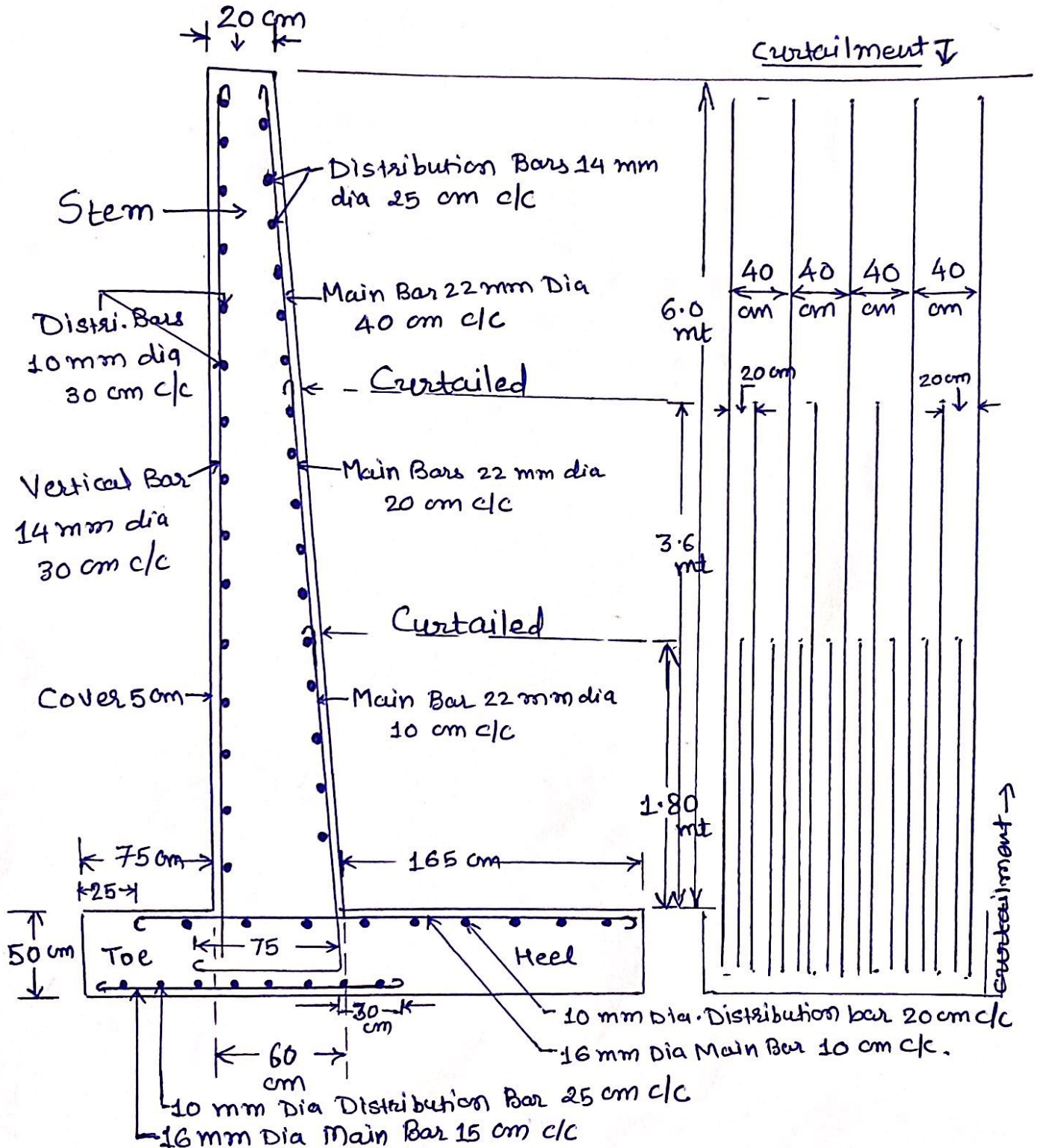


# Estimate of R.C.C. Retaining Wall.

→ Prepare a detailed estimate of R.C.C. Retaining Wall of 30 meter in length. whose cross section is given in figure.



