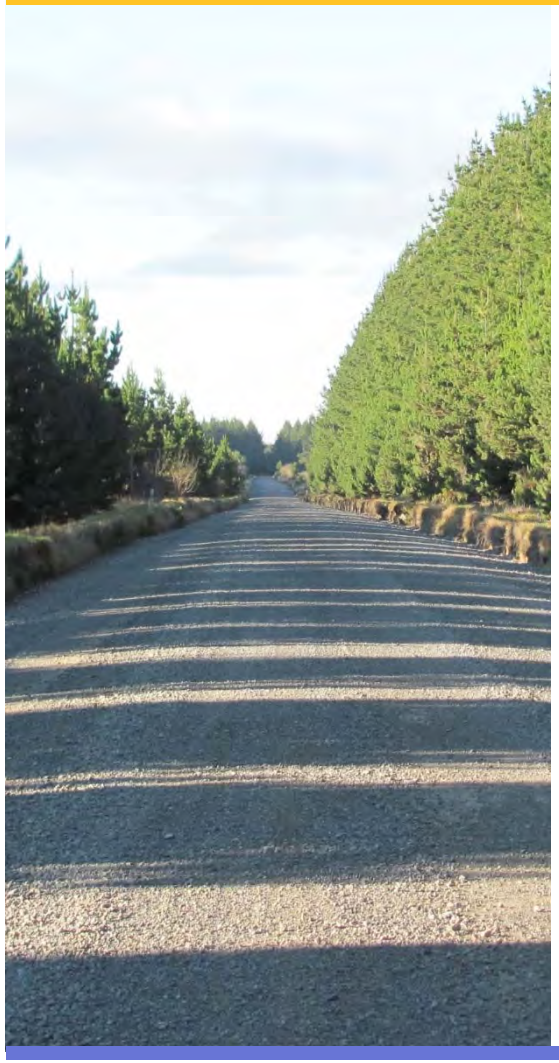
Creating Connections

REAAA Driving Progress

ROAD ENGINEERING ASSOCIATION OF ASIA & AUSTRALASIA (NZ)



Greg Arnold – Road Science

Anthony Stubbs – Road Science

Brett Kelly – Downer

Thomas Wright – Opus

Performance Based Testing for Design of Area Wide Pavement Treatments

SPONSORED BY: NZ TRANSPORT AGENCY WAKA KOTAHI, Fulton Hogan, Downer

East Waikato Maintenance Contract

Network Budget Forecast

Flat-lined budget until 2014/15 Season.

2011/12 Total Network Budget

Reduced by 11% compared to the previous five year average.

Existing 5-Year Hybrid Lump Sum Contract

Collaboratively renegotiated a reduced lump sum, retaining existing performance criteria.

LOW VOLUME ROADS WORKSHOP 2013

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East Waikato Maintenance Contract

Potential of Performance-based rehabilitation design.

Saving of 12% on rehabilitation costs.

Historic Austroads Approach

Overlay aggregate and 1.5% cement stabilised.

New Performance-based Approach

Design specifically for the rehabilitation.

