



UKCRIC

UK COLLABORATORIUM
FOR RESEARCH ON
INFRASTRUCTURE & CITIES
**Inspired infrastructure
for better living**

National Infrastructure Laboratory and Associated Research

Professor David Richards
UKCRIC Director, Research Strategy

8th February 2021

UKCRIC Southampton Roadshow

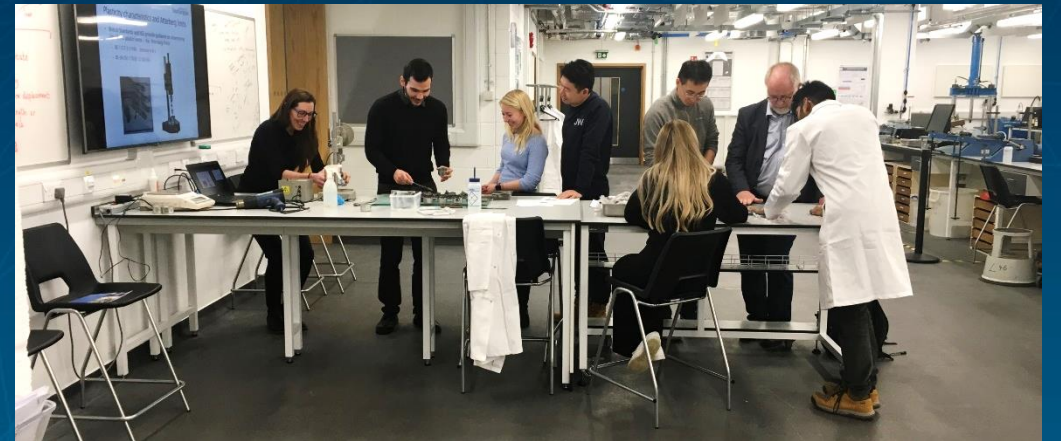


National Infrastructure Laboratory, University of Southampton



UKCRIC National Infrastructure Laboratory

- Opened in 2019, funded by UK Govt.
- Home to ~100 academics, researchers and PhD students
- Research and Teaching Laboratories:
 - Geotechnical Centrifuge Facility
 - Large Structures Testing Laboratory (LSTL)
 - Testing and Structures Research Laboratory (TSRL)
 - Geomechanics Laboratory
 - Energy Laboratory



