

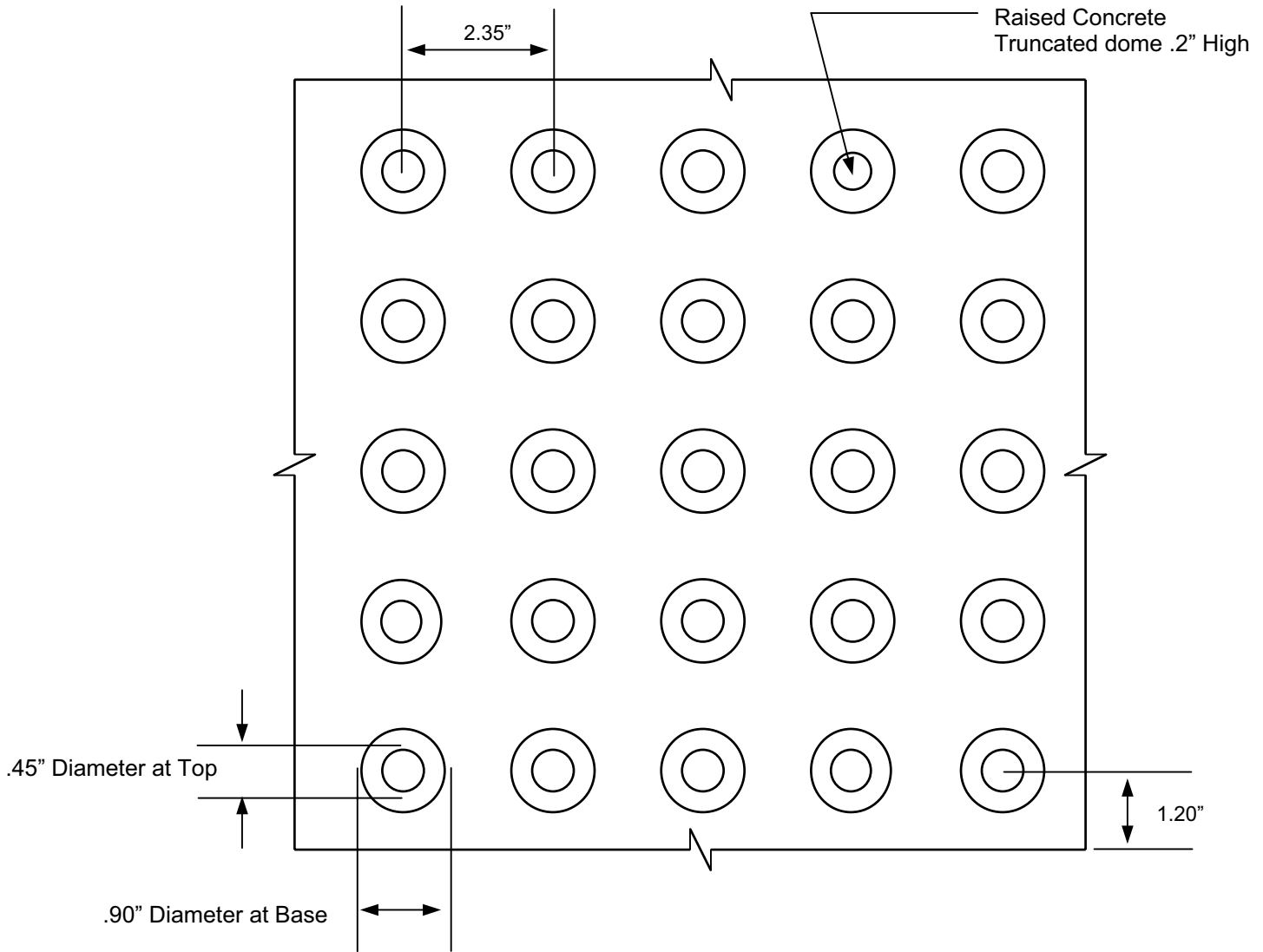


# Detectable Warning Pavers

Technical Drawings  
&  
Specification Guide

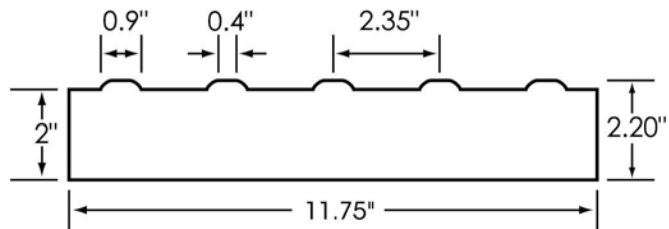
# Detectable Warning Pavers

## Technical Drawing



Standard Sizes: 12" x 12" x 2"

Standard Colors: Red  
 Charcoal  
 Yellow  
 Natural



*Custom colors & sizes are also available*

# **Detectable Warning Pavers**

## **Department of Transportation Design Specifications**

SECTION I - INTRODUCTION  
SECTION II - HISTORY  
SECTION III - APPLICATION  
SECTION IV - SPECIFICATIONS

### **SECTION I - INTRODUCTION**

Detectable warnings are an Americans with Disabilities Act (ADA) requirement in the current Americans with Disabilities Act Accessibility Guidelines (ADAAG) for the use of detecting the boundary between the sidewalk and the street. Truncated domes are the only detectable warnings allowed by ADAAG. Grooves, exposed aggregate, and other designs intended for use as detectable warning are too similar to pavement textures, cracks and joints and are not considered equivalent facilitation. The detectable warning is a unique and standardized surface intended to function much like a stop sign to alert pedestrians who are blind or visually impaired to the presence of hazards in the line of travel. Truncated domes are a unique design and have proven to be the most detectable surface.

