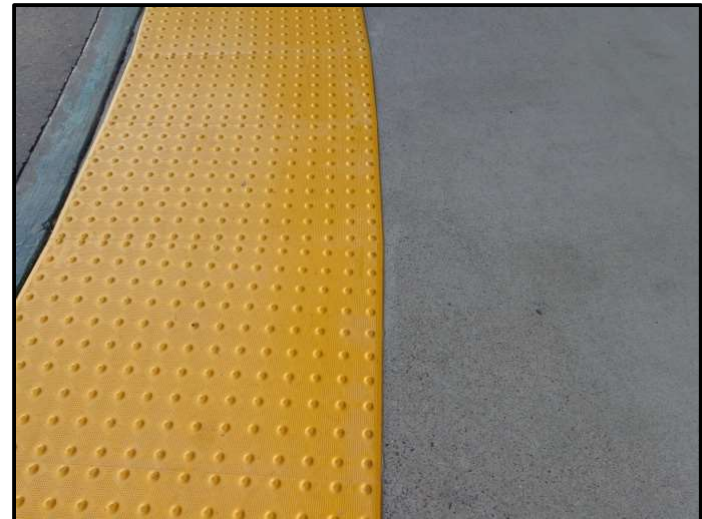


DETECTABLE WARNINGS						BIN 5
Author:	Bill Zellmer AIA, CASp	Issue Date:	November 7, 2014	Sutter Health - Physical Access Compliance		
	Sutter PAC Group	Revisions:	March 7, 2022	Barrier Interpretation Notice (BIN)		
Topic No.	Topic Name	Brief Description	2019 CBC - Code Text:	2010 ADA Standards - Text:	Sutter Guidance	Additional Information
1	Color and Contrast	Visual Contrast and color is specified in the 2019 CBC. At most locations where detectable warnings are required, they are required to be <u>Yellow</u> .	11B-705.1.1.3 Color and Contrast. Detectable warning surfaces shall comply with Section 11B705.1.1.3.1. The material used to comply with this section shall be an integral part of the detectable warning surface. Exceptions: 1. Replacement of less than 20 percent of existing detectable warnings at a single contiguous location shall be permitted to be in-kind at existing curb ramps, islands, or cut-through medians with detectable warnings in compliance with the code requirements in effect at the time of installation. 2. Existing installed detectable warnings at curb ramps, islands, or cut-through medians may comply with Section 11B-705.1.1.3.2 in lieu of Section 11B-705.1.1.3.1. 11B-705.1.1.3.1 Detectable warning surfaces shall be yellow and approximate FS 33538 of SAE AMS-STD-595A	None	Provide 'yellow' detectable warnings for all Sutter projects.	See Detail Page 5.1
2	Resiliency	DW are required to provide a difference in sound when a cane-user taps the DW as opposed to tapping the surrounding paving.	CBC Section 11B-705.1.1.4 "Resiliency. Detectable warning surfaces shall differ from adjoining surfaces in resiliency or sound-on-cane contact. Exception: Detectable warning surfaces at curb ramps, islands or cut-through medians shall not be required to comply with section 11B-705.1.1.5	None.	Sutter preference is to specify rubber or similar resilient materials for detectable warnings.	See Detail Page 5.2
3	Installation Method	Glue-down and/or surface-mounting installations have raised concerns about trip-hazards due to excessive height and lack of durability.	CBC Section 11B-303.2 Vertical. Changes in level between 1/4" high maximum shall be permitted to be vertical and without edge treatment.	None.	Sutter Preference: DW shall be <u>recessed</u> at all locations where the substrate is not an existing surface which is to remain.	See Detail Page 5.3
4	Curved Installation	Curved installations have raised concerns about compliance with the dome spacing requirements and possible trip hazards due to field cut DW mats.	CBC Section 11B-705.1.1.2 Dome spacing. Truncated domes in a detectable warning surface shall have a center-to-center spacing of 2.3 inches minimum and 2.4 inches maximum, and a base-to-base spacing of 0.65 inch minimum, measured between the most adjacent domes on a square grid. Exception: Where installed in a radial pattern, truncated domes shall have a center-to-center spacing of 1.6 inches minimum to 2.4 inches maximum.	None.	1. Sutter preference is to avoid curved installations when possible. 2. Sutter discourages cutting the DW mats in a way that presents partially cut domes at the leading edge of the DW mat. 3. Curved installations must meet the dome spacing requirement of 1.6" minimum and 2.4" maximum center-to-center spacing. For installations with an inside radius less than 100', Sutter discourages curved applications.	See Detail Page 5.4

