



August 5, 2014

Mr. J. Timothy Lincoln
City Engineer
City of Houston
Public Works and Engineering Department
1002 Washington Ave.
Houston Texas 77007

Dear Mr. Lincoln,

Thank you for considering TRUEGRID porous pavers technology and subsequent approval of the TRUEGRID permeable paving system as an acceptable paving design in the city of Houston for single family residential driveway applications, as per the design parameters in the City Code Chapter. As a Houston based manufacturer, we're excited that our eco-friendly porous pavers will help with storm water control, water quality improvement, and the recycling of post-consumer plastic waste in our city.

TRUEGRID structural specifications are attached.

Sincerely,

Barry Stiles
President & CEO
TRUEGRID Permeable Pavers

Nathan Wood
VP Sales
Direct: 832-723-0236
TRUEGRID Permeable Pavers

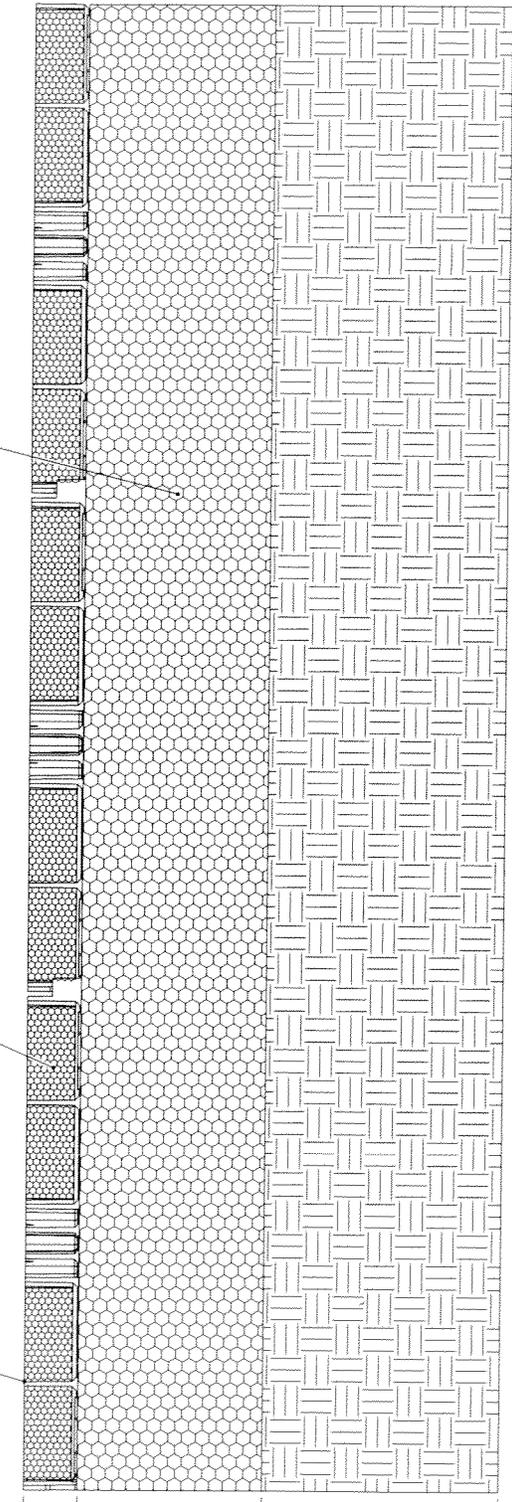
REV	DESCRIPTION	APVD	DATE
00	ORIGINAL ISSUE	BS	22-Aug-13
01	REVISED MATERIAL FILL DEPTH. REVISED SUB-BASE. DIM IS 7.5 WAS 4'-6"	BS	27-Jun-14

- TrueGrid SHALL SUPPORT LOAD CAPACITIES OF MINIMUM 120,000 LBS PER SQ/FT. TrueGrid STRENGTHENS WITH FILL MATERIAL.
- IF OVER FILLING TRUEGRID'S CELLS, OVER FILL NO MORE THAN 1/2" ABOVE TOP OF GRID.
- INCREASED SUB BASE DEPTH IS ONLY NEEDED FOR INCREASED STORM WATER RETENTION.