### **SECTION II - HISTORY**

The Department of Justice (DOJ) is the lead agency that oversees the Americans with Disabilities Act (ADA)(1990). The U.S. Access Board develops the minimum design standards for complying with the ADA. The Department of Transportation is a designated agency responsible for enforcing the standards and implementing regulations of the ADA's Title II (State and Local Government Services). The Federal Highway Administration (FHWA) is the enforcement authority for overseeing pedestrian discrimination issues under the Title II implementing regulations. The original requirement in ADAAG was suspended for a time to conduct further research. Research was conducted, and the suspension of the requirement was lifted on July 26, 2001, and are now required when constructing and altering curb ramps.

Detectable warnings were required in 1991 by the Americans with Disabilities Act Accessible Guideline (ADAAG) (regulatory standards) for hazardous vehicular ways, transit platform edges, and curb ramps. A suspension was placed on requiring detectable warnings. The reason for the suspension was to conduct research on the performance of their detectability. The Department of Justice, as the lead agency that oversees the Americans with Disabilities Act continued the suspension through July 26, 2001, which allowed 10 years for conducting research. The research determined that other designs used in place of truncated domes such as grooves, striations, and exposed aggregate, were not detectable in the sidewalk and roadway environment because of the similarities to other surface textures and defects. Truncated domes have a unique design that can be detected underfoot and with a cane, and other surfaces are not considered ADA equivalent and therefore do not comply with the ADA requirements.

The Department of Justice allowed the suspension to expire on July 26, 2001 and consequently since this date, detectable warnings are again required. FHWA is obligated to enforce the requirements, and state and local governments are required to apply the minimum design standards when constructing and altering pedestrian facilities. The original ADA design standard for truncated domes is found in ADAAG (4.29.2), but updated and new design recommendation for the dimension and placement of the domes on curb ramps have been made. Both FHWA and the U.S. Access Board are encouraging the use of the new design over the original.

### **SECTION III - APPLICATION**

Detectable warnings must be placed where islands or medians are less than 48 inches wide. The detectable warning should extend across the full length of the cut through the island or median. The detectable warning is a unique and standardized surface intended to function much like a stop sign to alert pedestrians who are blind or visually impaired to the presence of hazards in the line of travel. The truncated dome surface should not be used for way finding or directional information. The removal of curbs, which provided a clearly defined indication of the location of the edge of the street, has caused difficulty for individuals who are blind or visually impaired.

### **SECTION IV - SPECIFICATIONS**

#### **A. Size**

Detectable warnings shall be 24 inches [610 mm] in the direction of travel and extend the full width of the curb ramp or flush surface. Research has confirmed that for people who are visually impaired, there is a high level of risk of inadvertent street entry associated with the presence of curb ramps, particularly those having slopes of 1:12 or less. It has been demonstrated that detectable warnings complying with existing ADAAG Section 4.29.2 are highly detectable by persons with visual impairments, and can provide an effective stop signal for persons who are blind or visually impaired which can be used to determine the end of the sidewalk and the beginning of the vehicular way. Research has also demonstrated that 24 inches of detectable warning material is sufficient to enable persons who are blind or visually impaired to stop on 90 percent of approaches.

#### **B. Location**

The detectable warning shall be located so that the edge nearest the curb line or other potential hazard is 6 to 8 inches [150 to 205 mm] from the curb line or other potential hazard. Placement of the detectable warnings a maximum of 6 to 8 inches back from the curb line gives some latitude in placement of the detectable warning. Where curbing is embedded at the sidewalk/street junction, this will not need to be replaced. In addition, allowing 6 to 8 inches of ramp (or curb) surface beyond the detectable warning will give pedestrians who are blind an additional stopping distance before they step into the street. It will also enable some persons having mobility impairments to make a smoother transition between the street and the curb ramp.

#### **C. Dome size and spacing**

Truncated domes shall have a base diameter of 0.9 inches [23 mm] minimum to 1.4 inches [36 mm] maximum, a top diameter of 50% or 0.45inch [10 mm] to .9 inches [23mm] at the top, a height of 0.2 inch [5 mm] and a center-to-center spacing of 1.6 inches [41 mm] to 2.4 inches [61 mm] measured along one side of a square arrangement. Drawing shows an overhead view of a truncated dome surface having the domes in a square pattern with parallel arrangement. The size and spacing of the domes affect detectability by pedestrians who are blind. This specification is much more detailed than that in the current ADAAG, and offers much less latitude in dimensions and spacing. It ensures that the dome spacing is the maximum currently known to be consistent with high detectability. The bottom diameter measures 0.9-1.4 inches, and the top diameter varies widely. The diameter of the dome where it touches the sole of the shoe affects detectability, and the top diameter of 0.4 to 0.45 of an inch is the suggested, as based on current research.

#### **D. Dome alignment**

Domes shall be aligned on a square grid in the predominant direction of travel to permit wheels to roll between domes. This specification ensures a greater degree of safety and negotiability for persons with mobility impairments. It requires square alignment, to give people using wheeled mobility aids the greatest chance of being able to avoid the truncated domes.

#### **E. Visual Contrast**

There shall be a minimum of 70% contrast in light reflectance between the detectable warning and an adjoining surface. The material used to provide visual contrast shall be an integral part of the detectable warning surface. Refer to your local committee on visual contrast, as some suggest that a lesser level of contrast could be as effective and more economical to provide than a minimum 70%.

END OF SECTION

## DETECTABLE WARNING PAVERS SPECIFICATIONS GUIDE

### SANDSET METHOD

#### PART 1 GENERAL

##### 1.1 SUMMARY

A. Furnish materials, labor, transportation, services, and equipment necessary to furnish and install Architectural Concrete Pavers as indicated on drawings and as specified herein.

