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Study the Effectiveof Seismic load on Behavior of Shear Wall in Frame Structure

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ABSTRACT : *Structural walls, or shear walls, are elements used to resist lateral loads, such as those generated by wind and earthquakes. Structural walls are considerably deeper than typical beams or columns. This attribute gives structural walls considerable in-plane stiffness which makes structural walls a natural choice for resisting lateral loads. In addition to considerable strength, structural walls can dissipate a great deal of energy if detailed properly. Walls are an invaluable structural element when protecting buildings from seismic events. Buildings often rely on structural walls as the main lateral force resisting system. Shear walls are required to perform in multiple ways. Shear walls can then be designed to limit building damage to the specified degree. The load-deformation response of the structural walls must be accurately predicted and related to structural damage in order to achieve these performance goals under loading events of various magnitudes. The applied load is generally transferred to the wall by a diaphragm or collector or drag member. The performance of the framed buildings depends on the structural system adopted for the structure The term structural system or structural frame in structural engineering refers to load-resisting sub-system of a structure. The structural system transfers loads through interconnected structural components or members. These structural systems need to be chosen based on its height and loads and need to be carried out, etc. The selection of appropriate structural systems for building must satisfy both strength and stiffness requirements. The structural system must be adequate to resist lateral and gravity loads that cause horizontal shear deformation and overturning deformation. The efficiency of a structural system is measured in terms of their ability to resist lateral load, which increases with the height of the frame. A building can be considered as tall when the effect of lateral loads is reflected in the design. Lateral deflections of framed buildings should be limited to prevent damage to both structural and nonstructural elements. In the present study, the structural performance of the framed building with shear wall will be analysis.*

KEY WORDS: *Structural walls,Shear walls,frame structure,Seismic Load,frame system*

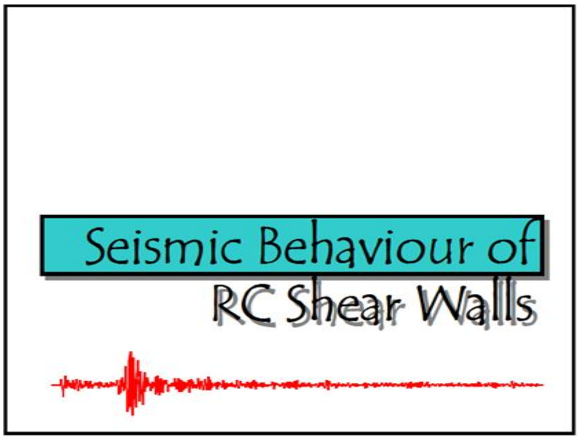
I. INTRODUCTION

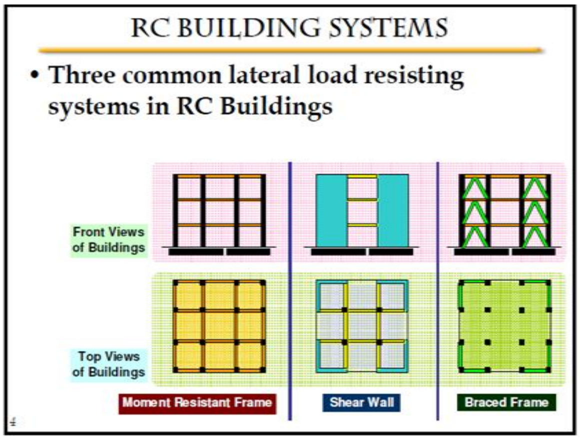
Seismic Load : Earthquake forces experienced by a building result from ground motions (accelerations) which are also fluctuating or dynamic in nature, in fact they reverse direction some what chaotically. The magnitude of an earthquake force depends on the magnitude of an earthquake, distance from the earthquake source(epicenter), local ground conditions that may amplify ground shaking (or dampen it), the weight(or mass) of the structure, and the type of structural system and its ability to with stand abusive cyclic loading. In theory and practice, the lateral force that a building experiences from an earthquake increases in direct proportion with the acceleration of ground motion at the building site and the mass of the building (i.e., a doubling in ground motion acceleration or building mass will double the load).This theory rests on the simplicity and validity of Newton's law of physics: F = m x a, where 'F' represents force, 'm' represents mass or weight, and 'a' represents acceleration. For example, as a car accelerates forward, a force is imparted to the driver through the seat to push him forward with the car(this force is equivalent to the weight of the driver multiplied by the acceleration or rate of change in speed of the car). As the brake is applied, the car is decelerated and a force is imparted to the driver by the seat-belt to push him back toward the seat. Similarly, as the ground accelerates back and forth during an earthquake it imparts back-and-forth(cyclic) forces to a building through its foundation which is forced to move with the ground. One can imagine a very light structure such as fabric tent that will be undamaged in almost any earthquake but it will not survive high wind. The reason is the low mass (weight) of the tent. Therefore, residential buildings generally perform reasonably well in earthquakes but are more vulnerable in high-wind load prone areas. Regardless, the proper amount of bracing is required in both cases.

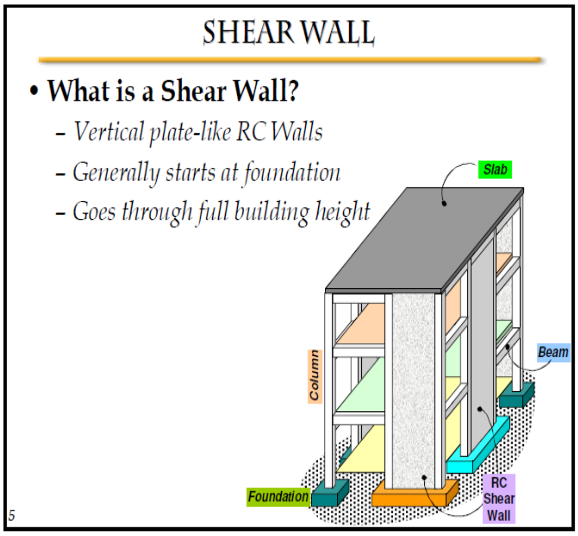
Why Are Buildings With Shear Walls Preferred In Seismic Zones?

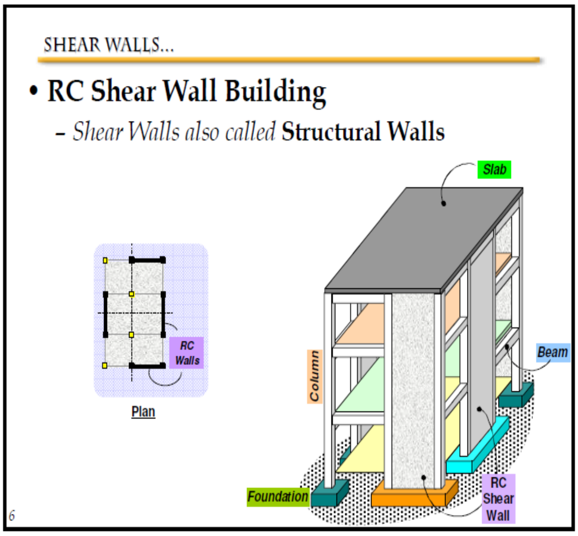
Reinforced concrete (RC) buildings often have vertical plate-like RC walls called Shear Walls in addition to slabs, beams and columns. These walls generally start at foundation level and are continuous throughout the building height. Their thickness can be as low as 150mm, or as high as 400mm in high rise buildings. Shear walls are usually provided along both length and width of buildings. Shear walls are like vertically-oriented wide beams that carry earthquake loads downwards to the foundation.

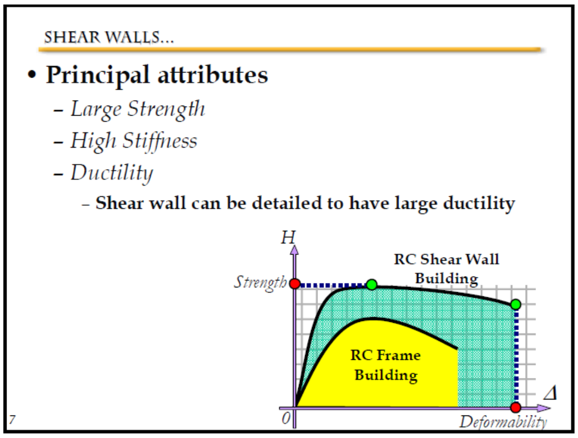
"We cannot afford to build concrete buildings meant to resist severe earthquakes without shear walls." Mark Fintel, a noted consulting engineer in USA Shear walls in high seismic regions requires special detailing. However, in past earthquakes, even buildings with sufficient amount of walls that were not specially detailed for seismic performance (but had enough well-distributed reinforcement) were saved from collapse. Shear wall buildings are a popular choice in many earthquake prone countries, like Chile, New Zealand and USA. Shear walls are easy to construct, because reinforcement detailing of walls is relatively straight-forward and therefore easily implemented at site. Shear walls are efficient; both in terms of construction cost properly designed and detailed buildings with Shear walls have shown very good performance in past earthquakes. The overwhelming success of buildings with shear walls in resisting strong earthquakes is summarized in the quote: And effectiveness in minimizing earthquake damage in structural and non- Structural elements (like glass windows and building contents).

