International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

"Seismic Retrofitting of High-Risebuilding Using Jacketing and by Adding Shear Wall"

Yogesh Sanjay Pawar
Department of civil Engineering, N.B. Navale sinhgad College of Engineering, Solapur, India.

Date of Submission: 20-06-2024 Date of Acceptance: 30-06-2024

ABSTRACT: The analysis and comparison of Existing building without retrofitting with Deteriorated building structure and Retrofitted building structure by considering percentage variation in deterioration and retrofication at different locations of overall building structure by applying various methods of retrofitting are studied to investigate the seismic behavior of high-rise building.
In this study multistoried building model of Existing building structure without retrofitting, Deteriorated building structure and Retrofitted building structure by considering percentage variation in deterioration and retrofication of overall building structure is taken into account and the analysis is carried out by using response spectrum analysis.
Codes referred:
IS 456:2000, IS 1893:2016

➢ **OBJECTIVES**

Thisproposed work isfocusedon:

- To Study of Retrofitting of Building.
- To Analyze multistoried building without Retrofitting.
- To Analyze multistoried building with various methods of Retrofitting.
- To Study the structural behavior of building by applying Jacketing method of Retrofitting and by adding shear wall at different location of building.
- To Compare results of storey drift and storey shear for various methods of Retrofitting.

I. INTRODUCTION:

Nowadays, deterioration of concretestructure is a commonproblem. In our surrounding nearly 80 % of building structures are non-engineered and that's why the deterioration of such structures occurs. The reasons behind this are many, like - occurrence of natural hazards like earthquakes, lack of awareness of several important codal provisions in construction, poor quality of supervision etc... These factors lead to strength deficient structures. Sometimes, overloading of structures leads to

excessive deformations and corrosion which need considerable attention today. To overcome all these effects on reinforced concrete structures: repair, retrofitting or strengthening are regularly required activities in construction field today.

The term "retrofit" signifies the use of new innovations to a more seasoned system.It is the method of changing or repairing and modifying something after it has been made. Retrofitting of buildings is needed for the houses that are influenced by disappointments and harmed by seismic forces. Retrofitting of structures implies making changes to an existing structure so as to protect it from flooding or different hazards like earthquakes, high winds, etc.

➢ **Methods of Retrofitting Considered:**

1) Jacketing Method
2) Adding Shear Wall

Fig 1.1 Jacketing of beam and column

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Fig 1.2 Adding Shear wall

II. METHODOLOGY

Taking into the consideration the need and objectives of dissertation,

1) A multistoried storey building model of Existing building structure without retrofitting, Deteriorated building structure and Retrofitted building structure by considering percentage variation in deterioration and retrofication of overall building structure is taken into account and the analysis is carried out by using response spectrum analysis.
2) Considering earthquake loads as loading for the structure according to Indian standards, IS 1893:2016 by using structural analysis software.
3) The analysis results such as drift, and Storey shear are evaluated for multistoriedbuilding model of Existing building structure without retrofitting, Deteriorated building structure and Retrofitted building structure by considering percentage variation in deterioration and retrofication of overall building structure is investigated.
4) The analysis and comparison of Existing building without retrofitting with Deteriorated building structure and Retrofitted building structure by considering percentage variation in deterioration and retrofication at different locations of overall building structure by applying various methods of retrofitting are studied to investigate the seismic behavior of high-rise building.
5) For the analysis and comparison of Existing building without retrofitting with Deteriorated building structure and Retrofitted building structure by considering percentage variation in deterioration and retrofication at different locations of overall building structure by applying various methods of retrofitting the seismic response displacement, drift, and Storey shear are evaluated.

This study based on response spectrum analysis of a multistoried building model of Existing building structure without retrofitting. The work presented in this report is seismic analysis of Existing building without retrofitting with Deteriorated building structure and Retrofitted building structure by considering percentage variation in deterioration and retrofication at different locations of overall building structure by applying various methods of retrofitting using seismic analysis software by considering earthquake loads according to Indian standard, IS 1893:2016 and response spectrum analysis. Computational model for validation case taken from reference and building is modeled as per IS 456:2000 and IS 1893:2016 in structural analysis software.

Mainly, eleven case studies have been chosen for the seismic retrofitting of high-rise building using structural analysis software are given below,

Case 1: Model of Existing building Structure

To analyze the high-rise building without retrofitting a G+20 storey building model is selected and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 2: Model of 18.36 % Deteriorated building Structure

In this model 18.36 % deterioration is considered of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 3: Model of 51.02 % Deteriorated building Structure

In this model 51.02 % deterioration is considered of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 4: Model of 100% Deteriorated building Structure

In this model 100 % deterioration is considered of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Case 5: Model of 18.36 % Retrofitted building Structureusing jacketing

In this model 18.36 % Retrofitting using jacketing is of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 6: Model of 51.02 % Retrofitted building Structure using jacketing

In this model 51.02 % Retrofitting using jacketing is of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 7: Model of 100 % Retrofitted building Structureusing jacketing

In this model 100 % Retrofitting using jacketing is of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 8: Model of 18.36 % Retrofitted building Structureusing Shear wall

In this model 18.36 % Retrofitting using Shear wall is of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 9: Model of 51.02 % Retrofitted building Structureusing Shear wall

In this model 51.02 % Retrofitting using Shear wall is of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 10: Model of 100 % Retrofitted building Structureusing Shear wall

In this model 100 % Retrofitting using Shear wall is of overall existing building model. and analyzed in structural analysis software using response spectrum analysis. The seismic response such as Drift and Storey shear are discussed.

Case 11: Comparative Study of all cases

A comparative study between Existing building without retrofitting with Deteriorated building structure and Retrofitted building structure by considering percentage variation in deterioration and retrofication at different locations of overall building structure by applying various methods of retrofitting using seismic analysis software. The seismic response such as Drift and Storey shear are evaluated.

Case 1) MODEL OF EXISTING BUILDING WITHOUT RETROFITTING

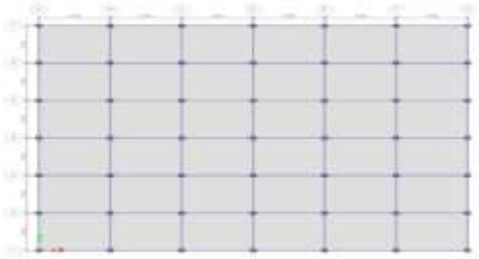


Fig 2.1 PLAN

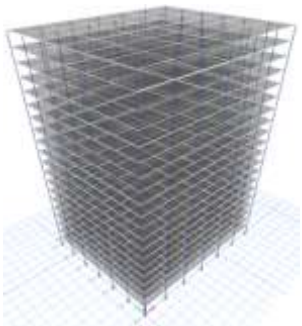


Fig 2.2 3D View

Case2) MODEL OF 18.36 % DETERIORATED BUILDING

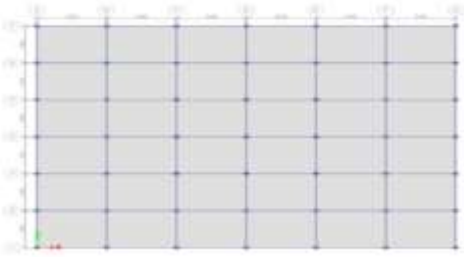


Fig 2.3 PLAN

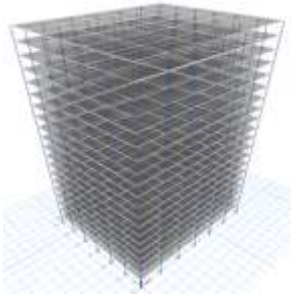


Fig 2.4 3D View

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Case 3) MODEL OF 51.02% DETERIORATED BUILDING

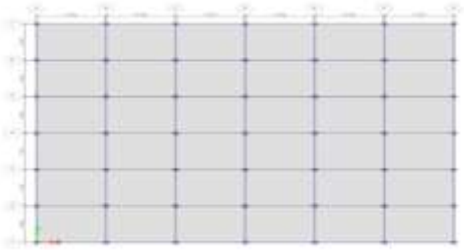


Fig 2.5 PLAN

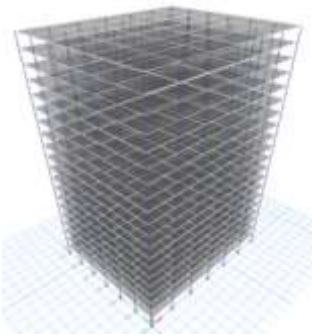


Fig 2.6 3D View

Case 4) MODEL OF 100% DETERIORATED BUILDING

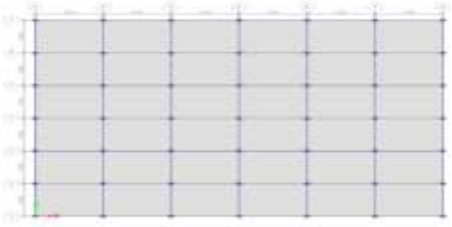


Fig 2.7 PLAN

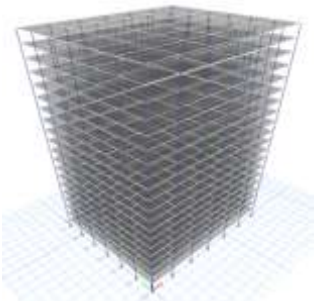


Fig 2.8 3D View

Case 5) MODEL OF 18.36% RETROFITTED BUILDING USING JACKETING

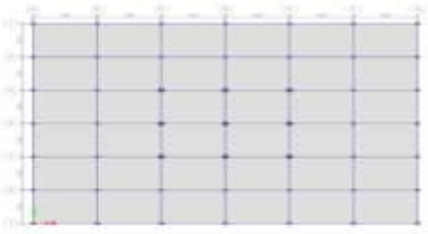


Fig 2.9 PLAN

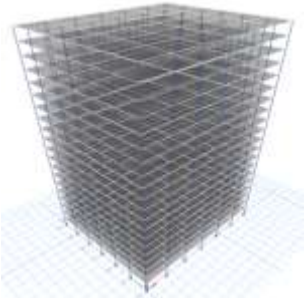


Fig 2.10 3D View

Case 6) MODEL OF 51.02% RETROFITTED BUILDING USING JACKETING

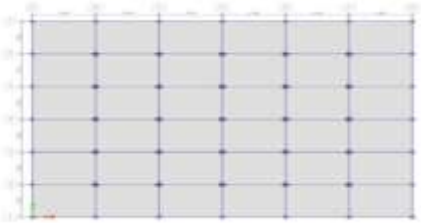


Fig 2.11 PLAN

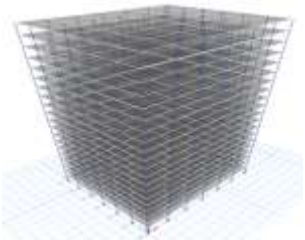


Fig 2.12 3D View

Case 7) MODEL OF 100 % RETROFITTED BUILDING USING JACKETING

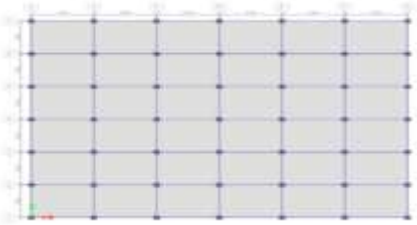


Fig 2.13 PLAN

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

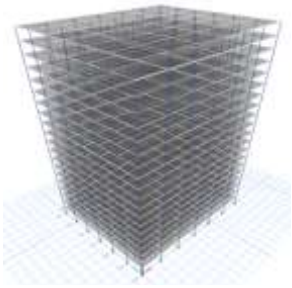


Fig 2.14 3D View

Case 8) MODEL OF 18.36 % RETROFITTED BUILDING USING SHEAR WALL

Fig 2.15 PLAN

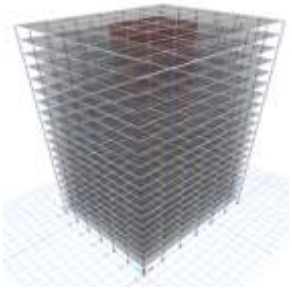


Fig 3.16 3D View

Case 9) MODEL OF 51.02 % RETROFITTED BUILDING USING SHEAR WALL

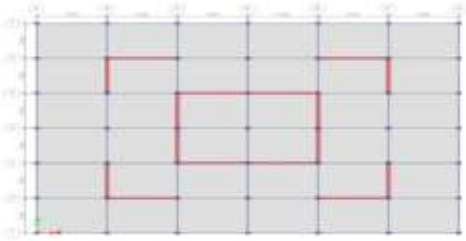


Fig 3.17 PLAN

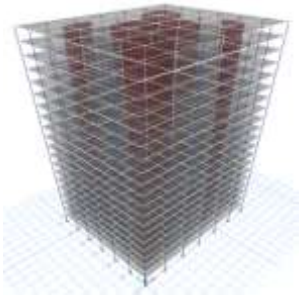


Fig 3.18 3D View

Case 10) MODEL OF 100% RETROFITTED BUILDING USING SHEAR WALL

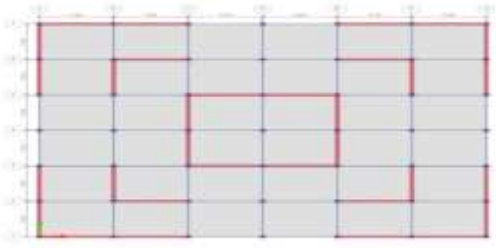


Fig 3.19 PLAN

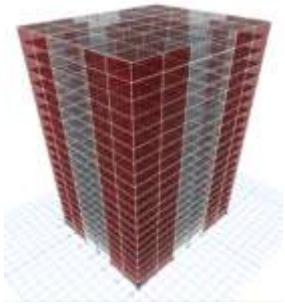


Fig 3.20 3D View

Specifications: The following specifications are adopted for study.

Table 1. Specifications of Modeling	
Specifications	Plan Dimensions = 36m X 30m
A. For Existing building without Retrofitting	
1. Grade of concrete	M 30
2. Grade of steel	HYSD 500

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

3.Column size	350 mm X 450 mm
4. Beam size	250 mm X 350 mm
5. Slab Thickness	120 mm
B. For Deteriorated building	
1. Grade of concrete	M 30
2. Grade of steel	HYSD 500
3.Column size	270 mm X 370 mm
4. Beam size	150 mm X 250 mm
5. Slab Thickness	120 mm
C. For Retrofitted building using jacketing	
1. Grade of concrete	M 35
2. Grade of steel	HYSD 550
3.Column size	400 mm X 500 mm
4. Beam size	300 mm X 400 mm
5. Slab Thickness	120 mm
D.For Retrofitted building using Shear wall	
1. Grade of concrete	M 35
2. Grade of steel	HYSD 550
3. Shear wall size	230 mm
Basic Data considered	
a) Storey height for all models	3 m
b) Location of Building	Pune
c) Earthquake zone	III
d) Zone Factor	0.16
e) Damping Ratio	5%
f) Importance Factor	1
g) Response reduction factor	5
h) Soil Type	II (Medium soil)
i) Type of structure	Special moment resisting frame
j) Type of diaphragm	Rigid
k) Direction of lateral forces	X direction and Y direction
l) Load pattern considered	DL, LL, EQx, Eqy
1.DL	Programme calculated
2. LL	3 kN/m
m) Response Spectrum Forces	RSx and Rsy
No of Models	10 models
Existing Building without retrofitting	1 model
Deteriorated building with percentage variation in deterioration	3 models with percentage variation as (18.36%, 51.02% and 100%)

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Retrofitted building using jacketing with percentage variation in retrofication	3 models with percentage variation as (18.36%, 51.02% and 100%)
Retrofitted building using Shear wall with percentage variation in retrofication	3 models with percentage variation as (18.36%, 51.02% and 100%)
Load Combinations	All load combinations as per IS 1893:2016
Type of support at base	Fixed

III. ANALYSIS RESULTS OF ALL CASES

Table 2. Evaluation of maximum Drift and Storey shear for Existing Building

Sr no	Load combination	Maximum drift	Maximum storey shear (kN)
1	1.2(DL+LL+EQX)	0.002066	-1656.1608
2	1.2 (DL+LLEQX)	0.002066	1656.1608
3	1.2(DL+LL+EQY)	0.002094	-1664.8018
4	1. (DL+LL-EQY)	0.002094	1664.8018
5	1.5(DL+LL+EQX)	0.002582	-2070.201
6	1.5 (DL+LLEQX)	0.002582	2070.201
7	**1.5(DL+LL+EQY)**	**0.002617**	**-2081.0023**
8	1.5 (DL+LL-EQY)	0.002617	2081.0023
9	0.9 (DL+LL+EQX)	0.001549	-1242.1206
10	0.9 (DL+LL-EQX)	0.001549	1242.1206
11	0.9 (DL+LL+EQY)	0.00157	-1248.6014
12	1.2 (DL+LL-EQY)	0.00157	1248.6014

Observations:

In this Existing Building model for all load combinations the dynamic analysis is carried out to observe the maximum Displacement, maximum Drift and maximum Storey shear.

The analysis results for each are shown in above table from that the maximum values of Displacement, Drift and Storey shear are obtained for Load combination7. So, the combination 7 is considered for further analysis of all cases.