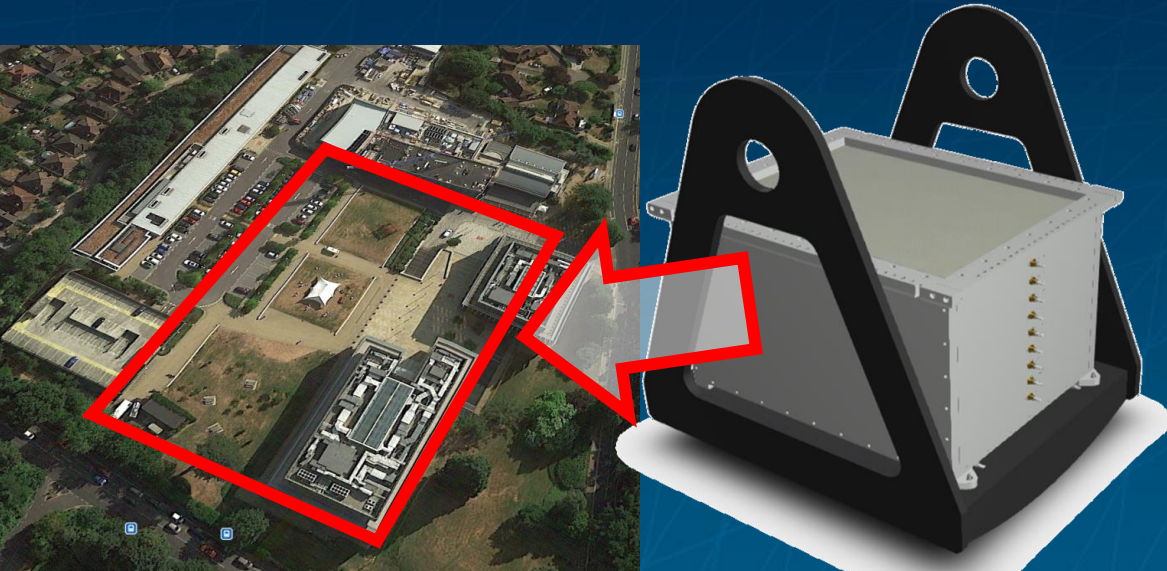
Informal Learning Space



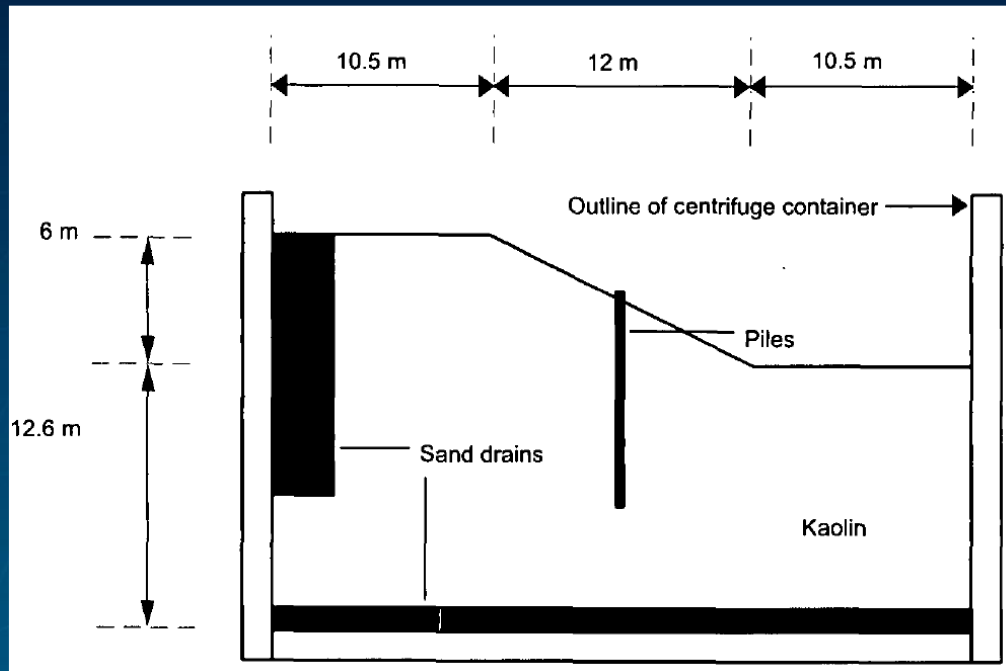
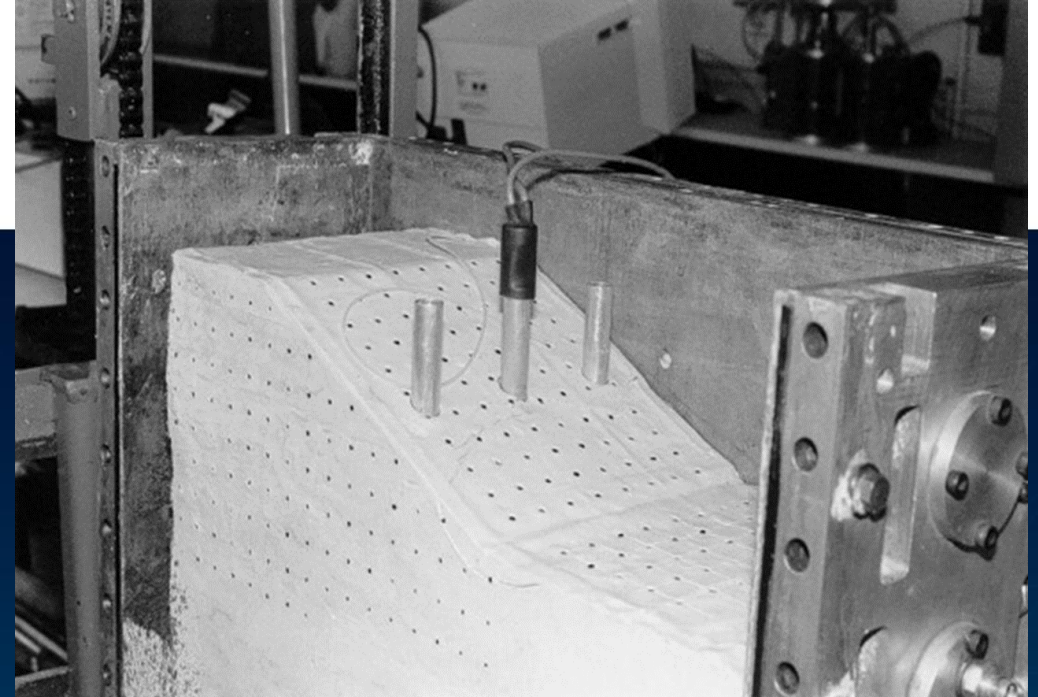
Geotechnical Centrifuge Facility



