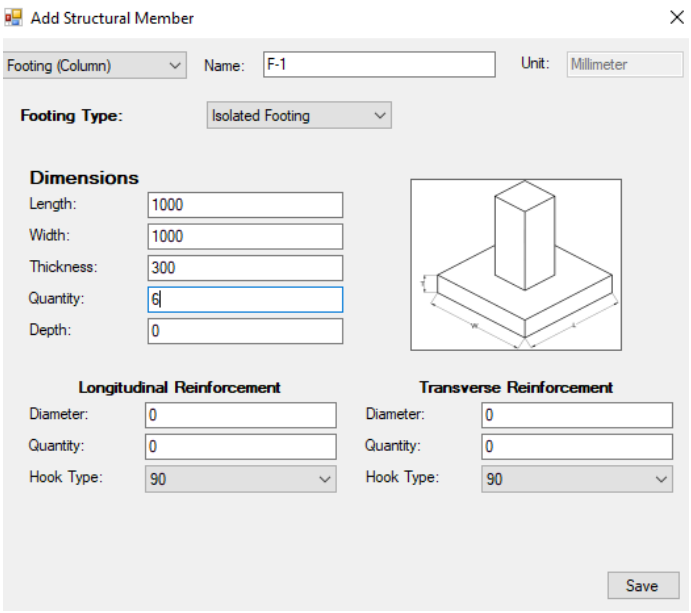
VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

FORMWORKS, FRAMEWORKS AND SCAFFOLDING

A. Footing FORMWORKS

F-1



Get the surface area of each side

a= Length of footing (L) = 1m

b= Width of footing (W) = 1m

t = thickness = 0.3 m

A = Perimeter x Thickness x set

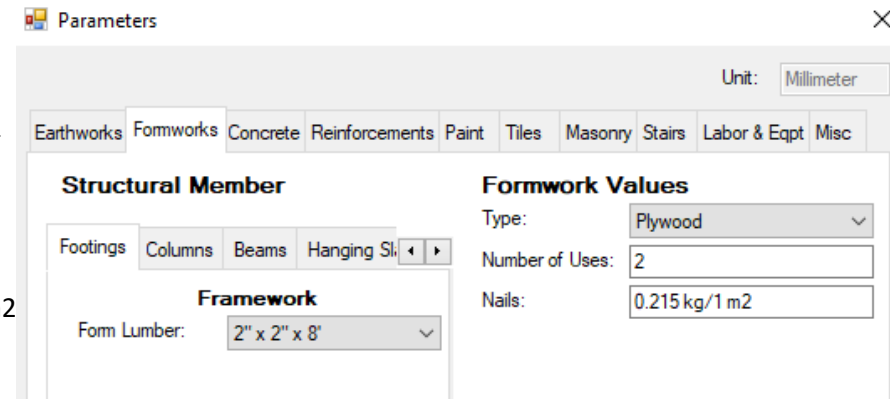
Perimeter = 2(length+width) + 0.2

= (2(1+1) +0.2) x 0.3m x 6sets = 7.56 m2

F-2

L = 900, W= 900 T=300

A= (2(0.9+0.9) +0.2) x 0.3 x 5 sets = 5.7 m2



F-3 (L = 800 , W=800, T 300)

A= (2(0.8+0.8) +0.2) x 0.3 x 2 sets = 2.04 m2

Total surface area of footings = 7.56 m2 + 5.7 m2 + 2.04 m2 = 15.3 m2

No. of pieces of Plywood needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{15.3}{(1.2*2.4)} = 5.31\ pcs\ X\ 50\%$

$= 2.66\ or\ 3\ pcs\ \ always\ round\ up\ if\ there's\ a\ decimal$

NOTE:

50% is the number of "uses"

If number of uses is set to 2 in FORMWORKS PARAMETERS, multiply by ½ or 50%

If number of uses is set to 3, multiply by 1/3 or 33.33%

¼ or 25%, 1/5 or 20%, 1/6 or 16.67% ….

Always round up the nearest whole number in terms of pieces

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B. FRAMEWORKS FOR FOOTINGS.

F-1 (SELECTED FOR COMPUTATION SINCE F-1 HAS THE LARGEST AREA= 7.56 m2)
Find the total number of Bd.Ft for lumber framework. (SELECTED FORM LUMBER 2" X 2" X 8')

i. For Length (L) which is 1m in this example. (1m + 0.1m = 1.1m) @ 4 sets
To get the Bd.Ft for the length:

$$= \frac{4(SELECTED\ FORM\ LUMBER * ((L + 0.1) * 3.28)}{12}$$

$$= \frac{4(2 * 2 * (1.1 * 3.28)}{12} = 4.81\ bd.ft$$

Note: 2 * 2 Here is from 2" x 2" x 8' Selected by the user

ii. For Width (W) which is 1m in this example. (1m) @ 4 sets
Note: Use only the width, no need to add 0.1m

$$= \frac{4(SELECTED\ FORM\ LUMBER * (W * 3.28)}{12}$$

$$= \frac{4(2 * 2 * (1 * 3.28)}{12} = 4.37\ bd.ft$$

iii. In a footing, there are always 4 sides for form work

2 sets of sides are always identical.

First set of sides:

Determine the number of vertical frame

= (L+0.1)/0.7m + 1

= (1+0.1)/0.7 +1= 2.57 or 3 pcs.

(ALWAYS ROUND UP IF THERE IS A DECIMAL IN THIS PART)

Multiply by 2 (because this is an identical set)

= 3 x2 = 6pcs.

2nd set of sides:

= ((W)/0.7m + 1) = ((1)/0.7 +1)= 2.43 or 3 pcs.

= 3 x 2 = 6pcs

Total number of Pieces = 6+6 = 12 pcs.

To get its length:

If the user selected 2"x 2" = thickness of footing – 0.1m

If the user selected 2" x 3" = thickness of footing – 0.15 m

In this case use = 0.3 – 0.1 = 0.2m (since the user selected 2"x 2")

$$= \frac{12\ (2 * 2 * (0.2 * 3.28)}{12} = 2.624\ bd.ft$$

12 is the number of pcs, but only for this part (vertical frames)

Total number of bd.ft = 4.81 + 4.37 + 2.624 = 11.804 bd. Ft

iv. Solve for the multiplier

Multiplier= (Total bd. Ft /area of the largest footing (F1 =7.56 m2))
Surface area = (L+0.1 x thickness x 2) + (W x thickness x 2)

= 11.804 / ((1.1x0.3x2) +(1x0.3x2)) = 9.38 bd ft / m2

Total Board foot (bd.ft) = 9.38 x 15.3 = 143.514 bd ft. x 50% = 71.575 bd. Ft
Note: 15.3 m2 came from Total surface area of footings computed above from page 1

SELECTED FORM LUMBER UNDER PARAMETERS BY USER: 2" X 2" X 8'

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT * 12}{SELECTED\ LUMBER\ FORM} = \frac{71.757 * 12}{2 * 2 * 8} = 27\ pcs\ of\ \ 2" \ x\ 2" \ x\ 8'$

Total no of pcs for footings 1 2 and 3 = 27pcs of 2" x2" x 8'

Summary for Footing Formworks

Plywood: 3pcs (P 674.00 /pc) = P 2,022.00
Total number of LUMBER: 2" x 2" x 8' @ 27pcs **(P 130.00 /pc) = P 3,510.00**

Total Material Cost= 2,022 + 3510 = P 5,532.00

Unit cost = Total Material cost / area of formworks= 5532/ 15.3 = P 361.568

Labor cost = labor rate* area of formwork = P 300.00 / m2 * 15.3 m2 = P 4590.00

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
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D. FOR TRAPEZOIDAL WALL FOOTING
(FOR REFERENCE ONLY, NOT INCLUDED IN THE TOTAL)

L: 53.25 m

L f-f: 32.7 m

BT: 0.4m

BU: 0.2m

T: 0.2m

$$\text{A} = (([(\text{c x L}) + 0.2] + \left(\frac{B_U + B_T}{2} \times T\right)) \text{ x } 2) \text{ x no of sets.}$$

$$c = \sqrt{\left(\frac{BT - BU}{2}\right)^2 + (T)^2}$$

$$c = \sqrt{\left(\frac{0.4 - 0.2}{2}\right)^2 + (0.2)^2} = 0.2236\ m$$

$$\text{A} = (([(0.2236 \text{ x } 53.25) + 0.2] + \left(\frac{0.2+0.4}{2} \times 0.2\right)) \text{ x } 2) \text{ x } 1 = 24.3334 \text{ m2}$$

No. of pieces of Plywood needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{24.334}{(1.2*2.4)} = 8.449\ pcs\ X\ 50\%$

= 4.224 or **5 pcs of plywood**

NOTE: BEFORE COMPUTING THE NO. OF PIECES , ADD ALL THE AREA OF ALL FOOTINGS FIRST (FOOTING, COMBINED FOOTING, TRAPEZOIDAL FOOTING)

For RECTANGULAR WALL FOOTING, no need for form works assuming the trimmed soil is shaped good enough.

5 pcs of plywood (@ 674 per pc) = P 3370.00

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
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I. COLUMNS

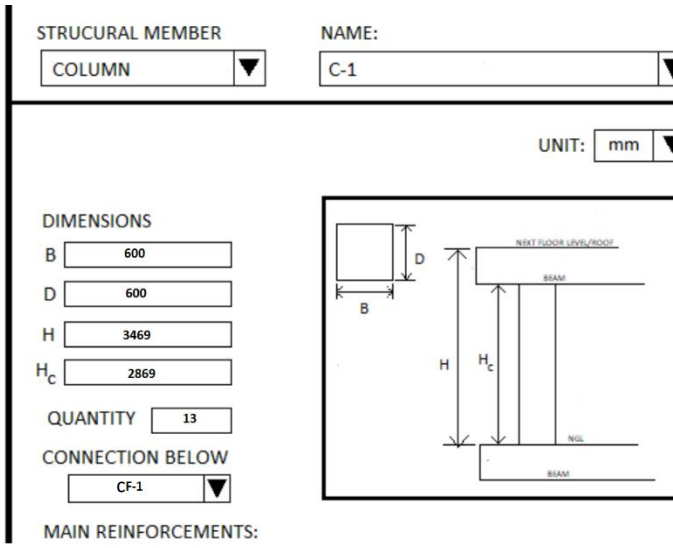
Note: sets = quantity = QTY

A. Form work

For Columns 1, 2, and 3 @ 13 sets x 3

(GROUND FLR)

H1: 3469 mm
B: 600 mm
D: 600 mm

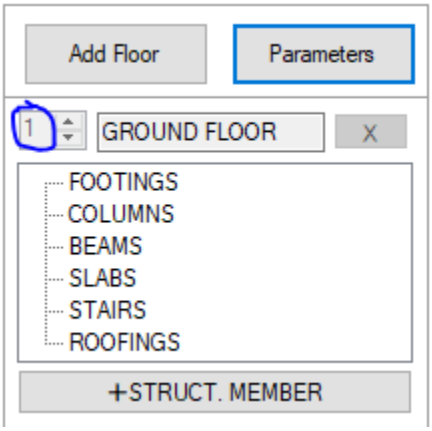


Perimeter = 2(b+d) + 0.2 = 2(0.6 + 0.6) + 0.2 = 2.6 m

A= Perimeter x height x sets

AREA =2.6 x 3.469 x 13 sets x 3 columns = **351.75 m2**

$$\frac{TOTAL\ \ surface\ AREA}{AREA\ OF\ PLYWOOD\ (1.2\ m\ *\ 2.4m)} = \frac{351.75}{(1.2 * 2.4)} = 122.14pcs\ x\ 50\% = 61.07\ or\ 62pcs$$



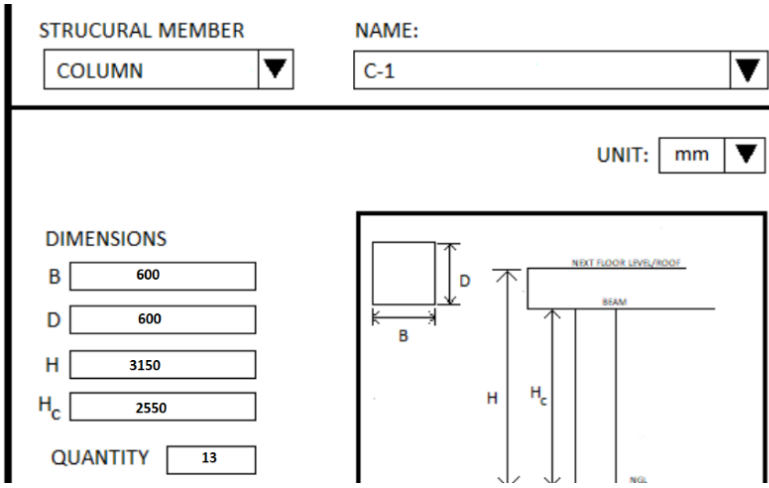
Note: Ground floor is always and forever permanently 1 anyways.

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

For Columns 1, 2, and 3 @ 13 sets x 3 **(C1 C2 AND C3 HAVE SAME INPUTS AND DIMENSIONS)**

(2ND FLOOR – 4TH FLOOR)

H: 3150 mm
B:600
D:600



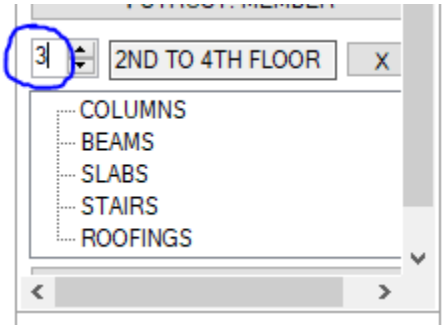
Perimeter = 2(b+d) + 0.2 = 2(0.6 + 0.6) + 0.2 = 2.6 m

A= Perimeter x height x sets

A= 2.6 x 3.150 x 13 sets x 3 columns = **319.41 m²**

$$= \frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{319.41}{(1.2*2.4)} = 110.91\ pcs\ X\ 50\%$$

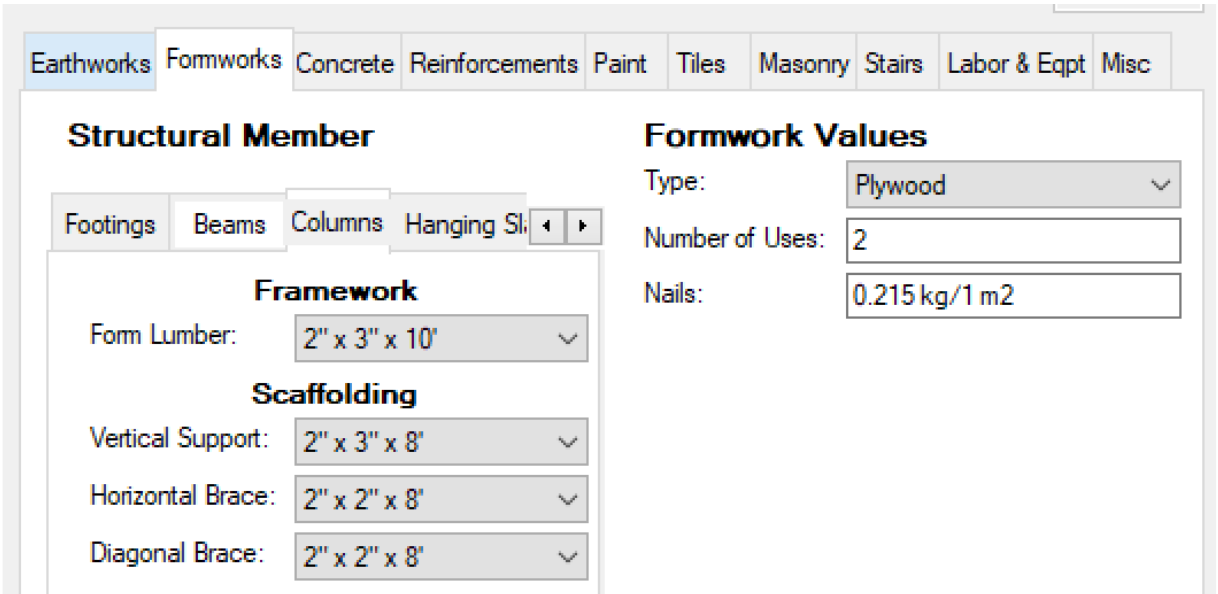
$$= 55.45\ pcs = 56\ pcs$$



$$= 56\ pcs * 3\ floors = 168\ pcs.$$

Area Total = 351.75 + 319.41 x 3 floors = 1309.98 m² **(TO BE USED IN TOTAL SQM IN BOQ)**

Total no. of plywood = 62 + 168 = **230 pcs**



VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
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B. **COLUMN (OR POST) FRAMEWORK**

From lumber selected by user: 2" x 3" x 10"
Thickness of plywood = BASED ON ALWAYS ½" (FIXED)

Look for the value in the table that matched the category

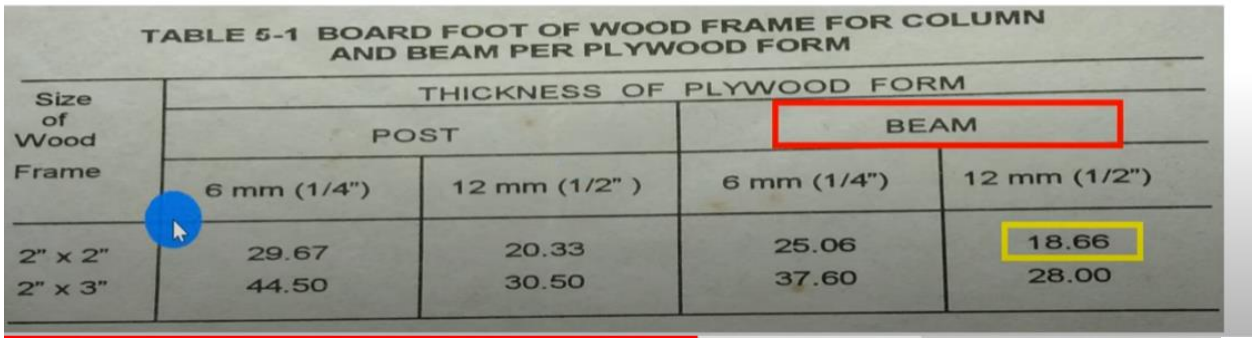
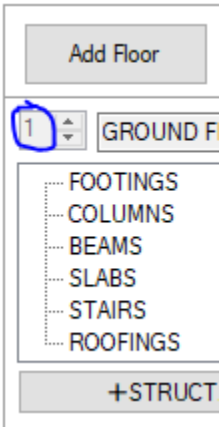


TABLE 5-1 BOARD FOOT OF WOOD FRAME FOR COLUMN AND BEAM PER PLYWOOD FORM

Size of Wood Frame	THICKNESS OF PLYWOOD FORM			
	POST		BEAM	
	6 mm (1/4")	12 mm (1/2")	6 mm (1/4")	12 mm (1/2")
2" x 2"	29.67	20.33	25.06	18.66
2" x 3"	44.50	30.50	37.60	28.00

Note: disregard the rectangular highlights in this table



FOR GROUND FLOOR:

= 62 pcs x 30.50 = 1891 bd. ft.

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{1891*12}{2*3*10} = 378.2\ or\ 379\ \ pcs\ of\ \ 2"\ x\ 3"\ x\ 10'$

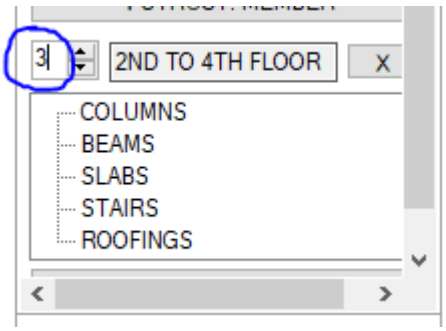
$$379\ \ pcs * 1\ floor = 379\ pcs$$

FOR 2nd to 4th FLOOR:

= 56 pcs x 30.50 = 1708 bd. ft.

