

Chapter 1

ADA Standards and Guidelines

INTRODUCTION

The Americans with Disabilities Act (ADA) of 1990 provides civil rights protections to individuals with disabilities and prohibits discrimination with regard to services and accommodations provided by local and state governments. Pedestrian facilities in the public right-of-way fall under Title II of the ADA, which applies to state and local government services (including facilities). The *Santa Fe Transition Plan – Public-Right-of-Way Update* is a plan for the City of Santa Fe to make sidewalks, curb ramps, and street crossings in the public right-of-way accessible to all pedestrians, including those with disabilities, in compliance with federal standards and guidelines.

This document provides the background for this project, including relevant accessibility standards and guidelines (Chapter 1), describes the evaluation and results (Chapter 2), discusses action steps for making access modifications to bring the public right-of-way into compliance with 2011 Standards (Chapter 3), and provides an overview of the transition plan (Chapter 4).

ADA STANDARDS AND GUIDELINES

National

The U.S. Access Board develops accessibility guidelines and standards for the built environment, as well as vehicles for transportation services, communications and information technology, and medical diagnostic equipment. Following the 1990 passage of the ADA, the Access Board developed and continues to update the ADA Accessibility Guidelines (ADAAG), design guidelines that the U.S. Department of Justice (USDOT) and the U.S. Department of Transportation (USDOT) have adopted into enforceable standards. Municipalities are required to comply with the adopted guidelines and standards when designing, building, and improving elements in the built environment, including sidewalks, and pedestrian facilities, as well as codes, standards and guidelines adopted at the local level.

The first version of the ADA Accessibility Guidelines (ADAAG) was published in 1991 to set accessibility guidelines to places of public accommodation and commercial facilities. This version of the ADAAG did not address requirements for public rights-of-way, with the exception of curb ramps and pedestrian refuge islands. In 1992, the U.S. Access Board proposed supplements to the ADAAG to address public right-of-way accessibility requirements. However, concerns were raised about how to fund and manage the

reconstruction of significant portions of the existing right-of-way, thus stalling the effort. Finally, in 1999, a U.S. Access Board Committee revisited the ADAAG and proposed additional standards for public sidewalks, protruding objects, street fixtures and furniture, sidewalk-street transitions, pedestrian crossings, and vehicular ways and facilities.

The first *Draft Guidelines for Accessible Public Rights-of-Way* were released by the Access Board in 2002. Based on committee recommendations regarding these specifications, the Access Board published an updated version of the ADAAG in 2004, and the *Revised Draft Guidelines for Accessible Public Rights-of-Way* in 2005. Following consideration of comments received on this second draft, in July 2011, the Access Board published *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way*. As of January 2017, these guidelines (sometimes referred to in this document as the *Proposed PROW Guidelines*) have not yet been finalized; however, they are considered the current recommended practice for designing and improving sidewalks, curb ramps, and crosswalks.

The currently *enforceable* guidelines and standards are based on the ADAAG issued by the Access Board in July 2004 and subsequent technical amendments. These guidelines were adopted, with several minor modifications, as standards enforced by the USDOT in November 2006 (focusing on transportation facilities such as bus stops and rail stations, as well as passenger vehicles). In September 2010, following a lengthy rulemaking process with extensive public commentary, the USDOJ also adopted the 2004 ADAAG into enforceable standards, published as the *2010 ADA Standards for Accessible Design*. The USDOJ document sets minimum accessibility requirements for newly designed or altered state and local government facilities, public accommodations, and commercial facilities. Chapter 4 of the *2010 Standards* document includes the 2004 ADAAG that dictate accessibility standards for public services and accommodations, including public rights-of-way. As required by the USDOJ, all new or altered state and local government facilities beginning construction on or after March 15, 2012 must follow the requirements of the 2010 Standards.

Facilities built or altered prior to this date were subject to the USDOJ's 1991 ADA standards which adopted the Access Board's concurrently published 1991 ADAAG.

Prior to passage of the ADA, only federally-funded facilities were required to be accessible, under the Architectural Barriers Act (ABA) of 1968, as well as Section 504 the Rehabilitation Act in 1973, which required federally assisted programs, services, and activities to be accessible. This could also impact facilities that host programs, even if the facilities are not federally-funded. In 1982, the Access Board published *Minimum Guidelines and Requirements for Accessible Design (MGRAD)*, and in 1984 the Uniform Federal Accessibility Standards (UFAS) was published. These documents continue to be in use by the Department of Housing and Urban Development (HUD), and were updated in the *2004 ADA and ABA Accessibility Guidelines* and adopted by several federal agencies as the *ABA Accessibility Standards*. The ABA Standards essentially mirror the ADAAG.

Going even further back in time, the American National Standards Institute (ANSI) developed a voluntary technical standard, A117.1, first published in 1961 and updated in 1980 and beyond.

The ADAAG and USDOT/USDOJ standards apply to new construction and modifications, as will the Proposed PROW Guidelines once finalized and adopted. Because accessibility standards that local governments are required to follow have evolved over time, a sidewalk may have been compliant with the standards in place at the time. Finalization of the requirements regarding detectable warnings was particularly lengthy. Detectable warnings provide a tactile surface (required under the ADAAG in the form of truncated domes), intended to alert people with vision impairments of the boundary between sidewalk and street. Boundaries can be detected under foot and with a cane, and if they are a contrasting color to the sidewalk, can also serve as a visual warning to individuals with low vision. There was concern at the time of the first ADAAG that they had not been adequately researched. Therefore, the requirement to install detectable warnings on curb ramps was suspended in 1994 until July 2001.

The Access Board is currently developing new guidelines for shared use paths, which are used for off-road transportation and recreation by pedestrians, bicyclists, and skaters. To date, the Access Board has solicited notices of proposed rulemaking and collected public comments. Ultimately, these guidelines will supplement the Proposed PROW Guidelines.

State Standards

The New Mexico Department of Transportation (NMDOT) requires compliance with the 2011 Proposed PROW Guidelines for all new and altered pedestrian routes constructed in NMDOT owned public right-of-way. Standard drawings were issued with an infrastructure design directive in January 2015. The *NMDOT ADA Directive* may be found in Appendix A.

