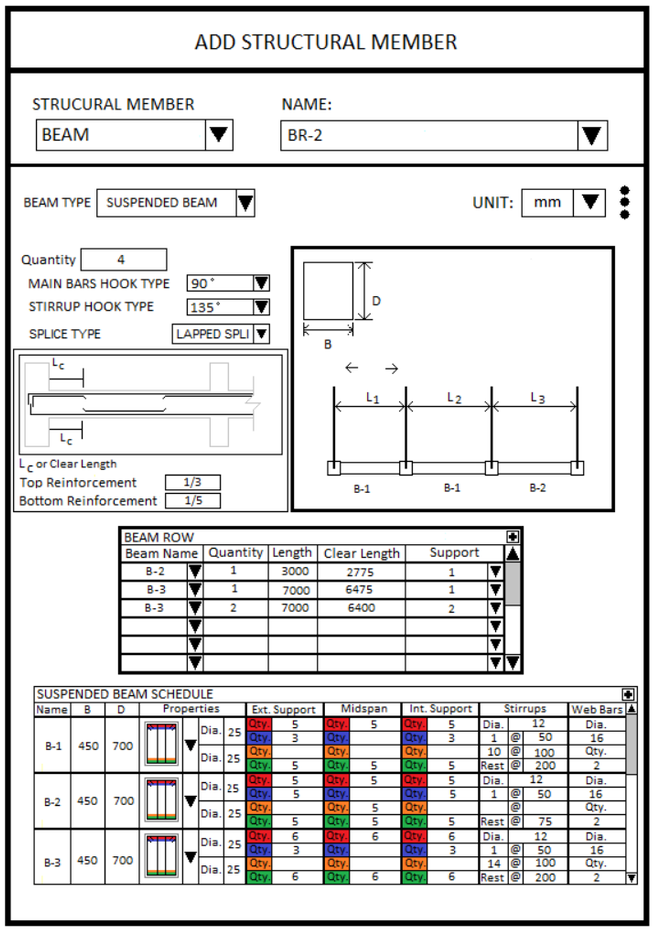
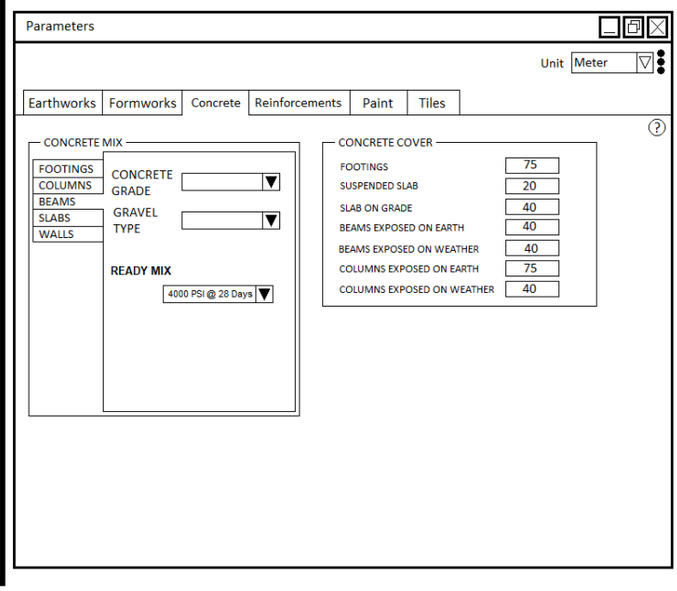
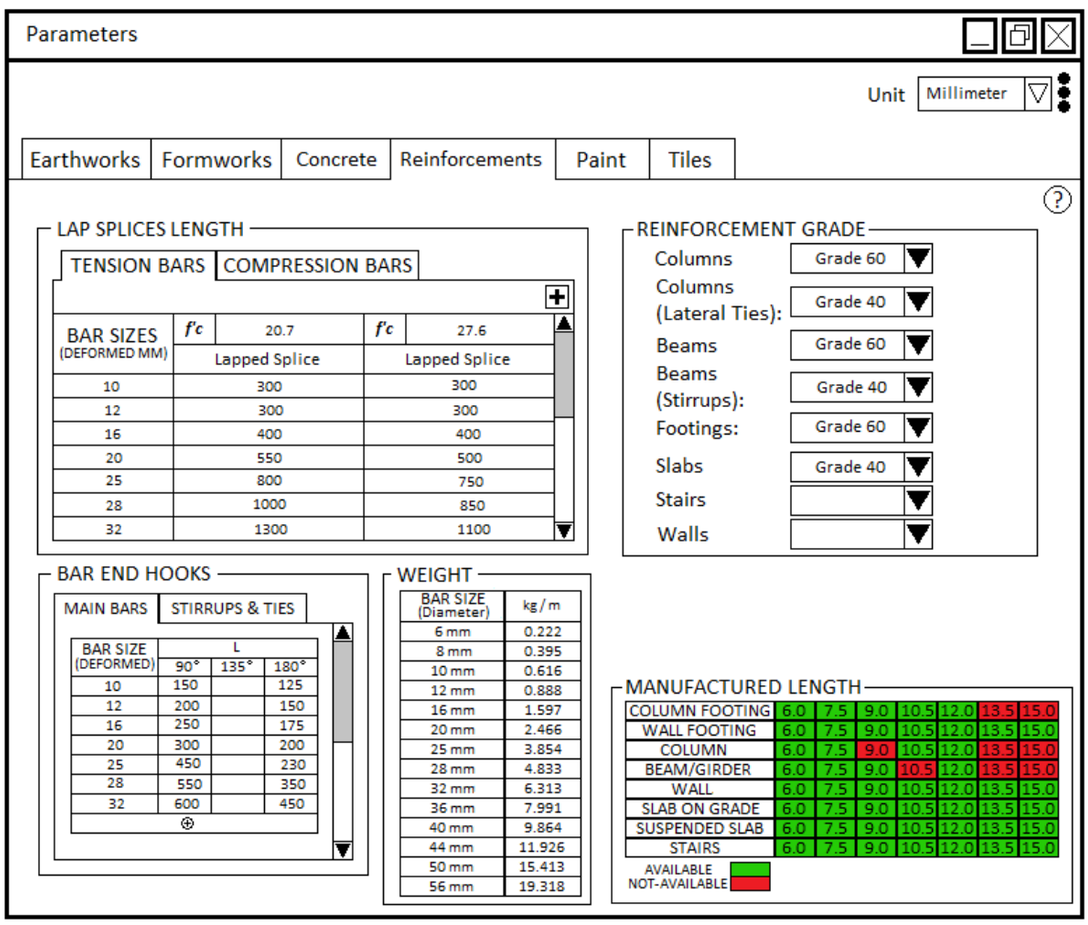
REFERENCE

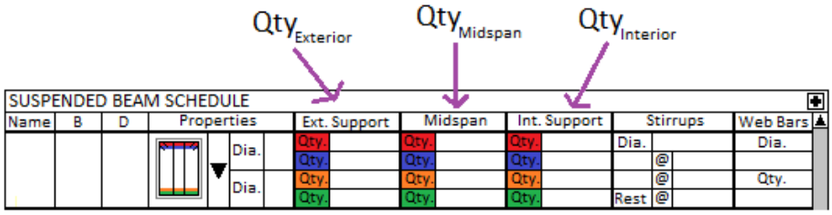

ADD STRUCTURAL MEMBER
STRUCURAL MEMBER
BEAM
NAME:
BR-2
BEAM TYPE
SUSPENDED BEAM
UNIT:
mm
Quantity
4
MAIN BARS HOOK TYPE
90°
STIRRUP HOOK TYPE
135°
SPLICE TYPE
LAPPED SPLI
Lc or Clear Length
Top Reinforcement
1/3
Bottom Reinforcement
1/5
D
B
L1
L2
L3
B-1
B-1
B-2
BEAM ROW
Beam Name
Quantity
Length
Clear Length
Support
B-2
1
3000
2775
1
B-3
1
7000
6475
1
B-3
2
7000
6400
2
SUSPENDED BEAM SCHEDULE
Name
B
D
Properties
Ext. Support
Midspan
Int. Support
Stirrups
Web Bars
B-1
450
700
B-2
450
700
B-3
450
700


Parameters
Unit
Meter
Earthworks
Formworks
Concrete
Reinforcements
Paint
Tiles
CONCRETE MIX
FOOTINGS
COLUMNS
BEAMS
SLABS
WALLS
CONCRETE GRADE
GRAVEL TYPE
READY MIX
4000 PSI @ 28 Days
CONCRETE COVER
FOOTINGS
75
SUSPENDED SLAB
20
SLAB ON GRADE
40
BEAMS EXPOSED ON EARTH
40
BEAMS EXPOSED ON WEATHER
40
COLUMNS EXPOSED ON EARTH
75
COLUMNS EXPOSED ON WEATHER
40


