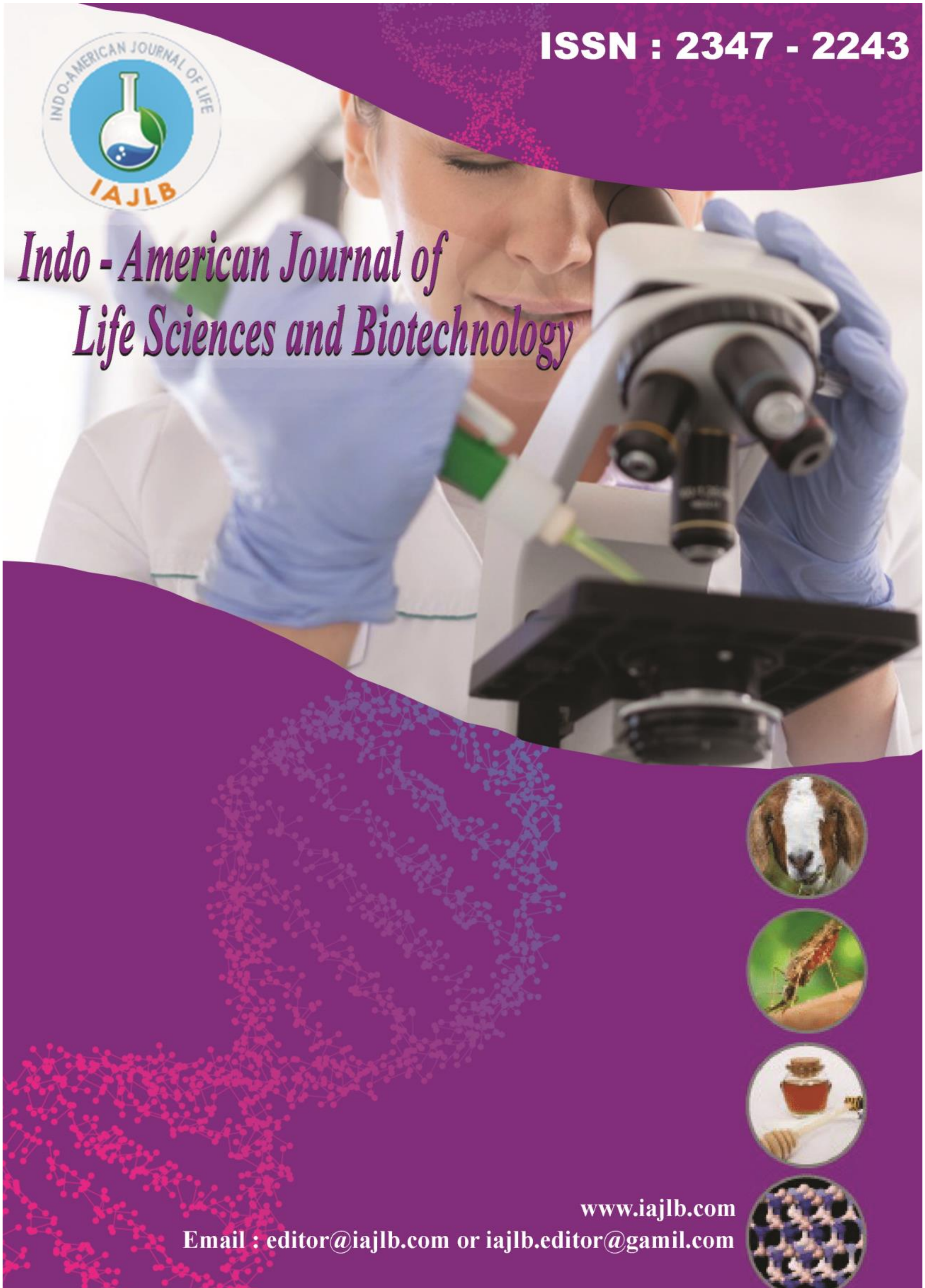
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SEISMICANALYSISOFMULTISTOREDBUILDINGWITHAND WITHOUTSHEAR WALLSBYUSINGE-TABS

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ABSTRACT: To resist lateral stresses produced in the wall plane by earthquakes, winds, and flexible parts, shear walls use a unique structural design. Structural walls are an effective means of bracing and can withstand significant lateral loads. For this reason, it is critical to evaluate these seismic shear walls' seismic reaction to ensure that the buildings are responding effectively. The primary goal of this research is to locate the shear wall in a multi-story building. The effectiveness of the shear wall has been examined using four different models. It is a bare-frame system, while the other three versions are dual-type systems. Zone II, III, IV, and V earthquake loads are applied to an octagonal ten-story building. Lateral displacement and story drift as well as ground-floor costs are estimated in both scenarios when a column is replaced by a shear wall.

