Major Project Report

On

RETROFITTING OF MULI-STOREY BUILDING WITH DIFFERENT SYSTEMS FOR SEISMIC LOADINGS (EARTHQUAKE RESISTANT DESIGN)

Submitted In Partial Fulfilment of the Requirements for the Award of the
Master of Engineering
in
Civil Engineering
with specialization in
STRUCTURAL ENGINEERING

Submitted by:
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Roll. No. 2011/STR/10
M. Tech. (Structural Engineering)

Under the guidance of:-

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CERTIFICATE

This is to certify that the major project-II entitled **"Retrofitting Of Multi-Storey Building With Different Systems For Seismic Loadings**".) being submitted by me, is a bonafide record of my own work carried by me under the guidance of **Dr. NIRENDRA DEV, Professor** In Partial Fulfilment of the Requirements for the Award of the Master of Engineering in Civil Engineering

with specialization in **Structural Engineering** Delhi Technological University (Formerly Delhi College Of Engineering) DELHI-110042

The matter embodied in this project has not been submitted for the award of any other degree.

PAWAN KUNAR SAINI

Roll No 2011/STR/10

CERTIFICATE

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Dr. NIRENDRA DEV

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ABSTRACT

The tectonic events, volcanism, collapsing of subterranean cavities or manmade effects may be a cause of minor or severe vibrating motion on the surface of the earth. So a building resting on it will experience motion at its base. This unpredictable seismic motion has kinetic energy which is also responsible for the generation of inertia force and if transmitted to a structure, may cause damage .This kinetic energy can be dissipated up to a certain extent by providing the seismic resistant devices.

In the past, building structure have been designed without any consideration of the seismic effects. The knowledge about the earthquake, their behaviour and their effects on structures grew with time and seismic resistant design procedures have been started to be followed in the analysis and design of structures.

The adding of bracing, shear wall, jacketing of beams & columns strengthening of individual elements by various material, mass reduction, supplemental damping and base isolation etc are seismic resistant device. may be added to the new structure as well as existing seismic vulnerable structure as seismic resistant device.

Seismic codes help to improve the behaviour of structure so that it may withstand the earthquake effects without significant loss of life and property . Seismic codes [IS 1893(Part-1):2002, IS13920:1993 are available for new framed structure and CED-39 seismic evaluation and strengthening of existing reinforced concrete buildings. Some main clause of CED -39 along with basic concept of base isolation system is covered in part of literature review.

This project involves the seismic evaluation of an old RCC building .A Seven storey RCC apartment building has been taken to examine the health. Strengthening is required for its safe function. Apart from this thousands of buildings in Delhi require seismic strengthening.

A case study of actual building where base isolation methods have been applied,. New ward block in GTB hospital with 500 beds capacity has been design by providing lead core type Isolators. The costing is more for base isolation but justified through improved earthquake performance.

In this project the isolators are design for 250&400 MT load carrying capacity by the provision of UBC-1997,FEMA-356 and IS -1893 (Part I): 2002 for multi-storey buildings assuming the building as a rigid body, wind load has not been considered in the study. The shear wall and X-Bracing are design as per IS 456 & IS 800 by using computer programmes.

The analysis is performed for similar conditions on a seven story building by providing three different type of seismic resisting device seperately i e Shear wall, steel bracing and Isolators by using the software ETABS-Non linear Version 9.7.4 trial version. The story drift, base shear, diaphragm deflection are noted for the comparisons .

Comparison tables and Graphs are prepared for noted items These comparison shows that a Base Isolated building will perform better than a buildings provided with conventional seismic resistant devices but the initial investment is higher with the base isolation systems.

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