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## **SECTION 32 17 26 – TACTILE WAYFINDING**

### **DIRECTIONAL BAR TILE CAST-IN-PLACE REPLACEABLE**

#### **SECTION 1 – GENERAL**

##### **1.1 DESCRIPTION**

- A. This Section includes Specifications for furnishing and installing embedded Cast-In-Place Replaceable Directional Bar Tile embedded in concrete for locations shown on the Drawings, in accordance with the Contract Documents and as directed by the Engineer.

##### **1.2 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Special Conditions and Division 1 Specifications Section, apply to this Section.
- B. Department of Justice ADA Standards (2010)
- C. Department of Transportation ADA Standards for Transportation Facilities (2006)
- D. Proposed Guidelines for Accessible Public Rights-of-Way (2011)
- E. California Title 24
- F. ISO 23599:2019-01 – Assistive products for blind and vision-impaired persons — Tactile walking surface indicators
- G. ISO 21542:2011 – Building Construction – Accessibility and Usability of the Built Environment
- H. ISO 9001 – Certificate No. 0502011, ISO 1409 and ISO/B 16949 Certified Manufacturing Facility located in Jefferson, Ohio
- I. Accessibility for Ontarians with Disabilities Act - (AODA)
- J. Canadian Standards Association – (CSA)

##### **1.3 SUBMITTALS**

- A. Product Data Sheet: Submit ADA Solutions literature describing products, installation procedures and routine maintenance.
- B. Samples for Verification Purposes: Submit two (2) Directional Bar Tile samples. Samples shall be properly labeled and shall contain the following information: Name of Project, Submitted By, Date of Submittal, and Manufacturer's Name.

- C. Shop Drawings: Submit the Standard Manufacturer Shop Drawings showing all pertinent characteristics of the Cast-In-Place Replaceable Directional Bar Tile including profile, tile surface profile, plans of tile placement including joints, and material to be used as well as outlining installation materials and procedures.
- D. Material Test Reports: Submit all completed current test results from qualified, accredited independent testing laboratories by ASTM and UL/Canada guidelines and indicating that materials proposed for use follow specification requirements and meet or exceed the properties indicated on these specifications.
- E. Maintenance Instructions: Submit copies of the manufacturer’s specified installation and maintenance practices for each type of Directional Bar Tile and accessories as required.

**1.4 QUALITY ASSURANCE**

- A. Provide Cast-In-Place Replaceable Directional Bar Tile and accessories as produced by a single manufacturer with a minimum of five years of experience in manufacturing Detectable Warning Surface products.
- B. Installer’s Qualifications: Engage an experienced installer certified in writing by Cast-In-Place Replaceable Directional Bar Tile manufacturer as qualified for installation, who has completed installations similar in material, design, and extent to that indicated for the Contract.
- C. Directional Bar Tile must be compliant with ADAAG, PROWAG, and California Title 24 requirements.
- D. Directional Bar Tile shall meet or exceed the following test criteria using the most current test methods:

<b>Standard</b>	<b>Standard Description</b>	<b>Value</b>
ASTM D695	Compressive Strength	28,900 psi minimum
ASTM D790	Flexural Strength	29,300 psi minimum
ASTM D 638	Tensile Strength	11,600 psi minimum
ASTM C 1028	Standard Test Method for Determining the Static Coefficient of Friction (Slip Resistance)	1.18 Dry / 1.05 Wet
AS HB198:2014 (AS/NZS 4586)	Pendulum Sustainable Slip Resistance (SSR)	Pendulum Test Value (PTV), with Four S (96) hard rubber slider: 56 Dry / 44 Wet; After 500 cycles of abrasion: 34 Wet
ASTM C501	Abrasion Resistance	Minimum 500
FM 5-594	Abrasion Resistance, Florida Method	Average Volume Loss: no more than 0.03 cm <sup>3</sup>
NTPEP TP103 (2015)	High Temperature Thermal Cycling Exposure, (Sect 14) and Resistance to Impact from Falling Tup (Sect 10)	Min. 60 thermal cycles at 200°F (93.33°C) = maximum damage classification of ‘C’ at 20 ft-lb impact
ASTM G155	Accelerated Weathering	ΔE<5.0 at 2,000 hours min.
ASTM D570	Water Absorption	0.07%
ASTM C1026	Freeze/Thaw/Heat	No deterioration
ASTM D1037	Freeze/Thaw	No deterioration
ASTM D543	Chemical Stain Resistance	No reaction
ASTM D1308	Chemical Stain Resistance	No reaction
ASTM-B117	Salt and Spray	No change after 200 hours
ASTM E84	Flame Spread Index	20
AASHTO H20	Load Bearing Test	No Damage at 16,000 lbs.

