CHEMBASE TREATMENT SYSTEM (CTS)

What is Chembase?

Stronger roads, built from the soil already beneath them.

The Chembase Treatment System (CTS) is a liquid, organic polymer-based soil treatment for building and rehabilitating roads.

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

www.chembase.com.au

Unique, and more ways to save

Why CTS is unique

- Other organic products suit only a small segment of soil types
- Parts of the road then need traditional methods or cement slurry: a mixed-bag approach adding risk, time and cost
- CTS is a complete end-to-end solution for most soil types
- One method across the whole road build, with longevity proven on NSW trial roads

~25%

of the cost of some alternative paving and stabilising methods

- No cart-away of hundreds of truckloads of soil
- No imported gravel by the truckload
- Time is money: faster builds
- Easy to use and apply
- Less labour and equipment

Strength and water control

- Reduces absorbed water; blocks surface water
- Raises compaction, CBR and UCS strength
- Reduces voids between soil particles
- Less shrink/swell and volume change
- Keeps long-term strength of lime-treated soil

Workability

- Improves workability; aids compaction
- Dries wet soils; upgrades marginal materials
- Reduces dust on site
- Liquid form, very easy to apply

Environment and supply

- Non-toxic, non-poisonous when diluted; no harm to flora or fauna
- Conserves aggregate and energy
- Eliminates frost heave and break-up
- Improves durability; reduces costs

Chembase treatment provides the following Key benefits:

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1. Improved resistance to water penetration, reducing volume change.
2. Strength improvements measured primarily by CBR and UCS.
3. Improvement in strength of Chembase/Lime stabilised road material (i.e. long-term strength gain).
4. Reduced shrink/swell behaviour.

Savings

You don’t have to cart away 100’s trucks of soil.
You don’t have to import material like gravel equivalent to 100’s trucks.
Time is money. Save time and you can save money.
The product of Chembase is easy to apply.
And there are a lot more benefits including less labour, less equipment applied, and the list goes on.

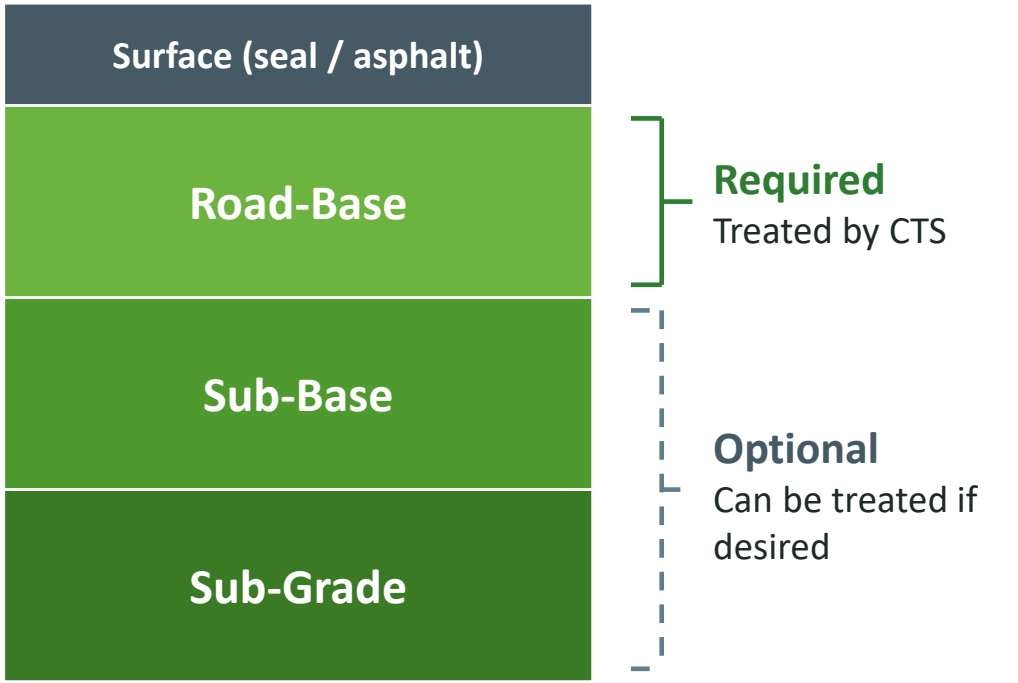
Turns ordinary soil into a strong foundation

Liquid organic polymer
A liquid soil treatment used to build and repair roads.

