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# DIAPHRAGM ACTION OF SLAB TYPE STRUCTURE CONSISTING OF PRECAST ELEMENTS CONNECTED BY ENERGY DISSIPATERS

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Precast elements provide a versatile tool to construct especially one story industrial type buildings in a relatively short time. Beam to column, beam to cladding, cladding to foundation, cladding to cladding, beam to slab and slab to slab connections may have drastic changes on the seismic response of the building. This is pronounced for the slab type structures because of the in plane deformations of the first story slabs.

A special type of connectors which can be utilized for the connections mentioned above have been developed in the structural Dynamics and earthquake engineering laboratory of Istanbul Technical University (STEELAB).

In this paper, the effects of individual connectors on the overall response of the simple one story precast structures subjected to selected earthquake records [1] have been parametrically investigated. For this purpose, a special structural model has been prepared using the very well-known computer program SAP2000 [2] taking into consideration all kind of material and geometrical nonlinearities. Some of the geometrical features of the model used are given in the Figure 1.

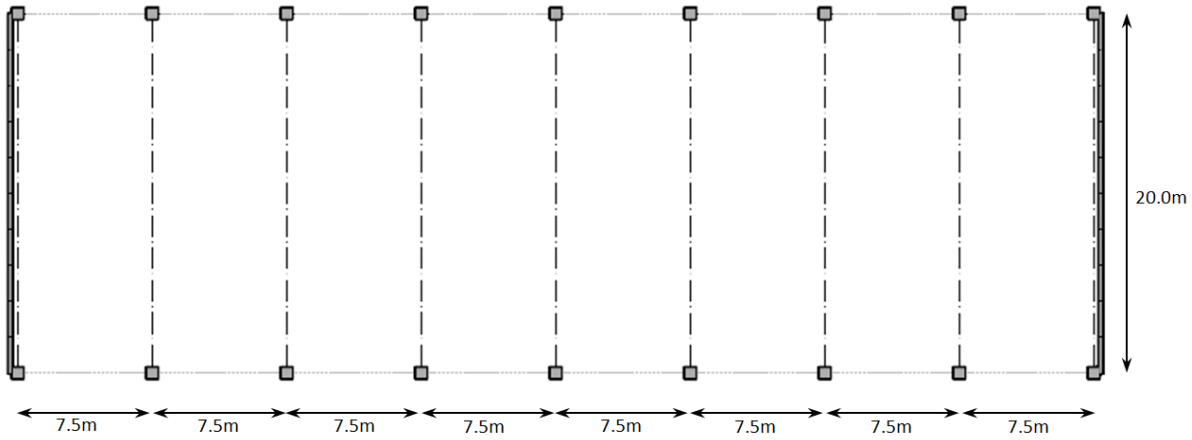


Figure 1. Geometrical features of the computer model.

This prototype has been prepared keeping in mind the following properties:

1) Depending on the lateral rigidity of the connectors one can create three different type of connections namely isolated, integrated or a connector which acts in between

2) Using the lateral rigidity of the claddings one can create a slab type structure which has two shear walls at each side and frames in between as it is shown in Figure 2.