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Author:	Bill Zellmer	ISSUE DATE:	November 7, 2014	5.1 – Color and Contrast
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- A. Code History:** Because determining the 'Light Reflectance Value' of concrete, asphalt and other paving materials is both imprecise and technically challenging, the contrast requirement has been revised in a recently approved amendment to the California Building Code. The original 2013 CBC code text of 11B-705.1.1.3 carried forward the 2010 CBC text, except inadvertently left out the '70%' requirement. Thus it provided a formula to determine the contrast ratio between two surfaces, but did not specify what constitutes a compliant ratio (which is stated as 70% in the 2010 CBC).
- B. Technically Challenging:** In practice, per the specified formula, yellow DW will provide approximately a 30% contrast with off-white concrete. This reality contributed to the recent code change. Many have overcome the contrast issue by specifying dark red or dark brown DW, which works well except that the code specifically requires yellow unless it is for curb-ramps, islands or cut-through medians.
- C. Yellow-Only:** During the 2015 Code Cycle, the CBC was changed, and then it was changed again during the 2019 Code Cycle, to only allow yellow detectable warnings in the vast majority of locations where detectable warnings would be used.



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5.2 – Resiliency

- A. CBC Section 11B-705.1.1.4 “Resiliency.** Detectable warning surfaces shall differ from adjoining surfaces in resiliency or sound-on-cane contact. **Exception:** Detectable warning surfaces at curb ramps, islands or cut-through medians shall not be required to comply with section 11B-705.1.1.5
- B.** This code section offers no methodology for measurement, requiring individual judgment-calls. It is particularly difficult to determine the variation of the sound-on cane contact between two surfaces that have not yet been installed. There is no corresponding requirement in the ADA Standards, therefore, final determination of compliance will be up to the building official.
- C.** Assuming that the surrounding surfaces are concrete, asphalt or similar paving; it is likely that a rubber or other similarly resilient detectable warning will comply with these requirements.
- D.** Sutter discourages specification of a non-resilient detectable warning material such as cast iron, as this may not satisfy the resiliency requirement. While curb ramps are exempt from this requirement, Sutter preference is to specify a resilient material for detectable warnings in all locations.



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5.3 – Installation Method

A. The two primary methods of installation are:

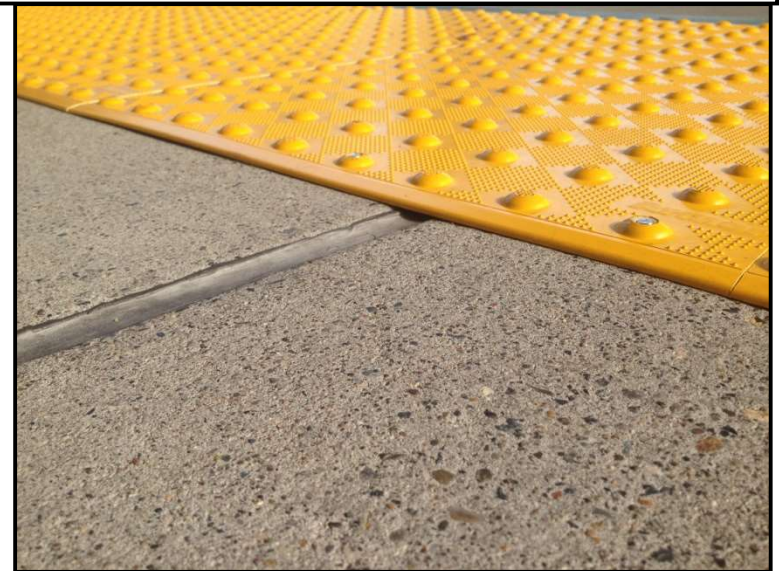
1. Cast-in-place - Recessed
2. Glue-down – Surface Applied (may also have mechanical fasteners)

B. Code Requirements: There are two essential code requirements that must be satisfied:

1. The maximum allowed vertical change in height is $\frac{1}{4}$ "
2. The installation must be 'maintained' in working condition. Therefore, any glued-down installations must be 'permanent'.

