

Contents

Foreword	8
Executive summary	9
1 Introduction (R. Katzenbach, A. Schmitt & J. Turek)	11
<hr/>	
2 Aspects of education of geotechnical and structural engineers (R. Katzenbach & J. Turek)	15
<hr/>	
3 Regulations and codes of practice of interaction (B. Casey)	19
3.1 Regulation by civil or criminal law	19
3.2 Regulation by codes of practice/other technical codes	19
3.3 Regulation/control of qualifications to practise	20
<hr/>	
4. Interaction experiences from projects (M. R. Fragoso)	22
4.1 General division of tasks and responsibilities of geotechnical and structural engineers	22
4.2 Examples of interaction in projects	24
4.3 Quality assurance in projects	25
4.4 Legal aspects	25
<hr/>	
5 Examples of European practice	26
5.1 Austrian National Report (D. Adam & H. Hartl)	26
5.1.1 Project work	26
5.1.2 Legal matters	28
5.1.3 Education of geotechnical and structural engineers	29
5.2 Belgian National Report (W. van Impe)	29
5.2.1 Introduction	29
5.2.2 Questions concerning project work	30

5.2.3	<i>Questions concerning legal matters</i>	30
5.2.4	<i>Questions concerning education</i>	30
5.2.5	<i>Concerning project work</i>	31
5.2.6	<i>Concerning legal matters</i>	31
5.2.7	<i>Concerning education</i>	31
5.3	The practice in the Czech Republic (<i>J. Boháč</i>)	31
5.3.1	<i>Introduction</i>	31
5.3.2	<i>Approval and realisation of civil engineering projects; chartering system</i>	32
5.3.3	<i>The role of structural and geotechnical engineers; legal aspects</i>	32
5.3.4	<i>Education</i>	34
5.4	Finnish National Report (<i>J. Hartikainen</i>)	34
5.4.1	<i>Project work</i>	35
5.4.2	<i>Legal matters</i>	36
5.4.3	<i>Education</i>	37
5.5	French National Report (<i>S. Borel & J. P. Magnan</i>)	37
5.5.1	<i>Preliminary note</i>	37
5.5.2	<i>Questions concerning the project work</i>	38
5.5.3	<i>Questions concerning legal matters</i>	40
5.5.4	<i>Questions concerning education</i>	42
5.5.5	<i>French geotechnical missions—classifications and specifications</i>	43
5.6	Interaction between structural and geotechnical engineers in Germany (<i>R. Katzenbach & J. Turek</i>)	46
5.6.1	<i>Regulations effecting the interaction</i>	46
5.6.2	<i>Education of civil engineers</i>	48
5.7	Usual procedures on civil engineering practice in Greece (<i>A. Avdelas</i>)	50
5.7.1	<i>Aim of the report</i>	50
5.7.2	<i>Usual procedures in the approval and execution process on civil engineering projects</i>	50
5.7.3	<i>Definition of tasks; legal matters</i>	52
5.7.4	<i>Basic codes</i>	53
5.7.5	<i>Educational issues</i>	53
5.8	The practice, regulation and education of geotechnical/structural engineering in Ireland (<i>B. Casey</i>)	54
5.8.1	<i>Regulation of engineering in Ireland</i>	54
5.8.2	<i>Procurement of engineering services in Ireland</i>	55
5.8.3	<i>Interaction between geotechnical engineers and structural engineers in Ireland</i>	56
5.8.4	<i>Education</i>	56
5.9	Regulations for civil engineering in Italy (<i>P. Simonini</i>)	56

