ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD

36 CFR Part 1190

[Docket No. ATBCB 2011–0004]

RIN 3014–AA26

Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way

AGENCY: Architectural and Transportation Barriers Compliance Board.

ACTION: Final rule.

SUMMARY: The Architectural and Transportation Barriers Compliance Board (Access Board or Board) issues its final rule that provides minimum guidelines for the accessibility of pedestrian facilities in the public right-of-way. These guidelines, once adopted, would ensure that facilities used by pedestrians, such as sidewalks and crosswalks, constructed or altered in the public right-of-way by Federal, state, and local Governments are readily accessible to and usable by pedestrians with disabilities. When the guidelines are adopted, with or without modifications, as accessibility standards in regulations issued by other Federal agencies implementing the Americans with Disabilities Act, Section 504 of the Rehabilitation Act, and the Architectural Barriers Act, compliance with those enforceable accessibility standards is mandatory.

DATES: The final rule is effective September 7, 2023.

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SUPPLEMENTARY INFORMATION:

I. Executive Summary

The U.S. Access Board issues its final rule for accessibility guidelines for pedestrian facilities in public rights-of-way (PROWAG or guidelines). These guidelines are issued under Title II of the Americans with Disabilities Act of 1990 (ADA) and the Architectural Barriers Act of 1968 (ABA). Title II of the ADA applies to State and local government facilities, among others. The ABA applies to facilities constructed or altered by or on behalf of the Federal Government, facilities leased by Federal agencies, and some facilities built with Federal funds.

The purpose of these guidelines is to ensure that pedestrian facilities located in the public right-of-way are readily accessible to and usable by pedestrians with disabilities. Despite on-going efforts to improve access, pedestrians with disabilities throughout the United States continue to face major challenges in public rights-of-way because many sidewalks, crosswalks, and other pedestrian facilities are inaccessible. Equal access to pedestrian facilities is of particular importance because pedestrian travel is the principal means of independent transportation for many persons with disabilities.

Key accessible features of pedestrian facilities specified in these guidelines include:

Pedestrian Access Routes: Sidewalks, shared use paths and other pedestrian circulation paths must contain a ''pedestrian access route,'' which is required to be accessible to and traversable by individuals with disabilities. The portions of these sidewalks and paths that comprise the pedestrian access route must be wide enough to minimize the possibility of a pedestrian using a mobility device falling into a roadway when passed by another pedestrian. Pedestrian access routes have specified cross slopes and running slopes so that they are traversable by pedestrians using manual wheelchairs or other mobility aids without exhaustive effort. Surfaces of paths in the pedestrian access route must be firm, stable, and slip resistant, without large openings or abrupt changes in level. Objects may not hazardously protrude onto sidewalks, shared use paths, or other pedestrian circulation paths.

- *Alternate Pedestrian Access Routes:* When an entity closes a pedestrian access route for construction, it must provide a temporary alternate pedestrian access route with basic accessible features. Alternate pedestrian access routes ensure that construction in the public right-of-way does not prevent pedestrians with disabilities from reaching their destinations.
- *Accessible Pedestrian Signals:* All new and altered pedestrian signal heads installed at crosswalks must include ''accessible pedestrian signals'' (APS), which have audible and vibrotactile features indicating the walk interval so that a pedestrian who is blind or has low vision will know when to cross the street. Pedestrian push buttons must be located within a reach range such that a person seated in a wheelchair can reach them. The walk speed used to calculate the crossing time allows pedestrians with disabilities sufficient time to cross.
- *Crosswalks:* Curb ramps and detectable warning surfaces are required where a pedestrian circulation path meets a vehicular way. Crosswalks at multilane roundabouts and channelized turn lanes must have additional treatments that alert motorists to the presence of pedestrians or slow or stop traffic at those crosswalks.
- *Transit Stops:* Boarding and alighting areas at sidewalk or street level, as well as elevated boarding platforms, must be sized and situated such that a person with a disability can board and alight buses and rail cars. Pedestrian access routes must connect boarding and alighting areas and boarding platforms to other pedestrian facilities. Transit shelters must have clear space for use by a person in a wheelchair.
- *On-Street Parking:* On-street non-residential parking must have designated accessible parking spaces sized so that a person with a disability may exit a parked vehicle and maneuver to the sidewalk without entering a vehicular way. Standard size designated accessible on-street parking spaces must be situated near an existing crosswalk with curb ramps.

These minimum guidelines will become enforceable once they are adopted, with or without modifications, as mandatory standards under the ADA by the U.S. Department of Justice (DOJ) and the U.S. Department of Transportation (USDOT), or the four Federal agencies that set standards for the Federal Government under the Architectural Barriers Act—the U.S. Postal Service (USPS), General Services Administration (GSA), U.S. Department of Defense (DOD), and U.S. Department of Housing and Urban Development (HUD)).

II. Legal Authority and Need for Rulemaking

These guidelines are issued pursuant to the ADA and the Rehabilitation Act, which provide statutory authority for the Access Board to issue minimum accessibility guidelines to ensure that transportation facilities are usable by persons with disabilities. *See* 29 U.S.C. 792(b)(3)(B), 42 U.S.C. 12204. These guidelines serve as the minimum requirements for enforceable standards issued by other agencies pursuant to their responsibilities under the ADA and the ABA. 29 U.S.C. 792(b)(3)(B); 42 U.S.C. 4151 *et seq.*, 12134(c), 12149(b).

As described in the Rulemaking History section below, these final guidelines have been long awaited, particularly by state and local governments subject to Title II of the ADA. Both the Access Board's 2004

Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (2004 ADAAG/ABAAG), and the Board's initial 1991 Americans with Disabilities Act Accessibility Guidelines, were developed primarily for buildings and facilities on sites. 36 CFR part 1191; 56 FR 35408 (July 26, 1991). While some of the requirements can be readily applied to pedestrian facilities in the public right-of-way, others need substantial modification, and many issues specific to public rights-of-way were simply not addressed. Further, the magnitude of existing physical constraints in public rights-of-way poses unique considerations that are not present in the context of buildings and sites.

In the absence of final technical requirements for accessibility of pedestrian facilities, state and local governments have been left to determine on their own how to comply with the ADA's existing mandate to make public pedestrian transportation facilities accessible. The lack of final Federal standards has contributed to uncertainty about the relevant standards, which has resulted in courts determining technical requirements for accessibility, in some cases applying requirements for buildings and sites to public rights-of-way, although public rights-of-way are, for the most part, not specifically addressed by these standards (*see e.g., Kirola* v. *City & Cty. of S.F.,* 860 F.3d 1164 (9th Cir. 2017) (finding that ADAAG applies to public rights-of-way); *Fortyune* v. *City of Lomita,* 766 F.3d 1098 (9th Cir. 2014) (applying the 2010 ADA Standards to diagonal parking in public rights-of-way in the absence of enforceable accessibility standards for public rights-of-way); *see also Sarfaty* v. *City of L.A.,* No. 2:17–cv–03594–SVW–KS, 2020 U.S. Dist. LEXIS 40893 (C.D. Cal. Feb. 7, 2020) (concluding that neither PROWAG draft guidelines nor the 2010 ADA Standards are applicable to on-street parking).

In addition, the Federal Government similarly lacks accessibility criteria for public rights-of-way, although there are numerous Federal sites that contain public rights-of-way, such as national parks, medical and educational campuses, and military installations. Consequently, the Federal Government, which seeks to be a leader in accessibility, has been without clear, specific, enforceable technical standards for accessibility in public rights-of-way. These final accessibility guidelines for pedestrian facilities in public rights-of-way will serve as the technical basis of enforceable standards issued under the ABA by GSA, USPS, DoD, and HUD. *See* 29 U.S.C. 792(b)(3)(B); 42 U.S.C. 4151 *et seq.*

III. Rulemaking History

The Access Board began developing accessibility guidelines for pedestrian facilities in public rights-of-way shortly after the ADA was enacted in 1990. In 1992, the Board issued proposed guidelines for state and local government facilities, including pedestrian facilities in public rights-of-way, followed by interim guidelines in 1994 that also contained provisions for public rights-of-way. 57 FR 60612 (December 21, 1992); 59 FR 31676 (June 20, 1994).

In response to the proposed and interim guidelines, the Board received numerous public comments that indicated a need for further outreach, education, and research on accessible pedestrian facilities in public rights-of-way. Consequently, when the Board issued its first final guidelines for state and local government facilities in 1998, the requirements for pedestrian facilities in the public right-of-way were not included. 63 FR 2000 (January 13, 1998).

In 1999, the Access Board established a Federal advisory committee to recommend accessibility guidelines for pedestrian facilities in public rights-of-way. The committee included a wide range of stakeholders, including representatives of state and local governments, the transportation industry, disability rights advocacy organizations, and other interested groups.[1]

In 2001, the advisory committee presented its consensus recommendations to the Board. *See* U.S. Access Board, Building a True Community: Final Report of the Public Rights-of-Way Access Advisory Committee. (Jan. 10, 2001). Based on the advisory committee's recommendations, the Access Board developed draft accessibility guidelines for pedestrian facilities in the public right-of-way, which it made available for public review and comment in 2002. 67 FR 41206 (June 17, 2002). In 2005, the Board published revised draft guidelines, also seeking to gather data for a regulatory assessment of the guidelines' potential costs and benefits. 70 FR 70734 (November 23, 2005).

Following the 2005 release, the Access Board continued to further improve the draft guidelines, engaging numerous stakeholders and sponsoring research on various key provisions. The Access Board also engaged in substantial education and outreach efforts, conducting training programs around the country, and answering questions on its technical assistance hotline. In July 2007, the Public Rights-of-Way Access Advisory Committee released a 108-page planning and design guide for alterations based on the 2005 draft guidelines.

In July 2011, the Access Board initiated the instant rulemaking, issuing a Notice of Proposed Rulemaking for Accessibility Guidelines for Public Rights-of-Way (NPRM). *See* 76 FR 44664 (July 26, 2011); Notice of Proposed Rulemaking—Correction, 76 FR 45481 (July 29, 2011). The NPRM was supported by a regulatory analysis based in part on cost estimates provided through a 2010 interagency agreement with the Volpe National Transportation Systems Center (Volpe Center). *See* Regulatory Assessment of Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way & Appendix (June 2011); Volpe Center, ''Cost Analysis of Public Rights-of-Way Accessibility Guidelines'' (November 29, 2010), *both available at https://www.regulations.gov* in rulemaking docket (ATBCB–2011–0004).

The NPRM requested public comments on all provisions of the proposed Accessibility Guidelines for Public Rights-of-Way (proposed rule or proposed guidelines). In particular, the Access Board sought comments from regulated entities, including state and local governments, on the costs and impacts of certain portions of the proposed rule. The comment period ended on November 23, 2011, and was subsequently reopened until February 2,

[1] The following organizations were members of the advisory committee: AARP, America Walks, American Association of State Highway and Transportation Officials, American Council of the Blind, American Institute of Architects, American Public Transit Association, American Public Works Association, Association for Education and Rehabilitation of the Blind and Visually Impaired, Bicycle Federation of America, Californians for Disability Rights, Canadian Standards Association (Technical Committee on Barrier-Free Design), City of Birmingham (Department of Planning, Engineering and Permits), Council of Citizens with Low Vision International, Disability and Business Technical Assistance Centers, Disability Rights Education and Defense Fund, Federal Highway Administration, Hawaii Commission on Persons with Disabilities, Hawaii Department of Transportation, Institute of Traffic Engineers (now called Institute of Transportation Engineers), Los Angeles Department of Public Works (Bureau of Street Services), Massachusetts Architectural Access Board, Municipality of Anchorage, National Center for Bicycling and Walking, National Council on Independent Living, National Federation of the Blind, New York State Department of Transportation, Paralyzed Veterans of America, Portland Office of Transportation, San Francisco Mayor's Office on Disability, State of Alaska, TASH, Texas Department of Transportation, and The Seeing Eye.

2012.[2] During the two comment periods, 460 commenters submitted approximately 600 comments. The Board also held public hearings in Dallas, Texas and Washington, DC in fall 2011.

On February 13, 2013, the Board issued a supplemental notice of proposed rulemaking (SNPRM) announcing its intent to add requirements for shared use paths (SUPs) to the proposed guidelines for pedestrian facilities in the public right-of-way.[3] 78 FR 10110 (Feb. 13, 2013). The SNPRM specified which provisions of the proposed rule would be changed to include requirements for SUPs. During the 90-day comment period that followed, 55 commenters provided feedback on the provisions outlined in the SNPRM.

The Board carefully reviewed the public comments received in response to the NPRM and SNPRM, consulted with DOJ and USDOT, and revised the rule text for final publication. In 2015, the Board entered into a second interagency agreement with the Volpe Center to assess costs of the final provisions. However, in January 2017, in response to Executive Order 13771 (January 30, 2017), which required that agencies identify two regulations for elimination for every new regulation proposed and that the total incremental cost of any new regulations and deregulatory actions be zero, the Board ceased work on the PROWAG final rule. Staff shifted efforts to education, outreach, and technical assistance. From 2017 through 2022, Board staff addressed hundreds of technical assistance inquiries related to PROWAG.

In 2021, following issuance of E.O. 13992 (January 20, 2021), which rescinded E.O. 13771, the Board resumed work on the PROWAG rulemaking and entered into a final interagency agreement with the Volpe Center to prepare the final regulatory impact analysis (FRIA). The FRIA is available in the docket for this rulemaking on regulations.gov and on the Access Board's website, *www.access-board.gov.*

In consideration of the FRIA, public comments and testimony, feedback from other Federal agencies, and many years of close collaboration with stakeholders, the Access Board now issues these final guidelines on accessible pedestrian facilities in the public right-of-way.

IV. Summary of Significant Changes

The significant changes to the final rule text from the versions proposed in the NPRM and SNPRM are as follows:

• *Alterations.* There are three major changes with the way alterations are treated in the final rule. First, any portion of a pedestrian facility that is altered must be altered to comply with these guidelines regardless of the intended ''scope of the project'' by the entity undertaking the alteration (R201.1). This approach is consistent with the way accessibility guidelines for buildings and sites are applied. The change is described in the Major Issues section below.

Second, in the final rule, facilities and portions of facilities that are ''added'' to an existing, developed public right-of-way are ''alterations,'' and are subject to the requirements for altered facilities (*see* R104.3; R201.1; R202). This includes that compliance with the requirements is required to the maximum extent feasible where existing physical constraints make compliance with the applicable requirements technically infeasible (R202.3). In the proposed rule, added elements were treated as new construction and subject to full compliance with all applicable requirements regardless of existing physical constraints (NPRM R202.2). This change is addressed in the Major Issues section below.

Third, altered facilities must be connected to an existing pedestrian circulation path by a pedestrian access route (R202.2). In the proposed rule, only select alterations required a connection; however, to ensure that pedestrians with disabilities can realize the benefits of an altered pedestrian facility that is made accessible consistent with these guidelines, the final rule requires all altered facilities to connect to a pedestrian circulation path.

• *Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD).* In the final rule, MUTCD provisions are not incorporated by reference. The Board proposed to incorporate by reference various sections of the MUTCD in the NPRM. As explained in the major issues section below, this created confusion as to the application of those provisions in the context of PROWAG. Consequently, the Board has stated all required technical provisions directly in the rule text, many of which were taken from the MUTCD, as explained in the Section-by-Section discussion below.

• *Alterations that Trigger Installation of Accessible Pedestrian Signals.* In the NPRM, the Board indicated that the alteration of a signal controller and software, or the replacement of a signal head, would trigger the requirement to install an accessible pedestrian signal (NPRM R209.2). Upon consideration of public comments, the Access Board acknowledges the diverse nature of alterations that affect pedestrian signals, and declines in the final guidelines to list specific actions that trigger the requirement to install accessible pedestrian signals. Rather, pedestrian signals are subject to the same alteration requirements as other pedestrian facilities. The entity making the alteration will assess, according to requirements in the guidelines as adopted by USDOT and DOJ, whether installation of an accessible pedestrian signal is required. The Board notes that USDOT and DOJ may provide further specifics as to alterations triggering installation of APS in their rulemakings adopting these guidelines.

• *Crosswalk Treatments at Roundabouts.* The final rule expands the crosswalk treatment options among which jurisdictions must select for installation at multilane pedestrian crossings at roundabouts to include: a traffic control signal with a pedestrian signal head, a pedestrian hybrid beacon, a pedestrian actuated rectangular rapid flashing beacon, and a raised crossing. This change is discussed in the Major Issues section below.

V. Summary of Comments and Major Issues Raised by Commenters

A. Overview of Commenters

In response to the NPRM, 460 commenters submitted approximately 600 comments on the provisions of the proposed rule, including 25 state departments of transportation and highway administrations, 2 state utility organizations, and 1 state transit

[2] Before the NPRM's initial comment period ended on November 23, 2011, three national associations of local elected officials requested that the Access Board extend the comment period to allow local governments additional time to respond to the proposed rule. A national association of engineering companies also requested an extension of the comment period. The Access Board thus reopened the comment period through February 2, 2012. See Notice of Proposed Rulemaking—Reopening of Comment Period, 76 FR 75844 (Dec. 5, 2011).

[3] In March 2011, the Board issued an advance notice of proposed rulemaking announcing its intent to develop accessibility guidelines for SUPs and noted that it was considering including the SUP requirements in the guidelines for pedestrian facilities in the public right-of-way. 76 FR 17064, 17070 (March 28, 2011). The Board initially determined that SUPs would be addressed in a separate rulemaking, and thus did not include SUPs in the proposed public right-of-way guidelines. However, upon further consideration, the Board determined that SUPs were sufficiently similar to other pedestrian circulation paths such that they should be included in the final rule for pedestrian facilities in the public right-of-way. The Board then issued the SNPRM informing the public of its decision to include SUPs in the proposed guidelines and soliciting comments regarding the specific provisions that would apply to SUPs. 78 FR 10110 (Feb. 13, 2013).

authority. Eighty-seven local government organizations commented, including city and county departments of transportation, engineering, public works, and planning; city councils and mayor's offices; and highway districts and transit authorities.

The Access Board received comments from approximately 255 individuals commenting on their own behalf, including persons with a range of disabilities who will directly benefit from these guidelines, and mobility specialists with experience teaching persons with disabilities how to navigate public rights-of-way. Individual commenters also included numerous civil engineers and planners with expertise in the design and construction of pedestrian facilities.

In addition, the Access Board received comments from representatives of approximately 90 organizations including national and local disability rights advocacy organizations, engineering companies, law firms involved in ADA litigation, professional associations, and pedestrian and citizen advocacy organizations.

In addition to soliciting written comments, the Board also held two public hearings on the proposed rule. NPRM, 76 FR at 44664. In Dallas, Texas, on September 12, 2011, twelve witnesses testified regarding the proposed guidelines. See PROW NPRM Public Hearing, Dallas, Sept. 2011, Docket ID ATBCB–2011–0346. Witnesses included engineers and architects, local government officials, and disability rights advocates, among others. Id. Fifteen individuals testified at a public hearing in Washington, DC on November 9, 2011, including representatives from organizations working with people with disabilities, private industry, and professional associations. *See* Transcript from PROW NPRM, Docket ID ATBCB–2011–0607.

In response to the SNPRM to add shared use paths to the proposed rule, the Access Board received comments from 55 commenters. Eighteen state and local government entities commented, as well as seven disability rights organizations, three engineering companies, four citizens' organizations, and two industry associations. In addition, over 20 individuals, including industry professionals and persons with disabilities, responded to the SNPRM.

The Access Board appreciates the robust and thoughtful public response to the PROWAG rulemaking, and carefully considered all testimony and comments received in response to both the NPRM and the SNPRM. Commenters provided feedback on many specific provisions of the proposed rule. The majority of these comments are addressed in the Section-by-Section Analysis in Section VI of this preamble. However, numerous commenters raised concerns regarding four issues: the application of the guidelines to new construction and alterations; the requirements regarding accessible pedestrian signals; the requirement for pedestrian signals or pedestrian hybrid beacons at roundabouts; and the extension of the leveling out of intersections to pedestrian crossings. The Board addresses these major issues below.

B. Major Issues

1. Application of the Guidelines to New Construction and Existing Facilities

Treatment of New Construction, Added Facilities, and Alterations

In the proposed rule, the Board identified three types of pedestrian facilities subject to PROWAG: newly constructed facilities, added facilities, and altered facilities. The NPRM specified that newly constructed and added facilities were subject to full compliance with PROWAG (NPRM R201.1; NPRM R202.2), while alterations were expected to comply to the maximum extent practicable where existing physical constraints make it impracticable to fully comply (NPRM R202.3.1).

These three classifications of facilities were carried over from the accessibility guidelines for buildings and sites, where they have been used successfully for many years. 69 FR 44083, 36 CFR part 1191 (July 23, 2004) and 56 FR 35408 (July 26, 1991). However, in response to the PROWAG NPRM, the Board received comments from state DOTs and others indicating confusion as to how to distinguish between new, added, and altered facilities in the public right-of-way. In addition, since publication of the NPRM, the Board has regularly received technical assistance inquiries from individuals seeking to determine whether a particular public right-of-way construction project must fully comply with requirements for new construction or is subject to considerations for existing physical constraints for alterations.

The Board concurs that the distinctions between new construction, added facilities, and alterations, which are readily apparent in construction of a building, are not as clear in the public right-of-way. For example, under the language of the NPRM, a jurisdiction might consider the extension of a sidewalk an alteration of an existing pedestrian facility or alternatively an addition of a new pedestrian facility. The level of compliance with accessibility requirements might hinge on that characterization.

In determining how to resolve this confusion in the final rule, the Board considered comments from state DOTs, local government entities, an association of engineering companies, and the American Association of State Highway and Transportation Officials (AASHTO) indicating that any construction in existing public rights-of-way should be subject to considerations for existing physical constraints, highlighting that existing storm and sanitary sewer infrastructure, utilities, and adjacent developed facilities may make full compliance with the guidelines impossible.

In the final rule, the Board has defined ''alteration'' as ''a change to or an addition of a pedestrian facility in an existing developed public right-of-way that affects or could affect pedestrian access, circulation, or usability'' (R104.3). In so defining ''alteration,'' the Board has revised the requirements for added facilities, now allowing them to comply to the maximum extent feasible where existing physical constraints make compliance with applicable requirements technically infeasible (R202.3). The Board has also provided a definition for ''developed'' as ''[c]ontaining buildings, pedestrian facilities, roadways, utilities, or elements'' (R104.3). Taken together, the Board expects full compliance with the requirements for new construction on undeveloped land (*i.e.,* greenfield), while any construction undertaken in an existing developed right-of-way is expected to comply to the maximum extent feasible where existing physical constraints make compliance with applicable requirements technically infeasible. The Board has concluded that these expectations for compliance are reasonable in light of existing infrastructure in developed rights-of-way, and the opportunity for full compliance in a new public right-of-way built on undeveloped land.

Alterations vs. Maintenance

In response to the NPRM, the Board received several comments seeking clarity on what types of roadwork would constitute an ''alteration'' within the meaning of the rule. The proposed guidelines defined ''alteration'' as ''[A] change to a facility in the public right-of-way that affects or could affect pedestrian access, circulation, or use. Alterations include, but are not limited to, resurfacing, rehabilitation, reconstruction, historic restoration, or changes or rearrangement of structural

parts or elements of a facility'' (NPRM R105.5).

One state department of transportation, four local government entities, a national parks and recreation organization, and an individual engineer commenter requested further clarification on the definition of ''alteration,'' or additional examples.

Much of the concern centered on the Board's inclusion of the example of ''resurfacing.'' Five states and AASHTO, seven local government entities, various organizations associated with the construction industry, an independent Federal agency, and an engineering company expressed concern that ''resurfacing'' was included in the definition of alteration and sought additional information on the definition of ''resurfacing.'' These commenters were concerned that ''maintenance'' operations and ''pavement preservation'' would trigger an obligation to comply with these guidelines.

Since the publication of the NPRM, this issue has largely been resolved. In 2013, DOJ and USDOT issued joint guidance clarifying when resurfacing is considered an ''alteration'' for purposes of ADA Title II compliance and specifying the types of treatments that are considered maintenance. *See* DOJ and USDOT, Department of Justice/ Department of Transportation Joint Technical Assistance on Title II of the Americans with Disabilities Act Requirements to Provide Curb Ramps when Streets, Roads, or Highways are Altered through Resurfacing (July 8, 2013), *available at https://www.ada.gov/doj-fhwa-ta.htm; see also* Q & A Supplement to the 2013 DOJ/DOT Joint Technical Assistance on the Title II of the ADA Requirements To Provide Curb Ramps when Streets, Roads, or Highways are Altered through Resurfacing, *available at https://ada.gov/doj-fhwa-ta-supplement-2015.html.*

The Board's revised definition of ''alteration'' in the final rule omits the examples of specific roadway treatments, deferring to USDOT's and DOJ's joint technical assistance as to which treatments and types of construction are considered alterations for purposes of enforcement of their standards. However, the Board here clarifies that where a roadway treatment is determined to be an alteration, compliance with PROWAG is triggered and the technical requirements apply, regardless of the ''scope of the [alteration] project.'' The elimination of the ''scope of the project'' language from the final rule is discussed below.

Scope of the Project

The proposed guidelines indicated that where existing elements are altered, each altered facility ''within the scope of the project'' must be made to comply with the guidelines (NPRM R202.3). One state and several local government entities requested clarification on the intended meaning of ''scope of the project,'' and disability rights advocacy organizations expressed concern that regulated entities may define the scope of the project to avoid compliance. The Board has thus removed this language from the final rule.

Under the final rule, altered portions of existing pedestrian facilities are expected to comply with the requirements (R201.1). This means that the portion of a pedestrian facility that is altered is expected to comply with all applicable technical requirements. Where existing physical constraints make compliance with applicable requirements technically infeasible, compliance with these requirements is required to the maximum extent feasible (R202.3). This is the same approach that is employed in the 2004 ADA and ABA Accessibility Guidelines for buildings and sites.

Existing Physical Constraints

Section R202.3.1 of the NPRM stated that where existing physical constraints make full compliance with these guidelines ''impracticable,'' alterations must comply with the technical specifications of these guidelines to the ''extent practicable.'' The proposed section R202.3.1 provided examples of existing physical constraints, including ''underlying terrain, right-of-way availability, underground structures, adjacent developed facilities, drainage, or the presence of a notable natural or historic feature.''

Numerous commenters expressed varying concerns about section R202.3.1 of the proposed rule. One state public utility commission, four local government entities, and an engineering firm requested that the Access Board provide further explanation of the meaning of ''extent practicable'' and one state DOT recommended replacing the term with ''maximum extent practicable.'' A disability rights advocacy organization requested a requirement for full compliance with the guidelines unless ''technically infeasible.'' Three disability rights advocacy organizations and two individuals expressed concern that the language describing existing physical constraints was too broad or might be used as an excuse to deviate from the technical requirements. Three state DOTs and one local government entity requested clarification on ''right-of-way availability'' as an existing physical constraint and wondered whether they would be expected to obtain additional right-of-way.

In the final rule, the Board has replaced the term ''impracticable'' with ''technically infeasible'' and ''extent practicable'' with ''maximum extent feasible,'' which are the terms used in the 2004 ADA and ABA Accessibility Guidelines. *See e.g.,* 36 CFR part 1191, App. B, 202.3 Exception 2. The Board acknowledges that ''impracticable'' and ''extent practicable'' were intended to be interpreted in the same way as ''technically infeasible'' and ''maximum extent feasible,'' and the use of different terms was creating confusion. The expectation is that in the context of alterations, entities are responsible for compliance with applicable technical requirements to the maximum extent feasible where existing physical constraints make compliance with those requirements technically infeasible.

The Board also eliminated ''right-of-way availability'' as an example of an existing physical constraint. The Board acknowledges that in many cases regulated entities have authority to acquire additional right-of-way, which made it a confusing example of an existing physical constraint. DOJ and USDOT may provide further information as to any expectations that entities acquire additional right-of-way to meet accessibility requirements.

A disability rights advocacy organization requested that the Board apply the ''primary function'' and ''path of travel'' requirements from the 2004 ADA and ABA Accessibility Guidelines. 36 CFR part 1191, App. B 202.4. In addition, a local chapter of a national public works association, seven local government entities, and a disability rights advocacy organization would like the final rule to contain a 20% threshold for determining whether the cost of providing accessibility features is disproportionate to the overall cost of the alteration.[4] The Board points

[4] Section 202.4 of the 2004 ADA and ABA Guidelines states that an alteration that affects or could affect the usability of or access to an area containing a primary function shall be made so as to ensure that, to the maximum extent feasible, the path of travel to the altered area, including the rest rooms, telephones, and drinking fountains serving the altered area, are readily accessible to and usable by individuals with disabilities, unless such alterations are disproportionate to the overall alterations in terms of cost and scope as determined under criteria established by the Attorney General. In existing transportation facilities, an area of primary function shall be as defined under regulations published by the Secretary of the Department of Transportation or the Attorney General. 36 CFR part 1191, App. B, § 202.4.

commenters to the detailed explanation in the preamble to the NPRM as to why the primary function area and path of travel concepts are not appropriate for pedestrian rights-of-way. 76 FR 44664, 44672 (July 26, 2011).

Existing Facilities

Several commenters expressed concern about their obligations under Title II of the ADA and Section 504 of the Rehabilitation Act for existing facilities that are not altered. *See* 28 CFR 35.150 (containing DOJ accessibility requirements for state and local governments' existing facilities); see also 49 CFR 27.11(c) (requiring recipients of USDOT Federal financial assistance to undertake accessibility compliance planning). When DOJ and USDOT conduct rulemaking to include accessibility standards for pedestrian facilities in the public right-of-way in regulations implementing Title II of the ADA and Section 504 of the Rehabilitation Act, they will address the application of their accessibility standards to existing facilities that are not altered. Comments concerning existing facilities that are not altered should be directed to DOJ and USDOT at that time. These guidelines address only new construction and alterations of existing facilities, and are voluntary until adopted by other agencies, with or without modifications, as enforceable standards.

2. Accessible Pedestrian Signals

Scoping for Accessible Pedestrian Signals

Accessible Pedestrian Signals are devices that communicate information about pedestrian signal timing in non-visual formats such as audible tones, speech messages, and/or vibrating surfaces (R104.3). In the NPRM, the Board proposed that all new and altered pedestrian signals conform to the requirements for accessible pedestrian signals in sections 4E.08 through 4E.13 of the MUTCD (NPRM R209.1).

Several entities submitted comments opposing universal installation of accessible pedestrian signals. Eight state and three local government entities advocated for their jurisdictions' more limited practices with respect to determining where accessible pedestrian signals should be installed: six states and one local government installed accessible signals upon citizen request or as part of planned upgrades; one state and one local government consulted with mobility specialists or disability advocacy groups before installing an accessible pedestrian signal in a given location; one state only installed accessible pedestrian signals where a substantial population of blind individuals is known to travel, such as near a school for students who are blind; one city installed accessible pedestrian signals within a quarter mile of light rail stations, and elsewhere upon request.

Two local governments, while not stating a current practice, indicated that they would like to work with organizations representing the ''low vision community'' to determine where accessible signals should be installed. Fifteen other local government commenters and six individual commenters from the engineering industry, and an association of city transportation engineers preferred that the guidelines leave the decision as to whether to install accessible pedestrian signals to ''engineering judgment,'' as specified in the MUTCD. A national organization of transportation officials expressed that the guidelines should require accessible pedestrian signals only where there is a demonstrated need. Three states and two cities indicated that they already provide accessible pedestrian signals whenever possible when new pedestrian signals are installed, or existing signals are altered.

This requirement for the installation of accessible pedestrian signals was also one of the proposed provisions of PROWAG that generated the most public support. More than 115 commenters, including disability rights organizations, individuals with disabilities, and mobility specialists, supported the proposed requirement.

Upon careful consideration of the comments, as well as the costs and benefits of this requirement, the Board has decided to retain in the final rule scoping specifying that accessible pedestrian signals be installed wherever new pedestrian signals are provided, and whenever pedestrian signals are altered. Accessible pedestrian signals are crucial to the independent movement of individuals who are blind or have low vision throughout public rights-of-way.[5] Over time this requirement will make accessible pedestrian signals ubiquitous throughout the United States, allowing people who are blind or have low vision to undertake independent pedestrian travel to any destination where pedestrian facilities exist. Anything less than a universal requirement is unlikely to achieve a uniform nationwide result.

The Board has assessed the incremental costs associated with the installation of accessible pedestrian signals. FRIA at 46. The Board acknowledges that the requirement for universal installation of APS is the single most costly provision of PROWAG. *Id.* However, it is the provision expected to provide the greatest advance in equity for persons who are blind or have low vision, as the use of accessible pedestrian signals is one of the accessibility features of public rights-of-way that has not been uniformly adopted across the United States. The Board has assessed the costs and benefits of this requirement and is confident that the combination of the monetizable and unmonetizable benefits greatly outweigh the costs. *See* FRIA at 129.

Specific changes to language of the provision are addressed in the section-by-section analysis below.

Alterations of Accessible Pedestrian Signals

In the NPRM, the Board specified alteration of the signal controller and software, and replacement of a signal head as alterations that would trigger

DOJ's 2010 ADA Standards state in part that alterations made to provide an accessible path of travel to the altered area will be deemed disproportionate to the overall alteration when the cost exceeds 20% of the cost of the alteration to the primary function area. 28 CFR 35.151(b)(4)(iii)(A).

[5] The Access Board acknowledges a historical difference of opinion between advocacy organizations for people who are blind as to the need for accessible pedestrian signals. The Board further notes that this difference of opinion has diminished over time. In the NPRM, the Access Board observed that in response to the 2002 draft guidelines, two thirds of commenters identifying themselves as being blind or having low vision supported installation of accessible pedestrian signals. 76 FR at 44676. In response to the NPRM, commenters indicating a vision disability overwhelmingly expressed support for accessible pedestrian signals. In 2001, the National Federation of the Blind (NFB) opposed universal installation of accessible pedestrian signals on the grounds that they were unnecessary in most circumstances, and that the sounds emitted by accessible signals interfered with detection of vehicles through audible cues. *See* Public Rights of Way Advisory Committee, Building a True Community, Minority Report. 153 (January 10, 2001). However, even at that time, the NFB noted changing features of public rights-of-way that complicated the traditional reliance on traffic noises for navigation, including quieter cars, complex signal intersections, wide streets, and the use of pedestrian actuated signals. *Id.* In response to the NPRM, the NFB advised that it now supports the use of accessible pedestrian signals when installed in consultation with the blind community. *See* NFB, Public Comment, ATBCB–2011–0004–0251, available at *www.regulations.gov.* The Access Board notes that accessible pedestrian signals must be equally available to all individuals, whether or not they are affiliated with or known to any particular advocacy organization or civic group. The Board observes that the American Council of the Blind strongly supports the installation of accessible pedestrian signals wherever pedestrian signals exist. *See* American Council of the Blind, Public Comment, ATBCB–2011–0004–0341, available at *www.regulations.gov.*

installation of an accessible pedestrian signal consistent with the technical requirements (NPRM R209.2). The Access Board received numerous comments disagreeing with the proposed provision. Ten state departments of transportation and 28 local government entities responded, in addition to five professional organizations. These commenters indicated that neither altering a signal controller and software, nor replacing a signal head offers an opportunity to convert an existing pedestrian signal to an accessible pedestrian signal. Some of these commenters were concerned that under the proposed language, a minor modification or repair could result in an extensive project to upgrade an entire intersection. Others worried that they would have to forgo regular software upgrades provided by signal manufactures unless they intended to convert existing equipment to accessible pedestrian signals.

Four disability rights advocacy organizations, one pedestrian advocacy organization, and four individuals supported the proposed specifications regarding specific actions that should trigger installation of accessible pedestrian signals, and requested that the Access Board add other triggering actions in the final rule. The National Committee on Uniform Traffic Control Devices (NCUTCD) recommended requiring installation of accessible pedestrian signals when traffic signal equipment modification or timing changes affect the ability of a pedestrian with a disability to be aware of the change. *See* NCUTCD, Public Comment, ATBCB–2011–0004–0477, available at *www.regulations.gov.* NCUTCD cited reduction of walk time or pedestrian clearance, and installation of modified turn phasing as examples of such changes that should warrant conversion to an accessible pedestrian signal. *Id.*

The Access Board proposed the requirements of section R209.2 to ensure that accessible pedestrian signals would be installed during alteration projects. Upon consideration of public comments, the Access Board acknowledges the diverse nature of alterations that affect pedestrian signals, and declines in the final guidelines to specify specific actions that trigger the requirement to install accessible pedestrian signals. Rather, pedestrian signals are subject to the same alteration requirements as other pedestrian facilities. The entity making the alteration will assess, according to requirements in the guidelines as adopted by USDOT and DOJ, whether installation of an accessible pedestrian signal is required. The Board notes that USDOT and DOJ may provide further specifics as to alterations triggering installation of APS in their rulemakings adopting these guidelines.

3. Pedestrian Crossing Treatments at Roundabouts

In the NPRM, the Board proposed a requirement for installation of an accessible pedestrian actuated signal at multilane pedestrian street crossings[6] at roundabouts (NPRM Section R306.3.2). In an advisory issued with the proposed rule, the Board indicated that a Pedestrian Hybrid Beacon (PHB) could be used in lieu of a standard pedestrian signal.[7]

Roundabouts present unique challenges for pedestrians who are blind. At roundabouts, entering and exiting vehicles yield, but do not stop. The continuous traffic flow removes many of the audible cues that pedestrians who are blind use to navigate pedestrian street crossings. Without signals that periodically stop vehicles, pedestrians must assess when there is a sufficient gap in traffic to cross. Sighted pedestrians visually assess the distance and speed of on-coming cars to decide when they should cross. However, pedestrians who are blind or have low vision are not able to identify breaks in on-coming traffic by sight and lack the audible cues that might otherwise substitute for visible information.

The Board included the requirement for an accessible pedestrian signal or an accessible PHB at multilane pedestrian street crossings at roundabouts to make those complex pedestrian street crossings accessible to people who are blind or have low vision. At multilane roundabouts, pedestrians who are blind or have low vision face additional challenges. While a vehicle in the lane nearest the curb might stop for a pedestrian who is blind, the stopped vehicle may mask the audible cues of a car in the next lane that does not yield. *See* Transportation Research Board, NCHRP Report 674: Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities, 6 (2011), *available at https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_674.pdf. https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_674.pdf. https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_674.pdf.* As a result, pedestrians who are blind take substantially more time to locate a crossing opportunity and make more errors in assessing such opportunities than sighted pedestrians. *Id.* To address these challenges, the proposed rule specified a requirement for a pedestrian actuated signal to be provided at all multilane pedestrian street crossings at roundabouts.

The Access Board received numerous comments on this proposed provision. Five state departments of transportation, eleven local government entities, two professional associations for engineers, three engineering companies, and two individuals opposed a universal requirement for the proposed pedestrian treatments at multilane roundabouts. These commenters opined that engineering judgement and/or warrant criteria should be used on a case-by-case basis to determine whether a pedestrian treatment is appropriate at a given roundabout crossing. Two states, seven local government entities, a local public works association, and AASHTO opposed the requirement on the grounds that pedestrian signals and PHBs will create a false sense of safety for pedestrians as drivers who would not be expecting signals at roundabouts would fail to yield to pedestrians.

One state, five local government entities, and a professional association related to the construction industry expressed concern that the addition of pedestrian signals or PHBs would defeat the purpose of using roundabouts instead of traditional intersections. Specifically, these commenters noted that roundabouts keep traffic continuously flowing, reduce air pollution from idling vehicles, reduce accidents, and may cost less to build as compared to fully signalized intersections. Three local government entities expressed concern that PHBs would be confusing to motorists in parts of the country where, at the time the comments were submitted, they were not frequently used. Three state departments of transportation, eight local government entities, a transportation engineering firm, and a public works professional association found the proposed provision too restrictive as written and urged the Access Board to consider other pedestrian crossing treatments such as raised crosswalks and rapid rectangular flashing beacons (RRFBs).

Many other commenters supported the proposed requirement for signals or PHBs at multilane pedestrian street crossings at roundabouts. Two municipalities, seven disability rights advocacy organizations, two pedestrian

[6] In the final rule, the term ''crosswalk'' has been substituted for ''pedestrian street crossing'' to use terminology consistent with the MUTCD.

[7] Pedestrian Hybrid Beacons (PHBs) are a special type of hybrid beacon used to war and control traffic at an unsignalized location to assist pedestrians in crossing a street at a marked crosswalk (R104.3).

advocacy organizations, one engineering firm, and 99 individuals, including persons with disabilities, mobility specialists, and others, supported the proposed provision. Three disability rights organizations requested that the final rule require signals or PHBs at all roundabouts, including single lane pedestrian crossings. Two researchers who generally supported the proposed rule also encouraged further study on other acceptable treatments, such as raised crosswalks and RRFBs.

The Access Board considered all of the comments submitted regarding pedestrian treatments at roundabouts. In addition to the comments, the Board considered relevant research on alternate pedestrian treatments such as raised crosswalks and RRFBs. Raised crosswalks are marked pedestrian crossings on elevated speed tables that require a driver to slow down to cross the speed table. Because drivers must slow their vehicles to traverse the raised crossing, they are more likely to yield to pedestrians waiting to cross. RRFBs are flashing yellow rectangular lights that are activated by the pedestrian and supplement a pedestrian warning sign. The flashing beacons draw a driver's attention to the pedestrian in the crosswalk, increasing the likelihood that the driver will yield to the pedestrian. Unlike the PHB, neither the raised crosswalk nor the RRFB provide the driver with a ''stop'' signal. Rather, they bring increased awareness to the presence of a pedestrian.

National Cooperative Highway Research Program Project 674 assessed the use of PHBs and raised crosswalks at a multilane roundabout by blind pedestrians in Golden, Colorado. *See* Transportation Research Board, NCHRP Report 674: Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities 6 (2011), *available at https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_674.pdf.* Researchers found positive effects on decision making regarding crossings by blind pedestrians using both types of treatments. *Id.*

A study undertaken by Western Michigan University confirmed the effectiveness of PHBs at multilane roundabouts and showed that RRFBs could be effective in some instances. *See* Dept. of Blindness and Low Vision Studies, Western Michigan University et al., Road Commission for Oakland County PHB and RRFB Study: Final Report, 5–7 (October 5, 2011) *available at https://www.rcocweb.org/DocumentCenter/Home/View/99* (indicating that RRFBs installed at two-lane roundabout entries had a positive impact on decision making by blind pedestrians as to assessing when to cross; however, RRFBs were less effective at two-lane roundabout exits and three-lane roundabouts).

A Federal Highway Administration (FHWA) study found further support for the conclusion that under certain circumstances, RRFBs can be effective at providing accessibility for pedestrian crossings at multilane roundabouts. FHWA, Pub. No. FHWA–SA–15–69, Evaluation of Rectangular Rapid-Flashing Beacons (RRFB) at Multilane Roundabouts, 34 (2015, Updated 2020) *available at https://safety.fhwa.dot.gov/intersection/roundabouts/fhwasa15069.pdf.*

The Board also reviewed Transportation Research Board-sponsored research on crossing solutions at roundabouts and channelized turn lanes for pedestrians who are blind or have low vision. *See* Transportation Research Board, NCHRP 3–78b: Guidelines for the Application of Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities, Final Project Report (2016) *available at https://itre.ncsu.edu/wp-content/uploads/sites/2/2017/04/NCHRP-03-78b_Final-Guidelines.pdf; see also* Transportation Research Board, NCHRP 834: Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities, A Guidebook (2017) *available at https://www.trb.org/Main/Blurbs/175586.aspx.*

Multilane roundabouts remain highly complex crossings for pedestrians who are blind or have low vision. In light of the lack of clear audible cues at these crossings and the additional challenges posed by the geometry of multilane crossings in these locations, in the final rule the Board has retained the requirement for an enhanced crosswalk treatment at each multilane pedestrian crossing at roundabouts. However, based on commenter feedback and the Board's review of available research, the final rule includes three treatment options for crosswalks at roundabouts, in addition to standard accessible pedestrian signals: PHBs, raised crosswalks, and RRFBs. All three treatments demonstrated positive effects over untreated crossings in the research studies described above. While the three treatments did not perform identically in each research study, the Board finds that each treatment was effective in certain scenarios. The final rule requires that, like other accessible pedestrian signals, all new and altered PHBs provide audible and vibrotactile information in addition to visible cues, and all new and altered RRFBs provide audible information communicating that the warning lights are flashing.

