Delaware T² Center

TRAVEL-LOG

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ADA Requirements – Part 2

Design and Construction Issues of Pedestrian Facilities

By: Alan S. Kercher, P.E. – T² Center Consultant

Part 1 of the ADA Requirements series of articles discussed how ADA requirements affect Municipal Public Works Projects, as well as, transition plan requirements and the recent increase in complaints. The Barden v. Sacramento case in which the court dealt the City a severe penalty for failure to comply with ADA regulations was highlighted. Part 2 will summarize design requirements for curb ramps. Future articles will discuss the design of sidewalks and crosswalks, as well as, highlight common construction issues.

Without proper curb ramps, pedestrian travel in urban areas is dangerous, difficult, and is in some cases impossible for people who use wheelchairs, scooters, and other mobility aids. Curb ramps allow people with mobility impairments to gain access to the sidewalks and to pass through center islands in streets. Otherwise, these individuals are forced to travel in streets and roadways and are put in danger or are prevented from reaching their destinations.

Requirements for Improvements

When streets and roads are newly built or altered, they must have ramps wherever there are curbs or other barriers preventing entry from a pedestrian walkway. Likewise, when new sidewalks or walkways are built or altered, they must contain curb ramps or sloped areas wherever they intersect with streets or roads. While resurfacing a street or sidewalk is considered an alteration for these purposes, filling potholes
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Traffic Calming – Part 3

Speed Control Using Horizontal Measures

By: Alan S. Kercher, P.E.- T² Center Consultant

Part 1 of the Traffic Calming Series of articles briefly discussed why stop signs typically are not the answer to speed control. It also provided a brief overview of Delaware's Toolbox of Traffic Calming Measures as set forth in the DelDOT Traffic Calming Design Manual. Part 2 provided an overview of vertical measures that can be utilized for speed control. Part 3 will provide an overview of horizontal measures that can be utilized for speed control. The four horizontal measures specified in the DelDOT Traffic Calming Design Manual are Mini-Traffic Circles, Roundabouts, Chicanes, and Lateral Shifts.
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ADA Requirements – Part 2

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alone will not trigger the alteration requirements. This is not to say that non-compliant ramps on streets which are not being resurfaced don't have to be upgraded. Non-compliant ramps should be part of the transition plan which provides a prioritized plan for determining when each pedestrian facility will be brought into compliance.

ADAAG Requirements

The American Disabilities Act Accessibility Guidelines (ADAAG) outlines the geometric design criteria, construction tolerances, physical condition, and obstruction prevention of pedestrian facilities. The design controls listed below apply to each of the pedestrian facilities including sidewalks, curb ramps, and crosswalks.

- Alignment
- Width
- Grade Changes
- Profile Slope
- Cross Slope

The guidelines for these design criteria attempt to provide safety and access for all pedestrians including those with disabilities. The following is a list of some of the most important design criteria for curb ramps:

- Curb Ramps are an ADA requirement for transition from a vehicular travelway to a pedestrian facility. They must be placed perpendicular to the face of the curb.
- The maximum allowable ramp grade is 12:1 (8.33%). Where this cannot be obtained due to a steeper adjacent roadway, the ramp can be limited to 15 ft. in length, and the grade may exceed 12:1. If the ramp is located within the primary travel lane such as a parallel curb ramp, the slope must not exceed 2 percent.
- The cross-slope of a ramp should not exceed 50:1 (2%).
- The maximum change in grade from roadway to ramp cannot exceed 13% with 11% being recommended.
- The ramp width must be a minimum of 48 inches. DelDOT prefers 60-inch ramp widths.
- Curb ramps should be free from obstructions such as gratings, access covers, and drainage inlets.
- Curb ramps should be designed with adequate drainage to keep stormwater from ponding at the entrance of the ramp. The addition of drainage inlets at the upstream sides of curb ramps is a good practice.
- The landing of a curb ramp should be a minimum of 48 inches wide with 60 inches preferred to provide adequate turning space for a wheelchair. The landing of a curb ramp should not exceed 50:1 slope in any direction.
- Flares should have a slope no greater than 12:1 and are not considered part of the accessible route. Where flares are used, a landing must be provided.
- Transition points between curb ramp, landing, gutter and street should be flush. The maximum vertical tolerance between two surfaces is ¼ inch. If the vertical difference between surfaces is between ¼ inch and ½ inch, the transition must have a 2:1 beveled edge, and if the difference vertically is greater than ½ inch, it must be treated as a ramp – 12:1 max slope.

