SANDBERG

CURRICULUM VITAE

M A EDEN BSc MSc FGS C. Geol

PARTNER

Manager, Geomaterials Research Services Department

PERSONAL

Surname:	EDEN
Forenames:	Michael Andrew
Date of Birth:	18 January 1965
Nationality:	British

PROFESSIONAL EDUCATION

1990	Queen Mary and Westfield College, University of London Masters Degree
1986	University College Cardiff Honours Degree in Geology

PROFESSIONAL BODIES

1992	Elected fellow of the Geological Society
2000	Elected as Chartered Geologist by the Geological Society

SUMMARY OF EXPERIENCE

Partner at Sandberg LLP (2008 to present) and previously Director of Geomaterials Research Services (1998 to 2008). Geomaterials Research Services was established in 1984 to carry out research on construction materials of geological origin for commercial purposes. Through Geomaterials Research Services Ltd Michael Eden has had involvement in many important civil engineering projects including the Channel Tunnel, and the Second Severn Crossing in the UK and the Tsing-Ma Bridge in Hong Kong. Michael Eden has more than 20 years experience as a practising materials consultant carrying out petrographic examination and other types of specialist analytical techniques in the investigation of problems with civil engineering constriction materials.

Litigation Experience:

Acted as an expert witness in court on several occasions in connection with disputes involving cracking in concrete, the deterioration of concrete exposed to silage and microsilica in concrete. Has extensive experience in many concrete investigations involving litigation in the UK and overseas in connection with disputes involving:

- Sulphate attack in foundation concrete
- Delayed ettringite formation in concrete
- Alkali-aggregate reaction in concrete
- Concrete coatings
- Water/cement ratio and PFA content of concrete
- Pyrite-related heave in mudstone fill
- Criminal investigations
- Building stone staining

Examples of projects undertaken:

Since 1991 in excess of 5000 commercial reports have been compiled on various aspects of building materials relating mainly to concrete, mortar/render, grout, building stones and historic construction materials. A substantial proportion of this work has involved the investigation of concrete from many important civil engineering projects. Some examples of research Reports (Restricted Circulation) compiled include the following:

1988 – 1991	The petrographic investigation of the aggregate and trial mix concretes relating to the construction of the Channel Tunnel.
1992 to 1993	The analysis of Permo – Triassic sediment relating to the investigation of a potential site for the underground storage of hazardous waste.
1997	The analysis of samples of Keuper Marl from the Abbey Sewer tunnel with particular reference to the influence of swelling sheet silicates on engineering behaviour.
1998 to present	Concrete from a substantial number of bridge foundations from many locations in the UK has been examined for the presence of the thaumasite form of sulphate attack. Many hundred samples have been examined. Some of the results of this investigation were presented at the First International Conference on Thaumasite in Cementitious Materials (2002).
2000 to 2001	The investigation of a potential new source of aggregate in Hong Kong with particular reference to controlling the development of alkali aggregate reaction in concrete.
2005 to 2006	An investigation into the cause of cracking in a major highway structure in Malaysia. The investigation included the evaluation of the results of the petrographic examination and expansion testing of a substantial number of core samples obtained from the structure and an assessment of the potential for further long-term deterioration of the concrete in the structure.
2007 to present	Investigations into the causes of heave in foundations constructed on pyrite-bearing mudstone crushed rock fill. The investigations to date have involved several hundred structures in Southern Ireland including domestic dwellings, bus depots and community centres. The investigation has included the evaluation of sulphate attack in foundation concrete in contact with the fill and the investigation of the pyrite decomposition and mechanisms of sulphate generation.

2011 to present	An investigation of causes of concrete expansion in an extensive marine petrochemical installation constructed from precast concrete blocks. The investigation focussed on the effects of high temperatures reached during the curing of the blocks due to their large volume and high cement content.

Professional:

Member of the Applied Petrography Group and author of APG-SR2 A Code of Practice for the Petrographic Examination of Concrete in the UK.

Contributor to Concrete Society Technical Report No. 71 – Concrete petrography – An introductory guide for the non-specialist, 2010.

Contributor to the Report of the Thaumasite Expert Group compiled by the Department of Transport 1999.

Contributor to a report for the Health and Safety Executive on the Effectiveness of Concrete Repairs.

Recent Publications:

Eden, M. A.; The Petrographic Examination of Concrete and Concrete Repairs. Published in Concrete Repair – A Practical Guide. Grantham, M. G. (Ed). 2001, Taylor and Francis.

Eden, M. A.; Fire Damaged Concrete – the Potential for on-going Post-Fire Deterioration in Fire Damaged Concrete, Published in Concrete Solutions. Grantham, M. G. (Ed). 2001, Taylor and Francis.

Baldwin, R.; Eden M. A. An Investigation of an Old Problem – Optimisation and Cost Effectiveness. 10th International Conference on Applied Mineralogy, 2011.

Applied Petrography Group. *A code of practice for the petrographic examination of concrete* (Author Eden, MA), SR 2, The Geological Society of London, London, 2010.

Wimpenny D E, White PS and Eden M A 'Two Case Studies Of The management of Bridges Diagnosed With Delayed Ettringite Formation, *Proceedings of the 5th Institution of Civil Engineers International Bridge Design, Construction and Maintenance Conference, Beijing, China, 17-18 September 2007 (Edt Lark R), Thomas Telford, pp 448-457.*

Eden, M. A., White, P S, Wimpenny D E. 2007. A petrographic investigation of concrete with suspected delayed ettringite formation – a case study from a bridge in Malaysia. *Proceedings of the 11th Euroseminar on Microscopy Applied to Building Materials 5-9 June 2007, Porto, Portugal.*

Eden, M. A. 2003. The laboratory investigation of concrete affected by thaumasite sulphate attack in the UK. *Cement and Concrete Composites* **25** (2003) 847-850.

Eden, M. A. 2003. An investigation into the effectiveness of the cathodic protection system in the replaced reinforced concrete road deck in the West Tunnel of the Dartford River Crossing. *In: Proceedings of the 1st International Conference on Concrete Repair, St Malo, France. 15-17 July 2003.*

Poole, A. B., Eden, M. A., Lawrence D. F. 2004. The effects of ionic mobilities on alkali-silica reaction progression in concrete. *In: Proceedings of the 12th International Conference on Alkali-Aggregate Reaction in Concrete, Beijing, China. 15-19 October 2004.*

Grantham, M. G., Gray, M. J., Eden, M. A., Delayed ettringite formation in foundation bases – a case study. *Proceedings of Structural Faults and Repair 1999.* (Edinburgh University Press).

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