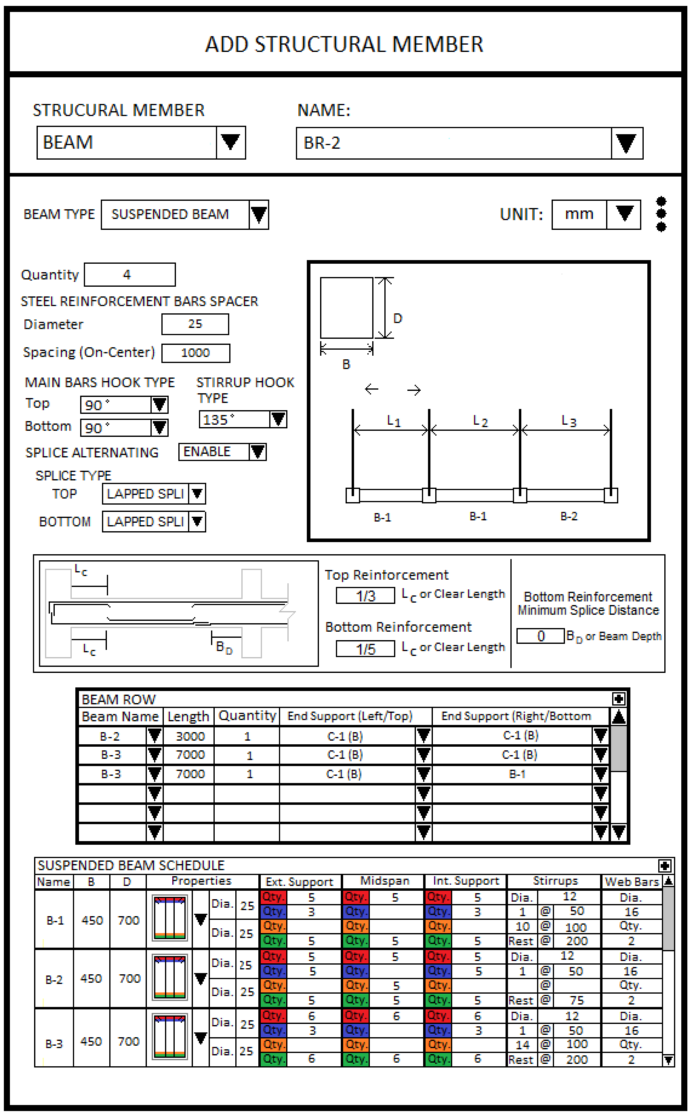
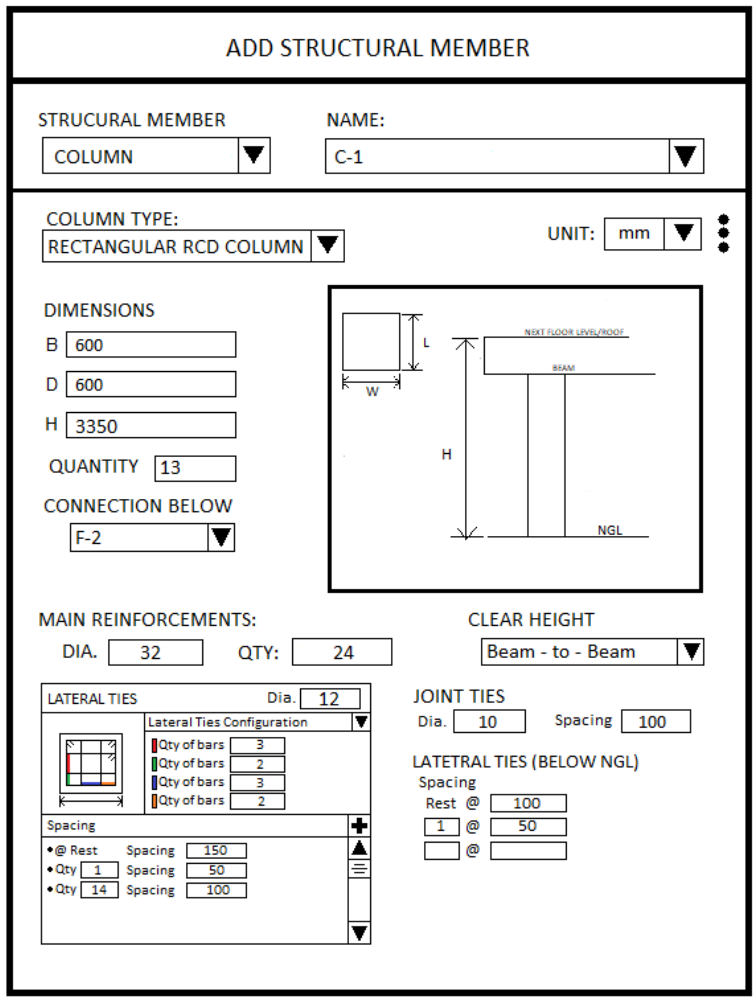
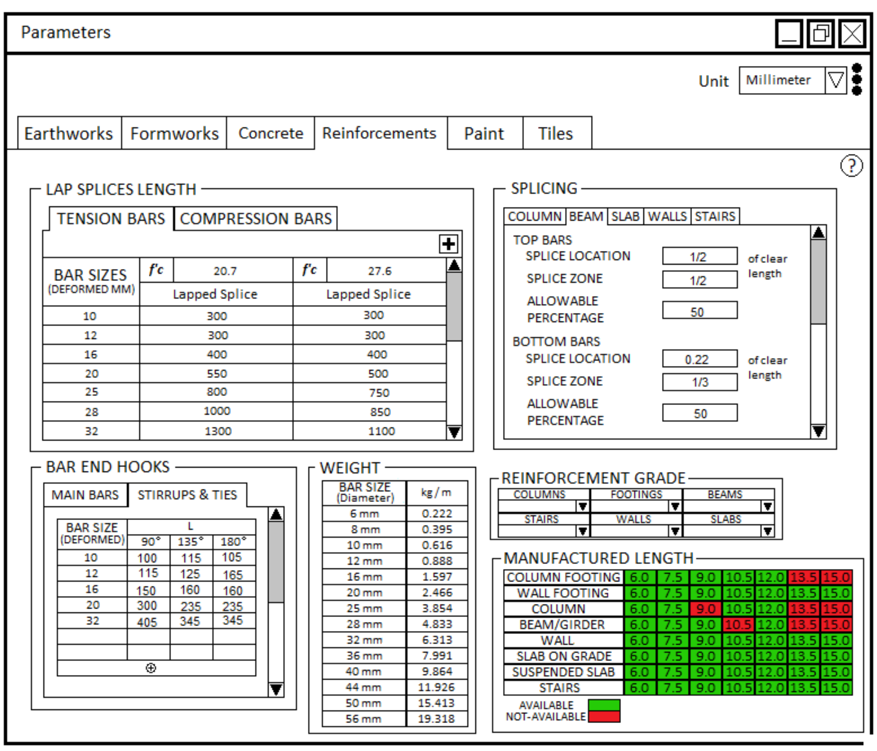
REFERENCE



