



# COLORADO

## Department of Transportation

Division of Project Support

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Denver, CO 80222-3400

### MEMORANDUM

**TO:** RTD'S, PE III'S, AND RESIDENT ENGINEERS  
**FROM:** JARED ESQUIBEL, DIRECTOR OF PROJECT SUPPORT JRE  
**DATE:** FEBRUARY 8, 2017  
**SUBJECT:** DIVISION OF PROJECT SUPPORT MEMO +0.5% CONSTRUCTION TOLERANCE FOR ADA CURB RAMPS

The purpose of this Memorandum is to provide the background on the investigative work performed by Project Development Staff and Civil Rights and Business Resource Center Staff for defining an allowable measurement/workmanship construction tolerance for ADA curb ramps. As part of CDOT's compliance commitment to the Americans with Disabilities Act Title II, the Project Development Branch is revising Standard Plan M-608-1, Curb Ramps. CDOT is in the process of including many more typical design options within the revised M&S Standard Plan along with revising its policies on acceptance of constructed curb ramps. This requires CDOT to define clear and consistent acceptance criteria for staff, consultants, and contractors.

Consistency is defined here as knowing what the dimensions are in the plans or M&S Standards for the specific curb ramps and allowing for a reasonable measurement/workmanship construction tolerance. This will allow CDOT to be clear and consistent regarding when it will accept ramps or request corrective work. CDOT is making a huge investment with funding and resources to upgrade ADA curb ramps statewide and must adhere to PROWAG and accepted construction practices related to dimensions of the curb ramps to enhance mobility and accessibility. This begins with clearly defining our construction tolerance when it comes to ramps and their associated slopes. Therefore, after extensive research, the Project Development Branch and Civil Rights and Business Resource Center recommend that CDOT adopt a maximum tolerance on ramp slopes of +0.5 percent beyond the stated maximum for acceptance in construction. Guidance to help assess existing ramps will be forthcoming and will involve multiple controlling parameters.

CDOT does not dispute the maximum measurements established for curb ramp slopes currently enforced by the Department of Justice and the Federal Highway Administration, however no construction is perfect and a precise policy must be defined in order to set clear quality expectations, minimize disputes in the field and to define a consistent statewide acceptance policy. In the case of CDOTs existing M-608-1 standard, no tolerance is defined. Without a defined tolerance, it is governed by the less restrictive subsection 105.03 of our spec book, which states:



“For those items of work where working tolerances are not specified, the Contractor shall perform the work in a manner consistent with reasonable and customary manufacturing and construction practices.”

Incidentally, this same vague guidance is echoed by Public Right-of-Way Accessibilities Guidelines (PROWAG) “Dimensions are subject to conventional industry tolerances except where dimensions are stated as a range (R103.1).” Therefore, it is in the best interest of the department to define a tolerance precisely.

CDOT has consulted with both FHWA as well as the U.S. Access Board for additional perspectives regarding tolerances associated with constructing and measuring curb ramps. The response we received during a phone call with FHWA and also reflected in an email from the Access Board was that ultimately, CDOT must determine if a defined tolerance will be allowed and must assume the risk associated with that decision. At a minimum, FHWA representatives conceded the need to allow for a tolerance in measuring instrument accuracy.

The following points were used to define conventional industry tolerances for flatwork and the agency’s recommended +0.5 percent proposed tolerance for curb ramp slopes.

- 1) Delaware DOT (DelDOT) allows for a 1.0 percent tolerance on curb ramps (see DelDOT’s *Pedestrian Accessibility Standards for Facilities in the Public Right of Way* and see attached table for additional states)
- 2) Research from the U.S. Access Board’s (the entity responsible for PROWAG) webpage, <https://www.access-board.gov/research/completed-research/dimensional-tolerances/part-ii> specifically section 1.2.5 Ramps, states:

“**1.2.5 Ramps.** When overall running slope and cross slope for accessible ramps are measured according to Sections 1.1.11 a recommended tolerance for these slopes is +0.5%.

In the ideal case, planning for a 7.5% running slope allows for construction inaccuracies while still maintaining the required 1:12 slope. However, when a design slope of 1:12 is indicated a tolerance of +0.5% is reasonable.

Many accessibility experts consider a 2% cross slope to be the maximum. However, there is conflicting research concerning the need to have a 2% maximum cross slope and that the actual maximum depends on user type (wheelchair, walker, cane, etc.), length of travel, and other variables. It seems reasonable to allow a +0.5% tolerance for ramp slopes and cross slopes.”

“However, when a design slope of 1:12 is indicated a tolerance of +0.5% is reasonable.”

- 3) Further, industry tolerances can be found in the *Handbook of Construction Tolerances*, 2<sup>nd</sup> Edition, by David Kent Ballast. This respected publication again suggests a +0.5% tolerance on curb ramps slopes. (See page 21, Table 1-9 Recommended tolerances for right-of-way construction.)

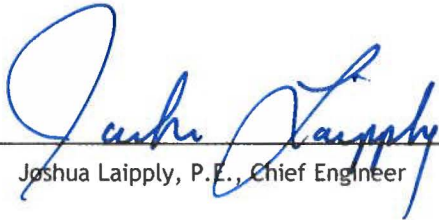
These sources, combined with the fact that smart level manufacturers (the primary field tool) have acknowledged a maximum accuracy of up to ~0.5% on their products, lead to a tolerance of +0.5



percent being a defensible limit and a low level of risk for CDOT. The current CDOT M&S Standards define an 8.33% maximum which is consistent with PROWAG and ADA information. The designer can always design for less than that unless there are other factors to consider which may warrant a determination that would qualify under maximum extent feasibility criteria as discussed in PROWAG.

Not defining a clear tolerance makes it impossible to develop a consistent field policy for enforcement and potentially leading to ADA compliance. It may also lead to more administrative and enforcement costs for CDOT and less funding for new pedestrian facilities and remediation work of facilities at the lowest levels of compliance.

I concur:

  
Joshua Laipply, P.E., Chief Engineer

2/22/2017  
Date

