

SECTION 09650

DETECTABLE WARNING TACTILES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Section includes specifications for detectable warning tactile panels for installation at the following locations: Station platform edge, and the pedestrian crossings at stations, and at vehicular grade crossings. See Section 09655 for detectable guide tactiles.
- B. The tactile panels (panels) shall be surface install for installation only on concrete surface.

1.02 REFERENCE STANDARDS

- A. ADA (Americans with Disability Act) Standards for Accessible Design, 2010 or latest
- B. American Society for Testing and Materials (ASTM International):
 - 1. B117 Practice for Operating Salt Spray (Fog) Apparatus
 - 2. C501 Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
 - 3. C1028 Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
 - 4. D570 Test Method for Water Absorption of Plastics
 - 5. D638 Test Method for Tensile Properties of Plastics
 - 6. D695 Test Method for Compressive Properties of Rigid Plastics
 - 7. D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - 8. D1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
 - 9. D5420 Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
 - 10. E84 Test Method for Surface Burning Characteristics of Building Materials

11. G155 Practice for Operating Xenon-Arc Light Apparatus for Exposure of Non Metallic Materials

C. Caltrain Standard Drawings

1.03 SUBMITTALS

- A. Shop Drawings: showing fabrication details; panel surface profile; fastener locations; plans of panel placement including joints, and material to be used as well as outlining installation materials and procedure. Include procedures for containment and disposal of milling and sawcutting waste water.
- B. Product Data: manufacturer's literature describing products and installation procedures. Include product data for adhesives and sealants.
- C. Samples:
 1. Samples of panels measuring at least 12 inches x 12 inches. Panel sampled shall include longitudinal edge with integral flange and transverse ship-lap edges.
 2. Samples of panels and sealant for verification of color match.
- D. Maintenance Instructions: manufacturer's specified maintenance practices for each type of panel and accessory as required.
- E. Quality Assurance Submittals:
 1. Material Test Reports: test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties specified in this Section. Tests which indicate performance for the panels shall have been performed within three (3) years of the Invitation to Bid.
 2. Submit list of projects in California that successfully demonstrate the proposed products' durability and weatherability.

1.04 QUALITY ASSURANCE

- A. Panels and accessories, including panel adhesive, fasteners, and sealants, shall be from a single source. Products shall have been in successful service for a period of five (5) years.
- B. Installer's Qualifications: Engage an experienced Installer certified in writing by panel manufacturer as qualified for installation, who has successfully completed panel installations similar in material, design, and extent to that indicated for Project. Only persons who are thoroughly trained and experience in the installation of the panels shall perform the work.
- C. Provide services of manufacturer's field representative who shall be present at all times during installation.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Panel type shall be identified by part number on packages.

1.06 SITE CONDITIONS

- A. Environmental Conditions and Protection: Perform field work only when environmental conditions fall within those recommended by manufacturers of the products.

1.07 WARRANTY

- A. Panels shall be covered by a written warranty for a period of five (5) years from date of final completion. The warranty includes defective work, breakage, deformation, delamination, fading and chalking of finishes, and loosening of panels. Warranty shall include furnishing new materials, removal of existing panels, and installation of new panels.

1.08 EXTRA STOCK

- A. Furnish four (4) additional panels of each type of installed panels and corresponding fasteners. Deliver extra stock to location (within 30 mile radius of work site) designated by the Engineer. Furnish extra stock materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification.

PART 2 - PRODUCTS

2.01 PANELS

- A. Manufacturers: Subject to conformance with the requirements of this Section, use products fabricated by the following manufacturers may be acceptable, or other Engineer approved equal:
 - 1. ADA Solutions, Inc.
 - 2. Transit-Tile
 - 3. Armor-Tile by Engineered Plastics, Inc.
- B. Panels shall be homogenous glass and carbon reinforced composite or an epoxy polymer composition which is color and UV stable. Color shall be Federal Safety Yellow (FS 33538) and homogenous throughout the panel thickness.
- C. Truncated Dome Geometry:
 - 1. Truncated dome surface shall comply with ADA and ABA guidelines, 705, Detectable Warnings. (Title 49 CFR Transportation, Part 37.9 Standards for Accessible Transportation Facilities, Appendix A, Section 4.29.2 – Detectable Warnings on Walking Surfaces).

2. Truncated Dome Description:
 - a. Staggered Dome and In-Line Patterns (nominal dimensions):
The truncated dome shall measure 0.45 inch diameter at the top of the dome, 0.90 inch diameter at the base of the dome, 0.20 inch high, and 1.6 inch on center (staggered pattern) and 2.35 inch on center (in-line pattern).
 - b. In order to ensure a uniform appearance of the detectable warning surface throughout the system, equivalent facilitation findings or alternate patterns will not be acceptable.
3. Truncated dome pattern shall align properly from Panel to Panel.