Curb Ramp Types

There are three general types of curb ramps: perpendicular, parallel and diagonal.

Perpendicular Curb Ramp

The path of travel on the ramp is perpendicular to the path of travel on the sidewalk. Advantages of

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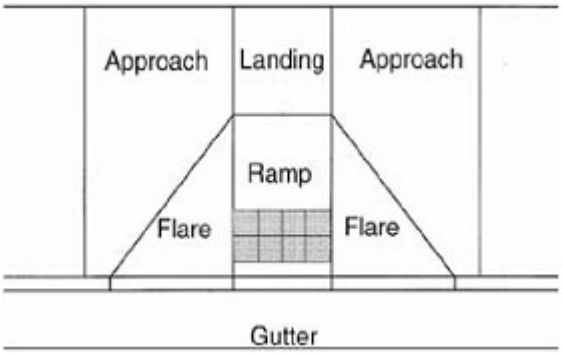
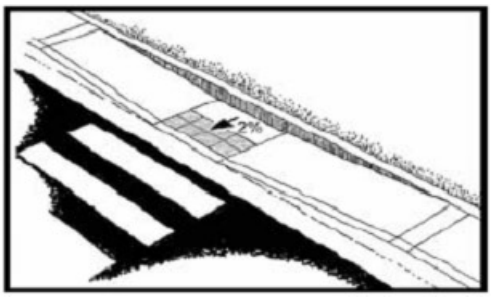
a perpendicular ramp are that it provides a straight path of travel on small and medium radius corners at crossings; it is positioned within the crosswalk and is located at the expected crossing location. Disadvantages of this type of ramp are that it is difficult to provide a straight path of travel on large radius corners and a wide sidewalk or curb extension may be needed to accommodate the curb ramp and level landing



Typical Perpendicular Curb Ramp Components

Parallel Curb Ramp

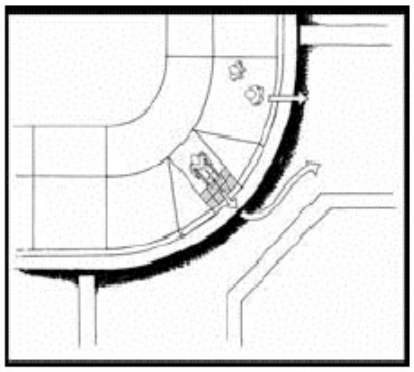
The path of travel on the ramp is parallel to the adjacent vehicular path of travel. Advantages of a parallel ramp are that it provides a connection to the street with crosswalk lines (if existing), a level maneuvering area, edges on the sides of the ramp are clearly defined for people with visual impairments and limited right-of-way is required. Disadvantages of a parallel ramp are that it requires "thru" pedestrians to use the ramp, the landing area is shared by all pedestrians - potentially creating conflict points, and there is potential for ponding or accumulation of debris at the curb.



Typical Parallel Curb Ramp

Diagonal Curb Ramp

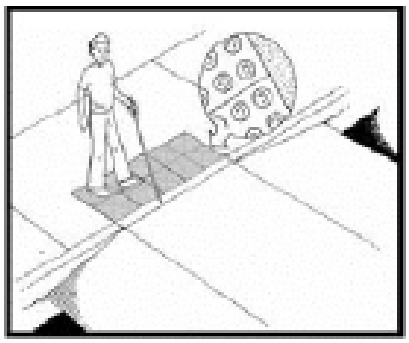
A single curb ramp is located at the apex of the intersection corner. The primary advantage of a diagonal curb ramp is that only one curb ramp is required to be constructed at each corner. The primary disadvantage is that the path of travel that will lead into the center of the intersection on small radius corners may create conflicts with motorists. This is not the preferred location for a curb ramp.



Typical Diagonal Curb Ramp

Surface Detectable Warning Systems

All curb ramps shall have surface detectable warning systems (truncated domes.) Truncated domes are visual and tactile cues for the visually impaired to perceive the transition from roadway to sidewalk. The truncated domes must be contrasting in color from the sidewalk. There must be 2 square feet of truncated domes per each foot of ramp width (ex. ramp width of 4 ft. = 8 sq. ft. of truncated domes.)



Detectable Warnings – Truncated Domes

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Maintenance

The physical condition of the pedestrian facilities is also an important aspect of ADAAG requirements. Proper maintenance and upkeep of these facilities should be an ongoing process for any agency. Physical deficiencies such as excessive cracks or joints in a sidewalk, or ponded water at a curb ramp can cause safety issues for all pedestrians. These deficiencies may be caused by poor planning, design, and/or construction.