The analysis is carried out to study the seismic behavior of the structure under the influence of following forces:

1) Load Combination 1.5(DL+LL+EQY)
2) Response Spectrum Forces RSx and RSy
3) Earthquake Forces EQx and EQy

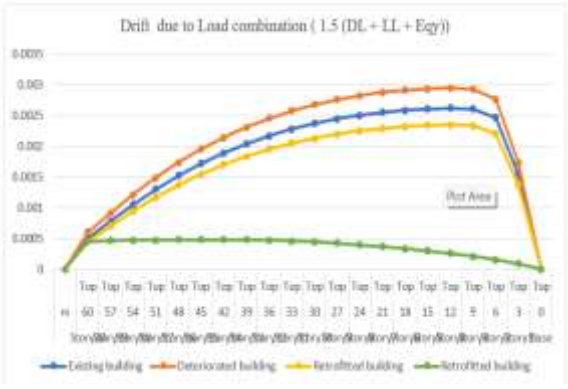
The above Forces are considered to study the seismic behavior of building structure such as Displacement Drift and Storey shear under 10 cases as mentioned.

Table 3. Drift Comparison due to load combination (1.5 (DL + LL + EQy)) for Case 1, Case 2, Case 5 and Case 8

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (mm)	18.36 % deterioration Y direction (mm)	Percentage increase	18.36 % Retrofitted building using jacketing Y direction	Percentage decrease	18.36 % Retrofitted building using shear wall Y	Percentage decrease

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

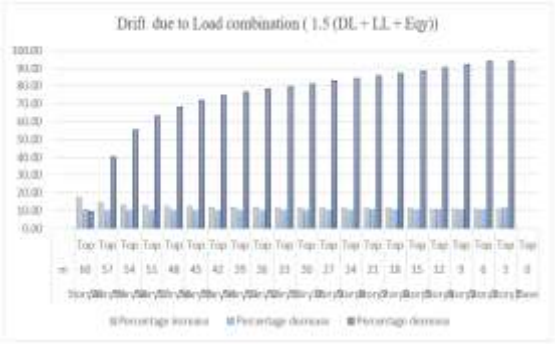
				(mm)		direction (mm)	
S20	0.0005	0.000603	17.08	0.000449	10.20	0.000452	9.60
S19	0.000777	0.00091	14.62	0.000699	10.04	0.000463	40.41
S18	0.00105	0.001212	13.37	0.000945	10.00	0.00047	55.24
S17	0.001297	0.001487	12.78	0.001168	9.95	0.000476	63.30
S16	0.001519	0.001733	12.35	0.001368	9.94	0.000481	68.33
S15	**0.001715**	0.00195	12.05	0.001544	9.97	**0.000483**	**71.84**
S14	0.001887	0.002142	11.90	0.001699	9.96	0.000482	74.46
S13	0.002037	0.002308	11.74	0.001834	9.97	0.000477	76.58
S12	0.002166	0.002452	11.66	0.001949	10.02	0.00047	78.30
S11	0.002276	0.002573	11.54	0.002047	10.06	0.000458	79.88
S10	0.002367	0.002674	11.48	0.002128	10.10	0.000443	81.28
S9	0.002442	0.002756	11.39	0.002195	10.11	0.000423	82.68
S8	0.002502	0.002822	11.34	0.002248	10.15	0.000399	84.05
S7	0.002548	0.002872	11.28	0.002288	10.20	0.00037	85.48
S6	0.002583	0.002908	11.18	0.002318	10.26	0.000337	86.95
S5	0.002606	0.002932	11.12	0.002338	10.28	0.000299	88.53
S4	**0.002617**	**0.002942**	**11.05**	**0.002347**	**10.32**	0.000257	90.18
S3	0.002602	0.002923	10.98	0.002331	10.42	0.000209	91.97
S2	0.002464	0.002766	10.92	0.002202	10.63	0.000155	93.71
S1	0.001548	0.001737	10.88	0.001375	11.18	0.000091	94.12
Base	0	0	0	0	0	0	0



Graph 3.1 Drift due to load combination

(1.5 (DL + LL + EQy))

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.2 Percentage variation due to Drift

Observations:

The table 3 and graphs 3.1 and 3.2 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 10.88 % to17.08 %

b) The maximum drift at storey 4 is increased by 11.05 % (i.e. increase from 0.002617 to 0.002942)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 11.18 % to 10.20 %

b) The maximum drift at storey 4 is decreased by 10.32 % (i.e. decrease from 0.002617 to 0.002347)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 94.12 % to9.60 %.

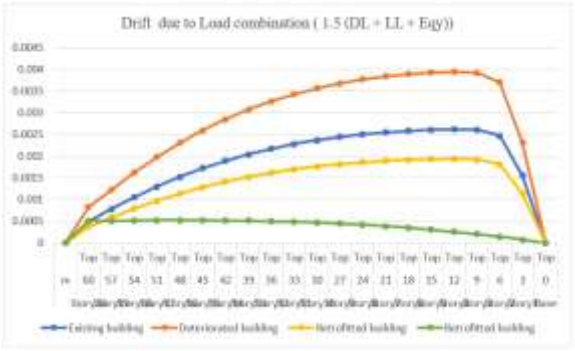
b) The maximum drift at storey 15 is decreased by 71.84 % (i.e. decrease from 0.001715 to 0.000483)

Table 4.Drift Comparison due to load combination (1.5 (DL + LL + EQy)) for Case 1, Case 3, Case 6 and Case 9

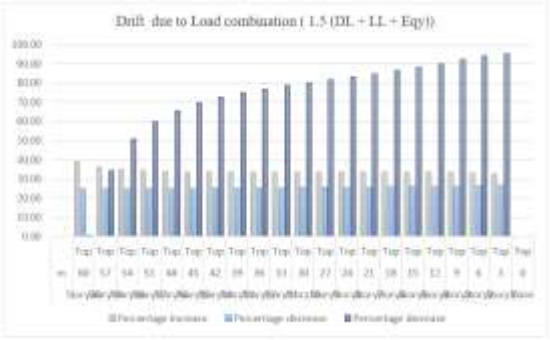
Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (mm)	51.02 % deterioration Y direction (mm)	Percentage increase	51.02 % Retrofitted building using jacketing Y direction (mm)	Percentage decrease	51.02 % Retrofitted building using shear wall Y direction (mm)	Percentage decrease
S20	**0.0005**	0.000821	39.10	0.000375	25.00	**0.000502**	**0.40**
S19	0.000777	0.001219	36.26	0.000584	24.84	0.000509	34.49
S18	0.00105	0.001615	34.98	0.000788	24.95	0.000515	50.95
S17	0.001297	0.001976	34.36	0.000973	24.98	0.000519	59.98
S16	**0.001519**	0.002301	33.99	0.001138	25.08	**0.000521**	**65.70**
S15	0.001715	0.00259	33.78	0.001284	25.13	0.000521	69.62
S14	0.001887	0.002845	33.67	0.001412	25.17	0.000517	72.60
S13	0.002037	0.003067	33.58	0.001523	25.23	0.00051	74.96
S12	0.002166	0.00326	33.56	0.001617	25.35	0.0005	76.92
S11	0.002276	0.003425	33.55	0.001697	25.44	0.000485	78.69
S10	0.002367	0.003563	33.57	0.001763	25.52	0.000467	80.27
S9	0.002442	0.003677	33.59	0.001817	25.59	0.000444	81.82

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S8	0.002502	0.003768	33.60	0.001859	25.70	0.000416	83.37
S7	0.002548	0.003839	33.63	0.001891	25.78	0.000384	84.93
S6	0.002583	0.003891	33.62	0.001914	25.90	0.000347	86.57
S5	0.002606	0.003926	33.62	0.001929	25.98	0.000305	88.30
S4	**0.002617**	**0.003942**	**33.61**	**0.001935**	**26.06**	0.000257	90.18
S3	0.002602	0.003916	33.55	0.00192	26.21	0.000203	92.20
S2	0.002464	0.003699	33.39	0.001813	26.42	0.000143	94.20
S1	0.001548	0.002301	32.72	0.001133	26.81	0.000071	95.41
Base	0	0	0	0	0	0	0



Graph 3.3 Drift due to load combination (1.5 (DL + LL + EQy))



Graph 3.4 Percentage variation due to Drift

Observations:

The table 4 and graphs 3.3 and 3.4 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 32.72 % to 39.10 %

b) The maximum drift at storey 4 is increased by 33.61 % (i.e. increase from 0.002617 to 0.003942)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 26.81 %to 25 %

b) The maximum drift at storey 4 is decreased by 26.06 % (i.e. decrease from 0.002617 to 0.001935)

3) By comparing existing building model to 51.02 % Retrofitted building model usingShear wall.

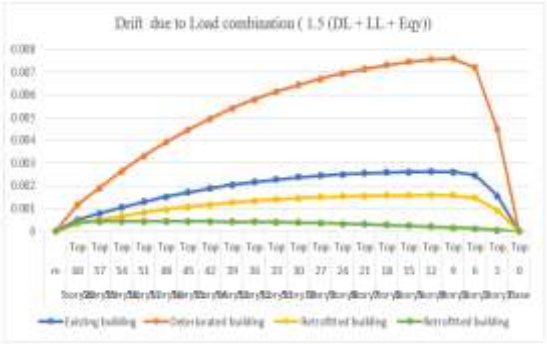
a) It is observed that the drift from storey 1 to storey 20 is decreased by 95.41 % To 34.49 % up to storey 19 and at storey 20 it is increased by 0.40 % (i.e.increase from 0.0005 to0.000502)

b) The maximum drift at storey 16 is decreased by 65.70% (i.e. decrease from0.001519 to 0.000521)

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

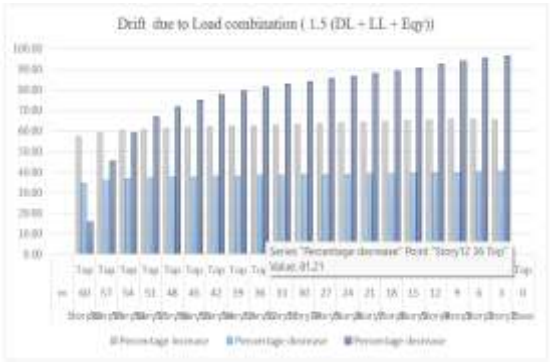
Table 5. Drift Comparison due to load combination (1.5 (DL + LL + EQy)) for Case 1, Case 4, Case 7 and Case 10

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (mm)	100 % deterioration Y direction (mm)	Percentage increase	100 % Retrofitted building using jacketing Y direction (mm)	Percentage decrease	100 % Retrofitted building using shear wall Y direction (mm)	Percentage decrease
S20	0.0005	0.001172	57.34	0.000327	34.60	0.000421	15.80
S19	0.000777	0.001904	59.19	0.000497	36.04	0.000425	45.30
S18	0.00105	0.002632	60.11	0.000664	36.76	0.000428	59.24
S17	0.001297	0.003303	60.73	0.000815	37.16	0.00043	66.85
S16	**0.001519**	0.003912	61.17	0.00095	37.46	**0.00043**	**71.69**
S15	0.001715	0.004463	61.57	0.001069	37.67	0.000429	74.99
S14	0.001887	0.004957	61.93	0.001173	37.84	0.000424	77.53
S13	0.002037	0.005399	62.27	0.001262	38.05	0.000417	79.53
S12	0.002166	0.005792	62.60	0.001339	38.18	0.000407	81.21
S11	0.002276	0.006139	62.93	0.001402	38.40	0.000394	82.69
S10	0.002367	0.006444	63.27	0.001455	38.53	0.000377	84.07
S9	0.002442	0.00671	63.61	0.001497	38.70	0.000357	85.38
S8	0.002502	0.006942	63.96	0.001529	38.89	0.000334	86.65
S7	0.002548	0.007141	64.32	0.001553	39.05	0.000307	87.95
S6	0.002583	0.007311	64.67	0.001569	39.26	0.000276	89.31
S5	0.002606	0.007455	65.04	0.001577	39.49	0.000241	90.75
S4	**0.002617**	**0.007565**	**65.41**	**0.001579**	**39.66**	0.000201	92.32
S3	0.002602	0.00759	65.72	0.001564	39.89	0.000158	93.93
S2	0.002464	0.007214	65.84	0.001473	40.22	0.000109	95.58
S1	0.001548	0.00447	65.37	0.000918	40.70	0.000053	96.58
Base	0	0	0	0	0	0	0



Graph 3.5 Drift due to load combination (1.5 (DL + LL + EQy))

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.6 Percentage variation due to Drift

Observations:

The table 5 and graphs 3.5 and 3.6 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 65.37 % to 57.34 %

b) The maximum drift at storey 4 is increased by 65.41% (i.e. increase from 0.002617 to 0.007565)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 40.70 %to 34.60 %

b) The maximum drift at storey 4 is decreased by 39.66 % (i.e. decrease from 0.002617 to 0.001579)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 96.58 % to 15.80 %.

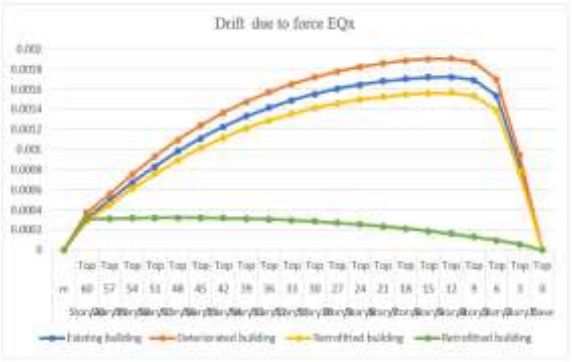
b) The maximum drift at storey 16 is decreased by 71.69 % (i.e. decrease from0.001519 to 0.00043)

Table 6. Drift Comparison due to force EQx for Case 1, Case 2, Case 5 and Case 8

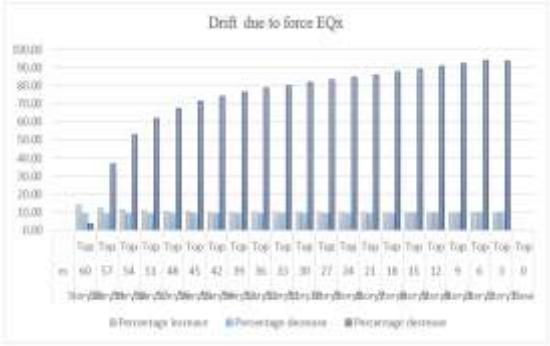
Story	**Existing building**	**Deteriorated building**		**Retrofitted building**		**Retrofitted building**	
	X direction (mm)	**18.36 % deterioration X direction (mm)**	**Percentage increase**	**18.36 % Retrofitted building using jacketing X direction (mm)**	**Percentage decrease**	**18.36 % Retrofitted building using shear wall X direction (mm)**	**Percentage decrease**
S20	0.000317	0.000368	13.86	0.000289	8.83	0.000306	3.47
S19	0.00049	0.000557	12.03	0.000446	8.98	0.000311	36.53
S18	0.000667	0.000751	11.19	0.000608	8.85	0.000315	52.77
S17	0.000832	0.000931	10.63	0.000758	8.89	0.000318	61.78
S16	**0.00098**	0.001093	10.34	0.000893	8.88	**0.000319**	**67.45**
S15	0.001111	0.001237	10.19	0.001013	8.82	0.000319	71.29
S14	0.001227	0.001364	10.04	0.001118	8.88	0.000317	74.16
S13	0.001328	0.001474	9.91	0.001209	8.96	0.000312	76.51
S12	0.001415	0.00157	9.87	0.001288	8.98	0.000305	78.45
S11	0.001489	0.001651	9.81	0.001355	9.00	0.000296	80.12
S10	0.001551	0.001719	9.77	0.001412	8.96	0.000285	81.62
S9	0.001603	0.001775	9.69	0.001458	9.05	0.000271	83.09
S8	0.001645	0.001821	9.67	0.001495	9.12	0.000254	84.56

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S7	0.001677	0.001856	9.64	0.001525	9.06	0.000235	85.99
S6	0.001702	0.001883	9.61	0.001546	9.17	0.000213	87.49
S5	0.001718	0.0019	9.58	0.00156	9.20	0.000188	89.06
S4	**0.001722**	**0.001903**	**9.51**	**0.001562**	**9.29**	0.00016	90.71
S3	0.001691	0.001868	9.48	0.001533	9.34	0.000129	92.37
S2	0.001533	0.001694	9.50	0.001387	9.52	0.000095	93.80
S1	0.000857	0.000947	9.50	0.000772	9.92	0.000055	93.58
Base	0	0	0	0	0	0	0



Graph 3.7 Drift due to force EQx



Graph 3.8 Percentage variation due to Drift

Observations:

The table 6 and graphs 3.7 and 3.8 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 9.50 % to 13.86 %

b) The maximum drift at storey 4 is increased by 9.51 % (i.e. increase from 0.001722 to 0.001903)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 9.92 %to 8.83 %

b) The maximum drift at storey 4 is decreased by 9.29 % (i.e. decrease from 0.001722 to 0.001562)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

