



HISTORICAL CONSTRUCTIONS 2001

**Accounting for the “block
effect” in structural
interventions in Lisbon’s old
“Pombaline” downtown buildings**

III International Seminar
7 - 8 - 9 November 2001
Guimarães, Portugal

**Construções
Históricas**

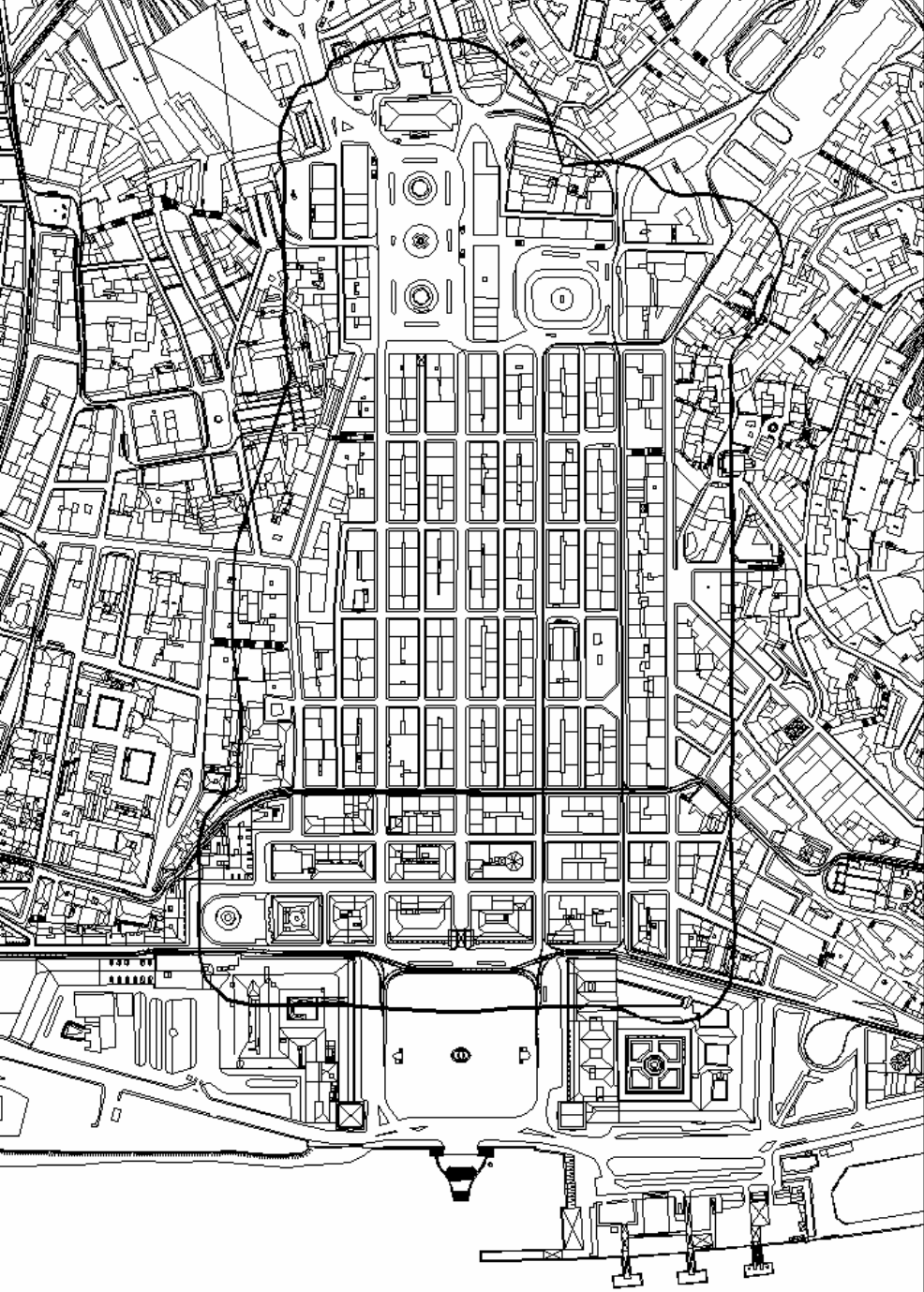
**Historical
Constructions**

