



## 1 Using Group Layering

The Group Layering Option within CADS RC can be used to differentiate between the reinforcement placed in the top, bottom, near face or far face of the structure by easily placing the bars, ranges, bar runs and bar labels etc. on different associated AutoCAD layers. For instance, the top reinforcement could be shown with a dashed line and then the bottom reinforcement could be shown with a continuous line.

### 1.1 Group Layering Customisation and Configuration

The major benefit of the GLO (Group Layering Option) is that the drawing can be presented to show only the top or bottom reinforcement bars for instance, or just the bars associated with a particular layer group such as T2 layer. The member titles of the concrete structure can be sub-divided to match the GLO; i.e. Member Titles can be set-up as Top Steel Slab, or Bottom Steel Slab.

Initially this workbook describes which files are used by GLO, their locations and how to customise the files to suit your requirements.

After this a worked example describes how to use GLO to place reinforcement on a slab in the top and bottom layers, how to display the required reinforcement.

#### 1.1.1 GLO Filenames and their default locations

There are two files that control the GLO;

RCGRPLAY.GLO

This document is a text file that allows you to select the appropriate reinforcement group. The default location of this file on a standalone installation is "C:\Program Files\CADS\AutoCAD 2016\CADS RC 2016.0\CADS-RC\params" for installation of CADS RC 2016 with AutoCAD 2016.

RC-LAY.TXT

This is the layer definition file for CADS RC. If CADS RC needs to place an entity on a layer that does not exist it will refer to the RC-LAY.TXT to create the file. The default location of this file on a standalone installation is "C:\Program Files\CADS\AutoCAD 2016\CADS RC 2016.0\CADS-RC\params".

## 1.1.2 Customising the Group Layering File (GLO)

The RCGRPLAY.GLO file is a text file and can be edited using either WordPad or NotePad. As this file is located in a "C:\program files" sub-folder which is protected you will need to save the file in alternative location such as your desktop or documents folder and then manually copy the file into its original location. Remember to save the file as a TXT file. We would also suggest that you save it to an alternative filename with the same GLO extension, this will prevent your customisation being overwritten on the next upgrade of CADS RC. You can configure CADS RC to use alternative GLO files, this is covered later.

Extract from default RCGRPLAY.GLO file for T1 Group Layers

The extract below only shows the T1 Group Layers.

```
[ G.L.O] ; Screen Menu Title (no longer supported by AutoCAD)
[-----] ; Blank Line under the title
[ T1/N1] ; Group Name
Rebars BarT1 ; Reinforcement Bars T1 layer
Centre colour Cyan ; Bar plot line colour
Profile colour White ; Bar profile colour
Bar run BarT1 ; Bars in Section Layer
Bar section BarT1 ; Single Bar in Section Layer
Ticks BarT1 ; Bar Ticks Layer
Label TxtT1 ; Bar Labels T1 layer
Range Line TxtT1 ; Range Line Layer
End Marker TxtT1 ; Range End Marker Layer
Bar Refs TxtT1 ; Bar Mark Reference Layer
Range Refs TxtT1 ; Range Text Layer
Range Dots TxtT1 ; Range Dot Layer, between range and bar
Range Intermid TxtT1 ; Layer for lines between range lines in multiple ranges
RC Leader TxtT1 ; Leader Layer
Tags TxtT1 ; Bar Tags Layer
Tags Text TxtT1 ; Bar Tag Text Layer
Tension Symbol BarT1 ; Tension Coupler Symbol Layer
Compression Symbol BarT1 ; Compression Coupler Symbol Layer
Thread Symbol BarT1 ; Coupler Thread Symbol Layer
Coupler Txt TxtT1 ; Coupler Text Layer
```

As you can see from the above extract CADS ship the GLO set-up with the T1 Layer configured to use only two AutoCAD layers. You may wish to expand the number of layers the option uses. If you



introduce new layer names, as shown in the example below, these will have to be add to the RC-LAY.TXT file, customisation of this file covered in the next section.

Shown in figure 1.1 is a sample RC drawing with each CADS RC graphic annotated with the name shown in the RCGRPLAY.GLO file.

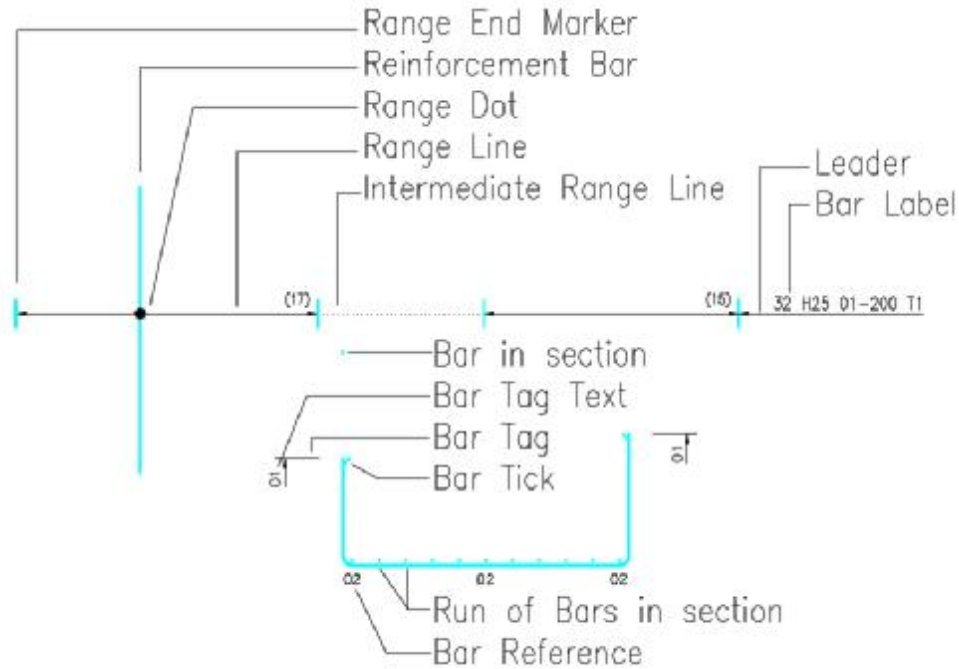


Figure 1.1 CADS RC Graphics Definition

Extract from a customised RCGRPLAY.GLO file for T1 Group Layers

The extract below only shows the T1 Group Layers, if you decide to change the layers you will have to add new layer names to all the Groups. Extra groups can be added by copying a previous group and renaming the Group Name and their associated layers, these then need adding to the RC-LAY.TXT file.

