Appendix 10

Section 10 *Seismic Performance Assessment & Rehabilitation: SPEAR*

presented by F. Taucer

European Laboratory for Structural Assessment (ELSA)

Seismic Performance Assessment & Rehabilitation: SPEAR

ompetitive and Sustainable Growth (Growth 2001, dedicated call)

Contract G6RD-CT-2001-00525

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WORKING MEETING WITH DG ENTR UNIT G5

The history

- Collaboration agreements were established with Japanese and US research organizations.
- The problem of the seismic assessment and rehabilitation of existing buildings was jointly identified as the most socially and economically relevant.
- An Expression of Interest was submitted to the Programme Growth.
- The EoI was selected as deserving specific research work. A dedicated Growth call was issued.
- The proposal prepared by the SPEAR consortium was selected for funding among other proposals.

Facts

- Earthquakes pose a large threat to the life and property in Europe. Average annual casualties due to earthquakes in the EU and candidate stated exceeds 20,000. Direct economic losses in Izmit (TR) were estimated as 20 billion Euro, and in Athens 2 billion Euro.
- Casualties and losses are mainly due to deficient R/C buildings, and, to a lesser extent, to old URM buildings.
- The same problem is being addressed in other countries. Research efforts have been or are being undertaken. A harmonized approach should possibly be sought.
- A method for the identification of hazardous buildings and their cost-effective seismic upgrading should be developed. The work will contribute to the revision of EC8 Part 1-4, during its conversion from ENV to EV by 2003.

The consortium

- University of Patras (Administrative coordination) (GR)
- JRC (Scientific and technical coordination)
- LNEC (P)
- University of Rome (I)
- University of Pavia (I)
- Imperial College (UK)
- University of Ljubljana (SL)
- EQE Europe (UK)

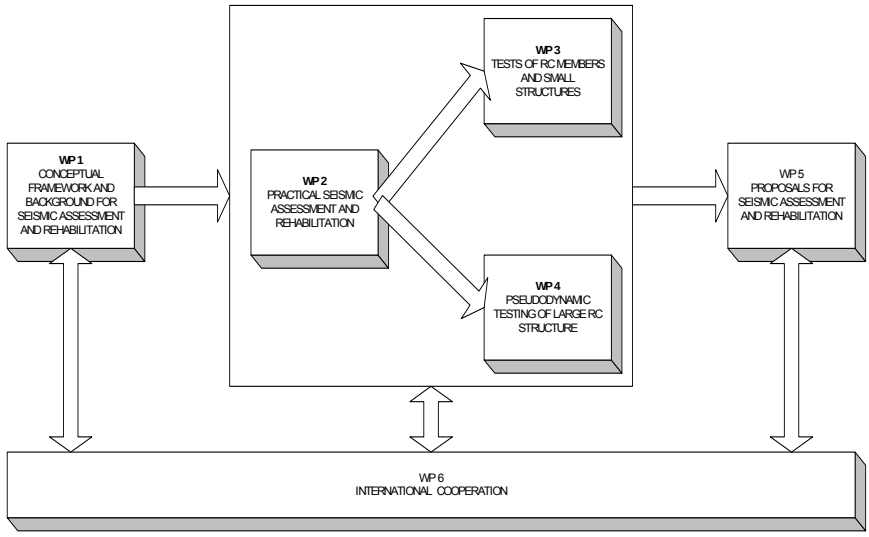
The overseas partners

- Building Research Institute, Ministry of Construction, Japan.
- University of Tokyo.
- The three US Earthquake Engineering Research Centres funded by NSF:
  MAE, MCEER, PEER.
- Earthquake Engineering Research Centre, University of Ankara, Turkey.

Workpackages

- WP1: Conceptual framework and background of seismic assessment and rehabilitation
- WP2: Practical seismic assessment and rehabilitation
- WP3: Tests of RC members and small structures
- WP4: PsD testing of large RC structure
- WP5: Proposals for seismic assessment and rehabilitation
- WP6: International cooperation
- WP7: Project management

Workplan



Workpackages

WP1: Conceptual framework

- Internationally harmonised definition of performance parameters and criteria. Emphasis on cyclic damage, local to global relations, effects on load bearing capacity.
- Review of common rehabilitation strategies for RC and masonry buildings
- Review and inventory of common and new (advanced composites) rehabilitation techniques

Workpackages

WP2: Practical assessment & rehabilitation

- Comparative evaluation of existing methods (ICONS, NODISASTR, ECOEST - Japan Building Disaster Prevention Agency, NZ Association of EE, FEMA)
- Development/modification of simple methods.
- Development of models for strength and deformation of retrofitted elements.
- Development of rules for proportioning of the retrofitted elements (focus on deformation capacity).

