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Stephanie Pollack, MassDOT Secretary & CEO  
Steve Poftak, General Manager



## DESIGN DIRECTIVE

To: Distribution

From: Erik J. Stoothoff, P.E. *ESG*  
Chief Engineer

Date: 9/4/2020

RE: Design Tolerances for Ramps, Sloped walkways, Cross Slopes & Level Surfaces

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This design directive is intended to consolidate, reiterate, supplement, and clarify the MBTA's approach, preferences, and requirements regarding design tolerances.

In the event that conditions warrant deviation from this directive, a design waiver signed by The Chief Engineer and department owning the scope of work will be required of the project.

Design Consultants shall design to standards as prescribed by Code. MBTA Standards shall apply only where Code does not address a topic or the MBTA requires a standard above and beyond Code. The more stringent shall always apply.

### **OBJECTIVE**

In order to ensure that a number of key station features are constructed in such a way to achieve or exceed minimum requirements, the MBTA requires certain features be designed to exceed said requirements. This additional tolerance will allow for minor deviations during construction.

### **CODES, STANDARDS AND POLICIES**

- 780 CMR – Massachusetts State Building Code
- 521 CMR – Massachusetts Architectural Access Board
- US DOT ADA Regulations & Standards

### **DESIGN REQUIREMENTS**

Running slope of Ramps, including Curb Ramps:

- As described in State and Federal regulations, ramps shall be designed and constructed with the least slope possible
- The running slope of a ramp shall not exceed 8.3% (1:12) once constructed. In order to ensure this outcome, ramps shall be designed with a maximum running slope of 0.5% less than code, unless otherwise approved by SWA and OCE.

- Finished construction exceeding the current code maximum slope will be rejected and require reconstruction, modifications such as large-scale grinding or overlays will not be accepted as corrective measures.

#### Running Slope of Sloped Walkways:

- The running slope of a sloped walkway shall not exceed 5% (1:20) once constructed. In order to ensure this outcome, sloped walkways shall be designed with the maximum running slope of 0.5% less than required by code, unless otherwise approved by SWA and OCE.

#### Cross Slope of Ramps, Sloped Walkways, Walkways:

- The cross slope of any ramp, walkway or landing shall not exceed 2% (1:50) once constructed. In order to ensure this outcome, cross slopes shall be designed to 1.0% (1:100).
- Ramps and walkways shall be designed with a single cross slope.

#### Level Landing Surfaces:

- The cross slope and running slope of any pedestrian access area required to be level (level landings, access aisles, platforms, etc.) shall not exceed 2% (1:50) in any given direction once constructed. In order to ensure this outcome, slopes shall be designed to 1.0% (1:100) in any given direction.

### **SLOPE DOCUMENTATION AND MEASUREMENT REQUIREMENTS**

- All sloped sections and level landings on drawings shall be labeled with percentages and point grades
- Site work and post construction review of slopes shall utilize at least two 24 inch smart levels. Smart levels shall be calibrated before use. Surfaces to be measured shall be free of silt, sand, and other debris.
  - For ramp segments, utilize repetitive and easily reverified slope measurement locations such as directly above or below expansion joints or railing posts.
  - For minimum width access paths of only 60 inches wide, measure slopes at width third points of 20 inches from each edge of clear path. For wider ramps additional measurements shall be required with measurements not further spaced than 24 inches measured perpendicular to the path of travel.
  - If walkways contain curves, additional slope measurements and point grades for both the inside and outside of the curve radius shall be shown on drawings.

In the event that conditions warrant deviation from this directive, a design waiver signed by the Chief Engineer, System-Wide Accessibility and the department owning the scope of work will be required of the project.