# Improved Design & Construction Methodology for Urban Local Roads in Flood Prone Areas

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Stabilised Pavements of Australia


AustStab
Pavement Recycling and Stabilisation Association

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# Scope

- Introducing River Terrace
  - Site Condition and Constraints
- Design
  - Rehabilitation Pavement Design
  - Construction Process
  - Mix Design
- Construction Phase and Post Construction Testing
- Project Economics
- Conclusion

# River Terrace



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# Site Condition & Constraints


Mullumbimby fill exclusion zone


Local geology

# Rehabilitation Pavement Design

| Layer | Details |
|---|---|
| Spray Seal | Double/Double (14mm/7mm aggregate)* |
| Priming Treatment | Cutback primer, AMC0 or AMC00 |
| Base Course – DGB20 | 150 mm - CBR 35% |
| Subbase Course – DGS20 or DGS40 | 300 mm - CBR 25% |
| Natural Subgrade - Silty CLAY (CH) | CBR 4% |
| * A 40 mm thick asphalt seal (AC10) may also be acceptable as a seal if preferred by Council. | |

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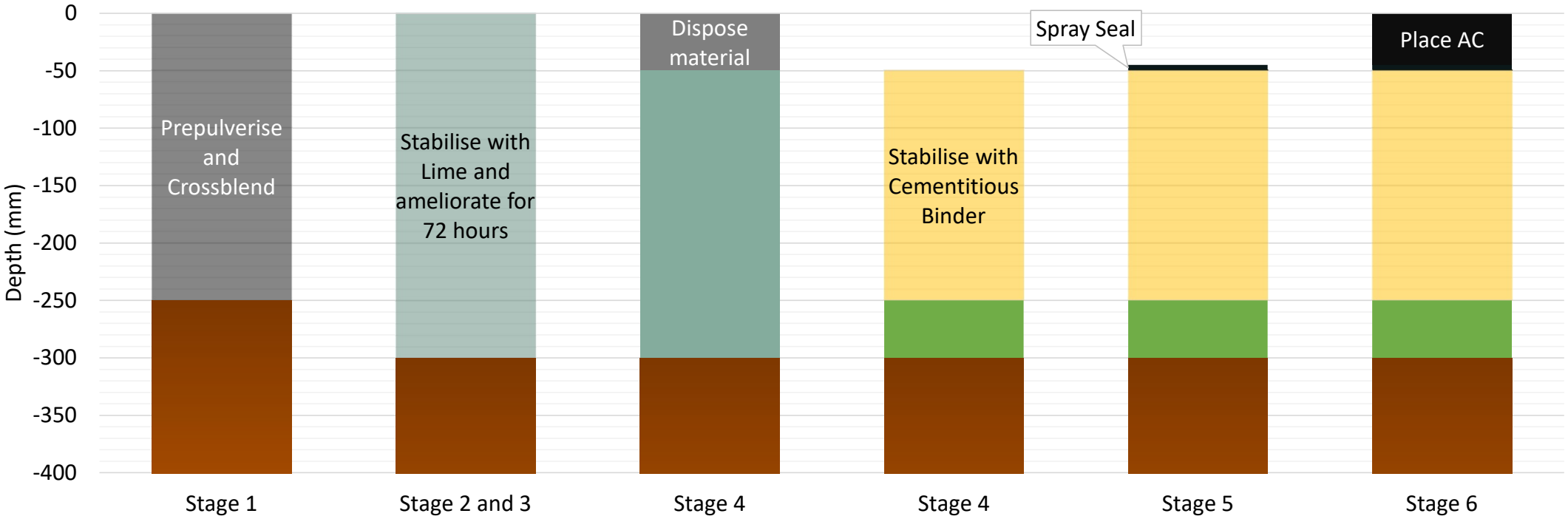
| Lime Stabilised Subgrade Insitu – 5% Lime Content | 200 mm - CBR 10% |
| Natural Subgrade – Silty CLAY (CH) | CBR 4% |
| * A 40 mm thick asphalt seal (AC10) may also be acceptable as a seal if preferred by Council. | |

