Chembase Treatment System (CTS)

Application and treatment of sub-base layers, adding ash waste

Research and development

“It costs you nothing to find out how much you can save.”

What is ash waste?

Coal ash

The waste left at power plants from burning coal for fuel.

Wood ash

The powder that remains after burning wood at a bonfire, fireplace or industrial plant.

Contaminants

Coal ash contains contaminants such as lead, arsenic, mercury, cadmium and chromium.

Why management matters

Without proper management these can pollute waterways, groundwater, drinking water and the air.

How ash strengthens soil

Pozzolanic reaction

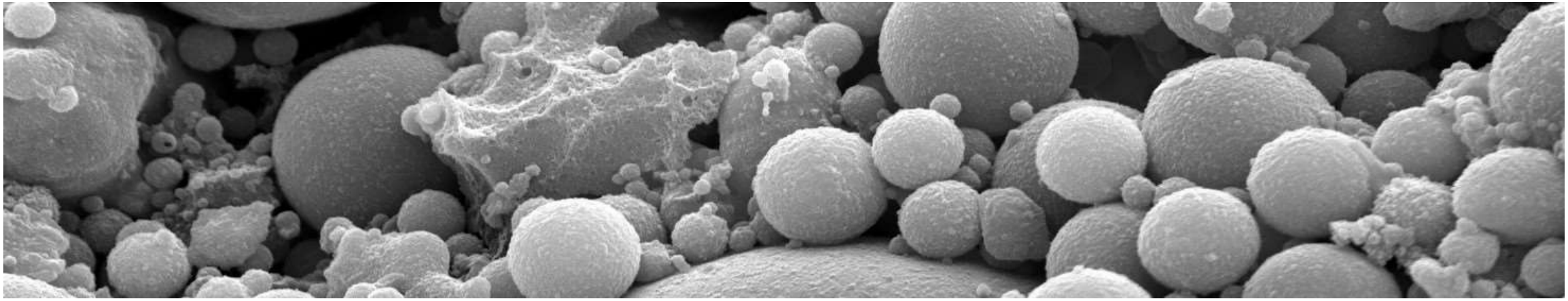
Ash breaks soil-cement clusters into smaller ones, giving more reactive surface for hydration and pozzolanic reactions.

Binds with lime

Mixed with lime and water, ash forms a compound like Portland cement.

Tames swelling soils

As an admixture, ash reduces the problems posed by swelling soils such as black cotton soils.



Where ash is used in construction

Bases and subgrades

Ash is used to stabilise road bases and subgrades.

Backfill

Stabilised backfill reduces lateral earth pressures.

Embankments

Stabilised embankments have better slope stability.

Concrete

Improves strength, reduces water demand and makes concrete easier to pump.

Ash waste in numbers

70%+

Pozzolanic compounds required in Class F ash (ASTM C618)

50–70%

Pozzolanic compounds in Class C ash

540–860

kg/m³: bulk density without close compaction

1,120–1,500

kg/m³: bulk density when close packed or vibrated

Water retention at field level was found to be three times higher in ash than in soils.

Figures as quoted in the Chembase R&D brochure. Pozzolanic compounds are silica, alumina and iron oxides.

Four types of soil stabilisation

Cement

Cement is added to the soil to bind it.

Lime

Lime makes clay particles clump, so the soil is more friable.

Bitumen

Bitumen is used to stabilise soil and sand.

Chemical

Additives change the soil's properties. This is the CTS approach.

Stabilisation turns weak soil into a strong base layer by reducing permeability and increasing strength.