References

More information on the ADA law, design standards, best practices and the proposed changes can be found on the following web sites:

http://www.usdoj.gov/disabilities.htm
http://www.access-board.gov/

Safety Circuit Rider Program to Begin in Fall 2006

Two years ago, the Federal Highway Administration (FHWA) began to fund a pilot safety circuit rider program at 4 of 58 T² Centers around the nation. The FHWA asked the Delaware T² Center to assist in soliciting proposals from interested centers and selecting the best proposals. Ultimately, the centers in West Virginia, Kentucky, Florida, and the Northern Plains Tribal Association were selected.

We are now at the point where we are ready to begin a Safety Circuit Rider Program here in Delaware. Since we are not receiving additional federal or matching funds for this program we will only do a few projects in the first year, but we plan to expand our activities before too long.

Alan Kercher, P.E., our current T² Engineer will manage and conduct the program. Here is a summary if how it will operate:

1. A Delaware municipality concerned about one or more hazardous locations on the streets it maintains asks the T² Center to investigate the situation and recommend solutions.
2. Mr. Kercher and his team will make field visits, review accident data, and consult with municipal officials.
3. We will consult with DelDOT officials and other safety experts.
4. We will issue a non-binding report that emphasizes effective, low-cost safety improvements that you can deploy in the short-term.
5. We will help you analyze how well the improvements have worked.

In addition, should the municipality request it, we will also assist you in developing a plan to reach compliance with the Americans with Disabilities Act (ADA). Both the FHWA and DelDOT are increasing their efforts to encourage complete ADA compliance throughout Delaware. Recent lawsuits or threats of lawsuits in Delaware and many other states have put state and local governments on notice that ADA compliance is a necessity, not an option.

Soon, we will be mailing to you additional details about our new Safety Circuit Rider Program. The mailing will include a form on which you can request our technical assistance. We look forward to hearing from you.

Traffic Calming – Part 3

Speed Control Using Horizontal Measures

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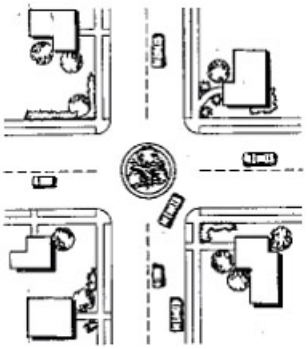
1. Mini-Traffic Circles

Mini-traffic circles are raised islands placed in intersections around which traffic circulates in a counterclockwise direction. The typical travel path around a mini-traffic circle has a radius of 95 ft., yielding a crossing speed through the intersection of 20 mph. The design vehicle for the typical mini-traffic circle is a single unit truck. Larger vehicles will have to mount the center island of the circle. Typically the center of the circle will be landscaped with low lying plants that should not obstruct the driver's line of sight and small trees capable of breaking away during a collision. Drainage in the intersection is achieved by setting the circle higher at the center and sloping the pavement down to the curb line at 1% to 2%.



Typical Mini-Traffic Circle

Alternative mini-traffic circle designs call for circles that fit within the curb lines of smaller intersections and allow traffic to make left turns in front of the center island. These will only be applicable if two criteria are met: intersection widening is not feasible, and entering traffic volumes are less than 500 vehicles per day.

2. Roundabouts

Roundabouts are similar to mini-traffic circles in that traffic circulates around a center island, but they are generally larger and are used in applications where higher traffic volumes and higher speeds are expected. Splitter islands are used at the approaches of the roundabout to slow traffic and discourage wrong-way movements. The typical roundabout has a design speed of 25 mph. The design speed is the result of a 180 ft. radius travel path around the center island. The inscribed circle formed by the splitter islands has a radius of 48 ft. and includes both the center island and travel lanes around the island. The center island has a 27 ft. radius which usually includes a 6 ft. mountable curb on the outer edge for buses and semi-trailers. Automobiles and single unit trucks can circulate around the center island without driving on the mountable curb. DelDOT does allow for larger roundabouts with design speeds as high as 30 mph and two circulating lanes as a maximum.

Pedestrian traffic is directed around a roundabout through the use of crosswalks. Crosswalks are set one car length (20 ft.) back from the yield line to allow pedestrians to cross behind waiting cars. Cut-throughs are provided at the splitter islands to allow pedestrians to cross at grade.