Parameters
Unit
Millimeter
Earthworks
Formworks
Concrete
Reinforcements
Paint
Tiles
LAP SPLICES LENGTH
TENSION BARS
COMPRESSION BARS
BAR SIZES (DEFORMED MM)
f'c
20.7
27.6
Lapped Splice
10
300
300
12
300
300
16
400
400
20
550
500
25
800
750
28
1000
850
32
1300
1100
REINFORCEMENT GRADE
Columns
Grade 60
Columns (Lateral Ties):
Grade 40
Beams
Grade 60
Beams (Stirrups):
Grade 40
Footings:
Grade 60
Slabs
Grade 40
Stairs
Walls
BAR END HOOKS
MAIN BARS
STIRRUPS & TIES
BAR SIZE (DEFORMED)
L
90°
135°
180°
10
150
125
12
200
150
16
250
175
20
300
200
25
450
230
28
550
350
32
600
450
WEIGHT
BAR SIZE (Diameter)
kg / m
6 mm
0.222
8 mm
0.395
10 mm
0.616
12 mm
0.888
16 mm
1.597
20 mm
2.466
25 mm
3.854
28 mm
4.833
32 mm
6.313
36 mm
7.991
40 mm
9.864
44 mm
11.926
50 mm
15.413
56 mm
19.318
MANUFACTURED LENGTH
COLUMN FOOTING
WALL FOOTING
COLUMN
BEAM/GIRDER
WALL
SLAB ON GRADE
SUSPENDED SLAB
STAIRS
6.0
7.5
9.0
10.5
12.0
13.5
15.0
AVAILABLE
NOT-AVAILABLE

STEPS

1. The program will determine the quantity of the main reinforcement of each beam



$$Qty_{Cont(TOP)} = Qty_{Midspan} + Qty_{Midspan}$$

$$Qty_{Cont(Bott)} = \frac{Qty_{Exterior} + Qty_{Exterior} + Qty_{Interior} + Qty_{Interior}}{2}$$

Example

BEAM ROW

Beam Name	Quantity	Length	Clear Length	Support
B-2	1	3000	2775	1
B-3	1	7000	6475	1
B-3	2	7000	6400	2

- Ref 1

B-2	450	700		Dia.	25	Qty.	5	Qty.	5	Qty.	5	Dia.	12		Dia.
						Qty.	5	Qty.		Qty.	5	1	@	50	16
				Dia.	25	Qty.		Qty.	5	Qty.			@		Qty.
						Qty.	5	Qty.	5	Qty.	5	Rest	@	75	2

$$Qty_{Cont(TOP)} = Qty_{Midspan} + Qty_{Midspan}$$

$$Qty_{Cont(TOP)} = 5 + 0$$

$$Qty_{Cont(TOP)} = \mathbf{5}$$

$$Qty_{Cont(BOTT)} = \frac{Qty_{Exterior} + Qty_{Exterior} + Qty_{Interior} + Qty_{Interior}}{2}$$

$$Qty_{Cont(BOTT)} = \frac{0 + 5 + 0 + 5}{2}$$

$$Qty_{Cont(BOTT)} = \mathbf{5}$$

- Ref 2

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.	12		Dia.
						Qty.	3	Qty.		Qty.	3	1	@	50	16
				Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$Qty_{Cont(TOP)} = Qty_{Midspan} + Qty_{Midspan}$$

$$Qty_{Cont(TOP)} = 6 + 0$$

$$Qty_{Cont(TOP)} = \mathbf{6}$$

$$Qty_{Cont(BOTT)} = \frac{Qty_{Exterior} + Qty_{Exterior} + Qty_{Interior} + Qty_{Interior}}{2}$$

$$Qty_{Cont(BOTT)} = \frac{0 + 6 + 0 + 6}{2}$$

$$Qty_{Cont(BOTT)} = \mathbf{6}$$

- Ref 3

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.	12		Dia.
						Qty.	3	Qty.		Qty.	3	1	@	50	16
				Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$Qty_{Cont(TOP)} = Qty_{Midspan} + Qty_{Midspan}$$

$$Qty_{Cont(TOP)} = 6 + 0$$

$$Qty_{Cont(TOP)} = \mathbf{6}$$

$$Qty_{Cont(BOTT)} = \frac{Qty_{Exterior} + Qty_{Exterior} + Qty_{Interior} + Qty_{Interior}}{2}$$

$$Qty_{Cont(BOTT)} = \frac{0 + 6 + 0 + 6}{2}$$

$$Qty_{Cont(BOTT)} = \mathbf{6}$$

- Ref 4

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.		12	Dia.
						Qty.	3	Qty.		Qty.	3	1	@	50	16
				Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$Qty_{Cont(TOP)} = Qty_{Midspan} + Qty_{Midspan}$$

$$Qty_{Cont(TOP)} = 6 + 0$$

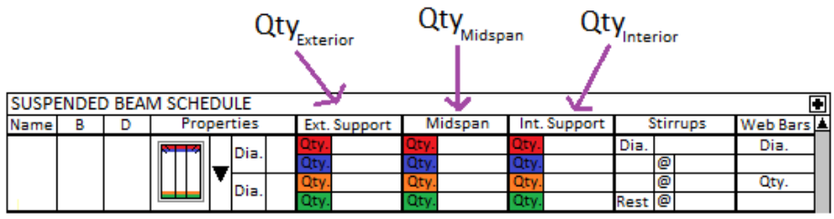
$$Qty_{Cont(TOP)} = \mathbf{6}$$

$$Qty_{Cont(BOTT)} = \frac{Qty_{Exterior} + Qty_{Exterior} + Qty_{Interior} + Qty_{Interior}}{2}$$

$$Qty_{Cont(BOTT)} = \frac{0 + 6 + 0 + 6}{2}$$

$$Qty_{Cont(BOTT)} = \mathbf{6}$$

2. The program will determine the quantity of the extra reinforcement of each beam. (*Must be round up to whole number*)



$$Qty_{Extra(TOP)A} = Qty_{Exterior} + Qty_{Exterior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)B} = Qty_{Interior} + Qty_{Interior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(BOTT)} = Qty_{Midspan} + Qty_{Midspan} - Qty_{Cont(Bott)}$$

Example

BEAM ROW

Beam Name	Quantity	Length	Clear Length	Support
B-2	1	3000	2775	1
B-3	1	7000	6475	1
B-3	2	7000	6400	2

- Ref 1

B-2	450	700		Dia.	25	Qty.	5	Qty.	5	Qty.	5	Dia.		12	Dia.
						Qty.	5	Qty.		Qty.	5	1	@	50	16
				Dia.	25	Qty.		Qty.	5	Qty.			@		Qty.
						Qty.	5	Qty.	5	Qty.	5	Rest	@	75	2

$$Qty_{Extra(TOP)A} = Qty_{Exterior} + Qty_{Exterior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)A} = 5 + 5 - 5$$

$$Qty_{Extra(TOP)A} = \mathbf{5}$$

$$Qty_{Extra(TOP)B} = Qty_{Interior} + Qty_{Interior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)B} = 5 + 5 - 5$$

$$Qty_{Extra(TOP)B} = \mathbf{5}$$

$$Qty_{Extra(BOTT)} = Qty_{Midspan} + Qty_{Midspan} - Qty_{Cont(Bott)}$$

$$Qty_{Extra(BOTT)} = 5 + 5 - 5$$

$$Qty_{Extra(BOTT)} = \mathbf{5}$$

- Ref 2

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.		12	Dia.
						Qty.	3	Qty.		Qty.	3	1	@	50	16
				Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$Qty_{Extra(TOP)A} = Qty_{Exterior} + Qty_{Exterior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)A} = 6 + 3 - 6$$

$$Qty_{Extra(TOP)A} = \mathbf{3}$$

$$Qty_{Extra(TOP)B} = Qty_{Interior} + Qty_{Interior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)B} = 6 + 3 - 6$$

$$Qty_{Extra(TOP)B} = \mathbf{3}$$

$$Qty_{Extra(BOTT)} = Qty_{Midspan} + Qty_{Midspan} - Qty_{Cont(Bott)}$$

$$Qty_{Extra(BOTT)} = 0 + 6 - 6$$

$$Qty_{Extra(BOTT)} = \mathbf{0}$$

- Ref 3

B-3	450	700			Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.		12	Dia.
							Qty.	3	Qty.		Qty.	3	1	@	50	16
					Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
							Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$Qty_{Extra(TOP)A} = Qty_{Exterior} + Qty_{Exterior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)A} = 6 + 3 - 6$$

$$Qty_{Extra(TOP)A} = \mathbf{3}$$

$$Qty_{Extra(TOP)B} = Qty_{Interior} + Qty_{Interior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)B} = 6 + 3 - 6$$

$$Qty_{Extra(TOP)B} = \mathbf{3}$$

$$Qty_{Extra(BOTT)} = Qty_{Midspan} + Qty_{Midspan} - Qty_{Cont(Bott)}$$

$$Qty_{Extra(BOTT)} = 0 + 6 - 6$$

$$Qty_{Extra(BOTT)} = \mathbf{0}$$

- Ref 4

B-3	450	700			Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.		12	Dia.
							Qty.	3	Qty.		Qty.	3	1	@	50	16
					Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
							Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$Qty_{Extra(TOP)A} = Qty_{Exterior} + Qty_{Exterior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)A} = 6 + 3 - 6$$

$$Qty_{Extra(TOP)A} = \mathbf{3}$$

$$Qty_{Extra(TOP)B} = Qty_{Interior} + Qty_{Interior} - Qty_{Cont(TOP)}$$

$$Qty_{Extra(TOP)B} = 6 + 3 - 6$$

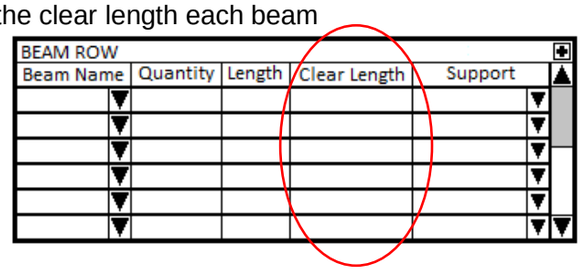
$$Qty_{Extra(TOP)B} = \mathbf{3}$$

$$Qty_{Extra(BOTT)} = Qty_{Midspan} + Qty_{Midspan} - Qty_{Cont(Bott)}$$

$$Qty_{Extra(BOTT)} = 0 + 6 - 6$$

$$Qty_{Extra(BOTT)} = \mathbf{0}$$

3. The program will determine the clear length each beam



Example:

