

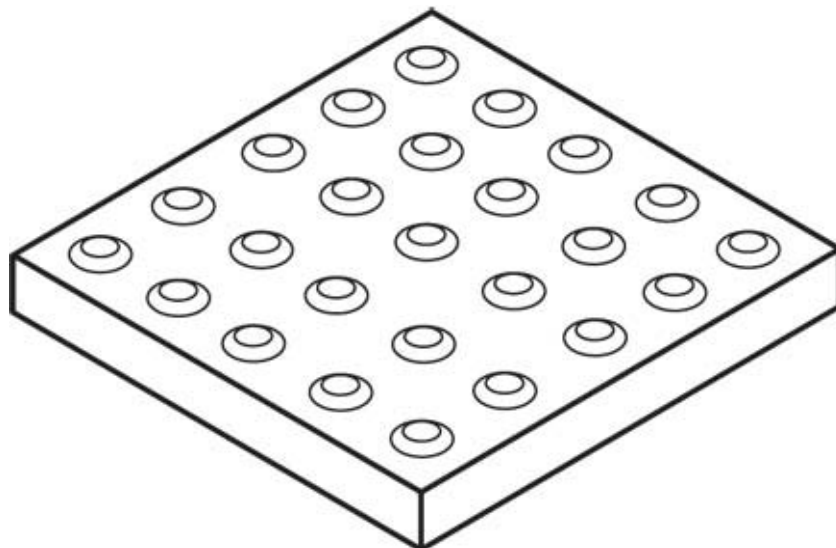


Detectable Warning Pavers

Technical Drawings

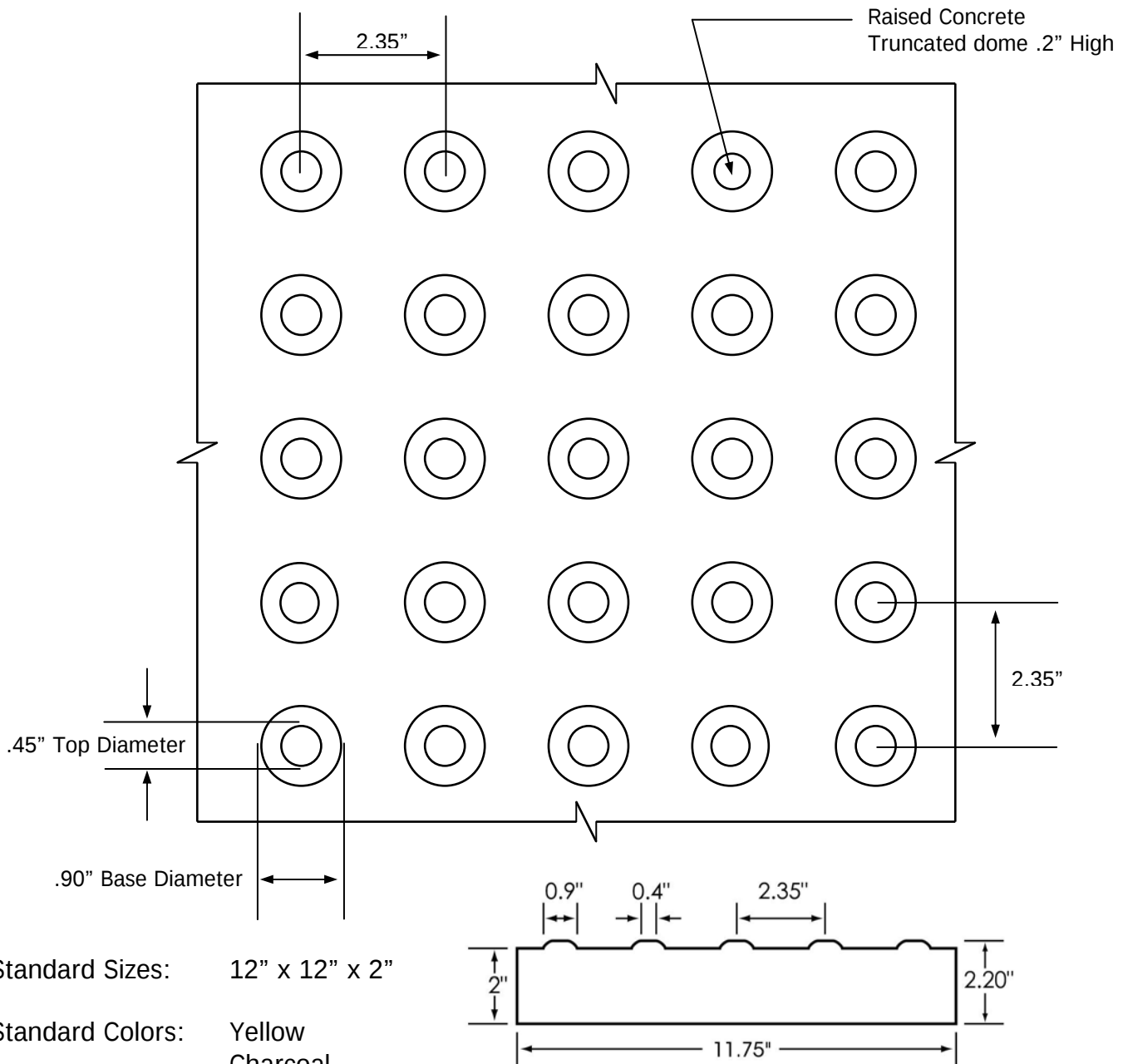
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Specification Guide



Detectable Warning Pavers

Product Diagram – In Line



Standard Sizes: 12" x 12" x 2"

Standard Colors: Yellow
Charcoal
Red
Natural

Custom colors & sizes are also available.

Department of Transportation (DOT)

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 0.45 inch [10 mm] to .9 inches [23 mm] 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%.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 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.
- B. Related Sections include the following:
 - 1. Division 02 - Section 02210 Grading
 - 2. Division 02 - Section 02220 Excavation, Backfilling and Compaction.
 - 3. Division 02 - Section 02770 Concrete Paving, Walks, Curbs and Gutters.
 - 4. Division 03 - Section 03300 Cast-In-Place Concrete.
 - 5. Division 07 - Section 07120 Modified Bituminous Sheet Membrane Waterproofing.
 - 6. Division 07 - Section 07920 Sealants.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C-150 -Specification for Portland Cement.
 - 2. ASTM C-33 -Specification for Concrete Aggregates.
 - 3. ASTM C-140 - Specification for Concrete.
 - 4. ASTM C-293
 - 5. ASTM C-1028
 - 6. ASTM C501, 50
 - 7. ASTM C241
- B. Tile Council of America (TCA)
 - 1. TCA F102 - Installation Method Cement Mortar Bonded.
 - 2. TCA F101 - Installation Method Cement Mortar Bonded.
- C. American National Standards Institute (ANSI)
 - 1. ANSI A-118.4 - Latex Portland Cement Mortar.
 - 2. ANSI A-118.6 - Grout - Latex.
- D. Performance Requirements
 - 1. *Compressive Strength:* At the time of delivery, the average compressive strength shall not be less than 8,000psi with no individual unit less than 7,000psi (48,000kPa) per ASTM C-140.
 - 2. *Water Absorption:* Shall not be greater than 6% per ASTM C-936.
 - 3. *Flexural Strength:* Shall not be less than 800psi (5,500kPa) per ASTM C-293.
 - 4. *Freeze/Thaw:* Durability of the paver shall meet the freeze/thaw tests per Section 8 of ASTM C-67 and shall have no breakage and not greater than 1 % loss in dry weight of any individual unit when subject to 50 cycles of freeze/ thaw.
 - 5. *Static Coefficient of Friction:* ASTM C-1028 conditionally slip resistant:
 - a. Wet: 0.50 - 0.60 and Dry: 0.60 - 0.70

6. *Sizing Dimensions:* Shall not differ by more than 1/16 inch (1.6 mm) from width, height, length or thickness. Unit shall conform to a true plane and not differ by more than 1/16 inch (1.6 mm) in either concave and/or convex warpage.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data:
 1. Manufacturer's data sheets on each product to be used, including preparation instructions, Installation methods, Storage and handling requirements and recommendations.
 2. Submit test results from an independent testing laboratory for compliance with performance requirements specified herein.
 3. Submit two copies of written instructions for recommended maintenance.
- B. Shop Drawings:
 1. Layout drawings of each paved area showing the pattern of pavers, indicate pavers requiring cutting, indicate setting bed methods in each area, drainage patterns and drains and indicate and relationship of paving joints. Include details of setting beds, noting all materials and their thickness, show details at curbs and vertical surfaces.
 2. Details of custom (nonstandard) curbs and stair tread/risers, include methods of installation.
- C. Samples:
 1. Submit two complete sets of color chips representing manufacturer's full range of available colors and texture. Color will be selected by Architect / Engineer / Landscape Architect / Owner from manufacturer's available standard and custom colors.

1.5 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** All products covered under this Section shall be produced by a single manufacturer unless otherwise specified with a minimum of ten (10) years proven production experience.
- B. **Installer Qualifications:** Installer shall have a minimum of three (3) years proven specialized construction experience with this product and be capable of estimating & building from blueprint plans and details, in addition to proper material handling. All Work must comply with local, state/provincial licensing and bonding requirements.
- C. **Special Consideration:** The paver manufacturer shall demonstrate, either by proven field performance or a laboratory freeze-thaw test, that the paving units have adequate durability if they are to be subjected to a freeze-thaw environment.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with provisions of Section 01300.
- B. Protect Precast Concrete Pavers during shipment, storage and construction against damage. Store a minimum of 4 inches off the ground on pallets in a dry location and cover with polyethylene to protect from contact with materials which would cause staining or discoloration.

- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
 - 1. Do not work during freezing weather or on wet or frozen sub-base.

1.8 WARRANTIES / GUARANTEES

- A. Tile Tech Detectable Warning Pavers shall remain free from defects for a period of ten (5) years. The contractor shall warrant that his work will remain free from defects of labor and materials used in conjunction with his work in accordance with the general conditions for this project or a maximum of three (3) years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
Tile Tech Pavers Inc., 888-380-5575 Phone: (213) 380-5560 Fax: (213) 380-5561
 E-mail: sales@tiletechpavers.com Website: www.tiletechpavers.com
- B. Substitutions: Not permitted.
- C. Precast Concrete Pavers equal in appearance and function and meeting these specifications, will be acceptable when the specified submittals are approved in writing by the Architect prior to bid.

2.2 MATERIALS

- A. **Concrete Pavers: Detectable Warning or ADA Truncated Dome Pavers** as manufactured by Tile Tech
 - 1. Color: Standard and custom range as manufactured by Tile Tech Pavers Inc.
 - 2. Size: Nominal 12"x12", 12"x24", 16"x24"
 - 3. Thickness: 2"
 - 4. Surface Finish: Shot-blasted or Honed.
 - 5. Edge Finish: 3/16" bevel on all four (4) sides.
 - 6. Weight: 11 to 22 lbs per square foot depending on paver size & thickness.

