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2022

Hybrid Conference

September 13-16, 2022

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REHABEND 2022

CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

(9th REHABEND Congress)

Granada (Spain), September 13th-16th, 2022

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9TH EURO-AMERICAN CONGRESS ON CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

REHABEND 2022

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The **Euro-American Congress REHABEND 2022** on **Construction Pathology, Rehabilitation Technology and Heritage Management** was carried out in **Granada (Spain)**, in **September 2022**. The event was co-organized by seventeen organizations of **eight European and American countries**, and it was co-chaired by the **University of Cantabria**, through its Building Technology R&D Group (GTED-UC), and the **University of Granada**.

REHABEND 2022 **continued the series of the eight previous REHABEND international events**, which had been developed **since 2006 in different Spanish cities**. In the **2020 edition held online,** more than **325 papers** were presented by professionals and researchers from **more than 35 countries**.

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 Granada**, which Alhambra fortress, the magnificent gardens of the Generalife and the residential district of the Albaycín, a rich repository of Moorish vernacular architecture, have been declared as UNESCO World Heritage Site. This event aimed 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 met around **280 technical contributions** coming from professionals, academics and specialists.

Based on previous experiences, the Congress **was proposed once again in the Euro-American cultural space**. The **official languages** were **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 previous editions of REHABEND.

Under these premises and the successful previous editions, the Congress was sponsored by the **Government of Spain**, the **Government of Andalusia**, the **Provincial Government of Granada**, the **Municipality of Granada**, the **Council of the Alhambra and the Generalife**, **Granada Convention Bureau**, **Sacromonte Abbey Foundation, Tecnalia, Mapei,** the **University of Cantabria** and the **University of Granada**. In addition, several Universities, Technical and Professional Associations, Institutes, Foundations and Companies committed their collaboration in order to the success of this initiative.

REHABEND 2022 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 attended the congress** for the confidence shown in the event. Sincerely, many thanks to all.

Dr. Ignacio Lombillo
Chairman of the REHABEND 2022 Congress
Associate Professor
University of Cantabria

Dr. María Paz Sáez
Chairwoman of the REHABEND 2022 Congress
Associate Professor
University of Granada

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), 6th (Burgos, 2016) and 7th Congress (Caceres, 2018), all of them carried out in Spanish cities. The 2020 edition was to be held in person in Granada, Spain, in March 2020, but due to the global health emergency resulting from Covid-19, it had to be held online in September 2020.

The ability to convene of the eight perfomed editions was prominent, gathering an appreciable number of experts in the topics of the Congress. As a reference, in the 8th edition (REHABEND 2020) took part more than 325 speakers from more than 35 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 of papers corresponding to the previous congresses are attached below. The ISSN of the series of REHABEND books is 2386-8198. In addition, since REHABEND 2014, the papers presented at the congress have been indexed in scopus.

REHABEND 2006
(Book of Papers)
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REHABEND 2007
(Book of Papers)
ISBN: 978-84-691-3612-6

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REHABEND 2016
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The Collaborating Entities have been presented grouped in countries, following an alphabetical order. As Collaborating Entities have been considered to all that have contributed at least with two accepted articles in the Congress, or that some of its members formed part of the International Scientific Committee of the Congress / keynote speakers. Finally, in each country, the Collaborating Entities have been ordered according to the number of accepted articles.

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Portugal-Centre of Materials and Building Technologies C-MADE

Portugal-Institute for Sustainability and Innovation in Structural Engineering

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

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1.- PREVIOUS STUDIES	1.1.- Multidisciplinary studies (historical, archaeological, etc.). 1.2.- Heritage and territory. 1.3.- Urban regeneration. 1.4.- Economical and financial policies. 1.5.- Social participation processes and socio-cultural aspects in rehabilitation projects. 1.6.- Construction pathology. 1.7.- Diagnostic techniques and structural assessment. 1.8.- Vulnerability studies and risk management. 1.9.- Guides and regulations.
2.- PROJECT	2.1.- Theoretical criteria of the intervention project. 2.2.- Traditional materials and construction methods. 2.3.- Novelty products applicable 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 and infrastructures. 4.2.- Preventive conservation of built heritage.
5.- DIFFUSION AND PROMOTION	5.1.- Heritage and cultural tourism. 5.2.- Teaching and training. 5.3.- New technologies applied to the heritage diffusion. 5.4.- Accessibility to cultural heritage. 5.5.- Built heritage management.

KEYNOTE SPEAKERS

Congress REHABEND 2022 on

CONSTRUCTION PATHOLOGY, REHABILITATION TECHNOLOGY AND HERITAGE MANAGEMENT

Granada, Spain, September 13th-16th, 2022

	HOUR	INSTITUTION	SPEAKER	TITLE
13/09/2022	10h30 - 11h05	NORTHUMBRIA UNIVERSITY (UNITED KINGDOM)	PROF. DR. MARCO CORRADI	The use of titanium in conservation and seismic reinforcement of masonry structures
	11h10 - 11h45	UNIVERSITÀ DEL SALENTO (ITALY)	PROF. DR. MARIA ANTONIETTA AIELLO	Strengthening of masonry structures with inorganic matrix composites (IMCs)
14/09/2022	10h30 - 11h05	UNIVERSIDAD POLITÉCNICA DE VALENCIA (SPAIN)	PROF. DR. JOSÉ M. ADAM	Recent experimental research on structural robustness at the ICITECH-UPV
	11h10 - 11h45	UNIVERSIDAD DE VIGO (SPAIN)	PROF. DR. BELÉN RIVEIRO	Reaching resilient transport infrastructures: some examples of multidisciplinary research to optimize the maintenance of large infrastructure
15/09/2022	10h30 - 11h05	FUNDACIÓN ABADÍA DEL SACROMONTE (SPAIN)	ARQ. ANTONIO MARTÍN MUÑOZ	Arquitectura de muchos tiempos: la Abadía del Sacromonte en Granada
	11h10 - 11h45	UNIVERSIDADE DO MINHO (PORTUGAL)	PROF. DR. PAULO B. LOURENÇO	Conservation and management of the built heritage: recent works on modern heritage buildings of portuguese origin

KEYNOTE SESSION nº 1: September 13th, 2022, 10h30-11h05 (Room 1)

PROF. DR. MARCO CORRADI

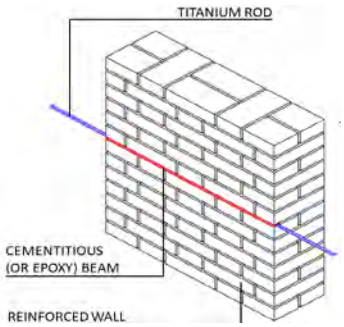
Dr. Corradi is actually an Associate Professor at the University of Northumbria, Newcastle upon Tyne, UK.

He has 20 years experience including eight years as an aggregate professor at the University of Perugia, Italy. From 1998 to 2013 Dr. Corradi was Coordinator and Lecturer of the course "Mechanics of Structures" and "Experimental analysis of existing structures".

With an internationally recognised research profile in the field of structural analysis and retrofitting of historic constructions, he has been invited as a guest speaker at numerous research seminars in universities across Europe and USA. In addition, he sits on the editorial board of 8 scientific engineering journals. Dr. Corradi is an Editor of Journal of Construction and Building Materials, edited by Elsevier. The research component focuses on the use of new advanced materials for upgrading of existing masonry and wood historic constructions. He is the Chairman of the Northern Counties (in the United Kingdom) Institution of Structural Engineers (IStructE) and a fellow of the High Education Academy (HEA). Dr. Corradi is also an honorary partner of the University of Aberdeen, Scotland. He is author of 254 articles and 4 books.

THE USE OF TITANIUM IN CONSERVATION AND SEISMIC REINFORCEMENT OF MASONRY STRUCTURES

ABSTRACT: Heritage masonry buildings, often made of rubble stone masonry and weak lime mortar, have been typically designed with little or no regard for the effects of seismic loadings. Recent destructive earthquakes in Italy, Greece, Japan and other areas of the world have clearly demonstrated that these heritage structures are particularly susceptible to the inertial forces activated during earthquakes. The poor performance of historic buildings both against the in-plane and out-of-plane horizontal actions, led building code committees to significantly increases the code requirements for lateral support of existing masonry buildings. In the late 1980s the concepts of "Seismic improvement", "Local intervention", "Seismic repair", "Interventions to make the building earthquake-resistant" were progressively introduced and defined. With each new earthquake, especially when this produced a significant loss in cultural heritage, reinforcement strategies have been updated and new solutions proposed. However, existing masonry buildings still remain at risk because, these old and often heritage structures cannot be sufficiently improved to meet the current standards for new masonry constructions. The upgrading of such structures has become a priority in the field of earthquake engineering. This paper addresses the problem of the use of titanium elements to reinforced historic masonry member. New advanced materials (composite materials, stainless steel, natural fibres) are being widely researched for repair and rehabilitation in civil engineering structures, but little research has been conducted regarding titanium. The potential benefits, liabilities, and architectural considerations regarding the use of titanium alloys for reinforcing masonry structures are discussed with an emphasis on in-plane shear loading and out-of-plane bending. This paper therefore presents the state of the art in the use of titanium profiles in retrofitting masonry structural elements within historic structures. It includes a review of the development of the retrofitting methods and existing experimental studies on the mechanical behavior of masonry structures reinforced with titanium. Finally, it presents a number of case studies and draws conclusions on current trends and practices based on reported studies.



