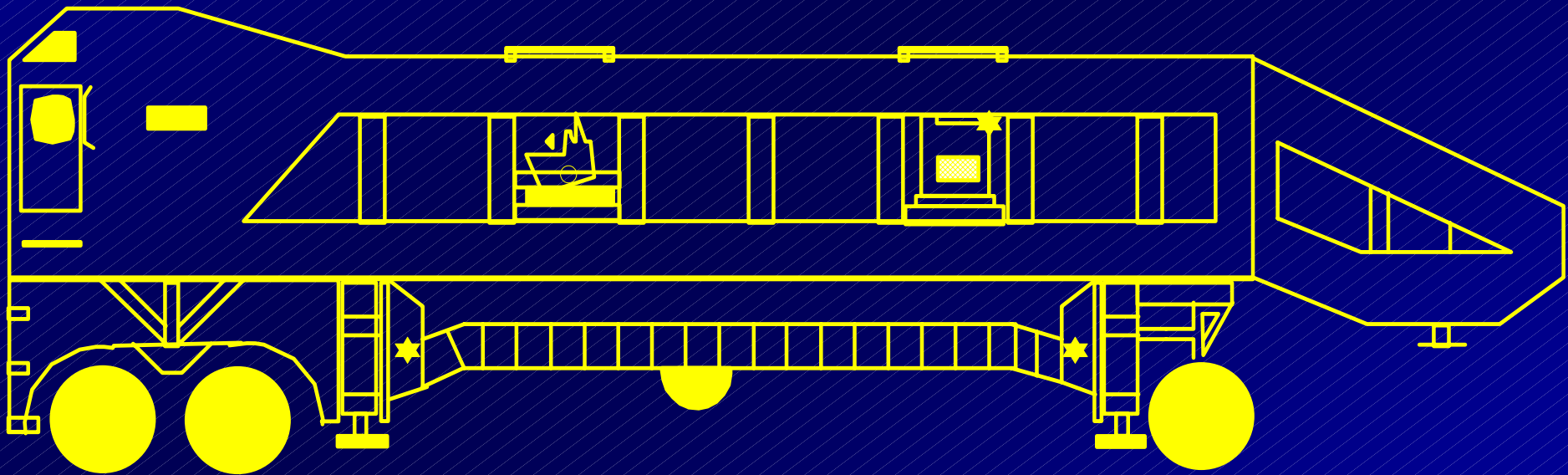


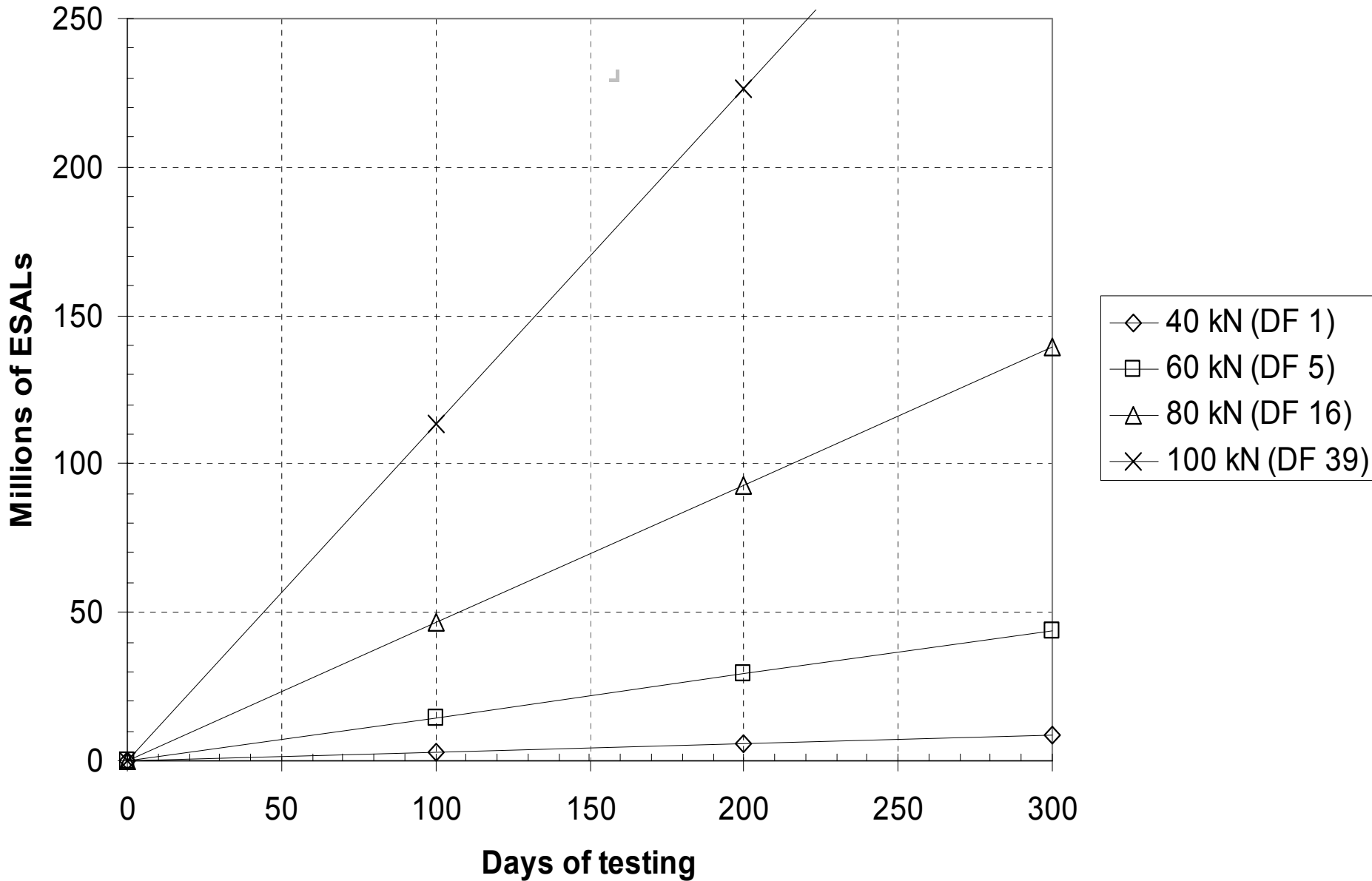
The Heavy Vehicle Simulator (HVS)

N.F. Coetzee, Ph.D., P.E.
Dynatest Consulting, Inc.

HVS Schematic



HVS Load Acceleration Effect (29000 reps/day ; n = 4)



Current HVS Programs

CSIR - Transportek

WPRC - (CAL/APT)

