

# Detectable Warning Surfaces (DWS)



The following slides will discuss detectable warning surfaces or DWS. DWS may also be referred to as truncated domes.

## Detectable Warning Surface (DWS)

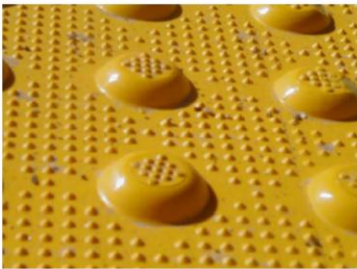


*What is a DWS?*

Raised truncated domes in a rectangular array.

*Where do you place them?*

Placed across the bottom of the curb ramp.



*What exactly do they do?*

Aid those visually impaired to identify the end of the ramp.

DWS = Stop



What is a DWS?

Raised truncated domes in a rectangular array.

Where do you place them?

Placed across the bottom of the curb ramp or more generally where pedestrians will encounter traffic.

What exactly do they do?

Aid pedestrians with visual impairments to identify where traffic will be encountered.

DWS = Stop

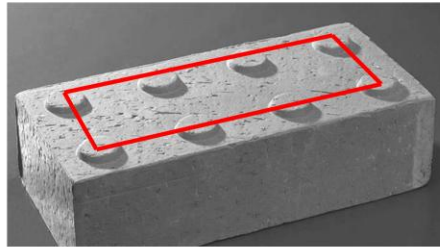
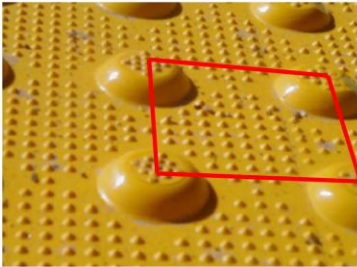
## Dome Arrangement



Approved domes should form a square grid with respect to the edge of tile.

Diagonally arranged domes form a diamond and should not be used for new construction.

Diagonally arranged domes do not need upgraded if the other properties of the curb ramp meet the latest ADA requirements.



Approved domes should form a square grid with respect to the edge of tile (bottom graphics).

Diagonally arranged domes form a diamond and should not be used for new construction as shown on the upper left graphic.

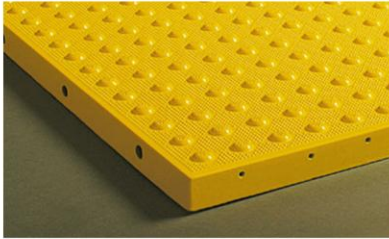
Diagonally arranged domes do not need upgraded if the other properties of the curb ramp meet the latest ADA requirements.

Please note the domes do not provide directional cues and must be aligned perpendicular to the grade break.

# DWS Materials



- Cast Iron
- Steel or Stainless Steel
- Polymer/Concrete Tiles
- Brick Pavers
- Fiberglass
- Rubber Mats
- Stamped



Many material types are available, such as:

Cast Iron

Steel or Stainless Steel

Polymer/Concrete Tiles

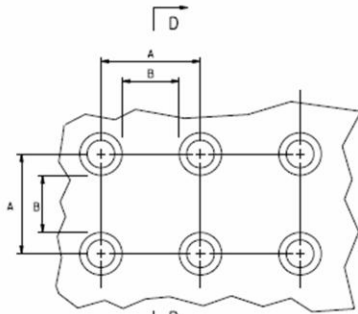
Brick Pavers

Fiberglass

Rubber Mats

Stamped

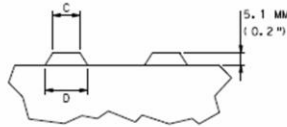
# DWS as Per RC-67



TRUNCATED DOME DIMENSIONS		
DIM	MIN mm (inch)	MAX mm (inch)
A	41 (1.6")	61 (2.4")
B	17 (0.65")	38 (1.5")
C	(13)	(13)
D	23 (0.9")	36 (1.4")

