HVSIA 2010

HVSIA HMA FEEDBACK

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Background

- Evaluation of rut-resistant HMA overlays in SA
- Initially permanent deformation tests
- Then fatigue and durability tests

- 2006 to 2009
- 16 HVS tests planned – 9 completed as rut tests
- Laboratory program

- Preliminary results and papers and outputs

Current status

- Reports
  - Refer to Matrix for current Level 1 reports – drafts for comment
  - APT 2008 paper

- Major findings, conclusions and recommendations
  - Next slides

- Future of project
  - Need to finalize laboratory reports and combine all data into Level 2
  - Need to conduct fatigue and durability HVS test

AC mixes

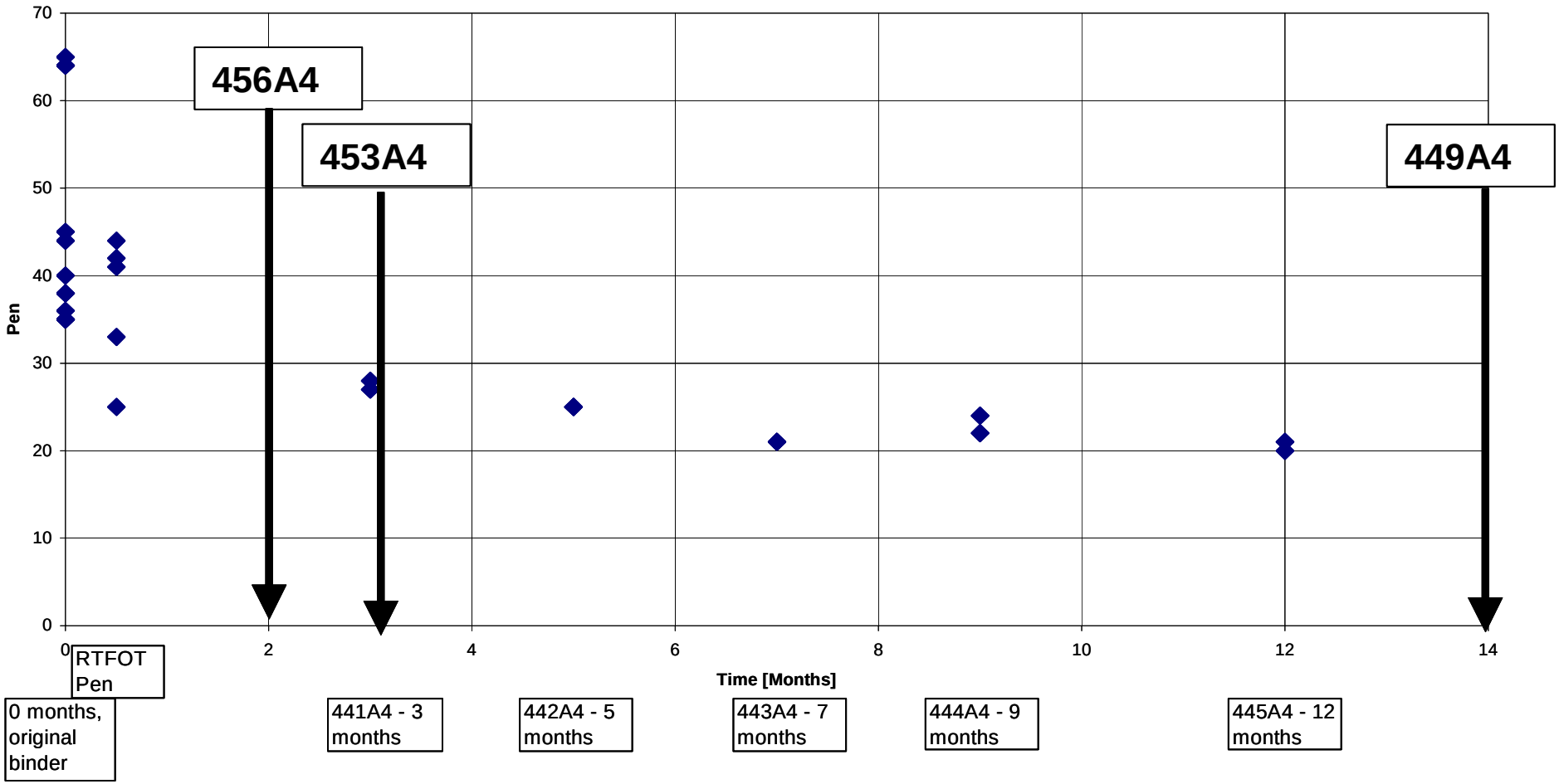
- Standard mix (STD)
- Rut Resistance 1 (coarser mix – same binder content)
- Rut Resistance 2 (even coarser mix – same binder content)

