



sealing-free



Building in Harmony with Nature

natural optical appearance



high load bearing capacity



www.tte.eu

HÜBNER-LEE



Greened parking place + paved driving track



Creative design with TTE® as a 'module'



Base course layer replacement for paving covers

WHAT is TTE®?

TTE® is more than just a layer (plastic turf grid) - it is a near-natural construction concept which sets new standards for ecological traffic surfaces.

- TTE® stands for **S**eparation, **S**upport and **D**ewatering
- **fully water permeable** surfaces without dewatering equipment
- **Base course layer replacement** by up to **100%** through load distribution
- **Securing the ecosystem** (protected resources ground, water, the climate/air)
- **only small amounts of building works required** and associated costs
- **CO₂ emissions** of up to **80% less** compared to conventional building methods

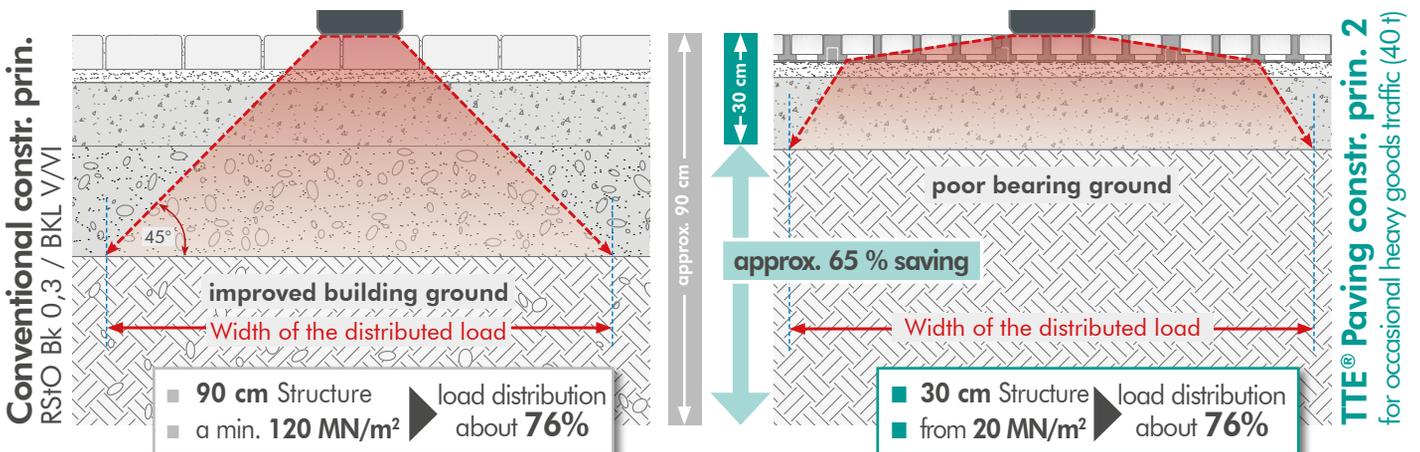


TTE®-MultiDrain^{PLUS}

800 x 400 x 60 mm
ca. 27 kg/m²
Strut thickness:
14-15 mm

HOW does TTE® function?

The innovative idea of the TTE® construction element is to replace the base layer material by an intelligent load distribution and, in this way, to combine the covering and base layer into one system. (Extract Load distribution checking)



The TTE® construction principle can be demonstrated to deliver the same load transfer as conventional construction principles.



Public greened parking place



Outside facility for a residential building

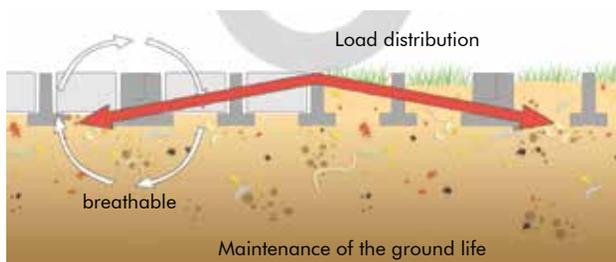


Parking places at a retail centre

WHY is the TTE[®] system ecologically friendly?