[ G.L.O]		; Screen Menu Title
[-----]		; Blank Line under the title
[ T1/N1]		; Group Name
Rebars	BarT1	; Reinforcement Bars T1 layer
Centre colour	Cyan	; Bar plot line colour
Profile colour	White	; Bar profile colour
Bar run	BarRunT1	; Bars in Section Layer
Bar section	BarRunT1	; Single Bar in Section Layer
Ticks	BarTickT1	; Bar Ticks Layer
Label	BarLbIT1	; Bar Labels T1 layer
Range Line	RangeT1	; Range Line Layer
End Marker	EndMarkT1	; Range End Marker Layer
Bar Refs	BarRefT1	; Bar Mark Reference Layer

Range Refs	RangeRefT1	; Range Text Layer
Range Dots	RangeDotT1	; Range Dot Layer, between range and bar
Range Intermid	RangeIntTxtT1	;Layer for lines between range lines in multiple ;ranges
RC Leader	LeaderT1	; Leader Layer
Tags	BarTagT1	; Bar Tags Layer
Tags Text	TagsTxtT1	; Bar Tag Text Layer
Tension Symbol	TensionT1	; Tension Coupler Symbol Layer
Compression Symbol	SymbolT1	; Compression Coupler Symbol Layer
Thread Symbol	ThreadT1	; Coupler Thread Symbol Layer
Coupler Txt	CoupTxtT1	; Coupler Text Layer

The extract above has added 16 layers to the T1/N1 Group, these will need to be added to the layer creation file RC-LAY.TXT, this is described below.

### 1.1.3 Customising the Layer Definition file

The RC-LAY.TXT file is a text file and it can be edited using either WordPad or NotePad. As this file is located in a "C:\program files" sub-folder which is protected you will need to save the file in alternative location such as your desktop or documents folder and then manually copy the file into its original location. Remember to save the file as a TXT file. We would also suggest that you save it to an alternative filename with the same TXT extension, this will prevent your customisation being overwritten on the next upgrade of CADS RC. You can configure CADS RC to use alternative layer creation files.

Extract from Default RC-LAY.TXT File for T1 Group Layers

```
;-----
BarT1           ; Reinforcement Bar Layer etc.
Continuous     ; Linetype
Cyan           ; Colour
;-----
TxtT1          ; Reinforcement Label Layer etc.
Continuous     ; Linetype
White          ; Colour
```

The above extract of the default RC-LAY.TXT file shows the layers, linetypes and colours used in the default RCGRPLAY.GLO file for Layer Group T1. If you have expanded the number of layers that the GLO option uses, as shown in the Customised Extract above, you will need to add the new layer names, as shown in the example below, to the RC-LAY.TXT file.

Extract from Customised RC-LAY.TXT File for T1 Group Layers

```
BarT1           ; Reinforcement Bars T1 layer
```



```

3mmHidden      ; Linetype
Cyan           ; Colour
;-----
BarRunT1       ; Run of Bars in Section & Single Bar in Section
; Layer
Continuous     ; Linetype
Cyan           ; Colour
;-----
BarTickT1      ; Bar Ticks Layer
Continuous     ; Linetype
Cyan           ; Colour
;-----
BarLbIT1       ; Bar Labels T1 layer
Continuous     ; Linetype
Yellow         ; Colour
;-----
RangeT1        ; Range Line Layer
Continuous     ; Linetype
White          ; Colour
;-----
EndMarkT1      ; Range End Marker Layer
Continuous     ; Linetype
Cyan           ; Colour
;-----
BarRefT1       ; Bar Mark Reference Layer
Continuous     ; Linetype
White          ; Colour
;-----
RangeRefT1     ; Range Text Layer
Continuous     ; Linetype
White          ; Colour
;-----
RangeDotT1     ; Range Dot Layer, between range and bar
Continuous     ; Linetype
White          ; Colour
;-----
RangeIntTxtT1 ; Layer for lines between range lines in multiple
; ranges
Continuous     ; Linetype
White          ; Colour
;-----
LeaderT1       ; Leader Layer
Continuous     ; Linetype
White          ; Colour
;-----
BarTagT1       ; Bar Tags Layer
Continuous     ; Linetype
White          ; Colour
;-----
TagsTxtT1      ; Bar Tag Text Layer

```

```

Continuous      ; Linetype
White           ; Colour
;-----
TensionT1      ; Tension Coupler Symbol Layer
Continuous     ; Linetype
White          ; Colour
;-----
SymbolT1       ; Compression Coupler Symbol Layer
Continuous     ; Linetype
White          ; Colour
;-----
ThreadT1       ; Coupler Thread Symbol Layer
Continuous     ; Linetype
White          ; Colour
;-----
CoupTxtT1      ; Coupler Text Layer
Continuous     ; Linetype
White          ; Colour

```

### 1.1.4 Configuring the Customised GLO Files and turning on the Group Layering Option

If you have customised and renamed the GLO & Layer Creation files discussed above, you will need to reconfigure CADs-RC to use these new files.

Load CADs RC from your desktop

From the CADs RC Ribbon click on the Configuration Centre, select the Miscellaneous Configuration and then pick the More Miscellaneous Configuration button, shown in figure 1.3 below.

To reconfigure the Group Layering and Layer Definition Files, pick on their respective buttons and browse to the directory where you have stored the customised files. Select the appropriate filename and then pick OK.

Pick Ok from the Second Miscellaneous Configuration Dialogue Box to return to the original Miscellaneous Configuration Dialogue Box.

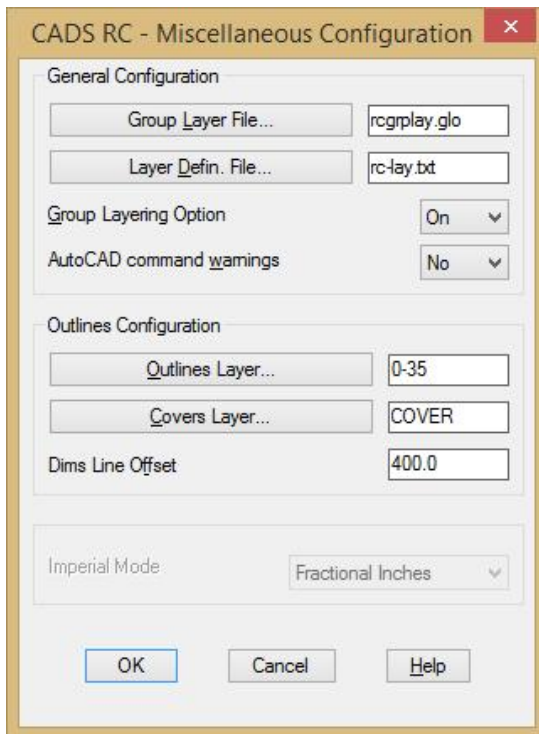


Figure 1.2 More Miscellaneous Configuration Dialogue Box

If you are going to use the Group Layering Option for all new drawings you will need to save the changes you have made to CADs-RC, this is achieved by Writing Prototype Settings. Pick the option Write Prototype Settings, this creates a \*.ini file for CADs RC, the file is saved in your "C:\ProgramData\CADs\AutoCAD 2016\CADs RC 2016.0\CADs-RC\Params" folder.