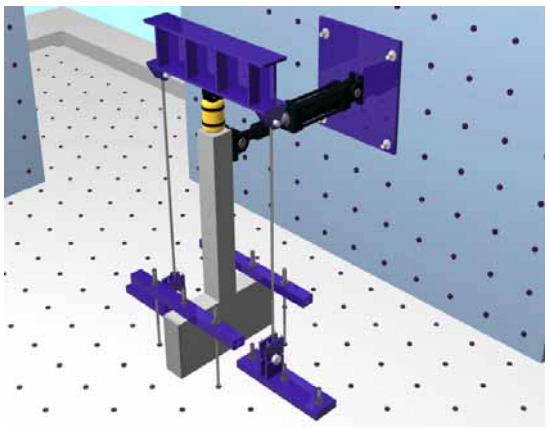
Benchmark structures

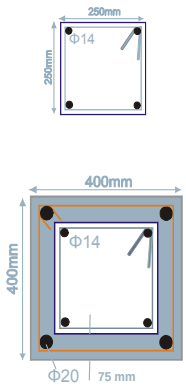
Workpackages

WP3: Tests on elements & substructures

- Definition, design and assessment. Elements will be selected so that they are representative, they supplement other tests other than duplicating. High axial load and irregularity included.
- Numerical simulations and assessment with existing and new methods.
- Cyclic tests on columns and joints, before and after retrofitting.
- Tests on subassemblages: cyclic tests on a 1:1.5, 3-storey plane frame; on a 1:1.5, 2-storey, 1-bay-by-1-bay 3D frame; shake table test on a smaller scale 3D structure.

Tests on subassemblages



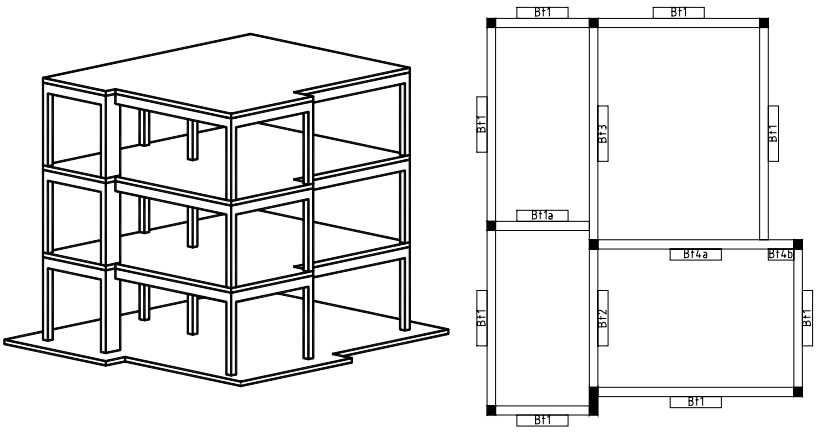


Workpackages

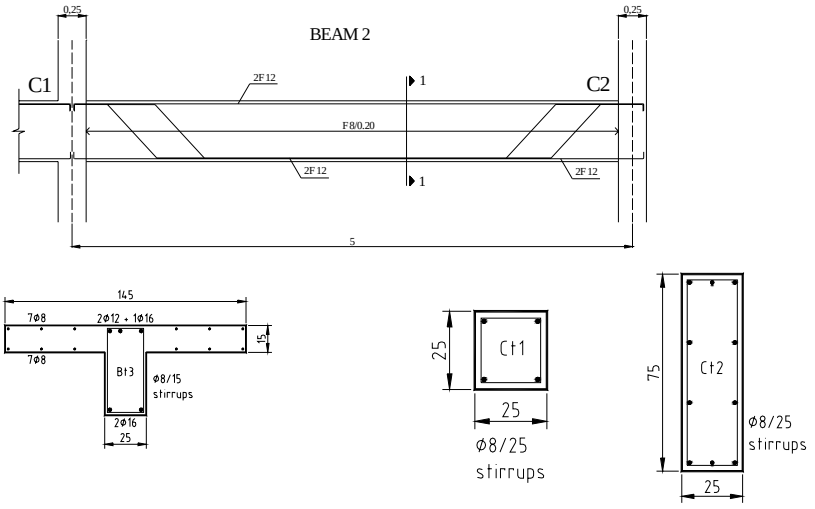
WP4: PsD tests

- Definition, design and construction. The mock-up will be representative of non-seismic RC construction of the 70's. Irregularities in plan and detailing will be included.
- Pre-test assessment & numerical simulations.
- Tests on the un-retrofitted structure.
- Repair and local member upgrading with advanced composites. Re-testing.
- Repair and global upgrading. Jacketing to correct plan-wise irregularities.
- Re-test to failure.

The test structure



Non-seismic detailing



Workpackages

WP5: Guidelines for assessment & rehabilitation

- Post-test assessment of performance parameters and criteria, existing and new methods, schemes and techniques.
- Drafting of guidelines.
- Proposals for EC8, Part 1-4. The final draft of part 1-4 is expected by February 2003.

A new NAS partner

- By means of a recently approved NAS proposal, the Higher Technology Institute in Nicosia, Cyprus, will join the SPEAR consortium.
- The additional research work will address the possibility of adopting existing and new EC8 provisions in NAS.