GENERAL PROGRAMME

REHABEND 2018

CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

(7th REHABEND Congress)

Cáceres (Spain), May 15th-18th, 2018

PERMANENT SECRETARIAT:

UNIVERSITY OF CANTABRIA
Civil Engineering School
Department of Structural and Mechanical Engineering
Building Technology R&D Group (GTED-UC)
Avenida Los Castros s/n 39005 SANTANDER (SPAIN)
Tel: +34 942 201 738 (43) Fax: +34 942 201 747
E-mail: rehabend@unican.es
www.rehabend.unican.es

7TH EURO-AMERICAN CONGRESS ON CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

REHABEND 2018

ORGANIZED BY:

UNIVERSITY OF CANTABRIA (SPAIN)
www.unican.es // www.gted.unican.es

UNIVERSITY OF EXTREMADURA (SPAIN)
www.unex.es

CO-ORGANIZERS ENTITIES:

TECNALIA (SPAIN)

POLITÉCNICO DI BARI (ITALY)

UNIV. ESTADUAL PAULISTA "JÚLIO DE MESQUIDA FILHO" (BRAZIL)

UNIVERSITY OF MIAMI (USA)

UNIVERSIDADE DE AVEIRO (PORTUGAL)

UNIVERSIDAD POLITÉCNICA DE CATALUÑA (SPAIN)

UNIV. MICHOACANA SAN NICOLÁS HIDALGO (MEXICO)

UNIVERSIDAD AUSTRAL (CHILE)

UNIV. DE LA REPÚBLICA (URUGUAY)

UNIVERSIDAD DEL PAÍS VASCO (SPAIN)

UNIVERSIDAD DE BURGOS (SPAIN)

UNIV. ARGENTINA JOHN F. KENNEDY (ARGENTINA)

UNIVERSIDAD POLITÉCNICA DE MADRID (SPAIN)

UNIVERSIDAD DE SEVILLA (SPAIN)

UNIV. EUROPEA MIGUEL DE CERVANTES (SPAIN)

INSTITUTO SUPERIOR TÉCNICO (PORTUGAL)

UNIVERSIDADE FEDERAL DE MINAS GERAIS (BRAZIL)

UNIV. NACIONAL PEDRO RUIZ GALLO (PERU)

The **Euro-American Congress REHABEND 2018** on **Construction Pathology, Rehabilitation Technology and Heritage Management** is going to be carried out in **Cáceres (Spain)**, in **May 2018**. The event is organized by twenty organizations of **ten European and American countries**, and it is co-chaired by the **University of Cantabria**, through its Building Technology R&D Group (GTED-UC), and the **University of Extremadura**.

REHABEND 2018 **continues the series of the six previous REHABEND international events**, which had been developed **since 2006 in different Spanish cities**. The previous one, in **2016**, was carried out in **Burgos**. In 2016 edition, **around than 310 papers** by Professionals and Researchers of more than **30 countries** were presented and it became a conference of great interest according to the people who attended the congress.

Construction Pathology, Rehabilitation Technology and Heritage Management currently have great importance for construction sector. This prompted the organizers to propose the **technical event on these topics in Cáceres**, which old city has been declared a UNESCO World Heritage Site and is also on the 'Via de la Plata' path, the Silver Route, of the 'Camino de Santiago'. This event aims to collect the **advances obtained in the last two years** in the **theoretical knowledge** and **practical realizations** carried out on the referred topics. The Congress will meet more than **300 technical contributions** coming from professionals, academics and specialists.

Based on previous experiences the Congress **is proposed once again in the Euro-American cultural space**. The **official languages** are **English**, **Italian**, **Portuguese** and **Spanish**. Organizers understand that technical articles and oral presentations, with the support of graphic material and schemes, may be understood by the people who take part in the congress, as it was evident in REHABEND 2014 and 2016.

Under these premises and the successful previous editions, the Congress is sponsored by the **Government of Spain**, the **Government of Extremadura**, the **Provincial Government of Cáceres**, the **Municipality of Cáceres**, **Sika**, **HeidelbergCement**, **Portneo**, the **University of Cantabria** and the **University of Extremadura**. In addition, several Universities, Technical and Professional Associations, Institutes, Foundations and Companies commit their **collaboration** in order to the success of this initiative.

REHABEND 2018 organizers would like to thank the multiple received supports: to the **Sponsor and Collaborating Entities**; to the **Scientific Committee Members** for their hard work in the revision of the different technical contributions, ensuring the required level of quality of an international event; to the **Keynote Speakers**; to the different **Speakers** for their relevant contributions and, in general, to the **people who will attend the congress** for the confidence shown in the event. Sincerely, many thanks to all.

Prof. Luis Villegas
Chairman of the REHABEND 2018 Congress
Full Professor
University of Cantabria

Prof. César Medina
Chairman of the REHABEND 2018 Congress
Associate Professor
University of Extremadura

The University of Cantabria, through its Building Technology R&D Group (GTED-UC), was the promoter of the REHABEND Congresses on Construction Pathology, Rehabilitation Technology and Heritage Management.

The 1st REHABEND Congress was set in motion in Santander in November 2006. It became established in the 2nd (Santander, 2007), 3rd (Valencia, 2008), 4th (Bilbao, 2009), 5th (Santander, 2014) and 6th Congress (Burgos, 2016), all of them carried out in Spanish cities. The ability to convene of the six performed editions was prominent, gathering an appreciable number of experts in the topics of the Congress. As a reference, in the 6th edition (REHABEND 2016) took part around 310 speakers from more than 30 countries from all over the world.

The 3rd edition of the Congress (REHABEND 2008) was organized together with the Construction Technologic Institute of the Valencian Autonomous Community (AIDICO), and the 4rd and 5th editions (REHABEND 2009 and 2014), in addition to AIDICO, the Congresses were co-organized with TECNALIA Research&Innovation. Since the 6th edition (REHABEND 2016) the congress has been co-organized by several entities from different Euro-American countries.

The covers and ISBN of the books corresponding to the previous congresses are attached below. The ISSN of the series of REHABEND books is 2386-8198.

REHABEND 2006 (Book of Papers)
ISBN: 978-84-690-5269-3 (several languages)

REHABEND 2007 (Book of Papers)
ISBN: 978-84-691-3612-6 (several languages)

REHABEND 2008 (Book of Papers)
ISBN: 978-84-692-5650-3 (several languages)

REHABEND 2009 (Book of Papers)
ISBN: 978-84-8873-404-4 (several languages)

REHABEND 2014 (Book of Abstracts)
ISBN: 978-84-606-6738-4 (in English)
ISBN: 978-84-616-8862-3 (several languages)
REHABEND 2014 (Digital Book of Papers)
ISBN: 978-84-616-8863-0 (several languages)

REHABEND 2016 (Book of Abstracts)
ISBN: 978-84-608-7940-4 (in English)
REHABEND 2016 (Digital Book of Papers)
ISBN: 978-84-608-7941-1 (several languages)

SPONSOR ENTITIES

Goverment of Spain

Government of Extremadura

Provincial Government of Cáceres

Municipality of Cáceres

"El Brocense" Cultural Body

Sika

HeidelbergCement

Portneo

University of Cantabria

University of Extremadura

COLLABORATING ENTITIES

The Collaborating Entities have been presented grouped in countries, following an alphabetical order. As Collaborating Entities have been considered to all that have contributed with more than two accepted articles in the Congress, or that some of its members formed part of the International Scientific Committee of the Congress. Finally, in each country, the Collaborating Entities have been ordered according to the number of accepted articles.