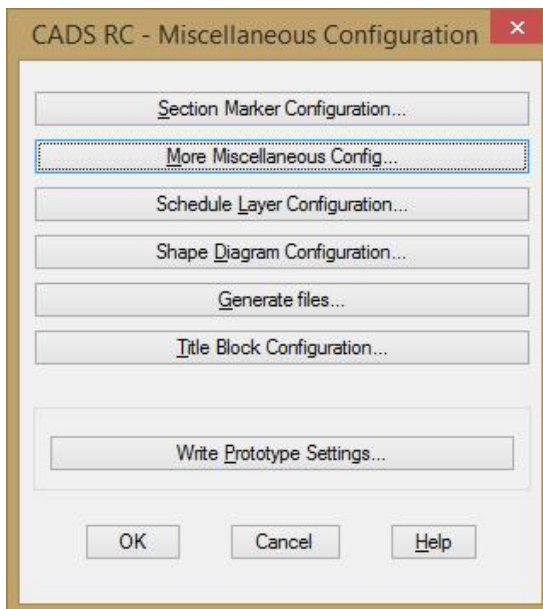


Figure 1.3 Miscellaneous Configuration Dialogue Box

When you start a new drawing CADs RC will automatic read the configuration settings stored in the INI file.

## 1.2 Detailing and Editing Using GLO CADS RC 2016

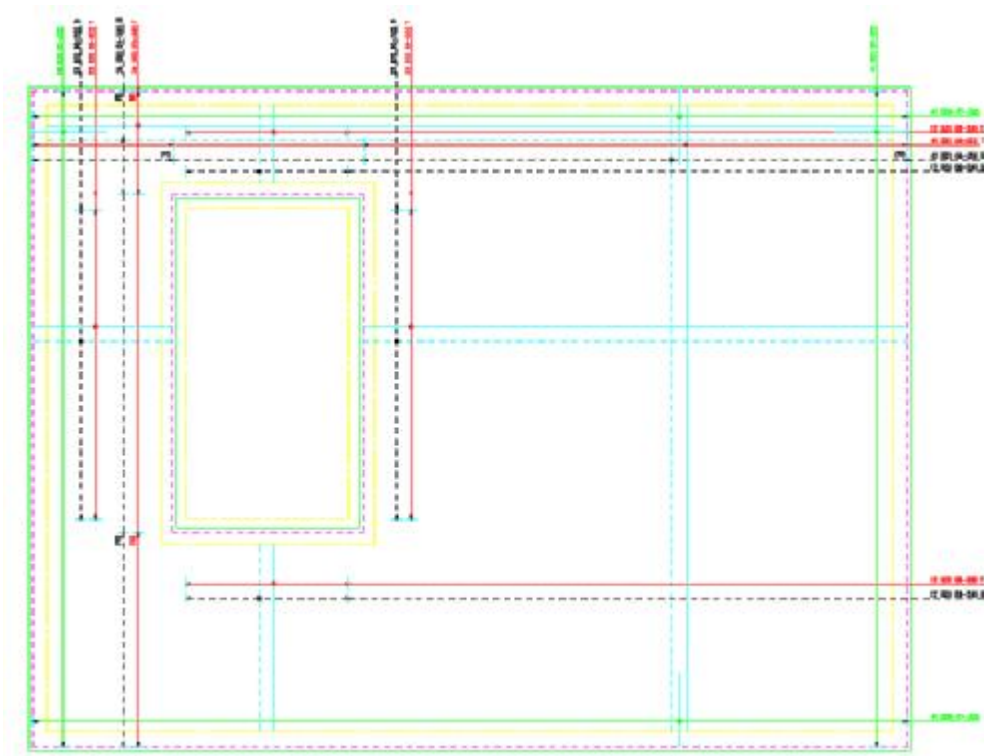


Figure 1.4 Finished Reinforced Slab Drawing

To help illustrate how to use the Group Layering Option you are going to add several bars to a general arrangement drawing of a simple slab with a stairwell. You will split the reinforcement into three Releases, 1 - Top-steel, 2 - Bottom-steel and 3 - Side-steel. As you place the steel in each location you will type in the appropriate GLO Option, T1, B1 or Section. The Reinforcement layers have already been created on this drawing and their properties edited to show top steel as a continuous line, section/side steel as a chain line and bottom steel as a hidden line.

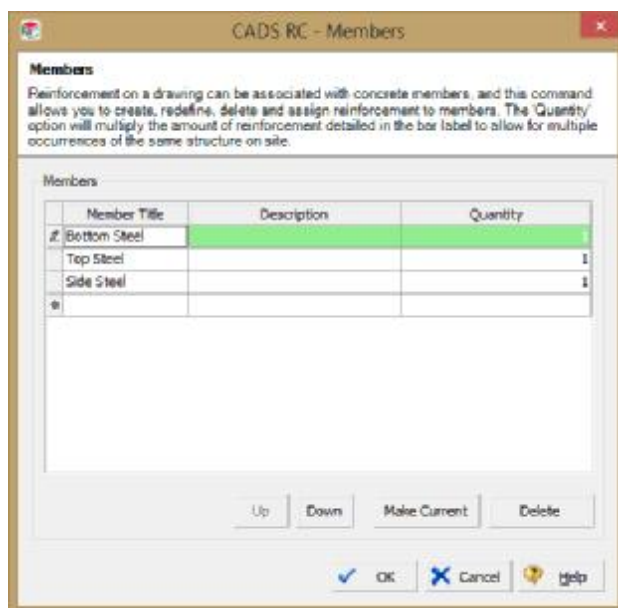


Figure 1.5 Releases Dialog



Open drawing CADS RC GLO1.DWG or CADS RC GLO1.DWG which has been included on the email /download of with this tutorial. Make sure that the CADS-RC GLO is switched on. If you are unsure how to do this look at the previous chapter.

Next, create the following member titles Top-steel, Bottom-steel and Section-steel. Make the member title Bottom-steel the current member.

Delete the general arrangement dimensions.