##### 1.2 REFERENCES

A. American Society of Testing Materials (ASTM):

1. ASTM C-150
2. ASTM C-33
3. ASTM C-140
4. ASTM C-293
5. ASTM C-1028
6. ASTM C501, 50
7. ASTM C241

B. Performance Requirements

1. Compressive Strength at the time of delivery to be not less than 5,000 psi; Averaging 7,000 psi when tested in accordance with ASTM C-140.
2. Water Absorption shall not be greater than 5-1/2% to 6-1/2%, when tested in accordance with ASTM C-293.
3. Flexural Strength shall not be less than 900psi average. 950psi when tested in accordance with ASTM C-293.
4. Static Coefficient of Friction ASTM C-1028 conditionally slip resistant:
  - a. Wet: 0.50 - 0.60
  - b. Dry: 0.60 - 0.70

##### 1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in the manufacture of pre-cast concrete pavers for a minimum of three (3) years.

B. Installation shall be by a contractor and crew with at least (1) year of experience in placing concrete pavers on projects of similar nature or dollar cost.

C. Installation Contractor shall conform to all local, state/provincial licensing and bonding requirements.

##### 1.4 SUBMITTALS

A. Submit installation instructions as recommended by manufacturer.

B. Submit full size sample sets of concrete paving units to indicate color and shape selections. Color will be selected by Architect / Engineer / Landscape Architect / Owner from manufacturer's available colors.

- C. Submit sieve analysis for grading of bedding and joint sand.
- D. Submit test results from an independent testing laboratory for compliance with performance requirements specified herein.
- E. Indicate layout, pattern, and relationship of paving joints to fixtures and project formed details.
- F. Submit two copies of written instructions for recommended maintenance.

**1.5 PROJECT CONDITIONS**

- A. Do not install sand or pavers during heavy rain or snowfall.
- B. Do not install sand and pavers over frozen base materials.
- C. Do not install frozen sand.

**1.6 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Packaging and Shipping: Precast pavers to be stretch wrapped in rows and banded on pallets, delivered in original unopened packaging with legible manufacturer identification, including size, quantity, manufacture date and inspector initials.
- B. Sand shall be covered with waterproof covering to prevent exposure to rainfall or removal by wind. The covering shall be secured in place.

**1.7 WARRANTY**

- A. Manufacturer/Installer shall warrant installed system for a period of 3 year from date of substantial completion against failure of workmanship and materials.

**1.8 MAINTENANCE**

- A. Extra Materials: Deliver supply of maintenance materials to the owner. Furnish maintenance materials from same lot as materials installed, and enclosed in protective packaging with appropriate identifying labels.
  - 1. Furnish not less than 1 percent of total product installed maintenance stock for each type, color, pattern and size of paver product installed.

**PART 2 - PRODUCTS**

**2.1 DETECTABLE WARNING / ADA TRUNCATED DOME PAVERS**

- A. Manufacturers
  - 1. Acceptable Manufacturer
    - a. Tile Tech Industries - Los Angeles, CA - (213) 489-25555, [www.TileTechPavers.com](http://www.TileTechPavers.com)
  - 2. Drawings and installation specifications are based on manufacturer's proprietary literature from Tile Tech Industries. Other manufacturer's shall comply with the minimum levels of material specifications and detailing indicated on the drawings or specified herein.

## 2.2 MATERIALS

A. *Portland Cement*: ASTM C-150 specifications for Portland Cement.

B. *Aggregates*: All aggregates to meet ASTM C-33 specifications, cleaned and properly graded to size. Aggregate shall be blended to meet individual project requirements. Aggregates to meet ASTM C241 HA 10 minimum.

C. *Coloring*: Pigments used shall be inorganic, resistant to alkalinity and used per manufacturer's recommendations.

D. *Color Blending*: Factory-blend pre-cast paver that has a natural color range so products taken from one container will have the same range as products from a separate container.

E. *Cleaner*: Liquid neutral chemical cleaner with pH factor between 7 and 8, of formulation recommended by sealer manufacturer for type of precast paver used.

F. *Sealer*: Colorless, slip and stain resistant penetrating or acrylic sealer with pH factor between 7 and 8 that does not affect color or physical properties of precast paver surface.

## 2.3 MANUFACTURED UNITS

### A. Precast Pavers

1. Sizes: 11.875" x 11.875" x 2" (Actual)
2. Square face edges or beveled.
3. Finish: Rough ground and shot blast surface.
4. Color:
  - a. Custom - Colors selected from blended aggregate and matrix colors.
  - b. Colors to be selected from Tile Tech stocking color chart.
5. Concrete pavers are not factory sealed.

## 2.4 MIXES

A. *Aggregate*: natural, sound, crushed marble chips without excessive flats or flakes

B. *Matrix Pigments*: Pure mineral or synthetic pigments, resistant to alkalies and non-fading. Mix pigments with matrix to provide required colors.

C. *Face layer*: Minimum depth of 3/8" (nominal) and shall include 70% coverage of the Paver face with marble aggregate.

## 2.5 FABRICATION

- A. Mechanically vibrated in the molds.
- B. Hydraulically pressed by 600 tons of pressure.
- C. Moisture cured with 100% humidity for 24 hours.
- D. Factory finish: In-line grinding and shot blasting.

2.6 SAND BEDDING COURSE

A. Bedding and joint sand shall be clean, non-plastic, and free from deleterious or foreign matter. The sand shall be natural or manufactured from crushed rock. Limestone screenings or stone dust shall not be used.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Verify that subgrade preparation, compacted density and elevations conform to the specifications. Compaction of the soil subgrade to at least 95% Standard Proctor Density per ASTM D 698 is recommended. Higher density or compaction to ASTM D 1557 may be necessary for areas subject to vehicular traffic. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils. The Architect/Engineer should inspect subgrade preparation, elevations, and conduct density tests for conformance to specifications.

B. Verify that Geotextiles, if applicable, have been placed according to specifications.

C. Verify that aggregate base materials, thickness, compaction, surface tolerances, and elevations conform to the specifications.

D. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved.

E. Verify that base is dry, uniform, even, and ready to support sand, pavers, and imposed or anticipated vehicular loads.

3.2 INSTALLATION

A. Spread a sand/cement mix evenly over the base course and screed to a nominal 1 in. (25 mm.) thickness, not exceeding 1-1/2 in. (40mm) thickness. The screened sand should not be disturbed. Place sufficient sand to stay ahead of the laid pavers. Do not use the bedding sand to fill depressions in the base surface.

B. Ensure that pavers are free of foreign materials before installation.

C. Lay the pavers in the pattern(s) as shown on the drawings. Maintain straight pattern lines.

D. Fill gaps at the edges of the paved area with cut pavers.

E. Cut pavers to be placed along the edge with a wet masonry saw.

G. Tamp into bedding or use a low amplitude, high frequency plate vibrator to vibrate the pavers into the sand (cover vibrator plate to prevent surface damage to pavers).

H. Sweep dry joint sand into the joints.

I. Sweep off excess sand when the job is complete.

J. The final surface elevations shall not deviate more than 1/16 in. under a 10 ft. (3 m) long straightedge.



K. The surface elevation of pavers shall be 1/8 in. to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

**3.3 CLEANING AND SEALING**

A. Wash entire surface with neutral cleaner.

1. pH factor between 7 and 10.
2. Biodegradable phosphate free.

B. Rinse with clean water and allow to dry thoroughly.

C. Apply sealer in accordance with manufacturer's directions.

1. pH factor between 7 and 10
2. Non-discoloring or amber.
3. Penetrating type designed especially for precast concrete pavers.

END OF SECTION

## **BONDED AND THIN SET METHOD**

### **PART 3 – EXECUTION (BONDED METHOD)**

#### **3.1 EXAMINATION**

A. Inspect areas to receive underbed for:

1. Defects in existing concrete work that affect proper execution of Paver installation.
2. Variances beyond allowable tolerances.

Note: Structural cracks in substrate will usually be transmitted through Pavers. All cracks to have control joint installed directly over crack. Small cracks can use a fracture membrane system.

#### **3.2 INSTALLATION**

A. Underbed

1. Thoroughly saturate concrete with water, slush and broom with neat cement paste.
2. Place underbed mix approximately 1" to 1 ¼".
3. Screed underbed to elevation of "paver thickness" below finished floor elevation.

### **PART 3 – EXECUTION (THIN SET METHOD)**

#### **3.1 EXAMINATION**

A. Inspect areas to receive underbed for:

- a) Defects in existing work that affect proper execution of Paver installation.
- b) Variances beyond allowable tolerances.
- c) Maximum variation in sub floor not to exceed 1/8" in 10'0" from required plane.

#### **3.2 INSTALLATION**

A. Thin set application

1. Apply latex cement mortar, conform with ANSI A118.4 utilizing a 3/8" x 1/4" square notch trowel.
2. Apply thin set for a minimum of 1/8" setting bed. Allow for thin set manufacturers' recommended setting time before grouting (if required).
3. Coat underside of each unit with latex cement mortar, firmly set, tamp into bedding to ensure minimum 95% surface contact with mortar bed.
4. All units to be installed level, square, parallel, except where otherwise indicated in a true plane with adjacent units and other floor finishes.
5. Maintain a maximum joint of 1/32" or less.

B. Control Joints

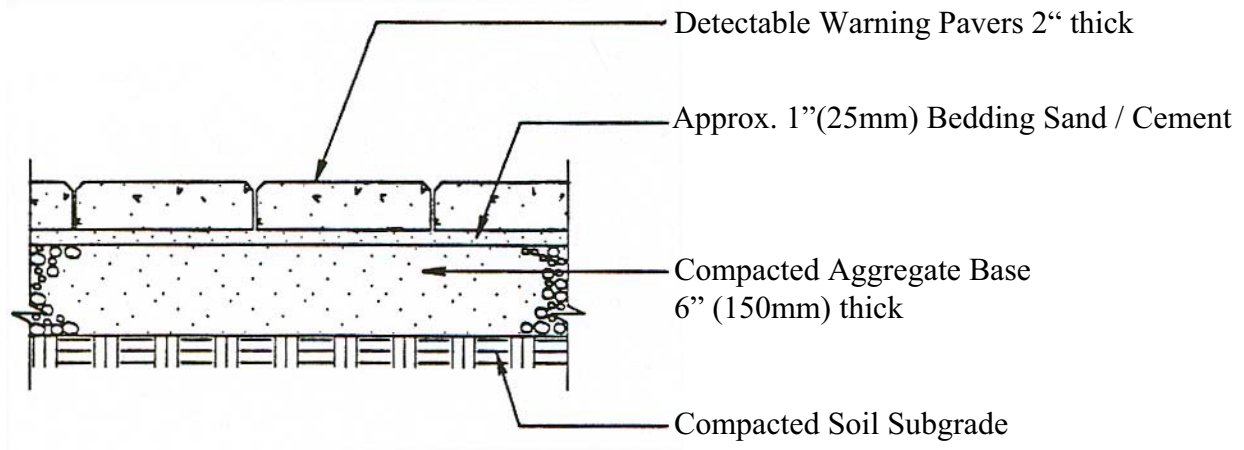
1. Over all structural expansion joints
2. All perimeter edges to have soft joints.