△01 TrueGrid PERMEABLE PAVING SYSTEM

△01 TrueGrid FILL MATERIAL 1.8" DEPTH UNIFORMLY GRADED WASHED STONE. 1" DIAMETER & UNDER COMMON: ANY No 57 STONE / CLEAN

△01 SUB-BASE UNIFORMLY GRADED WASHED STONE MUST BE ANGULAR & COMPACTED 1-1/2" DIAMETER & UNDER COMMON: ANY No 57 STONE / CLEAN



CLIENT / PROJECT:	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.		APPROVAL INFORMATION	
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DRAWN BY: J. Thelty		DATE: 10-Aug-10	REV: JT	DATE: 10-Aug-10
CHECKED BY: N. Wood		DATE: 22-Aug-13	REV: NW	DATE: 22-Aug-13
APPROVED BY: B. Stiles		DATE: 22-Aug-13	REV: BS	DATE: 22-Aug-13
TG-0040-GF.sldprt		TG-0020-GF		
SCALE: 1:4 MASS		DRAWING NUMBER: TG-0020-GF		
SHEET: 1 OF 1		REV: 01		

NOTES:



TRUEGRID GRAVEL FILL INSTALLATION PERMEABLE PAVING SYSTEM

TrueGrid Permeable Paver Technical Specifications

SECTION 32 12 43 – Porous Flexible Paving

PART 1 – GENERAL

1.1 Description of Work

A. Work included

1. Provide and install sub-base material as shown on drawings or per recommended sub-base alternatives as provided from additional manufacturer's information. See 2.2 Materials
2. Provide all TrueGrid Permeable Paver products and installation per the manufacturer's instructions provided on this specification sheet and other available specification material.
3. Provide and install specified fill material for TrueGrid gravel fill options and provide and install specified fill material for TrueGrid grass fill options.

B. Related Work

1. Subgrade preparation under Section 31 20 00 Earth Moving
2. Subsurface drainage materials – Section 33 46 00 Sub Drainage, when needed
3. Irrigation installation – Section 32 80 00 Irrigation, when needed.

1.2 Quality Assurance

- A. Follow Section 01 33 00 Submittal Procedures requirements.
- B. Installation performed to provided specification or accepted alternative specification.
- C. Certificates:
 1. Manufacturer signed certificate stating the product is MADE IN THE USA.
- D. Substitutions: No material will be considered as an equivalent to TrueGrid unless it meets all areas of available specification.

1.3 Delivery , Storage, and Handling

- A. Protect TrueGrid Permeable Paver units from damage during delivery and unloading.

1.4 Project Conditions

- A. Review installation and coordinate TrueGrid Permeable Paver work with other work affected.
- B. All hard surface paving adjacent to TrueGrid Permeable Paver areas, including concrete walks and asphalt paving should be completed prior to installation of TrueGrid Permeable Pavers.
- C. For TrueGrid's grass fill application, install turf when ambient air temperatures is at least 55 degrees.
- D. In cold weather, do not use on frozen materials or materials mixed or coated with ice or frost, and do not build on a frozen base or wet, saturated or muddy subgrade.
- E. Protect partially completed paving against damage from other construction traffic when work is in progress.

1.5 Limited Warranty

- A. TrueGrid Permeable Paver warrants to its purchasers that all products furnished will be free from defects in material and/or workmanship.
- B. This warranty shall extend for a period of (5) years following the date of shipment.
- C. Providing a written claim is presented TrueGrid within the warranty period and after inspection by TrueGrid showing the materials have failed under the warranty, all defective materials shall be refurbished under the warranty at no charge, excluding re-installation costs.
- D. Our liability under this warranty is limited to the refurbishing of materials and does not include any responsibility for incidental, consequential, or other damages of any nature.

PART 2 – PRODUCTS

2.1 Availability

- A. Acceptable Manufacturer: TrueGrid Pavers, 2500 Summer St. Studio 3225, Houston, TX 77007
Phone: 1-855-355-GRID. Email: nwood@truegridpaver.com Website: www.truegridpaver.com

2.2 Materials

- A. Base Course: TrueGrid was developed for multiple acceptable base materials. Locally sourced angular #57 stone/clean, sandy gravel material, crushed concrete, crushed shale, limerock, and crushed lava are acceptable materials. Variations in permeability of aggregates should be considered.

