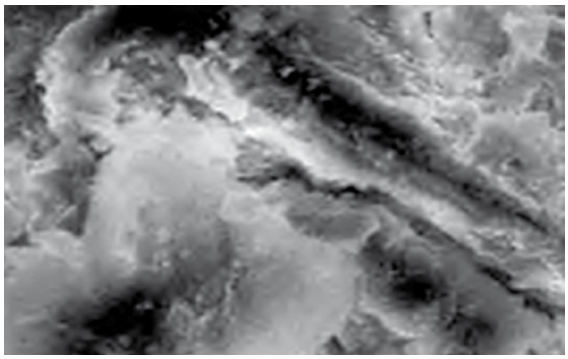
NovoCrete®
Soil stabilization technology

# About NovoCrete® technology

## Introduction

NovoCrete® is used for the construction of high-quality bearing layers using the existing soil, it accelerates the cement hydration process and increases the resistance to pressure, the static and dynamic moduli of elasticity, the resistance to bending and tensile strength, the resistance to freezing and soil stabilization rich in humus. The elastic behavior of the layers results in an altered set of cement hydration because NovoCrete® boosts this process and at the same time modify the reaction of the cement. Common cements reaches the major unconfined compression after 28 days, by adding NovoCrete® a new crystalline structure during hydration process is forming up to 90 days. This chemical reaction cause in growth of crystals during the hydration process and of the intense crystalline interlocking, using NovoCrete®, it is possible to increase strength and bearing capacity besides to minimize tensile stresses of soil. Unlike the traditional methods of construction, with NovoCrete® and cement, the coating of the upper layers of multipurpose roads is possible without the use of mineral bearing layers, thus saving money and time for construction.

*Pure Cement: open pore structure*



*Cement with NovoCrete®: closed dense structure*

## Product description

NovoCrete® is a whitish powder consisting of alkaline and alkaline earth elements or complex compounds. It promotes cement hydration process and inhibits the action of fulvic acids and carbonic acids. Apart from improving the above mentioned parameters, NovoCrete® also promotes the immobilization of pollutants, such as heavy metals and organic parameters, which get permanently embedded in the new crystal structures in the soil. During the chemical reaction ( $CaCL_2$ x $6H_20$ ) arise Antarcticit (kind of Calcium-chloride Dihydrate) which grows in a trigometrical crystal system. This new aggregate can form needle-crystals up to 15 cm. This growth in combination with the other Novocrete® minerals gives the desired elasticity and strenght to the base layer. Stabilized bases courses treated with cement only, usually combine high stiffness with a high risk on premature cracking. This undesirable combination was regarded as a major handicap for stabilization.

25 kg
Bags

1.000 kg
Big Bags

**Experience: > 22 years - projects: > 1.000 - countries: > 50**

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# About NovoCrete® technology

## Advantages at a glance

> Much faster construction process
> Roads can be re-opened for traffic already after 24 hours
> Possibility to build roads with and without pavement
> No need for soil exchange or additional gravel material, in-situ material can be used
> 90 day hydration process: next to no cracking with binder from up to 14%
> During the hydration process, long crystal needles are formed, allowing very high bearing strengths
> With a binder content of >10%, after 1 to 2 days values of at least 150 MN/m² can be attained, and can continue to increase for up to 90 days
> The stabilized layers show low bending tensile strength. Concrete anchors may be installed
> Water does not penetrate, nor any other fluid, into the stabilized layers, guaranteeing safety from frost
> Longer lifespan as it is water-resistant, and increased acid and salt resistant
> Lifespan can be prolonged by laying a thin wearing course
> No problems with loamy or clayey soils containing high levels of sulphur associated with high cement content
> Adaptable to nearly all soil types - even grainy sands or organic material can be reinforced
> Soils with high levels of salt can be stabilized
> Stabilizing contaminated soils is possible
> No problems from frost, thaw or changes in conditions, as water-resistant base courses may even be constructed from in-situ soils
> Stabilization measures can be customised and adapted to particular soil conditions
> Less to no expenses for maintenance are required for years
> Restoration of surfaces to original condition is possible

## Environmental friendly technology

### 1 | $CO_2$ saving

Less environmental impact due to significant reduction of
> transportation of equipment
> transportation of material
> use of machinery (working hours)
> general traffic (deviations and traffic jams)

### 2 | Saving of material

Reduction of new layers and processing of existing material such as
> old, existing asphalt layers
> old, existing base layers
> in-situ soil material instead of applying natural resources

### 3 | Groundwater protection

Active protection due to
> impermeable, leak-proof surfaces
> compliance with the boundary values of the Drinking Water Ordinance




### 4 | Sustainability

Quality intensification compared to conventional construction methods by
> resistant and durable results
> significantly reduced maintenance costs
> reduced thickness of the layers
> saving of landfill sites
> reduction of waste disposal expenses
> protection of resources
> capability for complete dismantling of stabilized layers

