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Date: __/__/__

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Section A

Subject Introduction to Structural dynamics and Earthquake Engineering.

Department BE (C)

Instructor Engr. Yaseen

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QNo (01)

Figure: 01.

As we know that when shear wall form the main lateral resistant elements of a resistant elements of a structure, and there is not a continuous load path through the walls from roof to foundation, the resalt can be serious overstressing at the points of discontinuity. This discontinous shear wall condition represents a special, but common, case of the "soft" first-story problem.

So the main problem in figure-1 is discontinous shear walls.

The discontinuous shear wall is a fundamental design ~~Cond~~ Contradiction: the purpose of a shear wall is to collect diaphragm loads at each floor and transmit them as directly and efficiently as possible to the foundation. To interrupt this load path is undesirable.

possible Solution:-

For the problem in fig-1, the possible solution is to avoid discontinuous shear wall or to eliminate the shear walls.

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

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Figure: 2

In fig-2 the problem is 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 then those above. Also we can see in fig. that the building is less stiff in ground level.

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 ~~sto~~ soft or weak story at any height creates a problem, a discontinuity between the first and second floor tend to result in the most serious condition.

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we have come to the conclusion that in fig-2 the problem is "soft" story.

Possible Solution:

In fig-2 as it is "soft" story problem, so we can provide supports in the ground floor. By addition of columns or by adding bracing or by adding external buttresses.

In fig-2 we can see some external buttresses are provided so thats good.

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Figure: 3

As we know that re-entrant corner is the common characteristics of building forms that, in plan, that will be L, T, H, etc any of three ~~type~~ shapes.

So in fig-3 we can see the re-entrant corner. Also it can be due to the torsion- or that re-entrant corner that the columns of the building are badly effected some of them are cracked and some are broken.

Possible Solution:

There are two alternative approaches 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. The later solution applies only to smaller buildings.

In case of seperation the use of splayed rather than right angle re-entrant corners.

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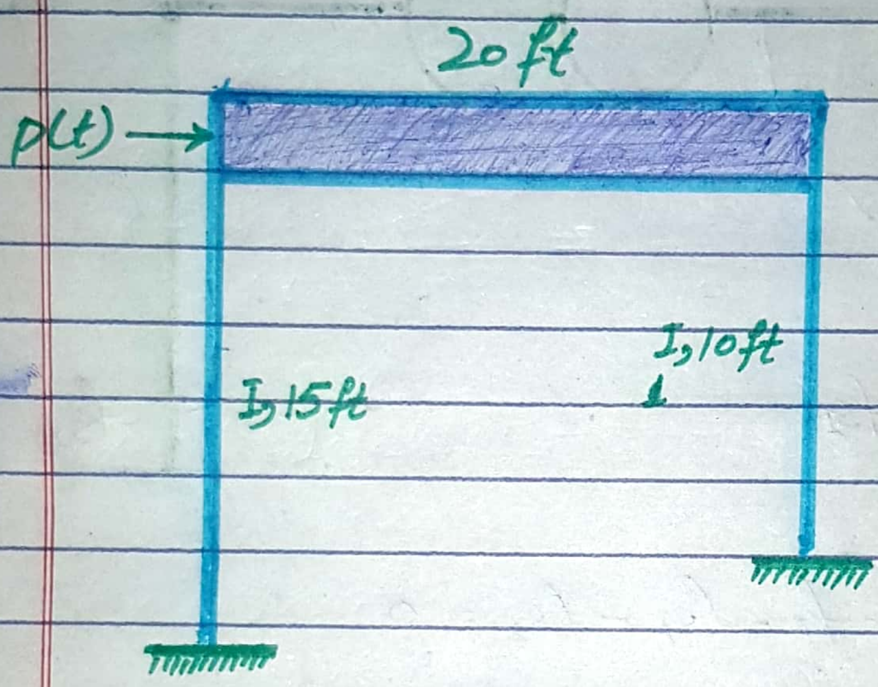
Problem:- ID 7691



Solution:

As we know that

$W = mg$

So;

$$m = \frac{W}{g}$$

$$m = \frac{7691 \times 20}{32.2}$$

$$m = 4777.02 \ lb.sec^2/ft$$

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Ans

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

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

$K_{eq} = k_1 + k_2$

$$K = \frac{12EI}{h_1^3} + \frac{12EI}{h_2^3}$$

$$K = 12EI\left(\frac{1}{h_1^3} + \frac{1}{h_2^2}\right)$$

$$K = 12 \times 29000 \times 1200\left(\frac{1}{(15\times12)^3} + \frac{1}{(10\times12)^3}\right)$$

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

~~K~~ or

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

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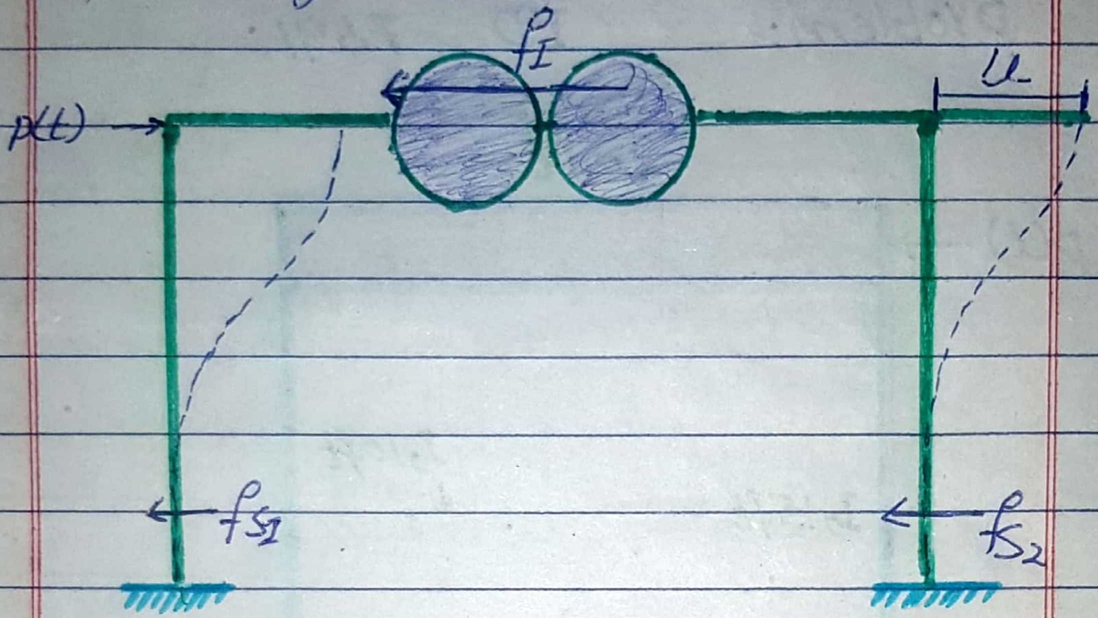
Using D-Alembert's principle of ~~Using~~ dynamic equilibriums.



$p(t) - f_I - f_{s_1} - f_{s_2} = 0$

$p(t) - m\ddot{u} - (f_{s_1} + f_{s_2}) = 0$

~~$(K_1 u) + m\ddot{u}$~~

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

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

As $K = 3759\,k/ft$

$4777.02\,\ddot{u} + 3.76 \times 10^6 u = p(t)$

where u and p(t) are in ft and lb.