Case Study - Buildings

Ground Anchor Instrumentation

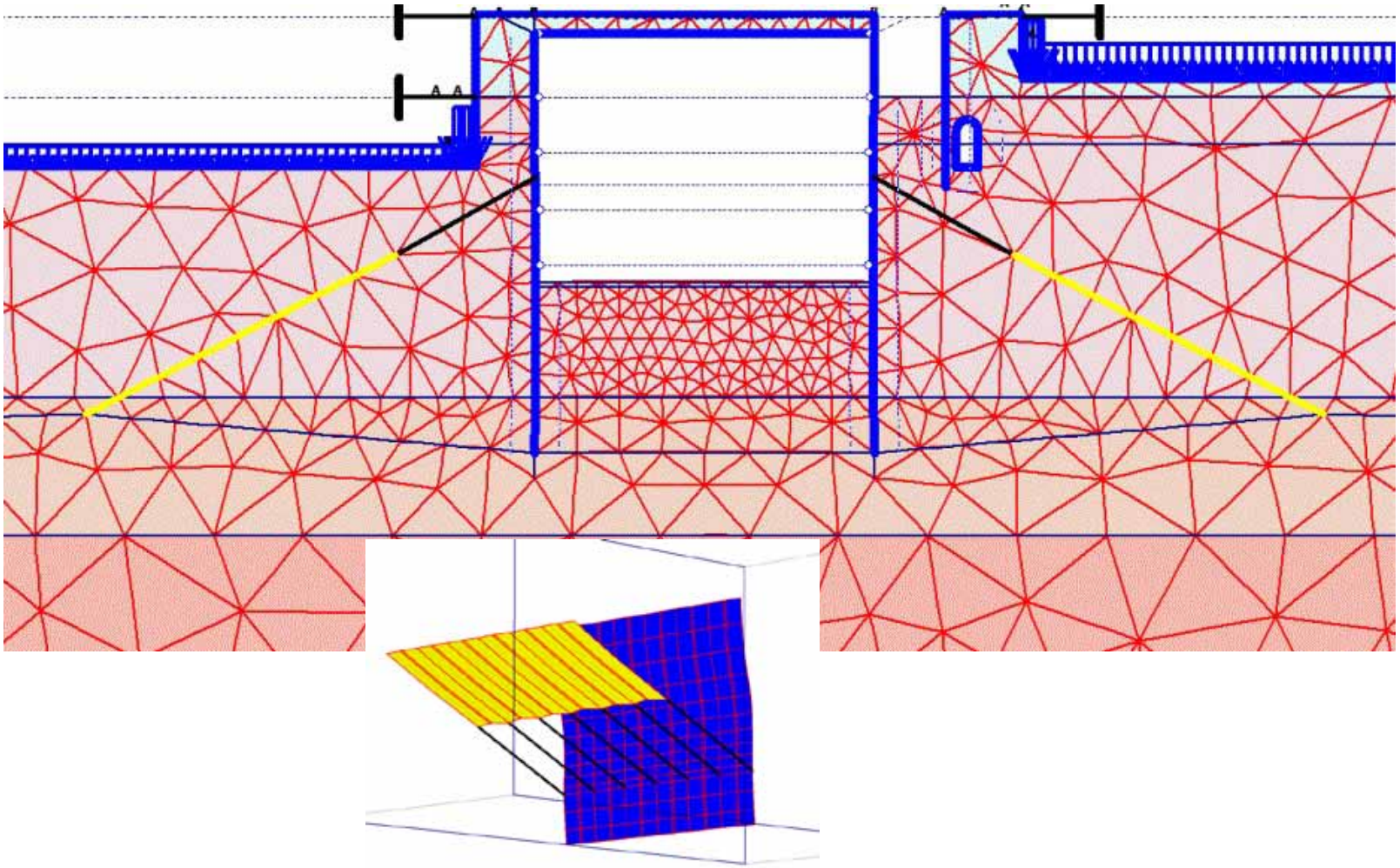
Madrid, Spain, 2006

Ground anchor instrumentation

Aim	Measurement of the build up of strain within 20m concrete filled ground anchors as they are tensioned. The anchors were used to tether diaphragm walls to the ground rock within a new, multi-story, underground car park construction. This will be a long-term monitoring project.
Location	Madrid, Spain
System Integrator	Smart Fibres, Ltd
End Customer	Withheld
Date	2006
Instrumentation	(1) Micron Optics , sm125 Optical Sensing Interrogator (Smart Fibres, W4)
Sensors	SmartBar LGL sensor arrays
Software	Smart Fibres' SmartSoft
FBG Technology Benefit	Ease of deployment, high multiplexing, lower cost than conventional gages.

Ground anchor instrumentation

- Sectional and isometric plans of the installations. The grouted anchor sections are shown yellow.