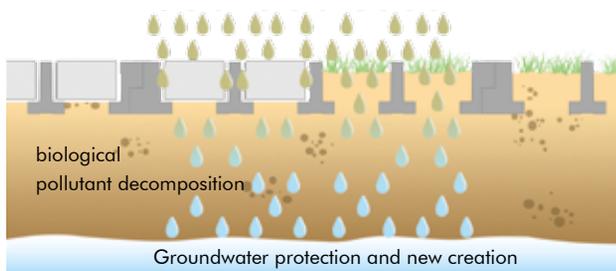
Environmental protection is our central goal. Using the TTE[®] system you can create a near-natural reinforcement with which you can retain the ecosystem and also profit from your investment at the same time.

SOIL PROTECTION



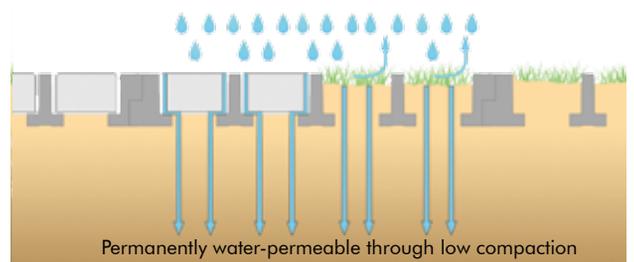
- through load distribution the requirements on the load bearing capacity and compaction and thus also intervention in the protected resource, the earth, are reduced
- the ecologically valuable living ground zone is retained; there is protection against post-compression and the ground remains breathable

GROUNDWATER PROTECTION



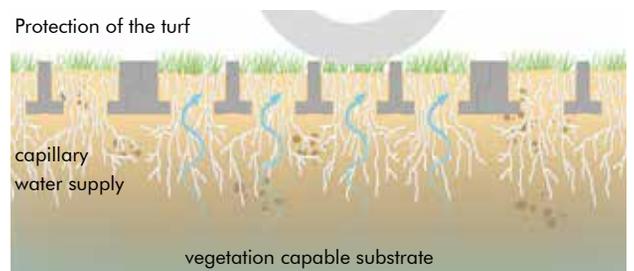
- pretreatment of polluted rain water over a living ground zone
- Thus TTE[®] protects the groundwater from pollutants and promotes new growth
- Rain water treatment is also made possible for the first time for paved surfaces capable of seepage.

WATER BALANCE



- the low compaction of the substrate secures retention and fully decentralised seepage of rain water
- according to the construction principle and permeability of the substrate also additional flowing off of surface water from traffic surfaces can be included (dimensionable, project-related)

VEGETATION CAPABILITY



- TTE[®] protects the substrate and the turf from shear forces and compaction
- through connection to a vegetation capable substrate, without breakage of capillaries, an optimal supply of water and nutrients as well as a deep root-ness is secured.

20 years of the TTE[®] construction principle
- about **3 million** m² in Europe



Private parking place, construction principle 1



Public parking place construction principle 2



TTE[®] SYSTEM
für nachhaltiges Bauen

Residential street, construction principle 3

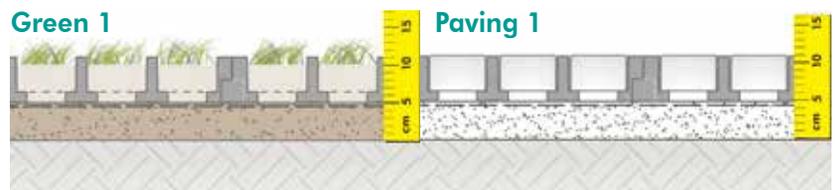
WHERE is the TTE[®] construction principle used?

The system serves to reinforce traffic surfaces of all kinds. The TTE[®] construction principle is subdivided into greened and paved surfaces and varies according to intensity of use.

