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Q1
① AM

The type of serious Configuration condition mentioned in figure is Soft story.

The building in which the stiffness of lower storey is less as compare to all the above storeys, this Phenomenon is called Soft and weak story

Effect∴

the most prominent of the problems caused by severe stress concentration is that of the soft storey.

the presence of wall in upper storeys make them much stiffer than the upper ground storey.

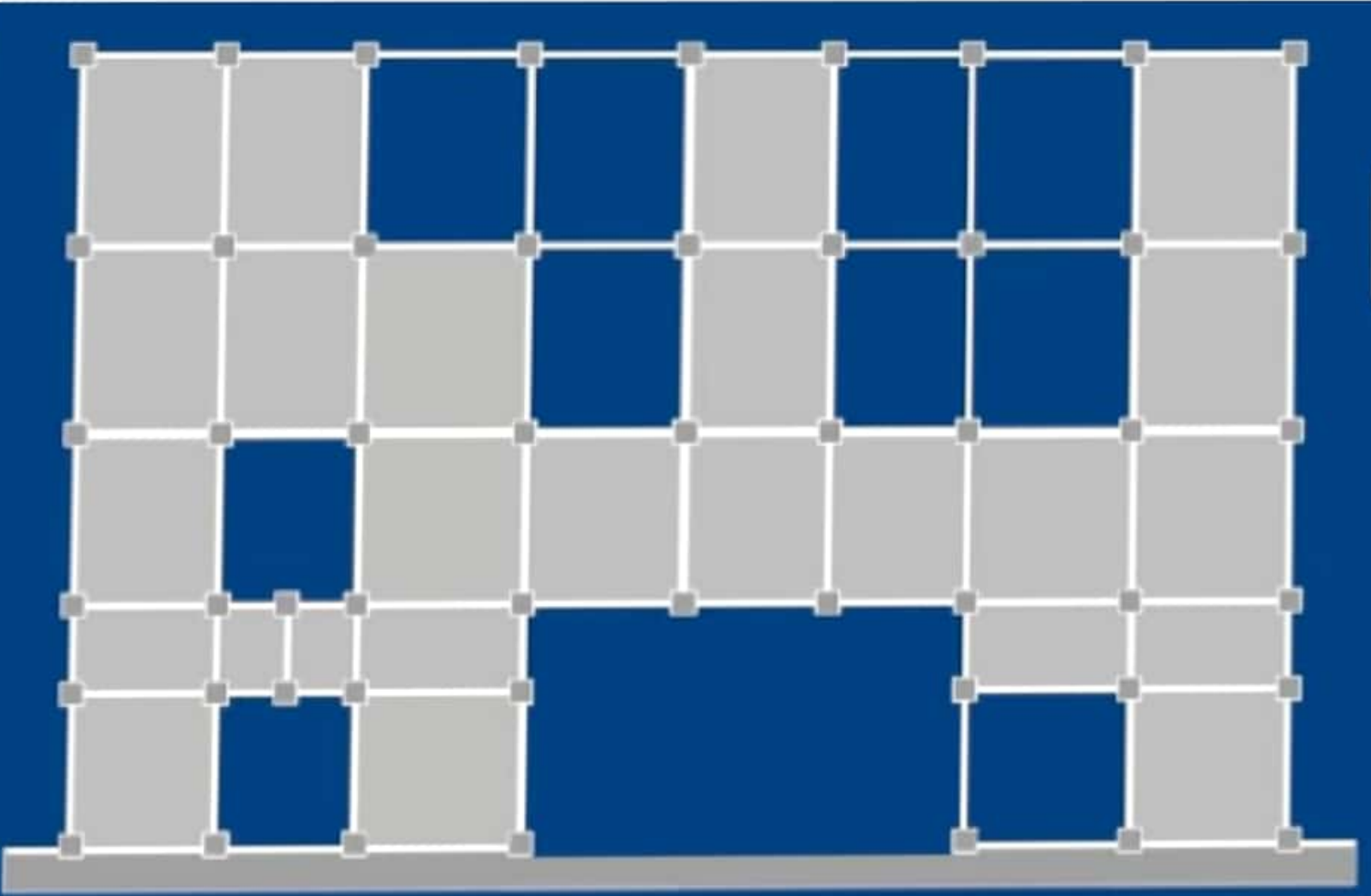
thus the upper storeys moves almost together

as a single block and most of the horizontal displacement ~~is~~ of the building occurs in soft ground storey itself.

Possible Solution:

- * Provide more columns in order to achieve the required strength and to increase the stiffness to overcome soft story configuration condition.
- * Add bracing to the soft storey of the building.
- * Add external buttresses.
- * By specifically designing the first storey for much larger loads and smaller induced displacement than the rest of the structure.

