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## TRUNCATED DOMES/DETECTABLE WARNING SYSTEMS

### GENERAL

Acceptance of truncated domes/detectable warning panels shall be based on source and fabricator approval prior to project letting. Truncated domes/detectable warning panels **may** apply to projects with pedestrian ramps in urban areas when it is specified. All truncated domes/detectable warning panels shall meet the requirements of the American with Disabilities Act (ADA). Surface-applied truncated domes, field-applied surface coatings/paint, stamped concrete, imprint plastic and/or asphalt shall not be accepted.

### SOURCE APPROVAL

Approval shall be based on the following:

1. Submit Quality Control Procedures including testing rates, material sources, mix designs (if concrete), material type, grade, Mill Test Reports, coating type, and installation/instruction requirements.
2. Test reports by independent certified laboratory and documentation submitted shall verify compliance with applicable specification requirements.
3. Submit a two to three square foot truncated dome test sample. Samples shall represent a production lot.

Qualified suppliers/producers of truncated domes/detectable warning panels will be placed on the approved list in Appendix A of this IM.

### REQUIREMENTS

- Truncated domes/detectable warning panels shall meet the requirements of Section 2511.02D of the Iowa DOT Standard Specifications.
- Truncated domes/detectable warning panels shall consist of raised truncated domes aligned in a square grid pattern and shall comply with the following:
  - a. Dome size: truncated domes in a detectable warning surface shall have a base diameter of 0.9 in. (23 mm) to 1.4 in. (36 mm), a minimum top diameter of 50% of the base diameter to a maximum top diameter of 65% of the base diameter. Domes shall have a nominal height of 0.2 in. (5 mm).
  - b. Dome Spacing: truncated domes in a detectable warning surface shall have a center-to-center spacing of 1.6 in. (41 mm) minimum up to 2.4 in. (61mm) maximum measured between all domes in a square grid.

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- c. Size: Detectable warning panels shall have a minimum of 24 in. (610 mm) in the direction of travel and shall extend the full width of the curb ramp landing.
- Types of acceptable panels shall be precast, modular, and prefabricated only. Surface-applied, stamped and imprinted concrete and/or asphalt types of warning panels shall not be acceptable.
  - Modular Brick Pavers shall comply with the requirements of ASTM C902, Class SX, Type I.
  - Freeze and Thaw durability shall be demonstrated by test or by proven field performance that the truncated dome units have adequate durability for the intended use. The field evaluation shall be based on tests of units made with the same materials, concrete mix design, manufacturing process and curing methods (not less than a three year evaluation). An independent certified laboratory shall test truncated domes/detectable warning panels for freeze and thaw per ASTM C1372 and shall be performed in accordance with ASTM C1262 using a 3% NaCL solution. Freeze and thaw testing shall comply with either (1) The percent weight loss of each of five test specimens at the conclusion of one hundred cycles shall not exceed 1% of its initial weight; or (2) The percent weight loss of each of four out of five test specimens at the conclusion of one hundred and fifty cycles shall not exceed 1.5% of its initial weight.

Note: ASTM 1262 freeze and thaw test is intended to determine the effects of freezing and thawing on concrete units in the presence of water or saline solution. The ASTM 1262 Test Procedure is not intended to provide a quantitative measure to determine an expected length of service life for a specific type of concrete unit.

- Truncated domes/detectable warning panels shall have homogenous coloring. Any surface-applied coating must be on the panel at the time of manufacture. Field-applied surface coatings and/or paint shall not be acceptable.
  - Curing compounds that discolor the concrete shall not be used.
  - Acceptable colors for the panels shall be Federal Yellow #33538 and/or Brick Red Federal Color #22144 (and/or approved equal).
  - Coating applied at the time of manufacture shall meet the intended DOT requirement. Surface coatings/paint (other than concrete panels) shall be powder-type and baked on the surface of the panel per manufacturer's recommendations. **NOTE**: A friction type and flexibility test report shall be submitted.
  - All truncated domes/detectable warning panels shall be installed in strict accordance with the manufacturer's recommendations. The installation instructions shall include details regarding product-specific construction requirements.
  - The perimeter of panels shall be sealed with concrete sealer after installation and curing process. Sealers shall meet the requirements of IM 491.12 (Appendix B).
  - Other types of materials must be tested for grade, quality, and coating.
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## **MATERIAL REQUIREMENTS**

### **Concrete Precast Panels**

1. If coarse aggregate is used, it shall be Class 3 aggregate and shall not exceed 3/8 in. top size and shall meet the requirements of Section 4115.
2. Fine aggregate shall meet the requirements of Section 4110.
3. Cement shall be Type I or Type III meeting the requirements of ASTM C150. Minimum cement content shall be 610 lbs. per cubic yard.
4. Water-cement ratio shall not exceed 0.45 lb./lb.
5. Air content shall be  $6.5 \pm 1\%$ .
6. Concrete strength shall be a minimum of 3500 psi.
7. Freeze-thaw shall meet the requirements of ASTM C1262 using 3% NaCl solution as stated previously in this IM.
8. Absorption shall not exceed 5%.
9. No surface degradation, voids, or fading shall be allowed on the surface.
10. The District Materials Engineer shall approve the mix design.
11. Any change in mix design of product formulation without DOT approval shall result in product being removed from the approved list.

### **Metal Panels**

Truncated dome/detectable warning panels made with materials such as cast iron, steel, or stainless steel shall be approved prior to bidding on a project and prior to placement.

### **Other Materials**

Panels made with material other than precast concrete shall be evaluated on a case-by-case basis.

## **ACCEPTANCE & USE**

All test results shall meet the requirements of the intended DOT Specifications. The DOT reserves the right to remove products from the approved list based upon failed field performance.