CHAPTER 6

PEDESTRIAN FACILITIES AND THE AMERICANS WITH DISABILITIES ACT

6.0 INTRODUCTION

Pedestrians are a part of every roadway environment and attention must be paid to their presence in urban as well as rural areas. Pedestrian access, safety and needs must be given full consideration during the planning and design of all transportation projects. The District Traffic Engineer should be consulted to see if there is a history of pedestrian crashes within the project limits or if the route has been declared an unsafe walking route for school children under Pennsylvania Department of Transportation (PennDOT) regulations.

The Americans with Disabilities Act (ADA) of 1990 is a federal civil rights statute that prohibits discrimination against people with disabilities. ADA implementing regulations for Title II prohibit discrimination in the provision of services, programs, and activities by state and local governments. Designing and constructing pedestrian facilities in the public right-of-way that are not usable by people with disabilities may constitute discrimination. Section 504 of the Rehabilitation Act of 1973 (504) includes similar prohibitions in the conduct of federally-funded programs.

Title II, Subpart A, of the ADA covers State and local government services, including the design and construction of buildings and facilities and the operation of government programs. Rulemaking authority and enforcement are the responsibility of the Department of Justice. However, the United States Department of Transportation has been designated to implement compliance procedures relating to transportation, including those for highways, streets and traffic management. The Federal Highway Administration (FHWA) Office of Civil Rights oversees the US DOT mandate in these areas.

ADA accessibility provisions apply to the entire transportation project development process including planning, design, construction and maintenance activities.

This Chapter provides the designer with the general guidance and direction to the Department's design procedures and requirements for the design of pedestrian facilities. There are a number of design facilities that should be considered in projects which will accommodate pedestrians. In special situations, some of these facilities can be used as countermeasures to reduce the potential for pedestrian accidents. These facilities include but are not limited to:

1. Sidewalks
2. Grade separations (overpasses and underpasses)
3. Refuge islands
4. Pedestrian barriers
5. Installation of pedestrian signals and pedestrian push buttons
6. Prohibition of pedestrians (on interstate highways, some intersections, or by statute or permit)
7. Widening of shoulders (in rural areas)
8. Improvements or installation of lighting
9. Installation of special signing and pavement markings
10. Prohibition of vehicle parking
11. Designation of one-way streets

The following references provide additional guidance for accessibility issues to assist in the determination of pedestrian needs and/or design of pedestrian accommodation within the highway right-of-way. The following documents were used in the development of PennDOT's standards and policies.

- Publication 10, Design Manual, Part 1, *Transportation Program Development and Project Delivery Process*, including Publication 10X, Design Manual, Part 1X, *Appendices to Design Manuals 1, 1A, 1B, and 1C*, Appendix S, Bicycle and Pedestrian Checklist
- PennDOT Training Manual, "Pennsylvania Pedestrian and Bicyclist Safety and Accommodation"
- AASHTO - "A Policy on Geometric Design of Highways and Streets" - 2004 AASHTO Green Book

- AASHTO - "Guide for the Planning, Design and Operation of Pedestrian Facilities" - 2004
- U.S. Access Board, "Draft Public Rights-of-Way Accessibility Guidelines" (PROWAG)
- U.S. Access Board, "Special Report: Accessible Public Rights-of-Way Planning and Design for Alterations"
- U.S. Department of Transportation, Federal Highway Administration, "Designing Sidewalks and Trails for Access, Part II of II, Best Practices Design Guide"
- U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices"
- 67 PA Code § 212, Official Traffic Control Devices

6.1 DEFINITIONS

The following definitions will be used in conjunction with the criteria described in this Chapter:

1. Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) July 26, 2011
www.access-board.gov/prowac/nprm.pdf

2. ADA Compliant Pedestrian Signals. Accessible Pedestrian Signals (APS), a device that communicates information about the WALK phase in audible and vibrotactile formats.
(*MUTCD* 2009 Edition Section 4E.06)
mutcd.fhwa.dot.gov

3. Alteration Project. 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.

4. Blended Transition. A pedestrian walkway connection with a grade of 5 percent or less between the level of the walkway and the level of the roadway crosswalk.

5. Crosswalk. That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalk 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 sidewalk on one side of the roadway, that part of a roadway included within the extension of the lateral lines of the existing sidewalk.

Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.

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

7. Curb. The edge of a roadway surface which has been raised to contain, protect or form a gutter and is usually made of concrete or cut stone.

8. Curb Ramp. A short pedestrian ramp cutting through a curb or built up to a curb from a lower level.

9. Detectable Warning Surface (DWS). A standardized truncated dome grid surface built in or applied to the pedestrian access route to warn visually impaired people of hazards. The surface is placed where pedestrians will encounter the presence of hazards in the line of travel, such as the edge of roadway and railroads, indicating that they should stop and determine the nature of the hazard before proceeding further.

10. Engineering Judgment. The evaluation of available pertinent information and the application of appropriate principles, standards, guidelines and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of highway related facilities. Engineering judgment will be exercised by a licensed Professional Engineer, or by an individual working under the supervision of such Engineer. Documentation of engineering judgment is not required but is desirable when determining if ADA accessibility facilities cannot be designed to the maximum extent feasible.

11. Intersection. A roadway area formed by the connection of lateral curb lines or the lateral roadway boundaries of two or more highways or streets that join each other. Alley or driveway junctions normally do not constitute an intersection.

12. Island. A defined area between traffic lanes for control of vehicular movements or for pedestrian access and refuge. It includes all end protection and approach treatments. A median located within an intersection area is also considered to be an island. See Refuge Island.

13. Landing. An approximately level [1V:50H (2.00%) maximum in longitudinal slope and cross slope] part of a pedestrian accessible route or walkway that provides a space for performing turning maneuvers, resting or accessing pushbuttons.

14. *MUTCD*. Manual on Uniform Traffic Control Devices (2009 Edition)
mutcd.fhwa.dot.gov

15. New Construction Projects. A highway new construction project is the construction of a transportation facility where none existed, in a location without existing site constraints, where it is technically feasible to fully meet the standards for accessibility.

16. Pedestrian. A person traveling on foot or using assistive devices, such as wheelchairs, for mobility.

17. Pedestrian Access Route (PAR). A continuous and unobstructed walkway within a pedestrian circulation path that provides accessibility. Pedestrian accessible routes may include parking access aisles, curb ramps, crosswalks at vehicular ways, walks, ramps, and lifts.
Draft Public Rights of Way Accessibility Guidelines (PROWAG)
www.access-board.gov/prowac/draft.htm

18. Pedestrian Facilities. A general term denoting improvements and provisions made to accommodate or encourage non-vehicular transit.

19. Pedestrian Grade Separation Facilities. An accessible pedestrian traffic separation structure either over or under the roadway elevation (grade) of the vehicular traffic lanes providing a safe pathway access across the roadway.

20. Physical Barrier. A physical obstruction (i.e. fence, planter, guide rail, etc.) which prohibits a pedestrian movement. Placement of intentional physical barrier to deter pedestrian movements must be outside the vehicular line of sight and clear zone.

21. Public Right-of-Way. Consists of everything between the highway right-of-way limits, including travel lanes, medians, refuge islands, planting strips, sidewalks and other facilities of a roadway system.

22. Ramp. Any part of a constructed pedestrian pathway with a slope greater than 1V:20H (5.00%).

23. Refuge Island. A specifically defined area (most often raised above the street level) between vehicular traffic lanes intended as a pedestrian refuge location for persons unable to cross the entire roadway width at one time.

24. Running Slope, also known as longitudinal slope. The slope that is parallel to the direction of travel.

25. Sidewalk. A portion of a roadway between curb lines or the lateral line of a roadway and the adjacent property line or easement of private property that is paved or improved and intended for use by pedestrians.

26. Shoulder. A section of a roadway system adjacent to the traveled way that may be shared by motorized vehicles, horse drawn vehicles, bicycles, and pedestrians. The shoulder facilitates drainage, supports the roadway and provides a buffer between vehicles and pedestrians.

27. Site Infeasibility. Existing physical or site constraints which prohibit the incorporation of elements, spaces or facilities that are in full and strict compliance with the minimum requirements for new construction and which are necessary to provide pedestrian access, circulation and use.

28. Technically Infeasible. A finding that alterations to an existing facility cannot fully meet the standards because of existing site conditions that would require additional work, right-of-way acquisition or impacts, not included in the original scope or limits of the alteration project. Existing site constraints such as limited right-of-way, existing utilities, existing structures, environmental/historic impacts or other site constraints may also prohibit modification or addition of elements, spaces, or facilities that are in full and strict compliance with the standards (e.g., curb ramps may be constructed with slopes greater than 1V:12H (8.33%) where space limitations prohibit the use of flatter slopes). Where full compliance is found to be technically infeasible, these curb ramps must use slopes that provide access to the maximum extent feasible.

29. Traffic Control Device. A sign, signal, pavement marking, or other device used to regulate, warn, or guide traffic that is placed on, over, or adjacent to a street, highway, pedestrian facility, or shared-use path by authority of a public agency having jurisdiction.

30. Transition Plan. The Transition Plan should identify all current physical obstacles that limit accessibility to individuals with disabilities, describe in detail the methods that will be used to make the facilities accessible, specify a schedule for taking steps necessary to achieve compliance and identify the official responsible for implementing the plan. The District Transition Plan Items list will typically not have existing curb ramps that are noncompliant or technically infeasible curb ramps listed. Missing curb ramps will not be added to the District Transition Plan Items list as they will be updated with the next alteration plan. Complaints may result in facilities being added to the District Transition Plan Items list. Rarely, curb ramps that are required as part of an alteration project cannot be completed with that project and must be added to the District Transition Plan Items list. The District Transition Plan Items list is submitted to Central Office for inclusion in the Department Transition Plan. A public entity with 50 or more employees is required to have a Transition Plan.

31. Traveled Way. The portion of the roadway for the movement of vehicles, exclusive of roadway shoulders, berms, sidewalks and parking lanes.

32. Walkway. The continuous portion of a pedestrian access route that is connected to street crossings by curb ramps or blended transitions.

6.2 ADA REQUIREMENTS, STANDARDS AND GUIDELINES

Under the ADA, the United States Access Board has developed and continues to maintain accessibility design guidelines for accessible buildings and facilities known as the 2010 ADA Standards and the Draft Public Rights-Of-Way Guidelines (PROWAG). The 2010 ADA Standards focus mainly on facilities on sites such as buildings and is not always applicable to the public right-of-way. PROWAG provides guidance for facilities located within the public right-of-way that could be affected by constraints posed by space limitations at sidewalks, roadway design practices, slope, and terrain.

The United States Access Board's guidelines become enforceable when they are adopted by the standard setting agency for the ADA. The agencies responsible for standards under the ADA are the Department of Justice (DOJ) and the United States Department of Transportation (US DOT). Both the DOJ and US DOT have accepted the 2010 ADA Standards as standards. <u>It should be noted; the standards and guidelines serve as a means to achieve and/or measure ADA compliancy but are not requirements of ADA.</u>

The requirements of ADA include:

- New construction must be accessible and usable by persons with disabilities. Technical infeasibility should not usually be a factor in its design.
- Alterations to existing facilities, within the scope or limits of a project, must provide usability to the maximum extent feasible.
- Existing facilities that have not been altered shall not deny access to persons with disabilities.

Both the 2010 ADA Standards and PROWAG provide means to meet the requirements of ADA. Facilities located outside of the public right-of-way are governed by the 2010 ADA Standards; and facilities located within the public right-of-way are governed by PROWAG. This is consistent with a February 2006 FHWA memorandum that states the PROWAG will be used as a best practice for facilities located within the public right-of-way, when the 2010 ADA Standards is silent or not applicable. The 2010 ADA Standards, PROWAG and other standards and guidelines have been incorporated into PennDOT's standards and guidelines to achieve ADA compliance.

A. New Construction Projects. All new construction projects that have pedestrian needs will incorporate appropriate pedestrian facilities to be accessible and usable by persons with disabilities. New construction projects for highways and bridges are generally built on new locations where construction space or other existing restrictions are rare. Project cost is not an acceptable reason to fail to construct or delay completing an ADA required improvement for accessibility compliance.

PennDOT's design development process will assess and ensure that accessibility requirements are addressed during the earliest stages possible to reduce or prevent potential conflicts with various planning, right-of-way, environmental, utilities, or other highway design related issues. Project scopes may also need expanded to meet pedestrian needs.

B. Alteration Projects and Removing Existing Pedestrian Access Barriers. A highway alteration project is a change to any portion of an existing facility (space, site, structure, or improvement of a pedestrian or vehicular route) located in the highway right-of-way that affects or could affect usability, access, circulation, or use of the facility. Alterations could affect the structure, grade, function and use of the roadway. Projects such as reconstruction, major rehabilitation, milling, resurfacing, widening, traffic signal installation and pedestrian signal installation all affect access, circulation or use of a facility.

As per Title II of ADA, when a facility is altered, it must be improved or upgraded to meet the latest standards. Where it is technically infeasible to meet the latest standards, access must be provided to the maximum extent possible. See Section 6.2.B.4 for additional discussion on Technically Infeasible. At a minimum, only the altered facilities are required to be improved or upgraded to current standards. It may be cost beneficial to improve unaltered facilities while construction forces are mobilized. Additional improvements may be unavoidable due to the improvement of one facility affecting the use of an adjacent facility. Coordinate with the local municipality or property owner to obtain right-of-way or temporary construction easements for altered facilities located outside of PennDOT right-of-way.

As the ADA standards or PennDOT standards change, a state-wide upgrade of all facilities is not required. Instead, it is systematically initiated by alteration projects. Meaning, if a facility was constructed to an older standard and provides access but has not been altered since construction, the facility does not need to be upgraded. For example, a curb ramp was constructed according to standards before the DWS requirement. If the curb ramp has not been altered and provides access, the curb ramp is technically compliant. Only when the curb ramp, or the pedestrian crossing, is altered must it fully meet the latest standard and in this case include the DWS. Some sidewalk alteration projects may trigger curb ramp upgrades as well.

All alteration type projects must assess pedestrian needs and must improve or upgrade altered existing facilities to the latest standards. See Section 6.6 for tools available to help assess pedestrian needs. The ADA Law, 28 CFR Part 35.151(e) - New construction or alterations provides the general direction for the placement of curb ramps: (1) Newly constructed or altered streets, roads and highways must contain curb ramps or other sloped areas at any intersection having curbs or other barriers to entry from a street level pedestrian walkway. (2) Newly constructed or altered street level pedestrian walkways must contain curb ramps or other sloped areas at intersections to streets, roads, or highways.

During alteration projects curb ramps must be installed or upgraded and must be provided at all street crossings and signalized entrances. "T" intersections may provide only one crossing of the through roadway based on pedestrian needs. Plus intersections may provide only one crossing of the through roadway in the event existing utilities, drains, severe slopes, etc…that are not in the scope of work, make providing an accessible crossing Technically Infeasible. In the rare cases where safety concerns, such as sight distance, warrant pedestrian crossing be prohibited on one or more legs of an intersection, the TE-672 should be completed, see Section 6.6. "No Pedestrian Crossing" signs are only required if crossing is prohibited.

Where existing site constraints limit the ability to fully meet the latest standards, the improvements or upgrades must be done to provide access to the maximum extent feasible within the scope or limits of the designated project. Projects altering the usability of the roadway must incorporate accessible pedestrian improvements at the same time as the alterations to the roadway are performed.

All alteration projects require the removal of the existing pedestrian access barriers, such as missing curb ramps, when they are located within the limits of work. Only in rare situations may the pedestrian access barrier remain and the location of the barrier added to the Transition Plan to be addressed at a later time. Alterations at signalized intersections must follow appropriate traffic signal policies and procedures.

1. Major Alteration Projects. Major alteration projects can affect access, circulation, or use of existing facilities within the existing right-of-way. These alterations can include 4R projects such as resurfacing, restoration, rehabilitation and reconstruction and other alterations such as major widening, bridge projects, interstate safety rest area / welcome center restorations and certain transportation enhancements.

a. Transportation Enhancements (TE) and other Federal-aid Programs. Transportation Enhancements are special projects related to ground transportation facilities that improve the quality of life in Pennsylvania. The TE program includes project categories such as Hometown Streets and other enhancements such as bicycle and pedestrian paths, streetscapes, scenic overlooks, rest areas and rehabilitation of historic transportation related buildings such as train stations.

All Federal-aid special transportation programs such as TE projects involving pedestrian accessibility must include current applicable pedestrian accessibility facilities whether or not the project is located within the public right-of-way. The 2010 ADA Standards include special guidelines for building alterations and historic preservation projects.

b. Highway Occupancy Permits. The need to provide new or additional pedestrian access along and across existing highways as a result of new adjacent property development must require the approval and issuance of a PennDOT Highway Occupancy Permit (HOP) to the local government or adjacent property owner. The HOP may include the requirement that ADA compliant pedestrian facilities be made a part of the permit conditions.

The permittee shall be responsible to continuously maintain the facilities including curbs, sidewalks and curb ramps so as to conform to the permit and so as not to interfere or be inconsistent with the design, maintenance, and drainage of the highway, or the safe and convenient passage of traffic upon the highway. Curb ramps are an integral part of the entire sidewalk system.

For ADA facilities in PennDOT ROW, PennDOT should complete, or verify the completed, Curb Ramp Inspection Forms (CS-4401) and approve the Technically Infeasible Forms for all ADA Curb Ramps and pedestrian facilities that are appurtenant and integral to the function and operation of driveways / local roads where they intersect the State Route. If ADA facilities are located outside PennDOT ROW and are deemed integral to the function / operation of a driveway / local road at the intersection of a State Route, the HOP applicant should prepare and submit any Technically Infeasible Forms for ADE approval.

This includes all curb ramps crossing State Routes, curb ramps crossing local roads at the intersection of State Routes, and curb ramps constructed as part of commercial / residential / industrial driveways that provide access to or from State Routes.

Pedestrian facilities that are not appurtenant and integral to the function of driveways / local roads do not require PennDOT approval or oversight. When permit plans indicate the construction of any pedestrian facilities, the following note should be included on the plans.

"CONSTRUCT ALL PROPOSED PEDESTRIAN FACILITIES ON THESE PLANS TO COMPLY WITH THE AMERICANS WITH DISABILITITES ACT, PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG), AND THE 2010 ADA STANDARDS."

Appropriate accessibility guidelines, construction standards and specifications or other approved construction details must be used in the preliminary and final design stages of all projects to ensure accessibility facilities are constructed where required in the project.

2. Minor Alteration Projects. Minor or Betterment alteration projects can affect access, circulation, or use of existing facilities within the existing right-of-way. Minor or Betterment Projects that could affect existing pedestrian access and trigger the need for installation of or upgrading of accessibility facilities are listed below.

- Milling, resurfacing, restoration, rehabilitation and reconstruction for pavement improvements and widening, intersection improvements and utility adjustments
- Roadway signalization – Placement of poles and control panels
- Pedestrian signalization – Placement of poles and control panels
- Signing – Placement of poles or posts
- Roadway lighting – Placement of poles, junction boxes and control panels
- Construction of grade separation structures – Overpasses and underpasses
- Rehabilitation or replacement of any length bridge structure
- Shoulder rebuilding and widening – Adjoining or part of a pedestrian access route
- Inlet replacement – Inlet locations affecting pedestrian routes
- Guide rail replacements – Adjoining or part of a pedestrian access route
- Fringe parking areas – Parking and pedestrian circulation
- Safety rest areas and welcome centers – Work affecting parking and pedestrian circulation
- Transportation Enhancements – Projects relating to public use of highway facilities and streetscapes

Resurfacing is an alteration that improves the vehicular paths of the roadway. It is also an alteration to pedestrian paths that cross the altered roadway; therefore the pedestrian paths must be upgraded to the latest ADA requirements. A federal court case ruled the curb ramps at the end of the altered pedestrian path must also be considered altered and must be upgraded. Source: Kinney v. Yerusalim, 9 F.3d 1067 (3d Cir. 1993), cert. denied, 511 U.S. 1033 (1994).

These minor alteration projects are general examples only and each operation must be assessed individually in relation to any existing pedestrian accessibility feature.

3. Non-alteration Projects. Minor or Betterment Projects that in all likelihood will not affect access, circulation, or use of existing facilities within the existing right-of-way are listed below:

- Truck escape ramps
- Guide rail removal or replacement not affecting pedestrian access routes
- Roadside slope flattening
- Pavement markings and line striping
- Shoulder rebuilding in areas not affecting pedestrian access routes
- Signal maintenance / signal head replacement
- Sign maintenance / replacement
- Roadway lighting maintenance including luminaire and bracket arm replacements
- Truck weigh stations
- Wetland replacement mitigation
- Safety hardware upgrades
- Drainage – replacement of manholes, endwalls, pipes, culverts and inlets not affecting pedestrian access routes
- Bridge painting

Normal maintenance activities are not considered alterations and do not require simultaneous improvements to pedestrian accessibility under the ADA. Maintenance activities include actions that are intended to preserve the roadway system, retard future deterioration and maintain the functional condition of the roadway without increasing the structural capacity. Maintenance activities can include seal coats, slurry seals, and other

preventive maintenance items such as crack sealing / joint repair, pavement / pothole patching, shoulder repair, repair to drainage systems, emergency repairs and pipe cleaning.

4. Technically Infeasible. All construction must meet PennDOT's standards. For existing sites where it is technically infeasible to construct facilities fully to current PennDOT's standards, as determined by using sound engineering judgment, a "Technically Infeasible Form" documentation must be prepared. This must be submitted and approved before construction to document that access has been designed to the maximum extent feasible. The Technically Infeasible Form (similar to a design exception) must include the following:

- Project site constraints that would adversely affect installing the appropriate access feature
- Reasons why the access feature cannot be designed to the desired standards
- The design solution derived to provide access to the maximum extent feasible

Project site constraints may include but are not limited to:

- Limited right-of-way
- Existing utilities
- Existing buildings, walls or vaults
- Environmental impacts
- Historic impacts
- Safety
- Roadway profile slope

Project scope, not cost, will determine when existing site constraints justify the use of the Technically Infeasible Form. In certain situations, existing site constraints may justify the use of a design that provides access to the maximum extent feasible if removing the existing site constraints would require additional work that is not included as part of the project scope. For example, a resurfacing project may not include removal of existing site constraints in the project scope and may be justification for installing a facility that provides access to the maximum extent feasible. However, for a widening project that includes right-of-way acquisition, utility relocations and removing underground vaults as part of the project scope, these constraints will not be satisfactory justification for installing a facility that does not meet PennDOT's standards since they are part of the project scope. The existing site constraints must be evaluated on a case-by-case basis using sound engineering judgment before submitting a Technically Infeasible Form.

a. Technically Infeasible Scenario #1. For an overlay project, the designer suggests that an existing Type 1 curb ramp without a landing provides the maximum access possible since the curb ramp is located within limited right-of-way and is part of a narrow sidewalk. In this situation the designer is incorrect. A Type 2 curb ramp may be installed and provide full access, the Type 1 curb ramp design is not appropriate because the level of access can be improved. The Type 2 curb ramp must be installed to provide access fully meeting the standards.

b. Technically Infeasible Scenario #2. For an overlay project, the designer suggests that an existing Type 2 curb ramp with a ramp slope of 1V:10H (10.00%) provides the maximum access feasible after evaluating all possible design alternatives within the project scope. The existing site constraints included narrow sidewalk width and limited right-of-way. In certain situations the designer may reach the conclusion that a curb ramp cannot be improved without going beyond the project scope and may not be required to upgrade the facility. For this scenario it is important to evaluate if the facility is accessible. The 1V:10H (10.00%) curb ramp slope is greater than the maximum curb ramp slope but still provides a general accessible solution.

c. Technically Infeasible Scenario #3. For an overlay project, the designer suggests that an existing Type 1 diagonal curb ramp should be replaced with a Type 4A curb ramp with a slope slightly exceeding the standards due to limited sidewalk width. An evaluated alternative that included the installation of two fully compliant Type 2 curb ramps was dismissed by the designer because it required the adjustment of an existing electric box where one of the curb ramps would be placed. In this situation, utility adjustments are not part of the project scope. However the utility adjustment would not have a major impact on the

project and is not suitable justification for installing a curb ramp that does not fully meet the standards. Relocating existing utilities, obtaining right-of-way, or performing other out-of-scope work in order to fully meet the standards must be evaluated on a case-by-case basis.

d. Technically Infeasible Scenario #4. For an off-alignment project, the designer suggests that an existing Type 1 curb ramp without a landing provides the maximum access possible due to proposed utility locations and limited right-of-way. New construction projects are held to the highest degree of PennDOT's standards since the project scope provides the greatest flexibility to provide accessible facilities. In the above scenario, the site constraints listed are part of the project scope and are not valid. Additional right-of-way or alternate placement of proposed utilities will be required to meet PennDOT's standards.

The Technically Infeasible Form will be reviewed prior to construction by the District ADA Review Committee. It is recommended that the District ADA Review Committee have the following members or disciplines: Traffic, Bike/Pedestrian Coordinator, Safety, Maintenance, and Community Relations Coordinator. The District ADA Review Committee will make a recommendation for approval to the ADE of Design or delegate. Once approved by the ADE of Design or delegate, the Technically Infeasible Form will be submitted as part of the contract documents. For Design/Build projects, the Technically Infeasible Form will become part of the contract documents upon approval. The District will be responsible for maintaining a copy of all Technically Infeasible Forms. An electronic copy must be sent to the ADA Coordinator at Central Office where the data will be archived into a database.

See Chapter 6, Appendix A, *Technically Infeasible Form*, for additional information.

C. Unaltered Existing Facilities. As per the Title II requirements under the ADA, existing facilities and programs, even though they have not been altered, must not deny access to persons with disabilities. A range of methods are available to ensure that people who have disabilities are not denied access to public facilities and programs. In many situations, an operational solution may achieve program accessibility without the need for construction.

In fact, existing facilities do not have to be made accessible if other methods of providing access are effective. Except for the installation of curb ramps, which are specifically required for program access, structural changes are an option of last resort.

A pedestrian circulation system (sidewalks, street crossings, shared-use paths in the public right-of-way) is a facility that a local government provides for its citizens. It is the general availability of this facility to people with disabilities that must be evaluated when considering the existing pedestrian environment. Full compliance with facility standards developed for new construction and alterations may not be required to achieve access.

Facility accessibility can be thought of as providing a basic level of usability. It targets high-priority access improvements (curb ramps) that eliminate major barriers to the use of existing facilities, so that people with disabilities are not excluded from participation. Program accessibility requires careful planning to identify those efforts that will provide the greatest access to the available resources. Non-construction approaches may include alternate accessible routes, relocation of services or activities to accessible locations, or providing the service or benefit directly to the individual.

Jurisdictions should consider whether such operational solutions would be sustainable over the long term. For some rights-of-way elements, structural changes may be more economical. In an existing right-of-way that is not otherwise being altered, the minimum requirement for achieving program accessibility is the installation of curb ramps at selected locations where existing pedestrian walkways cross curbs. This work must be identified in the transition plan.

6.3 PROJECT TYPE EXAMPLES

A. Maintenance Type Projects. The following examples represent projects that include routine maintenance and repair work that generally does not impact, disturb or modify pedestrian usability. Note: Resurfacing projects are not considered routine maintenance and are not represented with the following examples.

- Repair of drainage pipes or inlets that result in a small portion of sidewalk being removed and replaced. This type of work will require only that the sidewalk be repaired in-kind and no additional installation / upgrade of sidewalk or curb ramps would be required. However this project would not be considered a maintenance type project if a significant length (equal to or greater than 30 m or 46 m^2 (100 ft or 500 ft^2)) of sidewalk is removed.

