NON LINEAR DYNAMIC ANALYSIS OF G+25 BUILDING BY USING DIFFERENT TYPES OF SEISMIC ZONES AND DIFFERENT S.OIL CONDITIONS

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ABSTRACT

Planning of a structure such that lessoning harm amid a seismic tremor makes the structure very uneconomical, as the quake may or won't not happen in its life time and is an uncommon wonder. In this paper a G+25 existing RCC surrounded structure has been examined and outlined utilizing business programming ETABS9.7.4

The building is outlined according to IS 1893(Part 1):2002 for quake powers in various seismic zones. The primary goals of the paper are to analyze the variety of steel rate, most extreme shear constrain, greatest bowing minute, and greatest avoidance in various seismic zone. Varieties are definitely higher from zone II to zone V for various soil conditions (loose, medium, Hard soils). The story relocations, most extreme shear constrain, greatest twisting minute, most extreme redirection is increments from zone II to zone V.

KEYWORDS: G+25, story relocations, most extreme shear constrain, great twisting minute, most extreme redirection, etc.

I. INTRODUCTION

The term tremor can be utilized to depict any sort of seismic occasion which might be either common or started by people, which produces seismic waves. Tremors are caused regularly by burst of topographical deficiencies; yet they can likewise be activated by different occasions like volcanic action, mine impacts, avalanches and atomic tests. An unexpected arrival of vitality in the Earth's hull which makes seismic waves brings about what is called a tremor, which is moreover known as a tremor, a The shake or a quake). recurrence sort and greatness of tremors experienced over some undefined time frame characterizes the seismicity (seismic movement) of that territory. The perceptions from a seismometer are utilized to quantify tremor. Seismic tremors more prominent than around 5 are for the most part given an account of the size of minute extent. Those littler than greatness 5, which are more in number, as detailed by the national seismological observatories are for the most part estimated on the nearby extent scale, which is otherwise called the Richter scale.

INDIAN SEISMIC CODE IS 1893

"IS: 1893-2002 (Part-1) proposals for tremor safe outline of structures are starting unveiled in 1962 for the plan of structures in seismic tremor inclined territories. The code was updated for five times in 1966, 1970, 1975, 1984 and 2002 (Part-1) that, this ordinary is implied for the tremor safe plan of customary structures and for the quake safe outline of unique structures viz., dams, long traverse spans, major mechanical tasks and so forth, site particular explained examination should be attempted. The customary way to deal with insecure plan has been construct generally after giving a blend of quality and flexibility to oppose the compulsory burdens. The Indian subcontinent has a background marked by destroying tremors. The real explanation behind the high recurrence and power of the seismic tremors is that the Indian plate is crashing into Asia at a rate of around 47 mm/year.

Geological measurements of India demonstrate that just about 54% of the land is defenseless against quakes. A World Bank and United Nations report indicates gauges that around 200 million city occupants in India will be presented to tempests and tremors by 2050.The most recent rendition of seismic zoning guide of

India given in the quake safe outline code of India [IS 1893 (Part 1) 2002] allots four levels of seismicity for India as far as zone factors. As it were, the quake zoning guide of India partitions India into 4 seismic zones (Zone 2, 3, 4 and 5) dissimilar to its past variant, which comprised of five or six zones for the nation. As indicated by the present zoning map, Zone 5 expects the most abnormal amount of seismicity while Zone 2 is related with the least level of seismicity.

SOIL CONDITIONS IN INDIA

Table 1 of IS 1893 (1) presents the increase in allowable bearing pressure in soils. The type of soil mainly constituting the foundation are categorized into three types

A) TYPE I - ROCK OR HARD SOIL:

Very much reviewed rock and sand rock and sand rock blends with or without mud folio, and clayey sands ineffectively evaluated or sand earth blends (GB, CW, SB, SW, and SC) having N over 30, where N is the standard infiltration esteem.

B) TYPE II - MEDIUM SOIL

All soils with N between 10 and 30, and poorly graded sands or gravelly sands with little or no fines (SP) with N>15

C) TYPE III - SOFT SOIL

All dirts other than SP with N<10. The above order depends on IS1498-1970 [IS 1498, 1970], which utilizes prefixes and additions to arrange the sort and subgroup as abridged in Table 2 and Table 3. These prefixes and postfixes are utilized as a gathering image as indicated by the order of the dirts.

OBJECTIVES OF THE STUDY

1. To examine abnormalities in structures dissect and plan of G+6 storied structure according to code (IS1893:2002) arrangement.
2. Investigate the structures in Etabs programming to complete the story avoidance, story float, story shear power and base shear of standard and sporadic structures utilizing reaction range examination and think about the aftereffects of various structure
3. Flexibility based seismic tremor safe outline according to IS 13920.

II. LITERATURE REVIEW

Atkinson, G.M. and Boore, D.M., (2006)

They were available the new seismic tremor ground-movement relations for hard-shake and soil destinations in eastern North America (ENA), including evaluations of their aleatory vulnerability (fluctuation) have been produced in view of a stochastic limited blame model.

The model consolidates new data acquired from ENA seismographic information accumulated in the course of recent years, including three-segment broadband information that give new data on ENA source and way impacts.

