


# Unit 5 Lesson 1: Introduction to Pedestrian Access Route & Curb Ramp System

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 **Course Navigation Tips:**

- To complete each lesson, you must interact with the audio narration at the top of each section.
- You may drag the toggle on the playback bar to the last 5 seconds and let it play. This will allow the system to note it as complete.
- You are encouraged to complete the entire unit before closing in case your progress is not saved.

 **You must click on all images before moving on to next Lesson.**



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Start Audio Narration

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## **Pedestrian Access Route (PAR)**

The entire **pedestrian access route** needs to be accessible to ensure that it is usable by all pedestrians. Pedestrian access routes must comply with the accessible route slopes, surface, dimensions, and other requirements adopted by the agency. The pedestrian access route under the ADA has requirements for construction to ensure that pedestrian facilities constructed are accessible to the disabled population. Accessible routes are provided to allow pedestrians to get from their origin point to their destination point or public service in the public right of way.

The pedestrian access route is defined in the **Oregon Standard Specifications for Construction, Sec. 00759.02** as:

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**“An area for the use of pedestrians to navigate along sidewalks, driveways, curb ramps, crossings, and pedestrian facilities.”**

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**00759.00 Scope - *“This Work consists of furnishing, placing and finishing Commercial Grade Concrete curbs, concrete curb ramps with curbs, islands, traffic separators, driveways, sidewalks, monolithic curb and sidewalks, miscellaneous surfaces, and stairs in close conformity to the lines, grades and dimensions shown or established.”***



Pedestrian Access Route. It is the Surface that is Accessible and Contiguous to Reach a Destination

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## **Pedestrian Circulation Area**

The traversable walkway area outside of and including the pedestrian access route is considered the **pedestrian circulation area**. The pedestrian circulation area is any area on the walkway that a pedestrian could use.

Flared side treatments, for example, are a part of the pedestrian circulation area but are not in the pedestrian access route. All areas of the pedestrian circulation area should be inspected but are not necessarily recorded on the curb ramp system inspection forms. These areas shall meet the contract plan and specification requirements.



## Highlighted Pedestrian Circulation Area. Surface for Pedestrians Use

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An important concept related to the available pedestrian accessible route is clear width. This is discussed later in the units and lessons. The clear width is determined by the applicable maximum allowable cross slope on the finished surface and the vertical clearance requirements for pedestrian to walk around or under.

### **Proximity Limits**

Unless otherwise shown on the contract plans, proximity limit is the boundary including all curb ramp system components and the sidewalk transition panels. The proximity limit extends around all new concrete and at least two feet beyond the new concrete. Proximity limits are the boundary for curb ramp system inspections. This is the area that will be measured for ADA

compliance and is based on ODOT requirements. The figure below shows a curb ramp system with an outline of the proximity limits that includes two curb ramps system and the area beyond the new concrete.

Within the proximity limits, conduct a general inspection looking for lips where the new work ties into existing work and record any other features, such as utilities or furniture within the proximity limits. Also verify that there are no slopes within the proximity limits that are worse than what is allowed in the contract plans.

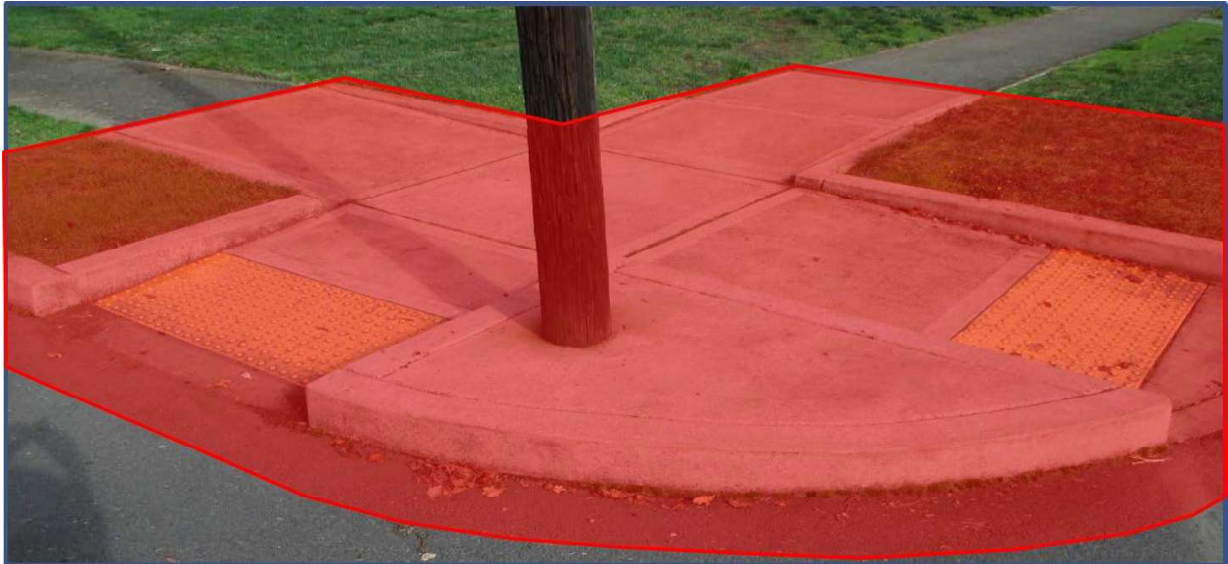


Illustration of Proximity Area that Extends Around all New Concrete and Two Feet Beyond

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## Curb Ramp System

A curb ramp system provides an accessible pedestrian transition between the sidewalk and the street. It cuts through or is built up to the curb. Curb ramps allow pedestrians with varying abilities to enter and exit the sidewalk or other similar pedestrian facilities.



*A Curb Ramp System*

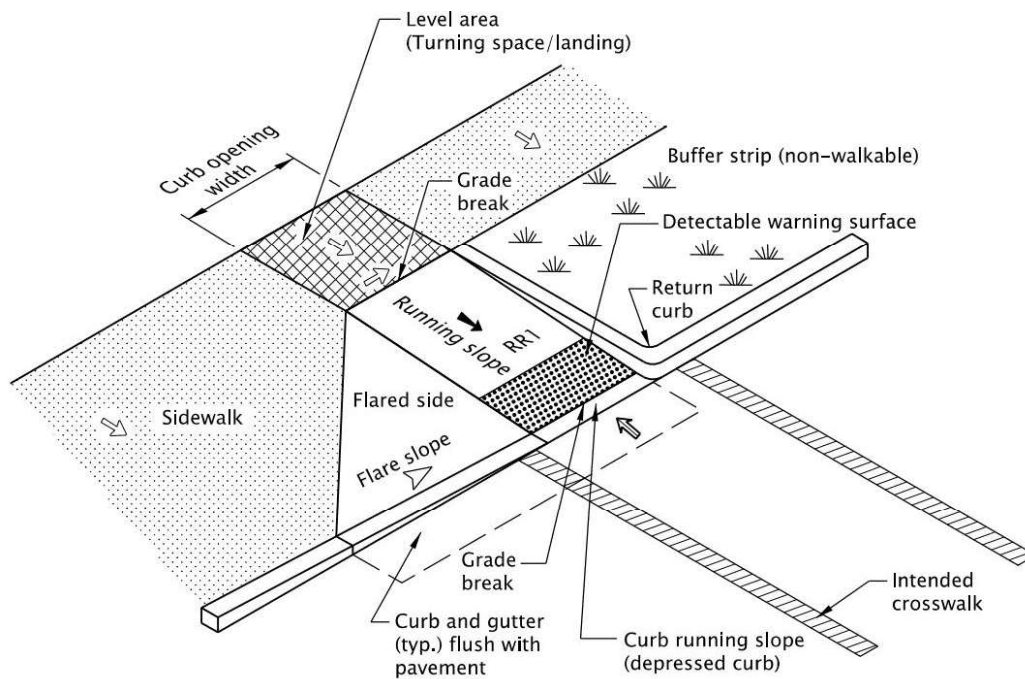
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Curb ramp systems are made up of various planar components that have slope and dimension requirements. This is to ensure that they are accessible to the greatest number of pedestrians with varying abilities. There are essential terms and processes to master for accurately inspecting curb ramp systems and filling out the inspection forms. The following units will

describe pedestrian access route concepts, curb ramp system components and how to measure them.

The following is a list of key components and associated terms that you will learn in Unit 5.

- Ramp Run
- Running Slope
- Cross Slope
- Ramp Run Length
- Grade Break
- Curbing
- Gutter Pan
- Counter Slope
- Gutter Flow Slope
- Curb Running Slope
- Turn Spaces
- Landings
- Level Areas



**TYPICAL CURB RAMP SYSTEM COMPONENTS**  
(PERPENDICULAR TYPE SHOWN)

## RD900 Typical Curb Ramp System Components

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### Curb Ramp Slopes and Dimensions

Accessible Pedestrian Access Routes (PAR) are inspected for maximum slopes and maximum and minimum dimensions within the curb ramp system.

Standard drawings and curb ramp detail sheets provide accessible design guidance through a legend of patterns and arrows representing allowable dimensions and slopes.



LEGEND:

	Marked or Intended crossing location
	Sidewalk or other traversable surface
	Detectable warning surface (DWS)
	Level area (Turning space/landing)
	Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
	Running slope 4.0% max. (Max. 4.9% finished surface slope)
	Running slope 7.5% max. (Max. 8.3% finished surface slope)
	Counter slope 4.0% max. ascending or descending (Max. 5.0% finished surface slope) Slope as required for drainage
	Flare slope (Max. 10.0% finished surface slope)
	4'x4' clear space
RR1	Ramp Run Position 1

*RD900 Legend*

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Scroll through the curb ramp drawing legend symbols and patterns and click on each one for the description.



Cross slope 1.5% max.  
(Max. 2.0% finished surface slope)  
(Normal sidewalk cross slope)

1 of 8

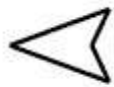


Running slope 4.0% max.  
(Max. 4.9% finished surface slope)

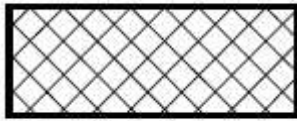
2 of 8



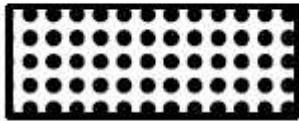
Counter slope 4.0% max. ascending or descending  
(Max. 5.0% finished surface slope)  
Slope as required for drainage



Flare slope  
(Max. 10.0% finished surface slope)



Level area (Turning space/landing)



Detectable warning surface (DWS)



Review all figures, complete activities, and advance audio to the end before moving on.

CONTINUE

## Unit 5 Lesson 2: Ramp Runs

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**You must click on all images before moving on to next Lesson.**



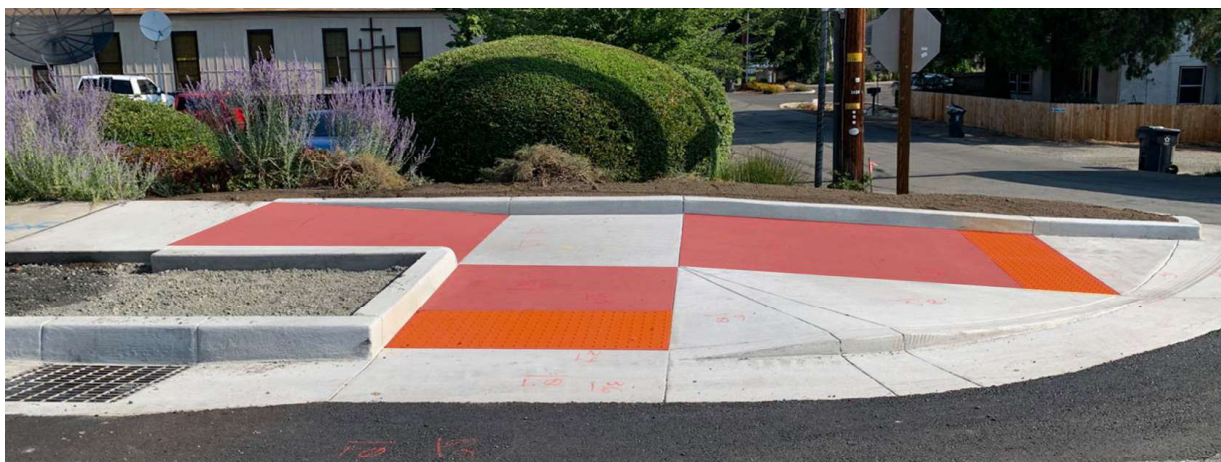
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### Ramp Run

A ramp run is a sloping surface within a curb ramp system. Curb ramp systems can have more than one ramp run. A ramp run may be parallel to the street, perpendicular to the street, or may be constructed at an angle on a street corner radius. Important terms for ramp runs include running slope, cross slope and grade breaks which will be discussed in more detail in this lesson.



Example of Ramp Run Surfaces, Shaded in Red

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## Running Slope

The ramp running slope is the grade of a surface that is parallel to the direction of pedestrian travel on a curb ramp. There are four running slopes in the figure to the Right.