- Utility repairs or relocations that result in a small portion (less than 30 m and less than 46 m^2 (less than 100 ft and less than 500 ft^2)) of sidewalk being removed and replaced would require only repair in kind and would not trigger any new installation or upgrades to existing sidewalk or curb ramps. The placement of utilities may not decrease the accessible path width to less than 1220 mm (4 ft).

- Repair of damaged traffic barrier adjacent to sidewalk in an urban area would not require upgrade of the adjacent sidewalk or curb ramps.

- Repair of potholes, spot patching of roadway or crack sealing of roadway would not require any installation or upgrades to adjacent sidewalks or curb ramps.

- Modifications to existing traffic signals (non-structural) such as repair, replacement and maintenance of traffic signal head modules, pedestrian signal head modules, loop detectors, video detectors, microwave detectors, signal controller features, wiring, junction boxes, traffic control signage, roadway lighting or cameras would not require any installation or upgrades to adjacent sidewalks or curb ramps. However, if the modification creates a negative impact to the existing sidewalk or existing pedestrian push buttons are not accessible, improvements or upgrades must be installed.

- Re-striping or modifications to the pavement markings on a roadway would not require installation or upgrade of existing sidewalk or curb ramps. If new striping is installed to designate a crossing to curbs without curb ramps at the crossing, it will be necessary to install curb ramps.

- Spot patching or repair of existing sidewalk to correct buckling, cracking or other severely deteriorated conditions would not require installation of new or upgrade of existing sidewalk. However, as a rule of thumb, if more than 50% of a run of sidewalk is being repaired, the entire length should be upgraded to PennDOT's standards. This work may include installing or upgrading curb ramps.

- Slurry seals to correct surface friction or seal entire roadway to address cracking would not require upgrade of the curb ramps. These applications must be feathered into the curb ramp to provide a flush transition.

- Emergency repairs would not require upgrade or installation of curb ramps. Emergency repairs include interim pavement patching or thin overlays for severely distressed pavement due to a harsh winter, natural or man-made disasters.

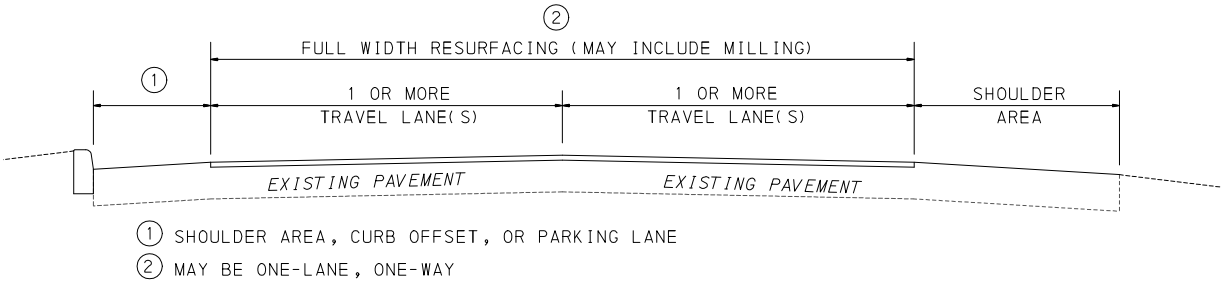
- Traffic signal timing modifications, repair or maintenance of pedestrian pushbuttons and the addition or modification of a closed loop system would not require modifications to meet PennDOT's standards.

B. Alteration Type Projects. The following projects include alterations that affect pedestrian usability. That is, when an existing element is replaced, it must either meet current PennDOT's standards or have an approved Technically Infeasible Form for any element that does not meet full compliance. The work does not require any additional work beyond the altered facilities; however, it may be beneficial to upgrade other unaltered pedestrian facilities as part of the project to improve access. Resurfacing is considered an alteration. Examples of Alteration Type Projects include:

- A resurfacing project, including maintenance resurfacing, affects the usability of pedestrian paths that cross the resurfacing area. This alteration project must install new curb ramps where any pedestrian route crosses a curb and upgrade existing curb ramps to the latest PennDOT standards. Provide access to pedestrian push buttons to the maximum extent feasible. The resurfacing project would not require the existing sidewalks or driveways within the limits of the project to meet PennDOT's standards since the sidewalk and driveways are not altered as part of the project.

- When utility or roadway maintenance work such as mechanized patching requires the resurfacing of the full width of the roadway and that resurfacing goes through a Pedestrian Accessible Route (PAR), it is considered an alteration and the curb ramps on both ends of the PAR must be in compliance with ADA standards to the maximum extent feasible. Full width of the roadway is defined as the outside travel lane edge to outside travel lane edge. See figure below.

  When utility or roadway maintenance work requires resurfacing of one or more travel lanes, but not the full width of the roadway, and the resurfacing does not extend the pavement lifecycle, curb ramp upgrades will not be triggered. Documentation should be put into the file indicating the pavement resurfacing schedule has not been affected due to the lane resurfacing required by the utility or roadway maintenance work. Adjusting the utility or roadway maintenance work resurfacing requirements or other utility or roadway maintenance scopes of work to avoid ADA requirements is not allowed.



- A signal project includes installing a new signal pole and push buttons on one corner of an intersection. Part of a curb ramp flare must be sawcut and removed in order to install the signal pole foundation. The installation of a signal pole is an alteration to the pedestrian push button but not an alteration to the sidewalk or street even though a small portion of the curb ramp is impacted and therefore the curb ramp does not need to be upgraded as a part of this project. If the pole is placed where it has a negative impact on the pedestrian access route, the negative impact must be addressed.

- A signal project included removing an existing signal pole, installing a new signal pole and installing push buttons on one corner of an intersection. The corner of the intersection has sidewalk but is missing a curb ramp. The installation of the pedestrian push button and signal pole is not an alteration to the sidewalk or street; however, PennDOT may not deny access to the push button and must provide access to the push button.

- Traffic signal mast arm modifications/relocations, addition/upgrade/relocation of the pedestrian detection system (push buttons, audible system, etc.), addition of a new pedestrian signal system that was not previously incorporated into the intersection, lane widening that modifies the existing pedestrian system (relocation of pedestrian poles, timing modifications, etc.) are all alterations that would require the altered facility to meet PennDOT's standards.

- A utility company decides to relocate its utility lines underground, requiring the reconstruction of a substantial length [equal to or greater than 30 m (100 ft)] of existing sidewalk. The newly constructed sidewalk will need to meet PennDOT's standards. The limits of the sidewalk to be replaced must be extended to meet logical termini. Curb ramps must be installed or upgraded and must be provided at all street crossings and signalized entrances unless a pedestrian study determines accommodations are not warranted. The limits will be determined by the Assistant District Executive (ADE of Design, ADE Services, or their designate using sound engineering judgment, considering factors such as ownership of

the sidewalk, degree of impact, complexity of the solution and overall project scope. If the work disturbs 50% or more of the sidewalk width and the limit of sidewalk reconstruction is within 15 ft of a pedestrian crossing, curb ramp upgrades will be required for that corner or mid-block crossing. For projects over 300 ft, if a pedestrian crossing or curb ramp is within 5% of the total disturbed length of sidewalk, curb ramp upgrades will be required for that corner or mid-block crossing. For example, a 572 ft sidewalk disturbance would be required to extend 28.6 ft to upgrade a crosswalk or install a required crosswalk. The measurement will be from the end of disturbance to the edge of the existing (or missing) landing or ramp or crosswalk line.

- Striping (not restriping) of a crosswalk improves the pedestrian crossing and is an alteration. Alterations to the pedestrian path must also upgrade curb ramps at the crossing.

- Minor widening or geometric improvements are being made to a non-curbed section of roadway in a rural area with no evidence of existing pedestrian activity (i.e., worn dirt paths, visual observation of people walking in roadway, adjacent bus stops, adjacent pedestrian destinations such as schools or shopping centers, etc.). The project would not require the installation of new sidewalks if it is not within a designated growth area or if a pedestrian study does not support the need.

- A substantial section of sidewalk is to be reconstructed under an area-wide sidewalk contract. The entire section will be required to be replaced to PennDOT's standards. The sidewalk must extend to logical termini. As a rule of thumb, if more than 50% of a run of sidewalk is being replaced, the entire length should be upgraded to PennDOT's standards.

C. Reconstruction and New Construction Type Projects. The following projects are typically major projects including new construction, reconstruction, retrofit projects, sidewalk retrofit projects and community enhancement projects. These projects will be held to the highest standards regarding pedestrian usability and ADA compliance. A Technically Infeasible Form will be required for any reconstructed pedestrian facility that does not meet PennDOT's standards. Technically Infeasible justification may only be applied to New Construction in very limited circumstances. These projects must evaluate the need for pedestrian circulation paths, including PAR's between logical termini. Pedestrian needs should be evaluated in the planning phase (Pre-TIP), refined and/or reevaluated in scoping and preliminary engineering. Coordination with the local municipality is critical to this process.

- New construction or reconstruction of a curbed roadway must evaluate adding new or upgraded sidewalks and curb ramps to PennDOT's standards at all street crossings and signalized entrances.

- New construction or reconstruction of a bridge in an urban area or an area with evidence of existing pedestrian activity (i.e., worn dirt paths, visual observation of people walking in roadway, adjacent bus stops, adjacent pedestrian destinations such as schools or shopping centers, etc.) must evaluate adding new or upgraded sidewalks and curb ramps to PennDOT's standards.

- A community enhancement project must evaluate including new sidewalk or improve the existing sidewalk and curb ramps to PennDOT's standards within the project limits and extending the limits to logical termini. If aerial utilities are to be moved to support the project, they must be either relocated entirely outside of the new sidewalk or, if necessary, within the sidewalk (last resort) outside of the PAR where they will not become obstructions to ensure access for all pedestrians to the maximum extent possible.

- A park and ride lot or an expansion to an existing park and ride lot must evaluate providing or upgrading sidewalks and curb ramps that meet PennDOT's standards to access adjacent sidewalks, bus stops or transit stations. When transit loading areas are within the park and ride lot, they must meet the requirements of the proposed 2011 PROWAG.

- When it is determined through a pedestrian study that sidewalk is to be included in the project scope, the municipality will be responsible for future maintenance. A sidewalk maintenance agreement must be signed or sidewalk will not be installed or reconstructed. See Section 6.6.

- Minor widening or geometric improvements are being made at an intersection with curb, but no existing sidewalk. If a pedestrian study determines there is a need to accommodate pedestrians (i.e., local or regional plans, worn dirt paths, visual observation of people walking in roadway, adjacent bus stops, adjacent pedestrian generators and attractions such as schools or shopping centers, etc.) new sidewalk meeting PennDOT's standards should be evaluated for construction in the area of the widening and extend to logical termini. Curb ramps must also be installed or upgraded where pedestrian paths cross curbs.

- A resurfacing project includes the addition of new sidewalk within the project limits. All new sidewalk and curb ramps within the project limits must meet PennDOT's standards.

- A developer widens the roadway to provide an auxiliary lane. As a result, the existing sidewalks are impacted. The developer must replace the impacted sidewalk along their frontage, and may need to replace the remaining pedestrian facilities within the project limits to PennDOT's standards.

- A developer wants to modify their existing access onto PennDOT right-of-way. There currently is no sidewalk along the property frontage and there is evidence of existing pedestrian activity and/or existing sidewalk along the frontage of adjacent businesses. The developer must install curb ramps meeting PennDOT's standards at all street crossings and signalized entrances along the property frontage. The developer may be required to install new sidewalk along the property frontage and extend the improvements beyond the frontage to logical termini in accordance with municipal ordinance to provide pedestrian continuity and connectivity.

- New construction or reconstruction of shared use paths must meet PennDOT's standards, which includes providing curb ramps wherever a trail crosses a curb.

- Placement of a new signalized intersection or complete upgrade of an existing signalized intersection must meet PennDOT's standards.

D. Connections to Existing Facilities. All construction must meet PennDOT's standards. At the limits of the project or limits of construction, connections to the existing sidewalk or other facilities will be required. At these tie in locations, deviation from the standards may be necessary to match the existing facility. For example, as part of a curb ramp upgrade, a small portion of sidewalk has been reconstructed at a width equal to 1525 mm (60 in). The existing sidewalk width is equal to 915 mm (36 in) at the tie in location. In this example the sidewalk width will transition from the proposed width to the existing width. See Publication 72M, *Roadway Construction Standards*, RC-67M for Transition to Existing Sidewalk Detail. A Technically Infeasible Form is not required for transitions required to connect to existing facilities.

6.4 LIAISON WITH LOCAL GOVERNMENT AND PRIVATE PROPERTY OWNERS

Maintaining the proper liaison with local governments and school districts concerning the installation and funding of accessibility facilities is an important part of this policy. Local governments must be kept informed of any adjacent roadway project scope of work that entails accessibility facilities that may affect their facilities or require their participation in funding or maintenance responsibilities.

A. Americans with Disabilities Act: Reimbursement and Maintenance for Curb Ramps with Local Municipalities. Resurfacing projects, including overlay, wearing course resurfacing and mill and fill projects, are considered an alteration to the roadway and to any pedestrian path that is crossed. As per Title II requirements under the ADA, when a facility is altered, the facility must meet the current standards. A federal court decision (Kinney v. Yerusalim, 1993) determined the pedestrian crossing and the curb ramps are to be considered as a single unit. Therefore, when the pedestrian crossing is altered, the curb ramp is also considered altered and must be reconstructed or upgraded to meet the current standards by the entity performing the alteration. If PennDOT performs the resurfacing project or impacts the pedestrian path, PennDOT is ultimately responsible to see that all curb ramps meet the current PennDOT standards.

Coordination must be completed with the local municipality to discuss financial and maintenance responsibilities.

1. 100% Federal Funded Projects.
- PennDOT will not seek any reimbursement from the municipality.

2. 100% State Funded Projects.
- Pedestrian facilities that provide access across state routes – PennDOT will fully fund.
- Pedestrian facilities that provide access across local roads – Municipality will fully fund.
- Pedestrian facilities that provide access across both state routes and local roads – 50/50 cost sharing.

3. Federal State and Local Funded Projects.
- Each party will be responsible for their percentage of the total project cost.
    - See Chapter 6, Appendix B, for Charts 1-6, funding scenarios.

As per State Highway Law of 1945, local municipalities will be responsible for maintaining all structures located outside of the curb lines. A maintenance agreement will be required for all sidewalk installation and replacement projects, except projects performed under an HOP. The maintenance agreement process is to be completed in the design phase of the project, prior to advertising. Maintenance agreements will not be required for installation or replacement of curb ramps and/or level landings where such installation or replacement is done to provide ADA compliant facilities.

According to the State Highway Law of 1945, Sections 502, 513, 522 and 542, the Secretary of Transportation has determined that the Department will perform roadway maintenance between curblines and will not perform maintenance for pedestrian structures such as, but not limited to, curb, sidewalks, curb ramps and level landing areas. This includes level landings providing access to pedestrian pushbuttons. These pedestrian structures located outside of the curb lines will be maintained by municipalities. The only exceptions to this allocation of maintenance responsibilities are those set forth specifically by agreement [or for such structures on bridges maintained by the Department].

Curb ramps and level landings are portions of the sidewalk system that provide ADA compliant pedestrian accessibility across the roadway and to pedestrian pushbuttons. Curb ramps and level landings are installed pursuant to ADA requirements, not Section 670-416 of the State Highway Law.

With respect to sidewalk installation or replacement projects, if a municipality chooses not to sign the maintenance agreement, the Department can (a) cancel the project; (b) reduce the scope of work for the project, or (c) program a project in another municipality that is willing to sign the agreement. As part of the cooperation, a local government or group of local governments may choose to meet with the Department to map out long range plans.

A series of coordination letters and a reimbursement and maintenance agreement has been developed to expedite coordination with municipalities (See Chapter 6, Appendix C). The municipality has several methods of reimbursement:

1. The municipality must make payment to the Commonwealth in full within thirty (30) days of receipt of such invoice.

2. The municipality, after receipt of such invoice, must make monthly payments to the Commonwealth for a period of one (1) year. The payments must be in equal amounts and total all costs.

3. The municipality must make payment to the Commonwealth in full after receiving the necessary funds from a Pennsylvania Infrastructure Bank (PIB) loan. The municipality must make payment to the Commonwealth in full within thirty (30) days of receipt of such loan, which must be no longer than sixty (60) days after completion of the Project.

4. The municipality authorizes the Commonwealth to withhold and apply a portion of the municipality's Liquid Fuels Tax Fund allocation as necessary to reimburse the Commonwealth in full for all costs.

Should municipalities choose not to participate in funding their curb ramps, the Department will adjust the project limits of work. The Department will address curb ramps along state routes only and adjust milling and resurfacing operations to follow along the face of curb thereby not impacting the curb ramps along the local roads. In some

cases it will be necessary to upgrade the curb ramps along the local road in order to correctly upgrade the curb ramps along the state route. If the municipality chooses not to participate in funding curb ramps, the Department will fund the local curb ramps in order to comply with ADA regulations.

B. Installing Curb Ramps Located Outside of the Public Right-of-Way. The acquisition of right-of-way for the construction of curb ramps is dependent on the scope of work for the project. If the project scope includes right-of-way acquisition, then right-of-way must be acquired where applicable for curb ramp construction. However, if the project scope does not include right-of-way acquisition, then right-of-way will not be acquired for curb ramp installations. The following should be noted:

1. PennDOT typically does not have maintenance responsibility beyond the face of curb but still may have right-of-way that extends beyond the face of curb.

2. Municipal right-of-way is public right-of-way. Curb ramps and other pedestrian facilities may be installed or upgraded within the municipal right-of-way.

For sidewalk or curb ramp construction on private property (sidewalk area is in public use and project scope that does not include right-of-way acquisition), perform the following coordination with the property owner:

1. Send initial certified letter (Authorization to Enter Introduction) to the property owner explaining the scope of the project and the affect on their property. See Chapter 6, Appendix D, Attachment A. Include Form RW-397A, Authorization to Enter (Waiver of Claim).

2. Set up an appointment with the property owner and **PennDOT personnel** to have property owner sign off on Form RW-397A, Authorization to Enter (Waiver of Claim).

3. Outcome 1. Property owner signs Form RW-397A, Authorization to Enter (Waiver of Claim).
- Construct curb ramp to current standards.

4. Outcome 2. Property owner refuses to sign Form RW-397A, Authorization to Enter (Waiver of Claim).
- Send a second certified letter (Authorization to Enter Failure to Respond) notifying the property owner of their liability. See Chapter 6, Appendix D, Attachment B.
- Depending on available right-of-way:
  - Install new or upgrade existing curb ramp to the maximum extent feasible.
  - Do not install new or upgrade the curb ramp, and add the existing curb ramp to the ADA Transition Plan to be addressed in the future.
  - Document that authorization to enter has been denied from the property owner (with the Technically Infeasible Form).

6.5 PEDESTRIAN ACCESS ROUTE

The pedestrian access route (PAR) as defined by PROWAG is a continuous and unobstructed walkway within a pedestrian circulation path that provides accessibility. Pedestrian accessible routes may include parking access aisles, curb ramps, crosswalks at vehicular ways, walks, ramps, roadway shoulders, water table on bridge decks, and lifts. The following sections will discuss many of these facilities separately; however, these facilities share the common requirements of the PAR.

A. PAR General Requirements.

1. Surface Requirements. The surface must be stable and firm with a slip resistant textured finish. A standard test has not been identified for measuring slip resistance; therefore sound engineering judgment must be used in the determination.

2. Elevation Differences. For elevation differences located within the PAR (excluding depressed curb for curb ramps) existing changes in level up to 6.4 mm (0.25 in) in height may remain without any edge treatment. Changes in level greater than 6.5 mm (0.25 in) and less than or equal to 13 mm (0.5 in) height must be beveled

with no slope greater than 1V:2H (50.00%). Changes in level greater than 13 mm (0.5 in) height must be accomplished by means of a sloped surface such as a ramp or curb ramp.

3. Grate Openings and Horizontal Gaps.

a. Expansion Joints. The use of expansion joints should be minimized and their size should be less than 13 mm (0.5 in) in width. Expansion joint material is required where the curb ramp adjoins any rigid pavement, sidewalk, curb or structure. The top of the joint filler must be flush with the adjacent concrete surface.

b. Inlet Grates. Inlet grates located within the pedestrian access route must have spaces no greater than 13 mm (0.5 in) wide in one direction. If gratings have elongated openings, then they must be placed so that the long dimension is perpendicular to the dominant direction of pedestrian travel.

4. Longitudinal Slopes. The least possible slope must be used for the PAR. The maximum desirable slope is 1V:20H (5.00%); however, when the PAR is located within the public right-of-way, including vehicular bridges, the longitudinal slope may match the adjacent roadway profile slope. It may be necessary to temporarily exceed the roadway profile when crossing driveways or providing curb ramps. Where an overpass, underpass, bridge, or similar structure is designed for pedestrian use only and the approach slope to the structure exceeds 5 percent, a ramp, elevator, limited use/limited application elevator, or platform lift shall be provided. Elevators and platform lifts shall be unlocked during the operating hours of the facility served.

5. Cross Slopes. Cross slopes may not exceed 1V:50H (2.00%). The cross slope of curb ramps, blended transitions, and turning spaces shall be 2 percent maximum. At pedestrian street crossings without yield or stop control and at midblock pedestrian street crossings, the cross slope shall be permitted to equal the street or highway grade. See 2011 PROWAG R304.5.3 for more information.

6. Unobstructed Width. Minimum unobstructed widths of 1220 mm (48 in) provide the necessary room for pedestrians using wheelchairs. This is consistent with PROWAG and exceeds the 2010 ADA Standards minimum clear widths of 915 mm (36 in). See Figure 6.1.

Note: The 2010 ADA Standards allow for a 915 mm (36 in) minimum clear width with provisions to allow an 815 mm (32 in) clear width if the obstruction (such as a street sign) is less than 610 mm (24 in). The Department's standards exceed this width. Appropriate application of the 2010 ADA Standards minimum clear width is acceptable in determining if existing facilities are accessible.

a. Protruding Objects. Refer to Figure 6.3. Objects projecting from walls such as signs, telephones, canopies, etc. with their leading edges between 685 mm and 2030 mm (27 in and 80 in) above the finished sidewalk must protrude no more than 100 mm (4 in) into any portion of a sidewalk (Figure 6.3(a)). Objects mounted with their leading edges located less than 685 mm (27 in) or more than 2030 mm (80 in) above the finished sidewalk may project any amount provided they do not reduce the required continuous passage along the sidewalk (Figures 6.3(a) and (b)). Free standing objects mounted on posts may overhang their mountings a maximum of 305 mm (12 in) when located between 685 mm and 2030 mm (27 in and 80 in) above the ground or finished sidewalk provided they do not reduce the required continuous passage along the sidewalk (Figures 6.3(c) and (d)). Note: The 2010 ADA Standards and PROWAG depict overhead clearance as 2030 mm (80 in); **however, refer to the *MUTCD* for traffic signal mounting requirements.**

b. Headroom. Guide rail, handrail or other barriers must be provided when the vertical clearance of an area along or adjoining a sidewalk or continuous passage is less than 2030 mm (80 in) high. The leading edge of such barriers must be located a maximum of 685 mm (27 in) above the finished sidewalk (Figures 6.3(a) and (c-1)).

7. Landing Requirements.

a. Size. A minimum 1220 mm × 1220 mm (48 in × 48 in) landing must be provided where pedestrians perform turning maneuvers or require resting areas. When the turning area is confined by walls, curbs or

other obstructions, the landing must be 1525 mm × 1525 mm (60 in × 60 in). See Figure 6.2 for the 2010 ADA Standards wheelchair turning space requirements for confined spaces.

b. Slope. The surface slope of the landing must not exceed 1V:50H (2.00%) in longitudinal slope or cross slope.

8. Detectable Warning Surfaces (DWS). The PAR must also have a standardized detectable warning surface comprised of truncated domes as detailed in Publication 72M, *Roadway Construction Standards*, RC-67M. For pedestrians with vision impairments, detectable warnings can provide a confirming cue of the street edge. Normally the DWS is installed as part of a curb ramp; however, a DWS must be installed where the PAR crosses streets, alleys or railroads. Detectable warning surfaces should not be provided at crossings of residential driveways since the pedestrian right-of-way continues across residential driveway aprons. However, where commercial driveways are provided with yield or stop control, detectable warning surfaces should be provided at the junction between the pedestrian route and the vehicular route. DWS must be bid as "either/or" items. The contractor can choose from any of the product types listed in Publication 35, *Approved Construction Materials* (Bulletin 15). Requests to use a specific type must be approved by the Bureau of Project Delivery, Highway Delivery Division, Project Schedules, Specifications and Constructability Section.

a. Contrast. Many colors are available for the DWS. It is recommended that the color selection is coordinated with in-place DWS. The DWS must contrast light-on-dark or dark-on-light. Currently a standard test has not been defined to measure the contrast; therefore, contrast must be determined using sound engineering judgment.

b. Dome Arrangement. The domes must be aligned in parallel and perpendicular rows and columns in relation to the edge of the tile or unit. This dome arrangement allows the truncated domes to be installed in the direction of the PAR, path of the wheelchair travel and perpendicular to the grade break at the toe of the ramp or curb ramp. This will provide pedestrians using wheelchairs the ability to maneuver between the domes rather than travelling over them. Older versions of the truncated domes are arranged in diagonal rows in relation to the edge of the tile or unit. This older configuration is still detectable as a warning surface for existing in-place applications, but should not be used for future construction.

c. DWS in Roadway Shoulders. Roadway shoulders are designed and constructed to support the roadway and, as a general rule, are not constructed as a PAR and are not required to comply with ADA requirements. DWS should not be installed in the shoulder. At intersections without sidewalks, connecting trails, or other accessible pedestrian circulation paths systems, marked or unmarked crosswalks to shoulders do not require DWS in the shoulder. In the rare case the shoulder is intended to be a PAR, it should be constructed with a 2% cross slope and DWS will be required in the shoulder at crosswalks. Central Office ADA Coordinator approval is required for construction of shoulders as a PAR. See Section 6.5.B.4.

d. Pedestrian Pushbutton Access. Ramps and level landings to access pedestrian pushbuttons, located behind the shoulder, will still have DWS. DWS should be placed in the ramp or level landing, outside the shoulder, at the back edge of the shoulder. Intersection raised islands that intersect a crosswalk are considered barriers to access and require curb ramps and DWS.

e. At cut-through pedestrian refuge islands, detectable warning surfaces shall be placed at the edges of the pedestrian island and shall be separated by a 610 mm (2.0 ft) minimum length of surface without detectable warnings. Detectable warning surfaces are not required at pedestrian refuge islands that are cut-through at street level and are less than 6.0 ft in length in the direction of pedestrian travel. Where a cut-through pedestrian refuge island is less than 6.0 ft in length and the pedestrian street crossing is signalized, the signal should be timed for a complete crossing of the street.

B. PAR Miscellaneous Requirements.

1. Algebraic Grade Difference. The algebraic grade difference between any two surfaces, such as the road surface and curb ramp, must not exceed 13.33%. Where the algebraic grade difference exceeds 13.33%, a 610 mm (24 in) transition strip must be used to create a more gradual change in grade. Transition strip slope

must not exceed 1V:20H (5.00%). See Publication 72M, *Roadway Construction Standards*, RC-67M for details.

