ID #7745

Q1) Describe the types of configurations depicted in figure 1, 2 and 3. How they can effect seismic performance of a structure and what are their possible solutions?

Ans:- *) FIGURE 1:-

when shear walls from the main lateral resistant element of a structure and there is not a continuous load path through the walls from roof of foundation the result can be serious over stressing at point of discontinuity. This discontinuous shear wall condition represent a special, but common, case of the soft first story problem.

*) The discontinuous shear wall is a fundamental design contradiction. the purpose of a shear wall is to collect diaphragm load at each floor and transmit them as directly and efficiently as possible to the foundation to interrupt this load path is undesireable.

*) Possible Solution:-

The solution to the problem of the discontinous shearwall is to eliminate shear walls.

*) If the dicision is made to use shear walls, then their presence must be recognized from the beginning of Schematic design and their size and location made the subject of carefull architectural and engineering co-ordination early.

Q1) -: FIGURE 2:-

The most prominent of the problem caused by severe stress concentration is that of the "soft" story. The term has commonly been applied to building whose ground-level story is less stiff than those above.

*) The building code distinguish between "soft" and "weak" stories. soft stories are less stiff or more flexible, then the story above. weak stories have less strength.

*) A soft or weak story of any height creates a problem but since the cumulative load are greatest towards the base of the building a discontinuity between the first and second floor tends to result in the most serious condition.

*) The most prominent of the problems caused by severe stress concentration is that of the "soft" story.

*) **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 problems by adding this.

Q1) FIGURE 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 element that trend to be located in this region, result in local stress concentrations at the re-entrant corner.

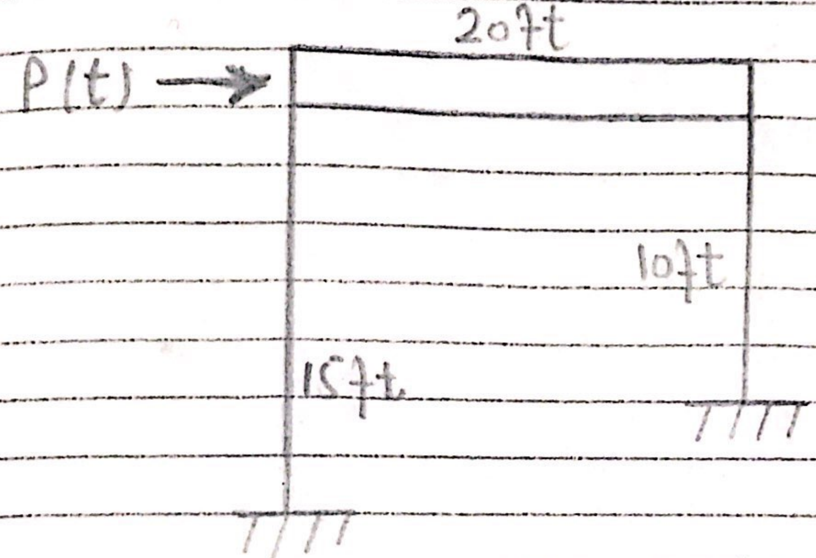
*) The Second problem of this form is torsion which is caused because the center of mass and the center of rigidity in this form cannot geometrically coincide for all possible earthquake directions. The result is rotation. The resulting force are very difficult to analyze and predict.

*) Problem Solution :-

There are two basic alternative approaches to the problem of re-entrant corner forms. Structurally to separate the building into simpler shapes, or to tie the building together more strongly with element positioned to provide a more balanced resistant. (The latter solutions applies only to smaller buildings. The use of splayed together rather than right angle re-entrant corners lessons the stress concentration. This is analogues to the way a tapered beam is structurally more desireable than an abruptly notched one.

Q2) Develop the equation of motion of the frame shown in fig 4 under the action of a lateral dynamic force P(t). consider a uniformly distributed gravity load of (registration number) lb/ft acting on the beam. Neglect damping effect.

Ans :-



$$m = \frac{w}{g} = \frac{7745 \times 20}{32.2}$$

$$m = 4810.55 \text{ lb sec}^2/\text{ft}.$$

+) :: Using D-Alembert's Principle of dynamic equilibrium

$$P(t) - F_I - F_{s_1} - F_{s_2} = 0$$
$$P(t) - m\ddot{u} - (F_{s_1} + F_{s_2}) = 0$$

$$(k_1 u + k_2 u) + m\ddot{u} = P(t)$$
$$(ku) + m\ddot{u} = P(t) \qquad \therefore \text{As } k = 37.57$$

$$4810.55 + 3.76 \times 10^6 u = Pt$$

where u and p(t) are in ft and lb.