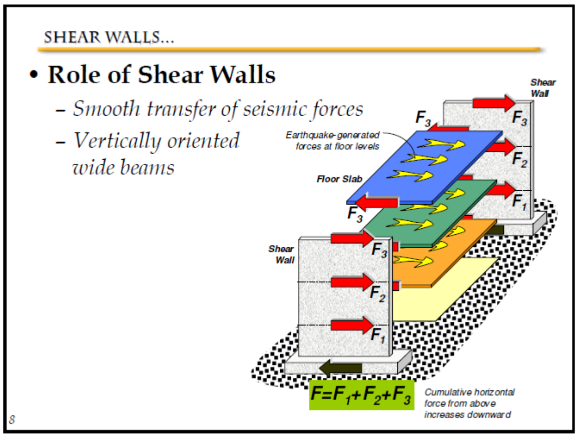


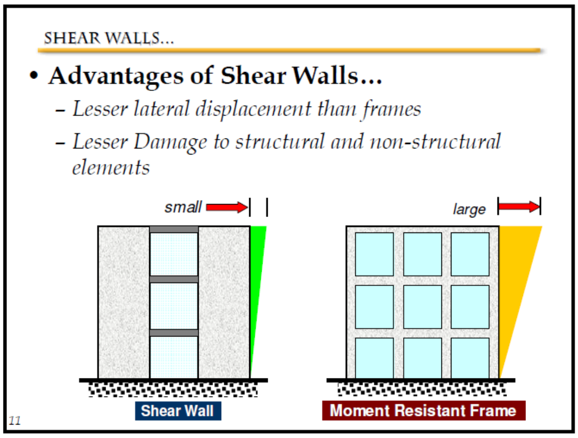


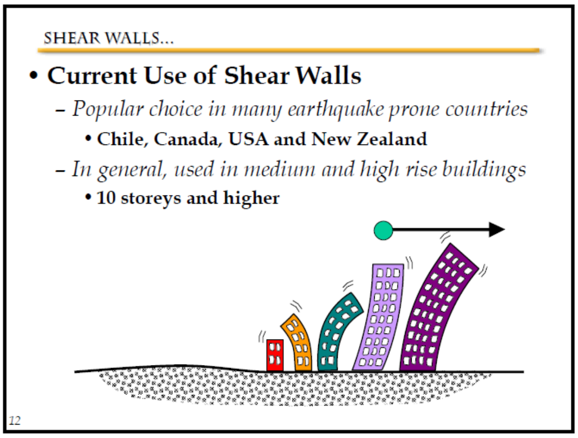


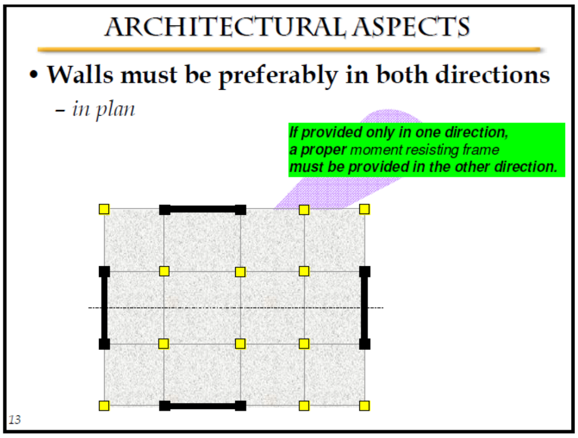


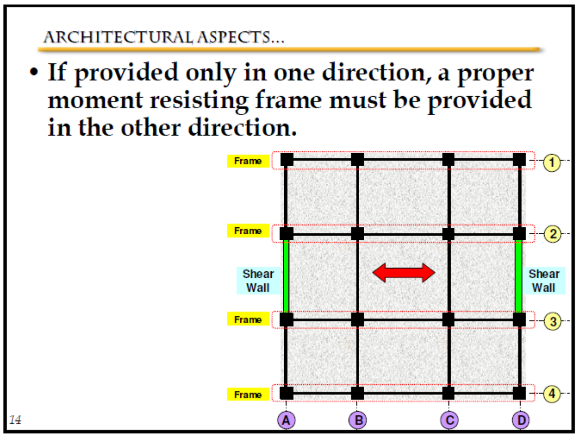

SHEAR WALLS…
• Principal attributes
– Large Strength
– High Stiffness
– Ductility
– Shear wall can be detailed to have large ductility
H
Strength
RC Shear Wall Building
RC Frame Building
0
Δ
Deformability
7

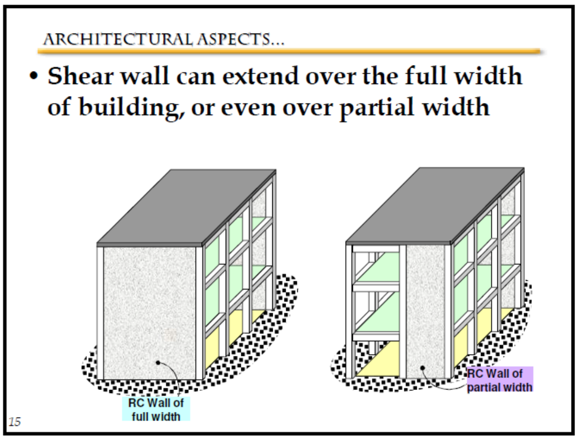

SHEAR WALLS…
• Role of Shear Walls
– Smooth transfer of seismic forces
– Vertically oriented wide beams
Shear Wall
Earthquake-generated forces at floor levels
Floor Slab
Shear Wall
F=F1+F2+F3
Cumulative horizontal force from above increases downward
8

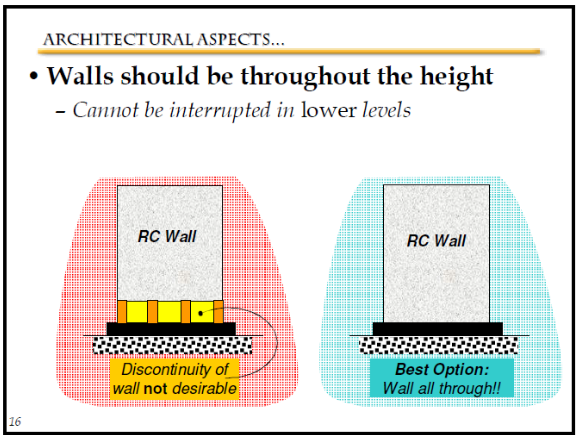

SHEAR WALLS…
• Advantages of Shear Walls…
– Lesser lateral displacement than frames
– Lesser Damage to structural and non-structural elements
small
large
Shear Wall
Moment Resistant Frame
11

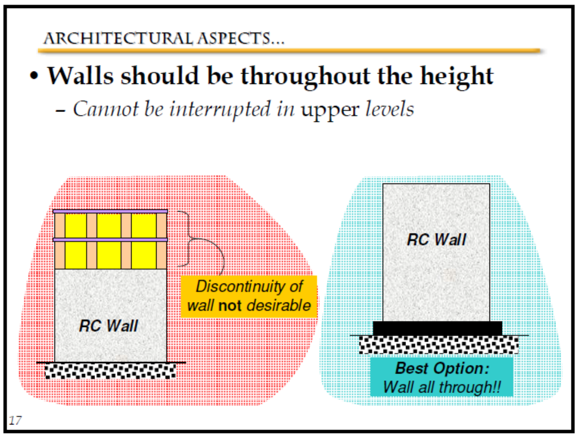

SHEAR WALLS…
• Current Use of Shear Walls
– Popular choice in many earthquake prone countries
• Chile, Canada, USA and New Zealand
– In general, used in medium and high rise buildings
• 10 storeys and higher
12

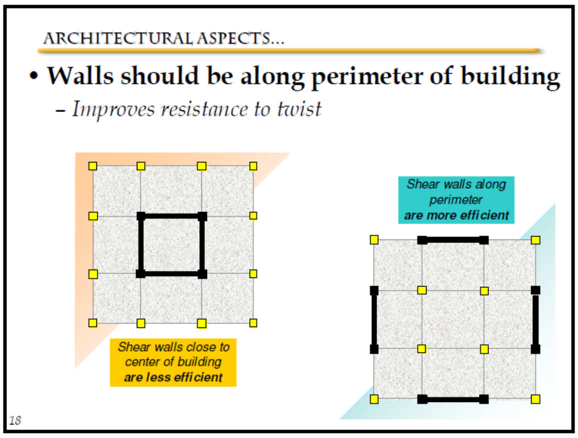

ARCHITECTURAL ASPECTS
• Walls must be preferably in both directions
– in plan
If provided only in one direction, a proper moment resisting frame must be provided in the other direction.
13

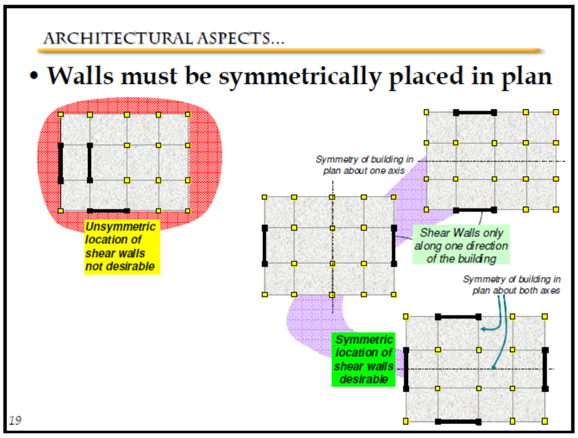

ARCHITECTURAL ASPECTS…
• If provided only in one direction, a proper moment resisting frame must be provided in the other direction.
Frame
Frame
Shear Wall
Shear Wall
Frame
Frame
1
2
3
4
A
B
C
D
14

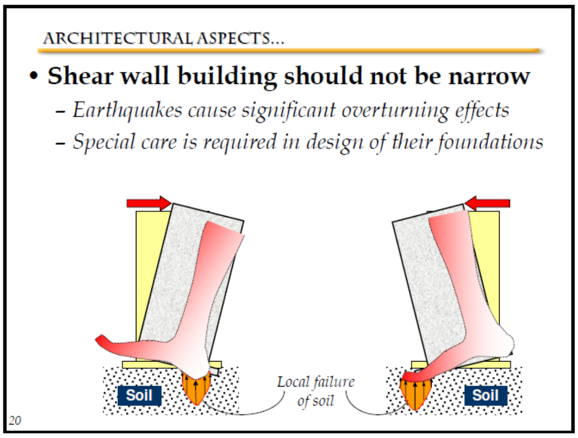

ARCHITECTURAL ASPECTS…
• Shear wall can extend over the full width of building, or even over partial width
RC Wall of full width
RC Wall of partial width
15

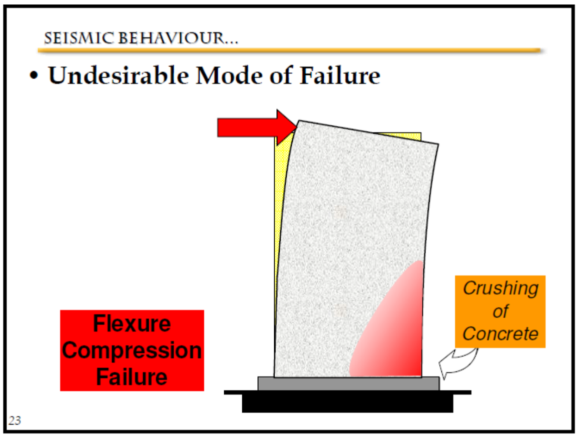

ARCHITECTURAL ASPECTS…
• Walls should be throughout the height
– Cannot be interrupted in lower levels
RC Wall
RC Wall
Discontinuity of wall not desirable
Best Option: Wall all through!!
16

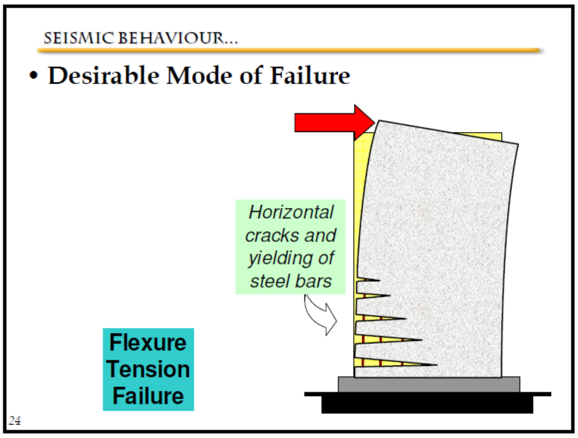

ARCHITECTURAL ASPECTS…
• Walls should be throughout the height
– Cannot be interrupted in upper levels
RC Wall
Discontinuity of wall not desirable
RC Wall
Best Option: Wall all through!!
17