The Board notes that research on single lane roundabouts indicates that certain single lane roundabouts pose challenges to pedestrians with disabilities attempting to cross. *See* David A. Guth et. al., *Blind and Sighted Pedestrians' Road Crossing Judgments at a Single-Lane Roundabout,* 55 Human Factors, 632 (June 2013). However, it is not clear from the limited available research, whether all single lane roundabouts, or only those with certain characteristics, pose barriers to safe crossing for pedestrians who are blind such that enhanced crossing treatments are required. USDOT plans to undertake additional research to study the conditions under which single lane crossings at roundabouts present challenges for pedestrians who are blind.

4. Leveling Out of Intersections Extended Through Pedestrian Crossings

In the NPRM, the Board proposed to require that the grade of pedestrian access routes in crosswalks not exceed 5% (NPRM R302.5.1). The proposed rule also limited the cross slope of pedestrian access routes to 2% (NPRM R302.6), and the cross slope of pedestrian access routes contained within crosswalks at approaches without yield or stop control to 5% (NPRM R302.6.1). The effect of these provisions was to require that in new construction, the leveling out of streets at intersections be extended to crosswalks. It is common practice to level out streets at intersections so that the slope of a street does not present a significant cross slope to the intersecting roadway. AASHTO recommends that at intersections, grades in excess of three percent should be avoided. *See* AASHTO, Policy on Geometric Design of Highways and Streets at 9–34.

The cross slope of a crosswalk is the same as the grade of the roadway that runs through it. Where traffic is required to slow down at a crosswalk because there is a device such as a stop or yield sign, the grade of the road (and the cross slope of the crosswalk) can be flatter because vehicles move more slowly through the crosswalk. However, where traffic will flow across a crosswalk without slowing or stopping, such as during a green light or at an intersection without any traffic control device, abrupt changes in the grade of the road should be minimized to prevent a vehicle from jolting or bottoming out on the grade change in hilly areas.

The proposed rule specified cross slope of pedestrian street crossing in

new construction and alterations according to the type of traffic control provided at the intersection. At NPRM section R302.6.1, the proposed guidelines called for a maximum 5% cross slope for pedestrian street crossings ''without yield or stop control.'' In an advisory at R302.6.1, the Board explained that crossings ''without yield or stop control'' refer to those crossings that do not have a stop or yield sign, or alternately have a traffic signal that is ''designed for the green phase.'' The Board further clarified that crossings ''without yield or stop control'' are those intersections where ''vehicles can proceed through the intersection without slowing or stopping.'' Proposed provision R302.6 provided for a 1:48 maximum cross slope for other pedestrian street crossings at intersections, which would include those with a stop or yield sign, or other type of traffic control device requiring a full stop or yield.

In response to the NPRM, ten state entities, six local government entities, eight individuals from the engineering and planning industry, and one engineering firm indicated that the Board should use clearer language to distinguish between the types of crossings. Thus, in the final rule, the Board has separated the requirements according to the type of traffic control at the crosswalk: crosswalk with yield or stop control devices (R302.5.2.1); crosswalk at an uncontrolled approach (R302.5.2.2); crosswalk with traffic control signal or PHB (R302.5.2.3); and midblock and roundabout crosswalks (R302.5.2.4).

Many commenters expressed concern about the application of the cross slope provisions in alterations. Three state departments of transportation and one local government entity were concerned that changes in signalization alone, without any construction to the roadway itself, would trigger a requirement to comply with the cross slope requirements at pedestrian crossings. Two states, one association representing state departments of transportation, one local government, and one engineer pointed out that signalization of intersections change over time and questioned whether the requirement should be tied to a fluid marker. The local government and engineer commenters noted that while 5% maximum cross slope might be acceptable at the time of new construction, once more houses and facilities are built around an intersection warranting a stop sign, the requirement would shift to 2%. Commenters noted that a 2% maximum cross slope is less easily achieved in an alteration than in new construction. The Board notes that an alteration to a traffic control device would not necessarily trigger a requirement to comply with cross slope requirements at that crosswalk if the crosswalk is not being altered.

One state expressed concern that resurfacing roadways would trigger a requirement to regrade intersections. A local government indicated that retrofitting cross slopes of existing crossings would have more than minimal impacts, and another local government requested that existing crossings be entirely exempted from the requirement. Four organizations associated with the construction and public works industries expressed concern about the cost of compliance for existing intersections. One state was not sure that it could meet the cross slope requirements given existing infrastructure. Seven local government entities expressed that altering intersections to comply with cross slope requirements would be ''unreasonable,'' ''burdensome,'' ''impractical,'' ''difficult,'' or ''not feasible without major reconstruction.''

The Board acknowledges that full compliance with the cross slope requirements for crosswalks, which is expected in new construction, may be challenging in some alterations due to existing physical constraints. In alterations, compliance with R302.5.2 is required to the maximum extent feasible where existing physical constraints, as discussed in R202.3, make compliance technically infeasible. If existing curbs, gutters, sidewalks, and utilities are not part of the facility being altered, they are generally considered ''adjacent developed facilities'' which are a type of existing physical constraint under R202.3 that could constrain the technical feasibility of compliance with R302.5.2. Thus, if a public entity is not otherwise altering the adjacent developed facilities as part of its crosswalk alteration and those existing physical constraints would make compliance with R302.5.2 technically infeasible, then compliance is required to the maximum extent feasible without needing to alter the adjacent developed facilities.

The Board notes, however, that when alterations are made to crosswalks, R203.6.2 requires curb ramps or blended transitions to be provided on both ends of the crosswalk where a pedestrian access route crosses a curb, thus making such curb ramps or blended transitions part of the crosswalk being altered. Accordingly, existing curb ramps and blended transitions are not considered existing physical constraints under R202.3. Similarly, existing curbs within the crosswalk where there is no curb ramp or blended transition, are not considered existing physical constraints under R202.3.

The Board has assessed the costs of compliance with the crosswalk cross slope requirements in the FRIA. *See* FRIA at 114. In light of the existing physical constraints provision at R202.3, the application of which to R302.5.2 is described above, as well as the large number of jurisdictions whose design guidance for crosswalk cross slope already meets the PROWAG technical requirements, the Board believes commenters' concerns that this requirement is ''unreasonable,'' ''burdensome,'' or ''not feasible without major reconstruction'' to be based on a misunderstanding of the requirements. Further, the Board regards the accessibility of crosswalks, where individuals with disabilities are present in vehicular ways, to be critical in ensuring equitable use of pedestrian facilities.

Several state and local jurisdictions objected to the technical requirements themselves. One state department of transportation indicated that a 3% maximum cross slope is appropriate for pedestrian crossings with stop and yield control, and 6% maximum is appropriate for other crossings. Two local government entities recommended 5% maximum cross slope for all crossings. Another state agreed with a grade limitation on side streets, but not through streets, which would eliminate restrictions on cross slope of pedestrian crossings spanning through streets. Another state DOT commented that regrading pedestrian crossings is costly and problematic for vehicles, and preferred that tabling not be required. Three local government entities, a public works association, and an association of engineering professionals expressed concern that the cross slope requirements will create a ''roller coaster'' street profile or ''jolt'' vehicles as they pass over pedestrian crossings. The Board disagrees that the technical requirements, when properly implemented, will result in the engineering concerns expressed by some commenters. Further, the Board observes that if an entity can demonstrate that the unique characteristics of the underlying terrain of a specific newly designed intersection preclude full compliance with the cross slope requirements, under DOJ's Title II regulations under the ADA, full compliance with the cross slope requirements may not be required. *See* 28 CFR 35.151. In alterations, where compliance is technically infeasible,

alterations must comply with requirements to the maximum extent feasible (R202.3). In addition, the Board has provided an exception for the grade of crosswalks where superelevation exceeds 5% (R302.4.3).

Other commenters supported the proposed requirements. A professional organization of mobility specialists for people who are blind requested that the Board encourage tabling wherever feasible. A pedestrian advocacy organization asserted that 2% should be the maximum cross slope for all pedestrian crossings. A non-profit accessible design organization also indicated that 2% maximum cross slope should be the standard for all pedestrian crossings, noting that a 5% cross slope is too steep for many manual wheelchair users.

After careful review of the comments, the Board has retained the substantive cross slope requirements for crosswalks as proposed. A cross slope of 1:48 (2.1%) is well established in accessibility guidelines as the appropriate maneuverable cross slope for most individuals in manual wheelchairs and persons with balance impairments. *See, e.g.,* Uniform Federal Accessibility Standards (UFAS), 49 FR 31528 (Aug. 7, 1984) and the 2004 ABA and ADA Accessibility Guidelines, 36 CFR part 1191.

The Board notes that if the 1:48 cross slope ratio were expressed as a percentage to the nearest hundredth, the relevant percentage would be 2.08%. This percentage has been expressed as 2.1% in the regulatory text due to the limitations of current digital measuring tools commonly used in sidewalk construction, which would round 2.08% to 2.1%.

In these guidelines, the Board balances accessibility with engineering considerations. The Board has assessed the costs of compliance with the crosswalk cross slope requirements in the FRIA. *See* FRIA at 114.

5. MUTCD

The proposed guidelines incorporated by reference portions of the 2009 edition of the USDOT Federal Highway Administration's (FHWA's) Manual on Uniform Traffic Control Devices (MUTCD), which is the standard for traffic control devices used throughout the United States. The incorporated sections included several definitions and technical requirements for alternate pedestrian access routes and accessible pedestrian signals and push buttons (NPRM R105.2; R205; R209.1).

Several disability rights advocacy organizations objected to this approach. Two organizations objected to the Access Board's use of the MUTCD in lieu of creating its own technical specifications for these regulated features, while others did not oppose the use of the MUTCD standard but felt that the relevant text of the MUTCD should be reproduced within the guidelines or in an appendix. A variety of commenters urged the Access Board to include the full text of MUTCD definitions for specified terms incorporated by reference.

The National Technology Transfer and Advancement Act requires Federal agencies to use technical standards developed by voluntary consensus standards organizations to carry out policy objectives. 15 U.S.C. 3701 *et seq.* Wherever practical and appropriate, government adoption of voluntary standards reduces the burden of compliance with Federal regulations on regulated entities, and also reduces costs to the government. *See generally,* Office of Management and Budget (OMB), Circular A–119. The MUTCD was developed as a voluntary consensus standard for traffic control devices and was subsequently adopted by the FHWA as a national standard. *See* FHWA, Evolution of MUTCD, *available at https://mutcd.fhwa.dot.gov/kno-history.htm.* States must adopt the content of the MUTCD within two years of issuance. 23 CFR part 655, subpart F.

Consistent with its statutory obligations and OMB guidance to reduce the burden on regulated entities, the Access Board uses existing technical standards where possible to meet its policy objectives. Accordingly, the Board proposed incorporation by reference of the MUTCD sections. However, upon review of the comments, and after over a decade of providing technical assistance on the application of those provisions, the Board concurs with commenters that incorporating MUTCD provisions by reference does not provide sufficient clarity for a mandatory standard.

Specifically, the Board notes that the MUTCD contains several types of provisions, some of which are mandatory standards and some of which are guidance, options, and supporting explanations. The Board proposed to incorporate by reference the standards, but further indicated that the guidance, options, and support statements must be used to interpret the standards. The NPRM further stated that if there were any differences between the MUTCD and the proposed rule, the proposed rule applied. Upon review, and in light of the comments, it is clear that this approach does not provide sufficient specificity to achieve uniform nationwide accessibility. In addition, application of the MUTCD relies heavily on engineering judgement, which further invites the possibility of subjective determinations of the need for specific accessibility features.

In the final rule, the Board has addressed this confusion by eliminating all references to the MUTCD and including the specific definitions and requirements directly in the rule text. The technical provisions and the definitions included in the rule text adhere closely to substantive requirements of the MUTCD. The origin of the substantive requirements, and any deviations from the MUTCD, are explained in the Section-by-Section discussion below.

The Board notes that four state DOTs and three local government commenters expressed concern that these guidelines ''conflict'' with the MUTCD. One state DOT and two local governments indicated that where MUTCD and these guidelines differ, the MUTCD should apply. Two state DOTs commented that if certain treatments are required for accessibility purposes, they should be contained in the MUTCD. Another state department of transportation observed that the MUTCD and the guidelines should not be interpreted as conflicting.

In the development of this final rule, the Access Board consulted representatives from USDOT's Federal Highways Administration, which issues the MUTCD. In addition, the Access Board reviewed USDOT's proposed rule to update the MUTCD. National Standards for Traffic Control Devices; the Manual on Uniform Traffic Control Devices for Streets and Highways; Revision, 85 FR 80898 (proposed Dec. 14, 2020)(to be codified at 23 CFR parts 470, 635, and 655). When USDOT undertakes its own rulemaking to adopt these guidelines as enforceable standards, USDOT will determine how to ensure that there is no ''conflict'' within its own regulations.

VI. Section-by-Section Analysis

A. Structural Changes to the Rule Text

To improve clarity of the rule text, the Board made some non-substantive structural changes. First, while not a change to the rule text itself, the advisories that appeared with the proposed rule text have been removed. The Access Board no longer publishes advisories in the Code of Federal Regulations (CFR) as the information contained in those advisories is guidance, not mandatory requirements. The Access Board will provide guidance on its website to assist regulated parties understand and properly implement the final enforceable standards that are

issued by the standard-setting agencies. In some areas, information that previously appeared in an advisory has been moved to the rule text. Those instances are discussed in the section-by-section discussion below.

Second, as previously noted, the Board eliminated incorporation by reference of portions of the MUTCD, opting instead to state the requirements directly in the PROWAG rule text. The Board agreed with numerous commenters who indicated that stating the requirements in the rule text would provide greater clarity. Substantive changes relating to the specific MUTCD sections referenced in the proposed rule are discussed in their respective sections below.

B. Chapter 1: Application and Administration

R101 Purpose and Application

The final rule contains scoping and technical requirements that ensure that pedestrian facilities located in public rights-of-way are readily accessible to and usable by pedestrians with disabilities. This includes both pedestrian facilities in a street or highway right-of-way and pedestrian facilities located in an independent right-of-way or easement, such as a shared use path. These scoping and technical requirements apply to facilities covered by both the ADA and the ABA and become mandatory once adopted for enforcement by another Federal agency issuing regulations implementing the ADA, Section 504 of the Rehabilitation Act, or the ABA.

The intent of this section has not changed from what was proposed in the NPRM; however, the text has been edited for clarity. Specifically, R101.1 states that the guidelines apply to public rights-of-way, including a public right-of-way that forms the boundary of a site or that lies within a site. This clarification is provided so that jurisdictions understand that these guidelines apply to public rights-of-way that may also be part of a ''site,'' and thus subject to 36 CFR 1191. *See* CFR part 1191, App. B, 106.5 & App. C F106.5 (defining ''site'' as a ''parcel of land bounded by a property line or a designated portion of a public right-of-way''). Where a public right-of-way is part of a site covered by the ABA or Title II of the ADA, these guidelines apply to the public right-of-way portion of that site.

As stated in the Major Issues section above, these guidelines do not address existing facilities unless they are altered at the discretion of a covered entity. DOJ's and USDOT's regulations implementing these guidelines under the ADA, will address requirements for existing pedestrian facilities in the public right-of-way.

R102 Deviations From These Guidelines

This section, titled ''Equivalent Facilitation'' in the proposed rule, states that under the ADA, the use of alternative designs, products, or technologies that result in substantially equivalent or greater accessibility and usability than the proposed guidelines is permitted. The Access Board has added language clarifying that the use of alternative designs, products, or technologies is not permitted for facilities subject to the ABA. The Board has also added a provision at R102.2 explaining that under the ABA, deviations from an enforceable standard issued by GSA, HUD, DoD, or USPS require an approved waiver or modification, which is issued by the standard-setting agency upon a determination that the waiver or modification is ''clearly necessary.'' *See* 42 U.S.C. 4156.

R103 Conventions

R103.1 Conventional Industry Tolerances

Conventional industry tolerances apply where dimensions are not stated as a range. The final rule clarifies that dimensions that are stated as having a specific minimum or maximum endpoint are considered a range. For example, a cross slope specified as ''1:48 (2.1%) maximum'' is considered a range from zero to 1:48 (2.1%). Designing to a dimension below the maximum allows for construction inaccuracies without the need for a tolerance.

Several engineers and state DOTs requested that we provide a list of specific tolerances. Tolerances are determined by the industry for the material used. It would not be beneficial to codify specific tolerances in these guidelines that cannot be easily updated when revised by industry. The Board also received comments requesting guidance on how measurements should be taken to assess compliance and others expressing concern about how construction variations would be treated in enforcement scenarios. These concerns should be directed to the enforcing agencies when they issue their proposed rules.

R103.2 Calculation of Percentages

Where the required number of elements or facilities to be provided based on the specified ratio or percentage is not a whole number, the result is rounded up to the next whole number. For example, if a group of five benches is provided at a location that is not a transit stop or shelter, R209.6.2 requires 50% of the benches to provide clear space complying with R404. Since 50% of five is 2.5, the result is rounded up and three benches would be required to provide the clear space.

In the final rule, the Board has omitted the proposed sentence indicating that rounding down for values less than one half is permitted where the determination of the required size or dimension of an element or facility involves ratios or percentages. The Board notes the potential for misinterpretation of this sentence as allowing a regulated entity to round down the measurement of a slope, for example a cross slope of 2.44%, to a whole number. The Board further notes that while this provision is included in the 2004 ABA and ADA Accessibility Guidelines, it has long been a source of confusion. Notably, the Board received a comment from a local government entity erroneously applying this provision to the walking speed used to determine pedestrian signal timing.

R103.3 Units of Measurement

Linear measurements in these guidelines are stated in both U.S. customary units and metric units. Slopes are expressed in both ratios and percentages. Each system should be used independently and consistently, as they may not be exact equivalents.

In the proposed rule, slope measurements were stated only in percentages, which in most cases had been rounded to whole numbers. For consistency with the 2004 ADA and ABA Accessibility Guidelines, which expresses slope only in ratios, in the final rule slopes are expressed in both ratios and percentages. The practical effect of this change is that slopes stated as 2 percent in the proposed rule are 1:48 (2.1%) in the final rule, which is the ratio used in the 2004 ADA and ABA Accessibility Guidelines. The Board has elected to state percentages to one decimal place for ease of implementation, as current digital measuring tools commonly used in sidewalk construction typically provide measurements to one decimal place.

R104 Definitions

This was section 105 in the NPRM but was redesignated as section 104 when the Board deleted proposed section 104 as the result of the decision to eliminate the reference to the MUTCD in favor of providing the actual language from the MUTCD (sometimes as modified) throughout the rule.

R104.1 Undefined Terms

The proposed rule indicated that undefined terms are defined using a collegiate dictionary in the sense that the context implies. The final rule implements the Board's current standard approach to undefined terms, stating that undefined terms shall be given their ordinary meaning in the sense that the context implies.

R104.2 Interchangeability

This provision states that the plural and singular forms of a word are used interchangeably in these guidelines.

R104.3 Defined Terms

The Board's decision to include all substantive requirements in the final rule text in lieu of incorporating MUTCD provisions by reference has resulted in significant expansion of the number of defined terms in these guidelines. The proposed rule text, as modified by the SNPRM, included 17 definitions and nine MUTCD definitions that were incorporated by reference.

In addition, the proposed rule specified that terms appearing in the sections of the MUTCD that were incorporated by reference would have the meanings as stated in the definition section of the MUTCD. In moving MUTCD requirements and definitions that had been previously incorporated by reference directly into the rule text, the Board also added to the rule text the relevant defined terms from MUTCD that appeared in these sections.

The Board also added several terms to provide clarity to the rule text and removed a few defined terms that were no longer needed in light of revisions to the proposed rule. In total, the final rule has 52 defined terms, which are identified throughout the rule text in italic font.

The following terms were added from the MUTCD, either verbatim, or with minimal edits made for clarity: Accessible Pedestrian Signal, Crosswalk, Highway, Median, Pedestrian, Pedestrian Interval Change, Pedestrian Hybrid Beacon, Pedestrian Signal Head, Push Button, Push Button Locator Tone, Roadway, Roundabout, Sidewalk, Splitter Island, Traveled Way, and Walk Interval. The following additional terms, which have definitions that are not taken from MUTCD, have been added to provide further clarity to the rule text: Block Perimeter, Boarding Platform, Building, Curb, Detectable Warning Surface, Developed, Grade, Parallel Curb Ramp, Passenger Loading Zone, Pedestrian Activated Warning Devices, Pedestrian Refuge Island, Perpendicular Curb Ramp, Ramp, Stair, Standard Curb Height, Street,[8] Transit Shelter, Transit Stop, Transitional Segment, and Vibrotactile.

A few proposed defined terms have been removed from the final rule:

- ''Facility,'' a term and definition that came from ADAAG, has been replaced by ''pedestrian facility'' and a corresponding definition that more accurately reflects how the term is used in PROWAG. In addition, the reference to ''elements'' was removed from the definition of pedestrian facility, since elements are components of a pedestrian facility.
- ''Island,'' which was proposed to be incorporated by reference from MUTCD, has been replaced by ''Pedestrian Refuge Island'' with a corresponding definition that clarifies the characteristics that make an island suitable for pedestrian refuge (specifically, that the traversable path of the island be at least 72 inches long in the direction of travel to allow sufficient space for two detectable warning surfaces, separation of those surfaces, and space for a pedestrian to wait).
- ''Intersection,'' which was proposed to be incorporated by reference from MUTCD, has been eliminated from the defined terms. The Board concluded that future regulated entities, specifically state and local departments of transportation, can readily identify an intersection, and that reproducing the highly technical MUTCD definition of intersection in the rule text would not provide additional clarity.
- ''Vertical Surface Discontinuities'' was eliminated entirely from the rule text. In the final rule, this concept is expressed in the relevant provisions as ''changes in level,'' which is a widely understood requirement of ADAAG.

In the final PROWAG rule text, most of the original definitions that were proposed have been edited for clarity as follows:

- *Accessible:* The word ''facility,'' which is no longer a defined term, has been replaced with ''pedestrian facility'' and ''element.''
- *Alteration:* The defined term now also includes ''altered.'' As explained in the Major Issues section above, the definition has been edited to clarify that an addition of a pedestrian facility to an existing, developed right-of-way is considered an alteration within the requirements of PROWAG. Several commenters requested edits to or clarifications regarding the examples that were included in the proposed definition. The Board has removed the examples from the definitions. Providing examples, if necessary, is better left to the enforcing agencies.
- *Blended Transition:* This definition has been revised to more accurately describe the portion of a pedestrian access route that is a blended transition, and to differentiate blended transitions from curb ramps.
- *Cross Slope:* The word ''grade'' has been changed to slope, which reflects more typical usage.
- *Curb Line:* The word ''highway'' was removed for clarity, as ''street'' sufficiently conveys the concept.
- *Curb Ramp:* The edited definition clarifies that the words ''parallel'' and ''perpendicular'' are stated relative to the curb or street that curb ramps serve.
- *Element:* The word ''pedestrian facility'' has been substituted for ''facility,'' reflecting the substitution of defined terms, as described above.
- *Grade Break:* The term ''running slope'' has been substituted for ''grade'' for consistency in the way these terms are used throughout the rule text.
- *Operable Part:* The phrase ''interact with the element'' has been added to as a use of an operable part. This addition is designed to cover QR codes and any other markings that are intended to be scanned with a mobile device.
- *Pedestrian Access Route:* The term ''accessible'' has been added to clarify that the pedestrian access route is the portion of a pedestrian circulation path that complies with the pedestrian access route accessibility requirements in these guidelines. The phrase ''coinciding with'' has been removed as redundant.
- *Pedestrian Circulation Path:* The word ''travel'' was removed in favor of the word ''use'' for clarity.
- *Qualified Historic Building or Facility:* The term ''qualified historic facility'' was updated to ''qualified historic building or facility'' for clarity to match the term that is used in the 2004 ABA and ADA Accessibility Guidelines.
- *Running Slope:* The word ''slope'' has been substituted for ''grade'' for consistency. In response to comments, the Board has clarified that grade and running slope are synonymous.
- *Shared Use Path:* In response to comments from state and local government entities, the Board has edited the definition to emphasize the transportation purpose of shared use paths. While many shared use paths are also used for recreation, a path that is used primarily for recreation is not subject to the shared use path

[8] In the NPRM, the Board proposed to incorporate the definition of ''street'' from MUTCD, which is used in the MUTCD as a synonym of ''highway.'' However, the definition of ''street'' in the final rule reflects the use of the term in PROWAG as a synonym of the defined term ''roadway,'' not ''highway.''

requirements in this rule. Regulated entities should carefully consider the purpose and use of paths when determining whether to treat them as shared use paths under these guidelines. A wooded cut-through in a suburban area regularly used by residents on foot and on bicycles to reach a transit stop is likely a shared use path. A hiking trail through a mountainous area used primarily for recreational hiking and biking is probably not a shared use path under these guidelines.

C. Chapter 2: Scoping Requirements

R201 General

Scope (R201.1)

All newly constructed pedestrian facilities and elements, and all altered portions of existing pedestrian facilities must comply with these guidelines. There is no substantive change in the general scope of the final rule from what was proposed. However, as described in the major issues section above, the Board clarified that newly constructed pedestrian facilities are those that are constructed on greenfield. Any pedestrian facilities or elements that are constructed on or added to developed land, as defined in section R104 are subject to the requirements for alterations, described in section R202.

R201.1 excepts from compliance pedestrian facilities within areas used only by service personnel for maintenance, repair, or monitoring of equipment. This exception was included in the proposed rule as a separate provision entitled ''R203 Machinery Spaces.''

Temporary and Permanent Pedestrian Facilities (R201.2)

This provision specifies that both temporary and permanent pedestrian facilities in the public right-of-way must comply with these guidelines. Temporary facilities might include outdoor festival structures or pop-up service counters. In the final rule, the provision clarifies that when a pedestrian circulation path or transit stop is temporarily closed, an alternate pedestrian access route or transit stop must be provided in accordance with R204. As stated in R204, temporary alternate pedestrian access routes are subject to the technical requirements of R303 and R402 in lieu of the full requirements for permanent pedestrian access routes described at R203.

Buildings, Structures, and Elements (R201.3)

This provision explains that buildings, structures, and elements that are in the public right-of-way and are not specifically covered by these guidelines are subject to the applicable requirements for buildings and sites at 36 CFR part 1191. In response to commenters' requests for clarity as to what is intended here, the Board added examples of buildings, structures and elements at safety rest areas or park and ride lots, and temporary performance stages and reviewing stands. As stated in R201.2, all permanent and temporary pedestrian facilities in the public right-of-way must comply with accessibility standards. However, PROWAG does not provide technical requirements for every type of structure that is provided for pedestrian use in the public right-of-way. For example, technical accessibility requirements for performance stages are not included in PROWAG, but this provision directs a jurisdiction constructing a performance stage in the public right-of-way to the buildings and sites guidelines for technical accessibility requirements of that structure.

R202 Alterations

The main purpose of this section is to describe the additional flexibilities provided for compliance when construction of pedestrian facilities and elements occurs on developed land as compared to the expected full compliance of new construction on undeveloped land. These flexibilities are as follows.

- *R202.2:* Altered elements are connected by a pedestrian access route to an existing pedestrian circulation path. This allows altered elements to tie into an existing pedestrian circulation path (which may not necessarily have a pedestrian access route) instead of requiring a full network of pedestrian access routes as specified in R203.2, which for new construction requires all accessible elements, spaces, and pedestrian facilities to be connected by a pedestrian access route. A transitional segment, as defined in R104.3, may be used in the connection of an altered pedestrian access route to an existing pedestrian circulation path.
- *R202.3:* Alterations must comply with a requirement to the maximum extent feasible where existing physical constraints make full compliance with that requirement technically infeasible. Examples of physical constraints include underlying terrain, underground structures, adjacent developed facilities, drainage, or the presence of a significant natural or historic feature. The language of this section has been revised for clarity. Numerous commenters indicated that the proposed language, which stated that compliance was required to the ''extent practicable'' where physical constraints made full compliance ''impracticable,'' was confusing, and requested that the Board use the phrase ''maximum extent feasible'' the term that is used in the 2004 ABA and ADA Accessibility Guidelines. The Board concurred with commenters and modified the language of the provision for consistency.
- *R202.5:* Alterations to qualified historic buildings or facilities must comply with a requirement to the maximum extent feasible where full compliance with the requirement would threaten the historic significance of the qualified historic building or facility. The wording of this provision was changed slightly from the proposed language to clarify that this exception is not intended to protect every element of a historic property, for example every historic cobblestone, present in a public right-of-way. Rather, the intent is to protect the historic significance of the facility generally. The revised language clarifies, for example, that the removal of a portion of cobblestones to install a curb ramp that provides access to individuals with disabilities does not necessarily threaten the historic significance of the entire facility.

In addition, in section R202.4, the final rule states that alterations may not decrease the accessibility of existing pedestrian facilities below the requirements of the guidelines. This provision has been edited for clarity. The Board uses the term ''accessible'' in the rule text to refer to pedestrian facilities that are compliant with the guidelines (R104.3). This baseline is useful for jurisdictions implementing PROWAG in certain alteration scenarios where they must make choices amongst various accessible features to achieve compliance. For example, to add a missing landing, the slope of an existing curb ramp may need to be increased to the maximum allowable slope. This is an acceptable choice under these guidelines.

In addition to the above-described changes, the Board has made two other important modifications to the Alterations section of these guidelines. First, as described in the Major Issues section, the Board has included pedestrian facilities and elements that are ''added'' to developed areas within the definition of alteration. This is a change from the proposed rule where added elements and facilities were subject to the requirements for new construction. The Board agreed with numerous commenters who expressed the view that existing physical constraints present on developed property might affect the extent to

which some added elements and facilities in the public right-of-way could comply strictly with new construction standards.

Second, also as discussed in the Major Issues section, the Board stated at proposed R202.3 that each altered element, space, or facility ''within the scope of the [alteration] project'' was required to comply with these guidelines. Some state and local government commenters indicated confusion over the meaning of ''scope of the project,'' and some disability rights advocacy organizations expressed concern that the phrase did not clearly convey expectations for compliance with these guidelines. The Board concurs that this provision was an unnecessary source of confusion and has eliminated the proposed R202.3 (which would have appeared at 202.1 in the final rule) as duplicative with the general scoping provision at R201.1. The term ''scope of the project'' no longer appears in the guidelines. As in the 2004 ABA & ADA Accessibility Guidelines, whatever is altered must be made compliant.

R203 Pedestrian Access Routes

This section contains scoping requirements that explain where pedestrian access routes are required, and scoping requirements that point to the technical requirements in Chapters 3 and 4 applicable to each component of pedestrian access routes.

Pedestrian access routes are a portion of the traversable pedestrian facilities in a public right-of-way that must comply with the accessibility requirements in these guidelines. In new construction, there will be a continuous network of pedestrian access routes that connect all accessible elements, spaces, and pedestrian facilities (R203.2). In alterations, a continuous network of pedestrian access routes will be established piece-by-piece as pedestrian facilities are altered and brought into compliance with PROWAG.[9]

A pedestrian access route exists within or is connected by each newly constructed or altered traversable pedestrian facility: pedestrian circulation paths (including shared use paths) (R203.3); crosswalks (R203.4); pedestrian at-grade rail crossings (R203.5); curb ramps and blended transitions (R203.6); pedestrian overpasses and underpasses (R203.7); ramps (R203.8); elevators and limited use/limited application elevators (R203.9); platform lifts (R203.10); and doors and gates (R203.11).[10] Again, the goal, over time, is a continuous accessible pathway through all traversable facilities in the public right-of-way.

The structure of section R203 Pedestrian Access Routes in the final rule has been revised from the proposed section R204 of the NPRM (as modified by the SNPRM). First, with edits to R203.1 General, the Board has clarified that the facilities listed in R203 either ''contain'' or ''connect'' a pedestrian access route. In the years since the NPRM was published, Access Board technical staff have received inquiries related to whether each piece of sidewalk or pedestrian facility is expected to be part of a pedestrian access route, or whether, for example, a pedestrian access route could be provided on one side of the street and not the other. This confusion stems from a requirement in the 2004 ABA and ADA Accessibility Guidelines that at least one accessible route connect buildings, sites, elements, and spaces, but does not require that each route between these locations be accessible. *See* 36 CFR part 1191, App. A, Ch. 2, 206.2.2.

The public right-of-way in this aspect is not analogous to buildings and sites. Every new or altered pedestrian facility must be made accessible. Thus, the Access Board clarifies that the requirements for pedestrian access routes are applicable to every newly constructed or altered pedestrian circulation path, crosswalk, pedestrian at-grade rail crossing, and pedestrian overpass and underpass, and the curb ramps, ramps, elevators, platform lifts, and doors and gates that connect pedestrian facilities with pedestrian access routes must also comply with the accessibility requirements of PROWAG.

Second, the Board has moved the scoping for crosswalks (referred to as pedestrian street crossings in the proposed rule at NPRM R206) and the scoping for curb ramps and blended transitions (NPRM R207) into the final rule's scoping section for pedestrian access routes at R203. The Board made this change to further clarify that crosswalks, curb ramps, and blended transitions are pedestrian facilities that comprise part of the continuous network of pedestrian access routes present in the public right-of-way.

Third, in response to numerous technical assistance inquiries over the years since the NPRM was published, in the final rule the Board has added detailed scoping as to the required placement of curb ramps. The scoping clarifies when curb ramps are required at intersection crosswalks, midblock and roundabout crosswalks, on-street parking, and passenger loading zones. It further clarifies that when alterations are made to crosswalks, missing curb ramps must be added as part of the alteration. This added scoping is discussed in greater detail below.

Pedestrian Circulation Paths (R203.3)

In response to the proposed rule (NPRM 204.2), some commenters requested that the Access Board explicitly require that jurisdictions provide sidewalks, while others requested that the Board clarify that the PROWAG rule does not require sidewalks. The final rule requires that pedestrian access routes connect accessible elements, spaces, and pedestrian facilities (R203.2). A pedestrian access route is comprised primarily of conforming portions of a pedestrian circulation path, which are defined as ''a prepared exterior or interior surface provided for pedestrian use in the public right-of-way'' (R104.3). It does not matter under the rule whether the pedestrian access route runs through a sidewalk, shared use path, shoulder intended for pedestrian use, or other type of prepared surface, as long as it meets the technical requirements for pedestrian access routes. Jurisdictions may meet the requirements of PROWAG using any of the available options.

In the final rule the Board has revised this provision to indicate that transitional segments, as defined in R104.3, may be used to connect new or altered pedestrian access routes to existing pedestrian circulation paths. Transitional segments appeared in the proposed rule at NPRM R202.3.2.

Crosswalks (R203.4)

As noted above, in the final rule, the Board has relocated the scoping for crosswalks to the scoping section for pedestrian access routes to reinforce that crosswalks have a pedestrian access

[9] Consistent with the incremental method of application of this rule, the Board has included an exception for existing pedestrian circulation paths. This exception allows a jurisdiction to alter an element in the public right-of-way that is on or adjacent to an existing pedestrian circulation path without altering the pedestrian circulation path to provide a fully compliant pedestrian access route. For example, if a jurisdiction installs a bench on an existing sidewalk, the bench must comply with PROWAG requirements (R209.6), but the jurisdiction is not also required by PROWAG to replace the sidewalk. However, if the jurisdiction were to install a bench where no pedestrian circulation path existed, it would be required to connect the bench with a compliant pedestrian access route to an existing pedestrian circulation path (R202.2).

[10] Stairs are not part of a pedestrian access route and are not acceptable as a sole connector of pedestrian facilities. However, stairs may be provided in addition to ramps or other pedestrian access route components. Where stairs are provided in the public right-of-way, they must meet technical requirements (R213).

route within them and are part of the continuous network of accessible pedestrian facilities required through public rights-of-way. In addition, the Board has substituted the MUTCD-defined term ''crosswalk,'' with minor revisions to the MUTCD definition, for the term ''pedestrian street crossing'' that was used in the proposed rule (NPRM R204.3). In doing so the Board clarifies that there is no distinction between the places the Access Board expects pedestrian crossings to occur and the industry understanding of the places where crosswalks are located. The main impact of the use of the MUTCD-defined term ''crosswalk'' in place of ''pedestrian street crossing'' is to further clarify the places where curb ramps are required. This is detailed below in the discussion of R203.6.

Pedestrian At-Grade Rail Crossings (R203.5)

The Board has added scoping for pedestrian at-grade rail crossings to clarify that wherever pedestrian at-grade rail crossings are provided they contain a pedestrian access route. The technical requirements are referenced.

Curb Ramps and Blended Transitions (R203.6)

The 2011 NPRM specified that a curb ramp (or blended transition) must be provided for each pedestrian crossing (NPRM R207.1). The proposed rule indicated that a diagonal curb ramp would continue to be permitted in an alteration scenario where physical constraints prevented the installation of a curb ramp for each crossing (NPRM R207.2). In response to these proposed provisions, a few state and local government commenters requested flexibility to install a single curb ramp based on engineering judgement, while others either agreed with the changes or requested that the Board more clearly state the requirements. Two local government commenters lamented the costs of having installed non-compliant curb ramps over a number of years. Other individuals and disability rights advocacy organizations agreed with limiting the use of diagonal curb ramps.

The final rule maintains the requirement that one curb ramp or blended transition be provided for each crosswalk at an intersection corner, and alternatively allows a blended transition to span all crosswalks at an intersection corner. Use of a single curb ramp at the apex of an intersection corner is permitted in alterations where existing physical constraints make compliance technically infeasible. Diagonal curb ramps often route users into the roadway, not within a crosswalk. To provide equity to persons with disabilities in the public right-of-way, PROWAG must ensure that a person in a wheelchair who requires a curb ramp to cross a street is afforded the same opportunity to stay within the safety of a crosswalk as a person who is able to step off the curb directly into a crosswalk. Thus, unless there are existing physical constraints that prohibit the provision of a curb ramp for each crosswalk, one curb ramp per crossing that is contained within the crosswalk must be provided.

The Board notes that since 2011, numerous state and local jurisdictions have adopted a requirement for one curb ramp per crosswalk at an intersection corner, and the Board is not aware of widespread engineering concerns that have resulted from this shift in local policies. *See* FRIA at 99. In addition, the Board notes that when requesting flexibility for new construction, jurisdictions were characterizing newly installed curb ramps in existing rights-of-way as new construction. Such installations are considered alterations under the final rule, and the flexibility for a single curb ramp would be permitted if physical constraints make compliance technically infeasible. The Board does not anticipate that insurmountable engineering issues would prevent full compliance in new construction, which as described above, would be construction on undeveloped land.

In response to numerous technical assistance inquiries received by the Board since the NPRM was published seeking clarification on the places where curb ramps must be installed, the Board has added detailed scoping for the required placement of curb ramps. The NPRM stated that curb ramps or blended transitions are required at each pedestrian street crossing. This substantive requirement has not changed, but the Board has provided further clarification regarding what it meant by ''pedestrian street crossing'' to explain where curb ramps are required. As described above, the Board replaced the term ''pedestrian street crossing'' with the MUTCD-defined term ''crosswalk.''

The MUTCD definition of crosswalk, which appears in R104.5, indicates that a crosswalk is present wherever there is a pedestrian circulation path on one side of a street that approaches the roadway at an angle such that the path would cross the street if the lateral lines of the path were continued (regardless of whether it is marked or unmarked), or where pavement markings indicate a crosswalk. R203.6.1.1 and R203.6.2 clarify that a curb ramp or blended transition must be provided at each end of a crosswalk at an intersection corner, a midblock crossing, and a roundabout crossing. These provisions further clarify that where crossing is prohibited at an intersection or not intended midblock or at a roundabout, jurisdictions must take care to ensure that there is no crosswalk, no curb ramp, and the pedestrian circulation path is separated from the roadway. Information on how to ensure that no crosswalk is present has been added to these provisions for clarity. This information was previously stated in an advisory that accompanied the NPRM rule text (NPRM Advisory 206).

Equity in the public right-of-way requires that persons with disabilities have equal access to crosswalks and information about whether a crosswalk is present. Where pedestrian crossing is permitted, curb ramps must be provided so that persons who use wheelchairs can access them. Where pedestrian crossing is prohibited at an intersection or is not intended midblock or at a roundabout, cane-detectable features must indicate to persons who are blind that this a not a place to cross. Several state DOTs commented on the NPRM advisory, expressing concern that the addition of detectable treatments would be costly, unnecessary, or obstruct sightlines for motorists. The Board has included an assessment of the costs in its Final Regulatory Impact Analysis and notes that jurisdictions have options for ensuring that they do not create a crosswalk where crossing is prohibited or not intended. This includes options, such as grass strips and landscaping, that can be used where a jurisdiction is concerned that a sign or barrier might obstruct motorists' sightlines.

The Board is aware of concerns expressed by individuals seeking technical assistance implementing the proposed rule that a curb ramp is required on each side of a crosswalk, even in scenarios where there is a pedestrian circulation path only on one side. The purpose of this requirement is to ensure that a person in a wheelchair who has entered a crosswalk on one side is able to safely exit the roadway on the other side as a person who does not use a wheelchair would do by stepping onto the curb. Jurisdictions that do not wish to provide a curb ramp on the side of the street where no pedestrian circulation path is present must ensure that there is no crosswalk, as defined in R104.3. Thus, the jurisdiction must provide a separation between the pedestrian circulation path and the roadway to indicate to pedestrians that crossing is prohibited. Where no

crosswalk is present and a separation treatment exists, curb ramps are not required. USDOT and DOJ may provide additional information regarding the acceptable characteristics of a separation treatment used to indicate the absence of a crosswalk.

The Board has added scoping provisions at R203.6.1 clarifying that curb ramps or blended transitions may be required to connect on-street parking spaces, on-street parking space access aisles, and passenger loading zones to pedestrian access routes if needed to accomplish the required connection.

At R203.6.2, the Board has clarified that when alterations are made to crosswalks, curb ramps or blended transitions must be provided on both ends of the crosswalk where the pedestrian access route crosses a curb. This provision provides consistency with DOJ's and USDOT's joint technical assistance document on the requirements to provide curb ramps when streets, roads, or highways are altered through resurfacing. *See* Department of Justice/Department of Transportation Joint Technical Assistance on Title II of the Americans with Disabilities Act Requirements to Provide Curb Ramps when Streets, Roads, or Highways are Altered through Resurfaces, *available at https://www.fhwa.dot.gov/civilrights/programs/ada/doj_fhwa_ta.cfm; see also* Q & A Supplement to the 2013 DOJ/DOT Joint Technical Assistance on the Title II of the ADA Requirements To Provide Curb Ramps when Streets, Roads, or Highways are Altered through Resurfacing, *available at https://ada.gov/doj-fhwa-ta-supplement-2015.html.* By adding this requirement to PROWAG, the Board seeks to minimize confusion as to the legal obligations of jurisdictions to provide curb ramps.

Pedestrian Overpasses and Underpasses (R203.7)

In R203.7, the Board has clarified that pedestrian overpasses and underpasses include overpasses and underpasses on shared use paths. In addition, the Board has eliminated platform lifts as an option to achieve accessibility of these structures in new construction. A state disability council opined in its comments that limited use/limited application elevators and platform lifts do not provide equal access because of limited functionality. Platform lifts are more difficult for users with disabilities to independently operate and are more likely to breakdown in outdoor environments than elevators and limited use/limited application elevators. The Board is aware of many instances of maintenance issues and mechanical failures with respect to platform lifts and has thus revised the rule text to allow these devices only in alterations when installation of an elevator or limited use/limited application elevator is not technically feasible. Jurisdictions that install platform lifts should be aware of their maintenance obligations to ensure platform lifts remain operable at all times that the pedestrian facility is open for pedestrian use.