UNIVERSITIES

Argentina-Universidad Tecnológica Nacional

Brazil-Universidade Federal do Rio de Janeiro

Brazil-Universidade de Brasília

Brazil-Universidade de São Paulo

Brazil-Universidade de Santa Cruz do Sul

Brazil-Univ. Estadual Paulista

Brazil-Universidade do Extremo Sul Catarinense

Brazil-Universidade Federal de Minas Gerais

Brazil-Universidade Federal de Goiás

Brazil-Universidade Federal de São Carlos

Canada-Ryerson University

Chile-Universidad Austral de Chile

Colombia-Universidad Nacional de Colombia

Cuba-Universidad Central "Marta Abreu" de las Villas

Dominican Rep-Pontificia Universidad Catolica Madre y Maestra

Dominican Rep-Universidad Nacional Pedro Henríquez Ureña

Greece-University of Patras

Italy-Università degli studi della Basilicata

Italy-Politecnico di Milano

Italy-Università degli Studi di Cagliari

Italy-Università degli Studi di Catania

Italy-Università di Bologna

Italy-University of Rome Tor Vergata

Italy-Università degli Studi di Salerno

Italy-Politécnico di Bari

Italy-Università degli Studi del Molise

Lybia-University of Benghazi

Mexico-Univ. Michoacana de San Nicolás de Hidalgo

Mexico-Universidad Nacional Autónoma de México

Peru-Univiversidad Nacional Pedro Ruiz Gallo

Peru-Universidad Nacional de San Martín

Peru-Universidad Privada Antenor Orrego

Poland-Cracow University of Technology

Poland-Lodz University of Technology

Portugal-Universidade de Coimbra

Portugal-Universidade de Aveiro

Portugal-Universidade do Porto

Portugal-Instituto Superior Técnico

Portugal-Instituto Politécnico de Bragança

Potugal-Instituto Politecnico de Leiria

Portugal-Univ. of Trás-os-Montes e Alto Douro

Portugal-Univ. da Beira Interior

Portugal-Universidade Nova de Lisboa

Portugal-Escola Superior de Tecnologia e Gestão de Viseu

Portugal-Universidade do Minho

Spain-Universidad de Cantabria

Spain-Universidad del País Vasco

Spain-Universidad de Extremadura

Spain-Universidad de Sevilla

Spain-Universidad de Granada

Spain-Universidad Politécnica de Cataluña

Spain-Universidad Politécnica de Madrid

Spain-Universidad de La Coruña

Spain-Universidad de Burgos

Spain-Universidad de Navarra

Spain-Universiversidad de Cádiz

Spain-Universidad de Alicante

Spain-Univ. Europea Miguel de Cervantes

Spain-Universidad Politécnica de Valencia

Spain-Universidad de Oviedo

Spain-Universidad de Málaga

Spain-Universidad de Valladolid

Spain-Universidad Alfonso X El Sabio

Spain-Universidad de Salamanca

Spain-Universitat Internacional de Catalunya

Turkey-Istanbul Technical University

United States of America-University of Miami

Uruguay-Universidad de la República

ASSOCIATIONS, FOUNDATIONS & PUBLIC ENTITIES

Argentina-CeReDeTeC Centro Regional de Desarrollos Tecnológicos para la Construcción, Sismología e Ingeniería Sísmica

México-Instituto de Ingeniería de la UNAM

Portugal-Laboratório Nacional de Engenharia Civil

Portugal-ITECONS - UCoimbra

Portugal-Instituto da Construção - UPorto

Portugal-ISISE – Institute for Sustainability and Innovation in Structural Engineering

Portugal-Centre of Materials and Building Technologies C-MADE

Portugal-Centro de Estudos de Arquitectura e Urbanismo (CEAU-FAUP)

Portugal-Parques de Sintra - Monte da Lua

Spain-Instituto de Ciencias de la Construcción Eduardo Torroja

Spain-Tecnalia Research & Innovation

Spain-Instituto Geológico y Minero de España

SPONSOR & COLLABORATING ENTITIES

Spain-Junta de Extremadura

Spain-Instituto Valenciano de Conservación y Restauración de Bienes Culturales (IVC+r)

Spain-Diputación de Castellón - Servicio de Restauración

Spain-Colegio Oficial de Aparejadores y Arquitectos Técnicos de Cáceres

Spain- International centre for numerical methods in engineering

Spain-Fundación Leonardo Torres Quevedo

Spain-Fundación Docomomo

Red Iberoamericana PROTERRA

COMPANIES

JOURNALS

MDPI – *Infrastructures* (ISSN 2412-3811)

ORGANIZING COMMITTEE

CONFERENCE CHAIRMEN:

- Prof. Dr. Luis Villegas. University of Cantabria.
- Prof. Dr. César Medina. University of Extremadura.

CONGRESS COORDINATORS:

- Prof. Dr. Ignacio Lombillo. University of Cantabria.
- MSc. Haydee Blanco. University of Cantabria.
- MSc. Yosbel Boffill. University of Cantabria.
- Prof. Dr. Agustín Matías. Univ. of Extremadura.
- Prof. Dra. Mª Beatriz Montalbán. Univ. of Extremadura.

CONGRESS ASSISTANS:

- MSc. Cesar A. Carrasco. University of Cantabria.
- Arq. Daniela A. Rojas. University of Cantabria.
- Eng. Mª Belén de la Torre. University of Cantabria.
- Arq. Clarisa P. García. University of Cantabria.
- Eng. Blas Cantero. University of Extremadura.
- Eng. Paula Velardo. University of Extremadura.
- Eng. Pablo Plaza. University of Extremadura.

1.- PREVIOUS STUDIES	1.1.- Studies of conservation (historical, archaeological, etc.). 1.2.- Heritage and territory. 1.3.- Urban regeneration. 1.4.- Economical and financial policies. 1.5.- Processes of social participation and socio-cultural aspects in rehabilitation projects. 1.6.- Pathology in construction. 1.7.- Diagnostic techniques and structural assessment (no destructive testing, monitoring and numerical modeling). 1.8.- Guides and regulations.
2.- PROJECT	2.1.- Criteria theoretical of the intervention project. 2.2.- Traditional materials and construction methods. 2.3.- Applicable novelty products and new technologies. 2.4.- Sustainable design and energy efficiency.
3.- BUILDING INTERVENTION	3.1.- Intervention plans. 3.2.- Rehabilitation and durability. 3.3.- Reinforcement technologies. 3.4.- Restoration of artworks. 3.5.- Conservation of industrial heritage. 3.6.- Examples of intervention.
4.- MAINTENANCE	4.1.- Construction maintenance. 4.2.- Preventive conservation of built heritage.
5.- DIFFUSION AND PROMOTION	5.1.- Heritage and cultural tourism. 5.2.- Formation. 5.3.- New technologies applied to the heritage diffusion. 5.4.- Accessibility to cultural heritage. 5.5.- Working networks in the cultural heritage. 5.6.- Management of of built heritage.

KEYNOTE SPEAKERS

Congress REHABEND 2018 on

CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

Cáceres, Spain, May 15th-18th, 2018

	HOUR	COUNTRY	INSTITUTION	SPEAKER	TITLE
15/05/2018	10h30 - 11h05	BRAZIL	UNIVERSIDADE DE SÃO PAULO	PROF. DR. HOLMER SALVASTANO	DURABILITY ASPECTS OF MORE SUSTAINABLE CEMENT BASED COMPOSITES REINFORCED WITH NATURAL FIBERS
	11h10 - 11h45	SPAIN	INTERNATIONAL CENTRE FOR NUMERICAL METHODS IN ENGINEERING	PROF. DRA. CARMEN ANDRADE	MODELS OF PROPAGATION OF REINFORCED CONCRETE DETERIORATION
16/05/2018	10h30 - 11h05	SPAIN	UNIVERSIDAD POLITÉCNICA DE MADRID	PROF. DR. JUAN MONJO	STRUCTURAL CONSOLIDATION AS A FIRST STEP IN THE RECOVERY OF ARCHITECTURAL HERITAGE
	11h10 - 11h45	PORTUGAL	INSTITUTO SUPERIOR TÉCNICO DE LISBOA	PROF. DR. JORGE DE BRITO	EXPERT KNOWLEDGE-BASED BUILDING MANAGEMENT SYSTEMS
17/05/2018	10h30 - 11h05	URUGUAY	UNIVERSIDAD DE LA REPÚBLICA	PROF. DR. ATILIO MORQUIO	LA MAMPOSTERÍA CERÁMICA EN URUGUAY, LAS CONSTRUCCIONES PATRIMONIALES DE LOS SIGLOS XVIII Y XIX. LA CERÁMICA ARMADA Y LA OBRA DEL INGENIERO ELADIO DIESTE EN EL SIGLO XX. CARACTERÍSTICAS DE LAS MISMAS, SU ESTADO Y SU MANTENIMIENTO
	11h10 - 11h45	ITALY	POLITECNICO DI BARI	PROF. DR. FABIO FATIGUSO	INNOVATIVE TECHNIQUES AND OPERATION PROTOCOLS FOR ASSESSMENT AND CONTROL OF THE BUILT HERITAGE

PLENARY SESSION nº 1: May 15th, 2018, 10h30-11h05 (Room 1)

PROF. DR. HOLMER SALVASTANO

Holmer Savastano Junior got his doctor degree in the field of civil construction (USP, Brazil, 1992).

He has a post doctorate in the CSIRO, Australia (1998-99) and a research visit to UPV, Spain (2009) for studying composite materials.

Holmer has built extensive collaboration with international research groups and with the industry in the field of reinforced cement matrices since 2001.

He coordinates the Research Nucleus on Materials for Biosystems, USP since 2012.

He has published ~140 full scientific papers with more than 1,300 citations (Web of Science), in addition to four inovation patents.

His main interest is on the use of residual and non-conventional resources, sustainable and eco-friendly housing and infrastructure.

One of his main achievements was the contribution for the development of asbestos free fibercement solutions adapted to Brazilian market.

ABSTRACT: **DURABILITY ASPECTS OF MORE SUSTAINABLE CEMENT BASED COMPOSITES REINFORCED WITH NATURAL FIBERS**

This presentation highlights vegetable fibers and their potential for the reinforcement of cementitious materials. Different approaches for the proper preparation of raw materials, improving the processing methods, assessing physical-mechanical performance and durability of non-conventional fiber-cement composites are discussed in a progressive way in order to demonstrate the capability of the vegetable fibers for engineering applications. Starting with the introduction of the vegetable fiber as a material for civil engineering, this talk is divided in three main topics: (i) preparation and characterization of the fibers from nano- to macro- scales; (ii) their application as optimized reinforcement of cement-based composites; and (iii) an overview of the composite behavior after exposure to severe accelerated ageing conditions.

