CERIS - CIVIL ENGINEERING RESEARCH AND INNOVATION FOR SUSTAINABILITY

Scientific Report 2023

Planned Research for 2024

EXECUTIVE BOARD

Dídia Covas | CERIS President Filipa Ferreira | CERIS Vice President Inês Flores-Colen | CERIS Vice President João Abreu e Silva | CERIS Vice President João Gomes Ferreira | CERIS Vice President Rafaela Cardoso | CERIS Vice President

DECIVIL DEPARTMENT OF CIVIL ENGINEERING, ARCHITECTURE AND ENVIRONMENT TÉCNICO LISBOA May 2024







TABLE OF CONTENTS

1. UNIT DESCRIPTION 3 1.1 GENERAL DESCRIPTION 3 1.2 ORGANZATION 4 1.3 RESEARCH STAFF 6 1.4 ADMINISTRATIVE AND TECHNICAL STAFF. 7 1.5 FACILITES 8 1.6 INSTRUMENTS FOR TRANSFER OF KNOWLEDGE. 8 1.7 ANALYSIS OF THE SCIENTIFIC ACTIVITY. 8 2. RESEARCH OB JECTIVES 11 2.1 INSTITUTIONAL OBJECTIVES 11 2.1 INSTITUTIONAL OBJECTIVES 11 2.2 RESEARCH GROUPS (RG) 11 2.3 THEMATIC STRANDS (TS) 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS 15 3. MAIN ACHIEVEMENT S 21 3.1 DOCTORAL PROGRAMS 21 3.2 ACTIVITY INDICATORS 21 3.3 EVOLUTION OF RESEARCH GROUP RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS 30 3.6 RESEARCH GROUP RESULTS 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 4. FUTURE RESEARCH 37 5. CLOSURE 45	SUMMARY1					
1.1 GENERAL DESCRIPTION 3 1.2 ORGANIZATION 4 1.3 RESEARCH STAFF 6 1.4 ADMINISTRATIVE AND TECHNICAL STAFF. 7 1.5 FACILITIES. 8 1.6 INSTRUMENTS FOR TRANSFER OF KNOWLEDGE. 8 1.6 INSTRUMENTS FOR TRANSFER OF KNOWLEDGE. 8 1.7 ANALYSIS OF THE SCIENTIFIC ACTIVITY 8 2. RESEARCH OBJECTIVES. 11 2.1 INSTITUTIONAL OBJECTIVES. 11 2.2 RESEARCH GROUPS (RG) 11 2.3 THEMATIC STRANDS (TS) 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS 15 3. MAIN ACHIEVEMENTS 21 3.1 DOCTORAL PROGRAMS 21 3.2 ACTIVITY INDICATORS 21 3.3 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS 30 3.6 RESEARCH GROUP RESULTS 36 <th>1.</th> <th>UN</th> <th></th> <th>3</th>	1.	UN		3		
1.2 ORGANIZATION		1.1	GENERAL DESCRIPTION	3		
1.3 RESEARCH STAFF 6 1.4 ADMINISTRATIVE AND TECHNICAL STAFF. 7 1.5 FACILITIES. 8 1.6 INSTRUMENTS FOR TRANSFER OF KNOWLEDGE. 8 1.7 ANALYSIS OF THE SCIENTIFIC ACTIVITY. 8 2. RESEARCH OB JECTIVES 11 2.1 INSTITUTIONAL OBJECTIVES 11 2.2 RESEARCH GROUPS (RG). 11 2.3 THEMATIC STRANDS (TS). 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS. 15 3. MAIN ACHIEVEMENTS 21 3.1 DOCTORAL PROGRAMS. 21 3.2 ACTIVITY INDICATORS. 21 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX A – PHD THESES COMPLETED IN 2023 129 RESEARCH GROUP 1 -		1.2	ORGANIZATION	4		
1.4 ADMINISTRATIVE AND TECHNICAL STAFF. 7 1.5 FACILITIES 8 1.6 INSTRUMENTS FOR TRANSFER OF KNOWLEDGE. 8 1.7 ANALYSIS OF THE SCIENTIFIC ACTIVITY. 8 2. RESEARCH OB JECTIVES 11 2.1 INSTITUTIONAL OBJECTIVES 11 2.2 RESEARCH GROUPS (RG) 11 2.3 THEMATIC STRANDS (TS) 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS 15 3. MAIN ACHIEVEMENTS 21 3.1 DOCTORAL PROGRAMS 21 3.2 ACTIVITY INDICATORS 21 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS 30 3.6 RESEARCH GROUP RESULTS 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX A – PHD THESES COMPLETED IN 2023 53 ANNEX C–RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYD		1.3	RESEARCH STAFF	6		
1.5 FACILITIES 8 1.6 INSTRUMENTS FOR TRANSFER OF KNOWLEDGE 8 1.7 ANALYSIS OF THE SCIENTIFIC ACTIVITY 8 2. RESEARCH OBJECTIVES 11 2.1 INSTITUTIONAL OBJECTIVES 11 2.2 RESEARCH GROUPS (RG) 11 2.3 THEMATIC STRANDS (TS) 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS 15 3. MAIN ACHIEVEMENT S 21 3.1 DOCTORAL PROGRAMS 21 3.2 ACTIVITY INDICATORS 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.5 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 30 3.6 RESEARCH GROUP RESULTS 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - H		1.4	ADMINISTRATIVE AND TECHNICAL STAFF	7		
1.6 INSTRUMENTS FOR TRANSFER OF KNOWLEDGE		1.5	FACILITIES	8		
1.7 ANALYSIS OF THE SCIENTIFIC ACTIVITY. 8 2. RESEARCH OB JECTIVES 11 2.1 INSTITUTIONAL OBJECTIVES. 11 2.2 RESEARCH GROUPS (RG). 11 2.3 THEMATIC STRANDS (TS). 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS. 15 3. MAIN ACHIEVEMENTS. 21 3.1 DOCTORAL PROGRAMS. 21 3.2 ACTIVITY INDICATORS. 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE. 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GRO		1.6	INSTRUMENTS FOR TRANSFER OF KNOWLEDGE	8		
2. RESEARCH OBJECTIVES 11 2.1 INSTITUTIONAL OBJECTIVES 11 2.2 RESEARCH GROUPS (RG) 11 2.3 THEMATIC STRANDS (TS) 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS 15 3. MAIN ACHIEVEMENTS 21 3.1 DOCTORAL PROGRAMS 21 3.2 ACTIVITY INDICATORS 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS 30 3.6 RESEARCH GROUP RESULTS 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES 132 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES 145 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES 145		1.7	ANALYSIS OF THE SCIENTIFIC ACTIVITY	8		
2.1 INSTITUTIONAL OBJECTIVES. 11 2.2 RESEARCH GROUPS (RG). 11 2.3 THEMATIC STRANDS (TS). 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS. 15 3. MAIN ACHIEVEMENTS 21 3.1 DOCTORAL PROGRAMS. 21 3.2 ACTIVITY INDICATORS. 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145	2.	RE	SEARCH OBJECTIVES1	1		
2.2 RESEARCH GROUPS (RG) 11 2.3 THEMATIC STRANDS (TS) 12 2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS 15 3. MAIN ACHIEVEMENTS 21 3.1 DOCTORAL PROGRAMS 21 3.2 ACTIVITY OF RESEARCH GROUPS 21 3.1 DOCTORAL PROGRAMS 21 3.2 ACTIVITY INDICATORS 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.5 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS 30 3.6 RESEARCH GROUP RESULTS 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES 145 RESEARCH GROUP		2.1	INSTITUTIONAL OBJECTIVES	1		
2.3 THEMATIC STRANDS (TS)		2.2	RESEARCH GROUPS (RG)	1		
2.4 RESEARCH AREAS 13 2.5 ACTIVITY OF RESEARCH GROUPS 15 3. MAIN ACHIEVEMENTS 21 3.1 DOCTORAL PROGRAMS 21 3.2 ACTIVITY INDICATORS 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS 30 3.6 RESEARCH GROUP RESULTS 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES 145 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES 145		2.3	THEMATIC STRANDS (TS)	2		
2.5 ACTIVITY OF RESEARCH GROUPS. 15 3. MAIN ACHIEVEMENTS. 21 3.1 DOCTORAL PROGRAMS. 21 3.2 ACTIVITY INDICATORS. 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE. 45 ANNEX A – PHD THESES COMPLETED IN 2023. 47 ANNEX B – PAPERS PUBLISHED IN 2023. 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GROUP 3 - SYSTEMS AND MANAGEMENT 155		2.4	RESEARCH AREAS	3		
3. MAIN ACHIEVEMENTS 21 3.1 DOCTORAL PROGRAMS. 21 3.2 ACTIVITY INDICATORS. 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023. 47 ANNEX B – PAPERS PUBLISHED IN 2023. 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145		2.5	ACTIVITY OF RESEARCH GROUPS	5		
3.1 DOCTORAL PROGRAMS. 21 3.2 ACTIVITY INDICATORS. 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE. 45 ANNEX A – PHD THESES COMPLETED IN 2023. 47 ANNEX B – PAPERS PUBLISHED IN 2023. 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GROUP 3 - SYSTEMS AND MANAGEMENT 155	3.	MA	IN ACHIEVEMENTS2 ²	1		
3.2 ACTIVITY INDICATORS. 21 3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023. 47 ANNEX B – PAPERS PUBLISHED IN 2023. 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GROUP 3 - SYSTEMS AND MANAGEMENT 155		3.1	DOCTORAL PROGRAMS	1		
3.3 EVOLUTION IN THE NUMBER OF RESEARCHERS 24 3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GROUP 3 - SYSTEMS AND MANAGEMENT 155		3.2	ACTIVITY INDICATORS	1		
3.4 EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING. 26 3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE. 45 ANNEX A – PHD THESES COMPLETED IN 2023. 47 ANNEX B – PAPERS PUBLISHED IN 2023. 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GROUP 3 - SYSTEMS AND MANAGEMENT 155		3.3	EVOLUTION IN THE NUMBER OF RESEARCHERS	4		
3.5 EVOLUTION OF THE MAIN ACTIVITY INDICATORS. 30 3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH		3.4	EVOLUTION OF RESEARCH AND CONSULTANCY FUNDING	6		
3.6 RESEARCH GROUP RESULTS. 36 4. FUTURE RESEARCH 37 5. CLOSURE. 45 ANNEX A – PHD THESES COMPLETED IN 2023. 47 ANNEX B – PAPERS PUBLISHED IN 2023. 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS. 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES. 145 RESEARCH GROUP 3 - SYSTEMS AND MANAGEMENT 155		3.5	EVOLUTION OF THE MAIN ACTIVITY INDICATORS	0		
4. FUTURE RESEARCH 37 5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 53 ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES 145 RESEARCH GROUP 3 - SYSTEMS AND MANAGEMENT 155		3.6	RESEARCH GROUP RESULTS	6		
5. CLOSURE 45 ANNEX A – PHD THESES COMPLETED IN 2023 47 ANNEX B – PAPERS PUBLISHED IN 2023 53 ANNEX C–RESEARCH GROUP ACTIVITIES IN 2023 129 RESEARCH GROUP 1 - HYDRAULICS 131 RESEARCH GROUP 2 - ENVIRONMENT AND WATER RESOURCES 145 RESEARCH GROUP 3 - SYSTEMS AND MANAGEMENT 155	4.	FU	TURE RESEARCH	7		
ANNEX A – PHD THESES COMPLETED IN 2023	5.	CL	OSURE	5		
ANNEX B – PAPERS PUBLISHED IN 2023	ANNEX A – PHD THESES COMPLETED IN 2023					
ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023	ANNEX B – PAPERS PUBLISHED IN 202353					
RESEARCH GROUP 1 - HYDRAULICS	A	ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023129				
INTER A DESTRUCTION AND A DESTRUCTION A DESTRUCTION AND A DESTRUCTION A DESTRUCTION AND A DESTRUCTION A DESTRUCTION AND A DESTRUCTION AND A DESTRUCTION AND A DESTRUCTION AND		RESE RESE	ARCH GROUP 1 - HYDRAULICS	1 5 5		

i





RESEARCH GROUP 4 - TRANSPORTATION SYSTEMS	.165
RESEARCH GROUP 5 – STUDIES ON CONSTRUCTION	.175
RESEARCH GROUP 6 - STRUCTURAL DESIGN AND GEOTECHNICS	.191



SUMMARY

CERIS - Civil Engineering Research and Innovation for Sustainability - is a research center on Built and Natural Environment, hosted by the Department of Civil Engineering, Architecture and Georresources (DECivil) of IST, Universidade de Lisboa (UL). In 2023, CERIS had 157 PhD members, 24 PhD collaborators, and 204 Collaborators without PhD, and covers the following domains: Construction, Environment, Geotechnics, Hydraulics, Regional and Urban Planning, Structures, Systems and Management, Transport Systems, and Water Resources.

CERIS was formally created in 2015 to integrate three Civil Engineering Department research centers at Instituto Superior Técnico (IST). This is the eighth report on the scientific activity, being the fifth report after the 2017-18 FCT evaluation, in which CERIS emerged as one of the two research centers in Civil Engineering in Portugal classified as Excellent. This report provides information relevant to map CERIS' position in the national and international contexts, addressing the integration of scientific objectives, and presenting the 2023 performance indices.

This report is organized into four main parts. The first part focuses on the center description, including an overview of CERIS and a description of its internal organization, governance structure, technical and administrative staff, and supporting laboratory facilities. The second part refers to research objectives, namely the general objectives of CERIS and the specific objectives of the research groups. The third part reports and discusses the main achievements in 2023. Global figures regarding publications in WoS/Scopus-indexed journals, concluded PhD theses and research and consultancy funding are presented. The last part describes each research group's planned research activities for 2024.

As expected, merging centers with diverse cultures and practices has been demanding in terms of governance and operation. Still, it is fully consolidated and aligned with CERIS' mission and objectives. Furthermore, the engagement of an expert in the management of Science and Technology and of (at least) four researchers for the thematic strands in 2022 provided a boost to CERIS.

In 2023, CERIS researchers maintained their levels of national and international visibility. They participated in the organization of 11 international events and the scientific committees of 38 international and 3 national events. Members of CERIS have been invited to deliver 17 lectures and short courses, including keynote lectures. Membership of editorial boards remained strong (140+ roles), including 4 Editors-in-Chief and 16 Associate Editors in WoS-Scopus-indexed journals, as well as participation in technical committees for drafting codes and standards (i.e., 75 national and 60 international). All the indicators related to participation in conferences, organization of scientific events, and invited lectures show some recover after the Covid-19 pandemic.

Publication in WoS/Scopus-indexed journals slightly increased compared to 2022 (i.e., 425 to 443 papers). Also, the number of papers in Q1 and Q2 WoS/Scopus-indexed journals slightly decreased (i.e., from 338 to 320 papers), essentially representing stabilization considering the publications in previous years. In 2023, 2.8 WoS or Scopus papers were published per CERIS member, a slight increase compared to the previous year. Nevertheless, these numbers show a consolidated improvement to the year CERIS was





founded (2015) when 2.3 WoS/Scopus papers were published per CERIS member. The number of WoS/Scopus-indexed Q1 and Q2 papers per PhD researcher slightly increased from 1.48 in 2022 to 1.77 in 2023. The number of other papers indexed in WoS or Scopus per PhD researcher slightly increased. The number of papers published in international conference proceedings per PhD researcher slightly increased from 1.02 in 2021 to 1.29 in 2021.

The number of PhD theses concluded in 2023 was 33 (0.21 per member and 0.18 per PhD researcher), 28 of which were in IST-UL doctoral programs or other institutions related to CERIS. The number of supervised doctoral students whose PhD theses will be concluded after 2023 is 214, including 152 registered at IST-UL, 15 at FCT- Universidade NOVA de Lisboa (UNL), and 17at University of Coimbra. The involvement of CERIS in doctoral programs has contributed to the overall trend for improvement (i.e., PhD theses and publications), as IST-UL coordinates four PhD programs, and two in joint participation with other Portuguese universities.

The results summarized above are inextricably linked with research and contract funding in the recent past. Maintaining or improving the 2022 performance may be influenced by the effects of the economic crisis, policies on regional funding that impair the Lisbon area, and the grading that CERIS has been awarded in the 2017-18 FCT evaluation of the Portuguese research units. The FCT grading has provided leverage to CERIS in public competitions and competitive bidding. After the minimum, in 2019, of 1.21 M€, in 2023, there was a recovery to 2.78 M€ (i.e., the best result since 2009). Nevertheless, the 2023 incoming funds (ca. 3.64 M€) are unbalanced, with R&D funding about two times the consultancy funding. The gap between R&D funding and consultancy was higher than in 2021, as R&D funding increased considerably (i.e., mainly due to EU-funded projects) and consultancy funding slightly decreased. Funding increase in 2023 indicates a positive performance in securing several types of funding, namely EU-funded projects.



1. UNIT DESCRIPTION

1.1 General description

CERIS - Civil Engineering Research and Innovation for Sustainability - is a research unit of Instituto Superior Técnico (IST), University of Lisbon (UL), hosted by the Department of Civil Engineering (DECivil), Architecture and Georresources (DECivil) and integrated into the Association of Instituto Superior Técnico for Research and Development (IST-ID). The IST-ID is a private non-profit institution that primarily aims to carry out science and technology activities, foster knowledge transfer, and promote the involvement of national and foreign researchers in RD&I activities and projects in their areas of expertise.

Although CERIS was formally created in 2015, through government dispatches 7822/2015 and 12360/2015, its formation as an RD&I unit registered (number 04625) with Fundação para a Ciência e a Tecnologia (FCT), the Portuguese research-funding agency, was proposed in the framework of the 2008-2012 evaluation of the National Science and Technology System, as the merge of three centers of DECivil: CEHIDRO, CESUR, and ICIST. Their integration in CERIS enhances a comprehensive thematic coverage, in-depth and scope. It promotes synergies in the inherently multidisciplinary built and natural environment fields, which they previously addressed in a non-integrated manner. The engagement of an expert in the management of Science and Technology and of (at least) four researchers for the thematic strands in 2022 provided a definitive boost to CERIS by articulating the installed expertise, the funding opportunities, and the new avenues for the promotion of CERIS products made available by social networking and specialized platforms.

At the end of 2023, CERIS benefited from the expertise of 157 PhD members, 24 PhD collaborators (i.e., this distinction is explained below), and 142 non-PhD collaborators. CERIS has no parallel in the national context regarding size and scope and has the right profile needed to attain a strong international presence. This key driver for establishing CERIS was set on a wider vision of the national research system and resulted from discussions initiated in 2010 on national and international prospects. It was based on the ASCE report 'The Vision for Civil Engineering in 2025' and framed by three key documents: 'Europe 2020', 'Horizon 2020', and 'Portugal 2020'.

The mission and objectives of CERIS and the policy guidelines address the sector's needs in research and knowledge transfer. They are set under the guiding principle of basing research and innovation on PhD programs while exploiting the diversity of profiles of its members. This diversity is instrumental in promoting the different forms of knowledge transfer practiced by CERIS, ranging from continuous training and skills development to direct support to public institutions and industrial and service companies. New policies on membership support merging the founding centers into CERIS, work organization, and restructuring their research lines into thematic strands that derive directly from national and EU directives. Their research is typically based on mathematical modeling, experimentation, and fieldwork.

CERIS: Civil Engineering Research and Innovation for Sustainability



1.2 Organization

The organic structure of CERIS meets the recommendations set by IST and FCT. It comprises the President, the Executive Board, the Scientific Council, the External Advisory Committee, the Coordinating Committee, the Research Groups (RG), the Thematic Strands (TS), and the two Hubs, as presented in Figure 1.



Figure 1 | Structure of Governance in 2023

The President of CERIS is responsible for the overall CERIS management. The President is assisted by the Executive Board and, whenever necessary, by the Scientific Council Advisory Board. The President of CERIS chairs the Executive Board and the Scientific Council Plenary and Advisory Board meetings.

The Executive Board assesses, assists, and promotes the policies on cooperation through coordination and comprises five members: the President of CERIS, Vice Presidents from different research groups, and a member of the Executive Board of DECivil. In the current Executive Board (Table 1), Dídia Covas (RG1), the President) is responsible for administrative, financial, and project management matters. For the definition of the strategic plan, Inês Flores-Colen (RG5), also a member of the Executive Board of DECivil, oversees scientific affairs; Rafaela Cardoso (RG6) is responsible for the laboratories; João Abreu e Silva (RG4) is responsible for the promotion of R&D initiatives and internationalization, Filipa Ferreira (RG2) is responsible for PhD activities, image, communication and dissemination, and João Ferreira (RG5) oversees the connections with the industry.

The previous Executive Board, which directed CERIS in 2021-2022, was formed by the president Eduardo Júlio (RG6) and the following vice presidents: José Silvestre (RG5), Carlos Oliveira Cruz (RG5), Carlos Tiago (RG6), Manuel Pinheiro (RG2) and João Correia (RG5).

The Scientific Council comprises researchers that comply with curricular selection criteria based on scientific





production. Yearly, the Scientific Council approves scientific reports, plans, financial reports, and budgets. It may delegate competencies on the Advisory and Executive Boards, but it rules all relevant matters of CERIS. The Coordinating Committee includes the members of the Executive Board and the Coordinators of the four Thematic Strands. Its main competence is to design and supervise the strategic program of CERIS. The thematic strands structure the scientific activity developed by the six Research Groups. Their coordinators in 2022 and 2023 are identified in Tables 2 and 3.

Position	Present (2023-2024)	
CERIS President	Dídia Covas	
	Filipa Ferreira	
CERIS Vice Presidents	Inês Flores-Colen	
	João Abreu e Silva	
	João Ferreira	
	Rafaela Cardoso	

Table 1 | Executive Boards

Table 2 | Thematic Strands and coordinators

Domain	Present 2023
Product Development in Civil Engineering Industries	Fernando Branco
Risk and Safety in Built and Natural Environments	Filipe Moura
Rehabilitation of Built and Natural Environments	Jorge de Brito / Maria da Glória Gomes
Response to Natural and Societal Changes	Manuel Pinheiro

Table 3 | Research Groups and coordinators

Group	Designation	2022	Present 2023
RG1	Hydraulics	António Pinheiro	António Pinheiro
RG2	Environment and Water Resources	José Saldanha Matos	José Saldanha Matos
RG3	Systems and Management	Rui Cunha Marques	Rui Cunha Marques/ António Aguiar da Costa
RG4	Transportation Systems	Luis Picado Santos	Luis Picado Santos
RG5	Studies on Construction	João Correia	João Correia
RG6	Structures and Geotechnics	Rita Bento	Eduardo Júlio

The External Advisory Committee of CERIS consists of well-known scientists and representatives from the industry with recognized knowledge and experience on the challenges faced by institutions with similar





missions and objectives. Besides advising on strategic planning and long-term perspectives, its main competence is to periodically assess the quality and the relevance of the scientific activity of CERIS, the adequacy of its organization, the quality of the scientific environment, the level of internationalization of its activities and its performance in the transfer of knowledge, technology, and dissemination. The current composition of the External Advisory Committee is defined in Table 4.

Advisor	Institution	
Anton Schleiss	École Polytechnique Fédérale de Lausanne Switzerland	
José Manuel Vassallo	Universidad Politécnica de Madrid Spain	
Michael Lacasse	National Research Council Canada Canada	
Luc Taerwe	Ghent University Belgium	
José Príncipe	University of Florida United States of America	

Table 4 | External Advisory Committee

1.3 **Research staff**

According to CERIS rules and regulations, researchers are classified as members and collaborators (Table 5). Members are PhD researchers that meet the productivity criteria set by the Scientific Council of CERIS. Collaborators are typically PhD students and specialists employed by firms, public services, and agencies. The PhD researchers that do not meet the productivity criteria set by the Scientific Council each year are collaborators. As FCT requested in 2013, there was the need to add the classification of Integrated members, selected between the members to identify the unit's core team.

The productivity criteria are based on the research component of the academic evaluation system set by IST for every three years of evaluation, which values the publication of papers and the number of citations, supervision of PhD theses, coordination, and participation in concluded competitive research projects and knowledge transfer. In 2015, the Scientific Council of CERIS set the minimum requirement to be proportional to the grade of Excellent in the IST evaluation system.

In this report, members of the Scientific Council are referred to as 'Members.' They all hold a PhD title. The terms 'PhD researchers' or the synonym 'Researchers with PhD' combine members and collaborators with PhD The PhD researchers may be permanent staff in their institutions, hired as researchers under DL57, or hold post-doc scholarships.

The term 'non-PhD collaborator' includes all collaborators that do not hold a PhD degree. The term 'PhD students' combines PhD students registered at IST-UL (i.e., CERIS-IST PhD students) with PhD students registered at other institutions (i.e., External PhD Students). Note that 'PhD students' is not a subgroup of 'non-PhD collaborator.' There are PhD students that are not non-PhD collaborators; they may be collaborators in other research centers or state laboratories.

The 2023 distribution of researchers is summarized in Table 5. They include UL's academic staff and fifteen



other universities and polytechnics¹, besides private companies and foundations.

Turne	Downonaut	Non-po	T . (.)		
туре	Permanent	Contract	Scholarship	Iotai	
Members	127	30	0	157	
Collaborators with PhD	14	10	0	24	
Collaborators without PhD	0	0	204	204	

Table 5 | Profile of research staff

1.4 Administrative and technical staff

In 2023, CERIS shared with CITUA the support of the administrative staff from DECivil, namely accounting services, secretariat, and technical staff assigned to computational and experimental laboratories.

The central services of IST guarantee the accounting service. CERIS has one administrative staff (i.e., Ana Soares Ramos, hired by IST) dedicated to the activities of the Directive Board and 9.5 administrative staff dedicated to RG affairs. These ten employees are hired by IST (8) and IST-ID (2), being one of them part-time with CITUA. Informatics services, including assistance to the Laboratory of Computational Mechanics, are guaranteed by an informatic technician (i.e., Filipe Aparício, which provides services to CERIS). The technical staff assigned to CERIS laboratories is summarized in Table 6, amounting to 4 employees, of which two were hired by IST, one by IST-ID, and one by ADIST.

The process of hiring the science and technology manager was completed in 2021. In the medium term, this contract will increase the dynamism of researchers in international competitive tenders and increase interaction between research groups. The hiring of four researchers for each thematic strand was initiated in 2021, while the entire hiring process was completed in 2022.

The number of technical staff assigned to the operation of its computational and experimental laboratories, presented in Table 6, is small. It is a persistent challange mainly caused by a long-established freeze on hiring. This staff is complemented by the DECivil Laboratories Coordinator, supported by a joint supervisor for the Structures, Construction, and Geotechnics laboratories (LERM, LC, and LG). A good part of the day-to-day operation is supported by PhD researchers and students, which is a good opportunity for their technical education but is limited to their theses and makes long-term knowledge transfer difficult.

¹ Instituto Politécnico de Leiria, Instituto Politécnico de Setúbal, Instituto Superior de Engenharia de Coimbra, Instituto Superior de Engenharia de Lisboa, Universidade da Beira Interior, Universidade da Madeira, Universidade de Coimbra, Universidade do Algarve, Universidade Estadual de Campinas (Brazil), Universidade Estadual do Mato Grosso, Universidade Federal de Minas Gerais (Brazil), Universidade Nova de Lisboa, University of Antwerp (Bélgica), University of East Anglia (UK), University of Western Australia (Austrália).



Table 6 | Laboratories and technical staff

Laboratory	Staff (no.)
Laboratory of Computational Mechanics (LMC)	1
Laboratory of Construction (LC) RG5	0.4+0.5
Laboratory of Geotechnics (LG) RG6	0.2
Laboratory of Hydraulics, Water Resources and Environment (LHRHA) RG1, RG2	0.5
Laboratory of Structures and Strength of Materials (LERM) RG6	1+0.4
Laboratory of Transport Infrastructures (LVCT) RG4	1

1.5 Facilities

The research methods adopted by CERIS include mathematical and numerical modeling, laboratory experimentation, and *in-situ* studies. CERIS has up-to-date hardware and software and adequately equipped experimental facilities. The main difficulties in this context are the limitation constraints on procurement, acquisition/renovation, and maintenance/calibration of equipment caused by Government austerity measures.

Experimental research and PhD projects are supported by the laboratories identified in Table 6. In the cases of some researchers and for joint projects, CERIS takes advantage of the experimental facilities of LNEC, Laboratório Nacional de Engenharia Civil (i.e., national laboratory of civil engineering), located within 3 km of IST, other research centers of IST and IST-ID, UNL, INESC, etc., being institutional collaboration duly protocolled. Of course, the opposite also occurs.

1.6 Instruments for Transfer of Knowledge

The two main ways CERIS promotes knowledge transfer are through specialized consultancy and advanced training. CERIS members offer a large and diversified set of specialization courses through FUNDEC, the advanced training instrument of DECivil, a private partnership with the major companies operating in the Civil Engineering sector created in 1995. Consultancy is regulated regarding conflicts of interest and unfair competition and can be directly contracted with CERIS or through FUNDEC or IST.

1.7 Analysis of the scientific activity

The analysis of the activity in 2023 presented in this report is set within the framework of the statutory objectives of CERIS and centered on the research content, the research organization, and the evolution of scientific productivity indicators.

The research content is addressed in Section 2, where the thematic strands that structure the research activity and their main work areas are defined. The areas of activity of the Research Groups in 2023 are also summarized to support the analysis of three key aspects in a new unit merging centers that used to



operate independently: the 2023 profiles of the research groups, their organization, and the existing and planned forms of internal cooperation. Identifying these aspects should sustain internal policies on membership and internal funding initiatives to promote cooperation and research focus.

The information summarized in Section 3 covers a wide range of research activity indicators, namely on theses and publications, visibility and recognition of the research, and research and consultancy contracts. The analysis of the 2023 results is set on the evolution in time (i.e., since 2013 in all indicators) of the number of researchers, of the capacity to secure research and consultancy funds, and of two main activity indicators, namely completed PhD theses and publication of papers in WoS/Scopus-indexed journals.

The performance of research units is usually assessed in terms of production rates per team member, which implies a clear definition of the population of the research team, namely Members and PhD researchers.

The production rates are presented in terms of Members and, in some instances, in terms of PhD researchers to stress the importance of the internal policies on membership. Those rates are presented in global terms and at the unit level.

The same information at the group level is available in Annex C. The diversity of the profiles of PhD collaborators can be high within a group and across groups, ranging from non-academic experts to young PhD researchers; therefore, the analysis at the group level would imply an effort in detailing and justifications that could easily fall into individual assessment, well out of the scope of this report.







2. RESEARCH OBJECTIVES

2.1 Institutional objectives

The research objectives of CERIS are set to comply with its statutory mission: "To create and disseminate scientific knowledge and to promote innovation in the Built and Natural Environment filled through the active involvement in fundamental and applied research, at both national and international levels, and to enhance higher education and research training." CERIS operates under a set of objectives to accomplish its mission and organizes its activity in thematic strands selected according to national and European policy guidelines.

CERIS coordinates, under the same host institution, knowledge and skills on Built and Natural Environment topics with the following objectives: (i) to promote quality research based on PhD programs; (ii) to transfer its expertise by providing specialized training and services and consulting; (iii) to ensure wide dissemination of its results.

To attain its first objective, the policy of CERIS is to organize PhD programs in the framework of national and international networks and consortia and to integrate doctoral theses in competitive research funding projects. CERIS also benefits from the direct participation of IST in international networks and programs set up to promote the mobility of students and researchers.

CERIS participates in international initiatives promoted by IST and cooperates with national professional associations regarding ongoing specialized training. To develop mutually beneficial relationships with industrial and engineering firms, central and local administration, and governmental agencies, CERIS focuses on the formulations of public and private policies and on innovation programs that address the specific needs of the sector, namely through the Portuguese Technological Platform for Construction, the Portuguese Water Partnership, and the Sustainable Habitat Cluster.

CERIS values the dissemination of research results through the best-ranked journals and the best--established conferences. They have a decisive impact on recognition, visibility, and engagement in contracted research and recruiting young researchers. The partnerships mentioned above play a key role in knowledge transfer initiatives, enabling a closer relationship with public and private institutions.

2.2 Research Groups (RG)

The research groups in 2023 are numbered as shown in Table 7.



Before	Designation
RG1	Hydraulics
RG2	Environment and Water Resources
RG3 Systems and Management	
RG4	Transportation Systems
RG5 Studies on Construction	
RG6	Structures and Geotechnics

2.3 Thematic strands (TS)

Thematic strands have been defined sufficiently broadly and cover priority work areas. Their relevance in content and the adequacy of internal expertise should guide the progressive realignment of the activities planned at the group level through the periodic reassessment of strategic and operational objectives and supporting internal seeding programs.

The interdisciplinary knowledge in the Built and Natural Environment field addresses issues centered on the Construction Industry, namely structural rehabilitation, safety and security, and innovation regarding eco-efficient materials, solutions, and technologies. It encompasses urban and regional planning and management, mobility of people and freight, environment and water resources planning, management and policy, and water services, including drinking water distribution, sewage treatment, hydraulic infrastructure, and renewable energies. Moreover, they include dimensions that cut across several areas, such as strategic environmental assessment, systems modeling, and optimization, decision processes, relevant public policies, and governance issues.

In this context, and taking into consideration national and European policy guidelines, the following thematic strands (TS) were established in 2013 to structure the activities of CERIS:

- TS1 Product Development in Civil Engineering Industries;
- TS2 Risk and Safety in Built and Natural Environments;
- TS3 Rehabilitation of Built and Natural Environments;
- TS4 Response to Natural and Societal Changes.

TS1 – Product Development in Civil Engineering Industries embraces research activities whose main purpose is to improve the competitiveness of civil engineering industries by developing innovative products and procedures and by improving the efficiency of existing ones. The applied research focuses on developing projects with a strong emphasis on "idea to business," implying a robust involvement of industrial partners and using the interdisciplinary nature of CERIS. The deepening of existing collaborations with the industry is encouraged. The Portuguese Technological Platform for Construction





(PTPC), whose university-industry work groups are already developing proposals for new projects, is an important partner in this context.

TS2 - Risk and Safety in Built and Natural Environments focus on the reduction of risk to people, the environment, and natural and built heritage that may be affected by the occurrence of extreme events, either natural, such as floods, droughts, earthquakes, windstorms, and tsunamis, or due to man's activities, such as accidental pollution, deficient structures, and infrastructures, blasts, and fires. Environmental and manmade hazards may devastate the built and the natural environment, namely natural resources. Hazard and risk assessment and the development of structural and non-structural safety measures are major societal challenges in a rapidly changing world, with people concentrating in large urban areas and the growing exploitation of limited natural resources.

TS3 - Rehabilitation of Built and Natural Environments stands out as the new construction sector paradigm and environment preservation paradigm. New knowledge and skills gathered through interdisciplinary activity are needed to respond to current demands. The main goals include reducing risks, ensuring safety, and promoting more efficient and sustainable life cycle management of energy and natural resources to foster urban cohesion and protect natural and cultural heritage. This thematic strand seeks to mobilize activity within the CERIS research groups in rehabilitation and restoration and promote synergies to carry out research at the forefront of existing knowledge.

TS4 - Response to Natural and Societal Changes addresses issues related to the characterization, mitigation, and adaptation to natural and societal changes, as they induce stress or even ruptures in the "business as usual" approach to the built and natural environment, especially in what concerns the relevant policies, procedures and design and operation of infrastructures for a sustainable interaction between man and nature. Climatic change is of immense importance as a driver, forcing adaptation measures in all areas of economic activity and social life and aggravating all the pre-existing problems caused by social and economic changes.

2.4 **Research** areas

The principal areas of work selected in each Thematic Strand are the following, as defined by their coordinators:

TS1 – Product Development in Civil Engineering Industries

- (i) Developing eco-efficient, high-performance, and durable cementitious materials and products for new construction and rehabilitation.
- (ii) Advanced composite materials and products for civil engineering applications.
- (iii) Develop components, devices, and software to improve the seismic performance of civil infrastructure.
- (iv) Sensors, intelligent systems, and knowledge-based management infrastructure concern improved safety, maintenance, and management procedures.





- (v) Improvement of products and project efficiency, including life cycle analysis, conflict management, negotiation procedures, private and public values, and use of e-business and e-procurement platforms.
- (vi) Development of synergic management to sustainable tourism destination Lidera destinations (i.e., to improve product efficiency and performance).
- (vii) Improve natural treatment systems through pilot facilities to define the best procedures when facing seasonal interruptions and determine maximum load capacity.

TS2 – Risk and Safety in Built and Natural Environments

- (i) Risk assessment of natural and man-made hazards to support decision-making on allocating resources for safety improvement works.
- (ii) Engineering expertise for improving the safety of people and the environment, namely the development of solutions and techniques for improving construction robustness and resilience, as well as for structural protection, strengthening, and rehabilitation.
- (iii) Prevention, preparedness, and management of risk considering natural hazards and climate change scenarios, concerning non-structural measures related to management, elaboration of risk prevention, preparedness plans, and operational and management procedures.

TS3 – Rehabilitation of Built and Natural Environments

- (i) Enhancement of the spatial functionality, energy efficiency, and structural performance of civil infrastructures, including improving seismic and fire resistance.
- (ii) Study of deterioration processes and development of advanced inspection and monitoring techniques to enhance the durability and safety of civil infrastructures.
- (iii) Development of urban management models to establish financing systems of urban rehabilitation and public investments and flexibility and efficiency of the existing transport network infrastructure and management.
- (iv) Rehabilitation of natural and transformed water bodies, namely rivers, lakes, reservoirs, and aquifers, and improvement of the flexibility and efficiency of the existing water infrastructure and management systems, mainly concerning water supply and wastewater services.

TS4 – Response to Natural and Societal Changes

- (i) Understanding the complexity of natural and societal changes regarding adaptation and resilience, competition and mitigation, path dependence, emergence, self-organization, and metabolic mechanisms.
- (ii) Improving governance, seeking better integration of policies, new flexible planning, and management tools, searching for new methods, tools, and devices for efficiency, economy, and equity concerning energy, resources, and the materials used.
- (iii) Enhancing the tools to respond adaptively to natural and societal changes concerning information and communication technologies, computation, and network systems provides the platform for designing more intelligent and interconnected tools and smarter buildings, infrastructures, and services.





The principal areas of work selected in each Thematic Strand reflect the number of research groups involved in core and complementary topics, as shown in Table 8. This information is complemented in the next section with data on existing and expected forms of cooperation at the group level.

Thematic strand	RG1	RG2	RG3	RG4	RG5	RG6
TS1 - Product Development	~		~	✓	✓	√
TS2 - Risk and Safety	~	~	~	~		~
TS3 - Rehabilitation	~	~	~	~	✓	~
TS4 - Response to Changes	~	~	~	~		

Table 8 | Groups participating in Thematic Strands

2.5 Activity of research groups

The following describes, for each Research Group (RG), its principal research areas and relative topics addressed in 2023, as defined by their coordinators. A description of the main achievements of each RG can be consulted in Annex C.

RG1 | Hydraulics

12 PhD members | 6 PhD collaborators | 26 non-PhD collaborators

The activity of RG1 was organized into the following major topics:

- a) Pressurized water systems. Numerical and experimental analysis of hydraulic transients in pressurized pipes (RS); Condition assessment of water and wastewater assets (RS); Water mixing and renewal processes in water storage tanks (RS); Water-use and energy efficiency in urban water systems (RS); Energy recovery in water services and the use of pumps as turbines (PD). Digital twin in water distribution networks. New tools, technologies, and algorithms using the Internet of Things, artificial intelligence, and machine learning for the digital transition in the water sector.
- b) Hydropower solutions based on new energy converter devices, hybrid energy schemes, and pumped-storage hydropower for the energy transition, allowing the integration of other renewable sources (i.e., wind and solar PV).
- c) Fluvial hydraulic structures. Development of mitigation strategies and pre-cast shelters for fish downstream of powerhouses with the hydropeaking operation (RS); Numerical and experimental modeling of different flood release and related hydraulic structures (RS; RNBE); Study of the hydraulics of PKW weirs combined with spillways (RS, RNBE); Study of the pressure field and slab stability in a plunge pool lined with concrete slabs (RS). Sluice gate hydraulic performance improvements, Pumped storage hydropower, Investigation of hydraulic properties of vertical drop



- d) River restoration and management. Monitoring tools, based on physically based computational models, for water and sediment quality in rivers and estuaries (RNBE); Risk management in the valleys downstream of dams (RS; RNSC); Environmental flows determination procedures and hydropower station operation rules to reduce ecological risk downstream of dams (RS, RNBE); River restoration and development of fish passes for low height river obstacles to improve ecological connection along regulated rivers (PD; RNBE; RNSC).
- e) Environmental fluid mechanics. Laboratory investigation of rough-wall open-channel turbulence (RNBE); CFD simulation of solid-fluid interactions in turbulent flows (RNBE); Laboratory investigation and mathematical simulation of transport of dissolved substances (RS, RNBE); Heat and mass transport in wetlands (RNBE).
- f) Sediment transport and river morphodynamics: Hydrodynamics of river diversions in equilibrium (RS; RNBE). Desilting efficiency of vane fields in channel bifurcations. Local scour at transversally inclined sand bed channels. Application to long-term channel morphology evolution, dambreaching, dam-break flows, and overland tsunami propagation (RS); Mathematical simulation (Eulerian and Lagrangian) of transport processes (RS). Application to long-term channel morphology evolution, dam-breaching, dam-break flows, and overland tsunami propagation (RS); Application of machine learning in stage-discharge prediction.
- g) Coastal morphodynamics and coastal and port structures. Assessment of the vulnerability to flooding of the built environments on low-lying areas of estuaries due to extreme ocean storm surge events and climate action (RNBE; RNSC); Modular port facilities in rivers for bulk cargo; (RNBE); Morphological modeling of beach morphology in the presence of coastal structures. (RS); Tidal energy in estuaries; (RNBE).

RG2 | Environment and Water Resources

15 PhD members | 2 PhD collaborators | 31 non-PhD collaborators

The activity of RG2 was focused on the following topics:

- a) Hydrology and water resources, including trend detection in hydrologic time series and modeling; drought analysis and flood analysis, including joint probability cumulative distribution functions, empirical copulas, and non-stationary models; development of rainfall-runoff models; machine learning techniques applied to hydrologic modeling, including artificial neuronal network; development of daily runoff modeling in very large watersheds based on satellite data; development of regionalized impact scenarios for the water sector and climate change impact assessments; and risk assessment study on flash floods and debris.
- b) Water services, covering water supply, sanitation, urban stormwater, and water pollution control. The following themes were included: 1D-2D dynamic simulation of the hydraulics and environmental performance of wastewater/stormwater systems; urban resilience evaluation and management in the water sector; hydraulic and environmental performance of nature-based



solutions (e.g., green roofs); non-sewer sanitation and fecal sludge management; biosolids treatment and reuse; research on constructed wetlands as wastewater treatment systems.

- c) Environmental issues, including the themes of assessment and analysis of climate change impacts on natural and man-made water resource systems, sustainable governance, and the environmental management applied to sustainable construction.
- d) Hydrogeology and groundwater services, including groundwater pollution and risk assessment; groundwater and ecosystems; aquifer recharge and discharge; water and climate change; decision support systems for water catchment management and development of effective methods for risk-based environmental decision-making.

RG3 | Systems and Management

9 PhD members | 1PhD collaborators | 34 non-PhD collaborators

RG3 had relevant results in specific topics such as:

- a) Regulatory and contracting policies, pricing, and performance assessment, including Efficiency and productivity of public services and infrastructure; Regulatory governance and substance; Tariffs and pricing of public utilities and transportation; Economics of water and waste services; Governance models in local government.
- b) Decision-making and systems design, operations and management, and project management, including Decision aiding and MCDA methods; Logistics and supply chain management; Systems modeling and optimization; Procurement models of PPPs; Infrastructure contract management; Risk assessment and management.
- c) Information modeling and technologies, including Ground deformation measure with advanced SAR interferometric methods; 3D city information models and their application; Spatial analysis problems; Building information modeling and systems interoperability; Construction innovation and information management; E-business and e-procurement in construction.

RG4 | Transportation Systems

11 PhD members | 0 PhD collaborators | 28 non-PhD collaborators

RG4 research focused on the following three main topics:

- a) Road, Airport, and Rail Infrastructure Systems, including methodologies and models to predict degradation and improve maintenance, renewal, and investment decisions within the different transport infrastructure systems and across them (i.e., integrated asset management) and Retrofitting transport systems: changing and adapting "old to like-new" transport systems to meet new performance standards while extending the existing ones;
- b) Transport Systems Planning and Operations, including urban mobility, and active and shared mobility, as vehicle-sharing systems, the modeling and testing of demand response



transportation, multi-modal systems, bike-sharing, and freight services supported by the development of appropriate ITS tools;

c) Strategy and Policy in Transport Systems, including new types of integration of public and private transportation modes and services (i.e., among each type and across the types), new types of business models for freight and passengers' services enhancing more efficient intermodality.

