IQRA NATIONAL UNIVERSITY

Quantity Survey & Estimation

Lecture 02&03 (final)

BAR BENDING SCHEDULE

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WHAT IS BAR BENDING SCHEDULE?

Bar bending schedule commonly known as BBS is one of the most important terms in Civil Engineering. Because it plays a vital role in building construction.

Like other building materials estimation of steel is also required for constructing a building and here BBS comes with an easy solution

Bar bending schedule provides the reinforcement calculation and some other important details such as bar mark, bar diameter, bar shape, cutting length, number of bars, the weight of bar, total weight of steel etc. So that we can order the required amount of steel in advance.

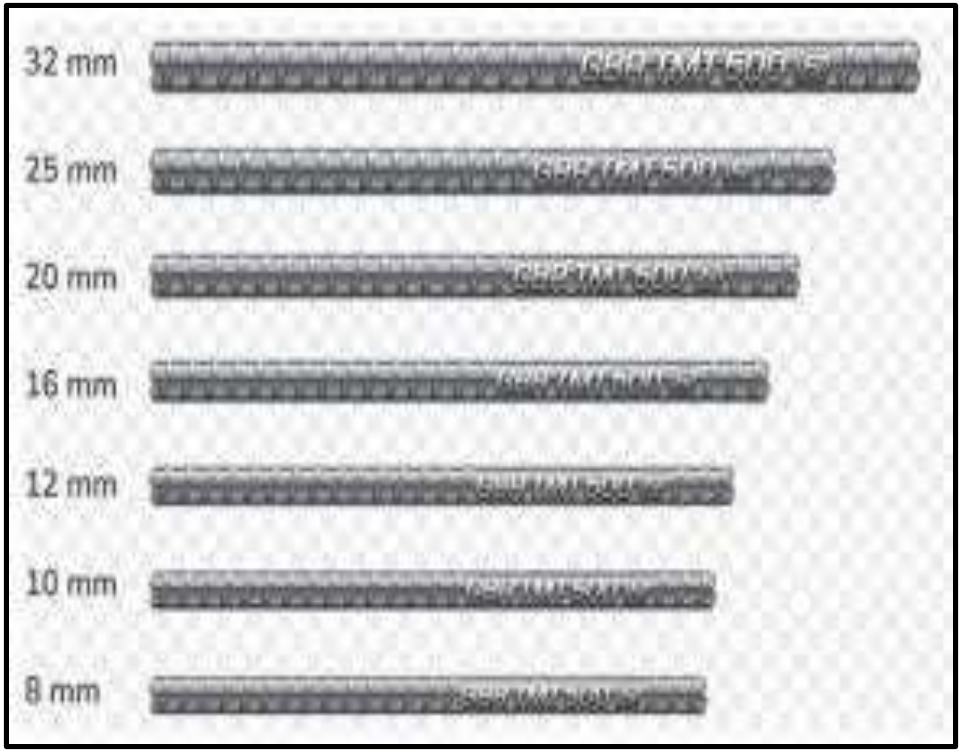
HISTORY OF BAR BENDING SCHEDULE:

- Long years back when there was no today's bar bending schedule, certain recommendations given by Prof. BN Dutta were used for estimating steel for different components of a building.

Description	Percentage
Beam	2% of total volume of concrete
Column	5% of total volume of concrete
Slab	1% of total volume of concrete
Footing	0.8% of total volume of concrete

But these are now backdated (not wrong) and we don't use them in today. Because No accurate values were specified if we use more bars in a single member. Nowadays we are constructing 150+ floors building. It is now possible with our modern techniques, equipment etc. Estimation of steel becomes easier because of BBS.

