



## GS TERRAELAST

### Introduction

**GS TerraElast**, a new surface material, is the ideal solution to all problems in road, sidewalk, & yard construction.

**GS TerraElast** can supplement or entirely replace construction materials such as asphalt and concrete with a high-strength, water-permeable, sound-absorbent composite that can be installed on a level grade (no slope needed for drainage).

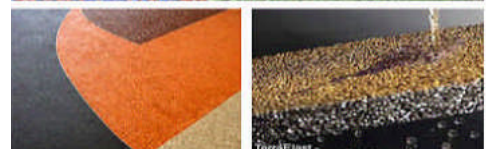
**GS TerraElast has many great features...**

- Water-permeable, with "open" spaces of approximately 40%
- Greater pressure resistance and tensile strength. More durable, resilient, and temperature-resistant than asphalt/concrete
- Environmentally friendly from installation to disposal



**Civil engineering trends indicate that *environmentally friendly construction that does not use heavy oil compounds* – which is still the rule today – *is essential*.**

With its outstanding characteristics, **GS TerraElast** is a trend-setting alternative for road, yard, and sidewalk construction in every way.



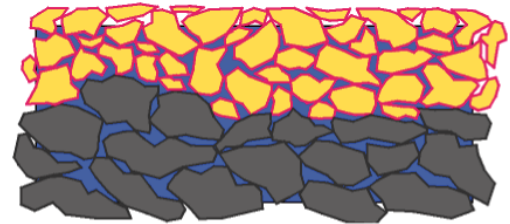


**GS TERRAELAST**

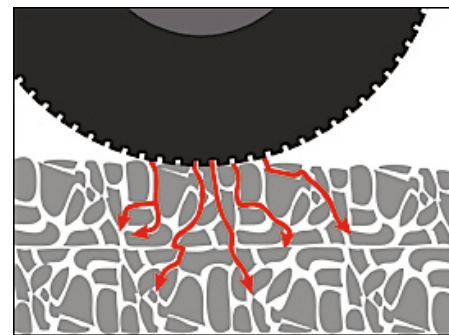
**Advantages & Benefits**

**GS TerraElast** , has many benefits...

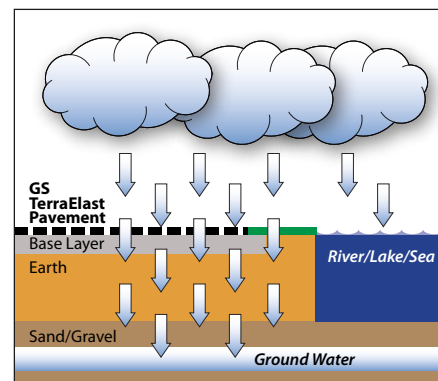
- Water-Permeable
- Elastic
- Inherently Stable
- Sound-Absorbent
- Environmentally Friendly
- Resilient
- Frost-Resistant
- Seamless Installation
- Durable
- Easy To Care For
- Low Maintenance
- Sets Quickly
- Skid-Resistant
- Reduces Sprayed Water
- Saves Material
- Choice Of Colours
- Does Not Create A Sealed Surface
- Less Road Noise
- No Aquaplaning
- No Drainage
- No Lane Grooves
- No Frost Damage
- No Pot Holes
- Reduced Wear
- Less Ongoing Maintenance
- Reduced Pollution
- Less Material Costs
- No Sealing Charges
- Reduced Personnel Costs



**Water Permeable**



**Noise Absorbent**



**Natural Water Cycle**



**GS TERRAELAST**

**Advantages & Benefits (cont'd)**

The advantages of the **GS TerraElast** system can be summarised under three categories:

### **1. Cost-effective installation and maintenance:**

- **Low planning and installation costs / no drainage grade**  
In addition to the elimination of expensive sewer systems, the precise grade normally required for drainage can also be disregarded.
- **Frost resistance**  
A void volume of 40% and seamless installation prevents frost damage – maximum expansion tolerance – (Marth frost resistance report, 27/04/2004)
- **Resistant against surface damage / lane grooves**  
Compared to conventional pavement, TerraElast construction materials are more durable under heavy loads, remaining elastic and retaining their shape when exposed to heat.