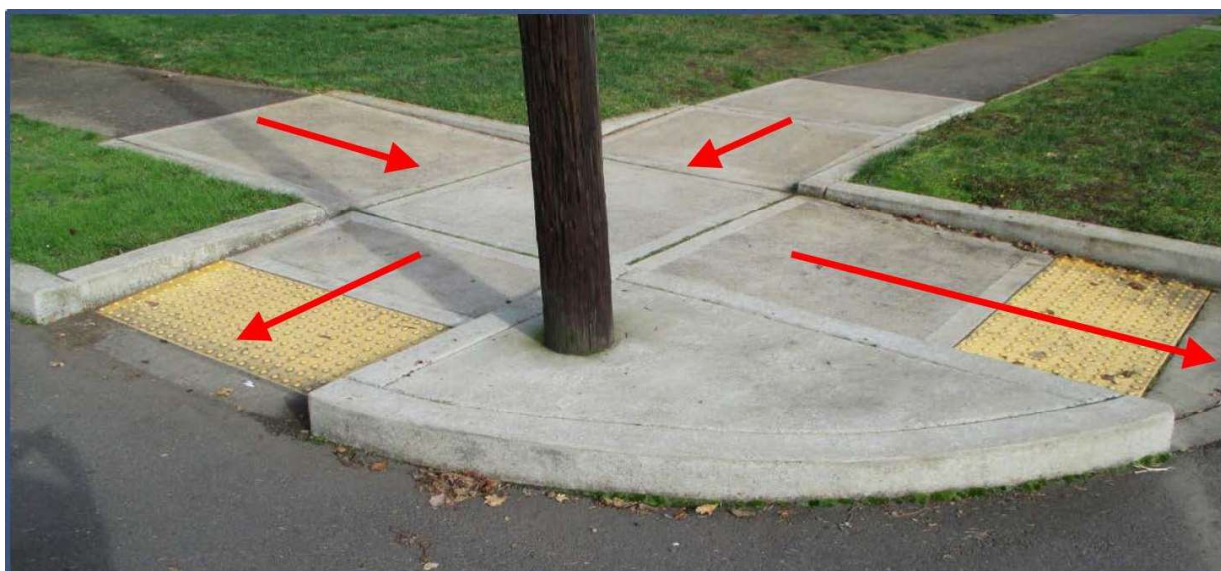
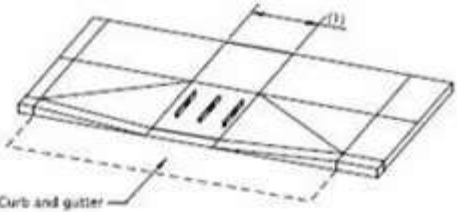
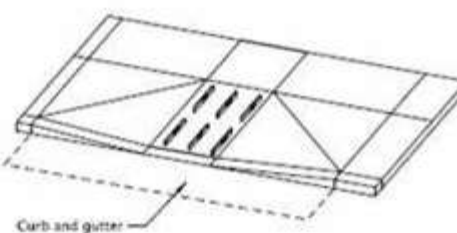
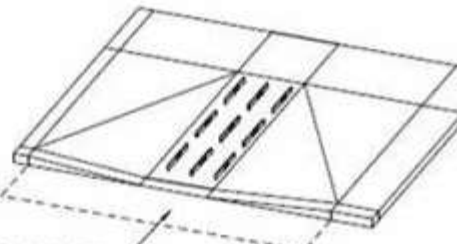
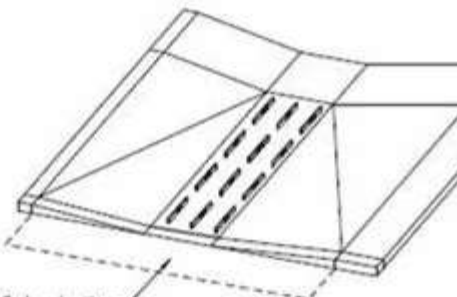


Image of Ramp Run Running Slopes.

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Ramp Length	Running Slope (3)
< 4'	
4'-7'	
7-10'	
10'-15'	

Smart Level Tool Placement Guide on Ramp Runs.

### Running Slope Measurements

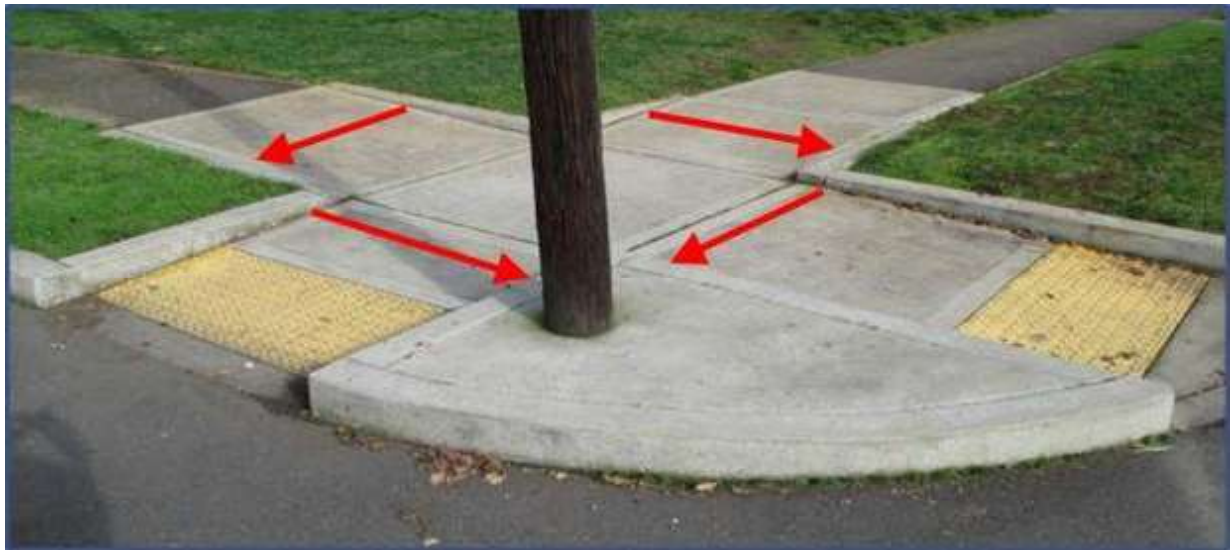
The image to the left illustrates level placement locations when measuring ramp run slopes. The number of measurements will depend on the dimensions of the curb ramp system as it relates to the surface size. Measure the surface in 1-to-2-foot increments up and down the ramp run.



Specified slopes in the contract plans shall be compliant when measured anywhere on the ramp. Do not place levels across two adjacent surfaces. When the surface cannot accommodate a 24-inch smart level tool, the 6-inch smart level tool is used to measure the running slope. The maximum allowable running slope is 8.3%. In some curb ramp system designs, a Design Exception (DE) may be approved for a running slope exceeding the 8.3% standard prior to construction. Visually inspect the ramp for any noticeable irregularities, measure and record the highest slope.

## Cross Slope

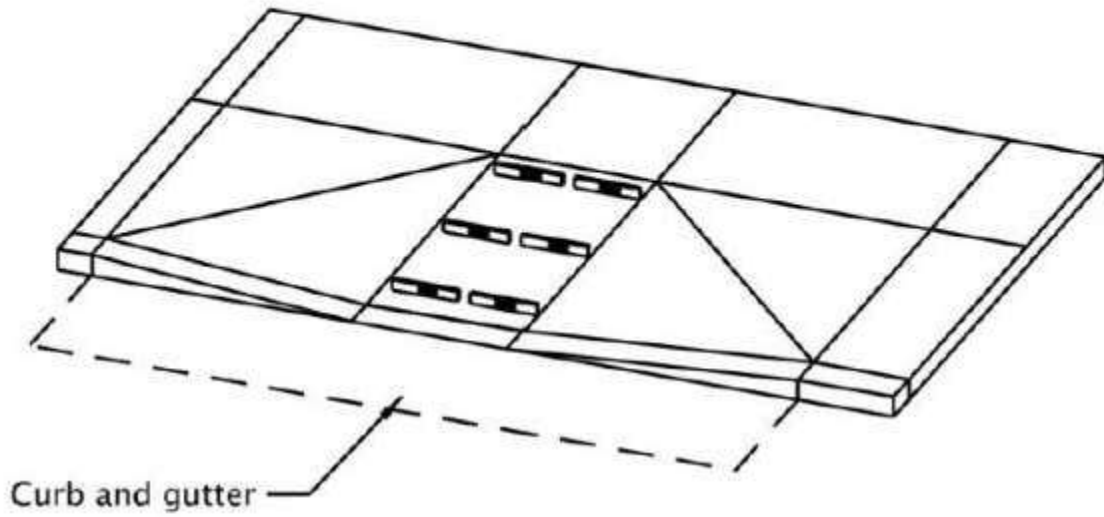
The cross slope is the grade of a surface perpendicular to the running slope or traversed surface in the direction of pedestrian travel.



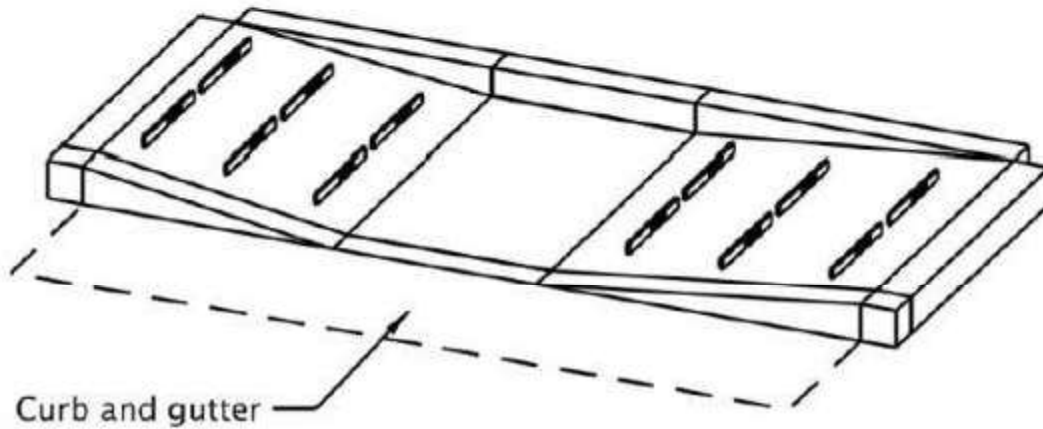
The Arrows in the Photo Show How the Cross Slope is Oriented Perpendicular to the Ramp Run

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## Cross Slope 1



## Cross Slope 2 & 3



Measuring Cross Slope

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### **Cross Slope Measurements**

Measure the cross slope of the entire ramp run from top to bottom of the ramp run. Proceed with additional measurements for the entire length of the ramp run until you reach the turn

space or level landing or the bottom grade break, about every foot. Cross slope measurements are perpendicular to the running slope. Measure the surface in 1-to-2-foot increments up and down the ramp run. The number of measurements will depend on the dimensions of the curb ramp system as it relates to the surface size.



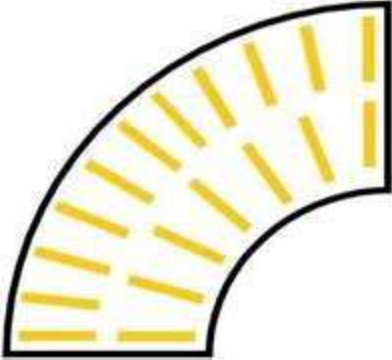
The Photo Illustrates an Example of Cross Slope Level Placement on a Ramp Run

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The maximum allowable cross slope is 2.0%. In some curb ramp system designs, a Design Exception (DE) may be approved for a cross slope exceeding 2.0%. Visually inspect the ramp for any noticeable irregularities, measure and record the highest slope. For some curb ramp styles, there will be situations where the measurements along the top portion of the ramp run will be the only one recorded on the inspection forms. This will be discussed in later Lessons.

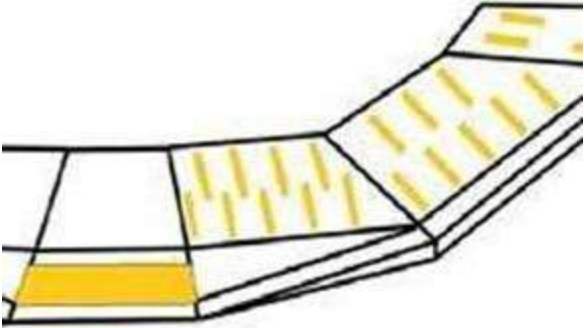
## Measuring Running Slope and Cross Slopes on Curves

Ramp running slopes on curves will be measured parallel to the curb and/or parallel to the intended path of travel. Cross slopes are measured perpendicular to the running slope which follows the curb. Scroll through examples.



**Example of Level Placements for Cross Slope Measurements on a Radius**

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**Example of Level Placements for Cross Slope Measurements on an Angled Pedestrian Route.**

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# Ramp Run Length

The Ramp Run Length is the longest distance measured parallel to the ramp run including the directional curb component if applicable to the curb ramp system design. The longest distance measured is recorded on the inspection form for each ramp run. It is not a pass or fail criteria for the inspection, rather general information about the curb ramp system.



Photo of Curb Ramp System with Dimension Lines for Ramp Run Lengths.

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# Grade Break

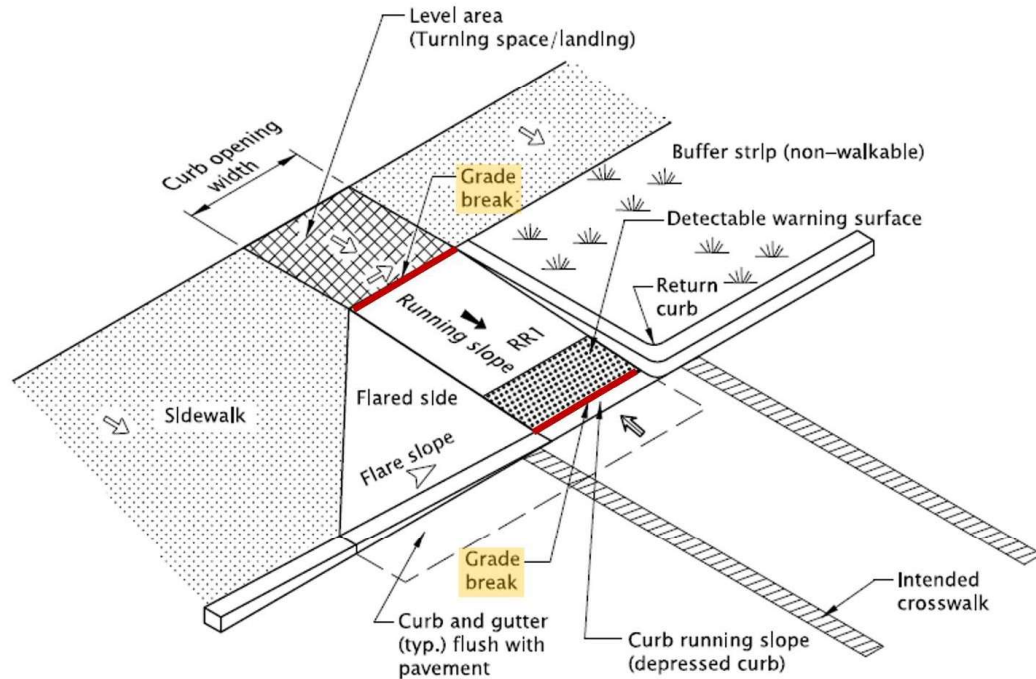


Illustration of Grade Breaks on a Curb Ramp

A grade break is where a change in slope occurs. In curb ramp systems, it is usually aligned with a dummy joint or, in the case of a monolithic concrete pour, a crease in the concrete (Note that dummy joints can occur within ramp runs and other planar surfaces and may not necessarily define a grade break). Contraction joints are done at less frequent spacing and do not necessarily define a grade break. Grade breaks often differentiate the various curb ramp system components such as ramp runs.

For persons using mobility devices, bridging grade breaks may cause one or more wheels to lift off the surface causing instability for the user. When grade breaks are perpendicular to the path of travel, it is more likely that a wheeled device will remain stable while traveling. For this reason, perpendicular grade breaks are required at the top and bottom of Ramp Runs and are visually inspected.