- Results slides focuses on STD vs RR1 vs RR2

Major findings, conclusions and recommendations

- **HMA temperature**
  - Rut development at higher temperature (RR1) similar to rut development at 60°C - Indicates possible aggregate interlock
  - Rut development (under channelised conditions) for RR2 mix much less than for the STD mix, indicating that improved aggregate packing may lead to beneficial rut resistant mix (also refer to the loading conditions).
- **Loading conditions**
  - 2 different loading conditions
    - standard (40 kN, 620 kPa) channelised uni-directional load
    - n-shaped (60 kN, 800 kPa) wandering bi-directional load
  - caused higher load case to develop higher permanent deformation (as expected)
  - Wandering, bi-directional, n-shaped load case caused higher permanent deformation in 2 RR mixes than in the STD HMA mix.
  - Most reasonable explanation - age of binder at time of test
    - age of standard HMA test (449A4) to be more than 4 times that of 2 rut resistant HMA mixes when testing started

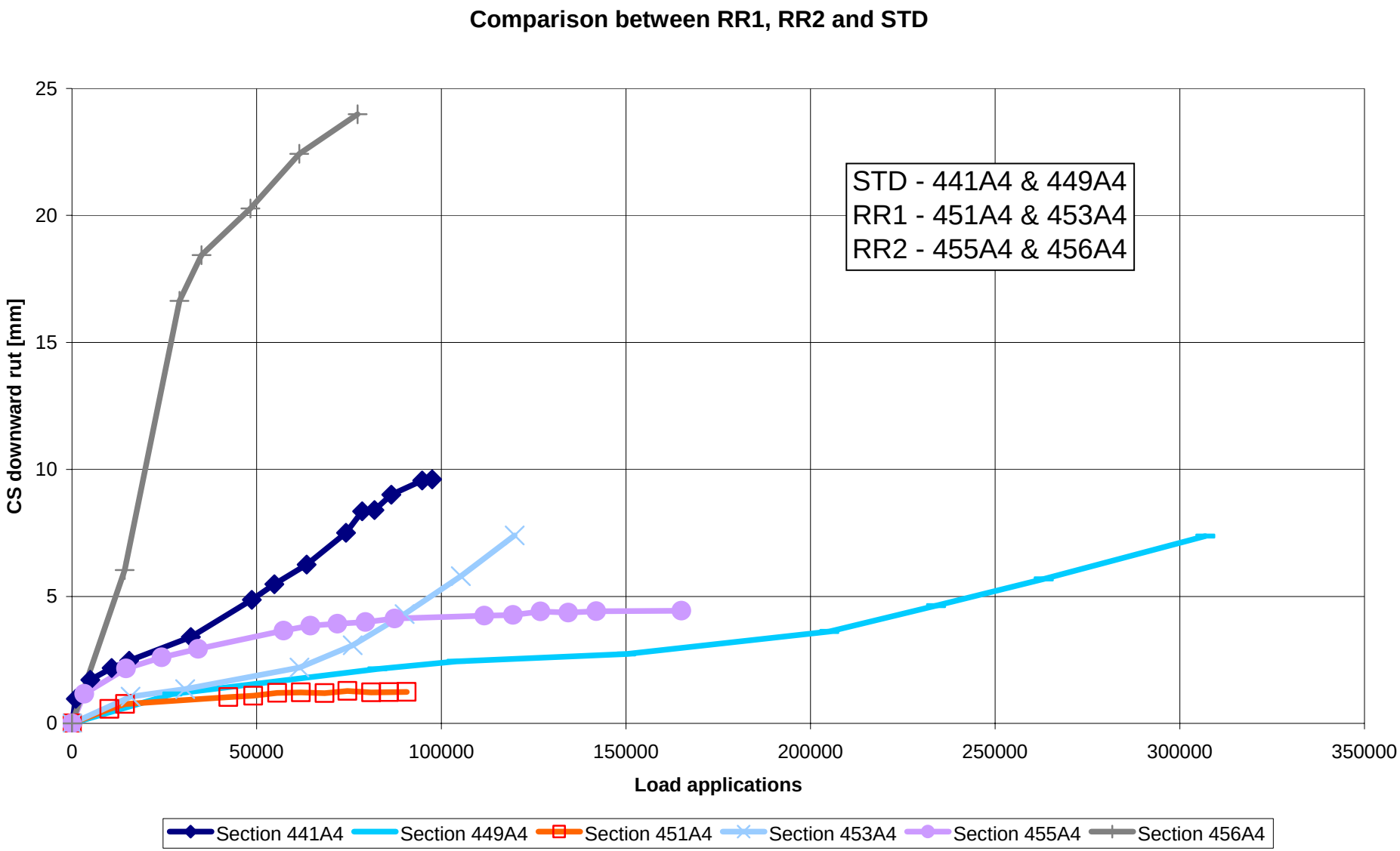
Ageing graph