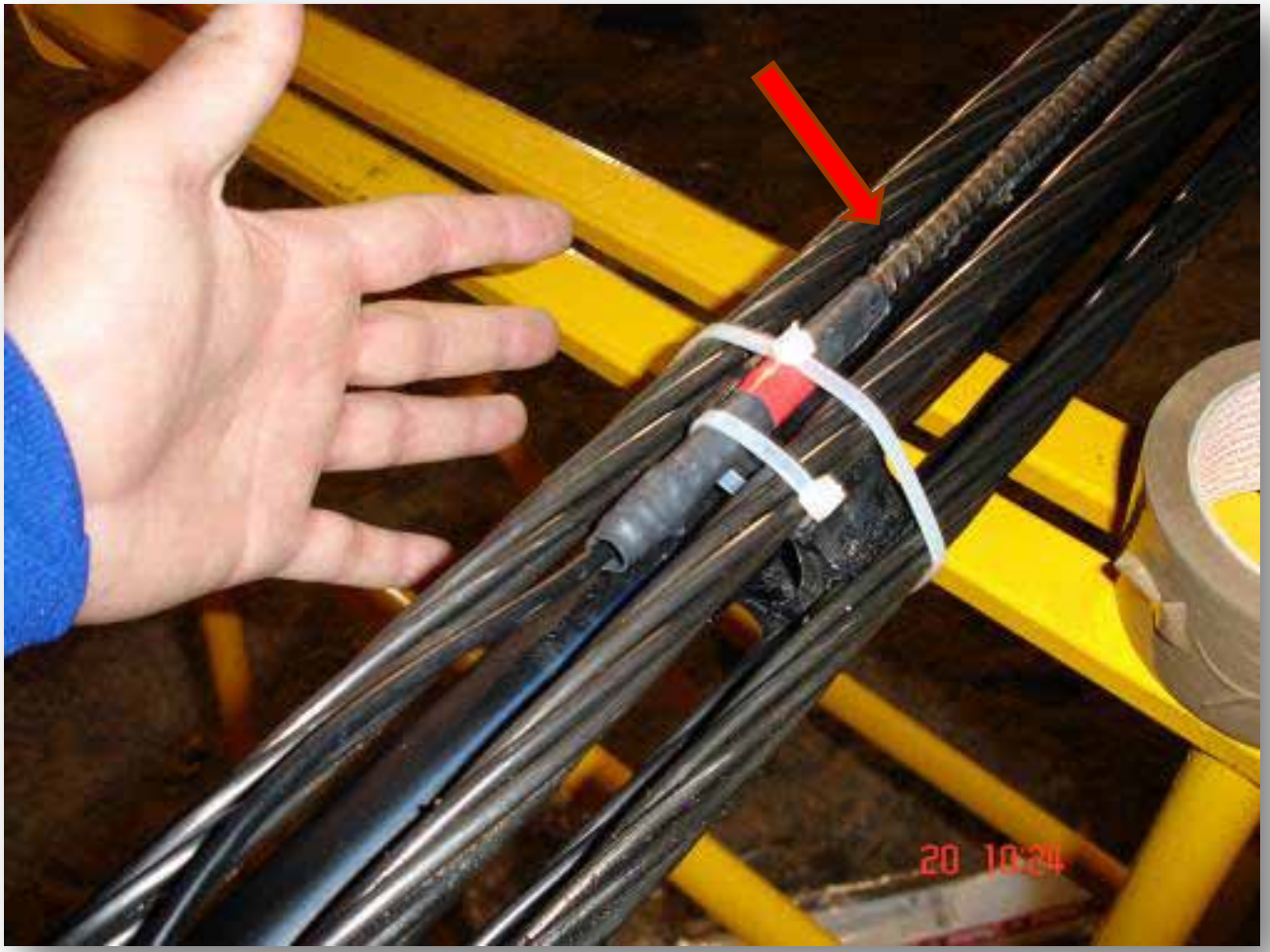
Ground anchor instrumentation

- On site preparation of the instrumented anchors.

- Sensors arrays were embedded into two ground anchors by lashing them to the steel anchor cables prior to insertion into the boreholes. Each array comprised several 2m gage length SmartBar sensors formed by embedding FBGs into steel reinforcement bars, plus temperature compensation sensors. The anchors were then inserted into boreholes in the ground rock and then concrete grout was injected into the holes.

Ground anchor instrumentation

- Close up of the anchor cables and integrated SmartBar sensor prior to installation and grouting.



Results

- Results
  - During the tensioning, a sm125 (Smart Fibres W4) interrogator recorded the build up of the tension profile within the grouted anchor section so as to ensure the prescribed load was applied and no slippage of the anchor occurred. During the operation of the structure, the anchor tension was periodically measured to ensure that the loading conditions remain within expected limits.
  - The data obtained indicated that the instrumentation was successful, and the verification of anchor design and assessment on long-term anchor stability proved beneficial to the client for this and future constructions.
  - Further information to follow when released by the client.

- Acknowledgements
  - Smart Fibres Ltd, UK

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