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Section : "B"

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Subject : Earth Quake

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Q1:2

## "FIGURE (1)"

\* In figure (1) The failure occurs due to soft story at the ground story. Soft story is that story which has less stiffness from the above story. It can also occur due to discontinuous shear wall.

Causes of the story includes

\* When we don't provide initial walls (masonry wall) in a stories, normally initial wall increase the stiffness of the story. If we don't provide initial walls in a rectangular story and provide initial in the above stories, so in that stories in which we have not provided initial wall have less stiffness and will behave a soft story.

Solution:-

\* \* "The solution for soft story

is to add columns, add braces, add

walls and add addition of external

buttresses "



## FIGURE "2"

In figure "2" the failure occurs due to "re-entrant corner."

★ There are two problems created by this, first is that it tends to produce different motion between two wings of the building because of stiff elements that tend to be located in this region, result local stress concentration at the re-entrant corner.

★ Second problem of this form is torsion which is caused because center of motion and center of rigidity in this form geometrically coincide for all possible earthquake direction. The result is rotation. The resulting force are very difficult to analyze and predict.

### Solution:—

There are two different alternative approaches to the problem of re-entrant corner forms: Structurally to separate the building into similar shapes, or to tie the building together more strongly with elements positioned to provide a more balanced resistance. In case of separation building must be sufficiently away to ensure they do not pound together and damage each other in an earthquake.



## FIGURE "3"

In figure (3) the failure occurs due to "vertical discontinuity"

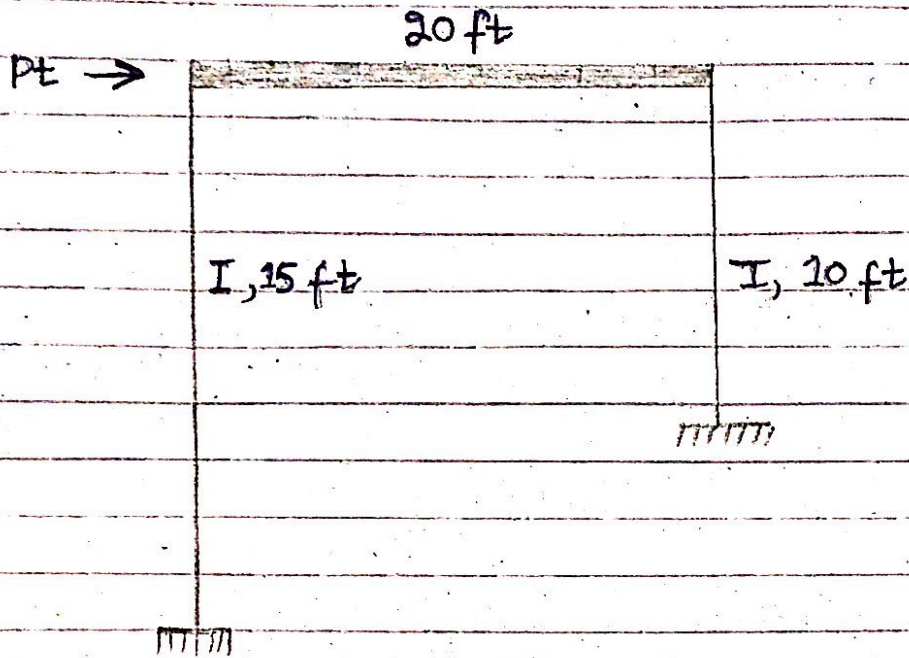
★ There is vertical discontinuity due to which the load path will change during the lateral forces. At the location where the load path is changing there will be stress concentration. If the member capacity strength is less the stress concentration failure will occur.

SOLUTION:

"Remove the vertical discontinuity by providing the element through over the height"



Q2



Given Data:-

$$E = 29000 \text{ ksi}$$

$$I = 1200 \text{ in}^4$$

Uniformly Distributed Gravity load = 7755 lb/ft

Required Data:-

Develop equation of motion =  $P(t) = ?$

Solution:-

$$K_{eq} = k_1 + k_2$$

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

$$K = 12 \times 29000 \times 1200 \left[ \frac{1}{(15 \times 12)^3} + \frac{1}{(10 \times 12)^3} \right]$$

$$K = 313.29 \text{ k/In}$$

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

$$\Rightarrow m = \frac{w}{g} = \frac{7.755 \times 20}{32.2} = 4.816 \text{ k Sec}^2/\text{ft}$$

$$m = 4816 \text{ lb Sec}^2/\text{ft}$$

$$\Rightarrow p(t) = Ku + mu$$

$$p(t) = 3759 \times 10^6 + 4816 \dot{u}$$