BEAM ROW

Beam Name	Quantity	Length	Clear Length	Support
B-2	1	3000	2775	1
B-3	1	7000	6475	1
B-3	2	7000	6400	2

Ref (1)

$$L_C = 2775$$

Ref (2)

$$L_C = 6475$$

Ref (3)

$$L_C = 6400$$

Ref (4)

$$L_C = 6400$$

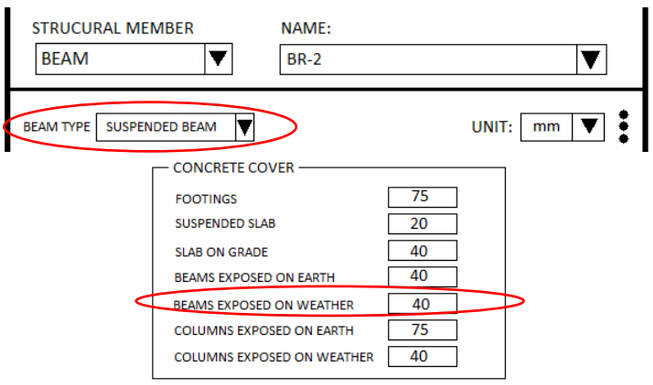
4. The program will determine the Concrete Cover (CC_S) of the Beam Row
   - Case 1: Beam Type is “Footing Tie Beam” or “Grade Beam”

$$CC_S = \boxed{\text{BEAMS EXPOSED ON EARTH}}$$

   - Case 2: Beam Type is “Suspended Beam” or “Roof Beam”

$CC_S =$ | BEAMS EXPOSED ON WEATHER

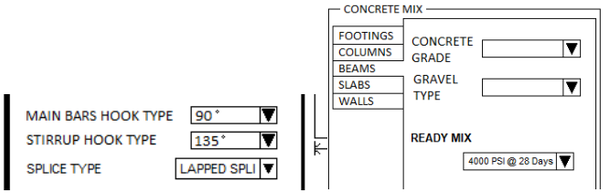
Example



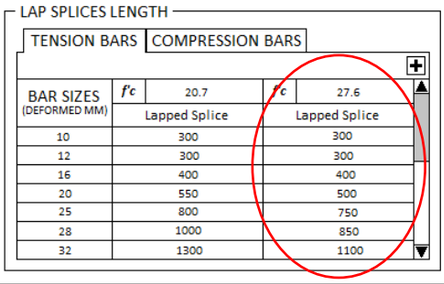
$$CC_S = 40$$

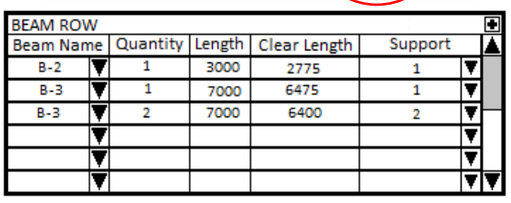
5. The program will determine the Splice Length (S_L).
   - Case 1: Splice Type is “Mechanical” or “Welded Splice (Butt)”
   $$S_L = 0$$
   - Case 2: Splice Type is “Lapped Splice” or “Welded Splice (Lapped)”
   $$S_L = Based\ on\ the\ Parameters\ (Tension)$$

Example:

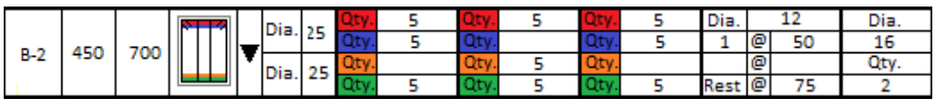


$$f'c = 4000\ psi \rightarrow 27.6$$



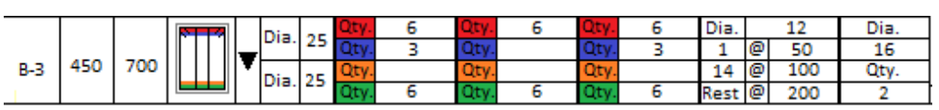


Ref (1)



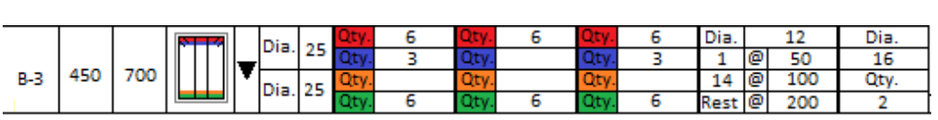
$$d_{B(MR-TOP)} = 25 : Thus, S_{L(TOP)} = 750$$
$$d_{B(MR-BOTT)} = 25 : Thus, S_{L(BOTT)} = 750$$

Ref (2)



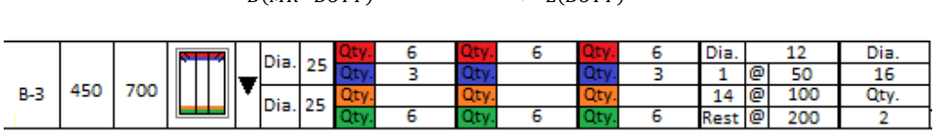
$$d_{B(MR-TOP)} = 25 : Thus, S_{L(TOP)} = 750$$
$$d_{B(MR-BOTT)} = 25 : Thus, S_{L(BOTT)} = 750$$

Ref (3)



$$d_{B(MR-TOP)} = 25 : Thus, S_{L(TOP)} = 750$$
$$d_{B(MR-BOTT)} = 25 : Thus, S_{L(BOTT)} = 750$$

Ref (4)



$$d_{B(MR-TOP)} = 25 : Thus, S_{L(TOP)} = 750$$
$$d_{B(MR-BOTT)} = 25 : Thus, S_{L(BOTT)} = 750$$

6. The program will determine the length of the main reinforcement of each beam. (must be converted to meters)

Case 1: $n_{Last} > 1$

- If $Support = \text{“}1 - End\ Support\text{”}$

$$L_B\ of\ Qty_{Cont} = L + H_L + 0.5S_L - CC_S$$

- If $Support = \text{“}2 - End\ Support\text{”}$

a) If $n = 1$ or $n = n_{Last}$

$$L_B\ of\ Qty_{Cont} = 1.5L + H_L + 0.5S_L - 0.5L_C - CC_S$$

b) Else,

$$L_B\ of\ Qty_{Cont} = L + S_L$$

Case 2: $n_{Last} = 1$

- If $Support = \text{“}1 - End\ Support\text{”}$

$$L_B\ of\ Qty_{Cont} = 2(L + H_L - CC_S) - L_C$$

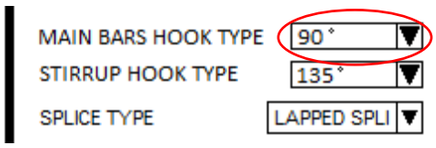
- If $Support = \text{“}2 - End\ Support$

$$L_B\ of\ Qty_{Cont} = 2(L + H_L - CC_S) - L_C$$

Where;

$$H_L = Hook\ Length\ based\ in\ the\ Prameters$$

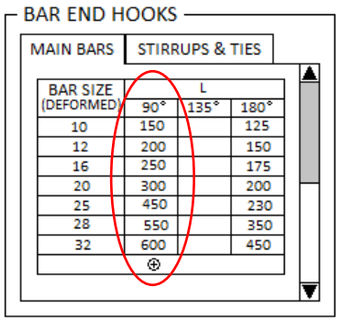
Example:



BEAM ROW

Beam Name	Quantity	Length	Clear Length	Support
B-2	1	3000	2775	1
B-3	1	7000	6475	1
B-3	2	7000	6400	2

$$n_{Last} = 4 \therefore n_{Last} > 1$$



BAR SIZE (DEFORMED)	L 90°	135°	180°
10	150		125
12	200		150
16	250		175
20	300		200
25	450		230
28	550		350
32	600		450

Ref (1) $Support = \text{“}1 - End\ Support\text{”}\ \&\ n = 1$

B-2	450	700		Dia.	25	Qty.	5	Qty.	5	Qty.	5	Dia.		12		Dia.
						Qty.	5	Qty.		Qty.	5	1	@	50		16
				Dia.	25	Qty.		Qty.	5	Qty.			@			Qty.
						Qty.	5	Qty.	5	Qty.	5	Rest	@	75		2

$$d_{B(MR-TOP)} = 25 : Thus, H_{L(TOP)} = 450$$

$$d_{B(MR-BOTT)} = 25 : Thus, H_{L(BOTT)} = 450$$

$$L_B\ of\ Qty_{Cont(TOP)} = L + H_{L(TOP)} + 0.5S_{L(TOP)} - CC_S$$

$$L_B\ of\ Qty_{Cont(TOP)} = 3000 + 450 + 0.5(750) - 40$$

$$L_B\ of\ Qty_{Cont(TOP)} = 3785\ mm \rightarrow \mathbf{3.785\ m}$$

$$L_B\ of\ Qty_{Cont(BOTT)} = L + H_{L(BOTT)} + 0.5S_{L(BOTT)} - CC_S$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 3000 + 450 + 0.5(750) - 40$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 3785\ mm \rightarrow \mathbf{3.785\ m}$$

Ref (2) $Support = \text{“}2 - End\ Support\text{”}\ \&\quad n = 2$

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.		12		Dia.
						Qty.	3	Qty.		Qty.	3	1	@	50		16
				Dia.	25	Qty.		Qty.		Qty.		14	@	100		Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@	200		2

$$L_B\ of\ Qty_{Cont(TOP)} = L + S_{L(TOP)}$$

$$L_B\ of\ Qty_{Cont(TOP)} = 7000 + 750$$

$$L_B\ of\ Qty_{Cont(TOP)} = 7750\ mm \rightarrow \mathbf{7.75\ m}$$

$$L_B\ of\ Qty_{Cont(BOTT)} = L + S_{L(BOTT)}$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 7000 + 750$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 7750\ mm \rightarrow \mathbf{7.75\ m}$$

Ref (3) $Support = \text{“}2 - End\ Support\text{”}\ \&\quad n = 3$

B-3	450	700		▼	Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.	@	12	Dia.
							Qty.	3	Qty.		Qty.	3	1	@	50	16
					Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
							Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$L_B\ of\ Qty_{Cont(TOP)} = L + S_{L(TOP)}$$

$$L_B\ of\ Qty_{Cont(TOP)} = 7000 + 750$$

$$L_B\ of\ Qty_{Cont(TOP)} = 7750\ mm \rightarrow \mathbf{7.75\ m}$$

$$L_B\ of\ Qty_{Cont(BOTT)} = L + S_{L(BOTT)}$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 7000 + 750$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 7750\ mm \rightarrow \mathbf{7.75\ m}$$

Ref (4) $Support\ =\ "2-End\ Support"$ & $n = 4 = n_{Last}$

B-3	450	700		▼	Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.	@	12	Dia.
							Qty.	3	Qty.		Qty.	3	1	@	50	16
					Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
							Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$d_{B(MR-TOP)} = 25 : Thus, H_{L(TOP)} = 450$$

$$d_{B(MR-BOTT)} = 25 : Thus, H_{L(BOTT)} = 450$$

$$L_B\ of\ Qty_{Cont(TOP)} = 1.5L + H_{L(TOP)} + 0.5S_{L(TOP)} - 0.5L_C - CC_S$$

$$L_B\ of\ Qty_{Cont(TOP)} = 1.5(7000) + 450 + 0.5(750) - 0.5(6400) - 40$$

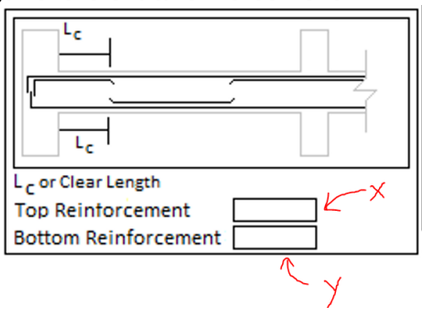
$$L_B\ of\ Qty_{Cont(TOP)} = 8085\ mm \rightarrow \mathbf{8.085\ m}$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 1.5L + H_{L(BOTT)} + 0.5S_{L(BOTT)} - 0.5L_C - CC_S$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 1.5(7000) + 450 + 0.5(750) - 0.5(6400) - 40$$

$$L_B\ of\ Qty_{Cont(BOTT)} = 8085\ mm \rightarrow \mathbf{8.085\ m}$$

7. The program will determine the length of the extra reinforcement



I. For $L_B\ of\ Qty_{Extra\ (TOP)}$

Case 1: $n_{Last} > 1$

- If $Support\ =\ "1-End\ Support"$

$$L_B\ of\ Qty_{Extra(TOP)A} = 0$$

$$L_B\ of\ Qty_{Extra(TOP)B} = (x-1)L_C + L$$

- If $Support\ =\ "2-End\ Support"$

a) If $n = 1$ or $n = n_{Last}$

$$L_B\ of\ Qty_{Extra(TOP)A} = L + H_L + (x-1)L_C - CC_S$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 0.5L + (x-0.5)L_C$$

b) Else,

$$L_B\ of\ Qty_{Extra(TOP)A} = 0.5L + (x-0.5)L_C$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 0.5L + (x-0.5)L_C$$

Case 2: $n_{Last} = 1$

- If $Support\ =\ "1-End\ Support"$

$$L_B\ of\ Qty_{Extra(TOP)A} = 0$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 2L + H_L + (x-2)L_C - CC_S$$

- If $Support\ =\ "2-End\ Support$

$$L_B\ of\ Qty_{Extra(TOP)A} = 2(L + H_L - CC_S) - L_C$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 2(L + H_L - CC_S) - L_C$$

Where;

$$H_L = Hook\ Length\ based\ in\ the\ Prameters$$

II. For $L_B\ of\ Qty_{Extra\ (BOTT)}$

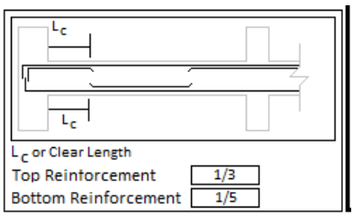
Case 1: $Support\ =\ "1-End\ Support"$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = 0$$

Case 2: $Support\ =\ "2-End\ Support"$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = L_C(1-2y)$$

Example



$$x = \frac{1}{3} \quad \& \quad y = \frac{1}{5}$$

BEAM ROW

Beam Name	Quantity	Length	Clear Length	Support
B-2	1	3000	2775	1
B-3	1	7000	6475	1
B-3	2	7000	6400	2

$$n_{Last} = 4, Thus\ n_{Last} > 1$$

Ref (1) $Support\ =\ "1-End\ Support"\ \&\ n = 1$

B-2	450	700		Dia.	25	Qty.	5	Qty.	5	Qty.	5	Dia.		12	Dia.
						Qty.	5	Qty.		Qty.	5	1	@	50	16
				Dia.	25	Qty.		Qty.	5	Qty.			@		Qty.
						Qty.	5	Qty.	5	Qty.	5	Rest	@	75	2

$$L_B\ of\ Qty_{Extra(TOP)A} = \mathbf{0}$$

$$L_B\ of\ Qty_{Extra(TOP)B} = (x-1)L_C + L$$

$$L_B\ of\ Qty_{Extra(TOP)B} = \left(\frac{1}{3} - 1\right)(2775) + (3000)$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 1150\ mm \rightarrow \mathbf{1.15\ m}$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = \mathbf{0}$$

Ref (2) $Support\ =\ "2-End\ Support"\ \&\quad n = 2$

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.		12	Dia.
						Qty.	3	Qty.		Qty.	3	1	@	50	16
				Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$L_B\ of\ Qty_{Extra(TOP)A} = 0.5L + (x-0.5)L_C$$

$$L_B\ of\ Qty_{Extra(TOP)A} = 0.5(7000) + \left(\frac{1}{3} - 0.5\right)(6475)$$

$$L_B\ of\ Qty_{Extra(TOP)A} = 2420.83\ mm \rightarrow \mathbf{2.421\ m}$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 0.5L + (x-0.5)L_C$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 0.5(7000) + \left(\frac{1}{3} - 0.5\right)(6475)$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 2420.83\ mm \rightarrow \mathbf{2.421\ m}$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = L_C(1-2y)$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = 6475\left(1 - 2\left(\frac{1}{5}\right)\right)$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = 3885\ mm \rightarrow \mathbf{3.885\ m}$$