## DETECTABLE WARNING SURFACE (DWS) TRUNCATED DOME DETAILS

- ⑬ THE C DIMENSION IS 50% TO 65% OF THE D DIMENSION.
- ⑭ CONSTRUCTION JOINTS ARE SHOWN TO DEPICT THE 90 DEGREE GRID. ACTUAL SIZE AND SHAPE MAY VARY.
- ⑮ ONE CORNER OF THE DWS MUST BE WITHIN 200 (8") OF THE FACE OF CURB. NO OTHER POINT ON THE LEADING EDGE OF THE DWS MAY BE MORE THAN 1550 (60") FROM THE FACE OF CURB.

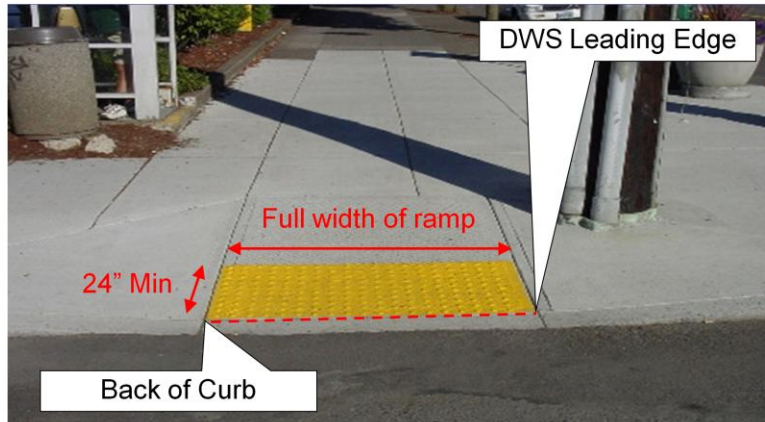


SECTION D-D



On the lower left, you can see a section view of a truncated dome. The bottom and top diameter have specific tolerances. Also notice how the top of the dome is flat.

# DWS Placement



One corner of the DWS must be at the back of curb.

The leading edge must be no more than 60" from back of curb.



In most cases, DWS placement as part of a curb ramp will be directly behind the curb.

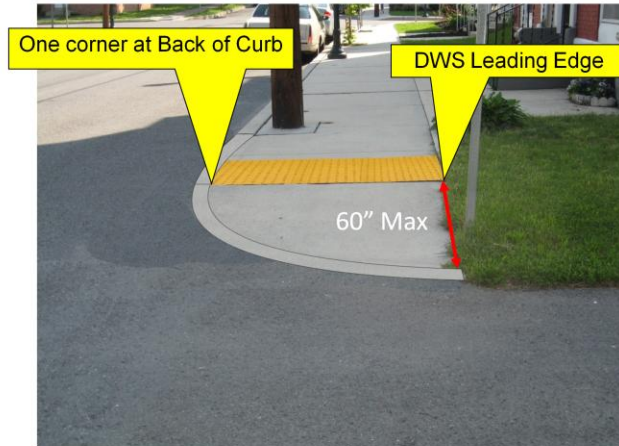
The leading edge must be no more than 60" from the back of curb. This may not make a lot of sense on this slide, however the next slide will provide a clearer picture.

## DWS Placement

Notice the small strips of concrete along the DWS.

For retrofits, the DWS strip will be installed to the nearest 1' to avoid unnecessary cutting.

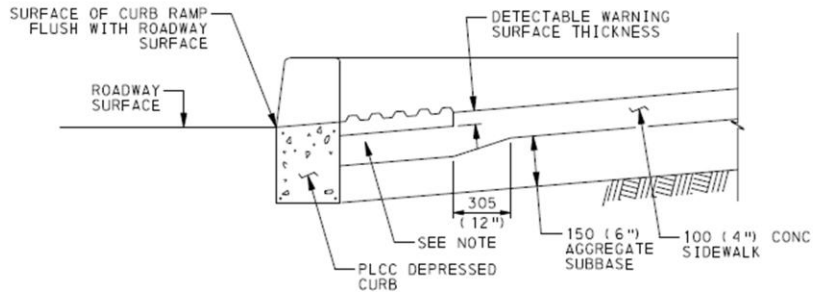
All new ramps will be constructed so that this does not occur.