### 5 | 100 % recyclable

Use of
> purely mineral components
> nontoxic
> not harmful components

### 6 | Immobilization

The process of the soil stabilization
> immobilizes hazardous substances
> makes contaminated soils usable

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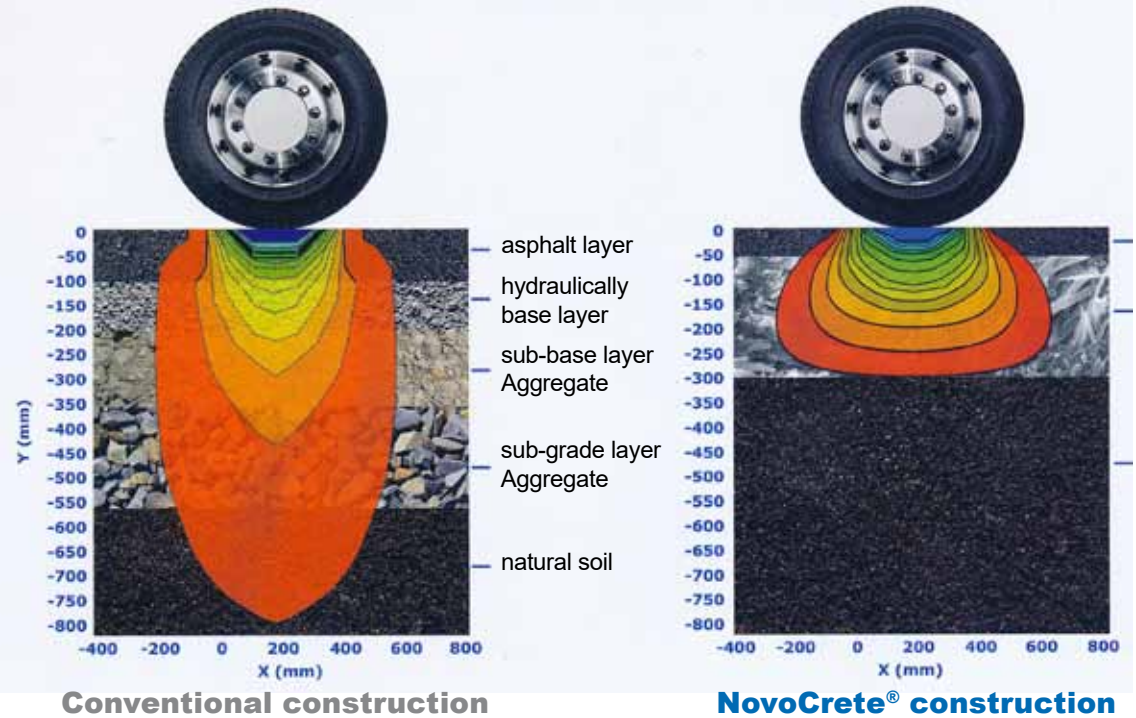
# Further advantages

