Sanral Field testing: R35 Data and R104 Trial Sections

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- Field testing background
- Provisional R35 data
- R104 planning

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Field testing background

- Objective:
  - Benchmark of pavement material parameters (σ, ε, δ)
  - Not calibration
- Place in Sanral project
  - After materials model developments
- Expected outcome
  - Verification of parameters predicted using materials models

Provisional R35 data

- R35 used to evaluated selected instruments
- Evaluated installation procedure and data collection process

Site instrumentation

- R35

  Pressure cells (V and H), Strain gauges, Accelerometers, Pressure film

Horizontal and vertical pressure under roller

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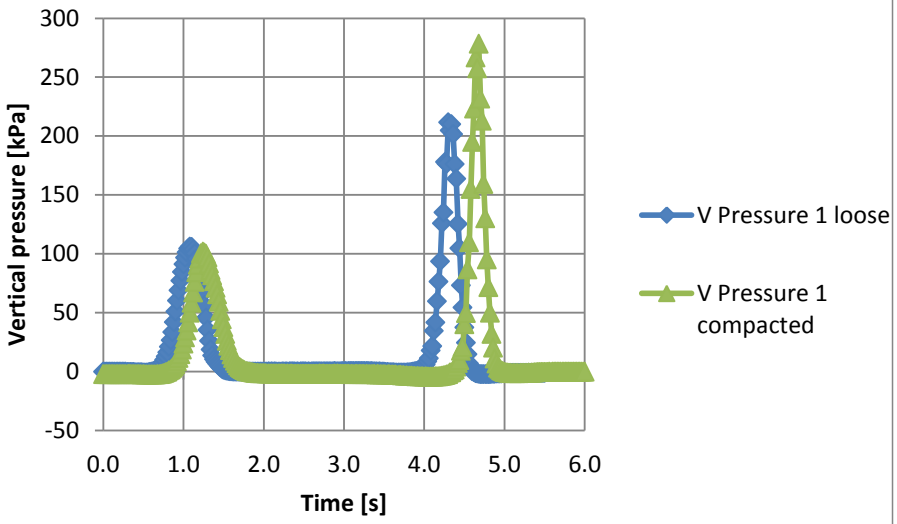
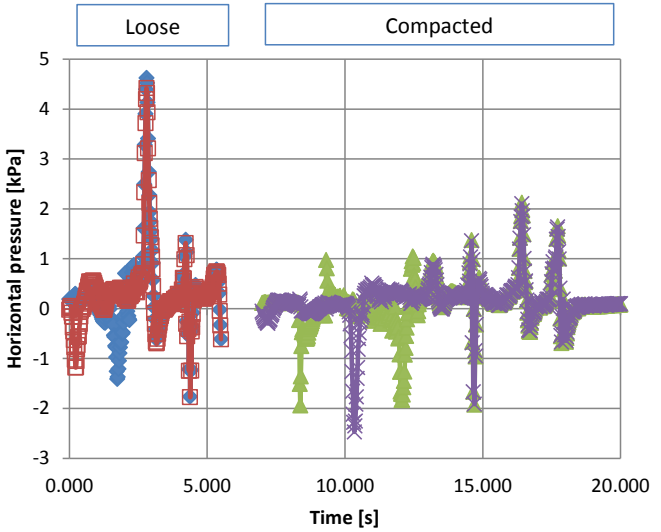
Horizontal and vertical pressure under roller





Parameter	Loose condition	Compacted condition
Maximum vertical pressure [kPa]	214.0	282.9
Maximum horizontal pressure [kPa]	6.4	4.1
Vertical pressure : Horizontal pressure ratio	33.5	69.6

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Horizontal and vertical pressure under roller

- Working with reasonable values
- Appear robust for longer term measurements
- Appreciate that presence of sensors will affect stresses – need to measure somewhere