Ramps (R203.8); Elevators and Limited Use/Limited Application Elevators (R203.9); Platform Lifts (R203.10)

At R203.8 through R203.10, the Board added scoping provisions for ramps, elevators and limited use/limited application elevators, and platform lifts so that it is clear that wherever these facilities are present in the public right-of-way, they must comply with accessibility requirements.

Doors, Doorways, and Gates (R203.11)

In the final rule, the Board has revised the scoping for doors, doorways, and gates to require that all doors, doorways and gates that are part of a pedestrian access route must comply with the specified technical accessibility requirements. This is a change from the proposed rule, which required all doors, doorways, and gates of any pedestrian facility to comply with requirements (NPRM R218), and a change from the SNPRM which exempted doors, doorways, and gates on shared use paths from compliance (SNPRM R218). In the preamble to the SNPRM, the Board indicated that the exemption for shared use paths was provided to avoid a perceived conflict with AASHTO guidance. 78 FR 10110, 10113 (Feb. 13, 2013). AASHTO discourages the use of physical barriers on shared use paths. *See* AASHTO, Guide for the Development of Bicycle Facilities at 5–46.

In response to the SNPRM, several disability rights advocacy organizations commented that doors, doorways, and gates on shared use paths should not be excepted, and two state DOTs requested clarity regarding applicable technical standards for these facilities. The Board concurred with commenters that pedestrian gates on shared use paths should not be excepted from accessibility requirements. Persons with disabilities must be able to access shared use paths through gates if they are provided. The Board has thus reinstated the technical requirements for doors, doorways, and gates in the final rule. Further, consistent with AASHTO guidance, which recommends the use of bollards if physical barriers are needed to restrict motor vehicle entry, the final rule permits the use of bollards on shared use paths (R302.2).

R204 Alternate Pedestrian Access Routes, Transit Stops, and Passenger Loading Zones

Alternate Pedestrian Access Route (R204.1)

The proposed scoping for alternate pedestrian access routes stated that an alternate pedestrian access route is required when a pedestrian circulation path is closed due to construction, alterations, maintenance operations, or other similar conditions (NPRM R205). In the final rule, the Board has maintained similar scoping; however, it has removed the term ''alterations'' from the list of conditions to avoid confusion as ''construction'' accurately covers the intended scenario. In addition, the Board has edited the text to indicate that the requirement to provide an alternate pedestrian access route is triggered by a pedestrian circulation path being made inaccessible due to the described conditions, rather than being completely closed, since a pedestrian circulation path can be unusable for persons with disabilities without being completely closed to all users. The Board has added ''closure'' to the list of conditions triggering the requirement for an alternate pedestrian access route to clarify that where a pedestrian circulation path is completely closed for any reason, an alternate pedestrian access route must be provided.

In the proposed rule, the scoping provision for alternate pedestrian access routes pointed to provisions of the MUTCD that were incorporated by reference. The final rule instead points to the relevant technical provisions of chapters 3 and 4, as the MUTCD provisions are no longer incorporated by reference.

In response to the proposed rule, state and local government commenters raised concerns regarding scenarios where the alternate route would need to deviate substantially from the original pedestrian circulation path. For example, one state DOT indicated that freeway widening projects may necessitate the complete closure of a bridge, including the pedestrian facilities, making an alternate pedestrian access route infeasible or impossible to provide.

In response to these concerns, in the final rule the Board has added an exception allowing an ''alternate means of providing access'' for pedestrians with disabilities where establishing an alternate pedestrian access route is technically infeasible. An ''alternate

means of providing access'' does not mean an alternate pedestrian access route that falls short of the technical requirements stated at R303. Rather, this exception is intended to allow for completely different means of access in scenarios such as a bridge closure, where establishing an alternate pedestrian access route is not technically feasible. For example, in the case of a bridge closure, an alternate means of providing access might be the provision of accessible shuttle bus service. DOJ and USDOT may provide additional information regarding acceptable alternate means of providing access and the circumstances under which this exception may be used.

The Access Board received numerous public comments supporting a requirement for the provision of alternate pedestrian access routes, including approximately 150 individual commenters and several disability rights and pedestrian advocacy organizations. Several local government commenters and one state DOT requested flexibility to provide alternate accessible routes only when deemed practicable. In addition, two state DOTs, two local government commenters, and two industry organizations expressed concern regarding the cost of providing alternate routes.

The Board acknowledges that there are costs involved in providing alternate pedestrian access routes and has assessed those costs in the FRIA. *See* FRIA at 126. However, equity in our public rights-of-way cannot be achieved without the provision of temporary accessible facilities where permanent accessible facilities are temporarily unavailable. A person without a disability may readily assess safety and traffic conditions and navigate around a closed pedestrian circulation path if an alternate facility is not provided. However, a pedestrian with a disability may not be able to see alternatives, assess traffic to step into a roadway, or have the ability to step on and off of the curb for a few feet around a closure. The Board thus maintains the requirement for the provision of alternate pedestrian access routes where pedestrian circulation paths are made inaccessible due to construction, maintenance operations, closure, or similar conditions. The technical requirements, now stated in R303, seek to provide minimum accessibility for alternate routes while minimizing the costs for regulated entities. The technical requirements are detailed in the discussion of section R303, below.

Alternate Transit Stops (R204.2)

In the final rule, the Board has added a provision requiring that where accessible transit stops are not accessible due to construction, maintenance operations, or other similar conditions, an alternate transit stop be provided. MUTCD section 6D.01, which the Board proposed to incorporate by reference indicates that to accommodate the needs of individuals with disabilities, transit stops should be maintained in temporary traffic control zones (6D.01 paragraph 11). If the accessibility of a transit stop cannot be maintained, an alternate accessible transit stop must be provided.

Alternate Passenger Loading Zones (R204.3)

The Board has added a provision in the scoping of the final rule to emphasize that where a temporary passenger loading zone is provided, it must be accessible per the relevant technical provisions. This requirement is already covered by the general scoping provision R201.2, which indicates that the requirements in the guidelines apply to temporary pedestrian facilities. However, the Board added this provision to emphasize that alternate passenger loading zones provided in the public right-of-way during construction or maintenance operations must be accessible.

R205 Detectable Warning Surfaces

Detectable warning surfaces are standardized surfaces built in or applied to certain pedestrian walking surfaces to warn pedestrians who are blind or have low vision of a hazard. A distinct cane-detectable pattern of truncated domes provides a tactile cue of transitions to vehicular routes and of open drop-offs at transit platforms. The proposed rule required detectable warning surfaces at curb ramps or blended transitions, which remove tactile cues otherwise provided by curb faces; at cut-through pedestrian refuge islands to indicate their presence within a crosswalk; at at-grade rail crossings not located in a street or highway; along drop-offs at the boundary of passenger boarding platforms, which are above standard curb height; and along boarding sidewalk and street-level rail boarding and alighting areas not protected by screens or guards.

In the final rule, the Board is also requiring detectable warning surfaces on pedestrian circulation paths at driveways with stop or yield control to alert pedestrians who are blind or have low vision that they are walking into an active vehicular way. The Board indicated in an advisory that accompanied the proposed rule text that detectable warning surfaces should be provided at commercial driveways with stop or yield control (NPRM Advisory R208.1). Several commenters, including state and local governments, requested clarification on the provision of detectable warning surfaces at commercial driveways. In the final rule, the Board clarifies that detectable warning surfaces are required at driveways where stop or yield control is provided. In the final rule, the Board declines to limit the covered driveways to ''commercial'' driveways to ensure that pedestrian circulation paths at driveways to multifamily housing facilities that have stop or yield control also have detectable warning surfaces.

Some state and local government commenters encouraged the Board to move the requirement for detectable warning surfaces at commercial driveways from the advisory to the rule text. Two state DOT commenters questioned whether stop or yield control was the appropriate threshold for application of the requirement. The Board has concluded that where there is sufficient vehicular traffic to provide stop or yield control (*i.e.,* stop or yield signage) or traffic signals, there is a sufficient hazard to pedestrians who are blind or have low vision such that a detectable warning surface is warranted to advise individuals that they are entering an active vehicular way. Two state DOTs objected to implementing detectable warning surfaces at commercial driveways because they would be provided at sidewalk as opposed to street level. In response to these concerns, the Board notes that detectable warning surfaces are consistently used to provide tactile notification of a vehicular way where a curb is not present. This could be at street level, in the case of curb ramps, or at sidewalk level in the case of driveways.

Several commenters questioned whether the Board intended to require detectable warning surfaces at street or sidewalk level bus stops. In R104.3, the Board added a definition of ''boarding platform'' to clarify that detectable warning surfaces are only required where the bus boarding and alighting area is on a platform raised above standard curb height.

The proposed rule indicated that detectable warning surfaces are neither required nor desirable at cut-through pedestrian refuge islands that are less than 6 feet in length in the direction of pedestrian travel (NPRM R208.2 and NPRM Advisory R208.2). In the final

rule, the Board has clarified this substantive requirement by defining the term ''pedestrian refuge island'' at R104.3. The definition clarifies that only islands that are at least 72 inches in length in direction of pedestrian travel are considered suitable for pedestrian refuge. Islands that are at least 72 inches in length allow for a 24-inch detectable warning surface at each edge and at least 24 inches between the surfaces to provide detectable separation of the surfaces and to have sufficient space to wait. A cut-through island that is shorter than 72 inches is not suitable for pedestrian refuge, and there is thus no need to distinguish the cut-through from the rest of the crosswalk; the timing provided for pedestrian crossing must allow for the pedestrian to cross the entire traveled way as required by R306.2.

In the final rule, the Board has restructured for clarity the scoping section for detectable warning surfaces at R205 to provide a separate provision for each place that detectable warning surfaces are required. Each provision indicates that technical requirements relevant to that placement.

R206 Pedestrian Signal Heads and Pedestrian Activated Warning Devices

Where pedestrian signal heads and pedestrian activated warning devices are provided at crosswalks, they must be accompanied by audible information devices that make those visual signals accessible to persons who are blind or have low vision. In the proposed rule, the Board incorporated by reference sections of the MUTCD in lieu of providing technical requirements for these devices.

As proposed by incorporation by reference of MUTCD section 4E.09 paragraph 7 (NPRM R209.1), the final rule requires that the accessible features of pedestrian signal heads and pedestrian activated warning devices must be available at all times.

Commenters expressed confusion regarding the expectations for implementation of the incorporated sections of the MUTCD. In response to these concerns, in the final rule the Board has stated the technical requirements for accessible pedestrian signal heads and accessible pedestrian activated warning devices directly in the rule text. The scoping section for these devices has been modified to provide detailed references to the new technical sections.

Numerous state and local government commenters objected to a universal requirement for accessible pedestrian signals in new construction wherever pedestrian signal heads are provided. As described above in the Major Issues section, after careful consideration of these comments, the Board has retained the requirement for accessible features for all new and altered pedestrian signal heads and pedestrian activated warning devices.

In the proposed rule, the Board specified that altering the signal controller and software, or replacing the signal head, would constitute an alteration requiring compliance with the technical requirements for accessible pedestrian signals and push buttons. As described above in the Major Issues section, in the final rule the Board has removed the provision specifying the types of alterations that would trigger implementation of the technical accessibility requirements for pedestrian signal heads and pedestrian activated warning devices. USDOT and DOJ may provide additional guidance on these issues.

Finally, in the final rule the Board has updated the terminology used in the heading of this section for consistency with the terminology used by MUTCD and USDOT, and to better described the devices that must be made accessible.

R207 Protruding Objects and Vertical Clearance

Limitations on the extent to which objects may protrude horizontally into a pedestrian circulation path, as well as vertical clearance requirements above a pedestrian circulation path, apply to the full width of pedestrian circulation paths. The specific technical requirements for protruding objects and vertical clearances appear in section R402 of the final rule.

In the public right-of-way context, a ''protruding object'' is anything that extends into the three-dimensional space above a pedestrian circulation path, or an object contained wholly within it. Examples include, but are not limited to, streetlights, utility poles and equipment cabinets, signposts and signs, parking meters, trash receptacles, public telephones, mailboxes, newspaper vending machines, benches, transit shelters, kiosks, bicycle racks, planters and planted trees, and street sculptures. Technical requirements for protruding objects are designed to ensure that objects located within pedestrian circulation paths are cane-detectable, so they do not present hazards for people who are blind or have low vision.

Regulated entities will need to comply with the requirements for protruding objects when installing or permitting the installation of utilities, trees, awnings, street furniture, and other objects on or adjacent to pedestrian circulation paths. The American Association of State Highway and Transportation Officials (AASHTO) recommends that trees and shrubs be pruned to maintain usability of walkways, and that permitted uses of public rights-of-way, such as sidewalk cafes, be monitored to ensure that they do not encroach upon the pedestrian access route. *See* AASHTO, Guide for the Planning, Design, and Operation of Pedestrian Facilities 4–3 (2021). State and local governments will be responsible for enforcing compliance with maintenance agreements to prevent tree branches or other objects from impermissibly protruding into a pedestrian circulation path where the jurisdiction does not provide the maintenance directly.

The scoping provision for protruding objects included in the SNPRM modified the proposed scoping provision text indicating that protruding objects must not reduce the clear width required for pedestrian access routes (NPRM 210). In the SNPRM, the Board added an 8-foot vertical clearance requirement for shared use paths (SNPRM 210.3). In the final rule, the Board has moved both vertical clearance and clear width requirements to the technical section on protruding objects and vertical clearance at R402.4 and R402.5. Comments received regarding those provisions are addressed in the discussion of R402.4 and R402.5 below. The Board has renamed the section to ''Protruding Objects and Vertical Clearance'' for clarity.

In response to the NPRM, a local government and an engineer commented that the requirements for protruding objects should apply only to the pedestrian access route portion of the pedestrian circulation path. A local government entity commented that an exception should be provided applying protruding objects requirements to only 36 inches of the pedestrian circulation path in constrained conditions. While a person using a wheelchair can visually assess a sidewalk to determine which portion has less cross slope or fewer changes in level, a blind pedestrian or a person with low vision is not going to know which portion of the pedestrian circulation path has been designated as a pedestrian access route. Thus, objects that protrude into any portion of the pedestrian circulation path could create a hazard if not cane-detectable. The Board thus maintains the requirement that the entire pedestrian circulation path comply with the technical requirements for protruding objects.

The Board acknowledges that the advisory included with the proposed rule created confusion for commenters

regarding the concepts of clear width and protruding objects (NPRM Advisory 210). Clear width refers to the width of pedestrian access route walking surface that is required to be completely clear of any objects. This means that within the width of the pedestrian access route, there can be no street furniture, utility poles, or other objects of any kind directly on the walking surface. Clear width technical requirements for pedestrian access routes are specified in R302.2. Protruding objects refer to objects that are in the three-dimensional area above the walking surface, but not directly touching the walking surface. Those objects must conform to the technical requirements for protruding objects at R402.

R208 Pedestrian Signs

Signs that are intended solely for pedestrians, including transit signs, and all signs serving shared use paths, must comply with the technical requirements for visual characters at R410. Thus, signs that are not on shared use paths and are intended for both motorists and pedestrians, or bicyclists and pedestrians, are not required to comply. However, all signs on shared use paths are required to comply as pedestrians (1) should be aware of the potential movement of bicycles in the shared space, and (2) have a reasonable expectation that any sign on a shared use path is potentially providing pedestrian information.

The scoping excepts two categories of pedestrian signs from compliance with technical requirements for visual characters at R410. First, transit schedules, timetables, and maps are not required to comply. Compliance with the technical requirements for these specific types of transit signs would render them too large. Other types of transit signs, such as signs that identify stops and routes, must comply with the requirements. The second category of signs that are exempted from compliance are signs that are mounted immediately above or incorporated into a push button detector unit. The requirements of R410 may also make these signs too large.

In the NPRM, the Board used inartful language to convey that signs intended solely for pedestrians are the signs covered by this rule (NPRM 211.2). The Board has edited this language for clarity. Also, in the NPRM, the Board proposed that where audible sign systems and other technologies are used to provide equivalent information to information contained on pedestrian signs, the signs would not need to comply with technical requirements for visual characters (NPRM R211.1). In an accompanying advisory, the Board presented remote infrared signs as an example of an audible technology, that if used, would make it unnecessary for the sign to comply with technical requirements for visual characters (NPRM Advisory 211.1). In response to the proposed rule, two advocacy organizations for people who are blind or have low vision and a state DOT commented that the provision of audible signs does not negate the need for compliance with technical requirements for visual characters.

The Board concurs that reliance on audible signs in lieu of compliance for visual characters is insufficient for persons who have both low vision and hearing impairments. Further, while acknowledging the 14 commenters who indicated support for the use of remote infrared signs, the Board has concluded that relying on technologies that require a pedestrian to have a receiver does not currently provide equal access to visual signs; however, in the future this may be a possibility with more widespread development and adoption of wayfinding mobile applications. Thus, in the final rule, all signs intended solely for pedestrians must comply with technical requirements for visual characters except for the two categories of signs described above.

Requirements for accessible parking space signs have been moved to the technical section for on-street parking spaces (R310). The requirement for signage at accessible passenger loading zones has been eliminated in the final rule for consistency with ADAAG and to avoid misinterpretation of the sign as indicating exclusive use for passengers with disabilities, particularly where there is only one loading zone.

R209 Street Furniture

Drinking Fountains (R209.2)

Each drinking fountain in the public right-of-way must comply with accessibility requirements at 602.1 through 602.6 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

Public Street Toilets (R209.3)

Each permanent public street toilet must comply with sections 603 through 610 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). Permanent street toilets are standalone toilet room units that are provided in public rights-of-way in cities throughout the United States. Specific examples of these permanent street toilets are discussed in the FRIA. FRIA at 125. Street toilets are different than, for example, traditional restroom facilities provided at highway rest stops. Those traditional bathroom facilities are in a building; pursuant to R201.3, they are subject to the applicable requirements of 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

Portable toilet units must comply with section 603 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). Where there are multiple portable toilet units clustered in a single location, at least 5 percent, but no fewer than one of each type of toilet unit at each cluster must comply with the referenced technical requirements. In this context, ''type'' references those units differentiated by gender.

The Board has revised the scoping of the public street toilet section for clarity, including revising the heading, which reads ''Public Toilet Facilities,'' to avoid the confusion between public street toilets and traditional toilet facilities that was reflected in the public comments. The Board has also corrected the references to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines) and provided separate provisions for permanent street toilets and portable toilet units.

Tables (R209.4)

At each group of adjacent tables, at least 5 percent, but no fewer than one table, must comply with technical accessibility requirements at 902 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). The proposed rule had stated the requirements relative to each ''location'' where tables were provided, and a state government commenter indicated that this language was unclear. The Board has thus revised the text of this provision to clarify that the requirement applies to each group of adjacent tables, as opposed to all tables in a larger area that might be considered a ''location.''

Sales or Service Counters (R209.5)

Each sales or service counter in the public right-of-way must comply with section 904.4 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). In the final rule, the Board has added exceptions (one applicable to facilities subject to the ADA and a second applicable to facilities subject to the ABA) to this scoping for sales and service counters that are located in a building that is not itself in the public right-of-way, but that directly serves the public right-of-way, such as a walk-up service window on a sidewalk. The Board added these exceptions to eliminate confusion for sales and service counters that are part of a building and thus subject to 36 CFR part

1191, but directly serve the public right-of-way. In buildings, at least one of each type of sales or service counter must comply with technical requirements. In the public right-of-way, each sales or service counter must comply.

Benches (R209.6)

In the proposed rule, the Board provided a single scoping provision for all benches in the public right-of-way except for those at tables (which are covered under the technical requirements for tables) (NPRM R212.6). This included benches along pedestrian circulation paths and those at transit stops and shelters. Commenters indicated that the requirement that clear space not overlap the area within 1.5 feet of the front of the bench was confusing. The Board concluded that while the requirement is appropriate for transit shelters, it should be revised for other contexts.

In the final rule, the Board has clarified that for benches at transit stops (R209.6.1) and benches not at transit stops or shelters (R209.6.2) the clear space complying with R404 must be next to either end of the bench, or if the bench does not have an ''end,'' such as a circular bench, the clear space must be either integral to the bench or located no more than 18 inches (455 mm) from the front of the bench. Where the clear space is integral to the bench, there will be a break in the bench where the clear space is located. These requirements ensure that a pedestrian using a wheelchair may sit in proximity to a companion seated on the bench. The Board has restructured the provision for clarity.

In the final rule, the Board has maintained the requirement that the clear space not overlap the area within 18 inches (455 mm) for benches provided within transit shelters. *See* R209.6.1; R309.2.2. In a transit shelter, the primary goal is to provide shelter to as many individuals as possible within the limited space. Thus, the clear space may be situated at the end of a bench or at least 18 inches from the front edge of the seat, ensuring that the bench may be fully occupied while the clear space is in use.

Four commenters requested that the Board provide technical criteria for benches. The Board concurs with commenters that benches in the public right-of-way should have armrests and back support for maximum accessibility. As stated in the advisory that accompanied the proposed rule, benches that provide full back support and armrests to assist in sitting and standing are more useable by pedestrians with disabilities. However, as the Board did not propose specific technical requirements, such as specifications for armrest loads and dimensions and back height, the Board declines to add those now at the final rule stage.

One company that provides jurisdictions with advertisement-funded bus stop benches requested that the Board exempt bus stop benches located on unimproved surfaces from the requirement to provide clear space in order to protect the company's business model. The Access Board declines this request. Consistent with the implementation approach of many accessibility regulations, new construction and alterations provide an opportunity for a jurisdiction to add accessibility to a pedestrian facility at minimal additional cost. PROWAG requires the provision of boarding and alighting areas at all newly constructed and altered transit stops. Thus, when installing concrete for the boarding and alighting areas required by PROWAG, a jurisdiction has the opportunity to install a concrete pad for a bench if the jurisdiction so desires. PROWAG does not require jurisdictions to provide benches at transit stops, but where provided, they must comply with accessibility requirements.

Operable Parts of Other Fixed Elements (R209.7)

Operable parts of other fixed elements to be used by pedestrians, including street furniture, not specifically addressed by this rule must comply with technical requirements for operable parts at R403. This provision has been added in response to commenters' concerns about other types of street furniture that are not specifically addressed in the rule text.

The Board notes that operable parts on parking meters and pay stations other than those that serve accessible parking spaces, which have additional technical requirements specified at 310.6, are covered under R209.7 and must comply with the technical requirements for operable parts at R403. This means that all parking meters and pay stations must meet clear space, reach range, and operation requirements; however, they do not need to comply with requirements for visual displays stated at R310.6 that ensure information is visible to a person using a manual wheelchair. Two disability rights advocacy organizations commented in support of clear space at all parking meters and pay stations. The Board observes that many individuals with disabilities use parking spaces other than accessible spaces; to ensure equity in public rights-of-way, persons with disabilities must be able to access parking meters and pay stations wherever they park.

R210 Transit Stops and Transit Shelters

Where provided, transit stops and transit shelters shall comply with the technical requirements at R309. In response to the NPRM, a local government transit advisory group commented that the Board had failed to propose a scoping provision for vending machines at transit shelters. The Board concurs that this was an oversight, and has added a scoping provision for fare vending machines that references the operable parts technical requirements at R403 and the relevant provisions of Section 707 of 36 CFR part 1191. The Board also added a scoping provision for operable parts of other fixed elements at transit stops and shelters intended to be used by pedestrians.

R211 On-Street Parking

Where on-street parking is provided and is metered or designated by signs or pavement markings, accessible parking spaces complying with the technical provisions at R310 must be provided. The minimum number of accessible on-street parking spaces required is determined according to Table R211 assessing the total number of spaces.

The Board has made several revisions to this scoping section based on public comments. In the proposed rule, the board used the total number of spaces on a ''block perimeter'' to determine the number of accessible spaces required. Several commenters indicated that the meaning of block perimeter was unclear, while others noted that not all on-street parking is located on a block perimeter. In response to these concerns, the Board has defined block perimeter in R104.3 and included an example within the definition for clarity. In addition, the Board has added a provision for parking not on a block perimeter to clarify that those on-street parking spaces are also subject to accessibility requirements.

In response to commenter concerns, the Board has excepted on-street spaces that are designated exclusively for commercial or law enforcement vehicles, or residential parking. Those excepted spaces are not counted for the purpose of determining the required number of accessible spaces. These spaces must be designated for use solely for the excepted purpose; spaces that are designated for commercial or law enforcement vehicle use or residential parking only during certain hours are not excepted and must be counted for the purpose of determining the required number of accessible spaces. Another

exception states that where on-street parking spaces are altered, the requirements of R211 shall apply only to the affected parking spaces until the minimum number of accessible on-street parking spaces as specified in Table R211 are provided. Thus, for example, alteration of a single on-street parking space on a block perimeter would not trigger the obligation to provide the total number of required accessible spaces on the block perimeter. Only the altered space would need to be made accessible if an insufficient number of accessible spaces were available.

The Board notes that these minimum guidelines for the provision of accessible parking in public rights-of-way do not prevent regulated entities from providing additional accessible parking, including residential accessible parking. Standard-setting agencies may also adopt a more stringent standard.

In response to the NPRM, a local government commenter asked whether on-street accessible spaces are required where there is an adjacent public off-street lot, and a state government DOT requested that the Board allow jurisdictions to combine the number of on-street and off-street parking spaces for the purpose of designating accessible spaces. On-street parking spaces are covered by PROWAG and off-street parking in lots or garages is covered by the requirements at 36 CFR 1191. Accessible parking must be separately designated for on-street and off-street locations. To ensure equity for persons with disabilities, if on-street parking is provided then accessible on-street parking must also be provided.

Several local government commenters requested flexibility for the provision of accessible on-street parking where paratransit or other parking management programs, such as free parking, are provided for persons with disabilities. The Board has carefully considered these comments and has declined to provide exceptions for jurisdictions with paratransit or parking management programs. The provision of accessible on-street parking spaces consistent with PROWAG ensures that parking spaces are available that will allow persons with disabilities to park close to their destinations and have either a direct or nearby connection to a pedestrian access route or pedestrian circulation path. The provision of paratransit or free parking for persons with disabilities does not address the availability of accessible parking for persons with disabilities who rely on private vehicle transportation. Jurisdictions that allow persons with disabled parking placards to park in ''no parking'' or loading zone areas cannot guarantee that those areas will have accessible features such as proximity to a curb ramp or an adjacent sidewalk clear of obstructions such that a ramp can be deployed.

One commenter indicated that the rule should include guidelines for accessible electric vehicle charging stations. The Board is undertaking a separate rulemaking to address the accessibility of electric vehicle charging stations, which may ultimately address electric vehicle charging stations in the public right-of-way. *See* ATBCB Fall 2022 Unified Agenda, *available at https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202210&RIN=3014-AA48.*

R212 Passenger Loading Zones

Where permanently designated passenger loading zones other than transit stops are provided, at least one accessible passenger loading zone complying with technical requirements must be provided in every continuous 100 feet (30 m) of loading zone space, or fraction thereof. The Board revised the text of this scoping provision to clarify that the passenger loading zones covered by this rule are those that are permanently designated for passenger loading, other than transit stops. This includes passenger loading zones permanently designated for ride share. Often, permanent passenger loading zones in the public right-of-way are comprised of a sidewalk cut out so that vehicles can pull out of the traveled way to unload passengers. However, a permanently affixed sign designating a passenger loading zone is sufficient to bring the loading zone under coverage of this rule. Passenger loading zones that vary with the time of day or the occupancy of a particular retail space, such as valet stands that are provided only during certain hours, are not considered permanently designated and are therefore not subject to PROWAG.

R213 Stairs and Escalators

Where provided on pedestrian circulation paths, stairs must comply with technical requirements at R408 and escalators must comply with section 810.9 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). Stairs and escalators are not part of pedestrian access routes, but where they are provided in the public right-of-way, they must comply with technical requirements. Persons with certain disabilities will find a short set of stairs more useable than a long ramp, thus although these pedestrian facilities are not part of the pedestrian access route, it is nonetheless important that they conform to accessibility requirements.

In the final rule, the Board substituted the word ''stairs'' for ''stairways'' for consistency with the term used in the requirements of 36 CFR part 1191 (ABA & ADA Accessibility Guidelines), and to clarify that a single stair is subject to the requirements of PROWAG.[11] In response to technical assistance inquiries made to the Board over the years since the proposed rule was published, the Board has added a definition for ''stair'' in R104.3 to clarify that a curb is not a stair.

R214 Handrails

Wherever handrails are installed on *pedestrian circulation paths,* including on stairs, they must comply with technical requirements at R409. A few commenters expressed confusion over where handrails must be installed. PROWAG requires handrails in two places: on ramp runs with a rise greater than 6 inches (150mm) (R407.8) and on stairs (R408.8). The Board has taken care to ensure that the distinction between ramps requiring handrails and other sloped surfaces not requiring handrails is clear in the final rule. The final rule text clarifies that a sidewalk or other pedestrian circulation path is not subject to the requirements for ramps, including the requirement for handrails, unless its grade exceeds the allowable specifications of R302.4 (R407.1). Jurisdictions may install handrails in places other than ramps and stairs at their own discretion. Wherever handrails are installed in the public right-of-way, they must conform to the technical requirements of R409 regardless of whether they are required by PROWAG or have been placed voluntarily.

D. Chapter 3: Technical Requirements

R301 General

The technical requirements contain accessibility design criteria and apply as specified in the scoping provisions of Chapter 2 or where referenced by another technical requirement in Chapter 3 or 4. These technical requirements were developed specifically for pedestrian facilities in the public right-of-way.

R302 Pedestrian Access Routes

The technical requirements for pedestrian access routes at R302 are intended to provide a continuous path throughout the pedestrian facilities of a

[11] Section 504 of Appendix D to 36 CFR part 1191 (ABA & ADA Accessibility Guidelines) is entitled ''Stairways,'' however the terms ''stair'' or ''stairs'' are used throughout the text of the requirements.

public right-of-way that is accessible to persons with disabilities. These technical requirements include clear width, passing spaces, grade, cross slope, and surface characteristics. The technical requirements as proposed in the NPRM were adapted from the technical requirements for accessible routes for buildings and facilities at 36 CFR part 1191, Appx. A 206. Based on careful consideration of the many comments received in response to the proposed and supplemental proposed rules, the Board has modified several of the pedestrian access route technical provisions for consistency with the public right-of-way context and for clarity of the requirements.

In the final rule, the Board eliminated the list of components of pedestrian access routes that appeared in NPRM R302.2. The Board concurred with a local government commenter who opined that each facility included in this list should have scoping in Chapter 2. The Board revised R203 to provide scoping for each pedestrian facility, and then determined that the list of facilities with associated technical provisions at NPRM R302.2 was duplicative of the revised section R203. Further, the Board concluded that the list at NPRM R302.2 added to the confusion regarding the concept of a pedestrian access route in the public right-of-way.

As explained above in the discussion of R203, pedestrian access routes in the public right-of-way function differently than accessible routes in buildings and on sites. Accessible routes in buildings and on sites are required to connect accessible facilities and elements to other accessible facilities and elements and may consist of various components. 36 CFR part 1191, Appx. D 206.2, 402.2. A pedestrian access route in the public right-of-way runs through nearly every traversable surface within the pedestrian facilities; thus, unlike the requirements for a building, every new and altered traversable surface in the public right-of-way, except for stairs and facilities that have been specifically excepted, must comply with pedestrian access route requirements. As a result of elimination of the proposed R302.2, the sub-provisions of R302 have been renumbered.

Continuous Clear Width (R302.2)

The requirements for clear width of pedestrian access routes have not changed from what the Board proposed, as modified by the SNPRM (SNPRM R302.3). Specifically, a 48-inch (1220 mm) continuous clear width is required for most portions of the pedestrian access route. There are two exceptions: (1) places where a pedestrian access route crosses medians and pedestrian refuge islands, which require 60 inches of clear width or the width of the crosswalk (whichever is greater), and (2) shared use paths where the clear width must extend the entire width of the path. In response to commenter questions, the Board revised the language of the provision to clarify that the required width is measured exclusive of any curb. Also, in response to comments, the Board has added a sentence clarifying that bollards are permitted on shared use paths as long as the clear width of the pedestrian access route is 48 inches (1220 mm) or wider (R302.2.2).

In response to the NPRM, three state DOTs and two utility companies requested that the Board allow a reduction in the clear width of pedestrian access routes to accommodate utility poles, traffic signal poles, and similar obstructions. An additional 28 individual commenters employed by utility companies requested that the Board revise the clear width requirement to 36 inches. In alterations, including the addition of a pedestrian circulation path to an existing right-of-way, where existing physical constraints make compliance with the clear width requirements technically infeasible, compliance with these requirements is required to the maximum extent feasible. *See* R202.3. In that circumstance, the jurisdiction must comply with the requirement to the maximum extent feasible. Thus, these guidelines permit a jurisdiction to reduce the clear width of a pedestrian access route to account for existing utility infrastructure if the pedestrian circulation path cannot be rerouted around the utility and the utility cannot reasonably be relocated.

In the context of alterations, where there are existing physical constraints, the width must still comply to the maximum extent feasible; a pedestrian circulation path narrower than 36 inches may be impassible by a person with a mobility device. In new construction of undeveloped land, by contrast, the Board expects jurisdictions to insist that utilities, traffic signals, and street furniture be located to allow for full compliance with accessibility requirements. However, as provided in DOJ's Title II regulations, full compliance with the relevant accessibility requirements is not required in the context of new construction where a public entity can demonstrate that it is structurally impracticable to meet the requirements. Full compliance is considered structurally impracticable only in those rare circumstances when the unique characteristics of terrain prevent the incorporation of accessibility features. 28 CFR 35.151.

Some commenters, including two disability rights advocacy organizations, a pedestrian advocacy organization and a local government DOT, requested that the Board expand the required clear width to 60 or 72 inches. The Board acknowledges that its public rights-of-way advisory committee recommended a width of 60 inches. *See* Public Rights of Way Access Advisory Committee, Building a True Community: Final Report, 13 (2001) *available at https://www.access-board.gov/files/advisory-committee-reports/prow-report.pdf.* However, that recommendation included several circumstances where a reduction in width would be permitted. *Id.* The Board opted to require 48 inches clear width with a requirement for 60 inch passing spaces as a minimum accessibility requirement. Forty-eight inches allows room for a person using a mobility device to traverse a pedestrian circulation path.

In response to the SNPRM, some commenters requested that the Access Board add a minimum width for shared use paths. Jurisdictions determine the width for a shared use path using criteria related to anticipated user volumes. AASHTO recommends that two-directional shared use paths should be 10 feet wide minimum. AASHTO, Guide for the Development of Bicycle Facilities 5–3 (4th ed. 2004). Where shared use paths are anticipated to serve a high percentage of pedestrians and high user volumes, AASHTO recommends that the paths should be 11 to 14 feet wide to enable a bicyclist to pass another path user travelling in the same direction, at the same time a path user is approaching from the opposite direction. *Id.* In certain ''very rare'' circumstances, AASHTO permits the width of shared use paths to be reduced to 8 feet. *Id.*

The Board is concerned that stating a minimum width, such as the width required for a pedestrian access route, may cause confusion that would result in the installation of narrower shared use paths than what would otherwise be used. Thus, the Board has maintained the requirement stated in the SNPRM that technical requirements for pedestrian access routes are applicable to the full width of shared use paths, whatever the width.

In response to a local government commenter that expressed concern that motorists would mistake a full-width curb ramp of a shared use path for a driveway, and a state DOT requested an exception for bollards that prohibit vehicular travel, the Board has added a

sentence to R302.2.2 clarifying the obstructions such as bollards are permitted on shared use paths as long as the clear width of the pedestrian access route is not reduced to less than 48 inches (1220 mm).

One local government commenter sought clarification regarding the applicable clear width for a path where bicyclists and pedestrians travel on separate but adjacent paths. A state's department of recreation asserted that for pedestrian paths with adjacent equestrian paths, the requirements should apply only to the pedestrian portion of the path. Whether a particular pedestrian facility should be considered a shared use path or not will be determined by the specific characteristics of the path. The question is whether there is a shared use path, or a pedestrian circulation path and an adjacent bike path or equestrian path.

If there is a detectable separation between the pedestrian portion of the path and the bike or equestrian portion of the path, then it may not actually be a shared use path, but rather two distinct facilities in close proximity.

Passing Spaces (R302.3)

Passing spaces must be provided at intervals of 200 feet (61 m) maximum where the clear width of the pedestrian access route is less than 60 inches (1525 mm). The passing spaces, which are 60 inches by 60 inches, are provided to allow sufficient space for two persons in wheelchairs to pass each other. Pedestrian access routes and passing spaces may overlap. In response to the NPRM, a utility company expressed concern about passing spaces being added to a pedestrian access route near an at-grade rail crossing where typically pedestrians would be channelized into the crossing. Passing spaces must be added at intervals no greater than 200 feet, but jurisdictions have flexibility to place some passing spaces at shorter intervals to ensure that specific areas are avoided.

A local government commenter requested clarification as to what length of a pedestrian circulation path would need to be altered to trigger the requirement for a passing space. As this is a question regarding how the technical requirements will be enforced, the Board notes that USDOT and DOJ may provide further specifics on this issue.

Grade (R302.4)

The grade of a pedestrian access route is the running slope of the route in the direction of pedestrian travel. Grade is the vertical change in elevation over the horizontal distance covered and is expressed as either a ratio or, when dividing these two numbers, as a percent. The grade of pedestrian access routes must comply with the specifications corresponding to the location of the pedestrian access route, except for the grade of curb ramps and blended transitions, and ramps, which must comply with the grade specifications of their respective technical requirements (R304, R407).

Where pedestrian access routes are contained within a street or highway right-of-way, the grade of the pedestrian access route shall not exceed 1:20 (5.0%). An exception permits the grade of the pedestrian access route to not exceed the grade established for the adjacent street or highway, where the grade established for that adjacent street or highway exceeds 1:20 (5.0%) (R302.4.1). However, where pedestrian access routes are contained within crosswalks, a maximum grade of 1:20 (5.0%) is required (R302.4.3). This is consistent with AASHTO guidance, which recommends that the sidewalk grade follow the grade of adjacent roadways, and also recommends maximum cross slopes for roadways. *See* AASHTO, A Policy on Geometric Design of Highways and Streets 4–7 (7th ed. 2018); *see also* AASHTO, Guide for the Development of Bicycle Facilities 5–16 (4th ed. 2012). Where pedestrian access routes are not contained within a street or highway right-of-way, such as a shared use path that runs through either a separate right-of-way or an easement on private land, a maximum grade of 1:20 (5.0%) is required (R302.4.2).

In response to comments from state and local government entities, the Board restructured R302.4.1 (NPRM 302.5) to clarify that a pedestrian access route within a highway right-of-way may be graded to 1:20 (5.0%), even where the grade of the adjacent street is less than 1:20 (5.0%). The Board has restructured this provision to provide a general requirement of 1:20 (5.0%) maximum grade of the pedestrian access route, with an exception stating that where the grade of the adjacent street exceeds 1:20 (5.0%), the grade of the pedestrian access route shall not exceed the grade of the adjacent street. In some circumstances where the grade of the adjacent street is less than 1:20 (5.0%), compliance with the general requirement could result in a pedestrian access route with a grade of 1:20 (5.0%) maximum being steeper than the grade of the adjacent street if the grade of the adjacent street is less than 1:20 (5.0%).

The Board also received comments from four state DOTs indicating that their standard maximum for superelevation exceeds 5%. To address this concern, the Board has added an exception for the grade of the pedestrian access route within a crosswalk, which specifies that where roadway design requires superelevation greater than 1:20 (5.0%) at the location of a crosswalk, the grade of the pedestrian access route within the crosswalk may be the same as the superelevation (R302.4.3).

In the SNPRM, the Board added a provision requiring compliance with grade requirements to the ''extent practicable'' in both new construction and alterations where compliance with grade requirements for pedestrian access routes ''not practicable'' due to existing terrain or infrastructure, right-of-way availability, a notable natural feature, or similar existing physical constraints (SNPRM R302.5.2). The Board explained that this provision was responsive to comments to the Advance Notice of Proposed Rulemaking (ANPRM) on accessibility guidelines for shared use paths indicating that physical constraints may prevent full compliance with grade requirements.

The comments received in response to the SNPRM indicate that the proposed language at SNPRM R302.5.2 did not provide additional clarity or substantial flexibilities beyond what is already available through other provisions and standards. The Board received comments from some state DOTs and local governments detailing circumstances where the grade of SUPs in their jurisdictions exceed 5% principally due to underlying terrain. For example, one local government located in a mountainous area noted that only 17% of the land within its jurisdiction has a slope of 5% or less and indicated that its design guidelines allow the grade of shared use paths to exceed 5% for short sections where topographical constraints necessitate design flexibility. A state DOT observed that the language of the SNPRM created a ''grey area'' where jurisdictions would use engineering judgement in determining whether compliance with the 5% maximum grade was ''practicable'' due to existing terrain. An accessibility advocacy organization commented that accessibility standards should be applied ''100 percent'' and only scaled back where existing site conditions warrant.

Upon consideration of the comments and further reflection and research, the Board has concluded that the proposed provision at SNPRM R302.5.2 specifically allowing the grade of the pedestrian access route to comply with grade requirements to the ''extent

practicable'' [12] where compliance is ''not practicable'' is not needed for the following reasons.

First, the Board notes that the Volpe Center, which assessed the costs of compliance with this provision, observed that the majority of shared use path miles cataloged in available documentation are built on abandoned or converted railroad track beds, and thus have a grade of less than 1:100 (1.0%) due to their railroad origins. *See* FRIA at 66. Further, the Board notes that the grade of shared use paths built within a highway right-of-way may match the grade of the adjacent street if it exceeds 1:20 (5.0%) (R302.4.1 Exception). In addition, AASHTO advises that the grade of a shared use path in an independent right-of-way should not exceed 5%. *See* AASHTO, Guide for the Development of Bicycle Facilities 5–16 (4th ed. 2012). Consequently, the majority of shared use paths will meet the technical requirements for the grade of pedestrian access routes at R302.4.

Second, the Board notes that most shared use paths are built on existing rights-of-way and thus considered alterations under the final rule. *See* FRIA at 66. As explained above, ''added'' pedestrian facilities were required to fully comply with technical requirements as ''new construction'' under the proposed rule; however, under the final rule pedestrian facilities added to existing, developed rights-of-way are alterations. *See* 104.3. Section R202.3 of the final rule allows a regulated entity to comply with a requirement to the maximum extent feasible where the requirement is technically infeasible due to existing physical constraints. Section R202.3 specifically lists underlying terrain, underground structures, adjacent developed facilities, drainage, and the presence of a significant natural or historic feature as examples of existing physical constraints that may prevent compliance with a requirement.

For example, a state department of conservation and recreation submitted a comment in response to the SNPRM requesting that the Access Board allow new shared use paths to use the grade of the existing facility that they will be built on, such as a fire road or abandoned railroad that would serve as a trail bed. Under the final rule, the construction of shared use paths on existing facilities such as these are alterations, and compliance would be expected to the maximum extent feasible where existing physical constraints make compliance technically infeasible (*see* R202.3).

Second, with respect to newly constructed shared use paths not within a highway right-of-way, the Access Board observes that DOJ regulations implementing accessibility requirements under Title II of the ADA state that full compliance with the relevant accessibility requirements is not required in the context of new construction where a public entity can demonstrate that it is structurally impracticable to meet the requirements. 28 CFR 35.151. While under DOJ's regulation full compliance is considered structurally impracticable only in those rare circumstances when the unique characteristics of terrain prevent the incorporation of accessibility features, the comments received in response to the SNPRM indicate that the main impediment to full compliance with grade requirements is the underlying terrain. DOJ and USDOT may elect to provide additional information regarding the unique characteristics of terrain that would make compliance with grade requirements structurally impracticable.