Ref (3) $Support\ =\ "2-End\ Support"\ \&\quad n = 3$

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.		12	Dia.
						Qty.	3	Qty.		Qty.	3	1	@	50	16
				Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$L_B\ of\ Qty_{Extra(TOP)A} = 0.5L + (x-0.5)L_C$$

$$L_B\ of\ Qty_{Extra(TOP)A} = 0.5(7000) + \left(\frac{1}{3} - 0.5\right)(6400)$$

$$L_B\ of\ Qty_{Extra(TOP)A} = 2433.33\ mm \rightarrow \mathbf{2.434\ m}$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 0.5L + (x-0.5)L_C$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 0.5(7000) + \left(\frac{1}{3} - 0.5\right)(6400)$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 2433.33\ mm \rightarrow \mathbf{2.434\ m}$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = L_C(1-2y)$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = 6400\left(1 - 2\left(\frac{1}{5}\right)\right)$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = 3840\ mm \rightarrow \mathbf{3.84\ m}$$

Ref (4) $Support\ =\ "2 - End\ Support"$ & $n = 4 = n_{Last}$

B-3	450	700		▼	Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.	@	12	Dia.
							Qty.	3	Qty.		Qty.	3	1	@	50	16
					Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
							Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$L_B\ of\ Qty_{Extra(TOP)A} = L + H_L + (x-1)L_C - CC_S$$

$$L_B\ of\ Qty_{Extra(TOP)A} = 7000 + 450 + \left(\frac{1}{3} - 1\right)(6400) - 40$$

$$L_B\ of\ Qty_{Extra(TOP)A} = 3143.33\ mm \rightarrow \mathbf{3.144\ m}$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 0.5L + (x-0.5)L_C$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 0.5(7000) + \left(\frac{1}{3} - 0.5\right)(6400)$$

$$L_B\ of\ Qty_{Extra(TOP)B} = 2433.33\ mm \rightarrow \mathbf{2.434\ m}$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = L_C(1 - 2y)$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = 6400\left(1 - 2\left(\frac{1}{5}\right)\right)$$

$$L_B\ of\ Qty_{Extra\ (BOTT)} = 3840\ mm \rightarrow \mathbf{3.84\ m}$$

8. The program will determine the manufactured length and its corresponding manufacture quantity

LEGEND:

$Qty_P = no.of\ pcs.\ produced$	$Qty_M = no.of\ manufactured\ pcs.$
$L_M = Available\ Manufactured\ Reinforcement\ Length$	$Qty_{BR} = Quantity\ of\ Beam\ Row$
$L_W = Wastage\ Length$	$L_E = Excess\ manufactured$ bar length

- For $L_B\ of\ Qty_{Cont}$

  I. Case 1: $d_{B(MR-TOP)} = d_{B(MR-BOTT)}$

$$Qty_{Pn} = \frac{L_M}{L_B\ of\ Qty_{Cont(TOP)}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_B$$

$$Qty_{Mn} = m \cdot \frac{Qty_{Cont(TOP)} + Qty_{Cont(BOTT)}}{Qty_{Pn}} \cdot Qty_{BR}$$

$$L_E\ (m) = [Qty_M(round\ up\ to\ whole\ number) - Qty_M] \times L_M$$

And

$$Total\ Wastage\ = L_E + L_W[Qty_{Mn}\ (round\ down\ to\ whole\ number)]$$

Then the program will choose the manufactured bar length with the lowest $Total\ wastage$

  II. Case 2: $d_{B(MR-TOP)} \neq d_{B(MR-BOTT)}$

$$Qty_P = \frac{L_M}{L_B\ of\ Qty_{Cont(\_\_\_)}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_B$$

$$Qty_M = \frac{Qty_{Cont(\_\_\_)}}{Qty_P} \cdot Qty_{BR}$$

$$L_E\ (m) = [Qty_M(round\ up\ to\ whole\ number) - Qty_M] \times L_M$$

And

$$Total\ Wastage\ = L_E + L_W[Qty_{Mn}\ (round\ down\ to\ whole\ number)]$$

Then the program will choose the manufactured bar length with the lowest $Total\ wastage$

- For $L_B\ of\ Qty_{Extra\ (TOP)}$

  I. Case 1: $L_B\ of\ Qty_{Extra(TOP)A} = L_B\ of\ Qty_{Extra(TOP)B}$

$$Qty_P = \frac{L_M}{L_B\ of\ Qty_{Extra(TOP)A}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_B$$

$$Qty_M = \frac{Qty_{Extra(TOP)A} + Qty_{Extra(TOP)B}}{Qty_P} \cdot Qty_{BR}$$

$$L_E\ (m) = [Qty_M(round\ up\ to\ whole\ number) - Qty_M] \times L_M$$

And

$$Total\ Wastage\ = L_E + L_W[Qty_{Mn}\ (round\ down\ to\ whole\ number)]$$

Then the program will choose the manufactured bar length with the lowest $Total\ wastage$

II. Case 2: $L_B\ of\ Qty_{Extra(TOP)A} \neq L_B\ of\ Qty_{Extra(TOP)B}$

$$Qty_P = \frac{L_M}{L_B\ of\ Qty_{Extra(TOP)\_\_}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_B$$

$$Qty_M = \frac{Qty_{Extra(TOP)\_\_}}{Qty_P} \cdot Qty_{BR}$$

$$L_E\ (m) = [Qty_M(round\ up\ to\ whole\ number) - Qty_M] \times L_M$$

And

$$Total\ Wastage\ = L_E + L_W[Qty_{Mn}\ (round\ down\ to\ whole\ number)]$$

Then the program will choose the manufactured bar length with the lowest $Total\ wastage$

- For $L_B\ of\ Qty_{Extra\ (BOTT)}$

$$Qty_P = \frac{L_M}{L_B\ of\ Qty_{Extra\ (BOTT)}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_B$$

$$Qty_M = \frac{L_B\ of\ Qty_{Extra\ (BOTT)}}{Qty_{Pn}} \cdot Qty_{BR}$$

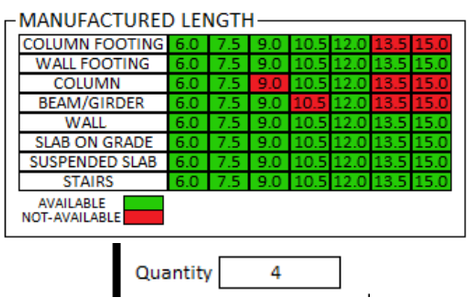
$$L_E\ (m) = [Qty_M(round\ up\ to\ whole\ number) - Qty_M] \times L_M$$

And

$$Total\ Wastage\ = L_E + L_W[Qty_{Mn}\ (round\ down\ to\ whole\ number)]$$

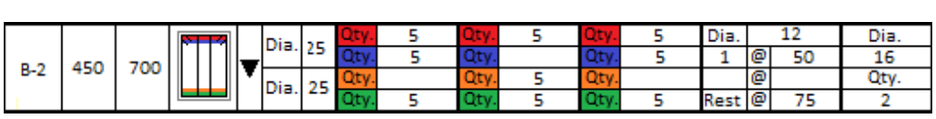
Then the program will choose the manufactured bar length with the lowest $Total\ wastage$

Example



$$Qty_{BR} = 4$$

Ref (1)



- For $L_B\ of\ Qty_{Cont}$

$$d_{B(MR-TOP)} = 25\ \ \&\ \ d_{B(MR-BOTT)} = 25$$

$$d_{B(MR-TOP)} = d_{B(MR-BOTT)}$$

$L_B\ of\ Qty_{Cont(TOP)} = 3.785\ m$

$Qty_{Total} = Qty_{Extra(TOP)A} + Qty_{Extra(TOP)B} = 5 + 5 = 10$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	10	3.785	4	1.59	1	40	40	2.215	0	88.600
7.5				1.98	1	40	40	3.715	0	148.600
9				2.38	2	20	20	1.430	0	28.600
12				3.17	3	13.33	14	0.645	8	16.385

$L_M = \mathbf{12\ m}$ & $Qty_M = \mathbf{14}$

- For $L_B\ of\ Qty_{Extra\ (TOP)}$

$$L_B\ of\ Qty_{Extra\ (TOP)A} = 0\ m$$

$$L_B\ of\ Qty_{Extra\ (TOP)B} = 1.15\ m \quad \& \quad Qty_{Extra\ (TOP)B} = 5$$

$$L_B\ of\ Qty_{Extra\ (TOP)A} \neq L_B\ of\ Qty_{Extra\ (TOP)B}$$

$L_B\ of\ Qty_{Extra\ (TOP)A} = 0\ m$ & $Qty_{Extra\ (TOP)A} = 5$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	5	0	4	#DIV/0!	#DIV/0!	#####	#####	#DIV/0!	#DIV/0!	#DIV/0!
7.5				#DIV/0!	#DIV/0!	#####	#####	#DIV/0!	#DIV/0!	#DIV/0!
9				#DIV/0!	#DIV/0!	#####	#####	#DIV/0!	#DIV/0!	#DIV/0!
12				#DIV/0!	#DIV/0!	#####	#####	#DIV/0!	#DIV/0!	#DIV/0!