KEYNOTE SESSION nº 2: September 13th, 2022, 11h10-11h45 (Room 1)

PROF. DR. MARIA ANTONIETTA AIELLO

Full Professor of Structural Engineering at the Department of Engineering for Innovation, University of Salento, and Associate member of the ITC-CNR (Institute of Technologies for Construction - National Research Council). Director of the Lab. of Structural Mechanics and Structural Engineering of the University of Salento.

Her main research interests are retrofitting of existing RC and masonry structures with innovative materials and systems, seismic vulnerability of existing structures and non-structural elements, short and long term behavior of structures made by FRC and CSA cement, use of recycled materials in concrete elements.

Dr. Aiello is member of fib, RILEM and ACI committees. Chair of the RILEM TC IMC-Durability of Inorganic Matrix Composites used for Strengthening of Masonry Constructions. Member of Study Groups of CNR (National Research Council), National Higher Council of Public Works, ACI and RILEM, for the assessment of technical documents concerning the design and qualification of new materials (FRCM, CRM, FRP) for strengthening existing structures.

STRENGTHENING OF MASONRY STRUCTURES WITH INORGANIC MATRIX COMPOSITES (IMCs)

ABSTRACT: Nowadays rehabilitation of existing masonry buildings has a key-role in the field of civil constructions, as a large part of them is dated back over centuries and in many cases protected by heritage institutes. On the other hand, Rehabilitation and Sustainability complement each other since reuse of old buildings avoids the disposal and its consequent environmental impact and prevent the expansion of built environment, furthermore conservation is becoming a priority to deliver the built cultural heritage in good shape for the future generations.

In this context, the interest in adequate materials and techniques for structural rehabilitation has steadily grown in recent years, aiming to guarantee safety requirements, extending the building service life, limiting the environmental impact. The use of Steel Reinforced Mortar (SRM) and Fiber Reinforced Polymer (FRP) have been experienced as strengthening techniques for masonry structures in the past. SRM has widely evidenced its vulnerability to electrochemical corrosion while FRPs have been proved to be hardly compatible with historical masonry not only from a mechanical point of view but also because of the application of that material often does not accomplish the stringent rules of conservation and limits the breathability of the existing masonry.

A new generation of systems and materials, namely Inorganic Matrix Composites (IMC), consisting in a fiber mesh or FRP grid, combined with mortar, seems able to overcome the mentioned drawbacks. The main features of these emerging materials and systems will be presented along with their field of application. In particular, the main focus will be done on the confinement of masonry columns (Fig. 1) and shear strengthening of masonry walls (Fig. 2), introducing also the potential use of new green mortar able to make the strengthening systems effective in contributing to energy retrofitting. In addition, durability issues will be discussed, being at the moment the major gap within the scientific knowledge.

Fig. 1: Confinement of Masonry Columns

Fig. 2: Shear Strengthening of Masonry

KEYNOTE SESSION nº 3: September 14th, 2022, 10h30-11h05 (Room 1)

PROF. DR. JOSÉ M. ADAM

Jose M. Adam is full Professor at the Universitat Politècnica de València – UPV, where he is engaged in teaching in the Civil Engineering School and the Department of Construction Engineering. Prof. Adam is the group leader of Building Resilient (www.b-resilient.webs.upv.es), a research group at ICITECH-UPV. Before joining the UPV in 2005, he worked as a structural engineer and was involved in the design and construction of many large projects.

His research is carried out in the structural engineering field and has always been oriented towards improving the resilience of buildings and infrastructures. The areas in which he is now working are: 1) structural assessment; and 2) progressive collapse and robustness. Prof. Adam considers himself an experimentalist and his research has always been associated with ambitious experimental campaigns, including many on full-scale structures. He combines basic and applied research with a high degree of transfer to industry. The following are some of the highlights of his professional career: Holder of an ERC Consolidator Grant, which is one of the EU's most prestigious research grants, for the amount of €2.5 million; Senior Editor of Construction and Building Materials, one of the leading journals in its field (indexed in the JCR; Q1; 1st decile); and Partner-founder of Calsens (UPV spin-off company), which is involved in monitoring structures, structural assessment and decision making.

RECENT EXPERIMENTAL RESEARCH ON STRUCTURAL ROBUSTNESS AT THE ICITECH-UPV

ABSTRACT: Present-day buildings and infrastructures are becoming increasingly prone to the devastating consequences of extreme abnormal events caused by climate change, terrorist threats or simple ageing, among others. These events often cause local-initial damage to critical structural elements, closely followed by a cascade of further failures in the rest of the building/infrastructure. This phenomenon, known as "progressive collapse", is usually accompanied by serious losses in terms of material and human lives

Due to the importance of avoiding progressive collapse, the concept of robustness, understood as insensitivity to a local failure, has been introduced in present-day design standards. Achieving resilient societies involves making the buildings and infrastructures we use resilient, so that there is an urgent need for robust buildings and infrastructures.

Building Resilient is an ICITECH's research group at the Universitat Politècnica de València (UPV), involved in large-scale testing in the structural engineering field. Since 2017, Building Resilient has dedicated a large part of its resources to research in structural robustness and the progressive collapse of buildings and infrastructures with the aim of contributing to improving resilience in our society.

This keynote lecture will present Building Resilient's most recent research in the field of robustness and progressive collapse, based on tests on full-scale specimens. This will include: 1) shoring systems used during the construction of building structures; 2) cast-in-place reinforced concrete building structures; 3) precast concrete building structures; 4) timbrel cross-vaults; and 5) steel truss bridges. The present situation of the ongoing Endure project, financed by the European Research Council (ERC), will also be described.

Testing a full-scale building subjected to column-removal scenarios

Testing a real steel riveted railway bridge (built in 1915) to analyse its robustness after failing some of its elements

KEYNOTE SESSION nº 4: September 14th, 2022, 11h10-11h45 (Room 1)

PROF. DR. BELÉN RIVEIRO

Dr. Belén Riveiro is an Associate Professor of Structural Engineering at the University of Vigo (Spain) since 2012. She holds a MSc in Construction Engineering (2015), MSc in Forestry Engineering (2006) and a PhD in Environmental Engineering (2011). She has been an Associate Professor in Geomatics at Newcastle University (UK) in 2011-12, and was a postdoctoral visiting research fellow at the University of Minho (2012 and 2014), the University of Cambridge (2015) and at Delft University of Technology (2016).

Her research is focused on the application of remote sensing technologies in structural engineering for the automated modelling, inspection and material characterization using inverse analysis procedures. She has a strong multidisciplinary profile thanks to her involvement in projects comprising non-destructive testing and photogrammetry, structural engineering and artificial intelligence. Her research has been associated with ambitius experimental campaigns, including many in-service bridges and the hundreds of km of road and railway networks. She has been principal Investigator in several research and innovation projects (at national and international level) and coordinator of an European action on the resilience of transport infrastructure to extreme events (within the H2020 Framework Program). She is Associate Editor of Remote Sensing (MDPI), and Secretary of the ISPRS WGII/10 3D Mapping for Environmental & Infrastructure Monitoring for the period 2016-2022.

REACHING RESILIENT TRANSPORT INFRASTRUCTURES: SOME EXAMPLES OF MULTIDISCIPLINARY RESEARCH TO OPTIMIZE THE MAINTENANCE OF LARGE INFRASTRUCTURE

ABSTRACT: Resilience of transport infrastructure has been gaining attention over the last years. There is an increasing concern about the exposure of ageing infrastructure assets to extreme events and their recovery capability. Bridges are challenging structures to design and built, especially those designed to spam large distances as those in rivers, and become one of the most vulnerable assets within the transportation network. Most of the bridge stock built after 1945 was projected with a design life of 50-100 years, being most of them operational today. Ageing processes together with the changing loading conditions make these assets specially vulnerable to structural damage and material degradation. To ensure the optimal operation of inland transportation networks, appropriate maintenance practices are required. Structural health monitoring (SHM) is the first step in order to obtaing reliable information for enhanced mantainance, not only for the diagnosis of the asset, but also to anticipate its structural reponse in case an extreme event ocurrs. Due to the large number of these type of structures in our transport networks, new techniques and methods facilitating a more accurate diagnostic and safety assessment are being demanded.