2. Driveway Aprons. This information will supplement the information presented in Chapter 7, Driveways. Excessive cross slope on driveway aprons can be a significant barrier for pedestrian use. A level area with minimal cross slope is necessary for accessible passage across a driveway. Driveway aprons that are constructed like ramps, with steep, short side flares, can render a section of sidewalk impassable, especially when encountered in series, as in residential neighborhoods. Compound cross slopes, such as those that occur at the flares of a driveway apron or curb ramp, may cause tipping and falling if one wheel of a wheelchair loses contact with the ground or the tip of a walker or crutch cannot rest on a level area. Even with narrow sidewalks along the curb, it is possible to design a sidewalk to pass across the driveway apron without exceeding a cross slope limitation of 1V:50H (2.00%). Sidewalks that cross multiple driveways that are close together can create a rollercoaster effect as the sidewalk ramps up and down to cross the driveways. Consider keeping the top of sidewalk at driveway elevation until all driveways have been crossed. Another option is to use a reduced height sidewalk between driveways while trying to keep the ramp slopes under 5%, with 8.33% as a maximum. See Chapter 7, Driveways.

3. Utilities. Existing utilities, such as electric boxes, manholes, inlets, fire hydrants and electric poles, may remain in the PAR given the utility meets the previously mentioned requirements. Proposed utilities should be placed outside of the PAR where feasible or at a minimum where they do not obstruct the PAR.

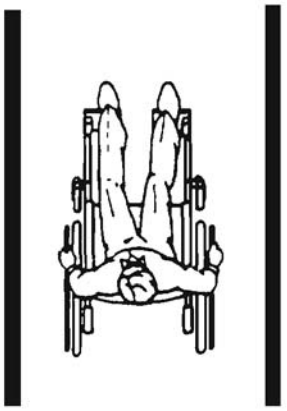
4. Roadway shoulders and the water table on bridge decks are not constructed to be pedestrian facilities and are therefore not required to comply with ADA requirements, although pedestrians are permitted to use them. Roadway shoulders and water tables on bridge decks should be constructed according to current design standards. If pedestrian needs are such that sidewalks are warranted along the corridor, but cannot be constructed; construct the shoulders according to current standards and, if practical, grade the area adjacent to the shoulder to facilitate future sidewalk installation. In the rare case pedestrian needs warrant construction of shoulders at 2%, Central Office ADA Coordinator approval is required. An executive summary of the pedestrian study and plans needed to give a corridor overview should be submitted with the approval request.

5. When replacing an existing bridge that has sidewalk, and there is no sidewalk on either approach to the bridge, the new bridge may not require sidewalk. The pedestrian study should check to see if there are future plans for sidewalk on the bridge approaches. If both approaches do not have sidewalk and there are no future plans for sidewalks on both approaches, then most likely sidewalk would not be warranted. The new bridge shoulders should be constructed according to current design standards, unless the bridge shoulders provide connectivity between two existing PAR's.

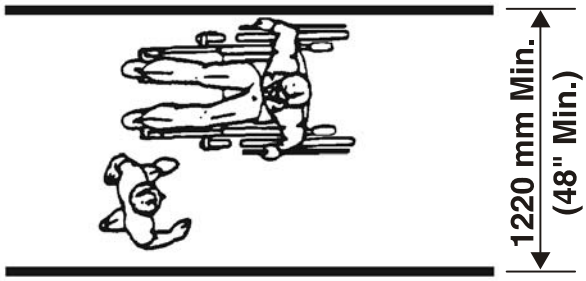
6. On July 26, 2011 the U.S. Access Board released for public comment proposed guidelines for accessible public rights-of-way. The guidelines provide design criteria for public streets and sidewalks, including pedestrian access routes, street crossings, curb ramps and blended transitions, on-street parking, street furniture, and other elements. The specifications comprehensively address access that accommodates all types of disabilities, including mobility and vision impairments, while taking into account conditions and constraints that may impact compliance, such as space limitations and terrain, as indicated in an overview of the rule. The 2011 proposed guidelines, or PROWAG, can be found here: www.access-board.gov/prowac/nprm.pdf.

7. Shared Use Paths are designed for both transportation and recreation purposes and are used by pedestrians, bicyclists, skaters, equestrians, and other users. The U.S. Access Board is currently in the process of developing guidelines for Shared Use Paths. Shared use path design is similar to roadway design but on a smaller scale and for lower speeds. Whether located within a highway right-of-way, provided along a riverbank, or established over natural terrain within an independent right-of-way, shared use paths differ from sidewalks and trails in that they are primarily designed for bicyclists and others for transportation purposes such as commuting to work.

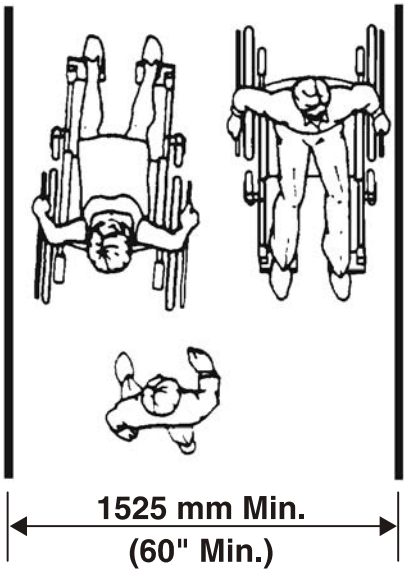
The Advanced Notice of Proposed Rulemaking (ANPRM) for Shared Use Paths, published on March 28, 2011, can be found at: www.access-board.gov/sup/anprm.pdf.



(a)
Minimum Clear Width
for Single Wheelchair



(b)
Minimum Passage Width for One Wheelchair
and One Ambulatory Person



(c)
Minimum Clear Width
for Two Wheelchairs

*The 2010 ADA Standards **minimum clear width does not equate to sidewalk width.** Sidewalk widths must be 1525 mm (60 in) minimum. The sidewalk width may be reduced to 1220 mm (48 in) if 1525 mm × 1525 mm (60 in × 60 in) passing areas are provided every 61 m (200 ft). Consider pedestrian volume in determining required sidewalk width. Minimum accessible path must be 1220 mm (48 in) minimum. These widths exceed the 2010 ADA Standards minimum clear width of 915 mm (36 in) for a single wheel chair due to the probability of multiple pedestrians.

FIGURE 6.1
Minimum Clear Width Dimensions

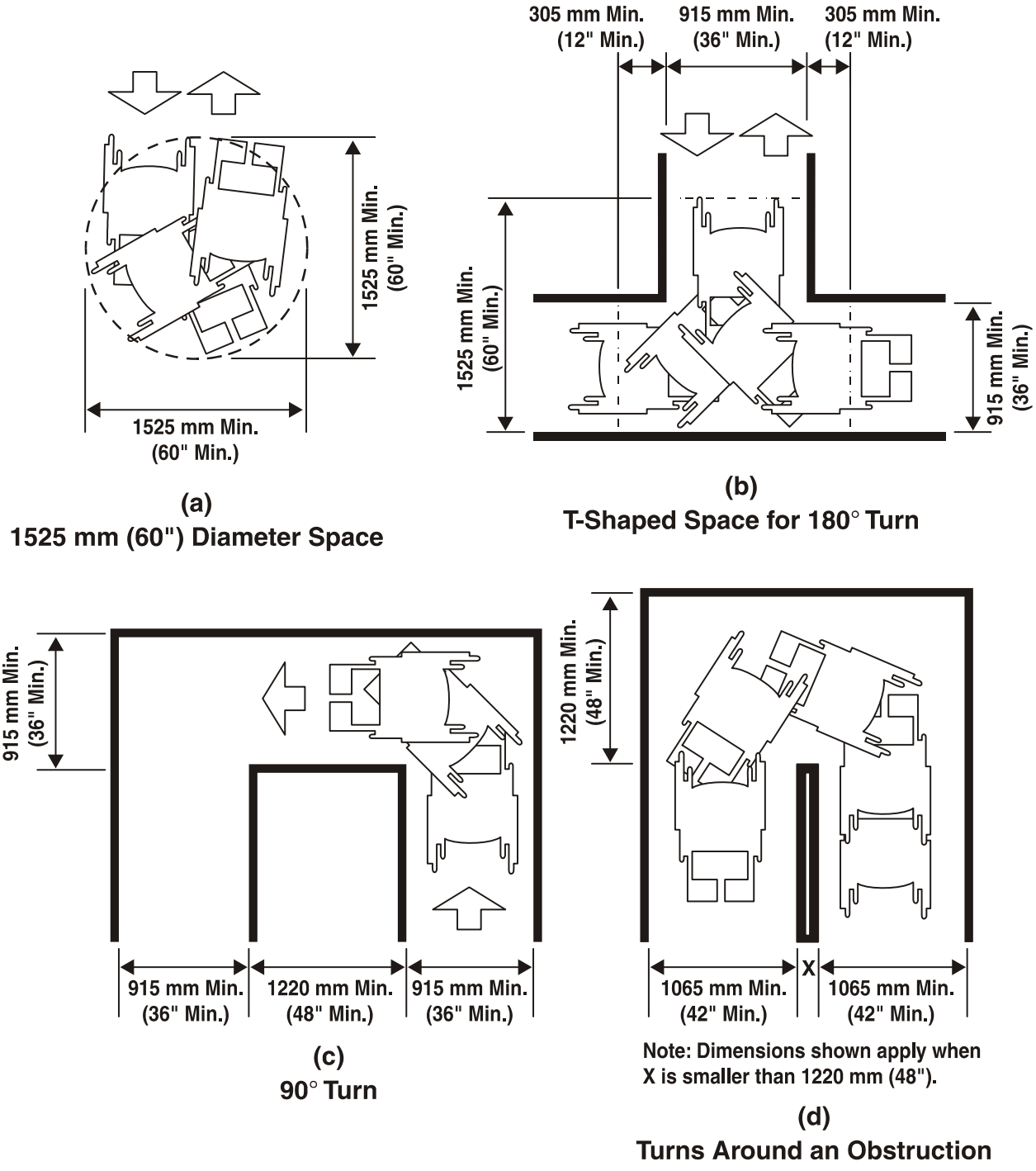
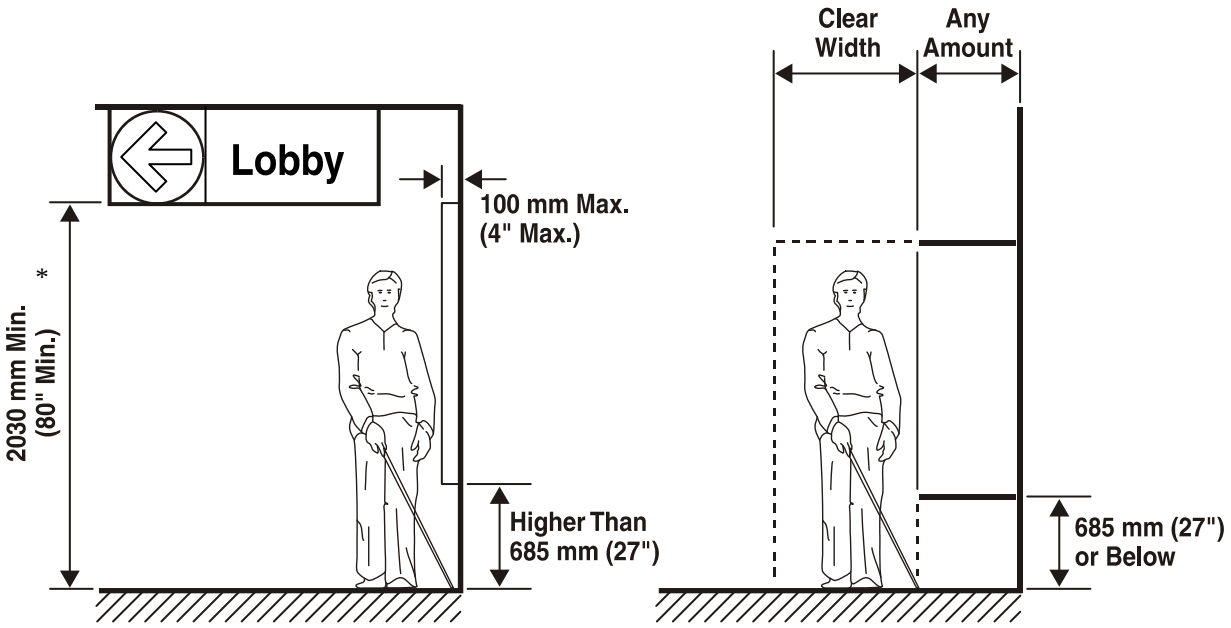
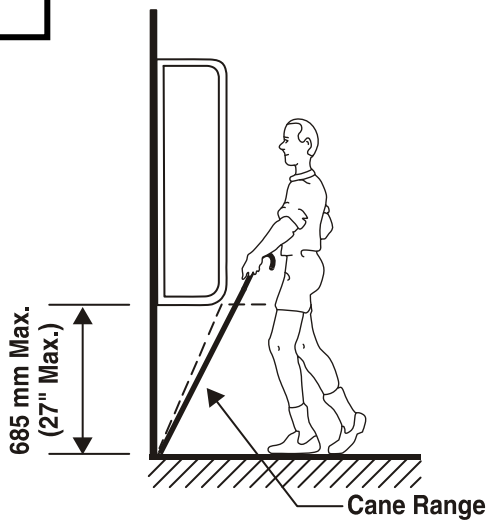


FIGURE 6.2
Wheelchair Turning Space



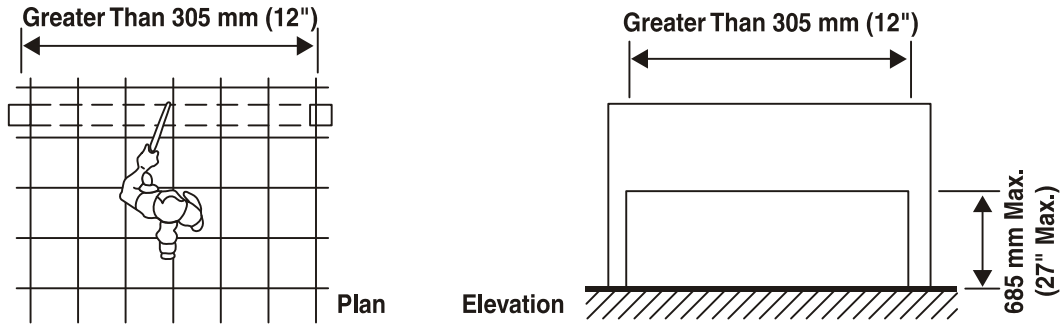
(a)
Walking Parallel to a Wall

*Refer to the *MUTCD* when placing traffic signals.

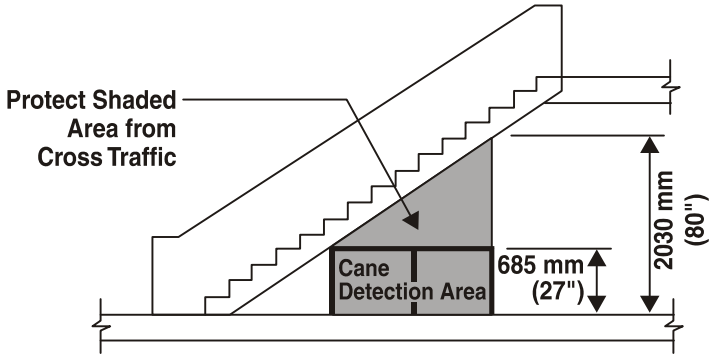


(b)
Walking Perpendicular to a Wall

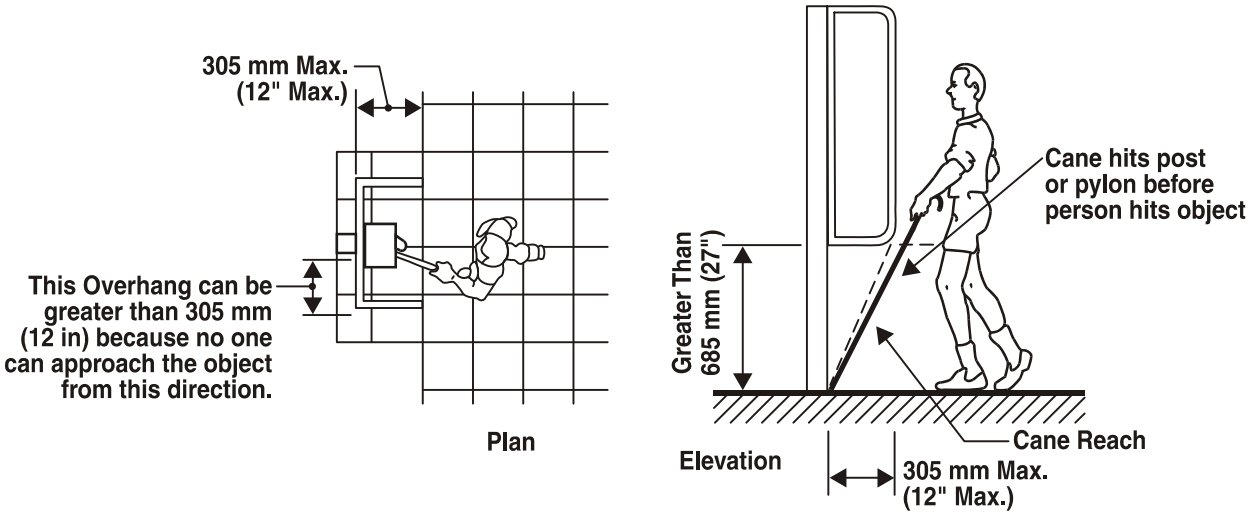
FIGURE 6.3
Protruding Objects



(c) Free Standing Overhanging Objects



(c-1) Overhead Objects



(d) Objects Mounted on Posts or Pylons

FIGURE 6.3 (Continued)
Protruding Objects

8. On June 20, 2007, the Access Board issued a Notice of Proposed Rulemaking (NPRM) to establish accessibility guidelines pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails, and beach access routes that are constructed or altered by or on behalf of the Federal government. The latest version of The Draft Final Accessibility Guidelines for Outdoor Areas can be found at: www.access-board.gov/outdoor/draft-final.pdf.

6.6 SIDEWALKS

Sidewalks are an essential part of the urban street cross section. In rural and suburban areas, community development such as schools, local businesses, industrial plants and recreation areas may result in pedestrian concentrations that make sidewalks a necessity. In many cases, the absence of roadway lighting and higher traffic speeds in rural areas increases the potential for vehicle and pedestrian conflicts.

In general, wherever roadside and land development conditions affect regular pedestrian movement along a highway, sidewalks should be considered. As a general practice, sidewalks should be constructed along any roadway without shoulders where there is a need to provide pedestrian accommodation. Where sidewalks are built along a high-speed highway, buffer areas should be established to separate pedestrians from the travel way.

The following policy on sidewalks is consistent with the Smart Transportation theme to consider all highway corridor modes.

The Department may construct new sidewalks when pedestrian needs have been evaluated and the needs of pedestrians have been determined as follows:

1. A sidewalk has been programmed as a project or project component through the Transportation Improvement Program (TIP) process.

2. A municipality requests the inclusion of sidewalks to be installed as part of the programmed (post TIP) Department project. The municipality has agreed to fund the sidewalk construction and any additional right-of-way costs.

3. The Department may replace sidewalks when an existing sidewalk is removed, relocated or altered, as a result of the Department project.

4. The need to accommodate critical pedestrian safety needs has been identified within the limits of a Department project. (i.e., Pedestrians are forced to walk in traffic lanes between pedestrian generators with an existing or potential crash history.)

In all of the above scenarios, the municipality is responsible for future sidewalk maintenance. A maintenance agreement must be executed or ordinances clarifying maintenance responsibilities must be in place. If a municipality refuses to accept ownership and maintenance responsibilities for a proposed sidewalk, then that sidewalk should be deleted from the scope of work. If practical, grade the area adjacent to the shoulder to facilitate future sidewalk installation. Roadway shoulders and the water table on bridge decks are not constructed to be pedestrian facilities and are therefore not required to comply with ADA requirements, although pedestrians are permitted to use them. Roadway shoulders and water tables on bridge decks should be constructed according to current design standards.

Should the need for sidewalks be identified in the scoping process and the municipality is unwilling to participate in funding and/or maintenance responsibilities, the design and construction of the project should consider features that do not preclude future sidewalk installations. Topographical limitations and funding availability must be considered in this evaluation.

There are several tools available to analyze pedestrian needs:

1. Pedestrian Study Determination - Chapter 6, Appendix E

2. Bike/Pedestrian Checklist - Publication 10X, Design Manual, Part 1X, *Appendices to Design Manuals 1, 1A, 1B, and 1C*, Appendix S.

3. TE-672 Pedestrian Accommodation at Intersections Checklist, see the following link: ftp.dot.state.pa.us/public/PubsForms/Forms/TE-672.pdf

4. Local and Regional Planning Documents

A. Agreements.

1. Establish an agreement between jurisdictional and contributing entities (Department, municipality, developer, project sponsor, etc.) on the cost sharing responsibilities for sidewalks that address the following conditions:

a. A reimbursement agreement clarifies the cost to be borne by the contributing entities of the total sidewalk, curbing and incidental construction costs.

b. A reimbursement agreement clarifies the right-of-way acquisition and costs, and utility relocations, adjustments and cost to facilitate the sidewalk.

c. A reimbursement agreement is required when Federal and/or State funds in combination with local matching funds are used for a project.

2. An agreement is not necessary if the above responsibilities are addressed through the issuance of a Highway Occupancy Permit (HOP).

B. Funding.

1. It is Department policy not to use State funds for sidewalk construction. At the discretion of the Department, State funds may be used for a limited number of applications as described below:

a. ADA compliance for alterations as defined in Americans with Disabilities Act policy and design guidance in this Manual.

b. The construction of new sidewalks to accommodate critical pedestrian safety needs that have been identified within the limits of a Department project.

c. To replace sidewalk where an existing sidewalk is removed, relocated or altered as the result of a Department project.

2. For sidewalks within public right-of-way:

a. Federal funds with local matching funds may be used for construction within public right-of-way when a pedestrian need is identified.

b. State funds may be used for construction within the public right-of-way for those applications noted in Section 6.6.B.1.

3. For sidewalks outside existing public right-of-way:

a. Federal funds may be used on sidewalk outside public right-of-way if the sidewalk will be constructed as part of a Transportation Enhancement (TE) or Federal Safe Routes to School (SRTS) project.

b. Federal funds with local matching funds when applicable may be used on a right-of-way purchase required for sidewalk construction including ADA accommodations, to remediate a critical pedestrian

safety need, to replace an existing sidewalk, or for new sidewalk installations. The project scope includes right-of-way acquisition.

c. Federal funds and/or State funds may be used on private property, when replacing an existing curb ramp or when an "Authorization to Enter (Waiver of Claim)" is in place.

d. State funds may be used on a right-of-way purchase to construct those applications as noted in Section 6.6.B.1.

C. Sidewalk Maintenance. Sidewalk maintenance is the responsibility of the municipality. The municipality may use its maintenance forces or require abutting landowners to maintain the sidewalk through municipal ordinances. Refer to the following for further guidance:

1. A maintenance agreement, generally between the municipality and the Department or municipal ordinances clarifying maintenance responsibilities, is required for a sidewalk on public right-of-way.

2. A maintenance agreement is required for a sidewalk on private property where local ordinances do not stipulate maintenance responsibilities.

D. Additional Support Information.

1. The Federal requirement for consideration of pedestrian need is provided in the Safe, Accessible, Flexible, Efficient Transportation Equity Act - a Legacy for Users (SAFETEA-LU) of 2005. Based on SAFETEA-LU, Federal funds may be used to construct sidewalks. Independent pedestrian-based projects are often funded through Transportation Enhancement, Hometown Streets, or Safe Routes to School projects. Furthermore, the Department's Smart Transportation Policy, Pennsylvania's Mobility Plan, the Statewide Bicycle and Pedestrian Plan and Context Sensitive Solutions, all strongly advocate enhanced pedestrian access and mobility.

2. The Department's legal authority to construct sidewalks emanates in part from the Highway Act of 1945; and Act 120.

3. Financing the cost of a new sidewalk to meet a critical pedestrian safety need may derive from different sources, including but not limited to the Surface Transportation Program (STP), TE, SRTS, Highway Safety Improvement Program (HSIP) funds, State funds, Act 44 funds, County funds, Bridge Bill funds, and Capital funds.

E. Highway Occupancy Permit. New development along existing highways may increase pedestrian traffic to the point that it is desirable to construct curbs and sidewalks. In this situation, the property owner or the local government may request a highway occupancy permit (HOP) to construct a curb and sidewalk within the Department's right-of-way. The permit should be prepared in accordance with the Department's "Highway Occupancy Permit Manual" and will be reviewed to ensure that the development plans identify appropriate curb ramp locations or other ADA accessibility requirements. The request to construct curbs on any State highway where curbs do not presently exist must be reviewed by the responsible PennDOT District Office to determine the effects of the curb on safety, capacity, drainage, and pedestrian access.

F. General Information. The Department should first attempt to enter into a maintenance agreement. However, sidewalks may be constructed by the Department on bridges or through tunnels with no abutting property ownership with whom to attach maintenance responsibility. In these rare cases, the Department may accept maintenance responsibility.

On projects where the Department's work requires the replacement of curbs and the sidewalk is not disturbed, the Department must replace the area of sidewalk needed to provide for curb ramp accessibility.

When the existing sidewalk width is equal to or greater than 1525 mm (60 in), the preferred width of new sidewalk connecting to existing sidewalk will equal the width of the existing sidewalk. When the existing sidewalk width is less than 1525 mm (60 in), the width and cross slope must be transitioned as indicated in Publication 72M, *Roadway*

Construction Standards, RC-67M. The approximate limits of sidewalk removal and replacement will be determined by the cross slope transition and the width transition, where the longest transition length controls.

Where sidewalk is to be replaced to a building line, the floor elevations and entrances will control the grade. Drainage flow must be away from the building at all points on the sidewalk.

Installing barriers such as railings, curbs, or walls along the edge of the sidewalk should be considered when adjacent ground surfaces abruptly fall away from the sidewalk elevation.

6.7 SIDEWALK DESIGN CRITERIA

Sidewalks must meet the following criteria:

1. See PAR requirements in Section 6.5.

2. Minimum sidewalk width of 1525 mm (60 in). The sidewalk width may be reduced to 1220 mm (48 in) if 1525 mm × 1525 mm (60 in × 60 in) passing areas are provided every 61 m (200 ft). Consider pedestrian volume in determining required sidewalk width. Minimum accessible path width may not be less than 1220 mm (48 in). These widths exceed the 2010 ADA Standards minimum clear width of 915 mm (36 in) for a single wheelchair due to the probability of multiple pedestrians. See Figure 6.1 for the 2010 ADA Standards minimum clear width dimensions associated with wheelchair accessibility.

3. Handrails are not required on sidewalks.

4. Sidewalks must be separated from vehicular travel lanes by curbs, planting strips or other barriers which will be continuous except where interrupted by driveways, alleys or connections to accessible elements.

6.8 PEDESTRIAN GRADE SEPARATION FACILITIES

A. Physical Separation. The physical separation of pedestrian and vehicular traffic and their associated control measures vary and depend largely on the following factors for consideration:

1. Pedestrian-generating sources in the area
2. Pedestrian crossing volumes
3. Vehicular traffic volumes to be crossed
4. Type of highway and number of lanes to be crossed
5. Location of nearest crossing facility
6. Number of vehicles turning at intersections

The intersection of pedestrians' access routes and vehicles may sometimes present serious problems, especially where arterial streets traverse a business district and there are intersections with high-volume cross streets. In extreme cases, grade separations for pedestrians provide the only satisfactory solution. Although separations for pedestrians are justified in some instances, at-grade crosswalks will remain the predominant form of crossing. Conflict is minimized if the crosswalks are properly placed, designed, maintained and operated. The use of other physical barriers such as median barriers, guide rail, refuge islands and fencing should also be studied to protect pedestrians at crossing locations.

In most cases, the use of a pedestrian overpass will be more acceptable than an underpass since pedestrians are more reluctant to use an underpass due to other safety considerations.