C. Sutter Preference – Glue-down:

1. Sutter discourages glue-down installation.
2. Project teams that choose to provide glue-down installation methods must be able to confirm a long-lasting, durable installation.



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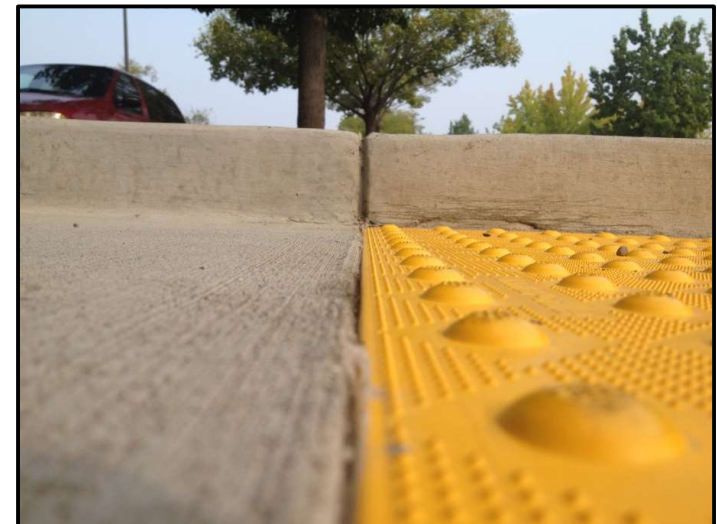
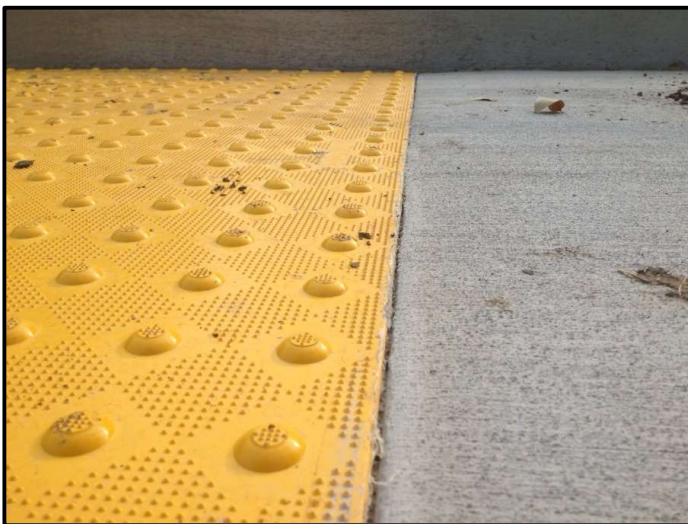
Author:	Bill Zellmer	ISSUE DATE:	November 7, 2014
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5.3 – Installation Method

D. Sutter Preference – Recessed Installation:

1. It is Sutter preference to require recessed installation methods for all new construction. This will limit Sutter exposure to trip-hazard liability and provide a more durable and better-looking installation. The finished surface of the DW should be flush with surrounding paving, with only the domes rising above the flush surface.
2. Surface-applied installations are appropriate for retrofit projects only. When the under-laying paving is being replaced anyway (for correction of slope, or other issues) then Sutter will consider it to be 'new construction'.

E. Trip-Hazard: The surface-applied installation presents a trip-hazard that is a significant issue for healthcare facilities. Even when the maximum .25" vertical height requirement is met, there is a compounding concern that a $\frac{1}{4}$ " vertical edge at edge of the DW mat in combination with another .2" of the actual domes creates a .45" aggregate height change from the surrounding paving, and a significant trip hazard. The recessed installation avoids the trip-hazard and is an all-around better solution.