Accelerometer data

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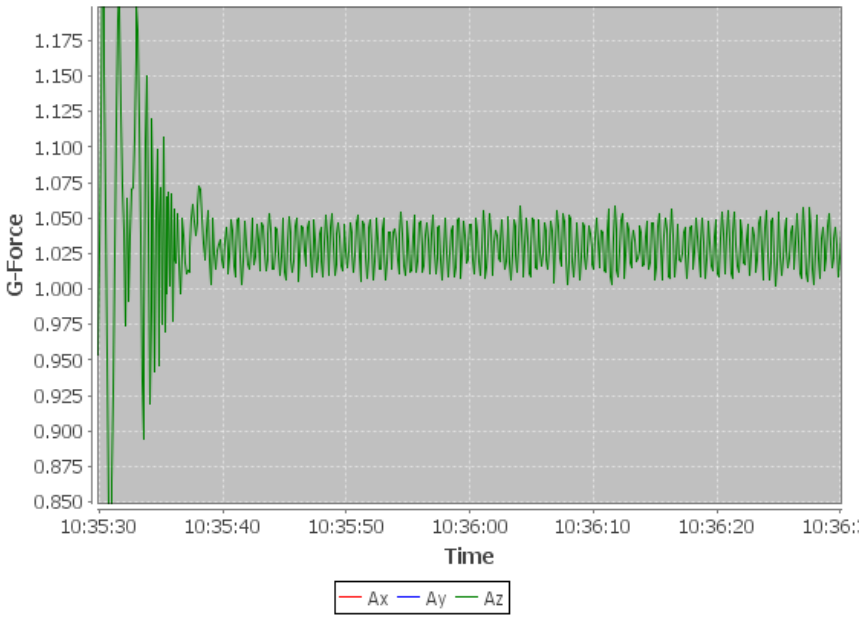
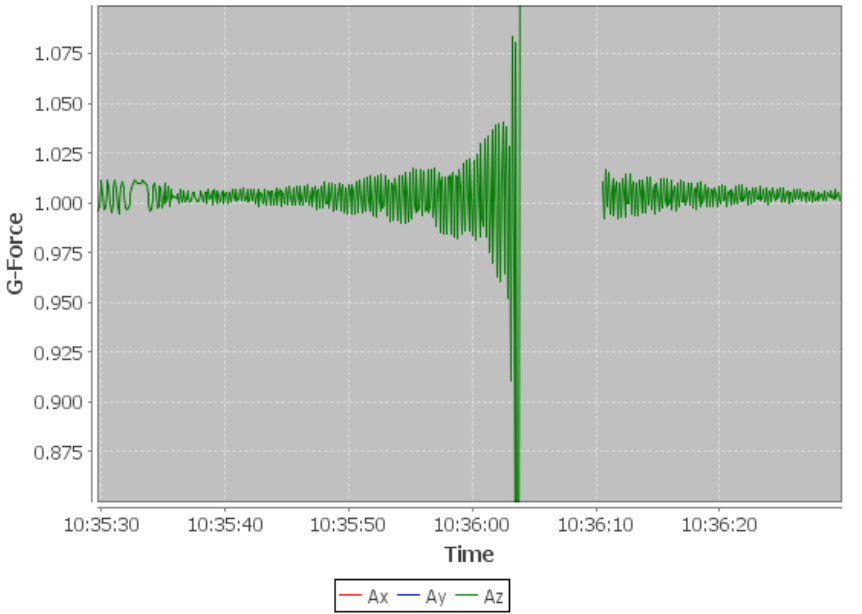
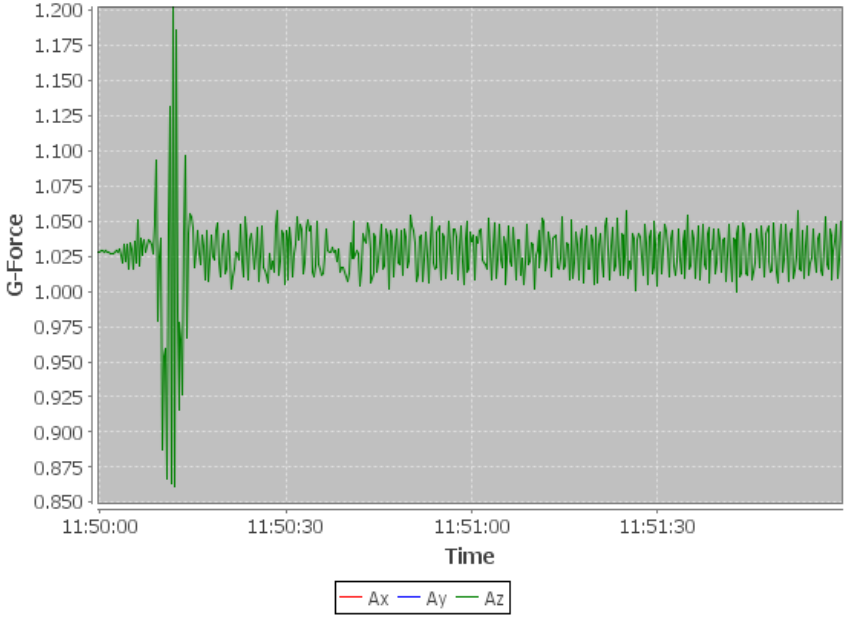
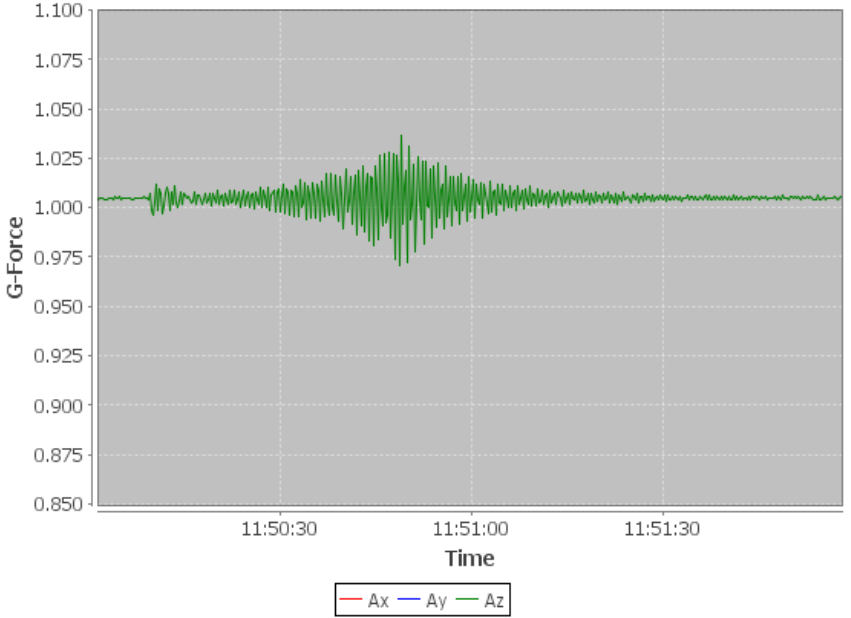
10:35 - loose