RG5 | Studies on Construction

58 PhD members | 8 PhD collaborators | 104 non-PhD collaborators

RG5 developed research projects in the following domains:

- a) Innovative applications of materials such as GFRP and CFRP: breakthroughs in concrete and mortars technology were experimentally validated; mortars and concrete formulations with nanomaterials were performed; studies on the energy efficiency of different materials, building components and construction systems such as active and glazing facades, shading devices and green roofs and walls were conducted; risk-informed quality, safety, and environmental management in construction related research was included in various national and international actions, including normative work;
- b) New theories on sustainability and construction: the use of traditional techniques and materials (earth, wood, stone, brick), implementation of selective demolition and recycling maximization (i.e., recycled aggregates in concrete and mortars production), and strategies of passive design and acclimatization;
- c) Life-cycle management systems (i.e., inspection, diagnosis, maintenance, and rehabilitation); conservation of historical building heritage (i.e., within various European research projects); other projects included sensors in structures, technological innovation, and assessment of complex structures;
- d) Seismic rehabilitation of masonry buildings; experimental and numerical analysis of timberframed masonry walls subjected to monotonic and cyclic loading; reinforcement of timber-framed masonry walls with elastoplastic dampers, reinforced render, or steel plates. Experimental and numerical analysis of ordinary masonry walls subjected to in-plane and out-of-plane loading. Seismic reinforcement of ordinary masonry walls with carbon fiber reinforced render or transverse hinge connectors.

RG6 | Structures and Geotechnics

34 PhD members | 13 PhD collaborators | 59 non-PhD collaborators

The research activity of RG6 for 2023 was planned to focus on six major research areas:

a) Mechanics, Modelling, and Analysis of Structures. Dynamic instabilities and algorithms for the numerical analysis of the mechanical behavior of non-smooth structures with frictional or elastoplastic components; Modelling of moving loads on beams on nonlinear foundations.



- b) Earthquake Engineering and Seismology. History of construction and structural behavior and construction techniques of traditional masonry tile vaults; Assessment of existing structures (e.g., dynamic characterization, seismic vulnerability, and seismic risk assessment); Update and improve a model for quick evaluation of the potential seismic performance of masonry and reinforced concrete buildings based on its application to existing buildings; Structural rehabilitation (e.g., seismic strengthening techniques, passive protection); Development of tools to improve preparedness and community resilience, aiming to reduce the seismic risk through non-structural elements (i.e., Dissemination of a Practical Guide, a Short Guide for Students, a Portfolio of Solution and an Earthquake Awareness Campaign "Move, Protect and Secure" the campaign is composed by a main short length film, accompanied by four teaser-spots); Seismic design of new masonry constructions.
- c) Structural Concrete. Advanced cementitious materials; (e.g., High-performance ordinary and prestress reinforcement; Enhanced durability; Sustainable and eco-efficient solutions; Modelling and design models (e.g., stress-fields models, FEM-based software with strongly embedded discontinuities, concrete reinforced with embedded fibers); Assessment of existing structures (e.g., reliability, structural robustness, monitoring, seismic vulnerability); Structural rehabilitation (e.g., repairing and strengthening techniques, seismic strengthening, passive protection); Prefabrication and innovation.
- d) Steel and Composite Structures. GBT formulations to perform buckling, post-buckling, and vibration analyses of isolated members and structural systems (e.g., continuous beams or simple frames) prone to local, distortional, and global deformations; In-depth investigations on the non-linear behavior, ultimate strength, and design of cold-formed steel open-section and tubular members experiencing coupling phenomena involving local and/or distortional buckling; Novel rational approaches for the design of cold-formed and hot-rolled steel angle columns; Development and implementation of (iv1) a displacement-based finite element for the linear analysis of curved members (circular axis), (iv2) a finite element formulation for the bifurcation analysis of composite steel-concrete beams; In-depth investigations on steel sub-assemblages with bolted and welded dissipative fuses; Proposal of design rules for composite structural members and parts; Applications to steel and composite bridges.
- e) Bridge Design. Buckling resistance of steel plated girders considering M-V interaction with high compression forces; Curved steel plates on bridge deck beams: Post buckling behavior and ultimate strength; The use of high strength steels in bridge deck; Fatigue assessment of steel bridge decks; Design of plate girder transverse stiffeners; Higher order beam theory (i.e., developments and applications to steel structures and bridges analysis); Analysis of the distortion effect on the dynamic behavior of high-speed railway bridges; Analysis of substructures of offshore wind turbines.
- f) Geotechnics. Dynamic characterization of soils from small to large strains, including liquefaction;
 Studies on the elastic response measured in resonant column and using bender elements;
 Characterization of the chemo-hydro-mechanical behavior of clayey and treated soils considering





their structure and degree of saturation; Characterization of soils treated with lime and cement and bacteria; Numerical analysis of geotechnical structures involving strong soil structure interaction (e.g., tunnels, retaining structures, piles, and thermoactive structures); Studies on soils decontamination techniques (e.g., electro-osmosis). Studies on gas migration in soils.



3. MAIN ACHIEVEMENTS

3.1 Doctoral programs

Besides 6 Master courses promoted by IST, CERIS researchers are presently engaged in PhD courses leading to 8 Doctoral degrees. Students and their supervisors can select structured, thematic PhD programs or a combination of PhD-level subjects offered by IST, other UL schools, or other universities under protocolled agreements.

The doctoral degrees and the structured PhD programs CERIS are engaged with are listed in Table 9, which includes information on coordination. One PhD program is offered under international protocols. One PhD program is IST-interdepartmental, and schools of UL jointly promote another.

Doctoral Degree	Observations
Civil Engineering (Eduardo Júlio) ⁽¹⁾	
Climate Change and Sustainable Development Policies (J.S. Matos) ⁽¹⁾	Consortium of 3 universities (involving seven schools)
River Restoration and Management (A. Pinheiro) ⁽¹⁾	Involves 4 UL schools
Transportation Systems (L.P. Santos) ⁽¹⁾	Consortium of 3 universities (involving three schools)

Table 9 | Participation in doctoral programs

⁽¹⁾ Coordinated by CERIS members.

3.2 Activity indicators

The main scientific outputs of CERIS in 2023 are presented in Table 10. They include:

- (i) 33 concluded PhD theses and 225 in progress beyond 2023;
- (ii) 85 concluded MSc dissertations;
- (iii) one authored book, three edited books, and 55 book chapters;
- (iv) 443 papers published in journals included in WoS or Scopus databases, plus one papers in international and national peer-reviewed journals (i.e., non-WoS, non-Scopus);
- (v) 233 papers published in international conference proceedings;
- (vi) 41 papers published in national conference proceedings.

The list of PhD theses published in 2023 can be seen in Annex A. The list of papers published in 2023 can be seen in Annex B.



ACTIVITIES		RG1	RG2	RG3	RG4	RG5	RG6	CERIS	
MSc Theses concluded in 2023		6	3	15	8	40	22	85	
PhD Theses Concluded To be concluded after 2023		3	3	4	5	14	8	33	
		To be concluded after 2023	18	23	30	29	91	51	225
Pa rev Publications		International peer- reviewed journals (WoS AND Scopus)	74	39	38	38	175	96	417
	Papers in peer- reviewed journals	Peer-reviewed journals (non-WOS OR non- Scopus)	6	4	3	3	7	6	26
		Peer-reviewed journals (non-WOS AND non- Scopus)	0	0	0	0	0	1	1
	Papers in proceedings	International	13	30	23	32	108	67	233
		National	8	10	3	1	8	22	41
	Books	Entire	0	0	0	1	0	1	2
		Chapters	10	2	4	12	72	26	64
		As editor	2	0	0	4	3	2	3
Reports Scientific Consultancy/others		Scientific	0	5	0	0	38	3	38
		Consultancy/others	2	2	4	15	19	14	55

Table 10 | 2023 activity indicators: theses and publications

The indicators frequently used to assess national and international visibility are summarized in Table 11, namely:

- (i) Editor in Chief of WoS or Scopus-indexed journals (4);
- (ii) Associate Editor of WoS or Scopus-indexed journals (16);
- (iii) Membership of editorial boards of WoS or Scopus-indexed journals, including Guest or Issue Editor (123);
- (iv) Participation in organizing committees of international conferences (11);
- (v) Participation in organizing committees of national conferences (2).

Other indicators that reflect the visibility and recognition of the scientific activity of CERIS members are:

- (i) 13 keynote lectures at international conferences and 4 invited lectures;
- (ii) 28 international recognition awards.

While these numbers show that CERIS has an international projection, the number of Editor-in-Chief and Associate Editors in high-impact journals (Q1 and Q2 WoS-indexed journals) remains low. Additionally, no refereeing for funding agencies was performed during 2023. These numbers are, therefore, well below CERIS potential. The number of competitive individual grants attributed to CERIS researchers in 2023 is high when compared to those that were attributed before and still active.



ACTIVITIES		RG1	RG2	RG3	RG4	RG5	RG6	TOTAL	
	Editor-in-Chief	WoS/Scopus- indexed Journals	1	0	1	1	1	0	4
		Other journals	0	0	0	0	0	0	0
	Associate Editor	WoS/Scopus- indexed Journals	6	0	3	1	9	9	16
Collective		Other journals	0	2	2	0	0	1	4
guidance in	Issue Editor/Guest editor/Membership	WoS/Scopus- indexed Journals	15	5	10	19	37	37	123
work	in Editorial Boards	Other journals	4	1	1	2	18	14	40
	Membership in Scientific Committees	International	1	2	0	3	28	4	38
		National	0	0	0	1	1	1	3
	Drafting of codes, Recommendations	International	0	5	6	2	20	27	60
		National	0	1	5	15	33	21	75
Organization of scientific events		International	0	0	0	3	7	1	11
		National	1	0	0	0	0	1	2
		International	2	2	2	0	14	8	28
Awards		National	2	1	0	1	4	2	10
Refereeing for funding agencies		International	0	0	0	0	0	0	0
		National	0	0	0	0	0	0	0
Invited lectures		Keynote lectures at international conferences	0	2	0	0	4	7	13
		Other	0	1	0	0	1	2	4

Table 11 | 2023 activity indicators: visibility and recognition of the research

Table 12 summarizes the 2023 initiatives to obtain funding through competitive research and consultancy.

Table 12 | 2023 activity indicators: research and consultancy contracts

ACTIVITIES		RG1	RG2	RG3	RG4	RG5	RG6	TOTAL	
Competitive research projects	International research grants	Started in 2023	2	3	2	2	7	2	13
		Active in 2023	1	7	4	4	14	6	25
	National research grants	Started in 2023	1	4	1	2	5	8	10
		Active in 2023	3	8	2	7	41	14	53
Competitive individual Starte		Started in 2023	2	2	2	1	8	3	18
research grants (PhD, Post- doc, sabbatical, etc.)		Active in 2023	5	2	1	3	19	11	41
Consultancy projects finalized in 2023		10	11	19	19	18	22	99	

Concerning the indicators presented in Table 13 (Other Initiatives), no models, software applications, pilot plants and prototypes were developed, while one international and six national patents were registered. The number of outreach and dissemination initiatives is listed in Table 14.



Table 13 | 2023 activity indicators: other initiatives

ACTIVITIES			RG2	RG3	RG4	RG5	RG6	TOTAL
Models			0	0	0	0	0	0
Software applications			0	0	0	0	0	0
Pilot plants		0	0	0	0	0	0	0
Prototypes		0	0	0	0	0	0	0
Datasta	International	0	0	0	0	0	1	1
Patents	National	1	0	0	0	4	1	6

Table 14 | 2023 Dissemination to a broad audience and Outreach

ACTIVITIES	RG1	RG2	RG3	RG4	RG5	RG6	TOTAL
Other actions (e.g., scientific dissemination to a broad audience, social media)	0	7	0	1	5	7	20

The databases in Tables 10 to 14 will be embedded in CERIS website.

3.3 Evolution in the Number of Researchers

The evolution in the number of Members and PhD researchers are presented in Figure 2, respectively. The increase in 2015 reflects the integration in ICIST of the academic staff of U. Nova de Lisboa and the internal reclassification of PhD members and collaborators. The number of PhD researchers remained stable in 2016 and 2017, but in 2017 the increase in the internal numerical criterion for selecting members reduced the number of members who became collaborators. In 2018, there was a slight decrease in both, mostly because Architecture and Urban Planning researchers left to find a new Architecture and Urban Planning Research Centre. The number of Members considerably decreased in 2023, while the number of PhD members and collaborators decreased from 228 to 181.

The evolution of the number of researchers - combining Members, PhD collaborators, and non-PhD researchers (i.e., PhD students and scholarships) - is presented in Figure 3. The numbers before 2016 and after 2018 are similar, around 350, which indicates some stability. In 2016, 2017, and 2018, a quite significant increase occurred, which is explained by three main reasons: (i) the fulfilment of the last calls of the various FCT-funded doctoral programs, most of which were led by CERIS; (ii) an increase of international PhD students, namely from Brazil; (iii) a more exact collection of the data concerning PhD supervision by CERIS researchers, namely of external students.

The number decrease observed in 2018 is mostly explained by researchers' departure from Architecture and Urban Planning. In 2019, there was a sharper decrease in non-PhD collaborators. In 2022, a decrease was observed, and then in 2023, the numbers of PhD and non-PhD collaborators increased from 370 in 2022 to 385.







Figure 2 | Evolution of Members and PhD Collaborators.



Figure 3 | Evolution of the Members and PhD collaborators and non-PhD collaborators.



3.4 Evolution of Research and consultancy funding

The aspects of the national economic scenario that are relevant in the present context are the following:

- (i) Austerity policies started to be implemented in 2010-2011 and induced an economic recession in 2013-2014, followed by a weak recovery after 2015;
- (ii) Public investment in RD&I, which had peaked in 2009, steadily decreased afterward;
- (iii) Local and regional authorities and public agencies also suffered budget cuts in the same period;
- (iv) From 2007-2008 onwards, the largest contractors in the Civil Engineering sector invested in the internationalization of their activity as the national infrastructure approached completion;
- (v) The economic crisis virtually paralyzed the Construction sector throughout this period, with a recent recovery based on the rehabilitation sector.

Figure 4 shows the evolution of total funding between 2013 and 2023. Funding from contracted research attained a local minimum in 2013 with 785 k€ worth of industry contracts due to the economic crisis (i.e., between 2011-2014, Portugal was under the supervision of FMI and the European Union through the Portuguese Adjustment Plan). Between 2014 and 2017, recovery and funding stabilized around an average of 1190 k€ (with a slight dip in 2016). The local maxima of 2014 were associated with strong results in the last FP7 calls for research projects in 2013 and 2014 and an increase in industry contracts in 2014. These results can be seen in Figure 5 and Figure 6. Funding steadily decreased until 2017, mostly influenced by a reduction in the value of R&D projects.

In 2018 there was a recovery of the R&D funding, influenced by the success of CERIS researchers in funding their research through FCT-funded national projects. Consultancy, however, remained at low values compared with pre-2013 standards.

Consultancy funding decreased again in 2019, falling to an all-time low of 500 k \in in 2019 (Figure 4 and Figure 6). Both R&D and consultancy funding grew in 2020. The reduction of public investment in research may still be the root cause of these low values. Still, the possibility that the market has adapted to the crisis by lowering the net value of the consultancy work provided by CERIS should be considered. If this is the case, then it is probable that the industry contracts will not return to the values before 2010 in the near future.

In 2023, the high values of 2014 were surpassed. These values are specifically associated with increased funding through R&D (Figure 6). This improved performance is mainly associated with a higher level of EU-funded projects, as seven new research projects' grants started in 2023, and 23 were already active in 2023 (Table 12). Considering the overall funding of EU-funded projects, they have the potential to have a high impact on the overall funding of CERIS. So, the participation in international calls for funding should be a continuous effort of CERIS members to keep up the good indicators of 2023.







Figure 4 | Total annual CERIS funding (research and consultancy).







Figure 6 | Consultancy annual CERIS funding.





While funding from R&D contracts steadily decreased between 2013 and 2017, it remained above 1.25 M€. In 2018, the research funding increased to 2.02 M€ (i.e., the best result since 2009), which was seen as the outcome of the success of CERIS researchers in the 2017 FCT call for projects in all scientific domains. If that was the case, the increase was related to the initial funds transfer from FCT to CERIS project managing institutions. However, in 2019, research funding hit an all-time low - of 1.21 M€ (Figure 5). The cause for this strong reduction is not evident. It may simply express a lag in subsequent payments by FCT, in which case a recovery is expected in the next years. This reduction indicates the need to secure other types of funding, namely through EU-funded projects.

The imbalance between R&D and consultancy funding in 2018 was high: 68% of the budget was sourced through R&D and 32% through consultancy; the latter was about 45% of the former (Figure 7 and Figure 8), as high as in 2013. Yet, the 2019 budget (ca. 1.71 M€) has deepened this trend, with R&D funding about 3.4 times the consultancy funding. It is worth mentioning that this ratio has been highly variable in the last few years - R&D and consultancy funding have converged from 2013 to 2017, as the latter increased and the former decreased. In 2017 parity was achieved. In 2018, R&D funding increased to about twice consultancy funding, a result mostly attributed to the satisfactory performance of CERIS in securing R&D funding. In 2019, the imbalance was the largest recorded despite the reduction of R&D funding. This trend was inverted in 2020, and the ratio returned to the figures of 2018. In 2022, the disparity between consultancy and R&D funding increased again, as R&D funding is more than three times the funding through consultancy.



Figure 7 | Annual funding in research and consultancy

CERIS





Figure 8 | Percentage of annual funding in research and consultancy.

In 2023, the budget secured through competitive research projects (2.58 M€) was two times that secured through consultancy (approximately 1.06 M€). While funding secured through specialized consultancy and industry-funded projects slightly increased in 2017, it fell again in 2018 and 2019, the latter being an all-time low, followed by a slight recovery in 2020 and 2021. In 2023, funding through specialized consultancy increased (i.e., 0.77 M€ in 2022 to 1.06 M€ in 2023). The many consultancy projects (99 finalized in 2023) are indicative of a consolidated recovery in industry funding but of the small dimension of the average CERIS consultancy projects. It may also be the case that the market has adapted to the crisis by lowering the net value of the consultancy work provided by CERIS. On the other hand, in 2023, funding through competitive research projects significantly increased. This phenomenon may be explained by increased funding opportunities and increased dynamics of researchers applying to such calls.

The evolution of PhD members' capacity to secure either of both forms of funding is presented in Figure 9. The lowest value was in 2019 when the average total funding was 16 k \in per CERIS member. There was a slight recovery in 2022 to 19 k \in per CERIS member. In 2023, another increase occurred, with 23 k \in per CERIS member. This increase is due to the values associated with R&D funding per CERIS member (16 k \in). In 2023, consultancy funding increased, as well the number of members in 2023.





Figure 9 | Total annual funding per member.



Figure 10 | Total annual funding per PhD researcher.

3.5 Evolution of the main activity indicators

The number (85) of MSc dissertations concluded in 2023 is lower than the number (130) reached in 2022. This can be explained mainly by the reduction of students in Civil Engineering. The number of completed PhD theses in 2023 (33) is lower than that in 2022 (42), as presented in Figure 11. Amongst those, 28





theses were in IST-UL doctoral programs or other institutions related to CERIS. The number of supervised doctoral students whose PhD theses will be concluded after 2023 is 214, including 152 registered at IST-UL, 17 at the University of Coimbra and 15 at FCT-UNL. The distribution of PhD students is heterogeneous regarding the scientific areas and the number of students per supervisor.



The ratio of concluded theses per PhD researcher (0.18, as seen in Figure 12) is equal to that of 2022, while the ratio of ongoing doctoral theses has increased (from 0.95 in 2022 to 1.18 in 2023, considering supervised or co-supervised active doctoral theses).



Figure 12 | Concluded PhD theses per PhD researcher.

The numbers reflect the relevance of the PhD programs headed by CERIS researchers. The oscillations may be associated with the competitiveness of PhD scholarship calls as well as with the dynamics of the labour market in the Architecture, Engineering and Construction sector, which has had a high demand for Civil Engineers in recent years. Moreover, most FCT-funded PhD programmes had their last call for applications in 2021, also affecting the drop in 2023.





In 2023, the number (233) of papers published in international conferences decreased when compared to 2022 (294 papers in international conferences) and 2019 (306 papers in international conferences, before the COVID-19 pandemic). In 2023, the number of international conference papers per researcher with a PhD was 1.29 (the same as in 2022).

The number of papers published in international WOS or Scopus-indexed journals slightly increased from 425 in 2022 to 443 in 2023 (see Figure 13). As expected, the number of papers published in WoS or Scopus-indexed journals was larger than those published in proceedings of international conferences, following the trend observed since 2018.





The evolution of the total number of papers published in international WOS or Scopus-indexed presented in Figure 13 presents a consistent increase in scientific activity from 2013 and a stabilization plateau from 2015 to 2017. From 2018 to 2021 there is an evident increase in all indicators - bulk number of papers, papers per PhD researcher, and papers per member. This may be attributed to the good level of completed PhD theses and the incorporation of highly productive junior researchers in post-doctoral positions. In 2022, the bulk number of published papers lowered and then slightly recovered in 2023, although the number of papers in Q1 and Q2 WoS journals has lowered since 2021 (Figure 14).

The publication ratios per member and PhD researchers are presented in Figures 15 and 16 Figure 16, respectively. In 2023, 2.4 WoS/Scopus papers were published per CERIS member. In 2022, the publication ratios (both per member and PhD researcher) decreased, but in 2023 a recovery is observed. The 2023 increase is more evident in the ratio per PhD researcher, which reached the highest number (2.4) since 2013. Additionally, when compared to the 2013-2017 period, the observed ratios in 2018-2023, both per member and PhD researcher, show a consolidated improvement.
CERIS: Civil Engineering Research and Innovation for Sustainability





Figure 14 | Papers published in international Q1 or Q2 WoS journals.





Figure 16 | Publication in WoS/Scopus journals per PhD researcher.





The number of WoS-indexed Q1 and Q2 papers per researcher with a PhD increased from 1.48 to 1.77, from 2022 to 2023 (Figure 17). The ratio of papers in WoS/Scopus-indexed journals with lower impact factors (Q3 and Q4, and Scopus journals) per researcher with a PhD increased from 0.36 to 0.67. The 2023 ratio is only surpassed by the one in 2018 (Figure 18).





Figure 17 | Publication in Q1 or Q2 WOS journals per PhD researcher.

Figure 18 | Publication in other (Non-Q1 and non-Q2) WoS or Scopus journals per PhD researcher.

The distribution of papers published in WoS journals per impact factor quartile is shown in Figure 19. In 2013-2017, about 50% of the papers were published in Q1 journals. This percentage was stable during that period. In 2019 this figure was 48%, and in 2020 this percentage dropped to 40%. In 2021 this percentage increased to 42%, but in 2022 it dropped to 35% and again in 2023, dropping to 28%. Nevertheless, in 2023, 72% of papers were published in Q1 and Q2 journals. While publications in Q1 journals have been decreasing since 2021, publications in Q2 journals have been increasing since 2017.







Figure 19 | Distribution of papers published in WOS journals per quartile (Q1 to Q4) of impact factor.

Figure 20 shows the number of papers in WoS/Scopus journals per PhD researcher grouped by impact factors (Q1 and Q2 compared to other quartiles). In 2023, on average, each researcher published 1.77 papers in Q1 or Q2 WoS-indexed journals.



Figure 20 | Distribution of papers per PhD researcher published in WoS or Scopus journals considering WoS-quartiles Q1 and Q2 and other journals indexed in Scopus or WoS.

The analysis of these data suggests the following comments:

- (i) If 2020 and 2021 are not considered, the number of papers in international conference proceedings in 2023 is the lowest since 2013.
- (ii) On the other hand, researchers redirected the dissemination of some of their work to journal publications, leading to an increase of the ratio of publications in non-Q1 WoS-indexed journal publications (from 275 in 2022 to 319 in 2023). The number of publications in Q1 WoS-indexed





journals decreased (from 150 in 2022 to 124 in 2023), while Q2 WoS-indexed journal publications increased (from 188 in 2022 to 197 in 2023).

Outreach and dissemination for a broad audience in 2023 was equal to that of 2022. Still, the numbers remain lower than those of 2019 by 26%. Carrying out dissemination and outreach is becoming imperative to promote CERIS visibility and expand the opportunities to apply CERIS members' expertise. These initiatives are expected to positively impact the capacity of CERIS researchers to form fruitful partnerships and to attract high-quality PhD students. The number of Editors in Chief and Associate Editors in high-impact journals (Q1 and Q2 WOS-indexed journals) and the number of keynote lectures in international conferences are believed to be below CERIS potential.

Finally, for the indicators classified as other initiatives, in 2023: a) models are typically laboratory test-rigs; there was no model developed in 2023, as in 2022; b) the software applications listed are limited to those accessible on the internet for public use; no software applications were made available for public use in 2023; c) in general terms, researchers first register national patents before submitting to international registration; in 2023, 1 international patent and 6 national patents were registered. Five more national patents were registered in 2023 when compared to 2022.

3.6 Research group results

The contribution of the research groups to the activity indicators presented above is presented in Annex C.



4. FUTURE RESEARCH

The CERIS activities planned for 2024 are a natural follow-up of the research carried out in 2023, as summarized in Section 2.4. As submitted by the coordinators of the research groups, the proposed activity will benefit from the internal program to promote cooperation in research, as framed by the thematic strands and the work areas presented in Sections 2.2 and 2.3.

RG1 | Hydraulics

The RG activities for 2024 will be organized according to major research topics as follows:

Pressurized water systems

- Numerical and experimental analysis of hydraulic transients in pressurized pipe systems (RS).
- Energy recovery in water services systems, using pumps as turbines, and developing new low-cost energy-harvesting technologies (e.g. propellers, centrifugal micro-turbine, water wheels) (PD), towards the digital and energy transition in the water sector.
- Anomalous events (e.g., bursts) detection, location, and quantification in water supply systems using machine learning techniques (RS).
- Modeling rapid pipe filling events in intermittent water supply systems (RS).
- Analysis and improvement of the resilience of drinking water systems for demand increase and pipe failure (RS).
- Multicriteria analysis for scheduling rehabilitation interventions in water distribution networks (RS).
- New energy converters, hybrid pumped hydropower, and energy storage solutions in renewables integration (RS).

Fluvial hydraulic structures

- Development of mitigation strategies and pre-cast shelters for fish downstream of powerhouses with a hydropeaking operation (RS).
- Numerical and experimental modeling of flood releases and related hydraulic structures (RS; RNBE).
- Study the hydraulics of PKW weirs combined with spillways (RS, RNBE).
- Study the pressure field and slab stability in a plunge pool lined with concrete slabs (RS).

River restoration and management

- Risk management in the valleys downstream of dams (RS; RNSC).
- Environmental flow determination procedures and hydropower station operation rules to reduce ecological risk downstream of dams (RS, RNBE).
- River restoration and development of fish passes for low-height river obstacles to improve ecological connection along regulated rivers (PD; RNBE; RNSC).





Environmental fluid mechanics

- Laboratory investigation of rough-wall open-channel turbulence (RNBE).
- CFD simulation of solid-fluid interactions in turbulent flows (RNBE).
- Laboratory investigation and mathematical simulation of transport of dissolved substances (RS, RNBE).
- Heat and mass transport in wetlands (RNBE).

Sediment transport and river morphodynamics

- Hydrodynamics of river diversions in equilibrium (RS; RNBE).
- Mathematical modeling of shallow flows with mobile beds. Application to long-term channel morphology evolution, dam-breaching, dam-break flows, and overland tsunami propagation (RS).
- Development of stabilization techniques for river meanders in equilibrium (RNBE).

Maritime hydraulics, coastal engineering and coastal morphodynamics

- Characterization of offshore wave climate and storm wave events (RS).
- Morphodynamic modelling and field observations of beaches and tidal inlets hydro-sedimentary dynamics, including engineering interventions (RS).
- Development of Nature-Based Solutions for Coastal Engineering (RNBE).

RG2 | Environment and Water Resources

The E&WR will continue focusing on environmental and water resources research activities to develop approaches, methodologies, and tools that cut across these areas, improving knowledge and capabilities to manage natural and built environments sustainably.

The research objectives will cover different cross-cutting issues related to the thematic strands defined for CERIS. The main activities will focus on "Natural and Societal Changes" and "Risk and Safety in Natural and Built Environments," with more limited contributions to the other two thematic strands.

The E&WR will continue concentrating its activities on the following major topics:

- Hydrology and water resources: characterization and modeling of hydrologic variables and processes, including extreme event analysis, planning and management of water resources, and water policy formulation;
- Integrated water resources management, including the joint management of water supply from surface and groundwater sources, controlling water uses and demand, and managing water guality and ecological requirements, specializing in transboundary river basins.





- Assessment and analysis of climate change impacts on natural and man-made systems, with special emphasis on water resource systems, including the formulation of measures and policies for promoting adaptation and mitigation;
- Coastal urban wastewater systems, including adaptation actions to climate change given sea level rise and risks of saline water inflows;
- Non-sewer solutions and fecal sludge management options and techniques for in low-income countries:
- Water asset management, performance indicators, and urban resilience related to urban water/wastewater/stormwater systems;
- Integrated sustainable wastewater solutions, including the hydraulic and environmental performance of nature-based solutions for mitigation and adaptation to climate change, such as constructed wetlands, green roofs, and detention ponds;
- Environmentally sustainable assessment (LiderA system) and management of built environments;
- Approaches to the transition to the carbon-neutral and circular economy, including sustainable buildings, infrastructures, and urban areas with a focus on water, energy, and materials cycles, with special emphasis on life-cycle framework;
- Implement monitoring, aquifer and geophysical testing and groundwater quality assessment to identify groundwater pollution sources (saline intrusion, agriculture, industry, mining), to quantify surface-groundwater exchange and to delineate groundwater-dependent ecosystems accurately;
- Employ advanced numerical and stochastic groundwater modeling techniques along with decision support systems (DSS) to improve groundwater management practices;
- Implement nature-based solutions and climate change mitigation measures to enhance groundwater quality and quantity, to minimize groundwater contamination and strengthen integrated water management approaches effectively;
- Utilize cutting-edge technology such as satellite-based remote sensors and drone-based sensors to enhance monitoring capabilities, including land use evaluation, soil moisture assessment, water availability analysis, and identification of aquifer recharge and discharge zones. Additionally, leverage satellite-based sensors, radar data, and meteorological reanalysis to monitor climate variables comprehensively;
- Investigate the importance of groundwater resources for ensuring water and food security in arid and semi-arid regions facing water scarcity.







RG3 | Systems and Management

In the future, the group will strategically incorporate other areas of the development which are the following:

- 1. Digital Built Environment and Twin Transition
- 2. Digital Twin and Asset Management
- 3. Decision support systems, Project management and Contracts

Digital Built Environment and Twin Transition

Our research group has made groundbreaking strides in the field of the digital built environment. One of our significant achievements is the innovative use of BIM, particularly for heritage management. We have tailored scan-to-BIM workflows at UNESCO World Heritage sites in Sintra, which have pioneered the integration of seismic assessment with BIM. We have also optimised emergency response routes and developed advanced sensor data integration, which has significantly enhanced heritage protection and facility management.

Using other information technologies, such as GIS, we conducted GIS-based data processing in various applications, including optimising crop distribution in Portugal in collaboration with the National Institute of Agricultural and Veterinary Research (INIAV). We have also mapped and monitored urban green roofs to assess their biodiversity potential and incorporated future global climate scenarios in risk evaluation for several natural hazards in Portugal.

Complementarily, our research group coordinated several projects that revolutionised the construction industry through digital transformation. Under the REV@Construction project, we have developed several digital tools for construction, influencing significant updates to standards and laws and promoting interoperability. Focusing on the Twin Transition, several initiatives have been conducted, such as the Circular ECO BIM project, which allowed the development of tools that can evaluate circularity and sustainability. One of these is the SmartLCA tool, which is a BIM-based LCA digital tool that has been developed and is now being deployed within the industry.

Digital Twin and Asset Management

Understanding the importance of asset management for the built environment, the group conducted several works on this topic. Notably, it firmly pushed the standardisation ecosystem around this matter, coordinating the respective standardisation technical committee. Specialising in asset management, our research group has also embraced the challenges of integrating Digital Twin (DT), especially within the demanding context of complex infrastructures. We have made significant strides in advancing asset management through the deployment of DTs, which serve as dynamic, real-time replicas of physical assets. This transformative approach facilitates data-driven management across the asset's lifecycle,





enhancing operational efficiency and decision-making. Central to our efforts was the DT4Health project, which has established a comprehensive framework for DT application in hospital settings.

Decision support systems, Project management and Contracts

The group is particularly concerned about simulation, optimisation, and performance analysis. Consistent research has been conducted on these topics, having in mind the implementation of more efficient processes and effective decision support systems. Relevant contributions have also been made to Project Management by studying the causes of delays in construction projects in Portugal and by developing a methodology that allows defining and substantiating mitigation measures based on the opinion of professionals. Concerning other operations challenges, the group conducted several studies on strategic production areas such as Modular Construction, Lean Construction and Reverse Logistics. Finally, a portfolio model was developed for strategic purchasing management in construction.

Furthermore, closer coordination with the CERIS strategy and the general orientations stemming from its thematic strands will be promoted. The horizontal character of the S&M group skills and competencies creates opportunities for synergetic cooperation and interactions with other CERIS research groups and to make relevant contributions closely linked to the thematic strands' objectives.

RG4 | Transportation Systems

The RG4 for 2024 will pursue the objectives described in section II.1 using the means and the routes offered by EU (Horizon Europe) and national (Portugal 2030 and FCT) financed research projects, by the research involved in each on going Ph.D. works integrated on the doctoral program in Transportation Systems, by the innovation, the technology and the development transfer to society and industry, by supporting the professional training programs set with several stakeholders on the transportation and infrastructure systems, and by the improvement of the results achieved within the international networks already established and the ones to enhance if the opportunity comes.

RG5 | Studies on Construction

The RG activities in 2024 will be a natural follow-up of the research carried out in 2023. These activities will cover research objectives that include different cross-cutting issues with branches in the four thematic strands: Product development in Civil Engineering industries (PD); Risk and safety in natural and built environments (RS); Rehabilitation of natural and built environments (RNBE); Response to natural and societal changes (RNSC).

The RG activities for 2024 will be organized according to major research topics. The general objectives of the group for 2024 are:

CERIS: Civil Engineering Research and Innovation for Sustainability



- To develop research projects in Construction Materials, Technology, and Management Innovation; Sustainable Construction; Monitoring, Rehabilitation, and Conservation of the Built Heritage. An effort will be made to concentrate on increasingly less wide and more specific fields to produce relevant results in national and international forums (measured in a significant increase in the number and impact factor of papers in peer-reviewed international journals, the supervision of Ph.D. Theses and the approval of national and international research grants): advanced materials and technologies also focusing on nanomaterials - establish international cooperation and be a national leader in the field of composites (GFRP and CFRP); concrete and mortars technology - proceed with Ph.D. and MSc studies under way (in strong collaboration with LNEC) and improve the Mortars Section of the Construction Laboratory; risk informed quality, safety and environmental management in construction - increase the already large international cooperation via technical committees and international conferences; sustainability and deconstruction strategies and technology - proceed with Ph.D. and MSc studies under way and be a national and international reference in the field of recycled aggregates for concrete and mortars production; building physics and passive design - continue the very good results in the near past and expand its potential through studies on energy efficiency and acoustics of innovative materials, components and construction systems; building acclimatization and mechanical systems continue collaboration with the Mechanics and Physics Departments of IST Department of IST, strategically important in terms of sustainable construction in terms of energy-saving; inspection, diagnosis, maintenance and rehabilitation systems - proceed with Ph.D. and MSc studies under way and be a national and international reference in the field of inspection and diagnosis systems; conservation of historical building heritage - continue and strengthen national and international cooperation projects, namely within the Construction Technological Portuguese Platform (PTPC);
- To continue participating in national and international committees, participating/organizing national and international conferences, teaching in Graduation and Post-Graduation courses in the field of construction (namely in the FCT Doctoral Program Eco Construction and Rehabilitation, launched in 2014), and participating in academic events and performing consultancy work.

RG6 | Structures and Geotechnics

In 2024, it is planned that the members of the RG6 continue working on the most relevant research topics of the area, according to reference international organizations and current priorities of the country.

A renewed effort to promote deeper and more effective collaboration between RG members and between these and internationally renowned researchers will be made to deliver relevant contributions to the sector and increase participation in research projects funded by the European Union. The main general purpose is to improve the construction sector's competitiveness, reduce risk and improve the safety of infrastructures, supporting the development of economical and eco-efficient materials and products and new technologies to design, build and maintain high-quality and long-lasting structures. This embraces the development of (i) sustainable materials and products, (ii) innovative construction methods,





addressing, particularly prefabrication, as well as rehabilitation, (iii) advanced computational tools for structural and geotechnical analysis, (iv) contributions to standards and design guidelines for both new and existing structures, including their foundations, (v) novel health monitoring and life-cycle assessment tools for structural and geotechnics uses, and (vi) steel industrial research and innovation in line with the European Green Deal.

Other more general objectives are the increase of the group internationalization and the links to industry, namely through:

- improvement of the competitive funding capacity in international and national research projects calls
- participation in national and international standardization committees,
- organization of academic national and international events, -
- participation in national and international Graduation and Post-Graduation courses (namely -ERASMUS and FCT Doctoral Programs) in the field of Structures and Geotechnics,
- expert consultancy work to partially fund research and provide practical applications to the results of research,
- cooperation with design offices and private companies,
- partnership with the industry for the optimization of resources and industrial efficiency upgrading.







5. CLOSURE

In 2023, CERIS counted on the expertise of 181 PhD and 204 non-PhD researchers, having the profile and critical mass needed to sustain a leading national position and attain a strong international presence in the sector. The number of CERIS Members increased in 2023, related to the new two hubs in CERIS and to the increment of members due to their past productivity.

FCT classifies CERIS as the only 'large research unit' in Civil Engineering. In day-to-day operations, one set of difficulties relates to inherited weaknesses in technical staff regarding the operation of laboratories and, especially, the creation of an administrative structure competent in the management of Science and Technology. The merging of the centres at CERIS's origin aimed at an improved use of human resources; however, the current freeze on recruiting technical staff is still an obstacle, and CERIS should use the existing resources to solve the difficulties foreseen.

The discussion that led to the creation of CERIS was focused on the dual challenge of respecting the identity of the founding centres while actively promoting internal cooperation in a new unit rich in synergies in the principal areas of the Built and Natural Environment. The first seven years of operation have shown that loss of identity is not an issue and confirmed that the core challenge of the merge was the progressive realignment of the activity of the research groups in the framework of the main work areas of the common thematic strands. It should not be expected that groups with long-established areas of operation would immediately readjust and start new forms of cooperation. However, the first signs of group cooperation result from sustained proactive internal initiatives (seed projects, etc.).

The number of Q1 and Q2 WoS-indexed journal papers in 2023 was lower than that in 2022. However, the ratios of Q1 and Q2 WoS-indexed journal papers per researcher and per member have increased. Still, considering the quartile of journals to be a benchmark for quality of the published papers, it has decreased, since papers published in Q1 and Q2 WoS-indexed journals represent 72% of all papers published in WoS or Scopus indexed journals. International recognition remained at the same level in 2023, with many Editor in Chief and Associate Editor roles. However, there is still a way to go to materialize that recognition into stable cooperation leading to international projects.

Regarding funding, 2023 results show an economic recovery, both in R&D and consultancy activities of CERIS members. Both national and international research funding has significantly increased since 2019, considering that 2023 funding is more than double the 2019 funding. Still, there are some difficulties in securing funding, namely related to the discouraging conditions that the universities in the Lisbon area must face when applying to Portugal 2030 calls. Nevertheless, funding through competitive research projects increased, which may be explained by the increased dynamics of researchers applying to such calls, also associated with the creation of the CERIS hubs in 2022.

Based on the high level of activities of CERIS in the 2013-23 period and the positive mark (Excellent) in the 2017 FCT evaluation, CERIS expects to maintain the leading position in the Civil Engineering area. Such a result would be coherent with all main international scientific rankings, where the University of Lisbon (in which CERIS is the only research unit in Civil Engineering) ranks first in that subject in Portugal.