THE REQUIREMENT FOR AN ADA TRANSITION PLAN

While the adopted standards and guidelines apply to new construction and alterations, they do not change pedestrian facilities constructed prior to their adoption. Local governments have an obligation to take steps toward compliance with regards to older, inaccessible facilities. These steps must be documented in a plan, known as a transition plan. Beginning in 1992, under the ADA and Section 504 [as codified in 28 CFR Part 35, Subpart D, §35.150 Existing facilities, (d) Transition plan], state and local governments with fifty or more employees are required to perform a self-evaluation of their current services, policies, and practices regarding ADA compliance. Each public agency must develop a transition plan to address compliance deficiencies (including inaccessible sidewalks and curb ramps). The transition plan must specifically:

- “(i) Identify physical obstacles in the public entity's facilities that limit the accessibility of its programs or activities to individuals with disabilities;*
- (ii) Describe in detail the methods that will be used to make the facilities accessible;*
- (iii) Specify the schedule for taking the steps necessary to achieve compliance with this section and, if the time period of the transition plan is longer than one year, identify steps that will be taken during each year of the transition period; and*
- (iv) Indicate the official responsible for implementation of the plan.”*

The requirement for this plan was established in July 1991, with the initial plan to be completed by July 1992. The transition plan must be updated periodically, and is expected to be implemented.

CITY ADA COMPLIANCE BACKGROUND AND SCOPE OF PROJECT

The City of Santa Fe developed its initial *ADA Self Evaluation and Transition Plan* in 1992, and updated it in 2011. The 2011 *ADA Transition Plan* focused on city policies, programs, services, activities, buildings, and parks. The 2011 plan included a representative sample of intersections and mid-block sections of city public right-of-way leading to city facilities, selected based on the city Public Works prioritization criteria for making accessibility improvements.

The purpose of this project was to update the 2011 *ADA Transition Plan* by including all walkways, sidewalks and curb ramps in the city public right-of-way along streets and roads. Santa Fe contracted with the KFH Group to conduct this study. Between June 2016 and January 2017, KFH Group conducted a field inventory and assessment, and developed a detailed database of all curb ramps, sidewalks and pedestrian pathways throughout Santa Fe. The field survey was conducted in two phases; the first focusing on curb ramps, and the second focusing on pathways. The survey tool compiled details necessary to determine compliance with the 2011 *Proposed PROW Guidelines*.

The remaining sections in this chapter present a summary of Proposed PROW Guidelines that apply to this project, and discussions of the features of curb ramps and pathways, and the guidelines that apply to each feature.

SUMMARY OF PROPOSED PROW GUIDELINES

The 2011 Proposed PROW Guidelines build on the 2004 ADAAG (and consequently the current USDOT and USDOJ standards). The Proposed Guidelines provide more detailed guidance with regards to pathways (including access for blind pedestrians at street crossings,

and variables related to street slope), contain additional styles of curb ramps not addressed in the ADAAG, and in some cases establish or change minimum or maximum measurements for items in the current ADAAG. The Proposed Guidelines are organized in the following chapters:

- Chapter R1: Application and Administration –General introductory information, including overarching applicability, measurement conventions, references to related standards, and definitions.
- Chapter R2: Scoping Requirements –Outlines the types of facility projects to which requirements apply, and indicates appropriate sections in the technical requirements that apply to each.
- Chapter R3: Technical Requirements –Provides detailed standards for pedestrian access routes, curb ramps, blended transitions, detectable warning surfaces, pedestrian street crossings, transit stops, shelters, on-street parking spaces, and passenger loading zones.
- Chapter R4: Supplementary Technical Requirements –Provides detailed standards for cross-cutting elements referenced in Chapter R3, including protruding objects (which can reduce the horizontal or vertical clearing of a pathway), operable parts (such as pedestrian signal pushbuttons), clear spaces (important to the accessibility of pedestrian signal pushbuttons, transit shelters, and parking payment locations), knee and toe clearance (related to clear spaces), reach ranges (govern placement pedestrian signal pushbuttons and parking payment machines in relation to clear spaces), ramps (cover ramps in general; curb ramps are covered in Chapter R3), stairways, handrails, visual characters on signs, and the International Symbol of Accessibility.

The numerous elements of the 2011 Proposed PROW Guidelines that apply to permanently installed curb ramps, sidewalks, and pedestrian street crossings are provided in Appendix B. These guidelines are summarized and discussed in the context of curb ramps and pedestrian pathways in the next two sections.

CURB RAMPS AND BLENDED TRANSITIONS

Curb ramps and blended transitions provide grade transition points between sidewalks and the street. These transition points provide people with mobility and vision disabilities with a navigable pathway.

Typical curb ramps include the ramp itself, a level landing at the top of the ramp (often part of the ramp itself), and a level landing at the bottom of the ramp, with a detectable warning to alert pedestrians with vision disabilities that they are making the transition from sidewalk to street crossing. The top and bottom landings often serve as turning spaces so that a

pedestrian using a wheelchair can turn the wheelchair to the direction of travel. Curb ramps that are placed perpendicular to the curb often have flared sides that slope between the ramp to the surrounding sidewalk, and parallel ramps are often two ramps sharing the same lower landing area.

The type of ramp design affects how these elements are configured. Figures 1-1 and 1-2 provide diagrams of the components of the most common types of curb ramps.

Figure 1-2: Components of a Perpendicular or Diagonal Curb Ramp

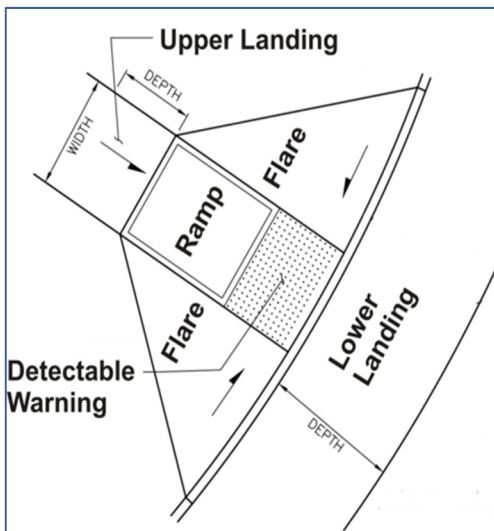
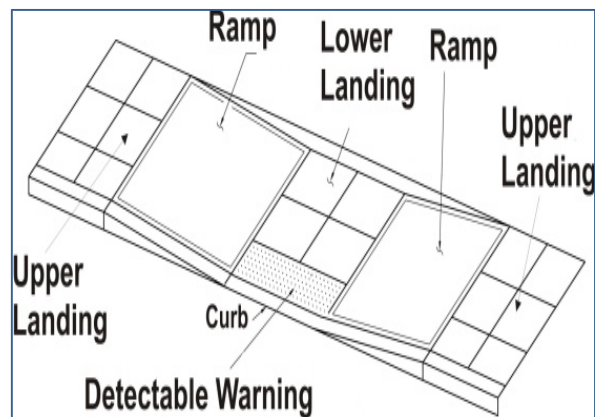


Figure 1-1 Components of a Parallel Curb Ramp



Types of Curb Ramps and Blended Transitions

There are four types of curb ramps allowable under the Proposed PROW Guidelines:

- Perpendicular
- Diagonal,
- Parallel, and
- Combination

Figure 1-3 displays examples of each of these.