- 6m-diameter, 130g acceleration
- 1 day test = up to 40 years
- Robotic multi-axis actuation
- Whole life simulation of loading and environmental forcing

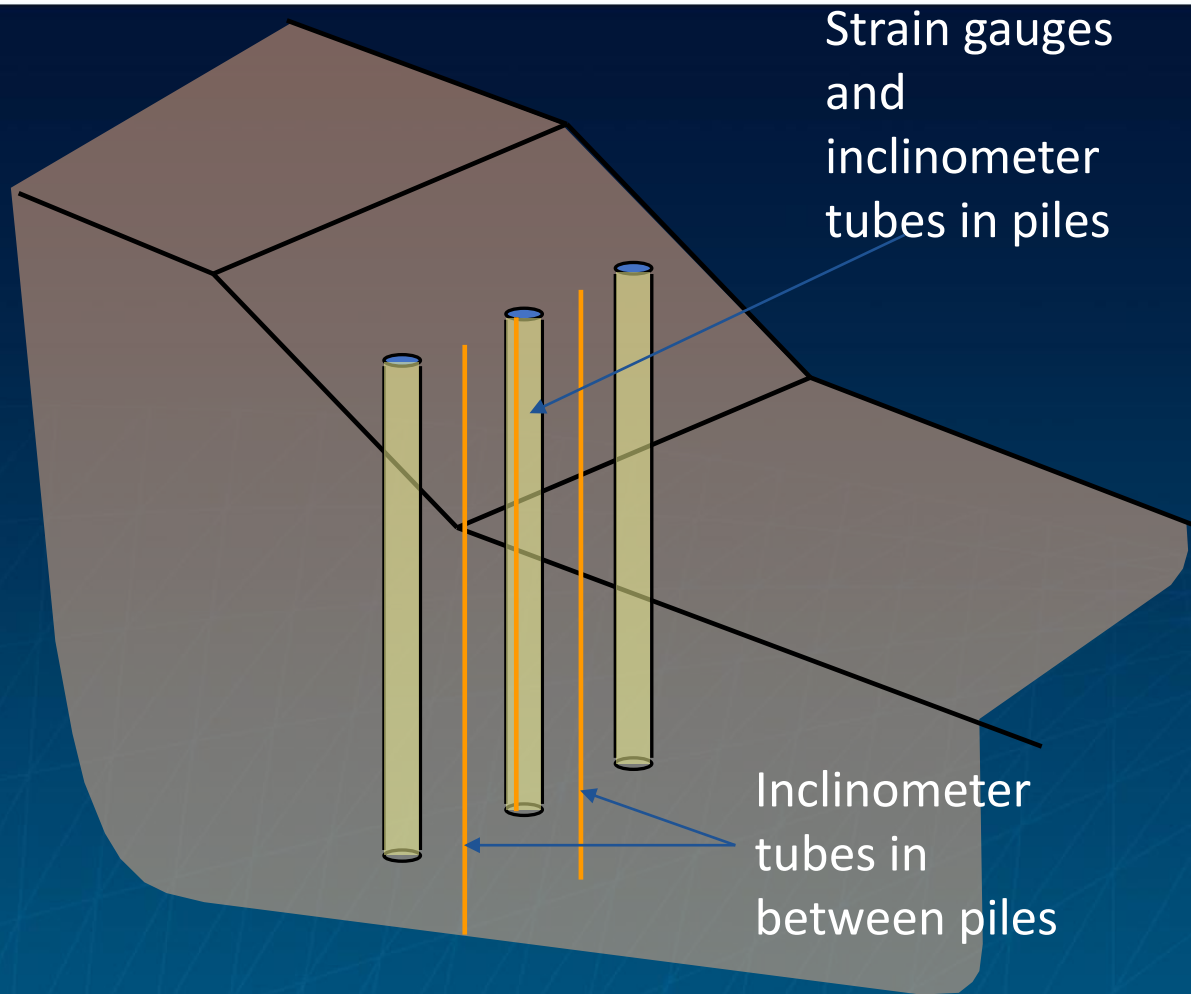


Geotechnical centrifuge model tests to investigate maximum effective pile spacing