Uses the soil already there
Treats the in-situ soil directly beneath the road surface.

Boosts lime stabilisation
Reacts with clay and hydrated lime to form a water-resistant matrix.

Works on almost any soil
Very high or very low clay soils (e.g. liquid limit above 50) are pre-treated first.



CTS is only required in the road-base layer. The layers below can also be treated, but it is not necessary.

How the Chembase Treatment System works

CHEMBASE® is a two-part organic stabiliser and compaction-aid system: five characteristics combined into one product, delivered in two parts and applied as liquids to pre-worked, scarified in-situ soil.

STEP 1 · PART A

Spray the Stabiliser

A liquid, water-based, plant-derived concentrate. Diluted with water, sprayed directly onto the in-situ soil and mixed through it. Its lubricity, from advanced surfactants, lets soil particles slide past each other, aiding compaction.

+

WITH

Add hydrated lime

Added with the Stabiliser in the same water tank or applied before the Stabiliser. Stabiliser and Activator quantities are calculated so both react completely.

+

STEP 2 · PART B

Spray the Activator

A liquid, water-based inorganic salt concentrate, sprayed after the Stabiliser. It reacts immediately to form a malleable compound within the soil profile.

→

STEP 3 · RESULT

Compact and open

The road can be used 48 hours after treatment with the Chembase Treatment System.

SOIL TYPES

What soil will Chembase work with?

Chembase Treatment System products work on almost any soil type that needs treatment, provided a few parameters are met so the treated soil performs as expected.

Soils Chembase works with

- Sandy clay loam
- Medium loam
- Silty clay loam
- Silty loam
- Silt
- Clay loam
- Sandy loam

May need pre-treatment

- Loamy sand
- Sand

When pre-treatment is needed

- Soil that is very high or very low in clay
- Soil with a liquid limit above 50
- Any soil that falls outside the treatment parameters

What Chembase does for your pavement

INCREASES

- Strength
- Density
- Compaction
- California Bearing Ratio
- Pavement life

DECREASES

- Moisture
- Shrinkage
- Swell and heaving
- Maintenance costs
- Construction costs

Measured performance

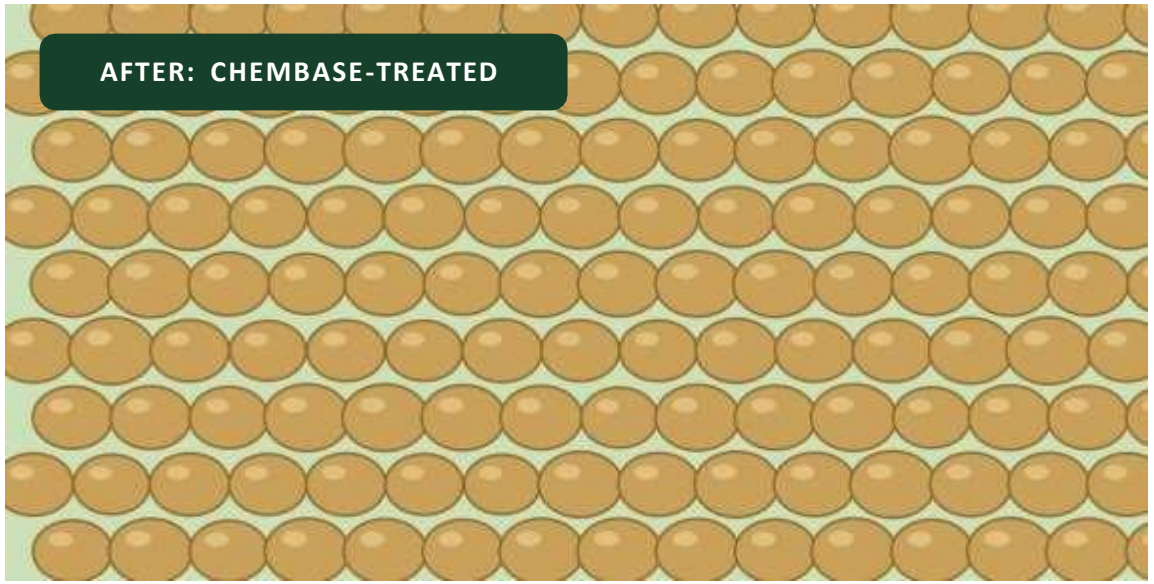
Improvements to a pavement or road-base, sub-base and sub-grade:

- Strength gains measured by UCS and CBR
- Better resistance to water penetration, reducing volume change
- Reduced shrink / swell behaviour
- Improved workability as a compaction aid
- Long-term strength gain in lime-stabilised material

From loose soil to a dense road-base matrix

The Chembase stabiliser enters the spaces between soil particles as they are compacted together and absorbs any free water inthose spaces.