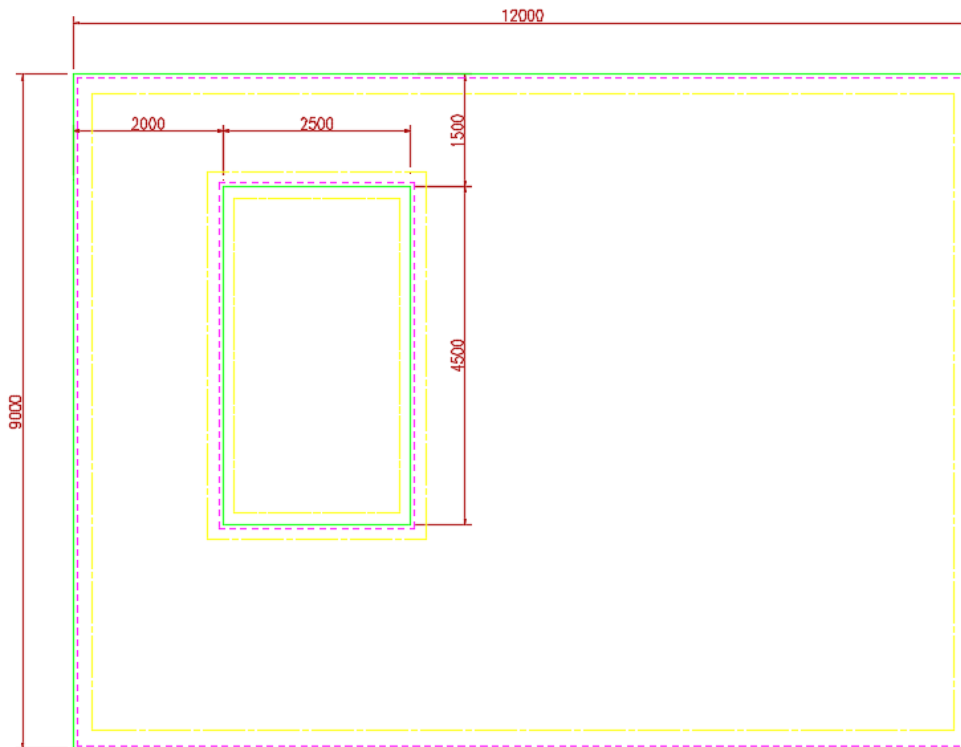


Figure 1.6 General Arrangement Drawing

Initially, you will place the steel on the bottom layer using GLO on member title Bottom-steel, then you will copy the ranges, bars and labels to the top layer using GLO and change the member title to Top-steel using the RC edit routines.

SET ONE (horizontal bar, vertical range line)

CADS RC – Detail Panel – Set Release 

Make Release 1 – Bottom Steel the current Release

CADS RC – Draw Range – New Mark 

Type Group Layer or 'I' to Ignore: Type B1

Choose Single Fixed Pitch Range.

Choose Shape Code 00,

Grade B, diameter 20, 200 c/c and B in the notes.

Draw the bar horizontally from the left to the right, as shown in Figure 1.7.

The range is placed from the top cover line to the bottom cover line, it will also take into account the stairwell opening, as shown in Figure 1.7.

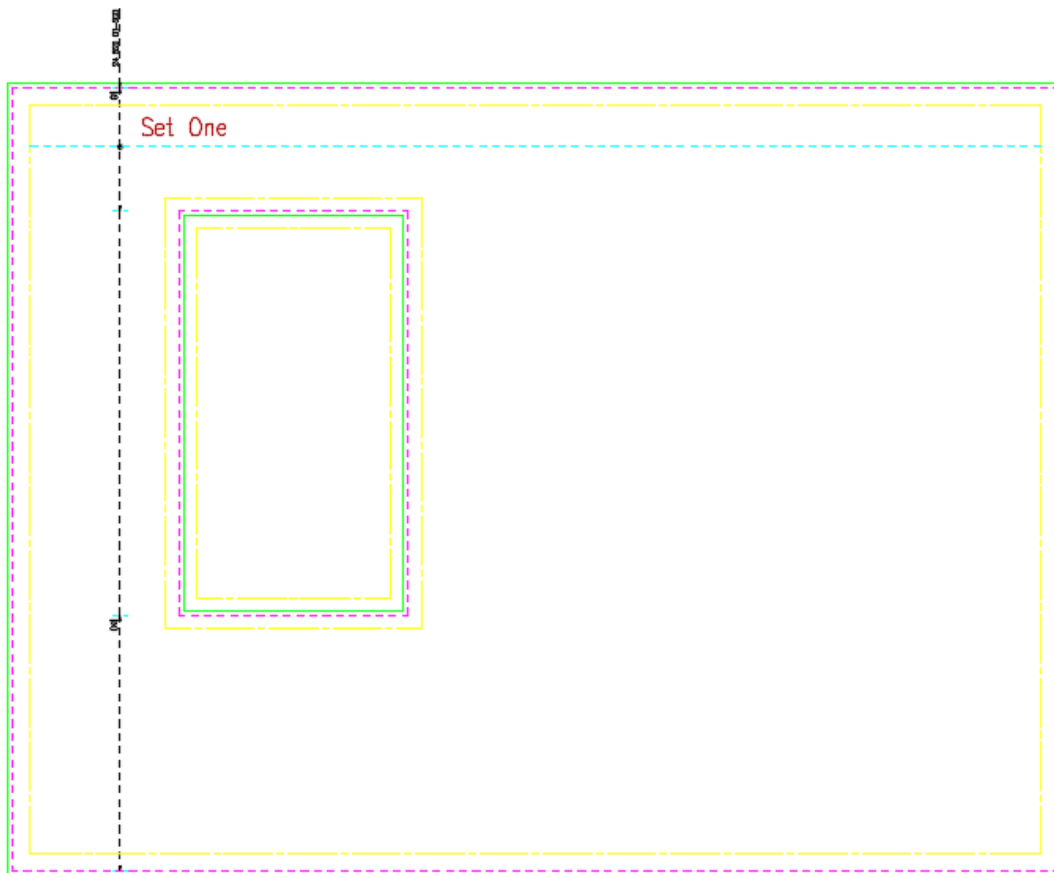


Figure 1.7 Slab with first Set of Bottom Bar and Range.

Continue and add the rest of the reinforcement to the bottom layer as detailed below and shown in figure 1.7.

SET TWO (horizontal bar, vertical range line)

GLO B1/F1, Single Indicator Range, Shape code0, Grade A615M/420, #22, 200c/c and B in notes

SET THREE (horizontal bar, vertical range line)

GLO B1/F1, Single Indicator Range, Shape Code0, Grade A615M/420, #22, 200c/c and B in notes

SET FOUR (vertical bar, horizontal range line)

GLO B1/F1, Single Fixed Pitch Range, Shape Code0, Grade A615M/420, #22, 200c/c and B in notes

SET FIVE (vertical bar, horizontal range line)

GLO B1/F1, Single Indicator Range, Shape Code 0, Grade A615M/420, #22, 200c/c and B in notes

SET SIX (vertical bar, horizontal range line)

GLO B1/F1, Single Indicator Range, Shape Code 0, Grade A615M/420, #22, 200c/c and B in notes

