

# CEMENT STABILISATION WORKSHOP

CONSULTANT'S VIEW

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# Structure of presentation

- Background
- Challenges facing design engineer
- Conclusions
- Recommendations

# Background

- 1941: First cement stabilised layer constructed.
- 1950's & 60's: Provincial road network was constructed with at least one stabilised pavement layer in nearly all of the pavements.
- 1970's & 80's: Road construction boom period.
  - Large stabilisation projects
  - TRH 13 guideline document, manuals & research papers
- 1990's: Mainly light rehabilitation projects.
  - Repair and reseal projects
  - Very limited stabilisation of pavement layers
- Recently : Upturn in road construction.
  - Strengthening of upper pavement layers as holding actions

# Challenges facing the design engineer

- To optimise the design of cement stabilised base layers taking the following into account:
  - Layer should be thick and strong enough to distribute the load and accommodate the high axle loads and tyre pressures without crushing in the upper portion or overstressing of the layer.
  - Layer must not be too thin to create a “glass plate on feather bed” situation.

Thickness of stabilised layer is however often dictated by availability of funds !

# Challenges facing the design engineer (2)

- Assessment of relevant sub-grade and support layer conditions and selection of representative samples for laboratory testing:
  - Pavement structure and materials can vary significantly along the length of a 40 to 60km long road which was constructed 40 – 50 years ago.
- Selection of type of cement to be used in laboratory tests:
  - Variety of different cements available on market but availability limited in project regions.

# Challenges facing the design engineer (3)

- Early trafficking:
  - Half width construction practices results in pressure to open road to traffic as early as possible.
  - Effect of early trafficking on strength gain?
- Priming:
  - How soon after stabilisation?
  - Logistics of priming in remote areas.

# Challenges facing the design engineer (4)

- Reworking of stabilised layers:
  - Addition of half the stabilising agent is allowable if layer is to be reworked within 7 days – final strength?
  - Treatment of previously stabilised layers?
- Ambient temperatures:
  - Unpredictable weather patterns.
  - Current specifications limit construction window in certain regions.

# Challenges facing the design engineer (5)

- Mixing process:
  - Performance of lightly stabilised layer depends strongly on effectiveness of mixing process.
  - Both bulk spreading and spreading by hand have limitations.
  - Limited space available for construction equipment during half width construction – recyclers.
  - Mixing with recyclers do have limitations!

# Challenges facing the design engineer (6)

- Surfacing:
  - Difficult to obtain acceptable surface ready for stone seal on a recycled stabilised base layer.
  - Carbonation, biscuit layers and loose surface due to over compaction are common defects in the surface of stabilised base layers.
  - Stone seals risky due to crushing and possible defects in base layer surface.
  - Asphalt layers very often not affordable during holding actions.
  - Asphalt and stone seal combination is preferred but very often not affordable due to budget constraints.

# Conclusions

- The limitations in design and construction of lightly stabilised base layers could limit the use of this technology.
- The stabilisation process entails modification and cementation of the material:
  - The current specification and best practice guideline documents were developed to ensure proper cementation of the material.
  - Lightly stabilised materials tend to lean more towards the modification of the material.

If so are the current specifications and best practice guidelines on stabilisation appropriate ?

# Recommendations

- Research should be undertaken to establish best practice guidelines for the lightly stabilised base layers, new construction methods, and current construction limitations.
- The results should be widely published to ensure that designers, contractors and clients are aware of the limitations in the design and construction of cement stabilised base layers.



Thank you