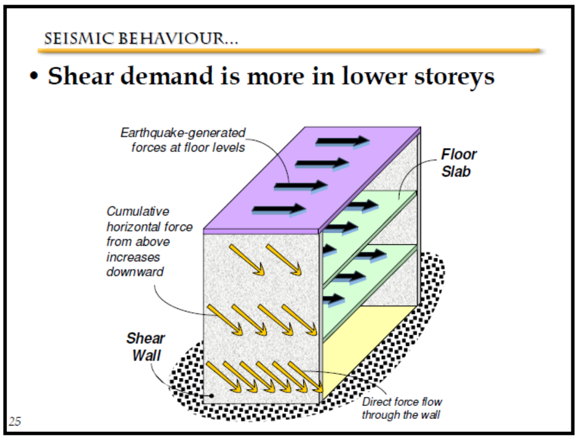

ARCHITECTURAL ASPECTS…
• Walls should be along perimeter of building
– Improves resistance to twist
Shear walls close to center of building are less efficient
Shear walls along perimeter are more efficient
18

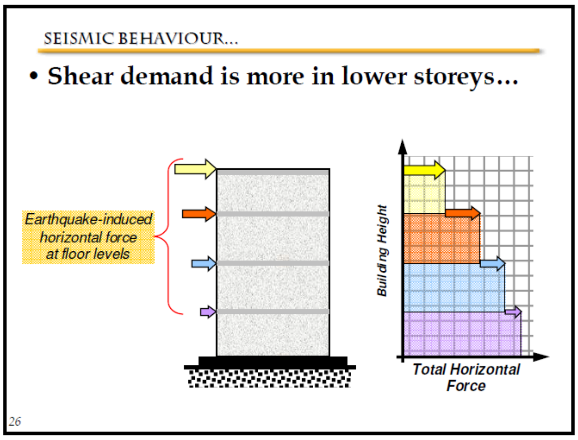

ARCHITECTURAL ASPECTS…
• Walls must be symmetrically placed in plan
Unsymmetric location of shear walls not desirable
Symmetry of building in plan about one axis
Shear Walls only along one direction of the building
Symmetry of building in plan about both axes
Symmetric location of shear walls desirable
19

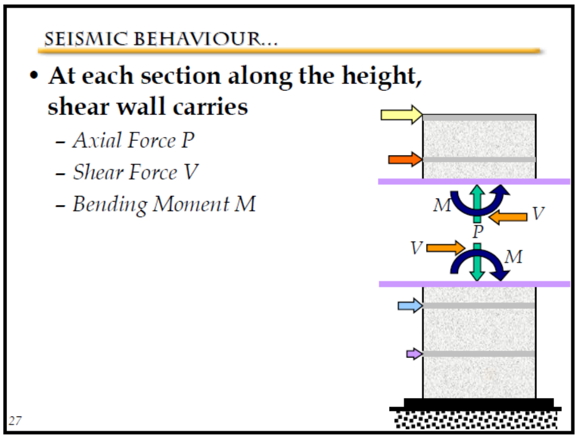

ARCHITECTURAL ASPECTS…
• Shear wall building should not be narrow
– Earthquakes cause significant overturning effects
– Special care is required in design of their foundations
Soil
Local failure of soil
Soil
20

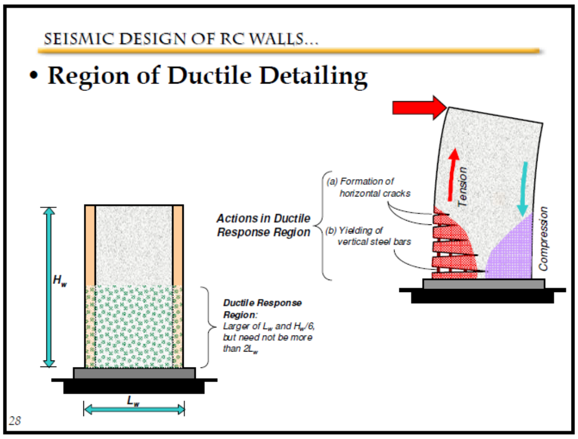

SEISMIC BEHAVIOUR…
• Undesirable Mode of Failure
Flexure Compression Failure
Crushing of Concrete
23


SEISMIC BEHAVIOUR…
• Desirable Mode of Failure
Horizontal cracks and yielding of steel bars
Flexure Tension Failure
24


SEISMIC BEHAVIOUR…
• Shear demand is more in lower storeys
Earthquake-generated forces at floor levels
Floor Slab
Cumulative horizontal force from above increases downward
Shear Wall
Direct force flow through the wall
25


SEISMIC BEHAVIOUR…
• Shear demand is more in lower storeys…
Earthquake-induced horizontal force at floor levels
Building Height
Total Horizontal Force
26





II. METHODOLOGY

Earthquake motion causes vibration of the structure leading to inertia forces. Thus a structure must be able to safely transmit the horizontal and the vertical inertia forces generated in the super structure through the foundation to the ground. Hence, for most of the ordinary structures, earthquake-resistant design requires ensuring that the structure has adequate lateral load carrying capacity. Seismic codes will guide a designer to safely design the structure for its intended purpose.

Quite a few methods are available for the earthquake analysis of buildings; two of them are presented here:
[1] Equivalent Static Lateral Force Method (pseudo static method).
[2] Dynamic analysis.
I. Response spectrum method.
II. Time history method.

Equivalent lateral Force (Seismic Coefficient) Method : This method of finding lateral forces is also known as the static method or the equivalent static method or the seismic coefficient method. The static method is the simplest one and it requires less computational effort and is based on formulae given in the code of practice.
In all the methods of analyzing a multi storey buildings recommended in the code, the structure is treated as discrete system having concentrated masses at floor levels which include the weight of columns and walls in any storey should be equally distributed to the floors above and below the storey. In addition, the appropriate amount of imposed load at this floor is also lumped with it. It is also assumed that the structure flexible and will deflect with respect to the position of foundation the lumped mass system reduces to the solution of a system of second order differential equations. These equations are formed by distribution, of mass and stiffness in a structure, together with its damping characteristics of the ground motion.

Dynamic Analysis : Dynamic analysis shall be performed to obtain the design seismic force, and its distribution in different levels along the height of the building, and in the various lateral load resisting element, for the following buildings:

Regular buildings: Those greater than 40m in height in zones IV and V, those greater than 90m in height in zone II and III.

Irregular buildings: All framed buildings higher than 12m in zones IV and V, and those greater than 40m in height in zones II and III.
The analysis of model for dynamic analysis of buildings with unusual configuration should be such that it adequately models the types of irregularities present in the building configuration. Buildings with plan irregularities, as defined in Table 4 of IS code: 1893-2002 cannot be modeled for dynamic analysis.
Dynamic analysis may be performed either by the TIME HISTORY METHOD or by the RESPONSE SPECTRUM METHOD

Time History Method : The usage of this method shall be on an appropriate ground motion and shall be performed using accepted principles of dynamics. In this method, the mathematical model of the building is subjected to accelerations from earthquake records that represent the expected earthquake at the base of the structure.

Response Spectrum Method : The word spectrum in engineering conveys the idea that the response of buildings having a broad range of periods is summarized in a single graph. This method shall be performed using the design spectrum specified in code or by a site-specific design spectrum for a structure prepared at a project site. The values of damping for building may be taken as 2 and 5 percent of the critical, for the purposes of dynamic of steel and reinforce concrete buildings, respectively. For most buildings, inelastic response can be expected to occur during a major earthquake, implying that an inelastic analysis is more proper for design. However, in spite of the availability of nonlinear inelastic programs, they are not used in typical design practice because:

[1] Their proper use requires knowledge of their inner workings and theories. design criteria, and
[2] Result produced are difficult to interpret and apply to traditional design criteria , and
[3] The necessary computations are expensive.
[4] Therefore, analysis in practice typically use linear elastic procedures based on the response spectrum method. The response spectrum analysis is the preferred method because it is easier to use.

III. NUMERICAL ANALYSES

STRUCTURE
G+19 earthquake resistant structure with shear walls

Problems In The Building Due To Earthquake : Main problems that would be arising due to earthquake in the structure are story drift and deflection of the building due to its large height and also torsion and others, so if the structure is proved to be safe in all the above mentioned problems than the structure would be safe in all cases in respect earthquake.

Geometrical Properties
[1] .No.of stories of the Building model=20
[2] Column size=500 mm x 500 mm
[3] Beam size= 700 mm x 500 mm
[4] Slab thickness=200mm

Loads
[1] Live Load=3KN/m2
[2] Wall Load=12.4KN/m
[3] Floor Finishing =1KN/m2
[4] Wind load

Wind coefficients
[1] Wind Speed=50m/s
[2] Terrain Category =2
[3] Structure Class=B
[4] Risk Coefficient(k1)=1
Topography(k3)=1

Seismic loading
[1] Seismic zone factor(Z)=0.36
[2] Soil Type= Medium(II)
[3] Response Reduction factor(R) =5%
[4] Story Range=Base to 20
[5] Important factor(I)=1

IV. MATERIAL PROPERTIES

Table I The materials used in structure and their general properties are

Material Text	Unit weight KN/m3	Elastic Modulus KN/m2	Shear Modulus KN/m2	Poisson Ratio Unit less	Thermal expansion coefficient 1/C
Concrete	23.563	24855578.28	10356490.95	0.2	0.0000099
Rebar steel	76.973	199947978.8	76903068.77	0.3	0.0000117
Bar steel	76.9730	199947978.8	769030068.77	0.3	0.0000117

Load Combinations : Load combination is the foremost important criteria for designing any structure and more important is the distribution of those loads on to various components of the structure like beams, columns, slabs and in our case shears walls and concrete core wall too. There are many kinds of loads existing depending on the location of the where the structure is to be constructed for example in a place where wind is frequent there we have to consider the wind loads and places where rains are heavy rain loads are included and same way all the other loads such as snow loads, earthquake load and etc. are included however DEAD LOADS, LIVE LOADS AND IMPOSEDLOADS are always included. Dead loads are all common depending on the structural components and specific gravity of the structure, to get the self weight of the structural component volume or area of the component is multiplied by the specific gravity of the component. Live loads depend on the purpose we are constructing the building. Imposed loads depend on the seismic loads, dead loads and according to are 1893 part 1 percentage of those values is finally considered.

