

DISTRIBUTION: Electronic Recipients List

MINNESOTA DEPARTMENT OF TRANSPORTATION DEVELOPED BY: Design Standards Unit ISSUED BY: Office of Project Management and Technical Support	TRANSMITTAL LETTER NO. (17-01) MANUAL: Road Design English Manual DATED: August 16, 2017
SUBJECT: Section 11-3 (Walkway Grades and Cross Slopes)	

A list of changes is attached to this update.

INSTRUCTIONS:

1. Record this transmittal letter number, date and subject on the transmittal record sheet located in the front of the ENGLISH manual. The last Transmittal Letter was 16-01, dated January 20, 2016.
2. Remove from the ENGLISH manual: 11-3(11) and 11-3(12)
3. Insert into the ENGLISH manual: 11-3(11) and 11-3(12)

All updated sheets are dated August, 2017.

4. The Road Design Manual and associated Transmittal Letters are available online in PDF format at.
<http://roaddesign.dot.state.mn.us/roaddesign.aspx>
5. Any technical questions regarding this transmittal should be directed to Mike Elle, Design Standards Engineer, at (651) 366-4622, or by email to DesignStandards.DOT@state.mn.us



Michael Elle, P.E.
Design Standards Engineer

THIS PAGE INTENTIONALLY LEFT BLANK

Summary of Changes

MnDOT Road Design Manual

17-01

Chapter 11

- Section 11-3.07 (Table 11-3.07)
 - Changed starred note to Numbered Note 1.
 - Added Numbered Note 2.
 - Modified Crosswalk location.
 - Removed 'max.' from Running Grades.
 - Removed 'Running. From Maximum Grade heading.

THIS PAGE INTENTIONALLY LEFT BLANK

11-3.07 Grades and Cross Slopes

Steep walkway grades create problems for most pedestrians, especially under adverse weather conditions. To be accessible, walkways must be designed so that built tolerances do not exceed the maximum grades shown in Table 11-3.07. Where shared use paths and pedestrian trails cross highways or streets, the crossing must also meet the same requirements as street crossings, including detectable warnings. Where a pedestrian circulation path is in the shoulder, it must contain a pedestrian access route and must meet the same requirements as walkways.

Walkway Location and Function	Desirable Grade		Maximum Grade ¹	
	Running	Cross	Running	Cross
Walkway parallel with roadway (where roadway grade controls walkway grade)	≤ 5%	1.5%	May exceed 5%, but must be less than or equal to roadway grade	2%
Recreational trail that functions as a sidewalk	≤ 5%	1.5%	5%	2%
Crosswalk with yield or stop sign ²	≤ 5% or max. extent feasible	1.5% or max. extent feasible	5%	2%
Crosswalk without yield or stop sign ²	≤ 5% or max. extent feasible	1.5% or max. extent feasible	5%	5%
Shoulder serves as pedestrian access route	≤ 5%	1.5% unless on super elevation	Equal to roadway grade	2%
Walkway crossing a driveway	≤ 5%	1.5%	Equal to roadway grade	2%
Midblock crossing	NA	NA	5% for any distance	Warped to meet roadway grade

Note: 1. The grades listed in these columns are maximum constructed grades. Designers must take construction tolerances into account to ensure finish surfaces do not exceed the maximum grade allowed. In cases where designs must exceed the maximum grade due to safety, topography or operations concerns, always design to the maximum extent feasible and document decisions in the project files.

2. A traffic signal with a green phase is not considered yield or stop condition by PROWAG.

WALKWAY RUNNING GRADES AND CROSS SLOPES**Table 11-3.07****11-3.08 Crossings**

Pedestrians and vehicles use two types of intersections. They are: at grade and grade separated intersections.

11-3.08.01 At Grade Intersections

Most vehicular/pedestrian conflicts occur within at-grade intersections. Pedestrians are the most vulnerable user group at these intersections and their needs must be integrated equally with motorists. Intersections are usually the best and most direct place for pedestrians to cross a street yet, if intersection crossings are intimidating, few pedestrians will cross them. Proper intersection design reduces the potential for conflicts between motorized and non-motorized modes while providing adequate through movements and turning movements for vehicles. To limit pedestrian exposure to vehicles in intersections, design intersections as compactly as possible. Designers must accommodate traffic volumes and large turning vehicles while maintaining pedestrian safety and comfort. Designers should always consider tools to create the safest and shortest crossing for pedestrians, such as shared or continuous turn lanes, narrowed lanes, reduced curb radii, refuge islands, medians, curb extensions, pavement markings that reinforce the preferred pedestrian path, signal type and timing, as well as the frequency of large turning vehicles.