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{1708*12}{2*3*10} = 341.6\ or\ 342\ \ pcs\ of\ \ 2"\ x\ 3"\ x\ 10'$

$$342pcs\ x\ 3\ floors = \ \boldsymbol{1026}\ pcs\ of\ \ 2"\ x\ 3"\ x\ 10'$$



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C. SCAFFOLDING

TABLE 5-3 QUANTITY OF LUMBER FOR SCAFFOLDING OR STAGING

Lumber Size	Column Board Ft. per M. Ht.			Beam Board Ft. per M. Ht.		Flooring Board Ft
	Vertical	Hor.	Brace	Vertical	Hor.	Per Sq. M.
2" x 2"	4.70	21.00	11.70	4.00	4.70	6.10
2" x 3"	7.00	31.67	17.50	6..00	7.00	9.10
2" x 4"	9.35	42.25	23.35	8.00	9.35	12.10

Note: disregard the rectangular highlights in this table

FOR GROUND FLOOR

VERTICAL SUPPORT

FORM LUMBER (2" X 3" 8')

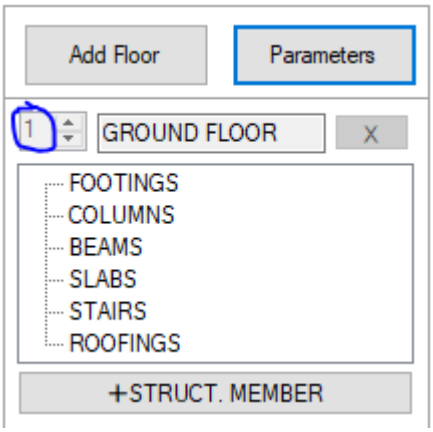
= Total column height x value in the table

C-1, C-2, C-3 @ 13 sets (GROUND FLR)
H1: 3469 mm
B: 600 mm
D: 600 mm

Total bd ft = [(3.469) x3 x 13] x 7 = 947.037 bd. Ft

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{947.037*12}{2*3*8} = 236.759 \times 50\% =$
$118.37\ or\ 119\ pcs\ of\ \ 2" \ x\ 3" \ x\ 8'$

119 **pcs** x 1 floor = $119\ pcs\ of\ \ 2" \ x\ 3" \ x\ 8'$



VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
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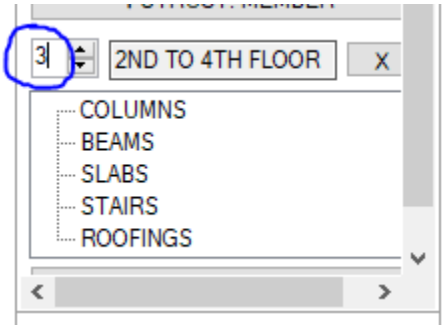


C-1, C-2, C-3 @ 13 sets (2ND FLOOR – 4TH FLOOR)
H: 3150 mm
B:600
D:600
Total bd ft = [(3.150) x3 x 13] x 7 = 859.95 bd. Ft

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{859.95*12}{2*3*8} = 214.98 \times 50\% =$
$107.49\ or\ 108\ pcs\ of\ \ 2" \times 3" \times 8'$

$= 108\ pcs\ x\ 3\ floors\ =\ 324\ pcs\ pcs\ of\ \ 2" \times 3" \times 8'$

HORIZONTAL BRACE (2 X 2 X 8)

C-1, C-2, C-3 @ 13 sets (GROUND FLR)
H1: 3469 mm
B: 600 mm
D: 600 mm

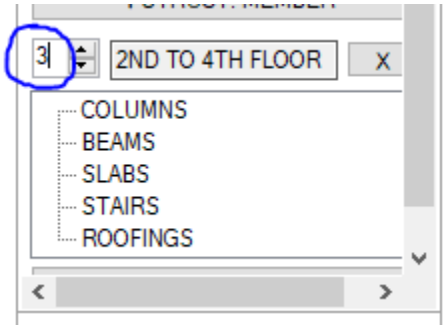
Total bd ft. = [(3.469) x3 x 13] x 21 = 2841.111 bd. Ft

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{2841.111*12}{2*2*8} = 1065.41 \times 50\% =$
$532.71\ or\ 533\ pcs\ of\ \ 2" \times 2" \times 8'$

C-1, C-2, C-3 @ 13 sets (2ND FLOOR – 4TH FLOOR)
H: 3150 mm
B:600
D:600
Total bd ft. = [(3.150) x3 x 13] x 21 = 2,579.85 bd. Ft

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{2{,}579.85*12}{2*2*8} = 967.44 \times 50\% =$
$483.72\ or\ 484\ pcs\ of\ \ 2" \times 3" \times 8'$

484 pcs x 3 floor = $1452\ pcs\ of\ \ 2" \times 2" \times 8'$



VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
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DIAGONAL BRACE (2 X 2 X 8)

C-1, C-2, C-3 @ 13 sets (GROUND FLR AND FIRST FLOOR)
H1: 3469 mm
B: 600 mm
D: 600 mm

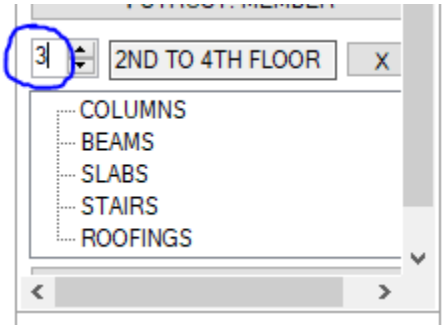
Total bd ft= [(3.469) x3 x 13] x 11.7 = 1582.9047 bd. Ft

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{1582.9047*12}{2*2*8} = 593.58 \times 50\% =$
$296.79\ or\ 297\ pcs\ of\ \ 2" \times 2" \times 8'$

C-1, C-2, C-3 @ 13 sets (2ND FLOOR – 4TH FLOOR)
H: 3150 mm
B:600
D:600
Total height= [(3.150) x3 x 13] x 11.7 = 1437.345 bd. Ft

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{1437.345*12}{2*2*8} = 539 \times 50\% =$
$269.5\ or\ 270\ pcs\ of\ \ 2" \times 3" \times 8'$

270 pcs x 3 floor = $810 pcs\ of\ \ 2" \times 2" \times 8'$



SUMMARY:

Plywood: 230 pcs (P 674.00 /pc) = P 155,020.00

2x2x8: 3092 pcs (P 130.00 /pc) = P 401,960.00

2x3x8: 443 pcs (P 150.00 /pc) = P 66,450.00

2x3x10: 1405 pcs (P 150.00 /pc) = P 210,750.00

Total material cost = P 834,180.00

Unit Cost= 834,180.00/1309.98= P 636.79

Labor cost = 1309.98* 300 = P 392,994.00

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
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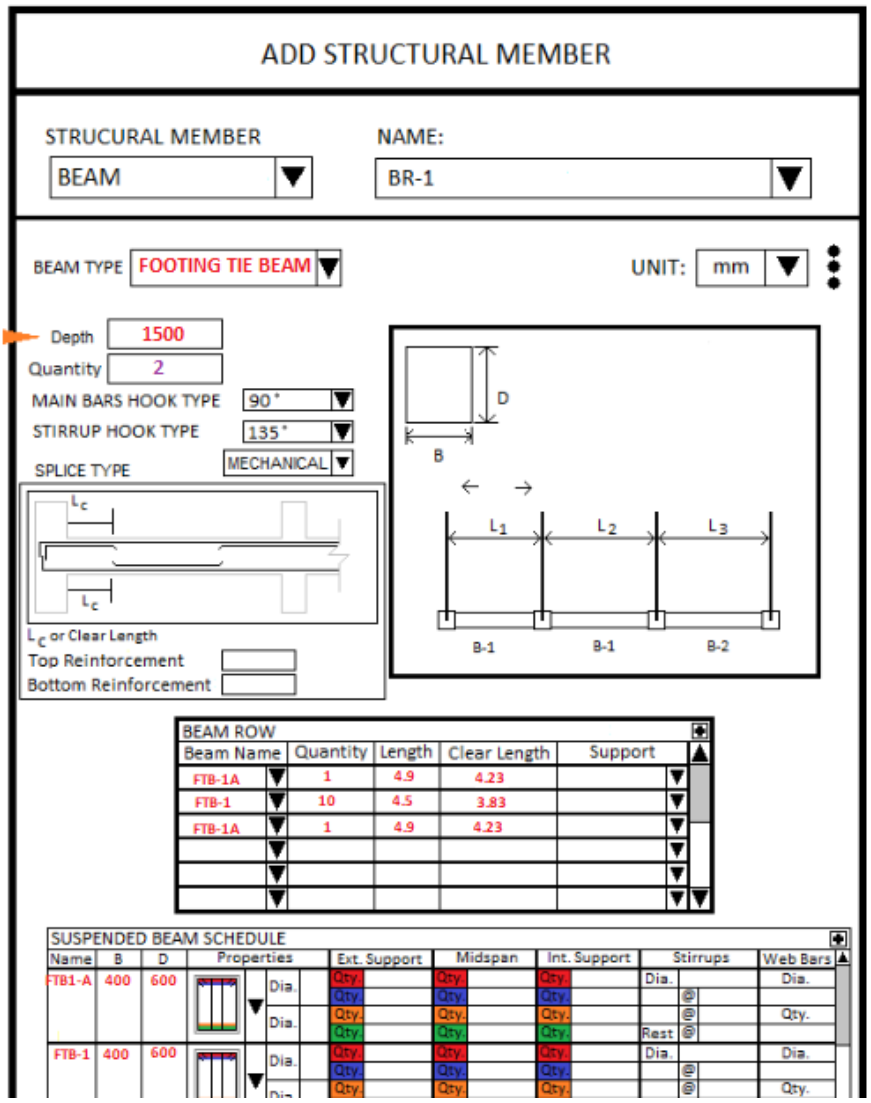
II. Beams / TIE BEAMS

A. formwork



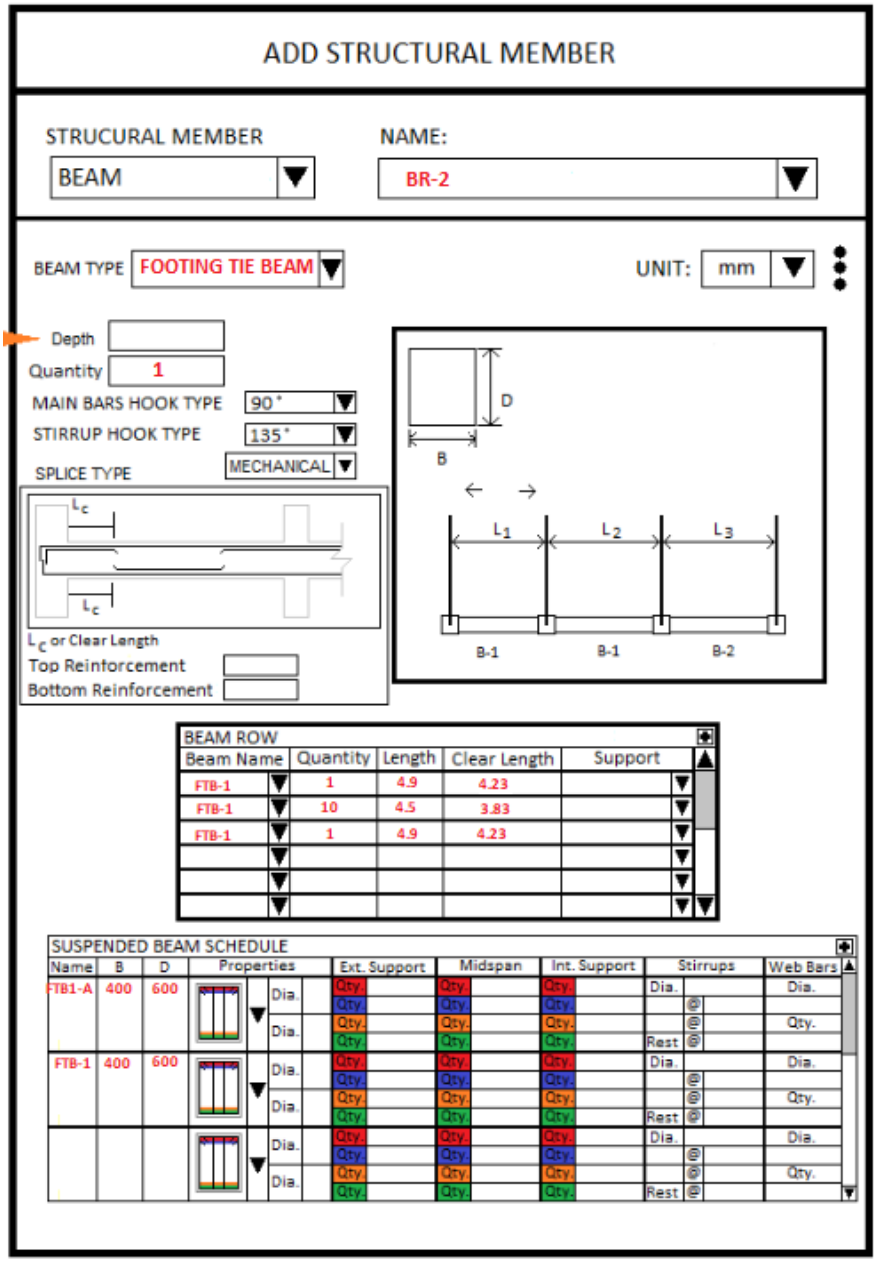
Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.6) + 0.4 + 0.1)] x [(4.9x1)+(4.5 x 10)+(4.9 x 1)] = 93.16 m2 X 2 QTY= **186.32 m2**

NOTE: ONLY THE ONES INCLUDED IN THE **BEAM ROW** ARE TO BE COMPUTED. BEAM SCHEDULE IS JUST THE LIST OF BEAMS IN THE PROJECT THAT CAN BE ADDED IN THE BEAM ROW. FOCUS ON WHAT IS INVOLVED IN THE **BEAM ROW.**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

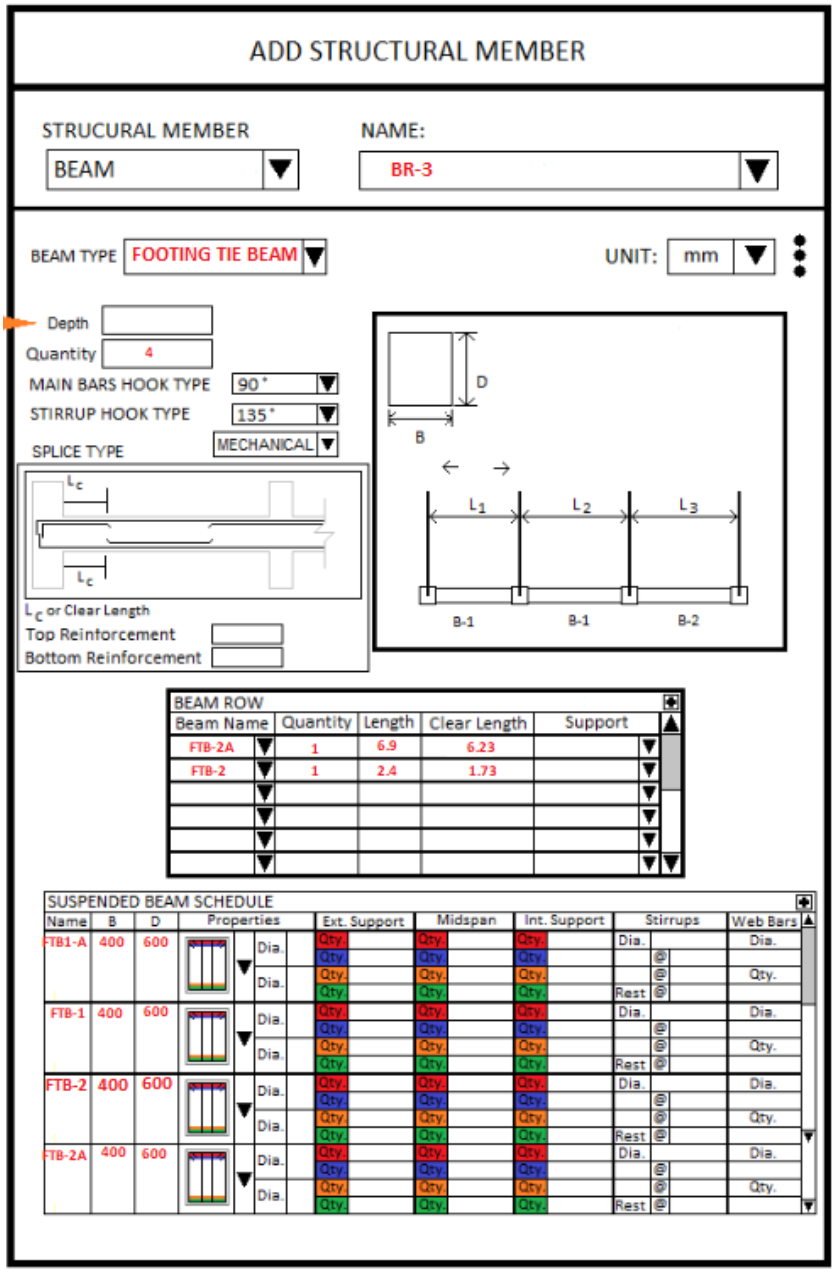


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.6) + 0.4 + 0.1)] x [(4.9x1)+(4.5 x 10)+(4.9 x 1)] = **93.16 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.6) + 0.4 + 0.1)] x [(6.9x1)+(2.4 x 1)] = 15.81 m2 x 4 = **63.24 m2**

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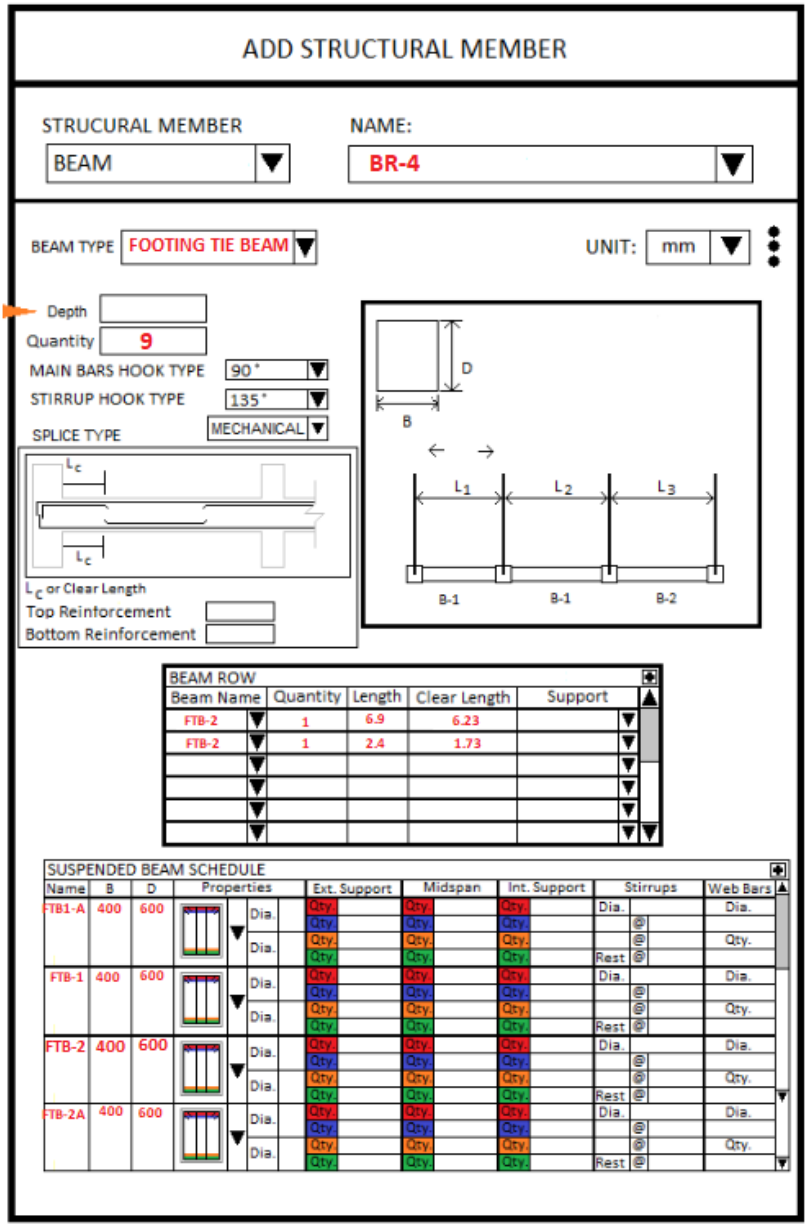


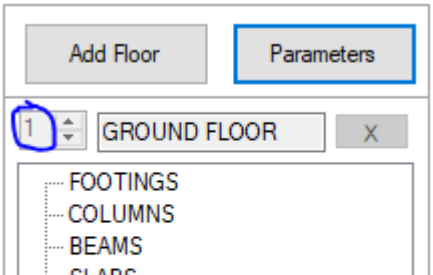
Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.6) + 0.4 + 0.1)] x [(6.9x1)+(2.4 x 1)] = 15.81 m2 x 9 = **142.29 m2**

Total area for Ground floor (Footing tie beam) = 186.32 + 93.16 + 63.24 + 142.29 = **485.01 m2**

No. of pieces of formworks needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{485.01}{(1.2*2.4)} = 168.406\ pcs\ X\ 50\%$

= 84.203 or 85 pcs x 1 floor = **85 pcs**



VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

B. Framework

Lumber selected: 2” x 3” x 8’

Thickness of formwork: ½ ” constant

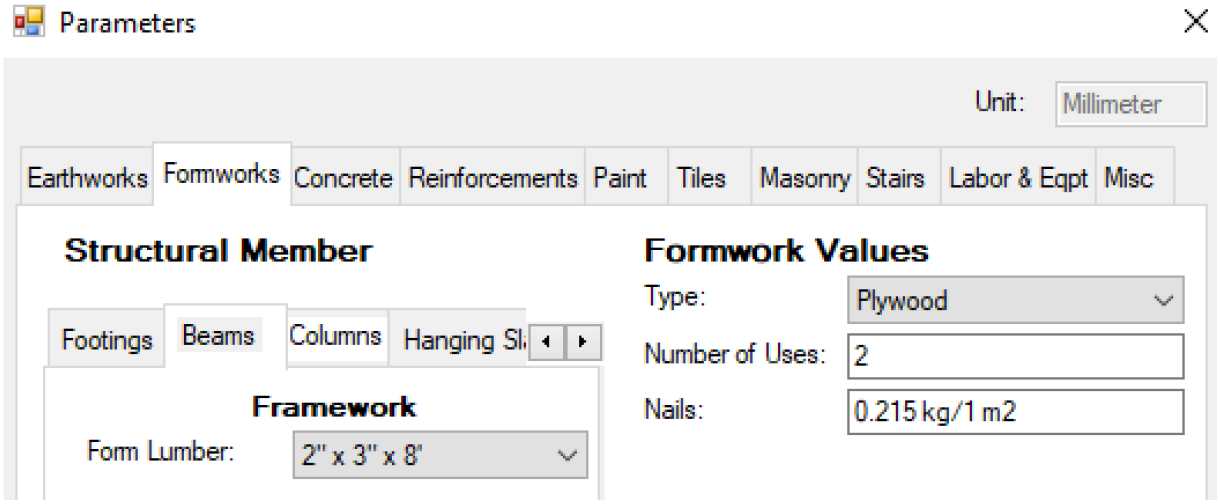
Look for the value in the table that matched the category

TABLE 5-1 BOARD FOOT OF WOOD FRAME FOR COLUMN AND BEAM PER PLYWOOD FORM

Size of Wood Frame	THICKNESS OF PLYWOOD FORM			
	POST		BEAM	
	6 mm (1/4")	12 mm (1/2")	6 mm (1/4")	12 mm (1/2")
2" x 2"	29.67	20.33	25.06	18.66
2" x 3"	44.50	30.50	37.60	28.00

Note: disregard the rectangular highlights in this table

85 pcs (from single floor ground floor) x 28 = 2380 bd ft.



