

# How to calculate steel quantity from drawing for Beam?

Hello, guys here we will learn how to calculate steel quantity in the beam which is given in the drawing.

Suppose we are given the length of beam 10' (Feet) and Depth of beam 18" (Inches). The arrangement of steel bars in the beam is given below.

Let the hook be  $9D$ . Where  $D$  is the diameter of the steel bars.

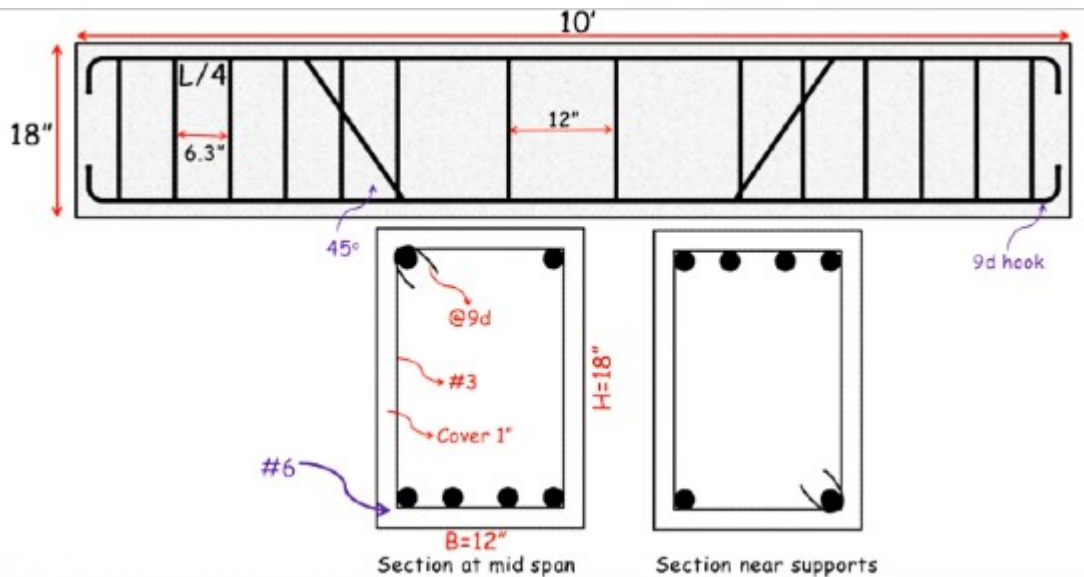
Spacing between the stirrups be 6.3" at the corners and 12" at the middles.

Clear Cover be 1".

Bent up bars are making angle of 45 degree with horizontal.

Hence, this is the drawing at the site. It is given by the designer, not by the surveyor. Surveyors have to calculate the quantity of steel from the given drawing below.

Now, let us move ahead and see "how to calculate steel quantity from drawing" for beam step by step.



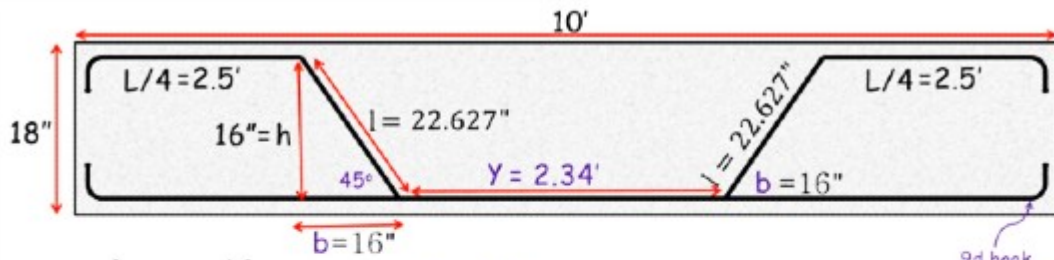
## Step-1 Calculate Quantity for Straight Steel Bars

Steel quantity in given beam ?

Steel for straight main bars:  
 Total cut Length of bars:  
 $= [10' - 2(\text{c.c}) + 2(\text{hooks})] \times \text{Number of bars}$   
 $= [10' - 2(1'') + 2(9(6/8''))] \times 4$   
 $= 43.83 \text{ ft.}$

Steel for bent up bars:

## Step-2 Calculate Quantity for Bent Up Steel Bars



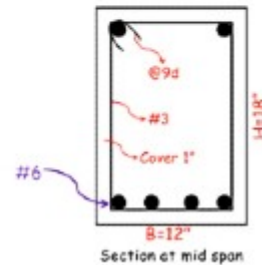
$$l = \frac{h}{\sin 45} = \frac{16}{\sin 45} = 22.627'' \quad b = 16''$$

$$L/4 = 10/4 = 2.5' \quad y = 10' - 2(2.5') - 2(16'') = 2.34'$$

Cut length of bent up bars:

$$= (2.5' + 2.5' + 22.627'' + 22.627'' + 2.34' + 2(9(6/8'')) \times 2$$

$$= 23.347 \text{ ft}$$



After Calculating length of bent up bars, calculate the Total Weight.

Steel quantity in given beam ?

