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Sec A

ID 7764

Subject Intro to structural Dynamics & Earthquake Engineering.

Subbmitted to Engr. Yaseen

Q1 Figure 1:-

When shear walls from the main lateral resistant elements of a structure and there is not a continuous load path through the walls from roof to foundation, the result can be serious overstressing at the point of discontinuity. This discontinuous shear wall condition represents a special, but common case of the soft.

The discontinous shear wall is a fundamental design contradiction. the pupose 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 discontinous shear wall is to eliminate the shear walls.

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

Q 1 Figure 2.

→ 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 stiff than those above.

→ 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, but since the cumulative loads are gretest towards the base of the building, a discontinuity b/w the first and second floor tends or result in the most serious condition.

Possible Solution:-

We can prevent the story (Building) by adding column by adding Brases and by add external batrases. In this pic we can find som problems the below soft story is damaged thats why we add column add brasses etc.

Q1. Figure 3:-

The re-entrant corner is the corner is the common characteristic of building froms that, in plan, assume the shape of an L, T, H etc are a combination of these shapes.

→ 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 the tend to be located in this region, result in local stress concentration are the re-enterant 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.

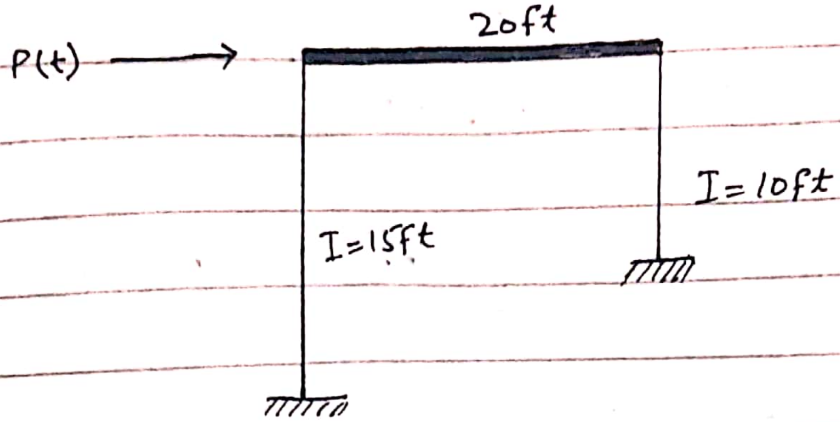
Possible solution:-

These are two basic alternative approches to the problem of re-entrant-cornor forms: strucurally to separate the building into simpler shape, 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 separation building must by sufficently away to ensure they do not pound together each other in an earthquake.

The use of splayed rather than right angle re-entrant corners lessens the stress concentrated.

This is analogos to the way a tapered beam is structurally more desirable than an abrusptly notched one.

Q2.



Given data:-

ID = 7764

Solution:-

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

$$m = \frac{7764\ lb/ft \times 20\ ft}{32.2\ ft/sec^2}$$

$$m = 4822.36\ lb\,sec^2/ft$$

Using D. Aembert's principle of dynamics equilibrium.

$$P(t) - f_1 - fs_1 - fs_2 = 0$$

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

$(k_1 u + k_2 u) + m\ddot{u} = P(t)$

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

As, $k = 3759$

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

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

$\Rightarrow 4822.36 + 3.76 \times 10^6 u = P(t)$

$$P(t) = 4826.12 \times 10^6 u.$$