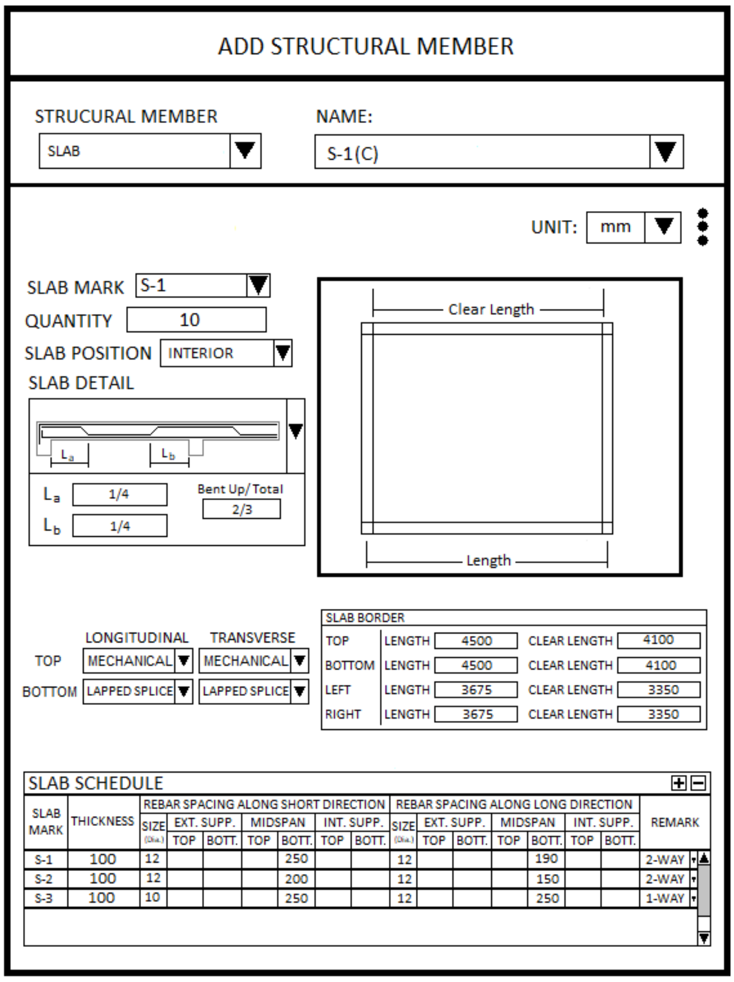
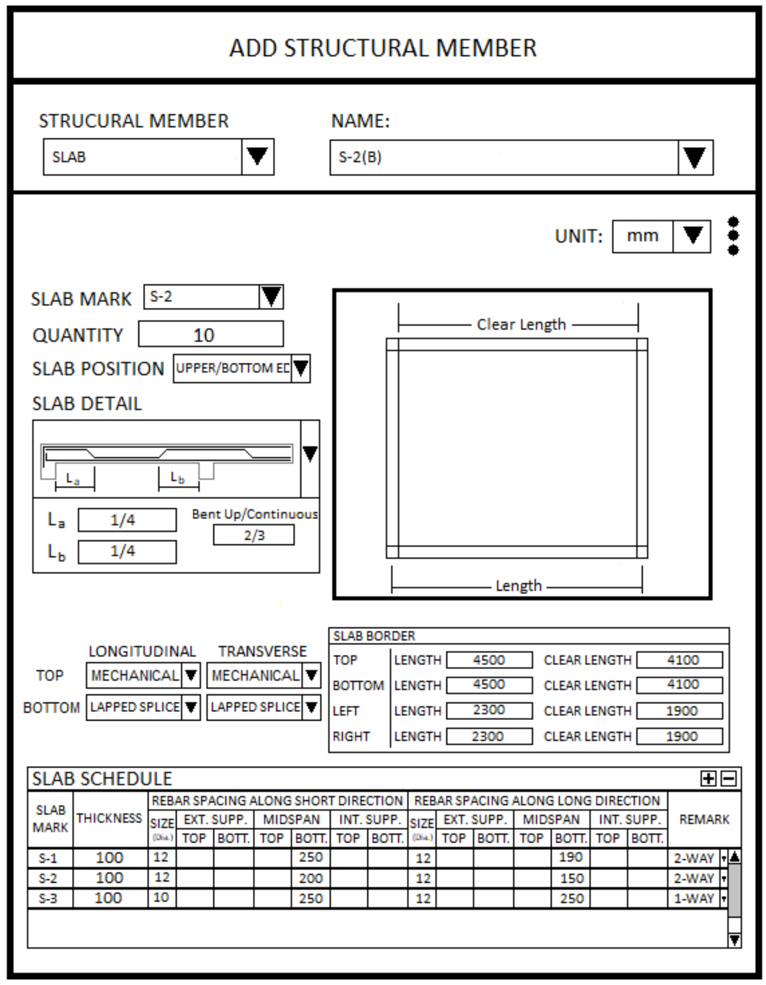
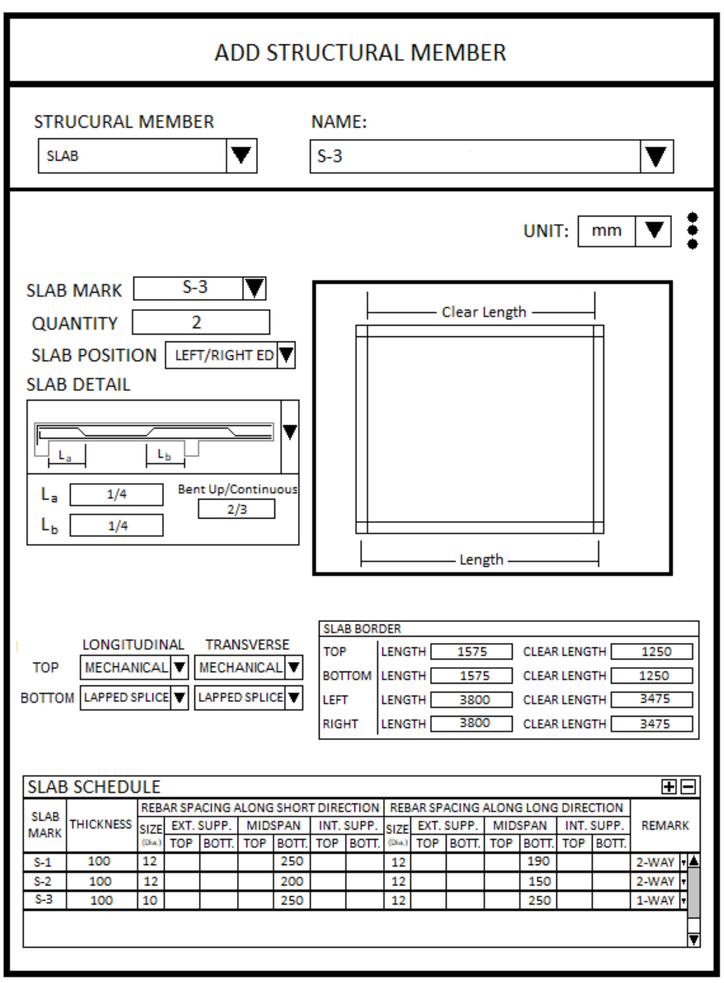
REFERENCE


ADD STRUCTURAL MEMBER
STRUCURAL MEMBER
SLAB
NAME:
S-1(C)
UNIT:
mm
SLAB MARK
S-1
QUANTITY
10
SLAB POSITION
INTERIOR
SLAB DETAIL
Bent Up/Total
1/4
1/4
2/3
Clear Length
Length
LONGITUDINAL
TRANSVERSE
TOP
MECHANICAL
MECHANICAL
BOTTOM
LAPPED SPLICE
LAPPED SPLICE
SLAB BORDER
TOP LENGTH 4500 CLEAR LENGTH 4100
BOTTOM LENGTH 4500 CLEAR LENGTH 4100
LEFT LENGTH 3675 CLEAR LENGTH 3350
RIGHT LENGTH 3675 CLEAR LENGTH 3350
SLAB SCHEDULE
SLAB MARK
THICKNESS
REBAR SPACING ALONG SHORT DIRECTION
REBAR SPACING ALONG LONG DIRECTION
SIZE
EXT. SUPP.
MIDSPAN
INT. SUPP.
TOP
BOTT.
REMARK
S-1 100 12 250 12 190 2-WAY
S-2 100 12 200 12 150 2-WAY
S-3 100 10 250 12 250 1-WAY


ADD STRUCTURAL MEMBER
STRUCURAL MEMBER
SLAB
NAME:
S-2(B)
UNIT:
mm
SLAB MARK
S-2
QUANTITY
10
SLAB POSITION
UPPER/BOTTOM ED
SLAB DETAIL
Bent Up/Continuous
1/4
1/4
2/3
Clear Length
Length
LONGITUDINAL
TRANSVERSE
TOP
MECHANICAL
MECHANICAL
BOTTOM
LAPPED SPLICE
LAPPED SPLICE
SLAB BORDER
TOP LENGTH 4500 CLEAR LENGTH 4100
BOTTOM LENGTH 4500 CLEAR LENGTH 4100
LEFT LENGTH 2300 CLEAR LENGTH 1900
RIGHT LENGTH 2300 CLEAR LENGTH 1900
SLAB SCHEDULE
SLAB MARK
THICKNESS
REBAR SPACING ALONG SHORT DIRECTION
REBAR SPACING ALONG LONG DIRECTION
SIZE
EXT. SUPP.
MIDSPAN
INT. SUPP.
TOP
BOTT.
REMARK
S-1 100 12 250 12 190 2-WAY
S-2 100 12 200 12 150 2-WAY
S-3 100 10 250 12 250 1-WAY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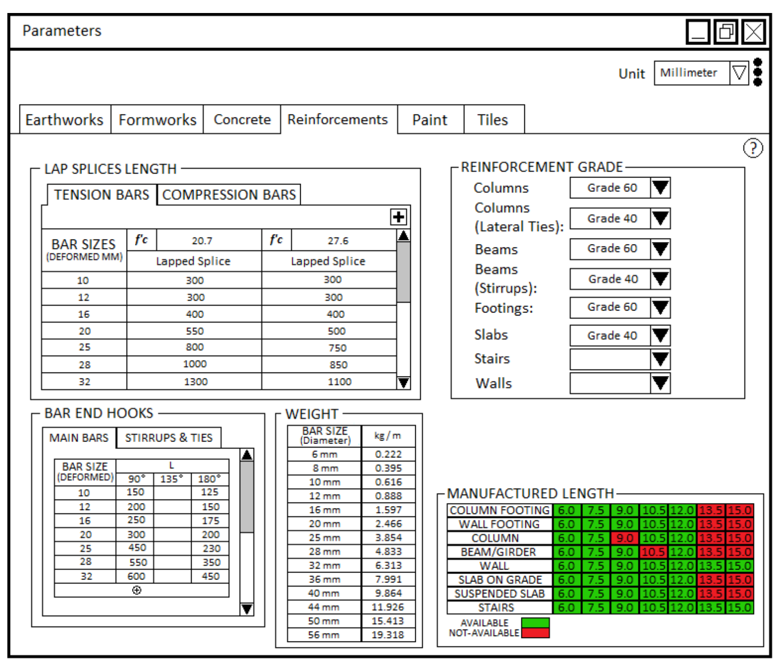
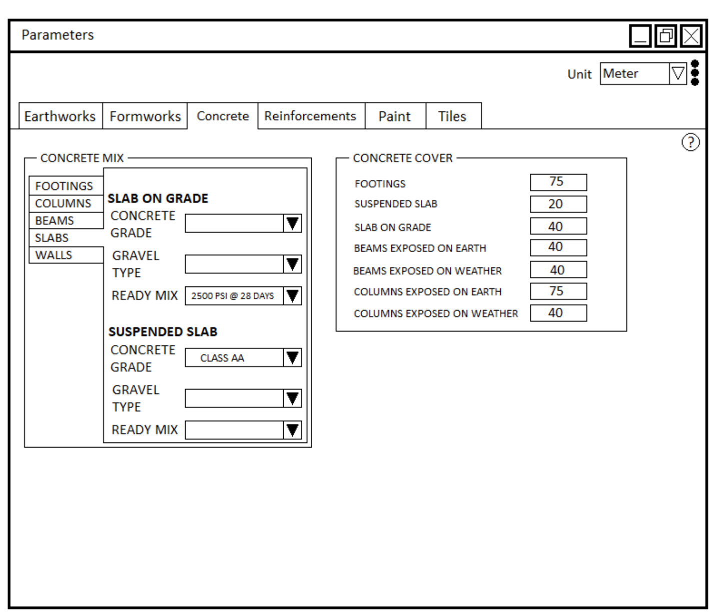
STRUCURAL MEMBER
SLAB
NAME:
S-3
UNIT:
mm
SLAB MARK
S-3
QUANTITY
2
SLAB POSITION
LEFT/RIGHT ED
SLAB DETAIL
Bent Up/Continuous
1/4
1/4
2/3
Clear Length
Length
LONGITUDINAL
TRANSVERSE
TOP
MECHANICAL
MECHANICAL
BOTTOM
LAPPED SPLICE
LAPPED SPLICE
SLAB BORDER
TOP LENGTH 1575 CLEAR LENGTH 1250
BOTTOM LENGTH 1575 CLEAR LENGTH 1250
LEFT LENGTH 3800 CLEAR LENGTH 3475
RIGHT LENGTH 3800 CLEAR LENGTH 3475
SLAB SCHEDULE
SLAB MARK
THICKNESS
REBAR SPACING ALONG SHORT DIRECTION
REBAR SPACING ALONG LONG DIRECTION
SIZE
EXT. SUPP.
MIDSPAN
INT. SUPP.
TOP
BOTT.
REMARK
S-1 100 12 250 12 190 2-WAY
S-2 100 12 200 12 150 2-WAY
S-3 100 10 250 12 250 1-WAY


Parameters
Unit
Millimeter
Earthworks
Formworks
Concrete
Reinforcements
Paint
Tiles
LAP SPLICES LENGTH
TENSION BARS
COMPRESSION BARS
BAR SIZES
Lapped Splice
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
WEIGHT
MANUFACTURED LENGTH
COLUMN FOOTING
WALL FOOTING
COLUMN
BEAM/GIRDER
WALL
SLAB ON GRADE
SUSPENDED SLAB
STAIRS
AVAILABLE
NOT-AVAILABLE


Parameters
Unit
Meter
Earthworks
Formworks
Concrete
Reinforcements
Paint
Tiles
CONCRETE MIX
FOOTINGS
COLUMNS
BEAMS
SLABS
WALLS
SLAB ON GRADE
CONCRETE GRADE
GRAVEL TYPE
READY MIX
SUSPENDED SLAB
CONCRETE GRADE
CLASS AA
GRAVEL TYPE
READY MIX
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 length and clear length of the inputted data in the slab border.