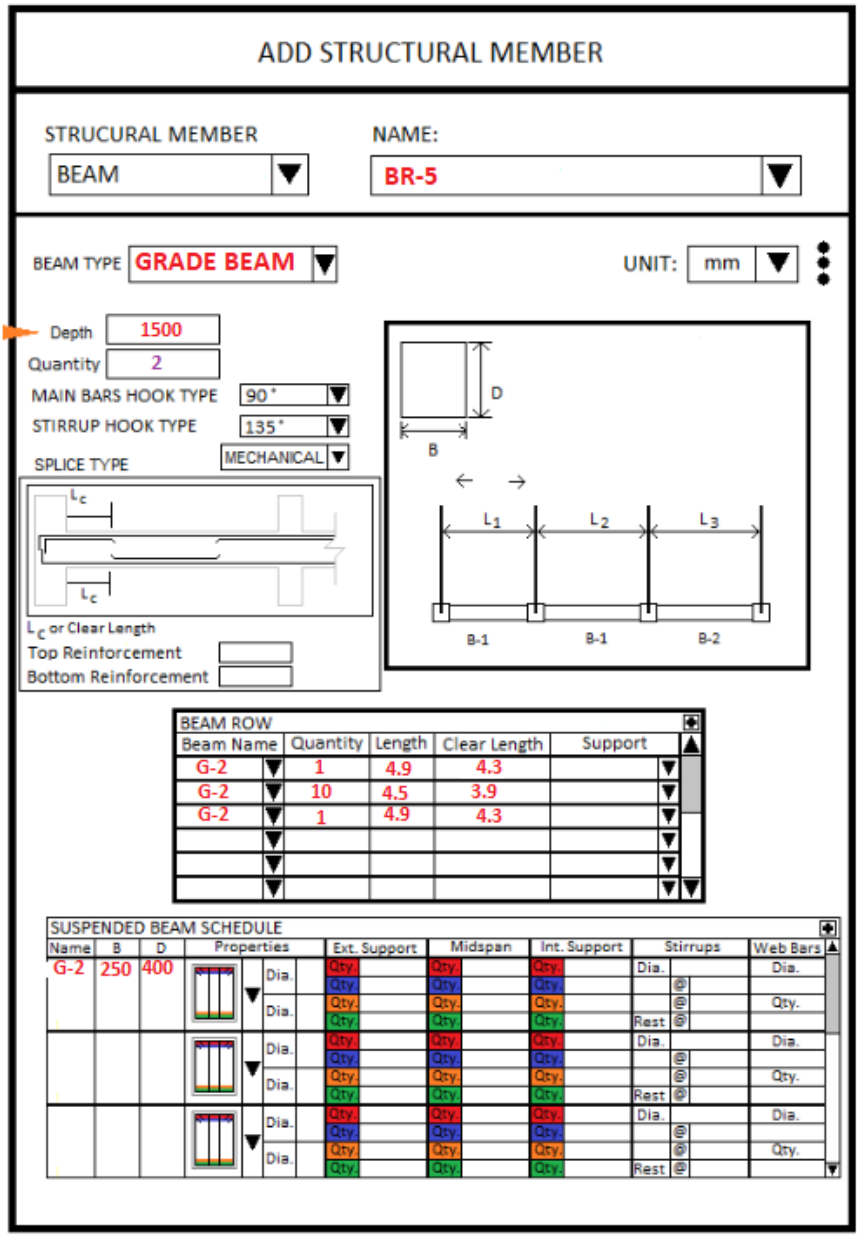
Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{2380*12}{2*3*8} = 595\ pcs\ of\ 2" \times 3" \times 8'$

$595\ pcs * 1\ \text{FLOOR (GROUND FLOOR)} = 595\ pcs\ of\ 2" \times 3" \times 8'$

NO NEED TO COMPUTE FOR SCAFFOLDING, NO SCAFFOLDING FOR FOOTING TIE BEAMS.

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

(Grade beams (2-4th floor))

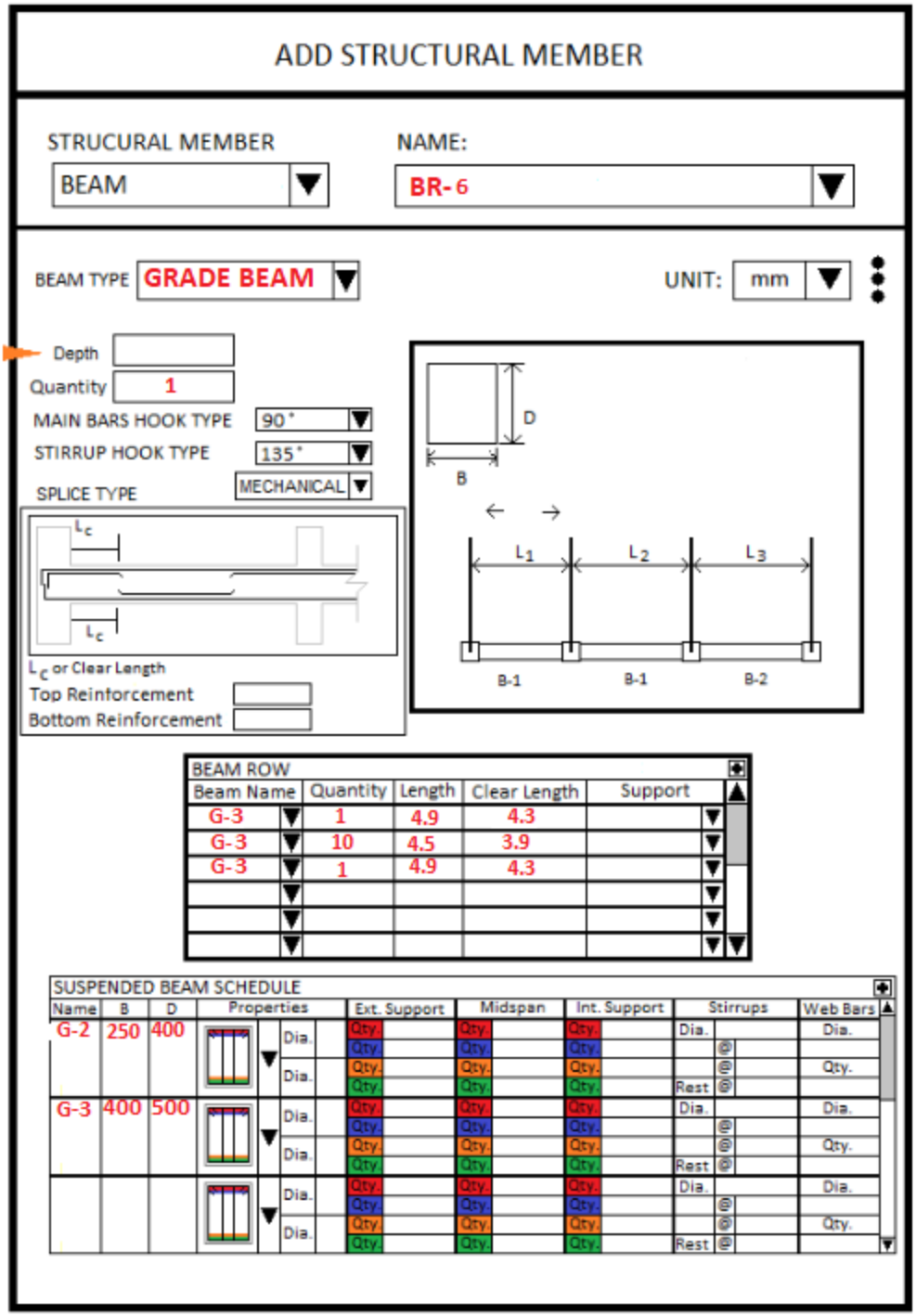


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25+ 0.1)] x [(4.9x1)+(4.5x10)+(4.9x 1)] = 63.02 m2 x 2 = **126.04 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

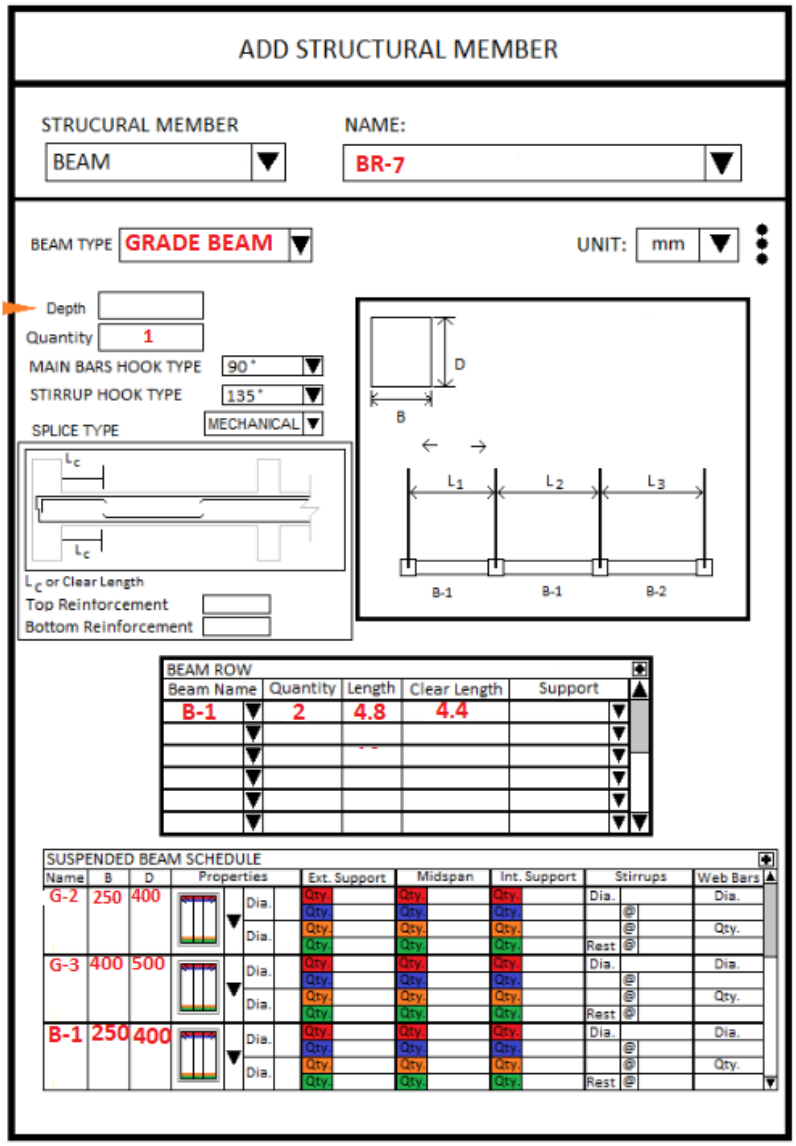


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.5) + 0.4 +0.1)] x [(4.9x1)+(4.5x10)+(4.9x 1)] = 82.2 m2 x 1 = **82.2 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

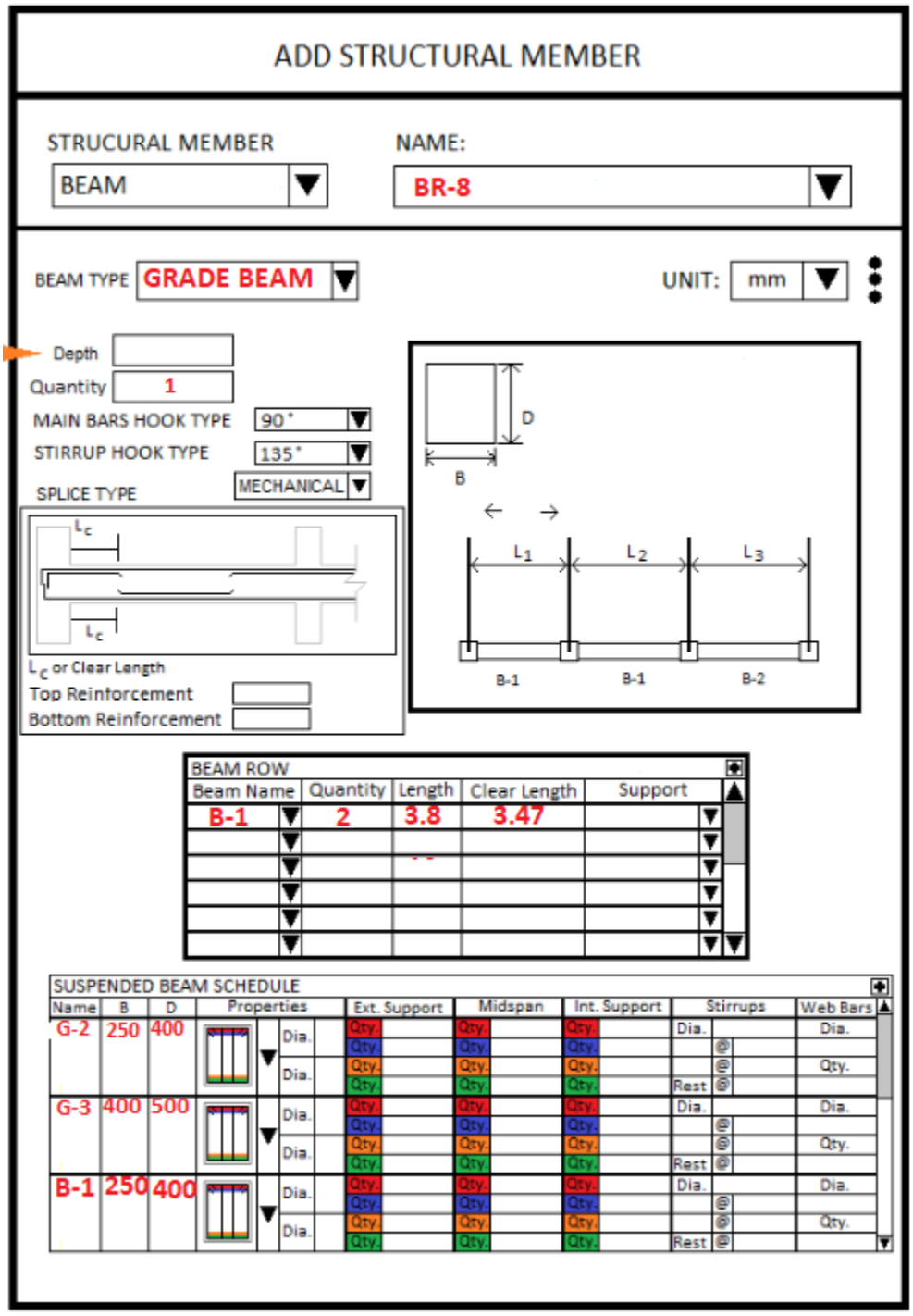


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(4.8x2)] = 11.04 m2 x 1 = **11.04 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

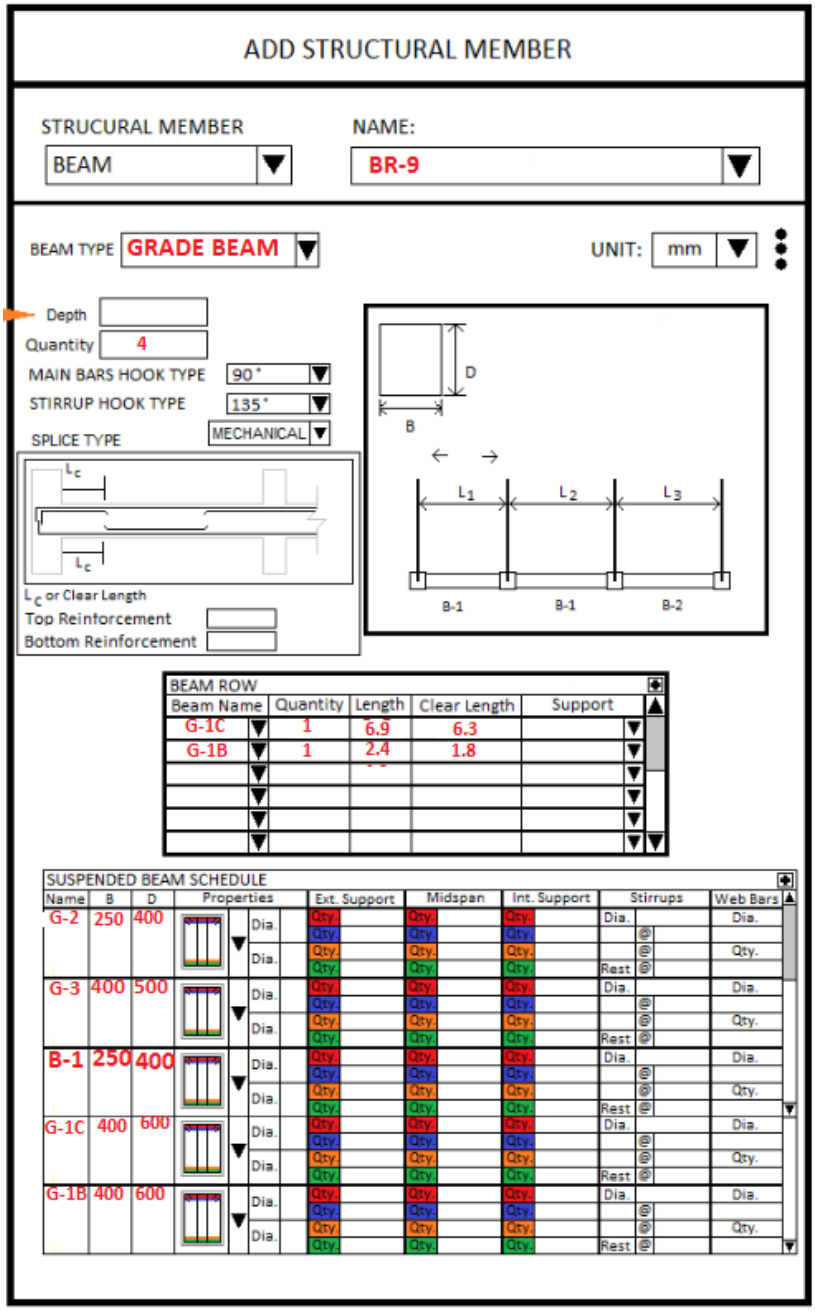


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(3.8x2)] = 8.74 m2 x 1 = **8.74m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

