall comply with Figure T703.1. The symbol shall have a background field height of 4 inches (100 mm) minimum. The symbol and its background shall have a non-glare finish. The symbol shall contrast with its background with either a light symbol on a dark background or a dark symbol on a light background.

Figure T703.1 International Symbol of Accessibility



*T704 Announcement Systems*

T704.1 General. Non-rail vehicles shall provide announcement systems in accordance with T704.

T704.2 Stop Request Systems. Stop request systems shall comply with T704.3.

T704.2.1 Audible and visible notification.

Audible and visible notification shall be provided onboard indicating when passengers have requested to disembark at the next stop on the fixed route. Audible notifications shall be verbal or non-verbal signals and sound only once for each stop. Visible components of stop request systems shall include signs complying with T702, lights, or other visually perceptible indicators. Visible components shall illuminate or activate with a stop request, be viewable onboard from all wheelchair spaces and priority seats for passengers with disabilities, and extinguish when the doors open at a stop on non-rail vehicles.

T704.2.2 Operation. A mechanism for requesting stops shall be located at each wheelchair space and priority seat for passengers with disabilities. Operable parts on stop request systems shall comply with T304.

T704.3 Automated Announcement Systems. Automated systems for stop announcements and route identification announcements shall comply with T704.3.

T704.3.1 Automated Stop Announcements. Automated stop announcement systems shall provide audible and visible notification of upcoming stops on fixed routes. Stop announcements shall use synthesized, recorded or digitized speech and be audible within non-rail vehicles. Visible components of stop announcements shall consist of signs complying with T702. Signs shall be viewable onboard from all wheelchair spaces and priority seats for passengers with disabilities.

T704.3.2 Automated Route Identification Announcements. Automated route identification systems shall audibly and visibly identify the fixed route on which the non-rail vehicle is operating. Audible route identification announcements shall be broadcast externally at boarding and alighting areas using synthesized, recorded or digitized speech. Signs displaying route identification information shall be provided on the front and boarding sides of non-rail vehicles. Signs shall comply with T702.

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