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Subject :- Earthquake Engineering

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Q1):- Figure #01

=> When shear wall form the main lateral resistant element of a structure, and there is not a continuous load pth through the walls from roof to foundation, the 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.

The discontinuous shear wall is fundamental design contradiction: the purpose of shear wall is to collect diaphragm loads at each floor and transmit them as directly and efficiently as possible to the foundation. To interupt this load path is undesirable.

Possibule solution:-

=> The solution to the problem of the discontinuos shear wall is to eliminate the shear walls.

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

Q1):- Figure # 02

⇒ 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 commulative loads are greatest towards the base of the building, a discontinuity between the first and second floor tends to result the most serious condition.

Possible solution:

We can Prevent the story or soft story by adding columns, by adding bracing and external buttresses. Basically in this problem we facing a soft story effect due to which we Prevent this Problem by adding this.

Q1):- figure #03

=> 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 this region, result in local stress concenterations 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 the predict.

Possible solutions:-

⇒ There are two basic alternative approaches to the problem of reentrant-corner forms: structurally to separate the building into simpler shapes, or to tie the building together more strongly with elements positioned to provide a more balanced resistance.
In case of separation building must be sufficiently away to ensure that do not together and damage each other in a earthquake.

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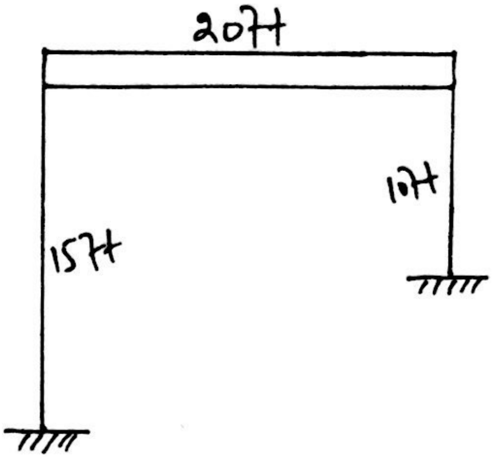
Q2:-



$E = 29000\,ksi$

$I = 1200\,in^4$

$Load = 7738\ lb/ft^2$

solution:- $K_{eq} = k_1 + k_2$

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

$K = 313.29\ k/in$

$K = 3759\ k/ft$

$\Rightarrow m = w/g$

$$m = \frac{7.738\times20}{32.2\ ft/sec^2}$$

$m = 4.80 \, k \, sec^2/ft$

$$m = 4800 \, k \, sec^2/ft$$

$m =$

$P(t) = ku + mu$

$$P(t) = 4800u + 3.759 \times 10^6$$