Alkaline environment is been proved as the main factor for lignocellulosic fibers degradation, and the decrease of the binder alkalinity becomes an approach to this problem. The reduction of portlandite has been satisfactorily achieved by its interaction with pozzolanic materials (such as residual ashes obtained from agricultural wastes) to form additional calcium-silicate hydrates. Another mechanism to reduce binder alkalinity is the replacement of Portland cement by other clinker-free binders (such as magnesium-based cement). As a complementary route, fast curing in modified atmosphere are also effective and viable to stabilize prefabricated components (such as panels, bricks and roofing sheets) reinforced with natural fibers. Additionally, degradation tests are explored for the evaluation of the durability of the resulting materials and components in real applications exposed to tropical environmental conditions. As the main result, this talk aims to show how to achieve properly more sustainable high performance components based on cementitious materials for civil construction and infrastructure.

PLENARY SESSION nº 2: May 15th, 2018, 11h10-11h45 (Room 1)

PROF. DRA. CARMEN ANDRADE

Prof. Carmen Andrade worked as a scientist studying the durability of buildings, with particular attention at the corrosion of steel in reinforced concrete at the Institute of Construction Sciences "Eduardo Torroja" of the (CSIC) of Spain.

She is the author of numerous papers and has been editor of several books.

She has supervised more than 30 PhD theses.

She has participated in and led various Standardization Committees and has been Chairperson of several international organizations related to her specialty (UEAtc, RILEM, WFTAO and Liaison Committee, which brings together associations: CIB, FIB, IABSE, IASS, RILEM and ECCE).

She has awarded Robert L'Hermite Medal (1987) to young scientists from RILEM, "Manuel Rocha" (2002) of the Presidency of Portugal", "ALCONPAT" (2013) for the merits of the whole carrier, R. N. Whitney Prize 2013 by NACE and "ACHE Medal" (2017) for the professional carrier.

She has been General Director of Technological Policy of the Ministry of Education and Science and Advisor to the Secretary of State Universities in the Ministry of Science and Innovation, Spain.

ABSTRACT: **MODELS OF PROPAGATION OF REINFORCED CONCRETE DETERIORATION**

Numerous existing structures located in marine environments manifest premature corrosion of reinforcement. Corrosion propagation modelling is necessary for the prediction of its performance and safety. In present paper the model proposed years ago is illustrated by means of the data collected in some reinforced concrete elements and specimens, with and without 3% admixed chlorides or carbonated, exposed to the Madrid atmosphere during more than 25 years. The instantaneous corrosion rate together with the associated parameters of corrosion potential and resistivity has been monitored periodically. The accumulated corrosion can be considered lineal as the climatic events repeat annually. In the paper is also presented the hydrothermal performance of concrete and its influence on the reinforcement corrosion process. The effect of temperature is double and in opposition because, on one hand it increases the corrosion rate in presence of capillary water but on the other hand, it induces its evaporation and increase in resistivity which decreases the corrosion rate. The evaporable water content of a concrete and not the relative humidity is what is directly related to the risk of deterioration reinforcement corrosion and therefore the most crucial effect is the direct exposition to rainfall or snow events.

Reinforced concrete may suffer rebar corrosion but also other types of attack to the material integrity. When these processes develop actively at significant rate, they usually manifest through cracking of concrete cover, expansions and efflorescences and they are named, for the sake of the service life calculation, as "propagation" periods. The most known generic model is that of reinforcement corrosion published by Tuutti with two time- phases: corrosion initiation and propagation, that is, during the penetration of aggressive substances no damage is produced until achieving the aggressive front the rebar level, where the oxides formed provoke the cracking of the cover. This result into a horizontal line regarding the damage level followed with a continuous increase when the external sign of deterioration are visible. The other most frequent attacks are: alkali-silica reaction or sulfate attack, acid or leaching by pure waters and frost attack. In present communication, although of complex mechanisms as corrosion is, it is shown that all these propagation periods can be linearized in order to be made "generic" and with the possibility to be considered too as a two-period service life model. Some examples are commented, in particular that of reinforcement corrosion which is modelled through a constant rate or with a bilinear trend.

PLENARY SESSION nº 3: May 16th, 2018, 10h30-11h05 (Room 1)

PROF. DR. JUAN MONJO

Architect, Architecture School of UPM - Madrid TECH (1970). Master of Architecture, Univ. of Illinois (1972). Dr. Architect, UPM - Madrid TECH (1976).

University professor since 1982.

Director of the Department of Construction and Architectural Technology of the UPM (1991-1998).

Director of the Master in Restoration, MRA-UPM - Madrid TECH (1997-2007).

Coordinator of the SC-8, of the CT-41 of AENOR since 2001.

Director of the Instituo de Ciencias de la Construcción Eduardo Torroja, of the CSIC (2003-2008).

Director of the Master of Pathology MPE-UPM - Madrid TECH since (2008-2017).

Researcher in charge of the AIPA Research Group, of the UPM - Madrid TECH (2009-2017).

Author or co-author of more than 20 books, among them, *Introduction a la Arquitectura Textil* (Madrid, 1991); *Patología de cerramientos y acabados arquitectónicos* (Madrid, 1994); *Tratado de Rehabilitación*, 5 volumes (Madrid, 1998-99); *Patología y técnicas de intervención en estructuras* (Madrid, 2001); *Tratado de construcción. Sistemas* (Madrid, 2001); *Dicionario de arquitectura y construcción* (Valladolid, 2001); *Tratado de construcción. Fachadas y cubiertas* (Madrid, 2003); *El ldetalle constructivo en arquitectura* (Madrid, 2007); *Fibrous and composite materials for civil engineering applications* (Oporto, 2011); *Fabric Structures in Architecture* (UK, 2016).

Author or co-author of more than 30 articles in specialized journals.

Author or co-author of more than 60 papers and presentations at conferences and technical lectures.

Research lines: *Construction systems*; *Building Pathology*; *Intervention techniques in the architectural heritage*; *Textile architecture*.

ABSTRACT: **STRUCTURAL CONSOLIDATION AS A FIRST STEP IN THE RECOVERY OF ARCHITECTURAL HERITAGE**

The intervention of the architectural heritage must ensure the fulfillment of the Vitruvian triad in the recovered building.

Firmitas. We must ensure its stability and integrity. We have to ***repair***.

Utilitas. We must ensure its functionality. We have to ***rehabilitate***.

Venustas. We must preserve its historical-artistic values. We have to ***restore***.

The three actions (*repair*, *rehabilitate* and *restore*) must be carried out simultaneously, but the first one that has to occupy our attention is to ensure *firmitas*, that is, the stability and integrity of the monument.

As an example, let's see the **consolidation of the Episcopal Palace of Tarazona**, as the first step of its recovery, after the execution of a previous diagnosis that allowed understanding the structural and integrity problems of the built-up complex.

The intervention was carried out by three members of the AIPA research group (Analisis e Intervención en el Patrimonio Arquitectónico): Rosa Bustamante, Juan Monjo and Pilar Rodríguez-Monterverde.

The previous diagnosis showed us the most important problems that affected stability:

South façade of the Tarazona Episcopal Palace, Spain

- **Set of buildings from different times**, from the 1st century to the 18th century.
- **Types of materials of the different walls**, stones, bricks and mortars.
- **Moisture**; capillarity, at the base, and filtration in the central courtyard.
- **Sliding**, of the south façade.
- **Settlement** of the central zone.
- **Opening**, of the top line of the facades.

As a consequence, the intervention has tried to:

1. **Reduce the effect of capillarity** and **prevent filtration** through the patio.
2. Interrupting the sliding with the **anchoring of the facades to the central rock.**
3. Tie the set of buildings with **anchorages in both directions.**
4. **Tied up of all the top lines** of the buildings.
5. **Anti-fall mesh on the south facade** to contain possible detachments.

PLENARY SESSION nº 4: May 16th, 2018, 11h10-11h45 (Room 1)

PROF. DR. JORGE DE BRITO

Jorge de Brito is a Civil Engineer, Master in Structural Engineering and PhD in Civil Engineering, all at Instituto Superior Técnico (IST), University of Lisbon, Portugal, where he is presently Full Professor in the Department of Civil Engineering, Architecture and Georresources.

He is presently the Head of the research center CERIS (Civil Engineering Research and Innovation for Sustainability), with over 200 post-doctoral researches and nearly 300 PhD students.

He is the Director of the FCT Doctoral Program Eco Construction and Rehabilitation since its beginning.

He is also Editor-in-Chief of the Journal of Building Engineering from Elsevier.

He is member of the following scientific international commissions: W80 (CIB) / 100-TSL (RILEM); TC RAC (RILEM); W86 (CIB); W115 (CIB); WC7 (IABSE).

He participated in 20 research programs (4 international), five of which as Principal investigator.

His main scientific areas of research are building and bridge management systems, service life prediction, life cycle assessment and green materials.

He has supervised 36 PhD and 160 MSc students.

He has co-authored 4 books, 24 book chapters, around 350 papers in international journals and over 200 papers in international conferences.