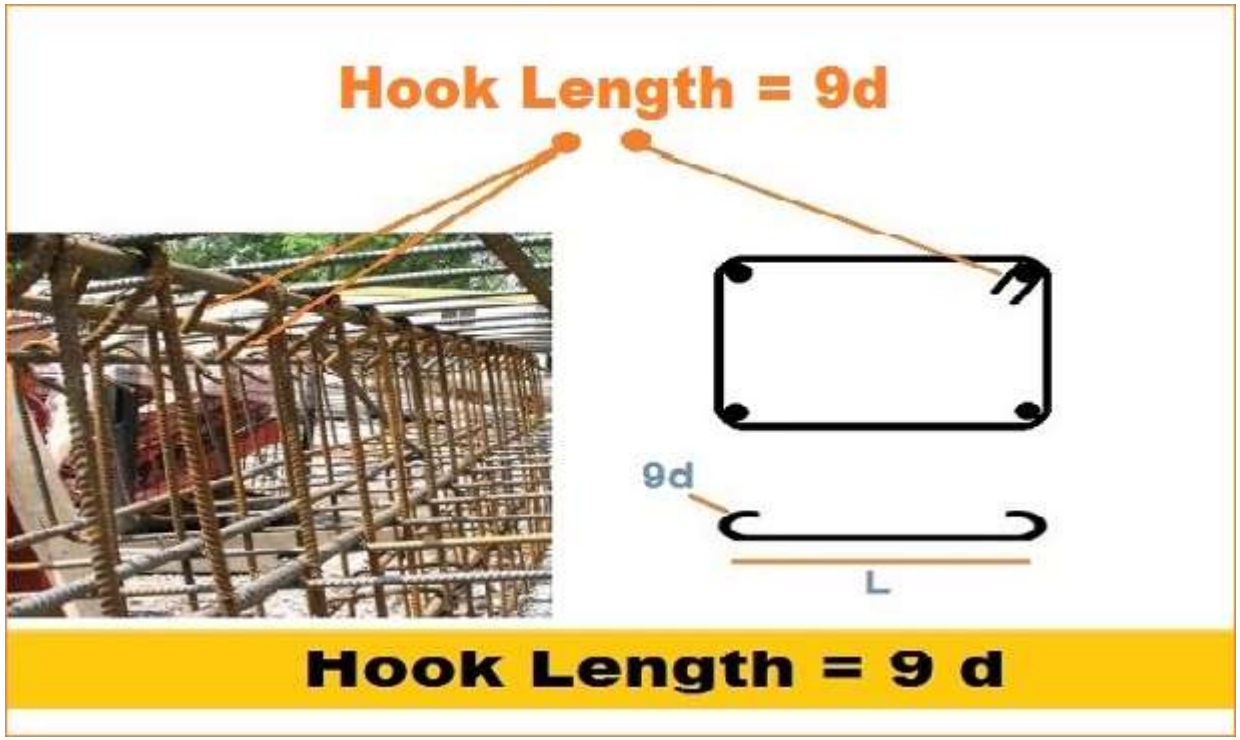
STEEL BAR SIZES



BAR SIZE DESIGNATION*	WEIGHT (LBS/FOOT)	BAR DIAMETER (INCHES)
#3	0.376	0.375
#4	0.668	0.500
#5	1.043	0.625
#6	1.502	0.750
#7	2.044	0.875
#8	2.670	1.000
#9	3.400	1.128
#10	4.303	1.270
#11	5.313	1.410
#14	7.650	1.693
#18	13.600	2.257

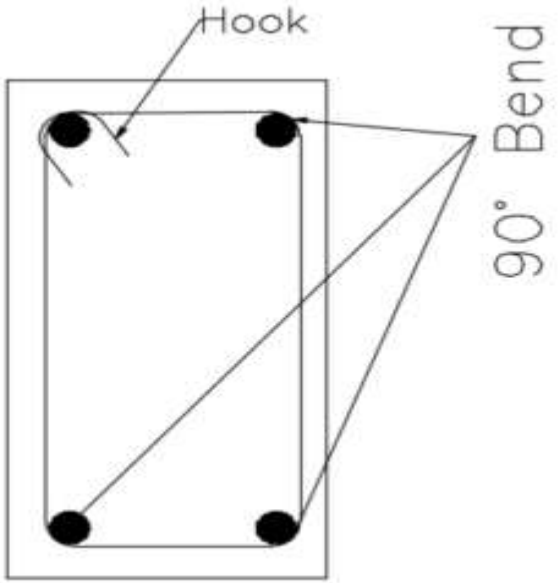
HOOK LENGTH:

- The hook is the extra length left at the 4th corner of a stirrup so that the stirrup retains its shape.
- Generally, hook length is taken as 9d or 10d for one side.
- Where d = Diameter of the bar.



