

 **HIWAY
STABILIZERS**



**INNOVATIVE SOIL
CONDITIONING
SOLUTIONS**



EXCELLENCE FROM THE GROUND UP

Hiway Group has been delivering innovative ground improvement solutions since 1986.

Our reputation for quality performance has been built upon our drive and commitment to safe work practices, innovation, environmental sustainability, leadership and excellence.

It is our commitment to innovation, environmental sustainability and industry leadership that has seen us introduce cutting edge technologies into Australia and develop our own advanced methodologies and stabilising products.

With a proven track record of ensuring high quality, lasting outcomes – even in challenging conditions – our in-house design and construction teams are industry experts.

Hiway Stabilizers is an internationally recognised brand and a leader in the design and delivery of advanced stabilisation solutions for pavements in civil, road and rail infrastructure construction and maintenance. Our expert team also provides a proven one-stop-shop for design and construction.

We offer a range of earthworks, subgrade, structural fill, capping subgrade, subbase and basecourse modification services that are more cost effective than traditional construction and rehabilitation methods.

These include cement and lime based stabilisation, aggregate modification, structural fill, subgrade and subbase improvement. As well as the cost savings they generate, our innovative solutions reduce construction time, increase strength and durability, and are more environmentally sustainable.

Our methods also have significant environmental benefits, particularly when considering the treatment of contaminated materials and remediation of contaminated sites to reduce costly excavation and disposal. We are committed to recycling existing materials where possible, whether that is the design of pavements or in how we treat aggregate and soils.

Hiway Stabilizers are Accredited Contractors under the AustStab ARRB accreditation scheme. This independent accreditation assures our clients that our processes and practices meet industry best practice standards.

ACCREDITED CONTRACTOR



2018-2021



SOIL CONDITIONING – CONDITIONING OF WET MATERIAL THE EASY WAY

Soil Conditioning of wet material using binder is generally always more cost effective than cut to waste and importation of good quality fill material and also often cheaper than conventional earthworks drying techniques which are time consuming and rely on good weather conditions.

Soil Conditioning provides immense benefits to the earthmoving contractor. By Soil Conditioning wet-of-optimum moisture content soils after a rain episode, earthworks operations can continue immediately thereby limiting unproductive down time.

The operation is very simple and enables large volumes of material to be dried instantly. Hiway Stabilizers plant is purpose built to handle almost any ground condition.

This enables earthworks to continue without delay and removes the risk of construction delays attributed to quality assurance test failures and rigorous supervision.

APPLICATIONS

- ▶ Construction of new pavements.
- ▶ Earthworks for residential subdivisions.
- ▶ Earthworks for Rail, civil and infrastructure projects.
- ▶ Earthworks for industrial and commercial developments.
- ▶ Rehabilitation of existing pavements.

BENEFITS

- ▶ Significantly improved subgrade stability with strength gains of up to 20 times.
- ▶ Cost savings due to reduced requirement for imported aggregates, fewer transport costs and faster construction time.
- ▶ Reduces risk of costly earthworks fill and subgrade pavement failures as stabilised substrate forms a soil particle and moisture barrier that protects overlying aggregate layers from upward migration of plastic fines.
- ▶ A robust durable platform for aggregate construction that does not require the more expensive cloth/grid/imported aggregate.
- ▶ Substantially reduces moisture susceptibility.
- ▶ Substantially reduces plasticity making soils easier to work due to the more friable nature.
- ▶ Creates a more uniform earthworks fill and subgrade layer.
- ▶ Can permit treated contaminated soils to remain in place rather than be cut to waste, and will enhance contaminant immobilisation.
- ▶ Dries large volumes of water-logged soil instantly.
- ▶ Can be undertaken in any weather conditions.
- ▶ Reduces down time by enabling earthworks to continue during the earthworks shoulder seasons and immediately after wet weather therefore increasing plant utilisation and return for the earthworks contractor.
- ▶ Enables reduced pavement thickness providing, time and cost savings.
- ▶ Our solutions improve earthworks fill and subgrade performance, while at the same time enabling faster construction and significant aggregate saving.

THE PROCESS

The process uses specific binders to enable maximum coverage of the soil particles when mixed.

The operation is carried out using specialised purpose-built machinery. This is usually of tracked configuration with very low ground pressure to enable work on very soft and wet material. The tracked machines are designed to ensure controlled, accurate and consistent spread of additive and depth of mixing. Other rubber tyred plant cannot deliver the same degree of precision as the tracked equipment as it inevitably becomes stuck, slides or cannot maintain a consistent speed.

The binder is delivered in pressurised tankers to site and pneumatically transferred from the tanker to the tracked spreader truck. From the tracked spreader it can be spread over almost any material condition including puddles and silt traps. The design application rate can be easily varied over a site depending on the variation in moisture contents and the types of soils encountered. The binder application rate can also be evaluated to provide enhanced immobilisation of organic and inorganic contaminants.