The following note is on RD 900 Standard Drawings for Curb Ramps:

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**“Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run, Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush”.**

### **Inconsistent Ramp Runs (ICRR)**

Inconsistent ramp runs are when the surface of a ramp run is not a planar, meaning the surface slopes in a ramp run are uneven or not consistent. Inconsistent ramp runs in curb ramp system inspections are related to Standard Specifications section 00759.50.

a) “The top and face of structures shall be true and straight, free from humps, sags, or other irregularities...”

### **Additional Notes on Measurements**

The figures below show the minimum measurement placement for levels for different ramp components. Note that these figures are just a starting point. If you see any irregularities on a ramp, you should also measure in those locations to ensure that the entire ramp complies, not just the locations shown here. Specified slopes shall comply when measured anywhere on the ramp.

Ramp Length	Running Slope (3)	Cross Slope 1	Cross Slope 2 and 3
<4'			
4-7'			
7-10'			
10'-15'			


### Minimum Ramp Run Measurements

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- For ramp widths greater than 5 feet, add a row of measurements for each additional 2-foot width.
- For ramp widths greater than 7 feet, add one additional measurement for each additional 2-foot width.
- Level placement locations shown are minimums. Specified slopes shall be compliant when measured anywhere on the ramp. (Inspectors may need to take additional measurements when a visible irregularity occurs on the surface of curb ramps systems. Record the highest value.)
- Do not place level across two adjacent surfaces (e.g., truncated domes/concrete, curb/truncated domes, and gutter/asphalt concrete pavement).

## Ramp Run FAQs




 **Q: Why do the curb ramp standard drawings and legends show the ramp running slope as “7.5% max. (Max. 8.3% finished surface slope)”?**

A: Designers are targeting a maximum ramp running slope of 7.5% with a 0.8% tolerance to ensure the finish construction does not exceed the American with Disabilities Act Federal Regulation requirements. The ramp inspection form will not “fail” the ramp running slope if the maximum finished surface slopes are 8.3% or less.

 **Q: Why do curb ramp standard drawings and legends show cross-slopes at “1.5% max (Max. 2.0% finished surface slope)”?**

A: Designers are using cross slopes with a 0.5% tolerance to ensure the finished construction does not exceed the American with Disabilities Act Federal Regulation requirements. Curb ramps systems should be constructed to the slopes shown on the contract plans. The curb ramp inspection form will not “fail” the ramp cross-slope if the maximum finished surface slopes are 2.0% or less.

 **Q: Can ramp runs have grade breaks?**

A: No. ODOT Standard Drawings RD900 Series states, “Grade breaks shall not be permitted on the surface of ramp runs and turning spaces.”



Review all figures and advance audio to the end before moving on.

## Unit 5 Lesson 3: Curbing & Gutter Pans

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**You must click on all images before moving on to next Lesson.**



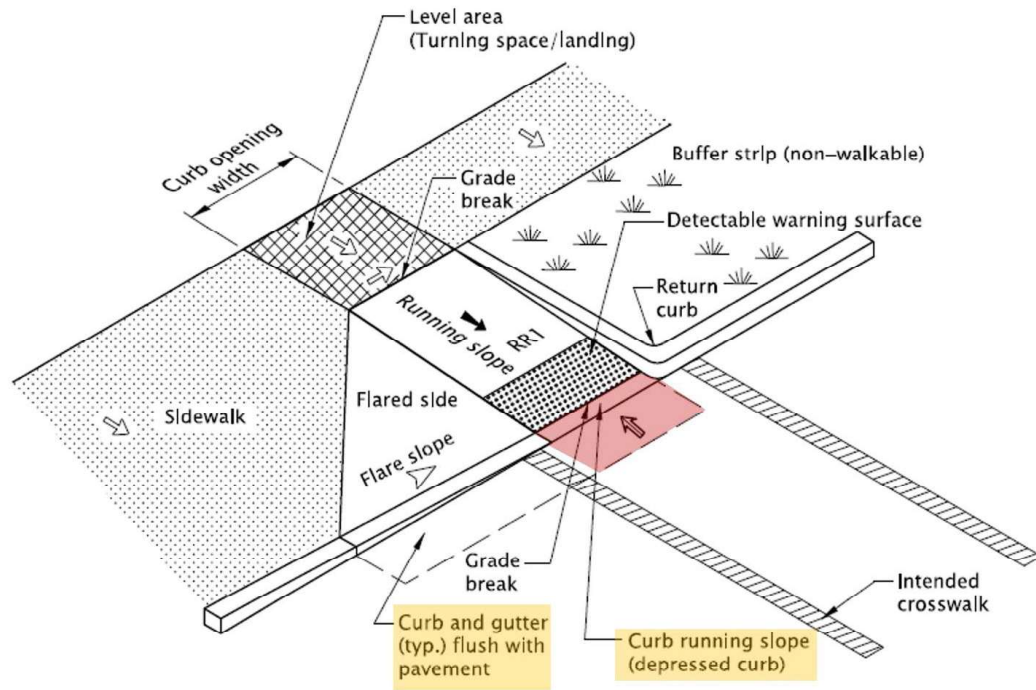
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### Curbing and Gutter Pans

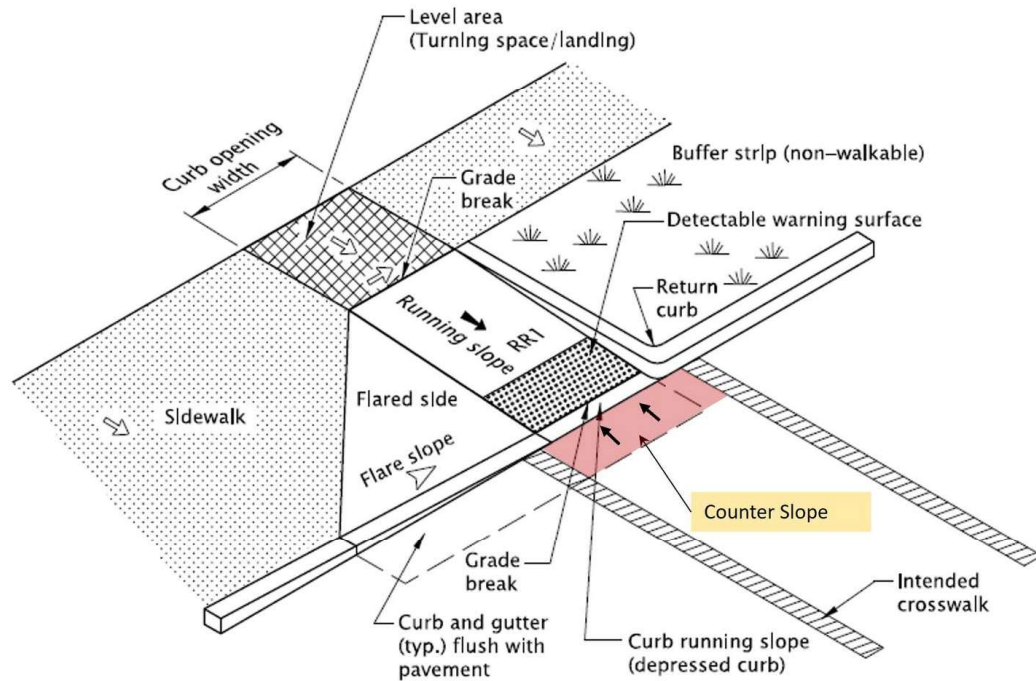
Curbs and Gutter Pans at the throat of the curb ramp openings must also meet accessibility standards. The intersection of the curbing and concrete gutter pans are essential for conveying stormwater away from the curb ramp opening. This also provides a smooth transition for pedestrians between the curb ramp and the roadway. There are different measurements and requirements for each part of the curb and gutter. Important terms include counter slope, curb running slope, gutter flow slope, intersection control type, and transitions when measuring the curb ramp system.



Curb And Gutter at a Curb Ramp System

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## Counter Slope



Counter Slope Highlighted on Curb Ramp

**Counter slope** is the grade of the street or gutter pan perpendicular to the curb or street edge located within 2 feet of the curb line.

## Counter Slope Measurements

Counter slopes are measured perpendicular to the curb line.

The curb ramp system counter slope is measured and recorded for the first 2 feet adjacent to the curb ramp opening. Where there is no concrete gutter pan, measure the counter slope for the first 2 feet adjacent to the curbing. Where a concrete gutter pan is present, measure the slope of the concrete gutter pan. Use the 24-inch level where it fits the surface, otherwise use the 6-inch level to take measurements.

Due to the batter and the beveled edge of the standard curb, a 2-foot level can rarely sit on a standard gutter pan without bridging multiple surfaces. See the figures below for examples of

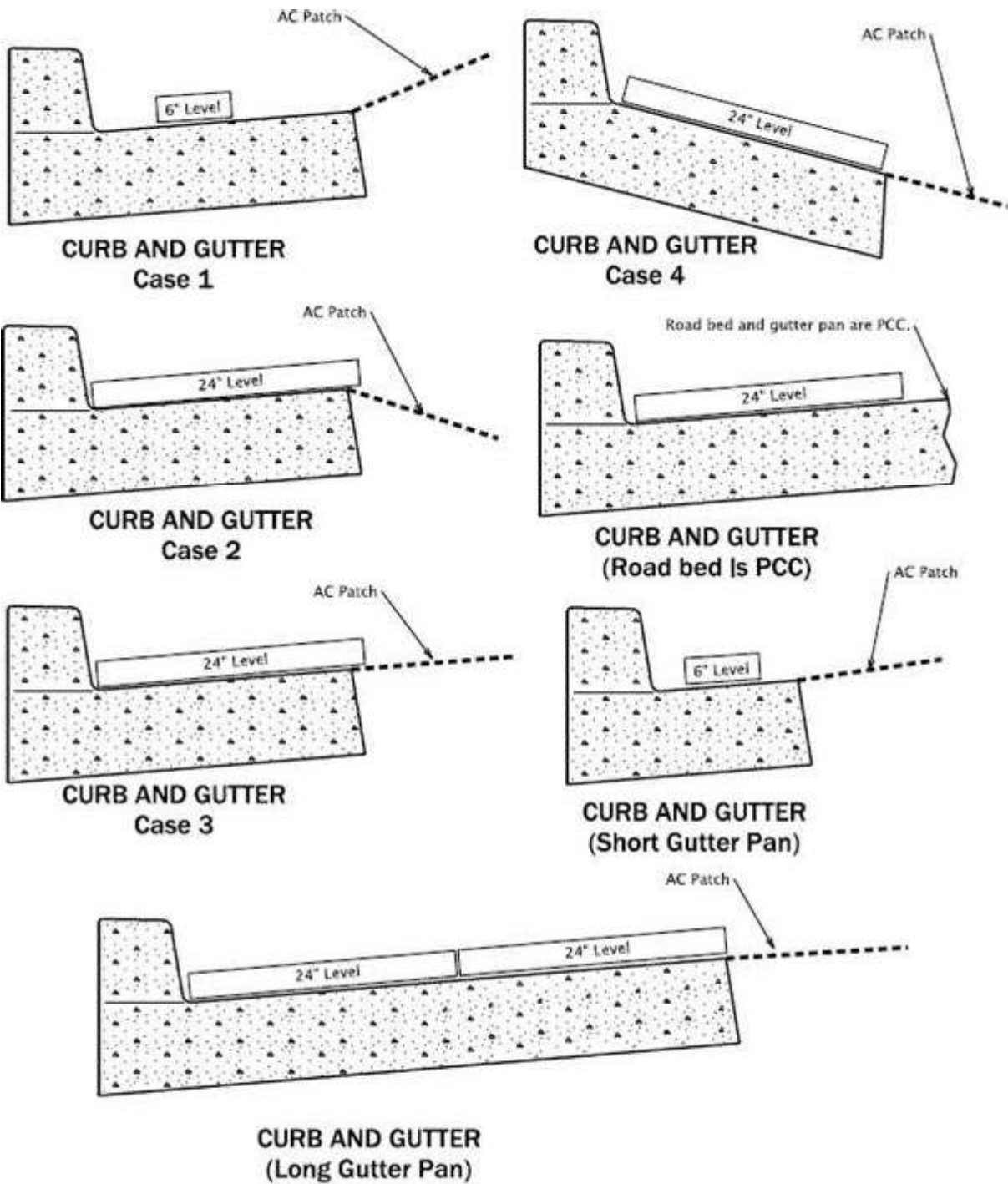
level placement on the gutter pan. The adjacent finished surface material shall be flush with the gutter pan surface without any lips. Avoid measurements that cross a raised permanent pavement stripe.