Figure 1-3: Types of Curb Ramps**Perpendicular****Diagonal****Parallel****Combination**

In addition to curb ramps, an alternative approach to providing access to street crossings is a category of treatment referred to as a blended transition. The Proposed PROW Guidelines define a blended transition as “a raised pedestrian street crossing, depressed corner, or similar connection between the pedestrian access route at the level of the sidewalk and the level of the pedestrian street crossing that has a grade of 5 percent or less.”

Figure 1-4: Examples of Blended Transitions

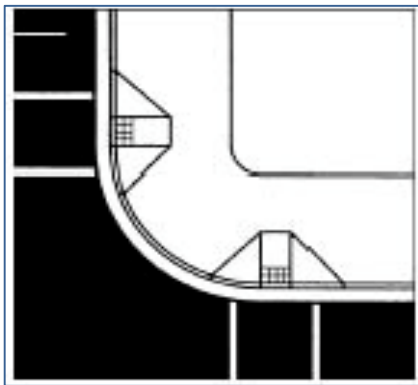
While no specific curb ramp or blended transition type is a better design than another, each type comes with certain advantages and disadvantages based on the location of the curb ramp and the context of the area, including sidewalk width. The *Proposed PROW Guidelines* indicate minimum sidewalk widths needed to install perpendicular, parallel, and combination ramps.

Perpendicular Curb Ramps

Perpendicular curb ramps are generally perpendicular to the street curb and allow pedestrians to cross the street perpendicular to vehicular traffic. Ideally they are in line with the path of travel of both the sidewalk and the street crossing, but this is not always possible within existing conditions. A distinguishing feature is that each ramp generally serves a single street crossing, so at a typical four-way intersection, two perpendicular ramps are needed at each corner (Figure 1-5).

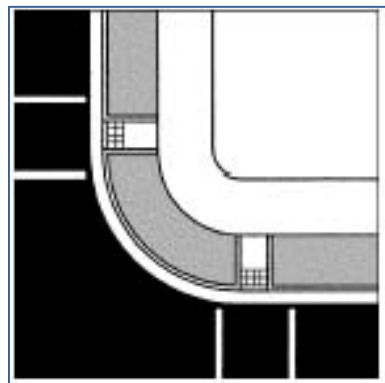
Perpendicular curb ramps typically have side flares, but not always. Sometimes a returned curb will be installed on one or both sides of the ramp (Figure 1-6).

Figure 1-5: Perpendicular Curb Ramps



Source: Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide

Figure 1-6: Perpendicular Curb Ramps with Curb Returns



Source: Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide

Advantages

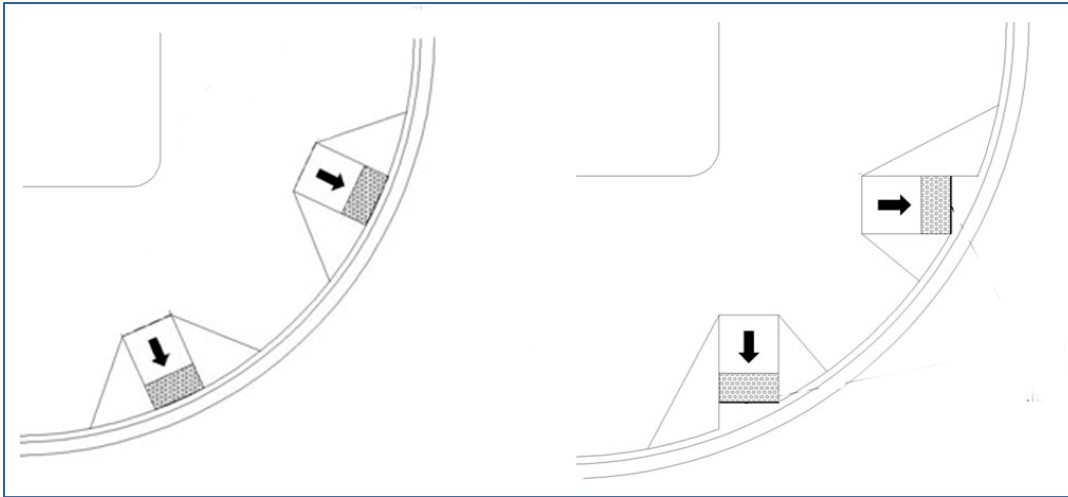
- Aligns perpendicular to vehicular traffic
- Provides straight path of travel on tight radius corners
- Aligns with crossing direction on tight radius corners
- Should be positioned with crosswalk
- At expected crossing location for all pedestrians

Disadvantages

- More expensive than a single diagonal ramp because two ramps must be constructed
- Does not provide a straight path on large radius corners unless ramp design is modified (see Figure 1-7).

- Requires a wide sidewalk corridor or curb extension to accommodate the ramp and a level landing. The Proposed PROW Guidelines advise that these ramps can be provided in places where the sidewalk is at least 12 feet wide.

Figure 1-7: Large Radius Corner Treatments



Source of base images: Proposed PROW Guidelines (modified Figures R304.2.1 and R304.5.2)

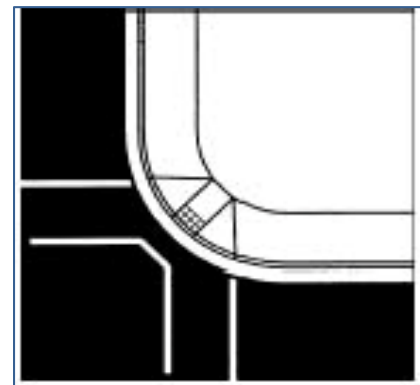
Diagonal Curb Ramps

Diagonal curb ramps are similar in design to perpendicular ramps; the main difference is in placement and alignment to the path of travel. Diagonal ramps are located at the apex of the corner of an intersection. Alignment of the ramp leads the pedestrian diagonally into the center of the intersection, and a single ramp provides access to two street crossings (Figure 1-8).

