

24 May 2013 - Timișoara

Retrofitting of precast reinforced concrete walls with cut-out opening using mixed NSM-EBR FRP techniques

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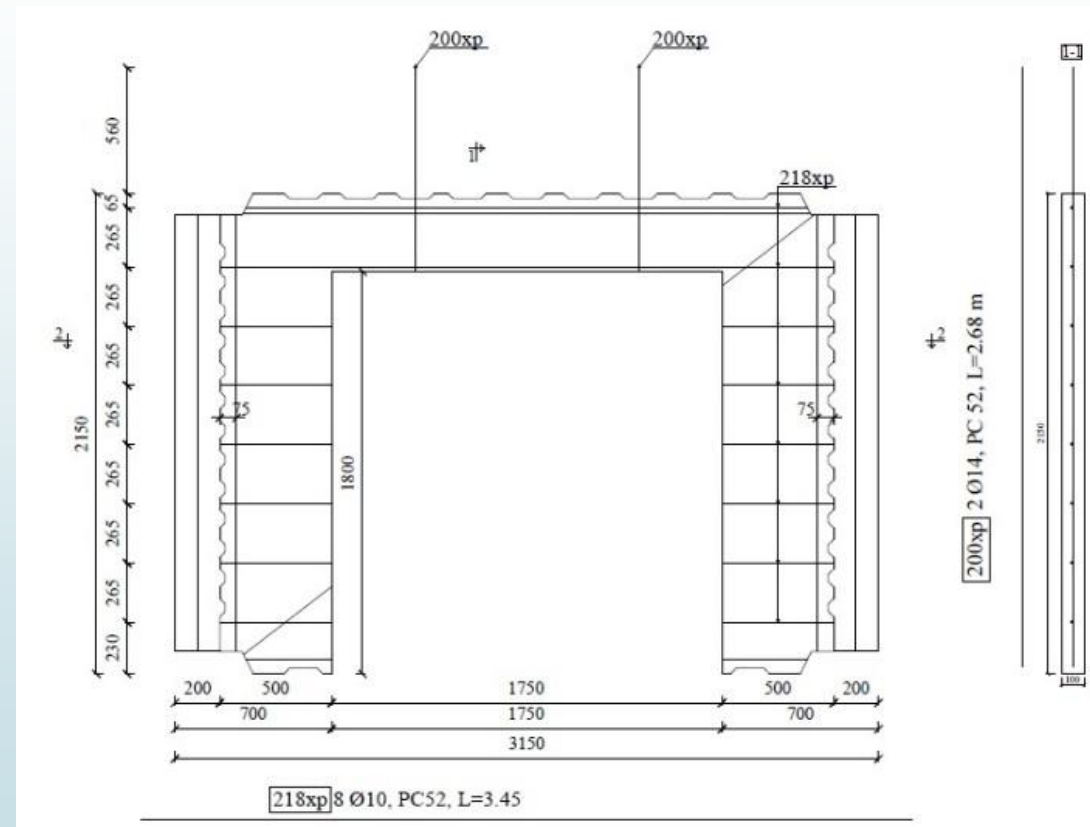
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1.Introduction

- ▶ Between 1954 and 1990 in Romania Precast Reinforced Concrete Large Panels (PRCLP) were used as structural system
- ▶ Due to comfort standards inhabitants have started to cut out opening to increase comfort
- ▶ The purpose of the paper is to present the influence of retrofiting method on the specimen and compare the results with an unstrengthen specimen.