Steel for straight main bars:  
Total cut Length of bars:

$$= [10' - 2(c.c) + 2(\text{hooks})] \times \text{Number of bars}$$

$$= [10' - 2(1'') + 2(9(6/8''))] \times 4$$

$$= 43.83 \text{ ft.}$$

Steel for bent up bars: = 23.347 ft

Total cut length = 43.83 ft + 23.347 ft

Total cut length = 67.177 ft.

Now, We can Calculate the weight of steel bars by the following formula. Remember the length of steel bars should be in feet and the diameter should be in mm to use this formula.

$$W = \frac{D^2}{52.9} \times L$$

$$W = \frac{6^2}{52.9} \times 67.177$$

$$W = 48 \text{ kg}$$

Here, we calculate the total length of stirrups, and then we can calculate the weight by using the following formula given

below.

Total Length of Stirrups = (Length of one stirrups \* No. of stirrups)

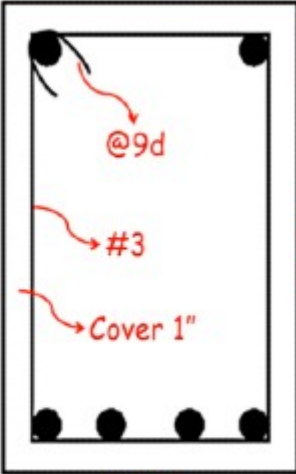
**total length of bar (stirrups) = length of one stirrup x number of stirrups**

Length of the stirrup = perimeter of rectangle+ hook

$$L = 2\{18'' - 2(1'')\} + \{12'' - 2(1'')\}2 + 9(3/8'')$$

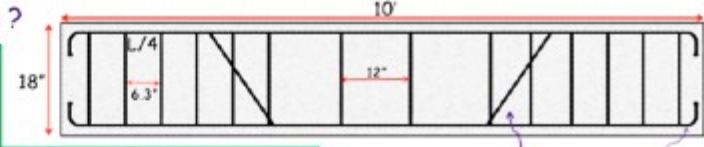
$$L = 32'' + 20'' + 3.375''$$

$$L = \frac{55.375 \text{ inches.}}{12}$$

$$L = 4.614 \text{ feet.}$$


Steel quantity in given beam ?

Steel stirrups:

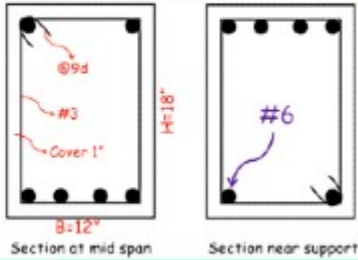


Cut length of one stirrup = 4.614 ft

Total length for all stirrups = 4.614 ft x 14

Total length for all stirrups = 64.6 ft

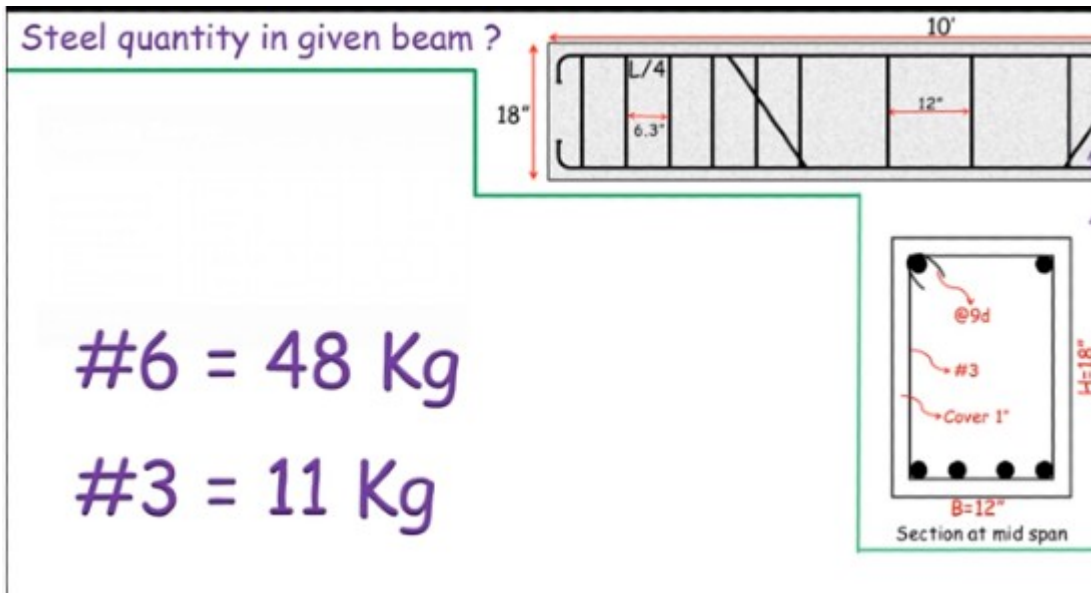
$$W = \frac{D^2}{52.9} \times L$$

$$W = \frac{3^2}{52.9} \times 64.6 = 11 \text{ kg}$$


Hence the total quantity of steel bars required for different grade of steel bars is given below.

For #6 grade we need 48 Kg Steel.

For #3 grade we need 11 Kg Steel.



## Video

Hence, in this way we can calculate the quantity of steel bars in a beam Step by Step.

I hope this article on “How to calculate steel quantity from drawing for Beam?” remains helpful for you.

Happy Learning – Civil Concept

Contributed by,

Civil Engineer – Ranjeet Sahani

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