**Construcciones
Históricas**

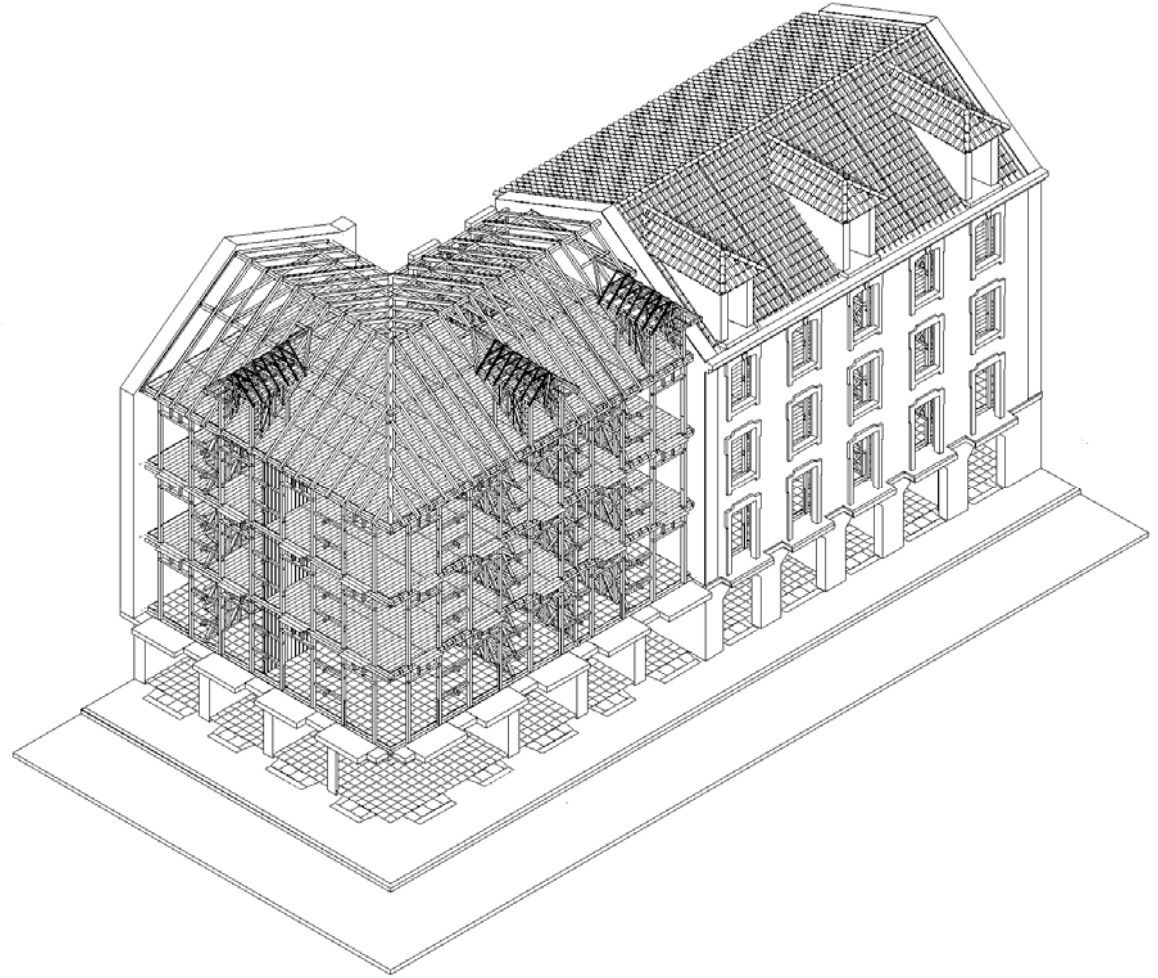
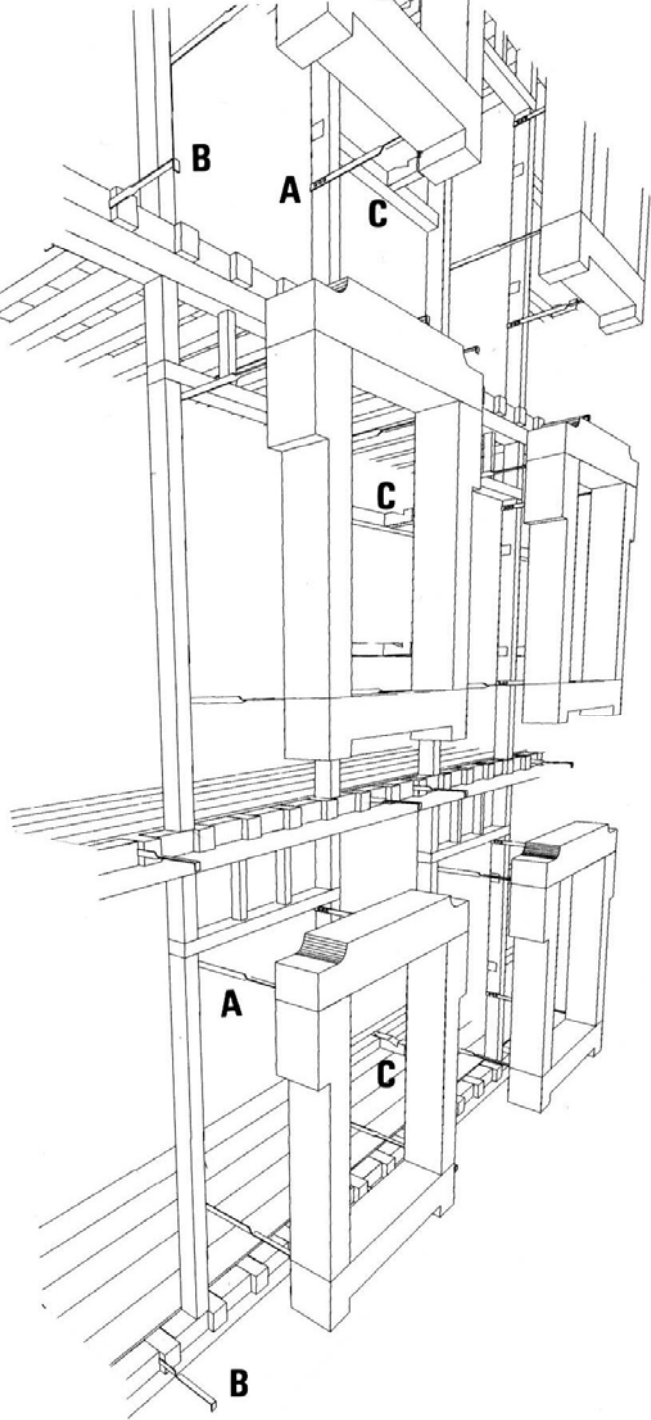
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1. Introduction
2. Structural characterisation of the "baixa pombalina"
3. A case study
4. Proposed methodology
5. Cost estimate
6. Conclusions

