IQRA NATIONAL UNIVERSITY
DEFINING POSSIBILITIES, CREATING OPPORTUNITIES

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Section	**A**
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Answer # 1 :

Figure # 1 :

- When shear walls form the main lateral resistance 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” first-story problem.

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

Possible Solutions :

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

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

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 crates 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 Solutions :

- There are some possible solutions for soft-story buildings if we want to avoid the soft-story effect than for this we must to add some columns to that story we can also add bracing and more that we can add external buttresses to the soft story building to improve the stiffness of the building.

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 elements that tend to be located to this region, result in local stress concentrations at the re-entrant corner.

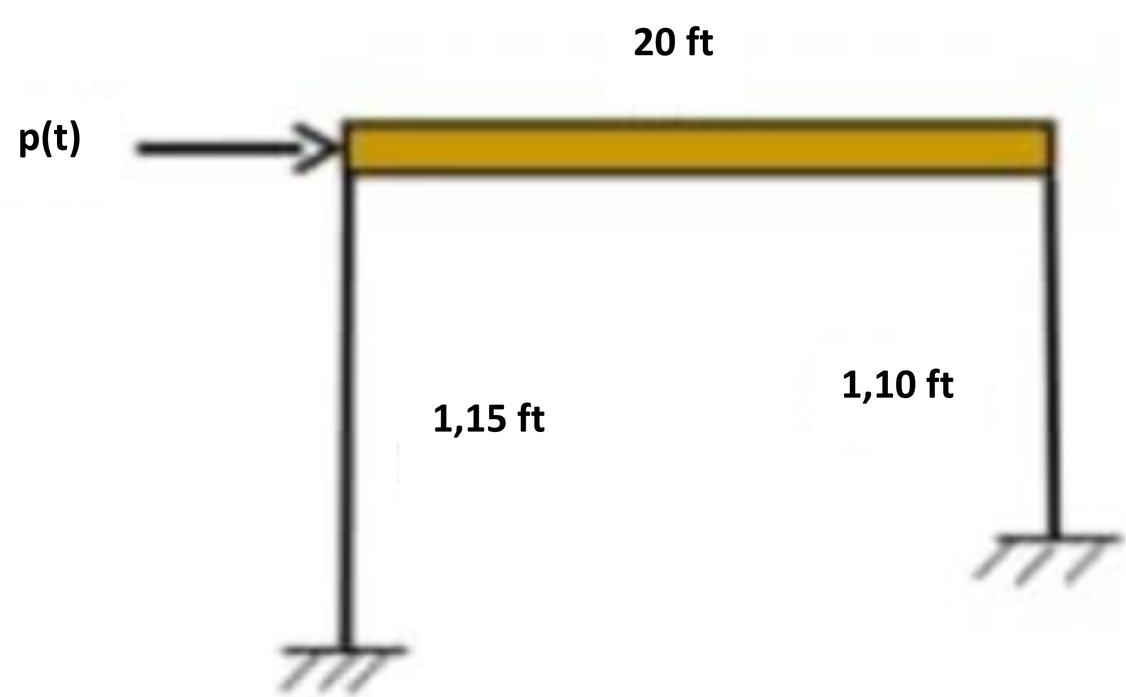
- The second problem of this form is torsion which is caused because the center of mass of the center of rigidity in this form cannot geometrically coincide for all possible earthquake directions. The resulting forces are very difficult to analyze and predict.

Possible solutions :

- 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 elements positioned to provide a more balanced resistance. The later solution applies only to smaller buildings.

Answer # 2 :

Diagram :



$m = (153.640 \text{ lb} / \text{ft}^2) / (32.2 \text{ ft} / \text{sec}^2)$

$m = 4{,}771.42 \text{ lb sec}^2 / \text{ft}$

Using D – Alembert's Principle of dynamic equilibrium

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

$p(t) - m\text{ii} - (fs_1 + fs_2) = 0$

$(K_1u + K_2u) + m\text{ii} = p(t)$

$(Ku) + m\text{ii} = p(t)$ $\quad\therefore$ **As, K = 3759**

$4{,}771.42\ \text{ii} + 3.76 \times 10^6\ u = p(t)$

Where u and (pt) are in ft and lb.