- **Black cotton soil** is unsuitable for foundations because of its property to undergo a volumetric change due to variation of moisture content. Black cotton soil has less bonding between soil particles, due to this black cotton soil is more susceptible to swelling and shrinkage.

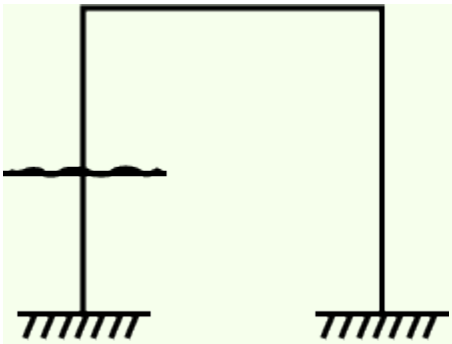
Number of unknown internal forces in each member of a rigid jointed plane frame is

A. 1

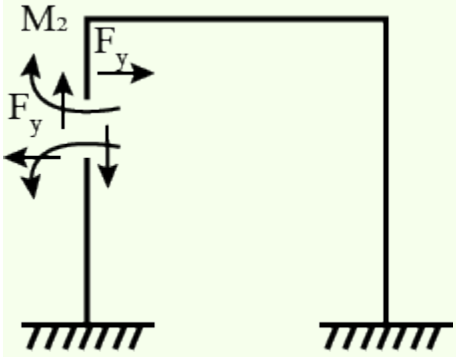
B. 2

C. 3

D. 6



Rigid jointed plane frame



i.e., 3 reactions in each members = 3 (i.e Mz, Fx, Fy)

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Difference Between Strip Footing And Strap Footing:

we will discuss the difference between strip footing and strap footing.

What Is Strip Footing:

Strip footing is a component of shallow foundation which distributes the weight of a load-bearing wall across the area of the ground. It is also known as wall footing.

Strip footing is commonly used as foundations of load-bearing walls where the soil is of good bearing capacity. The footing usually has twice the width as the load-bearing wall, sometimes it is even wider. The width, as well as the type of reinforcement, are depending on the bearing capacity of the foundation soil.

Advantages Of Strip Footing:

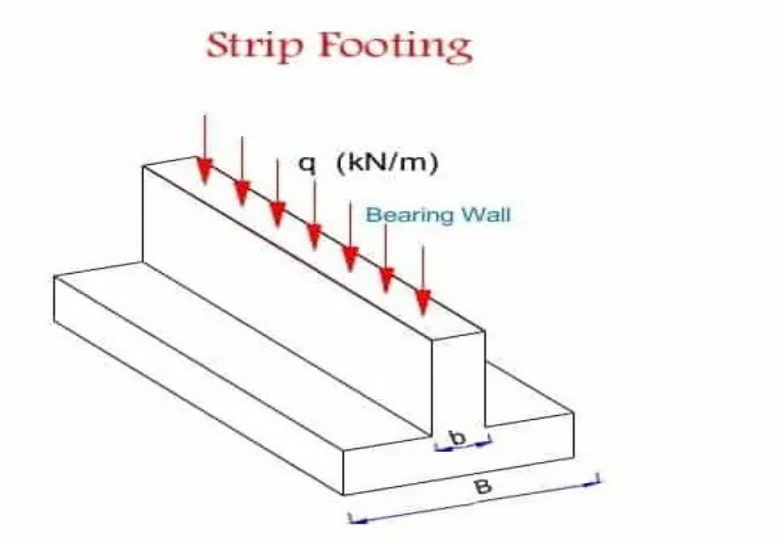
Simplicity of design, the possibility to build the foundation without expensive tools as well as its long-term operation.

Disadvantages Of Strip Footing:

Comparatively low durability, high cost in the final stages of construction (you must perform additional manual work, such as filling soil between the strips and its leveling, building floor etc), inability to make monolithic binding of the floor to the basement.