### **2. Safety:**

- No aquaplaning
- No splashed water (spray)
- Skid-resistant
- No lane groove formation due to inherently stable, elastic sub grade
- Reduced ice formation
- Precise fit, seamless repairs
- No frost damage or pot holes
- Flame-resistant



### **3. Environmental compatibility:**

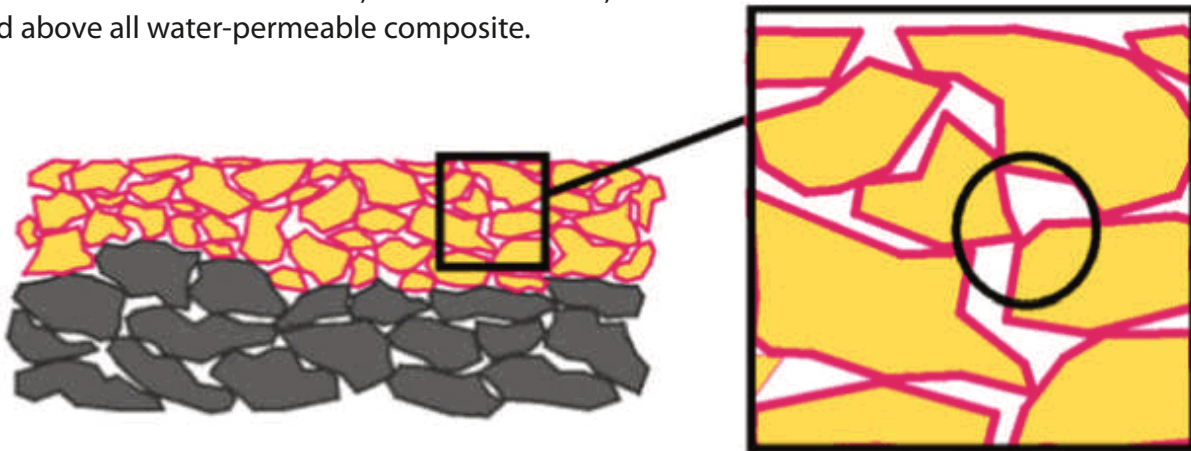
- No leaching (unlike asphalt which leaches oil, tar)
- Noise reduction due to outstanding sound absorbent characteristics
- Increased groundwater supply (surface is not sealed)
- No chemical de-icing, reduced use of salt



**GS TERRAELAST**

**Technology Overview**

The **GS TerraElast system** coats each grain and bonds the stones into a stable, sound-absorbent, and above all water-permeable composite.



The granulate is only bonded at the contact points.

**This results in water-permeable “open” spaces  
(proportion : approx. 40%).**

Standard street cleaning used on conventional asphalt roads prevents clogging of the pores.

*On the other hand, ultra-quiet asphalt made of “leftover” used oil compounds from the heavy oil industry is self-clogging, releasing its own components when subjected to heat and pressure.*

TerraElast is elastic, inherently stable, and does not leach; as a result, it is classified in water pollution class 0.





## GS TERRAELAST

### Installation Details

**Sandwich Architecture:**  
Road, sidewalk, and yard construction applications.

With **GS TerraElast**, only two layers are required:

1. Base Layer (Base Course) (10-25 cm)
2. Surface Course (2-4 cm)

=====> max. 29 cm total thickness

**This 2 layer design offers material savings and improved effectiveness when compared to traditional asphalt applications which usually consist of 3 to 5 layers.**

The **base layer** is made from coarse crushed stone (8/11 mm up to 22/33 mm depending on the requirements) is applied, graded, compacted, and sprayed with a binding agent. The binding agent bonds the base layer, creating a stable structure. The surface course is applied over the base course.

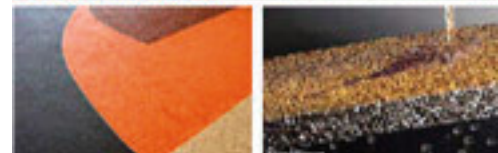
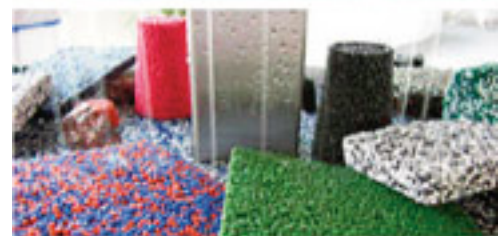
The granulate for the **surface course** is evenly mixed with the binding agent, applied over the base course in a viscous state, and then smoothed and compacted with a roller.

**The process uses conventional road construction mixers and surface preparation equipment.**

Preliminary steps in the **“asphalt mixer”** are *identical*.

With a 25 cm base course and 4 cm surface course, the system is suitable for heavy traffic.

The surface is fully load-bearing after 24 hours, which results in cost reductions due to an efficient installation process.





**GS TERRAELAST**

**Durability, Strength and  
Long-Term Performance**

**Long-term tests in Mannheim and Freiburg,  
Germany have shown:**

*Water permeability* - with a corresponding grain size (surface course 1- 3 mm), there is no significant reduction in seepage after 10 years.