Loose particles, voids and water. Poor load support.



Condensed, compacted particles. Improved load support.

KEY BENEFITS

- Better resistance to water penetration, reducing volume change
- Strength gains, measured primarily by CBR
- Long-term strength gain in lime-stabilised material
- Reduced shrink / swell behaviour

Every project starts with a soil test

Soils CTS works with

Sandy clay loam · Medium loam · Silty clay loam · Silty loam · Silt · Clay loam · Sandy loam. Almost any soil type is suitable, provided a few soil parameters are met.

Pre-treatment rule

Any soil that is very high or very low in clay (including loamy sand and sand) will require some form of pre-treatment. If the liquid limit of the soil is above 50, pre-treatment will be necessary.

Laboratory tests at a glance

1. **Plasticity**
2. **CBR, before and after Chembase and lime additives**
3. **Moisture content**
4. **OMC (optimum moisture content)**
5. **Shrink / swell**
6. **UCS compaction**
7. **Water permeability**
8. **Other tests as required**

Soil test before treatment	Standard
Particle size grading (PSD)	AS 1289.3.6.1-2009
Atterberg limits & linear shrinkage	AS 1289.3.9.1-2015
CBR incl. MMDD (10-day soak)	AS 1289.6.1.1-2014
UCS (28-day)	AS 5101.4-2008
Lime demand	TMR 2124b
Moisture content, pH, standard compaction, water permeability / capillary rise	Australian Standards

All tests are carried out by laboratories accredited to Australian and NATA standards.

Trial mix (% of dry soil weight)

0.32% Polymer Stabiliser

0.16% Activator

+1–2% Lime above lime demand

- Cured at approx. 23 °C, tested at day 7 and day 28
- Day 28 shows approx. 20–25% more strength than day 7, and it keeps gaining over weeks and months

Laboratory testing to Australian Standards

Test required	Standard
Moisture content of sampled material	AS 1289.2.1.1
Particle size distribution (PSD)	AS 1289.3.6.1, AS 1289.3.6.3
Atterberg limits and linear shrinkage	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.4.1
Standard compaction tests	AS 1289.5.1.1
California Bearing Ratio (CBR)	AS 1289.6.1.1
Unconfined Compressive Strength (UCS)	AS 5101.4
Water permeability / capillary rise	AS 5101.5
Lime demand	ASTM D6276 or Q133 (DMR Queensland)

Why we test first

- An accredited laboratory tests untreated control samples, one test of each type
- Results set the quantities of Chembase compound, lime and water for each layer
- They are the baseline that treated results are compared against

The tests determine

- Plasticity and shrink / swell
- CBR before and after Chembase and lime
- Moisture content and OMC (optimum moisture content)
- UCS compaction and water permeability

Safe to use, cheaper to build and keep

1 Workable in any weather

Can be applied at any time of the year.

2 Non-damaging when diluted

Won't oxidise or damage metal, equipment or other materials any more than water.

5 Water resistance

Keeps water out of the treated layer, eliminating potholes and cutting repair costs.

3 Product safety

- Organic: maintains ecological balance
- Non-hazardous
- Non-flammable in storage and in use
- Non-corrosive
- Hypoallergenic; not harmful to people or animals
- Safe for handling
- Biodegradable and water soluble
- Environmentally safe on all flora and fauna

No special PPE: basic gloves and eye protection recommended. chembase.com.au/other-reports/

65%+

saving on road construction

75%+

saving on road maintenance

4 Savings. The 1987–1992 NSW road trials show records of nil maintenance. See the CTS Product Comparison Price Chart at chembase.com.au/home/

Backed by soil testing and university research

UNSW R&D 2021: turning waste into stronger roads

Shredded plastic & crushed glass

Mixed into the treated sub-base (1 km × 8 m wide × 200 mm deep).