2.3 PRECAST MATERIAL REQUIREMENTS

- 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 batch will have the same range as products from a separate batch.

- 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 10 that does not affect color or physical properties of precast paver surface.

2.4 INSTALLATION MATERIALS

A. Sand-Set Method

- 1. *Sand Setting Bed Material*: Sand shall be common sand generally referred to as concrete sand and shall be free of organic materials and any other contaminants that could potentially stain or otherwise damage the unit pavers.
- 2. *Joint Filler Materials*: Sand conforming with ASTM C-144 with 100% passing a No.16 sieve.
- 3. *Landscape Filter Fabric*: Woven or non-woven non-biodegradable filter between the compacted base and the sand leveling bed.
- 4. *Preformed Asphalt Joint Filler*: As indicated on drawings: ASTM D-994, 1/2inch (13 mm) thick, for expansion joints which are not sealed, one of the following:
 - a. *Code 1301* by W.R. Grace and Co.
 - b. *Asphalt Expansion Joint* by W. R. Meadows, Inc.
 - c. *Elastite Asphalt Expansion Joint* by The Celotex Corporation.

B. Mortar Setting Bed (Thin-Set) Method - PEDESTRIAN

- 1. *Latex Mortar Mix*: ANSI A-118.4.
- 2. *Water*: Clean and free of deleterious acids, alkalies or organic materials.
- 3. *Grout*: ANSI A-118.6, Grout - Latex.
- 4. *Sealant, Back-up & Bond Breaker*: As specified in Section 07920 - Sealants and Caulking.

C. Portland Cement Setting Bed (Thick-Set) Method

- 1. *Portland Cement Mortar Mix*: ASTM C-150 Custom Bldg Products thick Bed Mortar Mix with Admix, or approved equal.
- 2. *Reinforcement*: 2inches by 2inches (51mm by 51mm) - 16/16 welded galvanized wire mesh used in thick mortar bed.
- 3. *Water*: Clean and free of deleterious acids, alkalies or organic materials.
- 4. *Grout*: Custom Bldg Products Grout with Admix, color as selected or approved equal.
- 5. *Bond Slurry*: Custom Bldg Products bond coat or approved equal.
- 6. *Sealant, Back-up & Bond Breaker*: As specified in Section 07920 - Sealants and Caulking.

D. Bituminous Setting Bed Method

- 1. *Asphalt Setting Bed Materials*:
 - a. *Asphalt Cement*: ASTM D-3381, viscosity grade AC-10 or AC-20.
 - b. *Fine Aggregate*: Clean, hard sand, free of organic matter, uniformly graded from coarse to fine, all passing the No.4 sieve meeting the gradation requirements when testing in accordance with ASTM-C136.
 - c. *Mixing*: Provide plant mixed asphalt setting bed by combining approximately 93% dry fine aggregate and approximately 7% hot asphalt cement and heat to approximately 300 degrees F (149 degree C). Provide each ton of setting bed material apportioned by weight with the approximate ratio of 145lb (66kg) of asphalt to 1,855lb (841kg) of sand.

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2. *Setting Bed Primer:* Cut back asphalt, ASTM D-2028, grade as recommended by manufacturer.
3. *Asphalt Adhesive:* Standard neoprene modified asphalt adhesive containing oxidized asphalt combined with 2% neoprene and 10% long fibered mineral fibers with a softening point of 155 degrees F.
4. *Joint Filler Materials:* Sand conforming to ASTM C-144 with 100% passing a No.16 sieve.
5. *Pre-formed Asphalt Joint Filler:* ASTM D-994, 1/2inch (13mm) thick, for expansion joints which are not sealed, one of the following:
 - a. *Code 1301* by W.R. Grace and Co.
 - b. *Asphalt Expansion Joint* by W. R. Meadows, Inc.
 - c. *Elastite Asphalt Expansion Joint* by The Celotex Corporation.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Prior to starting work inspect the sub-grade to ensure that it has been properly prepared. Commencement of work shall imply acceptance of sub-grade conditions.
 1. Verify that sub-grade preparation, compacted density and elevations conform to the specifications. Compaction of the soil sub-grade 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.
 2. Stabilization of the sub-grade and/or base material may be necessary with weak or saturated sub-grade soils. The Architect/Engineer should inspect sub-grade preparation, elevations, and conduct density tests for conformance to specifications.
 3. Verify that Geotextiles, if applicable, have been placed according to specifications.
 4. Verify that aggregate base materials, thickness, compaction, surface tolerances, and elevations conform to the specifications.
 5. Verify that base is dry, uniform, even, and ready to support sand, pavers, and imposed or anticipated vehicular loads.
 6. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved.
- B. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with Tile Tech Pavers Inc. and other contributing manufacturer's instructions. Installation requirements vary for each individual project site. Precast Pavers used, pattern, grid layout, starting point, and finished elevation should be shown on plan view shop drawings, which have been prepared and approved by the designer, installing contractor and/or owner.

B. Placement Tolerance:

1. Maximum of 1/16 inch (1.6 mm) height variation between adjacent pavers.
2. Individual pavers shall not vary more than 1/16 inch (1.6mm) from level across width of the paver.
3. Paved areas shall not vary more than 1/4 inch (6 mm) from level in a distance of 10 feet (3m) measured at any location and in any direction.
4. The surface elevation of pavers shall be 1/8 in. to 1/4 in. (3mm to 6mm) above adjacent drainage inlets, concrete collars or channels.
5. Joints between pavers to be 3/16 inch (4.8mm) or 1/8 inch (3mm).
6. Concrete shall not exceed 1/8 inch in 10 feet (3 mm in 3 m) from required plane. Concrete to be steel troweled with fine broom finish. No curing or sealing compound used.

C. Sand-Set Method Installation:

1. 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.
2. Lay the pavers in the pattern(s) as shown on the drawings. Maintain straight pattern lines.
3. Field cut pavers with wet masonry saw in accordance with manufacturer's recommendations for methods, equipment and precautions.
4. Tamp into bedding or use a low amplitude, high frequency plate vibrator to vibrate the pavers into the sand. Cover vibrator plate with carpet or card board to prevent surface damage to pavers.
5. Sweep dry joint sand into the joints & sweep off excess sand when the job is complete.

D. Mortar Setting Bed (Thin-Set) Method Installation - PEDESTRIAN

1. Installation of Mortar bed as per TCA F102. All Materials used shall follow instructions of manufacturer for use in mortar method.
2. Install precast concrete pavers.
3. Grouting of pavers in strict accordance with grout manufacturer's directions and instructions. Use latex or acrylic additives from the same manufacturer as the grout.
4. All expansion and Control joints shall be installed per TCA EJ171. Joint materials used shall follow manufacturer's directions and instructions.
5. Rework mixes from time to time to maintain proper consistency, as recommended by manufacturer but do not add ingredients. Discard mortar that has reached its initial set.
6. Field cut pavers with wet masonry saw in accordance with manufacturer's recommendations for methods, equipment and precautions.
7. Remove, scrub & wash clean mortar stains and all other types of soiling from exposed paver surfaces.

E. Portland Cement Setting Bed (Thick-Set) Method Installation

1. Installation of Mortar bed as per TCA F101. All materials used follow instructions of manufacturer for use in mortar method.
2. Install precast concrete pavers and firmly set, tamp into bedding to ensure minimum 95% surface contact with mortar bed. Coat underside of each precast pavers unit with latex cement mortar.
3. Grouting of pavers in strict accordance with grout manufacturer's directions and instructions. Use latex or acrylic additives from the same manufacturer as the grout.

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4. All expansion and Control joints shall be installed per TCA EJ171. Joint materials used shall follow manufacturer's directions and instructions.
5. Field cut pavers with wet masonry saw in accordance with manufacturer's recommendations for methods, equipment and precautions.
6. Remove, scrub & wash clean mortar stains and all other types of soiling from exposed paver surfaces.

F. Bituminous Setting Bed Method Installation

1. Place solid steel 3/4 inch (19 mm) thick control bars directly on the base or slab. Install shims under bars for minor adjustment of depth and finish paver elevations. Space bars approximately 11 feet (3.4m) apart and parallel to each other to serve as guides for strike-off boards.
2. Place asphalt setting bed at not less than 200 degrees F (93 degree C) in panels between control bars on the primed concrete slab or binder course to no less than 3/4 inch (19mm) compacted thickness. Spread material and strike off by pulling the material with a 12 feet long by 2 inches by 6 inches (3.7m by 51mm by 152mm) wood board several times to produce a smooth firm and even setting bed. Add fresh material in low, porous spots after each pass of the strike-off board. After each panel is complete remove and advance the first control bar to the next panel position in readiness for placing and striking adjacent panels. Fill in depressions left by the control bar.
3. Roll setting bed with a roller (not over one ton in weight) to a nominal depth of 3/4 inch (19 mm) thick while it is still hot. Add additional material to adjust thickness required and to allow for setting of pavers to finish elevations and slopes.
 - a. If setting bed is installed greater than 1-1/2 inches (38mm) thick, place in two equal lifts. Place the second lift immediately after the first to assure bond between lifts.
 - b. If pavers are not installed immediately after setting bed, provide protection of setting bed with minimum 1/2 inch plywood sheet laid on the setting bed with butted joints. Repair all damage to the setting bed prior to installing pavers.

F. Concrete Slab Installation – VEHICULAR

1. Install precast concrete pavers, slabs and curbs in locations, patterns and at elevations and with slopes for surface drainage as shown on the Drawings and in accordance with the manufacturer's printed installation instructions and the final reviewed shop drawings.
2. Apply neoprene modified asphalt adhesive on the cured setting bed by squeegeeing or troweling. If troweled on, use a trowel with serrations not exceeding 1/16 inch (1.5 mm) depth. Place adhesive to not more than 1/16 inch (1.6mm) thickness over the total surface of the setting bed. Do not begin installation of pavers, slabs and curbs until adhesive is dry to the touch.
3. Lay out pavement in 30 feet (9m) working area modules. Set precast concrete pavers, slabs and curbs by hand on dry adhesive in patterns shown on the Drawings with hand tight joints 1/16 inch to 1/8 inch (1.6 mm to 3 mm) wide joints and uniform top surfaces.
4. Field cut pavers with wet masonry saw in accordance with manufacturer's recommendations for methods, equipment and precautions.
5. Maintain accurate alignment and check for creep and shrinkage. Make adjustments to creep and shrinkage within the 30 feet (9 m) module area.
6. Sweep fine dry sand over pavement surface to fill joints immediately after installing pavers, slabs and curbs on setting bed. Brush in sand until joints are completely filled, remove surplus sand. Do not allow traffic on installed pavers, slabs or curbing until the joints have been filled.
7. Protect newly laid pavers, slabs and curbs with plywood panels on which workers stand. Advance protective panels as work progresses but maintain protection in areas subject to continued movement of materials and equipment to avoid creating depressions or disrupting alignment of installed pavers, slabs and curbs.