## High flexibility - Distribution of Tension and Deformations




Conventional construction

NovoCrete® construction

## High load bearing capacity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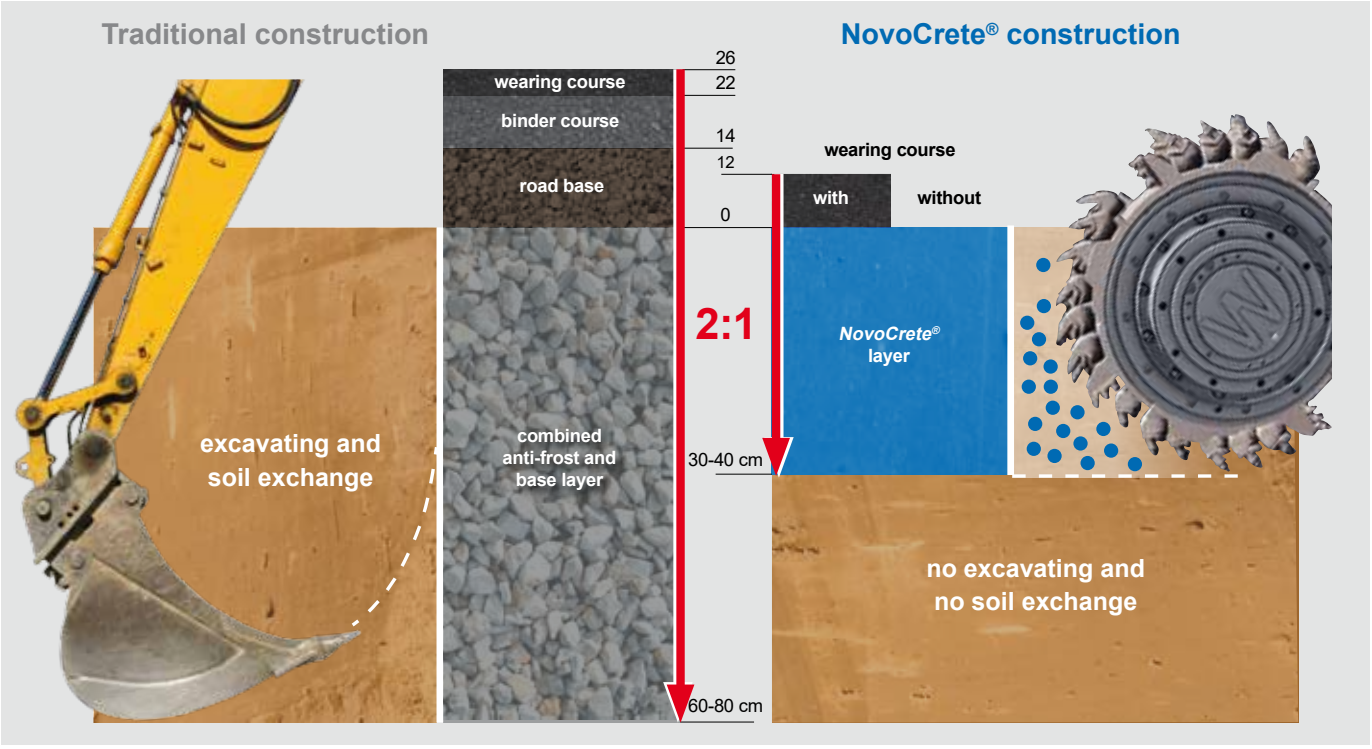
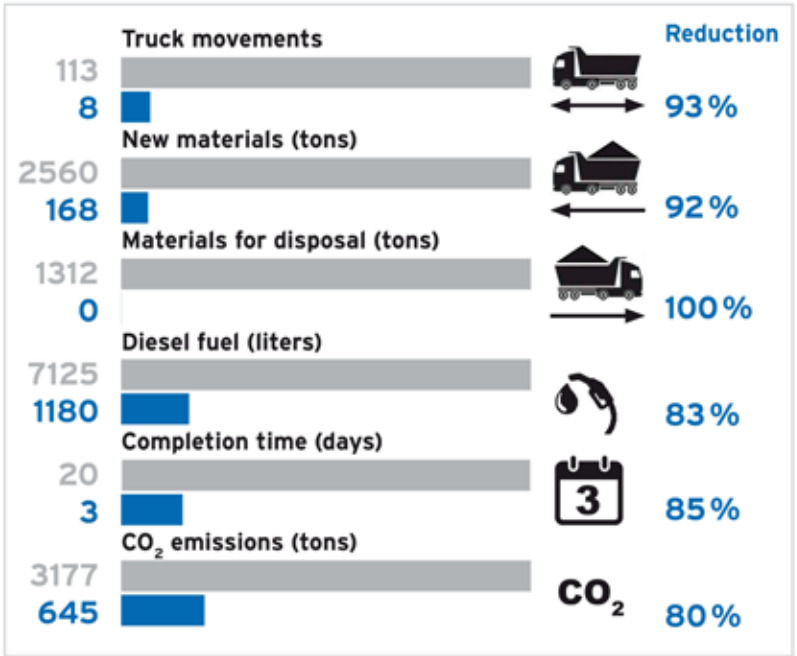
# Possible savings

## The difference 2:1




Examle Road: length 1km, width 7,5m




## Areas of use

> Road and motorway construction
> Footpaths, cycle paths, forest paths and agricultural roads
> Access routes for the oil, gas and wood industries
> Establishment of base layers under hall floors
> Taxiways and parking areas
> Railway tracks
> Tunnel and sewage system construction
> General foundations
> Parking, container storage points, logistics centres
> Harbour premises and wharves
> Storage areas for wood, metal, etc.
> Foundation for windfarms
> Embankment stabilization
> Slope reinforcements, grouting
> Dam reinforcements
> Landfill sites
> Replacement of depth foundations