The aesthetic and economical design of pedestrian grade separation facilities should be encouraged and can best be accomplished by recognizing the need for pedestrian grade separation in the planning and preliminary design stages. This permits maximum latitude in site selection and grade line adjustments between the pedestrian grade separation facility and the highway.

B. Access. All pedestrian grade separation facilities must meet the following minimum accessibility criteria:

1. Access Provisions.

a. See PAR General Requirements in Section 6.5 for additional requirements unless noted otherwise below.

b. Provide pedestrian sidewalks and ramps at all separation structures. Where warranted and possible, a stairway can also be provided in addition to the ramp. In certain situations, access by platform lift (wheelchair lift) or elevator may be necessary. Note: Ramps are used to traverse an elevation difference at various locations such as building entrances; curb ramps are used to traverse the elevation difference of a curb. See Section 6.9 for Curb Ramp Design Considerations.

c. Some persons with mobility impairments may find lengthy ramps more difficult to negotiate than stairs complying with the proper design criteria. Care is necessary to avoid inadvertently creating a mobility problem for one group of people while accommodating another group.

d. Walkways should have a minimum 2440 mm (96 in) width.

e. Maximum slopes of adjoining accessible routes not to exceed a gradient of 1V:20H (5.00%).

f. Walkways with a slope gradient greater than 1V:20H (5.00%) will be considered ramps.

2. Ramps and Landings.

a. Use flattest gradient possible. Ramp slopes between 1V:20H (5.00%) and 1V:16H (6.25%) are preferred for easier access. Wheelchair users with disabilities affecting their arms or with low stamina have serious difficulty using inclines (ramps). Many people cannot manage a 1V:12H (8.33%) slope for a 9 m (30 ft) distance. The maximum ramp slope is 1V:12H (8.33%).

b. Maximum length of ramps between landings is dependent on the slope and horizontal projection as indicated in Table 6.1.

c. Maximum rise between landings is 760 mm (30 in).

d. Landing width must be at least as wide as the widest ramp run approaching the landing and have a minimum clear length of 1525 mm (60 in) due to a confined turning space.

e. If a ramp changes direction at a landing, the minimum landing size must be 1525 mm × 1525 mm (60 in × 60 in) due to a confined turning space.

f. Ramps must have level landings at the bottom and top of each run.

g. Circular style ramps are not recommended since they normally have non-uniform cross slopes which do not permit all wheelchair wheels to be on the ground at the same time. The lack of level landings also does not permit any resting areas for people with limited stamina.

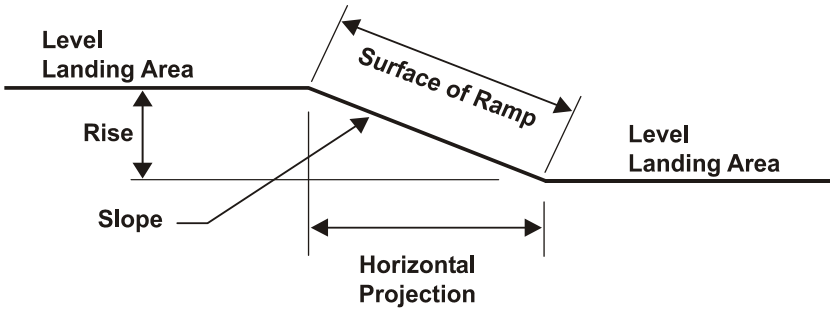


TABLE 6.1
RAMPS BETWEEN LANDING AREAS

TYPICAL RAMP DIMENSIONAL ELEMENTS BETWEEN LANDING AREAS		
SLOPE	**RISE (Maximum)**	**HORIZONTAL PROJECTION (Maximum)**
1V:12H < 1V:16H	760 mm (30 in)	9 m (30 ft)
1V:16H < 1V:20H	760 mm (30 in)	12 m (40 ft)

3. Handrails (See Figures 6.4, 6.5 and 6.6).

a. In addition to any protective railings, parapets or fencing, provide handrail on both sides of all stairways and ramp runs exceeding a 150 mm (6 in) rise or an 1830 mm (72 in) horizontal projection in order to provide support for balance and security in ascending or descending the structure.

b. Top of gripping surface for handrail must be mounted between 860 mm and 965 mm (34 in and 38 in) above the ramp surface and be parallel with the ramp or landing surface.

c. Where handrails are not required, provide a 50 mm (2 in) minimum height curb or other vertical guard to prevent drop off from ramp or landing.

d. Ends of handrail must be either rounded or returned smoothly to floor, wall or post and should not project into any walkway.

e. Clear space between handrail and wall surface must be a minimum of 38 mm (1.5 in).

f. If handrails are not continuous, they must extend at least 305 mm (12 in) beyond the top and bottom of the ramp segment.

g. Handrails must not rotate within their fittings.

h. Avoid recessed handrail locations in vertical surfaces.

i. Handrail materials should be capable of withstanding bending moments of at least 1112 N (250 lb) horizontal concentrated load. Fasteners and support mounts should withstand an 1112 N (250 lb) shear load and 1112 N (250 lb) tensile load.

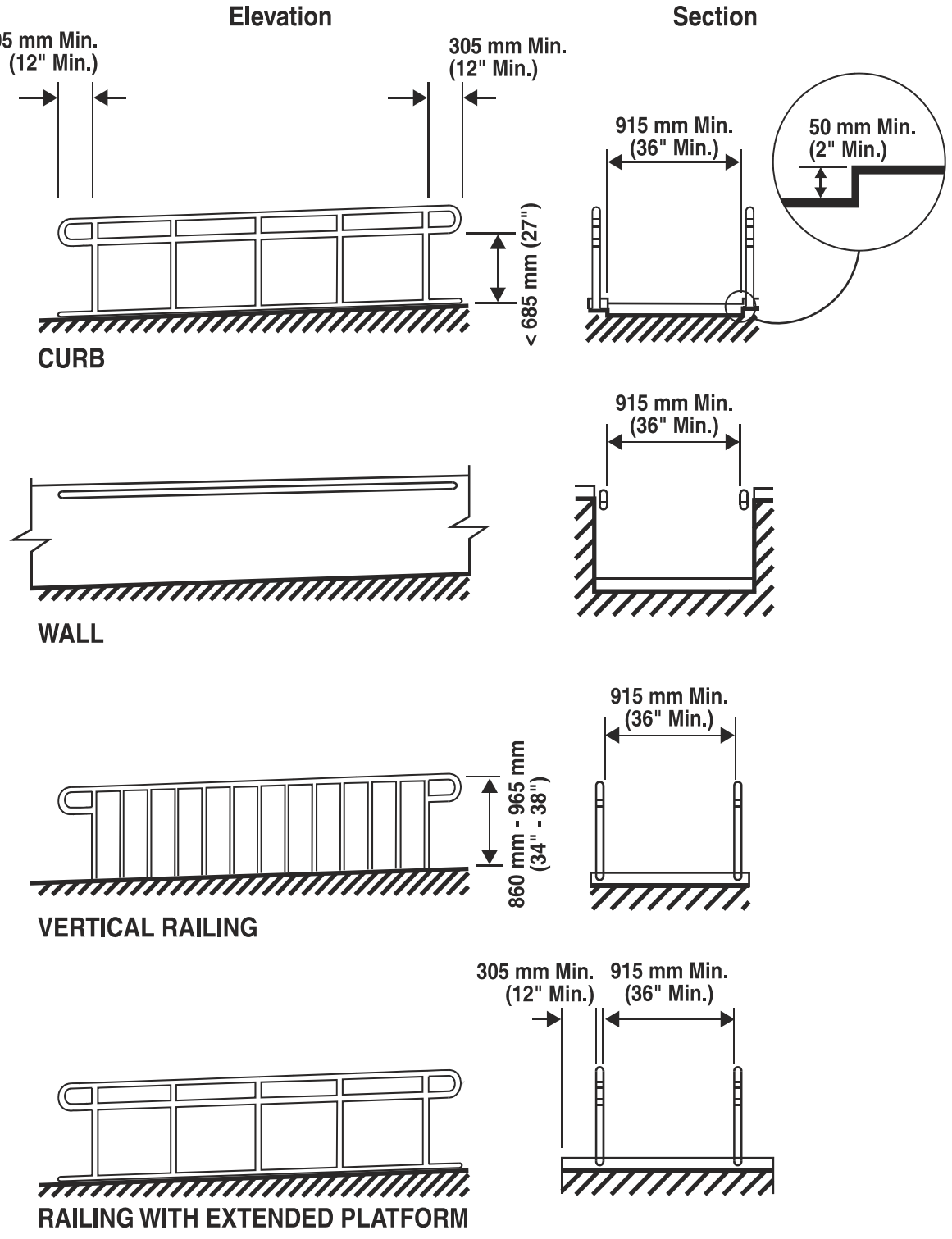


FIGURE 6.4

Examples of Edge Protection and Handrail Extensions

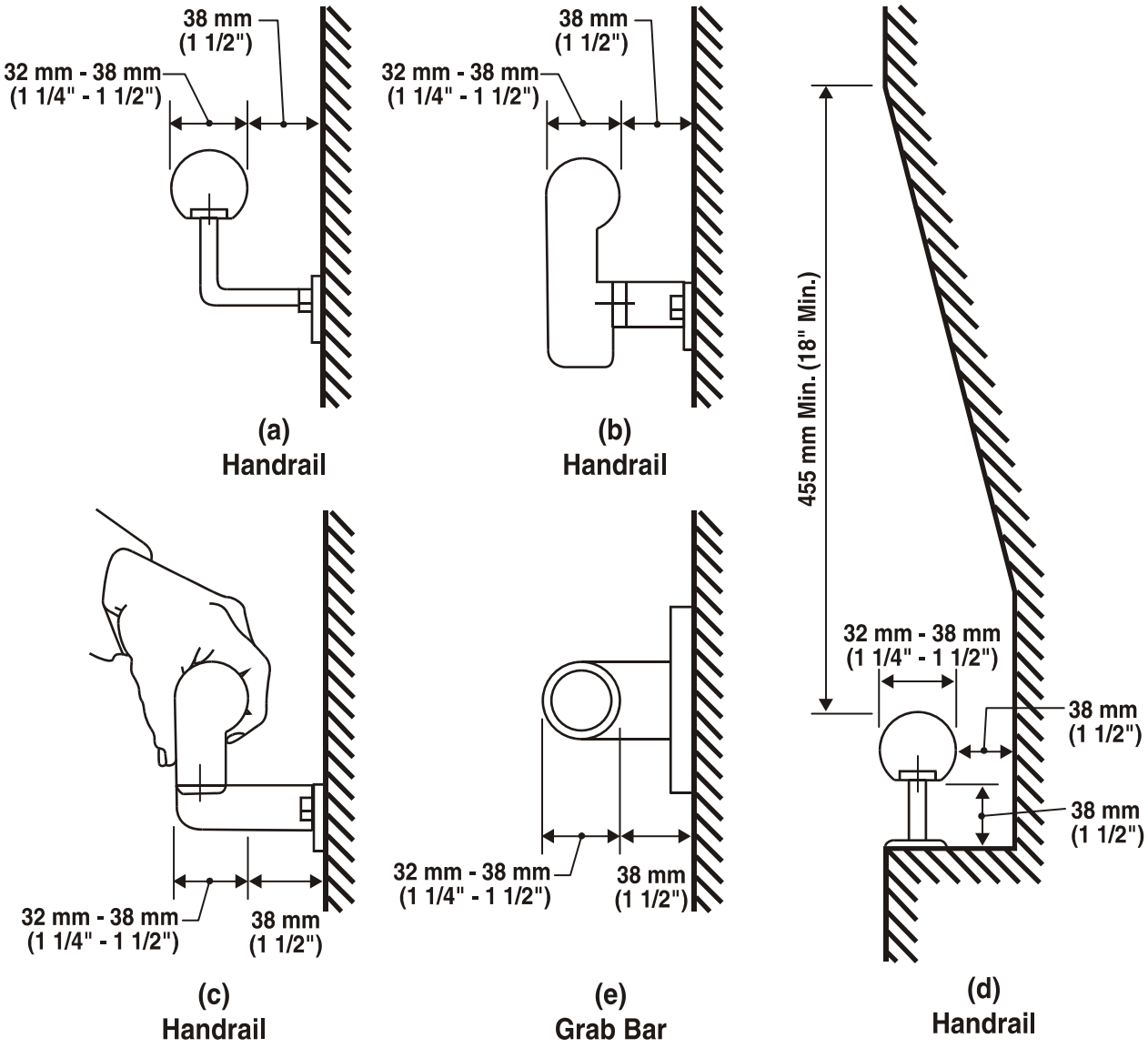
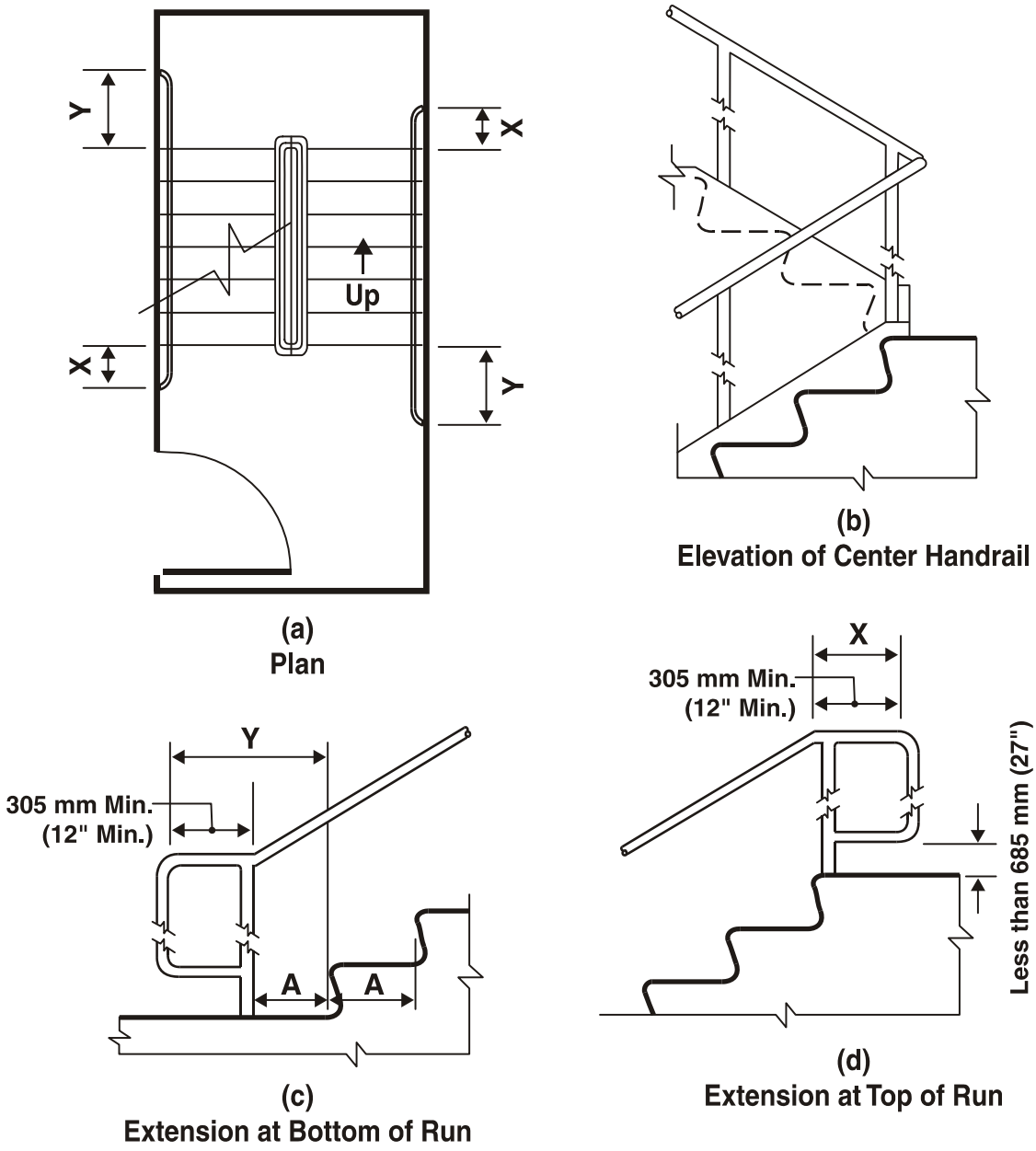


FIGURE 6.5
Size and Spacing of Handrails and Grab Bars



NOTE:
X is the 305 mm (12 in) minimum handrail extension required at each top riser. Y is the minimum handrail extension of 305 mm (12 in) plus the width of one tread (A) that is required at each bottom riser.

FIGURE 6.6
Stair/Step Handrails

4. Stairways (See Figures 6.6 and 6.7).

a. Maximum 180 mm (7 in) riser (R = vertical rise in millimeters (inches)), 130 mm (5 in) is preferred.

b. Tread (T = horizontal projection in millimeters (inches)) length designed to appropriate standard stair design formulas to achieve the needed slope as approved. Minimum tread width of 280 mm (11 in). A common stair design formula is 2R + T = 660 mm (26 in).

c. Use rounded tread nosing with maximum 13 mm (0.5 in) radius of curvature.

d. Provide landing for every 1525 mm to 1830 mm (60 in to 72 in) change in elevation and if possible avoid using over 10 steps or less than three steps per flight.

e. Provide handrail along both sides of the stairway.

f. Winding the stairway or reversing the stair direction alignment can reduce space requirements.

g. Pitch stairs surface so that water will not accumulate on walking surfaces. Maximum pitch is 2.00%; 1.00% pitch is recommended.

h. Do not use open tread steps or steps with projected nosings.

i. No part of a stairway should overhang a walkway at or below head height. A clear head room passageway above the walkway of 2135 mm (84 in) minimum is required.

j. Stairways that lead to a walkway should be setback from the edge of the stair nosing at least 585 mm (23 in) from the walkway at the bottom and at least 305 mm (12 in) at the top.

5. Additional Criteria. Additional design criteria for pedestrian grade separation facilities are found in the AASHTO Bridge Specifications.

6. Lighting.

a. The installation of lighting at pedestrian grade separation structures should be carefully considered.

b. Stairways which have regular use should have at least shadow lighting to indicate the beginning and end and if possible the edge of each tread.

c. The simplest lighting approach is an overhead light placed to one side on the upper height of the stairway with the luminaires directed to shine down upon the stairway. Avoid placing landscape plant material in locations where their shadows may obscure the intended light illumination on the ramp or stairway.

d. An illumination guideline for ramps or stairways is to provide a minimum average of 22 lx (2.0 footcandles) of light on the intended surface.

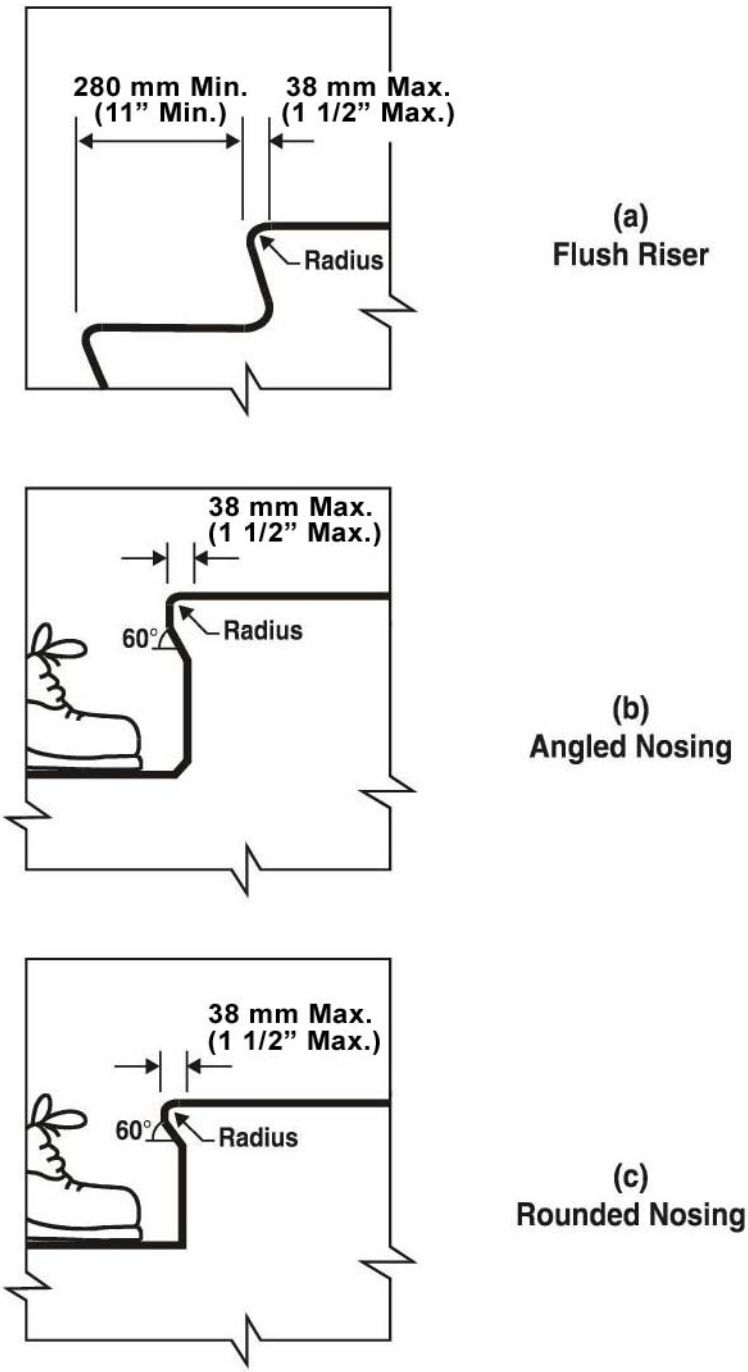


FIGURE 6.7
Usable Tread Width and Examples of Acceptable Nosings

6.9 CURB RAMP DESIGN CONSIDERATIONS

A. Existing Conditions. Curb ramps are constructed to permit people in wheelchairs to cross a curb with ease. Design of curb ramps may vary in relation to the following existing conditions:

1. Sidewalk width.
2. Sidewalk location with respect to the back face of curb.
3. Height and width of curb cross section.
4. Design turning radius and length of curve along the curb face.
5. Angle of street intersection(s).
6. Planned or existing location of sign and signal control devices.
7. Stormwater inlets and public surface utilities.
8. Possible sight obstructions.
9. Street width.
10. Other physical obstructions such as buildings, bridges and walls.
11. Roadway grade.
12. Parking spaces.

The ADA Law, 28 CFR Part 35.151(e) - New construction or alterations provides the general direction for the placement of curb ramps: (1) Newly constructed or altered streets, roads and highways must contain curb ramps or other sloped areas at any intersection having curbs or other barriers to entry from a street level pedestrian walkway. (2) Newly constructed or altered street level pedestrian walkways must contain curb ramps or other sloped areas at intersections to streets, roads, or highways.

Resurfacing projects and "curb ramp only" projects do not typically include changes to roadway geometry, including roadway profile grade. When the roadway profile grade exceeds 2%, and profile adjustments are not in the scope of work, the depressed curb must be constructed to match the roadway profile and the curb ramp cross slope will transition to meet the roadway profile grade as gradually as possible, but not to exceed a rate of change of 3% per LF. In normal crown sections, stormwater flow must be maintained along the curb line and the roadway should not be adjusted in any way that would alter the flow line. Transitioning the curb ramp cross slope to the roadway profile allows the pedestrian to adjust to the cross slope of the crosswalk in the safety of the area behind the curb and does not push stormwater into the vehicular path. Curb ramps and the flared sides of curb ramps shall be located so that they do not project into vehicular traffic lanes, parking spaces, or parking access aisles.

B. General Considerations. All curb and sidewalk areas being constructed or reconstructed in the Commonwealth must provide curb ramps for persons with physical disabilities as shown in Publication 72M, *Roadway Construction Standards*. The following must be considered in the design of curb ramps.

1. A curb ramp must be provided at locations that meet the criteria of the referenced ADA Law, Part 28 CFR Part 35.151(e).

2. All slopes are measured with respect to a level plane. The upward pitch (slope) of a road profile or sidewalk away from the curb will effectively increase the total height to be negotiated by the curb ramp.

3. Crosswalk markings serve primarily to guide pedestrians across roadways in the proper path and also to warn the motorist of a pedestrian crossing point.

4. Curb ramps should be wholly contained within marked pedestrian crosswalks (excluding flared sides for non-diagonal curb ramps) to keep crosswalk widths to a minimum and to enable ramp use to be incorporated as part of the established pedestrian control at the intersection.

5. Separate curb ramps to provide space for curb ramp flares and landing areas. Moving the curb ramp to the side may increase the width of the crosswalk. See Figure 6.8.

6. Curb ramps are not limited to intersections and marked crosswalks but should also be considered at other appropriate points of pedestrian concentration or access such as refuge medians/islands, mid-block crossings, parking areas and other traffic separation islands. At uncontrolled pedestrian crossings, a warrant analysis may

be required to evaluate pedestrian needs and safety. Access may also be provided at raised median, refuge and other traffic islands by providing a level street elevation crossing cut through the island. Islands or medians to be accessed by curb ramps on each side should be wide enough to have a minimum 1220 mm (48 in) level [1V:50H (2.00%)] surface between the curb ramps.

7. Adequate visibility is required to ensure safe pedestrian movement. A sight distance study is recommended to ensure that curb ramps are not placed at locations where motorists cannot see the low profile of people using wheelchairs. Vehicle parking must be eliminated at least 6.0 m (20 ft) from the inside pedestrian crosswalk line at intersections. Parking may also be eliminated at midblock crossings to provide access from the curb ramp and to increase the visibility of the pedestrian. See Chapter 6, Appendix F for standard letters.

8. Built-up curb ramps are not permitted in new construction and their use must be carefully evaluated in any alteration work location. Built-up curb ramps should not project into any vehicular traffic lane, parking space or access aisle. Built-up curb ramps are best utilized in parking lots or locations removed from vehicular traffic or major curb drainage flows. Snow removal considerations around these ramp projections must also be evaluated when considering the use of a built-up curb ramp.

9. Mountable curbs are not suitable for pedestrian access unless their design conforms to the curb ramp design criteria. Plain concrete gutter should not be used where curb ramps are proposed.

10. Raised median islands in crossing locations should not be less than 1220 mm (48 in) deep for cut through street level access openings. To allow for attendant assisted wheelchairs, 1830 mm (72 in) is required.

11. Curb ramps serving adjoining crosswalks should not be located too close to each other in order to avoid excessive undulating pavement surfaces which can be uncomfortable to walk on or become unsafe for pedestrians. See Figure 6.8 for the preferred design and Figure 6.9 for the non-desirable design. This situation often occurs at intersections having a curb radius less than 4.5 m (15 ft). As a last resort a continuous, wide, diagonal curb ramp may be considered in this situation for alteration work but is not permitted in new construction. Note: Diagonal curb ramps provide less pedestrian protection from turning vehicles and require ADE of Design approval.

12. If a curb ramp or other ADA accessibility feature cannot be designed to the appropriate standards, then a Technically Infeasible Form must be prepared describing the existing site constraints, design alternatives evaluated and the design alternative selected to provide access to the maximum extent feasible. The form must be reviewed, approved by the ADE of Design or delegate and placed in the project design document file.

13. Curb ramps must be oriented in such a fashion that the grade break is approachable by a pedestrian in a wheelchair. This can be accomplished by installing the curb ramp perpendicular to the curb. This allows for a wheelchair to make contact with both wheels before experiencing a change in grade. This may cause the curb ramp to not be in alignment with the crossing direction. The curb ramp may be installed in the same direction as the crossing and not perpendicular to the curb when a triangular landing is provided. This provides non-visual cues for pedestrians with visual disabilities. The triangular landing must be approximately level [1V:50H (2.00%)]. See Figure 6.11.