# Recommended Construction Process



# Mix Design


| | Application Rate, % | Field Target Spread Rate, kg/m$^2$ |
|---|---|---|
| Hydrated Lime (1st Treatment) | 3.0 | 18.0 |
| 60/40 Slag/Lime (2nd Treatment | 4.0 | 15.5 |

a) Conduct Lime Demand (LD) test on subgrade clay.
b) Adopt lime content of LD+1%.
c) Breakdown all samples together to ensure accurate proportions of the bituminous wearing course, base gravel and subgrade are contained in the mixture. This was to reflect the initial prepulverising and crossblending phase.
d) Determine OMC/MDD with LD+1% hydrated lime.
e) Mix hydrated lime at LD+1% at OMC.
f) Prepare UCS cylinders.
g) Cure the samples whilst in the cylinders at 25 degrees for no less than 72 hours.
h) Break down the samples to reflect the second stabilisation mixing process.
i) Determine OMC/MDD with 60/40 slag/lime.
j) Undertake UCS testing at 3%, 4% and 5% 60/40 slag/lime.

# Construction Phase

| Date | Activity | Duration |
|---|---|---|
| 10 April 2024 | Prepulverisation and crossblending | 1 day |
| 12 April 2024 | 300mm lime stabilisation | 1 day |
| 13-15 April 2024 | Amelioration | 3 days |
| 16 April 2024 | Removal of 50mm of lime treated material | 1 day |
| 17 April 2024 | Slag/Lime strengthening stabilisation | 1 day |
| 26 April 2024 | Placement of SAMI seal | 1 day |
| 30 April 2024 | Placement of 50mm AC wearing course | 1 day |

# Construction Phase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# Post Construction Testing

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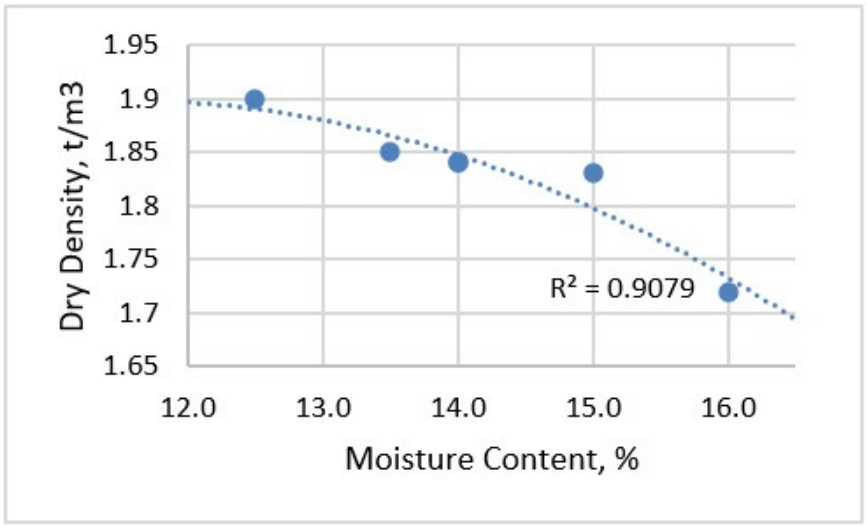