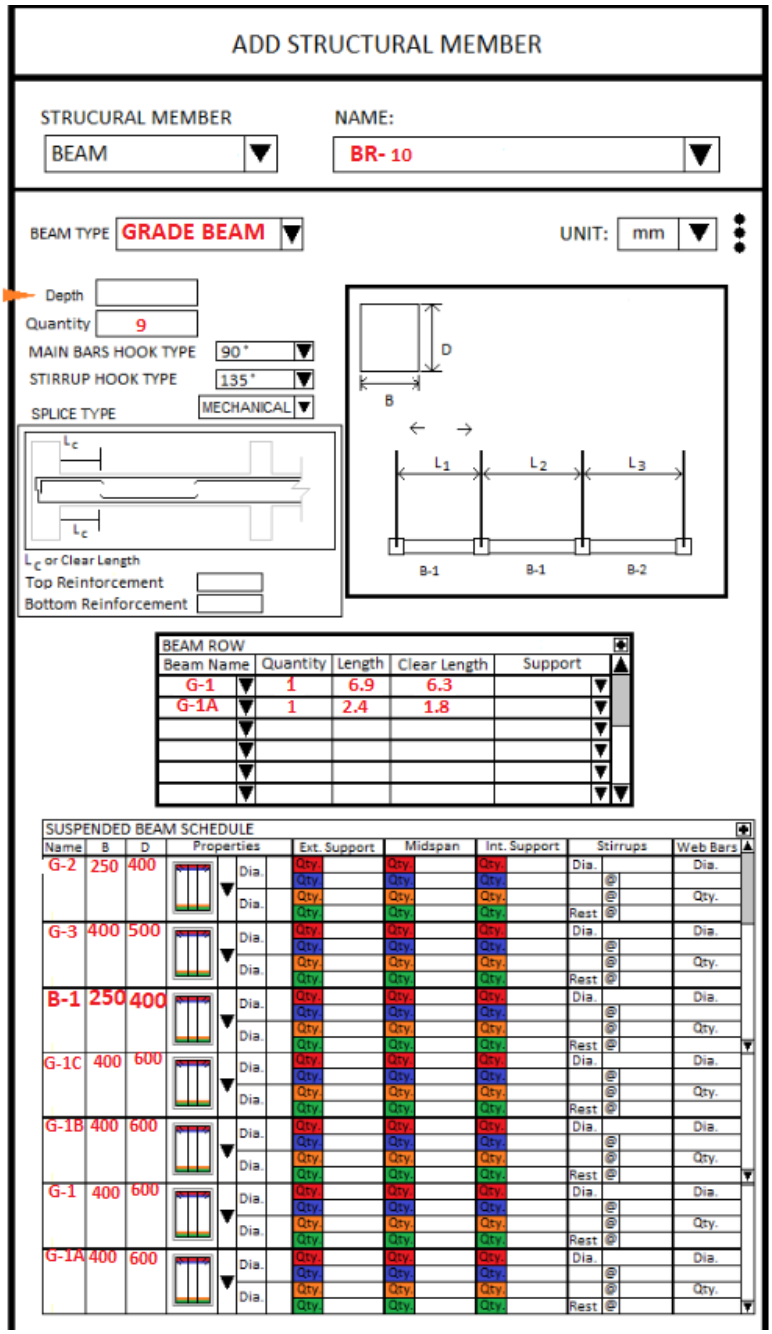


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.6) + 0.4 +0.1)] x [(6.9x1)+(2.4x1)] = 15.81 m2 x 4 = **63.24 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

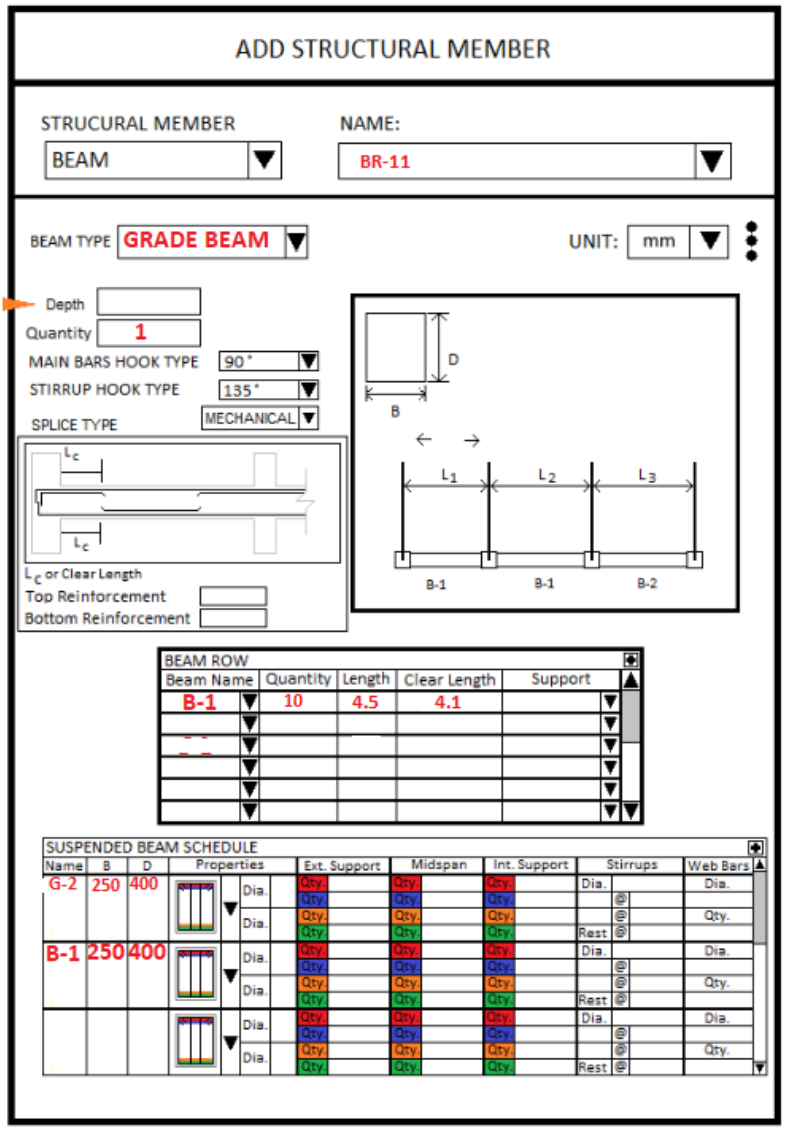


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.6) + 0.4 +0.1)] x [(6.9x1)+(2.4x1)] = 15.81 m2 x 9 = **142.29 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

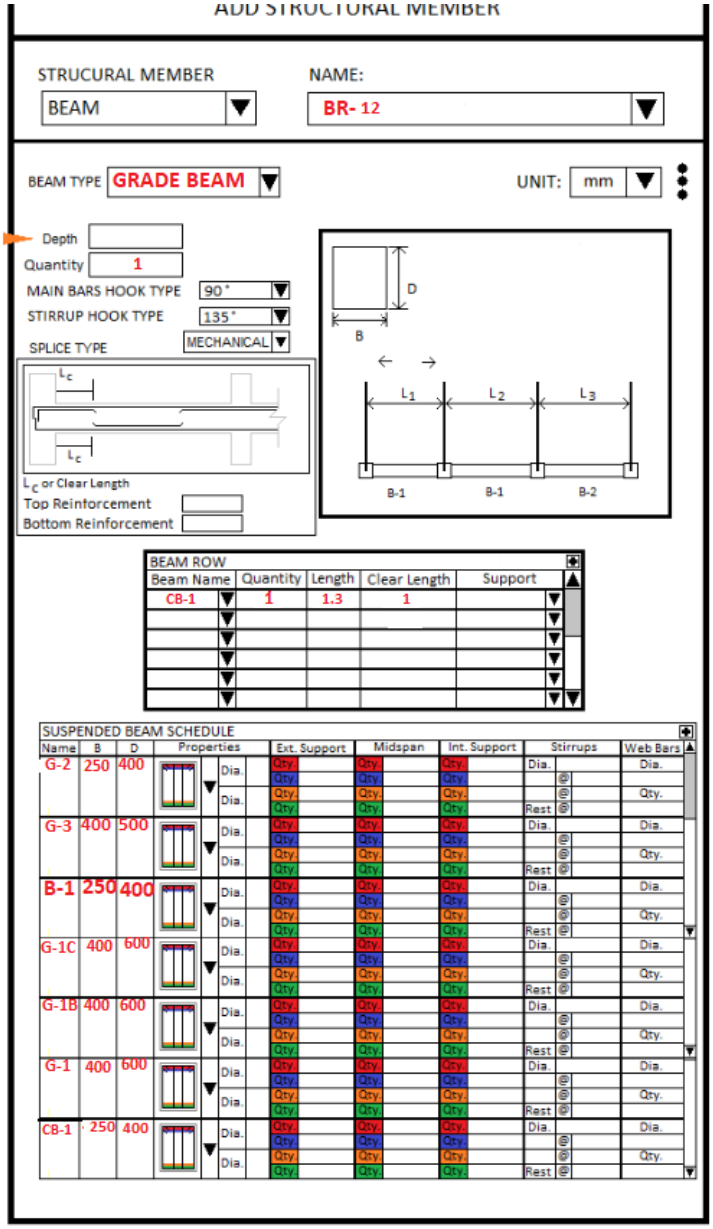


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(4.5x10)] = 51.75 m2 x 1 = **51.75 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

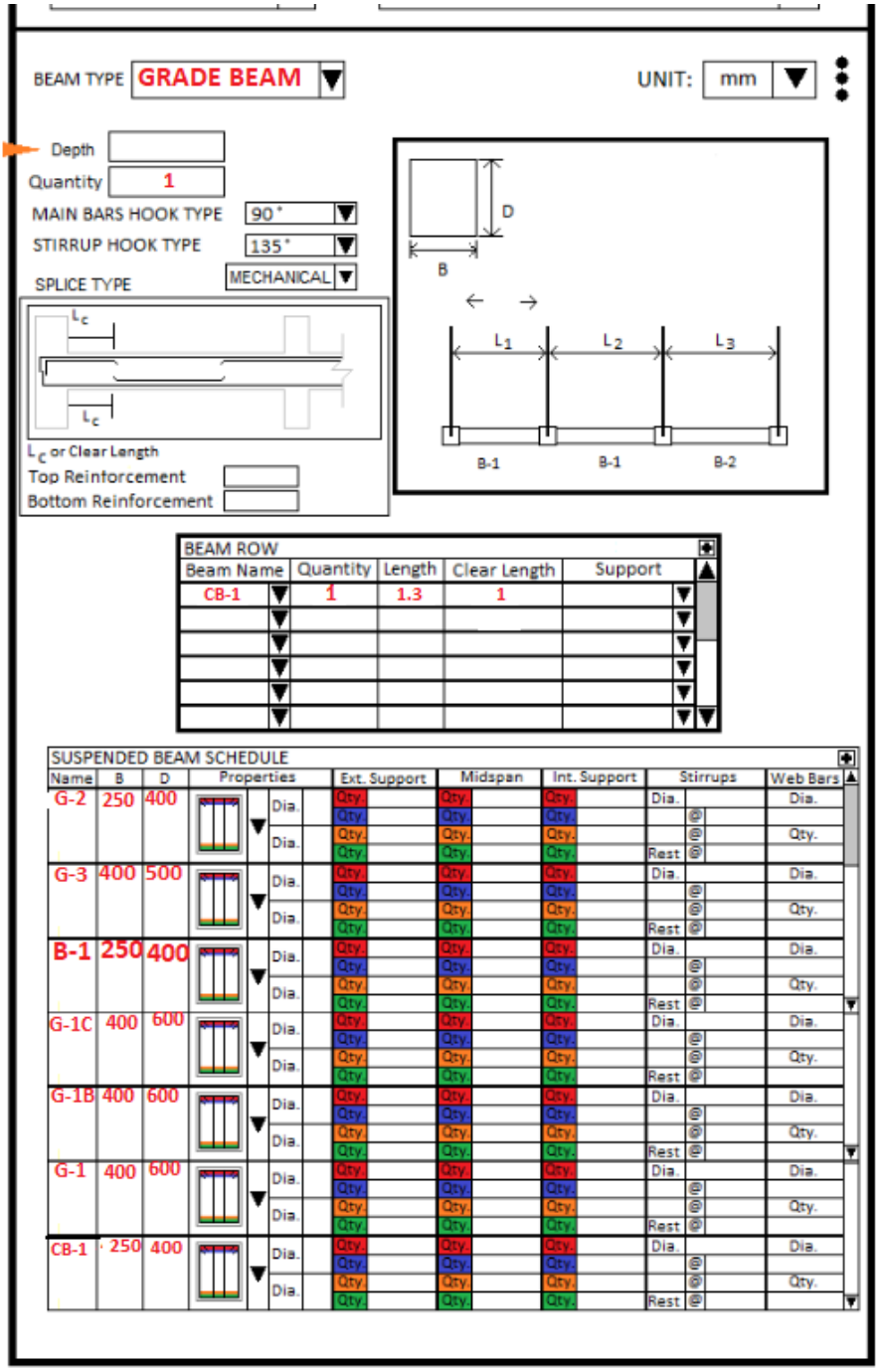


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(1.3x1)] = 1.495 m2 x 1 = **1.495 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

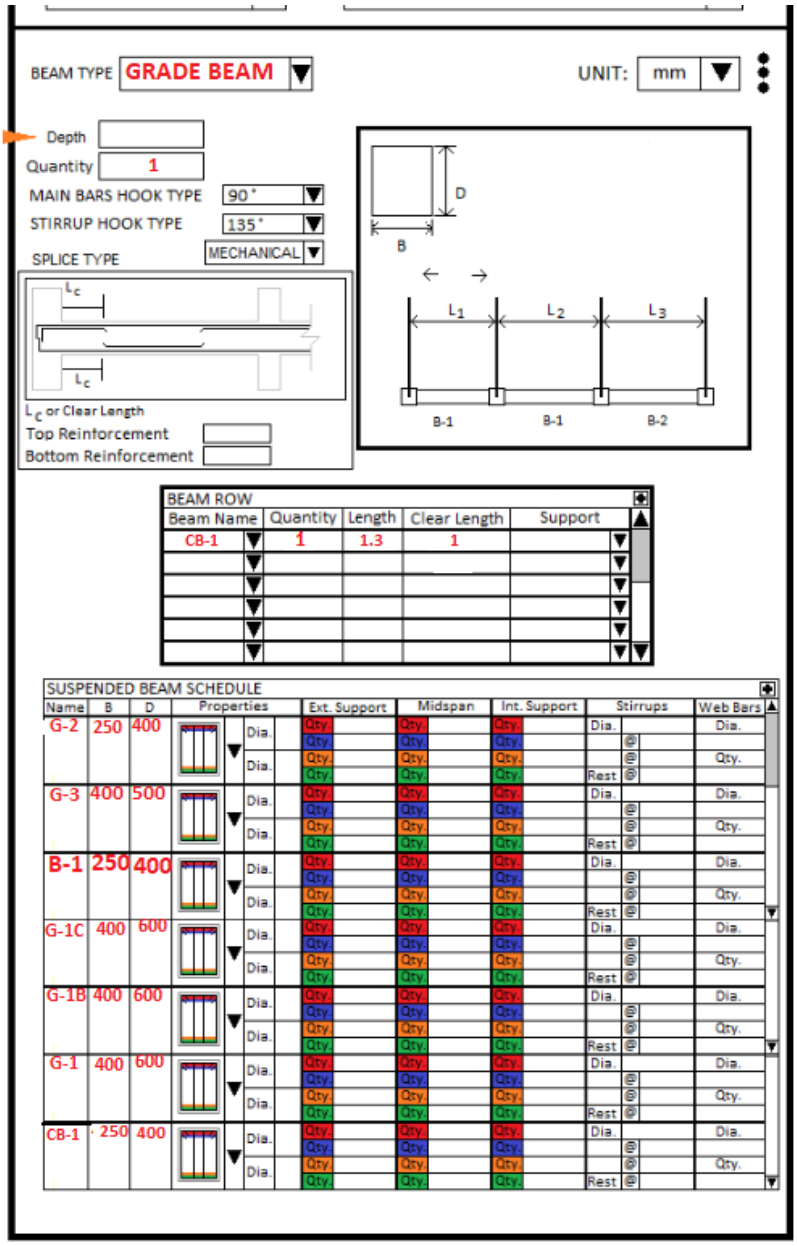


Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(1.3x1)] = 1.495 m2 x 1 = **1.495 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

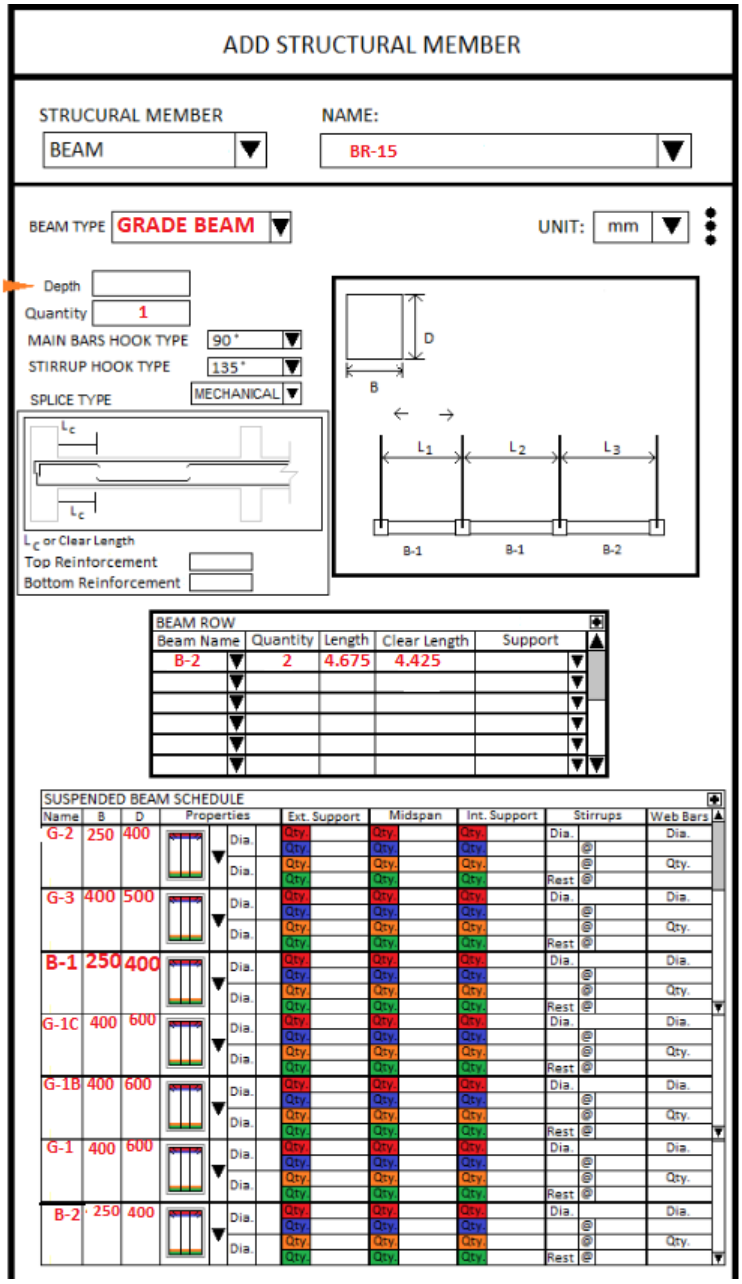
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(1.3x1)] = 1.495 m2 x 1 = **1.495 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



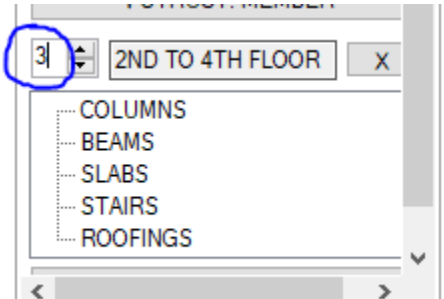
Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(4.675x2)] = 10.7525 m2 x 1 = **10.7525 m2**

Total area for Grade beams = 126.04 + 82.2 +11.04 + 8.74 +63.24+142.29+51.75+1.495+1.495+1.495 +10.7525 = **500.5375 m2**

No. of pieces of formworks needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{500.5375}{(1.2*2.4)} = 173.797\ pcs\ X\ 50\%$