$L_M = \mathbf{0\ m}$ & $Qty_{Mn} = \mathbf{0}$

$L_B\ of\ Qty_{Extra\ (TOP)B} = 1.15\ m$ & $Qty_{Extra\ (TOP)B} = 5$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	5	1.15	4	5.22	5	4.00	4	0.25	0	1.000
7.5				6.52	6	3.33	4	0.60	5	6.800
9				7.83	7	2.86	3	0.95	1.29	3.186
12				10.43	10	2.00	2	0.50	0	1.000

$L_M = \mathbf{6\ m}$ & $Qty_{Mn} = \mathbf{4}$

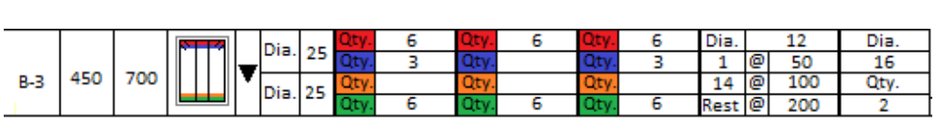
- $L_B\ of\ Qty_{Extra\ (BOTT)}$

$L_B\ of\ Qty_{Extra\ (BOTT)} = 0\ m$ & $Qty_{Extra\ (BOTT)} = 5$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	5	0	4	#DIV/0!	#DIV/0!	#####	#####	#DIV/0!	#DIV/0!	#DIV/0!
7.5				#DIV/0!	#DIV/0!	#####	#####	#DIV/0!	#DIV/0!	#DIV/0!
9				#DIV/0!	#DIV/0!	#####	#####	#DIV/0!	#DIV/0!	#DIV/0!
12				#DIV/0!	#DIV/0!	#####	#####	#DIV/0!	#DIV/0!	#DIV/0!

$L_M = \mathbf{0\ m}$ & $Qty_{Mn} = \mathbf{0}$

Ref (2)



- $L_B\ of\ Qty_{Cont}$

$$d_{B(MR-TOP)} = 25 \quad \& \quad d_{B(MR-BOTT)} = 25$$

$$d_{B(MR-TOP)} = d_{B(MR-BOTT)}$$

$$L_B\ of\ Qty_{Cont(TOP)} = 7.75\ m$$
$$Qty_{Total} = Qty_{Cont(TOP)} + Qty_{Cont(BOTT)} = 6 + 6 = 12$$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	12	7.75	4	0.77	0	#####	#####	0.00	#DIV/0!	#DIV/0!
7.5				0.97	0	#####	#####	0.00	#DIV/0!	#DIV/0!
9				1.16	1	48.00	48	1.25	0.00	60.000
12				1.55	1	48.00	48	4.25	0	204.000

$$L_M = \mathbf{9\ m}\ \ \&\ \ Qty_{Mn} = \mathbf{48}$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

$$L_B\ of\ Qty_{Extra(TOP)A} = 2.421\ m$$
$$L_B\ of\ Qty_{Extra(TOP)B} = 2.421\ m$$
$$L_B\ of\ Qty_{Extra(TOP)A} = L_B\ of\ Qty_{Extra(TOP)B}$$

$$L_B\ of\ Qty_{Extra(TOP)A} = 2.421\ m$$

$$Qty_{Total} = Qty_{Extra(TOP)A} + Qty_{Extra(TOP)B} = 3 + 3 = 6$$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	6	2.241	4	2.68	2	12.00	12	1.52	0	18.216
7.5				3.35	3	8.00	8	0.78	0	6.216
9				4.02	4	6.00	6	0.04	0.00	0.216
12				5.35	5	4.80	5	0.80	2.4	5.580

$$L_M = \mathbf{9\ m}\ \ \&\ \ Qty_{Mn} = \mathbf{6}$$

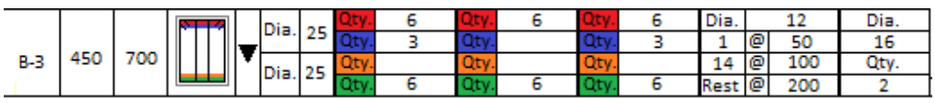
- $L_B\ of\ \ Qty_{Extra\ (BOTT)}$

$$L_B\ of\ \ Qty_{Extra\ (BOTT)} = 3.885\ m\ \ \&\ \ Qty_{Extra\ (BOTT)} = 0$$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	0	3.885	4	1.54	1	0.00	0	2.12	0	0.000
7.5				1.93	1	0.00	0	3.62	0	0.000
9				2.32	2	0.00	0	1.23	0	0.000
12				3.09	3	0.00	0	0.35	0	0.000

$$L_M = \mathbf{12\ m}\ \ \&\ \ Qty_{Mn} = \mathbf{0}$$

Ref (3)



- $L_B\ of\ Qty_{Cont}$

$$d_{B(MR-TOP)} = 25\ \ \&\ \ d_{B(MR-BOTT)} = 25$$
$$d_{B(MR-TOP)} = d_{B(MR-BOTT)}$$

$$L_B\ of\ Qty_{Cont(TOP)} = 7.75\ m$$

$$Qty_{Total} = Qty_{Cont(TOP)} + Qty_{Cont(BOTT)} = 6 + 6 = 12$$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	12	7.75	4	0.77	0	#####	#####	0.00	#DIV/0!	#DIV/0!
7.5				0.97	0	#####	#####	0.00	#DIV/0!	#DIV/0!
9				1.16	1	48.00	48	1.25	0	60.000
12				1.55	1	48.00	48	4.25	0	204.000

$$L_M = \mathbf{9\ m}\ \ \&\ \ Qty_{Mn} = \mathbf{48}$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

$$L_B\ of\ Qty_{Extra(TOP)A} = 2.434\ m$$
$$L_B\ of\ Qty_{Extra(TOP)B} = 2.434\ m$$
$$L_B\ of\ Qty_{Extra(TOP)A} = L_B\ of\ Qty_{Extra(TOP)A}$$

$L_B\ of\ Qty_{Extra(TOP)A} = 2.434\ m$

$Qty_{Total} = Qty_{Extra(TOP)A} + Qty_{Extra(TOP)B} = 3 + 3 = 6$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	6	2.434	4	2.47	2	12.00	12	1.13	0	13.584
7.5				3.08	3	8.00	8	0.20	0	1.584
9				3.70	3	8.00	8	1.70	0.00	13.584
12				4.93	4	6.00	6	2.26	0	13.584

$L_M = \mathbf{7.5\ m}$ & $Qty_{Mn} = \mathbf{8}$

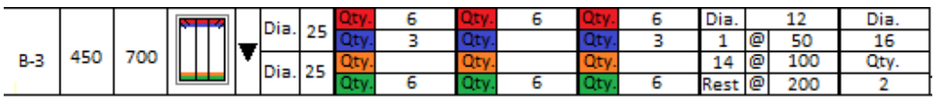
- $L_B\ of\ Qty_{Extra\ (BOTT)}$

$L_B\ of\ Qty_{Extra\ (BOTT)} = 3.84\ m$ & $Qty_{Extra\ (BOTT)} = 0$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	0	3.84	4	1.56	1	0.00	0	2.16	0	0.000
7.5				1.95	1	0.00	0	3.66	0	0.000
9				2.34	2	0.00	0	1.32	0	0.000
12				3.13	3	0.00	0	0.48	0	0.000

$L_M = \mathbf{12\ m}$ & $Qty_{Mn} = \mathbf{0}$

Ref (4)



- $L_B\ of\ Qty_{Cont}$

$$d_{B(MR-TOP)} = 25\ \ \&\ \ d_{B(MR-BOTT)} = 25$$
$$d_{B(MR-TOP)} = d_{B(MR-BOTT)}$$

$L_B\ of\ Qty_{Cont(TOP)} = 8.085\ m$

$Qty_{Total} = Qty_{Cont(TOP)} + Qty_{Cont(BOTT)} = 6 + 6 = 12$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	12	8.085	4	0.74	0	#####	#####	0.00	#DIV/0!	#DIV/0!
7.5				0.93	0	#####	#####	0.00	#DIV/0!	#DIV/0!
9				1.11	1	48.00	48	0.91	0.00	43.920
12				1.48	1	48.00	48	3.92	0	187.920

$L_M = \mathbf{9\ m}$ & $Qty_{Mn} = \mathbf{48}$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

$$L_B\ of\ Qty_{Extra(TOP)A} = 3.144\ m$$
$$L_B\ of\ Qty_{Extra(TOP)B} = 2.434\ m$$
$$L_B\ of\ Qty_{Extra(TOP)A} \neq L_B\ of\ Qty_{Extra(TOP)B}$$

$L_B\ of\ Qty_{Extra(TOP)A} = 3.144\ m$ & $Qty_{Extra(TOP)A} = 3$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]	Qty [M]	L [W]	L [E]	Total Waste

6	3	3.144	4	1.91	1	12.00	12	2.86	0	34.272
7.5				2.39	2	6.00	6	1.21	0	7.272
9				2.86	2	6.00	6	2.71	0.00	16.272
12				3.82	3	4.00	4	2.57	0	10.272

$L_M = \mathbf{7.5\ m}$ & $Qty_{Mn} = \mathbf{6}$

$L_B\ of\ Qty_{Extra(TOP)B} = 2.434\ m$ & $Qty_{Extra(TOP)B} = 3$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	3	2.434	4	2.47	2	6.00	6	1.13	0	6.792
7.5				3.08	3	4.00	4	0.20	0	0.792
9				3.70	3	4.00	4	1.70	0.00	6.792
12				4.93	4	3.00	3	2.26	0	6.792

