



Standard Drawing Report

Date: March 17, 2022

Technical Owner: Civil – John Wilson, PE

Standard Drawing No. P-548 **Calculation Book No.** n/a

Drawing Title: Corner Curb Ramp



Expires 06/30/2022

Background Information, Including Reference Material:

This drawing was created in 2015 and modelled after the 1992 standard drawings 3-120, 3-122, and 3-124 as well as similar ODOT standard drawings at that time. It includes two types of combination curb ramps at intersection corners with standard sidewalk corridors (0.5ft curb, 4ft furnishing zone, 6ft sidewalk), and one type of parallel curb ramp at an intersection corner depicting a 7ft curb-tight sidewalk.

Detail A (Combination Curb Ramps) is applicable to corners with smaller radii, where two curb ramps can be constructed. Detail B (Parallel Curb Ramps) is applicable to corners with curb-tight sidewalk. Detail C (Single Diagonal Curb Ramps) is applicable to corners with larger radii, where only one diagonal curb ramp can be constructed.

Assumption Made:

The drawing meets US DOT ADA Standards for Transportation Facilities (2006) and FHWA best practices. The drawing is used with the City of Portland Standard Construction Specifications.

The following assumptions were made for the 10-inch concrete surfacing shown in detail C:

- Wheel load of 16,000 pounds force.
- Dynamic force (impact factor) of 1.3.
- Contact patch of 20 inches x 10 inches.
- 45 degree spread angle.
- Allowable bearing pressure of 42psi (medium density granular soil).

These assumptions result in a bearing pressure of 17.3psi, or a factor of safety of 2.42 against exceeding the allowable bearing pressure of a poorly prepared base with a fully cracked panel.

No general assumptions were made otherwise.

Design Narrative:

The drawing defines the three common types of corner curb ramp: combination curb ramps, diagonal curb ramp, and parallel curb ramps at curb-tight sidewalks. The combination and diagonal curb ramps contain elements of parallel and perpendicular curb ramps. Perpendicular curb ramps were not shown because it is uncommon in Portland to have furnishing zones of adequate width. Corner curb ramps typically require a site-specific design.

The preferred ramp is shown in Detail A. It is feasible at 12-foot-wide sidewalk corridors when the curb radius is less than 13.5 feet, or when ramps can be located further from the corner either at a marked crossing or with an approved variance. Detail B is not preferred, as it requires careful attention to the construction at the bottom of the ramp to limit the accumulation of water and debris. Detail B can also create a curvilinear ramp at locations with small curb radius. Curvilinear ramps are not preferred as the curb ramp can create compound slopes and are not planar. In some cases, the result could lead to only three points of wheel contact for a mobility device and create instability. This becomes more problematic in steep terrain. Detail B was shown to provide an acceptable solution in cases with constrained right-of-way. Detail C is not preferred, primarily because it requires those in mobility devices to turn within the roadway and thus prolonging exposure to motorists who are turning. It was shown to provide an acceptable solution at corners with large radii.

This drawing is to be accompanied by P-550, P-551, and may be accompanied by P-549 as required. Additional background information on the installation and placement criteria of Detectable Warning Surfaces is described in the P-550 standard drawing and report.

Curb ramps are required to span a vertical change in level greater than 1/2 inch (ADA Standard 303.4) along newly constructed or altered street with curbs and sidewalks at intersections (28 CFR 35.151(i)).

This drawing defines the shape of the combination and parallel curb ramp at corners. It defines the slopes and the widths required for the basic combination and parallel curb ramp. The 8.3% slope (1:12) of the ramp running slopes, the ramp flares, and the 5% counter slope (1:20) of adjoining road surfaces immediately adjacent to curb ramps. A walking surface can have a maximum cross slope of 2% (1:48). Ramp running slopes and cross slopes may be positive or negative but should not allow stormwater drainage to accumulate or discharge onto private property.

As per the 2020 City of Portland Standard Construction Specifications, the working tolerance of ramp running slope and ramp cross slope, including the ramp landing, is 0.5%. Design values of 1.5% for ramp cross slope, and 7.2% for ramp running slope are provided to accommodate most irregularities or variances due to construction methods or materials. Additional design values are provided on the PBOT ADA Curb Ramp Design Report to aid in designing compliant ramps.

