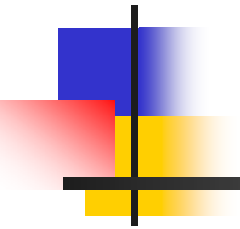


Florida APT



Tom Byron

Pavement Research Engineer

Florida Department of Transportation



Agenda


- HVS and associated investigations since September 2006
- Significant findings since last meeting
- Reports published
- Future plans



Investigations Since 2006

- Top-down cracking
 - Accelerated Pavement Aging System (APAS)
 - Over 2,000,000 12 kip passes on aged sections
 - Surface strain gages
- Construction variability

Top Down Cracking

- 
- Florida's predominant distress mode
 - Longitudinal wheel path
 - Contributing factors
 - Aging?
 - Temperature?
 - Possible improvements
 - Binder?
 - Gradation?

Accelerated Pav't Aging System

- Designed in-house
- Coverage: 10'X24'
- Heats above 90C at 2" depth
- 12 Independent heaters
- 2 x Thermocouples per heater
- Wireless data transmission to HVS Control Room

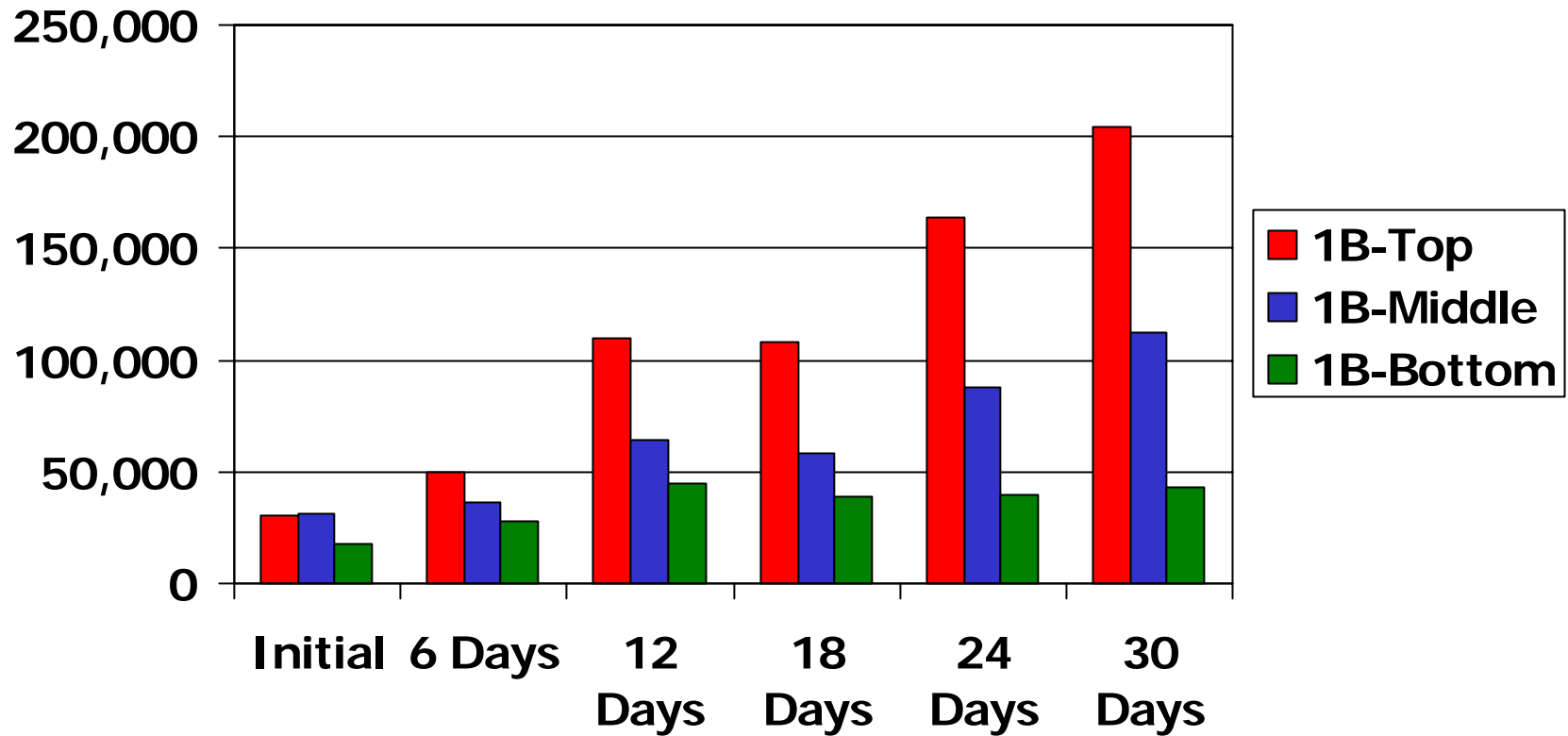




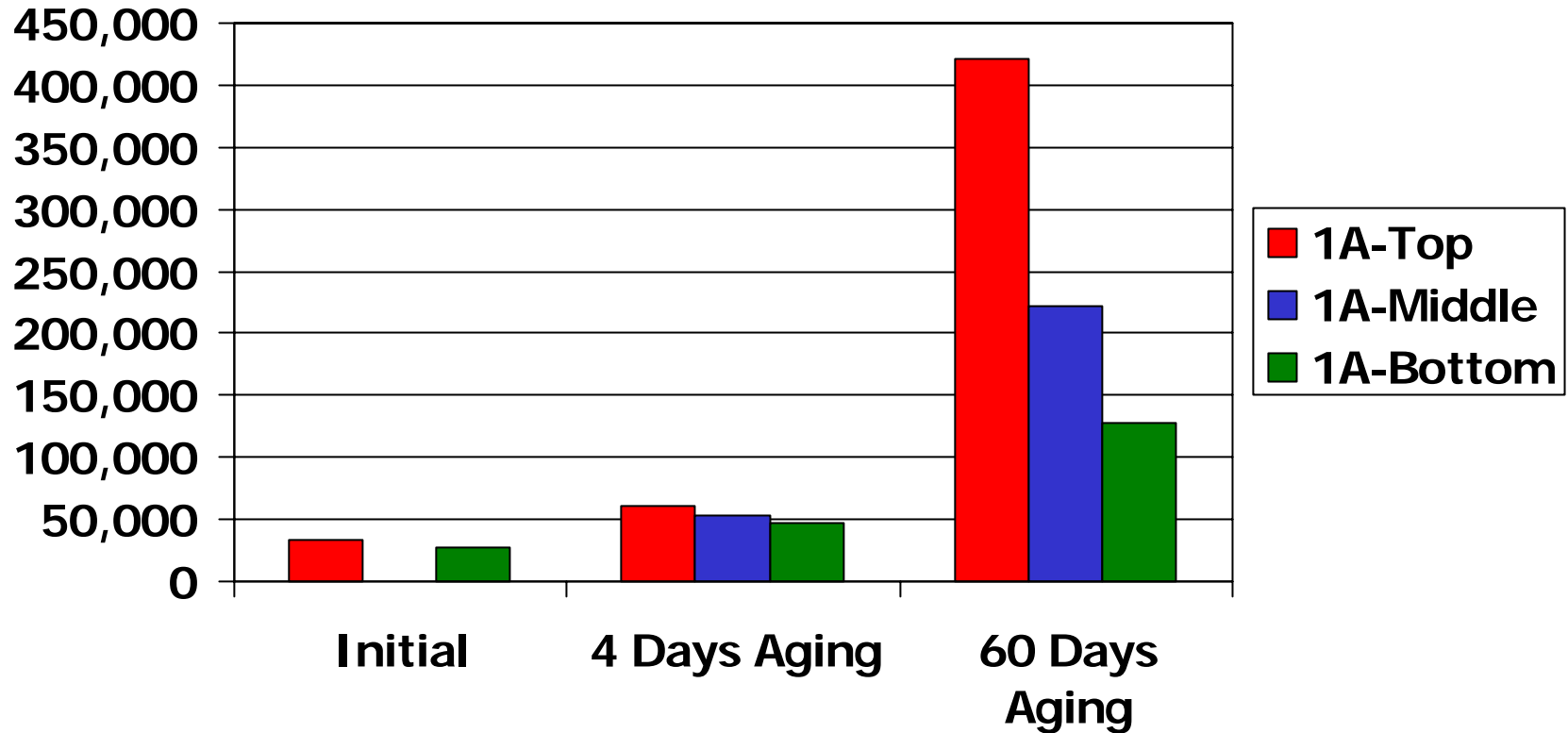
Aging Game Plan

- Heating Cycle – 2 days on, 1 day off, 2 days on
- Heated 60 days on longest section

Section 1B – Recovered Viscosities



Section 1A – Recovered Viscosities





Loading Game Plan

- Load wheel set at 12,000 pounds
- Section 1B - over 1.5 million passes
 - Through winter ("cold")
 - Crack development only over embedded gages
- Section 1A – 500,000 passes
 - Feb / Mar timeframe
 - Induced cracking – all transverse

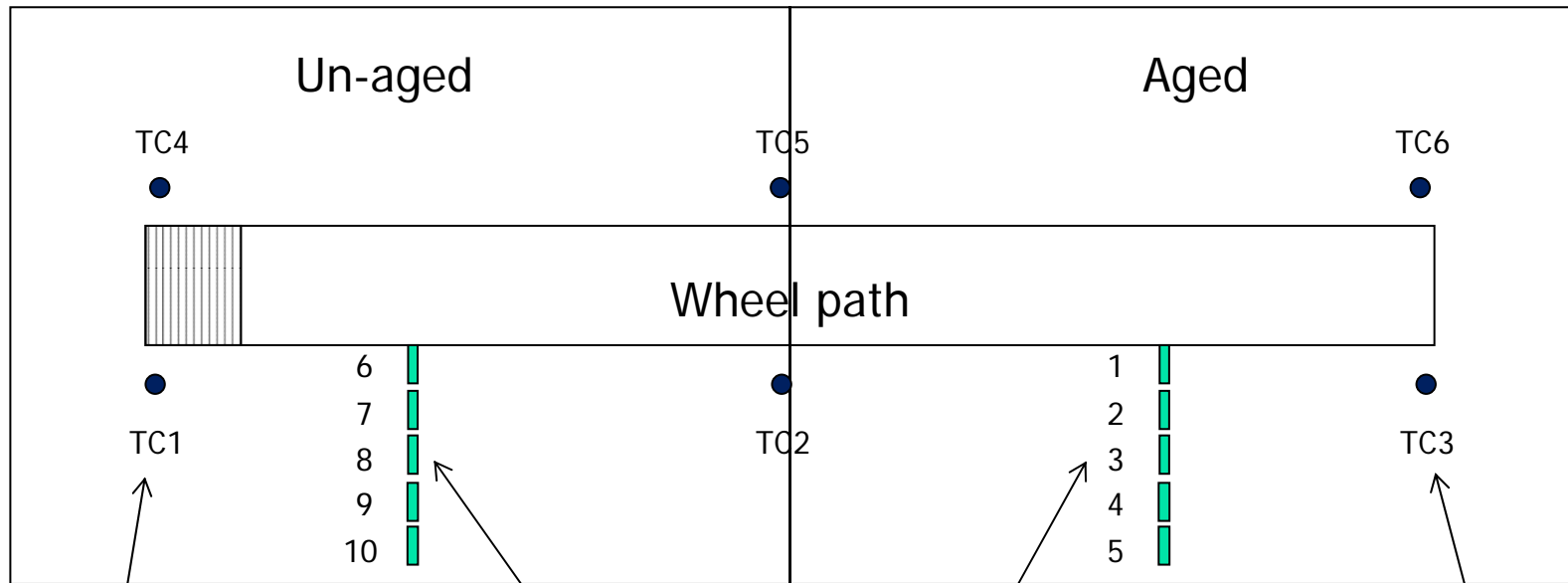


Surface Strain Gauges

- TML Surface Gauges
- 30mm gauge length
- Installation:
 - Surface preparation
 - Epoxy adhesive