# MEASUREMENT SHEET

Item No	Item Description	NO	L	B	H D <sup>m</sup>	Quantity
1.	R.C.C. work 1:2:4 excluding steel and its Bending but including centering, shuttering and binding steel.					
	→ Base slab	1	30.0	3.0	0.5	45.00 m <sup>3</sup> .
	→ Stem	1	30.0	$\frac{0.6+0.2}{2}$	6.0	72.00 m <sup>3</sup>
<b>Total =</b>						<b>117.00 m<sup>3</sup></b>
2.	Steel Bars including bending in reinforcement					
	<b>STEM -</b> Right side <u>22 mm Dia Bars.</u>					
	→ 22 mm $\phi$ main bars 40 cm c/c (full height)					$L = 6.5 - \text{Top cover} - \text{bottom cover} + 18D + 0.75$ $= 6.5 - 0.05 - 0.07 + 18(0.022) + 0.75$ $= 7.53 \text{ mt.}$ $\frac{\phi}{162} = \frac{(22)^2}{162} = 2.98 \text{ kg/m}$
	$\text{NO} = \frac{L - 2\text{cover}}{\text{spacing}} + 1 = \frac{30 - 2(0.05)}{0.4} + 1$ $\therefore \text{NO} = \frac{29.9}{0.4} + 1 = 76$	76	7.53 @	2.98 kg/m		1705.39 kg
	→ 22 mm $\phi$ Main Bars up to 3.6 mt height a 40 cm c/c.					
	$\text{NO} = \frac{29.9 - 2 \times 2}{0.4} + 1$ $= 75$	75	5.13 @	2.98 kg/m		1146.56 kg
	→ 22 mm $\phi$ Main Bars up to 1.8 mt height at 20 cm c/c.					
	$\text{NO} = \frac{29.9 - 2 \times 1}{0.2} + 1$ $= 150$	150	3.33 @	2.98 kg/m		1488.51 kg
<b>Total =</b>						<b>4340.46 kg</b>

# MEASUREMENT SHEET.

Item NO	Item Description	NO	L	B	H <sup>a</sup> D <sup>a</sup>	Quantity
	<p><u>14 mm dia Bars.</u> 14 mm <math>\phi</math> distribution bars right side of stem 25 cm c/c.</p> <p>NO = <math>\frac{6.5 - .05 - .07}{0.25} + 1</math> <math>\approx 27</math> Nos.</p> <p>6 hook = <math>6 \times 9 \times (.014)</math> 2 overlap = <math>2 \times (40 \times .014)</math></p> <p>→ Left side of stem 14 mm <math>\phi</math> vertical bars 30 cm c/c.</p> <p>NO = <math>\frac{30 - .1}{0.3} + 1 = 101</math></p> <p><u>10 mm dia Bars.</u> 10 mm <math>\phi</math> distribution bars left side of stem 30 cm c/c.</p> <p>NO = <math>\frac{6.5 - .05 - .07}{0.3} + 1</math> <math>= 22</math> Nos.</p>	27	31.78			<p>L = <math>6.5 - .05 - .07</math> S = 6.38 mt. Now Length ?</p> <p>Two overlap SO L = <math>30 - .05 - .05</math> <math>+ 6(9 \times .014) +</math> <math>2 \times (40 \times .014)</math> <math>= 31.776</math> mt. <u>1038.25 kg</u></p> <p>L = 6.5 - Top cover - bottom cover + 2 hooks. <math>= 6.5 - .05 - .07 + 18(.014)</math> <math>= 6.5 - .05 - .07 + 18(.014)</math> <math>= 6.63</math> <u>810.25 kg</u></p> <p><u>Total = 1848.50 kg</u></p> <p>L = 30 - 2 cover + 2 overlap + 6 hook L = <math>30 - .05 - .05 +</math> <math>2 \times 40 \times (.01) + 6(9 \times (.01))</math> <math>= 31.06</math> mt. <u>423.66 kg.</u></p>
		101	6.63			
		22	31.06			

## MEASUREMENT SHEET

Item NO	Item Description	NO	L	B	H <sup>a</sup> D	Quantity
	<b>BASE SLAB</b> At toe of Base slab 10 mm $\phi$ distribution bars at bottom 25 cm c/c.					$L = 30 - 2\text{cover} + 2\text{overlap} + 6\text{hook}$ $= 30 - .05 - .05 + 2 \times 40(.01) + 6(9 \times .01)$ $= 31.06$ $\frac{\phi^2}{162} = \frac{100}{162} = 0.62 \text{ kg/m}$
	$\text{NO} = \frac{(0.75 + 0.6 + 0.3) - .05}{0.25} + 1$ $= 7 \text{ Nos.}$	7	31.06	@	0.62 kg/m	<u>134.80 kg.</u>
	10 mm distribution bars at TOP (Heel) 20 cm c/c $S = 3.0 - .25 - .05 = 2.7$					Length same as above $\uparrow$ $= 31.06$
	$\text{NO} = \frac{2.7}{0.2} + 1 \approx 15 \text{ Nos}$	15	31.06	@	0.62 kg/m	<u>288.86 kg</u>
	<u>16 mm <math>\phi</math> bars</u> At toe side 16 mm $\phi$ main bars at bottom 15 cm c/c.					$L = 0.75 + .6 + .3 - .05 + 18(.016)$ $L = 1.89$ $\frac{\phi^2}{162} = \frac{(16)^2}{162} = 1.58 \text{ kg/m}$
	$\text{NO} = \frac{30 - .1}{0.15} + 1 = 200$	200	1.89	@	1.58 kg/m	<u>597.24 kg ✓</u>
	At Heel side 16 mm $\phi$ main bars at TOP 10 cm c/c					$L = (3.0 - .25 - .05) + 18(.016)$ $L = 2.988 \approx 2.99$
	$\text{NO} = \frac{30 - .1}{0.1} + 1 = 300$	300	2.99	@	1.58 kg/m	<u>1417.26 kg ✓</u>
						<u>Total = 2014.51 kg ✓</u>
	<b>GRAND TOTAL =</b>		<b>9050.78 kg</b>			
			<b>TOTAL STEEL <math>\approx</math></b>			<b><u>9051 kg</u></b>

