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SECTION	"C"
DEPARTMENT	BC - CIVIL
SUBJECT	INTRODUCTION TO STRUCTRAL DYNAMIC & EARTHQUACK

SUBMITTED TO : SIR yaseen

Q NO - 01

Figure - 1

The structure of figure 1 is discontinous shear wall.

→ If the earthquake come the structure of building will break at center.

The center of rigidity is at the center of the plan (from symmetry) and the longitudinal walls, being placed as distant as possible from this center, produce the greatest torsional resistance

⇒ Although the position of the center of rigidity of the symmetrical arrangment in remains at the center of the plan, the longitudinal walls are not entirely placed at the extremities thus resulting in a reduced torisonal resistance.

Solution:-

→ The shear wall in structure should be made to the end of the structure (foundation) mean that shear wall should fully made.

→ Additional column should be provided in the structure.

→ The solution to the problem of the discontinuous shear wall is to eliminate the shear walls.

→ If the decision is made to use shear walls, then their presence must be recognized from the begining of schematic design, and their size and location made the subject of careful architectural and engineering coordination early.

Figure :- 02

→ In Figure 2 the sturcture given is soft and weak stories structure.

→ If earthquake come the Lower portion of building or sturcture is less stiffer and upper portion of sturcture is more stiffer so Lower story column will be collaposed and the structure will be collaposed from ground floor.

→ The most prominent of the problems caused by severe stress concentration is that of the "soft" story

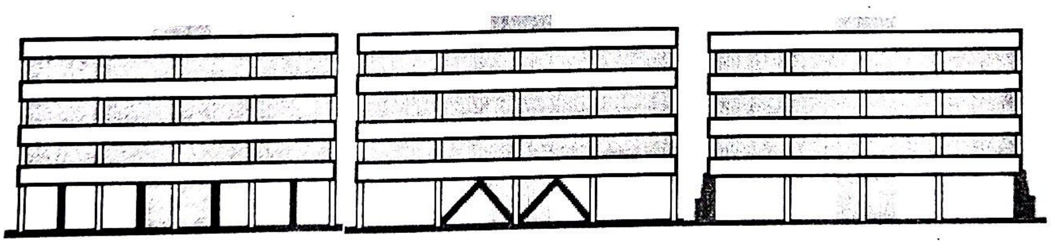
The term has commonly been applied to buildings whose ground-level story is less stiff than those above.

→ The building code distinguishes between "soft" and "weak" stories. Soft stories are less stiff, or more flexible, than the story above; weak stories have less strength.

→ A soft or weak story at any height creates a problem, but since the cumulative loads are greatest towards the base of the building, a discontinuity between the first and second floor tends to result in the most serious condition.

Solution:-

→ Addition of column, braces and external buttresses should be provided to the structure so the structure will gain it strength.



[redacted] Add columns   Add bracing   Add external buttresses

Figure :- 3

→ In Figure 3 the structure given is Re-entrant corner.

→ The re-entrant is common characteristic of building form and the shape in figure are in L-shape.

→ If, earthquake come the deformation will be occur in corner or wings of the building.

→ There are two problems created by these shapes. The

First is that they tend to produce differential motion between different wings of the building that, because of stiff elements that tend to be Located in this region. result in local stress concentrations at the re-entrant corner.

→ The Second problem of this from is torsion. which is caused because the center of mass and the center of rigidity in this form cannot geometrically coincide for all possible earthquake directions. The result is rotation. The resulting forces are very difficult to analyze and predict.

Solutions :-

→ There are two basic alternative approches to the problem of re-entrant-corner form: structurally to separate the building into simpler shapes, or to tie the building together more strongly with elements positioned to provide a more balanced resistance (see figure). The latter solution applies only to smaller buildings

→ Seperation of building

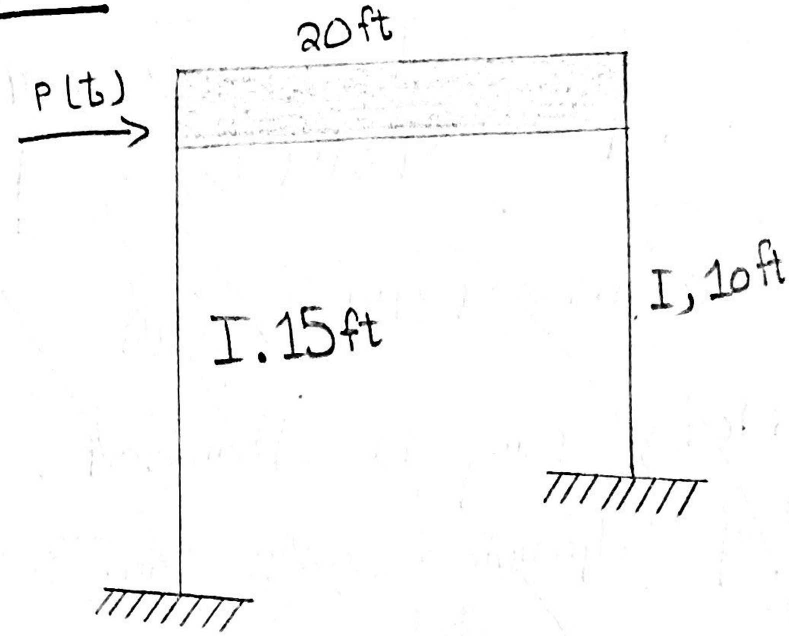
→ Stiff resistant elements should provided

→ In case of Separation building must be sufficiently away to ensure they do not pound together and damage each other in an earthquake.

→ The use of splayed rather than right angle ~~re~~-entrant corners Lessens the stress concentration.

→ This is analogous to the way a tapered beam is structurally more desirable than an abruptly notched one.

Q NO: 02



Given data:-

$\Rightarrow E = 29{,}000$ ksi

$\Rightarrow I = 1200$ in^4

$\Rightarrow$ uniformly Distributed Gravity Load

7751 lb/ft

Required data:-

$\Rightarrow$ Develop Equation of motion $= P(t) = ?$

Solution:-

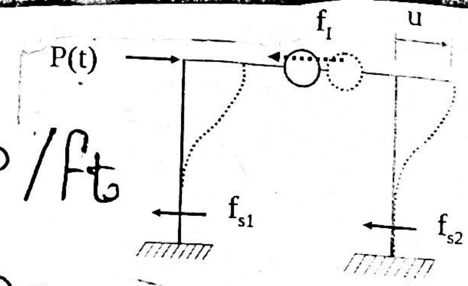
As; $K_{eq} = K_1 + K_2$

$$\Rightarrow K = 12EI \left[\frac{1}{h_1^3} + \frac{1}{h_2^3}\right]$$

$$= 12 \times 29{,}000 \times 1200 \times \left[\frac{1}{(15\times12)^3} + \frac{1}{(10\times12)^3}\right]$$

$\Rightarrow K = 313.29$ k/in

$\Rightarrow$ $\boxed{K = 3759 \text{ k/ft}}$



$K = 3.759 \times 10^6$ lb/ft

$$m = w/g = \frac{7751 \times 20}{32.2 \text{ ft/sec}^2}$$

$$M = 4814.28 \text{ lb}\cdot\text{sec}^2/\text{ft}$$

Now;

Using D-Alembert's Principle of dynamic equilibrium.

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

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

$$(K_1 u + K_2 u) + m\ddot{u} = P(t)$$

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

Putting value we get

$$P(t) = 4814.28 + 3.759 \times 10^6$$

Where u & P(t) are in ft and lb respectively.