More Reliable Pavement Maintenance, Design, and Asset Management
Using Regional Precedent Performance (RPP)

Lessons from a study of over 20 years of accumulated in situ testing and structural analyses of New Zealand road networks and Long Term Pavement Performance Sites with application to both

More Reliable Pavement Maintenance, Design, and Asset Management
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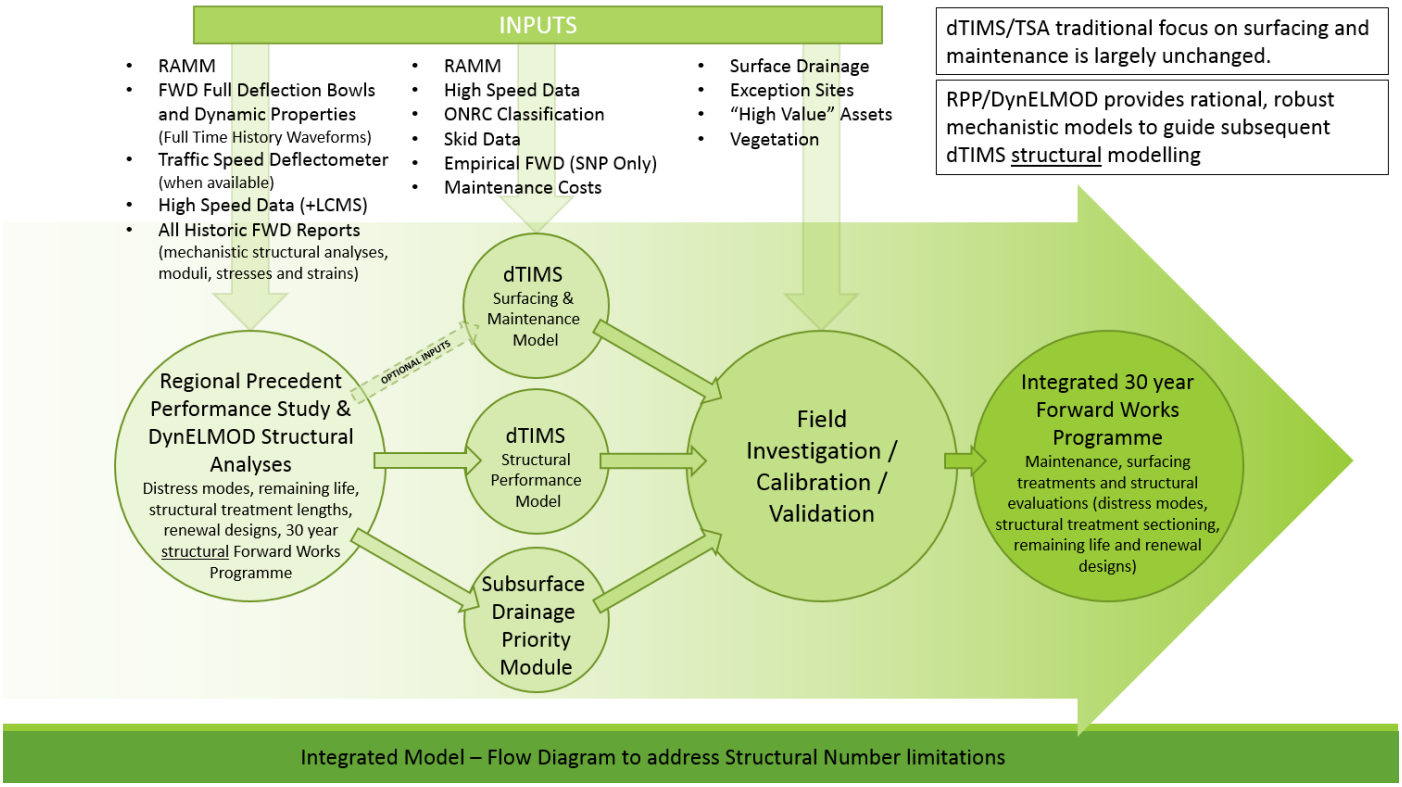
The following is a summary of the key points. More information can be found in this detailed presentation.

dTIMS/TSA is uses empirical parameters (FWD deflection and SNP) which only allows a basic estimation of pavement life. It does not perform any pavement structural analysis.