Test Track Layout

Direction of Travel



Thermocouples

Strain Gauges

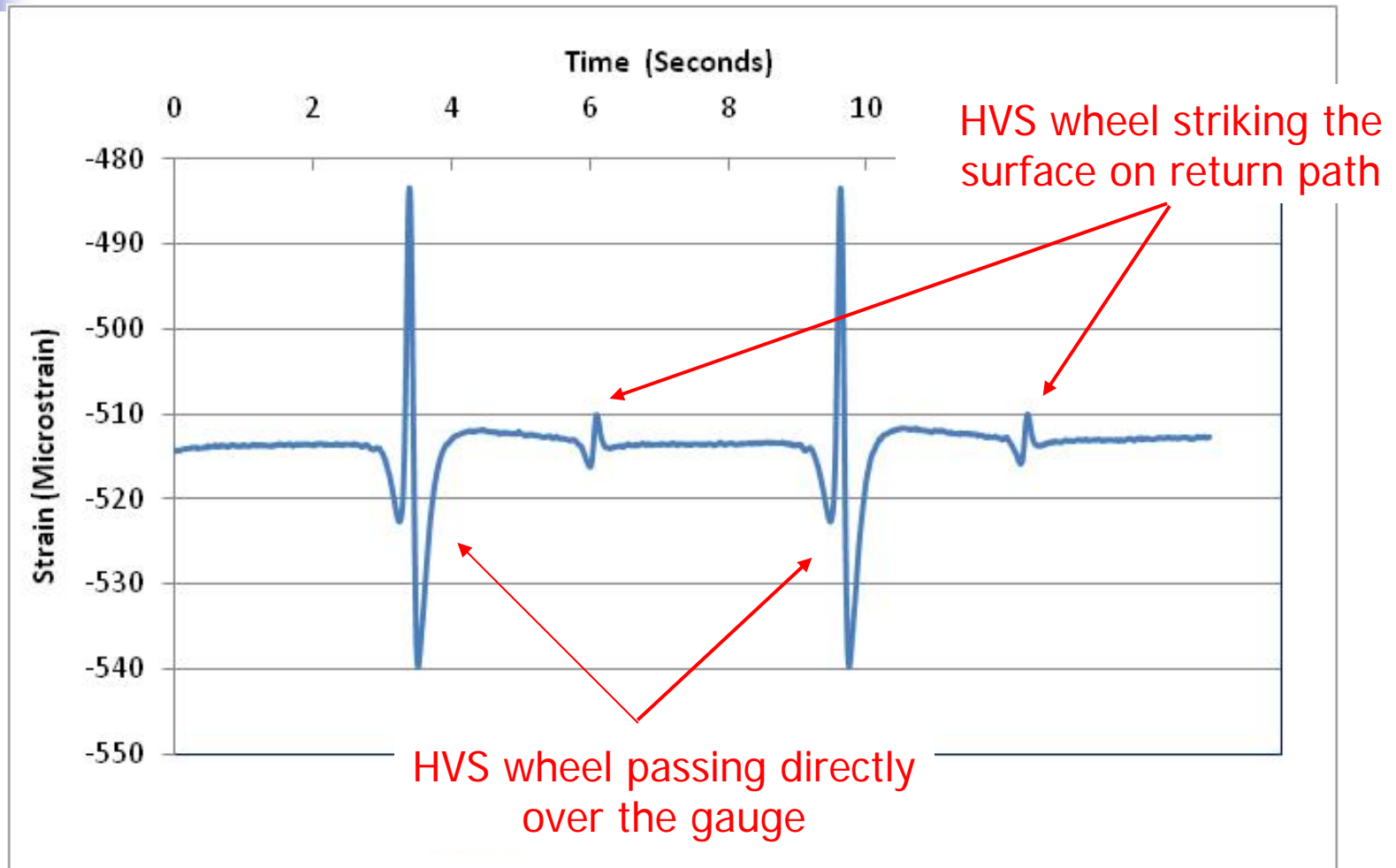
Thermocouples



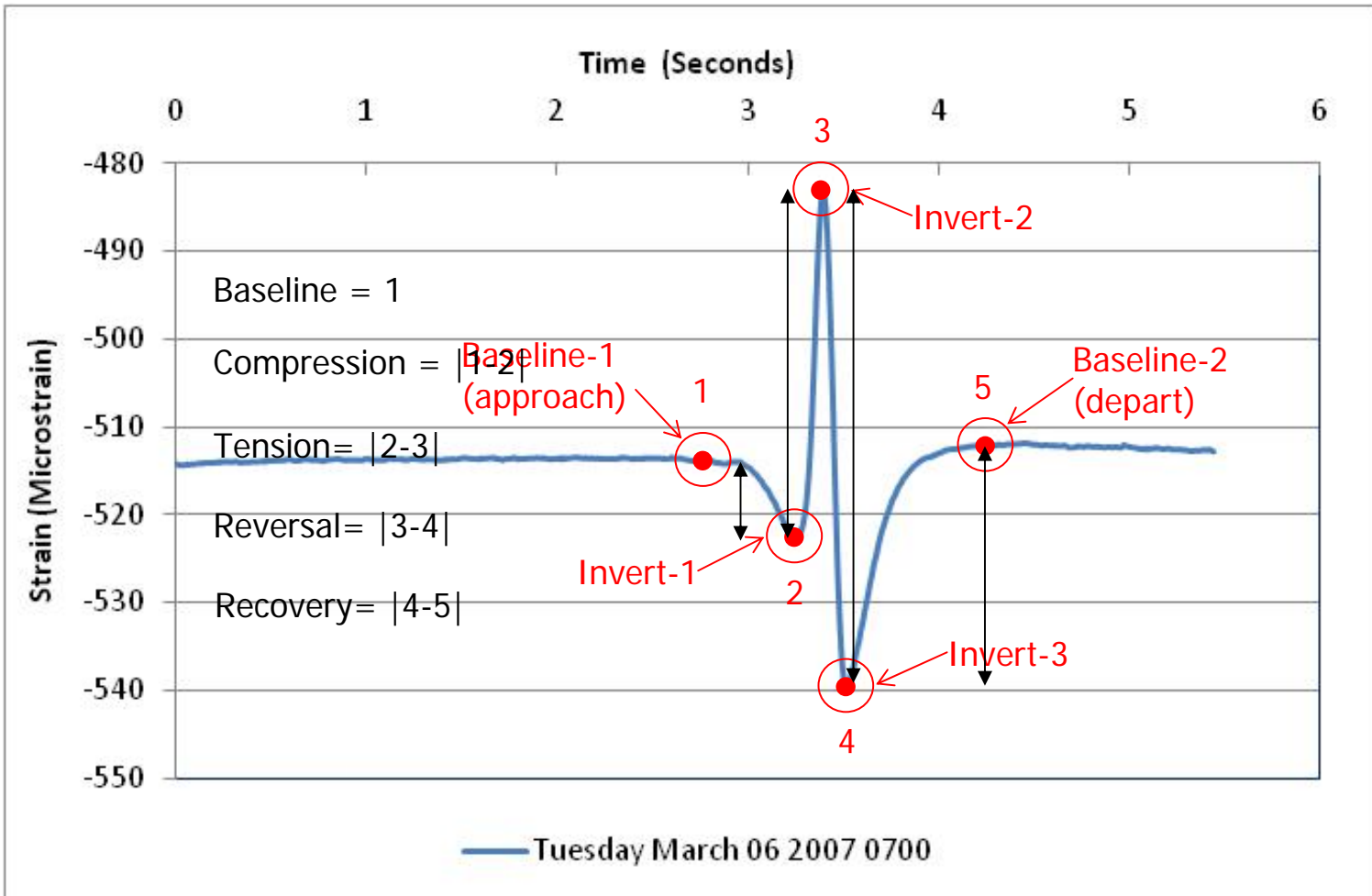
Data Collection

- Fully automated; LabView based system
- 1000 Hz data acquisition frequency
- Averaged every 100 points
- Data collected for 30 seconds, every 30 minutes, 24 hrs/day, 25 days
 - Good collection of data over wide temperature and gradient conditions

