Structural Studies,
Repairs, and Maintenance of
Heritage Architecture
VIII

Edited by

C.A. Brebbia
Wessex Institute of Technology, UK
CONTENTS

Section 1: Historical and Architectural Aspects

The concept of proportion in heritage architecture: a study of form, order and harmony
R.F. Borges

Conflict of Ancient Greek and Christian architecture during the first millennium
B.P. Leftheris

The Old City of Ghadames: an epitome of desert environment engineering
A. Abufayed

Covered bridges speak to a careful observer: insight into the geometry and manufacture of Smith trusses
M. Reckard

Technology and repairs in Castelli e ponti di mastro Nicola Zabaglia (Rome, 1743)
M.G. D'Amelio & N. Marconi

Mortars for intervention in monuments and historical buildings
I. Papayianni & M. Stefanidou

The shell structures of the Baroque
F. Escrig, V. Compán, J. Sánchez & J.P. Valcárcel

Ancient civic palace of Saluzzo: strengthening works
G. Pistone, F. Antonino & D. Zorgniotti
Section 2: Long Term Behaviour of Masonry Structures: Learning from Failures
(Special Session organised by L. Binda)

Experimental study on the damaged pillars of the Noto Cathedral
L. Binda, A. Saisi, R. De Benedictis & S. Tringali

Failures due to long-term behaviour of heavy structures:
the Pavia Civic Tower and the Noto Cathedral
L. Binda, A. Anzani & A. Saisi

Monitoring of long-term damage in Gothic Cathedrals
P. Roca, J.L. González, F. Aguerri & J.I. Aguerri

Experimental research on the creep behaviour of historic masonry
A. Anzani & G. Mirabella Roberti

Creep modelling of masonry historic towers
E. Papa & A. Taliercio

Repair techniques for creep and long-term damage
of massive structures
C. Modena & M.R. Valluzzi

Testing and modelling of masonry creep and damage
in uniaxial compression
J. Pina-Henriques & P.B. Lourenço

Section 3: Deterioration, Protection and Evaluation of Materials

Study on the deterioration and conservation
of the monument dedicated to the Fallen
in the “Risorgimento” battles, Ravenna (Italy)
M. Macchiaraola, S. Belacchi, D. Pinna, G. Ercolani, A. Ruffini & C. Fiori

In lab and in situ assessment of masonry stones’ mechanical properties
through the micro-drilling technique
G.E. Exadaktylos, Ch.Th. Papadopoulos, M.Ch. Stavropoulou
& A. Athanasiadou

Investigation of the protective effect of inorganic coating
with corrosion inhibitors against deterioration of structural damages
G. Batis, P. Pantazopoulou & A. Routoulas

Osmotic fabrics for historical building external surfaces protection
E. Attaianese, G. Caterina & G. Duca
Epoxy resins used for the repair of timber structures: The problem of short- and long-term performance evaluation
H. Cruz & J. S. Machado

C. Bertolini Cestari & T. Marzi

Impact of fuel reformulation on pollution-induced stone degradation
P. Buttini & G. Perego

Section 4: Simulation and Modelling

The moisture and temperature fields in the sandstone cupola of the “Church of Our Lady” in Dresden, Germany
P. Häupl & H. Fechner

Structural behaviour of Gothic vaults
J.P. Valcárcel, J. Domínguez, E. Martín, F. Escrig

A contribution to the analysis of historical structures using LHS method
J. Žák, A. Florian, P. Hradil

Finite element modeling of Guastavino tiled arches
E.P. Saliklis, S.J. Kurtz, S.V. Furnbach

Response of multiple-leaf masonry arch-tympani to dynamic and static loads
A. Drei, A. Fontana

Application of Bott-Duffin inverse to static and dynamic analysis of masonry structures
T. Aoki, T. Sato

A first approach to the load path method on masonry structure behaviour
G. De Tommasi, P. Monaco, C. Vitone

Limit analysis of masonry walls with rectangular openings by equivalent shear panel model
T. Takada, T. Aoki, C. Genovese

Unilateral contact analysis and failure prediction in stone bridges
M.E. Stavroulaki, G.E. Stavroulakis
Structural assessment of a wooden bell-tower
*N. André, P. Galimard & P. Morlier*

Natural fire simulation in 19th century fireproof buildings
*I. Wouters & M. Mollaert*

Modelling micro-structure aspects of masonry walls
by a simplified approach
*Ś. Casolo & F. Peña*

Section 5: Structural Issues

Structural defects and solutions: A case study
of Fort Cornwallis, Penang, Malaysia
*M.R. Ismail, A.G. Ahmad & H. Awang*

Structural analysis of the main apse vault of St. George
of Greeks Cathedral built c.1390 at Famagusta, Cyprus
*A. Atun*

Compressive strength of compressed earth block masonry
*G. Bei & I. Papayianni*

Visualisation and evaluation of structural characteristics
and problems of a Classical Ottoman bath
*Ö. Çizer & M.H. Turan*

Assessment of structural damages and development
of rehabilitation procedures for the Old City of Ghadames, Libya
*A. Abufayed & S.A. ElAzhari*