Ideally, the DWS tiles should not be cut but installed in a linear strip.

Here the DWS is installed directly behind the curb at the grade break. The triangular section of concrete in front of the DWS is the triangular landing needed to keep the grade break perpendicular to the path of travel.

## DWS Embedding Detail (RC-67)



NOTE: CONSTRUCT NOTCH AS SHOWN TO PROVIDE FULL THICKNESS SIDEWALK.

### DETECTABLE WARNING SURFACE EMBEDDING DETAIL



DWS embedding detail.

Here you can see that full depth sidewalk is installed under the DWS surface. This provides a solid base to support the DWS.



## Concrete Embedded DWS General Installation



1. Dry fit the tiles to determine location.
2. Pour concrete.
3. Place DWS into wet concrete.



The following slides depict a DWS installation as part of a curb ramp construction.

Starting with a freshly poured curb ramp, the DWS will be pressed into the concrete to remove all air voids. Pockets of air trapped under the DWS may cause them to pop out during the freeze and thaw cycles of the winter.

## Concrete Embedded DWS General Installation



4. Wiggle the tiles or tap with rubber mallet to set the correct elevation and remove air voids from under the surface.



5. Clean top surface or remove protective sheet.



Then the DWS is carefully tapped so that the surface is completely embedded. During this step a digital level should be at hand to measure the slope on the DWS to make sure the final slopes are acceptable.

Then the protective plastic is removed and any concrete on the DWS surface shall be cleaned.

This process has two pay items.

1. square yards of cement concrete sidewalks
2. Square feet of DWS

## Retrofit Installation Process

**DETECTABLE WARNING SURFACE (DWS)  
INSTALLATION DETAIL**

**DETECTABLE WARNING SURFACE (DWS)  
INSTALLATION INSTRUCTIONS**

1. SAW CUT EXISTING CURB RAMP SURFACE WHERE THE DWS WILL BE PLACED.
2. REMOVE EXISTING CONCRETE FROM THIS AREA.
3. REPLACE AND COMPACT ANY DISTURBED AGGREGATE SUBBASE.
4. PLACE NEW CEMENT CONCRETE AND LEVEL TO A 100 MM (4 INCH) DEPTH.
5. REMOVE 53 (2.125 MM) STYRENE FOAM (1/4 INCH) DEPTH OF THE FRESH CONCRETE.
6. LAY-OUT AND PROPERLY FIT EACH UNIT PRIOR TO SETTING IN WET CONCRETE.
7. CUT UNITS AS NECESSARY.
8. PLACE UNITS ACROSS THE ENTIRE WIDTH OF THE CURB RAMP SURFACE.
9. ALLOW FOR SMALL EXPANSION GAP BETWEEN EACH UNIT.
10. PRESS UNITS INTO FULL CONTACT WITH THE FRESH CONCRETE.
11. ADJUST HEIGHT OF EACH UNIT EDGE TO BE LEVEL WITH ADJACENT RAMP SURFACES.
12. ONLY TRUNCATED DOME'S SHOULD BE ABOVE THE FINISHED CONCRETE.
13. FILL ANY SAW CUT GAPS WITH APPROVED JOINT SEALANT MATERIAL.
14. DO NOT ALLOW FOOT TRAFFIC ON DWS UNTIL CONCRETE HAS CURED.

In the previous slide a new curb ramp was constructed. In this slide, an existing curb ramp is getting retrofitted with DWS.

The steps include:

Saw cutting the area of the DWS

Removing concrete

Pouring fresh concrete

Then embedding the DWS into the concrete.

This process has two pay items.

1. square yards of cement concrete sidewalks
2. Square feet of DWS