USACE-CRREL

Finland/Sweden

USACE-WES

Florida DOT

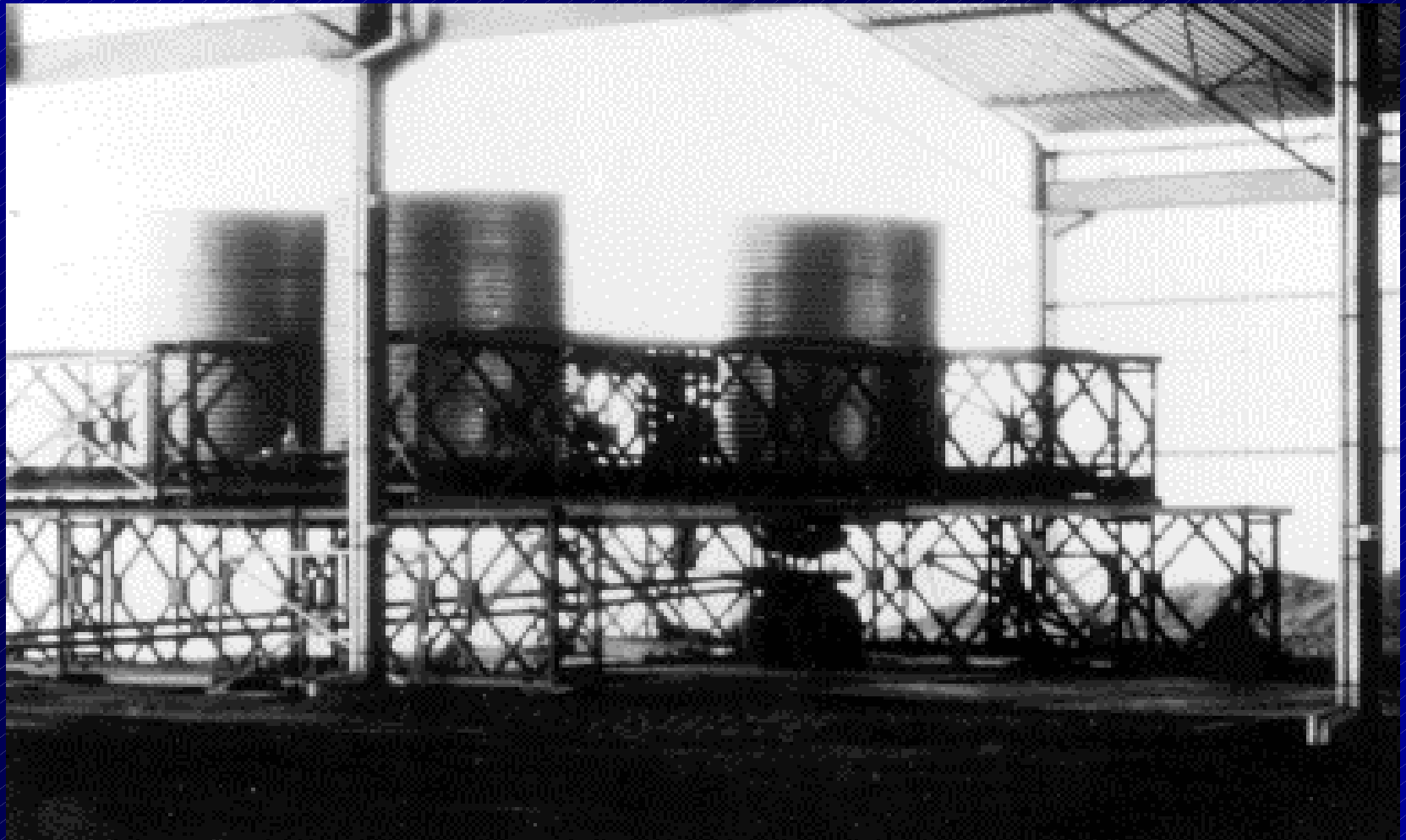
Development of the HVS

- Late 60's - Mk I
- 1972 - Mk II
- 1974 - Mk III
- 1994 - Mk IV
- 1997 - Mk V (Airfield)
- 1998 - Mk IV Plus