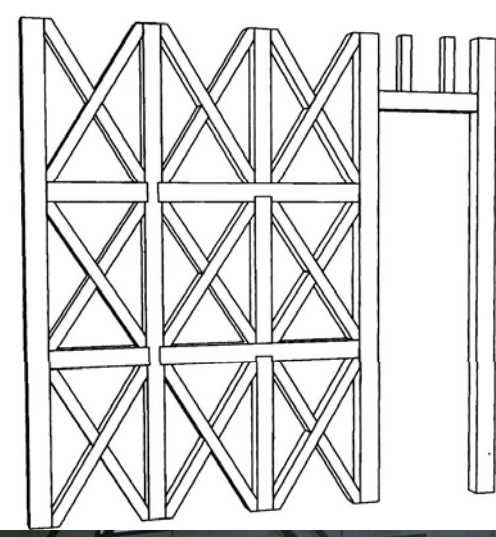
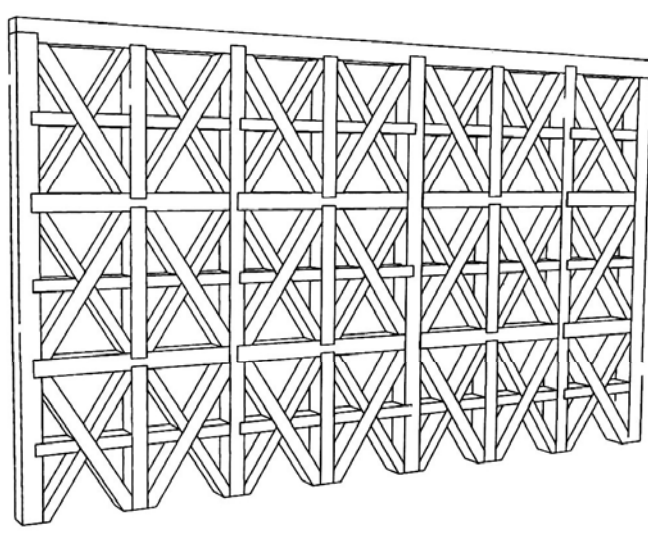
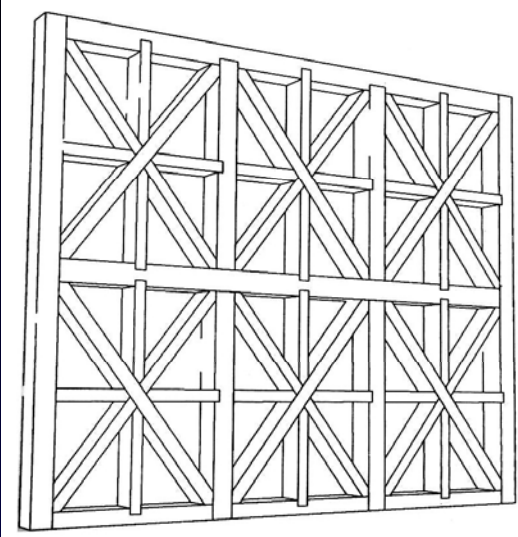