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8. Install the specified joint filler where precast concrete pavers, slabs and curbs abut curbs, other vertical surfaces and other construction.
9. After the precast concrete paving is completed, backfill the spaces along the edges of the walks, metal edging and pavements to the required elevations with material reviewed by the Testing Laboratory. The Material shall then be compacted until firm and the surface neatly graded, with allowance made for top soil.

3.4 PROTECTION

- A. Protect installed pavers until completion of project.
- B. Remove and replace pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement before Substantial Completion.

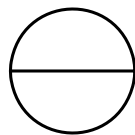
3.5 CLEANING & SEALING

- A. Wash entire surface with phosphate free neutral cleaner with pH factor between 7 to 10 and rinse with clean water and allow to dry thoroughly.
- B. Apply sealer in accordance with manufacturer's directions.
 1. pH factor between 7 and 10
 2. Non-discoloring and UV resistant.
 3. Penetrating type designed especially for precast concrete pavers.

3.6 MAINTENANCE

- A. Extra Materials: Deliver supply of maintenance materials to the owner. Furnish not less than 1 percent maintenance materials from same lot as materials installed, and enclosed in protective packaging with appropriate identifying labels.

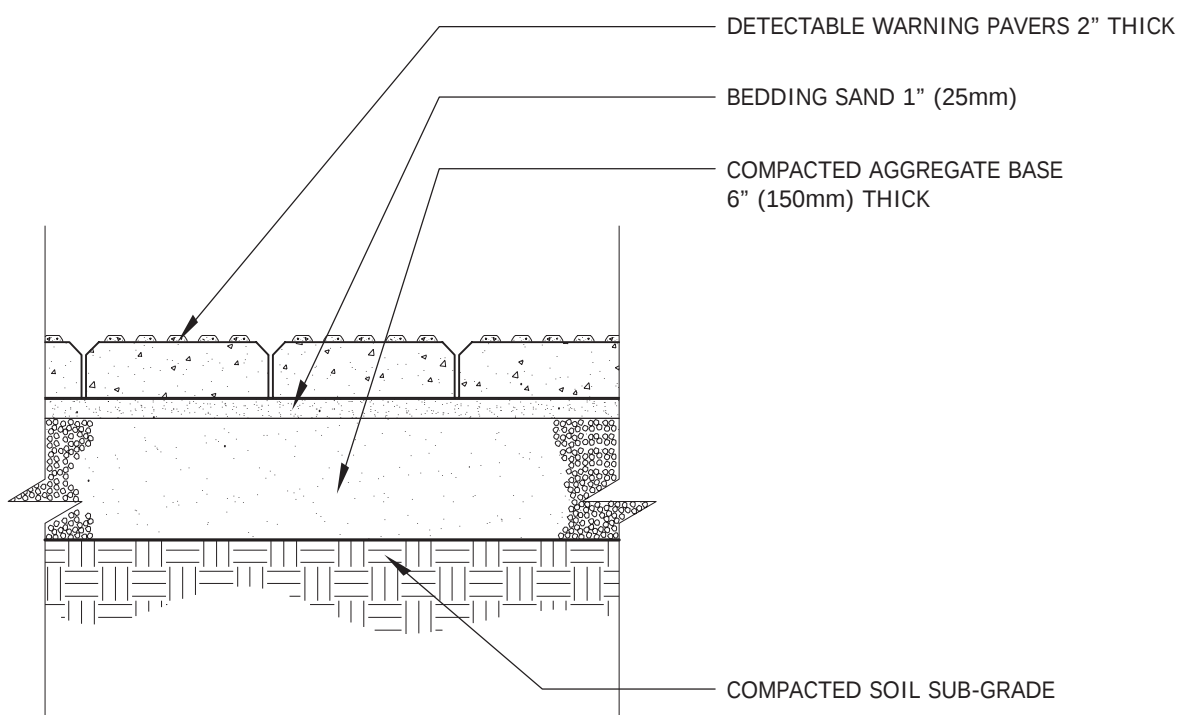
**END OF SECTION 02780
DETECTABLE WARNING PAVERS**



DETECTABLE WARNING PAVERS

INSTALLATION DIAGRAM - SAND-SET OVER COMPACTED BASE

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Toll Free: 888-380-5575 Fax: 213-380-5561

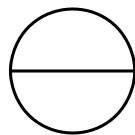


GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. DRAINS MAY BE NECESSARY IN SLOW DRAINING SUBGRADE.
3. CONCRETE PAVERS SHOULD BE PLACED IN A CEMENT TREATED BASE IF SOIL IS EXTREMELY WEAK OR CONSTANTLY SATURATE.
4. PLASTIC, STEEL, ALUMINUM OR PRECAST CONCRETE EDGING MAY BE USED.
5. JOINTS SHOULD BE SWEEPED WITH SAND.

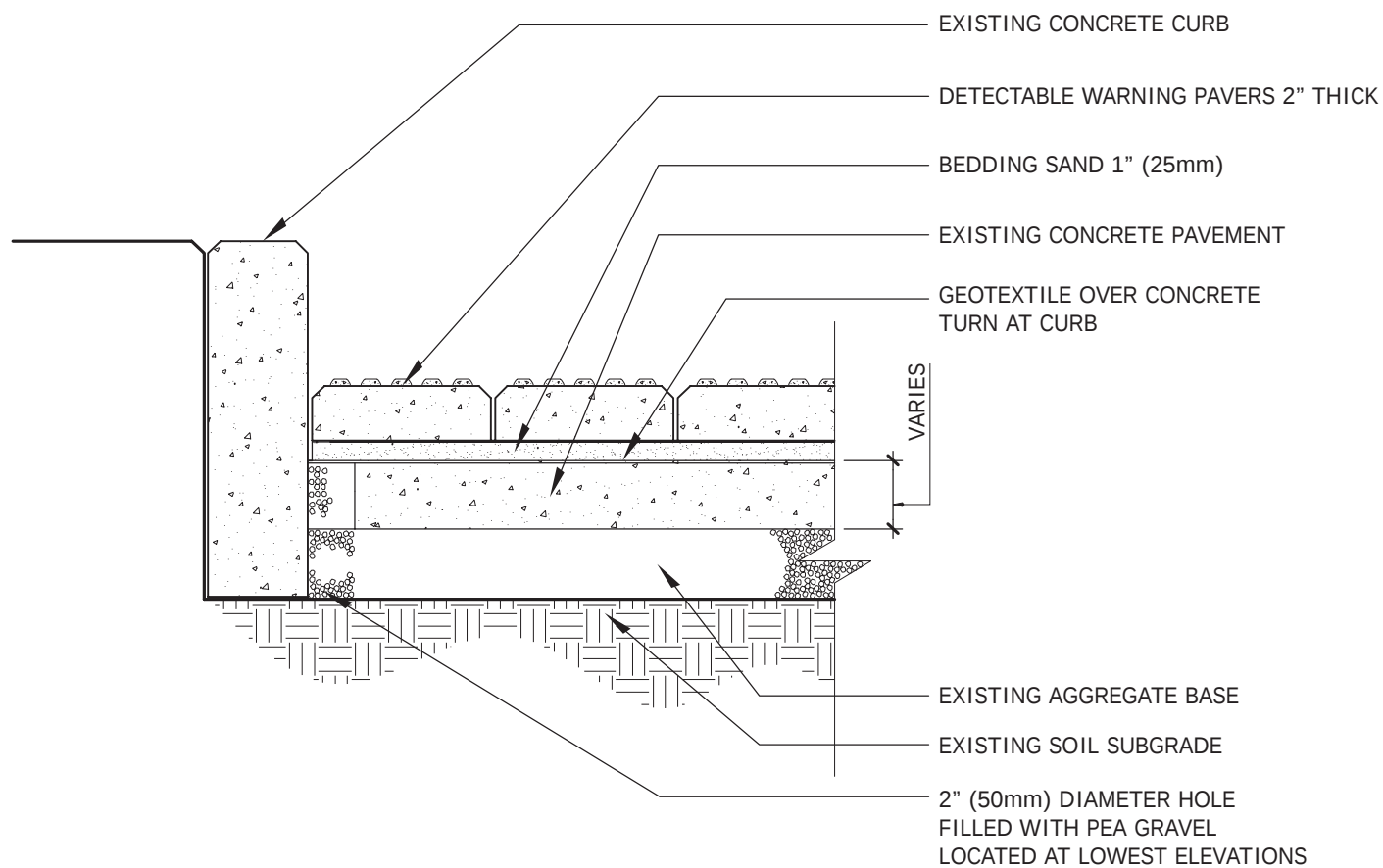


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INSTALLATION DIAGRAM - SAND-SET OVER EXISTING CONCRETE

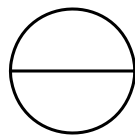


GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. EXISTING ASPHALT OR CONCRETE PAVEMENT SHALL BE THOROUGHLY INSPECTED FOR AREAS IN NEED OF PATCHING OR REPLACEMENT.
2. CONDUCT ALL REPAIRS AND FILL ALL CRACKS GREATER THAN 1/4" (7mm) WIDE PRIOR TO PLACING GEOTEXTILE, SAND AND PAVERS.
3. PROVIDE DRAINAGE OF SAND LAYER THROUGH PEA GRAVEL - FILLED WEEP HOLE(S) OR CATCH BASIN.