In parallel, digitalization is playing a key role in the adoption of innovative methods that allow the optimization of maintenance expenditures. As a result, new techniques in data acquisition and monitoring are being proposed in order to reduce the vulnerability of infrastructures. For instance, Laser Scanning systems provide accurate geometric data of actual condition of assets, which can be then processed into a digital information model of the infrastructure (eg. as-is BIM model). In the last years Laser Scanning has been investigated as a component of multidisciplinary surveys, where synergies between multi-source data have been demonstrated. In addition, automation is another requirement when the analysis are to be performed at a large scale and in a more objective manner.

This talk will present some recent examples of the research where different non-destructive techniques have been combined in order to acquire the actual condition of various in-service infrastructure assets, with the purpose of being used for the structural diagnosis. Different experiences including both the model-based and the data-driven SHM approaches will be presented. Automated data processing will be another key point in this talk, motivated by the Big Data nature of the datasets typically collected during the survey and monitoring of large infrastructure. A revision of methods successfully applied to the processing of the aforementioned data will be presented. These include: i) Machine Learning, Deep Learning or Heuristics for the handling of large datasets; and ii) surrogate modelling techniques such as Kriging or Surface Response Models as time-reduction strategies in model-based SHM.

KEYNOTE SESSION nº 5: September 15th, 2022, 10h30-11h05 (Room 1)

ARCH. ANTONIO MARTÍN MUÑOZ

Arquitecto (Edificación y Urbanismo) por la E.T.S.A. Sevilla. Julio 1989. Arquitecto Restaurador-Conservador de la Abadía del Sacromonte desde 2014.

Su ejercicio profesional se ha orientado hacia la especialización en restauración y rehabilitación de inmuebles y conjuntos patrimoniales, habiendo intervenido en un gran número de obras, entre otras: Restauración de la Iglesia de San Juan de los Reyes (Premio Unión Europea de Patrimonio Cultural Europa Nostra), Restauración de los Castillo de Castril y Ferreira, Alcazaba de Loja, Palacio de Dar-al-Horra, Monasterios de San Jerónimo y Santa Isabel la Real, rehabilitación de la Abadía del Sacromonte y de las iglesias de San Nicolás, San Andrés y San Cecilio de Granada, Consolidación de Torres Bermejas, etc.

Igualmente, ha intervenido en diversos espacios públicos vinculados a edificios catalogados: entornos de las iglesias mudéjares de Albuñán, Cortes, Cogollos de Guadix y Graena, o de las cuevas medievales de Los Algarbes y Los Camariles en Beas de Guadix (Granada), los Covarrones de Cortes o el acceso al Castillo de Castril. Además, se han rehabilitado más de 400 viviendas y edificios promovidos por la administración y por particulares. Ponente y participante en congresos, seminarios, conferencias y visitas al patrimonio.

ARQUITECTURA DE MUCHOS TIEMPOS: LA ABADÍA DEL SACROMONTE EN GRANADA

ABSTRACT: A partir de 1595, en lo que se identificaron como unos hornos de cal de época romana (caleras), en el paraje de Valparaiso, extramuros de la ciudad, se producen una serie de hallazgos de reliquias relacionadas con los santos mártires primeros evangelizadores de la Bética y particularmente de San Cecilio, patrón de la ciudad, junto a más de doscientas láminas circulares de plomo con textos en latín, árabe y otros grafismos, revolucionado la sensibilidad religiosa del momento, obligando a la intervención de la corona e incluso del propio papado de Roma. El lugar pasó conocerse como el Sacro-Monte (Monte Sagrado). El fervor popular suscitado por estos acontecimientos y el decidido apoyo del entonces arzobispo de Granada, culminaron con la erección de una abadía con casa para canónigos y colegio.

Surge así la desconocida –la sombra de la Alhambra es muy extensa– Abadía del Sacromonte que se configura como el mayor complejo monumental de la ciudad tras la fortaleza palatina medieval. Durante cuantrocientos años, con períodos de gran dinamismo y otros de indudable recesión, la Abadía del Sacromonte se ha constituido como referente religioso, cultural, docente y social de la ciudad. Todo ello acompañado por sucesivas ampliaciones del conjunto arquitectónico, para adecuarse a las demandas de cada iniciativa. En la actualidad, son más de 20.000 m² construidos en edificios como las Santa Cuevas, los Colegios Viejo y Nuevo, la Casa de los Canónigos, iglesia colegiata de la Asunción, iglesia y jardines de San Dionisio, edificio de Recepción, etc., correspondientes a diferentes estilos arquitectónicos según los períodos en que se alzaron. El último decenio se ha caracterizado por un importante proceso de revitalización que incide, directamente, en las construcciones y usos del conjunto, con una inversión inicial superior a cinco millones de euros para intervenciones arquitectónicas y con un evidente crecimiento –mitigado sensiblemente por la crisis sanitaria del covid-19-, tanto turístico como de otros usos que se van implantando, lo permite aventurar una nueva etapa de esplendor.

KEYNOTE SESSION nº 6: September 15th, 2022, 11h10-11h45 (Room 1)

PROF. DR. PAULO B. LOURENÇO

Professor at the Department of Civil Engineering, University of Minho, Portugal, and Head of the Institute in Sustainability and Innovation in Structural Engineering, with 200 researchers. Experienced in the fields of non-destructive testing, advanced experimental and numerical techniques, innovative repair and strengthening techniques, and earthquake engineering. Specialist in structural conservation and forensic engineering, with work on 100+ monuments including 17 UNESCO World Heritage. Leader of the revision of the European masonry code (EN 1996-1-1).

Coordinator of the European Master on Structural Analysis of Monuments and Historical Constructions, with alumni from 70+ countries and European Heritage / Europa Nostra Award (most prestigious in Europe). Editor of the International Journal of Architectural Heritage and advisor of the Conference Series on Structural Analysis of Historical Constructions. Supervised more than 50 PhD theses and coordinate multiple national and international research projects. Recently awarded an Advanced European Research Council Grant of 3.0 M€ to develop an integrated seismic assessment approach for heritage buildings. Coordinator of a just awarded innovative training network sustainable building lime applications via circular economy and biomimetic approaches with 15 PhD students across Europe.

CONSERVATION AND MANAGEMENT OF THE BUILT HERITAGE: RECENT WORKS ON MODERN HERITAGE BUILDINGS OF PORTUGUESE ORIGIN

ABSTRACT: Our built heritage is at risk, and this crisis requires professionals who have the ability to protect our shared heritage from various threats, including natural decay, human interventions, climatic changes, and natural hazards. Specialized expertise is necessary to advance protection of built cultural heritage - formerly a niche area, now increasing in importance. We need professionals able to understand structural systems in different cultural contexts, and we must encourage them to develop their expertise with a valuable international perspective. These trained professionals have their own intrinsic market value, with knowledge often not possessed by regularly trained engineers and architects. This knowledge includes techniques of seismic retrofitting that can be extended into any existing building, not just historic fabric; forensic engineering skills such as inspection, diagnosis, and arrest of deterioration and damage in various forms of historic construction; in-depth knowledge of survey techniques; and good writing and communication skills.