Figure 1



Q 1
Ans

3

The types of configuration condition in the figure is Discontinuous Shear walls.

The Purpose of the shear wall is to collect the diaphragm loads at each floor and transmit them as directly and efficiently to the foundation.

Effects:

* In absence of shear walls the lateral forces caused by earthquake create powerful torsion.

* When there is a discontinuity in shear walls it means that all the stories of a building do not contain shear wall so this indicates that there is no continuous load pattern from roof to foundation in absence of shear wall. The result can be serious at point of discontinuity during an earthquake.

Possible Solution ::

- * the solution to the problem of the discontinuous shear wall is ~~to~~ to eliminate the shear wall.
- * If the decision 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 careful architectural and engineering coordination early.
- * Reinforcing a frame by attaching or placing a rigid wall inside it maintains the shape of the frame and prevents rotation at the joints.



Q1
Ans

The types of configuration condition in the figure is Re-entrant corners.

The Re-entrant corner is a common ~~there characteristic~~ characteristic of building forms that in plan assume the shape of an L, T, H etc. or a combination of these shapes.

Effects:

- 1) Structure consisting of reentrant corners tend to produce differential motions between different using of the building that because of stiff elements that tend to be located in this regions result in local stress ~~concent~~ concentrations at re-entrant corner.
- 2) other effect of re-entrant corner is torsion. torsion is caused be caused the center

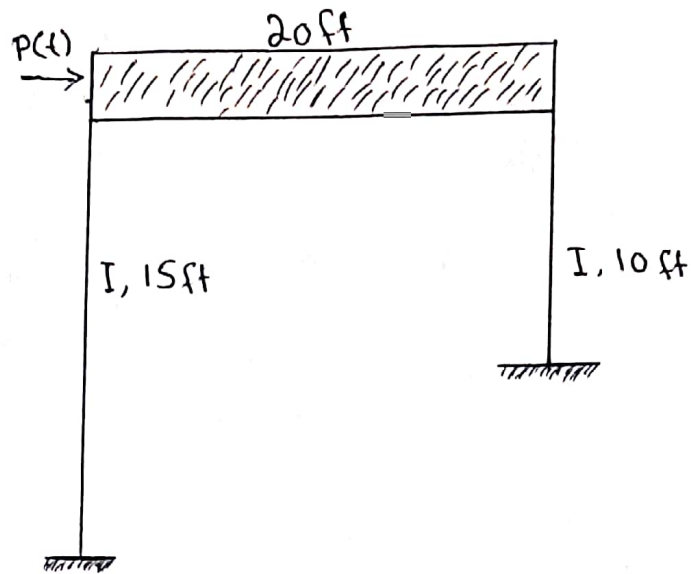
of mass and the center of rigidity in this form cannot geometrically earthquake directions the result is rotation. the resulting forces are very ~~diffi~~ difficult to analyze and predict.

Possible Solution

- * Structurally to separate the building into simpler shapes or to ~~the~~ tie the building together more strongly with elements positioned to provide a more balanced resistance.
- * the use of splayed rather than right angle reentrant corners lessens the stress concentration.

Q.No = 2

Problem ::



Given data

$$E = 29000 \text{ ksi}$$

$$I = 1200 \text{ in}^4$$

$$\text{Uniformly distributed load} = 7699 \text{ lb/ft}$$

Required data ::

Develop equation of motion = $P(t) = ?$

Solution ::

$$\text{As; } k_{eq} = k_1 + k_2$$

$$k = 12EI \left[\frac{1}{h_1^3} + \frac{1}{h_2^3} \right]$$

$$= 12 \times 29000 \times 1200 \times \left[\frac{1}{(15 \times 12)^3} + \frac{1}{(10 \times 12)^3} \right]$$

$$k = 313.29 \text{ k/in}$$

$$k = 3759 \text{ k/ft}$$

Now;

$$m = \frac{w}{g} = \frac{7.699 \times 20}{32.2 \text{ ft/sec}^2}$$

$$= 4.782 \text{ k} \cdot \text{sec}^2/\text{ft}$$

$$m = 4782 \text{ lb} \cdot \text{sec}^2/\text{ft}$$

Now using D. Alembert's principle of dynamic equilibrium

$$P(t) = ku + m\ddot{u} \quad \text{--- (1)}$$

$$\text{As } k = 3759 = 3.759 \times 10^6 \text{ lb/ft}$$

Putting value we get

~~$$P(t) = 4782 \ddot{u} + 3.759 \times 10^6 u$$~~

$$P(t) = 4782 \ddot{u} + 3.759 \times 10^6 u$$

where u and $P(t)$ are in ft and lb respectively.