The following Load Combinations have been considered for the design

1. 1.5(DL+ LL)
2. 1.5(DL ± EQXTP)
3. 1.5(DL ± EQYTP)
4. 1.5(DL ± EQXTN)
5. 1.5(DL ± EQYTN)
6. 1.2(DL + LL ± EQXTP)
7. 1.2(DL + LL ± EQYTP)
8. 1.2(DL + LL ± EQXTN)
9. 1.2(DL + LL ± EQYTN)
10. 1.5(DL ± WLX)
11. 1.5(DL ± WLY)
12. 1.2(DL + LL ± WLX)
13. 1.2(DL + LL ± WLY)

DL – Dead Load

LL – Live Load

EQTP–Earthquake load

With torsion positive

EQTN–Earthquake load

With torsion negative

WL- Wind load

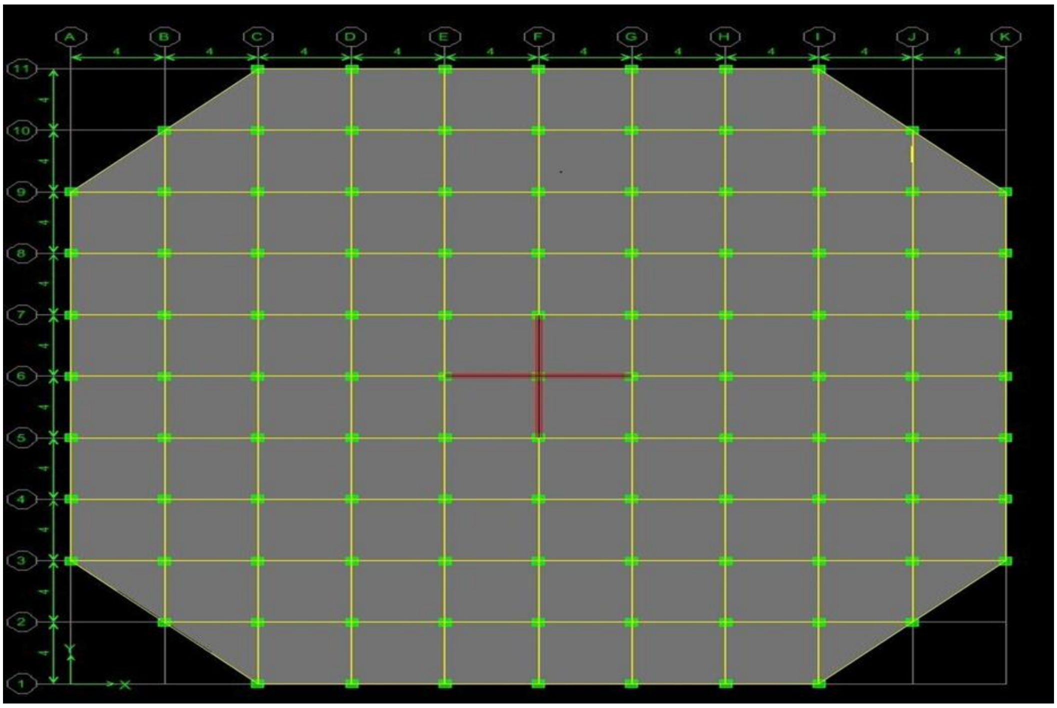


Figure 1: Basic Plan of The Building

Table II: Axial force, Shear Force, Torsion and Moment for columnC1

Story	Column	Load	Loc	AXIAL FORCE	SHEAR FORCE	TORSION	MOMENT
STORY1	C1	1.2DLLLEQY	2.5	-5981.12	2.99	0.699	-20.004
STORY2	C1	1.2DLLLEQY	2.5	-5679.2	-10.81	0.888	-31.458
STORY3	C1	1.2DLLLEQY	2.5	-5385.39	-15.63	0.899	-40.218
STORY4	C1	1.2DLLLEQY	2.5	-5097.36	-20.13	0.898	-45.37
STORY5	C1	1.2DLLLEQY	2.5	-4812.42	-23.46	0.894	-48.001
STORY6	C1	1.2DLLLEQY	2.5	-4528.9	-25.99	0.887	-48.977
STORY7	C1	1.2DLLLEQY	2.5	-4245.72	-27.88	0.876	-48.786
STORY8	C1	1.2DLLLEQY	2.5	-3962.1	-29.24	0.861	-47.741
STORY9	C1	1.2DLLLEQY	2.5	-3677.43	-30.17	0.841	-46.02
STORY10	C1	1.2DLLLEQY	2.5	-3391.19	-30.76	0.816	-43.719
STORY11	C1	1.2DLLLEQY	2.5	-3102.89	-31.04	0.784	-40.883
STORY12	C1	1.2DLLLEQY	2.5	-2812	-31.08	0.746	-37.525
STORY13	C1	1.2DLLLEQY	2.5	-2517.98	-30.93	0.7	-33.647
STORY14	C1	1.2DLLLEQY	2.5	-2220.24	-30.63	0.646	-29.246
STORY15	C1	1.2DLLLEQY	2.5	-1918.14	-30.24	0.584	-24.333
STORY16	C1	1.2DLLLEQY	2.5	-1611.02	-29.82	0.512	-18.94
STORY17	C1	1.2DLLLEQY	2.5	-1298.25	-29.44	0.431	-13.185
STORY18	C1	1.2DLLLEQY	2.5	-979.21	-29.34	0.339	-6.978
STORY19	C1	1.2DLLLEQY	2.5	-653.62	-28.53	0.236	-2.515
STORY20	C1	1.2DLLLEQY	2.5	-320.5	-36.26	0.125	11.945

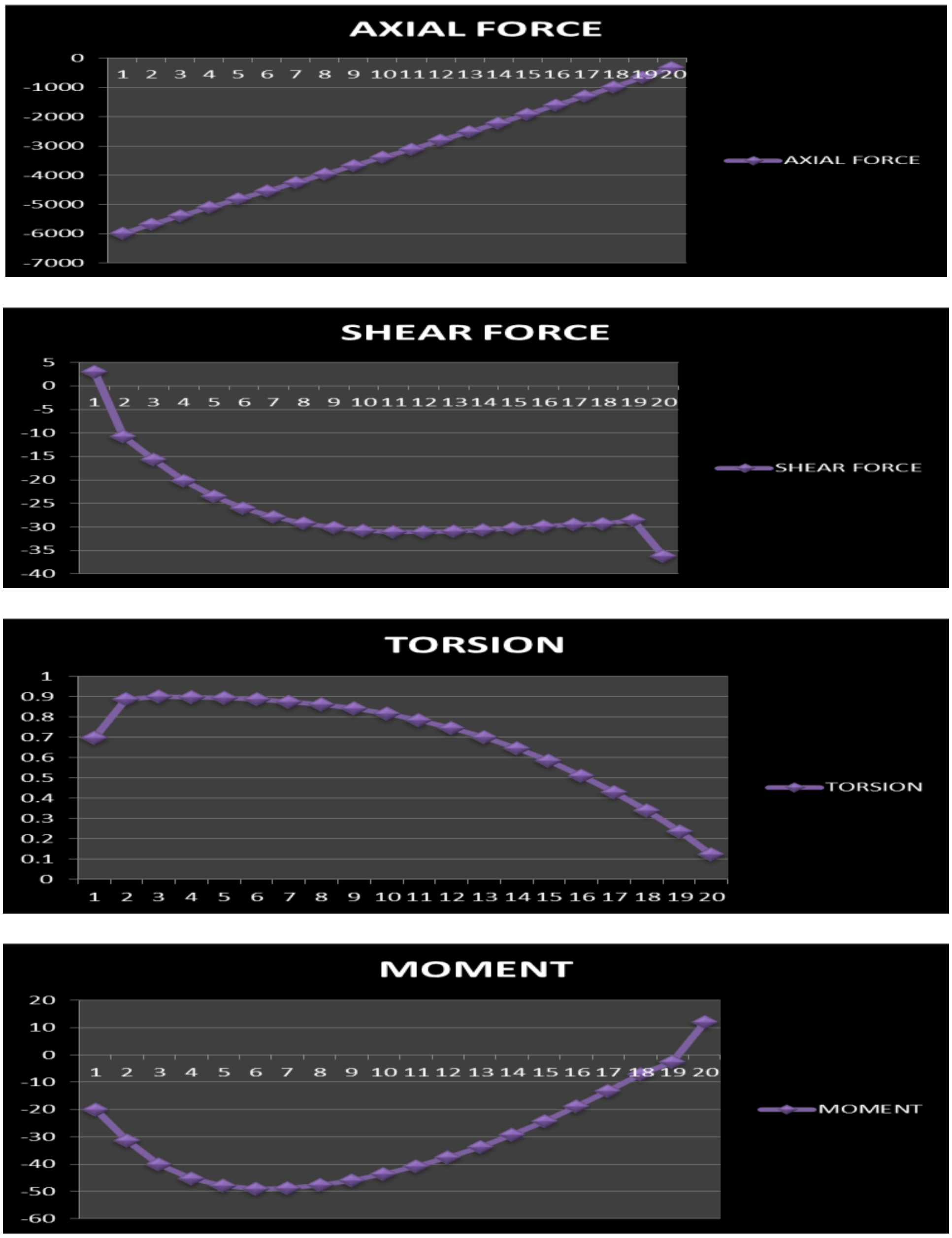


Figure 2: Axial force, Shear Force, Torsion and Moment for columnC1

Table III: Axial force, Shear Force, Torsion and Moment for columnC2

Story	Column	Load	Loc	AXIAL FORCE	SHEAR FORCE	TORSION	MOMENT
STORY1	C2	1.2DLLLEQY	2.5	-6603.93	7.94	0.699	-36.262
STORY2	C2	1.2DLLLEQY	2.5	-6226.23	1.01	0.888	-54.111
STORY3	C2	1.2DLLLEQY	2.5	-5863.39	-6.1	0.899	-65.904
STORY4	C2	1.2DLLLEQY	2.5	-5510.34	-12.14	0.898	-73.576
STORY5	C2	1.2DLLLEQY	2.5	-5165.54	-17.46	0.894	-78.05
STORY6	C2	1.2DLLLEQY	2.5	-4827.32	-22.1	0.887	-80.374
STORY7	C2	1.2DLLLEQY	2.5	-4494.32	-26.15	0.876	-81.122
STORY8	C2	1.2DLLLEQY	2.5	-4165.4	-29.66	0.861	-80.672
STORY9	C2	1.2DLLLEQY	2.5	-3839.61	-32.72	0.841	-79.246
STORY10	C2	1.2DLLLEQY	2.5	-3516.17	-35.38	0.816	-76.972
STORY11	C2	1.2DLLLEQY	2.5	-3194.43	-37.71	0.784	-73.916
STORY12	C2	1.2DLLLEQY	2.5	-2873.88	-39.76	0.746	-70.11
STORY13	C2	1.2DLLLEQY	2.5	-2554.1	-41.58	0.7	-65.572
STORY14	C2	1.2DLLLEQY	2.5	-2234.76	-43.24	0.646	-60.317
STORY15	C2	1.2DLLLEQY	2.5	-1915.64	-44.78	0.584	-54.377
STORY16	C2	1.2DLLLEQY	2.5	-1596.61	-46.25	0.512	-47.82
STORY17	C2	1.2DLLLEQY	2.5	-1277.66	-47.7	0.431	-40.764
STORY18	C2	1.2DLLLEQY	2.5	-958.94	-49.18	0.339	-33.472
STORY19	C2	1.2DLLLEQY	2.5	-640.18	-50.37	0.236	-26.108
STORY20	C2	1.2DLLLEQY	2.5	-325.91	-58.95	0.125	-22.275