$L_M = \mathbf{7.5\ m}$ & $Qty_{Mn} = \mathbf{4}$

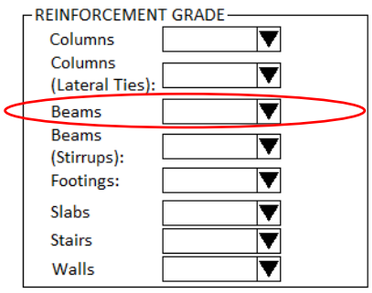
- $L_B\ of\ Qty_{Extra\ (BOTT)}$

$L_B\ of\ Qty_{Extra\ (BOTT)} = 3.84\ m$ & $Qty_{Extra\ (BOTT)} = 0$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	0	3.84	4	1.54	1	0.00	0	2.12	0	0.000
7.5				1.93	1	0.00	0	3.62	0	0.000
9				2.32	2	0.00	0	1.23	0	0.000
12				3.09	3	0.00	0	0.35	0	0.000

$L_M = \mathbf{12\ m}$ & $Qty_{Mn} = \mathbf{0}$

9. The program will determine the price of each beam



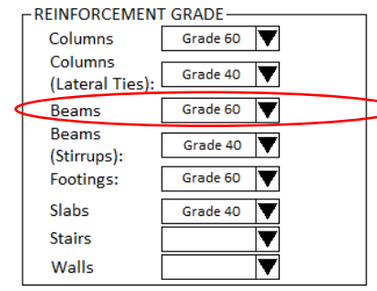
$$Price_{Beam} = \sum Qty_M Price_M$$

Where:

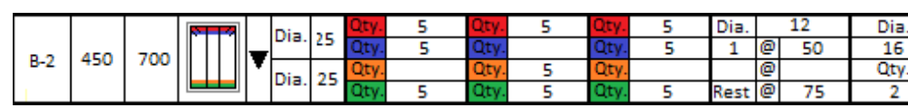
$Price_M = Price\ of\ the\ steel\ reinforcement\ based\ on\ Pricing$

$= Sorted\ through\ Reinforcement\ Grade, diameter, and\ Manufactured\ Length$

Example:



Ref (1)



$d_{B(MR-TOP)} = 25$ & $d_{B(MR-BOTT)} = 25$

Rebar GRADE 60 (⌀25mm) [6m]- **₱ 1040.31**

Rebar GRADE 60 (⌀25mm) [7.5m]- **₱ 1300.39**

Rebar GRADE 60 (⌀25mm) [9m]- **₱ 1560.47**

Rebar GRADE 60 (⌀25mm) [10.5m]- **₱ 1820.54**

Rebar GRADE 60 (⌀25mm) [12m]- **₱ 2080.62**

- $L_B\ of\ Qty_{Cont}$

  $L_M = 12\ m\ \ \&\ \ Qty_M = 14$

  $Price_M = ₱\ 2080.62$

  $$Qty_M Price_M = 14(2080.62) = ₱\ 29128.68$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

  a) $L_M = 0\ m\ \ \&\ \ Qty_{Mn} = 0$

  $Price_M = ₱\ 0.00$

  $$Qty_M Price_M = 0(0.00) = ₱\ 0.00$$

  b) $L_M = 6\ m\ \ \&\ \ Qty_{Mn} = 4$

  $Price_M = ₱\ 1040.31$

  $$Qty_M Price_M = 4(1040.31) = ₱\ 4161.24$$

- $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $L_M = 0\ m\ \ \&\ \ Qty_{Mn} = 0$

  $Price_M = ₱\ 0.00$

  $$Qty_M Price_M = 0(0.00) = ₱\ 0.00$$

- TOTAL

  $Price_{Beam} = \sum Qty_M Price_M$

  $Price_{Beam} = 29128.68 + 0 + 1040.31 + 0$

  $Price_{Beam} = ₱\ \mathbf{33289.92}$

Ref (2)

B-3	450	700			Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.		12	Dia.
							Qty.	3	Qty.		Qty.	3	1	@	50	16
					Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
							Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$d_{B(MR-TOP)} = 25\ \ \&\ \ d_{B(MR-BOTT)} = 25$$

Rebar GRADE 60 (⌀25mm) [6m]- **₱ 1040.31**

Rebar GRADE 60 (⌀25mm) [7.5m]- **₱ 1300.39**

Rebar GRADE 60 (⌀25mm) [9m]- **₱ 1560.47**

Rebar GRADE 60 (⌀25mm) [10.5m]- **₱ 1820.54**

Rebar GRADE 60 (⌀25mm) [12m]- **₱ 2080.62**

- $L_B\ of\ Qty_{Cont}$

  $L_M = 9\ m\ \ \&\ \ Qty_{Mn} = 48$

  $Price_M = ₱\ 1560.47$

  $$Qty_M Price_M = 48(1560.47) = ₱\ 74902.56$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

  $L_M = 9\ m\ \ \&\ \ Qty_{Mn} = 6$

  $Price_M = ₱\ 1560.47$

  $$Qty_M Price_M = 6(1560.47) = ₱\ 9362.82$$

- $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $L_M = 12\ m\ \ \&\ \ Qty_{Mn} = 0$

  $Price_M = ₱\ 2080.62$

  $$Qty_M Price_M = 0(2080.62) = ₱\ 0.00$$

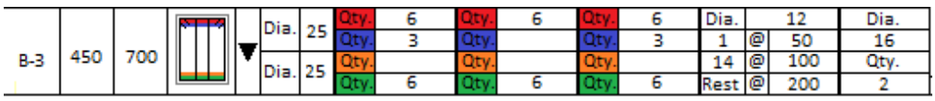
- TOTAL

  $Price_{Beam} = \sum Qty_M Price_M$

$$Price_{Beam} = 74902.56 + 9362.82 + 0$$

$$Price_{Beam} = ₱\ \mathbf{84265.38}$$

Ref (3)



$$d_{B(MR-TOP)} = 25 \quad \& \quad d_{B(MR-BOTT)} = 25$$

Rebar GRADE 60 (⌀25mm) [6m]- **₱ 1040.31**

Rebar GRADE 60 (⌀25mm) [7.5m]- **₱ 1300.39**

Rebar GRADE 60 (⌀25mm) [9m]- **₱ 1560.47**

Rebar GRADE 60 (⌀25mm) [10.5m]- **₱ 1820.54**

Rebar GRADE 60 (⌀25mm) [12m]- **₱ 2080.62**

- $L_B\ of\ Qty_{Cont}$

  $$L_M = 9\ m \quad \& \quad Qty_{Mn} = 48$$

  $$Price_M = ₱\ 1560.47$$

  $$Qty_M Price_M = 48(1560.47) = ₱\ 74902.56$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

  $$L_M = 7.5\ m \quad \& \quad Qty_{Mn} = 8$$

  $$Price_M = ₱\ 1300.39$$

  $$Qty_M Price_M = 8(1300.39) = ₱\ 10403.12$$

- $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $$L_M = 12\ m \quad \& \quad Qty_{Mn} = 0$$

  $$Price_M = ₱\ 2080.62$$

  $$Qty_M Price_M = 0(2080.62) = ₱\ 0.00$$

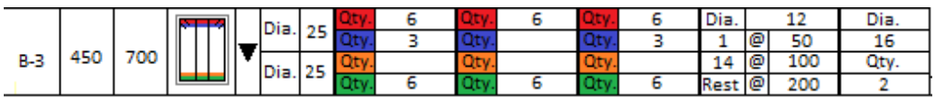
- TOTAL

  $$Price_{Beam} = \sum Qty_M Price_M$$

  $$Price_{Beam} = 74902.56 + 10403.12 + 0$$

  $$Price_{Beam} = ₱\ \mathbf{85305.68}$$

Ref (4)



$$d_{B(MR-TOP)} = 25 \quad \& \quad d_{B(MR-BOTT)} = 25$$

Rebar GRADE 60 (⌀25mm) [6m]- **₱ 1040.31**

Rebar GRADE 60 (⌀25mm) [7.5m]- **₱ 1300.39**

Rebar GRADE 60 (⌀25mm) [9m]- **₱ 1560.47**

Rebar GRADE 60 (⌀25mm) [10.5m]- **₱ 1820.54**

Rebar GRADE 60 (⌀25mm) [12m]- **₱ 2080.62**

- $L_B\ of\ Qty_{Cont}$

  $$L_M = 9\ m \quad \& \quad Qty_{Mn} = 48$$

  $$Price_M = ₱\ 1560.47$$

  $$Qty_M Price_M = 48(1560.47) = ₱\ 74902.56$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

  a) $L_M = 7.5\ m \quad \& \quad Qty_{Mn} = 6$

  $$Price_M = ₱\ 1300.39$$

  $$Qty_M Price_M = 6(1300.39) = ₱\ 7802.34$$

  b) $L_M = 7.5\ m \quad \& \quad Qty_{Mn} = 4$

  $$Price_M = ₱\ 1300.39$$

$$Qty_M Price_M = 4(1300.39) = ₱\ 5201.56$$

- $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $L_M = 12\ m\ \ \&\ \ Qty_{Mn} = 0$