Advantages

- Requires less space because there is only one ramp per corner
- Less expensive for alterations
- Normal path of travel intersects a curb rather than a ramp, thus enhancing detectability of transition into the street for people with vision impairments

Figure 1-8: Diagonal Curb Ramp



Source: Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide

Disadvantages

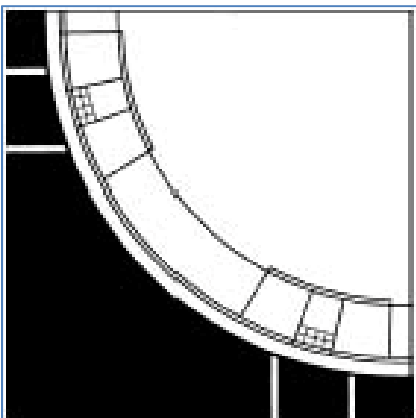
- Pedestrians may be in an area of conflict with motorists traveling straight and/or turning
- Requires directional changes at the top and bottom of the ramp
- Typically does not align with proper crossing direction
- Makes the essential level maneuvering area difficult to achieve at the bottom of the ramp
- May cause visually impaired persons to unintentionally travel into the middle of the intersection

Parallel Curb Ramps

Parallel curb ramps (Figure 1-9) typically consist of two ramps connecting to a shared level bottom landing (although sometimes only a single parallel ramp, such as at the end of a sidewalk that does not connect to another one). Ramps are oriented so that pedestrians traveling up or down the ramps travel parallel to vehicle traffic. These ramps are common on narrow sidewalks where there is little area for a top landing. The bottom landing is at street level and does not extend beyond the curb.

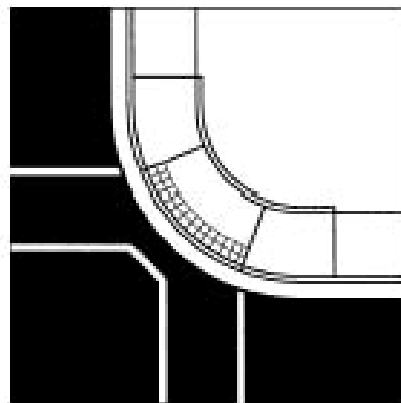
Parallel curb ramps can be designed so that one lower landing serves two street crossings at the corner (Figure 1-10).

Figure 1-9: Parallel Curb Ramps



Source: Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide

Figure 1-10: Parallel Curb Ramps with a Shared Lower Landing



Source: Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide

Advantages

- Requires minimal right-of-way. The Proposed PROW Guidelines advise that these ramps can be provided where the sidewalk is at least four feet wide.

- Enhances detectability of boundary between ramp and roadway because ramp ends at a landing not in the street
- Provides level turning and maneuvering area at top and bottom of ramp
- Provides clearly defined edges on sides of ramp for people with visual impairments

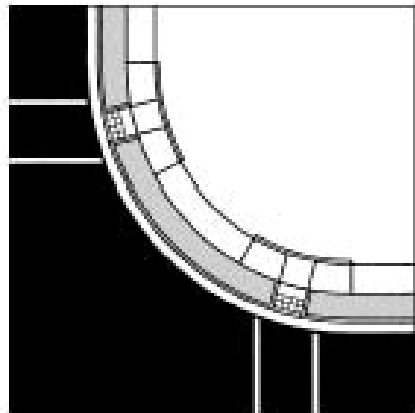
Disadvantages

- Requires users continuing along sidewalk to negotiate two ramp grades
- Requires careful attention during construction to limit water/debris accumulation in the level bottom landing.

Combination Curb Ramps

Combination curb ramps are modified curb ramps which take design components from perpendicular and parallel curb ramps. Generally, these ramps use the concept of a parallel ramp to lower the elevation of the landing, and then use a perpendicular ramp to bridge the remaining elevation gap down to the street (Figure 1-11). Combination ramps are typically used in areas where the sidewalk is narrow, and has a steep grade or a high curb.

Figure 1-11: Combination Curb



Source: Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide

Advantages

- Provides maneuvering area at the top of the perpendicular ramp/bottom of the parallel ramps
- Provides connection to the street within the marked crosswalk
- Aligns with proper crossing direction
- Provides adequate drainage to limit accumulation of water or debris

Disadvantages

- Generally requires more space than a parallel curb ramp. The Proposed PROW Guidelines advise that these ramps can be provided where the sidewalk is at least 6 feet wide.
- Requires more extensive alterations for installation in retrofit situations
- Requires users continuing along the sidewalk to negotiate the parallel ramps

Depressed Corners

Depressed corners are a type of blended transition that gradually lowers the level of the sidewalk to meet the grade of the street in a way that gives the illusion that the sidewalk and street are in a unified pedestrian space (Figure 1-12). The Proposed PROW Guidelines specify that blended transitions have a grade of 5 percent or less. Blended transitions are suitable for a range of sidewalk conditions.

Advantages

- Gives the illusion that the sidewalk and the street are a unified pedestrian space
- Can potentially be easier for wheelchair users to use due to the minimal slope and greater freedom to maneuver into path of travel at the base

Disadvantages

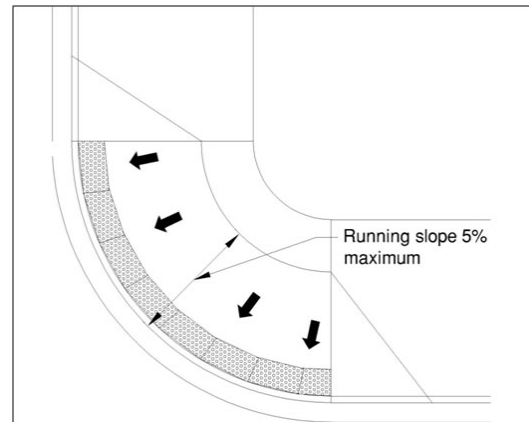
- May encourage vehicular traffic to drive onto the sidewalk when making tight turns (this can be mitigated by bollards or other barriers)
- Makes it more difficult for people with vision impairments (and guide dogs) to detect the boundary between the sidewalk and the street

A depressed corner design that is frequently found in Santa Fe involves separation of two crossings at a depressed corner by a curb. The curb separation provides a wayfinding cue for pedestrians with vision impairments and discourages vehicles from driving onto the sidewalk. Examples are shown in Figure 1-13.

Figure 1-13 – Depressed Corners Protected by Curb



Figure 1-12: Blended Transition – Depressed Corner

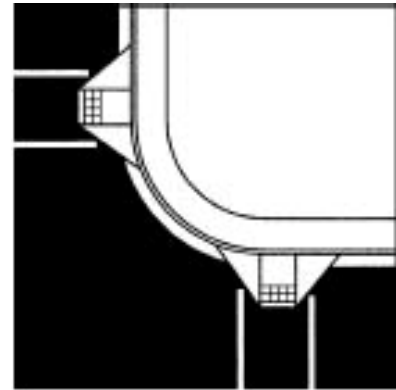


Source: 2011 Proposed PROW Guidelines, Figure R304.4.1

Other Variations

Less common varieties include built-up ramps, which are found in the UFAS, still in use by HUD. Built up ramps are built beyond the curb, with a ramp and flares that slope down to street level (Figure 1-14). They are not permitted to project into vehicular traffic lanes. A curb extension or bulb-out, with perpendicular ramps installed behind the curb, is preferable to a built-up curb ramp.