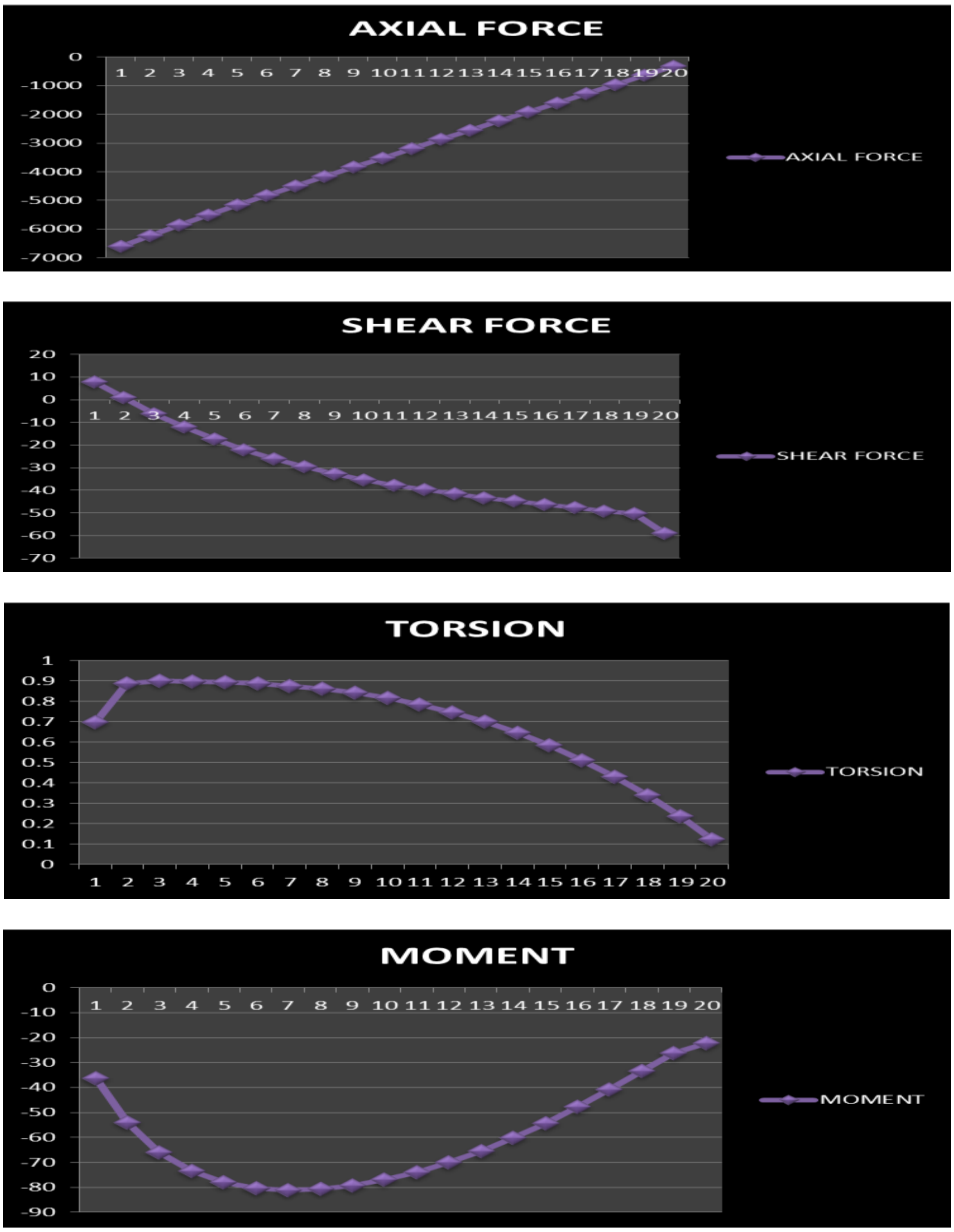
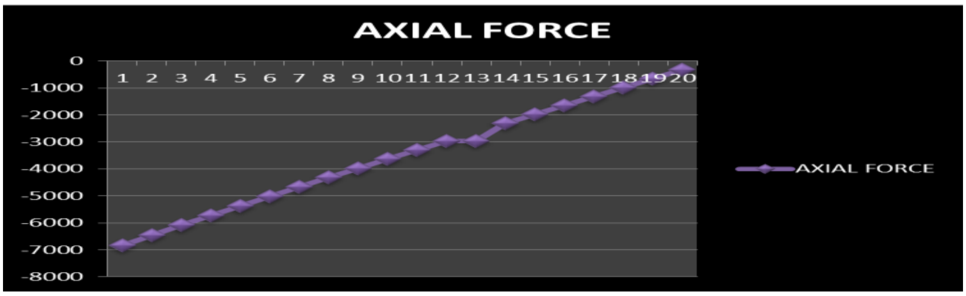
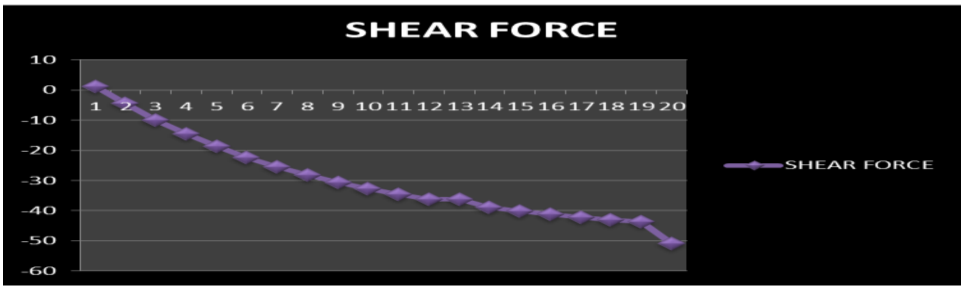


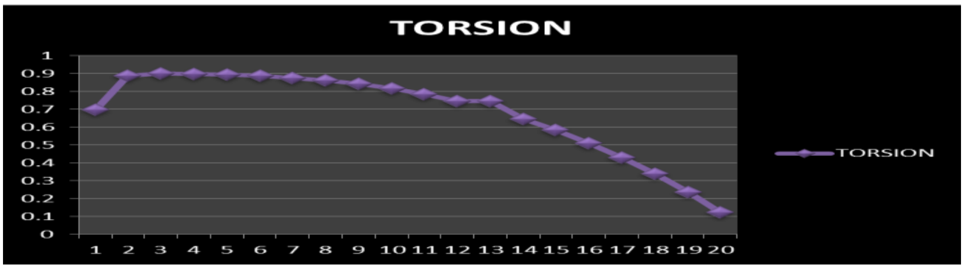
Figure 3: Axial force,Shear Force, Torsion and Moment for columnC2

Table IV: Axial force, Shear Force, Torsion and Moment for columnC4

Story	Column	Load	Loc	AXIAL FORCE	SHEAR FORCE	TORSION	MOMENT
STORY1	C4	1.2DLLLEQY	2.5	-6840.36	1.14	0.699	-38.844
STORY2	C4	1.2DLLLEQY	2.5	-6459.07	-4.4	0.888	-60.572
STORY3	C4	1.2DLLLEQY	2.5	-6087.55	-9.9	0.899	-75.858
STORY4	C4	1.2DLLLEQY	2.5	-5723.32	-14.58	0.898	-86.567
STORY5	C4	1.2DLLLEQY	2.5	-5365.25	-18.7	0.894	-93.676
STORY6	C4	1.2DLLLEQY	2.5	-5012.27	-22.29	0.887	-98.253
STORY7	C4	1.2DLLLEQY	2.5	-4663.56	-25.44	0.876	-100.899
STORY8	C4	1.2DLLLEQY	2.5	-4318.45	-28.18	0.861	-102.02
STORY9	C4	1.2DLLLEQY	2.5	-3976.41	-30.57	0.841	-101.862
STORY10	C4	1.2DLLLEQY	2.5	-3636.98	-32.67	0.816	-100.58
STORY11	C4	1.2DLLLEQY	2.5	-3299.78	-34.5	0.784	-98.267
STORY12	C4	1.2DLLLEQY	2.5	-2964.53	-36.12	0.746	-94.983
STORY13	C4	1.2DLLLEQY	2.5	-2964.53	-36.12	0.746	-94.983
STORY14	C4	1.2DLLLEQY	2.5	-2298.8	-38.85	0.646	-85.679
STORY15	C4	1.2DLLLEQY	2.5	-1967.91	-40.01	0.584	-79.77
STORY16	C4	1.2DLLLEQY	2.5	-1638.13	-41.08	0.512	-73.147
STORY17	C4	1.2DLLLEQY	2.5	-1309.29	-42.08	0.431	-65.97
STORY18	C4	1.2DLLLEQY	2.5	-981.35	-43.02	0.339	-58.545
STORY19	C4	1.2DLLLEQY	2.5	-653.82	-43.61	0.236	-50.801
STORY20	C4	1.2DLLLEQY	2.5	-329.82	-50.76	0.125	-51.899







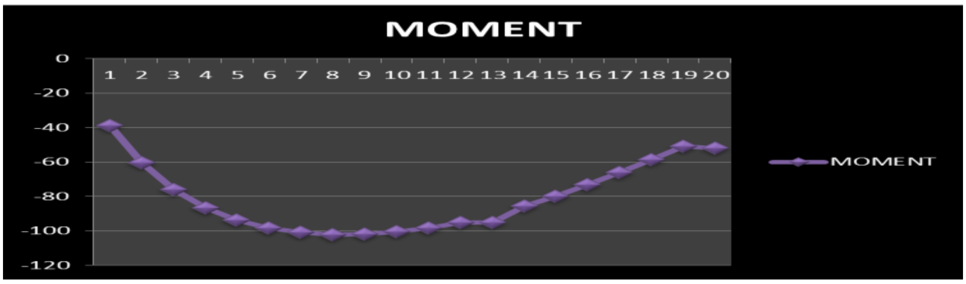
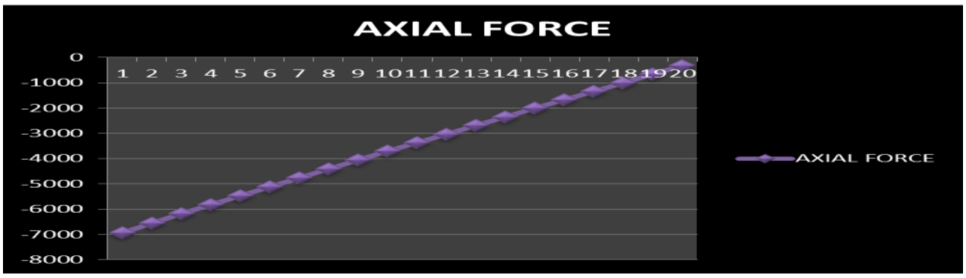
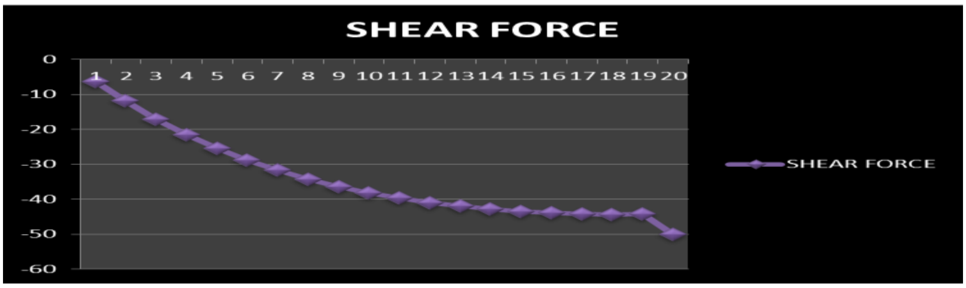