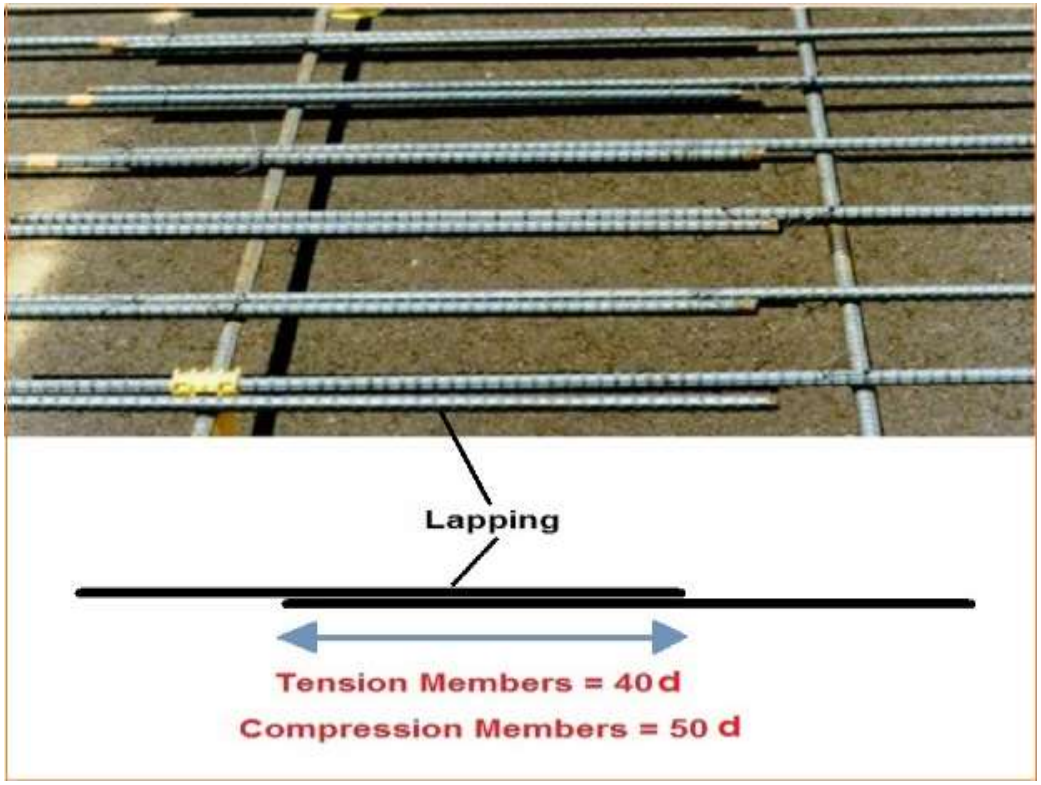
Bent length

- 3d for 135 degree bent
- 2d for 90 degree bent.



LAP LENGTH

- Lap length is the overlapping length of two bars side by side which gives required design length. In RCC structure if the length of a bar is not sufficiently available to make design length, lapping is done.