ANNEX A – PHD THESES COMPLETED IN 2023









PhD theses completed in 2023

Student name	Supervisor	Co-Supervisor #1	Co-Supervisor #2	Title	PhD program
Alessandra Ranesi	Maria Paulina Santos Forte de Faria Rodrigues	M. Rosário Veiga		Eco-efficient plasters for increased indoor air quality and comfort	Civil Engineering
Alissandra Pessoa Almeida	Maria Cristina de Oliveira Matos Silva	Vitor Faria e Sousa		Assessing rainwater harvesting system performance in university buildings: applications in Brazil and Portugal	Civil Engineering
Ana Cristina Chalaça Gil	Ana Paula Filipe Tomé	Maria Raquel Henriques da Silva	Luís Manuel Antunes Veiga	Digital Heritage of Architectural Heritage: Guidelines for documentation through a Heritage-BIM library consisting of generic heritage objects. The Serlian cloisters of Lisbon	Architecture
				study	
Ana Rita Monteiro Rocha de Sousa Martins	Filipe Manuel Mercier Vilaça e Moura	Carlos Miguel Lima de Azevedo		Peer-to-Peer Autonomous Car- sharing	Transportation Systems
Ana Sofia Santos Ferreira Leonardo	Manuel Guilherme Caras Altas Duarte Pinheiro	Ricardo Filipe Mesquita da Silva Mateus	Jorge Manuel Caliço Lopes de Brito	High-performance sustainable solutions for the refurbishment of commercial buildings	Civil Engineering
André Miguel Pereira Castelo	João Pedro Ramôa Ribeiro Correia	Jorge Manuel Caliço Lopes de Brito	Susana Bravo Cordeiro Baptista Cabral da Fonseca	Durability of all-composite civil engineering structures – development of an inspection and diagnosis system	Civil Engineering
António Luis Domingues Ginja	José António Raimundo Mendes da Silva	Luísa Trindade	Rui Lobo	Towards a Critical Archaeology of Architecture	Art History
Armando Demaj	Ana Isabel Mera Marques	João Paulo Janeiro Gomes Ferreira	António Manuel Candeias de Sousa Gago	Seismic rehabilitation of old buildings. Strengthening of load- bearing brick masonry walls with twisted steel bars	Civil Engineering
Bernardo Fontenele Garcia	Maria do Rosário Maurício Ribeiro Macário			Usability evaluation of multimodal transit maps: preference, performance and route planning	Transportation Systems
Bruno Aguirre Tessaro	Carlos Manuel Tiago Tavares Fernandes	Laurent-Stainier	João Pedro Ramôa Ribeiro Correia	Thermo-mechanical Structural Modelling of FRP profiles subject to fire	Computational Engineering





Student name	Supervisor	Co-Supervisor #1	Co-Supervisor #2	Title	PhD program
Bruno Emanuel da Silva Ferreira	Nelson Jorge Gaudêncio Carriço	Didia Isabel Cameira Covas		Real-time Pipe Burst Location Using Artificial Intelligence Techniques	Civil Engineering
Diogo Manuel Nunes Galhofo	Nuno Sivestre	António Pedro Carones Duarte		Computational Modelling and Simulation of Solar Sail Membranes: a Multiscale	Aerospace Engineering
Filomena Maietta	Silvia Meniconi	Bruno Brunone	Dídia Isabel Cameira Covas	Approacn Transient response of water distribution network: numerical and laboratory tests	Int. Doctoral Program in Civil and Environmental Engineering
Gabriel Costa Valença	Filipe Manuel Mercier Vilaça e Moura	Ana dos Santos Morais de Sá		Allocating road space dynamically over time in complex urban areas	Transportation Systems
Hala Ali Abdulrazaq	Manuel de Arriaga Brito Correia Guedes	Maria Alexandra Alegre	Jorge Manuel Caliço Lopes de Brito	Sustainable architecture in the Middle East: a study on Kurdistan region in Irag	Architecture
Inês do Nascimento Teotónio	Carlos Paulo Novais Oliveira da Silva Cruz	Maria Cristina de Oliveira Matos Silva	Nuno Albino Vieira Simões	The value of green roofs/façades: Incorporating life cycle assessment and investors/users' preferences in cost-benefit analysis	Civil Engineering
Javier Andres Forero Valencia	Claúdio Henrique de Almeida Feitosa	Luís Manuel Faria da Rocha Evangelista	Jorge Manuel Caliço Lopes de Brito	Improvement of concrete performance through treatment of coarse recycled concrete aggregates with acid solutions and addition of aluminium sulphate	Civil Engineering
Joana Miguel Santos Ramirão Costa	Rui Manuel Carvalho Viegas	Filipa Maria Santos Ferreira		Modelling a wastewater treatment plant into a water, energy and nutrients factory	Civil Engineering
Joana Vaz Baltazar	Elsa Cristina Tavares Lourenço Alves	António Heleno Cardoso		Sediment control at lateral water intakes through submerged vane- fields	Civil Engineering
João Diogo de Sousa Figueira	Carlos Augusto Santos Silva	Peter John Bourne-Webb		Critical aspects on shallow geothermal energy systems: development, design and infra- structure	Sustainable Energy Systems
João Diogo Fragoso Januário	Carlos Paulo Novais Oliveira da Silva Cruz	Humberto Salazar Amorim Varum	Vitor Faria e Sousa	Seismic risk and real estate prices: an analysis of revealed and stated preferences in Lisbon (Portugal)	Civil Engineering
Kamar Aljundi	Ana Maria Carvalho Pinheiro Vieira	Maria Rafaela Pinheiro Cardoso	José Alberto Marques Lapa	Sustainability and optimization guidelines of efficient solutions in	Civil Engineering





Student name	Supervisor	Co-Supervisor #1	Co-Supervisor #2	Title	PhD program
				shallow geothermal systems. Case study of Aveiro University	
Kathleen Standen	José Paulo Patrício Geraldes Monteiro	Rui Twohig Hugman		Managed Aquifer Recharge – an integrated water management solution for the Algarve	Marine, Earth and Environmental Sciences
Luís Filipe Soromenho Gomes	Diogo Filipe da Cunha Ferreira			Essays about public policies evaluation: Design of a sociotechnical process and	Transportation Systems
Mai Wardeh	Rui Domingos Ribeiro da Cunha Marques			Rebuilding Sustainable Communities after Disasters: Integrating Sustainable Development Goals in Refugee	Territorial Engineering and Territorial Planning
Marcus Omori Yano	Samuel da Silva	Elói João Faria Figueiredo		Transfer learning in Structural Health Monitoring	Mechanical Engineering
Mohammad Reza Manshadian	João António de Abreu e Silva			Effects of virtual communications and social network on travel behavior	Transportation Systems
Parisa Ahani	Amílcar José Martins Arantes	Sandra Maria de Brito Monteiro de Melo		Toward sustainable urban transportation: Developing optimization models in urban transportation fleet	Sustainable Energy Systems
Rafael Andrés Sanabria Díaz	Leandro Mouta Trautwein	António Manuel Pinho Ramos		A framework for the nonlinear finite element analysis of punching shear in flat slabs	Civil Engineering
Rafael Travincas Pinto	Maria Isabel Torres Morais	Inês dos Santos Flores Barbosa Colen		Analysis of the supports influence on applied mortars performance	Civil Engineering
Rui Manuel Cordeiro Colaço	João António de Abreu e Silva			Understanding retail location: a longitudinal analysis in the face of technological change	Territorial Engineering
Sara Maria Santos Soares Dias	António José Barreto Tadeu	Jorge Manuel Caliço Lopes de Brito	João António Soares de Almeida	Design, development and validation of construction elements made of composite wood waste	Civil Engineering
Sebastião Ferreira de Almeida Santos	Fátima Ferreiro	Ana Isabel Loupa Ramos	Alexandre Bacelar Gonçalves	Polarization and urban vulnerability. 'Peripheries' of planning and public policies in the Lisbon Metropolitan Area	Architecture of Contemporary Metropolitan Territories









ANNEX B – PAPERS PUBLISHED IN 2023









Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Abbaszadeh, H.; Norouzi, R.; Sume, V.; Kuriqi, A.; Daneshfaraz, R.; Abraham, J.	Sill Role Effect on the Flow Characteristics (Experimental and Regression Model Analytical)	Fluids	V. 8, n.º 8 (art. 235)	10.3390/fluids8080235	Non WoS; Scopus		Q3	
Abd-Elaty, I.; Fathy, I.; Kuriqi, A.; John, A.P.; Straface, S.; Ramadan, E.M.	Impact of Modern Irrigation Methods on Groundwater Storage and Land Subsidence in High-water Stress Regions	Water Resources Management	V. 37, n.º 4(1827- 1840)	10.1007/s11269-023-03457-5	WoS AND Scopus		Q1	Q1
Abd-Elaty, I.; Kuriqi, A.; Ganayem, H.M.; Ahmed, A.; Saleh, O.K.; Garrote, L.	Assessment of riverbank filtration performance for climatic change and a growing population	Frontiers in Environmental Science	V. 11 (art. 1136313)	10.3389/fenvs.2023.1136313	Non WoS; Scopus		Q1	
Abd-Elaty, I.; Kuriqi, A.; Garrote, L.	Freshwater cooling injection to mitigate saltwater intrusion and support sustainable groundwater management	Desalination	V. 564 (art. 116776)	10.1016/j.desal.2023.116776	WoS AND Scopus	9.9	Q1	Q1
Abd-Elaty, I.; Kuriqi, A.; Pugliese, L.; Zelenakova, M.; El Shinawi, A.	Mitigation of urban waterlogging from flash floods hazards in vulnerable watersheds	Journal of Hydrology: Regional Studies	V. 47 (art. 101429)	10.1016/j.ejrh.2023.101429	WoS AND Scopus	4.7	Q1	Q1
Abolghasemi Moghaddam, S.; Simões, N.; Gameiro da Silva, M.	Review of the experimental methods for evaluation of windows' solar heat gain coefficient: From standardized tests to new possibilities	Building and Environment	V. 242 (art. 110527)	10.1016/j.buildenv.2023.110527	WoS AND Scopus		Q1	Q1
Abuchar-Curi, A.M.; Coronado- Hernández, O.E.; Useche, J.;	Improving Pump Characteristics through Double Curvature Impellers:	Fluids	V. 8, n.º 8 (art. 217)	10.3390/fluids8080217	WoS AND Scopus		Q3	







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Abuchar-Soto, V.J.; Palencia-Díaz, A.; Paternina-Verona, D.A.; Ramos, H.M.	Experimental Measurements and 3D CFD Analysis							
Adnan, R.M.; Dai, HL.; Kuriqi, A.; Kisi, O.; Zounemat- Kermani, M.	Improving drought modeling based on new heuristic machine learning methods	Ain Shams Engineering Journal	V. 14, n.º 10 (art. 102168)	10.1016/j.asej.2023.102168	WoS AND Scopus	6.0	Q1	Q1
Adnan, R.M.; Mostafa, R.R.; Dai, HL.; Heddam, S.; Kuriqi, A.; Kisi, O.	Pan evaporation estimation by relevance vector machine tuned with new metaheuristic algorithms using limited climatic data	Engineering Applications of Computational Fluid Mechanics	V. 17, n.º 1 (art. 2192258)	10.1080/19942060.2023.2192258	WoS AND Scopus	6.1	Q1	Q1
Afonso, G.P.; Ferreira, D.C.; Figueira, J.R.	A Network-DEA model to evaluate the impact of quality and access on hospital performance	Annals of Operations Research		10.1007/s10479-023-05362-x	WoS AND Scopus	4.8	Q1	Q1
Aggarwal, R.; Kaur, S.; Dar, M.U.D.; Kuriqi, A.	Uncertainties in climate change scenarios for determining temperature and rainfall patterns in regions with mixed climate conditions	Acta Scientiarum Polonorum, Formatio Circumiectus	V. 22, n.º 1(91-106)	10.15576/ASP.FC/2023.22.1.91	WoS AND Scopus	0.4		Q4
Ahani, P.; Arantes, A.; Garmanjani, R.; Melo, S.	Optimizing Vehicle Replacement in Sustainable Urban Freight Transportation Subject to Presence of Regulatory Measures	Sustainability (Switzerland)	V. 15, n.º 16 (art. 12266)	10.3390/su151612266	WoS AND Scopus	3.9	Q2	Q2
Ahani, P.; Arantes, A.; Melo, S.	An Optimization Model for Structuring a Car-Sharing Fleet Considering Traffic Congestion Intensity	Journal of Advanced Transportation	V. 2023 (art. 9283130)	10.1155/2023/9283130	WoS AND Scopus		Q2	Q3





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Alexandre, C.M.; Quintella, B.R.; Ovidio, M.; Boavida, I.; Costa, M.J.; Palstra, A.P.; de Lima, R.L.P.; de Lima, J.L.M.P.; Almeida, P.R.	Technologies for the study of hydropeaking impacts on fish populations: Applications, advantages, outcomes, and future developments	River Research and Applications	V. 39, n.º 3(538-553	10.1002/rra.4039	WoS AND Scopus		Q2	Q3
Alfaiate, J.; Sluys, L.J.	A novel, total-iterative approach to model quasi-brittle materials	Engineering Fracture Mechanics	V. 277 (art. 108955)	10.1016/j.engfracmech.2022.108955	WoS AND Scopus		Q1	Q1
Alfaiate, J.; Sluys, L.J.; Costa, A.	Modelling fracture due to corrosion and mechanical loading in reinforced concrete	International Journal of Fracture	V. 243, n.º 2(143- 168)	10.1007/s10704-023-00733-8	WoS AND Scopus	2.5	Q2	Q3
Ali, M.; Oliveira, R.L.G.; Pereira, J.M.; Rodrigues, J.P.; Lourenço, P.B.; Ulrich Marschall, H.; Sayet, T.; Gasser, A.; Blond, E.	Experimental characterization of the nonlinear thermomechanical behaviour of refractory masonry with dry joints	Construction and Building Materials	V. 364 (art. 129960)	10.1016/j.conbuildmat.2022.129960	WoS AND Scopus	7.4	Q1	Q1
Almeida, A.P.; Liberalesso, T.; Silva, C.M.; Sousa, V.	Combining green roofs and rainwater harvesting systems in university buildings under different climate conditions	Science of the Total Environment	V. 887 (art. 163719)	10.1016/j.scitotenv.2023.163719	WoS AND Scopus		Q1	Q1
Al-Noaimat, Y.A.; Chougan, M.; Albar, A.; Skibicki, S.; Federowicz, K.; Hoffman, M.; Sibera, D.; Cendrowski, K.;	Recycled brick aggregates in one-part alkali-activated materials: Impact on 3D printing performance and material properties	Developments in the Built Environment	V. 16 (art. 100248)	10.1016/j.dibe.2023.100248	WoS AND Scopus		Q1	Q1







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Techman, M.; Pacheco, J.N.; Chung, SY.; Sikora, P.; Al- Kheetan, M.; Ghaffar, S.H.								
Alp, M.; Batalla, R.J.; Bejarano, M.D.; Boavida, I.; Capra, H.; Carolli, M.; Casas-Mulet, R.; Costa, M.J.; Halleraker, J.H.; Hauer, C.; Hayes, D.S.; Harby, A.; Noack, M.; Palau, A.; Schneider, M.; Schönfelder, L.; Tonolla, D.; Vanzo, D.; Venus, T.; Vericat, D.; Zolezzi, G.; Bruno, M.C.	Introducing HyPeak: An international network on hydropeaking research, practice, and policy	River Research and Applications	V. 39, n.º 3(283-291	10.1002/rra.3996	WoS AND Scopus		Q2	Q3
Alves, S.; Azevedo, A.B.; Mendes, L.; Silva, K.	Urban Regeneration, Rent Regulation and the Private Rental Sector in Portugal: A Case Study on Inner-City Lisbon's Social Sustainability	Land	V. 12, n.º 8 (art. 1644)	10.3390/land12081644	WoS AND Scopus		Q2	Q2
Andrade Santos, R.; Flores-Colen, I.; Simões, N.; Dinis Silvestre, J.	Auto-responsive technologies on opaquefacades: Worldwide climatic suitability under current and future weather conditions	Journal of Building Engineering	V. 63 (art. 105498)	10.1016/j.jobe.2022.105498	WoS AND Scopus	6.4	Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Antunes, A.; Ferreira, B.; Marques, N.; Carriço, N.	Hyperparameter Optimization of a Convolutional Neural Network Model for Pipe Burst Location in Water Distribution Networks	Journal of Imaging	V. 9, n.º 3 (art. 68)	10.3390/jimaging9030068	Non WoS; Scopus		Q2	
Antunes, V.; Neves, J.; Freire, A.C.	Could high RAP mixtures be multi-recycled? Validation through long-term performance assessment	Transportation Engineering	V. 14 (art. 100215)	10.1016/j.treng.2023.100215	Non WoS; Scopus		Q1	
Arantes, A.; Ferreira, L.M.D.F.	Development of delay mitigation measures in construction projects: a combined interpretative structural modeling and MICMAC analysis approach	Production Planning and Control		10.1080/09537287.2022.2163934	WoS AND Scopus		Q1	
Araújo, G.R.; Gomes, R.; Ferrão, P.; Gomes, M.G.	Optimizing building retrofit through data analytics: A study of multi-objective optimization and surrogate models derived from energy performance certificates	Energy and Built Environment		10.1016/j.enbenv.2023.07.002	Non WoS; Scopus		Q1	
Araújo, G.R.; Gomes, R.; Gomes, M.G.; Guedes, M.C.; Ferrão, P.	Surrogate Models for Efficient Multi-Objective Optimization of Building Performance	Energies	V. 16, n.º 10 (art. 4030)	10.3390/en 16104030	WoS AND Scopus		Q2	Q3
Araújo, G.R.; Teixeira, H.; Gomes, M.G.; Rodrigues, A.M.	Multi-objective optimization of thermochromic glazing properties to enhance building energy performance	Solar Energy	V. 249(446-456)	10.1016/j.solener.2022.11.043	WoS AND Scopus		Q1	





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Arruda, M.R.T.	Orthotropic damage model for composite structures using the 3D Tsai-Wu failure criterion	Mechanics of Advanced Materials and Structures		10.1080/15376494.2023.2277849	WoS AND Scopus		Q2	Q3
Arruda, M.R.T.; Bicelli, A.R.A.; Cantor, P.; Assis, E.B.; Branco, F.	Proposal of a fireproof design code for dwellings against the action of wildland fires	Resilient Cities and Structures	V. 2, n.º 3(104-119)	10.1016/j.rcns.2023.10.002	Non WoS; Scopus			
Arruda, M.R.T.; Cantor, P.; Bicelli, R.	Thermal Insulation of Hybrid GFRP-Lightweight Concrete Structures	CivilEng	V. 4, n.º 2(584-595)	10.3390/civileng4020034	Non WoS; Scopus			
Arruda, M.R.T.; Correia, J.R.; Ferreira, J.G.; Branco, F.A.; Reis, N.A.	Structural Assessment of a Water Reservoir Masonry Vaulted Roof from the Nineteenth Century	Journal of Performance of Constructed Facilities	V. 37, n.º 4 (art. 4023022)	10.1061/JPCFEV.CFENG-4435	WoS AND Scopus		Q2	Q3
Arruda, M.R.T.; Deividas, M.; Vadimas, K.	State of the art on structural reinforced concrete design guidelines with non-linear analyses	Mechanics of Advanced Materials and Structures		10.1080/15376494.2023.2192214	WoS AND Scopus		Q2	Q3
Arruda, M.R.T.; Trombini, M.; Pagani, A.	Implicit to Explicit Algorithm for ABAQUS Standard User- Subroutine UMAT for a 3D Hashin-Based Orthotropic Damage Model	Applied Sciences (Switzerland)	V. 13, n.º 2 (art. 1155)	10.3390/app13021155	WoS AND Scopus	2.838	Q2	Q2
Atiaga, O.; Guerrero, F.; Páez, F.; Castro, R.; Collahuazo, E.; Nunes, L.M.; Grijalva, M.; Grijalva, I.; Otero, X.L.	Assessment of variations in air quality in cities of Ecuador in relation to the lockdown due to the COVID-19 pandemic	Heliyon	V. 9, n.º 6 (art. e17033)	10.1016/j.heliyon.2023.e17033	WoS AND Scopus		Q1	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Augello, R.; Carrera, E.; Pagani, A.; Arruda, M.R.T.; Shen, J.	NODE-DEPENDENT KINEMATIC MODELS APPLIED TO REINFORCED CONCRETE STRUCTURES	Mathematics and Mechanics of Complex Systems	V. 11, n.º 1(19-43)	10.2140/memocs.2023.11.19	Non WoS; Scopus		Q1	
Azevedo, A.; Almeida, J.; Gonçalves, M.; Simões, N.; Castro, N.; Santos, A.; Tadeu, A.	Strategies to enhance the resistance of ETICS finishing coats to microbiological growth: A systematic study based on small- and large- scale laboratory tests	Construction and Building Materials	V. 407 (art. 133499)	10.1016/j.conbuildmat.2023.133499	WoS AND Scopus	7.4	Q1	Q1
Azevedo, A.S.; Firmo, J.P.; Correia, J.R.; Firouz, R.M.; Barros, J.A.O.	Fire behaviour of reinforced concrete slab strips strengthened with prestressed NSM-CFRP laminates	Engineering Structures	V. 297 (art. 116982)	10.1016/j.engstruct.2023.116982	WoS AND Scopus		Q1	Q1
Baballëku, M.; Isufi, B.; Ramos, A.P.	Seismic Performance of Reinforced Concrete Buildings with Joist and Wide-Beam Floors during the 26 November 2019 Albania Earthquake	Buildings	V. 13, n.º 5 (art. 1149)	10.3390/buildings13051149	WoS AND Scopus	3.8	Q2	Q2
Baghel, S.; Kothari, M.; Tripathi, M.P.; Das, S.; Kumar, A.; Kuriqi, A.	Water conservation appraisal using surfacerunoff estimated by an integrated SCS-CN and MCDA-AHP technique	Journal of Earth System Science	V. 132, n.º 3 (art. 127)	10.1007/s12040-023-02133-x	WoS AND Scopus	1.9	Q2	Q3
Baladrón, A.; Bejarano, M.D.; Boavida, I.	Functional traits: the pathways to riverine plant resistance in times of hydropeaking	Ecological Processes	V. 12, n.º 1 (art. 63)	10.1186/s13717-023-00475-4	WoS AND Scopus		Q1	Q2
Baladrón, A.; Bejarano, M.D.; Boavida, I.	Why do plants respond differently to hydropeaking disturbance? A functional approach	Ecological Indicators	V. 150 (art. 110237)	10.1016/j.ecolind.2023.110237	WoS AND Scopus		Q1	Q1







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Baladrón, A.V.; Cavalli, M.; Bó, M.S.; Isacch, J.P.	Differential response of the burrowing owl (Athene cunicularia) to heterospecific calls.; [respuesta diferencial de la lechucita vizcachera (Athene cunicularia) a vocalizaciones heteroespecíficas]	Hornero	V. 38, n.º 1	10.56178/eh.v38i1.536	Non WoS; Scopus		Q4	
Baltazar, LG; Alcobia, J; Silva, HE	Study of Natural Ventilation Strategies in the São Cristóvão Church in Lisbon Using a Multizone Airflow Model	Applied Sciences (Switzerland)	V. 13, n.º 21 (art. 11838)	10.3390/app132111838	WoS AND Scopus	2.838	Q2	Q2
Baptista, N.; Januario, J.F.; Cruz, C.O.	Social and Financial Sustainability of Real Estate Investment: Evaluating Public Perceptions towards Blockchain Technology	Sustainability (Switzerland)	V. 15, n.º 16 (art. 12288)	10.3390/su151612288	WoS AND Scopus	3.9	Q2	Q2
Barchetta, L.; Petrucci, E.; Xavier, V.; Bento, R.	A Simplified Framework for Historic Cities to Define Strategies Aimed at Implementing Resilience Skills: The Case of Lisbon Downtown	Buildings	V. 13, n.º 1 (art. 130)	10.3390/buildings13010130	WoS AND Scopus	3.8	Q2	Q2
Barreiro, J.; Santos, F.; Ferreira, F.; Neves, R.; Matos, J.S.	Development of a 1D/2D Urban Flood Model Using the Open-Source Models SWMM and MOHID Land	Sustainability (Switzerland)	V. 15, n.º 1 (art. 707)	10.3390/su15010707	WoS AND Scopus	3.9	Q2	Q2
Barreiros, AM; Durao, A; Galvao, A; Matos, C; Mateus, D; Araújo, I; Neves, L; Matos, M; Mourato, S	Analyzing Green Behavior and the Rational Use of Water in Portuguese Higher Education Campi	Sustainability (Switzerland)	V. 15, n.º 4 (art. 3035)	10.3390/su15043035	WoS AND Scopus	3.9	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Barrelas, J.; Silva, A.; de Brito, J.; Tadeu, A.	Effects of Climate Change on Rendered Façades: Expected Degradation in a Progressively Warmer and Drier Climate—A Review Based on the Literature	Buildings	V. 13, n.º 2 (art. 352)	10.3390/buildings13020352	WoS AND Scopus	3.8	Q2	Q2
Bastos, J.; Prina, M.; Garcia, R.	Life-cycle assessment of current and future electricity supply addressing average and marginal hourly demand: An application to Italy	Journal of Cleaner Production	V. 399 (art. 136563)	10.1016/j.jclepro.2023.136563	WoS AND Scopus		Q1	Q1
Bedon, C.; Santos, F.A.	Effect of Spring-Mass-Damper Pedestrian Models on the Performance of Low- Frequency or Lightweight Glazed Floors	Applied Sciences (Switzerland)	V. 13, n.º 6 (art. 4023)	10.3390/app13064023	WoS AND Scopus	2.838	Q2	Q2
Bedon, C.; Santos, F.A.	Effects of post-fracture repeated impacts and short- term temperature gradients on monolithic glass elements bonded by safety films	Composite Structures	V. 319 (art. 117166)	10.1016/j.compstruct.2023.117166	WoS AND Scopus		Q1	Q1
Bell, MRS; Rodríguez, YD; Suárez, EG; Soroa, DV	Design of asphalt concrete from oil drilling cuttings impregnated with diesel (OBM)	Revista Universidad y Sociedad	V. 15, n.º 3(648- 658)		Non WoS AND non Scopus			
Bellei, P.; Torres, I.; Solstad, R.; Flores- Colen, I.	Potential Use of Oyster Shell Waste in the Composition of Construction Composites: A Review	Buildings	V. 13, n.º 6 (art. 1546)	10.3390/buildings13061546	WoS AND Scopus	3.8	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Bellei, P; Magalhaes, F; Pereira, M; Torres, I; Solstad, R; Flores- Colen, I	Innovative Thermal Renders Incorporating Oyster Shells for Sustainable Insulation	Sustainability (Switzerland)	V. 15, n.º 22 (art. 15952)	10.3390/su152215952	WoS AND Scopus	3.9	Q2	Q2
Bento Rebelo, H.; Assunção, B.; Bedon, C.; Amarante dos Santos, F.	Exploratory study on the use of bi-stable supports for the impact protection of point-fixed glazing systems	International Journal of Protective Structures		10.1177/20414196231175979	WoS AND Scopus		Q2	
Bersch, J.D.; Flores- Colen, I.; Masuero, A.B.; Dal Molin, D.C.C.	Photocatalytic TiO2-Based Coatings for Mortars on Facades: A Review of Efficiency, Durability, and Sustainability	Buildings	V. 13, n.º 1 (art. 186)	10.3390/buildings13010186	WoS AND Scopus	3.8	Q2	Q2
Bicelli, A.R.; Cantor, P.; Arruda, M.R.; Tiago, C.; Bernardes de Assis, E.; Branco, F.	Numerical Assessment of Standard Firebrand Accumulation Curve When Transferring Temperature to Contact Surfaces	Applied Sciences (Switzerland)	V. 13, n.º 17 (art. 9657)	10.3390/app13179657	WoS AND Scopus	2.838	Q2	Q2
Biscaia, H.C.; Micaelo, R.; Cornetti, P.; Almeida, R.	Numerical bond assessment of carbon-epoxy stepped-lap joints	Engineering Fracture Mechanics	V. 289 (art. 109413)	10.1016/j.engfracmech.2023.109413	WoS AND Scopus		Q1	Q1
Boavida, I.; Costa, M.J.; Portela, M.M.; Godinho, F.; Tuhtan, J.; Pinheiro, A.	Do cyprinid fish use lateral flow-refuges during hydropeaking?	River Research and Applications	V. 39, n.º 3(554-560	10.1002/rra.3863	WoS AND Scopus		Q2	Q3
Bogas, J.A.; Real, S.; Cruz, R.; Azevedo, B.	Mechanical performance and shrinkage of compressed earth blocks stabilised with	Journal of Building Engineering	V. 79 (art. 107892)	10.1016/j.jobe.2023.107892	WoS AND Scopus	6.4	Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
	thermoactivated recycled cement							
Bolina, F.L.; Rodrigues, J.P.C.	Finite element analysis criteria for composite steel decking concrete slabs subjected to fire	Fire Safety Journal	V. 139 (art. 103818)	10.1016/j.firesaf.2023.103818	WoS AND Scopus		Q1	Q2
Bonilla-Correa, D.M.; Coronado- Hernández, Ó.E.; Fuertes-Miquel, V.S.; Besharat, M.; Ramos, H.M.	Application of Newton– Raphson Method for Computing the Final Air–Water Interface Location in a Pipe Water Filling	Water (Switzerland)	V. 15, n.º 7 (art. 1304)	10.3390/w15071304	WoS AND Scopus	3.4	Q2	Q2
Cabette, M.; Micaelo, R.; Pais, J.	The use of bio-oil from biodiesel production for enhancing the bitumen healing	Construction and Building Materials	V. 409 (art. 134033)	10.1016/j.conbuildmat.2023.134033	WoS AND Scopus	7.4	Q1	Q1
Cabette, M.; Pais, J.; Micaelo, R.	Extrinsic healing of asphalt mixtures: a review	Road Materials and Pavement Design		10.1080/14680629.2023.2266506	WoS AND Scopus		Q1	Q2
Caetano, J.; Carriço, N.; Figueira, J.R.; Covas, D.	A novel methodology for pipe grouping and rehabilitation interventions scheduling in water distribution networks	Urban Water Journal	V. 20, n.º 7(769-781	10.1080/1573062X.2023.2209560	WoS AND Scopus		Q2	Q2
Câmara, G.; Azevedo, N.M.; Micaelo, R.	Impact of Rejuvenator- Modified Mastic on Asphalt Mixture Stiffness: Meso-Scale Discrete Element Method Approach	Buildings	V. 13, n.º 12 (art. 3023)	10.3390/buildings13123023	WoS AND Scopus	3.8	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Câmara, G.; Azevedo, N.M.; Micaelo, R.; Silva, H.	Generalised Kelvin contact models for DEM modelling of asphalt mixtures	International Journal of Pavement Engineering	V. 24, n.º 1 (art. 2179625)	10.1080/10298436.2023.2179625	WoS AND Scopus		Q1	Q2
Câmara, G.; Micaelo, R.; Monteiro Azevedo, N.	3D DEM model simulation of asphalt mastics with sunflower oil	Computational Particle Mechanics	V. 10, n.º 6(1569- 1586	10.1007/s40571-023-00574-1	WoS AND Scopus		Q1	Q2
Cantor, P.; Arruda, M.R.T.; Firmo, J.; Branco, F.	Development of a standard firebrand accumulation temperature curve for residential wildfire protection system	Results in Engineering	V. 17 (art. 100935)	10.1016/j.rineng.2023.100935	WoS AND Scopus		Q2	
Cantor, P.; Bicelli, A.R.; de Assis, E.B.; Arruda, M.R.; Branco, F.	Report on Existing Fireproof Construction Guidelines for Dwellings against Wildfires	CivilEng	V. 4, n.º 2(657-678	10.3390/civileng4020038	Non WoS; Scopus			
Capitão, S.; Picado- Santos, L.; Almeida, A.; Mendes, F.	Assessment of aged and unaged hot and warm asphalt concrete containing high reclaimed asphalt pavement rate rejuvenated with waste cooking oil	Construction and Building Materials	V. 400 (art. 132801)	10.1016/j.conbuildmat.2023.132801	WoS AND Scopus	7.4	Q1	Q1
Cardoso, R.; Borges, I.; Vieira, J.; Duarte, S.O.D.; Monteiro, G.A.	Interactions between clay minerals, bacteria growth and urease activity on biocementation of soils	Applied Clay Science	V. 240 (art. 106972)	10.1016/j.clay.2023.106972	WoS AND Scopus		Q1	Q2
Cardoso, R.; Vieira, J.; Borges, I.	On the use of biocementation to treat collapsible soils	Engineering Geology	V. 313 (art. 106971)	10.1016/j.enggeo.2022.106971	WoS AND Scopus	7.4	Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Carmo, R.; Martins, R.; Arruda, M.R.T.; Costa, H.; Valente, D.; Valença, J.; Júlio, E.	Reinforcement detailing of connections between perpendicular hollow precast walls	Advances in Structural Engineering	V. 26, n.º 9(1663- 1681	10.1177/13694332231175402	WoS AND Scopus		Q1	Q2
Carmo, R.N.F.; Martins, R.; Gonçalves, R.; Costa, H.; Júlio, E.	Effect of the outer UHDC layer on shear and flexural behavior of RC beams produced with low binder concrete	Construction and Building Materials	V. 368 (art. 130402)	10.1016/j.conbuildmat.2023.130402	WoS AND Scopus	7.4	Q1	Q1
Carneiro, J.; Loureiro, D.; Covas, D.	Exploratory Analysis of Surrogate Metrics to Assess the Resilience of Water Distribution Networks	Water Resources Research	V. 59, n.º 8 (art. e2022WR034289)	10.1029/2022WR034289	WoS AND Scopus		Q1	Q1
Carriço, N.; Ferreira, B.; Antunes, A.; Caetano, J.; Covas, D.	Computational Tools for Supporting the Operation and Management of Water Distribution Systems towards Digital Transformation	Water (Switzerland)	V. 15, n.º 3 (art. 553)	10.3390/w15030553	WoS AND Scopus	3.4	Q2	Q2
Carriço, N.; Ferreira, B.; Antunes, A.; Grueau, C.I.C.; Barreira, R.; Mendes, A.; Covas, D.I.C.; Monteiro, L.; Santos, J.F.; Brito, I.S.	An Information System for Infrastructure Asset Management Tailored to Portuguese Water Utilities: Platform Conceptualization and a Prototype Demonstration	Systems	V. 11, n.º2 (art. 85)	10.3390/systems11020085	WoS AND Scopus		Q2	Q2
Caruso, M.; Couto, R.; Pinho, R.; Monteiro, R.	Decision-making approaches for optimal seismic/energy integrated retrofitting of existing buildings	Frontiers in Built Environment	V. 9 (art. 1176515)	10.3389/fbuil.2023.1176515	WoS AND Scopus		Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Castelo, S.; Amado, M.; Ferreira, F.	Challenges and Opportunities in the Use of Nature-Based Solutions for Urban Adaptation	Sustainability (Switzerland)	V. 15, n.º 9 (art. 7243)	10.3390/su15097243	WoS AND Scopus	3.9	Q2	Q2
Castro, W.; Souza, J.; Gaspar, P.; Silva, A.	Mapping the Risk of Occurrence of Defects in Façades with Ceramic Claddings	Buildings	V. 13, n.º 5 (art. 1209)	10.3390/buildings13051209	WoS AND Scopus	3.8	Q2	Q2
Catalão, F.P.; Cruz, C.O.; Sarmento, J.M.	Public Sector Corruption and Accountability in Cost Deviations and Overruns of Public Projects	Public Organization Review	V. 23, n.º 3(1105- 1126)	10.1007/s11115-022-00616-x	WoS AND Scopus		Q2	
Catalão, F.P.; Cruz, C.O.; Sarmento, J.M.	The entanglement of time and cost deviations in public projects	Annals of Public and Cooperative Economics	V. 94, n.º 1(241- 272)	10.1111/apce.12364	WoS AND Scopus		Q2	Q3
Cavalli, M.; Baladrón, A.V.; Bó, M.S.; Isacch, J.P.	Owls and the City: The Breeding Performance of Burrowing Owls Athene cunicularia is Better in Urban Than in Rural Areas	Ardeola	V. 71, n.º 1(81-100)	10.13157/arla.71.1.2024.ra5	WoS AND Scopus	0.807	Q2	Q2
Cerqueira, E.; Landesmann, A.; Camotim, D.; Dinis, P.B.; Martins, A.D.	Direct strength prediction of cold-formed steel fixed-ended singly-symmetric columns buckling in flexural-torsional modes	Thin-Walled Structures	V. 187 (art. 110730)	10.1016/j.tws.2023.110730	WoS AND Scopus	6.4	Q1	Q1
Chordà-Monsonís, J.; Moliner, E.; Galvín, P.; Martínez- Rodrigo, M.D.; Zacchei, E.; Tadeu, A.; Ferraz, I.; Romero, A.	Dynamic load allowance of long-span modular steel bridges	Engineering Structures	V. 282 (art. 115835)	10.1016/j.engstruct.2023.115835	WoS AND Scopus		Q1	Q1




Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Cintura, E.; Faria, P.; Duarte, M.; Nunes, L.	Eco-efficient boards with agro- industrial wastes – Assessment of different adhesives	Construction and Building Materials	V. 404 (art. 132665)	10.1016/j.conbuildmat.2023.132665	WoS AND Scopus	7.4	Q1	Q1
Cismasiu, C.; Silva, P.B.S.; Lemos, J.V.; Cismasiu, I.	Seismic Vulnerability Assessment of a Stone Arch Using Discrete Elements	International Journal of Architectural Heritage	V. 17, n.º 5(730-744	10.1080/15583058.2021.1963506	WoS AND Scopus		Q1	Q3
Cismasiu, I.; Azevedo, N.M.; Pinho, F.F.S.	Numerical Evaluation of Transverse Steel Connector Strengthening Effect on the Behavior of Rubble Stone Masonry Walls under Compression Using a Particle Model	Buildings	V. 13, n.º 4 (art. 987)	10.3390/buildings13040987	WoS AND Scopus	3.8	Q2	Q2
Coelho, G.B.A.; de Freitas, V.P.; Henriques, F.M.A.; Silva, H.E.	Retrofitting Historic Buildings for Future Climatic Conditions and Consequences in Terms of Artifacts Conservation Using Hygrothermal Building Simulation	Applied Sciences (Switzerland)	V. 13, n.º 4 (art. 2382)	10.3390/app13042382	WoS AND Scopus	2.838	Q2	Q2
Coelho, G.B.A.; Henriques, F.M.A.	The Importance of Moisture Transport Properties of Wall Finishings on the Hygrothermal Performance of Masonry Walls for Current and Future Climates	Applied Sciences (Switzerland)	V. 13, n.º 10 (art. 6318)	10.3390/app13106318	WoS AND Scopus	2.838	Q2	Q2
Coelho, G.B.A.; Rebelo, H.B.; De Freitas, V.P.; Henriques, F.M.A.; Sousa, L.	Current and future geographical distribution of the indoor conditions for high thermal inertia historic buildings across Portugal via hygrothermal simulation	Building and Environment	V. 245 (art. 110877)	10.1016/j.buildenv.2023.110877	WoS AND Scopus		Q1	Q1







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Coelho, K.; Almeida, J.; Castro, F.; Ribeiro, A.; Teixeira, T.; Palha, P.; Simões, N.	Experimental Characterisation of Different Ecological Substrates for Use in Green Roof Systems	Sustainability (Switzerland)	V. 15, n.º 1 (art. 575)	10.3390/su15010575	WoS AND Scopus	3.9	Q2	Q2
Colaço, R.; de Abreu e Silva, J.	Commercial land use change and growth processes – An assessment of retail location in Lisbon, Portugal, 1995–2020	Journal of Urban Management		10.1016/j.jum.2023.11.005	Non WoS; Scopus		Q1	
Colaço, R.; de Abreu e Silva, J.	Exploring the role of accessibility in shaping retail location using space syntax measures: A panel-data analysis in Lisbon, 1995–2010	Environment and Planning B: Urban Analytics and City Science	V. 50, n.º 5(1345- 1360)	10.1177/23998083221138570	WoS AND Scopus		Q1	Q2
Colaço, R.; de Abreu e Silva, J.	Interactions between Online Shopping, In-Store Shopping and Weekly Travel Behavior: An Analysis Before and in the Aftermath of COVID-19 in Lisbon, Portugal	Transportation Research Record		10.1177/03611981231194628	WoS AND Scopus		Q2	Q4
Cordeiro, S.; Ferrario, F.; Pereira, H.X.; Ferreira, F.; Matos, J.S.	Water Reuse, a Sustainable Alternative in the Context of Water Scarcity and Climate Change in the Lisbon Metropolitan Area	Sustainability (Switzerland)	V. 15, n.º 16 (art. 12578)	10.3390/su151612578	WoS AND Scopus	3.9	Q2	Q2
Correia, J.R.; Keller, T.; Garrido, M.; Sá, M.; Firmo, J.P.; Abu Shahid, M.; Machado, M.	Mechanical properties of FRP materials at elevated temperature – Definition of a temperature conversion factor for design in service conditions	Construction and Building Materials	V. 367 (art. 130298)	10.1016/j.conbuildmat.2023.130298	WoS AND Scopus	7.4	Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Costa, Á.; Cruz, C.O.; Sarmento, J.M.; Sousa, V.F.	Bundling Road and Railway Infrastructure Operators: Analysis of the Impact on Efficiency	Journal of Infrastructure Systems	V. 29, n.º 1 (art. 04023001-1)	10.1061/JITSE4.ISENG-2106	WoS AND Scopus		Q2	Q2
Costa, D.; , A. Gonilha J.; Silvestre, N.	Calibration and validation of a 3D homogenised model to simulate the damage progression of pultruded GFRP composites	Engineering Failure Analysis	V. 149 (art. 107261)	10.1016/j.engfailanal.2023.107261	WoS AND Scopus		Q1	Q1
Costa, J; Mesquita, E; Ferreira, F; Figueiredo, D; Rosa, MJ; Viegas, RMC	Modeling Chlorine Decay in Reclaimed Water Distribution Systems-A Lisbon Area Case Study	Sustainability (Switzerland)	V. 15, n.º 23 (art. 16211)	10.3390/su152316211	WoS AND Scopus	3.9	Q2	Q2
Costa, M.M.E.; Neto, S.	Exploratory analysis of the water governance frameworks regarding the OECD principles in two river basins in Brazil and Portugal	Utilities Policy	V. 82 (art. 101556)	10.1016/j.jup.2023.101556	WoS AND Scopus		Q1	Q2
Costamagna, E; Caruso, A; Galvao, A; Rizzo, A; Masi, F; Fiore, S; Boano, F	Impact of Biochar and Grapheneas Additives on the Treatment Performances of a Green Wall Fed with Greywater	Water (Switzerland)	V. 15, n.º 1 (art. 195)	10.3390/w15010195	WoS AND Scopus	3.4	Q2	Q2
Cruz, C.; Rodrigues, L.; Fernandes, F.; Santos, R.; Paixão, P.; Chasqueira, M.J.	Antibioticsusceptibility pattern of Portuguese environmental Legionella isolates	Frontiers in Cellular and Infection Microbiology	V. 13 (art. 1141115)	10.3389/fcimb.2023.1141115	WoS AND Scopus	5.7	Q1	Q2
Cruz, C.; Rodrigues, L.; Fernandes, F.; Santos, R.; Paixão, P.; Chasqueira, M.J.	Corrigendum: Antibiotic susceptibility pattern of Portuguese environmental Legionella isolates	Frontiers in Cellular and Infection Microbiology	V. 13 (art. 1272773)	10.3389/fcimb.2023.1272773	WoS AND Scopus	5.7	Q1	Q2







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
da Rocha, G.S.; Rodrigues, J.P.C.; da Silva Gazzana, D.	Electrical fire risk indexing using fuzzy Petri nets	Fire Safety Journal	V. 139 (art. 103817)	10.1016/j.firesaf.2023.103817	WoS AND Scopus		Q1	Q2
Da Silva Pinheiro, A.; Monteiro, L.S.P.P.; De Almeida, M.D.C.D.S.T.; Covas, D.I.C.	Water mixing in rectangular storage tanks: small-scale versus field tests	Journal of Hydraulic Research	V. 61, n.º 2(233- 248)	10.1080/00221686.2022.2161960	WoS AND Scopus		Q1	Q3
Dahmani, A.; Ammi, Y.; Bailek, N.; Kuriqi, A.; Al-Ansari, N.; Hanini, S.; Colak, I.; Abualigah, L.; El- Kenawy, ES.M.	Assessing the Efficacy of Improved Learning in Hourly Global Irradiance Prediction	Computers, Materials and Continua	V. 77(2579-2594)	10.32604/cmc.2023.040625	WoS AND Scopus	3.1	Q2	Q3
Daneshfaraz, R.; Norouzi, R.; Ebadzadeh, P.; Kuriqi, A.	Influence of sill integration in labyrinth sluice gate hydraulic performance	Innovative Infrastructure Solutions	V. 8, n.º 4 (art. 118)	10.1007/s41062-023-01083-z	WoS AND Scopus	2.4	Q2	Q2
Dang, F.; Li, C.; Nunes, L.M.; Tang, R.; Wang, J.; Dong, S.; Peijnenburg, W.J.G.M.; Wang, W.; Xing, B.; Lam, S.S.; Sonne, C.	Trophic transfer of silver nanoparticles shifts metabolism in snails and reduces food safety	Environment International	V. 176 (art. 107990)	10.1016/j.envint.2023.107990	Non WoS; Scopus		Q1	
Dantas, A.; Amado, M.	Refugee Camp: A Literature Review	Journal of Urban Planning and Development	V. 149, n.º 4 (art. 3123003)	10.1061/JUPDDM.UPENG-4311	WoS AND Scopus		Q2	Q3





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
de Abreu e Silva, J.; Correia, M.	The main drivers of urban sprawl in Portuguese medium cities between 2001 and 2011	Land Use Policy	V. 132 (art. 106803)	10.1016/j.landusepol.2023.106803	WoS AND Scopus		Q1	Q1
DE MENEZES, C.W.G.; Dos Santos, C.A.; Carvalho, D.M.; Brito, E.S.G.; Tavares, W.S.; DE MENEZES, S.J.M.D.C.; Zanuncio, J.C.	Sudden and simultaneous population outbreak of Neoaulacoryssus speciosus in an urban area of 12 municipalities in the Caatinga biome	Anais da Academia Brasileira de Ciencias	V. 95, n.º 1 (art. e20191295)	10.1590/0001-3765202320191295	WoS AND Scopus	1.3	Q2	Q3
De Paula, P.V.; Marques, R.C.; Gonçalves, J.M.	Public-Private Partnerships in Urban Regeneration Projects: A Review	Journal of Urban Planning and Development	V. 149, n.º 1 (art. 4022056)	10.1061/JUPDDM.UPENG-4144	WoS AND Scopus		Q2	Q3
Demaj, A.; Gago, A.; Marques, A.I.; Gomes Ferreira, J.	Shear performance of brick masonry walls reinforced with twisted steel bars	Structures	V. 58 (art. 105579)	10.1016/j.istruc.2023.105579	WoS AND Scopus		Q1	Q2
Dias, S.; Tadeu, A.; Almeida, J.; António, J.; de Brito, J.	Steel-concrete bond behaviour of concrete mixes with wood waste: pull-out and bending tests of full-scale beams and columns	Construction and Building Materials	V. 383 (art. 131343)	10.1016/j.conbuildmat.2023.131343	WoS AND Scopus	7.4	Q1	Q1
Díaz, R.S.; Isufi, B.; Trautwein, L.M.; Ramos, A.P.	Nonlinear analysis of flat slab- column connections to optimize the use of HPFRC under monotonic vertical loading	Structural Concrete	V. 24, n.º 5(5787- 5807	10.1002/suco.202200826	WoS AND Scopus		Q1	Q2
dos Santos, F.M.; de Souza Pelinson, N.; de Oliveira, R.P.; Di Lollo, J.A.	Using the SWAT model to identify erosion prone areas and to estimate soil loss and sediment transport in Mogi	Catena	V. 222 (art. 106872)	10.1016/j.catena.2022.106872	WoS AND Scopus		Q1	Q1