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**"Pombaline" timber
framed construction**





"Pombaline" timber framed construction

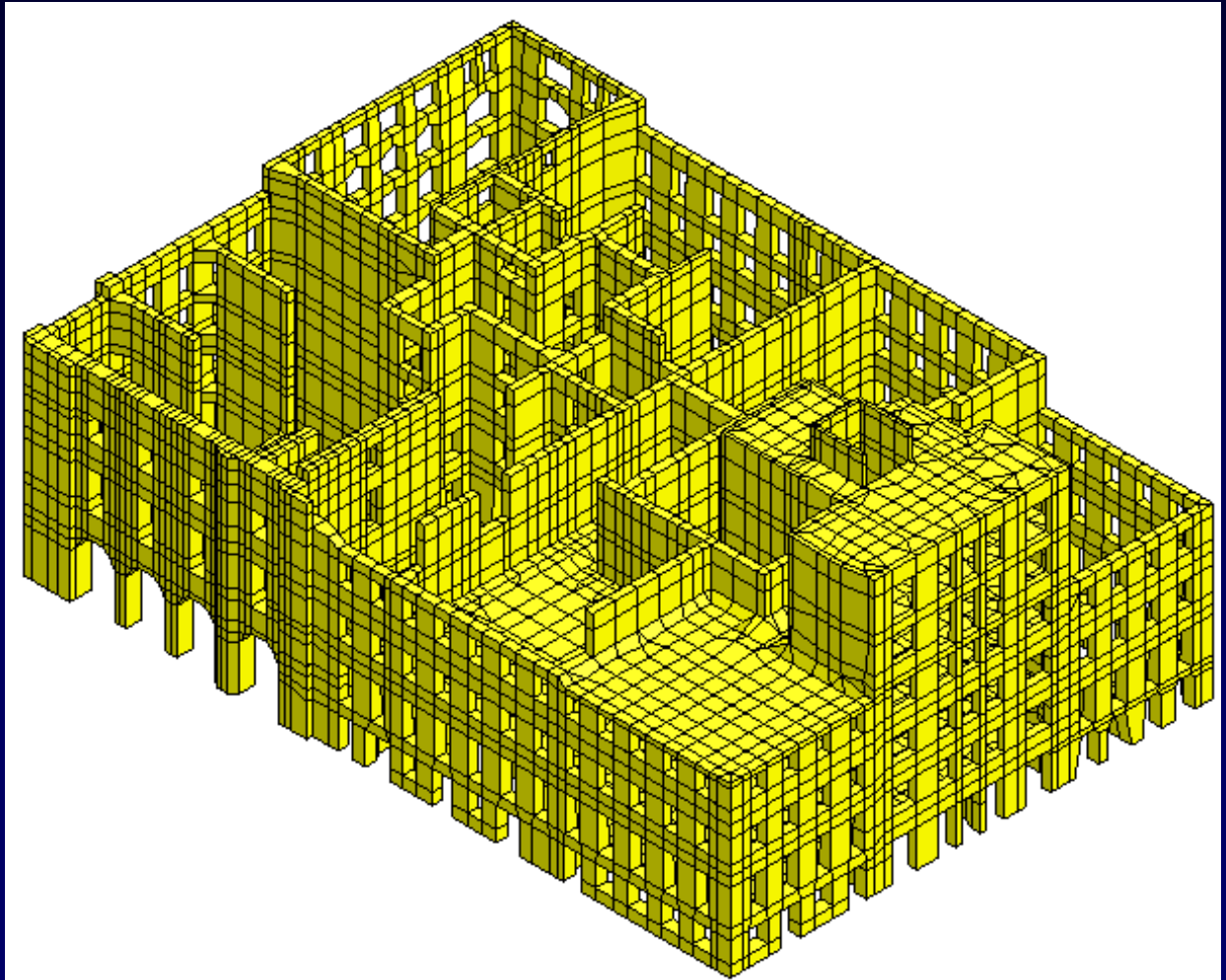


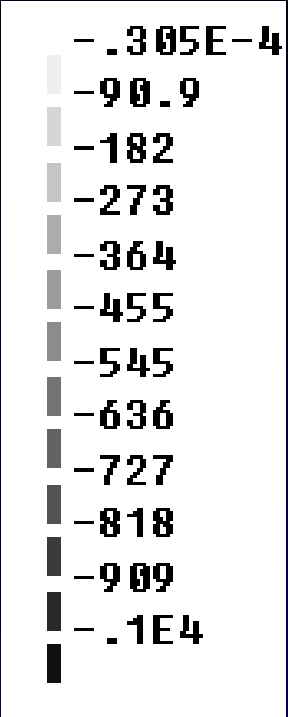
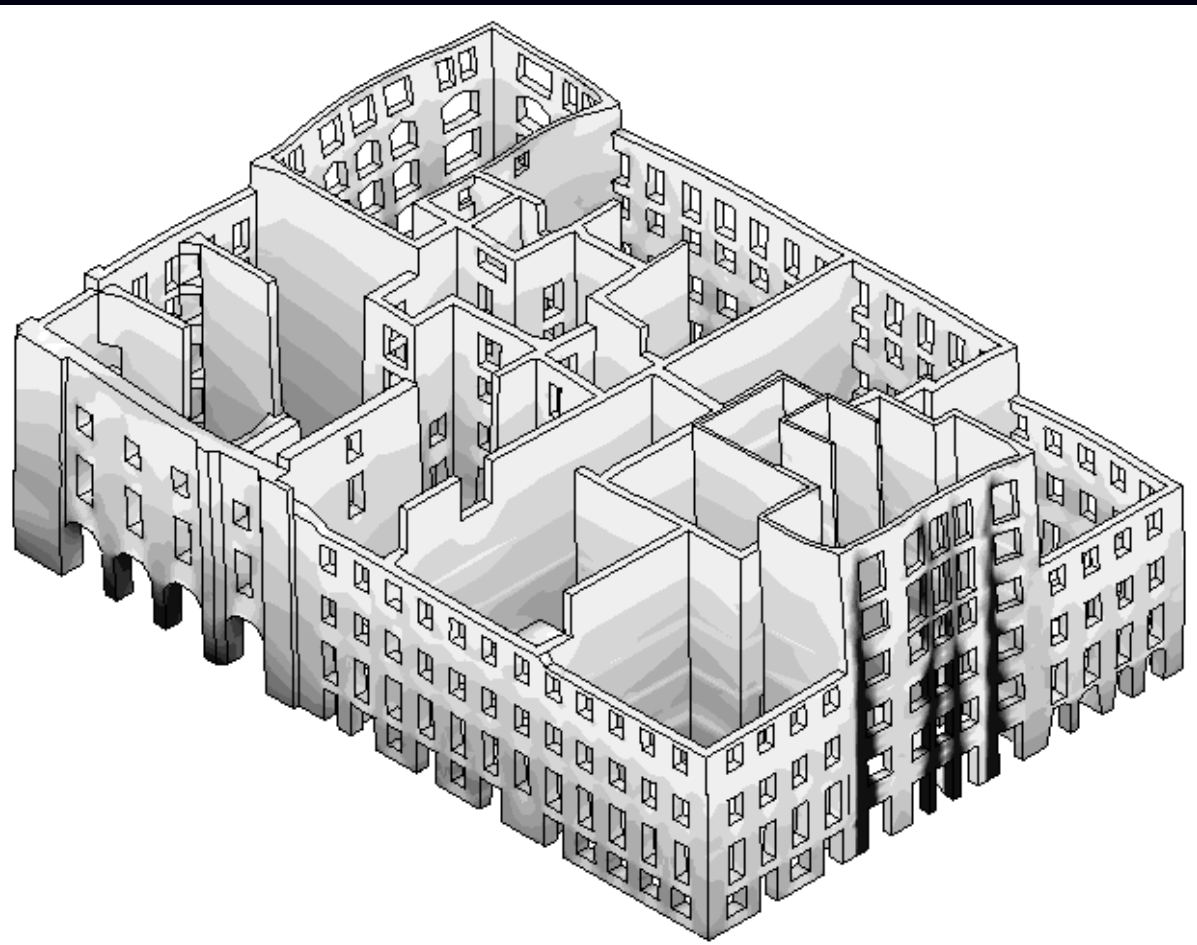
Survey and characterisation