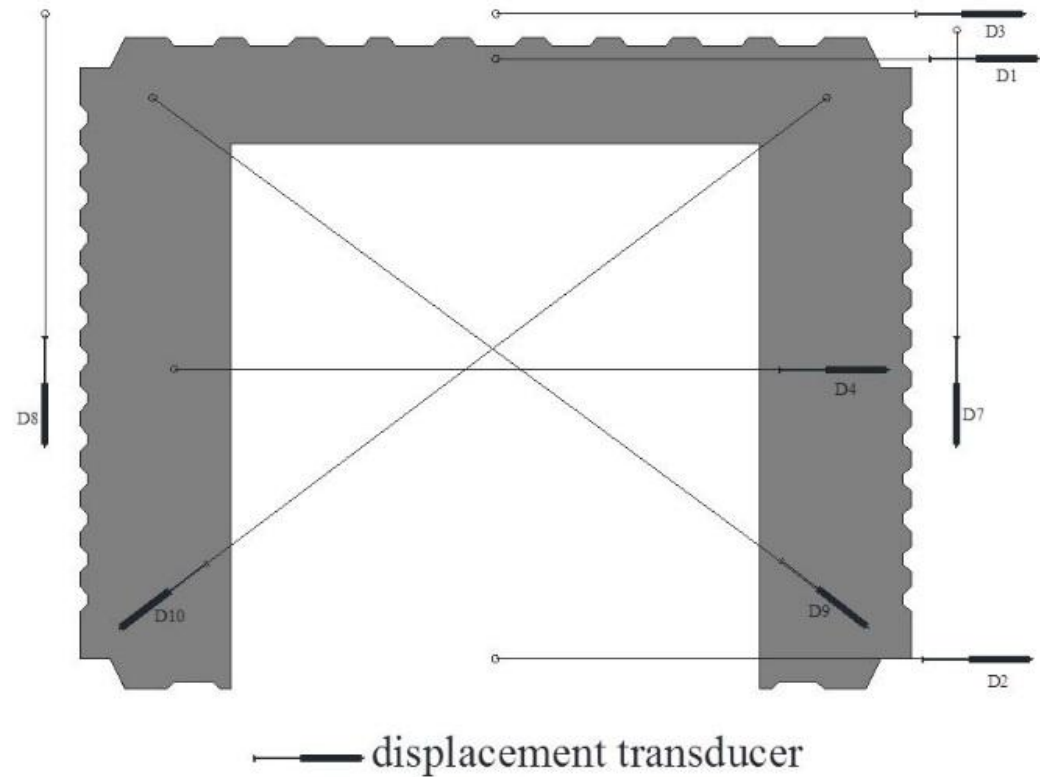
2. Test Program

- ▶ t is assumed to be at ground floor of a 5-story building
- ▶ The specimen is 1/1:2 model of real life
- ▶ Concrete compressive strength was 40.15 Mpa

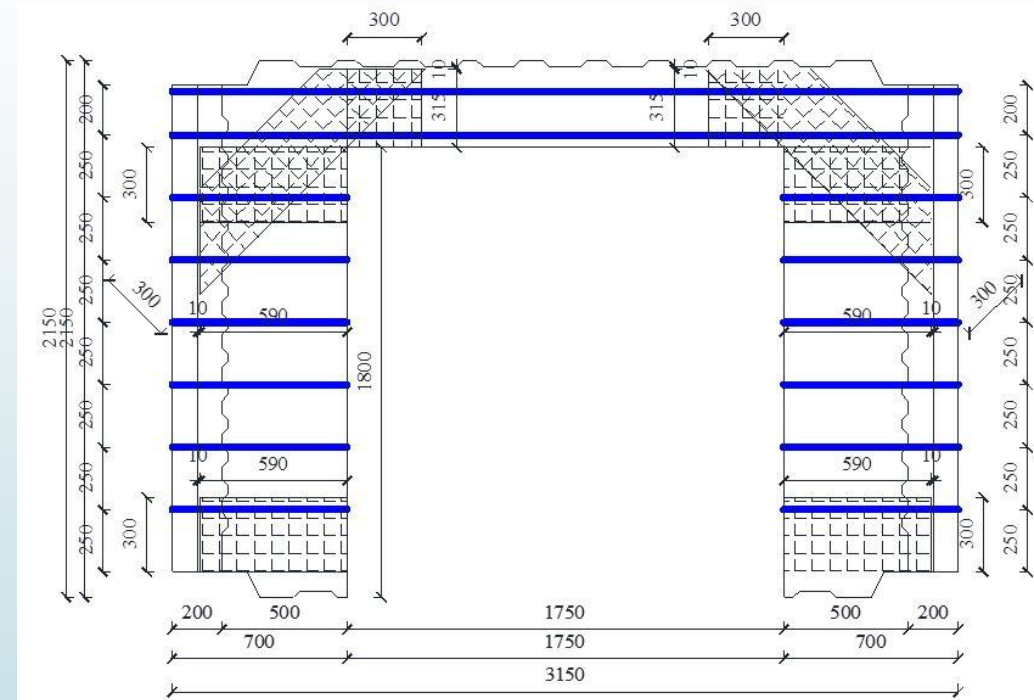


2. Test Program

- The element was subjected to in-plane horizontal cyclic forces
- Vertical loads constant at 220 kN
- For each 1mm increase 100kN
- Lateral loads, drift control, 0,1% of the height



3. Retrofitting Procedure



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4. Behaviour of the specimen