SLAB BORDER				
TOP	LENGTH		CLEAR LENGTH	
BOTTOM	LENGTH		CLEAR LENGTH	
LEFT	LENGTH		CLEAR LENGTH	
RIGHT	LENGTH		CLEAR LENGTH	

$$L_H = \frac{L_{Top} + L_{Bottom}}{2} \ and \ L_V = \frac{L_{Left} + L_{Right}}{2}$$

$$L_{CH} = \frac{L_{Clear(Top)} + L_{Clear(Bottom)}}{2} \ and \ L_{CV} = \frac{L_{Clear(Left)} + L_{Clear(Right)}}{2}$$

Example:

- S-1(C)

SLAB BORDER				
TOP	LENGTH	4500	CLEAR LENGTH	4100
BOTTOM	LENGTH	4500	CLEAR LENGTH	4100
LEFT	LENGTH	3675	CLEAR LENGTH	3350
RIGHT	LENGTH	3675	CLEAR LENGTH	3350

$$L_H = \frac{L_{Top} + L_{Bottom}}{2} = \frac{4500 + 4500}{2} = 4500$$

$$L_V = \frac{L_{Left} + L_{Right}}{2} = \frac{3675 + 3675}{2} = 3675$$

$$L_{CH} = \frac{L_{Clear(Top)} + L_{Clear(Bottom)}}{2} = \frac{4100 + 4100}{2} = 4100$$

$$L_{CV} = \frac{L_{Clear(Left)} + L_{Clear(Right)}}{2} = \frac{3350 + 3350}{2} = 3350$$

- S-2(B)

SLAB BORDER				
TOP	LENGTH	4500	CLEAR LENGTH	4100
BOTTOM	LENGTH	4500	CLEAR LENGTH	4100
LEFT	LENGTH	2300	CLEAR LENGTH	1900
RIGHT	LENGTH	2300	CLEAR LENGTH	1900

$$L_H = \frac{L_{Top} + L_{Bottom}}{2} = \frac{4500 + 4500}{2} = 4500$$

$$L_V = \frac{L_{Left} + L_{Right}}{2} = \frac{2300 + 2300}{2} = 2300$$

$$L_{CH} = \frac{L_{Clear(Top)} + L_{Clear(Bottom)}}{2} = \frac{4100 + 4100}{2} = 4100$$

$$L_{CV} = \frac{L_{Clear(Left)} + L_{Clear(Right)}}{2} = \frac{1900 + 1900}{2} = 1900$$

- S-3

SLAB BORDER				
TOP	LENGTH	1575	CLEAR LENGTH	1250
BOTTOM	LENGTH	1575	CLEAR LENGTH	1250
LEFT	LENGTH	3800	CLEAR LENGTH	3475
RIGHT	LENGTH	3800	CLEAR LENGTH	3475

$$L_H = \frac{L_{Top} + L_{Bottom}}{2} = \frac{1575 + 1575}{2} = 1575$$

$$L_V = \frac{L_{Left} + L_{Right}}{2} = \frac{3800 + 3800}{2} = 3800$$

$$L_{CH} = \frac{L_{Clear(Top)} + L_{Clear(Bottom)}}{2} = \frac{1250 + 1250}{2} = 1250$$

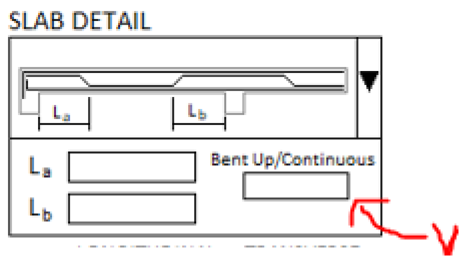
$$L_{CV} = \frac{L_{Clear(Left)} + L_{Clear(Right)}}{2} = \frac{3475 + 3475}{2} = 3475$$

2. The program will determine the quantity of the continuous steel reinforcements

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE	EXT. SUPP.		MIDSPAN		INT. SUPP.		
		(Dia.)	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	(Dia.)	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
																2-WAY

Case 1:



$$x = 1 : 2 - WAY$$

$$x = 0 : 1 - WAY$$

If $L_V \geq L_H$

- If $v \leq 0$

$$Qty_{V(Cont.)A} = \frac{L_{CH}}{Qty_{Int.Supp(Bott.)}} + 1$$

$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1$$

$$Qty_{H(Cont.)A} = \frac{L_{CV}}{Qty_{Int.Supp(Bott.)}} + 1$$

$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1$$

- If $v > 0$

$$Qty_{V(Cont.)A} = (1 - xv)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1$$

$$Qty_{H(Cont.)A} = (1 - v)\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1$$

If $L_V < L_H$

- If $v \leq 0$

$$Qty_{V(Cont.)A} = \frac{L_{CH}}{Qty_{Int.Supp(Bott.)}} + 1$$

$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1$$

$$Qty_{H(Cont.)A} = \frac{L_{CV}}{Qty_{Int.Supp(Bott.)}} + 1$$

$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1$$

- If $v > 0$

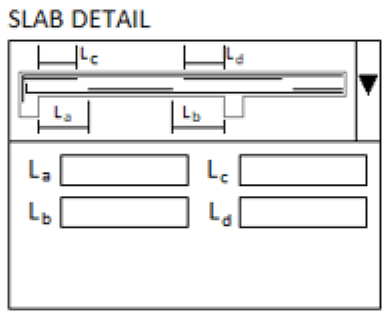
$$Qty_{V(Cont.)A} = (1 - v)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1$$

$$Qty_{H(Cont.)A} = (1 - xv)\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1$$

Case 2:



If $L_V \geq L_H$

$$Qty_{V(Cont.)A} = \frac{L_{CH}}{Qty_{Int.Supp(Bott.)}} + 1$$

$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1$$

$$Qty_{H(Cont.)A} = \frac{L_{CV}}{Qty_{Int.Supp(Bott.)}} + 1$$

$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1$$

If $L_V < L_H$

$$Qty_{V(Cont.)A} = \frac{L_{CH}}{Qty_{Int.Supp(Bott.)}} + 1$$

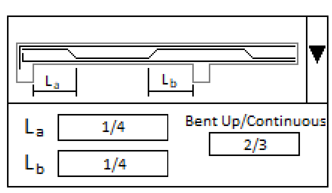
$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1$$

$$Qty_{H(Cont.)A} = \frac{L_{CV}}{Qty_{Int.Supp(Bott.)}} + 1$$

$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1$$

Example:

S-1(C): $L_V = 3675 < L_H = 4500$



$$v = 2/3$$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT	TOP	BOTT	TOP	BOTT		TOP	BOTT	TOP	BOTT	TOP	BOTT	
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

$$x = 1 : 2 - WAY$$

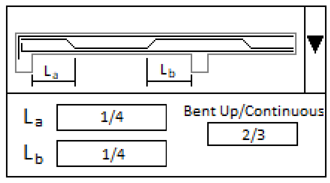
$$Qty_{V(Cont.)A} = (1 - v)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 - \frac{2}{3}\right)\left[\frac{4100}{190} + 1\right] = 7.53 \rightarrow \mathbf{8}$$

$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1 = \frac{4100}{0} + 1 = Error = \mathbf{0}$$

$$Qty_{H(Cont.)A} = (1 - xv)\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1 = \left(1 - 1 \cdot \frac{2}{3}\right)\left[\frac{3350}{250} + 1\right] = 4.8 \rightarrow \mathbf{5}$$

$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1 = \frac{3350}{0} + 1 = Error = \mathbf{0}$$

S-2(B): $L_V = 2300 < L_H = 4500$



$$v = 2/3$$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

$$x = 1 : 2 - WAY$$

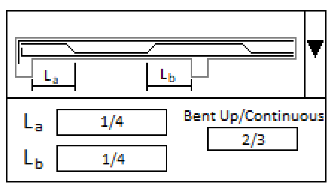
$$Qty_{V(Cont.)A} = (1 - v)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 - \frac{2}{3}\right)\left[\frac{4100}{150} + 1\right] = 9.44 \rightarrow \mathbf{10}$$

$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1 = \frac{4100}{0} + 1 = Error = \mathbf{0}$$

$$Qty_{H(Cont.)A} = (1 - xv)\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1 = \left(1 - 1 \cdot \frac{2}{3}\right)\left[\frac{1900}{200} + 1\right] = 3.5 \rightarrow \mathbf{4}$$

$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1 = \frac{1900}{0} + 1 = Error = \mathbf{0}$$

S-3: $L_V = 3800 > L_H = 1575$



$$v = 2/3$$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

$$x = 0 : 1 - WAY$$

$$Qty_{V(Cont.)A} = (1 - xv)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 - 0 \cdot \frac{2}{3}\right)\left[\frac{1250}{250} + 1\right] = \mathbf{6}$$

$$Qty_{V(Cont.)B} = \frac{L_{CH}}{Qty_{MidSpan(Top)}} + 1 = \frac{1250}{0} + 1 = Error = \mathbf{0}$$

$$Qty_{H(Cont.)A} = (1 - v)\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 - \frac{2}{3}\right)\left[\frac{3475}{250} + 1\right] = 4.97 \rightarrow \mathbf{5}$$

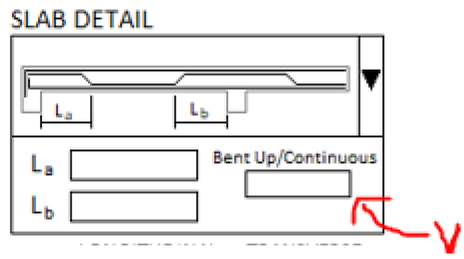
$$Qty_{H(Cont.)B} = \frac{L_{CV}}{Qty_{MidSpan(Top)}} + 1 = \frac{3475}{0} + 1 = Error = \mathbf{0}$$

3. The program will determine the extra bottom reinforcements

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
																2-WAY

Case 1:



$$x = 1:2 - WAY$$

$$x = 0:1 - WAY$$

If $L_V \geq L_H$

- If $v \leq 0$

$$Qty_{V(Extra)} = \frac{L_{CH}}{Qty_{Midspan(Bott.)}} - Qty_{V(Cont.)A} + 1$$

$$Qty_{H(Extra)} = \frac{L_{CV}}{Qty_{Midspan(Bott.)}} - Qty_{H(Cont.)A} + 1$$

- If $v > 0$

$$Qty_{V(Extra)} = (xv)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Extra)} = (v)\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

If $L_V < L_H$

- If $v \leq 0$

$$Qty_{V(Extra)} = \frac{L_{CH}}{Qty_{Midspan(Bott.)}} - Qty_{V(Cont.)A} + 1$$

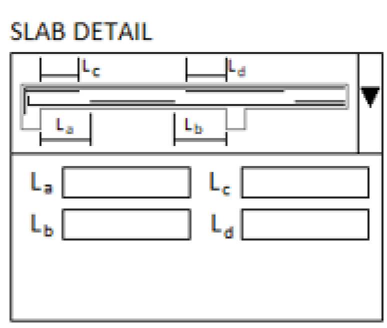
$$Qty_{H(Extra)} = \frac{L_{CV}}{Qty_{Midspan(Bott.)}} - Qty_{V(Cont.)A} + 1$$

- If $v > 0$

$$Qty_{V(Extra)} = (v)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Extra)} = (xv)\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

Case 2:



If $L_V \geq L_C$

$$Qty_{V(Extra)} = \frac{L_{CH}}{Qty_{Midspan(Bott.)}} - Qty_{V(Cont.)A} + 1$$

$$Qty_{H(Extra)} = \frac{L_{CV}}{Qty_{Midspan(Bott.)}} - Qty_{H(Cont.)A} + 1$$

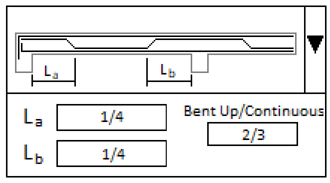
If $L_V < L_H$

$$Qty_{V(Extra)} = \frac{L_{CH}}{Qty_{Midspan(Bott.)}} - Qty_{V(Cont.)A} + 1$$

$$Qty_{H(Extra)} = \frac{L_{CV}}{Qty_{Midspan(Bott.)}} - Qty_{H(Cont.)A} + 1$$

Example:

S-1(C): $L_V = 3675 < L_H = 4500$



$$v = 2/3$$

SLAB SCHEDULE

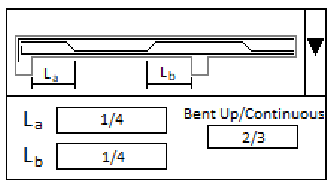
SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE	EXT. SUPP.		MIDSPAN		INT. SUPP.		
		(Dia.)	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	(Dia.)	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

$$x = 1 : 2 - WAY$$

$$Qty_{V(Extra)} = (v)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(\frac{2}{3}\right)\left[\frac{4100}{190} + 1\right] = 15.05 \rightarrow \mathbf{16}$$

$$Qty_{H(Extra)} = (xv)\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 \cdot \frac{2}{3}\right)\left[\frac{3350}{250} + 1\right] = 9.6 \rightarrow \mathbf{10}$$

S-2(B): $L_V = 2300 < L_H = 4500$



$$v = 2/3$$

SLAB SCHEDULE

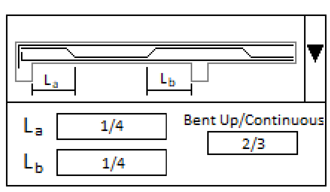
SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE	EXT. SUPP.		MIDSPAN		INT. SUPP.		
		(Dia.)	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	(Dia.)	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

$$x = 1 : 2 - WAY$$

$$Qty_{V(Extra)} = (v)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(\frac{2}{3}\right)\left[\frac{4100}{150} + 1\right] = 18.89 \rightarrow \mathbf{19}$$

$$Qty_{H(Extra)} = (xv)\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 \cdot \frac{2}{3}\right)\left[\frac{1900}{200} + 1\right] = \mathbf{7}$$

S-3 $L_V = 3800 > L_H = 1575$



$$v = 2/3$$

SLAB SCHEDULE

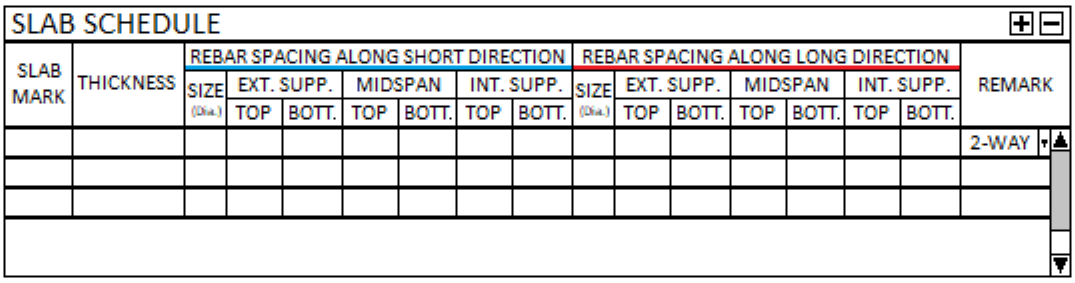
SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE	EXT. SUPP.		MIDSPAN		INT. SUPP.		
		(Dia.)	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	(Dia.)	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

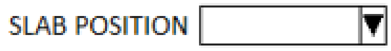
$$x = 0 : 1 - WAY$$

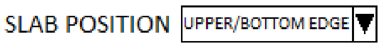
$$Qty_{V(Extra)} = (xv)\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(0 \cdot \frac{2}{3}\right)\left[\frac{1250}{250} + 1\right] = \mathbf{0}$$

$$Qty_{H(Extra)} = (v)\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(\frac{2}{3}\right)\left[\frac{3475}{250} + 1\right] = 9.93 \rightarrow \mathbf{10}$$

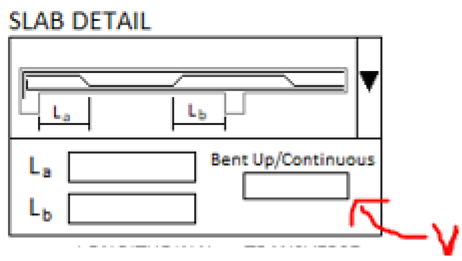
4. The program will determine the cut bars.





Case 1: 

- Case A:



$$x = 1 : 2 - WAY$$

$$x = 0 : 1 - WAY$$

If $L_V < L_H$

a) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{V(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{V(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{H(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{H(Cont.)B} + 1$$

If $L_V \geq L_H$

a) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{V(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{V(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{H(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{H(Cont.)B} + 1$$

If $L_V < L_H$

b) $v > 0$

$$Qty_{V(Cut)A} = 0$$

$$Qty_{V(Cut)B} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)A} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)B} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

If $L_V \geq L_H$

b) $v > 0$

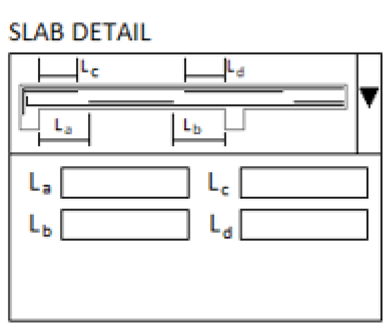
$$Qty_{V(Cut)A} = 0$$

$$Qty_{V(Cut)B} = xv\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)A} = v\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)B} = v\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

- Case B:



If $L_V < L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{V(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{V(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{H(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{H(Cont.)B} + 1$$

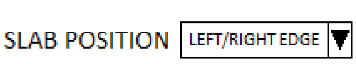
If $L_V \geq L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{V(Cont.)B} + 1$$

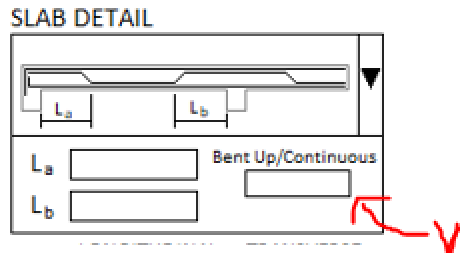
$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{V(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Intrior(Bott.)}} - Qty_{H(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{H(Cont.)B} + 1$$

Case 2: 

- Case A:



$$x = 1 : 2 - WAY$$
$$x = 0 : 1 - WAY$$

If $L_{CV} < L_H$

a) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$
$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$
$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$
$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

If $L_{CV} \geq L_H$

a) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$
$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$
$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$
$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

If $L_V < L_H$

b) $v > 0$

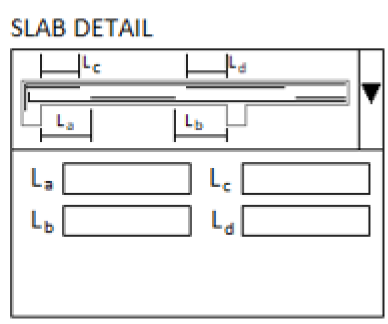
$$Qty_{V(Cut)A} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$
$$Qty_{V(Cut)B} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$
$$Qty_{H(Cut)A} = 0$$
$$Qty_{H(Cut)B} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

If $L_V \geq L_H$

b) $v > 0$

$$Qty_{V(Cut)A} = xv\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$
$$Qty_{V(Cut)B} = xv\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$
$$Qty_{H(Cut)A} = 0$$
$$Qty_{H(Cut)B} = v\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

- Case B:



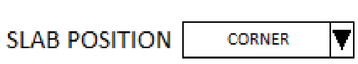
If $L_V < L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$
$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$
$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$
$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

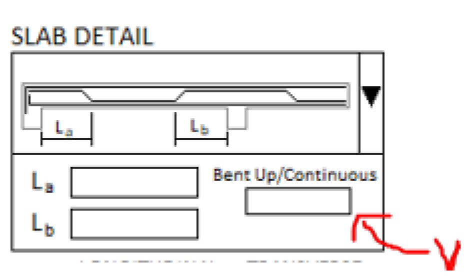
If $L_V \geq L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$
$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$
$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$
$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

Case 3:



- Case A:



$$x = 1 : 2 - WAY$$
$$x = 0 : 1 - WAY$$

If $L_V < L_H$

a) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

If $L_V \geq L_H$

a) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

If $L_V < L_H$

b) $v > 0$

$$Qty_{V(Cut)A} = 0$$

$$Qty_{V(Cut)B} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)A} = 0$$

$$Qty_{H(Cut)B} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

If $L_V \geq L_H$

b) $v > 0$

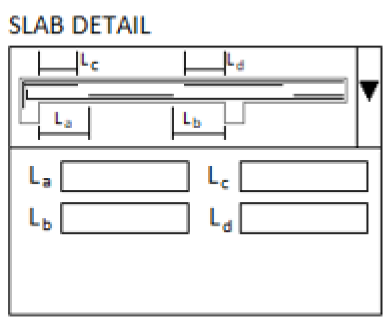
$$Qty_{V(Cut)A} = 0$$

$$Qty_{V(Cut)B} = xv\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)A} = 0$$

$$Qty_{H(Cut)B} = v\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

- Case B:



If $L_V < L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

If $L_V \geq L_H$

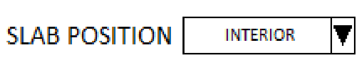
$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

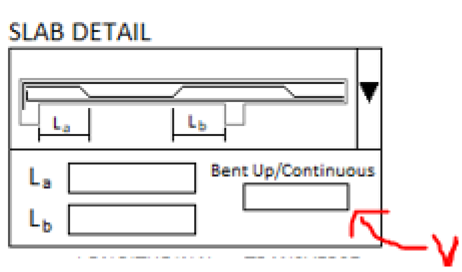
$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

Case 4:



- Case A:



$$x = 1:2 - WAY$$

$$x = 0:1 - WAY$$

If $L_V < L_H$

a) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

If $L_V \geq L_H$

a) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

If $L_V < L_H$

b) $v > 0$

$$Qty_{V(Cut)A} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{V(Cut)B} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)A} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)B} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

If $L_V \geq L_H$

b) $v > 0$

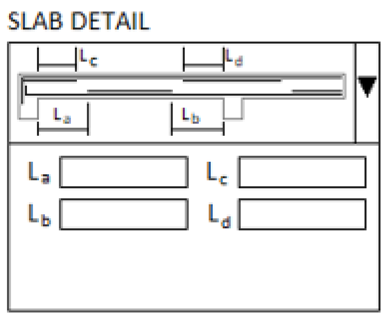
$$Qty_{V(Cut)A} = xv\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{V(Cut)B} = xv\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)A} = v\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

$$Qty_{H(Cut)B} = v\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right]$$

- Case B:



If $L_V < L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

If $L_V \geq L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

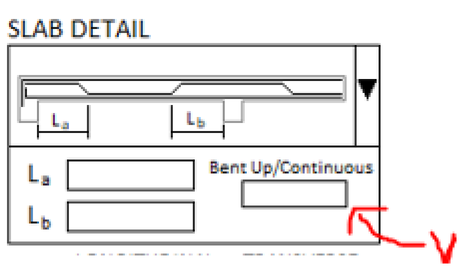
$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

Case 5: SLAB POSITION ISOLATED

- Case A:



$$x = 1 : 2 - WAY$$

$$x = 0 : 1 - WAY$$

If $L_V < L_H$

c) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

If $L_V \geq L_H$

c) $v \leq 0$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

If $L_V < L_H$

d) $v > 0$

$$Qty_{V(Cut)A} = 0$$

$$Qty_{V(Cut)B} = 0$$

$$Qty_{H(Cut)A} = 0$$

$$Qty_{H(Cut)B} = 0$$

If $L_V \geq L_H$

d) $v > 0$

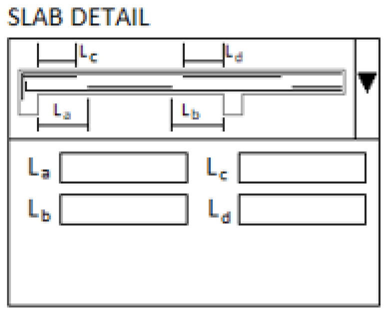
$$Qty_{V(Cut)A} = 0$$

$$Qty_{V(Cut)B} = 0$$

$$Qty_{H(Cut)A} = 0$$

$$Qty_{H(Cut)B} = 0$$

- Case B:



If $L_V < L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

If $L_V \geq L_H$

$$Qty_{V(Cut)A} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

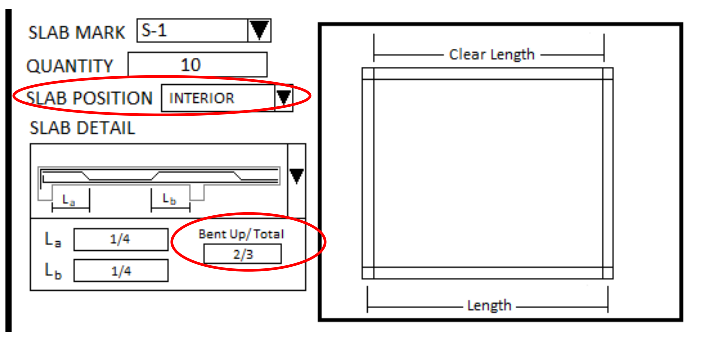
$$Qty_{V(Cut)B} = \frac{L_{CH}}{Qty_{Exterior(Bott.)}} - Qty_{Short(Cont.)B} + 1$$

$$Qty_{H(Cut)A} = \frac{L_{CV}}{Qty_{Exterior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

$$Qty_{H(Cut)B} = \frac{L_{CV}}{Qty_{Interior(Bott.)}} - Qty_{Long(Cont.)B} + 1$$