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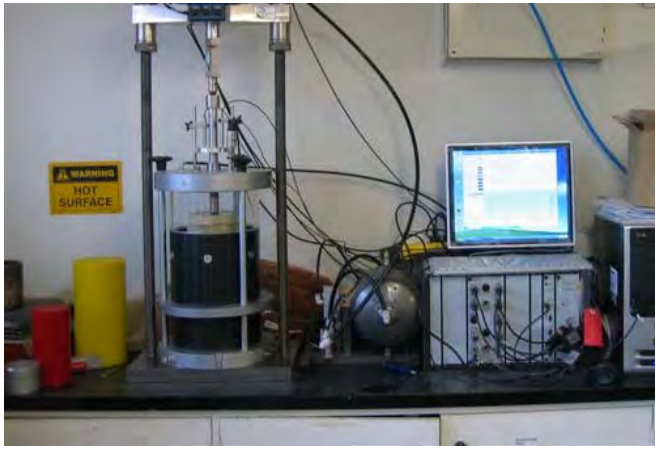
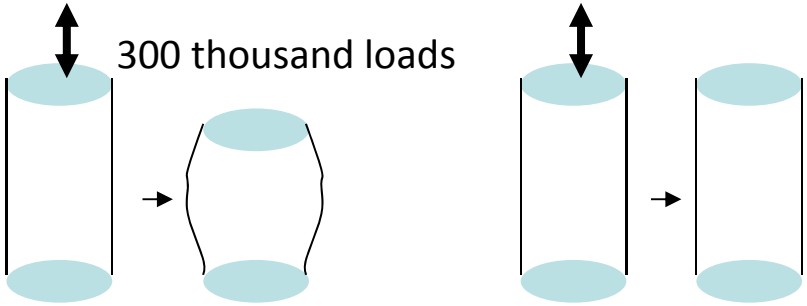
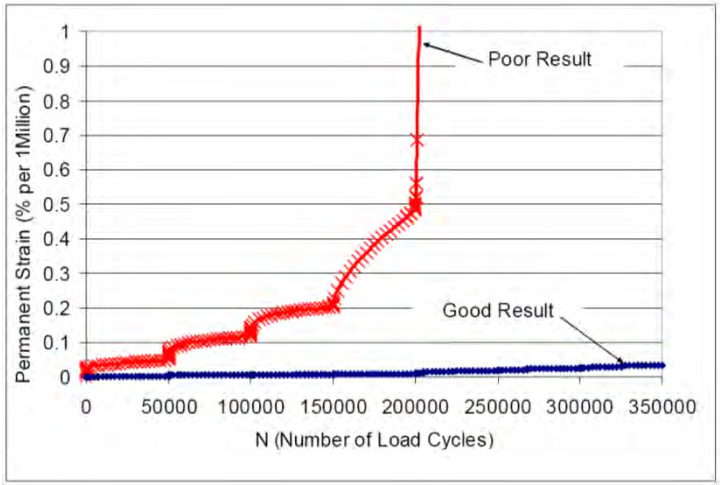
Repeated Load Triaxial Tests on test pit aggregate – East Waikato Hybrid
- How good is the existing material in the road?





Poor result existing
-Needs cement and,
-**Flexural Beam Test**

Good result
-Traditional treatment



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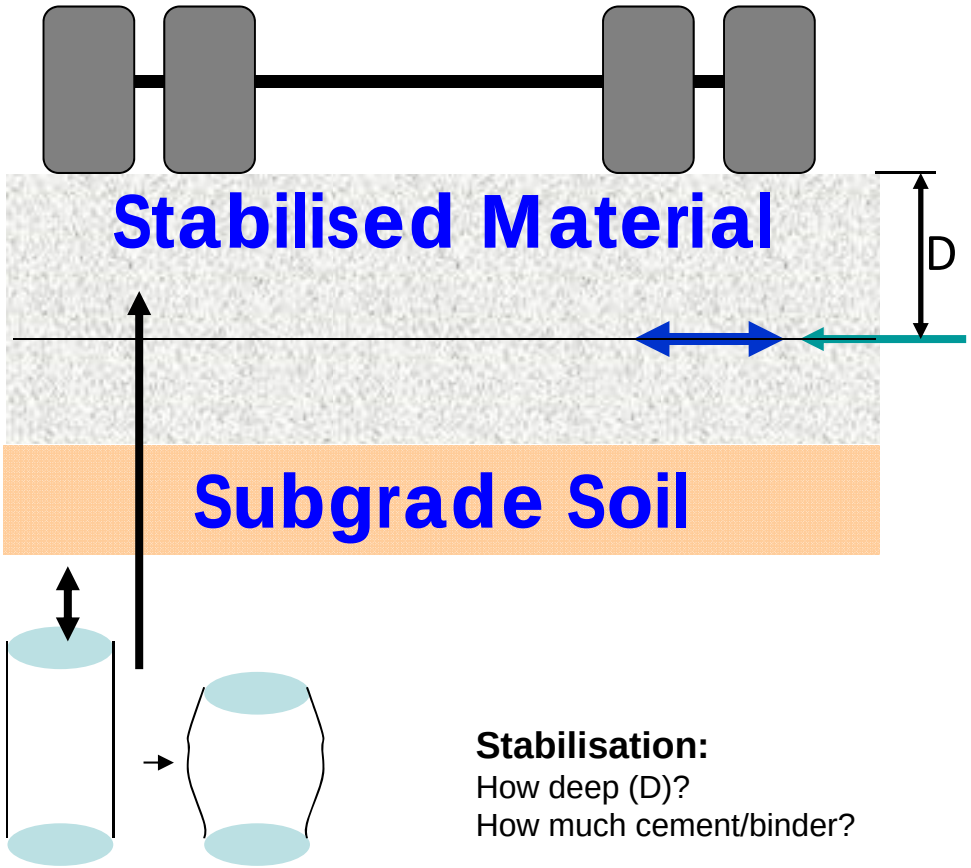
Flexural beam tests optimises cement/binder content and depth



Stabilisation:
How deep (D)?
How much cement/binder?