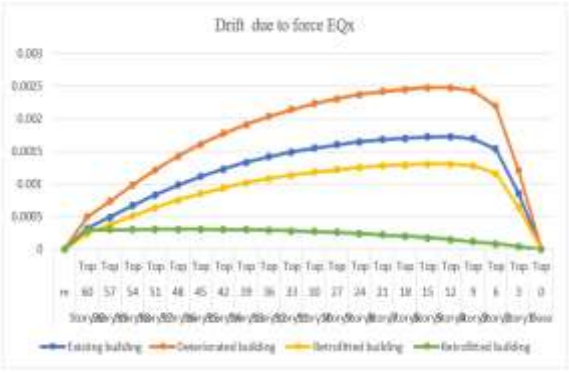
a) It is observed that the drift from storey 1 to storey 20 is decreased by 93.58 %to 3.47 %.

b) The maximum drift at storey 16 is decreased by 67.45 % (i.e. decrease from0.00098to 0.000319)

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

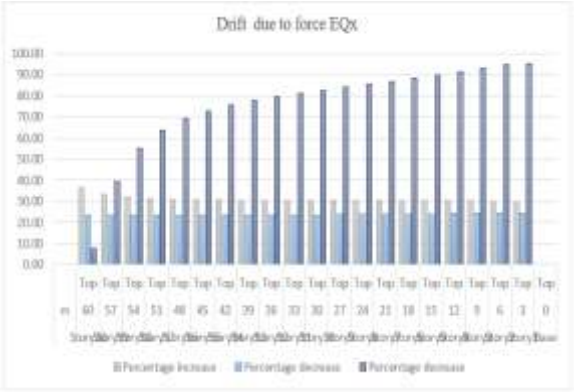
Table 7. Drift Comparison due to force EQx for Case 1, Case 3, Case 6 and Case 9

Story	Existing building	Deteriorated building	Percentage increase	Retrofitted building	Percentage decrease	Retrofitted building	Percentage decrease
	X direction (mm)	51.02 % deterioration X direction (mm)		51.02 % Retrofitted building using jacketing X direction (mm)		51.02 % Retrofitted building using shear wall X direction (mm)	
S20	0.000317	0.000497	36.22	0.000242	23.66	0.000293	7.57
S19	0.00049	0.000735	33.33	0.000375	23.47	0.000297	39.39
S18	0.000667	0.000983	32.15	0.000511	23.39	0.0003	55.02
S17	0.000832	0.001212	31.35	0.000637	23.44	0.000303	63.58
S16	**0.00098**	0.00142	30.99	0.00075	23.47	**0.000304**	**68.98**
S15	0.001111	0.001605	30.78	0.000851	23.40	0.000304	72.64
S14	0.001227	0.001769	30.64	0.000939	23.47	0.000301	75.47
S13	0.001328	0.001912	30.54	0.001015	23.57	0.000297	77.64
S12	0.001415	0.002036	30.50	0.001081	23.60	0.000291	79.43
S11	0.001489	0.002142	30.49	0.001137	23.64	0.000282	81.06
S10	0.001551	0.002232	30.51	0.001183	23.73	0.000271	82.53
S9	0.001603	0.002306	30.49	0.001221	23.83	0.000258	83.91
S8	0.001645	0.002367	30.50	0.001252	23.89	0.000242	85.29
S7	0.001677	0.002414	30.53	0.001276	23.91	0.000223	86.70
S6	0.001702	0.00245	30.53	0.001293	24.03	0.000201	88.19
S5	0.001718	0.002473	30.53	0.001304	24.10	0.000177	89.70
S4	**0.001722**	**0.002476**	**30.45**	**0.001305**	**24.22**	0.000149	91.35
S3	0.001691	0.002427	30.33	0.00128	24.31	0.000118	93.02
S2	0.001533	0.002193	30.10	0.001159	24.40	0.000083	94.59
S1	0.000857	0.001215	29.47	0.000647	24.50	0.000042	95.10
Base	0	0	0	0	0	0	0



Graph 3.9 Drift due to force EQx

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.10 Percentage variation due to Drift

Observations:

The table 7 and graphs 3.9 and 3.10 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 29.47 % to 36.22 %

b) The maximum drift at storey 4 is increased by 30.45 % (i.e. increase from 0.001722 to 0.002476)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 24.50 %to 23.66 %

b) The maximum drift at storey 4 is decreased by 24.22 % (i.e. decrease from 0.001722 to 0.001305)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 95.10 %to 7.57 %.

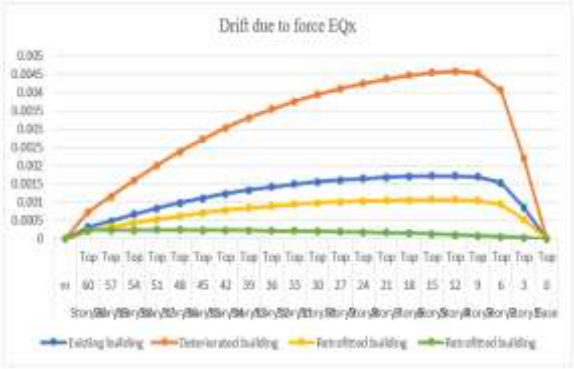
b) The maximum drift at storey 16 is decreased by 68.98% (i.e. decrease from0.00098to 0.000304)

Table 8. Drift Comparison due to force EQx for Case 1, Case 4, Case 7 and Case 10

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	X direction (mm)	100 % deterioration X direction (mm)	Percentage increase	100 % Retrofitted building using jacketing X direction (mm)	Percentage decrease	100 % Retrofitted building using shear wall X direction (mm)	Percentage decrease
S20	0.000317	0.000734	56.81	0.000209	34.07	0.000236	25.55
S19	0.00049	0.001152	57.47	0.000318	35.10	0.000238	51.43
S18	0.000667	0.00159	58.05	0.00043	35.53	0.00024	64.02
S17	0.000832	0.002003	58.46	0.000534	35.82	0.000241	71.03
S16	**0.00098**	0.00238	58.82	0.000626	36.12	**0.000241**	**75.41**
S15	0.001111	0.00272	59.15	0.000709	36.18	0.00024	78.40
S14	0.001227	0.003026	59.45	0.00078	36.43	0.000238	80.60
S13	0.001328	0.003299	59.75	0.000843	36.52	0.000234	82.38
S12	0.001415	0.003541	60.04	0.000896	36.68	0.000228	83.89
S11	0.001489	0.003754	60.34	0.000941	36.80	0.000221	85.16

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S10	0.001551	0.003941	60.64	0.000978	36.94	0.000212	86.33
S9	0.001603	0.004103	60.93	0.001008	37.12	0.000201	87.46
S8	0.001645	0.004243	61.23	0.001032	37.26	0.000187	88.63
S7	0.001677	0.004363	61.56	0.00105	37.39	0.000172	89.74
S6	0.001702	0.004463	61.86	0.001063	37.54	0.000155	90.89
S5	0.001718	0.004541	62.17	0.00107	37.72	0.000135	92.14
S4	**0.001722**	**0.004579**	**62.39**	**0.001069**	**37.92**	0.000114	93.38
S3	0.001691	0.004507	62.48	0.001047	38.08	0.000089	94.74
S2	0.001533	0.004058	62.22	0.000948	38.16	0.000063	95.89
S1	0.000857	0.002207	61.17	0.00053	38.16	0.000032	96.27
Base	0	0	0	0	0	0	0



Graph 3.11 Drift due to force EQx

Graph 3.12 Percentage variation due to Drift

Observations:

The table 8 and graphs 3.11 and 3.12 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.
a) It is observed that the drift from storey 1 to storey 20 is increased by 61.17 % to 56.81 %
b) The maximum drift at storey 4 is increased by 62.39 % (i.e. increase from 0.001722 to 0.004579)
2) By comparing existing building model to 100 % Retrofitted building model using jacketing.
a) It is observed that the drift from storey 1 to storey 20 is decreased by 38.16 %to 34.07 %
b) The maximum drift at storey 4 is decreased by 37.92% (i.e.decrease from 0.0017220.001069)
3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.
a) It is observed that the drift from storey 1 to storey 20 is decreased by 96.27 %to 25.55 %.
b) The maximum drift at storey 16 is decreased

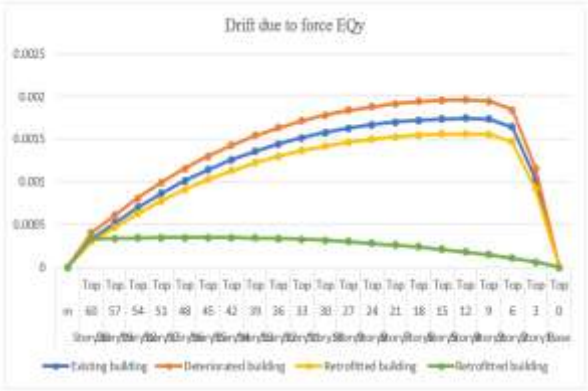
International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

by 75.41 % (i.e. decrease from0.00098to 0.000241)

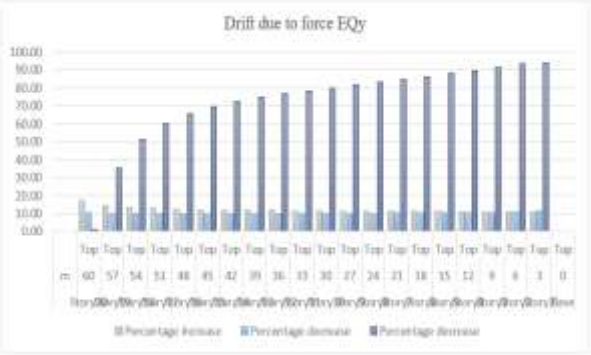
Table 9. Drift Comparison due to force EQy for Case 1, Case 2, Case 5 and Case 8

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (mm)	18.36 % deterioration Y direction (mm)	Percentage increase	18.36 % Retrofitted building using jacketing Y direction (mm)	Percentage decrease	18.36 % Retrofitted building using shear wall Y direction (mm)	Percentage decrease
S20	0.000333	0.000402	17.16	0.000299	10.21	0.000329	1.20
S19	0.000518	0.000606	14.52	0.000466	10.04	0.000336	35.14
S18	0.0007	0.000808	13.37	0.00063	10.00	0.000341	51.29
S17	0.000865	0.000991	12.71	0.000779	9.94	0.000345	60.12
S16	0.001013	0.001155	12.29	0.000912	9.97	0.000347	65.75
S15	**0.001143**	0.0013	12.08	0.00103	9.89	**0.000348**	**69.55**
S14	0.001258	0.001428	11.90	0.001133	9.94	0.000346	72.50
S13	0.001358	0.001539	11.76	0.001222	10.01	0.000342	74.82
S12	0.001444	0.001634	11.63	0.001299	10.04	0.000336	76.73
S11	0.001517	0.001715	11.55	0.001365	10.02	0.000327	78.44
S10	0.001578	0.001783	11.50	0.001419	10.08	0.000315	80.04
S9	0.001628	0.001838	11.43	0.001463	10.14	0.0003	81.57
S8	0.001668	0.001881	11.32	0.001499	10.13	0.000282	83.09
S7	0.001699	0.001915	11.28	0.001526	10.18	0.000261	84.64
S6	0.001722	0.001939	11.19	0.001545	10.28	0.000237	86.24
S5	0.001737	0.001955	11.15	0.001559	10.25	0.00021	87.91
S4	**0.001745**	**0.001961**	**11.01**	**0.001564**	**10.37**	0.000179	89.74
S3	0.001735	0.001948	10.93	0.001554	10.43	0.000145	91.64
S2	0.001643	0.001844	10.90	0.001468	10.65	0.000107	93.49
S1	0.001032	0.001158	10.88	0.000917	11.14	0.000061	94.09
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.13 Drift due to force EQy



Graph 3.14 Percentage variation due to Drift

Observations:

The table 9 and graphs 3.13 and 3.14 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 10.88 % to 17.16 %

b) The maximum drift at storey 4 is increased by 11.01 % (i.e. increase from 0.001745to 0.001961)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 11.14 %to 10.21 %

b) The maximum drift at storey 4 is decreased by 10.37 % (i.e. decrease from 0.001745to 0.001564)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 94.09 % to 1.20 %

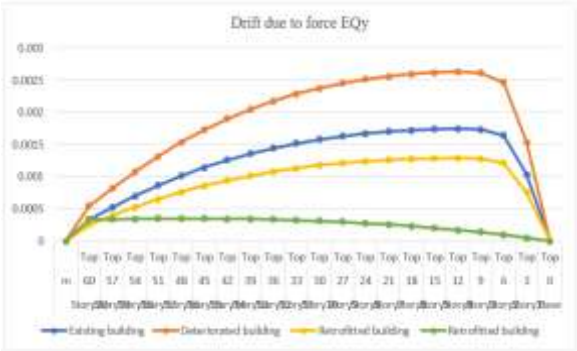
b) The maximum drift at storey 15 is decreased by 69.55 % (i.e. decrease from 0.001143to 0.000348)

Table 10. Drift Comparison due to force EQy for Case 1, Case 3, Case 6 and Case 9

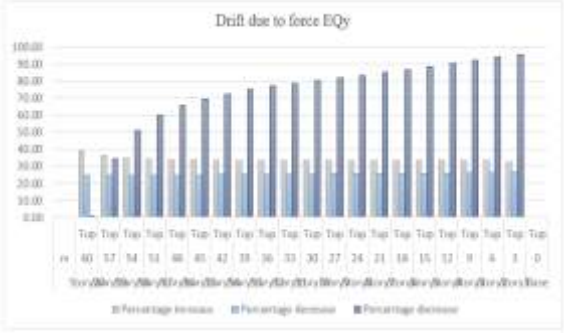
Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (mm)	51.02 % deterioration Y direction (mm)	Percentage increase	51.02 % Retrofitted building using jacketing Y direction (mm)	Percentage decrease	51.02 % Retrofitted building using shear wall Y direction (mm)	Percentage decrease

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S20	**0.000333**	0.000548	39.23	0.00025	24.92	**0.000335**	**0.60**
S19	0.000518	0.000813	36.29	0.000389	24.90	0.000339	34.56
S18	0.0007	0.001077	35.00	0.000525	25.00	0.000343	51.00
S17	0.000865	0.001317	34.32	0.000649	24.97	0.000346	60.00
S16	**0.001013**	0.001534	33.96	0.000759	25.07	**0.000347**	**65.75**
S15	0.001143	0.001726	33.78	0.000856	25.11	0.000347	69.64
S14	0.001258	0.001896	33.65	0.000941	25.20	0.000345	72.58
S13	0.001358	0.002045	33.59	0.001015	25.26	0.00034	74.96
S12	0.001444	0.002173	33.55	0.001078	25.35	0.000333	76.94
S11	0.001517	0.002283	33.55	0.001132	25.38	0.000324	78.64
S10	0.001578	0.002375	33.56	0.001176	25.48	0.000311	80.29
S9	0.001628	0.002451	33.58	0.001211	25.61	0.000296	81.82
S8	0.001668	0.002512	33.60	0.00124	25.66	0.000277	83.39
S7	0.001699	0.002559	33.61	0.001261	25.78	0.000256	84.93
S6	0.001722	0.002594	33.62	0.001276	25.90	0.000231	86.59
S5	0.001737	0.002618	33.65	0.001286	25.96	0.000203	88.31
S4	**0.001745**	**0.002628**	**33.60**	**0.00129**	**26.07**	0.000171	90.20
S3	0.001735	0.00261	33.52	0.00128	26.22	0.000136	92.16
S2	0.001643	0.002466	33.37	0.001209	26.42	0.00010	94.22
S1	0.001032	0.001534	32.72	0.000755	26.84	0.000047	95.45
Base	0	0	0	0	0	0	0



Graph 3.15 Drift due to force EQy



Graph 3.16 Percentage variation due to Drift

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Observations:

The table 10 and graphs 3.15 and 3.16 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 32.72 % to 39.23 %

b) The maximum drift at storey 4 is increased by 33.60 % (i.e. increase from 0.001745to 0.002628)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 26.84 %to 24.92 %

b) The maximum drift at storey 4 is decreased by 26.07 % (i.e. decrease from 0.001745to 0.00129)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

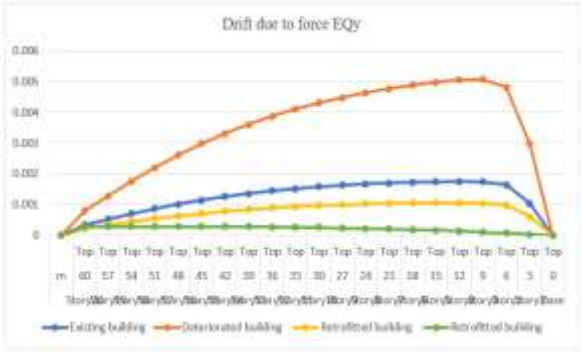
a) It is observed that the drift from storey 1 to storey 20 is decreased by 95.45 %to 34.56 % up to storey 19 and at storey 20 it is increased by 0.60 % (i.e.increase from 0.000333to0.000335)

b) The maximum drift at storey 16 is decreased by 65.75% (i.e. decrease from 0.001013to 0.000347)