- Scale 1:60
- Pile depth 9 m
- Pile diameter 0.95 m
- EI equivalent to 1 m dia reinforced concrete
- Pile spacing 3.2, 4.2 and 6.3 pile diameters
- Speswhite kaolin clay
- Increase to 60g then allow pore pressures to rise until either failure occurs or stability is reached

Discrete pile stabilization of infrastructure slopes



Strain gauges fixed to pile reinforcement cage

Also:

- Inclinometer tubes at toe and crest of slope
- Piezometers
- Raingauge

Hildenborough: pile installation



Hildenborough: final slope geometry

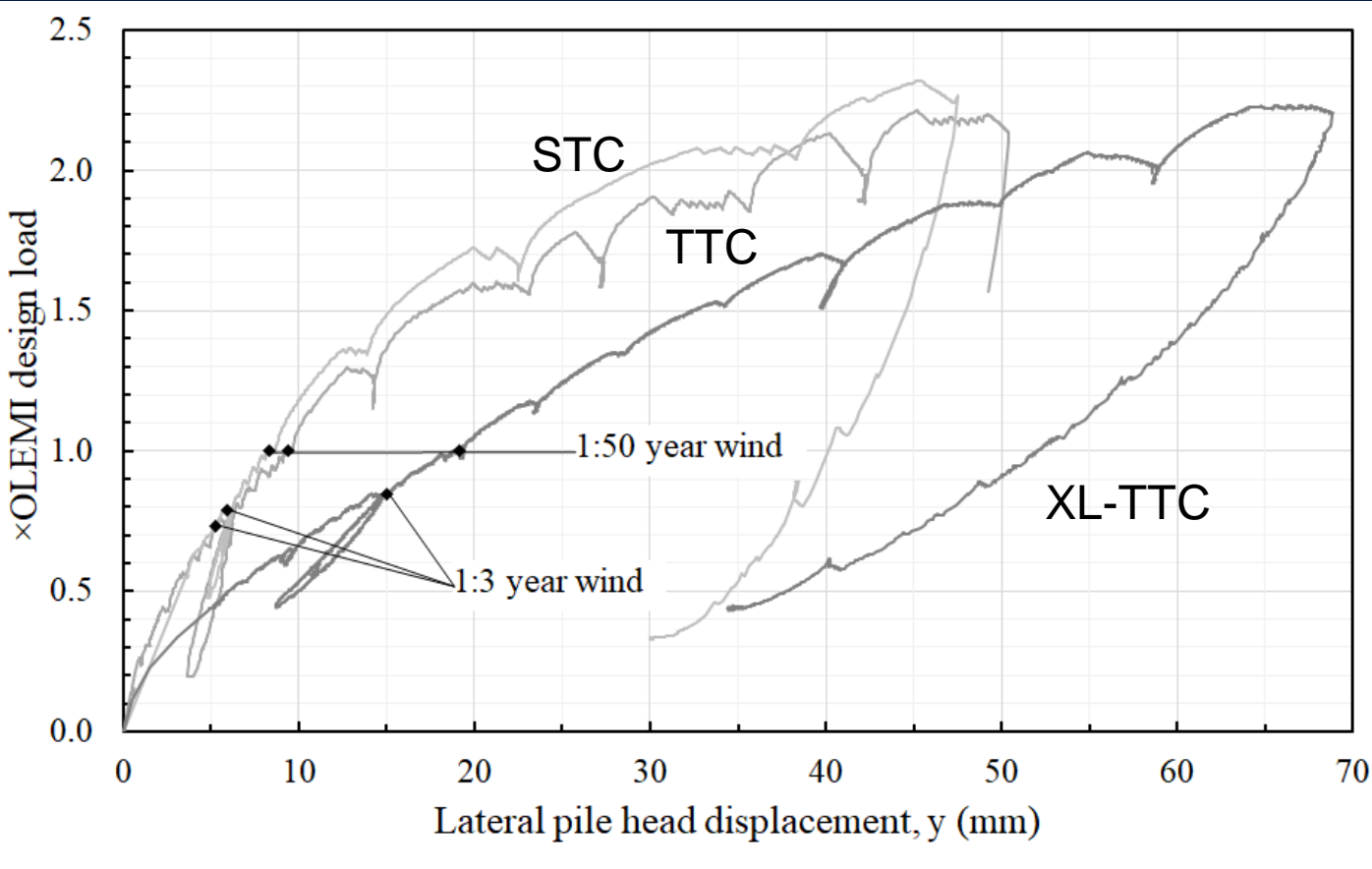
Field Testing – OLE Foundations



GWEP Series 1 XL-TTC



Outcome: new design specification



Ref:	NR/L2/CIV/074
Issue:	01
Date:	02 December 2017
Compliance date:	03 March 2018