Example

S-1(C): $L_V = 3675 < L_H = 4500$



$$v = 2/3$$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

$$x = 1 : 2 - WAY$$

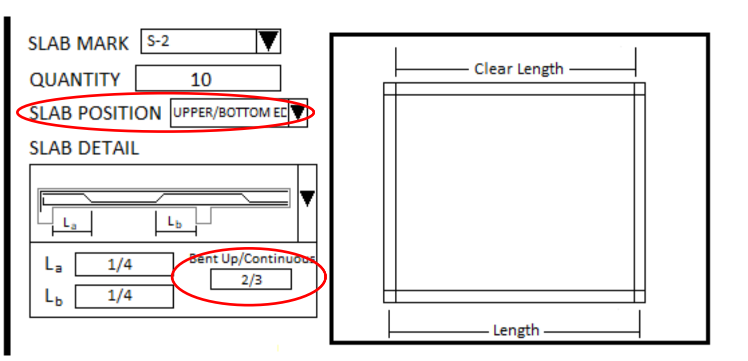
$$Qty_{V(Cut)A} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \frac{2}{3}\left[\frac{4100}{190} + 1\right] = 15.05 \rightarrow \mathbf{16}$$

$$Qty_{V(Cut)B} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \frac{2}{3}\left[\frac{4100}{190} + 1\right] = 15.05 \rightarrow \mathbf{16}$$

$$Qty_{H(Cut)A} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 \cdot \frac{2}{3}\right)\left[\frac{3350}{250} + 1\right] = 9.6 \rightarrow \mathbf{10}$$

$$Qty_{H(Cut)B} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 \cdot \frac{2}{3}\right)\left[\frac{3350}{250} + 1\right] = 9.6 \rightarrow \mathbf{10}$$

S-2(B): $L_V = 2300 < L_H = 4500$



$$v = 2/3$$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

$$x = 1 : 2 - WAY$$

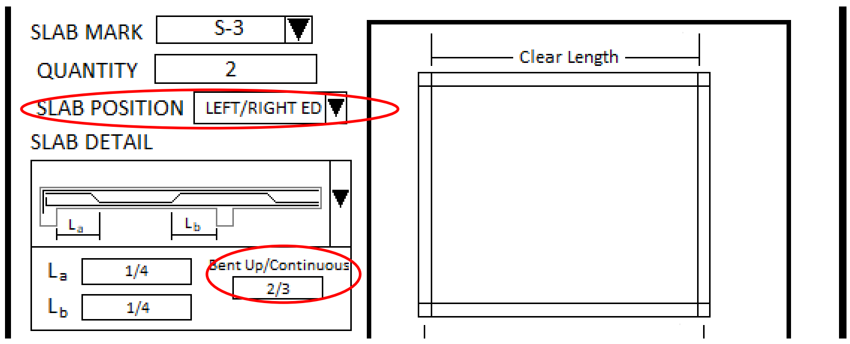
$$Qty_{V(Cut)A} = 0 = \mathbf{0}$$

$$Qty_{V(Cut)B} = v\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \frac{2}{3}\left[\frac{4100}{150} + 1\right] = 18.89 \rightarrow \mathbf{19}$$

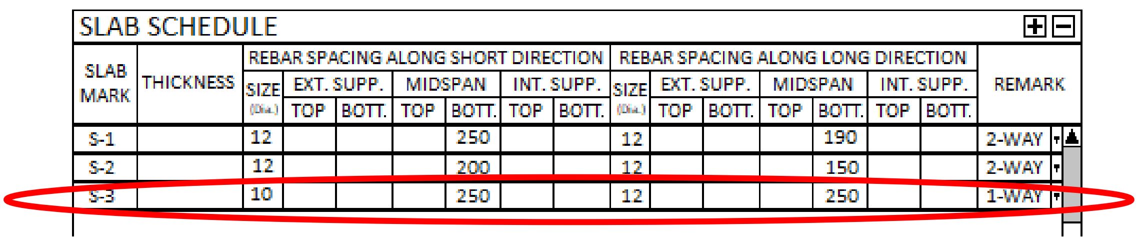
$$Qty_{H(Cut)A} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 \cdot \frac{2}{3}\right)\left[\frac{1900}{200} + 1\right] = \mathbf{7}$$

$$Qty_{H(Cut)B} = xv\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(1 \cdot \frac{2}{3}\right)\left[\frac{1900}{200} + 1\right] = \mathbf{7}$$

S-3 $L_V = 3800 > L_H = 1575$



$$v = 2/3$$



SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1		12				250			12				190			2-WAY
S-2		12				200			12				150			2-WAY
S-3		10				250			12				250			1-WAY

$$x = 0 : 1 - WAY$$

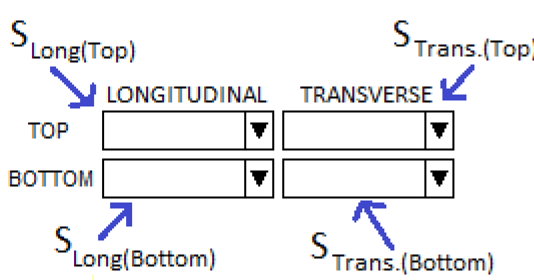
$$Qty_{V(Cut)A} = xv\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(0 \cdot \frac{2}{3}\right)\left[\frac{1250}{250} + 1\right] = \mathbf{0}$$

$$Qty_{V(Cut)B} = xv\left[\frac{L_{CH}}{Qty_{Midspan(Bott.)}} + 1\right] = \left(0 \cdot \frac{2}{3}\right)\left[\frac{1250}{250} + 1\right] = \mathbf{0}$$

$$Qty_{H(Cut)A} = 0 = \mathbf{0}$$

$$Qty_{H(Cut)B} = v\left[\frac{L_{CV}}{Qty_{Midspan(Bott.)}} + 1\right] = \frac{2}{3}\left[\frac{3475}{250} + 1\right] = 9.93 \rightarrow \mathbf{10}$$

5. The program will determine the Splice Length of continuous bars



If $L_V \geq L_H$

$$S_{LV(Bottom)} = S_{Long(Bottom)}$$

$$S_{LV(Top)} = S_{Long(Top)}$$

$$S_{LH(Bottom)} = S_{Trans(Bottom)}$$

$$S_{LH(Top)} = S_{Trans(Top)}$$

If $L_V < L_H$

$$S_{LV(Bottom)} = S_{Trans(Bottom)}$$

$$S_{LV(Top)} = S_{Trans(Top)}$$

$$S_{LH(Bottom)} = S_{Long(Bottom)}$$

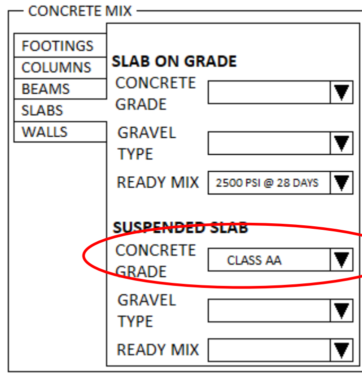
$$S_{LH(Top)} = S_{Long(Top)}$$

Where:

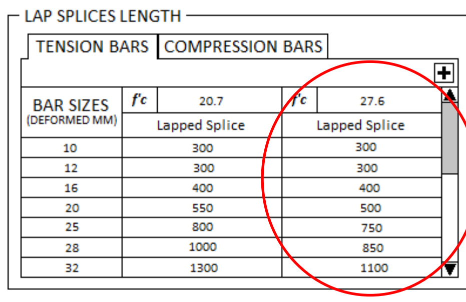
$$S_X = Splice\ Length\ based\ on\ the\ corresponding\ "Bar\ Size".$$

Example

Check the $Concrete\ Strength\ (f'c)$



$Concrete\ Grade: CLASS\ AA \therefore f'c = 4000\ psi = 27.6$

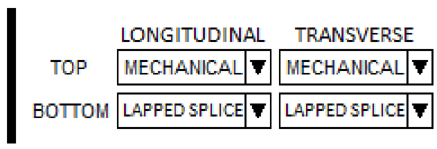


LAP SPLICES LENGTH

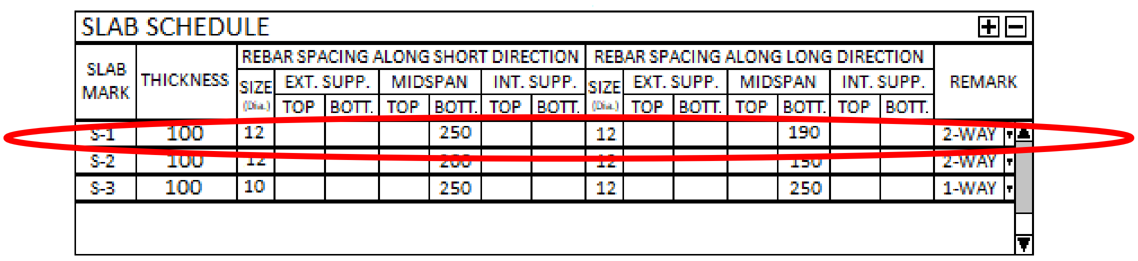
TENSION BARS | COMPRESSION BARS

BAR SIZES (DEFORMED MM)	f'c 20.7 Lapped Splice	f'c 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

S-1(C): $L_V = 3675 < L_H = 4500$



	LONGITUDINAL	TRANSVERSE
TOP	MECHANICAL	MECHANICAL
BOTTOM	LAPPED SPLICE	LAPPED SPLICE



SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

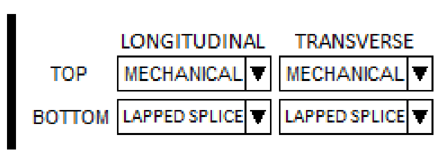
$$S_{LV(Bottom)} = S_{Trans(Bottom)} = \mathbf{300}$$

$$S_{LV(Top)} = S_{Trans(Top)} = \mathbf{0}$$

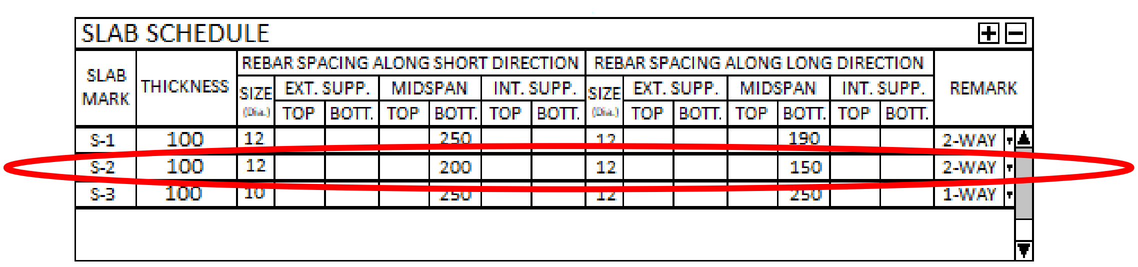
$$S_{LH(Bottom)} = S_{Long(Bottom)} = \mathbf{300}$$

$$S_{LH(Top)} = S_{Long(Top)} = \mathbf{0}$$

S-2(B): $L_V = 2300 < L_H = 4500$



	LONGITUDINAL	TRANSVERSE
TOP	MECHANICAL	MECHANICAL
BOTTOM	LAPPED SPLICE	LAPPED SPLICE



SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

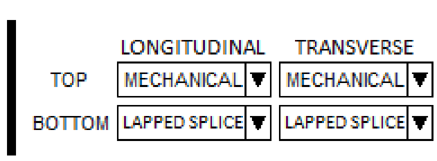
$$S_{LV(Bottom)} = S_{Trans(Bottom)} = \mathbf{300}$$

$$S_{LV(Top)} = S_{Trans(Top)} = \mathbf{0}$$

$$S_{LH(Bottom)} = S_{Long(Bottom)} = \mathbf{300}$$

$$S_{LH(Top)} = S_{Long(Top)} = \mathbf{0}$$

S-3 $L_V = 3800 > L_H = 1575$



	LONGITUDINAL	TRANSVERSE
TOP	MECHANICAL	MECHANICAL
BOTTOM	LAPPED SPLICE	LAPPED SPLICE

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

$$S_{LV(Bottom)} = S_{Long(Bottom)} = \mathbf{300}$$

$$S_{LV(Top)} = S_{Long(Top)} = \mathbf{0}$$

$$S_{LH(Bottom)} = S_{Trans(Bottom)} = \mathbf{300}$$

$$S_{LH(Top)} = S_{Trans(Top)} = \mathbf{0}$$

6. The program will determine the length of continuous rebars

Case 1: SLAB POSITION UPPER/BOTTOM EDGE

$$L_{V(Cont)A} = H_{LV} + 2L_V + 0.5S_{LV(Bottom)} - L_{CV} - CC_{BeamW}$$

$$L_{V(Cont)B} = H_{LV} + 2L_V + 0.5S_{LV(Top)} - L_{CV} - CC_{BeamW}$$

$$L_{H(Cont)A} = 2L_H + S_{LH(Bottom)} - L_{CH}$$

$$L_{H(Cont)B} = 2L_H + S_{LH(Top)} - L_{CH}$$

Case 2: SLAB POSITION LEFT/RIGHT EDGE

$$L_{V(Cont)A} = 2L_V + S_{LV(Bottom)} - L_{CV}$$

$$L_{V(Cont)B} = 2L_V + S_{LV(Top)} - L_{CV}$$

$$L_{H(Cont)A} = H_{LH} + 2L_H + 0.5S_{LH(Bottom)} - L_{CH} - CC_{BeamW}$$

$$L_{H(Cont)B} = H_{LH} + 2L_H + 0.5S_{LH(Top)} - L_{CH} - CC_{BeamW}$$

Case 3: SLAB POSITION CORNER

$$L_{V(Cont)A} = H_{LV} + 2L_V + 0.5S_{LV(Bottom)} - L_{CV} - CC_{BeamW}$$

$$L_{V(Cont)B} = H_{LV} + 2L_V + 0.5S_{LV(Top)} - L_{CV} - CC_{BeamW}$$

$$L_{H(Cont)A} = H_{LH} + 2L_H + 0.5S_{LH(Bottom)} - L_{CH} - CC_{BeamW}$$

$$L_{H(Cont)B} = H_{LH} + 2L_H + 0.5S_{LH(Top)} - L_{CH} - CC_{BeamW}$$

Case 4: SLAB POSITION INTERIOR

$$L_{V(Cont)A} = 2L_V + S_{LV(Bottom)} - L_{CH}$$

$$L_{V(Cont)B} = 2L_H + S_{LV(Top)} - L_{CH}$$

$$L_{H(Cont)A} = 2L_H + S_{LH(Bottom)} - L_{CH}$$

$$L_{H(Cont)B} = 2L_H + S_{LH(Top)} - L_{CH}$$

Case 5: SLAB POSITION ISOLATED

$$L_{V(Cont)A} = 2H_{LV} + 2L_V - L_{CV} - 2CC_{BeamW}$$

$$L_{V(Cont)B} = 2H_{LV} + 2L_V - L_{CV} - 2CC_{BeamW}$$

$$L_{H(Cont)A} = 2H_{LH} + 2L_H - L_{CH} - 2CC_{BeamW}$$

$$L_{H(Cont)B} = 2H_{LH} + 2L_H - L_{CH} - 2CC_{BeamW}$$

Example:

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

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

$$CC_{Slab} = 20$$

$$CC_{BeamW} = 40$$

S-1(C): SLAB POSITION INTERIOR

$L_{V(Cont)A} = 2L_V + S_{LV(Bottom)} - L_{CH} = 2(3675) + 300 - 3350 = 4300\ mm \rightarrow \mathbf{4.3\ m}$

$L_{V(Cont)B} = 2L_H + S_{LV(Top)} - L_{CH} = 2(3675) + 0 - 3350 = 4000\ mm \rightarrow \mathbf{4.0\ m}$

$L_{H(Cont)A} = 2L_H + S_{LH(Bottom)} - L_{CH} = 2(4500) + 300 - 4100 = 5200\ mm \rightarrow \mathbf{5.2\ m}$

$L_{H(Cont)B} = 2L_H + S_{LH(Top)} - L_{CH} = 2(4500) + 0 - 4100 = 4900\ mm \rightarrow \mathbf{4.9\ m}$

S-2(B): SLAB POSITION UPPER/BOTTOM ED

$$L_V = 2300 < L_H = 4500$$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

$$H_{LV} = 200$$

$L_{V(Cont)A} = H_{LV} + 2L_V + 0.5S_{LV(Bottom)} - L_{CV} - CC_{BeamW} = 200 + 2(2300) + 0.5(300) - 1900 - 40$

$L_{V(Cont)A} = 3010\ mm \rightarrow \mathbf{3.01\ m}$

$L_{V(Cont)B} = H_{LV} + 2L_V + 0.5S_{LV(Top)} - L_{CV} - CC_{BeamW} = 200 + 2(2300) + 0.5(0) - 1900 - 40 = 2860\ mm \rightarrow \mathbf{2.86\ m}$

$L_{H(Cont)A} = 2L_H + S_{LH(Bottom)} - L_{CH} = 2(4500) + 300 - 4100 = 5200\ mm \rightarrow \mathbf{5.2\ m}$

$L_{H(Cont)B} = 2L_H + S_{LH(Top)} - L_{CH} = 2(4500) + 0 - 4100 = 4900\ mm \rightarrow \mathbf{4.9\ m}$

S-3: SLAB POSITION LEFT/RIGHT ED

$$L_V = 3800 > L_H = 1575$$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

$$H_{LH} = 200$$

$L_{V(Cont)A} = 2L_V + S_{LV(Bottom)} - L_{CV} = 2(3800) + 300 - 3475 = 4425\ mm \rightarrow \mathbf{4.425\ m}$

$L_{V(Cont)B} = 2L_V + S_{LV(Top)} - L_{CV} = 2(3800) + 0 - 3475 = 4125\ mm \rightarrow \mathbf{4.125\ m}$

$L_{H(Cont)A} = H_{LH} + 2L_H + 0.5S_{LH(Bottom)} - L_{CH} - CC_{BeamW} = 200 + 2(1575) + 0.5(300) - 1250 - 40$

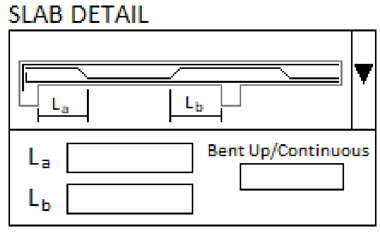
$L_{H(Cont)A} = 2210\ mm \rightarrow \mathbf{2.21\ m}$

$L_{H(Cont)B} = H_{LH} + 2L_H + 0.5S_{LH(Top)} - L_{CH} - CC_{BeamW} = 200 + 2(1575) + 0.5(0) - 1250 - 40$

$L_{H(Cont)B} = 2060\ mm \rightarrow \mathbf{2.06\ m}$

7. The program will determine the length of extra rebars

SLAB DETAIL



Case 1: SLAB POSITION UPPER/BOTTOM EDGE

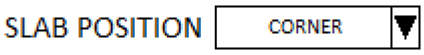
$$L_{V(Extra)} = H_{LV} + 1.5L_V + (2T - 4CC_{Slab})(\sqrt{2} - 1) - 0.5L_{CV} - CC_{BeamW}$$

$$L_{H(Extra)} = L_H + (2T - 4CC_{Slab})(\sqrt{2} - 1)$$

Case 2: SLAB POSITION LEFT/RIGHT EDGE

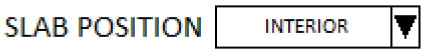
$$L_{V(Extra)} = L_V + (2T - 4CC_{Slab})(\sqrt{2} - 1)$$

$$L_{H(Extra)} = H_{LH} + 1.5L_H + (2T - 4CC_{Slab})(\sqrt{2} - 1) - 0.5L_{CH} - CC_{BeamW}$$

Case 3: 

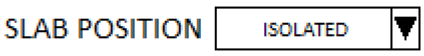
$$L_{V(Extra)} = H_{LV} + 1.5L_V + (2T - 4CC_{Slab})(\sqrt{2} - 1) - 0.5L_{CV} - CC_{BeamW}$$

$$L_{H(Extra)} = H_{LH} + 1.5L_H + (2T - 4CC_{Slab})(\sqrt{2} - 1) - 0.5L_{CH} - CC_{BeamW}$$

Case 4: 

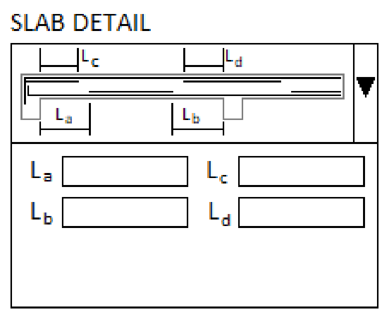
$$L_{V(Extra)} = L_V + (2T - 4CC_{Slab})(\sqrt{2} - 1)$$

$$L_{H(Extra)} = L_H + (2T - 4CC_{Slab})(\sqrt{2} - 1)$$

Case 5: 

$$L_{V(Extra)} = 2H_{LV} + 2L_V + (2T - 4CC_{Slab})(\sqrt{2} - 1) - L_{CV} - 2CC_{BeamW}$$

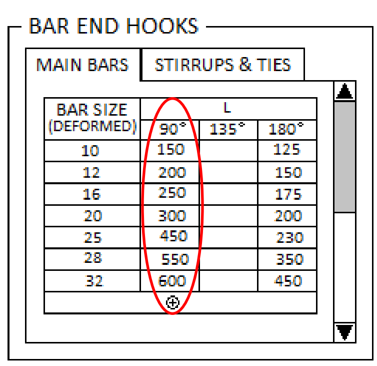
$$L_{H(Extra)} = 2H_{LH} + 2L_H + (2T - 4CC_{Slab})(\sqrt{2} - 1) - L_{CH} - 2CC_{BeamW}$$



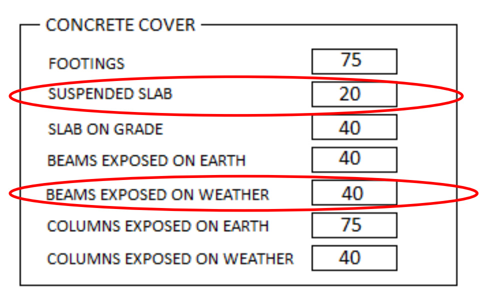
$$L_{V(Extra)} = L_{CV}(1 - L_a - L_b)$$

$$L_{H(Extra)} = L_{CH}(1 - L_a - L_b)$$

Example:



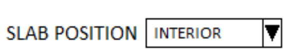
BAR SIZE (DEFORMED)	L 90°	135°	180°
10	150		125
12	200		150
16	250		175
20	300		200
25	450		230
28	550		350
32	600		450



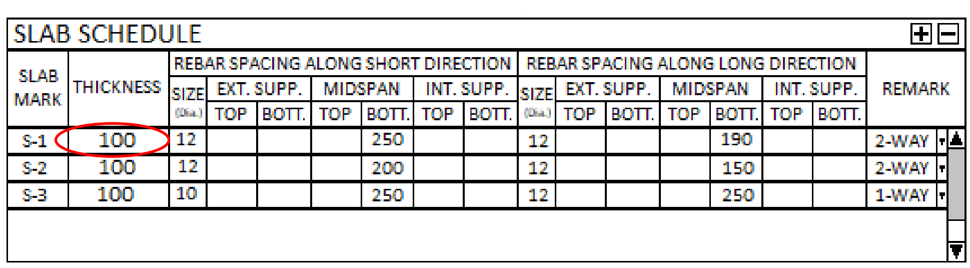
FOOTINGS	75
SUSPENDED SLAB	20
SLAB ON GRADE	40
BEAMS EXPOSED ON EARTH	40
BEAMS EXPOSED ON WEATHER	40
COLUMNS EXPOSED ON EARTH	75
COLUMNS EXPOSED ON WEATHER	40

$$CC_{Slab} = 20$$

$$CC_{BeamW} = 40$$

S-1(C): 

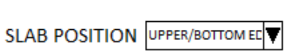
& $L_V = 3675 < L_H = 4500$



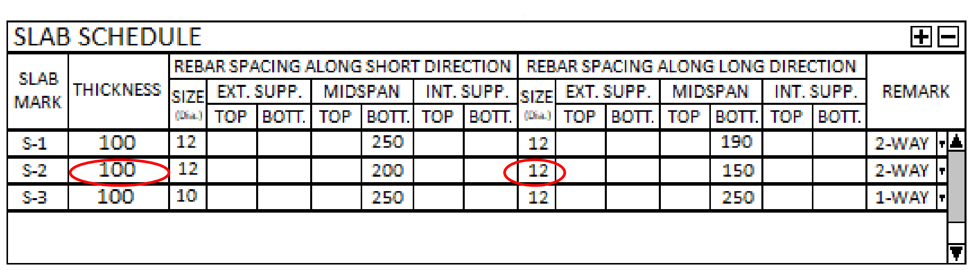
SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

$$L_{V(Extra)} = L_V + (2T - 4CC_{Slab})(\sqrt{2} - 1) = 3675 + [2(100) - 4(20)](\sqrt{2} - 1) = 3724.706\ mm \rightarrow \mathbf{3.725\ m}$$

$$L_{H(Extra)} = L_H + (2T - 4CC_{Slab})(\sqrt{2} - 1) = 4500 + [2(100) - 4(20)](\sqrt{2} - 1) = 4549.706\ mm \rightarrow \mathbf{4.55\ m}$$

S-2(B): 