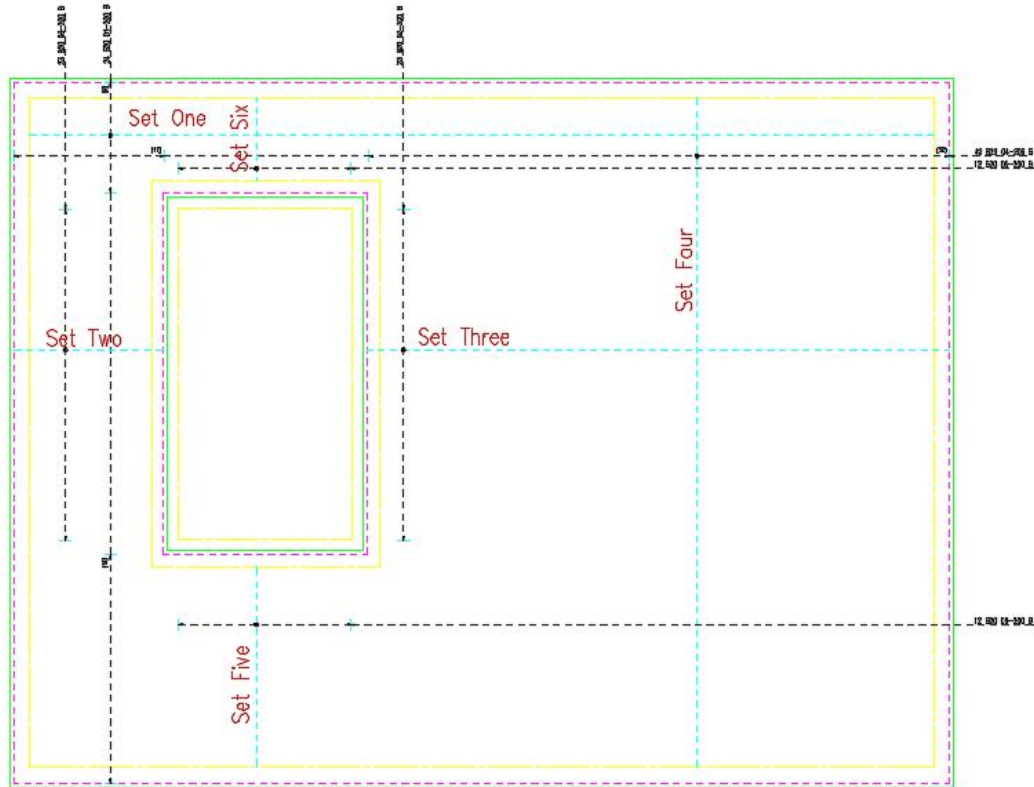


Figure 1.8 Reinforcement drawing showing bottom steel

The following describes how to copy the bar sets you have just created, move them off to one side of the drawing, change the member title and the group layer. You will also need to move the bars and ranges so that they do not clash with the bottom steel when you move them back on to the main drawing. You will also be instructed to use Bar Label Edit in Multiple mode to change the note from B to T.

### 1.2.1 Placing the Reinforcement in the Top Face of the Structure

Next you are going to copy all the ranges and bars you have just drawn and place them 20m to the right, so that you can edit the information easily.

If in Layout Space switch to Model Space

You can get CADS RC to make a selection set of all the RC entities on the drawing using the Select Bars command.

CADS RC – Utilities – Select Bars 

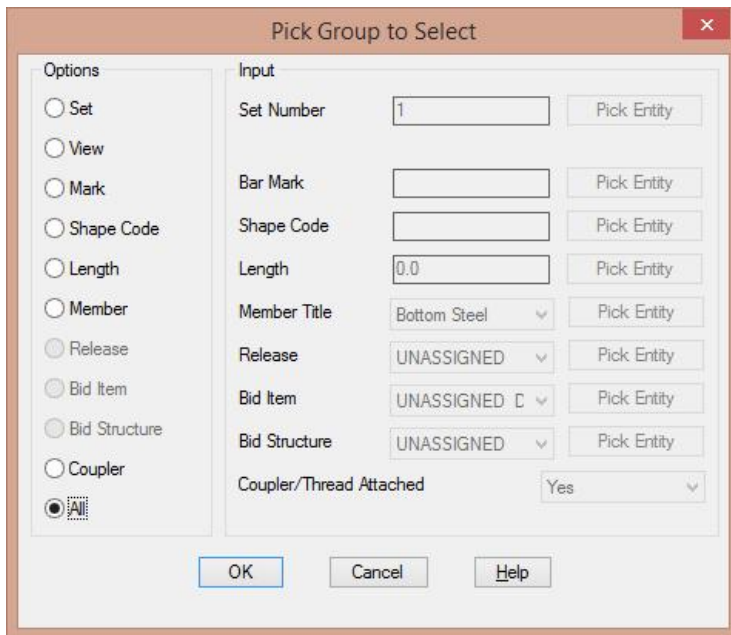


Figure 1.9 Select Bars dialog

Tick the All option and pick Ok

Then pick the AutoCAD Copy command – COPY BARS – SET

At the Select Objects prompt type P for previous selection set and press enter twice

Base Point: Choose bottom left corner of the slab.

Second Point of displacement: @20000,0

Now change the member title of the copied bars and ranges to Top-steel.

CADS RC – Editing – Assign Bars to Member Title – TOP-STEEL

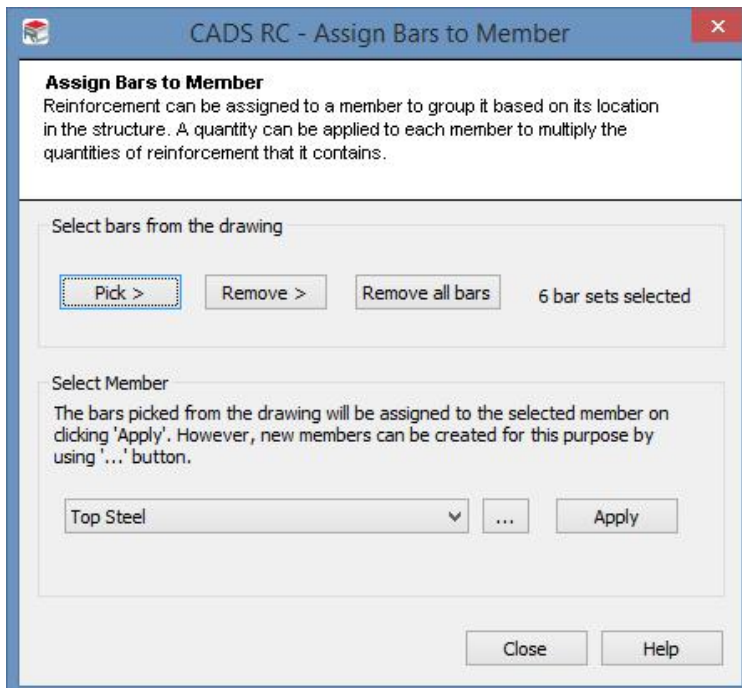


Figure 1.10 Assign Bars to Release dialog

Next move the ranges and bars to the Top Steel Layers using GLO

CADS RC – Utilities – Group Layering – Change to Other Group 

Type - T1

Notice how the bars change from broken lines to continuous lines coloured red.

Now change all the notes attached to the label from B to T using Bar Label Edit in Multiple Mode.