In sum, the Board has eliminated SNPRM R302.5.4 from the final rule as unnecessary in light of other available flexibilities to address circumstances where the characteristics of the underlying terrain prevent full compliance with the technical requirements for grade.

In the final rule, the Board has also eliminated a provision that provided flexibilities for instances where compliance with grade requirements is precluded by laws intended to preserve threatened or endangered species, the environment, or archeological, cultural, historical, or significant natural features (SNPRM R302.5.5). This provision was modeled after a provision in the Board's supplemental rulemaking under the ABA for Federal outdoor areas. 36 CFR part 1191, Appx. D 1019.1. Upon further consideration, the Board has concluded that while this exception was suitable for recreational trails in National Parks and other Federal lands, is not appropriate for the construction of transportation facilities, including shared use paths, which should be designed to prioritize equitable transportation for all, and are already subject to environmental review.

Cross Slope (R302.5)

Cross slope is the slope perpendicular to the direction of pedestrian travel (*see* R104.3). On a sidewalk, the cross slope is measured perpendicular to the curb line or edge of the street or highway. Excessive cross slope impedes travel by pedestrians who use wheeled mobility devices, since energy must be expended to counteract the perpendicular force of the cross slope. Excessive cross slope makes it more difficult for pedestrians who use wheelchairs to travel on uphill slopes and to maintain balance and control on downhill slopes. Excessive cross slope also negatively affects pedestrians who use braces, lower limb prostheses, crutches, or walkers, as well as pedestrians who have gait, balance, or stamina impairments.

A maximum cross slope of 1:48 (2.1%) is specified for pedestrian access routes, except for pedestrian access routes contained within certain crosswalks. This is the same cross slope specified for accessible routes in buildings and facilities. 36 CFR part 1191, Appx. D 403.3. In exterior environments, this cross slope is adequate to allow water to drain off paved walking surfaces.

The Board has added an exception to this general rule to clarify that the portion of a pedestrian access route within a street that connects an accessible parallel parking space to the nearest crosswalk as specified in R310.2.2 is not required to comply with cross slope requirements.

In crosswalks, the slope of the roadway is taken into consideration because the grade or running slope of the roadway perpendicular to the direction of pedestrian travel will comprise the cross slope of the crosswalk. The NPRM specified 5 percent maximum cross slope for pedestrian access routes contained within pedestrian street crossings ''without yield or stop control'' (NPRM R302.6.1). The purpose of allowing a steeper cross slope at these crosswalks is to avoid a jolt to vehicles at the change of grade where vehicles do not need to slow to a yield or stop at a crossing.

In an advisory that accompanied the proposed rule text, the Board indicated that a pedestrian street crossing ''without yield or stop control'' included intersections with a traffic signal designed for the green phase. In response to the NPRM, several commenters indicated that the meaning of ''without yield or stop control'' was unclear. The Board concurs with these commenters, and in the final rule has provided more specific requirements for different types of approaches.

In R302.5.2 of the final rule, the Board breaks down the cross slope for pedestrian access routes contained within a crosswalk. Specifically, the Board addresses crosswalks where the

[12] As explained in the Major Issues section above, to improve clarity of the final rule text the Board has removed the word ''practicable'' in favor of ''feasible,'' which is used in the 2004 ABA and ADA Accessibility Guidelines.

intersection approach has a stop or yield control device such as a stop or yield sign or a flashing red or yellow light (R302.5.2.1); crosswalks at uncontrolled intersection approaches where there is no indication that traffic must slow or stop (R302.5.2.2); and crosswalks at intersection approaches with a traffic control signal or pedestrian hybrid beacon, which have phases where traffic need not slow to cross the intersection, such as when the traffic signal is green or when the pedestrian hybrid beacon is not activated (R302.5.2.3).

The cross slope of the pedestrian access route within a midblock crosswalk or a crosswalk at a roundabout is permitted to be the same as the grade of the street that it crosses (R302.5.2.4). The Board added a reference to crossings at roundabouts to clarify that these crosswalks, which do not occur at traditional intersections, operate similarly to midblock crossings.

In response to the NPRM, the Board received numerous comments on the topic of cross slope, which are addressed above in the Major Issues section. The Board has assessed the costs of compliance of R302.5.2 in the FRIA. *See* FRIA at 114.

Surfaces (R302.6)

The walking surfaces of pedestrian access routes, elements, and spaces that are required to be accessible shall be stable, firm, and slip resistant (R302.6). This is the same requirement as the proposed rule (NPRM 302.7); in the final rule, the Board made edits for clarity.

The NPRM contained a provision regarding vertical alignment of surfaces, which was intended to communicate that adjacent surfaces, such as pavers, portions of sidewalk, or other pedestrian facilities and elements within the pedestrian access route, be on the same plane. The provision further required grade breaks to be flush (*i.e.,* without a gap between them), and stated requirements for at-grade rail crossings. Commenters mostly expressed confusion regarding the purpose of this provision. In the final rule, the Board has removed most of this provision, leaving only the requirement that grade breaks be flush (R302.6.1). The Board determined that the proposed requirement for planar surfaces was not needed in light of requirements for grade (R302.4), cross slope (R302.5) and changes in level (R302.6.2). The requirements for at-grade rail crossing surfaces have been consolidated at R302.6.4.

Changes in Level (R302.6.2)

In the proposed rule, the Board used the term ''vertical surface discontinuities'' to describe what is referred to as ''changes in level'' in the 2004 ABA and ADA Accessibility Guidelines. *See* NPRM R302.7.2; *see also* 36 CFR part 1191, Appx. A 303. In response to the NPRM, commenters suggested that this section be revised for better consistency with the 2004 ABA and ADA Accessibility Guidelines. The Board concurred with this suggestion and has updated the language at R302.6.2 to address ''changes in level.'' The term ''surface discontinuities'' has been eliminated from the guidelines.

The term ''changes in level'' as used in these guidelines refers to an abrupt increase or decrease in the level of the walking surface of a pedestrian access route, such as occurs when one sidewalk panel is slightly higher than an adjacent panel. It is measured relative to the plane of the walking surface; it does not take into consideration the grade of the pedestrian access route. The text of this provision has been revised for clarity. The requirements state that changes in level up to ¼ inch (6.4 mm) may be vertical. Changes in level between ¼ inch (6.4 mm) high and ½ inch (13 mm) high must be beveled.

The Board has also included an additional clarification that changes in level greater than ½ inch (13 mm) up to 6 inches (150 mm) must have a slope no greater than 1:12 (8.3%), and changes in level greater than 6 inches (150 mm) must comply with the requirements for ramps at R407. The Board added these provisions in response to comments and due to the many technical assistance inquiries seeking clarification as to where in the public right-of-way pedestrian access routes are to be treated as ramps.

In the public right-of-way, changes in level of 6 inches (150 mm) or less are not subject to the ramps technical requirements and thus do not require handrails, edge protection, or landings. This clarification addresses local government commenters' concerns about the difficulty of limiting changes in level to ½ inch (13 mm) in the public right-of-way due to soil movements. The Board acknowledges that sidewalk panels shift over time due to tree root growth, soil movement, and other factors. The Board anticipates that the clarified provisions will help jurisdictions better plan for sustained compliance through regular maintenance programs.

The Board acknowledges comments from two state government commenters that requested a requirement that utility covers, vault frames, and gratings not be located on curb ramps in new construction. The Board does recommend that these items be located elsewhere in new construction; however, these items are permitted if installed consistent with the requirements.

Horizontal Openings (R302.6.3)

Horizontal openings in ground surfaces, for example, holes in gratings or gaping cracks in pavement, must not be so large such that a sphere larger than ½ inch in diameter may pass through. The Board revised the language of this provision slightly from the proposed NPRM 302.7.3 to clarify that holes in gratings and joints are examples of horizontal openings, not the only horizontal openings covered by PROWAG.

In general, elongated openings are permitted perpendicular to the dominant direction of travel. In the final rule, in response to comments from a state DOT and a pedestrian advocacy organization, the Board has clarified that elongated openings are not permitted where pedestrian access routes intersect as a single dominant direction of travel cannot be identified in that circumstance.

The Board notes the concern raised by one commenter that one northern state uses 1-inch-wide horizontal openings on stairs to minimize snow and ice build-up, and acknowledges that newly constructed and altered stairs in this jurisdiction may require additional maintenance to clear snow and ice. However, equity requires that persons with disabilities in northern climates also have access to pedestrian facilities. A cane or crutch tip may become trapped in a horizontal opening wider than ½ inch.

In response to the NPRM, a local government commenter indicated that the horizontal openings requirements may conflict with water drainage in existing rights-of-way. As discussed above, alterations in existing rights-of-way are to comply with technical requirements to the maximum extent feasible where existing physical constraints make compliance with applicable requirements technically infeasible.

Surfaces at Pedestrian At-Grade Rail Crossings (R302.6.4)

In the final rule, the Board has consolidated at R302.6.4 all of the surface requirements for pedestrian access routes at pedestrian at-grade rail crossings. The surface alignment requirement (R302.6.4.1) has not changed from the proposed rule, except

that it was moved from the proposed vertical alignment section (NPRM R302.7.1), which was eliminated. Where a pedestrian access route crosses rails at grade, the pedestrian access route surface must be level and flush with the top of rail at the outer edges of the rails, and the surface between the rails must be aligned with the top of rail. This requirement keeps the surface of these crossings as consistent as possible except for the flangeway gap.

Flangeway gaps are the horizontal opening immediately adjacent to the rails that allow passage of train wheel flanges. Flangeway gaps, like other horizontal openings in a walking surface, can pose a potential hazard to pedestrians with certain disabilities because they can entrap wheelchair casters, walker wheels, and crutch or cane tips.

The requirements for flangeway gaps have been set at the narrowest dimension that allows a train to safely traverse a pedestrian crossing. There are two different dimensions for flangeway gaps: 3 inches maximum for crossings located on railroad track subject to Federal Railroad Administration (FRA) safety regulations at 49 CFR part 213, and 2 and ½ inches maximum for all others (R302.6.4.2). In the proposed rule, the Board had described these two categories as ''freight rail track'' and ''non-freight rail track,'' but revised the description for clarity at the request of the FRA.

In response to the proposed rule a public utilities commission requested that the Board include a specification for field side gaps (*i.e.,* gaps on the outer side of the rail). An additional specification is not needed for field side gaps because the general requirement for horizontal openings (½ inch) at R302.6.3 applies. A railroads association commented that while a 3-inch gap is acceptable for new construction, flangeway gaps widen over time. The Board acknowledges that, similar to many accessibility requirements, maintenance to sustain compliance may be required.

The same railroads association also commented that a 2 and ½ inch gap is not sufficient for Amtrak and other commuter railroads. However, those railroads generally operate on track subject to FRA safety regulations at 49 CFR part 213, and thus would be subject to the 3-inch maximum, not the 2 and ½ inch maximum. A state DOT questioned whether the maximums set would cause derailments, but did not provide any factual basis for this concern. An association of transportation engineers requested an exception where specific freight safety issues are identified. The association did not provide further information regarding the specific freight safety issues that would be presented by the 3-inch (75 mm) maximum requirement. The Board notes that this maximum is applicable only at pedestrian crossings; in alterations, compliance is expected to the maximum extent feasible where existing physical constraints make compliance with applicable requirements technically infeasible (R202.3).

A public utilities commission requested a requirement for flange filler. In the NPRM, the Board asked a question seeking information or research on materials and devices that fill the flangeway gap but received no responses. At the time that the NPRM was published, the Board anticipated that significant research would be undertaken on this topic. The Board acknowledges that flangeway gap fillers are used at some light rail station stops; however, there has not been sufficient research for the Board to conclude that a national mandatory requirement for flangeway gap fillers at grade-level crossings is appropriate. The Board intends to encourage further research on this topic, and may revisit a requirement for flangeway gap fillers in the future.

R303 Alternate Pedestrian Access Routes

The proposed rule did not contain technical provisions for alternate pedestrian access routes. Rather the scoping incorporated by reference specific provisions of the MUTCD. In response to commenter concerns, and as described above, the Board has eliminated references to the MUTCD and included technical requirements directly in the rule text.

In proposed section NPRM 205, the Board indicated that alternate pedestrian access routes must comply with sections 6D.01, 6D.02 and 6G.05 of the MUTCD (2009 Edition). The proposed rule further noted that where provided, pedestrian barricade and channelizing devices were required to comply with sections 6F.63, 6F.68, and 6F.71 of the MUTCD.[13]

The guiding principle with respect to accessibility for MUTCD alternate pedestrian access routes is found in MUTCD 6D.02 paragraph 3, which states, ''When existing pedestrian facilities are disrupted, closed, or relocated in a [temporary traffic control] zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.'' In section R303, the Board has specified the required accessibility features of alternate pedestrian access routes to ensure that they are detectable and contain the basic accessibility features of the closed route without being overly burdensome.

Signs (303.2)

The final rule requires that jurisdictions provide signs identifying alternate pedestrian access routes in advance of decision points. The signs must comply with technical requirements for characters at R410. In addition, proximity actuated audible signs or other non-visual means of conveying the information on the signs must be provided within the public right-of-way.

The signs are intended to provide clarity to pedestrians as to where any alternate pedestrian access route is located. Placing signs ahead of decision points, such as at an intersection that precedes a closed sidewalk, reduces the need for pedestrians to retrace their steps or alternately attempt to cross a roadway at a place other than a crosswalk.

The proposed rule referenced MUTCD 6D.01 paragraph 3, which requires that jurisdictions provide advance notification of sidewalk closures. Equity requires that whatever information is made available to sighted persons must also be provided in a non-visual format. Equitable access to information on alternate pedestrian access routes is contemplated in the guidance to MUTCD 6D.02, which was referenced in the proposed rule:

Because printed signs and surface delineation are not usable by pedestrians with visual disabilities, blocked routes, alternate crossings, and sign and signal information should be communicated to pedestrians with visual disabilities by providing audible information devices, accessible pedestrian signals, and barriers and channelizing devices that are detectable to pedestrians traveling with the aid of a long cane or who have low vision.

The Board also indicated in an advisory that accompanied the proposed rule that proximity-actuated audible signs are a preferred means to warn pedestrians who are blind or have low vision about sidewalk closures (NPRM Advisory R205).

In response to the NPRM, the Board received comments from four disability rights advocacy organizations, one state

[13] The Board acknowledges that some of the MUTCD provisions that were incorporated by reference contained standards that are not relevant to accessibility and therefore beyond the scope of this regulation. Accordingly, the substance of those non-relevant provisions of the MUTCD is not included in this final rule.

council on disability, and one state DOT in support of the use of proximity actuated audible signs. Two engineering organizations expressed concern that proximity actuated audible signs are not commonly used, would be expensive, and would likely be stolen. A rail transit and crossings branch of a public utility expressed concern that proximity actuated signs should not be required at rail crossings, where they might not be heard.

As stated above, equity requires that information provided in a visual format to pedestrians also be provided in a non-visual format so that pedestrians who are blind or have low vision have equal access to the information. The Board has evaluated the costs of these devices in the FRIA. *See* FRIA at 128. Further, the Board is confident that jurisdictions will find ways to secure these devices, as they do other types of equipment, to reduce the risk of theft. There is no exception for at-grade rail crossings. While the noise of a passing train may momentarily compete with an audible sign, during all other times it would be as functional as anywhere else. It is critical that dangerous areas for pedestrians, such as at-grade rail crossings, offer maximum accessibility with respect to safety information, such as information relating to an alternate route.

Surface (R303.3)

The surface of an alternate pedestrian access route must comply with technical accessibility requirements for surfaces at R302.6 at least to the extent that the closed route complied with those surface requirements. This is consistent with the proposed rule's reference to MUTCD 6D.02, which requires that temporary pedestrian facilities have accessibility features consistent with the closed route.

Continuous Clear Width (R303.4)

The minimum continuous clear with of alternate pedestrian access routes must be 48 inches, except where an alternate pedestrian access route utilizes an existing pedestrian circulation path, in which case the width must be at least the width of the temporarily closed pedestrian circulation path. MUTCD 6D.02 paragraph 3, which was referenced in the proposed rule, requires that temporary facilities include accessibility features consistent with the features present in the existing pedestrian facility.

With respect to the requirements for clear width of alternate pedestrian access routes, the Board has sought to balance the concerns of over 150 individual commenters and several disability rights and pedestrian advocacy organizations who support mandatory alternate pedestrian access routes usable by persons with disabilities, with the concerns of six state and local DOTs that would like the accessibility requirements for alternate routes not to exceed the existing accessibility of the temporarily closed route.

The Board has provided a general requirement for a minimum clear width of 48 inches, which as described in the discussion of pedestrian access routes at R302.2 above, is the minimum width that the Board has determined to be accessible for persons with disabilities. This width is achievable where an alternate pedestrian access route is provided within the roadway using barricades, or where an existing sidewalk used for the alternate pedestrian access route is at least 48 inches (as is the case in most central business districts and many jurisdictions that have already adopted 48 inches as a minimum sidewalk width). *See* FRIA at 76. However, as the Board is aware that there are existing sidewalks that will need to be used as alternate pedestrian access routes that are not 48 inches, the Board has provided an exception indicating that where an existing pedestrian circulation path is used as the alternate pedestrian access route, the width of the alternate route must not be less than the width of the temporarily closed path.

Curb Ramps or Blended Transitions (R303.5)

Where an alternate pedestrian access route crosses a curb, a curb ramp or blended transition complying with the requirements must be provided to ensure that the alternate pedestrian access route is useable by persons with mobility disabilities. A curb ramp or blended transition is required regardless of whether the temporarily closed pedestrian circulation path contained this accessibility feature. Again, the Board is seeking to balance the concerns of over 150 individual commenters and disability rights and pedestrian advocacy organizations with the concerns of local and state DOTs about the burden of building temporary facilities. An alternate pedestrian access route that does not provide a curb ramp or blended transition over a curb would not be usable for many persons with mobility disabilities, and they would not have equal access to the alternate route.

Detectable Edging of Channelizing Devices (R303.6)

Where a channelizing device is used to delineate an alternate pedestrian access route, continuous detectable edging complying with technical requirements must be provided for the length of the route. An exception is provided for places where pedestrians or vehicles turn or cross, which would necessitate a gap in the channelizing device and detectable edging. Where detectable edging is provided, the top of the topmost part of the detectable edging cannot be lower than 32 inches above the ground and must not be sharp or abrasive. These specifications allow for persons who are blind or have low vision to detect the edging by running their hands along the topmost part of the edging. The bottommost part of the edging cannot be more than 2 inches above the ground to allow for continuous cane detection. These specifications for detectable edging come from MUTCD 6F.63 paragraph 5, which was incorporated by reference in the proposed rule.

Pedestrian Signal Heads (R303.7)

Temporary pedestrian signals at alternate pedestrian access routes are not required by these guidelines. However, when a jurisdiction decides to provide temporary pedestrian signal heads in the public right-of-way, they are subject to these guidelines, as specified at R201.2. The Board has reiterated this requirement at R303.7 to ensure that jurisdictions understand that when a temporary pedestrian signal head is provided at a crosswalk that is part of an alternate pedestrian access route, pedestrian pushbuttons or passive detection devices complying with the technical requirements at R307 must be provided. Similar to the requirements for temporary signage, equity requires that visual information provided on pedestrian signal heads must be available to persons who are blind or have low vision in a non-visual format.

R304 Curb Ramps and Blended Transitions

Curb ramps provide a smooth transition where a pedestrian access route crosses a curb. Blended transitions provide a smooth wraparound connection at a corner or a flush connection where there is no curb to cut through. There are two types of curb ramps: perpendicular and parallel. Perpendicular curb ramps have running slopes that are perpendicular to the curb or street served. Parallel curb ramps have running slopes that are parallel to the curb or street served. Parallel curb

ramps provide a smooth transition to a landing at street level where a turn is made to enter the crosswalk. Blended transitions connect a pedestrian circulation path to the crosswalk with a grade not steeper than 1:20 (5.0%.) Examples of blended transitions are depressed corners or a connection from a sidewalk to a raised crosswalk. Although curb ramps may have slopes of 1:20 (5.0%) or less, blended transitions are not curb ramps with slopes 1:20 (5.0%) or less.

In the final rule, this section has been reorganized for clarity. In response to commenter concerns, the Board has provided definitions in R104.3 for ''perpendicular curb ramp,'' ''parallel curb ramp,'' and ''blended transitions.'' In addition, in the final rule, the Board has substituted the term ''landing'' for ''turning space,'' in response to commenters' requests for consistency with ADAAG terminology. The Board had used the term ''turning space'' in the NPRM to avoid confusion with the ''landings'' associated with ramps (R407). However, the Board acknowledges that ''landing'' is the commonly used term for these curb ramp-associated spaces, and in the final rule now uses the term ''landing.'' It is important to note, however, that the landings associated with ramps (R407.6) have different technical requirements than the landings associated with curb ramps (R304.2.4 and R304.3.4). Curb ramps are not ''ramps'' for the purposes of PROWAG (see definition of ''ramp'' at R104.3) and are thus not subject to the requirements for ramps at R407.

Perpendicular Curb Ramps (R304.2)

Numerous commenters from state and local government entities and an engineering association expressed confusion as to the proposed 1:20 (5.0%) minimum for the running slope of curb ramps, pointing out that in many cases a curb ramp need not reach 5% depending on the grade of the adjacent pedestrian facilities. The Board concurred with commenters and in the final rule has removed the minimum running slope and stated only a maximum of 1:12 (8.3%) (R304.2.1). In addition, the Board has added an exception to clarify that where the curb ramp length must exceed 15 feet (4.6 m) to achieve a 1:12 (8.3%) running slope, the curb ramp length shall extend at least 15 feet (4.6 m) and may have a running slope greater than 1:12 (8.3%). A curb ramp complying with the exception to R304.2.1 need not exceed 15 feet in length.

The cross slope of perpendicular curb ramp runs is specified at 1:48 (2.1%) maximum (R304.2.2). The Board has provided an exception stating that for curb ramps at a crosswalk, the cross slope may be equal to or less than the cross slope permitted at the crosswalk. This exception corrects an error in the proposed rule indicating that at certain pedestrian street crossings, the cross slope could equal the highway grade (NPRM R304.5.3); this conflicted with the cross slope provisions for certain crosswalks.

The requirements for grade breaks were moved out of the common requirements section to the perpendicular and parallel curb ramps sections for clarity. Grade breaks at the top and bottom of a curb ramp run must be perpendicular to the direction of the curb ramp run (R304.2.3). Grade breaks are not permitted on the surfaces of curb ramp runs and landings. Surface slopes that meet at grade breaks must be flush. There are no changes to this requirement from the proposed rule.

For each perpendicular curb ramp, a clear area 48 inches (1220 mm) wide by 48 inches (1220 mm) long must be provided beyond the bottom grade break and within the width of the crosswalk (R304.2.4). The clear area must be located outside the vehicle lanes, including any bike lanes, that run parallel to the crosswalk. The running slope of the clear area cannot exceed 1:20 (5.0%) maximum, and the cross slope is as specified by R302.5. The purpose of the clear area is to allow pedestrians an area outside of the vehicle lanes to orient themselves to the crossing.

In the proposed rule, this provision was entitled, ''Clear Space'' and appeared in the common requirements for curb ramps and blended transitions (NPRM R304.5.5). In the final rule it has been renamed ''Clear Area'' to avoid confusion with the clear spaces described at R404 and has been moved to the section specific to perpendicular curb ramps for clarity. Also in the final rule, the Board has specified slope and cross slope of clear areas in response to commenters' request for clarity on these requirements. In addition, the Board has clarified that vehicle lanes include any bike lanes.

Numerous state and local government entity commenters expressed confusion regarding the required location of the clear space, and in particular the requirement that the clear space be located wholly outside the parallel vehicle travel lane. Some commenters erroneously thought that an additional 48 inches of shoulder would be required to comply with this requirement. The confusion reflects a misunderstanding of how compliance is assessed. Each curb ramp is assessed separately, so although the clear space may be in a vehicle travel lane that is *perpendicular* to the pedestrian direction of travel, vehicle travel of that lane would be stopped when pedestrians enter the clear area to orient themselves to the crossing. The appropriate inquiry to assess compliance is whether the clear area is wholly outside the *parallel* vehicle travel lane when looking at the individual curb ramp.

When a change in direction is necessary to access the top of a perpendicular curb ramp from a pedestrian access route, a landing 48 inches (1220 mm) wide minimum by 48 inches (1220 mm) long minimum must be provided at the top of the curb ramp (R304.2.5). At shared use paths, the landing must be as wide as the shared use path. In response to numerous comments, the final rule eliminates a proposed requirement for a larger landing where the turning space is constrained. The cross slope requirements for landings, which appeared in the proposed rule at NPRM 304.5.3, have been consolidated into the perpendicular curb ramp section. Slope requirements have been added for clarity.

Perpendicular curb ramps must have flared sides with a 1:10 (10.0%) maximum slope where a pedestrian circulation path crosses the side of a curb ramp (R304.2.6). The slope of the flared sides is measured parallel to the curb line. In the NPRM, the Board sought comment on whether a steeper side flare slope should be specified (NPRM Question 18). While a few state and local government entities and other commenters expressed support for increasing the slope of flared sides, others, mostly disability rights advocacy organizations and individuals sought to retain the 1:10 (10%) maximum citing hazards to pedestrians. The Board carefully considered the comments and was persuaded that increasing the slope of flares beyond 1:10 (10.0%) would present accessibility issues. Thus, the Board has retained the 1:10 (10.0%) maximum side flare slope.

The Board has added a new provision at R304.2.7 which clarifies that a transitional segment may be used in the connection of a perpendicular curb ramp or its landing to a pedestrian access route. A transitional segment is defined in R104.3 as ''[t]he portion of a pedestrian circulation path that connects adjacent surfaces with different slopes or dimensions to provide a smooth transition.'' The purpose of allowing a transitional segment is to address circumstances such as the warping in the pedestrian circulation path that will need to occur,

even in new construction, to connect a curb ramp or landing with a cross slope that exceeds 1:48 (2.1%) to a pedestrian access route with a cross slope of 1:48 (2.1%) maximum.

Parallel Curb Ramps (R304.3)

Numerous commenters from state and local government entities and a public works association expressed confusion as to the proposed 1:20 (5.0%) minimum for the running slope of curb ramps, pointing out that in many cases a curb ramp need not reach 5% depending on the grade of the adjacent pedestrian facilities. The Board concurred with commenters and in the final rule has removed the minimum running slope and stated only a maximum of 1:12 (8.3%) (R304.3.1). In addition, the Board has added an exception to clarify that where the curb ramp length must exceed 15 feet (4.6 m) to achieve a 1:12 (8.3%) running slope, the curb ramp run length shall extend at least 15 feet (4.6 m) and may have a running slope greater than 1:12 (8.3%). Curb ramps complying with the exception to R304.3.1 need not exceed 15 feet.

The cross slope of parallel curb ramp runs is 1:48 (2.1%) maximum (R304.3.2). This provision was moved from the common requirements for curb ramps and blended transitions in the proposed rule (NPRM R304.5.3).

The requirements for grade breaks were moved out of the common requirements section to the perpendicular and parallel curb ramps sections for clarity. Grade breaks at the top and bottom of a curb ramp run must be perpendicular to the direction of the curb ramp run (R304.3.3). Grade breaks are not permitted on the surfaces of curb ramp runs and landings. Surface slopes that meet at grade breaks must be flush. There are no changes to this requirement from the proposed rule.

Landings that are 48 inches (1220 mm) wide minimum by 48 inches (1220 mm) long minimum must be provided at the bottom of parallel curb ramps (R304.3.4). As discussed above, in the proposed rule these landings were referred to as ''turning spaces'' (NPRM R304.3.1). In response to numerous comments, the final rule eliminates a proposed requirement for a larger landing where the turning space was constrained. The cross slope requirements for parallel curb ramp landings, which appeared in the proposed rule at NPRM 304.5.3, have been moved into the parallel curb ramp section. Slope requirements have been added for clarity.

Blended Transitions (R304.4)

A blended transition is a wraparound connection at a corner, or a flush connection where there is no curb to cut through, other than a curb ramp (R104.3). A blended transition is permitted in lieu of a curb ramp where a pedestrian access route crosses a curb, and where there is a flush connection between the sidewalk or shared use path and a crosswalk, such as at a raised crossing. When designed properly, one blended transition can serve all of the crosswalks at an intersection corner. The running slope of blended transitions is 1:20 (5.0%) maximum (R304.4.1).

The cross slope of a blended transition must be equal to or less than the cross slope of the crosswalk it serves (R304.4.2). The final rule corrects an error in the proposed rule indicating that at certain pedestrian street crossings, the cross slope of a blended transition may equal the highway grade (NPRM R304.5.3); this conflicted with the cross slope provisions for certain crosswalks. As explained above, the cross slope provision was moved from the common requirements for curb ramps and blended transitions in the proposed rule (NPRM R304.5.3) to provide greater clarity.

In the final rule, the Board has added a provision requiring a bypass where a blended transition serving more than one pedestrian circulation path has a running slope greater than 1:48 (2.1%). This is provided so that a pedestrian with a disability may bypass the slope of blended transition that the individual does not need to use. Without a bypass an individual with a disability may be forced to unnecessarily traverse a corner at a 1:20 (5.0%) cross slope. A bypass for blended transitions was not included in the proposed rule; individuals contacting the Board for technical assistance in implementing the proposed guidelines brought this issue to the attention of the Board.

Common Requirements (R304.5)

R304.5 specifies technical requirements applicable to both curb ramps and blended transitions.

Clear Width (R304.5.1)

The minimum clear width of curb ramps and blended transitions not on shared use paths is 48 inches (1220 mm) (R304.5.1.1). The minimum clear width of curb ramps and blended transitions on shared use paths is the width of the shared use path (R304.5.1.2).

In response to the SNPRM, the Board received comments from a few local government entities indicating concerns about the requirement that a curb ramp or blended transition on a shared use path be the same width as the shared use path. One local government commenter expressed concern that motorists would mistake a full-width curb ramp for a driveway. Another indicated that a full width curb ramp might be hard to achieve in an alteration. Another indicated that drainage, bridges, or utility poles might preclude full compliance.

The Board notes that jurisdictions have options to discourage motorists from erroneously entering a shared use path at a curb ramp, including signage or properly installed bollards (*see* R302.2.2). The Board further notes that alterations subject to existing physical constraints that make compliance with applicable requirements technically infeasible must comply with the applicable requirements to the maximum extent feasible (R202.3); in new construction of undeveloped land, the placement of drainage, bridges, or utility poles should not be an issue. In the SNPRM, the Board indicated that the requirement that a curb ramp or blended transition on a shared use path be the same width as the shared use path was similar to section 5.3.5 of the AASHTO Guide for the Development of Bicycle Facilities (2012). That provision states that the opening of a shared use path at a roadway should be the same width as the shared use path itself. While the Board considers the AASHTO approach to be best practice and anticipates that most jurisdictions will maintain the same width of a shared use path approaching a crosswalk, especially in new construction on undeveloped land, the language of R304.5.3 does not preclude a jurisdiction from tapering the width of a shared use path as it approaches a crosswalk. The clear width of the curb ramp must be the width of the shared use path at the place that the curb ramp meets the shared use path.

Change of Grade (R304.5.2)

A change of grade is an abrupt difference in the grades of two adjacent surfaces. Change of grade is determined by adding the two opposing slopes together. Where a change of grade that exceeds 13.3% occurs between a curb ramp or blended transition and the street or gutter, the final rule requires a transition space, with a running slope of 1:48 (2.1%) maximum and a cross slope no greater than the cross slope of the crosswalk as specified by R302.5, between the two surfaces that is a minimum of 24 inches in depth in the direction of pedestrian travel and the full width of the curb ramp. This

requirement is intended to prevent a wheelchair from tipping over while traversing an abrupt change of grade.

An accessible design firm commented that the change of grade should be limited to 11%. The Board acknowledges that its Public Rights-of-Way Access Advisory Committee recommended an 11% limit on change of grade in its 2001 report. *See* Public Rights-of-Way Advisory Committee, *supra,* at 18. However, the proposed change of grade has been 13% for many years, as described below, and the Access Board is not aware of safety issues resulting from this practice.

The proposed rule addressed change of grade as ''Counter Slope'' (NPRM R304.5.4) and specified a 5% maximum counter slope. Commenters requested additional clarity with respect to this provision. This provision has been reworded for clarity, and also to add an option for a change of grade that exceeds 13.3% if a transitional space is provided. However, the substantive requirements have not changed; the 13.3% maximum is a function of the 1:12 (8.3%) upper limit on curb ramp running slope (R304.2.1) and the 1:20 (5.0%) limit on grade of the pedestrian access route (R302.4), which was the permitted counter slope in the proposed rule.

Crosswalks (R304.5.3)

To ensure equitable safety to pedestrians with disabilities, in the final rule the Board has added a separate provision clarifying that curb ramps and blended transitions must lead directly into crosswalks. Specifically, perpendicular curb ramp runs and parallel curb ramp landings must be contained wholly within the width of the crosswalk they serve. In addition, the full width of blended transitions at shared use paths and 48 inches (1220 mm) of blended transitions at all other pedestrian circulation paths must be contained wholly within the width of the crosswalks they serve. In the proposed rule, the Board specified that the clear area required at the bottom of curb ramps be contained wholly within the width of the crosswalk served (NPRM R304.5.5). In light of the confusion exhibited by commenters with respect to the proposed clear area provision, the Board has made explicit the requirement that curb ramps and blended transitions lead directly into crosswalks.

Surfaces (R304.5.4)

In the final rule, the Board has added a provision clarifying that surfaces of curb ramps and blended transitions must comply with the technical requirements for surfaces of pedestrian access routes at R302.6; however, changes in level as described at R302.6.2 are not permitted.

R305 Detectable Warning Surfaces

Detectable warning surfaces are cane detectable surfaces consisting of truncated domes aligned in a square or radial grid pattern. As indicated in R205, detectable warning surfaces are required at specified locations to warn pedestrians who are blind or have low vision that they are entering or exiting a vehicular way, or that there is a drop from a boarding platform into a track street.

Two individual commenters and a manufacturer of detectable warning surfaces requested that the Board add wayfinding elements to the technical requirements for detectable warning surfaces. The Board is aware that there are detectable wayfinding surfaces that exist that provide tactile directional guidance. However, these serve a different purpose than the detectable warning surfaces required by ADAAG and PROWAG, which serve to warn pedestrians of the presence of a vehicular way.

As described in the final regulatory impact analysis, detectable warning surfaces as described in the proposed rule have been widely implemented throughout the United States over the past decade. FRIA at 13. Widespread consistent implementation of detectable warning surfaces coupled with the final rule's clarified requirement at R304.5.4 that curb ramps and blended transitions lead directly into crosswalks will provide additional wayfinding for pedestrians who are blind or have low vision. The Board will continue to monitor developments in outdoor wayfinding for possible future updates to PROWAG.

Dome Size and Spacing (R305.1.1 and R305.1.2)

The truncated domes on detectable warning surfaces have a base diameter of 0.9 inches (23 mm) minimum and 1.4 inches (36 mm) maximum, a top diameter of 50 percent of the base diameter minimum and 65 percent of the base diameter maximum, and a height of 0.2 inches (5.1 mm) (R305.1.1). In the final rule, in consideration of technical assistance inquiries received by the Access Board since publication of the proposed rule, the Board has added a sentence clarifying that when detectable warning surface tiles are cut to fit, partial domes are permitted along the cut edges.

With respect to spacing, truncated domes have a center-to-center spacing of 1.6 inches (41 mm) minimum and 2.4 inches (61 mm) maximum, and a base-to-base spacing of 0.65 inches (17 mm) minimum, measured between the most adjacent domes (R305.1.2). In the final rule, the Board has added an exception to clarify that when detectable warning surfaces are cut to fit, center-to-center spacing measured between domes adjacent to cut edges may exceed the spacing requirement up to twice the normal spacing between domes (R305.1.2 Exception 1). In addition, the Board has added an exception to clarify that dome spacing requirements do not apply at a gap in a detectable warning surface at an expansion joint, provided that the detectable warning surface aligns with both edges of the expansion joint (R305.1.2 Exception 2). This exception is particularly relevant to the installation of detectable warning surfaces on boarding platforms in the public right-of-way.

An advocacy organization for people who are blind commented that the Board should restate the dome size with exact specifications to ensure uniformity and to avoid the potential domes that are too large and close together to be detected. The Board maintains a narrow range in the permitted dome size to account for the various materials used for detectable warning surfaces. Again, over the past decade the proposed guidelines for detectable warning surfaces have been implemented by numerous jurisdictions throughout the United States; the Board is not aware of a detectability issue for detectable warning surfaces made within the required specifications.

A few other concerns were raised by commenters regarding the truncated dome design of detectable warning surfaces: one individual indicated that the truncated domes are too rough on wheelchair users; another individual asserted that the truncated dome design is difficult to keep free of snow and ice; and a regional association of engineers was concerned that the spacing would present a hazard to rollerbladers and skateboarders. The Board is aware that people who use wheelchairs typically prefer smooth surfaces for rollability; however, the Board must balance the accessibility needs of individuals with various types of disabilities. With respect to the concern regarding maintenance of detectable warning surfaces, the Board notes that over the past decade numerous jurisdictions that experience winter weather have been able to implement and appropriately maintain detectable warning surfaces. Further, the Board is not aware of widespread hazards to rollerbladers and

skateboarders posed by detectable warning surfaces.

Contrast (R305.1.3)

Detectable warning surfaces must contrast visually with adjacent walking surfaces, either light-on-dark or dark-on-light. Four commenters requested a more specific measure of contrast, such as 70%. Ten individual commenters, three disability rights advocacy organizations, and a pedestrian advocacy organization requested that the Board require that detectable warning surfaces be ''federal yellow.'' The Board has carefully considered these comments and declines to require a specific color or contrast percentage. The Board appreciates the desire for measurable standards; however, the percentage of contrast between surfaces is difficult to measure in outdoor environments that will have varying lighting conditions throughout the day. Further, as PROWAG does not specify a color or building material for any pedestrian surfaces, it would be difficult to specify a single color that would provide appropriate contrast in all circumstances. For example, federal yellow may provide less contrast with a concrete sidewalk than a maroon or black detectable warning surface. The Board has concluded that contrast is appropriately assessed on a case-by-case basis in consideration of the building materials used.

Size of Detectable Warning Surface (R305.1.4)

Detectable warning surfaces must extend 24 inches (610 mm) minimum in the direction of pedestrian travel. The width is specified depending on the type of pedestrian facility where the detectable warning surface is installed. This provision has been restructured for clarity. In the final rule, the Board has clarified that at cut-through pedestrian islands, the width of the detectable warning surface is the full width of the pedestrian circulation path; detectable warning surfaces at pedestrian refuge islands with curb ramps were already covered under the specification for the width of detectable warning surfaces at curb ramps and blended transitions, which is the full width of the curb ramp run (excluding any flared sides), blended transition, or landing.

In response to the proposed rule, the Board received comments from one individual and several local government entities in California requesting that the Board require a minimum of 36 inches in the direction of pedestrian travel or clarification as to whether 36 inches is permitted under PROWAG. The Board is aware that state requirements in California specify a 36-inch depth of detectable warning surfaces at curb ramps. *See* Cal. Code Regs. tit. 24, § 11B–705.1.2.2 (2022). Under PROWAG, detectable warning surfaces must extend a minimum of 24 inches in the direction of pedestrian travel. No maximum is stated; thus 36 inches is permitted. The Board notes that the requirement for a minimum of 24 inches (610 mm) of detectable warning surface in the direction of travel is supported by research. *See* Public Rights-of-Way Access Advisory Committee, *supra,* at 107 (describing the Committee's recommendation for a 24-inch (610 mm) detectable warning surface). To minimize the potential discomfort to some wheelchair users who traverse these surfaces, the Board seeks to require only the minimum length needed to provide adequate detectable warning.

Location (R305.2)

Section R305.2, called ''Placement'' in the NPRM, indicates specifically where a detectable warning surface is to be located at each of the places listed in R205 where detectable warning surfaces are required. In the final rule, the Board has revised the title of Section R305.2 to ''Location'' and the language of this section to address scenarios where there is no curb. The Board uses the phrase ''edge of pavement'' to refer to the place where the curb ramp or blended transition meets the street.

In addition, the Board has added a sentence stating that if a concrete border is required for proper installation of a detectable warning surface, a concrete border not exceeding 2 inches is permitted on all sides of the detectable warning surface except where the requirements at R305.2.1, R305.2.3, and R305.2.4 specifically allow a setback of six inches between the detectable warning surface and the edge of pavement. In the proposed rule, the Board provided an advisory indicating that where a concrete border is required for proper installation of a detectable warning surface, the border should not exceed 2 inches (NPRM Advisory R305.2). A local government in Texas and an association of accessibility professionals in Texas requested that the Board allow a 4-inch border. A design firm indicated that the Board should allow 6 inches on either side of the detectable warning surface, and a local government requested a 2-inch tolerance for the full width of a curb ramp. The Board is not aware of detectable warning surfaces requiring a border larger than 2 inches for proper installation. The option for up to a 6-inch (150 mm) setback between the detectable warning surface and the edge of pavement is provided to minimize the potential for damage to detectable warning surfaces during snow removal operations.

In the final rule, the substantive requirements for the location of detectable warning surfaces (except for the setback allowances described above) at perpendicular curb ramps (R305.2.1), parallel curb ramps (R305.2.2), blended transitions (R305.2.3), pedestrian refuge islands (R305.2.4), and sidewalk and street-level rail boarding and alighting areas (R305.2.7) are unchanged, although the Board has clarified some of the language. Specifically, the Board removed the requirement in the NPRM R305.2.1(2) that detectable warning surfaces are to be placed within one dome spacing of the bottom grade break. The final rule requires that the detectable warning surface be placed on the ramp run at the bottom grade break.

With respect to pedestrian at-grade rail crossings (R305.2.5), the Board has added a sentence clarifying that pedestrian gates must not overlap detectable warning surfaces. With respect to boarding platforms (R305.2.6), the Board has added an exception clarifying that where a curb is present, such as is the case with some bus rapid transit platforms, the detectable warning surface may be placed at the back of curb.

As described above in the discussion of R205, the final rule specifies that detectable warning surfaces be provided at driveways controlled with yield or stop control devices or traffic signals. Thus, the Board has added a corresponding technical provision at R305.2.8 stating that detectable warning surfaces at driveways controlled with yield or stop control devices or traffic signals are to be provided on the pedestrian circulation path where the pedestrian circulation path meets the driveway.

In response to the NPRM, the Board received various comments on the location of detectable warning surfaces at curb ramps. With respect to perpendicular curb ramps, two local government commenters requested clarification as to the placement of detectable warning surfaces at commercial driveways. For driveways where detectable warning surfaces are required, jurisdictions must follow any of the options for perpendicular curb ramps as appropriate. A level transition between the pedestrian access route and the driveway is treated as a blended transition.

In response to comments regarding the placement of detectable warning surfaces on perpendicular curb ramps at

a corner, in R305.2.1.(B) the Board changed ''either end'' to ''both ends'' for clarity. The Board received a comment asserting that the permitted 60-inch (1525 mm) setback was too great, while another requested an 8-foot setback instead. The Board notes that a setback of 5 feet is appropriate because it is still close enough to the curb to provide accurate notice of an imminent vehicular way and allow use of audible cues for crossing.

With respect to the location of detectable warning surfaces at parallel curb ramps, two commenters raised concerns regarding the clarity of the use of the terms ''flush transition'' and ''turning space'' in this context. In the final rule, these terms have been replaced (see R305.2.2). Two state DOTs expressed concerns regarding the clarity of the provision describing the location of the detectable warning surfaces at blended transitions. The Board has revised this language for clarity (*see* R305.2.3).