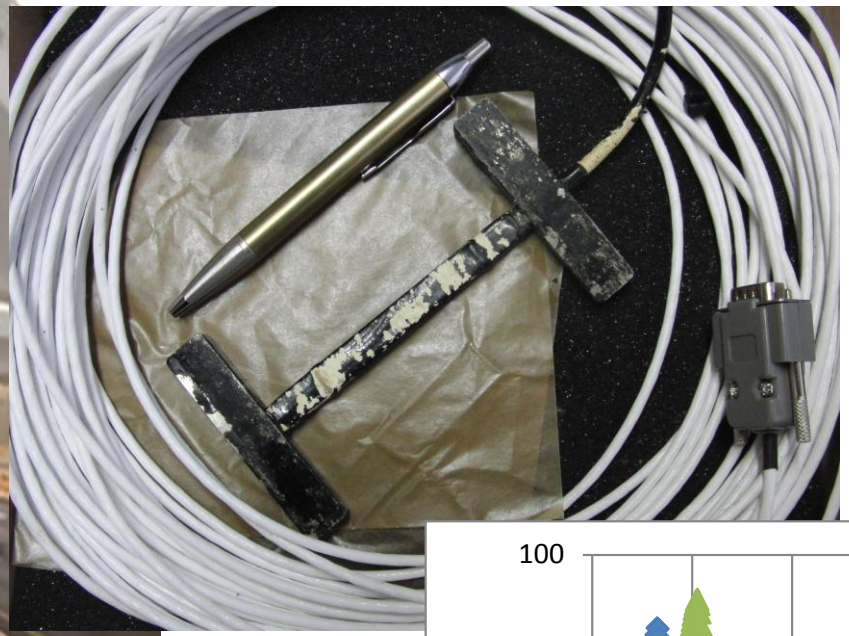


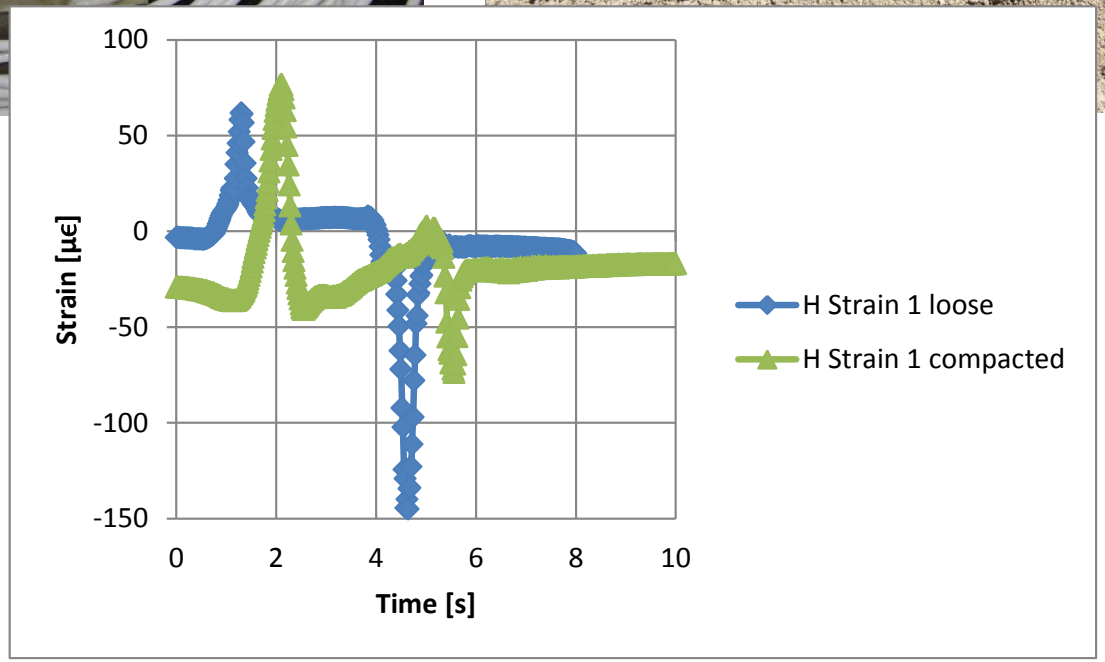
11:50 - compacted





Strain under roller



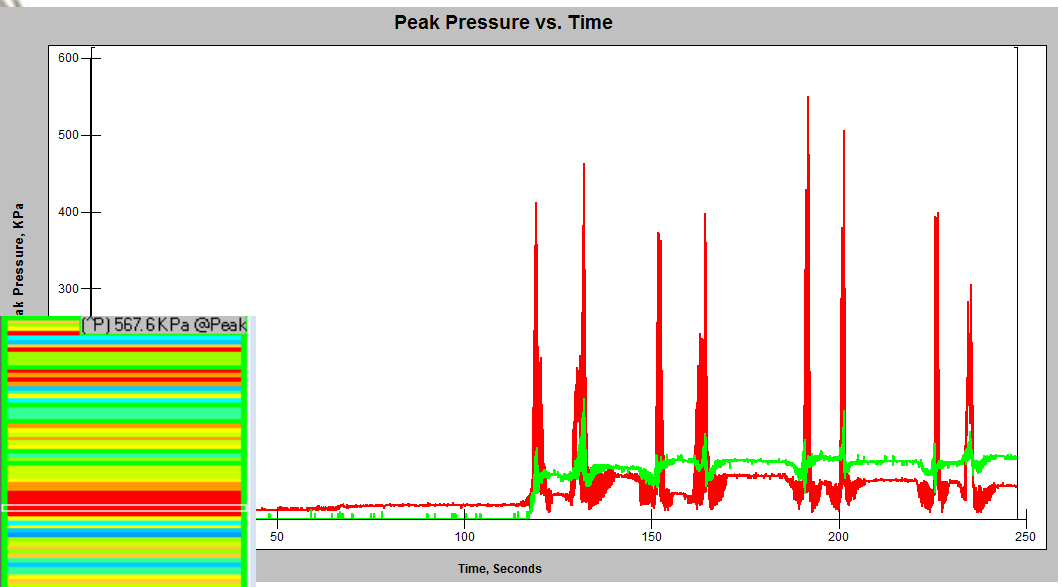