CADS RC – Editing – BAR LABEL EDIT

Pick bar/label to edit or <ENTER> for multiple selection: Press enter

Select items to edit globally: Pick each of the labels and then press enter, change the note from B to T.

To ensure that the bars, labels and the ranges do not overlay each other when you place the top steel entities back into the drawing, you will need to move horizontal entities down by 200mm and vertical entities 200mm to the left.

Once you have realigned the bars, ranges and labels, place the whole lot back onto the drawing by moving @-20000,0.

The drawing so far should look something like figure 1.10.

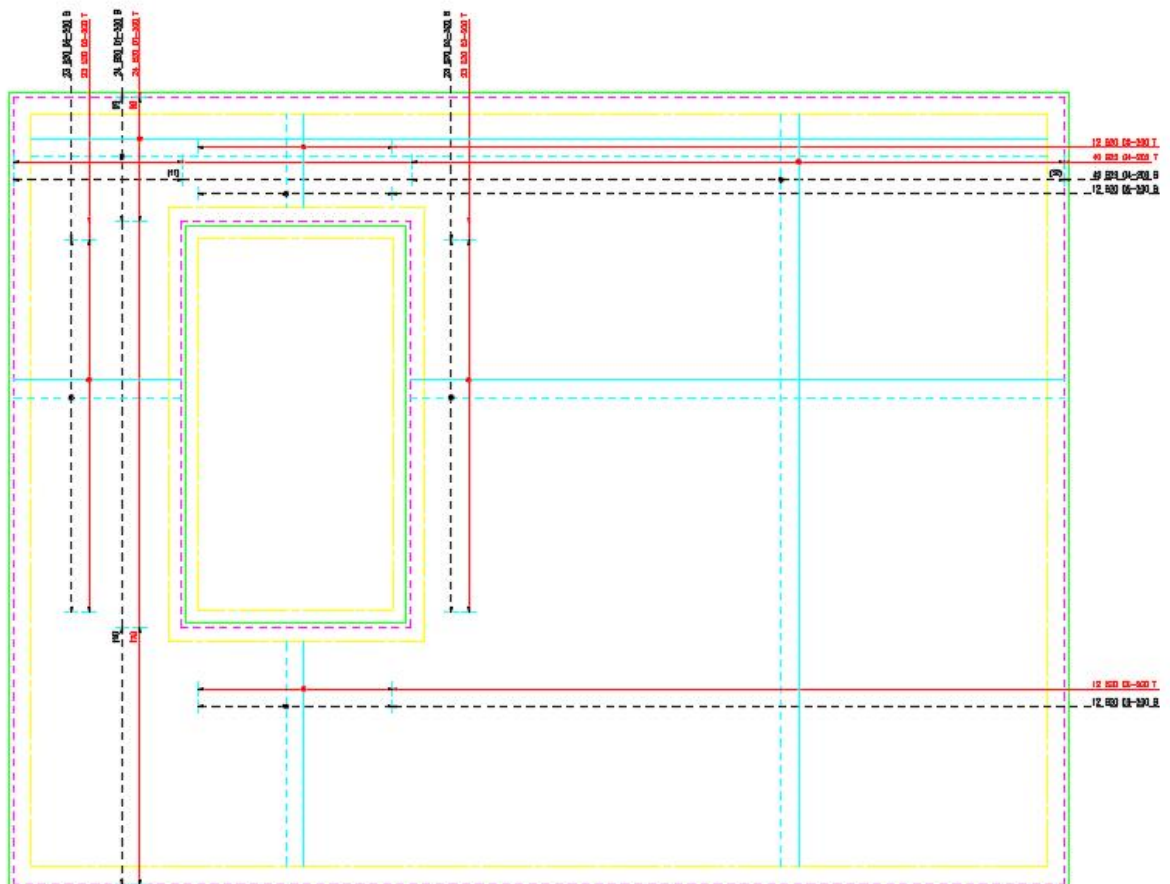


Figure 1.11 Reinforcement drawing showing the Top and Bottom Steel

Finally, you are going to add the side steel to the plan on member title 'Side-steel' and Group Layer 'Section'.

CADS RC – Draw Bar – Set Member Title

Pick the member title – 'Side Steel'

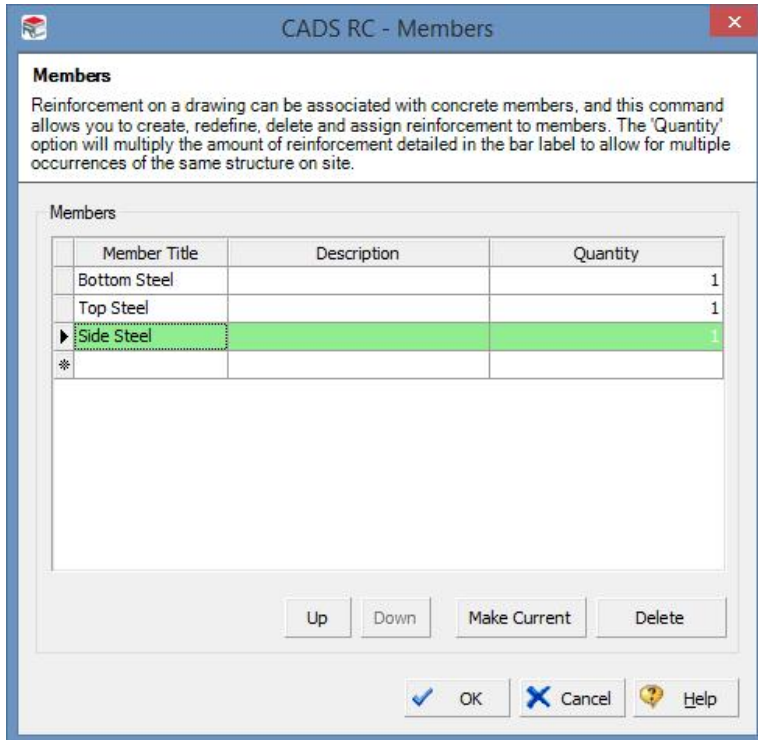


Figure 1.12 Set Member Title dialog

## 1.2.2 Placing the Reinforcement in the Side of the Structure

The next bar to be added is a horizontally placed Shape Code 17 with the 'B' leg lapping with the Shape Code 0 of Set One. When prompted for the lap type pick Tension Anchorage. This range and bar is then mirrored using Copy Bars to the right-hand side of the slab.

After this a vertically placed Shape Code 17 of the same bar mark number needs to be added lapping with the Shape Code 0 of Set Four. Again tension anchorage lap and mirror the bar and range to the bottom of the slab.

See Figure 1.11 for details.

CADS RC – Draw Range – New Mark

Type in Section for the GLO.

Single Indicator Range, Shape Code 21, Type B, 20mm dia, 200c/c, left view, leg B lapping with Set One, tension anchorage lap. Make the B dimension 350mm; you will edit the bar set later to make Leg D the same as Leg A.