INTRODUCTION

Multi-story reinforced concrete buildings benefit greatly from the use of shear walls for earthquake resilience. During earthquakes, the structure is still harmed for a variety of reasons. The way a structure behaves during an earthquake is determined by the way weight, stiffness, and strength are distributed across the structure. Concrete shear walls are installed in the building as a precaution against earthquakes. These can be employed to improve the structural integrity of buildings in the event of an earthquake. During significant earthquakes, structural safety is the primary issue of building design for seismic loads. In order to withstand lateral loads during earthquakes, it is critical that tall buildings have appropriate lateral stiffness. The use of a shear, which increases the weight and cost of the beams and columns. When it comes to concrete laying and vibrating, there is a lot of congestion at these joints because of this. When constructing towering buildings, shear walls are commonly utilized to prevent the building from collapsing. A building's lateral force resisting system can be rendered ineffective if shear walls are not placed in advantageous locations. With the use of ETAB, this work created one model for a bare-frame type residential structure and three models for a dual-type structural system. In order to withstand lateral loads caused by wind or seismic occurrences, high-rise buildings must have adequate stiffness. Because of their high carrying capacity, high ductility, and stiffness, reinforced concrete shear walls are ideal for buildings located in seismic zones. Buildings with

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many stories are more difficult to put and vibrate concrete at, because of the huge spans between beams and columns and the substantial reinforcing at beam-column intersections. This compromises the structural integrity of the structure and makes it less safe. Shear walls in high-rise buildings provide a feasible solution to these issues.

SeismicZonesofIndia

Earthquakes are more likely to occur in different parts of the country due to their differing geological makeup. To locate these areas, a seismic zone map is needed. The 1970 edition of the zone map divides India into five zones, I, II, III, IV, and V, based on the intensities suffered by destructive previous earthquakes. Since the country's geology and seismology are always changing, it is necessary to update the seismic zone maps from time to time. It was in 1962 that the Indian Standards issued the first seismic zone map, which was amended in 1967 and again in 1970. In 2002, the map was redrawn and just four seismic zones remain: II, III, IV, and V.

LITERATUREREVIEW

Building reaction to seismic excitations can be better understood using seismic analysis, a key tool in earthquake engineering. Seismic analysis is a relatively recent invention, as buildings used to be designed solely for gravity stresses. When it comes to structural analysis and design, earthquakes are a common occurrence. In Mayuri D. Bhagwat and et al [1], ETABS software is used to compare and analyze the seismic responses of a G+12 multistory conventional RCC building for the Konya and Bhuj earthquakes. This work involves performing time history analysis and response spectrum analysis on the building. Different acceptable criteria have been developed for Koyna and Bhuj based on their respective time periods (base shear, storey displacement, storey drifts). We observed that the first floor had the highest storey shear force compared to all other floors, and it reduced to a minimum at the top floor in all cases. [2] The base shear experienced by mass irregular building frames is more than that experienced by identical regular building frames of the same size. In the irregular building, the base shear was lower and the inter-storey drifts were larger. Research by Mohit Sharma and others A G+30 story ordinary building was used in this research. Zones 2 and 3 were subjected to static and dynamic analyses utilizing STAAD-Pro software and the design parameters specified in IS-1893-2002-Part-1. ABMM Saiful Islam and his colleagues [4] The results of this study suggest that earthquake-induced loads on buildings can be reduced significantly by using an isolation system. Low- and medium-rise buildings, in particular, are found to respond differently to a certain analysis method. The response spectrum analysis shows significantly less base shear than the time history analysis does. Time history analysis also yields a smaller amount of isolator displacement compared to response spectrum analysis.

MATERIALSANDMETHODS

In engineering, a shear wall is a structure built to withstand the shearing forces that result from lateral forces. For high-rise buildings, shear wall design was made mandatory by several rules. At least 30 percent difference in center of gravity is required for shear walls to be installed in a building. Concrete walls are used to keep the center of gravity and the center of stiffness within 30 percent of one other, so that lateral forces will not grow. Throughout the building's height, these shear walls begin at the base and stretch to the top. Shear walls can be as thin as 150mm or as thick as 400mm. Shear walls are large beams that transport earthquake stresses down to the base, and they are normally given along the building's length and width. High seismic locations necessitate specialized detailing for shear walls. Construction of shear walls is straightforward because to the simplicity and ease with which reinforcement details for walls may be implemented on site.