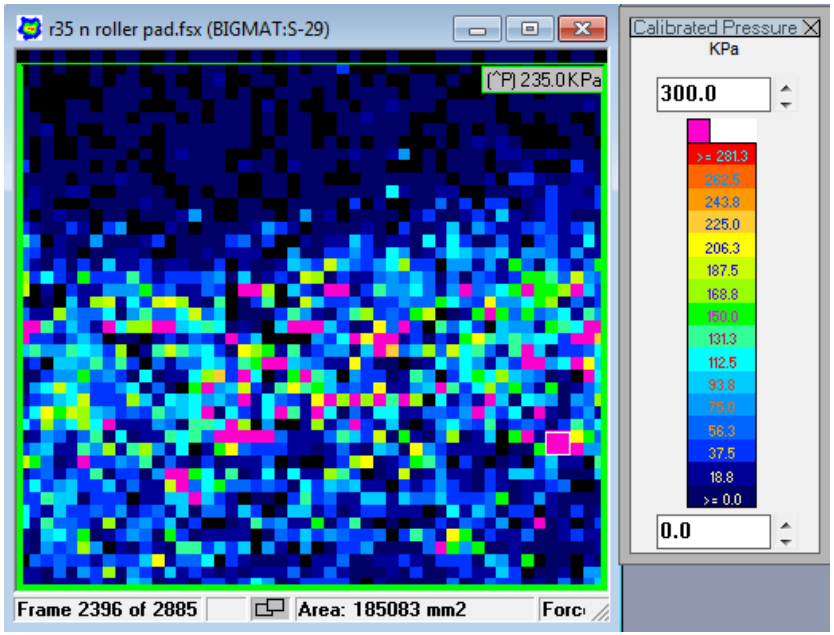
Strain under roller

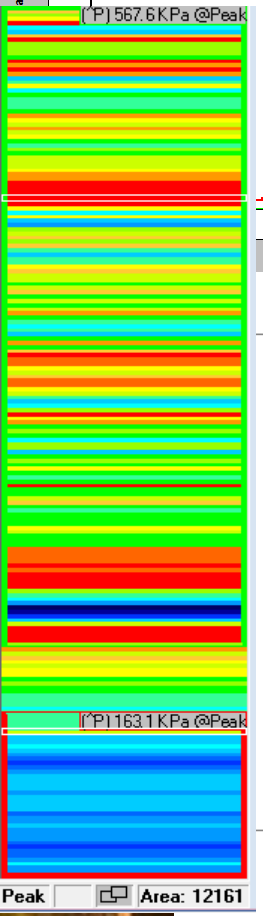
- Working well with reasonable data
- Appears robust