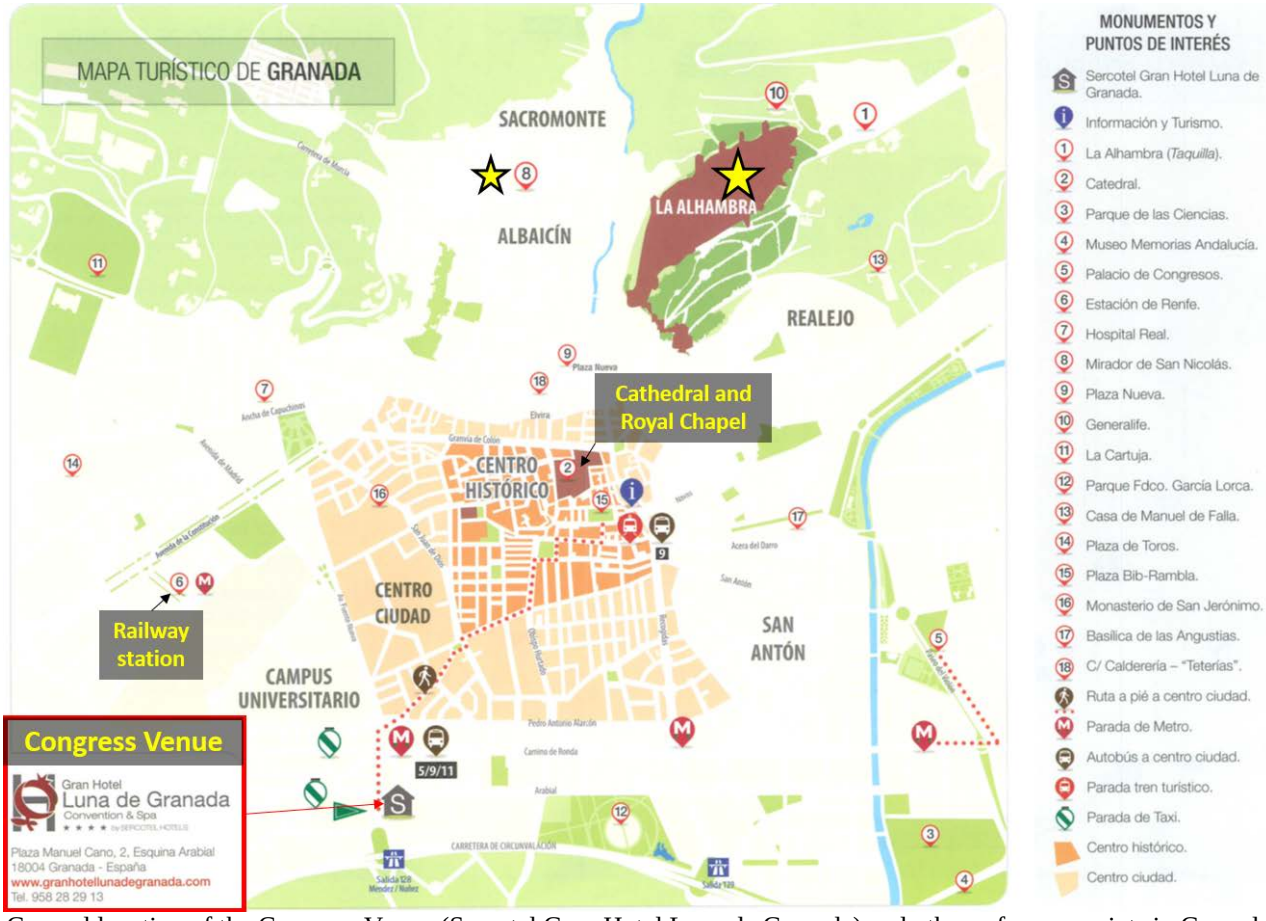
This talk will address the definition of an integrated methodology for preventive conservation historic buildings, the leverage of advanced technologies for the implementation of the methodology and standardization of methods and tools through the development of rules of "good practice". It is a must to raise public awareness about the societal and economic benefits associated with the adoption of regular preventive conservation actions. For this purpose, two recent works in modern heritage buildings and their conservation management plans will be addressed. The first one is in Beira, Mozambique, which witnessed some of the most important projects of the Modern Movement in the Colonial Portuguese Africa, namely its train station. The building was considered among the 100 more important 20th century Portuguese engineering buildings. The most striking sector of the complex is the atrium of the train station, with a large vault, asymmetrically juxtaposed to the office building and creating a large volume. The second one needs no further details, as one of the earliest works of the renowned Portuguese architect Álvaro Siza, the Swimming Pool in Leça.

Beira Central Station. Mozambique

Protheses try-outs at Siza Vieira Swimming Pools, Portugal

Day / Hour	Tuesday September 13th	Wednesday September 14th	Thursday September 15th	Friday September 16th
8h30	DOCUMENTATION DELIVERY	DOCUMENTATION DELIVERY	DOCUMENTATION DELIVERY	
9h00	PARALLEL SESSIONS	PARALLEL SESSIONS	PARALLEL SESSIONS	POST-CONGRESS TRIP (optional)
9h30				
10h00				
	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK	
10h30	KEYNOTE SESSIONS 1 & 2	KEYNOTE SESSIONS 3 & 4	KEYNOTE SESSIONS 5 & 6	
11h00				
11h30				
	BREAK	BREAK	BREAK	
12h00	OPENING	LUNCH	PARALLEL SESSIONS	
12h30				
13h00				
13h30	LUNCH	BREAK	LUNCH	TREASURES OF ANDALUSIA: RENAISSANCE MONUMENTAL ENSEMBLES OF ÚBEDA AND BAEZA (UNESCO World Heritage Sites)
14h00		IMPORTANT Buses departures: 14:00h		
14h30				
15h00	PARALLEL SESSIONS	TECHNICAL - CULTURAL TRIP	PARALLEL SESSIONS	
15h30				
16h00				
16h30	COFFEE BREAK	The ALHAMBRA and the magnificent gardens of the Generalife (UNESCO World Heritage Site)	COFFEE BREAK	
17h00	PARALLEL SESSIONS		PARALLEL SESSIONS	
17h30				
18h00			CLOSING	
18h30				
19h00				
19h30	WELCOME RECEPTION at *"Carmen de la Victoria"*			
20h00				
20h30				
21h00			CLOSING DINNER at *"Carmen de Los Mártires"*	

The Congress venue is the Sercotel Gran Hotel Luna de Granada****, which is sited in *Guitarrista Manuel Cano* Square, 2, ZIP code 18004 Granada, Spain (Google maps: latitude 37.176775; longitude -3.612387). It is located only within ten-minute distance from the historical centre.



General location of the Congress Venue (Sercotel Gran Hotel Luna de Granada) and other reference points in Granada

The hotel features several meeting rooms for conventions and conferences. The function rooms are multimodal, with natural light and Business Center.

The opening and closing sessions, the keynote lectures, the parallel sessions, coffee breaks and lunchs will be develop in the Congress venue.

AIRPORT	
***Federico García Lorca* Granada-Jaén Airport**	**Málaga-Costa del Sol Airport**
http://www.aena.es/en/federico-garcia-lorca-granada-jaen-airport/index.html	http://www.aena.es/en/malaga-airport/index.html
There are more flights in Málaga-Costa del Sol Airport than in F.G.L. Granada-Jaén Airport, but you have to travel from Málaga to Granada (around 140 km)	

POSSIBLE WAYS TO ARRIVE AT GRANADA FROM MADRID

RAILWAY (AVE – Spanish High-Speed Raiway, operated by Renfe)		
From	To	Approximate fare
'Puerta de Atocha' Station (Madrid) https://bit.ly/2HUSRwH	Granada Railway Station http://bit.ly/2OzL3om	Around 40-65€ (one-way ticket)
BUS		
From	To	Approximate fare
South bus station 'Méndez Álvaro' (Madrid) https://bit.ly/2JjLRIS	Granada bus station http://bit.ly/31yIUyt	Around 20-30€ (one-way ticket)
RENT A CAR		
The main companies (placed at the airport 'Madrid-Barajas') are listed in the next link: https://bit.ly/2JhTaRC		

DIFFERENT WAYS TO GET AROUND IN GRANADA CITY

WALKING

Walking is the best, and most sustainable,way to get around Granada. You need around 10-15 minutes to get the city center from the Congress Venue (please, see the map of the next page).

TAXI

There are two taxi companies in Granada: Pide Taxi Granada (**+34 958 28 00 00**) and Radio Taxi Genil **(+34 958 13 23 23**). There are 60 designated taxi ranks in Granada. They all have a square blue sign with a T.

Typical Granada taxi fares for your reference:

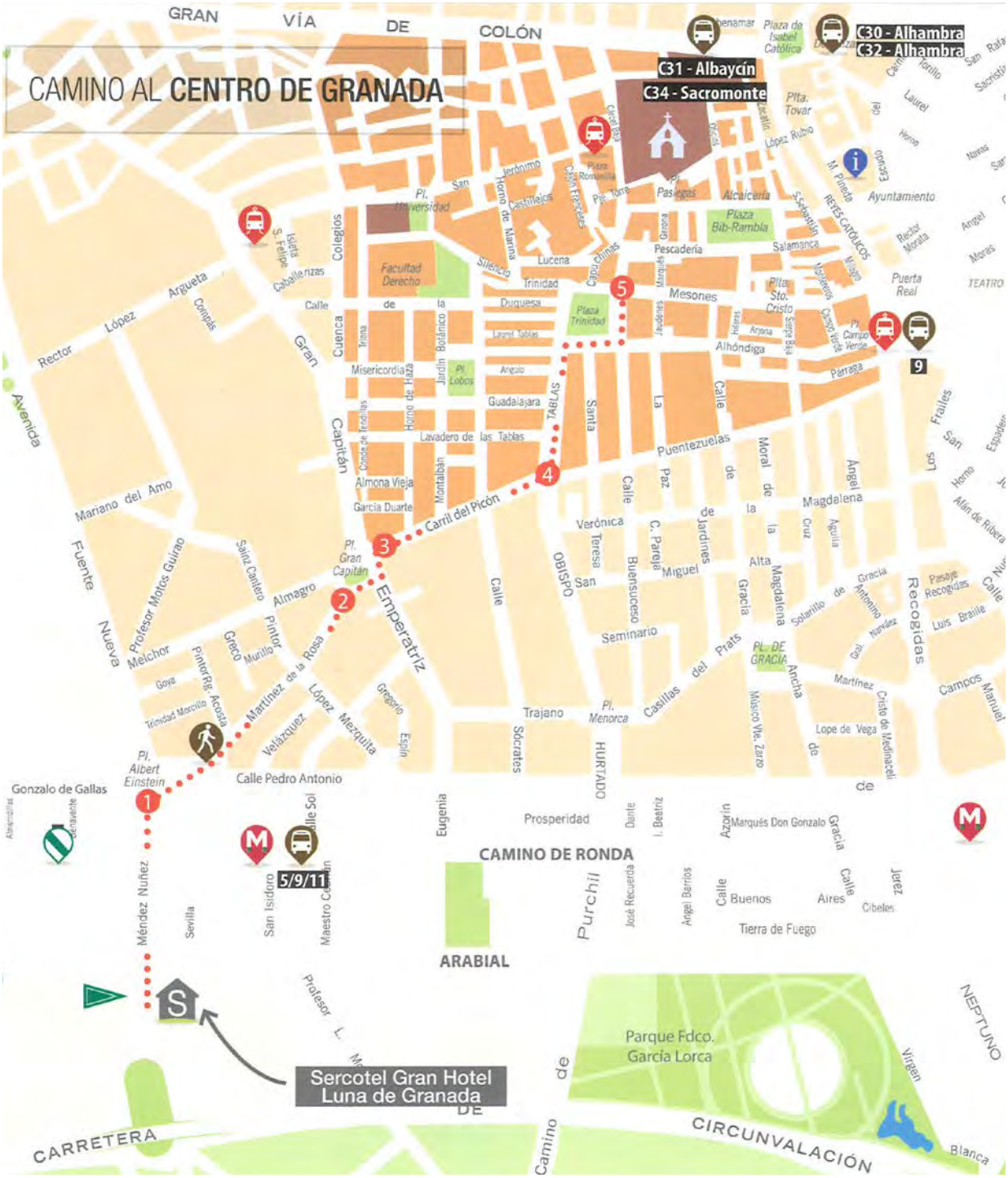
- Bus Station - Granada Centre: 8-11 €
- Bus Station - Granada Airport: 30-35 €
- Granada Centre - Alhambra: 7-10 €
- Granada Centre - Albaycin: 7-8 €