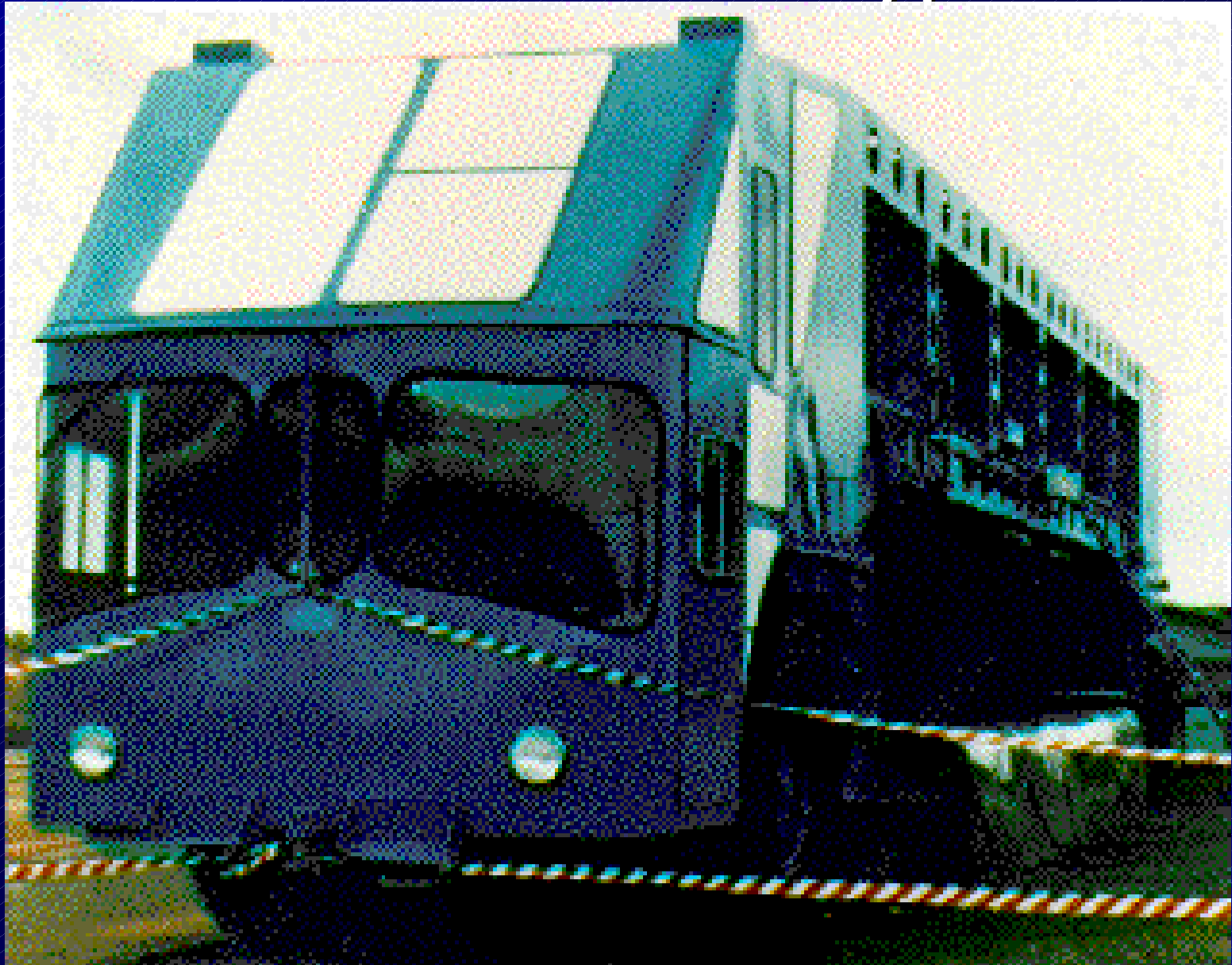
Chronology outside RSA

- Alaska - 1984
- Caltrans - Feb, May 1995 Mk III
- CRREL - Feb 1997 Mk IV
- VTT/VTI - May 1997 Mk IV
- WES - Dec 1998 Mk V Airfield
- FDOT - June 2000 Mk IV Plus
- Caltrans – 2000/01 Upgrade (Mk IV-)

HVS Mk I



HVS Mk II - Prototype



HVS MK III - Production



HVS Mk III 'Specifications'

- Load - up to 200 kN
- Speed - approx. 8 kph (18000 reps/day)