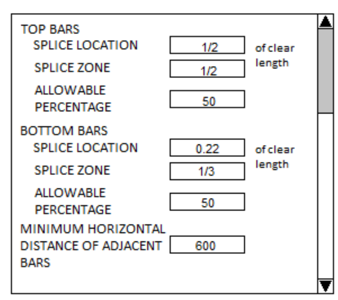
ADD STRUCTURAL MEMBER
STRUCURAL MEMBER
BEAM
NAME:
BR-2
BEAM TYPE
SUSPENDED BEAM
UNIT:
mm
Quantity
4
STEEL REINFORCEMENT BARS SPACER
Diameter
25
Spacing (On-Center)
1000
MAIN BARS HOOK TYPE
Top
90°
Bottom
90°
STIRRUP HOOK TYPE
135°
SPLICE ALTERNATING
ENABLE
SPLICE TYPE
TOP
LAPPED SPLI
BOTTOM
LAPPED SPLI
Top Reinforcement
1/3
Lc or Clear Length
Bottom Reinforcement
1/5
Lc or Clear Length
Bottom Reinforcement Minimum Splice Distance
0
BD or Beam Depth
BEAM ROW
Beam Name
Length
Quantity
End Support (Left/Top)
End Support (Right/Bottom
B-2
3000
1
C-1 (B)
C-1 (B)
B-3
7000
1
C-1 (B)
C-1 (B)
B-3
7000
1
C-1 (B)
B-1
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