Typical Roundabout Plan View

2. Chicanes

Chicanes, also referred to as serpentines and reversing curves, are curb extensions that alternate from one side of the street to the other forming s-shaped curves. Speeds are reduced as vehicles try to maneuver through the curves. They can be created with curb extensions or edge islands. Edge islands leave existing drainage channels open and are cheaper to construct. The typical chicane has trapezoidal shaped edge islands because these are the most effective at reducing speeds. The Edge Line taper for a chicane must conform to the MUTCD which stipulates an 8:1 minimum taper ratio.

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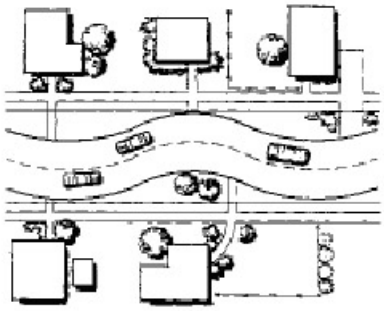
The curb extensions or edge islands should have vertical elements so the driver can clearly see them. Trees and other landscaping materials planted in these areas work well as visual cues.

It is a good practice to use mountable curbs rather than barrier curbs on chicanes because of the complexity of traffic movement. Mountable curbs may be placed at the edge of the travel lane, where as, barrier curbs should be offset at least 1 ft. from the edge of the travel lane.

The two lanes of traffic are typically separated by double solid yellow lines. A well-defined centerline is critical to keep motorists from attempting to cut into the opposing lane in order to avoid the chicane. If needed to discourage motorists from cutting across the centerline, a raised median may be installed provided that the median is mountable by a vehicle.

Parking bays may be incorporated into the design of chicanes; however, they are discouraged due to the already very complex nature of the traffic movement.



Typical Chicane

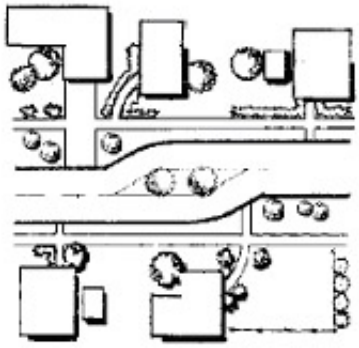
2. Lateral Shifts

Lateral shifts, also known as axial shifts and jogs, are curb extensions on otherwise straight streets. The intention is to cause the traffic to shift one way and then shift back to the initial direction of travel. The typical lateral shift can be considered half of a chicane, because the roadway alignment shifts only once. Unlike chicanes, lateral shifts can be used on roads with relatively high traffic volumes and higher posted speeds. Lateral shifts typically have a crossing speed 5 mph greater than that of a chicane.

Typically, a landscaped center island is used to separate the two opposing lanes of traffic. This is done to keep vehicles from driving into the opposing lane of travel. Similar to requirements for chicanes, DelDOT standards allow for the use of parking bays with lateral shifts, but only under specific conditions.

Accommodations for Bicyclists

Bicyclists tend to get cut off at horizontal speed control measures. Low volume roads with little bicycle traffic typically do not warrant special consideration since conflicts between bicyclists and horizontal speed control measures are infrequent. However, where volumes of bicyclists and motor vehicles are high, special accommodations should be made. Designs usually assume that bicycle lanes will end 70 to 100 ft. upstream of slow points. In order to provide bicyclists with ample space to merge into traffic, bypass lanes may be considered where high traffic volumes will be encountered at chicanes and lateral shifts. Bypass lanes should also be provided at roundabouts that experience 10,000 vehicles per day or greater.



Typical Lateral Shift

DelDOT Traffic Calming Design Manual

For more detailed information about these and other traffic calming measures, please visit www.deldot.net to view the DelDOT Traffic Calming Design Manual in PDF format.

T² Center Technical Assistance

As part of the Safety Circuit Rider Program, the T² Center will be glad to meet with any municipality that is interested in implementing traffic calming measures on the streets maintained by your municipality.

Other Upcoming Events

November 1-2 Asphalt Recycling, Kent Poly Tech Adult Conference Center

November 28 Safety Conscious Planning, Kent Poly Tech Adult Conference Center

Workshops Under Development

National Environmental Protection Act

Managing Construction Projects

Principals of Writing Highway Construction Specifications

Pedestrian Facility Design

Ethics for Transportation Professionals

Selling Your Projects to Supervisors and the Public

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The Technology Transfer (T²) Program is a nationwide effort financed jointly by the Federal Highway Administration and individual state departments of transportation. Its purpose is to interchange the latest state-of-the-art technology into terms understood by local and state highway or transportation personnel.

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