ABSTRACT: **EXPERT KNOWLEDGE-BASED BUILDING MANAGEMENT SYSTEMS**

Buildings have a limited period of time in which they completely fulfil their minimal performance requirements. However, the service life of a building can exceed an expected durability if maintenance operations are adequately planned and carried out. Whether maintenance operations consist of proactive (preventive and predictive) or corrective actions, an inspection is necessary to assess the actual maintenance needs. Inspection procedures should be as objective as possible in order to obtain a reliable diagnosis and support rational decisions.

At Instituto Superior Técnico (IST), University of Lisbon, a set of inspection systems has been developed to collect in situ data on different non-structural and structural building elements. Such systems intend to minimize the subjectivity of information, identifying and describing the degradation phenomena that may occur during the service life of a building element, based on specialized literature. Each of the developed systems is composed of: classification lists of defects, probable causes, advised diagnosis methods and adequate repair techniques; correlation matrices defining the relationship between defects and probable causes, different defects, defects and diagnosis methods and defects and repair techniques; detailed files of defects, diagnosis methods and repair techniques; and an inspection form to fill with information on the building, the building element, environmental exposure information, previous maintenance information and on the defect itself.

Systematically collecting information according to these parameters enables the standardization of inspection reports, as well as the creation of pathology databases. The IST research team has already developed inspection systems for: flat roofs waterproofing systems, adhesive ceramic tiling, epoxy resin industrial floor coatings, masonry walls, wood floorings, natural stone claddings, pitched roofs' claddings, gypsum plasterboard walls, gypsum plaster coatings, wall renderings, painted rendered walls, ETICS, window framing, architectural concrete surfaces, concrete road bridges, expansion joints in concrete road bridges and support bearings in road bridges. A way forward for the IST team's research is the development of a global computed inspection system that integrates the partial systems developed so far in a comprehensive analysis perspective.

PLENARY SESSION nº 5: May 17th, 2018, 10h30-11h05 (Room 1)

PROF. DR. ATILIO MORQUIO

Docente en las Facultades de Medicina., Arquitectura e Ingeniería. Desde 2008 Profesor Titular en la Facultad de Ingeniería de la Universidad de la Republica, Montevideo, Uruguay.

Ingeniero Civil, Master y Doctor en el área de Estructuras por la Universidad Federal de Río Grande del Sur (Porto Alegre) Brasil.

Director del Instituto de Estructuras y Transporte (2005-2007), Jefe del Departamento de Estructuras (2009- 2017), Director de la Carrera de Ingeniería Civil (2009-2013), y Comisión de postgrado de Ingeniería Civil desde 2006. Consejero de la Facultad (1994-1999 y 2010-2012).

Pro-Rector de Gestión de la Universidad (1999-2007).

Par evaluador del sistema de acreditación de carreras Arcosur.

Integra desde 2012 el Consejo Consultivo para la Enseñanza Terciaria Privada del Ministerio de Educación y Cultura.

Autor de 40 publicaciones arbitradas. Orientador de cinco tesis de doctorado y maestría.

Integra el Comité Científico de la Asociación Sudamérica de Ingeniería Estructural. Presidió el Comité Organizador de las XXXVI Jornadas Sudamericanas de Ingeniería Estructural realizadas en 2014.

Ha realizado un conjunto de asesoramientos sobre estructuras, que incluyen edificios, plantas industriales, centros educativos, estadios, puentes, silos, presas, torres metálicas y muelles.

Dirigió (2013-2015) el proyecto "Evaluación y control de estructuras del patrimonio arquitectónico nacional en mampostería cerámica aplicando técnicas no destructivas".

Participa del proyecto de la *Getty Foundation* "Creation of conservation, management plan and administration system for Cristo Obrero Church, Atlántida", obra realizada por el Ingeniero Eladio Dieste en los años 50.

ABSTRACT: **LA MAMPOSTERÍA CERÁMICA EN URUGUAY, LAS CONSTRUCCIONES PATRIMONIALES DE LOS SIGLOS XVIII Y XIX. LA CERÁMICA ARMADA Y LA OBRA DEL INGENIERO ELADIO DIESTE EN EL SIGLO XX. CARACTERÍSTICAS DE LAS MISMAS, SU ESTADO Y SU MANTENIMIENTO**.

El patrimonio arquitectónico existente en Uruguay se origina en el siglo XVIII. El mismo está fuertemente relacionado con la mampostería cerámica estructural. En esta Conferencia se describen las más importantes construcciones de los siglos XVIII y XIX existentes en el país, su estado actual y los estudios realizados por las Facultades de Ingeniería y Arquitectura de la UDELAR para evaluar su estado mediante la utilización de ensayos no destructivos.

En la segunda mitad del siglo XX surgen en Uruguay las estructuras de cerámica armada del Ingeniero Eladio Dieste que se caracterizan por su diseño artístico, por las formas flexibles y esbeltas, y por su naturaleza estáticamente optimizada. La conferencia incluye una descripción de las mismas, de su estado actual y de los principios que guiaron a su autor para su diseño. En forma mas detallada se presentan los estudios que se desarrollaron en la Iglesia Cristo Obrero de Atlántida para diagnosticar su estado y valorar posibles medidas para su conservación.

Iglesia Cristo Obrero de Atlantida

PLENARY SESSION nº 6: May 17th, 2018, 11h10-11h45 (Room 1)

PROF. DR. FABIO FATIGUSO

Civil Engineer and PhD in "Building Engineering", is Associate Professor in "Architectural Engineering" at Department DICATECh of Polytechnic of Bari. He holds the National Scientific Qualification as Full Professor for the sector 08/C1 Technological Design.

He lectures "Building Refurbishment and Conservation" and "Architectural Engineering" within the MsC in Building Engineering at the Polytechnic of Bari, "Building Refurbishment: Theory and Practice" (Module M805 Design and Sustainability III) within the MsC in European Construction Engineering.

He is Coordinator of the MsC in Building Engineering at the Polytechnic of Bari, Scientific Responsible of the Laboratory of Building Technologies at Department DICATECh of the Polytechnic of Bari, President and Founder Member of academic spin-off "B.Re.D. Building Refurbishment and Diagnostics s.r.l.", member of CIB W86 Committee "Building Pathology", as well as of member of the Committee for Architectural Quality and Landscape of the Municipality of Matera (European Capital of Culture 2019).

It has been Member of the Scientific Board of several international conferences and Member of the Editorial Boards and Reviewer of several journals.

He is author and co-author of five books and more than seventy articles and papers in international journals and proceedings.

Concerning the technology transfer, he has submitted three patents and he has been Scientific Consultant for several refurbishment projects in the Sassi di Matera (included in UNESCO World Heritage List).

His research and scientific activity relates to building refurbishment and maintenance, with particular reference to material, technological and functional aspects, in terms of compliance to current standards actual codes and fulfilment of quality levels, as well as to techniques and technologies for diagnostics and control, in terms of methodologies and procedures for damage assessment and diagnosis. Specific research fields concern the refurbishment and conservation of Mediterranean traditional dwellings in ancient towns, as well as of historic school buildings, particularly with reference to sustainable practices and energy efficiency solutions.

ABSTRACT: **INNOVATIVE TECHNIQUES AND OPERATION PROTOCOLS FOR ASSESSMENT AND CONTROL OF THE BUILT HERITAGE**

The process of investigation, assessment, monitoring and control for the integrated conservation of the built heritage relies on methods and techniques, which are widely studied and tested by the scientific and technical community.

However, they are still challenging research fields, due to continuous normative evolution – such as for energy efficiency, seismic protection, quality of products and processes – and to increasing development of advanced systems and devices – with prominent HW-SW issues within data acquisition and elaboration.

Consequently, different backgrounds and disciplines should merge into a comprehensive process, oriented to the analysis of material, constructional and technical characteristics and the diagnosis of state of conservation and residual performances. This is still more significant in the case of the historical built heritage.

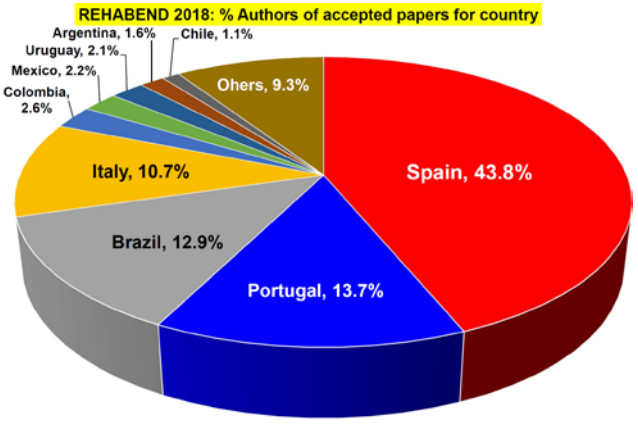
The paper offers a review about the abovementioned topics and it focuses on the some most current challenging research lines, such as: i) correlation methodologies for data from different sources, as decision-making support throughout assessment, diagnosis and intervention; ii) operation protocols for onsite investigation, in order to achieve meaningful and reliable results and preserve integrity and functionality; iii) development of innovative techniques for "contactless" detection and "augmented reality" representation by enabling ICTs.