Both the construction cost and the effectiveness of shear walls in reducing earthquake damage to both structural and non-structural elements are beneficial.

Methodology(DesignAspect)

Earthquakes can occur on both land and sea, at any place on the surface of the earth where there is a major fault.As a result of an earthquake occurring on land, there is a loss of human life. Tsunamis are massive tidal waves that can travel long distances when they are generated by a big earthquake beneath the ocean or sea. These tidal waves are known as Tsunamis. Gravity and seismic loads are coupled in all structures to ensure that adequate vertical and lateral strength and stiffness are achieved to meet the structural criteria and permissible deformation levels defined in the governing building code.

Most structures are effectively secured from vertical shaking because of the inherent safety factor in the design parameters. In constructions with long spans, where stability for design or overall stability analysis is required, vertical acceleration should also be taken into account.

ETABSSOFTWAREAND CALCULATIONS

ETABS is a powerful, yet simple-to-use, analysis and design application created exclusively for construction systems. This year's version of ETABS includes an intuitive and powerful graphical interface, as well as unparalleled modeling, analytic, design, and detailing procedures, all integrated using a single database. ETABS can handle the largest and most complicated building models, as well as a wide range of features.

range of nonlinear behaviors necessary for performance based design, making it the tool of choice for structuralengineersinthe buildingindustry.

Analysispart

It is able to do static analyses for floor or story loads that the user specifies in terms of vertical and lateral direction. Plate bending floors allow for the transmission of vertical homogenous loads from the floor to the beams and columns by bending the floor parts. Once these loads are transferred to nearby beams or columns, they can be modeled without having to explicitly model the secondary framing, hence reducing the time and effort required to model secondary framing.

Different building codes can be met with this software's automatic generation of lateral wind and seismic load profiles. The eigenvector or ritz -vector analysis is used to assess three-dimensional mode shapes and frequencies, modal participation factors, direction variables, and participating mass percentages. Static or dynamic analysis can both incorporate P-Delta effects.

Response spectra, linear time history, nonlinear time history, and static nonlinear (pushover) analysis can all be performed on a response data set to better understand its dynamics.

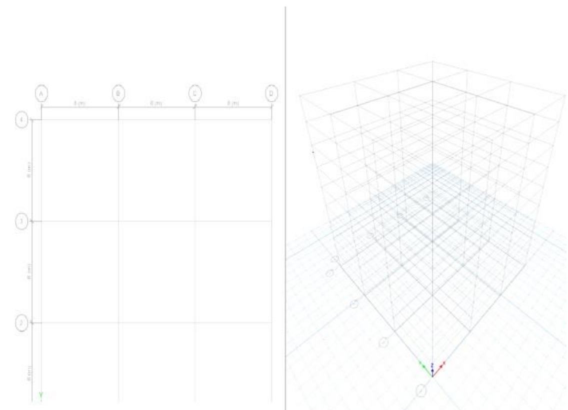
RESULTSANDDISCUSSION

A ten-storey, regular-plan building with a 3-meter-high story height is modeled for this investigation. The Indian Code of Practice for Seismic Resistant Design of Buildings was followed in the creation of these structures. Assumptions are made that the structures are anchored in place, with the floors acting as diaphragms. Structural parts have square and rectangular sections, and their dimensions can be altered to suit the needs of a particular project. The ground floor is presumed to have the same storey height as the rest of the building. ETAB Nonlinear v. 9.5.0 is used to model the buildings. The shear wall was studied in four different models, each with a different placement in the building. All four zones are investigated, comparing lateral displacement, story drift, percent Ast in column, concrete amount necessary, steel, and overall cost required for all models in all four zones.

Floor plans for the bare-framed building model are provided here: Model 1
Model 2 - Dual system floor plan with one shear wall on either side. Fig. 3: Dual system floor plan with shear wall on corner, L = 4.5m Model 4 - Dual system floor plan with shear wall on corner and L = 2m. The ground floor is the only location where any calculations are done. All measurements are in millimeters.

PLANAND3DFORG+9

StructureData



Thischapterprovidesmodelgeometryinformation,includingitemssuchasstorylevels,pointcoordinates,andelementconnectivity.

