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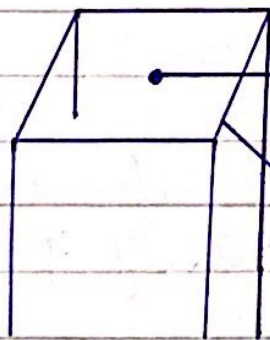
Q. NO :- 1.

Answer :-

Before discussing various, figure we will first explain this certain things :-

→ Center of mass/Center of gravity:-

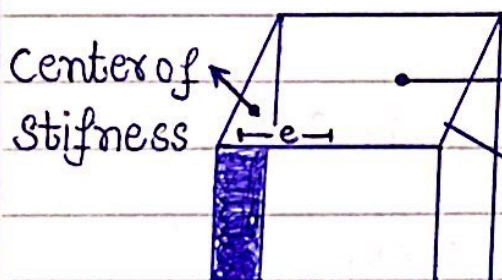
The point at which the object could be exactly balanced without any rotation resulting.



Center of mass coincides with Center of rigidity/stiffness.

Force.

Balance resistance.



Center of stiffness

Center of mass.

Force

unbalanced resistance.

→ Figure:-1.

The Center of mass is not coinciding with center of stiffness & hence eccentricity is created which results in unbalance resistance against disturbing forces also there are discontinuous shear walls in figure-1. which is not a good sign of structure stability against lateral loads.

→ Figure:-2.

Usually for parking purpose in lower stories of building shear walls & partition walls are avoided which results in soft stories form formation. In fig-2 soft stories has been observed in lower floors. which results in low/less stiffness of lower floors and hence eccentricity generated and this ununiform stiffness in several stories could easily prove a collapse against seismic loads.

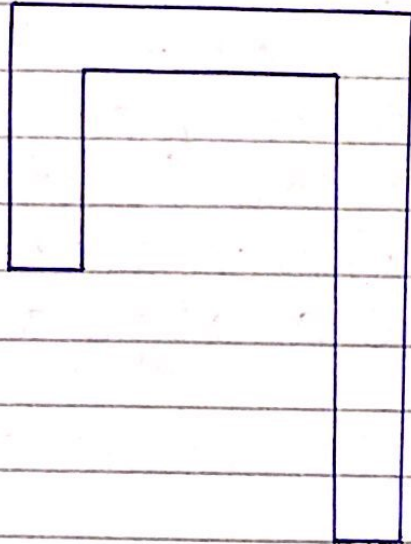
Three condition can easily avoid soft story formation:-

- ① Addition of extra columns.
- ② Add bracing.
- ③ Add external buttresses.

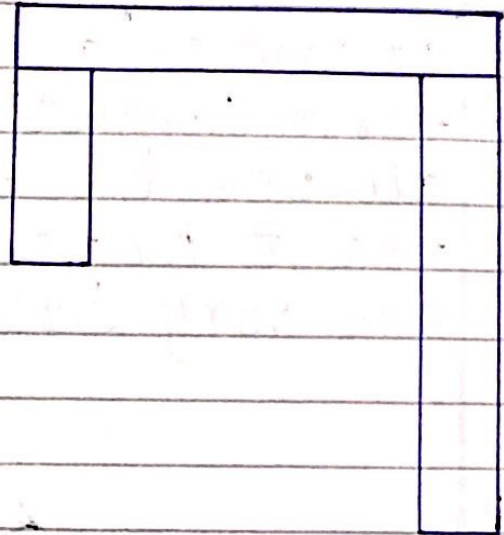


Figure :- 3.

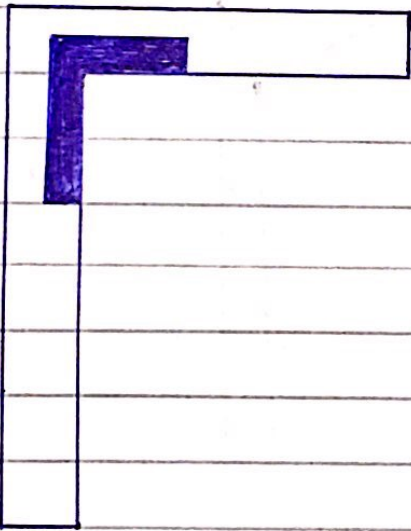
There are entrant corner, which may be in any shape L, T, H etc.



