IQRA NATIONAL UNIVERSITY

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Section : A

Quiz : Intro to Structural Dynamic and Earth Quake ENG

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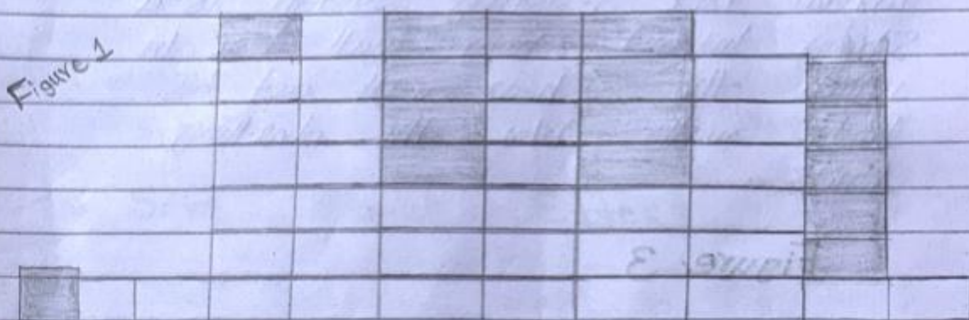
Q No. 1

Ans :- Figure 1.



Avoid Discontinous Shear Walls.

→ when shear walls from the main lateral resistant element of a structure and there is not a Continous load Path through the walls from roof to foundation. the result can be Serious overstressing at a Point of discontinuity. the discontinouity Shear wall Condition represent a Special, but Common, case of the Soft first Story Problem.

→ The discontinous Shear wall is a fundamental design Contridiction. the Purpose of a Shear Wall is to Collect diaphrgm loads at each floor and transimitt them as directly and efficiently as Possible to the foundation. To Interrupt this load Path undersirable.

Solution:

→ The Solution to the Problem of the discontinous Shear wall is to eliminate the Shear walls.

→ If the decision is made to use shear walls, than their Presence must be recongnized from the beginning of Schematic design and their Size and location made the Subject of Carefull architectural and engineering Coordination early.

Figure 2.

Soft and Weak Stories

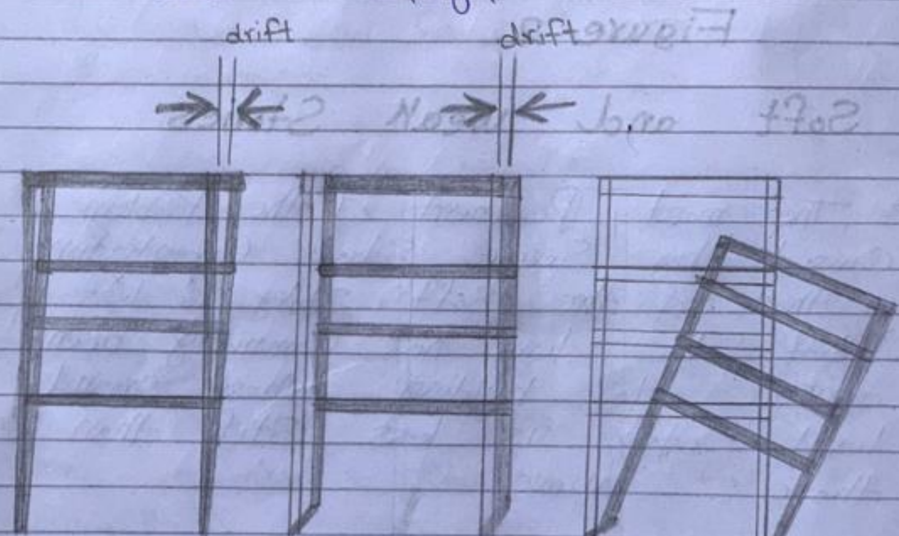
→ The most Prominent of the Problem Caused by Severe Stress Concentration is that of the "Soft" story is less Stiff. the term has Commonly been applied to building whose ground level Story is less Stiff than those above.

→ The building code distinguishes b/w "Soft" and "Weak" Stories. Soft Stories are less Stiff or more flexible, than the Story above weak Stories have less Strength.