5.9.1	<i>Introduction</i>	56
5.9.2	<i>Typical approval process</i>	57
5.9.3	<i>The role of the geotechnical engineer</i>	58
5.9.4	<i>Interaction between geotechnical engineers and geologists</i>	58
5.9.5	<i>The role of the Order of Engineers</i>	59
5.9.6	<i>Comments on geotechnical education for civil engineers</i>	59
5.10	Usual procedures on civil engineering practice in Norway (<i>T. Søreide</i>)	59
5.10.1	<i>Scope of report</i>	59
5.10.2	<i>Civil engineering contract and design process</i>	59
5.10.3	<i>Geotechnical and structural engineering services</i>	60
5.10.4	<i>Education in soil-structure interaction engineering</i>	62
5.10.5	<i>Final note</i>	62
5.11	Usual procedures on civil engineering practice in Portugal (<i>M. R. Fragoso</i>)	62
5.11.1	<i>Scope of report</i>	62
5.11.2	<i>Usual procedures in the approval and execution process on civil engineering projects</i>	63
5.11.3	<i>Geotechnical and structural engineering services</i>	64
5.11.4	<i>Education in soil-structure interaction engineering</i>	67
5.11.5	<i>Final note</i>	67
5.12	Slovene National Report (<i>B. Zlender</i>)	67
5.12.1	<i>Introduction</i>	67
5.12.2	<i>Preliminary note</i>	67
5.12.3	<i>Questions concerning project work</i>	70
5.12.4	<i>Questions concerning legal matters</i>	71
5.12.5	<i>Questions concerning education</i>	72
5.12.6	<i>Conclusion</i>	73
5.12.7	<i>Notes</i>	73
5.13	The practice, regulation and education of geotechnical/structural engineering in Sweden (<i>I. Svensk</i>)	73
5.13.1	<i>Regulation of geotechnical and structural engineering in Sweden</i>	74
5.13.2	<i>Interaction between geotechnical engineers and structural engineering in Sweden</i>	74
5.13.3	<i>Education</i>	75
6	Special aspects of interaction	76
6.1	Mutual benefits by modelling soil and structure within the same mechanical approach (<i>H. Hartl</i>)	76
6.1.1	<i>Abstract</i>	76

6.1.2	<i>Introduction</i>	76
6.1.3	<i>Problem investigated</i>	76
6.1.4	<i>Performance of a reinforced concrete pile embedded in soil</i>	77
6.1.5	<i>Spaced pile wall</i>	78
6.1.6	<i>Elliptical shaft foundation</i>	79
6.1.7	<i>Conclusion and outlook</i>	79
6.2	A numerical model to evaluate the seismic non-linear response of reinforced concrete structures taking into account soil-structure interaction (<i>M. R. Fragoso & M. J. Barros</i>)	80
6.2.1	<i>Abstract</i>	80
6.2.2	<i>Introduction</i>	80
6.2.3	<i>The numerical model developed</i>	81
6.2.4	<i>The foundation model</i>	81
6.2.5	<i>The structure model</i>	83
6.2.6	<i>Solution of the equations of motion</i>	84
6.2.7	<i>Parametric study</i>	85
6.2.8	<i>Conclusion</i>	86
6.3	Resolving the responsibilities for foundation engineering damage (<i>J. Hartikainen</i>)	88
6.3.1	<i>Reasons for increasing damage risks</i>	88
6.3.2	<i>Measures in cases of damage</i>	88
6.3.3	<i>Steps in resolving responsibilities</i>	89
6.3.4	<i>Avoiding the risk</i>	89
6.4	Influence of the interaction between soil and structure in the design of civil or geotechnical engineering works (<i>O. Pal</i>)	90
6.4.1	<i>Introduction</i>	90
6.4.2	<i>First case: distribution of stresses behind a sheet pile wall</i>	90
6.4.3	<i>Second case: behaviour of a tube in a non-homogeneous embankment</i>	91
6.4.4	<i>Conclusion</i>	93
6.5	Interaction between structural and geotechnical engineers (<i>T. Søreide</i>)	93
6.5.1	<i>Introduction</i>	93
6.5.2	<i>Verification requirements</i>	95
6.5.3	<i>Levels of verification</i>	96
6.5.4	<i>External verification</i>	98
6.5.5	<i>Internal verification</i>	100
6.5.6	<i>Budgeting, reporting and follow-up of non-conformances</i>	100
6.5.7	<i>Requirements concerning qualifications</i>	101

7 Final considerations and future developments
(*R. Katzenbach & J. Turek*)

104

8 References

105
