

INTERNATIONAL SOCIETY FOR SOIL MECHANICS AND GEOTECHNICAL ENGINEERING



This paper was downloaded from the Online Library of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). The library is available here:

<https://www.issmge.org/publications/online-library>

This is an open-access database that archives thousands of papers published under the Auspices of the ISSMGE and maintained by the Innovation and Development Committee of ISSMGE.

Administrative Report of TC 19 – Preservation of historic sites

Compte rendu de la commission technique N° 19, sur la préservation des sites historiques

Carlo Viggiani – Università di Napoli Federico II, Italy

1. ACTIVITY OF THE COMMITTEE

During the three years of activity the Committee met two times: the first meeting was organised in the occasion of the XI ECSMFE held in Copenhagen at the end of May 1995; the second meeting was held at the end of *Arrigo Croce Memorial symposium – Geotechnical Engineering for the preservation of Monuments and Historic Sites* – organised in Naples at the beginning of October 1996.

The activity of the Committee has been mainly finalised to the organisation of the above mentioned Symposium.

2. FIRST MEETING – COPENHAGEN, MAY 1995

Prof. Carlo Viggiani opened the meeting recalling the history of the TC19.

It was set up in 1981, as an European Technical Committee, by Arrigo Croce, Vice-President for Europe of the ISSMFE. At the beginning it was sponsored by the French Geotechnical Society and chaired by Prof. Jean Kérisel. In 1985 it became an International Technical Committee and since then it was sponsored by the Italian Geotechnical Society (AGI). It was chaired first by Prof. Arrigo Croce, and then by Prof. Ruggiero Jappelli.

The theme of the Geotechnical Aspects of the Preservation of Historic Sites and Old Monuments requires a strong interaction with other scientific and historic disciplines. A great deal of work was already done by the previous Committee in order to give some basic principles to the Geotechnical Engineering when approaching the restoration and conservation of a Monument. The concept of Ground Monument System (GMS), which takes into account the physical and mechanical properties of the ground and the superstructure as well as the historical background with particular attention paid to the old construction methods, was developed in order to define the object of interest of Geotechnical Engineers.

TC19 organised a successful meeting in Naples (Italy) in 1984 and produced a number of documents highlighting the role of Geotechnical Engineering in restoration and conservation of monuments and cities and the preservation of historic sites.

In order to select available experience, to present the achievements and the problems encountered in different parts of the world, and to assess the basic principles underlying any action in this field, Prof. Viggiani suggested to organise an International Symposium on “Geotechnical Engineering for the Preservation of Monuments and Historic Sites” to be held in Naples (Italy) in the Autumn of 1996 and dedicated to the late Prof. Arrigo Croce. The general theme was to be subdivided into 4 sessions:

1. Investigations (including historical investigations)
2. Monitoring
3. Intervention techniques
4. Case histories

The Symposium was to be organised collecting papers, refereed by a scientific committee, and national reports written by the members of TC19. A general report (or a State of the Art report) was expected to open each of the first three sessions, followed by the presentation of selected papers. The fourth session was to be dedicated to the presentation of selected Case Histories.

The attendees agreed on the theme, place and date of the proposed Symposium. Some members suggested to establish contacts with Structural engineers and Specialists of Technological Engineering.

For the organisation of the Symposium all the attendees agreed that:

- a registration fee is necessary in order to cover the Symposium expenses;
- the title of the Symposium should be “Geotechnical Engineering for the Preservation of Monuments and Historic Sites”
- the Symposium should be dedicated to the late Prof. Arrigo Croce;
- the Proceedings of the Symposium should be preferably published by Balkema.

3. ARRIGO CROCE MEMORIAL SYMPOSIUM

The Symposium was organised over the period of two days, including the presentation of special lectures, the session reports, selected speakers and floor discussion. The papers submitted to the Symposium (around 100) were circulated as a pre-print volume. The Symposium, jointly sponsored by the ISSMFE, the Università di Napoli Federico II and the Italian Geotechnical Society, was held at the School of Engineering of the Università di Napoli Federico II.

Some 150 delegates, coming from all over the world, attended the session; around 100 papers have been included in the pre-print volume, and some more, plus the General reports and Special Lectures have been included in the final volume recently published by Balkema.

In his opening address Prof. Carlo Viggiani said that the approach of engineers to monuments and historic sites must account for the peculiar character of these objects; to this aim a culture of restoration has to be developed and diffused among engineers. In the prosecution of the opening ceremony, Prof. Ruggiero Jappelli, former chairman of the Committee, recalled in an inspired lecture the late Prof. Arrigo Croce and his contribution to the topic of the Symposium. The widow and the two sons of Prof. Croce were attending the Symposium.

The variety of themes involved in the preservation of monuments and historic sites were well exemplified by the presentation in the Session 1 (*Case Histories*) chaired by Rodriguez Ortiz. They included the stability of the Tower of Pisa (*Jamiolkowski*); the construction techniques of ancient Pyramids of Egypt (*Parry*); the weathering of calcarenites in the

Valley of Temples in Agrigento (*Cotecchia*); the swelling of stiff clays due to erosion and the related stability problems of villages and cities on the top cliffs in the central and southern Italy, as Orvieto, Civita di Bagnoregio and Bisaccia (*Picarelli*).

