

ICES 2024

TITLE OF PROJECT:

Effects of Diaphragms on Seismic Response of Buildings

NAME OF ALL AUTHORS: *Om Patel,*

Postgraduate Student, Department of Civil Engineering, Nirma University, Ahmedabad 382481

NAME OF YOUR MENTOR: *Prof. Jahanvi Suthar,*

Assistant Professor, Department of Civil Engineering, Nirma University, Ahmedabad 382481

NAME OF YOUR COLLEGE: Civil Engineering Department, Institute of Technology
Nirma University, Ahmedabad-382481

ABSTRACT (150-300 words):

Many of the buildings in the current situation have irregular structural layouts. These irregularities may be present in both section and plan. These kinds of irregularities could cause such buildings to perform poorly during earthquakes. Therefore, it's crucial to evaluate the earthquake resistance of both new and existing buildings with such irregularities to ensure their safety and resilience. These days, it's very common to have floor openings and diaphragm discontinuities for lighting, aesthetics, staircases, lift shafts, etc. Such diaphragm discontinuities may have an impact on the building's functionality.

All recent software's give facility to assume the diaphragm as rigid, flexible, and semi-rigid. In this, an attempt has been made to find out the difference in seismic response of structure having the rigid and Semi-rigid diaphragm. As the opening in the structure increases the diaphragm behaves more and more flexibly.

In this study, structures having different size of openings are analyzed for both type of diaphragms. In the present study, seismic behavior multi-storied RC buildings with different levels of cut-outs in diaphragm are studied. Equivalent Static Method (ESM) and Response Spectrum Method (RSM) as presented by Indian Seismic Design Code are employed to estimate Internal Seismic Force on the buildings comprising of cutouts in diaphragm in the order of 10%, 20%, 30%, 45%, 60% are developed using Commercial Software. Seismic response quantities Peak base shear, peak displacement, peak inter-storey drift ratio, normalized base shear and normalized overturning moment are evaluated. It has been observed that diaphragm of the RC Building when modelled using rigid and flexible (semi-rigid) diaphragm show difference in lateral load transformation to lateral load resisting system except peak displacement increases with increasing percentage cut-out area in the diaphragm.

KEYWORDS: Diaphragm, Rigid and Semi rigid, Openings, Equivalent Static Method and Response Spectrum Method, Seismic analysis

CATEGORY: Structural Engineering