- Test length - approx. 6m
- Uni- and bi-directional; 1m wander
- Single, dual and aircraft test wheels
- 23 x 3,7 x 4,2 m ; 57 tonnes
- Mobile and self-powered

Susie in California



California PRC

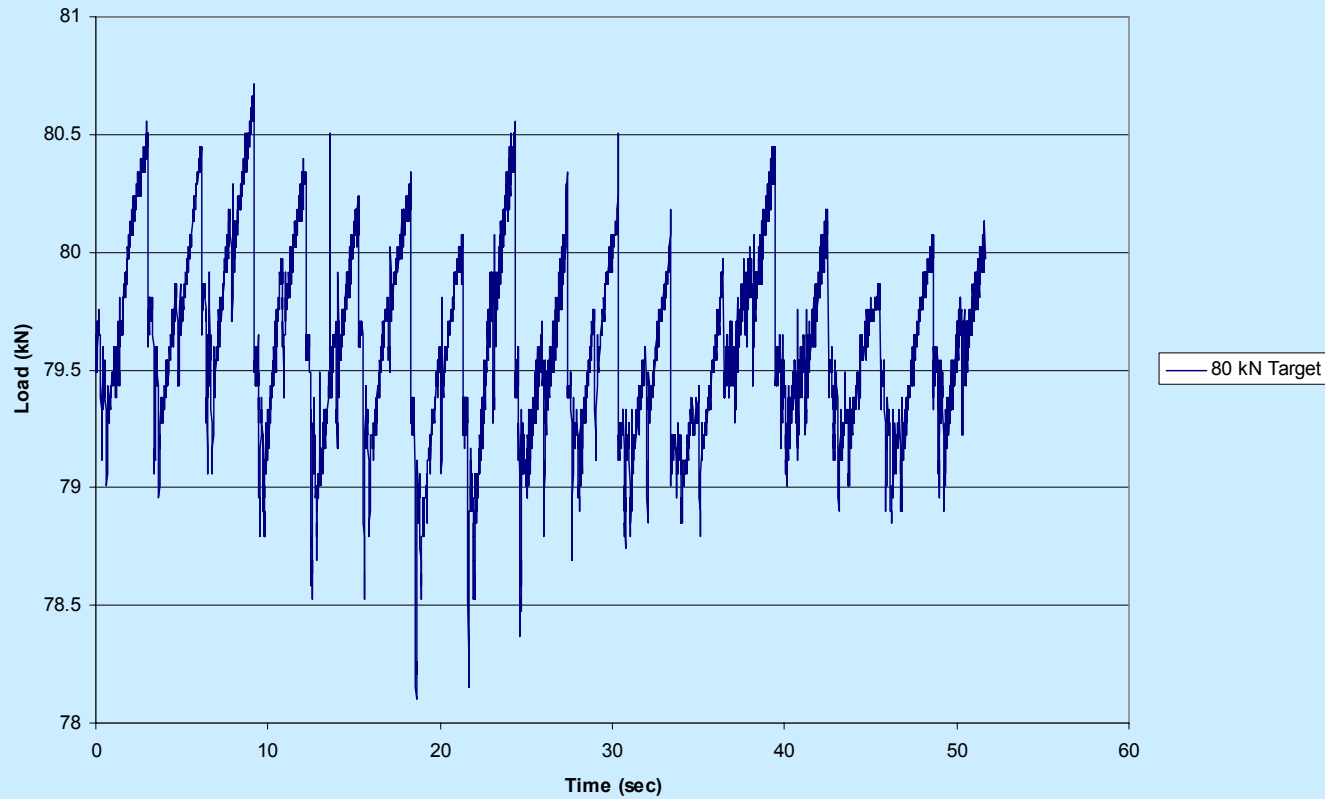
- DGAC vs ARHM-GG
- Drainable vs undrained bases
- Long life pavements (PCC, AC)
- Dowel bar retrofit
- MB road
- DISR (foamed bitumen)
- Integrated M-E design system