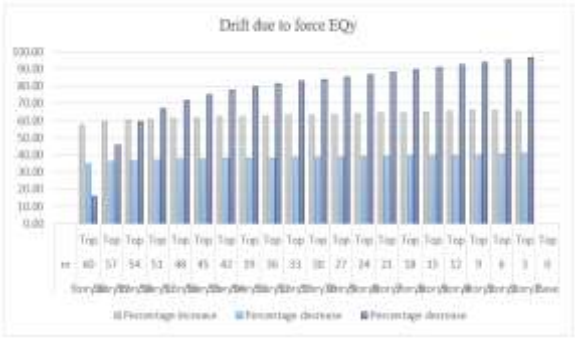
Table 11. Drift Comparison due to force EQy for Case 1, Case 4, Case 7 and Case 10

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (mm)	100 % deterioration Y direction (mm)	Percentage increase	100 % Retrofitted building using jacketing Y direction (mm)	Percentage decrease	100 % Retrofitted building using shear wall Y direction (mm)	Percentage decrease
S20	0.000333	0.000781	57.36	0.000218	34.53	0.00028	15.92
S19	0.000518	0.001269	59.18	0.000331	36.10	0.000283	45.37
S18	0.0007	0.001755	60.11	0.000443	36.71	0.000285	59.29
S17	0.000865	0.002202	60.72	0.000544	37.11	0.000287	66.82
S16	**0.001013**	0.002608	61.16	0.000633	37.51	**0.000287**	**71.67**
S15	0.001143	0.002975	61.58	0.000713	37.62	0.000286	74.98
S14	0.001258	0.003305	61.94	0.000782	37.84	0.000283	77.50
S13	0.001358	0.003599	62.27	0.000842	38.00	0.000278	79.53
S12	0.001444	0.003861	62.60	0.000892	38.23	0.000271	81.23
S11	0.001517	0.004093	62.94	0.000935	38.37	0.000263	82.66
S10	0.001578	0.004296	63.27	0.00097	38.53	0.000252	84.03
S9	0.001628	0.004474	63.61	0.000998	38.70	0.000238	85.38
S8	0.001668	0.004628	63.96	0.001019	38.91	0.000223	86.63
S7	0.001699	0.004761	64.31	0.001035	39.08	0.000204	87.99
S6	0.001722	0.004874	64.67	0.001046	39.26	0.000184	89.31
S5	0.001737	0.00497	65.05	0.001052	39.44	0.00016	90.79
S4	**0.001745**	**0.005043**	**65.40**	**0.001053**	**39.66**	0.000134	92.32
S3	0.001735	0.00506	65.71	0.001042	39.94	0.000105	93.95
S2	0.001643	0.004809	65.83	0.000982	40.23	0.000073	95.56
S1	0.001032	0.00298	65.37	0.000612	40.70	0.000036	96.51
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.17 Drift due to force EQy



Graph 3.18 Percentage variation due to Drift

Observations:

The table 11 and graphs 3.17 and 3.18 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 65.37% to 57.36 %

b) The maximum drift at storey 4 is increased by 65.40 % (i.e. increase from 0.001745to 0.005043)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 40.70 %to 34.53 %

b) The maximum drift at storey 4 is decreased by 39.66 % (i.e. decrease from 0.001745to 0.001053)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 96.51 % to 15.92 %

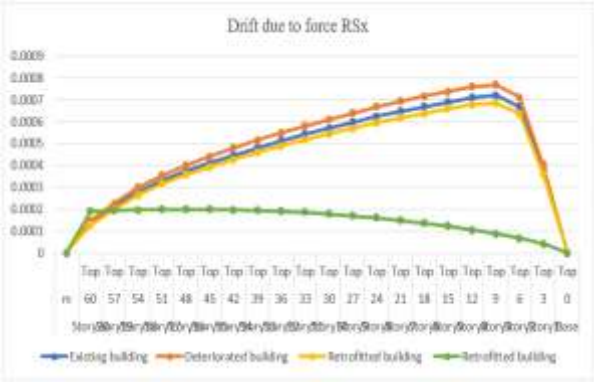
b) The maximum drift at storey 16 is decreased by 71.67 % (i.e. decrease from 0.001013 to 0.000287)

Table 12. Drift Comparison due to force RSx for Case 1, Case 2, Case 5 and Case 8

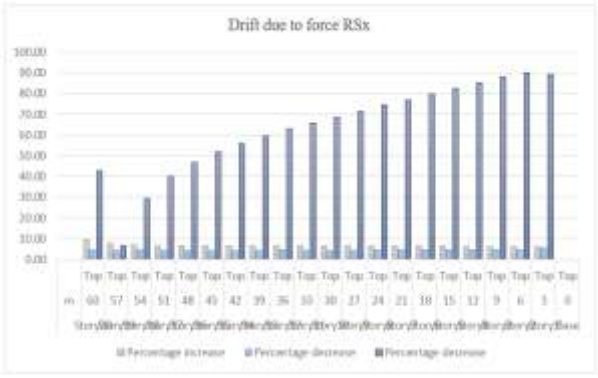
Story	**Existing building**	**Deteriorated building**		**Retrofitted building**		**Retrofitted building**	
	X direction (mm)	**18.36 % deterioration X direction (mm)**	**Percentage increase**	**18.36 % Retrofitted building using jacketing X direction (mm)**	**Percentage decrease**	**18.36 % Retrofitted building using shear wall X direction (mm)**	**Percentage decrease**
S20	**0.000133**	0.000147	9.52	0.000127	4.51	**0.00019**	42.86
S19	0.000208	0.000226	7.96	0.000199	4.33	0.000194	6.73
S18	0.000277	0.000298	7.05	0.000264	4.69	0.000196	29.24

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S17	0.00033	0.000354	6.78	0.000316	4.24	0.000198	40.00
S16	**0.000373**	0.000399	6.52	0.000357	4.29	**0.000199**	**46.65**
S15	0.00041	0.000439	6.61	0.000392	4.39	0.000198	51.71
S14	0.000446	0.000478	6.69	0.000426	4.48	0.000197	55.83
S13	0.00048	0.000515	6.80	0.000459	4.38	0.000194	59.58
S12	0.000512	0.000549	6.74	0.000489	4.49	0.00019	62.89
S11	0.000541	0.00058	6.72	0.000517	4.44	0.000185	65.80
S10	0.000569	0.000609	6.57	0.000544	4.39	0.000178	68.72
S9	0.000596	0.000639	6.73	0.00057	4.36	0.00017	71.48
S8	0.000623	0.000667	6.60	0.000595	4.49	0.00016	74.32
S7	0.000647	0.000693	6.64	0.000617	4.64	0.000149	76.97
S6	0.000668	0.000715	6.57	0.000637	4.64	0.000136	79.64
S5	0.000689	0.000737	6.51	0.000658	4.50	0.000122	82.29
S4	0.00071	0.000759	6.46	0.000678	4.51	0.000105	85.21
S3	**0.000719**	**0.000767**	**6.26**	**0.000685**	**4.73**	0.000087	87.90
S2	0.000667	0.000712	6.32	0.000635	4.80	0.000066	90.10
S1	0.000378	0.000403	6.20	0.000358	5.29	0.000041	89.15
Base	0	0	0	0	0	0	0



Graph 3.19 Drift due to force RSx



Graph 3.20 Percentage variation due to Drift

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Observations:

The table 12 and graphs 3.19 and 3.20 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 6.20 % to 9.52 %

b) The maximum drift at storey 3 is increased by 6.26% (i.e. increase from 0.000719to 0.000767)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 5.29 %to 4.51 %

b) The maximum drift at storey 3 is decreased by 4.73 % (i.e. decrease from 0.000719to0.000685)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

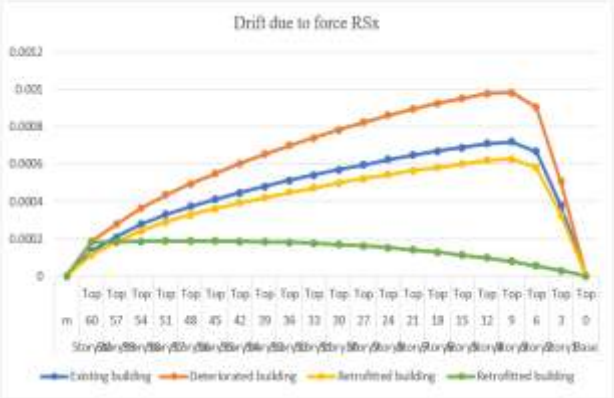
a) It is observed that the drift from storey 1 to storey 20 is decreased by 89.15 %to 6.73 % up to storey 19 and at storey 20 it is increased by 42.86 % (i.e.increase from 0.000133 to0.00019)

b) The maximum drift at storey 16 is decreased by 46.65% (i.e. decrease from 0.000373to 0.000199)

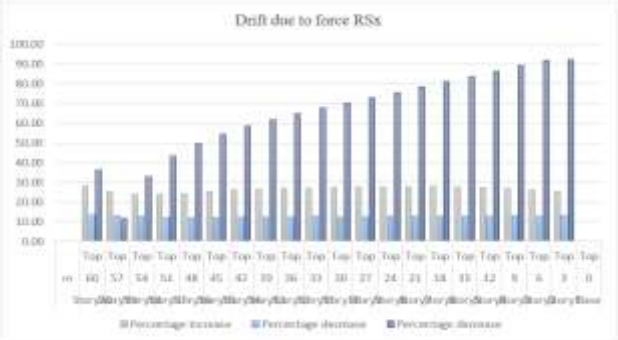
Table 13. Drift Comparison due to force RSx for Case 1, Case 3, Case 6 and Case 9

Storey	**Existing building**	**Deteriorated building**		**Retrofitted building**		**Retrofitted building**	
	X direction (mm)	**51.02 % deterioration X direction (mm)**	**Percentage increase**	**51.02 % Retrofitted building using jacketing X direction (mm)**	**Percentage decrease**	**51.02 % Retrofitted building using shear wall X direction (mm)**	**Percentage decrease**
S20	**0.000133**	0.000185	28.11	0.000115	13.53	**0.000181**	**36.09**
S19	0.000208	0.000278	25.18	0.000181	12.98	0.000184	11.54
S18	0.000277	0.000364	23.90	0.000242	12.64	0.000186	32.85
S17	0.00033	0.000434	23.96	0.00029	12.12	0.000187	43.33
S16	**0.000373**	0.000493	24.34	0.000328	12.06	**0.000188**	49.60
S15	0.00041	0.000548	25.18	0.000361	11.95	0.000188	54.15
S14	0.000446	0.000602	25.91	0.000391	12.33	0.000186	58.30
S13	0.00048	0.000653	26.49	0.00042	12.50	0.000184	61.67
S12	0.000512	0.000699	26.75	0.000448	12.50	0.00018	64.84
S11	0.000541	0.000741	26.99	0.000473	12.57	0.000175	67.65
S10	0.000569	0.000782	27.24	0.000498	12.48	0.000169	70.30
S9	0.000596	0.000822	27.49	0.000522	12.42	0.000161	72.99
S8	0.000623	0.000861	27.64	0.000544	12.68	0.000152	75.60
S7	0.000647	0.000895	27.71	0.000564	12.83	0.000141	78.21
S6	0.000668	0.000925	27.78	0.000582	12.87	0.000128	80.84
S5	0.000689	0.000952	27.63	0.000601	12.77	0.000113	83.60
S4	0.00071	0.000976	27.25	0.000619	12.82	0.000097	86.34
S3	**0.000719**	**0.000981**	**26.71**	**0.000626**	**12.93**	0.000078	89.15
S2	0.000667	0.000904	26.22	0.000581	12.89	0.000056	91.60
S1	0.000378	0.000506	25.30	0.000328	13.23	0.00003	92.06
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.21 Drift due to force RSx



Graph 3.22Percentage variation due to Drift

Observations:

The table 13 and graphs 3.21 and 3.22 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 25.30 % to 28.11 %

b) The maximum drift at storey 3 is increased by 26.71 % (i.e. increase from 0.000719to 0.000981)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 13.23 %to 13.53 %

b) The maximum drift at storey 3 is decreased by 12.93 %.(i.e. decrease from 0.000719to0.000626)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 92.06 %to 11.54 % up to storey 19 and at storey 20 it is increased by 36.09 % (i.e.increase from 0.000133 to0.000181)

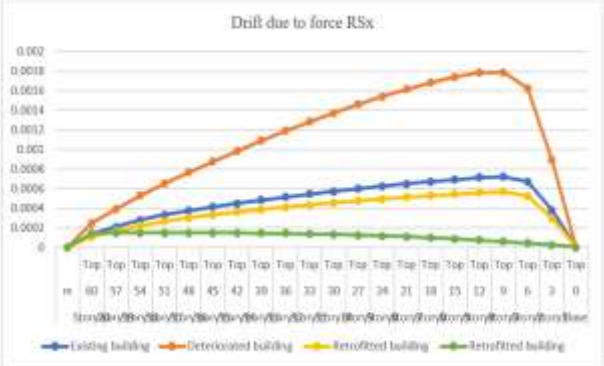
b) The maximum drift at storey 16 is decreased by 49.60%(i.e. decrease from 0.000373to 0.000188)

Table 14. Drift Comparison due to force RSx for Case 1, Case 4, Case 7 and Case 10

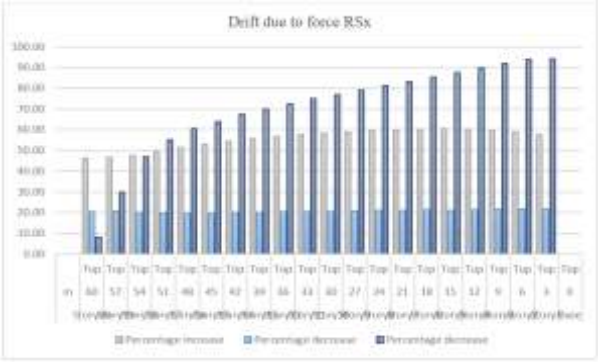
Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	X direction (mm)	100 % deterioration X direction (mm)	Percentage increase	100 % Retrofitted building using jacketing X direction (mm)	Percentage decrease	100 % Retrofitted building using shear wall X direction (mm)	Percentage decrease
S20	**0.000133**	0.000248	46.37	0.000106	20.30	**0.000144**	**8.27**

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S19	0.000208	0.000389	46.53	0.000165	20.67	0.000146	29.81
S18	0.000277	0.000528	47.54	0.000221	20.22	0.000147	46.93
S17	0.00033	0.000651	49.31	0.000265	19.70	0.000148	55.15
S16	**0.000373**	0.000764	51.18	0.0003	19.57	**0.000148**	**60.32**
S15	0.00041	0.000873	53.04	0.00033	19.51	0.000148	63.90
S14	0.000446	0.000982	54.58	0.000357	19.96	0.000146	67.26
S13	0.00048	0.001087	55.84	0.000383	20.21	0.000144	70.00
S12	0.000512	0.001186	56.83	0.000407	20.51	0.000141	72.46
S11	0.000541	0.001279	57.70	0.00043	20.52	0.000136	74.86
S10	0.000569	0.001368	58.41	0.000452	20.56	0.000131	76.98
S9	0.000596	0.001455	59.04	0.000473	20.64	0.000124	79.19
S8	0.000623	0.001537	59.47	0.000492	21.03	0.000117	81.22
S7	0.000647	0.001612	59.86	0.00051	21.17	0.000108	83.31
S6	0.000668	0.001678	60.19	0.000526	21.26	0.000097	85.48
S5	0.000689	0.001737	60.33	0.000543	21.19	0.000086	87.52
S4	0.00071	0.001781	60.13	0.000559	21.27	0.000073	89.72
S3	**0.000719**	**0.001782**	**59.65**	**0.000564**	**21.56**	0.000058	91.93
S2	0.000667	0.001624	58.93	0.000523	21.59	0.000041	93.85
S1	0.000378	0.000889	57.48	0.000296	21.69	0.000022	94.18
Base	0	0	0	0	0	0	0



Graph 3.23Drift due to force RSx



Graph 3.24Percentage variation due to Drift

Observations:
The table 14 and graphs 3.23 and 3.24 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 57.48 % to 46.37 %

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

b) The maximum drift at storey 3 is increased by 59.65 % (i.e. increase from 0.000719to 0.001782)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 21.69 %to 20.30 %

b) The maximum drift at storey 3 is decreased by 21.56 %.(i.e. decrease from 0.000719to0.000564)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 94.18 %to 29.81 % up to storey 19 and at storey 20 it is increased by 8.27 % (i.e.increase from 0.000133 to0.000144)

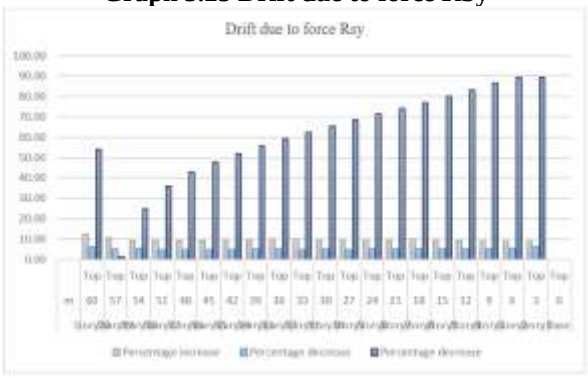
b) The maximum drift at storey 16 is decreased by 60.32%(i.e. decrease from 0.000373to 0.000148)

