Day: M T W T F S Date: __/__/__

Name: Muhammad Hamza

ID # 7692

Section: A

Subject: Introdution to structural dynamics & earthquake Engineering.

Department: BE(C)

Instructor: Engr. Yaseen

Name: Muhammad Hamza
ID # 7692

Day: M T W T F S   Date: __/__/__

Q.No (01).

Figure : 1.

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

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

The discontinuos shear wall is a fundamental design contradiction: the purpose of a shear wall is to collect diaphragm loads at each floor and transmit them

Name: Muhammad Hamza
ID # 7692

Day. M T W T F S   Date: __/__/__

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.

Name: Muhammad Hamza
ID # 7692

Day: M T W T F S Date: __/__/__

Q. No (01)

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 than those above. Also we can see in figue 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 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.

Name: Muhammad Hamza
ID# 7692

Day. M T W T F S Date: __/__/__

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

Name: Muhammad Hamza
ID # 7692

Day. M T W T F S   Date: __/__/__

Q. No (01)

Figure:- 3.

As we know ~~set~~ re-entrant coner is the common characteristics of building forms that, in plan, that will be L, T, H, etc any of these 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 forms: structurally to separate the building into simpler shapes, or to tie the building together more strongly with elements positioned to

Name: Muhammad Hamza
ID # 7692

Day: M T W T F S Date: __/__/__

to provide a more balanced resistance. Cs The later solution applies only to smaller buildings.

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

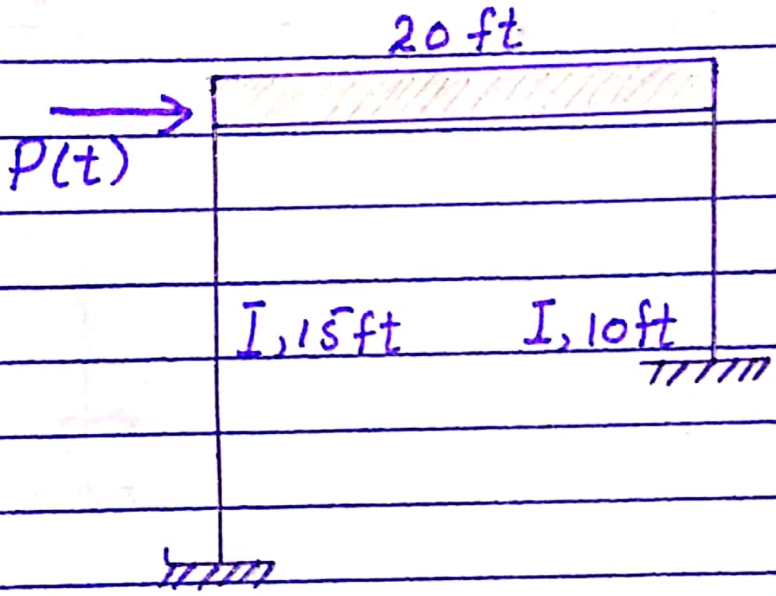
Name: Muhammad Hamza
ID # 7692

Day: M T W T F S Date:__/__/__

Q.No. (02)

Solution:-

ID # 7692.



As we know that

$$w = mg$$

So,

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

$$m = \frac{7692 \times 20}{32.2}$$

$$m = 4777.64 \text{ lb sec}^2/\text{ft}$$

Name : Muhammad Hamza
ID # 7692

Day. M T W T F S Date: __/__/__

As,

$E = 29,000$ ksi.

$I = 1200$ in^4.

$K_{eq} = K_1 + K_2$

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

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

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

$= 313.29$ K/in.

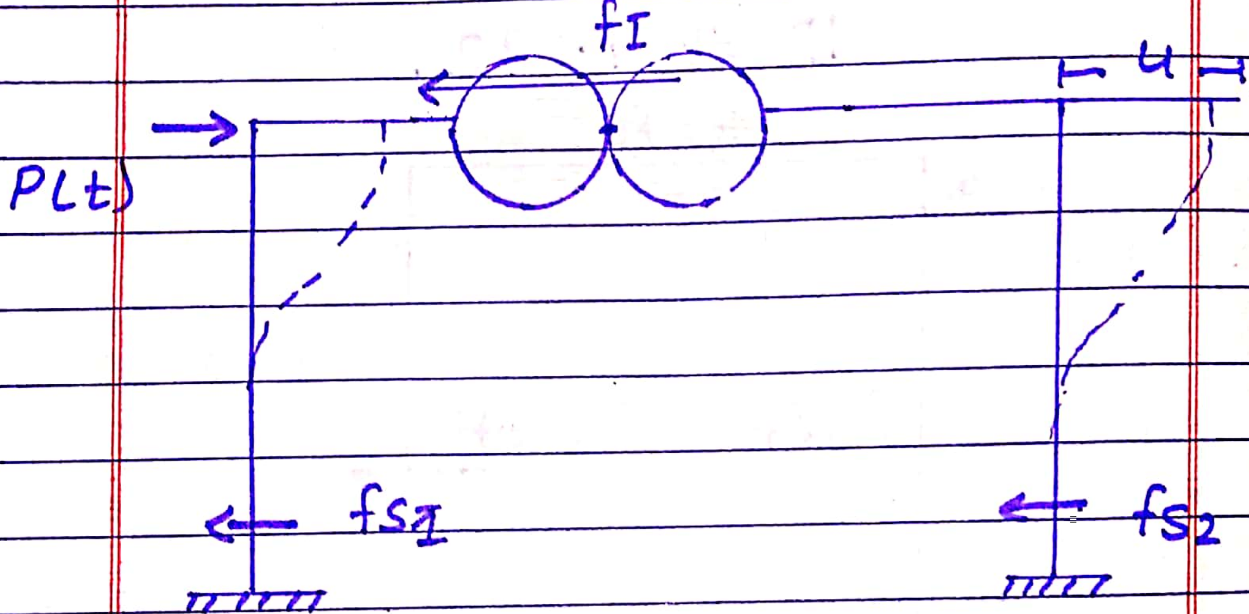
or

$K = 3759$ K/ft.

Name: Muhammad Hamza
ID # 7692

Day. M T W T F S Date: __/__/__

Using D-Alembert's principle of dynamic equilibrium's.



$P(t) - f_I - fs_1 - fs_2 = 0$

$P(t) - m\ddot{u} - (fs_1 + fs_2) = 0$

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

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

As we know, $K = 3759 \, K/ft$

$4777.64 \, \ddot{u} + 3.76 \times 10^6 u = P(t)$

where u and $P(t)$ are in ft and lb.