To little cement – too weak
To thin – will break
To thick – uneconomic

Poor result
Existing

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INSITU ROAD AGGREGATE CRAP?

NO

RELIES ON AGGREGATE INTERLOCK

LOW QUANTITIES OF BINDER FOR STRENGTH WHEN WET

UNBOUND GRANULAR DESIGN

YES

RELIES ON CEMENT BONDS

FLEXURAL BEAM TEST

TENSILE STRENGTH DESIGN

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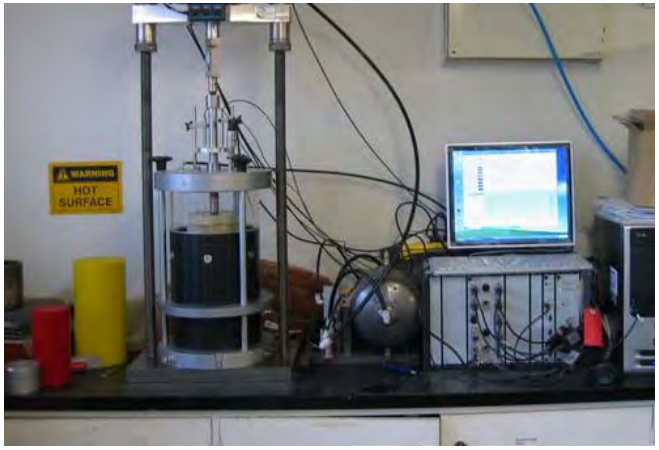
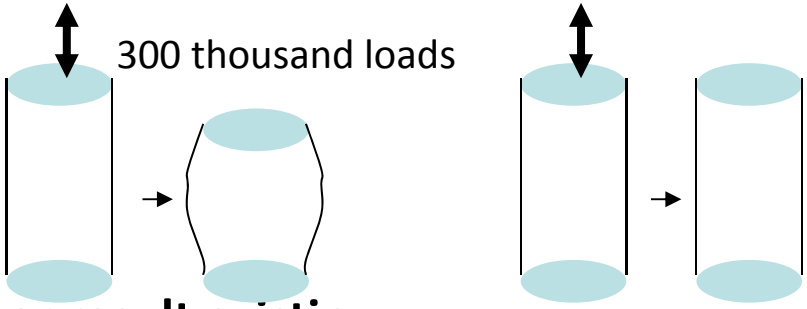
LOW VOLUME ROADS WORKSHOP 2013

Repeated Load Triaxial Tests on test pit aggregate – East Waikato Hybrid
- How good is the existing material in the road?





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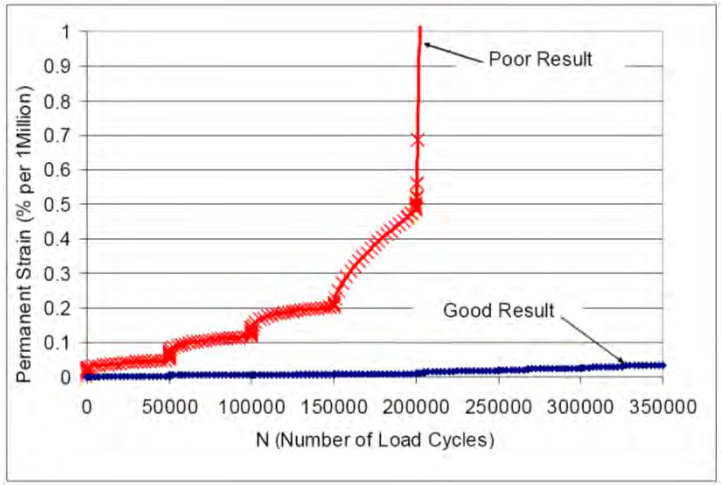