+ Information: https://www.lovegranada.com/transport/granada-taxis/

URBAN TRANSPORT

Bus to Granada city center: Line 9 (it is close to Sercotel Gran Hotel Luna de Granada, around 5 minutes walking).

+ Information: https://www.lovegranada.com/transport/granada-city-buses/



Different ways to get around in Granada city

<table>
<tr><th></th><th>Tuesday
September 13th</th><th>Wednesday
September 14th</th><th>Thursday
September 15th</th><th>Friday
September 16th</th></tr>
<tr><td>Morning</td><td>Companions:
Free Time
(shopping, etc.)</td><td>Companions:
Free Time
(shopping, etc.)</td><td>9h30 – 13h00
Trip (only for the companions)
The Cathedral, Royal Chapel and old downtown of Granada</td><td rowspan="2">9h00 – 20h00
Post-congress Trip
Treasures of Andalusia: Renaissance Monumental Ensembles of Úbeda and Baeza
(UNESCO World Heritage Sites)
(Optional)</td></tr>
<tr><td>Afternoon / Evening</td><td>19h30–20h30
Welcome reception at “Carmen de la Victoria”</td><td>14h00 – 19h30
Technical–Cultural trip
The Alhambra and the magnificent gardens of the Generalife
(UNESCO World Heritage Site)
IMPORTANT
Buses departures: 14:00h</td><td>21h00
Closing Dinner at “Carmen de Los Mártires”</td></tr>
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Tuesday, September 13th
Welcome reception at *"Carmen de la Victoria"*
For Delegates and Companions

The welcome reception is going to be developed at **19:30h** in the ***"Carmen de la Victoria"***.

A *carmen* is a traditional house in Granada, which is characterized by having a garden that functions as an orchard, following the traditional Arab style. Most of these houses have a large whitewashed wall to avoid showing off their lush interiors to outsiders. Due to the relief of these neighborhoods, these estates are usually staggered and their lush vegetation protrudes to the outside.

On the slope of the Chapiz, at the foot of the Albaicin, is the *Carmen de la Victoria*, a traditional 19th-century estate.

This carmen was built on the remains of a convent expropriated with the disentailment that functioned for some years as a prison and hospital. Finally, in 1944, the *Carmen de la Victoria* was built as we know it today. The layout of the gardens has remained unchanged since its construction, preserving the essence of the garden and orchard so characteristic of Granada's *carmenes*. At present, the Carmen de la Victoria belongs to the University of Granada and is used as a guest residence.

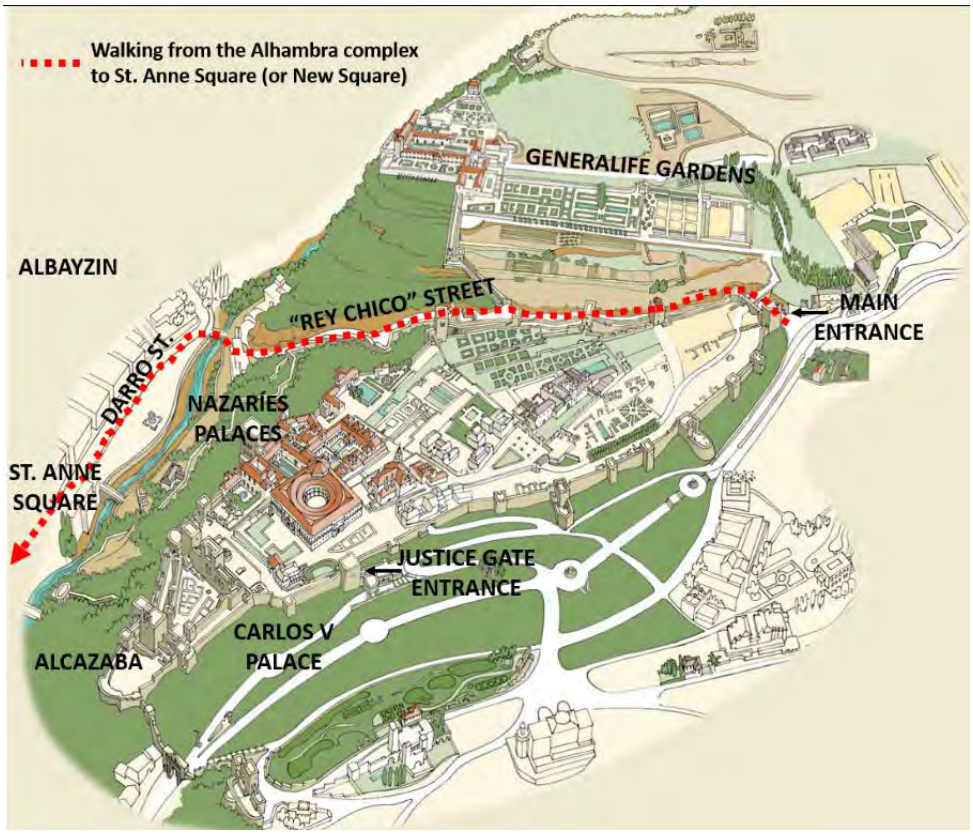
The garden area of this estate is full of hedges, fruit trees, and small fountains. The cypress walkway in the upper area is the oldest part of the carmen, fruit trees, and hedges. Also, inside you'll find one of the greatest viewpoints of the Alhambra in Granada.

Location: Cuesta del Chapiz, 9

Wednesday, September 14th
The Alhambra and the magnificent gardens of the Generalife
For Delegates (full inscriptions, not student inscriptions) and Companions

14:00h Departure from the congress venue (Sercotel Gran Hotel Luna de Granada)

The most part of the technical and cultural visit is going to take place in the Alhambra and Generalife. After that, we will go for a walk by the the surroundings of the complex, going down by the eastern side ("*Cuesta del Rey Chico*") towards the Darro river. Then, we will go through "*Paseo de los Tristes*" and the Darro Street ("*Carrera del Darro*"), until St. Anne Square ("*Plaza de Santa Ana*"), sited in the old downtown of Granada, where the visit will finish.



THE ALHAMBRA

The Alhambra is a palace and fortress complex located in Granada, Andalusia, Spain. It is placed on a strategic point, with a view over the whole city and the meadow (la Vega), and this fact leads to believe that other buildings were already on that site before the Muslims arrived.

Granada underneath the Alhambra

The Alhambra was so called because of its reddish walls (in Arabic, («*qa'lat al-Hamra'*» means Red Castle). It is located on top of the hill al-Sabika, on the left bank of the river Darro, to the west of the city of Granada and in front of the neighbourhood of the Albayzín.

Albayzín neighbourhood

It is now one of Spain's major tourist attractions, exhibiting the country's most significant and well-known Islamic architecture, together with 16th-century and later Christian building and garden interventions. The Alhambra, Generalife and Albayzín neighbourhood are UNESCO World Heritage Sites.