Table 15. Drift Comparison due to force RSy for Case 1, Case 2, Case 5 and Case 8

Storey	**Existing building**	**Deteriorated building**		**Retrofitted building**		**Retrofitted building**	
	Y direction (mm)	**18.36 % deterioration Y direction (mm)**	**Percentage increase**	**18.36 % Retrofitted building using jacketing Y direction (mm)**	**Percentage decrease**	**18.36 % Retrofitted building using shear wall Y direction (mm)**	**Percentage decrease**
S20	**0.000133**	0.000152	12.50	0.00013	6.02	**0.000205**	**54.14**
S19	0.000213	0.000238	10.50	0.0002	5.16	0.00021	1.41
S18	0.000284	0.000313	9.27	0.00027	5.28	0.000213	25.00
S17	0.000337	0.000372	9.41	0.00032	4.75	0.000216	35.91
S16	**0.000379**	0.000418	9.33	0.00036	4.75	**0.000217**	**42.74**
S15	0.000416	0.000459	9.37	0.0004	4.81	0.000217	47.84
S14	0.000451	0.000499	9.62	0.00043	4.88	0.000216	52.11
S13	0.000485	0.000537	9.68	0.00046	4.95	0.000214	55.88
S12	0.000516	0.000572	9.79	0.00049	5.04	0.00021	59.30
S11	0.000543	0.000602	9.80	0.00052	4.79	0.000204	62.43
S10	0.00057	0.000631	9.67	0.00054	4.91	0.000197	65.44
S9	0.000597	0.000661	9.68	0.00057	4.86	0.000188	68.51
S8	0.000623	0.000689	9.58	0.00059	4.98	0.000178	71.43
S7	0.000646	0.000715	9.65	0.00061	4.95	0.000166	74.30
S6	0.000666	0.000738	9.76	0.00063	4.95	0.000153	77.03
S5	0.000687	0.000759	9.49	0.00065	5.09	0.000137	80.06
S4	0.000709	0.000782	9.34	0.00067	4.94	0.000119	83.22
S3	**0.000728**	**0.0008**	**9.00**	**0.00069**	**5.22**	0.000098	86.54
S2	0.000707	0.000776	8.89	0.00067	5.37	0.000075	89.39
S1	0.000451	0.000495	8.89	0.00042	5.99	0.000047	89.58
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Graph 3.25 Drift due to force RSy



Graph 3.26 Percentage variation due to Drift

Observations:

The table 15 and graphs 3.25 and 3.26 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 8.89 % to 12.50 %

b) The maximum drift at storey 3 is increased by 9 % (i.e. increase from 0.000728 to 0.0008)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 5.99 %to 6.02 %

b) The maximum drift at storey 3 is decreased by 5.22 %.(i.e. decrease from 0.000728 to0.00069)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 89.58 %to 1.41 % up to storey 19 and at storey 20 it is increased by 54.14 % (i.e.increase from 0.000133to0.000205)

b) The maximum drift at storey 16 is decreased by 42.74%(i.e. decrease from 0.000379 to 0.000217)

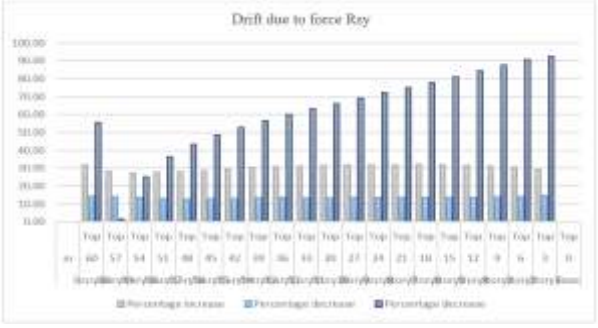
Table 16. Drift Comparison due to force RSy for Case 1, Case 3, Case 6 and Case 9

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (mm)	51.02 % deterioration Y direction (mm)	Percentage increase	51.02 % Retrofitted building using jacketing Y direction (mm)	Percentage decrease	51.02 % Retrofitted building using shear wall Y direction (mm)	Percentage decrease

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S20	**0.000133**	0.000195	31.79	0.00011	14.29	**0.000207**	**55.64**
S19	0.000213	0.000297	28.28	0.00018	14.08	0.00021	1.41
S18	0.000284	0.00039	27.18	0.00025	13.73	0.000212	25.35
S17	0.000337	0.000465	27.53	0.00029	13.06	0.000214	36.50
S16	**0.000379**	0.000527	28.08	0.00033	12.66	**0.000215**	**43.27**
S15	0.000416	0.000585	28.89	0.00036	12.98	0.000214	48.56
S14	0.000451	0.000642	29.75	0.00039	13.08	0.000213	52.77
S13	0.000485	0.000696	30.32	0.00042	13.40	0.00021	56.70
S12	0.000516	0.000745	30.74	0.00045	13.57	0.000206	60.08
S11	0.000543	0.00079	31.27	0.00047	13.26	0.0002	63.17
S10	0.00057	0.000832	31.49	0.00049	13.33	0.000193	66.14
S9	0.000597	0.000874	31.69	0.00052	13.57	0.000184	69.18
S8	0.000623	0.000914	31.84	0.00054	13.64	0.000173	72.23
S7	0.000646	0.00095	32.00	0.00056	13.78	0.000161	75.08
S6	0.000666	0.000981	32.11	0.00057	13.81	0.000147	77.93
S5	0.000687	0.001009	31.91	0.00059	13.83	0.00013	81.08
S4	0.000709	0.001036	31.56	0.00061	13.82	0.000111	84.34
S3	**0.000728**	**0.001055**	**31.00**	**0.00063**	**14.01**	0.00009	87.64
S2	0.000707	0.001017	30.48	0.00061	14.14	0.000065	90.81
S1	0.000451	0.00064	29.53	0.00038	14.86	0.000034	92.46
Base	0	0	0	0	0	0	0

Graph 3.27 Drift due to force RSy



Graph 3.28 Percentage variation due to Drift

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Observations:

The table 16 and graphs 3.27 and 3.28 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 29.53 % to 31.79 %

b) The maximum drift at storey 3 is increased by 31 % (i.e. increase from 0.000728 to 0.001055)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey

b) 1 to storey 20 is decreased by 14.86 %to 14.29 %

c) The maximum drift at storey 3 is decreased by 14.01 %. (i.e. decrease from 0.000728 to0.00063)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

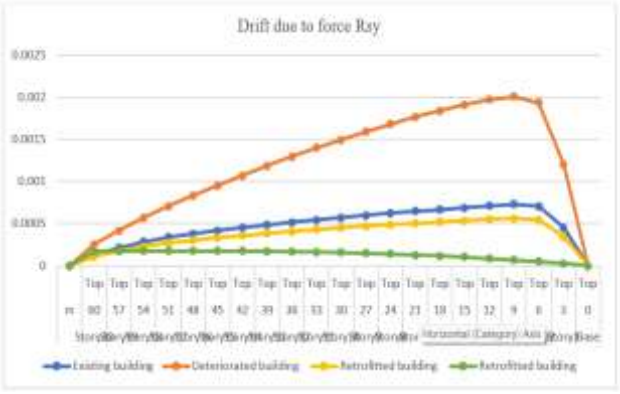
a) It is observed that the drift from storey 1 to storey 20 is decreased by 92.46 %to 1.41 % up to storey 19 and at storey 20 it is increased by 55.64 % (i.e.increase from 0.000133to0.000207)

b) The maximum drift at storey 16 is decreased by 43.27%(i.e. decrease from 0.000379 to 0.000215)

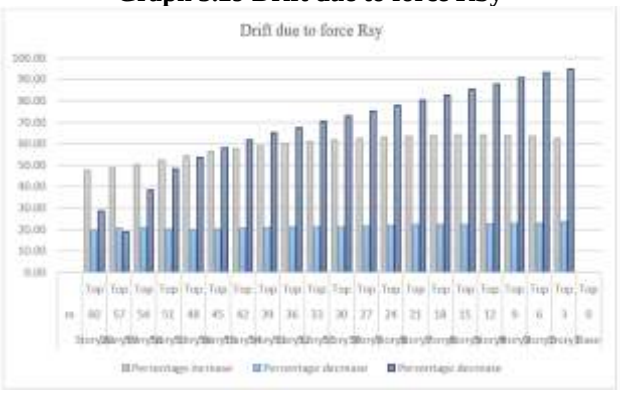
Table 17. Drift Comparison due to force RSy for Case 1, Case 4, Case 7 and Case 10

Story	Existing building	Deterio rated building		Retrofitted building		Retrofit ted building	
	Y direction (mm)	100 % deterioration Y direction (mm)	Percentag e increase	100 % Retrofitted building using jacketing Y direction (mm)	Percentag e decrease	100 % Retrofitted building using shear wall Y direction (mm)	Percentage decrease
S20	**0.000133**	0.000253	47.43	0.00011	19.55	**0.000171**	**28.57**
S19	0.000213	0.000415	48.67	0.00017	20.66	0.000173	18.78
S18	0.000284	0.00057	50.18	0.00023	20.77	0.000175	38.38
S17	0.000337	0.000706	52.27	0.00027	20.18	0.000175	48.07
S16	**0.000379**	0.00083	54.34	0.0003	20.05	**0.000176**	**53.56**
S15	0.000416	0.00095	56.21	0.00033	20.19	0.000175	57.93
S14	0.000451	0.001068	57.77	0.00036	20.62	0.000173	61.64
S13	0.000485	0.001184	59.04	0.00038	21.03	0.00017	64.95
S12	0.000516	0.001293	60.09	0.00041	21.32	0.000167	67.64
S11	0.000543	0.001396	61.10	0.00043	21.18	0.000161	70.35
S10	0.00057	0.001495	61.87	0.00045	21.23	0.000155	72.81
S9	0.000597	0.00159	62.45	0.00047	21.61	0.000147	75.38
S8	0.000623	0.001681	62.94	0.00049	21.99	0.000138	77.85
S7	0.000646	0.001764	63.38	0.0005	22.14	0.000127	80.34
S6	0.000666	0.001839	63.78	0.00052	22.22	0.000115	82.73
S5	0.000687	0.001908	63.99	0.00053	22.42	0.000101	85.30
S4	0.000709	0.001969	63.99	0.00055	22.43	0.000086	87.87
S3	**0.000728**	**0.002007**	**63.73**	**0.00056**	**22.80**	0.000068	90.66
S2	0.000707	0.001931	63.39	0.00054	23.06	0.000048	93.21
S1	0.000451	0.001204	62.54	0.00034	23.73	0.000024	94.68
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.29 Drift due to force RSy



Graph 3.30 Percentage variation due to Drift

Observations:

The table 17 and graphs 3.29 and 3.30 shows the drift and percentage variation due to drift along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the drift from storey 1 to storey 20 is increased by 62.54 % to 47.43 %

b) The maximum drift at storey 3 is increased by 63.73 % (i.e. increase from 0.000728 to 0.002007)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 23.73 %to 19.55 %

b) The maximum drift at storey 3 is decreased by 22.80 %.(i.e. decrease from 0.000728 to 0.00056)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

a) It is observed that the drift from storey 1 to storey 20 is decreased by 94.68 %to 18.78 % up to storey 19 and at storey 20 it is increased by 28.57 % (i.e.increase from 0.000133to0.000171)

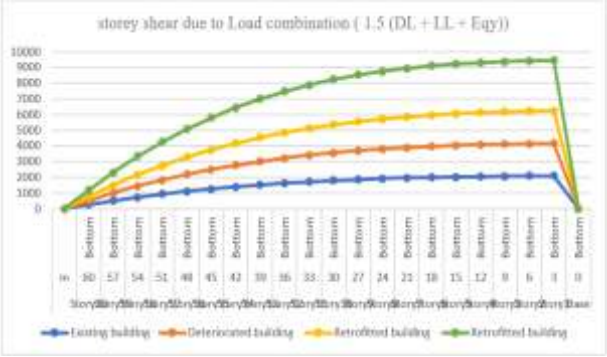
b) The maximum drift at storey 16 is decreased by 53.56%(i.e. decrease from 0.000379 to 0.000176)

Table 18. Storey shear Comparison due to load combination (1.5 (DL + LL + EQy)) for Case 1, Case 2, Case 5 and Case 8

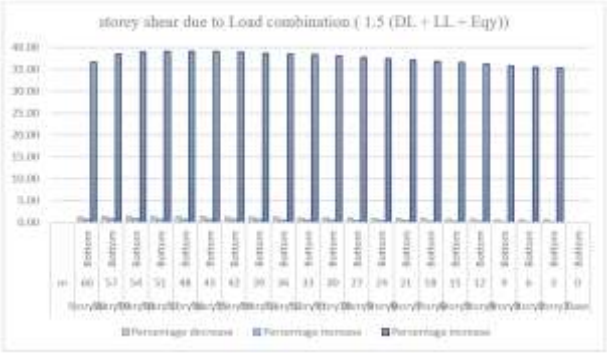
Story	Existing building	Deteriorated building	Percent age decrease	Retrofitted building	Percentage increase	Retrofitted building	Percent age increase
	Y direction (KN)	18.36 % deterioration Y direction (KN)		18.36 % Retrofitted building using jacketing Y direction		18.36 % Retrofitted building using shear wall Y direction	

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

				(KN)		(KN)	
S20	254.1784	250.9435	1.27	256.1117	0.76	400.7287	36.57
S19	497.6596	490.8731	1.36	501.773	0.83	809.0015	38.48
S18	717.7508	707.9357	1.37	723.6799	0.83	1175.6409	38.95
S17	915.6948	903.3439	1.35	923.0964	0.81	1502.8896	39.07
S16	1092.7351	1078.3107	1.32	1101.2871	0.78	1792.99	39.06
S15	1250.1165	1234.0505	1.29	1259.5179	0.75	2048.1836	38.96
S14	1389.0849	1371.7792	1.25	1399.0556	0.72	2270.7119	38.83
S13	1510.8875	1492.7136	1.20	1521.1682	0.68	2462.8158	38.65
S12	1616.772	1598.0711	1.16	1627.1243	0.64	2626.7357	38.45
S11	1707.9866	1689.0697	1.11	1718.1929	0.60	2764.7119	38.22
S10	1785.779	1766.9266	1.06	1795.6425	0.55	2878.9845	37.97
S9	1851.3955	1832.8574	1.00	1860.7402	0.50	2971.7931	37.70
S8	1906.0791	1888.0741	0.94	1914.7503	0.45	3045.3772	37.41
S7	1951.0662	1933.7815	0.89	1958.931	0.40	3101.976	37.10
S6	1987.5815	1971.1714	0.83	1994.5295	0.35	3143.8283	36.78
S5	2016.8265	2001.4101	0.76	2022.7717	0.29	3173.1725	36.44
S4	2039.9547	2025.6119	0.70	2044.8395	0.24	3192.2467	36.10
S3	2058.0098	2044.7705	0.64	2061.8136	0.18	3203.2875	35.75
S2	2071.7449	2059.562	0.59	2074.5091	0.13	3208.5301	35.43
S1	**2081.0023**	**2069.661**	**0.54**	**2082.9167**	**0.09**	**3210.2011**	**35.18**
Base	0	0	0	0	0	0	0



Graph 3.31 Storey shear due to Load combination (1.5 (DL + LL + Eqy))



Graph 3.32 Percentage variation due to Storey shear

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Observations:

The table 18 and graphs 3.31 and 3.32 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 0.54 % to 1.27 %

b) The maximum Storey shear at storey 1 is decreased by 0.54 % (i.e. decrease from 2081.0023 KNto 2069.661KN)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 0.09 %to 0.76 %

b) The maximum Storey shear at storey 1 is increased by 0.09 %.(i.e. increase from 2081.0023 KNto2082.9167 KN)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

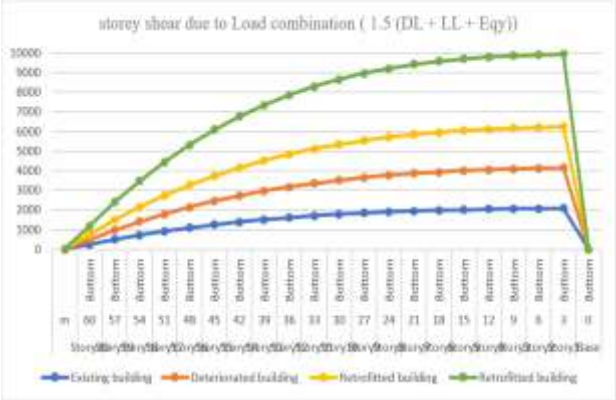
a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 35.18 %to 36.57 %

b) The maximum Storey shear at storey 1 is increased by 35.18%(i.e. increase from 2081.0023 KNto 3210.2011 KN)