Figure 1-14: Built-up Curb



Source: Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide

ADA Specifications for Curb Ramps

The Access Board's specifications and guidelines for curb ramp construction have been altered and updated over the course of the past 26 years since the initial ADAAG was issued. The specifications summarized within the following section are from the 2011 Proposed PROW Guidelines, distilling the elements detailed in Appendix A. Table 1-1 summarizes the dimensions and slopes of the elements specific to perpendicular and parallel ramps as required by the Proposed PROW Guidelines.

Table 1-1: Dimensions and Slopes for Perpendicular and Parallel Curb Ramp Elements

Element/ Specification	Perpendicular Curb Ramps	Parallel Curb Ramps
Ramp Run		
Running Slope	5 to 8.3 %	5 to 8.3%
Cross Slope	Maximum 2%	Maximum 2%
Width	Minimum 4 feet	Minimum 4 feet
Length	Maximum 15 feet	Maximum 15 feet
Flared Sides		
Slope	Maximum 10%	No flares for parallel ramps.
Top Landing Area		
Dimensions	Referred to as "turning space" (R304.2.1). Minimum 4 feet by 4 feet. Where constrained at the back of the sidewalk, a minimum of 5 feet in the direction of the ramp run.	Not specified for parallel curb ramps. Per R407.6 for ramps other than curb ramps, a landing area as wide as the widest ramp run leading to landing at least 5 feet long is required at the top and bottom of each ramp run.
Slope	Maximum 2% in any direction.	Not specified for parallel curb ramps. Per R407.6 for ramps other than curb ramps, maximum 2% in any direction.

Element/ Specification	Perpendicular Curb Ramps	Parallel Curb Ramps
Bottom Landing Area		
Dimensions	<p>Referred to as “clear space” (R304.5.5).</p> <p>Minimum 4 feet by 4 feet.</p> <p>Provided within width of pedestrian street crossing and wholly outside parallel vehicle travel lane.</p>	<p>Referred to as “turning space” (R304.3.1).</p> <p>Minimum 4 feet by 4 feet.</p> <p>Where constrained by two or more sides, a minimum of 5 feet in the direction of the street crossing.</p>
Running Slope	<p>Not specified for bottom “clear space” for perpendicular curb ramps.</p> <p>Per R304.5.4 Counter Slope: Maximum 5%</p>	Maximum 2%
Cross Slope	<p>Not specified for bottom “clear space” for perpendicular curb ramps.</p> <p>Per R302.6 Cross Slope: maximum 2% percent Exceptions:</p> <ul style="list-style-type: none"> • at street crossings without yield or stop control: maximum 5% • at midblock crossings: equal to street or highway grade 	<p>Maximum 2%</p> <p><i>(There is an exception for street or highway grade for turning areas at certain types of street crossings under R304.5.3, but it is unclear how this should be applied to a parallel ramp lower landing/turning area where direction of travel changes.)</i></p>

Ramp Run

The following dimensions and slopes apply to ramp runs for all types of curb ramps.

Ramp Slope

The running slope of any curb ramp should be between 5 percent and 8.3 percent.

Ramp Cross Slope

Curb ramp cross slopes should not exceed 2 percent.

An exception is allowed under the Proposed PROW Guidelines at pedestrian street crossings without yield or stop control and at midblock pedestrian street crossings. For curb ramps at these locations, the cross slope is allowed to equal the street or highway grade.

Ramp Width

The minimum curb ramp width is 48 inches.

Ramp Length

The maximum curb ramp length is 15 feet.

Flared Sides

Where provided (i.e., for perpendicular or diagonal ramps), flared sides should have a slope no greater than 10 percent, measured parallel to the curb line.

Top Landing Area

For perpendicular curb ramps, a landing area/turning space should be provided at the top of each ramp that measures at least 4 feet by 4 feet. Where the landing area is constrained at the back of the sidewalk, a minimum of 5 feet in the direction of the ramp run is recommended. The slope of this landing area should be no more than 2 percent in any direction.

(The minimum required depth under the ADAAG is 36 inches in the direction of travel by the width of the ramp (which must be a minimum of 36 inches). The ADAAG alternately allowed an absence of top landing area as long as there were flares no steeper than 8.3 percent.)

Although the 2011 Proposed PROW Guidelines do not specify a top landing for parallel curb ramps (which typically would be the connecting sidewalk), the need for a top landing area for parallel ramps is implied by:

- R304.3 Parallel Curb Ramps, R304.3.2 Running Slope: Maximum ramp length of 15 feet
- R407 Ramps (other than curb ramps), R407.6 Landings, requires landings at the top and bottom of each ramp run. The landing must be as wide as the widest ramp run leading to the landing, at least 5 feet long, with a slope of no more than 2 percent in any direction.

Bottom Landing Area

For perpendicular and diagonal ramps, a lower landing area (referred to as a clear space in the Proposed Guidelines) of at least 4 feet by 4 feet should be provided within the width of the pedestrian street crossing and outside of the parallel vehicle travel lane.

The Proposed Guidelines do not specify slopes for this clear space; however, the counter slope of the gutter or street at the foot of the ramp run should be no more than 5 percent. Additionally, the cross slope specified for pedestrian crossings—within which this clear landing area is required to be provided—is to be a maximum of 2 percent, except in the case

of those without yield or stop control, which can have a cross slope up to 5 percent, and midblock crossings, which can equal the street or highway grade.

For parallel ramps, a turning space should be provided at the bottom of each ramp that measures at least 4 feet by 4 feet. Where the turning area is constrained on two more sides, a minimum of 5 feet in the direction of the street crossing recommended. The slope of the turning area/landing area should be no more than 2 percent. There are exceptions for cross slope for street or highway grade for turning areas at certain types of street crossings under R304.5.3, as described in the preceding paragraph. However, it is not clear how this would be applied to a parallel ramp lower landing area/turning area, where the direction of travel changes.

This landing is generally contained within the sidewalk width for parallel ramps. The counter slope of the gutter or street where it connects to the lower landing should be no more than 5 percent.

Grade Break Connections

Grade breaks at the top and bottom of curb ramp runs must be perpendicular to the direction of the ramp run. Grade breaks are not permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks need to be flush.

Surfaces of Ramps and Landing Areas

Surfaces of curb ramps, landing areas, and flares should be firm, stable, and slip resistant. Utility covers, gratings, and other objects should not be located on curb ramp runs, blended transitions, turning spaces, or gutter areas.