Saltwater

Seawater can replace fresh water in the Chembase mix.

Ash waste

Ash combined with Chembase products in the sub-base.

Soil test before treatment	Standard
Particle size grading (PSD)	AS 1289.3.6.1-2009
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Moisture content, pH, standard compaction, water permeability / capillary rise	Australian Standards

Carried out by NATA-accredited Australian laboratories.

~32 tonnes

of shredded plastic or crushed glass reused per km of treated road.

All three also increase the CBR (UNSW report, 24 June 2021).

University research

- UNSW engaged by Chembase in February 2021; final reports issued 24 June 2021
- Sydney University reports, including freezing tolerance
- Full reports: chembase.com.au/unsw-university

15 advantages in one treatment

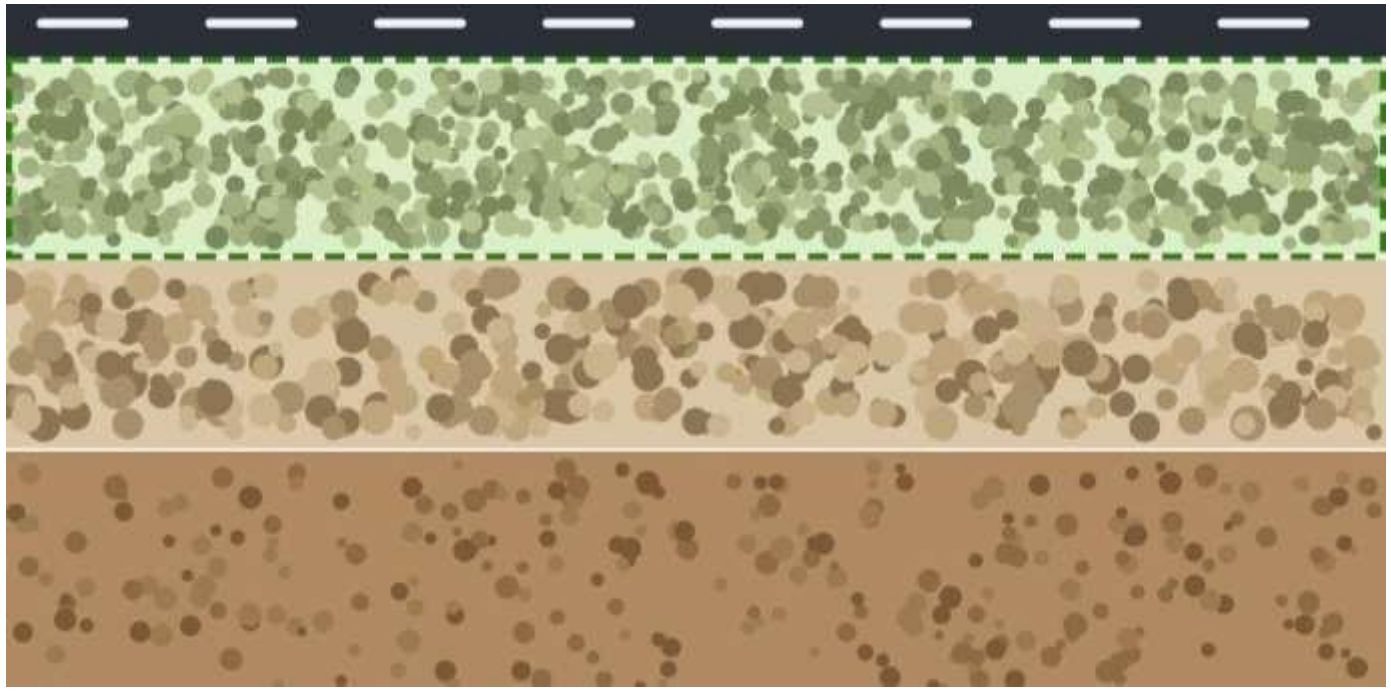
1. Workable in any weather
2. Non-damaging when diluted
3. Product safety
4. Savings
5. Water resistance
6. CBR increase
7. Liquefaction resistant
8. Freezing tolerance
9. Longevity
10. Oil & petroleum barrier
11. Re-compactable
12. Plastic & glass waste
13. Ash waste
14. Salt water
15. Brick pavements

Works with conventional road construction

CTS products can be used in the road-base, sub-base and sub-grade of a conventionally built road. They modify the existing soil to increase its strength, load-bearing capacity and resistance to moisture, improving the road's performance and durability.