END OF SECTION

# Detectable Warning Pavers Installation Diagrams

## 1. SAND SET INSTALLATION

### A. OVER COMPACTED AGGREGATE BASE



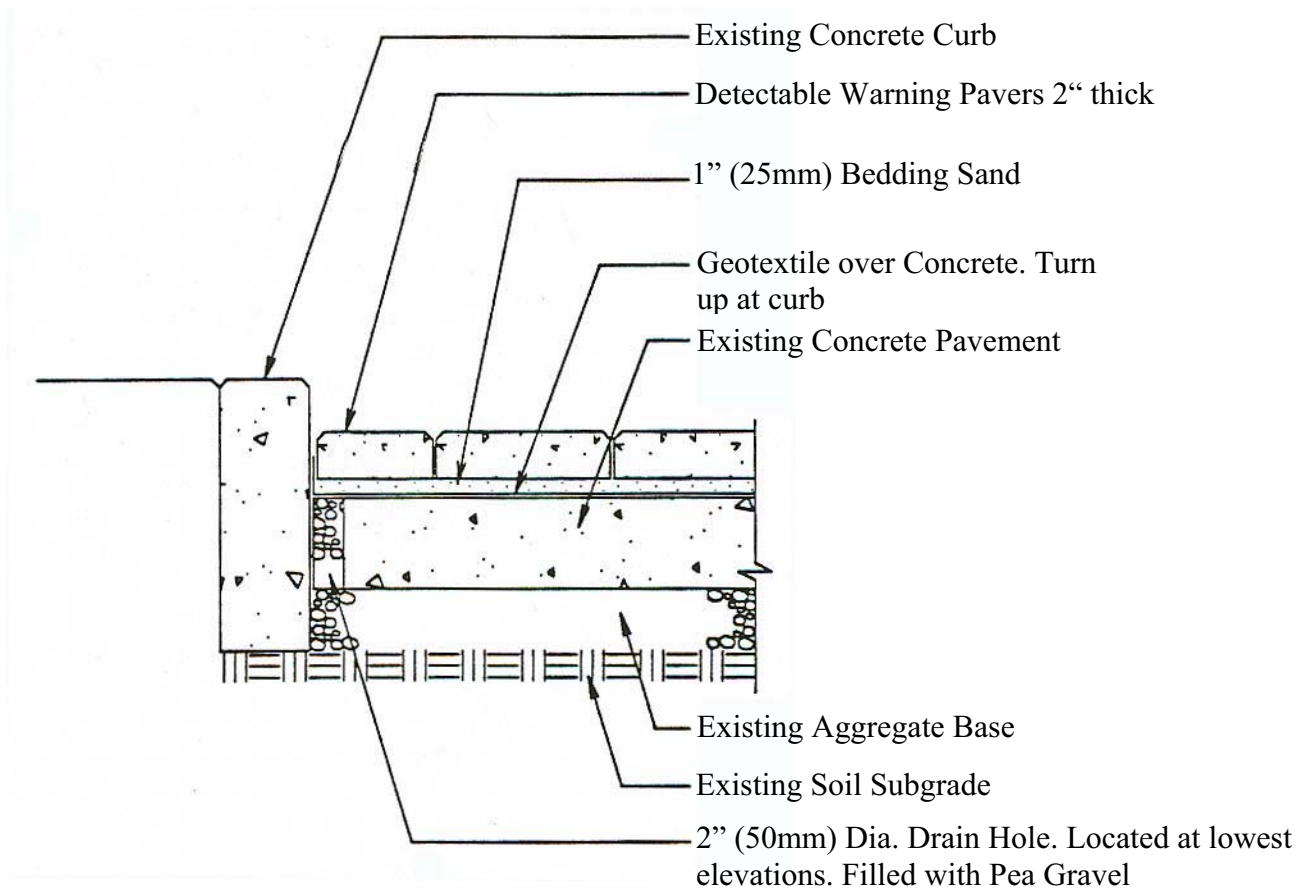
#### NOTES:

4. Drain may be necessary in slow draining subgrade.
5. Base thickness varies with traffic, climate & subgrade conditions.
6. Concrete Pavers should be placed on a cement treated base if soil is extremely weak or constantly saturated.
7. Plastic, steel aluminum, or precast concrete edging may be used.
8. Joints should be swept with sand.

# Detectable Warning Pavers Installation Diagrams

## 2. SAND SET INSTALLATION

### C. OVER EXISTING CONCRETE



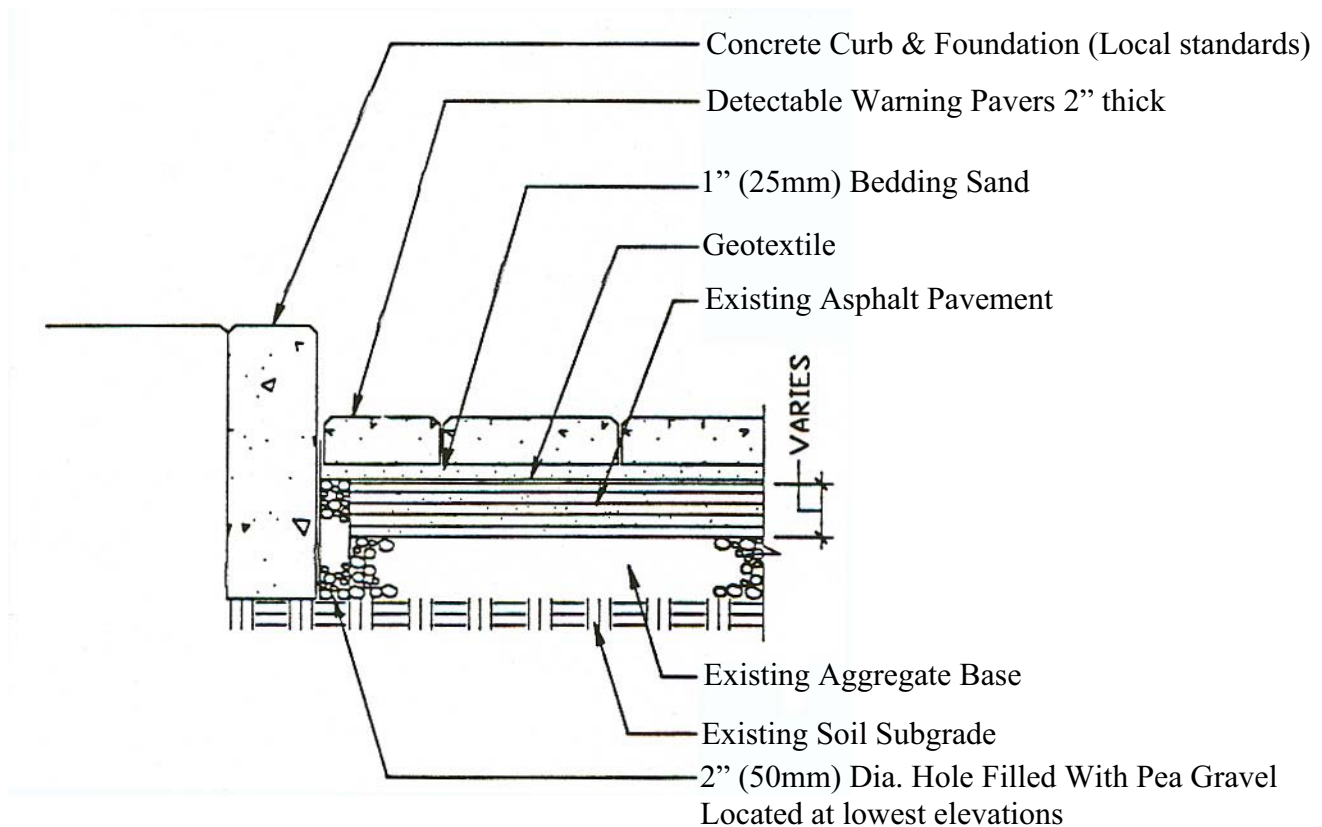
#### NOTES:

1. Existing asphalt or concrete pavement shall be thoroughly inspected for areas in need of patching or replacement. Conduct all repairs and fill all cracks greater than 1/4" (7mm) wide prior to placing Geotextile, sand & pavers.
2. Provide drainage of sand layer through pea gravel-filled weep holes(s) or catch basin.
3. Joints should be swept with sand.

# Detectable Warning Pavers Installation Diagrams

## 3. SAND SET INSTALLATION

### B. OVER EXISTING ASPHALT



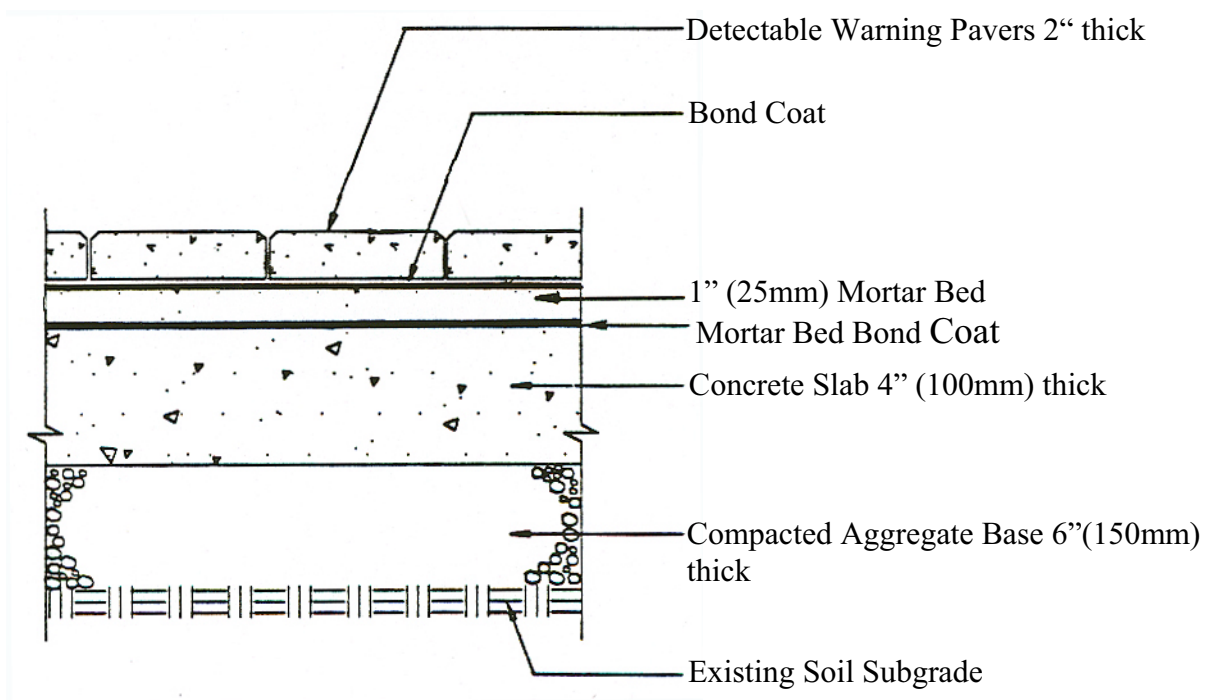
#### NOTES:

1. Existing asphalt or concrete pavement shall be thoroughly inspected for areas in need of patching or replacement. Conduct all repairs and fill all cracks greater than 1/4" (7mm) wide prior to placing Geotextile, sand & pavers.
2. Provide drainage of sand layer through pea gravel-filled weep hole(s)
3. Joints should be swept with sand.