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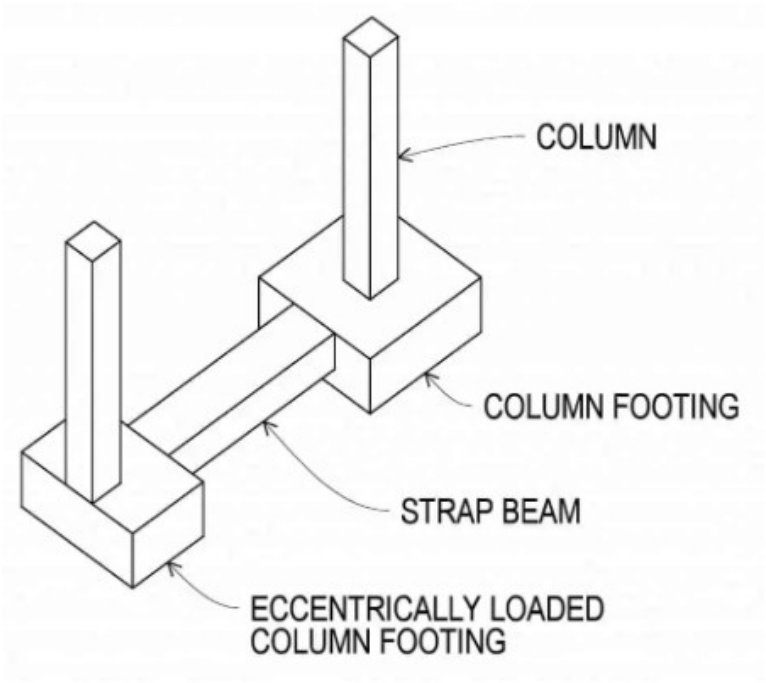


What Is Strap Footing?

A strap footing is necessitated when a certain column footing has to be restricted in width due to unavoidable interference or boundary limitation. It is a type of combined footing and also known as cantilever footing.

In such footing, the outer and inner column is connected by a strap beam, does not transfer any load to the soil. The individual footing areas of the columns are so arranged that the C.G of the combined loads of the two columns passes through the C.G of the two footing areas. Once this criterion is achieved, the pressure distribution below each individual footing will be uniform.

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Degree of static indeterminacy of a rigid-jointed plane frame having 15 members, 3 reaction components and 14 joints is

A. 2
B. 3
C. 6
D. 8

$Degree\ of\ static\ indeterminacy: (3m+r)-(3j+c)$

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$if\,(3m+r)<(3j+c), unstable$

$if\,(3m+r)=(3j+c), stable/unstable, statically\,determinate\,if\,stable$

$if\,(3m+r)>(3j+c), stable/unstable, statically\,indeterminate$

- ✓ M=15
- ✓ R=3
- ✓ J=14

we know that, Degree of static indeterminacy for plane frames

$$Ds=(3m+R)-(3j+C)$$

but here is no internal hinge so C = 0

$$Ds=(3x15+3)-(3x14)$$

$$Ds=6$$

Question 16. Assumption involved in Theory of Pure bending

- ✓ Material should be isotropic, homogeneous and should follow the hook's law.
- ✓ After bending all the longitudinal planes will bend about a common center of curvature.
- ✓ The Magnitude of radius of curvature is very large compared to cross sectional dimensions.
- ✓ The Young’s Modulus assumed to be same in tension as well as compression
- ✓ If a plane section before bending remains plane after bending, then the bending strain variation will be linear (strain is proportional to the distance from the neutral axis) with zero at the neutral axis and maximum at the top and bottom fibers.

Question 17. Refer EBcs EN 2015 1-1 Design Of Concrete Structure 1-1 Page 162

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Long column

- ✓ Long columns are not as strong as short columns; as a result, they are not preferable.
- ✓ Due to buckling, long columns generally get buckled.
- ✓ The slenderness ratio of long columns should be greater than 50.
- ✓ With the increased height of the columns, the load-carrying capacity also decreased.
- ✓ The load-bearing capacity of long columns is less.

Short column

- ✓ Short columns are the first choice of the constructor as they are stronger than long columns.
- ✓ Short columns quickly fail due to crushing.
- ✓ The slenderness ratio of short columns should be less than 50.
- ✓ With the decreased height of the columns, the load-carrying capacity also increased.
- ✓ The load-bearing capacity of short columns is more

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28. plastic limit

The water content at which soil sample changes from semi-solid to plastic state is called **plastic limit** and it is also defined as the water content at which soil would just begin to crumble when rolled into a thread of approximately 3 mm in diameter.

29. Liquid limit

Explanation: Liquid limit (WL): It is defined as the minimum water content at which the soil is still in the liquid state, but has a small shearing strength against flowing, which can be measured by available means.

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