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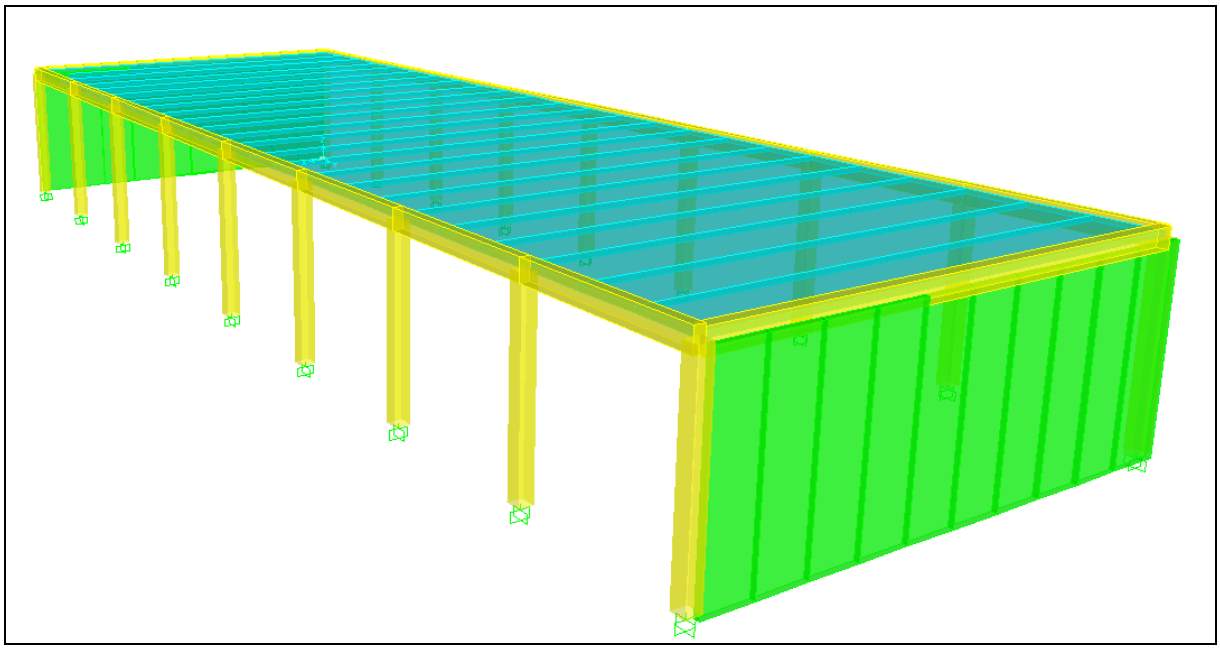

Figure 2. General view of the slab type structure which has two shear walls.

3) There will be no difficulty to resemble hinged rigid and semi-rigid connections between beam and column, between slab to beam, slab to slab etc.

A sample to the connectors so called steel cushions tested in the lab is presented in Figure 3. For the analytical representation of the test data the very well-known WEN model has been adopted. In figure no 4 the experimental and analytical results are shown together to prove the eligibility of the analytical model in this parametric work.

