

Figure 1. Cross-section of the Flexible Pavement Structure

Table 2. Main Components of the Patented Flexible Pavement Structure

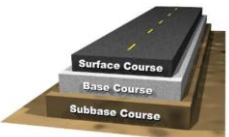



Main Components of the Invention		Properties	Figures/Photos
Pavement Structure	Subgrade	The natural materials located along the horizontal alignment of the pavement and served as a foundation of the pavement structure. The upper 15-20cm of the subgrade is scarified and blended to provide a uniform material before it is compacted to maximum density. The subgrade may also consists of borrow materials, well compacted. It may be necessary to treat the subgrade materials with certain types of stabilizers to achieve certain strength properties.	
	Sub-Base	Consists of materials of superior quality to that of the subgrade in terms of bearing capacity. This layer is usually consists of crushed aggregate or a mixture of fine and coarse aggregate.	
	Base	Usually consists of granular materials such as crushed stone, crushed or uncrushed gravel and sand. The materials should have better properties than those used for the sub-base course in terms of gradation and strength. To improve the materials properties, they can be stabilized with Portland cement, asphalt or lime.	
	Surface Layer	Usually made of asphaltic concrete, which is a mixture of asphalt cement and aggregate. The function of this layer is to withstand high tire pressure, resisting the wheel abrasion, provide a skid resisting surface and to waterproof the entire pavement structure. The quality of the surface material depends on the mix design of the asphalt concrete used.	
Geofabric (Terram 2000)		<p>Terram is ICI fibers' trade name for its fabrics for the Civil Engineering industry. Terram 2000 geotextile fabric enhances the performance and design life of granular pavement layers by providing the reinforcement, filtration and separation functions. Terram is made from 67% polypropylene and 33% polyethylene.</p> <ul style="list-style-type: none"> - Tensile Strength : 14.5 kN/m - Tensile Elongation : 60% - CBR Puncture Resistance : 2750 N - Cone Drop : 26 mm - Pore Size (Mean) : 65 μm - Permeability : 55 l/m² 	
Waterproof Heat Insulation Material		<ul style="list-style-type: none"> - Item Name: X PE Foam Foil Insulation - Material Structure: Alu + XPE/EPE Foam + Alu - Thermal Conductivity: 0.03 W/mk - Reflectivity: 95-97% - Temperature Resistance: -40~100 °C - Heat Insulating Ability: 34.5~56.6 °C - Water Vapor Transmission Rate: \leq 1.00 g/m²/day - Tensile Load (Maximum in N): MD-44, TD-99 - GSM: 180 – 410 g/cm² - Density: 431 g/m² 	
Foamglas Insulation Material		<p>Foam glass is a <u>porous glass foam material</u>. Its advantages as a <u>civil engineering material</u> include its light weight, high strength, and thermal and acoustic insulating properties. This material is moisture-proof, fireproof, and anti-corrosive. It has the advantages of long-term use performance.</p> <ul style="list-style-type: none"> - Item Name: Foamglas T3 + Slab XL - Operating Temperature range of -200 to 430 °C, - Expansion Coefficient (8 × 10 °C). - Thermal Conductivity D: 0.036 [W/(mK)] - Compressive Strength : CS \geq 500 kPa 	

Table 2. Main Functions of the Different Proposed Materials in the System

Material	Main Functions in the System			Details
	Thermal Insulation	Waterproof	Reinforcement	
Foamglas Material	Yes	Yes	Yes	Foamglas has a truly hermetically sealed and closed cell vapor tight internal structure. It has the capability to withstand high compressive loads and to provide a permanent thermal performance. Foamglas supports high compressive loads without deflection or movement. It is the ideal insulation material for load bearing areas. The close cell structure prevents water penetration or tracking by capillary action.
XPE Foam laminated Alu Foil (Double Side)	Yes	Yes	-	XPE Foam laminated Alu Foil provides low thermal conductivity and excellent heat insulation. The side of metalized XPE forms an effective waterproof, moisture proof, anti-static, tearing strength, anti-pull, leak resistance, and good fire resistance. It is protective, versatile and environmentally friendly.
Terram 2000	-	Yes	Yes	Terram is ICI fibers' trade name for its fabrics for the Civil Engineering industry. These range from lightweight, thermally bonded, non-woven, permeable materials designed for use in ground stabilization, drainage, reinforcement, and erosion control to special-purpose fabrics.
Proposed Layered Protection System	Function Doubled	Function Tripled	Function Doubled	The combination of the multi-function of the layered system enhances the performance of the flexible pavement.