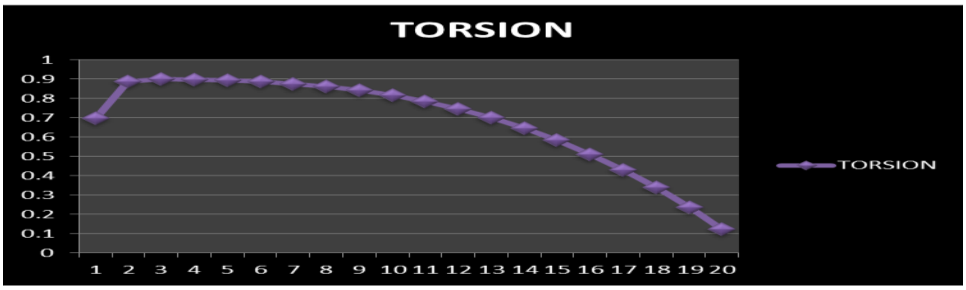
Figure 4:Axial force, Shear Force, Torsion and Moment for columnC4

Table V: Axial force, Shear Force, Torsion and Moment for columnC6

Story	Column	Load	Loc	AXIAL FORCE	SHEAR FORCE	TORSION	MOMENT
STORY1	C6	1.2DLLLEQY	2.5	-6936.63	-6.34	0.699	-38.329
STORY2	C6	1.2DLLLEQY	2.5	-6555.77	-11.89	0.888	-59.426
STORY3	C6	1.2DLLLEQY	2.5	-6183.69	-17.1	0.899	-74.085
STORY4	C6	1.2DLLLEQY	2.5	-5818.14	-21.54	0.898	-84.178
STORY5	C6	1.2DLLLEQY	2.5	-5458.03	-25.42	0.894	-90.682
STORY6	C6	1.2DLLLEQY	2.5	-5102.37	-28.79	0.887	-94.67
STORY7	C6	1.2DLLLEQY	2.5	-4750.38	-31.7	0.876	-96.745
STORY8	C6	1.2DLLLEQY	2.5	-4401.43	-34.2	0.861	-97.318
STORY9	C6	1.2DLLLEQY	2.5	-4055.02	-36.34	0.841	-96.638
STORY10	C6	1.2DLLLEQY	2.5	-3710.71	-38.15	0.816	-94.864
STORY11	C6	1.2DLLLEQY	2.5	-3368.17	-39.67	0.784	-92.093
STORY12	C6	1.2DLLLEQY	2.5	-3027.13	-40.94	0.746	-88.387
STORY13	C6	1.2DLLLEQY	2.5	-2687.35	-41.97	0.7	-83.795
STORY14	C6	1.2DLLLEQY	2.5	-2348.65	-42.8	0.646	-78.365
STORY15	C6	1.2DLLLEQY	2.5	-2010.88	-43.44	0.584	-72.164
STORY16	C6	1.2DLLLEQY	2.5	-1673.91	-43.91	0.512	-65.296
STORY17	C6	1.2DLLLEQY	2.5	-1337.63	-44.23	0.431	-57.929
STORY18	C6	1.2DLLLEQY	2.5	-1002.01	-44.39	0.339	-50.339
STORY19	C6	1.2DLLLEQY	2.5	-666.63	-44.11	0.236	-42.732
STORY20	C6	1.2DLLLEQY	2.5	-334.27	-49.99	0.125	-41.405







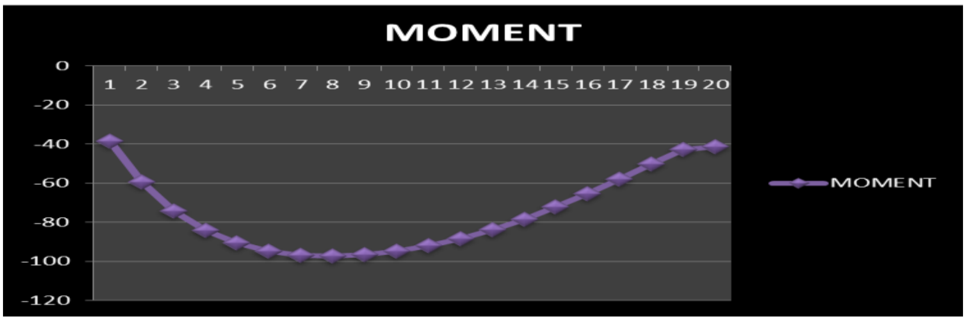
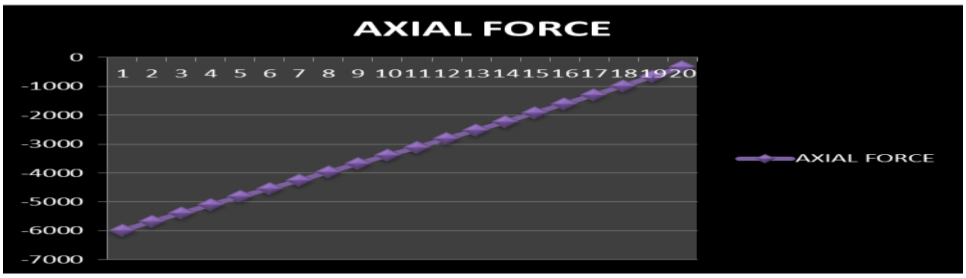
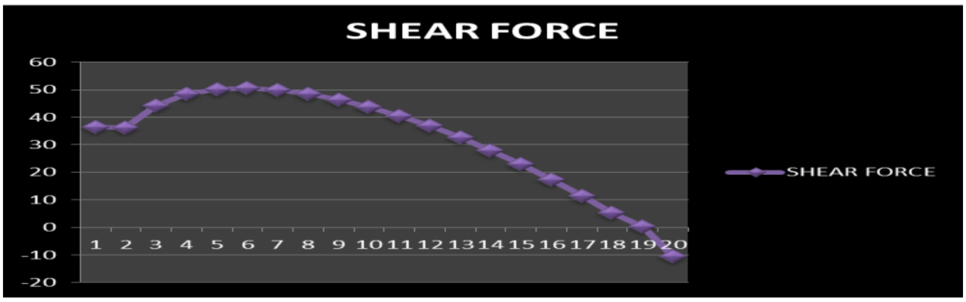


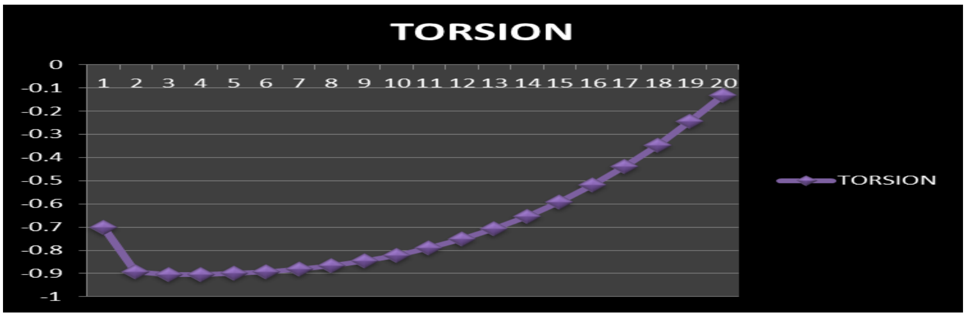
Figure 5: Axial force, Shear Force, Torsion and Moment for columnC6

Table VI: Axial force, Shear Force, Torsion and Moment for columnC1

Story	Column	Load	Loc	AXIAL FORCE	SHEAR FORCE	TORSION	MOMENT
STORY1	C1	1.2DLLLEQX	2.5	-5981.13	36.35	-0.701	5.976
STORY2	C1	1.2DLLLEQX	2.5	-5679.21	36.16	-0.894	12.12
STORY3	C1	1.2DLLLEQX	2.5	-5385.4	44.31	-0.905	17.009
STORY4	C1	1.2DLLLEQX	2.5	-5097.37	48.38	-0.904	21.094
STORY5	C1	1.2DLLLEQX	2.5	-4812.42	50.23	-0.9	24.17
STORY6	C1	1.2DLLLEQX	2.5	-4528.91	50.59	-0.893	26.484
STORY7	C1	1.2DLLLEQX	2.5	-4245.73	49.9	-0.882	28.185
STORY8	C1	1.2DLLLEQX	2.5	-3962.1	48.43	-0.867	29.387
STORY9	C1	1.2DLLLEQX	2.5	-3677.43	46.33	-0.847	30.179
STORY10	C1	1.2DLLLEQX	2.5	-3391.19	43.69	-0.822	30.628
STORY11	C1	1.2DLLLEQX	2.5	-3102.89	40.54	-0.791	30.792
STORY12	C1	1.2DLLLEQX	2.5	-2812	36.89	-0.752	30.72
STORY13	C1	1.2DLLLEQX	2.5	-2517.98	32.73	-0.707	30.461
STORY14	C1	1.2DLLLEQX	2.5	-2220.24	28.08	-0.653	30.064
STORY15	C1	1.2DLLLEQX	2.5	-1918.14	22.94	-0.591	29.584
STORY16	C1	1.2DLLLEQX	2.5	-1611.03	17.37	-0.519	29.095
STORY17	C1	1.2DLLLEQX	2.5	-1298.25	11.49	-0.438	28.65
STORY18	C1	1.2DLLLEQX	2.5	-979.21	5.35	-0.346	28.612
STORY19	C1	1.2DLLLEQX	2.5	-653.62	0.4	-0.243	27.185
STORY20	C1	1.2DLLLEQX	2.5	-320.5	-10.39	-0.132	39.994