D. Panel Configuration:

1. Panel thickness: 3/8 inches minimum, solid thickness for all type of panels.
2. Butt Joint, Staggered Truncated Domes:
 - a. For station platform edge (staggered pattern): Nominal 24 inches × 48 inches with a 7/16-inch thick deep flange along both long sides. The perimeter of the standard panel features a chamfer (no 90 degree return).
 - b. For station pedestrian crossings (staggered pattern): Nominal 36 inches × 48 inches (or longer) with a 7/16-inch thick deep flange along both long sides. The perimeter of the standard panel features a chamfer (no 90 degree return).
 - c. For pedestrian crossings at vehicular crossings (in-line pattern): Nominal 36 inches × 48 inches (or longer) with a 7/16-inch thick deep flange along both long sides. The perimeter of the standard panel features a chamfer (no 90 degree return).
2. The panel shall feature a butt joint detail from tactile warning panel to panel. Alternatively a ship lap detail may also be furnished.

E. Fastener Holes in the Panel:

1. Holes for fasteners shall be formed in the factory. The holes shall be located only at the centers of the truncated domes.

F. Performance characteristics: Panels shall meet the following standards.

Property	ASTM Test Method	Nominal Value
Accelerated Weathering (2,000 hours)	G155	Delta E: 5.0 max
Chemical Resistance	D1308	No Stain or Discoloration
Flexural Strength	D790	25,000psi min

Compressive Strength	D695	20,000psi min
Tensile Strength	D638	10,000psi min
Gardner Impact Test	D5420	110 in-lb min
Flame Spread	E84	FSI: 25 max SDI: 150 max
Slip Resistance	C1028	Friction Coeff: 0.80 min (wet or dry)
Wear Resistance	C501	500 min
Water Absorption (2 weeks)	D570	0.20% max
Salt Spray (120 hours)	B117	No Change

2.02. ACCESSORIES

- A. Fasteners for Concrete: Color matched nylon expansion sleeves with 1/4 inch diameter by 1-1/2 inches long stainless steel drive pins or as recommended by panel manufacturer for specific job conditions and accepted by the Engineer.
- B. Adhesive: Type approved by the panel manufacturer.
- C. Sealant: Urethane sealant of type approved by the panel manufacturer.
- D. Backer Road: Acceptable to sealant manufacturer. Where required, such as at platform expansion joints.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Apply adhesives, sealants and mechanical fasteners in accordance with the guidelines provided by their respective manufacturers.
- B. Utilize manufacturer-provided template to lay out area to receive panels.
- C. Form recess for panels by either milling with diamond blade head or casting recess in place (at new paving) so that installed panel will still flush relative to adjacent surface. Grind or form to the depth and width required by the approved shop drawings and manufacturer’s instructions. Finish cast-in-place recess with equivalent of a light broom finish. When milled, substrate shall have a light ribbed finish.
- D. Contain and remove slurry resulting from concrete milling and sawcutting. Do not wash slurry into track bed area. Slurry contaminates and stains track structure and impedes drainage.
- E. For Panels with Recessed Flanges:
 - 1. Utilize diamond bladed double headed wet saw to achieve parallel grooves to receive panels. Both sawcuts shall be made simultaneously from the same machine. Sawcut parallel to platform edge.
 - 2. After sawcutting, vacuum and power wash surface with clean clear water, free from all dirt and debris. Visually inspect surface for

obtrusions or foreign matter. If obtrusions are present, remove by grinding. Remove foreign matter by grinding or further washing, as appropriate.

- F. Immediately prior to application of the setting adhesive, inspect surfaces to receive panel to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oils, grease, sealers, and other contaminants. Verify that surfaces are structurally sound and that concrete has cured a minimum of 30 days. Obtain panel manufacturer's representative's and Engineer's approval of surface preparation before installing panels.
- G. Air entrapment: Apply generous amount of adhesives to eliminate air entrapment between the panels and the concrete surfaces.
- H. Set panels and install fasteners in accordance with panel manufacturer's instructions and as follows:
 - 1. Wherever possible, install full size (uncut) panels. Do not install panel sections measuring less than 24 inches in length. Only cut panels where absolutely necessary.
 - 2. Maintain gap between panels for expansion and contraction in accordance with manufacturer's instructions.
 - 3. At platform expansion joints, cut panels on their short sides, finish cut edges smoothly, and lay panels with cut edges aligned with the edges of the substrate along the joints. Install fasteners on either side of the expansion joint at the time of initial installation. After a minimum of 4 hours, make a sawcut measuring 5/16 inch wide across the composite detectable warning surface panel and fill with sealant. Make sawcut in the zone between truncated domes.
 - a. Where there is platform curvature, composite detectable warning surface panels shall be treated in a similar manner so that the joints remain uniform across the width of the joint between successive panels. However, in areas of platform curvature, the joint shall take on somewhat of a triangular configuration.
 - 4. Cutting through panel domes shall be kept to a minimum. Where less than half of the truncated dome remains, grind off balance of dome; where over half of the truncated dome remains, feather dome so as not to present a tripping hazard.
- I. Install sealant in accordance with manufacturer recommendations.

3.02 CLEANING AND PROTECTING

- A. After the area has been fully tiled and sealant system applied, clean panel surface, following the manufacturer recommended maintenance and cleaning procedures.

- B. Protect sealant and panels against damage during construction period. Comply with panel and sealant manufacturers' recommendations.
- C. Protect panels against damage from rolling loads following installation by covering with plywood or hardwood.
- D. Clean panel by method specified by the manufacturer.

END OF SECTION