



**INNOVATIVE  
SUSTAINABLE  
RAIL SECTOR  
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 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



## INNOVATIVE SOLUTIONS

We provide innovative, cost-saving solutions for:

- ▶ New pavement construction
- ▶ Subgrade and subbase stabilisation
- ▶ Aggregate modification
- ▶ Base-course improvement
- ▶ Pavement rehabilitation
- ▶ Rail track subgrade and structural fill stabilisation
- ▶ Commercial platform slab optimisation
- ▶ Earthworks
- ▶ Dustless stabilization
- ▶ Rolling Stock Stableing
- ▶ Design Optimisation
- ▶ Rail pavement design

## INSITU STABILISATION VS TRADITIONAL REMOVE & REPLACE

Example of a treatment comparison for contaminated ground in a rail corridor

Length	Width	Depth	Binder	Area	Volume	Mat. Density	Tonnes
729.8m	4.8m	0.3m	4.5%	10,000m <sup>2</sup>	3,503m <sup>3</sup>	1.9kg/m <sup>3</sup>	1,997t
INSITU STABILISING				REMOVE & REPLACE			
PROJECT TIME ESTIMATION							
Operational Time		16 hours over 2 days			32 hours over 4 days		
COSTS							
Plant		\$18,169			\$17,230		
Material Export		\$0			\$489,200		
Material Import		\$24,546			\$53,912		
<b>Total Cost</b>		<b>\$42,715</b>			<b>\$560,341</b>		
ENVIRONMENTAL IMPACT							
Fuel Consumption		1,392 litres			5,622 litres		
Material Waste		0 tonnes			1,997 tonnes		
Noise Pollution		366 dB			4,977 dB		
CO2 Emissions		4 tonnes			29 tonnes		
Material Demand		Small			Large		
SOCIAL/COMMUNITY IMPACTS							
Pavement Loading		Minor truck movements due to reduced plant			Major truck movements		
Traffic Congestion		Minimal – delivery trucks and establishment			Increased – to required trucking		
Noise Nuisance		Smaller noise levels/reduced duration			Larger noise levels/longer duration		
Dust Pollution		Minor ground dust Binder dust potential			Large ground disturbance No binder required		
Space usage		No landfill space required			Available landfill space reduced		

## SUBGRADE MODIFICATION

Hiway Stabilizers have over 35 years of refined experience in delivering stabilisation solutions.

Our subgrade stabilisation methodologies enable construction to be carried out faster and allow for the pavement design to be optimised to deliver significant cost benefits to the Client.

These solutions also offer the assurance that the subgrade will provide robust and durable performance, both during the construction period and in decades to come.

Our track record covers a wide range of applications, from local authority roads to site works for land developers and major infrastructure projects for Government bodies including rail contracts in confined and remote areas for ARTC.



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## 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 subgrade pavement failures as stabilized 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. Substantially reduces moisture susceptibility.
- ▶ Creates a more uniform subgrade layer.
- ▶ Dries large volumes of water-logged soil instantly. Can be undertaken in any weather conditions.
- ▶ Reduces down time by enabling earthworks to continue immediately after wet weather.
- ▶ May enable reduced pavement thickness providing, significant cost.
- ▶ Reduced risk of soft spots which are often experienced in rail foundations with the value upside of reducing the need for speed reductions.

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**Our solutions improve subgrade performance, while at the same time enabling faster construction and significant aggregate saving.**

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## BASECOURSE MODIFICATION

Hiway Stabilizers quick-turnaround services rejuvenate aged pavement materials, leaving them as good as or better than a premium basecourse, at a fraction of the cost.

Our solutions cost much less to implement than traditional pavement reconstruction and remediation methods and are proven to deliver lasting strength in the most challenging conditions.

Our 'one-stop-shop' design and project management service provide clients access to world-leading methodologies, delivered by local experts.

Our state-of-the-art fleet includes specialist foamed bitumen recycling equipment, as well as more conventional cement, lime and polymer stabilisation plant.

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## BASECOURSE STABILISATION

Basecourse stabilisation improves the performance of pavements by modifying in-situ or imported materials with cement, specialist blends, polymers or foamed bitumen.

Hiway Stabilizers has been a major provider of basecourse cement stabilisation pavements in Australia, consistently creating pavements with greater strength and performance, and longer design life.

Our proprietary binders and polymers enable cost effective stabilisation, regardless of aggregate properties, traffic loadings or intended pavement use.

We also provide a truly dustless stabilisation service through the new generation Wirtgen 240 S Pack dustless stabilizer particularly suited to urban and high profile sites i.e. Airports and urban rail corridors where traditional forms of stabilisation are not possible.

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## FILL DRYING/CONDITIONING OF IN-SITU MATERIAL

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

Fill Drying using lime provides immense benefits to the earthmoving contractor. By fill drying wet-of-optimum ground after a wet weather episode, earthworks operations can continue immediately thereby limiting unproductive down time.