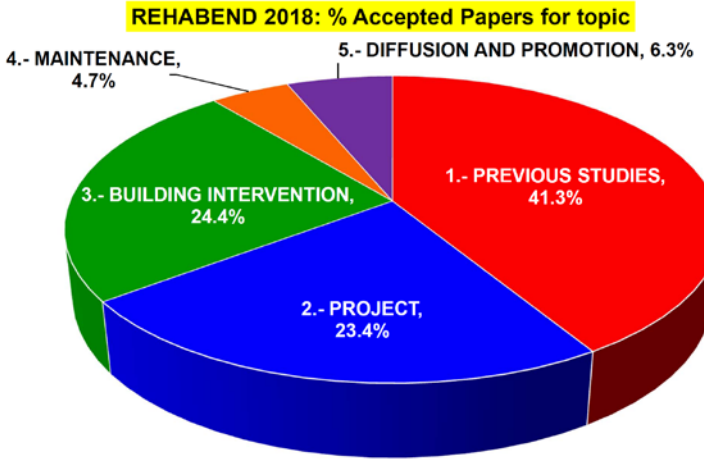
The final goal is to point out how assessment and control of building characteristics, obsolescence mechanisms and performance levels result from specific, integrated and coordinated tools.

Submitted abstracts: 498 // Accepted papers: 310 (from 31 countries)

Country	Countries which present authors in:	
	Submitted papers	Accepted papers
Spain	42.00%	43.80%
Portugal	12.80%	13.70%
Brazil	14.60%	12.90%
Italy	10.00%	10.70%
Colombia	2.60%	2.60%
Mexico	2.30%	2.20%
Uruguay	1.90%	2.10%
Argentina	1.70%	1.60%
Chile	1.00%	1.10%
Poland	0.90%	1.00%
Algeria	1.00%	0.80%
Turkey	0.70%	0.80%
Ecuador	0.80%	0.70%
Dominican Rep.	0.90%	0.70%
Libya	0.60%	0.60%
Peru	0.90%	0.60%
United States	0.60%	0.60%
Greece	0.40%	0.40%

Country	Countries which present authors in:	
	Submitted papers	Accepted papers
Germany	0.30%	0.40%
Egypt	0.30%	0.30%
India	0.30%	0.30%
Iraq	0.30%	0.30%
Ireland	0.30%	0.30%
South Korea	0.30%	0.30%
United Kingdom	0.50%	0.20%
Cyprus	0.20%	0.20%
Cuba	0.20%	0.20%
Lithuania	0.20%	0.20%
Switzerland	0.10%	0.10%
Canada	0.10%	0.10%
Austria	0.00%	0.10%
Morocco	0.60%	0.00%
France	0.30%	0.00%
Iran	0.30%	0.00%
Jordan	0.10%	0.00%





Day / Hour	Tuesday May 15th	Wednesday May 16th	Thursday May 17th	Friday May 18th
8h30	DOCUMENTATION DELIVERY	PARALLEL SESSIONS	PARALLEL SESSIONS	
9h00	PARALLEL SESSIONS			POST-CONGRESS TRIP (OPTIONAL) **TRUJILLO & MONASTERY OF GUADALUPE** The optional trip will include the visit to the Monastery of Guadalupe, a walk around the Historic Site of Puebla and a guided tour by the Historic City of Trujillo visiting the main square, Santa Maria Church, Marquis de la Encomienda Palace and the defensive walls. A lunch in a typical Guadalupe restaurant will be tasted.
9h30				
10h00				
	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK	
10h30	PLENARY SESSIONS 1 & 2	PLENARY SESSIONS 3 & 4	PLENARY SESSIONS 5 & 6	
11h00				
11h30				
	BREAK	BREAK	BREAK	
12h00	OPENING	PARALLEL SESSIONS	PARALLEL SESSIONS	
12h30				
13h00				
13h30	LUNCH	LUNCH	LUNCH	
14h00				
14h30				
15h00	PARALLEL SESSIONS	TECHNICAL - CULTURAL TRIP **MERIDA:** Roman Theater, Roman Amphitheater, National Museum of Roman Art, and panoramic visit of the city by bus	PARALLEL SESSIONS	
15h30				
16h00				
16h30	COFFEE BREAK		COFFEE BREAK	
17h00	PARALLEL SESSIONS		PARALLEL SESSIONS	
17h30				
18h00				
18h30			CLOSING	
19h00	WELCOME RECEPTION IN THE CITY HALL AND GUIDED VISIT BY THE HISTORICAL CENTER OF CÁCERES			
19h30				
20h00				
20h30				
21h00			CLOSING DINNER IN *ARGUIJUELA DE ABAJO* CASTLE	

The Congress Venue is in the San Francisco Cultural Complex - Congresses and Expositions Centre which has its headquarters in the 'Monastery San Francisco El Real' located in Ronda de San Francisco s/n, ZIP code 10002, Cáceres (Google maps: latitude 39.466862; longitude -6.367741).

General location of the 'Monastery of San Francisco El Real' and other reference points in Cáceres

It starts its historical course in 1472, whose an enterprising and tenacious friar, Pedro Ferrer, beat the existent legal obstacles to the foundation of and powerful magistrate appointed by the king, Diego García de Ulloa, who defeat the banning to give up real estates at the regular clergy, as that was arranged the code of laws conferred by Alfonso IX at the ciudad of Cáceres after its reconquest in 1227.

Processed the Bull of foundation for the Coria's bishop, Iñigo Manrique de Lara, and approved by the Pope Sixto IV, the 3 December 1472, its starts the construction of the monastery with the sizes and magnificence unbecoming to the Franciscan austerity. The expenses were bearded at the expense of the nobility and patronage of the Catholic Kings and of the Cardinal Mendoza, whose coat of arms shine in the apse and the crossing of the church. The chapels of the church and the cloisters are genuine pantheons where rest the lineage families of the nobility of Cáceres: Ulloa, Ovando, Rocha, Figueroa, Golfín, Peña, Aldana, Torres, Carvajal, Sánchez, Paredes, Blázquez, Saavedra, Mayorazgo,

Porcallo, etc. All the heraldry of Cáceres is represented in the more of one hundred coats of arms which exist.

General view of the San Francisco Cultural Complex in the *Monastery San Francisco El Real*

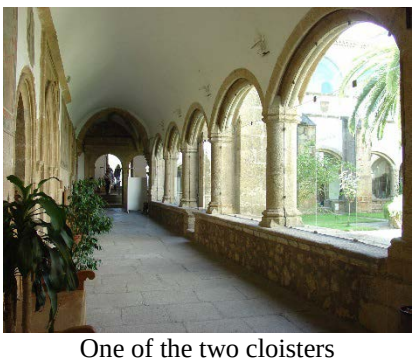
The pleasant monastic life was disturbed by the Peninsular War and the visits in the town of the French generals Victor, Soult and Girad, whose troops spoiled the Organ and set the fire to the older altarpiece. Some years later, in 1823, Juan Martín set the fire to the dormitories. Three years later, with the law of Disentailment of Mendizábal, the secularisation of the friars finished with the flourishing life of the convent which had served to varied matters: Barracks, Hospital, Compassion House, poor shelter, orphanage, and boarding-school of young orphan people of the province with the spatial resulting restructuring for each mission.

Starting from June 1980, a new destiny waited for the monastic Franciscan: to turn into a headquarters of the 'El Brocense' Cultural institution moving on to be called San Francisco cultural Complex.

The monastery take a clearstance of a late gothic style, standing out the interior of the Latin-cross church, with three naves, an apse and a raised transept, and the gothic cloister with the magnificent façade and chapels. The Works were extended during some decades, that is why the successive variety of style. Of the Renascent style, you highlight the loggia in arcade of the atrium, the lodge with its daring vault in four parts enriched with exuberant wets, the Sánchez-Paredes chapel, the baptismal font or washbasin of the sacristy, nowadays located between the two cloisters. There are different proofs of the Isabelline style which finds its beautifier expression in the deposit to the sacristy, with curly bracket arch, pomegranate and ornamentation with Indian heads. The colonial style is suggested the second floor of the gothic cloister and the powerful façade of the church, which the completion grazes in the façade -1723- that we place in the Baroque.

Although the upgrading and restoration Works, with greater or lesser luck, were the constant throughout of 150 years, it is in the autumn of 1981 when the definitive task to adapt as a whole to its cultural mission was performed. With this premise you had projected a rational and intelligent fulfillment of its setting up finding the harmony and the harmonisation with the History and the Art, squaring the essential elements of its first structure with a correct incorporation of the news technologies at the existent spaces and materials.

Main hall



One of the two cloisters

Church

POSSIBLE WAYS TO ARRIVE AT CÁCERES FROM MADRID

RAILWAY		
From	To	Approximate fare
'Puerta de Atocha' Station (Madrid) https://bit.ly/2HUSRwH	Cáceres Railway Station https://bit.ly/2HLHnxX	Around 25-30€ (one-way ticket)
BUS*		
From	To	Approximate fare
South bus station 'Méndez Álvaro' (Madrid) https://bit.ly/2JjLRIS	Cáceres bus station https://bit.ly/2HLHnxX	Around 25-30€ (round-trip ticket)
RENT A CAR		
The main companies (placed at the airport 'Madrid-Barajas') are listed in the next link: https://bit.ly/2JhTaRC		Around 250 – 400€ (4-5 days) depending on the type of vehicle

*It is more recommendable to travel by bus from Madrid to Cáceres, because there are more alternatives concerning to timetable, and the journey is shorten than by train.