Mohamed A. Azab (2012)

Over the early years of the 21st century, urban communities all through the Middle East, especially in the Gulf district have extended more quickly than any time in recent memory. Given the

III. METHOD OF ANALYSIS

BUILDING DATA

In the present examination, examination of G+25 multi-story working in numerous isolates zone for wind and earth shake powers is passed on out.3D demonstrate is set up for G+25 multi-story building is in ETABS. Building has a typical size of Basic parameters considered for the examination is

1. Utility of building : Residential building

2. Number of stories : G+25
   3. Shape of building : Rectangular
   4. Type of walls : Brick wall
   5. Geometric details
   a. Ground floor : 3.3m
   b. floor to floor height : 3m
   6. Material details
   a. Concrete Grad : M30
   b. All Steel Grades :   Fe415
   c. Bearing Capacity of Soil :200 KN/m^2
   7. Type Of Construction   : R.C.C FRAMED structure
   8. Column : 0.4m X 0.4m
   9. Beams   : 0.3m X 0.3m
   10. Slab : 0.120m

RESPONSE SPECTRUM METHOD:

The portrayal of greatest reaction of glorified single degree flexibility framework having certain period and damping, amid seismic tremor ground movements. This examination is completed by the code IS 1893-2002 (part1). Here sort of soil, seismic zone factor ought to be entered from IS 1893-2002 (part1).

The standard reaction spectra for kind of soil considered is connected to working for the examination in ETABS 2013 programming. Following graph demonstrates the standard reaction range for medium soil compose and that can be given as time period versus ghastly speeding up coefficient
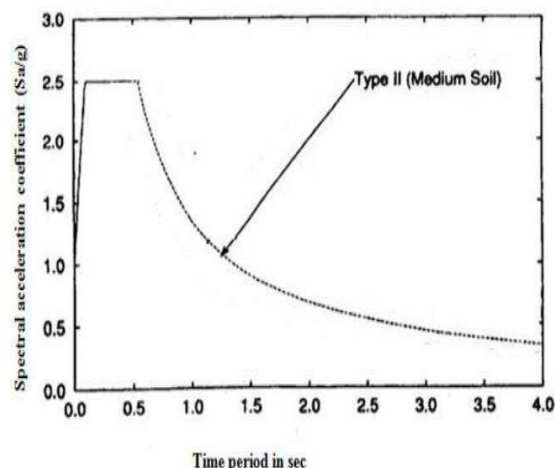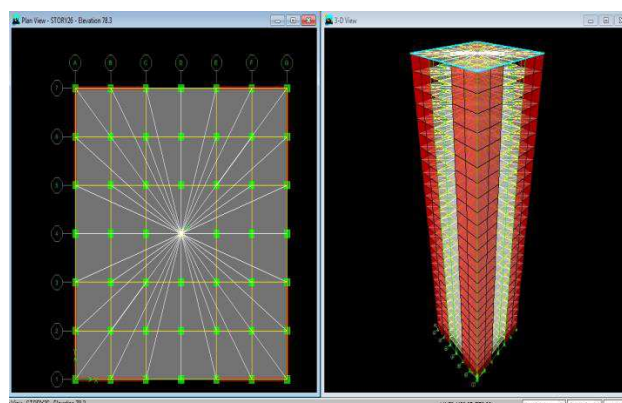

Figure 1:spectral acceleration and time period graph (Sa/g). Response spectrum

MODEL IN ETABS

IV. RESULTS AND ANALYSIS
ZONE 2:
STORY DRIFT

Table 1: Zone 2 drift calculations for different soil conditions

| Story	Drift in LS	Drift in MS	Drift in HS
STORY26	0.000135	0.000171	0.000203
STORY25	0.000136	0.000172	0.000204
STORY24	0.000136	0.000173	0.000205
STORY23	0.000137	0.000174	0.000206
STORY22	0.000137	0.000174	0.000207
STORY21	0.000137	0.000174	0.000207
STORY20	0.000137	0.000174	0.000207
STORY19	0.000136	0.000173	0.000206
STORY18	0.000135	0.000172	0.000204
STORY17	0.000134	0.00017	0.000202
STORY16	0.000132	0.000168	0.000199
STORY15	0.00013	0.000165	0.000196
STORY14	0.000127	0.000161	0.000191
STORY13	0.000124	0.000157	0.000186
STORY12	0.00012	0.000151	0.000179
STORY11	0.000115	0.000145	0.000172
STORY10	0.000109	0.000138	0.000163
STORY9	0.000103	0.00013	0.000153
STORY8	0.000096	0.00012	0.000142
STORY7	0.000088	0.00011	0.00013
STORY6	0.000079	0.000098	0.000116
STORY5	0.000069	0.000085	0.000101
STORY4	0.000058	0.000071	0.000084
STORY3	0.000045	0.000056	0.000065
STORY2	0.000032	0.000039	0.000045
STORY1	0.000015	0.000019	0.000022
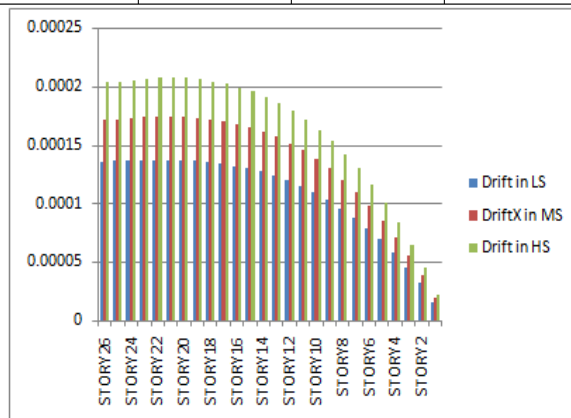
Figure 2: zone 2 drift graph for different soil conditions

