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Subject :: Intro to structure Dynamics & Earthquake eng

Section :: B

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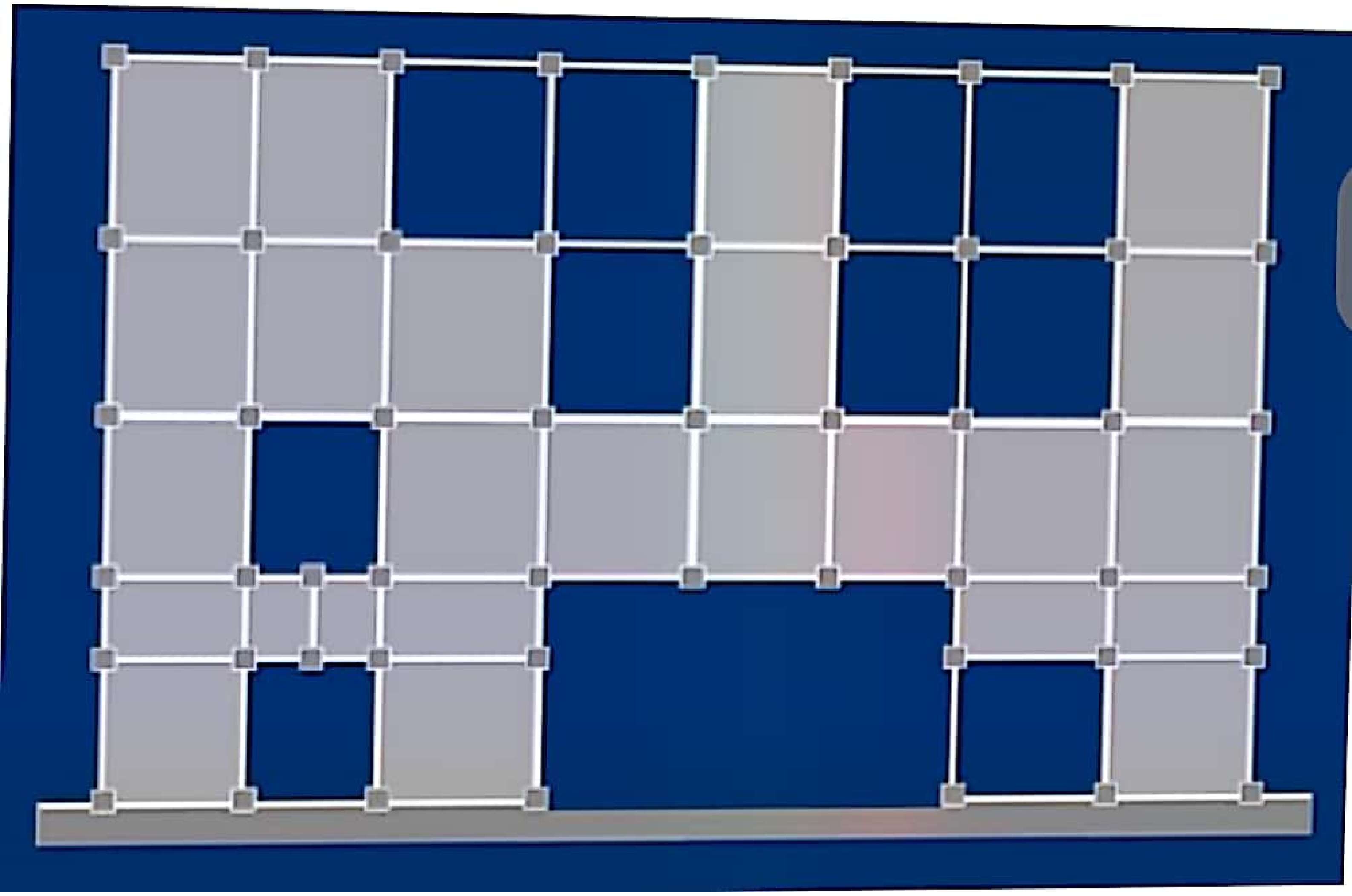
Figure 1



Q1
3

Ans As we Know that when shear wall form the main lateral resistant element of a resistant, element of a structure, and there is not a continous load path through the walls from roof to foundation, the result can be serious over stressing at the Points of discontinuity. The discontinous shear wall condition represents a special but common, case of ~~the~~ the

(2)

"Soft" first - story Problem.

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

The discontinious shear wall is a fundamental design contradication, 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 undersirable.

Possible Solution

For the problem in fig.1 the possible solution is to avoid discontinous shear wall or to ~~eliment~~ eliminate the shear walls.