**The surface is resistant against acids, leaching,  
and solar radiation.**

**It is extremely pressure resistant and has a high  
tensile strength.**



**Faculty for the construction of state transportation routes, Prof.  
Leykauf, Munich Technical University, research report 2362  
dated 05/06/2007**

*"The tests that were conducted resulted in characteristic values that indicate the load capacity of the structure under heavy truck traffic (high axle weights) and equipment such as fork lifts (high contact pressure while turning) is several times higher compared to asphalt."*

**Prof. Leykauf, Munich Technical University, research report 2385; 27/09/2007:**

*"In (wear tests under extreme conditions) ... with a tire contact pressure up to  $p_m=0.8 \text{ N/mm}^2$ , no surface deformation occurred (no lane grooves). ... The superstructure that was tested is highly resistant to deformation."*

**GS TerraElast construction materials are more durable under heavy loads, remaining elastic and retaining their shape when exposed to heat.**

Bending tensile strength up to  $20 \text{ N/mm}^2$

Pressure resistance up to  $45 \text{ N/mm}^2$



**GS TERRAELAST**

**Environmental benefits of unsealed surfaces**

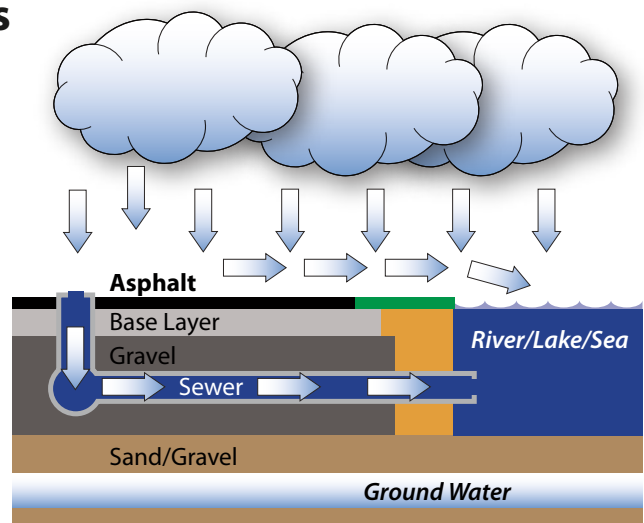
Using the GS TerraElast system for road construction leads to the even distribution of precipitation through the road surface.

**Conventional pavement systems**

High water, flooding, and reduced groundwater levels caused by massive disruptions to the natural groundwater system and by sealed surfaces.

A sewer network is expensive to install & maintain.

Flooding at other locations caused by a concentration of rainwater in sewers and natural bodies of water is a constant concern.

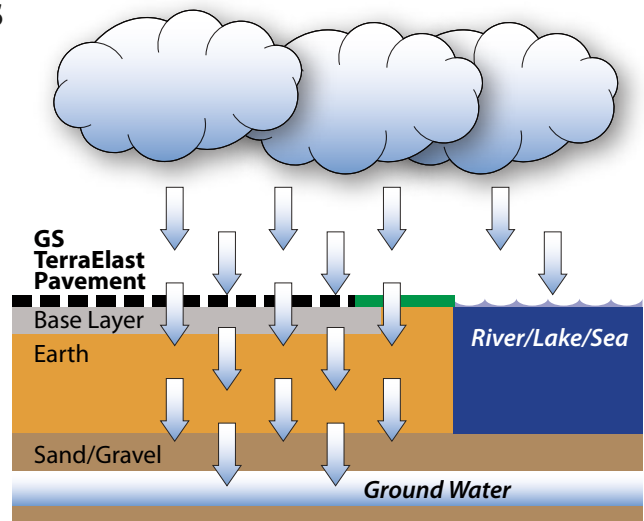


**GS TerraElast pavement systems**

We integrate all requirements of modern life in a pavement system with the natural characteristics of an undeveloped surface

A sewer network is not required.

Flooding at other locations caused by a concentration of rainwater is prevented.





## Absorption instead of reflection

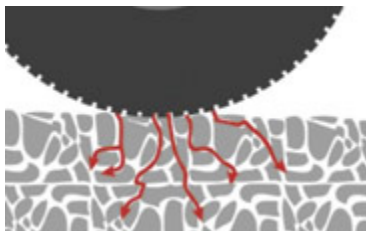
*GS TerraElast used as pavement absorbs noise at the source.*

Noise emission on standard roads is reduced by **8 dB at only 50km/h** (noise reduction by **3 dB** corresponds to **50% less noise** to the human ear).