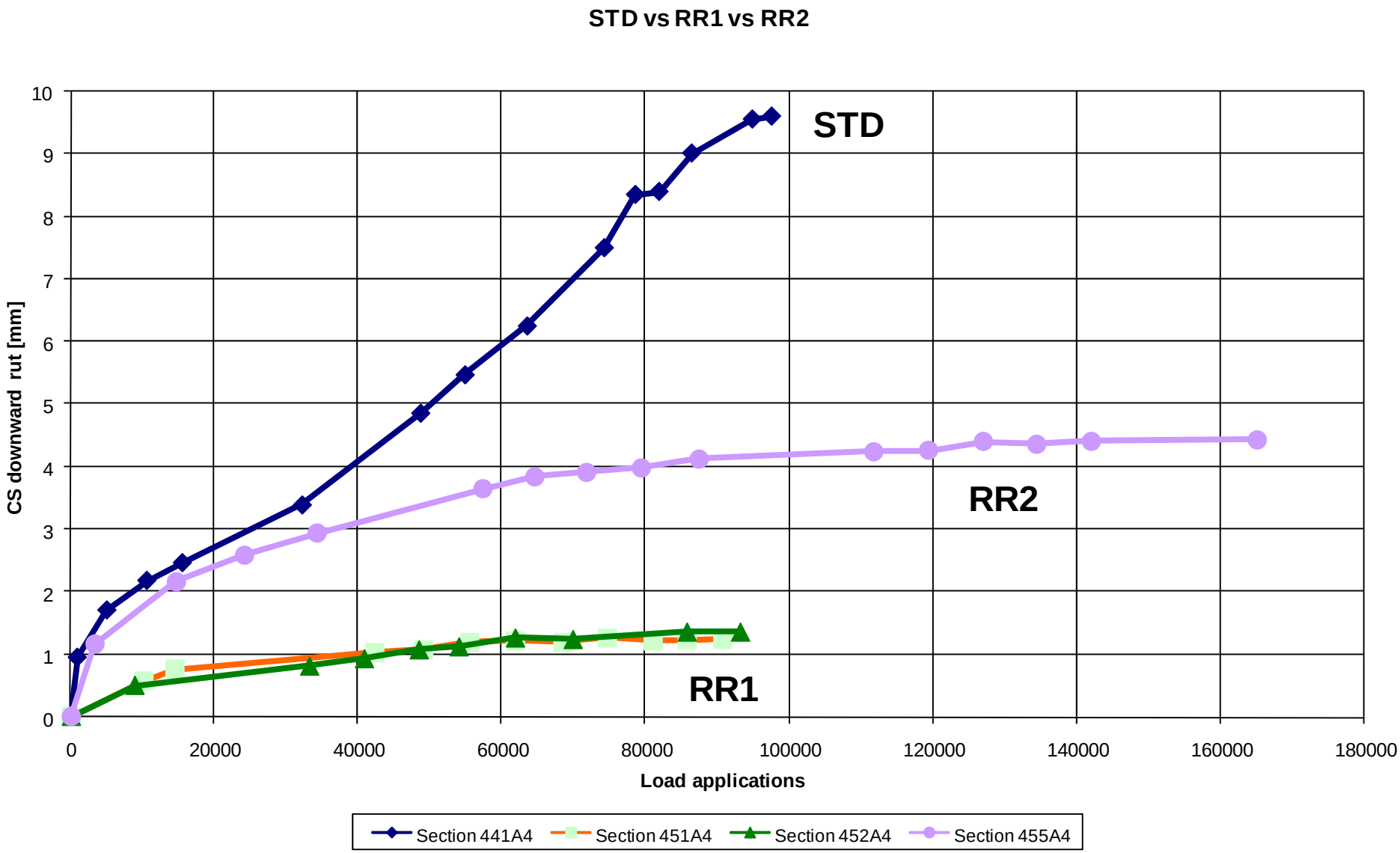
Major findings, conclusions and recommendations

- Expected lives
  - Based on rut rates of various tests
    - expected permanent deformation lives of 3 mixes are 1:3,6:10 for the STD:RR2:RR1 HMA mixes
    - Optimal aggregate packing provided optimal rut resistance
      - effect of binder should not be ignored, as illustrated when the aggressive loading conditions showed very large permanent deformation for RR2

Rutting graph



Rutting graph



Major findings, conclusions and recommendations

- **Further HMA evaluation**
  - Evaluation of rut resistant HMA mixes after a higher level of ageing has occurred should be attempted
  - Specialised rut resistant mixes such as SMAs should be included in test matrix to evaluate potential benefit that these premium mixes can provide
  - Planned fatigue and durability testing of HMA on LTPP sections should be performed (3 to 5 years after construction – normal traffic)
  - Questions regarding the effect of ageing of the binder on the HMA performance will also be addressed through these tests.