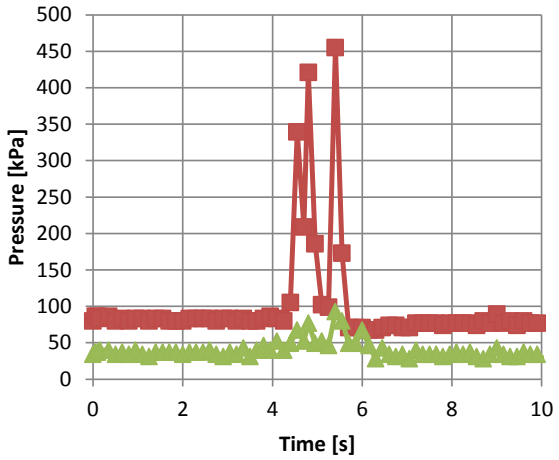
Pressure film under roller

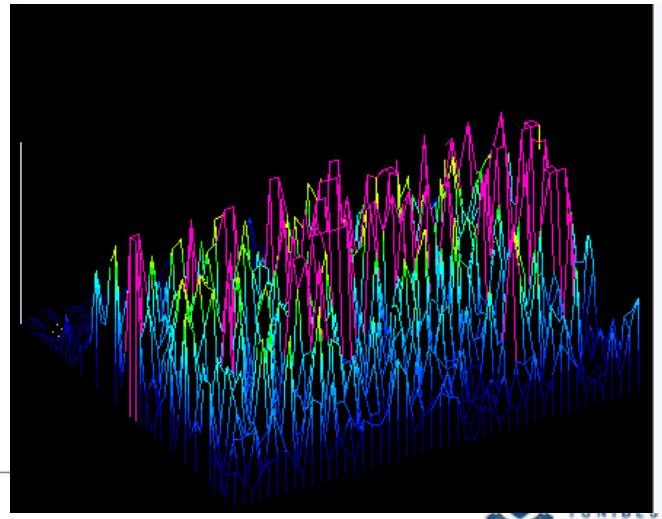
Pressure film under roller









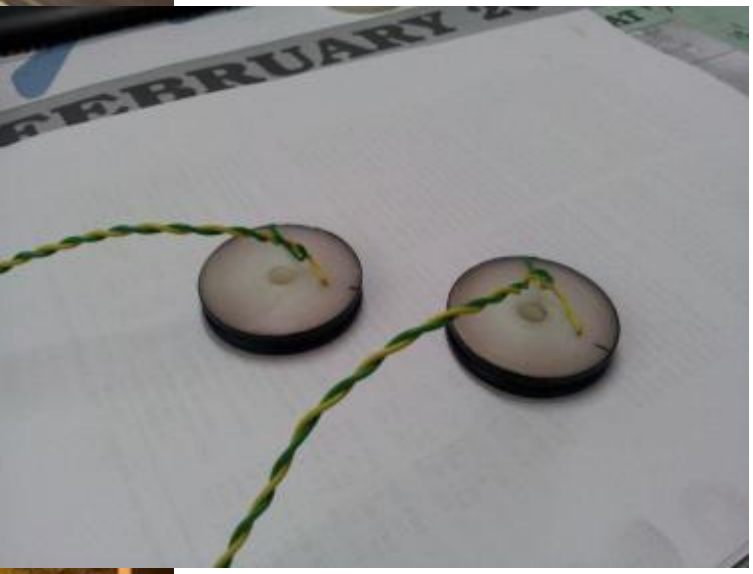


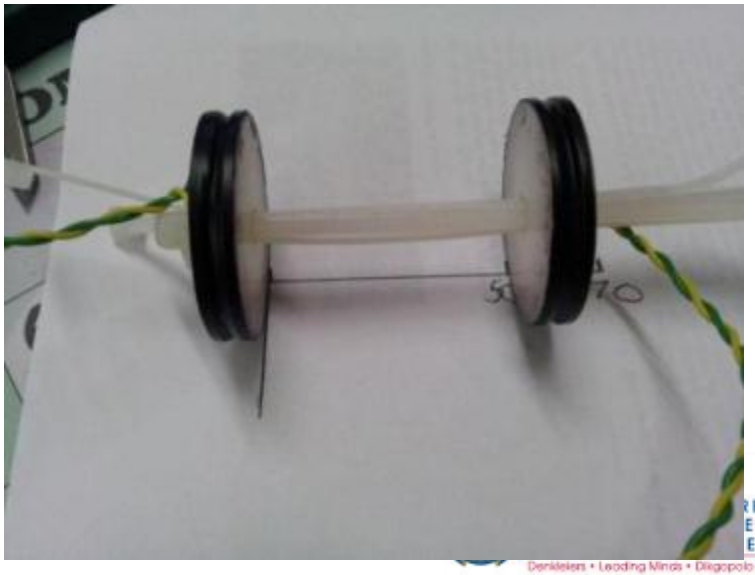
Pressure film under roller

- Reasonable values
- Care regarding protection of handles
- Appear robust
- High temperature option available