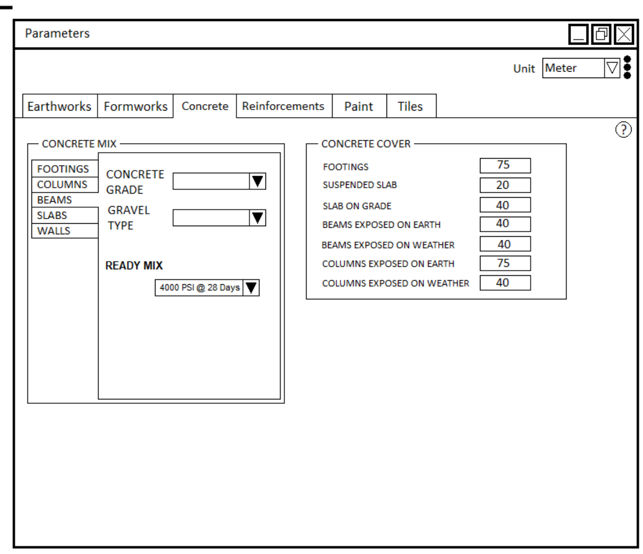
ADD STRUCTURAL MEMBER
STRUCURAL MEMBER
COLUMN
NAME:
C-1
COLUMN TYPE:
RECTANGULAR RCD COLUMN
UNIT:
mm
DIMENSIONS
B
600
D
600
H
3350
QUANTITY
13
CONNECTION BELOW
F-2
NEXT FLOOR LEVEL/ROOF
BEAM
NGL
MAIN REINFORCEMENTS:
DIA.
32
QTY:
24
CLEAR HEIGHT
Beam - to - Beam
LATERAL TIES
Dia.
12
Lateral Ties Configuration
Qty of bars
3
Qty of bars
2
Qty of bars
3
Qty of bars
2
Spacing
@ Rest
Spacing
150
Qty
1
Spacing
50
Qty
14
Spacing
100
JOINT TIES
Dia.
10
Spacing
100
LATETRAL TIES (BELOW NGL)
Spacing
Rest
@
100
1
@
50
@



Parameters
Unit
Millimeter
Earthworks
Formworks
Concrete
Reinforcements
Paint
Tiles
LAP SPLICES LENGTH
TENSION BARS
COMPRESSION BARS
BAR SIZES (DEFORMED MM)
f'c
20.7
f'c
27.6
Lapped Splice
Lapped Splice
10
300
300
12
300
300
16
400
400
20
550
500
25
800
750
28
1000
850
32
1300
1100
SPLICING
COLUMN
BEAM
SLAB
WALLS
STAIRS
TOP BARS
SPLICE LOCATION
1/2
of clear length
SPLICE ZONE
1/2
ALLOWABLE PERCENTAGE
50
BOTTOM BARS
SPLICE LOCATION
0.22
of clear length
SPLICE ZONE
1/3
ALLOWABLE PERCENTAGE
50
BAR END HOOKS
MAIN BARS
STIRRUPS & TIES
BAR SIZE (DEFORMED)
L
90°
135°
180°
10
100
115
105
12
115
125
165
16
150
160
160
20
300
235
235
32
405
345
345
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
REINFORCEMENT GRADE
COLUMNS
FOOTINGS
BEAMS
STAIRS
WALLS
SLABS
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



TOP BARS
SPLICE LOCATION
1/2
of clear length
SPLICE ZONE
1/2
ALLOWABLE PERCENTAGE
50
BOTTOM BARS
SPLICE LOCATION
0.22
of clear length
SPLICE ZONE
1/3
ALLOWABLE PERCENTAGE
50
MINIMUM HORIZONTAL DISTANCE OF ADJACENT BARS
600



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

STEPS

1. The program will determine the dimension of the support

    1. The program will determine the dimension of the support

LEGEND:

- If the support is a Column connected to its width **"Support Name(D)"** then

    a) Case 1: The Beam Type is "Footing Tie Beam" & "Grade Beam"

$$Dim_{S:Left/Top} = \frac{B_{column}+(CC_{EE}-CC_{EW})}{2} \quad or \quad Dim_{S:Right/Bott} = \frac{B_{column}+(CC_{EE}-CC_{EW})}{2}$$

    b) Case 2: The Beam Type is "Suspended Beam" & "Roof Beam"

$$Dim_{S:Left/Top} = \frac{B_{column}}{2} \quad or \quad Dim_{S:Right/Bott} = \frac{B_{column}}{2}$$

- If the support is a Column connected to its length **"Support Name(B)"** then

    a) Case 1: The Beam Type is "Footing Tie Beam" & "Grade Beam"

$$Dim_{S:Left/Top} = \frac{D_{column}+(CC_{EE}-CC_{EW})}{2} \quad or \quad Dim_{S:Right/Bott} = \frac{D_{column}+(CC_{EE}-CC_{EW})}{2}$$

    b) Case 2: The Beam Type is "Suspended Beam" & "Roof Beam"

$$Dim_{S:Left/Top} = \frac{D_{column}}{2} \quad or \quad Dim_{S:Right/Bott} = \frac{D_{column}}{2}$$

- If the support is a Beam, then

$$Dim_{S:Left/Top} = \frac{B_{beam}}{2} \quad or \quad Dim_{S:Right/Bott} = \frac{B_{beam}}{2}$$

- If there is No support, then

$$Dim_{S:Left/Top} = 0 \quad or \quad Dim_{S:Right/Bott} = 0$$

Example:

BEAM TYPE SUSPENDED BEAM   UNIT: mm

BEAM ROW

Beam Name	Length	Quantity	End Support (Left/Top)	End Support (Right/Bottom
B-2	3000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	B-1

Ref (1)

Since *Ref (1)* is connected to *C-1(D)* @ its left/top and @ its right/bottom. Thus,

$$Dim_{Left(1)} = \frac{B_{C1}}{2} = \frac{600}{2} = 300$$

$$Dim_{Right(1)} = \frac{B_{C1}}{2} = \frac{600}{2} = 300$$

Ref (2)

Since *Ref (2)* is connected to *C-1(D)* @ its left/top and @ its right/bottom. Thus,

$$Dim_{Left(2)} = \frac{B_{C1}}{2} = \frac{600}{2} = 300$$

$$Dim_{Right(2)} = \frac{B_{C1}}{2} = \frac{600}{2} = 300$$

Ref (3)

Since *Ref (2)* is connected to *C-1(D)* @ its left/top and @ its right/bottom. Thus,

$$Dim_{Left(2)} = \frac{B_{C1}}{2} = \frac{600}{2} = 300$$

$$Dim_{Right(2)} = \frac{B_{B-1}}{2} = \frac{450}{2} = 225$$

2. The program will determine the clear length of each beam.

$$L_{Cn} = L_n - \left(Dim_{Left(n)} + Dim_{Right(n)}\right)$$

Example:

BEAM ROW				
Beam Name	Length	Quantity	End Support (Left/Top)	End Support (Right/Bottom
B-2	3000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	B-1

Ref (1)

$$L_{C(1)} = L_1 - \left(Dim_{Left(1)} + Dim_{Right(1)}\right) = 3000 - (300 + 300) = 2400$$

Ref (2)

$$L_{C(2)} = L_2 - \left(Dim_{Left(2)} + Dim_{Right(2)}\right) = 7000 - (300 + 300) = 6400$$

Ref (3)

$$L_{C(3)} = L_3 - \left(Dim_{Left(3)} + Dim_{Right(3)}\right) = 7000 - (300 + 225) = 6475$$

3. The program will determine the quantity of stirrups each beam.

If a beam has an end support on both sides

$$Qty_{Cn} = \frac{L_{Cn} - 2[Qty_A \bullet Spacing_{@A} + Qty_B \bullet Spacing_{@B}]}{Spacing_{@Rest}} + 1$$