Level 2 Specification

Design and Installation of Overhead Line Foundations

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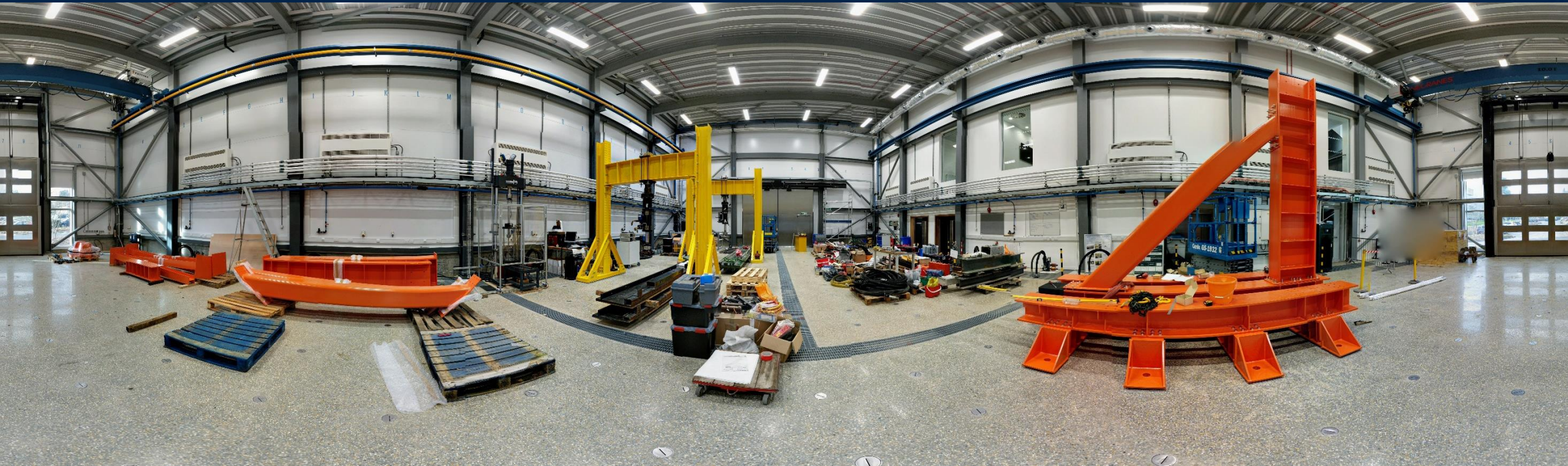
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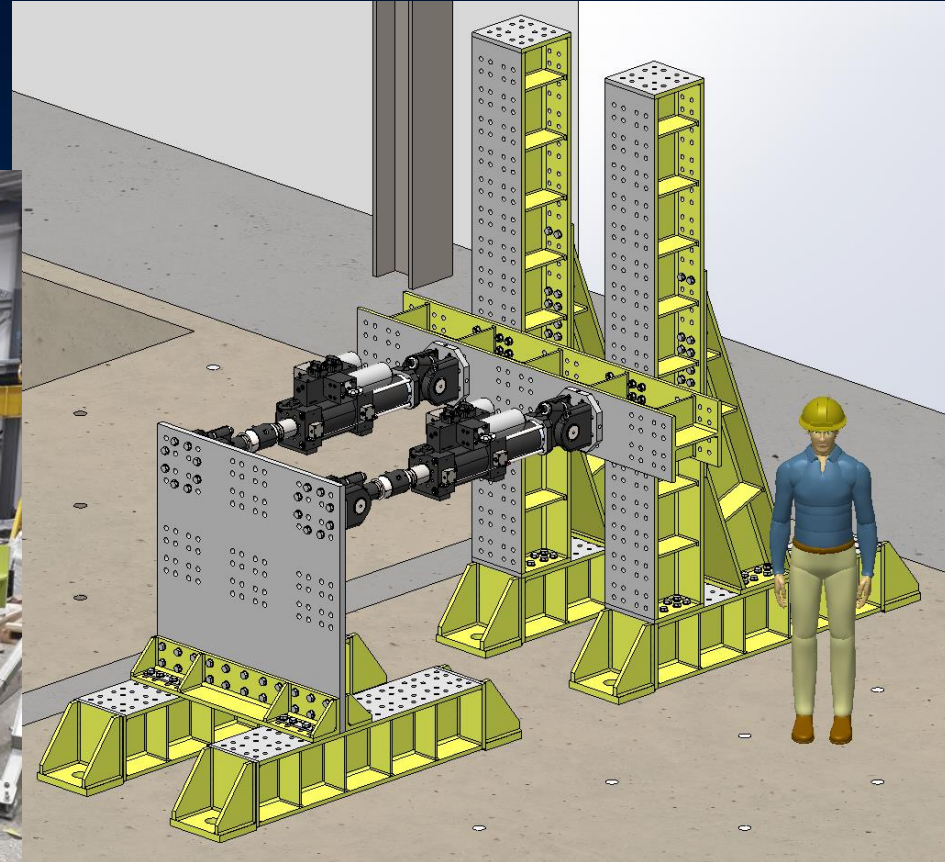
Large Structures Testing Laboratory (LSTL)



