Assignment/Quiz 1

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SUBJECT	:	Earthquake
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Question No: 01 Answer:

Figure-1:

Figure 1 shows discontinous shear wall. If seismic occur and there is not a continous load path through which load transfer from roof of the structure 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 their presence must be recoginzed from the beggining of schematic design and their size and location made the subject of carefull architectural & engineering coordination only.

Figure-2:

It shows the soft and weak stories and less stiff at ground level and above the ground level heavy and more stiffer.

The most prominent of the problem 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 above.

The building codes distinguishes between soft and weak stories. Soft stories are less stiff or more flexible than the above weak stories having less strength.

A soft or weak story at any height creates a problem but since the cummulative load are greatest towards the base of the building a

Second problem of this shape is torsion which is caused because the center of mass and center of rigid in the form cannot geometrical concide for possible earthquake directions. The result is rotation. The resulting forces are very difficult to analyzed and predicted

Solution:

There are three solution of this problem.

Structurally to the separate of building into simplex.

The second solation to provide the building together more strongly with elements position to provided a more balanced resistance.

This solution is only applies to smaller building.

The use of splated rather than the right angle re-entraint corners. cessons the stress concentration.

This analysis to the way tapered beam is structural more desrible than adruptly noteed one.

discontinuity between first and second floor tends to the result in most serious condition.

Solution:

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

- ~~Add~~ Add more column
- Add bracing
- Add external butresses

Figure 3:

In figure 3 the problem shows re-entrant corners. There are two problem created by these shapes.

- First one is that they tend to produce differentional motions between different wings of the building, this is because of building stiffness elements that tends to be located in this region result in local stress concentration at the re-entrant corners.

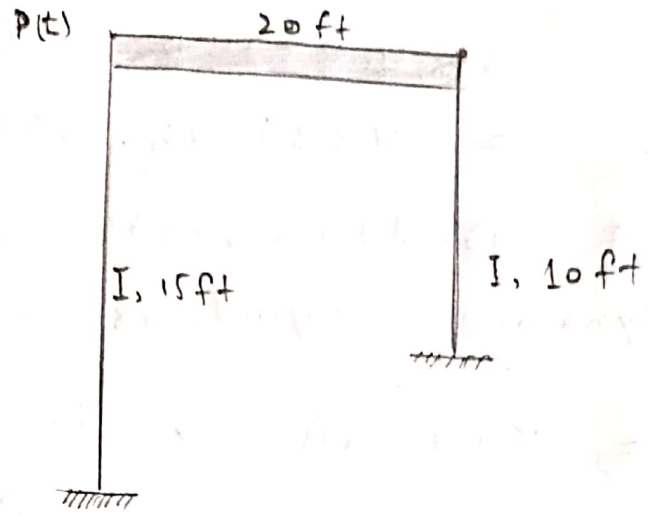
Second problem of this shape is torsion which is caused because the center of mass and center of rigid in the form cannot geometrical concide for possible earthquake directions. The result is rotation. The resulting forces are very difficult to analyzed and predicted

Solution:

There are three solution of this problem.

- Structurally to the separate of building into simples.
- The second solution to provide the building together more strongly with elements position to provided a more balanced resistance. This solution is only applies to smaller building.
- The use of splated rather than the right angle re-entraint corners. cessons the stress concentration.
- This analysis to the way tapered beam is structural more desrible than adruptly noteed one.

Question No: 02 Answer



Given data:

$E = 29000$ Ksi

$I = 1200$ in^4

Uniformly distributed gravity load = 7779 lb/ft

Required:

Develop equation of motion = P(t) = ?

Solution:

As; $K_{eq} = K_1 + K_2$

$$\Rightarrow K = 12EI\left[\frac{1}{h_1^3} + \frac{1}{h_2^3}\right]$$

$$= 12 \times 29000 \times 1200\left[\frac{1}{(15\times12)^3} + \frac{1}{(10\times12)^3}\right]$$

$K = 313.29$ K/in

$\Rightarrow K = 3759$ K/ft

Now

$$m = \frac{w}{g} = \frac{7.779 \times 20}{32.2 \text{ ft/sec}^2}$$

$$= 4.832 \text{ k.sec}^2/\text{ft}$$

$$= 4831 \text{ lb.sec}^2/\text{ft}$$

Now using D-Alembert's principle of dynamic equilibrium

$$P(t) = k\ddot{u} + m\ddot{u} \longrightarrow (i)$$

As $k = 3759 = 3.759 \times 10^6$ lb/ft

Putting values we get

$$P(t) = 4831\ddot{u} + 3.759 \times 10^6$$

so it is the equation of motion.