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SECTION : B

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Subject : INTro To Structural Dynamics and Earthquake Engg

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Q NO 1 :

Figure Answer :-

Configuration Condition & Effect on seismic performance.

→ If seismic occur and there is not a continious Load path through which load transfer from roof to foundation safely.

→ Thus the result can be serious over stressing at point of discontinious.

→ Due to above situation structure can be damage and collapse at critical point of structure.

→ Solution :- The solution to be problem of discontinious shear wall is to eliminate the shear wall.

→ If the decision is made to use shaev wall then their pressence must be recognized from the beginning of schematic design and their size and location made the subject for carefull architecture and engineering coordination early.

Figure 2: show a soft story effect and stifness of top story is more as compare to first one.

→ Effect on seismic performance :- The first prominent of the problem caused by several stress concentration is that of soft storey. The term has commonly been applied by building whose ground level story is less stiff then above.

→ The building code distinguishes b/w soft and weak stories soft stories are less stiff or more flexible than the above The above weak stories have less strength.

→ A soft or weak storey at any height creates a problem - But since the comulative load are greater towards the base of building.

Solution :-

(1) Add more column.

(2) Add bracing.

(3) Add external buttres.

Figure 3

configuration condition :-

Re-entrant corners

Effect on seismic performance of structure.

→ There are two problem created by these shapes. The first is that they tend to produce differential motions between wings of the building that because of stiff elements that tend to be located is this region, result in local stress concentration at the re-entrant re-entrant corner.

→ The second problem of the form is torison which is caused because the center of mass and the centre of rigidity in this form cannot gemetrically coincide for all possible earth quake directions. The result is rotation. The resulting forces are very difficult to analyze and predict.

Solution :-

There are two basic alternate approches to the problem of re-entrant corner

form. 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 latter solution applies only to smaller buildings.

→ The use of splayed rather than right angle. This is analgous to the way a tapered beam is structurally more desirable than a absruptly notched one.

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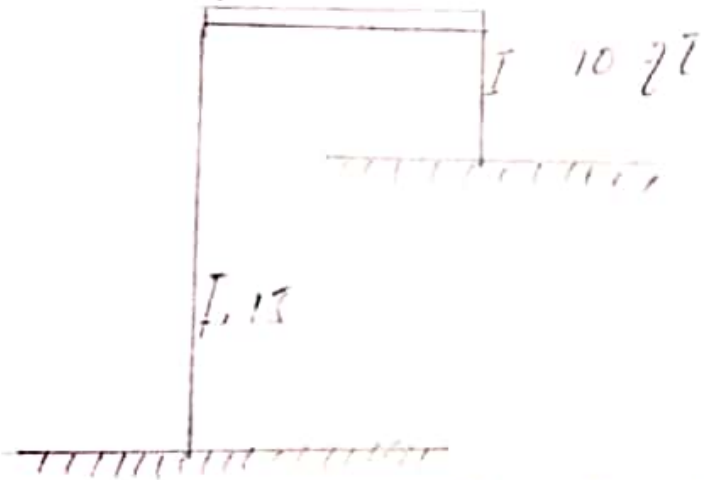
Q2:- Equation of motion for a frame under lateral Dynamic force.




solution:- $E = 29000$ ksi, $I = 1200$ in$^4$

load = 7718 lb/ft$^2$

$K = K_1 + K_2$

$K = 12EI \left[ \frac{1}{(15\times12)^3} + \frac{1}{(10\times12)^3} \right]$

$K = 813.29$ K/in

$K = 3959$ K/ft

$m = w/g$

put Value

$7.718 \times 20K / 32.2$ ft/sec$^2$

$m = 154.36/32.2 = 4.793$ K sec$^2$/ft

$m = 4793$ lb$^2$/ft

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

put Value

$P(t) = 47930 + 3.6 \times 10^6 u$