Once spread the binder is then mixed into the wet soil using a stabilising machine. The hydration process effectively dries back the wet material and generates heat producing a 'mechanical' strength gain. As well as this 'mechanical' strength gain there are also chemical strength gains as per the normal stabilisation process which continues over time.

SOIL CONDITIONING POTENTIAL BENEFITS

Large-scale earthworks project greater than 2,000,000m³

SOIL CONDITIONING BENEFITS	ESTIMATED COST SAVINGS & ENVIRONMENTAL IMPACTS ON 2,000,000M ³ EARTHWORK PROJECT
Reduced rework	Re-work could cost extended delays due to time taken to ascertain responsibility for failure on a project of this scale that could be as much as \$1 million.
Reduction in non-productive days on site	Non-productive days are usually a contractor cost but inevitably variations and claims are raised to cover this and can result in costly settlements up to \$1 million.
Reduced need to cut to waste	Transportation, tipping fees, travel costs and purchase of new aggregates are significantly reduced - on a project of this size, savings can be anywhere up to \$2 million and preserves our precious quarry resource for more demanding applications.
Environmental benefits in reduction of use of virgin aggregates	
Reduced programme duration resulting in less overhead and other operational costs	Delays will mean substantial claim for additional P&G costs and can be in the order of \$3 million.
Programme certainty reducing risk of liquidated damages	LDs vary from project to project but the higher the risk the higher the number - anywhere up to \$5 million on a job of this size.
Reduced vehicle movements through less cart away	Rather than focus on costs the environmental impact on the locality will be significant as Heavy vehicle movements will be considerably reduced.
Less noise, dust and time risks	By reducing time on the job through working during the traditional 'down time' an overall programme reduction will be achieved meaning a reduction in the 'effect' period. Similarly, by not importing and tipping materials, dust and noise will be reduced over the term of the project and this will remove a lot of local disruption and complaints.

Potential benefits are substantial on both small and large projects. Some of these potential savings are Contractors risk and not a direct saving to Client, however, the overall benefits to the project can be substantial.

DESIGN & TESTING

The design process for Soil Conditioning should be approached pragmatically and does not usually require the same level of technical input as normal stabilisation. Laboratory testing can be undertaken to confirm the natural strength of the material to be treated at its natural water content versus the strength achievable once dried back with the use of stabilisation binders.

Due to varying on site soil types and moisture contents, this is usually not a practical procedure to forecast precise treatment. It should however not be discounted as it provides a good guide in setting application rates, and this can then be adjusted on site by our experienced operators who have extensive experience in managing changing ground conditions. Similarly our in-house technical support team can provide design and construction methodology optimisation.

Designs usually allow for anywhere between 1% and 3% binder to condition wet materials. On rare occasions up to 5% binder has been used for very wet and/or contaminated soils. Application rates will always vary for different material types and conditions. The operation requires careful control throughout its implementation. All spread rates are checked and recorded for each area of stabilisation completed. The depth of conditioning is also checked and recorded.

The performance of the treated material is of paramount importance and is usually controlled using traditional earthworks testing equipment which may consist of Pilcon shear vane or Scala penetrometer to test strength and nuclear densometer with sampling or core cutter to test compaction density and moisture content.

SOIL CONDITIONING COMPARISON OF CONSTRUCTION OPTION COSTS

Assuming earthworks site of: 40,000m² area / 30,000m³ volume of cut to fill

ITEM	RATE	UNIT	CUT TO WASTE & HARDFILL REPLACEMENT	DRY NATURALLY/ REHANDLE	SOIL CONDITIONING
P&G / Site Management	\$2,000	Day	\$150,000	\$180,000	\$40,000
Form heavy duty access track for trucks		LS	\$45,000	\$10,000	\$10,000
Excavate waste and load on trucks	\$3	m ³ solid	\$90,000		
Cartage to dump	\$20	m ³ solid	\$600,000		
Dump fees	\$15	m ³ solid	\$450,000		
Truck washing before leaving site	\$1	m ³ solid	\$30,000	\$3,000	\$1,000
Import and place hardfill	\$75	m ³ solid	\$2,250,000		
Form drying area		LS		\$60,000	
Cut and place in drying area	\$3	m ³ solid		\$90,000	
Disc drying	\$3	m ³ solid		\$90,000	-
Uplift from drying area and place in fill	\$3	m ³ solid		\$90,000	-
Unproductive labour over wet weather		LS	\$40,000	\$80,000	
Idle plant over wet weather		LS	\$25,000	\$50,000	
Cut to fill	\$3	m ³ solid			\$90,000
Soil Conditioning	\$14	m ³ solid			\$420,000
Total cost			\$3,680,000	\$653,000	\$561,000
Time to construct			75 days	90 days	20 days
Risk of construction in wet weather			Medium	High	Low

SH1 TRANSMISSION GULLY WELLINGTON MOTORWAY – CASE STUDY

- ▶ 800,000m² of Soil Conditioning.
- ▶ 82,000m² of Subgrade Stabilisation.
- ▶ Soil Conditioning was not implemented until late into the project.
- ▶ High productivity Soil Conditioning commenced June 2019 and continues to date bringing significant programme advantages.
- ▶ The project would be faced with at least six months further delays if Soil Conditioning wasn't adopted.