Else,

$$Qty_{Cn} = \frac{L_{Cn} - [Qty_A \bullet Spacing_{@A} + Qty_B \bullet Spacing_{@B}]}{Spacing_{@Rest}} + 1$$

Example:

BEAM ROW				
Beam Name	Length	Quantity	End Support (Left/Top)	End Support (Right/Bottom
B-2	3000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	B-1

SUSPENDED BEAM SCHEDULE														
Name	B	D	Properties		Ext. Support		Midspan		Int. Support		Stirrups			Web Bars
B-1	450	700	Dia.	25	Qty.	5	Qty.	5	Qty.	5	Dia.		12	Dia.
					Qty.	3	Qty.		Qty.	3	1	@	50	16
			Dia.	25	Qty.		Qty.		Qty.		10	@	100	Qty.
					Qty.	5	Qty.	5	Qty.	5	Rest	@	200	2
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
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

Ref (1)

Since it has end support on both sides. Thus,

$$Qty_{C(1)} = \frac{L_{C(1)} - 2[Qty_{A1} \bullet Spacing_{@A1} + Qty_{B1} \bullet Spacing_{@B1}]}{Spacing_{@Rest1}} + 1$$

$$Qty_{C(1)} = \frac{2400 - 2[1(50) + 0(0)]}{75} + 1$$

$$Qty_{C(1)} = 31.67 \rightarrow 32$$

Ref (2)

Since it has end support on both sides. Thus,

$$Qty_{C(2)} = \frac{L_{C(2)} - 2[Qty_{A2} \bullet Spacing_{@A2} + Qty_{B2} \bullet Spacing_{@B2}]}{Spacing_{@Rest2}} + 1$$

$$Qty_{C(2)} = \frac{6400 - 2[1(50) + 14(100)]}{200} + 1$$

$$Qty_{C(2)} = 18.5 \rightarrow 19$$

Ref (3)

Since it has end support on both sides. Thus,

$$Qty_{C(3)} = \frac{L_{C(3)} - 2[Qty_{A3} \bullet Spacing_{@A3} + Qty_{B3} \bullet Spacing_{@B3}]}{Spacing_{@Rest3}} + 1$$

$$Qty_{C(3)} = \frac{6475 - 2[1(50) + 14(100)]}{200} + 1$$

$$Qty_{C(3)} = 18.875 \rightarrow 19$$

4. The program will determine the spacing of the main reinforcements of each beam.

LEGEND:

$$S = \frac{B_{B(n)} - d_{bUM} - 2\left[d_{bS} + CC_B\right]}{Qty_{RED@Int.Support(n)} - 1}$$

Example:

Beam Type: Suspended Beam

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

BEAM ROW

Beam Name	Length	Quantity	End Support (Left/Top)	End Support (Right/Bottom
B-2	3000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	B-1

SUSPENDED BEAM SCHEDULE

Name	B	D	Properties		Ext. Support		Midspan		Int. Support		Stirrups			Web Bars
B-1	450	700	Dia.	25	Qty.	5	Qty.	5	Qty.	5	Dia.		12	Dia.
					Qty.	3	Qty.		Qty.	3	1	@	50	16
			Dia.	25	Qty.		Qty.		Qty.		10	@	100	Qty.
					Qty.	5	Qty.	5	Qty.	5	Rest	@	200	2
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
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

Ref (1)

$$S_1 = \frac{B_{B(1)} - d_{bUM(1)} - 2\left[d_{bS(1)} + CC_B\right]}{Qty_{RED@Int.Support(1)} - 1} = \frac{450 - 25 - 2(12 + 40)}{5 - 1} = 80.25$$

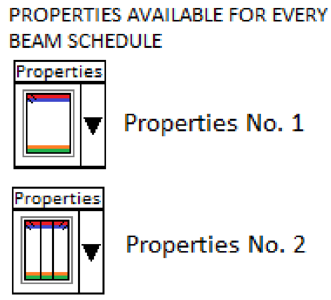
Ref (2)

$$S_2 = \frac{B_{B(2)} - d_{bUM(2)} - 2\left[d_{bS(2)} + CC_B\right]}{Qty_{RED@Int.Support(2)} - 1} = \frac{450 - 25 - 2(12 + 40)}{6 - 1} = 64.2$$