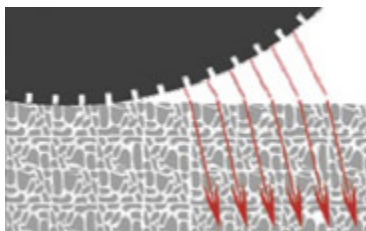


Most of the noise caused by road traffic is the result of **rolling resistance**.

Air is **compressed** between the tire and the road surface until it escapes in a **miniature explosion**.



With **GS TerraElast**, noise is discharged into the road surface.



**GS TerraElast** pavement prevents compression due to a large number of open cavities. Air escapes into the road surface.

Müller-BBM report dated 20/06/2007  
(sound insulation experts)

*"(...) at 50 km/h (passenger vehicles / trucks), the GS TerraElast pavement system (sandwich architecture) generates 2-3 dB less noise than the quietest version of standard dual-layer open-pore asphalt currently available" (latest OPA2 ultra-quiet asphalt)*





**GS TERRAELAST**

**Key Characteristics (Summary)**

- Compared to standard asphalt, street noise is reduced by 8 dB at 50 km/h. Compared to the latest ultra-quiet asphalt (OPA2), it is reduced by 3 dB. (A 3 dB reduction corresponds to 50% less noise to the human ear.)
- Water-permeable, no aquaplaning and less splashed water, very little ice formation (less salting during the winter).
- Temperature-resistant (-30 to +120 degrees Celsius). Asphalt heats up, softens, and buckles.
- Higher tensile strength than concrete (at least 13.2 N/mm<sup>2</sup> for the base course; at least 12.3 N/mm<sup>2</sup> for the surface course); no lane groove formation over the long term.
- No frost damage since there is sufficient void volume to allow water to expand.
- Environmentally friendly, no leaching of hazardous substances.
- No special requirements for removal or demolition – water pollution class 0. (Can be deposited in a landfill or water protection area without causing problems.) - Asphalt has to be 100% recycled or disposed of at high cost -
- Cost savings:
  1. Reduction or elimination of storm sewers
  2. Elimination of municipal sealing charges
- Extremely durable:
  1. Very stable
  2. Resistant against acids and bases
- Easy to clean, can be repaired at low cost with no loss of quality



**GS TERRAELAST**

**Applications**

**Road, sidewalk, and yard construction**

The elimination of drainage systems regularly makes the **GS TerraElast** sidewalk and yard construction system more cost effective to buy and install than conventional materials.

The following factors also need to be considered for **long-term payback**...

**NO COSTS FOR:**

- Measures to compensate for sealed surfaces – e.g. reforestation
- top resealing the surface
- Sewer installation and connections for drainage
- Frost protection and repairing frost damage

*Longer Lifespan ==> Reduced Wear ==> Lower Maintenance Costs*

**Conclusion:**

The **GS TerraElast system** reduces costs at *acquisition and over its entire life cycle!*

**Sound insulation walls**

The principle of conventional sound insulation walls is based on reflection, e.g.: *Deflecting sound in another direction.*

**Unlike** conventional methods, the **GS TerraElast** sound insulation wall achieves **noise reduction through absorption**.

Up to 90% of road noise is generated just above the surface, mainly through rolling resistance.

The GS TerraElast sound insulation wall **absorbs and dampens noise**.

**Advantages of the GS TerraElast sound insulation wall:**

- Choice of colours
- Far less expensive than conventional sound insulation walls
- Significantly reduced wall height with improved effectiveness





**GS TERRAELAST**

**Applications**

**Additional applications**

In addition to road, sidewalk, yard construction, and sound insulation walls for freeways **GS TerraElast** products can also be used for a wide range of other applications:

- Coastline protection and sand retention
- Airport construction and renovation
- Ballast stabilization for railway lines
- Tree protection rings
- Stairs (slip-resistant)
- Indoor, outdoor, and private pools (slip-resistant when wet)
- Car wash facilities
- Terraces and balconies
- Sanitary facilities (vanities, sinks, showers, etc.)
- Complete trade show booths
- Manhole covers
- Parks, golf courses
- Dividing walls
- Partial and full wall coverings
- Designer furniture (shelves, tables, lamps, etc.)
- Sales counters, reception desks

Since **GS TerraElast** can use different grain sizes, materials (stone, glass slag, gravel, etc.) and colours of fill, custom surface designs are possible (logos, red bicycle trails, etc.). This allows for creative and intuitive designs that enhance landscape layouts of any type. With 20,000 colour combinations, you have a wide colour gamut to choose from.