=86.89 or 87 pcs of plywood **x 3 floors = 261 pcs of plywood**



VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

C. Framework

Lumber selected: 2” x 3” x 8’

Thickness of formwork: ½ ” constant

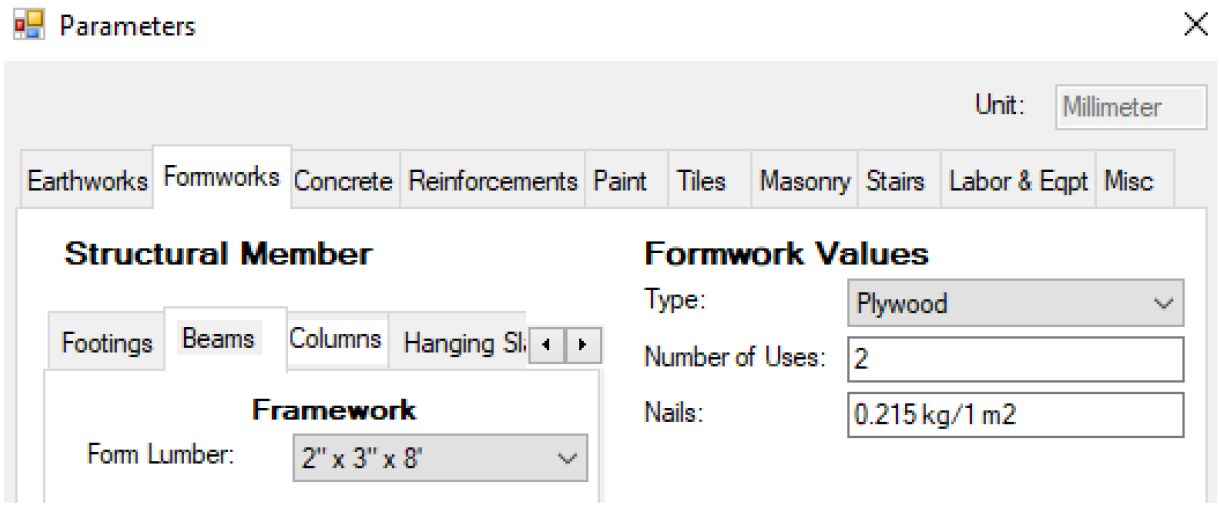
Look for the value in the table that matched the category

TABLE 5-1 BOARD FOOT OF WOOD FRAME FOR COLUMN AND BEAM PER PLYWOOD FORM

Size of Wood Frame	THICKNESS OF PLYWOOD FORM			
	POST		BEAM	
	6 mm (1/4”)	12 mm (1/2”)	6 mm (1/4”)	12 mm (1/2”)
2” x 2”	29.67	20.33	25.06	18.66
2” x 3”	44.50	30.50	37.60	28.00

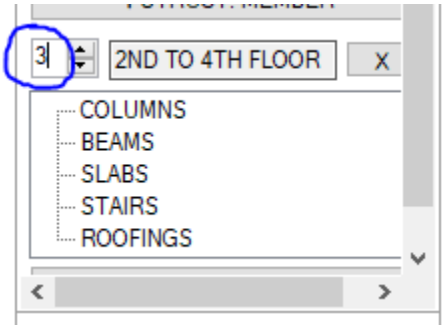
Note: disregard the rectangular highlights in this table

87 pcs (from single floor ground floor) x 28 = 2436 bd ft.



Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{2436*12}{2*3*8} = 609\ pcs\ of\ \ 2"\ x\ 3"\ x\ 8'$

$609\ \ pcs$ * 3 FLOOR (2ND TO 4TH FLR) $= 1827\ pcs\ of\ \ 2"\ x\ 3"\ x\ 8'$



VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

D. Scaffolding for beams (NO SCAFFOLDING FOR TIE BEAMS!!!)

TABLE 5-3 QUANTITY OF LUMBER FOR SCAFFOLDING OR STAGING

Lumber Size	Column Board Ft. per M. Ht.			Beam Board Ft. per M. Ht.		Flooring Board Ft Per Sq. M.
	Vertical	Hor.	Brace	Vertical	Hor.	
2" x 2"	4.70	21.00	11.70	4.00	4.70	6.10
2" x 3"	7.00	31.67	17.50	6..00	7.00	9.10
2" x 4"	9.35	42.25	23.35	8.00	9.35	12.10

Note: disregard the rectangular highlights in this table

THERE are two Scaffoldings, VERTICAL AND HORIZONTAL .

Find the total height by summing up all the lengths of the beams in that floor.

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25+ 0.1)] x [(4.9x1)+(4.5x10)+(4.9x 1)] = 63.02 m2 x 2 = **126.04 m2**

Total length = [(4.9x1)+(4.5x10)+(4.9x 1)] x 2 set +[(4.9x1)+(4.5x10)+(4.9x 1)] x 1set + [(4.8x2)] x 1 set + [(3.8x2)] x1 set + [(6.9x1)+(2.4x1)] x 4 sets + [(6.9x1)+(2.4x1)] x 9 sets + [(4.5x10)] x 1 set + [(1.3x1)] x1 set + [(1.3x1)] x1 set + [(1.3x1)] x1 set + [(4.675x2)] x 1set

Total length = 360.75 m

Vertical Support (2" x 2" x 8')
= Total length of beams x value in the table
= 360.75 x 4 =1443 bd. ft.

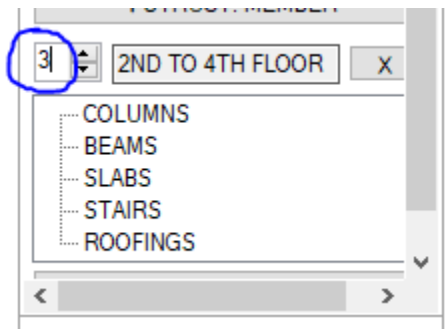
Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{1443*12}{2*2*8} = 541.125\ x\ 50\% = 270.56\ or\ 271\ pcs\ of\ 2x2x8$

271 pcs * 3 floors = **813 pcs of 2" x 2" x 8'**

Horizontal Support (2" x 2" x 8')
= 360.75 m x 4.7 = 1695.525 bd. Ft

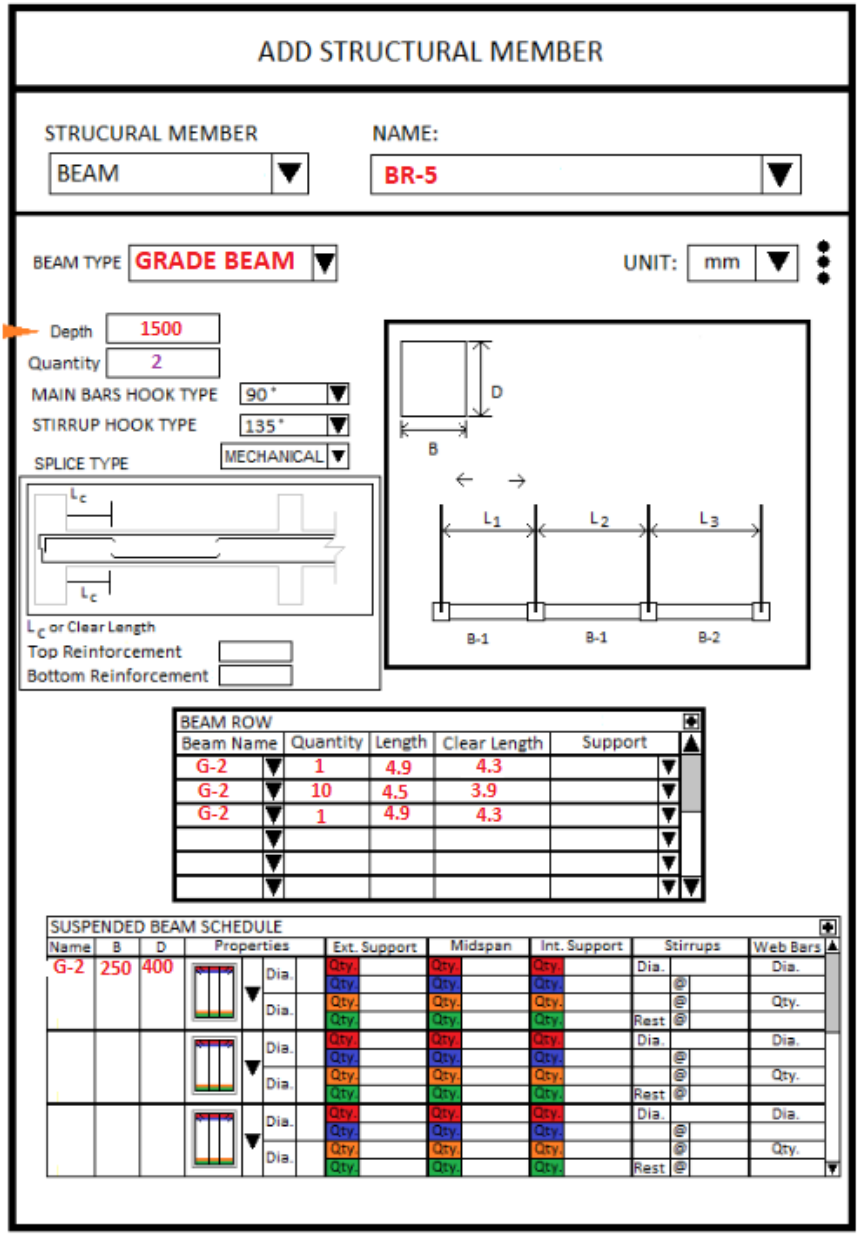
Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{1695.525*12}{2*2*8} = 635.821\ x\ 50\% = 317.91\ or\ 318\ pcs\ of\ 2x2x8$

318 x 3 floors **= 954 pcs 2" x 2"x 8'**



VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

(ROOF BEAM) - Same inputs and given as Grade beams, same illustrations used.

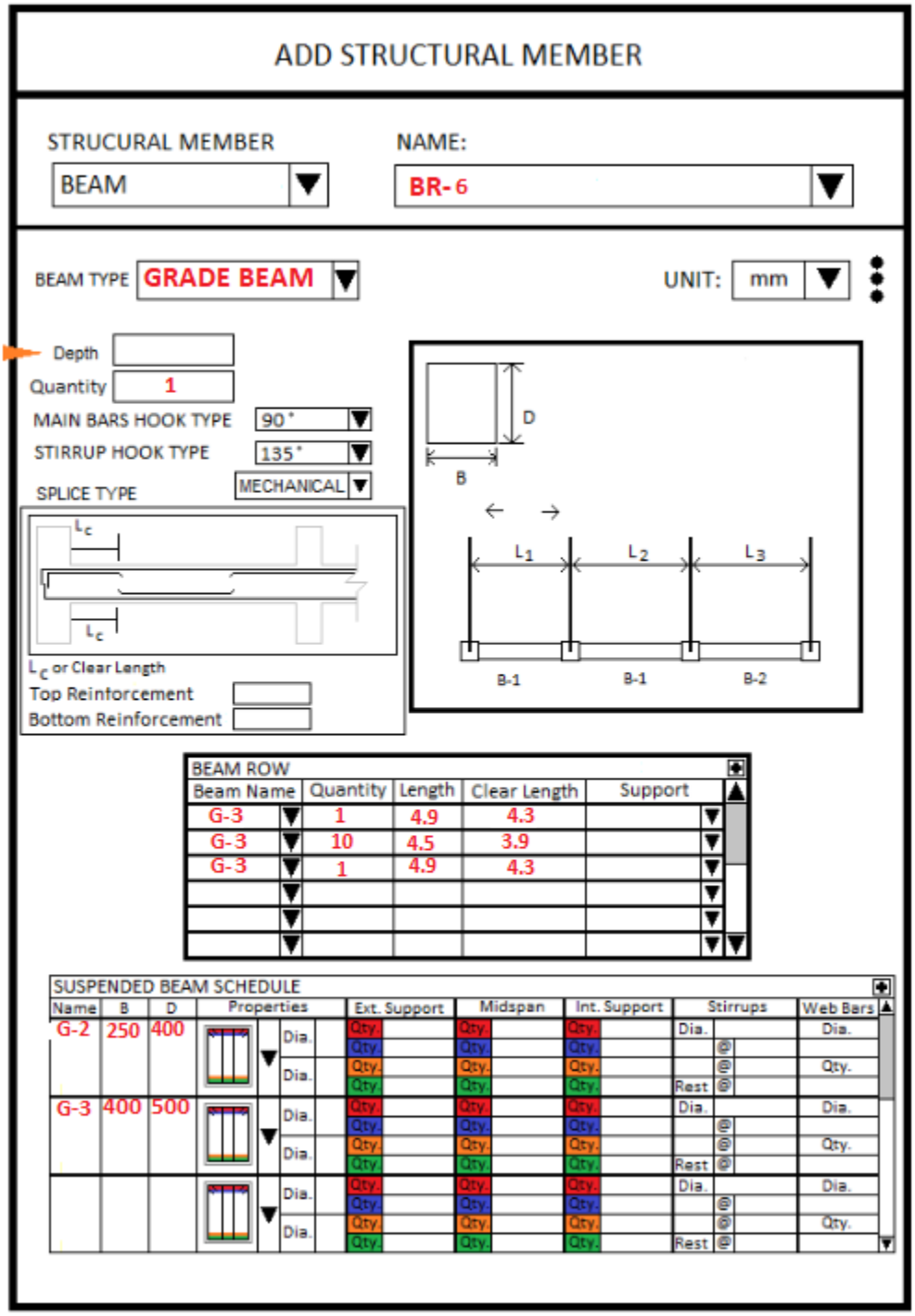


BEAM ROW 16

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25+ 0.1)] x [(4.9x1)+(4.5x10)+(4.9x 1)] = 63.02 m2 x 2 = **126.04 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



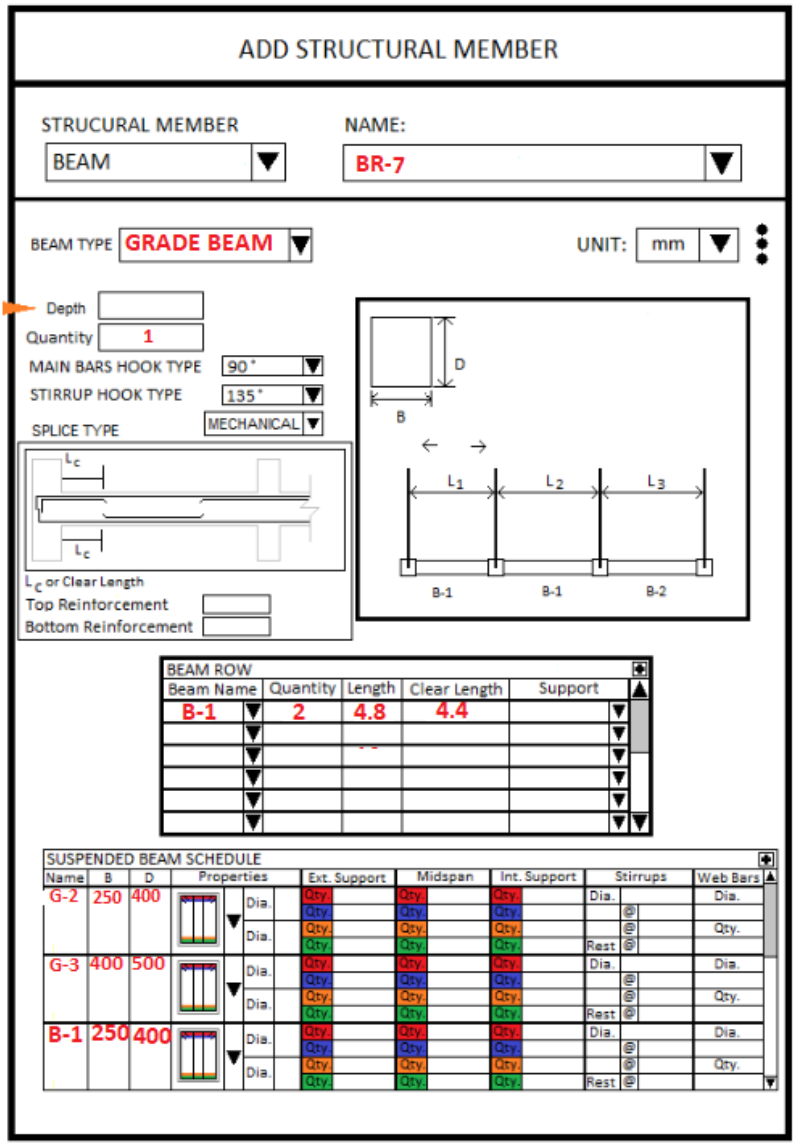
BEAM ROW 17

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.5) + 0.4 +0.1)] x [(4.9x1)+(4.5x10)+(4.9x 1)] = 82.2 m2 x 1 = **82.2 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



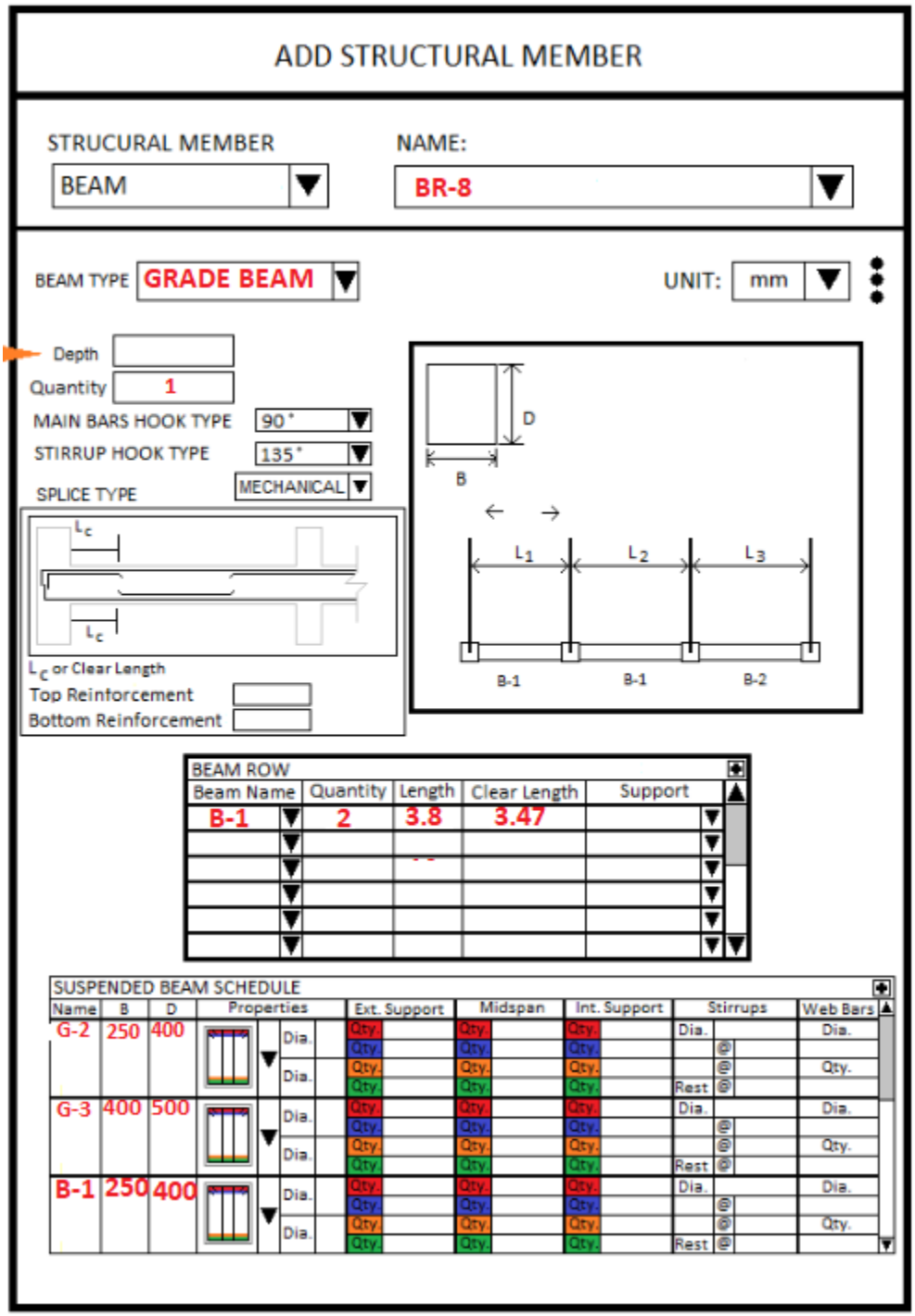
BEAM ROW 18

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(4.8x2)] = 11.04 m2 x 1 = **11.04 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



