Assignment / Quiz

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Subject : Intro To Structure Dynamics & Earthquake Engineering

Section : "B"

Exam : Mid paper

Program : BE(c)

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Q No :~ 1 :~

Ans:

* **Figure (1):-** its shows discontinuous shear wall.

→ If Seismic occur and there is not a continuous load path through which load transfer from roof of the structure to foundation and the result can be serious over stressing at point of discontinuous. due to above saturation structure can be damage and collapse at critical point of the structure.

=> Solution:-

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

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

⇒ Figure # 2 :-

→ Figure # 2 shows the soft and weak stories and less stiff at ground level and above the ground level heavy & more stiffer.

⇒ The most prominent of the problems caused by several stress concentration is that of soft story. The term has commonly been applied to building whose ground level story is less stiff than above.

→ The building code distinguishes b/w "soft" & "weak" stories. Soft stories are less stiff or more flexible than the above weak stories having less strength.

→ A soft or weak story at any height creates a problem but since the commulative load are greatest towards the base of the building a discontinuity b/w first & second floor tends to the result in most serious condition.

⇒ POSSIBLE SOLUTION:-

The solution of this type of problem in structure to add the following structural elements;

(I) Add more column. (II) Add bracing
(III) Add external buttresses.

2) Figure #3 :-

In figure #3 the problem shows re-entrant corners.

⇒ There are two problem created by these shapes.

→ First, first one is that they tend to produce differential motions between different wings of the building this is because of building stiffness elements that tends to be located in this region result in local stress concentration at the re-entrant corners.

→ Second, second problem of this shape is torsion which is caused because the centre of mass and centre of rigid in the form cannot geometrical concide for possible earth quake directions. The result is rotation. The resulting forces are very difficult to analyze and predicted.

⇒ Solution:-

There are three solution of this problem;

→ Structurally to the separate of building into simples.

⇒

→ The second solution to provide tie the building together more strongly with elements positions to provided a more balanced resistance.

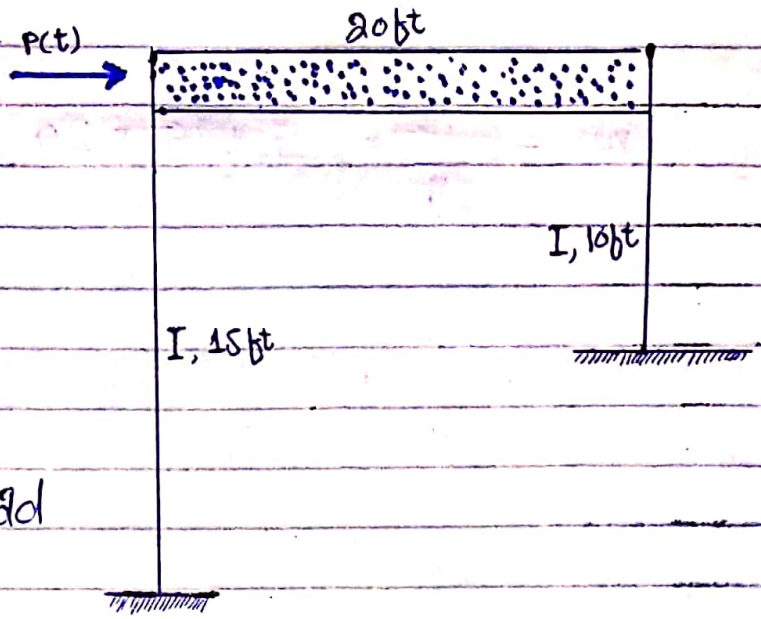
This solution is only applies to smaller building.

→ The use of splated rather than the right angle re-entrant corneos cessens the stress concentration.

→ This Analysis to the way tapered beam is structural more desirable than adruptly notched one.

QNO:-2:-

PROBLEM:



GIVEN DATA:-

$E = 29000\ ksi$

$I = 1200\ in^4$

uniformly distributed load $= 7695\ lb/ft$

REQUIRED DATA:-

Develope equation of motion = P(t) = ?

Solution:-

As we know;

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

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

Put the values

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

$$K = 313.29\ k/in \Rightarrow 3759\ k/ft$$

$\Rightarrow$

Now;

$$m = \frac{w}{g} = \frac{7.695 \times 20}{32.2\ ft/s^2}$$

$$m = 4.779\ k.\ sec^2/ft$$

$$\boxed{m = 4779\ lb.\ sec/ft}$$

Now using D. Alembert's principle of dynamic equillibrium;

$$P(t) = ku + m\ddot{u} \quad \text{—} \quad (1)$$

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

put the values;

$$\boxed{P(t) = 4779\ \ddot{u} + 3.759 \times 10^6}$$

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