14. Narrow sidewalks may not provide the necessary space to install perpendicular curb ramps. A different curb ramp type such a Type 2 or Type 6 curb ramp must be considered. See Figure 6.12.

15. Where a pedestrian circulation path crosses the curb ramp, flared sides shall be sloped 10 percent maximum, measured parallel to the curb line. The use of steeper flares is acceptable provided they are protected from pedestrian traffic. See Figure 6.13.

16. Excessively steep curb ramps may deny access and must be reconstructed with an appropriate slope or be replaced by a different type of curb ramp. See Figure 6.14.

17. Vertical drops or lips located within the PAR may cause a pedestrian to trip or deny access to a pedestrian using a wheelchair. Curbed flares must be located outside of the pedestrian access route. A non-walk surface such as grass limits the PAR and will allow the installation of a curbed flare. See Figure 6.15.

18. Sidewalks, curb ramps and roadway drainage features must be designed and constructed to prevent surface drainage from ponding at the bottom of the curb ramp. Edge of road elevations at the flow line must be graded to ensure positive drainage. For new construction, additional inlets may be required to prevent drainage issues. See Figure 6.16.

19. In all cases, the designer must attempt to design using the smallest possible corner turning radius to improve overall intersection efficiency. The use of small turning radii provides many improvements such as:

Motor vehicle traffic must slow to make a turn, making it safer for pedestrians. Less head turning is required of motor vehicle drivers because they approach the intersection at closer to right angles. Crosswalks are shorter (sometime as much as 50% shorter), which decreases pedestrian crossing time, thus decreasing pedestrian green time. This is very important to persons who use walkers, canes, or otherwise have a slower crossing speed. Longer crossing distances may intimidate them into not even using the intersection. Crosswalks are closer to the intersection, improving overall sight distance. More sidewalk space is provided for pedestrians. Curb ramps can be built perpendicular to the crosswalks, enabling persons with visual disabilities to more easily navigate the intersection. Smaller radii greatly reduce the need for diagonal curb ramps. Long wheelbase vehicles may find it more difficult to turn. However, this can be addressed by pulling back the stop bar in the receiving street. If this involves a multi-lane street, pulling back the stop bar also improves safety and reduces motor vehicle/pedestrian crashes.

20. Diagonal curb ramps should be avoided. They offer limited guidance to the location of the crosswalk to pedestrians with visual disabilities.

21. The use of sidewalk bulb-outs should be considered where applicable to reduce crosswalk length and provide needed space to install curb ramps.

22. People with visual impairments often have difficulty using curb ramps since the curb ramp makes locating the edge of the street more difficult and the ramps and side flare surfaces may be more difficult to walk across. See Figure 6.17. Where possible, the curb ramps should be separated as far as possible but parallel to the direct line of pedestrian movement. See Figure 6.8.

23. The appropriate level of detail must be provided on the plans to ensure compliant construction. See Figure 6.18 for an overview of required details.

C. New Construction. The guidelines presented in this Chapter will apply to new construction unless specifically noted for alteration work only.

D. Alterations. The following should be considered for curb ramps in alteration projects.

1. Designing curb ramps for alteration projects will generally be more difficult than for new construction projects because existing conditions such as buildings, walls, sidewalk gradients, right-of-way width, etc. may limit the space available to provide the required accessibility. Specific curb ramp locations should be adapted to existing site conditions.

2. Curb ramps may necessitate the relocation of various existing features such as street signs, mailboxes, telephone booths, newspaper dispensers or other obstacles interfering with the desired accessibility. Relocating major utility conflicts such as fire hydrants, light poles, utility poles and drainage inlets should be assessed on a case by case basis.

3. Although existing conditions may dictate that pedestrian crosswalks be prohibited at an intersection, this restriction could possibly change at some time in the future. Appropriate measures, such as signal pole location

and placement of other utilities, should be taken to allow for future curb ramps. Curb ramp design is dependent on many factors; therefore, depressed curbs will not be installed for future curb ramp locations.

4. In general, when an existing space in the highway right-of-way is to be altered, each element in the space within the project scope or limits must comply with applicable requirements for new construction to the maximum extent feasible.

5. Alteration projects must not decrease or have the effect of decreasing the accessibility of a facility or a pedestrian circulation route below the requirements for new construction in effect at the time of the alteration. However, where the nature of the existing facility to be altered makes it technically infeasible to meet PennDOT's standards through the planned alteration, the maximum access feasible must be provided. For example, for an overlay project, an existing curb ramp must be upgraded and as a result the sidewalk must be closed. The alternate route is a sub-standard width sidewalk that cannot be expanded due to limited right-of-way. Other alternatives evaluated did not provide a greater level of access than the sub-standard width sidewalk. In this case it is technically infeasible to provide access fully meeting the standards during construction; however, access is provided to the maximum extent feasible given the situation.

6. An alteration of an existing facility must not impose a requirement for accessibility greater than required for new construction.

7. Alteration projects will not be required to expand a planned scope of work to include other items of accessibility. The scope of alteration work includes only the work included in the limits, boundaries, or scope of a planned project with no obligation to expand the scope or limits of a project to include other work or adjacent areas.

8. Existing project site conditions may limit accessibility design choices and should be identified early in the project scope. Depending on project scope, alteration projects may not require obtaining additional right-of-way. Alterations do not require narrowing roadway widths to comply with the design standards.

9. Newly issued accessibility guidelines will not require the need to upgrade existing accessibility facilities in the highway right-of-way at the time of the new guideline issuance if the accessibility facilities were constructed using previously approved accessibility standards. However, construction upgrades to the new standards will apply when the existing pedestrian route or facility is to be altered as part of a new planned project improvement to the roadway.

10. Alteration projects that include the installation of or relocation of telephone/utility poles, posts, street trees, fire hydrants, or other types of street furniture on or near existing pedestrian pathways will provide the required accessibility clearances designated for a pedestrian access route.

11. Any temporary construction activities required for alterations that affect existing pedestrian circulation paths will require the provision of a safe, alternate and accessible pedestrian route around the construction activities. The alternate route must comply with all applicable design guidelines to the maximum extent feasible so that the usability of the accessible route is maintained. The alternate route will be kept in place through the duration of the construction activity. See Section 6.14, Temporary Alternate Circulation Paths at Construction Sites.

E. Ramp Types. Curb ramp design criteria can be adapted to provide various configurations which may allow curb ramp installations in limited space conditions. See Figure 6.10 for adaptive curb ramp installations. Publication 72M, *Roadway Construction Standards*, RC-67M provides construction details for several curb ramp types that can be adapted to both new construction and alterations.

1. Type 1. The Type 1 curb ramp consists of a curb ramp and level landing for turning maneuvers at the top of the ramp. This curb ramp is ideal for locations where the existing sidewalk width is wide, provides a consistent path and allows the pedestrian to bypass the curb ramp when continuing on the sidewalk. The steeper ramp slope at the depressed curb provides better drainage than other curb ramps. The drawback of this curb ramp is the relatively wider required sidewalk width needed to install the curb ramp.

2. Type 2. The Type 2 curb ramp contains two ramps and a level landing at the roadway elevation. This curb ramp can be used on narrow sidewalks. Drawbacks include a flat slope at the depressed curb and pedestrians must traverse the curb ramps whether or not they desire to cross the street.

3. Type 3. The Type 3 curb ramp consists of a ramp that brings the street up to the top of the normal or non-depressed curb. Type 3 curb ramps can be used in situations where there is insufficient or no area available beyond the curb for other types of curb ramps. Type 3 curb ramps may not be used in locations where the ramp will project into vehicle traffic lanes, parking spaces, access aisles or interfere with curb drainage flows or snow removal operations. Type 3 curb ramps are not permitted in new construction. Negatives include pedestrians with visual disabilities may be confused by the detectable warning surface on the sidewalk and possible damage during snow removal operations.

4. Type 4 and Type 4A. Type 4 and Type 4A curb ramps are similar to a Type 1 curb ramp but utilize a curb or a steep flare slope that is placed outside of the path of the pedestrian. A non-walk surface or permanent barrier must deter or protect the pedestrian from crossing the unexpected vertical drop of the curb or steep flare slope. These curb ramps provide flares that may be installed where utilities limit the installation of flatter slopes. Depending on turning maneuvers, a landing may still be required.

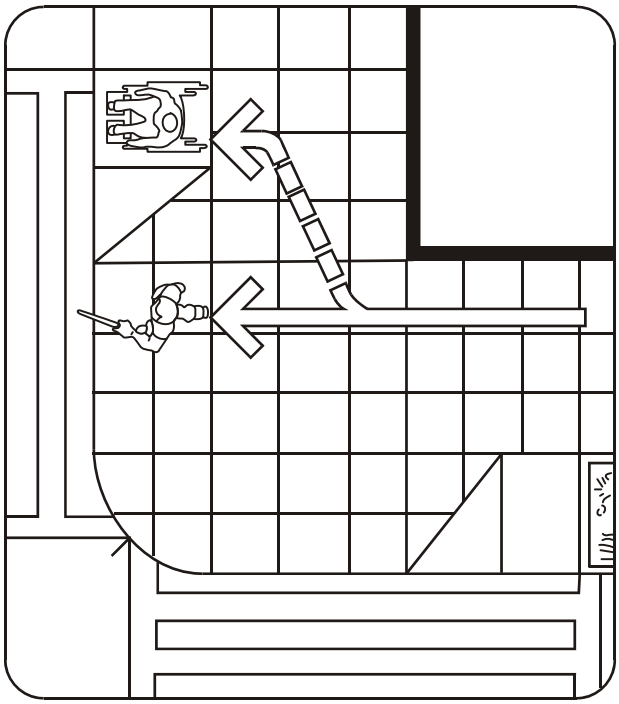
5. Type 6. The Type 6 curb ramp is a combination ramp that utilizes a ramp from the street leading to a landing where the pedestrian can access both left and right directions for a total of three ramps. A plain cement concrete curb cheek wall is necessary to fit the curb ramp into the adjacent ground surface. This curb ramp is ideal in residential areas where a green/planted strip separates the sidewalk from the curb. Drawbacks include the pedestrian must traverse the ramps when continuing on the sidewalk and the additional form work to construct.

6. Blended Transition. The blended transition pedestrian walkway is not considered a curb ramp since all surfaces slopes are less than 1V:20H (5.00%) gradient. This flat pedestrian transition connection to the level of the roadway is good for wheelchair users, but is less desirable for persons with visual impairments since locating the edge of the roadway is more difficult and less protection from turning vehicles is provided. Guidelines in Figure 6.17 must be followed when considering this type of pedestrian walkway.

7. Median or Refuge Island Access Openings. These openings provide access through a median or refuge island where there is need for pedestrians to walk across the median or island. The Type B detail indicates a sloped flare side to connect to the adjacent ground surface, but this flare is not designed to be an accessible slope. The median opening is only intended for narrow openings. If drainage flows through the opening, debris will collect on the truncated domes.

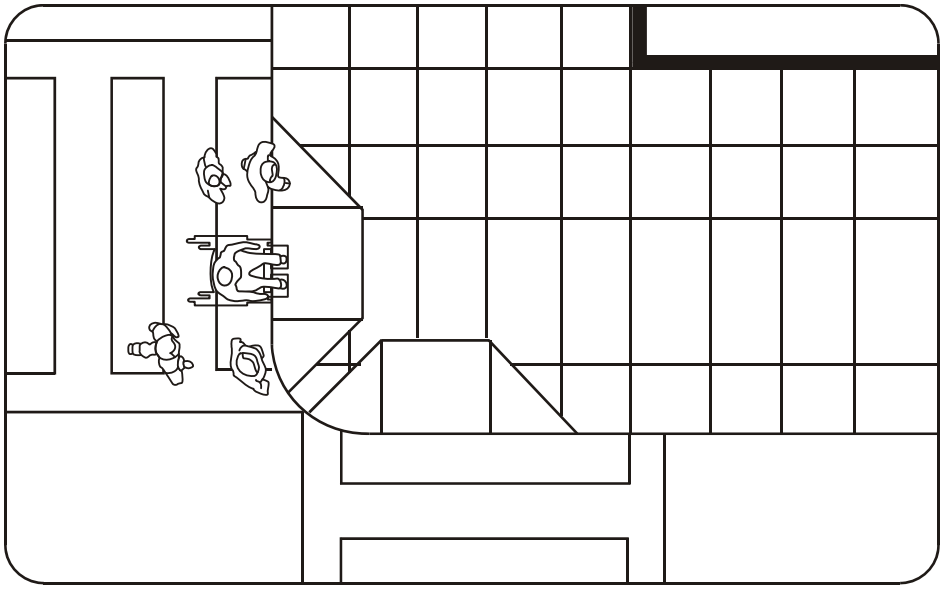
8. Ramped Medians or Islands. This design places back to back curb ramps separated by a landing area. The landing area is intended to provide pedestrians a resting area. The ramps as compared to an access opening will not allow drainage to flow directly through the median and thus prevents debris collection. This design is difficult to use since the median width must be wide enough to install the ramps and landing area.

F. Non-standard Curb Ramps. When a standard curb ramp cannot be installed due to existing conditions, a non-standard curb ramp may be needed. Non-standard curb ramps must meet the curb ramp design criteria. See Section 6.11, Curb Ramp Design Criteria. When a non-standard curb ramp is used, appropriate detail must be included in the construction plans.



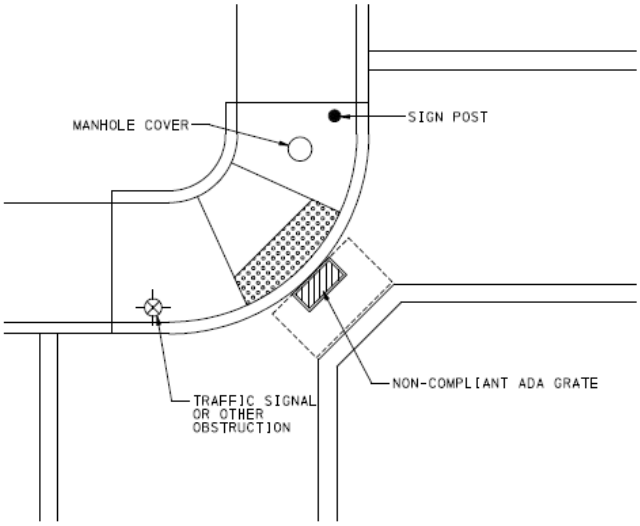
Note: Curb ramp located to the side, away from direct line of pedestrian movement.

FIGURE 6.8
Curb Ramps at Marked Crosswalks



Note: Avoid locating curb ramps too close together.

FIGURE 6.9
Curb Ramps at Marked Crosswalks



POTENTIAL SOLUTIONS:
FOR ALTERATIONS: UTILITIES IN THE PATH OF TRAVEL ARE ACCEPTABLE IF A 4'-0" PEDESTRIAN PATH IS MAINTAINED, THE TOP SURFACE IS FLUSH (LESS THAN 1/4" IN ELEVATION DIFFERENCE), FIRM, STABLE AND SLIP RESISTANT. INLET GRATES MUST HAVE OPENINGS NO GREATER THAN 1/2" IN DIRECTION OF TRAVEL.

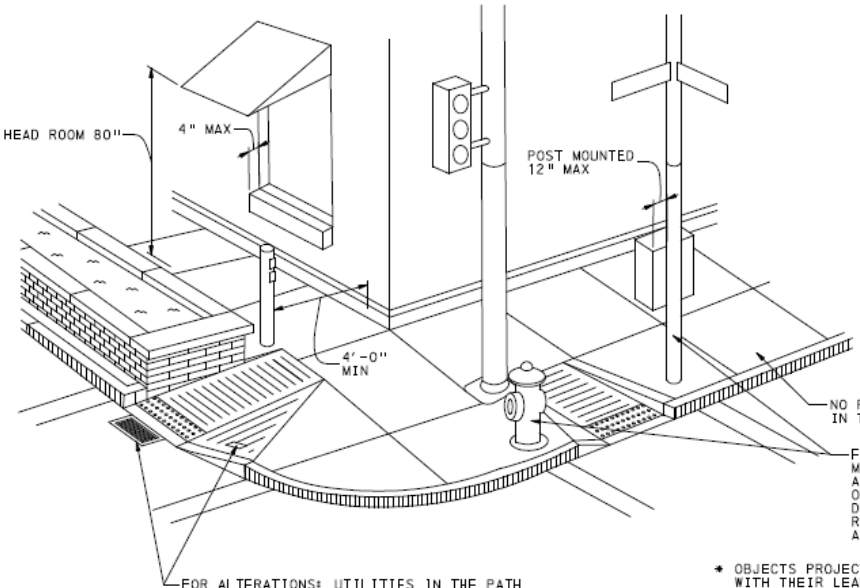
FOR NEW CONSTRUCTION: IF FEASIBLE LOCATE THE CURB RAMPS SO THAT THE UTILITIES ARE NOT IN THE PEDESTRIAN PATH OF TRAVEL.

REPLACE EXISTING GRATE WITH A GRATE WITH AN OPENING LESS THAN 1/2" IN DIRECTION OF TRAVEL. THE REPLACEMENT GRATE CAN NOT AFFECT INLET CAPACITY.

RECONFIGURE RAMPS TO UTILIZE TWO RAMPS AND AVOID EXISTING GRATE.

IF THE UTILITY AND ADJACENT SURFACE ELEVATION DIFFERENCE IS GREATER THAN 1/4", ADJUST UTILITY TO REMOVE GRADE DIFFERENCE.

POTENTIAL PROBLEM
UTILITIES IN PEDESTRIAN PATH



FOR ALTERATIONS: UTILITIES IN THE PATH OF TRAVEL ARE ACCEPTABLE IF THE TOP SURFACE IS FLUSH, FIRM, STABLE AND SLIP RESISTANT. INLET GRATES MUST HAVE OPENINGS NO GREATER THAN 1/2" IN DIRECTION OF TRAVEL.

NEW CONSTRUCTION: AT CURB RAMPS, LOCATE UTILITIES SO THAT THEY ARE NOT IN THE PEDESTRIAN PATH OF TRAVEL.

* OBJECTS PROJECTING FROM WALLS (FOR EXAMPLE, TELEPHONES) WITH THEIR LEADING EDGES BETWEEN 27" AND 80" ABOVE THE FINISHED SURFACE SHALL PROTRUDE NO MORE THAN 4" INTO PEDESTRIAN WALKWAYS.

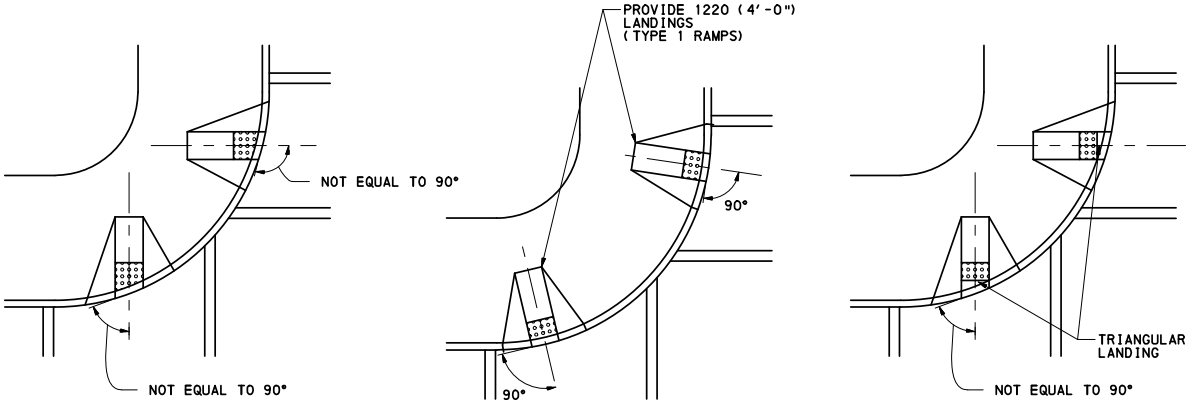
** OBJECTS MOUNTED WITH THEIR LEADING EDGES AT OR BELOW 27" ABOVE THE FINISHED SURFACE MAY PROTRUDE ANY AMOUNT.

*** OBJECTS MOUNTED ON POSTS OR PYLONS: OVERHANG 12" MAXIMUM FROM 27" TO 80" ABOVE THE GROUND OR FINISHED SURFACE.

**** PROTRUDING OBJECTS SHALL NOT REDUCE THE CLEAR WIDTH OF AN ACCESSIBLE ROUTE OR MANEUVERING SPACE.

UTILITIES AND
VERTICAL OBSTRUCTIONS
AT CURB RAMPS

FIGURE 6.10
Design Considerations: Utilities in Path of Travel



ON CORNERS WITH WIDE TURNING RADII, CURB RAMPS THAT ARE NOT PERPENDICULAR TO THE CURB CREATE PROBLEMS FOR WHEELCHAIR USERS BECAUSE THEY REQUIRE USERS TO NEGOTIATE RAPID CHANGES IN GRADE AND CROSS SLOPE WITH TWO WHEELS LEAVING THE GROUND.

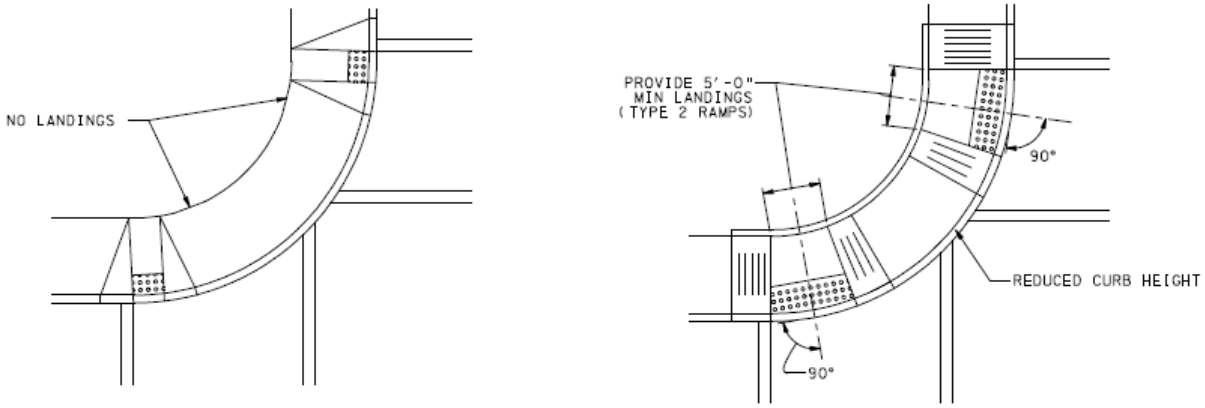
POTENTIAL PROBLEM
CURB RAMPS NOT PERPENDICULAR TO CURB RETURNS

RECOMMENDATION
RECONSTRUCT RAMPS 90° TO CURB RETURN

SEE RC-67M FOR DETAILS

RECOMMENDATION
PROVIDE TRIANGULAR LANDINGS AT THE BOTTOM OF THE CURB RAMPS

FIGURE 6.11
Design Considerations: Non-Perpendicular Type 1 Curb Ramps



PERPENDICULAR RAMPS WITHOUT LEVEL LANDINGS MAY NOT BE INSTALLED AND MUST BE REPLACED. THIS REQUIRES A WHEELCHAIR USER TO WAIT ON A SLOPED SURFACE PRIOR TO CROSSING AND DOES NOT PROVIDE AN ACCESSIBLE PATH ALONG THE SIDEWALK.

FOR ALTERATIONS, IT MAY BE NECESSARY TO MODIFY THE FLARE SLOPES 1V:12H (8.33%) TO ALLOW ACCESS ACROSS THE FLARE SLOPE. THIS MODIFICATION IS NOT DESIRABLE AND OTHER MODIFICATIONS SHOULD BE CONSIDERED.

PARALLEL CURB RAMPS PROVIDE A LEVEL LANDING AT THE BACK OF THE CURB.