POSSIBLE WAYS TO ARRIVE AT CÁCERES FROM LISBON

BUS	
Avanza: http://www.avanzabus.com/web/default.aspx	Around 30€ (round-trip ticket)
RENT A CAR	
The main companies are listed in the next link: https://bit.ly/2F9nhrV	Around 250 – 400€ (4-5 days) depending on the type of vehicle

TAXI

Main taxi ranks in Cáceres:

- Train station: https://bit.ly/2HLHnxX
- Bus station: https://bit.ly/2HLHnxX
- C/ Gran Vía (close to Main Square -*Plaza Mayor*-): https://bit.ly/2F8ShZc
- America Square -*Plaza de América*-: https://bit.ly/2vCD1UT
- Canovas Street -*Paseo de Cánovas*-: https://bit.ly/2qRFrKw

Telephones:

+34 927 21 21 21

+34 927 24 24 24

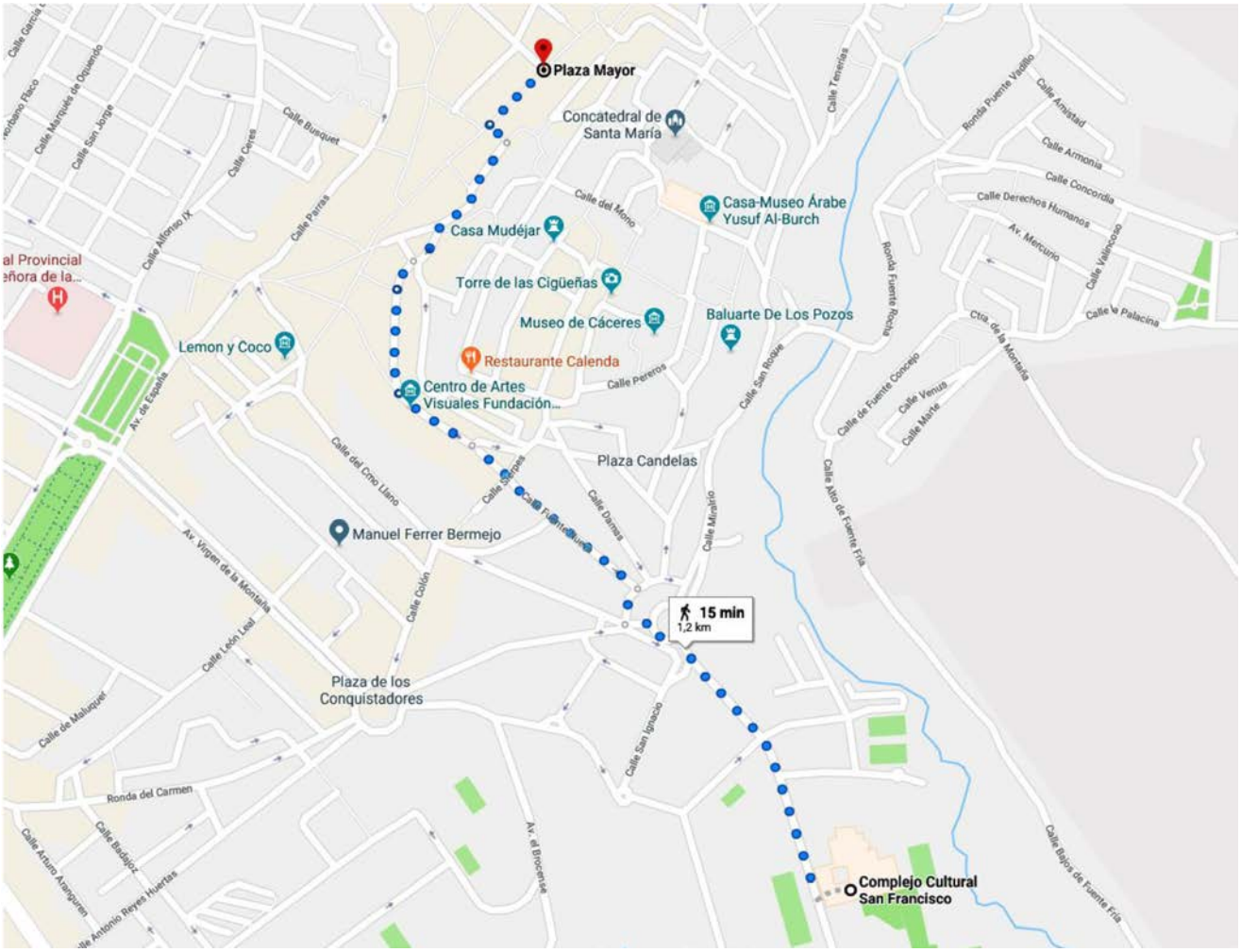
URBAN TRANSPORT (BUSES)

Lines 7 and 8 has a bus stop in the San Francisco Cultural Complex.

In '**Cáceres BUS –Official App**', an specific APP for mobile phones, you can check the different lines, bus stops and timetable: https://play.google.com/store/apps/details?id=com.cuatroochenta.subusCáceres&hl=es

WALKING

From the historic downtown of Cáceres, the San Francisco Cultural Complex may be reached in **15-20 minutes**.



	Tuesday May 15th	**Wednesday May 16th**	**Thursday May 17th**	**Friday May 18th**
Morning	Companions: **Free Time** (shopping, etc.)	Companions: **Free Time** (shopping, etc.)	**9h30 – 13h00** Trip (only for the companions) **Vostell-Malpartida Museum and Natural Monument of *Los Barruecos***	**9h00 – 20h00** **Post-congress trip** **Treasures of Extremadura: Royal Monastery of *Santa María de Guadalupe* and the Historic Sites of Puebla and Trujillo** (Optional)
Afternoon	**19h15–21h00** **Welcome reception and guided visit by the historical downtown of Cáceres** hosted by Mayor of the City of Cáceres	**15h00 – 21h00** **Technical–Cultural trip** **Remains of the Roman colony of *Emerita Augusta* and the National Museum of Roman Art of Mérida**	**21h00** **Closing Dinner at *Arguijuela de Abajo* Castle**	

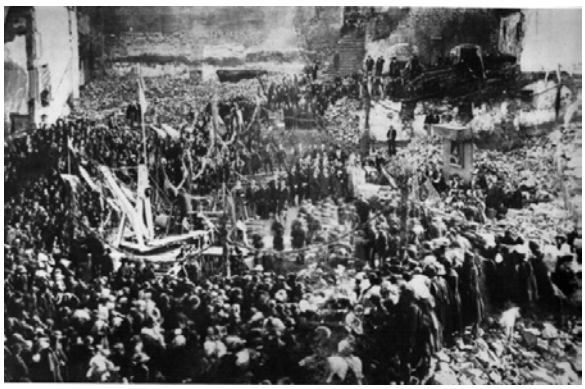
Tuesday, May 15th
Welcome reception hosted by Mayor of the City of Cáceres and guided visit by the historical downtown of Cáceres
For Delegates (full inscriptions), Students and Companions

On Tuesday, May 15th, 2108, from 19:15h, it is going to be carried out a **welcome reception hosted by the Mayor of Cáceres**. This event will consist on a **welcome to the congress participants to the city of Cáceres** by the highest political authority of the city.

The social event will take place in the **Meeting Room of the Cáceres City Hall** and annexed spaces. After that, a guided visits by the historical downtown of Cáceres will be developed.

This neoclassic building that accommodates the Cáceres City Hall was designed by Ignacio Mª de Michelena and was **built in 1869**. The building dominates the Main Square of the City, so called Plaza Mayor. The main façade has a beautiful arcaded atrium. The most important spaces of the building are brought together by an impressive balcony which constitutes an interesting architectural solution which contribute to harmonize the general view of the square. The central part of the building is rounded off by the coat of arms of the City of Cáceres and a clock.

The Meeting Room of the Cáceres City Hall was refurbished at the end of the 1960s by Manuel García Creas. This space constitute the heart of the local government because the main decisions are discussed in it.



Historic event for the Cáceres City Hall at the groundbreaking ceremony of the building (Photo from collection of J.R. Marchena)

Meeting Room of the Cáceres City Hall

Wednesday, May 16th
Remains of the Roman colony of *Emerita Augusta* and the National Museum of Roman Art of Mérida
For Delegates (full inscriptions, not student inscriptions) and Companions

15:00h Departure from the congress venue (San Francisco Cultural Complex)

The technical and cultural visits are going to take place in Mérida (the Roman city of *Emerita Augusta*). During the trip, several key places of the city will be visited: Roman Theatre, Roman Amphitheatre and the National Museum of Roman Art. Besides, the delegates and companions will enjoy a panoramic view of the city by bus.