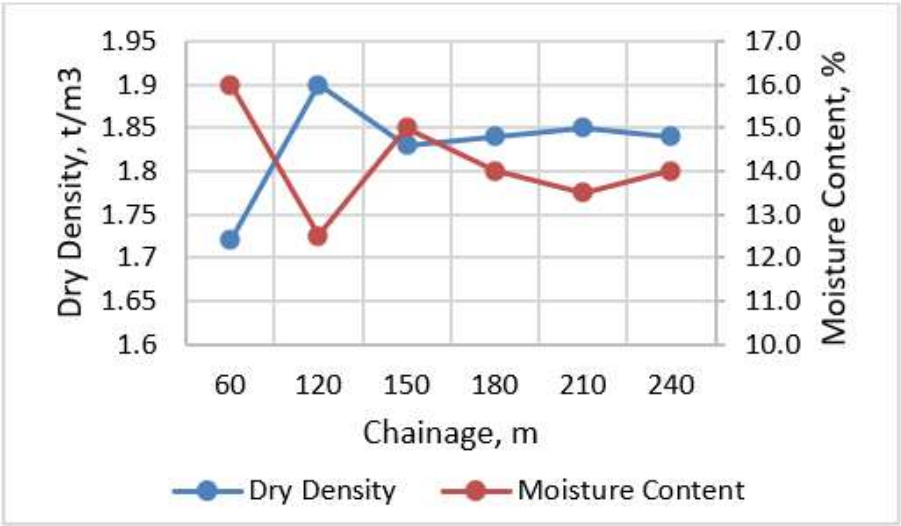

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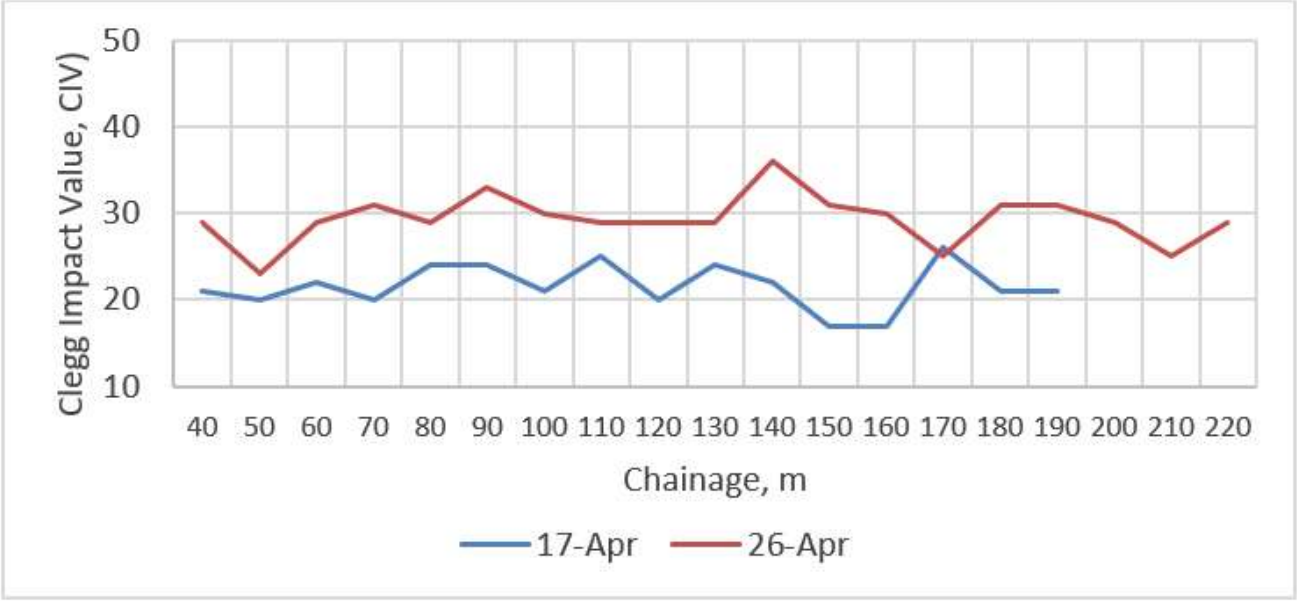

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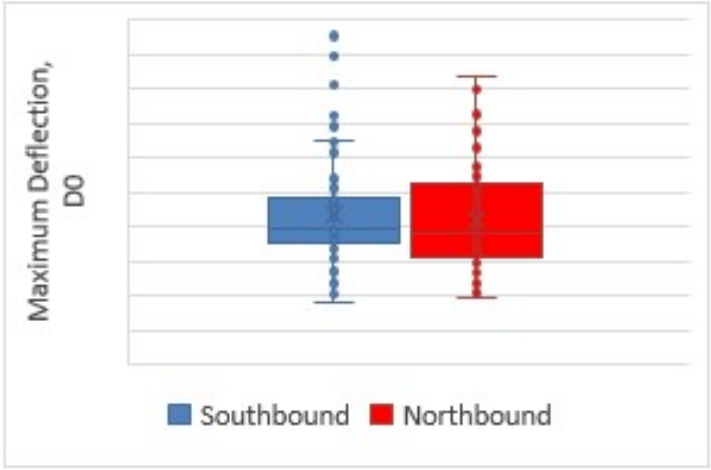