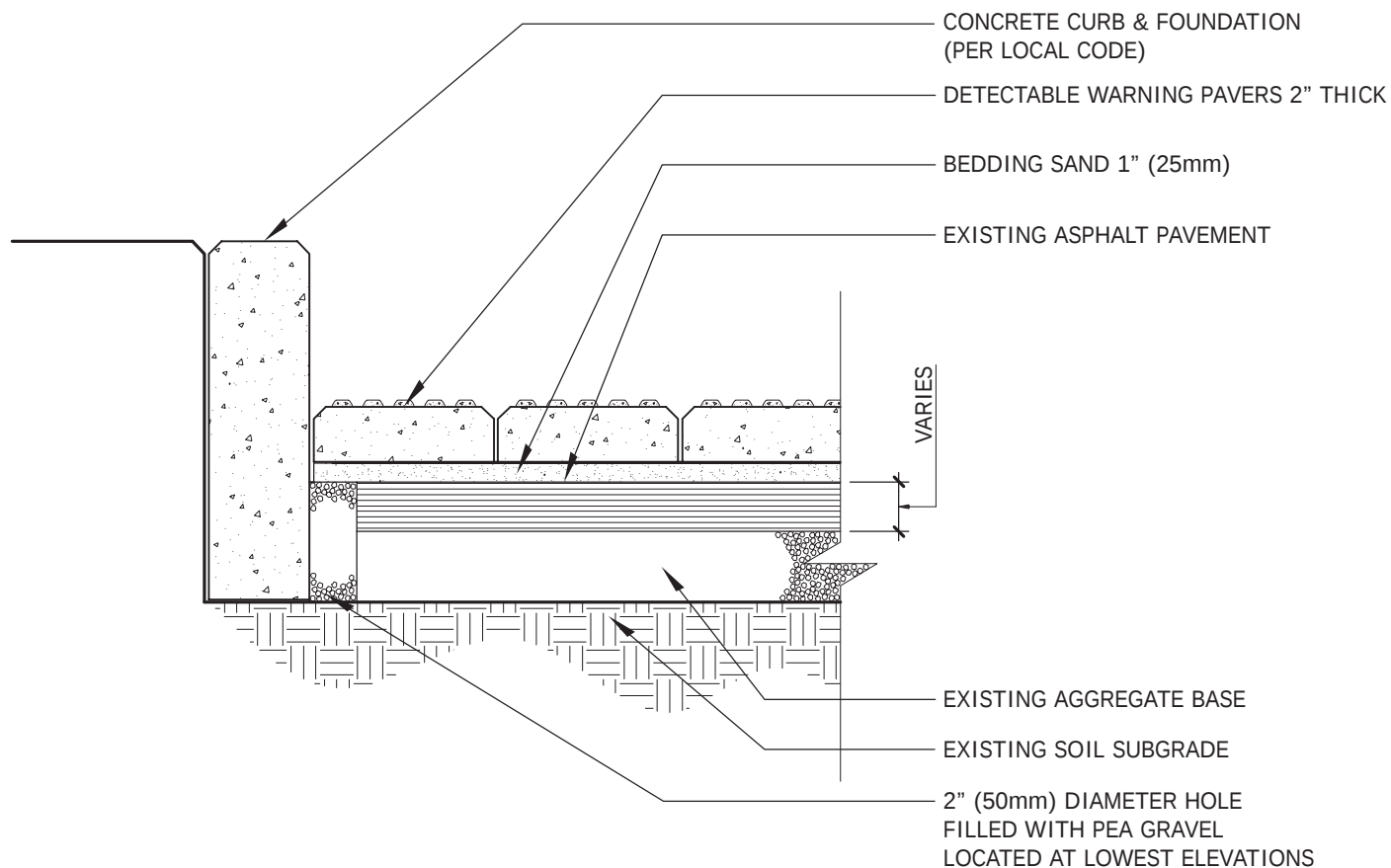


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DETECTABLE WARNING PAVERS

INSTALLATION DIAGRAM - SAND-SET OVER EXISTING ASPHALT

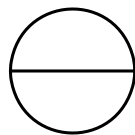


GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. EXISTING ASPHALT OR CONCRETE PAVEMENT SHALL BE THOROUGHLY INSPECTED FOR AREAS IN NEED OF PATCHING OR REPLACEMENT.
2. PROVIDE DRAINAGE OF SAND LAYER THROUGH PEA GRAVEL - FILLED WEEP HOLE(S) OR CATCH BASIN.
3. JOINTS SHOULD BE SWEEPED WITH SAND

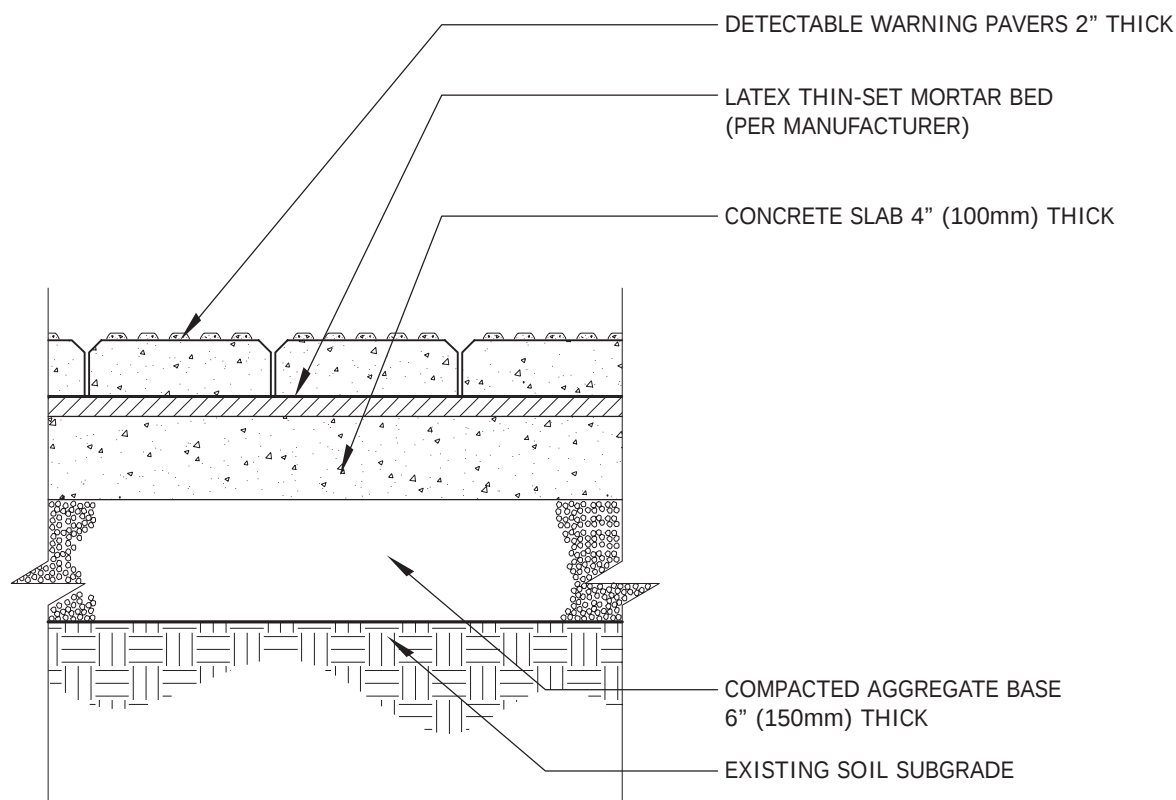


National Distribution Tel: 213-380-5560
Toll Free: 888-380-5575 Fax: 213-380-5561



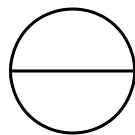
DETECTABLE WARNING PAVERS

INSTALLATION DIAGRAM - MORTAR THIN-SET OVER CONCRETE



GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

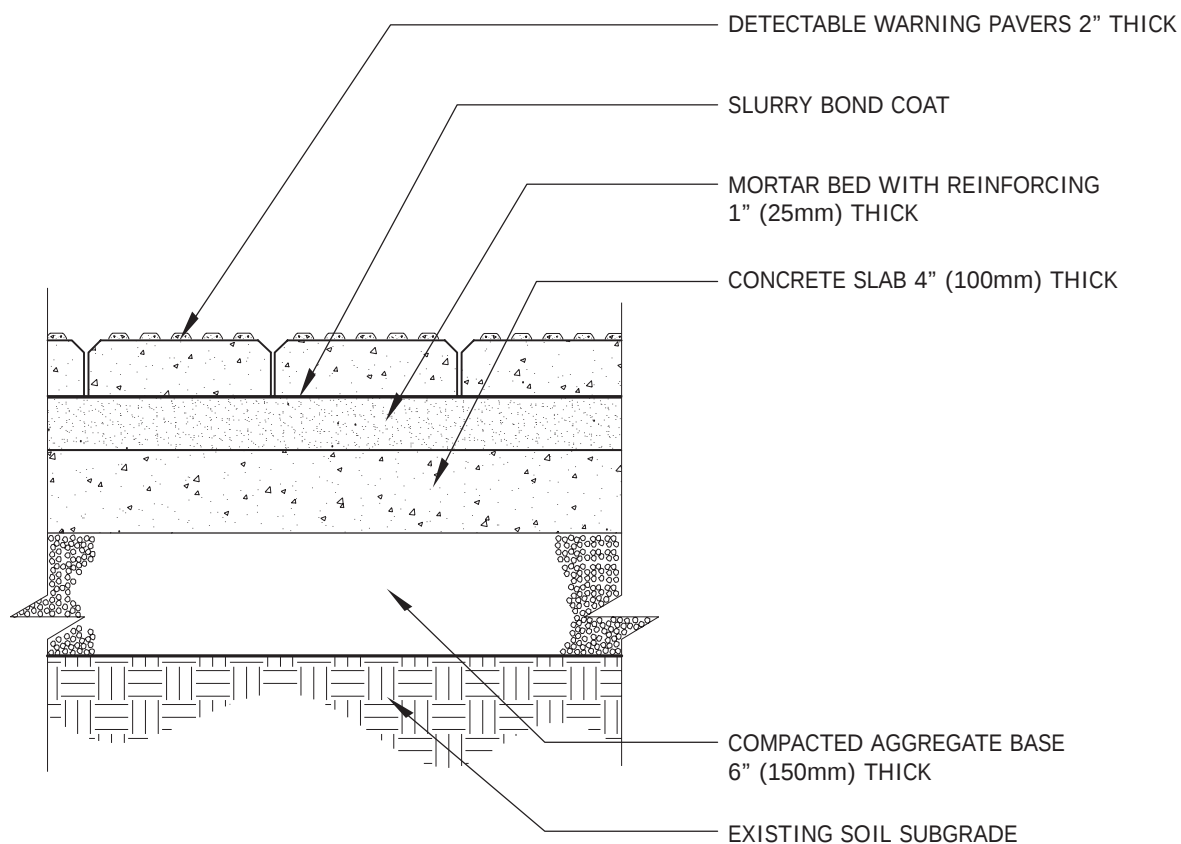
1. CONCRETE SLAB SHALL BE SLOPED TO PROVIDE COMPLETE SURFACE DRAINAGE.
2. PROVIDE SUBSURFACE DRAINAGE AS REQUIRED.
3. SLAB TO HAVE STEEL TROWEL AND FINE BROOM FINISH. DO NOT USE CURING COMPOUNDS.
4. MAXIMUM VARIATION IN SLAB 1/4" IN 10'
5. EXPANSION JOINTS ARE MANDATORY. ARCHITECT MUST SPECIFY LOCATION AND DETAILS ON DRAWING.