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# Application and results

## Procedure steps


Spreading of cement-NovoCrete®


Milling of cement-NovoCrete®


Static and dynamic compaction


Levelling with a Grader


Watering


Installation of asphalt after 48h

## Comparison of expected results using conventional technology vs. NovoCrete® technology

| | Conventional technology | NovoCrete® technology |
|---|---|---|
| | | |
| Load bearing capacity ($MN/m^2$) | < 150 $MN/m^2$ | min. 150 - 500 $MN/m^2$ (or higher) |
| Compressive strength (after 7 days) $N/mm^2$ | not measurable | 2,0 up to 9,0 $N/mm^2$ (depending on soil type/dosage) |
| Modulus of elasticity (MPa) | not measurable | 2.000 up to 12.500 MPa |
| Tensile strength (MPa) | not measurable | 0,5 up to 1,5 MPa |
| Water impermeability (m/s) | permeable | $10^{-6}$ to $10^{-9}$ m/s (depending on soil type) |
| Frost resistant | yes | yes |
| Soil exchange required | yes | no |
| Aggregate required | yes | no |
| Thickness of base layer | 40 up to 100 cm | 25 up to 40 cm (depending on soil type, road class, traffic volume) |
| Pavement required | yes | not mandotary |
| Thickness of asphalt layer can be reduced | limited | yes |
| Construction process | weeks/months | up to 3.000 $m^2$ per day |
| Re-open for traffic | after weeks/months | after 48 hours Reduction of construction time minimum 60% |
| Immobilization of pollutants in the same process with stabilization | no | yes |
| Warranty | 5 years (Germany) | 5 years (Germany) |
| Life cycle | Max. 10 years | 20 years |

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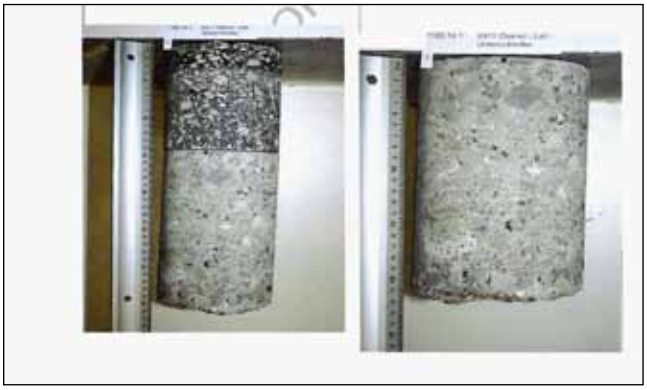
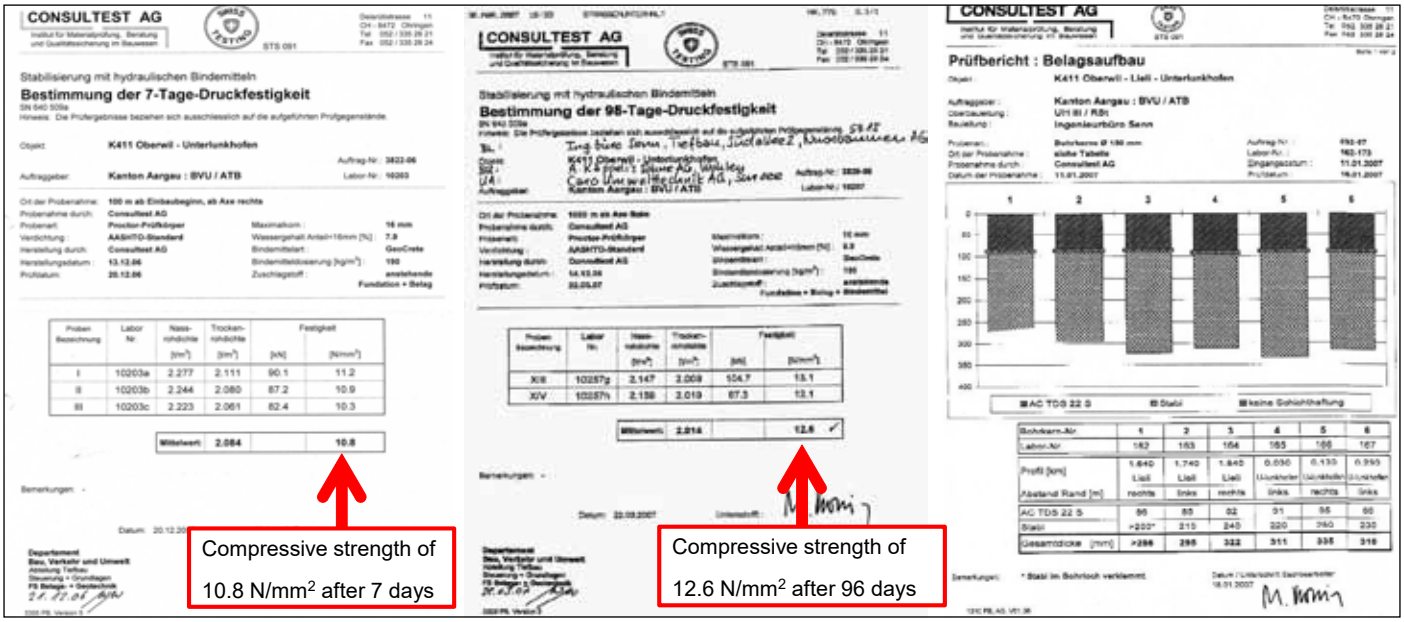
# Results

## Taking of drill cores



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