1. Conforming to the following sieve analysis and requirements:

<u>% Passing</u>	<u>Sieve Size</u>
100	3/4" – 1"
85	3/8"
60	#4
30	#40
< 3	#200

2. Sources of the material may include "pit run" or "crusher run". Crusher run material will typically require sand to be added (20 to 30 percent by volume) for long term high porosity. Should local sources not be available an alternative mixture can be created by mixing 2/3 crushed stone (.75 dia) with 1/3 sand as available.
- B. TrueGrid Permeable Pavers: Injection molded, highly durable, plastic grid structure with unique design components for high load capacity, high traffic applications. Produced from 100% Post Consumer Plastic. 1.8" cell height. Pre-assembled in 4' x 4' sheets for quick installation. Sheets can be reconfigured if needed. (See TrueGrid Specifications Sheet for more specifications and information.)
 - C. *Gravel Fill*: Obtain clean, washed angular rock to fill the 1.8" tall TrueGrid cells and spaces between. TrueGrid can be filled to top of cells and exposed or overfilled to hide cells. Maximum rock should be 1" in diameter and below.
 1. TrueGrid's design does not require anchors on level ground or slopes up to 8 degrees. TrueGrid is designed for slopes above 8 degrees. However, as a precaution, anchors/staking may need to be considered per each sloped install above 8 degrees.
 - D. *Grass Fill*: A sandy loam or loam soil should be used to fill the empty grass paver cells. The selection of sandy loam or loam soil should be made based upon the soil requirements of the turf variety selected for the project. Other soils if compatible with type of seed or sod are acceptable.

PART 3 – EXECUTION

3.1 Limited Warranty

- A. Examine sub-grade and base course installed conditions. Do not start TrueGrid Permeable Paver installation until unsatisfactory conditions are corrected. Check for improperly compacted trenches, debris, and improper gradients
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance. If existing conditions are found unsatisfactory, contact Quality Control Manager for resolution.

3.2 Preparation

- A. Place base course material over prepared sub base to grades shown on plans or from TrueGrid's recommended depths per application type, in lifts not to exceed 6", compacting each lift separately to 95% Modified Proctor. Leave minimum 1.8" for TrueGrid Permeable Paver unit. Fill to final grade.

3.3 Installation of TrueGrid Permeable Paver

- A. Install TrueGrid Permeable Paver units by placing cells face up. Sheets come preassembled in 4'x4' sheets and connect with friction fit interlocking connectors. No tooling required to connect or disconnect TrueGrid units. (9) Individual 16"x16" pieces can be disconnected from each 4'x4' sheet and reconfigured as needed. Units can be cut around curves and organic shapes on the job site with any electrical handsaw. Maintain 1" clearance to any pre-installed object or surface structure. Top of cells shall be between .25" to .5" below the surface of adjacent hard-surface pavements.
- B. Rock or soil fill aggregate can be driven directly on pre-filled TrueGrid to be dumped and spread.

3.4 Installation of Gravel Fill: TrueGrid gravel fill applications only

- A. Install Gravel into TrueGrid cavities by back dumping directly from dump truck or from buckets mounted to tractors. Hand shoveling fill gravel into the cells is also acceptable for smaller jobs. Direct exit the site by driving forward. While TrueGrid Permeable Pavers can handle high load capacities while empty, avoid sharp turns over unfilled rings. The gravel fill can then be spread from the pile using steer loaders, power brooms, blades, flat bottomed shovels, and/or wide “asphalt rakes” to fill the cells. The gravel should then be compacted when the cells are at capacity by using a roller for larger areas or a vibrating plate for smaller areas. If fully covering TrueGrid cells, typical coverage is .25” - .5” above cells.

3.5 Installation of Grass Fill: TrueGrid grass fill applications only– See Section 32 92 19 Seeding and 32 91 13 Soil Preparation. Choose either seed or sod.

- A. Hydroseeding/hydro-mulching – A combination of water, seed and fertilizer are homogeneously mixed in a truck mounted tank. The seed mixture is sprayed onto the site at rates shown in specification section 32 92 19.16 Hydraulic Seeding. Coverage should be uniform and complete. Following germination of the seed, areas lacking germination larger than 8”x 8” must be reseeded immediately. Seeded areas must be fertilized and kept moist during development of the turf.
- B. Sod – Use 0.5” thick (soil thickness) rolled sod from a reputable grower. Species should be wear resistant, free from disease, and in excellent condition.

3.6 Protection

- A. *Gravel fill:* Avoid sharp turns or “jack knives” in trailered vehicles when cells are empty. Damage due to buckling can occur.
- B. *Grass Fill / Seeded:* Seeded areas must be protected from any traffic, other than emergency vehicles, For a period of 4 – 6 weeks, or until the grass is mature to handle traffic. Avoid sharp turns or “jack knives” in trailered vehicles when cells are empty. Damage due to buckling can occur.
- C. *Grass Fill / Sodded:* Seeded areas must be protected from any traffic, other than emergency vehicles, For a period of 3 – 4 weeks, or until root system has been established.

