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Sec * C

Subject * Intro to Structural Dynamics & Earthquake Engineering

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Q. 1

Fig (a)

When Shear Walls from the main lateral Resistant elements of a structure and from the roof to foundation, there is not a Continous load path through the Walls, and at the there will be Serious overstressing at the points of discontinuity. This ~~Ao~~ discontinuous shear wall condition represents a Special, but common, case of the "Soft" first-Story problem.

The discontinuous shear Wall is a fundamental design contradiction: The Purpose of a 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:-

The Solution to the problem of the discontinuous shear wall is to eliminate the shear walls.

If the decision is made to use shear walls, then their ~~Presence~~ Presence must be recognized from the beginning of Schematic design, and their size and loction made the Subject of careful architectural and engineering coordination early.

Q. 1
Fig (b)

The most prominent of the Problems 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 Story Stiff Than Those above.

→ The buildings 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, but since the cumulative loads are greatest towards the base of the building, a discontinuity between the first and second floor tends to result in the most serious condition.

Possible Solution:

Soft story effect can be usually reduced by adding new columns, braces and external buttresses in a structure. due to these addition the structure will be more stable. due to these addition soft story will be neglected soft story usually causes drift in a structure which is dangerous and will be controlled by addition of these column, bracing and external buttresses.

Q.No 1
Fig (c) (3)

There are two problems created by these shapes. The first is that they tend to produce differential motions between different wings of the building that, because of stiff elements that tend to be located in the region, result in local stress concentrations at the re-entrant corner.

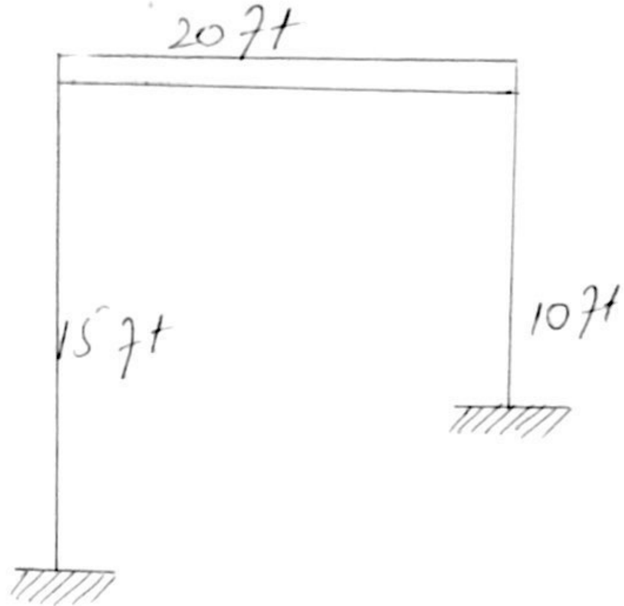
The second problem of this form is torsion. which is caused because the center of mass and the center of rigidity in this form cannot geometrically coincide for all possible earthquake directions. The result is rotation. The resulting forces are very difficult to analyze and Predict.

Possible Solutions:-

There are two basic alternative approaches to the problem of reentrant-corner forms: Structurally to Separat the building into Simpler Shapes, or tie the building together more Strongly with elements positioned to provide a more balanced resistance. The latter Solution applies only to smaller buildings.

In Case of Separation building must be sufficiently away to ensure they do not pound together and damage each other in an earthquake.

Q: 2 (1)



$F = 29000$ ksi

$I = 1200$ in^4

Load = 7763 lb/ft^2

Solution:

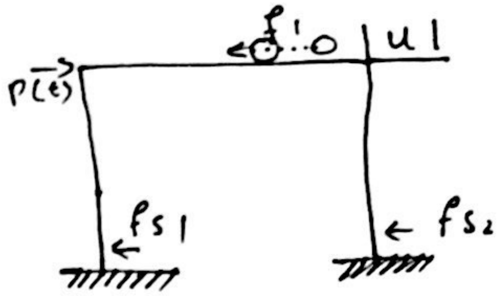
$$K_{eq} = K_1 + K_2$$

$$K = 12EI \left| \frac{1}{(15\times12)^2} + \frac{1}{(10\times12)^2} \right|$$

$K = 313.29$ k/in

$K = 3759$ k/ft

$\Rightarrow m = W/g$



$$m = \frac{7.763 \times 20}{32.2 \ ft/sec^2}$$

$m = 4.82 \ K \ sec^2/ft$

$m = 4820 \ lb \ sec^2/ft$

$P(t) = Kv + mu$

Put Values

$$\boxed{P(t) = 4820\ddot{u} + 3.759 \times 10^6}$$

So it is equation of Motion