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
	Guaçu River basin in Sao Paulo State, Brazil							
Duarte, A.P.C.; Mazzuca, P.; Lopo de Carvalho, J.M.; Tiago, C.; Firmo, J.P.; Correia, J.R.	Determination of the temperature-dependent thermophysical properties of polymeric foams using numerical inverse analysis	Construction and Building Materials	V. 394 (art. 131980)	10.1016/j.conbuildmat.2023.131980	WoS AND Scopus	7.4	Q1	Q1
Duarte, R; Gomes, MD; Rodrigues, AM; Pimentel, F	A Large-Diameter Earth-Air Heat Exchanger (EAHX) Built for Standalone Office Room Cooling: Monitoring Results for Hot and Dry Summer Conditions	Applied Sciences (Switzerland)	V. 13, n.º 22 (art. 12134)	10.3390/app132212134	WoS AND Scopus	2.838	Q2	Q2
Elmoudnia, H.; Faria, P.; Jalal, R.; Waqif, M.; Saâdi, L.	Effectiveness of alkaline and hydrothermal treatments on cellulosic fibers extracted from the Moroccan Pennisetum Alopecuroides plant: Chemical and morphological characterization	Carbohydrate Polymer Technologies and Applications	V. 5 (art. 100276)	10.1016/j.carpta.2022.100276	WoS AND Scopus		Q1	
Espinosa, L.A.; Portela, M.M.; Moreira Freitas, L.M.; Gharbia, S.	Addressing the Spatiotemporal Patterns of Heatwaves in Portugal with a Validated ERA5-Land Dataset (1980– 2021)	Water (Switzerland)	V. 15, n.º 17 (art. 3102)	10.3390/w15173102	WoS AND Scopus	3.4	Q2	Q2
Esteves, B.; Aires, P.; Sen, U.; Gomes, M.D.G.; Guiné, R.P.F.; Domingos, I.; Ferreira, J.; Viana, H.; Cruz-Lopes, L.P.	Particleboard Production from Paulownia tomentosa (Thunb.) Steud. Grown in Portugal	Polymers	V. 15, n.º 5 (art. 1158)	10.3390/polym15051158	WoS AND Scopus		Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Fagundes, T.S.; Marques, R.C.	Challenges of recycled water pricing	Utilities Policy	V. 82 (art. 101569)	10.1016/j.jup.2023.101569	WoS AND Scopus		Q1	Q2
Fagundes, T.S.; Marques, R.C.; Malheiros, T.	Water affordability analysis: a critical literature review	Aqua Water Infrastructure, Ecosystems and Society	V. 72, n.º 8(1431- 1445	10.2166/aqua.2023.035	WoS AND Scopus	1.9	Q2	Q3
Falcão, A.P.; Gonçalves, A.B.; Ferreira, G.F.	A discussion on the estimation of apparent colour of water with the Forel-Ule index for medium-width sections of rivers with high hydrodynamic activity	Remote Sensing Applications: Society and Environment	V. 32 (art. 101075)	10.1016/j.rsase.2023.101075	WoS AND Scopus		Q1	
Félix, R.; Orozco- Fontalvo, M.; Moura, F.	Socio-economic assessment of shared e-scooters: do the benefits overcome the externalities?	Transportation Research Part D: Transport and Environment	V. 118 (art. 103714)	10.1016/j.trd.2023.103714	WoS AND Scopus		Q1	Q1
Feltes, J.; Borsoi, G.; Caiado, P.; Dionísio, A.; Parracha, J.; Flores- Colen, I.	Graffiti removal on external thermal insulation composite systems through chemical- mechanical methods: A feasible protocol?	Journal of Building Engineering	V. 66 (art. 105872)	10.1016/j.jobe.2023.105872	WoS AND Scopus	6.4	Q1	Q1
Fernandes, E; Marques, RC	Review of Water Reuse from a Circular Economy Perspective	Water (Switzerland)	V. 15, n.º 5 (art. 848)	10.3390/w15050848	WoS AND Scopus	3.4	Q2	Q2
Fernandes, L.S.; Galvão, A.; Santos, R.; Monteiro, S.	Impact of water reuse on agricultural practices and human health	Environmental Research	V. 216 (art. 114762)	10.1016/j.envres.2022.114762	Non WoS; Scopus		Q1	





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Ferreira, A.; Pinheiro, M.D.; Brito, J.D.; Mateus, R.	A critical analysis of LEED, BREEAM and DGNB as sustainability assessment methods for retail buildings	Journal of Building Engineering	V. 66 (art. 105825)	10.1016/j.jobe.2023.105825	WoS AND Scopus	6.4	Q1	Q1
Ferreira, A.; Pinheiro, M.D.; Brito, J.D.; Mateus, R.; Mendonça, R.	Wall and roof solutions for a retail building considering cost investment and life cycle approach: A case study in Portugal	Journal of Cleaner Production	V. 383 (art. 135314)	10.1016/j.jclepro.2022.135314	WoS AND Scopus		Q1	Q1
Ferreira, A.; Pinheiro, M.D.; de Brito, J.; Mateus, R.	Embodied vs. Operational Energy and Carbon in Retail Building Shells: A Case Study in Portugal	Energies	V. 16, n.º 1 (art. 378)	10.3390/en16010378	WoS AND Scopus		Q2	Q3
Ferreira, A.; Pinheiro, M.D.; de Brito, J.; Mateus, R.; Sousa, V.	Water Intensity Indicators in the Global Retail Sector	Water Resources Management	V. 37, n.º 1(219- 234)	10.1007/s11269-022-03363-2	WoS AND Scopus		Q1	Q1
Ferreira, A.; Sousa, V.; Pinheiro, M.; Meireles, I.; Silva, C.M.; Brito, J.; Mateus, R.	Potential of rainwater harvesting in the retail sector: a case study in Portugal	Environmental Science and Pollution Research	V. 30, n.º 14(42427- 42442)	10.1007/s11356-023-25137-y	WoS AND Scopus		Q1	Q1
Ferreira, B.; Antunes, A.; Carriço, N.; Covas, D.	NSGA-II parameterization for the optimal pressure sensor location in water distribution networks	Urban Water Journal	V. 20, n.º 6(738- 750)	10.1080/1573062X.2023.2209553	WoS AND Scopus		Q2	Q2
Ferreira, C.; De Brito, J.; Dias, I.S.; Flores-Colen, I.; Silva, A.	Selection of an Optimized Maintenance Policy for Rendered Facades	Journal of Performance of Constructed Facilities	V. 37, n.º 5 (art. 4023039)	10.1061/JPCFEV.CFENG-4448	WoS AND Scopus		Q2	Q3





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Ferreira, D.C.; Caldas, P.; Varela, M.; Marques, R.C.	A geometric aggregation of performance indicators considering regulatory constraints: An application to the urban solid waste management	Expert Systems with Applications	V. 218 (art. 119540)	10.1016/j.eswa.2023.119540	WoS AND Scopus	8.5	Q1	Q1
Ferreira, D.C.; Figueira, J.R.; Greco, S.; Marques, R.C.	Data Envelopment Analysis models with imperfect knowledge of input and output values: An application to Portuguese public hospitals	Expert Systems with Applications	V. 231 (art. 120543)	10.1016/j.eswa.2023.120543	WoS AND Scopus	8.5	Q1	Q1
Ferreira, D.C.; Soares, R.; Pedro, M.I.; Marques, R.C.	Customer satisfaction in the presence of imperfect knowledge of data	International Transactions in Operational Research	V. 30, n.º 3(1505- 1536)	10.1111/itor.13093	WoS AND Scopus		Q1	
Ferreira, D.C.; Vieira, I.; Pedro, M.I.; Caldas, P.; Varela, M.	Patient Satisfaction with Healthcare Services and the Techniques Used for its Assessment: A Systematic Literature Review and a Bibliometric Analysis	Healthcare (Switzerland)	V. 11, n.º 5 (art. 639)	10.3390/healthcare11050639	WoS AND Scopus	2.8	Q2	Q3
Ferreira, J.P.; Ferras, D.; Covas, D.I.C.; Kapelan, Z.	Improved SWMM Modeling for Rapid Pipe Filling Incorporating Air Behavior in Intermittent Water Supply Systems	Journal of Hydraulic Engineering	V. 149, n.º 4 (art. 4023004)	10.1061/JHEND8.HYENG-13137	WoS AND Scopus		Q2	Q3
Ferreira, MT; Soldado, E; Borsoi, G; Mendes, MP; Flores-Colen, I	Nanomaterials Applied in the Construction Sector: Environmental, Human Health, and Economic Indicators	Applied Sciences (Switzerland)	V. 13, n.º 23 (art. 12896)	10.3390/app132312896	WoS AND Scopus	2.838	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Ferreira, P.L.; Covas, D.I.C.	New Optimized Equal-Area Mesh Used in Axisymmetric Models for Laminar Transient Flows	Water (Switzerland)	V. 15, n.º 7 (art. 1402)	10.3390/w15071402	WoS AND Scopus	3.4	Q2	Q2
Figueiredo, A.S.; Ferraria, A.M.; Botelho do Rego, A.M.; Monteiro, S.; Santos, R.; Minhalma, M.; Sánchez-Loredo, M.G.; Tovar-Tovar, R.L.; de Pinho, M.N.	Bactericide Activity of Cellulose Acetate/Silver Nanoparticles Asymmetric Membranes: Surfaces and Porous Structures Role	Membranes	V. 13, n.º 1 (art. 4)	10.3390/membran es13010004	Non WoS; Scopus		Q2	
Figueiredo, E.; Omori Yano, M.; Da Silva, S.; Moldovan, I.; Adrian Bud, M.	Transfer Learning to Enhance the Damage Detection Performance in Bridges When Using Numerical Models	Journal of Bridge Engineering	V. 28, n.º 1 (art. 4022134)	10.1061/(ASCE)BE.1943-5592.0001979	WoS AND Scopus		Q1	Q2
Figueiredo, E.; Santos, L.O.; Moldovan, I.; Kraniotis, D.; Melo, J.; Dias, L.; Coelho, G.B.A.	A Roadmap for an Integrated Assessment Approach to the Adaptation of Concrete Bridges to Climate Change	Journal of Bridge Engineering	V. 28, n.º 6 (art. 3123002)	10.1061/JBENF2.BEENG-5735	WoS AND Scopus		Q1	Q2
Fragoso Januário, J.; Oliveira Cruz, C.; Varum, H.; Faria e Sousa, V.	Is housing becoming less affordable? A study of affordability in the Portuguese housing market	Property Management	V. 41, n.º 5(698-728	10.1108/PM-08-2022-0059	WoS AND Scopus		Q3	Q4
Frasca, F.; Bartolucci, B.; Parracha, J.L.; Ogut, O.; Mendes, M.P.; Siani, A.M.; Tzortzi,	A quantitative comparison on the use of thermal insulation materials in three European countries through the TEnSE	Building and Environment	V. 245 (art. 110973)	10.1016/j.buildenv.2023.110973	WoS AND Scopus		Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
J.N.; Bertolin, C.; Flores-Colen, I.	approach: Challenges and opportunities							
Furtado, A.; Rodrigues, H.; Arêde, A.	Experimental study of the flexural strength of masonry brick walls strengthened with thermal insulation	Construction and Building Materials	V. 401 (art. 132934)	10.1016/j.conbuildmat.2023.132934	WoS AND Scopus	7.4	Q1	Q1
Furtado, A.; Rodrigues, H.; Arêde, A.; Varum, H.	A experimental characterization of seismic plus thermal energy retrofitting techniques for masonry infill walls	Journal of Building Engineering	V. 75 (art. 106854)	10.1016/j.jobe.2023.106854	WoS AND Scopus	6.4	Q1	Q1
Furtado, A.; Rodrigues, H.; Rodrigues, M.F.; Arêde, A.; Varum, H.	A novel holistic approach for the seismic-energy performance assessment of masonry infill walls	Soil Dynamics and Earthquake Engineering	V. 173 (art. 108129)	10.1016/j.soildyn.2023.108129	WoS AND Scopus		Q1	Q2
Furtado, A.; Rodrigues, H.; Varum, H.	Simplified Guidelines for Retrofitting Scenarios in the European Countries	Energies	V. 16, n.º 5 (art. 2408)	10.3390/en16052408	WoS AND Scopus		Q2	Q3
Galderisi, A.; Bravo, M.; lezzi, G.; Cruciani, G.; Paris, E.; Brito, J.D.	Physico-Mechanical Performances of Mortars Prepared with Sorted Earthquake Rubble: The Role of CDW Type and Contained Crystalline Phases	Materials	V. 16, n.º 7 (art. 2855)	10.3390/ma16072855	WoS AND Scopus	3.4	Q2	Q2
Galuppi, L.; Zacchei, E.	Analytical solutions for plates connected by edge beams, under various loading conditions: An application for insulating glass units	Thin-Walled Structures	V. 188 (art. 110877)	10.1016/j.tws.2023.110877	WoS AND Scopus	6.4	Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Gao, R.; Wang, W.; Zhou, K.; Zhao, Y.; Yang, C.; Ren, Q.	Optimization of a Multiphase Mixed Flow Field in Backfill Slurry Preparation Based on Multiphase Flow Interaction	ACS Omega	V. 8, n.º 38(34698- 34709)	10.1021/acsomega.3c03660	WoS AND Scopus	4.1	Q1	Q2
Gerardo, R; de Lima, IP	Applying RGB-Based Vegetation Indices Obtained from UAS Imagery for Monitoring the Rice Crop at the Field Scale: A Case Study in Portugal	Agriculture	V. 13, n.º 10 (art. 1916)	10.3390/agriculture13101916	WoS AND Scopus	3.6	Q2	Q1
Gerardo, R; de Lima, IP	Comparing the Capability of Sentinel-2 and Landsat 9 Imagery for Mapping Water and Sandbars in the River Bed of the Lower Tagus River (Portugal)	REMOTE SENSING	V. 15, n.º 7 (art. 1927)	10.3390/rs15071927	WoS AND Scopus		Q1	Q2
Gião, R.; Lúcio, V.; Chastre, C.	Innovative Seismic Strengthening Techniques to Be Used in RC Beams' Critical Zones	Buildings	V. 13, n.º 1 (art. 95)	10.3390/buildings13010095	WoS AND Scopus	3.8	Q2	Q2
Gil, B.C.; Borsoi, G.; Parracha, J.L.; Dionísio, A.; Veiga, R.; Flores-Colen, I.	Effectiveness and durability of anti-graffiti products applied on ETICS: towards a compatible and sustainable graffiti removal protocol	Environmental Science and Pollution Research	V. 30, n.º 24(65160- 65176)	10.1007/s11356-023-26889-3	WoS AND Scopus		Q1	Q1
Godinho, FN; Alexandre, C; Almeida, PR; Martínez-Capel, F; Cortes, RMV; Quintella, BR; Sanz- Ronda, J; Santos,	Hydropeaking impact assessment for Iberian cyprinids and leuciscids: An adaptation of the hydropeaking tool method	River Research and Applications	V. 39, n.º 3(340- 348)	10.1002/rra.3943	WoS AND Scopus		Q2	Q3





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
JM; Palau, A; Pinheiro, AN; Boavida, I								
Gomes, G.D.J.; Lúcio, V.J.D.G.; Cismasiu, C.	Development of a high- performance blast energy- absorbing system for building structures	International Journal of Protective Structures		10.1177/20414196231183006	WoS AND Scopus		Q2	
Gomes, G.D.J.; Lúcio, V.J.D.G.; Cismasiu, C.; Mingote, J.L.	Experimental Validation and Numerical Analysis of a High- Performance Blast Energy- Absorbing System for Building Structures	Buildings	V. 13, n.º 3 (art. 601)	10.3390/buildings13030601	WoS AND Scopus	3.8	Q2	Q2
Gomes, M.D.G.; Bogas, J.A.; Real, S.; Moret Rodrigues, A.; Machete, R.	Thermal Performance Assessment of Lightweight Aggregate Concrete by Different Test Methods	Sustainability (Switzerland)	V. 15, n.º 14 (art. 11105)	10.3390/su151411105	WoS AND Scopus	3.9	Q2	Q2
Gomes, M.G.; Tomé, A.	A digital and non-destructive integrated methodology for heritage modelling and deterioration mapping. The case study of the Moorish Castle in Sintra	Developments in the Built Environment	V. 14 (art. 100145)	10.1016/j.dibe.2023.100145	WoS AND Scopus		Q1	Q1
Gonçalves, I.; Vinagre, C.; Silva, A.	Patterns of rock pool molluscs in differing shore exposures	Marine Biology	V. 170, n.º 6 (art. 77)	10.1007/s00227-023-04223-2	WoS AND Scopus		Q1	
Gonçalves, R.	A Geometrically Exact Beam Finite Element for Non- Prismatic Strip Beams: Linearized Lateral-Torsional Stability	International Journal of Structural Stability and Dynamics	V. 23, n.º 12 (art. 2350139)	10.1142/S0219455423501390	WoS AND Scopus		Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Gonçalves, R.	A Geometrically Exact Beam Finite Element for Non- Prismatic Strip Beams: The 2D Case	International Journal of Structural Stability and Dynamics	V. 23, n.º 4 (art. 2350037)	10.1142/S0219455423500372	WoS AND Scopus		Q2	Q2
Gonçalves, R.	A Geometrically Exact Beam Finite Element for Non- Prismatic Strip Beams: The Spatial Case	International Journal of Structural Stability and Dynamics	(art. 2450138)	10.1142/S0219455424501384	WoS AND Scopus		Q2	Q2
Gonçalves, R.; Camotim, D.; Basaglia, C.; Martins, A.D.; Peres, N.	Latest developments on the analysis of thin-walled structures using Generalised Beam Theory (GBT)	Journal of Constructional Steel Research	V. 204 (art. 107858)	10.1016/j.jcsr.2023.107858	WoS AND Scopus		Q1	Q2
Gonçalves, R.; Henriques, D.; Antão, A.; Ritto- Corrêa, M.	On non-uniform plastic torsion of steel I-section cantilevers	Thin-Walled Structures	V. 187 (art. 110731)	10.1016/j.tws.2023.110731	WoS AND Scopus	6.4	Q1	Q1
Gonçalves, R.; Martins, A.D.; Camotim, D.	Elastic Bifurcation, Postbuckling Behavior, and Collapse of Thin-Walled Regular Polygonal Columns	Journal of Engineering Mechanics	V. 149, n.º 1 (art. 4022090)	10.1061/(ASCE)EM.1943-7889.0002172	WoS AND Scopus		Q1	Q2
Göswein, V.; Galimshina, A.; Habert, G.	Bio-based renovation in Europe: Investor and homeowner prospects	One Earth	V. 6, n.º 11(1435- 1438)	10.1016/j.oneear.2023.10.026	WoS AND Scopus		Q1	Q1
Gumgum, F.; Cardoso, A.H.	Optimizing the Desilting Efficiency of Submerged Vane Fields at Lateral Diversions	Journal of Hydraulic Engineering	V. 149, n.º 1 (art. 4022031)	10.1061/(ASCE)HY.1943-7900.0002030	WoS AND Scopus		Q2	Q3
Guruprasad, P.S.M.; Quaranta, E.; Coronado-	Hydropower Advantages over Batteries in Energy Storage of	Energies	V. 16, n.º 17 (art. 6309)	10.3390/en16176309	WoS AND Scopus		Q2	Q3





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Hernández, O.E.; Ramos, H.M.	Off-Grid Systems: A Case Study							
Gururani, D.M.; Kumar, Y.; Abed, S.A.; Kumar, V.; Vishwakarma, D.K.; Al-Ansari, N.; Singh, K.; Kuriqi, A.; Mattar, M.A.	Mapping Prospects for Artificial Groundwater Recharge Utilizing Remote Sensing and GIS Methods	Water (Switzerland)	V. 15, n.º 22 (art. 3904)	10.3390/w15223904	WoS AND Scopus	3.4	Q2	Q2
Hayes, D.S.; Bruno, M.C.; Alp, M.; Boavida, I.; Batalla, R.J.; Bejarano, M.D.; Noack, M.; Vanzo, D.; Casas-Mulet, R.; Vericat, D.; Carolli, M.; Tonolla, D.; Halleraker, J.H.; Gosselin, MP.; Chiogna, G.; Zolezzi, G.; Venus, T.E.	100 key questions to guide hydropeaking research and policy	Renewable and Sustainable Energy Reviews	V. 187 (art. 113729)	10.1016/j.rser.2023.113729	WoS AND Scopus		Q1	Q1
Hekrle, M.; Liberalesso, T.; Machác, J.; Matos Silva, C.	The economic value of green roofs: A case study using different cost-benefit analysis approaches	Journal of Cleaner Production	V. 413 (art. 137531)	10.1016/j.jclepro.2023.137531	WoS AND Scopus		Q1	Q1
Henriques, D.F.; Clara, M.P.; Flores- Colen, I.	Inspection and structural assessment of traditional timber floors: a practical systematization	International Journal of Building Pathology and Adaptation	V. 41, n.º 3(675- 691)	10.1108/IJBPA-08-2021-0106	Non WoS; Scopus		Q2	





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Hernández Cervantes, D.; Arciniega Nevárez, J.A.; Ramos, H.M.; Delgado Galván, X.; Pineda Sandoval, J.D.; Mora Rodríguez, J.	EPANET INP Code for Incomplete Mixing Model in Cross Junctions for Water Distribution Networks	Water (Switzerland)	V. 15, n.º 24 (art. 4253)	10.3390/w15244253	WoS AND Scopus	3.4	Q2	Q2
Heydari-Noghabi, H.; Varandas, J.N.; Zakeri, J.A.; Esmaeili, M.	Performance Evaluation of a Combined Transition System in Slab-Ballasted Railway Track Using a Vehicle-Track- Substructure Interaction Model	KSCE Journal of Civil Engineering	V. 27, n.º 9(3848- 3860	10.1007/s12205-023-1273-8	WoS AND Scopus		Q3	Q3
Hicks, S.P.; Matos, S.B.; Pimentel, A.; Belli, G.; Gheri, D.; Tsekhmistrenko, M.; Hosseini, K.; Geissler, W.H.; Silva, R.; Wallenstein, N.; Ferreira, A.M.G.	Exclusive Seismoacoustic Detection and Characterization of an Unseen and Unheard Fireball Over the North Atlantic	Geophysical Research Letters	V. 50, n.º 22 (art. e2023GL105773)	10.1029/2023GL105773	WoS AND Scopus		Q1	Q1
Hidalgo-Sánchez, F.M.; Torres- González, M.; Mascort-Albea, E.J.; Canivell, J.; Romero-Hernández, R.; Martín-del-Río, J.J.	NDT spatial data integration for monumental buildings: technical information management for the Royal Alcazar of Seville	Building Research and Information	V. 51, n.º 6(625-647	10.1080/09613218.2022.2162476	WoS AND Scopus	3.9	Q1	Q2
Hofmann, M.; Machado, M.; Shahid, A.; Dourado, F.;	Pultruded carbon fibre reinforced polymer strips produced with a novel bio-	Composites Science and Technology	V. 234 (art. 109936)	10.1016/j.compscitech.2023.109936	WoS AND Scopus		Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Garrido, M.; Bordado, J.C.; Correia, J.R.	based thermosetpolyester for structural strengthening							
Hoxha, B.; Kuriqi, A.; Filkoski, R.V.	Influence of seasonal air density fluctuations on wind speed distribution in complex terrains in the context of energy yield	Energy, Ecology and Environment		10.1007/s40974-023-00301-9	WoS AND Scopus	4.4	Q2	Q2
Ibrahim, M.D.; Alola, A.A.; Ferreira, D.C.	Assessing sustainable development goals attainment through energy-environmental efficiency: The case of Latin American and Caribbean countries	Sustainable Energy Technologies and Assessments	V. 57 (art. 103219)	10.1016/j.seta.2023.103219	WoS AND Scopus		Q1	
lkram, R.M.A.; Cao, X.; Sadeghifar, T.; Kuriqi, A.; Kisi, O.; Shahid, S.	Improving Significant Wave Height Prediction Using a Neuro-Fuzzy Approach and Marine Predators Algorithm	Journal of Marine Science and Engineering	V. 11, n.º 6 (art. 1163)	10.3390/jmse11061163	WoS AND Scopus		Q2	Q2
Ikram, R.M.A.; Mostafa, R.R.; Chen, Z.; Islam, A.R.M.T.; Kisi, O.; Kuriqi, A.; Zounemat-Kermani, M.	Advanced Hybrid Metaheuristic Machine Learning Models Application for Reference Crop Evapotranspiration Prediction	Agronomy	V. 13, n.º 1 (art. 98)	10.3390/agronomy13010098	WoS AND Scopus	3.7	Q1	Q1
Jamei, M.; Bailek, N.; Bouchouicha, K.; Hassan, M.A.; Elbeltagi, A.; Kuriqi, A.; Al-Ansar, N.; Almorox, J.; El- Kenawy, ES.M.	Data-Driven Models for Predicting Solar Radiation in Semi-Arid Regions	Computers, Materials and Continua	V. 74, n.º 1(1625- 1640	10.32604/cmc.2023.031406	WoS AND Scopus	3.1	Q2	Q3







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Januário, J.F.; Costa, Á.; Cruz, C.O.; Sarmento, J.M.; Sousa, V.F.E.	Effects of regional accessibility on productivity: An analysis based on composite indicators	Journal of Infrastructure, Policy and Development	V. 7, n.º 3 (art. 2092)	10.24294/jipd.v7i3.2092	WoS AND Scopus		Q2	Q4
Januário, J.F.; Cruz, C.O.	The Impact of the 2008 Financial Crisis on Lisbon's Housing Prices	Journal of Risk and Financial Management	V. 16, n.º 1 (art. 46)	10.3390/jrfm16010046	WoS AND Scopus		Q3	
Jerónimo, R.; Gonçalves, M.; Furtado, C.; Rodrigues, K.; Ferreira, C.; Simões, N.	Experimental Assessment and Validation of the Hygrothermal Behaviour of an Innovative Light Steel Frame (LSF) Wall Incorporating a Monitoring System	Buildings	V. 13, n.º 10 (art. 2509)	10.3390/buildings13102509	WoS AND Scopus	3.8	Q2	Q2
Jia, X.; Buyle, S.; Macário, R.	Developing an airport sustainability evaluation index through composite indicator approach	Journal of Air Transport Management	V. 113 (art. 102469)	10.1016/j.jairtraman.2023.102469	WoS AND Scopus		Q1	Q2
Jia, X.; Macário, R.; Buyle, S.	ExpandingHorizons: A Review of Sustainability Evaluation Methodologies in the Airport Sector and Beyond	Sustainability (Switzerland)	V. 15, n.º 15 (art. 11584)	10.3390/su151511584	WoS AND Scopus	3.9	Q2	Q2
Jones, G.A.; Ferreira, A.M.G.; Kulessa, B.; Schimmel, M.; Berbellini, A.; Morelli, A.	Constraints on the Cryohydrological Warming of Firn and Ice in Greenland From Rayleigh Wave Ellipticity Data	Geophysical Research Letters	V. 50, n.º 15 (art. e2023GL103673)	10.1029/2023GL103673	WoS AND Scopus		Q1	Q1
Jones, G.A.; Kulessa, B.; Ferreira, A.M.G.; Schimmel, M.;	Extraction and applications of Rayleigh wave ellipticity in polar regions	AnnalsofGlaciology		10.1017/aog.2023.1	WoS AND Scopus	2.9	Q1	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Berbellini, A.; Morelli, A.								
Khiavi, A.N.; Tavoosi, M.; Kuriqi, A.	Conjunct application of machine learning and game theory in groundwater quality mapping	En vironmental Earth Sciences	V. 82, n.º 17 (art. 395)	10.1007/s12665-023-11059-y	WoS AND Scopus	2.8	Q2	Q2
Kisi, O.; Ardiçlioglu, M.; Hadi, A.M.W.; Kuriqi, A.; Kulls, C.	Estimation of Mean Velocity Upstream and Downstream of a Bridge Model Using Metaheuristic Regression Methods	Water Resources Management	V. 37, n.º 14(5559- 5580)	10.1007/s11269-023-03618-6	WoS AND Scopus		Q1	Q1
Koech, A.K.; Buyle, S.; Macário, R.	Airline brand awareness and perceived quality effect on the attitudes towards frequent-flyer programs and airline brand choice - Moderating effect of frequent-flyer programs	Journal of Air Transport Management	V. 107 (art. 102342)	10.1016/j.jairtraman.2022.102342	WoS AND Scopus		Q1	Q2
Lakreb, N.; Sen, U.; Beddiar, A.; Zitoune, R.; Nobre, C.; Gomes, M.G.; Pereira, H.	Properties of eco-friendly mortars produced by partial cement replacement with waste cork particles: a feasibility study	Biomass Conversion and Biorefinery	V. 13, n.º 13(11997- 12007)	10.1007/s13399-021-02139-9	WoS AND Scopus		Q3	Q3
Lamaa, G.; Duarte, A.P.C.; Silva, R.V.; de Brito, J.	Carbonation of Alkali-Activated Materials: A Review	Materials	V. 16, n.º 8 (art. 3086)	10.3390/ma16083086	WoS AND Scopus	3.4	Q2	Q2
Lamaa, G.; Suescum-Morales, D.; Duarte, A.P.C.; Silva, R.V.; de Brito, J.	Optimising the Performance of CO2-Cured Alkali-Activated Aluminosilicate Industrial By- Products as Precursors	Materials	V. 16, n.º 5 (art. 1923)	10.3390/ma16051923	WoS AND Scopus	3.4	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Leitão, N.S.; Castilho, E.	Chemo-Thermo-Mechanical FEA as a Support Tool for Damage Diagnostic of a Cracked Concrete Arch Dam: A Case Study	Eng	V. 4, n.º 2(1265- 1289)	10.3390/eng4020074	Non WoS; Scopus			
Leitão, N.S.; Castilho, E.; Farinha, M.L.B.	Towards a Better Understanding of Concrete Arch Dam Behavior during the First Filling of the Reservoir	CivilEng	V. 4, n.º 1(151-173)	10.3390/civileng4010010	Non WoS; Scopus			
Li, T.; Nogueira, R.; de Brito, J.; Liu, J.	Influence of fine aggregate's morphology on mortars' rheology	Journal of Building Engineering	V. 63 (art. 105450)	10.1016/j.jobe.2022.105450	WoS AND Scopus	6.4	Q1	Q1
Li, T.; Nogueira, R.; de Brito, J.; Liu, J.	Quantitative analysis of the influence of fine aggregate's grading on mortar's rheology	Journal of Materials Research and Technology	V. 25(310-318)	10.1016/j.jmrt.2023.05.236	WoS AND Scopus		Q1	Q1
Li, T.; Nogueira, R.; de Brito, J.; Liu, J.	Underlying mechanisms of the influence of fine aggregates' content and properties on mortar's plastic viscosity	Journal of Building Engineering	V. 67 (art. 106016)	10.1016/j.jobe.2023.106016	WoS AND Scopus	6.4	Q1	Q1
Liberalesso, T.; Silva, C.M.; Cruz, C.O.	Assessing financial subsidies for green roofs: A micro-scale analysis of Lisbon (Portugal)	Cities	V. 137 (art. 104295)	10.1016/j.cities.2023.104295	WoS AND Scopus		Q1	Q1
Lima, D.F.; Branco, J.M.; Parracha, J.; Machado, J.S.; Nunes, L.	Effects of anobiid damage on shear strength parallel to the grain in single step joints	Materials and Structures/Materiaux et Constructions	V. 56, n.º 8 (art. 148)	10.1617/s11527-023-02234-5	WoS AND Scopus		Q1	Q2
Lima, S.; Brochado, A.; Marques, R.C.	Public–Private Partnerships: A Fresh Risk-Based Approach to Water Sector Projects	Infrastructures	V. 8, n.º6 (art. 102)	10.3390/infrastructures8060102	WoS AND Scopus		Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Lombardi, C.; Annaswamy, A.M.; Picado-Santos, L.	Model-based dynamic toll pricing scheme for a congested suburban freeway with multiple access locations	Journal of Intelligent Transportation Systems: Technology, Planning, and Operations	V. 27, n.º 6(693-720	10.1080/15472450.2022.2075702	WoS AND Scopus		Q1	
Lopes, A.S.; Orozco-Fontalvo, M.; Moura, F.; Vale, D.	Mobility as a service and socio-territorial inequalities: A systematic literature review	Journal of Transport and Land Use	V. 16, n.º 1(215-240	10.5198/jtlu.2023.2273	WoS AND Scopus		Q2	Q4
Lopes, D.M.; Duarte, A.P.C.; Silvestre, N.	Experimental Investigation of Light Steel Framing Walls under Horizontal Loading	Buildings	V. 13, n.º 1 (art. 193)	10.3390/buildings13010193	WoS AND Scopus	3.8	Q2	Q2
Lopes, R.F.R.; Modarres, M.; Rodrigues, J.P.C.; Almeida, M.	Experimental demonstration test of damages in houses caused by wildland-urban interface fires	Fire Safety Journal	V. 141 (art. 103934)	10.1016/j.firesaf.2023.103934	WoS AND Scopus		Q1	Q2
Lopes, R.F.R.; Rodrigues, J.P.C.; Correia, A.J.P.M.	Numerical modelling of composite steel and concrete double-skin and double-tube square cross-section columns subjected to fire	Fire Safety Journal	V. 139 (art. 103808)	10.1016/j.firesaf.2023.103808	WoS AND Scopus		Q1	Q2
Loureiro, D.; Beceiro, P.; Fernandes, E.; Alegre, H.; Covas, D.	Energy efficiency assessment in collective irrigation systems using water and energy balances: methodology and application	Irrigation Science		10.1007/s00271-023-00891-6	WoS AND Scopus	3.0	Q2	Q2
Lucchesi, S.T.; E Silva, J.A.; Larranaga, A.M.;	Machine Learning and Image Recognition Technologies to Identify Built Environment Barriers and Incentives to Walk	Transportation Research Record	V. 2677 (1)	10.1177/03611981221097965	WoS AND Scopus		Q2	Q4







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Zechin, D.; Cybis, H.B.B.								
Lupattelli, A.; Bourne-Webb, P.J.; Bodas Freitas, T.M.; Salciarini, D.	A Numerical Study of the Behavior of Micropile Foundations under Cyclic Thermal Loading	Applied Sciences (Switzerland)	V. 13, n.º 17 (art. 9791)	10.3390/app13179791	WoS AND Scopus	2.838	Q2	Q2
Machado, M.; Garrido, M.; Firmo, J.P.; Azevedo, A.; Correia, J.R.; Bordado, J.C.; Dourado, F.	Bio-Based Pultruded CFRP Laminates: Bond to Concrete and Structural Performance of Full-Scale Strengthened Reinforced Concrete Beams	Materials	V. 16, n.º 14 (art. 4974)	10.3390/ma16144974	WoS AND Scopus	3.4	Q2	Q2
Machado, M.; Hofmann, M.; Garrido, M.; Correia, J.R.; Bordado, J.C.; Rosa, I.C.	Incorporation of Lignin in Bio- Based Resins for Potential Application in Fiber–Polymer Composites	Applied Sciences (Switzerland)	V. 13, n.º 14 (art. 8342)	10.3390/app13148342	WoS AND Scopus	2.838	Q2	Q2
Machete, I.F.; Marques, R.C.	Project Risks Influence on Water Supply and Sanitation Sector Financing Opportunities	Water (Switzerland)	V. 15, n.º 12 (art. 2295)	10.3390/w15122295	WoS AND Scopus	3.4	Q2	Q2
Machete, I.F.; Marques, R.C.	Water supply and sanitation projects in the last decade: project characteristics, multilateral development bank performance, and quality of results	Journal of Water Sanitation and Hygiene for Development	V. 13, n.º 12(986- 1000	10.2166/washdev.2023.176	WoS AND Scopus		Q3	Q4
Machete, R.; Neves, M.; Ponte, M.; Falcão, A.P.; Bento, R.	A BIM-Based Model for Structural Health Monitoring of the Central Body of the	Buildings	V. 13, n.º 6 (art. 1532)	10.3390/buildings13061532	WoS AND Scopus	3.8	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
	Monserrate Palace: A First Approach							
Malça, J; Almeida, RMSF; Silva, JARM	Evaluation of the Hygrothermal Conditions of a Typical Residential Building in the Azores Archipelago	ENERGIES	V. 16, n.º 13 (art. 5075)	10.3390/en16135075	WoS AND Scopus		Q2	Q3
Maletič, D.; Marques de Almeida, N.; Gomišček, B.; Maletič, M.	Understanding motives for and barriers to implementing asset management system: an empirical study for engineered physical assets	Production Planning and Control	V. 34, n.º 15(1497- 1512	10.1080/09537287.2022.2026672	Non WoS; Scopus		Q1	
Malka, L.; Bidaj, F.; Kuriqi, A.; Jaku, A.; Roçi, R.; Gebremedhin, A.	Energy system analysis with a focus on future energy demand projections: The case of Norway	Energy	V. 272 (art. 127107)	10.1016/j.energy.2023.127107	WoS AND Scopus		Q1	Q1
Manta, D.; Gonçalves, R.; Camotim, D.	On the compatibility between Reissner–Mindlin shell and GBT-based finite elements	Thin-Walled Structures	V. 192 (art. 111150)	10.1016/j.tws.2023.111150	WoS AND Scopus	6.4	Q1	Q1
Maravelaki, PN.; Kapetanaki, K.; Papayianni, I.; Ioannou, I.; Faria, P.; Alvarez, J.; Stefanidou, M.; Nunes, C.; Theodoridou, M.; Ferrara, L.; Toniolo, L.	RILEM TC 277-LHS report: additives and admixtures for modern lime-based mortars	Materials and Structures/Materiaux et Constructions	V. 56, n.º 5 (art. 106)	10.1617/s11527-023-02175-z	WoS AND Scopus		Q1	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Marchão, C.; Marreiros, R.; Ribeiro, F.	Effect of the type of posttensioning anchorage on the behavior of anchorage zones	Structural Concrete	V. 24, n.º 6(6973- 6987)	10.1002/suco.202300168	WoS AND Scopus		Q1	Q2
Marchão, C.; Marreiros, R.; Ribeiro, F.	Experimental study on the cracking behavior of anchorage zones	Structural Concrete		10.1002/suco.202300554	WoS AND Scopus		Q1	Q2
Marín-García, D.; Rubio-Gómez- Torga, J.; Duarte- Pinheiro, M.; Moyano, J.	Simplified automatic prediction of the level of damage to similar buildings affected by river flood in a specific area	Sustainable Cities and Society	V. 88 (art. 104251)	10.1016/j.scs.2022.104251	WoS AND Scopus		Q1	Q1
Markuna, S.; Kumar, P.; Ali, R.; Vishwkarma, D.K.; Kushwaha, K.S.; Kumar, R.; Singh, V.K.; Chaudhary, S.; Kuriqi, A.	Application of Innovative Machine Learning Techniques for Long-Term Rainfall Prediction	Pure and Applied Geophysics	V. 180, n.º 1(335- 363	10.1007/s00024-022-03189-4	WoS AND Scopus		Q2	Q3
Marques, R.C.; Simões, P.; Machete, I.; Fagundes, T.	Water Disconnectionand Vital Flow Policies: International Practices in Medium- and High-Income Countries	Water (Switzerland)	V. 15, n.º 5 (art. 935)	10.3390/w15050935	WoS AND Scopus	3.4	Q2	Q2
Martins, D.; Gonilha, J.; , R. Correia J.; Silvestre, N.; Guerreiro, L.; Branco, F.	Monotonic and cyclic sway behaviour of 2-dimensional frames made of pultruded GFRP I-section profiles	Structures	V. 55(2461-2477)	10.1016/j.istruc.2023.07.035	WoS AND Scopus		Q1	Q2
Martins, N.M.C.; Covas, D.I.C.; Meniconi, S.;	Hydrodynamics of laminarpipe flow through an extended partial blockage by CFD	Journal of Hydroinformatics	V. 25, n.º 6(2268- 2280)	10.2166/hydro.2023.042	WoS AND Scopus		Q2	





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Capponi, C.; Brunone, B.								
Martins, N.R.; Bourne-Webb, P.J.	An assessment of the potential effect of climate change on renewable hybrid heating and cooling systems	Journal of Building Engineering	V. 64 (art. 105598)	10.1016/j.jobe.2022.105598	WoS AND Scopus	6.4	Q1	Q1
Martins, N.R.; Carrilho da Graça, G.	Health effects of PM2.5 emissions from woodstoves and fireplaces in living spaces	Journal of Building Engineering	V. 79 (art. 107848)	10.1016/j.jobe.2023.107848	WoS AND Scopus	6.4	Q1	Q1
Martins, R.; Carmo, R.D.; Costa, H.; Júlio, E.	A review on precast structural concrete walls and connections	Advances in Structural Engineering	V. 26, n.º 14(2600- 2620	10.1177/13694332231191073	WoS AND Scopus		Q1	Q2
Masrur Ahmed, A.A; Bailek, N.; Abualigah, L.; Bouchouicha, K.; Kuriqi, A.; Sharifi, A.; Sareh, P.; Al khatib, A.M.G.; Mishra, P.; Colak, I.; El-kenawy, ES.M.	Global control of electrical supply: A variational mode decomposition-aided deep learning model for energy consumption prediction	Energy Reports	V. 10(2152-2165	10.1016/j.egyr.2023.08.076	WoS AND Scopus	5.2	Q2	Q2
Matias, S.R.; Ferreira, P.A.; Sainz-Aja, J.A.; Pombo, J.	Prediction of slab track settlement using an innovative 3D train-track numerical tool: Full-Scale laboratory validation	Construction and Building Materials	V. 408 (art. 133438)	10.1016/j.conbuildmat.2023.133438	WoS AND Scopus	7.4	Q1	Q1
Matos Silva, C.; Bernardo, F.; Manso, M.; Loupa Ramos, I.	Green Spaces over a Roof or on the Ground, Does It Matter? The Perception of Ecosystem Services and Potential Restorative Effects	Sustainability (Switzerland)	V. 15, n.º 6 (art. 5334)	10.3390/su15065334	WoS AND Scopus	3.9	Q2	Q2







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Matos, J.P.; Ferreira, F.; Mendes, D.; Matos, J.S.	Evaluating Compound Flooding Risks in Coastal Cities under Climate Change— The Maputo Case Study, in Mozambique	Sustainability (Switzerland)	V. 15, n.º 19 (art. 14497)	10.3390/su151914497	WoS AND Scopus	3.9	Q2	Q2
Mazzuca, P.; Ombres, L.; Guglielmi, M.; Verre, S.	Residual Mechanical Properties of PBO FRCM Composites after Elevated Temperature Exposure: Experimental and Comparative Analysis	Journal of Materials in Civil Engineering	V. 35, n.º 11 (art. 4023383)	10.1061/JMCEE7.MTENG-15917	WoS AND Scopus		Q1	Q2
Meeûs, J.; Dewulf, W.; Macário, R.	Management Systems in Aviation: Challenges and Opportunities to Upgrade to an Integrated Management System	Sustainability (Switzerland)	V. 15, n.º 13 (art. 10424)	10.3390/su151310424	WoS AND Scopus	3.9	Q2	Q2
Meireles, I.; Sousa, V.; Matos, J.P.; Cruz, C.O.	Determinants of water loss in Portuguese utilities	Utilities Policy	V. 83 (art. 101603)	10.1016/j.jup.2023.101603	WoS AND Scopus		Q1	Q2
Melo, S; Silva, F; Abbasi, M; Ahani, P; Macedo, J	Public Acceptance of the Use of Drones in City Logistics: A Citizen-Centric Perspective	Sustainability (Switzerland)	V. 15, n.º 3 (art. 2621)	10.3390/su15032621	WoS AND Scopus	3.9	Q2	Q2
Mendes, S.V.; Aleixo, R.; Larcher, M.; Amaral, S.; Ferreira, R.M.L.	Dataset of velocities of dry granular flows in a partially obstructed tilted chute	Data in Brief	V. 51 (art. 109676)	10.1016/j.dib.2023.109676	WoS AND Scopus		Q2	
Menghini, A.; Kanyilmaz, A.; Calado, L.; Castiglioni, C.A.	Experimental Assessment of the Behavior of Tubular Truss Girder Joints Fabricated with Laser Cutting Technology	Journal of Structural Engineering (United States)	V. 149, n.º 6 (art. 4023065)	10.1061/JSENDH.STENG-12019	WoS AND Scopus		Q1	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Micheletti, A.; dos Santos, F.A.; Guest, S.D.	Prestrain-induced bistability in the design of tensegrity units for mechanical metamaterials	Applied Physics Letters	V. 123, n.º 12 (art. 121702)	10.1063/5.0160023	WoS AND Scopus		Q1	Q2
Miguel, F.; de Brito, J.; Silva, R.V.	Durability-related performance of recycled aggregate concrete containing alkali-activated municipal solid waste incinerator bottom ash	Construction and Building Materials	V. 397 (art. 132415)	10.1016/j.conbuildmat.2023.132415	WoS AND Scopus	7.4	Q1	Q1
Miranda, J.; Valença, J.; Costa, H.; Júlio, E.	Restoration intervention of exposed white concrete buildings: The case of 'Pavilhão do Conhecimento', Portugal	Journal of Building Engineering	V. 69 (art. 106175)	10.1016/j.jobe.2023.106175	WoS AND Scopus	6.4	Q1	Q1
Miranda, L.; Caldeira, L.; Serra, J.B.; Gomes, R.C.	Geotechnical characterization of a novel material obtained by injecting a closed cell expansive polyurethane resin into a sand mass	Transportation Geotechnics	V. 42 (art. 101051)	10.1016/j.trgeo.2023.101051	WoS AND Scopus		Q1	Q1
Moghaddam, S.A.; Serra, C.; Gameiro da Silva, M.; Simões, N.	Comprehensive Review and Analysis of Glazing Systems towards Nearly Zero-Energy Buildings: Energy Performance, Thermal Comfort, Cost-Effectiveness, and Environmental Impact Perspectives	Energies	V. 16, n.º 17 (art. 6283)	10.3390/en16176283	WoS AND Scopus		Q2	Q3
Mohamed, H.; Furtado, A.; Rodrigues, H.	Appraisal of masonry infill walls dynamic characteristics: An analytical study	Engineering Structures	V. 297 (art. 116995)	10.1016/j.engstruct.2023.116995	WoS AND Scopus		Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Monteiro, S.; Machado-Moreira, B.; Linke, R.; Blanch, A.R.; Ballesté, E.; Méndez, J.; Maunula, L.; Oristo, S.; Stange, C.; Tiehm, A.; Farnleitner, A.H.; Santos, R.; García- Aljaro, C.	Performance of bacterial and mitochondrial qPCR source tracking methods: A European multi-center study	International Journal of Hygiene and Environmental Health	V. 253 (art. 114241)	10.1016/j.ijheh.2023.114241	WoS AND Scopus		Q1	
Montenegro, A.A.A.; Junior, V.P.S.; de Lima, J.L.M.P.; da Silva, J.R.L.; Abrantes, J.R.C.B.	Estimation of topsoil moisture and hydraulic conductivity using infrared thermography in the Brazilian semiarid; [Estimativa da umidade e condutividade hidráulica do solo superficial usando termografia por infravermelhos no semiárido brasileiro]	Engenharia Sanitaria e Ambiental	V. 28 (art. e20220205)	10.1590/S1413-415220220205	WoS AND Scopus	0.5	Q4	Q4
Morais, C.; Ribeiro, J.; Silva, J.	Human factors in aviation: Fatigue management in ramp workers	Open Engineering	V. 13, n.º 1 (art. 20220411)	10.1515/eng-2022-0411	WoS AND Scopus		Q4	
Mostafa, R.R.; Kisi, O.; Adnan, R.M.; Sadeghifar, T.; Kuriqi, A.	Modeling Potential Evapotranspiration by Improved Machine Learning Methods Using Limited Climatic Data	Water (Switzerland)	V. 15, n.º 3 (art. 486)	10.3390/w15030486	WoS AND Scopus	3.4	Q2	Q2
Mota Filho, T.M.M.; da Silva Camargo, R.; de Menezes, C.W.G.; Zanuncio, J.C.; Brito, E.S.G.;	Fumigant toxicity of Cymbopogonflexuosus lemon grass (Poaceae) essential oil to Sitophilus zeamais maize weevil (Coleoptera:	Cereal Research Communications		10.1007/s42976-023-00389-z	WoS AND Scopus	1.6	Q4	Q3