- 30m x 15m Large hall for structure and sub-structure testing
- Realistic multi-axis loading
- Data-rich: imaging and sensor networks

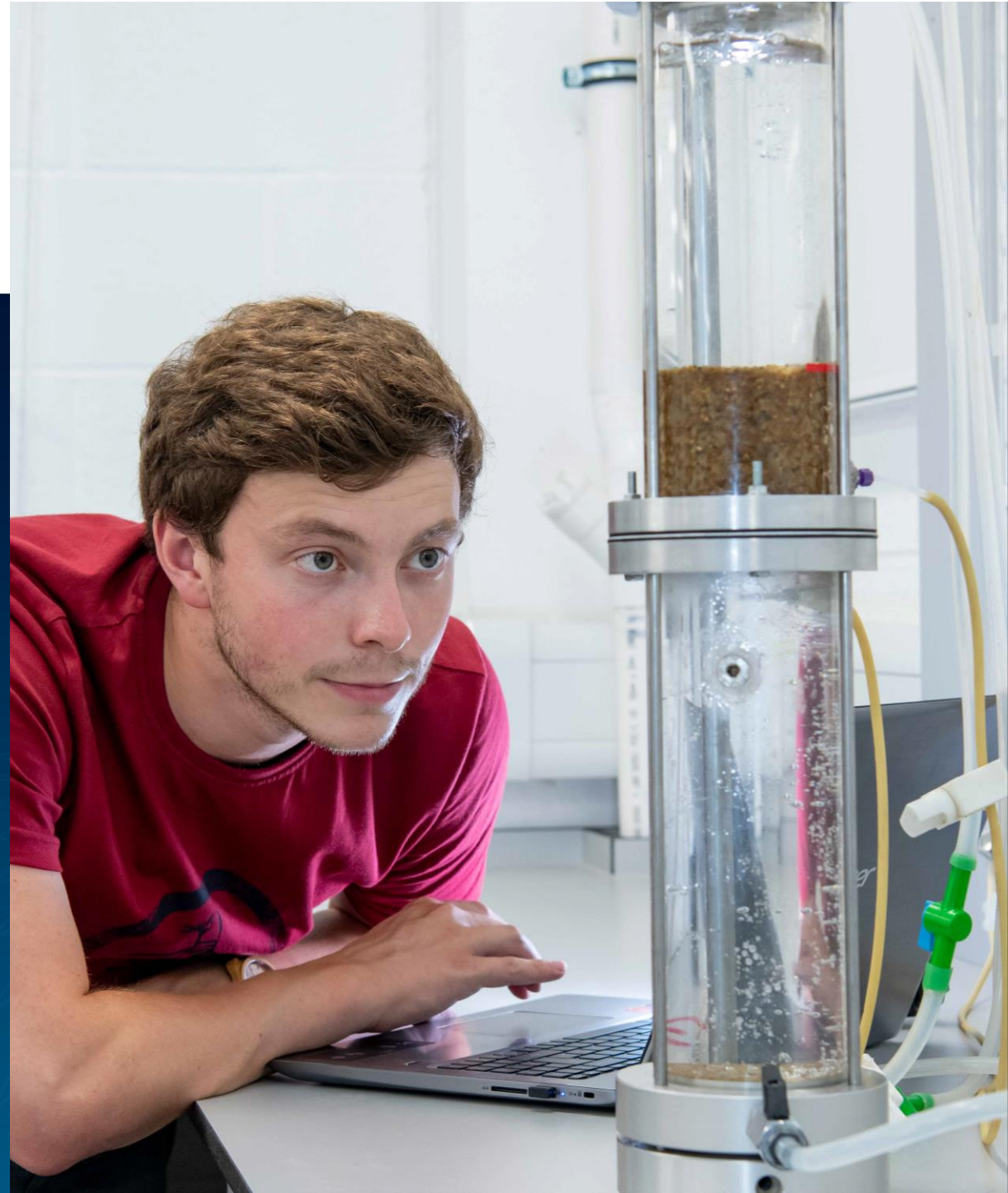


S2025 Modular large structures testing rig kit



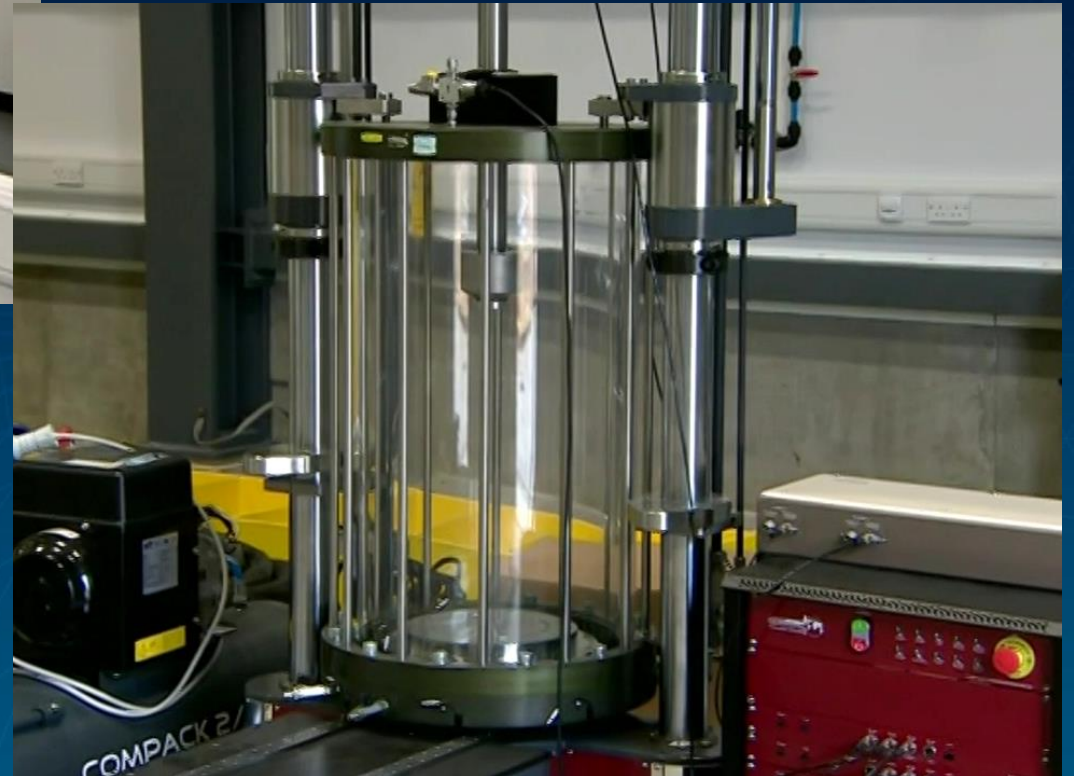
Geomechanics Laboratory

- Element testing and model testing of geomaterials
- Triaxial, oedometric, simple shear, hollow cylinder, RC devices
- Temperature-controlled environment for gas hydrate generation and testing
- Tank for ROV-based seabed testing
- Staging for fieldwork: sensor development, calibration and field preparation



300mm dia x 600mm Dynamic Tx m/c

Geomechanics Laboratory





Rail corrugations
Leominster



Testing and Structures Research Laboratory (TSRL)

- Material testing lab widely used for industry, research and teaching
- Static, cyclic and high strain rate testing
- Imaging and thermography for deformation, strain and stress mapping
- Non-destructive testing
- Ultrasonic monitoring
- Composites manufacturing
- Environmental chambers



Testing and Structures Research Laboratory (TSRL)



[www.southampton.ac.uk/engineering/
research/facilities/tsrl.page](http://www.southampton.ac.uk/engineering/research/facilities/tsrl.page)

