"Structure Dynamic and Earth Quick Engineering"

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Section = "C"

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1 Q:

Describe the type of the Configuration depicted in Figure 1, 2 and 3. How they can effect seismic performance of a structure and what are their possible Solutions.?

1 Ans:

Figure (1) Shows discontinous Shear walls.
if Seismic occur and there is not a Continous load path through which load transfer from roof to foundation and then result can be serious over stressing at point

of discontinous, due to above satituation structure can be demage and collapse at critical point of the structure.

Solution:

The Solution of the problem of the discontinoul Shear wall is to **eliminate** the Shear **wall.**

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 carefull Architural and Engineering cordination early.

Figure 2:

Figure 2 Shows the soft and weak stories and less stiff at ground level. And above the ground level heavy and more stiffer.

performance:-

the most prominent of the problems caused by several stress concentration is that of soft story. The term has commonly been applied to buildings whose ground level story is less stiff than those above.

The building code distinguished b/w "soft" and "weak" stories soft stories are less stiff or more flexible then the above weak stories have less strength.

A soft or weak story at any height creates a problem, but since the commulative load are gretest towards, The base of the buildings a discontinous b/w first and second floor tends to result in the most serious condition.

Possible solution:-

the solution of this type of

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problem in structure to add the following structural elements.

- ★ Add more columns.
- ★ Add bracing.
- ★ Add external buttresses.

Figure 3 :

in figure 3 the problem shows Re-entrant corners.

Problem :

There are two problem created by theses shapes.

- ★ The first one is that they tend to produce differential motions b/w different wings of the building that, because of stiff elements that tend to be located in this region result in local stress concentrated at the re-entrant corners.

- ★ The second problem of this from is Torsion of which is caused because the center of mass and the center of rigid in this form cannot geometrical concide for possible earth quake directions. The result is rotation the resulting forces are very diffucult to Anylaze and protect.

Solution:

There are three solutions of this problem.

* Structurally to the seperate the buildings into simpler.

* The 2nd solution to provide Tie ~~and~~ the building together more strongly with elements positions to provide a more balanced resistance.

* This solution is only applies only to smaller building.

* The use of splayed rather than the right angle re-entrant corners less ness

the stress Concentration.

★ This analogus to the way tapered (Beam, is the structural more desirable. than abruptly notched one

Q:2 Develop the equation of motion of the frame shown in figure "4" under the action of a lateral dynamic forces p(t). Consider a uniformly Distributed gravity load of ("registration number") lb/ft acting on the beam. Neglect damping effect.?

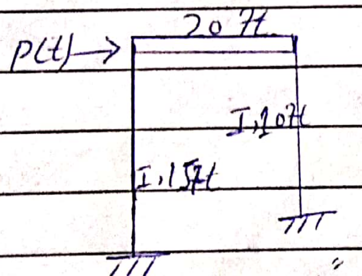
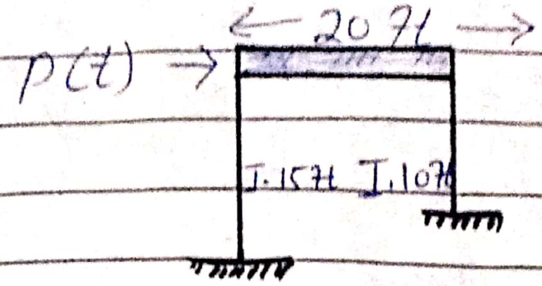


Fig (4)

Ans: "Equation of motion for a frame under lateral Dynamic force;

P.T.O.



As we know that;

$E = 29000$ ksi
$I = 1200$ in^4
$L = 7766$ lb/ft

Solution::

As; $K = K1 + K2$ —

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

$K = 313.29$ K/in

OR

$K = 3759$ K/ft

Mass::

As, $m = \frac{w}{g} = \frac{7.766 \times 20}{32.2 \text{ ft/sec}^2}$

$m = 4.823$ K.sec^2/ft

$m = 4823$ lb/sec/ft

Sly = w 7766 lb/ft

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using D-Alembert principle of dynamic equilibrium;

$$P(t) - f_I - f_{s1} - f_{s2} = 0$$

$$P(t) - m\ddot{u} - (f_{s1} - f_{s2}) = 0$$

$$(K_1 u + K_2 u) + m\ddot{u} = P(t)$$

$$Ku + m\ddot{u} = P(t)$$

As by puting values so,

$$P(t) = 4823u + 3759\ddot{u}$$

Where u and p(t) are in "ft" and "lb" respecitively.