AutoCAD Copy – NEW SET

Mirror the Shape Code 17, its label and range line to the right hand side of the slab.

CADS RC – Draw Range – New Set

Type in Section for the GLO.

Leg A lapping with Set Four, edit the dimensions and add the missing Leg C dimension, which is the same as Leg A.

AutoCAD Mirror - NEW SET

Mirror the vertical Shape Code 17, its label and range line to the bottom of the slab.

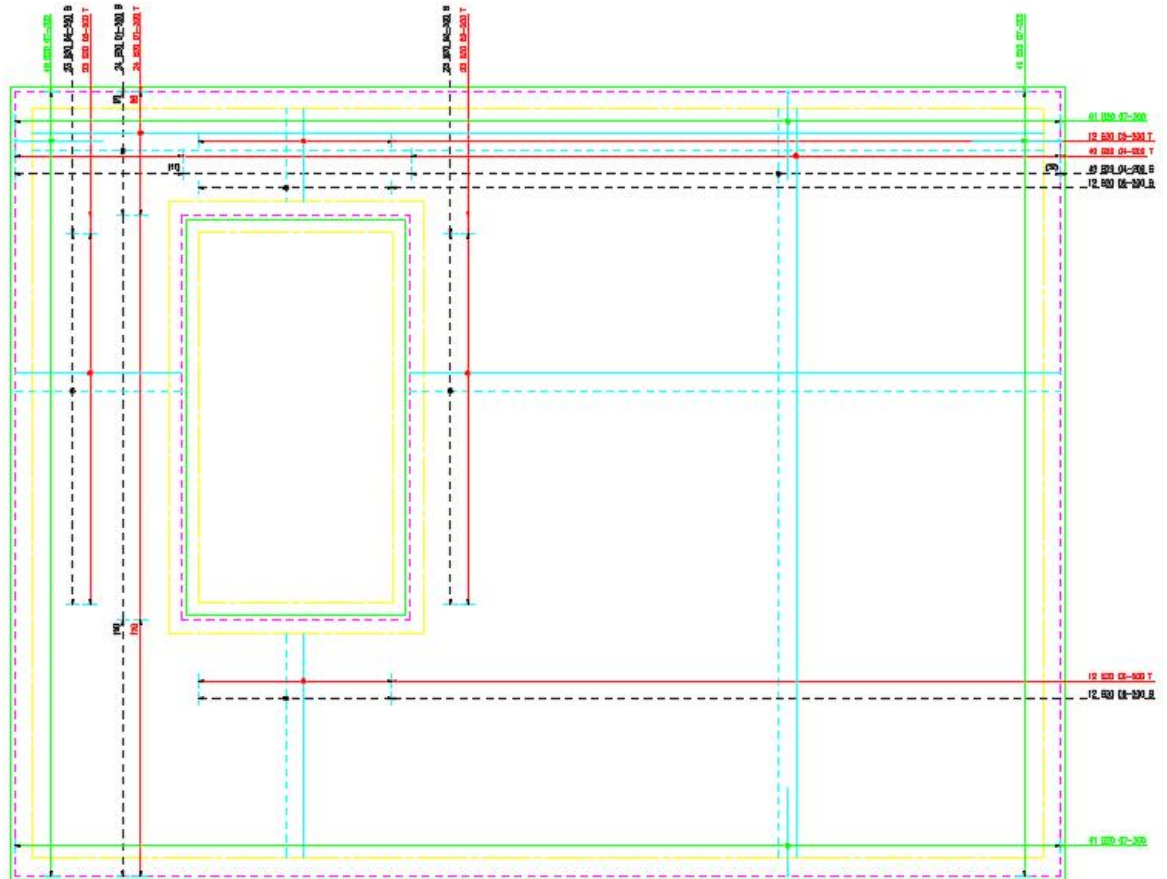


Figure 1.13 Reinforcement Drawing showing the Top, Bottom and Side Steel



Member	Bar Mark	Type & Size	No. of Members	No. of Bars in Each	Total No. Bars	Bar Length	Shape Code	A	B	C	D	DIR	Reinforcement
Bottom Steel	01	R20	1	24	24	11500	30		11500				
	02	R20	1	23	23	7400	30		7400				
	03	R20	1	23	23	1900	30		1900				
	04	R20	1	49	49	8000	30		8000				
	05	R20	1	12	12	1650	30		1650				
	06	R20	1	12	12	2550	30		2550				
Side Steel	07	R20	1	48	48	2250	21		1000	358	1800		
	08	R20	1	48	48	2250	21		1100	358	1800		
	09	R20	1	61	61	2250	21		1000	358	1800		
	10	R20	1	61	61	2100	21		1000	358	1800		
Top Steel	04	R20	1	24	24	11500	30		11500				
	02	R20	1	23	23	7100	30		7100				
	03	R20	1	23	23	1900	30		1900				
	04	R20	1	49	49	8000	30		8000				
	05	R20	1	12	12	1650	30		1650				
	06	R20	1	12	12	2550	30		2550				

Figure 1.14 Completed Bar List, Unformatted

## 1.3 Displaying Different Groups

You have added enough bars to the drawing to start using the display options inside the Group Layering Option.

Open drawing CADS RC GLO-2.dwg or if you prefer keep CADS RC GLO-1.dwg open; this is the drawing you have added the reinforcement to.

The Toolbar Icon, command line input, side screen option and pull down menu path are shown for the Group Layering Display functions below.

### 1.3.1 Show Group Only

This command will show only the group typed in at the AutoCAD command line, any other groups will be automatically turned off. This is useful for preparing a drawing for plotting where you only require the picked layer to be plotted.

Pull Down Menu      CADS RC – Group Layering – Show Group Only

Command Line      type in 'cads\_rc\_show\_one\_glo'

Toolbar



Pick one of the top bars

Only the top bars with the continuous line are shown.

In this tutorial the GLO has been used in combination with different releases, so that you can plot a drawing with only the top steel and issue a schedule sheet showing the top steel only.



