

PRODUCT SUMMARY

	Ferrocrete	Portland Cement	Phoenix	Eco Phoenix	Microcem 550	Microcem 650 (SR)	Microcem 900	Lime
Soil stabilisation		✓	✓	✓				✓
Piling (in situ)								
Sulfate ground			✓	✓				
Normal ground		✓	✓	✓				
Piling (precast)								
Sulfate ground			✓					
Normal ground	✓	✓						
Diaphragm walls								
Sulfate ground			✓	✓				
Normal ground		✓	✓	✓				
Deep foundations			✓	✓				
Tunnels								
Injection grouting						✓	✓	
Sprayed concrete	✓	✓						
Repairs					✓	✓		

**CEMENT & LIME
BASED SOLUTIONS FOR
GEOTECHNICAL APPLICATIONS**



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THE IMPORTANCE OF CEMENT & LIME BASED GEOTECHNICAL SOLUTIONS

Cement is playing an increasingly important part in geotechnical engineering, a branch of engineering concerned with the behaviour of earth materials. Geotechnical engineering is a vital consideration in any form of construction in the ground, and Tarmac has developed a range of cost-effective and environmentally-responsible solutions.

Tarmac geotechnical solutions offer significant benefits over traditional construction methods:

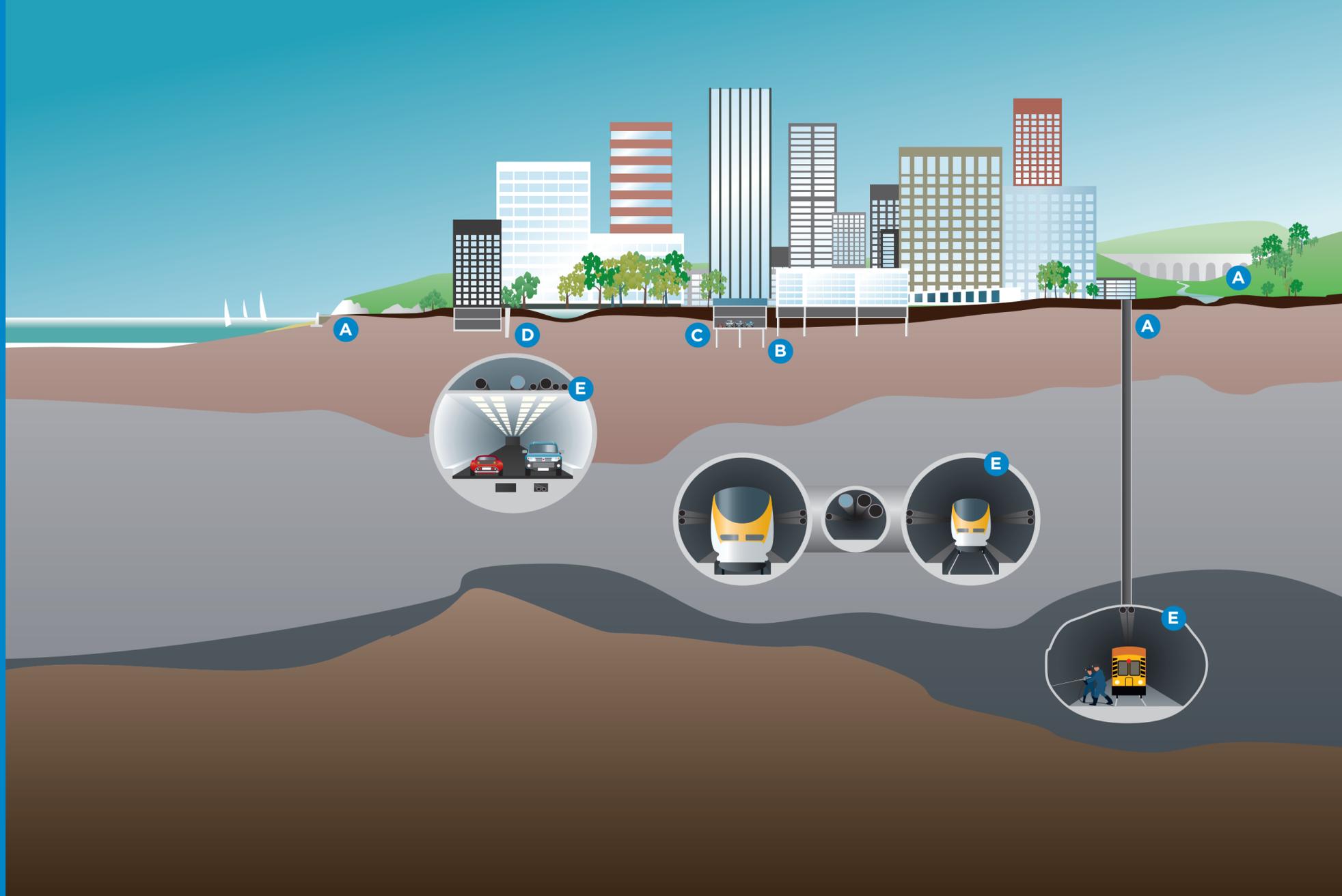
Cost reductions – in situ treatment is more cost-effective than traditional excavation in terms of reduced vehicle movements, landfill tax benefits and reduced need for importation of virgin aggregate.

Time-saving – shorter build periods by minimising site preparation, tipping and import of materials. Wet ground can be dried and strengthened for immediate use.

Reduced wastage – in situ treatment eliminates the need for material importation – for example, sub-base materials.

Less environmental impact – no need to remove inappropriate materials or to import virgin aggregates. In situ mixing of small quantities of the appropriate cement or lime can drastically reduce the scale of associated construction activities and vehicle movements. The result is lower cost, less congestion and reduced neighbourhood conflict.