# Material Calculation R.C.C (1:2:4)

NOW Qty of Concrete for R.C.C. Retaining wall is = 117 m<sup>3</sup>.

R.C.C. Proportion is 1:2:4 so

- 1 PART Cement
- 2 Part Sand
- 4 Part Aggregate

TOTAL 7 Part.

NOW Qty of volume of Concrete = 117 m<sup>3</sup>

$$\therefore \text{Dry Volume of Concrete} = 1.52 \times 117 = 177.84 \text{ m}^3.$$

$$\text{Quantity of Cement in m}^3 = \frac{1 \times 177.84}{7}$$

$$= 25.4057 \text{ m}^3 \approx 25.41$$

$$\text{Volume of 1 bag of Cement} = 0.035 \text{ m}^3.$$

$$\therefore \text{NO of Cement bags} = \frac{25.41}{0.035} = 726 \text{ Nos.}$$

Ans  $\rightarrow$  726 bags (1)

$$\text{Sand Volume} = \frac{2 \times 177.84}{7} = 50.81 \text{ m}^3 \text{ (2)}$$

$$\text{Aggregate Volume} = \frac{4 \times 177.84}{7} = 101.62 \text{ m}^3 \text{ (3)}$$

## % of Steel in Retaining Wall.

Total wt of steel used in R.C.C. Retaining Wall = 9051 kg

$$\therefore \text{Volume of Steel} = \frac{9051 \text{ kg}}{7850 \text{ kg/m}^3} = 1.153 \text{ m}^3.$$

$$\% \text{ of Steel} = \frac{\text{Volume of Steel}}{\text{Volume of C.C. retaining wall}} \times 100$$

$$= \frac{1.153 \text{ m}^3}{117 \text{ m}^3} \times 100$$

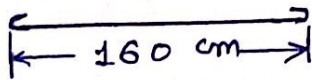
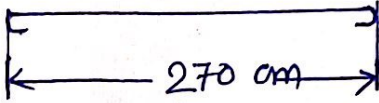
$$= 0.9855 \approx 0.99 \%$$

$$\% \text{ of Steel} = \underline{0.99\%} \text{ --- Ans.}$$

BAR BENDING SCHEDULE R.C.C. RETAINING WALL.

DISCRIPTION OF BAR	SHAPE OF BENDING LENGTH IN C.M.	LENGTH	NO	TOTAL LENGTH	WEIGHT KG.
Main Vertical Bars at right side of stem with Curtailment of dia 22 mm <u>Main 22 mm <math>\phi</math></u>		7.53	76	572.28	1705.39
		5.13	75	384.75	1146.56
		3.33	150	499.5	1488.51
Vertical Bar at Left side of stem with Dia 14 mm. <u>Vertical 14 mm <math>\phi</math></u>		6.63	101	669.63	810.25 kg
Distribution bars right side of stem with dia 14 mm. <u>Distribution 14 mm <math>\phi</math></u>	<p>Two overlap.</p>	27	31.78	858.06	1038.25 kg
AT Left side of stem 10 mm dia distribution bars <u>Distribution 10 mm <math>\phi</math></u>	<p>Two overlap</p>	22	31.06	663.32	423.66
IN Base slab AT Toe. 10 mm $\phi$ distribution.		7	31.06	217.42	134.80
AT Heel 10 mm $\phi$ distribution.		15	31.06	465.9	288.86
					CONTD...

BAR BENDING SCHEDULE OF R.C.C. RETAINING WALL

DISCRIPTION OF BAR	SHAPE OF BENDING LENGTH IN C.M.	LENGTH	NO	TOTAL LENGTH	WEIGHT KG.
AT Toe side 16 mm dia Main bars at bottom. <u>Main bar 16 mm <math>\phi</math></u>		1.89	200	378.0	597.24
AT Heel side 16 mm dia. Main bars at top. <u>Main bar 16mm<math>\phi</math></u>		2.99	300	897.0	1417.26