

Fig. 6 Cross-sections of modified concrete columns

In Fig. 7, two examples of primary pre-stressed beam strengthening are illustrated. In particular, one can see the concrete reinforcement of the concrete slab in the area around the column for a first floor beam (Fig. 7a) and the beam strengthening by use of steel plates for a ground floor beam (Fig. 7b).

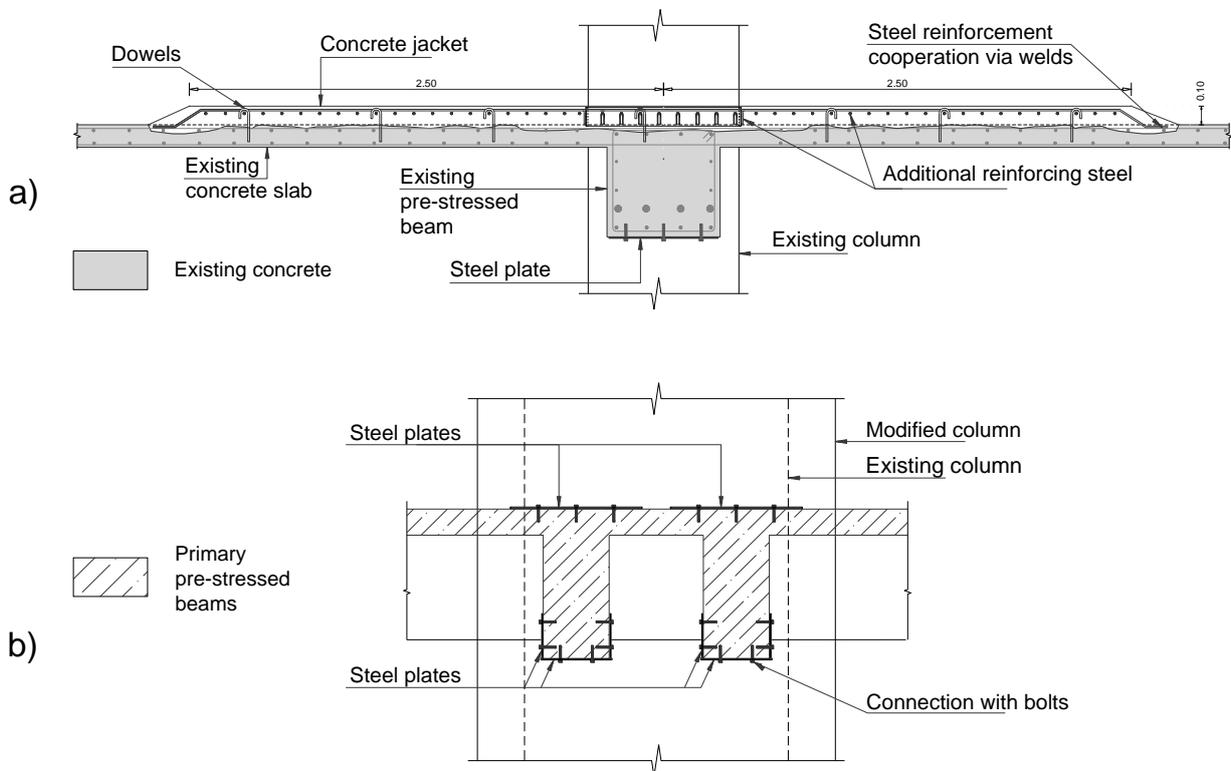


Fig. 7 Cross-sections of pre-stressed concrete beams of a) first floor and b) ground floor after strengthening modifications

6. CONCLUSIONS

The investigation in this study focused on the structural response and strengthening of pre-stressed concrete girders. The capacity assessment of the existing structure involved destructive methods for the evaluation of concrete mechanical properties, whereas the tendon geometry was specified through a geophysical method. In addition, non-destructive methods proved quite useful for determining the corrosion rate of the existing steel reinforcements and tendons.

Numerical analyses followed with appropriate simulations of members and boundary conditions, while the European Standards were implemented in order to check the structural elements. Several load stages were taken into account for each analysis. The results demonstrated that the structure was in need of serious strengthening in order to cope with its new use requirements.

The proposed modifications consisted of addition of new structural members and strengthening of existing ones, by increasing concrete cross sections and adding steel reinforcements and plates.

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