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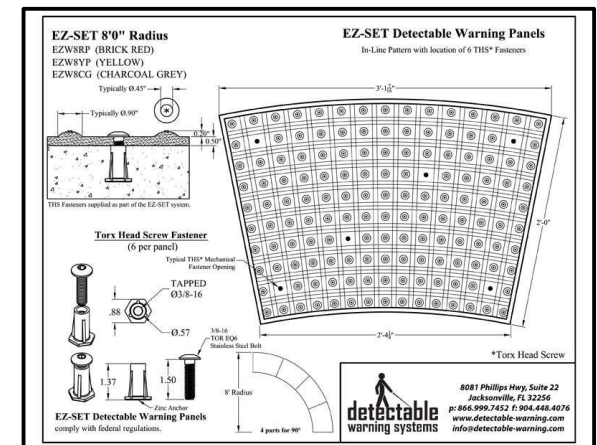
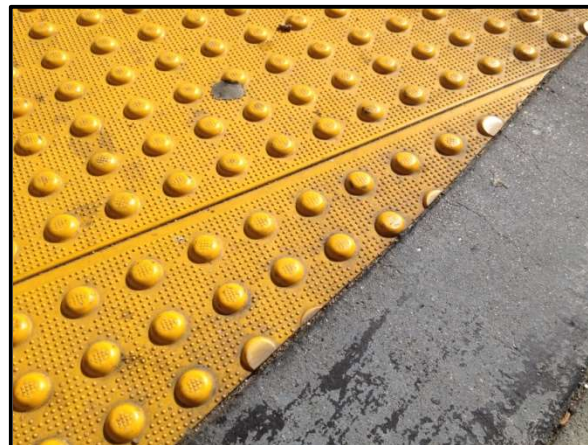
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Author:	Bill Zellmer	ISSUE DATE:	November 7, 2014
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5.4 – Curved Installations

- A. Code Citation: CBC 11B-705.1.1.2 Dome spacing.** Truncated domes in a detectable warning surface shall have a center-to-center spacing of 2.3 inches minimum and 2.4 inches maximum, and a base-to-base spacing of .65 inch minimum, measured between the most adjacent domes on a square grid. Exception: Where installed in a radial pattern, truncated domes shall have a center-to-center spacing of 1.6 inches minimum to 2.4 inches maximum.
- B.** The nature of curved installations requires choosing between options that each have significant down-sides. The three most common methods are discussed on the follows pages as:
1. Side-Miter
 2. Strict-Grid
 3. Manufactured Radial Pattern



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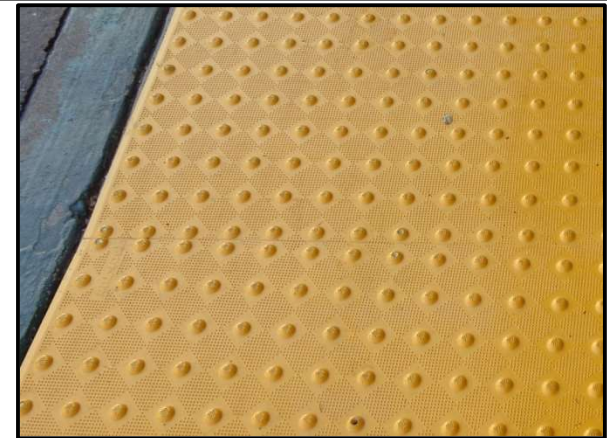
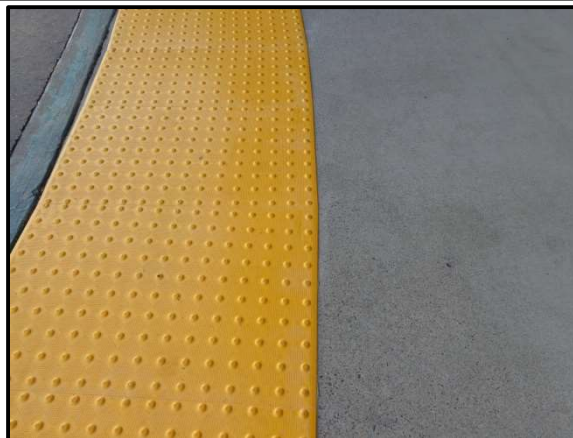
C. Detectable Warning – Side-Miter

This is probably the most common installation method to date. Straight sections of detectable warnings are cut along the sides to create a slightly ‘pie-shaped’ trapezoid. The trapezoids are installed with the cut edges ‘mitered’ along the sides, which creates a shape that follows the curve of the particular installation.

Downside: The dome spacing along the mitered edge will change from a larger spacing to a smaller spacing at the inside of the curve, and in most cases will actually result in spacing that drops below the minimum allowed spacing of 1.6 inches. Furthermore, in many installations the mitered edge will result in cutting through some of the domes. Sutter discourages installations of this type with an inside radius less than 100 feet, as it is likely that the dome spacing will be less than the 1.6” minimum allowed by code.