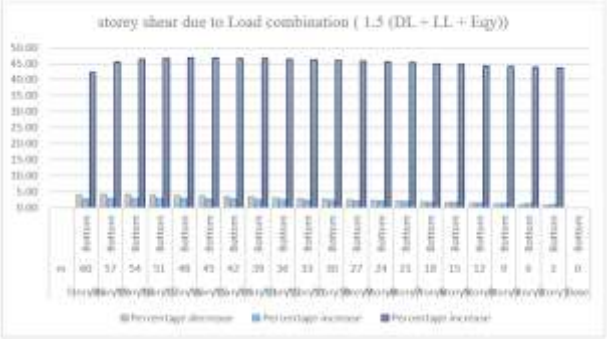
Table 19. Storey shear Comparison due to load combination (1.5 (DL + LL + EQy)) for Case 1, Case 3, Case 6 and Case 9

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (KN)	51.02 % deterioration Y direction (KN)	Percentage decrease	51.02 % Retrofitted building using jacketing Y direction (KN)	Percentage increase	51.02 % Retrofitted building using shear wall Y direction (KN)	Percentage increase
S20	254.1784	244.3868	3.85	261.0736	2.71	440.2046	42.26
S19	497.6596	477.4932	4.05	512.026	2.89	912.2341	45.45
S18	717.7508	688.9026	4.02	738.4689	2.89	1336.1276	46.28
S17	915.6948	879.7597	3.92	941.7094	2.84	1714.4778	46.59
S16	1092.7351	1051.2097	3.80	1123.0555	2.77	2049.8763	46.69
S15	1250.1165	1204.3994	3.66	1283.8158	2.70	2344.9146	46.69
S14	1389.0849	1340.4768	3.50	1425.3004	2.61	2602.183	46.62
S13	1510.8875	1460.5909	3.33	1548.8199	2.51	2824.272	46.50
S12	1616.772	1565.8916	3.15	1655.6859	2.41	3013.7711	46.35
S11	1707.9866	1657.5286	2.95	1747.21	2.30	3173.2699	46.18
S10	1785.779	1736.6506	2.75	1824.7036	2.18	3305.3572	45.97
S9	1851.3955	1804.4038	2.54	1889.4773	2.06	3412.6218	45.75
S8	1906.0791	1861.9292	2.32	1942.8388	1.93	3497.6518	45.50
S7	1951.0662	1910.3583	2.09	1986.0911	1.80	3563.0351	45.24
S6	1987.5815	1950.8049	1.85	2020.528	1.66	3611.359	44.96
S5	2016.8265	1984.3492	1.61	2047.4253	1.52	3645.21	44.67
S4	2039.9547	2012.0028	1.37	2068.0215	1.38	3667.1737	44.37
S3	2058.0098	2034.6199	1.14	2083.4702	1.24	3679.8339	44.07
S2	2071.7449	2052.6423	0.92	2094.7002	1.11	3685.7718	43.79
S1	**2081.0023**	**2065.2226**	**0.76**	**2101.9447**	**1.01**	**3687.5611**	**43.57**
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.33 Storey shear due to Load combination (1.5 (DL + LL + Eqy))



Graph 3.34 Percentage variation due to Storey shear

Observations:

The table 19 and graphs 3.33 and 3.34 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 0.76 % to 3.85 %

b) The maximum Storey shear at storey 1 is decreased by 0.76 % (i.e. decrease from 2081.0023 KNto 2065.2226KN)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 1.01 %to 2.71 %

b) The maximum Storey shear at storey 1 is increased by 1.01 %.(i.e. increase from 2081.0023 KNto2101.9447KN)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 43.57 %to 42.26 %

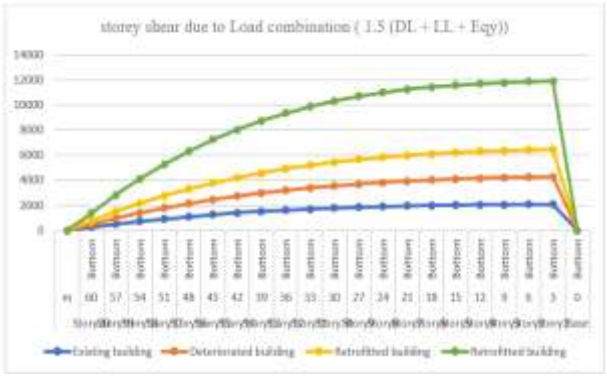
b) The maximum Storey shear at storey 1 is increased by 43.57%(i.e. increase from 2081.0023 KNto 3687.5611 KN)

Table 20. Storey shear Comparison due to load combination (1.5 (DL + LL + EQy)) for Case 1, Case 4, Case 7 and Case 10

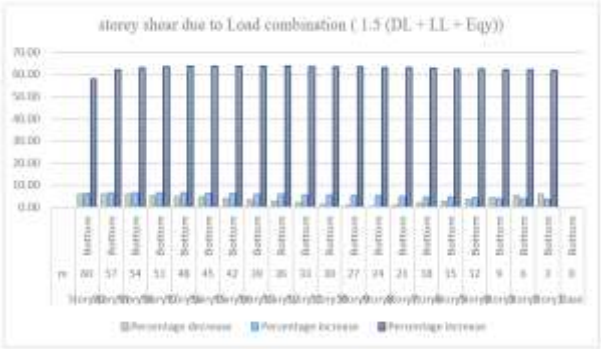
Story	Existing building	Deteriorated building	Percentage decrease	Retrofitted building	Percentage increase	Retrofitted building	Percentage increase
	Y direction (KN)	100 % deterioration Y direction (KN)		100 % Retrofitted building using jacketing Y direction (KN)		100 % Retrofitted building using shear wall Y direction (KN)	
S20	254.1784	239.3312	5.84	269.9558	6.21	601.2774	57.73

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S19	497.6596	467.5015	6.06	530.322	6.56	1306.2952	61.90
S18	717.7508	676.083	5.81	765.0386	6.59	1939.2844	62.99
S17	915.6948	866.1004	5.42	975.4764	6.53	2504.129	63.43
S16	1092.7351	1038.5789	4.96	1163.0066	6.43	3004.7125	63.63
S15	1250.1165	1194.5459	4.45	1329.0015	6.31	3444.9177	63.71
S14	1389.0849	1335.0309	3.89	1474.8339	6.17	3828.627	63.72
S13	1510.8875	1461.0647	3.30	1601.8778	6.02	4159.7225	63.68
S12	1616.772	1573.6787	2.67	1711.5075	5.86	4442.0858	63.60
S11	1707.9866	1673.9038	2.00	1805.0976	5.69	4679.5981	63.50
S10	1785.779	1762.768	1.29	1884.0224	5.50	4876.1404	63.38
S9	1851.3955	1841.2936	0.55	1949.6554	5.31	5035.5935	63.23
S8	**1906.0791**	**1910.492**	**0.23**	2003.3681	5.10	5161.8379	63.07
S7	**1951.0662**	**1971.3555**	**1.04**	2046.5277	4.89	5258.7535	62.90
S6	**1987.5815**	**2024.8412**	**1.87**	2080.4936	4.67	5330.2201	62.71
S5	**2016.8265**	**2071.841**	**2.73**	2106.6101	4.45	5380.117	62.51
S4	**2039.9547**	**2113.1131**	**3.59**	2126.1903	4.23	5412.3227	62.31
S3	**2058.0098**	**2149.1147**	**4.43**	2140.475	4.01	5430.7149	62.10
S2	**2071.7449**	**2179.5226**	**5.20**	2150.5157	3.80	5439.1691	61.91
S1	**2081.0023**	**2201.643**	**5.80**	**2156.7758**	**3.64**	**5441.5562**	**61.76**
Base	0	0	0	0	0	0	0



Graph 3.35 Storey shear due to Load combination (1.5 (DL + LL + Eqy))



Graph 3.36 Percentage variation due to Storey shear

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Observations:

The table 20 and graphs 3.35 and 3.36 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 up to storey 8 is increased by 5.80% to 0.23 % and from storey 9 to storey 20 it is decreased by 0.55 % to 5.84 %

b) The maximum Storey shear at storey 1 is increased by 5.80 % (i.e. increase from 2081.0023 KNto 2201.643KN)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 3.64 %to 6.21 %

b) The maximum Storey shear at storey 1 is increased by 3.64 %.(i.e. increase from 2081.0023 KNto2156.7758KN)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

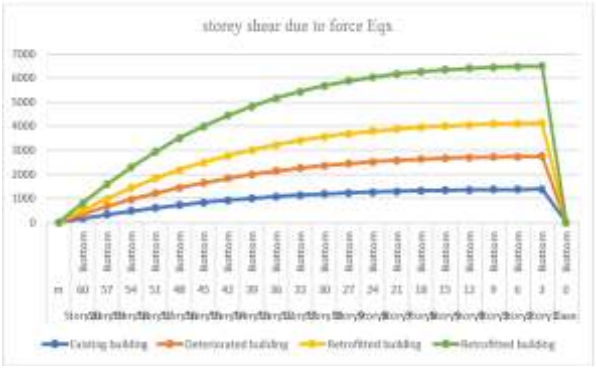
a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 61.76 % to 57.73 %

b) The maximum Storey shear at storey 1 is increased by 61.76%(i.e. increase from 2081.0023 KNto 5441.5562 KN)

Table 21. Storey shear Comparison due to force EQx for Case 1, Case 2, Case 5 and Case 8

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	X direction (KN)	18.36 % deterioration X direction (KN)	Percentage decrease	18.36 % Retrofitted building using jacketing X direction (KN)	Percentage increase	18.36 % Retrofitted building using shear wall X direction (KN)	Percentage increase
S20	169.2458	166.9226	1.37	170.6288	0.82	294.3426	42.50
S19	331.3419	326.4722	1.47	334.2811	0.89	594.2053	44.24
S18	477.841	470.7697	1.48	482.0965	0.89	863.4679	44.66
S17	609.5725	600.6249	1.47	614.9184	0.88	1103.7793	44.77
S16	727.3654	716.847	1.45	733.5895	0.86	1316.788	44.76
S15	832.0488	820.2454	1.42	838.9528	0.83	1504.1423	44.68
S14	924.4528	911.6305	1.39	931.8522	0.80	1667.4904	44.56
S13	1005.408	991.8128	1.35	1013.1317	0.77	1808.4799	44.41
S12	1075.744	1061.6034	1.31	1083.6356	0.73	1928.7587	44.23
S11	1136.293	1121.8126	1.27	1144.2082	0.70	2029.9743	44.02
S10	1187.883	1173.2502	1.23	1195.6927	0.66	2113.7741	43.80
S9	1231.342	1216.7236	1.19	1238.9308	0.62	2181.8055	43.56
S8	1267.494	1253.0366	1.14	1274.7607	0.57	2235.7154	43.31
S7	1297.158	1282.9861	1.09	1304.0149	0.53	2277.1512	43.04
S6	1321.138	1307.3565	1.04	1327.5153	0.48	2307.7597	42.75
S5	1340.221	1326.9094	0.99	1346.0639	0.44	2329.1877	42.46
S4	1355.149	1342.3609	0.94	1360.4238	0.39	2343.0819	42.16
S3	1366.575	1354.3293	0.90	1371.2745	0.34	2351.0883	41.87
S2	1374.938	1363.2043	0.85	1379.1008	0.30	2354.8523	41.61
S1	**1380.134**	**1368.7848**	**0.82**	**1383.8902**	**0.27**	**2356.0137**	**41.42**
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.37 Storey shear due to force EQx

Graph 3.38 Percentage variation due to Storey shear

Observations:

The table 21 and graphs 3.37 and 3.38 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 0.82% to 1.37 %

b) The maximum Storey shear at storey 1 is decreased by 0.82% (i.e. decrease from 1380.134 KNto 1368.7848 KN)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 0.27 %to 0.82 %

b) The maximum Storey shear at storey 1 is increased by 0.27 %.(i.e. increase from 1380.134 KNto1383.8902 KN)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 41.42 %to 42.50 %

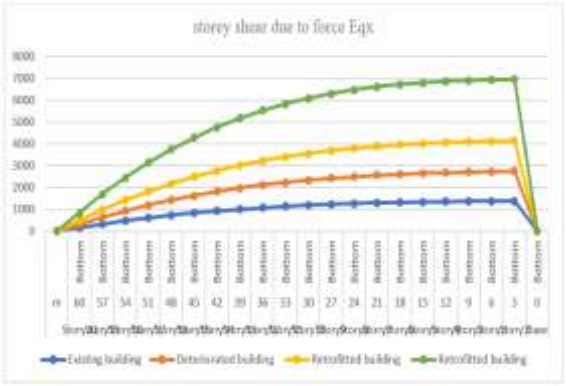
b) The maximum Storey shear at storey 1 is increased by 41.42%(i.e. increase from 1380.134 KNto 2356.0137 KN)

Table 22. Storey shear Comparison due to force EQx for Case 1, Case 3, Case 6 and Case 9

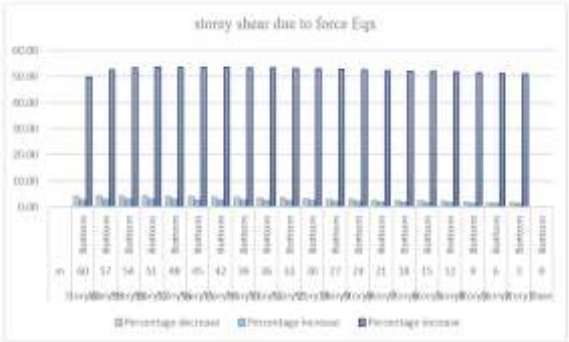
Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	X direction (KN)	51.02 % deterioration X direction (KN)	Percentage decrease	51.02 % Retrofitted building using jacketing X direction (KN)	Percentage increase	51.02 % Retrofitted building using shear wall X direction (KN)	Percentage increase
S20	169.2458	162.2049	4.16	174.0164	2.82	335.9383	49.62

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S19	331.3419	316.8297	4.38	341.2841	3.00	696.1198	52.40
S18	477.841	456.9689	4.37	492.2149	3.01	1019.5268	53.13
S17	609.5725	583.3882	4.30	627.6803	2.97	1308.1415	53.40
S16	727.3654	696.8525	4.19	748.5519	2.91	1563.9459	53.49
S15	832.0488	798.1271	4.08	855.7012	2.84	1788.9215	53.49
S14	924.4528	887.9775	3.95	950.0006	2.76	1985.0496	53.43
S13	1005.408	967.1701	3.80	1032.3226	2.68	2154.3111	53.33
S12	1075.744	1036.4712	3.65	1103.5401	2.58	2298.6869	53.20
S11	1136.293	1096.6463	3.49	1164.5259	2.48	2420.1575	53.05
S10	1187.883	1148.4599	3.32	1216.152	2.38	2520.7031	52.87
S9	1231.342	1192.6734	3.14	1259.2891	2.27	2602.304	52.68
S8	1267.494	1230.0432	2.95	1294.8051	2.15	2666.9401	52.47
S7	1297.158	1261.3168	2.76	1323.5629	2.04	2716.5911	52.25
S6	1321.138	1287.2259	2.57	1346.4165	1.91	2753.2365	52.02
S5	1340.221	1308.4727	2.37	1364.2032	1.79	2778.8553	51.77
S4	1355.149	1325.7017	2.17	1377.7267	1.67	2795.4263	51.52
S3	1366.575	1339.4347	1.99	1387.7197	1.55	2804.9271	51.28
S2	1374.938	1349.9083	1.82	1394.748	1.44	2809.3343	51.06
S1	**1380.134**	**1356.6326**	**1.70**	**1398.9497**	**1.36**	**2810.62**	**50.90**
Base	0	0	0	0	0	0	0



Graph 3.39 Storey shear due to force EQx



Graph 3.40 Percentage variation due to Storey shear

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Observations:

The table 22 and graphs 3.39 and 3.40 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 1.70 % to 4.16 %

b) The maximum Storey shear at storey 1 is decreased by 1.70 % (i.e. decrease from 1380.134 KNto 1356.6326KN)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 1.36 %to 2.82 %

b) The maximum Storey shear at storey 1 is increased by 1.36 %.(i.e. increase from 1380.134 KNto1398.9497 KN)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

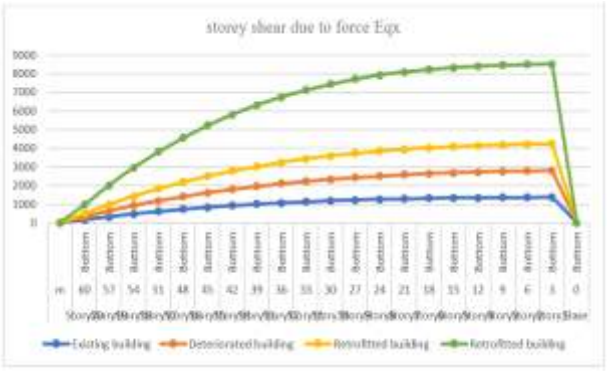
a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 50.90 %to 49.62 %

b) The maximum Storey shear at storey 1 is increased by 50.90%(i.e. increase from 1380.134 KNto 2810.62 KN)

Table 23. Storey shear Comparison due to force EQx for Case 1, Case 4, Case 7 and Case 10