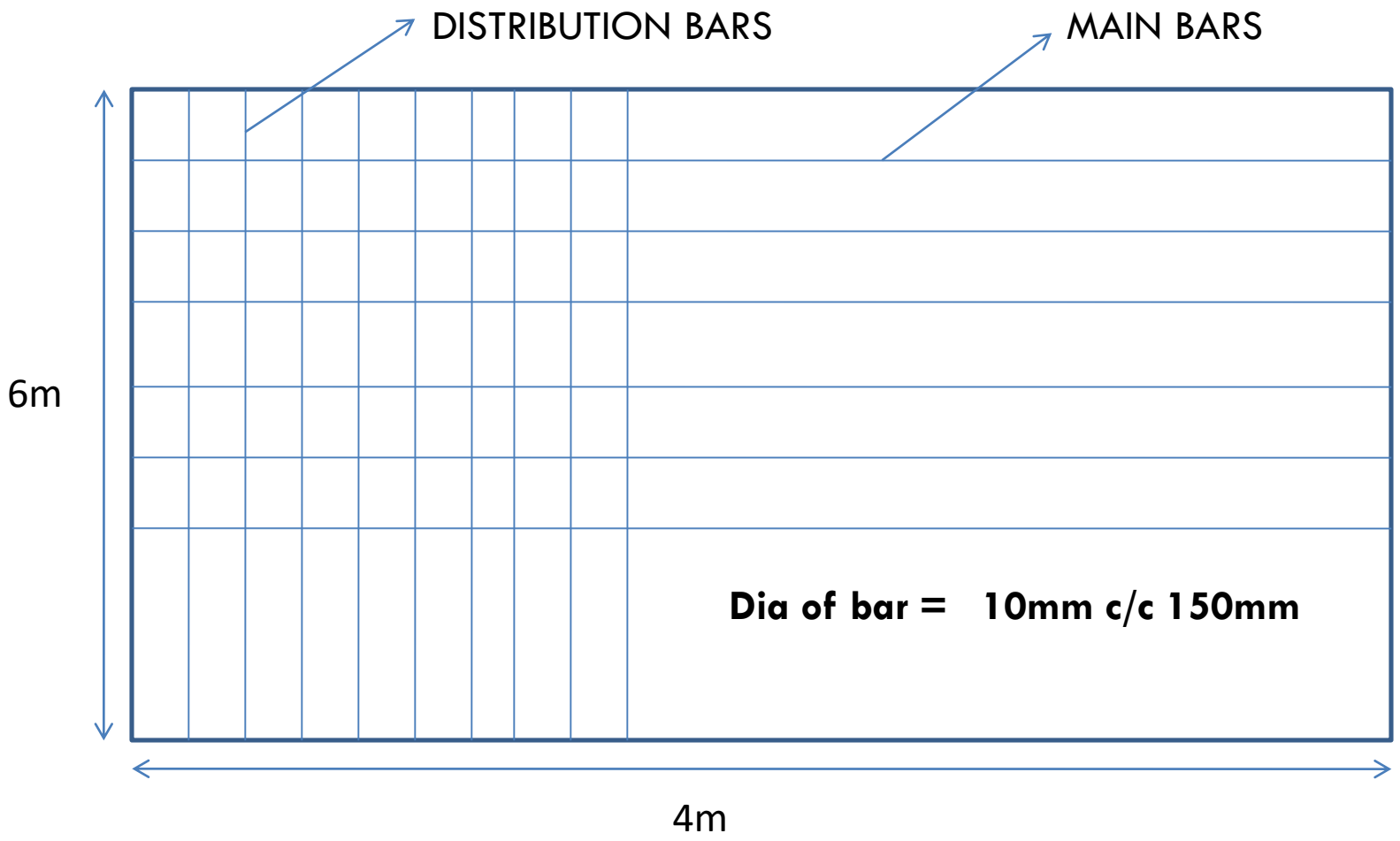


UNIT WEIGHT OF STEEL

- The weight of bar is calculated by the following formula
- $W = d^2L/162$
- Where W = Weight of bars.
- L = Length of bars in meter.
- d = Diameter of the bar.

- The weight of bar is calculated by the following formula
- $W = d^2L/52.91$
- L = Length of bars in feet.