Moorish poets described it as "*a pearl set in emeralds*", an allusion to the colour of its buildings and the woods around them. The palace complex was designed with the mountainous site in mind and many forms of technology were considered. The park (Alameda de la Alhambra), which is overgrown with wildflowers and grass in the spring, was planted with roses, oranges, and myrtles; its most characteristic feature, however, is the dense wood of English elms brought by the Duke of Wellington in 1812. The park has a multitude of nightingales and is usually filled with the sound of running water from several fountains and cascades. These are supplied through a conduit 8 km (5.0 mi) long, which is connected with the Darro river at the monastery of Jesus del Valle above Granada.

The Alhambra: "a pearl set in emeralds"

Brief historical introduction

The first historical documents known about the Alhambra date from the 9th century and they refer to Sawwar ben Hamdun who, in the year 889, had to seek refuge in the Alcazaba, a fortress, and had to repair it due to the civil fights that were destroying the Caliphate of Cordoba, to which Granada then belonged. This site subsequently started to be extended and populated.

The castle of the Alhambra was added to the city's area within the ramparts in the 9th century, which implied that the castle became a military fortress with a view over the whole city. In spite of this, it was not until the arrival of the first king of the Nasrid dynasty, Mohammed ben Al-Hamar (Mohammed I, 1238-1273), in the 13th century, that the royal residence was established in the Alhambra. This event marked the beginning of the Alhambra's most glorious period.

Yusuf I (1333-1353) and Mohammed V (1353-1391) are responsible for most of the constructions of the Alhambra that we can still admire today. From the improvements of the Alcazaba and the palaces, to the Patio of the Lions (Patio de los Leones) and its annexed rooms, including the extension of the area within the ramparts, the Justice Gate (Puerta de la Justicia), the extension and decoration of the towers, the building of the Baths (Baños), the Comares Room (Cuarto de Comares) and the Hall of the Boat (Sala de la Barca). Hardly anything remains from what the later Nasrid Kings did.

Patio of the Lions

Baths

Comares Room

After the conclusion of the Christian Reconquista in 1492, the site became the Royal Court of Catholic Monarchs, Ferdinand and Isabella. It was where Christopher Columbus received royal endorsement for his expedition.

Granada's surrender in 1492 (Francisco Pradilla, 1882)

Catholic Monarchs and Christopher Columbus (Emanuel Leutze,1843)

From the time of the Catholic Monarchs until today we must underline that Charles V ordered the demolition of a part of the complex in order to build the palace which bears his name. We must also remember the construction of the Emperor's Chambers and the Queen's Dressing Room ("Peinador de la Reina").

Charles V palace

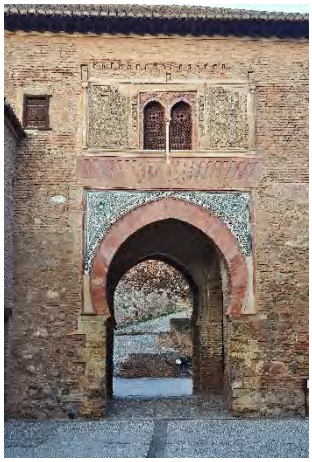
Throughout the 18th century the Alhambra was abandoned. During the French domination part of the fortress was blown up. It was not until the 19th century when the site was rediscovered, starting the process of repairing, restoring and preserving which is still maintained nowadays.

During the 18th century the Alhambra was abandoned

Restoration works

Architectural & artisctic introduction

The Nasrid architecture marked the end of the glorious period that started with the Umayyads in Cordoba in the 8th century. The architects of the Cordovan mosque, which was built a long time before the Alhambra, did not influence this architecture. It includes some of the typical elements of the andalusian architecture, such as the horseshoe arch with sprandel (square wide frame which envelopes the arch) and the arch scallops (arch scallop of triangular shape), as well as its own special elements such as the capitals of the columns of the Alhambra.



Horseshoe arch with sprandel (Wine Gate)

Arch scallop of triangular shape

Column detail

Most of the palace buildings are quadrangular in plan, with all the rooms opening on to a central court, and the whole reached its present size simply by the gradual addition of new quadrangles, designed on the same principle, though varying in dimensions, and connected with each other by smaller rooms and passages.

Alhambra was extended by the different Muslim rulers who lived in the complex. However, each new section that was added followed the consistent theme of “paradise on earth”. Column arcades, fountains with running water, and reflecting pools were used to add to the aesthetic and functional complexity. In every case, the exterior was left plain and austere. Sun and wind were freely admitted. Blue, red, and a golden yellow, all somewhat faded through lapse of time and exposure, are the colors chiefly employed.

The greatest concern of the architects of the Alhambra was to cover every single space with decoration, no matter the size of the space. No decorative element was enough. Most of the interior arches are false arches, with no structure; they are there only to decorate. Walls are covered with beautiful and extremely rich tile mosaics ("alicatado") and plasterwork (carved stucco) rather than stone. And the coverings have wooden frames that have been exquisitely carved, etc.

Tile detail at the Alhambra

Carved stucco at the Alhambra

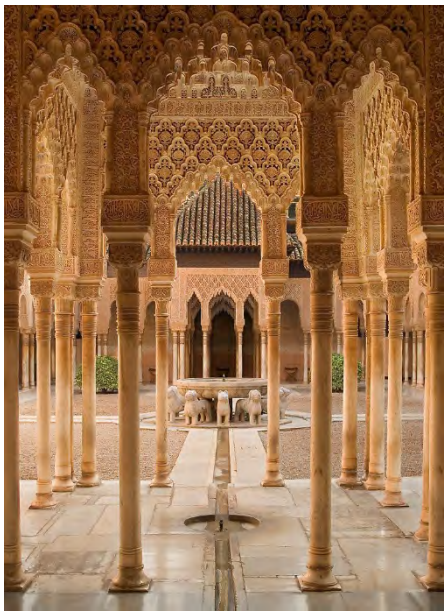
Even though the Muslim art bans the representation of figures, the decorating themes in the Alhambra are quite varied. The classical calligraphic decoration is used, in particular cursive and kufic inscriptions, which reproduce the words of Zawi ben Ziri (founder of the Nasrid dynasty): "*Only God is Victor*", and poems written by different poets of the court. The decorative elements most often used by these architects were stylised vegetal forms ("ataurique"), interlacing decoration and complicated mathematical patterns ("lacería").

Kufic inscriptions

Ataurique

The Alhambra was built with its own special type of column, which is not used in any other building. This column has a very fine cylindrical shaft, the base of which has a big concave moulding and is decorated with rings on the top part. The capital is divided into two bodies and the first one, cylindrically shaped, has a very simple decoration and a prism with a rounded-angled base and stylised vegetal forms as decoration.

One of the most impressive decorative elements used in the Alhambra is the mocarabe vault, formed by little cells or alveoluses placed one on top of the other one and which may be admired in the Hall of the Abencerrajes ("Sala de los Abencerrajes") and the Hall of the Two Sisters ("Sala de las Dos Hermanas").

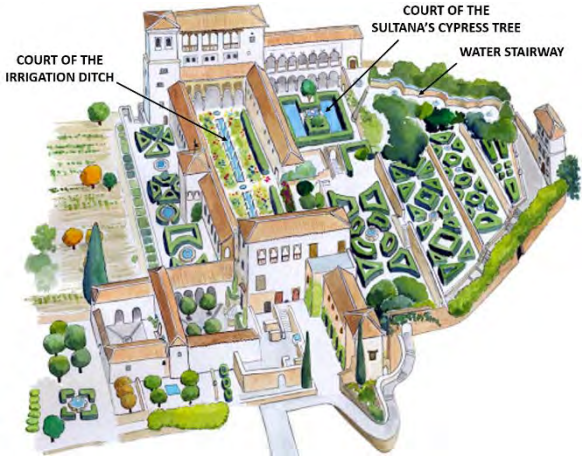


Special type of Alhambra's columns

Mocarabe vault (Hall of the Abencerrajes)

THE GENERALIFE

The Generalife became a leisure place for the kings of Granada when they wanted to get away from the official affairs of the palace. It occupied the slopes of the Hill of the Sun, from which there is a complete view over the city and the valleys of the rivers Genil and Darro. There are different interpretations of the meaning of its name: the Governor's Garden, the Architect's ("*alarife*") Garden, the Vegetable Garden of the Gypsy Festivity Organiser, etc.



General perspective of Generalife

Court of the Irrigation Ditch

It was built in the 13th century. In spite of it being very close to the Alhambra and the close relationship between the two complexes, it is considered to be outside the city. Nowadays the Generalife is formed by two groups of buildings connected by the Court of the Irrigation Ditch. Nevertheless it is difficult to know what the Generalife originally looked like, as it has been altered and rebuilt at different moments throughout the Christian period. These changes were at first necessary due to the sorry state of deterioration and neglect that was the result of the late Muslim period and later on they changed its layout and distorted many of its features.

In the Generalife there is no kind of decorative excess or points of interest in its architecture. Unlike the Alhambra, all the buildings of the Generalife are quite solid, but in general poor and simple. This indicates an intimate and peaceful atmosphere that the kings were looking for when

they retired to these gardens to rest. There are only some decorative motifs of plasterwork, which are not very varied, but are exquisitely fine and tasteful.