TTE[®] Construction Principle 1

Passenger cars up to a total weight of **3.5 t**

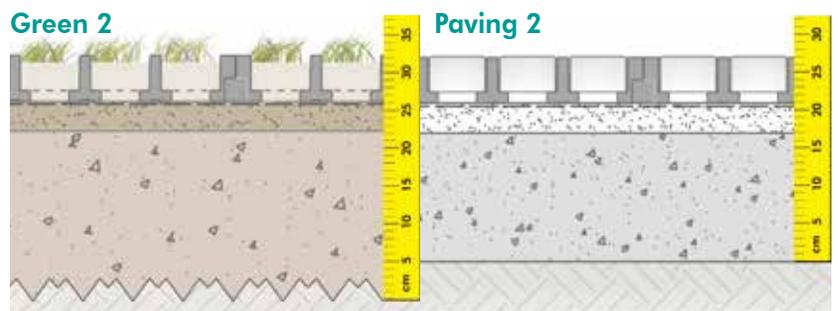
- pathways and bike lanes
- private passenger car parking spaces
- private entrances



TTE[®] Construction Principle 2

Passenger car and **occasional** heavy goods traffic
(represents Bk 0.3 / BKL V/VI according to RStO)

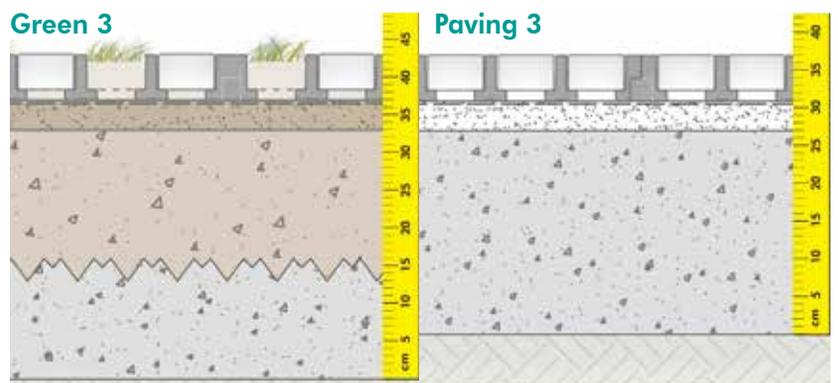
- public car parking spaces + entrances
- entrances to fire stations/bypass roads
- courtyard fortifications
- service roads
- rural roads



TTE[®] Construction Principle 3

Heavy goods traffic up to **40 t**
(represents Bk 1.8 / BKL III according to RStO)

- Local streets
- Lorry and bus parking places
- Industrial warehouse spaces and entrances
- Service pathways at motorway service stations





4. Laying of TTE® elements on a separating mesh



5. Inserting the TTE® paving stones

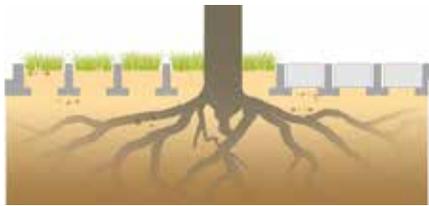


6. Filling and seeding of chambers

FURTHER application solutions possible with the TTE® system

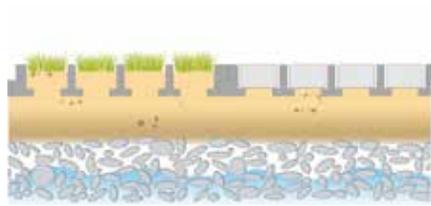
The TTE® load distribution system is an innovation for reinforcing of root areas, for drainage systems which can be driven over and as a base course layer replacement for poor building grounds.

Root protection for existing/new plantings



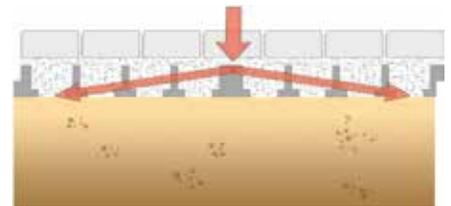
- the cost-effective alternative to tree disks and root bridges
- a compact and weight reducing structure for fastening without damaging the roots
- permanent protection against pressure and compaction
- a good water supply to and ventilation of the root area
- unlimited development of the root system

passable drainage system



- a high drainage performance through lower demands upon compaction of the substrate and surface channeling
- Pretreatment of polluted rain water over a living ground zone
- surfaces/French drainage system which can be driven over (up to 40 t.)

