CASE STUDY:
Construction Verification

Key Project Elements

- ACN/PCN assessment
- Visual inspection
- Geotechnical investigation
- FWD testing

Objectives

This project was, essentially, an investigation to verify the outcomes of the 2019 design process. Testing was carried out during construction. The specific objectives of the investigation included:

- Correlate the geotechnical and laboratory testing, with the pavement FWD results.
- Verify the design parameters (modulus).
- Compare various aspects of the lime stabilisation process and strength, over time.

BRIGGS ROAD

Sep 2020

Client Requirements

Briggs Road, in Raceview, Ipswich, was reconstructed with a lime-stabilised subgrade. Pavement Management Services provided the design for that reconstruction, in early 2019.

The design project completed in 2019 included discussion as to which methodology should be used: the Austroads methodology or the DTMR MRTS07A construction specification: In Situ Stabilised Subgrades Using Quick or Hydrated Lime? The pavement was subsequently stabilised with lime and designed using the more conservative Austroads design methodology.

Following recommendations from the design report, HEH Civil/Ipswich City Council engaged Pavement Management Services to investigate the efficacy of the design process and to verify the pavement design parameters, using in situ testing during construction. In essence, the requirement was to verify the design parameters and confirm whether the required stabilisation had been achieved, to an acceptable standard.

Provisions were included in the design, to conduct non-destructive FWD testing, as a construction quality assurance measure. That FWD testing would confirm whether the target stiffness for the stabilising (subgrade) layer, had been achieved.

BRIGGS ROAD

Sep 2020

Recommendations Provided

- Conduct Dynamic Cone Penetrometer (DCP) testing, pre-, during-, and post stabilisation laboratory testing and Falling Weight Deflectometer testing.
- Test the existing, non-stabilised subgrade (at subgrade level) as a baseline for comparison.
- Ensure the design requirements were met post stabilisation for design verification and to proceed with construction.
- Test the stabilised subgrade over time to observe the behaviour of the material.
- Compare all testing results: pre- and post-stabilisation, for recommendations regarding future stabilisation pavement designs and construction.
- As an additional control measure, DCP testing was conducted on the natural subgrade and after stabilisation, to observe the change in results.
- Both data sets (Stage 1 and 2) have shown the subgrade to homogenise the pavement and exhibit fewer, erratic responses to loading. The latter is an effect of mechanical stabilisation (kneading of the subgrade) and subgrade compaction.
- Laboratory CBR (California Bearing Ratio) Testing.

Benefit to the Client

- The stabilised subgrade showed initial (48-hour) strength improvements by factors of 2.8 to 4.1 times that of the original strength, which was very similar to the 28-day stiffness, with only marginal differences.
- The Austroads methodology, which assigned a design modulus at the lower end of what can be expected of the stabilised layer, was considered conservative.
- The Austroads mix design strength requirement of the stabilised material to meet with the design CBR may be underestimating the CBR requirement and base, according to this investigation.