DETECTABLE WARNING PAVERS

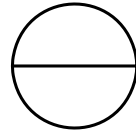
INSTALLATION DIAGRAM - MORTAR THICK-SET OVER CONCRETE

National Distribution Tel: 213-380-5560
Toll Free: 888-380-5575 Fax: 213-380-5561



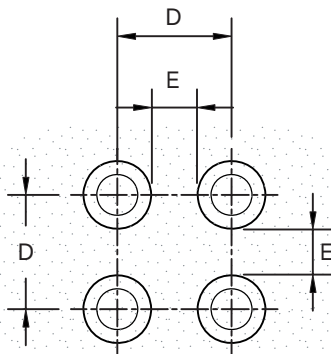
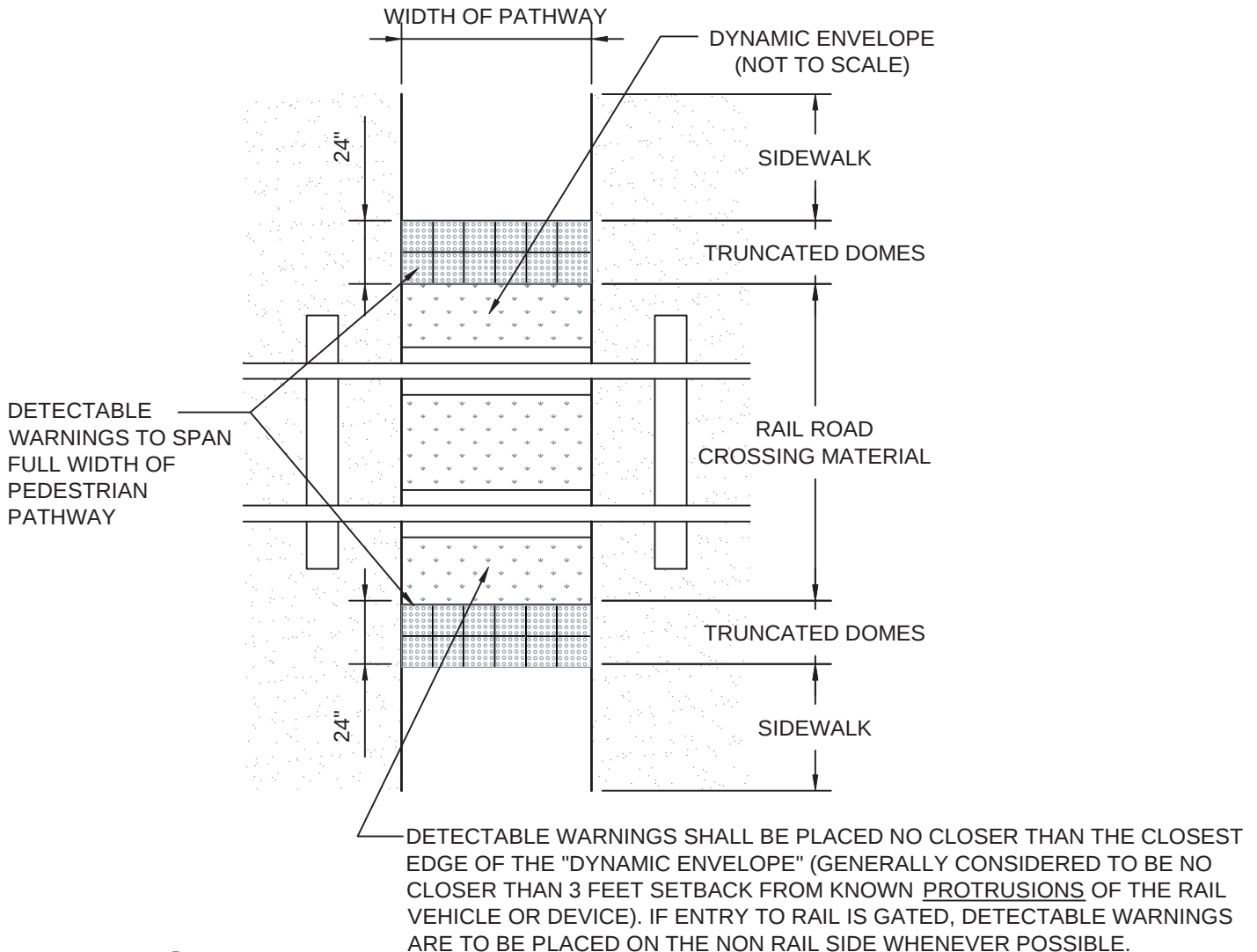
GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. CONCRETE SLAB SHALL BE SLOPED TO PROVIDE COMPLETE SURFACE DRAINAGE.
2. PROVIDE SUBSURFACE DRAINAGE AS REQUIRED.
3. SLAB TO HAVE STEEL TROWEL AND FINE BROOM FINISH. DO NOT USE CURING COMPOUNDS.
4. MAXIMUM VARIATION IN SLAB 1/4" IN 10'
5. EXPANSION JOINTS ARE MANDATORY. ARCHITECT MUST SPECIFY LOCATION AND DETAILS ON DRAWING.
6. JOINTS SHOULD BE SWEEPED WITH SAND OR GROUT.



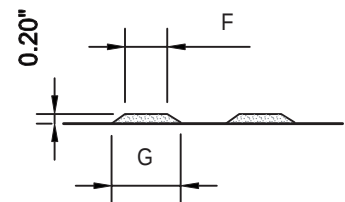
DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - RAIL ROAD CROSSING



PLAN

	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"



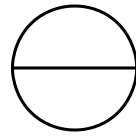
ELEVATION

GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com

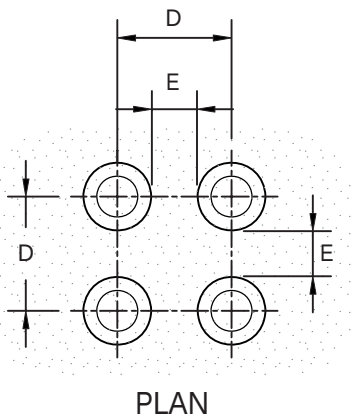
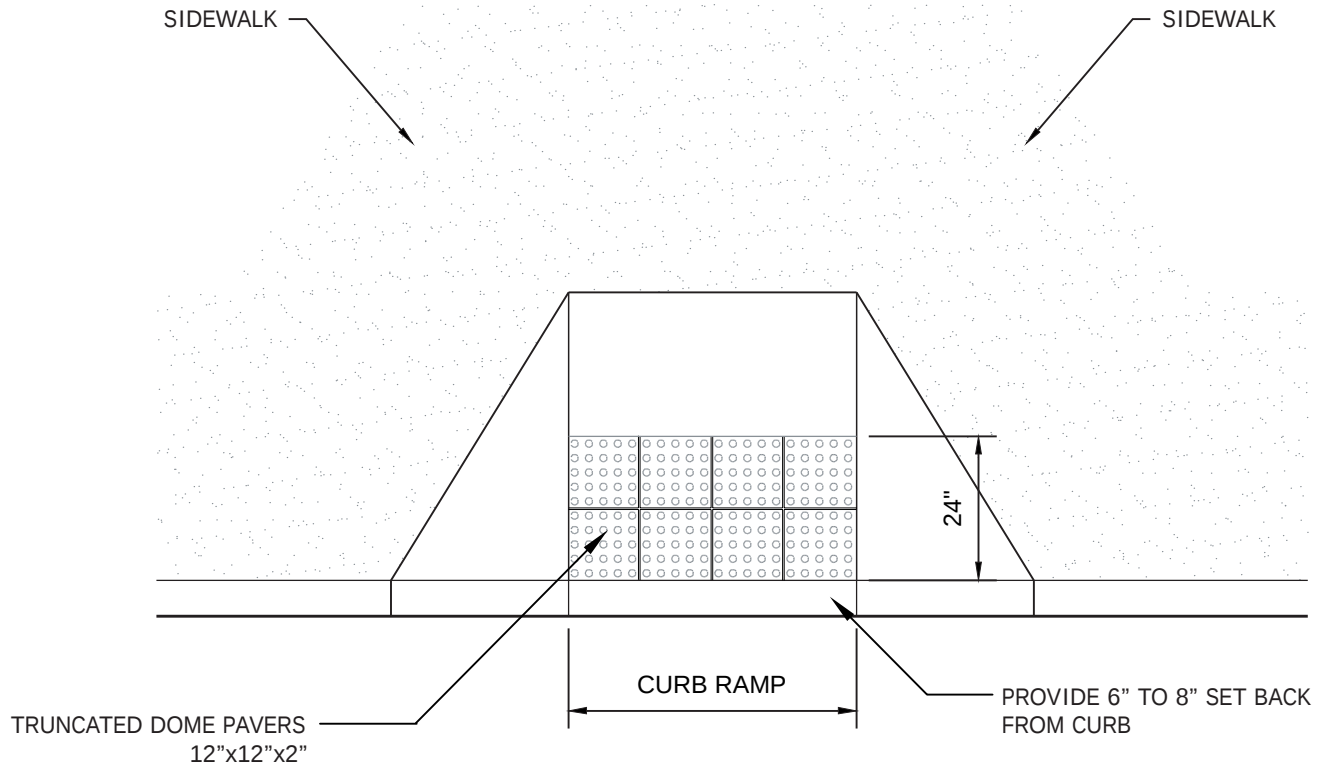


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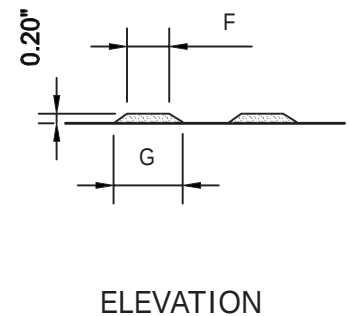


DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - CURB RAMP



	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"

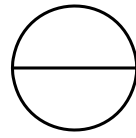


GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com

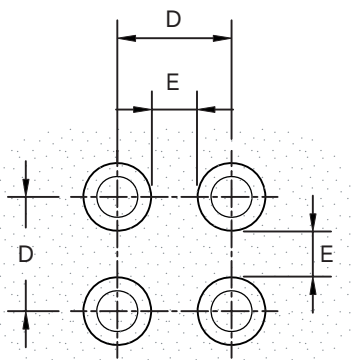
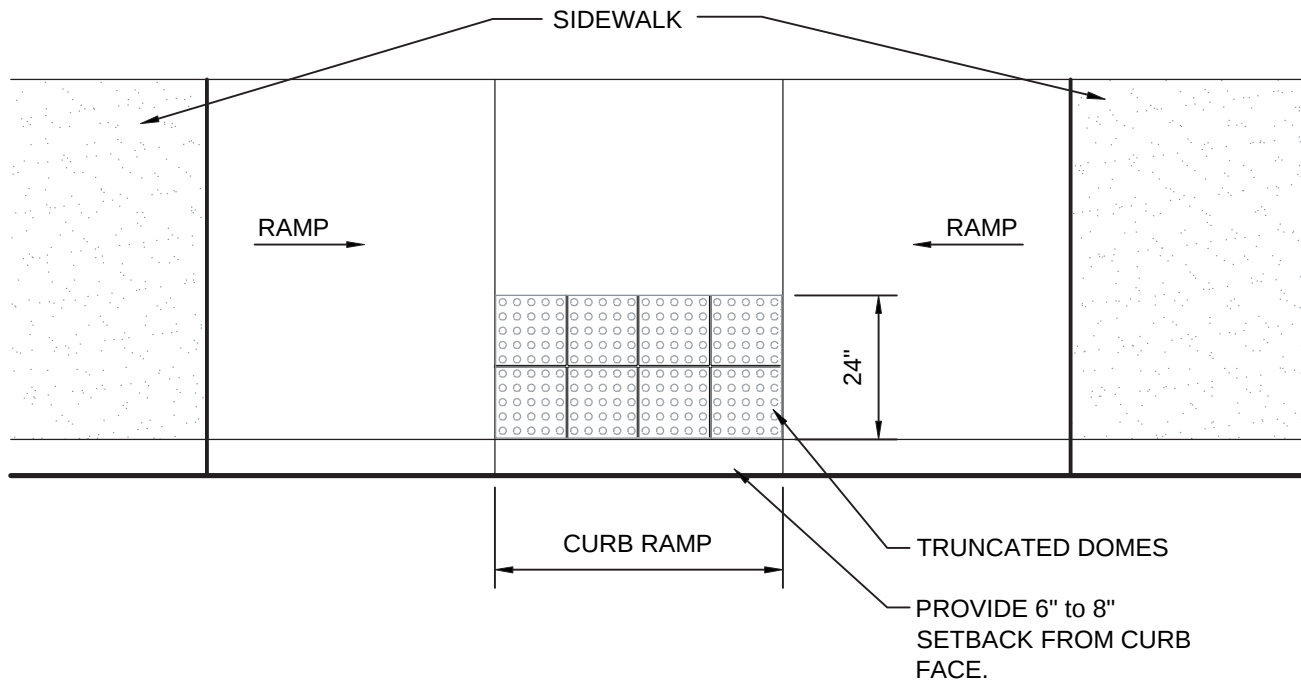