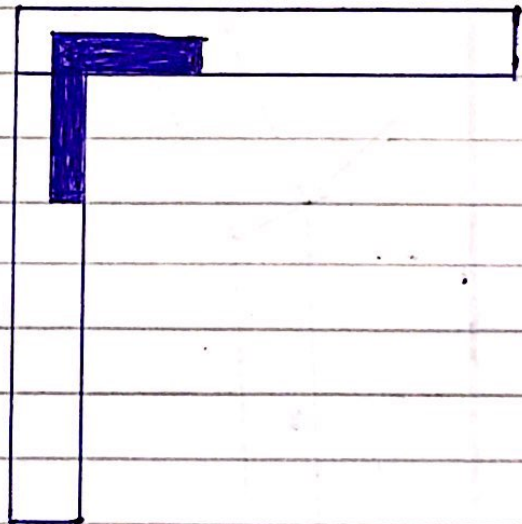
Undesirable



Preferred



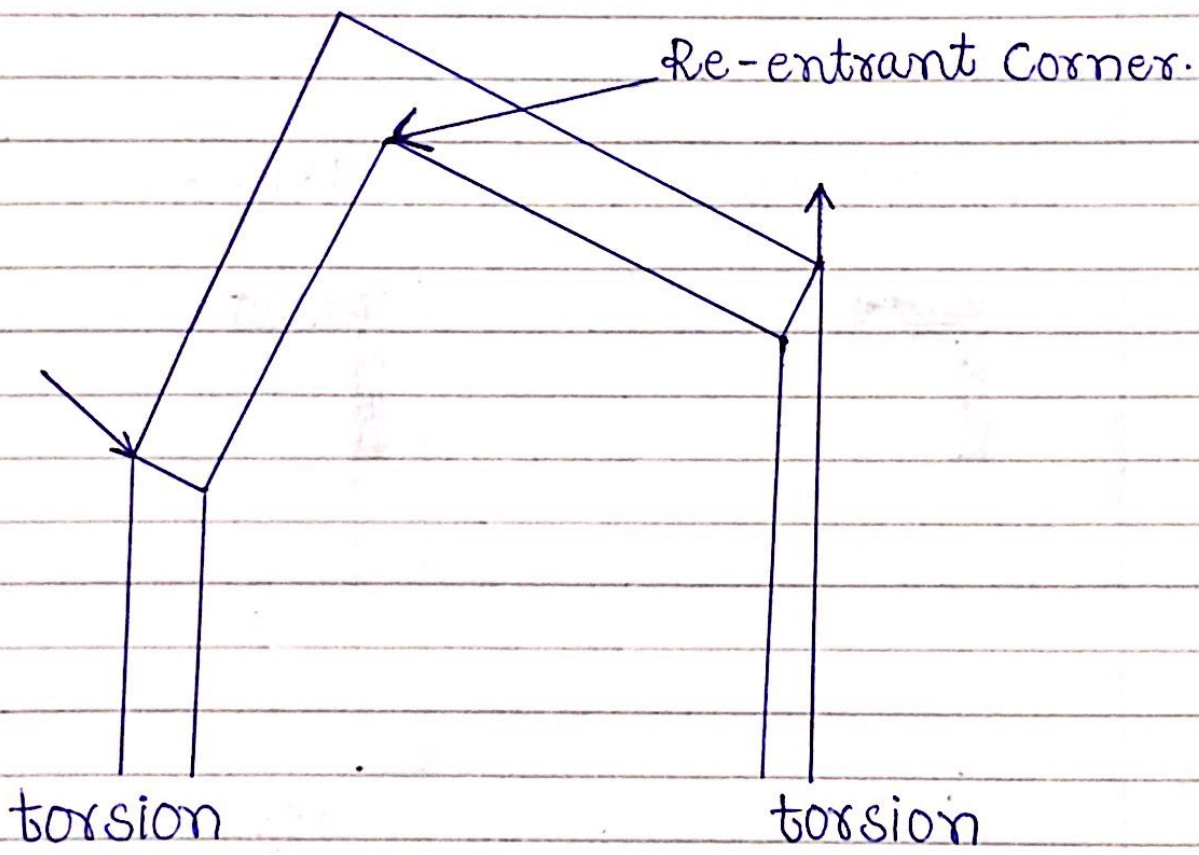
Undesirable

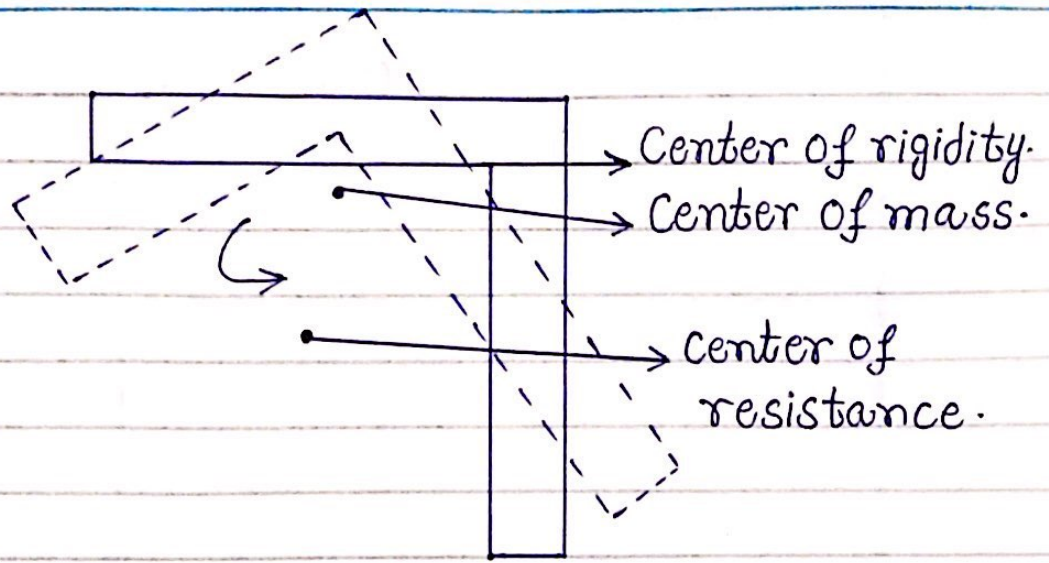


Preferred.

Re-entrant create two problem they tend to produce differential motions b/w different wing's of building, because

of Stiff element that tend to be Located in this region, result in Local stress Concentration at re-entrant Corner. Secound is torsion because the Center of mass and Center of rigidity in the form Cannot geometrically Concide for all possible earth quake direction. Hence result in rotation. The resulting forces are very difficult to analyze and Predict





→ Problem Solution:-