HVS Mk IV Specifications

- Computer - control & data
- Load - up to 200 kN
- Speed - apprx 13 kph (29000 reps/day)
- Test section - approx. 6m x 1m
- Uni- and bi-directional; 1m wander
- Single, dual and aircraft test wheels
- 23 x 3,7 x 3,9 m ; 46 tonnes
- Mobile and self-powered

HVS Control Data

HVS Mk IV Load Data - Uni-directional



USACE - CRREL



USACE - CRREL



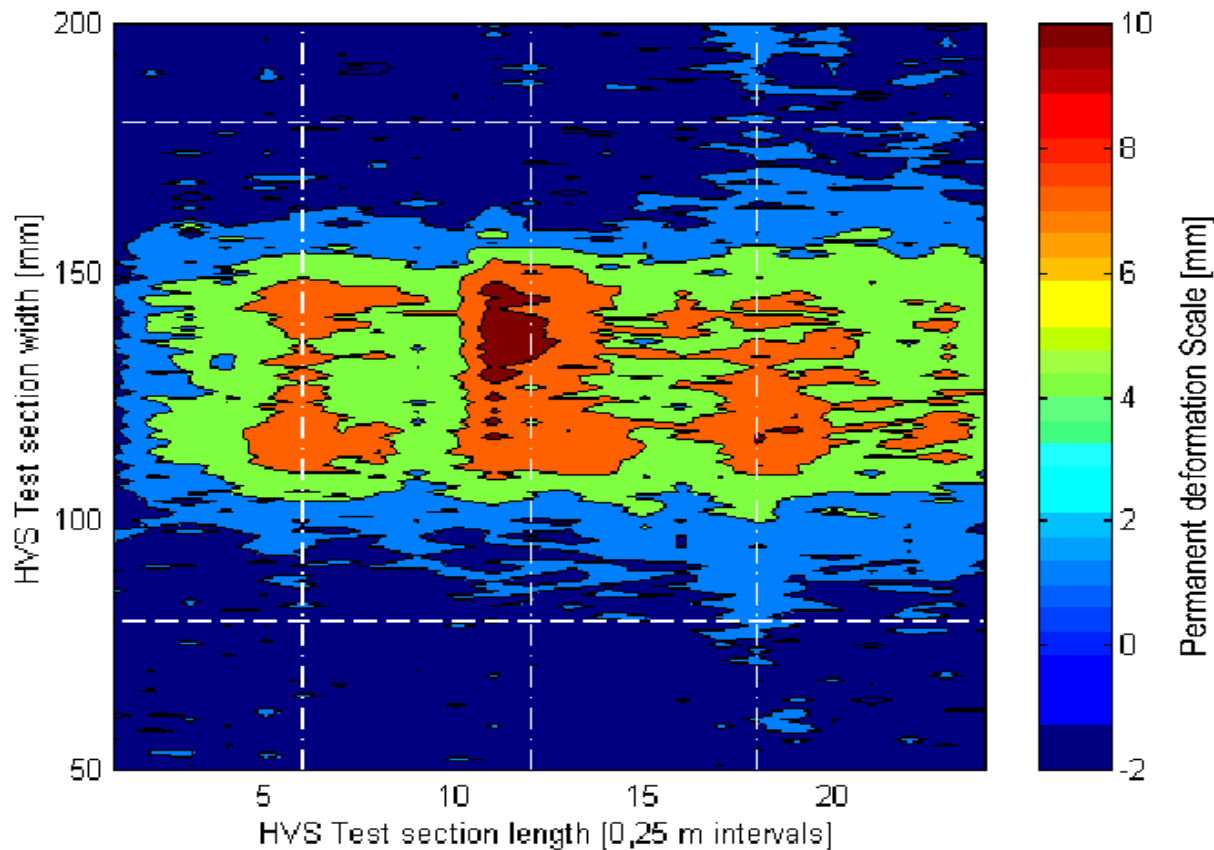
USACE - CRREL

- USFHWA Subgrade Study
- NYDOT Pooled Fund Continuation
- USFS/Co-op LVR Tire pressure
- USAF Thaw study
- Geogrids to reduce base
- Utility cut performance

VTT/VTI HVS Mk IV

- Lower maximum load (100 kN)
- Higher load accuracy
- Rudimentary dynamic load
- Temperature control