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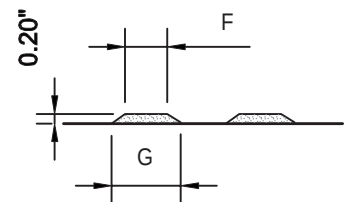
DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - TRANSITION CURB RAMPS



PLAN

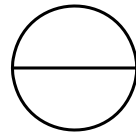
	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"



ELEVATION

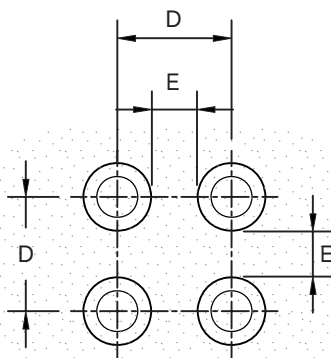
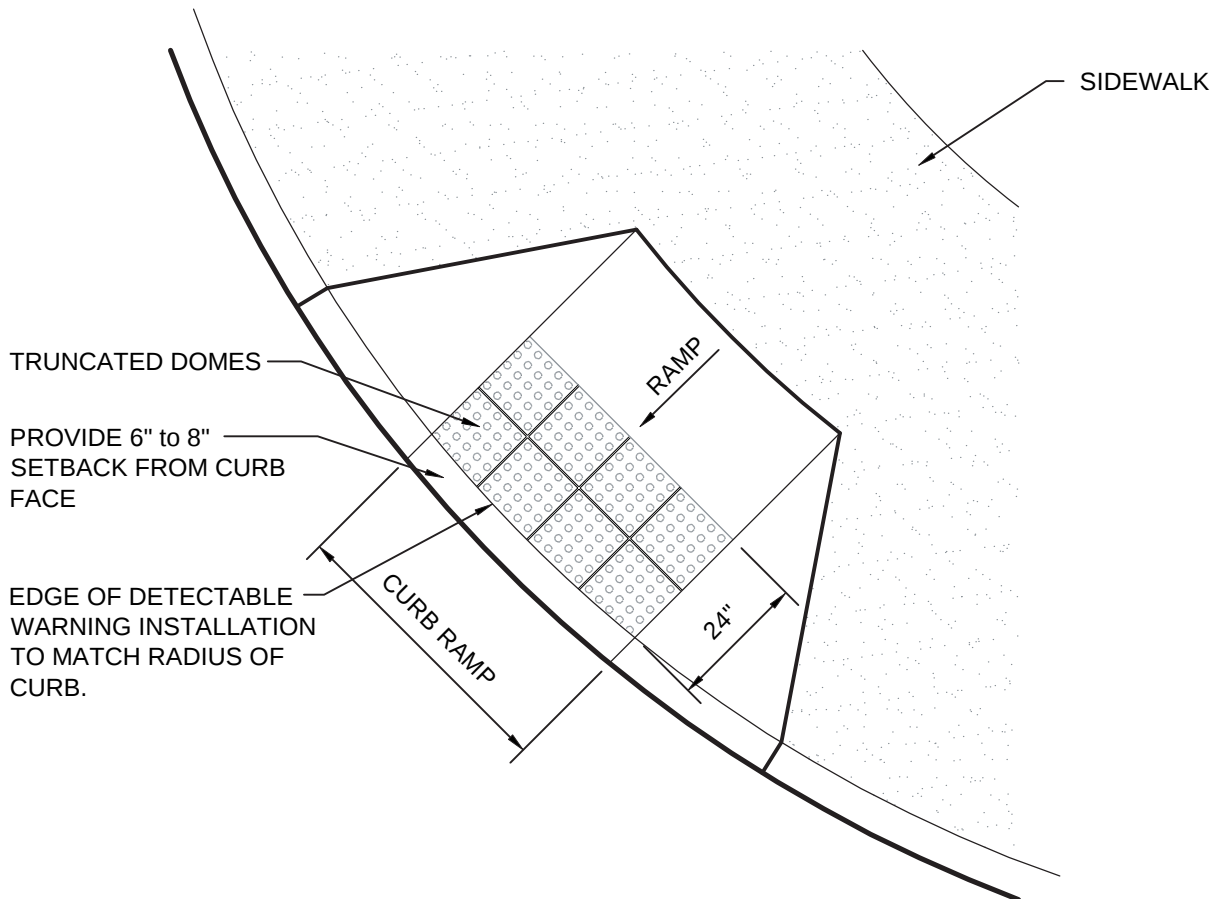
GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com



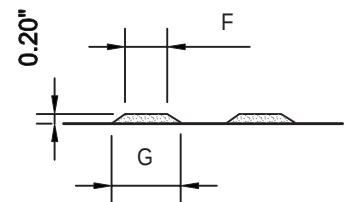
DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - SHARED CURB RAMP



PLAN

	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"



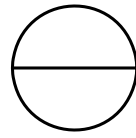
ELEVATION

GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com

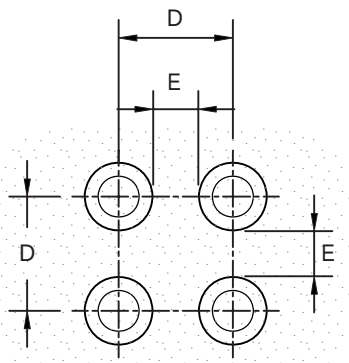
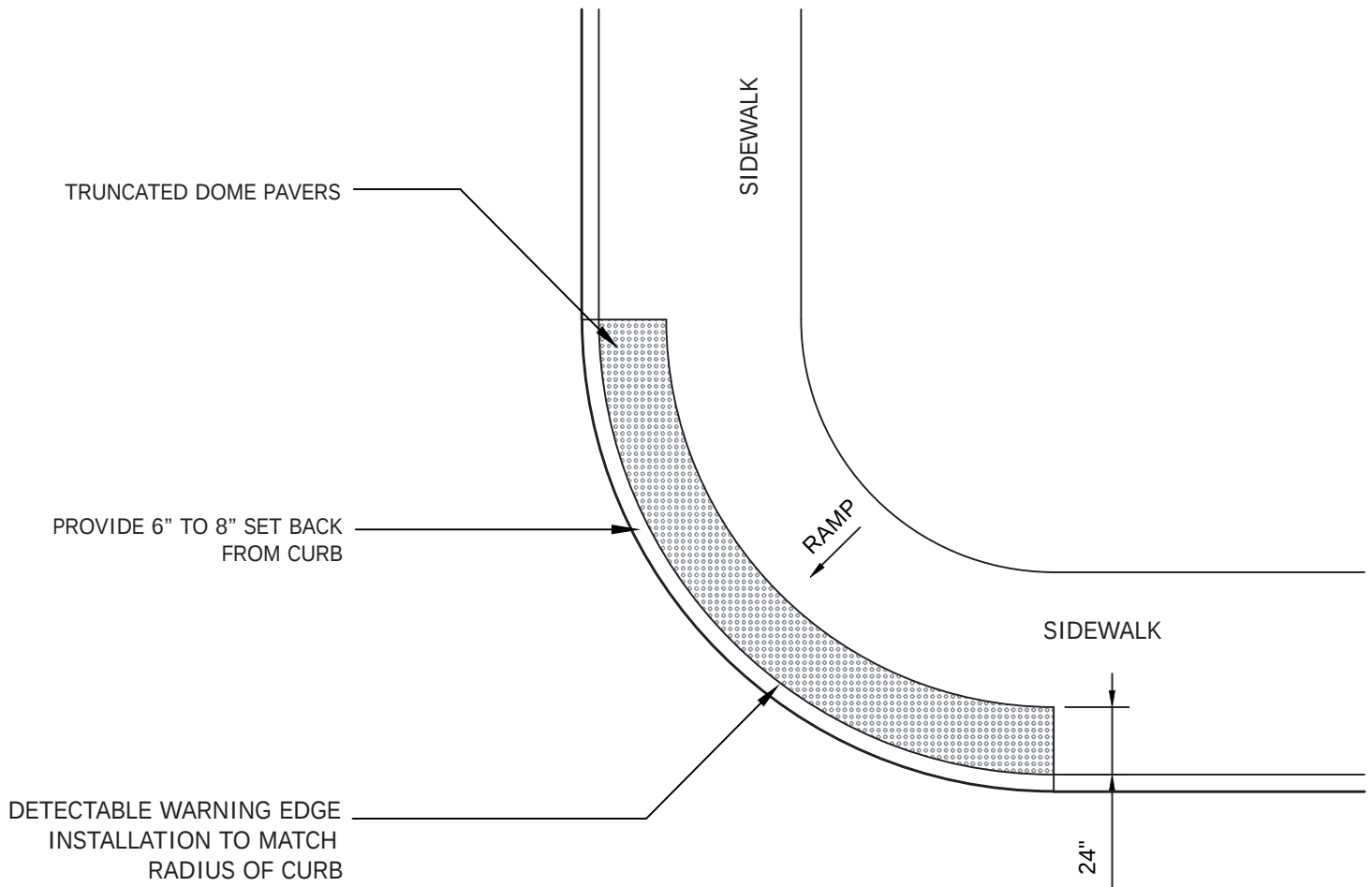


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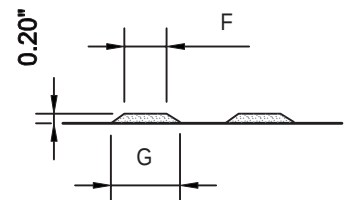
DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - BLENDED CURB



PLAN

	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"