& $L_V = 2300 < L_H = 4500$



SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REBAR SPACING ALONG LONG DIRECTION SIZE (Dia.)	EXT. SUPP. TOP	EXT. SUPP. BOTT.	MIDSPAN TOP	MIDSPAN BOTT.	INT. SUPP. TOP	INT. SUPP. BOTT.	REMARK
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

$$H_{LV} = 200$$

$$L_{V(Extra)} = H_{LV} + 1.5L_V + (2T - 4CC_{Slab})(\sqrt{2} - 1) - 0.5L_{CV} - CC_{BeamW}$$

$$= 200 + 1.5(2300) + [2(100) - 4(20)](\sqrt{2} - 1) - 0.5(1900) - 40$$

$$L_{V(Extra)} = 2709.706\ mm \rightarrow \mathbf{2.71\ m}$$

$$L_{H(Extra)} = L_H + (2T - 4CC_{Slab})(\sqrt{2} - 1)$$

$$= 4500 + [2(100) - 4(20)](\sqrt{2} - 1)$$

$$L_{H(Extra)} = 4549.706\ mm \rightarrow \mathbf{4.55\ m}$$

S-3: SLAB POSITION LEFT/RIGHT ED ▼ & $L_V = 3800 > L_H = 1575$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

$$H_{LH} = 200$$

$$L_{V(Extra)} = L_V + (2T - 4CC_{Slab})(\sqrt{2} - 1)$$

$$L_{V(Extra)} = 3800 + [2(100) - 4(20)](\sqrt{2} - 1) =$$

$$L_{V(Extra)} = 3849.706\ mm \rightarrow \mathbf{3.85\ m}$$

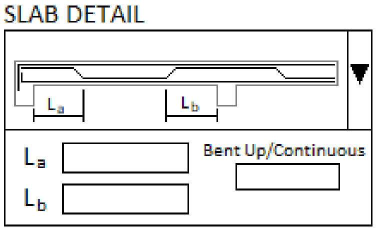
$$L_{H(Extra)} = H_{LH} + 1.5L_H + (2T - 4CC_{Slab})(\sqrt{2} - 1) - 0.5L_{CH} - CC_{BeamW}$$

$$L_{H(Extra)} = 200 + 1.5(1575) + [2(100) - 4(20)](\sqrt{2} - 1) - 0.5(1250) - 40$$

$$L_{H(Extra)} = 1947.206\ mm \rightarrow \mathbf{1.9472\ m}$$

8. The program will determine the length of cut bars

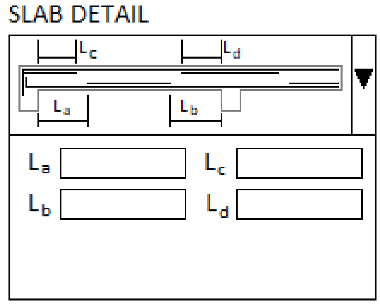
SLAB DETAIL



$$Z_1 = L_a$$

$$Z_2 = L_b$$

SLAB DETAIL



$$Z_1 = L_c$$

$$Z_2 = L_d$$

Case 1: SLAB POSITION UPPER/BOTTOM EDGE ▼

$$L_{V(Cut)A} = H_{LV} + L_{CV}(Z_1 - 1) + L_V - CC_{BeamW}$$

$$L_{V(Cut)B} = L_{CV}(Z_2 - 0.5) + 0.5L_V$$

$$L_{H(Cut)A} = L_{CH}(Z_1 - 0.5) + 0.5L_H$$

$$L_{H(Cut)B} = L_{CH}(Z_2 - 0.5) + 0.5L_H$$

Case 2: SLAB POSITION LEFT/RIGHT EDGE ▼

$$L_{V(Cut)A} = L_{CV}(Z_1 - 0.5) + 0.5L_V$$

$$L_{V(Cut)B} = L_{CV}(Z_2 - 0.5) + 0.5L_V$$

$$L_{H(Cut)A} = H_{LH} + L_{CH}(Z_1 - 1) + L_H - CC_{BeamW}$$

$$L_{H(Cut)B} = L_{CH}(Z_2 - 0.5) + 0.5L_H$$

Case 3: SLAB POSITION CORNER ▼

$$L_{V(Cut)A} = H_{LV} + L_{CV}(Z_1 - 1) + L_V - CC_{BeamW}$$

$$L_{V(Cut)B} = L_{CV}(Z_2 - 0.5) + 0.5L_V$$

$$L_{H(Cut)A} = H_{LH} + L_{CH}(Z_1 - 1) + L_H - CC_{BeamW}$$

$$L_{H(Cut)B} = L_{CH}(Z_2 - 0.5) + 0.5L_H$$

Case 4: SLAB POSITION INTERIOR ▼

$$L_{V(Cut)A} = L_{CV}(Z_1 - 0.5) + 0.5L_V$$

$$L_{V(Cut)B} = L_{CV}(Z_2 - 0.5) + 0.5L_V$$

$$L_{H(Cut)A} = L_{CH}(Z_1 - 0.5) + 0.5L_H$$
$$L_{H(Cut)B} = L_{CH}(Z_2 - 0.5) + 0.5L_H$$

Case 5: SLAB POSITION ISOLATED

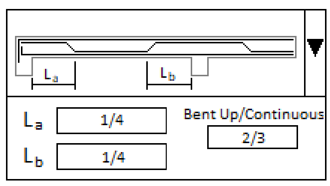
$$L_{V(Cut)A} = H_{LV} + L_{CV}(Z_1 - 1) + L_V - CC_{BeamW}$$
$$L_{V(Cut)B} = H_{LV} + L_{CV}(Z_2 - 1) + L_V - CC_{BeamW}$$
$$L_{H(Cut)A} = H_{LH} + L_{CH}(Z_1 - 1) + L_H - CC_{BeamW}$$
$$L_{H(Cut)B} = H_{LH} + L_{CH}(Z_2 - 1) + L_H - CC_{BeamW}$$

Example:

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

$$CC_{BeamW} = 40$$

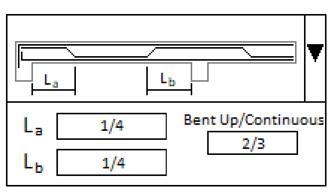
S-1(C): SLAB POSITION INTERIOR & $L_V = 3675 < L_H = 4500$



$$Z_1 = L_a = 1/4$$
$$Z_2 = L_b = 1/4$$

$$L_{V(Cut)A} = L_{CV}(Z_1 - 0.5) + 0.5L_V = 3350\left(\frac{1}{4} - 0.5\right) + 0.5(3675) = 1000\ mm \rightarrow \mathbf{1.00\ m}$$
$$L_{V(Cut)B} = L_{CV}(Z_2 - 0.5) + 0.5L_V = 3350\left(\frac{1}{4} - 0.5\right) + 0.5(3675) = 1000\ mm \rightarrow \mathbf{1.00\ m}$$
$$L_{H(Cut)A} = L_{CH}(Z_1 - 0.5) + 0.5L_H = 4100\left(\frac{1}{4} - 0.5\right) + 0.5(4500) = 1225\ mm \rightarrow \mathbf{1.225\ m}$$
$$L_{H(Cut)B} = L_{CH}(Z_2 - 0.5) + 0.5L_H = 4100\left(\frac{1}{4} - 0.5\right) + 0.5(4500) = 1225\ mm \rightarrow \mathbf{1.225\ m}$$

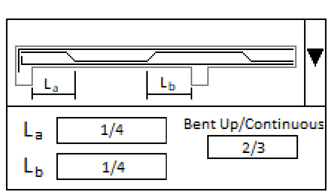
S-2(B): SLAB POSITION UPPER/BOTTOM ED & $L_V = 2300 < L_H = 4500$



$$Z_1 = L_a = 1/3$$
$$Z_2 = L_b = 1/3$$

$$L_{V(Cut)A} = H_{LV} + L_{CV}(Z_1 - 1) + L_V - CC_{BeamW} = 200 + 1900\left(\frac{1}{4} - 1\right) + 2300 - 40 = 1035\ mm \rightarrow \mathbf{1.035\ m}$$
$$L_{V(Cut)B} = L_{CV}(Z_2 - 0.5) + 0.5L_V = 1900\left(\frac{1}{4} - 0.5\right) + 0.5(2300) = 675\ mm \rightarrow \mathbf{0.675\ m}$$
$$L_{H(Cut)A} = L_{CH}(Z_1 - 0.5) + 0.5L_H = 4100\left(\frac{1}{4} - 0.5\right) + 0.5(4500) = 1225\ mm \rightarrow \mathbf{1.225\ m}$$
$$L_{H(Cut)B} = L_{CH}(Z_2 - 0.5) + 0.5L_H = 4100\left(\frac{1}{4} - 0.5\right) + 0.5(4500) = 1225\ mm \rightarrow \mathbf{1.225\ m}$$

S-3: SLAB POSITION LEFT/RIGHT ED & $L_V = 3800 > L_H = 1575$



$$Z_1 = L_a = 1/4$$
$$Z_2 = L_b = 1/4$$

$$L_{V(Cut)A} = L_{CV}(Z_1 - 0.5) + 0.5L_V = 3475\left(\frac{1}{4} - 0.5\right) + 0.5(3800) = 1031.25\ mm \rightarrow \mathbf{1.03125\ m}$$
$$L_{V(Cut)B} = L_{CV}(Z_2 - 0.5) + 0.5L_V = 3475\left(\frac{1}{4} - 0.5\right) + 0.5(3800) = 1031.25\ mm \rightarrow \mathbf{1.03125\ m}$$

$$L_{H(Cut)A} = H_{LH} + L_{CH}(Z_1 - 1) + L_H - CC_{BeamW} = 200 + 1250\left(\frac{1}{4} - 1\right) + 1575 - 40 = 797.5\ mm \rightarrow \mathbf{0.7975\ m}$$

$$L_{H(Cut)B} = L_{CH}(Z_2 - 0.5) + 0.5L_H = 1250\left(\frac{1}{4} - 0.5\right) + 0.5(1575) = 475\ mm \rightarrow \mathbf{0.475\ m}$$

9. The program will determine the appropriate manufactured length and its respected quantity on each computed reinforcement.

   Note

$$X = V\ or\ H$$

- For Continuous Rebars

  a) If $L_{X(Cont)A} = L_{X(Cont)B}$

$$Qty_{Pn} = \frac{L_M}{L_{X(Cont)A}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_{X(Cont)A}$$

$$Qty_{Mn} = m \cdot \frac{Qty_{X(Cont.)A} + Qty_{X(Cont.)B}}{Qty_{Pn}} \cdot Qty_{Slab}$$

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

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 $Total\ wastage$

  b) Else,

$$Qty_{Pn} = \frac{L_M}{L_{X(Cont)\_}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_{X(Cont)\_}$$

$$Qty_{Mn} = \frac{Qty_{X(Cont.)\_}}{Qty_{Pn}} \cdot Qty_{Slab}$$

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

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 Extra Rebars

$$Qty_{Pn} = \frac{L_M}{L_{X(Extra)}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_{X(Cont)\_}$$

$$Qty_{Mn} = \frac{Qty_{X(Extra)}}{Qty_{Pn}} \cdot Qty_{Slab}$$

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

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 Cut Rebars

  a) If $L_{X(Cut)A} = L_{X(Cut)B}$

$$Qty_{Pn} = \frac{L_M}{L_{X(Cut)A}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_{X(Cont)A}$$

$$Qty_{Mn} = m \cdot \frac{Qty_{X(Cut)A} + Qty_{X(Cut)B}}{Qty_{Pn}} \cdot Qty_{Slab}$$

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

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 $Total\ wastage$

b) Else,

$$Qty_{Pn} = \frac{L_M}{L_{X(Cut)\_}}$$

$$L_W = [Qty_P - Qty_P\ (round\ down\ into\ whole\ number)] \times L_{X(Cut)\_}$$

$$Qty_{Mn} = \frac{Qty_{X(Cut)\_}}{Qty_{Pn}} \cdot Qty_{Slab}$$

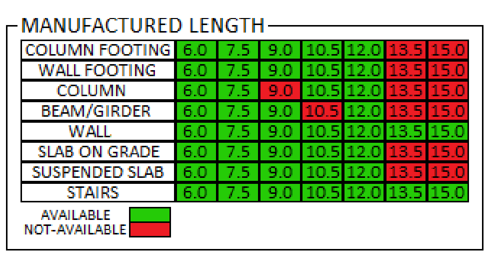
$$L_E\ (m) = [Qty_M (round\ up\ to\ whole\ number) - Qty_M] \times L_M$$

And

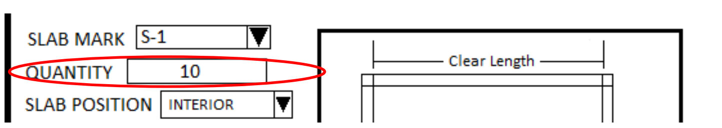
$$Total\ Wastage\ = L_E + L_W[Qty_{Mn}\ (round\ down\ to\ whole\ number)]$$

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

Example:



S-1(C)



