Introduction to the TRUEGRID System

In urban watersheds, almost all of the impervious surface area is represented by building rooftops and paved surfaces. In residential areas most of the paved area is represented by the roadway system and residential driveways. Parking lots and paved industrial storage areas represent an even larger portion of the impervious surface in commercial and industrial areas. Impervious pavements can produce two-thirds of the excess runoff in an urban catchment. Runoff from impervious pavements contributes a substantial loading of hydrocarbons and heavy metal pollutants, and contributes greatly to the increased temperature of surface runoff. In most urban jurisdictions, a paved roadway system with a traditional curb and gutter configuration provides a key component of the overall urban drainage system. Surface flow from adjoining tributary watersheds is conveyed directly into catch basin inlets and connected piping systems. In these traditional impervious paved systems, the runoff coefficient (runoff volume) is increased and the time of concentration is decreased resulting in increased peak rates of runoff.

TRUEGRID provides a highly permeable stabilized surfaces that can be used for the movement and parking of vehicles (automobiles, trucks, construction equipment, aircraft, etc.) and storage of materials and equipment. Compared to conventional pavement, the TRUEGRID system is designed to infiltrate storm water runoff instead of shedding it off the surface. TRUEGRID will reduce the amount of runoff by allowing water to pass through surfaces that would otherwise be impervious. The storm water passes through the load bearing surface and aggregate sub base that are selected based upon the intended application and required infiltration rate. Runoff is stored in the stone aggregate sub base course / storage layer, and allowed to infiltrate into the surrounding soil (functioning like an infiltration basin).

A **TRUEGRID** surface has very high initial surface infiltration rates and can immediately infiltrate and store rainfall and runoff from high intensity rainstorms. In many cases, direct runoff is completely eliminated. The surface infiltration rates for these pavements will in most cases exceed 200-250 inches/hour. This is several orders of magnitude higher than all the rainfall intensities encountered in the Southwest and Midwest USA. These high infiltration rates are also 2-3 orders of magnitude higher than most soil infiltration rates. The TRUEGRID system relies on the ability of the void space within the surface material and the sub base to receive, store, and infiltrate water into the underlying sub soils. The aggregate sub base provides a temporary “reservoir”, receiving the inflow from the surface pavement layer and providing temporary storage while the water is discharged to the sub grade through infiltration or released to surface discharge through a sub drain system.

TRUEGRID Permeable Paversare designed to provide design professionals with an eco-friendly alternative to concrete and asphalt and other impervious surfaces.
Similar systems have been used in Europe for over 40 years and have been highly effective and accepted as a better alternative to impervious surfaces. TRUEGRID improved upon this concept and developed a stronger, more durable, USA made version that can handle any load and rigors concrete can handle….while being nearly 100% permeable.
TRUEGRID has been honored as one of two winners, from hundreds of green technology products considered, to receive grants support for education from entities including the U.S. Department of the Interior and the U.S. Department of Energy. These grants were awarded to TRUEGRID to promote and educate others on the benefits of TRUEGRID as an eco-friendly alternative to concrete and asphalt. TRUEGRID was chosen due to its low impact development properties, its stormwater maintenance /high permeability qualities, high load capacities, long life expectancy-no maintenance performance and 100% post-consumer recycled material composition.

The value of the TRUEGRID systems includes:

Runoff volume reduction/eliminationis achieved when TRUEGRID is placed over *in situ* soils and a defined volume of the water passing through the pavement is infiltrated into the soil subgrade below.

Peak runoff rate reduction is achieved when the volume of water passing through the TRUEGRID surface is "detained" for a defined period of time within the pavement cross-section and the open graded aggregate sub base beneath the pavement. The effective infiltration rate for the watershed is increased by trapping the water in the permeable surfaces and effectively increasing the time of concentration in the catchment area.