StoryData

GridData

Name	Height in	Elevation in	Master Story	Similar To	Splice Story
Story10	36	360	Yes	None	No
Story9	36	324	No	Story10	No
Story8	36	288	No	Story10	No
Story7	36	252	No	Story10	No
Story6	36	216	No	Story10	No
Story5	36	180	No	Story10	No
Story4	36	144	No	Story10	No
Story3	36	108	No	Story10	No
Story2	36	72	No	Story10	No
Story1	36	36	No	Story10	No
Base	0	0	No	None	No

Name	Type	Story Range	X Origin ft	Y Origin ft	Rotation deg	Bubble Size in	Color
G1	Cartesian	Default	0	0	0	60	ffa0a0a0

Table 1.3 - Grid Lines

Grid System	Grid Direction	Grid ID	Visible	Bubble Location	Ordinate ft
G1	X	A	Yes	End	0
G1	X	B	Yes	End	8
G1	X	C	Yes	End	16
G1	X	D	Yes	End	24
G1	Y	1	Yes	Start	0
G1	Y	2	Yes	Start	8
G1	Y	3	Yes	Start	16
G1	Y	4	Yes	Start	24

Label	X in	Y in	ΔZ Below in
1	0	0	0
2	0	96	0
3	0	192	0
4	0	288	0
5	96	0	0
6	96	96	0
7	96	192	0
8	96	288	0
9	192	0	0
10	192	96	0
11	192	192	0
12	192	288	0
13	288	0	0

Materials

IndianIS875:1987AutoWindLoadCalculation
Thiscalculationpresentsthe automaticallygeneratedlateralwindloadsforload patternW.LaccordingtoIndianIS875:1987,ascalculatedbyETABS.
Exposure ParametersExposure From = DiaphragmsStructure Class = Class BTerrain Category = Category 2WindDirection=0;90degrees

BasicWind Speed,V_b[ISFig.1]	
WindwardCoefficient, $C_{p,wind}$	
LeewardCoefficient,$C_{p,lee}$	

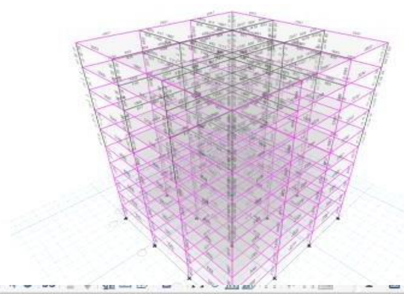
Top Story = Story10Bottom Story = BaseInclude Parapet = NoLateralLoading

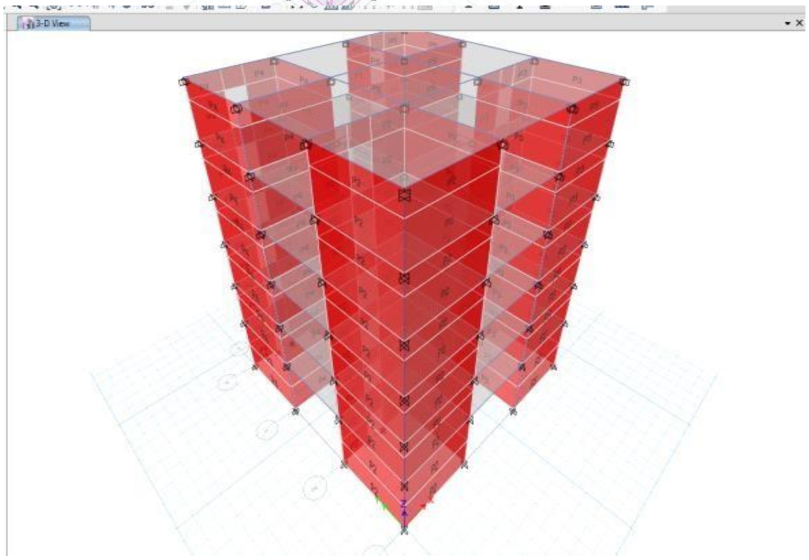
DesignWind Speed,V_z[IS5.3]	
DesignWind Speed,Vz[IS5.3]	

IS18932002AutoSeismicLoadCalculation
ThiscalculationpresentstheautomaticallygeneratedlateralseismicloadsforloadpatternS.LaccordingtoIS18932002,ascalculatedbyETABS.
DirectionandEccentricity

Direction = Multiple

EccentricityRatio =5%foralldiaphragms
StructuralPeriod
PeriodCalculationMethod=ProgramCalculated
DesignChecked
DesignOf ShearWall





Axial,ShearAndMomentsAssaigning

CONCLUSION

1.According to this analysis, building a 10 storey structure with a shear wall at a shortspan corner (model 4) is the most cost-effective option. Large-scale shear walls are ineffective in buildings with a height of 10 floors or less, according to this study. The shear wall is found to be cost-effective and efficient in high-rise buildings.

2.Also noted was the fact.

3.The attraction of forces will be affected if the shear wall is moved, thus it must be in the right place.

When the shear wall's dimensions are large, it absorbs the majority of horizontal forces

Providing shear barriers in the right places significantly decreases earthquake-induced displacements..

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