  $Price_M = ₱\ 2080.62$

  $$Qty_M Price_M = 0(2080.62) = ₱\ 0.00$$

- TOTAL

  $Price_{Beam} = \sum Qty_M Price_M$

  $Price_{Beam} = 74902.56 + 7802.34 + 5201.56 + 0$

  $Price_{Beam} = ₱\ \mathbf{87906.46}$

10. The program will determine the total price of the beam row

$$Price_{Total} = \sum Price_{Beam}$$

Example

$Price_{Total} = \sum Price_{Beam}$

$Price_{Total} = 33289.92 + 84265.38 + 85305.68 + 87906.46$

$Price_{Total} = ₱\ \mathbf{290767.44}$

11. The program will determine the weight of each beam

- For $L_B\ of\ Qty_{Cont}$

  a) If $d_{B(MR-TOP)} = d_{B(MR-BOTT)}$

  $$L_M Qty_M W_{D(TOP)}$$

  b) If $d_{B(MR-TOP)} \neq d_{B(MR-BOTT)}$

  $$L_{M(TOP)} Qty_{M(TOP)} W_{D(TOP)} + L_{M(BOTT)} Qty_{M(BOTT)} W_{D(BOTT)}$$

- For $L_B\ of\ Qty_{Extra\ (TOP)}$

  $$L_M Qty_M W_{D(TOP)}$$

- For $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $$L_M Qty_M W_{D(BOTT)}$$

Then

$$W_{Beam} = \sum L_M Qty_M W_D$$

Where:

$W_D = Weight\ based\ of\ the\ cdiameter\ of\ the\ main\ reinforcement.$

Example

WEIGHT

BAR SIZE (Diameter)	kg / m
6 mm	0.222
8 mm	0.395
10 mm	0.616
12 mm	0.888
16 mm	1.597
20 mm	2.466
25 mm	3.854
28 mm	4.833
32 mm	6.313
36 mm	7.991
40 mm	9.864
44 mm	11.926
50 mm	15.413
56 mm	19.318

Ref (1)

B-2	450	700		▼	Dia.	25	Qty.	5	Qty.	5	Qty.	5	Dia.	12		Dia.
					Dia.	25	Qty.	5	Qty.		Qty.	5	1	@	50	16
							Qty.		Qty.	5	Qty.			@		Qty.
							Qty.	5	Qty.	5	Qty.	5	Rest	@	75	2

$d_{B(MR-TOP)} = 25\ \ \&\ \ d_{B(MR-BOTT)} = 25$

$W_{D(TOP)} = 3.854\ kg/m$

$W_{D(BOTT)} = 3.854\ kg/m$

- $L_B\ of\ Qty_{Cont}$

  $L_M = 12\ m\ \ \&\ \ Qty_M = 14$

$$L_M Qty_M W_D = 12(14)(3.854) = 647.472\ kg$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

  $L_M = 0\ m\ \ \&\ \ Qty_{Mn} = 0$

  $L_M = 6\ m\ \ \&\ \ Qty_{Mn} = 4$

$$L_M Qty_M W_{D(TOP)} = [0(0) + 6(4)](3.854) = 92.496\ kg$$

- $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $L_M = 0\ m\ \ \&\ \ Qty_{Mn} = 0$

$$L_M Qty_M W_{D(BOTT)} = 0(0)(3.854) = 0\ kg$$

- TOTAL

$$W_{Beam} = \sum L_M Qty_M W_D = 647.472 + 92.496 + 0 = \mathbf{739.968\ kg}$$

Ref (2)

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.	12	Dia.
						Qty.	3	Qty.		Qty.	3	1	@ 50	16
				Dia.	25	Qty.		Qty.		Qty.		14	@ 100	Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@ 200	2

$$d_{B(MR-TOP)} = 25\ \ \&\ \ d_{B(MR-BOTT)} = 25$$

$$W_{D(TOP)} = 3.854\ kg/m$$

$$W_{D(BOTT)} = 3.854\ kg/m$$

- $L_B\ of\ Qty_{Cont}$

  $L_M = 9\ m\ \ \&\ \ Qty_{Mn} = 48$

$$L_M Qty_M W_D = 9(48)(3.854) = 1664.928\ kg$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

  $L_M = 9\ m\ \ \&\ \ Qty_{Mn} = 6$

$$L_M Qty_M W_{D(TOP)} = 9(6)(3.854) = 208.116\ kg$$

- $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $L_M = 12\ m\ \ \&\ \ Qty_{Mn} = 0$

$$L_M Qty_M W_{D(BOTT)} = 12(0)(3.854) = 0\ kg$$

- TOTAL

$$W_{Beam} = \sum L_M Qty_M W_D = 1664.928 + 208.116 + 0 = \mathbf{1873.044\ kg}$$

Ref (3)

B-3	450	700		Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.	12	Dia.
						Qty.	3	Qty.		Qty.	3	1	@ 50	16
				Dia.	25	Qty.		Qty.		Qty.		14	@ 100	Qty.
						Qty.	6	Qty.	6	Qty.	6	Rest	@ 200	2

$$d_{B(MR-TOP)} = 25\ \ \&\ \ d_{B(MR-BOTT)} = 25$$

$$W_{D(TOP)} = 3.854\ kg/m$$

$$W_{D(BOTT)} = 3.854\ kg/m$$

- $L_B\ of\ Qty_{Cont}$

  $L_M = 9\ m\ \ \&\ \ Qty_{Mn} = 48$

$$L_M Qty_M W_D = 9(48)(3.854) = 1664.928\ kg$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

  $L_M = 7.5\ m\ \ \&\ \ Qty_{Mn} = 8$

$$L_M Qty_M W_{D(TOP)} = 7.5(8)(3.854) = 231.24\ kg$$

- $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $L_M = 12\ m\ \ \&\ \ Qty_{Mn} = 0$

$$L_M Qty_M W_{D(BOTT)} = 12(0)(3.854) = 0\ kg$$

- TOTAL

$$W_{Beam} = \sum L_M Qty_M W_D = 1664.928 + 231.24 + 0 = \mathbf{1896.168\ kg}$$

Ref (4)

B-3	450	700		▼	Dia.	25	Qty.	6	Qty.	6	Qty.	6	Dia.	12		Dia.
							Qty.	3	Qty.		Qty.	3	1	@	50	16
					Dia.	25	Qty.		Qty.		Qty.		14	@	100	Qty.
							Qty.	6	Qty.	6	Qty.	6	Rest	@	200	2

$$d_{B(MR-TOP)} = 25 \quad \& \quad d_{B(MR-BOTT)} = 25$$

$$W_{D(TOP)} = 3.854\ kg/m$$

$$W_{D(BOTT)} = 3.854\ kg/m$$

- $L_B\ of\ Qty_{Cont}$

  $L_M = 9\ m \quad \& \quad Qty_{Mn} = 48$

  $$L_M Qty_M W_D = 9(48)(3.854) = 1664.928\ kg$$

- $L_B\ of\ Qty_{Extra\ (TOP)}$

  $L_M = 7.5\ m \quad \& \quad Qty_{Mn} = 6$

  $L_M = 7.5\ m \quad \& \quad Qty_{Mn} = 4$

  $$L_M Qty_M W_{D(TOP)} = [7.5(6) + 7.5(4)](3.854) = 289.05\ kg$$

- $L_B\ of\ Qty_{Extra\ (BOTT)}$

  $L_M = 12\ m \quad \& \quad Qty_{Mn} = 0$

  $$L_M Qty_M W_{D(BOTT)} = 12(0)(3.854) = 0\ kg$$

- TOTAL

$$W_{Beam} = \sum L_M Qty_M W_D = 1664.928 + 289.05 + 0 = \mathbf{1953.978\ kg}$$

12. The program will determine the total weight of the beam row

$$W_{BR} = \sum W_{Beam}$$

Example:

$W_{BR} = \sum W_{Beam}$

$W_{BR} = 739.968 + 1873.044 + 1896.168 + 1953.978$

$W_{BR} = \mathbf{6463.158\ kg}$

13. The program will determine the labor price of the beam row

$$Price_{Labor} = W_{BR} \cdot L_R$$

Where:

$L_R = Labor\ Rate\ in\ Footing\ based\ in\ the\ Pricing$

CATEGORY: LABOR RATE (REBAR **PER KG**) - 9 items

FOOTING [KG]- **P 17**

WALL FOOTING [KG]- **P 17**

COLUMN [KG]- **P 15**

STAIRS [KG]- **P 15**

BEAM [KG]- **P 16**

FOOTING TIE BEAM [KG] - **P 16**

SLAB ON GRADE [KG]- **P 17**

SUSPENDED SLAB [KG]- **P 18**

WALLS [KG]- **P 16**

Example:

$$L_R = ₱\ 16$$

$Price_{Labor} = W_{BR} \cdot L_R$

$Price_{Labor} = 6463.158(16)$

$Price_{Labor} = ₱\ \mathbf{103419.528}$