POTENTIAL PROBLEM
TYPE 1 CURB RAMP WITHOUT LANDINGS

RECOMMENDATION
RECONSTRUCT TYPE 2 AS PARALLEL RAMPS

FIGURE 6.12
Design Considerations: Type 1 Curb Ramps Without Landings

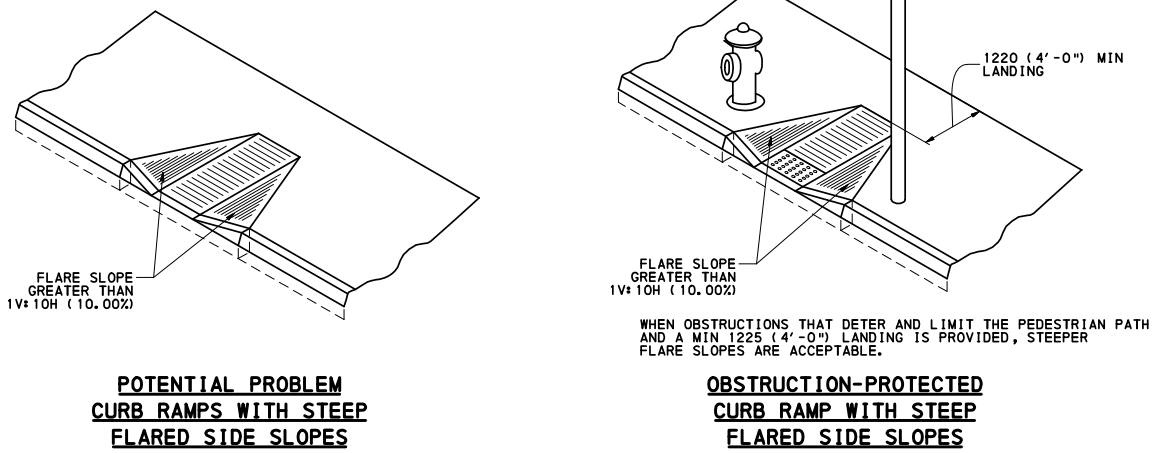


FIGURE 6.13
Design Considerations: Steep Flares in PAR

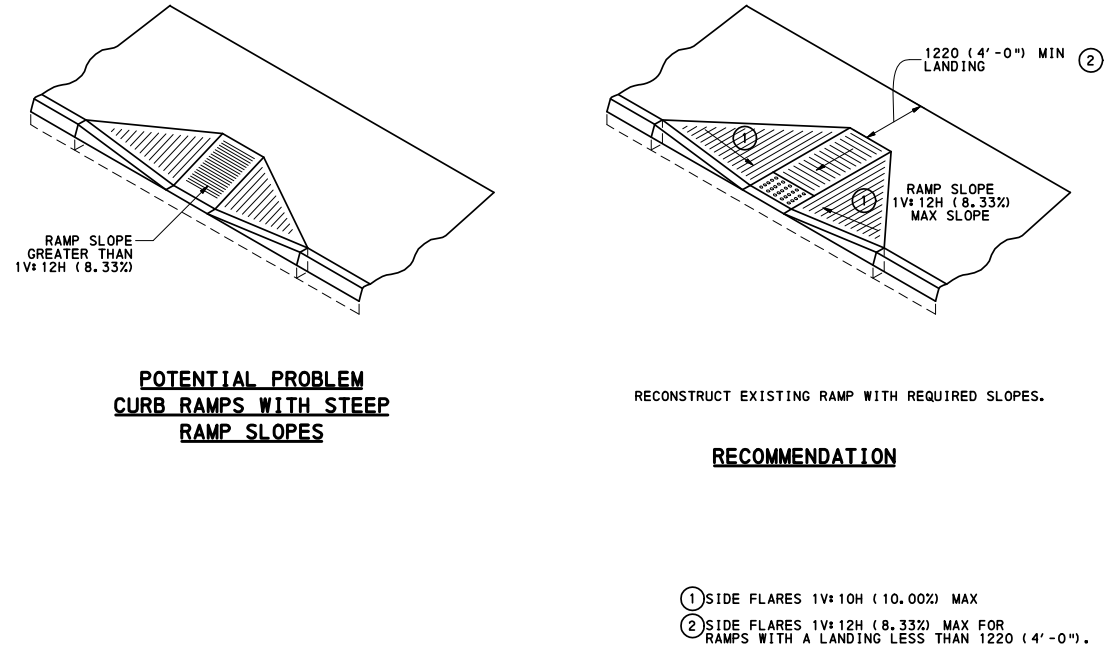


FIGURE 6.14
Design Considerations: Steep Curb Ramps

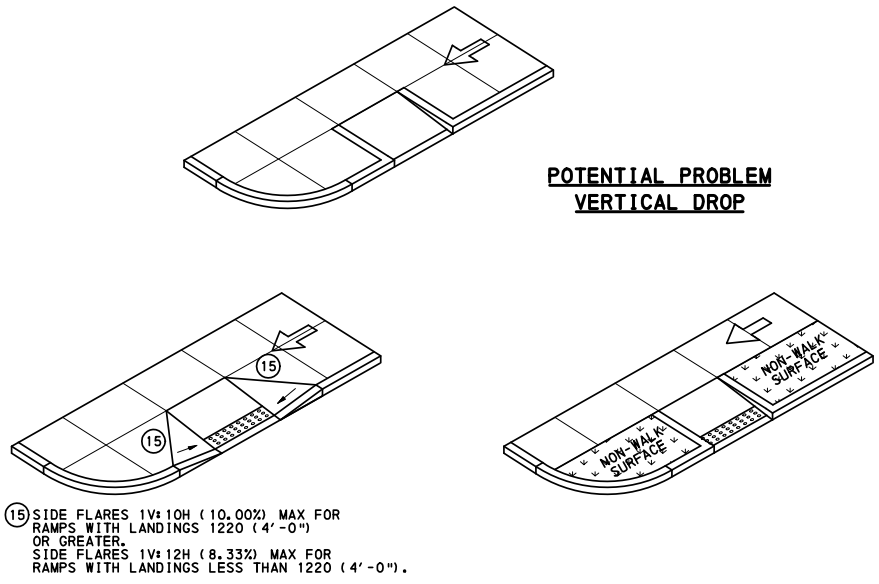


FIGURE 6.15
Design Considerations: Vertical Drops in PAR

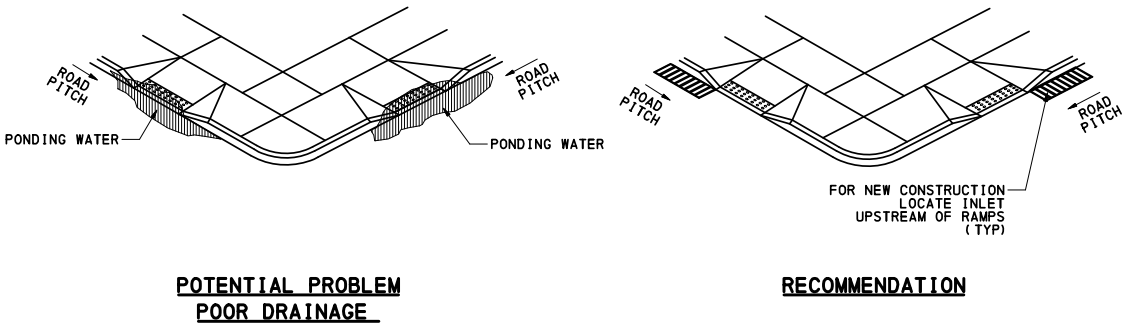
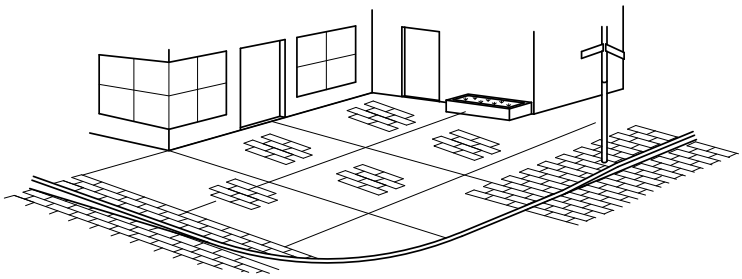
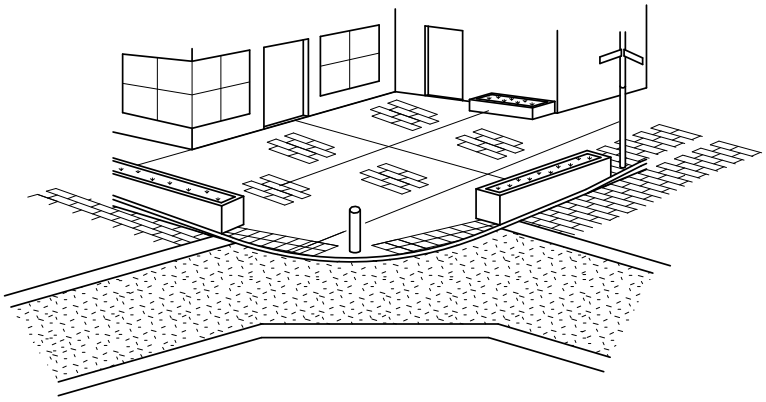


FIGURE 6.16
Design Considerations: Ponding at Curb Ramps



DECORATIVE PATTERNS USED AT DEPRESSED CURBS, SUCH AS BRICK PATTERN, CREATE A CONTINUOUS PATHWAY. PEOPLE WITH VISION AND COGNITIVE IMPAIRMENTS HAVE DIFFICULTY DETECTING WHERE THE STREET BEGINS AND ENDS.

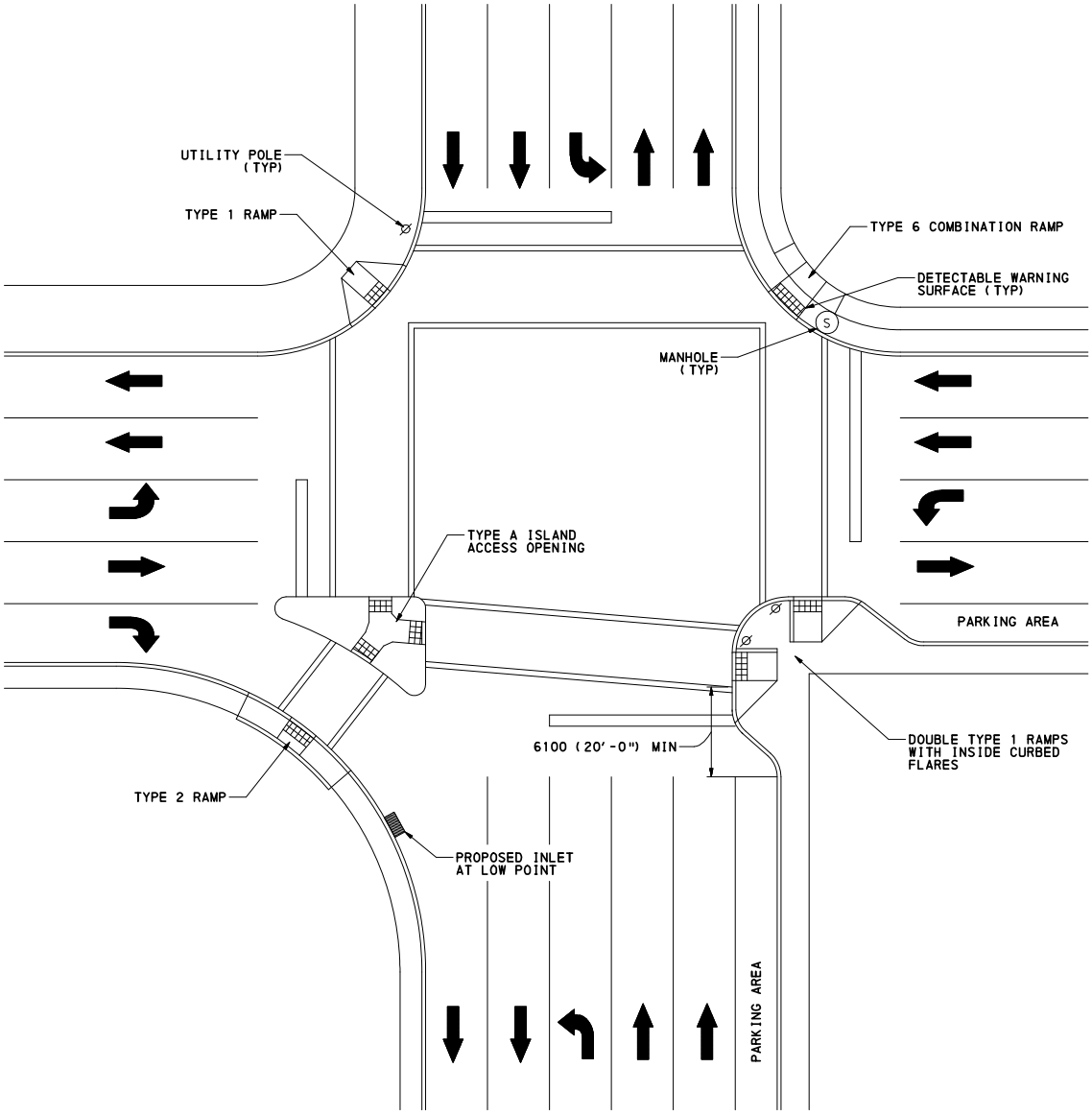
POTENTIAL PROBLEM
LARGE BLENDED TRANSITIONS



DETECTABLE WARNING SURFACES, CONTRASTING SURFACE MATERIALS, AND BARRIER POSTS ARE WEASURES THAT CAN BE UTILIZED TO CONVEY THE TRANSITION BETWEEN STREET AND SIDEWALK AT DEPRESSED CORNERS. THIS CORNER WOULD BE A GOOD LOCATION FOR ACCESSIBLE SIGNALS.

RECOMMENDATION

FIGURE 6.17
Design Considerations: Depressed Curb and Blended Transitions



DESIGN CONSIDERATIONS:

LOCATIONS OF DRAINAGE, UTILITY OR OTHER POSSIBLE OBSTRUCTIONS.

LOCATIONS OF PEDESTRIAN PUSH BUTTONS.

CROSSWALK LOCATIONS CLEARLY AND ACCURATELY SHOWN.

LOCATIONS OF LOWPOINTS AND FLOW LINE ELEVATIONS.

CURB RAMPS LEAD TO A 1220 (4'-0") MIN ACCESSIBLE PATH WITH A MAX 2.00% CROSS SLOPE.

CURB RAMP AND FLARE SLOPES CALCULATED BASED ON ROAD PITCH AND RECOMMENDED SLOPES.

DOCUMENTATION OF NOT MEETING DESIGN REQUIREMENTS IF NOT TECHNICALLY FEASIBLE.

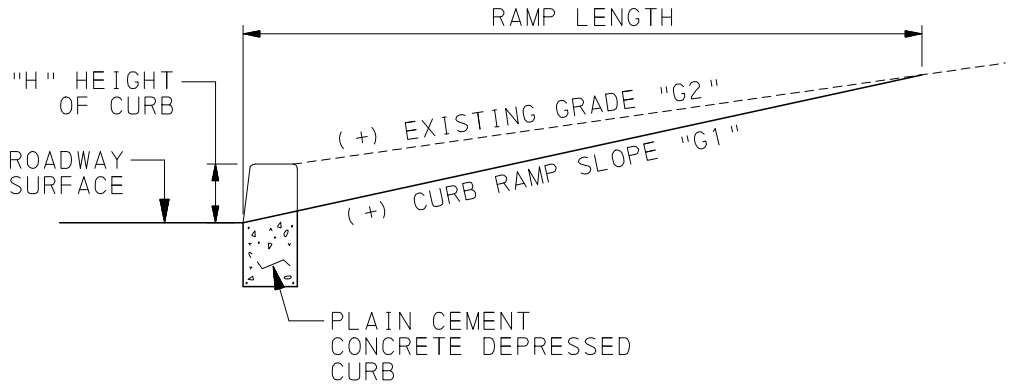
LEVEL OF DETAIL:

CURB RAMP AND FLARE EDGES ACUURATELY SHOWN.

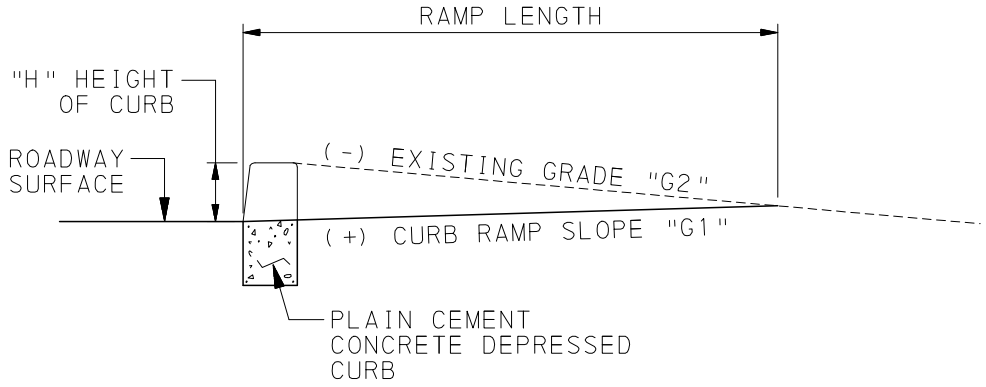
DETECTABLE WARNING SURFACE CLEARLY AND ACCURATELY SHOWN.

CURB RAMP LOCATIONS AND TYPES CLEARLY IDENTIFIED.

FIGURE 6.18
Design Considerations: Plan Details



SECTION VIEW
(CHASING GRADE)



SECTION VIEW
(OPPOSING GRADES)

To calculate ramp length:
"G1" Proposed Curb Ramp Slope (%)
"G2" Existing Grade (%)
"H" Height of Curb (ft)

$$\text{Ramp Length (ft)} = \frac{H}{(G1 - G2)/100}$$

Example #1 $\frac{0.67}{(5 - -3)}$ = 8.4' Example #2 $\frac{0.5}{(5\text{-}2)/100}$ = 16.7' Use Steeper Slope

FIGURE 6.19

Design Considerations: Ramp and Flare Calculations

APPROXIMATE RAMP LENGTH (MM) "G1" 5% SLOPE														
		"H" CURB HEIGHT (MM)												
"G2" EXISTING GRADE (%)			25	50	75	100	125	150	175	200	225	250	275	300
	CHASING GRADE	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		4	2500	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		3	1250	2500	3750	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		2	834	1667	2500	3334	4167	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		1	625	1250	1875	2500	3125	3750	4375	n/a	n/a	n/a	n/a	n/a
		0	500	1000	1500	2000	2500	3000	3500	4000	4500	n/a	n/a	n/a
	OPPOSING GRADE	-1	417	834	1250	1667	2084	2500	2917	3334	3750	4167	n/a	n/a
		-2	358	715	1072	1429	1786	2143	2500	2858	3215	3572	3929	4286
		-3	313	625	938	1250	1563	1875	2188	2500	2813	3125	3438	3750
		-4	278	556	834	1112	1389	1667	1945	2223	2500	2778	3056	3334
		-5	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
		-6	228	455	682	910	1137	1364	1591	1819	2046	2273	2500	2728
		-7	209	417	625	834	1042	1250	1459	1667	1875	2084	2292	2500
		-8	193	385	577	770	962	1154	1347	1539	1731	1924	2116	2308
		-9	179	358	536	715	893	1072	1250	1429	1608	1786	1965	2143
		-10	167	334	500	667	834	1000	1167	1334	1500	1667	1834	2000
		-11	157	313	469	625	782	938	1094	1250	1407	1563	1719	1875
		-12	148	295	442	589	736	883	1030	1177	1324	1471	1618	1765

Use the above chart to determine the approximate ramp length.

Step 1: Find the appropriate curb height along the top row.
Step 2: Follow the curb height down to the existing grade slope.
Step 3: The intersecting value is the approximate ramp length at the given slope.
Step 4: "n/a" indicates that a steeper slope must be used. The current slope produces a ramp length greater than 4500 mm.

FIGURE 6.20 (METRIC)
Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH (MM) "G1" 6% SLOPE														
		"H" CURB HEIGHT (MM)												
"G2" EXISTING GRADE (%)			25	50	75	100	125	150	175	200	225	250	275	300
	CHASING GRADE	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		5	2500	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		4	1250	2500	3750	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		3	834	1667	2500	3334	4167	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		2	625	1250	1875	2500	3125	3750	4375	n/a	n/a	n/a	n/a	n/a
		1	500	1000	1500	2000	2500	3000	3500	4000	4500	n/a	n/a	n/a
		0	417	834	1250	1667	2084	2500	2917	3334	3750	4167	n/a	n/a
	OPPOSING GRADE	-1	358	715	1072	1429	1786	2143	2500	2858	3215	3572	3929	4286
		-2	313	625	938	1250	1563	1875	2188	2500	2813	3125	3438	3750
		-3	278	556	834	1112	1389	1667	1945	2223	2500	2778	3056	3334
		-4	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
		-5	228	455	682	910	1137	1364	1591	1819	2046	2273	2500	2728
		-6	209	417	625	834	1042	1250	1459	1667	1875	2084	2292	2500
		-7	193	385	577	770	962	1154	1347	1539	1731	1924	2116	2308
		-8	179	358	536	715	893	1072	1250	1429	1608	1786	1965	2143
		-9	167	334	500	667	834	1000	1167	1334	1500	1667	1834	2000
		-10	157	313	469	625	782	938	1094	1250	1407	1563	1719	1875
		-11	148	295	442	589	736	883	1030	1177	1324	1471	1618	1765
		-12	139	278	417	556	695	834	973	1112	1250	1389	1528	1667

Use the above chart to determine the approximate ramp length.

Step 1: Find the appropriate curb height along the top row.

Step 2: Follow the curb height down to the existing grade slope.

Step 3: The intersecting value is the approximate ramp length at the given slope.

Step 4: "n/a" indicates that a steeper slope must be used. The current slope produces a ramp length greater than 4500 mm.

FIGURE 6.20 (METRIC) (CONTINUED)

Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH (MM) "G1" 7% SLOPE														
		"H" CURB HEIGHT (MM)												
"G2" EXISTING GRADE (%)			25	50	75	100	125	150	175	200	225	250	275	300
	CHASING GRADE	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		6	2500	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		5	1250	2500	3750	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		4	834	1667	2500	3334	4167	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		3	625	1250	1875	2500	3125	3750	4375	n/a	n/a	n/a	n/a	n/a
		2	500	1000	1500	2000	2500	3000	3500	4000	4500	n/a	n/a	n/a
		1	417	834	1250	1667	2084	2500	2917	3334	3750	4167	n/a	n/a
		0	358	715	1072	1429	1786	2143	2500	2858	3215	3572	3929	4286
	OPPOSING GRADE	-1	313	625	938	1250	1563	1875	2188	2500	2813	3125	3438	3750
		-2	278	556	834	1112	1389	1667	1945	2223	2500	2778	3056	3334
		-3	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
		-4	228	455	682	910	1137	1364	1591	1819	2046	2273	2500	2728
		-5	209	417	625	834	1042	1250	1459	1667	1875	2084	2292	2500
		-6	193	385	577	770	962	1154	1347	1539	1731	1924	2116	2308
		-7	179	358	536	715	893	1072	1250	1429	1608	1786	1965	2143
		-8	167	334	500	667	834	1000	1167	1334	1500	1667	1834	2000
		-9	157	313	469	625	782	938	1094	1250	1407	1563	1719	1875
		-10	148	295	442	589	736	883	1030	1177	1324	1471	1618	1765
		-11	139	278	417	556	695	834	973	1112	1250	1389	1528	1667
		-12	132	264	395	527	658	790	922	1053	1185	1316	1448	1579

Use the above chart to determine the approximate ramp length.

Step 1: Find the appropriate curb height along the top row.

Step 2: Follow the curb height down to the existing grade slope.

Step 3: The intersecting value is the approximate ramp length at the given slope.

Step 4: "n/a" indicates that a steeper slope must be used. The current slope produces a ramp length greater than 4500 mm.

FIGURE 6.20 (METRIC) (CONTINUED)

Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH (MM) "G1" 8.33% SLOPE														
		"H" CURB HEIGHT (MM)												
"G2" EXISTING GRADE (%)			25	50	75	100	125	150	175	200	225	250	275	300
	CHASING GRADE	12	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		11	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		10	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		9	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		8	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		7	1880	3760	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		6	1073	2146	3219	4292	4575	4575	4575	4575	4575	4575	4575	4575
		5	751	1502	2253	3004	3754	4505	4575	4575	4575	4575	4575	4575
		4	578	1155	1733	2310	2887	3465	4042	4575	4575	4575	4575	4575
		3	470	939	1408	1877	2346	2815	3284	3753	4222	4575	4575	4575
		2	395	790	1185	1580	1975	2370	2765	3160	3555	3950	4345	4575
		1	342	683	1024	1365	1706	2047	2388	2729	3070	3411	3752	4093
		0	301	601	901	1201	1501	1801	2101	2401	2702	3002	3302	3602
	OPPOSING GRADE	-1	268	536	804	1072	1340	1608	1876	2144	2412	2680	2948	3216
		-2	243	485	727	969	1211	1453	1695	1937	2179	2421	2663	2905
		-3	221	442	662	883	1104	1324	1545	1766	1986	2207	2428	2648
		-4	203	406	609	812	1014	1217	1420	1623	1825	2028	2231	2434
		-5	188	376	563	751	938	1126	1313	1501	1688	1876	2064	2251
		-6	175	349	524	698	873	1047	1222	1396	1571	1745	1920	2094
		-7	164	327	490	653	816	979	1142	1305	1468	1631	1794	1957
		-8	154	307	460	613	766	919	1072	1225	1378	1531	1685	1838
		-9	145	289	433	578	722	866	1010	1155	1299	1443	1587	1732
		-10	137	273	410	546	682	819	955	1092	1228	1364	1501	1637
		-11	130	259	388	518	647	776	906	1035	1164	1294	1423	1552
		-12	123	246	369	492	615	738	861	984	1107	1230	1353	1476

Use the above chart to determine the approximate ramp length.

Step 1. Find the appropriate curb height along the top row.
Step 2. Follow the curb height down to the existing grade slope.
Step 3. The intersecting value is the approximate ramp length at the given slope.

FIGURE 6.20 (METRIC) (CONTINUED)
Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH (MM) "G1" 10% SLOPE														
		"H" CURB HEIGHT (MM)												
"G2" EXISTING GRADE (%)			25	50	75	100	125	150	175	200	225	250	275	300
	CHASING GRADE	12	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		11	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		10	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		9	2500	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575	4575
		8	1250	2500	3750	4575	4575	4575	4575	4575	4575	4575	4575	4575
		7	834	1667	2500	3334	4167	4575	4575	4575	4575	4575	4575	4575
		6	625	1250	1875	2500	3125	3750	4375	4575	4575	4575	4575	4575
		5	500	1000	1500	2000	2500	3000	3500	4000	4500	4575	4575	4575
		4	417	834	1250	1667	2084	2500	2917	3334	3750	4167	4575	4575
		3	358	715	1072	1429	1786	2143	2500	2858	3215	3572	3929	4286
		2	313	625	938	1250	1563	1875	2188	2500	2813	3125	3438	3750
		1	278	556	834	1112	1389	1667	1945	2223	2500	2778	3056	3334
		0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
	OPPOSING GRADE	-1	228	455	682	910	1137	1364	1591	1819	2046	2273	2500	2728
		-2	209	417	625	834	1042	1250	1459	1667	1875	2084	2292	2500
		-3	193	385	577	770	962	1154	1347	1539	1731	1924	2116	2308
		-4	179	358	536	715	893	1072	1250	1429	1608	1786	1965	2143
		-5	167	334	500	667	834	1000	1167	1334	1500	1667	1834	2000
		-6	157	313	469	625	782	938	1094	1250	1407	1563	1719	1875
		-7	148	295	442	589	736	883	1030	1177	1324	1471	1618	1765
		-8	139	278	417	556	695	834	973	1112	1250	1389	1528	1667
		-9	132	264	395	527	658	790	922	1053	1185	1316	1448	1579
		-10	125	250	375	500	625	750	875	1000	1125	1250	1375	1500
		-11	120	239	358	477	596	715	834	953	1072	1191	1310	1429
		-12	114	228	341	455	569	682	796	910	1023	1137	1250	1364

Use the above chart to determine the approximate ramp length.

Step 1: Find the appropriate curb height along the top row.
Step 2: Follow the curb height down to the existing grade slope.
Step 3: The intersecting value is the approximate ramp length at the given slope.

FIGURE 6.20 (METRIC) (CONTINUED)
Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH "G1" 5% SLOPE													
		"H" CURB HEIGHT (IN)											
"G2" EXISTING GRADE (%)			1	2	3	4	5	6	7	8	9	10	11	12
	CHASING GRADE	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		4	8.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		3	4.2	8.4	12.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		2	2.8	5.6	8.4	11.2	13.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		1	2.1	4.2	6.3	8.4	10.5	12.5	14.6	n/a	n/a	n/a	n/a	n/a
		0	1.7	3.4	5.0	6.7	8.4	10.0	11.7	13.4	15.0	n/a	n/a	n/a
	OPPOSING GRADE	-1	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.5	13.9	n/a	n/a
		-2	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	13.1	14.3
		-3	1.1	2.1	3.2	4.2	5.3	6.3	7.3	8.4	9.4	10.5	11.5	12.5
		-4	1.0	1.9	2.8	3.8	4.7	5.6	6.5	7.5	8.4	9.3	10.2	11.2
		-5	0.9	1.7	2.5	3.4	4.2	5.0	5.9	6.7	7.5	8.4	9.2	10.0
		-6	0.8	1.6	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.6	8.4	9.1
		-7	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.7	8.4
		-8	0.7	1.3	2.0	2.6	3.3	3.9	4.5	5.2	5.8	6.5	7.1	7.7
		-9	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2
		-10	0.6	1.2	1.7	2.3	2.8	3.4	3.9	4.5	5.0	5.6	6.2	6.7
		-11	0.6	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.7	5.3	5.8	6.3
		-12	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.4	5.9

Use the above chart to determine the approximate ramp length.

Step 1: Find the appropriate curb height along the top row.

Step 2: Follow the curb height down to the existing grade slope.

Step 3: The intersecting value is the approximate ramp length at the given slope.

Step 4: "n/a" indicates that a steeper slope must be used. The current slope produces a ramp length greater than 15'-0".