- E. Stamped concrete, polymer concrete, concrete pavers/tile, or brick products are not acceptable for use on this project.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Directional Bar Tile shall be suitably packaged or crated to prevent damage in shipment and handling. Finished surfaces shall be protected by sturdy plastic wrappings to protect the tile from concrete residue during installation.
- B. Directional Bar Tile shall be delivered to a location at the building site for storage before installation. Store tiles in an area that is within an acceptable temperature range 40°F - 90°F (4°C - 32°C) and maintain the storage facility in a clean, dry condition to prevent contamination or damage to the tiles.

## 1.6 SITE CONDITIONS

- A. Environmental Conditions and Protection: Maintain a minimum temperature of 40°F (4°C) in spaces to receive Directional Bar Tile for at least 24 hours before installation, during installation, and for not less than 24 hours after installation.
- B. The use of water for work, cleaning, or dust control, etc. shall be contained and controlled and shall not be allowed to come in to contact with the general public. Provide barricades or screens to protect pedestrians.

## 1.7 MANUFACTURER'S WARRANTY

- A. Cast-In-Place Replaceable Directional Bar Tile shall be guaranteed in writing for a period of seven (7) years from date of Contract's final completion. The guarantee includes manufacturing defects, breakage, and deformation.

## 1.8 INSTALLATION WARRANTY

- A. Cast-In-Place Replaceable Directional Bar Tile installation shall be warranted in writing for two (2) years by the installer. Products must be guaranteed from defective work and loosening of tiles.

## SECTION 2 – PRODUCTS

### 2.1 MANUFACTURERS

- A. Cast-In-Place Replaceable Directional Bar Tile by ADA Solutions, 323 Andover Street, Suite 3, Wilmington, MA 01887. Toll-Free: 800-372-0519, [sales@adatile.com](mailto:sales@adatile.com), [www.adatile.com](http://www.adatile.com).
- B. Tile Sizes
  - a. 24" x 24" (609.6 x 609.6 mm), 2 rows of 8 bars
  - b. 12" x 24" (304.8 x 609.6 mm), 2 rows of 4 bars
  - c. 12" x 24" (304.8 x 609.6 mm), 1 row of 8 bars perpendicular
  - d. 12" x 12" (304.8 x 304.8 mm), 1 row of 4 bars
  - e. 6" x 48" (152.4 x 1219.2 mm), 4 rows of 2 bars
  - f. 6" x 24" (152.4 x 609.6 mm), 2 rows of 2 bars
- C. Existing engineered and field-tested products, which have been in successful service for five (5) years are subject to specification compliance, may be incorporated in the project and shall meet or exceed the specified test criteria and characteristics. Requests for Approved Equal status must be submitted and approved by the Owner before the Tender Phase of the project.