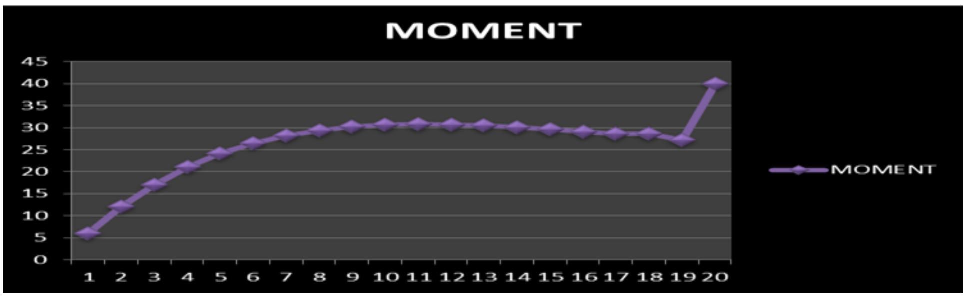
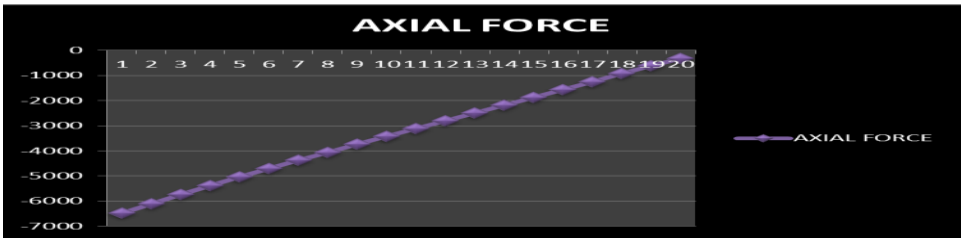
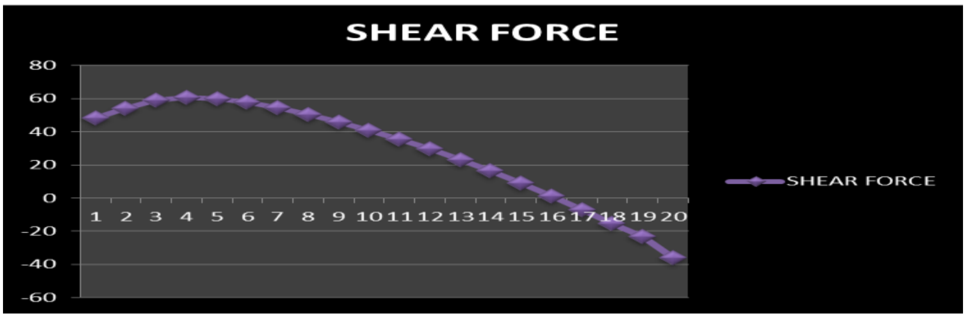


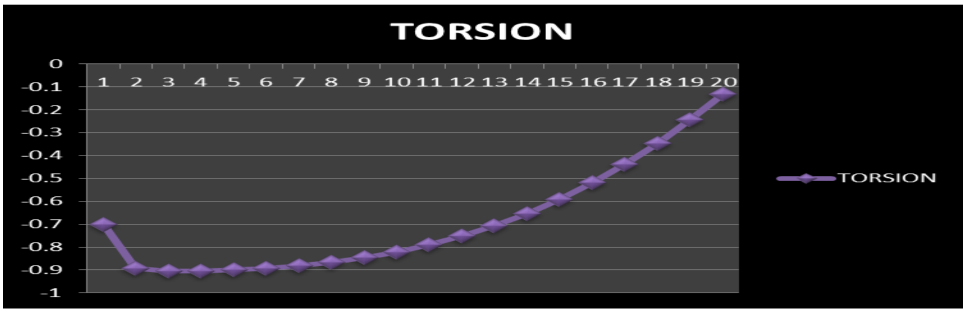
Figure 6:Axial force, Shear Force, Torsion and Moment for columnC1

TableVII:Axial force, Shear Force, Torsion and Moment for columnC2

Story	Column	Load	Loc	AXIAL FORCE	SHEAR FORCE	TORSION	MOMENT
STORY1	C2	1.2DLLLEQX	2.5	-6476.29	48.2	-0.701	-10.762
STORY2	C2	1.2DLLLEQX	2.5	-6096.56	53.97	-0.894	-10.749
STORY3	C2	1.2DLLLEQX	2.5	-5734.07	58.9	-0.905	-8.508
STORY4	C2	1.2DLLLEQX	2.5	-5383.03	60.68	-0.904	-6.505
STORY5	C2	1.2DLLLEQX	2.5	-5041.85	59.93	-0.9	-4.794
STORY6	C2	1.2DLLLEQX	2.5	-4708.64	57.69	-0.893	-3.356
STORY7	C2	1.2DLLLEQX	2.5	-4381.79	54.43	-0.882	-2.15
STORY8	C2	1.2DLLLEQX	2.5	-4059.91	50.47	-0.867	-1.136
STORY9	C2	1.2DLLLEQX	2.5	-3741.81	45.96	-0.847	-0.277
STORY10	C2	1.2DLLLEQX	2.5	-3426.48	40.98	-0.822	0.468
STORY11	C2	1.2DLLLEQX	2.5	-3113.12	35.54	-0.791	1.135
STORY12	C2	1.2DLLLEQX	2.5	-2801.04	29.64	-0.752	1.762
STORY13	C2	1.2DLLLEQX	2.5	-2489.71	23.25	-0.707	2.387
STORY14	C2	1.2DLLLEQX	2.5	-2178.74	16.35	-0.653	3.049
STORY15	C2	1.2DLLLEQX	2.5	-1867.87	8.96	-0.591	3.79
STORY16	C2	1.2DLLLEQX	2.5	-1556.96	1.12	-0.519	4.653
STORY17	C2	1.2DLLLEQX	2.5	-1246.04	-7.07	-0.438	5.686
STORY18	C2	1.2DLLLEQX	2.5	-935.34	-15.36	-0.346	6.918
STORY19	C2	1.2DLLLEQX	2.5	-624.64	-22.99	-0.243	8.398
STORY20	C2	1.2DLLLEQX	2.5	-318.84	-35.86	-0.132	12.237







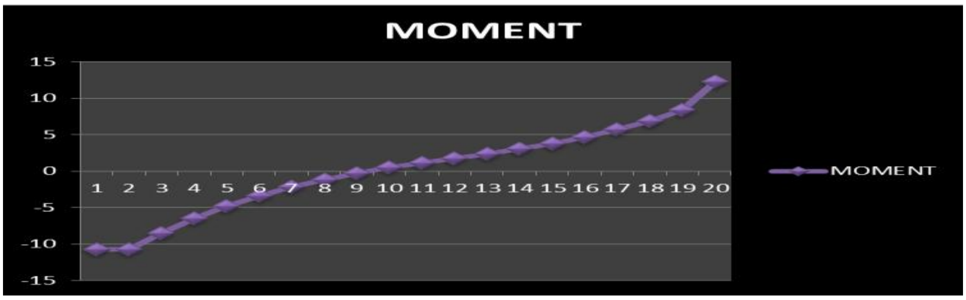
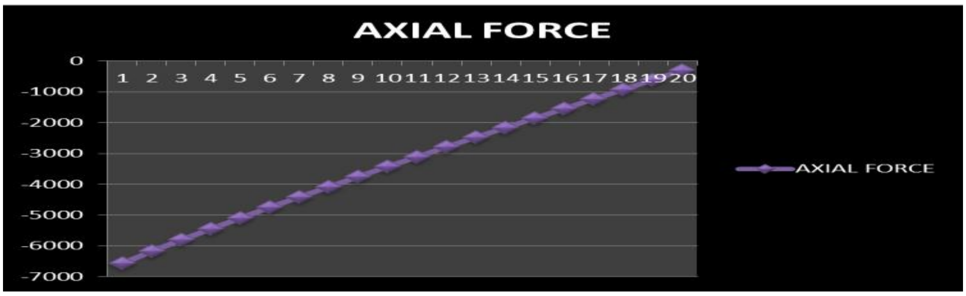
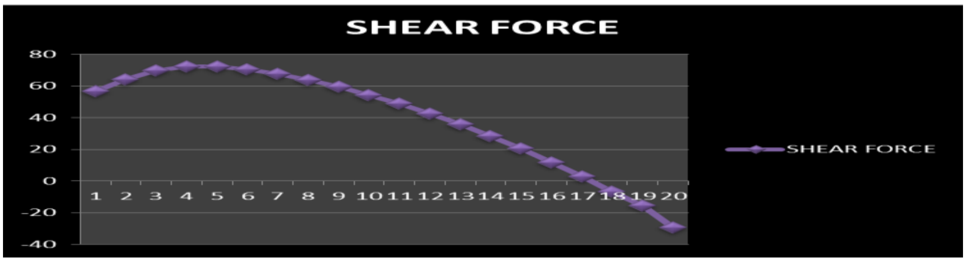


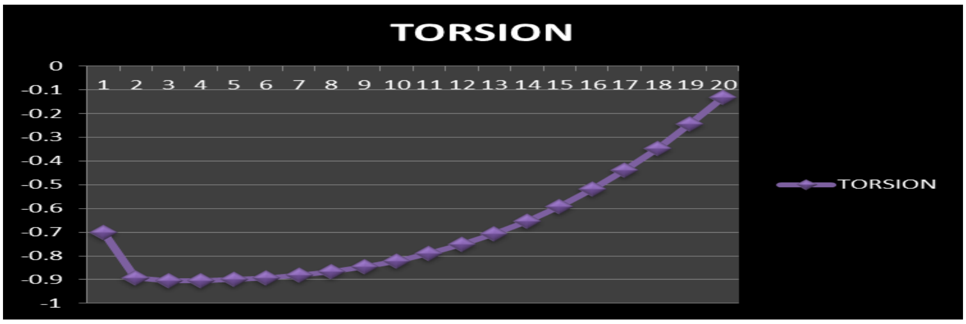
Figure 7: Axial force, Shear Force, Torsion and Moment for columnC2

TableVIII:Axial force, Shear Force, Torsion and Moment for columnC4

Story	Column	Load	Loc	AXIAL FORCE	SHEAR FORCE	TORSION	MOMENT
STORY1	C4	1.2DLLLEQX	2.5	-6562.56	56.71	-0.701	-12.67
STORY2	C4	1.2DLLLEQX	2.5	-6176.39	64.1	-0.894	-15.803
STORY3	C4	1.2DLLLEQX	2.5	-5804.63	69.85	-0.905	-16.353
STORY4	C4	1.2DLLLEQX	2.5	-5443.44	72.38	-0.904	-16.732
STORY5	C4	1.2DLLLEQX	2.5	-5091.64	72.2	-0.9	-17.052
STORY6	C4	1.2DLLLEQX	2.5	-4747.82	70.41	-0.893	-17.31
STORY7	C4	1.2DLLLEQX	2.5	-4410.74	67.5	-0.882	-17.492
STORY8	C4	1.2DLLLEQX	2.5	-4079.29	63.77	-0.867	-17.586
STORY9	C4	1.2DLLLEQX	2.5	-3752.52	59.38	-0.847	-17.58
STORY10	C4	1.2DLLLEQX	2.5	-3429.61	54.4	-0.822	-17.461
STORY11	C4	1.2DLLLEQX	2.5	-3109.85	48.84	-0.791	-17.218
STORY12	C4	1.2DLLLEQX	2.5	-2792.66	42.69	-0.752	-16.837
STORY13	C4	1.2DLLLEQX	2.5	-2477.58	35.93	-0.707	-16.309
STORY14	C4	1.2DLLLEQX	2.5	-2164.21	28.53	-0.653	-15.622
STORY15	C4	1.2DLLLEQX	2.5	-1852.3	20.5	-0.591	-14.763
STORY16	C4	1.2DLLLEQX	2.5	-1541.66	11.88	-0.519	-13.723
STORY17	C4	1.2DLLLEQX	2.5	-1232.19	2.78	-0.438	-12.488
STORY18	C4	1.2DLLLEQX	2.5	-923.95	-6.53	-0.346	-11.066
STORY19	C4	1.2DLLLEQX	2.5	-616.5	-15.33	-0.243	-9.26
STORY20	C4	1.2DLLLEQX	2.5	-313.9	-29.36	-0.132	-8.944