The Board also received comments regarding the location for the detectable warning surface at pedestrian at-grade rail crossings. Two state DOTs and a state public utilities commission expressed concern that 72 inches from the centerline of the nearest rail is too close to the rail to place the detectable warning. The Board notes that this provision provides a range that allows the detectable warning surface to be placed between 72 inches (1830 mm) and 15 feet (4.6 m) from the centerline of the nearest rail. This range applies to light rail and freight train crossings. Seventy-two inches (1830 mm) is appropriate for some light rail crossings; the Board concurs that freight crossings would likely be placed farther back from the rail. The Board is confident that jurisdictions will apply appropriate safety considerations for particular crossings when determining where to place the detectable warning surface within the required range.

Two advocacy organizations for persons with disabilities expressed concern about how close the detectable warning surface would be placed to pedestrian gates at pedestrian at-grade rail crossings. In response, the Board added language clarifying that pedestrian gates must not overlap detectable warnings (R305.2.5).

The Board received three comments requesting that it clarify the meaning of ''boarding platform,'' as used in R305.2.6 so that it is clear that the Board does not intend for detectable warning surfaces to be placed at standard sidewalk-level bus stops. In the final rule, the Board added a definition of ''boarding platform'' at R104.3, which clarifies that boarding platforms are platforms ''raised above standard curb height.''

R306 Crosswalks

The technical requirements for crosswalks address the required pedestrian signal phase timing and accessible walk indication, as well as specifications for crosswalks at roundabouts and channelized turn lanes.

Pedestrian Signal Phase Timing (R306.2)

Where pedestrian signal indications are provided at a crosswalk, the pedestrian signal phase timing is based on a pedestrian clearance time that is calculated using a pedestrian walking speed of 3.5 ft/s (1.1 m/s) or less from the location of the pedestrian push button to a pedestrian refuge island or the far side of the traveled way. This is the same walking speed proposed in the NPRM.

Four state DOTs and ten local government entities objected to this provision in the NPRM, pointing out that in the MUTCD this walk speed appears as guidance (MUTCD 4E.06 paragraph 7) and is thus not required. These jurisdictions would like to use engineering judgment to determine the clearance time, expressing potential issues that might result from longer clearance times, such as an increase in air pollution from vehicular delays, jaywalking, and red light running. Six disability rights advocacy organizations requested that pedestrian clearance times be calculated using a slower walking speed of 3.0 ft/s to 3.25 ft/s.

The Board has carefully considered the comments received on this issue. In the final rule, the Board has maintained the requirement that pedestrian clearance time be calculated using a walking speed of 3.5 ft/s (1.1 m/s) or less, and further requires that the walk interval be 7 seconds minimum.

In addition, the final rule states that where the pedestrian clearance time is calculated to a pedestrian refuge island, an additional pedestrian push button or passive detection device must be provided on the pedestrian refuge island. This was a proposed requirement that comes directly from MUTCD section 4E.08 paragraph 13, which was incorporated by reference in the NPRM (NPRM R209.1).

In using a walking speed of 3.5 ft/s (1.1 m/s), the Board seeks to balance the traffic management concerns of state and local jurisdictions while ensuring that pedestrians with disabilities are afforded sufficient time to traverse a crosswalk. The Board notes that in 2009, FHWA made a research-based decision to revise the MUTCD recommended walking speed for calculating pedestrian clearance times.[14] The Board acknowledges that disability rights advocacy organizations cited an AAA Foundation study that found that pedestrians with mobility impairments who do not use wheelchairs had an average walking speed of 3.30 ft/s (1.01 m/s), but also found that a walking speed of 3.5 ft/s would generally accommodate a 15th percentile older adult.[15] However, a more recent study found a 3.41 ft/s (1.04 m/s) walking speed for pedestrians with physical disabilities at unsignalized crosswalks.[16] The Board concludes that the combination of a 7-second minimum walk interval and a pedestrian clearance time based on a 3.5 ft/s (1.1 m/s) walking speed will provide sufficient crossing time for most persons with disabilities. This requirement should not cause significant vehicular delays.[17]

Further, in the final rule, the Board incorporated another option from MUTCD section 4E.06 paragraph 8 in an exception allowing a faster walking speed to be used if a passive detection device is provided that automatically adjusts the pedestrian clearance time based on the pedestrian's actual clearance of the crosswalk (R306.2 Exception). These devices tailor the clearance to the actual presence of the pedestrian in the crosswalk.

One state DOT and one local government commenter, as well as the National Committee on Uniform Traffic Control Devices, requested that the Access Board add a provision allowing a 4 ft/s walking speed where an extended pushbutton press allows additional time. This is an option under MUTCD section 4E.06 paragraph 8. The Board declines to allow jurisdictions to raise the walking speed to 4 ft/s where an extended pushbutton press is provided as pedestrians may not be aware that they need additional time until they are already in the crosswalk. However, as noted above, the Board has provided additional flexibility for

[14] *National Standards for Traffic Control Devices; the Manual on Uniform Traffic Control Devices for Streets and Highways; Revision* 74 FR 66730, 66822 (Dec. 16, 2009) (codified at 23 CFR part 655).

[15] AAA Foundation for Traffic Safety, Pedestrian Signal Safety for Older Adults, 18 (2007) available at *https://aaafoundation.org/wp-content/uploads/2018/02/PedestrianSignalSafetyOlderPersonsReport.pdf.*

[16] Albert Forde & Janice Daniel, *Pedestrian Walking Speed at Un-signalized Midblock Crosswalk and Its Impact on Urban Street Segment Performance,* 8 J.of Traffic and Transportation Eng., 57 (2021) *available at https://www.sciencedirect.com/science/article/pii/S209575641830415X.*

[17] *See* AAA Foundation for Traffic Safety, Pedestrian Signal Safety for Older Adults at 19.

jurisdictions if a passive detection device is used that auto-adjusts to the pedestrian's actual clearance of the crosswalk. *See* R306.2 Exception.

As noted above, in the final rule text, the Board has specified a requirement that the walk interval be 7 seconds minimum for all signalized crosswalks, which is the length recommended by the MUTCD. Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) 2009 Edition, 4E.06 paragraph 11. The MUTCD provides guidance indicating that walk intervals as short as 4 seconds may be used where pedestrian volumes and characteristics do not require a 7-second walk interval; however, walk intervals of less than 7 seconds do not provide a sufficient amount of time for many people with disabilities to leave the curb as they need to wait for a curb ramp to be clear and then navigate down the ramp.

Accessible Walk Indication (R306.3)

An accessible walk indication complying with the technical requirements at R308.2 must have the same duration as the walk interval. However, where the pedestrian signal rests in ''walk,'' the accessible walk indication may be limited to the first 7 seconds of the walk interval. If the pedestrian signal is resting in walk and there is sufficient time remaining to provide an accessible walk interval before the beginning of the pedestrian change interval, the accessible walk indication may be recalled by a button press (R306.3 Exception). This requirement is based on MUTCD section 4E.11, which was among the sections of the MUTCD incorporated by reference in the proposed rule. In consultation with USDOT, the Board has slightly revised the second sentence of the exception from the MUTCD language to clarify that the accessible walk interval may be recalled only when there is sufficient time remaining for a full walk interval before the pedestrian change interval begins. This change ensures that an accessible walk indication is provided only when there is enough crossing time remaining to disembark the sidewalk and fully cross the street.

Roundabouts (R306.4)

Section R306.4 specifies the edge detection and crosswalk treatments required at roundabouts. A roundabout is a circular intersection with yield control at entry, which permits a vehicle on the circulatory roadway to proceed, and with deflection of the approaching vehicle counter-clockwise around a central island (R104.3).

Several commenters requested an explanation as to why edge detection treatments are needed at roundabouts but not elsewhere. Edge detection treatments are required at roundabouts to assist pedestrians who are blind or have low vision to locate the crosswalk (R306.4.1). At roundabouts, the orientation of the crosswalks to the circular roadway eliminates traditional tactile cues at crosswalks inherent to standard rectilinear intersections. In addition, the continuous circular traffic flow at these unsignalized crosswalks obscures the audible cues that pedestrians who are blind would otherwise use to detect a crossing and gaps in the traffic. Thus, edge detection treatments are needed to ensure that pedestrians who are blind or have low vision have the same opportunity to use a crosswalk at a roundabout as individuals with vision.

There are two options to ensure that crosswalks at roundabouts are detectable. The pedestrian circulation path can be separated from the curb, crosswalk to crosswalk, with landscaping or another nonprepared surface 24 inches (610 mm) wide minimum (R306.4.1.1). Alternatively, where sidewalks are flush against the curb, a continuous and detectable vertical edge treatment must be provided along the street side of the sidewalk wherever pedestrian crossing is not intended (R306.4.1.2). The bottom of the vertical edge treatment can be no higher than 15 inches (380 mm) maximum above the walking surface of the pedestrian circulation path.

In the proposed rule, the Board addressed continuous and detectable edge treatment at curb-attached sidewalks (NPRM R306.3.1). In the final rule, the Board has clarified that the other option is separation between the curb and the pedestrian circulation path by landscaping or nonprepared surface (R306.4.1.1).

The Board's reference in the proposed rule (NPRM R306.3.1) to chains, fencing, and railings created confusion for commenters and others who have sought technical assistance from the Board regarding vertical edge detection. The Board indicated a maximum height for the bottom edge of these treatments but did not intend to convey that these are the only options for vertical edge detection that jurisdictions may use. Consequently, in the final rule, the Board has removed the reference to chains, fencing and railings. The Board will provide examples of vertical edge detection options in its technical assistance materials.

Two state DOTs and one engineer commented that a standard or raised curb should be a sufficient indication that crossing is not intended. A standard or raised curb does not provide sufficient indication that a crossing is not intended. Four state DOTs expressed concern that vertical edge treatments would negatively impact snow removal operations. The Board notes that jurisdictions that have these concerns may opt for separation instead of a vertical edge treatment. One state DOT requested that cobblestone treatment be permitted for separation. Cobblestone surfaces are prepared surfaces that are used in existing facilities for pedestrian circulation. Thus, they are not useful for wayfinding because they are easily mistaken for a walking surface. *See e.g.,* Transportation Research Board, NCHRP 3–78b: Guidelines for the Application of Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities at 3–2 (showing a blind pedestrian mistaking a cobblestone separation for a walking surface at a roundabout).

The Board observes that while several state DOTs and local government commenters expressed concern regarding the implementation or need for detectable edge treatment at roundabouts, over 150 individuals, five disability rights organizations, and one local government official commented in support of a requirement for edge detection at roundabouts. The Board is confident that persons with disabilities need edge detection for equitable use and safety of pedestrian facilities at roundabouts.

Crosswalks at multi-lane segments of roundabouts and multi-lane channelized turn lanes require one or more of the following treatments: a traffic control signal with a pedestrian signal head; a pedestrian hybrid beacon; a pedestrian actuated rectangular rapid flashing beacon; or a raised crossing (R306.4.2 and R306.5). The requirement for crosswalk treatments at multi-lane roundabouts is discussed in the Major Issues section above. For the same accessibility reasons that these treatments are needed at roundabout crossings, they are also needed at multi-lane channelized turn crossings. Accordingly, the Board has included that requirement at R306.5.

R307 Pedestrian Pushbuttons and Passive Pedestrian Detection

An accessible pedestrian signal is a device that communicates information about pedestrian signal timing in non-visual formats such as audible tones or speech messages, and vibrating surfaces. In the proposed rule, technical requirements for accessible pedestrian signals were incorporated by reference from the MUTCD. Specifically, the

proposed rule indicated that accessible pedestrian signals and pushbuttons would comply with MUTCD sections 4E.08 through 4E.13. A rehabilitation design firm and a state DOT requested that the Board clarify whether the MUTCD provisions were required or recommended, and three disability rights advocacy organizations expressed concern that engineering judgement would be permitted in a jurisdiction's implementation of the incorporated MUTCD provisions. In addition, one engineering association requested that the requirements be consistent with the MUTCD.

The Board concurs that additional clarification as to the technical requirements for accessible pedestrian signals is appropriate and has thus added technical sections for pedestrian pushbuttons and passive pedestrian detection (R307) and accessible pedestrian signal walk indications (R308) directly to the rule text, based on the technical requirements of the MUTCD sections referenced in the proposed rule. The MUTCD sections are not incorporated by reference. The requirements are generally consistent with the MUTCD, as described in the provision-specific discussions below; however, the language used in the final rule text clarifies that these requirements are mandatory.

In general, accessible pedestrian signals have three features: (1) a method of activation, which is either a pushbutton that activates accessible features when pressed or a passive pedestrian detection device that uses technology to detect the presence of pedestrians and then automatically activates accessible features; (2) a device that provides audible indications of visual pedestrian signals for people who are blind or have low vision; and (3) a pushbutton with a tactile arrow that provides vibrotactile cues to individuals who are deaf and also blind or have low vision. These three features may be integrated into one device or presented in multiple devices that work together as a system. Operable parts must comply with technical requirements for operable parts at R403 (R307.1).

Activation (R307.2)

Pedestrian push buttons and passive detection devices activate the accessible pedestrian signals and, where applicable, the walk interval. This provision was incorporated by reference in the proposed rule from MUTCD section 4E.09 paragraph 13, but referred only to pedestrian push buttons. In the final rule, the Board revised the language to clarify that push buttons or passive detection will activate the accessible pedestrian signals and walk interval, where applicable. In addition, the language of the proposed MUTCD provision suggested that pushbuttons were optional, which was inconsistent with the language of NPRM R209.1 indicating that pushbuttons are required. The revised language in the final rule removes this inconsistency, clarifying that pedestrian push buttons are required.

Extended Push Button Press (R307.3)

Where an extended push button press is used to provide additional features, a push button press of less than one second actuates only the pedestrian timing and any associated accessible walk indication, and a push button press of one second or more actuates the pedestrian timing, any associated accessible walk indication, and any additional features. If additional crossing time is provided by means of an extended pushbutton press, a sign so indicating shall be mounted adjacent to or integral with the pedestrian push button. This provision is taken from MUTCD section 4E.13 paragraph 2.

Location (R307.4)

Pedestrian push buttons must be located no greater than 5 feet from the side of a curb ramp run or the edge of the farthest associated crosswalk line from the center of the intersection (R307.4). Pedestrian push buttons must be located between 1.5 and 10 feet from the edge of the curb or pavement. The purpose of this provision is to ensure that push buttons are placed in close proximity to the crosswalk they serve as individuals who need the tactile features will need to stand next to the push button while awaiting the walk interval, and often the audible signals emanate from the push button housing.

This provision is taken from MUTCD 4E.08 paragraph 4, which states that pedestrian pushbuttons should be located between 1.5 and 6 feet from the edge of the pavement and 4E.08 paragraph 6, which states that where physical constraints prevent that location, the pushbutton should not be farther than 10 feet from the edge of curb or pavement. The Board agrees that placing the pushbutton between 1.5 and 6 feet from the edge of curb or pavement is preferable but has extended the requirement to 10 feet in acknowledgment that the geometry of some intersections, even in new construction, will necessitate placement further than 6 feet from the edge of curb or pavement.

Where two pedestrian push buttons are provided on the same corner, they must be 10 feet or more apart; however, in alterations where it is technically infeasible to provide 10 feet of separation between pedestrian push buttons on the same corner, the pedestrian pushbuttons may be closer together and a pedestrian push button information message complying with R308.3.2 must be provided (R307.4.1). This provision is taken from MUTCD sections 4E.08 paragraphs 7 and 8 and 4E.10 paragraph 3. Two local government commenters and AASHTO expressed concern regarding the requirement for 10 feet of separation between pedestrian push buttons on the same corner. The Board notes that in the final rule this requirement applies to new construction on undeveloped land. Pedestrian push buttons that are added to existing rights-of-way are considered alterations, and alterations subject to existing physical constraints that make compliance with applicable requirements technically infeasible must comply with the applicable requirements to the maximum extent feasible (R202.3).

Push Button Orientation (R307.5)

The face of the push button must be aligned parallel to its associated crosswalk. This alignment ensures that the tactile arrow points in the direction of pedestrian travel, and provides uniformity for wayfinding. This provision is taken from MUTCD section 4E.08 paragraph 4.

Audible and Vibrotactile Walk Indications for Pedestrian Signal Heads (R307.6)

Pedestrian push buttons or passive detection devices must activate audible and vibrotactile walk indications complying with R308. This requirement specifies that both audible and vibrotactile indications are required, and is taken from MUTCD section 4E.11 paragraph 2.

Audible and Vibrotactile Indication for Pedestrian Activated Warning Devices Without a Walk Indication (R307.7)

Where a pedestrian push button or a passive detection device is provided for pedestrian activated warning devices, such as rectangular rapid flashing beacons, the pedestrian push button or passive detection device must activate a speech message that indicates the status of the beacon in lieu of an audible walk indication. The speech message volume must comply with requirements stated at R308.4. Where a pedestrian push button is provided, it must not include vibrotactile features indicating a walk interval.

This provision clarifies the type of accessible indications that are required

for pedestrian activated warning devices. Pedestrian activated warning devices, such as rectangular rapid flashing beacons, do not stop traffic. Rather they provide flashing lights that draw drivers' attention to the crosswalk to warn them of the presence of pedestrians. Because these devices do not stop traffic, there is no walk interval, and thus no audible or vibrotactile walk indication. An audible or vibrotactile walk indication would falsely convey to a pedestrian who is blind or has low vision that the traffic has been stopped by a traffic control device. Instead, the speech message will state the status of the beacon, such as the beacon is flashing or the beacon has been activated, which is consistent with the visual indications of the device.

Locator Tone (R307.8)

Pedestrian push buttons must have a locator tone complying with R307.8. This provision is taken from MUTCD section 4E.12 paragraph 2. The locator tone is a sound that emanates from the push button housing that enables individuals who are blind or have low vision to locate the push button.

Locator tones have a duration of 0.15 seconds or less and repeat at one-second intervals except when another audible indication from the same device is active (R307.8.1). This requirement is taken from MUTCD section 4E.12 paragraph 4. To avoid a scenario in which multiple sounds are simultaneously emanating from the same device, the Board has added language clarifying that when another audible indication from the same device is active, the locator tone is to be silenced. The Board has also added an exception allowing the locator tone to be silenced if a passive detection system activates the locator tone when a pedestrian is within a 12-foot radius of the pedestrian push button. This addresses some commenter concerns regarding sounds bothering nearby residents. However, the Board also notes that those concerns are likely no longer an issue due to evolving technology; when the proposed rule was published, speakers were placed closer to the pedestrian signal heads, and were not typically integrated into the pedestrian push button device as they are now. This resulted in louder audible cues than those that emanate from today's devices.

Pedestrian push button locator tones must be intensity responsive to ambient sound and audible 6 to 12 feet from the push button, or to the building line, whichever is less (R307.8.2). The push button locator tone must be louder than ambient sound up to a maximum volume of 5 dBA louder than ambient sound. Automatic volume adjustment in response to ambient traffic sound level is capped at a maximum volume of 100 dBA. This requirement is taken from MUTCD sections 4E.11 paragraphs 9 and 10 and 4E.12 paragraph 6.

Section R307.8.3 requires that where audible beaconing is used, the volume of the push button locator tone during the pedestrian change interval of the called pedestrian phase be increased and operated in one of the following ways: the louder audible walk indication and louder locator tone comes from the far end of the crosswalk, as pedestrians cross the street; the louder locator tone comes from both ends of the crosswalk; or the louder locator tone comes from an additional speaker that is aimed at the center of the crosswalk and that is mounted on a pedestrian signal head. This requirement is taken from MUTCD section 4E.13 paragraph 8.

When the traffic control signal is operating in a flashing mode, pedestrian push button locator tones must remain active, and the pedestrian push button must activate a speech message that communicates the operating mode of the traffic control signal (R307.8.4). Where traffic control signals or pedestrian hybrid beacons are activated from a flashing or dark mode to a stop-and-go mode by pedestrian actuations, a speech message communicating the operating status of the traffic control signal is not required. Flashing mode refers to when traffic signals flash either red or yellow, often late at night when traffic volumes are reduced, or at intersections in rural areas with low regular traffic flow.

Requirements for push button locator tones are addressed at MUTCD section 4E.12 paragraph 5. The MUTCD states that push buttons must be deactivated when the traffic control signal is in flashing mode. In response to comments from a national disability rights advocacy organization that emphasized the importance of visual information being provided in non-visual format for pedestrians who are blind or have low vision, the Board has explicitly deviated from the MUTCD's approach in this instance to ensure that pedestrians who are blind or have low vision can access information regarding the status of the traffic control device.

Tactile Arrow (R307.9)

Pedestrian push buttons must have a tactile arrow with high visual contrast that is aligned parallel to the direction of travel on their associated crosswalks. This requirement is taken from MUTCD 4E.12 paragraph 1.

R308 Accessible Pedestrian Signal Walk Indications

Audible and vibrotactile walk indications are provided by accessible pedestrian signals during a walk interval. The walk interval occurs when a traffic control device signals traffic to stop and a pedestrian signal head signals to pedestrians, using the illuminated ''walking person'' visual signal, to exit the curb and begin to cross the street. The remainder of the time allotted for pedestrians to complete the crossing is called the ''pedestrian change interval,'' and is signaled by an illuminated flashing ''upraised hand.'' The technical requirements in section R308 pertain mostly to the audible and vibrotactile cues during the walk interval. The Board acknowledges and concurs with commenters' requests for standardization with respect to audible cues. These requirements will provide standardization with respect to the type of sound, pattern of speech message, and volume of the audible cues provided.

Audible and Vibrotactile Walk Indications (R308.2)

Accessible pedestrian signals have an audible and vibrotactile walk indication during the walk interval only. The audible walk indication must be audible from the beginning of the associated crosswalk. During the pedestrian change interval, audible cues of the accessible pedestrian signals revert to the pedestrian push button locator tone. This requirement is taken from MUTCD sections 4E.11 paragraphs 4 and 25.

Audible Walk Indications (R308.3)

There are two types of audible walk indications: a percussive tone (R308.3.1) and a speech walk message (R308.3.2). A percussive tone is required where an accessible pedestrian signal is provided at a single crossing or where two accessible pedestrian signals are 10 feet or more from each other at a corner. The percussive tone repeats eight to ten ticks per second with multiple frequencies and a dominant component at 880 Hz. In alterations, where it is technically infeasible to provide 10 feet separation between pedestrian push buttons on the same corner, the audible walk indication for each signal is a speech walk message that complies with R308.3.2. These requirements are taken from MUTCD section 4E.11 paragraphs 7 and 8.

Several commenters objected to the ''chirping'' noise that was used by early accessible pedestrian signals. The Board notes that the final rule prescribes either a percussive tone or an audible speech

message depending on the circumstances; chirping noises are not permitted.

The Board carefully considered comments on the format of audible walk indications from two national advocacy organizations for people who are blind or have low vision. Both organizations requested that the audible walk indications be limited to speech messages to ensure that the same information available to a sighted pedestrian is provided to a pedestrian who is blind or has low vision.

In the absence of additional significant research studies regarding audible walk indications, the Board has accepted the MUTCD's preference for percussive tones over speech messages. The Board notes that MUTCD adopted this approach based on research that concluded that speech walk indications were not understandable to pedestrians under all ambient sound conditions. *See* Transportation Research Board, NCHRP Document 117B: Guidelines for Accessible Pedestrian Signals: Final Report, 91–92 (2007) available at *https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w117b.pdf.* The principal purpose of visual pedestrian signal heads is to provide safety to pedestrians who are crossing the street by informing pedestrians of the walk interval, that is, the interval during which they are to step off the curb so that they have sufficient time to cross the street before the traffic light changes. In accepting the MUTCD's preference for percussive tones, the Board is prioritizing audible communication of the walk indication over other information, and the available research indicates that the percussive tone is more widely audible across various ambient sound conditions. *Id.*

The Board acknowledges that this approach does not wholly address issues that may face pedestrians who are blind or have low vision, as they are not provided with the same information that is provided visually, specifically the pedestrian countdown. Consequently, persons who are blind or have low vision approaching a crosswalk during the pedestrian clearance interval will not know how many seconds remain and may then wait an entire cycle for the audible walk indication even if they would have had sufficient time to cross. The Board will encourage additional research regarding speech messages at crosswalks, including the viability of an audible pedestrian countdown.

Jurisdictions have the option of providing speech information messages at a pedestrian signal, regardless of whether it is a pretimed signal or actuated with the pedestrian push button or passive detection; however, the speech information message may only be actuated when the walk interval is not timing (R308.3.2.1). Speech information messages provide wayfinding assistance for persons who are blind or have low vision and can be especially helpful at intersection corners with multiple crossings. If provided, the speech message must begin with the term ''Wait,'' followed by intersection identification information modeled after: ''Wait to cross Broadway at Grand.'' Information on intersection signalization or geometry may also be provided after the intersection identification information.

Where a speech walk message is used as the audible walk indication, it must use the following patterns. At intersections having pedestrian phasing that is concurrent with vehicular phasing, the speech message must be patterned after the model: ''Broadway. Walk sign is on to cross Broadway.'' (R308.3.2.2). At intersections with exclusive pedestrian phasing, meaning that traffic is stopped in all directions while pedestrians cross in all directions, the speech message must be patterned after the model: ''Walk sign is on for all crossings'' (R308.3.2.3). Where a pilot light is provided, the speech message ''Wait'' must be provided if actuated while the walk interval is not timing (R308.2.3.4). These speech message requirements come from MUTCD sections 4E.11 paragraphs 18 and 19 and 4E.08 paragraph 17.

Volume (R308.4)

Audible walk indications must be louder than ambient sound, up to a maximum volume of 5 dBA louder than ambient sound. For automatic volume adjustment in response to ambient traffic sound, the maximum volume is 100 dBA. Where audible beaconing is provided in response to an extended push button press, the beaconing can exceed 5 dBA louder than ambient sound; however, the maximum volume remains 100 dBA. Volume requirements come from MUTCD section 4E.10 paragraphs 9 and 10.

Vibrotactile Walk Indication (R308.5)

The pedestrian push button must vibrate during the walk interval. People who use vibrotactile cues, such as people who are both deaf and blind, will stand with their hand on the pedestrian push button until it vibrates indicating the walk interval. The only vibrotactile cue provided is the walk interval. The vibrotactile walk indication requirement comes from MUTCD section 4E.11 paragraph 3.

R309 Transit Stops and Transit Shelters

The technical requirements for transit stops and transit shelters, which appear at NPRM section 308 in the proposed rule, are largely based on provisions for transit facilities in the 2004 ADA and ABA Guidelines.

Transit Stops (R309.1)

A transit stop is defined in the final rule as, ''An area that is designated for passengers to board or alight from buses, rail cars, and other transportation vehicles that operate on a fixed route or scheduled route, including bus stops and *boarding platform*s. This definition does not include intercity rail except where a stop is located in the *public right-of-way.*'' (R104.3). This includes, but is not limited to, all bus stops, bus rapid transit stops, and streetcar stops on fixed or scheduled routes in the public right-of-way. It also includes intercity rail stops located in the public right-of-way, such as flag stops. An alteration to a transit stop will trigger these technical requirements, including alterations to bus stops that currently have no features other than signage.

Boarding and alighting areas at sidewalk or street-level must comply with technical requirements specific to boarding and alighting areas for slope and dimensions, as well as common requirements for all transit stops, and must serve each accessible vehicle entry and exit (R309.1.1, R309.1.3). Where a transit shelter is provided, the boarding and alighting area can be located within or outside the shelter.

The proposed rule required that transit stops serving multicar vehicles have technically compliant boarding and alighting areas for each vehicle (NPRM R308.1.1). In the final rule, the Board has replaced this language with a more precise requirement that a compliant boarding and alighting area serve each accessible vehicle entry.

A state DOT requested that the Board incorporate language indicating that entities comply with this requirement ''to the extent that the construction specifications are within their control,'' which is language that the U.S. Department of Transportation added to modify its adoption of 810.2.2 of Appendix D to 36 CFR part 1191. *See* 49 CFR part 37, Appx. A. The Board expects that entities will coordinate to comply with accessibility requirements in the public right-of-way, and thus declines to add this language. However, enforcement-related issues may be addressed by USDOT's separate rulemaking adopting these guidelines.

Boarding and alighting areas must have a clear length of 96 inches (2440

mm) minimum, measured perpendicular to the face of the curb or street edge, and a clear width of 60 inches (1525 mm) minimum, measured parallel to the street. These are the same substantive requirements proposed in the NPRM (NPRM R308.1.1.1). In response to the NPRM, five local government entities and one state DOT expressed concern that 8 feet of clear space would not be feasible at existing shuttle stops, and a state DOT requested to orient the boarding and alighting area in the other direction to accommodate limited right-of-way. The orientation of boarding and alighting areas is important because the dimensions as specified accommodate deployment of a lift or ramp. The Board notes that alterations, including transit stops that are added to existing right-of-way, are required to comply with the applicable requirements to the maximum extent feasible where existing physical constraints make compliance with these requirements technically infeasible (R202.3). The Board thus anticipates that there will be instances in existing right-of-way where full compliance of the 96-inch length will not be achieved.

The slope of boarding and alighting areas measured parallel to the street must be the same as the grade of the street (R309.1.1.2). The slope of boarding and alighting areas measured perpendicular to the street must be 1:48 (2.1%) maximum. There are no substantive changes to this provision from the proposed rule. The provision has been retitled ''slope,'' as the term ''grade,'' which was used in the proposed rule, connotes a specific direction of pedestrian travel.

Boarding platforms in the public right-of-way must comply with technical requirements for platform and vehicle coordination (R309.1.2.1) and slope (R309.1.2.2) as well as common requirements for all transit stops (R309.1.3). The final rule defines ''boarding platform'' as ''[a] platform raised above *standard curb height* used for transit vehicle boarding and alighting'' (R104.3). Standard curb height is defined as, ''[t]he typical height of a curb according to local standards for a given road type, but usually between 3 inches (75 mm) and 9 inches (230 mm) high relative to the surface of the roadway or gutter'' (R104.3). Examples of boarding platforms in the public right-of-way include, but are not limited to, bus rapid transit stops or streetcar stops where the boarding and alighting area is higher than the standard curb height. This may include places where the stop is on the sidewalk, but the sidewalk is raised higher than the standard curb height.

Boarding platforms must be positioned to coordinate with vehicles in accordance with DOT's applicable requirements in 49 CFR parts 37 and 38, which require the height of the vehicle floor and the platform to be coordinated so as to minimize vertical and horizontal gaps. There is no change to this requirement from the proposed rule.

The slope of boarding platforms measured parallel to the track or street must be the same as the grade of the track or street, while the slope of the boarding platform measured perpendicular to the track or street must be 1:48 (2.1%) maximum. This is a change from the proposed rule, which required the slope to be 2% maximum in each direction for new construction. Upon consideration, the Board has concluded that similar to boarding and alighting areas at street level, the slope of boarding platforms measured parallel to the street or track must be the same as the grade of the track or street even in new construction.

Boarding and alighting areas and boarding platforms must comply with surface characteristics stated at R302.6 (R309.1.3.1). In new construction on undeveloped land, boarding and alighting areas and boarding platforms connect to pedestrian access routes in accordance with R203.2. In alterations, boarding and alighting areas and boarding platforms must connect to existing pedestrian circulation paths by pedestrian access routes complying with R302 (R309.1.3.2). This connection is required by R202.2 but also expressed here to ensure that jurisdictions understand that any altered boarding and alighting areas and boarding platforms must be connected to an existing pedestrian circulation path. This requirement seeks to avoid a scenario in which a person with a disability alights a transit vehicle but is then trapped in the alighting area because there is no connection to a pedestrian circulation path. In response to the NPRM, two individuals and a state DOT commented in support of a connection requirement.

The Board acknowledges a comment from a national advocacy organization for individuals who are blind or have low vision requesting that the Board require all transit stops in new construction to have boarding and alighting areas or boarding platforms that are at least 6 inches higher than street level. The organization asserts that such a requirement will minimize gaps between the vehicle and the alighting area, minimize the slope of low-floor transit bus ramps when extended, and prevent transit vehicles from encroaching into alighting areas and possibly hitting a passenger. The Board is unaware of research indicating that these are widespread problems for transit riders with disabilities in jurisdictions where transit stops are located at street-level. The Board thus declines to require a specific height for transit stops.

Transit Shelters (R309.2)

Pedestrian access routes must connect transit shelters to boarding and alighting areas or boarding platforms (R309.2.1). This requirement, which appeared at NPRM R308.2 in the proposed rule, ensures that persons with disabilities are able to access transit shelters. Transit shelters must have a clear space complying with the technical requirements at R404 entirely within the shelter (R309.2.2). This clear space allows a person using a wheelchair sufficient space inside the shelter to await the transit vehicle. Where seating is provided within the shelter, the clear space must be located either at one end of a seat or so as to not overlap the area within 18 inches (460 mm) from the front edge of the seat to leave leg room for seating provided within the shelter.

Any environmental controls provided within a transit shelter, such as lights or heating, must be proximity actuated to ensure that persons with disabilities can use them (R309.2.3). Protruding objects within transit shelters must comply with technical requirements for protruding objects at R402 to ensure that they are not hazards to persons who are blind or have low vision (R309.2.4).

There are no substantive changes in the final rule for technical requirements for transit shelters, although the provisions have been restructured for clarity. In response to the proposed rule, a disability rights advocacy organization requested that the Board add a requirement for a wheelchair turning space. Two design firms also commented on turning space, indicating that any required turning space should be permitted to be partially outside the shelter. The Board considered these comments and concluded that a requirement for turning space is not necessary in light of the typical designs of transit shelters, which would allow a person in a wheelchair to make a turn either partially inside the shelter or directly outside.

The Board acknowledges a comment from a design firm requesting technical criteria for benches. As stated above in the discussion of street furniture (R209), the Board concurs that technical criteria for benches, specifically back support and armrest requirements, would be useful to ensure accessibility, but as the

Board did not propose specific dimensions for accessible benches in the proposed rule, the Board declines to add them now in the final rule. The Board may consider technical criteria for benches in a future rulemaking.

R310 On-Street Parking Spaces

In the proposed rule, technical requirements for accessible on-street parking spaces were addressed at NPRM R309. There are few substantive changes from the proposed requirements; however, in the final rule, the provisions have been restructured for clarity.

Parallel On-Street Parking Spaces (R310.2)

In the proposed rule, the Board presented two sets of specifications for accessible parallel on-street parking spaces: specifications for wide sidewalks where the width of the adjacent sidewalk or available right-of-way exceeds 14 feet (NPRM R309.2.1) and specifications for narrow sidewalks, where the available sidewalk or right-of-way is 14 feet or less.

In the final rule, the Board had restructured this section to clarify that in new construction on undeveloped land, larger accessible parallel on-street parking spaces are required. Specifically, in the final rule, the default dimensions of accessible parallel on-street parking spaces are 24 feet long minimum parallel to the sidewalk and 13 feet wide minimum perpendicular to the sidewalk (R310.2.1). The 13-foot width accounts for the typical width of a parallel parking space plus an additional five feet, which in the proposed rule was characterized as an ''access aisle'' (NPRM R309.2.1). The 24-foot length accounts for the 20-foot length of a typical parking space (the dimension that the Board has used in R211 as a proxy to count unmarked parking spaces) plus 48 inches that will allow a person exiting on the driver side of the vehicle to access the connection to the pedestrian access route, such as a curb ramp, on the passenger side of the vehicle.

In the final rule, the Board concurred with an individual commenter who recommended that the Board provide total dimensions for the accessible parallel space instead of dimensions for an additional access aisle. The Board has observed in the implementation of the proposed guidelines that some jurisdictions have marked the access aisles, which creates confusion for both drivers and parking enforcement officials as to whether a vehicle may be parked in the access aisle. The point of the additional space of the access aisle (now additional width in the final rule) is to allow the driver to situate the vehicle anywhere within the full width of the space so that a person with a disability may exit the vehicle on whichever side is needed without exiting directly into a travelled way. Some persons with disabilities will need space on the driver side of their vehicle, outside of the travelled way, to transfer to a wheelchair.

The Board has provided two exceptions to the required dimensions for accessible parallel on-street parking spaces that are applicable in alterations. First, in Exception 1, the Board states that where parallel on-street parking spaces are altered but the adjacent pedestrian circulation path is not, any accessible parallel on-street parking spaces provided may have the same dimensions as the adjacent parallel on-street parking spaces if they are provided nearest the crosswalk at the end of the block face or nearest a midblock crosswalk, and a curb ramp or blended transition is provided serving the crosswalk.

This exception clarifies that where a jurisdiction is not altering a sidewalk, it need not alter the sidewalk solely to provide accessible parallel on-street spaces with the prescribed dimensions of R310.2.1, if they meet the conditions above. Rather, where, for example, the parking lane is being repaved (altered), but the sidewalk will not be altered, the jurisdiction is permitted to provide typically-sized, accessible parking spaces if they are provided nearest a crosswalk at the end of the block face or nearest a midblock crosswalk, and a curb ramp or blended transition is provided serving the crosswalk. The substantive content of this exception appeared at NPRM R309.2.1.1. The language has been revised to clarify that that the spaces must be provided nearest to a crosswalk where a curb ramp or blended transition is provided, as was the intent of the proposed language requiring the spaces to be located ''at the end of the block face.''

Exception 2 of section R310.2.1 of the final rule contains the provision that appeared at NPRM R309.2.2, which relates to the requirements for parallel parking adjacent to narrow sidewalks. Where providing parallel on-street parking spaces with the dimensions specified in R310.2.1 would result in an available right-of-way width less than or equal to 9 feet (2.7 m), measured from the curb line to the right-of-way line, the accessible parallel on-street parking spaces may have the same dimensions as the adjacent parallel on-street parking spaces if they are provided nearest a crosswalk at the end of the block face or nearest a midblock crosswalk, and a curb ramp or blended transition is provided serving the crosswalk. The language of this provision has been edited to clarify that there must be a curb ramp or blended transition present where the accessible spaces are located, as was the intention in the proposed rule of requiring that they be located ''at the end of the block face.'' In addition, in the final rule, the Board has clarified that these accessible spaces may have the same dimensions as the adjacent parallel on-street spaces.

As in the proposed rule, the Board limits the requirement for the larger sized parking space to places where 9 full feet of available right-of-way will remain. Nine feet of available right-of-way allows for the required 48-inch clear width of the pedestrian access route and an additional 5 feet for street furniture and building frontage.

Two local government commenters and one state DOT objected to the requirement to locate typically-sized accessible parallel on-street parking spaces nearest to curb ramps. They asserted that local programs may locate spaces based on need or have requirements that the must be a certain distance from an intersection. The Board acknowledges that in the absence of Federal requirements, some state and local jurisdictions have created their own specifications for the location of accessible on-street spaces. However, to provide equity to persons with disabilities with respect to their personal safety, the amount of time that they spend in the roadway between their vehicle and the sidewalk must be minimized. Thus, it is crucial that accessible spaces are located nearest the crosswalk at the end of the block face or nearest mid-block crosswalk with a curb ramp or blended transition serving the crosswalk.

Each accessible parking space complying with the dimensions of R310.2.1 must have an independent connection to a pedestrian access route (R310.2.2). If there is a curb between the parking space and the pedestrian access route, a curb ramp or blended transition complying with R304 must be provided in accordance with R203.6.1.3 and R310.2.2; however, a detectable warning surface is not required. Built-up curb ramps within the parking space are not permitted. The clear area requirement for a curb ramp directly serving a parking space complying with the dimensions of R310.2.1 is satisfied within the additional length of the space. Accessible spaces provided in accordance with the exceptions to R310.2.1 must be connected to the curb ramp serving the crosswalk by a

pedestrian circulation path that complies with technical requirements for surfaces at R302.6, except that changes in level are not permitted.

A state disability board requested that the rule specify slope and cross slope for parking spaces. The Board considered this request, but concluded that roadway design considerations preclude the Board from specifying slope and cross slope for on-street parking. However, in the final rule, the Board has added a provision requiring surfaces of parking spaces to comply with technical specifications for surfaces at R302.6, except that changes in level are not permitted (R310.2.3). As indicated in the advisory at NPRM 309.1, accessible parking spaces should be located where the street has the least crown and grade (and close to key destinations).

A state DOT and a local government entity pointed out in response to the proposed rule that the access aisle (now additional width) of a parallel parking space does not benefit side lift and ramp users because they typically deploy onto the sidewalk. In the final rule, the Board has added a provision requiring that the center 50 percent of the length of the sidewalk or other surface adjacent to accessible parking spaces be free of obstructions (R310.2.4). This requirement will ensure that there is an adjacent unobstructed area to accommodate deployment of a lift or ramp.

In the final rule, the Board, concurring with a comment from an association of accessibility professionals, also added a provision clarifying the requirement for identification of accessible on-street parking spaces with a sign bearing the International Symbol of Accessibility installed 60 inches (1525 mm) minimum above the ground measured to the bottom of the sign (R310.2.5).

Perpendicular Parking Spaces (R310.3)

In the final rule, the Board has split perpendicular and angled on-street parking spaces into separate provisions, with an additional common requirements provision applicable to both, to address a change in the dimensions of the spaces and access aisles. In response to comments expressing confusion as to the need for a 96-inch access aisle for perpendicular and angled parking, the Board notes that the purpose of the access aisle is to allow sufficient space between an accessible vehicle and the next vehicle to deploy a ramp.

In R310.3.1 of the final rule, the Board has retained the proposed requirement that perpendicular spaces have an adjacent 96-inch (2440 mm) minimum access aisle extending the full length of the space. The Board has also retained the allowance that one access aisle may be shared by two spaces, but has clarified that this is only permitted where the front entry and rear entry parking are both allowed. Most wheelchair vans that are equipped with a ramp deploy on the passenger side. Thus, where a driver can park the vehicle such that the access aisle is on the passenger side, regardless of which side of the space the access aisle is located, it is appropriate that access aisle be shared by two spaces.

Angled Parking Spaces (R310.4)

In the final rule, the Board has reallocated the total amount of space anticipated for the angled parking space and access aisle as follows. The Board has stated the width of accessible angled parking spaces to 132 inches (3350 mm) and reduced the width of the access aisle to 60 inches (1525 mm) (R310.4.1). The access aisle must extend the full length of the parking space on the passenger side (R310.4.2).

Because most wheelchair vans equipped with a ramp deploy on the passenger side, the Board requires that the access aisle be located on that side of the vehicle. The larger parking space allows a driver flexibility to situate the vehicle within the space so that a person with a disability on either side of the vehicle will have sufficient clearance to disembark. A person deploying a ramp on the passenger side would pull in all the way to the left in the space, which would allow the equivalent of the proposed 96-inch access aisle (*see* NPRM R309.3). However, for a person with a disability exiting the vehicle on the driver's side, the vehicle would be situated immediately adjacent to the access aisle, which would allow an additional three feet of clearance on the driver's side.

Common Requirements for Perpendicular and Angled Parking Spaces (R310.5)

The following requirements apply to accessible perpendicular and accessible angled on-street parking spaces. The access aisles must be marked to discourage people from parking in them (R310.5.1). The access aisles must be located at the same level as the parking space they serve and cannot encroach on the traveled way (R310.5.2). These requirements are substantively the same as those proposed at NPRM R309.3.