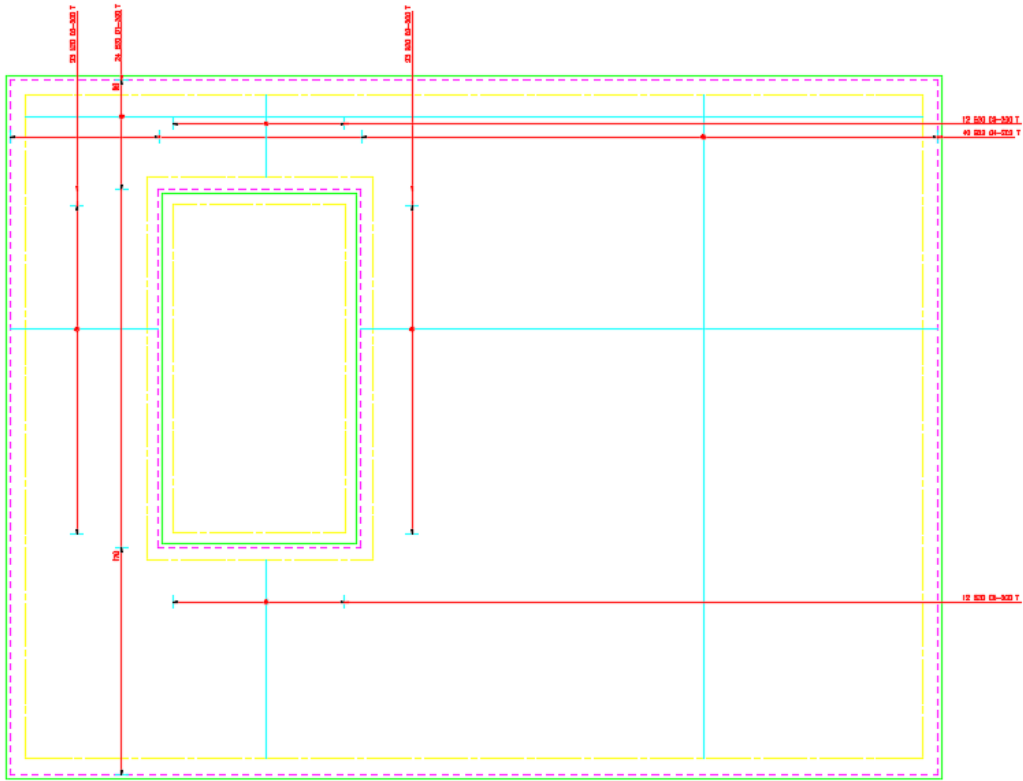


Figure 1.15 Drawing showing top steel only

### 1.3.2 Show Group

This command allows you to turn on a group by picking it from the side menu. You can use this command to turn on as many groups as you wish.

Pull Down Menu      CADS RC – Group Layering – Show Group

Command Line      type in 'cads\_rc\_show\_glo'

Toolbar      

Pick the B1/F1 option from the side screen menu.

The drawing now shows the bottom steel as well as the top steel.

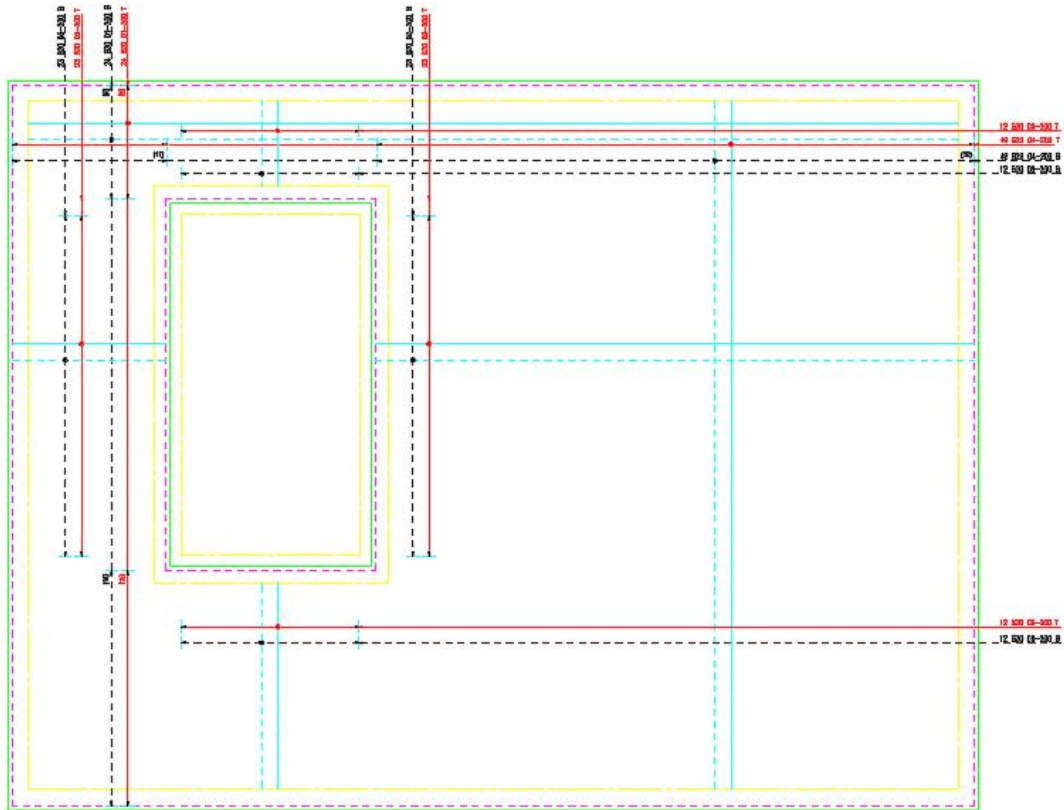


Figure 1.16 Reinforcement Drawing Showing Top & Bottom Steel

### 1.3.3 Show All Groups

This command turns on all the group layers on the reinforcement drawing.

Pull Down Menu CADS RC – Group Layering – Show All Groups

Command Line type in 'cads\_rc\_show\_glo A'

Toolbar



### 1.3.4 Suppress Group Only

This command turns off the group picked from the side screen menu and turns all other groups on.

Pull Down Menu CADS RC – Group Layering – Suppress Group Only


Command Line type in 'cads\_rc\_!show\_one\_glo'

Toolbar




### 1.3.5 Suppress Group

This command turns off the group picked from the side screen menu.

Pull Down Menu CADS RC – Group Layering – Suppress Group Only  
Command Line type in 'cads\_rc\_!show\_glo'  
Toolbar 

### 1.3.6 Suppress All Groups


This command turns off all the groups.

Pull Down Menu CADS RC – Group Layering – Suppress Group Only  
Command Line type in 'cads\_rc\_show\_one\_glo N'  
Toolbar 

### 1.3.7 Change to Another Group

You have you used this command earlier in the tutorial to change the copied bar sets from the bottom to the top group.

The command allows you to change the RC entities on one group layer to another group layer. It simply requires you to select the RC entities you wish to change, and then pick the group you wish to change them to from the side screen menu. CADS RC will redraw the selected entities on their new group layer.

Pull Down Menu CADS RC – Group Layering – Suppress Group Only  
Command Line type in 'cads\_rc\_change\_glo'  
Toolbar 

## 1.4 Group Layering and Non-RC Entities

The GLO facilities are designed to work specifically with bar views and their associated components, however, there is no reason why any object cannot be drawn on one of the group layers so that it can be turned on or off with the group. At present other CADS RC objects such as outlines are drawn according to their configured layers, and the GLO does not over-ride these settings. If you want such objects on one group layer, then you will need to change the object's layer.