Up-side: The miter-cut edge and any cuts through domes occur only at panel edges, and are easily avoided by wheelchair users who prefer to align their wheels in the valleys between rows of domes. As one crosses the detectable warnings, the direction of travel is perpendicular to the miter-joints and will rarely result in a wheelchair that encounters any of the miter joints.

Furthermore, the leading edge of the detectable warnings are always full, un-cut domes, that are perpendicular to the path of travel,



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5.4 – Curved Installations

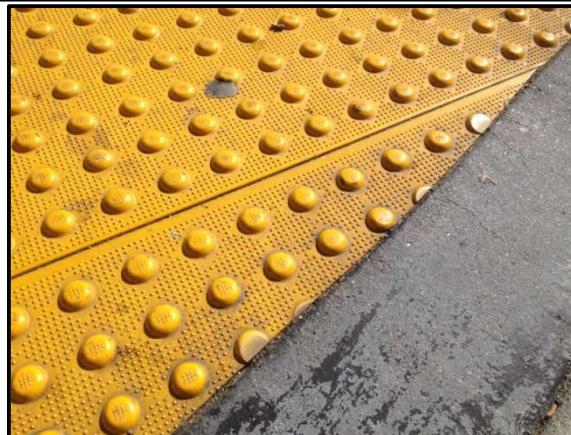
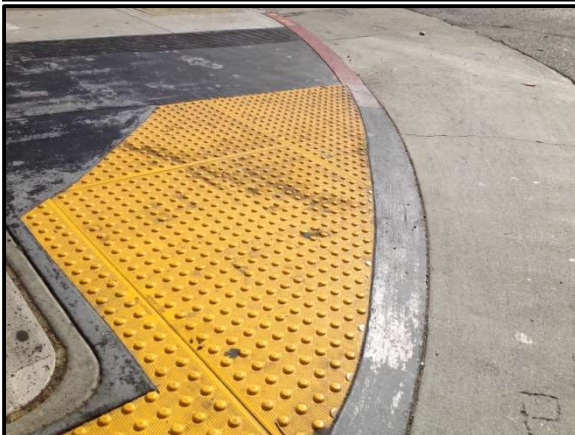
D. Detectable Warning – Strict-Grid

In this methodology, the grid orientation is aligned with the preferred path-of-travel, and is strictly maintained in the same orientation throughout the installation. This method is especially common at street intersections where the orientation of dome grid helps the sight impaired (as well as wheelchair users) to align themselves in the direction of the cross-walk.

Downside: The curved shape inevitably requires cutting through domes at varied and unpredictable angles. Frequently, the cut domes are field-beveled to reduce the trip hazard of the abrupt cut dome edges. The cut domes are always along the leading edge of the detectable warnings and unavoidable by both wheelchair users and the sight-impaired.

Furthermore, technically, the field-cut and field beveled domes do not meet the size and height requirements of the CBC, and again, are an un-avoidable part of the path-of-travel.

Up-side: For applications at street crossings, the ‘Strict-Grid’ arrangement allows sight-impaired and wheelchair users to align themselves with the direction of the cross-walk.



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5.4 – Curved Installations

E. Detectable Warning – Manufactured Radial Pattern

In efforts to resolve the curve problem, some manufacturers offer detectable warnings in pre-manufactured, radial patterns. The radius of the curve may be 'stock' or may be specified to suit the project.

Downside: Cost, availability and convenience are factors to consider. The use of pre-manufactured radial pattern detectable warnings requires a higher degree of project management as the curved sections are not interchangeable with straight sections. Curve radius must be specifically ordered to suit the project.

The code specifically limits the spacing of domes manufactured in a radial pattern, making tight curve installations non-compliant. **CBC 11B-705.1.1.2 Exception:** "Where installed in a radial pattern, truncated domes shall have a center-to-center spacing of 1.6 inches minimum to 2.4 inches maximum."

Up-side: The pre-manufactured radial pattern resolves both the problems of miter-joint installations, and Strict-Grid installations. There are no field-cuts through domes, and the spacing of domes is compliant for larger radius installations.

