Name : M. Asif

ID # : 7734

Section : B

Paper : Intro to structural dynamics & Earthquake.

Instructor : Engr. Yaseen Mahmood

Department : Civil Engineering

Date : 17 April 2020

Q No 1. Describe the type of configuration depicted in figure 1, 2, 3 How they can be effect seismic performance of a structure and what their possible solution.

Ans:- Figure (1) shows discontinous shear walls.

→ If seismic occour and there is not a continous load path through which load transfer from roof to foundation and the result can be serious over stressing at point of discontinous. due to above @ structure can be damage and collapse at critical point of the structure.

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

→ If the decision is made to use shear wall then then presence must be recognized from the beginning schematic design and their size and location made the subject

of careful architectural and engineering coordination early.

Figure 2 :-

Figure 2 shows the soft and weak ~~stories~~ stories and less stiff at ground level.

Performance :-

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

→ The building code distinguishes b/w "soft and "weak" stories. soft stories are less 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 comulative load are greatest towards the base of the building a discontinuity b/w first and second floor

tends to result in the most serious condition.

Possible Solution:-

The solution of this type of problem in structure to add the following structural elements.

1. Add more columns
2. Add bracing
3. add external buttresses.

Figure. 3.

In figure No. 3 the problem shows Re-entrant corners.

Problem:-

There are two problem created by these shaps.

→ The first one that is they tend to produce differential motions between different 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 corners.

→ 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 coincide for possible earthquake directions. The result is rotation the resulting forces are very defficult to analyze and predictret.

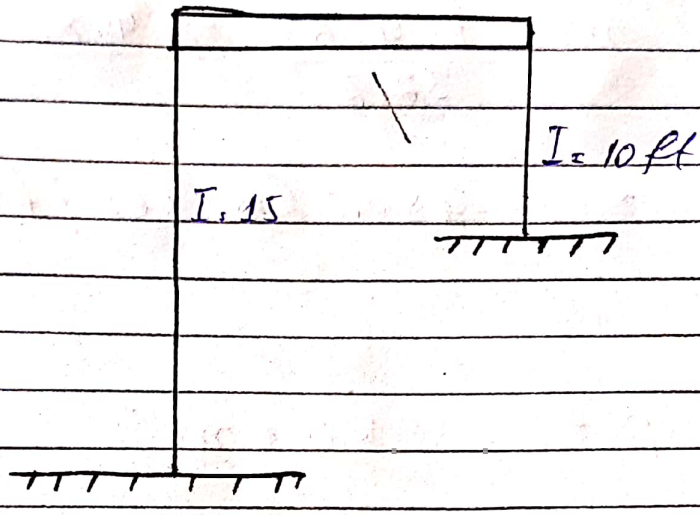
Solution :-

There are three solutions of this problem.

→ structurally to separate the building shapes.

→ The 2nd solution to provide Tie the building together more strongly with elements positioned to provide a more balanced resistance. This solution is only applies on this type of problems.

Q NO 2. Equation of Motion for a frame under Lateral Dynamic force.



Sol :-

$E = 29000\ Ksi$,

$I = 1200\ in^4$

Load $= 7734\ lb/ft^2$

$K = K_1 + K_2$

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

$K = 313.29\ K/in$

$$\boxed{K = 3759\ K/ft}$$

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

$$= \frac{7.734 \times 20}{32.2 \text{ ft/sec}^2}$$

$$m = \frac{154.68}{32.2} \Rightarrow 4.80 \text{ K sec}^2/\text{ft}$$

$$m = 4800 \text{ lb sec}^2/\text{ft}$$

$$p(t) = k u + m \ddot{u}$$

$$p(t) = 4800 \ddot{u} + 3.76 \times 10^6 u$$