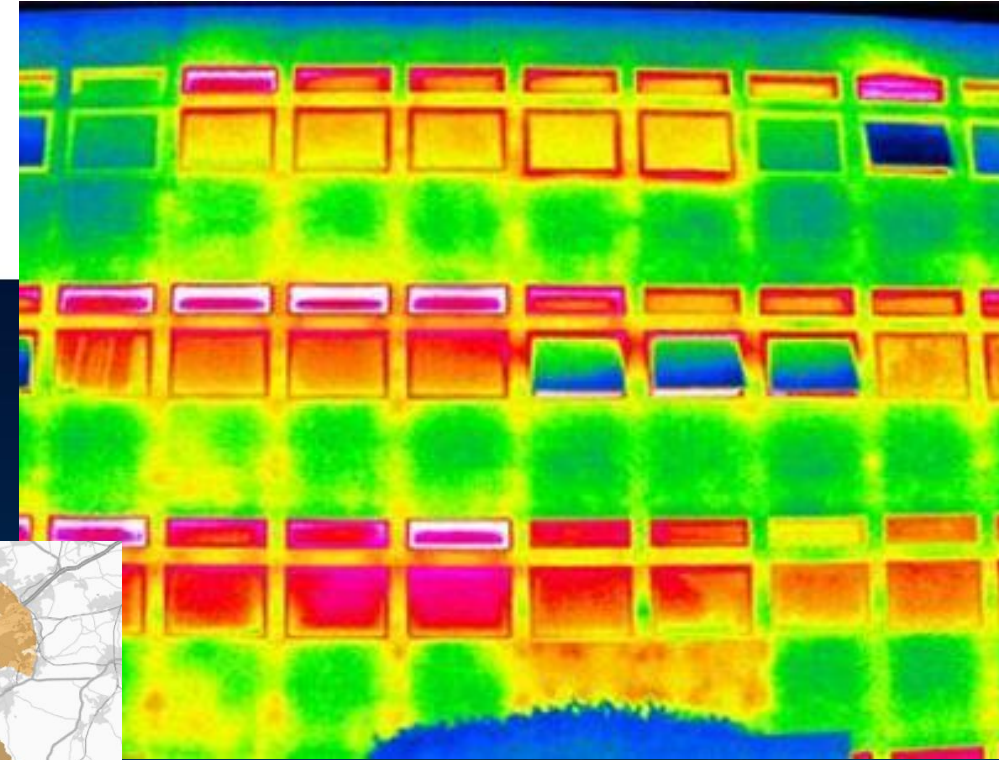
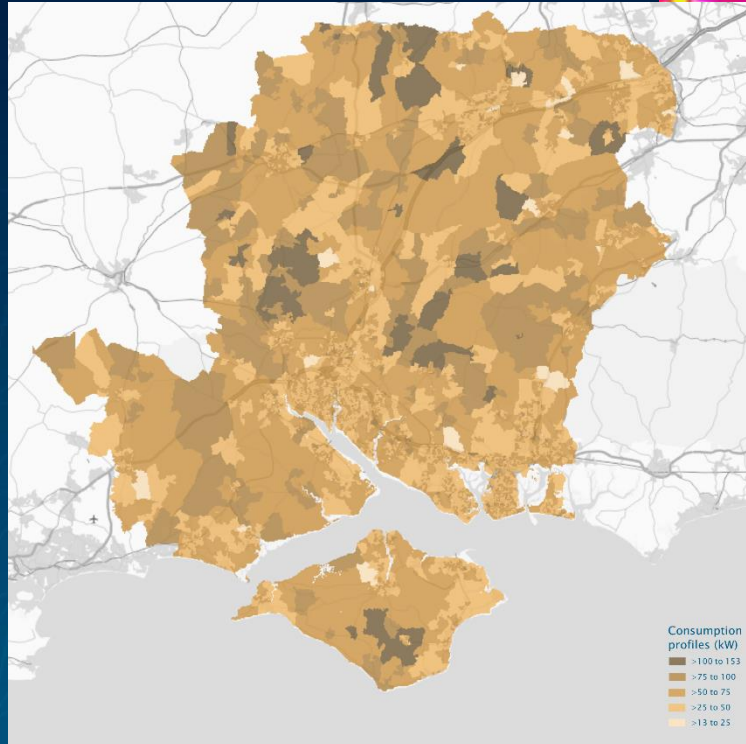


Grimshaw

Energy Laboratory

- Monitoring systems for buildings and the urban environment
- Demand modelling and infrastructure resilience
- Energy studies in cities
- Photovoltaics
- Marine Energy Systems
- Wind Energy
- Energy for Development

• <https://energy.soton.ac.uk>



Access the NIL facilities

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