The Fill Drying operation is made simple with our refined methodology and this operation enables large volumes of material to be dried instantly. Hiway Stabilizers plant is purpose built to handle almost any ground condition. We have achieved in excess of 3,000m<sup>3</sup> solid per day with one fill conditioning crew on past operations with ease.

The Fill Conditioning/Drying process enables earthworks to continue and will reduce the time otherwise required to undercut/replace or disc dry the wet material. This significantly reduces the constant risk otherwise of quality testing failures and the requirement for rigorous supervision.



## CASE STUDY 1: HORNSBY JUNCTION REMODELLING

Hornsby Junction – network interconnected tracks located between Pacific Highway and Bridge Road, Hornsby. Passenger and Freight Services T1 lines meet. Work area was very channelised within a live rail corridor.

The Hiways developed alternative (to ARTC standard) pavement design had many benefits – considered to be more sustainable, while more structurally robust and cheaper. In addition the stabilised SG alternative eliminated need to remove contaminated material to regulated landfill and replace with 2,000 tonne select material.

**Materials:** Mix of gravels and sandy clay with high levels of contamination.

**Mix Design Testing Included:** Lime Demand, CBR, 7 and 28 day UCS, Atterberg Limits, absorption, swell, capillary rise, pH, sulphate and organic matter testing.

**Treatment Comprised:** Blend of lime (3% hydrated) and cement (1.5%) to a compacted depth of 300mm.



### KEY CHALLENGES

The key challenges related to the work site being in a highly urbanised location and within the live rail corridor. This meant that access was limited for deliveries of plant and additive materials requiring close coordination with the Client's team. Hiway's managed this by utilising two spreader trucks which ensured a full bulk tanker load of additive could be emptied and transported onto site within each window of opportunity across the track (prior to 6am, 3 hours around midday and after 6:30pm) and also utilised two water trucks (one to transport water to site and pump underneath the live rail lines and one to receive the water and remain on site) in order to ensure the project targets could be met.

Because of the potential problems for train driver's visibility it was determined that hydrated lime instead of quicklime (for the lime component) was the most appropriate material thereby avoiding any slaking onsite. To further manage this issue, spotters were utilised and spreading of binder adjacent to live rail lines was halted while trains were approaching. Another challenge was completing all the induction requirements for both Transport for NSW and Novorail and gaining Rail Industry Worker registration for all people to be involved in the project on site.

### SOLUTIONS

Hiway's scope included a full document review of the previous testing and sampling of materials across the site. An examination of the materials led to a decision to propose a blend of hydrated lime and GP cement stabilisation as the preferred treatment. Hiway's undertook a detailed design as per the project specifications to ensure requirements by NovoRail were met. Design testing included Lime demand, CBR, 7 and 28 day UCS, Atterberg Limits, absorption, swell, capillary rise, pH, sulphate and organic matter testing to comply with the stringent conditions set out in the project specification.

Utilising this information, Hiway's utilised the typical rail design model undertaking back calculations in Circlly to determine appropriate design loadings and thus determine the depth or treatment required using the mechanist modelling assuming the dependable design strength characteristic were met. A detailed Design Report was then prepared and submitted to the Client for approval by its engineering consultants. Close attention to logistics management and coordination with the Client ensured an excellent outcome with minimal disruption, completion within programme and all design requirements comfortably achieved.

## CASE STUDY 2: INLAND RAIL – PARKES TO NARROWMINE (P2N) PROJECT

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. This major generational project is to upgrade the capacity of the line to carry longer trains with double stacked containers and thereby improve freight efficiencies.

The P2N section is 104km in length and involves the removal of existing track infrastructure, strengthening the subgrade using stabilisation and then the replacement of capping layer, ballast and track with associated drainage improvements and passing loops.

Hiway's scope included the supply, spreading and mixing of lime into the subgrade generally to a depth of 300mm.

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

**Project Start/Completion:** March 2019 to February 2020

**Scope Value:** \$7m



### KEY CHALLENGES

This project is one of the largest subgrade stabilisation projects in Australia with its need for multiple teams and work fronts to meet program. The stabilisation option was the most appropriate solution to delivering a robust subgrade foundation for the new rail line. It minimised the need for removal and disposal of existing poor quality materials and the depletion of scarce new quarry products. Stabilisation 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 lime and the logistics of its transportation and storage.
- ▶ The volume of water required in a drought affected part of NSW and our Client's ability to supply this water.
- ▶ The requirement for rail industry accreditation 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. This was done by mobilising additional resources from other regions of Hiway's operational crews and associated equipment including Queensland, Victoria and WA. The ramping up of crews was managed to minimise impact on other major projects being delivered by Hiway's including the Pacific Highway Upgrade W2B and The Northern Road. Close attention to logistics management and coordination with INLink and suppliers ensured there were minimal delays in gearing up to maximum production and ensuring that lime was always available to deliver the stabilised subgrade. Crews were rotated at regular intervals and potential incoming crews were put through the rail accreditation process and other inductions and medicals required to work in the rail corridor.



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STABILIZERS**

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