The dashed green zone is the road-base: the layer Chembase is designed to stabilise.

Chembase and conventional road construction work together.



Road surface
The sealed or unsealed top layer.

Road-base (treated)
Load-bearing layer directly beneath the surface.

Sub-base
Spreads loads down to the natural ground.

Sub-grade
The natural in-situ soil the pavement is built on.

Time is money. Save time and you save money.

On-site savings

- No carting away hundreds of truckloads of soil
- No importing hundreds of truckloads of gravel
- Much quicker than traditional road construction
- Easy to use and apply
- Less labour and less equipment on site

Cost efficient

No manufactured road base needed. Expensive manufactured road base material is not required, saving material and transport costs that would involve hundreds of truckloads.

Sealing is not necessary. A Chembase-stabilised road becomes a heavily bound road-base layer: water resistant, tightly compacted, with an increased CBR and reduced swell and shrink.

One product. Every benefit

Product description

CHEMBASE® is a non-hazardous, easy-to-use and environmentally friendly water-soluble organic soil stabiliser. Used with an activator, it stabilises unsealed roads, highways, road shoulders, car parks and cattle feedlots.

Chembase products

The range has been simplified by combining every Chembase product into one, with the same characteristics, benefits and advantages.

Plastic Road Base System

Almost any soil type is suitable. For example, the Plastic Road Base System (PRBS) applies the Chembase stabiliser and activator into the soil of the road-base during construction.

Where can the Chembase Treatment System be used?

- Highways
- Unsealed roads
- Housing estate subdivisions
- Car parks and driveways
- Tennis courts
- Reservoirs and dams
- Airport foundations
- Airstrip foundations
- Mines
- Mine haul roads
- Cattle feed lots
- Freezing road conditions to −62 °C

…and anywhere else soil stabilisation is required.

What you need per kilometre of road

Road coverage (standard traffic loading)

8,000 m² of road

= **1 km** long

= **8 m** wide (one lane each way)

= **200 mm** depth

200 mm depth
Standard traffic · per km

10,500 L
Polymer Stabiliser (Part A)

5,250 L
Activator (Part B)

300 mm depth
Heavy traffic · per km

15,500 L
Polymer Stabiliser (Part A)

7,750 L
Activator (Part B)

Plus, hydrated lime

Lime is added to both mixes and is an extra cost to the customer.

WHAT CAN CHANGE THE QUANTITIES

Soil density: Product may vary 5–10% up or down with soil density. Soil testing is required before any application.

Road depth: Increases from 200 mm to 300 mm for heavy traffic.

Soil tests: Final quantities of Chembase products and lime are based on the test results.

Containers, packing and shelf life

IBC: 1,000 litres

Drum: 205 litres

IBC: 1,000 litres (gross 1,065 kg)

Drum: 205 litres (gross 211 kg)

Packed: Plastic drums or IBCs, on a pallet (export), wrapped

Shelf life: 24 months unopened; beyond that the effect on soil treatment may be reduced

See it in action, and build safely

Videos

- Chembase: The Future of Soil Stabilisation
- Chembase Freezing Conditions Tolerance
- How to Apply Chembase (English)
- How to Apply Chembase (Mandarin)

Videos are a basic guide only. Every application is assessed and guided by a Chembase technician.

CTS Quantities Calculator

Work out how much product you need, for a wide range of applications.

Reports and documents

Ecological Balance · Safety Data Sheets (SDS) · Environmental Statement · Statement of Support · FAQs

WORK SAFETY · TOP SIX ROAD CONSTRUCTION SAFETY TIPS

01	Plan your job thoroughly
02	Hold daily safety meetings
03	Enforce a strict PPE code
04	Think like a driver: control your traffic flow
05	Avoid blind spots: keep a clear line of sight
06	Appoint a dedicated site safety officer

Deliver better roads, at a lower cost, than traditional building methods.

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

+61 2 8566 3344

info@chembase.com.au

www.chembase.com.au

Level 4, 141 Walker Street, North Sydney NSW 2060