STORY SHEAR

Table 2: zone 2 shear force calculations for different soil conditions

| Story	Shear force in LS	Shear force in MS	Shear force in HS
STORY26	136.65	156.22	175.16
STORY25	307.64	355.72	401.94
STORY24	454.3	531.56	605.3
STORY23	577.3	684.57	786.12
STORY22	677.88	816.14	945.7
STORY21	757.96	928.17	1085.85
STORY20	820.23	1023.18	1208.82
STORY19	868.11	1104.18	1317.24
STORY18	905.69	1174.53	1413.98
STORY17	937.51	1237.74	1501.92
STORY16	968.17	1297.16	1583.79
STORY15	1001.76	1355.67	1661.88
STORY14	1041.38	1415.34	1737.88
STORY13	1088.61	1477.28	1812.71
STORY12	1143.39	1541.58	1886.55
STORY11	1204.24	1607.38	1958.84
STORY10	1268.63	1673.1	2028.5
STORY9	1333.53	1736.75	2094.07
STORY8	1395.84	1796.21	2153.98
STORY7	1452.77	1849.49	2206.76
STORY6	1502.07	1894.98	2251.21
STORY5	1542.2	1931.59	2286.59
STORY4	1572.39	1958.89	2312.72
STORY3	1592.75	1977.13	2330.03
STORY2	1604.25	1987.35	2339.63
STORY1	1608.85	1991.39	2343.38
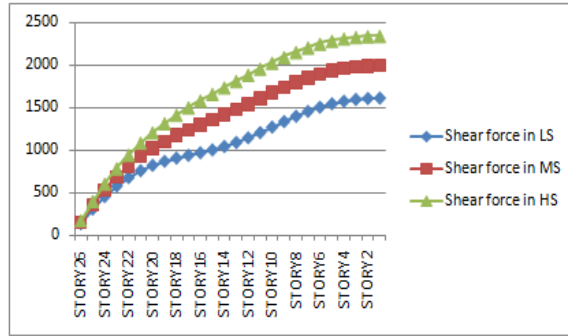
Figure 3:zone2 shear force graph for different soil conditions

BENDING MOMENT

Table 3: zone 2 bending moment calculations for different soil conditions

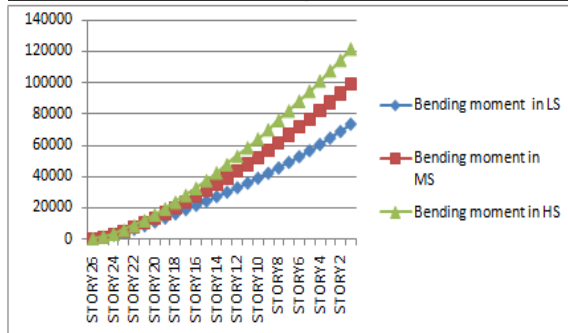| Story	Bending moment in LS	Bending moment in MS	Bending moment in HS
STORY26	409.939	468.676	525.489
STORY25	1332.667	1535.604	1731.065
STORY24	2694.705	3129.239	3545.904
STORY23	4424.029	5179.977	5901.213
STORY22	6451.452	7621.411	8731.355
STORY21	8712.245	10391.75	11975.06
STORY20	11147.85	13435.19	15576.62
STORY19	13707.57	16703.28	19486.87
STORY18	16350.12	20155.86	23664.04
STORY17	19044.86	23761.83	28074.11
STORY16	21772.52	27499.3	32690.85
STORY15	24525.33	31355.26	37495.36
STORY14	27306.4	35324.61	42475.2
STORY13	30128.23	39408.75	47623.11
STORY12	33010.39	43613.62	52935.43
STORY11	35976.6	47947.56	58410.46
STORY10	39051.42	52419.06	64046.7
STORY9	42256.99	57034.75	69841.46
STORY8	45610.24	61797.78	75789.66
STORY7	49120.97	66706.76	81883.15
STORY6	52790.89	71755.42	88110.52
STORY5	56613.86	76932.81	94457.35
STORY4	60576.99	82224.23	100907
STORY3	64662.58	87612.57	107441.7
STORY2	68850.48	93079.99	114044.2
STORY1	73551.74	99165.89	121366.8

Figure 4: zone 2 bending moment graph for different soil conditions

BUILDING TORQUE

Table 4:zone 2 torque calculations for different soil conditions

| Story	Building Torque (T) in LS	Building Torque (T) in MS	Building Torque (T) in HS
STORY26	5598.474	6400.64	7176.552
STORY25	12608.36	14579.2	16473.17
STORY24	18634.58	21803.45	24825.46
STORY23	23724.86	28128.05	32287.5
STORY22	27968.23	33641.62	38941.45
STORY21	31510.21	38472.96	44900.52
STORY20	34556.93	42788.29	50305.22
STORY19	37347.54	46774	55310.97
STORY18	40098.83	50606.92	60068.23
STORY17	42968.81	54427.41	64702.35
STORY16	46055.43	58327.74	69300.86
STORY15	49406	62352.48	73909.86
STORY14	53023.38	66503.88	78536.63
STORY13	56869.27	70748.23	83155.14
STORY12	60869.13	75022.75	87712.79
STORY11	64920.89	79243.56	92137.98
STORY10	68906.55	83314.43	96348
STORY9	72704.51	87135.98	100257.1
STORY8	76200.76	90614.32	103784.2
STORY7	79297.67	93668.84	106860
STORY6	81920.92	96238.7	109433.4
STORY5	84024.37	98288.07	111476.1
STORY4	85593.57	99809.94	112987
STORY3	86648.46	100829.1	113995.2
STORY2	87245.35	101404.5	114562.3
STORY1	87485.75	101636.1	114789.6
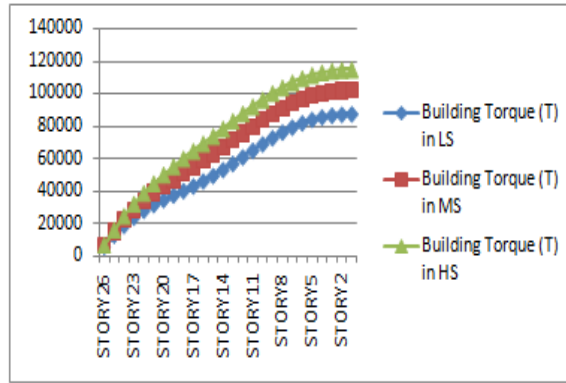
Figure 5::zone 2 torque graph for different soil conditions