Emu Coils

- Measuring strain / displacement
- Long history in UK, New Zealand
- Organized in stacks to measure horizontal, vertical and longitudinal movement





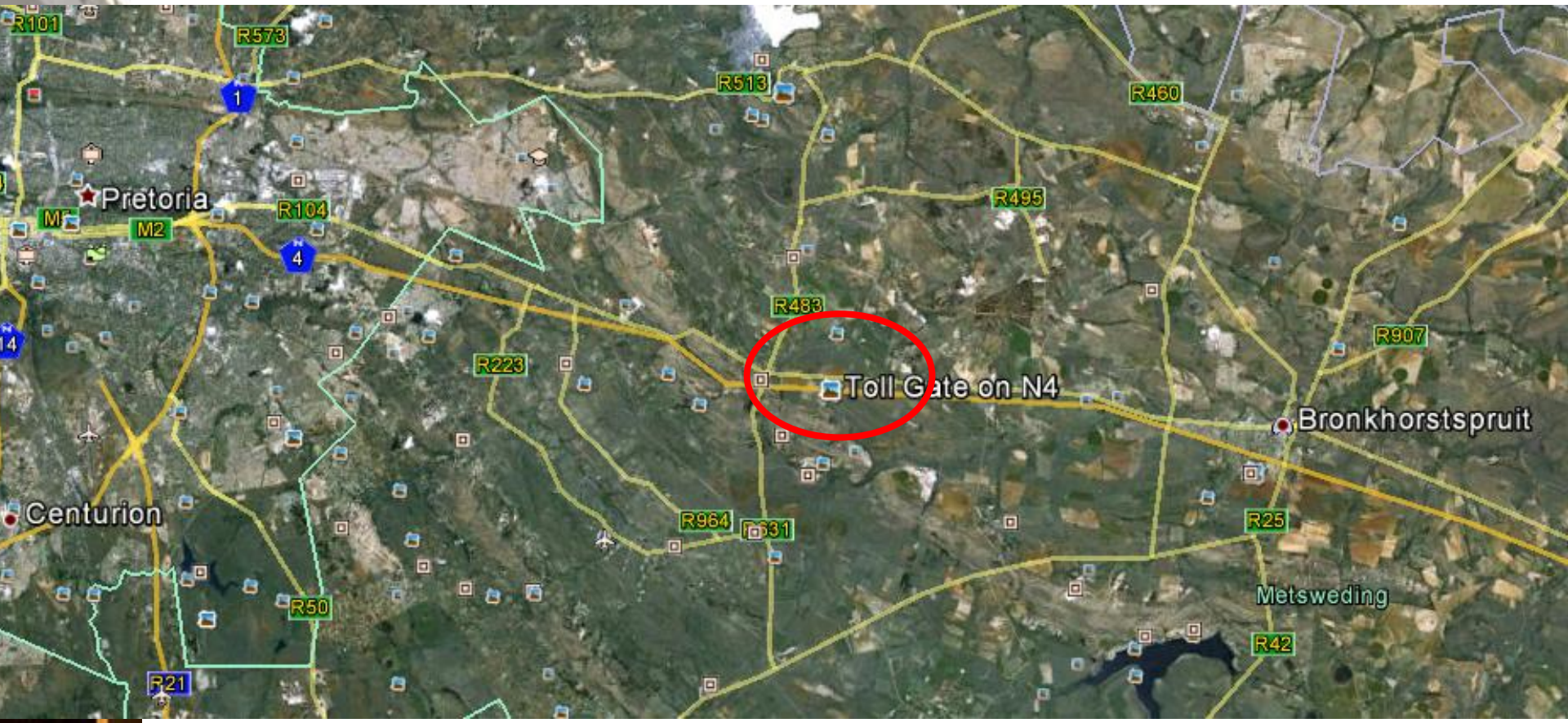
R104 planning

- Planning process
- Location
- Test sections
- Instruments

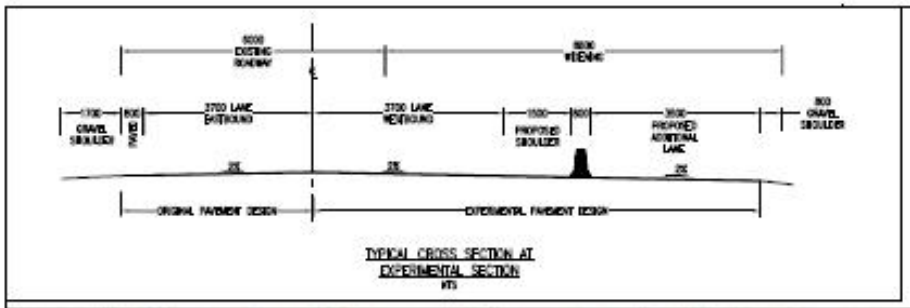
Planning process

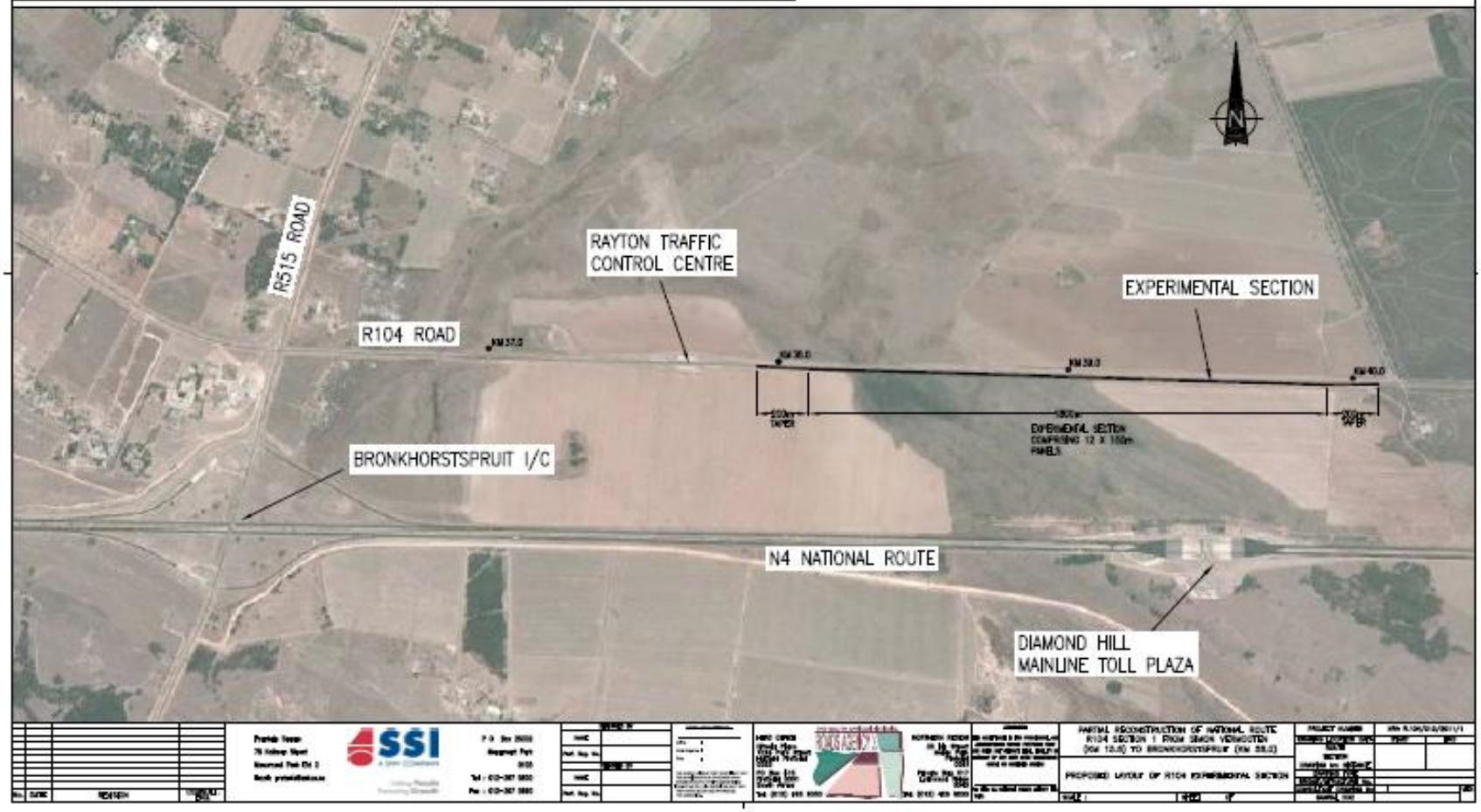
- Submission of designs
- Input regarding sensors requirements
- Collation of designs and plans
- Budget
- Start construction

Location


R101
R573
1
R513
R460
Pretoria
M1
M2
R104
4
R495
R483
R907
R223
Toll Gate on N4
Bronkhorstspruit
Centurion
R964
R25
Metsweding
R50
R42
R21

Location


TYPICAL CROSS SECTION AT
EXPERIMENTAL SECTION


R515 ROAD
RAYTON TRAFFIC
CONTROL CENTRE
EXPERIMENTAL SECTION
R104 ROAD
BRONKHORSTSPRUIT I/C
N4 NATIONAL ROUTE
DIAMOND HILL
MAINLINE TOLL PLAZA

Location

- R104 Bronkhorstspruit
- 10 pavement types (21 sections)
- Between 16 m and 100 m long
- 2 lanes
  - 1 instrumented (outer)
  - 1 duplicate – normal traffic