Ref (3)

$$S_3 = \frac{B_{B(3)} - d_{bUM(3)} - 2\left[d_{bS(3)} + CC_B\right]}{Qty_{RED@Int.Support(3)} - 1} = \frac{450 - 25 - 2(12 + 40)}{6 - 1} = 64.2$$

5. The program will determine the length of each beam through their corresponding property of their respected Beam Mark



- Properties No. 1:

$$L_{Bn} = 2\left(D_{Bn} + d_{bUM} + S_n\left(Qty_{RED@Int.Support(n)} - 1\right) + H_L\right) - 4\left(CC_B\right) - 11d_{bS(n)}$$

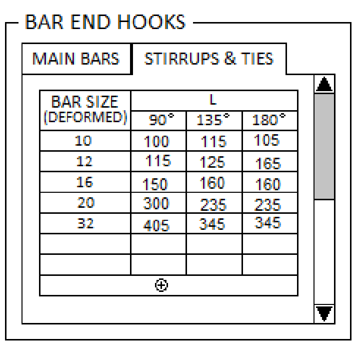
- Properties No. 2

$$L_{Bn} = 2\left[D_{Bn} + d_{bUM} + S_n\left(Qty_{RED@Int.Support(n)} - 2\right) + H_L\right] - 4\left(CC_B\right) - 11d_{bS(n)}$$

Where:

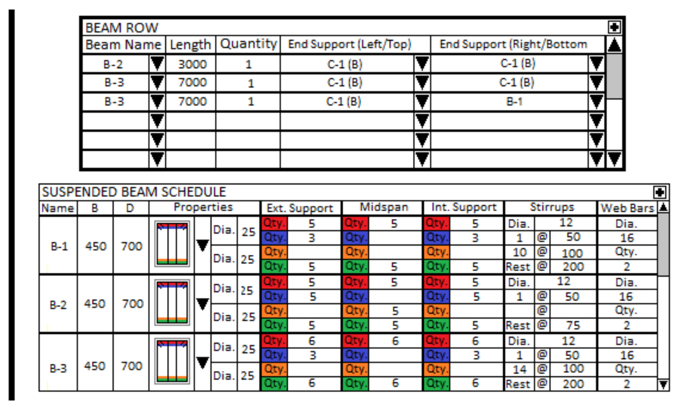
$H_L = Hook\ Length\ of\ the\ Stirrups(135°)\ based\ on\ the\ Table\ in\ Parameters(Renforcement)$

Example:



BAR END HOOKS — MAIN BARS / STIRRUPS & TIES

BAR SIZE (DEFORMED)	L 90°	135°	180°
10	100	115	105
12	115	125	165
16	150	160	160
20	300	235	235
32	405	345	345



BEAM ROW

Beam Name	Length	Quantity	End Support (Left/Top)	End Support (Right/Bottom
B-2	3000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	C-1 (B)
B-3	7000	1	C-1 (B)	B-1

SUSPENDED BEAM SCHEDULE

Name	B	D	Properties		Ext. Support	Midspan	Int. Support	Stirrups	Web Bars
B-1	450	700	Dia.	25	Qty. 5	Qty. 5	Qty. 5	Dia. 12	Dia.
					Qty. 3	Qty.	Qty. 3	1 @ 50	16
			Dia.	25	Qty.	Qty.	Qty.	10 @ 100	Qty.
					Qty. 5	Qty. 5	Qty. 5	Rest @ 200	2
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
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

Ref (1)

$$L_{B(1)} = 2\left[D_{B(1)} + d_{bUM(1)} + S_1\left(Qty_{RED@Int.Support(1)} - 2\right) + H_L\right] - 4\left(CC_B\right) - 11d_{bS(1)}$$

$$L_{B(1)} = 2[700 + 25 + 80.25(5 - 2) + 125] - 4(40) - 11(12)$$

$$L_{B(1)} = 1889.5\ mm$$

Ref (2)

$$L_{B(2)} = 2\left[D_{B(2)} + d_{bUM(2)} + S_2\left(Qty_{RED@Int.Support(2)} - 2\right) + H_L\right] - 4\left(CC_B\right) - 11d_{bS(2)}$$