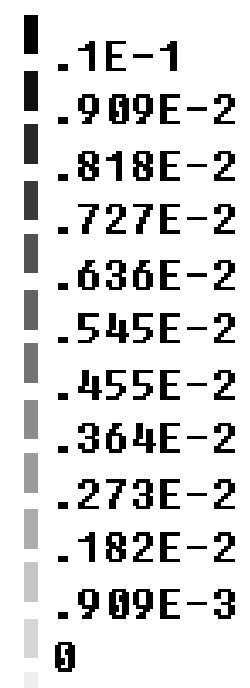
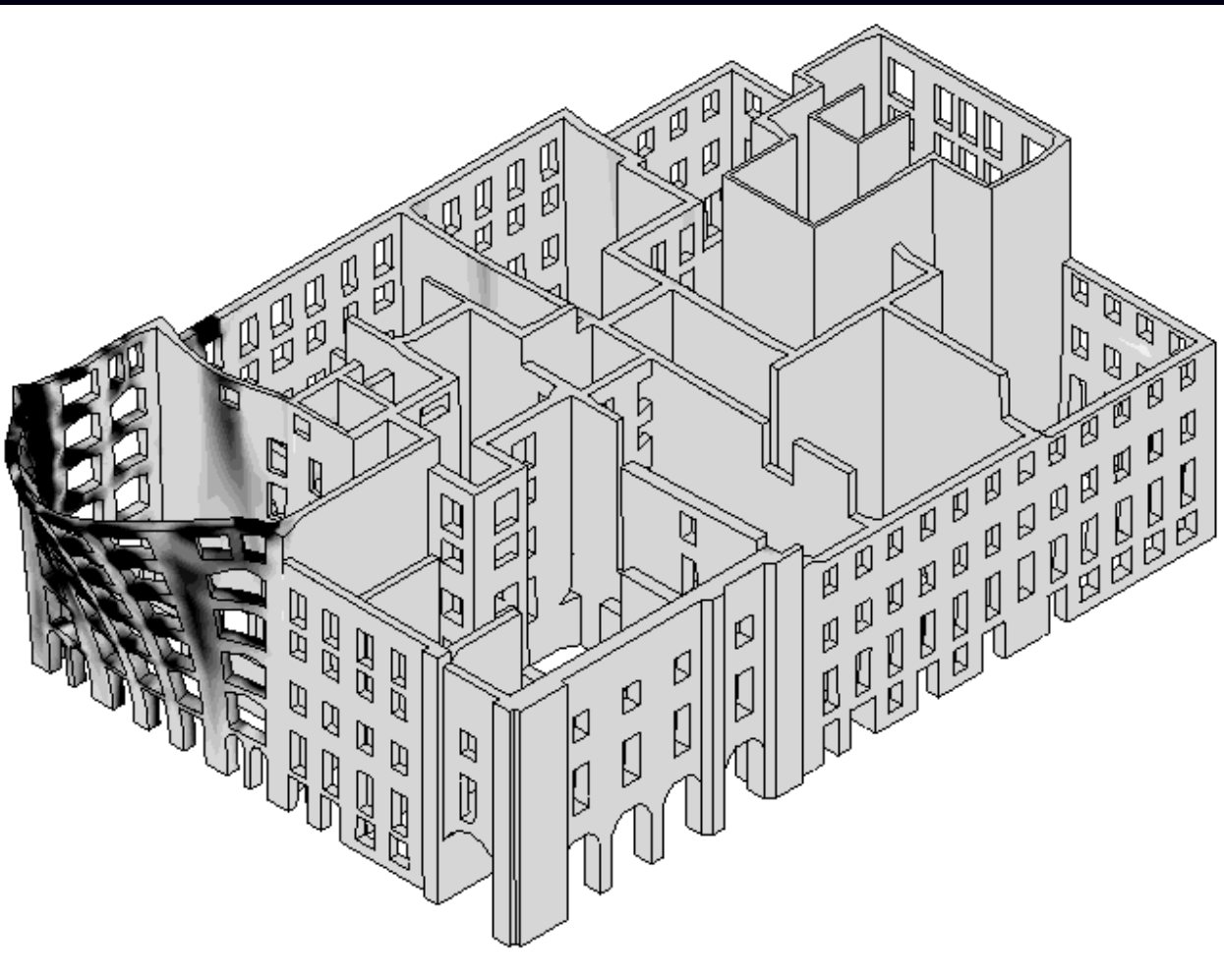
Phases of interventions where inspection and assessment techniques are used