Pollutant removal.Specific field data on the reductions of pollutant concentrations by various permeable pavements are limited. However, reductions in the concentrations of total suspended solids and associated constituents, such as metals, oils, and greases appear to be relatively high. The fact that all permeable pavements significantly reduce the average annual runoff volume makes them very effective in reducing pollutant loads reaching the receiving waters. Infiltration of storm water runoff through the pavement surface will provide a degree of suspended solids removal followed by additional removal of colloidal solids and soluble pollutants in the aggregate sub base and sub soils. Sorption of metals to colloidal solids and within the pavement void matrix is another removal function. Soluble organic pollutants adsorbed within the pavement void matrix and the open graded aggregate sub base will be exposed to biodegradation over time. Adsorption and ion exchange occur as storm water travels through the unsaturated (vadose) zone below the aggregate base and reduce the particulate and dissolved pollutant loading to the groundwater (saturated zone).Permeable pavement can be used to provide ground water recharge. Some data suggest that asmuch as 70% to 80% of annual rainfall will go toward ground water recharge (Gburek and Urban,1980). A third study by Brattebo and Booth (2003) indicates that many trademarked permeable paver systems effectively reduced concentrations of motor oil, copper, and zinc. Furthermore, the study found that almost all precipitation that fell on the permeable pavers infiltrated even after 6 years of daily use as a parking area.

Reduces Heat Island Effect. Heat Island Effect occurs in areas such as a city and industrial sites that have consistently higher temperatures than surrounding areas because of greater retention of heat. This retention of heat is due to buildings, concrete, and asphalt.
Using TRUEGRID in these "hot spot" areas for pathways, parking lots, driveways, roofs…etc., reduces the absorbability of solar rays and thus helps steady and cool the natural environment.

High load bearing capacity.TRUEGRID is designed with the highest load capacities of any grid system and can withstand significant structural loads. TRUEGRID provides a stable and continuous load-bearing surface throughout parking areas.

GREENSPEC Listed, Sustainable Product

TRUEGRID was developed and is manufactured in Houston, TX. It is produced from 100% post-consumer recycled material. (We also have production in Maxwell, TX….1hr from San Antonio / 30 min from New Braunfels.)
TRUEGRID will add to LEED Credits in the following categories.

- Construction Activity: Pollution Prevention
- Storm water Design: Quantity Control
- Storm water Design: Quality Control
- Heat Island Effect: Non-Roof
- Recycled Material Content

Sub-base considerations

Crushed aggregate meeting ASTM No. 57 is commonly used for open-graded sub bases along with ASTM No. 2 to No. 4. These materials are widely available and they are recommended for most TRUEGRID Permeable Paver applications. These materials will have a nominal porosity (volume of voids/total volume of base) over 0.32 and a storage capacity in the void space (volume of voids/volume of aggregate) approaching 40%. A 40% void space provides 0.4 cubic feet of storage capacity for each cubic foot of aggregate (the volume of the base will need to be 2.5 times the volume of water to be stored).

Chart A: Permeable Base

AASHTO #57 permeable sub base material defined as:

Sieve Size		Percent Passing	
mm	In.	#57	Typical
37.5	1-1/2	100	100
25	1	95-100	97
19	3/4		75
12.5	1/2	26-60	45
9.5	3/8		25
4.75	#4	0-10	5
2.36	#8	0-5	2

Chart B: Infiltration Rate (IR) Inches/Hour

	Percent of Slope				
Soil Texture, Type	0-4%	5-8%	8-12%	12-16%	Over 16%
Coarse Sand	1.25	1.00	.75	.50	.31
Medium Sand	1.06	.85	.64	.42	.27
Fine Sand	.94	.75	.56	.38	.24
Loamy Sand	.88	.70	.53	.35	.22
Sandy Loam	.75	.60	.45	.30	.19
Fine Sandy Loam	.63	.50	.38	.25	.16
V. Fine Sandy Loam	.59	.47	.35	.24	.15
Loam	.54	.43	.33	.22	.14
Silt Loam	.50	.40	.30	.20	.13
Silt	.44	.35	.26	.18	.11
Sandy Clay	.31	.25	.19	.12	.08
Clay Loam	.25	.20	.15	.10	.06
Silty Clay	.19	.15	.11	.08	.05
Clay	.13	.10	.08	.05	.03

Derived from U.S. Department of Agriculture information

Notes:
Click on the TRUEGRID website page “ENGINEERS & ARCHITECTS” for cross section drawings of typical TRUEGRID Installations for gravel fill and grass fill.