→ A Soft or weak Story at any height creates a Problem but Since the Cumulative loads are greatest toward the base of the building, a discontinuity b/w the first & Second floor tends to result in the most serries Condition.

Soft Storey Effect

→ The most Prominent of the Problem caused by Severe Stress Concentration is that of the "Soft" Story.



A Normel B Soft Story C Collapse

Solution :-

This apartment house appears to have a soft first story. but the lateral force resisting system is a strong internal shear wall box, In which the shear wall act as party walls b/w the dwelling units.

Figure 3

The re-entrant corner is the common characteristics of building forms that In-plan, assume the shape of an L, T, H etc or a combination of these shapes

→ There are two problem created by these shapes. the first is that they tend to produce differential motion b/w different wings of the building that, because of stiff element that tend to be located in this region, result in local stress concentration at the re-entrant corner.

→ 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 coincided for all

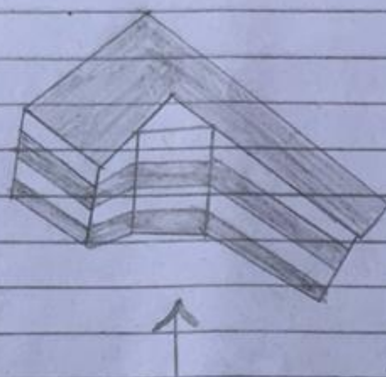
Possible earthquake directions. the result is rotation. the resulting forces are Vary difficult to analyze and Pridict.

Solution :-

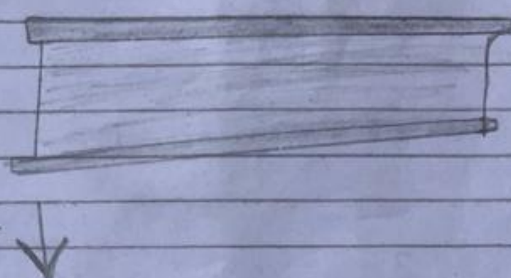
There are two basic alternative approches to the problem of re-entrant-corner forms; Structurally to Separate the building into Simpler shapes or to the building together more Strongly with elements Positioned to Provide a more balanced resistance. the letter Solution applies only to Smaller buildings.

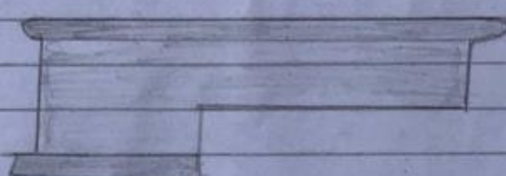
In case of Separation building must be Sufficently away to ensure they do not Pound together and damage each other in an earthquake.

The use of splayed rather than right angle re-entrant Corners lessens the Stress Concentration.



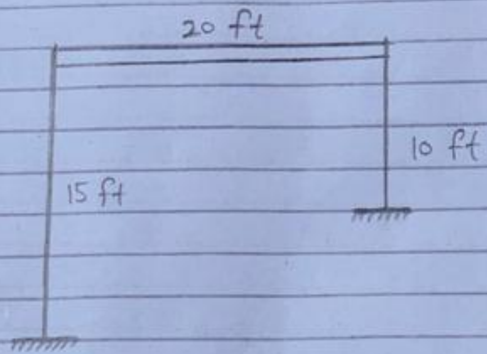
Splayed re-entrant Corners





This is analogous to the way a trapped beam Is Structurally more desirable then an abruptly notched one.

Q2



Given Data :-

$E = 29000$ Ksi
$I = 1200$ In^4
load $= 7737$ lb/ft^2

Solution :-

As there are In Pallel Series
So their Stiffness must be

$K_{eq} = K_1 + K_2$
we know that

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

$K = 313.29$ K/In

$K = 3759$ K/ft

$m = w/g$

$m = \frac{7.737 \times 20}{32.2 \ ft/sec^2}$

$m = 4.805 \ K \ Sec^2/ft$

$m = 4805 \ lb \ Sec^2/ft$

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

Now Putting Values

$$\boxed{P(t) = 4805\ddot{u} + 3.759 \times 10^6}$$

So it is equation of motion.