SECTION 32 17 26.16 – tactile warning surface - cast-in-place

1. General
   1. Summary
      1. This Section specifies furnishing and installing cast-in-place tactile warning surface tiles where indicated.
      2. Related Requirements:
         1. Section 31 23 33 – Trenching and Backfilling.
         2. Section 32 12 16 – Asphalt Paving for Parking Lots and Driveways.
         3. Section 32 16 26 – Concrete Curbs and Sidewalks.
   2. Submittals
      1. Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
      2. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.
      3. Samples for Verification Purposes: Submit one (1) 12" x 12" size tile sample.
      4. Shop drawings are required for products specified showing fabrication details, composite structural system, tile surface profile, fastener, and anchor locations, plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.
      5. Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratories to qualify that materials proposed for use are in compliance with requirements and meet or exceed the properties indicated on the specifications. All tests shall be conducted on a Cast in Place Warning tile (or approved equal) as certified by a qualified independent testing laboratory.
      6. Maintenance Instructions: Submit copies of manufacturer's specified installation and maintenance practices for each type of Warning tile and accessory as required.
   3. Quality Assurance
      1. Provide Cast in Place Warning tiles and accessories as produced by a single manufacturer with a minimum of three (3) years' experience in the manufacturing of Cast in Place Warning tiles.
      2. Installer's Qualifications: Engage an experienced installer certified in writing by Cast in Place Warning tile manufacturer as qualified for installation, who has successfully completed installations similar in material, design, and extent to that indicated for the Project.
      3. Provide Cast in Place Warning tiles which are in compliance with the following standards (or most recent):
         1. Americans with Disabilities Act (Title III Regulations, 28 CFR Part 36 ADA STANDARDS FOR ACCESSIBLE DESIGN, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES).
   4. DELIVERY, STORAGE AND HANDLING
      1. Cast in Place Warning tiles shall be suitably packaged or crated to prevent damage in shipment and handling. Finished surfaces shall be protected by sturdy plastic wrappings to protect tile from concrete residue during installation and tile type shall be identified by part number.
      2. Cast in Place Warning tiles shall be delivered to location at building site for storage prior to installation.
   5. SITE CONDITIONS
      1. Environmental Conditions and Protection: Maintain minimum temperature of 5 deg C (41 deg F) in spaces to receive Cast in Place Warning tiles for at least 24 hours prior to installation, during installation, and for not less than 24 hours after installation.
      2. The use of water for work, cleaning, or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the general public. Provide barricades or screens to protect the general public.
   6. WARRANTY
      1. Material: Warrant material in writing for a period of five (5) years from date of substantial completion. Warranty includes factory defects, breakage, and deformation.
      2. Installation: Warrant installation in writing for a period of two (2) years.
2. Products
   1. manufacturers
   2. PERFORMANCE requirements
      1. Product Data: Vitrified Polymer Composite (VPC) Cast in Place Warning tiles shall meet or exceed the following test criteria:
         1. Compressive Strength: To ASTM D 695; ≥ 28,000 psi.
         2. Flexural Strength: To ASTM D 790; ≥ 25,000 psi.
         3. Tensile Strength: To ASTM D 638; ≥ 19,000 psi.
         4. Impact Resistance: To ASTM D 5420; ≥ 550 in-lbf/in.
         5. Coefficient of Thermal Expansion: To ASTM D 696; 2.78 x 10-6/deg F.
         6. Flame Spread Index: To CAN/ULC-S102; ≤ 25.
         7. Water Absorption: To ASTM D 570; ≤ 0.05%.
         8. Chemical Resistance: To ASTM D 543; No Failure.
   3. MATERIALS
      1. Tactile Warning Surface:
         1. Vitrified Polymer Composite (VPC) Cast in Place Warning tiles shall be an epoxy polymer composition with a ultra-violet coating employing aluminum oxide particles in the truncated domes.
         2. Basis of Design Material: Armor Tile as distributed under license by Engineered Plastics, or approved equivalent as accepted by the Consultant.
         3. Dimensions: The tile shall incorporate an in-line pattern of truncated domes measuring nominal 0.2" height, 0.9" base diameter, 0.45" top diameter spaced center-to-center 2.35" as measured on a diagonal and 1.67" as measured side by side in-line.
         4. Colour: Homogeneous throughout the tile; Colour: Federal Yellow.
3. Execution
   1. INSTALLATION
      1. During cast in place tactile warning surface tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
      2. Prior to placement review manufacturer and contract drawings prior to the construction and refer any and all discrepancies to the Consultant.
      3. The specifications of the structural embedment flange system and related materials shall be in strict accordance with the contract documents and the guidelines set by their respective manufacturers. Not recommended for asphalt applications.
      4. The physical characteristics of the concrete shall be consistent with the contract specifications while maintaining a slump range of 4 to 7 inches to permit solid placement of the tactile warning surface.
      5. The factory-installed plastic sheeting must remain in place during the entire installation process to prevent the splashing of concrete onto the finished surface of the tile.
      6. When preparing to set the tile, it is important that no concrete be removed in the area to accept the tile. It is imperative that the installation technique eliminates any air voids under the tile. Holes in the tile perimeter allow air to escape during the installation process. Concrete will flow through the large holes in each embedment flange on the underside of the tile. This will lock the tile solidly into the cured concrete.
      7. The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the tile placement. Immediately after finishing concrete, the electronic level should be used to check that the required slope is achieved. The tile shall be placed true and square to the curb edge in accordance with the contract drawings. The Cast in Place Warning tiles shall be tamped (or vibrated) into the fresh concrete to ensure that the field level of the tile is flush to the adjacent concrete surface. The embedment process should not be accomplished by stepping on the tile as this may cause uneven setting which can result in air voids under the tile surface. The contract drawings indicate that the tile field level (base of truncated dome) is flush to adjacent surfaces to permit proper water drainage and eliminate tripping hazards between adjacent finishes.
      8. In cold weather climates, cast in tiles deeper such that the top of domes are level to the adjacent concrete on the top and sides of ramp and that the base of domes to allow water drainage. This installation will reduce the possibility of damage due to snow clearing operations.
      9. Immediately after placement, the tile elevation is to be checked to adjacent concrete. The elevation and slope should be set consistent with contract drawings to permit water drainage to curb as the design dictates. Ensure that the field surface of the tile is flush with the surrounding concrete and back of curb so that no ponding is possible on the tile at the back side of curb.
      10. While concrete is workable, a 3/8" radius edging tool shall be used to create a finished edge of concrete, then a steel trowel shall be used to finish the concrete around the tile's perimeter, flush to the field level of the tile.
      11. During and after the tile installation and the concrete curing stage, it is imperative that there is no walking, leaning or external forces placed on the tile that may rock the tile causing a void between the underside of tile and concrete.
      12. Following tile placement, review installation tolerances to contract drawings and adjust tile before the concrete sets. Two suitable weights of 25 lb each may be required to be placed on each tile as necessary to ensure solid contact of the underside of tile to concrete.
      13. Remove protective wrap from tile surface once concrete has cured.
   2. CLEANING, PROTECTING AND MAINTENANCE
      1. Protect tiles against damage during construction period to comply with Warning tile manufacturer's specification.
      2. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.
      3. Comply with manufacturer's maintenance manual for cleaning and maintaining tile surface and it is recommended to perform annual inspections for safety and integrity.

END OF SECTION