At combination curb ramps, where there is no vertical obstruction adjacent to the landing, the turning space may be 4 feet. The minimum width of sidewalk at the street crossing for a parallel style curb ramp is 5 feet and provides for a turning space adjacent to a curb or other obstruction at the back of the ramp. An additional foot of clearance adjacent to turning spaces is required for mobility device foot plates or overhang of power assisted device fenders to utilize when maneuvering, as indicated in note 11. PBOT's minimum sidewalk width is 5 feet exclusive of the curb. The flat landing, which is a turning space, should match the design sidewalk width and not restrict thru pedestrian movements or capacity. The turning space meets ADA Standard 304.3.2, which exceeds US DOT requirements at curb ramps. Transitions back to a narrower sidewalk width require a transition panel meeting the requirements in P-549.

Pedestrian pushbuttons may be placed within parallel ramp runs, adjacent to the landing, provided there is at least a 4-foot-wide accessible route. The sidewalk must be at least 77 inches wide when pushbuttons are placed 1.5' from the face of curb at parallel curb ramps, which provides for dimensions and staking tolerances for pushbuttons on base mounted signal posts; larger signal poles will require additional width.

Slopes are provided to one tenth of one percent, which conform to the accuracy of standard measurement devices which is at least $\pm 0.175\%$, and the precision which is at least 0.1%. All slopes are relative to a horizontal plane.

The flat landing is any surface that has a maximum slope of 2% in any direction, typically measured at the boundaries of the landing. For a perfectly rectangular landing with a running and cross slope of 2%, the mathematical value of the slope in the diagonal direction is 2.8% and is acceptable under current approved inspection practices.

Curbing shown at the back of the ramp on detail C is specified to prevent stormwater within the gutter from overtopping the back of the sidewalk and discharging onto private property. If the curb ramp is located adjacent to a steep slope, the curb may provide protection against a mobility device from unintentionally leaving the back of the ramp. The curb may not be warranted at locations where stormwater will flow away from the ramp, or when an adjacent structure will prevent stormwater from leaving the right-of-way.

Update: March 17, 2022

This drawing was revised in response to a request to clarify gutter construction at curb ramps. Terminology throughout the drawing was revised to conform to FHWA, e.g., "curb ramp" instead of "sidewalk ramp." The details were revised to show the locations of construction joints, providing for a clear separation between city-maintained curb ramps and property-owner-maintained sidewalks. Gutter was shown on detail A to provide an example to show that the gutter should extend the full length of the adjacent flare. A counter slope symbol was added to show the location where the ADA Standard criteria 406.2 applies. The property lines were deleted as they were unnecessary. A bottom landing was shown on detail C to normalize the acceptable material and thickness when portland cement concrete is used, often required for greater grade control. The legend was revised for clarity.

Note 1 was added to clarify PBOT Administrative Rule TRN-9.04, specifying that curb ramps must be 6 inches thick.

Note 3 was added to clarify that a curb ramp may exceed the maximum running slope criteria when the ramp run length would otherwise exceed 15 feet in length.

Note 4 was added to indicate the preferred ramp width is 5 feet, with the minimum width of 4 feet allowed.

Note 5 replaces note 6, to align with City Engineer Directive ST 005.

Note 6 was added to prevent mobility devices from becoming unstable when one side of the device is lower than the other, or when not all four wheels are in contact with the surface, which can occur when grade breaks are not perpendicular to ramp runs.

Note 7 replaces note 8 to require a site-specific design for curb returns with handrail.

Note 9 replaces note 10 and aligns with the City Engineer Directive ST 003.

Note 10 replaces annotations and dimensions for transition panels to existing sidewalk, and references revised standard drawing P-549 for transitional segments to unaltered segments of sidewalks with a cross slope greater than 2%.

Note 12 replaces note 13 and conforms with FHWA guidance regarding change of grade, and references revised standard drawing P-549.

Note 13 replaces note 5 and references revised drawing P-550 for miscellaneous curb ramp details.

Inlet placement adjacent to curb ramps was shown to support note 14 related to mitigating stormwater drainage that might discharge onto private property. The minimum inlet placement adjacent to a curb ramp was shown to avoid unacceptable grades adjacent to the curb ramp and obviates existing standard drawing P-202.