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SECTION: B

SUBJECT: Introduction to Structural Dynamics and Earthquake Engineering

SUBMITTED TO: Engr. Yaseen

DEPT.: B.S Civil

SEMESTER: 8

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Q1

Ans: Figure:

Configuration Condition

⇒ Discontinuous Shear walls

Effect on Seismic Performance

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

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

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

⇒ Solution: The solution to the problem of discontinuous shear wall is to eliminate the shear wall.

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-> If the decision is made to use shear wall then their pressure must be recogzined from the begining of schematic design and their size and location made the subject of careful architecturus and engineering coordination early.

=> Figure : 2
Shows a soft storey effect and stiffness of top storey is more as compare to first one.

=> Effect on Seismic Performance
The most prominent of the problems caused by several stress concentration is that of soft storey. The term has commonly been applied to building where ground level storey is less stiff than above.
The building code distinguishes between "soft" and "weak" stories soft stories are less stiff or more flexible than the above weak stories have less strength.

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

⇒ Solution

(i) Add more column

(ii) Add bracing

(iii) Add external buttress

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→ Figure: 3

Configuration Condition

→ Re-entrant Corners

Effect on seismic performance of a structure

→ There are two problems 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 in this region, result in local stress concentration at the re-entrant corner.

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

→ Solution: There are two basic alternative approaches 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 angl re-entrant corners lessens the stress concentration. This is analogous to the way a tapered beam is structurally more ~~de~~ desirable than a abruptly notched one.

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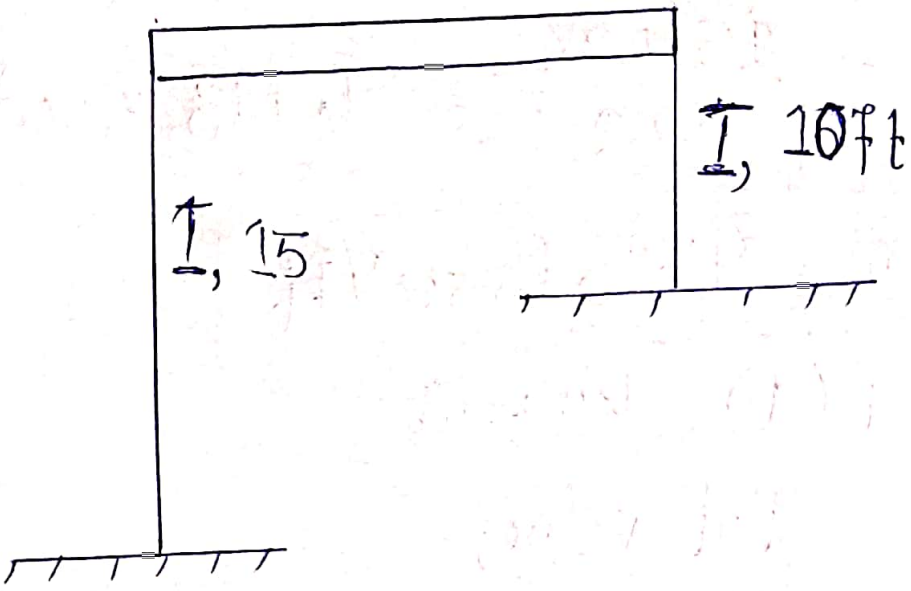
Q2

Sol: Equation of Motion for a frame under Lateral Dynamic Force



Sol: $E = 29000\ ksi$, $I = 1200\ in^4$

Load: $7718\ lb/ft^2$

$K = K_1 + K_2$

$K = 12EI\left|\frac{1}{(15\times12)^2} + \frac{1}{(10\times12)^2}\right|$

$K = 313.29\ k/in$

$K = 3759\ k/ft$

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

$$= \frac{7.718 \times 20\,k}{32.2\ ft/sec^2}$$

$$m = \frac{154.36}{32.2} = 4.793\ k\ sec^2/ft$$

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

$$P(t) = ku + m\ddot{u}$$ → put values

$$P(t) = 4793\ddot{u} + 3.76 \times 10^6 u$$

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