Typical Dynamic Strain Pulse



Dynamic Strain Pulse – Points of Interest

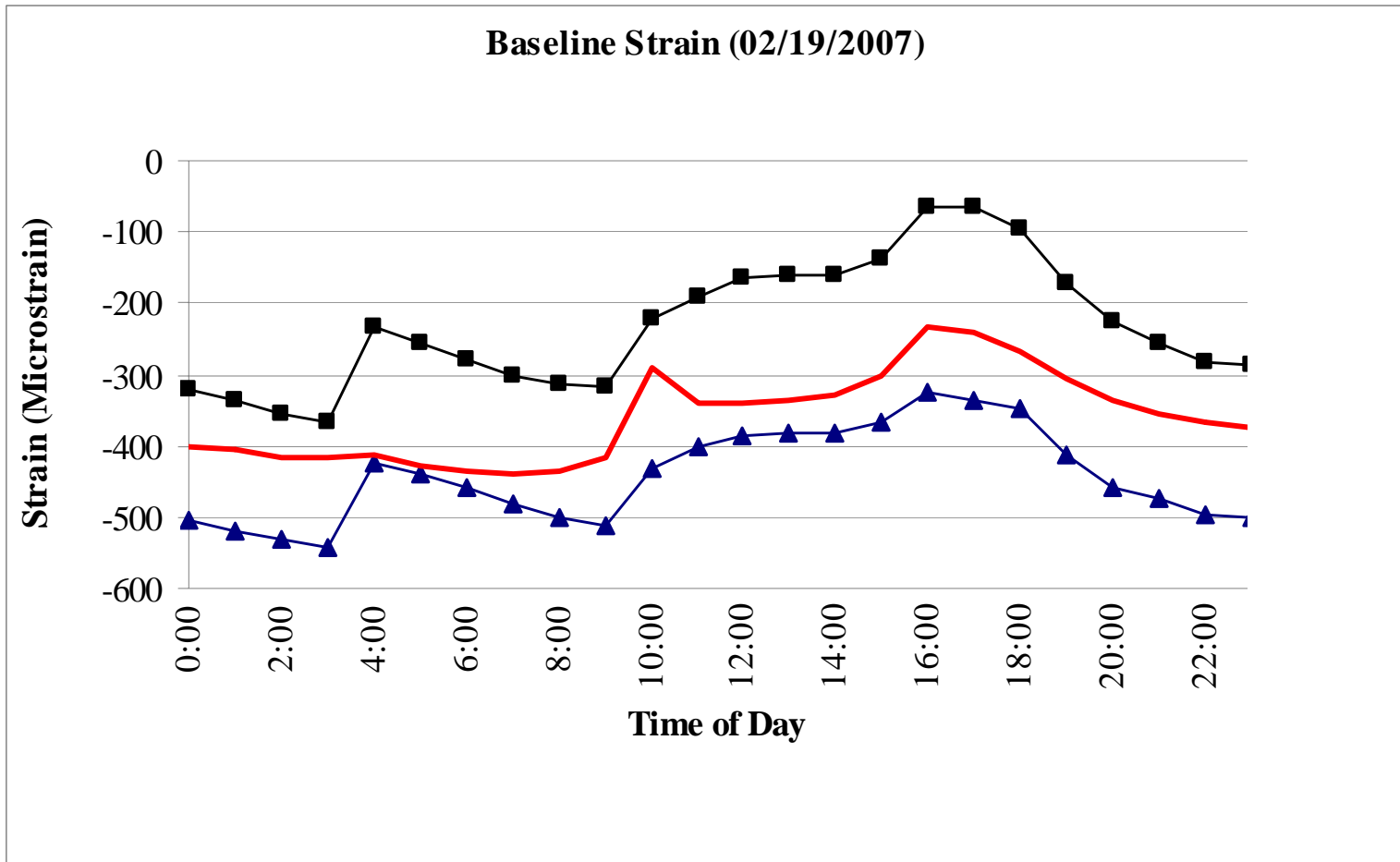




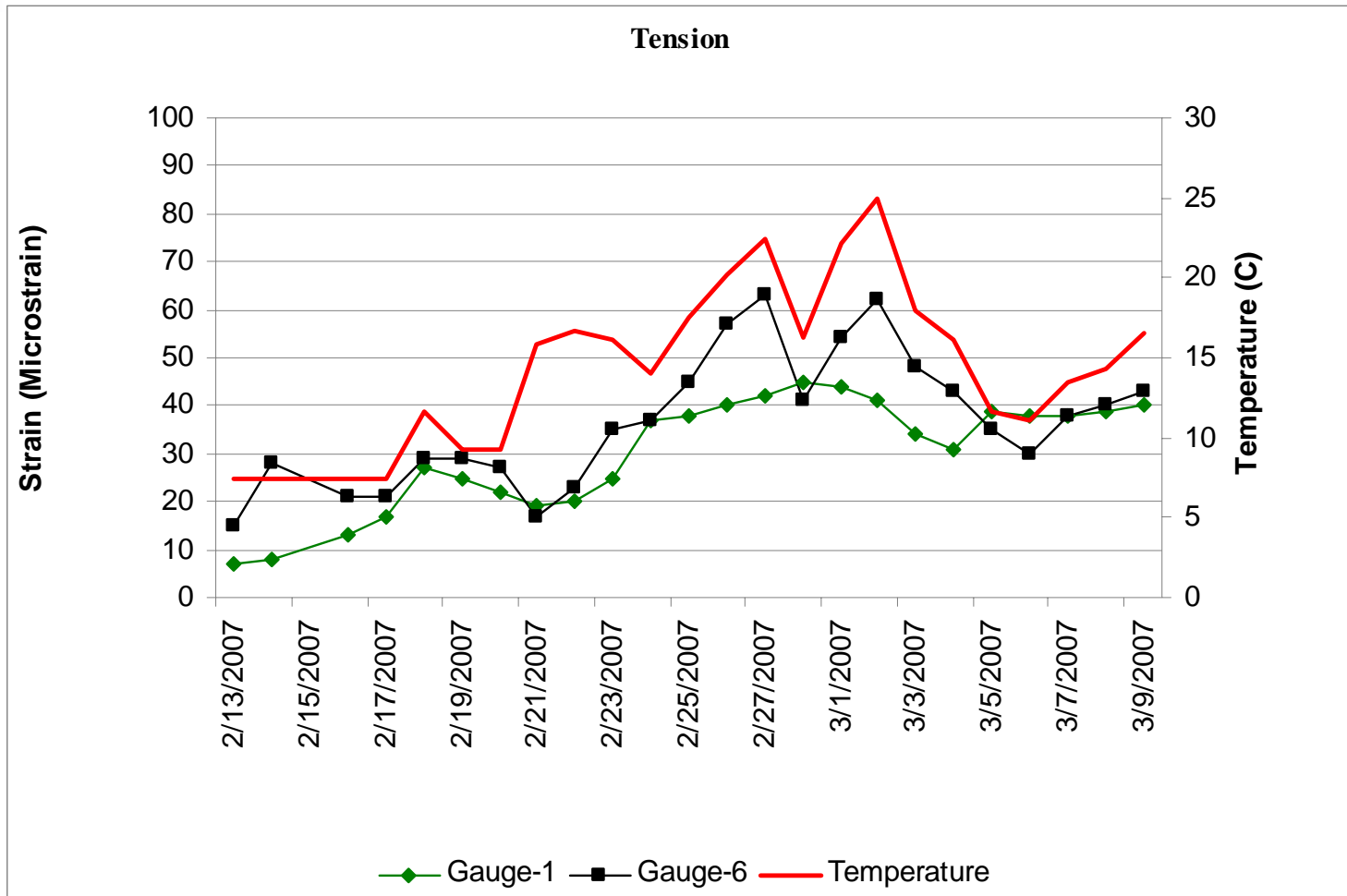
Temperature Measurement

- 6 thermocouple trees
- Temperature measured at:
 - Surface
 - 2-in depth (mid-layer)
 - 4-in depth (bottom of asphalt)
- Collected and logged continuously