Session 2 on *Investigations* was chaired by Prof. J. Feda. The General Reporter, U. Smolczyk, emphasised the importance of investigations in the preservation of monuments and historic sites. Presentations in this session included some recent experience in three different sites related to the classical period of Greece (*Stamatopoulos*); the study of interaction between the Domus Tiberii on the Palatine Hill and its foundation soil to establish the guidelines for the restoration works (*Scarpelli*); the use of original techniques for the topographic and the structural survey of the cliff resting on Via Krupp in Capri (*Aversa*); the impact of swell properties of Esna-shale on the ancient monuments of the Deir El-Bari (*El-Banna*); the renovation of the great Ommayad Mosque in Damascus (*Mawlawi*).

The subject of Session 3 was Monitoring, Chairman E. Ovando Shelley, General reporter J.B. Burland. The latter pointed out the importance of well planned long term monitoring in deciding upon the most appropriate stabilisation of remedial measures. Papers presented in this session included testing and monitoring for the restoration of the Metropolitan Cathedral of Mexico City (*Rossi*); survey damage and restoration of monuments in Olinda (*Gusmao Filho*) and crack monitoring in the Westminster Palace (*G. Viggiani*).

The Final Session, on intervention techniques, was chaired by G. Augusti. In their General Report G. Calabresi and S. D'Agostino emphasised the great variety of problems encountered in saving old monuments and historic sites and some controversial issues about the kind and scope of the intervention works. The papers presented in this session included the geotechnical aspects of underexcavating Mexico City's Cathedral (*Ovando Shelley*), the preservation of historical town of Orvieto (*Pane, Tommasi*), the recommendations in the realm of foundation engineering in Italy (*Marconi*), and a comparative analysis of some Italian monuments (*P. Croce*).

In his closing address Viggiani insisted on the urgent need of developing and diffusing among engineers a culture respectful of the material integrity of the monuments. The symposium had been intended as a step towards this goal.

On the morning of 4 October the Dean of the Università di Napoli Federico II bestowed on Prof. Jean Kérisel a *honoris causa* degree in Geotechnical Engineering. The candidate, introduced by Prof. Viggiani, delivered a masterly lecture on the geotechnical aspects of the monuments of the Egypt of Pharaohs, that was greatly appreciated by the audience.

4. SECOND MEETING – NAPLES, SCHOOL OF ENGINEERING

The meeting was attended by: J.B. Burland, J. Gusmão-Filho, R. Jappelli, F.S. Mawlawi, C.A. Micucci, K. Nishida, C. Oteo, E. Ovando-Shelley, J.M. Rodriguez Ortiz, A.C. Stamatopoulos, C. Viggiani, S. Aversa.

Viggiani commented on the "Arrigo Croce Memorial Symposium – Geotechnical Engineering for the Preservation of Monuments and Historic Sites" held in Naples before the TC19 meeting. All the attendees expressed their appraisal for the organisation and for the scientific value of the Symposium.

Viggiani introduced the themes to be discussed in the meeting:

- renovation of the terms of TC19;
- sponsor Society;
- program for the possible new terms;
- activity of TC19 in view of Hamburg Conference.

The attendees discussed these topics in considerable detail. The main conclusions are summarised in the following.

Renovation of the terms of TC19; Sponsor Society

The attendees agreed unanimously to ask for a renewal of the terms of the Committee in order to accomplish the work carried out since the Committee was appointed by Arrigo Croce as an European Technical Committee.

The Italian Member Society (AGI) was invited to continue to act as a sponsor for the next new terms; Viggiani reported that there is a positive aptitude of AGI.

Program of activity

In the next terms the activity should be mainly addressed to the definition of general guidelines for geotechnical investigation, analysis and intervention on monuments and in historic sites. At the same time it is necessary to continue the collection of case histories in order to increase the knowledge.

One or two very significant cases could be directly investigated by groups of members of TC19 in order to operate directly on site. For this purpose it is necessary to investigate the possibility of getting a financial support from International Institutions (such as UNESCO, CEE, etc.). Jappelli and Ovando-Shelley were asked to suggest some significant case-histories.

A link should be created with structural engineers and other specialists (historian of arts, architects, archaeologists, etc.) involved in the Preservation of Monuments and Historic Sites.

The proposal of the Russian Geotechnical Society to organise a Symposium on Preservation of Historic Sites during 1999 in San Petersburg can be supported by TC19.

The following Terms of Reference are proposed for the next mandate:

1. Continuing the collection of case-histories, possibly with the organisation of a new symposium
2. Co-operating in the definition of correct procedures of investigation, analysis and intervention in a few cases suggested by International Organisations
3. Preparing very general guidelines for Geotechnical Engineering of Monuments and Historic Sites.

Hamburg Conference

The attendees asked the chairman to prepare a brief report on TC19. A detailed report of activity will not be required because, at that time, the volume of Proceedings of the Arrigo Croce Memorial Symposium will be available.