Eurocode 7 – Part 2

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But first a few definitions

Eurocode – not a code as we would tend to use the word with BS5930 say but a STANDARD
We shall do certain things

Standard – a Standard in our general understanding and in line with BS1377 say; a testing or execution standard

A Technical Specification – TS a document outlining a method, but not a standard, we may take as optional

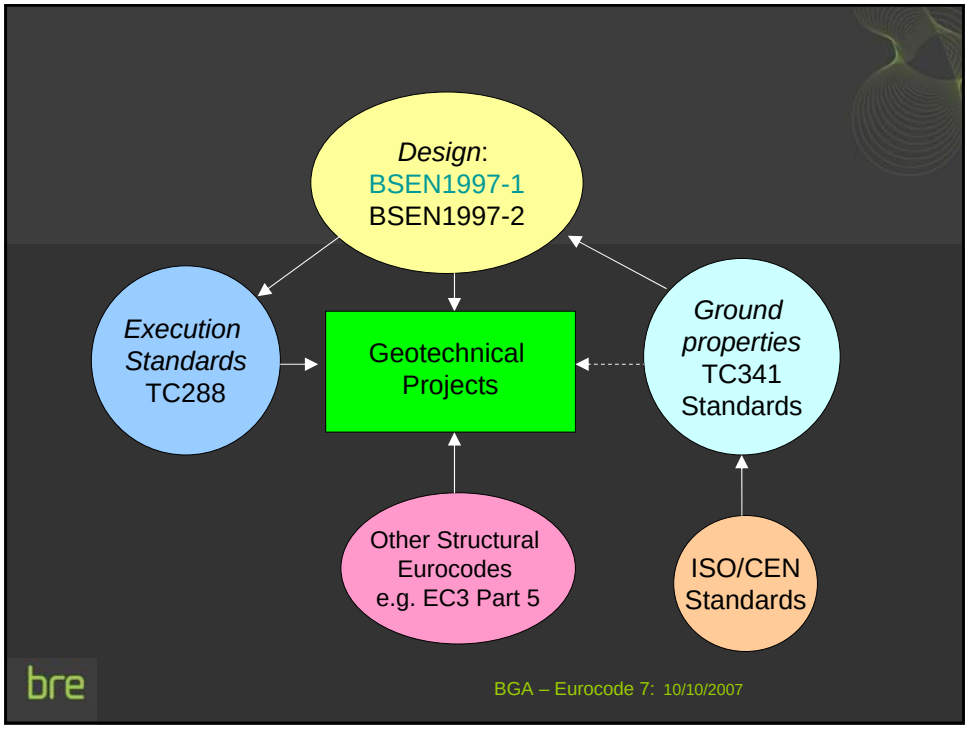
National Annex (NA) – document stating nationally determined parameters

But first a few definitions

- A Standard can co-exist with conflicting National Standards for only 6 months before withdrawal of the National document
- The Eurocode can co-exist for a longer period; presently no later than March 2010, but!

Eurocode 7 – Part 2: what is it

- EC7-1 is about geotechnical design
- EC7-2 is concerned with ground investigation and testing.
- EC7-1 cannot be used without EC7-2.
- EC7-2 is supported by NEW 'Testing Standards' (Standards) and Technical Specifications (TS) – CEN TC341, ISO TC182
- EC7-2 will affect all our GI practice as it will impinge on many of our codes and standards



EC7 Part 2: what is it

- BS EN 1997-1 describes in only general terms the methods to be used for obtaining ground design parameters
- BS EN 1997-2 and its associated Testing and other Standards (31) and Technical Specifications (16) itemise and discuss the methods that are to be used to obtain the basic and derived parameters from which design values are acquired.

Supporting Documents

- Sampling and Drilling 1 & 2
- Field (in situ) tests 12 & 2
- Geo-hydraulic tests 6 & 0
- Laboratory tests 0 & 12
- Soil and rock description and classification 4 & 0
- Qualifications 0 & 2
- Piles, anchorages, nails, reinforced earth etc 8 & 0

- Geotechnical works 14 & 0

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EN1997-2 - Part 2 – Ground investigation and testing

Contents:

1. General
2. Planning of ground investigation
3. Soil and rock sampling and groundwater measurements
4. Field tests in soils and rocks
5. Laboratory tests on soils and rocks
6. Ground investigation report

Informative Annexes:

A – B Planning
C – K Field Testing
L – W Laboratory testing

B. Planning strategies of geotechnical investigations

H. Field Vane Test

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EC7 -2 vs BS5930

EC7-1	BS5930
1. General	Section 1: Preliminary considerations;
2. Planning of ground investigation	Section 2: Ground investigations;
3. Soil and rock sampling and groundwater measurements	Section 3: Field investigations;
4. Field tests in soils and rocks	Section 4: Field tests;
5. Laboratory tests on soils and rocks	Section 5: Laboratory tests on samples;
6. Ground investigation report	Section 6: Description of soils and rocks;
	Section 7: Reports and interpretation.

Informative Annexes (for example):

B. Planning strategies of geotechnical investigations

H. Field Vane Test

Codes & Standards being affected by Part 2

BS5930:1999 - Site investigation

BS1377:1990 - Methods of test for Soils for civil engineering purposes

EN 1997-2

EN 1997-2 provides rules related to:

- planning and reporting of ground investigations;
- general requirements for a number of commonly used laboratory and field tests;
- interpretation and evaluation of test results;
- derivation of values of geotechnical parameters and coefficients.
- In addition, examples of the application of field test results to design are given in Annexes.