In new construction on undeveloped land, access aisles must connect to pedestrian access routes (R310.5.3); in alterations, the access aisle may connect to an existing pedestrian circulation path in accordance with R202.2 (R310.5.3 Exception 1). In the proposed rule, this provision was entitled, ''Curb Ramps or Blended Transitions'' (NPRM R309.4). The Board has replaced this section with more precise language requiring a connection to a pedestrian access route, as in some areas there is no curb between the parking and the pedestrian access route and thus, no curb ramp is needed. Where curb ramps are used to make the connection, they must be provided in accordance with R203.6.1.4 and must comply with the technical requirements for curb ramps at R304 (R310.5.3); however, a detectable warning surface is not required on a curb ramp or blended transition used exclusively to connect on-street parking access aisles to pedestrian access routes.[18]

Where curb ramps or blended transitions are used, they must not reduce the required width or length of the access aisles or accessible parking spaces (R310.5.3). This requirement clarifies a statement made in the proposed rule that ''[c]urb ramps shall not be located within the access aisle'' (NPRM R309.4), which a state DOT indicated was unclear. The Board has observed jurisdictions install curb ramps within an access aisle that obstruct the area intended for deployment of a ramp. The connection to the pedestrian access route, which could be a curb ramp, blended transition, or a section of pedestrian access route, must be wholly outside the required dimensions of the access aisle. A built-up curb ramp within the access aisle that reduces the required dimensions or otherwise obstructs deployment of a ramp or lift is not permitted.

Surfaces of parking spaces and access aisles serving them must comply with technical requirements for surface characteristics at R302.6, except that changes in level are not permitted (R310.5.4). A state DOT, a local government entity, and an engineer commented on the slope and cross slope characteristics of access aisles; however, the Board neither proposed nor included in the final rule any slope or cross slope requirements for on-street parking spaces or access aisles due to roadway design considerations.

In the final rule, the Board, concurring with a comment from an

[18] The Board acknowledges an error in NPRM Figure R309.3 depicting a detectable warning surface on a curb ramp serving an access aisle. Several commenters pointed out this error. The error will be corrected in technical assistance materials made available on the Access Board's website in support of the final rule.

association of accessibility professionals, has added a provision clarifying the requirement for identification of accessible on-street parking spaces with a sign bearing the International Symbol of Accessibility installed 60 inches (1525 mm) minimum above the ground measured to the bottom of the sign (R310.5.5).

Parking Meters and Parking Pay Stations (R310.6)

The operable parts of parking meters and parking pay stations that serve accessible parking spaces must comply with technical requirements for operable parts at R403. The clear space required by R403.2 shall be located so that displays and information on parking meters and pay stations are visible from a point located 40 inches (1015 mm) maximum above the center of the clear space in front of the parking meter or parking pay station.

The only change to the substantive requirements of this section from the proposed rule is the elimination of NPRM 309.5.1 which required that parking meters for parallel parking spaces be located at the head or foot of the parking space. This requirement has been superseded by R310.2.4, which requires the center 50 percent of the length of each parking space to be free from obstructions. The provision in the final rule more precisely accomplishes the goal of ensuring that the area adjacent to a parallel parking space needed to deploy a ramp will not be obstructed, while eliminating a concern expressed by a commenter as to the uncertainty of where the ''head'' and ''foot'' of the parking space are located, and the concern expressed by other commenters that the proposed language prescribed the provision of parking meters even for jurisdictions where users of accessible spaces do not pay for parking.

R311 Passenger Loading Zones

The substantive technical requirements for accessible passenger loading zones differ minimally from the proposed requirements at NPRM R310; however, in the final rule they have been reorganized for clarity.

Accessible passenger loading zones must provide a vehicular pull-up space that is 96 inches (2440 mm) wide minimum and 20 feet (6.1 m) long minimum (R311.2). Vehicle pull-up spaces have adjacent access aisles that are 60 inches (1525 mm) wide minimum extending the full length of the vehicle pull-up space (R311.3). Two local government entities and one individual commented that the dimensions specified do not account for sidewalk widths or pedestrian volumes. The Board does not require that accessible passenger loading zones be provided. In new construction on undeveloped land, neither of the issues raised should be a concern as the design would reflect these considerations. In alterations, jurisdictions must comply with the applicable requirements to the maximum extent feasible where existing physical constraints make compliance with these requirements technically infeasible (see R202.3).

Access aisles must be at the same level as the vehicle pull-up space they serve and must not encroach on the traveled way. In alterations, where existing right-of-way precludes the installation of an access aisle separate from the pedestrian access route and the vehicle drop-off area is at-grade with the sidewalk, there may be overlap between the pedestrian access route and the access aisle.

As with accessible parallel parking spaces, the Board has added a requirement for accessible passenger loading zones that the center 50 percent of the adjacent sidewalk, or other surface, be free of obstructions to ensure that there is room for a vehicle to deploy a side lift or ramp.

Access aisle surfaces must be marked to discourage parking in them (R311.3.2). Surfaces of vehicle pull-up spaces and the access aisles serving them must comply with characteristics of surfaces specified at R302.6; in the final rule the Board has clarified that changes in level are not permitted (R311.4). Some commenters requested clarification regarding the required slope and cross slope of accessible passenger loading zones; however, the Board neither proposed nor included in the final rule any slope or cross slope requirements for passenger loading zones due to roadway design considerations.

Similar to the final requirements for accessible parking spaces, the Board has replaced a proposed provision requiring curb ramps or blended transitions to connect the access aisle to the pedestrian access route (NPRM R310.3) with language simply requiring the connection in consideration of places where there is no curb between the passenger loading zone and the adjacent pedestrian access route (R311.5). In alterations, the access aisle may connect to an existing pedestrian circulation path in accordance with R202.2. Where curb ramps and blended transitions are used, they must comply with technical requirements for curb ramps, except that detectable warning surfaces are not required on curb ramps and blended transitions used exclusively to connect access aisles to pedestrian access routes. Curb ramps and blended transitions also must not reduce the required width or length of access aisles. A built-up curb ramp within the access aisle that reduces the required dimensions or otherwise obstructs deployment of a ramp or lift is not permitted.

E. Chapter 4: Supplemental Technical Requirements

Chapter 4 contains technical requirements that, as originally proposed in the NPRM, were virtually the same as similarly titled provisions in the 2004 ADA and ABA Accessibility Guidelines. In response to public comments, and to improve the clarity of the final rule text, several of these provisions have been revised to address the public rights-of-way context more precisely. Consequently, the original distinction between Chapter 3 and Chapter 4 of the PROWAG rule text, where Chapter 3 was specific to PROWAG and Chapter 4 was taken almost directly from the 2004 ADA and ABA Accessibility Guidelines, no longer applies. However, as the proposed guidelines have been widely adopted by state and local government entities, the Board has maintained the two-chapter structure of the technical requirements to ease the transition from the proposed guidelines to the final Guidelines.

R401 General

The supplemental technical requirements in Chapter 4 apply as specified in the scoping provisions of Chapter 2 or where referenced by another technical requirement in Chapter 3 or 4. These technical requirements have been adapted specifically for pedestrian facilities in the public right-of-way. In the final rule, the Board has replaced the term ''finish surface,'' which is typically used to refer to an interior surface, with ''walking surface'' or ''ground surface,'' which are more appropriate in the rights-of-way context. Measurements are taken from the top of the surface.

R402 Protruding Objects and Vertical Clearance

The name of this section, called ''Protruding Objects'' in the proposed rule (NPRM R402) has been revised in the final rule to more precisely reflect the content. There are many types of protrusions in the public right-of-way, including but not limited to signs, awnings, and landscaping. Landscaping protrusions in the public rights-of-way are common and pose special challenges to pedestrians with disabilities. For example, low hanging tree branches pose a hazard to pedestrian who are

blind or have low vision. Overgrown shrubbery may impede a blind pedestrian's ability to trail on the edge of a sidewalk or force a pedestrian in a wheelchair hazardously close to the roadway. Thus, to ensure equal access to public rights-of-way for persons with disabilities, jurisdictions must take care to ensure that protrusions do not exceed the specified limits, and that vertical clearance is properly maintained.

Protrusion Limits (R402.2)

Objects with leading edges that are more than 27 inches (685 mm) and less than 80 inches (2030 mm) above the walking surface cannot protrude horizontally more than 4 inches (100 mm) into pedestrian circulation paths. The text of this provision has been revised for clarity, but the substantive requirement has not been changed from the proposed provision, which was based on the 2004 ABA and ADA Accessibility Guidelines. However, in the final rule, the Board has added an exception that allows handrails to protrude 4.5 inches (115 mm) into a pedestrian circulation path to account for consistency with the 2004 ABA and ADA Accessibility Guidelines. *See* 36 CFR part 1191, Appx. D 307.2 Exception (allowing handrails to protrude 4.5 inches (115 mm)).

In response to the NPRM, one local government entity indicated that the protrusion limits could affect landscaping requirements and increase landscape trimming costs. The Board notes that it is common practice for jurisdictions to manage and maintain the landscaping abutting sidewalks and other pedestrian circulation paths; the final rule's protrusion limits are unlikely to significantly affect those costs.

Post-Mounted Objects (R402.3)

Post-mounted objects must be installed in compliance with these technical requirements so they do not pose a hazard to persons who are blind or have low vision. In the final rule, the Board has revised the text of these provisions for clarity. The Board has also excepted the sloping portion of handrails serving stairs and ramps from compliance with R402.3.

Where objects mounted on a single post or pylon are more than 27 inches (685 mm) and less than 80 inches (2030 mm) above the walking surface, the objects must not protrude more than 4 inches horizontally into the pedestrian circulation path, as measured horizontally either from the post or pylon or from the outside edge of the base if the base is at least 2½ inches (64 mm) high (R402.3.2). A 2½ inch solid base is cane detectable.

Where objects within a pedestrian circulation path are mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches (305 mm), the lowest edge of the object must be 27 inches (685 mm) maximum above the walking surface (low enough so that it is cane-detectable) or 80 inches (2030 mm) minimum above the walking surface (high enough that someone could walk under it) (R402.3.2). In the final rule, the Board has added an exception allowing objects mounted on two or more posts or pylons that do not comply with the above dimensions if a barrier with its lowest edge at 27 inches maximum above the walking surface is provided. The barrier is cane-detectable, and thus reduces the hazard.

Vertical Clearance (R402.4)

The vertical clearance of a pedestrian circulation path must be 80 inches high minimum. Where the vertical clearance is less than 80 inches, guards or other barriers must be provided to prohibit pedestrian travel. This will prevent pedestrians from colliding with objects overhead. The lowest edge of the guard or barrier must be no higher than 27 inches above the walking surface to ensure that it is cane detectable. These substantive requirements for vertical clearance have not changed from those in the proposed rule, although they have been revised for clarity. In addition, the Board has substituted the word ''guard'' for ''guardrail,'' which has a different meaning in the transportation context.

In response to the NPRM, the Board received comments from a disability rights advocacy organization and an accessible design firm requesting that the Board required vertical clearance of 96 inches to account for sagging wet branches, awnings, and wires. The Board has maintained the vertical clearance at 80 inches, which provides sufficient head clearance for most people. As in the case of several of PROWAG's technical requirements, some maintenance may be needed to maintain compliance.

Required Clear Width (R402.5)

In the final rule, the Board has added a provision to clarify that protruding objects may not reduce the clear width required for pedestrian access routes, as specified at R302.2. That means, for example, that an object mounted between posts cannot be placed in the middle of a sidewalk, even if it complies with the requirements at R402.3.2, if it obstructs the required clear width of the path.

R403 Operable Parts

An operable part is a component of an element used to insert or withdraw objects, or to activate, deactivate, or adjust the element, or interact with the element (R104.3). The technical requirements for operable parts apply to operable parts on street furniture, fare vending machines, other fixed elements at transit stops and shelters, accessible pedestrian signals (pedestrian push buttons), parking meters and parking pay stations that serve accessible parking spaces, and any other fixed elements used by pedestrians. A clear space complying with technical requirements at R404 must be provided at operable parts (R403.2). Operable parts must be located within the reach ranges specified in R406 (R403.3). There are no substantive changes to the technical requirements for operable parts from what was proposed in the NPRM; however, the Board updated the definition of ''operable part'' to include a component of an element use to ''interact with the element'' (R104.3). This addition is designed to cover QR codes and any other future markings that are intended to be scanned with a mobile device. If a QR code or similar marking is provided on an element, that code or marking must be within reach range, and clear space complying with R404 must be provided so that a person in a wheelchair can use it.

Operable parts must be operable with one hand and not require tight grasping, pinching, or twisting of the wrist (R403.4). The force required to activate operable parts may not exceed 5 pounds (22.2 N). One local government entity objected to this requirement asserting that products rated for exterior use have controls that likely require more force than 5 pounds to operate. The Board is not aware of jurisdictions having actual difficulties obtaining products that comply with this requirement. Exterior environments on buildings and sites are also subject to the same technical requirements for operable parts. 36 CFR part 1191, Appx. B 205, Appx. C F205, Appx. D 309.

R404 Clear Spaces

Clear spaces are required at operable parts so that a person with a wheelchair or other mobility aids (such as a walker or crutches) has sufficient room and a stable surface to access an operable part. Clear spaces are also provided adjacent or integral to benches so that a person using a wheelchair may sit in proximity to a companion using the bench. Two disability rights advocacy organizations requested in their comments that the Board remove the advisory specifying

clear space is required at parking meters and parking pay stations ''that serve accessible parking spaces'' (NPRM Advisory R404.1), because they believe that clear space should be provided at all parking meters and pay stations. All advisories have been removed from the final rule text; however, the Board also notes that with the addition of R209.7 in the final rule, operable parts of all fixed elements, which would include all parking meters and pay stations, must comply with technical requirements for operable parts at R403.

Clear spaces are 30 inches (760 mm) minimum by 48 inches (1220 mm) minimum (R404.3). Their surfaces must comply with technical requirements for surface characteristics at R302.6 (R404.2). The slope of a clear space must be 1:48 (2.1%) maximum in both directions (R402.2). This is a change from the proposed rule, which required a running slope consistent with the grade of the adjacent pedestrian access route and a cross slope of 2 percent. The Board agreed with commenters that minimizing the slope in both directions provides better accessibility, particularly where both hands are needed for an operable part, leaving a person without a hand to stabilize a manual wheelchair. The Board has retained an exception where the grade of an adjacent pedestrian access route conforms to the requirements of R302.4; in those situations, the slope of the clear space may be consistent with the slope of the pedestrian access route.

Two state DOTs and a regional association of engineers raised concerns about the cross slope exceeding 2 percent in circumstances where a pedestrian pushbutton for an accessible pedestrian signal is adjacent to a curb ramp and the clear space then overlaps the curb ramp. The Board notes that full compliance is expected for new construction on undeveloped land, and that in alterations, where existing physical constraints make compliance with applicable requirements technically infeasible, compliance with these requirements is required to the maximum extent feasible (*see* R202.3). The final rule also allows pedestrian push buttons to be located up to 10 feet away from the edge of curb to help avoid the scenario where clear space is located on a curb ramp (*see* R307.4).

Clear spaces may include knee and toe clearance complying with R405 (R404.4.). Clear spaces are positioned either for a forward approach or parallel approach (R404.5). In the final rule, the Board has clarified the orientation of the clear space for each approach: the 30-inch side is nearest to the element for a forward approach, and the 48-inch side is nearest to the element for a parallel approach (R404.5).

Clear spaces must not be located on curb ramp runs or flares. One fully unobstructed side of a clear space must adjoin a pedestrian access route or another clear space (R404.6). If a clear space is confined on all or part of three sides, additional maneuvering clearance must be provided (R404.7). For a forward approach where the depth of the confined space exceeds 24 inches measured perpendicular to the element, the clear space and additional maneuvering clearance must be 36 inches (915 mm) wide minimum (R404.7.1). The clear space and additional maneuvering clearance must be 60 inches (1525 mm) wide minimum for a parallel approach where the depth of the confined space exceeds 15 inches.

R405 Knee and Toe Clearance

The technical requirements for knee and toe clearance apply where space beneath an element is included as part of the clear space. These technical requirements are virtually identical to those in the 2004 ABA and ADA Accessibility Guidelines. The only change from the proposed rule is that the Board added a clarifying provision at R405.2.4 stating that space extending more than 6 inches (150 mm) beyond the available knee clearance at 9 inches above the ground surface is not considered toe clearance. The Board added this provision for consistency with section 306.2.4 of the 2004 ABA and ADA Accessibility Guidelines.

R406 Reach Ranges

Technical requirements for reach ranges describe where an operable part must be located so that a person using a wheelchair can reach it. They also specify whether obstructions between the pedestrian and the element with the operable part are permitted, and if so, to what extent. The substantive requirements have not changed from the proposed rule, but the text of the provisions has been edited for clarity.

For both forward and parallel approaches, the reach range extends between 15 inches (380 mm) and 48 inches (1220 mm) above the ground surface (R406.2). Where the clear space is configured solely for a forward approach to an element, obstructions are not permitted between the clear space and the element (R406.3.1). Where a clear space is configured for a parallel approach to an element, an obstruction 10 inches (255 mm) deep maximum is permitted between the clear space and the element (R406.3.2).

In response to comments from three state DOTs requesting that the Board clarify the permitted height of an obstruction, in the final rule the Board has stated that for clear spaces configured for a parallel approach to an element, the permitted obstruction must be no more than 34 inches (865 mm) high (R406.3.2). This obstructed high reach limit is consistent with that stated in section 308.3.2 of the 2004 ABA and ADA Accessibility Guidelines.

Four state DOTs, three local government commenters, and an engineering firm requested that an obstructed side reach up to 24 inches deep be allowed as is permitted in the 2004 ADA and ABA Accessibility Guidelines. The Board declines to make this change, as most operable parts placed in new construction in the public right-of-way can be located so they are unobstructed. The Board notes that most of the concerns expressed related to existing rights-of-way. Alterations must comply with the applicable requirements to the maximum extent feasible where existing physical constraints make compliance with these requirements technically infeasible (R202.3). An engineering firm expressed concern that the 10-inch obstruction depth limit would present challenges for mounting push buttons within the specified reach range. The Board notes that push button extensions, which are readily available, mitigate this concern.

R407 Ramps

Ramps in the public right-of-way are used to provide access to a pedestrian overpass or underpass, to the entrance of a building or facility, and in instances where the grade of the sidewalk exceeds the allowances specified at R302.4. In the final rule, the Board has defined a ''ramp'' as a ''sloped walking surface with a running slope steeper than 1:20 (5.0%) that accomplishes a change in level and is not part of a pedestrian circulation path that follows the roadway grade. A curb ramp is not a ramp'' (R104.3).

In addition, the Board has revised R407.1 to state that R407 does not apply to curb ramps or pedestrian access routes following the grade established for the adjacent street consistent with the requirements of R302.4.1.

This definition and revisions to R407.1 address two repeated concerns in the comments to the NPRM and in subsequent technical assistance inquiries the Board has received since the NPRM was published. First, the Board clarifies that ''curb ramps'' and ''ramps'' are different types of pedestrian facilities and have distinct technical requirements. Two state DOTs, one local government entity, an

accessible design firm, and an association of accessibility professionals requested that the Board clarify that R407 does not apply to curb ramps. In the final rule, both ''ramp'' and ''curb ramp'' are defined in R104.3. The technical requirements for curb ramps appear at R304 in accordance with the scoping at R203.6. The technical requirements for ramps appear at R407. Second, the Board clarifies that pedestrian circulation paths that follow the street grade are not ramps, even if they exceed a slope of 1:20 (5.0%) and thus do not require compliance with R407 (see R302.4.1).

The running slope of a ramp run is 1:12 (8.3%) maximum (R407.2) and the cross slope of a ramp run is 1:48 (2.1%) maximum (R407.3). In the proposed rule, the Board had specified a minimum running slope of 5 percent, which was derived from the proposed maximum grade of a pedestrian access route (NPRM R407.2). A state DOT requested that the Board eliminate the minimum slope, and the Board concurred that stating a minimum slope was contributing to the confusion as to the applicability of the ramp technical requirements. Thus, the final rule does not state a minimum running slope for ramp runs.

The clear width of a ramp run must be 48 inches (1220 mm) minimum, and if handrails are provided, the clear width between handrails must be 48 inches (1220 mm) minimum (R407.4). This is a departure from the NPRM in which the Board proposed that the clear width of ramps be 36 inches minimum, consistent with the 2004 ADA and ABA Accessibility Guidelines. Several commenters, including three state DOTs and a local government entity, recommended that ramps have a minimum width of 48 inches, consistent with the rest of the pedestrian access route in the public right-of-way. The Board concurred, but also provided an exception allowing a minimum width between handrails of 36 inches (915 mm) for ramps that exclusively serve a building entrance.

The rise for any ramp run is 30 inches (760 mm) maximum (R407.5). Landings must be provided at the top and bottom of each ramp run (R407.6). Landing slopes must be 1:48 (2.1%) maximum parallel and perpendicular to the ramp running slope. Landings are 60 inches (1525 mm) long minimum (R407.6.3) and as wide as the widest ramp run leading to the landing (R407.6.2). Ramps that change direction between runs at landings must have a clear landing 60 inches (1525 mm) minimum by 60 inches (1525 mm) minimum where the ramps change direction (R407.6.4). A state DOT requested 48 inch (1220 mm) minimum landings; the Board declines this suggestion as switchbacks require more space for maneuvering. A state disability board requested that the Board clarify that handrails cannot overlap the minimum clear dimensions of the landing. The Board does not think this modification to the rule text is needed, as R407.4 indicates that clear width is measured inside any handrails.

Surfaces of ramp runs and landings comply with R302.6, except that changes in level, are not permitted (R407.7). Ramp runs with a rise greater than 6 inches (150 mm) must have handrails complying with R409 (R407.8).

Edge protection must be provided on each side of ramp runs and each side of ramp landings, except those serving an adjoining ramp run, stairway, or other pedestrian circulation path (R407.9). In the final rule, this provision has been revised for clarity. There are two options for edge protection. One is to extend the surface of the ramp run or landing 12 inches (305 mm) minimum beyond the inside face of the handrail (R407.9.1). The other is to provide a 4-inch (100 mm) high curb or a barrier that prevents the passage of a 4-inch sphere (R407.9.2). In the final rule, the Board has specified the minimum height of the curb for clarity and consistency with guidance for the 2004 ABA and ADA Accessibility Guidelines. *See* U.S. Access Board, Guide to ADA Accessibility Standards, ''Edge Protection'' *available at https://www.access-board.gov/ada/guides/chapter-4-ramps-and-curb-ramps/* (stating, ''Curbs if used must be at least 4'' high''). The Board emphasizes that only one edge protection option is required; if a curb or barrier is provided, the extended surface is not required.

R408 Stairs

Technical accessibility requirements for stairs are needed for individuals with disabilities who are ambulatory and use stairs. For example, a person who drags a foot may catch it on a nosing if it does not comply with the requirements. For individuals who walk with difficulty or have challenges with balance, it is often preferable to use stairs rather than a ramp when both are provided as stairs may represent a shorter distance to be traveled or a more even surface.

The final technical requirements for stairs in the public right-of-way are almost identical to the requirements for stairs in the 2004 ADA and ABA Accessibility Guidelines, and those proposed in the NPRM with two exceptions. First, consistent with the requirements in the 2004 ADA and ABA Accessibility Guidelines but different than the NPRM, the Board has clarified at R408.4 that treads are permitted to have a slope of 1:48 (2.1%) maximum. Second, in response to a request from over 80 commenters, the Board has added a requirement for visual contrast on stair treads and landings.

All steps on a flight of stairs must have uniform riser heights and uniform tread depths (R408.2). Risers must be 4 inches (100 mm) high minimum and 7 inches (180 mm) high maximum. Treads must be 11 inches (280 mm) deep minimum. Two commenters requested that the Board permit the bottom riser to be of varying height to accommodate the grade of the sidewalk. The Board does not find that a modification to the rule text is needed to account for this scenario. DOJ regulations implementing accessibility requirements under Title II of the ADA state that full compliance with the relevant accessibility requirements is not required in the context of new construction where a public entity can demonstrate that it is structurally impracticable to meet the requirements. 28 CFR 35.151. In alterations, where compliance with a requirement is technically infeasible, compliance is required to the maximum extent feasible (*see* R202.3).

Open risers are not permitted (R408.3). Stair treads must comply with technical requirements for surface characteristics at R302.6, except that changes in level are not permitted (R408.4). However, treads may have a slope not steeper than 1:48 (2.1%).

The radius of curvature at the leading edge of the tread must be 0.5 inches (13 mm) maximum (R408.5). If the nosing projects beyond the riser, the underside of the leading edge of the nosing must be curved or beveled. Risers are permitted to slope under the tread at an angle of 30 degrees maximum from vertical. The nosing may project 1.5 inches (38 mm) maximum over the tread below.

The leading edge of each step tread and top landing must be marked by a 1-inch (25 mm) wide stripe (R408.6). The stripe must contrast visually with the rest of the step tread or circulation path surface, either light-on-dark or dark-on-light. In adopting a requirement for contrast striping, the Board notes that a 1- to 2-inch stripe of contrasting color (either dark-on-light or light-on dark) is required by American National Standard (ANSI) through adoption of international building codes (IBC) to help users distinguish each step.[19] In

[19] ''Accessible and Usable Buildings and Facilities,'' American National Standard (2009): 41,

addition, the Access Board requires contrast striping on vehicle stairs to assist individuals with low vision distinguish between steps. 36 CFR part 1192, Appx. A T405.3. The Board has assessed the costs of contrast striping on stairs and finds them reasonable with respect to the accessibility for persons with low vision. FRIA at 109.

Stairs must have handrails complying with the technical requirements for handrails at R409.

R409 Handrails

Wherever handrails are provided in the public right-of-way, regardless of whether or not they are required, they must comply with technical requirements for handrails. The Board received several comments in response to the handrails technical requirements in the NPRM asking the Board to clarify where handrails are required. Again, handrails are required on ramps and stairs (R409.2); they are not required on curb ramps or pedestrian circulation paths complying with the grade requirements at R302.4. The Board added a statement to R409.1 clarifying that R409 does not apply to curb ramps.

The technical requirements for handrails in the final rule are substantively the same as the technical requirements in the NPRM. The Board provided clarification, described below, as to how jurisdictions are to handle scenarios where handrail extensions would reduce the clear width of a pedestrian access route (see R409.10).

Handrails must be continuous within the full length of each ramp run or stair flight (R409.3). Inside handrails on switchback or dogleg ramps and stairs must be continuous between ramp runs or stair flights.

The top of handrail gripping surfaces must be between 34 inches (865 mm) and 38 inches (965 mm) above walking surfaces, ramp surfaces, and stair nosings (R409.4). Handrails must be installed at a consistent height. There must be at least 1.5 inches (38 mm) between the handrail gripping surface and any other adjacent surface to allow sufficient room to grip the handrail (R409.5).

Handrail gripping surfaces must be continuous along their length and unobstructed along their tops and sides (R409.6). The bottoms of handrail gripping surfaces must not be obstructed for more than 20 percent of their length. Any horizontal projections must be at least 1.5 inches (38 mm) below the bottom of the handrail gripping surface.

Handrail gripping surfaces' cross sections comply with either R409.7.1 (circular) or R409.7.2 (non-circular). Where expansion joints are necessary for large spans of handrails, the expansion joint cross section may be smaller than the specified cross section diameters for sections no more than 1 inch (25 mm) long. Handrail gripping surfaces with a circular cross section must have an outside diameter of 1.25 inches (32 mm) minimum and 2 inches (51 mm) maximum (R409.7.1). Handrail gripping surfaces with a non-circular cross section must have a perimeter dimension of 4 inches (100 mm) minimum and 6.25 inches (160 mm) maximum, and a cross-section dimension of 2.25 inches (57 mm) maximum (R409.7.2). Handrail gripping surfaces and any surfaces adjacent must not be sharp or abrasive and must have rounded edges (R409.8).

Handrails must not rotate within their fittings; however, where expansion joints are necessary for large spans of handrails, the expansion joint may rotate in its fitting (R409.9).

Handrail gripping surfaces must extend beyond and in the same direction of ramp runs and stair flights in accordance with R409.10. In response to a comment from a state DOT requesting clarity on the requirement for handrail extensions where they would protrude into a pedestrian circulation path, the Board has clarified that in new construction on undeveloped land, handrails must not extend into a roadway or pedestrian circulation path. However, in alterations, if handrail extensions complying with R409.10 would reduce the clear width of a pedestrian access route, they shall extend as far as possible without reducing the clear width. Extensions are not required for continuous handrails at the inside turn of switchback or dogleg ramps and stairs.

The required extensions are as follows. Ramp handrails must extend horizontally above the landing for 12 inches (305 mm) minimum beyond the top and bottom of ramp runs (R409.10.1). Extensions must either return to a wall, guard, or the landing surface, or be continuous to the handrail of an adjacent ramp run. At the top of a stair flight, handrails must extend horizontally above the landing for 12 inches (305 mm) minimum beginning directly above the first riser nosing (R409.10.2). Extensions must either return to a wall, guard, or the landing surface, or be continuous to the handrail of an adjacent stair flight.

At the bottom of a stair flight, handrails must extend at the slope of the stair flight for a horizontal distance at least equal to one tread depth beyond the last riser nosing (R409.10.3). Extensions must either return to a wall, guard, or the landing surface, or be continuous to the handrail of an adjacent stair flight.

R410 Visual Characters on Signs

Technical requirements for pedestrian signs provide accessibility to pedestrians with low vision. As stated in the scoping at R208, all signs on shared use paths and all other signs in the public right-of-way intended for pedestrians other than those explicitly excepted are required to comply with the technical requirements. The Board notes, in response to a local government comment, that a noncompliant sign accompanied by a compliant sign does not meet the requirements. All signs covered by the scoping must comply with the technical requirements.

The only change to the final technical requirements for signs from the proposed provisions is that the Board has relocated the requirement for height to the end of the section as a more logical placement. The technical requirements for visual characters on signs are substantively identical to the character requirements in the 2004 ADA and ABA Accessibility Guidelines. 36 CFR part 1191, Appx. D 703.

Characters and their background must have a non-glare finish (R410.2), contrast with their background (R410.2), and be conventional in form (R410.4). Characters may be uppercase or lowercase or a combination of both (R410.3).

Characters must be selected from 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'' (R410.5). Minimum character heights are specified in Table R410.6. The viewing distance is measured as the horizontal distance between the character and an obstruction preventing further approach towards the sign (R410.6). Character height is based on the uppercase letter ''I''.

Stroke thickness (R410.7), character spacing (R410.8), and line spacing (R410.9) are specified. Visual characters must be at least 40 inches (1015 mm) above the ground surface.

411 International Symbol of Accessibility

The International Symbol of Accessibility (ISA) is provided as a figure. Wherever the ISA is used, it must have a non-glare finish and contrast with its background. In the final rule, this provision has been slightly restructured, but there are no

access from ANSI A117.1 (2009): Accessible and Usable Buildings and Facilities (*mzarchitects.com*)

substantive changes from the proposed requirements.

VII. Regulatory Process Matters

A. Regulatory Planning and Review (Executive Orders 12866 and 13563)

The Office of Management and Budget has reviewed this final rule pursuant to E.O. 12866, 58 FR 51735 (Sept. 30, 1993), Principles of Regulations, and E.O. 13563, 76 FR 3821, (Jan. 21, 2011), Improving Regulation and Regulatory Review.

The USDOT Volpe Center prepared the final regulatory impact analysis (FRIA) on behalf of the Access Board. The FRIA is available on the Access Board's website at *www.access-board.gov* and in the regulatory docket at *www.regulations.gov.* The FRIA estimates the annual costs of PROWAG, and describes the significant benefits, some of which are quantifiable. While the benefits of regulations that ensure civil rights cannot be fully quantified and monetized, according to the Volpe Center's estimates, the monetizable benefits of this final rule far outweigh the costs. The Board concludes that consistent with E.O. 13563, the benefits of this final rule, (quantitative and qualitative) justify the costs.

Pursuant to E.O. 13563, the Volpe Center has used ''the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible''; however, the final rule and the underlying statutes create many important benefits that, in the words of E.O. 13563, stem from ''values that are difficult or impossible to quantify.'' In addition to considering the rule's quantitative effects, the Board has considered the rule's qualitative effects.

Executive Order 13563 states that in making a reasoned determination that a regulation's benefits justify its costs, ''each agency may consider and (discuss qualitatively) values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts.'' The proposed guidelines promote important societal values that are difficult or impossible to quantify. When enacting the ADA, Congress found ''the discriminatory effects of architectural, transportation, and communication barriers'' to be a continuing problem that ''denies people with disabilities the opportunity to compete on an equal basis and to pursue those opportunities for which our free society is justifiably famous, and costs the United States billions of dollars in unnecessary expenses resulting from dependency and nonproductivity.'' 42 U.S.C. 12101(a)(5) and (9).

Congress declared that ''the Nation's proper goals regarding individuals with disabilities are to assure equality of opportunity, full participation, independent living, and economic self-sufficiency.'' 42 U.S.C. 12101(a)(8). This final rule promotes the goals declared by Congress by eliminating the discriminatory effects of architectural, transportation, and communication barriers in the design and construction of pedestrian facilities in the public right-of-way. The proposed guidelines are also important to achieving the benefits of the other parts of the Americans with Disabilities Act. As the House Report for the Americans with Disabilities Act stated, ''[t]he employment, transportation, and public accommodation sections . . . would be meaningless if people who use wheelchairs were not afforded the opportunity to travel on and between the streets.'' H.R. 485, 101st Cong., 2d Sess. 84 (1990).

In the FRIA, the Volpe Center provides benefits and costs calculated relative to a no-action baseline, which represents a continuation of existing state and local design standards and construction practices. The details of the baseline vary significantly across PROWAG provisions, because in some areas existing practices align fairly closely with PROWAG, while in other cases there are larger differences.

The FRIA describes the methodology used to calculate compliance costs and associated benefits, including data sources, key input values and assumptions, calculation methods, and information on potential limitations and sources of uncertainty. This methodology is then applied to estimate the costs and benefits of major PROWAG provisions on a lifecycle basis, relative to a no-action baseline.

The below summarizes the quantified cost and benefit estimates. The FRIA also presents a discussion of potential compliance costs for pedestrian overpasses and underpasses; sidewalk dimensions and materials; handrails; public street toilets; transit stops and shelters; and alternate pedestrian access routes. However, these are not listed in the summary table because they are expected to have little to no overall cost impact relative to the baseline. Similarly, a number of other benefits were identified that could not be monetized using the available data.

As the relevant analysis time periods can vary by provision, the costs and benefits have been converted to annualized equivalents (using 3% and 7% discount rates) to ease comparisons. As the figures indicate, estimated monetized benefits exceed estimated compliance costs by a considerable margin. However, some of the most important benefits of this rule, in the form of equal access to public facilities, personal freedom and independence, and the elimination of accessibility barriers to mobility, are not quantified due to the inherent difficulty in monetizing such impacts.

SUMMARY OF ESTIMATED BENEFITS AND COSTS

PROWAG provision	Annualized cost/benefit ($ millions, 7% discounting to 2021 base year)	Annualized cost/benefit ($ millions, 3% discounting to 2021 base year)	Time period analyzed (years)
Detectable Warning	$1.0	$1.0	50
On-Street Parking	11.4	17.0	20
Passenger Loading Zones	1.4	1.4	20
Accessible Pedestrian Signals	98.8	103.6	25
Shared-Use Paths	43.9	60.0	15
Pedestrian Overpasses and Underpasses	0.0	0.0	30
Sidewalk Width	0.0	0.0	50
Roundabouts—Crossings	12.6	16.9	25
Roundabouts—Edge Detection	2.4	2.8	50
Curb Ramps	22.0	30.6	20
Stair Visual Contrast	0.1	0.1	50
Crosswalk Cross Slope	3.0	3.1	25

SUMMARY OF ESTIMATED BENEFITS AND COSTS—Continued

PROWAG provision	Annualized cost/benefit ($ millions, 7% discounting to 2021 base year)	Annualized cost/benefit ($ millions, 3% discounting to 2021 base year)	Time period analyzed (years)
Total Costs	196.7	236.5	
Accessible Pedestrian Signals: Mobility Component	68.9	83.5	25
Roundabouts: Safety Component	0.1	0.1	25
On-Street Parking: Mobility Component	928.0	1,083.6	20
Multiple Provisions: New Trips Value	14,479.3	19,575.3	30
Multiple Provisions: Health Benefit	0.03	0.04	30
Total Benefits	15,476.3	20,742.5	

B. Regulatory Flexibility Act

The impacts of the proposed guidelines on small governmental jurisdictions with a population of less than 50,000 are discussed below. This information is required by the Regulatory Flexibility Act (5 U.S.C. 603).

1. Statement of the Need for, and Objectives of, the Rule

The Access Board's current accessibility guidelines, the 2004 ADA and ABA Accessibility Guidelines, were developed primarily for buildings and facilities on sites. Some of the requirements in the 2004 ADA and ABA Accessibility Guidelines can be readily applied to pedestrian facilities in the public right-of-way, but other requirements are developed specifically for pedestrian facilities in the public right-of-way and address conditions and constraints that exist in the public right-of-way.

The Access Board is required to issue accessibility guidelines by the Americans with Disabilities Act (ADA) (42 U.S.C. 12204) and Section 502 of the Rehabilitation Act (29 U.S.C. 792) to ensure that newly constructed and altered facilities are readily accessible to and usable by pedestrians with disabilities.

2. Statement of Significant Issues Raised by Public Comments in Response to the Initial Regulatory Flexibility Analysis

The NPRM received 14 comments from entities considered ''small'', *i.e.,* government entities with a population under 50,000. In these comments, the most common concern was about the cost of APS, although in at least some instances this was due to a misunderstanding that the final rule requires retrofitting equipment, which is not the case. This final rule applies only to new construction and alterations.

Other comments asked clarifying questions about definitions and the applicability of the proposed rule, and one commentor explicitly supported the proposed rule in its entirety.

The Access Board carefully considered all comments, including those from small government entities, and revised the final rule in light of those comments. No changes were made, however, that solely affect small government entities.

3. Response of the Agency to Any Comments Filed by the Chief Counsel for Advocacy of the Small Business Administration in Response to the Proposed Rule

No comments were filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the proposed rule.

4. Small Governmental Jurisdictions Affected by Proposed Accessibility Guidelines

The number of small governmental jurisdictions with a population less than 50,000 affected by the proposed guidelines is shown in the table below.[20] The total number of jurisdictions with populations under 50,000 is 36,931.

Governmental jurisdictions	Population under 10,000	Population 10,000 to 24,999	Population 25,000 to 49,999
County	687	807	611
Municipal	16,432	1,559	738
Town or Township	14,997	784	316
Total	32,206	3,150	1,665

More than 65 percent of municipal governments (12,701) and almost 75 percent of towns and townships (12,062) have a population of less than 2,500. Many of these small governmental jurisdictions are located in rural areas, which generally do not construct pedestrian transportation networks (*e.g.,* sidewalks, pedestrian street crossings, and pedestrian signals).

In addition, some jurisdictions do not have full responsibility for all rights-of-way within their town or county boundaries, and accordingly would only be affected by this final rule with respect to the right-of-way that is in their purview. For example, in Delaware, North Carolina, and West Virginia, the State DOT is responsible for the management of roadways, which means that small governmental jurisdictions in these states [21] are less likely to be burdened by the final rule, as the State DOTs may be primarily

[20] Source: U.S. Census Bureau 2017 Census of Governments available at: *https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html.*

[21] There are 90 counties and 821 municipal governments with population under 50,000 per U.S. Census data in these three states.

responsible for the affected infrastructure.

5. Compliance Requirements

The public rights-of-way accessibility guidelines address the design, construction, and alteration of pedestrian facilities in the public right-of-way, including sidewalks, crosswalks, pedestrian overpasses and underpasses, curb ramps and blended transitions at crosswalks, pedestrian signals, street furniture (*i.e.,* drinking fountains, public toilet facilities, tables, counters, and benches), pedestrian signs, transit stops and transit shelters for buses and light rail vehicles, on-street parking that is marked or metered, and passenger loading zones. The Section-by-Section Analysis of the preamble describes the proposed accessibility guidelines. Compliance with the proposed accessibility guidelines is not mandatory until they are adopted, with or without additions and modifications, as accessibility standards by other Federal agencies. There are no reporting or recordkeeping requirements.

6. Significant Alternatives Which Minimize Any Significant Economic Impacts on Small Entities

The regulatory assessment analyzes the following five requirements in the final rule that will have more than minimal impacts on state and local transportation departments:

• *Accessible pedestrian signals and pedestrian pushbuttons required when pedestrian signals are newly installed or altered at signalized intersections.* Accessible pedestrian signals and pedestrian pushbuttons communicate the information about the WALK and DON'T WALK intervals at signalized intersections in non-visual formats (*i.e.,* audible tones and vibrotactile surfaces) to pedestrians who are blind or have low vision.

• *Pedestrian activated signals or raised crossings at roundabouts with pedestrian street crossings.* A roundabout is a circular intersection with yield control at entry, which permits a vehicle on the circulatory roadway to proceed, and with deflection of the approaching vehicle counter-clockwise around a central island. Pedestrian activated signals or raised crossings are required at roundabouts with pedestrian street crossings to facilitate crossing by pedestrians who are blind or have low vision. Some small governmental jurisdictions with a population less than 50,000 do construct roundabouts, and accordingly may be affected by this requirement, although they may only construct a small number of roundabouts.

• *Accessible shared use paths located in the public right-of-way.* The shared use paths requirements that are likely to impose costs include those related to detectable warning surfaces, grade, and trail surface. The existing data suggests that shared use paths in small governmental jurisdictions are not necessarily any more or less compliant than all shared use paths in the U.S., suggesting that this will be an area of costs for small jurisdictions in line with the overall prevalence of shared use paths.

• *One curb ramp per street crossing provided at each corner of intersections.* Existing guidelines allow for a single diagonal curb ramp serving street crossings; however, the final rule will require two parallel or perpendicular curb ramps. There is no requirement where no pedestrian crossing exists.

• *On-street parking must meet minimum thresholds for the number of accessible spaces per block perimeter or other location.* On-street parking is typically found along the curbside in retail, office, and mixed-use areas, but it is unknown how common this type of parking is in small governmental jurisdictions.

There are no significant alternatives that will minimize any significant impacts of these requirements on small governmental jurisdictions and achieve the objectives of the ADA, Section 504 of the Rehabilitation Act, and the ABA to eliminate the discriminatory effects of architectural, transportation, and communication barriers in the design and construction of pedestrian facilities in the public right-of-way.

C. Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act does not apply to legislative or regulatory provisions that establish or enforce any ''statutory rights that prohibit discrimination on the basis of race, color, religion, sex, national origin, age, handicap, or disability.'' 2 U.S.C. 658a. Accordingly, it does not apply to this rulemaking.

D. Paperwork Reduction Act

This regulation contains no information collection requirements subject to review by the Office of Management and Budget under the Paperwork Reduction Act. See 44 U.S.C. 3501, *et seq.*

E. Congressional Review Act

To the extent this rule is subject to the Congressional Review Act, the Access Board has complied with its requirements by submitting this final rule to Congress and the Government Accountability Office prior to publication in the **Federal Register**.

F. Federalism (Executive Order 13132)

The proposed rule adheres to the fundamental federalism principles and policy making criteria in Executive Order 13132. The portion of this rule applicable to state and local governments is issued under the authority of the Americans with Disabilities Act, 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 Americans with Disabilities Act was enacted ''to provide a clear and comprehensive national mandate for the elimination of discrimination against individuals with disabilities.'' 42 U.S.C. 12101(b)(1). The Americans with Disabilities Act 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 than are afforded by this chapter.'' 42 U.S.C. 12201(b). This rule is based largely on the recommendations of a Federal advisory committee which included representatives of state and local governments. The Access Board made drafts of the proposed rule available for public review and comment. State and local governments provided comments on the drafts of the proposed rule.

List of Subjects in 36 CFR Part 1190

Buildings and facilities, Civil rights, Federal buildings and facilities, Highways and roads, Individuals with disabilities, Parking, Rights-of-way, Transportation.

Approved by vote of the Access Board on March 15, 2023.

Christopher Kuczynski,

General Counsel.

■ Accordingly, for the reasons set forth in the preamble, the Access Board adds 36 CFR part 1190 to read as follows:

PART 1190—ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY

Sec.

Authority: 29 U.S.C. 792; 42 U.S.C. 12204; 42 U.S.C. 4151 *et seq.*

§ 1190.1 Accessibility Guidelines.

