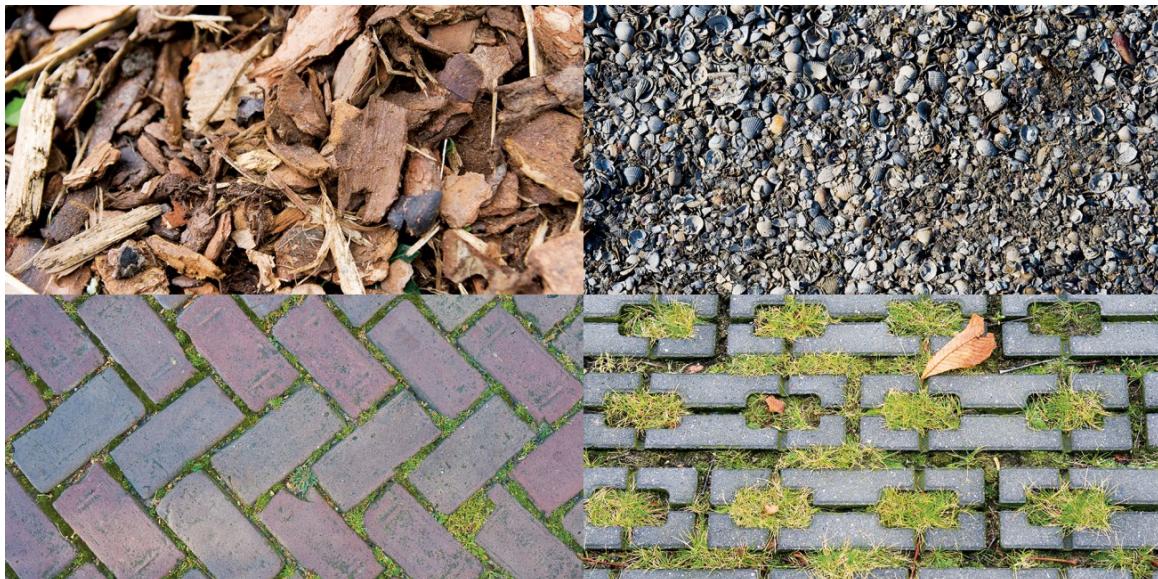


# URBAN GREEN-BLUE GRIDS for sustainable and resilient cities

Measures › Water › Buffering and infiltration › Porous paving materials

## Porous paving materials



© atelier GROENBLAUW, Amar Sjauw En Wa

### Data

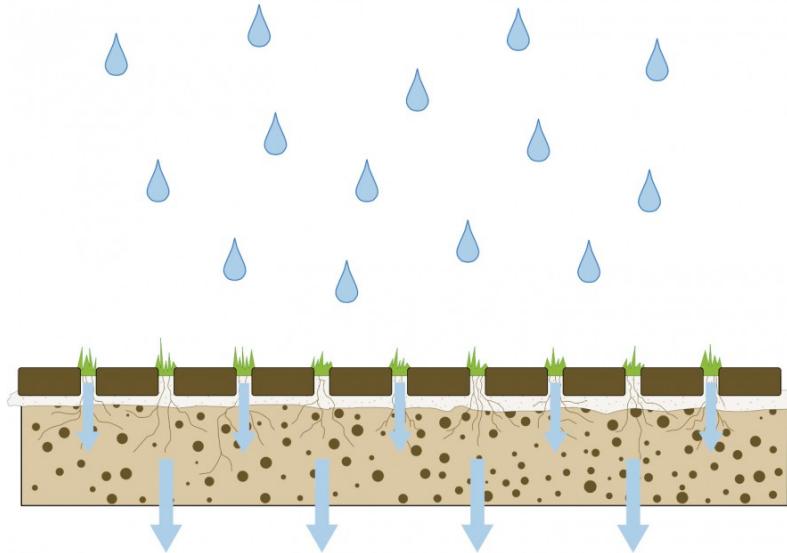
**Application:** In well-drained ground  
**Advantage:** Low-tech, low maintenance  
**Disadvantage:** No buffering capacity

Water ••  
Heat ••  
Biodiversity •  
Multifunctional space usage •  
Construction costs •  
Maintenance/management •

Besides reducing the percentage of impervious surfaces, porous paving materials can also be used to cover the ground. Any porous material is highly suitable for paving: for example, open cell concrete blocks, grass concrete pavers, woodchips, shells or gravel can be used as paving materials. Precipitation can infiltrate into the ground without any appreciable difficulty; the percentage of openings varies from around 15% to 40%. This type of paving material can be used for such purposes as footpaths, playgrounds, fire service roads and central reservations,

for aeration around trees, as edging for paving materials and in verges. For roads and car parks that are used extensively, paving materials such as porous clinkers, open-joint clinkers, open paving patterns, gravel or shells can be used.