Measuring Counter Slope with a 6-inch Level



Measuring Counter Slope with a 6-inch Level

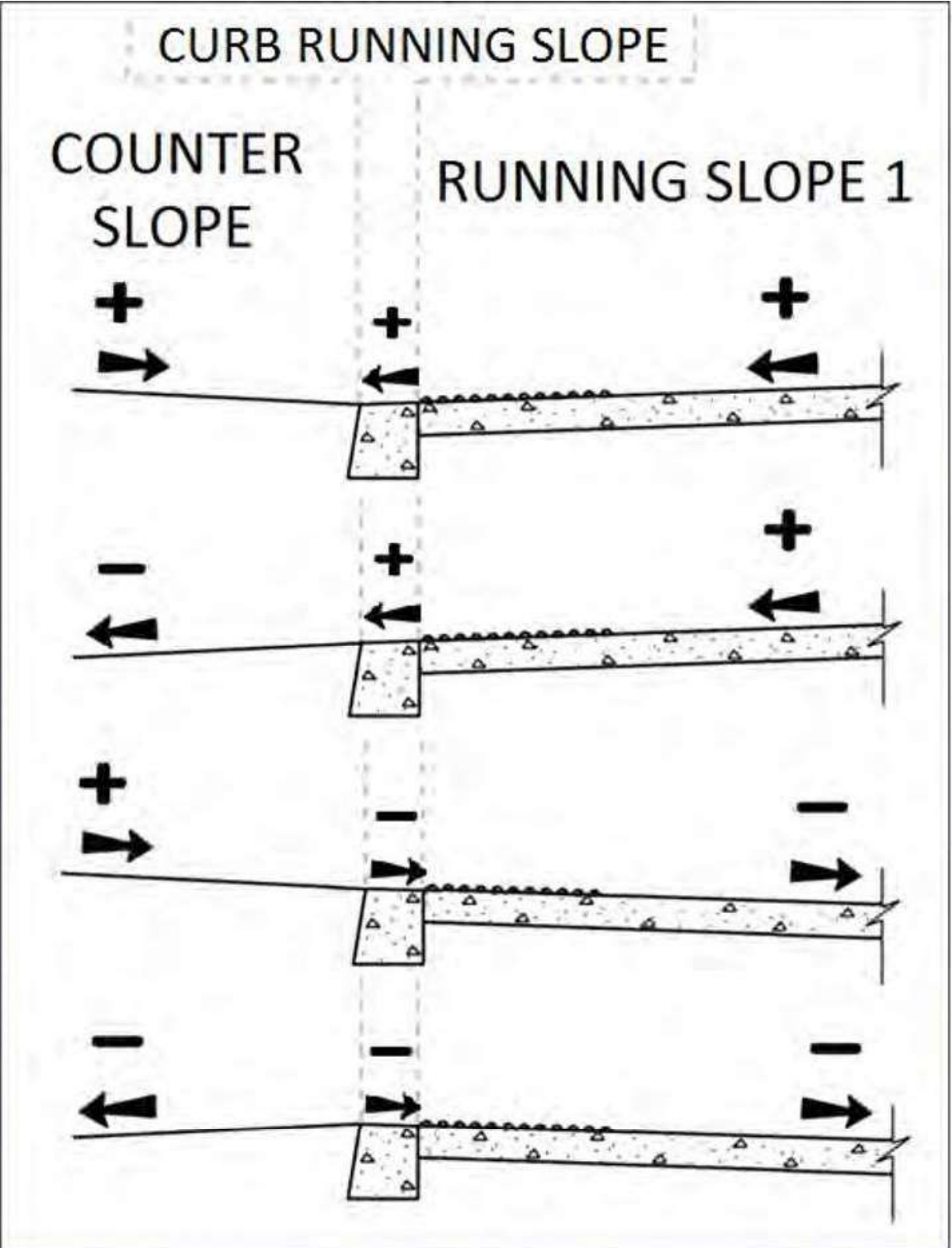


### Gutter Pan Counter Slope Measurement Examples

Where a wide gutter pan is constructed, visually inspect that the asphalt patch adjacent to the gutter pan does not have any lips or gaps and that it nominally matches the existing road slope in

the crosswalk. When a wider gutter pan is present, for example at designated bus stops or bike lanes, ensure there are no grade breaks or construction joints where wheels travel.

**Where a gutter pan is not constructed, measure the counter slope on the 2 feet of the finished surface from the front of the curb.** This might occur when the roadbed is constructed from reinforced Portland Cement Concrete, for example.




Slope Conventions for Counter Slope, Curb Running Slope and Ramp Runs.

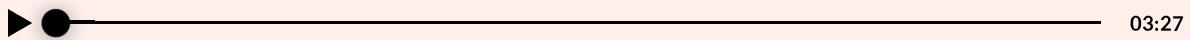


## Slope Conventions for Counter Slope Measurements

Slope conventions for counter slope measurements are determined from the face of curb line. Counter slope measurements are recorded as either a positive or negative slope. The positive value is based on a typical curb ramp system that conveys storm water at the curb line in a “V” section. A “V” section occurs when the counter slope and the curb running slope are configured to collect storm water as the lowest elevation point. Review the figure below for the slope convention.

- **Sloping towards (+) the gutter line is positive.**
- **Sloping away (-) from the gutter line is negative.**

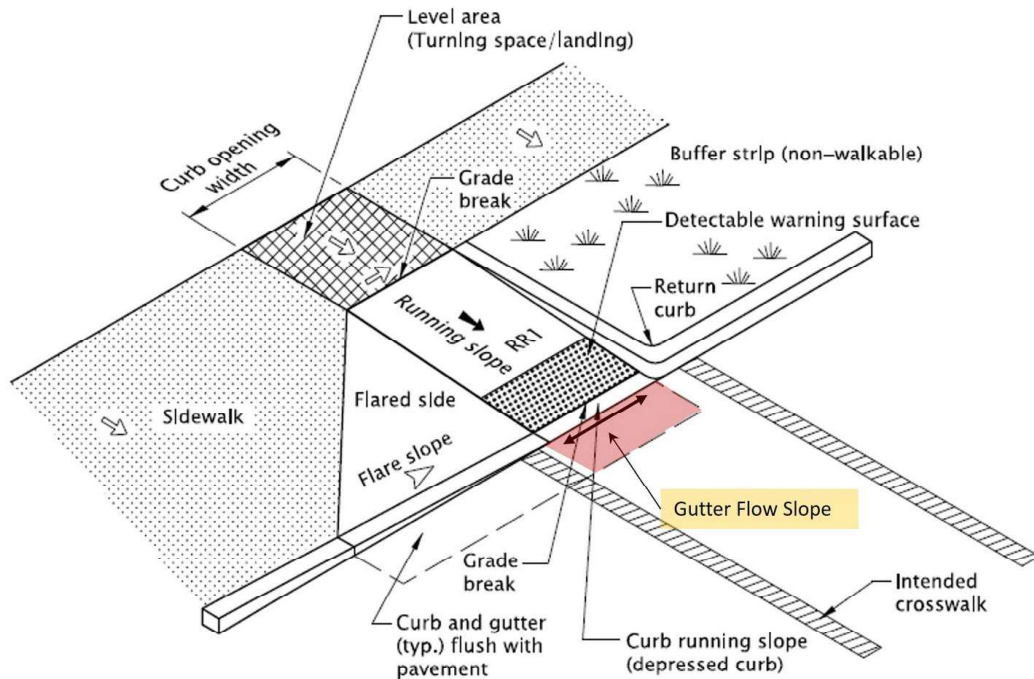
 If you don't have the information available to you in the plans to determine which direction to construct the counter slope or curb running slope, contact the agency representative for the contract to get the information.



Continue Audio Narration

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## Gutter Flow Slope



Gutter Flow Slope Highlighted on Curb Ramp

The **gutter flow slope** is the grade at the curb line where the front bottom of the curb and the gutter pan meet. It is parallel to the curb or street edge where water is conveyed to a drainage system. Gutter Flow Slope is measured at the curb ramp opening. Water cannot pool in front of a curb ramp system.

## Gutter Flow Slope Measurements

Allowable gutter flow slope values are based on the intersection control type. The slope measurement recorded is taken parallel to the curb line adjacent to the face of curb and recorded. Measurements taken over the entire surface of the gutter pan or at the edge of the gutter pan abutting the asphalt connection are used to confirm a smooth connection and should not exceed the gutter flow slope maximum values. In some scenarios this area may be warped

to match the existing roadbed. In new construction, where the roadbed and crosswalk are newly constructed or reconstructed, the gutter flow slope shall not exceed the gutter flow slope maximum values.

**The intersection control type** is based on the traffic control device for vehicle operations. Inspection requires confirmation of the intersection control type. You will need this information to complete the inspection form of the curb ramp system. It should be on the Contract Documents. If you don't have the information available to you in the plans, contact the agency representative for the contract to get the information.

There are three intersection control types. The maximum gutter flow slope for the three intersection control types are:

- At **stop/yield** locations the gutter flow slope is a maximum of **2.0%**.
- At **signalized/uncontrolled** locations - the gutter flow slope is a maximum of **5.0%**.
- At **midblock** locations – the gutter flow slope is **less than or equal to the slope of the roadway**.

Illustrations for determining the allowable gutter flow slope are in Exhibit D, available on the **Traffic Assets & Inspection website** under **General Resources**.

## Traffic Assets & Inspection

WEBPAGE



ADA-ExhibitD.pdf  
205.2 KB



**i** Note: Exhibit D shows design values for gutter flow slope with a 0.5% tolerance. When inspecting constructed gutter flow slopes in the field, the maximum constructed slopes are as shown (bulleted) above.

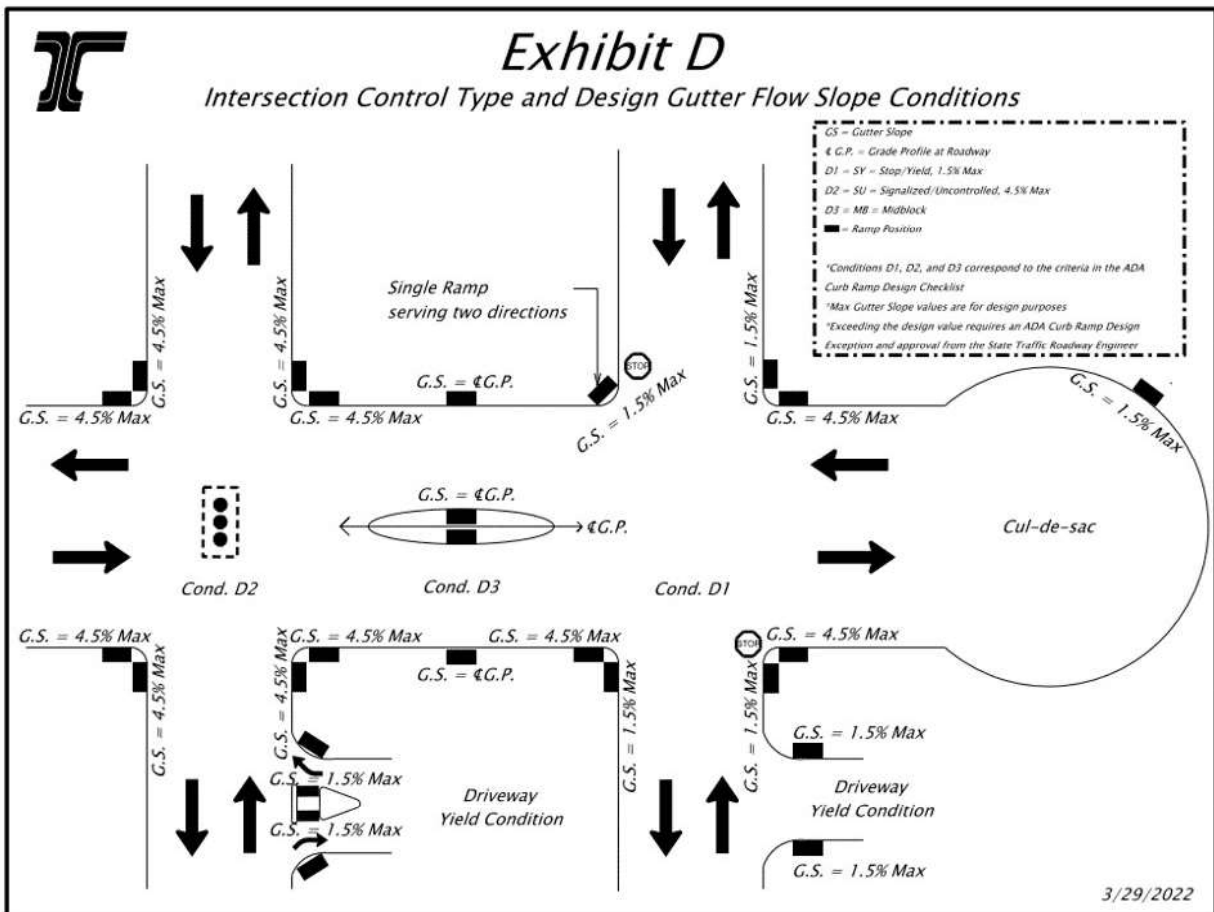


Exhibit D, Page 1, Intersection Control Types and Design Gutter Flow Slope Requirements

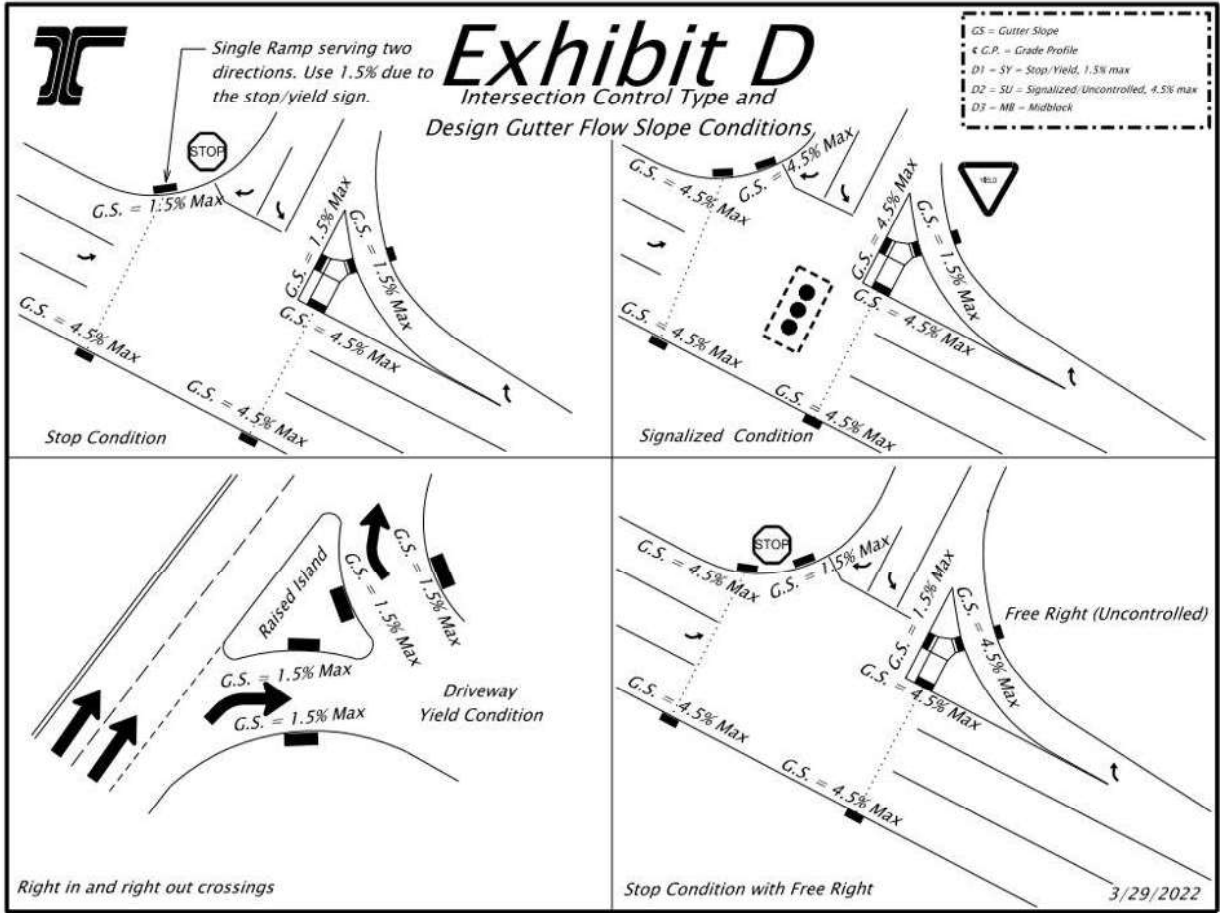


Exhibit D, Page 2, Intersection Control Types and Design Gutter Flow Requirements