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Forti, L.C.; Araújo, C.R.R.	Curculionidae) and phytotoxicity to Zea mays (Poaceae)							
Moura, F.; Valença, G.; Félix, R.; Vale, D.S.	The impact of public bike- sharing systems on mobility patterns: Generating or replacing trips?	International Journal of Sustainable Transportation	V. 17, n.º 11(1254- 1263)	10.1080/15568318.2022.2163209	WoS AND Scopus		Q2	Q3
Narzetti, W.; Pinto, F.S.; Narzetti, D.; Cetrulo, T.	Reaching Universal Coverage of Water and Sanitation Services: Is Regionalization a Sustainable Path for Developing Countries?	Water (Switzerland)	V. 15, n.º 15 (art. 2756)	10.3390/w15152756	WoS AND Scopus	3.4	Q2	Q2
Nascimento, S.; Oliveira Pedro, J.J.; Santos, R.; Kuhlmann, U.	Experimental behaviour of plate girders in steel – Internal forces in intermediate transverse stiffeners	Engineering Structures	V. 291 (art. 116425)	10.1016/j.engstruct.2023.116425	WoS AND Scopus		Q1	Q1
Neto, S.	Past, present, and future of water governance—areflective walk on advances and failures since 1977	World Water Policy	V. 9, n.º 2(138-145	10.1002/wwp2.12105	Non WoS; Scopus		Q3	
Neves, J.; Castro, L.; Monteiro, A.	Numerical modelling of the behaviour of soils treated by cement on road pavements; [MODELAÇÃO NUMÉRICA DO COMPORTAMENTO DE SOLOS TRATADOS COM CIMENTO EM PAVIMENTOS RODOVIÁRIOS]	Geotecnia	V. 2023, n.º 157(7- 28	10.14195/2184-8394_157_1	Non WoS; Scopus			
Neves, J.; Crucho, J.	Performance Evaluation of Steel Slag Asphalt Mixtures for	Applied Sciences (Switzerland)	V. 13, n.º 9 (art. 5716)	10.3390/app13095716	WoS AND Scopus	2.838	Q2	Q2







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
	Sustainable Road Pavement Rehabilitation							
Nhantumbo, C.; Cangi Vaz, N.; Rodrigues, M.; Manuel, C.; Rapulua, S.; Langa, J.; Nhantumbo, H.; Joaquim, D.; Dosse, M.; Sumbana, J.; Santos, R.; Monteiro, S.; Juízo, D.	Assessment of Microbial Contamination in the Infulene River Basin, Mozambique	Water (Switzerland)	V. 15, n.º 2 (art. 219)	10.3390/w15020219	WoS AND Scopus	3.4	Q2	Q2
Nivesh, S.; Patil, J.P.; Goyal, V.C.; Saran, B.; Singh, A.K.; Raizada, A.; Malik, A.; Kuriqi, A.	Assessment of future water demand and supply using WEAP model in Dhasan River Basin, Madhya Pradesh, India	Environmental Science and Pollution Research	V. 30, n.º 10(27289- 27302	10.1007/s11356-022-24050-0	WoS AND Scopus		Q1	Q1
Nogueira, C.G.; Yoshio, L.; Zacchei, E.	Deterministic and probabilistic approaches for corrosion in RC structures: A direct proposed model to total service life predictions	Case Studies in Construction Materials	V. 18 (art. e01913)	10.1016/j.cscm.2023.e01913	WoS AND Scopus		Q1	Q1
Novaes, C.; Marques, R.	Are Rainwater and Stormwater Part of the Urban CE Efficiency?	Sustainability (Switzerland)	V. 15, n.º 14 (art. 11168)	10.3390/su151411168	WoS AND Scopus	3.9	Q2	Q2
Novaes, C.A.; Marques, R.C.	Institutional paradigm shift: transitions in stormwater management principles	Environmental Science and Pollution Research	V. 30, n.º 7(17179- 17192	10.1007/s11356-022-23325-w	WoS AND Scopus		Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Novaes, C.A.; Marques, R.C.	Policies, institutions, and regulations: PIRs of a stormwater management system	Water Science and Technology	V. 88, n.º 8(2189- 2200	10.2166/wst.2023.316	WoS AND Scopus	2,7	Q2	Q2
Nunes, A.M.; Ferreira, D.F.D.C.	Evaluating Portuguese Public Hospitals Performance: Any Difference before and during COVID-19?	Sustainability (Switzerland)	V. 15, n.º 1 (art. 294)	10.3390/su15010294	WoS AND Scopus	3.9	Q2	Q2
Nunes, L; Duarte, S; Parracha, JL; Jones, D; Paulmier, I; Kutnik, M	Insulation Materials Susceptibility to Biological Degradation Agents: Molds and Subterranean Termites	Applied Sciences (Switzerland)	V. 13, n.º 20 (art. 11311)	10.3390/app132011311	WoS AND Scopus	2.838	Q2	Q2
Nyembwe, JP.K.B.; Ogundiran, J.O.; Chenari, B.; Simões, N.A.V.; Gameiro da Silva, M.	The Indoor Climate of Hospitals in Tropical Countries: A Systematic Review	Energies	V. 16, n.º 8 (art. 3513)	10.3390/en16083513	WoS AND Scopus		Q2	Q3
Oliveira, A.S.; Silva, J.S.; Guiomar, N.; Fernandes, P.; Nereu, M.; Gaspar, J.; Lopes, R.F.R.; Rodrigues, J.P.C.	The effect of broadleaf forests in wildfiremitigation in the WUI – A simulation study	International Journal of Disaster Risk Reduction	V. 93 (art. 103788)	10.1016/j.ijdrr.2023.103788	WoS AND Scopus		Q1	Q1
Oliveira, C.S.; Çakti, E.; Camacho, V.; Dar, E.	Revisiting the Frequency Laws for Ottoman Minarets. Analysis of Uncertainties	International Journal of Architectural Heritage	V. 17, n.º 10(1648- 1668	10.1080/15583058.2022.2057881	WoS AND Scopus		Q1	Q3
Oliveira, C.S.; Lemos, J.V.	Back-analysis of the Collapse of a Tetrastyle Canopy during the April 25, 2015 Nepal Earthquake	International Journal of Architectural Heritage	V. 17, n.º 2(418- 430)	10.1080/15583058.2021.1925781	WoS AND Scopus		Q1	Q3





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Oliveira, FSBF; Oliveira, JNC	Topo-bathymetric behaviour of a beach controlled by a groyne field and a dune-seawall backshore	JOURNAL OF COASTAL CONSERVATION	V. 27, n.º2 (art. 10)	10.1007/s11852-023-00938-y	WoS AND Scopus	2.1	Q2	Q2
Oliveira, L.; Gomes, R.C.; Teves-Costa, P.	Contribution to the seismic microzonation of Lisbon based on the integration of geological, geophysical, and geotechnical data	Soil Dynamics and Earthquake Engineering	V. 171 (art. 107965)	10.1016/j.soildyn.2023.107965	WoS AND Scopus		Q1	Q2
Oliveira, R.G.; Rodrigues, J.P.C.; Pereira, J.M.	Numerical simulations on refractory linings for steel casting vessels	Fire Safety Journal	V. 138 (art. 103794)	10.1016/j.firesaf.2023.103794	WoS AND Scopus		Q1	Q2
Omori Yano, M.; da Silva, S.; Figueiredo, E.; Giacon Villani, L.G.	Damage quantification using transfer component analysis combined with Gaussian process regression	Structural Health Monitoring	V. 22, n.º 2(1290- 1307	10.1177/14759217221094500	WoS AND Scopus		Q1	
Omori Yano, M.; Figueiredo, E.; da Silva, S.; Cury, A.	Foundations and applicability of transfer learning for structural health monitoring of bridges	Mechanical Systems and Signal Processing	V. 204 (art. 110766)	10.1016/j.ymssp.2023.110766	Non WoS; Scopus		Q1	
Omori Yano, M.; Figueiredo, E.; da Silva, S.; Cury, A.; Moldovan, I.	Transfer Learning for Structural Health Monitoring in Bridges That Underwent Retrofitting	Buildings	V. 13, n.º 9 (art. 2323)	10.3390/buildings13092323	WoS AND Scopus	3.8	Q2	Q2
Orozco-Fontalvo, M.; Llerena, L.; Cantillo, V.	Dockless electric scooters: A review of a growing micromobility mode	International Journal of Sustainable Transportation	V. 17, n.º 4(406-422	10.1080/15568318.2022.2044097	WoS AND Scopus		Q2	Q3
Orozco-Fontalvo, M.; Moura, F.	Refocusing MaaSapproach: A brief	Transport Policy	V. 141(340-342)	10.1016/j.tranpol.2023.08.002	WoS AND Scopus		Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Ostetto, L.; Sousa, R.; Fernandes, P.; Rodrigues, H.	Influence and effectiveness of horizontal diaphragms and cladding wall panels on the seismic behaviour of precast RC industrial buildings	Engineering Structures	V. 285 (art. 116046)	10.1016/j.engstruct.2023.116046	WoS AND Scopus		Q1	Q1
Otero, J.; Borsoi, G.; Monasterio-Guillot, L.	The Boom in Nanomaterials for Built Heritage Conservation: Why Does Size Matter?	Materials	V. 16, n.º 8 (art. 3277)	10.3390/ma16083277	WoS AND Scopus	3.4	Q2	Q2
Paíz, R.; Low-Calle, J.F.; Molina-Estrada, A.G.; Gil-Villalba, S.; Condesso de Melo, M.T.	Combining spectral analysis and geochemical tracers to investigate surface water– groundwater interactions: A case study in an intensive agricultural setting (southern Guatemala)	Science of the Total Environment	V. 899 (art. 165578)	10.1016/j.scitotenv.2023.165578	WoS AND Scopus		Q1	Q1
Parracha, J.L.; Bartolucci, B.; Boccacci, G.; Ogut, O.; Bartels, G.; Siani, A.M.; Frasca, F.; Bertolin, C.; Mendes, M.P.; Flores-Colen, I.	A dataset of criteria on the use of thermal insulation solutions in building facades located in Norway, Portugal and Italy	Data in Brief	V. 50 (art. 109622)	10.1016/j.dib.2023.109622	WoS AND Scopus		Q2	
Parracha, J.L.; Santos, A.R.; Lazera, R.; Flores- Colen, I.; Gomes, M.G.; Rodrigues, A.M.	Performance of lightweight thermal insulating mortars applied on brick substrate specimens and prototype wall	Construction and Building Materials	V. 364 (art. 129954)	10.1016/j.conbuildmat.2022.129954	WoS AND Scopus	7.4	Q1	Q1
Parracha, J.L.; Veiga, R.; Flores- Colen, I.; Nunes, L.	Toward the Sustainable and Efficient Use of External Thermal Insulation Composite	Buildings	V. 13, n.º 7 (art. 1664)	10.3390/buildings13071664	WoS AND Scopus	3.8	Q2	Q2







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
	Systems (ETICS): A Comprehensive Review of Anomalies, Performance Parameters, Requirements and Durability							
Parvaze, S.; Kumar, R.; Khan, J.N.; Al- Ansari, N.; Parvaze, S.; Vishwakarma, D.K.; Elbeltagi, A.; Kuriqi, A.	Optimization of Water Distribution Systems Using Genetic Algorithms: A Review	Archives of Computational Methods in Engineering	V. 30, n.º 7(4209- 4244	10.1007/s11831-023-09944-7	WoS AND Scopus	9.7	Q1	Q1
Pascoal, A.; Almeida, A.; Capitão, S.; Picado- Santos, L.	Improvement of Warm-Mix Asphalt Concrete Performance with Lignin Obtained from Bioethanol Production from Forest Biomass Waste	Materials	V. 16, n.º 23 (art. 7339)	10.3390/ma16237339	WoS AND Scopus	3.4	Q2	Q2
Paternina-Verona, D.A.; Coronado- Hernández, O.E.; Espinoza-Román, H.G.; Fuertes- Miquel, V.S.; Ramos, H.M.	Different Experimental and Numerical Models to Analyse Emptying Processes in Pressurised Pipes with Trapped Air	Applied Sciences (Switzerland)	V. 13, n.º 13 (art. 7727)	10.3390/app13137727	WoS AND Scopus	2.838	Q2	Q2
Paternina-Verona, D.A.; Coronado- Hernández, O.E.; Espinoza-Román, H.G.; Fuertes- Miquel, V.S.; Ramos, H.M.	Rapid Filling Analysis with an Entrapped Air Pocket in Water Pipelines Using a 3D CFD Model	Water (Switzerland)	V. 15, n.º 5 (art. 834)	10.3390/w15050834	WoS AND Scopus	3.4	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Paternina-Verona, D.A.; Flórez-Acero, L.C.; Coronado- Hernández, O.E.; Espinoza-Román, H.G.; Fuertes- Miquel, V.S.; Ramos, H.M.	Two-dimensional simulation of emptying manoeuvres in water pipelines with admitted air	Urban Water Journal	V. 20, n.º 7(801- 812)	10.1080/1573062X.2023.2211053	WoS AND Scopus		Q2	Q2
Paulpandian, M.K.S.; Neves, R.	Reinforced Concrete Durability Design Through a Semi- probabilistic Approach	Periodica Polytechnica Civil Engineering	V. 67, n.º 3(735-743	10.3311/PPci.21350	WoS AND Scopus		Q3	Q3
Pavia, S.; Veiga, R.; Hughes, J.; Pesce, G.; Valek, J.; Alvarez, J.I.; Faria, P.; Padovnik, A.	Correction: RILEM TC 277- LHS report: How hot are hot- lime-mixed mortars? A review (Materials and Structures, (2023), 56, 4, (87), 10.1617/s11527-023-02157-1)	Materials and Structures/Materiaux et Constructions	V. 56, n.º 7 (art. 136)	10.1617/s11527-023-02209-6	WoS AND Scopus		Q1	Q2
Pavia, S.; Veiga, R.; Hughes, J.; Pesce, G.; Valek, J.; Alvarez, J.I.; Faria, P.; Padovnik, A.	RILEM TC 277-LHS report: How hot are hot-lime-mixed mortars? A review	Materials and Structures/Materiaux et Constructions	V. 56, n.º 4 (art. 87)	10.1617/s11527-023-02157-1	WoS AND Scopus		Q1	Q2
Pederneiras, YM; Pereira, MA; Figueira, JR	Are the Portuguese public hospitals sustainable? A triple bottom line hybrid data envelopment analysis approach	INTERNATIONAL TRANSACTIONS IN OPERATIONAL RESEARCH	V. 30, n.º 1(453-475	10.1111/itor.12966	WoS AND Scopus		Q1	
Pedral Sampaio, R.; Aguiar Costa, A.; Flores-Colen, I.	A discussion of digital transition impact on facility management of hospital buildings	Facilities	V. 41, n.º 05/jun(389-406)	10.1108/F-07-2022-0092	WoS AND Scopus		Q2	





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Pedrosa, M.; Arantes, A.; Cruz, C.O.	Barriers to Adopting Lean Methodology in the Portuguese Construction Industry	Buildings	V. 13, n.º 8 (art. 2047)	10.3390/buildings13082047	WoS AND Scopus	3.8	Q2	Q2
Pedroso, M.; Flores- Colen, I.; Silvestre, J.D.; Gomes, M.G.; Hawreen, A.; Ball, R.J.	Synergistic effect of fibres on the physical, mechanical, and microstructural properties of aerogel-based thermal insulating renders	Cement and Concrete Composites	V. 139 (art. 105045)	10.1016/j.cemconcomp.2023.105045	WoS AND Scopus		Q1	Q1
Pedroso, M.; Gomes, M.D.G.; Silvestre, J.D.; Hawreen, A.; Flores- Colen, I.	Thermophysical Parameters and Hygrothermal Simulation of Aerogel-Based Fibre- Enhanced Thermal Insulating Renders Applied on Exterior Walls	Energies	V. 16, n.º 7 (art. 3048)	10.3390/en 16073048	WoS AND Scopus		Q2	Q3
Pedroso, M.; Silvestre, J.D.; Flores-Colen, I.; Gomes, M.G.	Environmental impact of wall multilayer coating systems containing aerogel-based fibre- enhanced thermal renders	Journal of Building Engineering	V. 76 (art. 107322)	10.1016/j.jobe.2023.107322	WoS AND Scopus	6.4	Q1	Q1
Pedroso, M.; Silvestre, J.D.; Gomes, M.D.G.; Hawreen, A.; Bersch, J.D.; Flores- Colen, I.	Integrated Performance Evaluation of Aerogel-Based Fibre-Enhanced Thermal Renders Applied on Building Walls	Gels	V. 9, n.º 11 (art. 898)	10.3390/gels9110898	WoS AND Scopus		Q2	
Pedroso, M.; Silvestre, J.D.; Gomes, M.G.; Bersch, J.D.; Flores- Colen, I.	Application of Silica-Aerogel- Fibre-Based Thermal Renders for Retrofits in Building Walls: A Comparative Assessment with Benchmark Solutions	Gels	V. 9, n.º 11 (art. 861)	10.3390/gels9110861	WoS AND Scopus		Q2	




Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Pereira, C.; Flores- Colen, I.; Mendes, M.P.	Guidelines to reduce the effects of urban heat in a changing climate: Green infrastructures and design measures	Sustainable Development		10.1002/sd.2646	WoS AND Scopus		Q1	Q1
Peres, R.; Couto, R.; Sousa, I.; Castro, J.M.; Bento, R.	Modelling and evaluation of brittle shear effects on the seismic performanceand loss assessment of RC buildings	Engineering Structures	V. 275 (art. 115230)	10.1016/j.engstruct.2022.115230	WoS AND Scopus		Q1	Q1
Pessoa, S.; Jesus, M.; Guimarães, A.S.; Lucas, S.S.; Simões, N.	Experimental characterisation of hygrothermal properties of a 3D printed cementitious mortar	Case Studies in Construction Materials	V. 19 (art. e02355)	10.1016/j.cscm.2023.e02355	WoS AND Scopus		Q1	Q1
Petersen, A.; Silva, A.; González, M.	Service Life Prediction of Painted Renderings Using Maintenance Data through Regression Techniques	Buildings	V. 13, n.º 3 (art. 785)	10.3390/buildings13030785	WoS AND Scopus	3.8	Q2	Q2
Phan-Huy, C.; Göswein,V.; Habert, G.	Climate-effective use of straw in the EU bioeconomy— comparing avoided and delayed emissions in the agricultural, energy and construction sectors	Environmental Research Letters	V. 18, n.º 12 (art. 124004)	10.1088/1748-9326/ad0517	WoS AND Scopus	6.7	Q1	Q1
Pienika, R.; Cataldo, J.; Ramos, H.M.	CFD Analysis of a Hydrostatic Pressure Machine with an Open Source Solver	Fluids	V. 8, n.º 1 (art. 9)	10.3390/fluids8010009	WoS AND Scopus		Q3	
Pineda Sandoval, J.D.; Arciniega- Nevárez, J.A.; Delgado-Galván, X.; Ramos, H.M.;	Street Lighting and Charging Stations with PATs Location Applying Artificial Intelligence	Water (Switzerland)	V. 15, n.º 4 (art. 616)	10.3390/w15040616	WoS AND Scopus	3.4	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Pérez-Sánchez, M.; López-Jiménez, P.A.; Mora Rodríguez, J.								
Pinheiro, A.; Vaz, S.; Monteiro, L.; Almeida, M.D.C.; Covas, D.	Improving mixing and renewal in drinking water storage tanks: lessons learnt and practical measures	Urban Water Journal	V. 20, n.º 7(897-909	10.1080/1573062X.2023.2217433	WoS AND Scopus		Q2	Q2
Piras, D.; Spurio Mancini, A.; Ferreira, A.M.G.; Joachimi, B.; Hobson, M.P.	Towards fast machine- learning-assisted Bayesian posterior inference of microseismic event location and source mechanism	Geophysical Journal International	V. 232, n.º 2(1219- 1235	10.1093/gji/ggac385	WoS AND Scopus	2.8	Q1	Q2
Pires, J.; Santos, R.; Monteiro, S.	Antibioticresistance genes in bacteriophages from wastewater treatment plant and hospital wastewaters	Science of the Total Environment	V. 892 (art. 164708)	10.1016/j.scitotenv.2023.164708	WoS AND Scopus		Q1	Q1
Plank, P.A.; Gomes, L.F.; Caldas, P.; Varela, M.; Ferreira, D.C.	Assessing the Traveling Risks Perceived by South African Travelers during Pandemic Outbreaks: The Case of COVID-19	Sustainability (Switzerland)	V. 15, n.º 12 (art. 9267)	10.3390/su15129267	WoS AND Scopus	3.9	Q2	Q2
Ponte, M.; Penna, A.; Bento, R.	In-plane cyclic tests of strengthened rubble stone masonry	Materials and Structures/Materiaux et Constructions	V. 56, n.º 2 (art. 41)	10.1617/s11527-023-02126-8	WoS AND Scopus		Q1	Q2
Pontes, J.; Real, S.; Alexandre Bogas, J.	The rapid chloride migration test as a method to determine the chloride penetration resistance of concrete in marine environment	Construction and Building Materials	V. 404 (art. 133281)	10.1016/j.conbuildmat.2023.133281	WoS AND Scopus	7.4	Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Prieto, A.J.; Torres- González, M.; Carpio, M.	Virtual web-based instruments in the evaluation of functional degradation of heritage timber buildings	Building Research and Information		10.1080/09613218.2023.2214826	WoS AND Scopus	3.9	Q1	Q2
Proença, J.M.; Ferreira, R.; Gago, A.S.	Seismic Retrofit of Pilotis Buildings by Novel Aluminium Buckling-Restrained Braces (AI-BRBs). Application to a Modernist Architecture Building in Lisbon	International Journal of Architectural Heritage		10.1080/15583058.2023.2204821	WoS AND Scopus		Q1	Q3
Proenca, JM; Calado, L; Kanyilmaz, A	Dissipative Replaceable Bracing Connections (DRBrC) for earthquake protection of steel and composite structures	Steel and Composite Structures	V. 46, n.º 2(237- 252)	10.12989/scs.2023.46.2.237	WoS AND Scopus		Q1	Q1
Quaranta, E.; Ramos, H.M.; Stein, U.	Digitalisation of the European Water Sector to Foster the Green and Digital Transitions	Water (Switzerland)	V. 15, n.º 15 (art. 2785)	10.3390/w15152785	WoS AND Scopus	3.4	Q2	Q2
Quintero, J.; Gomes, R.C.; Rios, S.; Ferreira, C.; Viana da Fonseca, A.	Liquefaction assessment based on numerical simulations and simplified methods: A deep soil deposit case study in the Greater Lisbon	Soil Dynamics and Earthquake Engineering	V. 169 (art. 107866)	10.1016/j.soildyn.2023.107866	WoS AND Scopus		Q1	Q2
Rafeiro, J.; Tomé, A.	Finding the Lost 16th-Century Monastery of Madre de Deus: A Pedagogical Approach to Virtual Reconstruction Research	Heritage	V. 6, n.º 9(6213- 6239	10.3390/heritage6090326	WoS AND Scopus		Q1	
Ramos, A.P.; Isufi, B.; Marreiros, R.; Coronelli, D.; Netti,	Seismic Performance of Strengthened Slab-Column	Journal of Earthquake Engineering	V. 27, n.º 9(2299- 2318	10.1080/13632469.2022.2112320	WoS AND Scopus		Q1	Q2







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
T.; Lamperti Tornaghi, M.; Tsionis, G.; Muttoni, A.	Connections in a Full-Scale Test							
Ramos, H.M.; Coronado- Hernández, O.E.; Morgado, P.A.; Simão, M.	Mathematic Modelling of a Reversible Hydropower System: Dynamic Effects in Turbine Mode	Water (Switzerland)	V. 15, n.º 11 (art. 2034)	10.3390/w15112034	WoS AND Scopus	3.4	Q2	Q2
Ramos, H.M.; Giralt, L.; López-Jiménez, P.A.; Pérez- Sánchez, M.	Water-energy nexus management strategy towards sustainable mobility goal in smart cities	Urban Water Journal	V. 20, n.º 10(1406- 1417	10.1080/1573062X.2021.1973041	WoS AND Scopus		Q2	Q2
Ramos, H.M.; Kuriqi, A.; Besharat, M.; Creaco, E.; Tasca, E.; Coronado- Hernández, O.E.; Pienika, R.; Iglesias- Rey, P.	Smart Water Grids and Digital Twin for the Management of System Efficiency in Water Distribution Networks	Water (Switzerland)	V. 15, n.º 6 (art. 1129)	10.3390/w15061129	WoS AND Scopus	3.4	Q2	Q2
Ramos, H.M.; Kuriqi, A.; Coronado- Hernández, O.E.; López-Jiménez, P.A.; Pérez- Sánchez, M.	Are digital twins improving urban-water systems efficiency and sustainable development goals?	Urban Water Journal		10.1080/1573062X.2023.2180396	WoS AND Scopus		Q2	Q2
Ramos, H.M.; Morani, M.C.; Pugliese, F.; Fecarotta, O.	Integrated Smart Management in WDN: Methodology and Application	Water (Switzerland)	V. 15, n.º 6 (art. 1217)	10.3390/w15061217	WoS AND Scopus	3.4	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Ramulu, C.; Pateriya, R.N.; Naik, M.A.; Vishwakarma, D.K.; Kuriqi, A.; Al- Ansari, N.; Alataway, A.; Dewidar, A.Z.; Mattar, M.A.	A residue management machine for chopping paddy residues in combine harvested paddy field	Scientific Reports	V. 13, n.º 1 (art. 5077)	10.1038/s41598-023-32148-9	WoS AND Scopus		Q1	Q2
Ranesi, A.; Faria, P.; Freire, M.T.; Gonçalves, M.; Rosário Veiga, M.	Gypsum plastering mortars with Acacia dealbata biowaste additions: Effect of different fractions and contents on the relative humidity dependent properties	Construction and Building Materials	V. 404 (art. 133283)	10.1016/j.conbuildmat.2023.133283	WoS AND Scopus	7.4	Q1	Q1
Reis, A.F.; Baptista, P.; Moura, F.	How to promote the environmental sustainability of shared e-scooters: A life-cycle analysis based on a case study from Lisbon, Portugal,	Journal of Urban Mobility	V. 3 (art. 100044)	10.1016/j.urbmob.2022.100044	WoS AND Scopus			
Ren, Q.; Pacheco, J.; de Brito, J.	Calibration of wall effects in mesostructure modelling of concrete using marker- controlled watershed segmentation	Construction and Building Materials	V. 398 (art. 132505)	10.1016/j.conbuildmat.2023.132505	WoS AND Scopus	7.4	Q1	Q1
Ren, Q.; Pacheco, J.; de Brito, J.	Methods for the modelling of concrete mesostructures: a critical review	Construction and Building Materials	V. 408 (art. 133570)	10.1016/j.conbuildmat.2023.133570	WoS AND Scopus	7.4	Q1	Q1
Ren, Q.; Pacheco, J.; de Brito, J.	New generation and separation method for the computational modelling of the mesostructure of concrete	Engineering Fracture Mechanics	V. 284 (art. 109212)	10.1016/j.engfracmech.2023.109212	WoS AND Scopus		Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Requena-Garcia- Cruz, M.V.; Cattari, S.; Bento, R.; Morales-Esteban, A.	Comparative study of alternative equivalent frame approaches for the seismic assessment of masonry buildings in OpenSees	Journal of Building Engineering	V. 66 (art. 105877)	10.1016/j.jobe.2023.105877	WoS AND Scopus	6.4	Q1	Q1
Restelli, F.; Koelemeijer, P.; Ferreira, A.M.G.	Normal mode observability of radial anisotropy in the Earth's mantle	Geophysical Journal International	V. 233, n.º 1(663- 679	10.1093/gji/ggac474	WoS AND Scopus	2.8	Q1	Q2
Rezvani, S.M.H.S.; de Almeida, N.M.; Falcão, M.J.	Climate Adaptation Measures for Enhancing Urban Resilience	Buildings	V. 13, n.º 9 (art. 2163)	10.3390/buildings13092163	WoS AND Scopus	3.8	Q2	Q2
Rezvani, S.M.H.S.; Falcão, M.J.; Komljenovic, D.; de Almeida, N.M.	A Systematic Literature Review on Urban Resilience Enabled with Asset and Disaster Risk Management Approaches and GIS-Based Decision Support Tools	Applied Sciences (Switzerland)	V. 13, n.º 4 (art. 2223)	10.3390/app13042223	WoS AND Scopus	2.838	Q2	Q2
Ribeiro, C.; Pereira, P.F.; Ramos, N.M.M.; Flores- Colen, I.; Valentim, N.	Assessment of the impacts of balconies on indoor environmental quality in mild climate conditions, Portugal	Building Research and Information		10.1080/09613218.2023.2229451	WoS AND Scopus	3.9	Q1	Q2
Ribeiro, G.; Almeida, J.; Lobo, P.S.	Conceptual design of transfer structures	Structural Concrete	V. 24, n.º 1(1070- 1082	10.1002/suco.202200448	WoS AND Scopus		Q1	Q2
Ribeiro, T.; Freire, A.C.; Sá-da-Costa, M.; Canejo, J.; Cordeiro, V.; Micaelo, R.	Investigating Asphalt Self- Healing with Colorless Binder and Pigmented Rejuvenator	Sustainability (Switzerland)	V. 15, n.º 5 (art. 4556)	10.3390/su15054556	WoS AND Scopus	3.9	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Robalo, A.; Brandão, J.; Shibata, T.; Solo- Gabriele, H.; Santos, R.; Monteiro, S.	Detection of enteric viruses and SARS-CoV-2 in beach sand	Science of the Total Environment	V. 901 (art. 165836)	10.1016/j.scitotenv.2023.165836	WoS AND Scopus		Q1	Q1
Robalo, K.; Costa, H.; Carmo, R.; Júlio, E.	Development and Characterization of Eco- Efficient Ultra-High Durability Concrete	Sustainability (Switzerland)	V. 15, n.º 3 (art. 2381)	10.3390/su15032381	WoS AND Scopus	3.9	Q2	Q2
Roberto da Silva, S.; de Brito, J.; Andrade, J.J.D.O.	Synergic effect of recycled aggregate, fly ash, and hydrated lime in concrete production	Journal of Building Engineering	V. 70 (art. 106370)	10.1016/j.jobe.2023.106370	WoS AND Scopus	6.4	Q1	Q1
Rocha, B.T.; Melo, P.C.; Afonso, N.; Abreu e Silva, J.	The local impacts of building a large motorway network: Urban growth, suburbanisation, and agglomeration	Economics of Transportation	V. 34 (art. 100302)	10.1016/j.ecotra.2023.100302	WoS AND Scopus	2.8	Q2	Q2
Rocha, B.T.; Melo, P.C.; Afonso, N.; de Abreu e Silva, J.	Motorways, local economic activity and commuting	Regional Studies	V. 58, n.º 1(164- 177)	10.1080/00343404.2023.2187768	WoS AND Scopus		Q1	Q1
Rodrigues da Silva, A.; Estima, J.; Marques, J.; Gamito, I.; Serra, A.; Moura, L.; Ricardo, A.M.; Mendes, L.; Ferreira, R.M.L.	A Web GIS Platform to Modeling, Simulate and Analyze Flood Events: The RiverCure Portal	ISPRS International Journal of Geo- Information	V. 12, n.º 7 (art. 268)	10.3390/ijgi12070268	WoS AND Scopus		Q1	Q3





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Rodrigues, P.; Teixeira, P.F.	Modelling tamping effectiveness for track geometry longitudinal levelling defects	Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit		10.1177/09544097231219827	WoS AND Scopus		Q2	Q3
Romero-Gómez, M.I.; Costa-Pereira, M.F.; Soares Dias, A.P.; Flores-Colen, I.	Influence of high-temperature exposure on the properties of gypsum-plastic waste composites: Thermophysical and microstructural analysis	Journal of Building Engineering	V. 79 (art. 107862)	10.1016/j.jobe.2023.107862	WoS AND Scopus	6.4	Q1	Q1
Romero-Gómez, M.I.; Silva, R.V.; de Brito, J.; Flores- Colen, I.	Prototype of alveolar gypsum blocks with plastic waste addition for partition walls: Physico-mechanical, water- resistance and life cycle assessment	Journal of Cleaner Production	V. 432 (art. 139810)	10.1016/j.jclepro.2023.139810	WoS AND Scopus		Q1	Q1
Romero-Gómez, M.I.; Silva, R.V.; Flores-Colen, I.; de Brito, J.	Physico-mechanical properties of plastic waste-containing gypsum composites exposed to elevated temperature	Construction and Building Materials	V. 398 (art. 132530)	10.1016/j.conbuildmat.2023.132530	WoS AND Scopus	7.4	Q1	Q1
Romero-Gómez, M.I.; Silva, R.V.; Flores-Colen, I.; Rubio-de-Hita, P.	Mechanical performance of waste fishing net fibre- reinforced gypsum composites	Construction and Building Materials	V. 387 (art. 131675)	10.1016/j.conbuildmat.2023.131675	WoS AND Scopus	7.4	Q1	Q1
Romero-Sánchez, E.; Morales- Esteban, A.; Bento, R.; Navarro-Casas, J.	Numerical modelling for the seismic assessment of complex masonry heritage buildings: the case study of the Giralda tower	Bulletin of Earthquake Engineering	V. 21, n.º 9(4669- 4701	10.1007/s10518-023-01714-x	WoS AND Scopus		Q1	Q1





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Roque, D.; Falcão, A.P.; Perissin, D.; Amado, C.; Lemos, J.V.; Fonseca, A.	SARClust—A New Tool to Analyze InSAR Displacement Time Series for Structure Monitoring	Sustainability (Switzerland)	V. 15, n.º 4 (art. 3728)	10.3390/su15043728	WoS AND Scopus	3.9	Q2	Q2
Rosa, I.C.; Firmo, J.P.; Correia, J.R.; Bisby, L.A.	Fire Behavior of GFRP- Reinforced Concrete Structural Members: A State-Of-The-Art Review	Journal of Composites for Construction	V. 27, n.º 5 (art. 3123002)	10.1061/JCCOF2.CCENG-4268	WoS AND Scopus		Q1	Q2
Ruviaro, A.S.; dos Santos Lima, G.T.; Silvestro, L.; Barraza, M.T.; Rocha, J.C.; de Brito, J.; Gleize, P.J.P.; Pelisser, F.	Characterization and investigation of the use of oat husk ash as supplementary cementitious material as partial replacement of Portland cement: Analysis of fresh and hardened properties and environmental assessment	Construction and Building Materials	V. 363 (art. 129762)	10.1016/j.conbuildmat.2022.129762	WoS AND Scopus	7.4	Q1	Q1
Sampaio, A.Z.; Azevedo, G.; Gomes, A.	BIM Manager Role in the Integration and Coordination of Construction Projects	Buildings	V. 13, n.º 8 (art. 2101)	10.3390/buildings13082101	WoS AND Scopus	3.8	Q2	Q2
Sampaio, A.Z.; Sequeira, P.; Gomes, A.M.; Sanchez-Lite, A.	BIM Methodology in Structural Design: A Practical Case of Collaboration, Coordination, and Integration	Buildings	V. 13, n.º1 (art. 31)	10.3390/buildings13010031	WoS AND Scopus	3.8	Q2	Q2
Sampaio, A.Z.; Tomé, J.; Gomes, A.M.	Heritage Building Information Modelling Implementation First Steps Applied in a Castle Building: Historic Evolution Identity, Data Collection and Stratigraphic Modelling	Heritage	V. 6, n.º 10(6472- 6493	10.3390/heritage6100338	WoS AND Scopus		Q1	





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Santos F. A.	Toward a Novel Energy- Dissipation Metamaterial with Tensegrity Architecture	Advanced Materials	V. 35, n.º 26 (art. 2300639)	10.1002/adma.202300639	WoS AND Scopus		Q1	Q1
Santos, B.; Gonçalves, J.; Almeida, P.G.; Martins- Nepomuceno, A.M.T.	GIS-based inventory for safeguarding and promoting Portuguese glazed tiles cultural heritage	Heritage Science	V. 11, n.º 1 (art. 133)	10.1186/s40494-023-00976-7	WoS AND Scopus		Q1	Q3
Santos, F.	On the dynamic response of a building model equipped with multiple curved-surface sliders	Mechanics Research Communications	V. 128 (art. 104058)	10.1016/j.mechrescom.2023.104058	WoS AND Scopus		Q2	Q3
Santos, J.F.; Tadic, L.; Portela, M.M.; Espinosa, L.A.; Brlekovic, T.	Drought Characterization in Croatia Using E-OBS Gridded Data	Water (Switzerland)	V. 15, n.º 21 (art. 3806)	10.3390/w15213806	WoS AND Scopus	3.4	Q2	Q2
Santos, LF; Cardoso, MA; Galvao, AF	Storm water systems' performance: assessment framework application to Portuguese water utilities	INTERNATIONAL JOURNAL OF WATER RESOURCES DEVELOPMENT	V. 39, n.º 3(459-484	10.1080/07900627.2021.2004882	WoS AND Scopus		Q1	
Santos, M.F.; Castro, C.P.; Matos, R.V.; Alves, L.; Matos, J.S.	Dry Sanitation Technologies: Developing a Simplified Multi- Criteria Decision Analysis Tool	Sustainability (Switzerland)	V. 15, n.º 19 (art. 14155)	10.3390/su151914155	WoS AND Scopus	3.9	Q2	Q2
Santos, ML; Silva, CM; Ferreira, F; Matos, JS	Hydrological Analysis of Green Roofs Performance under a Mediterranean Climate: A Case Study in Lisbon, Portugal	Sustainability (Switzerland)	V. 15, n.º 2 (art. 1064)	10.3390/su15021064	WoS AND Scopus	3.9	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Santos, R.M.B.; Boavida, I.; Cortes, R.M.V.; Pacheco, F.A.L.; Sanches Fernandes, L.F.; Monteiro, S.M.; Jesus, J.B.	Effect of river restoration on spawning activity of Iberian barbel (Luciobarbus bocagei)	Journal for Nature Conservation	V. 76 (art. 126488)	10.1016/j.jnc.2023.126488	WoS AND Scopus		Q2	Q2
Schlaphorst, D.; Silveira, G.; Mata, J.; Krüger, F.; Dahm, T.; Ferreira, A.M.G.	Heterogeneous seismic anisotropy beneath Madeira and Canary archipelagos revealed by local and teleseismic shear wave splitting	Geophysical Journal International	V. 233, n.º 1(510- 528)	10.1093/gji/ggac472	WoS AND Scopus	2.8	Q1	Q2
Sena da Fonseca, B.; Ferreira Pinto, A.P.; Rucha, M.; Alves, M.M.; Montemor, M.F.	Damaging effects of salt crystallization on a porous limestone after consolidation treatments	Construction and Building Materials	V. 374 (art. 130967)	10.1016/j.conbuildmat.2023.130967	WoS AND Scopus	7.4	Q1	Q1
Senes, G.P.; Barboza, L.G.A.; Nunes, L.M.; Otero, X.L.	Microplastics in feces and pellets from yellow-legged gull (Larus michahellis) in the Atlantic Islands National Park of Galicia (NW Spain)	Marine Pollution Bulletin	V. 195 (art. 115531)	10.1016/j.marpolbul.2023.115531	WoS AND Scopus		Q1	
Sequeira, L.; Cantero, B.; Bravo, M.; de Brito, J.; Medina, C.	The Influence of Recycled Cement, Fly Ash, and Magnesium Oxide on the Mechanical Performance of Sustainable Cementitious Materials	Materials	V. 16, n.º 7 (art. 2760)	10.3390/ma16072760	WoS AND Scopus	3.4	Q2	Q2
Sequeira, L.; Forero, J.; Bravo, M.;	Durability of Concrete with Partial Replacement of Portland Cement by	Materials	V. 16, n.º 7 (art. 2670)	10.3390/ma16072670	WoS AND Scopus	3.4	Q2	Q2







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Evangelista, L.; de Brito, J.	Incorporating Reactive Magnesium Oxide and Fly Ash							
Shahid, A.T.; Hofmann, M.; Garrido, M.; Correia, J.R.; Rosa, I.C.	Freeze-Thaw Durability of Basalt Fibre Reinforced Bio- Based Unsaturated Polyester Composite	Materials	V. 16, n.º 15 (art. 5411)	10.3390/ma16155411	WoS AND Scopus	3.4	Q2	Q2
Shen, J.; Arruda, M.R.T.; Pagani, A.	Concrete damage analysis based on higher-order beam theories usingfracture energy regularization	Mechanics of Advanced Materials and Structures	V. 30, n.º 22(4582- 4596	10.1080/15376494.2022.2098430	WoS AND Scopus		Q2	Q3
Sierra-Sánchez, A.; Coronado- Hernández, Ó.E.; Paternina-Verona, D.A.; Gatica, G.; Ramos, H.M.	Statistical Analysis to Quantify the Impact of Map Type on Estimating Peak Discharge in Non-Instrumented Basins	Transactions on Energy Systems and Engineering Applications	V. 4, n.º 2 (art. 522)	10.32397/tesea.vol4.n2.522	Non WoS; Scopus			
Silva Lobo, P.; Jesus, M.; Freitas, P.S.A.	Prediction of the failure strain of FRP sheets on confined concrete columns with circular cross-section	International Journal of Structural Integrity	V. 14, n.º 1(19-43)	10.1108/IJSI-03-2022-0045	WoS AND Scopus	2.7	Q3	Q2
Silva, A.R.; Mesquita, D.P.; Salomé Duarte, M.; Lado Ribeiro, A.R.; Pereira, M.F.R.; Madalena Alves, M.; Monteiro, S.; Santos, R.; Cunha, M.V.; Jorge, S.; Vieira, J.; Vilaça, J.; Lopes, L.C.;	Exploring the correlations between epi indicators of COVID-19 and the concentration of pharmaceutical compounds in wastewater treatment plants in Northern Portugal	Journal of Hazardous Materials Advances	V. 10 (art. 100315)	10.1016/j.hazadv.2023.100315	Non WoS; Scopus			





