

CASE STUDY: Pavement Design

➔ Key Project Elements

- Ground penetrating radar (GPR)
 - Falling weight deflectometer (FWD)
 - Laser and visual survey
 - Borehole investigation
 - Pavement Design
 - Assessment of sustainable product options
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➔ The Client

Willoughby City Council engaged PMS to conduct a comprehensive pavement investigation for two sections: - Mowbray Road West and Mowbray Road.

➔ Objectives

- Conduct a comprehensive pavement investigation.
- Provide in-depth technical research and discussion regarding technical products to be implemented by Council.



MOWBRAY ROAD

Sep 2019

Methodology

- Perform visual survey, geotechnical investigation (borehole testing) GPR and FWD testing.
- The GPR was correlated with the geotechnical information and the pavements were subsectioned into 15 homogenous sections.
- The compiled geotechnical data was used to supplement the FWD deflection data in the back analysis of the pavement structure, for the calculation of layer moduli and remaining pavement life.
- Client provided traffic data, used in the mechanistic-empirical design method, to ensure a design life of 25 years for all proposed treatments.

Mowbray Road

Recommendations Provided

- Four treatment options, specific to identified distresses and locations.
- A polymer-modified binder, AC14, was proposed for the intersections, where rutting was prominent due to heavy vehicle movements.
- Deep-lift asphalt patching proposed to be localised to failed areas, to minimise construction time and cost.

Type



Mill and fill on top of stabilised base.

Existing base course replaced with AC20 asphalt overlay with a PMB (A10E) AC14 wearing course, to mitigate formation of rutting due to bus and heavy vehicle movements.



Mill and fill with asphalt reinforcement.

Geosynthetic reinforcement recommended to mitigate reflective cracking from the underlying pavement structure. A SAMI seal was included as an alternative option.

The underlying base material indicated good stiffness, albeit with extensive block cracking. This, coupled with time construction time constraints, required an overlay with asphalt reinforcing, to ensure longevity of the pavement structure.



Deep lift asphalt patch.

Identified failing areas calculated **to an accuracy of 1m²**. Failed sections of the existing pavement were identified using all of the collected data - and this deep-lift option applied only where required, to save time and costs.



Deep lift asphalt.

Localised to Mowbray Road intersection. Existing asphalt was identified as being poor quality, with substandard structural support. New design proposed removal of all unsuitable materials and reconstruction of asphalt base layer with a PMB (A10E) AC14 wearing course, to mitigate formation of rutting due to heavy vehicle movements.

Sustainable Materials

Subsequent to the pavement investigation, Willoughby City Council requested assistance in evaluating the emerging asphalt and concrete products on the market, which are made from recycled components.

PMS reviewed seven products available in the market, comparing them to the specifications of the equivalent standard product.

We provided a summary of the products and to what extent they meet the national safety standards.

New, environmentally-friendly products for use in road construction, are emerging in the market. PMS has up-to-date knowledge of these products, their application and restrictions. We can help you to select the best product for your specific needs.

→ Outputs

- Structural performance of existing pavement using FWD data.
- Profile of existing pavement structure using geotechnical investigation.
- Rutting performance of existing surfacing and pavement structure.
- Calculation of existing pavement remaining life.
- Identification of pavement distresses.
- Structural analysis of existing pavement structures and design of 4 proposed treatment options.
- Proposed treatments, specific to distress type and identified localised failures.
- Research into and provision of, options for environmentally-friendly products.

→ Benefits to Client

- Pavement design options documented as inputs to the planning process.
- Confirmation of estimated remaining pavement life.
- Identification of areas for specific repairs and/or maintenance, such as heavy patching, to allow most cost-effective maintenance expenditure to be applied.
- Assessment of possible options for inclusion of recycled product into the design of new pavement sections.