Porous paving materials cannot be used for intensively used roads or car parks owing to the risk of pollution, and because those materials cannot bear large loads. [Geiger et al., 2009]



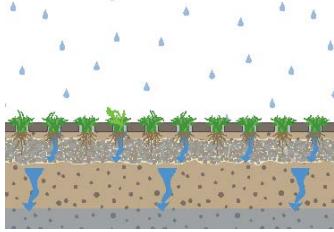
Section scheme © atelier GROENBLAUW, Marlies van der Linden (based on: Geiger et al, 2009)

### Grass concrete pavers

Car parks, roads and garage drives that see less intensive use can be paved using grass concrete tiles. Depending on the type of foundation under the tiles, the infiltration percentage can be as high as 100%.



Grass concrete pavement in Delft, The Netherlands © atelier GROENBLAUW, Amar Sjauw En Wa



[Grass concrete pavers © atelier GROENBLAUW](#)

(<http://www.groenblauwenetwerken.com/cms/..../uploads/20160225-Rainproof-06-grasbetonstenen.jpg>)

## Porous clinkers

Porous clinkers have a grain structure with a high percentage of pores that let through water and air. Combined with a porous joint filler, or if the clinkers are laid on a porous foundation and not joined, surfaces with porous clinkers can achieve infiltration percentages of up to 100%. Porous clinkers can be used for footpaths and cycle paths. One drawback, however, is that the clinkers become clogged with sediment after a while.



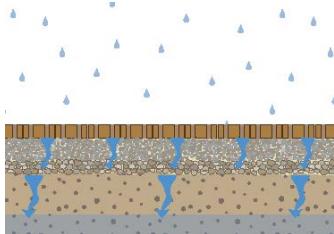
Porous clinkers © Breukers

## Open-joint clinkers

These clinkers have nubs on their sides, ensuring that a gap always remains between separate clinkers and the joints remain open.



Open-joint clinkers © atelier GROENBLAUW, Amar Sjauw En Wa



Porous clinkers © atelier GROENBLAUW

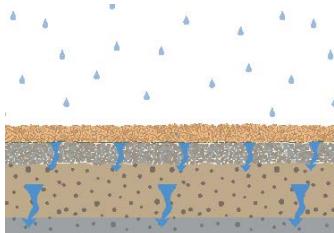
(<http://www.groenblauwenetwerken.com/cms/..../uploads/20160225-Rainproof-07-poreuze-klinkers.jpg>)

## Woodchips and pine bark

These are natural products that both let through water and air. They are suitable for playgrounds and garden paths. Since woodchips and pine bark prevent vegetation from growing, they are an alternative to weed killers. As paving materials, woodchips and pine bark need to be topped up with new material after a few years.



Tree bark © atelier GROENBLAUW, Amar Sjauw En Wa



Soft semi permeable pavement © atelier GROENBLAUW

(<http://www.groenblauwenetwerken.com/cms/..../uploads/20160225-Rainproof-08-half-verharding-zacht.jpg>)

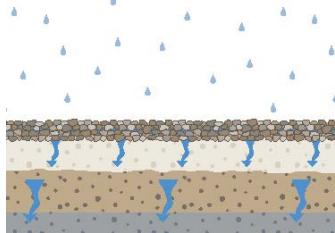
## **Gravel, stone chippings and shells**

Gravel or stone chippings with a consistent average grain diameter can be used on porous foundations. On less solid foundations, subsidence will mean that holes will have to be filled periodically. Gravel and stone chippings can be used for footpaths and for cycle paths and car parks that are used less intensively.

Shells and stone chippings can be used as loose covering layers or strewn to become embedded in sand or clay. With less solid foundations, these types of paving, like gravel and stone chippings, can require a great deal of maintenance. Stabilisation mats can be used for added stability and to help the material retain its shape, and for use on less solid foundations.



Gravel, stone chippings and shells © atelier GROENBLAUW, Amar Sjauw En Wa



[Hard semi permeable pavement © atelier GROENBLAUW](#)

(<http://www.groenblauwenetwerken.com/cms/..../uploads/20160225-Rainproof-09-half-verharding-hard.jpg>)

## **Mixtures of road metal and grass**

These surfaces consist of a mixture of humus and road metal or gravel in a stabilising mat. Grass is sown on the top layer, after which it is compacted.

## **Open paving patterns**

Ordinary clinkers can also be laid in open or semi-open patterns. The open parts can be filled with grass, gravel or shells. With only a small amount of creativity, all manner of patterns can be conceived, and stones also come in a range of different types. Even the percentage of

openings in the paving can be determined by varying the pattern. Important factors for preventing subsidence are the quality of the foundation and the stability of the pattern. This type of paving cannot support heavy loads.



Open paving patterns in Delft, The Netherlands © atelier GROENBLAUW, Amar Sjauw En Wa

## Literature

- Geiger W., Dreiseitl H. & Stemplewski J.; Neue Wege für das Regenwasser – Handbuch zum Rückhalt und zur Versickerung von Regenwasser in Baugebieten; Oldenbourg Industrieverlag GmbH, München, 2009

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Source: <http://www.urbangreenbluegrids.com/measures/porous-paving-materials/>

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Green-blue urban grids make cities sustainable, resilient and climate-proof. This website and the design tool will help to find fitting measures and inspires with attractive examples.