ZONE 3:
STORY DRIFT

Table 5 :Zone 3 drift calculations for different soil conditions

| Story	Drift in LS	DriftX in MS	Drift in HS
STORY26	0.000217	0.000274	0.000325
STORY25	0.000218	0.000276	0.000327
STORY24	0.000219	0.000277	0.000329
STORY23	0.00022	0.000278	0.00033
STORY22	0.00022	0.000279	0.000331
STORY21	0.00022	0.000279	0.000331
STORY20	0.00022	0.000278	0.00033
STORY19	0.000219	0.000277	0.000329
STORY18	0.000217	0.000275	0.000327
STORY17	0.000215	0.000272	0.000323
STORY16	0.000212	0.000269	0.000319
STORY15	0.000208	0.000264	0.000313
STORY14	0.000203	0.000258	0.000306
STORY13	0.000198	0.000251	0.000297
STORY12	0.000191	0.000242	0.000287
STORY11	0.000183	0.000232	0.000275
STORY10	0.000175	0.000221	0.000261
STORY9	0.000165	0.000207	0.000245
STORY8	0.000153	0.000193	0.000228
STORY7	0.00014	0.000176	0.000208
STORY6	0.000125	0.000157	0.000185
STORY5	0.000109	0.000137	0.000161
STORY4	0.000091	0.000114	0.000134
STORY3	0.000072	0.000089	0.000104
STORY2	0.00005	0.000062	0.000072
STORY1	0.000024	0.00003	0.000035
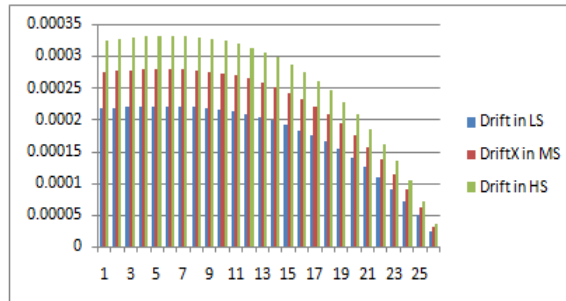
Figure 6: zone 3 drift graph for different soil conditions

STORY SHEAR

Table 6: zone 3 shear force calculations for different soil conditions

| Story	Shear force in LS	Shear force in MS	Shear force in HS
STORY26	218.99	249.96	280.26
STORY25	492.84	569.16	643.11
STORY24	727.52	850.49	968.49
STORY23	924.17	1095.32	1257.79
STORY22	1084.81	1305.82	1513.12
STORY21	1212.6	1485.08	1737.36
STORY20	1311.85	1637.09	1934.12
STORY19	1388.12	1766.69	2107.59
STORY18	1447.99	1879.25	2262.36
STORY17	1498.76	1980.38	2403.07
STORY16	1547.8	2075.46	2534.06
STORY15	1601.68	2169.07	2659.01
STORY14	1665.29	2264.54	2780.6
STORY13	1741.11	2363.65	2900.34
STORY12	1829.01	2466.53	3018.47
STORY11	1926.54	2571.81	3134.15
STORY10	2029.65	2676.96	3245.6
STORY9	2133.45	2778.81	3350.51
STORY8	2233.01	2873.94	3446.37
STORY7	2323.88	2959.19	3530.81
STORY6	2402.48	3031.97	3601.93
STORY5	2466.39	3090.55	3658.55
STORY4	2514.45	3134.22	3700.35
STORY3	2546.85	3163.41	3728.05
STORY2	2565.17	3179.76	3743.42
STORY1	2572.52	3186.23	3749.42
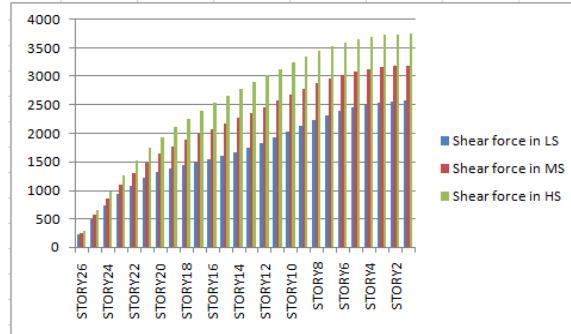
Figure 7:zone3 shear force graph for different soil conditions