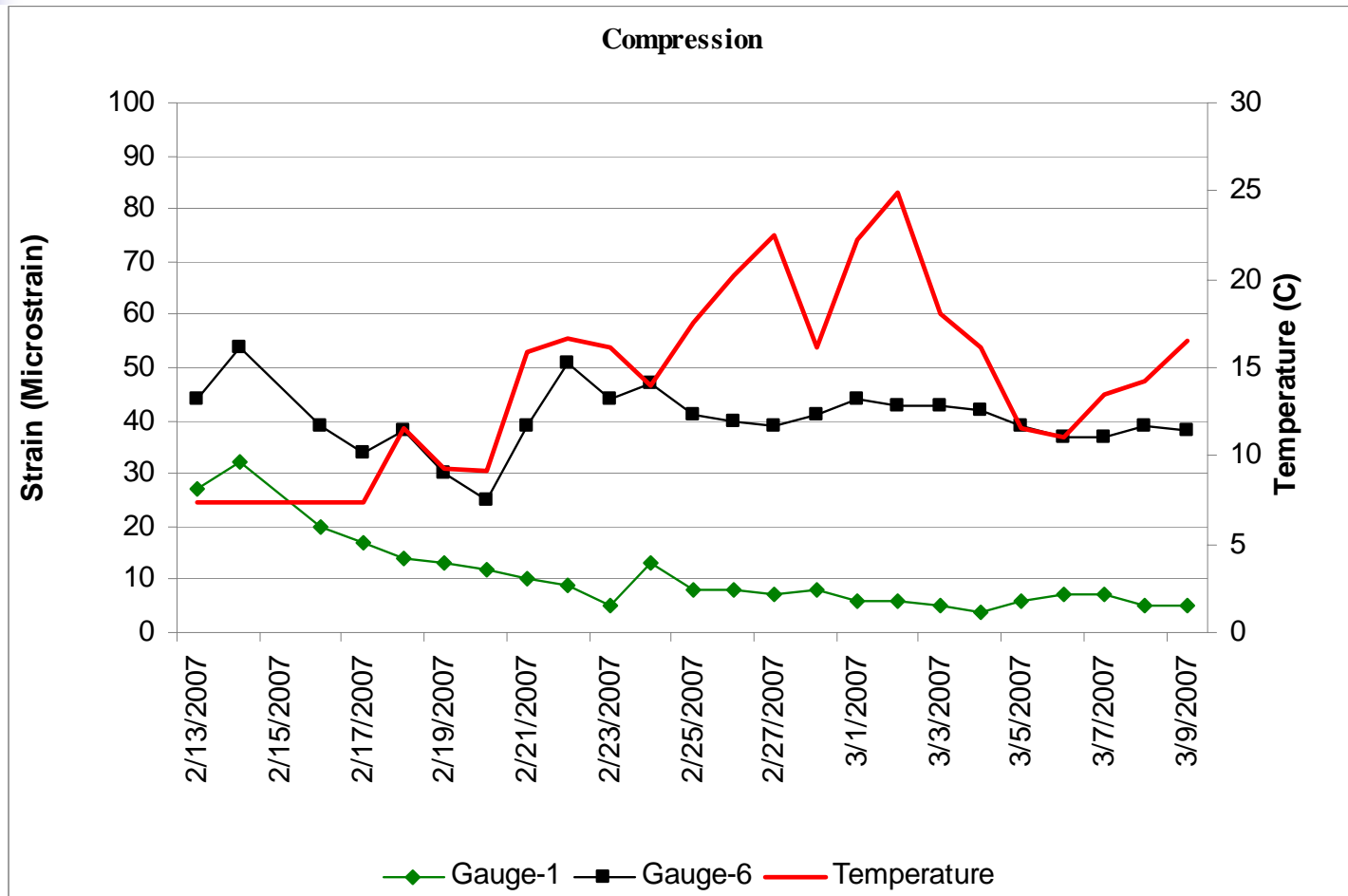
Variation of Baseline Strain in 1 Day



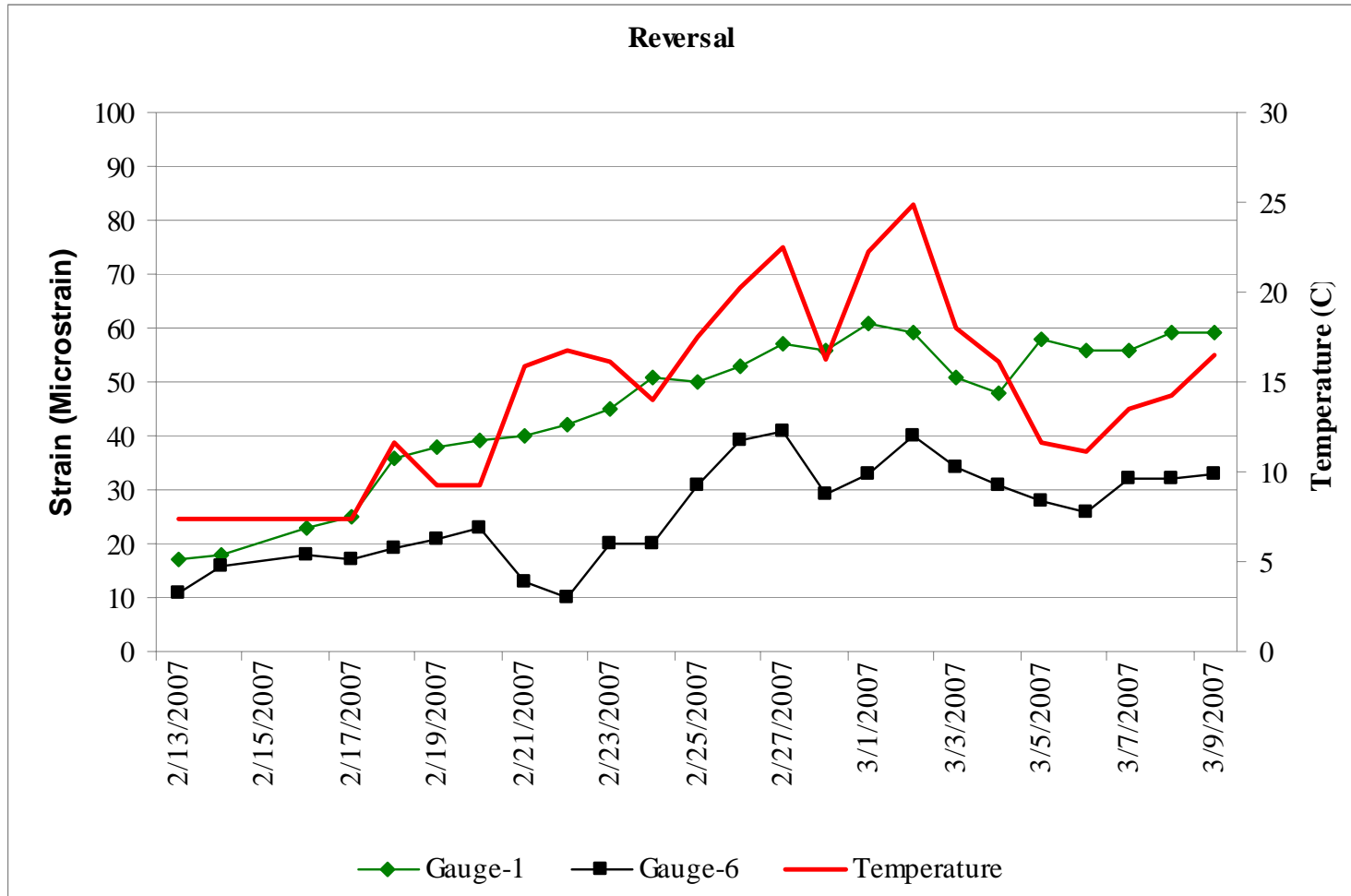
Accumulation of Tensile Strain (7.00am)