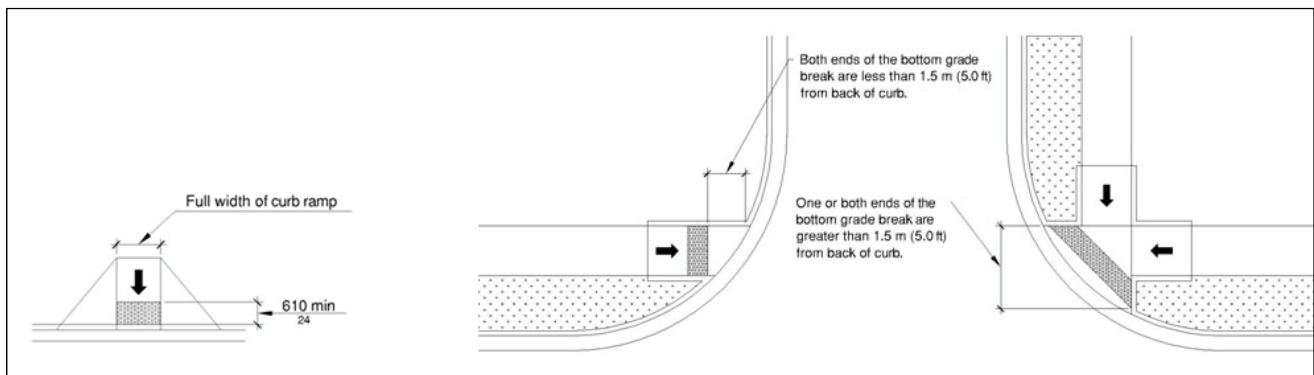
Detectable Warnings

Detectable warnings must be a minimum of 24 inches in depth in the direction of pedestrian travel.

For perpendicular ramps, the detectable warning must extend the full width of the ramp run and be placed, based on ramp design, as indicated in Table 1-2 and illustrated in Figure 1-15.

Table 1-2: Placement of Detectable Warnings at Perpendicular Curb Ramps

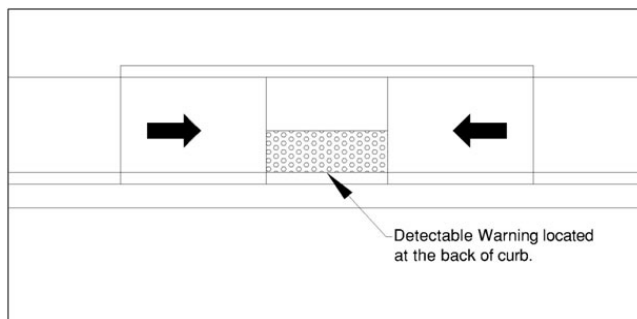
Location of Ends of Bottom Grade Break	Detectable Warning Placement Location
In front of the back of curb	At the back of curb
Behind the back of curb, and the distance from either end of the bottom grade brake to the back of curb is 5 feet or less	On ramp run within one dome spacing of the bottom grade break
Behind the back of curb, and the distance from either end of the bottom grade brake to the back of curb is more than 5 feet	On lower landing at the back of curb

Figure 1-15: Placement of Detectable Warnings on Different Styles of Perpendicular Curb Ramps

Source: 2011 Proposed PROW Guidelines

For parallel ramps, the detectable warning should be placed at the back of curb, at the flush transition between the street and sidewalk, for the full width of this transition (Figure 1-16).

The Proposed Guidelines advise that the rows of truncated domes in detectable warning surfaces should be aligned perpendicular to the grade break between the ramp run and the street so pedestrians who use wheelchairs can “track” between the domes (although this is less critical on surfaces with slopes below 5 percent).

Figure 1-16: Placement of Detectable Warning on Parallel Curb Ramp

Source: 2011 Proposed PROW Guidelines

ADA Specifications for Blended Transitions

This section presents allowable specifications for depressed corners and other blended transitions under the Proposed PROW Guidelines.

Width

The minimum clear width on a blended transition is 48 inches.

Running Slope

The maximum allowable running slope on a blended transition is 5 percent.

Cross Slope

Cross slopes on blended transitions should not exceed 2 percent.

An exception is allowed under the Proposed PROW Guidelines at pedestrian street crossings without yield or stop control and at midblock pedestrian street crossings. For blended transitions at these locations, the cross slope is allowed to equal the street or highway grade.

Counter Slope

The counter slope of the gutter or street at the foot of the blended transition should be no more than 5 percent.

Surface

The surface of a blended transition should be firm, stable, and slip resistant. Utility covers and gratings, and other objects should not be located on the blended transition.

Detectable Warnings

Detectable warnings must be a minimum of 24 inches in depth in the direction of pedestrian travel. On blended transitions, detectable warnings must be placed at the back of the curb at the flush transition between street and sidewalk.

PATHWAYS

The pedestrian pathway guidelines referenced in this project draw from numerous sections of the Proposed Guidelines including:

- Chapter R2: Sections R204, R206, R208, R209, R210
- Chapter R3: Sections R302, R305, R306
- Chapter R4: Sections R402, R403, R404, R406, and R407.

Details of these requirements are presented in Appendix B and summarized in this section as they apply to sidewalks, street crossings, and pedestrian crossing signals (specifically access to signal pushbuttons, and presence of audible pedestrian signals).

The summary of the accessibility specifications is followed by an introduction to common barriers to a full-accessible pedestrian pathway in the public right-of-way along, and crossing, streets and highways. Because conducting a 100% set of measurements for every foot of sidewalk was not a feasible undertaking under this project, the field assessment assessed general dimensions and sampled slopes, with a focus on identifying barriers in the environment that constrained accessibility.

General Specifications

Width

In general, a minimum continuous clear width of 4 feet is required for pedestrian pathways.

The minimum width increases to 5 feet for pathways within medians and pedestrian refuge islands.

On pathways where the clear width of pedestrian access routes is less than 5 feet, passing spaces need to be provided at least every 200 feet. Passing spaces must be a minimum of 5 feet by 5 feet and are permitted to overlap pedestrian access routes.

Grade

Running Slope

Generally, a pathway's running slope can be no greater than 5 percent. This includes street crossings.

Where the pathway is alongside a street or highway (e.g., a sidewalk), it is allowed to be the general grade established for the adjacent street or highway (but not steeper.)

Cross Slope

Generally, a pathway's cross slope may not exceed 2 percent. Two exceptions are allowable under the Proposed Guidelines:

- At pedestrian street crossings without yield or stop control – Where vehicles generally proceed through an intersection without slowing or stopping—the cross slope for the street crossing can be up to 5 percent. Where there is a yield or stop control, the 2 percent maximum rule applies.
- At mid-block pedestrian street crossings, the cross slope can equal the street or highway grade.

Surface

Surfaces of pedestrian access routes and elements must be firm, stable, and slip resistant. They must be generally planar, with flush grade breaks and pavement connections.