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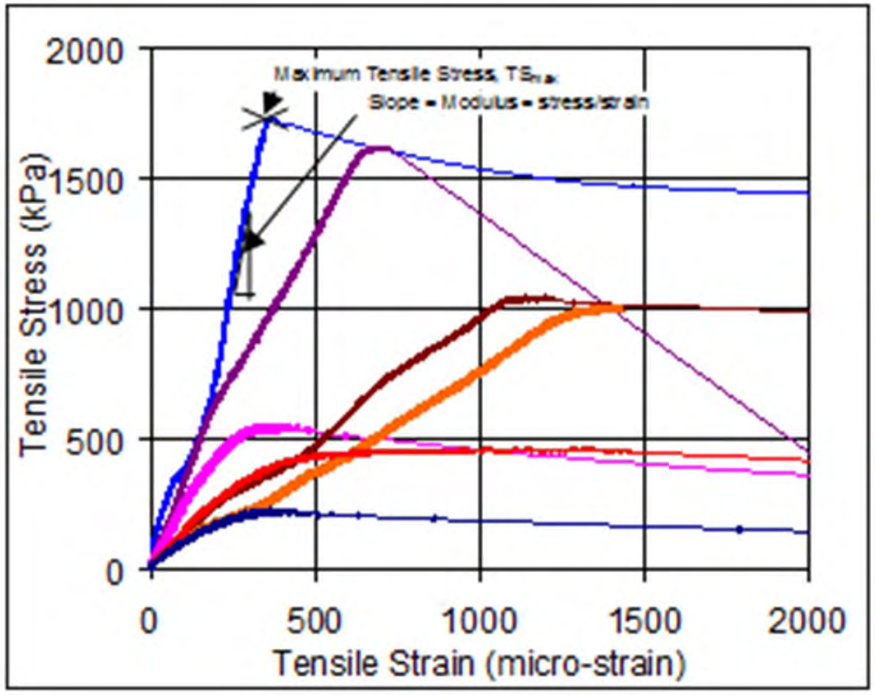

INSITU ROAD AGGREGATE CRAP?

YES

FLEXURAL BEAM TEST

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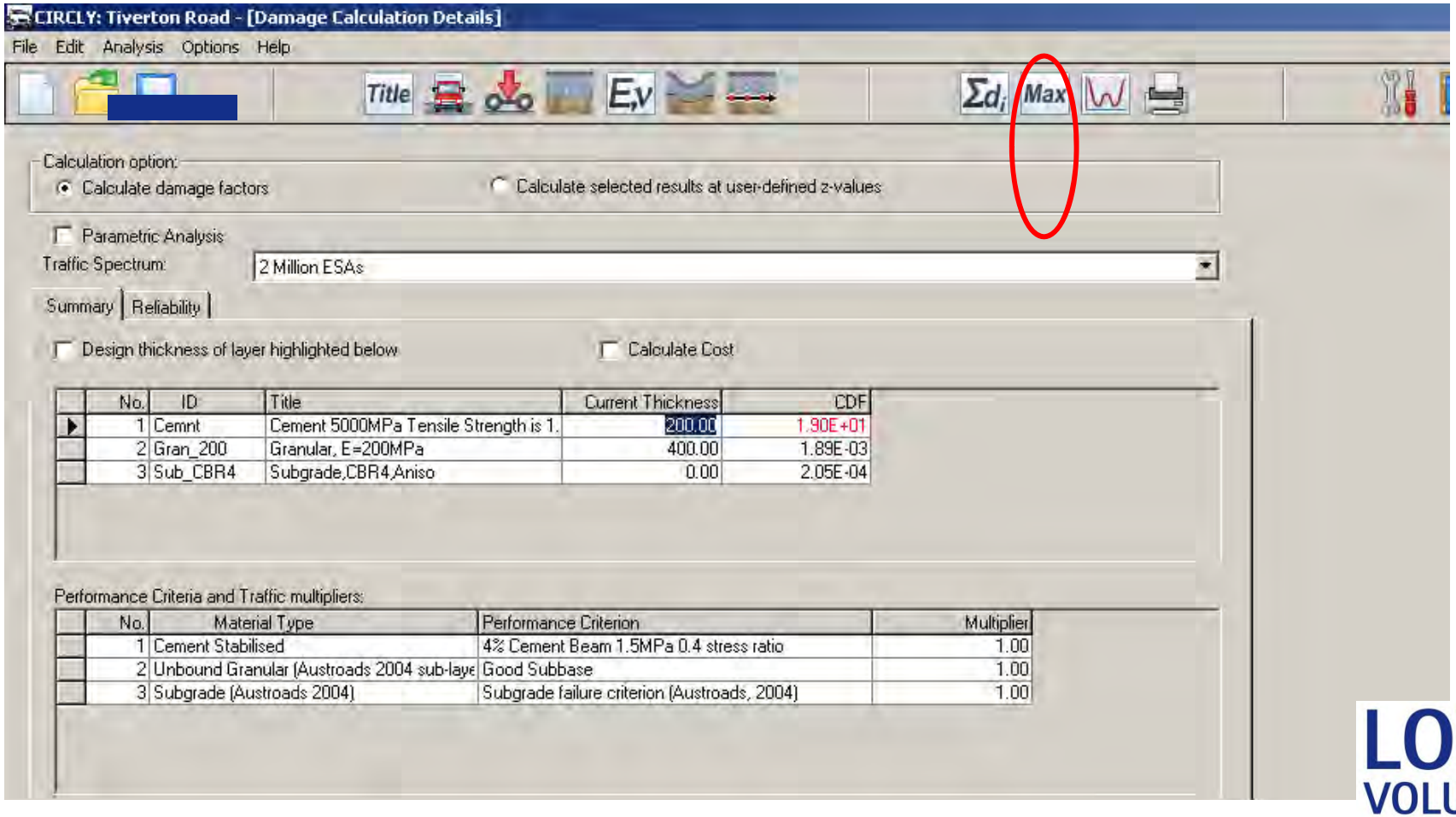