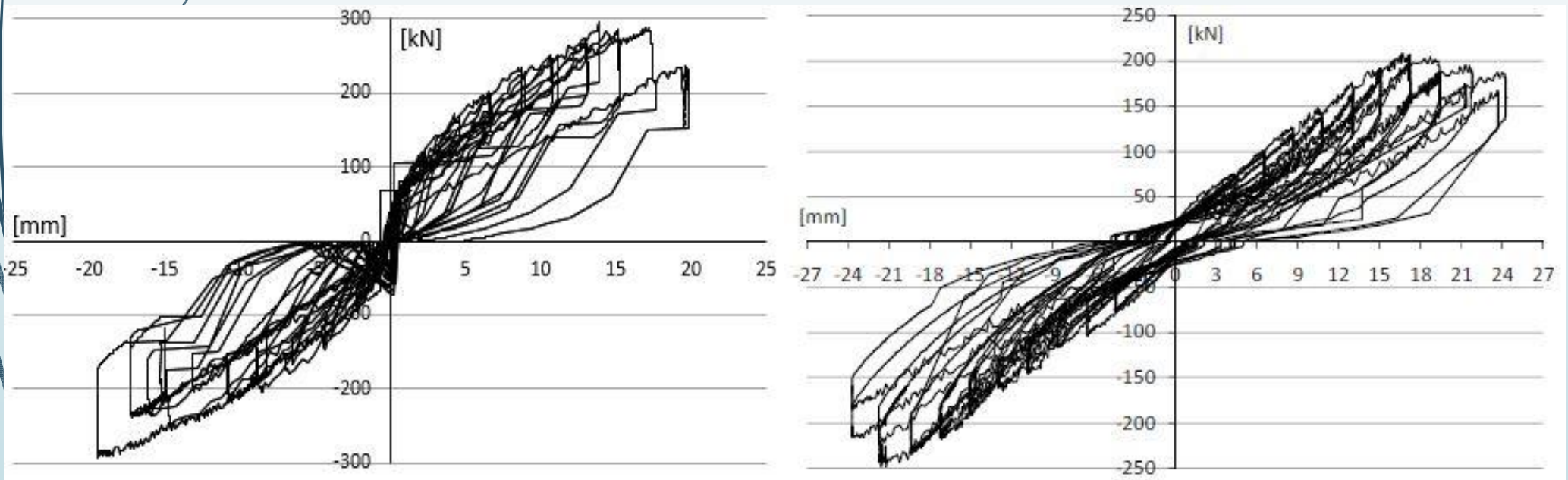
- ▶ Ductile behavior
- ▶ Failure at 19.87 drift

- ▶ First crack appeared at 8.6mm drift
- ▶ CFRP-EBR mesh exfoliated
- ▶ Concrete crushing at T shaped boundary



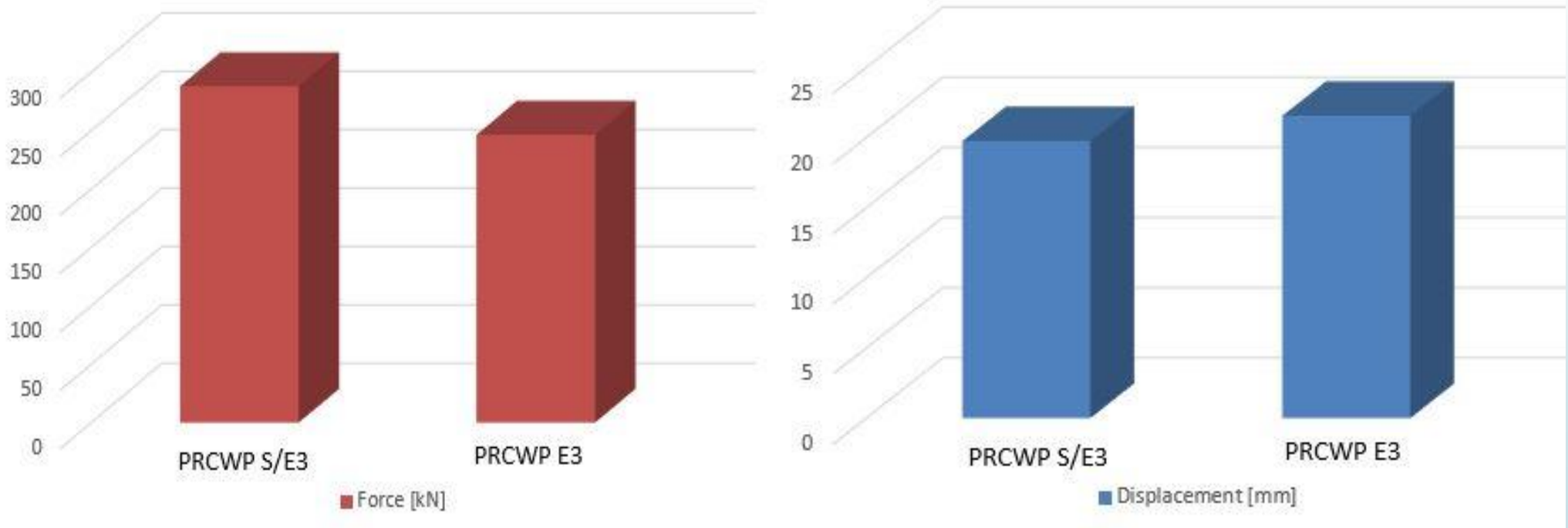
5. Results

- ▶ Maximum loading force was 288 kN at 17.2 mm drift
- ▶ 20.2 % of load bearing capacity lost at 19.87 mm drift, 230 kN



5. Results

- Maximum loads and displacement histograms



6. Conclusions

- ▶ The objective was to obtain similar bearing capacity as a PRCWP with an initial large door opening
- ▶ From the results it can be clearly seen that the retrofitting strategy was a success
- ▶ The bearing capacity was increased with 17 % from 246.5 kN to 288 kN
- ▶ The drift was 8.4 % smaller on the retrofitted specimen