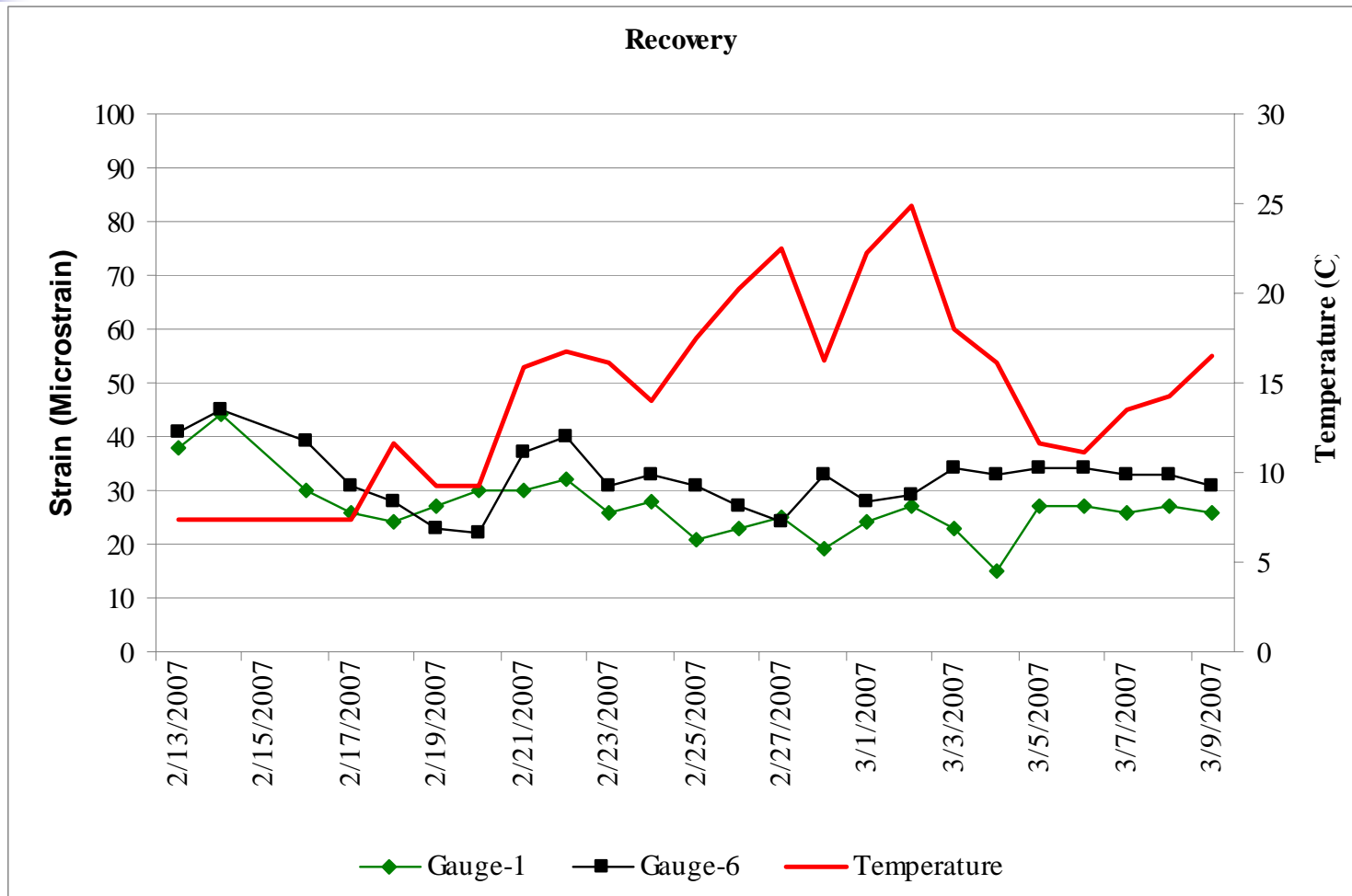
Accumulation of Compressive Strain (7.00am)



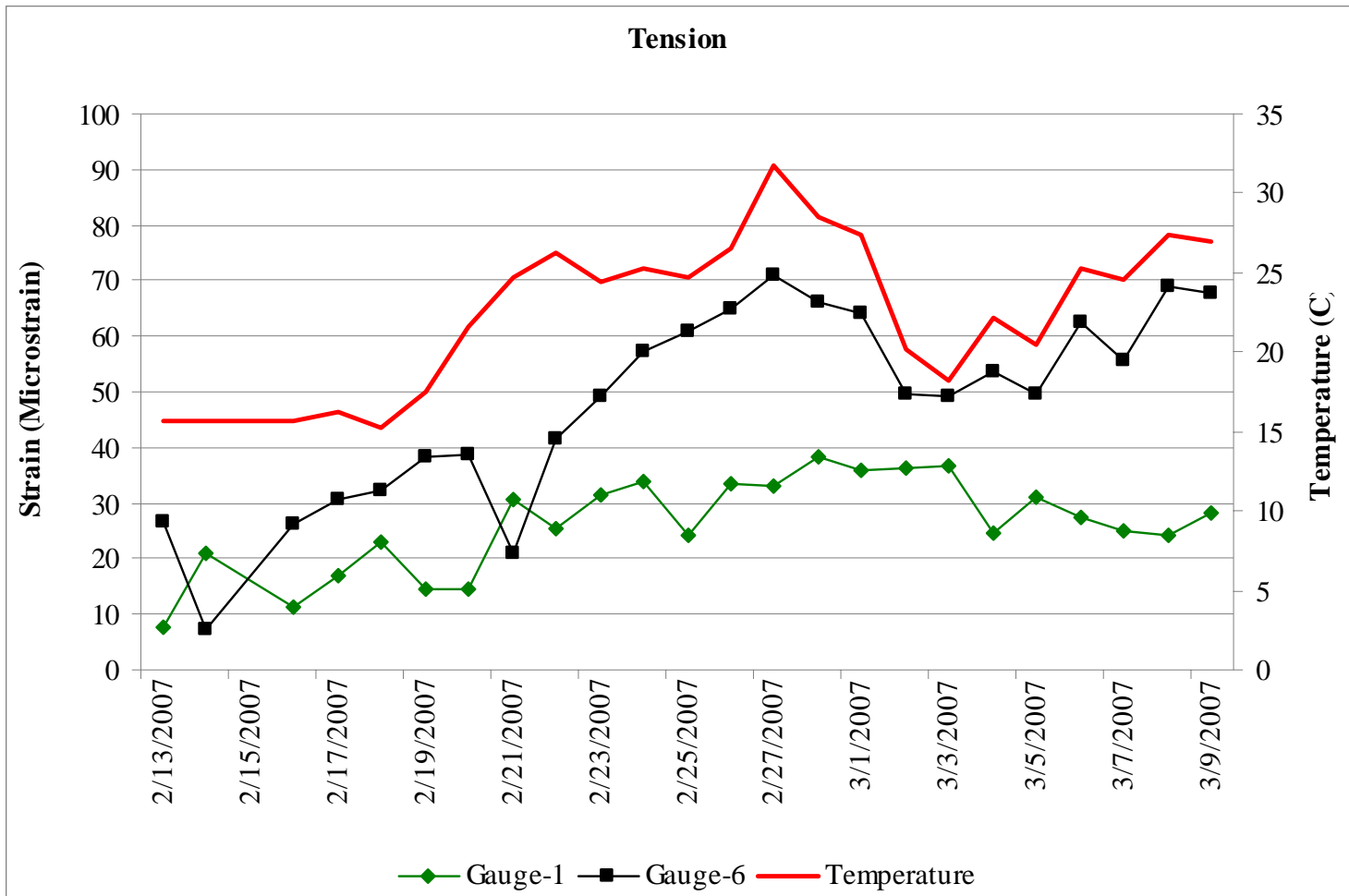
Accumulation of Reversal Strain (7.00am)