Client: New Zealand Transport Agency / CPB & Heb Partnership

Duration: June 2019 to present

Scope Value: Significant



KEY CHALLENGES

The key challenges for this project were:

- ▶ Poor ground conditions, high rainfall and steep topography with very limited drying areas.
- ▶ Access to this greenfield site is very demanding as the alignment is in steep cuts/fills with only a handful of access points along its 27km length.
- ▶ The alignment under construction is also the haul road for most of the project therefore access through the site is very limited during and after rain.

SOLUTIONS

- ▶ These conditions were overcome through Soil Conditioning carried out by Hiway Stabilizers.
- ▶ Wet material required for fill was placed in situ and then stabilized straight away achieving instant strength gain.
- ▶ Soil Conditioning eliminated delays caused through conventionally drying the material in a drying area and rehandling the material into the fill.
- ▶ Soil Conditioning also meant that work could continue or recommence during/after rain events and access through the site was not negatively affected as the treated material could be trafficked instantly after stabilization.
- ▶ Soil Conditioning continued through the winter months thereby extending the Earthworks window and reducing the contract programme time when, traditionally, works would otherwise be suspended.
- ▶ Had Hiway Stabilizers not carried out Soil Conditioning, the project may have been faced with Earthworks delays exceeding six months.

OUTCOMES & BENEFITS

- ▶ Reduced construction time.
- ▶ Reduced cut to waste and subsequent demand on precious aggregate resources.
- ▶ Reduced damage to road network from carting metal to site.
- ▶ Reduced disruption to road network from carting metal to site.
- ▶ Greater surety of achieving specification requirements.
- ▶ Increased ultimate strength.
- ▶ Increased strength and moisture resilience of conditioned soils resulted in less disruption with site hauling.

PARKES TO NARROMINE INLAND RAIL PROJECT (P2N) – CASE STUDY

The P2N project was the first NSW section of the 1,700km long inland rail project between Victoria and Brisbane, Queensland. The P2N section is one of 13 individual projects that make up the inland rail project.

The P2N section is 104km in length and involved the removal of existing track infrastructure and ballast materials. The removed material was then recycled through multiple layers utilising binder stabilisation to form the foundation of the new alignment. This was followed by the introduction of new structural fill and capping layers requiring multiple stabilising machines for moisture conditioning (Soil Conditioning).

Client: INLink JV (BMD and Fulton Hogan joint venture)

Duration: March 2019 to February 2020

Scope Value: Significant



KEY CHALLENGES

This project is one of the largest subgrade stabilisation projects in Australia. The stabilisation option was the most appropriate solution to delivering a robust subgrade foundation for the new rail line.

Soil Conditioning minimised the need for removal and disposal of existing poor quality materials and the depletion of scarce new quarry products. Stabilisation incorporating substantial quantities of Soil Conditioning enabled the engineering properties of the existing soils to be improved and meet the increased carrying capacity required for the new rail line.

The key challenges related to the work site being in a relatively remote part of NSW, the duration of the work and the number of stabilising crews needed to maintain the delivery program.

Other challenges included:

- ▶ The volume of binder and the logistics of its transportation and storage.
- ▶ The requirement for rail industry accreditation.
- ▶ Inductions for all staff.
- ▶ Fatigue management and crew rotations.

SOLUTIONS

Commencing in March 2019 with one crew for spreading and mixing we gradually increased the number of crews each month as more work fronts became available after track removal by INLink. At the peak in September 2019 Hiway's had eight operational crews along the site.

Close attention to logistics management and coordination with INLink and suppliers ensured there were minimal delays in gearing up to maximum production.

When there were binder supply issues we utilised our industry knowledge and relationships to source binder from other suppliers to ensure continuity of the project to meet target milestones.

Crews were rotated at regular intervals and potential incoming crews were put through the rail and other inductions and medicals required to work in the rail corridor.

PROJECT OUTCOMES

Hiway's scope was delivered in accordance with the INLink project program with resources adjusted during the course of the work to ensure we remained on schedule. The project enabled us to upskill people and have more of them inducted into rail corridor works and environment. The crews worked closely with the client's team to ensure we met all of their requirements and also proactively managed Zero Harm which meant there were no lost time incidents during our work on the project.



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