If the dicision is made to use shear walls, then their presence must be recognized from the begining

③

of structure design and their size and location made the subject of careful architectural and engineering coordination early.

(4)

→ In the Problem is caused by severe strees concentration is that of the "seft" story. The term has commonly been applied to building whose ground level story is less stift than 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 soft or weak story at any height creates a discontinuity between the first and second floor tend to result in the most serious condition. we come to the conclusion that in fig.2 the problem is "self" story.

Possible solution

(8)

As it is "soft" story Problem, so we can Provide supports in the ground Floor By addition of column or by adding bracing or by adding external buttresses.

We can see some external buttresses are provided so thats good.

→ As we Know that re-extrant corner is the common characteristics of building borms that in plan that will be L, T, H etc any of three shapes

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

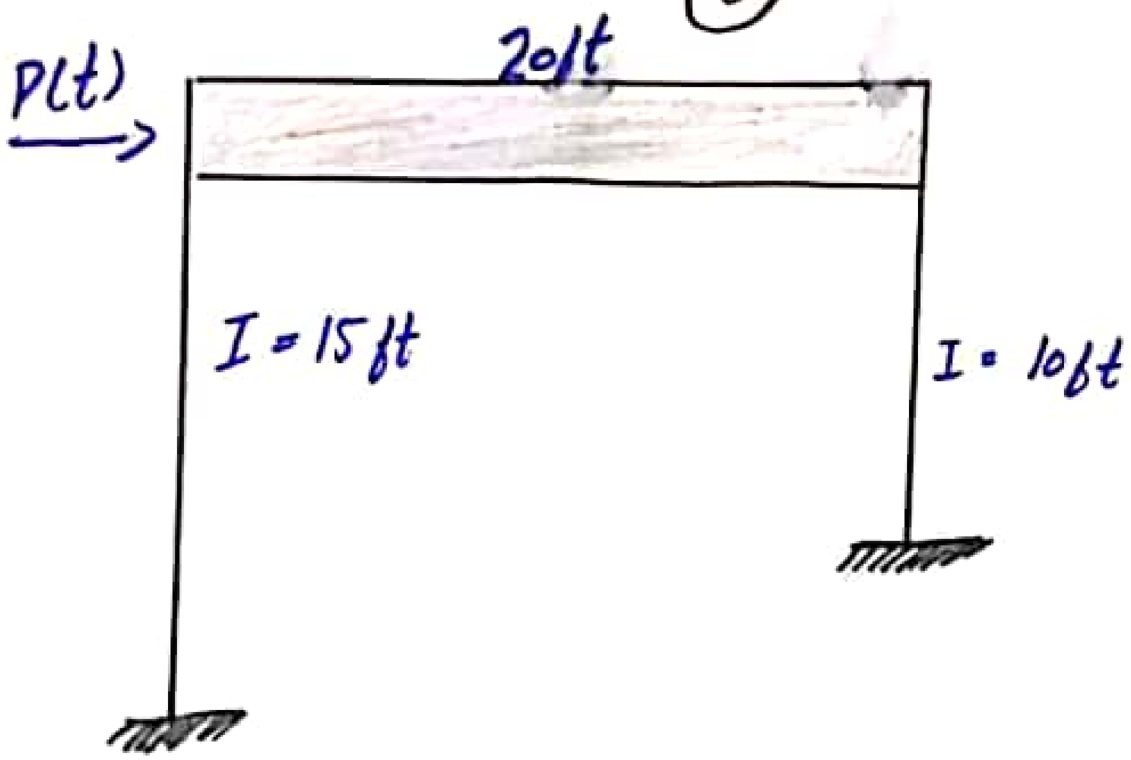
Possible solution

There are two alternative approaches to the problem of re-entrant corner form: structurally to separate the building into simple 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.

⑧



Given data

$E = 29{,}000$ Ksi

$I = 1200\ in^4$

* Uniformly Distributed Gravity load = 7768 lb/ft

Required Data

* Develop Equation of motion = P(t) = ?

Sol

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

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

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

$\Rightarrow K = 313.29\ K/in$

$\Rightarrow K = 3759\ K/ft$

& $m = W/g = \frac{7768 \times 20}{32.2\ ft/sec^2}$

$= 4824\ K \cdot Sec^2/ft$

$$\boxed{m = 4824\ lb \cdot Sec^2/ft^2}$$

Now Using D-Alembert's Principle of dynamic equilibrium.

$P(t) = Ku + m\ddot{u} \longrightarrow (1)$

As $K = 3759 = 3.759 \times 10^6\ lb/ft$

Putting value we get

$$\boxed{P(t) = 4824\ddot{u} + 3.759 \times 10^6}$$ Ans

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