$$L_{B(2)} = 2[700 + 25 + 64.2(6 - 2) + 125] - 4(40) - 11(12)$$

$$L_{B(2)} = 1921.6\ mm$$

Ref (3)

$$L_{B(3)} = 2\left[D_{B(3)} + d_{bUM(3)} + S_3\left(Qty_{RED@Int.Support(3)} - 2\right) + H_L\right] - 4\left(CC_B\right) - 11d_{bS(3)}$$

$$L_{B(3)} = 2[700 + 25 + 64.2(6 - 2) + 125] - 4(40) - 11(12)$$

$$L_{B(3)} = 1921.6\ mm$$

6. After determining the quantities of main reinforcement and their respective required bar length, the program will determine their respective manufactured bars and no. of manufactured pcs.

If $\sum Qty_{(n)} or\ its\ L_B\ is\ equal\ to\ ZERO\ then,$

$$Qty_{Pn} = 0\ pcs$$

$$L_{CBn} = 0\ m$$

Else, compute

$$Qty_{Pn} = \frac{L_M}{L_{Bn}}$$

For Qty_{Mn}

If the Beam Properties No. 1:
If the Beam Properties No. 2:

a) If a beam has an end support on both sides.

$$Qty_{Mn} = \frac{m \cdot Qty_{Beam(n)} \bullet \left[2\left(Qty_{A(n)} + Qty_{B(n)}\right) + Qty_{C(n)}\right]}{Qty_{Pn}\ (round\ down\ into\ whole\ number)} \bullet Qty_{Beam\ Row}$$

b) Else,

$$Qty_{Mn} = \frac{m \cdot Qty_{Beam(n)} \bullet \left[Qty_{A(n)} + Qty_{B(n)} + Qty_{C(n)}\right]}{Qty_{Pn}\ (round\ down\ into\ whole\ number)} \bullet Qty_{Beam\ Row}$$

Then,

$$L_W = \left[Qty_{Pn} - Qty_{Pn}\ (round\ down\ into\ whole\ number)\right] \times L_{Bn}$$

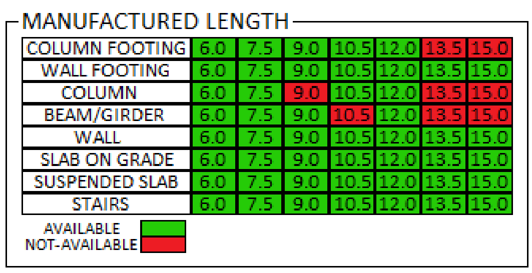
$$L_E\,(m) = \left[Qty_{Mn}(round\ up\ to\ whole\ number) - Qty_{Mn}\right] \times L_M$$

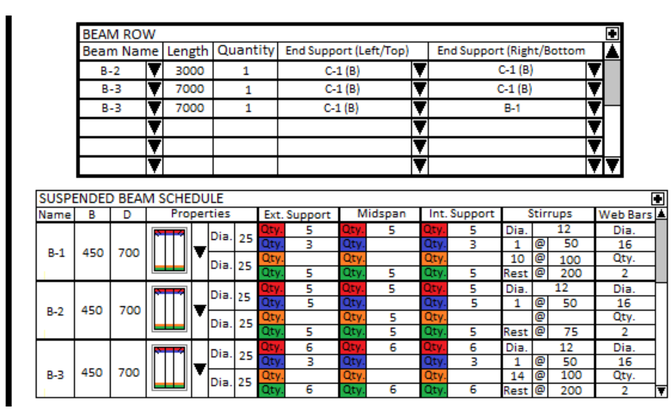
And

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

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

Example:





Ref (1): Beam Property 1 & has support on both sides

$$Qty_{Total(1)} = Qty_{Beam(1)} \bullet \left[2\left(Qty_{A(1)} + Qty_{B(1)}\right) + Qty_{C(1)}\right] = 1 \cdot [2(1\ +\ 0) +\ 32] =\ 34$$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	m	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	34	1.8895	3	2	3.18	3	68	68	0.332	0	22.542
7.5					3.97	3	68	68	1.832	0	124.542
9					4.76	4	51	51	1.442	0	73.542
12					6.35	6	34	34	0.663	0	22.542