The accessibility guidelines for pedestrian facilities in the public right-

of-way are set forth in the appendix to this part. When the guidelines are adopted, with or without additions and modifications, as accessibility standards in regulations issued by other Federal agencies implementing the Americans with Disabilities Act, Section 504 of the Rehabilitation Act, and the Architectural Barriers Act, compliance with the accessibility standards is mandatory.

Appendix to Part 1190—Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way

Chapter 1: Application and Administration

R101 Purpose and Application

R101.1 *Purpose.* These guidelines contain scoping and technical requirements to ensure that *pedestrian facilities* located in the *public right-of-way* (including a *public right-of-way* that forms the boundary of a site or that lies within a site bounded by a property line), are readily *accessible* to and usable by *pedestrians* with disabilities.

R101.2 *Application to ADA-Covered Facilities.* These guidelines apply to *pedestrian facilities* in *public rights-of-way* to the extent required by regulations issued by Federal agencies under the Americans with Disabilities Act of 1990, as amended (42 U.S.C. 12101 *et seq.*) (ADA).

R101.3 *Application to ABA-Covered Facilities.* These guidelines apply to *pedestrian facilities* in *public rights-of-way* to the extent required by regulations issued by Federal agencies under the Architectural Barriers Act of 1968 (42 U.S.C. 4151 *et seq.*) (ABA).

R101.4 *Effect on Existing Pedestrian Facilities.* These guidelines do not address existing *pedestrian facilities* unless the *pedestrian facilities* are altered at the discretion of a covered entity. The Department of Justice has authority over existing facilities that are subject to the requirement for program access under title II of the ADA. Any determination that this document applies to existing facilities subject to the program access requirement is solely within the discretion of the Department of Justice and is effective only to the extent required by regulations issued by the Department of Justice.

R102 Deviations From These Guidelines

R102.1 *ADA-Covered Facilities and Equivalent Facilitation.* The use of alternative designs, products, or technologies that result in substantially equivalent or greater accessibility and usability than the requirements in these guidelines shall be permitted for *pedestrian facilities* in the *public right-of-way* subject to the ADA.

R102.2 *ABA-Covered Facilities and Waivers or Modifications.* Equivalent facilitation is not permitted for *pedestrian facilities* in the *public right-of-way* subject to the ABA. The ABA authorizes the Administrator of the General Services Administration, the Secretary of the Department of Housing and Urban Development, the Secretary of the Department of Defense, and the United States Postal Service to modify or waive the accessibility standards for buildings and facilities covered by the ABA on a case-by-case basis, upon application made by the head of the department, agency, or instrumentality of the United States concerned and upon a determination that the waiver is clearly necessary. Pursuant to Section 502(b)(1) of the Rehabilitation Act of 1973, 29 U.S.C. 792(b), the Access Board shall ensure that modifications and waivers are based on findings of fact and are not inconsistent with the ABA.

R103 Conventions

R103.1 *Conventional Industry Tolerances.* All dimensions are subject to conventional industry tolerances except where requirements are stated as a range with specific minimum or maximum endpoints.

R103.2 *Calculation of Percentages.* Where the required number of *elements* or facilities to be provided is determined by calculations of ratios or percentages and remainders or fractions result, the next greater whole number of such *elements* or facilities shall be provided.

R103.3 *Units of Measurement.* Measurements are stated in U.S. customary units and metric units. The values stated in each system (U.S. customary units and metric units) may not be exact equivalents, and each system shall be used independently of the other. Slopes are expressed in terms of both ratios and percentages. Ratios and percentages may not be exact equivalents, and each shall be used independently of the other.

R104 Definitions

R104.1 *Undefined Terms.* Terms that are not defined in R104.3 or in regulations issued by the Department of Justice and the Department of Transportation under the ADA, the four standard setting agencies under the ABA or other Federal agencies that adopt these guidelines as accessibility standards shall be given their ordinarily accepted meaning in the sense that the context implies.

R104.2 *Interchangeability.* Words, terms, and phrases used in the singular include the plural and those used in the plural include the singular.

R104.3 *Defined Terms.* For the purpose of these guidelines, the following terms have the indicated meaning:

Accessible. A *pedestrian facility* or *element* in the *public right-of-way* that complies with these guidelines.

Accessible Pedestrian Signal. A device that communicates information about *pedestrian* signal timing in non-visual formats such as audible tones or speech messages, and vibrating surfaces.

Alteration or altered. A change to or an addition of a *pedestrian facility* in an existing, *developed public right-of-way* that affects or could affect *pedestrian* access, circulation, or usability.

Blended Transition. A wraparound connection at a corner, or a flush connection where there is no *curb* to cut through, other than a *curb ramp.*

Block Perimeter. The near side of the *streets* surrounding a block. For example, on a square block bounded by Main Street to the south, Pine Street to the north, 1st Street to the east, and 2nd Street to the west, the *block perimeter* includes the north side of Main Street, the south side of Pine Street, the west side of 1st Street, and the east side of 2nd Street.

Boarding Platform. A platform raised above *standard curb height* used for transit vehicle boarding and alighting.

Building. Any structure used or intended for supporting or sheltering any use or occupancy.

Crosswalk. That part of a *roadway* that is located at an intersection included within the connections of the lateral lines of the *pedestrian circulation paths* on opposite sides of the *highway* measured from the *curbs,* or in the absence of *curbs,* from the edges of the traversable *roadway,* and in the absence of a *pedestrian circulation path* on one side of the *roadway,* the part of a *roadway* included within the extension of the lateral lines of the *pedestrian circulation path* at right angles to the center line; or at any portion of a *roadway* at an intersection or elsewhere distinctly indicated as a *pedestrian* crossing by pavement marking lines on the surface. *Crosswalks* at intersections may be marked or unmarked.

Cross Slope. The slope that is perpendicular to the direction of *pedestrian* travel.

Curb. A raised feature along the side of a *street* that delineates the edge of the *roadway* or *pedestrian circulation path.*

Curb Line. A line at the face of the *curb* that marks the transition between the *curb* and the gutter or *street.*

Curb Ramp. A sloped connection that is cut through or built up to a *curb. Curb ramps* may be perpendicular or parallel to the *curb* or to the *street* they serve or be a combination thereof.

Detectable Warning Surface. A standardized surface feature built in or applied to *pedestrian circulation paths* and other *pedestrian facilities* to warn of hazards.

Developed. Containing *buildings, pedestrian facilities, roadways,* utilities, or *elements.*

Element. An architectural or mechanical component of a *building, pedestrian facility,* space, site, or *public right-of-way.*

Grade. See *Running slope.*

Grade Break. The line where two surface planes with different *running slopes* meet.

Highway. A general term denoting a public way for purposes of vehicular travel, including the entire area within the *public right-of-way.*

Median. The area between two *roadways* of a divided *highway* measured from edge of *traveled way* to edge of *traveled way.* The *median* excludes turn lanes. The *median* width might be different between intersections, interchanges, and at opposite approaches of the same intersection.

Operable Part. A component of an *element* used to insert or withdraw objects, or to activate, deactivate, or adjust the *element,* or to interact with the *element.*

Parallel Curb Ramp. A *curb ramp* with a *running slope* that is parallel to the *curb* or *street* it serves.

Passenger Loading Zone. An area that is specifically designed or designated for

loading and unloading passengers, but that does not primarily serve vehicles on a fixed or scheduled route.

Pedestrian. A person on foot, travelling by wheelchair or other mobility device, on skates, or on a skateboard.

Pedestrian Access Route. An *accessible,* continuous, and unobstructed path of travel for use by *pedestrians* with disabilities within a *pedestrian circulation path.*

Pedestrian Activated Warning Devices. Devices that are installed in conjunction with a warning sign and are activated to alert vehicle operators to the presence of a *pedestrian,* such as rectangular rapid flashing beacons.

Pedestrian Change Interval. An interval during which the flashing upraised hand (symbolizing ''don't walk'') signal indication is displayed.

Pedestrian Circulation Path. A prepared exterior or interior surface provided for *pedestrian* use in the *public right-of-way.*

Pedestrian Facility. A structure, route, or space for *pedestrian* circulation or use located in the *public right-of-way.*

Pedestrian Hybrid Beacon. A special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist *pedestrians* in crossing a *street* at a marked *crosswalk.*

Pedestrian Refuge Island. A defined area 72 inches (1828 mm) long minimum in the direction of *pedestrian* travel located between traffic lanes for *pedestrian* refuge within a *median, splitter island,* or channelizing island.

Pedestrian Signal Head. A device containing the walking person symbol (symbolizing ''walk'') and the upraised hand symbol (symbolizing ''don't walk''), that is installed to direct *pedestrian* traffic at a *crosswalk.*

Perpendicular Curb Ramp. A *curb ramp* with a *running slope* that is perpendicular to the *curb* or the *street* it serves.

Public Right-of-Way. Public land acquired for or dedicated to transportation purposes, or other land where there is a legally established right for use by the public for transportation purposes.

Push Button. A button to activate a device or signal timing for *pedestrians,* bicyclists, or others crossing a *roadway.*

Push Button Locator Tone. A repeating sound that informs approaching *pedestrians* that a *push button* exists to actuate *pedestrian* timing or receive additional information and that enables *pedestrians* who are blind or have low vision to locate the *push button.*

Qualified Historic Building or Facility. A *building* or facility that is listed in or eligible for listing in the National Register of Historic Places or designated as historic under an appropriate state or local law.

Ramp. A sloped walking surface with a *running slope* steeper than 1:20 (5.0%) that accomplishes a change in level and is not part of a *pedestrian circulation path* that follows the *roadway grade.* A *curb ramp* is not a *ramp.*

Roadway. That portion of a *highway* improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the *sidewalk,* berm, or shoulder.

Roundabout. A circular intersection with yield control at entry, which permits a vehicle on a circular *roadway* to proceed, and with deflection of the approaching vehicle counterclockwise around a central island.

Running Slope. The slope that is parallel to the direction of *pedestrian* travel.

Shared Use Path. A multi-use path designed primarily for use by bicyclists, *pedestrians,* and other authorized motorized and non-motorized users, for transportation purposes, and that may also be used for recreation. *Shared use paths* are physically separated from motor vehicle traffic by an open space or barrier and are either within the *highway* or other *public right-of-way.*

Sidewalk. That portion of a *highway* between the *curb line,* or the lateral line of a *roadway,* and the adjacent property line, or on easements of private property, that is paved or improved and intended for use by *pedestrians.*

Splitter Island. A *median* island used to separate opposing directions of traffic entering and exiting a *roundabout.*

Stair. A change in elevation comprised of at least one tread and riser. A *curb* is not a *stair.*

Standard Curb Height. The typical height of a *curb* according to local standards for a given road type, but usually between 3 inches (75 mm) and 9 inches (230 mm) high relative to the surface of the *roadway* or gutter.

Street. See *Roadway.*

Transit Shelter. A structure provided at a *transit stop* to provide passengers protection from the weather.

Transit Stop. An area that is designated for passengers to board or alight from buses, rail cars, and other transportation vehicles that operate on a fixed route or scheduled route, including bus stops and *boarding platforms.* This definition does not include intercity rail except where a stop is located in the *public right-of-way.*

Transitional Segment. The portion of a *pedestrian circulation path* that connects adjacent surfaces with different slopes or dimensions to provide a smooth transition.

Traveled Way. The portion of the *roadway* for the movement of vehicles, exclusive of the shoulder, berm, *sidewalk,* and parking lane.

Vibrotactile. A method of communicating information by touch using a vibrating surface.

Walk Interval. An interval during which the walking person (symbolizing ''walk'') signal indication is displayed.

Chapter 2: Scoping Requirements

R201 General

R201.1 *Scope.* All newly constructed *pedestrian facilities* and *altered* portions of existing *pedestrian facilities* for *pedestrian* circulation and use located in the *public right-of-way* shall comply with these guidelines.

Exception: Pedestrian facilities within vaults, tunnels, and other spaces used only by service personnel for maintenance, repair, or monitoring of equipment are not required to comply with these guidelines.

R201.2 *Temporary and Permanent Pedestrian Facilities.* The requirements in these guidelines shall apply to temporary and permanent *pedestrian facilities* and *elements* in the *public right-of-way.* Where a *pedestrian circulation path* or *transit stop* is temporarily closed by construction, maintenance operations, or similar conditions, an alternate *pedestrian access route or transit stop* shall be provided in accordance with R204.

R201.3 *Buildings, Structures, and Elements. Buildings,* structures, and *elements* in the *public right-of-way* that are not covered by the requirements in these guidelines shall comply with the applicable requirements in 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). Examples include, but are not limited to, *buildings,* structures, and *elements* at safety rest areas or park and ride lots, temporary performance stages and reviewing stands.

R202 Alterations

R202.1 *General. Alterations* to *pedestrian facilities* shall comply with R202.

R202.2 *Connection to Pedestrian Circulation Path.* Where *pedestrian facilities* are *altered,* they shall be connected by a *pedestrian access route* complying with R302 to an existing *pedestrian circulation path.* A *transitional segment* may be used in the connection.

R202.3 *Existing Physical Constraints.* In *alterations,* where existing physical constraints make compliance with applicable requirements technically infeasible, compliance with these requirements is required to the maximum extent feasible. Existing physical constraints include, but are not limited to, underlying terrain, underground structures, adjacent *developed* facilities, drainage, or the presence of a significant natural or historic feature.

R202.4 *Reduction in Access Prohibited.* An *alteration* to *pedestrian facilities* or *elements* shall not decrease the accessibility of an existing *pedestrian facility* or *element* or an *accessible* connection to an adjacent *building* or site below the requirements in these guidelines.

R202.5 *Alterations to Qualified Historic Facilities.* Where the State Historic Preservation Officer or Advisory Council on Historic Preservation determines that compliance with an applicable requirement of these guidelines would threaten or destroy the historic significance of a *qualified historic building or facility,* compliance with that requirement is required to the maximum extent feasible without threatening or destroying the historic significance of the *qualified historic building or facility.*

R203 Pedestrian Access Routes

R203.1 *General.* Where provided, the *pedestrian facilities* addressed in R203 shall contain or connect a *pedestrian access route,* and shall comply with these guidelines.

R203.2 *Connection to Accessible Facilities. Pedestrian access routes* shall connect *accessible elements,* spaces, and *pedestrian facilities* in accordance with R203.2.

R203.2.1 *Connection to Accessible Facilities subject to the ADA. Pedestrian access routes* subject to the ADA shall connect *accessible elements,* spaces, and

pedestrian facilities required to be *accessible* and connect to *accessible* routes required by section 206.2.1 of appendix B to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines) that connect *building* and facility entrances to public *streets* and *sidewalks.*

Exception: Where *elements* are *altered,* on or adjacent to an existing *pedestrian circulation path,* the existing *pedestrian circulation path* need not be *altered* to provide a *pedestrian access route* complying with R202.2.

R203.2.2 *Connection to Accessible Facilities subject to the ABA. Pedestrian access routes* subject to the ABA shall connect *accessible elements,* spaces, and *pedestrian facilities* required to be *accessible* and connect to *accessible* routes required by section F206.2.1 of appendix C to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines) that connect *building* and facility entrances to public *streets* and *sidewalks.*

Exception: Where *elements* are *altered,* on or adjacent to an existing *pedestrian circulation path,* the existing *pedestrian circulation path* need not be *altered* to provide a *pedestrian access route* complying with R202.2.

R203.3 *Pedestrian Circulation Paths. Pedestrian access routes* complying with R302 shall be provided within *pedestrian circulation paths,* including *sidewalks* and *shared use paths. Transitional segments* may be used to connect new or *altered pedestrian access routes* to existing *pedestrian circulation paths,* and the differences between adjacent surface characteristics shall be minimized to provide a smooth transition.

R203.4 *Crosswalks.* A *pedestrian access route* complying with R302 shall be provided within and for the full length of a *crosswalk,* including *medians* and *pedestrian refuge islands. Crosswalks* shall comply with R306.

R203.5 *Pedestrian At-Grade Rail Crossing.* Where a *pedestrian circulation path* crosses at-grade rail tracks, a *pedestrian access route* complying with R302 shall be included within the *pedestrian* at-grade rail crossing. *Pedestrian* at-grade rail crossings shall comply with R306.

R203.6 *Curb Ramps and Blended Transitions.* A *curb ramp, blended transition,* or a combination of *curb ramps* and *blended transition*s shall be provided in accordance with R203.6 and shall comply with R304.

R203.6.1 *Placement.* Placement of *curb ramps* and *blended transition*s shall comply with R203.6.1.

R203.6.1.1 *Crosswalks at an Intersection.* At an intersection corner, one *curb ramp* or *blended transition* shall be provided for each *crosswalk,* or a single *blended transition* that spans all *crosswalks* at the intersection corner may be provided. Where *pedestrian* crossing is prohibited, *curb ramps* or *blended transitions* shall not be provided, and the *pedestrian circulation path* shall be either (a) separated from the *roadway* with landscaping or other non-prepared surface or (b) separated from the *roadway* by a detectable vertical edge treatment with a bottom edge 15 inches maximum above the *pedestrian circulation path.*

Exception: In *alterations,* where existing physical constraints make compliance with R203.6.1.1 technically infeasible, a single *curb ramp* complying with R304 shall be permitted at the apex of the intersection corner.

R203.6.1.2 *Mid-Block and Roundabout Crosswalks.* At a mid-block or *roundabout crosswalk, curb ramps* or *blended transitions* shall be provided on both ends of the *crosswalk.* Where *pedestrian* crossing is not intended, *curb ramps* or *blended transitions* shall not be provided, and the *pedestrian circulation path* shall be either (a) separated from the *roadway* with landscaping or other non-prepared surface or (b) separated from the *roadway* by a detectable vertical edge treatment with a bottom edge 15 inches maximum above the *pedestrian circulation path.*

R203.6.1.3 *Parallel On-Street Parking.* At parallel on-street parking spaces complying with the dimensions specified in R310.2.1, a *curb ramp* or *blended transition* shall be provided at either end of the parking space if needed to connect the parking space to a *pedestrian access route.*

R203.6.1.4 *Perpendicular and Angled On-Street Parking and Passenger Loading Zones.* At perpendicular and angled on-street parking spaces, and at *passenger loading zones,* a *curb ramp* or *blended transition* shall be provided if needed to connect the access aisle to a *pedestrian access route.*

R203.6.2 *Alterations to Crosswalks.* When *alterations* are made to *crosswalks, curb ramps* or *blended transition*s shall be provided on both ends of the *crosswalk* where the *pedestrian access route* crosses a *curb.*

R203.7 *Pedestrian Overpasses and Underpasses. Pedestrian* overpasses and underpasses shall contain a *pedestrian access route* complying with R302. Where an overpass, underpass, bridge, or similar structure is designed for *pedestrian* use only, or pedestrian and bicycle use only, and the approach slope to the structure exceeds 1:20 (5.0%), a *ramp* complying with R407, or an elevator or limited use/limited application elevator complying with sections 407 or 408 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines), shall be provided. Elevators and limited use/limited application elevators shall be unlocked and independently usable during the operating hours of the *pedestrian facility* served.

Exception: In *alterations,* where existing physical constraints make compliance with R203.7 technically infeasible, a platform lift complying with section 410 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines) shall be permitted.

R203.8 *Ramps.* Where provided, *ramps* shall comply with R407.

R203.9. *Elevators and Limited Use/Limited Application Elevators.* Where provided, elevators and limited use/limited application elevators shall comply with sections 407 or 408 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

R203.10 *Platform Lifts.* In *alterations,* where the use of elevators or limited use elevators is not technically feasible, platform lifts may be used and shall comply with section 410 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

R203.11 *Doors, Doorways, and Gates.* Doors, doorways, and gates that are part of a *pedestrian access route* shall comply with section 404 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

R204 Alternate Pedestrian Access Routes, Transit Stops, and Passenger Loading Zones

R204.1 *Alternate Pedestrian Access Route.* When a *pedestrian circulation path* is temporarily not *accessible* due to construction, maintenance operations, closure, or other similar conditions, an alternate *pedestrian access route* must be provided and comply with R303 and R402.

Exception: If establishing or maintaining an alternate *pedestrian access route* is technically infeasible due to site conditions or existing physical constraints, an alternate means of providing access for *pedestrians* with disabilities shall be permitted.

R204.2 *Alternate Transit Stops.* Where *accessible transit stops* are temporarily not *accessible* due to construction, maintenance operations, or other similar conditions, alternate *transit stops* complying with R309 shall be provided.

R204.3 *Alternate Passenger Loading Zones.* Where a permanently designated *passenger loading zone* is temporarily not *accessible* due to construction, maintenance operations, or other similar conditions, and a temporary *passenger loading zone* is provided, it must comply with R311.

R205 Detectable Warning Surfaces

R205.1 *General. Detectable warning surfaces* shall be provided in accordance with R205.

R205.2 *Curb Ramps and Blended Transitions. Curb ramps* shall have *detectable warning surfaces* complying with R205.2.1. *Blended transition*s shall have *detectable warning surfaces* complying with R205.2.2.

Exception: Detectable warning surfaces are not required on *curb ramps* and *blended transition*s used exclusively to connect *passenger loading zones, accessible* parallel on-street parking spaces, and access aisles for perpendicular and angled parking spaces to *pedestrian access routes.*

R205.2.1 *Curb Ramps. Curb ramps* located at *crosswalks* shall have *detectable warning surfaces* complying with R305.1 and either R305.2.1 or R305.2.2.

R205.2.2 *Blended Transitions. Blended transition*s located at *crosswalks* shall have *detectable warning surfaces* complying with R305.1 and R305.2.3.

R205.3 *Pedestrian Refuge Islands.* Cut-through *pedestrian refuge islands* shall have *detectable warning surfaces* complying with R305.1 and R305.2.4.

R205.4 *Pedestrian At-Grade Rail Crossings. Pedestrian* at-grade rail crossings not located within a *street* shall have *detectable warning surfaces* complying with R305.1 and R305.2.5. *Pedestrian* at-grade rail crossings located within a *street* at a *crosswalk* shall not have *detectable warning surfaces* adjacent to the railway.

R205.5 *Boarding Platforms. Boarding platform*s at *transit stops* that are not protected by screens or guards along the sides of the boarding and alighting areas facing the transit vehicles shall have *detectable warning surfaces* complying with R305.1 and R305.2.6.

R205.6 *Sidewalk and Street-Level Rail Boarding and Alighting Areas.* Boarding and alighting areas at *sidewalk* or *street*-level *transit stops* for rail vehicles that are not protected by screens or guards along the side of the boarding and alighting areas facing the rail vehicles shall have *detectable warning surfaces* complying with R305.1 and R305.2.7.

R205.7 *Driveways. Pedestrian circulation paths* at driveways controlled with yield or stop control devices or traffic signals shall have *detectable warning surfaces* complying with R305.2.8.

R206 Pedestrian Signal Heads and Pedestrian Activated Warning Devices

R206.1 *General.* Where provided, *pedestrian signal heads* and *pedestrian activated warning devices* shall comply with R206. The *accessible* features required by these guidelines shall be available at all times.

R206.2 *Traffic Control Signals and Hybrid Beacons with Pedestrian Signal Heads.* Where *pedestrian signal heads* are provided at *crosswalks,* the walk indication shall comply with R308. *Pedestrian signal heads* must have a *pedestrian push button* complying with R307, except for R307.7, or passive detection or pretimed operation that activates audible and *vibrotactile* indications complying with R308.

R206.3 *Pedestrian Activated Warning Devices. Pedestrian activated warning devices* shall have *pedestrian push buttons* complying with R307, except for R307.2 and R307.6, or passive detection that operates audible indications complying with R307.7.

R207 Protruding Objects and Vertical Clearance

R207.1 *General.* Protruding objects and vertical clearance along any portion of a *pedestrian circulation path* shall comply with R402.

R208 Pedestrian Signs

R208.1 *General.* Where provided, signs intended solely for *pedestrians,* including transit signs, and all signs serving *shared use paths,* shall comply with R410.

Exceptions: 1. Transit schedules, timetables, and maps are not required to comply with R410.

2. Signs mounted immediately above or incorporated into a *push button* detector unit are not required to comply with R410.

R209 Street Furniture

R209.1 *General.* Where provided, street furniture shall comply with the applicable requirements in R209.

R209.2 *Drinking Fountains.* Drinking fountains shall comply with sections 602.1 through 602.6 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

R209.3 *Public Street Toilets.* Public street toilets shall be provided in accordance with R209.3.

R209.3.1 *Permanent Public Street Toilets.* Permanent public street toilets shall comply with sections 603 through 610 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

R209.3.2 *Portable Toilet Units.* Portable toilet units shall comply with section 603 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). Where multiple single user portable toilet units are clustered at a single location, at least 5 percent, but no fewer than one of each type of the toilet units at each cluster shall be required to comply with 603 Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). Portable toilet units complying with section 603 shall be identified by the International Symbol of Accessibility complying with R411.

R209.4 *Tables.* At least 5 percent of tables at each group of adjacent tables, but no fewer than one, shall comply with section 902 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

R209.5 *Sales or Service Counters.* Sales or service counters shall comply with section 904.4 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

Exception 1: Sales or service counters that are located in a *building* subject to the ADA that is not itself in the *public right-of-way* but that directly serve the *public right-of-way,* such as at a service window accessed from the *sidewalk,* may comply with section 227.3 of Appendix B to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

Exception 2: Sales or service counters that are located in a *building* subject to the ABA that is not itself in the *public right-of-way* but that directly serve the *public right-of-way,* such as at a service window accessed from the *sidewalk,* may comply with section F227.3 of Appendix C to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines).

R209.6 *Benches.* Benches, other than those that are part of tables complying with R209.4, shall comply with R209.6.

R209.6.1 *Benches at Transit Stops and Shelters.* Benches provided at *transit stops* shall have clear space complying with R404 next to either end of the bench, or if the bench has no end, such as a circular bench, the clear space shall either be integral to the bench or no more than 18 inches (455 mm) from the front of the bench. Benches provided within *transit shelters* shall have clear space complying with R309.2.2.

R209.6.2 *Benches Not at Transit Stops and Shelters.* At least 50 percent, but no less than one, of benches at each group of adjacent benches shall provide clear space complying with R404. The clear space shall be located next to either end of the bench, or if the bench has no end, such as a circular bench, the clear space shall either be integral to the bench or no more than 18 inches (455 mm) from the front of the bench.

R209.7 *Operable Parts of Other Fixed Elements. Operable parts* of other fixed *elements* to be used by *pedestrians* shall comply with R403.

R210 Transit Stops and Transit Shelters

R210.1 *General.* Where provided, *transit stops* and *transit shelters* shall comply with R309.

R210.2 *Fare Vending Machines.* Where provided at *transit stops* and *transit shelters,* fare vending machines shall comply with R403 and section 707 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines), except for 707.2 and 707.3.

R210.3. *Operable Parts of Other Fixed Elements. Operable parts* of other fixed *elements* at *transit stops* and shelters intended to be used by *pedestrians* shall comply with R403.

R211 On-Street Parking Spaces

R211.1 *General.* Where on-street parking is provided and is metered or designated by signs or pavement markings, accessible parking spaces complying with R310 shall be provided in accordance with R211 and Table R211.

Exceptions: 1. On-street parking spaces designated exclusively as residential parking shall not be required to comply with R211 and shall not be counted for purposes of Table R211.

2. On-street parking spaces designated exclusively for commercial or law enforcement vehicles shall not be required to comply with R211 and shall not be counted for purposes of Table R211.

3. Where on-street parking spaces are *altered,* the requirements of R211 shall apply only to the affected parking spaces until the minimum number of *accessible* on-street parking spaces as specified in Table R211 are provided.

R211.2 *Parking on Block Perimeter.* Where parking spaces are provided on a *block perimeter* and are metered or designated by signs or pavement markings, *accessible* parking spaces complying with R310 shall be provided in accordance with Table R211. Where parking is metered or designated by signs or pavement markings, but individual spaces are not marked, each 20 feet (6.1 m) of *block perimeter* where parking is designated shall be counted as one parking space.

R211.3 *Parking not on Block Perimeter.* Where parking spaces are provided on a section of a *street* that is not part of a *block perimeter, accessible* parking spaces complying with R310 shall be provided in accordance with Table R211. Where parking is metered or designated by signs or pavement markings, but individual spaces are not marked, each 20 feet (6.1 m) of *street* where parking is designated shall be counted as one parking space.

TABLE R211 ON-STREET PARKING SPACES

Total number of metered or designated parking spaces	Minimum required number of *accessible* parking spaces
1 to 25	1.
26 to 50	2.
51 to 75	3.
76 to 100	4.
101 to 150	5.
151 to 200	6.
201 and over	4 percent of total.

R212 Passenger Loading Zones

R212.1 *General.* Where permanently designated *passenger loading zones* other than *transit stops* are provided, at least one *accessible passenger loading zone* complying with R311 shall be provided in every continuous 100 feet (30 m) of loading zone space, or fraction thereof.

R213 Stairs and Escalators

R213.1 *General.* Where provided on *pedestrian circulation paths, stairs* shall comply with R408 and escalators shall comply with section 810.9 of Appendix D to 36 CFR part 1191 (ADA & ABA Accessibility Guidelines). *Stairs* and escalators shall not be part of *pedestrian access routes.*

R214 Handrails

R214.1 *General.* Where provided on *pedestrian circulation paths,* handrails shall comply with R409.

Chapter 3: Technical Requirements

R301 General

R301.1 *Scope.* The technical requirements in Chapter 3 shall apply where required by Chapter 2 or where referenced by a requirement in these guidelines.

R302 Pedestrian Access Routes

R302.1 *General. Pedestrian access routes* shall comply with R302.

R302.2 *Continuous Clear Width.* Except as provided in R302.2.1 and R302.2.2, the continuous clear width of *pedestrian access routes* shall be 48 inches (1220 mm) minimum, exclusive of the width of any *curb.*

R302.2.1 *Medians and Pedestrian Refuge Islands.* The clear width of *pedestrian access routes* crossing *medians* and *pedestrian refuge islands* shall be 60 inches (1525 mm) minimum, except that where *shared use paths* cross *medians* and *pedestrian refuge islands* the clear width of the *pedestrian access route* shall be 60 inches (1525 mm) minimum or at least as wide as the *crosswalk,* whichever is greater.

R302.2.2 *Shared Use Paths.* On *shared use paths,* the clear width of the *pedestrian access route* shall extend the full width provided for *pedestrian* circulation on the path. Obstructions, such as bollards, shall not reduce the clear width of the *pedestrian access route* to less than 48 inches (1220 mm) measured from the edge of the obstruction.

R302.3 *Passing Spaces.* Where the clear width of *pedestrian access routes* is less than 60 inches (1525 mm), passing spaces shall be provided at intervals of 200 feet (61 m) maximum. Passing spaces shall be 60 inches (1525 mm) minimum by 60 inches (1525 mm) minimum. Passing spaces and *pedestrian access routes* are permitted to overlap.

R302.4 *Grade.* The *grade* of *pedestrian access routes* shall comply with R302.4, except the *grade* of *curb ramps* and *blended transitions* shall comply with R304 and the *grade* of *ramps* shall comply with R407.

R302.4.1 *Within Highway Right-of-Way.* Except as provided in R302.4.3, where a *pedestrian access route* is contained within a *highway* right-of-way, the *grade* of the *pedestrian access route* shall not exceed 1:20 (5.0%).

Exception: Where the *grade* established for the adjacent *street* exceeds 1:20 (5.0%), the *grade* of the *pedestrian access route* shall not exceed the *grade* established for the adjacent *street.*

R302.4.2 *Not Within Highway Right-of-Way.* Where a *pedestrian access route* is not contained within a *highway* right-of-way, the *grade* of the *pedestrian access route* shall not exceed 1:20 (5.0%).

R302.4.3 *Within a Crosswalk.* Where a *pedestrian access route* is contained within a *crosswalk,* the *grade* of the *pedestrian access route* shall be 1:20 (5.0%) maximum.

Exception: Where *roadway* design requires superelevation greater than 1:20 (5.0%) at the location of a *crosswalk,* the *grade* of the *pedestrian access route* within the *crosswalk* may be the same as the superelevation.

R302.5 *Cross Slope.* The *cross slope* of a *pedestrian access route* shall comply with R302.5.

R302.5.1 *Not Contained Within a Crosswalk.* The *cross slope* of a *pedestrian access route* not contained within a *crosswalk* shall be 1:48 (2.1%) maximum.

Exception: The portion of a *pedestrian access route* within a *street* that connects an *accessible* parallel on-street parking space to the nearest *crosswalk* at the end of the block face or the nearest midblock *crosswalk* is not required to comply with R302.5.

R302.5.2 *Contained Within a Crosswalk.* The *cross slope* of a *pedestrian access route* contained within a *crosswalk* shall comply with R302.5.2.

R302.5.2.1 *Crosswalk with Yield or Stop Control Devices.* Where a *pedestrian access route* is contained within a *crosswalk* at an intersection approach with yield or stop control devices, the *cross slope* of the *pedestrian access route* shall be 1:48 (2.1%) maximum.

R302.5.2.2 *Crosswalk at Uncontrolled Approach.* Where a *pedestrian access route* is contained within a *crosswalk* at an uncontrolled approach, the *cross slope* of the *pedestrian access route* shall be 1:20 (5.0%) maximum.

R302.5.2.3 *Crosswalk with Traffic Control Signal or Pedestrian Hybrid Beacon.* Where a *pedestrian access route* is contained within a *crosswalk* at an intersection approach controlled by a traffic control signal or *pedestrian hybrid beacon,* the *cross slope* of the *pedestrian access route* shall be 1:20 (5.0%) maximum.

R302.5.2.4 *Midblock and Roundabout Crosswalks.* The *cross slope* of a *pedestrian access route* within a midblock *crosswalk* or a *crosswalk* at a *roundabout* shall not exceed the *street grade.*

R302.6 *Surfaces.* The walking surfaces of *pedestrian access routes, elements,* and spaces that are required to be *accessible* shall be stable, firm, and slip resistant and shall comply with R302.6.

R302.6.1 *Grade Breaks. Grade breaks* shall be flush.

R302.6.2 *Changes in Level.* Changes in level of ¼ inch (6.4 mm) maximum shall be permitted to be vertical. Changes in level between ¼ inch (6.4 mm) and ½ inch (13 mm) shall be beveled with a slope not steeper than 1:2 (50.0%). Changes in level greater than ½ inch (13 mm) up to 6 inches shall have a 1:12 (8.3%) maximum slope. Changes in level greater than 6 inches (150 mm) shall comply with R407.

R302.6.3 *Horizontal Openings.* Horizontal openings in ground surfaces, such as those in gratings and joints, other than flangeway gaps (see R302.6.4), shall not allow passage of a sphere larger than ½ inch (13 mm) in diameter. Except where multiple directions of travel intersect, elongated openings are permitted and shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

R302.6.4 *Surfaces at Pedestrian At-Grade Rail Crossings.* Surfaces at *pedestrian* at-grade rail crossings shall comply with R302.6.4.

R302.6.4.1 *Surface Alignment.* Where a *pedestrian access route* crosses rails at grade, the *pedestrian access route* surface shall be level and flush with the top of rail at the outer edges of the rails, and the surface between the rails shall be aligned with the top of rail.

R302.6.4.2 *Flangeway Gaps. Flangeway gaps shall comply with R302.6.4.2.*

R302.6.4.2.1 *Flangeway Gaps at Tracks Subject to FRA Safety Regulations.* At *pedestrian* at-grade rail crossings that cross tracks that are subject to safety regulations at 49 CFR part 213, issued by the Federal Railroad Administration, flangeway gaps shall be 3 inches (75 mm) wide maximum.

R302.6.4.2.2 *Flangeway Gaps at Tracks Not Subject to FRA Safety Regulations.* At *pedestrian* at-grade rail crossings that cross tracks that are not subject to safety regulations at 49 CFR part 213, issued by the Federal Railroad Administration, flangeway gaps shall be 2 ½ inches (64 mm) wide maximum.

R303 Alternate Pedestrian Access Routes

R303.1 *General.* Alternate *pedestrian access routes* shall comply with R303.

R303.2 *Signs.* Signs identifying alternate *pedestrian access routes* shall be provided in advance of decision points and shall comply with R410. Proximity actuated audible signs or other non-visual means within the *public right-of-way* of conveying the information that identifies the alternate *pedestrian access route* shall also be provided.

R303.3 *Surface.* Alternate *pedestrian access route* surfaces shall comply with R302.6 or shall not be less *accessible* than the surface of the temporarily closed *pedestrian circulation path.*

R303.4 *Continuous Clear Width.* The minimum continuous clear width of alternate *pedestrian access routes* shall be 48 inches (1220 mm) exclusive of the width of any *curb.*

Exception: Where the alternate *pedestrian access route* utilizes an existing *pedestrian circulation path,* the width shall not be less than the width of the temporarily closed *pedestrian circulation path.*

R303.5 *Curb Ramp or Blended Transition.* Where an alternate *pedestrian access route* crosses a *curb,* a *curb ramp* or *blended transition* complying with R304 shall be provided.

R303.6 *Detectable Edging of Channelizing Devices.* Where a channelizing device is used to delineate an alternate *pedestrian access route,* continuous detectable edging complying with R303.6 shall be provided throughout the length of the route.

Exception: Where *pedestrians* or vehicles turn or cross, gaps in the detectable edging are permitted.

R303.6.1 *Top.* The top of the top detectable edging shall be no lower than 32

inches (815 mm) above the walking surface and be free of sharp or abrasive surfaces.

R303.6.2 *Bottom.* The bottom of the bottom detectable edging shall be 2 inches (51 mm) maximum above the walking surface.

R303.7 *Pedestrian Signal Heads.* Where temporary *pedestrian signal heads* are provided at a *crosswalk* that is part of an alternate *pedestrian access route,* pedestrian pushbuttons or passive detection devices shall be provided and shall comply with R307.

R304 Curb Ramps and Blended Transitions

R304.1 *General. Curb ramps* and *blended transition*s shall comply with R304 and have *detectable warning surfaces* in accordance with R205.

R304.2 *Perpendicular Curb Ramps. Perpendicular curb ramps* shall comply with R304.2 and R304.5.

R304.2.1 *Running Slope.* The *running slope* of a *curb ramp* shall be perpendicular to the curb or gutter *grade break.* The *running slope* of the *curb ramp* shall be 1:12 (8.3%) maximum.

Exception: Where the *curb ramp* length must exceed 15 feet (4.6 m) to achieve a 1:12 (8.3%) *running slope,* the *curb ramp* length shall extend at least 15 feet (4.6 m) and may have a *running slope* greater than 1:12 (8.3%).

R304.2.2 *Cross Slope.* The *cross slope* of a *curb ramp* run shall be 1:48 (2.1) maximum.

Exception: At *crosswalks,* the *cross slope* of the *curb ramp* run shall be permitted to be equal to or less than the *cross slope* of the *crosswalk* as specified by R302.5.

R304.2.3 *Grade Breaks. Grade breaks* at the top and bottom of a *curb ramp* run shall be perpendicular to the direction of the *curb ramp* run. *Grade breaks* shall not be permitted on the surfaces of *curb ramp* runs and landings. Surface slopes that meet at *grade breaks* shall be flush.

R304.2.4 *Clear Area.* A clear area 48 inches (1220 mm) wide minimum by 48 inches long (1220 mm) minimum shall be provided beyond the bottom *grade break* of the *perpendicular curb ramp* run and within the width of the *crosswalk.* At *shared use paths,* the clear area shall be as wide as *the shared use path.* The clear area shall be located wholly outside the vehicle travel lanes, including bicycle lanes, that run parallel to the *crosswalk.* The *running slope* of the clear area shall be 1:20 (5.0%) maximum. The *cross slope* of the clear area shall be as specified by R302.5.

R304.2.5 *Landing.* When a change in direction is necessary to access a *curb ramp* from a *pedestrian access route,* a landing shall be provided at the top of the *curb ramp.* The landing shall be 48 inches (1220 mm) wide minimum by 48 inches (1220 mm) long minimum. At *shared use paths,* the landing shall be as wide as the *shared use path.* Where a landing serves only one *curb* ramp, the landing slope measured perpendicular to the *curb ramp* run shall be equal to or less than the *cross slope* of the *curb ramp* run, and the landing slope measured parallel to the *curb ramp* run shall be 1:48 (2.1%) maximum. Where a landing serves two *curb ramps,* the landing slope in either direction of travel shall not exceed the *cross slope* of the *crosswalk* parallel to the direction of travel as specified by R302.5.

R304.2.6 *Side Treatments.* Where a *pedestrian circulation path* crosses the side of a *curb ramp,* the side of the *curb ramp* shall be flared. The slope of the flared side shall be 1:10 (10.0%) maximum, measured parallel to the adjacent *curb line.*

R304.2.7 *Connection to Pedestrian Facilities. Perpendicular curb ramps* or their landings shall be connected to adjacent *pedestrian facilities* by *pedestrian access routes* complying with R302. A *transitional segment* may be used in the connection.

R304.3 *Parallel Curb Ramps. Parallel curb ramps* shall comply with R304.3 and R304.5.

R304.3.1 *Running Slope.* The *running slope* of the *curb ramp* run shall be parallel to the curb and shall be 1:12 (8.3%) maximum.

Exception: Where the *curb ramp* run length must exceed 15 feet (4.6 m) to achieve a 1:12 (8.3%) *running slope,* the *curb ramp* run length shall extend at least 15 feet (4.6 m) and may have a *running slope* greater than 1:12 (8.3%).

R304.3.2 *Cross Slope.* The *cross slope* of the *curb ramp* run shall be 1:48 (2.1%) maximum.

R304.3.3 *Grade Breaks. Grade breaks* at the top and bottom of a *curb ramp* run shall be perpendicular to the direction of the *curb ramp* run. *Grade breaks* shall not be permitted on the surfaces of *curb ramp* runs or landings. Surface slopes that meet at *grade breaks* shall be flush.

R304.3.4 *Landings.* Landings shall be provided at the bottom of *parallel curb ramps.* Landings shall be 48 inches (1220 mm) wide minimum by 48 inches (1220 mm) long minimum. The slope of the landing, measured parallel to the direction of travel on the *curb ramp* run, shall be permitted to be equal to or less than the slope of the *roadway* or the *cross slope* of the *crosswalk* as specified by R302.5. The *cross slope* of the landing shall be 1:48 (2.1%) maximum measured perpendicular to the direction of travel on the *curb ramp* run.

R304.4 *Blended Transitions. Blended transition*s shall comply with R304.4 and R304.5.

R304.4.1 *Running Slope.* The *running slope* of *blended transition*s shall be 1:20 (5.0%) maximum.

R304.4.2 *Cross Slope.* The *cross slope* of *blended transition*s shall be equal to or less than the *cross slope* of the *crosswalk* as specified by R302.5.

R304.4.3 *Bypass.* Where a *blended transition* serving more than one *pedestrian circulation path* has a *running slope* greater than 1:48 (2.1%), a *pedestrian access route* shall be provided so that a *pedestrian* not crossing the *street* may bypass the *blended transition.*

R304.5 *Common Requirements. Curb ramps* and *blended transition*s shall comply with R304.5.

R304.5.1 *Width.* The width of *curb ramp* runs (excluding any flared sides) and *blended transition*s shall comply with R304.5.1.1 or R304.5.1.2, as applicable.

R304.5.1.1 *Curb Ramps and Blended Transitions Not on Shared Use Paths.* The clear width of *curb ramp* runs (excluding any flared sides) and *blended transition*s not on *shared use paths* shall be 48 inches (1220 mm) minimum.