## 2.2 MATERIALS

- A. Composition: Cast-In-Place Replaceable Directional Bar Tile shall be manufactured using a matte finish exterior grade homogeneous (uniform color throughout thickness of product) glass and carbon reinforced polyester based Sheet Molding Compound (SMC) composite material. Raised directional bars must contain fiberglass reinforcement within the bars for superior structural integrity and impact resistance. A matte finish will be required on the Tactile Surface for superior slip resistance performance superior to that offered by a gloss finish. Use of Tactile Surface Products employing coatings or featuring layers of material with differing composition, performance, or color properties is expressly prohibited under this Section.
- B. Color: Color shall be single, homogeneous color throughout tile
  - 1. Federal Yellow (Y), Federal Standard Color No. 33538
  - 2. Brick Red (R), Federal Standard Color No. 20109
  - 3. Clay Red (CR) Federal Standard Color No. 22144
  - 4. Safety Red (SR) Federal Standard No. 31350
  - 5. Black (B) Federal Standard Color No. 37038
  - 6. Dark Gray (G) Federal Standard Color No. 36081
  - 7. Safety Blue (B) Federal Standard Color No. 15187
  - 8. White (W) Federal Standard Color No 27925
  - 9. Seattle Yellow (SY) Federal Standard Color No. 23594
- C. Directional Bars: Raised directional bars of 0.20" (5.0 mm) nominal height, 11.0" (279.4 mm) minimum length, base width of 1.3" (33 mm) nominal and top width of 0.90" (22.86 mm) nominal. Spacing between parallel bars shall be 3.0" (76.2 mm) on center.
- D. Cast-In-Place Replaceable Directional Bar Tiles shall feature corrosion resistant concrete anchor inserts minimum 1.5" (38.1 mm) long with 0.25" (6.35 mm) x 1.5" (38.1 mm) long corrosion resistance bolts.

## SECTION 3 – EXECUTION

### 3.1 PREPARATION

- A. During all concrete pouring and Directional Bar Tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- B. The physical characteristics of the concrete shall be consistent with the Contract Specifications while maintaining a slump range of 4 - 7 to permit solid placement of the Cast-In-Place Replaceable Directional Bar Tiles. An overly wet mix will cause the tiles to float. Under these conditions, suitable weights such as 2 concrete blocks or sandbags (25 pounds) may be placed on each tile.
- C. The concrete shall be poured and finished, true and smooth to the required dimensions and slope prior to tile placement.

### 3.2 EQUIPMENT

- A. Contractor shall provide all tools, equipment, and services required for satisfactory installation per manufacturer's instruction as Incidental Work. Equipment which may be required include typical mason's tools, a 4-foot level with electronic slope readout, 25 lb. (11.4 kg) weights, vibrator, rubber mallet with 2" x 4" x 10" (51 mm x 102 mm x 254 mm) wood tamping plate, and a device for cutting the Directional Bar Tile.

### **3.3 INSTALLATION**

- A. Contractor will not be allowed to install Cast-In-Place Replaceable Directional Bar Tiles until all submittals have been reviewed and approved by the Engineer. Tiles shall be installed per manufacturer's instructions.
- B. To the maximum extent possible, the Directional Bar Tiles shall be oriented in a straight, aligned row at locations indicated on design drawings. Alignment between successive tiles should be within 0.125" (3.17 mm).
- C. Cast-In-Place Replaceable Directional Bar Tiles shall be tamped or vibrated into the fresh concrete to ensure that there are no voids or air pockets, and the field level of the tile is flush to the adjacent concrete surface or as the Drawings indicate to permit proper water drainage and eliminate tripping hazards between adjacent finishes.
- D. Cutting and Setting of tiles shall be cut into size and configuration indicated on the Drawings using a 60 tooth carbide blade on a table saw or equivalent cutting device. For specific instructions for cutting and setting refer to Detectable Warning Surface manufacturer's written instructions.
- E. For installation with continuous runs of multiple tiles, allow 1/8" (3.17 mm) separation between successive tiles to for expansion/contraction.

### **3.4 CLEANING AND PROTECTING**

- A. Protect Cast-In-Place Replaceable Directional Bar Tiles against damage during construction period to comply with tile manufacturer's Specifications.
- B. During and after the tile installation and the concrete curing stage, it is imperative that there are no walking, leaning or external forces placed on the tile to rock the tile, causing a void between the underside of the tile and the concrete.
- C. Remove Protective Plastic Sheeting from tile within 24 hours of installation of the tile. Particularly under hot weather conditions (80 degrees or higher), plastic sheeting will adhere strongly (resulting in difficult removal of same) to tile when not removed quickly.
- D. If requested by the Project Manager, clean tiles not more than four (4) days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean tile by method specified by tile manufacturer.

**END OF SECTION** (Updated 12/14/2020)