Regional Precedent Performance (RPP) uses the full deflection-time wave profile, and incorporates all parameters determined from a fully mechanistic pavement structural analysis. It provides the most reliable means of assessing pavement life.

Because six regions have now been evaluated using RPP, and each have been evaluated on exactly the same basis, the ONRC concepts can be readily applied between each network, or even sub-network. For example, the 4 regions within the Auckland Transport network (North, South, Central and West) can be readily and effectively compared with each other to judge outcomes such as priorities for rehabilitation, long term performance and design efficiency (both under- and over-design) so that areas for savings can be identified.



Integrated Model – Flow Diagram to address Structural Number limitations

A summary of unique characteristics of RPP that are not available in dTIMS or TSA:

1. New techniques for substantially improving asset management and the reliability and effectiveness of Austroads pavement design based on New Zealand regional precedent performance. Both empirical and mechanistic approaches are included and compared.

2. Pavement Rehabilitation: A definitive procedure for decision making on re-surfacing versus rehabilitation (structural renewal) as shown in Figure 1

3. Moduli (layer stiffness) of what is being achieved locally (rather than Austroads expectations) for:

    - Unbound basecourses
    - Cement stabilised basecourses
    - Foamed bitumen stabilised (FBS) basecourses

4. Prediction of expected performance of newly constructed pavements. Predicting performance for modified/stabilised pavements where the curing / dryback in the early months provides significant change in stiffness / inferred performance.

5. Construction verification

    - deflection targets and changes in subgrade moduli with increasing pavement thickness
    - stress dependency in all layers but primarily the subgrade
    - accounting for stress dependency on projects where deflection is the critical design criterion
    - stress dependency effects in sandy soils
    - subgrade stabilisation

6. Subsoil drainage requirements for the entire network, and prioritising those locations that will give maximum return (where drainage will be most cost effective because they exhibit saturated subgrades as well as least structural life).

7. Rigorously determined Load Damage Factors for every treatment length (or set of roads), potential for future damage from High Productivity Motor Vehicles (HPMV), and effects of overload axles/increased loadings.

8. Allowable strains to minimise cracking in thin AC and OGPA surfacings – assessing high strain mixes/polymers from precedent performance.

9. Reality checks for rehabilitation or new pavement designs using local (or national) precedence. Specific rehabilitation design is provided for each test point, including: dig-out depth for reconstruction, overlay thickness, depth of stabilisation (cement or foamed bitumen). The entire network is properly sub-sectioned into “structural treatment lengths” using a rational approach to define homogeneous sections based on stiffnesses, stresses and strains in each layer.

10. A spreadsheet for the design of cement stabilised or foamed bitumen pavements in each specific region.

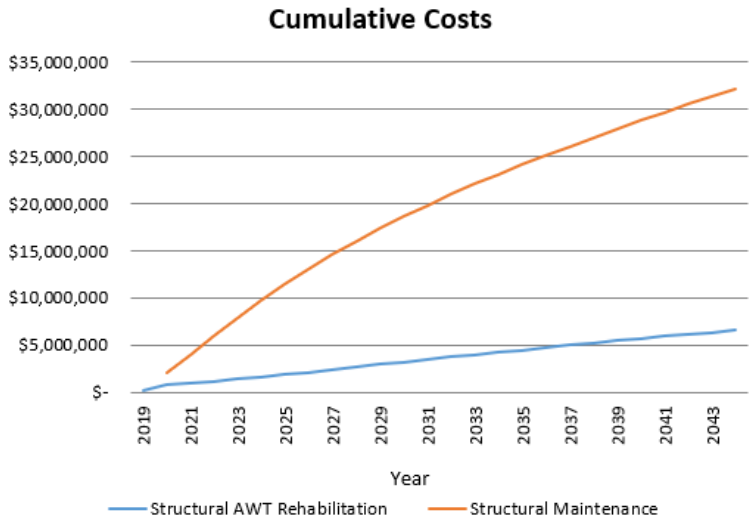


Figure 1. Example large road network summary comparison between cumulative costs of structural maintenance (i.e. localised patch repairs and digouts) and Area Wide Treatment (AWT) where strategic lengths of the full width of the roadway are rehabilitated