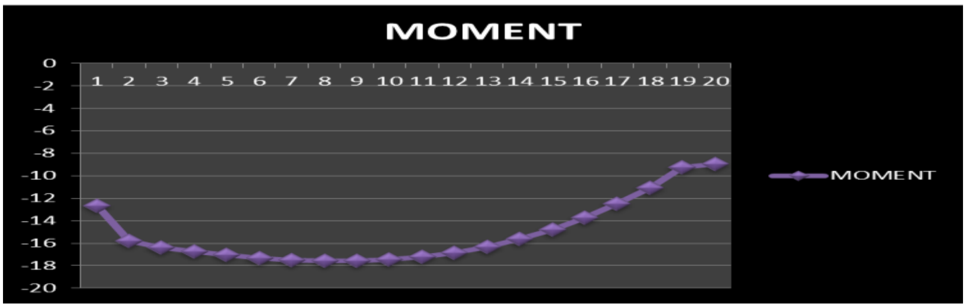


Figure 8: Axial force, Shear Force, Torsion and Moment for columnC4

Table IX:Axial force Shear Force, Torsion and Moment for columnC6

Story	Column	Load	Loc	AXIAL FORCE	SHEAR FORCE	TORSION	MOMENT
STORY1	C6	1.2DLLLEQX	2.5	-6554.88	64.22	-0.701	-12.18
STORY2	C6	1.2DLLLEQX	2.5	-6167.73	71.66	-0.894	-14.702
STORY3	C6	1.2DLLLEQX	2.5	-5795.59	77.13	-0.905	-14.645
STORY4	C6	1.2DLLLEQX	2.5	-5434.36	79.43	-0.904	-14.425
STORY5	C6	1.2DLLLEQX	2.5	-5082.8	79.04	-0.9	-14.159
STORY6	C6	1.2DLLLEQX	2.5	-4739.39	77.04	-0.893	-13.845
STORY7	C6	1.2DLLLEQX	2.5	-4402.86	73.91	-0.882	-13.475
STORY8	C6	1.2DLLLEQX	2.5	-4072.03	69.94	-0.867	-13.039
STORY9	C6	1.2DLLLEQX	2.5	-3745.93	65.3	-0.847	-12.53
STORY10	C6	1.2DLLLEQX	2.5	-3423.7	60.04	-0.822	-11.937
STORY11	C6	1.2DLLLEQX	2.5	-3104.61	54.18	-0.791	-11.253
STORY12	C6	1.2DLLLEQX	2.5	-2788.06	47.68	-0.752	-10.469
STORY13	C6	1.2DLLLEQX	2.5	-2473.57	40.51	-0.707	-9.577
STORY14	C6	1.2DLLLEQX	2.5	-2160.75	32.64	-0.653	-8.566
STORY15	C6	1.2DLLLEQX	2.5	-1849.34	24.08	-0.591	-7.429
STORY16	C6	1.2DLLLEQX	2.5	-1539.16	14.86	-0.519	-6.156
STORY17	C6	1.2DLLLEQX	2.5	-1230.12	5.08	-0.438	-4.74
STORY18	C6	1.2DLLLEQX	2.5	-922.3	-5.02	-0.346	-3.156
STORY19	C6	1.2DLLLEQX	2.5	-615.31	-14.68	-0.243	-1.525
STORY20	C6	1.2DLLLEQX	2.5	-313.27	-29.88	-0.132	1.428

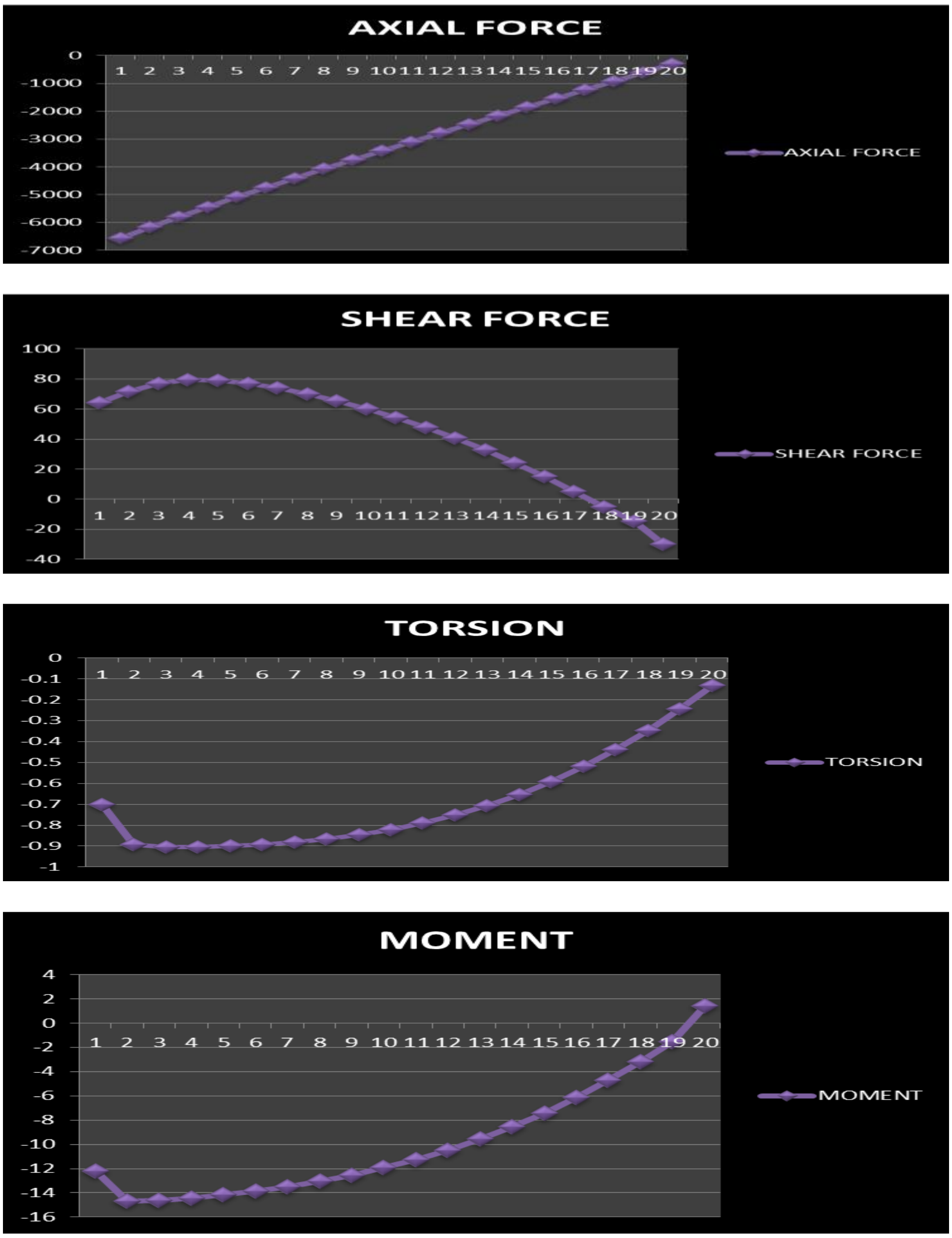


Figure 9: Axial force, Shear Force, Torsion and Moment for columnC6

V. DISCUSSION ON RESULTS

The structural prototype is prepared and lots of data is been collected from the prototype. All the aspects such as safety of structure in shear, moment and in story drift have been collected. So now to check whether to know whether the structure is safe with established shear walls and all construction of core wall in the center we need to compare the graphical values of structure with the shear wall and a simple rigid frame structure.The tallness of a structure is relative and cannot be defined in absolute terms either in relation to height or the number of stories. The council of Tall Buildings and Urban Habitat considers building having 9 or more stories as high-rise structures. But, from a structural engineer's point of view the tall structure or multi-storied building can be defined as one that, by virtue of its height, is affected by lateral forces due to wind or earthquake or both to an extent. Lateral loads can develop high stresses, produce sway movement or cause vibration. Therefore, it is very important for the structure to have sufficient strength against vertical loads together with adequate stiffness to resist lateral forces. So lateral forces due to wind or seismic loading must be considered for tall building design along with gravity forces vertical loads. Tall and slender buildings are strongly wind sensitive and wind forces are applied to the exposed surfaces of the building, whereas seismic forces are inertial (body forces), which result from the distortion of the ground and the inertial resistance of the building. These forces cause horizontal deflection is the predicted movement of a structure under lateral loads . Lateral deflection and drift have three effects on a structure; the movement can affect the structural elements (such as beams and columns); the movements can affect non-structural elements (such as the windows and cladding); and the movements can affect adjacent structures. Without proper consideration during the design process, large deflections and drifts can have adverse effects on structural elements, nonstructural elements, and adjacent structures. When the initial sizes of the frame members have been selected, an approximate check on the horizontal drift of the structures can be made. In this study analysis is done with changing structural parameters to observe the effect on the lateral deflection of the tall building due to earthquake loading. There are three major types of structures were identified in this study, such as rigid frame, coupled shear wall and wall frame structures.

VI. CONCLUSION

[1] Based on the analysis and discussion ,shear wall are very much suitable for resisting earthquake induced lateral forces in multistoried structural systems when compared to multistoried structural systems whit out shear walls. They can be made to behave in a ductile manner by adopting proper detailing techniques.

[2] Shear walls must provide the necessary lateral strength to resist horizontal earthquake forces.
[3] When shear walls are strong enough, they will transfer these horizontal forces to the next element in the load path below them, such as other shear walls, floors, foundation walls, slabs or footings.
[4] Shear walls also provide lateral stiffness to prevent the roof or floor above from excessive side-sway.
[5] When shear walls are stiff enough, they will prevent floor and roof framing members from moving off their supports.
[6] Also, buildings that are sufficiently stiff will usually suffer less nonstructural damage
[7] It is evident from the observing result that the shear wall are making value of torsion very low.
[8] It is evident from the observing result that for combination loads 1.2 DLLLEQX&1.2DLLLEQY ,maximum value of moment at story one and minimum value of shear force also at story one . The Moment is maximum when the shear force is minimum or changes sign.
[9] The vertical reinforcement that is uniformly distributed in the shear wall shall not be less than the horizontal reinforcement .This provision is particularly for squat walls (i.e. Height-to-width ratio is about 1.0).However ,for walls whit height-to-width ratio less than 1.0, a major part of the shear force is resisted by the vertical reinforcement. Hence ,adequate vertical reinforcement should be provided for such walls.

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