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	X direction (KN)	100 % deterioration X direction (KN)	Percentage decrease	100 % Retrofitted building using jacketing X direction (KN)	Percentage increase	100 % Retrofitted building using shear wall X direction (KN)	Percentage increase
S20	169.2458	157.8973	6.71	179.9533	6.33	474.6498	64.34
S19	331.3419	308.2099	6.98	353.5145	6.69	1031.1411	67.87
S18	477.841	445.3946	6.79	509.9794	6.73	1530.7259	68.78
S17	609.5725	570.14	6.47	650.2622	6.68	1976.475	69.16
S16	727.3654	683.1321	6.08	775.2765	6.59	2371.4587	69.33
S15	832.0488	785.0571	5.65	885.9362	6.48	2718.7471	69.40
S14	924.4528	876.6019	5.18	983.156	6.35	3021.4102	69.40
S13	1005.408	958.4536	4.67	1067.8506	6.21	3282.5176	69.37
S12	1075.744	1031.2988	4.13	1140.935	6.06	3505.1387	69.31
S11	1136.293	1095.8226	3.56	1203.3243	5.90	3692.3428	69.23
S10	1187.883	1152.7065	2.96	1255.9328	5.73	3847.1991	69.12
S9	1231.342	1202.6265	2.33	1299.6738	5.55	3972.7766	69.01
S8	1267.494	1246.248	1.68	1335.4583	5.36	4072.144	68.87
S7	1297.158	1284.219	1.00	1364.1929	5.17	4148.3702	68.73
S6	1321.138	1317.1568	0.30	1386.7771	4.97	4204.5235	68.58
S5	**1340.221**	**1345.6231**	**0.40**	1404.0959	4.77	4243.6724	68.42
S4	**1355.149**	**1370.0715**	**1.10**	1417.0063	4.56	4268.8847	68.26
S3	**1366.575**	**1390.7311**	**1.77**	1426.305	4.37	4283.2279	68.09
S2	**1374.938**	**1407.3257**	**2.36**	1432.6473	4.20	4289.7686	67.95
S1	**1380.134**	**1418.3432**	**2.77**	**1436.3242**	**4.07**	**4291.5703**	**67.84**
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.41 Storey shear due to force EQx

Graph 3.42 Percentage variation due to Storey shear

Observations:

The table 23 and graphs 3.41 and 3.42 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 up to storey 5 is increased by 2.77 % to 0.40% and from storey 6 to storey 20 it is decreased by 0.30 % to 6.71 %

b) The maximum Storey shear at storey 1 is increased by 2.77 % (i.e. increase from 1380.134 KNto 1418.343KN)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 4.07 %to 6.33 %

b) The maximum Storey shear at storey 1 is increased by 4.07 %.(i.e. increase from 1380.134 KNto1436.3242KN)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 67.84% to 64.34%

b) The maximum Storey shear at storey 1 is increased by 67.84%(i.e. increase from 1380.134 KNto 4291.5703 KN)

Table 24. Storey shear Comparison due to force EQy for Case 1, Case 2, Case 5 and Case 8

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (mm)	18.36 % deterioration Y direction (mm)	Percentage decrease	18.36 % Retrofitted building using jacketing Y direction (mm)	Percentage increase	18.36 % Retrofitted building using shear wall Y direction (mm)	Percentage increase
S20	169.4523	167.296	1.27	170.7411	0.76	267.2513	36.59
S19	331.7731	327.249	1.36	334.5153	0.83	539.5414	38.51

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S18	478.5005	471.957	1.37	482.4533	0.83	784.0722	38.97
S17	610.4632	602.229	1.35	615.3976	0.81	1002.3387	39.10
S16	728.4901	718.874	1.32	734.1914	0.78	1195.8354	39.08
S15	833.411	822.7	1.29	839.6786	0.75	1366.0566	38.99
S14	926.0566	914.52	1.25	932.7037	0.72	1514.4962	38.85
S13	1007.258	995.142	1.20	1014.1121	0.68	1642.6478	38.68
S12	1077.848	1065.38	1.16	1084.7495	0.64	1752.0049	38.48
S11	1138.658	1126.05	1.11	1145.4619	0.60	1844.0609	38.25
S10	1190.519	1177.95	1.06	1197.095	0.55	1920.3087	38.00
S9	1234.264	1221.9	1.00	1240.4935	0.50	1982.2413	37.73
S8	1270.719	1258.72	0.94	1276.5002	0.45	2031.3515	37.44
S7	1300.711	1289.19	0.89	1305.954	0.40	2069.1318	37.14
S6	1325.054	1314.11	0.83	1329.6863	0.35	2097.0746	36.81
S5	1344.551	1334.27	0.76	1348.5145	0.29	2116.6722	36.48
S4	1359.97	1350.41	0.70	1363.2263	0.24	2129.4162	36.13
S3	1372.007	1363.18	0.64	1374.5424	0.18	2136.7978	35.79
S2	1381.163	1373.04	0.59	1383.0061	0.13	2140.3069	35.47
S1	**1387.335**	**1379.77**	**0.54**	**1388.6111**	**0.09**	**2141.428**	**35.21**
Base	0	0	0	0	0	0	0

Graph 3.43 Storey shear due to force EQy

Graph 3.44 Percentage variation due to Storey shear

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Observations:

The table 24 and graphs 3.43 and 3.44 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 0.54 % to 1.27 %

b) The maximum Storey shear at storey 1 is decreased by 0.54 % (i.e. decrease from 1387.335 KNto 1379.77 KN)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 0.09 %to 0.76 %

b) The maximum Storey shear at storey 1 is increased by 0.09 %.(i.e. increase from 1387.335 KNto1388.611 KN)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

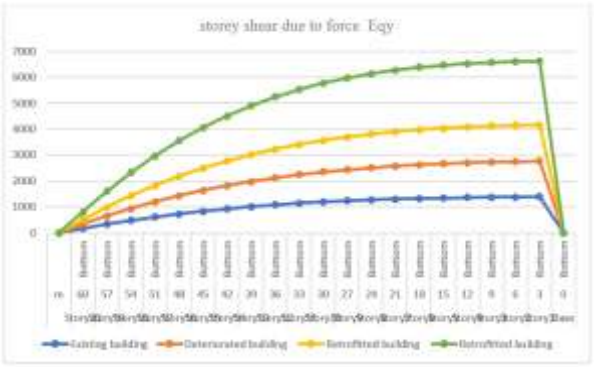
a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 35.21 % to 36.59 %

b) The maximum Storey shear at storey 1 is increased by 35.21%(i.e. increase from 1387.335 KNto 2141.42 KN)

Table 25. Storey shear Comparison due to force EQy for Case 1, Case 3, Case 6 and Case 9

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (KN)	51.02 % deterioration Y direction (KN)	Percentage decrease	51.02 % Retrofitted building using jacketing Y direction (KN)	Percentage increase	51.02 % Retrofitted building using shear wall Y direction (KN)	Percentage increase
S20	169.4523	162.925	3.85	174.0491	2.71	293.4697	42.26
S19	331.7731	318.329	4.05	341.3507	2.89	608.1561	45.45
S18	478.5005	459.268	4.02	492.3126	2.89	890.7518	46.28
S17	610.4632	586.506	3.92	627.8063	2.84	1142.9852	46.59
S16	728.4901	700.807	3.80	748.7037	2.77	1366.5842	46.69
S15	833.411	802.933	3.66	855.8772	2.70	1563.2764	46.69
S14	926.0566	893.651	3.50	950.2003	2.61	1734.7887	46.62
S13	1007.258	973.727	3.33	1032.5466	2.51	1882.848	46.50
S12	1077.848	1043.93	3.15	1103.7906	2.41	2009.1808	46.35
S11	1138.658	1105.02	2.95	1164.8066	2.30	2115.5133	46.18
S10	1190.519	1157.77	2.75	1216.4691	2.18	2203.5715	45.97
S9	1234.264	1202.94	2.54	1259.6515	2.06	2275.0812	45.75
S8	1270.719	1241.29	2.32	1295.2259	1.93	2331.7679	45.50
S7	1300.711	1273.57	2.09	1324.0607	1.80	2375.3567	45.24
S6	1325.054	1300.54	1.85	1347.0187	1.66	2407.5726	44.96
S5	1344.551	1322.9	1.61	1364.9502	1.52	2430.14	44.67
S4	1359.97	1341.34	1.37	1378.681	1.38	2444.7824	44.37
S3	1372.007	1356.41	1.14	1388.9801	1.24	2453.2226	44.07
S2	1381.163	1368.43	0.92	1396.4668	1.11	2457.1812	43.79
S1	**1387.335**	**1376.82**	**0.76**	**1401.2965**	**1.01**	**2458.3741**	**43.57**
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252



Graph 3.45 Storey shear due to force EQy

Graph 3.46 Percentage variation due to Storey shear

Observations:

The table 25 and graphs 3.45 and 3.46 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 0.76 % to 3.85 %

b) The maximum Storey shear at storey 1 is decreased by 0.76 % (i.e. decrease from 1387.335 KNto 1376.82KN)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 1.01 %to 2.71 %

b) The maximum Storey shear at storey 1 is increased by 1.01 %.(i.e. increase from 1387.335 KNto1401.2965 KN)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 43.57 %to 42.26 %

b) The maximum Storey shear at storey 1 is increased by 43.57%(i.e. increase from 1387.335 KNto 2458.3741 KN)

Table 26. Storey shear Comparison due to force EQy for Case 1, Case 4, Case 7 and Case 10

Story	Existing building	Deteriorated building	Percent age decrease	Retrofitted building	Percent age increase	Retrofitted building	Percentage increase
	Y direction (KN)	100 % deterioration Y direction (KN)		100 % Retrofitted building using jacketing Y direction (KN)		100 % Retrofitted building using shear wall Y direction (KN)	

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S20	169.4523	159.554	5.84	179.9705	6.21	400.8516	57.73
S19	331.7731	311.668	6.06	353.548	6.56	870.8635	61.90
S18	478.5005	450.722	5.81	510.0258	6.59	1292.8562	62.99
S17	610.4632	577.4	5.42	650.3176	6.53	1669.4193	63.43
S16	728.4901	692.386	4.96	775.3378	6.43	2003.1416	63.63
S15	833.411	796.364	4.45	886.001	6.31	2296.6118	63.71
S14	926.0566	890.021	3.89	983.2226	6.17	2552.418	63.72
S13	1007.258	974.043	3.30	1067.9186	6.02	2773.1484	63.68
S12	1077.848	1049.12	2.67	1141.005	5.86	2961.3905	63.60
S11	1138.658	1115.94	2.00	1203.3984	5.69	3119.7321	63.50
S10	1190.519	1175.18	1.29	1256.0149	5.50	3250.7603	63.38
S9	1234.264	1227.53	0.55	1299.7703	5.31	3357.0624	63.23
S8	**1270.719**	**1273.66**	**0.23**	1335.5788	5.10	3441.2252	63.07
S7	**1300.711**	**1314.24**	**1.04**	1364.3518	4.89	3505.8356	62.90
S6	**1325.054**	**1349.89**	**1.87**	1386.9957	4.67	3553.4801	62.71
S5	**1344.551**	**1381.23**	**2.73**	1404.4068	4.45	3586.7447	62.51
S4	**1359.97**	**1408.74**	**3.59**	1417.4602	4.23	3608.2152	62.31
S3	**1372.007**	**1432.74**	**4.43**	1426.9833	4.01	3620.4766	62.10
S2	**1381.163**	**1453.02**	**5.20**	1433.6771	3.80	3626.1128	61.91
S1	**1387.335**	**1467.76**	**5.80**	**1437.8505**	**3.64**	**3627.7041**	**61.76**
Base	0	0	0	0	0	0	0

Graph 3.47 Storey shear due to force EQy

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Graph 3.48 Percentage variation due to Storey shear

Observations:

The table 26 and graphs 3.47 and 3.48 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 up to storey 8 is increased by 5.80 % to 0.23 % and from storey 9 to storey 20 it is decreased by 0.55 % to 5.84 %

b) The maximum Storey shear at storey 1 is increased by 5.80 % (i.e. increase from 1387.335 KNto 1467.76KN)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 3.64 %to 6.21 %

b) The maximum Storey shear at storey 1 is increased by 3.64 %.(i.e. increase from 1387.335 KNto1437.8505KN)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 61.76 %to 57.73%

b) The maximum Storey shear at storey 1 is increased by 61.76%(i.e. increase from 1387.335 KNto 3627.7041 KN)

Table 27. Storey shear Comparison due to force RSx for Case 1, Case 2, Case 5 and Case 8

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	X direction (KN)	18.36 % deterioration X direction (KN)	Percentage decrease	18.36 % Retrofitted building using jacketing X direction (KN)	Percentage increase	18.36 % Retrofitted building using shear wall X direction (KN)	Percentage increase
S20	81.3036	77.5972	4.56	85.3527	4.98	237.0949	65.71
S19	154.9956	147.4686	4.86	163.1516	5.26	464.4507	66.63
S18	212.0673	201.311	5.07	223.8286	5.55	650.9056	67.42
S17	253.1364	239.9731	5.20	267.8443	5.81	799.091	68.32
S16	284.0592	269.3888	5.16	300.9581	5.95	914.9221	68.95
S15	311.9416	296.4772	4.96	330.3515	5.90	1006.6858	69.01
S14	340.2993	324.3213	4.70	359.8626	5.75	1083.3992	68.59
S13	368.1597	351.5314	4.52	388.9203	5.64	1152.9594	68.07

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S12	393.5158	375.9457	4.46	415.7224	5.64	1220.8339	67.77
S11	416.513	397.8305	4.49	440.3188	5.72	1289.8463	67.71
S10	439.1138	419.4088	4.49	464.3913	5.76	1360.9511	67.73
S9	462.3771	441.9443	4.42	488.7771	5.71	1434.2849	67.76
S8	485.0103	464.1472	4.30	512.2077	5.61	1509.735	67.87
S7	505.1186	483.9276	4.20	533.0262	5.52	1586.7437	68.17
S6	523.0367	501.3506	4.15	551.8289	5.50	1663.656	68.56
S5	541.7193	519.1934	4.16	571.6608	5.53	1737.2333	68.82
S4	563.6124	539.9558	4.20	594.8146	5.54	1802.8397	68.74
S3	586.9576	562.1643	4.22	619.2427	5.50	1855.3895	68.36
S2	605.8464	580.2578	4.22	638.797	5.44	1890.8075	67.96
S1	**614.7109**	**588.8513**	**4.21**	**647.8552**	**5.39**	**1907.2484**	**67.77**
Base	0	0	0	0	0	0	0

Graph 3.49 Storey shear due to force RSx

Graph 3.50 Percentage variation due to Storey shear

Observations:

The table 27 and graphs 3.49 and 3.50 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 4.21 % to 4.56 %

b) The maximum Storey shear at storey 1 is decreased by 4.21 % (i.e. decrease from 614.7109KNto 588.8513 KN)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 5.39 %to 4.98 %

b) The maximum Storey shear at storey 1 is

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

increased by 5.39 %.(i.e. increase from 614.7109KNto647.8552 KN)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 67.77 %to 65.71 %

b) The maximum Storey shear at storey 1 is increased by 67.77%(i.e. increase from 614.7109KNto 1907.2484 KN)

Table 28. Storey shear Comparison due to force RSx for Case 1, Case 3, Case 6 and Case 9

Story	**Existing building**	**Deteriorated building**		**Retrofitted building**		**Retrofitted building**	
	X direction (KN)	**51.02 % deterioration X direction (KN)**	**Percentage decrease**	**51.02 % Retrofitted building using jacketing X direction (KN)**	**Percentage increase**	**51.02 % Retrofitted building using shear wall X direction (KN)**	**Percentage increase**
S20	81.3036	70.1048	13.77	93.4511	14.94	268.8152	69.75
S19	154.9956	132.9712	14.21	179.6071	15.88	536.2603	71.10
S18	212.0673	181.8936	14.23	247.7476	16.82	753.3766	71.85
S17	253.1364	218.1816	13.81	297.9778	17.71	926.2351	72.67
S16	284.0592	247.5425	12.86	335.8295	18.23	1064.2986	73.31
S15	311.9416	275.9832	11.53	368.5816	18.16	1177.8465	73.52
S14	340.2993	305.5201	10.22	400.6314	17.73	1275.6885	73.32
S13	368.1597	334.2066	9.22	432.1423	17.38	1364.3405	73.02
S12	393.5158	359.8608	8.55	461.7165	17.33	1448.4984	72.83
S11	416.513	382.8562	8.08	489.2833	17.47	1531.6625	72.81
S10	439.1138	405.4323	7.67	516.0964	17.53	1616.1046	72.83
S9	462.3771	428.8698	7.25	542.6804	17.37	1702.4767	72.84
S8	485.0103	451.9688	6.81	567.8544	17.08	1789.851	72.90
S7	505.1186	472.6234	6.43	590.3647	16.88	1876.3658	73.08
S6	523.0367	490.5391	6.21	611.2044	16.86	1959.8089	73.31
S5	541.7193	507.8899	6.24	633.5083	16.94	2037.5037	73.41
S4	563.6124	526.889	6.52	659.2708	16.97	2105.7565	73.23
S3	586.9576	546.6047	6.87	685.9491	16.87	2159.877	72.82
S2	605.8464	562.633	7.13	706.9713	16.69	2195.5805	72.41
S1	**614.7109**	**570.4841**	**7.19**	**716.5526**	**16.57**	**2211.3119**	**72.20**
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Graph 3.51 Storey shear due to force RSx