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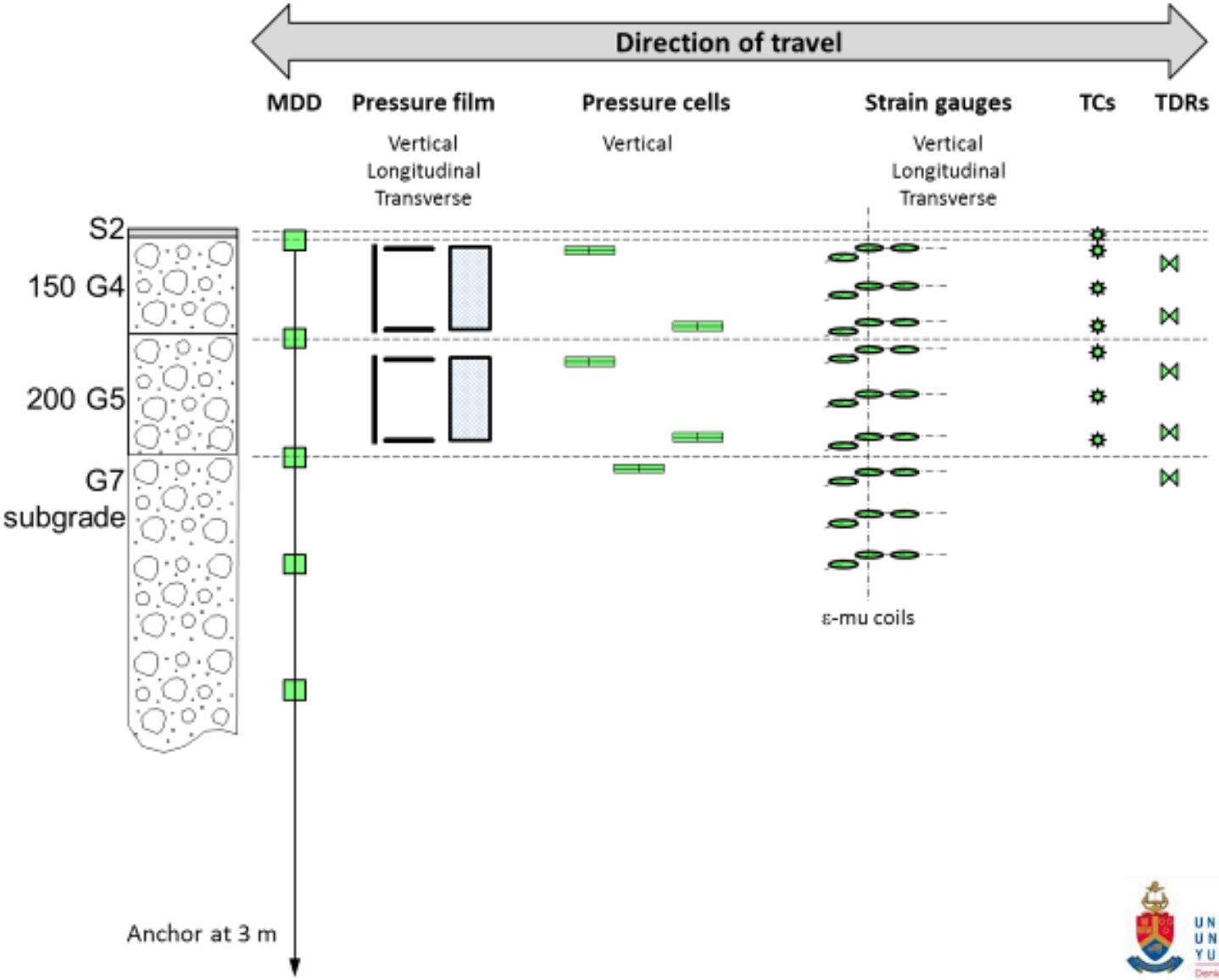
Test sections

- Natural gravel base
- Inverted G1
- Foam Treated Base (FTB)
- Emulsion Treated Base (ETB)
- Cement Treated Base (CTB)
- Bitumen-based (HiMA)
- Bitumen-based (BTB)
- Jointed Concrete
- Ultra-Thin Continuously Reinforced Concrete Pavement (UTCRCP)
- Block paving

Test sections

- At least 1.32 MESA
- Layout allows for
  - 80 km/h truck speeds over sections
- Subgrade and subbase
  - Similar subgrade for all sections
  - Subbase
    - C4 – all except below
    - G5 / G7 – G4, FTB, ETB, CTB, JC1

Typical Test sections - Granular



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Sensors

- Initial shopping list
- Primary and secondary sensors
- Costs
- Order lead times
- Sensor clusters per section
- Final list of sensors
    - What is required to benchmark data

Sensors - Initial shopping list

- 41 Pressure cells
- 42 Strain gauges
- 47 Pressure films
- 10 Accelerometers
- 14 Moisture sensors
- 80 Temperature sensors
- 7 Strain gauges on steel
- 8 MDDs
- 121 εmu coils
- 36 JDMDs
- 1 Weather station

Progress

- Currently preparation of subgrade layer
- Expected to start with construction late in November 2012
- Measurements only after all construction has been completed