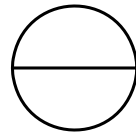
ELEVATION

GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com

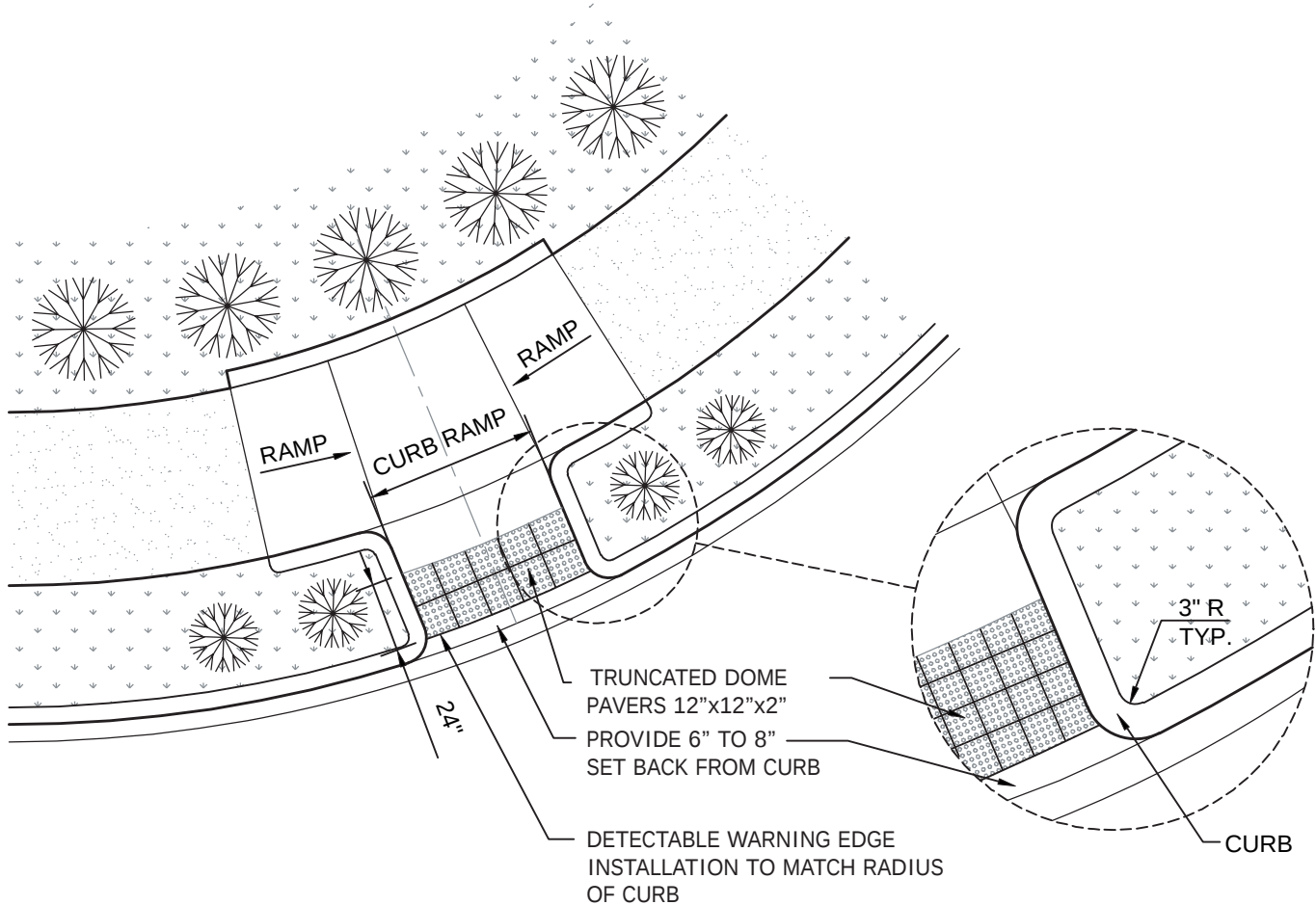


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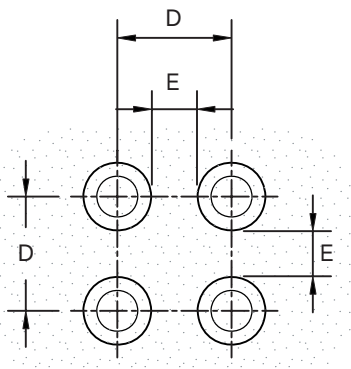


DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - CURB RAMP

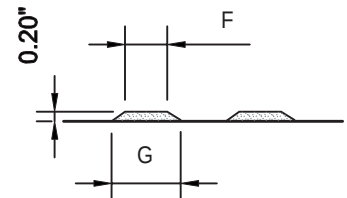


CURB RADIUS DETAIL



PLAN

	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"



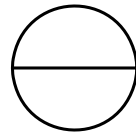
ELEVATION

GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com

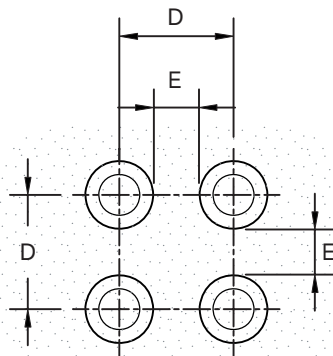
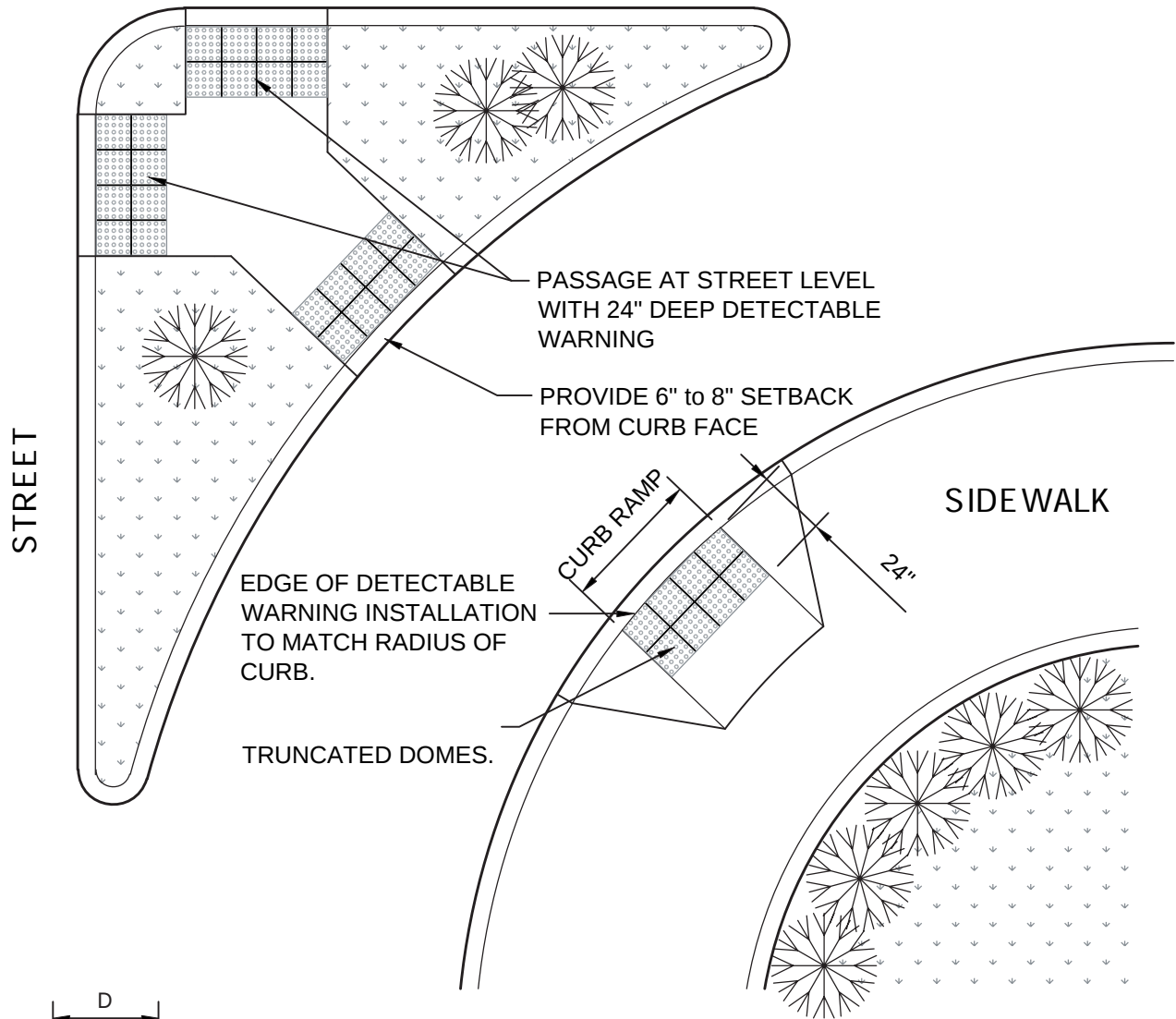


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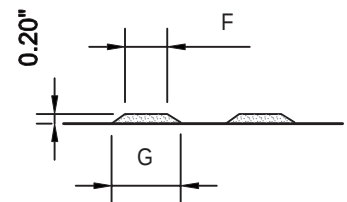
DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - REFUGE ISLAND



PLAN

	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"