FIGURE 6.20 (ENGLISH)

Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH "G1" 6% SLOPE														
		"H" CURB HEIGHT (IN)												
"G2" EXISTING GRADE (%)			1	2	3	4	5	6	7	8	9	10	11	12
	CHASING GRADE	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		5	8.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		4	4.2	8.4	12.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		3	2.8	5.6	8.4	11.2	13.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		2	2.1	4.2	6.3	8.4	10.5	12.5	14.6	n/a	n/a	n/a	n/a	n/a
		1	1.7	3.4	5.0	6.7	8.4	10.0	11.7	13.4	15.0	n/a	n/a	n/a
		0	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.5	13.9	n/a	n/a
	OPPOSING GRADE	-1	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	13.1	14.3
		-2	1.1	2.1	3.2	4.2	5.3	6.3	7.3	8.4	9.4	10.5	11.5	12.5
		-3	1.0	1.9	2.8	3.8	4.7	5.6	6.5	7.5	8.4	9.3	10.2	11.2
		-4	0.9	1.7	2.5	3.4	4.2	5.0	5.9	6.7	7.5	8.4	9.2	10.0
		-5	0.8	1.6	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.6	8.4	9.1
		-6	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.7	8.4
		-7	0.7	1.3	2.0	2.6	3.3	3.9	4.5	5.2	5.8	6.5	7.1	7.7
		-8	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2
		-9	0.6	1.2	1.7	2.3	2.8	3.4	3.9	4.5	5.0	5.6	6.2	6.7
		-10	0.6	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.7	5.3	5.8	6.3
		-11	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.4	5.9
		-12	0.5	1.0	1.4	1.9	2.4	2.8	3.3	3.8	4.2	4.7	5.1	5.6

Use the above chart to determine the approximate ramp length.

Step 1: Find the appropriate curb height along the top row.

Step 2: Follow the curb height down to the existing grade slope.

Step 3: The intersecting value is the approximate ramp length at the given slope.

Step 4: "n/a" indicates that a steeper slope must be used. The current slope produces a ramp length greater than 15'-0".

FIGURE 6.20 (ENGLISH) (CONTINUED)

Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH "G1" 7% SLOPE														
		"H" CURB HEIGHT (IN)												
"G2" EXISTING GRADE (%)			1	2	3	4	5	6	7	8	9	10	11	12
	CHASING GRADE	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		6	8.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		5	4.2	8.4	12.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		4	2.8	5.6	8.4	11.2	13.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		3	2.1	4.2	6.3	8.4	10.5	12.5	14.6	n/a	n/a	n/a	n/a	n/a
		2	1.7	3.4	5.0	6.7	8.4	10.0	11.7	13.4	15.0	n/a	n/a	n/a
		1	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.5	13.9	n/a	n/a
		0	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	13.1	14.3
	OPPOSING GRADE	-1	1.1	2.1	3.2	4.2	5.3	6.3	7.3	8.4	9.4	10.5	11.5	12.5
		-2	1.0	1.9	2.8	3.8	4.7	5.6	6.5	7.5	8.4	9.3	10.2	11.2
		-3	0.9	1.7	2.5	3.4	4.2	5.0	5.9	6.7	7.5	8.4	9.2	10.0
		-4	0.8	1.6	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.6	8.4	9.1
		-5	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.7	8.4
		-6	0.7	1.3	2.0	2.6	3.3	3.9	4.5	5.2	5.8	6.5	7.1	7.7
		-7	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2
		-8	0.6	1.2	1.7	2.3	2.8	3.4	3.9	4.5	5.0	5.6	6.2	6.7
		-9	0.6	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.7	5.3	5.8	6.3
		-10	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.4	5.9
		-11	0.5	1.0	1.4	1.9	2.4	2.8	3.3	3.8	4.2	4.7	5.1	5.6
		-12	0.5	0.9	1.4	1.8	2.2	2.7	3.1	3.6	4.0	4.4	4.9	5.3

Use the above chart to determine the approximate ramp length.

Step 1: Find the appropriate curb height along the top row.

Step 2: Follow the curb height down to the existing grade slope.

Step 3: The intersecting value is the approximate ramp length at the given slope.

Step 4: "n/a" indicates that a steeper slope must be used. The current slope produces a ramp length greater than 15'-0".

FIGURE 6.20 (ENGLISH) (CONTINUED)

Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH "G1" 8.33% SLOPE														
		"H" CURB HEIGHT (IN)												
"G2" EXISTING GRADE (%)			1	2	3	4	5	6	7	8	9	10	11	12
	CHASING GRADE	12	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		11	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		10	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		9	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		8	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		7	6.3	12.6	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		6	3.6	7.2	10.8	14.4	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		5	2.6	5.1	7.6	10.1	12.6	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		4	2.0	3.9	5.8	7.7	9.7	11.6	13.5	15.0	15.0	15.0	15.0	15.0
		3	1.6	3.2	4.7	6.3	7.9	9.4	11.0	12.6	14.1	15.0	15.0	15.0
		2	1.4	2.7	4.0	5.3	6.6	7.9	9.3	10.6	11.9	13.2	14.5	15.0
		1	1.2	2.3	3.5	4.6	5.7	6.9	8.0	9.1	10.3	11.4	12.6	13.7
		0	1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1
	OPPOSING GRADE	-1	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9.0	9.9	10.8
		-2	0.9	1.7	2.5	3.3	4.1	4.9	5.7	6.5	7.3	8.1	8.9	9.7
		-3	0.8	1.5	2.3	3.0	3.7	4.5	5.2	5.9	6.7	7.4	8.1	8.9
		-4	0.7	1.4	2.1	2.8	3.4	4.1	4.8	5.5	6.1	6.8	7.5	8.2
		-5	0.7	1.3	1.9	2.6	3.2	3.8	4.4	5.1	5.7	6.3	6.9	7.6
		-6	0.6	1.2	1.8	2.4	3.0	3.5	4.1	4.7	5.3	5.9	6.4	7.0
		-7	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.4	4.9	5.5	6.0	6.6
		-8	0.6	1.1	1.6	2.1	2.6	3.1	3.6	4.1	4.6	5.2	5.7	6.2
		-9	0.5	1.0	1.5	2.0	2.5	2.9	3.4	3.9	4.4	4.9	5.3	5.8
		-10	0.5	1.0	1.4	1.9	2.3	2.8	3.2	3.7	4.1	4.6	5.1	5.5
		-11	0.5	0.9	1.3	1.8	2.2	2.6	3.1	3.5	3.9	4.4	4.8	5.2
		-12	0.5	0.9	1.3	1.7	2.1	2.5	2.9	3.3	3.7	4.1	4.6	5.0

Use the above chart to determine the approximate ramp length.

Step 1. Find the appropriate curb height along the top row.
Step 2. Follow the curb height down to the existing grade slope.
Step 3. The intersecting value is the approximate ramp length at the given slope.

FIGURE 6.20 (ENGLISH) (CONTINUED)
Design Considerations: Ramp and Flare Length Charts

APPROXIMATE RAMP LENGTH "G1" 10% SLOPE														
		"H" CURB HEIGHT (IN)												
"G2" EXISTING GRADE (%)			1	2	3	4	5	6	7	8	9	10	11	12
	CHASING GRADE	12	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		11	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		10	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		9	8.4	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		8	4.2	8.4	12.5	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		7	2.8	5.6	8.4	11.2	13.9	15.0	15.0	15.0	15.0	15.0	15.0	15.0
		6	2.1	4.2	6.3	8.4	10.5	12.5	14.6	15.0	15.0	15.0	15.0	15.0
		5	1.7	3.4	5.0	6.7	8.4	10.0	11.7	13.4	15.0	15.0	15.0	15.0
		4	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.5	13.9	15.0	15.0
		3	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	13.1	14.3
		2	1.1	2.1	3.2	4.2	5.3	6.3	7.3	8.4	9.4	10.5	11.5	12.5
		1	1.0	1.9	2.8	3.8	4.7	5.6	6.5	7.5	8.4	9.3	10.2	11.2
		0	0.9	1.7	2.5	3.4	4.2	5.0	5.9	6.7	7.5	8.4	9.2	10.0
	OPPOSING GRADE	-1	0.8	1.6	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.6	8.4	9.1
		-2	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.7	8.4
		-3	0.7	1.3	2.0	2.6	3.3	3.9	4.5	5.2	5.8	6.5	7.1	7.7
		-4	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2
		-5	0.6	1.2	1.7	2.3	2.8	3.4	3.9	4.5	5.0	5.6	6.2	6.7
		-6	0.6	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.7	5.3	5.8	6.3
		-7	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.4	5.9
		-8	0.5	1.0	1.4	1.9	2.4	2.8	3.3	3.8	4.2	4.7	5.1	5.6
		-9	0.5	0.9	1.4	1.8	2.2	2.7	3.1	3.6	4.0	4.4	4.9	5.3
		-10	0.5	0.9	1.3	1.7	2.1	2.5	3.0	3.4	3.8	4.2	4.6	5.0
		-11	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8
		-12	0.4	0.8	1.2	1.6	1.9	2.3	2.7	3.1	3.5	3.8	4.2	4.6

Use the above chart to determine the approximate ramp length.

Step 1: Find the appropriate curb height along the top row.
Step 2: Follow the curb height down to the existing grade slope.
Step 3: The intersecting value is the approximate ramp length at the given slope.

FIGURE 6.20 (ENGLISH) (CONTINUED)
Design Considerations: Ramp and Flare Length Charts

6.10 CURB RAMP DESIGN REQUIREMENTS FOR ROADWAY INTERSECTIONS

A. Separate Curb Ramps or Single "Diagonal" Curb Ramp.

1. Two separate curb ramps (one curb ramp per crossing direction) must be used at each roadway intersection corner for all projects where technically feasible. This provides several advantages such as increased visibility, directional cues, decreased pedestrian crossing distance and does not require a wheelchair user to change direction when entering or leaving the curb ramp.

2. A single diagonal curb ramp (one curb ramp per two crossing directions at the middle of the curve) may be used where separate curb ramps are not feasible. Diagonal curb ramps are acceptable (with ADE of Design or delegate approval), provided crosswalks are constructed wide enough that a person in a wheelchair may enter either crosswalk from the ramp or the crosswalk markings provide a minimum 1220 mm (48 in) wide overrun clear zone at the bottom of the curb ramp. It is important to a visually impaired person using the sidewalk that the location of the curb ramps be as uniform as possible within a general area. See Publication 72M, *Roadway Construction Standards*, RC-67M for typical Type 1 curb ramp layouts at an intersection.

Diagonal curb ramps are not preferred and should be used sparingly in areas where pedestrian or vehicular traffic volumes are both moderate to high. Avoid using single ramps for large radius corner curbs. This type of location is less satisfactory for persons with visual disabilities since they are not useful to provide directional information about the crosswalk and may misdirect users.

Diagonal curb ramp locations also require pedestrians using wheelchairs to change direction when entering or leaving the curb ramp unless a diagonal intersection movement is allowed. The turning movement requires more time to cross the intersection and is performed where the pedestrian may be exposed to turning vehicular traffic.

When an existing diagonal curb ramp is altered, the existing diagonal curb ramps must be removed and replaced with separate curb ramps where technically feasible. Diagonal ramps will be acceptable for the following situations:

- Separate curb ramps cannot be installed to fully meet PennDOT standards; however, a diagonal ramp can be installed and fully meet PennDOT standards.
- When separate curb ramps would create a negative impact to:
  - Sight distance
  - Alignment with curb ramps on other side of street
  - Drainage/ponding
  - Relocated cross walk or stop bar locations would be undesirable
- Installation of separate curb ramps would require significant out of scope work that would stop construction or cancel project.
- Other factors as determined by the ADE of Design.

B. Pedestrian Crosswalk Location. Establish the inside pedestrian crosswalk lines by bisecting the intersection radii. The outside crosswalk lines may be placed close to the edge of the curb ramp if necessary. Sound engineering judgment is always necessary for minor adjustments in the curb ramp locations if the intersection has corners with varying radii or the corner is critical for ramp location.

C. Flares and Crosswalks. Single corner (Diagonal) Type 1 curb ramps must have at least a 610 mm (24 in) long segment of full height curb located on each side of the curb ramp between the flare and the nearest marked crosswalk lines.

D. Drainage. Curb ramps should not be located where pedestrians must cross drainage structures such as inlets and manholes. Design must consider both the location of the curb ramp and the location of the drainage structures in new construction. Locate additional drainage inlets on the upstream side of all curb ramps where applicable and locate curb ramps away from low points of the curb return.

6.11 CURB RAMP DESIGN CRITERIA

A. See PAR Requirements. Section 6.5.

B. Depressed Curb for Curb Ramps. The transition from curb ramp to adjacent sidewalks, streets or gutters, etc. must be flush and free of abrupt changes. For pedestrians using a wheelchair, a vertical lip at the depressed curb for curb ramps causes the pedestrian to exert additional force and may result in a backward direction fall. A vertical lip is acceptable and practical at depressed curb for driveways since it is not located within the PAR and only vehicles will travel across this change in elevation.

C. Curb Ramp Slopes. The least possible slope must be used for any curb ramp. However, the maximum curb ramp slope is 1V:12H (8.33%). Care should be taken to assure a uniform grade on the curb ramp free of sags and short grade changes. Position the ramp slope perpendicular to the curb to provide a grade break that may be approached perpendicularly. See Figure 6.11. It may be necessary to limit the run of a parallel or perpendicular curb ramp in order to avoid chasing grade indefinitely when traversing the height of curb. Curb ramp length not to exceed 4500 mm (15 ft). Adjust the curb ramp slope as needed to provide access to the maximum extent feasible.

D. Curb Ramp Widths. Minimum width of a curb ramp is 1220 mm (48 in) exclusive of flared side slopes.

E. Flares Located Within Pedestrian Access Route. Curb ramp side flares positioned where pedestrians can walk across them must have flared sides with a maximum slope of 1V:10H (10.00%), measured parallel along the curb. If the level landing at the top of the curb ramp is less than 4 ft deep, flares shall be 8.33% maximum. It may be necessary to limit the length of a flare in order to avoid chasing grade indefinitely when traversing the height of curb. Flare length, measured along the curb, should not exceed 4500 mm (15 ft). Adjust flare slope as needed to provide access to the maximum extent feasible. See Publication 72M, *Roadway Construction Standards*, RC-67M details for additional information.

F. Flares and Return Curbs Located Outside of Pedestrian Circulation Path. In locations where pedestrians would not normally walk across the flare due to sidewalk obstructions such as street furniture, poles, fire hydrants, grass or tree lawns, return curbs may be used thereby eliminating the need for flared side slope surfaces (Type 4 and 4A curb ramps, see Publication 72M, *Roadway Construction Standards*, RC-67M). Note: Objects cannot be placed where they would affect clear zone or sight distance requirements.

G. Landing Requirements.

1. Triangular Landings on Radial Curb. If a curb ramp is not installed perpendicular to the curb, a triangular landing must be installed at the bottom of the curb ramp to provide an approach to the grade break. Installing the curb ramp in the same direction as the crossing provides a directional cue for pedestrians with visual disabilities. The detectable warning surface must be installed behind the grade break.

2. Type 1 Curb Ramps. For a Type 1 curb ramp a landing is required at the top of the curb ramp and is connected to the continuous passage. For alterations to existing facilities where site infeasibility precludes the 1220 mm (48 in) landing length at the top of the curb ramp and other curb ramp types do not provide adequate access, then a minimum 915 mm (36 in) landing length may be provided. When the Type 1 curb ramp top landing is less than 1220 mm (48 in), the slope of the side flares must be 1V:12H (8.33%) maximum.

H. Miscellaneous Requirements.

1. Railings. Curb ramps do not require handrails.

6.12 TRAFFIC CONTROL REQUIREMENTS

The requirements described herein may not fit all situations and cannot replace the need for the use of sound engineering judgment in the location and design of curb ramps and crosswalk markings. Although the written guidance in this Manual does not indicate that a diagonal curb ramp requires the installation of a crosswalk, as a

safety consideration, new crosswalk striping should be added to projects in medium to high pedestrian traffic areas to create the necessary clear space within the crosswalk configuration.

1. When the curb ramp is at the middle of curve (MC), the inside pedestrian crosswalk lines should be established by bisecting the intersecting radii and locating the crosswalk lines 1220 mm (48 in) from the MC as shown on the Standards for Roadway Construction.

2. Stop line markings should be used where it is important to indicate the point behind which vehicles are required to stop in compliance with a traffic signal, stop sign or other legal requirements. Markings should be placed 1220 mm (48 in) in advance of and parallel to the nearest crosswalk line.

3. For additional design guidance and recommendations with respect to pedestrian crosswalk markings, refer to the *MUTCD*.

6.13 PEDESTRIAN CROSSING CONTROLS

When provided, pedestrian-actuated crosswalk crossing controls on accessible routes must meet the following guidelines:

1. Controls must be raised from or flush with their housings and be a minimum of 50 mm (2 in) in the smallest dimension. The force required to activate the control must be no greater than 22 N (5 lb).

2. Controls must be located as close as practicable to the curb ramp serving the controlled crossing and permit operation from a clear ground space. Control location must not interfere with the movement of pedestrians on or across the curb ramp.

3. Controls must be a maximum height of 1065 mm (42 in) above the finished sidewalk surface.

4. A firm stable and slip resistant area with a minimum size of 1220 mm × 1220 mm (48 in × 48 in) must be provided to allow for a forward or parallel approach to the controls. Where a parallel approach is provided, controls must be within 255 mm (10 in) horizontally of and centered on the clear ground space. Where a forward approach is provided, controls must abut and be centered on the clear ground space.

5. Refer to the *MUTCD* for additional guidance.

6.14 TEMPORARY ALTERNATE CIRCULATION PATHS AT CONSTRUCTION SITES

Construction and alteration work within the public right-of-way that affects pedestrian circulation elements, spaces, or facilities must comply with the following provisions:

1. Construction or alterations affecting pedestrian pathways must require the provision of a safe, alternate and accessible pedestrian circulation path around the construction activities.

2. The alternate route must comply with all applicable design guidelines to the maximum extent feasible under existing conditions so that the usability of the accessible route is maintained.

3. The alternate route must be kept in place through the duration of the construction activity and must be clearly signed for pedestrian use. See Publication 213, *Temporary Traffic Control Guidelines*, PATA 40 and 41 and *MUTCD* Figures 6H-28 and 6H-29 for pedestrian notification signage for pedestrian route closings and detours.

4. The alternate route should be provided on the same side of the street as the disrupted route, to the maximum extent feasible. Where it is not feasible to provide a same-side alternate circulation path, detour the pedestrians to a similar level of accessible route as the disrupted route as close to the construction site as

possible. The detour circulation path may require the installation of temporary accessible pedestrian signals, curb ramps, or other accessibility facilities.

5. Walking surfaces must be firm, stable, slip-resistant, at least 1525 mm (60 in) wide and be maintained free of rubble or debris that would adversely affect the movement of persons with mobility problems. The width may be reduced to 1220 mm (48 in) if passing areas 1525 mm × 1525 mm (60 in × 60 in) are provided every 61 m (200 ft).

6. The alternate circulation path must be protected from construction activities, drop-offs, and vehicular traffic with approved pedestrian barricades or channelizing devices. The pedestrian barriers or channelizing devices must be continuous, stable and non-flexible and consist of a wall, fence, or enclosures specified in *MUTCD* Sections 6F.63, 6F.68 and 6F.71 with detectable, continuous bottom edge 150 mm (6 in) maximum height above the walkway surface.

7. The barricades and channelizing devices must also provide a continuous surface or upper rail at a 915 mm (36 in) minimum height above the walkway surface and toe rail at 150 mm (6 in) maximum height above the walkway surface. Support members may not protrude into the alternate circulation path. Sidewalk barriers should be detectable by blind pedestrians or those who have low vision. Plastic tape, movable cones, and print signs at a sidewalk excavation will not generally provide adequate notice or protection. Accessibility provisions for protruding objects and construction barrier criteria in the *MUTCD* offer helpful guidance in this area.

8. Protrusions into the alternate circulation path are not permitted.

6.15 TECHNICAL Q&A INFORMATION FOR ACCESSIBILITY ISSUES

These questions and answers are general in nature and may not be inclusive of the full scope of accessibility issues at a given site. All alteration project sites must be fully evaluated on a site by site basis to determine what accessibility issues should be included in the alteration work operations.

All curb ramp details in the 2010 ADA Standards, PROWAG and other approved reference sources that have developed various curb ramp types are indicated for new construction applications. There are few specific alteration construction details since there could be innumerable existing site conditions that could require detail adjustments. However, several alteration details have been added to Publication 72M, *Roadway Construction Standards*, RC-67M for certain accessibility situations. Each curb ramp alteration will require engineering adaptation to adjust the construction detail to the alteration site conditions.

The answers to these questions have been derived from several sources related to the ADA law, ADAAG standards, PROWAG and FHWA guidelines.

A. ADA Authority and Function.

***1. Question* - What's the difference between the ADA, ADA regulations and ADAAG?**
***Answer* -** The Americans with Disabilities Act (ADA) is a law passed in July 1990 that prohibits discrimination on the basis of disability. The statute required certain designated Federal agencies to develop implementing regulations, the first of which were promulgated in July of 1991. This rulemaking continues today. The regulations detail a wide range of administrative and procedural requirements, including compliance with design and construction standards; those standards are expressed in the Americans with Disabilities Act Accessibility Guidelines (ADAAG). ADAAG contains requirements for new construction and alterations. The U.S. Access Board develops the requirements as "guidelines" to serve as a basis for "standards" enforced by the Department of Justice (DOJ) and the Department of Transportation (US DOT). ADAAG derived from an earlier Federal standard, the Uniform Federal Accessibility Standards (UFAS). See Section 6.2 for additional information.

***2. Question* – Is PennDOT responsible for all ADA curb ramps for all accessible routes within our highway right-of-way regardless of who has jurisdiction for an intersecting municipal street or roadway?**

Answer - Pennsylvania law does not, as a rule, require PennDOT to construct sidewalks. The Department is permitted by Pennsylvania law to install sidewalks as a part of State funded projects under certain circumstances including the need to address the safety of pedestrian traffic. Generally, sidewalk installation is at the discretion of the Secretary and requires a formal agreement with the involved municipality or local government. The installation of a sidewalk is considered a "construction improvement" with repairs and maintenance being a local government responsibility.

Similarly, the legal responsibility for maintenance of pedestrian facilities beyond the curb line, with certain exceptions, lies with either the municipality or adjoining property owners. The curb ramp is a portion of the sidewalk system that allows ADA pedestrian accessibility across the roadway.

The ADA effectively preempted PA law regarding responsibility for areas beyond the curb line by attaching liability for construction of curb ramps to the "public entity" with the responsibility or authority over streets, roads or walkways. (PennDOT is responsible to provide curb ramps that cross state roadways and local municipalities are responsible to provide curb ramps that cross their streets and other roadways.)

The ADA did not, however, assign a maintenance obligation to the "public entity" installing the curb ramp. Therefore, PA law has not been preempted concerning maintenance obligations and PennDOT is not required to maintain a curb ramp behind the curb line even though we may have originally constructed the ramp to provide access across a municipal street or roadway. See Section 6.6 for additional information.

3. *Question* - What is the public right-of-way?

Answer - The public right-of-way consists of everything between the right-of-way limits, including travel lanes, medians, planting strips, sidewalks and other facilities.

***4. Question* - What are the elements of an accessible design?**

Answer - Public agencies have the choice of whether to follow the standards in the ADA Accessibility Guidelines (ADAAG) or the Uniform Federal Accessibility Standards (UFAS). Source: 28 CFR §35.151(c); (Appendix A to 28 CFR Part 36). *FHWA encourages public agencies to use ADAAG and the United States Access Board Public Rights-of-Way Accessibility Guidelines (PROWAG) as a best practice where the current standard, ADAAG, is silent or inapplicable, according to a February 2006 Federal Highway Administration (FHWA) Memorandum.* Under the ADAAG standards, an accessible design to a highway, street, or walkway includes accessible sidewalks and curb ramps with detectable warnings. Source: 28 CFR §35.151(c) and (e) (curb ramps), ADAAG 4.3-4.5 (accessible routes), 4.7 (curb ramps with detectable warnings), 4.29 (detectable warnings). Continuously maintained sidewalks are required by the case of Barden v. City of Sacramento, 292 F.3d 1073 (9th Cir. 2002), cert. denied, 123 S.Ct. 2639 (2003).

Accessible pedestrian signals and signs must be considered, with a reasonable and consistent plan to facilitate safe street crossings. Source: 28 CFR §35.151(c); 23 U.S.C. §217(g)(2). See Section 6.2 for additional information.

***5. Question* - When should accessible design elements be incorporated into projects in the public right-of-way?**

Answer - FHWA encourages the consideration of pedestrian needs in all construction, reconstruction and rehabilitation projects. If a public agency provides pedestrian facilities, those facilities must be accessible to persons with disabilities. A public agency is not relieved of its obligation to make its pedestrian facilities accessible if no individual with a disability is known to live in a particular area. This is true regardless of its funding source. Source: DOJ's ADA Title II Technical Assistance Manual, § II-5.1000, 1993. See Section 6.0 for additional information.

***6. Question* - What should a public agency do when it does not control all of the public right-of-way required to provide access for persons with disabilities?**
***Answer* -** The public agency should work jointly with all others with interests in the highway, street, or walkway to ensure that pedestrian access improvements occur at the same time as any alteration or new project. *The ADA encourages this cooperation by making each of the public agencies involved subject to complaints or lawsuits for failure to meet the ADA and Section 504 requirements*. Source: 28 CFR §§ 35.170 – 35.178. See Section 6.2.B for additional information.

***7. Question* - Does the ADA permit an individual with a disability to sue when that individual believes that discrimination is about to occur, or must the individual wait for the discrimination to occur?**
***Answer* -** The ADA permits an individual to allege discrimination based on a reasonable belief that the planned construction or alteration of a place of public accommodation, such as curb ramps, have not been adequately provided at public sidewalk crossings of a street or are non-conforming to the ADAAG. The resolution of such challenges prior to the construction of a facility is encouraged to enable any necessary remedial measures to be incorporated during the planning, design, or construction stages, when such changes can be more readily addressed. FHWA has federal oversight authority for the investigation of transportation related ADA issues.

***8. Question* - What projects must provide pedestrian access for persons with disabilities?**
***Answer* -** Any project for construction or alteration of a facility that provides access to pedestrians must be made accessible to persons with disabilities. Source: 42 U.S.C. §§ 12131 - 12134; 28 CFR §§ 35.150, 35.151; Kinney v. Yerusalim**,** 9 F.3d 1067 (3d Cir. 1993), cert. denied, 511 U.S. 1033 (1994). See Section 6.2 for additional information.

***9. Question* - How does cost factor into a public agency's decision in its transition plan concerning which existing facilities must comply with ADA and Section 504 pedestrian access requirements?**
***Answer* -** For existing facilities requiring accessibility improvements as scheduled in the transition plans, the public agency must provide accessibility improvements unless the cost of the upgrades is unduly burdensome. The test for being unduly burdensome is the proportion of the cost for accessibility improvements compared to the agency's overall budget, not simply the project cost. Source: 28 CFR Part 35, App. A, discussion at §35.150, ¶¶ 4 – 7.

The decision that pedestrian access would be unduly burdensome must be made by the head of a public agency or that official's designee, accompanied by a written statement of the reasons for the decision. Source: 28 CFR §35.150(a)(3).

***10. Question* - Can cost be a reason not to complete an ADA-required accessibility improvement for a new project planned outside of the transition plan, with ADA accessibility improvements required to make the facility readily accessible and usable by individuals with disabilities?**
***Answer* -** No. Cost may not be a reason to fail to construct or delay constructing a new facility so that the facility is readily accessible to and usable by persons with disabilities under the ADAAG standards. Source: 28 CFR §35.151(a); see DOJ Technical Assistance Manual for Title II of the ADA, II-6.3100(3). See Section 6.2.B.4 for additional information.

***11. Question* - Can cost be a reason to decide what ADA-required improvements will be completed for an alteration project planned outside of the transition plan, with ADA accessibility improvements required within the scope of the project?**
***Answer* -** No. Cost may not be a reason for a public entity to fail to complete an ADA-required improvement within the scope of an alteration project under the ADAAG standards. A public agency must complete any ADA-required accessibility improvements within the scope of an alteration project to the maximum extent feasible. Source: 28 CFR §35.151(b); DOJ Technical Assistance Manual for Title II of the ADA, II-6.3100(4). See Section 6.2.B.4 for additional information.