3.7 Field Quality Control

- A. Any damaged sections of TrueGrid Permeable Pavers during install can be removed and replaced with no evidence of replacement apparent.
- B. Remove all excess materials, debris, and equipment from site upon completion of install.

3.8 Maintenance

- A. *Grass Fill:* Normal turf care procedures should be followed including as specified in Section 32 92 00 Manufacturers of Turfs and Grasses.

B. *Gravel Fill*: If the install is one that is initially a cell covered install, raking gravel back over exposed cell tops may be necessary if over fill aggregate migrates.

C. When snow removal is required, keep edged plow blade a minimum of 1" above the TrueGrid surface to avoid damage to the TrueGrid Permeable Paver Surface.

END OF SECTION 32 12 43

NOTES

Manufacturer's Product Specification Sheet

Dimensions: 16" x 16" x 1.8" (1.72 sq/ft)

Pre-Assembled: 16 sq/ft per layer (4' x 4' sheet) (9 grids per layer)

Cell Width: 3-3/16"

Weight: 2.15 lbs

Porosity: 90%

Compressive strength: 6,880 psi pre fill. Psi increases significantly with aggregate fill.

Material: Recycled High Density Polyethylene (100% post-consumer)

Color: Black with UV Stabilizer

Temperature Range: Dimensionally Stable for -58F to 194F

Moisture Absorption: .01%

Environmental Compatibility: nontoxic, harmless to plants, animals, and microorganisms.
Inert material, groundwater neutral

Installation Speed: 1000 sq/ft per man hour

Other features of TrueGrid

- Highly resistant to oils, gasoline, acids, salt, ammonia, and alcohol
- May be saw cut...
- Patent pending design yields ultimate hoop strength
- Circular elements provide multi-directional crush and shear strength
- Flexible links allow expansion and contraction depending on environmental conditions
- Built in X-Anchors allows weight of filler to hold grid down without any extra staking.
- Interlocking connectors

Ground Preparation: Depends upon site condition and local conditions.

Suggested Sub-base: 1/2" – 1-1/2" diameter clean/washed, angular gravel. Depth of this layer should be a minimum of 2"- 6". For additional drainage, increase depth of sub-base.

Class 2 road base (crushed concrete) is also a typical sub-base material.

Gravel/sandy soil mix (60/40) is suggested for grass fill applications.

Level sub-base before laying TrueGrid.

Installation: Layout and snap together pre-assembled sheets. (9 pcs per layer = 16 sq/ft)

If body weight does not level the grids, use plate vibrator or heavy cylinder to level.

Backfill: Any angular or round medium may be used. Fill cells with filler of choice.

1" diameter or smaller is recommended for gravel fill.

TrueGrid may be cut on site. Pre-cutting is not required. Angle grinder, circular saw, compass saw, or handsaw are all options to cut TrueGrid.

Delivery

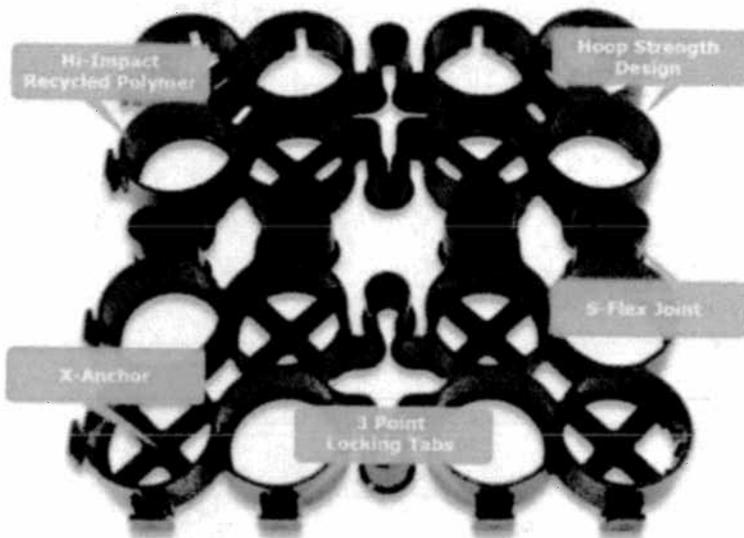
Pallet content: 775 sq/ft = 50 layers per pallet = 450 pcs

Pallet dimensions: 48" x 48" x 95"

Approximate pallet weight: 1,018 lbs

Truckload: 24 pallets or 18,600 sq/ft

For more info on TrueGrid please click onto our website www.truegridpaver.com.



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