Preliminary investigation on the preservation
of Machu Picchu ruins: Discussions from topographical
and geological aspects
*M. Fujisawa & T. Kakimi*

The influence of deterioration on the lifetime of timber structures
*J.-W.G. van de Kuilen*

Section 6: The Structural Conservation
of the Archaeological Heritage of Italy
(Special Session organised by S. D'Agostino)

The concept of reversibility in the structural restoration
of archaeological sites
*S. D'Agostino & M. Bellomo*
Extraordinary maintenance work carried out on the arch of Titus in Rome
*M.L. Conforto & S.D'Agostino*

Safety assessment of the foundations of the Basilica of Maxentius in Rome
*G. Calabresi & M. Fattorini*

The mausoleum of Cecilia Metella on the Appia Antica: a structural contribution to its restoration and adaptation for use
*S. D'Agostino & M. Bellomo*

Section 7: Prevention of Structural Damage

An optimisation algorithm for the collapse detection of stone masonry structures
*P. Trovalusci & C. Baggio*

Risk to old bridges due to ship impact on German inland waterways
*M. Curbach & D. Proske*

Using reinforced concrete yoke to strengthen arch bridges: fracture mechanism analysis and computation mode
*J.T. Zhou*

Section 8: Seismic Behaviour

Performance-based seismic design criteria for historic buildings
*S.E. Thomasen*

Numerical simulation of the behavior of Byzantine churches under gravitational and seismic actions
*G.C. Manos, L. Papas, V.J. Soulis & A. Diagouma*

Seismic rehabilitation of cathedral towers in Peru
*D. Torrealva, A. Blanco, G. Tumialan & A. Nanni*

Earthquake structural problems and urgent measures undertaken to support the Katholikon of Dafni Monastery in Athens, Greece
*A. Miltiadou-Fezans, T.P. Tassios, N. Delinikolas, E. Chorafa, E. Zarogianni & I. Chandrinos*

Response of the building “Mercado Torroja” of Algeciras, under seismic load
*A. Corz, J. Franco & J. Domínguez*
Integrated system for building survey and evaluation of seismic retrofit possibilities
M. Bostenaru Dan

Modified estimation method of fundamental periods of historic buildings with masonry shear walls in Taiwan
W.-S. Chang, M.-F. Hsu & C.-J. Chen

Assessment of the seismic vulnerability of unreinforced masonry buildings
Gr.G. Penelis, A.J. Kappos & K.C. Stylianidis

Cracks modelling in presence of notch and seizure effects in historical buildings damaged by an earthquake in Piedmont
R. Roccati & M. Roselli

Section 9: Case Studies

Computer modelling of the Basilica of Pilar in Zaragoza (Spain)
S. Hernández & L.E. Romera

A small valley in Greece and its bridges throughout the centuries
M. Karaveziroglou, E. Karayianni, E. Stavrakakis & A. Vaggelakos

Structural analysis for the reconstruction design of the old bridge of Mostar
M. Orlando, P. Spinelli & A. Vignoli

Rehabilitation of a Cruzeiro in Portugal
A.L. Velosa & P. Cachim

Weld repair of the U.S. Capitol dome

Contribution to the study of restoration of the Museum of fine arts of Algiers, Algeria
M.A. Allal

Rehabilitation of traditional mills
J.C. Viegas & J.A. Miranda

Static analysis of the Turris Lybisonis Roman multispans stone arch bridge
I. Mura, Z. Odoni & M. Perra
Construction of a fountain in the form of a concave-convex concrete shell
V. Kilar

Section 10: Maintenance and Repairs

The role of geotechnical engineering in the preservation of our architectural heritage
V. Caputo

The maintenance of historic iron and steel structures: repair techniques
G.G. Nieuwmeijer & G.J. Arends

Setting of the restoration project for durability
A. Guida, F. Fatiguso & I. Mecca

The influence of the boundary conditions in rising damp in historical constructions
V.P. Freitas & M.I.M. Torres

World heritage in odd shoes: Reconstruction of the central building of the Budapest University of Technology and Economics
M. Armuth & Gy. Visnovitz

Pultruded composite shear spike for repair of timber members
D. Radford, R. Gutkowski, D. Van Goethem & M. Peterson

Roots and buildings
C. Mattheck, I. Tesari & K. Bethge

Building maintenance: a re-discovered culture
C. Bertolini Cestari

The reactivation of a historic shaft-building
S. Niederhagemann

Section 11: Material Problems

The effect of aggregate composition on physical and mechanical characteristics of repair mortars
P. Manita & T.C. Triantafillou
Flexural bearing capacity and related ductility demand for masonry sections under nonlinear constitutive law
C. Cucchiara, L. La Mendola & M. Papia

Section 12: Timber Construction

Behaviour and rehabilitation of queen post timber trusses: A case study
M. del Senno & M. Piazza

In-situ evaluation of timber roof structures of historic buildings

Inspection of timber construction by measuring drilling resistance using Resistograph F300-S
R. Kappel & C. Mattheck

Semi-destructive methods for evaluation of timber structures
B. Kasal, M. Drdacky & I. Jirovsky

Index of Authors