BENDING MOMENT

Table 7 zone 3 bending moment calculations for different soil conditions

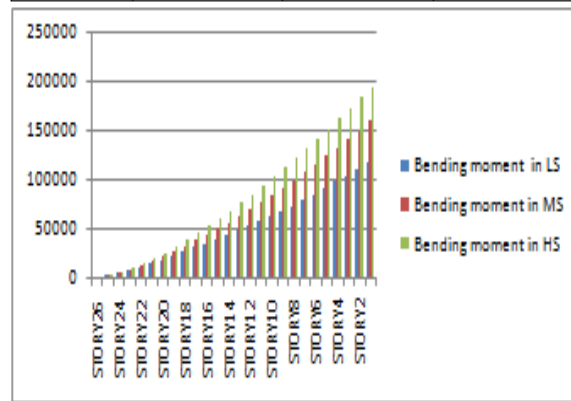| Story	Bending moment in LS	Bending moment in MS	Bending moment in HS
STORY26	656.97	749.882	840.785
STORY25	2135.176	2456.966	2769.711
STORY24	4316.357	5006.783	5673.457
STORY23	7084.712	8287.963	9441.954
STORY22	10329.12	12194.26	13970.18
STORY21	13945.75	16626.79	19160.11
STORY20	17840.78	21496.31	24922.59
STORY19	21933.12	26725.24	31179
STORY18	26156.87	32249.37	37862.47
STORY17	30463.22	38018.93	44918.57
STORY16	34821.68	43998.89	52305.35
STORY15	39220.21	50168.41	59992.57
STORY14	43664.17	56519.37	67960.32
STORY13	48173.87	63054	76196.97
STORY12	52780.92	69781.79	84696.7
STORY11	57523.43	76716.1	93456.74
STORY10	62440.7	83870.5	102474.7
STORY9	67568.07	91255.6	111746.3
STORY8	72932.41	98876.44	121263.5
STORY7	78549.09	106730.8	131013
STORY6	84420.55	114808.7	140976.8
STORY5	90536.7	123092.5	151131.7
STORY4	96876.72	131558.8	161451.2
STORY3	103412.2	140180.1	171906.8
STORY2	110110.9	148928	182470.7
STORY1	117630.4	158665.4	194186.8

Figure 8: zone 3 bending moment graph for different soil conditions

Building Torque:Table 8:zone 3 torque calculations for different soil conditions

| Story	Building Torque (T) in LS	Building Torque (T) in MS	Building Torque (T) in HS
STORY26	8972.138	10241.02	11482.48
STORY25	20198.63	23326.72	26357.06
STORY24	29842.14	34885.51	39720.74
STORY23	37981.29	45004.88	51660
STORY22	44761.35	53826.6	62306.32
STORY21	50418.49	61556.74	71840.84
STORY20	55285.8	68461.26	80488.36
STORY19	59747.9	74838.4	88497.55
STORY18	64151.67	80971.06	96109.17
STORY17	68748.89	87083.86	103523.8
STORY16	73694.99	93324.38	110881.4
STORY15	79064.36	99763.96	118255.8
STORY14	84860.13	106406.2	125658.6
STORY13	91019.59	113197.2	133048.2
STORY12	97422.21	120036.4	140340.5
STORY11	103903.7	126789.7	147420.8
STORY10	110274.9	133303.1	154156.8
STORY9	116341.3	139417.6	160411.3
STORY8	121921.3	144982.9	166054.7
STORY7	126859.8	149870.1	170976
STORY6	131039.5	153981.9	175093.4
STORY5	134388.2	157260.9	178361.7
STORY4	136884.8	159695.9	180779.2
STORY3	138562.8	161326.6	182392.4
STORY2	139513.6	162247.1	183299.7
STORY1	139898.2	162617.8	183663.4
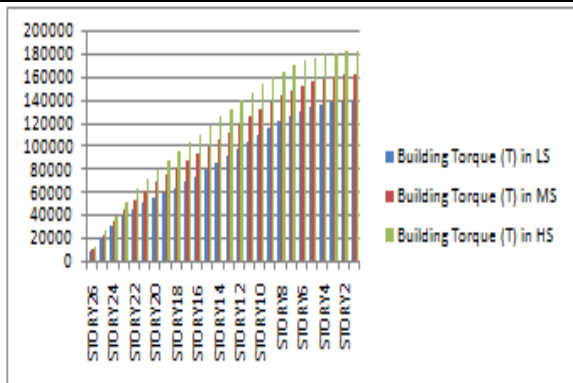
Figure 9: ::zone 3 torque graph for different soil conditions

ZONE 4:
STORY DRIFT

Table 9 :Zone 4 drift calculations for different soil conditions

| Story	Drift in LS	Drift X in MS	Drift in HS
STORY26	0.000325	0.000617	0.000488
STORY25	0.000327	0.00062	0.000491
STORY24	0.000328	0.000623	0.000493
STORY23	0.00033	0.000626	0.000495
STORY22	0.00033	0.000627	0.000496
STORY21	0.00033	0.000627	0.000496
STORY20	0.000329	0.000626	0.000496
STORY19	0.000328	0.000624	0.000494
STORY18	0.000325	0.000619	0.00049
STORY17	0.000322	0.000613	0.000485
STORY16	0.000318	0.000604	0.000478
STORY15	0.000312	0.000593	0.00047
STORY14	0.000305	0.00058	0.000459
STORY13	0.000297	0.000564	0.000446
STORY12	0.000287	0.000545	0.00043
STORY11	0.000275	0.000522	0.000412
STORY10	0.000262	0.000496	0.000392
STORY9	0.000247	0.000467	0.000368
STORY8	0.00023	0.000433	0.000341
STORY7	0.00021	0.000396	0.000311
STORY6	0.000188	0.000354	0.000278
STORY5	0.000164	0.000307	0.000241
STORY4	0.000137	0.000256	0.000201
STORY3	0.000107	0.0002	0.000157
STORY2	0.000075	0.000139	0.000108
STORY1	0.000037	0.000067	0.000052
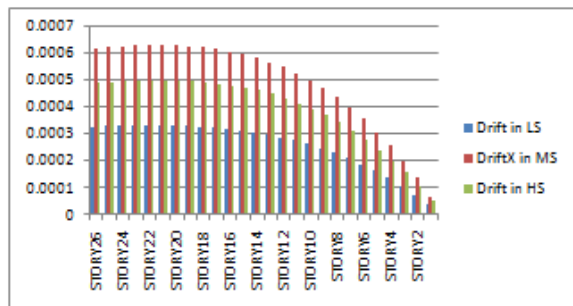
Figure 10: zone 4 drift graph for different soil conditions