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Cement 5000MPa Tensile Strength is 1.7MPa
Maximum damage values for each vehicle type

Vehicle Type	Damage Factor	Critical Stress (MPa)
ESA750-Full	.18964E+02	-0.77 E+00

Maximum of total damage= 18.96374

Granular, E=200MPa
Maximum damage values for each vehicle type

Vehicle Type	Damage Factor	Critical Strain
ESA750-Full	.18906E-02	0.21726E-03

Maximum of total damage= 1.8905672E-03

Subgrade,CBR4,Aniso
Maximum damage values for each vehicle type

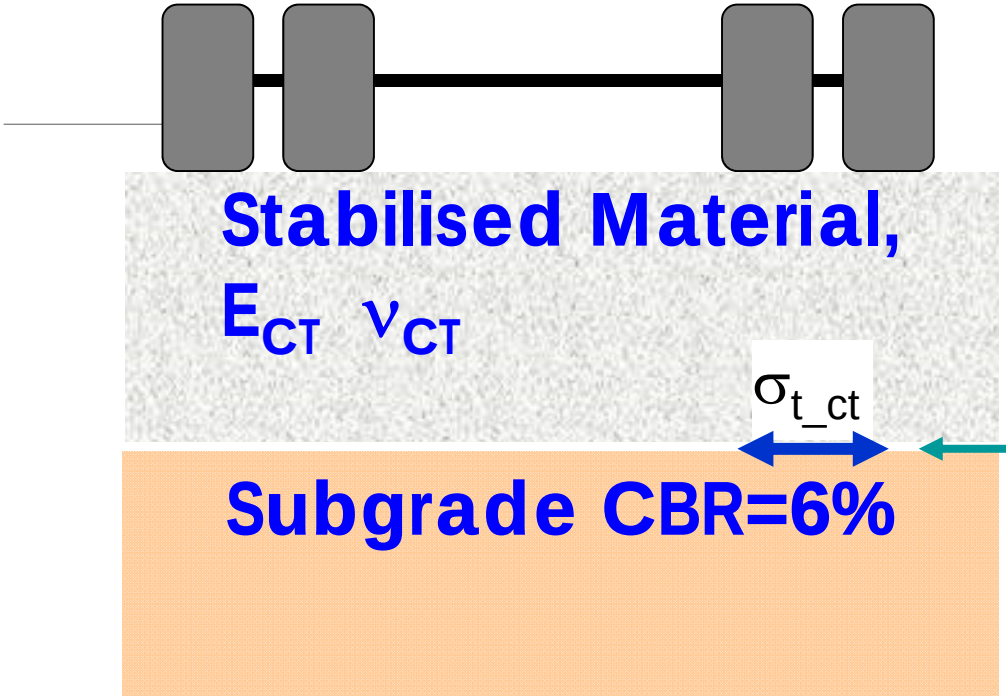
Vehicle Type	Damage Factor	Critical Strain
ESA750-Full	.20516E-03	0.34793E-03

Maximum of total damage= 2.0516428E-04

-ve because in tension

(0.77 MPA)

Taihape to Napier Road – Low Volume



250mm Cement Stabilised

CIRCLY Calculated
Tensile Stress = 380 kPa