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Carvalho, M.; Brito, C.; Martins, A.; Pereira, L.								
Silva, B.A.; Ferreira Pinto, A.P.; Gomes, A.; Candeias, A.	Influence of Water Content and Mixing Conditions on the Properties of Lime-Based Materials	Buildings	V. 13, n.º 6 (art. 1530)	10.3390/buildings13061530	WoS AND Scopus	3.8	Q2	Q2
Silva, C.M.M.D.A.E.; Pereira, M.M.L.; Capuzzo, V.M.S.; de Brito, J.	Concrete produced with recycled concrete aggregate exposed to treatment methods	Case Studies in Construction Materials	V. 18 (art. e01938)	10.1016/j.cscm.2023.e01938	WoS AND Scopus		Q1	Q1
Silva, HE; Henriques, FMA	Energy Efficiency in Historic Museums: The Interplay between Thermal Rehabilitation, Climate Control Strategies and Regional Climates	Applied Sciences (Switzerland)	V. 13, n.º 23(art. 12732)	10.3390/app132312732	WoS AND Scopus	2.838	Q2	Q2
Silva, V.; Taherian, A.; Oliveira, C.S.	Earthquake early warning for Portugal: part 2 – where is it beneficial?	Bulletin of Earthquake Engineering	V. 21, n.º 9(4091- 4109	10.1007/s10518-023-01715-w	WoS AND Scopus		Q1	Q1
Silva, W.; Picado- Santos, L.; Barroso, S.; Cabral, A.E.; Stefanutti, R.	Assessment of Interlocking Concrete Block Pavement with By-Products and Comparison with an Asphalt Pavement: A Review	Applied Sciences (Switzerland)	V. 13, n.º 10 (art. 5846)	10.3390/app13105846	WoS AND Scopus	2.838	Q2	Q2
Silva, W.B.C.; Barroso, S.H.A.; Cabral, A.E.B.; Stefanutti, R.; Picado-Santos, L.G.	Assessment of concrete road paving blocks with coal bottom ash: Physical and mechanical characterization	Case Studies in Construction Materials	V. 18 (art. e02094)	10.1016/j.cscm.2023.e02094	WoS AND Scopus		Q1	Q1







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Silvestre, H.C.; Marques, R.C.; Dollery, B.; Correia, A.M.	An institutional and transaction cost analysis for the efficiency of water service in Brazilian local government consortia	Local Government Studies		10.1080/03003930.2023.2234302	Non WoS; Scopus		Q1	
Simão, P.D.; Rodrigues, J.P.C.	Direct evaluation of fire resistance for restrained steel columns in frames using consistent rigid-plastic models and energy formulations	Engineering Structures	V. 276 (art. 115344)	10.1016/j.engstruct.2022.115344	WoS AND Scopus		Q1	Q1
Simão, P.D.; Rodrigues, J.P.C.; Fernandes, H.D.	A voxels-based Rayleigh-Ritz method for the post-buckling elasto-plastic analysis of restrained steel columns in fire	Journal of Constructional Steel Research	V. 201 (art. 107736)	10.1016/j.jcsr.2022.107736	WoS AND Scopus		Q1	Q2
Simões, N.; Moghaddam, S.A.; da Silva, M.G.	Review of the Experimental Methods for Evaluation of Windows' Thermal Transmittance: From Standardized Tests to New Possibilities	Buildings	V. 13, n.º 3 (art. 703)	10.3390/buildings13030703	WoS AND Scopus	3.8	Q2	Q2
Singh, S.; Kumar, D.; Kumar, A.; Kuriqi, A.	Entropy-based assessment of climate dynamics with varying elevations for hilly areas of Uttarakhand, India	Sustainable Water Resources Management	V. 9, n.º 4 (art. 130)	10.1007/s40899-023-00914-2	WoS AND Scopus		Q3	
Singh, S.K.; Vishwakarma, D.K.; Ali Abed, S.; Al- Ansari, N.; Kashyap, P.S.; Kumar, A.; Kumar, P.; Kumar, R.; Jat, R.; Saraswat, A.; Kuriqi,	Soil erosion control from trash residues at varying land slopes under simulated rainfall conditions	Mathematical Biosciences and Engineering	V. 20, n.º 6(11403- 11428)	10.3934/mbe.2023506	WoS AND Scopus		Q3	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
A.; Elbeltagi, A.; Heddam, S.; Kim, S.								
Soares, A.C.M.; Costa, H.; do Carmo, R.; Rodrigues, A.; Gaspar, F.; Júlio, E.	Comprehensive design methodology for 3D printing mortars	Construction and Building Materials	V. 401 (art. 132804)	10.1016/j.conbuildmat.2023.132804	WoS AND Scopus	7.4	Q1	Q1
Soares, K.; Torres, I.; Flores-Colen, I.; Silveira, D.	The Influence of Traditional Substrates on the Behaviour of Lime Mortars	International Journal of Architectural Heritage		10.1080/15583058.2023.2286503	WoS AND Scopus		Q1	Q3
Sobrinho, J.; de Pablo, H.; Pinto, L.; Neves, R.	Upscaling local domains in regional domains: An offline nudging approach	Environmental Modelling and Software	V. 161 (art. 105626)	10.1016/j.envsoft.2023.105626	Non WoS; Scopus		Q1	
Sousa, J.H.; Gomes, M.G.; da Silva, F.M.; Tomé, A.	Systematization of spatial functional layouts and pedestrian wind comfort assessment for an ultra-thin triangular free form shell structure	Building and Environment	V. 246 (art. 110951)	10.1016/j.buildenv.2023.110951	WoS AND Scopus		Q1	Q1
Sousa, V.; Bogas, J.A.; Real, S.; Meireles, I.	Industrial production of recycled cement: energy consumption and carbon dioxide emission estimation	Environmental Science and Pollution Research	V. 30, n.º 4(8778- 8789)	10.1007/s11356-022-20887-7	WoS AND Scopus		Q1	Q1
Sousa, V.; Bogas, J.A.; Real, S.; Meireles, I.; Carriço, A.	Recycled cement production energy consumption optimization	Sustainable Chemistry and Pharmacy	V. 32 (art. 101010)	10.1016/j.scp.2023.101010	WoS AND Scopus		Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Sousa, V.; Drumond, A.; Meireles, I.	Fuel consumption rate and emissions variability in waste collectionservices routes: case study of Cascais Ambiente	Environmental Science and Pollution Research		10.1007/s11356-023-29045-z	WoS AND Scopus		Q1	Q1
Sousa, V.; Meireles, I.	Quality and asset management: conceptual compatibility towards sustainable infrastructures management	Total Quality Management and Business Excellence	V. 34, n.º 05/jun(743-767)	10.1080/14783363.2022.2105201	WoS AND Scopus		Q1	Q3
Standen, K.; Costa, L.; Hugman, R.; Monteiro, J.P.	Integration of Managed Aquifer Recharge into the Water Supply System in the Algarve Region, Portugal	Water (Switzerland)	V. 15, n.º 12 (art. 2286)	10.3390/w15122286	WoS AND Scopus	3.4	Q2	Q2
Stojnic, I.; Pfister, M.; Matos, J.; Schleiss, A.J.	Air–water flow in a plain stilling basin below smooth and stepped chutes	Journal of Hydraulic Research	V. 61, n.º 1(51-66)	10.1080/00221686.2022.2106593	WoS AND Scopus		Q1	Q3
Sturgeon, W.; Ferreira, A.M.G.; Schardong, L.; Marignier, A.	Crustal Structure of the Western U.S. From Rayleigh and Love Wave Amplification Data	Journal of Geophysical Research: Solid Earth	V. 128, n.º 8 (art. e2022JB026148)	10.1029/2022JB026148	WoS AND Scopus	3.9	Q1	Q1
Tasca, E.; Besharat, M.; Ramos, H.M.; Luvizotto, E., Jr.; Karney, B.	Contribution of Air Management to the Energy Efficiency of Water Pipelines	Sustainability (Switzerland)	V. 15, n.º 5 (art. 3875)	10.3390/su15053875	WoS AND Scopus	3.9	Q2	Q2
Tasca, E.; Besharat, M.; Ramos, H.M.; Luvizotto, E., Jr.; Karney, B.	Exploring the Sensitivity of the Transient Response following Power Failure to Air Valve and Pipeline Characteristics	Water (Switzerland)	V. 15, n.º 19 (art. 3476)	10.3390/w15193476	WoS AND Scopus	3.4	Q2	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Teotónio,I.; Oliveira Cruz, C.; Matos Silva, C.; Lopes, R.F.R.	Bridging CBA and MCA for evaluating green infrastructure: Proposal of a new evaluation model (MAGICA)	Socio-Economic Planning Sciences	V. 85 (art. 101446)	10.1016/j.seps.2022.101446	WoS AND Scopus	4.641	Q1	Q1
Tomczyk, P.; Mastalerek, K.; Wiatkowski, M.; Kuriqi, A.; Jurasz, J.	Assessment of a Francis Micro Hydro Turbine Performance Installed in a Wastewater Treatment Plant	Energies	V. 16, n.º 20 (art. 7214)	10.3390/en16207214	WoS AND Scopus		Q2	Q3
Torres-Gonzáles, M.; Valença, J.; Santos, B.O.; Silva, A.; Mendes, M.P.	Stain View: A Fast and Reliable Method for Mapping Stains in Facades Using Image Classification in HSV and CIELab Colour Space	Remote Sensing	V. 15, n.º 11 (art. 2895)	10.3390/rs15112895	WoS AND Scopus		Q1	Q2
Torres-González, M.; Blasco-López, F.J.; Alejandre Sánchez, F.J.; Aducin-Ochoa, J.M.; Moya-Fierro, M.	Conservation and Preservation of Historic Plasterwork: The Study of Decorative Pineapples of the Royal Alcazar of Seville	International Journal of Architectural Heritage		10.1080/15583058.2023.2231395	WoS AND Scopus		Q1	Q3
Torres-González, M.; Freire, M.T.; Alejandre, F.J.; Blasco-López, F.J.; Silva, A.	Degradation Model Applied to the Plasterwork of the Palace of Pedro I (Royal Alcazar of Seville)	Buildings	V. 13, n.º 1 (art. 121)	10.3390/buildings13010121	WoS AND Scopus	3.8	Q2	Q2
Torres-González, M.; Martín-Del-Rio, J.J.; Alejandre- Sánchez, F.J.; León Muñoz, M.; Bienvenido-Huertas, D.; Macías Bernal, J.M.	Guidelines for Conservation and Restoration of Historic Polychrome Plasterwork: the Church of St María la Blanca in Seville, Spain	Studies in Conservation	V. 68, n.º 5(529- 547)	10.1080/00393630.2022.2072096	WoS AND Scopus		Q1	Q4







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Torres-González, M.; Revuelta, E.C.; Calero-Castillo, A.I.	Photogrammetric state of degradation assessment of decorative claddings: the plasterwork of the Maidens' Courtyard (The Royal Alcazar of Seville); [Evaluación fotogramétrica del estado de degradación de revestimientos decorativos: las yeserias del Patio de las Doncellas (El Real Alcázar de Sevilla)]	Virtual Archaeology Review	V. 14, n.º 28(110- 123)	10.4995/var.2023.18647	Non WoS; Scopus		Q1	
Travincas, R.; Pereira, M.F.C.; Torres, I.; Maurício, A.; Silveira, D.; Flores-Colen, I.	X-ray microtomography applied to mortars: Review of microstructural visualization and parameterization	Micron	V. 164 (art. 103375)	10.1016/j.micron.2022.103375	WoS AND Scopus		Q2	Q2
Travincas, R.; Torres, I.; Flores- Colen, I.; Francisco, M.; Bellei, P.	The influence of the substrate type on the performance of an industrial cement mortar for general use	Journal of Building Engineering	V. 73 (art. 106784)	10.1016/j.jobe.2023.106784	WoS AND Scopus	6.4	Q1	Q1
Trichês Lucchesi, S.; de Abreu e Silva, J.; Larranaga, A.M.; Cybis, H.B.B.	Walkability premium: evidence for low-income communities	International Journal of Sustainable Transportation	V. 17, n.º 7(727- 739)	10.1080/15568318.2022.2090036	WoS AND Scopus		Q2	Q3
Vahedi, N.; Correia, J.R.; Vassilopoulos, A.P.; Keller, T.	Effects of core air gaps and steel inserts on thermomechanical response of GFRP-balsa sandwich panels subjected to fire	Composite Structures	V. 313 (art. 116924)	10.1016/j.compstruct.2023.116924	WoS AND Scopus		Q1	Q1
Valença, G.; Moura, F.; Morais de Sá, A.	Exploring criteria for reallocating road space	Journal of Urban Design		10.1080/13574809.2023.2240245	WoS AND Scopus		Q1	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
	dynamically: lessons from a workshop with experts							
Valença, G.; Moura, F.; Morais de Sá, A.	How can we develop road space allocation solutions for smart cities using emerging information technologies? A review using text mining	International Journal of Information Management Data Insights	V. 3, n.º 1 (art. 100150)	10.1016/j.jjimei.2022.100150	Non WoS; Scopus		Q1	
Valença, G.; Moura, F.; Morais de Sá, A.	Where is it complex to reallocate road space?	Environment and Planning B: Urban Analytics and City Science		10.1177/23998083231217770	WoS AND Scopus		Q1	Q2
Valença, J.; Ferreira, C.; Araújo, A.G.; Júlio, E.	An Image-Based Framework for Measuring the Prestress Level in CFRP Laminates: Experimental Validation	Materials	V. 16, n.º 5 (art. 1813)	10.3390/ma16051813	WoS AND Scopus	3.4	Q2	Q2
Valente Monteiro, A.; Gonçalves, A.; Balayssac, JP.; Yssorche- Cubaynes, MP.; Costa, A.	On the role of compaction in disputes over the quality of the supplied concrete	Materials and Structures/Materiaux et Constructions	V. 56, n.º 3 (art. 60)	10.1617/s11527-023-02148-2	WoS AND Scopus		Q1	Q2
Vallée, T.; Kaufmann, M.; Adams, R.D.; Albiez, M.; Correia, J.R.; Tannert, T.	Are probabilistic methods a way to get rid of fudge factors? Part II: Application and examples	International Journal of Adhesion and Adhesives	V. 124 (art. 103364)	10.1016/j.ijadhadh.2023.103364	WoS AND Scopus		Q1	Q2
Van Camp, M.; De Viron, O.; Ferreira, A.M.G.; Verhoeven, O.	A naive Bayesian method to chase mantleplumes in global tomography models	Geophysical Journal International	V. 232, n.º 3(1821- 1832)	10.1093/gji/ggac415	WoS AND Scopus	2.8	Q1	Q2







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Veiga, R.; Faria, P.; van Hees, R.; Stefanidou, M.; Maravelaki, PN.; Papayianni, I.; Ioannou, I.; Theodoridou, M.; Bokan Bosilijkov, V.; Bicer-Simsir, B.; Tedeschi, C.; Carneiro, A.	RILEM TC 277-LHS report: properties of lime-based renders and plasters— discussion of current test methods and proposals for improvement	Materials and Structures/Materiaux et Constructions	V. 56, n.º 4 (art. 70)	10.1617/s11527-023-02141-9	WoS AND Scopus		Q1	Q2
Ventura, M.; , S. Dias I.; Flores- Colen, I.; Silva, A.	Pathology and proactive maintenance of floor finishes	International Journal of Building Pathology and Adaptation	V. 41, n.º 3(588- 605)	10.1108/IJBPA-11-2021-0158	WoS AND Scopus		Q2	
Viegas, C.A.; Borsoi, G.; Moreira, L.M.; Parracha, J.L.; Nunes, L.; Malanho, S.; Veiga, R.; Flores- Colen, I.	Diversity and distribution of microbial communities on the surface of External Thermal Insulation Composite Systems (ETICS) facades in residential buildings	International Biodeterioration and Biodegradation	V. 184 (art. 105658)	10.1016/j.ibiod.2023.105658	WoS AND Scopus	4.8	Q1	Q2
Vieira, A.; Santos, B.; Picado-Santos, L.	Modelling Road Work Zone Crashes' Nature and Type of Person Involved Using Multinomial Logistic Regression	Sustainability (Switzerland)	V. 15, n.º 3 (art. 2674)	10.3390/su15032674	WoS AND Scopus	3.9	Q2	Q2
Vieira, I.; Ferreira, D.; Pedro, M.I.	The satisfaction of healthcare consumers: analysis and comparison of different methodologies	International Transactions in Operational Research	V. 30, n.º 1(545-571	10.1111/itor.13098	WoS AND Scopus		Q1	





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Vieira, J.; Poças Martins, J.; de Almeida, N.M.; Patrício, H.; Morgado, J.	Reshaping the Digital Twin Construct with Levels of Digital Twinning (LoDT)	Applied System Innovation	V. 6, n.º 6 (art. 114)	10.3390/asi6060114	WoS AND Scopus	3.8	Q2	Q2
Villalba-Barrios, A.F.; Coronado- Hernández, O.E.; Fuertes-Miquel, V.S.; Coronado- Hernández, J.R.; Ramos, H.M.	Statistical Approach for Computing Base Flow Rates in Gaged Rivers and Hydropower Effect Analysis	Hydrology	V. 10, n.º 7 (art. 137)	10.3390/hydrology10070137	WoS AND Scopus		Q2	
Vish wakarma, D.K.; Kumar, R.; Abed, S.A.; Al-Ansari, N.; Kumar, A.; Kush waha, N.L.; Yadav, D.; Kumawat, A.; Kuriqi, A.; Alataway, A.; Dewidar, A.Z.; Mattar, M.A.	Modeling of soil moisture movement and wetting behavior under point-source trickle irrigation	Scientific Reports	V. 13, n.º 1 (art. 14981)	10.1038/s41598-023-41435-4	WoS AND Scopus		Q1	Q2
Vishwakarma, D.K.; Kumar, R.; Tomar, A.S.; Kuriqi, A.	Eco-hydrological modeling of soil wetting pattern dimensions under drip irrigation systems	Heliyon	V. 9, n.º 7 (art. e18078)	10.1016/j.heliyon.2023.e18078	WoS AND Scopus		Q1	Q2
Vishwakarma, D.K.; Kuriqi, A.; Abed, S.A.; Kishore, G.; Al- Ansari, N.; Pandey, K.; Kumar, P.; Kushwaha, N.L.; Jewel, A.	Forecasting of stage-discharge in a non-perennial river using machine learning with gamma test	Heliyon	V. 9, n.º 5 (art. e16290)	10.1016/j.heliyon.2023.e16290	WoS AND Scopus		Q1	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Wang, H.; She, D.; Cardoso, R.	Understanding the Effect of Seasonal Climate Variability on the Salinity in Unsaturated Agricultural Soil	Agronomy	V. 13, n.º 11 (art. 2802)	10.3390/agronomy13112802	WoS AND Scopus	3.7	Q1	Q1
Wani, S.; Selvaraj, T.; Faria, P.; Mehra, A.; Shukla, R.	Study on ancient green materials and technology used in Udaipur palace, India: an input to abate climate changes in modern construction	Environmental Science and Pollution Research	V. 30, n.º 41(93952- 93969)	10.1007/s11356-023-28785-2	WoS AND Scopus		Q1	Q1
Wardeh, M.; Marques, R.C.	Measuring the SDGs in Refugee Camps: An Insight into Arab States Bordering Syria	Sustainability (Switzerland)	V. 15, n.º 2 (art. 1720)	10.3390/su15021720	WoS AND Scopus	3.9	Q2	Q2
Wardeh, M.; Marques, R.C.	Progress on sustainable development goal 6 in refugee camps in the Middle East: a comparative study	Utilities Policy	V. 82 (art. 101575)	10.1016/j.jup.2023.101575	WoS AND Scopus		Q1	Q2
Weggemans, J.; Santos, M.L.; Ferreira, F.; Moreno, G.D.; Matos, J.S.	Modeling the Hydraulic Performance of Pilot Green Roofs Using the Storm Water Management Model: How Important Is Calibration?	Sustainability (Switzerland)	V. 15, n.º 19 (art. 14421)	10.3390/su151914421	WoS AND Scopus	3.9	Q2	Q2
Wu, C.; Ding, Y.; Almeida-Femandes, L.; Gonilha, J.; Silvestre, N.; Correia, J.R.	State-of-the-art review on the web crippling of pultruded GFRP profiles	Thin-Walled Structures	V. 192 (art. 111128)	10.1016/j.tws.2023.111128	WoS AND Scopus	6.4	Q1	Q1
Wu, C; He, XJ; He, L; Zhao, X; Wang, YG; Li, C; Yang, YC; Zhang, XY	Improving cable-stayed bridge longitudinal aseismic capability via fluid viscous damper	STRUCTURES	V. 57 (art. 105199)	10.1016/j.istruc.2023.105199	WoS AND Scopus		Q1	Q2





Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
	parametric optimization and experimental investigation							
Wu, C; He, XJ; Wu, WW; Ji, KM	Low cycle fatigue crack propagation and damage evolution of concrete beams reinforced with GFRP bar	Composite Structures	V. 304 (art. 116312)	10.1016/j.compstruct.2022.116312	WoS AND Scopus		Q1	Q1
Yousefi, M.; Khalili, V.; Gharaei- Moghaddam, N.; de Brito, J.	Evaluating the Mechanical Properties of Fibre-Reinforced Concrete Containing Coconut Palm Leaf Ash as Supplementary Cementitious Material	Iranian Journal of Science and Technology - Transactions of Civil Engineering	V. 47, n.º 2(909-924	10.1007/s40996-022-00967-x	WoS AND Scopus		Q3	Q3
Zacchei, E.; Gorla Nogueira, C.	Numerical solutions for the treatment brine by diffusive and migration flux using new brine-clay-seawater system	Journal of Environmental Management	V. 338 (art. 117844)	10.1016/j.jenvman.2023.117844	WoS AND Scopus		Q2	Q1
Zacchei, E.; Lizarazo-Marriaga, J.; García-Sánchez, F.; Tadeu, A.	Multifactorial Diffusion of Chloride lons in Concrete considering the Non-linear Voltage Distortion of Other Species	Arabian Journal for Science and Engineering	V. 48, n.º 10(14195- 14211)	10.1007/s13369-023-08109-9	WoS AND Scopus	2.9	Q1	Q2
Zacchei, E.; Lyra, P.H.C.	Recalibration of low seismic excitations in Brazil through probabilistic and deterministic analyses: Application for shear buildings structures	Structural Concrete	V. 24, n.º 1(937- 955)	10.1002/suco.202100839	WoS AND Scopus		Q1	Q2
Zacchei, E.; Lyra, P.H.C.; Lage, G.E.; Antonine, E.; Soares, A.B. Jr.;	Structural Health Monitoring and Mathematical Modelling of a Site-Specific Concrete	International Journal of Civil Engineering	V. 21, n.º 3(427- 443)	10.1007/s40999-022-00770-9	WoS AND Scopus	1.7	Q2	Q3







Authors	Title of paper	Journal	Vol, Number (Pages)	DOI	Type of journal	Impact Factor Clar. Analytics (2023)	Quartile Scopus	Quartile WoS
Caruso, N.C.; de Assis, C.S.	Bridge Under Moving Two-Axle Vehicles							
Zacchei, E.; Simões, N.; Vieira, A.; Esteves, M.; Silva, H.	Corrigendum to "Modelling of layers interactions on the structural behaviour of insulating glasses. Vertical deflection analyses" [Case Stud. Constr. Mater. 18 (2023) 2129] (Case Studies in Construction Materials (2023) 18, (S2214509523003091), (10.1016/j.cscm.2023.e02129))	Case Studies in Construction Materials	V. 19 (art. e02473)	10.1016/j.cscm.2023.e02473	WoS AND Scopus		Q1	Q1
Zacchei, E.; Simões, N.; Vieira, A.; Esteves, M.; Silva, H.	Modelling of layers interactions on the structural behaviour of insulating glasses. Vertical deflection analyses	Case Studies in Construction Materials	V. 18 (art. e02129)	10.1016/j.cscm.2023.e02129	WoS AND Scopus		Q1	Q1
Zhao, F.; Hu, J.; Liu, T.; Zhou, T.; Ren, Q.	Study of the Macro and Micro Characteristics of and Their Relationships in Cemented Backfill Based on SEM	Materials	V. 16, n.º 13 (art. 4772)	10.3390/ma16134772	WoS AND Scopus	3.4	Q2	Q2





ANNEX C-RESEARCH GROUP ACTIVITIES IN 2023









RESEARCH GROUP 1 - Hydraulics

RESEARCH GROUP COORDINATOR – António Pinheiro

PART I - RESOURCES

I.1 Budget

BUDGET (euros)							
F	СТ	Other Funding					
STRATEGIC	FCT Projects	Other Research Funding		Consultancy		TOTAL	
Funding		National	International	National	International		
12 806,74	76 034,44	5 389,13	199 010,63	100 725,48	0,00	393 966,42	

I.2 Personnel

PERSONNEL					
	Category	Member	Collaborator		
Name			with PhD	without PhD	
				PhD student	Other
António Heleno Cardoso	Full Professor	x			
António Alberto do Nascimento Pinheiro	Full Professor	х			
António Alexandre Trigo Teixeira	Associate Professor	х			
Dídia Isabel Cameira Covas	Full Professor	×			
Diogo Mendes	Assistant Professor	х			
Helena Margarida Machado da Silva Ramos	Full Professor	х			
Jorge de Saldanha Gonçalves Matos	Associate Professor	х			
Rui Miguel Lage Ferreira	Associate Professor	х			
Maria da Graça Reis e Silva de Oliveira Neves (CERIS-Nova)	Associate Professor		x		



PERSONNEL						
			Collaborator			
Name	Category	Member	with	without PhD		
			PhD PhD student		Other	
Hilda de Pablo	Assistant Professor		x			
António Betâmio de Almeida	Emeritus Professor		х			
Alban Kuriqi	Assistant Researcher	х				
Ana Margarida da Costa Ricardo	Assistant Researcher	х				
Isabel Maria Bento de Matos Boavida	Assistant Researcher	х				
Maria João Ferreira Rodrigues Costa	Assistant Researcher		х			
Marta Sofia Ferreira Cabral	Assistant Researcher		x			
Nuno Miguel da Conceição Martins	Assistant Researcher	х				
Ana Isabel da Rocha e Sá Lopes Quaresma	Assistant Researcher		x			
Filipe Alexandre da Silva Romão	Assistant Researcher		х			
Alejandro Baladron Julian	PhD Student			x		
António M.A.P.R. Muralha	PhD Student			x		
Bruno E. da Silva Ferreira (concluded 2023)	PhD Student			x		
Catarina Isabel Ferreira Simões	PhD Student			x		
Dora Patrícia Valente Salgueiro	PhD Student			x		
Filomena Maietta (concluded 2023)	PhD Student			x		
Francisco Bernardo	PhD Student			x		
James Green	PhD Student			x		
Joana Vaz Baltazar (concluded 2023)	PhD Student			x		
Joana Raquel J. Carneiro	PhD Student			x		
João Cavaleiro Ferreira	PhD Student			x		
João Pedro Gaspar Caetano	PhD Student			x		
Leonardo Zandonadi Moura	PhD Student			x		
Leila Alizadeh	PhD Student			x		
Luís Palma N. Mendes	PhD Student			x		
Pedro Manuel Saraiva Cardoso	PhD Student			x		



PERSONNEL						
	Category	Member	Collaborator			
Name			with	without PhD		
			PhD	PhD student	Other	
Renan S. Leite de Andrade	PhD Student			x		
Ricardo Jorge Lourenço Jónatas	PhD Student			x		
Solange Valente Mendes	PhD Student			x		
Teresa P. A. Alvarez	PhD Student			x		
Steven Andrei Restrepo Velasquez	PhD Student			x		
Ana Pauseiro	scolarship				x	
Guilherme Macara	scolarship				x	
Mariana Azevedo Lopes	scolarship				x	
Prajwal Guruprasad	scolarship				x	
Tiago Correia	scolarship				x	

The summary table is shown below.

Time	Dermenent	Non-pe	Total	
туре	rennanent	Contract	Scholarship	Total
Members	8	4		12
Collaborators with PhD	2	8		10
Collaborators without PhD			26	26
Technical staff	0.5			0.5
Administrative Staff	1			1
Others				0



PART II - DESCRIPTION

Leadership

Professor António Pinheiro has been the Hydraulics Research Group (RG) coordinator since 2014. The coordinator is the group representative in regular meetings with the Executive Board (and with other group coordinators) and official meetings. The coordinator manages the part of the FCT fund allocated to the research group by the Executive Board.

Description of the Research Group

The Hydraulics research group develops R&D activities involving about 58 researchers (12 members, 8 seven permanent staff, and 10 collaborators, including an IST Emeritus Professor and 21 PhD students). Research cuts across several areas like the safety of hydrosystems, assessment, and enhancement of water use and energy efficiency in water supply systems, experimental and numerical modeling of hydraulic circuits and structures, sediment transport, local scour, hydropower and hybrid energy production, ecohydraulics and river rehabilitation and restoration, ocean waves and ocean storm surges, and coastal and port structures protection.

The main research activities have been focused on the following major topics: i) pressurized water systems; ii) fluvial hydraulic structures; iii) river restoration and management; iv) environmental fluid mechanics; v) sediment transport and river morphodynamics; vi) ocean waves, coastal morphodynamics, and port structures.

The most recently published research shows group skills in experimental and numerical research. Recently improved laboratory facilities are expected to foster experimental research programs, which usually have a strong numerical modeling component.

One of the group members (António Cardoso) is the Programme Director of the FCT PhD program on Environmental Hydraulics and Hydrology (H2Doc), and another one (António Pinheiro) is the IST cocoordinator of the FCT PhD program on River Restoration and Management (FLUVIO). This leadership of PhD programs has allowed the group to pursue new research topics.

The researchers of this group have interacted with colleagues in other research areas, namely hydrology, water resources, ecology, pollution control, and sociology. Internationalization is a strong asset of the group, with several researchers serving as editors, associate editors, guest editors, and members of editorial boards of international journals in WoS and Scopus databases.

Most of the seven permanent members also have experience collaborating with the industry in hydraulic structures design and consultancy services, developing different contract studies, or producing expert reports about special issues concerning existing works or works under construction.

General Objectives





The group research objectives include different cross-cutting issues with branches in the four thematic strands of CERIS. However, the group's main activities are focused on the thematic strands of Risk and Safety in Natural and Built Environments (RS) and Rehabilitation of Natural and Built Environments (RNBE). Nevertheless, some contributions are expected to the other two thematic strands.

The safety and design of pressurized pipe systems (RS) and the development of new energy concepts and converters, including pumped storage, hydropower, and water hammer, are crucial for safer and more flexible and reliable solutions to attain the objective of decarbonization of energy production in 2050 (RNBE). The development of digital water (real-time data to provide recommendations to users) and digital twins (combinations of models and real-time data) concepts will be considered to control and assure the system's operationality, namely burst detection, energy efficiency improvement, and hydro-energy recovery on existing infrastructures.

The safety of river structures (RS) is closely connected with studying long-term channel morphology. These phenomena are progressively solved with numerical modeling. Its application to dam-break flows and overland tsunami propagation was considered. Risk management is closely related to these aspects, either in the valleys downstream of dams or to reduce the ecological impacts of the uses of water, like, for instance, hydropower production.

Climate changes or major alterations in the catchment basins advise developing innovative hydraulic structures and circuits. CFD modeling of hydraulic structures and circuits contributes to a better knowledge of the behavior of these hydraulic systems and to the development of measures to reduce accident probability (RS).

Assessing the vulnerability to flooding of the built environments on low-lying estuaries due to extreme ocean storm surges or rising sea levels caused by climate change were also research objectives of this group (RS).

Concerning RNBE, the ecohydraulics line included improving fish passes design guidelines, improving ecological connectivity along regulated rivers, and providing mitigation strategies and shelters for fish downstream of powerhouses with the hydropeaking operation (RS) as the improvement of the river's physical and chemical features. In this scope, studying the transport of sediment, pollutants, and nutrients in rivers and estuaries, the elaboration of guidelines for the rehabilitation of river confluences, and the development of stabilization techniques for river meanders were under concern.

Some of the mentioned R&D objectives included aspects related to the response to natural and societal changes thematic strand. Managing regulated rivers and improving ecological conditions, maintaining river and seashore recreational and economic uses, more and more associated with tourism activities, are major societal challenges. Additionally, within the same line, the social and economic analysis of small dams and weirs removal to improve ecological conditions downstream is a cross-cutting issue that the group is still pursuing.

Group Governance



A simple organizational structure was set up to guarantee the coordination of the members' actions while keeping individual scientific freedom so that each one may continue to promote the initiatives necessary to foster the research activity.

The Directive Board of CERIS appointed the Group Coordinator (Professor António Pinheiro). The Coordinator participated in the meetings promoted by the heads of the four thematic strands and promoted group meetings whenever necessary. When adequate, the meetings are extended to other researchers and external collaborators, such as post-docs and PhD students enrolled in research projects conducted by group members.

The Group Coordinator elaborated, with the contributions of the group members, the annual report and activity plan. The Group Coordinator was also responsible for fostering joint initiatives between group members and trying to boost the collaboration between groups across the thematic strands, supporting cross-cutting R&D projects that the members may be willing to promote.

Facilities

The experimental research of RG1 is supported by several facilities assembled at the Laboratory of Hydraulics and Environment (LHE). This laboratory is located on the IST campus, is shared with other research groups, and is also used for teaching activities. The main facilities installed in the LHE are:

- Didactic flume: It is 5.0 m long, 0.30 m wide, and 0.40 m high, a tilting flume made from acrylic and aluminum. It is equipped with several experimental apparatuses for generating different backwater profiles.
- Blue flume: It's 6.0 m long, 0.395 m wide, and 0.40 m high, a tilting flume made of acrylic and steel. It includes a recirculating water circuit with a frequency-controlled pump.
- Multipurpose free surface hydraulics flume: 8 m long, 0.70 m wide, and 0.80 m high horizontal flume, made of a steel frame and glass side walls, equipped with flap gates immediately up and downstream the flume. This flume is part of the bioterium where we perform experiments with live animal (fish) in compliance with national and EU regulation.
- Wave flume: This is a 20 m long, 0.70 m wide, and 1.00 m high wave channel equipped with a wave generator able to produce regular and irregular waves with frequencies between 0.05 Hz and 1.5 Hz, equipped with resistive probes and a wave absorbing system.
- CRIV recirculating and tilting hydraulics flume: CRIV is a 12.5 m long, 0.41 m wide, and 0.50 m high prismatic glassed walls channel with adjustable slope. It includes a water and sediment recirculation circuit.
- Confluence flume includes the main channel (MC) and a tributary channel (TC). The MC is 10.0 m long, 1.00 m wide, and 0.70 m high. The TC is 4.0 m long, 0.50 m high, and has adjustable width. It is equipped with conveyors for sand feeding and an automated transverse system.



- Pool-type fishway flume: This is a 1/2.5 scaled model of a real fishway. The channel is 5.70 m long, 0.40 m wide, and 0.50 m high; it is a tilting flume made of a steel frame and glass side walls and includes a recirculating water circuit.
- <u>Steep-slopes flume</u>: This is a 3.50 m long, 0.50 m wide, and 0.50 m high steel flume with an adjustable slope up to 26.5%. It includes a recirculating water circuit equipped with a hopper and a conveyor belt for coarse sediment feeding.
- Test-Hydro: Test-Hydro is an innovative pipe rig for testing small-power reaction turbomachines in both transient and steady-state conditions, being fully instrumented and equipped with a stateof-the-art data acquisition system. The rig is a closed reversible circuit composed of steel pipes with diameters between 50 and 200 mm for testing small-power turbomachines. The instrumentation includes sensors for measuring discharge, pressure, torque, electric power, rotational speed, and temperature. A software application has been developed in LabView for acquiring, treating, and analyzing collected data and determining the efficiency of tested turbomachines.
- <u>Water hammer test-rig I</u>: This rig is composed of a copper pipe coil with 103 m and 20 mm diameter, with a centrifugal pump and control valves. It has been developed for measuring transient pressures generated by pump trip-off and valve maneuvers. It is equipped for acquiring high-frequency pressure variations.
- <u>Water hammer test-rig II:</u> This rig is composed of a straight pipe, 15 m long, 20 mm diameter, for measuring transient pressures generated by valve maneuvers. It is equipped for acquiring highfrequency pressure variations.
- <u>Water hammer test-rig III:</u> This rig consists of polyethylene (PE) pipe coils 200 m in length and 50 mm in diameter, with a hydro-pneumatic vessel upstream and valves downstream for analyzing transients generated by valve maneuvers in viscoelastic pipes and pipe with leaks.
- PAT systems: two pumps as turbines (PAT) can be tested isolated or installed in parallel and series. The system is composed of an air vessel, a pipe rig of metal and HDPE and PVC pipe branches, with a flowmeter and transducers installed. In the recirculating, there are also two pumps to operate also in single, parallel, and series modes.
- <u>TP5B Five-blade tubular propeller</u>: TP5B was designed at LH to study the efficiency of microenergy production with a maximum turbine flow of 12 l/s.
- <u>Compressed air volume system (CAV)</u>: this is used to study the behavior of entrapped air during pipe filling and under transient conditions. This system comprises two hydro-pneumatic vessels, one CAV, a pump with a maximum nominal head of 28.2 m and a nominal power of 4 kW, and control valves.
- <u>Energy converter facility</u>, based on centrifugal turbines and wells pumps, and TI-CAES for energy storage induced by hydraulic transient conditions.



- <u>Filling and emptying</u> processes in pipe systems (DN=45 mm) with air values or orifices in the higher point of the pipe profile for the upsurge control.
- <u>A small-scale model of water storage tanks with two cross-sections (circular and rectangular)</u>, different inlet and outlet pipe configurations, and with/without baffles and multiple nozzles to study the water mixing conditions and renewal time.
- <u>A small-scale model of an undershot water wheel</u> with plane blades installed in a horizontal flume with a recirculating flow circuit to study the mechanical power and efficiency of the water wheel for different flow rates and rotational speeds.

There is also an extension of the LHE in IG energy labs, developed under CERIS supervision and for operating conditions not available at LHE:

- Development of a new low-head propeller turbine, with 120° upstream connection and long downstream draftube.

Research carried out in these facilities uses advanced instrumentation, namely:

CERIS: Civil Engineering Research and Innovation for Sustainability

- <u>PIV Particle Image Velocimetry</u>: PIV is a laser-based technique to acquire 2D instantaneous velocity fields at a maximum frequency of 15 Hz, composed of a 1600x1200 CCD camera synchronized with a 30 mJ, 532 nm laser.
- <u>ADV Acoustic Doppler Velocimetry</u>: ADV for pointwise measurement of 3D velocity; composed of down-looking and side-looking probe (200 Hz max; control vol 1.5-7 mm) and a VCM for field applications (8 Hz max; control vol 15 mm).
- <u>UVP</u> <u>Ultrasonic Velocity Profiler</u>: Acoustic probes for measuring velocity profiles and water and bottom levels; composed of 1 UVP system with two probes of 2 MHz and 4 MHz.
- <u>Limnimeter</u>: 10 ultrasonic distance measuring sensors UNDK30U6103/S14 with sensing range 100-700 mm, repeatability < 3 mm, and response time <5 ms. Used to <u>measure bed and water</u> <u>surface levels.</u>
- <u>Mini-Echo-Sounder</u>: Two Mini-Echo-Sounders (UltraLab UWS) to measure bathymetry, erosion, and sedimentation without emptying the model. It measures distances in water from 2 cm up to 15 m with 1mm accuracy and 1MHz acquisition rate.
- <u>3D Automated Transverse System</u>: this equipment moves longitudinally, transversely, and vertically to the channel, allowing automatic measurements. Conflume, a specifically developed software, controls it.
- <u>Tubular propeller turbine</u> for low-head energy recovery.
- RTK GNSS Real-Time Kinematic Global Navigation Satellite System: RTK GNSS is a system capable of carrying out xyz field measurements with a sampling rate of up to 2 Hz and with vertical and horizontal accuracies smaller than 0.05 m and 0.10 m, respectively. The RTK GNSS is used





to study beach erosion during coastal storms, beach accretion and beach changes induced by coastal engineering interventions, such as beach nourishments.

The group's activities are also supported by a computational server acquired by a research project, which features 16 CPUs and 8 GPU boards specific for computation.





PART III – ACTIVITY

III.1 Activity indicators - Summary table for 2023

	ACTIVITIES		Number
PhD Theses		Concluded	3
The meses		To be concluded after 2023	18
		International peer-reviewed journals (WoS AND Scopus)	74
	Papers in peer-reviewed journals	Peer-reviewed journals (non-WOS OR non-Scopus)	6
Publications		Peer-reviewed journals (non-WOS AND non-Scopus)	0
	Papers in proceedings	International	13
		National	8
		Entire	0
	Books	Chapters	10
		As editor	2
Reports		Scientific	0
		Consultancy/others	2
	Editor-in-Chief	WoS/Scopus-indexed Journals	1
		Other journals	0
	Associate Editor	WoS/Scopus-indexed Journals	6
		Other journals	0
Collective guidance in	Issue Editor/Guest	WoS/Scopus-indexed Journals	15
scientific work	editor/Membership Editorial Boards	Other journals	4
	Membership in Scientific	International	1
	Committees	National	0
	Drafting of codes,	International	0
	Recommendations	National	0
Organization of scientifi	c events	International	0
organization of scientine events		National	1




	ACTIVITIES		Number	
	International research grants	Started in 2023	2	
Competitive research	international recearch grante	Active in 2023	1	
projects	National research grants	Started in 2023	2	
		Active in 2023	2	
Competitive individual re	esearch grants (PhD, Post-doc,	Started in 2023	2	
sabbatical, etc)		Active in 2023	5	
Awards		International	2	
		National	2	
Refereeing for funding	agencies	International	0	
		National	0	
		Keynote lectures at international	0	
Invited lectures				
		Other	0	
Models			0	
Software applications			0	
Pilot plants			0	
Prototypes			0	
Patents		International	0	
National				
Other actions (<i>e.g.,</i> scientific dissemination to a broad audience, social media)				

III.2 Highlights of main achievements

The research group activity allowed for achieving or overcoming the set quantitative objectives. It is important to underline the number of papers in international journals with peer review (80) and the number of papers in international conferences (21). These significant numbers were possible because the group presently has a significant number of PhD students (21 active in 2023). Thesis development in the paper format model and international collaboration with other research universities has been promoted to foster research result publications. In this line, it is also important to underline the laboratory facilities' importance in carrying out diversified research.





The group's international recognition remained high, with 1 members serving as Editor-Chief of Q1 (SCOPUS) journals, 6 members serving as Associate Editor, and 15 integrating editorial boards of indexed journals. Group members integrated the scientific committee of 4 international events.

During 2023, the consultancy activities were also significant, resulting in the public recognition of the RG member's expertise in different hydraulic and environmental engineering fields.



PART IV – FUTURE ACTIVITY (2024)

The RG activities in 2024 will be a natural follow-up of the research carried out in 2023. These activities will cover research objectives that include different cross-cutting issues with branches in the four thematic strands: Product development in Civil Engineering industries (PD); Risk and safety in natural and built environments (RS); Rehabilitation of natural and built environments (RNBE); Response to natural and societal changes (RNSC).

The RG activities for 2024 will be organized according to major research topics as follows:

Pressurized water systems

- Numerical and experimental analysis of hydraulic transients in pressurized pipe systems (RS).
- Energy recovery in water services systems, using pumps as turbines, and developing new low-cost energy-harvesting technologies (e.g. propellers, centrifugal micro-turbine, water wheels) (PD), towards the digital and energy transition in the water sector.
- Anomalous events (e.g., bursts) detection, location, and quantification in water supply systems using machine learning techniques (RS).
- Modeling rapid pipe filling events in intermittent water supply systems (RS).
- Analysis and improvement of the resilience of drinking water systems for demand increase and pipe failure (RS).
- Multicriteria analysis for scheduling rehabilitation interventions in water distribution networks (RS).
- New energy converters, hybrid pumped hydropower, and energy storage solutions in renewables integration (RS).

Fluvial hydraulic structures

- Development of mitigation strategies and pre-cast shelters for fish downstream of powerhouses with a hydropeaking operation (RS).
- Numerical and experimental modeling of flood releases and related hydraulic structures (RS; RNBE).
- Study the hydraulics of PKW weirs combined with spillways (RS, RNBE).
- Study the pressure field and slab stability in a plunge pool lined with concrete slabs (RS).