Besides of the Patio of the Irrigation Ditch, which is the most important part of the Generalife, another interesting space is the Court of the Sultana's Cypress Tree. It is named after its most famous old cypress. The Water Stairway, one of the staircases in these gardens is especially beautiful because of its beauty and originality.

Court of the Sultana's Cypress Tree

Water Stairway

19:00h Walking towards Granada's downtown.

As it was previously referred, we will go down towards Granada's downtown by Rey Chico Street. Then, we will go through "Paseo de los Tristes" and the Darro Street until St. Anne Square, where the visit will finish.

Rey Chico Street

"Paseo de los Tristes"

Darro Street

New Square and St. Anne Square

Around 19:30h Arriving at Granada's downtown.

Thursday, September 15th
The Cathedral, Royal Chapel and old downtown of Granada
Only Companions

09:30h Departure from the congress venue (Sercotel Gran Hotel Luna de Granada).

During the trip for companions the Cathedral, Royal Chapel and old downtown of Granada will be visited.

CATHEDRAL

The construction of Granada Cathedral was begun by Queen Isabella immediately after the conquest of Granada on the site of the Mosque. Carlos V, always respectful to the memory of his ancestors, made sure that the Cathedral was built in accordance with desires of the Catholic kings. This cathedral is a masterpiece of Spanish Renaissance style, with impressive facades and a stunning interior with a grand altar and many chapels of different ages and styles, the most interesting being the chapel of "*Nuestra Señora de la Antigua*". It is one of the largest cathedrals in the world.

The first stone of the Cathedral of Granada was laid in 1523 on the site of the ancient mosque. Its master builder was Enrique Egas. These works, concentrating on the foundations, lasted five years. Egas was replaced by Diego de Siloé, another Spanish master builder trained in Italy. His first decision was to change the Gothic style of Granada Cathedral to the Renaissance style. He persuaded the King to change the style, which was possible because what built Egas was only the foundations.

The Cathedral of Granada was left incomplete in its facade. Of the two towers planned only one was built and its height had to be lowered because the foundations for a Gothic cathedral could not resist the heavy mass of the tower.

Granada Cathedral

Burial monument of the Catholic Monarchs in the Royal Chapel

ROYAL CHAPEL

The Royal Chapel is located between Granada Cathedral, the old Fish Market and the Church of Sagrario. The construction of the Royal Chapel of Granada was ordered by the Catholic Monarchs in 1504 as a place of burial for their bodies. The Monarchs died before the chapel was finished, and their bodies rested in the convent of San Francisco de la Alhambra (today the "*Parador Nacional de Turismo"*) until the Royal Chapel was completed. Charles V was subsequently commissioned in 1521 to move the bodies of his grandparents to the newly completed chapel. Carlos V buried almost all the dead of the family in the Royal Chapel, including Ferdinand and Isabella, Philip the Handsome and Joanna the Mad, his wife Elizabeth, their children and Princess Maria of Portugal, wife of Prince Philip.

It was Philip II who moved everyone buried in the chapel to his newly built Escorial. He left only the Catholic Monarchs and Philip and Juana, who currently lie with their parents.

The burial monument of the Kings is the work of the Italian Domenico Fancelli, who built it in Genoa with Carrara marble, while that of Joanna the Mad and Philip the Handsome is the work of Bartolomé Ordóñez.

WALKING THROUGH GRANADA'S DOWNTOWN

After that, companions will go for a walk for the Granada's old downtown. They could visit, among other sites, the "*Corral del Carbón*" and the silk market or "*Alcaicería*".

The "*Corral del Carbón*" is the only Nasrid alhóndiga preserved in its entirety in the Iberian peninsula. It was built before 1340, and his original name was "*Al-Funduq al-Gidida*" or New Alhóndiga. Located south of the Muslim city, next to the "*Alcaicería*", to the souk of the Medina and to the Main Mosque, served as inn for merchants in transit, warehouse and wholesale market. In 1494 the Catholic Monarchs granted it to Sancho de Arana. At his death it came to auction, being used as hosting of coal merchants, later as "corral de comedias" and then as a tenement house.

It was declared a National Historic-Artistic Monument in 1918. It currently houses the offices and personnel administration of City of Granada Orchestra, and is home to the International Festival of Music and Dance of Granada. It is also occasional stage in the courtyard, of theatrical performances, flamenco concerts and conferences.

Corral del Carbón: main door and indoor view

Alcaicería market

The name Alcaicería (in Arabic "*al-Kaysar-ia*") means the "place of Caesar", to thank the Byzantine Emperor Justinian, after he granted the Arabs the exclusive right to manufacture and sell silk in the 6th century.

The Alcaicería, home of the Great Bazaar of Granada, was originally a labyrinth of streets and alleyways between New square and Bib-Rambla square, bursting with more than 200 stalls selling Arabic silks, spices and other precious goods. The Granadan Alcaicería was built in the 15th century, and survived until the 19th century, when a fire sadly destroyed it. A replica was built in a neo-Moorish style, beginning just off the Reyes Catolicos street and extending back as far as the Cathedral.

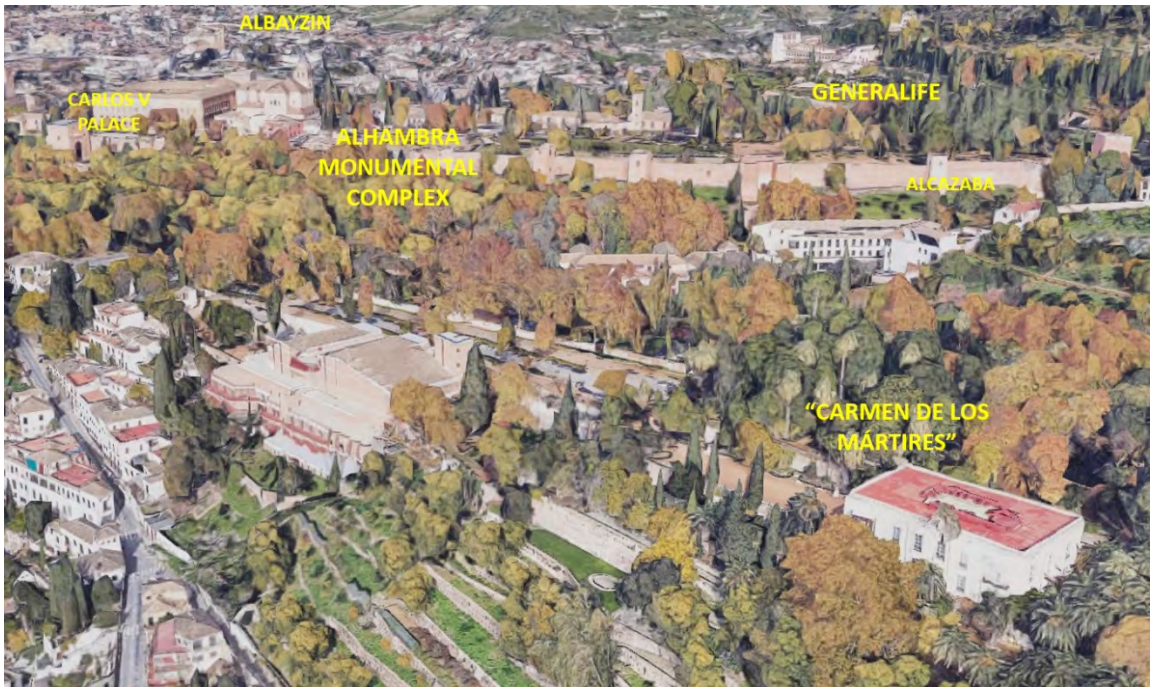
These days the Alcaicería is home to Granada's souvenir stalls, selling a variety of ethnic clothing, Arabic craftwork (traditional painted ceramics, wooden inlay and typical stained-glass lamps) and souvenir memorabilia.

13:00h Arriving at congress venue.

Thursday, September 15th
Closing Dinner at *"Carmen de Los Mártires"*
For Delegates (full inscriptions, not student inscriptions) and Companions

The closing dinner is going to be developed at **21:00h** in the wonderful ***"Carmen de Los Mártires"***.

Just a few metres away from the famous Alhambra Tours, Granada keeps one of its stunning wonders, an oasis hidden away from the hustle and bustle of a capital city. *Carmen de los Mártires* (Carmen of the Martyrs), the largest garden in the city of Granada, stretches out over seven hectares along the southern slopes of Mauror Hill on a piece of land belonging to the Alhambra and that the Moors referred to as Campo de Ahabul. *Carmen de los Mártires* is a 19th-century construction made up of a palace building and vast gardens.