# Detectable Warning Pavers Installation Diagrams

## 2. MORTAR SET INSTALLATION

### B. THICK SET (BONDED) OVER CONCRETE



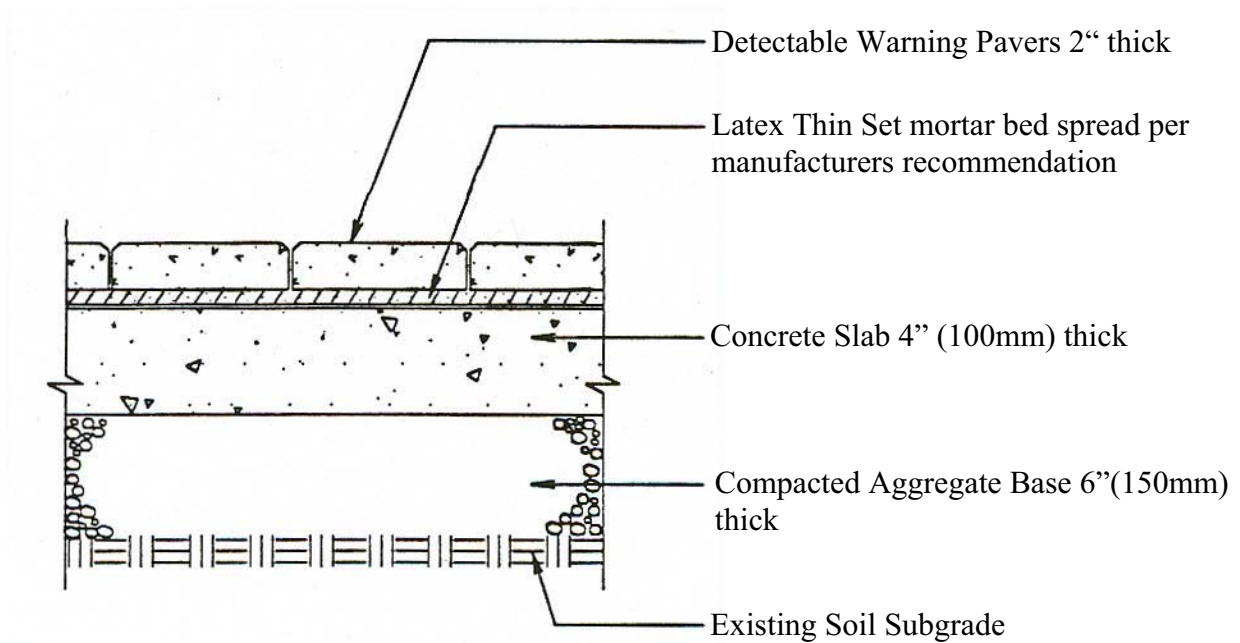
#### NOTES:

1. Concrete slab shall be sloped to provide complete surface drainage. Provide subsurface drainage as required.
2. Slab to have steel trowel and fine broom finish. Do not use curing compounds. Maximum variation in the slab 1/4" in 10'.
3. Expansion joints are mandatory. Architect must specify location and details on drawings.
4. This method is not recommended where the mortar bed is subjected to freeze thaw cycles.
5. Joints should be swept with sand or grouted.

# Detectable Warning Pavers Installation Diagrams

## 2. MORTAR SET INSTALLATION

### A. THIN SET OVER CONCRETE



#### NOTES:

1. Concrete slab shall be sloped to provide complete surface drainage. Provide subsurface drainage as required.
2. Slab to have steel trowel and fine broom finish. Do not use curing compounds. Maximum variation in the slab  $\frac{1}{4}$ " in 10'.
3. Expansion joints are mandatory. Architect must specify location and details on drawings.
4. Joints should be swept with sand or grout.



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- Fax: (415) 330-3030
- Fax: (714) 693-1034

File No.: 31028  
 Lab No.: T-97-311

November 11, 1997

CLIENT: **TILE TECH, LLC**  
 5371 Wilshire Blvd., Suite #200  
 Los Angeles, CA 90036  
 Attn.: Paul Partovi

Subject: **12" x 12" x1" thick Concrete Paver Tile, Textured Surface.**  
 Specification: ASTM C 936 / ASTM C 140 Compressive Strength (Modified)  
 Source: Submitted to Laboratory by Client.

**REPORT of TEST**

**COMPRESSIVE STRENGTH TEST**

*Samples were dried-conditioned as specified then used tested accordingly.*

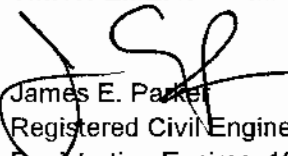
Sample No.	Dimensions (In.)	Gross Area (sq. in.)	Max. Load (Lbs.)	Compressive Strength, (PSI)
1	2.04 x 2.00	4.08	35,200	8,627
2	1.95 x 2.00	3.90	31,900	8,179
3	2.04 x 1.98	4.04	36,000	8,913
4	2.02 x 1.96	3.96	32,300	8,158
5	2.03 x 2.01	4.08	31,500	7,720

Average : **8,320** PSI

**Requirement: ASTM C 936**

The average compressive strength shall be not less than 8,000 PSI with no individual unit less than 7,200 PSI.

Respectfully Submitted,  
**SMITH-EMERY COMPANY**

  
 James E. Parker  
 Registered Civil Engineer No.: 41507  
 Registration Expires: 12-31-99

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# SMITH-EMERY COMPANY

The Full Service Independent Testing Laboratory, Established 1904

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File No.: 31028  
Lab No.: T-97-311

November 11, 1997

CLIENT: **TILE TECH, LLC**  
5371 Wilshire Blvd., Suite #200  
Los Angeles, CA 90036  
Attn.: Paul Partovi

Subject: **12" x 12" x 1" thick Concrete Paver Tile, Textured Surface.**  
Specification: ASTM C 293 - Modulus of Rupture Test (Modified for Required Size).  
Source: Submitted to Laboratory by Client.

## REPORT of TEST

### MODULUS OF RUPTURE

Samples were cut, dried and conditioned as specified then tested accordingly.