River restoration and management

- Risk management in the valleys downstream of dams (RS; RNSC).
- Environmental flow determination procedures and hydropower station operation rules to reduce ecological risk downstream of dams (RS, RNBE).
- River restoration and development of fish passes for low-height river obstacles to improve ecological connection along regulated rivers (PD; RNBE; RNSC).

Environmental fluid mechanics





- Laboratory investigation of rough-wall open-channel turbulence (RNBE). -
- CFD simulation of solid-fluid interactions in turbulent flows (RNBE).
- Laboratory investigation and mathematical simulation of transport of dissolved substances (RS, -RNBE).
- Heat and mass transport in wetlands (RNBE).

Sediment transport and river morphodynamics

- Hydrodynamics of river diversions in equilibrium (RS; RNBE). -
- Mathematical modeling of shallow flows with mobile beds. Application to long-term channel morphology evolution, dam-breaching, dam-break flows, and overland tsunami propagation (RS).
- Development of stabilization techniques for river meanders in equilibrium (RNBE). -

Maritime hydraulics, coastal engineering and coastal morphodynamics

- Characterization of offshore wave climate and storm wave events (RS). -
- Morphodynamic modelling and field observations of beaches and tidal inlets hydro-sedimentary dynamics, including engineering interventions (RS).
- Development of Nature-Based Solutions for Coastal Engineering (RNBE). -





RESEARCH GROUP 2 - Environment and water resources

RESEARCH GROUP COORDINATOR – José Saldanha Matos

PART I - RESOURCES

I.1 Budget

BUDGET (euros)							
F	СТ	Other Funding					
STRATEGIC	FCT Projects	Other Research Funding		Consultancy		TOTAL	
runung		National	International	National	International		
15 135,23	0,00	36 532,46	0,00	148 674,43	0,00	200 342,12	

I.2 Personnel

PERSONNEL						
			Collaborators			
Name	Category	Member		without	without PhD	
			with PhD	PhD student	Other	
Ana Fonseca Galvão	Assistant	х				
	Professor					
Filipa Maria Santos Ferreira	Associate	х				
	Professor					
José Manuel de Saldanha Gonçalves Matos	Full Professor	x				
José Paulo Patrício Geraldes Monteiro	Assistant	х				
	Professor					
Luís Miguel de Amorim Ferreira Fernandes Nunes	Assistant Professor	x				
Manuel Guilherme Caras Altas Duarte Pinheiro	Full Professor	х				
Maria Manuela Portela Correia dos Santos Ramos da Silva	Full Professor	x				
Maria Paula Sofio Silva Mendes	Researcher	х				
Maria Teresa Condesso de Melo	Assistant	х				
	Professor					
Nuno Miguel de Jesus Barreiras	Researcher		x			
Rodrigo de Almada Cardoso Proença de Oliveira	Assistant	х				
	Professor					





PERSONNEL						
			Collaborators			
Name	Category	Member		withou	t PhD	
			with PhD	PhD student	Other	
José Pedro Gamito de Saldanha Calado Matos	Assistant	x				
Ana Catarina Ferreira da Silva	Research		х			
Sílvia Patrícia Nunes Monteiro	Research	х				
Ricardo Jaime Pereira Rosário dos Santos	Research	х				
João Nuno da Palma Nascimento	Researcher	х				
Luis Angel Espinosa Villalpando	Researcher	х				
Melissa Nogueira Sondermann	Researcher		х			
A. M. Bustillo	PhD Student			x		
Amir Gholipour	PhD Student			x		
Ana Luísa de Carvalho Quaresma	PhD Student			x		
Ana Rita Vieira de Castro	PhD Student			x		
Ana Rosária Oliveira Gonçalves	PhD Student			х		
Ana Sofia Santos Ferreira Leonardo (concluded 2023)	PhD Student			x		
Armen Chilingaryan	PhD Student			x		
Carla Larissa Fonseca da Silva	PhD Student			x		
Carmen Sofia Murilhas Cardoso de Lima Sousa	PhD Student			x		
Daniela Patrícia França Pinto de Andrade	PhD Student			x		
Edilson Filho	PhD Student			x		
Efraim Soma	PhD Student			x		
Francisco Miguel Cid Bispo Pereira	PhD Student			x		
Issa Saket Oskoui	PhD Student			x		
Joana Ferraz Contente	PhD Student			x		
Joana Miguel Santos Ramirão Costa (concluded 2023)	PhD Student			x		
João André Antunes Matos Lopes	PhD Student			x		
João Pedro Lopes Barreiro	PhD Student			x		





PERSONNEL						
			Collaborators			
Name	Category	Member	with PhD	without PhD		
			with Fild	PhD student	Other	
Kathleen Standen (concluded 2023)	PhD Student			x		
Lili Minasyan	PhD Student			x		
Maria Luiza da Cunha Oliveira Santos	PhD Student			x		
Mariana Campista Chagas	PhD Student			x		
Mariana La Pasta Cordeiro	PhD Student			x		
Pedro Gabriel Condelipes Monteiro	PhD Student			x		
Sofia Rita Machado Bicha Castelo	PhD Student			x		
Tiago André Nunes Martins	PhD Student			x		
Laryssa Mariana Moreira Freitas	Scholarship				х	
Carolina Gomes Pires de Castro	Scholarship				х	
Rui Marinheiro	Scholarship				х	
Daniela Silva	Scholarship				х	

The summary table can be seen below.

Type	Permanent	Non-p	ermanent	Total	
		Contract	Scholarship		
Members	10	4	1	15	
Collaborators with PhD	1	1		2	
Collaborators without PhD			31	31	
Technical staff	0.5			0.5	
Administrative Staff	1			1	
Others					

PART II - DESCRIPTION

Leadership





The coordinator is the group's representative in regular meetings with the Executive Board, other group coordinators, and official meetings. The coordinator manages the part of the FCT fund allocated to the Group. José Saldanha Matos has been coordinating this research group since 2016.

Description of the Research Group

At E&WR, research has been undertaken to establish methodologies and tools that cut across several areas of hydrology, and water resources management, including various fields of hydrogeology, urban water services, and broader environmental and sustainability issues, improving knowledge and capability to manage natural and built environments sustainably. Water and environmental policies and governance have also been addressed. R&D activities have been mostly developed with the involvement of 44 researchers of the research group (18 researchers with Ph.D., 26 Ph.D. students, and 4 scholarship), with interactions with colleagues of other areas of engineering and science, namely in construction, urban and regional planning, social sciences, ecology, information and design support systems, chemistry, and microbiology.

Internationalization activities are a major characteristic of most of the permanent members of the E&WR group, including serving on editorial boards of international journals, as members of scientific committees of international conferences, and drafts of international codes.

The E&WR group presents a wide variety of specific expertise that covers many scientific sub-topics within the vast area of hydraulics, water resources, and environment, where most group members have a scientific background and are involved in teaching and research activities.

Its members are involved in many national and international research projects, Ph.D. courses, and related activities. Most have extensive experience in consultancy for the water industry and public institutions. Two full professors and two associate professors with habilitation have been coordinating the research on environment and water resources and urban water and wastewater services, deciding on the most relevant topics to be addressed in these areas, considering the excellent background knowledge of the members of the group and state of the art at the international level, orientating the strategy of the group and the objectives.

A professor of the group (JSM) is a member of the Scientific Committee of the Ph.D. on Climate Change and Development Policies jointly organized by Schools of the University of Lisbon (UL) and the New University of Lisbon (UNL) and of the Ph.D. on Environmental Engineering (IST-UL).

Three professors of the group (RPO & MTCM&JSM) are members of the Tropical College (CTROP) of the University of Lisbon, which is a cross-sectional unit that engages teachers, researchers and students from several faculties aiming to develop transdisciplinary knowledge in tropical regions, prioritizing the aspects of research, education and cooperation, in conjunction with innovation and technology transfer and reinforcing ULisboa's role in scientific diplomacy.

General Objectives



E&WR group (RG2) develops research in the following areas: 1-Integrated water resources, modeling, and management; 2-Water and wastewater/stormwater systems and services 3-Groundwater and environment; and 4-Sustainability assessment and management.

RG2 is involved in the four thematic strands of CERIS and has the following main objectives:

- To promote adequate water resources management through policy formulation and governance;
- To promote integrated water resources management, including the development of advanced knowledge on hydrologic processes and groundwater assessment tools and modeling;
- To promote efficient water/wastewater/stormwater, urban services; -
- To promote sustainable sanitation approaches and solutions for the urban poor
- To promote the sustainable management of natural and built environments. -
- To develop methodologies for the identification of groundwater-dependent ecosystems and effective methods for risk-based environmental decision-making;
- To develop advanced potentialities in hydrogeology and groundwater research.

Group Governance

A simple organizational structure is defined to ensure the coordination of E&WR activities. The Group Leader, elected by its members and nominated by the Executive Board of CERIS, participates in regular meetings promoted by the Coordinators of the four thematic strands. Group meetings are promoted regularly with Ph.D. researchers to discuss the results and budget issues and monitor the group activity's progress. External collaborators, such as post-doctorate and Ph.D. students, may be invited to participate in these meetings, depending on their involvement in the agenda items.

The group coordinator will be responsible for stimulating joint activities among group members and for trying to increase the collaboration and cross-cutting initiatives with other groups of CERIS and other research unities of IST-UL.

Facilities

The E&WR group research is supported by several computational and laboratory facilities, assembled at the Laboratory of Hydraulics and Environment, and equipment for educational purposes. This laboratory is located at the IST campus and is equipped with advanced and state-of-the-art instrumentation. The laboratory is shared with other research groups and is used to conduct advanced experimental research, support doctoral programs, and support teaching activities for undergraduate courses.

PART III - ACTIVITY

III.1 Activity indicators - Summary table for 2023





ACTIVITIES				
		Concluded	3	
PhD meses		To be concluded after 2023	23	
		International peer-reviewed journals	20	
		(WoS AND Scopus)	29	
	Departs in past reviewed is uracle	Peer-reviewed journals (non-WOS OR	4	
	Papers in peer-reviewed journals	non-Scopus)	4	
		Peer-reviewed journals (non-WOS AND	0	
Publications		non-Scopus)	U	
	Papars in proceedings	International	30	
	rapers in proceedings	National	10	
		Entire	0	
	Books	Chapters	2	
		As editor	0	
Paparta	l	Scientific	5	
Reports		Consultancy/others	2	
_	Editor in Chief	WoS/Scopus-indexed Journals	0	
	Editor-In-Chief	Other journals	0	
	Associate Editor	WoS/Scopus-indexed Journals	0	
	Associate Eulioi	Other journals	2	
Collective guidanœ in	Issue Editor/Guest	WoS/Scopus-indexed Journals	5	
scientific work	editor/Membership Editorial Boards	Other journals	1	
	Membership in Scientific	International	2	
	Committees	National	0	
	Drafting of codes,	International	5	
	Recommendations	National	1	
Organization of scienti	ficevents	International	0	
organization of scienti	ne events	National	0	
	International research grants	Started in 2023	3	
Competitive research		Active in 2023	7	
projects	National research grants	Started in 2023	4	
		Active in 2023	8	
Competitive individua	l research grants (PhD, Post-doc,	Started in 2023	2	
sabbatical, etc)		Active in 2023	2	
Awards		International	2	
, wardo		National	1	
Refereeing for funding	agencies	International	1	
Tereferening for fullaling	ageneics	National	1	
		Keynote lectures at international	2	
Invited lectures		conferences		
		Other	1	
Models			0	





ACTIVITIES				
Software applications				
Pilot plants				
Prototypes				
Patents	International	0		
	National	0		
Other actions (e.g., scientific dissemination to a broad audience, social media)				

III.2 Highlight of main achievements

Members of the E&WR group were involved in a large number of research contracts funded by the water industry, the European Commission, the Portuguese Science and Technology Foundation (FCT), and other public institutions, with the main achievements contributing to the advance of science in terms of understanding the complexity of natural and built environments and enhancing approaches and tools to respond to natural and societal changes, in particular affecting water services, water resources, and the environment.

In the area of hydrology and water resources, relevant results were achieved in terms of validation of alternative datasets and modelling over large areas based on those datasets, trend detection in hydrologic time series and modeling; drought, heat wave, and flood analysis, including joint probability cumulative distribution functions, empirical copulas, and non-stationary models; development of rainfall-runoff models; artificial intelligence techniques applied to hydrologic modeling including artificial neuronal network; development of daily runoff modeling in very large watersheds based on satellite data; development of regionalized impact scenarios for the water sector and climate change impact assessments; and risk assessment study on flash floods and debris. The intense and proficuous collaboration with national stakeholders in water resources management continued, namely public administration, water and power utilities and irrigation association. Following the work done in previous years, collaboration is currently underway for the critical evaluation of the financial instruments used for managing water resources in Brazil.

In the area of water services, covering water supply, sanitation, and water pollution control, the following themes were investigated: performance of urban green roofs on adapting to climate change; urban stormwater performance indicators; organic and microbiological processes in constructed wetlands, both in a full-scale laboratory and in scaled installations; fecal sludge management, including research on the performance of sludge drying beds in low-income countries, nature-based solutions for wastewater management and reuse, in Mediterranean and tropical climates.

The research on environmental issues covered the themes of assessment and analysis of climate change impacts on natural and man-made water resource systems, sustainable governance, and the environmental management applied to sustainable construction. Life cycle analysis in civil engineering practices, notably in urban, building, and infrastructure construction, and the governance dimensions of environmental policies were also addressed.





The topics, with relevant results, addressed under the specific area of hydrogeology and groundwater services were the following ones: groundwater pollution and risk assessment; groundwater and ecosystems; aquifer recharge and discharge; water and climate change; decision support systems for water catchment management and development of effective methods for risk-based environmental decision-making. International scientific collaboration on groundwater resources research was established with Brazil, Guatemala, Chile, Angola and Cape Verde.

Another important achievement was the the funding renewal of the Joint Master Programme in Groundwater and Global Change - Impacts and Adaptation (acronym: GroundwatCh) in the framework of the Erasmus Mundus Programme (http://www.groundwatermaster.eu/)

Special effort has been put into disseminating important use of groundwater in ancestral and historical civilizations and increasing awareness for the urban water cycle sustainability by developing new creative cultural attractions integrating new scientific knowledge with public participation.

The following indicators were accomplished by E&WR group members: 26 of Ph.D. theses concluded or in progress in 2023 supervised by members/collaborators of the group (17); papers published in WOS peer-reviewed journals (39); papers in national and international proceedings (30).



PART IV – FUTURE ACTIVITY (2024)

The E&WR will continue to focus on environmental and water resources research activities to develop approaches, methodologies, and tools that cut across these areas, improving knowledge and capabilities to manage natural and built environments sustainably.

The research objectives will cover different cross-cutting issues related to the thematic strands defined for CERIS. The main activities will focus on "Natural and Societal Changes" and "Risk and Safety in Natural and Built Environments," with more limited contributions to the other two thematic strands.

The E&WR will continue concentrating its activities on the following major topics:

- Hydrology and water resources: characterization and modeling of hydrologic variables and processes, including extreme event analysis, planning and management of water resources, and water policy formulation;
- Integrated water resources management, including the joint management of water supply from surface and groundwater sources, controlling water uses and demand, and managing water quality and ecological requirements, specializing in transboundary river basins.
- Assessment and analysis of climate change impacts on natural and man-made systems, with special emphasis on water resource systems, including the formulation of measures and policies for promoting adaptation and mitigation;
- Coastal urban wastewater systems, including adaptation actions to climate change given sea level rise and risks of saline water inflows;
- Non-sewer solutions and fecal sludge management options and techniques for in low-income countries;
- Water asset management, performance indicators, and urban resilience related to urban water/wastewater/stormwater systems;
- Integrated sustainable wastewater solutions, including the hydraulic and environmental performance of nature-based solutions for mitigation and adaptation to climate change, such as constructed wetlands, green roofs, and detention ponds;
- Environmentally sustainable assessment (LiderA system) and management of built environments;
- Approaches to the transition to the carbon-neutral and circular economy, including sustainable buildings, infrastructures, and urban areas with a focus on water, energy, and materials cycles, with special emphasis on life-cycle framework;
- Implement monitoring, aquifer and geophysical testing and groundwater quality assessment to identify groundwater pollution sources (saline intrusion, agriculture, industry, mining), to quantify surface-groundwater exchange and to delineate groundwater-dependent ecosystems accurately;





- Employ advanced numerical and stochastic groundwater modeling techniques along with decision support systems (DSS) to improve groundwater management practices;
- Implement nature-based solutions and climate change mitigation measures to enhance groundwater quality and quantity, to minimize groundwater contamination and strengthen integrated water management approaches effectively;
- Utilize cutting-edge technology such as satellite-based remote sensors and drone-based sensors to enhance monitoring capabilities, including land use evaluation, soil moisture assessment, water availability analysis, and identification of aquifer recharge and discharge zones. Additionally, leverage satellite-based sensors, radar data, and meteorological reanalysis to monitor climate variables comprehensively;
- Investigate the importance of groundwater resources for ensuring water and food security in arid and semi-arid regions facing water scarcity.





RESEARCH GROUP 3 - Systems and Management

RESEARCH GROUP COORDINATOR – António Aguiar da Costa

PART I - RESOURCES

I.1 Budget

BUDGET (euros)							
FC	СТ	Other Funding					
STRATEGIC Funding	FCT Projects	Other Research Funding		Consultancy		TOTAL	
		National	International	National	International		
12 806,74	0,00	5 274,81	102 741,70	88 040,00	0,00	208 863,25	

I.2 Personnel

PERSONNEL						
			Collaborator			
Name	Category	Member	with PhD	without PhD		
			WILLIFIE	PhD student	Other	
Alcínia Zita de Almeida Sampaio	Professor	x				
Alexandre Bacelar Gonçalves	Professor	x				
Amílcar José Martins Arantes	Professor	x				
Ana Paula Martins Falcão Flor	Professor	x				
António Morais Aguiar da Costa	Professor	x				
Cristina Marta Castilho Pereira Santos Gomes	Professor	x				
Diogo Filipe da Cunha Ferreira	Professor	x				
Hugo Marco Consciência Silvestre	External Researcher		x			
Maria Susana Semião Neto	External Researcher	x				
Nuno Gonçalo Cordeiro Marques de Almeida	Professor	x				
Amaro Segunda Ricardo	PhD Student			x		

CERIS: Civil Engineering Research and Innovation for Sustainability



PERSONNEL						
Name	Category	Member	Collaborator with PhD	without PhD PhD student	Other	
Charles Chukwudi Okonyia OKEYIA	PhD Student			x		
Evaristo Augusto Andrade Fernandes	PhD Student			x		
Felisberto Lopes da Veiga Cortês	PhD Student			х		
Francisco Diogo Pascoal	PhD Student			х		
Heloisa Pimpão Chaves	PhD Student			x		
Inês dos Santos Balinho do Ó	PhD Student			x		
Inês Freire Machete	PhD Student			×		
Jaime Gabriel Silva	PhD Student			x		
Jean Marlo Pepino de Paula	PhD Student			x		
João Manuel Amor Perianes Palma	PhD Student			x		
João Pedro Cardoso Vieira	PhD Student			x		
Jonatan Yeraj Villavicencio Moreno	PhD Student			х		
José Frederico Silva Oliveira	PhD Student			x		
Luís Filipe Soromenho Gomes (concluded 2023)	PhD Student			x		
Luís Guilherme Pinto Afonso	PhD Student			x		
Mai Wardeh (concluded 2023)	PhD Student			x		
Manuel Pedro Rodrigues Pacheco	PhD Student			x		
Manuela Mesquita Trindade	PhD Student			x		
Maria Teresa Henriques Alves Ferreira	PhD Student			x		
Mariana de Moura Ormeche	PhD Student			×		
Maryam Salati	PhD Student			x		
Parisa Ahani (concluded 2023)	PhD Student			x		
Paula Vale de Paula	PhD Student			x		
Paulo Marco Calinas Rodrigues	PhD Student			х		
Pedro Emanuel Frazão Pedroso	PhD Student			х		
Rita Freire Machete	PhD Student			x		





PERSONNEL							
			Collaborator				
Name	Category	Member	with PhD	without PhD			
			with the	PhD student	Other		
Rodrigo da Silva Varela Pedral Sampaio	PhD Student			x			
Saikat Maiti	PhD Student			x			
Sebastião Ferreira de Almeida Santos	PhD Student			x			
Seyed Hossein Seyedi Rezvani	PhD Student			x			
Sílvia Helena de Freitas Barbosa Sá	PhD Student			x			
Thalita Fagundes	PhD Student			x			
Wagner Carvalho	PhD Student			x			

The summary table can be seen below.

Type	Permanant	Non-p	ermanent	Total	
туре	reimanent	Contract	Scholarship	Total	
Members	9	2		11	
Collaborators with PhD		2		2	
Collaborators without PhD			34	34	
Technical staff					
Administrative Staff	1			1	
Others					



PART II - DESCRIPTION

Leadership

Professor António Aguiar da Costa has been the Systems and Management Group coordinator since 2023. The coordinator is the group's representative in regular meetings with the Executive Board (and with other group coordinators) and official meetings. The coordinator manages the part of the FCT fund allocated to Group 3 by the Executive Board.

Description of the Research Group

The Group 3 Scientific Board comprises all Group 11 PhD members and meets formally once a year to discuss administrative and scientific subjects. In these meetings, the coordinator reports the guidelines of the Executive Board and other administrative issues the members discuss. The research interests of the group are often discussed in these formal meetings. Still, the knowledge exchange and collaborations mainly result from informal daily meetings between group members.

General Objectives

RG3 develops research in the following general domains:

- 1. Regulatory and contracting policies, pricing, and performance assessment;
- 2. Decision-making and systems design, operations and management, and project management;
- 3. Information modeling and technologies.

RG3 is mostly involved in these three thematic strands and has the following main objectives:

- To develop models and best practices related to regulatory and governance policies in infrastructure and public services;
- To contribute and propose new approaches to tariffs and pricing of infrastructure services;
- To apply and develop performance measurement methods, focusing on public utilities and transportation;
- To contribute to improving the processes of evaluation and decision-making concerning the design, management, and operation of complex systems;
- To test and apply state-of-the-art concepts, methods, and techniques of modeling, optimization, and evaluation emerging from the systems engineering domain;
- To contribute to advances in geomatics and geographical information science;





- To provide contributions to project support systems and information technologies.

The S&M group has a long tradition of engagement in applied research and innovative services provided for private and public organizations, and we intend to reinforce these industrial links. It is also our objective to consolidate our reputation as one of the leading groups in the areas of Operational Research and Engineering Systems and Information in the Civil Engineering field in Portugal and abroad in particular areas, aiming at strengthening our international collaborative ties and recognition. Providing contributions to the literature and increasing the number of published papers in leading international journals, in parallel with active participation in international forums and projects, is also a means to promote international visibility and recognition.

The research development strategy is based on three fundamental pillars:

- Existing skills and capacities to capture the essence of each problem and to devise appropriate frameworks that fit the decision context;
- Societal and industrial relevance of the issues to be addressed and capability to attract and engage partners that provide case studies and funding;
- Internationalization and networking of their members and ability to attract young researchers and involvement in international project teams.

Structure of the Research Group

Group Governance

Facilities

The facilities of Research Group 3 include the following:

- Laboratory of Geographical Information Systems (software and hardware), used by MSc students for the GIS-related applications in their theses;
- Laboratory of BIM and virtual reality (software and hardware), used by MSc and PhD students;
- · Geodetic and surveying equipment used in regular teaching and research;
- Various software for GIS, CAD, BIM, Revit, remote sensing and image processing, geometric modeling and virtual reality, and surveying equipment used by MSc students.





PART III - ACTIVITY

III.1 Activity indicators - Summary table for 2023

ACTIVITIES				
PhD Thosos		Concluded	4	
FID meses		To be concluded after 2023	30	
		International peer-reviewed journals (WoS AND Scopus)	38	
	Papers in peer-reviewed journals	Concluded4To be concluded after 202330International peer-reviewed journals (WoS AND Scopus)38Peer-reviewed journals (non-WOS OR non-Scopus)3Peer-reviewed journals (non-WOS AND non-Scopus)0dingsInternational23Mational3Entire0Chapters4As editor0Consultancy/others4As editor0Other journals0VoS/Scopus-indexed Journals1Other journals0WoS/Scopus-indexed Journals3Other journals2Editor/Guest 	3	
			0	
Publications	Papers in proceedings	International	23	
		National	3	
		Entire	0	
	Books Chapters 4 As editor 0 As editor 0 Scientific 0 Consultancy/others 4 WoS/Scopus-indexed Journals 1 Other journals 0 Associate Editor 0 Vork Issue Editor/Guest Editor/Membership Editorial Boards 0 Membership in Scientific Committees International 0 National 0	4		
		As editor	0	
Reports		Scientific	0	
Перона		Consultancy/others	4	
	Editor-in-Chief	WoS/Scopus-indexed Journals	1	
	Editor-in-Chief WoS/Scopus-indexed Journals Other journals Other journals Associate Editor WoS/Scopus-indexed Journals Other journals Other journals Issue Editor/Guest Editor/Membership Editorial Boards Other journals Membership in Scientific Committees International National International	Other journals	0	
		WoS/Scopus-indexed Journals	3	
		Other journals	2	
Collective guidance in	Issue Editor/Guest	rs in peer-reviewed journals (WoS AND Scopus) Peer-reviewed journals (non-WOS OR non-Scopus) Peer-reviewed journals (non-WOS AND 0 International 23 National 3 Entire 0 S Entire 0 Chapters 4 As editor 0 Consultancy/others 4 As editor 0 Consultancy/others 4 Scientific 0 Consultancy/others 4 WoS/Scopus-indexed Journals 1 Other journals 0 VoS/Scopus-indexed Journals 1 Chapters 1 Editor/Guest r/Membership Editorial Boards International 0 Internati	10	
scientific work	Associate Editor Wos/Scopus-Indexed Journals Collective guidance in scientific work Issue Editor/Guest Editor/Guest Editor/Membership Editorial Boards Wos/Scopus-indexed Journals Membership in Scientific Committees Other journals International Drafting of codes, Recommendations International National National National National	Other journals	1	
		International	0	
Collective guidance in scientific work Issue Editor/Guest WoS/Scopus-indexed Membership Editorial Boards Other journals International National Drafting of codes, Recommendations International National National	Membership in Scientific Committees	National	0	
	International	6		
	Draning of codes, Neconmendations	Other journals Editor/Guest WoS/Scopus-indexed Journals Debitorial Boards Other journals Other journals International International National Recommendations International International National International National International National	5	
Organization of scientif	ic events	International	0	
		National	0	
	International research grants	Started in 2023	2	
Competitive research		As editorScientificConsultancy/othersWoS/Scopus-indexed JournalsOther journalsOther journalsWoS/Scopus-indexed JournalsOther journalsEditor/Guest rial BoardsWoS/Scopus-indexed JournalsOther journalsEditor/Guest rial BoardsInternationalCommitteesInternationalNationalInternationalNationalInternationalNationalInternationalStarted in 2023Active in 2023InternationalNationalInternationalNationalInternationalActive in 2023Active in 2023Active in 2023Active in 2023InternationalNationalInternational	4	
projects	National research grants	Started in 2023	1	
	National research grants	Active in 2023	2	
Competitive individua	I research grants (PhD, Post-doc,	Started in 2023	2	
sabbatical, etc)		Active in 2023	1	
Awarda		International	2	
Awalus		National	0	
Reference for funding	agencies	International	0	
Refereeing for funding	agencies	National	0	
Invited lectures		Keynote lectures at international conferences	0	
		Other	0	
Models			0	
Software applications			0	





ACTIVITIES		
Pilot plants		0
Prototypes		0
Potonto	International	0
	National	0
Other actions (e.g., scientific dissemination to a broad audience, social media)		0

III.2 Highlight of main achievements

The research activities of the RG on Systems and Management within CERIS have been strategically directed toward the following domains:

- 1. Regulatory and contracting policies, pricing, and performance assessment;
- 2. Decision-making and systems design, operations and management, and project management;
- 3. Information modeling and technologies.

RG3 has relevant results in specific topics such as:

- 1a) Efficiency and productivity of public services and infrastructure
- 1b) Regulatory governance and substance
- 1c) Tariffs and pricing of public utilities and transportation
- 1d) Economics of water and waste services
- 1e) Governance models in local government
- 1f) Health policies
- 2a) Decision-aiding and MCDA methods
- 2b) Logistics and supply chain management
- 2c) Systems modeling and optimization
- 2d) Procurement models of PPPs
- 2e) Infrastructure contract management
- 2f) Risk assessment and management
- 3a) Ground deformation measure with advanced SAR interferometric methods;
- 3b) 3D city information models and their application;
- 3c) Spatial analysis problems;
- 3d) Building information modeling and systems interoperability;



3e) Construction innovation and information management;

3f) E-business and e-procurement in construction.

These lines of research were followed during 2023 and the objectives set were fulfilled. Consequently, major outputs were obtained this year, and this RG is now an international reference of excellence in some of its research areas. In 2023, 38 articles were published in international journals indexed in Web of Science and Scopus, 4 book chapters, and 23 papers in international proceedings. In 2023 the RG researchers continued to publish in the most reputed journals in their areas, such as Expert Systems with Applications, Waste Management, and Utilities Policy.

Four (4) Ph.D. theses were concluded, and 30 were continued.

The involvement and cooperation of the research group members with internationally reputed universities were sped up. One RG member is the Editor in Chief of an internationally indexed journal, 3 RG member is the associate editor of 4 international journals (2 WoS/Scopus indexed), and RG Researchers belong to 11 Editorial Boards of International Journals.

The most reputed meetings concerning the interest areas of the RG counted on the active participation of its members and, as usual, the collaboration of its members with international institutions such as the European Investment Bank, the Inter-American Development Bank, the World Bank, Transparency International, IHE – UNESCO or OECD. There was also a great involvement in international research projects. In 2023, nine seminars were organized by the Systems and Management Group, and several international webinars were co-promoted.





PART IV – FUTURE ACTIVITY (2024)

In the future, the group will strategically incorporate other areas of the development which are the following:

- 4. Digital Built Environment and Twin Transition
- 5. Digital Twin and Asset Management
- 6. Decision support systems, Project management and Contracts

Digital Built Environment and Twin Transition

Our research group has made groundbreaking strides in the field of the digital built environment. One of our significant achievements is the innovative use of BIM, particularly for heritage management. We have tailored scan-to-BIM workflows at UNESCO World Heritage sites in Sintra, which have pioneered the integration of seismic assessment with BIM. We have also optimised emergency response routes and developed advanced sensor data integration, which has significantly enhanced heritage protection and facility management.

Using other information technologies, such as GIS, we conducted GIS-based data processing in various applications, including optimising crop distribution in Portugal in collaboration with the National Institute of Agricultural and Veterinary Research (INIAV). We have also mapped and monitored urban green roofs to assess their biodiversity potential and incorporated future global climate scenarios in risk evaluation for several natural hazards in Portugal.

Complementarily, our research group coordinated several projects that revolutionised the construction industry through digital transformation. Under the REV@Construction project, we have developed several digital tools for construction, influencing significant updates to standards and laws and promoting interoperability. Focusing on the Twin Transition, several initiatives have been conducted, such as the Circular ECO BIM project, which allowed the development of tools that can evaluate circularity and sustainability. One of these is the SmartLCA tool, which is a BIM-based LCA digital tool that has been developed and is now being deployed within the industry.

Digital Twin and Asset Management

Understanding the importance of asset management for the built environment, the group conducted several works on this topic. Notably, it firmly pushed the standardisation ecosystem around this matter, coordinating the respective standardisation technical committee. Specialising in asset management, our research group has also embraced the challenges of integrating Digital Twin (DT), especially within the demanding context of complex infrastructures. We have made significant strides in advancing asset management through the deployment of DTs, which serve as dynamic, real-time replicas of physical assets. This transformative approach facilitates data-driven management across the asset's lifecycle,





enhancing operational efficiency and decision-making. Central to our efforts was the DT4Health project, which has established a comprehensive framework for DT application in hospital settings.

Decision support systems, Project management and Contracts

The group is particularly concerned about simulation, optimisation, and performance analysis. Consistent research has been conducted on these topics, having in mind the implementation of more efficient processes and effective decision support systems. Relevant contributions have also been made to Project Management by studying the causes of delays in construction projects in Portugal and by developing a methodology that allows defining and substantiating mitigation measures based on the opinion of professionals. Concerning other operations challenges, the group conducted several studies on strategic production areas such as Modular Construction, Lean Construction and Reverse Logistics. Finally, a portfolio model was developed for strategic purchasing management in construction.

Furthermore, closer coordination with the CERIS strategy and the general orientations stemming from its thematic strands will be promoted. The horizontal character of the S&M group skills and competencies creates opportunities for synergetic cooperation and interactions with other CERIS research groups and to make relevant contributions closely linked to the thematic strands' objectives.





RESEARCH GROUP 4 - Transportation Systems

RESEARCH GROUP COORDINATOR – Luís Picado Santos

PART I - RESOURCES

I.1 Budget

BUDGET (euros)							
FC	СТ	Other Funding					
STRATEGIC	FCT Projects	Other Research Funding		Consultancy		TOTAL	
Funding		National	International	National	International		
13 970,98	36 455,13	126 372,00	225 309,62	150 850,58	0,00	552 958,31	

I.2 Personnel

PERSONNEL						
			Collaborator			
Name	Category	Member	with	withou	t PhD	
			PhD	PhD student	Other	
Luís Guilherme de Picado Santos	Full Professor	x				
João de Abreu e Silva	Associate Professor with Habilitation	х				
Filipe Vilaça Moura	Associate Professor with Habilitation	х				
José Manuel Neves	Assistant Professor	x				
Paulo Fonseca Teixeira	Assistant Professor	х				
Patrícia Dinis Ferreira	Assistant Professor	х				
Vasco Reis	Researcher (hired under DL57)	x				
Silvino Capitão	Coordinator Professor (Politechnic of Coimbra)	х				

CERIS: Civil Engineering Research and Innovation for Sustainability



PERSONNEL							
			Collaborator				
Name	Category	Member		without PhD			
		vith PhD PhD student Ot ociate essor x		Other			
Rui Micaelo	Associate Professor	x					
Rosa Félix	Post-doc	x					
Vítor Filipe Antunes	Assistant Professor	x					
Ana Karina de Barros Christ	PhD Student			x			
Ana Rita Martins (concluded 2023)	PhD Student			x			
André Guerreiro Duarte	Ph.D. Student			x			
Bernardo Garcia (concluded 2023)	PhD Student			x			
Carlos Miguel Canhoto Franco Antunes	PhD Student			х			
Cristian Adorean	PhD Student			x			
Daniel António Patel dos Santos	PhD Student			x			
Duarte Amorim da Cunha	PhD Student			x			
Ewerton Chaves Moreira Torres	PhD Student			х			
Fabiana Peixoto de Mello	PhD Student			х			
Filipe Miguel Martins da Silva	PhD Student			х			
Freddy Paiva Nogueira	PhD Student			х			
Gabriel Costa Valença (concluded 2023)	PhD Student			х			
Gustavo Felipe Medeiros da Câmara	PhD Student			х			
Inês Balinho do Ó	PhD Student			x			
Javier Rueda	PhD Student			х			
Joana Félix Ribeiro da Cunha	PhD Student			x			
Julianno de Menezes Amorim	PhD Student			x			
Laísa Braga Kappler	PhD Student			x			



PERSONNEL						
			Collaborator			
Name	Category	Member	with	without PhD		
			PhD	PhD student	Other	
Laura Khammash	PhD Student			x		
Marco Antônio Silva	PhD Student			х		
Maria Ana Bonito	PhD Student			х		
Mauricio Orozco Fontalvo	PhD Student			х		
Miguel Nobre da Costa	PhD Student			х		
Mohammad Reza Najd Javadi Pour	PhD Student			х		
Mohammad Sadegh Bahadori (concluded 2023)	PhD Student			х		
Nuno Filipe da Silva Afonso	PhD Student			x		
Pedro Miguel Guerreiro Rodrigues	PhD Student			х		
Rui Manuel Cordeiro Colaço (concluded 2023)	PhD Student			х		
Sofia Ribeiro	PhD Student			x		
Telmo Alexandre Farto Fernandes	PhD Student			х		
Webert Brasil Cirilo da Silva	PhD Student			x		

The summary table can be seen below.

Туро	Pormanont	Non-p	ermanent	Total	
туре	rennanent	Contract	Scholarship	Total	
Members	10	1	0	11	
Collaborators with PhD	0	0	0	0	
Collaborators without PhD			30	30	
Technical staff					
Administrative Staff	1			1	
Others					



PART II - DESCRIPTION

Leadership

Professor Luís Picado Santos has coordinated the Transportation Infrastructure, Systems, and Policy group since 2022. The coordinator is the group's representative in regular meetings with the Executive Board (and other group coordinators) and official meetings. The coordinator manages FCT funds allocated to Group 4 by the Executive Board and follows up the approved regulations by all members when integrated with the activities pursued by the group.

Description of the Research Group

General Objectives

The group has five main objectives for the next four/to five-year period:

- To establish the best platforms and approaches to develop sustainable policies (regulatory, pricing, and evaluation) for the transportation systems
- To integrate public and private transportation modes and services under a new type of sustainable mobility demands and business models
- To enhance innovation in infrastructure planning, design, and technology for soft mobility
- To improve infrastructure systems development and management under new challenges, such as automated mobility for cargo and passengers.
- To develop and sustain participation in international professional and academic networks and thus increase the formal support of I&D and research, and to enhance the international Ph.D. programs (in association with MIT, UC, and UP) and its recognition on a broad international level.

This is going on in close coordination with the general orientations coming from the thematic strands of CERIS. This group has connections and will include contributions and achievements that may be closely linked to the objectives of all the thematic strands but mainly for "Response to natural and societal changes" and "Rehabilitation of natural and built environments."

Under the thematic strand "Response to natural and societal changes," certain developments are going on, such as "Transport systems and policies for an aging society," "New types of integration of public and private transportation modes and services (among each type and across the types) as vehicle-sharing systems including the modeling and testing of demand response transportation, multi-modal systems, shared-taxis, car-sharing, bike-sharing, and freight services supported by new types of business models and by the development of appropriate ITS tools."

Under the thematic strand "Rehabilitation of natural and built environments," aspects are going on: "Methodologies and models to predict degradation and improve maintenance, renewal and investment decisions within the different transport infrastructure systems and across them (integrated asset





management)" and "Retrofitting transport systems: changing and adapting "old to like-new" transport systems to meet new performance standards while extending the existing ones."

Nevertheless, many other subjects are included in the going on or predicted to be developed soon, which could be included in other thematic strands or even in the two main thematic strands where the group feels more conditions to establish its work base. These subjects are "the application of nanotechnology and development of low energy asphalt concrete incorporating industrial by products, having the same structural efficiency as traditional ones", "new concepts for railway infrastructure design to enhance reliability, availability, maintainability and resilience to natural events", "tools and indicators to infrastructure planning and design and technology development to foster sustainable modes in urban environments (for vulnerable users like pedestrians and cyclists)", "adaptable networks through dynamic regulatory schemes managed by advanced ICT technologies and implemented by ITS innovative solutions for infrastructure", "microscopic and other type of simulation modelling for the estimate of network safety performance for vehicles, freight and vulnerable users", "new life cycle assessment for transportation infrastructures in a low life cycle cost perspective, incorporating material, risk and flexibility and environmental concerns through the use of innovative techniques to survey the necessary indicators and to establish decisions", "to redesign global logistics processes, including the last mile component of the logistics chain, towards enhanced efficiency, reduction of CO2 emissions and enhancement of accessibility", "optimization and simulation of public transport operations under a huge uncertainty for demand and risk analysis to support decision-making in transport system investments".

Group Governance

The coordinator should raise all efforts on the following directions:

- stimulating joint activities among the members of the group; -
- trying to increase the collaboration and crosscutting initiatives with other groups of CERIS; -
- Encouraging meetings of thematic strand players whenever pertinent for any envisaged interdisciplinary action, acting in cooperation with the coordinator of the thematic strand.

Group meetings are promoted regularly, mainly with permanent members and collaborators, such as Postdoctorate and Ph.D. students, to discuss the results, the group activity, resource management, and to monitor the development of the activities.

Facilities

The research is supported by laboratory facilities of two types: experimental facilities (Laboratory of Transport Infrastructures, LVCT) and two rooms dedicated to developing transport and infrastructure systems applications. LVCT is mainly dedicated to research, teaching, and IR&D about road and airport pavements (materials, structures behavior, and its assessment). It also has worked in traffic surveys to





support traffic management studies. The two mentioned rooms support all the developments for transport planning, services, and operation, in connection with the doctoral program in transportation systems and all the research and technological transfer made for the industry. Both facilities are located at the IST campus of Alameda and are often shared with other research groups.





PART III - ACTIVITY

III.1 Activity indicators - Summary table for 2023

ACTIVITIES			
PhD Theses		Concluded	5
FIID IIIeses		To be concluded after 2023	30
		International peer-reviewed journals (WoS AND Scopus)	38
	International Concluded Theses To be concluded after 2023 International peer-reviewed journals (WoS AND Scopus) International peer-reviewed journals (WoS AND Scopus) Papers in peer-reviewed journals Peer-reviewed journals (non-WOS OR non-Scopus) Papers in proceedings International National Entire Books Consultancy/others orts Scientific Consultancy/others WoS/Scopus-indexed Journals Other journals Other journals Issue Editor/Membership Editor/Membership Editorian Boards Other journals WoS/Scopus-indexed Journals Other journals International National Boards Editor/Guest Boards International Other journals WoS/Scopus-indexed Journals Other journals Other journals International National International National International National International National International National International National	3	
		Concluded5To be concluded after 202330International peer-reviewed journals (WoS AND Scopus)38Peer-reviewed journals (non-WOS OR non-Scopus)3Peer-reviewed journals (non-WOS AND non-Scopus)0International32National1Editor1Chapters12As editor4Scientific0Consultancy/others15-ChiefWoS/Scopus-indexed Journals1Other journals0woS/Scopus-indexed Journals1Other journals0embershipEditor/Guest1Editor/GuestInternational3ship in Scientific eesInternational1of codes, nendationsInternational3National11ship in Scientific eesInternational3of codes, nendationsInternational3SNational1of codes, Active in 20232Active in 20237onal research grantsStarted in 20237Active in 202331Active in 202313Active in 202331Active in 202	0
Publications		International	32
	Papers in proceedings	National	1
		Entire	1
	Books	Chapters	12
		As editor	4
Denerte		Scientific	0
Reports		Consultancy/others	15
	Editor in Obief	WoS/Scopus-indexed Journals	1
	Editor-in-Chief	Other journals	0
	tive guidance entific work	WoS/Scopus-indexed Journals	1
Collective guidance	Associate Editor	Other journals	0
Collective guidance	e Editor/Guest Editor/Guest Editor/Membership Editorial Other journals 0 WoS/Scopus-indexed Journals 19 Other journals 2	19	
Collective guidance in scientific work Collective guidance in scientific work Collective guidance Editor/Membership Boards Membership in Scientific Committees Committees Codes	Other journals	2	
	International	3	
	National	1	
	Drafting of codes,	International	2
	Recommendations	National	15
Organization of scier	ntific events	International	3
		National	0
	International research grants	Started in 2023	2
Competitive	international research grants	Active in 2023	4
research projects	National research grants	Started in 2023	2
	Trational research grants	Active in 2023	7
Competitive individua	al research grants (PhD, Post-doc,	Started in 2023	1
sabbatical, etc.)		Active in 2023	3
Awards		International	0
Awalus		National	1
Potorooing for fundir		International	0
	ig agencies	National	0
Invited lectures		Keynote lectures at international conferences	0
		Other	0
Models			0





ACTIVITIES		
Software applications		0
Pilot plants		0
Prototypes		0
Patonte	International	0
	National	0
Other actions (e.g., scientific dissemination to a broad audience, social media)		1

III.2 Highlight of main achievements

The group's senior members regular participation in the most reputed international organizations, actively working in their committees, such as the OECD committees (International Transport Forum and others), European Parliament, European Commission, Advisors, and Evaluators to Research Programmes (in France, Belgium, Netherlands, Kazakhstan, Brazil and also with the European Commission), as well as with the Independent Evaluation Group of the World Bank Group, World Road Association Committees, UIC committees (International Union of Railways).

Several research and I&D contracts were established and are underway with the main transportation stakeholders in Portugal and abroad, for instance, Infrastructures de Portugal (National Road and Railway Infrastructure Administration), ANA (international airports manager in Portugal), Lisbon's public transportation operators (bus, metro, and Tagus river boat transit administration for the Lisbon metropolitan area), the Lisbon Metropolitan Authority and several construction and consultancy companies, acting in and outside Portugal.