Using a Smart Level to Measure Gutter Flow Slope

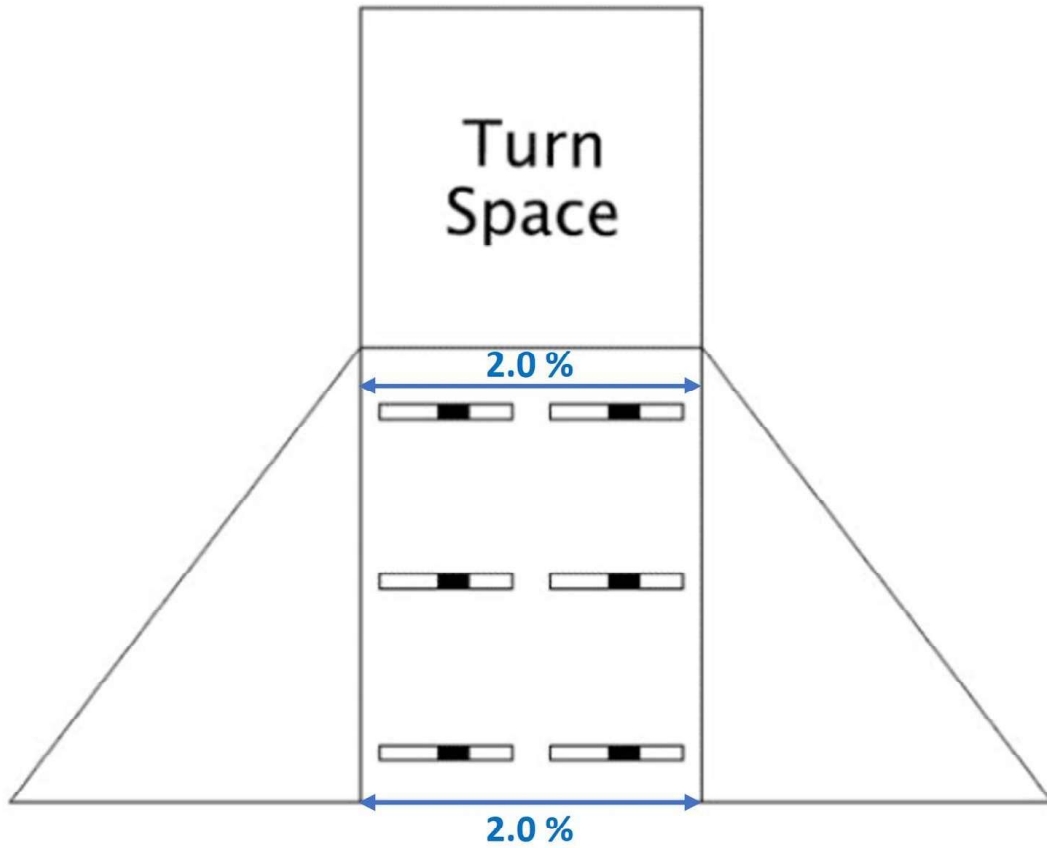
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### **Transitioning to Gutter Flow Slopes and Cross Slope Measurements**

As described in the previous Lesson, the Ramp Run cross slopes are to be a maximum of 2.0%. When the gutter flow slope is allowed to be greater than 2.0%, based on the intersection control type, ODOT transitions the cross slope. This transition typically occurs from the level area or turn space to the gutter flow line by warping the cross slope at a rate of 0.5% per foot in the ramp run and may include the directional curb component. All cross slope measurements down the Ramp Run or Directional Curb are not to exceed the maximum allowable gutter flow slope for the curb ramp system. Measure the cross slope along the entire length of the ramp run and directional curb and check for visible irregularities in the ramp run surface.

Scroll through the following illustrations of the three intersection condition scenarios with the typical transitions:

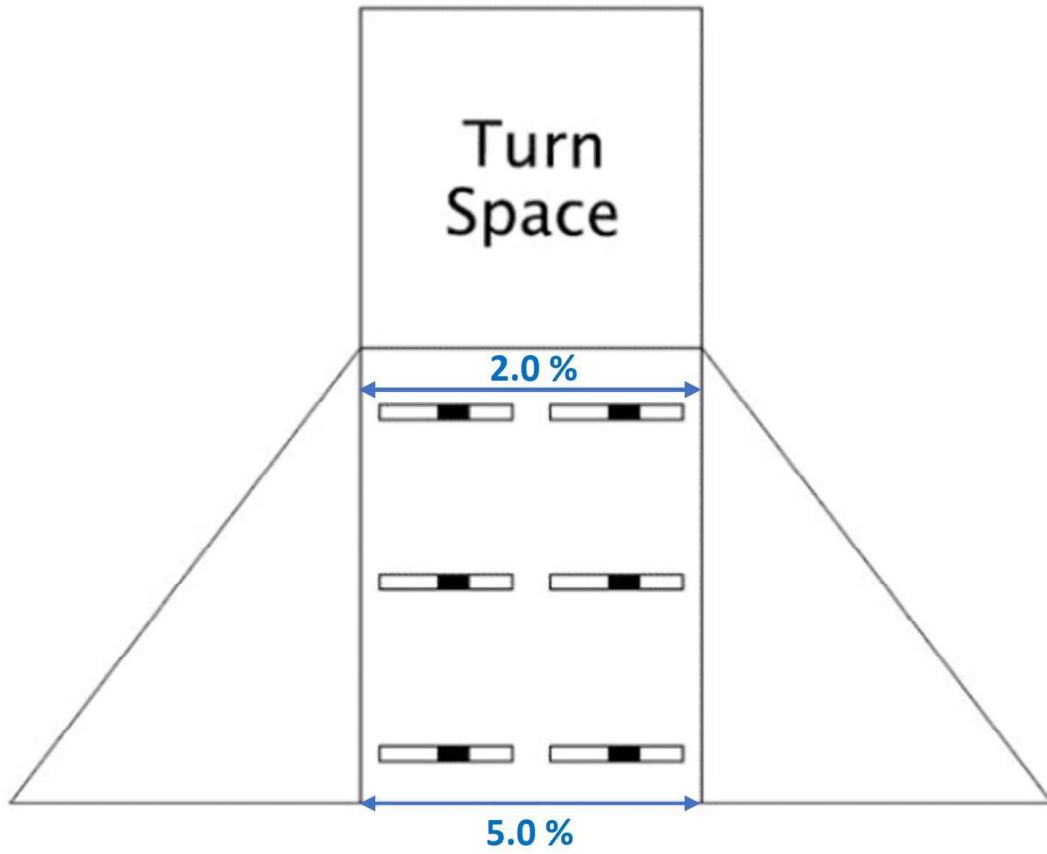
**At a Stop or Yield Approach**



**At stop/yield intersections = maximum of 2.0%**

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**At a Signalized or Uncontrolled Approach**

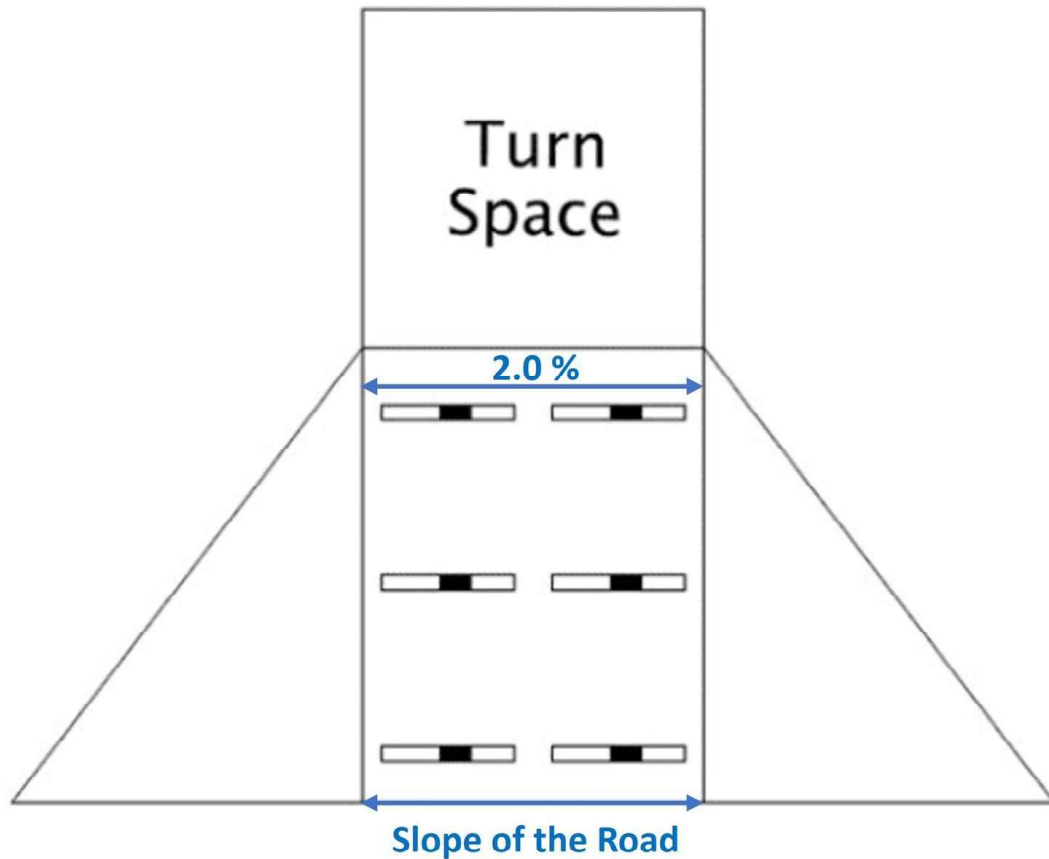


**At signalized/uncontrolled intersections = maximum of 5.0%**

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## At a Midblock Crossing



**At midblock = less than or equal to the slope of the roadway**

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Continue Audio Narration

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## Patching Transition Measurements

When constructing curb ramp system on an existing roadway, the asphalt connection (commonly referred to as "patching") between the edge of the gutter pan and the pavement sawcut will

need to be inspected. This is where the existing roadway transitions to the new curb ramp system construction in many projects.

The running slope of the new asphalt connection should be less than 5% and shall not make existing conditions worse (equal to or less than the existing road cross slope) for the crosswalk.

The cross slope from the newly constructed curb ramp system is warped in many cases to match back into the existing roadway profile. The cross slope should not exceed the maximum allowed based on the intersection control type for the gutter flow slope at that location. ODOT uses a 0.5% per foot warp rate to create a smooth transition to the extent feasible to match the sawcut pavement line.

The running slope measurements are to be taken perpendicular to the curb and edge of gutter parallel with the counter slope (not parallel to the path of travel in the crosswalk). The slope is measured in this direction because it is presumed mobility devices will approach the entrance perpendicular to the grade break at the curb. This measurement is not the same as the counter slope but extends to the pavement sawcut limit. The surface patching constructed is required to be flush with the existing pavement surface.

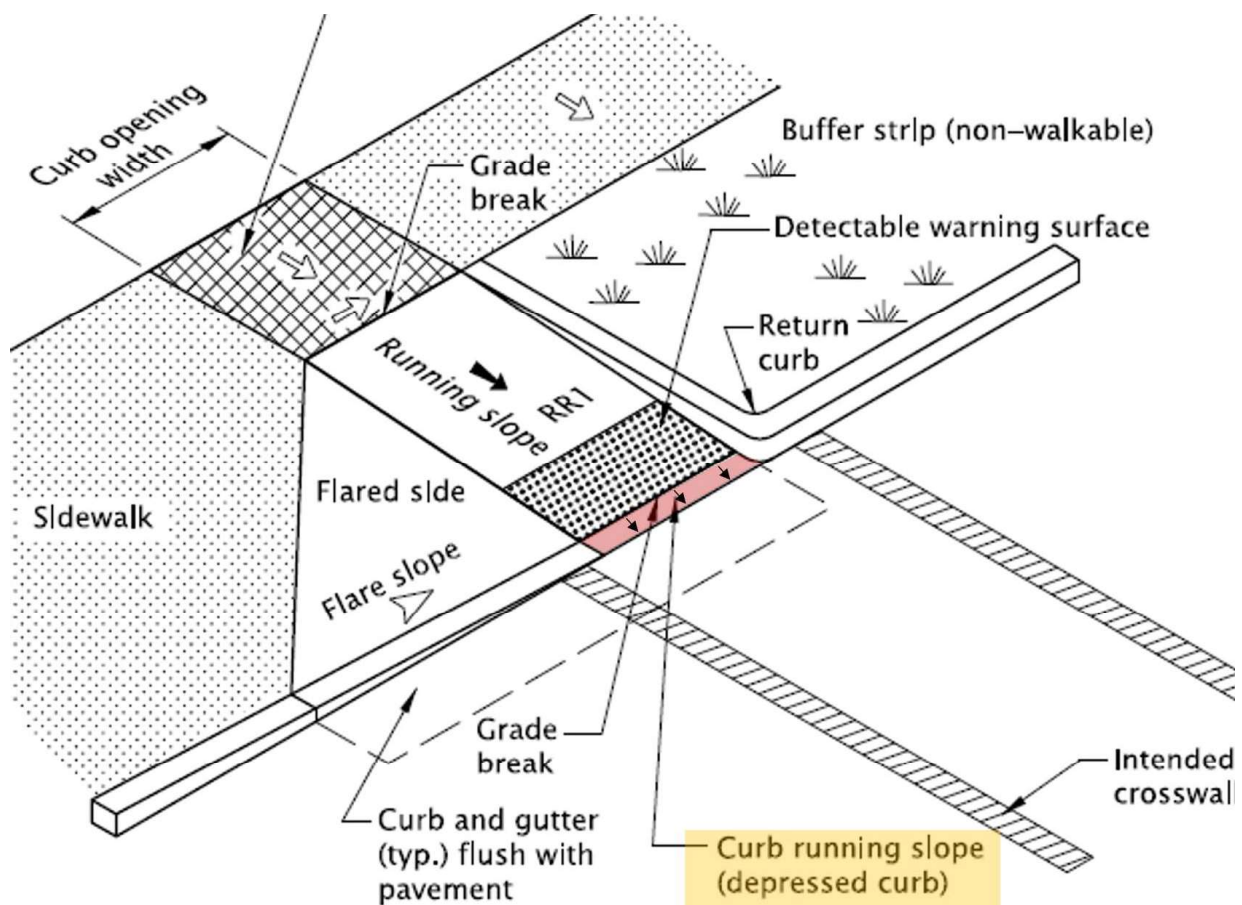


Correct Placement of  
Smart Level for  
Measuring Running  
Slope of New Asphalt  
Connection



Incorrect Placement of  
Smart Level for  
Measuring Running  
Slope of New Asphalt  
Connection

## **Curb Running Slope**



Curb Running Slope Highlighted on Curb Ramp

The **curb running slope** is the grade of the lowered, or depressed, curb across the front of the curb ramp throat to allow an accessible connection between the ramp run or directional curb, and the gutter pan.