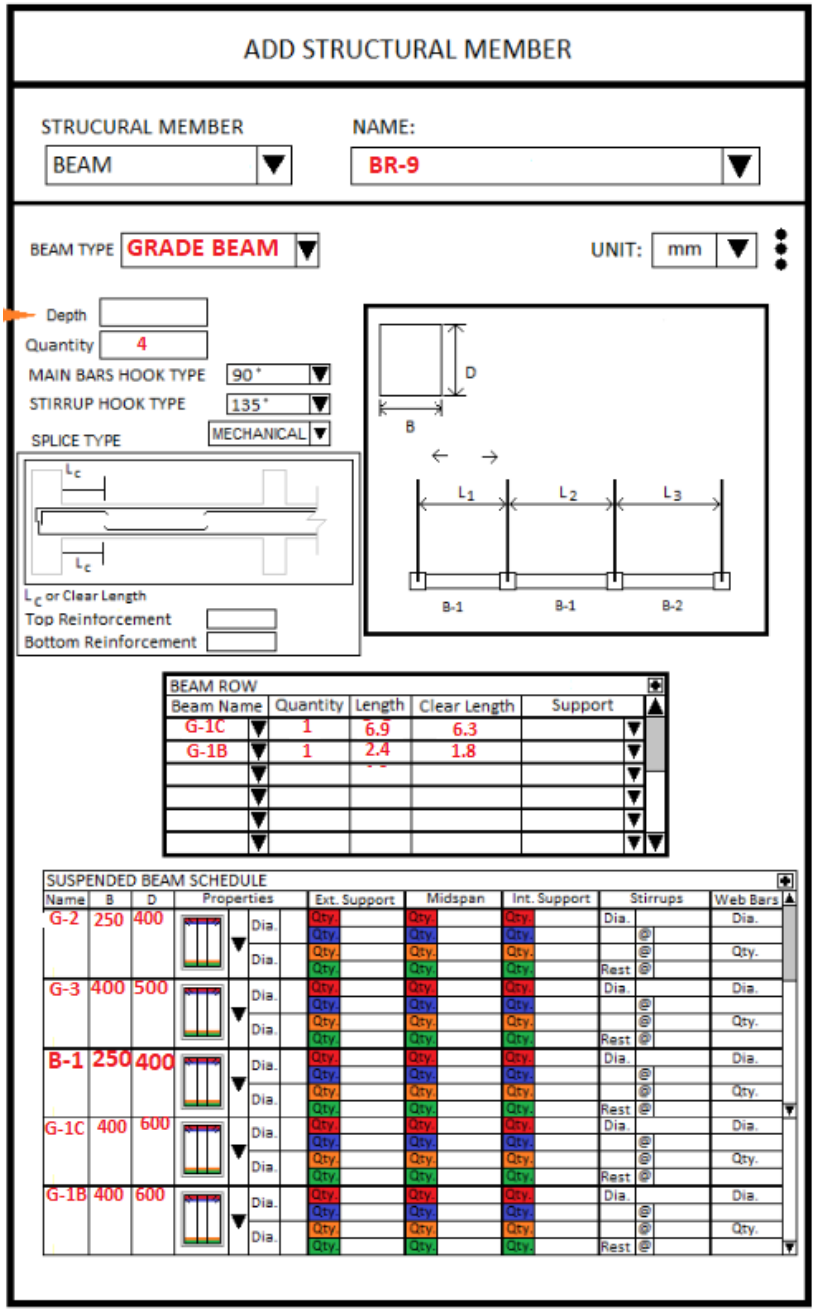
BEAM ROW 19

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(3.8x2)] = 8.74 m2 x 1 = **8.74m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



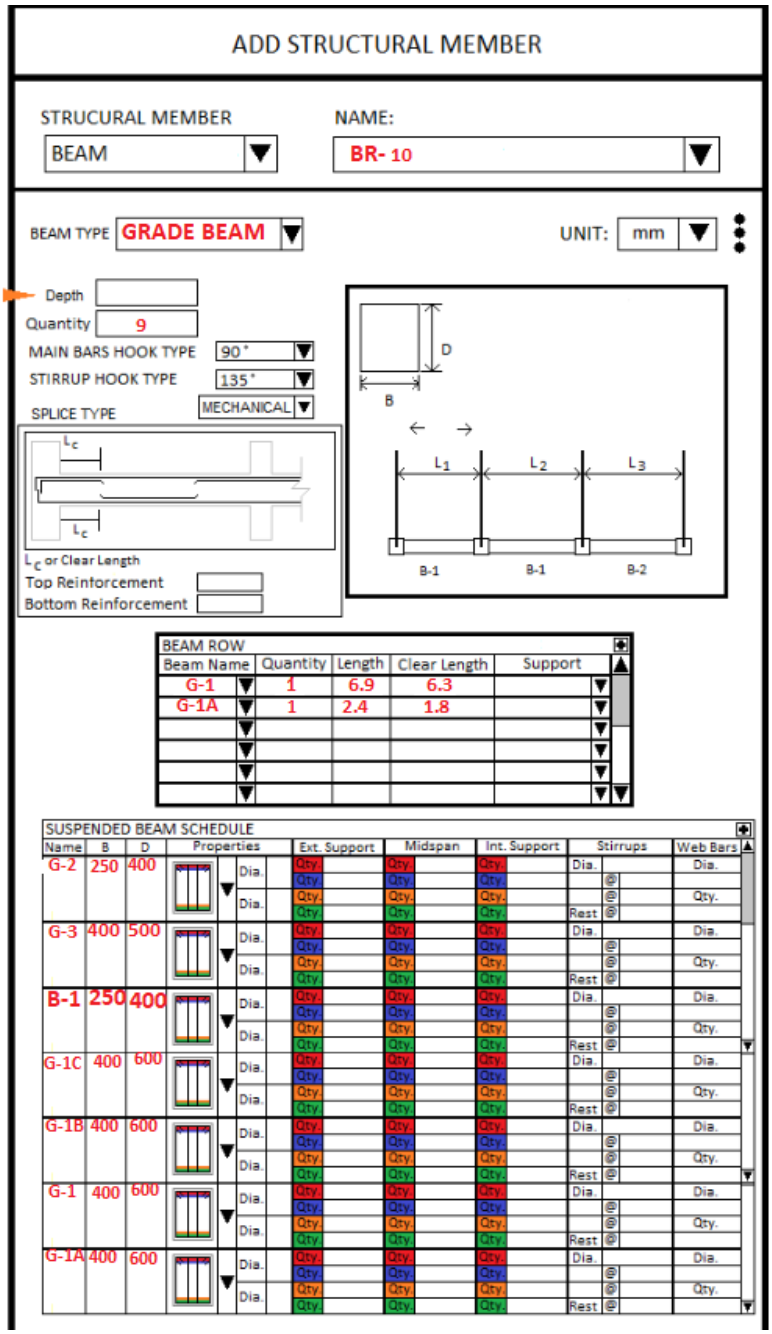
BEAM ROW 20

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.6) + 0.4 +0.1)] x [(6.9x1)+(2.4x1)] = 15.81 m2 x 4 = **63.24 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



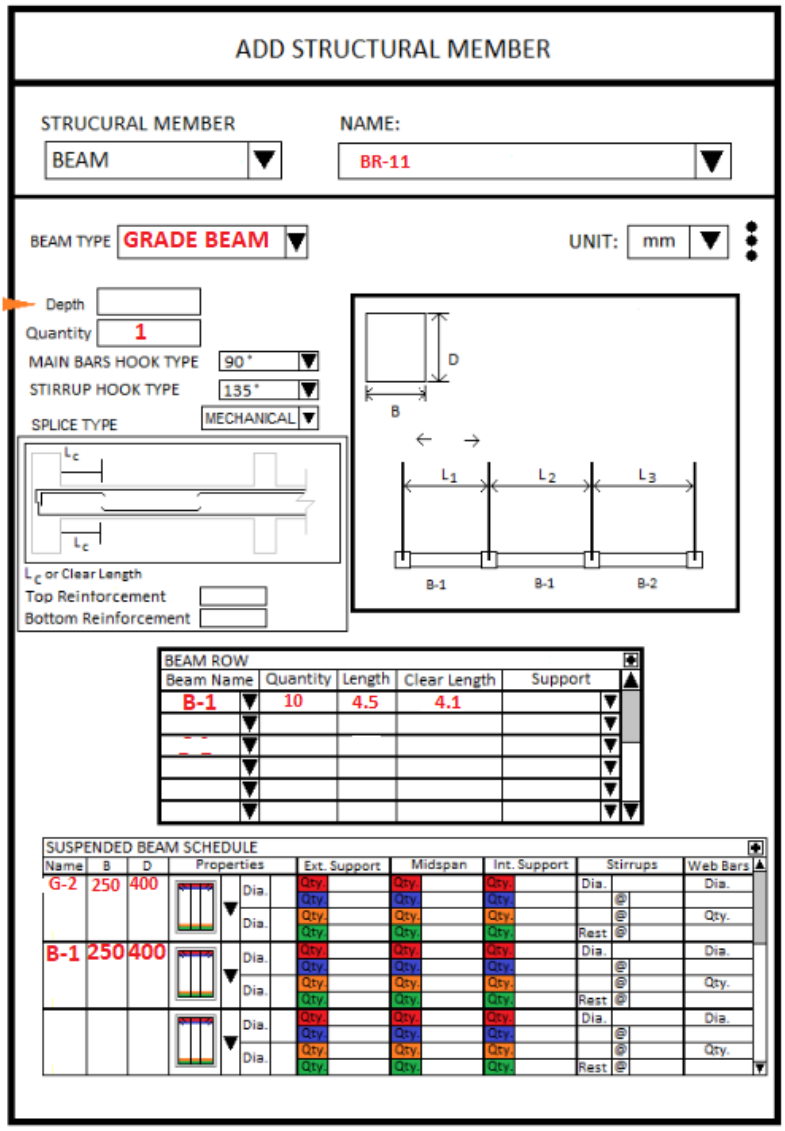
BEAM ROW 21

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.6) + 0.4 +0.1)] x [(6.9x1)+(2.4x1)] = 15.81 m2 x 9 = **142.29 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



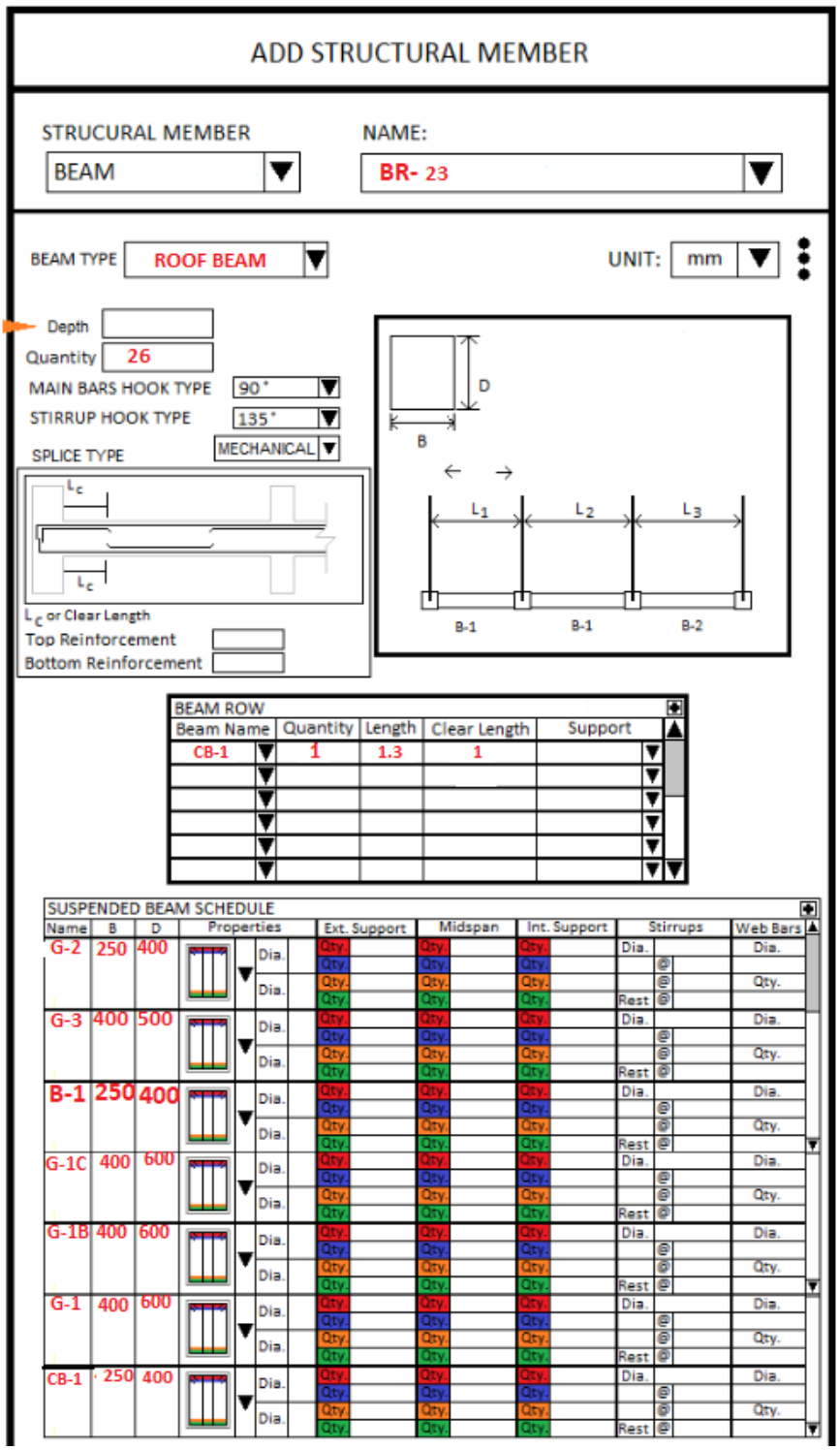
BEAM ROW 22

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(4.5x10)] = 51.75 m2 x 1 = **51.75 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



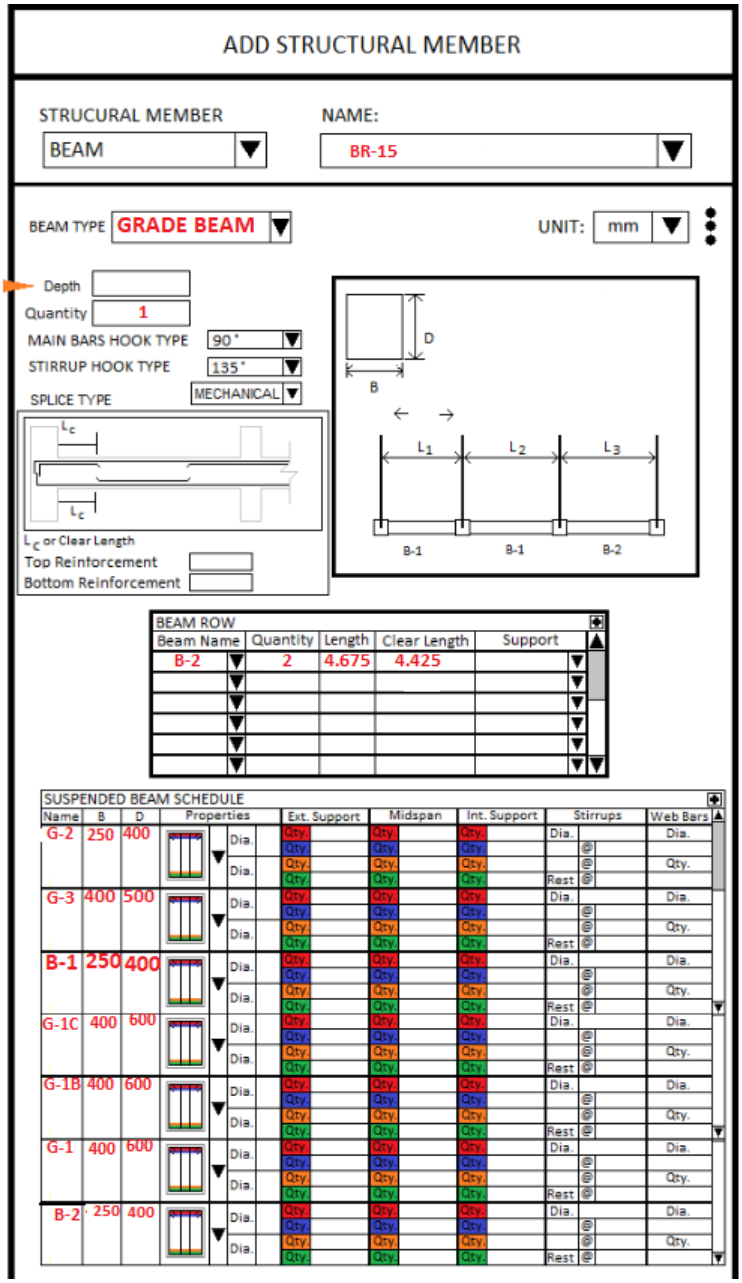
BEAM ROW 23

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(1.3x1)] = 1.495 m2 x 26 = **38.87 m2**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE



BEAM ROW 24

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25 +0.1)] x [(4.675x2)] = 10.7525 m2 x 1 = **10.7525 m2**

Total area for ROOF beams = 126.04 + 82.2 +11.04 + 8.74 +63.24+142.29+51.75+1.495(26)+
+10.7525 = **534.9225 m2**

No. of pieces of formworks needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{534.9225}{(1.2*2.4)} = 185.73\ pcs\ X\ 50\%$

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

=92.86 or 93 pcs of plywood **x 1 roof deck = 93 pcs of plywood**

E. Framework

Lumber selected: 2" x 3" x 8'

Thickness of formwork: ½ " constant

Look for the value in the table that matched the category

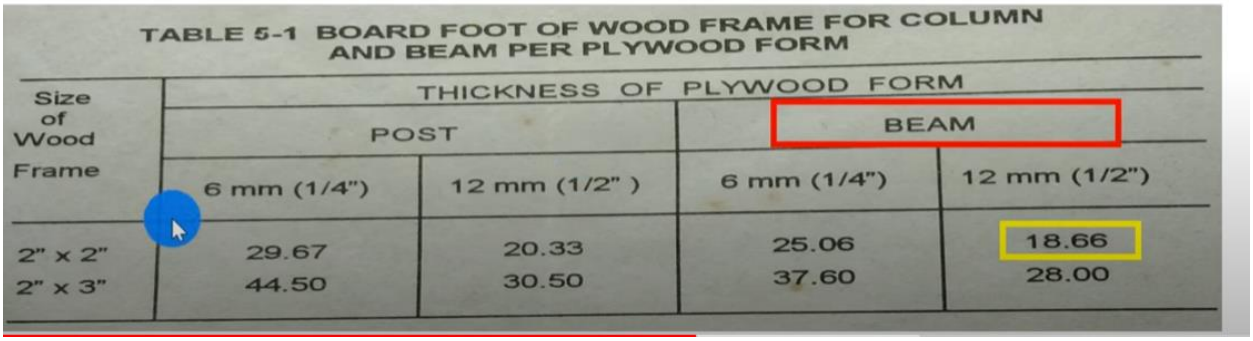
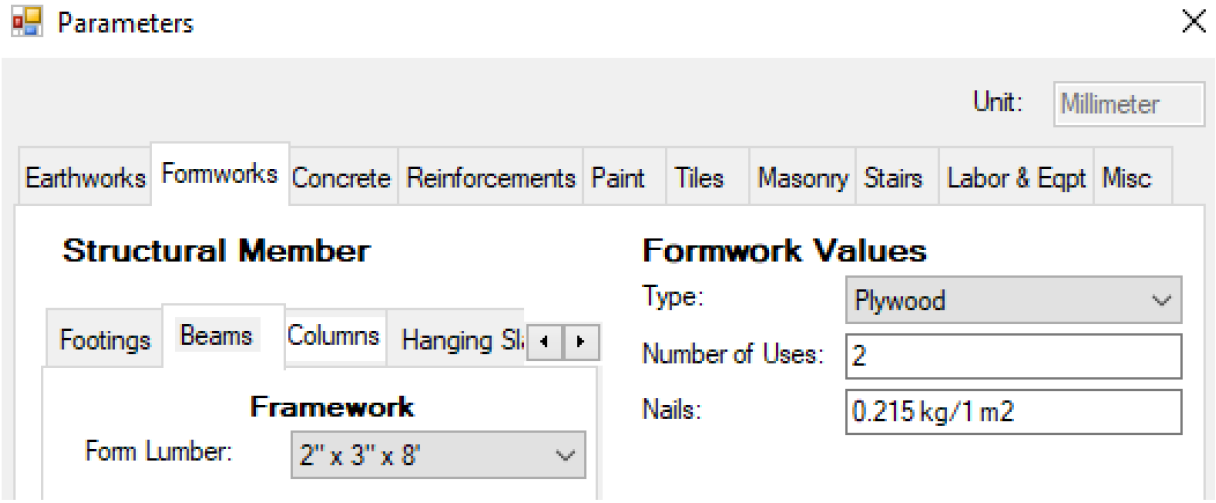


TABLE 5-1 BOARD FOOT OF WOOD FRAME FOR COLUMN AND BEAM PER PLYWOOD FORM

Size of Wood Frame	THICKNESS OF PLYWOOD FORM			
	POST		BEAM	
	6 mm (1/4")	12 mm (1/2")	6 mm (1/4")	12 mm (1/2")
2" x 2"	29.67	20.33	25.06	18.66
2" x 3"	44.50	30.50	37.60	28.00

Note: disregard the rectangular highlights in this table

93 pcs (from single floor ground floor) x 28 = 2604 bd ft.



Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{2604*12}{2*3*8} = 651\ pcs\ of\ 2" \times 3" \times 8'$

$651\ pcs$ *1 FLOOR (ROOF DECK) $= 651\ pcs\ of\ 2" \times 3" \times 8'$

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

F. Scaffolding for beams (NO SCAFFOLDING FOR TIE BEAMS!!!)

TABLE 5-3 QUANTITY OF LUMBER FOR SCAFFOLDING OR STAGING

Lumber Size	Column Board Ft. per M. Ht.			Beam Board Ft. per M. Ht.		Flooring Board Ft Per Sq. M.
	Vertical	Hor.	Brace	Vertical	Hor.	
2" x 2"	4.70	21.00	11.70	4.00	4.70	6.10
2" x 3"	7.00	31.67	17.50	6..00	7.00	9.10
2" x 4"	9.35	42.25	23.35	8.00	9.35	12.10

Note: disregard the rectangular highlights in this table

THERE are two Scaffoldings, VERTICAL AND HORIZONTAL .

Find the total height by summing up all the lengths of the beams in that floor.

Area =[(2(d) + b+ 0.1)] x [total Length] x QTY

= [(2 (0.4) + 0.25+ 0.1)] x [(4.9x1)+(4.5x10)+(4.9x 1)] = 63.02 m2 x 2 = **126.04 m2**

Total length = [(4.9x1)+(4.5x10)+(4.9x 1)] x 2 set +[(4.9x1)+(4.5x10)+(4.9x 1)] x 1set + [(4.8x2)] x 1 set + [(3.8x2)] x1 set + [(6.9x1)+(2.4x1)] x 4 sets + [(6.9x1)+(2.4x1)] x 9 sets + [(4.5x10)] x 1 set + [(1.3x1)] x26 set + [(4.675x2)] x 1set

Total length = 391.95 m

Vertical Support (2" x 2" x 8')
= Total length of beams x value in the table
= 391.95 x 4 =1567.8 bd. ft.

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{1567.8*12}{2*2*8} = 587.925\ x\ 50\% =$
$293.97\ or\ 294\ pcs\ of\ 2x2x8$
294 pcs * 1 floor (ROOF DECK) = **294 pcs of 2" x 2" x 8'**

Horizontal Support (2" x 2" x 8')
= 391.95 m **x 4.7 = 1842.165 bd. Ft**
Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{1842.165*12}{2*2*8} = 690.81\ x\ 50\% =$
$345.4\ or\ 346\ pcs\ of\ 2x2x8$
346 x 1 ROOF DECK **= 346 pcs 2" x 2"x 8'**

Summary for beam formworks:

plywood: 85+ 261+ 93 = **438 pcs (P 674.00 /pc) = P 295,212.00**

2" x 2" x 8': 813 + 954 + 294 + 346 =**2407 pcs (P 130.00 /pc) = P 312,920.00**

2" x 3" x8': 595+1827 + 651 = **3037 pcs (P 150.00 /pc) = P 455,550.00**

Total material cost : **P 1,063,682.00**

total area: 485.01 + 500.5375(3)+534.9225 = **2521.545 m2**

Unit cost : P 1,063,682.00 / 2521.545 m2 = **P 421.84**

Labor cost = 300* 2521.545 = **P 756,463.5**

III. SLAB (SUSPENDED SLAB ONLY)

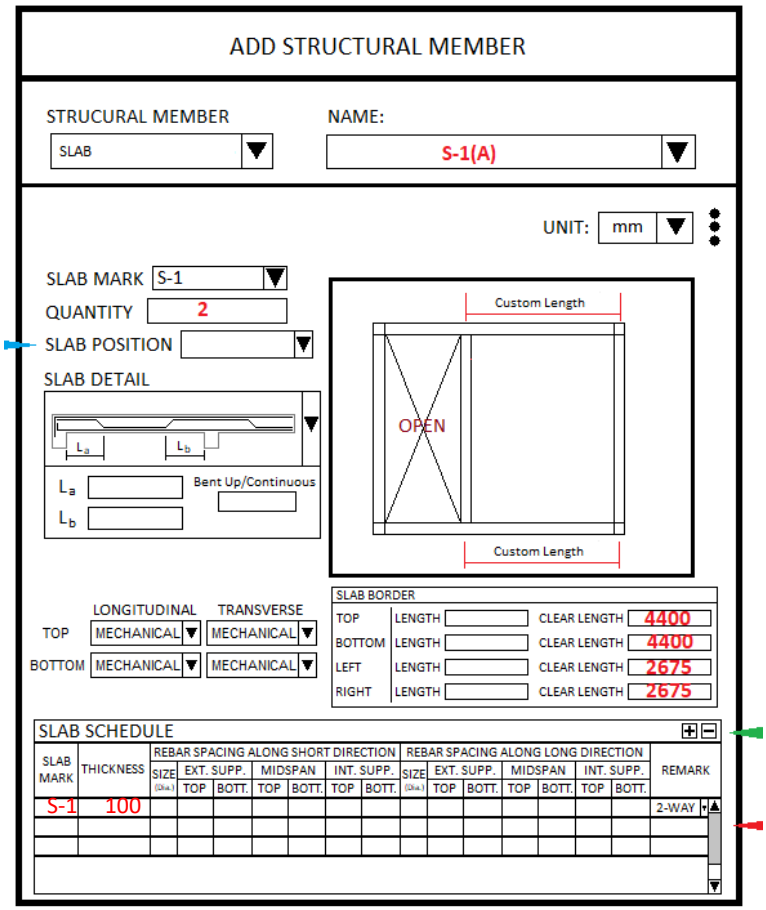
Not applicable to ground floor slabs, 2nd floor and above only.

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

A. FORMWORK

Hanging or Suspended Slab (2nd floor to 4th floor)

S-1 (A) @ 2 sets
L TOP: 4400mm
W LEFT: 2675mm
T: 100mm
A = 4.4 x 2.675 = 11.77 m2 x 2 qty = **23.54 m2**

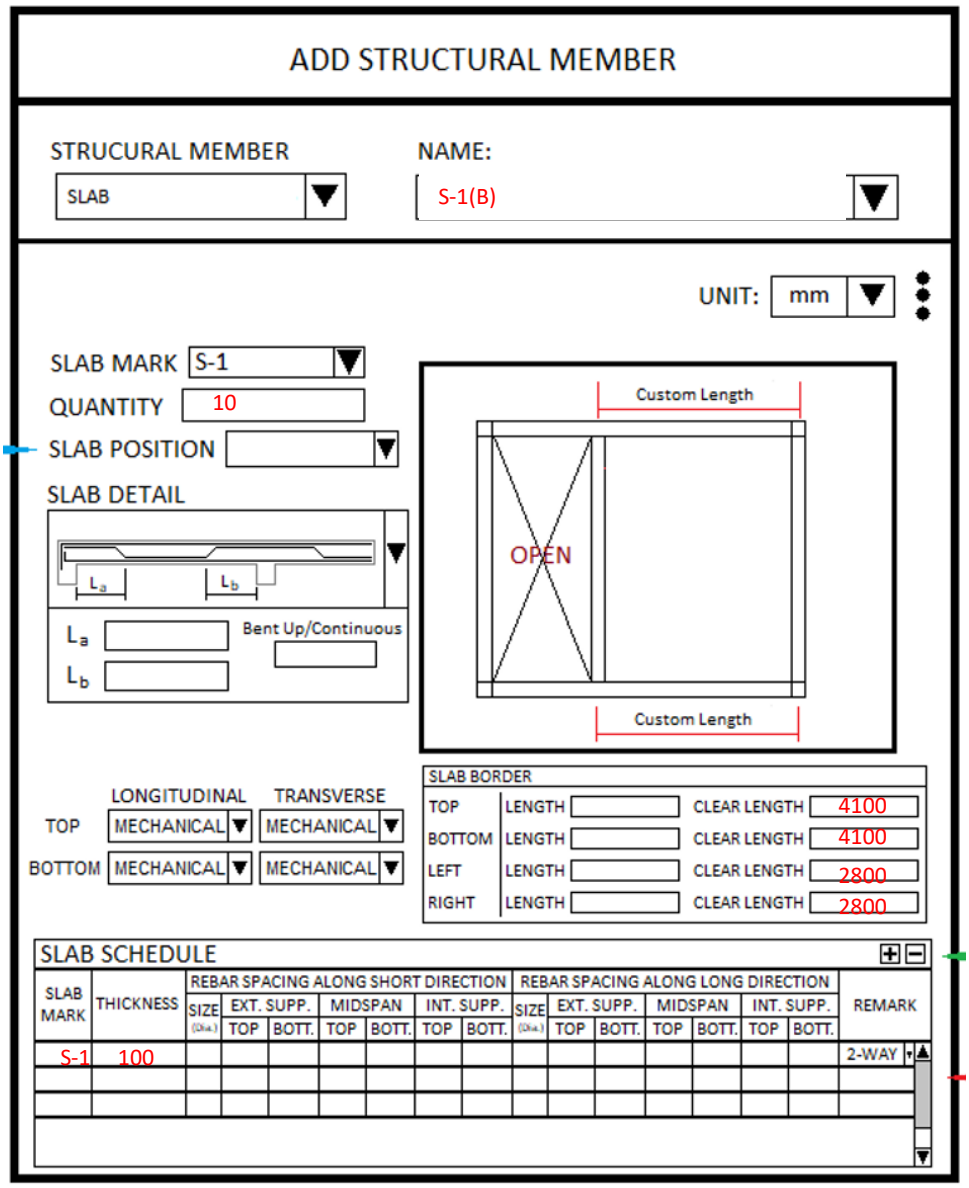


S-1 (B) @ 10 sets
L TOP: 4100mm

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

W LEFT: 2800mm
T: 100mm

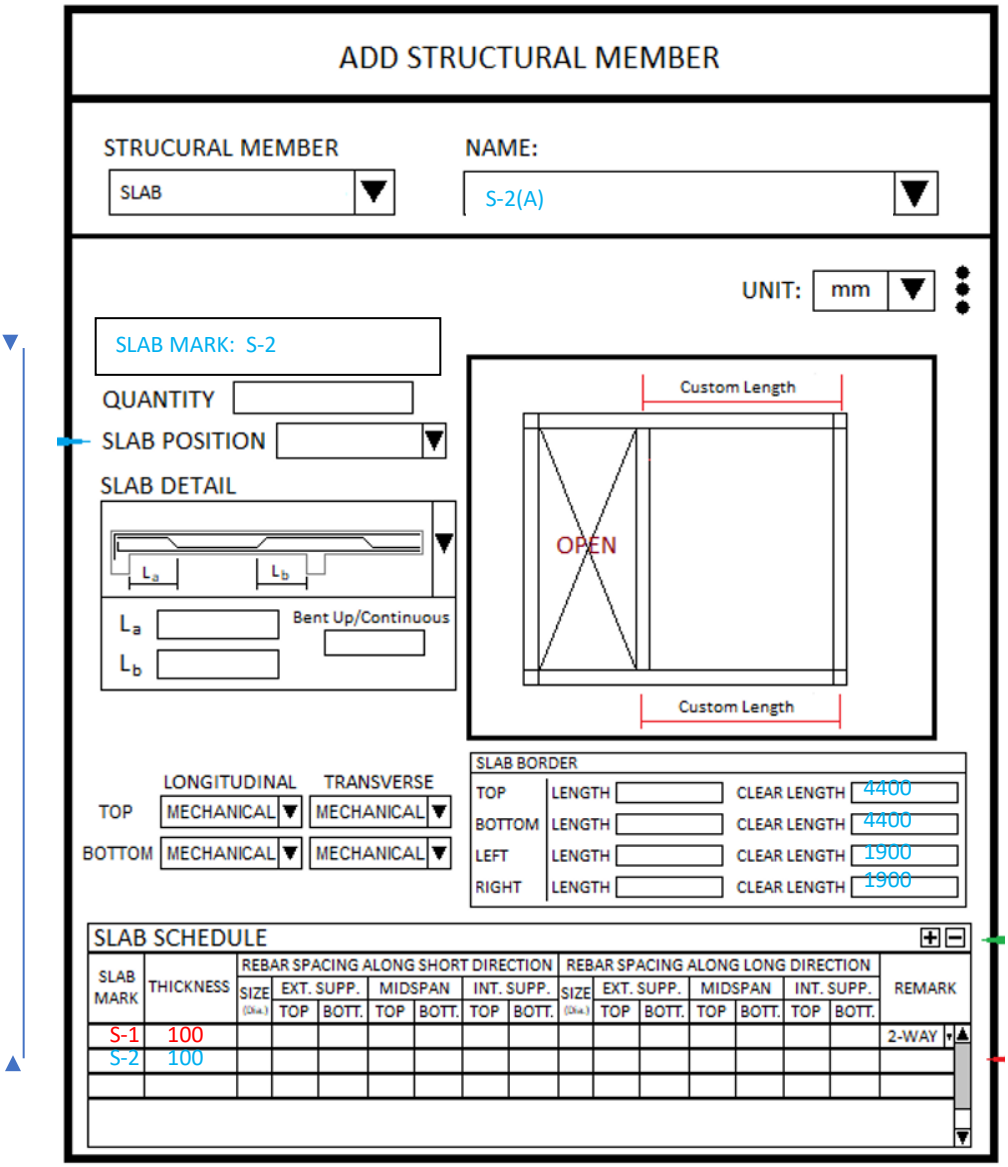
A = 4.1 x 2.800 =11.48 m2 x 10 = 114.8 m2



S-1 (C) @ 10 sets
L TOP: 4100mm

W LEFT: 3350mm
T: 100mm
A= 4.1 x 3.35= 13.735 m2 x 10 = 137.35 m2

S-2 (A) @ 2 SETS
L TOP: 4400mm
W LEFT: 1900 mm
T: 100mm
Area = 4.4 x 1.9 x 2 sets = **16.72 m2**

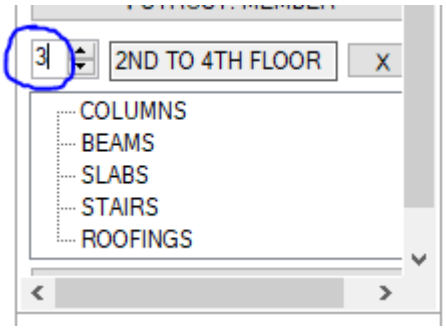


VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

S-2 (A) @ 10 SETS
L TOP: 4100mm
W LEFT: 1900 mm
T: 100mm
A= 4.1 x 1.9 x 10SETS = **77.9 m2**

S-3 (A) @ 2 SETS
L TOP: 1250mm
W LEFT: 3475mm
T: 100mm

V = 1.25 x 3.475= 4.34375 m2 x 2 = **8.6875 m2**



TOTAL AREA = 23.54 + 114.8+137.35+ 16.72+77.9+8.6875 = 378.9975 m2 (SINGLE FLOOR ONLY)

No. of pieces of Plywood needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{378.9975}{(1.2*2.4)}\ 131.596\ or\ 132\ pcs$

No. of uses of formwork is not applicable in slab, do not multiply 50 % (in sus. slab only).

132 pcs x 3 floors = **396 pcs.**

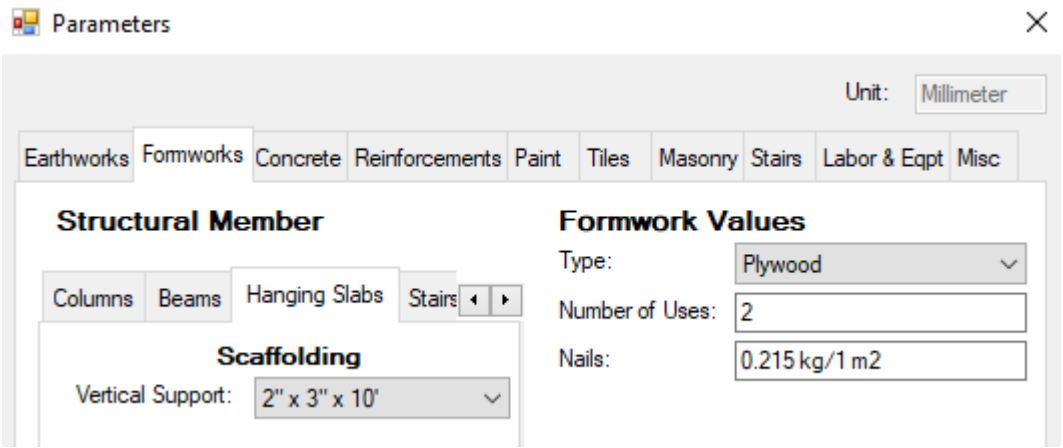
B. Scaffolding

Form lumber selected by user: 2” x 3” x 10’
A= 378.9975 m2 x 9.1 = 3448.87725 bd.ft

$$\frac{3448.87725 * 12}{2 * 3 * 10} = 689.775\ or\ 690\ pcs\ of\ 2"x\ 3"$$

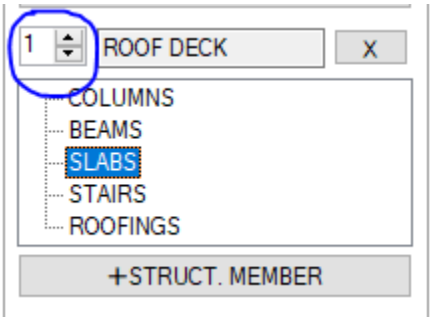
$$690\ pcs\ X\ 3\ FLOORS = 2070\ pcs\ of\ 2"x\ 3"\ x10'$$

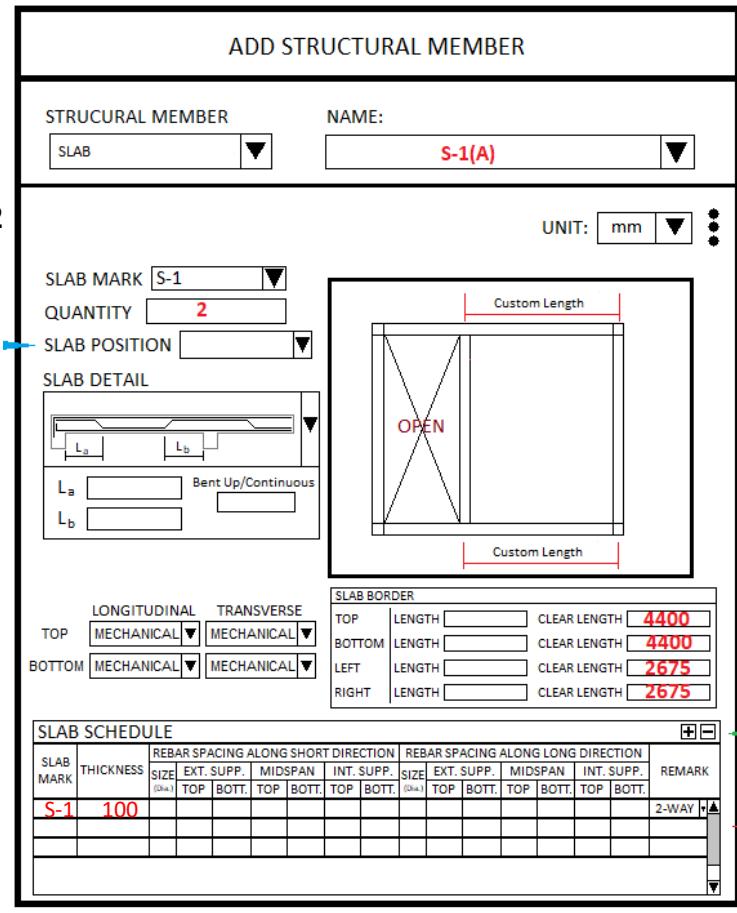
SIZE	FLOORING bd. Ft. Per sq.m
2" x 2"	6.1
2"x 3"	9.1
2" x 4"	12.1



VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

ROOF DECK
S-1 (A) @ 2 SETS
L: 4400 mm
W: 2675 mm
T: 100mm
A = 4.4 x 2.675 = 11.77 m2 x 2 qty = **23.54 m2**





No. of pieces of Plywood needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{23.54}{(1.2*2.4)}\ 8.1736\ or\ 9\ pcs$

Scaffolding

Form lumber selected by user: 2” x 3” x 10’
A= 23.54 m2 x 9.1 = 211.86 bd.ft

$$\frac{211.86\ *12}{2*3*10} = 42.372\ OR\ 43\ pcs\ of\ 2"x\ 3"\ x10'$$

TOTAL AREA FOR WHOLE SLAB = 378.9975(3 FLOORS) +23.54 = 1160.5325

Plywood: **405 pcs (P 674.00 /pc) = P 272,970.00**

2x3x10: **2113 pcs (P 150.00 /pc) = P 316,950.00**

Total material cost = P 589,920

Unit cost = 589,920/ 1160.5325 = P508.32

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

Labor cost = 1160.5325*300 = P 348,159.75

IIV. STAIRS (U-STAIRS)

IN THIS EXAMPLE, U-STAIRS IS USED

STEPS (FIRST FLIGHT)	10
STEPS (2ND FLIGHT)	7
STAIR LENGTH:	1200 mm
RISER HEIGHT :	150 mm
TREAD WIDTH:	225 mm
WAIST SLAB THICKNESS:	150mm
LANDING WIDTH:	1200 mm
GAP:	125 mm
LANDING THICKNESS:	150 mm

FIRST FLIGHT:

$$L = \sqrt{(RISER\ HEIGHT * NO\ OF\ STEPS)^2 + (TREAD\ WIDTH * NO\ OF\ STEPS)^2}$$

$$FLIGHT\ 1\ LENGTH = \sqrt{(150 * 10)^2 + (225 * 10)^2} = 2.705\ m$$

$$AREA\ OF\ PLYWOOD\ FOR\ BOTTOM\ SUPPORT$$

$$A = L\ \times SL\ STAIR\ LENGTH = 2.705\ \times 1.2 = 3.246\ m2$$

RISER BOARD

$$A = \big(L * (RISER\ HEIGHT + 0.1)\big) * 2$$

$$A = \big(2.705 * (0.15 + 0.1)\big) * 2 = 1.3525\ m2$$

NOTE: STAIR LENGTH SHOULD BE "STAIR WIDTH" (SW)

SECOND FLIGHT:

$$L = \sqrt{(RISER\ HEIGHT * NO\ OF\ STEPS)^2 + (TREAD\ WIDTH * NO\ OF\ STEPS)^2}$$

$$FLIGHT\ 2\ LENGTH = \sqrt{(150 * 7)^2 + (225 * 7)^2} = 1.892 \approx 1.9m$$ (ROUND UP MULTIPLES OF 5)

$$AREA\ OF\ PLYWOOD\ FOR\ BOTTOM\ SUPPORT$$

$$A = L\ \times STAIR\ WIDTH\ "SW" = 1.9\ \times 1.2 = 2.28\ m3$$

RISER BOARD

$$A = \big(L * (RISER\ HEIGHT + 0.1)\big) * 2$$

$$A = \big(1.9 * (0.15 + 0.1)\big) * 2 = 0.95\ m2$$

LANDING

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

A=(SW*2+GAP)*LANDING WIDTH + [2*LANDING WIDTH*LAND THCK] +[(SL*2+GAP)*LAND THCK]

$$A = \left[\left((1.2 * 2) + 0.125\right) * 1.2\right] + [2 * (1.2 * 0.15)] + \left((1.2 * 2) + 0.125\right) * 0.15) = 3.76875\ m2$$

STEPS:

A= SW x RISER X (STEPS FIRST FLIGHT + STEPS SECOND FLIGHT) = (1.2 X 0.15) X (10+7) = **3.06 m2**

Area total= Add all acquired area **(BOLD NUMBERS) X QTY OF STAIRS IN THAT FLOOR**

$$Area\ total = [(3.246 + \ 1.3525 + 2.28 + 0.95 + 3.76875 + 3.06) \ \times \ 1\ set =$$ **14.65725 m2**

No. of pieces of Plywood needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{14.65725}{(1.2*2.4)} = 5.089\ \times 50\%$

$$= 2.54\ or\ 3pcs\ * 1\ floor = 3pcs$$

FRAMEWORK FOR STAIRS:

By Default, 2" x 3" x8' is used

FOR FRONT SUPPORT BRACING

$$= \frac{\frac{SW}{0.6}(LUMBER\ WOOD\ SIZE \times (L\ \times 3.28))}{12}$$

$\frac{SW}{0.6} = \frac{1.2}{0.6} = 2$ **(ROUND UP TO NEAREST WHOLE NUMBER IF THERE'S A DECIMAL. ALWAYS. E.G 2.38 = 3)**

$$Front\ wood\ bracing\ (FIRST\ FLIGHT) = \frac{2(2 \times 3 \times (2.705\ \times 3.28))}{12} = 8.8724\ bd.ft$$

$$Front\ wood\ bracing\ (SECOND\ FLIGHT) = \frac{2\left(2 \times 3 \times (1.9\ \times 3.28)\right)}{12} = 6.23\ bd.ft$$

$$Bracing\ support\ per\ steps = \frac{TOTAL\ STEPS\ (LUMBER\ SIZE \times (3.28))}{12} \times \frac{SL}{0.6} (* rounded\ off\ value)$$

$$Bracing\ support\ per\ steps = \frac{(10+7)\ (2 \times 3 \times (3.28))}{12} = 27.88\ bd.ft\ \text{ x } 2 =$$ **55.76 bd. ft**

NOTE: 2 is from $\frac{SW}{0.6} = \frac{1.2}{0.6} = 2$

FOR BACK SUPPORT BRACING

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ

GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

$\frac{SW}{0.3} = \frac{1.2}{0.3} = 4$ **(ROUND UP TO NEAREST WHOLE NUMBER IF THERE'S A DECIMAL. ALWAYS.)**

$$\text{Back } wood\ bracing\ (FIRST\ FLIGHT) = \frac{4(2\times3\times(2.705\times3.28))}{12} = 17.7448\ bd.ft$$

$$Back\ wood\ bracing\ (SECOND\ FLIGHT) = \frac{4(2\times3\times(1.9\times3.28))}{12} = 12.464\ bd.ft$$

FOR STEPS

No. of steps: 10+7= 17

SW = 1.2 m

Lumber wood: 2" x 3"

$$Wood\ bracing\ for\ steps = \frac{2(LUMBER\ WOOD\ SIZE\times(SW\times3.28))}{12}$$ **x no. of steps**

$$Wood\ bracing\ for\ steps = \frac{2(2\times3\times(1.2\times3.28))}{12}$$ **x 17= 66.912 BD Ft.**

TOTAL VOLUME FOR STAIRS (FRAMEWORK): (8.8724 + 6.23+55.76+17.7448+12.464+66.912)x 1set = **168.0132 bd. Ft**

$$\text{Pcs of wood} = \frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{168.0132*12}{2*3*8} = 42\ x\ 50\% = 21\ pcs\ of\ 2x3x8\ *1\ floor = 21\ pcs$$

SCAFFOLDING FOR STAIRS:

USER SELECTION: 2" X 3" x 8 '

12 bd ft / m (CONSTANT)

= Flight 1 length + SW*2+ Gap + flight 2 length
= 2.705 + 1.2*2 + 0.125+ 1.9 = 7.13 m
7.13 m x 12 bd ft/ m = **85.56 bd. Ft x 1 set = 85.56**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

TOTAL VOLUME OF WOOD FOR STAIRS (SCAFFOLDING):

Pcs of wood = $\frac{TOTAL\ NUMBER\ OF\ BD.FT*12}{SELECTED\ LUMBER\ FORM} = \frac{85.56*12}{2*3*8} = 21.39\ x\ 50\% = 10.695\ \ or\ 11\ pcs\ of\ 2x3x8 * 1\ floor = 11\ pcs$

PLYWOOD: = 3 pcs (P 674.00 /pc) = P 2,022.00

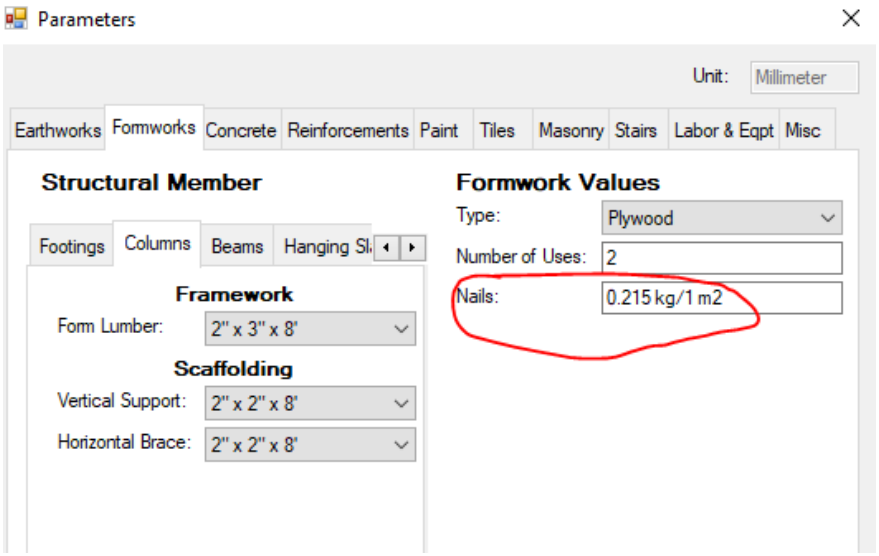
2"x3"x8" =32 pcs (P 150.00 /pc) = P 4800.00

Total material cost = P 6,822.00

Unit cost = 6,822.00/14.657 = P 465.44

Labor cost = 14.657 *300 = P 4,397.00

FOR NAILS



KG OF NAILS = TOTAL AREA OF PLYWOOD or PHENOLIC or ECOBOARD * 0.215

note: 0.215 is inputted by the user in formworks parameters.

ADD ALL AREA OF FORMWORKS= 14.657+1160.5325+2521.545+1309.98+24.334+15.3

= 5046.3485 m2 * 0.215

= **1084.9649 kg**

= 1084.96 kg (@ 150php /kg)

= 1084.96 x 150php

= PHP 162,744.735

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

FOR STRAIGHT STAIRS
(FOR REFERENCE ONLY, NOT INCLUDED IN THE TOTALITY OF THIS EXAMPLE)
- **Basically from U -stairs , remove 2nd flight, landing, and gap, you get straight stairs**

FLIGHT:

$$L = \sqrt{(RISER\ HEIGHT * NO\ OF\ STEPS)^2 + (TREAD\ WIDTH * NO\ OF\ STEPS)^2}$$

$$FLIGHT\ 1\ LENGTH = \sqrt{(150 * 10)^2 + (225 * 10)^2} = 2.705m$$

$$AREA\ OF\ PLYWOOD\ FOR\ BOTTOM\ SUPPORT$$

$$A = L\ \times SL\ STAIR\ LENGTH = 2.705\ \times 1.2 = 3.246\ m3$$

RISER BOARD

$$A = \big(L * (RISER\ HEIGHT + 0.1)\big) * 2$$

$$A = \big(2.705 * (0.15 + 0.1)\big) * 2 = 1.3525\ m2$$

STEPS:

A= SL x RISER X (no of STEPS) = (1.2 X 0.15) X (10) = 1.8 m2

Area total= Add all acquired area **(BOLD NUMBERS) X QTY OF STAIRS IN THAT FLOOR**

$Area\ total = (3.246 +\ 1.3525 + 1.8)\ \times\ 1 =$ **6.40 m2**

No. of pieces of Plywood needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{6.40}{(1.2*2.4)} = 2.05\ \times 50\%$

$$= 1.11\ or\ 2pcs$$

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

FRAMEWORK FOR STRAIGHT STAIRS:

By Default, 2" x 3" is used

FOR FRONT SUPPORT BRACING

$$\frac{\frac{SL}{0.6}\left(LUMBER\ WOOD\ SIZE \times (SL\ \times 3.28)\right)}{12}$$

$\frac{SL}{0.6} = \frac{1.2}{0.6} = 2$ **(ROUND UP TO NEAREST WHOLE NUMBER IF THERE'S A DECIMAL. ALWAYS. E.G 2.38 = 3)**

$$Front\ wood\ bracing\ = \frac{2(2 \times 3 \times (2.705\ \times 3.28))}{12} = 8.8724\ bd.ft$$

$$Bracing\ support\ per\ steps = \frac{TOTAL\ STEPS\ \left(LUMBER\ SIZE \times (3.28)\right)}{12} \times \frac{SL}{0.6} (* rounded\ off\ value)$$

$$Bracing\ support\ per\ steps = \frac{(10)\ (2 \times 3 \times (3.28))}{12} = 16.4\ bd.ft\ \text{ x 2 = } \mathbf{32.8\ bd.\ ft}$$

FOR BACK SUPPORT BRACING

$\frac{SL}{0.3} = \frac{1.2}{0.3} = 4$ **(ROUND UP TO NEAREST WHOLE NUMBER IF THERE'S A DECIMAL. ALWAYS.)**

$$\text{Back } wood\ bracing = \frac{4(2 \times 3 \times (2.705 \times 3.28))}{12} = 17.7448\ bd.ft$$

FOR STEPS

No. of steps: 10

SL = 1.2 m

Lumber wood: 2" x 3"

$$Wood\ bracing\ for\ steps = \frac{2(LUMBER\ WOOD\ SIZE \times (SL \times 3.28))}{12}$$ **x no. of steps**

$$Wood\ bracing\ for\ steps = \frac{2(2 \times 3 \times (1.2 \times 3.28))}{12}$$ **x 10 = 39.36 BD Ft.**

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

SCAFFOLDING FOR STAIRS:

USER SELECTION: 2" X 3"

12 bd ft / m (CONSTANT)

= Flight length
= 2.705
2.705 m x 12 bd ft/ m = **32.46 bd. Ft**

TOTAL VOLUME OF WOOD FOR STAIRS:
= (ALL BD. FT. OF SAME LUMBER SIZE) X QTY of stairs

= 8.8742 + 32.8+17.7448+39.36+32.46
* NOTE THAT IN THIS CASE ALL LUMBER SIZE IS 2" x 3".

= **131.239 bd ft. (2" x 3" lumber size)**

FOR L-STAIRS

(FOR REFERENCE ONLY, NOT INCLUDED IN THE TOTALITY OF THIS EXAMPLE)

- **Basically, from U -stairs, remove the gap and you'll get L-stairs**

FIRST FLIGHT:

$$L = \sqrt{(RISER\ HEIGHT * NO\ OF\ STEPS)^2 + (TREAD\ WIDTH * NO\ OF\ STEPS)^2}$$

$$FLIGHT\ 1\ LENGTH = \sqrt{(150 * 10)^2 + (225 * 10)^2} = 2.705m$$

$$AREA\ OF\ PLYWOOD\ FOR\ BOTTOM\ SUPPORT$$

$$A = L\ \times SW\ STAIR\ WIDTH = 2.705\ \times 1.2 = 3.246\ m2$$

RISER BOARD

$$A = \big(L * (RISER\ HEIGHT + 0.1)\big) * 2$$

$$A = \big(2.705 * (0.15 + 0.1)\big) * 2 = 1.3525\ m2$$

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

SECOND FLIGHT:

$$L = \sqrt{(RISER\ HEIGHT * NO\ OF\ STEPS)^2 + (TREAD\ WIDTH * NO\ OF\ STEPS)^2}$$

$FLIGHT\ 2\ LENGTH = \sqrt{(150 * 10)^2 + (225 * 10)^2} = 1.892 \approx 1.9m$ (ROUND UP MULTIPLES OF 5)

$$AREA\ OF\ PLYWOOD\ FOR\ BOTTOM\ SUPPORT$$

$$A = L\ \times SL\ STAIR\ LENGTH = 1.9\ \times 1.2 = 2.28\ m3$$

RISER BOARD

$$A = \big(L * (RISER\ HEIGHT + 0.1)\big) * 2$$

$$A = \big(1.9 * (0.15 + 0.1)\big) * 2 = 9.5\ m2$$

LANDING

$$A = SL^2 + [3 * (LAND\ THCK * SL)]$$

$$A = \big[((1.2^2))\big] + [3 * (0.15 * 1.2)] = 1.98\ m2$$

STEPS:

A= SL x RISER X (STEPS FIRST FLIGHT + STEPS SECOND FLIGHT) = (1.2 X 0.15) X (10+7) = **3.06 m2**

Area total= Add all acquired area **"BOLD NUMBERS" X QTY OF STAIRS IN THAT FLOOR**

$Area\ total = (3.246 +\ 1.3525 + 2.28 + 0.95 + 1.98 + 3.06)\ \times\ 1 =$ **12.8685 m2**

No. of pieces of Plywood needed = $\frac{TOTAL\ surface\ AREA}{AREA\ OF\ PLYWOOD\ "(1.2\ m * 2.4m)"} = \frac{12.8685}{(1.2*2.4)} = 4.468\ \times 50\%$

$$= 2.23\ or\ 3pcs$$

FRAMEWORK FOR STAIRS:

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

By Default, 2" x 3" x 8' is used

FOR FRONT SUPPORT BRACING

$$\frac{\frac{SL}{0.6}\left(LUMBER\ WOOD\ SIZE \times (SL\ \times 3.28)\right)}{12}$$

$\frac{SL}{0.6} = \frac{1.2}{0.6} = 2$ **(ROUND UP TO NEAREST WHOLE NUMBER IF THERE'S A DECIMAL. ALWAYS. E.G 2.38 = 3)**

$$Front\ wood\ bracing\ (FIRST\ FLIGHT) = \frac{2(2 \times 3 \times (2.705\ \times 3.28))}{12} = 8.8724\ bd.ft$$

$$Front\ wood\ bracing\ (SECOND\ FLIGHT) = \frac{2\left(2 \times 3 \times (1.9\ \times 3.28)\right)}{12} = 6.23\ bd.ft$$

$$Bracing\ support\ per\ steps = \frac{TOTAL\ STEPS\ \left(LUMBER\ SIZE \times (3.28)\right)}{12} \times \frac{SL}{0.6} (* rounded\ off\ value)$$

$$Bracing\ support\ per\ steps = \frac{(10+7)\ \left(2 \times 3 \times (3.28)\right)}{12} = 27.88\ bd.ft\ \text{ x } 2 = \textbf{55.76 bd. ft}$$

FOR BACK SUPPORT BRACING

$\frac{SL}{0.3} = \frac{1.2}{0.3} = 4$ **(ROUND UP TO NEAREST WHOLE NUMBER IF THERE'S A DECIMAL. ALWAYS.)**

$$\text{Back } wood\ bracing\ (FIRST\ FLIGHT) = \frac{4\left(2 \times 3 \times (2.705 \times 3.28)\right)}{12} = 17.7448\ bd.ft$$

$$Back\ wood\ bracing\ (SECOND\ FLIGHT) = \frac{4\left(2 \times 3 \times (1.9\ \times 3.28)\right)}{12} = 12.464\ bd.ft$$

FOR STEPS

No. of steps: 10+7= 17

SL = 1.2 m

VIOLET = CONSTANT (always in equation) RED = IMPORTANT NOTE TO READ
GREEN = SELECTED BY USER. (Dependent upon input or selection) ORANGE – CORRESPONDING VALUE

Lumber wood: 2” x 3”

$$Wood\ bracing\ for\ steps = \frac{2(LUMBER\ WOOD\ SIZE \times (SW \times 3.28))}{12}$$ **x no. of steps**

$$Wood\ bracing\ for\ steps = \frac{2(2 \times 3 \times (1.2 \times 3.28))}{12}$$ **x 17= 66.912 BD Ft.**

SCAFFOLDING FOR STAIRS:

USER SELECTION: 2” X 2”

12 bd ft / m (CONSTANT)

= Flight 1 length + SW+ flight 2 length
= 2.705 + 1.2 + 1.9 = 5.805 m
5.805 m x 12 bd ft/ m = **69.66 bd. Ft**

TOTAL VOLUME OF WOOD FOR STAIRS:
= ALL BD. FT. X QTY

*** FOR 2” X 3” LUMBER WOOD**
= 8.8724 + 6.23 + 55.76 + 17.7448 +12.464 + 66.912 = 167.9832 X 1 **= 167.98 bd. ft**

*** FOR 2” X 2” LUMBER WOOD**
= **69.66 bd. Ft**