- $(L_{V(Cont)A} = 4.3\ m) \neq (L_{V(Cont)B} = 4.0\ m)$

  i. $L_{V(Cont)A} = 4.3\ m\ \&\ Qty_{V(Cont)A} = 8$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	8	4.3	10	1.40	1	80	80	1.70	0	136.000
7.5				1.74	1	80	80	3.20	0	256.000
9				2.09	2	40	40	0.40	0.00	16.000
10.5				2.44	2	40	40	1.90	0.00	76.000
12				2.79	2	40	40	3.40	0.00	136.000

$$L_{M(V1)} = 9\ m\ \&\ Qty_{M(V1)} = 40$$

  ii. $L_{V(Cont)B} = 4\ m\ \&\ Qty_{V(Cont)B} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	0	4	10	1.50	1	0.00	0	2.00	0	0.000
7.5				1.88	1	0.00	0	3.50	0	0.000
9				2.25	2	0.00	0	1.00	0.00	0.000
10.5				2.63	2	0.00	0	2.50	0.00	0.000
12				3.00	3	0.00	0	0.00	0.00	0.000

$$L_{M(V2)} = 6\ m\ \&\ Qty_{M(V2)} = 0$$

- $\left(L_{H(Cont)A} = 5.2\ m\right) \neq \left(L_{H(Cont)B} = 4.9\ m\right)$
  i. $L_{H(Cont)A} = 5.2\ m\ \&\ Qty_{H(Cont)A} = 5$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	5	5.2	10	1.15	1	50.00	50	0.80	0	40.000
7.5				1.44	1	50.00	50	2.30	0	115.000
9				1.73	1	50.00	50	3.80	0.00	190.000
10.5				2.02	2	25.00	25	0.10	0.00	2.500
12				2.31	2	25.00	25	1.60	0.00	40.000

$$L_{M(H1)} = 10.5\ m\ \&\ Qty_{M(H1)} = 25$$

  ii. $L_{H(Cont)B} = 4.9\ m\ \&\ Qty_{H(Cont)B} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	0	4.9	10	1.22	1	0.00	0	1.10	0	0.000
7.5				1.53	1	0.00	0	2.60	0	0.000
9				1.84	1	0.00	0	4.10	0.00	0.000
10.5				2.14	2	0.00	0	0.70	0.00	0.000
12				2.45	2	0.00	0	2.20	0.00	0.000

$$L_{M(H2)} = 6\ m\ \&\ Qty_{M(H2)} = 0$$

- $L_{V(Extra)} = 3.725\ m\ \&\ Qty_{V(Extra)} = 16$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	16	3.725	10	1.61	1	160	160	2.28	0	364.000
7.5				2.01	2	80	80	0.05	0	4.000
9				2.42	2	80	80	1.55	0.00	124.000
10.5				2.82	2	80	80	3.05	0.00	244.000
12				3.22	3	53.33	54	0.82	8.00	51.725

$$L_{M(V3)} = 7.5\ m\ \&\ Qty_{M(V3)} = 80$$

- $L_{H(Extra)} = 4.55\ m$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	10	4.55	10	1.32	1	100	100	1.45	0	145.000
7.5				1.65	1	100	100	2.95	0	295.000
9				1.98	1	100	100	4.45	0.00	445.000
10.5				2.31	2	50	50	1.40	0.00	70.000
12				2.64	2	50	50	2.90	0.00	145.000

$$L_{M(H3)} = 10.5\ m\ \&\ Qty_{M(H2)} = 50$$

- $\left(L_{V(Cut)A} = 1.00\ m\right) = \left(L_{V(Cut)B} = 1.00\ m\right)$

$$Qty = Qty_{V(Cut)A} + Qty_{V(Cut)B} = 16 + 16 = 32$$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	32	1	10	6.00	6	53.33	54	0.00	4	4.000
7.5				7.50	7	45.71	46	0.50	2.14	24.643
9				9.00	9	35.56	36	0.00	4.00	4.000
10.5				10.50	10	32.00	32	0.50	0.00	16.000
12				12.00	12	26.67	27	0.00	4.00	4.000

$$L_{M(V4)} = 6\ m\ \&\ Qty_{M(V4)} = 54$$

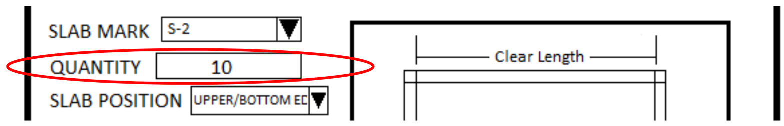
- $\left(L_{H(Cut)A} = 1.225\ m\right) = \left(L_{H(Cut)B} = 1.225\ m\right)$

$$Qty = Qty_{H(Cut)A} + Qty_{H(Cut)B} = 10 + 10 = 20$$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				4.90	4	50.00	50	1.10	0	55.000
7.5				6.12	6	33.33	34	0.15	5	9.950
9	20	1.225	10	7.35	7	28.57	29	0.42	3.86	15.757
10.5				8.57	8	25.00	25	0.70	0.00	17.500
12				9.80	9	22.22	23	0.98	9.33	30.783

$$L_{M(H4)} = 7.5\ m\ \&\ Qty_{M(V4)} = 34$$

S-2(B)



- $(L_{V(Cont)A} = 3.01\ m) \neq (L_{V(Cont)B} = 2.86\ m)$
  i. $L_{V(Cont)A} = 3.01\ m\ \&\ Qty_{V(Cont)A} = 10$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				1.99	1	100	100	2.99	0	299.000
7.5				2.49	2	50	50	1.48	0	74.000
9	10	3.01	10	2.99	2	50	50	2.98	0.00	149.000
10.5				3.49	3	33.33	34	1.47	7.00	55.510
12				3.99	3	33.33	34	2.97	8.00	106.010

$$L_{M(V1)} = 10.5\ m\ \&\ Qty_{M(V1)} = 34$$

  ii. $L_{V(Cont)B} = 2.86\ m\ \&\ Qty_{V(Cont)B} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				2.10	2	0.00	0	0.28	0	0.000
7.5				2.62	2	0.00	0	1.78	0	0.000
9	0	2.86	10	3.15	3	0.00	0	0.42	0.00	0.000
10.5				3.67	3	0.00	0	1.92	0.00	0.000
12				4.20	4	0.00	0	0.56	0.00	0.000

$$L_{M(V2)} = 6\ m\ \&\ Qty_{M(V2)} = 0$$

- $(L_{H(Cont)A} = 5.2\ m) \neq (L_{H(Cont)B} = 4.9\ m)$
  i. $L_{H(Cont)A} = 5.2\ m\ \&\ Qty_{H(Cont)A} = 4$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				1.15	1	40.00	40	0.80	0	32.000
7.5				1.44	1	40.00	40	2.30	0	92.000
9	4	5.2	10	1.73	1	40.00	40	3.80	0.00	152.000
10.5				2.02	2	20.00	20	0.10	0.00	2.000
12				2.31	2	20.00	20	1.60	0.00	32.000

$$L_{M(H1)} = 10.5\ m\ \&\ Qty_{M(H1)} = 20$$

  ii. $L_{H(Cont)B} = 4.9\ m\ \&\ Qty_{H(Cont)B} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				1.22	1	0.00	0	1.10	0	0.000
7.5				1.53	1	0.00	0	2.60	0	0.000
9	0	4.9	10	1.84	1	0.00	0	4.10	0.00	0.000
10.5				2.14	2	0.00	0	0.70	0.00	0.000
12				2.45	2	0.00	0	2.20	0.00	0.000

$$L_{M(H2)} = 6\ m\ \&\ Qty_{M(H2)} = 0$$

- $L_{V(Extra)} = 2.73\ m\ \&\ Qty_{V(Extra)} = 19$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				2.20	2	95.00	95	0.54	0	51.300
7.5				2.75	2	95.00	95	2.04	0	193.800
9	19	2.73	10	3.30	3	63.33	64	0.81	6.00	57.030
10.5				3.85	3	63.33	64	2.31	7.00	152.530
12				4.40	4	47.50	48	1.08	6.00	56.760

$$L_{M(V3)} = 6\ m\ \&\ Qty_{M(V3)} = 95$$

- $L_{H(Extra)} = 4.55\ m\ \&\ Qty_{H(Extra)} = 7$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				1.32	1	70.00	70	1.45	0	101.500
7.5				1.65	1	70.00	70	2.95	0	206.500
9	7	4.55	10	1.98	1	70.00	70	4.45	0.00	311.500
10.5				2.31	2	35.00	35	1.40	0.00	49.000
12				2.64	2	35.00	35	2.90	0.00	101.500

$$L_{M(H3)} = 10.5\ m\ \&\ Qty_{M(H3)} = 35$$

- $\left(L_{V(Cut)A} = 1.035\ m\right) \neq \left(L_{V(Cut)B} = 0.675\ m\right)$
  i. $L_{V(Cut)A} = 1.035\ m\ \& Qty_{V(Cut)A} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				5.80	5	0.00	0	0.83	0	0.000
7.5				7.25	7	0.00	0	0.26	0	0.000
9	0	1.035	10	8.70	8	0.00	0	0.72	0.00	0.000
10.5				10.14	10	0.00	0	0.15	0.00	0.000
12				11.59	11	0.00	0	0.62	0.00	0.000

$$L_{M(V4)} = 6\ m\ \&\ Qty_{M(V4)} = 0$$

  ii. $L_{V(Cut)B} = 0.675\ m\ \&\ Qty_{V(Cut)B} = 19$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				8.89	8	23.75	24	0.60	1.5	15.300
7.5				11.11	11	17.27	18	0.07	5.45	6.730
9	19	0.675	10	13.33	13	14.62	15	0.23	3.46	6.612
10.5				15.56	15	12.67	13	0.38	3.50	8.000
12				17.78	17	11.18	12	0.52	9.88	15.657

$$L_{M(V5)} = 9\ m\ \&\ Qty_{M(V5)} = 15$$

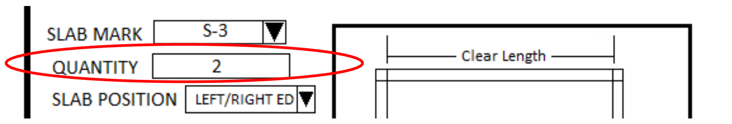
- $\left(L_{H(Cut)A} = 1.225\ m\right) = \left(L_{H(Cut)B} = 1.225\ m\right)$

$$Qty = Qty_{H(Cut)A} + Qty_{H(Cut)B} = 7 + 7 = 14$$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				4.90	4	35.00	35	1.10	0	38.500
7.5				6.12	6	23.33	24	0.15	5	8.450
9	14	1.225	10	7.35	7	20.00	20	0.42	0.00	8.500
10.5				8.57	8	17.50	18	0.70	5.25	17.150
12				9.80	9	15.56	16	0.98	5.33	19.958

$$L_{M(H4)} = 7.5\ m\ \&\ Qty_{M(H4)} = 24$$

S-3



- $\left(L_{V(Cont)A} = 4.425\ m\right) \neq \left(L_{V(Cont)B} = 4.125\ m\right)$
  i. $L_{V(Cont)A} = 4.425\ m\ \&\ Qty_{V(Cont)A} = 6$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				1.36	1	12.00	12	1.58	0	18.900
7.5				1.69	1	12.00	12	3.08	0	36.900
9	6	4.425	2	**2.03**	**2**	**6.00**	**6**	**0.15**	**0.00**	**0.900**
10.5				2.37	2	6.00	6	1.65	0.00	9.900
12				2.71	2	6.00	6	3.15	0.00	18.900

$$L_{M(V1)} = 9\ m\ \&\ Qty_{M(V1)} = 6$$

  ii. $L_{H(Cont)B} = 4.125\ m\ \&\ Qty_{H(Cont)B} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				**1.45**	**1**	**0.00**	**0**	**1.88**	**0**	**0.000**
7.5				1.82	1	0.00	0	3.38	0	0.000
9	0	4.125	2	2.18	2	0.00	0	0.75	0.00	0.000
10.5				2.55	2	0.00	0	2.25	0.00	0.000
12				2.91	2	0.00	0	3.75	0.00	0.000

$$L_{M(V2)} = 6\ m\ \&\ Qty_{M(V2)} = 0$$

- $\left(L_{H(Cont)A} = 2.21\ m\right) \neq \left(L_{H(Cont)B} = 2.06\ m\right)$
  i. $L_{H(Cont)A} = 2.21\ m\ \&\ Qty_{H(Cont)A} = 5$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				2.71	2	5.00	5	1.58	0	7.900
7.5				3.39	3	3.33	4	0.87	5	7.610
9	5	2.21	2	4.07	4	2.50	3	0.16	4.50	4.820
10.5				4.75	4	2.50	3	1.66	5.25	8.570
12				**5.43**	**5**	**2.00**	**2**	**0.95**	**0.00**	**1.900**

$$L_{M(H1)} = 12\ m\ \&\ Qty_{M(H1)} = 2$$

  ii. $L_{H(Cont)B} = 2.06\ m\ \&\ Qty_{H(Cont)B} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				**2.91**	**2**	**0.00**	**0**	**1.88**	**0**	**0.000**
7.5				3.64	3	0.00	0	1.32	0	0.000
9	0	2.06	2	4.37	4	0.00	0	0.76	0.00	0.000
10.5				5.10	5	0.00	0	0.20	0.00	0.000
12				5.83	5	0.00	0	1.70	0.00	0.000

$$L_{M(H2)} = 6\ m\ \&\ Qty_{M(H2)} = 0$$

- $L_{V(Extra)} = 3.85\ m\ \&\ Qty_{V(Extra)} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6				**1.56**	**1**	**0.00**	**0**	**2.15**	**0**	**0.000**
7.5				1.95	1	0.00	0	3.65	0	0.000
9	0	3.85	2	2.34	2	0.00	0	1.30	0.00	0.000
10.5				2.73	2	0.00	0	2.80	0.00	0.000
12				3.12	3	0.00	0	0.45	0.00	0.000

$$L_{M(V3)} = 6\ m\ \&\ Qty_{M(V3)} = 0$$

- $L_{H(Extra)} = 1.9472\ m\ \&\ Qty_{H(Extra)} = 10$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	10	1.9472	2	3.08	3	6.67	7	0.16	2	2.950
7.5				3.85	3	6.67	7	1.66	2.5	12.450
9				4.62	4	5.00	5	1.21	0.00	6.056
10.5				5.39	5	4.00	4	0.76	0.00	3.056
12				6.16	6	3.33	4	0.32	8.00	8.950

$$L_{M(H3)} = 6\ m\ \&\ Qty_{M(H3)} = 7$$

- $\left(L_{V(Cut)A} = 1.03125\ m\right) = \left(L_{V(Cut)B} = 1.03125\ m\right)$

$$Qty = Qty_{V(Cut)A} + Qty_{V(Cut)B} = 0 + 0 = 0$$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	0	1.03125	2	5.82	5	0.00	0	0.84	0	0.000
7.5				7.27	7	0.00	0	0.28	0	0.000
9				8.73	8	0.00	0	0.75	0.00	0.000
10.5				10.18	10	0.00	0	0.19	0.00	0.000
12				11.64	11	0.00	0	0.66	0.00	0.000

$$L_{M(V4)} = 6\ m\ \&\ Qty_{M(V4)} = 0$$

- $\left(L_{H(Cut)A} = 1.225\ m\right) = \left(L_{H(Cut)B} = 1.225\ m\right)$
    i. $L_{H(Cut)A} = 0.7975\ m\ \&Qty_{H(Cut)A} = 0$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	0	0.7975	2	7.52	7	0.00	0	0.42	0	0.000
7.5				9.40	9	0.00	0	0.32	0	0.000
9				11.29	11	0.00	0	0.23	0.00	0.000
10.5				13.17	13	0.00	0	0.13	0.00	0.000
12				15.05	15	0.00	0	0.04	0.00	0.000

