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Section = "B"

Subject : Into to structure Dynamics and Earth quacke Engineering

Exam = Mid

Ans. In Fig 1 The type of serious configuration condition mention in Fig 1 is discontinous shear walls. the purpose of shear wall is to collected the diaphragm load to each floor and transmit them as directly and efficently to the foundation.

Effects:

In absence of shear wall the lateral force cause by earth quacke create powerful torsion.

→ when there is a discontinuity in shear wall it mean that all the stories of a building doesnot contain shear wall so this indicates that there is no continous load pattern from roof to foundation is absence from of shear wall the result can be serious at point of discontinity during an earthquake

Solution :-

The solution to the problem of 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 begining of schematic design and their size and location made the subject of careful architectural and engineering coordination early.

Reinforcing a fram by attaching or placing a rigid wall inside it maintains the ~~shape~~ shape of fram and prevents rotation at the joints.

In this fig 2

The type of serious configuration condition mention in fig is soft storey

The building in which the stifness of lower story is less as compare to all the above ~~storeys~~ storeys.

This phenomenos is called soft and weak storeys.

Effect:-

The most prominent of the problem cause by servers stress concentration is that of the soft storeys

The presence of walls in upper storeys make them mush stiffer then the upper ground storey. thus upper storeys move almost together as a single block and most of the horizontal displacement of the building occurs in soft ground storey itselfs.

Possible solutions:

=> provide colums in order to achive the required strength and increase the stiffness of over come soft storey configuration condition.

=) Add bracing to the soft storey of building.

=) Add external butresses

=) By specifically designing the first storey from much larger loads and smaller induce displacements then the rest of the structure.

In Fig 3

The type of configuration condition in the Fig is Re-entrant corners.

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

Effects:-

Structure consisting of re-entrant corners tend to produce different motion b/w different using of building that because of stiff element that tend to be located in this regions result in this region result in local stress concentration at re-entrant corners.

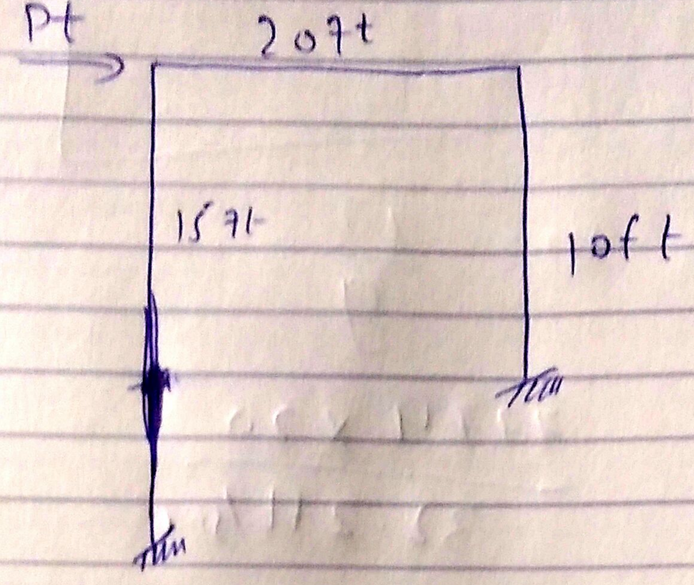
=) other effect of re-entrant corner is torsion Torsion is cause be caused the center of mass and the center of rigidity in this form cannot geometrically earth-quake directions the result is rotation the resulting force are very difficult to analyze and predict.

Possible solution:-

Structurally to separate the building into simpler shapes or to tie the building together more strongly with elements position to provide a more balance resistance.

The use of splayed rather than right angle re-entrant corner lessens the stress concentration.

Q2 solution



Given data

$E = 29{,}000\ ksi$

$I = 1200\ in^4$

Uniformly distribution gravity load = 7774

Required =

Develop Eq of motion = p(t) = ?

Sol

As $k_{ev} \left[\frac{1}{h_1^3} + \frac{1}{h_2^3} \right]$

$12 \times 29{,}000 \times 1200 \times \left[\frac{1}{(15 \times 12)^3} + \frac{1}{(10 \times 12)^3} \right]$

$k = 313.29\ k/in$

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

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

$$\frac{7774 \times 20}{32.2 \text{ ft/sec}}$$

$$m = 4828.5 \text{ lb.sec}^2/\text{ft}$$

Now using D-Alembert's principle of dynamic equilibrium

$$P(t) = ku + m\ddot{u} \rightarrow (1)$$

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

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

putting value

$$P_t = 3.759 \times 10^6 u + 4828.5 \ddot{u}$$

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