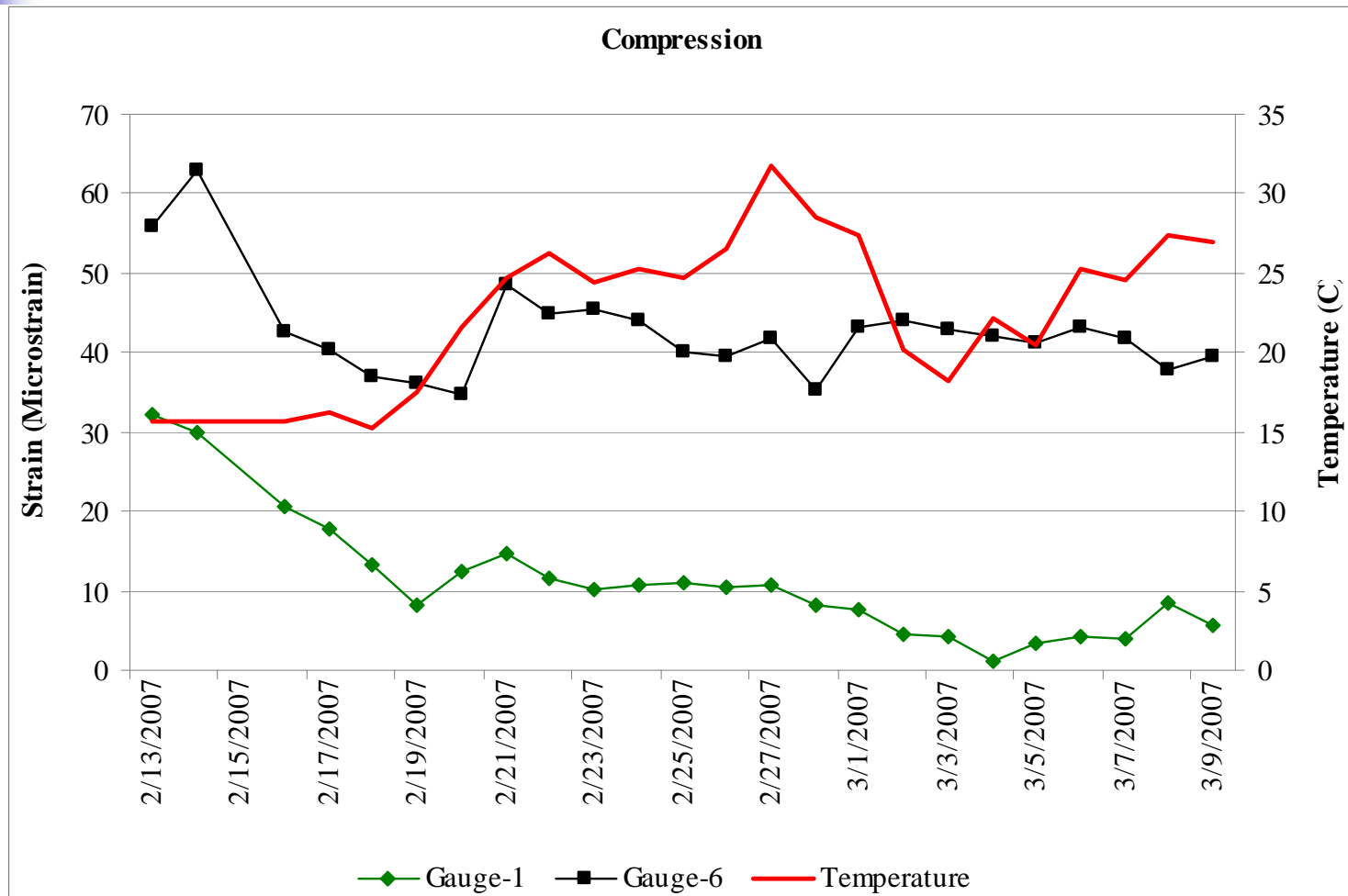
Accumulation of Recovery Strain (7.00am)



