earthquake risk mitigation of urban cultural heritage rui maio | ruiamaio@ua.pt





outline

urban cultural heritage state of art phd thesis working plan objectives timeline



urban cultural heritage

architectural valued buildings located within historical centers

which class or category?

Italian Linee Guida guidelines (Baccilieri 2012)

- Palaces, villages with interim/intermediate horizontal diaphragms;
- Churches, cathedrals and another structures without interim/intermediate horizontal diaphragms;
- Towers, bell towers and another slender structures (vertically);
- Masonry bridges, triumphal arches and another arch structures.

PERPETUATE project (Lagomarsino and Cattari 2014)

- Assets subjected to prevailing in-plane damage (palaces, castles, religious houses, caravansaries, collective buildings);
- Assets subjected to prevailing out-of-plane damage (churches, mosques, modern theatres, markets, industrial buildings);
- Assets characterized by monodimensional masonry elements (towers, bell towers, minarets, lighthouses, chimneys);
- Arched structures subject to in-plane damage (triumphal arches, aqueducts, bridges, cloisters);
- Massive structures with prevailing local failure of masonry (fortresses, defensive city walls, Roman and Greek theatres);
- Blocky structures subjected to overturning (columns, obelisks, trilithes, archaeological ruins, Greek temples);
- Built systems subjected to complex damage (historical centers).

state of the art



state of the art

PERPETUATE project:

- definition of safety levels
- definition of seismic hazard
- foundation problems and soil/structure interaction
- models for the seismic vulnerability at territorial scale
- diagnostic techniques, material parameters and structural identification
- models for the seismic analysis and design of interventions
- development of an integrated methodology and application to case studies

state of the art



phd thesis working plan



phd thesis working plan

JUL2016

T3 - In-plane behavior of UCH assets

In-situ testing campaign (*A*) Development of sensitivity and uncertainty analysis associated to numerical models (*B*) Implementation of traditional retrofitting solutions and cost-benefit analysis (*C*)

Deadline for the accomplishment of all the courses scheduled both for the PhD program Infrarisk- and for the Civil Engineering Department of the University of Aveiro, including the Seminar of the Research Project.

JAN2019

T5 - Strategies and guidelines

Definition of strategies and national code-oriented guidelines for the vulnerability and risk mitigation of urban cultural heritage assets

JAN2016 T1 - Literature review

Framework and literature review on earthquake risk mitigation of urban cultural heritage worldwide

JUL2017

T4 - Damage and loss scenarios Integration in GIS tools and

articulation with macroseismic hybrid-based approaches **JUL2019** Writing and compilation of the PhD thesis and publication of additional scientific articles

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