***12. Question* - Can a public agency delay compliance with the ADA and Section 504 on alteration projects through a systematic approach to schedule the project?**
***Answer* -** No. All pedestrian access upgrades within the scope of the project must occur at the same time as the alteration. Source: Kinney v. Yerusalim**,** 9 F.3d 1067 (3d Cir. 1993), cert. denied, 511 U.S. 1033 (1994). See Section 6.2.B for additional information.

B. General Design Criteria.

***1. Question* - Are handrails required for curb ramps?**
***Answer* -** Handrails are not required on curb ramps. (ADAAG Section 4.8.5)

***2. Question* - Is there a minimum landing width requirement at the top of a curb ramp? *ADAAG* Figure 12 shows a dimension "X" that is related to the slope of the side flares, but does not indicate a minimum.**
***Answer* -** The ADAAG minimum landing width at the top of a curb ramp is 915 mm (36 in). PROWAG minimum landing requires a minimum of 1220 mm (48 in). It should be noted, Publication 72M, *Roadway Construction Standards*, RC-67M depicts a 1220 mm (48 in) minimum landing. A curb ramp is part of the accessible route and must maintain a maximum 1V:50H (2.00%) cross slope. Where pedestrians perform turning maneuvers, a level landing [1V:50H (2.00%) maximum longitudinal and cross slope in any direction] is required.

Figure 12 in the ADAAG is not intended to represent all of the requirements for curb ramps. The actual requirements are contained in the text of the technical specifications (*ADAAG 4.3.3 & 4.7.1).* See Section 6.11.G for additional information.

***3. Question* - Does a level landing mean a zero percent slope?**
***Answer* -** The requirement for level landings refers to ramps (ADAAG Section 4.8.5) and does not refer specifically to curb ramps. In general, "level" means having a slope no greater than 1V:50H (2.00%) in longitudinal and cross slope. Landings at the top of curb ramps are generally part of a sidewalk configuration and are permitted to have a maximum cross slope of 1V:50H (2.00%) to allow for drainage to avoid the accumulation of water on the sidewalk. Any cross slopes on sidewalks and other ground surfaces can cause considerable difficulty in maneuvering a wheelchair in a straight line. See Section 6.1 for additional information.

***4. Question* - Are curb ramps required to have detectable warnings?**
***Answer* -** Originally, ADAAG required detectable warnings, a distinctively bumpy surface (truncated dome) detectable by cane and underfoot, on the entire surface of curb ramps to provide a tactile cue for persons with vision impairments of their approach to streets. This warning was required since the sloped surfaces of curb ramps remove a tactile cue provided by curb faces. The U.S. Access Board temporarily suspended these requirements for curb ramps in 1994 due to concerns raised about the technical specifications, the availability of complying products, snow and ice removal maintenance issues, usefulness and safety. DOJ and US DOT joined in this action, which effectively removed the requirement from the enforceable standards. The suspension was extended twice (in 1996 and 1998) to accommodate the review and update of ADAAG. The ADAAG Review Advisory Committee recommended that the issue of detectable warnings at curb ramps should be resolved specifically in relation to public rights-of-ways before reinstating any requirements in ADAAG, which specifically now applies to facilities on sites. The Board agreed and did not include requirements for detectable warnings at curb ramps in its update of ADAAG. Consequently, the Board did not further extend the suspension, which expired on July 26, 2001. Since the enforcing agencies did not also extend the suspension, the detectable warning requirements *are technically part of the standards again.* New guidelines have been developed and will be presented for public street curb ramps in a forthcoming guideline covering public rights-of-way (PROW). Publication 72M, *Roadway Construction Standards*, RC-67M has been revised to incorporate the new truncated dome dimensions and alignment. See Section 6.5.A.8 for additional information.

***5. Question* - Some older curb ramps have grooved or other textured surface treatments that were to make them detectable by persons with visual impairments or create a slip-resistance surface. Are these surfaces acceptable as the detectable warning strip requirement on curb ramps and other hazardous vehicular crossings?**
***Answer* -** No. A number of other textured surfaces have been used on curb ramps, but they have not been demonstrated to be highly detectable to pedestrians who are blind, both underfoot and by the use of a long cane. Grooved cement has been found to be minimally detectable to people using a long cane as a travel aid and it is even less detectable underfoot. Other decorative surfaces that may be assumed to be detectable have not been tested for detectability. Many surfaces that look like they should be highly detectable have been found to be low in detectability. Consistency in a warning surface is essential if it is to reliably be understood as a warning by pedestrians with visual impairments. The truncated dome texture specified in ADAAG (4.29.2) is the only surface that should be considered a detectable warning. See Section 6.5.A.8 for additional information.

***6. Question* - The truncated dome warning surface is to cover the entire surface of the curb ramp in the original ADAAG. Why has this requirement been changed to require only a 610 mm (2 ft) wide strip at the bottom of the curb ramp?**
***Answer* -** The change was made to reflect the width of detectable warning strips required at transit platform edges (ADAAG 1991). The rationale for the 610 mm (2 ft) width of detectable warnings has been repeatedly demonstrated to be a sufficient width of a surface highly detectable both underfoot and by use of a long cane, to enable detection and stopping on that surface by most blind travelers. A longer width of the detectable surface can confuse pedestrians that have become accustomed to the shorter requirement and mislead them as to where the edge of the street is actually located.

***7. Question* - Why has the alignment of the truncated domes been changed? Is the older arrangement of domes on an existing curb ramp still in compliance with the ADA?**
***Answer* -** The desired current arrangement of the rows of domes is to be aligned with the path of wheelchair travel and perpendicular to the grade break at the toe of the ramp. Pedestrians encountering either configuration will find the surface pattern equally detectable and the older alignment is still in compliance with ADAAG. See Section 6.5.A.8.b for additional information.

***8. Question* - Do sidewalk crossings of residential driveways require detectable warning surfaces on either side of the driveway?**
***Answer* -** No. Generally sidewalk crossings of residential driveways will not be provided with detectable warnings, since the pedestrian right-of-way continues across most driveway aprons and overuse of detectable warning surfaces should be avoided in the interest of message clarity for persons with visual impairments. See Section 6.5.A.8 for additional information.

***9. Question* - Do sidewalk crossings of commercial driveways require detectable warnings?**
***Answer* -** Yes, in certain situations. Where commercial driveways are provided with traffic control devices or otherwise are permitted to operate like public streets, detectable warnings should be provided at the junction between the pedestrian route and the commercial driveway. See Section 6.5.A.8 for additional information.

***10. Question* - Must the dimensions indicated in ADAAG be precisely met?**
***Answer* -** Yes. Dimensions that are not marked minimum or maximum are absolute, unless otherwise indicated in the text or captions.

***11. Question* - Must the bottom of the curb ramp at the depressed curb line be flush with the adjacent roadway surface? Doesn't ADAAG allow for a 6 mm (0.25 in) vertical rise?**
***Answer* -** The ADAAG specifically states that the transition from curb ramps to walks, gutter or streets must be flush and free of abrupt changes. Any lip at the transition area can cause disruption to wheelchair movement since the small front wheels (casters) swivel freely. When the casters hit a raised lip, they swivel sideways and stop rolling. ADAAG does allow (Section 4.5.2) vertical changes in level up to 6 mm (0.25 in) without edge treatment *along an accessible route*, but the requirement for curb ramp transition to an adjacent surface requires a flush transition. See Section 6.11.B for additional information.

***12. Question* - Is environmental documentation required for curb ramps during resurfacing projects?**
***Answer* -** That is a decision that must be made based on the overall scope of the alteration project. Publication 10B, Design Manual, Part 1B, *Post-TIP NEPA Procedures*, provides two CE actions that should cover this work if there is no additional right-of-way required in the project. Resurfacing is covered by a Level 1b CE Action #1 - modernization of a highway by resurfacing. Curb ramps are covered by a Level 1a CE Action #3 - Construction of bicycle and pedestrian lanes, paths and facilities and #15 – Alterations to facilities or vehicles in order to make them accessible for the elderly and handicapped persons.

A Level 1a CE is approved by the District Environmental Manager. A Level 1b CE is approved by the District Executive.

***13. Question* - If the intersection is provided with crosswalks must the curb ramp be inside the crosswalk lines?**
***Answer* -** The curb ramps at indicated crosswalks must be contained within the crosswalk lines. For ramps that serve only one crosswalk direction, the flares may be placed outside of the crosswalk. For diagonal ramps that serve two crosswalk directions, the flares must be inside of the crosswalk lines. See Publication 72M, *Roadway Construction Standards*, RC-67M for details.

***14. Question* - Do pedestrian sidewalk crossings of curbed alleys require curb ramps?**
***Answer* -** Yes. Detectable warnings should be provided at the junction between the pedestrian route and the alley. All pedestrian crossings of a curbed roadway must be provided with accessible curb ramps complete with detectable warning surfaces since the alley represents a hazard in the line of travel for pedestrians who are visually impaired. See Section 6.5.A.8 for additional information.

***15. Question* - Should detectable warning surfaces be placed at sidewalk crossings of alleys that are at the same elevation as the sidewalk?**
***Answer* -** Yes. Detectable warnings should be provided at the junction between the pedestrian route and the alley. The sidewalk crossing of the alley presents a hazardous condition and the detectable warning surface alerts pedestrians who are visually impaired to the presence of hazards in the line of travel, indicating that they should stop and determine the nature of the hazard before proceeding further.

Also from Public Rights of Way (PROW) - Advisory R221 Detectable Warning Surfaces. "Detectable warning surfaces are required where curb ramps, blended transitions, or landings provide a flush pedestrian connection to the street." See Section 6.5.A.8 for additional information.

***16. Question* - Are existing ADA accessibility facilities constructed under previous ADA criteria required to be upgraded every time new accessibility criteria are issued?**
***Answer* -** No. Existing ADA accessibility facilities are not required to be upgraded every time new accessibility criteria are issued. However, upgrading to new criteria would be required when the existing accessibility feature is located within the project scope or limits of work of various types of alteration projects or in new construction. See Section 6.2.C for additional information.

C. Elements of Accessible Design - Alterations.

***1. Question* - What projects constitute an alteration to the public right-of-way?**
***Answer* -** An alteration is a change to a facility in the public right-of-way that affects or could affect access, circulation, or use. Projects altering the use of the public right-of-way must incorporate pedestrian access improvements within the scope of the project to meet the requirements of the ADA and Section 504. These projects have the potential to affect the structure, grade, or use of the roadway. Alterations include items such as reconstruction, major rehabilitation, widening, resurfacing (e.g., overlays and mill and fill), signal installation and upgrades and projects of similar scale and effect. See Section 6.1 for additional information.

***2. Question* - When does the scope of an alteration project trigger accessibility improvements for people with disabilities?**
***Answer* -** The scope of an alteration project is determined by the extent the alteration project *directly changes or affects* the public right-of-way within the project limits. *The public agency must improve the accessibility of only that portion of the public right-of-way changed or affected by the alteration.* If a project resurfaces the

street for accessibility purposes, the curb ramps, and pavement at the pedestrian crosswalk are in the scope of the project, but the sidewalks are not. Any of the facilities disturbed by the construction must be replaced so that they are accessible. All remaining access improvements within the public right-of-way must occur within the schedule provided in the public agency's planning process. See Section 6.2.B for additional information.

***3. Question* - Can my alteration project decrease or have the effect of decreasing ADA accessibility below the requirements of new construction at the time of the alteration?**
***Answer* -** No. No alteration project should be undertaken which would decrease or have the effect of decreasing accessibility or utilization of an ADA feature or facility. However, if compliance with ADA standards is *technically infeasible*, the alteration must provide accessibility to the maximum extent feasible within the scope of the alteration. See Section 6.9.D.5 for additional information.

***4. Question* - What if the ADA standards do not indicate specific details applicable for my alteration site or where full compliance to the standards would be technically infeasible?**
***Answer* -** Where ADA standards do not include detailed provisions for a specific alteration situation, the designer must determine what constitutes accessible design based on sound engineering judgment to utilize the current standards and provide accessibility to the maximum extent feasible. See Section 6.9.F for additional information.

***5. Question* - How can *technically infeasible* be better understood? Do utility and right-of-way impacts meet the definition of technically infeasible?**
***Answer* -** The highest degree of accessibility is expected in new construction. Alterations to existing facilities must observe new construction criteria where technically feasible; less stringent technical specifications may be applied where technical infeasibility is encountered. Existing facilities must achieve a level of usability that balances user needs, the constraints of existing conditions and the resources available for remedial work.

Alterations constrained by work already in place, may default to an intermediate standard when structural and site conditions prohibit full accessibility. Existing facilities must provide access to the maximum extent possible, a flexibility that permits needs to be balanced against available resources. If the alteration project scope of work involves utility relocations or additional right-of-way acquisition at the location of the pedestrian facilities, then new construction standards should be utilized. If the project scope of work does not require utility relocations or acquisition of additional right-of-way, then those elements can be considered as being constraining features or technically infeasible site conditions.

***6. Question* - What role does the "maximum extent feasible" standard play for ADA accessibility requirements in altered projects?**
***Answer* -** In an alteration project, the public agency must incorporate the ADA accessibility standards to the maximum extent feasible. Source: 28 CFR §35.151(b). The feasibility meant by this standard is physical possibility only. A public agency is exempt from meeting the ADA standards in the rare instance where physical terrain or site conditions restrict constructing or altering the facility to the standard. Source: ADA Accessibility Guidelines 4.1.6(1)(j).

Cost is not a factor in determining whether meeting standards has been completed to the maximum extent feasible. Source: DOJ's ADA Title II Technical Assistance Manual, § II-6.3200(3)-(4), 1993. *No particular decision making process is required to determine that an accessibility improvement is not technically feasible, but the best practice is to document the decision to enable the public agency to explain the decision in any later compliance review*. See Section 6.2.B.4 for additional information.

***7. Question* - Can flush mounted utility valve boxes, junction boxes, manholes, etc. be located in a curb ramp surface, side flare, or landing?**
***Answer* -** Yes, existing utilities may be located within the pedestrian access route, if necessary. However, the box cover or manhole surface must be stable, firm, slip-resistant and flush with the adjacent surface. Proposed utilities must be placed outside of the pedestrian access route. See Section 6.5.B for additional information.

***8. Question* - Can utility, signal, or sign poles, fire hydrants, etc. be located in curb ramp side flares as long as lateral clearances for accessibility are met?**
***Answer* -** If necessary, yes. All attempts to relocate vertical obstructions to provide full accessibility should be attempted and easy to relocate features such as a sign pole can be readily relocated in most cases without adversely affecting its function on the street. There is no provision in the ADA to require moving existing utilities or acquiring new right-of-way for alteration work.

There are also several curb ramp design types that do not feature side flares that may be utilized to meet existing site conditions and help to prevent keeping poles or other undesired features from being located in the pedestrian curb ramp walkway. Side flare curb ramp types are generally utilized where pedestrians would have the need to laterally cross the ramp or for a wheelchair to make a turning movement. Providing appropriate lateral accessibility clearance** at a pole (post, fire hydrant, street tree, etc.) location would be necessary. Curb ramps with returned curbs may be used where pedestrian traffic would not normally be expected to walk across the ramp.

** The minimum clear width ground space for an accessible route for single point access is 815 mm (32 in), for a maximum length of 24 in, to accommodate single wheelchair passage (ADAAG 4.2.1). The remainder of the accessible route is 915 mm (36 in) minimum clear width (ADAAG 4.3.3). PROWAG requires a minimum 1220 mm (48 in) pedestrian access route. Recommended guideline: The **1220 mm (48 in) dimension should be used** as the desired minimum single point access dimension whenever possible due to the probability of multiple pedestrians. Pedestrian access route should not be confused with sidewalk width.

Alteration projects that include the installation of or relocation of poles, posts, street trees, fire hydrants, or other types of street furniture on or near existing pedestrian pathways must provide the required accessibility clearances designated for a pedestrian access route. See Section 6.5.B for additional information.

***9. Question* - New curb ramps are being installed at an existing developed corner. New construction standards require the curb ramp to be within the crosswalk, but an existing underground utility vault is located where the ramp should be. Must the utility vault be moved?**
***Answer* -** The scope of the project will determine the answer. If utilities are being moved for other reasons within the project limits, it may be possible to alter or relocate the vault. If project construction will not involve the vault, it may be technically infeasible to position the curb ramp at an optimal location. It may also be possible to widen the crosswalk markings to include the curb ramp.

***10. Question* - What if the curb ramp can be placed over the vault, but the access cover would be located on the curb ramp?**
***Answer* -** If the access cover must be located on the curb ramp, it should meet the surface requirements of the pedestrian access route (stable, firm, slip-resistant and flush with the adjacent surface). See Section 6.5.B for additional information.

***11. Question* - If existing diagonal curb ramps are present or proposed, should crosswalk striping be included in the project?**
***Answer* -** Diagonal curb ramps should be proposed sparingly in areas where pedestrian traffic is moderate to high. All curb ramps are to have a minimum 1220 mm (48 in) clear space (overrun area) on the street at the bottom of the curb ramp in order for wheelchair users to maneuver and change direction to cross the street in the direction of pedestrian traffic. Crosswalk configurations indicated in Publication 72M, *Roadway Construction Standards*, RC-67M encompass this clear space and provide some degree of safety to the pedestrian while maneuvering across the street. Although the written guidance in this chapter does not indicate that a diagonal curb ramp requires the installation of a crosswalk, as a safety consideration, new crosswalk striping should be added to projects in medium to high pedestrian traffic areas to create the necessary clear space (overrun area) within the crosswalk configuration.

***12. Question* - Is it acceptable to retain a drainage inlet or manhole in place where a pedestrian with a disability could cross them?**
Answer* -** If necessary, yes. The ADA does not desire to prevent these existing crossings except for new construction where they can be addressed in design. Remember that the ground surface for any accessible route must be stable, firm and slip-resistant. Grates and manhole covers must also be flush with the adjacent surface. Every effort should be made to position the ramp surface direction so that the pedestrian does not have to cross an inlet. The ADAAG makes provision for the appropriate grate type that is permissible in an accessible route walking surface. Note: The reduced opening size for ADA accessible grates may greatly reduce the hydraulic efficiency for the street inlet and increase the accumulation of debris at the inlet.

*** If gratings are located in walking surfaces, then they must have spaces no greater than 13 mm (0.5 in) wide in one direction. If gratings have elongated openings, then they must be placed so that the long dimension is perpendicular to the dominant direction of travel. See Section 6.5.B for additional information.

***13. Question* - Do we need to install a curb ramp at street locations where the adjacent roadway or gutter slopes exceed the ADAAG standard of 1V:20H (5.00%)?**
***Answer* -**Yes. The ADAAG is basically written for new construction where these issues can be addressed and avoided in design. In the original ADAAG, curb ramps were to be installed where an accessible route crossed a roadway; however, this provision has been greatly expanded in later years to where curb ramps are expected at every curbed roadway intersection where sidewalks enter the street. In an existing right-of-way that is not otherwise being altered, the minimum requirement for achieving program accessibility is the installation of curb ramps at selected locations where existing pedestrian walkways cross curbs. Even on steep sites, pedestrians using motorized wheelchairs or being assisted in traveling can use curb ramps and a connection to the street crossing should be available if there is a pedestrian walkway.

U.S. DOJ ADA Title II, Technical Assistance Manual Guidance – II-6.6000 Curb ramps. "When streets, roads, or highways are newly built or altered, they *must* have ramps or sloped areas *wherever there are curbs* or other barriers to entry from a sidewalk or path. Likewise, when new sidewalks or paths are built or altered, they *must* contain curb ramps or sloped areas *wherever they intersect with streets, roads, or highways*."

If it is not possible to install a curb ramp that is fully compliant with ADAAG in an existing sidewalk, each feature of accessibility should be maximized within the constraints of the site conditions at that location. Every decision must be arrived at individually, after considering the effects of contributing factors for the given site conditions based on the following guideline:

Alterations must follow the ADA Standards for Accessible Design unless compliance is technically infeasible. Where the nature of an existing facility makes it virtually impossible to comply with all of the accessibility standards applicable to planned alterations, any altered features of the facility that can be made accessible must be made accessible.

Additionally, because alterations to existing rights-of-way offer fewer opportunities to mitigate the effects of topography and to incorporate maneuvering space and other accessibility features, accessibility guidelines include less stringent technical criteria for some conditions, such as a steeper permitted slope for a curb ramp where it may be technically infeasible to meet new construction requirements. Alterations, however, may not be undertaken that have the effect of reducing existing levels of accessibility below the requirements for new construction.

***14. Question* - Curb ramp alteration work must transition to the adjacent existing sidewalk width and cross slope at some point. Is there a limit to the length of adjacent sidewalk that should be replaced?**
***Answer* -** The curb ramp must be constructed to meet the standards. The transition to the existing sidewalk width and cross slope will be as per Publication 72M, *Roadway Construction Standards*, RC-67M. The transition may not meet the standards but is intended to serve as temporary connection until the substandard sidewalk can be addressed in a subsequent project. See Section 6.3.D for additional information.

***15. Question* - A multi-block length of roadway is being resurfaced. The intersection corners have curb ramps that meet some but not all of the current design guidelines. For example, the cross slope may be too steep or the curb ramps do not have detectable warnings. Must the curb ramps be reconstructed to the latest guidelines as part of the resurfacing project?**
Answer - Yes, if it is technically feasible to provide the complying facilities. The work should be done at the same time the resurfacing is being done. See Section 6.2.B for additional information.

***16. Question* - One corner of an intersection is being altered by curb and gutter reconstruction and paired curb ramps are being installed as part of this project. The other three corners of the intersection are not being altered. Must new upgraded curb ramps be provided at the unaltered corners as part of this work?**
Answer - No. The scope of the project requires new upgraded curb ramps *only at the altered corner*. (Note: The ramps of the unaltered corner must be added to the transition plan.) See Section 6.2.B for additional information.

***17. Question* - What activities are not considered to be alterations?**
Answer - The DOJ does not consider maintenance activities, such as filling potholes, to be alterations. The DOJ does consider *resurfacing to be an alteration.* Source: DOJ's ADA Title II Technical Assistance Manual, § II-6.6000, 1993.

The FHWA has determined that maintenance activities include actions that are intended to preserve the system, retard future deterioration and maintain the functional condition of the roadway without increasing the structural capacity. These activities include, but are not limited to, thin surface treatments (nonstructural), joint repair, pavement patching (filling potholes), shoulder repair, signing, striping, minor signal upgrades and repairs to drainage systems. See Section 6.2.B.3 for additional information.

***18. Question* - Does a project altering a public right-of-way require simultaneous accessibility improvements?**
Answer - Yes. An alteration project must be planned, designed and constructed so that the accessibility improvements within the scope of the project occur at the same time as the alteration. Source: 29 CFR § 35.151; Kinney v. Yerusalim**,** 9 F.3d 1067 (3d Cir. 1993), cert. denied, 511 U.S. 1033 (1994).

The ADA does not stipulate how to perform simultaneous accessibility improvements. For example, a public agency may select specialty contractors to perform different specialized tasks prior to completion of the alteration project or concurrently with an ongoing project.

***19. Question* - Will it be necessary to modify Highway Occupancy Permit drawings if changes to curb ramps impact crosswalks and stop bar locations?**
Answer - The need to provide new or additional pedestrian access along and across existing highways as a result of new adjacent property development will require the approval and issuance of a PennDOT Highway Occupancy Permit (HOP) to the local government or adjacent property owner. The HOP elements may include the need for ADA accessibility facilities. PennDOT has the oversight responsibility for ADA accessibility within our roadway right-of-way including all HOP sites. Permit approvals should include the appropriate review of proposed accessibility facilities to meet approved standards and also require appropriate construction inspection to insure all permit accessibility standards have been met.

It is recommended that alterations to an existing HOP that creates substantial revisions to the functional use of the curb ramp, crosswalk configuration, or stop bar locations should be recorded by an acceptable method and become part of the HOP file. See Section 6.2.B.1.b for additional information.

D. Elements of Accessible Design - New Construction.

***1. Question* - Is there a specific static coefficient of friction required for a surface to be "slip resistant?"**
***Answer* -** Recommended static coefficients of friction for walking vary. OSHA recommends that walking surfaces have a static coefficient of friction of 0.5. The U.S. Access Board recommends a static coefficient of friction of 0.6 for accessible routes and 0.8 for ramps. However, there are a variety of ways to measure the coefficient of friction for different materials and no single test device or procedure has been identified by the U.S. Access Board. Without a defined test procedure, these friction values cannot be applied. It is recommended to use products that are identified by the manufacturer as having a "slip resistant" surface. See Section 6.5.A.1 for additional information.

***2. Question* - Will a standard provision be developed to require contractors to remove and replace curb ramps at their own expense if a new curb ramp installation does not meet criteria?**
***Answer* -** No. Construction inspection and approval of all construction activities remain the responsibility of the Department and ADA improvements should be given the same degree of importance as any other highway construction item. Each contract accessibility feature should be field inspected, measured and approved to ensure that the proper construction details and specifications have been appropriately met. Accessibility facilities not meeting the approved standards as determined by Department construction personnel will require the contractor to remove and replace the facility until they are in conformance to the construction standards.

For alteration projects, the ADA facilities will be constructed to the maximum extent feasible within the scope of the alteration. Construction contracts will not receive final acceptance until all accessibility facilities are approved by the Department.

E. Temporary Routes for Alteration Project Accessibility.

***1. Question* - How will alteration construction activities affect existing ADA accessibility?**
***Answer* -** Any construction activity required for alterations that affect existing pedestrian circulation paths will require the provision of a safe, alternate and accessible pedestrian route around the construction activity. The alternate route around the work zone must comply with all applicable accessibility guidelines to the maximum extent feasible so that the usability of the accessible route is maintained. The alternate route will be kept in place through the duration of the construction activity. See Section 6.14 for additional information.

F. Maintenance Issues.

***1. Question* - Are maintenance operations considered alterations for the purpose of the ADA?**
***Answer* -** The DOJ does not consider normal maintenance activities, such as filling potholes, to be alterations. The DOJ does consider *resurfacing beyond normal maintenance to be an alteration.* Source: DOJ's ADA Title II Technical Assistance Manual, § II-6.6000, 1993.

The FHWA has determined that maintenance activities include actions that are intended to preserve the system, retard future deterioration and maintain the functional condition of the roadway without increasing the structural capacity. These activities include, but are not limited to, thin surface treatments (nonstructural), joint repair, pavement patching (filling potholes), shoulder repair, signing, striping, minor signal upgrades and repairs to drainage systems. See Section 6.2.B.3 for additional information.

***2. Question* - Do maintenance activities require simultaneous improvements of the facility to meet ADA standards?**
***Answer* -** No. Maintenance activities do not require simultaneous improvements to pedestrian accessibility under the ADA and Section 504. However, in the development of the maintenance scope of work identified accessibility needs should be incorporated into the transition process. See Section 6.2.B.3 for additional information.

3. ***Question*** **- What obligation does a public agency have regarding snow removal in its walkways?**
Answer **-** A public agency must maintain its walkways in an accessible condition, with only isolated or temporary interruptions in accessibility. Source: 28 CFR §35.133. Part of this maintenance obligation includes reasonable snow removal efforts. See Section 6.6 for additional information.

4. ***Question*** **- What day-to-day maintenance is a public agency responsible for under the ADA?**
Answer - As part of maintenance operations, public agencies' standards and practices must ensure that the *day-to-day operations keep the path of travel on pedestrian facilities open and usable for persons with disabilities, throughout the year. This includes snow removal, as noted above, as well as debris removal, maintenance of accessible pedestrian walkways in work zones and correction of other disruptions*. Source: ADAAG 4.1.1(4). See Section 6.6 for additional information.

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