Vertical surface discontinuities cannot exceed $\frac{1}{2}$ inch in height, and those between one-quarter and $\frac{1}{2}$ inch must be beveled with a slope no steeper than 50 percent.

Horizontal openings in gratings and joints can be no wider than $\frac{1}{2}$ inch, with elongated openings in gratings placed so that the long dimension is perpendicular to the dominant direction of travel.

Where a pedestrian pathway crosses an at-grade rail line, the pedestrian access route surface must be level and flush, aligned with top of the rail. Flange way gaps at pedestrian crossings cannot exceed 2.5 inches on non-freight rail track and 3 inches on freight rail track.

Detectable Warnings

In addition to those required for curb ramps and blended transitions, detectable warnings are required for the following locations along pedestrian pathways:

- At cut-through pedestrian refuge islands, detectable warnings must be placed at the edges of the pedestrian island. They must be at least 2 feet in the direction of travel, and separated by a minimum of 2 feet of walking surface without detectable warnings. Logically, therefore, any cut-through would need to be a minimum of 6 feet long. On pedestrian refuge islands with curb ramps, detectable warnings should follow applicable guidelines for the type of curb ramp(s) installed.

- At pedestrian at-grade rail crossings that are not located within a street or highway, detectable warnings must be placed on each side of the rail crossing, between 6 feet and 15 feet from the centerline of the nearest rail. Where pedestrian gates are provided, the detectable warning must be placed on the side of the gates opposite the rail (i.e., so pedestrians would encounter the detectable warning before reaching the gate).

Pedestrian Signals

For the purposes of this project, accessibility of pedestrian signals focused on two aspects:

- The presence of pedestrian signals, including audible signals to help people with vision disabilities know when the visible “walk” signal is on, and
- The ability of a person in a wheelchair to access the pushbutton for manually-activated pedestrian signals.

Presence of Pedestrian Signals

With regards to accessible pedestrian signals and pedestrian pushbuttons, the Proposed Guidelines reference compliance with sections 4E.08 through 4E.13 of the Manual on Uniform Traffic Control Devices (MUTCD). The Proposed Guidelines supplement the MUTCD with the following guidelines related to roundabouts and channelized turn lanes.

When pedestrian facilities are provided at roundabouts with multi-lane pedestrian street crossings, an MUTCD-compliant pedestrian activated signal must be provided for each multi-lane segment of each pedestrian street crossing, including the splitter island and channelized turn lanes. Each signal must clearly identify which pedestrian street crossing segment the signal serves.

At signalized intersections other than roundabouts with pedestrian street crossings and channelized turn lanes, MUTCD-compliant pedestrian activated signals must also be provided.

Access to Pedestrian Signal Pushbuttons

The sections in the Proposed Guidelines relating to accessing operable parts, clear spaces, and reach ranges guide the accessibility requirements for pushbuttons at pedestrian signals. There needs to be a clear space adjacent to the pushbutton, connected to the pedestrian pathway, and the pushbutton must be mounted within a height range that makes it reachable by people in wheelchairs.

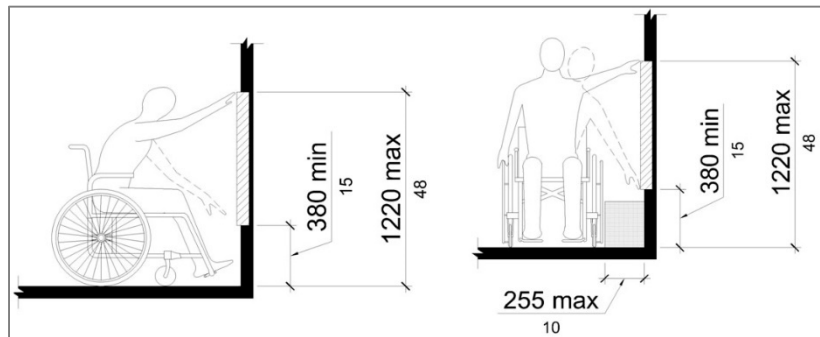
The clear space must have a firm, stable, and slip resistant surface, with a running slope that is consistent with the grade of the adjacent pedestrian access route and a maximum cross slope of 2 percent. It must be a minimum of 48 inches by 30 inches and must be positioned to

allow either forward or parallel (side) approach to the pushbutton, with at least one fully unobstructed side adjoining the pedestrian route.

If this space is confined on all or part of three sides, it must have additional maneuvering space. For a forward approach, the clear space and additional maneuvering space must be at least 3 feet wide where the depth exceeds 2 feet. For a parallel approach, the clear space and additional maneuvering space need a minimum width of 5 feet where the depth exceeds 16 inches.

The allowable reach range necessitates mounting the pushbutton between 15 inches and 4 feet in height (Figure 1-17). If the approach is parallel/sideways, an obstruction would be permitted that extends a maximum of 10 inches into the clear space below the reach range.

Figure 1-17: Reach range for a Pedestrian Signal Pushbutton



Source: 2011 Proposed PROW Guidelines (Figures R406.2 and R406.3)

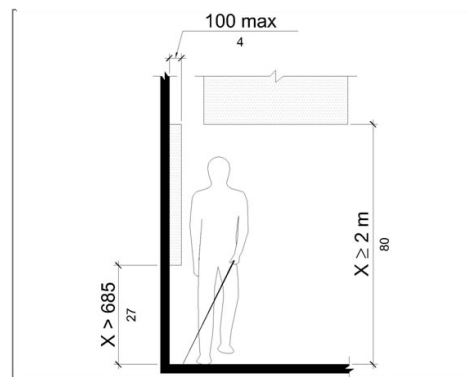
Vertical Clearance

In general, a minimum vertical clearance of 6.7 feet (80 inches) is needed for an accessible pedestrian pathway. The Proposed Guidelines specify the extent that objects can protrude into this clearance, designed to protect a pedestrian with a vision disability from walking into an object they are unable to detect with a cane (Figure 1-18).

An object with its lowest edge at least 27 inches above the walking surface can protrude no more than 4 inches into the vertical clear space.

An object mounted on a free-standing post or pylon between 27 inches and 6.7 feet (80 inches) above the walking surface may overhang a pedestrian circulation path a maximum of 4 inches measured horizontally from the post or pylon base. The base dimension of the post or pylon must be at least 2.5 inches thick.

Figure 1-18: Vertical Clearance and Protrusion Limits for Accessible Walk Paths



Source: 2011 Proposed PROW Guidelines (Figure R402.2)

Where an object is mounted between posts or pylons that are separated by more than 12 inches, the lowest edge of the object must be no higher than 27 inches, or at least 6.7 feet minimum above the walking surface.