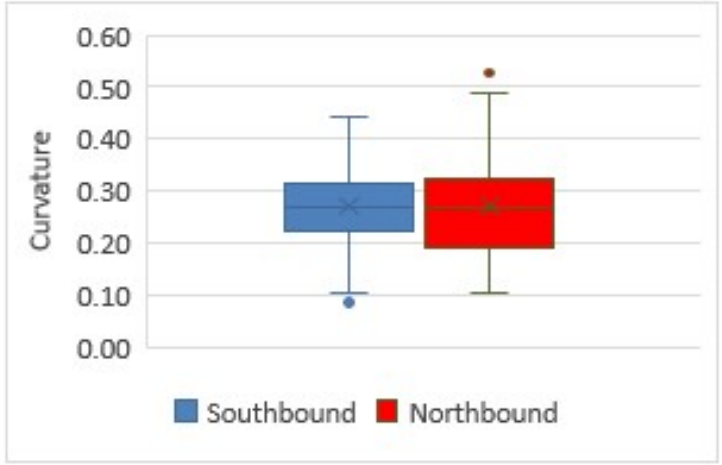


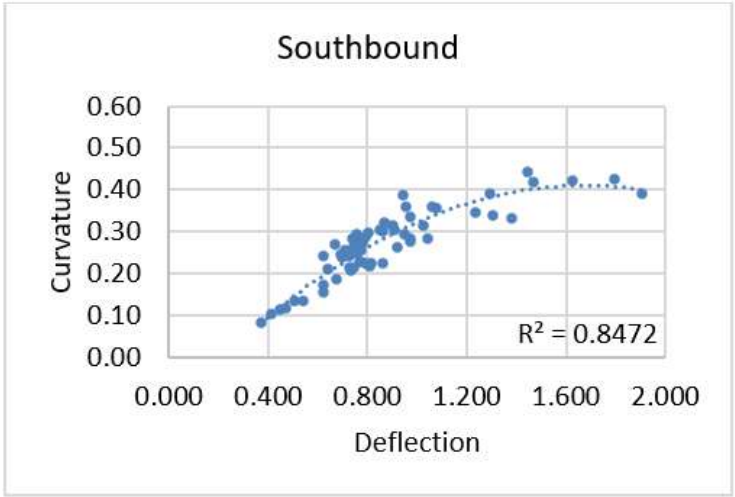


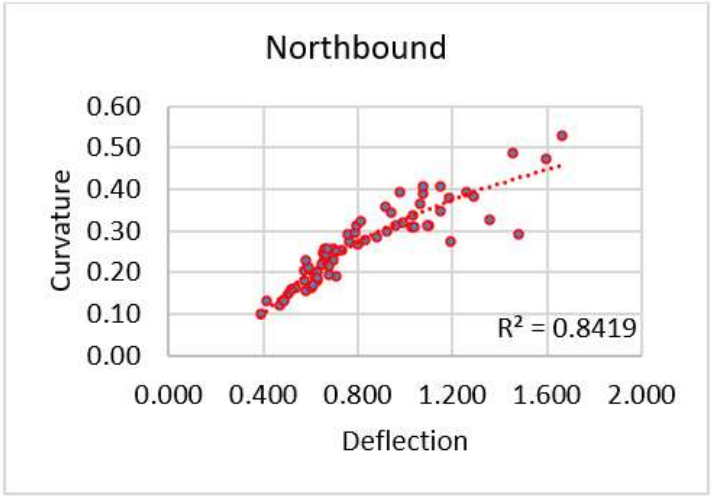

# Project Economics

| Item | Qty | Unit | Rate | Total Cost | % of total |
|---|---|---|---|---|---|
| Project management | 1 | item | $ 19,191.67 | $ 19,191.67 | 6% |
| Geotechnical investigations/designs | 1 | item | $ 16,080.00 | $ 16,080.00 | 5% |
| Site establishment/prelims | 10 | days | $ 3,131.51 | $ 31,315.10 | 9% |
| Traffic control | 12 | days | $ 1,604.89 | $ 19,258.68 | 6% |
| Initial seal | 3720 | m2 | $ 6.14 | $ 22,840.80 | 7% |
| 40mm AC10 Asphalt | 3185 | m2 | $ 32.57 | $ 103,735.50 | 31% |
| Pavement stabilisation | 2475 | m2 | $ 39.11 | $ 96,797.25 | 29% |
| Earthworks/drainage | 1 | item | $ 21,721.97 | $ 21,721.97 | 7% |
| | | | **Total** | **$ 330,940.90** | |

# Conclusion

- River Tce challenges not unique
  - Height restrictions
  - Flood zone
  - Thin pavements
  - Variable materials
  - Wet construction period
- Crossblending very important
- Double stabilisation strategy
  - 3.0% Hydrated Lime, then
  - 4.0% 60/40 Slag/lime