BBS OF SLAB



Solution

- **Step 01 (find the No's of Main bar)**
- MB are in the direction of 6m

  MB = (Length/spacing) +1 = 6m / 0.15m +1 = **41 No's**

- **Step 02 (find the No's of distribution bar)**
- DB are in the direction of 4m

  DB= (length/ spacing) + 1 = 4 m / 0.15 m +1 = **28 No's**

- **Step 03 (Total length of MB & DB)**

  MB = 41 X 4m = 164 m

  DB = 28 x 6 = 168 m

Total length = 164 + 168 = **332 m**

Solution

- **Step 04 (Unit weight of the steel)**

  weight of steel = $d^2/162$

  $= 10^2 / 162 = 0.61$ kg/m

- **Step 05 (Total weight of the steel used in the slab)**

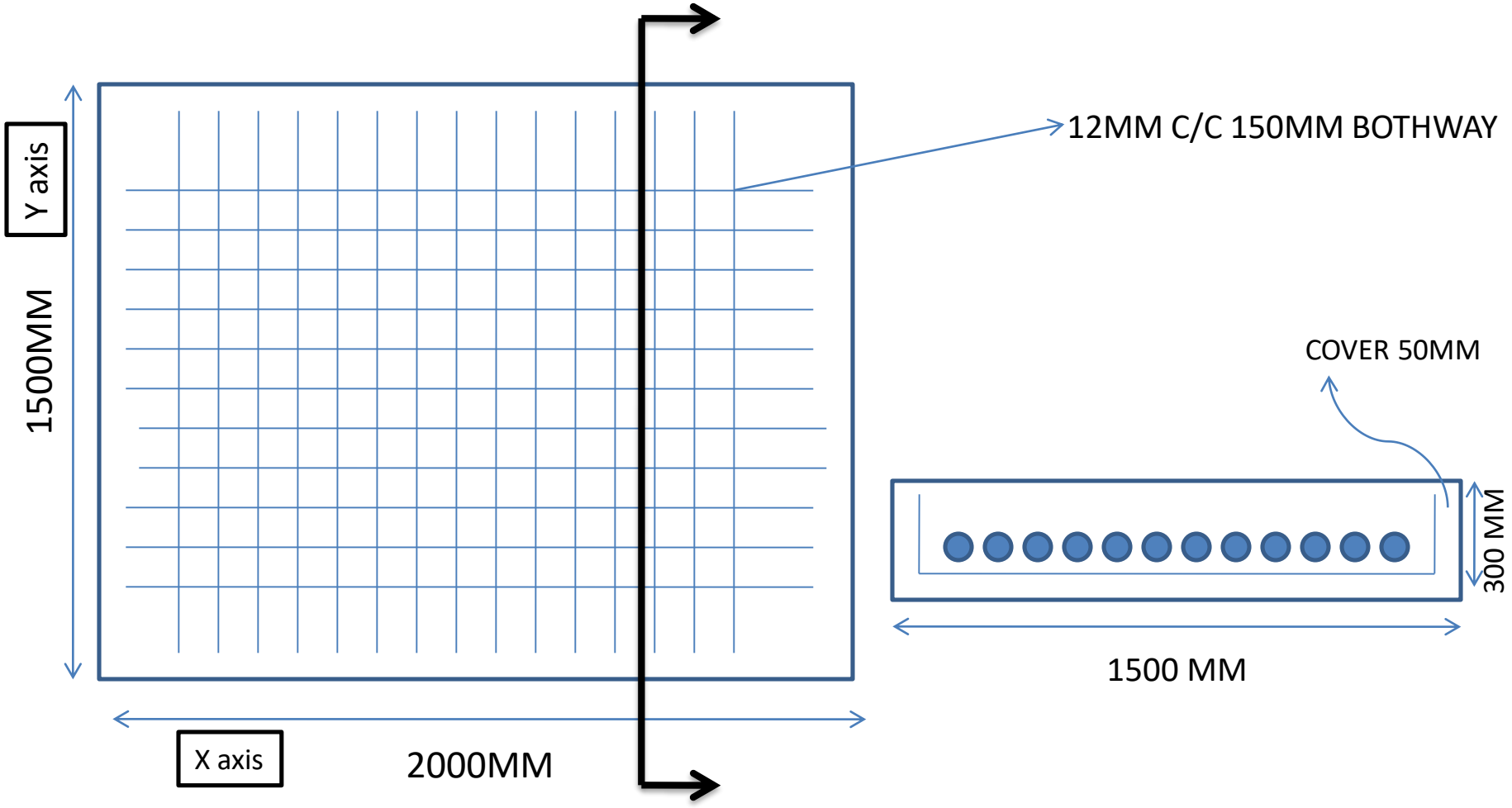
  Total length x unit weight

  332 x 0.61

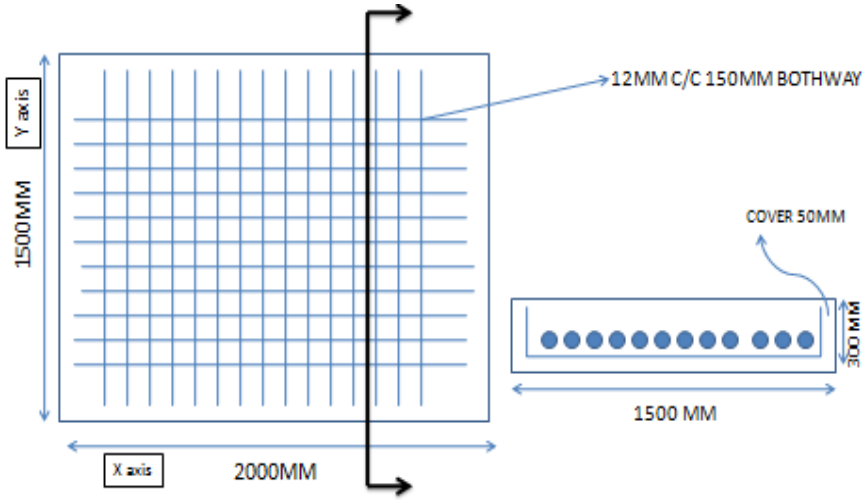
  202.52 kg of steel is used in slab

Sr.No	Type of bar	Diameter (mm)	No.s	Length (meter)	Total length (meter)	Unit weight (kg)	Total weight	Notes
1.	MB	10mm	41	4m	164m	0.61	100.kg	$d^2/162$
2.	DB	10mm	28	6m	168m	0.61	102.48kg	$d^2/162$
2% to 5% wastage shall be added								
