

ABSTRACT

The present thesis deals with the study – analysis and design – of a 5-storey steel office building, with and without braced frames, which includes a concrete core and basement, according to Eurocode. Three variations of the initial building are being studied, in order to compare and optimize them, and finally end up to the best and most economic solution. The resolution of the building was done using the software SAP2000v17.3.0. Specifically, the working structure is as follows:

The *first chapter* contains the main object of this study, the regulations that are being used and also a general presentation of SAP2000 software.

In the *second chapter* a general description of the building is being made, and informations about the geometry, dimensions and structural elements are being provided. Also we show the way the simulation of the 3 buildings in SAP2000 is being made, and some pictures of these simulations.

In the *third chapter* we represent the main elements that we use in our building, an extended reference in the determination of the loads that strain our building is being made, and the combinations of loads, that are used in the analysis and the design of the model, are being described.

In the *fourth chapter*, the theory that the program SAP2000 uses for analysis and design issues of steel buildings, is being analyzed.

In the *fifth, the sixth and the seventh chapter* there is a presentation of the results and the design details that came out of the analysis process of the building without the braced frames, the one with the braced frames and the one without the concrete core, respectively.

In the *eighth chapter*, some indicative member connections are being listed (column seating, main beam to column connection, secondary beam to main beam connection) from all the three buildings.

In the *ninth chapter*, there is a comparison of the three buildings as for their modal informations and the section forces.

In the *tenth and final chapter*, the conclusion of the comparison between the three buildings is being presented.