The **archaeological ensemble of Mérida (Roman colony of *Emerita Augusta*) is one of the largest and most extensive archaeological sites in Spain**. It was **declared a World Heritage Site by UNESCO in 1993**. The city itself, *Emerita Augusta*, was founded in 25 BC by Augustus, to resettle emeritus soldiers discharged from the Roman army from two veteran legions of the Cantabrian Wars (the *Legio V Alaudae* and *Legio X Gemina*). The term emeritus refers to the soldiers, all of whom had been honourably discharged from service. The city became the capital of the Roman province of Lusitania.

REMAINS OF THE ROMAN THEATRE OF EMERITA AUGUSTA

The Roman Theatre of Mérida is a construction promoted by the consul Vipsanius Agrippa. **It was constructed in the years 16 to 15 BC**.

The theater has undergone several renovations, notably at the end of the 1st century or early 2nd century AC (possibly during the reign of Emperor Trajan), when the current façade of the *scaenae* frons was erected, and another in the time of Constantine I (between 330 and 340) which introduced new decorative-architectural elements and a walkway around the monument. Following the theatre's abandonment in Late Antiquity, it was slowly covered with earth, with only the upper tiers of seats (*summa cavea*) remaining visible. In local folklore the site was referred to as 'The Seven Chairs', where, according to tradition, several Moorish kings sat to decide the fate of the city.

The theatre was located on the edge of the Roman city adjacent the city walls. Some of the seating was built into a hill called the *Cerro de San Albín*. Constructed in faithful accordance to the rules of the treatises of Vitruvius, the building corresponds to the typical Roman model. The structure exhibits similarities with the theatres of Dougga (Tunisia), Orange (France), Pompeii (Italy) and Rome.

Until the late 19th century, the only visible remains of the theater were the so-called 'Seven Chairs', remains of the tops of the bleachers and a formed concrete base covered with granite blocks that made up the façade of the building. The excavations of the theater began in 1910, directed by archaeologist José Ramón Mélida. Having limited resources and methodology

was not conducive to the reconstruction progress, which delayed excavation until the late nineteenth century, when most of the building was excavated, documenting numerous columns, cornices, statues and other building materials, especially the front stage. In the 1960s and 1970s the front stage was rebuilt under the direction of the architect and archaeologist José Menéndez-Pidal.

Besides being the most visited monument in the city, **it has been home to the development of the Festival of Classical Theatre of Mérida (*Festival de Mérida*) since 1933**. The Mérida Classical Theatre Festival is the oldest of its kind celebrated in Spain.


REMAINS OF THE ROMAN AMPHITHEATRE OF EMERITA AUGUSTA

The amphitheatre itself **was completed in 8 BC**. This building was intended for gladiatorial fights and combats between beasts or men and beasts (*venationes*).

The amphitheater had an elliptical shape, and had a major axis of 126 metres and one less than 102 metres with these measures in the arena of 64 metres by 41 metres respectively.

The sand-covered arena had a *fossa bestiaria* in the centre, which was covered with wood and sand. This *fossa* was used to house animals before they were released into the arena.

Its design consists of: a grandstand with *ima*, *media* and *summa cavea*, and a central arena. The stands had a **capacity of approximately 15,000 spectators** and had supporting stairs and hallways (*Scalae*) that connected the different parts internally.

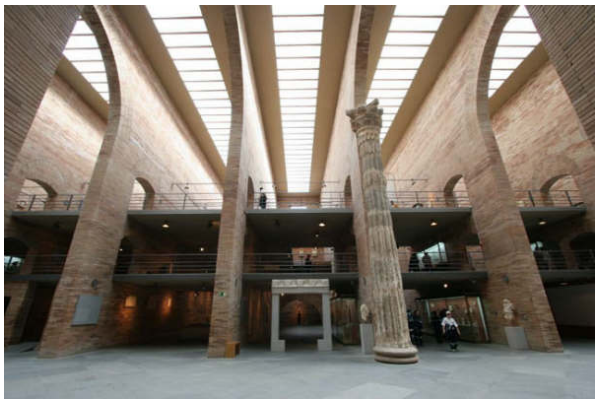

The *ima cavea* had of a row reserved for the local elite and 10 more for members of the public. There were also two stands located at both sides of the minor axis: one above the main entrance hall and another in front. Under them were the monumental inscription from which the amphitheater can be dated.

NATIONAL MUSEUM OF ROMAN ART

The museum **was opened in 1986** to hold the archeological artifacts found in the excavations in the city of Merida. It offers a synthesis of life in one of the main colonies in Roman Hispania, Emerita Augusta.

The National Museum of Roman Art is located in a building by Rafael Moneo that is a reference in contemporary museum architecture. With a display of emblematic items including Roman mosaics, sculptures, epigraphs, daily life objects and documents, which represents one of the great examples of the Romanisation process of Hispania.

The first intention of the project was to build a Museum which would offer to the people of Mérida an opportunity to recover the lost presence of the Roman town over which the new city had been built. Moreover, a certain will to recall and to evoke the Roman past can be felt in the project: the Museum, without falling into a strict imitation of Roman architecture, tries to suggest to the visitor how the Roman Mérida was in its time. The desire to approach the Roman world, that is the basis of the project, is satisfied by literally adopting Roman construction systems and not by merely applying mouldings and orders.

For that reason, the Roman construction system – massive masonry bearing walls filled with concrete – has given rise to a building in which the structure of the walls gives formal support to the architecture, an architecture of walls, in which the problem of intervals, proportions, the openings are the key elements. A system of parallel walls is hollowed out by means of a large arch, forming a virtual perspective, a nave that is the main space for some of the Museum's most valuable pieces.

The translucent white marble of the relics may be seen in dialectical interplay with the material presence of the brick wall. The natural illumination entering through skylights in most cases stimulates the dialogue between the works of art and the walls.

The crypt clearly shows the Museum's proposal to uncover the presence of the old Roman city.


21:00h Arriving at Cáceres.

Thursday, May 17th
Vostell-Malpartida Museum
and Natural Monument of *Los Barruecos*
Only Companions

09:30h Departure from the congress venue (San Francisco Cultural Complex)

During the trip for companions the Vostell-Malpartida Museum and the Natural Landscape of *Los Barruecos* will be visited:

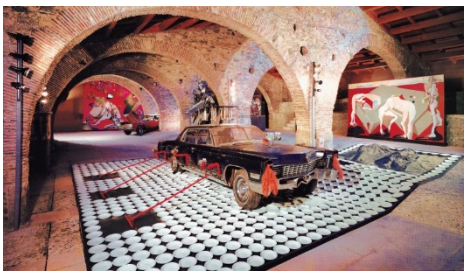
VOSTELL-MALPARTIDA MUSEUM

The German artist **Wolf Vostell (1932-1998) is a fundamental figure of contemporary art from the second half of the 20th century**. He was the discoverer of the 'Décollage' concept as an artistic tool, father of the Happening in Europe, pioneer of video art and initiator of the Fluxus Movement.


Vostell, linked to Extremadura since 1958, met in 1974 the *Paraje Natural Los Barruecos*.

This space combines the beauty of an incomparable natural landscape, town of granite boulders and numerous lagoons, with the emphatic presence of the complex of buildings of the wool laundry there since the mid-18th century. The encounter of this artist with this unexpected situation, resulted the implementation underway of a unique and innovative Museum, as an expression of avant-garde art; a meeting place for art and life.

Museo Vostell Malpartida offers visitors **three collections of contemporary art**: collection Wolf and Mercedes Vostell, Fluxus-donation collection Gino Di Maggio and collection of conceptual artists.



In addition to the showrooms, you can also visit the **Centre of interpretation of the livestock routes and history of the laundry wool**. The Museum extends the landscape of los Barruecos with two *esculturas-ambientes* installed both among the rocks: 'travel V.O.A.E.X. (h) ormigón by high Extremadura' (1976), that gave start Museo Vostell Malpartida activity, and 'The dead who is thirsty' (1978).

Currently, he composes as **one of the most important European museums of contemporary art** and has become Tribune forced within the national and international art scene.

NATURAL MONUMENT OF *LOS BARRUECOS*

The Natural Monument of *Los Barruecos* presents a **spectacular landscape dominated by large granite bowling**, sculpted by erosive agents for thousands of years. The whimsical shapes resulting present the most extensive catalogue of modeling on granite, which has attracted the attention of geologists and geomorphologists from around the world.

The landscape is completed with the presence of **four historical reservoirs**, in whose waters reflected shapes granite creating the feeling of an illusory landscape.


The conjunction of the shelter provided by the rocks and the abundance of water throughout the year are also an excellent claim to the fauna and flora. The fauna is varied, finding copies of birds of prey that move to Los Barruecos, attracted by the abundance of food and water. Its peculiarities **is especially significant in the Natural Monument of *Los Barruecos* the White Stork** and the tench. In the white stork colony it has such importance that has been considered the biggest in Europe in its natural state, nesting on the large granite bowling. The peculiarity of the colony of Los Barruecos, coupled with the extensive colony urban seated in the population and the efforts of the City Council for the conservation of this bird and its habitat, earned Malpartida de Cáceres the appointment of **European Stork village in 1997, by the European Natural Heritage Fund (EURONATUR)**.


