

Book review

Foundations on rock. (2nd Edition) D. C. Wyllie. London: E&FN Spon, 1999, xviii + 401 pp. ISBN 0-419-23210-9. £90

This book aims to incorporate a wide range of expertise in design and construction of rock foundations into a single volume, and contradicts a common presumption that problems end once foundations are on bedrock. Chapter 1 sets the scene by outlining the characteristics of rock foundations. This apparently superficial section includes some more advanced concepts. The use of partial factors of safety in limit-state analysis is introduced, together with the concept of risk/reliability in design. The concepts are clearly introduced and are welcome inclusions.

A chapter entitled 'Structural geology' discusses the discontinuities that are so important in understanding the behaviour of rock masses. The use of stereographic projections is described; this introductory coverage (even aided by a brief appendix) is too short to educate, as with other texts that try to teach this subject. The use of probabilistic modelling to predict fracture characteristics is valuable modern coverage.

The effects of different fracture conditions on deformability are described, and with reference to rock mass classification systems. The measurement of strength is described, also with reference to rock mass classification; it is disappointing that the constants used in the empirical failure criterion are out of date. Time-dependent aspects of rock behaviour are used to introduce weathering and creep.

Chapter 4 describes, in a well-trodden style, the processes of and methods used in investigations. A detailed account is given of the requirements in mapping discontinuities, building heavily and closely on standard ISRM recommendations (with further background given in an appendix). There is limited coverage of core-logging activities and, as in most texts, the measurement of joint orientations in oriented core is incomplete. The coverage of ground water monitoring and in situ testing is comprehensive, if conventional. Coverage is concentrated on the exotic, such as large jacking tests, with everyday procedures being dealt with rather more cursorily.

The assessment of bearing capacity considers codes before leading on to numerical analytical approaches. Consideration of the effects of poor ground is dominated by karst, with an apparently misplaced digression into methods of cavity detection. The calculation of settlement in various rock conditions is

covered comprehensively, together with explanation of the combined effects of geology and the works on stresses on the ground. Some worked examples are given. A reminder of the need to consider stability of the ground–foundation system is given, with examples of the analysis of slopes and external effects on stability. Strangely, seismic design is given less coverage than the effects of water scour.

The remaining chapters of the book deal with design and construction aspects of foundations on rock. Considerations for dams include sliding stability, the effects of water pressures and overturning, which lead on to aspects of stress and strain in the context of finite element analysis.

The use of deep foundations in rock includes assessment of load capacity on the base and side wall. Axial deformation calculations to determine settlement are described, followed by discussion of uplift and lateral loading aspects. This chapter gives a useful compilation of the assessment of deep rock foundations, which do not usually merit adequate space.

Chapter 9 describes tension foundations, with a summary of anchorage systems and their applications and with a clear and comprehensive description of the design process. Corrosion processes are described and protection methods are presented.

The final chapter is on construction methods in rock. Practical aspects of rock excavation, primarily drilling and blasting, are given, including the effects of blasting vibrations. This leads on to very brief details of rock preparation such as dentition, shotcrete, drainage and contractual matters. This chapter collects several aspects all too briefly.

As with many textbooks, the coverage is intended to be comprehensive. Greater clarity and impact would be achieved by limiting the presentation to selected key practical areas. The number and clarity of site case histories and worked examples are modest, and this overtly American book would have benefited from a more international viewpoint.

Nevertheless, this book provides comprehensive coverage of foundations on rock, and does so accessibly and clearly. If you need a single volume that presents all aspects of this wide subject, this book would serve. If you have the first edition, do not rush out to replace it with this one. The author has tried to incorporate progress in the subject, but some key developments are clearly missing, and the updating of the references is not comprehensive.

—D. Norbury