Seprate the building into Simpler or tie the building together more strongly with element's positined to provide a more balanced resistance.

Q. NO :- 2.

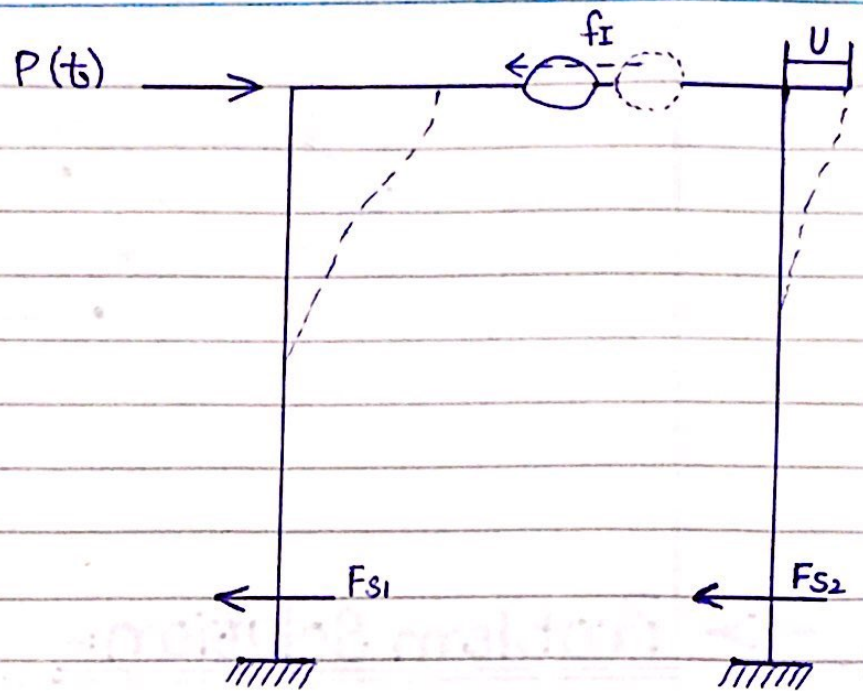
Answer:-

$$m = \frac{W}{g} = \frac{7746 \times 2.0k}{32.2 \text{ ft/sec}^2}$$

$$m = 4811.18 \text{ k} \cdot \text{sec}^2 / \text{ft} = 4811180 \text{ lb} \cdot \text{sec}^2 / \text{ft}$$

Using D-Alembert's Principle of dynamic equilibrium :-

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$$P(t) - f_I - f_{s1} - f_{s2} = 0$$

$$P(t) - m\ddot{u} - (f_{s1} + f_{s2}) = 0$$

$$(k_1 u + k_2 u) + m\ddot{u} = P(t)$$

$$(k u) + m\ddot{u} = P(t)$$

$$\text{As, } k = 3759 \text{ k/ft}$$

$$4811180 \ddot{u} + 3.76 \times 10^6 u = P(t)$$

Where,

U & $P(t)$ are in ft and lb.