### Curb Running Slope Measurement

The curb running slope is measured perpendicular to the face of curb, excluding any gutter pan adjacent to the street. The gutter pan could be constructed monolithic with the curb with no visible joint in some designs. At least 3 measurements are taken on the top surface of the curb for curb running slope calculations. **The value recorded for the curb running slope is the AVERAGE grade of the curb surface.** The curb running slope convention is a positive or negative slope, where positive values slope toward the street curb line. The curb running slope will be entered as the numeric value (+/-) in the inspection form.



Placement of 6-inch Smart Level on a Curb Running Slope

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## Measurement Tips

- For Counter Slope, take the same number of measurements based on ramp run width for running slope measurement. Additional measurements are generally required with each additional 2 feet of width for the ramp run.
- Measure gutter flow slopes consistent with the required number of cross slope measurements based on the ramp run width.
- A minimum of three measurements are required for curb running slope. Take the same number of measurements for curb running slope based on ramp run width for running slope measurement.

- Do not place level across two adjacent surfaces anywhere on the curb ramp system.

## Curbing and Gutter Pan FAQ's

**Q:** The training conveys that the counter slope on the asphalt patching in front of the gutter should match the existing asphalt slope, or not exceed 5%. There is some lingering confusion about whether the existing asphalt slope has to match the existing slope or whether it can be different (up to 5%)?

A: On projects where construction only encompasses curb ramp system retrofits and pavement reconstruction is limited to the surrounding area of the curb ramp system, the adjacent surface slope on the pedestrian access route/street cannot reduce existing accessibility performance and make things worse. The slope of the road within the pedestrian crosswalk, in the direction of travel, is not to be steeper than 5%. When the existing pavement exceeds 5% prior to construction, in no case shall the slope in the path of travel exceed the existing slope conditions. In other words, the asphalt connection or patching between the gutter pan and the sawcut should be equal to or less than the existing road slope.

**Q:** Will a curb running slope that is sloping down from the gutter (“opposite”) fail a ramp?

A: It depends. When the curb running slope is not in the same direction as the ramp running slope and creates a “v channel” at the back of curb, water will not drain and create ponding. This is cause for curb ramp system failure.

**Q:** When measuring curb running slope, if any one measurement is greater than 8.3% would it fail?

A: ODOT’s practice currently is to record the average slope of a minimum of three measurements. If the average curb running slope exceeds 8.3% it will fail. Curbs should be

constructed in conformance with the curb ramp system detail requirements specified in the contract plans, which is generally designed under 8.3% or flatter.



Review all figures and advance audio to the end before moving on.

## Unit 5 Lesson 4: Directional Curbs

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**You must click on all images before moving on to next Lesson.**



04:41

Start Audio Narration

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### Directional Curbs

Directional curb ramp systems are designed so the pedestrian path of travel is aligned parallel with the intended crosswalk. Directional curbs are constructed to facilitate a more direct path of travel for pedestrians and provide perpendicular grade breaks on a curved curb line. As described in Unit 5 Lesson 2, a perpendicular grade break is required on ramp runs to be accessible. Where the curb ramp system is on a radius, a perpendicular grade break is introduced in some cases. A directional curb can provide additional flexibility on how a curb ramp system is orientated to the corner and crosswalk, so the pedestrian walks in the most direct route and a straight line with the intended crosswalk.





A Directional Curb Highlighted in Red

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A directional curb is typically triangular shaped however, it may be a polygon shape, and it is the area between the bottom of the ramp run and the back of curb before entering the crosswalk. Directional curbs are not applicable to cut through islands that are at the same level with the profile of the street. Directional curbs are generally only applicable to perpendicular curb ramp styles or combination curb ramp styles. Curb ramp system styles will be discussed later in the

training. Refer to RD905 below for illustrations of directional curbs and the detectable warning surface placement with a directional curb.

**GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:**

1. Detectable warning surface details & locations are based on applicable ODOT Standards.
2. See project plans for details not shown. See Std. Drawg. RD700 & RD701 for curbs. See Std. Drawg. RD902 for detectable warning surface installation details.
3. On or along state highways, curbs and gutter is required at curb ramps.
4. Detectable warning surface placement for perpendicular ramps vary as shown.
5. Detectable warning surface placement across the grade break is prohibited.

**LEGEND:**

- Marked or Intended crossing location
- Sidewalk
- Detectable warning surface
- Running slope 7.5% max. (Max. 8.3% finished surface slope)
- Flare slope (Max. 10.0% finished surface slope)

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without first consulting a Registered Professional Engineer.*

All materials shall be in accordance with the current Oregon Standard Specifications.	
<b>OREGON STANDARD DRAWINGS</b>	
<b>DETECTABLE WARNING SURFACE PLACEMENT FOR DIRECTIONAL CURBS</b>	
DATE:	REVISION DESCRIPTION:
2024	
DESIGNED BY:	DATE:
NOVEMBER 2023	
CHECKED BY:	DATE:
SCALE:	BOOK NO.:
AS SHOWN	RD905

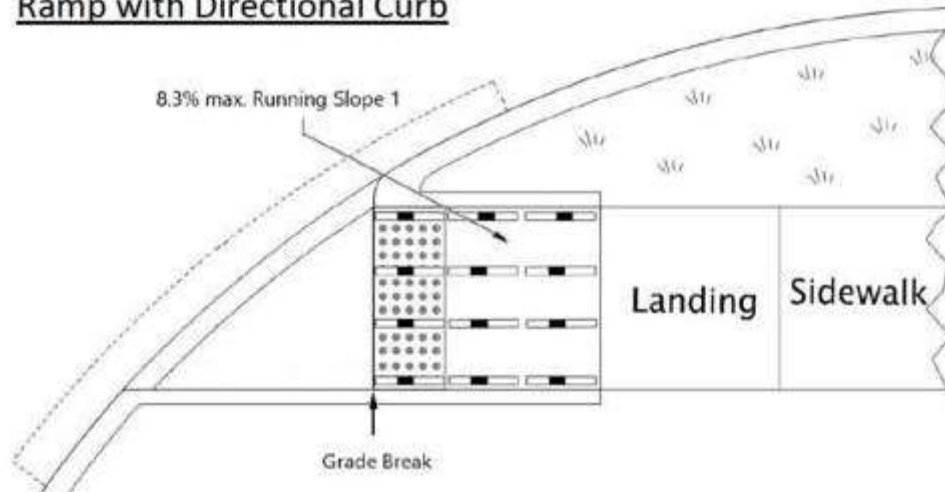
Effective Date: December 1, 2023 – May 31, 2024

## RD905 Directional Curbs

### Directional Curb Measurements

When a curb ramp system has a directional curb component, the ramp run above the directional curb is measured the same as any other Ramp Run component. Measure the running slope, cross slope and length record the maximum values. **Visually inspect the grade breaks ensuring they are perpendicular to the ramp run component.**

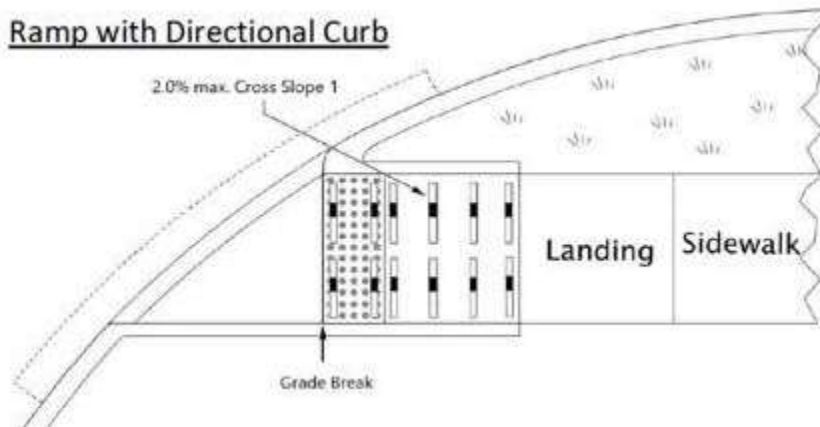
## Ramp with Directional Curb



Ramp Run Running Slope Measurements with a Directional Curb

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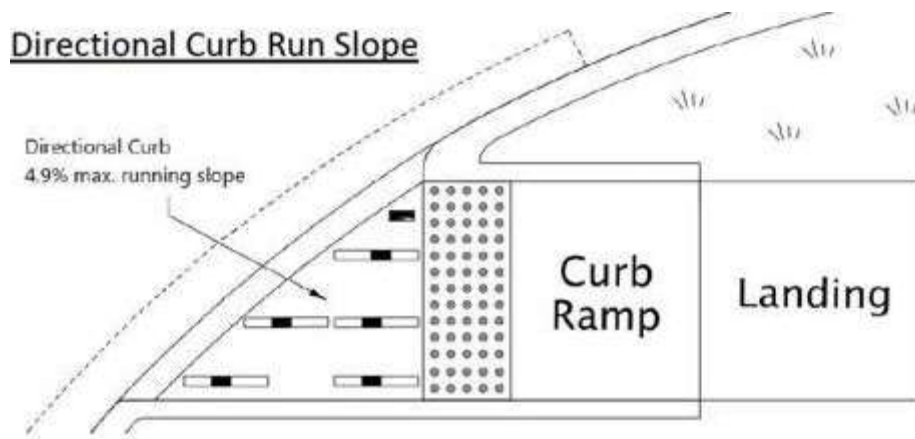
## Ramp with Directional Curb



Ramp Run Cross Slope Measurements with a Directional Curb

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## **Directional Curb Running Slope Measurement**



## Directional Curb Running Slope Measurements

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Where present, the running slope of the directional curb is required to be less than or equal to 4.9%. Running slope measurements are taken parallel to the ramp run in the triangular-shaped or polygon area. A 6-inch level is likely needed to measure the directional curb running slope for some portions of the surface. Take the same number of measurements along the width and length of the directional curb as you would for ramp runs, typically every 1 to 2 feet.

## Directional Curb Cross Slope Measurement

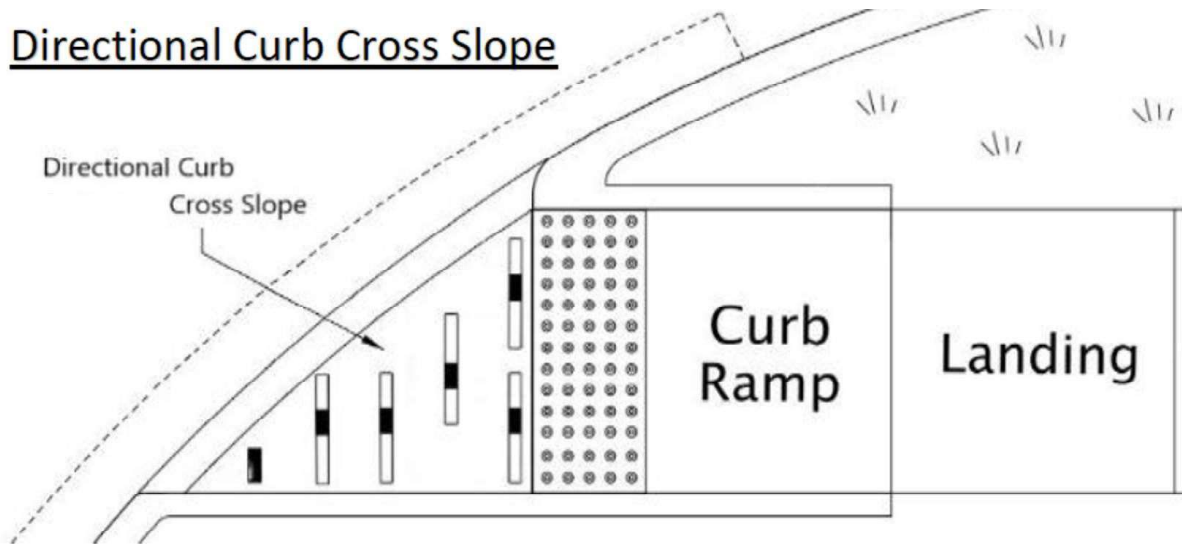
The directional curb cross slope is measured in the same increments as Ramp Runs, typically every 1 to 2 feet. You may need to use the 6-inch level in some areas of the surface. Mark the box on the form that indicates a directional curb is present. This impacts the acceptance value for the cross slope.

You will need to select the correct intersection control type when entering in the data on the form. The maximum cross slope for the directional curb is based on the intersection control type and the maximum allowable gutter flow slope at that location.

As described previously, there are three possible intersection control types that determine the maximum acceptable gutter flow slope. In some cases, the directional curb may warp cross slope to the gutter flow line designed. When warping is required ensure that the cross slopes do not

exceed the maximum allowable gutter flow slope permitted anywhere on the surface of the directional curb.

## Directional Curb Cross Slope



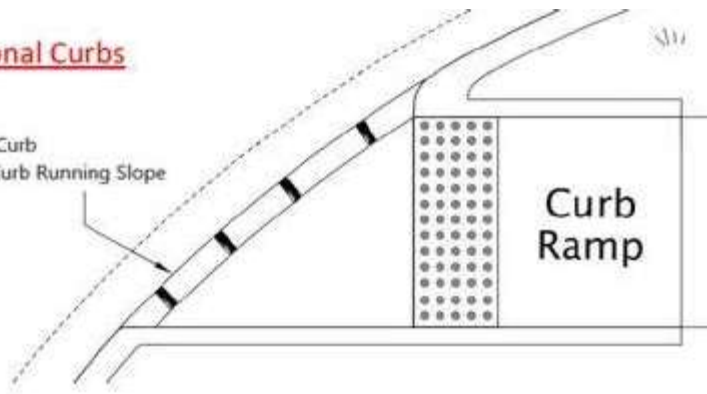
Directional Curb Cross Slope Measurement

## **Curb Running Slope Measurement on Directional Curbs**

The measurement technique for curb running slope adjacent to a directional curb is the same as any other curb running slope; perpendicular to the curb line. Mark the box on the form that indicates a directional curb is present. This impacts the acceptance value for the curb running slope. **The maximum slope for the curb running slope when it is adjacent to a directional curb is 4.9%.** Record the average of the measurements, which is a minimum of three locations. Take the same number of measurements as the counter slope and ramp run, based on the width of the curb ramp system.