STORY SHEAR

Table 10 zone 4 shear force calculations for different soil conditions

| Story	Shear force in LS	Shear force in MS	Shear force in HS
STORY26	328.48	562.41	420.39
STORY25	739.26	1280.6	964.67
STORY24	1091.29	1913.6	1452.73
STORY23	1386.25	2464.47	1886.68
STORY22	1627.22	2938.09	2269.68
STORY21	1818.89	3341.42	2606.04
STORY20	1967.77	3683.46	2901.17
STORY19	2082.17	3975.04	3161.39
STORY18	2171.98	4228.3	3393.54
STORY17	2248.14	4455.86	3604.61
STORY16	2321.7	4669.79	3801.1
STORY15	2402.52	4880.4	3988.52
STORY14	2497.93	5095.21	4170.9
STORY13	2611.66	5318.22	4350.5
STORY12	2743.51	5549.7	4527.71
STORY11	2889.81	5786.57	4701.22
STORY10	3044.47	6023.17	4868.4
STORY9	3200.18	6252.32	5025.76
STORY8	3349.52	6466.37	5169.55
STORY7	3485.82	6658.18	5296.21
STORY6	3603.72	6821.94	5402.9
STORY5	3699.59	6953.74	5487.82
STORY4	3771.67	7051.99	5550.53
STORY3	3820.28	7117.68	5592.08
STORY2	3847.76	7154.46	5615.12
STORY1	3858.78	7169.02	5624.12
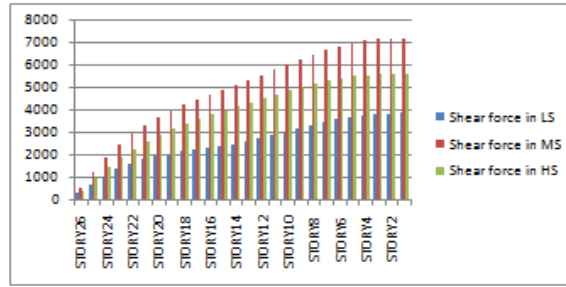
Figure 11: :zone3 shear force graph for different soil conditions

BENDING MOMENT

Table 11 zone 4 bending moment calculations for different soil conditions

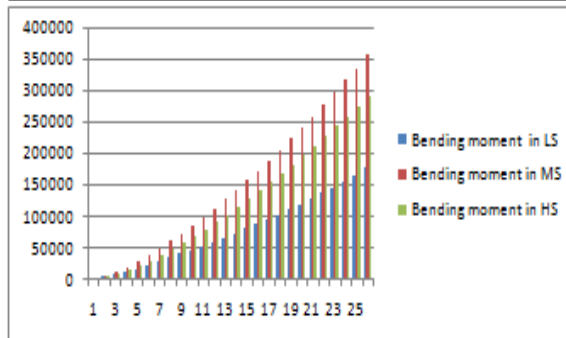| Story	Bending moment in LS	Bending moment in MS	Bending moment in HS
STORY26	985.455	1687.233	1261.177
STORY25	3202.764	5528.174	4154.566
STORY24	6474.536	11265.26	8510.185
STORY23	10627.07	18647.92	14162.93
STORY22	15493.68	27437.08	20955.27
STORY21	20918.62	37410.28	28740.16
STORY20	26761.17	48366.69	37383.89
STORY19	32899.68	60131.79	46768.5
STORY18	39235.3	72561.09	56793.7
STORY17	45694.83	85542.59	67377.86
STORY16	52232.52	98997.49	78458.02
STORY15	58830.32	112878.9	89988.85
STORY14	65496.25	127168.6	101940.5
STORY13	72260.81	141871.5	114295.5
STORY12	79171.38	157009	127045
STORY11	86285.14	172611.2	140185.1
STORY10	93661.05	188708.6	153712.1
STORY9	101352.1	205325.1	167619.5
STORY8	109398.6	222472	181895.2
STORY7	117823.6	240144.3	196519.6
STORY6	126630.8	258319.5	211465.2
STORY5	135805	276958.1	226697.6
STORY4	145315.1	296007.2	242176.8
STORY3	155118.3	315405.2	257860.2
STORY2	165166.4	335088	273706
STORY1	176445.7	356997.2	291280.2