Avoidance of landfill tax – by improving the soil already on site, 'dig and dump' is virtually eliminated.



TARMAC CEMENT AND LIME PRODUCTS FOR GEOTECHNICAL APPLICATIONS

Ferrocrete® bulk Portland cement CEM I 52,5	
Properties/features	Finely-ground Portland cement
Advantages	High early strength development
Benefits	Facilitates early demoulding, handling and use of precast units
Applications	Precast piling

Portland cement CEM I 52,5	
Properties/features	Consistent strength conforming to BSEN 197-1 Compatible with admixtures and additions
Advantages	Long experience of use
Benefits	Good early strength
Applications	Piling Diaphragm walls Sprayed concrete Soil stabilisation

Phoenix® Portland-fly Ash cement CEM II/B-V 42,5N	
Properties/features	Typically contains 27% fly ash Factory produced
Advantages	Moderately low-heat Spherical fly ash particles make a more cohesive mix. Lower embodied CO ₂
Benefits	Reduces risk of early-age thermal cracking in large pours Reduces attack on concrete in chemically-aggressive ground conditions Improves surface finish of concrete Excellent pumpability More sustainable
Applications	Deep foundations In situ and precast piling Diaphragm walls

Eco Phoenix® Pozzolanic Cement CEM IV/B-V 32,5N-LH	
Properties/features	Typically contains 42% fly ash
Advantages	Reduced effective alkali content Certified low heat of hydration
Benefits	Reduces chemical attack on concrete in aggressive ground conditions Minimises risk of alkali-silica reaction (ASR) in concretes containing high-reactivity or recycled aggregates Reduces risk of early-age thermal cracking in large pours
Applications	Deep foundations In situ and precast piling Diaphragm walls

Microcem® 550	
Properties/features	High-fineness (Typical D ₉₅ 30 µm and narrow particle size distribution, containing carefully selected set regulating additives)
Advantages	Good early strength development and controlled setting, high ultimate strength
Benefits	Produces good surface finish
Applications	Cement-based additives, repair compounds, flowing screeds and grouts

Microcem® 650 (SR)	
Properties/features	Super-fine cement (Typical D ₉₅ 20 µm) with narrow particle size distribution, containing carefully-selected set-regulating additives
Advantages	Good early strength development and controlled setting, high ultimate strength, low bleed
Benefits	Can be used with standard cement injection equipment
Applications	Injection into joints, cracks, fissures and soils to produce a watertight mass of grouted rock or soil Sulfate-resisting applications and use in hot climates

Microcem® 900	
Properties/features	Ultra-fine cement (Typical D ₉₅ 12 µm) with narrow particle size distribution, containing carefully-selected set-regulating additives
Advantages	Good early strength development and controlled setting, high ultimate strength, low bleed
Benefits	Can be used with standard cement injection equipment
Applications	Suitable for injection into hard rock, tight joints and fissures

Limbace 60, Fine 6 and Granular 15	
Properties/features	High purity and reactive quick lime products in a range of particle sizes to suit all site requirements
Advantages	Reduces need to import fill and granular sub-base material, increases strength and bearing capacity with improving resistance to weather and traffic, reduces ground's susceptibility to shrinkage and swelling, vast reduction in vehicle movements
Benefits	Easier foundation work, lower construction cost, safer construction, ability to maintain timetable and progress on site
Applications	Soil stabilisation, land remediation

All our cements (except Microcem, for which there is no British/European standard) are factory produced, CE Marked and perform to BS EN 197-1. Microcem is manufactured under an ISO 9001 accredited Quality Management System.

TYPICAL GEOTECHNICAL APPLICATIONS

Tarmac has developed a range of high-performance products with specially-formulated characteristics that are well suited for a wide variety of geotechnical applications.

A GROUND STABILISATION
Cement and lime play an important role in geotechnically improving areas of weak soil for all forms of construction within the UK, and are endorsed by the Highways Agency. Rising landfill cost have made soil stabilisation an increasingly important and desirable option.

B PILING
Both in situ and precast piling systems provide fast and effective foundation solutions. In situ piles can be varied to suit ground conditions, and using cement with high early strength properties and increased sulfate resistance enhances speed of installation and durability. Large diameters and long pile lengths can be achieved. Precast concrete piles suit all applications and ground conditions, and are highly cost effective – quick to install, no spoil, and reduced waste disposal costs.

C DEEP FOUNDATION
Deep foundations are required where there are large design loads and poor soil conditions at shallow depth, or other site constraints such as boundary lines. Using cement with a high ash or slag content reduces risk of sulfate attack and alkali-silica reaction, and increases durability in aggressive ground conditions.

D DIAPHRAGM WALLS
The most cost-effective retaining solution providing strong soil and hydraulic support. Diaphragm walls are especially relevant where watertightness and a stiff retaining structure are needed to control and protect the surrounding environment against settlement, and for water blocking. Using cement with fly ash or slag content increases the durability in aggressive ground conditions of reinforced concrete water-blocking diaphragm walls close to open water, where the ground water table is high, or where there are surrounding tunnels and open cuts.

E TUNNELLING
Sprayed concrete – Cement with good admixture reactivity and consistent quality produces sprayable, high-performing concrete, which is ideal for the tunnel lining.
Injection grouting – Ultrafine cements with narrow particle size distribution produce fast-setting mixes that can be injected to seal and strengthen the bedrock and control the flow of underground water.
Repair – Microfine cements are specially engineered to produce concrete for repair of damaged areas, tunnel segments, and to protect steel reinforcement in precast concrete segments