## Directional Curbs

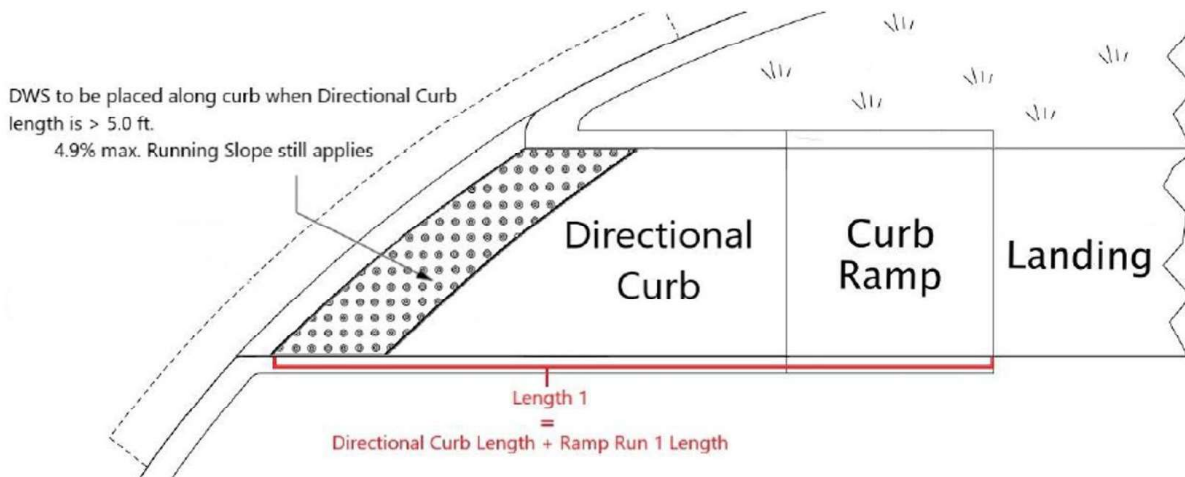
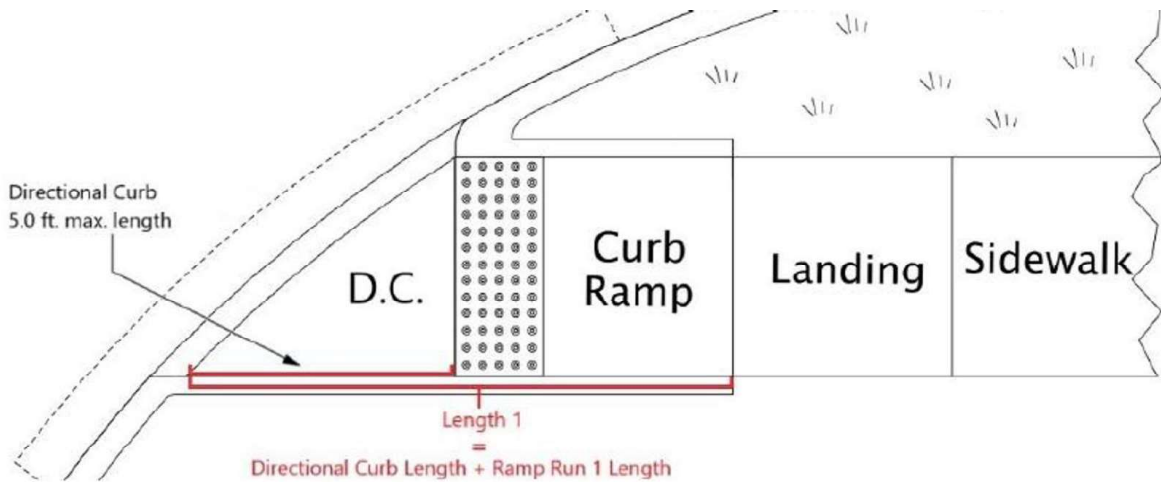
Directional Curb  
4.9% max. Curb Running Slope



Curb Running Slope Measurement on a Directional Curb

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## Ramp Run Length Measurement with Directional Curbs



## Images of Directional Curbs from the ADA Inspection Guide

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The Ramp Run Length is the longest distance measured parallel to the ramp run including the directional curb component if applicable to the curb ramp system design. The longest distance measured is recorded on the inspection form for each ramp run. It is not a pass or fail criteria for the inspection, rather general information about the curb ramp system.

The length of the ramp run and the directional curb are added together and recorded as the ramp run length on the inspection form as shown in Figure below. Do not include the landing or turn space in the length.



**Review all figures and advance audio to the end before moving on.**

**CONTINUE**

## Unit 5 Lesson 5: Turn Space, Landings & Level Areas

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You must click on all images before moving on to next Lesson.



02:01

Start Audio Narration

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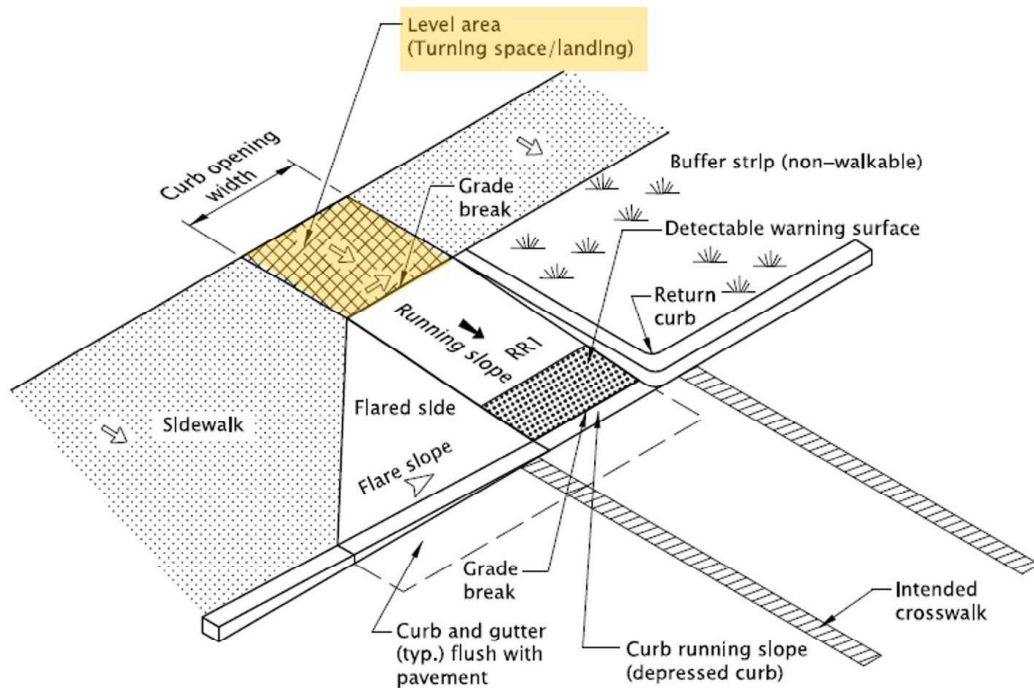
Turn spaces and landings are types of level areas. A **turn space** is a level area where the purpose is to provide an area in the pedestrian access route where a person using a mobility device can change direction. A **landing** is a level area where a person using a mobility can stop or rest before continuing along the pedestrian access route. Unlike a turn space, a landing is not necessarily used for changing direction.

Note that dummy joints and contraction joints can occur within turn spaces and landings and other planar surfaces and may not necessarily define the edges of the turn space or landing.

### Turn Spaces



The turn space is a level area where users can change direction, or rest before or after ascending a ramp. A level turn space is provided at any location that requires a turning movement so that mobility devices can reorient themselves with the intended path of travel along the pedestrian access route without tipping over.



Turn Space/ Level Area/ Landing

Turn spaces and level areas are adjacent to ramp runs and must be sharing a common border (touching) the ramp runs for the pedestrian access route. The turn space slopes in two directions (90 degrees to each other) with a slope of 2.0% or less finished with construction. To save space at a street corner, two curb ramps systems may sometimes share a turning space. Turn space slopes will be measured with a minimum 2-foot grid pattern.

## Landings

Landings are very similar to turn spaces and have the same dimensional and slope requirements of turn spaces. Landings do not require a pedestrian change in direction when traveling along the pedestrian access route. Landings are often located along sections of pedestrian access routes that have relatively steep slopes and are provided as a resting place.



03:20

Continue Audio Narration

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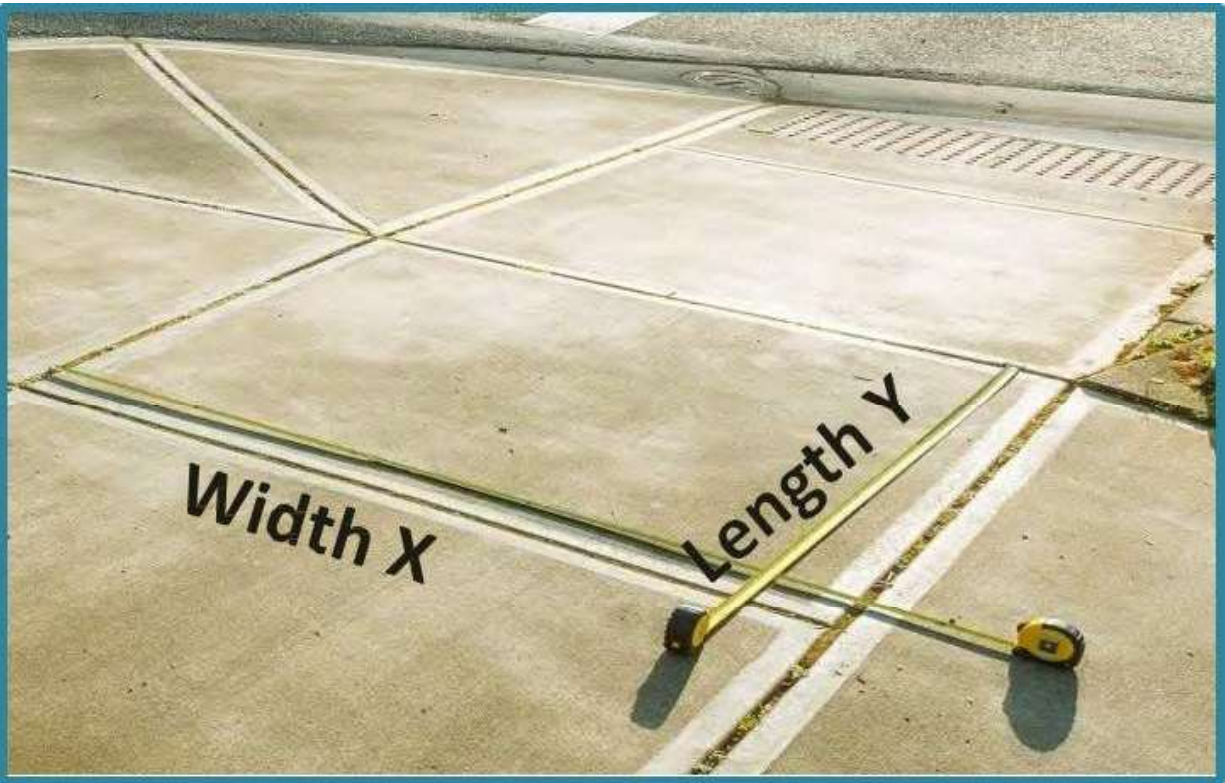
## Turn Space and Landing Measurements

The curb ramp detail sheets and standard drawings in the construction plans will show the turn space dimension requirements. In the Oregon Standard Drawing this is indicated with a crosshatch pattern on the drawing for curb ramp systems.

The turn space has four measurements including slopes and dimensions. The measurements recorded are:

- Width X
- Length Y
- Slope X
- Slope Y

The turn space Y direction is parallel to the direction of travel entering the ramp system from the street as you proceed typically up the ramp run component. The turn space X direction is perpendicular to the Y direction which should be at least as wide as the curb ramp opening. The level area may be larger than the width of the curb ramp, and maybe a polygon shape to encompass the overlapping curb ramp system that share a turn space.



Identifying X And Y on A Turn Space on a Perpendicular Ramp.

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**i** Do not measure turning spaces and level landing diagonal to the X and Y directions. A diagonal slope measurement is the resultant of the two directions, which may be greater than the X and Y acceptable slope values.

End of Walk curb ramp styles X and Y direction can be confusing. The Y direction for an End of walk curb ramp system connection is orientated with the grade of the roadway where you begin to walk up a ramp run. Y is parallel with the gutter line or roadway travel lanes. In many cases detectable warning surfaces are not installed on End of Walk curb ramp styles.

