Pushover Analysis of Building Using Soft Story At Different Levels

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Abstract- *In India the enormous loss of life and property perceived in the last couple of decades, attributable to failure of structures instigated by earthquakes. Responsiveness is now being given to the assessment of the sufficiency of strength in framed RCC structures to resist solid ground motions. The seismic reaction of RCC building frame in terms of performance point and the earthquake forces on Reinforced building frame with the help of pushover analysis is carried out in this project. In this method of analysis a model of the building is exposed to a lateral load. Pushover analysis can afford a substantial insight into the weak links in seismic concert of a structure and we can know the weak zones in the structure. In this project effort has been made to investigate the effect of Shear Wall and Structural Wall on lateral displacement and Base Shear in RCC Frames. RCC Frames with G+13 are considered, one with soft storey and other with normal building in L-shape. The pushover analysis of the RCC building frame is carried out by structural analysis and design software ETABS..*

Keywords- Pushover, ETABS, Soft Storey etc.

I. INTRODUCTION

The term earthquake can be used to describe any kind of seismic event which may be either natural or initiated by humans, which generates seismic waves. Earthquakes are caused commonly by rupture of geological faults; but they can also be triggered by other events like volcanic activity, mine blasts, landslides and nuclear tests. There are many buildings that have primary structural system, which do not meet the current seismic requirements and suffer extensive damage during the earthquake. According to the Seismic zoning Map of IS: 1893-2002, India is divided into four zones on the basis of seismic activities. They are zone II, zone III, zone IV and zone V. Some industries usually make full-scale models and execute wide testing, before manufacturing thousands of identical structures that have been analysed and designed with consideration of test results. Unluckily, this choice isn't available to building industry so that economy of huge scale creation is unfeasible. In India many existing structure design as per Indian standard code 456:2000 but to make building earthquake resistant IS 1893-2002 should be used to avoid future building vulnerable in earthquake.

Generally, loads on these structures are only gravity loads and result in elastic structural behaviour. However, under a Strong seismic event, a structure may actually be subjected to forces beyond its elastic limit. Since. There cent earthquake in last 4 decayed in which many concrete structure have been harshly damaged or collapsed, it have indicated the need for evaluating the seismic suitability of present building or purposed building. Therefore structure vulnerable to damage must be determined. To make or attain this objective, simplified linear elastic methods are not suitable. Thus the structural designer has developed a new method of design and seismic procedure that include performance based structure towards nonlinear technique.

*B.*OBJECTIVES

- To study the performance of RC plane frames under lateral loads (Earthquake loads).
- To perform Linear Analysis and Non-Linear Analysis.
- To study the performance of R.C.C structure with or without soft storey with respect to Different parameters such as story drift, story displacement, base shear, etc.
- To study the variation of pushover curve for a framed structure with shear wall and for a framed structure with soft storey.

II. MATERIALS & METHODOLOGY

A. PROBLEM STATEMENT

In the Present work three building models of G+15 has been developed for RCC, for different position of shear wall situated in zone V with subsoil Type medium -II were analyzed in ETAB software. All the buildings are subjected to same earthquake loading to check their seismic behavior for same storey and storey height. For the analysis of these models various methods of seismic analysis are available but

for present work both linear static and non-linear static method is used. Details of the methods are as given below.

B. TIME HISTORY ANALYSIS

Time-history analysis is the behavioural study of a structure under a past earthquake or wind acceleration data. Structure need not be SDoF system. Time-history is a plot of amplitude or acceleration vs time. In time history analyses the structural response is computed at a number of subsequent time instants