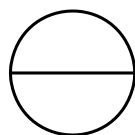
ELEVATION

GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com

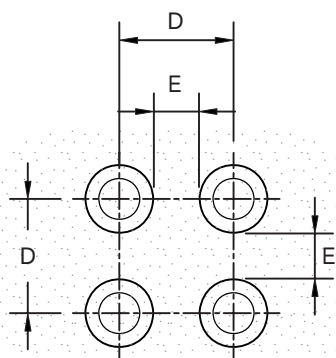
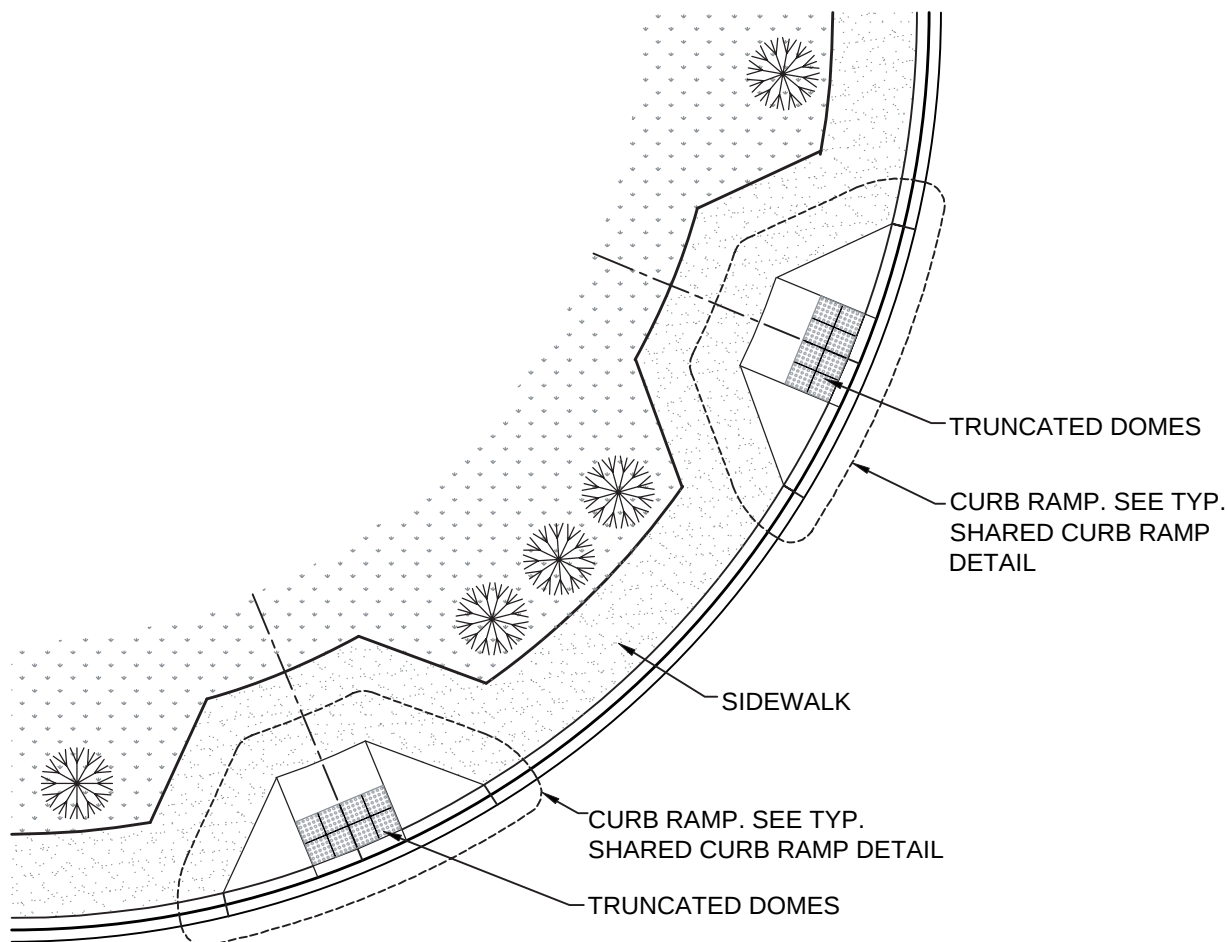


National Distribution Tel: 213-380-5560
Toll Free: 888-380-5575 Fax: 213-380-5561



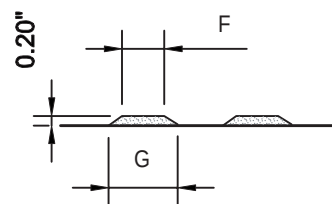
DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - PERPENDICULAR CORNER CURB RAMPS



PLAN

	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"



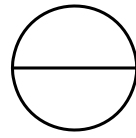
ELEVATION

GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com

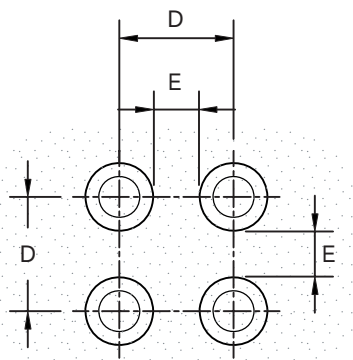
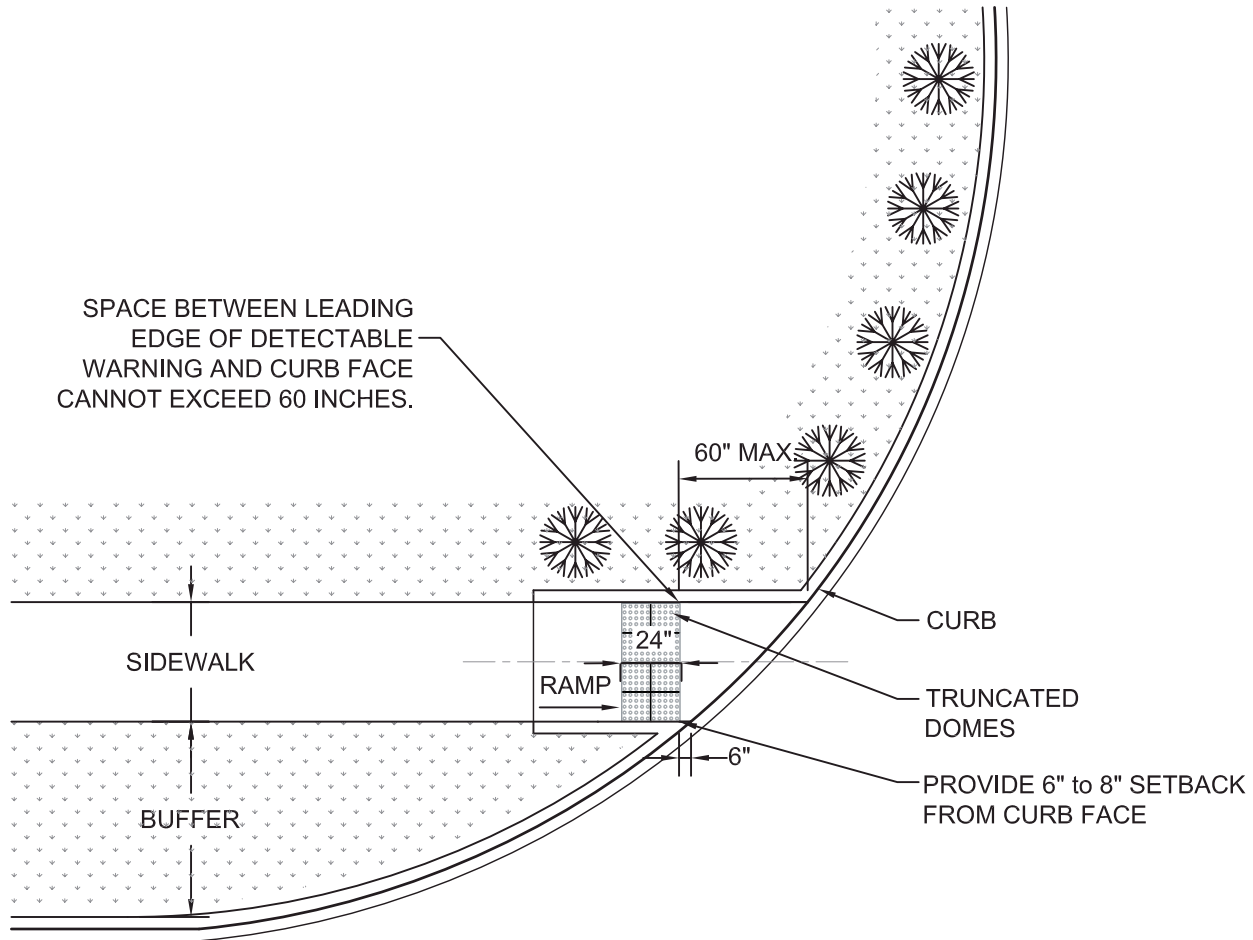


National Distribution Tel: 213-380-5560
Toll Free: 888-380-5575 Fax: 213-380-5561



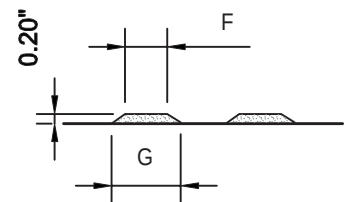
DETECTABLE WARNING PAVERS

APPLICATION DIAGRAM - SIDEWALK CURB RAMPS



PLAN

	MIN.	MAX.
D	1.60"	2.40"
E	.65"	1.50"
F	.45"	.80"
G	.90"	1.40"



ELEVATION

GENERAL NOTES: APPLY TO ALL OF THE ABOVE PRODUCTS

1. INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH TILE TECH PAVERS PRODUCT SPECIFICATIONS.
2. DRAWING NOT TO SCALE.
3. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.TILETECHPAVERS.com



SMITH-EMERY COMPANY

The Full Service Independent Testing Laboratory, Established 1904

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P.O. Box 880550, Hunter's Point Shipyard Bldg 114
5427 East La Palma Avenue

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• Anaheim, California 92807

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• (415) 330-3000
• (714) 693-1026

• Fax: (213) 746-7228
• 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" x 1" 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.

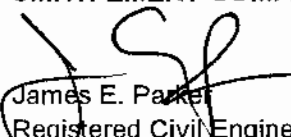
Sample No.	Dimensions (In.)	Gross Area (sq. in.)	Max. Load (Lbs.)	Compressive Strength, (PSI)
1	2.04 x 2.00	4.08	35,200	8,627
2	1.95 x 2.00	3.90	31,900	8,179
3	2.04 x 1.98	4.04	36,000	8,913
4	2.02 x 1.96	3.96	32,300	8,158
5	2.03 x 2.01	4.08	31,500	7,720

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

IC



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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" 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



SMITH-EMERY COMPANY

The Full Service Independent Testing Laboratory, Established 1904

751 East Washington Boulevard
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22395 Savi Ranch Parkway, Suite B
2517 Del Monte Street

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• San Francisco, California 94168
• Yorba Linda, California 92687
• West Sacramento, California 95634

• Tel: (415) 499-3411
• Tel: (415) 430-3000
• Tel: (714) 421-8538
• Tel: (916) 374-0734

• Fax: (213) 746-7228
• Fax: (415) 430-3030
• Fax: (714) 921-4264
• Fax: (916) 374-0835

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	41,600	8,308
Average:				8,614 PSI

Respectfully Submitted,

SMITH-EMERY COMPANY

James E. Partidge

President

Registered Civil Engineer No. 20070

Registration Expires 12/31/02





SMITH-EMERY COMPANY
The Full Service Independent Testing Laboratory, Established 1904

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• West Sacramento, California 95691

• (313) 749-3411
• (415) 330-3000
• (714) 921-8938
• (916) 374-0754

• Fax: (213) 746-7228
• Fax: (415) 330-3030
• 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:				8,614 PSI

Respectfully Submitted,

SMITH-EMERY COMPANY


James E. Partridge

President

Registered Civil Engineer No.: 25270

Registration Expires: 12-31-01



rc



SMITH-EMERY COMPANY

The Full Service Independent Testing Laboratory, Established 1904

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File No.: 31028

November 17, 1995

Lab No.: T-95-244

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. Trasorac

Registered Civil Engineer, No.: 44233

Registration Expires: 06-30-97

ECT:rc



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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)

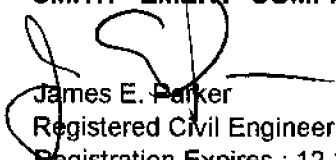
The tile samples were placed on a test fixture having three (3) supports located in a circle three and fifteen-thirty-secondths (3-15/32) inches in diameter with the load applied at the center as per specifications.

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