

DAV04 Warehouse

Mass Soil Mixing for Retaining Wall Foundation Support



1,300 m³

Total Volume Mixed

170+

MSM Cells Constructed

1.0 to 6.0 m

MSM Treatment Depth

2 Weeks

Project Length incl
Verification

PROJECT OVERVIEW

The DAV04 development at Brisbane Airport comprises a 3,569 m² speculative warehouse with an associated two-storey office building, heavy-duty hardstand, carparking, and associated civil works. The project is located at Lot DAV04, Boronia Road, within the Brisbane Airport precinct and was delivered by Xenia Constructions (QLD) Pty Ltd on behalf of Brisbane Airport Corporation.

The proposed development included sandstone block retaining walls up to 2.2 metres high along the south-eastern site boundary, immediately adjacent to an existing drainage channel. The proximity of these walls to the drainage channel and the presence of weak, un-preloaded alluvial clay soils along the site boundary created significant geotechnical challenges that required a specialist ground improvement solution.

THE CHALLENGE

Geotechnical investigation by Douglas Partners identified a complex subsurface profile along the south-eastern boundary. Very soft to soft alluvial clays extend to significant depth, with groundwater encountered at approximately 1.8 to 1.9 metres AD in this area and subject to tidal influence from the adjacent drainage channel. Global slope stability analyses confirmed that the proposed sandstone block retaining wall configurations failed to meet the minimum required factors of safety for both long-term drained and short-term undrained conditions. A maximum allowable bearing pressure of just 60 kPa was assessed at the top of the proposed bridging layer, placing strict constraints on the wall footing design.



MSM working in the alluvial clay, Brisbane Airport QLD

SITE GEOLOGY

The site is underlain by reclaimed fill over very soft to soft Holocene alluvial clays, with interlayered loose sands. In the south-eastern corner adjacent to the drainage channel, weak un-preloaded clays extend from near-surface to depth, with groundwater at approximately 2.6 metres AD. Settlement of 150 to 280 mm was anticipated in this zone without ground improvement. The weak clay profile was the primary driver for both the MSM treatment design and the geogrid reinforcement scheme required to achieve adequate global stability.

PROJECT SNAPSHOT

CLIENT

Xenia Constructions

OWNER

Brisbane Airport Corporation

LOCATION

Lot DAV04, Boronia Road, Brisbane Airport QLD

OUR SERVICES PROVIDED

Mass Soil Mixing (MSM)

MSM CELLS

174 no.

TREATMENT DEPTHS

6.0m (primary) / 1.0m (secondary)

TOTAL VOLUME MIXED

1,300 m³

VERIFICATION

Unconfined Compressive Strength (UCS)

PROJECT LENGTH

2 weeks including verification testing

Our Solution

On-site Batch Plant, purpose-built cement mixing and delivery system

MASS SOIL MIXING (MSM)

DGSA deployed a purpose-built MSM rig with an on-site batch plant to treat 174 MSM units along the alignment of the proposed sandstone block retaining walls. Each unit was pre-excavated and mixed in place using a cement grout blend delivered via a Seepex pump from a 6 m³ agitator tank. Treatment depths varied across the alignment from 0.3 m to 1.0 m deep cells, configured to deliver a continuous mass-mixed block directly beneath the wall footing with a design UCS of 500 kPa, sufficient to achieve the 60 kPa bearing pressure requirement at the underside of the wall footing without overstressing the underlying weak clay.

A total of 1,300 m³ of soil was treated across the works, incorporating 301 m³ of ready-mix cement grout. DGSA's MSM layout was developed in close coordination with the geotechnical engineer and wall designer, with cell positions adjusted across four revision cycles to align with the confirmed wall geometry and evolving site conditions. An independent batch plant monitored grout delivery volumes throughout, and 84 UCS cylinders were sampled across the full production run to verify compliance with the 500 kPa design strength requirement. The works were executed in confined conditions, coordinating with active retaining wall construction and civil earthworks immediately adjacent.



MSM rig in operation with UCS sampling on completed cell, Brisbane Airport QLD



BEFORE Proposed MSM for Retaining Wall Support, Brisbane Airport QLD



AFTER Proposed MSM for Retaining Wall Support, Brisbane Airport QLD

OUTCOME

DGSA's MSM treatment delivered a continuous, verifiable soil-cement block beneath the full length of the proposed sandstone block retaining wall alignment, achieving the specified 60 kPa bearing pressure within the constraints imposed by the weak alluvial clay subgrade. The 174 treated units and comprehensive UCS sampling programme provided the geotechnical assurance required to support the wall designer's certification. Works were completed and plant demobilised to programme, enabling Xenia Constructions to advance retaining wall construction and site civil works without delay.