Permanent Surface Deformation top view



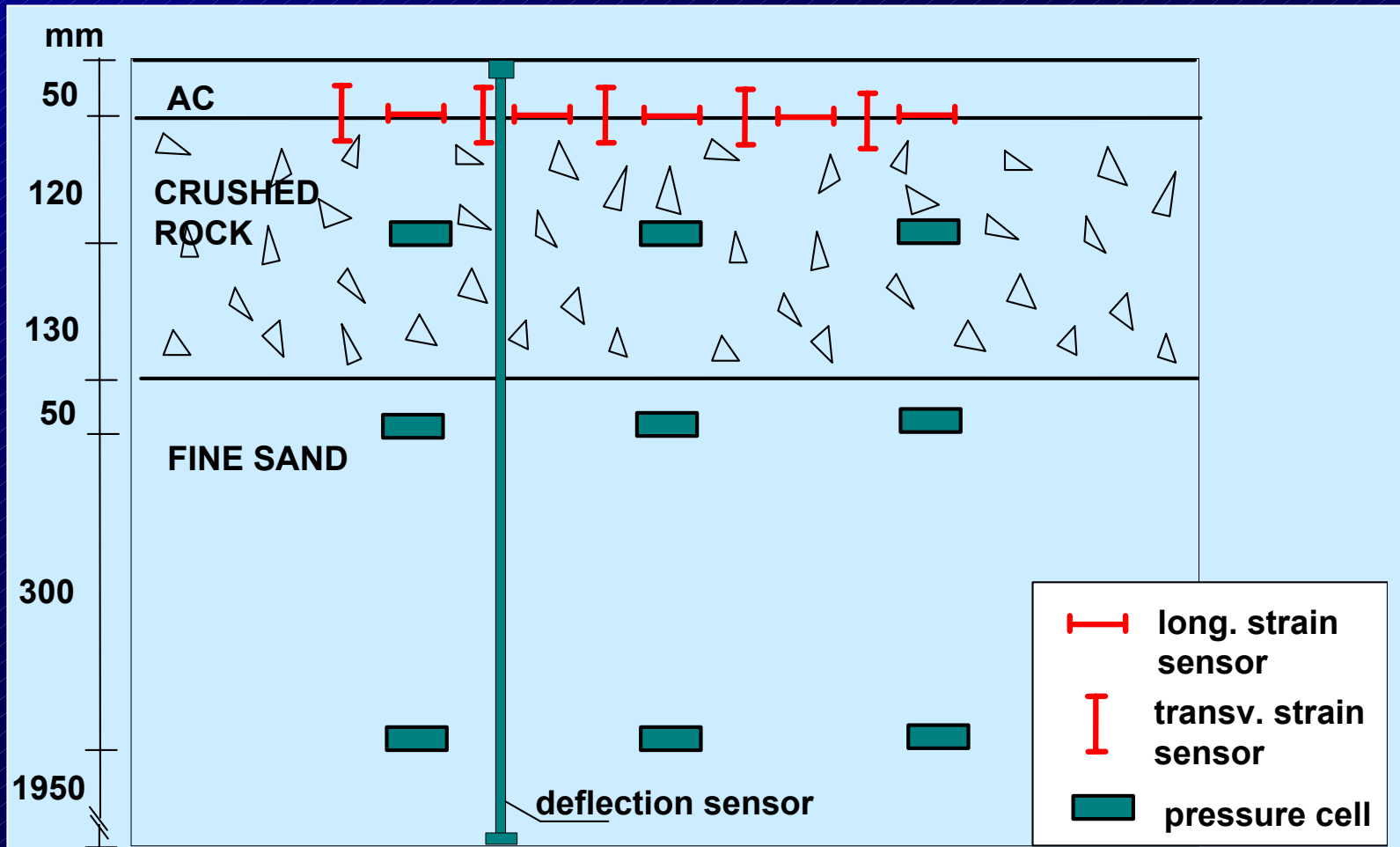
VTT/VTI



VTT/VTI

- HVS vs. field performance
- Typical Finnish/Swedish pavement
- Innovative pavements (steel reinf.)
- Improved design methods
- Validate lab material characterization
- Performance models
- Evaluate maintenance/improvements
- Co-operative work (Iceland, Poland)

VTT/VTI



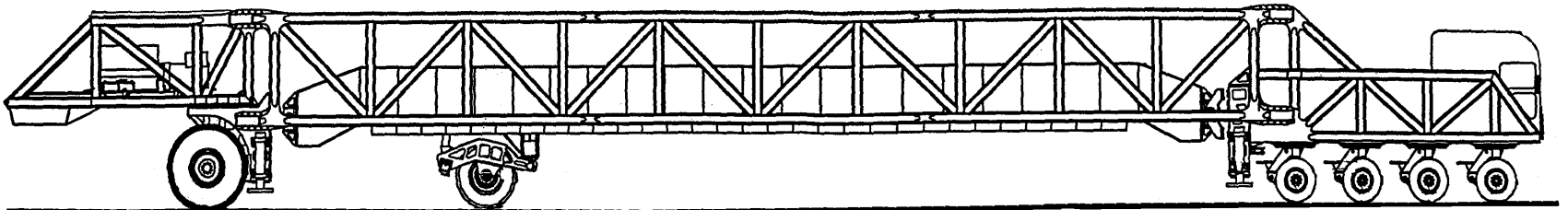
USACE-WES Bigfoot



HVS-A Mk V Specifications

- Computer - control & data (radio lan)
- Load - up to 440 kN
- Speed - approx. 13 kph (15000 reps/day)
- Test section - approx. 12m x 1,5m
- Uni- and bi-directional; 1,5m wander
- Single, dual and dual aircraft wheels
- 36,3 x 4,23 x 4,99m ; 102 tonnes
- Mobile and self-powered

HVS – A Schematic



USACE-WES Bigfoot

- New aircraft/vehicles e.g. C-17
- Expedient airfields (4 wk, 6 mo, 2 yr)
- 3-D pavement design/evaluation
- Wheel load interaction - short term
- Performance relationship - long term
- Initial 4 yr. Plan - 2 tests per year
- First test - 100000 coverages B727
- Military ground vehicles

USACE-WES Bigfoot



USACE-WES Bigfoot



CSIR/FDOT HVS MK IV Plus



HVS Mk IV Plus Specifications

- As for Mk IV
- Widened beam
- Dynamic load : $\pm 20\%$ and 3 cycles
- Tow end wheels straddle section
- Radio LAN

APT Site



Environmental Chamber

- 2" thick Styrofoam w/ aluminum sheeting.
- Windows & doors provided.
- Easily removable.





Laser Profiling

USACE - CRREL



Nick

The red color on the outside of this pencil is the color we have selected. Or something close.
Thanks

Larry

A handwritten signature in blue ink, appearing to read "Larry", written in a cursive style.

USACE-WES Bigfoot

