***Comparison the cost of project before and after the seismic design:***

***Introduction:***

The building is integrated set of system construction and architectural and interior , Designing the building lot is beautifully and added all the system that work to make the building better and more functional and comfortable, but forget the best things to preserve their lives, aseismic design to protect their lives or reduce the proportion of victims of earthquakes in the world.

There are some things that must work a minimum to make the building seismically resistant more.

***Design Criteria:-***

 Safety, economic cost and efficiency are important goals for any structural project, so (ACI-2002) code and the seismic code (UBC-97) are used to control the design criteria for this project, the f In this project in particular has been identified on the rules and laws of construction the following that must be taken into account to achieve a kind of safety against earthquakes, and work to suppress and not exaggerated, and access to the premises of resistance to the action of earthquakes, although the availability of these things does not mean the collapse of the building.

1. Seismic forces depend on the amount of dead weight to the origin, it increases with increasing the weight of origin, so you should lose weight for the origin of the Dead as much as possible.

2. Achieve uniformity in the form of the building in the horizontal and vertical projections, and that cannot be achieved for reasons that architectural or otherwise, can be used seismic joints.

3. Adjust the distribution of structural elements vertical so as to ensure the distribution of symmetric to (Stiffness) structural elements, especially in the outer walls, and ensure the distribution of symmetric blocks horizontally and vertically, so as to prevent deviation (Eccentricity) Center for rigidity (Stiffness Center) from the center of the weight of the building (Mass or Gravity Center ).

4. Vertical distribution of structural elements (columns and walls) are symmetric about the axes X and Y, and that this is not possible for reasons of architecture must be borne in mind that no more than the difference between the dimensions of the successive openings of the columns and walls of 20%.

5. Ensure the continuity of structural elements and uniformly from the bottom to the top, and allows obtaining a gradual reduction of the hardness of the vertical structural elements in proportion to the reduction-sections whenever we move from bottom to top.

6. Avoid using floor soft, which means that the floor or more in the building consisted of columns only without the walls and the rest of the floors containing the walls of the portable or carrying of reinforced concrete, and that cannot be avoided for reasons of architectural or functional parking

For example, you can add a number of walls and distributed symmetric.

7. When you use frames of reinforced concrete must be a commitment to the relationship between the columns, bridges, and by designing a column strong and bridge less powerful or what is known scientifically column strong and the bridge is weak, in which case there is a need to use the forms and dimensions suitable for the columns and the adoption of special controls.

8. Intensification of alkanes on the outskirts of the columns, bridges, and the intensification of alkanes in the area of ​​the intersection of bridges with columns (Joint), so as to prevent the formation of (Plastic Hinge), and securing long enough to iron socialization.

9. The use of bridges falling (Drop Beam) as much as possible while reducing the use of bridges, Mountain, and the use of tiles in one direction (one-way slab).

Following information explains these criteria:-

 ***cost analysis (before re-design):***

\*This table will show the items that are costing and how much the weight of each component before and after the seismic design.

|  |
| --- |
| *total area=823.5* |
| *COST /SM* | *TOTAL COST* | *Item of project*  |
| *41.97* | *34540* |  *Excavation* |
| *104.35* | *85878* | *Concrete Works* |
| *154.68* | *127298* | *Steel Work* |
| *342.3* | *281714.5* | *Finishing Works* |
| *85.66* | *70500* |  *External walls* |
| *44.88* | *36940* | *Electrical Work* |
| *55.54* | *45710* | *Mechanical Work* |
| *120* | *98820* | *Labor for structural elements*  |

Table15:total cost and *Cost per square meter*before the seismic design

\*Total cost per square meter.

|  |  |
| --- | --- |
| *823.5* | *total area SM* |
| *786647.9* | *total cost (NIS)* |
| *955.2494* | *cost per SM(SM/NIS)* |

Table 16: total cost per square meter.

***3.4-cost analysis (after re-design):***

|  |
| --- |
| *total area=1704m* |
| *COST /SM*  | *TOTAL COST*  | *Item of project*  |
| *56.15* | *95680* |  *Excavation* |
| *159.21* | *271302* | *Concrete Works* |
| *161.81* | *275720* | *Steel Work* |
| *325* | *553770* | *Finishing Works* |
| *77.83* | *132620* |  *External walls* |
| *56.34* | *96000* | *Electrical Work* |
| *71.89* | *122500* | *Mechanical Work* |
| *140* | *238360* | *Labor for structural elements*  |

Table17:total cost and *Cost per square meter* after the seismic design

\*Total cost per square meter.

|  |  |
| --- | --- |
| *1704* | *total area SM* |
| *1786152* | *total cost (NIS)* |
| *1050* | *cost per SM(SM/NIS)* |

Table 18: total cost per square meter after seismic design.

***Result***

Increase the proportion of cost between the two projects (10 %)

This increase is distributed on these elements

1. Excavation
2. Concrete work
3. Steel work
4. Finishing work
5. Mechanical work
6. Electrical work
7. External work
8. Labor for structural elements

I have been a redesign of all of these elements within engineering cods of that was increased this ratio costs.

***Conclusion:***

***-Architectural:***

*In this section has been added some areas, enlarge the windows in the south face*

*Distribution offices are ideally, designed the project to serveone idea.*

***Seismic***

*Added shear wall at the parties in all floor not only basement, re-distribution of the elements to increase rigidity*

*Construction. Intensification of shear steel at joint,shell windowsopenings good way .shell the*

*Stone specials at windows and doors.*

***Cost***

Afte**r** it had been calculated the cost ofproject for all elements

Explain to us increase was approximately (10%),distributed at all elements not only structural elements, orseismic design.