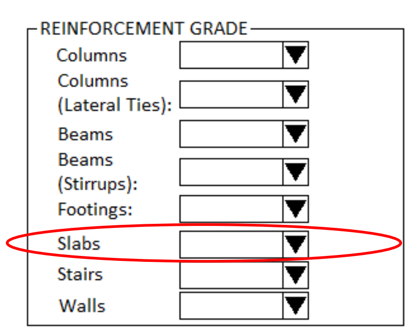
$$L_{M(H4)} = 6\ m\ \&\ Qty_{M(H4)} = 0$$

    ii. $L_{H(Cut)B} = 0.475\ m\ \&\ Qty_{H(Cut)B} = 10$

L [M]	Qty	L [B]	Qty (**Slab**)	Qty [P]		Qty [M]		L [W]	L [E]	Total Waste
6	10	0.475	2	12.63	12	1.67	2	0.30	2	2.300
7.5				15.79	15	1.33	2	0.38	5	5.375
9				18.95	18	1.11	2	0.45	8.00	8.450
10.5				22.11	22	0.91	1	0.05	0.95	0.955
12				25.26	25	0.80	1	0.13	2.40	2.400

$$L_{M(H5)} = 10.5\ m\ \&\ Qty_{M(H5)} = 1$$

10. The program will determine the price of the reinforcement



$$Price_{Slab} = \sum Qty_{M(V)} Price_{M(V)} + \sum Qty_{M(H)} Price_{M(H)}$$

Where:

$$Price_{M(\_)} = Price\ of\ the\ steel\ reinforcement\ based\ on\ Pricing$$

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

Example:

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	

S-1(C): $L_V = 3675 < L_H = 4500$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

- $\sum Qty_{M(V)} Price_{M(V)}$: $d_V = 12$

Rebar GRADE 40 (⌀12mm) [6m]- **P 234.43**

Rebar GRADE 40 (⌀12mm) [7.5m]- **P 293.04**

Rebar GRADE 40 (⌀12mm) [9m]- **P 351.65**

Rebar GRADE 40 (⌀12mm) [10.5m]- **P 410.26**

Rebar GRADE 40 (⌀12mm) [12m]- **P 468.86**

$L_{M(V1)} = 9\ m$: $Qty_{M(V1)} Price_{M(V1)} = 40(351.65) = ₱\ 14066.00$

$L_{M(V2)} = 6\ m$: $Qty_{M(V2)} Price_{M(V2)} = 0(234.43) = ₱\ 0.00$

$L_{M(V3)} = 7.5\ m$: $Qty_{M(V3)} Price_{M(V3)} = 80(293.04) = ₱\ 23443.20$

$L_{M(V4)} = 6\ m$: $Qty_{M(V4)} Price_{M(V4)} = 54(234.43) = ₱\ 12659.22$

$$\sum Qty_{M(V)} Price_{M(V)} = 14066.00 + 0.00 + 23443.20 + 12659.22 = ₱\ 50168.42$$

- $\sum Qty_{M(H)} Price_{M(H)}$: $d_H = 12$

Rebar GRADE 40 (⌀12mm) [6m]- **P 234.43**

Rebar GRADE 40 (⌀12mm) [7.5m]- **P 293.04**

Rebar GRADE 40 (⌀12mm) [9m]- **P 351.65**

Rebar GRADE 40 (⌀12mm) [10.5m]- **P 410.26**

Rebar GRADE 40 (⌀12mm) [12m]- **P 468.86**

$L_{M(H1)} = 10.5\ m$: $Qty_{M(H1)} Price_{M(H1)} = 25(410.26) = ₱\ 10256.50$

$L_{M(H2)} = 6\ m$: $Qty_{M(H2)} Price_{M(H2)} = 0(234.43) = ₱\ 0.00$

$L_{M(H3)} = 10.5\ m$: $Qty_{M(H3)} Price_{M(H3)} = 50(410.26) = ₱\ 20513.00$

$L_{M(H4)} = 7.5\ m$: $Qty_{M(H4)} Price_{M(H4)} = 34(293.04) = ₱\ 9963.36$

$$\sum Qty_{M(H)} Price_{M(H)} = 10256.50 + 0.00 + 20513.00 + 9963.36 = ₱\ 40732.86$$

- Total

$$Price_{Slab} = 50168.42 + 40732.86 = ₱\ \mathbf{90901.28}$$

S-2(B): $L_V = 2300 < L_H = 4500$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

- $\sum Qty_{M(V)}Price_{M(V)}$: $\quad d_V = 12$

Rebar GRADE 40 (⌀12mm) [6m]- **P 234.43**

Rebar GRADE 40 (⌀12mm) [7.5m]- **P 293.04**

Rebar GRADE 40 (⌀12mm) [9m]- **P 351.65**

Rebar GRADE 40 (⌀12mm) [10.5m]- **P 410.26**

Rebar GRADE 40 (⌀12mm) [12m]- **P 468.86**

$L_{M(V1)} = 10.5\ m$: $\quad Qty_{M(V1)}Price_{M(V1)} = 34(410.26) = ₱\ 13948.84$

$L_{M(V2)} = 6\ m$: $\quad Qty_{M(V2)}Price_{M(V2)} = 0(234.43) = ₱\ 0.00$

$L_{M(V3)} = 6\ m$: $\quad Qty_{M(V3)}Price_{M(V3)} = 95(234.43) = ₱\ 22270.85$

$L_{M(V4)} = 6\ m$: $\quad Qty_{M(V4)}Price_{M(V4)} = 0(234.43) = ₱\ 0.00$

$L_{M(V5)} = 9\ m$: $\quad Qty_{M(V5)}Price_{M(V5)} = 15(351.65) = ₱\ 5274.75$

$$\sum Qty_{M(V)}Price_{M(V)} = 13948.84 + 0.00 + 22270.85 + 0.00 + 5274.75 = ₱\ 41494.44$$

- $\sum Qty_{M(H)}Price_{M(H)}$: $\quad d_H = 12$

Rebar GRADE 40 (⌀12mm) [6m]- **P 234.43**

Rebar GRADE 40 (⌀12mm) [7.5m]- **P 293.04**

Rebar GRADE 40 (⌀12mm) [9m]- **P 351.65**

Rebar GRADE 40 (⌀12mm) [10.5m]- **P 410.26**

Rebar GRADE 40 (⌀12mm) [12m]- **P 468.86**

$L_{M(H1)} = 10.5\ m$: $\quad Qty_{M(H1)}Price_{M(H1)} = 20(410.26) = ₱\ 8205.20$

$L_{M(H2)} = 6\ m$: $\quad Qty_{M(H2)}Price_{M(H2)} = 0(234.43) = ₱\ 0.00$

$L_{M(H3)} = 10.5\ m$: $\quad Qty_{M(H3)}Price_{M(H3)} = 35(410.26) = ₱\ 14359.10$

$L_{M(H4)} = 7.5\ m$: $\quad Qty_{M(H4)}Price_{M(H4)} = 24(293.04) = ₱\ 7032.96$

$$\sum Qty_{M(H)}Price_{M(H)} = 8205.20 + 0.00 + 14359.10 + 7032.96 = ₱\ 29597.26$$

- Total

$$Price_{Slab} = 41494.44 + 29597.26 = ₱\ \mathbf{71091.7}$$

S-3: $\quad L_V = 3800 > L_H = 1575$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

- $\sum Qty_{M(V)}Price_{M(V)}$: $\quad d_V = 10$

Rebar GRADE 40 (⌀10mm) [6m]- **P 162.62**

Rebar GRADE 40 (⌀10mm) [7.5m]- **P 203.28**

Rebar GRADE 40 (⌀10mm) [9m]- **P 243.94**

Rebar GRADE 40 (⌀10mm) [10.5m]- **P 284.59**

Rebar GRADE 40 (⌀10mm) [12m]- **P 325.25**

$L_{M(V1)} = 9\ m$: $\quad Qty_{M(V1)}Price_{M(V1)} = 6(243.94) = ₱\ 1463.64$

$L_{M(V2)} = 6\ m$: $\quad Qty_{M(V2)}Price_{M(V2)} = 0(162.62) = ₱\ 0.00$

$L_{M(V3)} = 6\ m$: $\quad Qty_{M(V3)}Price_{M(V3)} = 0(162.62) = ₱0.00$

$L_{M(V4)} = 6\ m$: $\quad Qty_{M(V4)}Price_{M(V4)} = 0(162.62) = ₱\ 0.00$

$$\sum Qty_{M(V)}Price_{M(V)} = 1463.64 + 0.00 + 0.00 + 0.00 = ₱\ 1463.64$$

- $\sum Qty_{M(H)}Price_{M(H)}$: $\quad d_H = 12$

Rebar GRADE 40 (⌀12mm) [6m]- **P 234.43**

Rebar GRADE 40 (⌀12mm) [7.5m]- **P 293.04**

Rebar GRADE 40 (⌀12mm) [9m]- **P 351.65**

Rebar GRADE 40 (⌀12mm) [10.5m]- **P 410.26**

Rebar GRADE 40 (⌀12mm) [12m]- **P 468.86**

$L_{M(H1)} = 12\ m$: $\quad Qty_{M(H1)}Price_{M(H1)} = 2(468.86) = ₱\,937.72$

$L_{M(H2)} = 6\ m$: $\quad Qty_{M(H2)}Price_{M(H2)} = 0(234.43) = ₱\,0.00$

$L_{M(H3)} = 6\ m$: $\quad Qty_{M(H3)}Price_{M(H3)} = 7(234.43) = ₱\,1641.01$

$L_{M(H4)} = 6\ m$: $\quad Qty_{M(H4)}Price_{M(H4)} = 0(234.43) = ₱\,0.00$

$L_{M(H5)} = 10.5\ m$: $\quad Qty_{M(H5)}Price_{M(H5)} = 1(410.26) = ₱\,410.26$

$$\sum Qty_{M(V)}Price_{M(V)} = 937.72 + 0.00 + 1641.01 + 0.00 + 410.26 = ₱\,2988.99$$

- Total

$$Price_{Slab} = 1463.64 + 2988.99 = ₱\,\mathbf{4452.63}$$

11. The program will determine the weight of the reinforcement

$$W_{Slab} = W_{D(V)}\sum L_{M(V)}Qty_{M(V)} + W_{D(H)}\sum L_{M(H)}Qty_{M(H)}$$

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

Example:

S-1(C) $\quad L_V = 3675 < L_H = 4500$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

- $d_V = 12$

$$W_{D(V)}\sum L_{M(V)}Qty_{M(V)} = 0.888 \cdot [9(40) + 6(0) + 7.5(80) + 6(54)] = 1140.192\ kg$$

- $d_H = 12$

$$W_{D(H)}\sum L_{M(H)}Qty_{M(H)} = 0.888[10.5(25) + 6(0) + 10.5(50) + 7.5(34)] = 925.74\ kg$$

- Total

$$W_{Slab} = 1140.192 + 925.74 = \mathbf{2065.932\ kg}$$

S-2(B) $\quad L_V = 2300 < L_H = 4500$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

- $d_V = 12$

$$W_{D(V)} \sum L_{M(V)} Qty_{M(V)} = 0.888[10.5(34) + 6(0) + 6(95) + 6(0) + 9(15)] = 943.056\ kg$$

- $d_H = 12$

$$W_{D(H)} \sum L_{M(H)} Qty_{M(H)} = 0.888[10.5(20) + 6(0) + 10.5(35) + 7.5(24)] = 672.66\ kg$$

- Total

$$W_{Slab} = 943.056 + 672.66 = \mathbf{1615.716\ kg}$$

S-3 $L_V = 3800 > L_H = 1575$

SLAB SCHEDULE

SLAB MARK	THICKNESS	REBAR SPACING ALONG SHORT DIRECTION							REBAR SPACING ALONG LONG DIRECTION							REMARK
		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		SIZE (Dia.)	EXT. SUPP.		MIDSPAN		INT. SUPP.		
			TOP	BOTT.	TOP	BOTT.	TOP	BOTT.		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	
S-1	100	12				250			12				190			2-WAY
S-2	100	12				200			12				150			2-WAY
S-3	100	10				250			12				250			1-WAY

- $d_V = 10$

$$W_{D(V)} \sum L_{M(V)} Qty_{M(V)} = 0.616[9(6) + 6(0) + 6(0) + 6(0)] = 33.264\ kg$$

- $d_H = 12$

$$W_{D(H)} \sum L_{M(H)} Qty_{M(H)} = 0.888[12(2) + 6(0) + 6(7) + 6(0) + 10.5(1)] = 67.932\ kg$$

- Total

$$W_{Slab} = 33.264 + 67.932 = \mathbf{101.196\ kg}$$

12. The program will determine the labor price of the reinforcement

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

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:

S-1(C)

$$Price_{Labor} = 2065.932 \cdot 16 = ₱\ \mathbf{33054.912}$$

S-2(B)

$$Price_{Labor} = 1615.716 \cdot 16 = ₱\ \mathbf{25851.456}$$

S-3

$$Price_{Labor} = 101.196 \cdot 16 = ₱\ \mathbf{1619.136}$$