Impacts of the group activity are also reflected in publications and research projects undertaken, where this group typically maintains an average of more than nine research projects in parallel. Currently (2023), this group presents an average production of 3.8 peer review scientific papers per year and per member (i.e., 41 papers, 38 of which are WoS and/ or Scopus indexed).







PART IV – FUTURE ACTIVITY (2024)

The RG4 for 2024 will pursue the objectives described in section II.1 using the means and the routes offered by EU (Horizon Europe) and national (Portugal 2030 and FCT) financed research projects, by the research involved in each on going Ph.D. works integrated on the doctoral program in Transportation Systems, by the innovation, the technology and the development transfer to society and industry, by supporting the professional training programs set with several stakeholders on the transportation and infrastructure systems, and by the improvement of the results achieved within the international networks already established and the ones to enhance if the opportunity comes.









RESEARCH GROUP 5 – Studies on construction

RESEARCH GROUP COORDINATOR – João Ramôa Correia

PART I - RESOURCES

I.1 Budget

BUDGET (euros)							
F	СТ	Other Funding					
STRATEGIC	FCT Projects	Other Research Funding		Consultancy		TOTAL	
Funding		National	International	National	International		
45 405,70	174 515,96	79 491,30	317 560,73	308 800,00	0,00	925 773,69	

I.2 Personnel

PERSONNEL						
			Collaborator			
Name	Category	Member	with	withou	t PhD	
			PhD	PhD student	Other	
Ana Filipa Ferreira da Silva Cigarro Matos	Researcher	x				
Ana Paula Filipe Tomé	Assistant Professor	x				
Ana Paula Patrício Teixeira Ferreira Pinto França de Santana	Assistant Professor	x				
António Heleno Domingues Moret Rodrigues	Associate Professor	x				
António José Barreto Tadeu	Full Professor	x				
Augusto Martins Gomes	Associate Professor	x				
Beatriz Rosa de Abreu Pereira Marques	Researcher	x				
Bruna Amarílis da Palma e Silva	Researcher	x				
Carlos Paulo Novais Oliveira da Silva Cruz	Associate Professor	x				
Catarina Serra	Researcher	x				
Cinthia Maia Pederneiras	Researcher	x				
Clara Isabel Fernandes Pereira	Researcher	x				

CERIS: Civil Engineering Research and Innovation for Sustainability



PERSONNEL					
Name	Category	Member	Collaborator		
			with	without PhD	
			PhD	PhD student	Other
Cláudia Alexandra Rocha Ferreira	Researcher	x			
Enrico Zacchei	Researcher	x			
Evelina Brigite Pires da Moura Rodrigues	Researcher	x			
Fernando António Baptista Branco	Full Professor/retired	x			
Fernando Farinha da Silva Pinho	Assistant Professor	х			
Fernando Henriques	Full Professor	х			
Gina Maria Lourenço Matias	Researcher	x			
Giovanni Borsoi	Researcher	х			
Hugo Entradas Silva	Researcher	x			
Inês Cruz Mina Rosa	Researcher	х			
Inês dos Santos Flores Barbosa Colen	Full Professor	х			
Joana de Sousa Dias Prata	Researcher		x		
João António Soares de Almeida	Researcher	x			
João Nuno Noronha Ramos Vigário Pacheco	Researcher	х			
João Paulo Correia Rodrigues	Associate Professor	х			
João Paulo Janeiro Gomes Ferreira	Associate Professor	х			
João Pedro Ramôa Ribeiro Correia	Full Professor	х			
João Rafael Cardoso de Brito Oliveira Abrantes	Researcher		x		
Jorge Manuel Caliço Lopes de Brito	Full Professor	х			
José Alexandre de Brito Aleixo Bogas	Assistant Professor	х			
José António Raimundo Mendes da Silva	Associate Professor	x			
José Dinis Silvestre	Associate Professor	х			
José Manuel Cabecinhas de Almeida Gonilha	Researcher	х			
Julieta Maria Pires António	Associate Professor	x			
Luís Manuel Faria da Rocha Evangelista	Assistant Professor	х			
Márcio Paulo Ferreira Gonçalves	Researcher	x			




PERSONNEL						
			(Collaborator		
Name	Category	Member	with	without	t PhD	
			PhD	PhD student	Other	
Maria Cristina de Oliveira Matos Silva	Assistant Professor	x				
Maria da Glória de Almeida Gomes	Assistant Professor	x				
Maria de Castro Fonseca Mourão Manso	Researcher	x				
Maria do Rosário Dinis Moreira Fino	Researcher	x				
Maria Dulce e Silva Franco Henriques	Professor Adj	х				
Maria Idália da Silva Gomes	Professor Adj		x			
Maria Inês Vieira Simões	Researcher	x				
Maria Isabel Torres Morais	Assistant Professor	x				
Maria Paulina Santos Forte de Faria Rodrigues	Associate Professor	х				
Maria Teresa de Almeida Gouveia Geraldes Freire	Researcher	x				
Mário Alexandre de Jesus Garrido	Researcher	x				
Mário José Loureiro de Figueiredo e Sá	Researcher		x			
Michael Alexander de Oliveira Brett	Researcher	x				
Miguel Alberto Pereira Esteves	Researcher	x				
Miguel Nuno Caneiras Bravo	Researcher	x				
Nuno Albino Vieira Simões	Associate Professor	x				
Pedro Miguel Soares Raposeiro da Silva	Assistant Professor		x			
Rita Maria Vilela Nogueira	Assistant Professor	x				
Rui Miguel Sendas Jerónimo	Researcher		x			
Rui Vasco Pacheco Santos da Silva	Researcher	x				
Sofia Alexandra de Carvalho Ferreira Real	Researcher	х				
Vitor Faria e Sousa	Assistant Professor	х				
Wesley Bruno da Silva Machini	Researcher		x			
Admir Jeremias Silva Tavares	PhD Student			х		
Adnan Abdulghani Ali Al-ganad	PhD Student			х		
Adriana Melo Baio Dias	PhD Student			х		





PERSONNEL							
Collabo					aborator		
Name	Category	Member	with	without	PhD		
			PhD	PhD student	Other		
Adriana Sofia Rodrigues Boaventura de Azevedo	PhD Student			х			
Alessandra Ranesi (concluded 2023)	PhD Student			x			
Ali Shoaei	PhD Student			х			
Alissandra Pessoa Almeida (concluded 2023)	PhD Student			х			
Ana Chambel da Silva Carriço	PhD Student			x			
Ana Cristina Chalaça Gil (concluded 2023)	PhD Student			x			
Ana Cristina de Santana Inglês	PhD Student			x			
Ana Margarida Gaspar de Oliveira Braga Maia	PhD Student			х			
Ana Sofia Santos Ferreira Leonardo	PhD Student			x			
André Filipe Rosário Marcelino Silva	PhD Student			х			
André Miguel Pereira Castelo (concluded 2023)	PhD Student			х			
Andrea Ferre Balboa	PhD Student			x			
António Braz Leiras	PhD Student			x			
António Luis Domingues Ginja (concluded 2023)	PhD Student			х			
Armando Demaj (concluded 2023)	PhD Student			x			
Arpan Joshi	PhD Student			x			
Bahareh Ramezani	PhD Student			x			
Bernardete de Lourdes Ferreira Minervino	PhD Student			x			
Bruno Aguirre Tessaro (concluded 2023)	PhD Student			x			
Bruno Carvalho Lima de Alencar Matos	PhD Student			x			
Bruno Jorge Santos de Carvalho Matos	PhD Student			x			
Carlos Miguel Rocha	PhD Student			x			
Catarina Faria Lopes	PhD Student			х			
Catarina Pinto Mouraz	PhD Student			х			
Charles Severo Cenci	PhD Student			х			
Dany Azad Kareem Kassim	PhD Student			x			





PERSONNEL							
Collab					or		
Name	Category	Member	with	without	t PhD		
			PhD	PhD student	Other		
David Eduardo Nunes Bastos	PhD Student			х			
Deives Junior de Paula	PhD Student			x			
Douglas Rocha	PhD Student			x			
Eduarda da Conceição Nepomuceno	PhD Student			x			
Eleonora Cintura	PhD Student			x			
Eloísa Maria Castilho dos Santos	PhD Student			x			
Elżbieta Jadwiga Hamadyk	PhD Student			x			
Filomena das Dores Cardoso do Espírito Santo Carvalho	PhD Student			x			
Ghandy Diaa Eddine Lamaa	PhD Student			x			
Gonçalo Roque Araújo	PhD Student			х			
Gustavo Silva da Rocha	PhD Student			x			
Hala Ali Abdulrazaq	PhD Student			х			
Henriqueta Sofia de Almeida Teixeira	PhD Student			х			
llídio dos Santos Dias	PhD Student			x			
Inês do Nascimento Teotónio (concluded 2023)	PhD Student			х			
Inês Rodrigues Rita	PhD Student			х			
Isequiel José Soares Alcolete	PhD Student			x			
Javier Andres Forero Valencia (concluded 2023)	PhD Student			x			
Joana Alexandra Mirante Barrelas	PhD Student			x			
João Alfredo de Lazzari	PhD Student			x			
João Diogo Fragoso Januário (con cluded 2023)	PhD Student			х			
João Luís Carreiras Ribeiro Parracha	PhD Student			x			
João Maria da Costa de Sousa de Macedo Schedel	PhD Student			х			
João Paulo Melo Dâmaso Moniz	PhD Student			x			
João Pedro de Freitas Saraiva dos Santos	PhD Student			х			
Jordan Loïc Dongmo Tadonbou	PhD Student			x			

CERIS: Civil Engineering Research and Innovation for Sustainability



PERSONNEL							
				or			
Name	Category	Member	with	without PhD			
			PhD	PhD student	Other		
Jorge Miguel Pires do Nascimento Pontes	PhD Student			x			
José Lima Ferreira	PhD Student			x			
Kátia Maria Pereira Soares	PhD Student			x			
Madalena Fava Lopes Rucha	PhD Student			x			
Maria Ana Benoliel Nunes Bonito	PhD Student			х			
Maria Inês Sardinha Gomes	PhD Student			x			
Mariana Marques Gonçalves	PhD Student			x			
Marina Machado Leal dos Santos	PhD Student			x			
Marta Isabel Silva Rodrigues da Costa	PhD Student			x			
Martim Nabais	PhD Student			х			
Maryam Salati	PhD Student			x			
Mayara Di Castro Silva	PhD Student			x			
Md Abu Toyob Shahid	PhD Student			х			
Mehdi Mellef	PhD Student			х			
Muhammad Rubel	PhD Student			х			
Mustafa Bahjat Ibrahim	PhD Student			x			
Patrícia Alexandre Pereira Marques Marchante	PhD Student			х			
Paulo Jorge Dias de Carvalho	PhD Student			x			
Pedro de Andrade Quirino Rosa	PhD Student			x			
Pedro Emanuel Frazao Pedroso	PhD Student			х			
Pedro Enrique Cantor Cortes	PhD Student			x			
Poliana Bellei	PhD Student			х			
Qifan Ren	PhD Student			x			
Rafael Travincas Pinto (concluded 2023)	PhD Student			х			
Rafaela Caetano de Almeida	PhD Student			х			
Raphael Augusto Vasconcelos Carneiro Nascimento	PhD Student			х			





PERSONNEL							
				Collaborator			
Name	Category	Member	with	without	t PhD		
			PhD	PhD student	Other		
Ricardo Infante Gomes	PhD Student			х			
Ricardo Jorge Tomé Cruz	PhD Student			x			
Rita Freire Machete	PhD Student			x			
Rita Silva Andrade Santos	PhD Student			x			
Roberto Rosa de Santana	PhD Student			х			
Rodrigo Almeida Freitas	PhD Student			x			
Rodrigo da Silva Varela Pedral Sampaio	PhD Student			x			
Rúben Filipe Rosa Lopes	PhD Student			x			
Rui Miguel Silva de Craveira Neves	PhD Student			х			
Salem Alnezami	PhD Student			x			
Sara de Brito Coimbra	PhD Student			x			
Sara Maria Santos Soares Dias	PhD Student			x			
Sérgio Roberto Oberhauser Quintanilha Braga	PhD Student			х			
Seyedsajjad Hosseini	PhD Student			x			
Sofia Rita Machado Bicha Castelo	PhD Student			x			
Tânia Raquel Alves dos Santos	PhD Student			x			
Tarikul Hasan	PhD Student			х			
Tiago Liberalesso	PhD Student			х			
Tomás João Fernando	PhD Student			х			
Valdomiro Ceolin Neto	PhD Student			х			
Yoleimy del Carmen Avila Pereira	PhD Student			x			
Yu Yi Ye	PhD Student			х			

The summary table is shown below.

Туре	Permanent	Non-p	ermanent	Total
	remanent	Contract	Scholarship	Total





Members	29	25	0	54
Collaborators with PhD	3	4		7
Collaborators without PhD			104	104
Technical staff				0
Administrative Staff	2			2
Others				0



PART II - DESCRIPTION Leadership

The coordinator of the Group of Studies on Construction in 2023 was Professor João Ramôa Correia.

Description of the Research Group

The group RG5 is organized into four research domains, following the most representative research guidelines in which it is involved:

- Construction Materials, Technology, and Management Innovation;
- Sustainable Construction;
- Monitoring, Rehabilitation, and Conservation of the Built Heritage;
- Fire Behaviour of Materials and Structures.

General Objectives

- The research activities aim at developing research projects in the following domains:
- Construction Materials, Technology, and Management Innovation: advanced materials (GFRP, CFRP); waterproofing systems; concrete and mortars technology; construction quality, safety, environmental, and health management; virtual reality applications in construction;
- Sustainable Construction: sustainability and deconstruction strategies; sustainable traditional materials; demolition and recycling; recycled aggregates; building physics and passive design; building acclimatization and mechanical systems;
- Monitoring, Rehabilitation, and Conservation of the Built Heritage: Inspection, diagnosis, maintenance, and rehabilitation systems; maintenance of buildings envelope; conservation of historical building heritage; sensors, technological innovation, and structural assessment;
- Fire Design: fire resistance and risk evaluation of cultural heritage.

Other objectives are:

- 1. To participate in national and international technical and scientific committees;
- 2. To participate/organize national and international conferences;
- 3. To teach in Graduation and Post-Graduation courses in the field of construction and participate in academic events;
- 4. To perform consultancy work to fund research and provide practical applications to research results.



Group Governance

The group governance, promoted by the coordinator, aims at:

- promoting application to research funding (projects, scholarships, advanced consultancy, etc.);
- stimulating joint activities among the members of the group;
- increasing the collaboration with other groups of CERIS in the frame of transversal initiatives, namely in the context of the thematic strands;
- organizing CERIS seminars.

Facilities

Laboratory of Structures (LERM) and Laboratory of Construction (LC):

- One-compartment climatic chamber and several pieces of equipment to study hygrothermal behavior of a real scale prototype of walls and products and to assess indoor air quality; also including water spray, temperature, and humidity control devices; infrared cameras; moisture meter; pyranometer, lux meter, Multi-gas Monitor (Bruel & Kjaer) to measure the concentration up to 5 components of a gaseous mixture;
- Two accelerated carbonation climatic chambers;
- Wet/dry curing chambers, temperature/humidity control chamber for creep/shrinkage; •
- Five ovens for pre-conditioning and drying of solid samples; •
- One electric bottom-loading furnace and one three-zone split furnace, both electrically heated and . controlled by computer for fire resistance tests;
- One electrical, environmental chamber (Tinius Olsen) attachable to a universal testing machine;
- One video-extensometer: •
- One intermediate scale gas furnace controlled by computer for fire resistance tests; .
- Data loggers for data acquisition;
- Personal computers;
- Sensors such as displacement transducers, load cells, strain gauges, temperature transducers, pressure gauges, inclinometers, etc.;
- Load application systems, including hydraulic jacks (up to 5.000 kN capacity), electronic, electric, ٠ and manual hydraulic pumps (shared with other Groups);
- Universal testing machine Instron (tension/compression tests, 250 kN capacity, 100 mm stroke) (shared with other Groups);





- Universal testing machine for monotonic or cyclic tests in tension or compression, 50 KN capacity;
- Hydraulic Press for compression and modulus of elasticity tests (3.000 kN capacity) associated with a press for flexural tests;
- Hydraulic Press for compression and flexural tests of mortar, paste, and grout samples;
- Reaction wall equipped with 1.000 kN screw jack (shared with other Groups);
- Steel reaction frames (shared with other Groups);
- Various mortar and concrete mixers of different capacities, namely: 2 liters; 5 liters; 40 liters; 60 liters; 80 liters;
- Equipment to measure the fresh properties of concrete, mortar, and grout (Marsh flow cone, flowtable, slump cone, U-box, L-box, V-funnel, V-B apparatus, concrete air content meter - pressure method, Vicat needle-setting time, etc.);
- Equipment for aggregate characterization, such as High-capacity sieve shakers, Los Angeles • machines, sieves for flakiness index determination, and dry powder pycnometers;
- Equipment for abrasion resistance tests of stone and ceramic materials;
- Rapid chloride migration test for mortar and concrete samples;
- Set for construction condition evaluation including Schmidt hammers, pendulum hammers, steel bars detectors, phenolphthalein kit, chloride kit, crack microscope, crack rulers, strain gauges, core drilling machine, PH meter, Conductivity meter, moisture meter, hygrometers, impact test devices for renders and screeds, etc.;
- Measuring equipment for elastic properties of a wide range of materials based on the "impulse excitation technique" to measure dynamic elastic moduli over a range extending from 50 MPa to over 1000 GPa (Grindsonic); ultrasonic pulse velocity (Pundit) that measures transit time and pulse velocity, path length, perpendicular crack depth, and surface velocity; transducers with different shapes (contact; exponential) and frequencies (54 kHz; 150 kHz);
- Workshop for metallic and timber parts fabrication (drills, saws, welding machines, etc.) (shared with other Groups);
- Thermal conductivity meter equipment (Holometrix Rapid-K and portable hand-held Isomet with surface and inner probes and different ranges) for direct measurement of heat transfer properties of a wide range of isotropic materials; measurement of Thermal Conductivity, Thermal Diffusivity, Volume Heat Capacity, and Temperature;
- Water permeability tests for low to moderately permeable materials;
- Air/gas permeability tester for concrete samples;
- Handheld Digital Microscope for materials analysis





- High-capacity sieve shaker;
- Viscosimeter for grouts, pastes, and mortars produced with fine sand;
- One B&K Building Acoustics system for laboratory and in-situ tests;
- Life cycle assessment database of construction materials and building assemblies "from cradle to cradle." Software for Environmental and Economic Life cycle assessment of buildings and for modeling the building energy;
- Solar Cooling Laboratory (LSAS). It is being used to test solar-assisted absorption systems for • building acclimatization;
- Controlled (temperature and mass flow rate) hot and cooled water circuits, ventilation; •
- A modular single-effect absorption machine that allows the testing of specific components;
- Hot and cold-water circuits to run the machine; •
- A data acquisition system based on a digital multimeter and a real bank;
- Personal computers; .
- Measurement equipment includes PT100 sensors (4wire), pressure sensors, turbines, and electromagnetic flowmeters.

Laboratory of Computational Mechanics (LMC):

Facilities in the use of computers and printers shared with other Groups. The experiments are • carried out by the individual members of the Group or by PhD or MSc students. Sometimes the staff charged with the maintenance of LERM and LC gives some help, but the Group does not dispose of qualified experimental personnel to attend to all the research areas. When the global needs of the users of LERM and LC coincide in a certain period, delays in the research progress have occurred in the past. The maintenance and repair (or installation of new equipment) of equipment are normally done by staff from LERM, LC, or by specialized firms.





PART III - ACTIVITY

III.1 Activity indicators - Summary table for 2023

ACTIVITIES			
PhD Theses		Concluded	14
THD THESES		To be concluded after 2023	91
		International peer-reviewed journals (WoS AND Scopus)	175
	Papers in peer-reviewed journals	Peer-reviewed journals (non-WOS OR non-Scopus)	7
		Peer-reviewed journals (non-WOS AND non-Scopus)	0
Publications	Papars in proceedings	International	108
	rapers in proceedings	National	8
		Entire	0
	Books	Chapters	72
		As editor	3
Bonorto		Scientific	38
		Consultancy/others	19
Editor in Chief		WoS/Scopus-indexed Journals	1
		Other journals	0
	Associate Editor	WoS/Scopus-indexed Journals	9
		Other journals	0
Collective guidance in	Issue Editor/Guest	WoS/Scopus-indexed Journals	37
scientific work	Editor/Membership Editorial Boards	Other journals	18
	Membership in Scientific Committees	International	18
		National	28
	Drafting of codes Recommendations	International	20
		National	33
Organization of scientif	ic events	International	7
		National	0
	International research grants	Started in 2023	7
Competitive research		Active in 2023	14
projects	National research grants	Started in 2023	5
		Active in 2023	41
Competitive individua	I research grants (PhD, Post-doc,	Started in 2023	8
sabbatical, etc)		Active in 2023	19
Awards		International	14
		National	4
Reference for funding agencies		International	0
	~ <u>y</u> o	National	0
Invited lectures		Keynote lectures at international conferences	4
		Other	4
Models			0





ACTIVITIES		
Software applications		
Pilot plants		
Prototypes		
Potonto	International	0
Faterits	National	4
Other actions (e.g., scientific dissemination to a broad audience, social media)		

III.2 Highlight of main achievements

Various research programs were completed or initiated during this period and will provide results in the near future.

The main fields of research are:

- Innovative applications of materials such as GFRP and CFRP were studied in depth, experimentally, and analytically; most Portuguese research on waterproofing systems was performed within the group; breakthroughs in concrete and mortars technology were experimentally validated; mortars and concrete formulations with nanomaterials were performed; studies on the energy efficiency of different materials, building components and construction systems such as active and glazing facades, shading devices and green roofs and walls were conducted; risk-informed quality, safety and environmental management in construction related research was included in various national and international actions, including normative work;
- New theories on sustainability and construction were put forward, such as the use of traditional techniques and materials (earth, wood, stone, brick), implementation of selective demolition and recycling maximization (namely recycled aggregates in concrete and mortars production), and strategies of passive design and acclimatization;
- Life-cycle management systems (inspection, diagnosis, maintenance, and rehabilitation); conservation of historical building heritage (within various European research projects); other projects included sensors in structures, technological innovation, and assessment of complex structures; The summary of the main achievements is indicated in the above table;
- Seismic rehabilitation of masonry buildings; experimental and numerical analysis of timberframed masonry walls subjected to monotonic and cyclic loading; reinforcement of timberframed masonry walls with elastoplastic dampers, reinforced render, or steel plates.
 Experimental and numerical analysis of ordinary masonry walls subjected to in-plane and outof-plane loading. Seismic reinforcement of ordinary masonry walls with carbon fiber reinforced render or transverse hinge connectors.



PART IV – FUTURE ACTIVITY (2024)

The RG activities in 2024 will be a natural follow-up of the research carried out in 2023. These activities will cover research objectives that include different cross-cutting issues with branches in the four thematic strands: Product development in Civil Engineering industries (PD); Risk and safety in natural and built environments (RS); Rehabilitation of natural and built environments (RNBE); Response to natural and societal changes (RNSC).

The RG activities for 2024 will be organized according to major research topics as follows:

- To develop research projects in Construction Materials, Technology, and Management Innovation; Sustainable Construction; Monitoring, Rehabilitation, and Conservation of the Built Heritage. An effort will be made to concentrate on increasingly less wide and more specific fields to produce relevant results in national and international forums (measured in a significant increase in the number and impact factor of papers in peer-reviewed international journals, the supervision of Ph.D. Theses and the approval of national and international research grants): advanced materials and technologies also focusing on nanomaterials - establish international cooperation and be a national leader in the field of composites (GFRP and CFRP); concrete and mortars technology - proceed with Ph.D. and MSc studies under way (in strong collaboration with LNEC) and improve the Mortars Section of the Construction Laboratory; risk informed quality, safety and environmental management in construction - increase the already large international cooperation via technical committees and international conferences; sustainability and deconstruction strategies and technology - proceed with Ph.D. and MSc studies under way and be a national and international reference in the field of recycled aggregates for concrete and mortars production; building physics and passive design - continue the very good results in the near past and expand its potential through studies on energy efficiency and acoustics of innovative materials, components and construction systems; building acclimatization and mechanical systems continue collaboration with the Mechanics and Physics Departments of IST Department of IST, strategically important in terms of sustainable construction in terms of energy-saving; inspection, diagnosis, maintenance and rehabilitation systems - proceed with Ph.D. and MSc studies under way and be a national and international reference in the field of inspection and diagnosis systems; conservation of historical building heritage - continue and strengthen national and international cooperation projects, namely within the Construction Technological Portuguese Platform (PTPC);
- To continue participating in national and international committees, participating/organizing national and international conferences, teaching in Graduation and Post-Graduation courses in the field of construction (namely in the FCT Doctoral Program Eco Construction and Rehabilitation, launched in 2014), and participating in academic events and performing consultancy work.









RESEARCH GROUP 6 - Structural Design and Geotechnics

RESEARCH GROUP COORDINATOR – Eduardo Júlio

PART I - RESOURCES

I.1 Budget

BUDGET (euros)							
FCT Other Funding							
STRATEGIC Funding	FCT Projects	Other Research Funding		Consultancy		TOTAL	
		National	International	National	International		
31 434,71	112 683,12	828 289,77	151 567,85	266 816,36	0,00	1 390 791,81	

I.2 Personnel

PERSONNEL						
			Collaborator			
Name	Category	Member	with	witho	ut PhD	
			PhD	PhD student	Other	
André Filipe Castanheira Alves Furtado	Assistant Professor	х				
António Manuel Candeias de Sousa Gago	Associate Professor		х			
António Manuel Pinho Ramos	Associate Professor with Habilitation	x				
António Manuel Figueiredo Pinto da Costa	Assistant Professor		х			
Carla Alexandra da Cruz Marchão	Assistant Professor	х				
Carlos Alberto Ferreira de Sousa Oliveira	Full Professor Retired	х				
Carlos Manuel Tiago Tavares Fernandes	Assistant Professor		х			
Carlos Manuel Chastre Rodrigues	Associate Professor	х				
Corneliu Cismasiu	Associate Professor	х				
Dinar Reis Zamith Camotim	Full Professor Retired	х				
Eduardo Nuno Brito Santos Júlio	Full Professor	х				
Eduardo Soares Ribeiro Gomes Cavaco	Assistant Professor		х			
Elói João Faria Figueiredo	Full Professor	х				
Fernando Manuel Fernandes Simões	Assistant Professor with Habilitation		х			
Fernando Pedro Simões da Silva Dias Simão	Assistant Professor		х			
Filipe Pimentel Amarante dos Santos	Assistant Professor	х				
Hugo Miguel Bento Rebelo	Assistant Professor	х				
Hugo Sérgio Sousa Costa	Adj. Professor	х				
Ildi Cismasiu	Assistant Professor		х			
Jaime Alberto dos Santos	Associate Professor with Habilitation		x			

CERIS: Civil Engineering Research and Innovation for Sustainability



PERSONNEL						
				Collabora	or	
				with out Dh		
Name	Category	Member	with PhD	PhD student	Other	
João Carlos de Oliveira Fernandes de Almeida	Associate Professor		x			
	with Habilitation					
Joao Pedro Lage da Costa Firmo Jorge Miguel Silveira Filipe Mascarenhas Proenca	Assistant Professor Associate Professor	x				
José Joaquim Costa Branco de Oliveira Pedro	Assistant Professor	х				
José Nuno Varandas da Silva Ferreira	Assistant Professor		х			
Luís Manuel Coelho Guerreiro	Associate Professor with Habilitation	x				
Luís Manuel Calado de Oliveira Martins	Full Professor	х				
Maria Rafaela Pinheiro Cardoso	Associate Professor with Habilitation	x				
Mário Manuel Paisana dos Santos Lopes	Assistant Professor	х				
Nuno Rafael da Silva Peres	Professor		х			
Paulo Alexandre Lopes Fernandes	Coordinator Professor	х				
Paulo Renato Camacho da Silva Lobo	Assistant Professor		х			
Pedro Manuel de Castro Borges Dinis	Assistant Professor	х				
Peter John Bourne-Webb	Assistant Professor	х				
Ricardo Nuno Francisco do Carmo	Assistant Professor	х				
Rita Maria do Pranto Nogueira Leite Pereira Bento	Full Professor	x				
Rodrigo de Moura Gonçalves	Associate Professor with Habilitation	x				
Rui Pedro Carrilho Gomes	Assistant Professor	х				
Rui Pedro César Marreiros	Assistant Professor	х				
Teresa Maria Bodas de Araújo Freitas	Assistant Professor	х				
Válter José da Guia Lúcio	Associate Professor	х				
António Pedro Carones Duarte	Researcher	х				
Brisid Isufi	Researcher	х				
David Ventura Manta	Researcher	х				
lonut Dragos Moldovan	Researcher	х				
Jónatas Miguel de Almeida Valença	Researcher	х				
Mário Rui Tiago Arruda	Researcher	х				
Mónica Maria Sequeira Amaral Ferreira	Researcher		х			
Roman Fernandez Rodríguez	Researcher		х			
Abdalla Mustafa Abdalla Almukashfi	PhD Student			х		
Ali Asghar Nemati	PhD Student			х		
Amaro António Feliciano Catumbaiala	PhD Student			х		
Ana Célia Henriques Antunes	PhD Student			х		
Ana Raquel Rodrigues de Paula	PhD Student			х		
André Filipe Bento Guedes Quinhones	PhD Student			х		
António Maria Matos Lopes Simões	PhD Student			х		
Arianna Lupattelli	PhD Student			х		
Armando Demaj	PhD Student			х		
Bárbara Cardoso Gomes	PhD Student			х		
Bruno Aguirre Tessaro (concluded 2023)	PhD Student			х		
Bruno José Oliveira Santos	PhD Student			х		
Carlos Miguel de Araújo Rocha	PhD Student			x		



PERSONNEL					
			Collaborator		
News		Manula		witho	ut PhD
Name	Category	Member	with PhD	PhD student	Other
Deodato Bongo Manuel	PhD Student			x	
Diogo Nunes Galhofo (concluded 2023)	PhD Student			х	
Eduardo Menayame Kielo Madekanga	PhD Student			х	
Elisson Bilheiro Ferreira Filho	PhD Student			х	
Eliana Augusta Clemente Soldado	PhD Student			х	
Ellon Bernardes de Assis	PhD Student			х	
Emad Janghorban	PhD Student			х	
Fábio Moutinho Paiva	PhD Student			х	
Fernando Rocha Sarquis	PhD Student			х	
Gabriel de Jesus Gomes	PhD Student			х	
Ghandy Lamaa	PhD Student			x	
Inês Costa Feijão Borges	PhD Student			х	
João Carlos Martins Rei	PhD Student			х	
João Diogo Figueira (concluded 2023)	PhD Student			х	
João Manuel Alves Serra	PhD Student			х	
João Rodrigo da Silva Baptista	PhD Student			х	
José Pedro Pais Fernandes Basto	PhD Student			х	
Kamar Aljundi (concluded 2023)	PhD Student			х	
Laura Salime Hage de Souza	PhD Student			х	
Liliana Caria Oliveira	PhD Student			х	
Luís João Ferreira Vieira	PhD Student			х	
Luís Miguel Varela Maneta	PhD Student			х	
Marcus Omori Yano (concluded 2023)	PhD Student			х	
Maria Madalena de Oliveira da Ponte	PhD Student			х	
Mariana Cirila Sousa Jesus	PhD Student			х	
Mariana Isaura de Moura Ormeche	PhD Student			х	
Mariana Margarida Mateus Pinto	PhD Student			х	
Martim Nabais	PhD Student			х	
Mehdi Mellef	PhD Student			х	
Miguel Ângelo da Silva Rodrigues	PhD Student			х	
Mihai Adrian Bud	PhD Student			х	
Natan Sian das Neves	PhD Student			х	
Nima Tabarestani	PhD Student			х	
Peiman Ghaderi	PhD Student			х	
Rafael Sanabria Díaz (concluded 2023)	PhD Student			х	
Rafaela Caetano de Almeida	PhD Student			х	
Ricardo André das Neves Martins	PhD Student			х	
Rita Freire Machete	PhD Student			х	
Rita Monteiro Garcia Couto	PhD Student			х	
Salar Khaiiatali	PhD Student			х	
Sara Maria Santos Soares Dias	PhD Student			х	
Sérgio Marcelo de Deus Nascimento	PhD Student			х	
Seyedsajjad Hosseini	PhD Student			x	
Tatiana Costa Ferreira de Sá Marques	PhD Student			х	
Tomás João Fernando	PhD Student			х	
Victor Scartezini Terra	PhD Student			х	





The summary table is below.

Туре	Permanent	Non-pe	Total	
		Contract	Scholarship	rotai
Members	29	5	0	34
Collaborators with PhD	11	2	0	13
Collaborators without PhD			59	59
Technical staff				0
Administrative Staff	1.5			1.5
Others				



PART II - DESCRIPTION

Leadership

In 2023, Professor Eduardo Júlio was the coordinator of the Research Group RG6. All PhD members of the Group meet formally once a year to define and plan the common activities.

Description of the Research Group

General Objectives

The research activity of RG6 is planned to focus on six major research areas:

- 1. Mechanics, Modelling, and Analysis of Structures;
- 2. Earthquake Engineering and Seismology;
- 3. Structural Concrete;
- 4. Steel and Composite Structures;
- 5. Bridge Design;
- 6. Geotechnics.

In general terms and as transversal objectives, it was intended to:

- Develop new products with enhanced performance, durability, and eco-efficiency;
- Reduce risk and improve the safety of infrastructures, namely regarding seismic hazard characterization and seismic vulnerability assessment;
- Increase the efficiency of structural systems and the incorporation of innovative materials and devices;
- Develop more powerful and friendly models for structural and geotechnical analysis, directly linking to code standards;
- Develop alternative solutions for the rehabilitation of existing structures, in particular of historical buildings;
- Use the above to address specific societal challenges.

On the subject field of Mechanics, Modelling, and Analysis of Structures, the activity of the group was centered on the analysis of nonlinear, coupled structural problems using conventional and hybrid finite element formulations, focusing on the following topics:

- (i) Dynamic instabilities and algorithms for the numerical analysis of the mechanical behavior of non-smooth structures with frictional or elastoplastic components;
- (ii) Modeling of moving loads on beams on nonlinear foundations;
- (iii) Numerical simulation of the wildfire effects in dwellings located in forest areas using



computational fluid dynamics by solving the Navier-Stokes equations for low-speed, thermally-driven flows, including smoke and heat transport from fires.

(iv) Developing of hybrid-Trefftz stress plate elements for Reissner-Mindlin plates with an exact Kirchhoff limit.

On the subject field of Earthquake Engineering and Seismology, the activity of the group kept focused on the following topics:

- 1. History of construction and structural behavior and construction techniques of traditional masonry tile vaults;
- 2. Assessment of existing structures (e.g., dynamic characterization, seismic vulnerability, and seismic risk assessment);
- 3. Update and improve a model for quick evaluation of the potential seismic performance of masonry and reinforced concrete buildings based on its application to existing buildings;
- 4. Structural rehabilitation (e.g., seismic strengthening techniques, passive protection);
- 5. Development of tools to improve preparedness and community resilience, aiming to reduce the seismic risk through non-structural elements;
- 6. Seismic design of new masonry constructions.

On the subject of Structural Concrete, the activity aimed to deepen the work developed in previous years and kept focused on the following topics:

- 1. Advanced cementitious materials;
- 2. High-performance ordinary and prestress reinforcement;
- 3. Enhanced durability;
- 4. Sustainable and eco-efficient solutions;
- Modeling and design models (e.g., stress-fields models, FEM-based software with strongly embedded discontinuities, concrete reinforced with embedded fibers);
- Assessment of existing structures (e.g., reliability, structural robustness, monitoring, seismic vulnerability);
- 7. Structural rehabilitation (e.g., repairing and strengthening techniques, seismic strengthening, passive protection);
- 8. Prefabrication and innovation.

On the subject field of Steel and Composite Structures, the activity of the group was planned to develop in-house expertise in the following topics:

9. GBT formulations to perform buckling, post-buckling, and vibration analyses of isolated members and structural systems (e.g., continuous beams or simple frames) prone to local,





distortional, and global deformations;

- 10. In-depth investigations on the non-linear behavior, ultimate strength, and design of coldformed steel open-section and tubular members experiencing coupling phenomena involving local and/or distortional buckling;
- 11. Novel rational approaches for the design of cold-formed and hot-rolled steel angle columns;
- Development and implementation of (a) a displacement-based finite element for the linear analysis of curved members (circular axis), (b) a finite element formulation for the bifurcation analysis of composite steel-concrete beams;
- 13. In-depth investigations on steel sub-assemblages with bolted and welded dissipative fuses;
- 14. Proposal of design rules for composite structural members and parts;
- 15. Applications to steel and composite bridges.

In the field of Bridge Design, the activity was planned to deepen the work developed in previous years, focusing mainly on the following:

- Buckling resistance of steel plated girders considering M-V interaction with high compression forces (application to cable-stayed bridges);
- (ii) Curved steel plates on bridge deck beam: Post buckling behavior and ultimate strength;
- (iii) The use of high-strength steels in the bridge deck;
- (iv) Fatigue assessment of composite steel-concrete cable-stayed bridge decks;
- (v) Higher order beam theory (developments and applications to steel structures and bridges analysis);
- (vi) Analysis of the distortion effect on the dynamic behavior of high-speed railway bridges;
- (vii) Analysis of substructures of offshore wind turbines.

In the field of Geotechnics, the activity the group focused mainly on the following topics:

- (i) Dynamic characterization of soils from small to large strains, including liquefaction;
- (ii) Studies on the elastic response measured in resonant columns and using bender elements;
- (iii) Characterization of the chemo-hydro-mechanical behavior of clayey and treated soils considering their structure and degree of saturation,
- (iv) Characterization of soils treated with lime, cement, and bacteria,
- (v) Numerical analysis of geotechnical structures involving strong soil structure interaction (e.g., tunnels, retaining structures, piles, and thermoactivated structures),
- (vi) Studies on soil decontamination techniques (e.g., electro-osmosis),
- (vii) Numerical simulation of gas migration and temperature and solute transport in soils.



Group Governance

Facilities

The main laboratory facilities used by CERIS RG6 include: (i) the Laboratory of Structures and Strength of Materials (LERM), (ii) the Laboratory of Computational Mechanics (LMC), and (iii) the Laboratory of Geotechnics (LabGeo), all located at IST Alameda campus, and (iv) the Seismology Laboratory (SeismLab) that belongs to the National Geophysical Network. A more detailed description of each laboratory is presented ahead.

LERM: Regarding the laboratory components available at LERM, the following equipment should be mentioned: Travelling crane, Steel frames; Reaction wall (able to apply horizontal forces up to 1000 kN, 4m above floor level); Universal testing machine; Hydraulic Press for compression testing; Wind tunnel; Static and dynamic actuators; Automatic data acquisition systems; Accelerometers and displacement transducers; The equipment mentioned above allows the realization of full-scale tests of structural components or assemblage of structural elements up to one story frames.

LMC: Regarding the available computational equipment, the connection to a European electronic mail network should be emphasized, as well as the Computational Mechanics laboratories equipped with RISC technology graphic workstations, PCs, and Macs served by a cluster that includes a machine with parallel processing. All the necessary support equipment was also available, such as printers, plotters, scanners, and software for developing numerical models and experimental data processing.

LabGeo: The facilities of the Laboratory of Geotechnics have been used for teaching, research, and consultancy projects. It provides the experimental means necessary for developing fundamental research on the stress-strain behavior of soils from very small deformation to failure conditions under monotonic and cyclic loading. It also provides the possibility to obtain high-quality soil parameters for applied research on numerical modeling of soil-structure interaction problems. Several MSc and PhD theses were developed using the available equipment resources to perform advanced physical, mechanical, hydraulic, and electrical characterization of geomaterials in saturated and in unsaturated conditions. Moreover, existing equipment allows for field tests such as quality control, dynamic load tests on piles, and seismic tests for site characterization.

SeismLab: The seismology laboratory and the seismic networks are mainly used for research. CERIS operates a seismological laboratory belonging to the National Geophysical Network. The Network comprises 61 stations to monitor moderate to strong seismic activity in the Portuguese mainland and the Azores. These are accelerometric stations with common universal timing, implanted in the basement of small-size constructions such as fire brigade headquarters or schools. Soon, all the accelerometric stations will belong to a National Accelerometric Network close to the Accelerometric Stations of the Institute for the Sea and Atmosphere (IPMA). This connection was strongly supported and promoted by FCT.





PART III - ACTIVITY

III.1 Activity indicators - Summary table for 2023

ACTIVITIES				
PhD Theses		Concluded	8	
		To be concluded after 2023	51	
		International peer-reviewed journals (WoS AND Scopus)	96	
	Papers in peer-reviewed journals	Peer-reviewed journals (non-WOS OR non-Scopus)	6	
Publications		Peer-reviewed journals (non-WOS AND non-Scopus)	1	
	Denero in proceedings	International	67	
	rapers in proceedings	National	22	
	Books	Entire		
		Chapters		
		As editor		
Paparta		Scientific		
Перона		Consultancy/others	14	
	Editor in Chief	WoS/Scopus-indexed Journals	0	
	Editor-in-Chief	Other journals	0	
		WoS/Scopus-indexed Journals	9	
		Other journals	1	
Collective guidance in	lssue Editor/Guest Editor/Membership Editorial Boards	WoS/Scopus-indexed Journals	37	
scientific work		Other journals	14	
	Membership in Scientific Committees	International	4	
		National	1	
	Drofting of godog Decommondations	International	27	
	Diating of codes, Recommendations	National	21	
Organization of acientific quanta		International	1	
organization of scientin		National	1	
	International research grants	Started in 2023	2	
Competitive research	international research grants	Active in 2023	6	
projects	National research grants	Started in 2023	8	
	National research grants	Active in 2023	14	
Competitive individua	I research grants (PhD, Post-doc,	Started in 2023	3	
sabbatical, etc)		Active in 2023	11	
Awards		International	8	
		National	2	
Refereeing for funding agencies		International	0	
		National	0	
Invited lectures		Keynote lectures at international conferences	7	
		Other	2	
Models			0	
Software applications			0	





ACTIVITIES		
Pilot plants		0
Prototypes		0
Detente	International	1
Faterits	National	1
Other actions (e.g., scientific dissemination to a broad audience, social media)		7

III.2 Highlight of main achievements

In 2023, the following main achievements of Group RG6 can be highlighted:

- (i) 8 PhD Theses concluded, and 51 are in progress;
- (ii) 26-chapter books authored;
- (iii) 103 papers published in international journals (96 in journals indexed in WOS Web of Science);
- (iv) 67 papers published in international conference proceedings.
- (v) 22 papers published in national conference proceedings.
- (vi) 2 international research project was awarded, and six are ongoing.
- (vii) 8 national research projects awarded and 14 ongoings.
- (viii) 8 international and two national awards.

Group members organized or are in the process of organizing one International Conferences.

Group members serve as associate editors of 9 WOS-indexed journals, and the group was involved in 37 editorial boards of scientific journals.

Group members were also elected as members of scientific organizations at international and national levels, involved in funded research projects, in scientific committees of International events, and invited to deliver lectures at scientific events.



PART IV – FUTURE ACTIVITY (2024)

In 2024, it is planned that the members of the RG6 continue working on the most relevant research topics of the area, according to reference international organizations and current priorities of the country.

A renewed effort to promote deeper and more effective collaboration between RG members and between these and internationally renowned researchers will be made to deliver relevant contributions to the sector and increase participation in research projects funded by the European Union. The main general purpose is to improve the construction sector's competitiveness, reduce risk and improve the safety of infrastructures, supporting the development of economical and eco-efficient materials and products and new technologies to design, build and maintain high-quality and long-lasting structures. This embraces the development of (i) sustainable materials and products, (ii) innovative construction methods, addressing, particularly prefabrication, as well as rehabilitation, (iii) advanced computational tools for structural and geotechnical analysis, (iv) contributions to standards and design guidelines for both new and existing structures, including their foundations, (v) novel health monitoring and life-cycle assessment tools for structural and geotechnics use, and (vi) steel industrial research and innovation in line with the European Green Deal.

Other more general objectives are the increase of the group internationalization and the links to industry, namely through:

- improvement of the competitive funding capacity in international and national research projects calls
- participation in national and international standardization committees,
- organization of academic national and international events,
- participation in national and international Graduation and Post-Graduation courses (namely ERASMUS and FCT Doctoral Programs) in the field of Structures and Geotechnics,
- expert consultancy work to partially fund research and provide practical applications to the results of research,
- cooperation with design offices and private companies,
- partnership with the industry for the optimization of resources and industrial efficiency upgrading.