Figure 12::zone 4 bending moment graph for different soil conditions

BUILDING TORQUE

Table 12 : zone 4 torque calculations for different soil condition

| Story	Building Torque (T) in LS	Building Torque (T) in MS	Building Torque (T) in HS
STORY26	13458.21	23042.3	17223.72
STORY25	30297.94	52485.12	39535.6
STORY24	44763.21	78492.4	59581.1
STORY23	56971.94	101261	77490.01
STORY22	67142.03	121109.8	93459.47
STORY21	75627.74	138502.7	107761.3
STORY20	82928.7	154037.8	120732.5
STORY19	89621.84	168386.4	132746.3
STORY18	96227.51	182184.9	144163.8
STORY17	103123.3	195938.7	155285.6
STORY16	110542.5	209979.9	166322.1
STORY15	118596.5	224468.9	177383.7
STORY14	127290.2	239414	188487.9
STORY13	136529.4	254693.6	199572.3
STORY12	146133.3	270081.9	210510.7
STORY11	155855.6	285276.8	221131.2
STORY10	165412.3	299932	231235.2
STORY9	174512	313689.5	240617
STORY8	182882	326211.6	249082
STORY7	190289.8	337207.8	256464.1
STORY6	196559.2	346459.3	262640.1
STORY5	201582.3	353837	267542.6
STORY4	205327.2	359315.8	271168.8
STORY3	207844.1	362984.8	273588.5
STORY2	209270.4	365056.1	274949.5
STORY1	209847.3	365890	275495.1
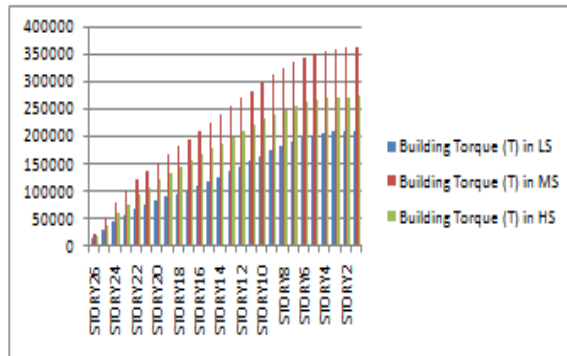
Figure 13 :zone 4 torque graph for different soil conditions

ZONE 5:
STORY DRIFT

Table 13 :Zone 5 drift calculations for different soil conditions

| Story	Drift in LS	Drift in MS	Drift in HS
STORY26	0.000487	0.000617	0.000731
STORY25	0.00049	0.00062	0.000736
STORY24	0.000493	0.000623	0.000739
STORY23	0.000494	0.000626	0.000742
STORY22	0.000495	0.000627	0.000744
STORY21	0.000495	0.000627	0.000745
STORY20	0.000494	0.000626	0.000743
STORY19	0.000492	0.000624	0.000741
STORY18	0.000488	0.000619	0.000735
STORY17	0.000483	0.000613	0.000728
STORY16	0.000476	0.000604	0.000718
STORY15	0.000468	0.000593	0.000705
STORY14	0.000457	0.00058	0.000688
STORY13	0.000445	0.000564	0.000669
STORY12	0.00043	0.000545	0.000646
STORY11	0.000413	0.000522	0.000619
STORY10	0.000393	0.000496	0.000588
STORY9	0.00037	0.000467	0.000552
STORY8	0.000344	0.000433	0.000512
STORY7	0.000315	0.000396	0.000467
STORY6	0.000282	0.000354	0.000417
STORY5	0.000246	0.000307	0.000362
STORY4	0.000206	0.000256	0.000301
STORY3	0.000161	0.0002	0.000235
STORY2	0.000112	0.000139	0.000162
STORY1	0.000055	0.000067	0.000078
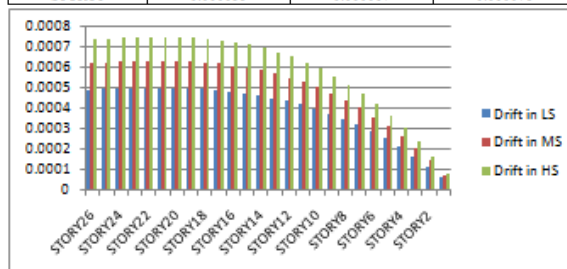
Figure 14: zone 5 drift graph for different soil conditions

STORY SHEAR

Table 14 zone 5 shear force calculations for different soil conditions

| Story	Shear force V in LS	Shear force V in MS	Shear force V in HS
STORY26	492.73	562.41	630.59
STORY25	1108.89	1280.6	1447
STORY24	1636.93	1913.6	2179.1
STORY23	2079.38	2464.47	2830.02
STORY22	2440.83	2938.09	3404.52
STORY21	2728.34	3341.42	3909.06
STORY20	2951.66	3683.46	4351.76
STORY19	3123.26	3975.04	4742.08
STORY18	3257.98	4228.3	5090.31
STORY17	3372.22	4455.86	5406.91
STORY16	3482.55	4669.79	5701.64
STORY15	3603.78	4880.4	5982.78
STORY14	3746.9	5095.21	6256.36
STORY13	3917.5	5318.22	6525.76
STORY12	4115.27	5549.7	6791.56
STORY11	4334.72	5786.57	7051.83
STORY10	4566.71	6023.17	7302.59
STORY9	4800.27	6252.32	7538.65
STORY8	5024.28	6466.37	7754.33
STORY7	5228.73	6658.18	7944.32
STORY6	5405.59	6821.94	8104.35
STORY5	5549.38	6953.74	8231.73
STORY4	5657.51	7051.99	8325.79
STORY3	5730.41	7117.68	8388.12
STORY2	5771.63	7154.46	8422.68
STORY1	5788.16	7169.02	8436.19
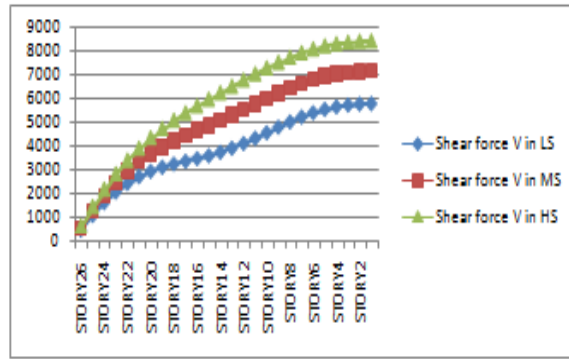
Figure 15 zone 5 shear force graph for different soil conditions