One product, supplied in two parts

PART A

Polymer-Stabiliser

+

PART B

Activator

**Chembase®
CTS**

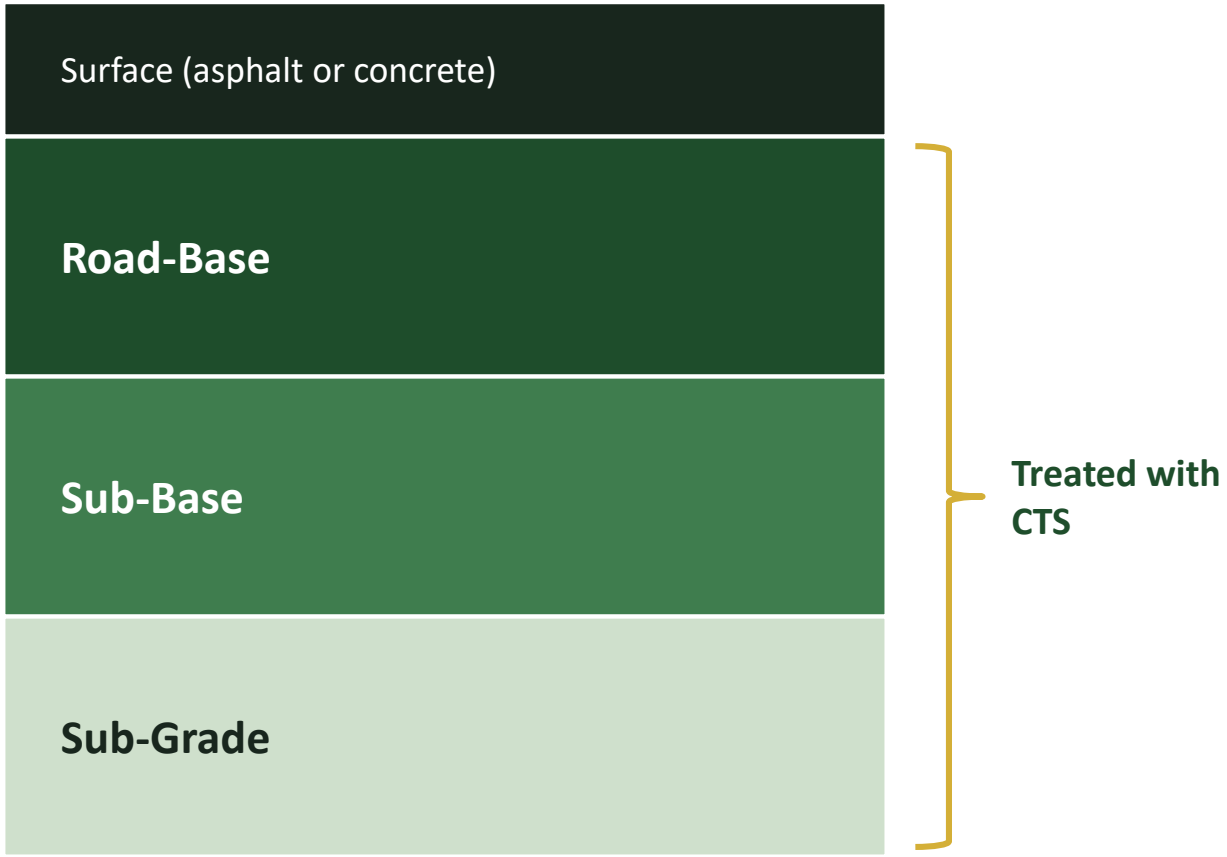
Five characteristics
combined in one product

A simplified range

- Five different chemistry characteristics are now combined into a single Chembase product.
- The application and treatment methods stay the same.
- The same characteristics, benefits and advantages are retained.

Naming: CTS stands for Chembase Treatment System. Chembase is also known as Chembase International and Chembase International Group.

Where CTS works: beneath the road surface



Indicative cross-section

Ash waste is mixed with the CTS-treated soil of the sub-base layers, which increases the CBR.

- **Greater strength**
- **Higher load-bearing capacity**
- **Resistance to moisture-related issues**

Chembase and conventional road construction work together.

From stabilised layers to lower costs

1. **Stabilised base layers**
   CTS stabilises the road-base, sub-base and sub-grade.

2. **Less water, fewer potholes**
   Water leakage and potholes are reduced in the treated area.

3. **Less maintenance**
   The treated area needs less ongoing repair.

4. **Lower cost, longer life**
   Reduced costs and greater longevity for the treated area.

Performance benefits of treated layers

CBR increase

Raises the California Bearing Ratio (CBR), a standard measure of soil strength.

Water resistance

Treated layers resist water, limiting moisture-related damage.

Liquefaction resistant

Treated soil resists liquefaction, the loss of strength in saturated ground.

Freezing-condition tolerance

Tolerates freezing conditions.

Oil and petroleum barrier

Prevents oil and petroleum penetrating the treated soil.

Longevity

A long service life for the treated area.

Practical and environmental benefits

On site

Workable in any weather
Application is not held up by conditions.

Stable once diluted
The diluted product will not oxidise.

Re-compactable
Treated soil can be re-compacted (20 years).

Savings
Less maintenance and reduced costs.

Safety and sustainability

Safe to use
Product-safe and environmentally safe.

Waste plastic and glass
Shredded plastic or stained glass added to treated soil increases CBR.

Ash waste
Ash added to treated soil increases CBR.

Saltwater
Saltwater can replace fresh water, and increases CBR.

Brick pavements
Can be used in brick pavement manufacturing.

What CTS does with ash waste

Higher CBR

Ash waste mixed with the CTS-treated soil increases the CBR.

Less waste

Adding ash waste to the treated sub-base layers reduces waste.

UNSW report, May 2021

Found that the CTS stabiliser and activator can be mixed with ash waste and that the mixture works well as road base.

A secondary resource

Coal ash is often more environmentally sustainable than raw alternatives such as sand and stone.

It costs you nothing to find out how much you can save

Talk to Chembase about putting ash waste to work in your sub-base layers.

INDEPENDENT UNIVERSITY REPORTS

Reports from The University of Sydney and UNSW (University of New South Wales) are available at www.chembase.com.au

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