Phase	Scope
I) Before the intervention	1. Preliminary investigation and survey
IA) Before modelling	2. Appraisal of the geometry of the construction
IB) During modelling	3. Assessment of material mechanical properties
II) During the intervention	4. Model validation
III) After the intervention	5. Quality assurance
	6. Evaluation of the effects on the intervention
	7. Monitoring of the structure

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**I. Complete survey and identification
of all sixty blocks of "Baixa
Pombalina";**

II. For each of the blocks, perform a survey of the existing structure, a characterisation of the structural materials and a classification in the categories proposed in Section 2.2;

III. For each of the blocks, construct a finite element model and perform the analysis, determining the forces in the structural elements. For the blocks with significant or moderate structural modifications, the analysis should be carried out using software easily available for practitioners;

IV. In case of a request by an owner or developer acting on a building located in a substantially modified block, the survey and model of the complete block should be provided;

V. The intervention in the building would only be approved if it is demonstrated that no negative contribution to the safety of the block occurs.

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Costs involved in survey and characterization and modelling (kEuro)

Task	Cost per building	Cost per block	Total
Architectural survey	10	70	4 200
Structural survey	9	63	3 780
Materials characterisation ¹			250
Foundation survey	2	14	840
Geotechnical survey ²			400
Modelling		30	1 800
Total			11 270

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The structural behaviour of an isolated building in "Baixa Pombalina" is different from the same building inside a block.

Municipal departments should be able to make available, to the owners and developers involved in rehabilitation / interventions, validated structural analysis models, capable of attaining a double objective: (a) enable the consideration of the “block effect” in the structural design of interventions required in a particular building; (b) provide evidence that none of the remaining buildings in the same block is deleteriously affected by the intervention.

The costs involved in the proposed studies, although significant, do not appear to be disproportionate.

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Thank you.