BENDING MOMENT

Table 15: zone 5 bending moment calculations for different soil conditions

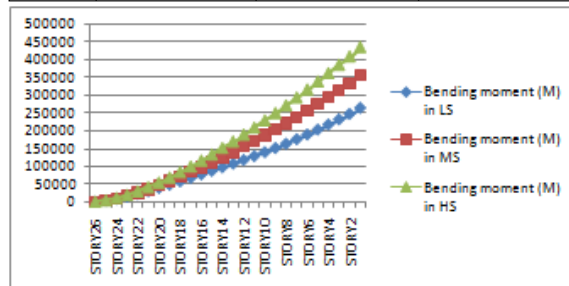| Story	Bending moment (M) in LS	Bending moment (M) in MS	Bending moment (M) in HS
STORY26	1478.178	1687.229	1891.762
STORY25	4804.127	5528.157	6231.835
STORY24	9711.772	11265.24	12765.26
STORY23	15940.56	18647.88	21244.37
STORY22	23240.48	27437.05	31432.88
STORY21	31377.89	37410.25	43110.22
STORY20	40141.71	48366.67	56075.81
STORY19	49349.5	60131.78	70152.74
STORY18	58852.95	72561.09	85190.56
STORY17	68542.26	85542.6	101066.8
STORY16	78348.81	98997.51	117687.1
STORY15	88245.51	112878.9	134983.3
STORY14	98244.39	127168.6	152910.7
STORY13	108391.2	141871.5	171443.2
STORY12	118757.1	157009	190567.6
STORY11	129427.7	172611.2	210277.6
STORY10	140491.6	188708.6	230568.1
STORY9	152028.1	205325.1	251429.2
STORY8	164097.9	222472	272842.8
STORY7	176735.4	240144.4	294779.4
STORY6	189946.3	258319.5	317197.9
STORY5	203707.6	276958.1	340046.4
STORY4	217972.6	296007.2	363265.2
STORY3	232677.5	315405.3	386790.3
STORY2	247749.6	335088	410559
STORY1	264668.5	356997.2	436920.3

Figure 16: zone 5 bending moment graph for different soil conditions

BUILDING TORQUE

Table 16:zone 5 torque calculations for different soil conditions

| Story	Building Torque (T) in LS	Building Torque (T) in MS	Building Torque (T) in HS
STORY26	20187.31	23042.3	25835.59
STORY25	45446.91	52485.12	59303.39
STORY24	67144.82	78492.4	89371.65
STORY23	85457.91	101261	116235
STORY22	100713	121109.8	140189.2
STORY21	113441.6	138502.7	161641.9
STORY20	124393.1	154037.8	181098.8
STORY19	134432.8	168386.4	199119.5
STORY18	144341.3	182184.9	216245.6
STORY17	154685	195938.7	232928.4
STORY16	165813.7	209979.9	249483.1
STORY15	177894.8	224468.9	266075.5
STORY14	190935.3	239414	282731.9
STORY13	204794.1	254693.6	299358.5
STORY12	219200	270081.9	315766
STORY11	233783.3	285276.8	331696.7
STORY10	248118.5	299932	346852.8
STORY9	261768	313689.5	360925.5
STORY8	274323	326211.6	373623
STORY7	285434.7	337207.8	384696.1
STORY6	294838.8	346459.3	393960.1
STORY5	302373.5	353837	401313.8
STORY4	307990.8	359315.8	406753.2
STORY3	311766.2	362984.8	410382.8
STORY2	313905.6	365056.1	412424.3
STORY1	314771	365890	413242.7
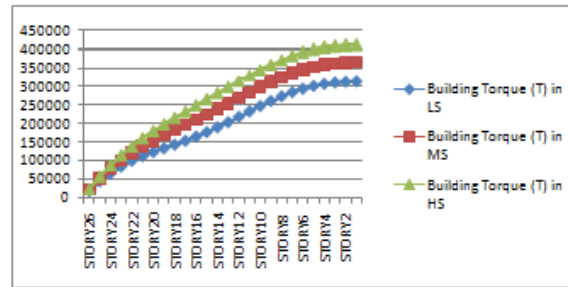
Figure 17::zone 5 torque graph for different soil conditions

CONCLUSIONS

1. The story drifts in the zone II shows that the values in the Hard soil has high drift values when compared to the other soils i.e loose soil and medium soil. The shear force has in zone II also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil.

2. The Bending moment has in zone II also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil. The Building torsion has in zone II also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil

3. The story drifts in the zone III shows that the values in the Hard soil has high drift values when compared to the other soils i.e loose soil and medium soil. The shear force in zone III has also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil.

4. The Bending moment in zone III has also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil. The Building torsion has in zone III also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil

5. The story drifts in the zone IV shows that the values in the Medium soil has high drift values when compared to the other soils i.e loose soil and Hard soil. The shear force in zone IV has also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil. The high shear force is obtained in medium soils.

6. The Bending moment in zone IV has also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil. The Bending moment is obtained in medium soils. The Building torsion has in zone IV also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil.

7. The story drifts in the zone V shows that the values in the Hard soil has high drift values when compared to the other soils i.e loose soil and Medium soil. The shear force in zone V has also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil. The high shear force is obtained in Hard soils.

8. The Bending moment in zone V has also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil. The Bending moment is obtained in Hard soils. The Building torsion has in zone V also shows less values in loose soils values compared to the other soils i.e medium soil and hard soil.

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