III. RESULTS AND OBSERVATIONS

Results After Adding Shear Wall With Time History Analysis For Bhuj

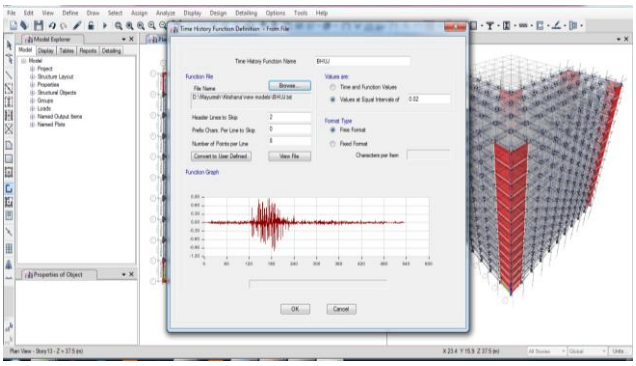
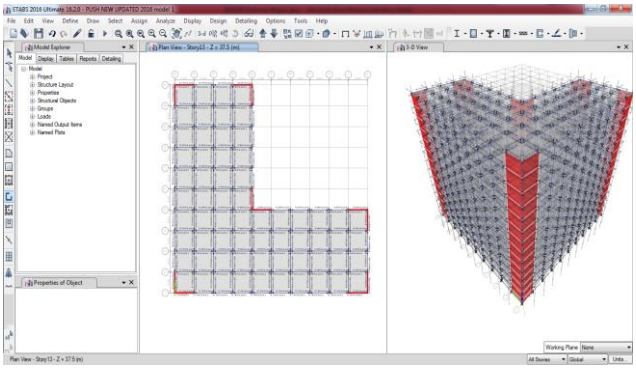
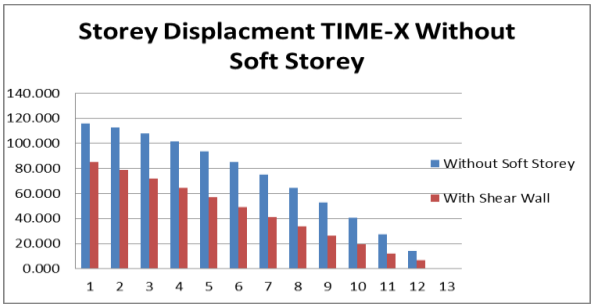


Fig 1 Assign Time History Function for All Models



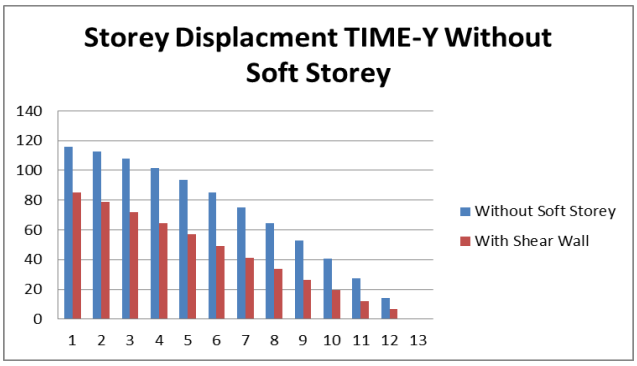
Displacement Time-X

Story	Without Soft Storey	With Shear Wall
13	115.865	85.297
12	112.561	78.727
11	107.696	71.807
10	101.350	64.497
9	93.724	56.955
8	84.986	49.279
7	75.253	41.463
6	64.591	33.872
5	53.038	26.214
4	40.645	19.229
3	27.520	12.252
2	14.021	6.53
1	0	0



Displacement TIME-Y

Story	Without Soft Storey	With Shear Wall
13	115.865	85.297
12	112.561	78.727
11	107.696	71.807
10	101.35	64.497
9	93.724	56.955
8	84.986	49.279
7	75.253	41.463
6	64.591	33.872
5	53.038	26.214
4	40.645	19.229
3	27.52	12.252
2	14.021	6.53
1	0	0



IV. CONCLUSION

1. Shear wall gives high stiffness to the structure so as the structure will be stable. Applying shear wall can effectively reduce the displacement of the structure. This will reduce the destruction comes from lateral loads such as an earthquake. Earlier studies showed that shear wall gives different performance based on its position in structures
2. Based on the time history analysis, the placement of shear wall at the corners of structure symmetrically gives the best performance to reduce the displacement. It can reduce the displacement up to 25% (X-dir) and 35% (Y-dir), so we can suggest assigning shear wall while using soft storey at low and mid-level of the building.

V. RECOMMENDATIONS

After retrofitting of all the models with shear walls hinges are not developed in any of the columns.

In medium high rise buildings (i.e. greater than 10 storeys) provision of shear walls is will be effective in enhancing the overall seismic capacity characteristics of the structure

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