Where the vertical clearance is less than 6.7 feet high, guardrails or other barriers to pedestrian travel must be provided, with the lowest edge of the guardrail or barrier located no higher than 27 inches above the walking surface.

Barriers and Obstructions

Barriers and obstructions render a curb ramp, crosswalk, or sidewalk difficult to use or even completely impassable. Barriers to clear width and walking surfaces may range from things permanently installed in what would otherwise be an accessible pedestrian route, such as utility poles or gratings with large gaps, to changes in the built environment over time, such as pavement heave or damage, to obstructions that could easily be removed, such as vendor boxes, overgrown landscape, or parked cars. Barriers such as steep slopes or cross slopes can be the result of design/construction errors or grade of the adjacent street. Driveways can be barriers if they contain vertical discontinuities or cars parked across the pedestrian pathway.

Barriers and obstructions are detailed in the following sections and are organized as follows:

- Cross Slopes
- Driveways
- Obstructions
- Protrusions
- Removable Barriers
- Running Slopes
- Surface Obstructions

Cross Slopes

A cross slope is the slope of the pathway perpendicular to the direction of travel (Figure 1-19). Cross slopes should be 2.0 percent or less. Steeper slopes make it difficult, if not hazardous, for a wheelchair user to access a sidewalk, crosswalk, landing area or curb ramp.

Figure 1-19: Example of a Steep Cross Slope



Driveways

Driveways are the points where vehicles navigate across (perpendicular to) pathway segments (Figure 1-20). They should be designed so that pedestrians are able to safely cross them.

Figure 1-20: Example of a Pathway Driveway Crossing with Issues



Obstructions

Obstructions are objects that limit or even prevent pedestrian travel on a pathway. The Proposed PROW Guidelines state that a walk path must provide at least 48 inches of clearance. Common obstructions include fire hydrants, utility poles, and sign posts.

Figure 1-21: Examples of Pathway Obstructions



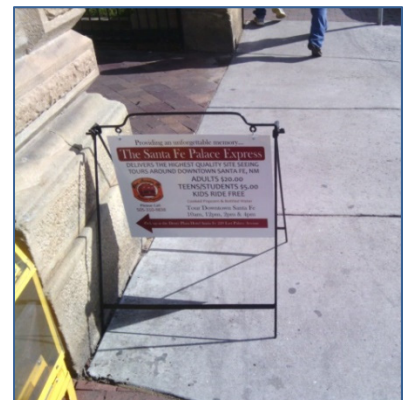
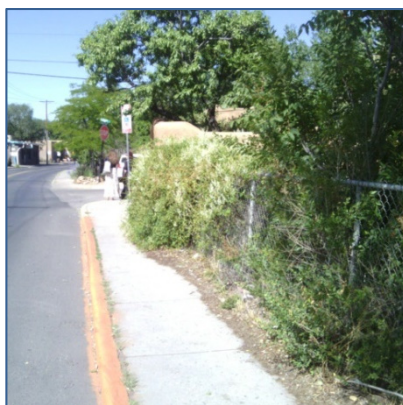
Protrusions

Protrusions are objects which have leading edges that encroach upon the walk path. Specifically under the ADAAG and Proposed PROW Guidelines, protrusions along a walk path that fall within a height of 27 inches to 80 inches from walking surface must not protrude more than 4 inches into the vertical clearance of the walk path. Below 27 inches, wider protrusions would likely be detected by a person with a vision impairment using a cane before they would walk into it. Typical protrusions are mounted signs, window ledges, and cables that support utility poles. Tree branches can be removable protrusions. Examples of protrusions are shown in Figure 1-22.

Figure 1-22: Examples of Vertical Clearance Protrusions

Removable Barriers

Removable barriers are objects that limit the effective use of the walk path to less than 48 inches and may be removed with relative ease. The primary example of a removable barrier is overgrown vegetation; however, rocks, debris, vendor boxes, and sandwich board advertisements also make up a decent portion of this category (Figure 1-23). Trash receptacles and parked cars can be barriers that change from day to day.

Figure 1-23: Examples of Removable Barriers

Running Slope

Running slope of a walk path should ideally be no more than 5 percent, although along streets and highways with a steeper slope, pathways may equal the grade of the roadway. Under the Proposed PROW Guidelines, running slopes of curb ramps should be between 5 and 8.3 percent. On landings at top and bottom of each ramp, and in crosswalks, clear spaces and turning areas, the running slope should ideally be 2 percent, although a 5 percent counter slope is allowable where the base of a curb ramp meets the street or gutter. Slopes that exceed the maximum allowable ranges (examples in Figure 1-24) are a barrier for people who use wheelchairs, and who may be unable to climb steep grades. Depending upon an individual's center of gravity in their wheelchair, steep slopes could potentially present a tipping hazard.

Figure 1-24: Running Slopes That Are Barriers



Surface Obstructions

Surface obstructions are a catch-all category for hindrances caused by issues with the sidewalk itself. There are four main types of surface obstructions including:

- Grade breaks
- Surface gaps
- Vertical discontinuities
- Uneven pavement

Figure 1-25 provides examples of various types of surface obstructions.

Surface obstructions should always be avoided on the surface of curb ramps, landing areas, clear spaces, and turning spaces.

Grade breaks occur at the top and bottom of ramps and can also occur along walk paths. They should be flush, planar and perpendicular to the path of travel. Grade breaks that are not perpendicular can be difficult to walk upon and can present a tipping hazard for someone in a wheelchair.

Figure 1-25: Examples of Surface Obstructions



Surface gaps can include pavement joints, gratings, and damaged pavement. Surface gaps greater than $\frac{1}{2}$ inch can be a tripping hazard for ambulatory pedestrians and be problematic for wheelchair users should their wheels get stuck in a groove. For this reason, elongated openings of gratings should be aligned perpendicular to the path of travel.

Vertical discontinuities can present a tripping hazard for ambulatory pedestrians and make it difficult for or prevent someone using a wheelchair from passing. Examples of vertical discontinuities include pavement expansion joints that are not flush, utility covers, and gratings. The ADAAG and Proposed PROW Guidelines permit vertical discontinuities up to $\frac{1}{2}$ inch, although those between $\frac{1}{4}$ and $\frac{1}{2}$ an inch require a bevel sloped up to 50 percent across the entire vertical gap.

Uneven pavement can involve each of the preceding three types of surface obstructions to some degree. As advised in the Propose PROW Guidelines, surfaces should be chosen for easy rollability. Surfaces that are rough, heavily textured, or composed of individual units such as

bricks or paving stones, can greatly increase rolling resistance, and the vibration of rolling over such surfaces can be painful for people who use wheelchairs and other mobility devices. Over time, pavement that was initially smooth can become uneven due to temperature changes, geologic changes, growth of tree routes, and heavy usage.