We cannot ignore *Los Barruecos* is an anthropic landscape, where **human activity has been decisive since prehistoric times**. Witness to this are the abundant archaeological sites that test taking advantage of the magnificent conditions of the place already in the Paleolithic. Of the Chalcolithic date walled settlements and the set of engravings and schematic paintings during the Roman era is constructed a magnificent villa - associated with nearby and the colonia Norba Caesarina - anthropomorphic tombs sets.

The last uses given in Los Barruecos are directly related to environmental activities: since it **was named Natural Monument in 1996**, the Junta de Extremadura endowed it with three buildings: the center of interpretation of the Natural Monument, Center of interpretation of water - the mill - and the visitors center where a room dedicated to the presence of the white stork in Malpartida is exposed.

13:00h Arriving at Cáceres

Thursday, May 17th
Closing Dinner at *Arguijuela de Abajo* Castle
For Delegates (full inscriptions, not student inscriptions) and Companions

The closing dinner is going to be developed at 21:00h in the wonderful **15th-century** *Arguijuela de Abajo* Castle.

This impressive building **lies on the Silver Way (*Vía de la Plata*)** and has been **declared a Cultural Heritage Site**.


Its construction dates from the middle of the 15th to the 16th century by order of Don Francisco de Ovando 'the Elder' ('*el Viejo*'). The walls and the exterior watchtowers were added later, during the 19th century. Within the complex you will find a walled garden, terraces, a pond, an olive grove, a chapel and outhouses for livestock.



The coats of arms of the founding family can be seen throughout the castle and those on façade are especially noteworthy.

The current owner is the Viscount of Roda who has converted the building for public use in a modern catering complex.

The visitor will enjoy the **impressive gardens**, designed by Consuelo Correcher one of the landscape architects with more expertise in historic gardens in the world.


Friday, May 18th: Post-congress trip (Optional)
Treasures of Extremadura: Royal Monastery of Santa María of Guadalupe and the Historic Sites of Puebla and Trujillo

9:00h Departure from Cáceres.

During the optional post-congress trip will be visited:

ROYAL MONASTERY OF SANTA MARÍA OF GUADALUPE

The Royal Monastery of Santa María of Guadalupe is located at the foot of the eastern side of the *Sierra de las Villuercas* and was one of the most important and fine monasteries in the country for more than four centuries. **UNESCO declared it a World Heritage Site in 1993**.

The monastery had its origins in the late 13th century, when a shepherd from Cáceres, named Gil Cordero, discovered on the bank of the Guadalupe River a statue of the Blessed Virgin, which had been apparently hidden by local inhabitants from Moorish invaders in 714. On the site of his discovery a chapel was built, dedicated under the title of Our Lady of Guadalupe.

King Alfonso XI, who visited the chapel more than once, invoked *Santa Maria de Guadalupe* in the Battle of *Rio Salado*. After gaining the victory, he ascribed it to the Madonna's intercession, declared the church at Guadalupe a royal sanctuary and undertook an extensive rebuilding program.

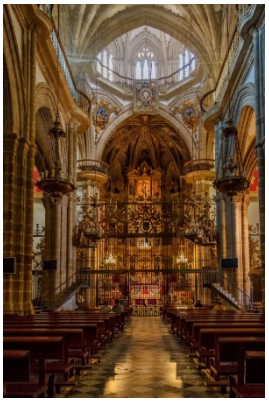
In 1389, the Hieronymite monks took over the monastery and made it their principal house. Construction works continued under the auspices of the order's first prior, and in 1474 Henry IV of Castile was entombed in Guadalupe, next to his mother.

The monastery has rich associations with America, including the Guadeloupe Island in the Caribbean. **It was here in Extremadura where Christopher Columbus made his first pilgrimage after discovering America in 1492** and where he first thanked heaven for his discovery.

Even after the monks from Guadalupe founded the famous monastery of Escorial, which was much closer to the royal capital, Madrid, *Santa Maria de Guadalupe* retained the royal patronage. It remained **the most important cloister in Spain** until the Confiscation of monasteries in 1835. In the 20th century, the monastery was revived by the Franciscan Order and **Pope Pius XII declared the shrine a 'Minor Papal Basilica' in 1955**.

The monastery, whose architecture evolved throughout many centuries, is still dominated by the main church, built by Alfonso XI and his immediate successors in the 14th and 15th centuries. The square chapel of *Santa Catalina* is also of the 15th century; it is known for a cluster of ornate 17th-century tombs. The 16th-century reliquaries chapel connects *Santa*

Catalina with the baroque sacristy, lavishly decorated and boasting a series of paintings by Zurbarán.


Behind the basilica is *Camarin de la Virgen*, an octagonal baroque structure with the impressive stuccoed Chamber of the Virgin and nine paintings by Luca Giordano. The jewel of this profusely ornamented hall is a throne containing the statue of the Madonna which gave the monastery its name.

Other notable structures include the *Mudéjar* cloister (1389-1405), with the magnificent Plateresque portal; the late Gothic cloister from 1531–33, and the new church, commissioned by one of Columbus's descendants in 1730.

HISTORIC SITE OF *LA PUEBLA DE GUADALUPE*

La Puebla de Guadalupe is a historic village, with cobbled streets and traditional homes, filled with valuable monuments, like the Royal Monastery of *Santa María of Guadalupe*, declared World Heritage. This **typical mountain village, declared Historic-Artistic Site**, grew under the wing of the Royal Monastery of *Santa María of Guadalupe*.

Located in the central ***Plaza de Santa María***, the **fountain of *Tres Caños*** is a reminder of one of the historical milestones of *La Puebla*, since it was in this square that the first Americans brought by Columbus from his second journey to America were baptised.

Across from the Monastery is the old **hospital of San Juan Bautista** (15th century), the present *Parador de Turismo* of Guadalupe (high quality hotel). Throughout its existence, the

building received thousands of pilgrims that travelled to Guadalupe. It was also an important School of Medicine, where many of the doctors that worked for the Royal Court were trained.


The hospital has an annexe that constitutes a reminder of the cultural splendour that the town enjoyed in the past: the **College of Infantes**, where students learned grammar, singing and theology.


Main Street (***calle Mayor***) is the main artery in a network of cobbled streets lined with traditional homes that have wooden balconies, porticoes and porches and it connects the higher and lower parts of the city.

The **College of Grammar** and the **Hermitage of the Shrine** (15th century), in the outskirts of the city, are also worthy of note.

La Puebla de Guadalupe is a great showcase of the **regional cuisine**. Dishes that are characterised by their simplicity and excellent quality of their ingredients are: Iberian sausages, *ajoblanco* (a cold soup with almonds, garlic, bread and olive oil), *migas* (breadcrumbs with Spanish sausage and bacon), lamb stew and 'Father-Pedro-style' chicken. Wines with the label Designation of Origin-Ribera del Guadiana go very well with any of these dishes.

Guadalupe is also a great starting point if the traveller wishes to visit nearby mountain-towns within the region of Las Villuercas, like Cañamero, Logrosán, or Berzocana.

HISTORIC CITY OFTRUJILLO

Trujillo was **settled on** a granite knoll **during Prehistoric times**. In **Roman times** the town **was known as *Turgalium*** and became a prefecture stipendiary of the Lusitanian capital, *Emerita Augusta* (today's Mérida). Later it **was colonised by East Germanic tribes (mainly Visigoths)** although the prevalence of the population would still have been Hispano-Roman.

With the **Muslim invasion and conquest in 711**, it became one of the main towns in the region (renamed ***Turjalah*** in Arabic) subjected to the Umayyad Emirate of Córdoba and the subsequent Caliphate ruled until the middle of the 11th century. During this time the ethnic tensions between the Berbers and Arabs weakened the Caliphate militarily while the

Reconquista gained success to the north of Extremadura in Castile. During this time the Berber Almohads took control of Trujillo and its environs.

During the time of Almohad rule, wars with Portugal, Castile and León guaranteed that the possession of Trujillo was tenuous. Rule alternated between these kingdoms and the Almohads returning for the last time to the Muslims in 1187.

Five centuries of Muslim occupation and control finally ended when an army formed by forces of the Military orders and the Bishop of Plasencia laid siege to the city of Trujillo with the support and blessing of Ferdinand III. Muhammad ibn Hüd tried to relieve the town but was driven off by the besieging army. **The town was finally captured by Christian forces on 1232**.

King Juan II of Castile gave the town the **title of city in 1430**. Later it had a **Jewish quarter located outside of the powerful medieval walls**. Trujillo, with the growth of the population was gradually extended beyond the walls.

Trujillo has a rich heritage. The old town contains **many medieval and renaissance buildings**. Many of these were built or **enriched by the conquistadors born in the city**. These include **Francisco Pizarro**, conqueror of Peru, and **Francisco de Orellana**, discoverer of Amazonas River. Pizarro's equestrian statue stands in the main square, the *Plaza Mayor*. The most important monuments are the castle (old Arab fortress), the church of Santa María (13th century), and the church of San Francisco.

20:00h Arriving at Cáceres