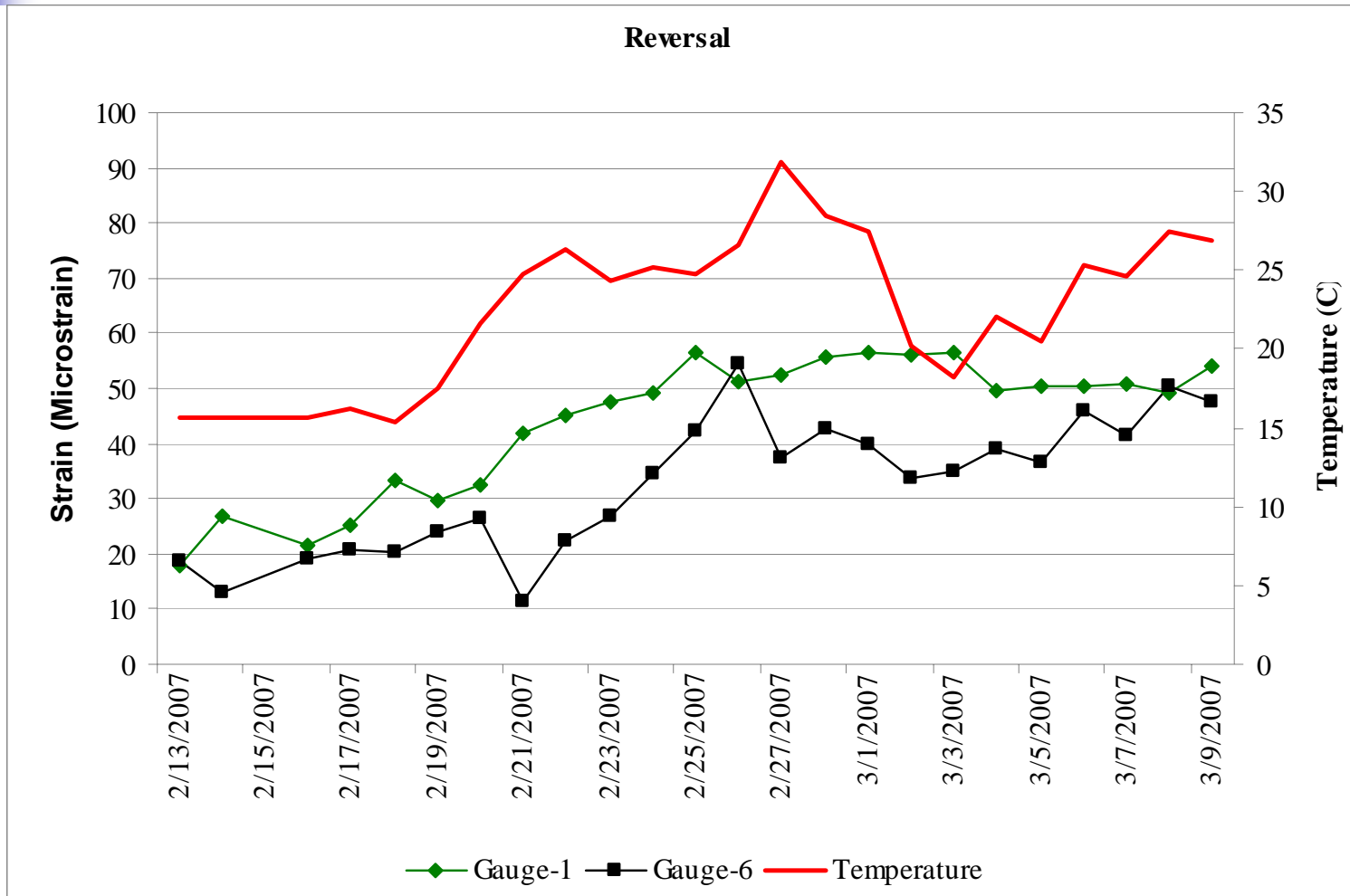
Accumulation of Tensile Strain (3.00pm)



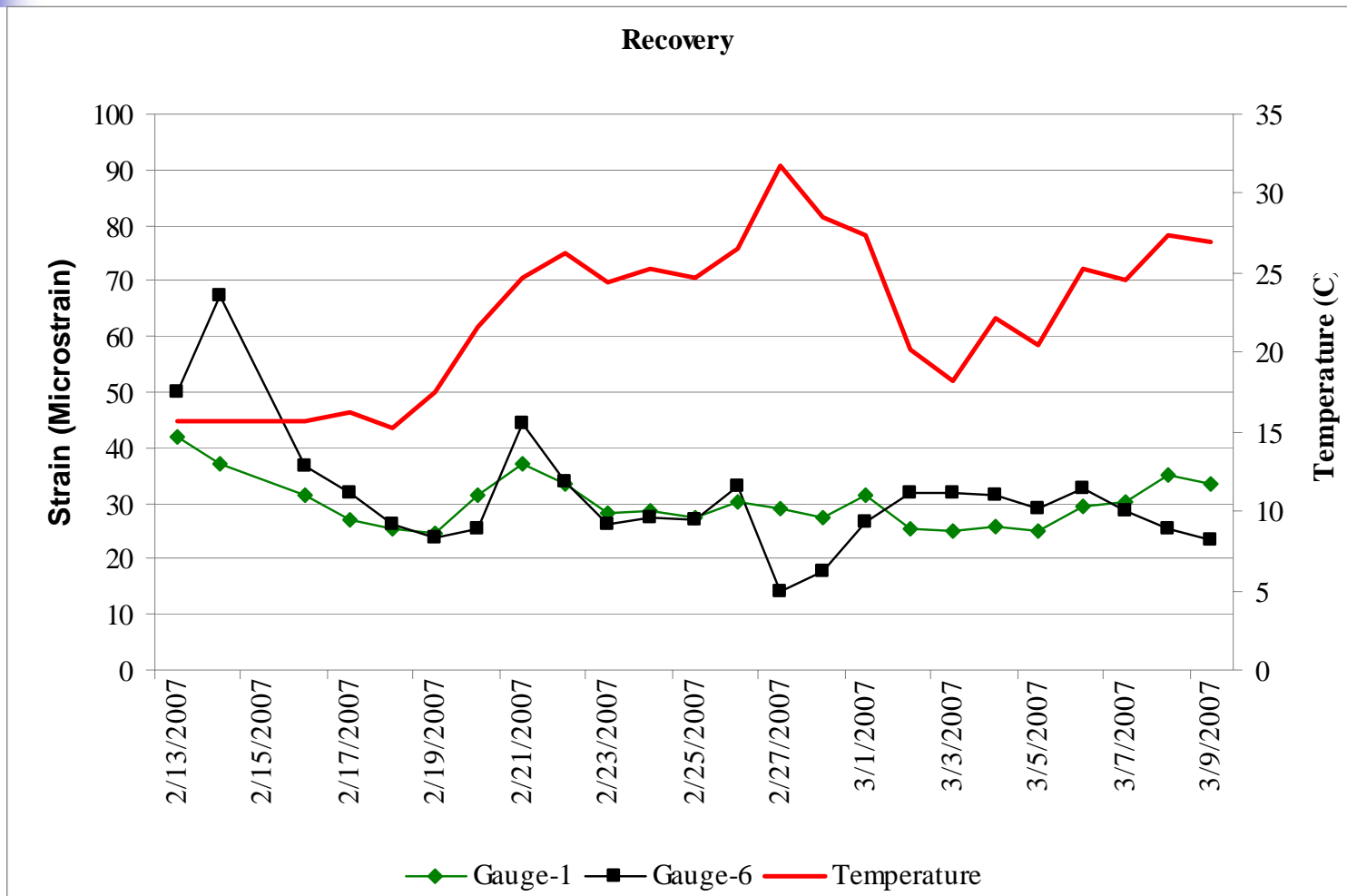
Accumulation of Compressive Strain (3.00pm)



Accumulation of Reversal Strain (3.00pm)



Accumulation of Recovery Strain (3.00pm)





Findings

- The APAS does a great job creating huge viscosity increases and gradients in HMA pavement
- However, aging alone (at least viscosity) is not enough to induce longitudinal wheel path TDC under HVS loading
- Aged pavement strain is less temperature dependent



Reports Published

- Feasibility of Using Accelerated Pavement Testing to Evaluate Long-Term Performance of Raised Pavement Markers (TRB Vol 1948 pg 108 – 113)
- Evaluation of Coarse- and Fine-Graded Superpave Mixtures Under Accelerated Pavement Testing (TRB 1974 pg 120 – 127)
- Evaluation of Feasibility of Using Composite Pavements in Florida by Means of HVS Testing (Report BD545-13 http://www.dot.state.fl.us/research-center/Completed_StateMaterials.htm)



Future Plans

- Continue aging / cracking research
- Continue construction variability evaluation
- Re-pave test track in Fall – Winter timeframe