- NOTE Establishment of characteristic values is covered in EN 1997-1.

EN1997-2 - Part 2 – Ground investigation and testing

For	Against
• A fairly comprehensive document that makes some clear requirements ('*shall*' statements). E.g. if the specified depth of an in situ test is not reached, the client *shall* be informed *immediately*.	• British codes (NOT 'Standards') rarely if ever use 'shall' – they use 'should'. • There may, therefore, be some surprises that could appear only in the courts?
• A lot of 'should' statements • 'if appropriate' • 'local experience'	• There is, in places, a lack of detailed guidance particularly on the planning and extent of site and ground investigations compared with e.g. BS5930:1999

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- EC7-2 makes compulsory the provision of a Ground Investigation Report to all relevant parties.
- EC7-2 is more prescriptive than BS5930 in its planning and execution requirements for ground investigation.
- The emphasis in EC7-1 on better prediction of settlement and deformation raises the importance of ground deformation properties. The need for better knowledge of the deformation properties of the ground from additional and specific testing should presage a profound change in UK geotechnical practice.

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EC7-2 identifies an explicit hierarchy of investigations that are also found in BS 5930:

- *Geotechnical investigations* , which comprise the gathering of all relevant information about the site and a ground investigation;
- *Ground investigations*, which comprise field investigations, laboratory testing and desk studies of geotechnical and geological information;
- *Field investigations*, which comprise direct investigations (drilling, sampling and trial pits) and indirect investigations (in situ tests, such as the CPT).

EC7 -2 also

- the conversion of test results into derived values of geotechnical parameters and coefficients.
- A derived value is defined as the value of a geotechnical parameter obtained from test results by theory, correlation or empiricism.
- An example would be the shear strength obtained through correlation with a q_c value measured in a cone penetration test.
- Correlations may also use a theoretical relationship to link a geotechnical parameter with a test result, for example when obtaining a value of the angle of shearing resistance φ′ from pressuremeter test results.

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EC7 Part 2 - examples

use of ‘shall’ in Principle clauses, rather than ‘should’ . (Examples from Section 2, 'Planning of Ground Investigations')	• *If the main ground investigations do not supply the necessary information, complementary investigations ‘shall’ be undertaken’.* Clients may come to appreciate that, if they fund more comprehensive, initial investigations, they can avoid the expense of otherwise compulsory further investigation at a later stage; • It is stated that investigations *shall* be planned and data *shall* be adequate to manage risks ; • The document states that a visual inspection *‘shall’* be undertaken before planning the investigation programme and used in conjunction with a desk study;

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EC7 Part 2 - examples

- It also says that quality assurance systems *shall* be in place for all aspects of the work ;
- The necessary number of specimens to be tested *'shall'* be determined; recommended numbers are contained in Informative Annexes but the status/validity of these will need to be discussed in the NA for Part 2. It is unclear what the implications might be if the recommendations are ignored and things go wrong;
- A table of applicability of various field tests is also presented.

EC7 Part 2 - examples

Section 3, on soil and rock sampling, introduces categories of sampling method based on BS EN ISO 22475-1

- The quality class relates to use in specific laboratory tests in order to give the test results required for the selection of characteristic values .
- This implies that only certain sampling methods can be used to obtain samples of a certain quality class.

EC7 Part 2 - examples

Section 4, Field tests in soils and rocks, specifies that CEN Standards *shall* be used when specifying tests. Conversion of test results into 'derived' values is introduced	• Existing BS 1377 and 5930 sections specifying test methods will become redundant where a corresponding Standard exists. • If a Technical Specification is listed for a particular test then this may be replaced; the NA for the UK is likely to address this.

EC7 Part 2 - examples

Section 5 - Laboratory tests on soils and rocks	• General statements occur with 'shall' throughout the section; much is simply good practice but if things go wrong then decisions taken relating to clauses saying 'shall' will need to be justified. • Checks *shall* be made that the laboratory equipment used is adequate, fit for purpose, is calibrated and within the calibration requirements. • There is a requirement that all test methods and procedures *shall* be reported. • A quality assurance system *'shall'* be in place in the laboratory . • All descriptions *'shall'* be to EN ISO 14688-1 and 14688-2.

EC7 Part 2 - examples

Section 6 - Ground investigation report deals with what *shall* be in the report. In a clear departure from most current practice, EC7-2 makes compulsory the provision of some form of Ground Investigation Report (GIR) as part of the Geotechnical Design Report.	• The report *shall* form part of the Geotechnical Design Report. – there will be a GI report!! • It *shall* state known limitations of the results; • It *shall* include a presentation of all available information and geological features and a geotechnical evaluation of the information; • All methods *shall* be documented in accordance with the relevant Standards; • It *shall* include all relevant information on how the derived values were arrived at.

Note

- Part 2 document gives no specific provisions for environmental or geophysical ground investigations.
- Only commonly used geotechnical laboratory and field tests are covered in it.
  - They were selected on the basis of their importance in geotechnical practice, availability in commercial geotechnical laboratories and the existence of an accepted testing procedure in Europe.
  - Things may change!

Part 2 and finally from me

- On the positive side:

- Most of what is contained in Part 2 represents ‘good practice’ and as such should not be considered too onerous or unworkable!