Graph 3.52 Percentage variation due to Storey shear

Observations:

The table 28 and graphs 3.51 and 3.52 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 7.19 % to 13.77 %

b) The maximum Storey shear at storey 1 is decreased by 7.19 % (i.e. decrease from 614.7109KNto 570.4841 KN)

2) By comparing existing building model to 51.02 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 16.57 %to 14.94 %

b) The maximum Storey shear at storey 1 is increased by 16.57 %.(i.e. increase from 614.7109KNto716.5526 KN)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 72.20 %to 69.75 %

b) The maximum Storey shear at storey 1 is increased by 72.20%(i.e. increase from 614.7109KNto 2211.3119 KN)

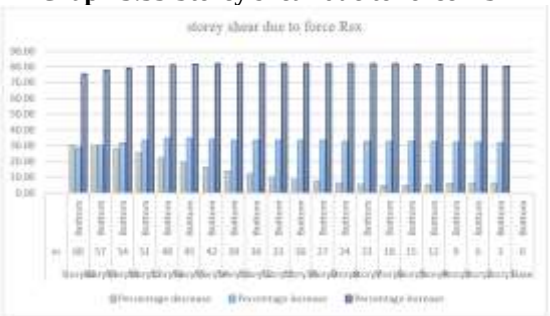
Table 29. Storey shear Comparison due to force RSx for Case 1, Case 4, Case 7 and Case 10

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	X direction (KN)	100 % deterioration X direction (KN)	Percentage decrease	100 % Retrofitted building using jacketing X direction (KN)	Percentage increase	100 % Retrofitted building using shear wall X direction (KN)	Percentage increase
S20	81.3036	56.5519	30.44	104.3987	28.41	333.6343	75.63
S19	154.9956	108.676	29.88	201.7037	30.14	708.8384	78.13

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S18	212.0673	152.211	28.23	279.639	31.86	1027.6145	79.36
S17	253.1364	188.3042	25.61	337.9802	33.52	1295.6426	80.46
S16	284.0592	220.6321	22.33	382.1475	34.53	1521.6074	81.33
S15	311.9416	252.639	19.01	419.6476	34.53	1715.0037	81.81
S14	340.2993	285.2062	16.19	455.503	33.85	1884.2994	81.94
S13	368.1597	317.018	13.89	490.6247	33.26	2036.2476	81.92
S12	393.5158	346.7519	11.88	524.0299	33.17	2176.1256	81.92
S11	416.513	374.5349	10.08	555.5491	33.38	2308.0413	81.95
S10	439.1138	401.4596	8.58	586.0351	33.46	2434.7691	81.96
S9	462.3771	428.0572	7.42	615.717	33.16	2557.367	81.92
S8	485.0103	453.5637	6.48	643.5025	32.68	2675.1841	81.87
S7	505.1186	476.785	5.61	668.5472	32.35	2786.4231	81.87
S6	523.0367	497.4951	4.88	692.2607	32.35	2888.7834	81.89
S5	541.7193	516.7274	4.61	717.8791	32.52	2979.6502	81.82
S4	563.6124	535.4876	4.99	747.069	32.55	3055.9056	81.56
S3	586.9576	553.1171	5.77	776.709	32.33	3114.0568	81.15
S2	605.8464	567.0741	6.40	799.6885	32.00	3151.3523	80.78
S1	**614.7109**	**574.5507**	**6.53**	**809.9859**	**31.77**	**3167.5762**	**80.59**
Base	0	0	0	0	0	0	0

Graph 3.53 Storey shear due to force RSx



Graph 3.54 Percentage variation due to Storey shear

Observations:

The table 29 and graphs 3.53 and 3.54 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 6.53 % to 30.44

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

%

b) The maximum Storey shear at storey 1 is decreased by 6.53 % (i.e. decrease from 614.7109KNto 574.5507 KN)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 31.77 %to 28.41 %

b) The maximum Storey shear at storey 1 is increased by 31.77 %.(i.e. increase from 614.7109KNto809.9859KN)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 80.59 %to 75.63 %

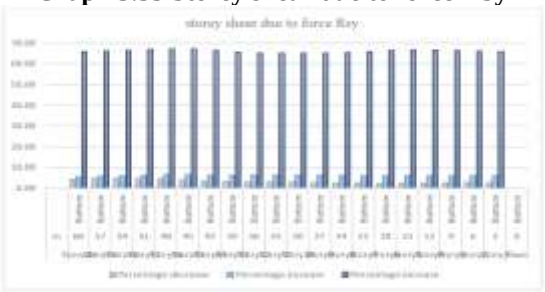
b) The maximum Storey shear at storey 1 is increased by 80.59%(i.e. increase from 614.7109KNto 3167.5762 KN)

Table 30. Storey shear Comparison due to force RSy for Case 1, Case 2, Case 5 and Case 8

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (KN)	18.36 % deterioration Y direction (KN)	Percentage decrease	18.36 % Retrofitted building using jacketing Y direction (KN)	Percentage increase	18.36 % Retrofitted building using shear wall Y direction (KN)	Percentage increase
S20	78.8183	75.3162	4.44	83.1173	5.45	230.7772	65.85
S19	151.2401	144.1288	4.70	159.9319	5.75	447.4958	66.20
S18	207.9045	197.8671	4.83	220.4869	6.05	620.1595	66.48
S17	249.0526	237.0889	4.80	264.8452	6.34	753.331	66.94
S16	280.1352	267.3575	4.56	298.3457	6.50	855.2531	67.25
S15	307.9879	295.2719	4.13	327.8962	6.46	935.3328	67.07
S14	336.1317	323.8197	3.66	357.359	6.32	1001.8282	66.45
S13	363.7209	351.6614	3.32	386.3269	6.22	1061.0431	65.72
S12	388.7564	376.6125	3.12	413.0371	6.25	1117.9044	65.22
S11	411.2892	398.829	3.03	437.4444	6.36	1176.5796	65.04
S10	433.3157	420.5484	2.95	461.2232	6.44	1240.116	65.06
S9	456.1576	443.2953	2.82	485.414	6.41	1309.5436	65.17
S8	478.7741	466.0596	2.66	508.9643	6.31	1383.6742	65.40
S7	499.1826	486.6862	2.50	530.1403	6.20	1460.0114	65.81
S6	517.2904	504.782	2.42	549.1523	6.16	1535.8519	66.32
S5	535.6976	522.6799	2.43	568.7358	6.17	1608.4688	66.70
S4	557.0458	542.9965	2.52	591.4018	6.17	1674.383	66.73
S3	580.2768	564.9855	2.64	615.7922	6.12	1728.8607	66.44
S2	599.9775	583.7219	2.71	636.221	6.04	1766.8035	66.04
S1	**610.0665**	**593.4664**	**2.72**	**646.5163**	**5.97**	**1784.8582**	**65.82**
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Graph 3.55 Storey shear due to force RSy



Graph 3.56 Percentage variation due to Storey shear

Observations:

The table 30 and graphs 3.55 and 3.56 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 18.36 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 2.72 % to 4.44 %

b) The maximum Storey shear at storey 1 is decreased by 2.72 % (i.e. decrease from 610.0665KNto 593.4664 KN)

2) By comparing existing building model to 18.36 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 5.97 %to 5.45 %

b) The maximum Storey shear at storey 1 is increased by 5.97 %.(i.e. increase from 610.0665KNto646.5163KN)

3) By comparing existing building model to 18.36 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 65.82 %to 65.85 %

b) The maximum Storey shear at storey 1 is increased by 65.82%(i.e. increase from 610.0665KNto 1784.8582 KN)

Table 31. Storey shear Comparison due to force RSy for Case 1, Case 3, Case 6 and Case 9

Story	Existing building	Deteriorated building		Retrofitted building		Retrofitted building	
	Y direction (KN)	51.02 % deterioration Y direction (KN)	Percentage decrease	51.02 % Retrofitted building using jacketing Y direction (KN)	Percentage increase	51.02 % Retrofitted building using shear wall Y direction (KN)	Percentage increase
S20	78.8183	67.3232	14.58	91.6925	16.33	254.2308	69.00
S19	151.2401	128.9149	14.76	177.3337	17.25	502.4767	69.90
S18	207.9045	177.9488	14.41	245.7703	18.21	698.6725	70.24
S17	249.0526	215.2819	13.56	296.6943	19.13	849.3969	70.68
S16	280.1352	245.8833	12.23	335.1966	19.66	964.9189	70.97

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

S15	307.9879	275.1836	10.65	368.2636	19.57	1056.3599	70.84
S14	336.1317	305.2392	9.19	400.3193	19.10	1133.1899	70.34
S13	363.7209	334.5359	8.02	431.7333	18.70	1202.4646	69.75
S12	388.7564	361.1114	7.11	461.2109	18.64	1269.5308	69.38
S11	411.2892	385.1161	6.36	488.6298	18.80	1338.6855	69.28
S10	433.3157	408.4377	5.74	515.2329	18.90	1412.8129	69.33
S9	456.1576	432.3265	5.22	541.7057	18.75	1492.5979	69.44
S8	478.7741	455.9082	4.78	567.0445	18.44	1576.5404	69.63
S7	499.1826	477.3241	4.38	589.9236	18.18	1661.9674	69.96
S6	517.2904	496.0948	4.10	610.9978	18.12	1745.9809	70.37
S5	535.6976	513.9447	4.06	633.148	18.19	1825.3863	70.65
S4	557.0458	532.9355	4.33	658.6033	18.23	1895.9378	70.62
S3	580.2768	552.6033	4.77	685.4682	18.13	1952.2447	70.28
S2	599.9775	569.1941	5.13	707.5596	17.93	1989.348	69.84
S1	**610.0665**	**578.1222**	**5.24**	**718.4704**	**17.77**	**2005.4977**	**69.58**
Base	0	0	0	0	0	0	0

Graph 3.57 Storey shear due to force RSy

Graph 3.58 Percentage variation due to Storey shear

Observations:

The table 31 and graphs 3.57 and 3.58 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 51.02 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 5.24 % to 14.58 %

b) The maximum Storey shear at storey 1 is decreased by 5.24 % (i.e. decrease from 610.0665KNto 578.1222 KN)

2) By comparing existing building model to 51.02 % Retrofitted building model using

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 17.77 %to 16.33 %
b) The maximum Storey shear at storey 1 is increased by 17.77 %.(i.e. increase from 610.0665KNto718.4704KN)

3) By comparing existing building model to 51.02 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 69.58 %to 69 %
b) The maximum Storey shear at storey 1 is increased by 69.58%(i.e. increase from 610.0665KNto 2005.4977 KN)

Table 32. Storey shear Comparison due to force RSy for Case 1, Case 4, Case 7 and Case 10

Story	**Existing building**	**Deteriorated building**		**Retrofitted building**		**Retrofitted building**	
	Y direction (KN)	**100 % deterioration Y direction (KN)**	**Percentage decrease**	**100 % Retrofitted building using jacketing Y direction (KN)**	**Percentage increase**	**100 % Retrofitted building using shear wall Y direction (KN)**	**Percentage increase**
S20	78.8183	53.8904	31.63	102.8942	30.55	308.6441	74.46
S19	151.2401	104.98	30.59	199.8837	32.16	645.8714	76.58
S18	207.9045	149.0728	28.30	278.256	33.84	922.4817	77.46
S17	249.0526	186.7934	25.00	337.3875	35.47	1146.7134	78.28
S16	280.1352	220.9496	21.13	382.2774	36.46	1329.5374	78.93
S15	307.9879	254.349	17.42	420.1467	36.42	1481.696	79.21
S14	336.1317	287.9205	14.34	456.0354	35.67	1612.5811	79.16
S13	363.7209	320.8178	11.80	491.0605	35.01	1730.3162	78.98
S12	388.7564	351.9971	9.46	524.3682	34.88	1841.4466	78.89
S11	411.2892	381.4138	7.26	555.7714	35.13	1950.2238	78.91
S10	433.3157	409.8054	5.43	586.1191	35.26	2058.6305	78.95
S9	456.1576	437.5972	4.07	615.7676	34.99	2167.1946	78.95
S8	478.7741	464.2727	3.03	643.7567	34.46	2275.4183	78.96
S7	499.1826	488.9129	2.06	669.1549	34.05	2381.4758	79.04
S6	517.2904	511.2446	1.17	693.0664	33.98	2482.1659	79.16
S5	535.6976	531.9677	0.70	718.5328	34.13	2573.6178	79.19
S4	557.0458	551.8737	0.93	747.495	34.19	2651.8951	78.99
S3	580.2768	570.5374	1.68	777.4646	33.98	2712.9369	78.61
S2	599.9775	585.8902	2.35	801.6642	33.62	2752.9664	78.21
S1	**610.0665**	**595.086**	**2.46**	**813.3705**	**33.32**	**2770.5732**	**77.98**
Base	0	0	0	0	0	0	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 06 June 2024, pp: 1006-1059 www.ijaem.net ISSN: 2395-5252

Graph 3.59 Storey shear due to force RSy

Graph 3.60 Percentage variation due to Storey shear

Observations:

The table 32 and graphs 3.59 and 3.60 shows the Storey shear and percentage variation due to Storey shear along storey height of building.

1) By comparing existing building model to 100 % deteriorated building model.

a) It is observed that the Storey shear from storey 1 to storey 20 is decreased by 2.46 % to 31.63 %

b) The maximum Storey shear at storey 1 is decreased by 2.46 % (i.e. decrease from 610.0665KNto 595.086 KN)

2) By comparing existing building model to 100 % Retrofitted building model using jacketing.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 33.32 %to 30.55 %

b) The maximum Storey shear at storey 1 is increased by 33.32 %.(i.e. increase from 610.0665KNto813.3705 KN)

3) By comparing existing building model to 100 % Retrofitted building model using Shear wall.

a) It is observed that the Storey shear from storey 1 to storey 20 is increased by 77.98 %to 74.46 %

b) The maximum Storey shear at storey 1 is increased by 77.98 %(i.e. increase from 610.0665KNto 2770.5732 KN)

IV. CONCLUSIONS:

1) Storey shear is having greater results in seismically retrofitted structures by using jacketing method and shear wall considering various percentage retrofication as compared to existing building structure without retrofitting.

2) Storey shear is decreased in 18.36 % and 51.02 % Deteriorated building model as compared to existing building model without retrofitting because of deterioration of building reduces the seismic weight of building structure but in case of 100 % Deteriorated model Storey shear is increased from storey 1 to storey 8 due to load combination considered and Earthquake force EQy and it is increased from storey 1 to storey 5 due to earthquake force EQx.

3) Drifts also shows the grater values in deteriorated building models as compared to existing building model without retrofitting and retrofitted building models considering various percentage retrofication.

4) In case of models of 18.36 %, 51.02 %, 100 % retrofitted using shear wall due to load combination, earthquake force EQy and the Response spectrum forces Rsx and Rsy the value of drift at storey 20 is observed more compared to the value of drift at storey 20 of existing building.

5) Retrofitting using shear wall is more efficient method as compared to retrofitting using jacketing technique because by using shear wall it is observed that it gives more stability against seismic forces which causes drift and displacement of a structure.

REFERENCES:

[1]. IS 1893 (Part 1): 2016 Criteria for EarthquakeResistant Design Structures, Bureau of Indian Standards, New Delhi.
[2]. IS 875 (Part 1): 1987, Indian Standard Code of Practice for Design Loads (Other than Earthquake) (Dead Load) for Buildings and Structures, Bureau of Indian Standards, New Delhi.
[3]. IS 875 (Part2): 1987, Indian Standard Code of Practice for Design Loads (Other than Earthquake) (Imposed Load) for Buildings and Structures, Bureau of Indian Standards, New Delhi.
[4]. IS 456-2000, Indian Standard Plain and Reinforced Concrete- Code of Practice, Bureau of Indian Standards, New Delhi.
[5]. PatilA.S,KumbharP.D,"TimehistoryanalysisofmultistoriedRRCbuildingfordifferentseismicintensities", InternationalJournalofStructuralandCivilEngineeringResearch,vol.-02,issue-03, Aug2013.
[6]. Yamada M. et al. "Multistorey Bracing Systems of Reinforced Concrete and Steel – Rigid FramesSubjectedtoHorizontalLoads PropositionofTotalEvaluationontheAseismicCapacityforDesign."
[7]. "Effect of Shear Wall on RC Building of Varying Heights" Gulam Hyder Mohiuddin, Masters in technology in Structural engineering, Anurag groups of institution, Venkatpur, Ghatkesar, Medchal Dist.- TS, India. A. Vimla, Professor, Department of civil engineering, Anurag group of institutions, Venkatpur, Ghatkesar, Medchal Dist.- TS, India.
[8]. NPATEL Lectures on Structural Dynamics
[9]. Referencebook by S K Duggal (second edition)