Sample No.	Width (b) (In.)	Depth (d) (In.)	Max. Load (lbs.)	M. O. R. (PSI)
1	1.959	1.161	480	1,091
2	2.049	1.169	510	1,093
3	2.068	1.163	560	1,201
4	2.138	1.161	510	1,062
5	2.027	1.163	680	1,488

Avg. M.O.R. = 1,187 PSI

Span = 4.0 inches

Respectfully Submitted,  
SMITH-EMERY COMPANY

James E. Parker  
Registered Civil Engineer No.: 41507  
Registration Expires: 12-31-99

JEP:rc



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 • Fax: (714) 921-4264  
 • Fax: (916) 274-0835

File No. 34076  
 Lab No. T-99-176 COMP

May 12, 1999

CLIENT **TILE TECH, INC.**  
 5371 Wilshire Blvd., Suite #200  
 Los Angeles, CA 90036

Subject **Compressive Strength Test on 12" x 12" x 2" thick Concrete Tile "TILE TECH"  
 (Dark Red: color)**

Specification: ASTM C 936 / ASTM C 140 Compressive Strength (Modified)

Source Submitted to Laboratory by Client

**REPORT of TEST**

**COMPRESSIVE STRENGTH TEST**

*Samples were dried-conditioned as specified then tested accordingly.*

Sample No.	Dimensions (ln.)	Gross Area (sq. in.)	Max. Load (Lbs.)	Compressive Strength, (PSI)
1	2.011 x 2.510	5.048	45,100	8,934
2	2.008 x 2.461	4.942	42,500	8,600
3	2.010 x 2.491	5.007	43,600	8,308
Average:				<b>8,614</b>

PSI

Respectfully Submitted,

**SMITH-EMERY COMPANY**

James E. Partidge  
 President

Registered Civil Engineer No. 26070  
 Registration Expires 12/31/02





**SMITH-EMERY COMPANY**  
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 • Fax: (714) 921-4264  
 • Fax: (916) 374-0835

File No.: 34076  
 Lab. No.: T-99-176 COMP

May 12, 1999

CLIENT: **SPEC CERAMICS, INC.**  
 1604 North Orangethorpe Way  
 Anaheim, CA 92801  
 Attn.: Mr. Will Stapp

Subject: **Compressive Strength Test on 12" x 12" x 2" thick Concrete Tile "TILE TECH"  
 (Dark Red: color)**

Specification: ASTM C 936 / ASTM C 140 Compressive Strength (Modified)  
 Source: Submitted to Laboratory by Client.

**REPORT of TEST**

**COMPRESSIVE STRENGTH TEST**

*Samples were dried-conditioned as specified then tested accordingly.*

Sample No.	Dimensions (In.)	Gross Area (sq. in.)	Max. Load (Lbs.)	Compressive Strength (PSI)
1	2.011 x 2.510	5.048	45,800	8,934
2	2.008 x 2.461	4.942	42,500	8,600
3	2.010 x 2.491	5.007	41,800	8,308
Average:				<b>8,614</b> PSI

Respectfully Submitted,  
**SMITH-EMERY COMPANY**

James E. Partridge  
 President

Registered Civil Engineer No.: 25270  
 Registration Expires: 12-31-01



rc



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File No.: 31028  
Lab No.: T-95-244

November 17, 1995

Client: **TILE TECH, INC.**  
5371 Wilshire Blvd., Suite 207  
Los Angeles, CA 90036  
Attn: John Haider

Subject: **16" x 16" x 1-1/4" Cement Paver Tile. (Gray)**  
Specification: ASTM C 936 & ASTM C 140  
Source : Submitted to Laboratory by Client.

### Report of Tests

#### Water Absorption

Five cut samples were immersed in clean potable water at room temperature (70° F ±10°F) for not less than 24 hrs. Samples then was removed from water, drained for 1 minute, damped dry any excess water and weighed; after which were dried in a well ventilated oven at 212° F - 239° F for 24 hours or until an approximate constant weight was achieved.

Sample No.	Wet Weight (grams)	Dried Weight (grams)	Compressive Strength, PSI
1.	831.8	795.9	4.51%
2.	876.0	833.4	5.11%
3.	868.1	829.0	4.72%
4.	873.4	831.8	5.00%
5.	874.1	828.9	5.45%

Average : 4.96%

#### ASTM C 936 Requirement:

The average absorption shall not be greater than 5% with no individual unit in excess of 7%.

Respectfully Submitted,  
SMITH-EMERY COMPANY

  
Edward C. Trasoras

Registered Civil Engineer, No.: 44233  
Registration Expires: 06-30-97  
ECT:rc



**SMITH-EMERY COMPANY**

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File No.: 31028  
Lab No.: T-97-208 BRK

June 16, 1997

Client : **TILE TECH, INC.**  
**5371 Wilshire Blvd., Suite 207**  
**Los Angeles, CA 90036**  
*Attn.: Mr. Jean Haider*

Subject: **16" x 16" x 1-3/8" thick Concrete Paver Tile (Grey color; Two layer construction)**  
Specification : ASTM C 648  
Source : Submitted to Laboratory by Client.

**Report of Test**

**BREAKING STRENGTH (ASTM C 648)**

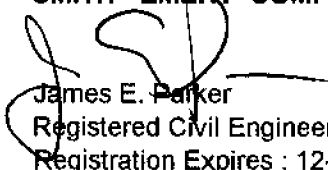
The tile samples were placed on a test fixture having three (3) supports located in a circle three and fifteen-thirty-secondths (3-15/32) inches in diameter with the load applied at the center as per specifications.

**Breaking Load (Lbs.)**

**One Sample Only - 2,500 pounds**

**Requirements :** ANSI A 137.1 (General) Breaking Strength; When tested as described.  
In ASTM C-648, the average breaking strength shall be 250 pounds or greater.

*Respectfully Submitted,*  
**SMITH - EMERY COMPANY**



**James E. Parker**  
**Registered Civil Engineer No. 41507**  
**Registration Expires : 12-31-99**

rc