

## 604-R-542 DETECTABLE WARNING ELEMENTS

(Revised 11-20-08)

The Standard Specifications are revised as follows:

SECTION 604, BEGIN LINE 25, DELETE AND INSERT AS FOLLOWS:

~~The detectable warning elements shall be set in thin set latex modified mortar in accordance with ANSI A108.1 or as recommended by the element manufacturer for outdoor use for adhering brick to concrete.~~

*The detectable warning surface in concrete curb ramps shall be selected from the Department's list of approved Detectable Warning Elements in accordance with 905.05.*

*The mortar bed material shall be a high-strength mortar in accordance with ASTM C 387. Part of the mix water shall be replaced with a Type II polymer modifier meeting the requirements of ASTM C 1438. The proportioning of water and polymer modifier shall be as recommended by the manufacturer of the polymer modifier.*

~~A type A C certification in accordance with 916 for detectable warning elements and thin set latex modified mortar shall be furnished shall be furnished for the masonry mortar and polymer modifier prior to use of the materials.~~

SECTION 604, BEGIN LINE 98, DELETE AND INSERT AS FOLLOWS:

**(g) Detectable Warning Elements**

~~Detectable warning elements shall be as shown on the plans. They shall be set in a thin set mortar on top of the concrete base. The concrete base shall be cleaned of all materials which might prevent the mortar from adhering to the base. The mortar shall be applied to the concrete in accordance with the manufacturer's recommendations. Where elements smaller than full sized are needed, whole elements shall be cut full depth with an appropriate power saw.~~

~~Brick joints shall be hand tight with a maximum of 1/16 in. (1.5 mm) width.~~

~~The joints between bricks shall be filled with a fine aggregate No. 15 or an equivalent sand. This filling shall be accomplished by repeated brooming of the aggregate across the face of the bricks. Excess aggregate shall then be removed from the surface.~~

*Detectable warning elements shall be manufactured or field cut to completely fill the area of the curb ramp as shown on the plans. Elements shall be installed to be level across joints or seams and shall be flush with the edges of adjoining concrete.*

*Brick elements shall be placed in a mortar setting bed within the hardened concrete block out. The concrete base of the block out shall have a rough textured finish, such as would be produced by a screed or wood float. The depth of the block out shall be such that a mortar bed thickness of 3/8 in. minimum to 3/4 in. maximum is achieved for the nominal depth of the element. The hardened concrete base shall be free of all material which might prevent the mortar setting bed from adhering. The concrete base shall be dampened with water, but be surface dry immediately prior to the placing the*

*mortar setting bed. The mortar setting bed shall be laid out the desired thickness, no more than 2 ft ahead of laying the elements. The elements shall be buttered with mortar on the bottom before placement into the setting bed. Elements from various manufacturers shall not be mixed at any individual concrete ramp location.*

*Brick elements shall be laid out in a running or stacked bond pattern with a 1/16 average joint width. The joint width shall not exceed 1/8 in. Whole elements should be laid first, followed by elements cut to size, keeping the number of joints to a minimum. A masonry saw shall be used to produce a clean, accurate, straight cut. The joint between elements shall be completely filled with a dry fine aggregate. The fine aggregate may be obtained from a non-Certified Aggregate Producer, but it shall be natural sand having a gradation where at least 95% of the material passes the No. 4 sieve. Excess fine aggregate shall be removed from the surface of the elements.*

*Cast iron elements shall be installed in accordance with the manufacturer's recommendations. When required, cutting of the elements shall be in accordance with the manufacturer's recommendations. Cut edges shall be ground to a smooth shape consistent with the manufactured edges.*

*Approved elements other than brick or cast iron shall be installed in accordance with the manufacturer's recommendations.*

SECTION 905, BEGIN LINE 36, DELETE AND INSERT AS FOLLOWS:

**905.05 Detectable Warning Elements**

~~Detectable warning bricks used in sidewalk curb ramps shall be in accordance with ASTM C 902, Class SX, type II. The color shall approximate 30109 or 30166 in accordance with Federal Standard No. 595a. The color shall be consistent throughout the brick. The truncated domes shall be as shown on the plans. The minimum dimensions of the brick shall be 2 1/4 in. (60 mm) thick by 3 5/8 in. (90 mm) wide by 7 5/8 in. (195 mm) long. The minimum thickness shall not be measured within the area of the domes.~~

*The detectable warning surface in concrete curb ramps shall be constructed using materials from the Departments approved list of Detectable Warning Elements, which is maintained by the Office of Materials Management. An element manufacturer wishing to add a product to the approved list shall comply with Procedure L of ITM 806.*

- (a) Brick detectable warning elements shall consist of clay, shale, or similarly naturally occurring earthy substance, subjected to heat treatment at elevated temperatures to form bricks or pavers. The dimensions of the element shall be 8 in. in length, 4 in. in width including any spacing lugs. The thickness of the element shall be 2 in., excluding dome height and edge chamfers. The truncated domes on the surface shall be formed integral with the main body of the detectable warning element and be present on the element prior to heat treatment. The size and physical requirements of the elements shall be in accordance with ASTM C 902 for weather and traffic environment classifications Class SX, Type II, respectively. The truncated domes may be ground off to meet the cap thickness requirement for compressive strength testing.*

- (b) *Brick detectable warning elements shall be predominantly red-brown in color and shall be uniform throughout the element. The color will be determined from the average of five color readings for detectable warning elements when measured at the top surface between the raised truncated domes and determined in accordance with ASTM E 1349, CIE Illuminant D65, 10° Standard Observer, using instrument geometry of 45°/0°, and the CIE L\*a\*b\* color system. The tested elements shall be within the limits as follows:*

	<i>Minimum</i>	<i>Maximum</i>
<i>L*</i>	<i>35.0</i>	<i>50.0</i>
<i>a*</i>	<i>6.0</i>	<i>36.0</i>
<i>b*</i>	<i>0.0</i>	<i>30.0</i>

*The value of a\* shall not be less than 90% of the value of b\*. The color difference of any installed element after one year of exposure or of an individual detectable warning element from the average color for any product or model from a manufacturer shall not be greater than 5.0 ΔE\* units. The color shall be uniform throughout the detectable warning elements.*

- (c) *Cast iron detectable warning elements shall be manufactured from gray iron in accordance with AASHTO M 105, Class 30A as a minimum. The truncated domes shall be as shown on the plans. The tops of the domes and the space between domes shall have a non-slip textured surface. The minimum thickness of the casting shall be 0.300 in. The minimum thickness shall not be measured within the area of integral reinforcing ribs or bracing, domes or the textured surface.*
- (d) *The height tolerance of the truncated domes shall be within 0.18 to 0.26 (3.50 to 6.50 mm). The base diameter, dome top diameter and dome spacing shall be within ± 1/16 in. (± 1.5 mm) of the design value. The design values shall be within the ranges identified in the Standard Drawings. No more than 2 truncated domes per element may be out of tolerance for dimensions.*
- (e) *Detectable warning elements that are not classified as brick in accordance with 905.05(a) or cast iron in accordance with 905.05(c) will be considered. The detectable warning elements shall meet the color requirements of 905.05(b) and the truncated dome requirements of 905.05(d).*
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