Carmen de los Mártires location in the city of Granada

If we look at the origins of both the place and its name, we find they are also curious. In the 11th century, a compound for jousting and military tournaments was built at the Mauror hill. In addition, they stored supplies for the fortress that they had started to build on the nearby Sabika Hill, which would then grow to become what we know today as the Alhambra. The palace area of the Alhambra was under construction, and the captive Christian workers began being imprisoned here. The area became known by Christians as *Campo de los Cautivos* (Field of Captives). The large dungeons which were dug out of the rock came to house up to 7000 prisoners, many of whom died during the seizure of the city at the end of the 15th century, when the Catholic Monarchs conquered Granada. Boabdil, the last Nasrid king, set out from this spot to deliver the keys of Granada to Isabella I of Castile, who ordered the construction of a hermitage -the city's first church- at the top of the hill, in honour of those Christian martyrs. Although the hermitage no longer exists today, its history led to the name of *Carmen de los Mártires.*

In 1573, that first hermitage was transformed into the Convento de los Carmelitas Descalzos (Discalced Carmelites Monastery), which had an orchard. San Juan de la Cruz, the prior of the monastery between 1582 and 1588, walked through this garden many years ago. The mystical

poet, who wrote most of his verses here, also planted trees, helped design the layout of the gardens and built an aqueduct that brought water from Generalife and can still be seen today. It is said that he would always read and write under the shade of the same tree, an odd cypress variety that is often confused with a cedar. The tree in question was brought from Mexico by Carmelite Missionaries and replanted by San Juan de la Cruz himself. Although it was struck by lightning 20 years ago, the old tree remains standing, with its branches reaching up towards the sky along the edge of the garden.

San Juan de la Cruz's odd cypress

Other views of the gardens

Between 1614 and 1620 a new church was constructed in order to replace the original. The whole convent was demolished in 1842 following the Ecclesiastical Confiscation of Mendizábal. After the monastery was demolished, the property was purchased by General Carlos Calderón and he ordered the construction of the existing mansion. However, Carmen de los Mártires did not reach its maximum splendour until it was ultimately acquired by a wealthy Belgian named Hubert Merrsmans in 1891.

During the second half of the 19th-century and the 20th-century historic gardens were built in an array of styles around the mansion. The French Baroque garden, which surrounds a small, round area with a fountain honouring Neptune in the centre and is surrounded by other statues that symbolise the four seasons, is home to magnolia trees, palm trees, orange trees and shrubs in bloom. Of the Spanish garden, only a pond surrounded by rose bushes and lime trees remains today since the rest was destroyed in the 1960s. The English-style garden, formed by a grove of palm trees presided by a fountain honouring Philip II of Spain, can be found behind the mansion.

French Baroque garden

English-style garden

Inspired by the Water Channel Courtyard of the Generalife, the neo-Nasrid courtyard was built in 1944 as a tribute to the gardens of the Nasrid dynasty, with jasmines peering out of the large windows and a rectangular pond in the middle.


Neo-Nasrid courtyard

Carmen de los Mártires was classified as a Cultural Heritage Site in 1943. Today, to the delight of locals and visitors alike, it is a public municipal area where weddings, celebrations or other events can also be hosted.

Outdoor view of the Palace

Indoor view of the Palace

Location: Paseo de los Mártires, s/n.

Friday, September 16th: Post-congress trip (Optional)
Treasures of Andalusia:
Renaissance Monumental Ensembles of *Úbeda* and *Baeza*

9:00h Departure from the congress venue (Sercotel Gran Hotel Luna de Granada).

The optional trip will include a visit to the Historic Sites of Úbeda and Baeza (UNESCO World Heritage Sites since 2003), located in the heart of the Andalusian province of Jaén.

The urban morphology of Úbeda and Baeza dates back to the Moorish 9th century and to the Reconquista in the 13th century. Both cities are fine examples of all the grandeur of the Renaissance in Andalusia in the 16th and 17th centuries. They are unique examples of the arrival of Renaissance trends in Spain, as you can see from their streets packed with churches, palaces and stately houses. This is an urban model with clear Italian influences, which Spain in turn gave its own characteristics before exporting it to Latin America in the colonial period. Úbeda and Baeza was nicknamed "queen" and "lady" by the brilliant poet Antonio Machado.

If culture is not enough to satisfy you, gastronomy will does the rest. Olive oil is a vital ingredient in popular gastronomy such as "*andrajos*" (stew with dumplings) and "*pipirrana*" (cold tomato dish), typical of Úbeda. Baeza's speciality is peppers stuffed with partridge and stewed kid with pine nuts. Confectionery includes "*ochios*" (flour and anisette tarts), walnut tarts and preserves. In this sense, the optional trip also includes a visit to a traditional olive oil mil ("*almazara*"), an olive oil tasting, and the lunch in a typical restaurant.

ÚBEDA

The beauty of Úbeda's townscape is sure to impress you. Green olive groves mark the edge of this historic town, giving way to façades of carved stone amidst whitewashed houses.

Aerial view of Úbeda

St. Lawrence viewpoint, Úbeda

Archaeological findings indicate a pre-Roman settlement at Úbeda. During the Reconquista, in 1233, King Ferdinand III conquered the city to the Kingdom of Castile. During the 14th and the 15th centuries, the differences between the local nobility and population impaired the growth of the town. In 1368, the city was damaged during the Castilian Civil War. This, combined with other circumstances, caused the worsening of the rivalry between several Ubetense families. This political instability was solved when the Catholic Monarchs ruled. During the 16th century, important Castilian aristocratic families from Úbeda reached top positions in the Spanish Monarchy administration. Notably, Francisco de los Cobos and his nephew Juan Vazquez de Molina became Secretary of State for Emperor Charles V and Philip II respectively. Due to the patronage of arts of these families, Úbeda became a Renaissance focus in Spain and from there Renaissance architecture spread to America. In the early 19th century the War of Independence (this war against Napoleon is often called the "Peninsular War" in English) produced huge

economic losses, and the city did not boost until the end of the 19th century, when several technical improvements were applied in agriculture an industry.

The city possesses 48 monuments, and more than a hundred of buildings of interest, almost all of them of Renaissance style. Thus Úbeda is especially noteworthy for the civil character of its buildings.

Going for a walk in Úbeda

Patio in Andusian style, Úbeda

Vázquez de Molina Square is home to the Úbeda's most representative examples of Renaissance architecture.

Vázquez de Molina Square

Holy Chapel of the Saviour of the World, *Santa María de los Reales Alcázares* Church and *Las Cadenas* Palace (so named for the decorative chains which once hung from the façade) will take you back in time to the most grandiose days of Úbeda's history. A spectacular ensemble, in a perfect state of conservation, where you can admire beautiful Plateresque façades, altarpieces by the great artist Alonso Berruguete and patios with arched galleries on two levels.

Santa María de los Reales Alcázares Church

Vázquez de Molina Palace or Las Cadenas Palace

This lovely environment is made complete with other crowning achievements of the Andalusian Renaissance such as the Hospital of Santiago, considered the Andalusian "*El Escorial*".

BAEZA

Neighboring Baeza compares with Úbeda in monumentality and artistic wealth, but here religion is the key element.

Aerial view of Baeza

Wandering through Baeza

Under the Romans, the town was known as *Beatia*. Following its conquest by the Visigoths, *Beatia* was the seat of a Bishopric of Baeza. From the beginning of the 7th century it was conquered by several Arab and Berber states during the Al-Andalus period, being named *Bayyasa*. The Christian Diocese was restablished following the town's conquest by Alfonso VII of Castile, but it was then still reconquered by the Almohads. After the Battle of *Las Navas de Tolosa*, Ferdinand III of Castile takes the city in 1227 and gives a legislative corpus to facilitate the new Castilian order and institutions. As well as the Diocese of Baeza, a University was founded what shaped the cultural personality of the city in the following centuries to come.

Going for a walk in Baeza

Baeza University, established in 1530s, now a secondary school

The 16th century was the golden era of Baeza. It grew rich from several industries and the noble families were well connected with the Spanish Imperial state. The city importance declined in the 17th century. The university closed for a time before being reopened by the 19th century as a seminary.

Baeza is a charming town with an incredible Renaissance heritage, whose most valuable treasures are gathered around the *Natividad de Nuestra Señora* Cathedral, a markedly Plateresque building. In its diamond-shaped points, flower ornamentation, braids and pinnacles we see an artistic trend unique in all of Europe.

St. Mary Square

Baeza Cathedral

And you will stop before the facades of the Palace of *Jabalquinto* and the Seminary of *San Felipe Neri* because of their beauty.

Jabalquinto Palace

Seminary of San Felipe Neri

The *Pópulo* Square formed by the *Pópulo* House, the Fountain of the Lions (from the Ibero-Roman ruins of *Cástulo* / *Linares* and possibly representing *Himilce*, wife of the Carthaginian general *Hannibal*), and the *Villalar* Arch (erected for Charles V's 1526 visit) should not be missed, nor the old abattoir.

Pópulo Square

Baeza's old abattoir

Many other palaces and ancestral homes will guide you through this town, birthplace of nobles and aristocrats.

20:00h Arriving in Granada.