11-3.08.02 Types of At Grade Intersections

Pedestrians use three types of at grade pedestrian crossings. They are: controlled, uncontrolled, and mid-block.

Controlled intersections utilize traffic signals and/or stop or yield signs. A basic requirement for all controlled intersections with traffic signals is that pedestrians must be able to reach push buttons and perceive the control device soon enough to perform the action it indicates. Information on traffic signal warrants and traffic controls such as APS are found in the MN MUTCD, MnDOT Signal Design Manual, and MnDOT Traffic Signal Timing and Coordination Manual.

Uncontrolled intersections have no traffic signals or signs to control the flow of traffic. When one or more legs of an intersection is uncontrolled, pedestrian crossing movements become more complex. Uncontrolled intersection crossings may operate safely for all users when design considerations like street width, traffic volume, speed, and line-of-sight issues are taken into account.

Mid-block crossings provide pedestrians opportunities to cross safely where there is a long distance between intersections or where there is a generator that entices pedestrians to cross at a location other than a corner. Should a mid-block crosswalk be warranted, provide markings, signals, and/or warning devices to alert motorists.

11-3.08.03 Crossing Features

Crossing features include: crosswalks, curb ramps, and detectable warning surfaces.

Crosswalks. Whether marked or unmarked, crosswalks exist at all corners and intersections. Crosswalks function as an extension of walkways and, unless restricted by signs for safety, must follow the most direct and convenient pedestrian path. Crosswalks may pass through a median or pedestrian refuge island. Marked crosswalks help direct pedestrians, including the sight-impaired, in the direction of crosswalks. Marked crosswalks must be 6 ft (1.8 m) wide minimum. For additional crosswalk design and cross slope information, consult the MN MUTCD and Table 11-3.07.

Curb Ramps. Curbs are barriers to pedestrians and impede or restrict mobility. Curb ramps permit people to cross streets without stepping up to or off curbs. Curb ramps provide accessibility between intersection corners and facilitate crossing for wheelchair users, people with vision impairments, people pushing strollers, bicyclists, and others. When properly located, perpendicular ramps can help direct pedestrians, including the sight-impaired, in the direction of crosswalks and pedestrian travel. Curb ramps installed at tangent points rather than on the corner radius provide more usable directional cues and create the shortest crossing point. All curb ramp surfaces must be smooth during the transition from the ramp to the gutter and roadway to prevent wheelchair users from becoming trapped, unbalanced, or unable to safely and efficiently maneuver through the pedestrian access route.

Curb Ramp Types. There are three curb ramp types: perpendicular; parallel; and blended transitions. Perpendicular ramps are generally preferred because they best guide pedestrians in the direction of travel. Parallel ramps are used where the available space between the curb and the property line is too tight to permit installing both a ramp and a landing. Blended transitions provide a connection where there is a narrow walkway at the back of curb. Blended transitions can be difficult for the vision-impaired to navigate into intersections and therefore function best when paired with APS. See Figure 11-3.08A for curb ramp types.

Curb Ramp Orientation. Perpendicular ramps have a running grade that cuts through or is built up to the curb at right angles or meets the gutter grade break at right angles. The preferred perpendicular curb ramp orientation is two ramps placed in line with crosswalks (see Figure 11-3.08A). Perpendicular ramps are sometimes placed singly at the apex of the corner (referred to as diagonal curb ramps). Avoid diagonal orientation whenever possible. However, they may be appropriate in preservation projects at existing intersections where drainage inlets or other design considerations make separate perpendicular ramps for each crosswalk impractical.

Parallel ramps have a running grade that is in-line with the direction of sidewalk travel and parallel to the curb. Blended transitions are connections between the pedestrian access route and the street that have a running grade of 5% or less. Level landings, gently sloped transitions, and raised crosswalks fall into this category.