Base course layer replacement/stabilisation



- modular mineral base course layer with near-normal surface seepage
- rigid substrate for paving stones and slab coverings or water-bound coverings
- already usable from a load bearing capacity $E_{v2} = 10 \text{ MN/m}^2$
- Reduces the mineral base course layer by up to 100%
- permanently loadable, even and water permeable surfaces

TTE®- The ideal solution for...

poor load carrying and inhomogeneous building ground, rainwater management and own ground dewatering as well as rain water treatment over a living ground zone. Through minimal intervention the TTE® system offers a **sensitive solution for development of protected areas** (natural, landscape, water conservation areas and root areas of trees).

...more than a turf grid



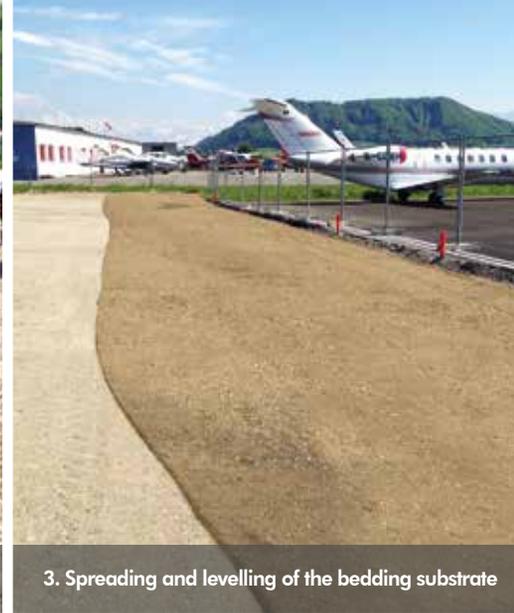


1. Gravel sand mixture on the existing topsoil

TTE® Construction Principle 2)



2. Rolling on the gravel sand into the top soil



3. Spreading and levelling of the bedding substrate

WHAT advantages do the TTE® construction principle offer?

TTE® is both a surface area reinforcement and a dewatering system. With just low level of building work required, both costs and resources can be saved and building projects can be implemented in the shortest possible time.

- TTE® replaces the mineral base course layer by up to 100 %
- no improvement of the building ground is needed for poor load carrying grounds
- no edge banding in side areas is needed due to the self-locking mechanism in the lattice
- high quality and durable fastening
- no further dewatering equipment is needed
- no rain water fees
- easy to obtain planning permission through low level intervention in the ecosystem

Comparison of conventional construction principles with the ecological TTE® construction principle

CONVENTIONAL construction principle RSiO Bk 0,3 / BKL V/VI	ECOLOGICAL TTE® construction principle TTE® construction principle 2
<p>BUILDING COSTS</p> <ol style="list-style-type: none"> Excavation approx. 60 cm (if so ground improvement) Dewatering equipment and manufacture the sewerage Flattening the building ground Compaction $\geq 45 \text{ MN/m}^2$ Setting the border rotary Antifreeze layer and Installing the base course layer, layer by layer approx. 50 cm with a high compaction power $\geq 120 \text{ MN/m}^2$ Creating the bedding Creating the covering layer <p>+ possibly also rain water treatment + possibly also tree disk / root bridge</p>	<p>SHORT TERM construction time</p> <ol style="list-style-type: none"> Excavation approx. 30 cm Flattening the building ground ($\geq 10 \text{ MN/m}^2$) Setting the border at the transverse sides Installing the base course layer approx. 20 cm with low compaction $\geq 20 \text{ MN/m}^2$ Creating the bedding Laying the TTE® ($20 \text{ m}^2/\text{Stunde}$) and filling
<p style="text-align: center;">€</p>	<p style="text-align: center;">€</p>
<p>FUNCTION</p> <ol style="list-style-type: none"> Taking up and absorption of traffic loads 	<p>MORE Function</p> <ol style="list-style-type: none"> Taking up and absorption of traffic loads Full decentralised seepage no drainage installation + sewerage Treatment of rain water by a living ground zone Protection of the ground life and the ecology Can also function at the same time as root protection