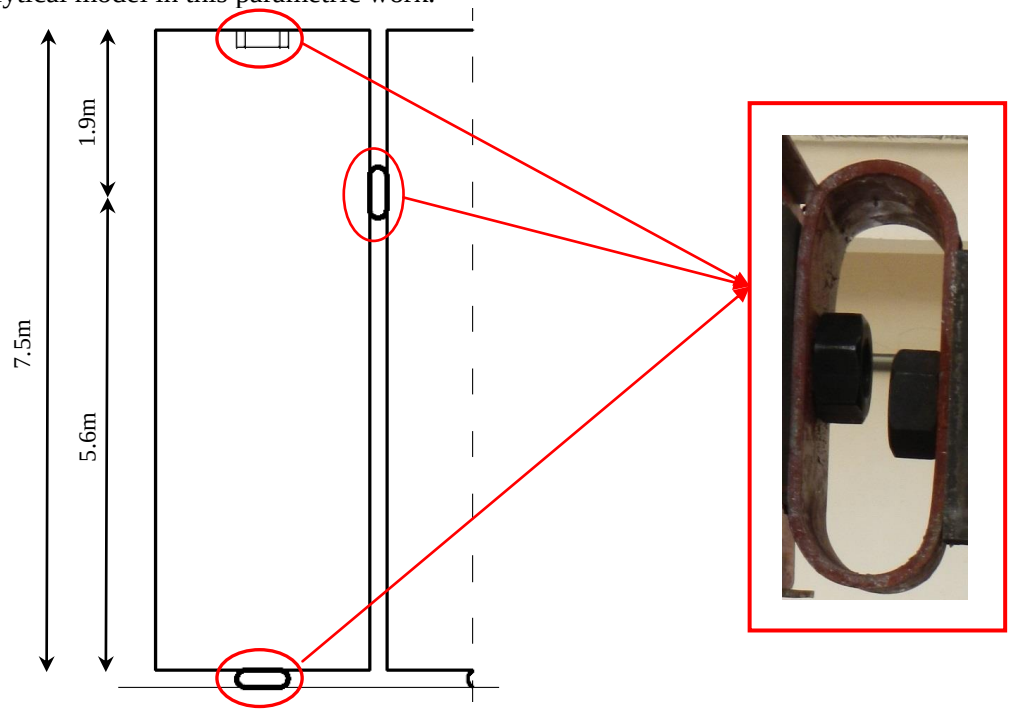


Figure 3. A sample of steel cushion

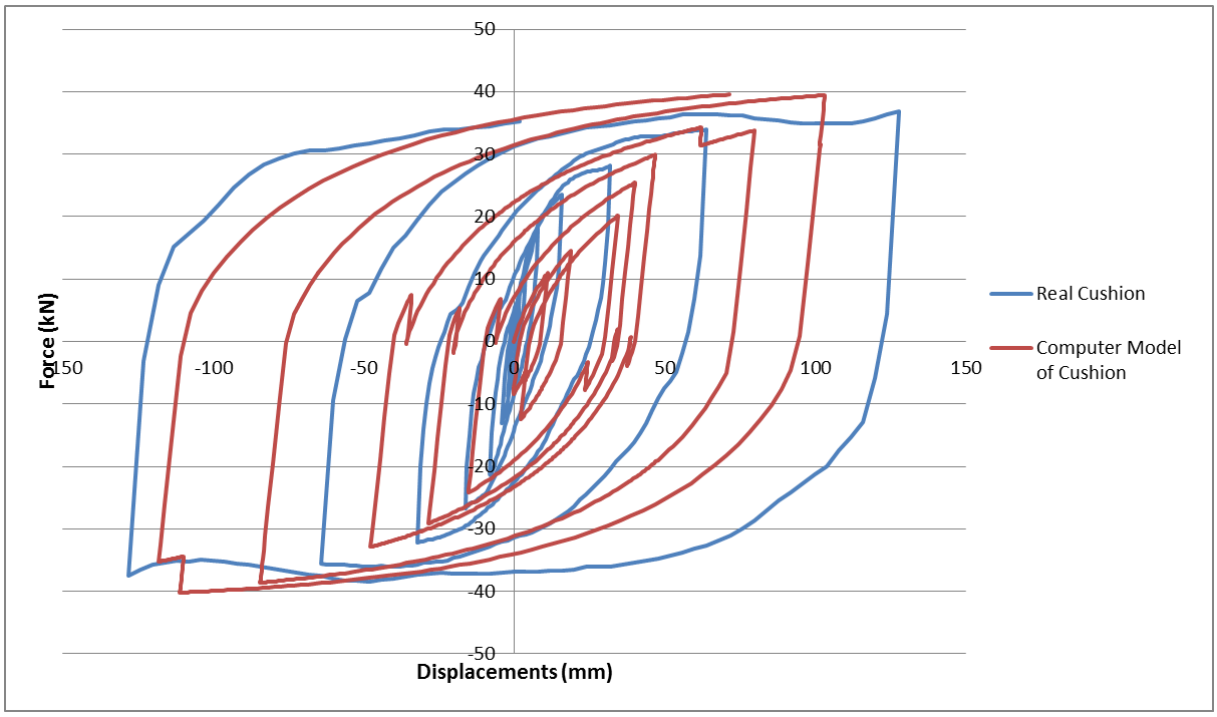


Figure 4. Experimental and analytical results of the tested steel cushion.

At the end of this parametric study, the following early results have been achieved.

1) The most effective connections on the distribution of shear forces are between cladding to foundation. Also, cladding to cladding and beam to cladding connections may be considered.

2) While the energy dissipation ratios are observed, that is seen that an optimization is needed to purpose a profitable design. The first two important energy dissipaters are placed between cladding to foundation and cladding to cladding. The following order of importance can be count as beam to cladding connection. While a connection is proposed highly rigid, it prevents occurring capacity of other connections on the system. In return, this fact makes choice of connections an important issue.

## REFERENCES

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