$L_{CM(1)}\ =\ 6\ m$ and $Qty_{M(1)}\ =\ 68\ pcs$

Ref (2): Beam Property 1 & has support on both sides

$$Qty_{Total(1)} = Qty_{Beam(2)} \bullet \left[2\left(Qty_{A(2)} + Qty_{B(2)}\right) + Qty_{C(2)}\right] = 1 \cdot [2(1\ +\ 14) +\ 19] =\ 49$$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	m	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	49	1.9216	3	2	3.12	3	98	98	0.235	0	23.050
7.5					3.90	3	98	98	1.735	0	170.050
9					4.68	4	73.5	74	1.314	4.5	100.393
12					6.24	6	49	49	0.470	0	23.050

$L_{CM(2)} = 6\,m$ and $Qty_{M(2)} = 98\,pcs$

Ref (3): Beam Property 1 & has support on both sides

$$Qty_{Total(1)} = Qty_{Beam(3)} \bullet \left[2\left(Qty_{A(3)} + Qty_{B(3)}\right) + Qty_{C(3)}\right] = 1\cdot[2(1 + 14) + 19] = 49$$

L [M]	Qty [Total]	L [B]	Qty (**B**eam**R**ow)	m	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	49	1.9216	3	2	3.12	3	98	98	0.235	0	23.050
7.5					3.90	3	98	98	1.735	0	170.050
9					4.68	4	73.5	74	1.314	4.5	100.393
12					6.24	6	49	49	0.470	0	23.050

$L_{CM(3)} = 6\,m$ and $Qty_{M(3)} = 98\,pcs$

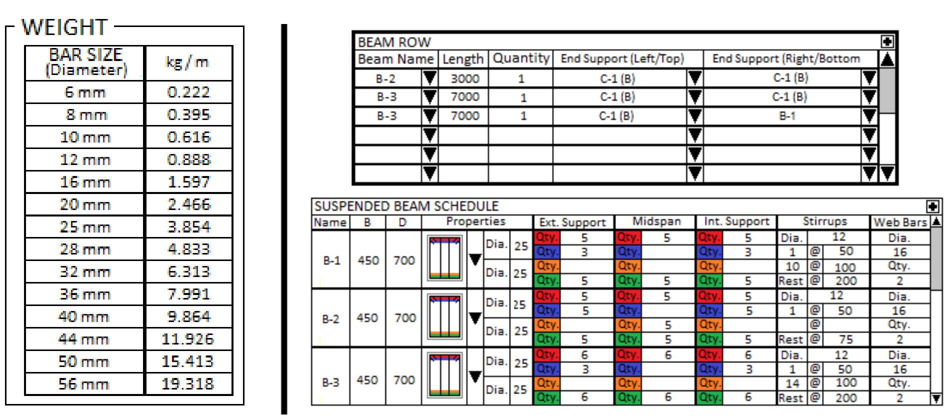
7. The program will then compute the total weight of the reinforcement.

$$W_T = \sum W_{Dn} L_{CMn} Qty_{Mn}$$

Where:

$W_{Dn} = Weight\ based\ of\ the\ closest\ coresponding\ diameter\ of\ the\ stirrup\ of\ each\ beam.$

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) Beam Name: B-2; $Stirrups\ Dia. = 12\,mm$ Thus, $W_{D(1)} = 0.888\,kg/m$

Ref (2) Beam Name: B-3; $Stirrups\ Dia. = 12\,mm$ Thus, $W_{D(2)} = 0.888\,kg/m$

Ref (3) Beam Name: B-3; $Stirrups\ Dia. = 12\,mm$ Thus, $W_{D(2)} = 0.888\,kg/m$

$$W_T = \sum W_{Dn} L_{CMn} Qty_{Mn}$$

$$W_T = W_{D(1)} L_{CM(1)} Qty_{M(1)} + W_{D(2)} L_{CM(2)} Qty_{M(2)} + W_{D(3)} L_{CM(3)} Qty_{M(3)}$$

$$W_T = 0.888(6)(68) + 0.888(6)(98) + 0.888(6)(98)$$

$$W_T = 1406.592\ kg$$