R304.5.1.2 *Curb Ramps and Blended Transitions on Shared Use Paths.* On *shared use paths,* the width of *curb ramp* runs (excluding any flared sides) and *blended transition*s shall be equal to the width of the *shared use path.*

R304.5.2 *Change of Grade.* At gutters and *streets* where a change of *grade* occurs adjacent to *curb ramps* and *blended transition*s, the change of *grade* shall comply with the requirements contained in (A) or (B) below:

A. The change of *grade* shall not exceed 13.3 percent, or

B. A transitional space shall be provided at the bottom of the *running slope* of the *curb ramp* run or *blended transition.* The transitional space shall extend 24 inches (610 mm) minimum in the direction of *pedestrian* travel and the full width of the *curb ramp* run or *blended transition.* Transitional spaces shall have *running slopes* of 1:48 (2.1%) maximum and *cross slopes* no greater than the *cross slope* of the *crosswalk* as specified by R302.5.

R304.5.3 *Crosswalks. Perpendicular curb ramp* runs, *parallel curb ramp* landings, and 48 inches (1220 mm) minimum width of *blended transition*s, except those at *shared use paths,* shall be contained wholly within the width of the *crosswalks* they serve. At *shared use paths,* the full width of a *perpendicular curb ramp* run, *parallel curb ramp* landing, or the *blended transition* shall be contained wholly within the width of the *crosswalk* it serves.

R304.5.4 *Surfaces.* Surfaces of *curb ramps* and *blended transitions* shall comply with R302.6 except that changes in level are not permitted.

R305 Detectable Warning Surfaces

R305.1 *General. Detectable warning surfaces* shall consist of truncated domes in a square or radial grid pattern and shall comply with R305.

R305.1.1 *Dome Size.* The truncated domes shall have a base diameter of 0.9 inches (23 mm) minimum and 1.4 inches (36 mm) maximum, a top diameter of 50 percent of the base diameter minimum and 65 percent of the base diameter maximum, and a height of 0.2 inches (5.1 mm). When *detectable warning surface* tiles are cut to fit, partial domes are permitted along the cut edges.

R305.1.2 *Dome Spacing.* The truncated domes shall have a center-to-center spacing of 1.6 inches (41 mm) minimum and 2.4 inches (61 mm) maximum, and a base-to-base spacing of 0.65 inches (17 mm) minimum, measured between the most adjacent domes.

Exceptions: 1. When *detectable warning surfaces* are cut to fit, center-to-center spacing measured between domes adjacent to cut edges shall not exceed twice the normal spacing between domes not adjacent to cut edges.

2. Dome spacing requirements do not apply at a gap in a *detectable warning surface* at an

expansion joint provided that the *detectable warning surface* aligns with both edges of the expansion joint.

R305.1.3 *Contrast. Detectable warning surfaces* shall contrast visually with adjacent walking surfaces, either light-on-dark or dark-on-light.

R305.1.4 *Surface Size. Detectable warning surfaces* shall extend 24 inches (610 mm) minimum in the direction of *pedestrian* travel. The width of *detectable warning surfaces* shall be as follows:

A. At *curb ramps* and *blended transitions*, *detectable warning surfaces* shall extend the full width of the *curb ramp* run (excluding any flared sides), *blended transition,* or landing.

B. At cut-through *pedestrian refuge islands, detectable warning surfaces* shall extend the full width of the *pedestrian circulation path* opening.

C. At *pedestrian* at-grade rail crossings not located within a *street, detectable warning surfaces* shall extend the full width of the *pedestrian circulation path.*

D. Where required at *boarding platforms*, *detectable warning surfaces* shall extend the full length of the unprotected areas of the platform.

E. At boarding and alighting areas at *sidewalk* or *street* level *transit stops* for rail vehicles, detectable warning surfaces shall extend the full length of the unprotected area of the *transit stop.*

R305.2 *Location.* The location of *detectable warning surfaces* shall comply with R305.2. Where a concrete border is required for proper installation of a *detectable warning surface,* a concrete border not exceeding 2 inches (51 mm) shall be permitted on all sides of the *detectable warning surface* except between the *detectable warning surface* and the edge of pavement where a setback is already permitted.

R305.2.1 *Perpendicular Curb Ramps.* On *perpendicular curb ramps, detectable warning surfaces* shall be located as follows:

A. Where the ends of the bottom *grade break* are in front of the back of *curb* or at the edge of pavement where there is no *curb,* the *detectable warning surface* shall be placed at the back of *curb* or no greater than 6 inches (150 mm) from the edge of pavement where there is no *curb.*

B. Where the ends of the bottom *grade break* are behind the back of *curb* or edge of pavement where there is no *curb* and the distance from both ends of the bottom *grade break* to the back of *curb* or edge of pavement where there is no *curb* is 60 inches (1525 mm) or less, the *detectable warning surface* shall be placed on the *ramp* run at the bottom *grade break.*

C. Where the ends of the bottom *grade break* are behind the back of *curb* or edge of pavement where there is no *curb* and the distance from either end of the bottom *grade break* to the back of *curb* or edge of pavement where there is no *curb* is more than 60 inches (1525 mm), the *detectable warning surface* shall be placed on the clear area so that both front corners of the *detectable warning surfaces* are at the back of *curb* or no greater than 6 inches (150 mm) from the edge of pavement where there is no *curb.*

R305.2.2 *Parallel Curb Ramps.* On *parallel curb ramps, detectable warning surfaces* shall be located on the landing at either the back of *curb* or the edge of pavement where there is no *curb.*

R305.2.3 *Blended Transitions.* On *blended transitions*, *detectable warning surfaces* shall be located on the *blended transition* so that both front corners of the *detectable warning surfaces* are at the back of *curb* or no greater than 6 inches (150 mm) from the edge pavement where there is no *curb.*

R305.2.4 *Pedestrian Refuge Islands.* At cut-through *pedestrian refuge islands, detectable warning surfaces* shall be located no greater than 6 inches (150 mm) from the edges of the *pedestrian refuge island* or at back of *curb* and shall be separated by a 24 inch (610 mm) minimum length of surface in the direction of travel without *detectable warning surfaces.*

R305.2.5 *Pedestrian At-Grade Rail Crossings.* At *pedestrian* at-grade rail crossings not located within a *street, detectable warning surfaces* shall be located on each side of the rail crossing. The edge of the *detectable warning surface* nearest the rail crossing shall be 6 feet (1.8 m) minimum and 15 feet (4.6 m) maximum from the centerline of the nearest rail. Where *pedestrian* gates are provided, *detectable warning surfaces* shall be located on the side of the gate opposite the rail. *Pedestrian* gates shall not overlap *detectable warning surfaces.*

R305.2.6 *Boarding Platforms.* At *boarding platforms* for transit vehicles, *detectable warning surfaces* shall be located at the boarding edge of the platform.

Exception: Where a *curb* is present at the boarding edge of the platform, the *detectable warning surface* may be placed at the back of *curb.*

R305.2.7 *Sidewalk and Street-Level Rail Boarding and Alighting Areas.* At boarding and alighting areas at *sidewalk* or *street*-level *transit stops* for rail vehicles, *detectable warning surfaces* shall be located at the edge of the boarding and alighting area closest to the rail vehicles.

R305.2.8 *Driveways.* Where driveways are controlled with yield or stop control devices or traffic signals, *detectable warning surfaces* shall be provided on the *pedestrian circulation path* where the *pedestrian circulation path* meets the driveway.

R306 Crosswalks

R306.1 *General. Crosswalks* shall comply with R306.

R306.2 *Pedestrian Signal Phase Timing.* Where a traffic control signal with *pedestrian* signal indications is provided at a crosswalk, *pedestrian* signal phase timing shall be based on a *pedestrian* clearance time that is calculated using a *pedestrian* walking speed of 3.5 ft/s (1.1 m/s) or less from the location of the *pedestrian push button* to a *pedestrian refuge island* or the far side of the *traveled way.* The *walk interval* shall be 7 seconds minimum. Where the *pedestrian* clearance time is calculated to a *pedestrian refuge island,* an additional *pedestrian push button* or passive detection device shall be provided on the *pedestrian refuge island.*

Exception: If a passive *pedestrian* detection device is used to automatically adjust the *pedestrian* clearance time based on the *pedestrian's* actual clearance of the *crosswalk,* a faster walking speed may be used.

R306.3 *Accessible Walk Indication.* An *accessible* walk indication complying with R308.2 shall have the same duration as the *walk interval.*

Exception: Where the *pedestrian* signal rests in walk, the *accessible* walk indication may be limited to the first 7 seconds of the *walk interval.* If the *pedestrian* signal is resting in walk and there is sufficient time remaining to provide an *accessible walk interval* before the beginning of the *pedestrian change interval,* the *accessible* walk indication may be recalled by a button press.

R306.4 *Roundabouts.* Where *pedestrian circulation paths* are provided at *roundabouts,* they shall comply with R306.4.

R306.4.1 *Edge Detection.* The *street* side edge of the *pedestrian circulation path* at the approach and along the circulatory *roadway* of the *roundabout* shall comply with R306.4.1.1 where not attached to the *curb,* or R306.4.1.2 where attached to the *curb. Detectable warning surfaces* shall not be used for *roundabout* edge detection.

R306.4.1.1 *Separation.* Where *pedestrian* crossing is not intended, the *pedestrian circulation path* shall be separated from the *curb, crosswalk* to *crosswalk,* with landscaping or other nonprepared surface 24 inches (610 mm) wide minimum.

R306.4.1.2 *Vertical Edge Treatment.* Where *pedestrian* crossing is not intended, a *curb*-attached *pedestrian circulation path* shall have a continuous and detectable vertical edge treatment along the *street* side of the *pedestrian circulation path,* from *crosswalk* to *crosswalk.* The bottom edge of the vertical edge treatment shall be 15 inches (380 mm) maximum above the *pedestrian circulation path.*

R306.4.2 *Crosswalk Treatments.* Each multi-lane segment of the *roundabout* containing a *crosswalk* shall provide a *crosswalk* treatment consisting of one or more of the following: a traffic control signal with a *pedestrian signal head;* a *pedestrian hybrid beacon;* a *pedestrian* actuated rectangular rapid flashing beacon; or a raised crossing.

R306.5 *Channelized Turn Lanes. Crosswalks* at multi-lane channelized turn lanes shall provide treatments consisting of one or more of the following: a traffic control signal with a *pedestrian signal head;* a *pedestrian hybrid beacon;* a *pedestrian* actuated rectangular rapid flashing beacon; or a raised crossing.

R307 Pedestrian Push Buttons and Passive Pedestrian Detection

R307.1 *General. Pedestrian push buttons* and passive *pedestrian* detection devices shall comply with R307. *Operable parts* of *pedestrian push buttons* shall comply with R403.

R307.2 *Activation. Pedestrian push buttons* and passive detection devices shall activate the *accessible pedestrian signals* and, where applicable, the *walk interval.*

R307.3 *Extended Push Button Press.* Where an extended *push button* press is used to provide any additional features, a *push button* press of less than one second shall actuate only the *pedestrian* timing and any associated *accessible* walk indication, and a *push button* press of one second or more shall actuate the *pedestrian* timing, any associated *accessible* walk indication, and any additional features. If additional crossing time is provided by means of an extended pushbutton press, a sign so indicating shall be mounted adjacent to or integral with the pedestrian push button.

R307.4 *Location. Pedestrian push buttons* shall be located no greater than 5 feet from the side of a *curb ramp* run or the edge of the farthest associated *crosswalk* line from the center of the intersection. *Pedestrian push buttons* shall be located between 1.5 and 10 feet from the edge of the *curb* or pavement.

R307.4.1 *Two Pedestrian Push Buttons on Same Corner.* Where two *pedestrian push buttons* are provided on the same corner, they shall be 10 feet or more apart.

Exception: In *alterations,* where technically infeasible to provide 10 feet separation between *pedestrian push buttons* on the same corner, a *pedestrian push button* information message complying with R308.3.2 shall be provided.

R307.5 *Push Button Orientation.* The face of the *push button* shall be parallel to its associated *crosswalk.*

R307.6 *Audible and Vibrotactile Walk Indications for Pedestrian Signal Heads. Pedestrian push buttons* or passive detection devices shall activate audible and *vibrotactile* walk indications complying with R308.

R307.7 *Audible and Vibrotactile Indication for Pedestrian Activated Warning Devices Without a Walk Indication.* Where a *pedestrian push button* or a passive detection device is provided for *pedestrian activated warning devices,* such as rectangular rapid flashing beacons, the *pedestrian push button* or passive detection device shall activate a speech message that indicates the status of the beacon in lieu of an audible walk indication. The speech message volume shall comply with R308.4. Where a *pedestrian push button* is provided, it shall not include *vibrotactile* features indicating a *walk interval.*

R307.8 *Locator Tone. Pedestrian push buttons* shall incorporate a locator tone complying with R307.8.

R307.8.1 *Duration.* Locator tones shall have a duration of 0.15 seconds or less and repeat at one-second intervals except when another audible indication from the same device is active. When another audible indication from the same device is active, the locator tone shall be silenced.

Exception: A locator tone may be silenced if a passive detection system activates the locator tone when a *pedestrian* is within a 12-foot radius of the *pedestrian push button.*

R307.8.2 *Locator Tone in Response to Ambient Sound. Pedestrian push button locator tones* shall be intensity responsive to ambient sound and shall be audible 6 to 12 feet from the *push button,* or to the *building* line, whichever is less. The *push button locator tone* shall be louder than ambient sound up to a maximum volume of 5 dBA louder than ambient sound. Automatic volume adjustment in response to ambient traffic sound level shall be a maximum volume of 100 dBA.

R307.8.3 *Locator Tone and Audible Beaconing.* Where audible beaconing is used, the volume of the *push button locator tone* during the *pedestrian change interval* of the called *pedestrian* phase shall be increased and operated in one of the following ways:

A. The louder audible walk indication and louder locator tone comes from the far end of the *crosswalk,* as *pedestrians* cross the *street;*

B. The louder locator tone comes from both ends of the *crosswalk;* or

C. The louder locator tone comes from an additional speaker that is aimed at the center of the *crosswalk* and that is mounted on a *pedestrian signal head.*

R307.8.4 *Locator Tone and Traffic Control Signal in Flashing Mode.* When the traffic control signal is operating in a flashing mode, *pedestrian push button locator tones* shall remain active, and the *pedestrian push button* shall activate a speech message that communicates the operating mode of the traffic control signal. Where traffic control signals or *pedestrian hybrid beacons* are activated from a flashing or dark mode to a stop-and-go mode by *pedestrian* actuations, a speech message communicating the operating status of the traffic control signal is not required.

R307.9 *Tactile Arrow. Pedestrian push buttons* shall have a tactile arrow with high visual contrast that is aligned parallel to the direction of travel on their associated *crosswalks.*

R308 Accessible Pedestrian Signal Walk Indications

R308.1 *General. Accessible pedestrian signal* walk indications shall comply with R308.

R308.2 *Audible and Vibrotactile Walk Indications. Accessible pedestrian signal*s shall have an audible and *vibrotactile* walk indication during the *walk interval* only. The audible walk indication shall be audible from the beginning of the associated *crosswalk.* Following the audible and *vibrotactile* walk indication and during the *pedestrian change interval, accessible pedestrian signal*s shall revert to the *pedestrian push button locator tone.*

R308.3 *Audible Walk Indications.* Audible walk indications shall comply with R308.3.

R308.3.1 *Percussive Tone.* Where an *accessible pedestrian signal* is provided at a single crossing or where two *accessible pedestrian signal*s are 10 feet or greater from each other at a corner, the audible walk indication shall be a percussive tone and repeat eight to ten ticks per second with multiple frequencies and a dominant component at 880 Hz.

R308.3.2 *Speech Walk Message.* In *alterations,* where it is technically infeasible to provide 10 feet separation between *pedestrian push buttons* on the same corner, the audible walk indication for each signal shall be a speech walk message that complies with R308.3.2.

R308.3.2.1 *Speech Information Message when Walk Interval is Not Timing.* Where speech *push button* information messages are made available at a pretimed signal or by actuating the *accessible pedestrian push button* or passive detection device, they shall only be actuated when the *walk interval* is not timing. They shall begin with the term ''Wait,'' followed by intersection identification information modeled after: ''Wait to cross Broadway at Grand.'' If information on intersection signalization or geometry is also given, it shall follow the intersection identification information.

R308.3.2.2 *Speech Walk Message during Pedestrian Phasing Concurrent with Vehicular Phasing.* Speech walk messages that are used at intersections having *pedestrian* phasing that is concurrent with vehicular phasing shall be patterned after the model: ''Broadway. Walk sign is on to cross Broadway.''

R308.3.2.3 *Speech Walk Message during Exclusive Pedestrian Phasing.* Speech walk messages that are used at intersections having exclusive *pedestrian* phasing shall be patterned after the model: ''Walk sign is on for all crossings.''

R308.3.2.4 *Speech Walk Message and Pilot Light.* If a pilot light is used at an *accessible pedestrian signal* location, each actuation shall be accompanied by the speech message, ''Wait.''

R308.4 *Volume.* Audible walk indications shall be louder than ambient sound up to a maximum volume of 5 dBA louder than ambient sound. Automatic volume adjustment in response to ambient traffic sound level shall be a maximum volume of 100 dBA.

Exception: Where audible beaconing is provided in response to an extended *push button* press, the beaconing can exceed 5 dBA louder than ambient sound.

R308.5 *Vibrotactile Walk Indication.* The *pedestrian push button* shall vibrate during the *walk interval.*

R309 Transit Stops and Transit Shelters

R309.1 *Transit Stops. Transit stops* shall comply with R309.1.

R309.1.1 *Boarding and Alighting Areas.* Boarding and alighting areas at *sidewalk* or *street*-level *transit stops* must serve each *accessible* vehicle entry and exit and shall comply with R309.1.1 and R309.1.3.

R309.1.1.1 *Dimensions.* Boarding and alighting areas shall have a clear length of 96 inches (2440 mm) minimum, measured perpendicular to the face of the *curb* or *street* edge, and a clear width of 60 inches (1525 mm) minimum, measured parallel to the *street.*

R309.1.1.2 *Slope.* The slope of boarding and alighting areas measured parallel to the *street* shall be the same as the *grade* of the *street.* The slope of boarding and alighting areas measured perpendicular to the *street* shall be 1:48 (2.1%) maximum.

R309.1.2 *Boarding Platforms. Boarding platform*s at *transit stops* shall comply with R309.1.2 and R309.1.3.

R309.1.2.1 *Platform and Vehicle Floor Coordination. Boarding platform*s shall be positioned to coordinate with vehicles in accordance with the applicable requirements in 49 CFR parts 37 and 38.

R309.1.2.2 *Slope.* The slope of the *boarding platform* measured parallel to the track or *street* shall be the same as the *grade* of the track or *street.* The *slope* of the *boarding platform* measured perpendicular to the track or *street* shall be 1:48 (2.1%) maximum.

R309.1.3 *Common Requirements.* Boarding and alighting areas and *boarding platforms* shall comply with R309.1.3.

R309.1.3.1 *Surfaces.* The surfaces of boarding and alighting areas and *boarding platforms* shall comply with R302.6.

R309.1.3.2 *Connection to Existing Pedestrian Circulation Paths.* In *alterations,* boarding and alighting areas and *boarding platforms* shall be connected to existing *pedestrian circulation paths* by *pedestrian access routes* complying with R302.

R309.2 *Transit Shelters. Transit shelters* shall comply with R309.2.

R309.2.1 *Connection to Boarding and Alighting Areas. Transit shelters* shall be connected by *pedestrian access routes* complying with R302 to boarding and alighting areas complying with R309.1.1 or *boarding platforms* complying with R309.1.2.

R309.2.2 *Clear Space. Transit shelters* shall provide a minimum clear space complying with R404 entirely within the shelter. Where seating is provided within *transit shelters,* the clear space shall be located either at one end of a seat or so as to not overlap the area within 18 inches (455 mm) from the front edge of the seat.

R309.2.3 *Environmental Controls.* Where provided, environmental controls within *transit shelters* shall be proximity-actuated.

R309.2.4 *Protruding Objects.* Protruding objects within *transit shelters* shall comply with R402.

R310 On-Street Parking Spaces

R310.1 *General.* On-street parking spaces shall comply with R310.

R310.2 *Parallel On-Street Parking Spaces.* Parallel on-street parking spaces shall comply with R310.2.

R310.2.1 *Dimensions.* Parallel on-street parking spaces shall be 24 feet (7.3 m) long minimum and 13 feet (4.0 m) wide minimum. Parallel on-street parking spaces shall not encroach on the *traveled way.*

Exceptions: 1. Where parallel on-street parking spaces are *altered* but the adjacent *pedestrian circulation path* is not, any *accessible* parallel on-street parking spaces provided may have the same dimensions as the adjacent parallel on-street parking spaces if they are provided nearest the *crosswalk* at the end of the block face or nearest a midblock *crosswalk,* and a *curb ramp* or *blended transition* is provided serving the *crosswalk.*

2. In *alterations,* where providing parallel on-street parking spaces with the dimensions specified in R310.2.1 would result in an available right-of-way width less than or equal to 9 feet (2.7 m), measured from the *curb line* to the right-of-way line, the *accessible* parallel on-street parking spaces may have the same dimensions as the adjacent parallel on-street parking spaces if they are provided nearest the *crosswalk* at the end of the block face or nearest a midblock *crosswalk,* and a *curb ramp* or *blended transition* is provided serving the *crosswalk.*

R310.2.2 *Pedestrian Access Route Connection.* Parallel on-street parking spaces shall connect to *pedestrian access routes.* Where *curb ramps* and *blended transitions* are used, they shall not reduce the required width or length of the parking spaces and shall be located at either end of the parking space. Where two or more *accessible* parallel on-street parking spaces complying with the dimensions specified in R310.2.1 are contiguous on a block face, each *accessible* parallel on-street parking space shall have an independent connection to the *pedestrian access route. Curb ramps* and *blended transitions* shall be provided in accordance with R203.6.1.3 and shall comply with R304. *Detectable warning surfaces* are not required on *curb ramps* and *blended transitions* used exclusively to connect *accessible* on-street parallel parking spaces to *pedestrian access routes.*

Exception: In *alterations,* where parallel on-street parking spaces are provided in accordance with Exception 1 or 2 to R310.2.1, the parallel on-street parking space shall be connected to the *curb ramp* or *blended transition* serving the *crosswalk* by a *pedestrian circulation path* complying with R302.6, except that changes in level are not permitted.

R310.2.3 *Surfaces.* Surfaces of parking spaces shall comply with R302.6, except that changes in level are not permitted.

R310.2.4 *Clearance Adjacent to Parking Spaces.* The center 50 percent of the length of the *sidewalk,* or other surface, adjacent to an *accessible* parallel parking space shall be free of obstructions, including parking identification signs, parking pay meters, and parking pay stations, and shall comply with R302.6.

R310.2.5 *Identification.* Parallel on-street parking spaces shall be identified by signs displaying the International Symbol of Accessibility complying with R411. Signs shall be 60 inches (1525 mm) minimum above the ground surface measured to the bottom of the sign.

R310.3 *Perpendicular Parking Spaces.* Perpendicular parking spaces shall comply with R310.3.

R310.3.1 *Access Aisles.* Perpendicular on-street parking spaces shall have adjacent access aisles 96 inches (2440 mm) wide minimum extending the full length of the parking space. One access aisle shall be permitted to serve two parking spaces where front and rear entry parking are both permitted. Where an access aisle serves only one parking space and parking is restricted to either front entry or rear entry orientation, the access aisle shall be located on the passenger side of the vehicle.

R310.4 *Angled Parking Spaces. Accessible* angled parking spaces shall comply with R310.4.

R310.4.1 *Width.* The width of an angled parking space shall be 132 inches (3350 mm).

R310.4.2 *Access Aisles.* Each angled on-street parking space shall have an adjacent access aisle 60 inches (1525 mm) wide minimum extending the full length of the parking space on the passenger side.

R310.5 *Common Requirements for Perpendicular and Angled Parking Spaces.* Perpendicular and angled parking spaces shall comply with R310.5.

R310.5.1 *Access Aisle Markings.* The access aisle surface shall be marked to discourage parking in the access aisle.

R310.5.2 *Access Aisle Location.* Access aisles shall be located at the same level as the parking space they serve and shall not encroach on the *traveled way.*

R310.5.3 *Pedestrian Access Route Connection.* Access aisles shall connect to *pedestrian access routes.* Where *curb ramps* and *blended transitions* are used, they shall not reduce the required width or length of access aisles and parking spaces. *Curb ramps* and *blended transitions* shall be provided in accordance with R203.6.1.4 and shall comply with R304. A *detectable warning surface* is not required on a *curb ramp* or *blended transition* used exclusively to connect on-street parking access aisles to *pedestrian access routes.*

Exception: In *alterations,* the access aisle may connect to an existing *pedestrian circulation path* in accordance with R202.2.

R310.5.4 *Surfaces.* Surfaces of parking spaces and access aisles serving them shall comply with R302.6, except that changes in level are not permitted.

R310.5.5 *Identification.* Perpendicular or angled on-street parking spaces shall be identified by signs displaying the International Symbol of Accessibility complying with R411. The signs shall be located at the head of the parking space. Signs shall be 60 inches (1525 mm) minimum above the ground surface measured to the bottom of the sign.

R310.6 *Parking Meters and Parking Pay Stations.* Parking meters and parking pay stations that serve *accessible* parking spaces shall provide *operable parts* complying with R403. The clear space required by R403.2 shall be located so that displays and information on parking meters and pay stations are visible from a point located 40 inches (1015 mm) maximum above the center of the clear space in front of the parking meter or parking pay station.

R311 Passenger Loading Zones

R311.1 *General. Accessible passenger loading zones* shall comply with R311.

R311.2 *Vehicle Pull-Up Space. Accessible passenger loading zones* shall provide a vehicular pull-up space that is 96 inches (2440 mm) wide minimum and 20 feet (6.1 m) long minimum.

R311.3 *Access Aisle.* Vehicle pull-up spaces shall have adjacent access aisles complying with R311.3 that are 60 inches (1525 mm) wide minimum extending the full length of the vehicle pull-up space. Access aisles shall be at the same level as the vehicle pull-up space they serve and shall not encroach on the *traveled way.*

R311.3.1 *Clearance Adjacent to Passenger Loading Zone.* The center 50 percent of the length of the *sidewalk,* or other surface, adjacent to an *accessible passenger loading zone* shall be free of obstructions and comply with R302.6.

R311.3.2 *Marking.* Access aisle surfaces shall be marked to discourage parking in them.

R311.4 *Surfaces.* Surfaces of vehicle pull-up spaces and the access aisles serving them shall comply with R302.6, except that changes in level are not permitted.

R311.5 *Pedestrian Access Route Connection.* Access aisles shall connect to *pedestrian access routes.* Where *curb ramps* and *blended transition*s are used, they shall be provided in accordance with R203.6.1.4 and comply with R304, and shall not reduce the required width or length of access aisles. *Detectable warning surfaces* are not required on *curb ramps* and *blended transitions* used exclusively to connect access aisles to *pedestrian access routes.*

Exception: In *alterations,* the access aisle may connect to an existing *pedestrian circulation path* in accordance with R202.2.

Chapter 4: Supplemental Technical Requirements

R401 General

R401.1 *Scope.* The supplemental technical requirements in Chapter 4 shall apply where required by Chapter 2 or where referenced by a requirement in these guidelines.

R402 Protruding Objects and Vertical Clearance

R402.1 *General.* Protruding objects and vertical clearance shall comply with R402.

R402.2 *Protrusion Limits.* Objects with leading edges more than 27 inches (685 mm) and less than 80 inches (2030 mm) above the walking surface shall not protrude horizontally more than 4 inches (100 mm) into *pedestrian circulation paths.*

Exception: Handrails shall be permitted to protrude 4½ inches (115 mm) maximum.

R402.3 *Post-Mounted Objects.* Where objects are mounted on posts or pylons, they shall comply with R402.3.

Exception: The sloping portions of handrails serving *stairs* and *ramps* shall not be required to comply with R402.3.

R402.3.1 *Objects Mounted on Single Post or Pylon.* Where objects are mounted on a single post or pylon and the objects are more than 27 inches (685 mm) and less than 80 inches (2030 mm) above the walking surface, the objects shall not protrude into the *pedestrian circulation path* more than 4 inches (100 mm) measured horizontally from the post or pylon or more than 4 inches (100mm) measured horizontally from the outside edge of the base where the base height is 2½ inches (64 mm) minimum.

R402.3.2 *Objects Mounted Between Posts or Pylons.* Where objects are mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches (305 mm), the lowest edge of the object shall be 27 inches (685 mm) maximum or 80 inches (2030 mm) minimum above the walking surface.

Exception: Objects mounted with the lowest edge greater than 27 inches (685 mm) and less than 80 inches (2030 mm) above the walking surface are permitted if a barrier with its lowest edge at 27 inches (685 mm) maximum above the walking surface is provided between the posts or pylons.

R402.4 *Vertical Clearance.* Vertical clearance shall be 80 inches (2030 mm) high minimum. Guards or other barriers to prohibit *pedestrian* travel shall be provided where the vertical clearance is less than 80 inches (2030 mm) high above the walking surface. The lowest edge of the guard or barrier shall be located 27 inches (685 mm) maximum above the walking surface.

R402.5 *Required Clear Width.* Protruding objects shall not reduce the clear width required for *pedestrian access routes.*

R403 Operable Parts

R403.1 *General. Operable parts* shall comply with R403.

R403.2 *Clear Space.* A clear space complying with R404 shall be provided at *operable parts.*

R403.3 *Height. Operable parts* shall be placed within one or more of the reach ranges specified in R406.

R403.4 *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 pounds (22.2 N) maximum.

R404 Clear Spaces

R404.1 *General.* Clear spaces shall comply with R404.

R404.2 *Surfaces.* Surfaces of clear spaces shall comply with R302.6. The slope of the clear space shall be 1:48 (2.1%) maximum in both directions.

Exception: Where the slope of the clear space would exceed 1:48 (2.1%) in either or both directions due to the *grade* of an adjacent *pedestrian access route* conforming to the requirements of R302.4, the slope of the clear space may be consistent with the slope of the *pedestrian access route.*

R404.3 *Size.* Clear spaces shall be 30 inches (760 mm) minimum by 48 inches (1220 mm) minimum.

R404.4 *Knee and Toe Clearance.* Unless otherwise specified, clear spaces shall be permitted to include knee and toe clearance complying with R405.

R404.5 *Position.* Clear spaces shall be positioned either for forward approach where the 30-inch side is nearest to the *element,* or for parallel approach where the 48-inch side is nearest to the *element.* Clear spaces shall not be located on *curb ramp* runs or flares.

R404.6 *Approach.* One full unobstructed side of a clear space shall adjoin a *pedestrian access route* or adjoin another clear space.

R404.7 *Maneuvering Clearance.* Where a clear space is confined on all or part of three sides, additional maneuvering clearance shall be provided in accordance with R404.7.1 and R404.7.2.

R404.7.1 *Forward Approach.* The clear space and additional maneuvering clearance shall be 36 inches (915 mm) wide minimum where the depth of the confined space exceeds 24 inches (610 mm) measured perpendicular to the *element.*

R404.7.2 *Parallel Approach.* The clear space and additional maneuvering clearance shall be 60 inches (1525 mm) wide minimum where the depth of the confined space exceeds 15 inches (380 mm) measured perpendicular to the *element.*

R405 Knee and Toe Clearance

R405.1 *General.* Where space beneath an *element* is included as part of a clear space, the space shall comply with R405. Additional space shall not be prohibited beneath an *element* but shall not be considered as part of the clear space.

R405.2 *Toe Clearance.* Toe clearance shall comply with R405.2.

R405.2.1 *General.* Space under an *element* between the ground surface and 9 inches (230 mm) above the ground surface shall be considered toe clearance and shall comply with R405.2.

R405.2.2 *Maximum Depth.* Toe clearance shall extend 25 inches (635 mm) maximum under an *element.*

R405.2.3 *Minimum Required Depth.* Where toe clearance is required at an *element* as part of a clear space, the toe clearance shall extend 17 inches (430 mm) minimum under the *element.*

R405.2.4 *Additional Clearance.* Space extending greater than 6 inches (150 mm) beyond the available knee clearance at 9 inches above the ground surface shall not be considered toe clearance.

R405.2.5 *Width.* Toe clearance shall be 30 inches (760 mm) wide minimum.

R405.3 *Knee Clearance.* Knee clearance shall comply with R405.3.

R405.3.1 *General.* Space under an *element* between 9 inches (230 mm) and 27 inches (685 mm) above the ground surface shall be considered knee clearance and shall comply with R405.3.

R405.3.2 *Maximum Depth.* Knee clearance shall extend 25 inches (635 mm) maximum under an *element* at 9 inches (230 mm) above the ground surface.

R405.3.3 *Minimum Required Depth.* Where knee clearance is required under an *element* as part of a clear space, the knee clearance shall be 11 inches (280 mm) deep minimum at 9 inches (230 mm) above the ground surface, and 8 inches (205 mm) deep minimum at 27 inches (685 mm) above the ground surface.

R405.3.4 *Clearance Reduction.* Between 9 inches (230 mm) and 27 inches (685mm) above the ground surface, the knee clearance shall be permitted to reduce at a rate of 1 inch (25 mm) in depth for each 6 inches (150 mm) in height.

R405.3.5 *Width.* Knee clearance shall be 30 inches (760 mm) wide minimum.

R406 Reach Ranges

R406.1 *General.* Reach ranges shall comply with R406.

R406.2 *Reach Range Limits.* For forward and parallel approaches, the high reach shall be 48 inches (1220 mm) maximum and the low reach shall be 15 inches (380 mm) minimum above the ground surface.

R406.3 *Obstructions.* Obstructed reach shall comply with R406.3.

R406.3.1 *Forward Reach.* Where the clear space is configured solely for a forward approach to an *element,* obstructions shall not be permitted between the clear space and the *element* for a forward reach.

R406.3.2 *Side Reach.* Where a clear space is configured for a parallel approach to an *element,* an obstruction shall be permitted between the clear space and the *element* where the depth of the obstruction is 10 inches (255 mm) maximum and the height of the obstruction is 34 inches (865 mm) maximum.

R407 Ramps

R407.1 *General. Ramps* shall comply with R407. R407 does not apply to *curb*

ramps or *pedestrian access routes* following the *grade* established for the adjacent *street* consistent with the requirements of R302.4.1.

R407.2 *Running Slope.* The *running slope* of each *ramp* run shall be 1:12 (8.3%) maximum.

R407.3 *Cross Slope.* The *cross slope* of *ramp* runs shall be 1:48 (2.1%) maximum.

R407.4 *Clear Width.* The clear width of a *ramp* run shall be 48 inches (1220 mm) minimum. Where handrails are provided, the clear width between handrails shall be 48 inches (1220 mm) minimum.

Exception: Where a *ramp* only serves a *building* entrance, the clear width of the *ramp* run shall be permitted to be 36 inches (915 mm) minimum. Where handrails are provided, the clear width between handrails shall be permitted to be 36 inches (915 mm) minimum.

R407.5 *Rise.* The rise for any *ramp* run shall be 30 inches (760 mm) maximum.

R407.6 *Landings. Ramps* shall have landings at the top and the bottom of each *ramp* run. Landings shall comply with R407.6.

R407.6.1 *Slope.* Landing slopes shall be 1:48 (2.1%) maximum parallel and perpendicular to the *ramp running slope.*

R407.6.2 *Width.* The landing clear width shall be at least as wide as the widest *ramp* run leading to the landing.

R407.6.3 *Length.* The landing clear length shall be 60 inches (1525 mm) long minimum.

R407.6.4 *Change in Direction. Ramps* that change direction between runs at landings shall have a clear landing 60 inches (1525 mm) minimum by 60 inches (1525 mm) minimum.

R407.7 *Surfaces.* Surfaces of *ramp* runs and landings shall comply with R302.6, except that changes in level are not permitted.

R407.8 *Handrails. Ramp* runs with a rise greater than 6 inches (150 mm) shall have handrails complying with R409.

R407.9 *Edge Protection.* Edge protection complying with R407.9.1 or R407.9.2 shall be provided on each side of *ramp* runs and each side of *ramp* landings except those serving an adjoining ramp run, stairway, or other *pedestrian circulation path.*

R407.9.1 *Extended Ramp Surface.* The surface of the *ramp* run or landing shall extend 12 inches (305 mm) minimum beyond the inside face of a handrail complying with R409.

R407.9.2 *Curb or Barrier.* A *curb* that is 4 inches (100 mm) high minimum, or a barrier that prevents the passage of a 4-inch (100 mm) diameter sphere, where any portion of the sphere is within 4 inches (100 mm) of the surface of the *ramp run* or landing, shall be provided.

R408 Stairs

R408.1 *General. Stairs* shall comply with R408.

R408.2 *Treads and Risers.* All steps on a flight of *stairs* shall have uniform riser heights and uniform tread depths. Risers shall be 4 inches (100 mm) high minimum and 7 inches (180 mm) high maximum. Treads shall be 11 inches (280 mm) deep minimum.

R408.3 *Open Risers.* Open risers are not permitted.

R408.4 *Tread Surface. Stair* treads shall comply with R302.6, except that changes in level are not permitted.

Exception: Treads shall be permitted to have a slope not steeper than 1:48 (2.1%).

R408.5 *Nosings.* The radius of curvature at the leading edge of the tread shall be ½ inch (13 mm) maximum. Nosings that project beyond risers shall have the underside of the leading edge curved or beveled. Risers shall be permitted to slope under the tread at an angle of 30 degrees maximum from vertical. The permitted projection of the nosing shall extend 1½ inches (38 mm) maximum over the tread below.

R408.6 *Visual Contrast.* The leading edge of each step tread and top landing 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.

R408.7 *Handrails. Stairs* shall have handrails complying with R409.

R409 Handrails

R409.1 *General.* Handrails required at *ramps* and *stairs,* and handrails provided on *pedestrian circulation paths* shall comply with R409. R409 does not apply to *curb ramps.*

R409.2 *Where Required.* Handrails shall be provided on both sides of *ramps* and *stairs.*

R409.3 *Continuity.* Handrails shall be continuous within the full length of each *ramp* run or *stair* flight. Inside handrails on switchback or dogleg *ramps* and *stairs* shall be continuous between *ramp* runs or *stair* flights.

R409.4 *Height.* The top of gripping surfaces of handrails shall be 34 inches (865 mm) minimum and 38 inches (965 mm) maximum vertically above walking surfaces, *ramp* surfaces, and *stair* nosings. Handrails shall be at a consistent height above walking surfaces, *ramp* surfaces, and *stair* nosings.

R409.5 *Clearance.* Clearance between handrail gripping surfaces and adjacent surfaces shall be 1½ inches (38 mm) minimum.

R409.6 *Gripping Surface.* Handrail gripping surfaces shall be continuous along their length and shall not be obstructed along their tops or sides. The bottoms of handrail gripping surfaces shall not be obstructed for more than 20 percent of their length. Where provided, horizontal projections shall occur 1½ inches (38 mm) minimum below the bottom of the handrail gripping surface.

R409.7 *Cross Section.* Handrail gripping surfaces shall have a cross section complying with R409.7.1 or R409.7.2. Where expansion joints are necessary for large spans of handrails, the expansion joint cross section is permitted to be smaller than the specified cross section diameters for 1 inch (25 mm) maximum in length.

R409.7.1 *Circular Cross Section.* Handrail gripping surfaces with a circular cross section shall have an outside diameter of 1¼ inches (32 mm) minimum and 2 inches (51 mm) maximum.

R409.7.2 *Non-Circular Cross Section.* Handrail gripping surfaces with a non-circular cross section shall have a perimeter dimension of 4 inches (100 mm) minimum and 6¼ inches (160 mm) maximum, and a cross-section dimension of 2¼ inches (57 mm) maximum.

R409.8 *Surfaces.* Handrail gripping surfaces and any surfaces adjacent to them shall be free of sharp or abrasive *elements* and shall have rounded edges.

R409.9 *Fittings.* Handrails shall not rotate within their fittings. Where expansion joints are necessary for large spans of handrails, the expansion joint is permitted to rotate in its fitting.

R409.10 *Handrail Extensions.* Handrail gripping surfaces shall extend beyond and in the same direction of *ramp* runs and *stair* flights in accordance with R409.10. Handrail extensions shall not extend into the *roadway or pedestrian circulation path.* In *alterations,* if handrail extensions complying with R409.10 would reduce the clear width of a *pedestrian access route,* they shall extend as far as possible without reducing the clear width of the *pedestrian access route.*

Exception: Extensions shall not be required for continuous handrails at the inside turn of switchback or dogleg *ramps* and *stairs.*

R409.10.1 *Top and Bottom Extension at Ramps. Ramp* handrails shall extend horizontally above the landing for 12 inches (305 mm) minimum beyond the top and bottom of *ramp* runs. Extensions shall return to a wall, guard, or the landing surface, or shall be continuous to the handrail of an adjacent *ramp* run.

R409.10.2 *Top Extension at Stairs.* At the top of a *stair* flight, handrails shall extend horizontally above the landing for 12 inches (305 mm) minimum beginning directly above the first riser nosing. Extensions shall return to a wall, guard, or the landing surface, or shall be continuous to the handrail of an adjacent *stair* flight.

R409.10.3 *Bottom Extension at Stairs.* At the bottom of a *stair* flight, handrails shall extend at the slope of the *stair* flight for a horizontal distance at least equal to one tread depth beyond the last riser nosing. Extensions shall return to a wall, guard, or the landing surface, or shall be continuous to the handrail of an adjacent *stair* flight.

R410 Visual Characters on Signs

R410.1 *General.* Visual characters on signs shall comply with R410.

R410.2 *Finish and Contrast.* Characters and their background shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background.

R410.3 *Case.* Characters shall be uppercase or lowercase or a combination of both.

R410.4 *Style.* Characters shall be conventional in form. Characters shall not be italic, oblique, script, highly decorative, or of other unusual forms.

R410.5 *Character Proportions.* Characters shall be selected from 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''.

R410.6 *Character Height.* Minimum character height shall comply with Table R410.6. Viewing distance shall be measured

as the horizontal distance between the character and an obstruction preventing further approach towards the sign. Character height shall be based on the uppercase letter ''I''.

R410.6 VISUAL CHARACTER HEIGHT

Height to finish surface from baseline of character	Horizontal viewing distance	Minimum character height
40 inches (1015 mm) to less than or equal to 70 inches (1780 mm).	Less than 72 inches (1830 mm) ...	5/8 inch (16 mm).
40 inches (1015 mm) to less than or equal to 70 inches (1780 mm).	72 inches (1830 mm) and greater	5/8 inch (16 mm), plus ⅛ inch (3.2 mm) per foot (305 mm) of viewing distance above 72 inches (1830 mm).
Greater than 70 inches (1780 mm) to less than or equal to 120 inches (3050 mm).	Less than 180 inches (4570 mm)	2 inches (51 mm).
Greater than 70 inches (1780 mm) to less than or equal to 120 inches (3050 mm).	180 inches (4570 mm) and greater	2 inches (51 mm), plus ⅛ inch (3.2 mm) per foot (305 mm) of viewing distance above 180 inches (4570 mm).
Greater than 120 inches (3050 mm)	Less than 21 feet (6400 mm)	3 inches (75 mm).
Greater than 120 inches (3050 mm)	21 feet (6400 mm) and greater	3 inches (75 mm), plus ⅛ inch (3.2 mm) per foot (305 mm) of viewing distance above 21 feet (6400 mm).

R410.7 *Stroke Thickness.* Stroke thickness of the uppercase letter ''I'' shall be 10 percent minimum and 30 percent maximum of the height of the character.

R410.8 *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.

R410.9 *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.

R410.10 *Height from Ground Surface.* Visual characters shall be 40 inches (1015 mm) minimum above the ground surface.

R411 International Symbol of Accessibility

R411.1 *General.* The International Symbol of Accessibility shall comply with R411 and Figure R411.

R411.2 *Finish and Contrast.* 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 R411—International Symbol of Accessibility

[FR Doc. 2023–16149 Filed 8–7–23; 8:45 am]

BILLING CODE 8150–01–P