Total					332 m	0.61	205kg	

BBS OF COLUMN FOOTING



Solution



- **Step 01 (find the Effective length)**

  Eff. Length (x) = length – both side covers

  = 2000 – 2x 50 = **1900 mm**

  Eff. Length (y) = 1500 – 2x50 = **1400 mm**

- **Step 02 (find the No's of bar)**

  No of bars (x) = Eff. Length / spacing +1

  = (1400 / 150) + 1 = **10 No.s**

  No of bars (y) = Eff. Length / spacing +1

  = (1900 / 150) + 1 = **14 No.s**

Solution

- **Step 03 (find the cutting length)**

  Along (x) = [Eff. Length + (bends)] – bent deductions

  = 1900 + 2 (300 -50 -50) – (2 (2 x12))

  = **2252mm or 2.25m**

Along (y) = [Eff. Length + (bends)] – bent deductions(2d)

= 1400 + 2 (300 -50 -50) – (2 (2 x12))

= **1752mm or 1.75m**

Sr. no.	Type of bar	Dia (mm)	No.	Length (m)	Total length (m)	Weight (Kg/m)	Total weight (Kg)	Notes
1.	(X) direction	12	10	2.25	22.5	0.89	20	$12^2/162 = 0.89$
2.	(Y) direction	12	14	1.75	24.5	0.89	22	$12^2/162 = 0.89$
TOTAL							42 Kg	
Add 5% wastage							2 Kg	
GROSS WEIGHT							**44 Kg**	

THE END