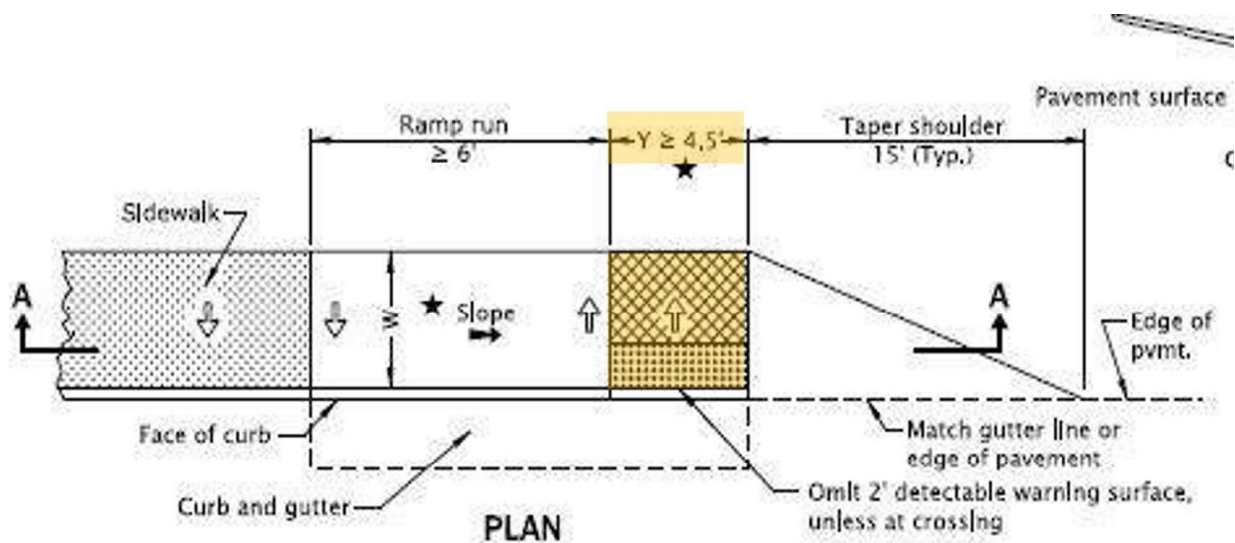
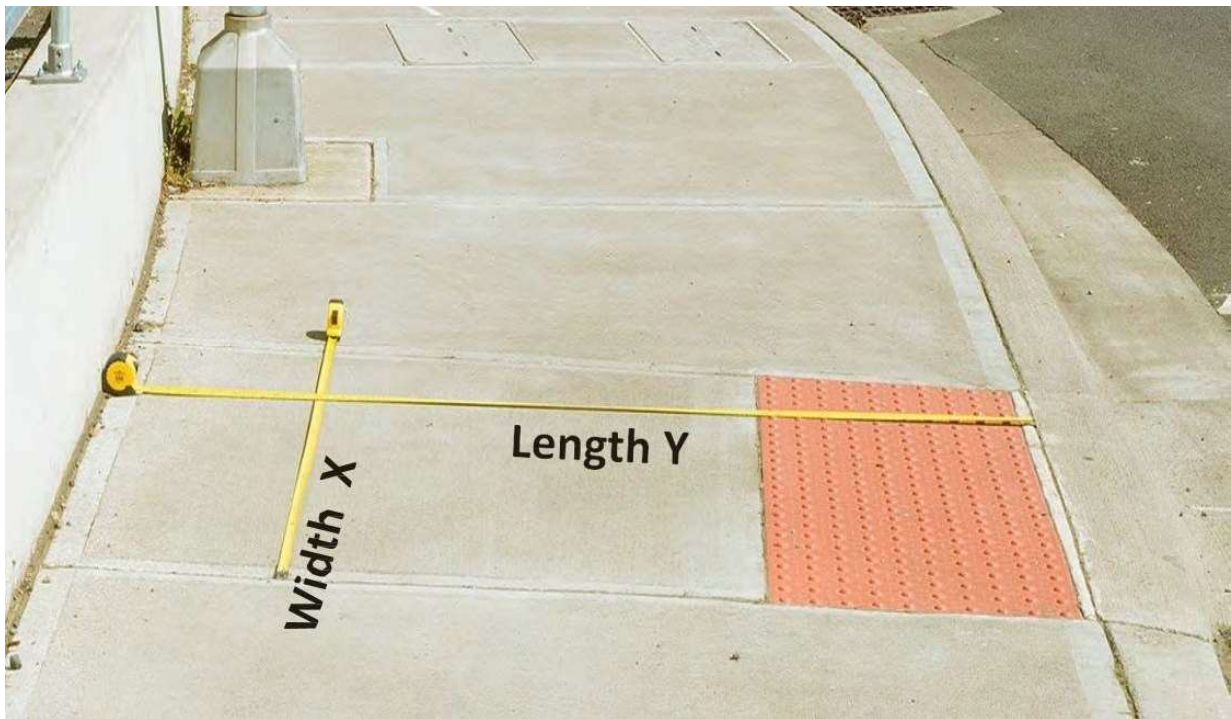


Illustration of the Y Direction on an End of Sidewalk Curb Ramp  
from RD950

Record the shortest X and Y dimensions on the curb ramp inspection form. The minimum turning space dimensions are 4 feet by 4 feet in the X and Y directions. Note any back of curb ramp obstructions that may be present. When a back of curb ramp obstruction is present at the turn space or landing, the minimum dimension in the Y direction is 5 feet.

The following image shows a parallel curb ramp style with a retaining wall along the back of the curb ramp system which is the back of ramp obstruction.



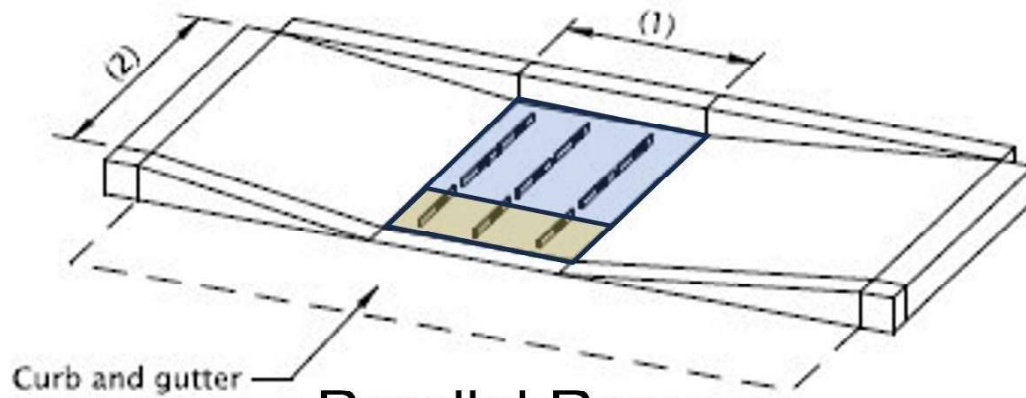
Measuring X and Y for a Turn Space on a Parallel Curb Style Ramp.  
Note Detectable Warning Surface is on the Turning Space and is  
Part of the Measurement

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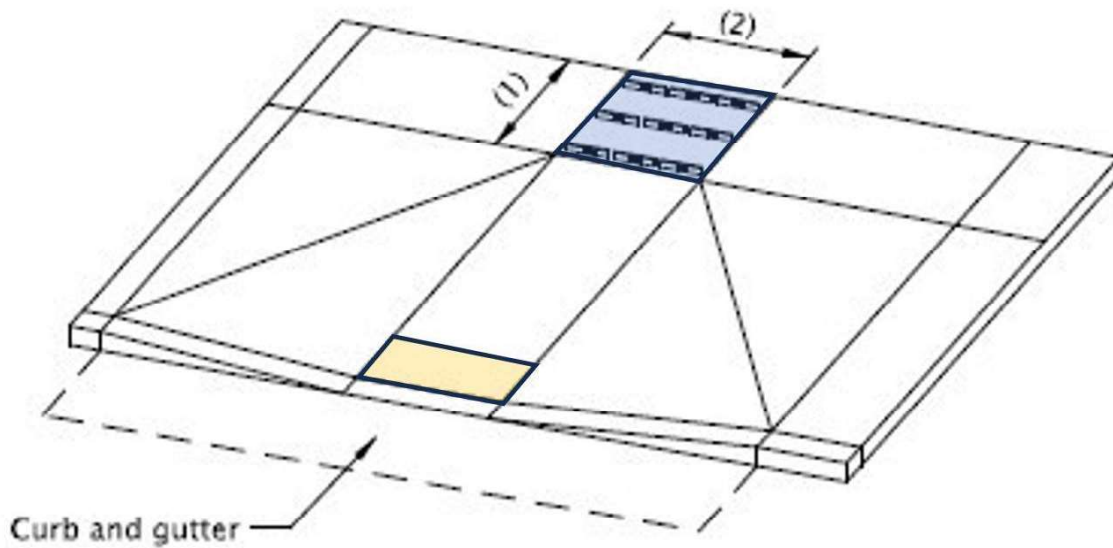
The placement of smart levels on turn spaces is shown in the illustration below. For widths greater than 5.0 feet, add a row of measurement for each additional 2 feet. Specified slopes shall comply when measured anywhere on the surface in the X and Y directions, free of humps and sags. Do not record slopes diagonal to the X and Y directions.

The detectable warning surface maybe located on the turn space and the underlying surface is included in the turn space measurements when checking for slope and dimensions. The slope must be less than 2.0% to be included on the turn space. When detectable warning surface is on the turn space, measure it separate from the rest of the concrete turn space. Do not bridge both surfaces with the smart level tool.

# Turn Space



Parallel Ramp



Perpendicular or Combination Ramp

Turn space Measurement Diagram



Turn Space Measurements for Slope in the X Direction

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## Turn Space Measurements for Slope in the Y Direction

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04:33

Continue Audio Narration

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### **Shared Turning Spaces**

Turn spaces can overlap each other and be irregularly shaped. Turn spaces can span across multiple panels and dummy joints and may not always be square. The dummy joint layout is to control concrete cracking and does not determine the turn space dimensions. The plan set will have the intended turn space labeled on the curb ramp detail sheet.

In all cases, the entire turn space area (level area) is measured for cross slope in both the X and Y directions. The lengths and widths are recorded on the form. The turn space must be touching and sharing a common border with the associated ramp run it serves.

The following is an example.





## Shared Turn Space

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The image to the left shows the boundary highlighting the irregular shaped turn space/level area. At inspection the entire solid blue border area is measured for cross slope compliance.

The following images show the turn space boundary for each curb ramp system at the corner. The horizontal measurements recorded on the form for the corresponding X and Y directions are labeled in the figures below. Notice in the image above the turn space is not square. Also note that the turn spaces overlap each other.

The solid red border area is the turn space for Curb Ramp System 1 and the dashed blue border area is the turn space for Curb Ramp System 2.





Note that there is a small triangular section of the shared level area that is not within the measured turn space areas for Curb Ramp System 1 and Curb Ramp System 2. The triangular area is still checked for slopes. Turn spaces must touch and share a common border with the ramp run for the crossing it serves, and it should be at least as wide as the curb ramp width at the top of the ramp run.



Image Showing the Overlapping Turn Space/Level Area for Ramp 1 and Ramp 2

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Additional turn spaces/level areas may also be designed for a building entrance or other pedestrian route connection to a business. These are to be inspected and measured per the contract plans; however, they are not recorded on the curb ramp system inspection form. These additional areas are a portion of the pedestrian access route which must meet ADA requirements.

### **Back of Ramp Obstruction (BORO)**

A back of ramp obstruction is any physical object that can obstruct the foot pads of a wheelchair while executing a turn movement or a front bumper of a power assisted scooter. Vertical clearance of mobility devices can be as little as  $\frac{3}{4}$  inch to 1 inch. Common obstructions include

raised curbs, utilities, retaining walls, pedestrian handrail, etc. An obstruction does not need to span across the entire width of the turn space to constitute a back of ramp obstruction. For example, a signal pole may not span the entire width of the turn space but it still constitutes a back of ramp obstruction. The requirement is to have at least 5.0 feet in the Y direction length (direction of the street crossing) on the turn space when an obstruction is present.

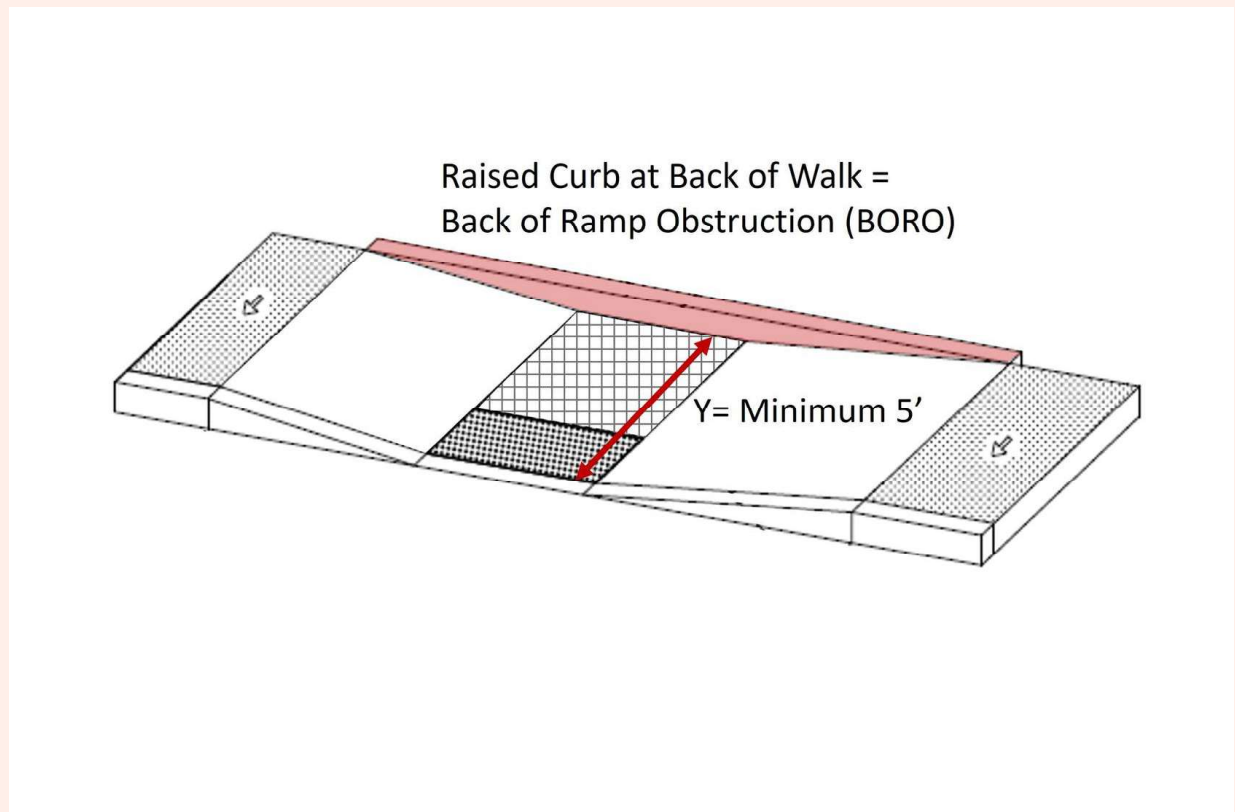



Illustration of a Back of Walk Obstruction on a Parallel Curb Ramp

## Turn Space, Landings FAQ's

- i** Q: A turn space is constructed at 3.9 feet width (x-direction) and there is flat area beyond the turn space score line. Could the flat area potentially be used to increase the turn space dimension (assuming no other issues are created doing this)?

A: The level area (turning space/landing) and inspection measurement is independent of the dummy joint or score line. It is preferable for the two things to align to identify the space, but it's not required. Other walking surfaces that can be used and traversed don't have dummy joints or score lines (e.g., unit pavers or other decorative scoring schemes) and it would be infeasible to do so.

 **Q: Why do standard drawing legends show turning spaces at “4.5 feet x 4.5 feet (4 feet x 4 feet min. finished surface)”?**

A: Turning spaces and landings are being designed with a 6-inch (0.5 feet) tolerance. Curb ramps systems should be constructed to meet the dimensions shown on the contract plans. The curb ramp inspection form will not “fail” the turn space if the minimum finished surface dimensions are met.



Review all figures and advance audio to the end before moving on. The quiz is on the next screen.